Virginia Board of Housing and Community Development
CODE AND STANDARDS COMMITTEE
2021 CODE CHANGE CYCLE – BOOK 2, PART 3
October 3, 2022

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General Stakeholders Workgroup Meeting Summaries

General Stakeholder Workgroup Meeting

March 1, 2022 9:00 a.m. – 11:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VCC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Group Participants:

Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
David Beahm: *Warren County*
Kenney Payne: *Representing himself*
Kerry Sutton: *American Concrete Institute (ACI)*
Oleg Bulshteyn: *Representing himself (as a renter in VA) author of proposal B1206.2*
Peter Broadbent: *Virginia Cable Telecommunications Association (VCTA)*
Robby Dawson: *National Fire Protection Association (NFPA)*
Ron Clements: *Chesterfield Building Official*
Scott Lang: *Honeywell Fire*
Sean Farrell: *Prince William County (also VBCOA) BHCD member, but not representing BHCD*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Also in Attendance:

Nolie Diakoulas: *Convert Solar*
Richard Roberts: *Honeywell*

Welcome:

Paul Messplay: Gave a brief tutorial about how to use the Adobe Connect meeting space features.
Jeff Brown: Welcomed the participants to the VCC Workgroup meeting, and gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Discussion covered the following points:

- DHCD staff introduced themselves.
- The 2021 code development cycle and Study Group, Sub-Workgroup and General Workgroup meeting flow summaries.
- The most notable change from prior years is that proposals will only be accepted during the proposal phase, but not during the final phase.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, disapproval, non-consensus, carry over, and withdrawn.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.
- The agendas with proposals are sent out a few weeks in advance of the meetings for individuals to review the information prior to the meetings. It is recommended that interested parties review and discuss proposals with proponents prior to meetings, in order to keep the meetings moving along to the voting phase.

Kenny Payne: Asked if Jeff will give the same introduction and summary at each Workgroup meeting.
Jeff: Yes, at least for the first cycle of meetings in March.
Participants introduced themselves, and who they were representing.

Proposals:

Jeff: Will introduce each of the proposals. If the proponent is on the call, he will turn the microphone over to them to introduce the proposal.

B310.6-21
Ron Clements: This proposal shortens the trail to get to the scoping requirements for certain residential structures without having to refer to other code books. It deletes the reference to IRC Section 103.4.5 for scoping and puts it into Section 310.6 of the VCC. It also cleans up the language in Section 310.6 to include all of the scoping listed in 310.6.1. Basically, the code was cleaned up to read easier in one location, without reference to other codes.
Kenny: Does VCC 103.4.6 become #5?
Ron: Yes.
Kenny: Proposed consensus for approval.
Sean Farrell: VBCOA supports this proposal in full.
Jeff: Based on group votes, it will be marked as Consensus for Approval.

B432-21
Andrew Milliken: New section for Chapter 4, as a result of a new chapter in IFC for plant processing and extraction facilities. The construction language that was in the new IFC chapter has been removed from the SFPC, leaving no reference to get from the VCC to the IFC. This points back to Chapter 39 of the IFC.
Sean: Typically 307.1.1 references the IFC if it's not H class, for storage battery systems, aerosol product storage, stationary fuel cell power systems, etc. Chapter 4 for special occupancies has other considerations to be reviewed and is usually not a direct link to the IFC. This might fit better in 307. He asked what Andrew and the group members think?

Andrew: There are sections in Chapter 4 for high-piled storage and other requirements. He thinks this could fit in either section, and he doesn't have a preference either way.

Kenny: Is neither for nor against. He doesn't think there is any other chapter or section with just one line or sentence. There's usually more detail, which lends itself more to chapter 3 as Sean said.

Ron: These are not always high hazard, so chapter 4 is appropriate. Perhaps 414 is more appropriate.

Sean: Section 307.1.1 says other than group H, which is where we bring in the direct link to the IFC for all uses that are not group H.

Jeff: Is the intent to capture the facilities that might be in the H use group, and ensure IFC compliance, or is it to capture those that may not be group H, but still have IFC requirements.

Andrew: More likely the latter. In most cases, they are not in H and would fit in the 307.1 scenario.

Kenny: Would it become # 19 in 307.1.1, or might it fit in with another number or as a sub of another number?

Andrew: Typed in the comments box and also verbally proposed to move it to 307.1.1(19)

Jeff: Voting to move to 307.1.1 with the same sentence – installation shall comply with chapter 39 of the IFC.

Sean: If high hazard, it would be captured in 307.1, but if not high hazard, it would be captured in 307.1.1.

Jeff: CAM to move to 307.1.1(19) to reference the IFC for non-H use extraction facilities.

Steve Shapiro: 307.1.1 starts by saying 'stores uses or handles hazardous materials'. Are we implying these plants are hazardous? Items 1-18 are all hazardous.

Andrew: The plants are not hazardous, but the processing and extraction processes contain hazardous materials.

Jeff: If it's moved to #19, it says it is not group H, instead of saying 'where it's not a group H'. Are any of these facilities not to be classified as group H? Typically, the other examples have a limit. Number 1 says that structures occupied for application of flammable finishes, provided that the areas comply with 416 fit here because they are not high hazard.

Sean: Adding a note that says it doesn't exceed MAQ tables would work.

Kenny: Is there any value to bringing in what chapter 39 says? This is just talking about installation, not construction. Or does chapter 39 include construction as well?

Jeff: asked Andrew to clarify the intent.

Andrew: The intent is to capture construction provisions. Most are installation of equipment, and not just construction, but this would encompass both, including chapter 39 construction provisions.

Ron: Looking at 39, he still leans towards…the purpose of 307 is to determine a classification. This section is really about how to handle the equipment and safety and gas-detection systems, regardless of occupancy. He is leaning toward chapter 4 rather than 307. He is not opposed, no matter where it is placed.

Kenny: Last cycle, there was a push to remove as much of the construction requirements from the IFC as possible. If this is involved with construction, would it be appropriate?

Jeff: He thinks its fine to reference IFC, because the building official would use the IFC chapter for the design and instruction of the plant.

Sean: There are exceptions as direct pointers to the IFC, as well as caveats to the MAQ tables, so he does think this section covers the unknowns. To Kenny's point, they didn't remove construction provisions from the IFC, they were removed from the SFPC. Any links to scoping here go to the IFC.

Steve: Agrees with Ron, that Andrew located this correctly in 432. If there were hearings, and this discussion came up, it would be tabled. It seems to need a harder look to identify all of the implications.

Jeff: It's up to Andrew if he wants to leave it in 4, move it to 3, or hold off on the proposal until the next meeting.

Ron: He doesn't see anything in Chapter 39 that prohibits a group H occupancy, so if it's only in 307.1.1 for non-group H facilities, how would someone with a group H extraction facility get to chapter 39?

Kenny: Corrected himself, section 425 has only one sentence pointing to NFPA 99, which is a precedent for this approach.

Sean: He's not opposed to placing it in chapter 4, but he's concerned about setting a precedent that would bring all chapters of the IFC to chapter 4 as special occupancies.

Andrew: He did look at various references, and does not just want to continue adding to chapter 4, but this seems to be unrepresented. He doesn't have a placement preference, but would like to have consensus either way.

Kenny: In the VEBC change of occupancy, there was 1 section that made reference to chapter 4 of the IBC, but the initial version listed the special occupancies in that one section. Would it be appropriate to create a chapter 401.2, which lists things like this in one line item?

Jeff: If the proposal stays as-is, would there be an objection? No responses.

Jeff: Based on group voting, this will be marked as consensus as modified (CAM) to read "design, construction and installation".

{BREAK – 10:18 – 10:23}

B918-21

Jeff: As Richard is still having mic trouble, Scott Lang will present this proposal, which was discussed in the IBEC study group.

Scott: This proposal seeks to reference the new NFPA 1225 (a combination of NFPA 1061 & 1221) and also reference the UL 2524. This would improve the safety and reliability of IBEC systems and set concrete objectives for signal strength within the standard.

Jeff: This was discussed in the IBEC Study group. One proposal coming out of the group will reference the IFC, which in turn references NFPA 1221 and UL 2524. It was decided to reference the IFC and not NFPA 1225 yet, since it's new and not in the IFC yet. Another proposal coming also gives the same references and also addresses responsibility for the systems.

Steve: A comparison was made between NFPA 1221 and NFPA 1225 by one of the study group members. Based on that comparison, there was not a big difference between the versions. It was decided as Jeff said, to reference the IFC and NFPA 1221.

Jeff: Richard Roberts typed in chat that he supports the direction of the Study Group, and Scott and Richard said they would withdraw this proposal.

Jeff: Proposal Withdrawn

B1020.2.1-21

Jeff: This proposal is to remove Section 1020.2.1 of the VCC. It references 3006.2.1 in the VCC which is already deleted.

Sean: This section isn't in the 2018 code.

Jeff: This is in the 2021 IBC and would carry to the VCC if not eliminated.

Kenny: Was there a previous proposal to delete it from the VCC? Could it be that it keeps getting deleted from state and reintroduced by national?

Jeff: That isn't the case here. It seems like this one was relocated from someplace else in the IBC.

Kenny: VCC section 3002.1.1 discusses enclosures as required by chapter 7. There would be a disconnect if 1020.2.1 was left in.

Ron: It looks like this section was added to the 2018 IBC as 1020.1.1 and renumbered. Since 3006.2.1 doesn't exist, it seems like this is an appropriate code change regardless.

Jeff: This proposal is consensus for approval (CA), since there's no opposition.

B1206.2-21

Oleg Bulshteyn: The purpose of this proposal is to improve the sound insulation in multi-family residential buildings. In his experience, and according to his research and reviews, what is there now is not adequate.

He included a document which cited several reviews. The simple language in the proposal says that the sound insulation in floor to ceiling assemblies needs to be increased.

Steve: Is opposed. He doesn't see any science that justifies the specific increase indicated.

Sean: Asked if there was national research done. It doesn't seem that VA is unique. He asked if Oleg tried to get this done at the ICC level.

Oleg: Submitted a proposal to the ICC, but it was after deadline, so it's not in the current update cycle. He knows that some municipalities have more stringent requirements than Virginia. There are thousands of complaints and reviews, and he thinks something needs to be done, as it's a public health issue. He moved into a brand new luxury apartment building in Virginia in 2014. There was too much noise bleeding through into his unit, especially from the unit above his. He says that the noise was so bad that he was forced to move out.

Kenny: Asked if there are any proposals being submitted to the 2024 code cycle? He asked if this could be handled from a zoning standpoint. He asked if Oleg tried to address this via zoning, instead of the building code.

Oleg: He says it's too widespread for that. He said that people who lease don't know what to expect when they move in as far as sound. This has been a major problem. There is substandard multi-family housing in Virginia, and it is not easy for people to move out and find more acceptable housing. If everything is built to the lower standards, there's nowhere for people to move anyway.

Kenny: Asked Oleg if he knows specifically what it would take (materials and installation) and what it would cost to make the change he proposed.

Oleg: He is not a design professional. He is speaking on behalf of himself and others as an end-user. He says he is one voice speaking unofficially on behalf of thousands of others.

Kenny: Asked about the specifics of going to 55 and 60 insulation ratings. How would they know if that increase would solve the problem?

Oleg: Maybe this is a starting point to raise awareness of the issue, to start a discussion. He doesn't know the specific numbers. There could be research done to determine the values.

David Beahm: He said Oleg spoke about sound concerns, and that he also spoke about "things falling off walls". It seems to him that there are two separate issues; one about sound and another about building design. He also wondered if there is another proposal about building design.

Oleg: Does not have a separate proposal for building design. He says this proposal addresses "airborne sound" in 1206.2 (things falling off the walls) and "impact sound" in 1206.3 (floor to ceiling assemblies).

David: Opposes this proposal as it stands.

Kenny: Does Oleg know what the sound was that knocked things off the wall?

Oleg: His major concern is the impact of sound and insulation. He didn't include things falling off walls in the proposal, he only used that as an example in this discussion. In his case, it was mostly the sounds of neighbors located upstairs from him. He said again that the noise caused him to leave his apartment, but there are still many people experiencing too much noise in apartment dwellings.

Jeff: Applauded Oleg as a citizen bringing it forward with no construction experience. He hopes the discussion feedback was helpful. The vote of the Workgroup will be brought forth to the Board of Housing.

Jeff: Asked if anyone on the call would support the proposal?

Jeff: This proposal was voted as CD – consensus for disapproval.

Next Steps:

Jeff: Meeting summaries for all the Workgroups will be posted in cdpVA in a few weeks. The next VCC meeting will be April 2. The cutoff to submit proposals for that meeting is March 11. The final cutoff to submit proposals in this cycle is May 1 – there will be no other proposals accepted after that date. All proposals considered by the Workgroups will tentatively go to the BHCD in September. He thanked everyone for their participation.

General Stakeholder Workgroup Meeting

March 2, 2022 9:00 a.m. – 10:44 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VEBC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Dave Fuller: *International Concrete Repair Institute (ICRI)*
Eric Edelson: *Edelson Consulting Group, American Concrete Institute (ACI)*
Keith Kesner: *CBM Engineers, ACI*
Kenney Payne: *Representing himself*
Kerry Sutton: *American Concrete Institute (ACI)*
Peter Broadbent: *Virginia Cable Telecommunications Association (VCTA)*
Randy Grumbine: *Factory-Built Housing, Virginia Manufactured and Modular Housing Association (VAMMHA)*
Richard Roberts: *Honeywell Senior Manager*
Robby Dawson: *National Fire Protection Association (NFPA)*
Ron Clements: *Chesterfield Building Official*
Sarah Thomas:
Scott Lang: *Honeywell Fire*
Sean Farrell: *Prince William County (also VBCOA) BHCD member, but not representing BHCD*

Welcome:

Paul Messplay: Gave a brief tutorial about how to use the Adobe Connect meeting space features.
Jeff Brown: Welcomed the participants to the VEBC meeting, and gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Discussion covered the following points:

- DHCD staff introduced themselves.
- Overview of the 2021 code development cycle, including Study Group, Sub-Workgroup and General Workgroup meetings.
- The most notable change from prior years is that proposals will only be accepted during the proposal phase, but not during the final phase.
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- Meeting summaries, proposals and voting results will be prepared and provided to the Board of Housing and Community Development.
- The agendas with proposals are sent out a few weeks in advance for individuals to review the information prior to the meetings. It is recommended that interested parties review and discuss proposals with proponents prior to meetings, in order to keep the meetings moving along to the voting phase.

Participants introduced themselves, and who they were representing.

Proposals:

EB102.2.2-21

Ron Clements: Andrew Milliken submitted a code change proposal last cycle to add section 302.2.1 to the existing building code which addresses repair or replacement of smoke alarms. Section 302.3 in the 2018 VEBC has requirements for the repair or replacement of smoke alarms, which would be lost when utilizing the R-5 exception in 102.2.2. Therefore, the language in 302.3 has been copied and added as an exception to 102.2.2 to mitigate this breakdown.

Robby Dawson: Could this allow or imply that a hard-wired interconnected smoke alarm could be replaced with a battery-only device in a house?

Ron: Existing hard-wired devices would still have to be replaced with hard-wired devices.

Richard Roberts: With Honeywell and representing the National Electric Manufacturers Association (NEMA) on this issue, is opposed to requiring solely battery operated smoke alarms that are sealed 10-year batteries. There are published statistics stating that a good percentage of these 10-year batteries aren't working in 10 years. Some of the newer technologies, such as the low frequency 520 hertz audible alarm signal helps to wake more people, including groups at higher risk. NEMA is generally opposed to technology-specific mandates. He would prefer to see "repair or replacement of smoke alarms that are solely battery powered" in order to mandate the use of 10-year batteries.

Kenney Payne: This code change is only here to give clarity, or fill a gap. It does not really make a change. He has a concern that opposition to a change which only corrects an existing code, or fills a gap should not happen in these meetings. A disagreement with the actual code (instead of the clarification) should be brought up in separately. He raised this issue during the last cycle as well, and he would like DHCD to address this point. He also thinks this proposal should move forward, but any opposition to the code itself should be addressed in another proposal.

Jeff: DHCD allows everyone to comment as they see fit. Notes are captured on everything, in order to provide a full and clear picture of the discussion in the summary report given to the Board of Housing and Community Development.

Andrew Milliken: This would not require a hard-wired device to be replaced by a battery operated device.

He agrees with Kenney that the intent is only to fill a gap, not make a change and he doesn't think the content of the code itself should be discussed.

Jeff: To clarify, there was a proposal approved last cycle in another section in the VEBC, which was intended to require 10-year sealed batteries in all battery devices. Ron discovered that it may not have covered all occupancies, and so he is proposing to copy that language here in order to include R-5 occupancies.

Richard: Thanked Kenney and Andrew for pointing out the requirement in the other section. He put a note in the chat:

"A 2015 NFPA Study titled "Smoke Alarms in US Home Fires" reports that 47% of the 601 10-year battery smoke alarms installed in 427 homes had dead batteries."

Sean Farrell: VBCOA supports this. Section R314.6 in the VRC does recognize 10-year battery operated devices.

Kenny: Thinks this may be non-consensus because there was an objection. If the other code section remains, then this one is required to fill a gap. He asked Jeff if everything would be captured in the summary for the BHCD.

Jeff: Yes, notes will be captured from what everyone has said. He did ask Richard to verify if he was in agreement or not in agreement to approve the proposal.

Richard: He won't object, since he doesn't want a broken code. He will bring the information back to NEMA to address in future code updates. He asked again for the original code change and Paul Messplay put a link in the chat box for VEBC 302.3. Kenny and Ron concurred.

Jeff: If Richard can get a proposal submitted before May 1 to address his concern, it can go to the Board at same time as this proposal.

Jeff: Seeing no other objections, this proposal has Consensus for Approval.

EB502.1.1-21

Keith Kesner: This proposal adds a sub-section with a reference to ACI 562, which was intended to provide clear concrete repair guidance. ACI 562 is a consensus document in response to issues with long term durability and performance of repaired concrete structures. This has been adopted as part of the existing building code in several states. It provides guidance to design professionals in evaluation of existing structures and in the design of repairs so that an equivalent level of safety is established in the repaired structure. It is also the first code that requires design professionals to consider durability of repairs and provides clear quality control requirements. It's a flexible document that is consistent with the VEBC. When preparing the proposal, the Applied Technology Council was consulted to ensure that there was no conflict with repairs to the seismic force resisting systems of existing structures.

Eric Edelson: He has repaired structures for more than 40 years. He has done millions of dollars' worth of re-repairs (repairing previously repaired structures). If the designs had been done in accordance with the ACI 562 code, those millions of dollars could have been saved. This is parallel to an engineer designing a new structure in accordance with ACI 318. ACI 562 gives direction to designing repairs. It will save money and repairs will be safer.

Kerry Sutton: Keith and Eric have spoken and their thoughts are representative of thousands in the industry, including the International Concrete Repair Institute, ACI and Virginia Ready Mix Association. The proposal to add this new section, and referencing the ACI 562 standard would be beneficial and complementary to the VEBC. It also assists with meeting the requirements of 102.1 in the existing building code as it provides for cost effective and timely repairs.

Kenney: Asked if this was submitted at the national level for either the 2021 or 2024 cycle?

Kerry: It was submitted for 2021. There were some who opposed (from California), but the opposition was not typical of other states in the country, who support it. She says other states have already adopted this code. It will be resubmitted for 2024.

Kenney: Asked if this goes above and beyond what is required in the 2021 IEBC?

Keith: It is consistent with IEBC, but provides more information on guidance for durability design of repair and evaluation of the existing structure. A majority of the time, the IEBC says that structure should be restored back to the original design code. It doesn't provide assistance with evaluation or repair design, including durability considerations.

Kenney: The reason statement goes into sustainability and durability. Doesn't that by default require more than the IEBC? If this is used, will repairs be required to be more sustainable and durable than they were in the original construction?

Keith: Any repair will be more sustainable and properly designed repairs will be more durable. The language of ACI 562 talks about the establishment of the design service life concept with the owner, and provides guidance on how to do that. There is no discussion of durability in IEBC so the ACI provides additional information to the owner and design professional. It gives the flexibility to go above and beyond, but does not require it.

Kenny: This looks like it would be required. He's not in favor of the words "in addition". It speaks specifically to seismic force resistant concrete elements being done in accordance with 305. The intent seems to be that all structural concrete repairs need to comply with 562 but seismic repairs only need to comply with 305.

Keith: That is correct; it was done that way to avoid conflict with 305, and to avoid changes to the seismic force resistance system. He doesn't think there will be any issue in Virginia, since there are very few structures in seismic design categories D, E or F.

Kenney: He wants to make sure it's not requiring anything above and beyond what's required in the 2021 IEBC. He's not necessarily in opposition if it doesn't. He thinks the language could be tweaked a bit. He asked if the proposed changes should be before or after section 502.

Kerry: If there's a modification in language or location that Kenney wants to provide, they will consider it.

Kenney: Suggested to remove "in addition", and start with the word "assessment".

Kerry: That would be fine.

Kenny: Is this a requirement if repairs are substantial or less than substantial?

Keith: Both

Kenney: OK. It probably is in the appropriate section then. Is it specific only to concrete?

Kerry: yes.

Ron: Thinks it's in the proper location, and that the words "in addition" are not needed. If there's less than substantial structural damage, would someone have to go through the entire process?

Keith: This is a building code requirement, so if the repair is being permitted, it would apply. ACI is trying to raise awareness and quality levels across the board.

Ron: Maybe it should be in 501, based on what was just said, but he's not objecting.

Jeff: Getting rid of the words "in addition" sounds like it would

Kerry: Clarifying the section change – is there any concern?

Kenny: He thinks it is ok in section 502.1.1 where it is, since it's for all damage. He is not opposed

Jeff: The group did not have any further objections. Kenny clarified that he is not opposed. Consensus for approval as Modified with striking the words "in addition".

{BREAK 10:17 – 10:22}

EB1102-21

Scott Lang: He is a proponent, but not the author. This will be in the 2024 IFC, so it is important enough to bring up now. This addresses existing energy storage systems that use lithium ion batteries. NFPA 855 is coming out with a 2nd edition, attempting to make these systems safer. Systems designed now, according to the latest fire code, NFPA 855 and UL9540 are in good shape, but there are a lot out there now that need to have a close look. The new 2024 code will be in the IFC, not the IEBC, though this is a better place for it than fire code. He thinks that energy storage systems could have their own work group, because there's so much going on. This would require a hazard mitigation analysis, early detection system and corrective action plan, in accordance with FMEA or HMA.

Jeff: Received an email from Steve Shapiro from AOBA; he couldn't attend, but his comment is that AOBA has concerns about retrofitting. Steve's comments are noted, but only participants on the meeting today will vote for a decision.

Kenney: He applauds the effort. He thinks this may be what sunk a cargo ship recently in the Atlantic Ocean. He does think that this needs to be driven by the General Assembly. There may be some things in Chapter 11 that weren't done through legislature, but wonders if this should be.

Ron: Has a concern putting this in the VEBC, since it's not about retrofitting and doesn't ask for anything to be done to the building. He thinks it might be better in chapter 12 of the SFPC, since it asks for information to be submitted to the Fire Official. Also, it says that it should be based on jurisdiction adoption of the fire code. Since Virginia does not do that, the language would need to be changed.

Jeff: In the SFPC Sub-workgroup now, there are some proposals being made to section 1207 of the SFPC, but more discussion is still needed. Approval of these systems should be under the Building Official in the VCC or USBC, but the operational and maintenance aspects should be in the SFPC. It is still in development. He knows that there are some looking into bringing the requirements of the 2024 IFC, Section 1207 into the 2021 VCC.

Robby: The fire on cargo ship was not determined to be caused by lithium ion batteries (at this point).

Ron: Agrees that requirements for construction and instillation should be in the VCC. If retrofitting was required, it would go in the VEBC. He doesn't know what a corrective action plan would accomplish. In 1102.1.1, it talks about providing information to first responders, which would be more appropriate in the fire prevention code.

Kenney: Wonders if chapter 4 of the IFC would be a better place for a corrective action plan. Perhaps tighten the language up here to analysis and put early detection and action plan in the IFC. He asked Ron where the chapter 12 he referred to is located.

Ron: Chapter 12 of the SFPC.

Kenney: A true retrofit would be done regardless of other plans, repairs, alterations, change of occupancy, etc. Something that would trigger the need for some action to the building would not be a true retrofit. This proposal sounds is something to be done for all buildings with energy storage systems instead of a change of occupancy, which would trigger something to be done.

Jeff: Has concerns about correlating with other code proposals coming forth. He asked for actual objections.

Ron: Clearly objects to this in its current form and in this location.

Andrew: Can it go to the SFPC Sub-workgroup?

Kenney: Opposes in the current form, especially in Section 1102 – it should be in Section 1101, if it was in this code at all.

Jeff: There is objection in the current form. It could go to the SFPC Sub-workgroup, since some in the group would prefer it to be part of the SFPC. He asked the proponents if they want to send it to the SFPC Sub-Workgroup.

Scott: He did have some concern about placement as well. He would be in favor of bringing it to the Sub-workgroup. Even though the 2024 IFC will address new systems, existing systems should be addressed somewhere.

Jeff: Will consider this a carryover item and bring it to the SFPC Sub-workgroup, especially for the corrective action plan. DHCD will invite Kenney and Ron to the SFPC Sub-workgroup.

Scott: Also asked to be invited to SFPC Sub-workgroup.

Next Steps:

Jeff: Thanked everyone for their participation. There will be another VEBC meeting in April. The cutoff for proposals to be discussed at that meeting is March 11. The last meeting will be in June and the cutoff to submit proposals for that meeting is May 1.

General Stakeholder Workgroup Meeting

March 4, 2022 9:00 a.m. – 9:24 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VMC & SFPC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
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Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Bryan Holland: *National Electrical Manufacturer's Association (NEMA)*
Robby Dawson: *National Fire Protection Association (NFPA)*
Ron Clements: *Chesterfield Building Official*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome:

Jeff Brown: Briefly reviewed the 2021 Code Development Cycle workflow. He shared the presentation on screen and in the file pod available to download. Highlights:

- tentative dates
- cdpVA web site
- base documents
- meeting types and topics

Participants introduced themselves, and who they represent.
Jeff: Asked participants to stay muted when not speaking, to let the group know if they are speaking for themselves or the group they represent, and to be clear on voting in favor of or in opposition to the proposal.

Proposals:

FP901.6.3.2-21
Andrew Milliken: Most of the annual on-site inspection records are kept electronically. This proposal would require a physical tag or sticker to be placed on the equipment, when the inspection is completed in accordance with section 901.6.1. This proposal was brought to the SFPC Sub-Workgroup, and had some revision based on recommendations from that meeting. Primarily, there was a sentence added to also require a physical tag for “all other” inspections in accordance with the applicable reference standards.
Jeff: Seeing no other discussion, this will be marked consensus for approval as modified. CAM

FP901.4.8-21
Andrew: This proposal was brought to the SFPC Sub-workgroup and had some modification of the wording for clarity. The proposal says that building components such as walls, ceilings and ceiling tiles, which are expected to be there during construction of the fire protection system, and are critical to the operation of the system, are maintained. This section can be cited when there are holes, missing walls, ceiling tiles, etc.
Robbie Dawson: (for himself) For the language used, “Where building components…are required by the installation standard”, where are ceiling tiles required?
Andrew: NFPA 13 and NFPA 72 both require smooth continuous ceiling.
Jeff: Seeing no other discussion, this will be marked consensus for approval as modified. CAM

FP1201.3-21
Jeff: This proposal was agreed to by the SFPC Sub-Workgroup, and the group became a co-proponent.
Andrew: This section was deleted from the 2018 SFPC, assuming that it was related to construction. It’s being added back in to ensure that the overall capacity of the energy storage systems do not exceed the maximum allowable quantity specified in the building code. This is similar to the way hazardous materials are handled. The applicable building code would have a threshold for when additional requirements would be necessary for energy storage systems.
Bryan Holland: He (NEMA) fully supports this. He asked why the first sentence was modified from the base model code, where the language about approval was put at the end, instead of at the beginning. He asked if the language could perhaps read “and as approved by the building official”
Andrew: The language has been used to ensure that the sections are not construction-related, so it was done for that purpose.
Jeff: Seeing no other discussion, this will be marked consensus for approval. CA

Next Steps:
Jeff: Thanked everyone for their participation and let them know that residential and trade workgroup meetings are the remaining ones scheduled in March. The next cycle of workgroup meetings will start in April.

General Stakeholder Workgroup Meeting

March 8, 2022 9:00 a.m. – 9:43 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VRC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Aaron Sutch: *Solar United Neighbors*
Al Larsen: *Ipsun Solar*
Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Chad Wilkins: *Owner of Convert Solar*
Claudia Cotton: *Government Relations Coastal Virginia Building Industry Association, Board of Housing and Community Development*
Herve Billiet: *Ipsun Solar*
Nolie Diakoulas: *Convert Solar*
Randy Grumbine: *Factory-Built Housing, Virginia Manufactured and Modular Housing Association (VAMMHA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome:

Jeff Brown: Welcomed the participants. He asked if anyone wanted to review the Adobe features or the 2021 Code Development Cycle presentation. Since there were no requests to review the information, he pointed out that the presentation is available in the files pod of the meeting space. He invited participants to introduce themselves and who they represent, and then he introduced the DHCD staff.

Proposals:

RB324-21 - Submitted by Al Larsen

Al Larsen: This is a proposal to modify the IRC rooftop pathways section. The incoming IRC provision will cause a substantial impediment to installing solar panels. This proposal will prevent that, while maintaining safety.

Herve Billiet: Changes were made to the fire setback and pathway requirements in the 2018 code development cycle. The pathway requirements became much wider than previously required. This new requirement would make solar panel installation either not economically viable, or would significantly reduce the size of projects and amount of energy generated. The prior setbacks were already safe, so the wider pathways inhibit solar installation without providing any new consumer safety benefit. The 2018 provisions are skewed too far, and this proposal would bring balance with tradeoffs.

Nolie Diakoulas: After the 2018 code development cycle was completed, Virginia adopted many new statutes, such as the Clean Economy Act, which seeks to remove any impediments to solar energy. This IRC code change impedes on that act, and should be removed or revised to make the code consistent with the superseding law. The DHCD said in 2014 that the IRC section R324.6.1, which regulates the installation of residential photovoltaic roof systems, doesn't reference the fire code and therefore, photovoltaic requirements set forth in the fire code are not applicable to 1-2 family dwellings. The pathway issue must be resolved in IRC, but not in any other code, such as the fire code. There may be concerns in fire community, and proponents invite discussion to see if they can arrive at an acceptable compromise. For example, if there are only solar panels on one side of the roof, the fire personnel could access the dwelling on the other side of the roof. Or, if there are setbacks on one side, but not the other side. They would like to revise R324.6.1 to satisfy safety concerns and also have no impact on solar viability. Perhaps adopting an exception clause may be viable.

Herve: It is common knowledge or practice to not walk on solar panels (besides in an emergency). They can be walked on safely in an emergency. There is also a main disconnect. Fire personnel can both turn off the main power, as well as walk on the panels safely.

Jeff: Asked for clarification of the reason statement where it says that in 2014, the industry reached out to DHCD. It seems like the question was if the solar provisions in the IFC were applicable to 1-2 family dwellings. The answer at that time was no. The provisions were in the IFC but not the IRC, so there was no pathway to the IFC for 1-2 family dwellings. Now, there are provisions in the IRC.

Al: He's not sure he understands Jeff's question. He said the original question was which code controls in the residential installations? The answer was included in the reason statement. What additional context is he looking for? They can go back to the original exchange after the meeting to clarify further.

Jeff: The original question was related to a different code edition, so it may not have the same application today as it did when the question was asked.

Al: He figured the easiest way to address the concern was in the IRC, not the IFC.

Andrew Milliken: Read a prepared statement:

I will be in opposition to the reduction to 18" and the reduction to a single pathway due to the impact that has on fire department operations. I'm aware that your reason statement indicated that fire departments do not operate on roofs however that is simply not the case throughout Virginia. In addition to house fires where ventilation is often needed, other incidents such as chimney fires, technical rescues, or lightning strikes require the fire department to access multiple roof areas for their operations. Most importantly, this section is intended to provide the working space for placing a roof ladder from the peak to the bottom roof edge which provides a stable working area for fire department operations. The width alone of the roof ladders used for *this purpose are 19-20" so they would not even fit in the proposed 18" space and certainly wouldn't provide room for adjustment or error during urgent emergency use.*

The International Residential Code requires a 36" path so that there is the minimum space needed for the firefighting gear, tools and equipment used for roof operations and access. This is the standard used across the nation and the gear, tactics and equipment used in Virginia is no different. Secondly, the elimination of a second path appears unjustified in your reason statement. During emergency incidents, often with limited visibility and rapid deployment, an access point clear of obstructions cannot be guaranteed from a single point. Having at least two choices for roof access provides critical options to firefighters who need to rapidly access the roof, particularly when homes are located away from emergency vehicle access.

As proposed, this change is problematic to the fire service and I can't support it for consensus approval. If a change is really needed across the industry, maybe a proposal to the International Residential Code would be the place to start.

Aaron Sutch: Represents homeowners. The provisions now really kill solar installations on many rooftops. Many only have one solar plane that's applicable for solar panels. There seems to not be a full consensus in the way fire departments handle this issue. He is hoping for some flexibility. This is an important, unique technology for homeowners; solar & battery storage allows them to save on energy bills and prepare for disasters. Again, the current code severely hampers the ability to install panels and meet sustainability goals. If a common path could be found, it would help to represent the rights of solar panel homeowners.

Andrew: Exception #2 says that pathways and setbacks need not be provided when the code official determines that rooftop operations will not be employed.

Nolie: There has been that exception, however, fire personnel have not been willing to give the exception and give no answer as to why. There is a pathway to exception, it's ok to have a setback for firefighters, 36" on front of house or driveway or street facing to access the mounting plane. But no setbacks other than 18" in other areas. In the original code that was sent out a few months ago, in the picture, there are 3 ft. setbacks around the entire array and no solar panels on the other side of house. If the roof can be accessed on side with no solar panels, it should be easy to do that. Or have setbacks on the front, but not the back. Or, ladder access from peak of the roof to the gutter line. Ladders can be laid on top of solar panels. The tesla solar roof, which is an all glass roof can be accessed. An acceptable compromise can be reached.

Jeff: After Workgroup discussions, the group votes on each proposal to make a recommendation to the Board of Housing and Community Development. Results of voting are: consensus for approval (CA), consensus for approval as modified (CAM), consensus for disapproval (CD), non-consensus (NC), carried over (CO) or withdrawn (W). Currently, it sounds like the group decision on this would be non-consensus. He called for one last discussion.

Nolie: Asked if Andrew wanted to meet outside of the group to draft something together. It's unknown by the proponents how many homes catch fire on a regular basis. That information would be good for solar companies and others to know. Solar companies are losing about 1/3 of their business due to this strict rule.

Jeff: It would be up to Al to make the final call. Again, it would currently be non-consensus decision, or it could carry over and the group could bring it up again in the April meeting to try to reach a consensus vote.

Andrew: That sounds good. He does have a Fire Services Codes and Standards Committee meeting on March 23rd. That might be an opportunity for the proponents to present their case and come closer to consensus moving forward. Just because they work with Andrew, doesn't mean everyone in fire services would have the same opinion.

Jeff: Asked Al if he wanted to work with Andrew to bring this to the Fire Services meeting.

Al: He's not sure what to call this. They do want to continue the discussion to reach consensus, which would ensure safety and not kill projects. What is the proposed continuance?

Jeff: There can only be one decision on this proposal. If it's voted on now, it would be non-consensus. It would be better to carry over and look for additional compromise or consensus for the April meeting.

Al: Wants to carry over.

Steve Shapiro: This has been discussed at the national level. Virginia isn't much different than other states. This should be done at the ICC level, rather than individual states. It seems that would be the better venue.

Herve: There are a lot of different roof styles across the states. Discussion at the National level would not be as productive as at the state level in Virginia. He spoke with Andrew earlier, and would like to speak further with him and Nolie about options to keep firefighters safe. He offered his own house as a test site to demonstrate.

Jeff: March 12 is the cutoff date for submitting proposals to the April workgroup. It can still be brought to the April meeting, if there are changes or not, to continue the discussion. The next cutoff to submit proposals is May 1 for the June meetings. Keep communications open, discussions flowing, and keep DHCD in the loop to update and facilitate.

Aaron: How would others get in on these meetings, such as municipal partners?

Jeff: Anyone is welcome. The workgroup meetings are open to the public.

Al: They will probably put the same proposal forward for April and will continue discussions.

Jeff: It will be on April 19 agenda, and will probably carry over again to the June meeting.

Andrew: The sentence with the most changes looks like a run-on sentence. It could be clearer.

Jeff: Carry over to April. (CO)

Jeff: Thanked everyone for their participation.

General Stakeholder Workgroup Meeting

March 9, 2022 9:00 a.m. – 9:39 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

Trades Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Brent Werlein: *Virginia Beach Public Utilities*
Daniel Willham*: Virginia Building Code Officials Association (VBCOA), Fairfax County*
Devon O Louis:
KC Bleile: *Viridiant*
Randy Grumbine: *Factory-Built Housing, Virginia Manufactured and Modular Housing Association (VAMMHA)*
Richard Grace: *Fairfax County Land Development Services; Chairman of VPMIA*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome:

Paul Messplay: Gave a brief tutorial about how to use the Adobe Connect meeting space features.
Jeff Brown: Welcomed the participants to the trades workgroup meeting, and gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Highlights:

- DHCD staff introduced themselves.
- 2021 code development cycle and Study Group, Sub-Workgroup and General Workgroup meeting flows.
- Proposals will only be accepted during the proposal phase, but not during the final phase.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, disapproval, non-consensus, carry over, and withdrawn.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development.
- Agendas with proposals are sent out a few weeks in advance for review prior to the meetings.

Participants introduced themselves, and who they were representing.

Proposal:

P1003.3.2-21

Brent Werlein: He proposed a similar change to the 2021 IPC, and received feedback that they would prefer the original wording. Now, he's bringing the proposal to the Virginia code change process, with the wording that was used prior to 2018, regarding food waste disposers. The proposal addresses an issue that when food waste disposers do not go through grease interceptors, it creates a problem in the sewer lines.

Steve Shapiro: Asked if Brent was in the ICC code change process currently, and if he submitted something for the 2024 process.

Brent: Submitted the change for the 2021 cycle, and will also submit this same type of change in the 2024 cycle.

Steve: The proposal submitted for the 2021 ICC cycle was not approved?

Brent: Yes, that's correct.

Jeff: To clarify, is the text in this proposal different from that which was submitted to the 2021 ICC hearings, and it has been revised here based on their comments?

Brent: Yes, that's correct.

Steve: Asked Brent if he had an order of magnitude for the cost impact of adding a solids separator?

Brent: He does not have an exact cost due to multiple variables. The cost could be $500 to $3,000 for a larger concrete interceptor.

Jeff: Asked for additional comments in support or opposition.

Steve: Asked Richard if VPMIA has taken a position.

Richard Grace: He was not sure. However, VPMIA did not support proposal P134-21. Probably because it was calling for the local sewer authority to perform the installation. He cannot say there's full approval, but he can't speak for VPMIA specifically about this proposal now.

Jeff: Since there was actually no opposition today, it will be marked consensus for approval (CA), unless Richard does want to stand in opposition for himself or VPMIA.

Richard: Asked for a few minutes.

Jeff: Let Brent know that if there was some opposition, the proposal could be carried over.

Steve: Suggested that it might be carried over to give Richard time to get a response from VPMIA, especially since it did not pass through at the ICC level.

Jeff: The proposal has already been posted for over 30 days.

Brent: He did cleanup the language since ICC 2021 and he is willing to wait for a discussion with VPMIA.

Richard: Said he would like to work with Brent on VPMIA support.

Jeff: This proposal will carry over per the proponent's request. The April workgroup cutoff to submit proposals is midnight this Friday, March 11 for the April 20 meeting. If the proposal is not ready by that time, May 1 is the cutoff to get it on the June workgroup agenda. He thanked everyone for their time and participation.

General Stakeholder Workgroup Meeting

April 12, 2022 9:00 a.m. – 11:38 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VCC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Brian Hilderbrand: *Construction Regulation Administrator, SBCO*
Thomas King: *Code and Regulation Specialist, SBCO*
Chad Lambert: *Southwest Code and Regulation Specialist, SBCO*

Group Participants:

Al Clark:
Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Daniel Willham: *Fairfax County; Chair of VBCOA Building Code Committee*
Jane Kim: *Fairfax County*
Jason Laws: *Virginia Building and Code Officials Association (VBCOA)*
Joshua (Jay) Davis: *Virginia Department of Fire Programs (VDFP), Virginia State Fire Marshal's Office*
Kenney Payne: *Representing himself*
L. Hale: *Virginia Fire Prevention Association (VFPA)*
Lee Stoermer: *Loudoun County Fire*
Lyle Solla-Yates: *Representing himself*
Matt Benka: *MDB Strategies*
Michael Redifer: *Virginia Elevator Safety Association (VAESA)*
Rory Stolzenberg: *Charlottesville Planning Commission*
Steve Shapiro: *Apartment and Office Building Association (AOBA); Virginia Apartment Management Association (VAMA)*
William Abraham

Welcome:

Jeff Brown: Welcomed the participants to the VCC Workgroup meeting and thanked everyone for joining. There are 18 proposals today related to the Virginia Construction Code (VCC), Industrialized Buildings Safety Regulations (IBSR) and the Virginia Amusement Device Regulations (VADR). The meeting is being recorded. Paul and Florin from DHCD are on the call can assist with any technical issues.

Paul Messplay: Gave a brief tutorial about how to use the Adobe Connect meeting space features.

Jeff: Gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Discussion covered the following points:

- DHCD staff were identified.
- The 2021 code development cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, carry over, and withdrawn.
- May 1st is the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.
- Agendas with proposals are sent out a few weeks prior to the meetings. It is recommended that interested parties review and discuss proposals with proponents prior to meetings.

Participants introduced themselves, and who they were representing.

Proposals:

AD20-21

Jeff: Submitted by the Amusement Device Technical Advisory Committee (ADTAC). When serious injury or death occurs, reporting is required. ASTM F747 provides a definition of 'serious injury', so that definition was copied into this section for clarity and consistency of application.

Kenny Payne: When terms like 'significant' are used, it can become an issue of debate. Is the word 'significant' really needed in the definition? Would it be better without that word? He understands however that the definition is copied from the ASTM standard.

Jeff: Asked Kenny to confirm that he was not speaking in opposition. He was not. With no further discussion, this will be marked as Consensus for Approval.

AD30-21

Jeff: Submitted by ADTAC. This proposal is intended to clarify that non-mechanized playground equipment is not an amusement device. Even if it is mechanized, it may or may not be an amusement device. The definition of amusement device should be consulted to make the determination. The phrase "where no admission fee is charged…" was stricken, knowing that there are some parks that have a small playground set, with a fee to enter the park. This is an effort to clarify that this type of area does not qualify as an amusement device. There is another proposal submitted by ADTAC to the USBC, which clarifies that these devices, if determined to be amusement devices, should be regulated under the VADR, not under the USBC.

Steve Shapiro: ADTAC and Ron Clements both have proposals amending this exemption in Section 102.3 on the agenda. The one Ron put forth, B102.3(1), may affect this one. He is wondering if they should review all 3 at the same time.

Jeff: Thinks this one in particular can stand alone. B102.3(2) from ADTAC, which modifies the USBC, and

Ron's B102.3(1) proposal may complement each other and work together. In B102.3(2), ADTAC clarifies the exemption of playground equipment and in B102.3(1), Ron says that even if the equipment is exempted, it should still comply with provisions in Chapter 4 for children's play equipment. Jeff asked if Ron was on the call and if he would like to discuss all three proposals together.

Jason Laws: Joined the group on behalf of Ron, who was unable to attend. He thought it would be acceptable to bring in the B102 proposals now and discuss all three together.

B102.3(2)-21

Jeff: This proposal submitted by ADTAC modifies the USBC exemption #7 to say that even if admission is charged, it doesn't change the nature of the device. Playground equipment should be exempt from USBC, whether it's mechanized or not. This compliments the proposed changes in AD30-21; if it's playground equipment that is not mechanized, it would be exempt, and if it is mechanized, it may be regulated under the VADR if it fits the VADR definition of an amusement device.

B102.3(1)-21

Jeff: This proposal was submitted by Ron Clements to modify the same exception, #7 in the USBC, to point to VCC Chapter 4 if the play structures are located inside buildings. Chapter 4 provisions don't necessarily give prescriptive construction requirements for the equipment. They deal more with flame spread and how it impacts the building.

Jason: VCC Chapter 4 tends to get a lot of proposals, so he didn't want to have to update the section number each time, Chapater 4 was referenced. The specific requirements are currently in Section 424.

Kenny: Chapter 4 applies to play structures located inside buildings. Technically, buildings have roofs. What if a play structure is installed inside a structure that doesn't have a roof?

Steve: If all 3 are sent through, would the B102 proposals be coordinated, and would the "non-mechanized" words be struck?

Jeff: Spoke with Ron prior to this meeting and he said that the ADTAC modifications would not affect what he wanted to accomplish regarding the exemption being in compliance with the safety provisions in Chapter 4. They would both be worked into exception #7 together.

Jason: Yes, the intent was to make sure that play structures were enforced under Chapter 4, and he had no issue with ADTAC's language modification in the section.

Kenny: An example of the question that he raised earlier about play structures inside of other structures without roofs is McDonald's. If the structures are technically not inside the buildings, would they be exempt?

Jeff: Section 424 says "children's play structures installed in all occupancies".

Jason: Is comfortable with changing language to match Chapter 4.

Jeff: It actually says in the IBC "All occupancies covered by this code". Is that language better?

Jason: That sounds good.

Jeff: Consensus for Approval as Modified. Item #7 to say "play structures installed inside all occupancies covered by this code shall be subject to the play structure section in VCC Chapter 4"

Jeff: Asked for any opposition to AD30, B102.3(1) and B102.3(2). With no further discussion, the proposals were decided as follows:

- AD30-Consensus for Approval
- B102.3(2)-Consensus for Approval
- B102.3(1)-Consensus for Approval as Modified

AD40-21

Jeff: Proposal submitted by ADTAC. This proposal updates the reference standards listed in the VADR. Old editions are stricken and newest editions are added. This is a standard process done each cycle. These are all updates, nothing new was added.

Steve: Curious about why he doesn't see a reason statement.

Jeff: Agrees. It could be that it was pulled from cdpVA without that section. DHCD staff went back and looked on cdpVA, and there was no reason statement in this case. The reason is to update standards to latest edition, which will be added to cdpVA.

Kenny: Advised that the group move forward to Consensus for Approval, provided the reason statement, resiliency statement and cost impact are added by DHCD staff after the meeting.

Jeff: Asked the group and there was no opposition. Consensus for Approval with the understanding that the reason statement, etc. would be added to the proposal in cdpVA by DHCD staff.

IB20-21

Jeff: DHCD staff proposed this editorial language cleanup. There was a code change in the 2018 IBSR related to shipping containers used in construction. The language sounded like DHCD was obligated to approve all intermodal shipping containers used as building components, so the wording was changed in paragraph D from "must" to "may" and from "will" to "may". With no further discussion, this was marked as Consensus for Approval.

IB60-21

Jeff: DHCD staff proposed this editorial language cleanup. There was a misspelling and a complicated sentence that were changed.

Kenny: Asked about the word "therefore". Should that be thereof, or no word at all? He doesn't think the word therefore is necessary.

{Break 10:00-10:05}

Jeff: Agreed with Kenny, that the word "therefore" is not needed.

Steve: Also agreed with Kenny, that the word "therefore" is not needed.

Jeff: Seeing no further discussion, the word "therefore" will be stricken. The proposal will be marked Consensus for Approval as Modified.

IB115-21

Jeff: This proposal from the DHCD staff is related to handling a change of occupancy classification in an industrialized building. Under the current regulations, if someone has an industrialized building that's registered, and wants to change its occupancy, they must hire a state-approved compliance assurance agency to inspect and recertify the building to the changed occupancy and have the data plate updated. It would also be reasonable for an existing building installed in a locality to be approved for a change of occupancy by the local building official under the USBC, and this proposal allows for that option. In this case, since it's a registered industrialized building, a change of occupancy would make it unregistered. The seal would be removed and it would be treated like an existing structure.

Steve: Is not a fan of permissive language in the code. It says "may be changed in accordance with one of the following", which could also mean that it may not be changed in accordance with one of the following. He suggests changing it from "may" to "must". He would also suggest changing all the "may"s to "shall"s in the underlined section.

Kenny: Agrees with Steve. When the goal is to give options, use "may", when the goal is to direct, use "shall".

Jeff: The intent is to provide an option to the building official in #2. In some scenarios, a code official may not be comfortable with taking this route in a registered building. Changing the first part works, since there are only 2 options as listed, but the building official can agree with one or the other.

Kenny: The charging statement would take care of the concern. If they chose one, they wouldn't have to be concerned with the other.

Jeff: How about "A change of occupancy classification in a registered industrialized building shall be in accordance with one of the following"

Steve: Suggested "when the occupancy classification of a registered industrialized building is proposed to be changed, the change of occupancy must be in accordance with one of the following".

Kenny: Has heard from building officials in the past that they have an issue with the word "proposed" in the Existing Building Code in Chapter 1 and perhaps also in Chapter 1 of the IBC. They are concerned that if something is proposed, it's not really changed. Would wording like this work, "When the occupancy classification of a registered industrialized building is changed…"? This means it's being done, not proposed to be done.

Jeff: Agrees. New statement suggested: "When the occupancy classification of a registered industrialized building is changed, the change of occupancy shall be in accordance with one of the following". With no further discussion, Consensus for Approval as Modified.

Kenny: Will the "may"s in #2 become "shall"s?

Jeff: The intent in #2 is to give the official an option. If "shall" is used, will that still be optional for the building officials? Are there any other thoughts about this?

Steve: Thinks "may" should be changed to "shall" in option #2. If option #1 is selected, there's no problem, but if #2 is chosen, it should be "shall".

Jeff: He agrees that the first "may" in option #2 should be a "shall". The second "may" in #2 still seems to be appropriate, because if it's a simple change of occupancy, they may not need full plans or an RDP or to hire a third party inspector. Any thoughts on that?

Steve: Agreed. Change 1st "may" to "shall" and leave the second "may" in option #2.

Jeff: Any other discussion? Consensus for Approval as Modified changing the charging statement and the first "may" to "shall" in option #2.

IB120-21

Jeff: This is a DHCD staff proposal for the IBSR, intended to clarify that the local building official has the option to approve the installation of an unregistered industrialized building without needing a third party compliance agency. If there's an unregistered building in a locality, the official would be able to use the USBC and treat it like any other structure. It would still remain an unregistered building, unless option 1 is selected.

Steve: In #1 the word "may" should be "shall". In #2, the first "may" should be "shall". The second "may" in #2 is ok.

Kenny: Agrees. The charging statement says pick one, then in the selections, there should be direction given using the word "shall". In #1 the word "may" should be "shall". In #2, the first "may" should be "shall".

Jeff: Concerned about #2. If it's non-compliant, then building official shall approve…it seems like it needs more work.

Kenny: What was the language in #2 of the previous proposal? Actually, it looks like it needs work.

Jeff: This one will be Carried Over until June, and brought back with revisions.

Kenny: Should #1 say registered and #2 say unregistered "shall be in accordance" and strike building official?

Jeff: That might work.

IB140-21

Jeff: DHCD staff proposal to IBSR. Editorial cleanup to clarify the paragraph. Any questions or comments? Seeing none, Consensus for Approval.

IB160-21

Jeff: DHCD staff proposal. There are two new offsite construction standards that were developed by ICC. The 1200 standard deals with planning and design related to modular and factory-built buildings. The 1205 standard deals with the administrative aspects and the approval process for offsite construction. These compliment and work together with the IBC, covering unique features of offsite construction that aren't otherwise in the building codes. Jeff was on the ICC standards development committee and he thinks they will complement the way things are done now in Virginia's IB program. There was an additional amendment made to clarify the order pf precedence for any potential conflicts between current IBSR and the incorporated standards. A statement was added to say that, where there are conflicts, the IBSR regulations supersede the new standards. Questions or comments? Seeing none, this is marked Consensus for Approval.

B110.9-21

Jeff: This proposal is from Ron Clements. Since Ron was not in the meeting, Jeff asked if Jason wanted to present it to the group.

Jason: This is adding permission to cancel a permit if requested by the permit holder or building owner. The building also can't be left in an unsafe state.

Jeff: With no further discussion, this will be marked as Consensus for Approval.

Jeff: Paused to ask anyone new in the meeting to identify themselves and who they represent if they have not had a chance to do so.

Rory Stolzenberg: Charlottesville Planning Commission.

B313.3-21

Jeff: DHCD staff proposal to update the code language to reflect a change related to the licensing authority for Family Day Homes. Effective July 1, 2021, oversight of Family Day Homes was transferred from the Department of Social Services to the Department of Education. This changed the reference from DSS to DOE. With no additional comments or discussion provided by the group, this proposal was marked as Consensus for Approval.

B407.4-21

Dan Willham: This fixes a broken link to the evacuation plan requirements in Section 1002.2, which was deleted by Virginia. He's now bringing in the requirement from the IFC.

Kenny: One of his code change proposals in a previous cycle was to delete such plans from the IBC, since they were more of a fire code requirement under the IFC. He referred to the IFC, but didn't say it was required in the IBC. The way this language reads, is that it's now a requirement in the IBC to comply with the IFC, instead of being required under the IFC. He would propose language that says something like "the fire safety and evacuation plans provided in accordance with the IFC shall identify the…" How is that language? It seems to still accomplish the goal of fixing the broken link without sounding like it's required under the IBC. For instance, sometimes in the building code, it says "where provided", meaning that it's not required to be provided, but when it happens, this is how to handle it. The way you have it says "shall be provided" under the IBC. Whereas saying "plans provided in accordance with the IFC" means it's required under the IFC. There's a nuance that's important there. As an architect, he doesn't provide fire safety and evacuation plans, but the building needs to be designed in accordance with the IBC. The language here sounds like the plans are required under the IBC and would need to be provided as part of the building design.

Dan: Is there a word added that he proposes to strike?

Kenny: It should read "The fire safety and evacuation plans provided in accordance with the IFC, shall identify…" The stricken words "The fire" and "provided in accordance with" should be kept.

Dan: Virginia doesn't enforce the IFC unless it's specifically referenced, what does it say in the SFPC?

Kenny: Not sure, but what he suggests is done regularly.

Dan: He understands. He would have to consider how to say that.

Kenny: Are there any fire people on the call to speak to where the link exists in the IFC?

Joshua Davis: Can see the desire to point to the IFC. The fire code requires some type of evacuation plan. He thinks there should be more discussion and rewording. He would like to assist Dan with that. He sees the significance and benefit of not making it the responsibility of the architect, and putting back to building official and fire official.

Kenny: He could work with Dan and Joshua

Dan: Agreed, and asked for Joshua's email address.

Jeff: This will be marked Carried Over for editing to be brought back in June.

B706.1-21

Jeff: This is a proposal from Ron Clements.

Jason: This is an attempt to fix a broken code change, which removed "Each portion of a building separated by one or more fire walls shall be considered a separate building". When that was removed, some other areas were affected; Chapter 9 specifically. This proposal also adds the sentence "Equipment and systems are permitted to serve multiple attached buildings on the same lot where separated by one or more fire walls." This clarifies that one sprinkler system, for example, can be used to serve both sides of the fire wall.

Dan: This did create a problem in the IBC and also created broken sections in Chapter 10 for egress. What does it mean to egress a building and not re-enter it? Chapter 10 has specific provisions that an exit shall not re-enter a building without a fire wall, so without a fire wall, where does it end? There's no definition for the end of a building unless you're outside. There's also a provision in Chapter 10 that states that every building should have at least one exterior exit door. There can be buildings inside of buildings without exit doors. This is hazardous for fire fighters. He does think that this proposal helps to clarify those things.

Andrew Milliken: The Fire Service Board's Codes and Standards Sub-Committee supports this change.

Kenny: The language in 503.1 is still there about how a fire wall is used for determining the height and area. This proposal helps to determine the other technical provisions in the code.

Jeff: Asked Dan to clarify if he supports this proposal and if his comments were about how the proposal fixes other broken areas.

Dan: Yes, that is correct.

Jeff: With no other discussion offered, this is marked as Consensus for Approval.

B1006.3.4-21

Lyle Solla-Yates: Is Chair of the Charlottesville Planning Commission, but is representing himself. Charlottesville is finishing a 5 year planning process, which allows more affordable housing in the city. Staircase requirements in the building code are important to affordability and sustainability. He shared an excerpt from an article which was not provided prior to the meeting. He put a link to the article in the chat: https://www.larchlab.com/wp-content/uploads/2022/01/Eliason_CoV-Point-Access-Blocks-report_v1.2.pdf
The article said, in part, that compact single stair buildings or point access blocks provide sufficient safe egress, while offering affordable, attractive and energy efficient building development.

Steve: He is opposed to having a 6 story building with only one exit for safety reasons.

Kenny: Does this need to be correlated with any other building code provisions? I.e. the difference between R2 and R5, height and area tables, types of construction, etc.

Rory: He encourages adoption of this proposal, which provides for smaller footprint, family friendly and energy efficient buildings. The two stairway requirement incentivizes long, double loaded corridors, which then incentivizes larger inter-connected buildings with smaller apartments with windows on only one side. Residential buildings with only 4 units per floor would enable point access block configurations and smaller footprint buildings with more fire walls between them. There would also be more cross ventilation and natural lighting available. Single stair buildings have been proven safe in Seattle, New York City and across the world. He sent a link to the Seattle building code section 1006.3 in the chat: https://www.seattle.gov/documents/Departments/SDCI/Codes/SeattleBuildingCode/2015SBCChapter10.pdf#page=8

Andrew Milliken: He opposes this proposal. With one exit path, the impact is extremely detrimental to occupant egress and fire fighters. He strongly feels that this change needs to be vetted at the national level, and not having Virginia stepping out until it has been properly vetted.

Joshua: Served for 26 years in the Charlottesville fire department and he was the Fire Marshal in his last 5 years there. He has been with the state now for 2 years. He is very well versed in the construction planning process and has been part of the discussion for affordable housing needs. He offered to work with the proponents to edit the wording and make it more agreeable to all. With some of the designs that Charlottesville has worked on, the concern was to not grab a little piece of language and forget that there's a vast amount of code behind it. Multiple things go into the design which would allow for a single stairwell. It's not something that can't be considered. Some states have made alterations to accommodate that desire. He again offered to help edit the proposal to allow for lower construction costs without creating a hazardous situation. They would need to address a lot of construction concerns like fire walls, sprinklers and alarm systems from the IBC and the IFC.

Dan: Agrees with Steve's concern. Exits are very important. The higher the building, the less safe the building is in general, especially when trying to egress from it. He appreciates the link to the Seattle code. There are a lot of requirements in there, like pressurized stairwells, no connection to interior stairways, door swings, etc. which are safety requirements that are not provided in this proposal. New York City limits the type of construction to Type 1 or 2 and limits the area per floor to 2,500 square feet with a slew of requirements, or in the case of 6 stories, 2,000 square feet per floor. None of those requirements are in this proposal. He also agrees that it should be handled at the international level.

Andrew C: Would like to be involved in conversations with Josh and proponents. Other states have explored this and it's also being done outside of the United States. It does warrant more discussion.

Lyle: It all seems to make sense. He would be happy to talk and work on it more.

Kenny: Given the magnitude of the potential impact of changes through all codes, would DHCD create a Sub-Workgroup to address?

Jeff: DHCD can help coordinate a discussion but there isn't enough time left in this cycle for a Sub-Workgroup or committee. DHCD can collect and distribute contact information for anyone wishing to discuss further, to help the proponent convene a meeting. It's up to the proponents, if they want DHCD to help in that way. He asked Lyle what he wanted to do.

Lyle: Asked DHCD if other code changes would be necessary, they said no. The reply was that there can be other code changes, but this one could stand alone. He's happy to carry this over to continue working on it and dialogue with others to help refine the proposal.

Steve: Wants to be part of the discussion. He thinks there would be many other codes that would be affected.

Jeff: Clarified that DHCD did not opine on whether other code sections should be changed. Lyle asked DHCD if there was any conflict with other code provisions. In our cursory review, there didn't appear to be any direct technical conflicts or technical issues with the changes proposed. However, other code sections should be considered for coordination or potential impacts.

Kenny: In his opinion, based on his experience with the code development process. If this goes up to 6 stories, he thinks there will be non-consensus. Historically when proposals are non-consensus, there's less than a 50/50 chance that they will be approved. He suggests taking baby steps, and only going up to 4 floors to start.

Jeff: If anyone wants to participate in the continued discussions before the next General Workgroup meeting, provide your name and email in the chat. DHCD will assist Lyle with setting up discussions. This item will be Carried Over.

{Break: 11:12 – 11:17}

B1010.2.8-21

Jeff: This is a proposal that was developed as part of the Active Shooter and Hostile Threats in Public Buildings Study Group. In the 2018 cycle, the General Assembly directed DHCD to develop regulations to allow barricade devices in school buildings for active shooter events. A Study Group was formed and a code change proposal was developed to layout a compliance path in both the USBC and SFPC for anyone who wanted to install these devices in schools. The proposal laid the framework for minimum safety criteria, training requirements and coordination between officials and first responders. In 2020, the General Assembly directed DHCD to form a Study Group to develop a code change proposal that would allow these devices in public buildings, which is where this proposal came from. This proposal takes what was laid out in the USBC and SFPC for schools in the last cycle, and added public buildings as another occupancy where ESS hardware would be allowed. The proposal also defines public buildings. Some Study Group members supported this and are listed as proponents, while other members didn't support it. Some who are not proponents of barricade devices in general did support the proposal, since devices could already be added and approved by officials using the code modification process without clear guidance otherwise. They thought that this would provide at least minimum standards and consistency in application if someone chooses to install them.

Dan: The wording in section 1103.2.15 seems incomplete, like there's one or more words missing. It says when emergency supplemental hardware is deployed in accordance with section 1010.2.8, is not required. Does it mean that it's not required to comply with the chapter?

Jeff: Thinks that the subsection that is being amended in this proposal is part of a list of things that wouldn't apply (taken out of context from another section not shown in the proposal).

Kenny: 1103.2 is the charging statement and 1103.2.15 is one of a list of items. Also, there's need to correct another word in 1031.11.

Jeff: Kenny is correct about the list. The other word will be fixed.

Dan: Still thinks "when" sounds out of place.

Jeff: Explained that if the device isn't active, there is no exception. When the device is active, there is an exemption from accessibility compliance.

Dan: If it said "the deployment" that would make sense. But, saying "when" followed by another "when" isn't a good sentence.

Jeff: If it said "supplemental hardware, when deployed…"

Dan: He suggests "the deployment of ESH during an active shooter event…"

Jeff: Can't speak on behalf of the Study Group to make the change. It will be marked as Carried Over for the Study Group to revisit the proposed language.

B1026.2-21

Jane Kim: This proposal is making a correction to something proposed in 2018 that was approved. This is proposing a change in the wording to ensure that necessary protection is provided for the refuge compartments.

Dan: Thinks the correction proposed does better align with the intent of the code.

Jeff: With no other discussion, this is marked as Consensus for Approval.

Next Steps:

Jeff: There will be more Workgroup meetings this week and next week. When all the meetings are wrapped up, DHCD will provide a summary for all of the meetings, posted in cdpVA. The decisions will also be updated in cdpVA. The proposals that are decided on will go to the BHCD in September. The final cutoff to get any remaining proposals or changes into cdpVA is May 1st. The last Workgroup meetings will be held June 7-15.

General Stakeholder Workgroup Meeting

April 13, 2022 9:00 a.m. – 9:38 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VEBC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Andrew Grigsby: *Viridiant*
Daniel Willham: *Fairfax County; Chair of VBCOA Building Code Committee*
Jason Laws: *Virginia Building and Code Officials Association (VBCOA)*
Kenney Payne: *Representing himself*
Scott Lang: *Honeywell Fire*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome:

Jeff Brown: Welcomed the participants to the VEBC meeting. There were originally 6 proposals on today's agenda, however EB502.1.1 was already discussed at a prior meeting and will not be discussed today.
Jeff: Asked the participants if they wanted him to review the DHCD presentation about the 2021 Code Change Cycle, or the Adobe Connect meeting space tutorial.

The group members voted thumbs down, as they are already familiar with those things.

Jeff: Reminded the group that the meeting is being recorded, and asked members to speak clearly.

Proposals:

EB1102-21

Scott Lang: Will carry over this proposal. He is hoping to get guidance from the SFPC Sub-Workgroup. This proposal was made for the 2024 IFC and was accepted. It's a little difficult to figure out where to put this in the VEBC. The concern is for older storage systems, and if they have been reviewed in light of the latest standards.
Steve: He is in opposition to this due to the retroactive nature of the proposal.

Jeff: It is a proposal to VEBC, however several other Energy Storage System related proposals are being worked on by the SFPC Sub-Workgroup and other groups. Therefore, it makes sense to have this proposal discussed by the SFPC Sub-Workgroup along with the others so they can be coordinated. This will be marked Carried Over.

EB102.2.1-21

Jeff: This is from Ron Clements, who is not present in the meeting. He opened the floor for discussion.

Steve: Supports this proposal.

Kenney Payne: Asked Jeff if he wanted someone to speak on behalf of Ron Clements.

Jeff: He was wondering if anyone on the call was familiar with this, or if Ron asked someone to speak on his behalf in regards to the proposal.

Kenney: Allison Cook was supposed to be on the call today to introduce the proposal as a VBCOA/VEBC Committee representative. Ron does say often that he stands behind the reason statement. This is intended to clean up the requirements for change of occupancy. Changing to an I-2 or I-3 occupancy doesn't fall under the VEBC. If there's an existing I-2 or I-3, and a change of occupancy is being made, the VEBC does apply. The VBCOA VEBC Committee supported this proposal.

Jeff: Seeing no other discussion, this proposal is marked Consensus for Approval.

EB603.6-21

Jeff: This is also a proposal from Ron Clements. He opened up the floor for discussion.

Kenney: This proposal was made to delete something that would never happen. For one, an alteration that increases occupant load without a change of occupancy would not happen. Secondly, any increase in sanitation would trigger a change of occupancy by definition. This is already an exception under the plumbing provisions in section 710.1. His reasoning to delete this section was that it would be contradictory to 710.1.

Jeff: Asked Kenney to clarify that he is not in opposition to the proposal.

Kenney: While he thinks that Virginia doesn't want the VEBC to be more stringent than the I-code, he's not in opposition to removing the section in the VEBC. The VBCOA VEBC committee did support this proposal.

Jeff: With no opposition or further discussion, this is marked as Consensus for Approval.

EB701.1-21

Jeff: Another proposal from Ron Clements. After it was submitted, he did notify DHCD of a modification, which was brought up on the screen. There was one word in the exception added "are NOT proposed to be". Jeff asked Jason if he would like to present this on behalf of Ron.

Jason Laws: Is not prepared to speak on it on behalf of Ron at this time.

Kenney: This is to clarify the intent of the code. There's no real change, other than being clearer and less wordy. In addition, Group R-5 has been included with groups H and I in being outside the scope of Chapter 14 since this chapter was not set up for structures designed per the IRC.

Andrew Grigsby: It calls out evaluation, fire safety, means of egress and other particulars. When and where do aspects of the energy code apply in VEBC vs. VCC? Are all the energy codes fully incorporated in the VCC?

Kenney: Chapter 7 is all about change of occupancy. There are no energy requirements for change of occupancy as far as he knows. Chapter 14 is a compliance alternative that evaluates buildings for compliance with the change of occupancy requirements based on provisions such as fire safety and means of egress and others, but it has never had an energy evaluation. If a school has changed to a business office, the Chapter 14 alternative can be used to look for a passing grade on the change of occupancy. The code isn't meant to do anything else. All that 701 does is say that Chapter 7 can be used or Chapter 14 can be used instead. There are no specific energy requirements in Chapter 7 of the VEBC or in the i-codes. Change of occupancy itself doesn't trigger energy requirements, but any alterations as part of the change in occupancy might trigger energy requirements. If there are any energy requirements in the VEBC, they would be followed there. If you're in the VCC, you would have to do what they require. All energy requirements were deleted from the IECC and put into the VEBC during the last code cycle.

Andrew: Would those provisions mirror what's in the current VCC, even if that's not where the text is?

Kenney: In VEBC energy requirements are a caveat. There isn't a trigger to go to the i-codes unless there's a threshold met in the VEBC.

Jeff: Asked if there was any opposition with the proposal, including the late modification of adding the word "not" in the exception.

Kenney: The reason for saying "not" in the exception is because in Chapter 14, I and H occupancies are not included, and there's no table to refer to for I, H or R5 structures.

Jefff: With no further discussion, this will be marked Consensus for Approval as Modified.

EB707.2-21

Jeff: This proposal is also from Ron Clements. He opened the room for discussion.

Kenney: This is another situation where the exception in question would never happen, so he proposed to delete it to clean up the code. The table only goes to 2 hours, and it would never be exceeded.

Jeff: With no further discussion, it will be marked Consensus for Approval.

Next Steps:

Jeff: Thanked everyone for their participation. There are a few more General Workgroup meetings being held in the next few days. The decisions for proposals discussed thus far will be updated in cdpVA, however, there's a bug in cdpVA that's being fixed now to accommodate those updates. The last Workgroup meetings will be in June and the cutoff to submit proposals is May 1st.

Steve: Expressed his approval with the virtual Workgroup meetings, especially as they are shorter, and they do not have to waste time driving.

Jeff: Thanked him for the comment.

Kenney: Let the group know that the VBCOA VEBC committee approved all of these proposals, except for EB1102-21, which they thought should be located somewhere else.

General Stakeholder Workgroup Meeting

April 14, 2022 9:00 a.m. – 11:38 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

Energy Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*

Group Participants:

Andrew Clark: *Home Builders Association of Virginia*
Ben Rabe: *New Buildings Institute (NBI)*
Daniel (Dan) Willham: *Fairfax County, Chair of VBCOA Building Code Committee*
Dawn Oleksy: *Climate Action Program & Operations Supervisor, City of Richmond*
Eric Lacey: *Responsible Energy Codes Alliance Chairman*
Jack Avis: *Avis Construction*
Jack Dyer: *Virginia Contractor Procurement Alliance (VCPA)*
KC Bleile: *Viridiant*
Laura Baker: *Responsible Energy Codes Alliance*
Linda Baskerville: *Arlington County Energy Plan Review*
Matt Benka: *VCPA and MDB Strategies*
Michael (Mike) O'Connor: *Virginia Petroleum Marketers and Convenience Stores; Virginia Propane Gas Association*
Michael Redifer: *Virginia Elevator Safety Association (VAESA)*
Mike Hamilton: *Arlington County*
Ross Shearer: *Vienna, Virginia resident*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
William (Bill) Penniman: *Sierra Club Virginia chapter*

Welcome:

Jeff Brown: Welcomed the participants to the Energy Workgroup meeting. He noted that the meeting is being recorded.

Paul Messplay: Gave a brief tutorial about how to use the Adobe Connect meeting space features.

Jeff: Gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Discussion covered the following points:

- DHCD staff were identified.
- The 2021 code development cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, carry over, and withdrawn.
- May 1st is the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.
- Agendas with proposals are sent out a few weeks prior to the meetings for individuals to review the information provided. It is recommended that interested parties review and discuss proposals with proponents prior to meetings, in order to keep the meetings moving along to the voting phase.

Participants introduced themselves, and who they were representing.

Proposals:

EC1301.1.1.1-21

Jeff: William Penniman on the call is the proponent.

Bill Penniman: This proposal is straightforward, calling for full implementation of 2021 IECC without amendment. It's important for future buyers and residents. This is consistent with national energy codes. It's supported by economic analysis undertaken by the Department of Energy and the Pacific Northwest National Laboratory, which found that fulfillment of the 2021 IECC would save consumers money as well as reduce costs to the public.

Jeff: Opened the floor for discussion.

Andrew Clark: This was discussed in the Energy Sub-Workgroup. Will those comments carry over into this? It was discussed at length.

Jeff: Typically, proposals sent to the BHCD include all discussions around the proposals from the Workgroups and Sub-workgroups, especially the non-consensus items.

Andrew: From the Home Builders' perspective, they oppose this proposal. The housing industry constantly hears about the need for low to moderate income housing. Home buyers have the option to construct their home to higher standards if that's affordable to them. With full adoption of the 2021 IECC, there's a big cost added to home owners and renters. In the ACEEE scorecard, Virginia earns a near-perfect score on building codes, but is ranking 25th because it loses 50% of energy points on utilities and transportation.

Jeff: It is helpful to articulate if you are for or against a proposal when you speak, as Andrew just did.

Eric Lacey: Responsible Energy Codes Alliance is in support of this proposal. They support the adoption of the latest model energy code. There are significant energy savings. It makes sense for Virginia to catch up with the model codes. He thinks that Virginia should start with the latest model code each cycle and look at historic amendments to see if they are still pertinent. In the ACEEE scorecard, Virginia is behind.

Steve: Won't repeat what he said at the Sub-workgroup. AOBA and VAMA are opposed to this change.

Ben Rabe: The comments he made in the Sub-workgroup will carry over for all proposals. He does support this proposal. When contractors work across state lines, it's helpful to have consistency. The vetting process in the IECC is very rigorous.

Dawn Oleksy: The Richmond Office of Sustainability supports this proposal. Building energy is 56% of the carbon footprint. In order to meet 2030 and 2050 greenhouse gas reduction goals, energy efficiency needs to be supported.

Dan Willham: Fairfax County supports this proposal.

Linda Baskerville: Arlington County supports this proposal. The housing stock problems that Andrew mentioned are not all attributable to the energy code. Putting them all on the back of the energy code is shortsighted. Virginia residents have undeniable long term benefits. Looking at this in the short term is not in accordance with Virginia's long term goals.

Mike O'Connor: Asked proponents if there were bills in the most recent General Assembly that were defeated, and if this is an attempt to go around the General Assembly.

Bill: Is not aware of such a bill. In the last General Assembly, HB2227 was adopted and was measured to be at least as stringent as the IECC.

Andrew: Is not making the claim that the energy code is the sole driver of housing cost. This is potentially another factor driving costs up. The building code process has been effective in lowering energy costs for residents. Data cited in an affordable housing study report as a part of HB854 (2020 session) breaks down energy cost by homeowner, renter, year built and AMI. In homes built after 2000, virtually every income bracket is not having energy cost burdens. Homes built before 2000, and before 1980, those at the lower income spectrum are energy cost burdened. We've made a significant amount of progress. There's a need to find out when diminishing returns come in. Adding costs to the construction creates impediments and barriers to home buyers. He encourages the group to look at the report with data pulled from the Department of Energy. He said he would send the report to the group. It shows pretty clearly that most folks are not energy cost burdened.

Linda: To Andrew's point, 20 years from now, the houses being built today will be the older stock, which as he pointed out, will be the houses that are energy cost burdened. They can be addressed in today's code.

Andrew: Homes built in the 30s, 40s and 50s were built according to much lower standards. Homes now are built to a much higher standard. To say that in 20-30 years these homes will be like ones built in 30s is like comparing apples to oranges.

Jeff: As a technical comment on this proposal, there is correlation between codes that will need to be done for a change this large. The proposal may not have done all of this work. This is not an opinion for or against.

Bill: On the issue of cost. There is an increase in the initial construction cost, however, it saves money for residents now and in the future. It also benefits the future health of the Commonwealth. It's been widely recognized that energy efficiency needs to be improved, energy consumption needs to be reduced and climate emissions and pollution needs to be reduced rapidly in the next decade or two. The old way of building won't accomplish that. While he hasn't looked in-depth at the study Andrew referred to, he did look at the tables and he doesn't think they prove as much as he indicated. Lower income people would not be the consumers for these energy custom builds anyway. This proposal is valuable, and he's willing to have more discussion to create a different proposal that is more selective without weakening the requirement.

Mike O: He reviewed HB2227. This was originally mandatory and mirrored what is being presented today. The bill was amended to say that it shall be considered by the Department of Housing, making it permissive instead of mandatory. He understands that there was also legislation this past session that aimed to accomplish the same thing. He suggests that this is an attempt to go around the legislature.

Bill: It is not an attempt to go around legislature. HB2227 said to consider full compliance with the latest version of the IECC and standards as stringent or more stringent, and it gave standards for doing it in terms of savings for residents and benefits for the public. This proposal fully complies with HB2227 that has passed. It's still a decision of the BHCD and we think this is the right decision.

Andrew: Responding to Bill's first comment, he understands the cost savings over time. However, initially, it will prohibit people from getting into the homes in the first place. The upfront cost increase is the biggest barrier for low and moderate income families. Most contractors are not building on the higher end and when they are taken to task, they are always pressed to build for lower to middle income families. Realtor data shows that houses selling in the $200k or less range have gone down almost 50% since 2019. Starter homes are almost extinct. The industry is not against energy efficiency, but they are trying to balance that with costs in order to provide a more diverse housing stock.

Bill: Taking the holistic view, energy efficiency does save money over time. NAHB has said that consumers do look for and want energy efficiency. Consumer Reports says that most buyers assume that the state codes match the national codes.

Jeff: Hearing no further discussion, this will be marked as Non Consensus.

{BREAK: 10:00 – 10:05}

EC-C401.2-21

Ben: This proposal is one that was submitted to the 2024 IECC. It is an ambitious proposal to submit to Virginia, so it is not expected to get consensus approval. It was submitted in order to start a conversation and let folks know what is coming up in the IECC process. It would require commercial buildings to move to all electric. It would require heat pumps and conduction cooking, which would have a great impact on the amount of carbon produced by commercial buildings. Commercial buildings produce about 40% of the carbon footprint in the country.

Andrew: This proposal is related to prohibiting natural gas in commercial buildings. We are opposed due to the comments already raised in the Sub-workgroup.

Steve: AOBA and VAMA also opposed, as noted in the Sub-workgroup.

Mike O: Petroleum Marketers and Propane Gas Association are opposed to this. Virginia small businesses provide oil heat and propane. There is no provision in this proposal to retrain workers in the petroleum and propane industries after they are forced out of business due to a proposal such as this. Also, the payback time on a heat pump is about 25 years. The only people who can afford to do this are the regulated utilities, who are using their rate-payer subsidized income to perform these conversions.

Bill: Supports this proposal, as it needs to happen as a matter of climate change mitigation and preparedness.

Jeff: With no further discussion offered, this will be marked Non Consensus.

EC-C402.4-21

Eric: Chapter 13 is where the Virginia amendments to the IECC are made. This proposal edits some that are no longer necessary. This proposal strikes sub sections 2, 3 and 4. Sub section 3 is an amendment that allows increased skylight area if the building complies with the daylight responsive controls. Virginia's current allowance is up to 5% skylight area and the IECC now allows up to 6%. This seems to be a sensible improvement in the code. By striking that sub section 3 amendment, Virginia would be adopting the IECC 6% skylight area for the buildings with daylight responsive controls. Sub sections 2 and 4 are related. These are changes that RECA proposed in the 2015 code update cycle. In 2015, Virginia had a better solar heat gain coefficient (SHGC) requirement than the model code had in 2015. Since then, the 2021 IECC has caught up to Virginia, and requires essentially the same SHGC even though it's now divided into fixed and operable fenestration. It has also simplified the calculation process for projection factor. A credit is given for having projections over the windows, allowing for higher SHGC. The 2021 IECC also removed the orientation specific SHGCs that cluttered up the 2015 and 2018 editions of the IECC. This simplifies the code and doesn't seem to be a large change substantively. The IECC approach is a good one, which also matches the ASHRAE 90.1-2019 standard, so the fenestration requirements are the same.

Steve: Talked about this on Monday in the Sub-workgroup, and he's in support of this. It is also cosponsored by the Energy Sub-workgroup.

Jeff: With no other comments or discussion, this is marked as Consensus for Approval.

EC-C403.3-21

Ben: This proposal would require dedicated outdoor air systems. There would be parallel systems and one would provide fresh outdoor air and the other would provide the heating and cooling. One advantage would be energy savings, as it would require much smaller fans. Another advantage would be that it allows more control over fresh air which has measurable impacts on health. This was also discussed in the Sub-workgroup.

Steve: Opposes the change.

Bill: Supports the proposal.

Jeff: Seeing no other comments or discussion, this will be marked as Non Consensus

EC-C403.4.1.6-21

Ben: This proposal was submitted for the 2024 IECC. It would allow for the utility company, third party provider and potentially others to have control over large quantities of thermostats to lessen the peaks and drops in the grid on hot days and help with brown outs. It would not affect comfort but would reduce strain on the grid.

Steve: Opposes this. He sees in the reason statement that 4 degrees was chosen based on the California energy code.

Andrew: Also in opposition.

Ben: California was used, knowing that they have a different climate, but that is open for discussion.

Mike O: Asked the proponent if a third party would be allowed to regulate the temperature of consumers' homes.

Ben: No.

Mikel O: What is the purpose?

Ben: To avoid peaks in the existing system.

Mike O: How?

Ben: Groups of buildings would be on a cycle, so that everyone is not ramping up the temperature at the same time.

Mike O: Who makes the decisions for the large groups of buildings?

Ben: The utility or third party provider would. This proposal would allow the technology to exist, and homeowners can opt in.

Mike O: Typed in the chat box that Petroleum and Propane associations are opposed to this proposal.

Bill: This puts technology in place for a critical measure to manage electric grids while keeping people comfortable. The utility or third party would allow customers to opt in, giving control of the short term fluctuation in energy flows, thereby smoothing out peaks to reduce costs. The consumer is usually paid to opt in. It is growing in availability around the country and in Virginia. He supports it.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

EC-C403.15-21

Ben: This proposal would require more efficient dehumidification systems for indoor agriculture (mainly cannabis farms). This is a very cost effective way to ensure that these buildings are as energy efficient as possible. There's also a lighting proposal coming, which is probably the most cost efficient.

Andrew: Asked if anyone is aware of this in the cannabis industry. He thinks it's important for someone in that industry to know about this and be involved with it. He is not comfortable with moving it forward unless someone in that industry is involved.

Ben: He hasn't reached out to any agricultural folks in Virginia. NBI has primarily worked with people in this industry in California, who have supported this.

Andrew: Thinks it should be Non Consensus because the industry it would affect is not here to discuss the proposal.

Steve: Asked Ben if he also spoke with people in Colorado about this.

Ben: Yes. They did help develop the code in Denver as well.

Bill: This is a case where Virginia should learn from other states. It should be done before the buildings are up and running. It's simple and sensible and he supports it.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

EC-C404.11-21

Ben: This proposal would require technology to be in place, which would allow commercial buildings to be on a cycle to ramp up their water heating. The building owners would get paid to opt in to the program. The cycle would not permit all buildings to ramp up at the same time, thereby causing strain on the grid. This would put the technology in place so that cyclical programs could be made available.

Andrew: Typed in the chat box "HBAV non consensus on 404.11"

Steve: Asked if the change doesn't require the building to do anything, but it gives them a choice to opt in, is that correct?

Ben: It puts technology in place, but doesn't require the building owner to subscribe. The water heater would have the capacity but it would not be turned on unless owner opts in.

Steve: It looks like the language says that if the water heater has a certain volume, the technology 'shall' be provided. It sounds like a mandate.

Ben: The water heater shall have the technology, but it would not be in use until the owner subscribes to allow the control of the water heater.

Bill: Supports this for same reason as the earlier demand-response program. This is a great place to help the grid. Plus, users are paid to participate.

Steve: It looks like the proposals don't stand alone; if one goes through, they both would.

Ben: They can be independent of each other.

Jeff: Hearing no other discussion, this will be marked as Non Consensus.

EC-C405.4-21

Ben: This is another indoor horticultural proposal, but related to lighting, which again is new to Virginia. Most places have LED now. This would put similar requirements on the marijuana industry in Virginia.

Andrew: Again, similar to the other one, he would want people from the industry to be able to provide input.

Bill: Also, like the other one, when the marijuana industry develops, it will explode and put burden on the utilities. At minimum, there should be lighting requirements in place up front. He thinks it's a sensible proposal and he supports it.

Ben: Would be happy to talk with people from the affected industry. He asked if anyone has a connection, to pass it along to him.

Jeff: Seeing no more discussion, this will be marked as Non Consensus.

EC-C405.13-21

Ben: He is happy to report that this proposal for a small amount of PV on commercial buildings just passed through the ICC consensus committee process. This will likely be in the 2024 IECC. It requires, with exception, a very small amount of solar panels to be placed on commercial buildings. This was discussed extensively in the Sub-workgroup.

Steve: Asked what the Sub-workgroup decided.

Jeff: Non Consensus.

Steve: Was in opposition then, and still is.

Bill: Is in support of this proposal.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

EC-C405.16-21

Ben: This is similar to the first proposal he discussed. Instead of requiring buildings to jump to all electric, this would get things ready for it. The upfront cost of running conduit and putting the electrical capacity in the building is way cheaper than doing it down the road. It would save people a lot of money not having to retrofit.

Steve: AOBA and VAMA Opposes

Andrew: In opposition as per comments made in the Sub-workgroup.

Bill: In order to combat climate change, electricity to the maximum extent possible needs to be implemented. Getting ready for it with relatively low costs up front will make the transition better and cheaper. It will benefit everyone. He supports it.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

EC-C407.6-21

Bill: ICC has a zero energy appendix, but to activate it, there needs to be a statement in the main body of the code. This would put a statement in the main body of the code to activate the appendix standard. It simply requires that there be truth in advertising, and formal confirmation of compliance with standards. He's willing to have it Carried Over for continued discussion and bring back to the June meetings.

Ben: NBI was highly involved in developing this proposal. It's a great opportunity for Virginia.

Steve: He is still in opposition to this, and is not sure that it belongs in a building code, due to it being about advertisement.

Andrew: Is willing to look at it further with others, as well as other proposals on the docket today.

Eric: Has seen stretch energy and net zero codes adopted across the country. Some are better than others. There was an improvement in the 2021 IECC with more standardized appendices. There would be real value to getting these programs similarly situated. He supports William's effort. It points to a standard that shows the consumer what a net zero energy building is.

Bill: Following the earlier discussions, he posted answers to some of the concerns raised in the public comment section, and he thinks there are solutions to advertising.

Jeff: This will be Carried Over.

EC-C1301.1.1-21

Jeff: Matt indicated he would carry this over until the June meeting.

Matt Benka: Confirmed that he wanted to carry this proposal over. This proposal is to revise materials or system requirements in this section, which may be not be needed or seldom used in construction. Some other states don't have this requirement, and Virginia contractors may have lost out on some business because of it. In the last session of the General Assembly, they submitted HB1289 which passed both the house and senate and was signed by the governor. He's not prepared today for a full presentation of this proposal. He and Jack Avis are available to discuss. He gave his direct phone # and website contact information.

Jack Avis: Examples would be a large warehouse heated to 60 degrees in the summer only or a manufacturing facility with a lot of residual heat from machinery, that doesn't run in the winter or a utility that needs to be above freezing to keep sprinkler pipes from freezing. Those are examples of the types of buildings that could be helped by this proposal.

Eric: Spent some time looking at the proposal and they are strongly opposed, as it is drafted now. He is willing to talk about it. It doesn't just exempt these buildings from improvements in the 2021 IECC it completely exempts them from the energy code. The statute that was passed requires BHCD to consider the proposal, but it would still exempt entire classes of buildings. Consider an Amazon warehouse, all of the systems could be exempt from the energy code. Other businesses that have people in them would be heated all the time. It requires very careful consideration to not exempt buildings that could easily comply.

Ben: Wants to echo Eric's comments that it seems like a very broad exemption for a large group of buildings and a more specific attempt would be better.

Jeff: This proposal will be discussed in the next Energy Sub-workgroup, and he encourages others to talk outside of and before that meeting to find common ground.

Matt: They don't want to be overly broad; they would rather be more specific. He would love to work together with others. He asked for participants to please contact him after this meeting.

Bill: Agrees with Eric. He thinks it's practically deficient, and also legally deficient. Square footage isn't the issue; cubic footage is the issue when talking about heating or cooling. Mass exemptions don't make sense. Tailored specific ones are better.

Jeff: This will be marked as Carried Over.

{BREAK: 11:05 – 11:10}

REC-R401.2-21 / REC-R401.2.5-21

Ben: These two proposals are the residential versions of all-electric and electric-ready buildings. The all-electric residential proposal is moving through the ICC process. The electric-ready building provides the same advantages of the all-electric proposal, but spreads the upfront costs out over time.

Jeff: Both of these were Non Consensus in the Sub-workgroup.

Andrew: Opposed, as discussed in the Sub-workgroup meeting.

Mike O: Opposed, as discussed in the Sub-workgroup meeting.

Bill: Supports these proposals, as electrification is essential to meet climate goals and is healthier for people.

Jeff: Seeing no further discussion, these two proposals will be marked as Non Consensus

REC-R402.1.2 (1)-21 / REC-R402.1.2 (2)-21 / REC-R402.2-21 / REC-R402.4-21 / REC-R402.4.1.2-21

Jeff: The next 5 proposals were heard by the Energy Sub-workgroup and the proponents have expressed that they are interested in carrying them over to the June meeting. He asked proponents if they wanted to discuss them in today's meeting.

Linda: Is fine with carrying these over, as there are productive discussions underway.

Bill: Willing to carry over until the June meeting. He would note that if a revised proposal needs to be submitted by May 1, discussions are urgent. Also, the EV readiness proposal being carried over applies to residential, but he will submit a commercial one also.

Jeff: May 1st is the cutoff date to get proposals submitted in cdpVA, and they can't be changed after that date. However, if work continues and there's an amendment after May 1, a Word document with those edits can be submitted to DHCD by at least a week or more before the June meetings, so that it can be included in the meeting for discussion.

Steve: Will be happy to meet with Bill about the EV commercial buildings.

Andrew: Is also willing to work with Bill. For single family homes, builders are offering EV capability and readiness options now.

Bill: Next week looks good to continue the discussions.

Jeff: These 5 proposals will be marked as Carried Over.

REC-R403.1.1.1-21

Ben: This is the residential version of the demand response thermostat proposal. It would put technology in place so homeowners can subscribe to programs down the road which will pay them for participation and minimize stress on the grid.

Jeff: This proposal was Non Consensus in the Sub-workgroup.

Eric: Speaking on his own behalf, he's familiar with cool keeper and other programs where consumers get a credit on their bill. This proposal doesn't require a big investment, only a thermostat with the capabilities when the home is built. Nobody wants to pay cost of tearing out an old thermostat and putting in a new one. If the homeowner elects to use it or not, it would be good to install the technology initially. This should be carried forward and discussed further.

Andrew: This was Non Consensus in the Sub-workgroup. He would be happy to continue the conversation, but he's opposed as it is now.

Bill: Is in favor of this.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

REC-R403.1.2-21

Bill: This proposal requires heat pumps to be used in electric buildings. Instead of installing electric resistance heat in new buildings, put in heat pumps. It was noted at the last meeting that 403.1.3 said "as a replacement in an existing unit". It may make sense to carry this over so that can be addressed.

Andrew: Thought that this was carried over in Sub-workgroup, as well as 403.3.3.

Jeff: This will be marked as Carried Over

REC-R403.3.3-21

Eric: Anyone can reach out to him to be involved in the continuing discussions. This proposal adopts the 2021 IECC provisions for duct testing.

Jeff: This will be Carried Over.

REC-R403.5.4-21

Ben: This proposal gives home owners the opportunity to help save money and reduce wear on the grid. It's basically the residential version of the previous commercial building water heater proposal.

Andrew: HBAV is Non Consensus

Bill: Supports this proposal, for the same reasons already given in prior discussions about similar proposals.

Jeff: Seeing no further discussion, this will be marked as Non Consensus.

REC-R404.2-21

Bill: This proposal is about solar readiness for single family and townhouse residences. It doesn't extend to large multi-family residential occupancies. It provides for readiness by putting in a conduit for solar equipment to be added later. There's a solar-ready provision in the current code, but it's in the appendix, and this would activate it. He's happy to carry it over if needed.

Ben: Is very much in favor of this proposal. They submitted a similar one. He would be happy to work with Bill.

Dawn: Supports this. The RVA Green 2050 has been in the works for many years already, and solar ready is prioritized as an important strategy to accomplish the goals.

Jeff: Andrew stepped away, but he indicated his non-support for this proposal and the next one in the chat box: Andrew Clark: I've got to leave for another meeting, but you can put HBAV down as non-consensus for the remaining two proposals.

Jeff: This proposal will be marked Carried Over.

REC-R404.4-21

Ben: This is his version of the proposal that Bill just discussed (REC-R404.2). He would like to carry it over to work towards consensus.

Bill: Would be happy to work with Ben and Andrew.

Jeff: Would this proposal correlate with R404.2?

Ben: yes

Jeff: Do you both want to carry both of these over?

Bill: Yes

Ben: Yes. They will work together on these last two proposals.

Jeff: This proposal will be marked Carried Over.

Next Steps:

Jeff: Workgroups continue to meet this week and next week. The decisions made in the Workgroups for the proposals discussed will be updated in cdpVA. They are currently working on correcting a glitch in the cdpVA system in order to be able to post the decisions. The final cutoff to submit proposals in this cycle is May 1. The final round of Workgroup meetings will be in June. All proposals considered by the Workgroups will tentatively go to the BHCD in September. He thanked everyone for their participation.

General Stakeholder Workgroup Meeting

April 15, 2022 9:00 a.m. – 10:38 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VMC & SFPC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Group Participants:

Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Andrew Milliken: *Virginia Fire Services Board (VFSB) - Fire Codes and Standards Committee*
Dale Powers: *Virginia Elevator Safety Association (VAESA)*
David Settle: *VAESA*
Joshua Davis: *Virginia State Fire Marshal's Office*
Lee Stoermer: *Loudoun County Fire Marshal's Office*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Matthew Mertz: *Fairfax County*
Michael Henley: *VAESA, Virginia Department of General Services (DGS)*
Michael Redifer: *VAESA*
Paula Johnson: *VAESA*
Ron Clements: *Chesterfield Building Official, representing himself*
Sarah Thomas: *Virginia Association for Commercial Real Estate*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome:

Paul Messplay: Gave an Adobe Connect tutorial of the features available.

Jeff Brown: Briefly reviewed the 2021 Code Development Cycle workflow. He shared the presentation on screen and in the file pod available to download. Highlights included:

- DHCD staff were identified by name
- tentative dates in the 2021 Code Development Cycle
- final phase change – no new proposals accepted after May 1st deadline
- cdpVA and DHCD web sites
- base documents
- meeting types and topics

Participants introduced themselves, and who they represent.

Jeff: Noted that the meeting agendas are prepared and sent out well in advance of the meetings. He encouraged group members to review proposals and contact proponents if needed before the General Workgroup meetings, so that potential issues could be discussed and consensus reached when practicable. He asked participants to stay muted when not speaking, to let the group know if they are speaking for themselves or for the group they represent, and to be clear on voting in favor of or in opposition to the proposals.

Proposals:

FP103.1-21 – SFPC SWG Proposal

Jeff: This proposal is from the SFPC Sub-Workgroup, where all the items on the spreadsheet were discussed at length and the proposal as a whole was voted as Consensus for Approval.

Steve Shapiro: Supports the proposal.

Andrew Milliken: Supports the proposal.

Jeff: With no additional discussion or comments heard, this was marked as Consensus for Approval.

FP107.11-21

Jeff: This proposal from Joshua Davis was submitted after the last SFPC Sub-Workgroup meeting, so it was not discussed in that group.

Joshua Davis: He will bring the proposal to the next SFPC Sub-Workgroup meeting for comments, but he would be happy to answer any questions today in this meeting. This proposal is about fees levied by the State Fire Marshal's Office for recovery of costs. The State Fire Marshal's Office is funded 60% through the general fund and 40% through revenue recovery for permit and inspection services. The current 2018 fee schedule still reflects the fees set in 2003. The purpose of the proposal is to update the fees according to the increase in costs since 2003. Permits required for food trucks were set in the 2018 code, but there were no associated fees set for the Fire Marshal to recover costs. This proposal sets the fee for that type of permit. Further in the document, there are also new fees listed, which were never levied in the past. These fees are set in the fire code for the whole state. Many localities were appraised to see what a good average price would be for the whole state.

Steve: Asked Joshua if he could clarify when the State Fire Marshal would be involved vs. the local Fire Marshal, and when these type of fees would be collected for the state.

Joshua: The State Fire Marshal is the fire code official for any locality that hasn't adopted the fire code and appointed an official to enforce the code. Currently, the State Fire Marshal is in charge of 62 of 95 districts in Virginia. The State Fire Marshal is also the fire code official for all state facilities, such as state universities, correctional facilities, Capitol buildings, etc. Fees for mobile food trucks are charged and collected by either the State or local Fire Marshal, based on the locality where they are registered. Any food truck coming into Virginia from another state would need to get a permit from the State Fire Marshal.

Steve: Asked Joshua to clarify if item #7 about fireworks was under the purview of the State Fire Marshal.

Joshua: Only if the locality is not involved. If the locality is already involved, the State Fire Marshal would not charge a separate fee.

Jeff: Asked if there were any other comments or questions. As none were given, this proposal was marked as Carried Over to be presented at the SFPC Sub-workgroup before coming back to the general Workgroup in June. Anyone is invited to attend the Sub-workgroup, but only group members will vote on proposals.

FP107.12-21

Jeff: This is a DHCD staff proposal. It is a companion proposal to one made in the USBC. There was a change in oversight of Family Day Homes put into effect on July 1, 2021. Previously, oversight and licensing was done by the Department of Social Services. Family Day Homes are now licensed by the Department Of Education. There was no change to the fee structure in this proposal. Hearing no further discussion, this was marked Consensus for Approval.

PM505.3-21

Ron Clements: This proposal is to being made to clean up the wording in the provisions. It may have been cut and pasted from the construction or plumbing code provisions, so he's making the language clearer that it's part of the maintenance code.

Jeff: Asked for comments or questions, and hearing none, this was marked as Consensus for Approval.

PM606.1-21

Jeff: This proposal is from Michael Redifer, on behalf of VAESA. Earlier in the day, Jeff spoke with Michael, who agreed to some edits which the DHCD staff suggested. The revised language was shown on the screen. There was a reference to an appendix with specific periodic testing required, and at some point, the reference was removed from the code. Because of this, it wasn't clear when these periodic tests were to be performed. The document shared on the Adobe Connect screen showed changes to the 2021 International Property Maintenance Code. Since there is an existing Virginia amendment to this section, the proposal would have to modify the Virginia Maintenance Code. If the stakeholders agree with the changes shown, the proposal will be edited in cdpVA to show the changes to the appropriate code book – 2018 Virginia Maintenance Code.

Michael Redifer: This doesn't really change anything that's being done, it just provides the authority to do so. The referenced appendix wasn't in the Virginia Property Maintenance Code. The reference to section 8.11 of ASME was put into the Virginia amendment to make sure that the proper people were conducting the tests.

Steve: Supports this proposal.

Jeff: With no other discussion offered, this was marked as Consensus for Approval as Modified.

PM703.2-21

Ron: In this proposal, the provisions that were eliminated are already not valid based on the hierarchy in the code. In section 703.3, the wording was updated using maintenance language, and the sentence about openings belongs in the Existing Building Code, not in the Maintenance Code. Vertical shafts are a retrofit provision from chapter 11 of the International Fire Code. The fusible link retrofit provision in 703.8 is a construction provision, not maintenance. These were all administrative edits to clean up the code.

Jeff: Hearing no further comments or questions, this was marked Consensus for Approval.

{BREAK 10:05 – 10:10}

PM704.1.1-21

Ron: This proposal is for administrative edits to clean up the code. In section 704.1.1, alterations or repairs belongs in the existing building code, so it was deleted. Section 704.1.3 does talk about maintenance, so it was moved to section 704.1.1. In section 704.1.2, design option belongs in the construction code, so it was deleted.

Jeff: Hearing no further discussion, this was marked as Consensus for Approval.

PM704.2-21

Ron: This proposal removes specific standards and a table laid out in the maintenance code, and simply points the user to perform maintenance according to the standards already laid out in the SFPC.

Jeff: Hearing no further discussion, this was marked as Consensus for Approval.

PM704.3-21

Ron: If a fire protection system is out of service, after the maintenance inspector reports it to the fire official, their job is done and any further responsibility belongs to fire official, as defined in the SFPC. For this reason, section 704.3 was cleaned up and section 704.3.1 was deleted.

Steve: It seems like something is missing in the first line and it doesn't read properly.

Joshua: He would recommend, "Where a required fire protection system is found or discovered to be out of service, it shall be maintained."

Ron: Agrees. He is open to changing the wording.

Steve: How about "When found to be out of service, it shall be maintained in accordance with the SFPC." Is that what you are trying to capture here?

Ron: Not quite. They want to maintain the system not only when it's out of service.

Andrew M: How about replacing "done" to read "placed out of service or taken out of service"?

Ron: Agrees to taken out of service. He typed in the chat box

"Where a required fire protection system is taken out of service, it shall be taken out of service in accordance with the SFPC... "

Lee Stoermer: Asked if it's about a system that is either found to be out of service, or is purposely taken out of service, and for what reason? He typed this in the chat box:

"Where a required fire protection system is taken out of service for service or maintenance, it shall be taken out of service in accordance with the SFPC....."

Andrew M: It doesn't matter why it's out of service. The owner could have turned it off because there was a leak. The violation would be that a system was somehow taken out of service in a way that's not in accordance with the SFPC. Ron's version is more apt to cover all scenarios.

Jeff: Hearing no further discussion, this was marked as Consensus for Approval as Modified as per Ron's new wording.

PM704.4-21

Ron: The maintenance and building codes address the building. Addressing a hole in the wall is different than citing the person who made the hole. In this case, tampering with or removing something that was put in place by the fire official doesn't belong in the maintenance code.

Jeff: Hearing no further discussion, this proposal was marked as Consensus for Approval.

PM704.5-21

Ron: If a maintenance inspector sees a bush in front of a fire connection, it should be reported, but gates and fences are the responsibility of the fire inspector. These sentences were deleted for that reason. Additionally, the word "provided" was removed, and the word "maintained" was left as appropriate to this code.

Jeff: Hearing no further discussion, this proposal was marked as Consensus for Approval.

PM705.1-21

Ron: The proposal is to delete 705.1 about retrofitting carbon monoxide alarms per Chapter 11 of the IFC. This doesn't belong in the maintenance code. The proposal was going to delete the reference to NFPA 720, however it will be part of the ICC code change for 2024 throughout all codes, so it can stay until next cycle to be coordinated with the changes to other references of NFPA 720. The proposed modification to the original proposal was shared on the screen.

Jeff: Hearing no further discussion, this proposal was marked as Consensus for Approval as Modified.

Next Steps:

Jeff: Thanked everyone for their participation and let them know that residential and trade Workgroup meetings will be held next week, and are the only two remaining for April. The next cycle of Workgroup meetings will be held June 7-15. He reminded everyone to submit any new proposals to cdpVA by May 1. DHCD staff will update all proposals in cdpVA with decisions made in the Workgroups as soon as a system glitch is fixed.

General Stakeholder Workgroup Meeting

April 19, 2022 9:00 a.m. – 10:02 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

VRC Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*

Group Participants:

Aaron Sutch: *Solar United Neighbors*
Al Larsen: *Ipsun Solar*
Andrew Clark: *Home Builders Association of Virginia*
Andrew Milliken: *Stafford County Fire and Rescue, Fire Services Board Codes and Standards Committee, Representing himself*
Daniel Willham: *Fairfax County*
KC Bliele: *Viridiant*
Nolie Diakoulas: *Convert Solar*
Ron Clements: *Chesterfield County*

Welcome:

Jeff Brown: Welcomed the participants. He noted that the meeting is being recorded and there will be breaks every hour.

Paul Messplay: Gave an overview of the Adobe Connect meeting room features.

Jeff: Reviewed the 2021 Code Development Cycle presentation with the following highlights:

- DHCD staff were identified by name
- Important dates in the cycle were reviewed
- cdpVA and DHCD website contents
- Study Groups, Sub-workgroups and Workgroups
- Base documents, proposals and regulations

Al Larsen: Asked which version of codes will be in effect as of July 1 2022.

Jeff: The 2018 codes are in effect currently, as of July 1, 2021. The 2021 codes will potentially go into effect in 2023, sometime in the second half of the year. The 2018 codes will remain in effect until that time.

Workgroup participants introduced themselves and who they represent.

Proposals:

Jeff: The two proposals on the agenda are for the same code section. If there is no opposition, the group will discuss both of them together. Group members voted to discuss both proposals together.

RB324-21

Al Larsen: Thanked the DHCD staff for their assistance. At the last meeting, this proposal was presented and some of the fire protection folks were concerned about making the changes as proposed, due to safety issues. Since then, there was discussion between solar representatives and fire protection representatives. They came up with language that adequately protects safety and eliminates impediments to solar installation. The proposal discussed at the previous meeting was modified to revert back to the 2018 language on 6.1 pathways. The 6.2 setback at the ridge provision says not less than an 18” clear setback is required on both sides of a horizontal ridge.

Jeff: Is there an additional amendment from what is presented on the screen now (and in cdpVA)?

Al: Yes, he did supply that to the DHCD staff. Again, the 6.1 reverts to the 2018 language and 6.2 was modified as described.

Nolie Diakoulas: Sent the latest revision to Jeff, which was agreed upon. It takes out the complications of having to figure out percentages. The new language clearly states 18” path on each side, which gives 36” for safety purposes.

Al: They aren’t proposing eliminating the 6.1 pathways, they are proposing reverting back to the 2018 language.

Jeff: It sounds like there will be no change to the 2018 IRC, and without change, the 2021 IRC will be incorporated into the 2021 USBC. There would need to be an amendment to the 2021 IRC to revert back to the language of the 2018 IRC.

Al: Yes, correct.

Nolie: The agreed upon edits to 6.2 and 6.2.1 were shown on the screen.

Jeff: They would need to take the 2021 IRC language and revert back to the 2018 IRC language.

Al: Yes, again, the 6.1 pathways provision would revert to the 2018 Language.

Andrew Clark: Requested the DHCD staff to send the document shown on the screen to the group. Is this only for homes that plan to have rooftop solar?

Al: Yes, that’s correct.

Jeff: Let the group know that the document is available for download in the files pod.

Andrew Milliken: The FSB met and discussed the proposal. The original opposition was to the changes to pathways. There’s no opposition to the ridge setback provision.

Jeff: Asked Andrew M to clarify that section 324.6.1 reverting back to 2018 IRC language is acceptable.

Andrew M: Has no problem reverting to the 2018 language for pathways.

Al: Appreciates the extra time that was allowed to work through the issues between solar and fire. They reached a compromise that works for everyone.

Jeff: It sounds like there is no opposition to reverting 6.1 to the 2018 IRC language, and changing 6.2 as noted.

Dan Willham: Is the language about adjacent plane somewhere in this section?

Nolie: Yes, in the 2018 code.

Jeff: If the language on the screen is acceptable, DHCD staff can make the change in cdpVA.

Note: At this point, Jeff directed the group conversation to proposal **RB324.6.1-21***. At the conclusion of that discussion, the group returned to* **RB324-21** *to continue the dialogue and vote.*

RB324.6.1-21

Jeff: This proposal was submitted by Jason Laws, who was not on the call. Jeff asked if anyone was able to present the proposal on behalf of Jason.

Dan: Can't speak for Jason, but this is identical to what was presented a few weeks ago at the ICC hearings in Rochester. There was a lot of opposition to it, even from folks in the solar industries. There was a representative from UL who was going to reach out to Jason to discuss it further. He thinks it might be a good idea to carry this proposal over.

Nolie: This is his first time seeing the proposal. It seems almost the same as what they are proposing; a 36" pathway on all mounting plains. He doesn't see any difference.

Jeff: Asked the group if there was any opposition or support for this proposal.

Nolie: Since he has had a chance to read this, he opposes it. It makes things more complicated than the original language in 6.1.

Al: Also likes having no revision to section 6.1. He agrees with Nolie that it complicates matters. In addition, their proposal was agreed upon with solar and fire folks, and since the proponent is not present to discuss this proposal, it doesn't add value. He can't support this now.

Aaron Sutch: Also agrees with Al & Nolie. Solar and fire representatives agreed on the prior proposal with no changes. He opposes this proposal.

Jeff: Hearing no further discussion, this will be marked as Consensus for Disapproval

RB324-21 (Continued)

Jeff: DHCD staff confirmed that there were no changes to section R324.6.1 between the 2018 and 2021 editions. Therefore, there would be no changes necessary to that section in this proposal. The only changes would be to section 6.2 to say that there will be not less than an 18 inch clear setback required for both sides of a horizontal ridge. All other language would be stricken from section 6.2.

Al: Confirmed that was accurate.

Jeff: Asked if there was any opposition or support for this proposal. A vote on this proposal resulted in Andrew M., Aaron and Nolie stating support for the proposal.

Dan: Asked if solar panels completely cover a roof, would this reduce or extend ridge pathways?

Nolie: Neither. It sets the access at 36" and doesn't get into % of coverage.

Dan: According to the last sentence that's stricken in this proposal, if a roof has more than 33% coverage, there would be a 72" path required.

Nolie: That is correct. The agreement with fire personnel is that 3 feet is fair enough workable space.

Dan: Asked Andrew Milliken if the path is for walking or venting.

Andrw M: A combination of both. The pathway to the ridge is important. This would ensure that there's a 36" path from the bottom edge of the roof to the ridge and across. It's a good compromise to look at ridge setbacks instead of only pathways to the ridge.

Dan: Is there any problem with 18" access?

Andrew M: The ridge usually has a vent, and 18" gives fire personnel enough access to work there. They would like more, but the 18" is adequate and acceptable.

Dan: Are solar panels typically on both sides of the ridge?

Nolie: Yes, especially on East / West facing roofs.

Jeff: It seems that there is support for this proposal with no opposition. The other proposal seemed to have some opposition. Hearing no further discussion, group members indicated approval with thumbs up. This proposal will be marked as Consensus for Approval as Modified, as shown on the screen. DHCD staff will make the corrections in cdpVA.

Next Steps:

Jeff: Thanked everyone for their participation and for the work done outside of the Workgroup meeting space to reach a compromise on the proposal. May 1 is the deadline to submit proposals in cdpVA for the last round of Workgroup meetings in June.

General Stakeholder Workgroup Meeting

April 20, 2022 9:00 a.m. – 9:11 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

Trades Proposals

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Group Participants:

Andrew Grigsby: *Viridiant*
Brent Werlein: *Virginia Beach Public Utilities, representing Hampton Roads Planning District Commission Fats, Oil and Grease (FOG) Subcommittee*
Richard Grace: *Culpeper County Building Department, representing Virginia Plumbing & Mechanical Inspectors Association (VPMIA)*

Welcome:

Jeff Brown: Welcomed the participants to the Trades Workgroup meeting. He reminded participants that the meeting is being recorded. He asked group members if they wanted to see either the Adobe tutorial or the Code Development presentation. Members were already familiar with the materials, so they declined.

Participants introduced themselves, and who they were representing.

Proposals:

P1003.3.2-21

Brent Werlein: This proposal addresses food waste grinders bypassing grease interceptors. He originally used language from the 2012 code, and revised it using the 2015 code language.

Jeff: Showed the original proposal and the revision on the screen.

Richard Grace: Worked with Brent on this proposal. Originally, it was a mixture between the past and the present. After the language was tweaked, it made full sense. VPMIA is in full support of the proposal.

Jeff: Hearing no further discussion, the group voted with thumbs up. This proposal was marked as Consensus for Approval as Modified

M410.2-21

Jeff: This proposal is from Jonathan Sargeant, not on the call. Jeff asked if anyone wanted to speak about it.

Richard: Agrees with the reasoning of the proposal. The original language restricted a test port to be located 10 pipe diameters downstream of the MP regulator, and didn't allow for alternatives. The way that Jonathan worded it, other viable options are able to be used. He fully supports it.

Jeff: With No further discussion offered, the group voted with thumbs up. This proposal was marked as Consensus for Approval.

Next Steps:

Jeff: Reminded the group that the final cutoff date to submit proposals in cdpVA is May 1st for the June Workgroup meetings.

General Stakeholder Workgroup Meeting – VCC Proposals
June 7, 2022 - 9:00 a.m. – 3:07 p.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Thomas King: *Code and Regulation Specialist, SBCO*
Chad Lambert: *Southwest Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Al Clark
Allison Cook: *Arlington County, VA*
Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Chuck Vernon
Conrad Speckert
Craig Toalson: *HBAV*
Daniel Willham: *Fairfax County and Virginia Building and Code Officials Association (VBCOA)*
Dannie
David Beahm: *Warren County*
E Wells
Edwin Ward
Emad Elmagraby
Gregg A. Karl
Jacob R. Newton: *Virginia, Maryland & Delaware Association of Electric Cooperatives VMDAEC*
Jason Laws: *Chesterfield County and VBCOA*
Jimmy Moss: *VBCOA*
John Armstrong: *Dominion Energy Services*
John Russell
Joseph C. Ransone
Lankika Perera
Linda Baskerville: *Arlington County Energy Plan Review*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Lyle Solla-Yates: *Representing himself*
Mary Koban: *Air Conditioning Heating and Refrigeration Institute (AHRI)*
Matt Smolsky: *PWC*
Matthew Cobb
Michelle Congdon
Paula Eubank: *FEMA*
Rebecca Quinn: *RC Quinn Consulting for FEMA*
Richard Gordon: *Hanover County and VBCOA*
Richard Grace: *Fairfax County and Virginia Plumbing and Mechanical Inspectors Association (VPMIA*
Ron Clements: *Chesterfield County Building Official*
Rory Stolzenberg: *Charlottesville Planning Commission*
Sarah Cosby: *Dominion Energy*
Sean Farrell: *Prince William County and VBCOA*
Shahriar Amiri: *Arlington County*
Snider: *ACFD*
Steve Orlowski
Steve Shapiro: *Apartment and Office Building Association (AOBA) and Virginia Apartment Management Association (VAMA)*
Taylor
Tod Connors*: Arlington County*
Tom H
Troy Knapp
William Abrahamson
William (Bill) Penniman: *Sierra Club, Virginia Chapter*

Welcome and Introductions

Jeff Brown: Welcomed participants. Let them know there would be a five-minute break each hour and an hour lunch break at noon. There's a full agenda with over 40 proposals, so the meeting may run until 5:00 p.m.

Paul Messplay: Gave a brief tutorial of Adobe Connect features.

Jeff: Gave an overview of the 2021 Code Development Cycle, using a slideshow presentation attached as part of the meeting documents. Discussion covered the following points:

- DHCD staff were identified.
- The 2021 code development cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, carry over, and withdrawn.
- May 1st was the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.

Jeff: Due to time constraints, participants did not introduce themselves, and who they were representing at the beginning of the meeting. Jeff asked them to introduce themselves and who they represent the first time that they speak, and if they are representing another group in a later proposal. The proposals provided on screen and in the files pod should be the most current version. There should not have been any modifications since May 1st, unless there is a floor modification. Some proposals with VCC changes may also be discussed in other General Workgroup meetings this week and next week, if they apply to more than one code.

B105.1.1-21

Jeff: This proposal was developed by the Resiliency Sub-workgroup. It adds additional qualifications for the Building Official and Technical Assistants related to knowledge of floodplain and high-velocity wind construction.

David Beahm: Is concerned about making an extensive list of things which are already covered under sound engineering practices.

Jason Laws: Chesterfield County. The requirement is ok for the Building Official but is not necessary for others.

Steve Shapiro: As a member of the Resiliency Sub-workgroup, the sub-workgroup thought it was necessary to highlight flood plain and high-velocity wind construction. To Jason's point, it only asks for "general knowledge". It's important for resiliency.

Andrew Clark: HBAV and Resiliency Sub-workgroup. Jason has a good point. How is general knowledge assessed and who assesses it? He may be inclined to change his opinion from what it was in the Sub-workgroup. It makes sense for the Building Official to have knowledge, but maybe not for others.

Steve S: The term "general knowledge" was already in the code, it isn't new with this proposal.

Shahriar Amiri: Building Official, Arlington County. He's neutral about this. General knowledge is a general term, not specifically defined.

Andrew Milliken: Agrees with Jason. Needing Technical Assistants to have flood plain and high velocity training is overreach. He opposes this proposal.

Allison Cook: Typed in the chat box:

Allison Cook - Arlington: Arlington VA speaking in opposition to B105.1.1-21 for the inclusion of the requirement that technical assistants need to have flood plain and high velocity wind construction

Jeff: Since it came from the Resiliency Sub-workgroup, there won't be a floor amendment, but the conversation will be captured.

Shahriar: Doesn't think it's appropriate having requirements for Technical Assistants in this.

Steve S: Thinks the proposal is ok as it is worded now.

Jeff: The Sub-workgroup members could be polled after the meeting and include results in the summary to the

BHCD if it looks like there's consensus in this Workgroup for a particular change.

Allison: Arlington. This isn't really a laundry list of things required for Technical Assistants, it is just asking for knowledge in one of those areas at a minimum. However, for all Technical Assistants to have general knowledge of flood plain and high velocity doesn't seem right. Perhaps it could be in the list as an option.

Jeff: The Resiliency Sub-workgroup will look at the resiliency impact analysis of proposals before they go to the BHCD, so this proposal can also be added to their agenda.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

B118-21

Ron Clements: The original language in this Section was cut and pasted from the Maintenance Code. This proposal updates the wording to construction-type language, more consistent with in the VCC. The definition of unsafe structure was removed. If a building or structure becomes unsafe during construction, as per the code in Section 118, there's a remedy (correction notice) in Section 118.2 and notice of violation in 118.3. Vacating an unsafe structure or posting a placard was removed, since that is maintenance language. Unsafe terminology was deleted from emergency repairs provisions.

Shahriar: Is concerned about removing the wording about vacating the structure, since a part of the building can become unsafe during alteration or revision, which would be the responsibility of the Building Official.

David: In Section 118.1, "immediate threat" on the fourth line should be moved to the third line, so it covers everything.

Ron: Asked if Shahriar is ok with the proposal if Sections 118.5 and 118.6 are not deleted.

Shahriar: Yes, if those are kept, it alleviates his concern.

Jeff: Asked for changes to be typed in chat box.

Ron: Keeping 118.4.1, 118.5 and 118.6.

Typed in chat box:

Ron Clements Chesterfield BI: Keep 118.4.1, 118.5, 118.6, 118.1; second line of 118.1 add "immediate" be tween "a" and "threat"

Jason Laws: ... determined by the Building Official to be an immediate threat to public safety due to faulty construction, deterioration, damage, structural instability, or another condition.

Jason Laws: need to remove another condition as well

Jason Laws: ...determined by the Building Official to be an immediate threat to public safety due to faulty construction, deterioration, damage, structural instability.

Jeff: This will include the floor amendment. Hearing no further discussion, this proposal will be marked Consensus for Approval as Modified.

B107.1-21

Jeff: This proposal was submitted by the DHCD staff. A sentence was added about fees levied, which is related to requirements in the State Law.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

{BREAK: 9:57 – 10:02}

B108.2-21

Jeff: The proponent was not on the call, so the floor was opened for discussion.

Steve S: Agrees with the proposal. The math supports it.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B108.3-21

Allison: This proposal allows for online permitting where available. It doesn't prevent in-office permitting.

Andrew C: HBAV. Asked if it could be more difficult for people who are not able to do it online. But, he doesn't have any problem with the proposal as it is written.

Paula Eubank: Typed in the chat box:

Paula Eubank: B108.3-21 please clarify "unless applicant voluntarily chooses otherwise". Does this intend that they may still submit via mail?

Allison: It will not prevent in-person delivery of the application. People would still have that choice

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B109.4.1-21

Jeff: The proponent was not available to present the proposal. He opened floor to discussion.

Linda Hale: Has a concern about DHCD staff resources being available for certifying third party reviewers, which is based on performance.

Jeff: DHCD is limited in the types of certifications offered. Certifications are offered to third parties, however, Linda's question is a good one.

David: Objects to this proposal. It requires another written policy from the Building Official.

Sean Farrell: Would this be retroactive to third party approvals in all jurisdictions?

Jimmy: There's already a system in place. This would be putting the burden on Building Official. He's opposed to this as written.

Jeff: Hearing no further discussion, he asked if there was any support for this proposal. With no support, this proposal will be marked as Consensus for Disapproval.

B113.3-21

Jeff: This proposal came from the Resiliency Sub-workgroup. He opened the floor for discussion.

Rebecca Quinn: typed in chat

Rebecca Quinn: I just wanted to point out that the same inspections are in the I-Codes -- two times submitting elevations in SFHAs.

David: Building Officials may not be qualified to do elevation inspections, so he is concerned about not having provisions for a third-party inspector approval process.

Rebecca: RC Quinn Consulting. Working with FEMA as they transition some personnel in region 3. The I Codes require submission of elevation documentation as part of inspection during construction. This should say "as part of the foundation inspection, submission of elevation documentation is required" so that there's no judgement needed by the inspector, just submission of documents. Documentation gets reviewed back in the office. Also, submission of elevation documents are needed prior to final inspection.

Paula: The field inspection is a verification of the elevation certificate and the floor elevation by use of documentation submitted.

David: Objects to this proposal as it is written, as well as where it is located.

Shahriar: Typed in the chat box:

Shahriar Amiri, Arlington County: I agree with the last commenter.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

B115.2-21

Jeff: The proponent was not on the call, so the floor was opened for discussion.

David: Thinks the language is not written correctly. It names other parties that don't need to be involved. He doesn't agree with or support this proposal.

Jimmy Moss: Agrees with David. He is in opposition to this proposal as it is written.

Sean: Agrees that the language as written doesn't work. It would prevent the permit applicant from being responsible for work that they were not licensed to perform.

Jeff: Asked the group if there was any support for the proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

B202-21

Jeff: This is a Resiliency Sub-workgroup proposal.

Paul Messplay: This proposal correlates definitions from the National Flood Insurance Program.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B202(2)-21

Jeff: The proponent was not on the call, so the floor was opened for discussion.

Sean: It removes responsibility from the permit-holder. He objects to this proposal.

Jeff: Asked the group if there was any support of the proposal. Seeing none, this proposal will be marked as Consensus for Disapproval.

B407.4-21

Dan Wilham: Fairfax County. This Section references a Section in Chapter 10, which Virginia deleted. The proposal is to clean up language and to fix a broken link. There were comments in another meeting, so the floor amendment seen on the screen is to address those comments. The fire code provides for the authority or requirement for fire safety plans. The amendment gives two options. One is to point to the fire code and clarify the fire safety construction procedures. The second choice is to delete the reference to fire safety evacuation plans.

Jeff: Asked for discussion about options and if there was support or not.

Andrew M: Asked what would change in the current code for option 2.

Dan: It deletes a reference to a Section in Chapter 10 which doesn't exist.

Steve S: Likes option 2.

David: Likes option 1, but he is ok either way.

Typed in the chat box: Shahriar and Richard Gordon like option 2.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified using option 2.

B432(2)-21

Shahriar: This proposal aims to mitigate hazards of lithium ion battery storage systems and EV charging stations. This is in Chapter 12 of the existing International Fire Code. This new section brings installation requirements from Chapter 12 of the IFC to the 2021 VCC. It also requires additional inspection for newly installed systems. Stakeholders from several localities and industries met outside of the official code development meetings to discuss this at length. Equipment is not regulated, but the building is, where the equipment is located.

Jeff: There's a similar proposal, FP1207, from the SFPC Sub-workgroup. Most of it is maintenance, but a part of it does the same thing as this one. That proposal will be discussed on June 10.

Shahriar: In Virginia, there's been jurisdiction issues about who enforces what. This brings construction-related ESS provisions into the VCC instead of deciding if it pertains to construction or maintenance.

Sarah Cosby: Dominion Energy. They have potential amendments for the group to consider. They would like language from the IFC pulled in (as the other proposal to be heard on June 10th does). It would be straight-forward and clear. The other option would be to pull in language from NFPA provision 855, which includes exemption language for Nickel Cadmium or Lead Acid batteries. Either of those would make the proposal acceptable, and they would support it.

Shahriar: Has no objection to bringing in NFPA 855.

Bill: Speaking for himself, he asked how this applies to a residential customer who wants to put in an off-the-shelf Tesla battery pack on their own.

Shahriar: This doesn't apply to residential. IRC has its own section that addresses his question.

Bill: He asked why only lithium ion batteries would be specified, and not the other battery types.

Shahriar: Runaway. It takes 6-8 hours to put out a fire, using 30,000 gallons of water. The runoff is highly acidic and hazardous, which requires a neutralizer. Nickel Cadmium and Lead Acid batteries do not have the same hazards.

Shahriar: typed in the chat to amend according to the Dominion Energy request:

Shahriar Amiri, Arlington County: Lead-acid and nickel-cadmium battery systems that are designed in accordance with IEEE C2, used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and locations outdoors or in building spaces used exclusively for such installations shall not be required to comply with this Chapter.

Sarah: Typed in the chat box:

Sarah Cosby: The language shared by Mr. Amiri at Dominion's request is sourced from NFPA 855. Thank you

Richard Gordon: Hanover County. He supports anything that would go through on this issue. A new section, a pointer to the IFCC provisions for ESS or otherwise.

Jacob Newton: Virginia Electric Cooperative. In support of either amendment.

Shahriar: Because of the thermal runaway, a special inspector should be used and a pointer to the IFC would not make that clear, while this proposal adds specific requirements for special inspections of ESS.

Andrew C: HBAV. Asked Shahriar to point out the language that says that this doesn't apply to residential.

Shahriar: That is in the VCC administration section, and there's also a section in the 2021 IRC dealing with Energy Storage Units. However, he can add a caveat to say that it doesn't apply to residential one and two family dwellings at the beginning of this section.

Florin Moldovan: typed in the chat box:

Florin Moldovan - DHCD: See VCC Section 310.6 and 2021 IRC 328.

Andrew C: However, it would apply to multi-family dwellings. He asked if anyone on the call knew if this would conflict with any of the Energy proposals that are being proposed.

Allison: Doesn't think this conflicts with other EV proposals. She thinks it adds an additional layer of safety.

Andrew C: Agrees with Allison. Conflict may not have been the right word. He was thinking that this proposal should be reviewed in conjunction with other EV proposals. He would still appreciate a note in this section that it doesn't apply to one and two family residential units.

Bill: Wanted to clarify that this proposal applies to stationary battery storage systems, but doesn't preclude parking EV cars, or charging them.

Shahriar: This doesn't preclude EV cars from charging anywhere. It deals with mobile mega packs.

Andrew C: To clarify, it does not deal with motor vehicles or single family, but it does address multi-family dwellings with structured parking and designated spaces?

Shahriar: Not this proposal. This is a stand-alone proposal for stationary Energy Storage Systems.

Jeff: Asked if anyone supports proposal as amended by Dominion Energy. Several individuals voted yes. He asked if anyone objects to the proposal as amended by Dominion Energy. There were no votes in opposition. He reminded the group that a similar proposal is going to be heard in the Workgroup meeting on Friday.

Andrew C: Did anyone in the commercial industry look at this?

Shahriar: Yes.

Jacob: Is this something that will be compared with the proposal on Friday?

Jeff: They are heard individually. If both are consensus for approval from the Workgroups, it will be up to the BHCD to decide which one will be the accepted code change. Either way, notes on all Workgroup discussions do go to the BHCD to assist them with the decision making process.

Sarah: Votes in support as amended. She will also be in the Workgroup meeting on Friday.

Jeff: This proposal will be marked as Consensus for Approval as Modified. The language Shahriar typed in the text box will be Exception #2, after ESS groups R3 and R4.

Jeff: Noted after the break to Change to the modification for B432(2):
Where it reads "shall not be required to comply with this Chapter", change "Chapter" to "Section".

Shahriar: Agreed.

Jeff: The proposal remains Consensus for Approval as Modified using "Section" instead of "Chapter".

{BREAK: 11:17 – 11:22}

B433-21

Shahriar: This proposal is for EV charging stations. There's a direct correlation between thermal runaway and fire from a vehicle under charge. Most of the requirements applies to EV charging stations inside of enclosed parking structures, and proximity to means of egress. It would not apply to open parking lots located away from buildings. It also helps to limit fire risk for buildings that have several parking stories underground. It would not prevent EV cars from parking anywhere, but it does address the locations where the vehicles would be charged.

Matthew Cobb: The water and personnel required to extinguish an EV lithium ion battery fire with thermal runaway is immense. The biggest threat to safety is underground charging stations.

Bill: For multi-family dwellings, is the possibility of charging precluded from any parking level? It sounds extreme. He also thought it was only a problem if the vehicle was more than 80% charged.

Shahriar: EV Chargers should not be located where the floor is more than 75 feet above the lowest level of fire department vehicle or more than 1 level below the lowest level of exit discharge. This would allow parking in the B1 or G1 level, but not lower. The 80% charge is not standard, levels differ by manufacturer. There's a national effort going forward to have the car give a warning when the level gets to the point of concern.

Matt Smolsky: PWC. Typed in the chat box:

Matt Smolsky - PWC: The charging locations must be in a manageable location and one that is readily accessible.

Bill: His understanding is that ICC is moving towards EV charging availability for every dwelling unit. He has proposals in now to allow charging stations at all levels.

Shahriar: This would prevent your proposal from going forward, being that it would preclude lower levels from having charging stations. He wouldn't want to throw the entire proposal out, because it has safety provisions for ventilation, access to the exits, alarms and decontamination of runoff. If there's a thermal runaway on a G4 level, it would probably render the building inoperable for some time. Limiting the charging station locations was also done in order to give fire personnel adequate access to fight fires.

Bill: Many buildings have above ground structured parking with good ventilation. How would this apply to that kind of parking?

Shahriar: The proposal addresses open parking structures. The exception is outside of level G1 and 75 ft. high. Open and ventilated structures are allowed.

Richard Gordon: What would spill control and neutralization measures be specifically?

Shahriar: There's a specific requirement to reduce the ph level in the water runoff to less than 30, and there are two ways to do that with specific guidance. One would be to contain the runoff with plastic or waterproof barriers. The other method is to use a neutralizer before entering a drainage system.

Andrew C: HBVA will oppose this. What was the workgroup that Shahriar referred to?

Shahriar: It was an unofficial group with a wider scope and varied stakeholders. It was beyond the DHCD scope.

Andrew C: Is working on some other proposals besides this one. He thinks this proposal is not correlating with those other proposals around charging stations.

Shahriar: Agrees. There's also a disconnect between EV charging stations and accessible parking spaces.

Andrew C: More correlation is needed.

Shahriar: Agreed. Virginia is behind and there needs to be at least situational awareness for fire personnel who need full hazmat preparedness.

Steve S: AOBA and VAMA are against this proposal. They have been working with Bill about how many EV ready, EV capable and EV installed stations to have, and this proposal would be opposed to that.

Gregg Karl: The extent of hazardous runoff from a lithium ion battery fire is enormous. Fire workers need respirators to engage with it. Again, a fire could take 8, 10 or 12 hours to put out. There's a small window from when the fire starts, getting it somewhat under control, and getting the vehicle removed before there's another flare-up. This can be done if the car is readily accessible. If the car is located on a lower level, that may not be possible, and residents would not be allowed to enter the parking area until it is extinguished.

Bill: He does not support this proposal. He thinks there needs to be more discussion on this, given the conflict with the national initiative to move towards EV.

Andrew C: typed in the chat box that he agrees with Bill.

Matthew C: Technology shouldn't be pushed beyond the safety of residents and first responders and also structural safety.

Andrew C: Thinks there should be a Study Group in the next Code Change Cycle.

Jeff: Hearing some support and some opposition, this proposal will be marked Non Consensus.

B706.1-21

This proposal was inadvertently added to this agenda. It was already voted on and marked as Consensus for Approval in the April Workgroup meeting.

B706.1.1-21

Shahriar: This proposal would eliminate the exception for having a party wall or fire wall between buildings. Two separate buildings with unprotected openings could cause a problem for both buildings. Fire separation distance is not even addressed.

Dan: Agrees with Shahriar. There should be planned agreements as well, not allowing an owner to make a decision when they are so close to another building.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

{BREAK: 12:00-12:30}

B903.2.3-21

David: There was a new item added to the 2018 ICC and there's been some confusion around it. Item 1 in the VCC is 20k and it is 12k in the IBC. The proposal wouldn't effect remote public schools, it would affect private schools. There was a proposed change in previous code change cycles to drop 20k to 12k and private schools were opposed to it.

Andrew M: Speaking on behalf of himself. There could be a gymnasium with 20k sq. ft. without sprinklers. The load of 300 is standard and should remain.

David: He doesn't want to cause a safety concern, but he is hoping to maintain the niche for private schools.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

B903.4.2-21

Jeff: The proponent was not on the call, so the floor was opened for discussion.

Andrew M: Speaking on behalf of himself. This would set up a situation where there's no audible or visual alarm system, and notification would solely rely on the monitoring company.

Jeff: Andrew spoke in opposition and hearing no further discussion, this will be marked as Consensus for Disapproval.

B907.5.2.3.2-21

Jeff: This is a DHCD staff proposal to address an apparent oversight in the model code. The section deals with sleeping or dwelling units, but the table only addressed sleeping units. Dwelling units were added for consistency.

Dan: This should also be fixed in the 2024 IBC, so it should be supported.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B918.1-21

Andrew M: This proposal was discussed in the In-Building Emergency Communication (IBEC) Study Group, but it was non consensus. It brings in language about how to accept and install systems and places responsibility back on the owner.

Jeff: There were a few similar proposals discussed in the IBEC Study Group. Some members were in favor of this one and some were not.

Steve S: AOBA and VAMA are in opposition to this proposal. The owner should not be responsible to provide all aspects of the system. The owner is ok with providing the cabling and referencing the Fire Code Sections 510.4 and 510.5 for installation. However, it should be the locality that's responsible to install the systems.

Jeff: If there is no further support, this will be marked as Consensus for Disapproval.

Andrew M: There were some Study Group members that were in support of this. Does that count for this decision?

Allison: Supports this proposal. This has been happening at the national level, and in Arlington and other Virginia localities.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

B918.1(2)-21

Jeff: The DHCD staff prepared this proposal on behalf of some stakeholders in the IBEC Study Group. It brings in

the Fire Code as a technical reference, without making changes to who's responsible to install the systems. Wiring would be the responsibility of the building owner and the rest of the system would be installed by the locality.
Steve S: AOBA and VAMA are in support of this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B918.1.1-21
Jeff: The DHCD staff prepared this proposal on behalf of some stakeholders in the IBEC study group. It eliminates some outdated language in an old Virginia amendment. Radiating cable is an outdated term.
Steve S: AOBA and VAMA are in support of this. Radiating cable technology actually defeats the purpose.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B1010.2.8-21
Jeff: The DHCD staff prepared this proposal on behalf of some stakeholders in the Active Shooter and Hostile Threats in Public Buildings Study Group. It uses language from a previously-approved use of barricades in schools to approve use of barricades in public buildings. Many members of the Study Group were in support of this, even if they were not in support of barricades in general, because it gives guidelines for proper use.
Jimmy: He was in the Study Group and there was a thorough discussion. He supports this proposal.
Andrew M: Representing the VFSB – Codes and Standards Committee, stated that they discussed the proposal and the group supports the proposal.
Andrew M: Representing self, noted that the proposal goes beyond the scope of the model code and although there was some good feedback for and against the proposal, he thinks it is appropriate for additional discussions to take place at the Board level, so the proposal should move forward as Non Consensus.
Jeff: With some support and some opposition, this proposal will be marked as Non Consensus.

B1020.1-21
Jeff: The proponent was not on the call. This proposal changes ratings for I-1 and I-3 occupancies, which seems to have been incorrectly labeled in the VCC. This change brings the table back in line with the I-Code.
Dan: Chair of the VBCOA Building Code Committee. In support of this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B1006.3.4-21
Lyle Solla-Yates: Speaking on behalf of himself. This proposal is driven by middle sized structures. It would allow residential buildings up to 20 homes with up to 5 stories to have a single staircase. This is a floor modification which is presented on the screen. This language is copied from Seattle codes. It reduces costs, is a better design, and makes things easier for fire personnel. This permits interior or exterior stairs with smoke control. He received an architect estimate, and it would cost about $380k per building for a second stairway.
Lyle: Gave some additional information in the chat box regarding this proposal:
Lyle Solla-Yates: This is an additional resource for item 22 https://www.larchlab.com/city-of-vancouver-report-on-point-access-blocks/ We also got an estimate for the cost of mandating a second staircase in Virginia, which came to $360,000 per building for six flights, assuming land, furring, and drywall are free. The estimate was $380,000, you can review the numbers at this link https://drive.google.com/file/d/1nG5bXXVvjHiGrEMTulr1cEO6fPIUhnfE/view?usp=sharing
Florin: Typed in the chat box:
Florin Moldovan - DHCD: The floor modification is available for download in the FILES pod at the left of screen.
Steve S: Speaking for himself. He thinks this is bigger than just Virginia and should be proposed on a national level. The code in Seattle has about 14 limitations and this does not. He is opposed to this.
Allison: Is also in opposition. One exit sounds unsafe. It should be debated at the national level.
Dan: Fairfax County. He is in opposition to this proposal. The Seattle code has many limitations and exceptions, which this does not. For example, the number of units on each floor and the size of the floorplans. He also thinks this should be debated at the national level.
David: Agrees that it should be done on a national level. He hasn't looked at the floor modification.

Andrew M: Virginia Fire Services Board, Codes and Standards Committee. The Committee reviewed the original proposal and is opposed to it. The Committee did not have a chance to review the floor modification shared today by the proponent.

Andrew M: Speaking for himself. Is opposed to the proposal. Exterior stairway has no ventilation, interior stairway pressure is discussed, but there is no requirement to use the interior stairway. There's a lot of different landscape in Virginia and one area is not like another, such as is the case in Seattle and New York City.

Andrew C: Is in support of the proposal, which reduces building costs. Many proposals increase costs. Waiting for discussion at the national level won't be productive. He would like to see a Study Group on this.

Allison: Thinks this is a national-level issue, but a workgroup next year in an off-year would be good.

Andrew C: Housing challenges in many localities may prohibit Virginia participation at the national level. Yet, he would support any movement at any level. He would like to see Virginia lead the way in reducing housing costs.

Rory: Thinks an incremental approach would be good. Instead of 5-story, it could start with 4-story buildings. It could also have limits like not allowing exterior stairs, etc. Some of the limitations in the Seattle code are redundant.

Lyle: There are some redundancies in the Seattle code, such as caps on units per floor and the per-parcel restriction. These have been removed in this proposal.

Additional discussion in the chat box:

Al Clark: Maybe just limit it to where there's ISO-1 fire service?

Rory Stolzenberg: Table 1006.3.2(1) has a limitation of 4 dwelling units per floor for any height building with a single stair

Lyle Solla-Yates, Charlottesville PC, speaking on own behalf: Mr. Stolzenberg is correct, redundant language was removed

Dannie: I am strongly in favor of that proposal

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

B1022.2.3-21

Jeff: This proposal was prepared by the DHCD staff in response to a letter from Delegate Reid and Senator Boysko to consider requiring automatic door openers in all ingress and egress paths.

David: Is in opposition to this due to additional expense as well as a lack of clarity in the exterior door definition.

Dan: Fairfax County and VBCOA Building Code Committee. The Code Committee was not in support of this. He is also in opposition to this proposal.

Jeff: Asked if there was any support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

B1103.2.15-21

Dan: This is a proposal to change language. It is administrative.

Allison: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B1112.1-21

Dan: This proposal is a cleanup of language. It removes an exception.

Jeff: All accessible spaces have to have signage. This exception was removed since it was in conflict with the state law.

Steve S: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B1602-21

Jeff: Asked Paul Messplay to introduce the proposal.

Paul: This proposal comes from the proposed changes to the 2024 IBC. It was developed by FEMA and had full support from HBAV at the ICC Committee Action Hearings in Rochester. It adds design considerations for tornado

loads. The Resiliency Sub-workgroup supported it.
Steve S: Approves of this proposal. It did go through the ICC hearings in Rochester, but there are still two more steps before final acceptance.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B2403.6-21
Bill: This proposal is for bird-friendly design and construction. Glass or shiny materials can cause birds to crash and die. There are several different materials available as options for compliance. Many U.S. jurisdictions have adopted this already.
Steve S: AOBA and VAMA do not support this proposal.
Andrew C: HBAV doesn't support this proposal. This was researched and there was a significant increase in cost and lead time in obtaining products.
Bill: This is for commercial buildings, not small residential buildings.
Richard Potts: Jeff had to step away for another meeting. Does anyone else support this besides the proponent? Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

{BREAK: 1:53-2:00}

BF202-21
Mary Koban: This proposal was submitted to the ICC by the Fire Code Action Committee and seeks to align the definition for flammable gas with the Globally Harmonized Flammable classification system, which may be approved this year. It classifies flammable gasses to class A and class B. She typed in the chat box:
Mary Koban-AHRI: Approved changes to the IBC and IFC include: Differentiation of lower flammability refrigerants from other higher flammability gases in storage by using the classifications and labeling provisions of the 7th edition of the Globally Harmonized System of Classification and Labelling of Chemicals, and for correlation with the IMC
Mary Koban-AHRI: https://www.iccsafe.org/building-safety-journal/bsj-technical/code-changes-on-a2l-refrigerants/
Mary Koban-AHRI: https://www.ahrinet.org/saferefrigerant
Mary Koban-AHRI: AHRI Public Webinar Series: https://www.ahrinet.org/news-events/webinars/ahri-refrigerant-webinar-series
Andrew M: Is the intent to change the IFC that's referenced by the construction code, or the SFPC?
Mary: She's not sure. She's looking at what needs to be done in all of the states.
Andrew M: Virginia doesn't have an IFC. Where would this change go if approved?
Florin: This proposal would go into the VCC in Chapter 3 if approved. Also, if approved for inclusion in the 2021 VCC, the 2021 SFPC would require buildings to comply with the applicable building code, which would include these provisions.
Richard: Asked if there was any support for this proposal.
Mary: Asked for feedback as to why there seemed to be no support at this time.
Andrew M: The first opposition is that it would create two different definitions between the SFPC and the building code. Also, Virginia has never made a change to the IFC, which is the reference standard. Lastly, if there are future changes to the IFC or the IBC, those changes would come through for discussion automatically.
Richard: Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

BF608.9-21
Mary: This proposal updates references to ammonia.
Richard: Asked if there was support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

BF608.17-21
Mary: Ammonia will be coming out of the code, so exceptions for machinery rooms will also come out with that.

Richard: Asked if there was support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

BF608.17(2)-21
Mary: Removes the exception for machinery rooms
Richard: Asked if there was support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

BF911.1-21
Mary: GHS will split the flammable gasses. This table shows explosion control requirements and an exception for Class B.
Richard: Asked if there was any support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

BF5003.1.1(1)-21
Mary: This proposal makes some changes to the MAQ table in accordance with the GHS.
Richard: Asked if there was any support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

Mary: Asked about the change process in Virginia. Especially given that the refrigerant storage will be down by 40% by January 2024.
Richard: Described the code change process in Virginia. He noted that the Board also reviews public comments.

B3005.4-21
Richard: The proponent was not on the call, so the floor was opened for discussion.
Dan: VBCOA Building Code Committee. This section was amended in the VCC. When it was changed in the IBC, that change wasn't carried forward. This adds in IBC language for exceptions. He supports this proposal.
Richard: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

B3006.1-21
Dan: This proposal is to fix a broken link that was created when a change was made in Chapter 1. The charging statement language was brought back into the code without making a requirement.
Andrew M: Supports this proposal.
Richard: Asked if there was any opposition. Hearing none, this proposal will be marked as Consensus for Approval.

B3007.6-21
Dan: This change would not be necessary if B3006.1-21 passes.
Richard: Asked if he wants to withdraw now, or wait for the Board to review.
Dan: They can let the Board know it's not required if the other one is approved.
Richard: He asked if there was any support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

B3008.1-21
Richard: This proposal only deletes the word "all".
Florin: There's an existing Virginia amendment which requires all those elevators to comply with the provisions of this section. The 2018 IBC was changed to provide a method of calculating the minimum number of elevators required to comply with this section. That created a conflict between the existing Virginia amendment and the 2021 IBC changes. Deleting the word "all", eliminates the conflict between the existing Virginia amendment and the 2018 IBC provisions.
Richard: Asked if there was any support for this proposal.
Dan: Supports this proposal.

Richard: Asked if there was any opposition for this proposal. Hearing none, this proposal will be marked as Consensus for Approval.

B3302.4-21

Andrew M: This proposal is to Chapter 33 of the VCC related to fire prevention during construction. There was construction language removed from the SFPC, so it was put here. There's also an editorial change about completion before occupancy. Finally, it looks at the 2021 IBC water supply for fire protection. It moves the water supply requirements from the VCC to the SFPC.

Allison: Supports this proposal.

Florin: This proposal was supported by the SFPC Sub-Workgroup.

Richard: Asked if there was any opposition? Hearing none, this proposal will be marked as Consensus for Approval.

AD75-21

Richard: This proposal adds a footnote that references compliance with Chapter 45 of Title 59.1 of "The Amusement Device Rider Safety Act."

David: Thinks this would be impossible to enforce, unless the code official is present constantly while the ride is in use. He doesn't think it's a good code change.

Dan: Agrees with David.

Richard: Hearing no further discussion, this will be marked as Consensus for Disapproval.

IB120-21

Richard: This proposal is from the DHCD staff.

Thomas King: Changed #2 from the building code official "may" approve to "shall" approve.

David: Wants to be clear that item #2 says "shall" and not "may".

Richard: This proposal will say "shall."

David: Was looking at a document that was included with the agenda and still said "may". He asked if the Building Official "shall" approve or if the Building Official "shall" approve in accordance with the USBC.

Florin: The original intent was to allow the Building Official two choices. Originally, when the word "may" was used, "shall" was suggested at the Workgroup in April, because "may" is not enforceable language. What is on the screen now is a change from the original, but it's not actually a floor modification. Florin typed in the chat box:

Florin Moldovan - DHCD: Current IBSR language: https://codes.iccsafe.org/content/VRGC2018P1/virginia-industrialized-building-safety-regulations#VRGC2018P1_Pt03_c012

David: Is in opposition to this proposal with the word "shall".

Steve S: Wants to go forward with Consensus for Approval using "shall". He was the one who requested the word change at the prior meeting.

Allison: Likes "may" approve. "shall" approve is a problem for her. Shall "review" might be better.

Jeff: DHCD thought "may" was good but the concern was that it gives 2 paths. One is only applicable if the Building Official approves it. However, staff is ok with keeping "may".

Steve S: Agrees with Jeff, the problem was if option 2 was taken, "shall" would be required.

David: The first part of the charging language requires something. In the next part, "shall" is ok then.

Jeff: The option is up to the Building Official. They can go back to option 1, which puts it back on the building owner to hire the CAA to review the building.

Dan: Has the same concerns. It sounds like it ties the hands of the Building Official. However, looking at the charging statement again, he gets it. Yet, he does see Building Officials getting upset over the word "shall".

Jeff: what if option #2 says Building Official "approves" in accordance with USBC instead of "shall" approve?

Dan: That's better.

Jimmy: Thinks that is a good suggestion.

Jeff: typed in chat box:

Jeff Brown - DHCD: 2. The Building Official approves the unregistered......

Steve S: Doesn't see the difference between Building Official approves or Building Official shall approve.

Jeff: It's not different, but the word shall is removed, so that it doesn't bother anyone.

Paula: typed in the chat box:

Paula Eubank: 2. ...or the unregistered building shall be approved by the Building Official in accordance with the USBC.

Jimmy: The charging statement does give options, and when one is chosen, that shall be done. It seems fine like it is. He doesn't care either way, as long as it goes through.

Linda: Typed in the chat box:

L Hale, VFPA, Arup: The building is found to be in compliance with the USBC and the Building Official approves the unregistered building....

Paula: Typed in the chat box:

Paula Eubank: leading with the unregistered building is more consistent with the language.

Jeff: Asked the group what they were thinking.

Dave: The original is good. It's correct when seen in light of the charging statement.

Steve S: Is ok with the original change to "shall" as proposed.

Jeff: Asked if there was any opposition to "shall" as written.

Allison: Is ok with it because of the charging statement. It only gets to "shall" if that option is used.

Dan: Is ok with it saying "shall".

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

Next Steps:

Jeff: Thanked everyone for their participation. The meeting summary will be sent out as soon as it is ready, the recommendations will be updated on cdpVA and the summary report with the proposals will be sent to BHCD in September.

General Stakeholder Workgroup Meeting – VEBC Proposals
June 8, 2022 - 9:00 a.m. – 11:00 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Group Participants:

Allison Cook: *Virginia Building and Code Officials Association (VBCOA)*
Andrew Clark: *Home Builders Association of Virginia (HBAV)*
Andrew Grigsby: *Viridiant*
Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Ben Rabe: *New Buildings Institute (NBI)*
Christina Jackson
Daniel Willham: *Fairfax County; Chair of VBCOA Building Code Committee*
David Beahm: *Warren County*
Jason Laws: *Virginia Building and Code Officials Association (VBCOA)*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
John Armstrong: *Dominion Energy*
Justin Perry: *Dominion Energy*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Mike O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Paula Eubank: *FEMA*
Rebecca Quinn: *FEMA*
Richard Grace: *Fairfax County Land Development Services; Chairman of Virginia Plumbing & Mechanical Inspectors Association (VPMIA)*
Sarah Thomas: *Virginia Association for Commercial Real Estate*
Scott Lang: *Honeywell Fire*
Shahriar Amiri: *Arlington County*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
William (Bill) Penniman: *Sierra Club*

Welcome and Introductions

Jeff Brown: Welcomed participants to the meeting, gave an overview of the agenda, and let the group know there would be breaks every hour. He asked them to stay muted unless speaking, and to let the group know who they represent as they speak to a proposal.

Paul Messplay: Gave an Adobe Connect tutorial.

Jeff: Gave a presentation about the Code Development Cycle. Highlights included:

- DHCD staff were identified.
- The 2021 Code Development Cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, carry over, and withdrawn.
- May 1st was the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.

EB604-21

Shahriar Amiri: This is a continuation of a proposal that was approved in yesterday's General Workgroup (VCC) meeting. It addresses potential hazards associated with lithium ion energy storage systems (ESS). It is from the 2021 IFC Section 1207, and two proposals were broken out into the VCC and the VEBC. The VCC proposal was heard yesterday. There was a modification in yesterday's approved proposal. He typed it in the chat box to add it as an exception to this proposal via floor modification:

Shahriar Amiri, Arlington County: Lead-acid and nickel-cadmium battery systems that are designed in accordance with IEEE C2, used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and locations outdoors or in building spaces used exclusively for such installations shall not be required to comply with this Section.

Steve Shapiro: AOBA and VAMA are in opposition to this proposal.

John Armstrong: Dominion Energy. Supports this proposal with the floor modification.

Sarah Thomas: Virginia Association for Commercial Real Estate. In opposition to this proposal.

Bill Penniman: This is mostly a permitting requirement. He asked Shahriar if this proposal would apply to single family or townhouse homes.

Shahriar: It is not meant to apply to single family dwellings. He's confused about objections to this proposal, since yesterday's proposal was approved.

Allison Cook: Supports this proposal.

Linda Hale: VFPA also supports this proposal.

Andrew Grigsby: Also wonders why there was objection to this proposal.

Shahriar: This doesn't require retrofitting, only to maintain ESS installed according to the proposal approved yesterday.

Jeff: Confirmed that this does not apply to one- or two-family residential dwellings.

Bill: Proposal 1102 has an exception for one- or two-family dwellings. He would like to add that to this proposal as well.

Shahriar: Typed an exception into the chat box to exclude one and two family dwellings:

Shahriar Amiri, Arlington County: This Section does not apply one and two-family dwellings.

William Penniman: Exception: Detached one- and two-family dwellings and townhouses.

David Beahm: Representing himself. There should not be an exception for residential because it might set a precedent that would cause exceptions to all proposals. It should also be removed from proposal 1102.

Andrew Clark: If he could change his vote from yesterday, he would vote no. He votes no on today's proposal because he does think this should be based on state-wide areas, since jurisdictions are not all like Northern Virginia and Maryland.

Shahriar: Said it was based on various Virginia jurisdictions.

Andrew C: Can't identify any people from the construction industry or builders from any jurisdictions who were involved in this.

Bill: Still concerned about exemption for residential single family homes and one- and two-family townhomes.

Jeff: Chapter 1 outlines that the code is not applicable to residential.

Bill: Still has the same concern that it should be specified in this proposal. If he were to put in a Tesla wall battery in his garage, for example, it would be in conflict with this.

Dan Willham: Suggested adding something to the reason statement, saying that it doesn't apply to residential.

Florin and Richard: Typed in the chat box:

Florin Moldovan - DHCD: VEBC scoping provisions as they relate to R-5: https://codes.iccsafe.org/content/VEBC2018P2/chapter-1-administration

Richard Potts: 102.2.2 Reconstruction, alteration, or repair in Group R-5 occupancies. Compliance with this section shall be an acceptable alternative to compliance with this code at the discretion of the owner or owner's agent. The VCC may be used for the reconstruction, alteration, or repair of Group R-5 buildings or structures subject to the following criteria: 1.Any reconstruction, alteration or repair shall not adversely affect the performance of the building or structure, or cause the building or structure to become unsafe or lower existing levels of health and safety. 2.Parts of the building or structure not being reconstructed, altered, or repaired shall not be required to comply with the requirements of the VCC applicable to newly constructed buildings or structures. 3.The installation of material or equipment, or both, that is neither required nor prohibited shall only be required to comply with the provisions of the VCC relating to the safe installation of such material or equipment. 4.Material or equipment

Jeff: The DHCD staff also had some questions about processing this proposal, which were already sent to Shahriar.

Shahriar: He's still working through the questions, but he defers to the DHCD staff to work out the issues related to the section numbering.

Jeff: The DHCD staff will review the proposal for changes needed, if any, before the BHCD reviews the proposal.

Jeff: Richard posted information from Chapter 1 related to residential occupancies and Shahriar posted the exception about utility substations. Asked Shahriar if there are any other modifications.

Bill: Wants it to be clear that residential is excluded.

Shahriar Will include that as an exception.

Justin Perry: Dominion Energy. Doesn't want the utility exception placed under #5, since it doesn't only apply to 604.1.

Shahriar: Since 604.1 is a charging statement, it would apply to the rest of 604.

Jeff: Likes it placed after #5, but not "under" #5. It would be in line with the main charging statement.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus. Shahriar will include the two floor modifications.

EB202-21

Jason Laws: Chesterfield. This is a proposal for an editorial change to remove the word "accessibility".

Jeff: Asked for opposition or support.

Dan: Speaking for himself, it looks like a good cleanup. He supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked Consensus for Approval.

EB404.3-21

Jason: This proposal is for an editorial change, which was approved at the national level. It cleans up the language to clarify the requirements.

Allison: VBCOA supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

EB102.2.2(2)-21

Jeff: The proponents were not on the call. The floor was opened for discussion.

Allison: Wonders if #3 is really an exception. It doesn't sound like it is.

Jeff: This proposal undoes another proposal that was voted as Consensus for Approval from the April Workgroup meeting, requiring 10 year battery smoke alarms.

David: Is opposed to this proposal.

Linda: It sounds like the 10 year battery in the smoke alarm could be replaced, which is not true. She opposes this proposal.

Jeff: Asked if there was any support for this proposal. Hearing none, this proposal will be marked as Consensus for Disapproval.

EB103.9-21

Paula: Speaking on behalf of RC Quinn Consulting and FEMA and representing the Resiliency Sub-Workgroup. This is a companion proposal to 103.4 in the VCC. Her notes show that they requested information from the DHCD staff if a registered design professional (RDP) or engineer could perform land surveys or give elevation certificates.

Jeff: Is not aware of any such follow up. It can be looked into before the proposal goes to the BHCD. Would the USBC have authority in this, or is it outside of the scope?

Paula: That's needed. The VCC language retained the RDP language. This proposal identifies a land surveyor, RDP or civil engineer.

Jeff: Asked if there was discussion about, support for or opposition to this proposal.

Paula: Asked if this will be correlated with the 103.4 proposal in the VCC, which wasn't on yesterday's schedule.

Jeff: DHCD staff will look into it.

David: Is opposed to this due to the specific language. He thinks noting an RDP is good enough.

Steve: Speaking for himself, as a member of the Sub-Workgroup, the big discussion was if an architect can do the certificate. He's not sure where that landed.

Jeff: DHCD staff goes through the proposals before they go to the BHCD to discover and discuss any legal concerns with the AG.

Paula: She isn't opposed to a friendly modification of the language. She didn't see any prohibition for an architect in any of the applicable codes. It would still be good for DHCD to look into it further.

Jeff: DHCD staff will look into any conflicts or issues raised.

David: If DHCD verifies the language and what is permitted or prohibited, he would be more comfortable. He removes his objection based on DHCD's assurances of looking into this further.

Jeff: There was not an official proposal submitted for 103.4 in the VCC.

Paula: Will check back through her notes.

Paul: The Sub-Workgroup discussed a proposal to 103.4 in the VCC, the final decision was non consensus, so it did not move forward as an official proposal. He typed a link to the meeting summary in the chat box: https://www.dhcd.virginia.gov/sites/default/files/Docx/code-development/resiliency-sub-workgroup-meeting-summary-04-27-22%20(1).pdf

Jeff: The result of a vote in support or opposition resulted in only thumbs up. With no opposition, this proposal will be marked as Consensus for Approval, providing DHCD contacts the AG to verify that there is no legal conflict.

EB304.3.1-21

Allison: This proposal is editorial in nature, providing the correct pointer to the VRC.

Steve: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

{BREAK: 10:17 – 10:22}

L Hale, VFPA, Arup: Typed in the chat box:

For EB304.3.1-21 is there an R310.4.4 in the 2021 VRC? I am seeing a R310.4 in the 2018 as the section

Paul Messplay: Responded in kind: Linda - Yes. R310.4.4 exists in the '21 residential code

EB805.2-21

Ben Rabe: This proposal requires that existing duct work serving new equipment in additions or alterations is tested. This proposal was supported by the Energy Sub-Workgroup.

Steve: AOBA and VAMA are opposed to this.

Jeff: The DHCD staff found that Section 601.4.7 in the VEBC limits testing in ducts that are not extended more than 40 feet. Chapter 8 and Chapter 6 may be in conflict since this has no exception to less than 40 feet of extended ducts. There may need to be a reference in this Section.

Richard Potts: Typed in the chat box:

601.4.7Ducts. In R-5 occupancies, where ducts from an existing heating and cooling system are extended, such duct systems with less than 40 linear feet (12.19 m) in unconditioned spaces shall not be required to be tested in accordance with Section R403.3.3 of the VECC.

Ben: He is fine with the DCHD staff correlating the Chapters as needed.

Andrew Grigsby: He sees new heat pumps being installed and people are still not comfortable, because there is a problem in the duct work. Anything that addresses ductwork is beneficial. He is in full support of this.

Bill: Representing the Sierra club. He supports this proposal.

Allison: Is in opposition to this proposal. Duct leakage is a concern, but it puts too much work and expense on the owner to find leaks. If they want to, that's one thing, but should not be a requirement.

Andrew Clark: agrees with Allison. It should be the consumers' choice. He is opposed to this proposal.

Richard Grace: VPMIA. He agrees with Allison, and he opposes this proposal.

Andrew Grigsby: Reducing duct leakage doesn't always mean a lot of time, effort and expense. Some fixes are simple and inexpensive.

Mike O'Connor: Typed in the chat box: The problem is that heat pumps do not provide sufficient heat in cold weather locations. Virginia Petroleum and Convenience marketers and Virginia Propane Gas Associations opposed.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EB805.3-21

Ben: Similar to the prior proposal, this proposal would require additions to meet the requirements of lighting, mechanical and water heating required by base code.

Steve: AOBA and VAMA are opposed to this.

Allison: Is opposed to this proposal.

Bill: Supports this proposal.

Richard Grace: VPMIA opposes this proposal.

Andrew Grigsby: Supports this proposal.

Allison: This proposal increases costs of construction, as stated in the Cost Impact statement.

Andrew Grigsby: The increased cost of construction is recovered several times over in time.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EB805.3(2)-21

Ben: This was written as an energy proposal to update the existing building section of the energy code, which Virginia doesn't adopt. This proposal requires the same testing for alterations as additions (in the prior proposal). This is a cost- effective way to check on duct efficacy.

Steve: AOBA and VAMA are in opposition to this proposal.

Allison Cook: Speaking for herself, she is opposed to this. Forced energy efficiency upgrades should not prohibit people from making upgrades for life safety reasons.

Richard Grace: For VPMIA. He agrees with Allison and is opposed to this proposal.

Bill: Sierra Club supports this proposal.

Mike O'Connor: Typed in chat: Virginia Petroleum and Convenience marketers and Virginia Propane Gas Associations opposed.

Richard Potts: Wanted to let the group know that there will be additional Energy proposals from Ben reviewed in tomorrow's Workgroup meeting. Those proposals were submitted later than the ones heard today, and they do have floor modifications.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EB1102-21

Scott Lang: This proposal comes from the 2024 IFC. It doesn't belong in the Virginia fire code, so it's being proposed to the VEBC. It would require people to look back at older systems (installed pre-2018) to ensure that they are safe.

Jeff: The SFPC Sub-Workgroup did not support this proposal when it was presented in that meeting.

Steve: Is opposed to this proposal, especially the retroactive requirement.

David: Is opposed to this proposal. The language is not appropriate for Virginia.

Justin: Dominion Energy. He doesn't like the word "early". He could support it without the word "early" in 1102.1.1, but not otherwise.

Scott: Doesn't have any objection to removing the word "early".

Andrew Grigsby: Supports this proposal.

Jeff: Asked Scott if he wanted to amend the proposal and remove the word "early".

Scott: Agrees to remove the word "early" from 1102.1.1 as a floor modification.

Jeff: Typed in the chat box: Modification to remove 2 instances of the word "early" form section 1102.1.1

Jeff: Hearing no further discussion, this proposal with the floor modification will be marked as Non Consensus.

EB1201.7-21

Jeff: This proposal is a DHCD staff cleanup of language. A sentence that's not applicable was removed.

Steve: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

EB1209.1-21

Andrew Milliken: This proposal correlates water supply requirements for fire prevention during construction across the codes and provides separation between construction areas as applicable.

Linda: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

Next Steps:

Jeff: Thanked everyone for their participation. There will be more Workgroup meetings this week and next week. All are welcome to join, yet there may be some overlap. The DHCD staff will submit the proposals with a summary to the BHCD in September for their decisions.

General Stakeholder Workgroup Meeting – Energy Proposals
June 9, 2022 - 9:00 a.m. – 2:00 p.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Andrew Clark: *Home Builders Association of Virginia (HBAV)*
Andrew McKinley: *American Institute of Architects (AIA)*
Andrew Klein: *Self Storage Association*
Ben Rabe: *New Buildings Institute (NBI)*
Brett Vassey: *Virginia Manufacturers Association*
Chelsea Harnish: *Virginia Energy Efficiency Council (VAEEC)*
Christina Jackson
Christopher Fox: *Van Metre*
Daniel (Dan) Willham: *Fairfax County, Chair of VBCOA Building Code Committee*
David Beahm: *Warren County*
Eric Lacey: *Responsible Energy Codes Alliance Chairman (RECA)*
Jack Avis: *Avis Construction*
Jeff Mang: *PIMA*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
John Olivieri: *HBAV, Virginia Beach*
KC Bleile: *Viridiant*
Laura Baker: *Responsible Energy Codes Alliance (RECA)*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Matt Benka: *Virginia Contractor Procurement Alliance (VCPA) and MDB Strategies*
Mike Hamilton: *Arlington County*
Neil Palmer: *Century Construction*
Paige Werner
Paula Eubank: *FEMA*
Rebecca Quinn: *RC Quinn Consulting for FEMA*
Richard Grace: *Culpeper County; Chairman of Virginia Plumbing & Mechanical Inspectors Association (VPMIA)*
Ross Shearer: *Vienna, Virginia resident*
Sarah Thomas: *Virginia Association for Commercial Real Estate*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
William (Bill) Penniman: *Sierra Club Virginia chapter*
Zach LeMaster

Welcome and Introductions
Jeff Brown: Welcomed participants to the meeting, gave an overview of the agenda, and let the group know there would be breaks every hour. He asked them to let the group know who they represent as they speak to proposals.

Paul Messplay: Gave an Adobe Connect tutorial.

Jeff: Gave a presentation about the Code Development Cycle. Highlights included:

- DHCD staff were identified.
- The 2021 Code Development Cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, carry over, and withdrawn.
- May 1st was the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.

EC-C401.2(2)-21
This proposal was withdrawn.

EC-C403.7.7-21
Richard Grace: This proposal is to cleanup and clarify existing requirements. The language “shall not be required” was changed to say “shall not be installed”.
David Beahm: Supports this proposal.
Dan Willham: Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

EC-C405.13(2)-21
Jeff: This is a DHCD staff proposal, which was drafted in response to a letter from Delegates Reid and Bulova. They asked for discussion and consideration regarding EV space requirements.
Steve: AOBA and VAMA are in opposition to this proposal and all the other EV proposals. There has been a lot of discussion around these EV proposals with no agreement as of yet. Also, after hearing from Shahriar Amiri in yesterday’s Workgroup meeting, there are additional concerns around fire safety that still need to be addressed and integrated with the other EV proposals.
Andrew Clark: Agrees with Steve’s comments. Even though EV may be the way to go in the future, more discussion is needed to ensure that the codes address all concerns. HBAV is opposed to this proposal.
KC Bleile: Spoke with utilities suppliers regarding load letters for projects already in process. They agreed to not change the load letters in those situations. She would like to see the EV proposals all state that exception.
Andrew Clark: Utility load letters for projects in process was one of the builders’ concerns as well as overall site planning.
David: Is in opposition to this proposal. He also agrees with Steve and Andrew about unanswered concerns, including accessible parking.
Sarah Thomas: Virginia Association for Commercial Real Estate is opposed to this proposal. She’s also in agreement with what the other group members just said.
Ben: NBI. He supports this proposal as well as the other EV proposals.
Bill: There are several EV proposals, and concerning the ones he put forth, he amended those to include EV ready, capable and installed spaces as a way to compromise. He supports this proposal as well. He thinks something should go forward around EV spaces.
Dan Willham: Fairfax County. Supports the concept in general. However, the 2021 ICC appeals board ruled this out of scope since it was not actually energy conservation. If this does go forward, they would have to determine

where to put it, considering that it isn't an energy-conservation measure.
Bill: To Dan's point, if this doesn't go into code somewhere, localities are free to do whatever they want.
Eric Lacey: Speaking for himself, as a Virginia resident, he doesn't think it is a good idea to wait 3 more years to implement EV readiness. The ICC appeal was more of a technicality. Electric Vehicles are not just the future, they are here now. It will be harder to address as more time goes by.
Jeff: Hearing no further discussion, this will be marked as Non Consensus.

EC-C405.10-21
Bill Penniman: This proposal is for EV readiness in multi-family residential dwellings. There would be 15% EV installed spaces, 15% EV ready spaces, and the rest EV capable spaces. He is willing to be flexible on the numbers if something can be agreed on. However, in light of the prior discussion regarding proposal EC-C405.13(2)-21, he knows this will be marked as non-consensus, so he will yield the floor.
Steve: Obviously, AOBA and VAMA are opposed to this proposal as well. He was working closely with Bill to come to an agreement, and thought it was only about numbers, until he heard Shahriar Amiri present the dangerous situations that could arise from using these EV charging stations in yesterday's Workgroup meeting. Fires taking several hours to extinguish, using thousands of gallons of water and creating hazardous runaway. He thinks that there is a lot more work to be done before coming to a decision.
Bill: He did hear about the concerns raised by Shahriar. He understood them to be mostly in underground parking. He hopes there can be a quicker resolution pertaining to outdoor, open and unattached parking areas.
David: Still wants to raise the issue of accessible parking. That should not be left out of the discussion.
Bill: Agrees with David and that will be taken into account.
Jeff: Hearing no further discussion, this will be marked as Non Consensus.

EC-C405.11.1-21
Bill: This proposal is directed at larger commercial parking venues such as office buildings and schools. There should be some kind of proposal going forward, even if there are only incremental steps towards EV readiness. He thinks that without something in the codes, localities are free to do whatever they want. He will also consider this to be Non Consensus, the same as the other EV proposals.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EC-C405.13(3)-21
Ben: This EV readiness proposal is going through the 2024 ICC process. They would like to continue to make progress so that at least one EV readiness proposal goes forward.
David: Reiterated that accessible parking should be considered.
Steve: AOBA and VAMA are opposed to this proposal.
Andrew Clark: HBAV is also opposed to this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EC-C407.6-21
Bill: This is a proposal that would activate the appendix for zero energy construction requirements if the builder declares that the building is zero energy. Eric Lacey provided a modification to propose alternative language.
Eric: This language pre-approves appendix RC and appendix CC for compliance when making buildings zero energy.
David: Is opposed to this proposal. He doesn't think a code official could enforce this. How the builder advertises the dwelling would be considered a buyer beware situation.
Steve: Is opposed to this proposal. He asked Eric if the language he suggested confirmed the residential section and added compliance with appendix CC as another option.
Eric: Yes. Appendix CC also includes the base code compliance.
Steve: There are exceptions, but the language shown doesn't include those exceptions.
Eric: Appendix CC would be more stringent, since it applies to zero energy buildings. He asked Steve what kind of exceptions he was concerned about.

Steve: Alterations and Additions.
Eric: This is only for new buildings.
Andrew Clark: HBAV is opposed to this, and considers it to be a truth in advertising issue.
Bill: Understands the opposition around the truth in advertising issue. He asked if those with that opinion would also be opposed to the language Eric suggested, which really only activates the appendices.
David: Asked Bill to clarify the question. There's no provision in the VCC to designate a building as anything anywhere. A builder could say its net zero, but it won't be recorded on the certificate of occupancy and won't be enforceable by the Building Official.
Bill: He understands the objection. He asked again to consider the language Eric proposed instead of what he originally proposed, which is different language.
Eric and Linda: typed in the chat box:
Eric Lacey: David, it seems that your concerns are mostly about the original proposal -- Do you have specific conc erns about the revised proposal on the screen? Would appreciate the feedback.
L Hale, VFPA, Arup: The alternative is not mandatory and allows for options as industry elects to accept energy efficiency. I am in support
Eric: Looking at R401.2, there are 3 compliance paths; 401.2.1, 401.2.2 and 401.2.3. Instead of adding a fourth Section with another compliance path he added an exception to point to the appendix. It does give another option if someone wants to use it. It doesn't address truth in advertising.
David: Is in opposition to both the original and the change submitted by Eric. He thinks the change submitted by Eric is completely different than what Bill submitted, and it should not be accepted as a floor modification. He asked if the code would allow the builder to build something according to the requirements in the appendix, without making the proposed original change or the modified change.
Eric: When the 2021 IECC goes through, the appendix will be there. This proposal gives a shortened pathway.
David: The Building Official is still not required to list compliance on the Certificate of Occupancy and only inspects for minimum requirements in the code. This would be something done in addition to that. He asked if someone could build these types of buildings without having any oversight from the Building Official.
Eric: He would have to defer to a Building Official. However, he doesn't think it is any different than when a builder seeks a permit to build via the prescriptive or performance path.
David: Is still in opposition to the proposal and the suggested change.
Ben: Typed in the chat box:
Ben Rabe | NBI: I am having connectivity issues, but wanted to state NBI's support for this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EC-C502.3-21
Ben: This proposal applies the credit section to additions. It was supported by the Energy Sub-Workgroup.
Steve: Was there a floor modification on this?
Richard: There was a modification to correlate the language better with the existing building code.
Steve: Is in opposition to this proposal.
Bill: Supports this proposal.
Eric: RECA supports this proposal. He's disappointed with the lack of support. When they make proposals to the new building code they get told that the existing buildings are more in need of energy updates. This proposal doesn't make significant changes, it only asks for some changes with many options available when making additions or alterations.
Steve: Doesn't think that this proposal is in line with the purpose of the existing building code. Additions and alterations should not have to comply with anything additional than what is already there. If the owner wants to do more, that should be their choice.
Andrew Clark: Asked if the floor modification was what they were looking at on the screen.
Jeff: Yes, the modification to this proposal consisted of relocating the proposed changes from the energy code to the VEBC.
Andrew Clark: Agrees with Steve, it seems to go against incentivizing existing building rehabilitation.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

{BREAK: 10:19-10:25}

EC-C503.3.2-21

Ben: This proposal would apply the commercial sizing guidelines to alterations and prevents oversizing of HVAC systems to save energy.
Jeff: This proposal was supported by the Energy Sub-workgroup. The modification is to move it from the energy code to the VEBC.
Eric: This clarifies that the system should be appropriately sized, which will help with performance and endurance.
Steve: Supports this proposal. It looks like it would provide for a cost savings.
Bill: Sierra club supports this proposal.
Andrew Clark and KC: Typed in the chat box that they support this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified.

EC-C1301.1.1-21

This proposal was put on the agenda in error. It has been withdrawn by the proponent.

EC-C1301.1.1(2)-21

Jeff: This is a DHCD staff proposal stemming from legislation requiring the BHCD to consider energy requirement exemptions for buildings with occupancy classifications of Groups F, S and U.
Eric: Is opposed to this proposal, which creates very broad exceptions for buildings.
Bill: Also opposes this proposal. It doesn't make sense. There is no energy efficiency or cost savings.
Matt Benka: Supports this proposal to see it move forward to the BHCD for their consideration.
Brett Vassey: Supports this proposal. He asked what the procedure is for the Board to vote on proposals.
Jeff: The Board could look at consensus and non-consensus proposals, but would usually vote on consensus proposals in blocks.
Jack Avis: Also supports the proposal to keep it moving forward.
Ben, KC, Chelsea and Paula: All typed in the chat box that they are opposed to this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EC-Appendix CB-21

Jack Avis: This proposal addresses building envelopes in F, S and U Occupancies, which are adding undue cost to developers and building owners. It makes Virginia less competitive with North Carolina, which doesn't have the same requirement. There have been concessions in working with the stakeholders, they have tightened up some requirements and they have come closer to consensus.
Eric: Is opposed to this proposal. There are alternatives in the code already that should address many of the concerns being raised. There are two other scenarios allowed in the IECC for low energy buildings and for buildings that aren't conditioned. ASHRAE 90.1 also has an exception to Section 5.1.2.3 for semi-heated spaces, which can be used. He thinks this code change is unnecessary. North Carolina is the only state that has made exemptions of this type.
Chelsea: Typed in the chat box:
Chelsea Harnish: VAEEC is opposed to EC-Appendix CB-21 for all of the reasons stated by Eric Lacey. We do appreciate the proponents meeting with us and would be happy to continue the conversation.
Brett: Is in support of this proposal. This provides more options and flexibility in factory spaces and allows Virginia to be more competitive. There is also some economic development flexibility.
Bill: Is in opposition to this proposal. Agrees with Eric and thinks it will bring the code back 3 decades for these building types. He doesn't think it would help economic development and it would hurt individuals working in the buildings.
Matt: Virginia Contractor Procurement Alliance. Virginia is less competitive in this space. It costs Virginia more to put in things that are not required in North Carolina.
Ben: Agrees with Bill and Eric. He is opposed to this proposal.
Andrew Klein: Self Storage Association. Supports this proposal. The options Eric spoke to are not good ones, as

they have minimum insulation requirements.
Andrew Clark: He often hears about the negative impacts of proposals on things like safety and well-being. He asked if there were some reported instances of harm since North Carolina made a change.
Eric: Doesn't know about people at risk in North Carolina. Thinks that North Carolina is the only state that has done this. He does think that if buildings are less energy efficient, that there is an overall health risk. Responding to Andrew Klein, he noted that there are no mandatory envelope requirements that have to be met if the low-energy building or semi-heated building provisions are followed
Bill: The long-standing legal standard is that if the code is modified to save money, it should remain consistent with the international codes.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

EC-C1301.1.1.1(2)-21
Bill: This is a proposal to adopt the 2021 IECC in full and is focused on new construction.
Steve: AOBA and VAMA are opposed to this proposal.
Andrew Clark: HBAV is opposed to this proposal. It would add a significant cost to housing for the consumer. He also thinks this may be more aspirational than practical. Virginia has an almost perfect score on residential and commercial energy efficiency in the ACEEE report.
Eric: Is in support of this proposal. Virginia is capable of meeting the requirements of the model energy code. He disagrees with Andrew. Virginia doesn't get an almost perfect score on the ACEEE report, and Virginia is specifically behind in the residential category.
Ben: Supports this proposal.
Andrew Clark: When the ACEEE report is broken down, utility programs and transportation policy brings the Virginia score down. The score is better for building and energy codes.
Bill: The DOE report supplied by Andrew in cdpVA does show that consumers are energy cost burdened, even higher income residents and buyers of new construction.
Andrew Clark: The DOE data shows that most cost burden is found under 30% AMI. Adding up-front costs are not going to help anyone over the next few decades, when they can't afford to purchase the home.
Jimmy Moss: Speaking for himself. He oversees affordable housing for people at 80% AMI and below in South West Virginia. They do attempt to provide energy efficiency, but they are very limited due to the costs. He opposes this proposal.
Brett: Typed in the chat box:
Brett Vassey (Virginia Manufacturers Association): Virginia's per capita BTU energy use has dropped since 2005 - https://vaenergyconsumer.com/wp-content/uploads/2021/12/2021-Virginia-Natural-Resources-Scorecard.pdf.
Virginia ranks #20 in the US. BTU's per GDP also fell and Virginia ranks #17 in the US.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R402.1.2 (1)-21
Laura Baker: This proposal would bring the Virginia code up to the 2021 IECC standards. There have been no updates to this Section in Virginia since 2012.
Andrew Clark: HBAV is in opposition to this proposal. It seems to be more aspirational than establishing a baseline.
Christopher Fox: Van Metre. There would be over 48 lumber products that would need to be changed, including the design plans. Changing from 2x4 to 2x6 lumber would be difficult because the lumber not readily available, and is more costly. It would cost about $10k more per house to comply with this proposal.
John Olivieri: HBAV Virginia Beach. He has been building affordable housing for many years. His costs could be between $10-18k more per house because of this proposal. Some of the upgrades needed would never allow for recuperating the costs. There are diminishing returns. Also, some of the things required are extremely difficult to get today.
Bill: Supports this proposal. There has been an attempt to bring this change for many cycles, and the home builders consistently oppose. He likes the idea of phasing things in, which is what the IECC has done, and Virginia has fallen behind. This doesn't require 2X6 lumber and HVAC is not even addressed here. Maryland has been

doing this and they make affordable housing.
Dan: Fairfax County. Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R402.1.2 (2)-21
Bill: This proposal is essentially the same as the previous one (REC-R402.1.1.2 (1) from Laura Baker.
Andrew Clark: HBAV is opposed to this proposal.
Laura: Supports this proposal.
Dan: Fairfax County. Supports this proposal.
Chelsea Harnish: Typed in the chat that VAEEC supports wall insulation proposals.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

{LUNCH 11:46am – 12:45pm}

REC-R402.4-21
Bill: This is a proposal to bring the Virginia code up to the 2012 IECC with respect to air leakage. It would delete some exceptions and bring the requirement down from 5 ACH to 3 ACH. Air changes are important because 25% of heating and cooling energy costs are due to the number of air changes. Tighter seals also help with insect intrusion. The primary objection is not cost of construction, it's closing the walls before testing occurs and having to open them up again.
Laura: RECA. This proposal is similar to her own, REC-R402.4.1.2, which is next on the agenda. It eases compliance where builders found it more difficult. The 2021 IECC sets the prescriptive requirement to 3 ACH, but the backstop requirement to 5 ACH, which allows builders to trade-off air tightness and have improved performance. There's also an alternate ACH calculation for small and attached homes, which eases some compliance concerns. While this would tighten up the prescriptive requirements, and it would also create exceptions to help with compliance.
Chris: The VRC 2018, which takes effect 7/1/22, adds a blower test for single family homes to see if they can get to 5 ACH. There are costs associated with tightening up the house. Also, if the envelope is too tight, it could be unhealthy. Foam insulation helps get to 5 ACH, but it is more expensive to use.
Andrew Clark: HBAV is opposed to this proposal. Blower door tests and 5 ACH was reached last year. He agrees with Chris. He doesn't agree with Bill that tighter homes are healthier. Carbon Monoxide poisoning is associated with houses that are too tight.
KC: Not speaking in support or opposition. Fresh air is a better strategy than envelope tightening. Hundreds of projects are now achieving this ACH level without using spray foam insulation. Looking at air sealing helps.
Ben: Using traditional building methods, foam insulation is not needed. 3 ACH has been the norm in lower temperature areas for a while. Attention to air ceiling does help to achieve this.
Bill: There does need to be controlled mechanical venting. The National Association of Home Builders (NAHB) says that tighter houses leads to improved air quality and removal of moisture in enclosures.
Dan: Supports this proposal.
Andrew Clark: Some tightness is good. Too much is not good. NAHB has pushed to maintain the requirements at 5 ACH.
David: Is opposed to this proposal. He thinks that higher air changes are happening regularly due to windows and doors opening frequently. It doesn't have to happen prescriptively.
Bill: The tech note in the NAHB discussion of building strategy specifically states how to get to 3 ACH.
Ben and Laura: Typed in the chat box that NBI and RECA respectively support this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R402.4.1.2-21
Laura Baker: This proposal is substantially similar to Bill's, which was just presented.
Andrew Clark: HBAV is opposed to this proposal.
Bill: Supports this proposal.
Andrew Clark: Asked Laura why original testing language was stricken and replaced with "shall be conducted by

an approved third party".
Laura: Negotiated that language in a previous discussion, but she is ok with going back to the original language.
Dan: Fairfax County. Supports this proposal.
David: Is opposed to this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R403.1.2-21
Bill: This proposal says that electric resistance heat shall not be used as the primary heat source in both new construction and with heating source replacement in existing buildings if a heat pump can be used instead.
Andrew Clark: HBAV supports this proposal.
David: Speaking for himself. There doesn't seem to be a way to enforce this.
Bill: The way to enforce this is to install a heat pump which has electric resistance built into the unit, which would trigger during defrost or emergency heat modes.
David: Is willing to remove his objection and support this proposal after hearing Bill's description, and seeing a note to that effect in the last sentence of the proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

REC-R403.1.4-21
Bill: This proposal says that onsite combustion of fossil fuel shall not be used as a primary heat source in new residential construction.
David: You mentioned that this correlates with heat pumps. Does this say that fossil fuels cannot be used as heat source in new construction?
Bill: It would only be prohibited as the primary heat source. The alternative primary sources are electric resistance or heat pump.
David: Opposes this proposal
Andrew Clark: HBAV is opposed to this proposal.
Ben: NBI supports this proposal.
Jeff: The DHCD staff will review this and some of the other fossil fuel vs. electric proposals with the AG prior to the BHCD meeting in September.
Bill: That is fine with him. He noted that there is a provision in the code that specifically empowers the BHCD to regulate HVAC systems.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R403.1.4(2)-21
Bill: This proposal says that an electric heat pump shall be the primary system for both heating and cooling when a central ducted air conditioning system is installed. A ductless heat pump would be installed when there is a ductless heating or cooling system. It doesn't prohibit other sources as backup systems and it doesn't apply to cooking.
David: Is opposed to this proposal because it doesn't give builders or consumers a choice.
Ben: Supports this proposal.
Andrew Clark: HBAV is opposed to this proposal. It does seem to be more aspirational than standard.
Bill: Shifting to heat pumps is one of the major approaches to limit climate change progression.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R403.3.3-21
Laura: This proposal would change the current duct testing requirements in conditioned space to meet the 2021 IECC standards. Eric made a modification to say in 1103.3.5 that building cavities would comply with the mechanical Section 1601.1.1 of the residential code. Currently, the energy code doesn't mention building cavities used as ducts or plenums, so this modification would give guidance on that issue. It also removes an exception for duct testing within the building thermal envelope.
Andrew Clark: HBAV supports this proposal. He asked if the modification was already discussed with HBAV.

Laura: Yes, this is the one that was discussed. It eases restrictions and points to the existing residential code for guidance.
Bill: Supports this proposal.
David: Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

REC-R404-21
Bill: This proposal calls for raceways to accommodate electric in the future if combustible appliances are installed.
David: Is opposed to this proposal. It adds costs for something that may never be used.
Ben: Supports this proposal. Readiness is more cost effective than tearing out walls to install something later.
Andrew Clark: HBAV is opposed to this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

Typed in the chat box:
William Penniman: By the way, I believe that the EV for multifamily and office were not the latest proposal that I submitted. It won't change the outcomes of non-consensus, but I would like the correct versions to be included in the package.
Richard Potts - DHCD: Bill, we will follow up with you to verify. Thanks

REC-R404.2-21
Bill: This is a proposal for solar readiness. It would require homes with roofs of 600 square feet or more, or those oriented to the south, to comply with appendix RA solar-ready provisions by putting in a conduit or raceway.
Andrew Clark: HBAV is opposed to this proposal. Something that may never be used should not be mandated. It should be up to the consumer if they want that as an option, or to buy a home that is already equipped.
Bill: If there's any question, roofs are strong enough to support solar panels today.
Ben: NBI Supports this proposal and is willing to work with HBAV to reach consensus.
Andrew Clark: Wants to know how the second exception would work for buildings that are shaded for more than 70 percent of the daylight hours. The calculation seems difficult.
Bill: It's primarily to allow flexibility for houses built in shady areas or near tall buildings. There are shade studies to calculate the measurement, and it would not come up often.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R404.4-21
Ben: This is NBI's proposal to create solar-ready residential homes. This is going through the 2024 ICC process.
Bill: Supports this proposal.
Andrew Clark: HBAV is opposed.
Jimmy: Speaking on behalf of himself, he is opposed to this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R503.1.2-21
Ben: This proposal was supported by the Energy Sub-Workgroup, and has a floor modification. It would prevent heating and cooling system oversizing.
Jeff: The modification was to bring it into the VEBC with the same intent as it had when proposed to the VECC.
Bill: Is in support of this proposal.
Laura: RECA Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified.

REC-R503.1.2.1-21
Ben: This proposal applies the same HVAC control requirements applicable to new construction, to large scale alterations.

Andrew Clark: Asked what the scope of compliance is for what must be done in R403.1 and R403.2.
Laura: R403.1 says that there must be a thermostat for each heating and cooling system, and there must be a programmable thermostat in the dwelling unit. Heat pumps must have controls that prevent supplementary electric resistance heat when the regular heating unit is in control. R403.2 says that the water heater must have a reset button or have water temperature sensing.
Florin: Typed in the chat box:
Florin Moldovan - DHCD: https://codes.iccsafe.org/content/IECC2021P2/chapter-4-re-residential-energy-efficiency#IECC2021P2_RE_Ch04_SecR403.1
Andrew Clark: Does not support this proposal. This requirement might be a disincentive for someone doing renovations.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

REC-R1104.2-21
Bill: This proposal involves EV readiness for 1- and 2-family houses and townhouses. If parking is provided, there would be a branch circuit installed. It is inexpensive and easy to install the conduit for EV charging stations.
Andrew Clark: Currently opposes this proposal, but does think that this one has the best chance of agreement. They will continue to discuss it up until the time of the BHCD meeting in September.
David: Is opposed to this proposal due to the possibility of parking spaces being large distances from the building and wiring would be costly. Also, there is potential danger in parking in a garage and using a charging station there.
KC: Supports this proposal.
Bill: Is willing to keep working on this and hopes for a compromise before it is heard by the BHCD.
Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

Next Steps:
Jeff: Thanked everyone for their participation. The proposal voting results will be updated in cdpVA. The remaining General Workgroup meetings will continue for the next few days. The BHCD meeting to decide on all proposals put forth is scheduled for September.

General Stakeholder Workgroup Meeting – SFPC & VMC Proposals
June 10, 2022 - 9:00 a.m. – 11:45 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Andrew Milliken: *Stafford County Fire and Rescue, Virginia Fire Services Board (VFSB) Codes and Standards Committee*
Christina Jackson
Daniel Willham: *Fairfax County and Virginia Building and Code Officials Association (VBCOA)*
David Beahm: *Warren County*
Dwayne Garriss: *Retired code official and Georgia state fire marshal*
Glenn Dean
Jacob R. Newton: *The Virginia, Maryland and Delaware Association of Electric Cooperatives (VMDAEC)*
Jason Laws: *Virginia Building and Code Officials Association (VBCOA)*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
John Armstrong: *Dominion Energy*
Joshua Davis: *Virginia State Fire Marshal's Office*
Lee Stoermer: *Loudoun County Fire Marshal's Office*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Matthew Mertz
Paula Eubank: *FEMA*
Perry Weller: *City of Staunton, VA*
Ron Clements: *Chesterfield County Building Official*
Sean Farrell: *Prince William County, member of VBCOA*
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
Zach LeMaster

Welcome and Introductions

Jeff Brown: Welcomed participants to the meeting, gave an overview of the agenda, and let the group know there would be breaks every hour. He asked them to let the group know who they represent as they speak to proposals.

Richard Potts: Gave an Adobe Connect tutorial.

Jeff: Gave a presentation about the Code Development Cycle. Highlights included:

- DHCD staff were identified.
- The 2021 Code Development Cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, and withdrawn.
- May 1st was the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.

FP107.11-21

Joshua Davis: This proposal makes changes to the State Fire Marshal's Office fees. 40% of the department's funding comes from fees, and the fees have not been adjusted for several years. Fee increases are based on cost of operations. There are also some new fees which are in line with the average fees levied in Virginia localities.

Steve Shapiro: Asked if there's an exception for when localities have their own Fire Official.

Joshua: There is language in the code that prohibits State Fire Marshals from leveraging fees when localities have their own Fire Marshal. It is not specifically in this section.

Jeff: Chapter 1 in the SFPC would lay that out.

Andrew Milliken: VFSB supports this proposal.

Linda Hale: VFPA supports this proposal. Chapter 1 does lay out the authority for local vs. state.

Sean Farrell: It is discussed in Chapter 1.

Glenn Dean: State and local fees have been clearly separated historically, and state and local authorities have worked in cooperation.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

PM103.2-21

Ron Clements: This proposal removes a duplicated definition, wherein a structure that is unfit for human occupancy is also considered an unsafe structure. The unsafe structure definition will remain, as it is used more often in the code, while the definition of unfit for human occupancy will be removed. This proposal also requires the rules for unsafe structures to be enforced in all localities.

David Beahm: Is opposed to this proposal. He would prefer that the language say that the structure is an "imminent" danger to safety.

Joshua: Asked how the Section might point back to the Building Official.

Ron: This is the maintenance code, so the Property Maintenance Official would be responsible.

Joshua: Asked how the Building Official would be notified if there was an unsafe condition.

Ron: Chapter 1 says that the Property Maintenance Official is responsible to notify the Official having jurisdiction.

Joshua: He understands. He neither supports nor opposes this proposal.

Christina Jackson: Is not in favor of removing the phrase "unfit for human occupancy". It may raise questions in different jurisdictions. For example, if a placard is posted and residents are allowed to go in and remove their personal items. She doesn't support or oppose the proposal.

Ron: He hasn't removed any requirement to post a notice or placard, so unsafe should also convey unfit for occupancy.

Steve: On behalf of himself, he supports this proposal. He also thinks that both terms are not needed.

David: He understands Ron's reasons and doesn't disagree, but he is concerned about some of the language. For example, item #5 discusses inoperable plumbing, which might make it unfit for human occupancy, yet not make the entire building unsafe.

Sean: Not speaking in support or opposition of this proposal. If something is deemed unfit, it has to be posted and the building vacated. If it is unsafe, the Building Official can issue a corrective order first.

Christina: On behalf of herself, she asked why Section 106.2 would be removed.

Ron: It seems to imply that someone other than the code Official can decide if the structure is unfit or unsafe, then require the Official to inspect the structure. He thinks the Official should be the one to decide if the structure is unsafe.

Christina: Asked if it would also prohibit a Fire Official from reporting an unsafe structure to a Code Official.

Ron: That's spelled out in another section. But, he is ok with keeping the section if the group decides on it.

David: Is still opposed to the change, but will consider potential changes that would move him towards approval.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

{BREAK: 10:04 – 10:10}

FP111.2-21

Jeff: This proposal was supported by the SFPC Sub-workgroup. It allows the Fire Official to send electronic notices. The proponent was not on the call, so the floor was opened for discussion.

Andrew: Supports this proposal.

Lee Stoermer: Typed in the chat box:

Lee Stoermer Loudoun FMO: Support as presented based on discussion during work group.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

David: Asked if the electronic communication was the only option (after the Consensus for Approval determination). He wanted to say that he was concerned that it might be, so he wanted it noted. He doesn't oppose the proposal.

Jeff: Since the proponent was not available, the question could not be answered.

Linda: It sounds like the email was an additional option, without removing any other options.

Sean: Agrees with Linda

Jeff: Concerns can be noted in public comments.

FP906.1-21

Jeff: This proposal includes a floor modification to change the VCC with the same language. The amendment was presented on the screen.

Dwayne Garriss: This proposes to remove the exemption for having portable fire extinguishers in certain use groups with quick response sprinklers. People do use extinguishers and this would provide an additional opportunity for safety. It would bring the Virginia code back in line with the national code.

Steve: AOBA and VAMA are opposed to this proposal, which has been submitted over several code cycles. The exemption has encouraged sprinkler installation and it discourages vandalism to extinguishers. Installing the sprinklers was a tradeoff to not require extinguishers. There is cost to purchase, inspect, maintain and replace extinguishers and there is also the threat of vandalism. It is more likely that the extinguishers would be vandalized than used in a fire and they could also cause personal harm to people using them improperly. Constituents would rather deal with expense due to water damage from sprinklers in the event of a fire, than to deal with injury of patrons trying to use fire extinguishers. He would personally look for escape from a fire than to look for an extinguisher, hope it works and use it to try and fight a fire.

Andrew: Supports this proposal with the floor amendment.

Dwayne: Extinguishers would not replace sprinklers. If fires are extinguished before sprinklers are engaged, it would reduce carbon footprint. Studies show that most people would try to put out a fire with an extinguisher if it was available.

Dan Willham: Not speaking in favor or opposition, he has used a fire extinguisher.

Glenn: Asked Steve to clarify if his organizations would rather deal with property damage from vandalism of extinguishers and improper use than damage from sprinklers.

Steve: They would rather deal with fire loss since they have insurance for that. They do not want people to be harmed if try to fight fire with an extinguisher. The comments on vandalism were just to say that the extinguishers would more likely be vandalized than used to fight a fire.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

FP912.2-21

Jeff: This proposal was presented to the SFPC Sub-workgroup, and it was not supported by that group. The proponent was not on the call, so the floor was opened for discussion.

Andrew: VFSB Codes and Standards Committee. Is not in support due to the construction language.

David: Is not in support due to construction language and also language about fire chief. Some localities don't have a fire chief.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

FP1207-21

Jeff: This proposal was drafted by the DHCD staff on behalf of the SFPC Sub-workgroup. The intent is to clarify that electrical energy storage systems are regulated by the USBC, even though the VCC references the IFC for systems design and installation. It adds Section 433.1 to the VCC to include compliance with the IFC. It also cleans up language in the SFPC to remove construction requirements and/or change them to be written in maintenance language. Shahriar Amiri has a similar proposal, so DHCD will recommend that only one gets approved by the BHCD.

Steve: Asked how this proposal works with Shahriar's proposal and why there are different section numbers used in the proposals.

Jeff: After proposed regulations are all put together, the correct sections will be determined. It seems like this proposal is cleaner and would be easier to match up with the 2024 provisions in the IFC. Shahriar's proposal does include exceptions for utility equipment regulation. This proposal does not spell that out, but Chapter 1 does say that utility equipment is not covered.

John Armstrong: Supports this proposal.

David: Asked if the BHCD would still look at both proposals if this one goes through.

Jeff: There are multiple ESS proposals, so they may all have to be reviewed separately and packaged together for the BHCD. Similarly, there are multiple sprinkler proposals and DHCD would send them together so the Board could select the one they like best.

David: Is in support of this proposal.

Jacob: Typed in the chat box:

Jacob R. Newton (VMDAEC): Virginia, Maryland, and Delaware Association of Electric Cooperatives supports FP1207-21 over the competing section proposed Tuesday.

Jeff: There was also a floor modification with some cleaned up language. It was shown on the screen.

Florin: The floor modification shows the SFPC Sub-workgroup approved language.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified.

FP3303.3.1-21

Andrew: This proposal from the VFSB Codes and Standards Committee is about fire safety during construction. It clarifies that the Building Official has the authority during construction and the Fire Official can request a stop work order from the Building Official if there are any violations. It also cleans up and clarifies language in the sections related to separation between construction areas and stairways.

Jeff: This proposal is supported by SFPC Sub-workgroup.

Steve: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

FP5601.2.2.1-21

Jeff: This was supported by the SFPC Sub-workgroup. The proponent made a Floor Amendment (shared on the Adobe Connect meeting screen) to change the NFPA 1124 reference from the 2013 edition to the 2006 edition. The proponent was not on the call, so the floor was opened for discussion.

Lee Stoermer: Typed in the chat box:

Lee Stoermer Loudoun FMO: support this item. 5601.2.2.1-21

Steve: Is in support of this proposal. The NFPA change also brings the section in line with the 2021 IFC.

Glenn: Wonders if the proponent was trying to go back to chapters 6 and 7 in the NFPA 1124. They are in the 2013 edition. There may be a change to the building code because Chapters 6 and 7 don't kick in until the MAQ is met.

Jeff: DHCD staff will go back to the proponent's email to see his reasons for changing NFPA editions.

Florin Moldovan: Typed in the chat box:

Florin Moldovan - DHCD: From Mr. Steven Sites' email: I was contacted by Charles Walker representing TNT Fireworks as the Director of Compliance. Charles noted that he had read my code change proposal and supported the concept but not the reference of NFPA 1124, 2013 edition. During the normal cycle of the 2013 edition the NFPA Standards Council issued Decision #14-1 that effectively made the language in this edition referencing retail sales withdrawn. This was an oversight in my research and effectively eliminates the language that my proposal's purpose. Charles suggested that I go back one edition to 2006.

Glenn: NFPA 1124 Chapters 6 and 7 don't kick in until the MAQ is met. A change to the building code would be appropriate. The NFPA Standards Council removed language, which they put in place with a promise of receiving information and supporting criteria from the fireworks industry, but it didn't happen.

Jeff: Asked for support or opposition from the group.

Linda: Supports this proposal. It seems that the proponent was trying to reference the retail sales, which the 2013 edition doesn't have.

Glenn: Was commenting earlier, and not speaking in support or opposition to the proposal.

David: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified.

FP5705.5-21

Perry Weller: City of Staunton. This is a proposal to update the language around both wall mounted and standing hand sanitizer dispensers, to clarify that the Fire Marshal has the authority to approve both. Prior to the pandemic, the code only spoke to wall mounted dispensers.

Jeff: This proposal was also supported by the SFPC Sub-workgroup.

Andrew: Is in support of this proposal.

David: Not speaking in support or opposition. Asked if this causes any conflict with construction in the IFC.

Perry: Building Officials do not have the authority to approve the installation of wall mounted dispensers, only the Fire Officials do. The only change is that a standing dispenser was added, while a wall mounted dispenser was already there.

Jeff: Having wall mounted dispensers approved by Fire Officials is already in the SFPC, this just added free standing dispensers to it.

David: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

{BREAK: 11:01-11:10}

PM101.1-21

Paula Eubank: This proposal is for an editorial change to add the word "Property" back to the title of the Virginia Maintenance Code, which is consistent with the national codes.

Christina: Is in support of this proposal.

Sean: Asked why "cited" was changed to "referred to"

Paula: It could have been done for consistency. She is ok with reverting back to "cited".

Sean: Has no objection to the wording. He's not in favor or opposition, just asking a question.
Paula: Asked if the DHCD staff could look into this wording for consistency.
Jeff: The DHCD staff can do that. As long as there is no opposition to the wording either way, DHCD will review and use language that is consistent with other code sections.
Christina: Other codes do use the word "cited".
David: VCC 101.4 has "referred to", but most other codes say "cited". He supports this proposal overall.
Jeff: Asked DHCD staff to type the floor modification in the chat box. Floor amendment.
Florin Moldovan - DHCD: As per discussions, replace the proposed word "referred" with the word "cited".
Paula: Please also check "may" vs. "should" for consistency.
David: The VCC administrative Section 101.1 has "may", so change "should" back to "may".
Paula: Supports that change.
Steve: When "referred" is deleted, the word "to" should also be deleted and instead use "may be cited as"
Christina: Also, change the short title from "VMC" to "VPMC".
Paula: Agrees with Christina.
David: This is also consistent with VCC 101.4.
Chat Box: Participants typed in the chat box to indicate floor modification and approval of such:
Jeff Brown - DHCD: The Virginia Uniform Statewide Building Code, Part III, the Virginia Maintenance Code, may be cited as the "Virginia Property Maintenance Code," or the short title of "VPMC".
Paula Eubank: correct.
Christina Jackson: Agree
David Beahm: yes
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified.

PM103.2.3-21
Christina: This proposal clarifies a change that was submitted in the 2018 Code Change Cycle. It limits the scope of changes that renters are responsible to make to match the Virginia Resident Landlord Tenant Act (VRLTA).
Dan: Asked if this should be placed in as a note or in the main code section. What is in the note section isn't enforceable.
Christina: She will defer placement to the DHCD staff.
Dan: It would be stronger in the code section.
Sean: Notes aren't mandates, they are just suggestions. This is the right place to give guidance to the Code Official. He's not speaking for or against the proposal.
Jeff: The notes are for the Code Officials' benefit. He suggested putting a period after Virginia. Then, adding a second note that says that it doesn't exceed the responsibility in the VRLTA.
Christina: Is ok with that suggestion.
David: Suggested "and not to exceed" instead of "but" not to exceed. He is in support of the proposal.
Jeff: Suggested a second sentence for clarity.
David: It does make sense that way.
Steve: Suggested that the second sentence says something like "In any case, it shall not exceed the…VRLTA"
Christina: Typed in the chat box:
Christina Jackson: This code section shall not exceed the provisions of an owner(s) responsibility as protected under the Virginia Residential Landlord and Tenant Act.
Sean: Speaking for himself. The note should be cautionary and not specify compliance. If the VRLTA has a definition of owner which conflicts with the VPMC definition of owner, that may also be problematic.
Steve: It should say shall not exceed the provisions of a "tenant(s)" responsibility.
Christina: That is correct. She typed in the chat box:
Christina Jackson: This code shall not exceed the tenant(s) responsibility as protected under the Virginia Residential Landlord and Tenant Act.
Paula: Asked if the word "provisions" was necessary.
Christina: She thinks "provisions" can be removed from the sentence. The definition of both owner and tenant in

the VRLTA is almost identical.

Jeff: Typed in the chat box:

Jeff Brown - DHCD: Assignment of responsibility must be in compliance with all other applicable laws and regulations, such as the Virginia Residential Landlord and Tenant Act. Where an owner states that a tenant is responsible for performing any of the owner's duties under this code, the code official may request information needed to verify the owner's statement, as allowed by § 55-11209 A 5 of the Code of Virginia. A tenant's responsibility is limited and protected under the Virginia Residential Landlord and Tenant Act

Dan: Typed in the chat box:

Daniel Willham: ..... Virginia. A tenant's responsibility is limited and protected under the Virginia Residential Landlord and Tenant Act.

Christina: Likes both Jeff's and Dan's modifications. She will defer to whatever the group likes best.

Paula: If Jeff's modification is used, she suggests changing the word "needed" to "required".

Sean: likes Dan's modification.

Christina: Would like to use Dan's sentence.

David: Supports Dan's modification as well.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval as Modified using Dan's sentence as typed in the chat box.

Next Steps:

Jeff: Thanked everyone for their participation. There will be a few more General Workgroup meetings held next week. The BHCD will meet in September to decide on changes. Soon after, code change training will take place.

General Stakeholder Workgroup Meeting – VRC Proposals
June 14, 2022 - 9:00 a.m. – 12:15 p.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Group Participants:

Abigail Thompson
Andrew Clark: *Home Builders Association of Virginia*
Andrew Milliken: *Stafford County Fire and Rescue, Representing himself*
Anthony Clatterbuck: *Home builder in Culpeper Virginia*
Claudia Cotton
Craig Toalson
Daniel Willham: *Fairfax County*
David Beahm: *Warren County*
Glenn Dean
Jason Laws: *Virginia Building and Code Officials Association* (*VBCOA)*
Jeffrey Shapiro
Jimmy Moss: *VBCOA*
John Ainslie
KC Bleile: *Viridiant*
Paula Eubank: *FEMA*
Richard Grace: *Culpeper County Building Department*
Ross Shearer
Steve Shapiro: *Apartment and Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
Susan Stillman:
William (Bill) Penniman: *Sierra Club, Virginia Chapter*
Zach LeMaster

Welcome and Introductions

Jeff Brown: Welcomed participants to the meeting, gave an overview of the agenda, and let the group know there would be breaks every hour. He asked them to let the group know who they represent as they speak to proposals.

Paul Messplay: Gave an Adobe Connect tutorial.

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- DHCD staff were identified.
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- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
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RB113.1-21

KC Bleile: This proposal is about minimum inspections prior to concealment and is intended to align with the energy code. There was an amendment to the language. KC typed in the chat box:

KC Bleile, Viridiant: "113.3(6) Inspection of energy conservation materials, equipment, and systems."

David Beahm: Representing himself. He is neither for nor against the language or the proposal itself. The final inspections have to be done before concealment, so the language may be unnecessary.

Andrew Clark: Agrees with David that the language may be unnecessary or overkill.

Paula Eubank: Agrees with David and Andrew that the language is unnecessary. She does like the modification in the chat better than the original sentence.

David: He is opposed to the language in the chat.

KC: Asked David how he would feel about the language if "prior to concealment" was added back in to the modified language.

David: Is opposed to adding unnecessary language in general.

KC: This currently doesn't align with the Energy Code minimum inspections prior to concealment

David: What is in the chat, he might support if it was prior to concealment, but he doesn't think equipment needs to be inspected before concealment.

Andrew C: Asked if the amended language is what KC typed in the chat.

KC: Yes it was, but she changed it again to read:

KC Bleile, Viridiant: 113.3(6) Inspection of energy conservation materials, equipment, and systems prior to concealment

Andrew C: This still seems too open ended and adds ambiguity to the minimum inspections. He thinks it is the discretion of Building Official to go above and beyond minimum inspection requirements.

Anthony Clatterbuck: Builder in Culpeper, Virginia. His concern is that he would have to install a complete system before concealment. It needs to be clear what needs to be inspected and what doesn't before concealment.

KC: Typed in the chat box:

KC Bleile, Viridiant: Per the 2021 IBC:

"Energy Inspection: Inspections shall be made to determine compliance with Chapter 13 and shall include, not be limited to, inspections for: envelope insulation R- and U-values, fenestration U-value, duct systems R-value and HVAC and water-heating equipment efficiency."

Richard Grace: Culpepper County Building Department. He doesn't agree with this change. It would be applicable to VCC as well as the VRC.

Jeff B: Agrees with Richard. There's not a separate administrative chapter for the VRC, so, it would be in

Chapter 1 of the USBC.

Richard: Doesn't like it in the VRC, it should be included in the VCC as well for more people to review.

David: Agrees with Richard, and is opposed to this change.

Bill Penniman: Typed in the chat box that he thinks the proposal makes sense.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus, with the most recent version amended in the chat: "113.3(6) Inspection of energy conservation materials, equipment, and systems prior to concealment".

RB116.1-21 – Withdrawn after the discussion:

Andrew Clark: This is a proposal to change the time for a Building Official to issue a Certificate of Occupancy from five working days to two.

David: Representing Warren County. He is opposed to this proposal. The change would put a burden on staff to get it done. The part of the sentence that says any pertinent laws or ordinances includes things that could take extra time. Building Officials do try to get the certificates done as quickly as possible.

Richard: Culpeper County. Agrees with David. He thinks it is unreasonable and puts too much burden on the Building Officials.

Paula: Agrees with David and Richard that it's an unnecessary burden on Building Official.

Dan Willham: Is opposed to this proposal. If it's left at five days, it doesn't mean that the certificate can't be issued sooner if possible.

Andrew C: Asked if there was any willingness to find middle ground between two and five days.

Anthony: In order to receive a final occupancy permit, the builder has to go through the Health Department, which takes another 5 days. With so much delay, owners are losing their mortgages. Any shortening would be helpful. He supports this proposal.

David: The Building Officials also have to get approval from the Virginia Department of Transportation. The certificates are still held up by other things the Building Official doesn't control. He doesn't see any movement down from five days.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

Andrew: Spoke with some stakeholders, and has decided to withdraw proposal RB116.1-21.

RB202-21

Paul Messplay: This is a Resiliency Sub-Workgroup proposal. It changes the Flood Hazard Area definition, which was correlated with the National Flood Insurance Program and the VCC. It also limits storage on the lowest floor to 200 feet or less, which correlates with FEMA documents. References to ASCE 24 and Coastal V Zones were added. There were also location and site preparation requirements added for the Building Official to receive a satisfactory Conditional Letter of Map Revision (CLOMR) from FEMA.

David: Supports this proposal, but he wanted to note that he is disappointed in having to comply with another number requirement; i.e. 200 square feet or less for the lowest floor storage.

Paula: There is no such thing as a FEMA "comment document" as cited in 322.3.1 item 2. The CLOMR is considered to be a comment document in itself. She doesn't support that language. It should be changed to reference only the CLOMR.

Steve Shapiro: Asked in the Resiliency Sub-Workgroup if there was such a thing as a FEMA comment document, and he was reassured that there was such a thing.

Paula: Paraphrased from the FEMA website: Building permits can't be issued on the basis of a CLOMR, because a CLOMR doesn't change the NFIP map. After the project is completed, the community must request a change to the NFIP map. She would prefer to see removal of the comment document. The reference to the CLOMR is inclusive and accurate. She asked Steve if he had any comment about the design flood elevation terminology change.

Steve: It is more consistent with other areas.

Jeff: With no further discussion, a vote showed only thumbs up and no thumbs down. This proposal will be marked as Consensus for Approval

{BREAK: 10:08-10:15}

RB302.13-21

Andrew Milliken: This proposal is to protect floor assemblies by bringing in the language of the 2021 IRC. The section was originally deleted from the VRC in 2012. There have been many developments since 2012 which should be considered.

Steve: Speaking for himself, not in support or opposition of the proposal. Item 3 should say "where complying with both of the following".

Andrew M: That language is ok with him.

Anthony: Requiring drywall on the underside of a basement or crawlspace doesn't make sense on many levels. It would be costly, require more intense labor and could cause mold, especially in unconditioned spaces. Something like spraying floor beams with a fire-resistant substance would make more sense. He is opposed to this proposal.

Jeff Shapiro: Speaking on behalf of himself. This is simply getting back to the model code and what other states are doing with this. This section tends to be adopted throughout jurisdictions. This change was a collaboration between the NAHB and fire services to address fire fighter safety. There are a variety of ways to achieve compliance without installing drywall. It's not nearly as controversial as sprinklers.

Anthony: Would be more inclined to support the proposal if the drywall component wasn't required. He is not aware of other approved assemblies.

Jeff S: The home building industry prefers a lot of options for compliance in codes. Drywall would always be used in a finished basement. There are exceptions listed as well.

Jeff B: Hearing no further discussion, he asked Andrew if he wanted to change language as proposed by Steve. Andrew declined. This proposal will be marked as Non Consensus as presented.

RB308.7-21

Bill: This is a proposal for bird-friendly construction in residential dwellings. There are up to a billion birds killed by flying into clear or reflective structures. About 44% of them are lost in residential dwellings. The proposal was supported by the Audubon Society of Northern Virginia.

Andrew C: Reached out to several window manufacturers and many of them were not familiar with bird-friendly glass. Others who knew of the product were extremely costly and there would be a delay to get the product. He is opposed to this proposal.

Bill: Other options besides windows are screens or film. These are inexpensive and available. There are links in the reason statement of the proposal to find those other options.

Andrew C: The proposal does allow for some flexibility and less expensive remedies. There would still be added inspection requirements for Building Officials. It should be the consumer's choice, not mandated in code.

Jeff: Asked if there was any support for the proposal.

Bill: Asked if the Audubon Society support would count.

Jeff: No. The vote is limited to members present.

Bill: Wanted a note to the BHCD in the comments that the Audubon Society supported the proposal.

Jeff: There is no DHCD staff summary for Non Consensus items, but written comments in cdpVA are included.

David: Consensus for Disapproval.

Jason Laws: Window films void warranties. He thinks it doesn't meet the purpose of protecting safety of residents, and is a stretch for minimum code requirements.

Bill: Preservation of natural resource is protection.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

RB310.2.1-21

Jeff: The proponents were not on the call. This proposal removes the state amendment for emergency escape and rescue opening size. The floor was opened for discussion.

Anthony: Is opposed to this. It's not necessary. The sash is removed for egress windows.

Jeff: Asked if there was any support for the proposal. Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

RB313.1-21

Andrew M: This brings back a proposal initially approved by the BHCD, requiring sprinklers for townhouses. There is a Floor Modification to remove NFPA 13 and 13R references.

Andrew C: Submitted comments in cdpVA. This would add too much cost to building new homes. Meters and water connection fees, especially those requiring a 1” meter are very expensive.

Jeff S: Sprinklers can run on water flow and a 1” meter isn’t required. He clarified that there is never a case where a 1” meter is needed under the IRC. There are also incentives that could reduce costs. A typical house uses the same range for minimum water flow and pressure rate that a sprinkler system can be designed to use. Maryland and Pennsylvania can make townhouse sprinklers work more affordably when including incentives. There can actually be a cost decrease. He prefers proposal RB313.1(3), which has a more incremental approach.

Andrew M: Hopes to have a compromise in the future and he’s glad that the BHCD will see the Study Group report with all of the conversation around this issue.

Andrew C: Asked what will be in the staff summary to the BHCD.

Jeff B: Everything related to a proposal is attached to it. The summary document to the BHCD will be new this cycle. There will definitely be a notation of who supported the proposals and who did not.

David: Asked if there is a headcount of who is for and who is against each of the proposals. He also asked if the Sprinkler Study Group agreed on any proposals. He’s against all of the RB313.1 code change proposals.

Jeff B: The summary will show who was in support and who was opposed and how the recommendation for or against came about. The Study Group didn’t vote for or against any proposals.

Paula: Speaking for herself, she opposes RB313.1.

Jeff S: The IRC is a minimum standard, but requirements can be exceeded. NFPA 13 or 13R goes further than the minimum P2904 or 13D system.

Bill: Speaking for himself. Supports this proposal and the next 2, so that they will go forward as Non Consensus instead of Consensus for Disapproval.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus as Modified.

RB313.1(2)-21

Glenn Dean: On page 5 of the Residential Sprinkler Study Group report, there was a good, concise summary of smoke alarms and sprinkler systems. On page 11, it says that homes built now are safer than those built decades ago; he would like to know in what way? Because of construction materials and items placed in the houses, fires and toxicity are faster and worse than they were in the past. Smoke detectors do give an early warning, but not soon enough because of the more flammable materials. Sprinklers would help with safety. Page 12 says that there is “no demand” for sprinklers. He thinks it’s because people aren’t aware of the need. Conclusions and acknowledgements say that Virginia is in alignment with majority of states that remove the IRC requirements for sprinklers in townhouses. He thinks that won’t last and that Virginia can lead or follow.

Andrew C: There should be a requirement for all localities in Virginia to send fire data to the Fire Programs, so that the data can be used correctly for analysis. The Workgroup last cycle was specific to townhomes. This proposal goes beyond that scope.

Glenn: Virginia Fire Incident Reporting System (VFIRS) has many data points and it’s hard to get down to more specific data. Even with all of those data points, the system itself is underutilized.

Andrew C: Agrees. He looked into that himself, and he had those same results. He thought there could possibly be a legislative push, or some collective effort to help the department to make that data more user friendly.

Anthony: Thinks that the most beneficial reports would be developed on a state-wide basis. Each locality has different things that they report on.

Andrew C: Typed in the chat box:

Andrew Clark: Agreed that a state level effort is needed. Sorry if I wasnt clear - when I referred to "the Department", i was referring to Dept of Fire Programs - not local fire departments.

Bill: Speaking for himself. Supports this proposal to ensure that it goes forward as Non Consensus.

Steve: Not speaking in favor or opposition, the first sentence should say An automatic residential fire sprinkler “system” instead of “systems”.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

RB313.1(3)-21

Jeff S: This is only for townhouses, and offers a path for builders to build them without fire sprinklers required. Townhouses with less than 3 units, would not require sprinklers. It would also be an opportunity to gather Virginia data. He says that there are only 4 states listed in the Study Group report, and he listed 13 states that have adopted the IRC requirement for sprinklers in townhouses.

Andrew C: Land development incentives would probably make for good discussions in the future and might be what moves the needle. Especially road widths. There's nothing in the proposals that would ensure that those incentives are granted. He is in opposition to this proposal today.

Jeff B: There is a Floor Modification on the screen to match the RB313.1.1 with what is in the IRC. If Jeff is in agreement, the proposal will move forward with it.

Jeff S: Agrees with the modification. He is willing to work with the home builders to ensure that they get incentives.

Steve: Asked Jeff about the exception: could there be 3 units with firewalls, then 3 more?

Jeff S: The IRC doesn't recognize fire walls like the IBC does. They would have to be separate buildings. 3 unit buildings separated from other 3 unit buildings would not require sprinklers.

Bill: Speaking for himself, he supports this proposal.

Dan: Supports this proposal.

David: Warren County. He is opposed to this proposal.

Andrew M: The VFSB Committee approves of this proposal.

Paula: Speaking for herself, she is against this proposal.

Jeff B: Hearing no further discussion, this proposal will be marked as Non Consensus with the Floor Modification.

RB315.3-21

Bill: This proposal would require carbon monoxide detectors with alarms in rooms where combustible fuel is located. He has had personal experiences with gas leaks and carbon monoxide.

Ross Shearer: Typed in the chat box:

Ross Shearer: I am unable to open my mike or raise a hand to speak. I support this proposal, RB315.3-21, for carbon monoxide alarms in rooms where there is open flame appliances as stated clearly in the proposal.

Anthony: On behalf of home builders, this proposal is overkill, as it would put carbon monoxide detectors in several rooms. He has found the most need for this in garages with generators. If inside the house, one is reasonable. He is opposed to this proposal.

Andrew C: HBAV. There have been some discussions this cycle about making the home more tightly sealed, which could lead to more carbon monoxide buildup. The IRC language seemed adequate. There was an NFPA study a few years ago that said that analyses of hazards should be done before new device suggestions were made. He asked if there were any studies done before this proposal was put together, and if the language in R331 came from the IRC.

Bill: The issues of fuel gas leaks and carbon monoxide buildup are real. The detectors are inexpensive and give an early warning if they are placed where the leaks would occur.

Susan Stillman: Typed in the chat box:

Susan Stillman: Speaking for myself, Susan Stillman, I am in favor of RB315.3-21. I had a bad experience with the gas company putting in a second regulator on my gas line. It caused my furnace to be compromised and fortunately my CO detector, next to the furnace, went off. This needs to be the case in every home.

Jeff Brown: Hearing no further discussion, this proposal will be marked as Non Consensus.

RB326-21

Jason: VBCOA. This is a proposal to revert back to the national definition of Habitable Attic, and to move the additional language out of the definition itself and into the code section.

Jeff S: Jason is correct in relation to the previous model code, but not the code being adopted. In Section 326.3 item #4 was stricken, but it is in the current model code. A habitable attic above the 3rd story is an additional floor, or a 4th story. This was created as a loophole to work around the 3 story limit of the IRC and get taller buildings approved under the IRC without having to go to the IBC and install a sprinkler system. It's not safe for fire fighters to use a 40 foot ground ladder or for a person to egress from a window that high.

Glenn: Topography could also be an issue and it's possible a 50+ foot ladder would be needed.

Bill: Supports this proposal.

Andrew C: HBAV. Asked Jason if this would change how habitable attics would be enforced in Virginia.

Jason: The intent was to keep it the same as the 2018 cycle.

Jeff S: There is nothing in reason statement that says why this is being stricken from the model code. If this goes through, it would be difficult to change it in another code cycle. The discussion needs to happen now.

Jason: Is not opposed to keeping #4 in as a Floor Modification. They were not looking at the 2021 code, so they didn't want to make a change from the 2018 code.

Andrew C: This was discussed at length in the last cycle. It was not adopted in the 2018 cycle.

Jeff S: He tried then to amend the 2018 code. Now it's different, because it would be striking something that is in the 2021 model code.

Jeff B: Asked Jason if he wanted to accept a Floor Modification. Jason said he will move forward with the original proposal. A vote resulted in David and Andrew C. showing thumbs up, Jeff S., Dan and Paula had thumbs down. This proposal will be marked as Non Consensus.

RB330.1-21

Jason: This is a proposal to include accessory dwelling units as an exception to the sound transmission requirement.

David: Supports this proposal.

Andrew C: Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

Next Steps:

Jeff: Thanked everyone for their participation. Tomorrow will be the last General Workgroup meeting on Trades. The DHCD staff will update cdpVA as soon as possible. Then, packages will be put together for the BHCD meeting in September.

General Stakeholder Workgroup Meeting – Trades Proposals
June 15, 2022 - 9:00 a.m. – 11:22 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Brian Hilderbrand: *Construction Regulation Administrator, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Group Participants:

Andrew Clark: *Home Builders Association of Virginia (HBAV)*
Bill Chapin
Dan Buuck: *National Association of Home Builders (NAHB)*
Daniel Willham*: Virginia Building and Code Officials Association (VBCOA), Fairfax County*
David Beahm:
David Hewitt
Jimmy Moss: *VBCOA*
John Ainslie: *HBAV*
Jonathan Sargeant: *Omegaflex*
Lisa Reiheld: *ICC PMG*
Mary Koban: *Air-Conditioning, Heating, and Refrigeration Institute (AHRI)*
Paula Eubank: *FEMA*
Richard Grace: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and VBCOA*
Robert Glass: *Daikin Comfort Technologies*
Stephen Spletzer: *Chemours*
Yi-ting Chiu
Zach LeMaster

Welcome and Introductions

Jeff Brown: Welcomed participants to the meeting, gave an overview of the agenda, and let the group know there would be breaks every hour. He asked them to stay muted unless speaking, and to let the group know who they represent as they speak to a proposal.

Paul Messplay: Gave an Adobe Connect tutorial.

Jeff: Gave a presentation about the Code Development Cycle. Highlights included:

- DHCD staff were identified.
- The 2021 Code Development Cycle and Study Group, Sub-Workgroup and General Workgroup meeting types and dates.
- Overview of the cdpVA and DHCD websites, including links to documents used during the cycle.
- Review of General Workgroup meeting agendas, meeting dates and voting processes.
- The main purpose of the General Workgroup meetings is to vote on the proposals in the agenda. The following voting options were reviewed: consensus for approval, approved as modified, consensus for disapproval, non-consensus, and withdrawn.
- May 1st was the final cutoff date for all proposals to be submitted.
- Meeting summaries, proposals and voting results will be prepared and submitted to the Board of Housing and Community Development for final review and decision.

RE2701.1.1-21

Dan Buuk: NAHB. This proposal deletes Section 210.8(F) from the NEC which requires GFCI coverage on HVAC condenser units. The code says “outdoor outlets” (any point that connects to the circuit, including hardwires). It doesn’t delete the requirement for receptacles, requiring GFCI coverage. The Section was not coordinated with product standards. Listed HVAC equipment has a leakage current above what would trip Class A GFCI. The touch current is well below levels that would hurt anyone. It could cause the air conditioning to trip the GFCI, which causes a risk of heat-related death.

Mary Koban: AHRI. Supports this proposal. There is an incompatibility between HVAC equipment and GFCI outlets. In testing, many were tripped. The Section should be deleted until the issue is resolved.

Robert Glass: Daikin Comfort Technologies. Agrees with Dan and Mary and he supports this proposal. There have already been 9 states to delete this Section, 5 states have edited the Section and 10 more states have delayed its implementation.

Andrew Clark: HBAV. Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

RE3902.16-21

Jeff: The proponent was not on the call. The floor was opened for discussion.

Dan B: NAHB data doesn’t support expanding AFCIs into areas where GFCIs are installed. An NFPA study says that there’s uncertainty around AFCI. If electricians install both AFCI and GFCI breakers and the AFCI causes nuisance tripping, the homeowner may replace it with a regular outlet and the GFCI safety would be lost. More and more states (22 now) are reducing AFCI coverage.

John Ainslie: Typed in the chat box:

John Ainslie: HBAV is opposed to this proposal

Jeff: Asked if there was any support for this proposal. Hearing none and with no further discussion offered, this proposal will be marked as Consensus for Disapproval.

RE3902.17-21

Dan B: NAHB. His comments for this proposal are the same as they were for RE2701.1.1-21 above.

Mary: Is in support of this proposal.

Robert: Is in support of this proposal, due to the incompatibility issue.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

RM1404.1-21

Mary: AHRI. This proposal is to update an old reference to the ULCSA 2012 edition to the 2019 edition. ANCE and grade standard are also both outdated.

Robert: Daikin Comfort Technologies. Supports this proposal. These changes have already been approved for the 2024 codes by the ICC.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

RM1411-21

Mary: AHRI. This proposal is to add new requirements using A2L refrigerants and UL 60335-2-40-2019. The AIM act was signed in Dec 2020, mandating that HFC's begin phasing down production. The phase down started Jan 1 2022 and manufacturers who are making HVAC equipment will need to transition to the new A2L classification. The UL 60335-2-40-2019 considers changes required to incorporate these new refrigerants. The AIM act document is in the Adobe file pod #6 and is available to download.

David Beahm: Representing himself. The reason statement in the prior proposal (RM1404.1-21) said it was adopted by the ICC in the 2024 code. He asked if this proposal was also adopted in the 2024 code. He is in support of this proposal.

Mary: She did miss including that note in this proposal. It is part of the 2024 codes adopted by the ICC.

Stephen Spletzer: Chemours. This is consistent with changes to the model codes and the updates in the industry. He is in support of this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

RM1601.4.11-21

Jeff: This proposal was submitted by the DHCD staff in response to a letter from a legislator, regarding floor registers in toilet and bathing spaces.

Robert: Daikin Comfort Technologies. If ductwork is in a crawlspace or basement and all registers are in the floor, how would registers be added to a bathroom in a place other than the floor? The cost impact statement says that it would not increase cost of construction, but it sounds like it would. If the ductwork and registers are in the attic, there's no conflict. He suggested saying instead that they shouldn't be within xx feet of a toilet or tub.

John: Typed in the chat box:

John Ainslie: is there any data on how problematic the current code is?

John Ainslie: this will increase cost of construction

John Ainslie: I am in opposition to this proposal

Jeff: Based on Robert's comment and John's text, it could increase the cost of construction. The proposal can be updated to reflect that potential cost increase.

Richard Grace: Not speaking in favor or against. If there's an HVAC in the attic, ductwork can drop down. If it is below the bathroom, ductwork can come up into the wall through a register.

Jeff: Asked if there was any support for the proposal.

Andrew: HBAV. He did speak with the legislator on this and thinks it should go through as Non Consensus so it can be further discussed.

Dan Willham: Speaking for himself, he supports this proposal.

Jeff: Noted that the language used was pulled in from the Virginia Mechanical Code. Hearing some support and some opposition, this proposal will be marked as Non Consensus.

M403.3.1.1-21

Richard: VPMIA and VBCOA. This proposal is to correct a change made in the last code cycle. The correction is to footnote i. The intent was to allow dentist offices and doctor offices that are not really ambulatory care to not have to comply with ASHRAE 170. Ventilation requirements were put in the footnote, but incorrectly. It is an editorial change to correct the original proposal.

Jeff: Asked if there was any discussion or opposition to this proposal. Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1101.2-21

Mary: AHRI. This proposal is for administrative purposes. It takes out refrigeration fittings from the table and places it in Section 1107.5, which is more applicable.

Robert: Daikin Comfort Technologies. In support of this proposal. The item is misplaced and should be relocated.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1101.2(2)-21

Mary: AHRI. Additional listed and labeled factory-built refrigeration equipment and appliances were added to the table. UL60335-2-89 was just completed and published in October, 2021, so it was too late to include in the I-Code. However, lower GWP equipment in the new UL is going to be standard.

Stephen: Chemours. He worked on updating the UL60335-2-89 with this lower GWP equipment. He is in support of this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

{BREAK: 10:06-10:15}

M1101.2.1-21

Mary: AHRI. This proposal is to add high-probability equipment using Group A2L, A2, A3 or B1 refrigerants as per the new UL 2-40 and 2-89, and will align with ASHRAE 15. Most of this was accepted in the 2024 I-Codes, except for the UL 2-89, which was only approved in October, 2021 as already discussed.

Stephen: Chemours. Supports this proposal. It is critical for the industry to allow these refrigerants.

Robert: Daikin Comfort Technologies. He supports this proposal, as it uses the most current standard.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1101.7-21

Mary: AHRI. This proposal discusses changing refrigerant in an existing system with refrigerant in the new classification. Language from ASHRAE 15 and the NAHB is included.

Stephen: Supports this proposal. This is consistent with ASHRAE 15 and is important when changes are made to the refrigerant system.

Robert: Daikin Comfort Technologies. Supports this proposal.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1103.1-21

Mary: AHRI. This proposal was accepted in the 2024 I-Codes. There will be new refrigerants with ASHRAE classifications. The table provides new information for installers.

Robert: Supports this proposal. It is in alignment with ASHRAE 24 and will be in the 2024 IMC. It adds information that will be used by installers and authorities having jurisdiction.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1104.3.1-21

Mary: AHRI. This proposal is to allow high-probability systems to use group A2 and A2L refrigerants. There are some exceptions for group A3 and B3 refrigerants. It also adds more information for self-contained systems to allow 150 gram charge for A3 refrigerants.

Stephen: Supports this proposal. It aligns with what's been approved in the 2024 I-Codes.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1104.3.1(2)-21

Mary: AHRI. This proposal was split out from the others because there's information added in accordance with UL 2-89. Item #3 was changed, and #5 and #6 were added. Also, some extraneous information was deleted. This aligns with ASHRAE 15.

Robert: Daikin Comfort Technologies. Is in support of this proposal. The rewording in Sections 1104.3.1 and 1104.3.2 is in accordance with the 2024 IMC.
Stephen: Chemours. Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1106.3-21
Mary: AHRI. This proposal removes the word "flammable" and replaces with specific refrigerant classes to align better with ASHRAE 34 and ASHRAE 15.
Stephen: Chemours. Supports this proposal. He is a voting member of ASHRAE 15 and this proposal is consistent with that standard.
Robert: Daikin Comfort Technologies. Supports this proposal. This will also be part of the 2024 IMC.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1106.4-21 Part I
Mary: AHRI. This Section has been edited to reflect ASHRAE 15 group refrigerants A2L and B2L. This also reflects what will be in the 2024 I-Codes.
David: Supports this proposal.
Stephen: Chemours. Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M1106.4-21 Part II
Mary: AHRI. This proposal deletes a ventilation requirement that is old and outdated. It was accepted in the 2024 I-Codes.
Stephen: Chemours. Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M-Chapter 15-21
Mary: AHRI. Updates this Section to reference the UL 2-89 2021 version, and give an update to the title. It is not yet updated in the I-Codes, since UL 2-89 was just published in October, 2021 after the 2024 I-Code changes.
Stephen: Chemours. Supports this proposal.
Robert: Daikin Comfort Technologies. Supports this proposal.
Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

M-FG Chapter 8-21 – (Reference Standard) Consensus for Disapproval
M-FG403.5-21 – (plastic pipe, tubing and fittings) Withdrawn
M-FG404.6-21 – (more comprehensive code change for composite piping) Consensus for Disapproval
Jeff: The 3 FG proposals will be grouped for discussion, as they are all related.
Bill Chapin: These proposals introduce technology for gas systems using PEX-AL-PEX tubing, which has been used in Europe for 20 years. The ASTM standard is referenced and the ISO standard is also referenced. A new Section was created and separated based on the material – aluminum or plastic. Otherwise, there would have to be exemptions each time. However, the M-FG403.5-21 proposal can be withdrawn because the language is already included in the comprehensive code change proposal M-FG404.6-21.
Jeff: If M-FG404.6-21 is approved, the reference standard in M-FG Chapter 8-21 would also be incorporated into the approved proposal.
Bill: That works for him. If 404.6 isn't approved, there is no point for the other one anyway.
Richard: VPMIA and VBCOA. This plastic product isn't tested or approved for gas piping systems. The ASTM F1281 standard talks a lot about water. Gas is only mentioned once, but it doesn't say what type of gas is compatible for use. Fuel gas is not mentioned. PMG 1588 also doesn't say that the product is approved for use with gas fuel. He has done a lot of research into this. He submitted a code interpretation request to the State Technical Review Board asking if PEX-AL-PEX pipe listed under ICC-ES product certificate PMG 1588 and proposed for use as gas piping within or under a building is at least equivalent in safety and suitability to other pipes listed for such use in

the Virginia Fuel Gas Code and the Virginia Residential Code. The Review Board Interpretation 1-2022 said the answer was that PEX-AL-PEX is not suitable for fuel gas systems. VPMIA and VBCOA are in opposition to this proposal as well as the other two.

Jonathan Sargeant: Omegaflex. Opposes these proposals. Similar proposals were submitted to the ICC for inclusion in the 2024 IFGC, and they suggested that the proponent submit the proposals to NFPA 54. The NFPA 54 committee heard these proposals and decided to not include them in the NFPA 54 code because the material was more plastic than metal. The Fuel Gas Code limits plastic pipe to below grade outdoors only. Plastic doesn't perform well in a building fire. Fuel Gas piping should also be electrically continuous and the fitting in the PEX-AL-PEX pipe is insulated, so that is a code violation. This pipe would also not meet the 1,000 degree flammability test. For these and other reasons, he recommends Consensus for Disapproval.

Paula Eubank: Speaking on behalf of herself. She opposes these proposals and agrees with Richard's statements.

Bill: There is no such requirement for any fittings in the code to meet a 1,000 degree flammability test. The TRB answer was not satisfactory because there was no evidence to support it. The product has been used for 20 years around the world. This change is completely different than the one proposed to the NFPA. The ISO standard testing is equivalent to the ASTM F 1281.

David: Warren County. Suggests that the proponent gets NFPA approval first. The TRB is the ultimate authority for interpretation in Virginia and their final determination stands.

Richard: Agrees with David.

Dan W: Fairfax County. For safety reasons, it's pretty obvious; plastic melts in fire.

Jeff: Hearing no further discussion, both remaining proposals M-FG404.6 and M-FG Chapter 8 will be marked as Consensus for Disapproval.

P401.4-21

Paula: Speaking on behalf of herself. This proposal would require automatic or touchless controls on faucets and anything else that would otherwise require touch operation in public restrooms for sanitary purposes. They would also be equipped with emergency shut off provisions for maintenance personnel.

David: Speaking for himself, he is opposed to this proposal as written. The burden of providing automatic plumbing fixtures is over excessive and the cost implication, maintenance and usability issues are also concerning.

John: Typed in the chat box:

John Ainslie: I agree with David, I oppose

Andrew: Speaking on behalf of Steve Shapiro, AOBA and VAMA are opposed to this proposal. This should be the choice of the individual developer and not mandated.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Disapproval.

P405.3.1-21

Paula: Speaking on behalf of herself. This proposal addresses that the space between inward swinging doors in bathroom stalls is too small. This is mostly an issue in the Ladies' rooms. The proposal would be to either swing the door outward or establish a minimum space between the fixture and the door as it opens.

David: Supports this proposal. He would prefer to not have the door swing outward however.

Andrew: Speaking for Steve Shapiro, AOBA and VAMA does not support this proposal. Adding additional inches drives up the cost for something that may not necessarily be an issue.

Paula: This wouldn't affect an accessible stall. There are no existing requirements for this. This issue has never been addressed. It would not add a lot of space.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

P605.15.2-21

Jeff: The proponent was not on the call. The proposal is to add another color to solvent cement. The floor was opened for discussion.

Jeff: Asked for discussion or opposition. Hearing none, this proposal will be marked as Consensus for Approval.

Next Steps:

Jeff: Thanked the participants. This was the last of the General Workgroup meetings. The DHCD staff will put together packages for the BHCD to review in September. Public comments can still be made in cdpVA before the packages are submitted.

David: Asked if there could be a spreadsheet provided listing the status of all the proposals in one place, instead of having to look at each proposal separately.

Jeff: The proposals are listed in cdpVA with the statuses in a section called Workgroup Actions. The DHCD staff is working on getting all of the statuses updated.

Mary: Asked if there was a date set for the BHCD meeting, and if it was available for anyone to attend.

Jeff: The meeting date is September 19th and it is open to public attendance. Brief public comments can be made at the beginning of the meeting, then the Board members discuss among themselves.

Mary: Asked when the approved regulations would go into effect.

Jeff: The DHCD staff puts the regulations together and re-submits to the Board for final approval in about December 2022. There are other things that happen behind the scenes, such as additional comment periods, publishing, putting code change training together, etc. The earliest that the regulations would probably become effective some time in or around the summer of 2023. There will be a notification posted with the effective date in advance.

Jeff: Thanked everyone again for their participation and closed the meeting.

Tab 11

Sub-Workgroup Meeting Summaries

Energy Sub-Workgroup Meeting Summary

March 24, 2022 9:00 a.m. – 2:10pm

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:
Jeff Brown: State Building Codes Director, State Building Codes Office (SBCO)
Florin Moldovan: Code and Regulation Specialist, SBCO
Richard Potts: Code Development and Technical Support Administrator, SBCO
Paul Messplay: Code and Regulation Specialist, SBCO
W. Travis Luter: Code and Regulation Specialist, SBCO
Kyle Flanders: Senior Policy Analyst and Regulatory Administrator

Sub-Workgroup Members:
Andy McKinley: American Institute of Architects, Virginia
Andrew Clark: Home Builders Association of Virginia
K.C. Bleile: Viridiant
Chelsea Harnish: Virginia Energy Efficiency Council
Steve Shapiro: Apartment & Office Building Association/Virginia Apartment and Management Association
Eric Lacey: Responsible Energy Codes Alliance
Jeff Mang: Polyisocyanurate Insulation Manufacturers Association
Maggie Kelley Riggins: Southeast Energy Efficiency Alliance
William Penniman: Sierra Club
Brian Clark: Habitat for Humanity

Other Interested Parties:
Andrea Papageorge
Brandy Mueller
Charlie Gunter
David Owen
Ellen Eggerton
Jacob Newton
Jennifer Eugene
John Ainslie
Laura Baker
Linda Baskerville
Mike Hamilton
Mike O'Connor
Morgan Whayland
Richard Grace
Ross Shearer
Sean Farrell
Steve Sunderman

Other Sub-Workgroup Members Not in Attendance:
Jim Canter: Virginia Building and Code Officials Association
Bettina Bergoo: Virginia Department of Energy

Ellis McKinney: Virginia Plumbing and Mechanical Inspectors Association
Corey Caney: International Association of Electrical Inspectors, Virginia

AGENDA AND DISCUSSION ITEMS

Welcome and Introductions

Richard Potts: Called the meeting to order at 9:00am and welcomed the group.
Paul Messplay: Provided an Adobe Connect features overview.
Richard Potts: Provided an overview of the background of the sub-workgroup and discussed how the sub-workgroup fits into the code development process.

Proposals

EC1301.1.1.1-21 – William Penniman

William Penniman – This proposal is very simple. It's the full adoption of the 2021 International Energy Conservation Code (IECC) without weakening VA amendments. This is consistent with applicable Virginia law of being in-line with national codes and it has been shown by the work of the Department of Energy and Pacific Northwest National Laboratory (PNNL) to save money. The life cycle savings are on the order of $8,300 on average.

Eric Lacey – This is a good proposal to kick things off because the proposal would essentially strike all of the Virginia specific amendments to the model code and get VA on track with the national codes. Others have submitted proposals to remove some of these amendments one by one. William's proposal would delete them all and if we feel some are necessary, we can add them back. I would like to see VA fully adopt the 2021 IECC. The 2021 IECC saw considerable support from public officials across the country and there's more support for this code than ever before. This would save homeowners money in the long run and will have a positive effect on the environment. I would encourage you to take a look at all the VA amendments and see if they are worthwhile going forward.

Steve Sunderman – Speaking in support of this proposal. We are looking to get into the 21st century here with energy conservation measures, which is what this is all about. Very much in favor. Strongly support.

Linda Baskerville – Arlington has a long-range energy conservation plan and to meet that by 2030, which isn't that far away now, we are going to really need to improve our energy efficiency. Going to the 2021 energy conservation criteria is going to help that.

Ross Shearer (IN CHAT) – I support this proposal for the reasons Eric mentioned. My house was built in 1964. It would have been nice if Virginia had paid just some attention to energy conservation in those days.

Andrew Clark – We do have concerns with this particular proposal with adopting the

2021 IECC in full. Staff provided a breakdown of some of the specific proposals that were included in there. Our preference would be to evaluate each of those on their own instead of adopting the 2021 IECC in full. Where our association comes down on this stuff, as builders, a lot of the messages we hear from local government officials is, "What are we doing to increase the supply of housing for folks at the lower to the middle end of the spectrum?" We're not talking about folks who are 30% Area Median Income (AMI), we're talking to 50-80% AMI. The Joint Legislative Audit & Review Commission (JLARC) in VA had a report this last year that home prices increased 15% and we've seen some that increased 35%. They found that we are 2,000 rental units short for people on the low end. The percentage of homes that sold under $200k decreased since 2015. There's the discussion with respect to upfront costs vs paybacks over time. The biggest impediment is for people at the lower end to be able to bring the cash to the table to cover those upfront costs. When we're talking about reducing energy burdens the focus should be on existing homes. We'd be happy to look at some of the individual proposals but we do have concerns about adopting the 2021 IECC in full.

Steve Shapiro – We're coming out of this terrible pandemic and I don't think now is the time to enact things to drive costs up. Andrew did a good job of framing it and we are not in support of this proposal.

John Ainslie – Just wanted to clarify one thing that's been mentioned. It's been mentioned that VA is not up to the national model energy codes, and while that may be a true statement, based on what I'm looking at, only 3 states of the 50 have adopted the 2021 IECC. So, most states are on the 2009, maybe 2012 code. The reason they are not is because it substantially increases the cost of housing. It keeps people from buying new, more energy efficient homes. While we may not be up to the national energy codes, most states are not.

William Penniman – We are always willing to talk. Living expenses, the occupancy costs, are what is critical, and clearly there are savings. Yes, the costs of new homes have gone up, but the costs of all homes have gone up. We didn't enter the market at the high-end anyway and there are plenty of options at all times. The problem is that if we don't make houses built today and the near future energy efficient, that will haunt occupants for the lifetime of the home, particular of those areas where it's difficult to retrofit – walls, air leakage and the like. I've never been in a session with builders where new regulations will be adopted "at the right time."

Andrew Clark – I disagree that the building community says it's never the right time for new regulations. You've seen significant progress with homes built in the last 10 to 20 years. We're establishing a baseline standard for safety and features and it should be up to the homeowner to choose above-baseline features for their home. If we keep raising the baseline, the gap in homeownership will get wider and wider. Just like we did last year with Eric and Chelsea where we had a lot of discussions offline, I think we can pursue that right and look at individual components.

Linda Baskerville – It seems that Andrew's comments are putting the burden on the energy code of making homes affordable to lower- and middle-income people. It may be a part, but there are so many other factors that come into play regarding the affordable of homes for first time homebuyers and middle-lower income homebuyers. It seems unwarranted to put it on the back of the energy code, which not only makes things better in the current environment but improving things for the future buyers as well.

Andrew Clark – Linda, thank you for those comments. For clarity I don't think we are putting it entirely on the back of the energy code and I don't think that will make or break the housing market for affordability. We're looking at this in totality with land costs, material costs, labor costs. The energy codes are a significant factor. It's not our perspective that affordability challenges are all on the energy codes.

Steve Sunderman – Andrew mentioned the big picture and, remember, the big picture really is where we're going in the future and what we're going to leave our children and grandchildren and climate change is the big issue. If we're not going to do this now, then when? When should we wait to make a substantial difference for the future? I think the time is now.

Chelsea Harnish – Someone was talking about the need to make existing homes more energy efficient and I want to point out that the two are not mutually exclusive. Organizations like mine are working on policies and initiatives to get older homes weatherized and retrofitted.

Ross Shearer (IN CHAT) – To follow up on affordability, it seems most fair to lower income and first-time buyers to include the benefits of higher energy efficiency like many luxury builders do for their wealthier clients.

Mike O'Connor (VA Petroleum Marketers) – Our concern is the issue of rate-payer subsidization of conversion. We're seeing that through things like the Regional Greenhouse Gase Initiative (RGGI) and other initiatives. We're also concerned that there are about 400,000 homes that continue to be heated by heating oil, kerosene, or propane, and those people have made substantial investments and those people will not be pleased when the government wants to come in and pull out those gas cooktops, heaters, etc. We are opposed to anything that would make rate-payers subsidize those costs.

Richard Potts – Asks the sub-workgroup members to provide positions on this proposal.

Votes:
- Opposed:
  - Steve Shapiro
  - Andrew Clark
- In favor:
  - William Penniman

Jeff Mang
Eric Lacey
Chelsea Harnish
Brian Clark
Andrew McKinney
Maggie Kelley Riggins

Richard Potts – This will be non-consensus.

EC-C407.6-21 – William Penniman

William Penniman – This proposal simply makes a positive statement about two appendices that are included in the 2021 IECC. Those are appendices are CC (Zero Energy Commercial Construction) and RC (Zero Energy Residential Construction). It simply requires that if a builder wants to build and sell a home as zero energy then they have to meet these standards.

Eric Lacey – Just a bit of background on these two appendices that are both new to the 2021 IECC, on the commercial side this appendix came out of AIA's 2030 challenge and based on your occupancy type you're required to install a certain amount of renewable energy to bridge the gap between the efficiency of the building and getting it to net zero. On the residential side this is kind of an extension of the Energy Rating Index (ERI) and the home must demonstrate a net zero ERI score. A reason these go into appendices is that a lot of states create net-zero paths and standardizing these paths have value. In VA, I'm not sure whether DHCD could adopt a stretch code or if localities would, but what I like about this proposal is that this is basically some truth in advertising. If you're going to call a home or building "Net Zero" you should meet these standards. This is a good proposal and I support it.

Andrew Clark – I'm not really opposed, I'm somewhere in between. I remember this came up last year and I thought that Kenny Payne or someone raised some questions. Are there other provisions in the code that are "truth in advertising" as Eric said? I don't really have a position, just curious if this is something the code has weighted into before.

William Penniman – When I put this together, I did find examples of "truth in advertising", but I don't remember where.

Ellen Eggerton – We already have a truth-in-advertising type of provision with the required certificate. This isn't a new idea in the code.

Steve Shapiro – I'm willing to look at whatever can be provided if this is carried over. I've got some concerns with this but I'm willing to give it a shot.

William Penniman – Even if there were no prior examples, I think it's important to include this to mitigate people selling their product under false pretenses.

William Penniman – Moves to have this carried over to meet with other members to discuss.

Richard Potts – This proposal is Carried Over.

REC-R402.1.2(1)-21 – Laura Baker

Laura Baker – This proposal essentially moves the wall insulation from VA's current amended level of R-15 to the levels in the 2021 IECC. We did an analysis using the Department of Energy's (DOE) methodology and found this would be a 13.1% energy cost saving with a payback period of less than 5 years. Wall insulation has been a topic of discussion in past cycles and I think it's time to move forward on wall insulation. We've had enough time to be ready and it's important to note that this proposal does not mandate using a specific stud size. You can use a 2x4 or a 2x6 wall. Wall insulation is something that doesn't change unless you're doing a major renovation so it's important to have strong wall insulation now.

Jeff Mang – Laura's proposal is a good one. I'll point out that there's a lot of interest in moving toward all electric use in the home and having a strong envelope will reduce the burden on the grid by a large amount.

William Penniman – I clearly support Laura's proposal. Fixing the walls now is very critical because it's difficult to do later. There are public benefits in reducing climate pollution and holding down energy costs, which enables residents, particularly low-income residents, to keep up with their mortgages and rents. This is a clear long-term win.

Andrew Clark – I think going to Mr. Penniman's comment, I really would be interested in seeing if any of the proponents have any data for homes built in the 2000's that occupants have any increased cost burdens associated with energy use. We had this discussion last year and I'd suggest we carry over these two proposals to allow some of our builders to meet with Mr. Penniman and Eric and Laura to educate us to see if we are maybe missing something. The feedback we've gotten from our members is very different than what's in the reason statement.

John Ainslie – I heard the proponent say the payback is 5 years. I've been building houses for more than 40 years and I know what the costs are. Though I haven't' done a cost benefit analysis on these proposals, I find it very difficult to believe that the payback period would be 5 years. My costs under the current codes are $0.92 per square foot. The only way I can see getting these R-values in a 2x4 wall is spray foam, but the square footage cost for that is over $5 per square foot. If you go to a 2x6 wall, there are whole other hosts of cost to consider – window and door jams increasing 2 inches, lost square footage, increased lumber costs. In the area that I build, Hampton Roads, we have to have structural sheathing to meet the wall bracing requirements. So doing the continuous insulation on the outside would be very cost prohibitive in still having to meet the wall bracing requirements. I'd guess the payback is closer to 50 years. I did a cost benefit analysis on ceiling insulation from R-30 to R-49 and I came up with 88 years. The National Association of Homebuilders (NAHB) came up with 92 years for payback. If people want increased wall insulation they should do it, but it should not be in the base code.

Steve Sunderman – My experience, with respect to 2x4 vs 2x6, is that building with 2x6 was actually more economical because you can space them 24" on center instead of 16" on center. The point being that as an architect I've felt the most economical thing we can do is use insulation. Insulation is typically not a very expensive material for what you get in return for its use. For every inch of increased insulation, you reduce energy use by half. I'm curious to see if anyone has done a recent study where it benefits you to stay with 2x4's instead of 2x6's.

David Owen – To clarify some of the things that John brought up with costs, the difference in cost of 2x4 vs 2x6 is minimal. But you have to consider the loss of square footage. If you go from 2x4 to 2x6 you reduce the square footage in the house which makes it less attractive to buyers. When you go to 2x6 you have to go to larger window openings and builders have to redo their plans.

Ross Shearer (IN CHAT) – As to wall insulation, Virginia is 3 iterations behind the model. The builders' claims of lengthy return on investment are not supported by all studies, some show a 5-year return. Perhaps the sub workgroup should request the Pacific Northwest Lab perform the cost benefit analysis comparing where Virginia is today to the model.

Laura Baker – The software we used was "BOP" which is the DOE's software. I'm happy to meet with Andrew and David and John and whomever else and bring this back next time if we can find an area where we can meet and hear each other.

Maggie Kelley Riggins - SEEA (IN CHAT) - I am happy to pull the information from PNNL. We have a funded relationship with their teams to be able to get information for groups like this. We can get data needed for a meeting as Laura referenced.

Andrew McKinley – I would like to be a part of that conversation, too, Laura, because I'm having a hard time seeing how these walls are actually going to be built. I also agree with Mr. Sunderman's comments with respect to law of diminishing return. Continuing to put insulation in the walls will not have the same payback when considering other components such as the facades and in the roof.

Richard Potts – This proposal is Carried Over.

REC-R402.1.2(2)-21 – William Penniman

William Penniman – My proposal parallels Laura's proposal. Wall insulation is incredibly important and it's very unfortunate that VA lags behind the national standards, which can be met in neighboring states like Maryland and that builders who work in VA and Maryland can meet those standards. The aggregate data for full compliance with the IECC says it can be done. The data provided by RECA in Laura's proposal also says it can be done. As others have noted, this is a problem that will last the life of the building since it is very difficult to upgrade wall insulation compared to ceiling insulation. VA currently operates under the 2009 standard, so we're already a decade behind. But, like Laura, I'm also willing to talk.

Richard Potts – If the proposals end up being identical, we like to have them merged and have the proponents for each listed as co-proponents on one proposal. Is it your position that you're willing to carry it over to continue the discussion or do you want an up or down vote on this proposal?

William Penniman – I'm willing to carry this over in order to engage in discussions. As far as combining the two, we can certainly discuss that, and I have no objection if we end up in the same place.

Laura Baker – Would it be possible to ask PNNL to take a look at these wall insulation requirements and do a cost benefit analysis for us? That way we don't have to take a SWG member's word for it and we can have someone provide that data.

Jeff Brown – Anyone is welcome to solicit a study from a laboratory or a group. DHCD won't reach out to specific laboratories or groups, but anyone else can do that.

Richard Potts – Reminds the group of the timeline we're operating under.

Maggie Kelley Riggins – SEEA (IN CHAT) – I am happy to pull the information from PNNL. We have a funded relationship with their teams to be able to get information for groups like this. We can get data needed for a meeting as Laura referenced.

Richard Potts – This proposal is Carried Over.

REC-R402.2-21 – William Penniman

Richard Potts – Briefly mentioned the appeal at the national level during the 2021 cycle that dealt with similar subject matter. Those proposals were CE217-19 parts 1 and 2.

William Penniman – This proposal is for EV readiness in residential properties. This would require wiring in the wall that could be converted later by the resident to an EV charging unit. That's one branch circuit per garage, not two. In the case of multi-family, the concept is to have gradations with a few initially installed chargers and then a few initial EV readiness stations and lastly, with the remaining units having the base infrastructure and the panel space. The numbers and percentages for multifamily are tied to the number of dwelling units. EV charging is coming. 80% is done at home. It saves $800 – 2,000 per year in operating and maintenance costs and reduces emissions by 2/3rds. Lack of this infrastructure will be a barrier to adoption and a barrier that will harm both residents and the public. With regard to the 2021 appeal, it is my understanding that since then the IECC has reversed its position and is open to having EV charging as a part of it next round, but even if it's not, the VA law that was enacted last year clearly says that the goal is to have energy codes at least as stringent as the IECC but can go above the IECC, especially if it is a marginal increase in the cost of construction for what you get. In multi-family, the range of potential costs varies depending on design. One study from San Francisco showed that the costs were quite manageable.

Eric Lacey – I just want to be clear I'm speaking on behalf on myself with this proposal. The appeal was kind of a technicality. The ICC determined that the scope of the IECC at the time did not cover EV. This proposal received 82% of the vote for these provisions. ICC has since changed its scope and there is a similar proposal for the 2024 code. Like William said, this doesn't really matter in VA because states can adopt the provisions they want. This looks like the same language that was advanced in the 2021 process. ICC also has a page of resources dedicated to EV charging and has a summary of the state and cities that have adopted these provisions. There's a lot of data available for people and it's very popular around the country.

Ben Rabe – I just want to reiterate New Building Institute's support for this proposal.

John Ainslie – Just for the benefit of the call, can you briefly explain the significance of the appeal and how this will affect VA.

Richard Potts – What it ultimately came down to was a Board decision. Our scopes are different from the I-Codes, so VA has its own scopes. I felt it was important to at least mention those appeals since it did affect those proposals.

Richard Grace – Speaking basically for myself and not really speaking in opposition. I like the idea, but as a code geek, and I don't know what the proposal looked like at the national level, but looking at this here I'm a little confused. I'm looking at these definitions and the odd part I'm looking at is that the "EV Ready Space" should have everything in that definition plus the equipment required to plug that vehicle in. It really confuses me how this is laid out. If I'm confused, I'm sure others will be confused as well. If I go down to section 402.2, I'm not sure how many times I've seen the word "facilitate" in the code. If I'm facilitating future installation, I'm pretty much just have a 40amp space in my panel, but I'm not sure that is all this section is really requiring. Down to 402.2.2, how am I supposed to enforce something like this? This sounds like a contractual issue, not a code issue. Again, not opposed to the idea, just opposed to what I'm reading here and trying to get it from concept to code.

Andrew Clark – Not to belabor the point, but some of the language issues brought up by Richard Grace were also mentioned at the national level. I'd like to get some incite from government officials because it looks like there are some zoning ordinance requirements like parking. I'm not sure where else we've done this. Developers on the multifamily side are starting to incorporate these things already, so maybe looking at incentives vs. mandates is the way to go. We do have some concerns with this proposal.

Michael O'Connor (IN CHAT) - Question 1 Who pays for the EV mandate?

Ben Rabe – To that question, I'll let William give a more robust answer. I know that NBI has framed this is that we are trying to save building owners money by doing this upgrade when it's most cost effective instead of down the road when you'd have to dig up concrete. Folks are asking for these types of changes.

William Penniman – A couple of things in terms of clarifying language to make it work better in the code. I'd be happy to spend time offline going through this and trying to fix this. There is a concept that's in here that's built in called "EVSE Installed" which means the whole package is installed. The question about who pays, it's picked up in the initial cost of construction which is paid for by the buyer, however, the savings are huge and it's a great benefit to residents. EV sales are increasing and major manufacturers are talking about no longer producing fossil fuel vehicles within the next 5 years. GM has said it's only going to build EV. As mentioned, the retrofit costs are huge and would be a barrier to EV adoption. In terms of single-family homes, if a builder puts the electric panel in the garage, you're only talking about as little as 2' to extend a wire to provide an outlet to plug in, which would only cost about $50. It's a tiny fraction of the cost for a new home and the benefits are huge. The idea that this is a zoning question is interesting, but there are provisions for parking in the building code for accessible spaces. If it's left to zoning and you're saying that it's up to each locality to set their own rules, please put that in writing, because if this doesn't pass here, I'll be sure to use it.

Richard Grace – The whole purpose of my comments was to make sure we can clean this up and make it presentable and I'm happy to work on that with you.

William Penniman – Okay, then I will defer the vote and bring it back later.

Andrew Clark –Requiring this, and not just giving consumers the option to work with a builder who is willing to provide these things, doesn't seem like the right approach.

Michael O'Connor (IN CHAT) - By mandating EV, how do you propose to replace the 32 per gallon motor fuels tax that funds about 40 percent of Virginia's transportation budget each year.

William Penniman – In terms of the fuels tax, the Governor is talking about getting rid of that anyway. But in the meantime, the huge run up of the cost of gas is even more of a reason to provide support for EV vehicles.

Michael O'Connor (IN CHAT) - Who pays to install the chargers? My question was not answered.

Mike Hamilton (IN CHAT) - All-electric vehicles (EVs) registered in Virginia are subject to a $88.20 annual license tax at time of registration.

Michael O'Connor (IN CHAT) - Electric vehicles pay $ 90 annually less than 1/3 of what a typical gasoline or diesel vehicle pays.

Richard Potts – So it sounds like the proponent is willing to work with Richard Grace and other entities to work on the language. It does sound like there is some objection to it, but we don't want to prevent anyone from moving forward and cleaning up language to make compromises. So, we will mark this as Carried Over.

REC-R402.4-21 – William Penniman

William Penniman – This proposal is simply to bring the VA code up to the air leakage standards to those in the IECC, which have been in the code for the last decade. It's beneficial to residents in heating costs savings, air quality, health, and keeping out vermin, as pointed out by the EPA. It's viable, it's been implemented, the material costs are low. There's some additional time for installation since you have to pay attention.

Ellen Eggerton – I'm in support of this proposal since neighboring states have already gotten to this. It's not a big leap for us to go to this level when we're already going to a level of air leakage control where we do this same process, we just have to do a better job at it. We already have to seal and tape everything anyway so I support this.

Laura Baker – I'd like to note my proposal does the same thing, but incorporates some additional new things in the 2021 IECC. There are a couple things in the 2021 IECC that make it easier to comply with these. First, the 2021 IECC adds a tradeoff limit so not every building has to meet 3 air changes per hour. There's also an exception to let small buildings and buildings under 1,500 square feet to not have to meet these provisions. We did a great job last cycle with getting mandatory blower door testing, and now that builders and officials have experience doing this, I think it's time to bring this into the code.

Andrew Clark – I was under the assumption that both proposals were identical, but as of right now I think we do have concerns with this proposal but would like some opportunity to talk with Laura about some of the tradeoffs that were in her proposal. We had not reviewed those. I will say that last year, like Laura mentioned, we discussed this at length and settled on 5 air changes per hour and I'd be curious how many states have gone to 3 air changes per hour. But at the moment we are non-consensus on these proposals but would like to talk with Laura more about hers.

William Penniman – I had assumed that the full deletion here would bring in the full IECC so I didn't think I needed to mention the tradeoffs.

Richard Potts –That is correct. When a state amendment is deleted, by default, the national language is used. So that code language would become the default in the 2021 cycle.

Andrew Clark – That's a helpful clarification.

Ellen Eggerton – If we approve this one and then approve Laura's would then the enhancements in Laura's override what we've approved in this one.

Richard Potts – We would try to head that off or we would try to get all of that ironed out before the full workgroups. If there are true differences between the two, we would want to work out the competing proposals. We wouldn't want two proposals doing different things to the same section going to the Board. The purpose of this group is to vet these technical changes and correct them before they go to the workgroups. Ideally, we would like to see proposals like this merged into one proposal. So, I think I'm hearing that this proposal and REC-402.4.1.2 would like to be discussed with Andrew and his group before making a decision, so we will mark this as Carried Over.

REC-R402.4.1.2-21 – Laura Baker

Carried Over based on conversations from REC-R402.4-21

REC-R403.1.2-21 – William Penniman

William Penniman – This proposal removes the option to use electric resistance heat as the primary electric heat source for space heating in new residential construction and it prohibits electric resistance heat as a replacement for a heat pump in existing homes.

Ellen Eggerton – I just wanted to add that there is the cost to install that primary resistance heat that wouldn't happen with an air conditioner. The heat pumps that are on the market today can go down to 17 degrees Fahrenheit so this is a good proposal to take out electric resistance heat since heat pumps can now meet probably 99% of the heating needs.

Ben rabe – I would encourage support for this proposal.

Mike O'Connor – Who is going to pay for all of these heat pumps and will it be funded by rate-payer subsidization.

William Penniman – This doesn't prohibit gas heat at all. This just prevents resistance heat as a heat source. So, I don't think you have any reason to oppose this.

John Ainslie – I have an issue with this. I can't see how this is a big issue. How many people are strictly using resistance heat? I think there are some cases where it may be the best option, but I don't like removing a perfectly viable option from the code. I don't see this as a huge energy efficiency option at all. Heat pumps have gotten much better over the years, but the resistance heat, although it's less efficient, there are times where it may be the best possible choice based on the size of the area being heated. I don't think it warrants just removing the ability to use that option.

David Owen – Where it says, "R403.1.2 Heat pump" and we cross out the word supplementary heat and adding the word "Mandatory". I think the market place will take care of this so I don't think we need to put this in the code.

Ellen Eggerton – I think that if you look at the change, the "Mandatory" was already there, that's not a change. It says that if you use heat pump heat, these requirements are mandatory. It's not changing the word mandatory, since it's already there, what it's changing is that the resistance heat can't be the supplemental heat and can't be the emergency heat. It's saying electric resistance heat can only be used during the default cycle. Is that what I'm understanding?

William Penniman – It's actually more generous than that. It still allows the supplementary electric resistance heat as the backup since many heat pumps are designed that way.

David Owen – I still don't understand why the word supplementary is crossed out since you are still talking about the supplementary heat to the heat pump. I just think the language could cleaned up so there wouldn't be misinterpretation.

Steve Shapiro – So this is only applying to level 2 alterations in the existing building code, correct? You're not applying it to any other type of alteration?

William Penniman – I can't recall the different levels of alterations, so I can't say it's definitely limited to a Level 2 alteration.

Mike Hamilton – I had one comment about Section 403.1.2 and the last sentence. There are other ways for the controls to know that the load can't be met beyond just the outdoor temperature. 40 degrees seems pretty high, but I just wanted to point out that that's something we should consider here.

Eric Lacey – I'm wondering if that first section should be R503.1.2 or somewhere there abouts in the existing building section of the IECC, rather than the IEBC.

Richard Potts – We did go through an exercise last cycle on how to get to Chapter 5. The effort was to move all of the Existing Building requirements to the VEBC.

Votes

In opposition:

Brian Clark

Andrew Clark

Steve Shapiro

In Favor:

Andrew McKinley

Chelsea Harnish

Eric Lacey

KC Bleile

William Penniman

Other stakeholders in opposition:

John Ainslie

Richard Potts – This proposal is Non-Consensus

REC-R403.3.3-21 – Eric Lacey

Eric Lacey – Here are the five changes, and I think the first three are non-controversial. The first is that the IECC requires duct testing, and I believe these are the standards that are already being used. So, this just refers to those standards. The second is that it adds a significant digit to the duct leakage, which is 4.0 cubic feet per minute. The third change is that you aren't required to test ducts serving ventilation systems. The last two may prompt some discussion. Virginia still allows building framing cavities to be used as ducts or plenums, and this change removes that ability. The last change requires all duct systems to be tested whether they are located in conditioned space or not. When DOE conducted field studies throughout the country, we noticed a trend that in homes not required to be tested for air leakage, the leakage rate was 2x higher and those homes met the exemption for having all of their ducts within conditioned space. The goal is to make this section read as close as possible to the IECC.

> Richard Potts – One thing I do want to mention with regard to this proposal was the section dealing with building cavities. The reason this was deleted was because there was a competing provision in the IRC, so there might be a conflict here and there may need to be some cleanup.
>
> Andrew Clark – We don't have a position one way or another with this one, but we will probably rope this into the conversation we'll be having with respect to other proposals.
>
> William Penniman – I would indicate that we support this proposal. This is a classic situation where buyers have no idea what's behind the walls and the technical and economic implications of those concealed features. Catching up to the 2021 IECC is entirely appropriate.
>
> David Owen – If I understand this correctly, we're saying that if we are in a conditioned crawlspace where the air handler and the ducts are down there, we want a little bit of leakage from the duct work for balancing the pressure in that space. I will agree where it's in another concealed space where you could get mold issues. We just got VA used to duct testing, so if we start eliminating some of these sections, we would be causing some confusion for the duct testers.
>
> Eric Lacey – I believe builders have been successfully testing ducts for some time now. The only difference here is for builders using the exemption for ducts entirely within conditioned space, you would be required to test to 8cfm, twice the level of leakage. I'm sure you've been in a house with a room furthers from the source and the reality is the conditioned air is not always getting to the intended spaces. I think this would also reduce the occurrences of builder call back from customers who were uncomfortable.
>
> Ben Rabe – This is common practice across the country and seems like a good way for Virginia to update their codes.
>
> David Owen – I stand corrected with what Eric said with respect to when duct testing came into effect. I think testing the ductwork when it's completely within conditioned space is an issue. The other issue from a practical standpoint is that most of the leakage is within the unit itself and, if that's in conditioned space, that's an advantage. Sealing those units is difficult and manufacturers haven't caught up with us.

Richard Grace (On behalf of VPMIA) – The section where we're looking at building framing cavities for ducts and plenums, I just want to point out that currently I did a quick search in the IRC and did not see the stud cavities. From what I remember, this was taken out of the IRC but it still exists in the Virginia Mechanical Code.

Eric Lacey – I would like to do some more research into the use of framing cavities being used as ducts or plenums.

Andrew Clark – There's a lot of good stuff put in the chat throughout the meeting. Are the contents of the chat going to be a part of the meeting minutes?

Richard Potts – Yes, we do include all of the substantive parts of the chat into the summary. This proposal is Carried Over.

REC-R404.2-21 – William Penniman

William Penniman – The 2021 IECC includes a solar ready appendix for detached 1-and 2-family dwellings and townhouses. Since VA doesn't allow localities to adopt and enforce appendices, the only way to activate the appendix and make it relevant is to include it in the body of the code, which is what this proposal would do. The solar ready provisions are very simple, basically requiring a conduit from a location on the roof to the panel. It doesn't require the installation of solar, but it makes it easier to install solar.

Andrew Clark – Our concerns are similar to what we expressed last year. Again, to my earlier point, allowing the consumers to make the personal financial decisions to incorporate these provisions instead of making it a baseline requirement is more beneficial.

Linda Baskerville – What Andrew is saying is only relevant to the first owner of a home and does not provide an ability to less expensively incorporate solar into their home.

Ben Rabe – Just to piggy-back off of previous commentary, this is another proposal where it's way more cost effective to do these readiness provisions on the front end than incorporating them later on. It makes it easier for people who want to add solar later and would not cost much on the front end.

Votes:

In opposition:

Andrew Clark
Steve Shapiro

In favor:

Brian Clark
Eric Lacey
Maggie Kelley Riggins

KC Bleile
William Penniman

Other stakeholders in opposition:

John Ainslie

Richard Potts – This proposal is Non-Consensus.

REC-R401.2-21 – Ben Rabe

Ben Rabe – This proposal requires that all new residential construction is all electric. Heat pumps are perfectly capable to efficiently heat and cool buildings in Virginia's climate year-round. An aggressive measure like this is something the New Buildings Institute supports.

William Penniman – I support this proposal. It will save residents money, it will reduce pollution, it's a critical measure for climate change, and will create a healthier house without the fumes from burning fossil fuels.

Andrew Clark – We're non-consensus. Will natural gas be excluded?

Ben Rabe – Yes.

Andrew Clark – This would be a prohibition on natural gas in Virginia?

Ben Rabe – Yes.

Andrew Clark – We are unequivocally non-consensus.

Michael O'Connor (IN CHAT) - non consensus from VPCGA and VA Propane Gas Association

Morgan Whayland – Virginia Natural Gas: We are opposed to this. Natural Gas is a critical path for us to achieve net-zero. When we think about energy efficiency, we have to think about the entire supply chain and natural gas is an efficient energy source.

Steve Shapiro (IN CHAT) - AOBA/VAMA in opposition as well

David Owen – Just clarification, is Mr. O'Connor's group not a representative and is no one from his group a representative?

Richard Potts – He is not a representative. We did our best to pare down the membership to a well-rounded group.

Jeff Brown – We started out by looking at stakeholders from previous years and asking them if they want to participate again. We're always open to having groups reach out to us and ask to be a part of this group but we have not heard from him asking to be a part of the group.

Andrew Clark – Weren't there bills recently passed that included natural gas as an important component of reaching net zero? I think one of those bills even said that natural gas could not be prohibited. I'm not sure how we this proposal would jive with state law.

William Penniman – I believe it's in the state energy policy to get to zero net carbon emissions, not just for the electric utilities who are supposed to hit it by 2045. The reality is, to combat climate change, we've got to stop burning fossil fuels. Sea-level rise on the cost of Virginia is projected to rise 2ft by 2050 and that should scare all of us. Natural gas may be clean, but burning it leaks methane.

John Ainslie – I'm, personally, having a hard time hearing participants with this online process. This online process is not the same as the face-to-face interaction that we used to enjoy prior to Covid. I think we need to get back to these meetings in person. I've heard participants saying that it will be cleaner to move away from gas. I've read those homes burning gas leave a smaller carbon footprint than those using electric. You have to look at the full life-cycle cost.

Ross Shearer (IN CHAT) - 401.2-21 There are countless environmental, health and safety issues associated with natural gas. Earlier this week the Washington Post reported a story of family experiencing illnesses including nausea. It turned out to be carbon monoxide leaking from a loose connection to the exhaust line of the gas furnace. Natural gas should not be used for any new construction. As to the natural gas stakeholders' question, who are the representative for the public stakeholders, home buyer, tenants and users of buildings? The construction code exists to protect Virginians.

Ben Rabe – One final point I'd like to make is that there's obviously a carbon impact and an environmental loss impact of electrical energy. However, as the grid continues to clean and as we build more buildings, there will be a very net positive impact on these buildings being all electric over their lives.

Andrew Clark – I did not hear a direct answer to whether this proposal is a direct conflict with the net-zero path that Virginia is on.

William Penniman – I don't think this conflicts with the path that Virginia is on. When I was referencing natural gas earlier, I was referring to possibly some manufacturing processes where it may still be required. I wasn't referring to residential properties.

Chelsea Harnish (IN CHAT) - To Andrew's question- The VCEA regulates electric utilities and sets carbon goals for that sector. The VCEA does not set carbon goals for the built environment.

Maggie Kelley Riggins – SEEA (IN CHAT) - Ross- VAEEC, Viridiant, and SEEA also serves as a representative of public stakeholders/building occupants, as well as building operators & technical needs in the field. There may be a few others as well.

Michael O'Connor (IN CHAT) - To the proponents: What would you propose to do with more than 60,000 generators in operation in Virginia fueled by natural gas and propane fueling hospitals, first responders nursing homes, etc. How would you propose to serve those essential sectors in times of emergency when the electricity is not available?

Ben Rabe – So obviously this wouldn't be an instantaneous change. Hospitals will still need backup generators. This is a very gradual change and won't happen overnight, which is why we need to address this now.

Votes:

In Opposition:
- Andrew Clark
- Brian Clark
- Steve Shapiro

In Favor:
- Laura Baker
- William Penniman

Abstain:
- Chelsea Harnish (IN CHAT)
- Maggie Kelley Riggins (IN CHAT)

Other stakeholders in opposition:
- John Ainslie

Richard – This proposal is Non-Consensus.

REC-R401.2.5-21 – Ben Rabe

Ben Rabe – This is similar to the previous proposal in that it encourages buildings to be all electric but does not require them to be electric.

Richard Potts – Looking at what you've revised here, which has revisions to Ch. 1 of the I-codes, we would need to address these in Ch. 1 of the Virginia codes.

Ben Rabe – I'd be happy to work with staff on that correlation.

William Penniman – Speaks in support of the change.

Michael O'Connor (IN CHAT) - VPCMA and VA Propane gas association opposed

Votes:

In Opposition:
- Andrew Clark
- Steve Shapiro

In Favor:

William Penniman
Laura Baker
Maggie Kelley Riggins
Brian Clark

Abstains:
Chelsea Harnish (IN CHAT)

Other stakeholders in opposition:
John Ainslie

Richard – This proposal is Non-Consensus.

REC-R403.1.1.1-21 – Ben Rabe

Ben Rabe – This is the reboot of the thermostatic demand control response. This would require new buildings to have thermostats that communicate with the grid to avoid peak-outs, brown-outs, etc. This will have added climate benefits as well as great resiliency impacts of lessening stress on the grid.

Chelsea Harnish – I'm neutral and I have some questions. Ben, I'm very curious with how this proposal is written. I'm very familiar with how DSM programs work and am an expert witness for Dominion. Who will run the DSM programs for this? I'm only familiar with utility companies running DSM programs.

Ben Rabe –This proposal even more so than others is meant to start a conversation around different opportunities to get demand response, grid controllable ideas in the code. Our proposal is not meant to regulate utility companies. We think these would be the best controls, but obviously the utility companies know what set points are most beneficial for the grid.

Votes:

In Opposition:
Andrew Clark
Brian Clark
KC Bleile
Maggie Kelley Riggins
Steve Shapiro

In Favor:
William Penniman

Richard Potts – This proposal is Non-Consensus.

REC-R403.5.4-21 – Ben Rabe

Ben Rabe – This would require demand responsive controls on water heaters, knowing that water heaters are able to self-regulate and heat up when there's cheaper energy on the grid based on time of day, overall use, etc. This would allow utilities to pour excess energy into something and reverse it when there's higher energy demand on the grid.

William Penniman – Demand response on water heaters is very simple technology. Could the demand response be used by other than the utility?

Ben Rabe – It's implied, but the intent is that the utility would be the best to control the demand response.

Michael O'Connor (IN CHAT) - VPCMA and Virginia Propane Gas Association opposed.

Andrew Clark (IN CHAT) - HBAV opposed

Chelsea Harnish (IN CHAT) - Currently, no utility in VA has a DR hot water heater program.

Votes:

In Opposition:

Andrew Clark (IN CHAT)
Brian Clark
KC Bleile
Maggie Kelley Riggins
Steve Shapiro

In Favor:

William Penniman

Richard Potts – This proposal is Non-Consensus.

REC-R404.4-21 – Ben Rabe

Ben Rabe – Very similar to an earlier proposal. This would require new homes to be solar-ready. Based on previous conversations I think we would be willing to pull this and work with the groups discussing the other proposal.

Richard Potts – Is this similar to the ones moving through the ICC process?

Ben Rabe – Yes.

Richard Potts –The ones I checked on haven't had a decision yet rendered by their committees, so keep us updated on that process. I do want you to know that we have the same issues here with Ch. 1 so those would need to be relocated as appropriate.

Steve Shapiro – Just to clarify, the other solar-ready proposal went through as non-consensus. That wasn't listed as a carry over, so I'm not sure what Ben is Referring to.

Richard Potts – That's correct. So, let's discuss this and take a vote.

William Penniman – I support this for the reasons I mentioned during my proposal.

Andrew Clark – Our opposition is for the reasons stated on the prior proposal.

Votes:

In Opposition:
- Steve Shapiro
- Brian Clark
- Andrew Clark (as stated above)

In Favor:
- Maggie Kelley Riggins
- William Penniman

Other stakeholders in opposition:
- John Ainslie

Richard Potts –This proposal is Non-Consensus.

EC-C401.2-21 – Ben Rabe

Ben Rabe – This is similar to the residential proposal for all-electric buildings, but for all buildings.

William Penniman – Support for the reasons previously given.

Votes:

In Opposition:
- Andrew Clark
- Brian Clark
- Maggie Kelley Riggins
- Steve Shapiro

In Favor:
- William Penniman

Other stakeholders in opposition:
- John Ainslie
- Michael O'Connor (IN CHAT) - VPCMA and Virginia Propane Gas Association

Richard Potts – This proposal is Non-Consensus.

EC-C403.3-21 – Ben Rabe

Ben Rabe – This proposal would require more efficient heating and cooling equipment in commercial buildings.

Richard Potts – It's time for a 5-minute break.

Steve Shapiro (IN CHAT) - I have to jump off for a doctor's appointment, but would note that I am in opposition to the remaining proposals...thanks everyone for the discussion.

Ross Shearer (IN CHAT) - Covid has taught us the importance of fresh air in commercial spaces when occupied. EC C403.3-21 would provide an important remedy for this feature. CO2 sensors can provide the needed proxy, but good quality current designs do not normally monitor for CO2 levels except when there is a call for heating or cooling. This proposal should be supported.

Ben Rabe – Separating ventilation from air condition get better ventilation to the spaces that we all occupy and reduces energy use as a result of lower powered fans. This additional ventilation has ability to reduce the spread of pathogens with separate airways for ventilation and conditioned air.

Richard Potts – Asks if Ben has reviewed the Virgnia Mechanical Code for any conflicts.

Ben Rabe – I cross-referenced the Virginia Mechanical Code. I should also note that I could not get the tables to look the way they are supposed to look.

William Penniman (IN CHAT) - I will need to leave shortly for another, pre-existing commitment. I support Mr. Rabe's proposals.

Votes:

In Opposition:

Andrew Clark

In Favor:

Laura Baker
Brian Clark
KC Bleile
Maggie Kelley Riggins
William Penniman

Other stakeholders in opposition:

John Ainslie

Richard Potts – This proposal is Non-Consensus.

EC-C403.4.1.6-21 – Ben Rabe

Ben Rabe – Similar to other proposals we discussed, this is a commercial proposal for grid controllable thermostats. The intent is for these to be controlled by the utility to reduce stress on the electrical grid.

Votes:

In Opposition:

Andrew Clark
Brian Clark
Maggie Kelley Riggins

In Favor:
William Penniman
KC Bleile
Laura Baker

Richard Potts – This proposal is Non-Consensus.

EC-C403.15-21 – Ben Rabe

Ben Rabe – This proposal would require dehumidification systems for indoor horticulture, which, as you all know, Virginia recently decriminalized marijuana. This has tremendous impacts on the energy system so this would require dehumidification for those indoor grow operations. The dehumidifier costs about $8.11 per square foot of the canopy and results in between $2.30 and $2.80 in maintenance cost over the life of the system.

William Penniman – Marijuana growing operations are huge consumers of energy. I would support both of those.

Votes:
In Opposition:
Andrew Clark
KC Bleile

In Favor:
William Penniman
Brian Clark
Laura Baker
Maggie Kelley Riggins

Other stakeholders in opposition:
John Ainslie

Richard Potts – This proposal is Non-Consensus.

EC-C404.11-21 – Ben Rabe

Ben Rabe – This proposal is similar to the residential demand control water heater proposal but would apply to commercial. This is intended to start a conversation on what the grid will look like in the future.

Votes:
In Opposition:
Andrew Clark
Brian Clark
KC Bleile
Maggie Kelley Riggins

In Favor:
William Penniman

Abstain:
Laura Baker

Other stakeholders in opposition:

John Ainslie
Michael O'Connor (IN CHAT) - VPCMA and Propane association opposed

Richard Potts – This proposal is Non-Consensus.

EC-C405.4-21 – Ben Rabe

Ben Rabe – Similar to my prior proposal, this deals with horticultural lightning in marijuana growing facilities. These operations use a tremendous amount of energy, especially with respect to lighting.

Votes:

In Opposition:
Andrew Clark

In Favor:
Brian Clark
William Penniman

Other stakeholders in opposition:
John Ainslie

Richard Potts – This proposal is Non-Consensus.

EC-C405.13-21 – Ben Rabe

Ben Rabe – This may be similar to a proposal by William Penniman that was carried over. This would require a very small amount of solar on commercial buildings where it would be determined to be cost effective. These costs are much lower during the construction phase instead of later on. The only way to get payback would be to have some solar installed at the time of construction.

Richard Potts –You asked if this was similar to the proposal that William Penniman carried over.

Ben Rabe – Yes. If so, I'd like to work with that group and working out this language.

Ross Shearer (IN CHAT) - This should be supported. It is more useful of geographic space to place solar or roofs than in former farmland or other cleared areas.

Richard Potts – Ben, I'm failing to find the carry-over proposal that you were referencing.

Ben Rabe – I may be mis-remembering.

Richard Potts – We double-checked and couldn't find a similar proposal that was carried over so we will take it to a vote.

Votes:

In Opposition:
Andrew Clark

In Favor:
Brian Clark

Abstain:
Laura Baker (IN CHAT)
KC Bleile (IN CHAT)
Chelsea Harnish (IN CHAT)

Other stakeholders in opposition:
John Ainslie

Richard Potts – This proposal is Non-Consensus.

EC-C405.16-21 – Ben Rabe

Ben Rabe – This is similar to other proposals you've heard. This is the commercial electric-ready proposal that would require buildings to have the infrastructure to convert to all electric energy in the future.

Michael O'Connor (IN CHAT) - VPCMA and VA Propane Gas opposed

Votes:

In Opposition:
Andrew Clark
Brian Clark

Richard Potts – This will be non-consensus. Going back to William Penniman's proposal EC407.6-21, since he had to leave, that proposal will be Carried Over.

Assignments and Next Steps

Richard Potts – Asks those who will be working on carry-over proposals to get together and workout appropriate language. Encourages members to reach out to staff if we can be of assistance.

Next Meeting

Richard Potts – We'd like to get the next meeting scheduled as soon as possible to get this carry-over proposals worked out before the deadline to get them before the general workgroup meetings.

Andrew Clark – In terms of the next meeting date, are you planning on sending out a Doodle Poll or some sort of survey? There's got to be a lot ofinterim conversations.

Richard Potts –We may be able to move some things around and rearrange schedules to provide options to the group.

Jeff Brown – We definitely want to give everyone time to discuss those carry-over proposals. We have to meet before the 12th because the 12th through the 14th is when our next general workgroup meetings start. If it happens that only one day can work, it may have to be what it is.

Chelsea Harnish –Can you clarify that the intent is to meet before April 12th?

Richard Potts – Yes, the goal is to get all of these carry-over proposals worked out so we can get them on the agenda for the full workgroup meetings.

Jeff Brown – If there are proposals that people are working on and they can't be there, there's still the option on the 14th to have them carried over again to the following meeting. If it doesn't work out to get them done before the next round of workgroup meetings, the proponent can still carry it over again.

Andrew Clark – Jeff's comment actually clarified what I was going to state. Just given the volume of stuff that's been carried over, its' going to be very challenging to get anything done before the 12th.

Jeff Brown – For the ones that didn't get decided today, the proponent can carry them all over. I'm imagining we're going to get another influx of meetings before the final deadline, so we still have some time, but not a lot of time.

Richard Potts – There are a number of energy proposals that have been submitted that we will need to work through.

John Ainslie – Do you have an approximate timeline for when these will go to the Codes and Standards Committee?

Jeff Brown – The tentative schedule is for them to be heard by the Codes and Standards Committee in September.

Richard Potts – Thanks the sub-workgroup members for their work and participation and adjourns the meeting at 2:10pm.

Energy Sub-Workgroup Meeting

April 11, 2022 9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Richard Potts: *Code Development and Technical Support Administrator, State Building Codes Office (SBCO)*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Sub-Workgroup Members:

Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Chelsea Harnish: *Virginia Energy Efficiency Council*
Eric Lacey: *Responsible Energy Codes Alliance (RECA)*
Jeff Mang: *Polyisocyanurate Insulation Manufacturers Association*
Jim Canter: *Virginia Building and Code Officials Association (VBCOA)*
K.C. Bleile: *Viridiant*
Steve Shapiro: *Apartment & Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
William Penniman: *Sierra Club*

Other Interested Parties:
David Owen: *HBAV.*
Craig Toalson HBAV
Dawn Oleksy: *Richmond Office of Sustainability*
Ellen Eggerton: *Alexandria Sustainability Coordinator and VBCOA*
Laura Baker: *RECA*
Linda Baskerville: *Arllington County*
Mike Hamilton: *Arllington County*
Mike O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Petrina Jones
Ross Shearer
Sean Farrell: *Prince William County, member of VBCOA, member of BHCD*

Sub-Workgroup Members not in attendance:

Andy McKinley: *American Institute of Architects (AIA), Virginia*
Bettina Bergoo: *Virginia Department of Energy*
Brian Clark: *Habitat for Humanity*
Corey Caney: *International Association of Electrical Inspectors (IAEI), Virginia*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
Maggie Kelley Riggins: *Southeast Energy Efficiency Alliance*

Welcome & Introductions:

Richard Potts: Welcomed participants. He quickly reviewed the microphone feature of Adobe Connect meeting space. He introduced DHCD staff and allowed participants to introduce themselves. He then gave an overview of the Energy Sub-Workgroup purpose and function.

Andrew Clark: Introduced himself and asked Richard about the timeline and if they needed to have all proposals completed prior to the Energy Workgroup meeting, or if they could continue to work on them until prior to the BHCD meeting.

Richard: The General Workgroup for energy proposals will meet this Thursday and will hear all proposals from this meeting. If more time is needed, the proponent can continue to work on their proposal until May 1st, in order to be discussed at June General Workgroup meeting.

Andrew: Representing the home builders, they are willing to continue to work towards consensus for any proposals.

Richard: This group does have a new proposal to review today. Other proposals carried over from last meeting will also be reviewed, to determine if the proponent wants to continue to work on those proposals or push through to the General Workgroup meeting. He did receive a proposal from Eric with revised language which will be discussed later.

Laura Baker: Wants to make sure that she understands the process. If the group agrees on a proposal do they have until May 1st to present at the next General Workgroup meeting on June 9th, or is that only for new proposals?

Richard: The goal is to send the General Workgroup meeting agenda out about a month ahead of the meetings. The proposals should be in their final state by that time, so that there are no unexpected changes made after the agenda has been sent. So, any proposals going to the June Workgroup meeting should be finalized no later than May 7th.

Andrew: If there's a proposal submitted by May 1st, can this group can still work on amendments prior to the June meeting, and even into September?

Richard: There's not a hard set cutoff to work on amendments. However, there could be a concern raised if changes are made after being submitted on the agenda, and stakeholders not having a chance to review them prior to the meeting.

Proposals:

EC-C402.4-21

Eric Lacey: This is a commercial energy code proposal. Chapter 13 of the VCC lists amendments to the model codes that Virginia has adopted over the years and carries them forward unless they are changed or removed. This proposal identifies 3 amendments that should be eliminated. Sub Sections 2 and 4 deal with the fenestration solar heat gain coefficient for commercial and multi-family buildings. This amendment was put in a few cycles ago because the Virginia SHGC was better than the model code. Since then, the IECC caught up with Virginia. It simplifies the way that SHGC and projection factors are treated. For the first time in a few cycles, IECC requires the same fenestration and SHGC factors as Virginia. It makes sense now to delete Sub Sections 2 and 4, both of which tweaked the fenestration SHGC requirement of Virginia. Sub Section 3 deals with maximum skylight area. There used to be a 5% cap on skylight area and now the 2021 IECC allows 6%. If this is deleted from the Virginia code, it bumps the area from 5 to 6%. These amendments don't seem to be necessary any longer.

Steve Shapiro: If these first two changes are made, they would not be any more restrictive in Virginia than they have been. Is that correct?

Eric: Not by much. The current SHGC requirement for commercial windows in Virginia doesn't differentiate between fixed and operable fenestration. It's set at .36. The 2021 IECC applies .36 to fixed fenestration and .33 to operable fenestration. If there's more frame area, the SHGC comes down naturally. The other 2021 ICC change is the same as Virginia. The 2021 IECC pre-calculates the projection factor adjustment and lists it in a table instead of giving a formula to be calculated manually. It comes out with roughly the same number either way. The intent is not to change the stringency of the Virginia code, but to align it with the IECC.

Steve: Wanted to make sure that it's not any more stringent than it already was in Virginia.

Eric: Virginia didn't adopt the orientation specific SHGC from the 2015 edition, because it would have made it a little higher. There's a lower SHGC that applies to operable fenestration – it's at .33 instead of .36. But in reality, operable fenestration has a larger frame area, so it shouldn't be more restrictive.

Richard: Asked if there was any further discussion. Seeing none, he asked the group members to vote thumbs up or down. All thumbs up. Vote on proposal resulted in Consensus for Approval.

Richard: The remainder of the proposals on the agenda were discussed and carried over from the last meeting. If no progress has been made to these, the proponents may either move the proposals forward as they are, or carry them over to the next meeting, in order to have more time to work towards consensus before the group votes.

EC-C407.6-21

William Penniman: There were questions raised in the last meeting about whether it's appropriate to tie a standard to how a building is marketed and how an inspector would know. He thought about it, and wants to modify the proposal to say that if a builder wants to sell something as a zero energy building, a statement would need to be submitted to the building inspector, so the inspector knows what testing should be done. If the building is confirmed as a zero energy building, there would be a permanent certificate issued stating that it's in compliance with the appendix. This also activates an appendix, which otherwise sits in the code with no purpose. He does want the time to be able to amend this proposal as indicated before submitting. He's willing to answer any questions and speak with anyone to move this further.

Andrew: Would the phrase "subject to any equivalent claim" open up a very broad description of the type of building? Should it be limited to zero energy and net zero energy building claims?

William: He thinks that if someone says "this uses no energy" that would be an equivalent claim. If it doesn't have the exact phrase, it's a work around.

Richard: Anything that would be a rehabilitation, would be in the existing building code. The wording might be readdressed differently in the VEBC. This proposal can be carried over until the next meeting to continue to work on the language.

Steve: He's not sure why this should be in the building code. It seems to be about selling, leasing and advertising.

William: With the standard set forth in the appendix, the building official would know if leakage based on the testing provided meets the standard. This will ensure that it's activated in a way that's useful for developers and buyers.

Richard: Asked William if he would be at the Energy Workgroup meeting.

William: Yes and he would be happy to discuss the proposal at that time to get feedback so that he can modify the proposal.

Richard: This will be Carried Over.

REC-R402.1.2 (1)-21

Laura: This is an insulation proposal and it's still being worked on to find common ground and get agreement from group members. She will continue to work on it and carry over.

Richard: Carried Over

REC-R402.1.2 (2)-21

William: Continuing to work on this with Andrew and others.

Richard: Carried Over.

REC-R402.2-21

William: This proposal is for EV charging readiness in residential construction. There were some comments made in the last meeting, so there was further discussion since then with Andrew and Richard Grace around technical issues and a definition that was dropped. He would like to have further discussion with group members, and he wants to carry over until the next meeting.

Richard: Carried Over. He noted that Richard Grace has new contact information, and will send it to William.

REC-R402.4-21
William: This is about air leakage and attempts to bring the code in line with the 2021 IECC. It is technically feasible and not uncommon to reach a 3 ACH. In the interest of further discussions, he's willing to carry over. He does want something to be submitted to the June Workgroup meetings.
Richard: Carried Over.

REC-R402.4.1.2-21
Laura: Air leakage proposal with 2021 language. Happy to continue to discuss with anyone and to carry over.
Richard: Carried Over

REC-R403.3.3-21
Richard: Eric provided a document with revisions (included in the file pod).
Eric: There was good feedback from the last Energy Sub Workgroup meeting, so he made some changes. He thought it would be helpful to recast this as amendments to the 2021 IECC. He had some trouble using the base documents as a starting point, so he started with the 2021 IECC language and asked what changes Virginia would want to make. He doesn't think any of them would be controversial. He highlighted several sections. The first is a test procedure for duct testing, and there was a reference added. The second change is an exception to the code for systems that aren't connected with the HVAC systems. The third is Virginia-specific language to the VCC. This is from the 2015 cycle, when duct testing was first added to the Virginia code. He doesn't think the language is necessary, so he's proposing that it be eliminated. For the next highlighted section, everything is 4.0 now. The next one is #3 testing for ducts in thermal envelope. It requires a test of all duct systems if they are in conditioned space or not. As mentioned on the last call, it's there to ensure that conditioned air is getting to the intended parts of the building. This is a change to the current code. It allows twice as much leakage as if the ducts were outside of conditioned space; 8.0 cubic feet per minute. The final change isif framing cavities are used as ducts or plenums, (which is not allowed in the IECC), they comply with VRC Section M1601.1.1. It would be helpful and useful to include a pointer to that section of the mechanical code.
Ellen: Thinks that item 3 is a direct reflection of a survey done in Virginia when random test of ducts found leak problems. This would benefit the homeowner.
Andrew: Asked Eric to send the document to him via email. Eric said he would send him an annotated version of the document. William asked for one as well. Eric will send them.
Richard: Asked Eric if he wanted to carry over or vote.
Eric: He is fine with carrying over until the next meeting.
KC Bleile: Sees a potential compromise between the builder association and energy advocates for moving this forward, especially with additional discussion around the use of plenums.
Richard: Carried Over.

Assignments & Next Steps:

Richard: Continue to work on these proposals outside of the group, and bring back to the next meeting. These will be heard at the upcoming General Workgroup. DHCD will get a summary out as soon as possible. Richard will look for a time for the next meeting to review the carried over proposals, and any new proposals. He thanked everyone for participation and reminded the group members that they could reach out to DHCD staff with any questions.

Energy Sub-Workgroup Meeting Summary

May 12, 2022 - 9:00 a.m. – 12:05 p.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: Senior Policy Analyst and Regulatory Administrator

Sub-Workgroup Members:

Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Chelsea Harnish: *Virginia Energy Efficiency Council*
Eric Lacey: *Responsible Energy Codes Alliance (RECA)*
K.C. Bleile: *Viridiant*
Steve Shapiro: *Apartment & Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*
William (Bill) Penniman: *Sierra Club; Virginia chapter*

Other Interested Parties:
Ben Rabe: *New Buildings Institute*
David Owen: *Home Building Association of Richmond*
Daniel Willham: *Fairfax County, Chair of VBCOA Building Code Committee*
Ellen Eggerton: *Alexandria Sustainability Coordinator and VBCOA member*
Jacob Newton: *Virginia, Maryland Delaware Association Electric Cooperatives*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
John Ainslie: *Ainslie Group and HBAV President*
Michael (Mike) O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Ross Shearer: *Citizen, Virginia*
Sarah Thomas: *The Vectre Corporation*
Steve Sunderman: *Resilient Virginia*

Sub-Workgroup Members not in attendance:

Andy McKinley: *American Institute of Architects (AIA), Virginia*
Bettina Bergoo: *Virginia Department of Energy*
Brian Clark: *Habitat for Humanity*
Corey Caney: *International Association of Electrical Inspectors (IAEI), Virginia*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
Jeff Mang: *Polyisocyanurate Insulation Manufacturers Association*
Jim Canter: *Virginia Building and Code Officials Association (VBCOA)*
Maggie Kelley Riggins: *Southeast Energy Efficiency Alliance*

Welcome and Introductions

Richard Potts: Welcomed participants. The agenda contains proposals carried over from the April 11, 2022 meeting, as we as new proposals. He introduced the DHCD staff. He asked group members to stay muted unless speaking. He explained that the Sub-workgroup members will vote in support or non-support of proposals. If the Sub-workgroup members are in support of a proposal, the proponent will be offered an opportunity to list the Sub-workgroup as a co-proponent. If the Sub-workgroup is not in support of a proposal, it will be reflected by the meeting summary.

Participants introduced themselves.

Carried over proposals from April 11, 2022

REC-R402.4-21

Bill Penniman: This is a proposal to bring the air leakage standards up from the 2012 to the 2021 IECC levels. He is still waiting to have discussions with Andrew Clark and other interested parties, hoping to gain consensus, so he is willing to carry this over.

Richard: Next week will be the last opportunity for this Sub-workgroup to meet before the Workgroup meetings.

Andrew Clark: This is similar to a proposal Eric and Laura submitted, and they will be meeting about that one on Monday. He will send an invite to Bill to join the discussion. He asked what the next steps are in the process.

Richard: The Workgroup meeting is in June, then the proposals go to the Codes and Standards Committee of the BHCD for the final vote. May 1st was the cutoff to get proposals into cdpVA, however, if there are still discussions and changes are agreed upon prior to the Workgroup meeting in June, they can be presented during that meeting as a floor amendment.

Andrew: After the June Workgroup meetings, is there any possibility to amend proposals if consensus was reached?

Richard: Not that he knows of, but he will ask Jeff and Cindy if there would be any opportunity for that, and let the group know next week.

Andrew: He would appreciate that.

Richard: This proposal will be carried over until next week's Sub-workgroup meeting.

EC-C407.6-21

Bill: Made some wording changes to incorporate feedback he received at the last Sub-workgroup meeting. This would now include a building constructed or marketed as zero energy in the appendix. The builder would be required to notify the building official that they intend to market the building as such, and provide test results on the permanent Certificate as per the standards in the appendix.

Steve Shapiro: Talked with Bill outside of the meeting, he appreciates the wording change, but he still doesn't think this belongs in the building code because it's marketing. It still says that the inspection must comply with the appendix. He doesn't support this.

Bill: The appendix is already there, this just makes it operational in a meaningful way.

Andrew: Agrees with Steve, he can't identify any other provisions in the code dealing with advertising. Only one section came close and it was regarding universal design features.

Eric Lacey: Agrees that there should be more uniform labeling for buildings that say they are net zero. He wondered if it would be possible to reference the appendix as an optional compliance path. Formally recognizing a net zero program in the code might also work.

Bill: He is open to the idea, which is better than non-consensus.

Steve Sunderman: Air leakage is one of the most important and least costly ways to improve building performance.

Steve Shapiro: Will not be able to join the May 19th Sub-workgroup meeting, but would be happy to review any language sent to him by the proponent.

Richard: Asked if Steve Shapiro had an alternate representative who could join the meeting.

Steve Shapiro: Will try to get someone, but isn't sure he will be able to.

Andrew: Would also be happy to review any changes to the language prior to the next Sub-workgroup meeting.

Richard: this will be carried over until the next Sub-workgroup meeting.

REC-R402.1.2(1)-21 and REC-R402.1.2(2)-21

Eric: These are the wall insulation proposals for Virginia to catch up with the model code. There is a group of stakeholders meeting to discuss these on Monday, before the next Sub-workgroup meeting, and he hopes to reach or come closer to consensus. He asked to carry these proposals over until the next Sub-workgroup meeting.

Richard: These proposals will be carried over until next week's Sub-workgroup meeting.

REC-R402.4.1.2-21

Eric: Stakeholders are meeting to discuss this proposal on Monday also, same as the prior two. He asked to carry this proposal over until the next Sub-workgroup meeting.

Richard: This proposal will be carried over until next week's Sub-workgroup meeting.

REC-R403.3.3-21

Eric: This proposal adopts the duct tightness testing in conditioned space, which was adopted in the 2021 IECC. He did make some changes based on feedback at the last Sub-workgroup meeting. He changed the proposal to require compliance with the VRC if using building cavities for ducts and to require duct leakage testing for ducts located within the envelope. He is again hoping to carry this over for additional discussion prior to the next Sub-workgroup meeting.

Richard: Hearing no further discussion, and seeing that Andrew typed in the chat that he has it on the agenda for Monday's discussion, this will also be carried over until next week's Sub-workgroup meeting.

New proposals

REC-R403.1.4

Bill: This proposal restricts on-site combustion as a primary heat source. It would allow fossil fuels as supplemental heat sources. It's not a total ban, just calls for electrification as a primary heat source. It should reduce cost of construction and operation, as well as being healthier for occupants.

Mike O'Connor: Virginia Petroleum and Convenience Marketers Association and Virginia Propane Gas Association oppose this proposal.

Ben Rabe: Supports this proposal

Andrew: Home Builders Association of Virginia does not support this proposal.

Richard: A vote resulted in Steve Shapiro, Andrew, and KC showing thumbs down, while Eric and William voted thumbs up. John Ainslie, and David Owen noted their opposition as well. This proposal will not be supported by the Sub-workgroup.

REC-R403.1.4(2)

Bill: This is a variation of the last proposal. If air conditioning is installed, a heat pump should be installed as the primary source of energy. Other fuels could be used to supplement or provide backup.

Ben: It is better than having separate heating and cooling systems.

Mike: Virginia Petroleum and Convenience Marketers Association and Virginia Propane Gas Association oppose this proposal.

Andrew: Home Builders Association of Virginia does not support this proposal.

Richard: A vote resulted in Steve Shapiro and Andrew showing thumbs down, while Eric and William voted thumbs up. In the chat box, David noted opposition and Steve Sunderman noted support. This proposal will not be supported by the Sub-workgroup.

REC-R404

Bill: This assumes that fossil fuels will be used for some appliances. It would require a raceway or circuit to support future electrification if the owner desires. Raceway conduits are low cost. This will allow people to switch to electric with no additional cost in the future.

Ben: Supports this proposal. Much less expensive and more convenient than switching with new conduit later.

Mike: Virginia Petroleum and Convenience Marketers Association and Virginia Propane Gas Association oppose this proposal.

Andrew: Home Builders Association of Virginia opposes this proposal.

Eric: It provides future options, and it doesn't rule anything out. He asked those opposed to give a reason.

Steve Sunderman: In a 2018 code change, there was an outlet required in case someone wanted to install a generator later. This is in line with that change, it makes sense, and helps homeowners prepare for the future.

Bill: Also asked the opposition to say why they were opposed.

Richard: A vote resulted in Andrew showing thumbs down, while Eric, KC and Bill voted thumbs up. In the chat box, David and John noted opposition. This proposal will not be supported by the Sub-workgroup.

REC-R1104.2

Bill: This proposal is for EV readiness in small residential/townhouse/duplex categories. They have discussed with Andrew, and would like to carry over in order to continue discussions.

Andrew: Thinks this may have a good chance of reaching consensus after more discussion. They also discussed it with Dominion Energy, who said that they could handle the utility infrastructure if the proposal passed. He does have some concern about getting this done by the June timeline. He said he would be happy to continue discussion and carry over and welcomed any other Sub-workgroup members to join the discussions if they wanted to.

Mike: Where is the language limiting to townhomes?

Bill: Because it's in Residential code, not the Construction code, it would only apply to single family, duplex and townhouse dwellings. Is that correct?

Richard: The "R" provisions of the IECC would also include multi-family occupancies 3 stories or less, unless specified otherwise.

Bill: That is another good reason to carry over.

Andrew: Discussions with Bill seemed to be limited to single family homes with garages. They were not even considering townhomes or multi-family dwellings.

KC Bleile: Asked Richard to clarify the time frame for full adoption of any codes voted in by the BHCD.

Richard: The anticipated approximate effective date would be late 2023. The USBC allows prior code edition to be used for a year after. So, latest would be late 2024.

KC: Would like to have other developers and utilities involved in this discussion as well. She will let them know.

Andrew: This would affect existing developments that have already been approved,. Requiring the additional infrastructure for EV may trigger new reviews by the approving authorities. Many builders are already offering this as an option. Asked DHCD staff if they could assist with convening a group of utilities to discuss the timeline.

Jacob Newton: Is part of an electric cooperative, and he would be interested in coordinating a meeting.

Steve Shapiro: typed in the chat box that he would also be interested in meeting with utilities folks.

Richard: Richard will ask Jeff and Cindy if there's any leeway to assist with offline meetings. This proposal will be carried over until the next Sub-workgroup meeting.

{BREAK 10:11 – 10:20}

REC-R503.1.2

Ben: This proposal would require the sizing of HVAC systems for alterations to comply with the same requirements as for new construction.

Richard: If approved, this will also need to be coordinated with the existing building code.

Eric: RECA supports this proposal.

Ellen Eggerton: Supports this proposal.

Chelsea: Typed in chat VAECC supports the proposal.

Richard: Hearing no further discussion, a vote resulted in only thumbs up. This proposal will be supported by the Sub-workgroup and Ben would like the Sub-workgroup to be listed as a co-proponent.

REC-R503.1.2.1

Ben: This proposal relates to HVAC system controls applicable to alterations and is a companion to the prior proposal.

Eric: RECA supports.

Richard: Hearing no further discussion, a vote resulted in only thumbs up. This proposal will be supported by the Sub-workgroup and Ben would like the Sub-workgroup to be listed as a co-proponent.

EC-C1301.1.1.1(2)

Bill: This proposal is for the VCC to comply with the 2021 IECC. It's fully supported by the Department of Energy and has rapid full payback.

Steve Shapiro: AOBA and VAMA are opposed.

Andrew: HBAV is opposed.

Richard: Hearing no further discussion, a vote resulted in Andrew and Steve Shapiro showing thumbs down. Bill and Eric gave thumbs up. Mike and John also indicated opposition. This proposal will not be supported by the Sub-workgroup.

EC-C405.10

Bill: This proposal is about EV readiness in multi-family homes. It would provide a base level of EVSE installed spaces and some EV ready spaces. The remainder of the units would be supported by EV capability. The bulk of the spaces would not have electrification initially, but there would be places ready to expand as needed. He spoke with Steve Shapiro outside of this Sub-workgroup meeting, and he will reach out to his constituents for further consideration. He would be willing to continue to meet with interested parties to discuss and come closer to consensus. He asked to carry this proposal over to the next Sub-workgroup meeting.

Richard: This would carry over into commercial and multi-family 3 and 4+ story dwellings. DHCD has a similar proposal, which would have certain specific requirements. That proposal will be reviewed later in the meeting.

Steve: Is still getting feedback from stakeholders, and discussions will continue.

Ben: Supports this proposal, and also has an EV proposal submitted. He would be willing to continue discussions as well.

Sarah Thomas: Introduced herself as from The Vectre Corporation and is representing The Virginia Association of Commercial Real Estate. She is also reaching out to members about this and other EV proposals and would like to carry this proposal over as well.

KC: Appreciates that Bill broke the multi-family proposal away from the single family homes.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EC-C405.11.1

Bill: This is an EV readiness proposal for commercial spaces with more than 10 parking spaces. There would be a few EV installed spaces, some EV ready spaces and the remainder would be EV capable. He would like to carry this proposal over to continue discussions outside of the Sub-workgroup.

Richard: Hearing no further discussion, this will be carried over to the next Sub-workgroup meeting.

EC-C403.7.7

Richard: The proponent, Richard Grace was not present in the call, nor was there a representative present to speak on his behalf.

Florin Moldovan: Gave a summary of the proposed changes, which were editorial in nature.

Richard: Hearing no further discussion, this proposal will be carried over to the next Sub-workgroup meeting.

EC-C405.13(3)

Ben: This proposal is similar to Bill's EC-C405.11.1 for EV readiness in commercial spaces. He is happy to carry over for continued discussions outside of the Sub-workgroup.

Andrew: Asked if DHCD staff had prepared a summary of the proposals, comparing the similarities and differences.

Richard: No, DHCD staff has not done that.

Andrew: Is wondering if there is a way to reduce the number of proposals or possibly combine some.

Richard: That could be worked out between proponents or the proposals could all go through. DHCD, however, has been directed to put something together for the BHCD to consider, so that draft will go forward.

Bill: He is willing to work on this however it unfolds. A common draft would work for him.

Steve Shapiro: His concern is mostly over the number of spaces used.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EC-C405.13(2)

Richard: This is the proposal that the DHCD staff put together based on the directive from the General Assembly.

Jeff: This is a conversation starter and one of several other similar proposals around EV charging spaces.

Bill: Thanked Jeff for the explanation, though there are some parts of this proposal he is not clear about. Further discussion for a common plan among stakeholders would be ideal.

Richard: This will be carried over until the next Sub-workgroup meeting.

Steve Shapiro: Mentioned that he will not be able to make the next Sub-workgroup meeting, and wanted to know if the conversations could continue until the June workgroup meeting.

Jeff: Conversations can continue beyond the Sub-workgroup meeting until the Workgroup meeting in June.

{BREAK 11:12-11:20}

EC-C502.3

Ben: This proposal expands the efficiency credit section to include alterations and additions. That would allow a flexible way to encourage efficiency in commercial alterations and additions.

Eric: RECA supports this proposal. For a minimal amount of energy efficiency upgrade, in a substantial enough addition, it makes sense to go beyond what is required in the code.

Steve Shapiro: Asked Eric to explain what he meant by things going beyond what's required by the code, and what size would a substantial addition be?

Ben: The base code requires that design professionals select measures from the points table that would achieve a certain amount of points. Additions and alterations are not required to use the table, so they have 2.5% less efficiency required. This would require selection from the tables to bring up to commercial grade. There are many exceptions to the size of the additions in C503.

Steve: How will this correlate with the existing building code?

Ben: Is open to putting it wherever it should go.

Richard: There would need to be a pathway from the existing building code to this code.

Bill: Supports this proposal.

Richard: Asked Ben if he wanted to carry this over so they can look into the existing building code for reference. DHCD will assist.

Ben: Yes, he would like to carry over.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EC-C503.3.2

Ben: This proposal is similar to the residential proposal, but it is the commercial version. New equipment and alterations would need to meet criteria for new buildings if the renovations are substantial enough.

Steve: Thinks this also needs to be coordinated with the existing building code.

Richard: This one may be more straight forward than the others. DHCD will help to correlate if the group agrees to the language.

Bill: Supports this proposal.

Richard: Hearing no further discussion, a vote resulted in Sub-workgroup members Eric, Bill, Steve Shapiro and KC showing Thumbs up. Mike indicated his opposition. The Sub-workgroup will support this proposal.

Mike: Typed in the chat box asking who selected the Sub-workgroup members.

Jeff: DHCD staff selected the members based on prior years and participation and expressed interest. Mike (or anyone) can express interest to be considered.

Mike: Asked if there were any Sub-workgroup members who are Virginia domiciled energy providers: electric, home heat, propane, etc.

Jeff: Not at this time.

Mike: Expressed concern that he wasn't able to vote and that there was not representation from the industries he mentioned included as Sub-workgroup members.

Richard: The Sub-workgroup supports this proposal and Ben would like the group to be listed as a co-proponent.

Steve: Commented that his thumbs up vote was based on how it correlates with the existing building code.

Richard: DHCD will work with Ben to make that update.

EB805.2

Ben: This proposal provides for duct testing and sizing to be the same as for new construction.

Andrew: Asked if ben would carry over to continue discussions.

Ben: Yes, he would like to carry this over.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EB805.3

Ben: This proposal is for additions to meet existing code requirements with a few exceptions.

Steve: Asked if Ben would carry this over to continue discussions.

Ben: Yes, he would like to carry this over.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EB805.3(2)

Ben: This proposal can also be carried over.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

EC-C1301.1.1

Richard: DHCD received a request from the proponent to carry this over to the next Sub-workgroup meeting.

EC-C401.2(2)

Richard: DHCD received a request from the proponent to carry this over to the next Sub-workgroup meeting.

EC-Appendix CB

Richard: DHCD received a request from the proponent to carry this over to the next Sub-workgroup meeting.

RB311.1

KC: Worked on this proposal with the building code official of Montgomery County, who noticed that item #6 in this section used the word “material” which was limiting. They added the words “provisions and” to be more inclusive. Other building code officials they spoke with agreed to this change.

Andrew: Why did Montgomery County have a problem with the language?

KC: The material referenced used to be just insulation, now there are additional materials. This includes the other materials.

Andrew: What are some examples of other materials?

KC: Testing results, for example. Other Counties supported this.

Ross Shearer: What is item 6? What are these provisions and materials? It’s not clear.

Andrew: Was door testing or duct testing the example given?

KC: Yes, officials would like to see the test results, which isn’t actually a material.

John: Typed in the chat box:

John Ainslie: Test reports are not part of a list of minimum inspections even though they are required for C.O.

Andrew: Would like to know more specifically what building officials want. Aren’t test results already provided?

Mike: Asked DHCD if there are any other codes amended this year in response to the request of one building official.

Richard: Not that he recalls off the top of his head. Proposals come from a wide array of proponents, ranging from an individual to associations or a group of proponents.

Bill: Concealment is a problem. If it bothers building officials they should inspect before concealment occurs. He supports this proposal.

Andrew: Can DHCD show where there are tests required to be provided now?

Richard: Yes, throughout the code. In this section, it may be just a change in language here to be inclusive.

KC: Yes. This was done to be fully inclusive. She doesn’t mind reaching out for more examples or more building official support. She is fine with carrying this over to the next meeting.

Richard: This proposal will be carried over to the next Sub-workgroup meeting.

Assignments and next steps:

Richard: There are several proposals that will be discussed outside of the Sub-workgroup before the next meeting to try to get consensus. The Sub-workgroup will meet again on 5/19 as the final time before the June full Workgroup meeting.

Bill: Asked if some people wanted to meet to discuss EV proposals now (after this Sub-workgroup meeting), since the meeting was originally scheduled to go until 2pm.

Steve: He is ok to meet after a lunch break. He reminded the group that he still won’t have AOBA and VAMA responses yet, but he’s willing to discuss the issues.

Ben: Typed in chat box, that he is ok to meet today.

Richard: DHCD will keep the Adobe Connect meeting space open for the discussions to continue between individuals who are interested.

Bill: Asked if anyone from DHCD could join to assist.

Richard: He can meet today. 1:30 seems to work for most interested parties. The Adobe meeting space will be open for people to return at 1:30 and discuss the carried over proposals further.

Energy Sub-Workgroup Meeting Summary
May 19, 2022 - 9:00 a.m. – 10:58 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Sub-Workgroup Members:

Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Chelsea Harnish: *Virginia Energy Efficiency Council*
Eric Lacey: *Responsible Energy Codes Alliance (RECA)*
K.C. Bleile: *Viridiant*
William (Bill) Penniman: *Sierra Club – Virginia chapter*

Other Interested Parties:
Ben Rabe: *New Buildings Institute*
Jack Avis: *Avis Construction, Virginia Contractor Procurement Alliance (VCPA)*
Laura Baker: *Responsible Energy Codes Alliance (RECA)*
Matt Benka: *Virginia Contractor Procurement Alliance (VCPA)*
Michael Redifer: *Representing himself, assisting Jack & Matt (VCPA) in the process*
Neil Palmer:
Ross Shearer: *Virginia citizen*

Sub-Workgroup Members not in attendance:

Andy McKinley: *American Institute of Architects (AIA), Virginia*
Bettina Bergoo: *Virginia Department of Energy*
Brian Clark: *Habitat for Humanity*
Corey Caney: *International Association of Electrical Inspectors (IAEI), Virginia*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
Jeff Mang: *Polyisocyanurate Insulation Manufacturers Association*
Jim Canter: *Virginia Building and Code Officials Association (VBCOA)*
Maggie Kelley Riggins: *Southeast Energy Efficiency Alliance*
Steve Shapiro: *Apartment & Office Building Association (AOBA), Virginia Apartment Management Association (VAMA)*

Welcome & Introductions

Richard Potts: Welcomed the attendees and thanked them for their participation. DHCD staff was introduced. The proposals will be voted on by the Sub-workgroup members for support or non-consensus. If the Sub-workgroup is in support of a proposal, the proponent will be asked if they would like to add the Sub-workgroup as a co-proponent before submitting to the General Workgroup for consideration.

Sub-workgroup members introduced themselves.

Carried over proposals from May 12, 2022

REC-R402.4-21

Bill Penniman: This proposal is to bring air leakage level down to 3 air changes per hour (ACH). The air leakage level of 3 ACH has been around for many years, but not yet adopted by Virginia. There was some discussion since the last group meeting with Andrew Clark and his constituents, and while consensus was not reached, he hopes there will be more discussion before the General Workgroup meets in June.

Laura Baker: Her proposal (R402.4.1.2) does essentially the same thing. She does support this proposal to bring Virginia up to the 2021 IECC standards.

Richard: Asked for a vote, which resulted in thumbs up from Bill Penniman, Chelsea Harnish and Eric Lacey. Andrew Clark voted thumbs down and KC Bleile abstained. This proposal will be marked as non-consensus.

EC-C407.6-21

Bill: This is a zero energy proposal, which provides the opportunity to activate the appendix. If the appendix is activated, there is a credit given. He asked Richard what would be the best way to further discussions and suggest language that might meet with consensus before the Workgroup meeting.

Richard: Use public comment on cdpVA and email to Sub-workgroup members.

Eric Lacey: The idea is to have language that would give the option of a net zero building, while not requiring it.

Ben Rabe: NBI was instrumental in getting the appendix into the code and wants it to move forward.

Richard: Hearing no further discussion, a vote resulted in Eric, KC and Bill showing thumbs up. Andrew Clark voted thumbs down and Chelsea abstained. Non consensus.

REC-R402.1.2(1)-21 and REC-R402.1.2(2)-21

Laura: This proposal (1) brings wall insulation up to the 2021 IECC standards. She met with builders on Monday and is still open to further discussions before the Workgroup meeting in June.

Richard: Since Bill has a similar proposal (2), the group can discuss both at the same time.

Bill: Agrees with Laura, Virginia is behind and this would catch up to the 2021 IECC. He's also open to discussion.

Andrew Clark: This proposal garners the most concern from the home builder industry. There's a cost estimate in the proposal of about $735, but builders think it's more like $10-15k. There was some discussion about redesigning homes, which is a secondary concern. DOE data shows homes built after 2000 are affordable for people and the energy cost burden is not on them. This proposal would be costly.

Ben: The homes would be energy efficient for lower-income people to purchase down the road.

Richard: Hearing no further discussion, (1) and (2) will be marked non-consensus.

REC-R402.4.1.2-21

Laura: This is the proposal that's similar to Bill's R402.4 with incremental improvements and some requirements being relaxed.

Richard: Hearing no further discussion, a vote resulted in thumbs up from Bill, Eric and Chelsea. Andrew voted thumbs down. Non-consensus.

REC-R403.3.3-21

Eric: This proposal eliminates the exception for duct testing for leakage in air-conditioned space. It would be required, but would allow twice the amount of leakage in conditioned space than in non-conditioned space. The

building cavities can be used as ducts in certain circumstances, as per the Virginia Residential Code.
Andrew: Supports this proposal.
Richard: Hearing no further discussion, a vote resulted in all thumbs up from the Sub-workgroup members. This proposal will be supported by the Sub-workgroup.

REC-R1104.2

Bill: This proposal is the first of three for EV readiness and applies to single-family, two-family and townhouse dwellings. It would require wiring for charging stations, leaving the option to owners to install chargers if wanted. There's been some resistance from utilities in providing all the energy required. He would be ok with just having a space without wires as an alternative.
Andrew: There's non-consensus now, but he hopes to get consensus before the Workgroup meeting. If pending projects already have a load letter from the electrical power provider, it may cause a problem for them if this proposal is adopted.
Bill: If only the conduit was installed with no wiring, it wouldn't affect the load letter.
Andrew: Dominion is one piece of it, but there are co-ops to consider as well.
Bill: It does give the customer an option to make their life easier and cheaper if there's a space available, and he decides later to add a charging station.
Andrew: Asked if this can go forward with no vote from the Sub-workgroup so that there's not a non-consensus decision.
Richard: This can go forward as 'no decision' from the group.
Jeff Brown: The summary will capture discussions and say that the stakeholders are still working on it. The summary won't indicate support or non-support.
Andrew: That would be a good solution for all the EV proposals.
Bill: Agreed.
Richard: If there is additional language or public comment, notify DHCD so it can go in as a floor amendment in the Workgroup meeting.
Andrew: After the June Workgroup meeting, but before the BHCD meeting, can there be other changes?
Jeff: No changes can be made to the proposals after the workgroup meetings, but if there's an agreement worked out, it can be provided to DHCD and will be included in the information given to the BHCD for consideration when they review the proposals at their September meeting.

EC-C405.10

Bill: This proposal is for multi-family units. There was some discussion at the last meeting, and he amended the language based on feedback. He added EV ready and EV capable spaces in addition to EV installed spaces. He changed some numbers to show 10% EV installed, 10% EV ready and the rest EV capable. He also added language about load management maximum total. He would like to continue discussions with stakeholders before the Workgroup meeting, with no vote from the Sub-workgroup today.

EC-C405.11.1

Richard: This EV-related proposal will go forward with no vote from the Sub-workgroup, while stakeholders continue discussions.

{Break: 10:00-10:05}

EC-C403.7.7

Richard: This proposal is from Richard Grace, who is not in the meeting today. It clarifies the language to prevent dampers from being installed where there's a grease duct serving a Type 1 hood. Hearing no further discussion, a vote resulted in abstentions from Eric, Chelsea and Andrew. Since there was no support or non-support, this will go forward with no position from the Sub-workgroup.

EC-C405.13(3)
Ben: He would like to continue discussions with stakeholders before the Workgroup meeting, with no vote from the Sub-workgroup today.

EC-C405.13(2)
Ben: He would like to continue discussions with stakeholders before the Workgroup meeting, with no vote from the Sub-workgroup today.

EC-C502.3
Ben: This proposal is about additional energy efficiency credits for alterations. He was hoping to get feedback from Andrew.
Andrew: Hasn't looked at it yet.
Richard: Asked Ben if he wanted to have a vote or no-vote from the Sub-workgroup today.
Ben: Asked Andrew if he would abstain from voting today and voice his opinion at the Workgroup meeting if he reviews the proposal before then.
Andrew: He is willing to abstain from voting today and review the proposal before the Workgroup. He also asked if this proposal could go forward with no vote from the group today, as they are doing with the EV ones.
Jeff: Either option works.
Richard: Advised that the Sub-workgroup could vote in support today, with Andrew abstaining, and the proposal would go to the Workgroup with the support of the Sub-workgroup. However, if Andrew reviews the proposal and decides to vote in opposition to it at the Workgroup, it would go to the BHCD as non-consensus.
Ben: Asked for a vote.
Richard: The vote resulted in 4 thumbs up from Chelsea, Eric, KC and Bill. Andrew abstained. This proposal will go forward as supported by the Sub-workgroup.

RB113.1-21
KC: This proposal is intended to clarify the existing code by adding the words "provisions and" to item #6. It was originally brought up by one Code Official, and KC has also asked other Code Officials, who support this.
Andrew: Would like to meet with KC on Monday to discuss the proposal further.
Richard: No vote or decision from the Sub-workgroup today. Discussions with stakeholders will continue.

EB805.2
Ben: This proposal is for duct testing requirements in alterations. He was waiting for Andrew to review it, but he would like to proceed with a vote if Andrew hasn't had a chance to review it yet (same as proposal-EC-C502.3).
Andrew: Agrees, and will abstain from voting today.
Richard: The vote resulted in 4 thumbs up from Chelsea, Eric, KC and Bill. Andrew abstained. This proposal will go forward as supported by the Sub-workgroup.

EB805.3
Ben: Same as EB805.2 for additions instead of alterations.
Richard: A vote resulted in Chelsea, Eric, KC, Bill giving thumbs up. Andrew abstained. This proposal will be supported by the Sub-workgroup.

EB805.3(2)
Ben: This is a commissioning requirement, which is already in new buildings, but this is for alterations.
Richard: A vote resulted in Chelsea, Eric and Bill giving thumbs up. Andrew and KC abstained. This proposal will be supported by the Sub-workgroup.

EC-C1301.1.1 withdrawn in favor of EC Appendix CB

Richard: This proposal was going to be presented last week, but Matt was not able to join the meeting. The DHCD staff has the same proposal, due to legislature directing the BHCD to consider it.

Matt: This simplifies building construction and will help to make Virginia more competitive.

Jack: Appendix CB limits it to the building envelope. A metal building would require R19 in the roof with R5 insulation block and R13 in the walls. Added B group (or areas with large warehouse but only a few offices), which would have to meet current code requirements.

Richard: This proposal and 1301.1.1(2) (from the DHCD staff) are for building use exceptions. EC401.2(2) is a companion proposal to appendix CB, which triggers use of the appendix. However, it can be removed because it's not needed.

Michael Redifer: It was to trigger the use of the appendix, but its cleaner the way DHCD did it. Withdraw 401.2(2).

EC-C1301.1.1(2) consensus to not support

EC-C401.2(2) withdrawn in favor of EC Appendix CB

Richard: This will be withdrawn; added Section 402.1.6 to the IECC instead.

EC-Appendix CB move forward with no decision

Eric: This is better than the wider exception. Occupancy classifications are broad, covering buildings that are multi-purpose use. He's a "no" right now, and would still like to work on it because it's not specific enough. Also, it only brings the code up to the 2006 IECC standards, which is not enough.

KC: Agrees with Eric. Particularly, utility and miscellaneous occupancies are too broad. Also non-consensus.

Bill: Is also a "no" right now. In favor of continuing to work on it.

Matt: Will continue to work on it, and welcomed others to join the discussions.

Richard: No vote or decision from the Sub-workgroup today. Discussions with stakeholders will continue.

Next steps

Richard: Thanked everyone for their time and participation. The General Workgroup meeting for energy proposals will be June 9th. Any existing building code proposals discussed will be heard in the General Workgroup meeting on June 8th.

Resiliency Sub Workgroup Meeting Summary

February 23, 2022 9:00 a.m. – 11:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Division of Building and Fire Regulations (BFR)*

Sub Workgroup Members:

Charles Baker: *Federal Emergency Management Agency (FEMA) Region 3*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
George Homewood: *City of Norfolk, Planning Director*
Joel Andre: *American Institute of Architects (AIA), Virginia*
John Harbin: *Hampton Roads Planning District Commission (HRPDC)*
Kenneth Somerset: *Virginia Floodplain Management Association (VFMA)*
Richard Gordon: *Virginia Building and Code Officials Association (VBCOA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA); Virginia Apartment and Management Association (VAMA)*
Steve Sunderman: *Resilient Virginia*
Traci Munyan: *DHCD, Resiliency*

Interested Parties

Andrew Grigsby: *Viridiant*
Brandy Buford: *Virginia Division of Conservation and Recreation (DCR)*
Chris Stone: *Clark Nexson, Virginia Beach, VP, Resiliency*
Fred Kirby*: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)* *standing in for Raka Goyal today
Maggie Odom-Goeller

Study Group Members not in attendance:

Raka Goyal: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Angela Davis: *Virginia Division of Conservation and Recreation (DCR)*
Casey Littlefield: *International Association of Electrical Inspectors (IAEI), Virginia*
Andrew Clark: *Home Builders Association of Virginia (HBAV)*

DISCUSSION:

Welcome and Introductions

Paul Messplay: Welcomed everyone to the meeting ant thanked them for their time. He noted that the meeting is open to all for discussion, however, only the Sub Workgroup members will vote and be eligible to take official actions. He discussed features of the Adobe Connect meeting room, and asked the group to stay muted when not speaking and to identify themselves before speaking. He let the group know that there would be 5 minute breaks each hour and an hour for lunch at noon. At his invitation, the DHCD staff and participants introduced themselves.

Overview of VA Code Development Process

Paul: Shared a short slide presentation with the 2021 Code Cycle notable dates; description of Study Groups, Sub Workgroups and Workgroups; website for cdpVA, and where to find Virginia codes online at the ICC website.

Background

Paul: Gave background information about the Resiliency Sub Workgroup formation and prior areas of focus:

- Executive Order 24 - Governor Northam created in 2018, stating that DHCD shall consult with relevant stakeholders and subject matter experts to identify and suggest resiliency improvements to the USBC for the 2018 code update. This process is continuing to the 2021 cycle, even though the group is no longer bound by the 2018 order.
- Prior Sub Workgroup Focus – They considered multiple resiliency topics and how buildings and structures are impacted by events like flooding, moving & rising water, high winds, hurricanes and tornadoes, wildfires, seismic activity and terrorism. The group settled on 2 main threats – flooding and high wind.

Group Discussion

1. What is resiliency?

   Paul: Asked the group to begin by discussing what resiliency means to them.

   George Homewood: Thinks in terms of shocks & stresses. Hurricanes and other big events are shocks. Stresses are not big disasters for the community, but they can be a disaster for some individuals. To achieve resiliency, we want to not only survive, but thrive. Climate change and sea level rise is real. Storms are getting more frequent, longer and more intense. Our building environment isn't designed in a way to effectively manage these things, especially in low lying areas and coastal areas. He's concerned about where and why water accumulates rapidly.

   Steve Sunderman: Climate change is real and the question is how to deal with it, besides just mitigation. People use the term "natural disasters", and he thinks they are really natural hazards. The issue is being prepared for a hazard, so that it doesn't become a disaster. Sustainability and resiliency seem to be conflated often. Sustainability is about resource conservation and the triple bottom line - prosperity, human activity and environment. Resiliency is more about preservation and preparation - being strong enough to withstand hazards. Destruction is the biggest problem with sustainability. To prevent destruction, something needs to be resilient.

   Paul: There will be some energy proposals for the group to look at, and understanding the relationship between resiliency and sustainability will be helpful.

   Andrew Grigsby: Thinks that Chris Stone shared a good comment in the chat box:

   > *"Sustainability does not include the ability to respond and recover, but resilience does not include the ability for future generations to have resources."*

   Over the years, he's noticed that sustainability has been about how to maintain a certain quality of life and allow future generations to enjoy the same quality. It was about utilization of resources. Climate change is doing damage to that movement. Resiliency is about bouncing back and recovering in a way to thrive. We want a sustainable society, we realize failures due to increasing hazards, shocks and stresses, so we need to build more resilient systems due to those increased hazards.

Steve Shapiro: Would want the group to look at cost impact, as well as resiliency impact. As we all know, chapter 1 of the USBC talks about constructing with the least cost to maintain standards.

2. Area(s) of focus for this code cycle:
   Paul: Last cycle, the Sub Workgroup found flooding and high wind to be the most important topics. Do we still want those, or focus on something else? Chris Stone put a list in the chat box of possible topics (stressors & shocks):

   > *"Hurricanes, Earthquakes, Wildfires, Heat Waves, Blizzard, Pandemics, Flooding, Tornadoes, Acts of Terrorism, Civil Unrest, Dam Failure, Drought, Affordability, Aging Population, Food Scarcity, Sea Level Rise, Wealth Gap, Land Subsidence, Aging Infrastructure, Population Growth, Melting Polar Ice, Global Warming, Increasing Pollution."*

   Chris Stone: This list was developed by the American Institute of Architects in 2017. He would also add the impact of increasing temperatures. Richmond and Norfolk are doing heat island studies. More people die from heat than any of these other listed items.

   George: Thinks that flooding and wind should continue to be discussed. He also agrees with Chris that heat island impacts are important. Heat impact is felt more by lower income communities and also disproportionately impacts the aging population. He thinks that universal design would be a good way to have fewer barriers in construction and address all segments. There's also a risk of wildfire and there are many things that can be done through the building code to reduce the potential of disaster due to wildfire.

   Paul: There are some things that won't be able to be addressed through the USBC (such as civil unrest, wealth gap, increasing population, etc.). Northern Virginia did an urban heat islands analysis last year, and he shared a link to the online report in the chat box. He asked the group what information they could share on this topic.

   Chris: One of the issues is the design parameters. For example, NOAA Atlas 14, which hasn't been updated since 2006, is used for precipitation. There is about a 20% increase in the IDF precipitation curves. It is similar with heat. Facilities are being designed with weather data that is stagnated, it will not be helpful for the long term of about 20 or 30 years.

   George: Heat island can be addressed by how buildings are sited, like including areas of shade, which may also protect from rain and snow.

   Chris: There was legislation that failed in the General Assembly this year, involving tree canopies. Tree canopies in urban areas do help with the heat island effect. Materials used can also help, such as reflective roofs.

   Andrew: Storm water management can also help.

   Paul: Heat islands does sound like an interesting topic to look at, and we can still look at the flooding and winds topics.

   Steve Sh: George mentioned wildfires. ICC does have the Wildland-Urban Interface Code, which describes different ways to mitigate wildfires.

   Steve Su: US Green Building Council has addressed heat island effects for many years, and we can look to them for recommendations.

   Richard Gordon: Discussions about heat island may tend towards site design and also building design. Other things that lean towards site design are fire access and fire response, wind damage, trees falling, etc. Mitigating hazards through site design as a way of resiliency is important.

   Paul: Topics don't need to be decided on now, but group members should consider topics to consider between now and the next meeting. He asked the group for more thoughts.

   Fred Kirby: A primary interest may be in the existing building code 502.1.1 regarding structural concrete. Retrofitting a weak first story for seismic activity can be part of resiliency and structural sustainability as well.

   Paul: Posted a link in the chat box to chapter 11 of the existing building code about retrofitting.

3. Proposals for Consideration:
   Paul: There are proposals on the cdpVA website now, which have resiliency impact statements. The task for the group is to discuss and determine if the proposals actually do have an impact on resiliency.

a) B1206.2-21

George: Whose definition of resiliency should we use? The writer of this proposal equates quality of life and resilience as the same thing. We may not all agree. In this case, I do not agree. Are we the arbiter of what resilience is in this case?

Paul: This group will determine what is resiliency and what is not. It is not defined in the code of Virginia.

Steve Su: Quality of life is part of resiliency, as in the case of protecting life and safety issues. As an example, if electric is lost for a period of time due to not being resilient, quality of life is impacted. Environment, people and cost are the trifecta that should be balanced.

Paul: Since there were no other comments, he asked for a vote of thumbs up or down to see if noise as a quality of life issue is part of resiliency. Eight down, two up (Charles, Traci), Kenneth abstained.

Steve Sh: He doesn't think this is resiliency, but even if he did think it was, he would still need to define noise level.

Paul: According to the vote, proposition B1206.2-21 does not rise to level of resiliency.

b) EB502.1.1-21

Paul: Fred mentioned the structural concrete in existing building code 502.1.1.

Fred: He is interested to find out when to upgrade, and what triggers the requirement.

Paul: This proponent references ACI 562 about additions and repair to structural concrete. The bottom of page 2 says that use of ACI code 562 standard helps ensure that repairs are properly performed and will satisfy an acceptable service life. Without minimum standards, repairs may not satisfy the intent of the code or expectations of the owners or public. Proper evaluation and repairs will improve resiliency of the building. News coverage demonstrates that there is a potential risk to life due to deteriorating concrete and inappropriate repairs. ACI 562 is referenced as a document for assessing and designing repairs and additions to structural concrete.

Richard G: Hasn't reviewed extensively ACI 562, but he has encountered poor concrete construction in older buildings, and proper repair would be beneficial. It leads to discussion about the condition of existing buildings

Ellis Mckinney: They have a lot of concrete repair in Arlington. He is not an expert in ACI 562, but he has experienced a lot of slab and garage repair in mixed use developments. Another tool to evaluate would be helpful. Much of the repair takes place at night, when after-hours inspections are needed to verify. This would be another tool in the toolbox, but may not rise totally to the level of resiliency in the long term. He does think the proposal itself is a good one.

Paul: The group will vote thumbs up or down to decide if the resiliency statement in the proposal is impactful, and should be discussed from a resiliency standpoint.

Steve Sh: To clarify, is the voting to determine if the proposal is resilient, or for support of the proposal as a whole?

Paul: The thumbs up will indicate agreement with the resiliency impact statement and thumbs down means disagreement with the resiliency impact statement. The group will not necessarily vote to show agreement with the proposal, but if it is part of resiliency, the group will provide an analysis for the Board of Housing and Community Development.

Steve Sh: Last cycle, the group did or didn't support individual proposals based on their content. Will the group not do that this time?

Jeff Brown: Last cycle, the group developed some proposals, and did some analysis of other proposals submitted. The group could also take a position on the proposals submitted if desired, when they do have a positive impact on resiliency. The group could actually become proponents or co-proponents of the proposals. If the group does not support a proposal, that could also be documented to bring to the full Workgroups.

Fred: Looking at the resiliency impact statement, he takes issue because the existing building code already covers it. He wonders if or what more the group can add to the statement. In California, they had weak first story buildings, and they evaluated them preemptively, since they are in a seismic area. In Virginia, the buildings stay as they are, unless something changes which requires a building permit, and then would trigger the existing building code. He would ask if the existing building stock or a segment thereof would have an issue that would cause this type of proposal to be needed over and above triggering the existing building code provision.

{BREAK: 10:07-10:12}

Paul: Steve Sunderman sent a document about the relationship between resiliency and sustainability. Paul dropped it in the document pod for anyone to view or download. He asked if Richard Gordon wanted to comment verbally on what Fred said earlier. Richard Gordon commented in the chat box:

"I think Mr. Kirby's comments speak to the greater issue of evaluating existing buildings, which is an important component of the resiliency discussion. This specific proposal would only provide guidance on assessment and repairs; it would not require any assessments on existing buildings. Any requirements for evaluation of existing buildings not undergoing alteration or repair should be in the Maintenance Code, not the VEBC"

Richard G: Supports the idea of including a discussion about evaluating existing buildings. Hazards related to existing buildings have not been specifically called out as a discussion item.

Fred: He wants to be careful to watch costs and not have unfunded mandates. He wants to keep the community safe, but watch costs, especially in existing building code requirements.

Paul: He could try to get a copy of ACI 562 if the group wants to see it. He asked the group to vote on if they want to see ACI 562 before voting on the resiliency impact statement. 8 yes and 3 no (George, John & Steve Sunderman)

Jeff: posted in the chat box:

"Note from ACI: COMPLIMENTARY COPIES OF ACI 562-21 are available upon request for DHCD staff, BHCD and Workgroup members. Those who would like a copy, please email Kerry Sutton at kerry.sutton@concrete.org and a link will be sent to you from ACI to access the document."

Paul: Asked those who voted thumbs down why they thought it was not necessary to wait to review the ACI before voting.

Steve Su: Thinks the ACI standards are well researched and documented, he has no need to look at the details. He thinks the concept is viable, and doesn't need to look at the ACI.

George, John and Andrew: all agreed with Steve.

Paul: Will still defer the vote until the rest of group who wants to look at the ACI gets to review it. He asked people with thumbs up to ask Kerry Sutton for the ACI, and be ready to vote on the proposal's resiliency impact at next meeting.

Steve Su: Asked if Paul could request the ACI from Kerry once and supply it to the group.

Paul: Licenses are done on an individual basis, so anyone who wants to see it has to request it themselves.

c) EB1102-21

Paul: This proposal is in regards to lithium ion technology energy storage systems. The purpose is to address protection shortcomings in the design, installation and maintenance of existing lithium ion energy storage systems by requiring a hazard analysis. This analysis would provide an early warning notification about a thermal runaway event, where none currently exists. This would increase resiliency of existing ESS by requiring an assessment of potential hazards that could destroy the ESS and provide unwanted exposure. Addressing these potential hazards upfront, provides for long term resilience of the systems and buildings where they are housed. After a few minutes review, he asked for thumbs up or down vote on resiliency.

Andrew: He's curious about table 1207.1.1. What is the capacity of the batteries? Would larger ones need it and not smaller ones? Is there a threshold?

Paul: Florin Moldovan posted a link to IFC chapter 12 in the chat box, answering the question.

Paul: 11 thumbs up, Steve Shapiro – thumbs down.

Andrew: It looks like the noted 12kwh applies only to a residential size battery. Would this hazard analysis be required from the manufacturer or the installer? For a larger system (industrial), he would definitely want it.

Paul: Residential applications are excluded via exception.

d) FP901.4.8-21

Paul: The proponent says that resiliency will be impacted because there will be better tools available to fire code officials to identify building construction features that must be maintained. The SFPC Sub Workgroup looked at it last week; some language was modified, but that did not affect the resiliency statement. He asked for thumbs up or down. 13 thumbs up, none down.

Steve Sh: His opposition to the last one, (EB1102-21) was because it seems retroactive – even before deciding on resiliency statement.

George: Isn't the point to decide on the resiliency statement only, or is it to include other things?

Paul: The mission is to decide on resiliency. Comments about other things can be made and captured.

George: Also, even if we like it for resiliency, we can still not like the proposal.

Paul: Yes, it goes both ways. The proposal can be liked or disliked, but the group still has to vote on resiliency.

Steve Sh: He still stands on his comments, and if it's retroactive, why bother voting on resiliency, because it shouldn't be considered anyway.

e) FP901.6.3.2-21

Paul: This proposal calls for a required annual inspection sticker to be placed on fire protection systems in a location determined by the fire official. The proponent says it will increase resiliency since it will provide inspection status awareness. He asked for comments, and thumbs vote when ready. 9 thumbs up, 2 down (George and Richard).

Fred: Thinks it's already addressed in NFPA 25, so he would not consider it to be an impact to resilience.

Richard: Looked in NFPA 25 and can't find this requirement in there. He agrees with the proposal itself, but doesn't think it impacts resiliency, because the inspections and documentation are in NFPA, so the sticker isn't very important.

George: Agrees that it's only convenient for a glance, and doesn't help with resilience, since inspections have to be done anyway and documented elsewhere.

Steve Su: Can there be three voting categories: agree with resiliency impact, disagree with resiliency impact, and no impact to resiliency?

Paul: Yes. He asked the group if anyone considered this proposal to be neutral – with no impact either way on resiliency. There were no additional comments.

f) FP1201.3-21

Paul: The proposal references the building code for hazardous material quantities, and allows the fire code official to require a hazard mitigation analysis for quantities in excess of those limits cited. The proponent says resiliency will be increased by improving correlation between the SFPC and applicable building code for energy storage system requirements.

George: Asked for a neutral voting option symbol (besides thumbs up or down).

Paul: Suggested that the group use the smiling face symbol to vote that there was a neutral impact on resiliency (neither yes nor no).

Richard G: Doesn't think that any of the propositions will be likely to decrease resiliency – they will probably all be an increase to resiliency or neutral.

Paul: That will probably be the case, but since cdpVA gives all 3 options, we should vote accordingly.

Andrew: Kilowatt hour energy is referenced. Wouldn't the issue be about kilowatts used (instantaneous power), not hours (which would be over time)?

Fred: There can be a large kilowatt available for a short period of time, which would require a relatively small battery. However, it's about storage, so hours would be needed for total capacity.

Andrew: Agrees, but the energy systems in the building would be rate of flow. If hours was removed, it would make more sense.

Richard G: kwh is total storage and the standard measure used. It does seem that the hazard they are trying to address is the potential total storage in the system.

Steve Su: Focusing on the resiliency impact statement, does the increase in correlation of fire and building codes increase resiliency? If it does, it seems like it would be positive on the resiliency scale and a good resiliency statement.

Paul: Yes, that is what the vote should be about. Namely, whether or not correlating the SFPC and the applicable building code increases resiliency.

Andrew: To sum it up, it sounds like they are saying don't have too big of a battery. He will take it on faith that it follows the model code.

Paul: There was some discussion about this in the SFPC Sub Workgroup, and they agreed that the proposal was technically correct. They agreed to support the proposal.

Paul: Resiliency impact vote resulted in 10 thumbs up, one down – Charles.

Assignments and Next Steps

Paul: Looking for volunteers to work on the three projects below. Is there anything people know about that's coming soon (2024), which will have a positive resiliency impact, and which the group may want to talk about and consider making a proposal? What about proposals in cdpVA now, particularly ones marked with neutral impacts? Reviewing George's additions?

1. Looking ahead to the 2024 Codes
   Ellis: Asked Paul to clarify this assignment.
   Paul: wants someone to go into cdp Access on the national level to look for anything set for the 2024 cycle that might impact resiliency?
   Ellis: Volunteered to do this. He participates in the ICC region 7 meetings on this topic.
2. Reviewing other proposals in cdpVA
   Steve Su: Will look in cdpVA for anything that is neutral in resiliency to see if there is a positive or negative impact to resiliency.
   Paul: will send a report to the group with how many are out there. Steve Sunderman can work on this, and if there are a lot, someone else can help. He doesn't think there are too many, but he will send the report.
3. Review proposed amendments provided by George Homewood
   John: will look at George's proposals. Charles and George will also help.

Next Meeting

Paul: Thanked everyone. Asked group members to send new information as soon as it is available. He will send a poll for the next meeting date.

Resiliency Sub-workgroup Meeting Summary

March 16, 2022 9:00 a.m. – 10:48 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Sub Workgroup Members:

George Homewood: *City of Norfolk, Planning Director*
Joel Andre: *American Institute of Architects (AIA), Virginia*
John Harbin: *Hampton Roads Planning District Commission (HRPDC)*
Raka Goyal: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Angela Davis: *Virginia Division of Conservation and Recreation (DCR)*
Richard Gordon: *Virginia Building and Code Officials Association (VBCOA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA); Virginia Apartment and Management Association (VAMA)*
Steve Sunderman: *Resilient Virginia*
Traci Munyan: *DHCD, Resiliency*
Andrew Grigsby: *Viridiant*

Interested Parties

Margaret Rockwell

Sub Workgroup Members not in attendance:

Charles Baker: *Federal Emergency Management Agency (FEMA) Region 3*
Kenneth Somerset: *Virginia Floodplain Management Association (VFMA)*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
Casey Littlefield: *International Association of Electrical Inspectors (IAEI), Virginia*
Andrew Clark: *Home Builders Association of Virginia (HBAV)*

Welcome and Introductions

Paul Messplay: Welcomed participants to the second meeting of the Resiliency Sub-workgroup and invited Raka Goyal to introduce herself, since she was not at the prior meeting.

Discussion

cdpVA Neutral Impact Proposals – Steve Sunderman

Paul: Steve Sunderman prepared a neutral impact analysis report from the proposals with neutral Resiliency Impact Statements in cdpVA. The file shared is also located in the pod on the left in the Adobe Connect meeting and is available for download.

Steve Sunderman: {B102.3-21} Reason Statement: "This exemption is based on exempting play structures from the amusement device provisions associated to these structures and was developed prior to VCC section 424. The provisions of VCC chapter 4 regarding children's play structures regulate the fuel loading limitations and fire protection requirements associated with having these structures inside of buildings. Fire protection provisions related to installation of play structures in buildings should remain applicable." He agrees with the Resiliency Impact Statement that the proposal will neither increase nor decrease resiliency. Other group participants agree.

Steve Sund: {B110.9-21} Reason Statement: "There is no provision in section 110 addressing proactive cancellation or discontinuance of building projects and permits by the permit holder or the owner. Abandonment of work and revocation provisions are provided, but neither of those code provisions address a simple request to cancel a permit." This is a documentation clarification or administrative issue. He agrees that the proposal will neither increase nor decrease resiliency. Other group participants agree.

Steve Sund: {B310.6-21} This proposal has a lengthy Reason Statement, but it says that the scope of the VRC is not provided in VCC Section 310, where it belongs. It's another formatting or administrative change, which he agrees has no impact on resiliency. Other group participants agree.

Steve Sund: {B706.1-21} This proposal aims to clarify the intent of the applicable code sections. It's another formatting or administrative change, which he agrees has no impact on resiliency. Other group participants agree.

Steve Sund: {B1006.3.4-21} Reason Statement: Experience in Seattle and New York City has shown that this kind of development with a limited floorplan can be allowed safely, as well as in other countries. This allows more compact missing middle residential development that was historically common in Virginia but has not been permitted for many years. Reviewers note that there is still a need for reliable aerial access, sprinklers, and alarms. It's another clarification issue with no impact on resiliency.

George Homewood: How broad is "resilience"? The ability to have missing metal, and therefore more affordable housing does contribute to economic resilience, although not necessarily physical resilience. He agrees with Steve that it doesn't increase physical resilience, but it could increase economic resilience.

Paul: This proposal appears to reduce stairways from 2 to 1. Would that make the building less safe or resilient?

Steve Sund: There could be an argument one way or another about the resiliency issues, but he still doesn't see a strong case to increase or decrease resiliency.

Paul: The group agrees. No impact on resiliency.

Steve Sund: {B1020.2.1-21} Reason Statement: "The VCC has historically eliminated the requirement for hoistway opening protection in 3006. As long as that section is eliminated in the 2021 VCC, the reference to 3006 from 1020 is invalid." It's another documentation clarification issue with no impact on resiliency. Other group participants agree.

Steve Sund: {EB102.2.2-21} Reason Statement: "VEBC section 302.3 has this requirement that replacement smoke alarms must meet UL 217 and requires 10 year sealed batteries for battery only replacements. If the R-5 exception is taken to use the VRC instead of the VEBC this requirement to have current technology replacement smoke alarms is lost. This code change brings application of the VRC to R-5 consistent with use of the VEBC for

R-5." He agrees that the code change has no impact on resiliency.

Andrew Grigsby: Improved smoke alarms theoretically reduce damage to buildings which overall would increase resiliency.

Steve Sund: The issue is that this is a documentation or code clarification; it isn't a new code requirement. It brings consistency between statements in the codes.

Paul: As discussed in a previous meeting, correlation between codes can have a positive impact on resiliency, (i.e. proposal FP1201.3-21).

Steve Shapiro: Agrees with Paul. If this change was not made, there would be an issue. The change ensures that R-5 isn't left out. Therefore, correlation between codes in this case increases resiliency.

Andrew: Agrees that this supports increased resiliency.

Steve: After hearing the discussion, he could say that it does increase resiliency.

Paul: Held a vote. This will increase resiliency due to coordination in codes. All thumbs up.

Steve: {EB603.6-21} Reason Statement: "Any occupant load change that increases the number of required plumbing fixtures is a change of occupancy by definition and section 710.1 is applicable. This provision is not consistent with the exception to 710.1 creating a confusing conflict." It's a documentation clarification issue, and he agrees that there is no impact on resiliency.

George: If the occupancy is increased, plumbing fixtures should be increased.

Steve Sund: The cost impact statement says that there's no impact. The section is already overridden by section 710.1, so this is essentially an editorial change. Even if the plumbing fixture requirement is changed, is that resiliency? He thinks it's still only editorial, with no impact to resiliency.

Richard Gordon: It's clear in section 710 that plumbing needs to be upgraded to match the occupancy. This is just a statement of clarification.

George: What's the exception to 710.1 that is referenced?

Richard: The exception says that in other than group R or I occupancies or childcare facilities classified as group E, where the occupant load is increased by 20% or less in the area where the change of occupancy occurs, additional plumbing fixtures required based on the increased occupant load in quantity specified in the IPC are not required. The exception is already in 710.1, which matches this.

Steve: Increase in plumbing fixtures seems to be more of a convenience issue than a resiliency issue.

Raka: Section 710 only comes into the picture when there's a change in occupancy. Section 603 doesn't say that. Does this change anything? It seems very specific only when there's a change of occupancy.

Paul: It's a good question. He asked the group if they could provide an answer.

Florin: When there's an increase in plumbing fixture requirements, it's already determined that there's a change in occupancy by definition in chapter 2 of the VEBC.

Raka: Thank you.

Paul: Called for a vote on no impact. The group voted thumbs up: no impact on resiliency.

Andrew: The group just decided that improving consistency, even at the editorial level did benefit resiliency because it would improve compliance. For this proposal, it doesn't seem to be the case. How is that principle going to be defined, or is it subjective? He's inclined to lean towards possible economic resiliency due to coordinating with other codes.

Paul: There is a precedent where coordination between codes has a positive impact on resiliency. This may not be coordination with code, but how about clarity? Does clarity in the code increase resiliency?

Steve Shap: This is different, it eliminates a conflict, and has no impact on resiliency.

Steve Sun: If there's a code requirement, aren't we obligated to comply with the most restrictive aspect of the code? By coordinating them, it removes any doubt, but it still wouldn't impact resiliency. It's just clarification.

Richard: If the code provisions' subject matter directly affects resiliency, then coordination between codes affects resiliency. If the subject matter of the change doesn't affect resiliency, then neither would coordination of codes.

Steve Sun: Agrees. He still sees no impact on resiliency in this proposal.

Paul: Voting again has all thumbs up for no impact.

Steve: {EB707.2-21} Reason Statement: "The exception is never applicable because the listed occupancies are never required to have a rating greater than 2 hours. This error is even noted in the ICC commentary for this section (1011.6.1 in the IEBC).” This is a code revision to remove an exception. It’s only an administrative correction or clarification, with no impact on resiliency. Other group members agree that there’s no impact.

Steve: {P1003.3.2-21} Reason Statement: “The use of food waste grinders also become a dumping sink for all food wastes and the grinders break up the food into small particles that heavily contribute to Fats, Oils and Grease production. Grease interceptors are not designed to handle solids loading so a solids interceptor is needed before a grease interceptor. If food waste grinder drains are allowed to bypass a grease interceptor, then the grease is passed through to the sewer collection system.” The Resiliency Impact Statement says “This proposal will not have an impact on the resiliency of the system in regards natural disasters, sea level rise and other climate concerns.” Steve disagrees, he thinks it does impact resiliency. Without such a provision, sewer collection systems could backup and cause damage to finishes and structures. Resilience is not just limited to climate considerations. He thinks that they only considered climate impacts, and not hazards in general.
Paul: Steve thinks proposal will impact resiliency. Vote shows everyone agrees that it will.

Steve: {RB324-21} This proposal has a very long Reason Statement. There’s a proposed reduction in pathway requirements on roofs for fire-fighting purposes, in order to maximize usability areas for solar panels. This one is difficult to evaluate because solar PVs are resiliency measures. This proposal reduces a means of access, but it’s not clear if it will hinder fire-fighting capability. If it increases PV effectiveness, it increases resiliency, but if it restricts fire fighter access, it decreases resiliency.
Paul: In the past, where portions of a proposal could increase resilience, while others could decrease resilience, it was left as a neutral impact proposal.
Steve Shap: This was discussed at the SFPC group. Fire services have concerns about reducing pathways. He agrees with the second part of Steve’s analysis, that reduction in access decreases resiliency.
Andrew: The change is from 3 feet or wider clearance, and the advocate says 1.5 feet is sufficient. He has been on many roofs and 3 feet is pretty wide, while 18 inches isn’t very wide. Is 2 feet a good compromise? He wants maximum PV coverage on roofs, because he sees it as very impactful on resiliency. This was discussed at the national level. Overall, he thinks 18 inches could be sufficient, and would support this as an increase on resiliency.
Paul: As groups have done in the past with competing opinions, it has been left as neutral. Should this one be left as neutral or something else?
Andrew: If members think there would be 25% negative impact and a 75% positive impact, should it remain neutral, or would it only be neutral for a 50/50 split?
Paul: There’s no time on these meetings to get into details. Given the time limitations, it would stay neutral if there are competing opinions. A thumbs up and down vote was mixed. The impact will remain neutral.
Paul: Thanked Steve Sunderman for preparing this analysis.

Proposed Amendments to the VCC, VEBC – Charles Baker, John Harbin, George Homewood

Paul: Asked George where they are with these proposals.
George: Tied these to the 2015 code. He wants some time to review the 2018 code to ensure that these are up to date, and return to the discussion next month.
Paul: This agenda item will be tabled until the next meeting.

2024 Model Code Provisions to Consider – Ellis McKinney

Paul: Ellis is not on the meeting today. This will be postponed until the next meeting.

Proposals for Consideration

Paul: These proposals were obtained from cdpVA, and have positive Resiliency Impact Statements. The group will discuss and vote on the resiliency impact from each item, as was just done with the neutral impact items.

B432-21

Paul: This proposal provides a correlation to the IFC for installation of plant processing or extraction facilities. The Resiliency Impact Statement says: "This proposal will increase resiliency by shoring up life safety and fire protection requirements between the Virginia Construction Code and the International Fire Code." He asked the group to comment or vote.

George: Is concerned about the earlier precedent where coordinating codes creates resilience on face value. He doesn't think this one increases or decreases resilience, and doesn't think that it should be a hard rule that coordinating codes automatically creates increased resilience.

Paul: Appreciates the comment. Angela Davis typed in the chat box that she agrees with George. He asked if there is any other discussion about his proposal in particular as it relates to resilience.

Andrew: He wonders about increasing coordination with code provisions that decrease resiliency. It could be getting convoluted.

Steve Shap: Agrees with Andrew Milliken's assessment (the proponent). Looking at the Reason Statement, the proposal does close the gap between codes, since construction requirements were added to the IFC but not the IBC. In this case, it would be a life safety issue due to the subject matter (extraction facilities).

Paul: Asked if the group members who didn't indicate thumbs up were abstaining.

Joel Andre: He is abstaining from a vote because it is not clear. He can see both sides of the argument.

Paul: George asked in the chat box: "Does life safety equal resilience?" It is an issue to consider and to Steve's point, safety to the structure is also something to consider. Having a link to technical provisions for construction of these facilities would increase resilience to the structure.

Paul: The vote on this item shows agreement that resiliency would be increased. Joel Andre abstained.

EB502.1.1-21 Note: Tabled from previous meeting

Paul: This was carried over from the previous meeting, to allow members to look through ACI 562. He asked for discussion.

Raka: Looked at ACI 562, which isn't a stand-alone code. It specifies minimum requirements. Commentary suggests that the building code may be used if it has better standards. She thinks that the VEBC does have better standards. She thinks that referencing it (ACI 562), might cause a conflict in compliance, and she doesn't agree with that. If it is referenced, she thinks it should be made clear that the VEBC would override minimum standards proposed by ACI 562.

Steve Shap: Likes the ACI 562 as a reference for structural concrete repair. He agrees with the proponents' Reason Statement, that it would increase resilience.

Paul: Chapter 1 in the VCC has an order of precedence, and any conflict would be addressed if there was one.

George: Typed in the chat box: "Are there any standards for structural concrete repair in VUSBC?"

Paul Not that he knows of. He asked DHCD staff to look it up. Steve Shapiro typed in the chat box: "I don't think there are."

George: If this is adopted, would it become the standard for concrete repair?

Paul: It does say that assessment, design, and repairs to structural concrete shall be in accordance with ACI 562. Assessment and design of repairs of seismic force-resisting concrete elements that result in changes of strength, stiffness, or ductility from pre-damage conditions shall be in accordance with Section 305.

George: Given the Florida condo collapse due to failure to repair structural concrete, perhaps this would be a smart thing to do.

Paul: Vote from the group resulted in thumbs up except for a dissenting vote from Raka.

[Break 9:59-10:04]

EC404.2-21

Paul: This was renamed in cdpVA as "REC404.2", but the text is the same. This provides provisions for when one and two family dwellings and townhouses are required to be solar ready. The proponent states in the Resiliency Impact Statement that it will increase resiliency by cutting greenhouse gas emissions and providing residential customers with the ability to generate solar energy. He asked the group to vote on resiliency impact. The group agreed that yes, it would Increase resiliency.

EC1301.1.1.1-21

Paul: This proposal eliminates the Virginia amendments to the IECC, and fully adopts the language of the 2021 IECC. The Resiliency Impact Statement says that it will increase resiliency by reducing health impacts from air pollution, temperature impacts from power outages, cost-driven reductions of heating and cooling and evictions.

George: Do the Virginia amendments have an impact of reducing the energy code requirements? Otherwise, it seems pointless.

Paul: The intent of the proposal is to reduce the weakening Virginia amendments and therefore increase the energy code requirements in Virginia by adopting the 2021 IECC.

Steve Shap: He personally doesn't agree with the code change. However, since the charge is not to weigh in on the code, just the resiliency impact, he does agree that it would increase resiliency.

Paul: Yes, as a reminder, the group votes on just the resiliency impacts and not the technical provisions of the proposals. The group did all vote with thumbs up that this proposal would increase resiliency.

FP103.1-21

Paul: This proposal came from the SFPC Sub-workgroup. It provides correlation between the applicable building code and references to the IFC for specific SFPC provisions that were either modified or removed in the base document. It's a large proposal which covers multiple code sections. The Resiliency Impact Statement says: "The proposal will increase the resiliency by ensuring that the buildings will be maintained in accordance with the applicable codes and standards." The group vote is to decide if correlation between the codes and providing appropriate references to how buildings will be maintained increases resiliency. Without further discussion, the group voted thumbs up, except for Raka Goyal, who abstained.

M410.2-21

Paul: The Reason Statement says, in part: "This proposal expands the list of acceptable pressure test ports beyond a simple tee fitting by recognizing that regulator, appliance gas control, and pre-fabricated manifold manufacturers provide integral test ports in their devices that meet the intent of the code." The Resiliency Impact Statement says: "This proposal would increase resiliency by eliminating unnecessary fittings, joints and potential leak paths in the gas piping system." Traditionally, downstream of a regulator would be a test port. There would also be a union in the piping between the regulator and the test port. This proposal would eliminate the extra piping, union and test port, and provide for testing directly at the regulator.

Steve Shap: Eliminating places where leaks could occur is certainly an increase in resiliency.

George: Disagrees with the Resiliency Impact Statement. He doesn't see it as increasing resilience, even though it is a good thing to do. He's getting uncomfortable with the way resiliency is being handled in the group.

Steve Sund: Thinks that the proposals need to be left alone and the resiliency needs to be voted on by itself. Anything that would reduce gas leakage and combustion would be a resiliency issue because it would protect the structure and continue to serve the needs of the people.

George: Safety and resiliency aren't the same thing. It may increase safety, but is that really by definition an increase in resiliency? He sees them as two different things.

Steve Sund: Safety is relative to occupants. If the building catches fire because of a gas leak, it speaks to destruction and resiliency of the structure. Resiliency has to do with the ability of the structure to continue to serve its function. If the building catches fire, it's both a personal safety and structural issue.

Paul: There's a distinction between safety of the building and safety of the occupants. There can be more discussion about if increases in the safety of a building also increases resiliency. As Paul counted the votes, George voted thumbs down, in disagreement that resiliency is increased, Raka and Angela abstained and other group members voted thumbs up, indicating their agreement that resiliency is increased.

REC402.1.2-21

Paul: This proposal changes the Virginia amendments to the wood frame wall insulation R value and U factor

requirements. The Resiliency Impact Statement says: “This proposal will increase resiliency in Virginia’s residential buildings. The International Code Council published a white paper titled The Important Role of Energy Codes in Achieving Resilience regarding the role of energy efficiency in resiliency.” (This document is located in the file pod in the meeting space.) “Specifically, the ICC found that increased insulation requirements support passive survivability and reduce energy burdens on low-income families, grid impacts by reducing energy demand, ice-dams, and condensation, limiting mold and mildew.”
Paul: With no further discussion, members all voted thumbs up that it does increase resiliency.

REC402.4.1.2-21

Paul: The Reason Statement says, in part: “The purpose of this code change proposal is to improve efficiency and maintain compliance flexibility for code users by modifying the air leakage testing requirements to be consistent with the 2021 IECC. Specifically, the proposal improves the baseline envelope tightness requirement from 5.0 ACH50 to 3.0 ACH50, but adds a performance path trade-off option for air tightness up to 5.0 ACH50, as long as the efficiency losses are accounted for.” The Resiliency Impact Statement says: “This proposal will increase the resiliency of homes. A properly sealed home will help maintain better indoor air quality and improve the long-term durability of the home. It will also reduce the volatility of indoor temperature swings and maintain more livable conditions during power outages due to natural emergencies.”

Steve Sund: The air infiltration issue is important for comfort, but the question is about fresh air. Tightening up a building envelope is ok, provided that there’s enough fresh air and ventilation. There is a potential to cause mold problems and limit ventilation. On the surface it seems to increase resiliency.

Andrew: Fresh air requirements is already addressed elsewhere in the code. Mechanical ventilation systems are required and should be commissioned and programmed to install per ASHRAE the right amount of fresh air in the building.

Steve: How about residential? Commercial is ok. Typically mechanical systems don’t provide fresh air in residences, they rely on air leak for make-up air. If it’s tightened up, there may be a potential problem.

Andrew: He thinks the residential code also requires fresh air. There is a problem with the selection of methods to provide fresh air. The minimum standard is least preferred, but is very low cost.

Paul: Raka and Richard abstained, and all other group members voted thumbs up for a positive impact on resiliency.

Assignments and Next Steps

Paul:

1. Review new batch of Neutral Impact Proposals in cdpVA
   Steve Sunderman will do this. He’ll ask for help if there are too many for him to handle.
2. 2024 Model Code Provisions to Consider
   Ellis does have a report. Paul will ask if he will continue to review and bring to the next meeting.
3. Updated proposed amendments to the VCC and VEBC based on 2018 language.
   George & John & Charlie will work on this together.

Next Meeting

Paul: The meetings are on a tighter schedule this cycle than they were in the past cycles. We will meet again in about a month in April. He will send Doodle poll within a week to select the best date.

Introduction: Andrew Grigsby (new group member) works for Viridiant, focusing on high-performance construction. He has a long history in construction.

Raka: Asked if the high flood area proposals that were tabled to tie into 2018 language were also going to be coordinated with the EO45 directive (not in the VCC) and also the state resiliency action plan.
Paul: Encouraged Raka to work with George on that for the next meeting. He thanked everyone for participating.

Resiliency Sub Workgroup

April 27th, 2022 9:00 a.m. – 1:53 p.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Sub Workgroup Members:

Andrew Grigsby: *Viridiant*
Angela Davis: *Virginia Department of Conservation and Recreation (DCR)*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
George Homewood: *City of Norfolk, Planning Director*
John Harbin: *Hampton Roads Planning District Commission (HRPDC)*
Raka Goyal: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Richard Gordon: *Virginia Building and Code Officials Association (VBCOA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA); Virginia Apartment and Management Association (VAMA)*
Steve Sunderman: *Resilient Virginia*
Traci Munyan: *DHCD, Resiliency*

Rebecca Quinn: *Federal Emergency Management Agency (FEMA) *alternate voting member standing in for Charles Baker*

Interested Parties

Kerry Sutton: *American Concrete Institute (ACI)*
Paula Eubank: *FEMA*

Sub Workgroup Members not in attendance:

Charles Baker: *Federal Emergency Management Agency (FEMA) Region 3*
Joel Andre: *American Institute of Architects (AIA), Virginia*
Kenneth Somerset: *Virginia Floodplain Management Association (VFMA)*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*
Casey Littlefield: *International Association of Electrical Inspectors (IAEI), Virginia*
Andrew Clark: *Home Builders Association of Virginia (HBAV)*

Welcome & Introductions

Paul Messplay: Welcomed the group members. He noted an addition to the agenda; RB230 Vinyl Siding, which was a code change proposal that was considered at the ICC Committee Action Hearings in Rochester last month. He let participants know that they could ask DHCD staff for help with any technical issues. He asked Rebecca Quin to introduce herself. She is representing FEMA and is standing in for Charles Baker as a voting member.

cdpVA Neutral Impact Proposals – Steve Sunderman, Paul Messplay

Paul: Paul Messplay and Steve Sunderman put together the analysis of new proposals in cdpVA which were identified as having a neutral impact to resiliency. He asked the group if they had any questions or comments.

Steve Sunderman: Energy conservation is not necessarily resiliency, unless it impacts the livability for the resident.

Andrew Grigsby: Livability, also called passive survivability always impacts resiliency. Most energy conservation aspects of the code will have this impact. It also reduces the threat of catastrophic events. He thinks it is part of resiliency.

Steve Shapiro: An energy change that creates homes that are all solar would be resilient. But, generally, he agrees with Steve Sunderman.

Paul: Put an example of a neutral resiliency impact proposal on the screen. EC-C1301.1.1 was considered by Paul to have a negative impact on resiliency, but Steve thought it would not impact resiliency. This is counted as neutral – anything with a non-consensus opinion remains neutral.

Angela Davis: Typed in the chat box:

Angela Davis: I would consider energy conservation a component of resilience due to its direct impact on the social determinants of health.

Andrew: Clarified his idea of passive survivability. If, for example a building is insulated, when it's better insulated, it can survive temperature swings and keep occupants safer. To him, that's resiliency in a nutshell.

Traci Munyan: George Homewood brought up the definition of resiliency at the last meeting. She thinks we should spend time discussing what resiliency is.

Steve Sunderman: If there isn't energy to run an HVAC system, that impacts resiliency. In the example of proposal EC-C1301.1.1, insulation for storage buildings and factories doesn't seem to him to have an impact on resiliency.

Raka Goyal: Thinks that even in EC-C1301.1.1, people who work there are affected and it does have a negative impact on resiliency.

Paul: This group is not looking at the technical content of proposals, only giving an opinion of the overall resiliency impact.

Proposed Amendments to the VCC, VEBC – George Homewood, Josh Harbin

George Homewood: The first proposal is intended to match the building code to FEMA language regarding floodplain. In section 103.4, it requires an engineer instead of a registered design professional to prepare the flood elevation certificate. In section 108.2, permit "may be required" was changed to "shall be required".

Steve Sunderman: In 103.4.4, when it says land surveyor or engineer, it could refer to any type of engineer. It may be better to keep registered design professional or design professional of record. An architect may be the responsible party in the project.

George: Although an architect may be responsible for design, they aren't approved by FEMA to complete an elevation certificate. Only a registered professional engineer or land surveyor can complete a flood elevation certificate.

Steve Sunderman: The wording should be changed from engineer to civil engineer.

George: Agrees with that change.

Steve Shapiro: Regarding 108.2.2, there's a list of things that don't require permits in the building code. He's opposed to "shall".

Rebecca Quinn: In the international codes, FEMA uses "registered design professional" even on the elevation certificate, and it relies on state law. If an architect isn't permitted by state law, FEMA doesn't give approval, just because the form says "registered design professional". Some states don't allow engineers to do land survey work. FEMA will comment on these proposals today, but not all of them. On the exemptions in 108.2, there isn't an exemption in the I-Code. Exempt from a permit isn't the same as exempt from requirements. FEMA will address some of these more thoroughly outside of this meeting.

Angela: typed in the chat box:

Angela Davis: The exact EC language is as follows: The Elevation Certificate is to be completed by a land surveyor, engineer, or architect who is authorized by law to certify elevation information when elevation information is required for Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, or AR/AO. Community officials who are authorized by law or ordinance to provide floodplain management

Angela Davis: Community officials who are authorized by law or ordinance to provide floodplain management information may also complete this form.*

George: [BS] section definitions were edited: Base Flood, Coastal A Zone and Coastal High Hazard Area. Base Flood is a.k.a. the 100-year floodplain, references either the Flood Insurance Study or the Flood Insurance Rate Map. Coastal A Zone has wave action between 1.5 and 3 feet in height.

Steve Shapiro: For coastal A zone, 1.5 ft. is also expressed in mm, then 3 feet is expressed in cm. He asked Paul, how sub workgroup will vote on these; as a bunch, or one at a time.

Paul: The group will vote on the individual sections at the end of each proposal.

George: Agrees with Steve, measurement should be mm instead of cm. The Coastal High Hazard Area was edited to include the Coastal Primary Sand Dune, reference the Flood Insurance Study, and include wave action over 3 feet. There's confusion in the building code between what the design flood is and what the base flood is. The terms are not synonymous. He's trying to figure out how to be clear that base flood is the 100-year floodplain, and design flood is base flood plus a degree of freeboard by the locality.

Rebecca: The difference between base flood and design flood has caused confusion since 1995.The design flood and design flood elevation is often the base flood, or a community could adopt a different map like future conditions, sea level rise, or flood of record. Making them the same would preclude localities from using different maps with a higher flood elevation, which may or may not have a frequency associated with it.

George: That's what he's trying to do here, for the very reason Rebecca specified. While the base flood is based on science and data, the design flood is the base flood plus other variables or freeboard.

Rebecca: Freeboard as used in ASCE 24 and elsewhere, is related to where a point on the building is relative to the water. Freeboard is added to the elevation of a building, not the water. If the intent is to allow localities to use another elevation or area, FEMA would endorse that, just write it carefully.

Raka: Agrees with what George and Rebecca are saying. She wanted to add that base flood is the 100-year, floodplain, and design flood adds a calculation to that. She's not sure if ASCE 24 defines design flood.

George: For the section with existing building and existing structure, the idea is to essentially ensure that work done would improve survivability. In order to be called existing and use the existing building code, the building or structure should have been built with a permit, or is a pre-firm structure that existed long before building permits were required. He is still uncertain about the language and is open to suggestions.

Rebecca: This sort of conflates an NFIP definition. A few cycles ago, FEMA removed from the I-Codes requirements for localities to notify them of the date that they put floodplain management regulations in place. FEMA is satisfied with the way that the code defines existing building. Something built after a community adopted regulations can be conforming or non-conforming. The existing building code captures both concepts. This may not even be needed here.

Steve Shapiro: If there's a building that was built in 1900 in a flood zone, the new language seems to say that it needs a permit.

George: That's the struggle he's had with the language. A building built in 1900 probably didn't have code requirements. It's a legal existing building, it may be conforming or non-conforming. He is fine with striking both of these sections if Rebecca thinks they are not necessary.

George: There are other types of flooding events that do exist in Virginia. These next edits to definitions of flood, flood hazard area, floodway and special flood hazard area (SFHA) were made in an attempt to be more in alignment with insurance requirements and FEMA regulations.

Steve Shapiro: Would he want to add something to special flood hazard area to capture what's being done locally?

George: He agrees that the SFHA should say something about localities adding areas. He made a note on that.

Paul: Angela recommended in chat:

Angela Davis: "Or otherwise legally designated" should be inserted in SFHA to be consistent.

Rebecca: A flood hazard area is anything that's not a special flood hazard area on the FEMA map.

George: The substantial improvement section was edited to match zoning language with building code language. Improving a structure over 50% has to comply with zoning and building code. This creates an exemption if an improvement is done to get up to design flood elevation standards.

Rebecca: #3 could allow elevation without full elevation. It says that even if someone is elevating a building it doesn't have to comply with other standards. That doesn't sound good. This is the building code, it doesn't supersede local zoning. #3 would conflict with the international existing building code for increasing the height of a foundation.

Angela: typed in the chat box: **Angela Davis:** #3-In terms of resilience, if a building is being elevated then it should meet current code. **Angela Davis:** #4-echoing the previous comment, any building identified as being in a flood-prone area and is being mitigated should meet current code.

{BREAK: 10:01 – 10:06}

George: 802.4 specifies design flood. Flood design data in 1603.1.7 adds grade beams in coastal areas.

Raka: Suggested removing the year from the code reference and leaving ASCE 7 or "Current reference code" which is now ASCE 7-16.

George: He can do that.

Rebecca: ASCE 24 refers to scour/erosion, not necessarily ASCE 7. Does he want both the lowest of horizontal structural member and the elevation of grade beam?

George: Grade beams are part of the foundation. If scour and erosion are prevalent, combined with wind events, the building can be brought down.

Paula: How would anticipated scour/erosion be determined? It seems like that would be subjective.

George: Flood Insurance Study gives guidance.

Rebecca: typed in chat "ASCE 24 addresses anticipated scour and erosion"

George: 1612.4 Flood hazard documentation should be on the official FEMA Elevation Certificate form. This is editorial to standardize reporting. 2.3 proposes to ban breakaway walls in zones. While the walls are designed to breakaway and not remove the structure, they become water and air borne debris, which could damage other structures. This doesn't prevent use of other barriers that don't provide a threat to adjacent structures.

Rebecca: FEMA encourages communities to consider these higher standards. Also, section 1612.4 is about documentation, while provisions for breakaway walls are in ASCE 24. If this is recommended, it should be an amendment to ASCE 24.

Raka: This doesn't belong in this section about documentation. This is restrictive language and should go somewhere else.

George: 2.3 exists now, regulating breakaway walls. If the prohibition of walls doesn't exist here, neither does the language in the first place. But, he is willing to move it.

George: The last change to the VCC is to remove the exception for R-3 buildings to have basements that wouldn't meet the flood insurance requirements.

Rebecca: Technical bulletin 11 allows low-grade crawl spaces in very specific circumstances and this was worked out with NAHB a decade or more ago. FEMA would be fine with removing this exception. There's discussion now about how that technical bulletin may change in the next edition.

George: The next section is for changes to the USBC and the VRC, (some are redundant from the previous section). Definition of hazard areas, base and design flood, and specific language referring to 2070 because the expected life of most buildings is about 50 years. 322.1.3 refers to Technical Bulletin 2 and ASCE 24. 322.1.5 limits storage area to 200 square feet or less. 322.1.6 is removing the exception for things under the floor, in accordance with FEMA P-348.

Rebecca: The typical equipment used for 1 or 2 family buildings would never meet these requirements, so she thinks it is fine to remove the exception. FEMA P-348 isn't a consensus standard, but it is the correct reference. The reference to ASCE 24 in section 322.1.3 may be creating two sets of rules, unless the reference is only regarding materials.

George: He's trying to clarify where to go to ensure compliance. He's not a subject matter expert on Technical Bulletin 2 or ASCE 24. He's not aware of any internal conflicts between the two.

Richard Gordon: Is concerned about referencing FEMA documents. They aren't written in enforceable language. It would be hard to determine compliance.

Steve Shapiro: Will all of these changes go back to the Workgroups? This discussion went from resiliency impact to code change proposals, so the Workgroup stakeholders should weigh in on this.

Paul: Yes, they will.

George: Section 322.1.9 about manufactured homes references design flood elevations. Section 322.2 defines Coastal A and other velocity enhanced zones. Section 322.2.1 elevation requirements in green will be discussed later. This is where it is located now in this section, but it will also appear later in another proposal to create 3 feet of freeboard in the flood plain. The requirement that walls need to be constructed of flood resistant materials was added in #4. Enclosed area in 322.2.2 is about design instead of base and talks about flood openings. Not every opening is a flood opening. In 322.3.1, some people try to alter the dune lines or land elevation to get out of the flood plain area. They would need a satisfactory Comment CLOMR to do that, which would give FEMA the responsibility of determining compliance.

Steve Shapiro: Is a Comment Document an actual form that's used with a CLOMR?

George: Yes, it is.

Paula Eubank: Is flood opening a defined term? If not, perhaps it should be.

George: 322.3.3 adds grade beams into the foundation and eliminates stem wall foundations in Coastal A zones.

Rebecca: Removing the stem wall option is written up by FEMA as a higher standard. The ASCE 24 permits backfill stem walls. She is aware of other localities that have removed it for 1-2 family residences, but leave it in for commercial buildings.

George: This is only proposed for the residential code.

George: 322.3.5, walls below the design flood elevation was amended to say that breakaway walls below the floor in Coastal A and high hazard areas are prohibited.

Rebecca: This is another FEMA higher standard. She asked if #2 about insect screening & lattice should remain in the code, and be made clear that those types of barriers are still permitted.

George: Yes, #2 can remain there as an exception.

George: 322.3.6 prohibits enclosed areas below the design flood elevation, which protects the building envelope. The idea is to keep tanks out of Coastal A and high hazard areas. If there is a tank, it should be kept above ground.

Rebecca: Someone asked her about tanks needed for sprinkler requirements and she thinks it makes sense. There shouldn't be chemical or fuel tanks, but water could be there, just elevated.

George: VEBC, flood elevation certificate should be completed by a land surveyor or registered professional engineer. He asked Steve Sunderman if it should say registered professional civil engineer.

Steve Sunderman: Yes, design professional of record or registered professional civil engineer.

Rebecca typed in chat:

Rebecca Quinn obo FEMA: Are civil engineers (or any engineers) authorized by law to do elevation surveys? Repeat my comment that whatever FEMA (or the I-Codes) say about engineers doing elevations doesn't supersede state authorization

Paula Eubank: This lacks consistency with VCC proposal.

Paul: DHCD will do some research on the issue of who can do the elevation survey. He asked Paula to elaborate on what she typed in the chat box.

Paula: wants consistent language. She thinks an architect can legally do this as well. She doesn't support it.

Paul: Going back through proposal 1, the group will vote on each section for approval or disapproval. Anything Consensus for Approval will go forward as a proposal from the Sub-workgroup. Non-Consensus items will go to the General Workgroup as proposals from George Homewood only if he submits them in cdp VA.

Steve Shapiro: Will the Sub-workgroup members who vote be identified on how they vote?
Paul: Yes, and only Sub-workgroup members can cast deciding votes.

{Break 10:53 – 11:00}

Paul: The group will review the sections of proposal #1 from George Homewood. Only Sub-workgroup members will vote thumbs up or thumbs down for each section. Any sections that have Consensus for Approval will go to the General Workgroup as one proposal coming from the SFPC Sub-workgroup. Non-consensus sections will go as a proposal coming from George Homewood as the proponent. All discussion notes and votes will be recorded as part of the summary that goes to the General Workgroup.
Rebecca: typed in the chat box:
Rebecca Quinn obo FEMA: IF wordsmithing was discussed, can we thumbs-up assuming that will be done
Paul: Yes. For example, where the group discussed using "civil engineer" instead of "engineer" it will be amended as proposed if the group votes that it is Consensus for Approval as Modified.
Steve Shapiro: A lot of these are things that FEMA gives points on as with CRS communities, for example. He doesn't agree with mandating some of these things for all localities. He gave a heads up that he will be voting no for some sections for that reason.

103.4 – A modification from George Homewood was typed in chat to say "registered professional civil engineer". Angela, Richard, Raka and Steve Shapiro voted thumbs down, everyone else voted thumbs up. Steve Shapiro typed in the chat that he would like to have an answer from DPOR first. Non Consensus.
108.2 –Raka, Rebecca, Richard and Steve Shapiro voted thumbs down. Debbie abstained. Everyone else voted thumbs up. Non Consensus.
Base Flood Elevation – Consensus for Approval.
Coastal A Zone – Modified to change measurements from cm. to mm. Rebecca voted thumbs down, all other group members voted thumbs up. Non Consensus.
George: Asked Rebecca why she voted thumbs down.
Rebecca: Unless a change makes a technical difference, it's better not to do it. She thinks changes should be kept to a minimum. This is how FEMA defines Coastal A Zone, and it's adequate. It doesn't need to be changed.
Coastal High Hazard Area - Modified to change measurements from cm to mm. Consensus for Approval as Modified.
Base Flood – Rebecca voted thumbs down, all other group members voted thumbs up. Non Consensus.
Raka: In the Coastal A zone, the wave height is limited to 3 feet and it is 3 feet or more in the High Hazard Area. The High Hazard Area also shows velocity zones. Should velocity also be included in the Coastal A Zone?
George: Coastal A is a relatively new concept and its only designation is having breaking wave heights of 1.5 to 3 feet. The Velocity Enhancement, which is the absolute coastal wave action of 3 feet or greater is for the High Hazard Area.
Raka: Is there an overlap at the 3 foot line for the zones?
George: There might have been, so he made the change for that reason. The wave height for a High Hazard area is 3 feet or more and the Coastal A zone is not greater than 3 feet.
Rebecca: Typed in the chat box that there is no overlap.
Angela: Typed link in chat with FEMA guidance on the zones and velocity enhancement.
https://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf
Existing Building and Existing Structure – George has withdrawn changes to these sections.
Flood or Flooding – Consensus for Approval.
Change Design flood to Base Flood – Rebecca voted thumbs down, all other group members voted thumbs up. Non Consensus.
Flood Hazard Area – Use the VCC wording, but strike "2070". Consensus for Approval as Modified, same for Flood Hazard Area definition in the VRC.
Steve Shapiro: Did George want to add a #3 to this section specific to individual communities?
George: Not now. He copied the language from the VRC to the VCC to make it expedient.

Floodway – Angela, Rebecca and Raka voted thumbs down, all other group members voted thumbs up. Non Consensus.
Special Flood Hazard Area - Consensus for Approval.
Steve Shapiro: The previous discussion was to make a change.
George: He can go either way, and since FEMA was not keen on making the change, he will keep it as it was submitted.
Paula: Pointed out wording inconsistency with other sections as the Flood Insurance Study comes after FIRM. Also, after FIRM, use (FIRM).
Substantial Improvement – Richard, Angela, Steve Shapiro, Debbie and Rebecca voted thumbs down. The other group members voted thumbs up. Non Consensus
802.4 – Steve Shapiro, Richard, Angela, Debbie, Raka and Rebecca voted thumbs down. The other group members voted thumbs up. Non Consensus.
Rebecca: Typed in chat box:
Rebecca Quinn obo FEMA: 802.4: Should not change because the elevation required by 1612 (ASCE 24) is higher than the WATER elevation. This contradicts ASCE 24

{Note: *Debbie Messmer stepped away from the room and did not vote on the next 5 sections***}**

1603.1.7 – George modified this to remove the year after the reference to ASCE 7. Rebecca voted thumbs down, Richard abstained and all other group members voted thumbs up. Non Consensus
1612.4 – Following the discussion, George decided to withdraw this change completely.
Paul: There was discussion about removing the form number from the Elevation Certificate. There was also a discussion about 2.3, if it should remain in the current section, or move to another section.
George: He is fine with removing the form number. He noted that Rebecca typed in the chat that the Elevation Certificate doesn't belong where it is. He asked the group if they thought 2.3 belongs where it is, (which is where it was) and if so, wouldn't his amendment also belong there. If this is not the right place for him to propose his amendment to 2.3, then he thinks it is the wrong place for 2.3 to begin with.
Rebecca: 1.1 and 2.1 are the only items that require elevation certificates. 1.2, 1.3, 2.2 and 2.3 are certification of designs, not elevations. Also, if calling out the certificate in 1.1 and 2.1, the word "Approved" should instead say "Current, effective form". This has to be submitted first (before it's approved or not).
Paula: The registered design professional can prepare and seal the document. She wonders if there may be wording discrepancy with other sections.
1805.1.2.1 – Steve Shapiro and Richard voted thumbs down, all other group members voted thumbs up. Non Consensus.
322.1.3 – Richard, Steve Shapiro and Rebecca voted thumbs down, all other group members voted thumbs up. Non Consensus
322.1.5 – Consensus for Approval

{Note: *Debbie Messmer returned to the room and continued to vote on the following sections***}**

322.1.6 – Rebecca, Richard and Steve Shapiro voted thumbs down as originally proposed, with the stricken language, and the addition of FEMA P-348, all other group members voted thumbs up. Non Consensus. On a second vote, only for the stricken language, without adding FEMA P-348, Richard and Steve Shapiro voted thumbs down and all other group members voted thumbs up. Non Consensus.
Rebecca: Supports striking the first part in the exception, but not adding "in accordance with FEMA P-348".
George – Agrees with that. Strike the first part and remove the reference to FEMA P-348.
322.1.8 – Consensus for Approval
322.1.9 – Rebecca voted thumb down, Richard abstained. All other group members voted thumbs up. Non Consensus
322.2 – With a modification to change cm to mm. Consensus for Approval as Modified

{Lunch Break 12:02 – 12:30}

{Note: *Angela Davis was away from the room, and did not vote on the remaining sections of this proposal or on the Vinyl Siding proposal***}**

322.2.1 Item #4.2 – modified to read "flood damage resistant materials" for consistency with other sections. Consensus for Approval as Modified. (322.2.1, items 1-3 will remain as they are written in 2021).
Steve Shapiro: The charging statement in #4 talks about garage and carport floors, then section 4.2 talks about walls. It just seems odd.
Rebecca: It is about both floors and walls. If the floors are below the required elevation, there need to be additional wall requirements. "flood damage resistant materials" is the correct phrase that should be used here.
George: He agrees to "flood damage resistant".
322.2.2 – Following the discussion, a vote was taken on keeping the reference to TB-1 in this section. Richard and Steve Shapiro voted thumbs down, Debbie abstained and all other group members voted thumbs up. Non Consensus. The remainder of the changes in this section was tabled for a later time.
Rebecca: typed in the chat box:
Rebecca Quinn obo FEMA: R322.2.2: is the intent to refer to TB-1 only for engineered openings – even though item 2.1 is written to cover both engineered and non-engineered? If citing non-consensus is OK, recommend move pointer to RB 1 to the end of item 2. And if you're OK citing TB 1, shouldn't the same be in R322.2.2.1 (next)? Editorial to update pointers to ASCE 24, should be Sec. 2.7.2.2. (ICC issued errata)
George: is there a recommendation to modify something other than changing cm to mm?
Rebecca: TB-1 has lots of guidance about engineered and non-engineered openings. The way this reads now, it seems like it could apply to only engineered openings. The reference to TB-1 should be moved to item #2 and it would be better to say "in accordance with R322.2.1 and TB-1", so that it would cover both the openings and the installation. Although, that may only cover the openings, and not the installation. Perhaps there should be a vote if there should be a reference to TB-1 at all.
Paul: Asked Rebecca if she would type something in a word document that might be acceptable language and placement.
Raka: Asked what the difference is between openings and flood openings, and would flood openings include other non-engineered openings?
George: Not all openings qualify as flood openings. This is an attempt to clarify that point.
Raka: OK, so it has to be a flood opening only. Thank you.
Paul: Asked George if he wanted to take a vote about including the reference to TB-1 in 322.2.2.
George: Yes.
Rebecca: Said if the group vote was to keep the reference to TB-1, she would send something with her opinion on where to put it and how it should read.
Steve Shapiro: Is TB in non-consensus language?
Rebecca: Yes, it is non-mandatory language for the most part. It is meant for guidance.
322.3.1 – Consensus for Approval.
322.3.3 – Steve Shapiro, thumbs down, Richard Gordon abstained, all others thumbs up. Non Consensus.
322.3.5 – Modified to retain item #2 – Steve Shapiro voted thumbs down, all other group members voted thumbs up. Non Consensus.
322.3.6 – Consensus for Approval.
322.3.6.1 – Steve Shapiro and Rebecca voted thumbs down, all other group members voted thumbs up. Non Consensus.
Rebecca: Typed in the chat box:
Rebecca Quinn obo FEMA: envelope protection change only works if breakaway walls not allowed
322.3.10 –Consensus for Approval.
VEBC 103.9 – modified to say "registered professional civil engineer". Richard Gordon abstained, and all other group members voted thumbs up. Consensus for Approval as Modified

{Note: *John Harbin was away from the room, and did not vote on the following sections***}**

RB230-22 – Vinyl Siding – Following the discussion, Richard voted thumbs down, Debbie abstained, and all other group members voted thumbs up. Non Consensus.

Paul: This proposal was developed by the Vinyl Siding Institute and FEMA to give technical guidance on proper installation of the starter strip, and if applicable, utility trim. This did receive a unanimous vote for approval by the ICC Committee Action Hearings in Rochester last month, with one modification. The floor modification was in 703.11.1.1, which says "Where the first course of siding has to be cut or trimmed, the bottom edge shall be secured with utility trim and snap locks as specified by the manufacturer's installation instructions". The proponents of this proposal cited a study done after a hurricane in Florida, which found widespread damage due to a starter strip being improperly installed. They propose that if the starter strip is properly installed as proposed, it would mitigate damage, including windborne debris.

Steve Shapiro: This was voted 14-0 by the ICC Committee, but there is still a time of public comment, and a revisit in Louisville, KY later this year before it becomes final.

Richard: He doesn't think that VBCOA supported this because the siding cited in the report which showed damage may not have been installed properly in the first place. Typically the installation is part of the manufacturer instructions.

Raka: 703.11.1.1 is already in the 2021 code and is about fasteners. Should the # be different?

Paul: Yes, correlation would be needed if this carries.

{Note: *Angela Davis returned to the room and voted on the remaining proposals***}**

Tornado Loads Proposal – Paul Messplay – Following the discussion, the vote was Consensus for Approval. This will go to the General Workgroup as coming from this Sub-workgroup.

Paul: This was also part of the ICC Committee Action Hearings in Rochester, and received a 14-0 vote. It was developed by ASCE, NIST and FEMA to include specific tornado loadings in the International Building Code under certain conditions. It was also supported by the NAHB at the hearings. It includes a map of tornado-prone regions and provides design considerations in those tornado-prone regions.

Steve Shapiro: There were two modifications proposed as well.

Paul: Yes, the first modification is in 1605.1 item 4 and in 2308.2.3 says "where design for tornado loads is required". The second is in 1603.1.4, which was modified to say "wind loads, and where required by Section 1609.5 tornado loads"

George Homewood – Proposal 2 – Following the discussion, Steve Shapiro voted thumbs down, Richard Gordon abstained and all other group members voted thumbs up. Non Consensus.

George: Withdraws the change to the definition in the first section, and is only submitting the change to 322.2.1. This is a proposal to add 3 feet of freeboard, changing it from 1 foot.

Rebecca: Supports not changing definitions. Asked George about why the change was made to 322.2.1 and not to 322.3.3.

George: Agrees with Rebecca, that it should also be in 322.3.3.

Paul: The group will not vote on the definition. The vote will be for changing to 3 feet in 322.2.1 and 322.3.3.

George Homewood – Proposal 3 – Following the discussion, the vote on the first two sections (105.1.1 and 105.2.1) resulted in Consensus for Approval as Modified, striking the phrase "in localities in Coastal Virginia". Debbie abstained and all other group members voted thumbs up. George withdrew the proposed change to Section 105.2.2

George: This proposal suggests that the building official and at least one technical assistant has general knowledge of floodplain and high-velocity wind construction requirements in Coastal Virginia areas.

Steve Shapiro: How is "general knowledge" defined and who decides if the building official and technical assistant has it? Is there definition of "Coastal Virginia"?

George: The General Assembly has defined Coastal Virginia. He could include a map if necessary. He copied the phrase "general knowledge" from a prior section.

Steve Sunderman: Wonders why this is restricted to Coastal Virginia? It could be applicable to other areas as well.

George: He would be happy to see this as a requirement in all areas, but he wanted to limit the scope so that it would be more acceptable.

Paul: As a reminder, Non Consensus proposals from the General Stakeholder Workgroups still go to the Board for consideration.
Steve Sunderman: Suggested removing "Coastal Virginia", so that universally, the building officials and technical assistants should have general knowledge of floodplains and high-velocity wind construction.
Steve Shapiro: 105.2.2 requires a Certified Floodplain Manager, so it should be voted on separately.
George: Is ok with voting on the first two sections as written, and the third one separately.
Paul: Voting on the first two sections as written (105.1.1 and 105.2.1) resulted in Richard, Steve Shapiro and Steve Sunderman voting thumbs down, Debbie abstained and the other group members voted thumbs up. Non Consensus
Paul: Asked George if he wanted to take a vote on the first two sections, striking "in localities in Coastal Virginia".
George: Yes.
George: wants to modify Section 105.2.2 to read "In localities designated as regulatory flood hazard areas"
Steve Shapiro: What if the building official is a CFM? Is that adequate?
George: Agreed. There should be at least one technical assistant or building official certified.
Richard: There could be another person who is a CFM besides the building official or technical assistant.
George: 105.2.2 is withdrawn.

{Note: *John Harbin was away from the room, and did not vote on the following sections***}**

George Homewood – Proposal 4 – After the discussion, the voting resulted in Consensus for Approval as Modified.
George: Added #4 and #8 to the list to have an inspection of the elevation at the foundation stage prior to vertical construction in #4 and prior to the final inspection in #8.
Rebecca: The language in 113.3.2 and 113.3.3 is the same as in the inspection section of the i-codes. The inspection has to be on more than just the elevation of the floor. She recommended that "of the elevation of the lowest floor" be removed. She asked if the pointer to 110 is still correct, or if it should point to 113.
Paul: Put a link in the chat for 113.3.2 and 113.3.3 in the i-codes. DHCD checks for correlation of the codes when proposals move forward.
Raka: There's inconsistency with the section numbers. These are IBC section numbers.
George: He said he could remove "of the elevation of the lowest floor" in #4 as per Rebecca's recommendation, but he doesn't want to change the language in #8.
Paul: Asked George what he wanted to reference in #8?
George: It should be 113.3.3 in the Virginia code.
Paul: There will be a change to the section reference in #4 to 113.3.2. Strike "of elevation of lowest floor" and reference 113.3.3 in #8.

George Homewood – Proposal 5
George: As time has run out, this will probably have to be submitted next cycle.

Next Steps:
Paul: There were other things on the agenda, which will have to be tabled for now. Ellis McKinney is not here today, and he didn't provide any documents to discuss the 2024 model code provisions. The positive impact analysis can be done in another meeting to go to Board, it doesn't need to be done before May 1. DHCD will send a Doodle Poll to find a meeting date. He noted that there were many things voted on in today's meeting, it was a valuable use of time. Some proposals will go as Consensus for Approval coming from the Sub-workgroup. Meeting Summaries for this Code Development Cycle are posted on the DHCD website. Paul typed a link in the chat box.

Statewide Fire Prevention Code (SFPC) Sub Workgroup Meeting Summary

February 16th, 2022 9:00 a.m. – 12:15 p.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:
Florin Moldovan: Code and Regulation Specialist, SBCO
Jeff Brown: State Building Codes Director, State Building Codes Office
Richard Potts: Code Development and Technical Support Administrator, SBCO
Paul Messplay: Code and Regulation Specialist, SBCO

Sub Workgroup Members:
Andrew Milliken: VFSB Chairman of Fire Codes and Standards Committee
Dustin Wakefield: Virginia Department of General Services, Division of Engineering and Buildings
Jimmy Moss: Virginia Building and Code Officials Association
Lou Wolf: American Institute of Architects, Virginia Chapter
Matthew Lannon: Virginia Restaurant, Lodging & Travel Association

Other Interested Parties:
Nolie Diakoulas
Russell Furr
Alan Larsen
Ron Clements
Timothy Loscomb
Gerry Maiatico

Sub Workgroup Members Not in Attendance:
Mike O'Connor: Virginia Petrol and Convenience Marketers Association
Steve Shapiro: Apartment and Office Building Association
Joshua Davis: State Fire Marshal's Office
Linda Hale: Virginia Fire Prevention Association
Jodi Roth: Virginia Retail Federation

AGENDA AND DISCUSSION ITEMS:

Welcome and Introductions
Florin Moldovan: Called the meeting to order at 9:00 am and began introductions of DHCD staff and members of the sub workgroup.

Discussion
Florin: Provided the SFPC sub workgroup members with an overview of Virginia's code development process and the 2021 SFPC base document with a power point presentation.

Proposals

FP901.4.8-21

Florin: Opened the floor to the proponent, Andrew Milliken, to provide an overview of this proposal and its intent.

Andrew: This proposal is a reference to a common violation and there is not a provision in the SFPC to cite for a violation. The intent of this proposal is to ensure that we have a direct pointer to maintaining construction features that allow the fire protection features to operate as intended when they were installed.

Dustin Wakefield: The first thing that jumps out is the word "Maintenance." Asks if Andrew has considered any overlap with the Maintenance Code. Looking at the specifics of the statement, "Where required by the installation standard," asks if this is where walls, ceilings, and tiles are required, or where maintenance of such items are required? It is unclear what the proposals is saying. Suggests possible room for re-wording to clarify what this proposal is saying.

Andrew: The SFPC is a maintenance and operations code, so there is a lot of maintenance language. The intent of this proposal is to make sure that it is required by the installation standard to provide those features – walls, ceiling, etc. Andrew states that he is open to any clarifying language.

Dustin: It would be helpful to clarify something along the lines of, "Where maintenance of specific elements, such as walls, ceilings, tiles, etc., is required by the standard…" Something definitively to state what is required and what is being maintained.

Andrew: The installation standard is not a maintenance standard, so this is just saying that when the installation requires those features, those features need to be maintained. We want to make sure the SFPC is maintaining the features as they are installed.

Dustin: "Where components such as walls, ceiling tiles, etc. are required by the installation standard, such features shall be maintained in accordance with the applicable building code."

Andrew: No objection there.

Jimmy Moss: The proposed change would make this fall along with what has been done throughout the Maintenance Code. Then the language would be consistent with all the previous language.

Florin: Asks for Andrew to coordinate with DHCD staff, Dustin, and Jimmy to correlate the language.

Jeff: Points out that we are pretty close to everyone being in agreement. This proposal will be on the March workgroup agenda for discussion, so there is time to work out this language. There could be a friendly floor amendment made at that general workgroup meeting.

FP901.6.3.2-21

Andrew: This section is intended for all fire protection systems that have annual inspections to provide either a tag or a sticker indicating the completion of the inspection and is intended to help make sure we have that information readily available to the property owner and authority having jurisdiction for these systems. This proposal language is taken from a number of other states that have similar requirements in the code.

Dustin: Asks about the referenced standards that govern these fire protection systems and whether there is any conflict between the language in the proposal and the requirements in the referenced standards.

Andrew: Great question. There are a number of different referenced standards that provide guidelines for tags and stickers, such as NFPA 25 for sprinklers and water-based fire protection systems. In the fire alarm world this is less prevalent, which is one of the areas where this could make sure we are uniform across the board. Andrew does not know of any referenced standard where this would create conflict since the proposal is based around the NFPA 25 guidelines.

Dustin: Asks if it would make any sense to preface this proposal with, "unless specifically addressed otherwise in a referenced standard," or, "unless not otherwise noted in governing standards for fire protection systems"?

Andrew: That is something we can look at. The goal here is to have more of an umbrella approach. We can provide more language if we need to, but sometimes that is not well embraced by code writing. Unless we know of a specific conflict that exists. Is open to a prefacing statement if it helps reach consensus.

Florin: Perhaps the two of you can collaborate on this proposal afterward.

Andrew: Asks Dustin to email him some proposed language or suggestions that we could get incorporated.

FP1201.3-21

Andrew: This proposal deals with Electrical Storage Systems (ESS). This was an item deleted in the 2018 edition. This is not related to those significant changes in the base document. This was a statement that was deleted that speaks to the mixing of ESS and making sure that we handle these in the same way that we handle hazardous materials. The code identifies quantity limits within Ch. 12, which have been deleted since they are construction, but this seeks to reinstate the hazardous material quantity limits by speaking to the quantities allowed in the applicable building code. Not setting a threshold or an amount, but referencing back to the thresholds in the applicable building code. The last statement speaks to the fire official having a hazard mitigation plan for quantities in excess of those thresholds.

Florin: Is there anyone not in agreement with this proposal or whom opposes this proposal?

Florin: Since there is no opposition, it seems we could add the SFPC sub workgroup as a co-proponent on this proposal unless anyone has any opposition to that.

Alan Larsen: I don't oppose it, so much as I don't understand it.

Florin: Thank you for your feedback, Alan, and perhaps Andrew can answer your questions. If no one in the sub workgroup is opposed to it, then we will move it forward as consensus. If it comes down to a vote, it will be a vote among those in the official SFPC sub workgroup. No one from the SFPC sub workgroup is speaking against it or providing any negative comments, so, with that said, if no one in the sub workgroup members list opposes the proposal, we will move it forward as consensus and we will add the group to the list of co-proponents.

Jimmy: This is a good proposal. Jimmy has been in agreement with it from the first time he heard it in the fire services work group. He does not see how there is any conflict in any way. States that this is a very good proposal.

Florin: We will add the SFPC sub workgroup as a co-proponent in cdp VA.

2021 SFPC Base Document – Proposed Changes by the Virginia Fire Services Board

Florin: Provides brief overview of the structure of the spreadsheet being shared and how these decisions will be submitted in cdp VA. It will be up to Andrew as to how he wishes to handle the non-consensus items. The purpose here is to try and gain consensus on whichever items we can today to make it easier for the proponents' sake. DHCD will assist with compiling everything in the proposal much like we have done in the past with the SFPC edits. Thanks Andrew and VFSB for going through these items. It is a very time-consuming process but very much worth it in the end.

** A copy of the spreadsheet cataloging these proposed changes is attached to this summary for reference. **

Proposed Changes Approved as Written Without Discussion

The following proposed changes received Consensus for Approval and contained no discussion.

Table 405.3	603.1 General	Section 806
1001.1 General	1207.1.2.1 Communication utilities	1207.1.2 Permits
107.2 Permits required	1207.2.1 Commissioning	1207.1.4.3 Additional protection measures
1207.1.6 Fire remediation	1207.3.6 Repairs or alterations	1207.2.1.2 Commissioning report
1207.2.2 Operations and maintenance	1207.4.2 Working clearances	1207.4 Signage
1207.4.1 Electrical disconnects	1207.4.6 Combustible storage	1207.4.3 Fire-resistance-rated separations
1207.4.5 Vehicle impact protection	1207.4.9 Security installations	1207.4.7 Toxic and highly toxic gasses
1207.4.8 Signage	1207.10.3 Permits	1207.4.10 Occupied work centers
1207.10 Mobile ESS equipment and operations	2203.1 Critical Depth Layer	1207.10.4 Documents
1207.10.4.1 Deployment Documents	2203.4.6 Smoking prohibited	2203.3.3 Cleanouts
2203.4.1 Classified electrical	2203.5 Housekeeping	2203.4.7 Spark-producing devices

2203.4.9.4 Inspection and preventative maintenance	3107.13.2 Location of Containers	2203.7 Emergency response plan
2205.1.1 Dust hazard analysis	5704.2.13.1.1 Temporarily out of service	3904.2.1 Listings
3904.2.2 Approvals	610.1 Installation	5704.2.13.1.2 Out of service for 90 days
107.2 Industrial additive manufacturing operational permit	4003.1 Spill control	808.5 Play structures
901.4 Maintenance and alterations	4004.3 Basement storage	4003.2 Ventilation
4003.4 Lightning	1207.1 General	4005.1 Automatic sprinklers
603.1.1 Equipment and wiring	1029 Assembly	1207.1.5 Large-scale fire test

Proposed Changes Approved as Written with Discussion

The following proposed changes received Consensus for Approval as written and contained discussion.

806.1.4 Fire-retardant treatment for naturally cut trees

Andrew: This section is currently deleted in the base document. This is in italics because the intent is to go back to the model codes. In this particular situation this references the fire retardant treatment on trees. We feel it is important to have that reference maintained.

Florin: Asks for any comments from the group. Hearing no comments, Florin moves this forward as consensus for approval.

Andrew: Is not sure how this should be documented. The intent is to just delete the charging statement to bring in the model languages.

Florin: In the regulations we would just strike off that charging statement. Jeff is documenting on the screen what we will include in this proposal: "Delete state amendment and incorporate the 2021 IFC section 806.1.4."

908.3 Fire alarm system interface

Andrew: This is something that is similar to some of our duct detection concerns and issues. We would want to include the supervisory signal as an option for buildings with these systems.

Ron Clements: Supports this change and thinks there should probably be a companion to this for the building code.

Andrew: Believes that this will already be in the 2021 building code.

Florin: Any other comments? Seeing none, we can mark this as consensus for approval.

Florin: Asks Ron if he is willing to take a look at this and make sure it's addressed in the I-codes and if it's not, to make the appropriate companion proposal. Ron agrees to take this on.

1201.2 Electrical wiring and equipment

Andrew: This proposal makes sure we encompass all of the references like the model code does.

Florin: Just a point of clarification on this one, DHCD Staff did not make any changes to the base document, we just maintained what was already in the 2018 SFPC.

Andrew: Yes, this was just something that was missed in the last cycle.

Florin: Any concerns with 1201.2? Hearing no concerns, we will mark this down as consensus for approval.

1207.2.3 Decommissioning

Andrew: Just as commissioning is important on these systems, so is decommissioning. This is scoped for decommissioning of mobile ESS.

Florin: Any comments? Seeing none, we will mark this down as consensus for approval.

Florin: Asks if Andrew is okay with Staff correcting the grammatical issue of "ESS Systems" being redundant.

Andrew: Yes.

1207.10 Table

Andrew: This proposes to change the reference to simply reference the IFC section for this table. We feel that the column that says "Section" and gives a number, needs to be an IFC section as opposed to just "Section."

Florin: Asks Andrew to clarify if the intent is just to add the word "IFC" to ensure the section we reference is actually the IFC section and not an SFPC section, correct?

Andrew: Correct

Florin: Any concerns? Hearing none, we will mark this as consensus for approval.

1207.10.6 Charging and storage

Andrew: This just indicates the IFC for these compliance items.

Florin: This is similar to the previous one where we deleted some sections so that we can reference the IFC, correct?

Andrew: Correct.

Florin: Any concerns? Seeing none, we will mark this down as consensus for approval.

2203.1 Table

Andrew: Since we are keeping the critical depth layer from the previous section, it's important to keep this table.

Florin: So, the idea is we want to maintain Table 2203.1 from the IFC, correct?

Andrew: Yes

Florin: Any questions? Seeing none, we will mark this down as consensus for approval

2203.4.5 Powered industrial trucks

Andrew: The base document says any powered equipment needs to maintain its listing, but it's not just that it needs to maintain the listing. The idea is that where those vehicles are used, they should be listed.

Florin: Any questions?

Florin: Is there a possibility that the codes in the past did not require these to be listed? Do you know of any of these requirements from several cycles ago?

Andrew: When we are talking about powered equipment that is portable and mobile, it is not necessarily under the purview of the building code.

Florin: Any other questions? Seeing none, we will mark this down as consensus for approval.

2203.4.9.2 Space heaters

Andrew: We feel the use and operation of a portable space heater is something that should be regulated by the SFPC. The modified language here identifies that we are talking about portable space heaters, not stationary devices.

Florin: Any questions?

Florin: Could the second sentence incorporate all appliances, even those that are stationary? Or is it implied in the first sentence that the second sentence only covers portable?

Andrew: You could put "portable" in front of the title, but we felt the model code language captures the intent.

Florin: It sounds like there are no other comments from the group so we will mark this as approved.

3303.5 Fire safety requirements of Types IV-A, IV-B and IV-C buildings

Andrew: Item #3 refers to construction features that are required by the building official in accordance with the applicable building code. Item #1 correlates the language by pointing to the appropriate standpipes section.

Florin: Any questions?

Florin: One quick question, is Item #3 the same as Item #3 in the 2018? That item was deemed unenforceable by the attorney general.

Andrew: It is not the same Item #3.

This proposal was moved forward as Consensus for Approval

Proposed Changes Approved as Modified by the Sub Workgroup

603.2.1 Modified or damaged

Andrew: This change is with regard to the reference to the term "This code and NFPA 70". The model code talks about making sure equipment and devices are not modified or damaged to constitute a fire hazard in accordance with this code or NFPA 70.

Florin: Have we considered adding "The applicable" in front of NFPA 70?

Andrew: We would not have any opposition to that.

Ron: Should this reference the existing building code?

Andrew: Asks if Ron is suggesting "Applicable building code, instead of 'this code'"?

Ron: Yes, that probably does it.

Andrew: We would not have any issue with that.

Dustin: This is just another wording nuance, but where it says "The applicable NFPA 70 standard" are we saying the enforced edition of or the applicable portion of?

Florin: What we have done in the previous SFPC edits is used "The applicable" in front of the standards, which would be applicable at the time of construction. If it just read "in accordance with NFPA 70", it would cause enforcement issues with those who think it references the current edition. Does that answer your question?

Dustin: It does if it is clear that it is applicable at the time of construction.

Florin: There is a definition of applicable building code in Ch. 2.

Ron: Not that it is a deal breaker, but if you get "applicable building code" you get to that NFPA standard at the time.

Florin: Any comments regarding that?

Andrew: We are in the realm of trying to obtain consensus, so if that gets us to consensus, we can do that. The idea was that these references to NFPA 70 come from the model code, so we are trying to stay consistent with that. But we would not be opposed if that is the pleasure of the group.

Florin: Do I hear from the group that it should read, "…in accordance with the applicable building code." And delete the reference to NFPA 70?

603.2.1 Modified or damaged. Electrical wiring, devices, equipment and appliances that are modified or damaged, and constitute an electrical shock or fire hazard, shall not be used until repaired or replaced in accordance with the applicable building code.

Andrew: Yes, that gets us consensus.

603.5 Relocatable power taps and current taps

Andrew: This is very similar to the others and, as Ron has pointed out, we can do what we have done before with the language. Taps and relocatable taps are defined terms so we want to incorporate language that references this code and the applicable building code.

Florin: Any comments? Hearing none, we can do what we have done with the other ones to read "in accordance with the applicable building code."

Andrew: We want to leave "In accordance with this code and the applicable building code."

603.5 Relocatable power taps and current taps. The construction and use of current taps and relocatable taps shall be in accordance with this code and the applicable building code.

Ron: If we just left it as "applicable building code" we would be leaving out the maintenance enforcement from this code.

1004.7 Outdoor areas

Andrew: This basically specifies what these outdoor areas are, which mirrors model code language.

Dustin: Just to make sure we account for anyone that could be using these outdoor areas in 1004.7. Maybe instead of saying, "useable by the building occupants," we say "useable outdoor areas," so this would take some of the guess work out for whose using it.

Andrew: This was just using model code language but I would be fine with that change.

Florin: So, we're just deleting "and useable by the building occupants."

Andrew: That's what Dustin was getting at.

Dustin: I was getting at "similar accessible and useable outdoor areas."

Florin: Does that look good (referencing the language typed on the screen)?

1004.7 Outdoor areas. The means of egress for yards, patios, occupied roofs, courts and similar accessible and usable outdoor areas shall be maintained in accordance with the applicable building code.

Dustin and Andrew: Agree it looks good.

Florin: We will mark this down as consensus as amended.

1203.2.5 Exhaust ventilation

Andrew: This is similar to other language we have provided with regard to exhaust ventilation. This removes the construction concept and includes the maintenance concept.

Florin: Any questions?

Dustin: Is this a case where we would want to preface this with, "When required," because this statement makes the assumption that this is required in every case.

Andrew: The closest language we have gotten to is, "Where required or provided," so if we wanted to provide that language that would be fine.

Florin: Does the amended text on the screen meet what you're trying to accomplish?

Dustin: Yes, the clarification there helps.

Florin: It sounds like the modified version is something that everyone agrees with.

Jeff: In reading this again, it is reading a little funny, "Where provided or required…" Suggests reversing the order to read: "Where standby power for mechanical exhaust ventilation systems is provided or required by the applicable building code, it shall be maintained."

Dustin: You may want to add, "standby power shall be maintained accordingly."

Jeff: Makes the edit on the spreadsheet and asks if that works:

> *1203.2.5 Exhaust ventilation. Where standby power for mechanical exhaust ventilation systems is provided or required by the applicable building code, the standby power shall be maintained.*

Dustin: That looks good.

1207.1.1 Scope and Table 1207.1.1

Andrew: This proposal is to revert back to the model codes and not have a state amendment. This section is a scoping section, it is not a construction or maintenance requirement. This is identifying what types of ESS are within the scope of this particular section. This may have been overlooked and seen as a construction table and we feel it is appropriate to have the scope for this section and what it applies to.

Florin: Could there be existing facilities that are in compliance with the applicable building code but not necessarily the 2021 IFC. Are we creating a situation here where when the 2021 goes into effect, there could be a chance that existing buildings are in non-compliance with the SFPC?

Andrew: No, this is a scoping section. This says that any smaller devices that do not meet the threshold values do not have maintenance requirements. This would not affect construction or put anything in non-compliance.

Florin: Any other questions?

Jeff: If we continue going through 1207 using maintenance language, the scoping language will not be a problem. There are places in 1207 addressing mobile ESS, which might have some construction requirements, and we may have to revisit this to see if we need to tweak it a little bit. Believes we are fine now, but wants the group to keep this in mind as we move forward.

Andrew: As we go down through this, when we get to mobile ESS, that is a separate section and there are construction requirements, but it is outside of 1207.1

Jeff: Believes that scoping is referring to all of 1207. Reiterates that we are okay, but if we get into construction provisions, we can talk about it and maybe revisit.

Jeff: During the discussion of 1207.1.5, suggests going back to the scoping language in 1207.1 and 1207.1.1 and adding language stating, "Mobile ESS shall comply with this section." We should maybe make it clear for mobile ESS which are not regulated by the USBC.

Andrew: Would that be something to put in 1207.10, at the beginning of the mobile section? Or should we put it in the scope?

Jeff: Unsure. We could discuss that.

Jimmy: Believes adding it to the scoping section would be best so you will know right from the beginning where this applies. This would make it easier going forward in the changes so you won't have to make sure that all of your language is specific to one or the other.

Florin: Any thoughts regarding that?

Andrew: Agrees with Jimmy. We can certainly come up with language in the scoping section to make it clear.

Florin: Sees a conflict between 1207.1 and 1207.1.1. 1207.1 requires compliance with the applicable building code and 1207.1.1 requires compliance with this section. Is this section imposing anything beyond what the applicable building code would have required?

Andrew: The intent of the scoping section is to make sure we are not regulating very small ESS equipment. It is important to not have maintenance requirements for small, handheld mobile phone chargers, for example. Does not believe that there is a requirement that is conflicting, but it may be something we want to review.

Jeff: Provides updated language on the spreadsheet to 1207.1.1:

> "1207.1.1 Scope. Mobile ESS having capacities exceeding the values shown in Table 1207.1.1 shall comply with this section. Other ESS having capacities exceeding the minimum ESS threshold quantities of the applicable building code shall be operated and maintained in accordance with this section and the applicable building code."

Andrew: That should do it.

Florin: Any comments or concerns with this language? Hearing none, we will move this as consensus as modified.

1207.1.4 Hazard mitigation analysis

Andrew: This was modified to not necessarily require a hazard mitigation analysis be provided, but to ensure that a copy of that a failure modes and effect analysis (FMEA) be provided to the Fire Official.

Jimmy: As it reads, that approved document has to be provided.

Andrew: Sure. We can add "when an FMEA is required by the applicable building code, a copy shall be provided." We were just trying to match the model code language as much as possible.

Dustin: Just noticing that it says "Fire Official". Don't we typically refer to the "Fire Code Official."

Jeff: We might actually address that in definitions or Ch. 1.

Ron: Posts in the chat that fire official and fire code official mean the same thing.

Language approved as modified:

1207.1.4 Hazard mitigation analysis. Where a failure modes and effects analysis (FMEA) or other approved hazard mitigation analysis is required by the applicable building code, a copy shall be provided to the Fire Official under any of the following conditions:

1. Where ESS technologies not specifically identified in Table 1207.1.1 are provided.

2. More than one ESS technology is provided in a room or enclosed area where there is a potential for adverse interaction between technologies.

3. Where allowed as a basis for increasing maximum allowable quantities.

Proposed Changes Withdrawn

1201.3 Mixed Systems

Proposed Changes Receiving Non-Consensus

901.4.3 Alterations in buildings and structures

Andrew: This is a newer section for the model code, which we have modified a bit to remove the construction provisions to state that fire protection systems and life safety systems need to be maintained during alterations.

Florin: Questions or concerns form the group?

Dustin: As we have talked about earlier, alterations are governed by the Existing Building Code, not necessarily the SFPC. We are primarily concerned about continuity of fire protection and life safety systems while the buildings are being occupied. It sounds like this is sort of crossing over a little bit in to the Existing Building Code realm and also puts a blanket requirement on the contractor for the fire protection and life safety systems.

Andrew: We can certainly add the words, "in the occupied structure." If there is a better reference to the Existing Building Code, we would be happy to do that. If we wanted to add the words, "Occupied building or structure," that would be appropriate.

Dustin: Would like to take a little time to think about this and look at the Existing Building Code. Dustin will send Andrew some suggested notation to change a little bit.

Other

Florin: Does anyone have any ideas of suggestions for the group as to what we should bring up next?

Ron: Suggests that it might be worth going through the tent provisions. The construction code and fire prevention code are not consistent.

Dustin: There are some differences between the SFPC and the IFC. The construction code for temporary structures does not really go into much detail at all – it refers back to the IFC. That would be a worthwhile endeavor.

Assignments and Next Steps

Florin: The only assignment falls on DHCD staff to compile these proposals into cdp VA. As far as what Ron brought up, we could compare the SFPC and IFC to come up with a better solution than we have.

Jeff: That is a great idea. We recognize there are some conflicting requirements for permits and approvals. What we can do is go back after this meeting and try and see the best way to handle it and then reach back out to the group. We might try to squeeze a meeting in before the General Workgroup Agenda. There is one other thing that stuck out, when we updated the scoping for Section 1207, we made it clear that there might be some construction provisions in there that would only be applicable to mobile ESS and then as we went through, we made reference to an IFC section. Jeff wonders if that is a dangerous path to go down since there is a lot of confusion about how the SFPC and IFC go together. There may be provisions in Section 1207 that deal with mobile ESS that we've deleted and we may want to bring those back instead of confusing people by referencing the IFC.

Andrew: We have all struggled with that Ch. 12 section and how we best make it clear. We thought the cleaner approach was to reference the IFC, but, like you said, that may be unprecedented territory and it may be better to add some construction provision in 1207 that are well within the scope of mobile ESS and not to be confused with other ESS. It would take more work to do that, but we will know which sections to do that to since they are referenced as IFC sections now.

Jeff: Any other thoughts? If others agree that referencing the IFC is an issue, we will have to go back and revisit those sections. These will not be on the March agenda, so we have time. We can go through and pull out the ones that reference the IFC and work with Andrew to come up with the alternative. If it is doable, we can have a quick meeting and see if everyone is good with that.

Florin: Just to confirm what Jeff said – of the proposals we heard today, the only ones being heard in March are the three proposals we discussed at the beginning. The spreadsheet that we went through did not make the agenda because the intent was for the group to go through all of these and have consensus items submitted as one proposal. Those will be heard at the following General Workgroup meeting.

Jeff: The cutoff for that is March 12th, so we would have to figure all of this out before March 12th to make any adjustments to this spreadsheet and get that consensus proposal submitted. It is doable and can hopefully be done without many changes. Jeff asks for thumbs up from the group – all present sub workgroup members are in agreement. That is another piece of homework that we will work on. We will look to have that meeting a week before March 12th to give us time to finalize the proposal and get it submitted in cdp VA.

Florin: Does anyone else have anything else for the good of the order? If not, a big thank you on behalf of DHCD for your work. We appreciate it and Virginia codes would not be where they are without your work.

Statewide Fire Prevention Code (SFPC) Sub Workgroup Meeting Summary

March 7, 2022 9:00 a.m. – 9:54 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*

Sub Workgroup Members:

Andrew Milliken: *Virginia Fire Services Board (VSFB), Chairman of Fire Codes and Standards Committee*
Dustin Wakefield: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Joshua (Jay) Davis: *State Fire Marshal's Office, Virginia Department of Fire Programs (VDFP)*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA)*

Other Interested Parties:

Ron Clements: *Chesterfield Building Official, member of VBCOA*
Randy Grumbine: *Factory-Built Housing, Virginia Manufactured and Modular Housing Association (VAMMHA)*
Robert Davidson: *Davidson Concepts*
Shahriar Amiri: *Arlington County Building Official*
Sean Farrell: *Prince William County, member of VBCOA, member of BHCD*

Sub Workgroup Members Not in Attendance:

Mike O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Lou Wolf: *SBW Architects, American Institute of Architects (AIA), Virginia Chapter*
Matthew Lannon: *Virginia Restaurant, Lodging & Travel Association (VRLTA)*
Jodi Roth: *Virginia Retail Federation (VRF)*

Welcome:
Jeff Brown: Welcomed members to the meeting and let them know that DHCD staff could assist with any questions.

Discussion:
Jeff: Gave an overview of the agenda. There were three items carried over from the last meeting, and one new Sub-workgroup proposal (FP 103.1)

Proposals

FP103.1 (SFPC SWG Proposal No.1) – 21
Jeff: Summarized the proposal, which was developed after the last SFPC sub-workgroup meeting. It contains the changes that were initiated by the Virginia Fire Services Board – Code and Standards Committee, and were all consensus for approval by this group. He asked all members to review the document for accuracy, which is located on the cdpVA website or in the file pod on the left in the Adobe meeting room. There are still a few days available to make any edits or corrections if needed before the March 12 cutoff date to include in the April general workgroup meeting.

Revised SFPC Section 901.4.3
Jeff: This proposal was carried over from the last meeting. Andrew revised the text according to the feedback. The document was shared on-screen with the original text and the revised text.
Andrew Milliken: This is an update from the last section that was not quite consensus. Dustin provided some updated language to clarify that it was about occupied structures.
Jeff: Asked if there was any further discussion from the group, and since there was none, this was marked as consensus for approval (CA). This will be added to the group of other proposals that are consensus for approval. Andrew will update cdpVA.

Revised SFPC Section 3107.13.2
Jeff: This was carried over from the last meeting. The issue was trying to get back to the IFC table, which was deleted from the SFPC. The group decided not to reference the table in the IFC. In this revision, the table from IFC 6104.3 was brought back into the SFPC here into section 3107.13.2.
Andrew: His suggestion is to put it back into 6104.3 following the model code, as long as everyone agrees that it refers to outdoors, and not construction.
Shahriar: Above ground LP gas systems, depending on the capacity, have a required separation from buildings and adjacent property that can be built on. In the case where he is, most buildings are podium buildings which have a parking garage 3-4 stories deep, and a plaza level, which is a building sitting on top of a building. What would this mean in Arlington, where there's a shortage of land, and everything goes on top of the roof? How would the separation distance apply in this case?
Andrew: NFPA 58, the standard for installing LP gas systems, provides specific requirements for when they have to be on the roof or in the building.
Jeff: This table was initially deleted, as it was being left under the IFC. Now, it is being put back in as a reference to tent or membrane structures.
Andrew: Yes, this is for outdoor installations.
Jeff: This is the reason for putting it in section 3107.13.2 instead of back in chapter 61.
Florin: This proposal was already agreed upon by the group. The only change that the DHCD staff made was to incorporate the table into the SFPC and change the numbering. This was done instead of referencing the IFC table 6104.3, which would only compile the existing confusion about which code to use. This kept the intent of the change the same, so DHCD staff haven't changed anything that wasn't already agreed on.

Jeff: Andrew suggested to bring the table back into the original section 6104.3 in the SFPC.

Florin: This table may be referenced in other sections as well, so that would need to be considered.

Sean Farrell: If this table goes back into chapter 61, to Shahriar's point, it would impact the installation of these containers everywhere. If the table remains in 3107, it would cover just those tent areas. If that's correct, I would be in favor of it being in 3107 but not in chapter 61.

Florin: Agrees

Jay Davis: Agrees. He is in favor of putting it in 31, but not in 61.

Florin: Is anyone opposed to putting it in 31, or are there any other concerns? Remember, the content was already agreed upon in the last meeting. With no further comments, this will be marked as consensus for approval (CA). DHCD staff will add it to cdpVA for Andrew to review.

Jeff: This proposal and the last one will be added to FP103.1 (SFPC SWG Proposal No.1) and be submitted in cdpVA as one proposal, by DHCD staff on behalf of the SFPC sub-workgroup.

SFPC Section 1207

Florin: This section is on the agenda to set the stage for a broader conversation in our next meeting. In the last meeting, the group approved several modifications to section 1207. It was also agreed that referencing the IFC was not the best idea, as it might lead to confusion. Looking closer at 1207, it seemed that there was some confusion about provisions applicable to mobile energy storage systems, which should fall under construction code. For example, when units are in a building, being recharged and getting ready for recommission and deployment. The more applicable location for this is the VCC. The SFPC should only include provisions for maintenance and operations. There was also discussion surrounding this in the VEBC workgroup meeting, and it was referred to the SFPC sub-workgroup. There are also some discussions, outside of this sub-workgroup, by other stakeholders about bringing the 2024 IFC Energy Storage System provisions into the 2021 VCC. This item is open for discussion, but it will set the stage for the next sub-workgroup meeting to work out where the provisions should be located.

Shahriar: There's been a lot of discussion about charging stations in Arlington and Northern Virginia, including building officials, fire personnel, manufacturers, energy advocates and others. There was a major building in Crystal City which attempted to put a Tesla mega-pack in use as a 5G backup. Shahriar denied the permit. Cars are not regulated by the building officials, but the damage they can cause can be extensive. New York City has recently had 10 fatalities from faulty batteries. If a car catches on fire, it takes an estimated 5-9 hours and 30,000 gallons of water to put it out. Even after that, a fire may reignite and burn until it is fully burned out. Thermal runoff from lithium-ion batteries has great toxicity both in water and fumes, and can actually penetrate the skin. In addition to charging stations and electric vehicles, other companies are using large battery packs for emergency generators and backup energy. One proposal they want to create is a section in chapter 4 of the VCC for special occupancy energy storage units, which would bring in section 1207 of the 2024 IFC, and put it in the VCC for new construction requirements. Ongoing testing and maintenance would be added to the SFPC. They are also looking at electric charging stations. Does it merit additional sensors, early warning, moving the lower-level charging stations up toward the surface? This technology changes quickly, so discussion is needed now. Some stations now have signs saying that particular car makes cannot use the station, due to the potential fire hazard.

Florin: Is there a time expected for the submission of this proposal?

Shahriar: There are a lot of details to be worked out, especially because there are many variables for fire protection used in energy storage systems. There's a meeting scheduled for March 15 to discuss a draft. Knowing that the deadline is May 1st, they will attempt to work within those parameters.

Florin: There are several references to energy storage systems in the 2021 IBC and VCC that will also need to be coordinated.

Jay: This is fascinating. He would be interested in joining the meetings for situational awareness. He doesn't necessarily deal with below-ground level charging stations. However, there are several large buildings with large deep cell power sources in trailers used for backup and alternate energy. If it takes 5 hours and 30k gallons of water for one car fire, as well as toxic runoff, this kind of storage would be many times worse. This is important for the VCC, including placement in proximity to buildings and firefighting needs.

Shahriar: He appreciates the collaboration between Building Officials and Fire Officials.

Sean: Section 307.1.1 of the VCC addresses battery storage and energy systems. However, this may not be the best location for the reference to the storage systems in the IFC. He would also like to sit in on the conversations with the group Shahriar spoke of.

Shahriar: There are many fire officials from various Virginia localities in the discussions, as well as UL and other laboratories. To Jay's point, there was a charging station proposed on a rooftop in Arlington, which was the size of two 18-wheel trailers.

Sean: They have industries in Prince William County reaching out to him for modification requirements to these types of systems. The conversation is needed.

Shahriar: The other struggle is that building code doesn't have retroactive requirements. Electric vehicle charging comes in after the buildings have already been built. Condominium owners are asking for the stations to be installed in existing buildings. Part of the conversation is how to alert the fire department and get them early warning and ventilation. If there's a lithium-ion battery, it cannot be put out until it burns out, which is extremely dangerous.

Sean: A 500 space garage, with 250 spaces utilizing battery charging stations could be disastrous.

Shahriar: Currently, the Amazon building in design has 200 electrical charging stations below grade to G-4 level. He sent the revised meeting invite to Jeff for distribution to this sub-workgroup.

Jeff: Will send the link out after this meeting.

Other / Next steps / Next meeting:

Florin: Asking for further discussion, and none was offered. He summarized what was discussed, including adding the CA items to the group proposal in cdpVA. The next meeting will contain additional discussion about 1207. The meeting date hasn't been set yet, but the invite and agenda will be distributed beforehand. He thanked everyone for participating.

Statewide Fire Prevention Code (SFPC) Sub Workgroup Meeting Summary

April 18, 2022 9:00 a.m. – 2:45 p.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Thomas King: *Code and Regulation Specialist, SBCO*

Sub Workgroup Members:

Andrew Milliken: *Virginia Fire Services Board (VFSB), Chairman of Fire Codes and Standards Committee*
Dustin Wakefield: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
Joshua (Jay) Davis: *State Fire Marshal's Office, Virginia Department of Fire Programs (VDFP)*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA)*

Other Interested Parties:

Kenney Payne: *American Institute of Architects (AIA)*
Ron Clements: *Chesterfield Building Official, member of VBCOA*
Scott Lang: *Honeywell Fire*
Sean Farrell: *Prince William County, member of VBCOA, member of BHCD*

Sub Workgroup Members Not in Attendance:

Mike O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Lou Wolf: *SBW Architects*, *American Institute of Architects (AIA), Virginia Chapter*
Matthew Lannon: *Virginia Restaurant, Lodging & Travel Association (VRLTA)*
Jodi Roth: *Virginia Retail Federation (VRF)*

Welcome:

Jeff Brown: Welcomed members to the meeting and let them know that DHCD staff could assist with any questions. Anyone can join in the discussion, but only Sub-Workgroup members will vote on the proposals.

Steve Shapiro: Asked if proposal EB1209 could be moved up on the agenda because he has to leave early.

Jeff: Asked Andrew Milliken if that was acceptable.

Andrew Milliken: Doesn't mind presenting first. All three of his proposals are related.

Jeff: All three of Andrew's proposals will be presented first.

Proposals:

FP3303.3.1-21

Andrew: The first proposal corrects a reference to IFC 112.3 and changes it to 111. Next, a reference to IFC section 110 is stricken, and says instead that the fire official may request a stop work order from building official. Next is a change of language to indicate maintenance instead of construction. Other references were cleaned up related to the Fuel Gas Code, standpipes, stairways and removing construction provisions.

Ron Clements: Thinks that separation between construction areas does not need to specifically mention Type I and Type II construction, since noncombustible materials was stricken. In section 3314.1, the current requirement triggers a standpipe at 40 feet. That was changed to "Where required by the applicable building code, a temporary or permanent standpipe shall be maintained…" This removed exceeding 40 feet as trigger. What is the trigger now?

Andrew: Construction language referencing 40 feet was removed. That remains in the building code.

Ron: He understands and agrees.

Andrew: For Ron's first comment, does he suggest striking the Type I and II construction or adding back the noncombustible materials?

Ron: Does it matter?

Andrew: He thinks Type I and II construction provides context and doesn't think the intent is to deal with separations in Types III, IV, and V construction.

Ron: He understands and is fine with leaving it.

Kenney Payne: Does 3305.8.7.6 setup .9? Does .8 talk about separation between other construction types, or does this stand on its own?

Andrew: This stands alone for Type I and Type II construction. The idea is to remove construction language from the SFPC and keep it in the VCC. Does he see something else in IFC?

Kenney: No, he was just wondering if there's a separate section for each type.

Jeff: Confirmed that 3305.9 is a new section, unique to Type I and Type II.

Andrew: Thinks it does provide context.

Jeff: Hearing no other discussion, this proposal will be marked as supported by the Sub-Workgroup. Does the Sub-Workgroup want to be a co-proponent? Since there was no opposition, this will add the SFPC Sub-Workgroup as a co-proponent.

NOTE: After all 3 of Andrew's proposals were reviewed, it was decided by the group that **FP3303.3.1-21, B3302.4-21 and EB1209.1-21** *would all be Carried Over until the next meeting*.

Subsequent Decision: At the end of the meeting, it was decided that Andrew would work on the language and submit the final proposals in cdpVA before May 1 for the June Workgroup meeting.

B3302.4-21

Andrew: This proposal adds two sections to the VCC, revises a section for an inaccurate reference and deletes another section, which belongs in the SFPC. The first part is separation of construction areas. The IFC reference is removed from the SFPC, but it should be added to the VCC. Section 3302.4 is for Type I Type II construction and section 3302.5 is for Type IV construction. In section 3312.1, the only change is the reference for temporary occupancy information. The last one is a large deletion, which belongs in the SFPC. The 2021 editions of the IFC and the IBC have a number of requirements for water supply for fire protection during construction. These requirements should be kept in the SFPC and deleted from the VCC, with a reference to the SFPC located here in the VCC instead.

Kenney: For sections 3302.3.4 and 3302.3.5, since they are located in the IBC or the VCC, would this extend to existing buildings? For example, if a Type I or Type II building is converting to a media center, would all of this be required?

Andrew: Not unless it's subject to Chapter 33 in the VCC. The VEBC has its own section for buildings under construction.

Kenney: If you make these changes in the VCC, do you also intend to make these changes in the VEBC?

Andrew: Just for the water supply requirements.

Kenney: When you say water, what requirements are being added? What if there's no water.

Andrew: That's a section for the next proposal in the VEBC.

Jeff: Section 3302.4 comes from Chapter 33 of the 2021 IFC?

Andrew: Yes, they should be emphasized in the VCC since they are being deleted from the SFPC.

Jeff: Section 3302.3 of the VCC says that fire safety during construction shall be provided according to Chapter 33 of the IFC. There does seem to be a link available.

Andrew: Agrees that there's a link. Yet, emphasizing that is easier if it's an actual section in the VCC.

Ron: Section 1201.5 in the VEBC references the IBC and IFC. There's a link to the existing building code here. If this provision is specific to work under construction, doesn't this really belong in the VEBC? There's a link, but when would you be in the VCC in an occupied building?

Andrew: Is the proposal to add language from 3302.4 to the VEBC?

Ron: Yes. It should probably be in the VEBC first.

Andrew: Is not opposed to that.

Ron: Over the last few cycles, they have tried to get things from the VCC into the VEBC where applicable. This is a friendly suggestion, not opposition.

Jeff: Asked Andrew if he wanted to table this to have more discussion about consistency in the codes before moving forward.

Andrew: Yes, that makes sense.

Kenney: Is in favor of carrying it over. The concern is occupied portions of a building. If the intent is adding a separate section to an occupied building, that's ok, since a lot of the existing building code is altering spaces in the existing buildings. However, a lot of Type I and Type II construction, doesn't have any separation. For example, converting classrooms in a building to a media center; would this require ripping out the ceiling and building walls up to the roof deck with noncombustible materials? The charging statement doesn't distinguish between a building and an existing space within a building. That's something to think about before it's carried over to next meeting.

Ron: It is fairly common for contractors to separate occupied and non-occupied space, but it's not done with noncombustible material.

Jeff: This will be marked as Carried Over.

EB1209.1-21

Andrew: Instead of having an open requirement for water supply, it would point to the SFPC, which regulates water supply for fire protection. This gets into vertical construction with a standpipe system. There needs to be water available. It uses the same language as the VCC.

Steve: This talks about standpipe systems in buildings under construction. Why would buildings under construction be in the VEBC instead of the VCC?

Andrew: This is existing language in section 1209.1, which speaks to water supplies for fire protection. It's an attempt to have consistent language across the codes. He can't speak to why it would or should be in the VEBC, but it already is.

Steve: Asked about pulling out the phrase “buildings under construction”.

Andrew: That's what we're talking about, specifically buildings under construction. Chapter 12 of the VEBC speaks to that.

Kenney: Last code cycle, language was developed about what an addition is. It's construction without a fire wall. If it has a fire wall, it would need to be under the VCC. With no fire wall, it's only an addition to an existing building. Perhaps using the word "addition" would capture what Andrew is trying to say.

Jeff: They should try to decide if this language is clear enough. "Under construction" doesn't sound like it falls under the VEBC.

Steve: Thinks Kenney is on the right track. The language currently sounds like a building that would be covered under the VCC.

Andrew: In Chapter 12 of the VEBC, there are provisions for standpipe systems, means of egress, demolition, sprinklers, fire extinguishers and other safeguards that are related to construction. Water supply is just one of the things in that section. He's not understanding what the suggestion is for this, since the whole chapter has construction related language.

Kenney: Doesn't want to delete the whole section. He wanted to address Steve's concern, and substitute the word "building" with the word "addition".

Jeff: Could there ever be a case where someone is adding standpipes to an existing building?

Kenney: Yes.

Jeff: Is it ok to say "buildings under construction" is limited to new buildings in the VCC, but describes existing buildings in the VEBC, addition of a fire wall alterations, renovations, etc.

Ron: Suggested using language similar to what is in section 1201.3, where it talks about requirements that shall be maintained at all times "during alterations repairs or additions". Using that phrasing instead of "buildings under construction" should make the point, and also be consistent with other sections.

Jeff: Asked Andrew what he thought about that, and if he wanted to carry this over until the next meeting. He also noted that Steve gave a thumbs up sign.

Andrew: Yes, that sounds good.

Jeff: This will be marked as Carried Over until the next meeting.

EB1102-21

Jeff: Scott wanted to bring his energy storage systems proposal to this group to get additional insight before he submits the final version.

Scott Lang: This proposal is an effort to bring in a change that's coming to the 2024 IFC related to existing energy storage systems. Some incidents that have happened recently has led to the idea that the older systems need to be looked at with an eye toward the latest standards of care. This would require that the owners of these older commercial systems complete a Failure Modes and Effects Analysis (FMEA) or a Hazard Mitigation Analysis (HMA). This does not cover residential systems. There's an exception for detached one- and two-family dwellings and townhouses. The 2018 IFC was the year that a lot of changes were made to energy storage systems. Before that, there was only requirements for battery backup. It will be Chapter 11 in the 2024 IFC. He's not exactly sure where to put this. Or, if there's a better way to word it.

Kenney: What are the potential mitigation requirements? Also, since Virginia is very clear about not requiring existing buildings meeting a current code, unless there's a retrofit, how would it even be enforced? Would the Board or General Assembly give the ok? What if later requirements are more stringent? Would they have to do this again? Personally, he agrees with this, but he doesn't know how it will land.

Jeff: If this goes forward, the Board will be made aware of it, but the Board cannot approve retrofit provisions in the building code. Retrofit provisions come as a directive from the General Assembly and they tie back to legislation. Also, retrofit provisions require a one-time upgrade by a certain date.

Steve: When this came up in the resiliency meeting, the retroactive nature of this was discussed. For that reason, he would be against this for AOBA and VAMA.

Ron: Doesn't see this as a retrofit. Other retrofits require something to be done to the building. This proposal doesn't say that. It requires that information to be given to the fire official. It makes more sense to put it into Chapter 12 of the Statewide Fire Prevention Code.

Jeff: Asked Scott to discuss the corrective action plan in 1102.1.2 to mitigate hazards, including if it would require the fire official to approve the plans and inspect after the corrective actions have been taken.

Scott: Yes, that would be the intent. Once the system is looked at and a hazard mitigation analysis is done, if things don't meet current standards of care, mitigations would be put in place that would then be inspected and approved. These are complex systems which could consist of anything. In UL9540 and 9540A, things identified include the types of gasses that are produced, thermal runaway, gas protection systems, fire protection systems, spacing that is required, etc. This is not intended to be updated every year. The codes and standards are pretty evolved now. Currently, the first edition of NFPA 855 is being used, but there were many things we didn't know when developing it. The second edition is coming out this year. Those standards have evolved quite a bit. He doesn't see that kind of change happening in the future. This has been an area over the last 5 years or so which has exploded. They want to make sure the older systems are safe.

Jeff: This is in the VEBC, enforced by the building official. The corrective action plan is to be submitted to the fire official under the SFPC. If there's a plan that needs construction or installation to be done under the USBC, that goes back to the building official. As this proposal stands now, it seems like there would only need to be a plan submitted to fire code official with no other action.

Kenney: The code change only asks for a plan, not actual work. However, the intent is that there would be mitigation performed, not just a plan submitted. He would suggest that it goes into chapter 4 of the IFC or the SFPC. Section 407 is about hazard communication and hazardous materials management plans. Could this be part of that section? As Scott said, people are installing these things. There could be existing buildings that already have a permit for storage systems. Is this intended to apply to existing buildings that already have the systems, or to buildings that don't have systems, but want to add them?

Scott: The intent is that when there's an existing energy storage system which doesn't meet the UL9540 or fire code standards, they should be looked at and addressed. This isn't really storage of batteries. It's more about electrical energy storage systems that are used to provide power. Storage of batteries themselves are not the main concern. The way to think of this is that it might not be in the right section, but the question is are we concerned about existing energy storage systems in Virginia. If it is about electrical energy storage systems that are used to provide power, what would the solution be?

Jeff: The group is about to discuss a very big proposal to section 1207 of the SFPC. This group made some agreements, but it still needed work. DHCD staff started from the beginning of SFPC 1207 and realized that any ESS system should be approved by the building official for installation or other upgrades under the USBC. SFPC section 1207 is all maintenance language. After an ESS system is deployed, and already approved as per the USBC, all maintenance falls under the SFPC section 1207. If Scott's proposal can be coordinated with this proposal, it would help to decide where Scott's proposal would go. A hazard mitigation analysis should be done before deployment, so the building official would approve it. Corrective action plans in existing systems should also go to the building official for approval, based on what is being proposed in SFPC 1207. He asked Scott if he would like to carry over his proposal and look at it again in the next meeting. He noted that Scott's proposal is already submitted in cdpVA, so it will be presented at the June Workgroup meeting. He said that DHCD staff would be happy to help him if he wanted to make changes in cdpVA before May 1st.

Scott: Does think that it should be coordinated, so he thinks it's ok to carry it over. He also noted that a main reason for this proposal is to get the discussion started, since it is on deck to be in the 2024 IFC.

{BREAK: 10:05-10:15}

Amendments to SFPC Section 1207

Jeff: At the previous meeting, the group reviewed a list of changes to the SFPC, proposed by the VFSB Sub-Committee, including several changes throughout SFPC Section 1207; however, the group decided that some additional work was still needed on Section 1207. DHCD staff agreed to go through the proposed changes to Section 1207 and make some additional edits to remove references to the IFC and address potential confusion related to mobile ESS. This proposal is the draft that DHCD developed.

In an Excel spreadsheet shared on-screen in the Adobe Connect meeting room, Column A showed the 2021 SFPC Base Document text. Column B showed the 2021 IFC text. Column C showed the 2021 SFPC text suggested by this code change proposal. Today's group decisions will be recorded in column D.

Each of the sections below were introduced by DHCD staff and there was a main theme of changing construction-related language to maintenance-related language.

107.2 – Says that a permit is required for stationary and mobile energy storage systems regulated by section 1207. Approved by group members as proposed.
1207.1 – No changes were made to this section. Approved by group members as proposed.
1207.1.1 and table 1207.1.1 – Following the discussion, section 1207.1.1 was approved by the group members to keep the original IFC language, and table 1207.1.1 will remain in the code as approved by the group members.
<u>Linda Hale:</u> Asked about the size of the systems. Is there a minimum size?
<u>Jeff</u>: The USBC says all systems have to comply, and points to section 1207.1.1, which is a capacity table. This lays out the requirements by size. If the system is smaller than the smallest one on the table, it's not regulated in section 1207.
<u>Linda:</u> A 20kw lithium ion battery is lower than the threshold. How can fire officials ensure that it's safe and maintained?
<u>Jeff:</u> Whatever can be regulated under the IFC now, this is keeping with those numbers. Whatever the general maintenance requirements are according to the capacity.
<u>Andrew</u>: 1207.1.1 is a scoping section. He wants to keep the table and the minimum. There's no maximum. It would be important for a minimum threshold for what's regulated by the SFPC.
<u>Jeff:</u> The intent is to keep with what is in the IFC. Instead of providing a table, it refers to the applicable building code.
<u>Andrew:</u> This isn't a maximum allowable quantity table. It scopes what is and what isn't regulated. Deciding what is regulated by the IFC isn't the way to go with scoping provisions and the SFPC. It should be very clear. The quantities and building code. What is regulated by SFPC has to be clear.
<u>Jeff:</u> Anything less than 3 kWh is not regulated. Anything less than minimum quantities isn't even regulated by the IFC.
<u>Linda:</u> Has been seeing a lot of fires from small lithium ion batteries and it's a concern for her.
<u>Jeff:</u> It's already in the IFC, but if it's less than the table, section 1207 doesn't even apply. Not losing anything here. There may be another section where they are included.
<u>Andrew:</u> Can't think of another section where this is referenced. There will be enforcement beyond the threshold. The SFPC is a stand-alone document. Thresholds would apply. That will regulate any hazards. For a scoping provision, there needs to be that language in the SFPC. It's fundamental for enforcement.
<u>Jeff:</u> Has there been any change in the IFC capacity? They wouldn't want an installed system being non-compliant if it was compliant in the past.
<u>Linda:</u> In her experience, they only add to it, not take away.
<u>Andrew:</u> If SFPC is maintenance, retroactive action would not be applicable. It won't follow what was in place when it was installed.
<u>Jeff:</u> Andrew and Linda are proposing to keep the table. Everything else will be maintenance and operation.
1207.1.2 – Approved by group members as proposed.
1207.1.2.1 – Approved by group members as proposed.
<u>Andrew:</u> standard exemption for communication utilities. Its' not regulated by the SFPC
1207.1.3 – Replaced installation and construction language with maintenance language. Approved by group members as proposed.
1207.1.4 – Changed language from construction related to maintenance related. After the discussion, this was approved by group members as modified, by striking the word "identified" from the proposed language and

leaving in the reference to table 1207.1.1.
Florin: There were a few revisions to this. It adds context to when an analysis is required as part of the permit application process. It says that the analysis shall be provided to the fire official, and it adds a paragraph defining who can prepare and stamp the analysis.
Andrew: Is this something required for all energy storage systems?
Florin: Anything specifically included in table 1207.1.1, the same as in the IFC. He asked for confirmation that table 1207.1.1 will remain in the code.
Jeff: Yes, keeping table 1207.1.1 was the decision.
Florin: Asked the group if they wanted to strike the word "identified", and have the sentence in item #1 read "Where ESS technologies not specifically in Table 1207.1.1". The group members agreed.
1207.1.4.1 and 1207.1.4.2 –
Florin: These sections should be deleted, as they refer to actions performed under the USBC, and the fire official wouldn't actually approve them, building official would. Approved by group members as proposed.
1207.1.4.3 – Approved by group members as proposed.
1207.1.5 – Following the discussion, this section was approved by group members as proposed.
Andrew: What is this requiring?
Florin: ESS to be maintained in such a way as to safeguard an adjacent ESS. Doing the same thing that most other sections do. Maintain in accordance with applicable building code.
Florin: Asked the group if they wanted to strike the section out totally or keep it as proposed. Andrew and Joshua thinks it should be stricken completely, and Steve and Linda think it should be kept as proposed. Florin asked Andrew and Joshua if they would be opposed to keeping the language as proposed.
Andrew: Is ok to move forward as proposed and not strike the section out. Seems a little confusing, but it doesn't really hurt anything.
1207.1.6 and 1207.1.6.1 – No changes were made to this IFC section. Approved by group members as proposed.

{BREAK 11:05-11:10}

1207.2 – No changes were made to this IFC section. Approved by group members as proposed.
1207.2.1 – Following the discussion, this was approved by group members as proposed.
Florin: This was revised from construction language (under USBC) to maintenance language. Items required in commissioning plan were removed, since those requirements are in the USBC. However, the requirement to provide documentation to the fire official was retained.
Andrew: Is there another section about decommissioning?
Florin: Yes. Decommissioning falls under the purview of the building official.
Andrew: Can the fire official get a copy of the decommissioning plan? There's a commissioning report for the fire official, but not a decommissioning report.
Florin: 1207.2.3 talks about decommissioning and it has to be approved in accordance with the applicable building code.
Andrew: OK.
1207.2.1.1 – Covered under the USBC, stricken from the SFPC. Approved by group members as proposed.
1207.2.1.2 – Keeps the commissioning responsibility under the applicable building code, but allows the fire code official to request documentation if desired. Approved by group members as proposed.
1207.2.2 & 1207.2.2.1 – No changes were made to this IFC section. Approved by group members as proposed.
1207.2.3 – Following the discussion, this was approved by group members as modified according to Jeff's proposed language in the chat box.
Florin: This section identifies the owner as the person responsible to notify the code official about decommissioning an energy storage system. It also says that the decommissioning plan is approved in accordance with the applicable building code. Detailed steps were removed (items 1 and 2). He asked the group if "code official" (copied from the IFC) should be changed to "fire code official" in the SFPC.

Andrew: Decommissioning should be done by the building official, but he doesn't want to leave the fire official out of the loop.

Florin: For the purpose of this section in the SFPC, someone has to notify the fire official of decommissioning.

Jeff: Proposed alternate language in the chat:

> **Jeff Brown - DHCD:** Decommissioning shall be performed in accordance with the decommissioning plan approved in accordance with the applicable building code. The fire code official shall also be notified by the ESS owner prior to the decommissioning of an ESS.

1207.3, 1207.3.1 and 1207.3.2 – No changes were made to these IFC sections. Approved by group members as proposed.
1207.3.3 – This was originally not going to be modified, but there's a similar section for mobile ESS. At the beginning of the body of the code, perhaps "when required by the applicable building code" should be added. Approved by group members as modified by adding "when required by the applicable building code".
1207.3.4 – Changed the word "provided" to "maintained". Approved by group members as proposed.
1207.3.5 – Changed to "maintained in accordance with applicable building code". Approved by group members as proposed.

The changes to the following provisions were already agreed to at the last meeting of this group:
1207.3.6 – Changed "repairs" to "repairs and alterations in accordance with applicable building code". Approved by group members as proposed.
1207.3.7 and 1207.3.7.1 – Stricken. Approved by group members as proposed.
1207.3.8 and 1207.3.9 – Stricken. Deleted. Approved by group members as proposed.

1207.4 – Replace "installations" with "maintenance". Approved by group members as proposed.
1207.4.1 – No changes were made to this IFC section. Approved by group members as proposed.
1207.4.2 and 1207.4.3 – Changes were made and agreed to at the last meeting. Approved by group members as proposed.
1207.4.4 – Stricken with agreement at the last meeting. Approved by group members as proposed.
1207.4.5 and 1207.4.6 – No changes were made to this IFC section. Following discussion, this was approved by group members as proposed.
Joshua: Section 4.5 says "shall be provided". Should it say "shall be maintained"?

Florin: In most cases it would. However, the group has historically agreed that vehicle impact protection and signage are things that can be required by the fire official.

Sean Farrell: typed in the chat box "It's operational more so than construction".

1207.4.7 – Following the discussion, this was approved by group members as modified according to Steve's proposed language in the chat box, except for replacing "provided" with "maintained".
Florin: The addition of "Hazardous exhaust systems" was approved at the last meeting. Since then, DHCD staff has added "shall be operated and maintained" to the end of the sentence.

Steve: The proposed language sounds a little strange. What's currently in the IFC says discharging shall be "provided and maintained" with the hazardous exhaust system, which sounds better.

Florin: This version has no technical changes, just an edit to the language. He asked Steve to type in the chat box language that he would propose.

Linda: The concern is if there's a hazardous exhaust system, it needs to be operated properly as designed. That's why language seems funny.

Steve: typed in chat:

> **Steve Shapiro, AOBA/VAMA:** Hazardous exhaust systems for ESS that have the potential to release toxic and highly toxic gas during charging, discharging and normal use conditions shall be provided and maintained.

Florin: What does group think about this language?

Andrew: Likes "operated and maintained" better than "provided and maintained".

Florin: Asked for a group vote, which resulted in using Steve's text, with the exception of replacing "provided and maintained" with "operated and maintained".

1207.4.8 and 1207.4.9 – No changes were made to these IFC sections. Approved by group members as proposed.

1207.4.10 – Following the discussion, this was Approved by group members as modified by Andrew to include the words "secured and".

Florin: This proposal was approved by the group in the last meeting, but DHCD edited the wording a bit to read more clearly.

Andrew: Asked if the cabinet where the ESS system is located can be locked. He asked to add "secured" to the text to read "shall be secured and provided with signage".

Florin: Yes. That can be added.

1207.4.11 – Changed from construction to maintenance language. Approved by group members as proposed.

1207.4.12 – No changes were made to this IFC section. Approved by group members as proposed.

1207.5 – Following the discussion, this was approved by group members as modified: keep section 1207.5; delete table, and where the table is referenced, replace with "applicable building code"

Florin: Originally, in the base document, the subsections were deleted, but this proposal brings them back and uses maintenance language instead of construction language.

Andrew: Only sees one reference to the table in sub-section 1207.5.2. He proposed that sub-section 1207.5.2 stays and delete the table. Reword so that maximum allowable quantities are "in accordance with applicable building code".

Jimmy Moss: Likes that idea.

Florin: Asked for a vote to strike the table and where it's referenced, say "applicable building code". The vote showed support of Andrew's suggestion.

1207.5.1 – reworded construction language to maintenance language. Approved by group members as proposed.

1207.5.2 – Strike out exceptions, and as per Andrew's proposal, reference "applicable building code" instead of table 1207.5, which was stricken. Approved by group members as modified.

1207.5.2.1- Approved by group members as proposed.

1207.5.3 – Added "unless otherwise approved" and changed from construction to maintenance language. Approved by group members as proposed.

{Lunch Break – 12:01 – 12:35}

1207.5.4 – Following discussion of **1207.5.5**, this was also Approved by group members as modified by adding "Chapter 9" to read "in accordance with Chapter 9 and the applicable building code"

1207.5.4.1 – Following the discussion, this was approved by group members as proposed.

Florin: Changed construction language to maintenance language, and added "in accordance with applicable building code".

Andrew: Wondering if this was previously a deleted section. There is a lot of different language here and the simple idea is to maintain the fire system.

Jeff: Originally, in the base document, all of section 1207.5, including sub-sections, was deleted.

Andrew: Thinks that if these sub-sections will stay in the code, they should be written in simple maintenance language. For example, the first sentence starts with "where required" and then it's a long way down before it mentions "maintained".

Florin: The way he reads it is that the systems mentioned need to be maintained.

Andrew: After reading further, he can see that.

Florin: One reason to keep this is that it refers to specialized systems, which would be helpful for the fire official, who may not be familiar with those types of the systems.

Andrew: Ok with this language.

1207.5.5 – Approved by group members as modified, adding "Chapter 9"

Florin: This deleted items 1-3 and the exception, and changed the language to apply to maintenance instead of construction.

Andrew: This should also reference Chapter 9.

Florin: This should then say, "in accordance with Chapter 9 and the applicable building code" in sub-sections 1207.5.4 and 1207.5.5.

1207.5.5.1 – Changed from construction to maintenance language. Approved by group members as proposed.

1207.5.6 – Added "unless otherwise approved in accordance with the applicable building code". Approved by group members as proposed.

1207.5.7 – No changes were made to this IFC section. Approved by group members as proposed.

1207.5.8 - Deleted the exception, modified language to apply to maintenance instead of construction, and added "in accordance with building code". Approved by group members as proposed.

1207.6 – Added "maintain in accordance with the applicable building code". Deleted table. Approved by group members as proposed.

1207.6.1 – Changed construction language to maintenance language, added "in accordance with the applicable building code". Approved by group members as proposed.

1207.6.1.1 – Changed construction language to maintenance language, added "in accordance with the applicable building code". Approved by group members as proposed.

1207.6.1.2 and sub-sections 1207.6.1.2.1, 1207.6.1.2.2, 1207.6.1.2.3 and 1207.6.1.2.4 – Following the discussion, section and sub-sections were Approved by group members as proposed.

Andrew: Proposed deleting the entire section and subsections, since it refers to construction.

Steve: Ventilation based on LFL is ok, but ventilation based on exhaust rate is not?

Andrew: This is a complicated section, since it was intended for construction, and it's difficult to break out and reclassify what needs to be stated in maintenance language. In the past, in other sections of the SFPC, they leave LFL in the code because it's important to identify an extremely hazardous situation. The exhaust rate is not so much.

Steve: He's not suggesting to delete the LFL section, but if they are deleting the exhaust rate, how would the code user see that?

Andrew: Exhaust ventilation needs to be maintained in section 6.1, but LFL needs an additional requirement.

Joshua: Language removed in other sections of the SFPC are left here. If these sub-sections are taken out, it's in line with what has already been done. But, it's ok with him to leave them in, if it's not construction language.

Florin: The proposed text does change construction language to maintenance language. Sub-section 1207.6.2.1 talks about associated standby power. If it's deleted, could it negatively impact the ability to enforce it?

Andrew: It's ok with him to leave it in.

Joshua: Likes leaving it in with the changed language. He thinks it is helpful for the inspector.

1207.6.2 and sub-sections 1207.6.2.1 and 1207.6.2.2 – Approved by group members as proposed.

1207.6.2.3 – No changes were made to this IFC section. Approved by group members as proposed.

1207.6.3 – Added "maintained in accordance with applicable building code", and removed exceptions. Approved by group members as proposed.

1207.6.4 – Changed from construction language to maintenance language. Approved by group members as proposed.

1207.6.5 – Changed from construction language to maintenance language. Approved by group members as proposed.

1207.7 – Added "maintain in accordance with applicable building code". Table was stricken. This is in line with other decisions. Approved by group members as proposed.

1207.7.1 – Following the discussion, this was approved by group members as modified

Changed language to require maintenance with applicable building code. Deleted items 1-4.

Andrew: Dedicated use buildings should only be used for ESS.

Florin: These dedicated buildings were approved already under the USBC. They just have to be maintained here. He asked Andrew what he would propose.

Andrew: How about "shall only be used for ESS", instead of "shall be maintained"?

Florin: How about "shall continue to be used as a dedicated use building"?

Andrew: typed in chat box:

Andrew Milliken: Buildings classified as Group F-1 occupancies and approved as dedicated-use ESS buildings in accordance with the applicable building code, shall only be used or occupied as approved.

Florin: The group liked his proposal, and this was approved as modified by Andrew.

1207.7.2 – Approved by group as modified by Andrew.

Florin: The group may want to say something about non-dedicated-use buildings, similar to 1207.7.1, as indicated by Andrew's proposed language. "approved as non-dedicated-use buildings…..shall be used or occupied as approved".

1207.7.3 – Added "unless already approved", and modified "shall be allowed" instead of "installed". Approved by group members as proposed.

1207.7.4 – Modified to remove construction language, and added "maintained in accordance with the applicable building code". Approved by group members as proposed.

1207.8 – Added "maintained in accordance…" and deleted a table. Approved by group members as proposed.

1207.8.1 & 1207.8.2 – This previously referenced the deleted table 1207.8, it was modified to reference the text in section 1207.8. Approved by group members as proposed.

1207.8.3 – Dimensions were eliminated. Added "shall be maintained in accordance…" Exceptions were deleted. Approved by group members as proposed. *Note: Upon further discussions later in the meeting, this was approved as modified (see notes towards end of summary, where this section was revisited.)

1207.8.4 – Added "Where the applicable building code allows…shall be maintained in accordance with the applicable building code". Approved by group members as proposed.

1207.9 – Added "in accordance with applicable building code". Deleted table. Approved by group members as proposed.

1207.9.1 – Referenced the deleted table 1207.9 and changed the reference to the text in section 1207.9. Approved by group members as proposed.

1207.9.2 – Refers to section 1207.9 instead of the deleted table 1207.9. Changes a reference to the IBC to read: "the applicable building code". Approved by group members as proposed.

1207.9.3 – Added "Where applicable building code requires separation" and "maintained in accordance with applicable building code". Removed exceptions. Following the discussion, this was marked as non-consensus. *Note: Upon further discussions later in the meeting, this was approved as modified (see notes towards end of summary, where this section was revisited.)

Andrew: There's no language about how far away from storage of hazardous materials. It would be difficult for inspector to go back to applicable code at the time of installation. He doesn't know what the fix might be, but he wanted to bring it up.

Florin: Can appreciate that. This is similar to edits that have been done historically, because of the requirements in the code at the time approved or installed. If they keep specific measurements, it would automatically put things out of compliance that were ok before.

Jimmy: Inspectors have to reference the code under which it was installed.

Linda: The inspector might want to refer to the code before leaving for the site. A problem might be if the ESS or hazardous material was moved after it was originally installed. They should have to come into compliance with 10 ft., if it was moved. Some things should be removed, and some not. Things that are operational, which are brought in after installation should be included.

Florin: If something is brought into any given building, if an ESS is installed, it would have had to go through the USBC installation and approval process, even if it's in an existing building. If the 10 feet dimension is left here, anything that was already approved with a separation of less than 10 feet, and not moved, would put them out of compliance.

Andrew: This is talking about outdoor areas, not inside a building. It's not the mobile section, but it is outdoor.

There should be an understanding of what is safe, even without going back to the original code.
Florin: When asked to vote on moving forward as currently proposed, Linda voted thumbs down. He asked Linda what else she would propose.
Linda: When the ESS is installed, then combustible or hazardous materials are stored, then it's mobile, that's the concern. ESS can be approved under whatever code year it's installed, but when things are brought in later, fire official should be able to say it must be 10 ft. away from other things. She proposes leaving in the 10 ft., and striking numbers 1, 2, 3 and 4 on the list, since it's not in the purview of the fire official.
Florin: Would "where the applicable building code requires separation" still be needed?
Linda: No, because it will be in accordance with the SFPC in effect at the time.
Florin: Is she proposing to keep the IFC language and strike items not under purview of fire official?
Linda: Yes.
Jimmy: Is not in agreement. If any of those materials are present, it goes back to the building code.
Steve: Asked Linda what she would do about the exceptions (which were stricken in the proposal)
Linda: The exceptions are not buildings, so they would be structures that would fall underneath #1 and have prescriptive language.
Florin: 1207.9.3 will be marked as non-consensus. He encourages group members to join together before the next meeting to see if they can come up with a new proposal in cdpVA. This can carry over until before May 1st, or if a Thursday meeting is needed this week to exhaust the rest of this agenda, it can be addressed at the end of that meeting.

{BREAK: 1:40 – 1:45}

1207.9.4 – Approved by group members as modified per Andrew's proposal to add "in accordance with Chapter 9 and the applicable building code"
Andrew: Add a reference to Chapter 9 to say "in accordance with Chapter 9 and the applicable building code".
1207.9.5 – Approved by group members as proposed.
Andrew: This doesn't specify what the separation is.
Florin: The charging statement 9.5 says "applicable building code", so all items listed fall under that. Approved as proposed.
1207.9.6 – Added "maintained in accordance with applicable building code" and struck the specific construction language in the line items. Approved by group members as proposed.
1207.10 – The table was left here because the sections referenced have all been modified today. However, footnotes were stricken as they were exceptions to the construction code requirements. The section and table were approved by group members as proposed. This will be double-checked by DHCD staff to make sure all of the sections referenced in the table were approved.
1207.10.1 and 1207.10.2 – No changes were made to these sections. Approved by group members as proposed.
1207.10.3 – Strike construction language, and add that permits are required in accordance with section 107.2. Approved by group members as proposed.
1207.10.4 Construction documents replaced with operational documents. Approved by group members as proposed.
1207.10.4.1 – Added "at the minimum" so as to not limit what the fire official could ask for, and changed operation to operational. No other changes were made. Approved by group members as proposed.
1207.10.5 – Added "approved in accordance with applicable building code:" Changed "established on the construction permits" to "identified on the operational permits". Approved by group members as proposed.
1207.10.6 – Exceptions 1 and 2 were modified to say "applicable building code" and "shall be maintained". Approved by group members as proposed.
1207.10.7 & 1207.10.7.1 – No changes were made to this IFC section. Approved by group members as proposed.
1207.10.7.2 – Approved by group members as proposed.

1207.10.7.3 – *Note: Upon further discussions later in the meeting, this was approved as modified (see notes towards end of summary, where this section was revisited.)
Florin: This is similar to the non-consensus section earlier. He asked what the group thought about it.
Andrew: How about: "where the applicable building code requires separation of 10 feet, the following…"
Florin: If that is used here, it could also be used for the other section.
Andrew: Thinks there were actually three non-consensus sections.
Florin: Decided to hold off until the end, and to circle back to it.
1207.10.7.4 – Changed from construction to maintenance language and added "Unless otherwise allowed by the applicable building code, …" Approved by group members as proposed.
1207.10.7.5 Changed to say "operational" permit. Approved by group members as proposed.
1207.10.7.6 – Approved by group members as proposed.
Florin: Fences with gates or other barriers. Added "in accordance with the applicable building code". This one does say 5 ft.
Andrew: Is ok with this as it is.
1207.10.7 No changes were made to this section. Approved by group members as proposed.
1207.11 – Shall be "maintained" instead of "installed". Approved by group members as proposed.
1207.11.1 – Added "Unless otherwise approved with the applicable building code", exceptions were stricken as they were building code provisions. Approved by group members as proposed.
1207.11.2 – Changed "installation" to "maintenance" and added "applicable building code". Approved by group members as proposed.
1207.11.2.1 – Adds "where…required by the applicable building code" and "shall be maintained". Approved by group members as proposed.
1207.11.3 – Added "Unless otherwise approved", changed "installed" to "located" and changed "IBC" to "VCC". Approved by group members as proposed.
1207.11.4 – Added "unless otherwise approved…" Approved by group members as proposed.
1207.11.5 – Changed "electrical installation" to inverters. Removed installation in accordance with NFPA 70. Added "where required by applicable building code". Approved by group members as proposed.
1207.11.6 – This was approved by group members as modified by Andrew, adding "in accordance with Section 907.2.10" and "in accordance with Chapter 9".
Florin: This replaces construction language with maintenance language.
Andrew: please add reference to Chapter 9 in the first sentence and last sentence.
1207.11.7 – Removed reference to mechanical code, replaced with "applicable building code". Approved by group members as proposed.
1207.11.8 – Approved by group members as modified by Andrew to read "operated and maintained…"
Florin: Revised construction language to maintenance language and added "applicable building code".
Andrew: The last sentence should say "operated and maintained in accordance with the applicable building code".
1207.11.9 – Added "Unless otherwise approved in accordance with the applicable building code". Approved by group members as proposed.
1207.11.10 – Added "the applicable" NFPA 70. Approved by group members as proposed.

VCC New Section
Florin: this section will say that Electrical ESS shall comply with applicable provisions of IFC. This will make it very clear to all that ESS is regulated by the IFC. Approved by group members as proposed.
Florin: Also noted that another group is making proposals to bring the IFC into the VCC. DHCD staff will ensure that the Board knows about both proposals and how they can work together or independently.

REVISIT Sections 1207.8.3, 1207.9.3 and 1207.10.7.3 – Approved by group members as modified by Andrew and further modified by Steve.
Florin: Asked Andrew if he had proposed language to address the concerns in this section.

Andrew: Other sections do provide prescriptive language that says when required by the applicable building code for a separation of xy feet, then, the ESS must be maintained. It may have drawbacks, but using such language might get consensus for now. It may still be readdressed in the next code cycle.

Florin: It sounds like it could be a good compromise. Requiring a certain distance, when the applicable building code so requires.

Jimmy: he would be agreeable to that.

Andrew: typed in the chat box:

Andrew Milliken: Where the applicable building code requires separation of 10 feet (3048 mm) from the following exposures, the separation shall be maintained in accordance with the applicable building code.

Steve: How about saying "minimum of 10 feet", which is in the IFC language?

Florin: Yes, that's good. All 3 sections will be approved as modified, using the appropriate language for each section as suggested by Andrew and further modified by Steve.

Other:

Florin: As a heads up, the DHCD staff proposal referencing requirements for permits is still referencing Chapter 1. Staff will check the IFC sections to make sure that Chapter 1 is there. If not, DHCD staff will create proposal for it.

Assignments / Next steps / Next meeting:

Florin: This group will probably meet one more time before the next Workgroup meeting on June 10th and discuss any other proposals that have been submitted.

Steve: This morning, the group discussed the fire safety door construction that might be further discussed this coming Thursday. He asked if that was still the intent.

Jeff: The group should meet before the May 1st deadline to discuss Andrew's three items. DHCD can share the 1207 decision spreadsheet with the proponent of the EB1102 proposal, to see the direction the group is heading, and allow the proponent to align with this group's proposal.

Andrew: Has a good idea of what to do with B3302 and EB1209. The F3303 proposal was decided as consensus for approval.

Steve: Yes, that's what he has in his notes.

Richard Potts: It was consensus, but got grouped back in with the other two.

Jeff: Asked if Andrew would like to meet again.

Andrew: He will modify according to the group feedback before May 1st for the next General Workgroup.

Jeff: The spreadsheet will be cleaned up and the 1207 proposal will be reflected accordingly.

Florin: Sections that have not been modified will not be included in the final proposal.

Statewide Fire Prevention Code (SFPC) Sub-workgroup

May 11, 2022 9:00 a.m. – 11:21 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations Division (BFR)*

Sub-workgroup Members:

Andrew Milliken: *Virginia Fire Services Board (VFSB), Chairman of Fire Codes and Standards Committee*
Dustin Wakefield: *Virginia Department of General Services (DGS), Division of Engineering and Buildings (DEB)*
Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
Joshua Davis: *State Fire Marshal's Office, Virginia Department of Fire Programs (VDFP)*
Linda Hale: *Virginia Fire Prevention Association (VFPA)*
Mike O'Connor: *Virginia Petroleum and Convenience Marketers Association (VPCMA)*
Robert Melvin: *Virginia Restaurant, Lodging and Travel Association (VRLTA) - *acted as an alternate voting member to Matthew Lannon, who was not in attendance*

Other Interested Parties:

Andrew Clark: *Home Builders Association of Virginia (HBAV)*
Dwayne Garriss: *Retired code official and Georgia state fire marshal*
Lee Stoermer: *Loudoun County Fire Department*
Perry Weller: *VFSB, Vice Chairman of Fire Codes and Standards Committee*
Ron Clements: *Chesterfield Building Official, member of VBCOA*
Scott Lang: *Honeywell Fire Systems*
Steven Sites: *City of Fairfax*

Sub-workgroup Members Not in Attendance:

Jodi Roth: *Virginia Retail Federation (VRF)*
Lou Wolf: *SBW Architects, American Institute of Architects (AIA), Virginia Chapter*
Matthew Lannon: *Virginia Restaurant, Lodging & Travel Association (VRLTA)*
Steve Shapiro: *Apartment and Office Building Association (AOBA)*

Welcome and introductions

Florin Moldovan: Thanked participants for attending and noted that the meeting is being recorded. DHCD staff in the meeting were identified. He asked participants to keep their microphones muted when not speaking. The meeting and discussion is open to all, but voting in support or opposition to the code change proposals is limited to Sub-workgroup members only.

Meeting participants introduced themselves.

Fire Safety During Construction – Andrew Milliken proposals

FP3303.3.1-21

Andrew Milliken: This is in the fire safety during construction section of the SFPC. The language in Chapter 33 was cleaned up, construction language was removed and replaced with maintenance language and water supply requirements were clarified.

Florin: This did receive group support last time, and it was carried over with the other two companion proposals (B3302.4 and EB1209.1). Hearing no further discussion, a vote resulted in only thumbs up. This will be marked as supported by the Sub-workgroup members as proposed.

B3302.4-21

Andrew M: This is about fire safety during construction in the VCC. The first two changes are sections which were removed from the SFPC and placed in the VCC, since they pertain to construction. The first one is about separations between construction areas and the second is about Type IV building construction requirements. The next change is to relocate and redirect the water supply needs to the SFPC, so that the fire official would be the agent who determines water supply for fire protection.

Florin: Hearing no further discussion, a vote resulted in only thumbs up. This will be marked as supported by Sub-workgroup members as proposed.

EB1209.1-21

Andrew M: This is about fire safety during construction in the VEBC. Comments received in the last meeting were around separation in construction areas in buildings that are already occupied. As a result, language was moved from the SFPC and brought here into the VEBC in Section 1201.8. The remaining original change directs the user to the SFPC, where the fire official determines water supply for fire protection.

Dustin Wakefield: Separations between areas under construction in occupied buildings is discussed in NFPA 241 Chapter 8. It covers fire-rated separations in non-sprinklered buildings and protecting openings in those walls. Should that be further considered or correlated? Even though it's only referenced as a standard in the SFPC, it's not in the VEBC.

Andrew M: This is for any separation provided in type I and type II buildings to ensure that they are of the same type of construction. It doesn't speak specifically to rated assemblies. The VEBC and VCC both reference the IFC, which references NFPA 241 for fire-rated separations.

Dustin: That helps. The type I and type II non-combustible construction isn't required to be here, but someone can get to NFPA 241 through the IFC. It's really for temporary separation walls and non-sprinklered buildings where the area under construction is a higher hazard than the occupied portion. There needs to be a 1-hour rated wall if there are no sprinklers. This seems to be ok, as long as the building is sprinklered and the materials have to be noncombustible.

Florin: Asked Dustin if he's ok with language presented.

Dustin: Yes, he is ok with it.

Florin: Pointed out the voting group members listed on the screen. Hearing no further discussion, a vote resulted in only thumbs up. This will be marked as supported by Sub-workgroup members as proposed.

Code Change Proposals:

FP1207-21

Florin: This proposal regarding energy storage systems was supported by this Sub-workgroup in the last meeting, and is provided for informational purposes only. He invited everyone to review the proposal and reach out to DHCD staff should they find and errors within the proposal.

FP107.11-21

Joshua: This is an update to fees set by the State Fire Marshal's office, which hasn't been updated for several code cycles. It brings fee schedules up to reflect actual costs. Fees are based on hourly rates and equipment used. There is a document attached showing how the fees were set. The State Fire Marshal's office is funded 60% through the General Fund and 40% through Special Funds (revenue received from these fees). Section 107.12 is a new section for permits in hazardous areas and permits for food trucks.

Michael O'Connor: Typed in the chat box:

Michael O'Connor: We are not necessarily opposed. However before voting we need to know whether this proposal has been vetted with impacted parties and what their position is.

Joshua: Looked at several local fee schedules, which they are in-line with. He included that information as supporting documentation to the proposal in cdpVA. He hasn't heard any discussion or response from other localities.

Florin: The supporting documentation that Joshua provided is in the meeting agenda, available for download in the Adobe Files Pod, and in cdpVA.

Jimmy Moss: Was the schedule based on actual costs from past history in addition to what the other localities are doing?

Joshua: The hourly fees were based on actual costs for salaries, leased vehicles, leased space and software. Fees for annual permits were based on travel distance and what the localities fee schedules are. The fee schedule is in line with Stanton, Stafford and Virginia Beach, plus travel to the various counties.

Michael: Typed in the chat box:

Michael O'Connor: has any outreach been done to stakeholders? The answer that we have not heard anything from anybody about this is a poor one. This needs a public airing

Joshua: Answering Michael's questions typed in the chat box – no, he hasn't reached out to stakeholders. He's sorry that Mr. O'Connor thinks that not hearing back from anyone is a poor answer. They haven't had an opportunity to reach out the public.

Dustin: What's the advantage of posting all the fees in the code as opposed to having a more flexible schedule? Was it always done like this?

Joshua: Yes, it has been this way since 2006. He met with DHCD staff about using a table to set fees, which could be more flexible and might work better. However, these fees won't even take effect until the 2021 fire code is adopted. They are still behind in getting fees, but it seems like this is the available avenue at this time. He would like to use a more flexible fee table for the future.

Florin: Confirmed that this is the appropriate place for the State Fire Marshal fees.

Jeff Brown: Currently, this is part of the state law. They have to be approved by the Board of Housing and Community Development (BHCD). This is the avenue to do that right now. The process can't be changed without changing the state law. Jeff also typed in the chat box:

Jeff Brown - DHCD: Mike, this proposal will also be on the June 10th General Stakeholder Workgroup meeting agenda for consideration by all stakeholders. The results of that meeting will be provided to the BHCD along with a recommendation from the General Stakeholder Workgroup.

Linda Hale: Knows that the State Fire Marshal's office is behind in collecting fees and recuperating their costs. She asked why they would make the proposal now, what changed that would prompt this?

Joshua: In the past, the State Fire Marshal's office had a Memorandum of Agreement (MOA) to do life safety code inspections. When the inspections were done, they were compensated by the Center for Medicare/Medicaid Services (CMS). About 70% of the inspections were life safety inspections, and they were primarily enforcing the life safety code over the fire code. The Memo of Agreement ended last year, and they no longer recover fees for the life safety inspections. As they shifted focus from the life safety inspections to enforcing the fire safety code, they reviewed their cost recovery options. They saw that the fees in the SFPC had not been updated in so long that they were no longer reflecting the actual costs that the office incurs.

Michael: Thinks that this is premature. He thinks this will have a big impact with lots of public opinion. He urges that this would be postponed. He is not in support of it going forward now.

Joshua: Half of the fees are inspection fees, which already exist. The proposal is to increase them. The other half is new annual permit fees. He asked Michael if he was concerned about all of the proposal or just some of it.

Linda: It looks like it may be a huge increase. She asked Joshua if he could walk through one for the group.

Joshua: In the example of a nightclub overcrowding, fire staff has to go out at night and drive to the location and address the issue. In order to recuperate expense for that, the fee increase is based on the hourly rate that it costs the State Fire Marshal's office to do the business. The annual permit fee is a one-time fee for a facility that houses or processes hazardous materials. One recent example is a chemical plant H structure storing hazmat in Wytheville where the building official asked the Fire Marshal's office for assistance with the inspection and function of the plant. Prior to this proposal, the Fire Marshal's office had no way to recover costs for this type of inspection. This type of building would tax water resources, public utilities, the building official and the State Fire marshal's office. Allowing a fee to cover costs also helps to build infrastructure for these kinds of needs. There needs to be oversight for these types of plants in rural areas. He provided all the information as to how the numbers were arrived at and that they are also in line with various localities.

Michael: Typed in the chat box:

Michael O'Connor: you are talking about public funds without public input, this is a shortcut

Florin: There seems to be some concerns as well as some support from the group members. He asked group members with concerns if they would be interested in meeting with Joshua outside of the Sub-workgroup meeting to continue discussions. He also noted that Joshua can do a floor amendment at the June 10th Workgroup meeting, to reflect changes, if any, that the stakeholders were able to reach consensus on.

Joshua: Answering Michael's question, he said this is the process, not a shortcut. This is the public forum to make this change. There's no other way to do it. He's happy to review this with anyone outside of this group meeting.

Jeff: This is the public forum. The ultimate decision will be made at the full Workgroup meeting on June 10. There are still about 30 days to discuss concerns with Joshua between now & then. Whatever decision is made at the full Workgroup that is the recommendation that will be forwarded to the BHCD.

Lee Stoermer: typed in the chat box:

Loudoun County, Fire Rescue, Fire Marshal Office: State FMO will need to be looking at doing updates to this on a more regular basis. Possibly this sort of language should be adding into the opening code language that this shall be reviewed with each code cycle.

Joshua: Replying to what Lee typed in chat, the Fire Marshal's office should look into updating the fees more often than has been done in the past. These fees are important to paying salaries. This will be addressed going forward in each code cycle. Language allowing review of fees each cycle has been in the code for many cycles.

Andrew Clark: Representing HBAV, thinks this is a good proposal, since the fees have not been updated in many years. He asked if the Sub-workgroup could meet again before the general Workgroup; he wouldn't like to see this proposal go to the Workgroup as Non Consensus.

Jeff: There is no other Sub-workgroup meeting scheduled between now and the June 10 General meeting, but there are still 30 days to review the proposal outside of the Sub-workgroup. DHCD would also be willing to attend any meetings with the stakeholders facilitated by Joshua, and assist if he would like.

Joshua: Would be very happy to have a meeting with anyone who wants to. He would also be willing to review the data he used to arrive at the fee amounts.

Florin: Based on the conversations and opposition from Sub-workgroup members, the proposal cannot be supported by the SFPC Sub-workgroup.

{BREAK 10:08 – 10:15}

FP111.2-21

Steven Sites: Representing the city of Fairfax. This proposal updates the allowable methods for the delivery of code violation notices, to include email. This would be cost and time effective. The notice of violation can be transmitted directly from the system where it's recorded and receipts can be tracked. This is not intended to replace in-person or physical mail delivery of the notification, it's just an additional option for delivery.

Florin: Hearing no further discussion, a vote resulted in only thumbs up. This proposal will be supported by the Sub-workgroup.

FP906.1-21

Florin: Received a notice of opposition from Steve Shapiro, representing AOBA and VAMA, as well as a letter from VRLTA stating their opposition. The letter is available for download in the Adobe Files Pod. Due to connectivity issues experienced by the proponent, Florin introduced the proposal, which would delete the exception for certain occupancies to not have an additional portable fire extinguisher when sprinklers are installed.

Robert Melvin: Representing VRLTA, they are in opposition and are concerned about the impact to group A occupancies. The redundancy of sprinklers and fire extinguishers is unnecessary. One specific concern is around patrons consuming alcohol and causing vandalism to portable fire extinguishers.

Dwayne Garris: This brings Virginia in alignment with the IFC. Virginia, New Jersey and Indiana are the only states with the exception, who have removed portable fire extinguishers because of having quick response sprinklers. He included a report from a 2017 NFPA study that showed that 84% of fires don't grow large enough to activate sprinklers. The National Association of Fire Marshals (NASFM), the Georgia chapter of the International Association of Fire Marshals and FEMA all believe in layered fire protections. Another study by David Wells included with the proposal shows that regardless of people being educated to leave the building during a fire, they will still try to fight the fire. They should have the proper tools to do that if needed. Training isn't required under OSHA for using fire extinguishers. FEMA, NASFM and others believe that training is beneficial and can be done via video. In a study done in eastern Kentucky, 98% of people who never used a fire extinguisher before, were able to use it correctly.

Perry Weller: Just experienced a situation in a local high school, where a fire was put out with a portable fire extinguisher. He doesn't think this needs to be changed. If the fires can be caught when they are small, before sprinklers are activated, it would save a lot of damage.

Ron Clements: Was code change submitted to VCC?

Florin: Not as far as he knows. DHCD will look into it.

Ron: It should be coordinated in the codes.

Dwayne: Is not sure what the VCC is. He thought the fire code was where this proposal should be. He asked for someone to explain to him what the VCC is.

Florin: The Virginia Construction Code uses the IBC with Virginia amendments. The SFPC uses IFC as model, but uses only maintenance & operation requirements, while construction requirements stay in the VCC.

Dwayne: Does the VCC refer to Section 906 in the fire code?

Florin: The VCC section 906.1 does have both exceptions 1 and 2, the same as the SFPC.

Ron: This doesn't change anything when buildings are constructed if it's not amended in the VCC.

Dwayne: Isn't there a group that works out correlation?

Florin: Virginia doesn't have a correlation committee like there is at the ICC level. DHCD does some correlation of codes where appropriate.

Dwayne: Addressing Perry's comment, this proposal wants to keep the fire extinguishers, not eliminate them. However, he did miss addressing this in the VCC.

Florin: Asked Dwayne if the intent was for the proposal to apply to new construction.

Dwayne: Yes, that was definitely part of the intent. He does also want it to stay in the SFPC.

Florin: The cutoff for proposals was May 1st. However, floor amendments are allowed to be introduced during the general Workgroup meetings. Given that the intent was to also amend the equivalent provisions in the VCC, DHCD staff will coordinate with Mr. Garriss and assist him with the floor amendment submittal to ensure that the proposal will include all the sections intended to be modified. Hearing no further discussion, with several group members in opposition, this proposal will not be supported by the Sub-workgroup.

FP912.2-21

Florin: This proposal puts the decision about where fire department connection devices are located, under the fire official. It goes back to IFC requirements, which were edited by Virginia a few cycles ago.

Dustin: The proposed language seems to go against the intent of the SFPC by talking about construction instead of maintenance. The fire department connections can only be relocated with a permit. This proposal seems to allow relocation without a permit.

Jimmy Moss: Agrees with Dustin.

Florin: Lee Stoermer typed a suggestion in chat, but the proponent was not on the call to address it.

Loudoun County, Fire Rescue, Fire Marshal Office: should it not be "with approval of fire chief and/or fire code official"

Perry: There used to be language in the 2015 code about the fire chief having input to where the access would be. Maybe that was the intent of this, but he's not sure. He does agree that if the proponent is not on the call, they cannot get any further clarification.

Florin: Hearing no further discussion, a vote resulted in all thumbs down. This proposal will not be supported by the Sub-workgroup as written.

FP5601.2.2.1-21

Steven: This section of the SFPC hasn't referenced NFPA 1124 since 2015. He wants to put a reference to the 2013 edition of NFPA 1124 back in, which contains sound and safe practices for the placement of permissible fireworks at sales or retail display sites. This would give fire officials the ability to ensure safe practices, such as prevention of ignition sources and security of the products within approved buildings, structures or tents. He noted that he didn't make any change to the reference standards section of the code.

Florin: Hearing no further discussion, a vote resulted in all thumbs up. This proposal will be supported by the Sub-workgroup. DHCD staff will help Steven coordinate this with the reference standards section.

FP5705.5-21

Perry: This proposal is regarding alcohol hand sanitizer dispensers. The code previously only addressed dispensers mounted on the walls. Dispensers can be mounted or stand alone, but they all need to be approved first. This adds language to allow for both types of dispensers.

Dustin: Typed a question in the chat box asking who approves the dispensers.

Perry: Approval of the dispensers is under purview of the fire official.

Dustin: The language sounds vague now. He wonders if it would be a good idea to definitively state in the language that any dispenser shall be approved by the fire code official. SFPC Chapter 2 defines "approved" as "acceptable to authority having jurisdiction".

Andrew M: This is consistent with other language in the SFPC.

Dustin: Gave a thumbs up to the language as written.

Florin: Hearing no further discussion, a vote resulted in all thumbs up. This proposal will be supported by the Sub-workgroup.

Assignments and Next Steps

Florin: Fire prevention proposals will go forth to the general Workgroup for discussion on June 10. Joshua was encouraged to meet with other stakeholders about his proposal FP107.11, and he was asked to send a Word document to DHCD with any changes he might have to the proposal to be presented to the Workgroup as a floor amendment. He thanked everyone for their participation.

TAB 12

ACTIVE SHOOTER AND HOSTILE THREATS IN PUBLIC BUILDINGS STUDY GROUP REPORT

March 29, 2022

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT 600 E. MAIN STREET SUITE 300 RICHMOND, VA 23219

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EXECUTIVE SUMMARY

Provisions were added in the 2018 editions (effective July 1, 2021) of the Uniform Statewide Building Code (USBC) and the Statewide Fire Prevention Code (SFPC) providing a compliance path for emergency supplemental hardware (aka barricade devices) to be installed in schools.[1] [2]

During the 2020 General Assembly Session, Senate Bill 333 and House Bill 670 directed the Department of Housing and Community Development (DHCD) to convene stakeholders to develop code change proposals for the USBC and SFPC, for submission to the Board of Housing and Community Development (BHCD), with the goal of assisting with the improvement of safety and security measures for the Commonwealth's public buildings during active shooter or hostile threat events.[3]

The Active Shooter and Hostile Threats in Public Buildings Study Group convened virtually (through Adobe Connect) three times: December 8, 2021; January 5, 2022; and January 26, 2022. At each of these meetings, the study group discussed the issues and shared pertinent information and concerns related to active shooter or hostile threat events, as well as the impact of installing emergency supplemental hardware in public buildings.[4]

Although consensus was not reached, the meetings resulted in a code change proposal that provides a compliance path for the installation of emergency supplemental hardware within public buildings and defines "public buildings" within the context of the USBC and SFPC.[5]

The following members support the code change proposal:

- Virginia Fire Prevention Association
- Virginia Building & Code Officials Association
- Nightlock

Some of the reasons cited for support:

- Installation of ESH can already be approved under the current code provisions, via the code modification process
- A reasonable expectation that further codifying the ESH requirements would result in more uniformity in building design, as well as code enforcement

The following members do not support the proposal:

- Virginia Fire Chiefs Association

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[1] USBC: https://codes.iccsafe.org/content/VCC2018P3
SFPC: https://codes.iccsafe.org/content/VFC2018P2

[2] The USBC defines "emergency supplemental hardware (ESH)" as: *"any approved hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill".*

[3] 2020 General Assembly, Senate Bill 333: https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP0533
2020 General Assembly, House Bill 670: https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP0130

[4] For a full list of Study Group members, please see Appendix B, "Study Group Members". For a full list of participants during each Study Group meeting, please see Appendix A, "Agendas, Meeting Summaries, Participants".

[5] For a copy of the proposal (B1010.2.8-21), please see Appendix D, "Code Change Proposals".

- Door and Hardware Institute
- Virginia Department of General Services - Division of Engineering
- American Institute of Architects – Virginia Chapter

Some of the reasons cited for opposition:

- The installation of ESH might lower the existing level of safety in certain situations
- Locking arrangements currently allowed by the model building codes are adequate
- According to research, no active shooter has breached a locked door
- Installing ESH in addition to regular locking mechanisms could add to confusion
- Difficulty for first responders in gaining entry and facilitating medical/rescue operations
- Additional training is required for the utilization of ESH
- Concern with treating public buildings different from private buildings

The following members abstained from providing an official position on the proposal:

- Virginia Department of Fire Programs/State Fire Marshal's Office
- Virginia State Police
- Stafford County
- Local Government (Orange County)
- Local Law Enforcement – City (City of Chesapeake)
- Local Law Enforcement – County (Roanoke County)
- Accessibility (Virginia Board for People with Disabilities)

The report that follows provides a summary of the discussions, including questions and concerns that were raised. Supporting documents and the summaries from each of the three Study Group meetings are included as appendices following this report.

Note: the links referenced throughout the report were active as of the writing of this report.

BACKGROUND

During the 2019 General Assembly Session, SB 1755 directed DHCD to convene stakeholders to develop USBC and SFPC proposals, with the goal of assisting in the provisions of safety and security measures for active shooter or hostile threats in public or private elementary and secondary schools and public or private institutions of higher education.[6] The meetings resulted in code change proposal B108.1-18, submitted to the BHCD for consideration on behalf of several stakeholder groups.[7] The proposal, which was approved as modified by the BHCD, culminated in new ESH provisions for inclusion in the 2018 USBC and the 2018 SFPC.

During the 2020 General Assembly Session, SB 333 and HB 670 directed DHCD to convene stakeholders to develop USBC and SFPC proposals with the goal of assisting in the provision of safety and security measures for the Commonwealth's public buildings for active shooter or hostile threats while maintaining compliance with basic ADA accessibility requirements.

The directive also required the examination of (i) door locking devices, (ii) barricade devices, and (iii) other safety measures on doors and windows for the purpose of preventing both ingress and egress in the event of a threat to the physical security of persons in such buildings.

CURRENT USBC REQUIREMENTS

Current code (2018 USBC, effective July 1, 2021) requirements allow for the installation of ESH in schools. Specifically, they are allowed in the following USBC uses/occupancies, when in compliance with several specific conditions for approval: Group E occupancies, except Group E day care facilities, and in Group B educational occupancies.

Prior to approval of ESH, the building code official must consult with the local fire code official, or state fire code official if no local fire code official exists, and the head of the local law-enforcement agency.

The local fire code official; the state fire code official; and the local fire, EMS, and law-enforcement first responders must be notified by the building code official when approval for ESH installation is granted.

Conditions specific to ESH approval in schools:

- The door must be capable of being opened from outside the room with a key, proprietary device provided by the manufacturer, or other approved means.
- If ESH is installed on fire door assemblies, the installation must comply with Section 716.2 of the Virginia Construction Code.[8]
- Modifications shall not be made to listed panic hardware, fire door hardware, or door closures.
- The ESH shall not be capable of being used on other doors not intended to be used and shall have at least one component that requires modification to, or is permanently affixed

[6] 2019 General Assembly, Senate Bill 1755: https://lis.virginia.gov/cgi-bin/legp604.exe?191+ful+SB1755
[7] B108.1-18: see Appendix C, "Supporting Documentation"
[8] Virginia Construction Code (VCC): https://codes.iccsafe.org/content/VCC2018P3

to, the surrounding wall, floor, door, or frame assembly construction for it to properly function.

- Employees shall engage in lockdown training procedures on how to deploy and remove the ESH, and its use must be incorporated in the approved lockdown plan complying with the SFPC.
- The ESH and its components must be maintained in accordance with the SFPC.
- Approved ESH must be of consistent type throughout a building. The exception allows the building official to approve alternate types of ESH when a consistent device cannot be installed.
- ESH installations, when deployed, are not required to comply with the accessibility provisions set forth by the VCC. VCC Section 1010.1.4.4 (item 2) recommends that school officials consult with their legal counsel regarding provisions of the Americans with Disabilities Act of 1990 (42 USC § 12101 et seq.).

CURRENT SFPC REQUIREMENTS

2018 SFPC provisions specific to ESH:

- Lockdown plans must include a description of how locking means and methods are in compliance with the requirements of the VCC and the applicable provisions of this code for egress and accessibility.
- Where a facility has installed approved ESH, employees must be trained on their assigned duties and procedures for the use of such device. Records of in-service training shall be made available to the fire code official upon request.
- The use of ESH to prevent the ingress or egress from any occupied space is prohibited, with some exceptions:
    - The device is utilized by authorized persons or other persons occupying such space in the event of any actual or perceived hostile threat or active shooter event.
    - The device is utilized in conjunction with any approved lockdown drill requiring the utilization of the approved ESH.
    - Utilization of the device for the testing, use, and training by emergency response personnel.
- ESH must be provided with a readily visible durable sign posted on the egress side on or adjacent to the door stating: “THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY.”
- Allows the fire code official to revoke the use and storage of ESH for due cause.

EXAMPLES OF ESS INSTALLATIONS IN VIRGINIA SCHOOLS

Pre - 2018 USBC Adoption

Prior to adoption of the 2018 USBC, the USBC did not specifically address ESH. However, Section 106.3 of the USBC allows a building official to approve a modification of any provision of the USBC, provided the spirit and functional intent of the code are observed and public health, welfare and safety are assured. This code modification process was utilized by some building officials, prior to the 2018 USBC adoption, to approve installation of ESH.

In accordance with the Nightlock representative's statements, their products have already been installed in 62 Virginia schools, as well as a couple of office buildings, over the past six to seven years.[9] Given the lack of information available, the Study Group was unable to ascertain what the approval process for the installation of ESH in said schools entailed. Speculation was made by study group members that some existing ESH installations may be undocumented and that first responders may be unaware of their existence.

One other anecdotal example of ESH installation, familiar to several Study Group members, is Augusta County Public Schools. The ESH approval in Augusta County schools followed the USBC code modification process and included coordination and consultation between the building official, school officials, local law enforcement and first responders.

Post - 2018 USBC Adoption

Study group members raised the question of whether anyone in the group is familiar with any installations of ESH in schools, since the adoption of the 2018 USBC. The idea being that testimony from building officials with experience on the review and approval of these devices, would be useful for the group during discussions. This testimony could aid the members in understanding what works and what doesn't, as well as what should or could be improved.

No Study Group member was aware of any installations since the adoption of the 2018 USBC.

In an effort to garner more information on the subject, DHCD staff sent a memo to all the Virginia building officials, inviting them to contact DHCD and share their experience, if any, with the review/approval of these devices based on the 2018 USBC provisions. DHCD staff has not received any replies to this request for information.

In another attempt to gather some feedback on this topic, DHCD reached out to Augusta County Public Schools and inquired about their experience with ESH since their installation. The response from Augusta County indicates that they continue to utilize the ESH during the drills mandated by the Virginia Department of Education and the Code of Virginia; new school staff are trained on the use of devices; there has been no need to activate the devices for a hostile threat situation; the ESH are easy to maintain. The School Security Committee has decided to continue to pursue installation of ESH in the remaining seven (7) elementary schools if funds are present, as they see the value in the device.

The Nightlock representative indicated that they are currently in the process of providing estimates to a couple of schools in Virginia.

EXAMPLES OF ESH INSTALLATIONS IN PUBLIC BUILDINGS

The Nightlock representative alluded to a couple of Virginia public buildings where their products have been installed, but only provided the name of one building: The Center for Naval Aviation Technical Training.

Nationwide, while Nightlock's primary market is schools, as per their representative, their products have been installed in varied public buildings, such as military, government, corporate

[9] Nightlock: https://nightlock.com/

and retail outlets. Nightlock's representative noted that their devices have been installed in all of Abercrombie's 800+ retail stores nationwide.

He added that their devices have been installed in all fifty US States.

CONSIDERATIONS AND CONCERNS

Several concerns associated with the installation of ESH were raised and evaluated by the Study Group members.

- A common theme appeared to be that installation of ESH might lower the level of safety in some situations.
  - The example of schools was given, in which case, the violence has usually come from within, not from outside. Installing ESH could only exacerbate the situation by providing the assailant the opportunity to lock the victim in the room.
  - Active shooters could barricade themselves along with the victims within a room by deploying the ESH. That would make it difficult for the law enforcement, emergency medical service, firefighters, etc. to access the room.
- Public buildings are operated differently than schools. Schools have a hierarchy of authority which enables the orderly deployment of ESH by designated staff. Public buildings are not always set up that way.
- Preference of door locks over supplemental hardware.
  - Research shows that the locking devices/arrangements currently allowed by the model building codes work, as no active shooter has breached a locked door.
  - Common locks are less confusing to operate. They are intuitive, no training is required for their use, unlike ESH.
  - Common locking devices initiated from inside the room can easily be unlocked, allow for access by first responders and are ADA compliant.
  - Installing ESH in addition to regular locking mechanisms could add to confusion.
  - Additional potential issues with ESH could result from insufficient training on utilizing the devices, as well as misplacement of an ESH device or part thereof.
- Benefits of current ESH code provisions: whilst opposition against expanding the current ESH allowances to other uses/occupancies was noted, the merit of existing building code provisions was recognized. Prior to the adoption of the 2018 USBC, there was no uniformity in the approval of these devices. Adding the criteria to the 2018 USBC by which ESH are to be approved made the code safer than it was before.
- Training/policy issue vs. building code issue: electrically locked doors, which are permitted by the current building codes, allow for remote locking activation. The example of an office building with several suites was given, where the ingress doors can be locked/unlocked remotely, and the building occupants/visitors have to identify themselves prior to entering the building.
- Incremental approach concerns: allowing the installation of ESH in public buildings, in addition to schools, is not favored by most Study Group members and is viewed as an incremental approach that could potentially open the door for future expansion to other buildings/occupancies.

- Public buildings vs. private buildings: the intent of developing code change proposals to allow for the installation of ESH in public buildings only, but not in private buildings, was questioned.
  - If there's a need for ESH in public buildings, why is there no need for ESH in private buildings?
  - What is unique about public building occupants that is different from private building occupants?
  - DHCD staff has clarified that the focus of this study is on public buildings as directed by the legislation. Proposals addressing this issue for private buildings could be submitted by anyone, outside of this study, for consideration by the BHCD.
- Allowing vs. requiring ESH: of note is that the intent of potential code change proposals is to create a compliance path to allow installation of ESH in public buildings and is not to mandate that ESH be installed in any building, similar to the existing code provisions for schools. Just because the code allows certain features or devices, it does not necessarily mean that the prospective building owners will chose to install them.

PUBLIC BUILDINGS

It became evident very early in the discussions that it would be essential to define what a public building is in the context of complying with the charge set forth by SB 333 and HB 670.

The group appeared to be in agreement that the intent of the bills was to address governmental buildings – owned, used, leased or otherwise occupied by a governmental entity.

Several definitions were considered:

- Code of Virginia § 2.2-1159. Facilities for persons with physical disabilities in certain buildings; definitions; construction standards; waiver; temporary buildings.[10]
  A. "Building" means *any building or facility, used by the public, which is constructed in whole or in part or altered by the use of state, county or municipal funds, or the funds of any political subdivision of this Commonwealth. "Building" shall not include public school buildings and facilities, which shall be governed by standards established by the Board of Education pursuant to § 22.1-138.*
- 10 CFR § 420.2 - Definitions.[11]
  Public building means *any building which is open to the public during normal business hours, including:*
  (1) Any building which provides facilities or shelter for public assembly, or which is used for educational office or institutional purposes;

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[10] Code of Virginia § 2.2-1159: https://law.lis.virginia.gov/vacode/title2.2/chapter11/section2.2-1159/#:~:text=%C2%A7%202.2%2D1159.-,Facilities%20for%20persons%20with%20physical%20disabilities%20in%20certain%20buildings%3B%20definitions,standards%3B%20waiver%3B%20temporary%20buildings.&text=%22Building%22%20shall%20not%20include%20public,pursuant%20to%20%C2%A7%2022.1%2D138.

[11] 10 CFR § 420.2: https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-420

(2) Any inn, hotel, motel, sports arena, supermarket, transportation terminal, retail store, restaurant, or other commercial establishment which provides services or retail merchandise;
(3) Any general office space and any portion of an industrial facility used primarily as office space;
(4) Any building owned by a State or political subdivision thereof, including libraries, museums, schools, hospitals, auditoriums, sport arenas, and university buildings; and
(5) Any public or private non-profit school or hospital.

- Law Insider.[12]
  Public building and "public work"; means *a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.*
- Biz fluent – Jennifer VanBaren.[13]
  Public buildings are *any type of building that is accessible to the public and is funded from public sources. Typically, public buildings are funded through tax money by the U.S. government or state or local governments. All types of governmental offices are considered public buildings. Public buildings generally serve the purpose of providing a service to the public. Many of these services are provided free to residents. This list includes public schools, libraries, courthouses and post offices.*
- Collins English Dictionary.[14]
  Public Building - *a building that belongs to a town or state, and is used by the public.*
- Study Group member.
  Public Building – *a building or structure of a governmental entity (local, state, or Federal government) that is accessible to the general public and funded from public sources, that exists for the purpose of providing services to the general public. Examples of such buildings are public schools, governmental offices and facilities, libraries, courthouses, and similar buildings.*
- DHCD staff.
  "Public Building" - *a structure or building that is owned, leased, or otherwise occupied by a municipality or the state and used for any municipal or public purposes by the municipality or the state.*

[12] https://www.lawinsider.com/dictionary/public-building
[13] Biz fluent – Jennifer VanBaren: https://bizfluent.com/info-7834283-types-public-buildings.html
[14] Collins English Dictionary: https://www.collinsdictionary.com/us/dictionary/english/public-building

AMERICANS WITH DISABILITIES ACT (ADA)[15]

SB 333 and HB 670 charges the Study Group to ensure that any code change proposals will maintain compliance with basic accessibility requirements of the ADA.

The ADA is a federal law with which owners and regulators must comply. It is not to be misconstrued as building code or construction provisions. The individuals charged with the enforcement of the building and fire codes are not normally authorized to interpret or enforce the ADA law.

> As per the U.S. Access Board, "*DOJ's and DOT's ADA Standards are not a building code, nor are they enforced like one.*[16] *They constitute design and construction requirements issued under a civil rights law. The ADA's mandates, including the accessibility standards, are enforced through investigations of complaints filed with federal agencies, or through litigation brought by private individuals or the federal government. There is no plan review or permitting process under the ADA. Nor are building departments required or authorized by the ADA to enforce the ADA Standards (some building departments even include a disclaimer on their plan checks indicating that ADA compliance is not part of their approval process). Entities covered by the law ultimately are responsible for ensuring compliance with the ADA Standards in new construction and alterations.*"

The current building code provisions exempt ESH, when deployed, from complying with the accessibility requirements prescribed by the USBC. In recognition of this, and to ensure that the ADA provisions were also considered, the ESH requirements in the USBC for schools state that school officials should consult with their legal counsel regarding applicable ADA provisions. The same approach could be taken with any code change proposal developed by this group.

Note: The Department of General Services representative clarified that the review and permitting process for state buildings does include verification for compliance with the ADA.

SUPPORTING DOCUMENTATION AND REFERENCE MATERIALS

Documentation discussed by the Study Group included the following:

- DHCD staff PowerPoint presentation
- Senate Bill 1755 - 2019 General Assembly
- Senate Bill 333 - 2020 General Assembly
- House Bill 670 - 2020 General Assembly
- 2018 Virginia Code Change Proposal B108.1-18
- Myths (and Facts) About Classroom Barricade Devices - submitted by Virginia Fire Prevention Association
- NFPA 3000 Brochure - submitted by Virginia Fire Prevention Association

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[15] ADA: https://www.ada.gov/

[16] U.S. Access Board: https://www.access-board.gov/ada/guides/chapter-1-using-the-ada-standards/#:~:text=DOJ's%20and%20DOT's%20ADA%20Standards%20are%20not%20a%20building%20code,under%20a%20civil%20rights%20law.

- Code Change Proposal - submitted by Virginia Fire Prevention Association
- Code Change Proposal - drafted by DHCD staff

Additional referenced materials include two articles found at the following links, shared with the Study Group by the Virginia Department of General Services representative:

- https://idighardware.com/2020/01/decoded-barricade-devices-and-the-ada-march-2019/
- https://www.tssbulletproof.com/blog/school-door-barricades-could-create-safety-concerns/

Documents and referenced articles submitted by Study Group members appear to favor the locking arrangements currently allowed by the model codes and advise against the installation of ESH in buildings.
In response to this, the Nightlock representative opined that the articles released by the door and hardware industry do not provide enough information about the facts associated with ESH. They will tell you what they want you to hear. The door and hardware industry see ESH as competition. They also lump all ESH into one item, although some are better than others. The Nightlock representative agrees that there are some ESH devices out there that are not good and should not be approved. However, there are ESH on the market that do comply with the model codes.

CODE CHANGE PROPOSAL DRAFTED BY VIRGINIA FIRE PREVENTION ASSOCIATION

The Virginia Fire Prevention Association representative drafted a code change proposal and shared with the Study Group for deliberation.

The proposal intends to add Section 404.2.3.3 to the SFPC which would require the development, operation and maintenance of lockdown plans, including the use of ESH, to be in accordance with Chapter 9 of NFPA 3000.

The group appeared to be in agreement that the proposal is not specific to public buildings, as required by SB 333 and HB 670, but it is more of a global type change. DHCD staff suggested that the proposal could be submitted outside of this group and offered to assist the VFPA representative with polling other Study Group members on whether they wish to be added as co-proponents to the proposal, in the event that it is submitted for consideration by the BHCD.

Note: upon further consideration, the VFPA representative has decided to not submit the code change proposal for consideration by the BHCD due to potential conflicts between NFPA 3000 and the IFC/SFPC.

CODE CHANGE PROPOSAL DRAFTED BY DHCD STAFF

DHCD staff drafted a code change proposal and presented it to the Study Group to facilitate discussions on what it would entail to add public buildings to the current code allowances.

The intent of the proposal is to comply with SB 333 and HB 670 by expanding on the existing provisions for ESH applicable to schools. The gist of the proposal is defining “Public Buildings” and adding public buildings to the list of uses/occupancies already allowed by the USBC to be provided with ESH.

Brief Summary of Proposed Changes

- Requires a building permit for the removal of ESH.
- Requires consultation between the building official, the local or state fire code official, as applicable, and the local law-enforcement agency prior to the removal of ESH. The local or state fire code official – as applicable; the local fire, EMS and law-enforcement must be notified upon approval/removal of ESH.
  Note: current code provisions already require a building permit for the installation of ESH, as well as notification upon approval. There could be instances in the future where the building changes owners/occupants/etc. and the building is no longer a "public building". Given that the proposal would only allow ESH in public buildings, if the building does not meet the definition for "public building" anymore, it would no longer be in compliance. Thus, the ESH would have to be removed.
- Defines "public building" as: "*a structure or building that is owned, leased, or otherwise occupied by a municipality or the state and used for any municipal or public purposes by the municipality or the state".*
- Adds "public buildings" to the list of existing uses/occupancies allowed to be provided with ESH. All existing code prescribed conditions for approval of ESH would apply to public buildings, as well.
- Adds "building owner" to existing USBC Note recommending school officials to consult with their legal counsel regarding provisions of the Americans with Disabilities Act of 1990.
- Modifies the SFPC to require the maintenance of ESH in accordance with the conditions of its approval (in addition to the manufacturer's instructions and the SFPC, which is already stipulated by the SFPC).

Upon deliberations by the Study Group during the meeting on January 26, 2022, the proposal received support from the following stakeholder representatives, in attendance: Virginia Fire Chiefs Association; Virginia Fire Prevention Association; Virginia Building and Code Officials Association; and Nightlock.

At the same meeting, the proposal was specifically opposed by the following stakeholder representatives, in attendance: Virginia Department of General Services; and Door and Hardware Institute. An email from the AIA (VA Chapter) representative, dated February 9, 2022, also indicated opposition to this proposal.

In an effort to provide all the stakeholders (including those not in attendance on January 26, 2022) the opportunity to express whether the entity they are representing supports or opposes the proposal, a doodle poll was sent out to the Study Group members on February 15, 2022. The poll respondents have indicated the following positions:

In support of the proposal: Virginia Fire Prevention Association; Virginia Building & Code Officials Association; Nightlock.
In opposition to the proposal: Virginia Fire Chiefs Association; Door and Hardware Institute; Virginia Department of General Services - Division of Engineering & Buildings; American Institute of Architects - VA Chapter.

CONCLUSIONS AND ACKNOWLEDGEMENTS

Study Group meetings yielded several fruitful discussions regarding ways in which the safety of public building occupants could be improved during potential active shooter or hostile threats situations. The stakeholders did not reach consensus on what would constitute the best solution. This report documents the key issues discussed and it includes supplementary documents provided by stakeholders. Below are a summary of the key findings, based on the information provided and stakeholder process.

- Common locking arrangements allowed by the model building code are effective and are preferred over ESH.
- There is some concern with treating public buildings different from private buildings.
- Discussions appeared to indicate that the overwhelming majority of stakeholders do not specifically endorse the installation of ESH. Likewise, expanding the code allowances to other uses/occupancies are not welcome by most stakeholders. However, providing a code compliant path for the approval of ESH should lead to uniformity.
- A code change proposal specific to public buildings was developed, as directed by SB 333 and HB 670, and considered by the group. The proposal modifies the USBC and the SFPC to allow the installation of ESH in public buildings while maintaining compliance with basic accessibility requirements under the ADA.

Finally, the staff of DHCD wish to thank the study group participants for the time and energy they committed to this process. The stakeholders presented arguments based on their backgrounds in fire services; fire and building codes; emergency management and prevention; law enforcement; public administration, door hardware and more. This committed group lent many hours of their time submitting documents, conducting conversations, and reviewing their colleagues' arguments and positions. They shared their knowledge and experience in the form of anecdotes, documented case studies, and current practices. We deeply appreciate their expertise and willingness to engage in the Study Group discussions.

APPENDIX A: Agendas, Meeting Summaries, Participants

Active Shooter and Hostile Threats in Public Buildings
December 8, 2021
9:00 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

AGENDA

1) Welcome

2) Introductions

3) Overview of VA Code Development Process

4) Background

5) Discussion

6) Assignments and Next Steps

7) Next Meeting

Active Shooter and Hostile Threats in Public Buildings Meeting Summary

December 8, 2021 9:00 a.m. - 10:55 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:
Cindy Davis: Deputy Director, Division of Building and Fire Regulations (BFR)
Jeanette Campbell: Administrative Assistant, BFR
Jeff Brown: State Building Codes Director, State Building Codes Office (SBCO)
Richard Potts: Code Development and Technical Support Administrator, SBCO
Paul Messplay: Code and Regulation Specialist, SBCO
Florin Moldovan: Code and Regulation Specialist, SBCO
Travis Luter: Code and Regulation Specialist, SBCO
Chad Lambert: Code and Regulation Specialist/South West Virginia, SBCO

Study Group Members:
Jimmy Moss: Virginia Building and Code Officials Association
Ernie Little: Virginia Fire Prevention Association, Virginia Fire Services Board
Billy Hux: Virginia Department of Fire Programs, Virginia State Fire Marshal
Mark Dreyer: Virginia Department of General Services, Division of Engineering and Buildings, State Review Architect
Patrick Green: Virginia state police First Sergeant and training manager
James Garrett: City of Chesapeake Police Department, Lieutenant in charge of S.W.A.T., and 911 coordinator
Cmdr. Chris Kuyper: Roanoke County Police Department Commander, Special Ops. instructor for county, FBI active shooter taskforce, Washington DC
Kurt Roeper: Door and Hardware Institute

Other Interested Parties:
Christopher Barry: Virginia Fire Chiefs Association, Fire Prevention Inspector-Loudoun County
Todd Strang: Fire Official-Spotsylvania County
Nadia Vugteveen: Virginia Commonwealth University Student
Stewart Anderson:
Andrew Milliken: Virginia Fire Chiefs Association, Virginia Fire Services Board Chairman of Fire Codes and Standards Committee
Ken Cook: Allegion
Dan Willham: Fairfax County

Study Group Members not in attendance:
Rob Comet – American Institute of Architects-VA
Frederick Presley - Stafford County
Jim Crozier - Orange County
Jack Taylor - Nightlock
Teri Morgan – Virginia Board for People with Disabilities

AGENDA AND DISCUSSION ITEMS: Power Point is on the DHCD website, with a link on the cdpVA website

1) Welcome

Jeff Brown: Welcomed participants to the Adobe Connect meeting. He noted that these meetings will be recorded; there will be no video for these meetings due to bandwidth limitations. He went over housekeeping items for participants: stay on mute if not speaking; use 'raise hand' function and wait to be announced; there will be hourly breaks; meetings are open to anyone, but discussions should be only between Study Group members. Documents presented will be posted later. Please be professional, respectful and concise when speaking.

2) Introductions

Jeff Brown: Introductions – DHCD staff members introduced themselves; Study Group members introduced themselves. Jeff reminded all that the discussion is among Study Group members and others are welcome to listen in on the meeting.

3) Overview of VA Code Development Process

Jeff Brown: Gave an overview of the 2021 Virginia Code Development Cycle with approximate dates by month of when each of the steps happen, i.e.: cdpVA opened for proposals in October 2021, NOIRAs were published in November 2021, groups meet to discuss code change proposals between December and June 2022, BHCD considers proposals in September 2022 and proposed regulations in December 2022, 2021 codes become effective in Virginia in the fall or winter of 2023.

The cdpVA website is: va.cdpacess.com The Virginia online code development system accepts proposals from anyone and all the information provided and captured during the process is available for viewing.

Study Groups study specific topics, identify areas of consensus and disagreement, and determine if code change proposals or other solutions are appropriate. They may review proposals, provide analysis, make recommendations, and/or develop code change proposals. Topics and proposals are meant to be presented and discussed during the proposed regulation phase, not the final phase, which is reserved for errors or minor corrections. Proposals and recommendations of Study Groups are reviewed by the General Workgroups prior to BHCD consideration. Study Groups are disbanded after they complete discussions.

Sub-Workgroups Review all code change proposals within their subject topics. They make recommendations on each proposal, including negotiating compromises where appropriate, in an attempt to form a group consensus on each proposal. They may also develop new code change proposals, or support proposals submitted by others by joining the proposal as a proponent. Proposals and recommendations of Sub-Workgroups are reviewed by the General Workgroups prior to BHCD consideration.

General Workgroups are open to all public for discussion and comment. They will review all proposals received, and aim for a consensus to approve or disapprove each one. They will recommend the proposals to the BHCD in blocks, sorted by those receiving consensus to approve or disapprove, as well as non-consensus proposals. The consensus proposals are usually voted through as recommended. Non-consensus proposals go to the BHCD in their entirety, including summaries and all related documents. Recommendations from this Study Group, for example, will go to General Workgroups and then to the BHCD as outlined.

4) Background

Jeff Brown: **2019 General Assembly Session: Senate Bill (SB) 1755** directed DHCD to convene stakeholders to develop USBC and SFPC proposals regarding safety and security measures for active shooter or hostile threats. The directive was specific to elementary and secondary schools and public or private higher education institutions. The review was to include examination of locking devices, barricade devices and other safety measures. This current Study Group has the same objectives, but is not limited to the same type of building.

2018 Code Development Cycle formed a School Safety Sub-Workgroup in February-March 2019, which convened April-August 2019. A non-consensus proposal, B108.1-18, was submitted to the BHCD, who approved it in December 2020. The 2018 USBC and SFPC became effective on July 1 this year.

2018 IBC Code sections: 1010.1.4.4 Locking arrangements in Group E and B educational occupancies. Provided for egress doors with locking arrangements to keep intruders out as long as the door is capable of being unlocked from outside with a key or other approved means, the door opens from inside the room as per Section 1010.1.9 and there are no modifications made to listed panic hardware, fire door hardware or door closers. **1010.1.4.4.1** Included remote operation of locks as per Section 1010.1.4.4. These IBC requirements were the baseline for the 2018 School Safety Sub-Workgroup meetings.

2018 School Safety Sub-Workgroup met four times. Multiple code change proposals and versions were considered. A full consensus was not reached, but 2 options were submitted to the BHCD. **B108.1-18:** Compliance path in VCC for 'emergency supplemental hardware' and **BO101.1:** Add a VCC appendix including a compliance path for 'emergency supplemental hardware' which would be optional for each locality to adopt.

B108.1-18 was approved: The term 'emergency supplemental hardware' – any approved hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill (barricades, in short). These devices are allowed in Group E (except day care facilities) and Group B educational occupancies. This was included in the 2018 USBC and SFPC and became effective July 1, 2021. Proponents were noted, but not all in the Sub-Workgroup supported it. **BO101.1.1-18** also included some proponents, but was not approved.

2020 General Assembly Session: SB 333 and HB 670 Directed DHCD to convene stakeholders to develop USBC and SFPC proposals with the goal of assisting in the provision of safety and security measures for the Commonwealth's public buildings for active shooter or hostile threats. These two bills are identical, and share the same objective as the 2019 General Assembly SB 1755, except that it relates to public buildings instead of educational institutions.

Current Study Group objectives: SB 333 and HB 670: Develop proposals to change USBC and SFPC to provide safety and security measures for active shooter or hostile threats in public buildings. There will potentially be some members who support and some who oppose, however there needs to be a goal of ultimately providing proposals for consideration by the Board, even if not supported by all members. The group is welcome to provide data and presentations regarding their position in any matter discussed. Try to develop proposals in line with what is already established in the codes for education buildings. If there is not full consensus, all information, including proponents and those opposed will be given to BHCD. Before moving forward with developing proposals, group members should review and understand the existing USBC and SFPC requirements.

All Virginia codes are available for free online at: https://codes.iccsafe.org/codes/virginia

2018 USBC - Current Virginia code requirements (effective 7/1/21):

New term defined: "Emergency Supplemental Hardware" is any approved hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill. The technical term can be interchangeable with 'barricades' or 'ESH' in discussions.

Section 108.1: When applications are required. Application for permit shall be obtained before any work is done during construction or demolition and for installations or alterations to any required means of egress system, including the addition of emergency supplemental hardware.

Section 110.1.1: Consultation & Notification. Prior to approval of ESH, the Building Code Official shall consult with local Fire Code Official or state Fire Marshal's office and local law enforcement agency. All officials need to be notified of approval and installation.

Sec 1010.1.4.4: Locking arrangements in educational Group E (except day care) and Group B institutions; internal doors for classrooms, offices and other occupied rooms are permitted to have ESH when 7 conditions are met:

1. Door can be opened from outside the room with a key, other manufacturer device or other approved means.
2. Door opens from within the room as per Section 1010.1.9, except when ESH not required to comply with Chapter 11. Schools should consult with legal counsel regarding accessibility and any other applicable requirements.
3. Installation of ESH on fire door must comply with Section 716.2 with no modifications to panic hardware fire door hardware or door closures.
4. ESH shall not be capable of being used on other doors not intended for use, and need at least one component requiring modification or is permanently affixed to surrounding wall, floor, door or frame to properly function.
5. Employees shall have lockdown training procedures about how to deploy and remove ESH, and its use shall be in the approved lockdown plan complying with the SFPC.
6. ESH and components shall be maintained in accordance with the SFPC.
7. Approved ESH shall be consistent throughout building (except alternate types of ESH in accordance with Section 110.1 when a consistent device can't be installed).

2018 USBC: ESH related amendments to general VCC requirements:

1010.1.9 Door operation prohibits a special key or knowledge to get out (exception added for ESH)
1010.1.9.1 Hardware has no tight grasping, pinching or twisting of wrist required (exception added for ESH)
1010.1.9.2 ESH height – 48" maximum above the floor (lower than 34" is ok for ESH)
1010.1.9.4 Locks and latches permitted. New item #7: Egress doors equipped with ESH complying with 1010.1.4.4

7.1 Visible sign on egress side "This hardware shall be used by authorized personnel only" in 1-inch letters on contrasting background.

7.2 Use of ESH is revocable by building fire official for due cause (in case of unauthorized or abusive use)

1010.1.9.5 Bolt locks: Prohibits manually operated flush or surface bolts (exception added for ESH)
1010.1.9.6 Unlatching shall not require more than one operation (exception to allow one additional operation for release of ESH).
1010.1.9.8 Delayed Egress: Exception to clarify that ESH shall not be considered a delayed egress locking system.
1103.2.15: New exception to the general accessibility requirements added for Group E buildings (except daycare) and Group B educational occupancies, when ESH is deployed during active shooter or hostile threat event.

2018 SFPC:

New term defined: Emergency Supplemental Hardware: Any approved hardware used only for emergency events or drills to keep intruders out during an active shooter or hostile threat event or drill.
SFPC 404.2.3.1 Lockdown Plan contents: Items to be included in lockdown plans item 4.4 amended to ensure lockdown plan also includes description of how locking complies with VCC
406.3.4.1 New section: ESH training shall be done and records shall be available to fire code official on request
1001.4 New Section: Unauthorized use – no person shall use ESH to prevent ingress or egress, except:

An authorized person for a real or perceived active shooter or hostile threat
Used in a lockdown drill as required
Used for testing and training by emergency response personnel.

If ESH is used for any of the 3 reasons, it must be removed immediately after the conditions pass.
1010.1.9 Door operations. Except as specifically permitted by the applicable building code (added for approved ESH), egress doors shall be clear to open without use of a key or special knowledge or effort.
1010.1.9.4 Locks & Latches. There must be a visible sign on the egress side of the door with 1-inch letters on a contrasting background stating "THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED". There must also be a visible sign on the egress side of the door, adjacent to the ESH, with 1-inch letters on a contrasting background stating "THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY".
1031.2 Reliability. Unless otherwise permitted by the applicable building code (added for approved ESH), exits shall be free from obstructions.
1031.11 New Section. Maintenance of ESH: Allows the fire code official to revoke the use and storage of ESH for due cause.

5) Next Steps

Jeff Brown:
Group purpose in developing and submitting USBC and SFPC code change proposals includes examining:

1. Public buildings – determine what buildings to include
2. Other devices and safety measures – Identify and consider devices or measures for doors and windows
3. Accessibility – ensure that any proposals address compliance with basic accessibility requirements.

Code Change Proposals expectations:

1. Group members are not expected to be a proponent of any proposal that they do not support
2. Proposals developed by group will be submitted with information clearly identifying members in support
3. Proposals will be submitted in cdpVA for further review by all stakeholders
4. Proposals will be discussed by General Stakeholder Workgroups to determine the recommendation prior to going to BHCD
5. Nobody is prevented from submitting a related proposal at any time.

6) Discussion

Jeff Brown opened the floor for discussion:

Kurt Roeper: Process questions – will the slides presented today be available to review later?
Jeff Brown: Yes, there's a copy of this presentation in the bottom left box of this Adobe Connect meeting. There will also be a link to the presentation posted in cdpVA.
Kurt: Regarding the current building code development cycle – does it begin with the current Virginia building code (2018 VCC), or with the ICC code (2021 IBC) as a base?
Jeff: It starts with the current Virginia building code regulations (2018 adopted 7/1/21). Any changes proposed, will be changes to the existing VCC. If there are sections of the IBC that are not amended by Virginia, the 2021 ICC text will be the starting point.

Mark Dreyer: Does anyone on the call have any anecdotal examples of ESH installation at a school since the 2018 VCC code became effective in July?
Jeff Brown: Unaware of any specific examples. He said he would check into it, and also asked group members to share if they find any occurrences.
Mark: He's looking for testimony from individuals who have seen these approved and installed, and thinks it could be useful to the group discussion.
Cindy Davis: As a reminder, Augusta County schools installed something and it precipitated the General Assembly discussion. We could reach out to Augusta County.
Mark: To clarify, he is wondering if any barricades have been approved and installed in any schools after July 2021, using the new Virginia 2018 code language; to see if there were any lessons learned, or expectations not met.

Mark Dreyer: is wondering if they can start a discussion now on what is a 'public building'.
Jeff: His impression is that the intent was not to consider every building open to the public, but that it was more geared towards governmental buildings.
Mark: Was certainly thinking state buildings would be included, but could it also include local city or county buildings (ex: Henrico public library)?
Jimmy Moss: typed in that he agreed with the initial thought that public buildings include state and local.
Cindy: shares a reminder that the legislation came in on the heels of the Virginia Beach shooting. It is probably on point to think state and local government buildings. This may require a new definition.
Jeff: Identifying what is a public building will need to be agreed upon by the group. This is a good start for homework, and a good start for any proposal that is recommended.

7) Next Meeting and pre-meeting work:

Jeff Brown: Prior to next meeting:

1. Review existing code requirements and reach out to DHCD with any questions.
2. Identify other devices or security measures for doors and windows – provide to DHCD by 12/20
3. Identify any other helpful/relevant information (reports/data) for review – provide to DHCD by 12/20

If anyone has something for the group to consider between now and the next meeting, notify DHCD or Jeff directly, so it can be distributed to the current Study Group and interested party email list.

Next Meeting (Virtual):
January 5, 2022
9:00 am to 3:00 pm
(with lunch break from 12:00 pm to 1:00 pm)

Jeff will try to send the agenda before the holidays (around 12/22)

DHCD attempts to publish all meeting summaries within a week or so for review.

Jeff thanked everyone and dismissed the group with happy holiday wishes.

AGENDA

Active Shooter and Hostile Threats in Public Buildings Study Group

January 5, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

- a) Study Group Members - Initial Thoughts
- b) SB333/HB670
- e) Documents Submitted by Members
  - i) Ernie Little - VFPA

III) Other

IV) Assignments and Next Steps

V) Next Meeting

Active Shooter and Hostile Threats in Public Buildings Study Group

Meeting Summary: January 5, 2022 9:00 a.m. to 10:42 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Study Group Members:

Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
Ernie Little: *Virginia Fire Prevention Association (VFPA), Virginia Fire Services Board (VFSB)*
Billy Hux: *Virginia Department of Fire Programs (VDFP), Virginia State Fire Marshal's Office*
Mark Dreyer: *Virginia Department of General Services (DGS), Division of Engineering and Buildings, State Review Architect*
Lt. James Garrett: *City of Chesapeake Police Department, Lieutenant in charge of S.W.A.T., and 911 coordinator*
Cmdr. Chris Kuyper: *Roanoke County Police Department Commander, Special Operations instructor for county, FBI active shooter taskforce, Washington DC*
Kurt Roeper: *Door and Hardware Institute*
Capt. Christopher Barry: *Virginia Fire Chiefs Association (VFCA), Fire Prevention Inspector-Loudoun County*
Jim Crozier: *Virginia Association of Counties*; *Orange County*
Rob Comet: *American Institute of Architects-VA, Retired architect with experience in schools*

Other Interested Parties:

Ken Cook: *Allegion*
Sean Farrell: *Prince William County*

Study Group Members not in attendance:

Sgt. Patrick Green: *Virginia State Police, First Sergeant and training manager*
Frederick Presley: *Stafford County*
Jack Taylor: *Nightlock*
Teri Morgan: *Virginia Board for People with Disabilities Executive Director*

Welcome

Jeff: Welcomed attendees and performed several mic checks to make sure people could be heard. He asked for individuals to stay muted unless they are speaking, and to introduce themselves when speaking. He let everyone know there would be 5 minute breaks each hour, and a one hour break for lunch. He also indicated that the meeting is open to everyone, but only study group members should join in the discussion. He gave Rob Comet the opportunity to introduce himself, as he missed the previous meeting. He introduced himself as a retired architect with experience in schools. He is representing the American Institute of Architects, Virginia.

Discussion

Jeff: The summary from this group's December 8th meeting contained an error on page 4. The 2018 change to the VCC Section 1010.1.9.8 said, "Delayed Egress: Exception to clarify that ESH shall be considered a delayed egress locking system." This should actually say, "Delayed Egress: Exception to clarify that ESH shall ***not*** be considered a delayed egress locking system." This will be corrected on the DHCD website and in the cdpVA link. The Last meeting was focused on background information. This discussion today will proceed with thoughts and comments based on previous experience, and ideas on how to move forward. He opened the floor for discussion.

Study Group Members - Initial Thoughts

Rob Comet: Started by asking if there were any other school representatives in the group. He is concerned that the problem may be made worse. In public school discussions in the past, there were concerns about sexual harassment in the classrooms, so windows were put in the classrooms. Then, there was concern about violence, and blinds were added to the windows. He thinks that in most cases, violence in public schools come from within the school, not from outside. Generally, schools are safer than other public spaces. He doesn't want to go too far with barricades by creating new scenarios such as violence within a locked space, fire, firebomb, etc.

Jeff: There are no other school representatives in this group. There were school representatives in the past discussion, but now we're looking at all public buildings.

Chris Kuyper: agrees with Rob. If there's an active shooter in a room with a barricade on the interior door, it will be hard for the police to enter. For that type of circumstance, he agrees with Rob that he doesn't want to make a worse situation. He wants to encourage public buildings to have locks on individual doors, so people can barricade themselves, but still make it accessible for law enforcement personnel to enter the room.

Ernie Little: also shared the concerns about room access. He doesn't think there's a need to fortify a classroom so that people cannot get in or out without the removal of a device. Also, the police would have a problem accessing the shooter and EMS would have trouble accessing patients. Classrooms are different than other public buildings. He provided an example in which each suite in in a building can lock down with a magnetic lock device that can be activated remotely, so that people have to identify themselves coming in. This is more of a training or policy issue than a hardware issue or building code issue. While locking people out is good, there's no need to lock people in a room until a device is removed. He thinks we there are other ways to handle a situation without needing a building code amendment at this time.

Mark Dreyer: He is a DGS architect whose group was involved with initial set of meetings, and they were not in favor of anything being incorporated in the building code, and they still feel that way. NFPA has responded to the dangers of devices in building codes. Everyone should look at that document. Devices in public buildings is even more hazardous than in public schools. Public schools have hierarchy of principal, teachers, etc. to run facilities in a regimented way. Public buildings are not necessarily set up that way. He's leery of applying anything to public buildings.

Billy Hux: from the State Fire Marshal's Office also agrees. Research over several years shows him that an active shooter hasn't gotten past any locked door. We can do our part to make things safer, but let's not compound an issue to fix another one.

Jeff: Jim Crozier is having mic problems and may not be able to participate.

Jeff: Gave a recap of the last meeting. New legislation that initiated this study group gave the directive to develop code change proposals to have additional barricade or safety devices to prohibit active shooters. Some may not be in support of any kind of barricade, but in order to comply with directive, some kind of proposal needs to go forth for consideration. Anything that goes to the Board for consideration will address the concerns raised. Last cycle, during the school barricades discussions, many were opposed to barricades as unnecessary or unsafe, so for each concern identified (training concerns, improper use, accessibility, maintenance, etc.) the group added something in the proposal to address those concerns. At the end of this process, there will be not just a proposal, but also a report to layout all discussion points, other documents submitted and meeting summaries. There will not be a study group recommendation for approval or disapproval; the study group will gather facts and address concerns. Data and other information submitted to DHCD by study group members and reviewed by the group will be included with the report. The goal is to clarify and simplify the information submitted to the Board, so we should avoid providing duplicated information. Ernie has already submitted some documents that will be discussed today.

Mark: Although DGS didn't support barricades in public schools, there was merit in items added to the code that made it safer than it was (when jurisdictions could put things in as they saw fit). The overarching guidance was good.

Jeff: Summarized some of the changes to the 2018 codes to address previously raised concerns. Existing provisions for schools were discussed at great length last time. Rather than reinventing the wheel, the group should build off of the existing code language. For example, there was a concern about consultation with all stakeholders (fire and law officials), so language was added to ensure consultation with law enforcement and fire prior to approving barricades in schools and notify them once installed. There were no minimum requirements in the codes prior to the 2018 editions, so devices for some schools were being approved through the building code modification process. In the last cycle, minimum requirements went into the code, providing some consistency throughout the state, whenever the devices are being considered. The 2018 code changes outlined 7 minimum requirements for devices:

1. Able to open from the outside
2. Can't violate listing on fire door or any other hardware.
3. For door operation to egress, there can be one additional movement.
4. Can't be used on other doors (permanently installed component).
5. Can only be one type in the building.
6. Requires training for employees and be included in the lockdown plan
7. Must be properly maintained (can be revoked if not used properly, according to the approval)

There were also some other exceptions and details in the building code to correlate with the allowance of devices:

- Can require key or special knowledge to egress
- Can require tight grasping or pinching
- Can be lower than 34"
- Locks & Latches: ESH Added to List (Restraint/Detention)
    - Signage Required (Authorized Personnel Only)
- Unlatching can require 2 operations (vs 1)
- Accessibility exception (only when deployed during hostile event or drill)

Even if a device is approved and installed, it is only allowed to be used during an active shooter event or during drills or training. Otherwise, only regular hardware is in place. Changes that were made in the SFPC:

- Lockdown plan contents
- ESH training records available
- Only authorized use (training, drill, or event)
- ESH Signage "Authorized Personnel Only"
- Maintenance

Between now and the next meeting, DHCD will put together a draft proposal to see what it would look like to take the 2018 changes and modify them to include “public buildings”. It could go into code as a separate section or be incorporated in the existing school provisions. That would be a good starting point for our next meeting and further discussions.

SB333/HB670

Jeff: DHCD was directed to convene the study group to develop proposals to address active shooter and hostile threats in public buildings. A couple of key items included in the legislation:

1 Public buildings
2 Other devices and measures
3. Ensure compliance with the Americans with Disabilities Act (ADA)

Last meeting, this group discussed the idea that ‘public building’ would be governmental (not all buildings open to public anywhere).

Rob: Once a ‘public building’ provision is approved, the public in general should have the same rights and opportunities.

Jeff: Please clarify.

Rob: If there’s a deemed need for the government to have a barrier device to protect employees, why would corporations not have the same privilege? What is special about a public servant that is different from a corporate servant? While a school is a different environment, a public building is so general. What’s the difference between a government office building and a corporate office building?

Jeff: doesn’t disagree, but he thinks the intent of the legislation was government buildings. It came from government and was meant to address government. If a proposal goes in for a public government building, there can always be someone who says why not other buildings? Anyone can submit a proposal. So, even if this group addresses government public buildings, someone could submit an alternative proposal for all types of buildings. The summary from this group could address what was directed – a proposal for government buildings, and someone else might also submit another proposal through cdpVA, addressing all buildings open to the public.

Mark: He works in the public sector, and is not if favor of barricades. He thinks this is an incremental approach, adding public buildings to schools, then it may ‘bleed’ out into all buildings. He does agree with Jeff that the intent is to cover governmental buildings this cycle. He also agrees with Rob that there’s no difference between someone working in a governmental or corporate office building.

Chris Barry: He researched online for what is defined as a public building. Sometimes it is considered a government-owned building for public assembly, but that is not always true. He found 7 sites that all define it differently. There needs to be a straight forward definition

Jim Garrett: Put a definition in the chat box from existing Virginia code for ‘public building’

> *§ 2.2-1159. Facilities for persons with physical disabilities in certain buildings; definitions; construction standards; waiver; temporary buildings. A. For the purposes of this section and § 2.2-1160: "Building" means any building or facility, used by the public, which is constructed in whole or in part or altered by the use of state, county or municipal funds, or the funds of any political subdivision of this Commonwealth. "Building" shall not include public school buildings and facilities, which shall be governed by standards established by the Board of Education pursuant to § 22.1-138.*

Jeff: He agrees that there are different definitions and doesn’t think the group will get any additional clarification. However, he is pretty confident that the intent is for governmental (municipal) buildings. He asked everyone to look at what Jim put in the chat box, and he put another possible definition in the chat box:

> *Possible Definition: “Public Building” - a structure or building that is owned, leased, or otherwise occupied by a municipality or the state and used for any municipal or public purposes by the municipality or the state.*

Mark: The first definition is based on funding source. In the second definition, the building could have been purchased by a governmental body, so even though it wasn’t originally publicly funded, it could become a public building by a later purchase.

Jeff: Asked everyone to keep thinking about a public building definition and submit any thoughts. They should keep in mind that they don't want to leave any loopholes.

Mark: He thinks it is important for the discussion to reiterate that this proposal would be something that would allow owners to install barricades, but it would not mandate that they be installed anywhere.

Jeff: Good point. It's similar to schools, where it doesn't mean that every school has to have barricades. If this is directed to public buildings, it would only lay out minimum requirements for approval and installation, if someone desires to install them. They would still have to first apply for a permit to install, the local building official would be required to consult with fire and law enforcement, and then all minimum requirements would be required to be met, etc.

{7 minute break: 9:58am - 10:05am}

Jeff: Chris Kuyper put another possible definition in the chat box. The group should continue to consider these definitions and circle back to this discussion later. They do need to pick a direction. He still believes that the proposal should only address municipal/government buildings, but he does want everyone to voice their opinion.

I like this definition of a public building from DOE: According to 10 CFR 420.2 [Title 10 – Energy; Chapter II -- Department of Energy; the term public building means "any building which is open to the public during normal business hours, including: (1) Any building which provides facilities or shelter for public assembly, or which is used for educational office or institutional purposes; (2) Any inn, hotel, motel, sports arena, supermarket, transportation terminal, retail store, restaurant, or other commercial establishment which provides services or retail merchandise; (3) Any general office space and any portion of an industrial facility used primarily as office space; (4) Any building owned by a State or political subdivision thereof, including libraries, museums, schools, hospitals, auditoriums, sport arenas, and university buildings; and (5) Any public or private non-profit school or hospital.10:05 AM

Jeff: Read off what the bill asked for regarding ingress and egress prevention. The main thing that is seen for preventing ingress and egress is what are typically called barricade devices. They looked at various devices last time, and Jeff also just performed a search looking for new types of devices or technology that might comply with some of the 7 minimum requirements in current code (permanently installed component, releasable from the exterior, only one additional motion to remove, etc.), but did not see anything new since last cycle. If anybody is familiar with other types of devices, please send to DHCD.

Jeff: The language of the bill says that proposals should be developed while maintaining compliance with the ADA. The ADA is a federal law from the DOJ and DOT (standards are available for free online). The ADA requirements aren't code or construction provisions, but it is a law that owners and regulators have to comply with. It is important to understand that the individuals that will be enforcing the building and fire codes are not authorized to interpret or enforce ADA law. He pulled an excerpt from the legislation and put it in the chat box:

DOJ's and DOT's ADA Standards are not a building code, nor are they enforced like one. They constitute design and construction requirements issued under a civil rights law. The ADA's mandates, including the accessibility standards, are enforced through investigations of complaints filed with federal agencies, or through litigation brought by private individuals or the federal government. There is no plan review or permitting process under the ADA. Nor are building departments required or authorized by the ADA to enforce the ADA Standards (some building departments even include a disclaimer on their plan checks indicating that ADA compliance is not part of their approval process). Entities covered by the law ultimately are responsible for ensuring compliance with the ADA Standards in new construction and alterations.

Jeff: The building code is the minimum, but a building owner is also responsible for complying with ADA. In recognition of this last cycle, language was put in to address compliance with ADA. The same existing language can be utilized to address ADA concerns with this new proposal:

The (owner) "should consult with their legal counsel regarding provisions of the Americans with Disabilities Act of 1990…and any other applicable requirements.

Chris K: The best way to bar someone from a room is a lock on a door. A government building owner would identify a good lock down location(s) in their space. No active shooter has penetrated a locked room in his experience. He doesn't think there's a need for additional hardware. In VA Tech, if there was a lock on the door, the shooter wouldn't have penetrated the rooms. A lock initiated from inside a room that can easily be opened from the inside and be accessible to law enforcement, which is ADA compliant, is the best solution.

Jeff: Those same thoughts were expressed last cycle. There are some newer types of hardware that are substantial in their locking mechanism, but still only require one motion to unlatch from inside and use a key from outside. There was a lot of concern previously in schools that retrofitting typical door locks was cost prohibitive, so some were interested in installing barricade devices as an alternative.

Chris K: Some of the barricades are confusing, and people may not know how to use them, as opposed to a standard simple door lock.

Mark: In state buildings in VA today, the ADA is reviewed in the permitting process, and it stands as the accessibility guidelines for code. For example, if there was barrier today in a state building, other than in schools, it would be rejected per the ADA.

Jeff: Since the proposal will be for government buildings only, the building official will be determining code compliance if devices are proposed, and the locality as the building owner will also be responsible for ensuring ADA is complied with as well.

Documents Submitted by Members

Ernie Little - VFPA

Jeff: Ernie had to step away, so this topic was tabled to the next meeting.

Mark Dreyer:

Mark: Submitted articles with information supporting that there's been no forced entry by an active shooter when there's a locked door. Layering barricades on top of a door lock could add to confusion, lack of training, loss of device or method to unlock and other problems can occur. Retrofitting in Public Schools which don't have modern locking mechanisms made barricades popular as an easy fix. He doesn't want to keep discussing things that were already discussed, but he did want to share the articles.

Article links from Mark Dreyer:
https://idighardware.com/2020/01/decoded-barricade-devices-and-the-ada-march-2019/
https://www.tssbulletproof.com/blog/school-door-barricades-could-create-safety-concerns/

Other

Jeff: Opened the floor for anyone to discuss anything of interest. There was no further discussion.

Assignments and Next Steps

Jeff: Asked if there are any examples of implementing existing school barricades that went into effect since the 2018 code changes? DHCD will search for some. If anyone else knows of any, please share with DHCD before the next meeting.

Jeff: What are other states and jurisdictions doing regarding barricades?

Mark: volunteered to research. He knows that he hasn't seen any public universities come through the permitting process for barricade devices in VA.

Jeff: knows of some other schools in VA that put in barricades prior to the 2018 changes, so DHCD staff will reach out to them. Again, if there is any other information to share, please send to DHCD by January 18th at the latest, in order to get the agenda out a week ahead of the next meeting.

Next Meeting

DHCD will send a Doodle poll to select a date for the next meeting during the week of Jan 24-28.
It will be scheduled from 9am - 3pm with an hour lunch break.
It will be a virtual meeting through Adobe. DHCD will send the agenda before the meeting.
DHCD will have a working draft proposal for public buildings based on the 2018 school proposal.

AGENDA

Active Shooter and Hostile Threats in Public Buildings Study Group

January 26, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

- A) Documents Submitted by Ernie Little (VFPA)
- B) Other States and Jurisdictions
- C) Virginia Experiences
- D) Draft Proposal

III) Other

IV) Assignments and Next Steps

V) Next Meeting

Active Shooter and Hostile Threats in Public Buildings Study Group

January 26, 2022 9:00 a.m. to 10:20 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Study Group Members:

Jimmy Moss: *Virginia Building and Code Officials Association (VBCOA)*
Ernie Little: *Virginia Fire Prevention Association (VFPA), Virginia Fire Services Board (VFSB)*
Mark Dreyer: *Virginia Department of General Services (DGS), Division of Engineering and Buildings, State Review Architect*
Jack Taylor: *Nightlock*
Kurt Roeper: *Door and Hardware Institute*
Christopher Barry: *Virginia Fire Chiefs Association (VFCA), Fire Prevention Inspector-Loudoun County*
Jim Crozier: *Virginia Association of Counties*; *Orange County*

Other Interested Parties:

Ken Cook: *Allegion*
Sean Farrell: *Prince William County*

Study Group Members not in attendance:

Rob Comet: *American Institute of Architects-VA, Retired architect with experience in schools*
James Garrett: *City of Chesapeake Police Department, Lieutenant in charge of S.W.A.T., and 911 coordinator*
Chris Kuyper: *Roanoke County Police Department Commander, Special Operations instructor for county, FBI active shooter taskforce, Washington DC*
Billy Hux: *Virginia Department of Fire Programs (VDFP), Virginia State Fire Marshal's Office*
Patrick Green: *Virginia State Police, First Sergeant and training manager*
Frederick Presley: *Stafford County*
Teri Morgan: *Virginia Board for People with Disabilities Executive Director*

AGENDA AND DISCUSSION ITEMS:

I) Welcome

Jeff Brown: Reminded the group that the meetings are recorded. Thanked everyone for their time. He's hoping to wrap up discussions today, finalize the proposal and begin working on the report. He asked everyone to be sure and speak up if they had anything to add to the discussion. He gave instructions for members to remain muted unless speaking, and to use the 'raise hand' feature to ask to speak. The study group members are listed in the box on the left. The meeting summary from the last study group meeting has been posted on the DHCD website and is available in cdpVA. He encouraged everyone to review it and let the staff know if there were any corrections needed. The summary from this meeting should be available in about a week. There will be breaks each hour. He asked members to identify themselves when speaking.

II) Discussion

A) Documents Submitted by Ernie Little (VFPA)

Jeff: asked Ernie to talk about the documents he submitted, since he had to step away from the meeting last time and these documents were not able to be discussed. However, Ernie was not signed in yet. Jeff said they would circle back to this later, when Ernie is available.

B) Other States and Jurisdictions

Jeff: Mark said in the last meeting that he would look for information on what other states and jurisdictions are doing about barricade devices.

Mark Dreyer: looked into the state of Virginia, and did not see any new activity in any of the jurisdictions he looked into.

Jeff: Anyone else?

Chris Barry: Asked the schools in his district, and there's nothing new in Loudoun.

C) Virginia Experiences

Jeff: DHCD staff sent a Memo to all Virginia building officials asking them to share any experiences with approving barricade devices in their jurisdictions since the 2018 code changes went into effect on July 1, 2021. There was no response to the request. DHCD also reached out to Augusta County schools, who did install devices prior to the 2018 code update. They still use the devices and it's working well for them. They have procedures in place for maintenance of the devices and training. They are looking into adding them in more schools.

Jack Taylor: His company Nightlock is based in Michigan. He says they have had increased activity recently. They currently have devices in 62 schools in VA. He is also working with a few VA schools, who are looking into their devices, but none of them have mentioned the new code.

Jeff: For the benefit of those that were not able to attend the previous meetings, he summarized the background discussions and activities around barricades in schools last cycle, and the directive to address barricades in public buildings this cycle.

D) Draft Proposal

Jeff: DHCD has drafted a proposal to meet the intent of the directives given by SB 333 and HB 670, understanding that some in the study group may not support it. The full report will outline the information discussed, including concerns. When the report and proposal are complete, there will still be opportunity to discuss and raise any concerns in the Workgroup meetings before being sent to the Board for a decision.

Jack: stated that the Naval technical training center in VA is using barricades and that while Nightlock barricades are mainly used in schools, they are used in other public buildings as well. He indicated they have barricades in municipal, military, government, corporate and retail buildings. They are primarily in place to protect employees, and give them a place to retreat to and shelter in place if needed.

Jeff: Reviewed the proposal drafted by the DHCD staff, which was sent out with the agenda and is available in the file pod on the left of the meeting space. Section 108.1 - when applications are required. This would impact the devices in any occupancy. Alteration to means of egress already required a permit per the code. Last cycle, language was added to include requiring a permit when adding barricade devices. The draft proposal includes language to require a permit for removing barricade devices as well.

Jimmy Moss**:** They were able to do all of this previously, but the wording in the proposal is good because it makes it very clear to everyone what is specifically required.

Mark: DEB would not issue a permit for removal. It would be better to say that removal should be coordinated with first responders and the training program.

Kurt Roeper: The existing Code requires permitting and approval of devices. According to a statement made earlier by a study group member, there are at least 62 schools in VA that have installed the devices, but DHCD did not get any response back from building officials when asked for examples of installed devices. How does that reconcile?

Jeff: There were a number of these devices installed prior to the 2018 USBC going into effect. They probably would have been installed with approval of a building official using a code modification or other process. At a previous Study Group meeting, it was acknowledged that barricade devices were already installed. DHCD staff asked for examples of any installations using the new 2018 regulations (effective July 1, 2021). DHCD didn't hear back from building officials on that request.

Jack: The same thing happened in Michigan. Sometimes, when a state goes through the regulating process, schools will wait a bit before implementing the new rules or guidelines. If he knows of any new code changes, he would definitely share those with all schools (or other buildings) who request devices in the state.

Kurt: is concerned that there may be many undocumented installations, where first responders may not have received notification.

Jeff: He isn't sure about what process each of the schools may have used prior to the 2018 code change. However, Augusta's approval process did include coordination and consultation with local law enforcement and first responders

Jeff: finished reviewing the proposal:

- 110.1.1 - Talks about notifying officials of removal of devices.
- Chapter 2 – definition of Public Building was added according to the previous Study Group discussions.
- 1010.2.8 - Was changed to include public buildings.
- 1103.2.15 - Added 'and public buildings'
- 1031.11 In SFPC – Added 'the conditions of its approval' to indicate that a change in building use would nullify the approval, as it was conditioned on the building use. As in a change of occupancy from public to private use for example.
- Reason statement – in compliance with SB 333 and HB 670 to expand the use of barricade devices to public buildings.

Jack: asked if under the draft proposal, there was a change in occupancy, the new owner could apply for use?

Jeff: The proposal would limit approval to "public buildings". The Study Group's directive is only for public buildings. It doesn't prevent anyone from submitting another proposal using different language, which would go to the Workgroups for consideration.

Chris: Indicated that he does not like the generic term 'notify first responders'.

Jeff: Highlighted section 110.1.1 listing the titles of the various officials (which was not changed).

Chris: stated there's a big difference between schools and public building staff structure. He wanted to review the training section.

Jeff: Reminded the group that there's no change to the language in 1010.2.8 #5 – The approval process includes checks to make sure that they are training as required and also requires that they make their training records available for inspection.

Jeff: If there are no other questions or concerns, DHCD will finalize the proposal and put it in cdpVA. They will also begin preparing the report to capture the thoughts and comments of group members. If all in the group support a proposal, they will typically put the study group's name on the proposal. Knowing that's not the case here, he wants to know who supports this, in order to put the proponent names on the proposal. Jeff asked for a show of hands (thumbs up or thumbs down) to indicate those who would support approval of the proposal to add barricades in public buildings.

Ernie Little: asked if he could review his proposal before the vote.

Jeff: wanted to vote first on the DHCD proposal separate from Ernie's proposal. The vote resulted in Jimmy Moss, Ernie Little, Jack Taylor and Chris Barry giving thumbs up, indicating that they would support approval of the DHCD proposal. Mark Dreyer and Kurt Roeper voted with thumbs down to indicate that they would not support approval of the proposal. Jim Crozier did not give thumbs up or thumbs down to indicate his position. Jeff will reach out again one last time for proponents before the draft is submitted for public viewing in cdpVA to confirm whose names will be added as co-proponents of the proposal. He reminded the group that it will be discussed again at the General Stakeholder Workgroup meeting.

A) (Revisit) Documents Submitted by Ernie Little (VFPA)

Ernie: Provided 3 documents (first 2 are background / informational)

1. Lori Greene, door & hardware manufacturers - myths & facts
2. NFPA 3000 toolkit - basis for developing a lockdown plan.
3. Code change proposal: amending 404.2.3.3 ASHER Program Compliance – "The development, operation and maintenance of lockdown plans, including the use of emergency supplemental hardware, shall be in accordance with chapter 9 of NFPA 3000".

Jack: Likes this; he says there are a lot of devices on the market, and there are only some that comply with code and should be approved. At the permitting process level, they need to have the same information and guidelines to decide whether to approve or not. The article by Lori Greene, door hardware industry, doesn't give enough factual information. Barricades are in competition with other door hardware. Lori lumps all barricade devices together. Some are safe to use and some are not as safe. The door hardware industry thinks that all barricades are in competition with them, so they lump them all together, and that's not a true representation.

Jeff: This discussion will be part of the summary. Ernie's proposal is not specific to public buildings. We can mention it as part of the discussions. This change could be submitted separately, and could include co-proponents. DHCD can assist Ernie with submitting the proposal on cdpVA.

Ernie: Yes, thanks. What does the group think?

Jeff: After Ernie finalizes and submits the proposal on cdpVA, DHCD can circle back to this group to ask for proponents.

Ernie: He asked about the additional public building definitions that he sent via email to Jeff.

Jeff: The definition used in the DHCD drafted proposal was based on group discussions in previous meetings. However, Ernie later submitted some additional definitions for consideration.

{BREAK 10:02 – 10:07}

Jeff: Asked Ernie to discuss the definitions of public buildings that he sent over.

Ernie: He provided a few, and he also put together one from all the choices as his favorite. It included examples of the types of buildings, which he thinks is missing from the DHCD draft proposal.

Jeff: asked the group to review & compare with the definition they chose in the DHCD draft proposal. There were no hands or comments, so he asked once more – if anything Ernie submitted would change the DHCD proposal. Seeing no response, the group will go forward with original draft definition proposed.

II) Other

Nothing further to review.

IV) Assignments and Next Steps

Jeff: DHCD will prepare and finalize the proposal and begin working on the report with the SG discussions noted. DHCD will put the proposal in cdpVA. They will also help Ernie with his proposal. These proposals should be submitted in time to be discussed at the April Workgroup meetings. The Workgroup date for this proposal is April 12th. The Workgroup date for SFPC and Ernie's proposal is April 15th. He asked group members to attend if they could to provide any additional perspective to the discussions. When the Workgroup sends the proposal to BHCD with their recommendation to approve or not, the summary report with SG and WG discussions will also be sent as a package.

V) Next Meeting

Jeff: There's no need for another meeting. He thanked the group members for their participation and closed the meeting.

APPENDIX B: Study Group Members

ACTIVE SHOOTER AND HOSTILE THREATS IN PUBLIC BUILDINGS

Study Group Members

Jimmy Moss – Virginia Building and Code Officials Association

Rob Comet – American Institute of Architects, VA Chapter

Ernie Little – Virginia Fire Prevention Association

Billy Hux – Virginia Department of Fire Programs

Mark Dreyer – Virginia Department of General Services

Patrick Green – Virginia State Police

Frederick Presley - Stafford County

Jim Crozier - Orange County

James Garrett - City of Chesapeake Police Department

Chris Kuyper - Roanoke County Police Department

Jack Taylor – Nightlock

Kurt Roeper - Door Hardware Institute

Teri Morgan - The Virginia Board for People with Disabilities

Chris Barry – Loudoun County

APPENDIX C: Supporting Documentation

VIRGINIA DHCD

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Partners for Better Communities

Active Shooter and Hostile Threats in Public Buildings Study Group

December 8, 2021 Meeting

2021 Code Development Cycle

DHCD staff

Cindy Davis, Deputy Director of Building and Fire Regulations

Jeff Brown, State Building Codes Office Director

Richard Potts, Code Development and Technical Support Administrator

Florin Moldovan, Code & Regulation Specialist

Paul Messplay, Code & Regulation Specialist

Jeanette Campbell, Administrative Assistant

Study Group members

- Jimmy Moss - VBCOA
- Rob Comet - AIA Va
- Ernie Little - VFPA
- Billy Hux - VDFP
- Mark Dreyer - DGS
- Patrick Green - VSP
- Frederick Presley - Stafford County
- Jim Crozier - Orange Co.
- James Garrett - City of Chesapeake
- Cmdr. Chris Kuyper - Roanoke County
- Jack Taylor - Nightlock
- Kurt Roeper - Door Hardware Institute
- Teri Morgan - VBPD

2021 code development cycle (tentative dates)

October 1st cdpVA was opened for submission of code change proposals for the 2021 Code Development Cycle

November 2021: Notices of Intended Regulatory Action (NOIRAs) Published

December 2021: Study Groups begin meeting

February 2022: Sub-Workgroups begin meeting

March-June 2022: Stakeholder Workgroup meetings

September 2022: BHCD meets to consider proposals

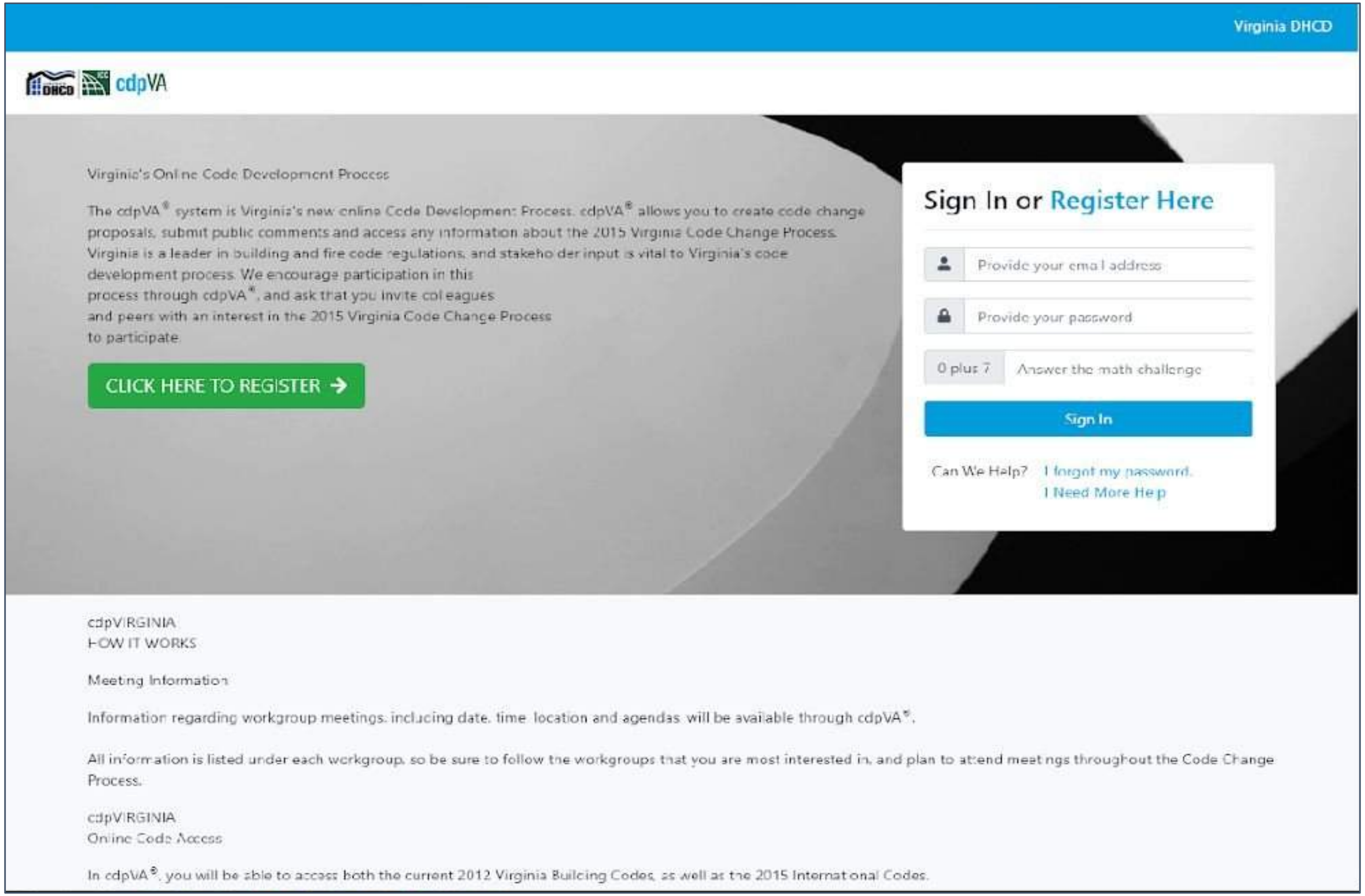
December 2022: BHCD considers proposed regulations

Fall/Winter 2023 = 2021 Virginia Codes Effective (Tentative)

cdpVA

va.cdpaccess.com

Virginia's online code development System (cdpVA)



Study Groups

- Study specific topics that require additional review and discussion
- Identify areas of consensus and disagreement
- Determine if code change proposals or other solutions are appropriate
- May review proposals, provide analysis, make recommendations, and/or develop code change proposals
- Proposals and recommendations of Study Groups are reviewed by the General Workgroups prior to BHCD consideration

Sub-workgroups

- Review all code change proposals within their subject topics, prior to the proposals being considered by the General Workgroups
- Make recommendations on each proposal, including negotiating compromises where appropriate
- May also develop new code change proposals, or support proposals submitted by others by joining the proposal as a proponent

General Stakeholder Workgroups

- All meetings are open to attendance and participation by anyone
- Review and discuss all submitted code change proposals, including all proposals and recommendations from Study Groups and Sub-Workgroups
- A workgroup recommendation is determined for each proposal and the recommendation is provided to the Board of Housing and Community Development
- Workgroup recommendations are classified as follows:

Consensus for Approval: No workgroup participant expressed opposition to the proposal

Consensus for Disapproval: Any workgroup participant expressed opposition to the proposal and no workgroup participant, other than the proponent, expressed support for the proposal.

Non-Consensus: Any workgroup participant expressed opposition to the proposal

2019 General Assembly Session

SB 1755 directed DHCD to convene stakeholders to develop USBC and SFPC proposals, with the goal of assisting in the provision of safety and security measures for active shooter or hostile threats:

- Commonwealth's elementary and secondary schools
- Public or private institutions of higher education

2019 General Assembly Session

SB 1755

The review conducted by the stakeholders shall include the examination of:

- locking devices,
- barricade devices, and
- other safety measures that may be utilized in an active shooter or hostile threat situation that occurs in any classroom or other area where students are located for a finite period of time.

2018 Code Development Cycle

School Safety Sub-Workgroup Timeline (2018 Cycle)

- **February - March 2019 -** School Safety Sub-workgroup formed
- **April - August 2019 -** School Safety Sub-workgroup convened
- **October 2019 -** BHCD approved proposal B108.1-18
- **December 2020 -** BHCD approves final 2018 USBC and SFPC
- **July 1, 2021 -** 2018 USBC and SFPC effective

2018 IBC code sections

1010.1.4.4 Locking arrangements in educational occupancies. In Group E and Group B educational occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

1. The door shall be capable of being unlocked from outside the room with a key or other approved means.
2. The door shall be openable from within the room in accordance with Section 1010.1.9.
3. Modifications shall not be made to listed panic hardware, fire door hardware or door closers.

1010.1.4.4.1 Remote operation of locks. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

2018 Code Development Cycle

2018 School Safety Sub-workgroup

- Four all day meetings held
- Multiple code change proposals and versions considered
- Ultimately, full consensus not reached on any proposal
- Two proposals (options) submitted for BHCD consideration
  - B108.1-18: compliance path in VCC for “emergency supplemental hardware”
  - BO101.1: add VCC appendix (for local adoption) that includes compliance path for “emergency supplemental hardware”

2018 Code Development Cycle

Proposal B108.1-18 (Approved)

- "Emergency supplemental hardware" allowed when in compliance with specific conditions for approval
- Emergency supplemental hardware allowed in Group E occupancies (except Group E day care facilities) & Group B educational occupancies
- Proponents: Virginia Building & Code Officials Association; Virginia Department of Education; Augusta County Public Schools; American Institute of Architects (AIA) Virginia; Virginia Tech.
- Approved emergency supplemental hardware requirements for schools included in 2018 USBC and SFPC (effective July 1, 2021)

2018 Code Development Cycle

Proposal BO101.1-18 (Not Approved)

- Technical requirements for emergency supplemental hardware similar to requirements of proposal B108.1-18
- Would have resulted in emergency supplemental hardware being allowed in some localities (where appendix adopted) but not in others
- Proponents: Steven Sites, Virginia Department of Fire Programs; Virginia Fire Prevention Association (VFPA); and Linda Hale (Loudoun County)

2020 General Assembly Session

SB 333 and HB 670 direct DHCD to convene stakeholders to develop USBC and SFPC proposals with the goal of assisting in the provision of safety and security measures for the Commonwealth's public buildings for active-shooter or hostile threats.

Study group objectives

SB 333 and HB 670

- Develop proposals for changes to the USBC and SFPC for submission to the Board of Housing and Community Development
  - Proposals to provide safety and security measures for “public buildings” for active-shooter or hostile threats.
  - Proposals to maintain compliance with basic ADA accessibility requirements
- Include examination of door locking devices, barricade devices, and other safety measures on doors and windows for the purpose of preventing both ingress and egress in the event of a threat to the physical security of persons in such buildings

Access to codes

codes.iccsafe.org/codes/virginia

Free Online Access to Virginia and ICC Code books!

Current Virginia code requirements

2018 USBC

New term defined:

> **EMERGENCY SUPPLEMENTAL HARDWARE.** Any approved hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill.

Current Virginia code requirements

2018 USBC

Section 108.1 When applications are required. Application for a permit shall be made to the building official and a permit shall be obtained prior to the commencement of any of the following activities….

1. Construction or demolition of a building or structure. Installations or alterations involving ….. (iv) the alteration of any required means of egress system, <u>including the addition of emergency supplemental hardware</u>,.....

Current Virginia code requirements

2018 USBC

Consultation and notification requirements added:

> **110.1.1 Consultation and notification.** Prior to approval of emergency supplemental hardware, the building code official shall consult with the local fire code official, or state fire code official if no local fire code official exists, and head of the local law-enforcement agency. The local fire code official; the state fire code official; and the local fire, EMS, and law-enforcement first responders shall be notified of such approval, after approval of such emergency supplemental hardware by the building code official.

Current Virginia code requirements

2018 USBC

General (amended 2018 IBC Section 1010.1.4.4)

1010.1.4.4 Locking arrangements in educational occupancies. In Group E occupancies, except Group E day care facilities, and Group B educational occupancies, exit access doors from classrooms, offices, and other occupied rooms, except for exit doors and doors across corridors, shall be permitted to be provided with emergency supplemental hardware where all of the following conditions are met:

Current Virginia code requirements

2018 USBC

Seven general conditions

1. The door shall be capable of being opened from outside the room with a key, proprietary device provided by the manufacturer, or other approved means.

2. The door shall be openable from within the room in accordance with Section 1010.1.9, except emergency supplemental hardware is not required to comply with Chapter 11.

   Note: School officials should consult with their legal counsel regarding provisions of the Americans with Disabilities Act of 1990 (42 USC § 12101 et seq.) and any other applicable requirements.

Current Virginia code requirements

2018 USBC

Seven general conditions

3. Installation of emergency supplemental hardware on fire door assemblies must comply with Section 716.2. Modifications shall not be made to listed panic hardware, fire door hardware, or door closures.

4. The emergency supplemental hardware shall not be capable of being used on other doors not intended to be used and shall have at least one component that requires modification to, or is permanently affixed to, the surrounding wall, floor, door, or frame assembly construction for it to properly function.

Current Virginia code requirements

2018 USBC

Seven general conditions

5. Employees shall engage in lockdown training procedures on how to deploy and remove the emergency supplemental hardware, and its use shall be incorporated in the approved lockdown plan complying with the SFPC.

6. The emergency supplemental hardware and its components shall be maintained in accordance with the SFPC.

Current Virginia code requirements

2018 USBC

Seven general conditions (continued)

7. Approved emergency supplemental hardware shall be of consistent type throughout a building.

   Exception:The building official may approve alternate types of emergency supplemental hardware in accordance with Section 110.1 when a consistent device cannot be installed.

Current Virginia code requirements

2018 USBC

ESH related amendments to general VCC requirements:

1010.1.9 Door operations - Prohibits a key or special knowledge being required for egress

- Exception for ESH provided in accordance with Section 1010.1.4.4

1010.1.9.1 Hardware - Prohibits tight grasping, pinching or twisting of wrist to operate

- Exception for ESH provided in accordance with Section 1010.1.4.4

1010.1.9.2 Hardware height - Requires hardware 34” minimum to 48” maximum above floor

- ESH shall be installed 48” maximum above the finished floor (can be installed below 34”)

Current Virginia code requirements

2018 USBC

ESH related amendments to general VCC requirements (cont.):

1010.1.9.4 Locks and latches - Conditions where locks and latches are permitted to prevent operation of doors

- New item #7 added for doors equipped with ESH in accordance with Section 1010.1.4.4

"7. Egress doors equipped with emergency supplemental hardware complying with Section 1010.1.4.4, from the egress side provided:

7.1. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

7.2. The use of the emergency supplemental hardware is revocable by the building official or fire official for due cause."

Current Virginia code requirements

2018 USBC

ESH related amendments to general VCC requirements (cont.):

1010.1.9.5 Bolt locks - Prohibits manually operated flush bolts or surface bolts

- Exception added for ESH provided in accordance with Section 1010.1.4.4

1010.1.9.6 Unlatching - The unlatching of any door or leaf shall not require more than one operation

- Exception added to allow one additional operation for release of emergency supplemental hardware provided in accordance with Section 1010.1.4.4

1010.1.9.8 Delayed egress

- Exception added to clarify that ESH shall not be considered a delayed egress locking system

Current Virginia code requirements

2018 USBC

ESH related amendments to general VCC requirements (cont.):

1103.2 General exceptions - Existing section includes exemptions from VCC Chapter 11 (accessibility requirements)

- New Section 1103.2.15 added

1103.2.15 - In Group E occupancies, except Group E day care facilities, and Group B educational occupancies, when emergency supplemental hardware is deployed during an active shooter or hostile threat event and provided in accordance with Section 1010.1.4.4.

Current Virginia code requirements

2018 SFPC

New term defined:

EMERGENCY SUPPLEMENTAL HARDWARE. Any approved hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill.

Current Virginia code requirements

2018 SFPC

404.2.3.1 Lockdown plan contents - Section lists items to be included in lockdown plans

- Item 4.4 amended to ensure lockdown plan also includes description of how locking (during initiation of a lockdown) complies with VCC

Current Virginia code requirements

2018 SFPC

New Section 406.3.4.1 added

> **406.3.4.1 Emergency supplemental hardware training.** Where a facility has installed approved emergency supplemental hardware, employees shall be trained on their assigned duties and procedures for the use of such device. Records of in-service training shall be made available to the fire code official upon request.

Current Virginia code requirements

2018 SFPC

New Section 1001.4 added

1001.4 Unauthorized use of emergency supplemental hardware. No person shall utilize any approved emergency supplemental hardware to prevent the ingress or egress from any occupied space.

Exceptions:

1. Utilized by authorized persons or other persons occupying such space in the event of any actual or perceived hostile threat or active shooter event.
2. Utilized in conjunction with any approved lockdown drill requiring the utilization of the approved emergency supplemental hardware.
3. Utilization for the testing, use and training by emergency response personnel.

Where such device is utilized in accordance with the Exceptions 1 through 3 above, the hardware device shall be removed immediately following the conditions of such exceptions.

Current Virginia code requirements

2018 SFPC

Section 1010.1.9 amended

1010.1.9 Door operations. Except as specifically permitted by this section <u>or the applicable building code</u>, egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.

Current Virginia code requirements

2018 SFPC

Section 1010.1.9.4 amended

1010.1.9.4 Locks and latches. Where required, a readily visible durable sign is posted on the egress side on or adjacent to the door stating:

THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED.

The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

<u>Emergency supplemental hardware provided in accordance with the applicable building code shall be provided a readily visible durable sign posted on the egress side on or adjacent to the door stating</u>:

<u>THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY.</u>

<u>The sign shall be in letters 1 inch (25 mm) high on a contrasting background</u>.

Current Virginia code requirements

2018 SFPC

Section 1031.2 amended

1031.2 Reliability. Unless otherwise permitted by the applicable building code, required exit accesses, exits and exit discharges shall be continuously maintained free from obstructions or impediments to full instant use in the case of fire or other emergency where the building area served by the means of egress is occupied. An exit or exit passageway shall not be used for any purpose that interferes with a means of egress.

Current Virginia code requirements

2018 SFPC

New Section 1031.10 added

1031.10 Maintenance of emergency supplemental hardware. Emergency supplemental hardware shall be installed in accordance with the applicable building code and shall be maintained in accordance with this code and the manufacturer's instructions. The fire code official shall be authorized to direct the practical application of any such hardware device to ensure the device operates as designed, and is free from any defects, damage, or conditions which may restrict the deployment and removal of such hardware device.

Next steps

Develop and submit USBC and SFPC code change proposals:

- **Public Buildings -** Determine buildings to include

- **Other devices and measures** - Identify and consider various devices or safety measures for doors and windows

- **ADA:** Ensure that any proposals address compliance with basic ADA accessibility requirements

Code change proposals

- Study group members will not be expected to join, as a proponent, any code change proposal that they do not support.
- Any code change proposals developed by the group will be submitted with information clearly identifying any members in support.
- Any proposals will be submitted in cdpVA for further review by all stakeholders
- Any proposals will be discussed by the General Stakeholder Workgroup(s) to determine a workgroup recommendation, prior to being considered by the BHCD
- Nothing prevents anyone (study group members or other interested parties) from submitting their own code change proposal(s) related to barricade devices

Assignments/homework

Prior to the next meeting, please:

- **Review existing code requirements and reach out to other members and/or DHCD staff with any questions**
- **Identify other devices** or **measures for doors and windows for review**
  - Please provide information to DHCD by December 20th
- **Identify and provide other helpful/relevant information (reports, data, etc.) for review**
  - Please provide to DHCD by December 20th

Note: If any member wants to share information with the group between meetings, please send it to DHCD staff and we will distribute it to our email list to make sure we do not miss any interested parties that might be added to our list as we go along.

Next meeting

Next Meeting (Virtual)

January 5, 2021

9:00 am - 3:00 pm

(lunch break 12:00 pm -1:00 pm)

Link: https://vadhcd.adobeconnect.com/va2021cdc/

VIRGINIA DHCD

Division of Building and Fire Regulations

State Building Codes Office

sbco@dhcd.virginia.gov

804-371-7150

ICC cdpVA

2019 SESSION

19100912D

SENATE BILL NO. 1755

Offered January 18, 2019

A BILL to direct the Board of Housing and Community Development to revise the Uniform Statewide Building Code and the Statewide Fire Prevention Code to permit the use of temporary barricade devices in classrooms.

Patrons-- Hanger; Delegates: Bell, Richard P. and Campbell, R.R.

Referred to Committee on General Laws and Technology

Be it enacted by the General Assembly of Virginia:

1. *§ 1. That the Board of Housing and Community Development (the Board) is directed to revise the Uniform Statewide Building Code and the Statewide Fire Prevention Code, as appropriate, to permit the use, by a staff member of a public or private elementary or secondary school or public or private institution of higher education, of a temporary barricade device on the door of a classroom or any other area where students are located for a finite period of time during an active shooter emergency or active shooter drill. The Board shall require that (i) such device not be permanently mounted to a door, (ii) such device require minimal steps to remove after it is engaged, and (iii) each public or private elementary or secondary school or public or private institution of higher education provide training to its staff members on the use of such device. Additionally, the administrator of any building in which a temporary barricade device is intended to be used shall be required to notify local law-enforcement authorities, local emergency medical services personnel, and the local fire marshal, if one has been appointed, of the intent to use such device prior to its use.*

2020 SESSION

CHAPTER 130

An Act to direct the Department of Housing and Community Development to convene stakeholders for the purpose of developing proposals for changes to the Uniform Statewide Building Code and the Statewide Fire Prevention Code to address active shooters or hostile threats.

[H 670]

Approved March 4, 2020

Be it enacted by the General Assembly of Virginia:

1. *§ 1. That the Department of Housing and Community Development is directed to convene stakeholders representing entities that enforce the Uniform Statewide Building Code (USBC) (§ **36-97** et seq.) and the Statewide Fire Prevention Code (SFPC) (§ **27-94** et seq.), other law-enforcement organizations, and representatives of local governments throughout the Commonwealth of Virginia to develop proposals for changes to the USBC and SFPC for submission to the Board of Housing and Community Development. Such proposals shall have the goal of assisting in the provision of safety and security measures for the Commonwealth's public buildings for active shooter or hostile threats while maintaining compliance with basic accessibility requirements under the Americans with Disabilities Act (42 U.S.C. § 12131 et seq.). The review of the stakeholders shall include the examination of (i) door locking devices, (ii) barricade devices, and (iii) other safety measures on doors and windows for the purpose of preventing both ingress and egress in the event of a threat to the physical security of persons in such buildings.*

2020 SESSION

CHAPTER 533

An Act to direct the Department of Housing and Community Development to convene stakeholders for the purpose of developing proposals for changes to the Uniform Statewide Building Code and the Statewide Fire Prevention Code to address active shooters or hostile threats.

[S 333]

Approved March 31, 2020

Be it enacted by the General Assembly of Virginia:

1. *§ 1. That the Department of Housing and Community Development is directed to convene stakeholders representing entities that enforce the Uniform Statewide Building Code (USBC) (§* ***36-97*** *et seq.) and the Statewide Fire Prevention Code (SFPC) (§* ***27-94*** *et seq.), other law-enforcement organizations, and representatives of local governments throughout the Commonwealth of Virginia to develop proposals for changes to the USBC and SFPC for submission to the Board of Housing and Community Development. Such proposals shall have the goal of assisting in the provision of safety and security measures for the Commonwealth's public buildings for active shooter or hostile threats while maintaining compliance with basic accessibility requirements under the Americans with Disabilities Act (42 U.S.C. § 12131 et seq.). The review of the stakeholders shall include the examination of (i) door locking devices, (ii) barricade devices, and (iii) other safety measures on doors and windows for the purpose of preventing both ingress and egress in the event of a threat to the physical security of persons in such buildings.*

B108.1-18

VCC: 108.1, 110.1, 110.1.1 (New), (New); IBC®: 1010.1.4.4, 1010.1.4.4.1, 1010.1.9, 1010.1.9.1, 1010.1.9.2, 1010.1.9.4, 1010.1.9.5, 1010.1.9.6, 1010.1.9.8, 1103.2, 1103.2.15 (New); VFC: (New); IFC®: 404.2.3, 404.2.3.1, 404.2.3.2, 406.4.1 (New), 1001.4 (New), [BE] 1010.1.9; VFC: (N) 1010.1.9.3; IFC®: 1031.2, 1031.2.1; VFC: 1031.10 (New)

Proponents: DHCD Staff on behalf of the following stakeholders represented at the School Safety Subworkgroup: Virginia Building & Code Officials Association; Virginia Department of Education; Augusta County Public Schools; American Institute of Architects (AIA) Virgi

2015 Virginia Construction Code

108.1 When applications are required.. Application for a permit shall be made to the building official and a permit shall be obtained prior to the commencement of any of the following activities, except that applications for emergency *construction*, alterations or *equipment* replacement shall be submitted by the end of the first *working day* that follows the day such work commences. In addition, the building official may authorize work to commence pending the receipt of an application or the issuance of a permit.

1. *Construction* or demolition of a *building* or *structure*. Installations or alterations involving (i) the removal or addition of any wall, partition or portion thereof; (ii) any structural component; (iii) the repair or replacement of any required component of a fire or smoke rated assembly; (iv) the alteration of any required means of egress system including the addition of emergency supplemental hardware; (v) water supply and distribution system, sanitary drainage system or vent system; (vi) electric wiring; (vii) fire protection system, mechanical systems, or fuel supply systems; or (viii) any equipment regulated by the USBC.
2. For change of occupancy, application for a permit shall be made when a new certificate of occupancy is required by the VEBC.
3. Movement of a lot line that increases the hazard to or decreases the level of safety of an existing building or structure in comparison to the building code under which such building or structure was constructed.
4. Removal or disturbing of any asbestos containing materials during the construction or demolition of a building or structure, including additions.

110.1 Approval and issuance of permits.. The building official shall examine or cause to be examined all applications for permits or amendments to such applications within a reasonable time after filing. If the applications or amendments do not comply with the provisions of this code or all pertinent laws and ordinances, the permit shall not be issued and the permit applicant shall be notified in writing of the reasons for not issuing the permit. If the application complies with the applicable requirements of this code, a permit shall be issued as soon as practicable. The issuance of permits shall not be delayed in an effort to control the pace of *construction* of new detached one- or two-family dwellings.

Add new text as follows:

1 110.1.1 New Code Section Consultation and notification.. Prior to approval of *emergency supplemental hardware* , the building code official shall consult with the local fire code official or state fire code official if no local fire code official exists, and head of the local law enforcement agency. The local fire code official, the state fire code official, and the local fire, EMS and law enforcement first responders shall be notified of such approval, after approval of such *emergency supplemental hardware* by the building code official.

1 New Code Section EMERGENCY SUPPLEMENTAL HARDWARE.. Any *approved* hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill.

2018 International Building Code

1010.1.4.4 Locking arrangements in educational occupancies.. In Group E occupancies, except Group E day care facilities, and Group B educational occupancies, ~~egress~~ exit access doors from classrooms, offices and other occupied rooms ~~shall~~ , except for exit doors and doors across corridors, shall be permitted to be provided with ~~locking arrangements designed to keep intruders from entering the room~~ emergency supplemental hardware where all of the following conditions are met:

1. The door shall be capable of being ~~unlocked~~ opened from outside the room with a key , proprietary device provided by the manufacturer, or other approved means.
2. The door shall be openable from within the room in accordance with Section 1010.1.9, except emergency supplemental hardware is not required to comply with Chapter 11.

   NOTE: School officials should consult with their legal counsel regarding provisions of the Americans with Disabilities Act and any other applicable requirements.
3. Installation of emergency supplemental hardware on fire door assemblies must comply with Section 716.2. Modifications shall not be made to listed panic hardware, fire door hardware or door closers.
4. The emergency supplemental hardware shall not be capable of being used on other doors not intended to be used and shall at least one component that requires modification to, or is permanently affixed to, the surrounding wall, floor, door and/or frame assembly construction for it to properly function.

5. Employees shall engage in lockdown training procedures on how to deploy and remove the emergency supplemental hardware and its use shall be incorporated in the approved lockdown plan complying with the SFPC.
6. The emergency supplemental hardware and its components shall be maintained in accordance with the SFPC.
7. Approved emergency supplemental hardware shall be of consistent type throughout a building.
   Exception: The building official may approve alternate types of emergency supplemental hardware in accordance with Section 110.1 when a consistent device cannot be installed.

1010.1.4.4.1 Remote operation of locks.. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

1010.1.9 Door operations.. Except as specifically permitted by this section, egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.
Exception : *Emergency supplemental hardware* provided in accordance with Section 1010.1.4.4.

1010.1.9.1 Hardware.. Door handles, pulls, latches, locks and other operating devices on doors required to be *accessible* by Chapter 11 shall not require tight grasping, tight pinching or twisting of the wrist to operate.
Exception. *Emergency supplemental hardware* provided in accordance with Section 1010.1.4.4.

1010.1.9.2 Hardware height.. Door handles, pulls, latches, locks and other operating devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219 mm) maximum above the finished floor. *Emergency supplemental hardware* provided in accordance with Section 1010.1.4.4, shall be installed 48 inches (1219 mm) maximum above the finished floor. Locks used only for security purposes and not used for normal operation are permitted at any height.

Exception: Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to have operable parts of the latch release on self-latching devices at 54 inches (1370 mm) maximum above the finished floor or ground, provided that the self-latching devices are not also self-locking devices operated by means of a key, electronic opener or integral combination lock.

1010.1.9.4 Locks and latches.. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
   2.1. The locking device is readily distinguishable as locked.
   2.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
   2.3. The use of the key-operated locking device is revocable by the *building official* for due cause.
3. Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware.
4. Doors from individual *dwelling* or *sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
5. *Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
6. Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.
7. Egress doors equipped with *emergency supplemental hardware* complying with Section 1010.1.4.4, from the egress side provided:
   7.1. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
   7.2. The use of the *emergency supplemental hardware* is revocable by the building official or fire official for due cause.

1010.1.9.5 Bolt locks.. Manually operated flush bolts or surface bolts are not permitted.

Exceptions:

1. On doors not required for egress in individual *dwelling units* or *sleeping units*.
2. Where a pair of doors serves a storage or equipment room, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf.
3. Where a pair of doors serves an *occupant load* of less than 50 persons in a Group B, F or S occupancy, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf. The inactive leaf shall not contain doorknobs, *panic* bars or similar operating

hardware.

4. Where a pair of doors serves a Group B, F or S occupancy, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf provided that such inactive leaf is not needed to meet egress capacity requirements and the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. The inactive leaf shall not contain doorknobs, *panic* bars or similar operating hardware.
5. Where a pair of doors serves patient care rooms in Group I-2 occupancies, self-latching edge- or surface-mounted bolts are permitted on the inactive leaf provided that the inactive leaf is not needed to meet egress capacity requirements and the inactive leaf shall not contain doorknobs, *panic* bars or similar operating hardware.
6. Emergency supplemental hardware provided in accordance with Section 1010.1.4.4.

1010.1.9.6 Unlatching.. The unlatching of any door or leaf shall not require more than one operation.

Exceptions:

1. Places of detention or restraint.
2. Where manually operated bolt locks are permitted by Section 1010.1.9.5.
3. Doors with automatic flush bolts as permitted by Section 1010.1.9.4, Item 3.
4. Doors from individual *dwelling units* and *sleeping units* of Group R occupancies as permitted by Section 1010.1.9.4, Item 4.
5. One additional operation shall be permitted for release of *emergency supplemental hardware* provided in accordance with Section 1010.1.4.4.

1010.1.9.8 Delayed egress.. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke* or *heat detection system* installed in accordance with Section 907.

1. Group B, F, I, M, R, S and U occupancies.
2. Group E classrooms with an *occupant load* of less than 50.

~~Exception~~ Exceptions:

1. Delayed egress locking systems shall be permitted to be installed on exit or *exit access* doors, other than the main exit or *exit access* door, serving a courtroom in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

2. Emergency supplemental hardware shall not be considered a delayed egress locking system.

1103.2 General exceptions.. *Sites*, buildings, *structures, facilities*, elements and spaces shall be exempt from this chapter to the extent specified in this section.

Add new text as follows:

1 1103.2.15 New Code Section Emergency supplemental hardware.. In Group E occupancies, except Group E day care facilities, and Group B educational occupancies, when *emergency supplemental hardware* is deployed during an active shooter or hostile threat event and provided in accordance with Section 1010.1.4.4.

2015 Virginia Statewide Prevention Fire Code

Add new text as follows:

1 New Code Section EMERGENCY SUPPLEMENTAL HARDWARE.. Any *approved* hardware used only for emergency events or drills to keep intruders from entering the room during an active shooter or hostile threat event or drill.

2018 International Fire Code

404.2.3 Lockdown plans.. Lockdown plans shall only be permitted where such plans are approved by the *fire code official* and are in compliance with Sections 404.2.3.1 and 404.2.3.2.

404.2.3.1 Lockdown plan contents.. Lockdown plans shall include the following:

1. Identification of individuals authorized to issue a lockdown order.
2. Security measures used during normal operations, when the building is occupied, that could adversely affect egress or fire department operations.

3. A description of identified emergency and security threats addressed by the plan, including specific lockdown procedures to be implemented for each threat condition.
4. Means and methods of initiating a lockdown plan for each threat, including:
   4.1. The means of notifying occupants of a lockdown event, which shall be distinct from the fire alarm signal.
   4.2. Identification of each door or other access point that will be secured.
   4.3. A description of the means or methods used to secure doors and other access points.
   4.4. A description of how locking means and methods are in compliance with the requirements of the VCC and the applicable provisions of this code for egress and accessibility.
5. Procedures for reporting to the fire department any lockdown condition affecting egress or fire department operations.
6. Procedures for determining and reporting the presence or absence of occupants to emergency response agencies during a lockdown.
7. Means for providing two-way communication between a central location and each area subject to being secured during a lockdown.
8. Identification of the prearranged signal for terminating the lockdown.
9. Identification of individuals authorized to issue a lockdown termination order.
10. Procedures for unlocking doors and verifying that the means of egress has been returned to normal operations upon termination of the lockdown.
11. Training procedures and frequency of lockdown plan drills.

404.2.3.2 Drills.. Lockdown plan drills shall be conducted in accordance with the approved plan. Such drills shall not be substituted for fire and evacuation drills required by Section 405.2.

Add new text as follows:

1 406.4.1 New Code Section Emergency supplemental hardware training.. Where a facility has installed approved emergency supplemental hardware, employees shall be trained on their assigned duties and procedures for the use of such device. Records of in-service training shall be made available to the fire code official upon request.

1 1001.4 New Code Section Unauthorized use of emergency supplemental hardware.. No person shall utilize any *approved emergency supplemental hardware* to prevent the ingress or egress from any occupied space.
Exceptions:

1. Utilized by authorized persons or other persons occupying such space in the event of any actual or perceived hostile threat or active shooter event.

2. Utilized in conjunction with any approved lockdown drill requiring the utilization of the approved *emergency supplemental hardware* .

3. Utilization for the testing, use and training by emergency response personnel.

Where such device is utilized in accordance with the Exceptions 1 through 3 above, the hardware device shall be removed immediately following the conditions of such exceptions.

[BE] 1010.1.9 Door operations.. Except as specifically permitted by this section or the applicable building code, egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.

2015 Virginia Statewide Prevention Fire Code

(N) 1010.1.9.3 Locks and latches.. Where required, a readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting ~~background and shall be *maintained*.~~ background. *Emergency supplemental hardware* provided in accordance with the applicable building code shall be provided a readily visible durable sign posted on the egress side on or adjacent to the door stating: THIS HARDWARE SHALL BE USED BY AUTHORIZED PERSONNEL ONLY. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

2018 International Fire Code

1031.2 Reliability.. ~~Required~~ Unless otherwise permitted by the applicable building code, required *exit accesses*, *exits* and *exit discharges* shall be continuously maintained free from obstructions or impediments to full instant use in the case of fire or other emergency where the building area served by the *means of egress* is occupied. An *exit* or *exit passageway* shall not be used for any purpose that interferes with a *means of egress*.

1031.2.1 Security devices and egress locks.. Security devices, excluding emergency supplemental hardware, affecting *means of egress* shall be subject to approval of the *fire code official*. Security devices and locking arrangements in the *means of egress* that restrict, control, or delay egress shall be installed and maintained as required by this ~~chapter.~~ chapter or as otherwise permitted under the applicable building code.

2015 Virginia Statewide Prevention Fire Code

Add new text as follows:

1 1031.10 **New Code Section Maintenance of emergency supplemental hardware..** *Emergency supplemental hardware* shall be installed in accordance with the applicable building code and shall be maintained in accordance with this code and the manufacturer's instructions. The fire code official shall be authorized to direct the practical application of any such hardware device to ensure the device operates as designed, and is free from any defects, damage, or conditions which may restrict the deployment and removal of such hardware device.

Reason Statement: This proposal allows limited types of barricade door devices in Group E and B educational occupancies only, by "taking over" the current 2018 IBC language and adding exceptions to the various door-related requirements to allow such hardware. A barricade door device would not necessarily need to go through the code modification process in accordance with VCC 106.3, unless it was a type that did not comply with the "openable from outside," limited height above finished floor requirements, and has a fixed component to function, among others.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency

Cost Impact: The code change proposal will not increase or decrease the cost of construction

Note: The SFPC text shown in this proposal does not reflect the final text in the 2018 SFPC. The text found here has been further modified by the BHCD and by proposals considered during the Final Regulations phase.

8 Myths (and Facts) about Classroom Barricade Devices

By Lori Greene, AHC/CDC, FDAI, FDHI, CCPR

The following myths and facts about classroom barricade devices were presented at the annual conference of the National Association of State Fire Marshals (NASFM), where I represented the Door Security & Safety Foundation in an effort to help each state fire marshal understand the safety concerns associated with the use of secondary locking devices.

NASFM members approved a resolution at the 2015 conference, supporting its Classroom Door Security Checklist. These documents are available on the Foundation's website, **doorsecuritysafety.org**; on NASFM's website at **firemarshals.org**; or by visiting **iDigHardware.com/schools**.

1. MYTH: The benefits of barricade devices outweigh the risks.

FACT: The perceived benefit of barricade devices is the relatively low cost; most ranging from $50-$150, and the easy procurement and installation. The school custodian could buy a slide bolt or padlock and hasp at the hardware store and accomplish a similar level of security. Historically, fire marshals have not allowed these security methods, because they're not code-compliant. Some jurisdictions are continuing to enforce current codes that do not allow these devices, and some are being pressured by school districts and politicians to put the codes aside in favor of security.

2. MYTH: Emergency responders can easily defeat a barricade device.

FACT: I'd like to know how emergency responders are going to gain access to a classroom once a barricade device is in place. There have already been school shootings where the intruder brought materials with them to barricade the doors, including the incidents at Virginia Tech, the West Nickel Mines schoolhouse, and Platte Canyon High School. At Platte Canyon High School, explosives were used by emergency responders to gain access to the classroom, and a student hostage was killed by the shooter during the chaos. After the West Nickel Mines shooting at an Amish schoolhouse, several news reports discussed law enforcement officers' concerns that they are not equipped to overcome classroom barricades.

3. MYTH: Some agencies recommend barricading with furniture; barricade devices are a better option.

FACT: A classroom barricade device may be easier to install than using furniture to barricade the door, but it may also be easily installed by an unauthorized person to secure a classroom and prevent access by school staff and emergency responders.

A 2007 study called *Barricaded Hostage and Crisis Situations in Schools: A Review of Recent Incidents,* examined 19 hostage situations that occurred in schools between 1998 and 2007. In 16 of the 19 cases, the perpetrator was

Photos courtesy of Lori Greene

a student at the school—the threat was already in the room. A barricade device available to anyone in the classroom could make these crimes easier to carry out, or could even encourage criminal acts.

4. MYTH: School shootings are very common and should be the main security concern for schools.

FACT: Statistics for school shootings are quite subjective. Some lists include gang-related shootings on school grounds, suicides, and accidental discharge of weapons. Other reports include only random shootings inside of the building, and omit suicides, gang related incidents, and deaths resulting from interpersonal conflicts.

In 2012, the year of the school shooting at Sandy Hook Elementary School, there were seven K-12 school shootings in the U.S. All of the school shooters were students except for two. The other casualties—three deaths and six injuries—were the result of students who brought guns to school.

While each incident is tragic, the statistics show that school shootings, although widely publicized, are very rare.

In comparison, the incidence of non-fatal victimization at school is very high. According to the National Center for Education, in 2012, students ages 12–18 were victims of more than 1.37 million nonfatal victimizations at school, including 615,600 thefts and 749,200 violent victimizations; 89,000 of which were serious violent victimizations.

5. MYTH: The risk of fire during an active shooter situation is low, so code requirements are not a priority.

FACT: Barricade devices are installed during a lockdown, so some may consider them safe for this limited period. One of the problems is that there are currently no widely-used standards for school security, and schools frequently call lockdowns for events that do not involve an active shooter. There are many situations that could require an evacuation while a school is in lockdown, and doors must provide free egress to facilitate evacuation.

I don't know of a barricade device that meets the current model code requirements for fire protection, accessibility, or egress—particularly when installed along with existing latching hardware.

6. MYTH: Lots of other states are allowing classroom barricade devices.

FACT: Although there are a few states where barricade devices have been allowed either by the state fire marshal or because of political intervention, there are many states that have issued directives addressing their requirements for code-complaint hardware.

In Minnesota, I found the rationale requiring code-compliant locks very compelling given the fact that the state is the location of the 2005 school shooting at Red Lake High School, where a 16-year-old killed seven people and wounded five others.

Although the classroom doors were locked, the shooter broke the glass and gained access to the classroom by turning the inside lever. And yet, Minnesota has not responded to this incident by choosing inexpensive security over free egress, fire protection, and accessibility. There are glazing products and films that will delay access to the inside lever, and would be a much more logical solution than installing a barricade device.

7. MYTH: Fire marshals do not have authority over barricade devices that are not permanently attached to doors.

Photo courtesy of Wayne Ficklin

FACT: How many fire marshals would allow this chained and padlocked panic hardware (above) in an occupied school? This photo was taken after the end of the school day, but while the school was occupied for an event. The fire marshal has the authority to order the chains and padlocks removed, even though they aren't permanently attached. Why would classroom doors be any different?

8. MYTH: Locksets do not provide enough protection against active shooters.

FACT: There are many locks that provide the necessary level of security and meet the model code requirements for egress, fire protection, and accessibility. These products are certified to meet recognized industry standards for security and durability and are listed for use on a fire door assembly. In some cases, schools looking to use barricade devices already have locking hardware but may not have distributed keys or established the protocols for lockdown.

In addition to standard mechanical locksets, there are also electrified locks available which can be locked using a fob, a code, or from a remote location. All of these classroom locking products will allow free egress at any time.

The Final Report of the Sandy Hook Advisory Commission states: "The testimony and other evidence presented to the Commission reveals that there has never been an event in which an active shooter breached a locked classroom door." A holistic approach must be taken for classroom security including training, drills, key distribution, and impact-resistance of glazing adjacent to the hardware, and there is no reason to sacrifice life safety in favor of security.

NFPA 3000™ (PS)

Standard for an Active Shooter/Hostile Event Response (ASHER) Program Toolkit

2018

IS YOUR COMMUNITY READY TO COME TOGETHER AT A MINUTE'S NOTICE?

When the unthinkable occurs, it's imperative that everyone knows the role they have to play. **NFPA 3000™ (PS), *Active Shooter/Hostile Event Response (ASHER) Program*** is a provisional standard created to help communities develop an integrated program for planning for, responding to, and recovering from active shooter or hostile events. NFPA 3000™ (PS) is not a list of measures to take, but a set of guidelines with which any community can create a unified plan of response specific to their needs.

GETTING UNIFIED WITH NFPA 3000™ (PS)

STEP 1

ASSESS

Whether you're a first responder, facility manager, civic leader, or school administrator, the first step is to identify whether an integrated plan exists to deal with an active shooter or hostile event.

- Take the risk assessment we've created to analyze the strengths and weaknesses of your current plan, or lack of one, available at **nfpa.org/nfpa3000-assessment**.
- Share the results of the assessment among your community partners to raise awareness of shortcomings and propose the creation of an integrated program.

STEP 2

ALIGN

Begin developing your integrated program by assigning a project leader and bringing together all stakeholders relevant to the mission.

- Participating partners can include but are not limited to Law Enforcement, Fire, EMS, Emergency Management, Facility Management, Business Leaders, Community Leaders, and Education Leaders.

STEP 3

PLAN

Start creating a specific plan for the whole community using the completed risk assessment as a starting point.

- Purchase the standard and the (optional) online training course.
- The online training course includes additional tools, such as the Program Planning Checklist. Download a sample at **nfpa.org/nfpa3000checklist**.
- Use the standard to help identify gaps and resource needs.

STEP 4

EDUCATE

Once the plan is complete, the team begins to educate the community at large, assigning roles and responsibilities to police officers and firefighters, emergency services, teachers, doctors, nurses and anyone else who may be called on to play a crucial role in a hostile event.

- Ensure the best program is in place by training together, doing practice drills or exercises, evaluating the results, and revising the plan as needed.

Implementing NFPA 3000™ (PS) is a way for communities, their facilities, and responders to begin coming together to develop the relationships and trust that are essential to an integrated response. And given the stakes, the more unified we can act during a hostile event, the more potential we have for saving lives.

FACT SHEET

NFPA 3000™ (PS): *STANDARD FOR AN ACTIVE SHOOTER/ HOSTILE EVENT RESPONSE (ASHER) PROGRAM*

What You Need To Know About NFPA 3000™ (PS)

As more hostile events continue to occur, it is critical for law enforcement, first responders, emergency personnel, facility managers, hospital officials, community members, and others to have the information they need to be prepared when attacks happen. To address that need, NFPA® developed a new standard – NFPA 3000™ (PS), *Standard for an Active Shooter/ Hostile Event Response (ASHER) Program*.

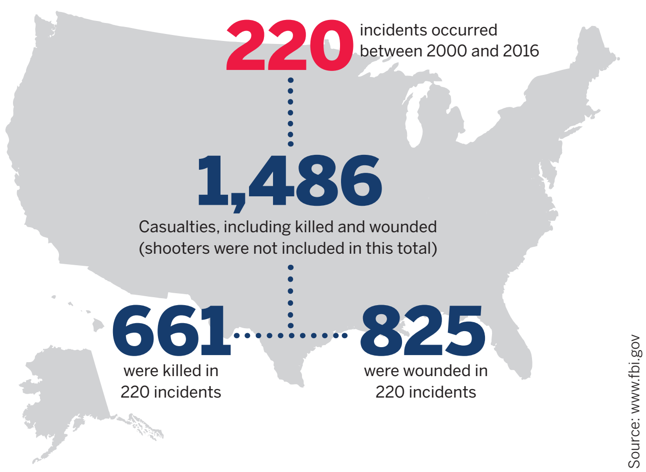
The purpose of NFPA 3000™ (PS) is to identify the minimum program elements needed to organize, manage, and sustain an active shooter and/or hostile event response program and to reduce or eliminate the risks, effect, and impact on an organization or community affected by these events. The document addresses the following areas and others:

- Planning
  - Assessing risks
  - Developing community-wide programs
- Responding
  - Establishing competencies
  - Communicating to all stakeholders
- Recovering
  - Planning recovery efforts
  - Taking into account healthcare and mental health issues

4 Main Concepts	
Every chapter is written with these 4 concepts in mind.	Whole Community
	Unified Command
	Integrated Response
	Planned Recovery

By the Numbers

Active shooter events in the US: 2000–2016



Active Shooter/Hostile Event Response Program

NFPA 3000™ (PS): *STANDARD FOR AN ACTIVE SHOOTER/ HOSTILE EVENT RESPONSE (ASHER) PROGRAM* CONTINUED

What You Should Know

If you are a **policymaker**, you need to know how implementing NFPA 3000™ (PS) can help make your entire community safer. As a leader, you can influence all aspects of your community to put into practice the parts that are relevant and be the connection that brings everyone together.

If you are a **facility manager**, you need to be involved in the creation of an active shooter/ hostile event response plan, integrate the plan with your response community, and train all personnel on the plan.

If you are a **first responder** (law, fire, or EMS), you must work together across disciplines to have the needed knowledge and training to reduce harm.

If you are a member of the **public**, ask your local officials if they have an active shooter/ hostile event response program in place that is integrated with the entire community.

Who Worked on Developing NFPA 3000™ (PS)?

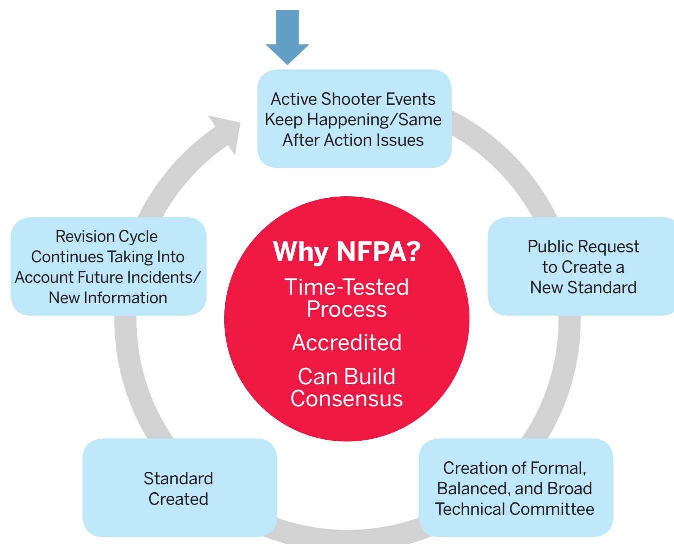
The standard was created with widespread support from fire service, law enforcement, EMS, emergency management, higher education, and facility management professionals. Committee members include representatives from 46 government agencies, organizations, and associations.

BECOME AN NFPA MEMBER
FOR MORE OF THESE RESOURCES

Is NFPA 3000™ (PS) Only for the Fire Service?

No, NFPA 3000™ (PS) is for all safety planners, first responders, and policy makers. This includes fire, EMS, police, school superintendents, facility managers, building owners, safety officers, safety and security consultants, loss control/risk safety officers, risk managers, emergency services directors, and federal, state, city, and municipal government officials. All of these stakeholders need to be at the table and working together.

How was NFPA 3000™ (PS) Developed?



Next Steps You Can Take

- Learn more by going to www.nfpa.org/3000 where you can follow the standard's development process and sign up for updates.
- Identify and implement the components that are relevant in your community.
- Visit www.nfpa.org/3000news for access to all the resources you need to implement NFPA 3000™ (PS) in your community.
- Engage with our experts and your peers on NFPA Xchange™ at https://community.nfpa.org/.

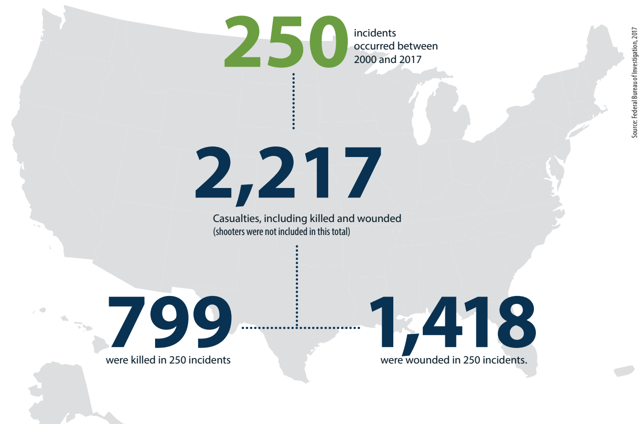
IT'S A BIG WORLD.
LET'S PROTECT IT TOGETHER.®

NFPA 3000™ (PS) READINESS ASSESSMENT

How prepared are you in the event of an active shooter incident?

Active shooter/hostile event incidents are not exclusive to big cities or to any particular area of the United States. These incidents are occurring all across the country. This map from www.fbi.gov shows the number of incidents from 2000-2017.

Are you adequately prepared to respond if such an event occurs on your community or organization? Take this brief assessment to help evaluate your readiness. Gauge your readiness level by answering Yes or No to the questions that follow.



Yes No

- ❑ ❑ Your community or organization is adequately committed to preparing for, responding to, and recovering from an active shooter/hostile event incident in a coordinated manner — not only internally but in partnership with other organizations.
- ❑ ❑ Individuals in your community have discussed and have planned for coordinated roles in the event of an incident.
- ❑ ❑ You know what is expected of you in your job role if an incident occurs.
- ❑ ❑ You have a planning team that integrates public and private partners in your community that creates active shooter/hostile event plans together.
- ❑ ❑ You participate in planning or training with organizations outside of your own.
- ❑ ❑ Based on your needs and risk assessments, you have adequate supplies and resources to meet the mission of preparing, responding, and recovering from an event.
- ❑ ❑ You have adequate financial resources to prepare for, respond to, and recover from an incident.

Yes No

- ❑ ❑ Your community (or organization) has conducted a risk assessment to evaluate relative risks for facilities or locations.
- ❑ ❑ You have an adequate communication plan for yourself, your community and your stakeholders that would allow you to stay in touch with your stakeholders and loved-ones in the event of an incident.
- ❑ ❑ You have planned with outside agencies and non-governmental partners for support in order to recover.

Next Steps You Can Take

- ✔ Visit www.nfpa.org/3000news for helpful materials and access to all the resources you need to implement NFPA 3000™ (PS) in your community or organization.
- ✔ Learn more by going to www.nfpa.org/3000 where you can follow the standard's development process and sign up for updates.
- ✔ Engage with our experts and your peers on NFPA Xchange™ at https://community.nfpa.org/.

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NFPA 3000™ (PS) ACTIVE SHOOTER / HOSTILE EVENT RESPONSE PROGRAM PLANNING SUMMARY CHECKLIST

ORGANIZATION INFORMATION

Name: ______________________ Date: ______________________

Position: ____

Community/Facility: _____________________________________

GOALS

This checklist helps guide the planning process for communities and facilities responsible for developing, managing, and sustaining an ASHER program by addressing emergency operations plans, standard operating procedures, and standard operating guidelines. The numbers that follow each item below refer to a specific section in NFPA 3000™ (PS), *Standard for an Active Shooter/Hostile Event Response (ASHER) Program.* Please use this checklist to help you get started. A more detailed checklist and other tools can be found in the NFPA 3000™ (PS) online training. For more information, visit www.nfpa.org/3000.

PLAN DEVELOPMENT (6.2)

Yes No

❑ ❑ Develop an ASHER plan organized in a logical framework based on resource capabilities and risk assessment. **(6.2)**

❑ ❑ Establish multi-agency and multidisciplinary relationships to develop plans, risk assessments, mutual aid agreements, and memoranda of understanding (MOUs). **(6.2.1)**

❑ ❑ Use formal management systems to ensure that plans are developed, maintained, updated, tested, and activated during the entire four-step process that follows: **(6.2.2)**

- Needs or gap assessment
- Implementation
- Plan development
- Evaluation

❑ ❑ Ensure the planning team performs a needs or gap assessment of resources necessary to meet the plan's mission. **(6.2.3)**

Yes No

❑ ❑ Ensure the plan is based on the results of a risk assessment and an analysis of ASHER program capabilities in relation to the risk. **(6.2.4)**

❑ ❑ Confirm that, at a minimum, the analysis includes the following: **(6.2.4.1)**

- Review of minimum standards* for emergency responder competencies in Chapter 12, Law Enforcement, and Chapter 13, Fire and EMS
- Analysis of current capabilities, including other plans and mutual aid of the authority having jurisdiction
- Review of agreements already in place between agencies
- Identification of gaps between applicable existing standards** and current capabilities
- Development of capabilities required to bridge gaps

❑ ❑ Ensure plans address coordination between agencies, including the following: **(6.2.5)**

- Resource management across all disciplines
- Staffing
- Integrated training
- Health and medical issues (including behavioral and holistic health)
- Financial responsibilities and management
- Recovery and restoration

❑ ❑ Check that plans are flexible so they can be adjusted as circumstances and environments change and serve as a starting point for multi-agency multidisciplinary operations. **(6.2.6)**

* NFPA 3000™ (PS) provides the minimum requirements.

** Existing standards include, but are not limited to: NFPA 99, NFPA 101, NFPA 450, NFPA 451, NFPA 1500, NFPA 1521, NFPA 1581, NFPA 1600, NFPA 1616, NFPA 1620, NFPA 1700, NFPA 1710, and NFPA 1720. For more information on any of these standards, visit www.nfpa.org/docinfo.

NOTES:

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This material contains information about NFPA 3000™ (PS), *Standard for an Active Shooter/Hostile Event Response (ASHER) Program*. For free access to the complete and most current version of this standard and all NFPA documents, please go to www.nfpa.org/docinfo.

APPENDIX D: Code Change Proposals

Code Change Proposal Drafted by Virginia Fire Prevention Association

Key Points for Consideration:

- After numerous international and national code development cycles, there remain no model codes that permit the use of emergency supplemental hardware in buildings other than group E, Group B educational and I-4 occupancies.
- Expanding the scope of emergency supplemental hardware to other use groups is inconsistent with the code development guideline found in Code of Virginia 36-99 where, "In formulating the Code provisions, the Board shall have due regard for generally accepted standards as recommended by nationally recognized organizations, including, but not limited to, the standards of the International Code Council and the National Fire Protection Association" • There IS a national standard that provides guidelines for facility preparedness of ALL OCCUPANCIES regarding active shooter and hostile events. NFPA 3000 is the Standard for an Active Shooter/Hostile Event Response (ASHER) Program and chapter 9 is specifically for facility preparedness.
- Active Shooter/Hostile Event protection of public buildings (and more broadly ALL occupancies) can be accomplished by referencing Chapter 9 of NFPA 3000 in the development, operation and maintenance of lockdown plans. This added reference to the only national standard for these events directly accomplishes the goals outlined in HB670 and SB33.

Proposal:

Virginia Statewide Fire Prevention Code

404.2.3.3 ASHER Program Compliance

The development, operation and maintenance of lockdown plans, including the use of emergency supplemental hardware, shall be in accordance with Chapter 9 of NFPA 3000.

B1010.2.8-21

VCC: Section 108.1, 110.1.1, SECTION 202, 1010.1.4.4, 1103.2.15; VFC: 1031.11

Proponents: DHCD Staff on behalf of the following stakeholders represented at the Active Shooter and Hostile Threat Events in Public Buildings Study Group: Virginia Building & Code Officials Association, Virginia Fire Prevention Association, Nightlock

2018 Virginia Construction Code

Revise as follows:

Section 108.1 When applications are required. Application for a permit shall be made to the *building official* and a permit shall be obtained prior to the commencement of any of the following activities, except that applications for emergency *construction*, alterations or *equipment* replacement shall be submitted by the end of the first *working day* that follows the day such work commences. In addition, the *building official* may authorize work to commence pending the receipt of an application or the issuance of a permit.

1. *Construction* or demolition of a *building* or *structure.* Installations or alterations involving (i) the removal or addition of any wall, partition or portion thereof, (ii) any structural component, (iii) the repair or replacement of any required component of a fire or smoke rated assembly, (iv) the alteration of any required means of egress system, including the addition or removal of *emergency supplemental hardware*, (v) water supply and distribution system, sanitary drainage system or vent system, (vi) electric wiring, (vii) fire protection system, mechanical systems, or fuel supply systems, or (viii) any *equipment* regulated by the USBC.
2. For *change of occupancy*, application for a permit shall be made when a new certificate of occupancy is required by the VEBC.
3. Movement of a *lot line* that increases the hazard to or decreases the level of safety of an existing *building* or *structure* in comparison to the *building* code under which such *building* or *structure* was constructed.
4. Removal or disturbing of any asbestos containing materials during the *construction* or demolition of a *building* or *structure*, including additions.

110.1.1 Consultation and notification. Prior to approval or removal of *emergency supplemental hardware*, the building code official shall consult with the local fire code official, or state fire code official if no local fire code official exists, and head of the local law-enforcement agency. The local fire code official; the state fire code official; and the local fire, EMS, and law-enforcement first responders shall be notified by the building code official of such approval or removal, after approval or removal of such *emergency supplemental hardware* ~~by the building code official.~~ .

SECTION 202 DEFINITIONS. "Public Building" - a structure or building that is owned, leased, or otherwise occupied by a municipality or the state and used for any municipal or public purposes by the municipality or the state.

~~1010.1.4.4~~ 1010.2.8 ~~Locking arrangements in educational occupancies~~ Emergency Supplemental Hardware. In Group E occupancies, except Group E day care facilities, ~~and~~ Group B educational occupancies and public buildings, *exit access doors* from classrooms, offices, and other occupied rooms, except for exit doors and doors across corridors, shall be permitted to be provided with *emergency supplemental hardware* where all of the following conditions are met:

1. The door shall be capable of being opened from outside the room with a key, proprietary device provided by the manufacturer, or other *approved* means.
2. The door shall be openable from within the room in accordance with Section 1010.1.9, except *emergency supplemental hardware* is not required to comply with Chapter 11.

   Note: School officials and building owners should consult with their legal counsel regarding provisions of the Americans with Disabilities Act of 1990 (42 USC § 12101 et seq.) and any other applicable requirements.
3. Installation of *emergency supplemental hardware* on fire door assemblies must comply with Section 716.2. Modifications shall not be made to listed *panic hardware*, fire door *hardware*, or door closures.
4. The *emergency supplemental hardware* shall not be capable of being used on other doors not intended to be used and shall have at least one component that requires modification to, or is permanently affixed to, the surrounding wall, floor, door, or frame assembly *construction* for it to properly function.
5. Employees shall engage in lockdown training procedures on how to deploy and remove the *emergency supplemental hardware*, and its use shall be incorporated in the *approved* lockdown plan complying with the SFPC.
6. The *emergency supplemental hardware* and its components shall be maintained in accordance with the SFPC.
7. *Approved emergency supplemental hardware* shall be of consistent type throughout a building.

   Exception: The *building official* may approve alternate types of *emergency supplemental hardware* in accordance with Section 110.1 when a consistent device cannot be installed.

1103.2.15 Emergency supplemental hardware. In Group E occupancies, except Group E day care facilities, ~~and~~ Group B educational occupancies, and public buildings, when *emergency supplemental hardware* is deployed during an active shooter or hostile threat event and provided in accordance with Section ~~1010.1.4.4.~~ 1010.2.8, is not required to comply with this chapter.

2018 Virginia Statewide Fire Prevention Code

Revise as follows:

1031.11 Emergency supplemental hardware. *Emergency supplemental hardware* shall be installed in accordance with the *applicable building code* and shall be *maintained* in accordance with this code , the conditions of its approval and the manufacturer's instructions. The *fire code official* shall be authorized to revoke the use and storage of *emergency supplemental hardware* within a *building* for due cause based on failure to comply with requirements in this code or the *applicable building code*. Revocations shall be rescinded upon achieving compliance with this code and the *applicable building code*.

Reason Statement: The proposal intends to comply with the SB 333 and HB 670 by expanding on the existing provisions for ESH. The gist of the proposal is the addition of "public buildings" to the list of uses/occupancies already allowed to be provided with ESH. The proposal was generated as a result of discussions during the Active Shooter and Hostile Threats in Public Buildings - Study Group, convened pursuant to the aforementioned bills. For more information on the Study Group activities and discussions, please see attached Study Group Report.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency
While the proposal does not increase the resiliency of buildings, arguments could be made that the resiliency of building occupants could be increased against active shooter or hostile threats events. Conversely, it could also be claimed that the resiliency of occupants could be reduced by enabling assailants to lock occupants in a given room and prevent first responders from entering.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal intends to **allow** the installation of ESH in public buildings, it does not **mandate** such. Should the building owner(s) decide to install ESH, the proposal could reduce or increase the cost of construction, depending upon the type of locking devices selected.

APPENDIX E:

GENERAL STAKEHOLDERS WORKGROUP MEETINGS EXCERPTS

Note: This Appendix contains excerpts from the General Stakeholders Workgroup Meetings related to the code change proposal resulted from the Study Group discussions and submitted by DHCD staff on behalf of the following stakeholders represented at the Active Shooter and Hostile Threat Events in Public Buildings Study Group: Virginia Building & Code Officials Association, Virginia Fire Prevention Association, Nightlock.

Code Change Proposal B1010.2.8-21

Excerpt from April 12, 2022, General Stakeholders Workgroup Meeting

Jeff Brown (DHCD staff): This is a proposal that was developed as part of the Active Shooter and Hostile Threats in Public Buildings Study Group. In the 2018 cycle, the General Assembly directed DHCD to develop regulations to allow barricade devices in school buildings for active shooter events. A Study Group was formed and a code change proposal was developed to layout a compliance path in both the USBC and SFPC for anyone who wanted to install these devices in schools. The proposal laid the framework for minimum safety criteria, training requirements and coordination between officials and first responders. In 2020, the General Assembly directed DHCD to form a Study Group to develop a code change proposal that would allow these devices in public buildings, which is where this proposal came from. This proposal takes what was laid out in the USBC and SFPC for schools in the last cycle, and added public buildings as another occupancy where ESS hardware would be allowed. The proposal also defines public buildings. Some Study Group members supported this and are listed as proponents, while other members didn't support it. Some who are not proponents of barricade devices in general did support the proposal, since devices could already be added and approved by officials using the code modification process without clear guidance otherwise. They thought that this would provide at least minimum standards and consistency in application if someone chooses to install them.

Dan Willham (Fairfax County): The wording in section 1103.2.15 seems incomplete, like there's one or more words missing. It says when emergency supplemental hardware is deployed in accordance with section 1010.2.8, is not required. Does it mean that it's not required to comply with the chapter?

Jeff Brown: Thinks that the subsection that is being amended in this proposal is part of a list of things that wouldn't apply (taken out of context from another section not shown in the proposal).

Kenny Payne (representing self): 1103.2 is the charging statement and 1103.2.15 is one of a list of items. Also, there's need to correct another word in 1031.11.

Jeff Brown: Kenny is correct about the list. The other word will be fixed.

Dan Willham: Still thinks "when" sounds out of place.

Jeff Brown: Explained that if the device isn't active, there is no exception. When the device is active, there is an exemption from accessibility compliance.

Dan Willham: If it said "the deployment" that would make sense. But, saying "when" followed by another "when" isn't a good sentence.

Jeff Brown: If it said "supplemental hardware, when deployed…"

Dan Willham: He suggests "the deployment of ESH during an active shooter event…"

Jeff Brown: Can't speak on behalf of the Study Group to make the change. It will be marked as Carried Over for the Study Group to revisit the proposed language.

Excerpt from June 7, 2022, General Stakeholders Workgroup Meeting Summary

B1010.2.8-21

Jeff Brown: The DHCD staff prepared this proposal on behalf of some stakeholders in the Active Shooter and Hostile Threats in Public Buildings Study Group. It uses language from a previously-approved use of barricades in schools to approve use of barricades in public buildings. Many members of the Study Group were in support of this, even if they were not in support of barricades in general, because it gives guidelines for proper use.

Jimmy Moss (Virginia Building and Code Officials Association): He was in the Study Group and there was a thorough discussion. He supports this proposal.

Andrew Milliken: Representing the VFSB – Codes and Standards Committee, stated that they discussed the proposal and the group supports the proposal.

Andrew Milliken: Representing self, noted that the proposal goes beyond the scope of the model code and although there was some good feedback for and against the proposal, he thinks it is appropriate for additional discussions to take place at the Board level, so the proposal should move forward as Non Consensus.

Jeff: With some support and some opposition, this proposal will be marked as Non Consensus.

DHCD Staff Notes:

- The concern raised at the April General Stakeholders Workgroup Meeting regarding wording in Section 1103.2.15 was related to existing code language; no stakeholder opposition to the changes suggested by the proposal was noted. The proposal was carried over so that the Study Group members have an opportunity to review any potential alternative language. After the meeting, the opposing party decided to submit a separate and distinct proposal to address the concerns with the existing code language. As such, the proposal was not brought back for further discussions by the Active Shooter and Hostile Threat Events in Public Buildings Study Group, but was included in the Agenda for the June 7th GSWG meeting.
- The proposal submitted to address the existing code language, included below for context, received a recommendation of consensus for approval by the stakeholders during the June General Stakeholders Workgroup Meeting.

B1103.2.15-21

VCC: 1103.2.15

Proponents: Daniel Willham (daniel.willham@fairfaxcounty.gov)

2018 Virginia Construction Code

Revise as follows:

1103.2.15 Emergency supplemental hardware. In Group E occupancies, except Group E day care facilities, and Group B educational occupancies, ~~when~~ *emergency supplemental hardware* is not required to comply with this chapter when deployed during an active shooter or hostile threat event and provided in accordance with ~~Section 1010.1.4.4.~~ Section 1010.2.8.~~1010.1.4.4.~~

Reason Statement: This proposal is just a language clean-up with revised wording to make it a complete sentence (instead of a series of dependent clauses), similar to the other sub-sections in this section. The change in section number only reflects the new section location in the 2021 code. There is no technical change.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency
This proposal is not related to resiliency.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is a language clean-up for grammar and does not affect construction cost.

TAB 13

IN-BUILDING EMERGENCY COMMUNICATIONS

STUDY GROUP REPORT

May 10th, 2022

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The scope of the study group was to review the existing in-building emergency communications (IBEC) systems provisions and assess their need for improvements.[1]

The study group convened virtually (through Adobe Connect) four times: December 1st, 2021, December 29th, 2022, January 18th, 2022, and February 24th, 2022. At each of these meetings, the study group discussed the issues and shared pertinent information and concerns related to IBEC systems, as well as the efficacy of the current building code requirements and whether changes to the current building code requirements are warranted.

Currently, the responsibility for the installation of IBEC systems is split between the building owner and the locality in which the building is being constructed. Building owners are required to install infrastructure cabling for the systems while the locality is responsible for any additional communication equipment required for the operation of the system.[2] After installation, the locality is responsible for maintenance, testing and any necessary system modifications or upgrades, as well as all associated costs.[3] Some members support maintaining the responsibilities as they currently are in the VCC, while other members support placing the full responsibility on one entity.

Additionally, the Virginia Construction Code (VCC) includes a requirement to install “radiating cable”, for IBEC systems, which is a cabling utilized in systems that are uncommon today, and the VCC provides very limited specifications for the design and installation of IBEC systems.

The Study Group considered the following code change proposals related to IBEC systems:

Proposal B918.1-21: The Virginia Fire Chiefs Association representative drafted proposal and shared it with the study group for deliberation. Some significant proposal details include:

- Adds references in the VCC to Section 510.4 and 510.5 of the International Fire Code (IFC) for the design, installation, and testing of IBEC systems.
- Transfers the responsibility for the installation of the entire IBEC system from the locality to the building owner.

The following Study Group members support proposal B918.1-21:

- Department of General Services
- Backhaul Engineering
- Virginia Building and Code Officials Association
- Virginia Fire Prevention Association

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[1] For a full list of Study Group members, please see Appendix B, “Study Group Members”. For a full list of participants during each Study Group meeting, please see Appendix A, “Meeting Summaries, Agendas, Participants”.

[2] The provisions for In-Building Emergency Communications Systems are located in Section 918 of the Virginia Construction Code: https://codes.iccsafe.org/content/VCC2018P3/chapter-9-fire-protection-and-life-safety-systems#VCC2018P3_Ch09_Sec918

[3] The provisions for the maintenance of In-Building Emergency Communications Systems are located in Section 510 of the Virginia Statewide Fire Prevention Code: https://codes.iccsafe.org/content/VFC2018P2/chapter-5-fire-service-features#VFC2018P2_Ch05_Sec510.1

- Virginia Fire Chiefs Association

The following Study Group members do not support proposal B918.1-21:

- International Association of Electrical Inspectors, Virginia Chapter
- Apartment & Office Building Association/Virginia Apartment Management Association
- Virginia Restaurant, Lodging & Travel Association

The primary opposition to this proposal centered on the increased cost-burden to building owners since the portion of the system that is currently required to be provided by the locality would now be required to be provided by the building owner.

Proposal B918.1(2)-21: Technical specifications related to the design and installation of IBEC systems are very limited in the current VCC. At the request of the study group, DHCD staff drafted proposal B918.1(2)-21 to address this issue and shared it with the study group for deliberation. Some significant proposal details include:

- Adds a reference in the VCC to sections 510.4 and 510.5 of the International Fire Code for the design, installation, and testing of IBEC systems.
- Does not change the existing VCC provisions regarding locality and building owner responsibilities (installation, testing, maintenance, upgrades, etc.).
- Deletes section 2702.2.3 in the IBC to reduce confusion since these requirements are covered in sections 510.4 and 510.5 of the International Fire Code

The following Study Group members support proposal B918.1(2)-21:

- Apartment & Office Building Association/Virginia Apartment Management Association
- Backhaul Engineering
- Virginia Restaurant, Lodging & Travel Association
- Virginia Fire Prevention Association
- Virginia Fire Chiefs Association

The following Study Group members do not support proposal B918.1(2)-21:

- International Association of Electrical Inspectors, Virginia Chapter
- Department of General Services
- Virginia Building and Code Officials Association

The primary opposition to this proposal was that it does not make sense to maintain the split-responsibility for the installation of the IBEC system between the building owner and the locality. Further, opponents felt that it would be incongruent to support both the VFCA proposal and this DHCD staff proposal given the competing requirements for whom is responsible for the installation of the IBEC system.

Proposal B918.1.1-21: Current VCC provisions for IBEC systems require installation of radiating cable; however, radiating cable systems are not common today. At the request of the study group, DHCD staff drafted proposal B918.1.1-21 to address this issue and shared it with the study group for deliberation. Some significant proposal details include:

- Replacing “radiating cable” with “cabling” to allow designers to opt for cabling other than radiating cable.
- Allows for new cabling technologies that would otherwise have been prevented by the existing limiting language.

The following Study Group members support proposal B918.1.1-21:

- Apartment & Office Building Association/Virginia Apartment Management Association
- Virginia Department of Fire Programs
- Virginia Restaurant, Lodging & Travel Association
- Virginia Fire Prevention Association
- Virginia Fire Chiefs Association
- Virginia Building and Code Officials Association

The following Study Group members do not support proposal B918.1.1-21:

- International Association of Electrical Inspectors, Virginia Chapter
- Department of General Services

The members that do not support this proposal did not provide reasoning for their opposition.

The report that follows provides a summary of the discussions, including questions and concerns that were raised. Supporting documents and the summaries from each of the four study group meetings are included as appendices following this report.

Note: the links referenced throughout the report were active as of the writing of this report.

BACKGROUND

During the 2003 Session of the Virginia General Assembly, the Virginia Department of Fire Programs, with the assistance from the Departments of Emergency Management and Housing and Community Development, was requested in House Joint Resolution 588 (HJ 588) to study the feasibility of adopting requirements within the Commonwealth that will ensure buildings are constructed and equipped to permit effective and reliable public safety radio communications for emergency personnel operating within them.[5]

At the same time, the Virginia General Assembly unanimously passed House Bill 2529, which would become state law requiring the Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring such new commercial, industrial, and multifamily buildings be designed and constructed so that emergency public safety personnel may send and receive emergency communications from within those structures or equipped with emergency communications equipment so that emergency public safety personnel may send and receive emergency communications from within those structures.[6] [7]

In December of 2004, as a result of the HJ 588 feasibility study and the new state law, the Virginia Department of Fire Programs and the Board of Housing and Community Development created an Ad-Hoc Committee on In-Building Emergency Communication Systems.[8] Though the code change proposals developed by this Ad-Hoc Committee did not receive consensus, the work of the committee laid the framework for the Ad-Hoc Committee during the following code cycle.

In January of 2007, the Ad-Hoc Committee on In-Building Emergency Communication Systems was reconvened and attempted to address the issues that had been brought up previously:

- Costs of the systems
- The party responsible for paying for additional IBEC equipment when interference is caused by new development
- How to interface the entire public safety spectrum used by all responders –
    - Mixed media/technology
    - Different ages of equipment
    - Different power outputs
- Potential legal issues faced by building owners when the equipment does not operate properly and the equipment failure leads to lost lives or serious injuries
- Technical issues with current systems

In October of 2007, the Stakeholder's Meeting for Further Consideration of Non-Consensus Items was presented with an IBEC code change proposal that was developed with consensus between the Ad-Hoc IBEC Committee, Workgroup 2, and Workgroup 3. This proposal received consensus for approval at this meeting and was approved by the Board of Housing and Community Development for inclusion in the 2006 edition of the Virginia Construction Code. The

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[5] House Joint Resolution 588: see Appendix C, "Supporting Documentation"
[6] House Bill 2529: see Appendix C, "Supporting Documentation"
[7] State Law § 36-99.6:2: https://law.lis.virginia.gov/vacode/title36/chapter6/section36-99.6:2/
[8] HJ 588 Feasibility Study: see Appendix C, "Supporting Documentation"

language approved for the 2006 edition remains mostly unchanged in the current Virginia Construction Code.[9]

During the 2018 Code Development Cycle, the Board of Housing and Community Development considered three code change proposals to amend the Virginia Construction Code IBEC requirements.[10]

- **B916.1-18 (Approved)** – Added exception #6 to 918.1 in the Virginia Construction Code, which provides an exception for the installation of IBEC systems in "buildings in localities that do not provide the additional communication equipment required for the operation of the system."
- **B916-18 (Not approved) –** Proposed adding technical requirements (system monitoring, installation per NFPA 1221 and NFPA 72, testing per NFPA 1221 and NFPA 72, critical area designations), and changing the responsibility for the installation of additional equipment for the IBEC system from the locality to the building owner.
- **B918.2-18 (Not approved) –** Proposed referencing the IFC for all requirements, while maintaining the five existing Virginia exceptions as outlined in the 2015 Virginia Construction Code.

The Board of Housing and Community Development approved B916.1-18, but determined that additional discussions were needed and directed DHCD staff to convene a group of interested stakeholders to continue the discussions during the 2021 Code Development Cycle.

The objectives for this study group were to:

- Gather information and data for review and discussion
- Identify issues with current requirements
- Identify areas of agreement and/or disagreement
- Identify areas of support and/or opposition
- Identify possible improvements to current requirements
    - Submit proposal(s) to update existing requirements (if applicable)
- Summarize findings or recommendations
- Review any related proposals submitted during the 2021 cycle (if applicable)

[9] 2006 IBEC Code Change Proposal: see Appendix C, "Supporting Documentation"
[10] B916.1-18, B916-18, and B918.2-18: see Appendix C, "Supporting Documentation"

CURRENT UNIFORM STATEWIDE BUILDING CODE (USBC) REQUIREMENTS

Current code (2018 USBC, effective July 1, 2021) requires the installation of dedicated infrastructure in buildings and structures within localities utilizing public safety wireless communications to accommodate and perpetuate continuous IBEC equipment to allow emergency public safety personnel to send and receive emergency communications.[11] The exceptions to this requirement are:

1. Buildings of Use Groups A-5, I-4, within dwelling units of R-2, R-3, R-4, R-5, and U.

2. Buildings of Types IV and V construction without basements, that are not considered unlimited area buildings in accordance with Section 507 of the USBC.

3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).

4. Buildings or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the building official has approved an alternative method to provide emergency communication equipment for emergency public safety personnel.

5. Where the owner provides technological documentation from a qualified individual that the structure or portion thereof does not impede emergency communication signals.

6. Buildings in localities that do not provide the additional communication equipment required for the operation of the system.

The responsibility for installing the IBEC system is split between the building owner and the locality. The building owner is required to install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The locality is responsible for the installation of any additional communication equipment required for the operation of the system.

The ongoing operation and maintenance of the IBEC system is the responsibility of the locality and the building owner is required to provide sufficient operational space within the building to allow the locality access to and the ability to operate the IBEC equipment.

Upon completion of installation, after providing reasonable notice to the owner or their representative, emergency public safety personnel shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner. Any noted deficiencies in the installation of the radiating cable or operational space shall be provided in an inspection report to the owner or the owner's representative.

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[11] The provisions for In-Building Emergency Communications Systems are located in Section 918 of the Virginia Construction Code: https://codes.iccsafe.org/content/VCC2018P3/chapter-9-fire-protection-and-life-safety-systems#VCC2018P3_Ch09_Sec918

The building owner is also required to provide standby power for the IBEC system with the capability of providing not less than 12 hours at 100-percent system operation capacity.

CURRENT STATEWIDE FIRE PREVENTION CODE (SFPC) REQUIREMENTS

2018 SFPC provisions specific to IBEC systems are located in section 510:[12]

- IBEC equipment shall be maintained in accordance with USBC and the provisions of section 510 of the SFPC.
- If it is determined by the locality that increased amplification of their emergency communication system is needed, the building owner shall allow the locality access as well as provide appropriate space within the building to install and maintain necessary additional communication equipment by the locality. If the building owner denies the locality access or appropriate space, or both, the building owner shall be responsible for the installation and maintenance of these additional systems.
- After providing reasonable notice to the owner or the owner's representative, the fire official, police chief, or their agents shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner.

[12] SFPC Maintenance of In-Building Emergency Communication Equipment: https://codes.iccsafe.org/content/VFC2018P2/chapter-5-fire-service-features#VFC2018P2_Ch05_Sec510

CONSIDERATIONS AND CONCERNS

Several concerns associated with the requirements for IBEC systems were raised and evaluated by the study group members.

- Responsibilities
    - One of the overarching discussions throughout the study group meetings dealt with split-system responsibility between the building owner and the locality. The current building code requirements place the responsibility for the installation of the infrastructure cabling on the building owner and installation of any other equipment on the locality.
    - At the study group's December 29th meeting, the Department of General Services' representative stated that the current split-responsibility of IBEC systems is not mirrored anywhere else in the code and that it is not a practical, nor efficient way to install a life-safety system in the building. The representative from Backhaul Engineering agreed with this sentiment and stated that putting the responsibility solely on the building owner or solely on the locality would be better, but that most localities do not have the money to fully-fund these systems.[13]
    - At the study group's January 18th meeting, the Virginia Fire Chiefs Association's representative provided national data from the Safer Buildings Coalition that states, according to Alan Perdue, the Executive Director of the Safer Buildings Coalition, that Virginia is the only state in the country with a split-system responsibility and that all other states place the responsibility for the design, installation, and maintenance of the system on the building owner.[14] [15]
    - While the current code requirements detail the responsibilities for the installation of the IBEC system, it is not entirely clear who is responsible for the design of the system. The discussion from the group's February 24th meeting landed on the general understanding from representatives from Backhaul Engineering and the Apartment & Office Building Association that the building owner is responsible for the design of the system. Building owners use software such as ibWave to assist in the system design based on a rough order of magnitude provided prior to the build and then the building owner will pick a vendor, either a manufacturer or independent contractor, to approve the design.[16]
    - While a plurality of the stakeholders supports the responsibility of the design, installation, and maintenance of the system being that of the building owner, representatives of the Apartment & Office Building Association and the Virginia Restaurant, Lodging & Travel Association oppose increasing the building owner's responsibility.[17]
- Technical system requirements
    - Another area of focus for the study group was on the technical requirements of IBEC systems. The general consensus from the group was that the current language in the building code does not address the technical requirements of the system design as it

[13] December 29th, 2021 Meeting Summary: see Appendix A
[14] January 18th, 2022 Meeting Summary: see Appendix A
[15] National ERCES Adoption Information: see Appendix C, "Supporting Documentation"
[16] February 24th, 2022 Meeting Summary: see Appendix A
[17] February 24th, 2022 Meeting Summary: see Appendix A

pertains to minimum signal strengths into the building, minimum signal strengths out of the building, ongoing system performance, amplification systems and components requirements, and signal booster requirements, among others. These technical requirements are outlined in Section 510.4 and 510.5 of the 2021 International Fire Code, but they are not outlined in the current building code.[18]

  - The group was asked at their January 18th meeting if they would be in support of DHCD staff drafting a proposal to incorporate references to Sections 510.4 and 510.5 of the 2021 International Fire Code to provide technical guidance on the design and installation of IBEC systems. Representatives from Backhaul Engineering, Virginia Department of Emergency Management, Virginia Municipal League, the Virginia Building and Code Officials Association, the International Association of Electrical Inspectors' Virginia Chapter, the American Institute of Architects' Virginia Chapter, the Apartment & Office Building Association, the Department of General Services, and the Virginia Fire Chiefs Association were all in support. No stakeholders present at the meeting were opposed to this route.[19]

- Costs
  - The costs associated with the installation of IBEC systems were discussed at several meetings.
  - At the group's December 29th meeting, the representative from the Department of General Services stated that one building owner estimated their costs to be between $0.50 and $0.75 per square foot, but did not follow-up with concrete data for the group.[20]
  - The representative from the Apartment & Office Building Association provided the group with IBEC systems costs from an engineer from Siemens based on five different building designs. The costs for these systems ranged from $0.10 to $0.38 per square foot and were provided to the group at their February 24th meeting.[21] These figures represent those costs incurred by the building owner and they include the design and installation of the wiring only and do not include the cost of additional equipment.
  - Other cost components considered by the group were with respect to annual testing and recertification and maintenance and monitoring. The representative from the Department of General Services stated that the system integrator he knows charged between $1,000 and $5,000 for the annual testing and recertification of IBEC systems for small to large systems. He also stated that most building owners typically sign up for maintenance and monitoring of the system, which costs between $1,000 and $2,000 per year.[22]

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[18] 2021 IFC IBEC Technical Requirements: https://codes.iccsafe.org/content/IFC2021P1/chapter-5-fire-service-features#IFC2021P1_Pt03_Ch05_Sec510.4

[19] January 18th, 2022 Meeting Summary: see Appendix A

[20] December 29th, 2021 Meeting Summary: see Appendix A

[21] IBEC Costs – Steve Shapiro: see Appendix C, "Supporting Documentation"

[22] January 18th, 2022 Meeting Summary: see Appendix A

CODE CHANGE PROPOSAL DRAFTED BY THE VIRGINIA FIRE CHIEFS ASSOCIATION (VFCA)

The Virginia Fire Chiefs Association representative drafted a code change proposal and shared it with the study group for deliberation.

The proposal intends to provide references to Sections 510.4 and 510.5 of the International Fire Code (IFC) for the design, installation, and testing of IBEC systems.[23]

Section 510.4 of the IFC covers the technical requirements for the systems, components, and equipment used in IBEC systems. These technical requirements outline the required listing of the equipment (UL 2524), the minimum signal strength requirements both into and out of the building, how the system shall be designed, the system's standby power requirements, how the system shall be monitored, and what design documents are required to be provided to the fire code official.

Section 510.5 of the IFC covers the installation requirements for IBEC systems and provides detailed provisions for the mounting of donor antennas, the system approval requirements prior to installation of the system, the minimum qualifications of the personnel responsible for installing the systems, the procedure for acceptance testing of the system, and to which federal regulations the IBEC system is to comply.

Further, this code change proposal places the responsibility for the installation of the entire IBEC system on the building owner. As such, the existing exception for buildings in localities that do not provide additional communication equipment for the operation of the system has been removed since the responsibility for the installation of the system is proposed to no longer be split between the building owner and the locality. Lastly, the Operations and the Acceptance Test provisions from the existing language were removed with the intent that the ongoing operations and maintenance of the IBEC system would shift from the locality to the building owner and the acceptance testing provisions would be covered in the reference to the International Fire Code.

Organizations in Support	**Organizations in Opposition**
Department of General Services	International Association of Electrical Inspectors, Virginia Chapter
Backhaul Engineering	Apartment & Office Building Association/Virginia Apartment Management Association
Virginia Building and Code Officials Association	Virginia Restaurant, Lodging & Travel Association
Virginia Fire Prevention Association	
Virginia Fire Chiefs Association	

[23] Section 510.4 and Section 510.5 of the 2021 International Fire Code

Note: The Apartment & Office Building Association represents the Virginia Apartment Management Association

The primary opposition to this proposal centered on the increased cost-burden to building owners since the portion of the system that is currently required to be provided by the locality would now be required to be provided by the building owner.

CODE CHANGE PROPOSALS DRAFTED BY DHCD STAFF

DHCD staff drafted two proposals to address IBEC systems. The first proposal incorporated a reference to sections 510.4 and 510.5 of the International Fire Code and provided a clarification that the acceptance testing procedure required by 510.5.4 of the International Fire Code should be the responsibility of the locality, as addressed in Section 918.2 of the Virginia Construction Code. This proposal also deleted section 2702.2.3 of the International Building Code, which addresses standby power for IBEC systems. At their January 18th meeting, the group decided it would be best to delete section 2702.2.3 of the International Building Code to reduce confusion since these requirements would be covered by referencing the aforementioned International Fire Code sections.

Organizations in Support	Organizations in Opposition
Apartment & Office Building Association/Virginia Apartment Management Association	International Association of Electrical Inspectors, Virginia Chapter
Backhaul Engineering	Department of General Services
Virginia Restaurant, Lodging & Travel Association	Virginia Building and Code Officials Association
Virginia Fire Prevention Association	
Virginia Fire Chiefs Association	

The primary opposition to this proposal was that it does not make sense to maintain the split-responsibility for the installation of the IBEC system between the building owner and the locality. Further, opponents felt that it would be incongruent to support both the VFCA proposal and this DHCD staff proposal given the competing requirements for whom is responsible for the installation of the IBEC system.

The second proposal drafted by DHCD staff dealt with the limitations surrounding the building owner being required to install “radiating cable, such as coaxial cable or equivalent.” Radiating cable was commonly used in IBEC systems when the existing VCC requirements were added to the 2006 USBC, but a radiating cable system is not common today. The change proposed by DHCD staff, based on conversations and deliberations in the study group, was to strike the existing language quoted above and replace it with “cabling” to allow designers to opt for cabling other than radiating cable. The intent is to provide the space for new cabling technologies that would otherwise have been prevented by the existing limiting language.

Organizations in Support	**Organizations in Opposition**
Apartment & Office Building Association/Virginia Apartment Management Association	International Association of Electrical Inspectors, Virginia Chapter
Virginia Department of Fire Programs	Department of General Services
Virginia Restaurant, Lodging & Travel Association	
Virginia Fire Prevention Association	
Virginia Fire Chiefs Association	
Virginia Building and Code Officials Association	

Opponents to this proposal did not provide reasoning for their opposition.

SUPPORTING DOCUMENTATION AND REFERENCE MATERIALS

Documentation discussed by the study group included the following:

- DHCD staff power point presentation
- House Bill 2529 – 2003 General Assembly
- House Joint Resolution 588 Feasibility Study
- BDA White Paper
- B916.1-18 – 2018 Code Cycle Proposal
- B916-18 – 2018 Code Cycle Proposal
- B918.1-18 – 2018 Code Cycle Proposal
- 47 CFR 90.219
- How to Best Determine When a Building Needs an ERCES or Not
- National ERCES Adoption Information
- North Carolina Fire Code Section 510
- NFPA 1221 vs NFPA 1225
- SAFECOM Guidance on P25 Compliance
- UL2524 Power Point
- IBEC System Costs
- Code Change Proposal - submitted by Virginia Fire Chiefs Association
- Code Change Proposals - drafted by DHCD staff

CONCLUSIONS AND ACKNOWLEDGEMENTS

Study group meetings yielded several fruitful discussions regarding ways in which the current building code requirements for IBEC systems fall short and the current code requirements can be improved by incorporating references to Sections 510.4 and 510.5 of the International Fire Code and possibly delineating the responsibility of the system to one party instead of two. The stakeholders did not reach consensus on these two items. However, this report documents the key issues discussed and it includes supplementary documents provided by stakeholders.

Below is a summary of the key findings, based on the information provided and stakeholder process.

- The current building code requirements for IBEC systems lack technical provisions for how these systems should be designed, installed, operated, and maintained.
  - Discussions indicated that the overwhelming majority of stakeholders support providing references to the technical requirements of IBEC systems in Sections 510.4 and 510.5 of the International Fire Code.
- A majority of stakeholders support putting the responsibility for the entirety of the IBEC system on the building owner.
- The costs incurred by building owners for the installation of the infrastructure cabling for IBEC systems are not much different than in 2003 when the General Assembly began looking into this issue, but the study group did not provide values for the potential incurred costs by the building owner if the responsibility for the system is placed entirely on the building owner.[24]

Finally, the staff of DHCD wishes to thank the study group participants for the time and energy they committed to this process. The stakeholders presented arguments based on their backgrounds in fire services; fire and building codes; emergency management and prevention; law enforcement; public administration, private engineering firms and more. This committed group lent many hours of their time submitting documents, conducting conversations, and reviewing their colleagues' arguments and positions. They shared their knowledge and experience in the form of anecdotes, documented case studies, and current practices. We deeply appreciate their expertise and willingness to engage in the study group discussions.

[24] February 24th, 2022 Meeting Summary: see Appendix A

APPENDIX A: Agendas, Meeting Summaries, Participants

In-Building Communications
December 1, 2021
9:00 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

AGENDA

1) Welcome

2) Introductions

3) Overview of VA Code Development Process

4) Background

5) Discussion

6) Assignments and Next Steps

7) Next Meeting

In-Building Communications Meeting Summary

December 1, 2021 9:00 a.m. – 10:35 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:
Cindy Davis: Deputy Director, Division of Building and Fire Regulations
Jeanette Campbell: Administrative Assistant, BFR
Jeff Brown: State Building Codes Director, State Building Codes Office
Richard Potts: Code Development and Technical Support Administrator, SBCO
Travis Luter: Code and Regulation Specialist, SBCO
Paul Messplay: Code and Regulation Specialist, SBCO
Florin Moldovan: Code and Regulation Specialist, SBCO
Stephen Reynolds: Training Specialist, Virginia Building Code Academy
Kyle Flanders: Senior Policy Analyst, Policy and Legislative Office

Study Group Members:
Jamie Wilks: Madison County Building Official; VBCOA committee member; prior Building Official in Matthews County; Retired from Norfolk fire department
Robert (Jonah) Margarella: Architect at Baskervill (Studio Director); 24+ years in architecture; member of SBCTRB
Dwayne Tuggle: Amherst, VA Mayor; VA State Police-retired
Steve Shapiro: Retired Building Official City of Hampton - 34 years; LLC Shapiro Associates; AOBA; prior President of ICC
Dana Buchwald: Senior Account Manager (in-building signal for emergency responders) at Backhaul Engineering
Debbie Messmer: Virginia Department of Emergency Management
Troy Knapp: Electric Plan Reviewer with VA DGS, Division of Engineering and Buildings; prior Electric Plan Review Engineer 13 years William & Mary College; 20+ years Electrical Engineer
Robert Melvin: VRLTA-Restaurant, Lodging & Travel Association, Director of Government Affairs
Andrew Milliken: VFCA, VFSB Chairman of Fire Codes and Standards Committee, (also submitted a proposal last cycle on this issue)
Tammy Breski: Broadband Project Manager, VA DHCD Division of Community Development; prior Verizon Construction Manager

Other Interested Parties:
Ron Clements
Ernie Little
Linda Hale
Sean Farrell
Todd Strang

Study Group Members not in attendance:
Patrick Green: Virginia State Police
Jodi Roth: Virginia Retail Federation
Gerry Maiataco: Virginia Fire Prevention Association
Tread Willis: International Association of Electrical Inspectors-VA
Jay Davis: Virginia Department of Fire Programs
Jim Crozier: Virginia Association of Counties

AGENDA AND DISCUSSION ITEMS: *(Power Point Presentation Slides with additional information indicated)*
Presentation is on the DHCD website, with a link on the cdpVA website

1) Welcome

Jeff Brown: General Housekeeping- Directed participants to the Adobe Connect presentation area, the attached files and microphone settings. Attendants were asked to mute microphones until they wish to speak, identify themselves as they speak, be respectful and be concise in their comments. Use the 'Raise Hand' feature in the meeting room to speak. Cameras will not be used in these virtual meetings. All meetings are public, but generally, discussions will be among study group members.

2) Introductions

Jeff Brown: DHCD staff introductions: Cindy, Jeff, Richard, Paul, Florin, Jeanette from BFR.
Study Group members made personal introductions. *(slide)*
Study Group members will be indicated as such in the Adobe Connect meeting participant list with 'SG' after their names. If anyone outside of the group would like to join the email list, they should contact sbco@dhcd.virginia.gov with their request.

Robert Melvin: He is not sure how many meetings his group can participate in, due to the General Assembly legislative process (Jodi as well). Jeff Brown acknowledged this and said he would try to work around those dates and get some meetings in before Session begins, and will wait until after Session ends to start the General Workgroup meetings in March.

3) Overview of VA Code Development Process

Jeff Brown: Showed participants *(3 slides)* indicating tentative meeting dates, Code Development Process flowchart and cdpVA website overview.

The Virginia codes are usually updated every 3 years. The 2018 code cycle was completed last year, and codes became effective in Virginia on 7/1/21.

The 2021 cycle to integrate the newest I-Codes into the Virginia code started with submitting the Notices of Intended Regulatory Action (NOIRA), which was published in the Virginia Register of Regulations. Study Groups will be conducted for special topics, in order to identify issues, review proposals and get recommendations before submitting them to the Board of Housing at the end of the phase. Files for discussion can be found in lower left box of this Adobe meeting site, including a flowchart of the regulatory process, together with this presentation *(all slides)*. These files can also be found on cdpVA.

The BHCD in October approved a policy to limit proposal submission only to the proposed phase. The final phase of the development process is limited only to corrections, technicalities or error revision; it is not intended for new changes, which was previously allowed, but it caused too many complications and delays to the process. If someone wants to propose a change during the final phase, it will instead be pushed to the next code change cycle. The cdpVA website *(slide)* can be used to submit change proposals. It also includes historical data from the 2015 and 2018 cycles, and other important information such as meeting dates, agendas, summaries, development cycle flowchart, base documents, etc…

Study Groups *(slide)* are generally small - about 12-15 group representatives. They meet regarding specific topics until discussions end. Any potential proposals resulting from the Study Group discussions will be included in the General Workgroup Agenda(s) for review and discussions by stakeholders, prior to BHCD consideration. The Study Groups will then disband. This IBEC group is a Study group. Recommendations we may make will be based on how discussions proceed and what proposals are submitted to this group and/or what proposals we submit as a group.

Sub-Workgroups *(slide)* review proposals according to topic, which are generally broader in scope than the Study groups. They will submit recommendations based on proposals received or created within the group to the General Workgroups, who make recommendations and submit to the BHCD. Currently, the Sub-Workgroups are: Energy, Statewide Fire Prevention Code and Resiliency.

General Workgroups *(slide)* consider proposals submitted by anyone and the meetings are public, open to all. The proposals go to the BHCD in blocks and those that are unanimously approved and disapproved are voted on by the BHCD in blocks. Proposals that did not reach a consensus for approval or disapproval are voted on individually by the BHCD. The General Workgroups for the 2021 cycle will start to meet in March.

4) Background / History

Jeff Brown: In Building Emergency Communications (IBEC) *(slide)* is 2-way emergency responder communication coverage inside of buildings. Starting in 2021, the I-Code term has been changed to Emergency Responder Communications Coverage (ERCC). This is used to indicate the ability to communicate in a building, not necessarily a specific communication system.

This group will also discuss Emergency Responder Communication Enhancement Systems (ERCES). ERCES may be used in buildings where the signal strength does not meet minimum requirements. This is a system made up of a donor antenna in-tower with a bi-directional amplifier to boost the signal. Coaxial cable or fiber medium is used to distribute the signal throughout the building. There are additional information sources online.

House Bill 2529 in 2003 *(slide)* was initiated as a result of problems identified in the 9-11 emergency response. BHCD was directed to develop codes for new building construction to ensure the operation of communications used by emergency personnel, or provide equipment to allow such emergency communications.

HJR 588 in 2003 *(slide)* directed a taskforce in Virginia to study the feasibility of adopting requirements to ensure that buildings were constructed and equipped to permit effective radio communications inside the buildings. The group agreed that local jurisdictions are responsible for delivering adequate radio signals to the exterior of a building before requiring the installation of emergency communications requirements to overcome signal degradation inside the structure.

2004-2007 Virginia ad-hoc committee *(slide)* compromise proposal was approved by the BHCD for the 2006 Virginia Construction Code (VCC), which remains mostly unchanged today.

2018 Code Development Cycle *(slide)* The BHCD considered proposals to amend the VCC emergency communications requirements. One was approved: (B916.1-18) however, two were not approved: (B916-18 and B918.1-18). The Board decided there needed to be a more in-depth study and discussion, which is what this Study Group will be doing.

The objectives of this Study Group *(slide)* are to gather information, identify issues with current code, identify areas of agreement or disagreement, support and opposition, identify possible improvements and submit proposals (if any), summarize findings and review any proposals related to the topic (if any) submitted throughout the 2021 cycle.

VCC codes are available for free online: codes.iccsafe.org/codes/Virginia *(slide)*

2021 IBC requirements *(slide)* of Section 918 (ERCC) states that two-way ERCC shall be provided in all new buildings in accordance with Section 510 of the International Fire Code (IFC). This is the only model we have.

2021 Section 510 IFC *(slide)* also states that two-way ERCC shall be provided in all new buildings (with 3 exceptions). It also includes technical requirements of the systems to be used. These systems also need to be designed in accordance with NFPA 1221, section 926, and they also need to be UL 2524 listed.

2018 requirements in VCC Section 918 *(slide)* has 6 listed exceptions: 1) Use groups, 2) Types IV and V, 3) One-story buildings less than 20k sq. ft., 4) Government owned or leased spaces with other security requirements approved by a Building Official, 5) Owner has a technical documentation form stating that the building does not impede signals 6) Building that doesn't provide the equipment needed to operate the system.

2018 VA requirements 918.1.1, .2, .3… and 918.2 *(slide)* regarding installation, operations, inspection and acceptance test for equipment. The building owner is not responsible for everything – they do need to provide infrastructure (cable installation) and space for the locality to work with the equipment. The locality should be responsible for the system after installation of cables, including operation, maintenance and inspection.

5) Discussion

Jeff Brown: 2018 cycle proposals *(slide)* B916.1-18 approved (adding exception 6); 916-18 not approved; 918.1-18 not approved.

This Study Group will be re-addressing the proposals not previously approved:

B916-18 proposed adding technical requirements (as per NFPA 1221 and 72). Virginia doesn't have any specifics currently. Proposed changing responsibility for installation from locality to building owner.

B918.1 proposed referencing the IFC, while keeping the existing 2015 VCC exceptions for installation.

Jeff Brown: Opened discussion to the floor for questions or comments about history and current status:

Dana Buchwald: In section 918, exception #3, what is the basis for this exception (+1 story over 20k sqft). Staff responded that this threshold was used to correlate with sprinkler requirements for buildings of similar size.

Troy Knapp: He is a Plan Reviewer. He says that not having technical requirements makes it difficult for planners and builders to follow. He agrees that this needs some clarification.

Jonah Margarella: Why were the 2 proposals open for discussion not approved? Jeff Brown says that one reason was cost and who would be responsible to pay, another may have been just because the group was too large with too many different sides and the BHCD wanted a Study Group to look into it further.

Cindy Davis: She thinks that AOBA had big concerns based on previous issues. Primarily: who is responsible? Especially for existing buildings, to upgrade or maintain older systems. Steve Shapiro agreed with Cindy.

Steve Shapiro: Regarding the reason for exception #5, he's unsure of what the wording entire structure or "portion thereof" would mean specifically. Jeff Brown said there may be only a portion of the building where communication fails.

Jamie Wilks: He thinks the current code section is good starting point, but it's important to identify the standards to adhere to. He also says some smaller localities would have trouble paying for these systems.

Andrew Milliken: As a starting point, it would be important for this group to look at what prior discussions were, especially the financial burden for localities. He is concerned that the existing code requirements did not achieve the original intended goal.

Robert Melvin: He understands Andrew's concerns, but also thinks that businesses would not be able to bear the financial burden at this time (COVID), inflation, etc. While we need to ensure safety protocols, hotels and restaurants, etc., will not be able to handle the financial burden and many didn't get any financial government assistance. Jeff Brown asked for any others to try to provide stats that could help with the financial discussion.

Andrew Milliken: Wants to clarify that most of this discussion is about new buildings. We should note that it will not be retroactively required for existing buildings.

Steve Shapiro: Asked about the financial information Jeff Brown is looking for; will the data need to be in by the 14th, and should we be more specific on what exactly the cost would be comprised of? Jeff Brown says it's not required by 14th, and he knows there have been different ideas about what the #s would include, as well as how it would be presented. He is not expecting that we will come to consensus about financial recommendations during the course of this Study Group.

6) Assignments and Next Steps

Jeff Brown asked for everyone to review and research the information provided, ask questions, raise concerns, gather additional information, and submit for the next meeting. *(slide)*

7) Next Meeting

December 29th 9am-3pm with a one hour lunch break from 12-1. *(slide)* There will be more discussion about the current issues at hand, rather than reviewing prior data. Adobe Connect will continue to be used for virtual meetings. Jeff Brown thanked everyone for their participation.

AGENDA

In-Building Emergency Communications Study Group

December 29, 2021

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

- A) Background of Virginia Requirements
  - i) Previous IBEC Feasibility Study (HJR588)
  - ii) Development of Initial Virginia Code Requirements
- B) Andrew Milliken Draft Proposal
- C) System Requirements (IFC, NFPA, etc.)
- D) Installation Responsibility
- E) System Costs

III) Other

IV) Assignments and Next Steps

V) Next Meeting

In-Building Emergency Communications Study Group

December 29, 2021 9:00 a.m. to 1:40 p.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Division of Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*

Study Group Members:

Jamie Wilks: *Madison County Building Official; VA Building Code Officials Association (VBCOA) committee member; prior Building Official in Matthews County; Retired from Norfolk fire department*
Robert (Jonah) Margarella: *Architect at Baskervill (Studio Director); 24+ years in architecture; member of State Building Code Technical Review Board (SBCTRB)*
Steve Shapiro: *Retired Building Official, City of Hampton-34 years; LLC Shapiro Associates; Apartment & Office Building Association (AOBA); prior President of International Code Council (ICC)*
Dana Buchwald: *Senior Account Manager (in-building signal for emergency responders) at Backhaul Engineering*
Joseph (Tread) Willis: *International Association of Electrical Inspectors-VA (IAEI)*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
Troy Knapp: *Electric Plan Reviewer with VA Department of General Services (DGS), Division of Engineering and Buildings; prior Electric Plan Review Engineer 13 years William & Mary College; 20+ years Electrical Engineer*
Robert Melvin: *Restaurant, Lodging & Travel Association (VRLTA), Director of Government Affairs*
Andrew Milliken: *VA Fire Chiefs Association (VFCA), VA Fire Services Board (VFSB) Chairman of Fire Codes and Standards Committee, (also submitted a proposal on this issue)*
Joshua (Jay) Davis: *Virginia Department of Fire Programs (VDFP)*

Other Interested Parties:

Todd Strang: *Spotsylvania County Fire Official*

Study Group Members not in attendance:

Patrick Green: *Virginia State Police (VSP)*
Jodi Roth: *Virginia Retail Federation*
Gerry Maiataco: *Virginia Fire Prevention Association (VFPA)*
Jim Crozier: *Virginia Association of Counties (VACO)*
Tammy Breski: *Broadband Project Manager, VA DHCD Division of Community Development; prior Verizon Construction Manager*
Dwayne Tuggle: *Amherst, VA Mayor; VA State Police-retired*

AGENDA AND DISCUSSION ITEMS:

1) Welcome

Jeff Brown: Thanked everyone for attending. Asked for members to stay muted unless they are speaking. The meeting is open to anyone, but only Study Group members should join the discussion. He noted that Patrick Green, Jodi Roth, Gerry Maiataco and Jim Crozier were not in attendance last week, and may not be on today. He allowed Tread Willis (IAEI) and Jay Davis (VDFP) to introduce themselves to the group, as they were not in last week's meeting.

The group objectives are to look at the issues surrounding in-building emergency communication systems, define areas of agreement and disagreement, look at the technical requirements in the code, discuss costs and responsibilities related to these systems and clarify this data for the Board of Housing and Community Development. All proposals made will be discussed. We currently have one draft proposal made by Andrew Milliken, which is on the table for discussion.

Notes will be taken in all meetings, including outstanding questions or issues, as well as areas of agreement. Questions will be researched by DHCD or assigned group members to provide answers. At the conclusion of the meetings, the group's findings will be summarized and reported to the Board, including the items of agreement.

2) Discussion:

Background of Virginia Requirements

Previous IBEC Feasibility Study (HJR588)

Jeff: There were some questions at the first meeting about the history of the IBEC requirements in the code. In 2003, there was a feasibility study done. There was legislation that directed DHCD to develop regulations related to IBEC systems and a joint resolution to conduct a feasibility study regarding potential IBEC regulations. The feasibility study (file attached) gives the background from 2003: discussion, issues, questions, findings, etc. Jeff thinks many of the same topics and issues will arise in this study group, so it will be important to see what was discussed in the feasibility study, and what is different since then. They discussed a broad range of the potential costs of system installation, but those have probably changed, so we will need to revisit the topic and gather updated data. He asked if there were any questions or comments about the study.

Dana Buchwald: asked if the group is only addressing new construction, and why? (Besides cost).

Jeff: Anything is open for discussion: what's required, what are options, what are pros & cons about new vs. existing buildings. In the past, the discussions did not include existing buildings. Andrew's proposal also does not addresses existing buildings. It is rare that there is a building code requirement for retrofit of existing buildings, though there are examples. Previous retrofit provisions have been implemented through legislation. Discussions will be noted in the final report, including talk around new vs. existing buildings, and where the group lands on that issue.

Dana: Specifically asked because she speaks with a lot of AHJs and fire marshals, who have said that they are afraid to go into some buildings, because they don't have a proper signal.

Andrew Milliken: Regarding new vs. existing buildings, he thinks it's important for the group to comment on both for the purpose of arriving at consensus. The VA code does speak specifically to new construction, so the group should prioritize that discussion. He still thinks it's beneficial to provide information on existing buildings.

Jay Davis: Regarding old vs. new buildings, in areas with some density, most localities deal with the ability to communicate in the buildings as they are constructed. When construction continues in the area, the systems can overlap and interfere with each other. Boosters may be needed to achieve clear communications. Localities may need to look at signals each time new construction is done. It isn't one and done, there is a need for constant checks and balances as growth continues. He thinks the group does need to discuss what happens after installation.

Jeff: Agrees with Jay. There is a responsibility question – who is responsible for system upgrades when needed? Currently localities are responsible for the systems and any upgrades, but the group will discuss responsibility not only as it relates to design and installation, but also maintenance and upgrades. Additionally, the FCC may require frequency changes, so the group would want to discuss what that would look like, how often would it happen, and who would be responsible for any upgrades?

Steve Shapiro: The feasibility study mentioned that a retrofit requirement could add 10-25% to the cost of a system, which would have a big impact.

Jonah Margarella: The IFC and VCC reference maintenance, testing and proof of compliance in section 510.6. Is that enough to keep validating the system over time?

Jeff: That is a good question, and it will be important keep it in mind during discussions about inspections and maintenance testing requirements and costs.

Tread Willis: The cost of retrofit requirements can be tremendous and could be infeasible or impractical. However, he thinks the group should consider the occupancy change language in chapter 7 of the existing building code (VEBC), and the increase in square footage qualification in Andrew's proposal to determine if, under certain circumstances, retrofitting could be required. He doesn't actually like the idea of doing that, however, the current existing building code says that a change of occupancy could actually require a new sprinkler system to be installed. Could the same apply for IBEC systems?

Jeff: Agrees that the VEBC would be the right place for any requirements related to existing buildings.

Development of Initial Virginia Code Requirements

Jeff: Drafts and the final code change proposal that was submitted to the BHCD:
Between the years of 2003-2007, there were many discussions and attempts to reach consensus. In 2007, a proposal from Cheri Hainer titled "IBEC proposal 2007.10.10" (attached) finally had an acceptable compromise. That document and the feasibility study together are good background information regarding how the existing IBEC code requirements were developed. He advised the group to look at these and all of the related documents sent out on Dec 17th for more background.

Dana: Was looking at the NFPA 1225 2022 (newest) edition considered (to see where the technology is heading)? For example, in the 2018 version, conduit wouldn't be required in every building and would save a tremendous amount of money. Was this addressed: looking at newer codes?

Jeff: It would be good to look at it and discuss. He asked Dana to captain that. Someone has submitted a draft proposal in cdpVA to incorporate 1225 into the 2021 USBC, but it's not fully processed yet. The group will start to look at the codes and standards more in the "system requirements" section (below).

Andrew Milliken Draft Proposal

Jeff: Andrew Milliken, representing the VFCA, drafted a proposal that is not officially in cdpVA yet. It is a good starting point, to see what a proposal for this cycle might look like (attached).

Andrew: Wanted to get something out to start discussions, and to bring section 918 in the new construction code back in line with the charge in Title 36. The main idea is to remove requirements for building owners to provide conduit, which serves no purpose, and to provide direction to code officials, in section 918.1.1, for what standards would apply to installation, and also meet the IFC standards. The proposal references NFPA 1221, not 1225, but the group can discuss further. He's trying to keep it concise and simple to get back in line with the charge in Title 36 and provide a new starting point for this section by removing excess requirements.

Steve: Who is responsible to provide the system in the building?

Andrew: The proposal keeps the same language that was found prior to 2018, requiring the building owner, where a system is necessary, to provide the system. This is similar to standpipe systems, where the building owner is responsible for installation.

Steve: What exactly would the owner have to provide?

Andrew: If the owner didn't meet the minimum signal requirements, or have attestation to prove that they could provide good communications coverage throughout the building, they would have to provide a 2-way IBEC system (DAS or bi-directional antenna system connected to the fire alarms). This is the same as the requirements in a number of states.

Troy Knapp: The difference he sees is that the Virginia code states 'providing radiating cable or equal' and then the locality would provide other equipment: basically amplifiers battery backup, together with acceptance testing. He thinks it's analogous to providing fire alarm horns and strobes in the building, but not providing the active equipment to make it work. The way it's setup - for the building owner to provide radiating cable or antennas, and for localities to provide amplifiers or other equipment to make it work - nothing else in the code is setup to work that way. It's not practical, not efficient, and it's no way to install a life-saving system in a building. It makes it hard to review plans, enforce the code and give guidance to engineers. It would be like putting emergency lights in and requiring the locality to put in a generator.

Dana: She agrees with Troy. It's nonsensical. To put the responsibility only on the building owner or only on the locality would be better. Most of the people she speaks to in localities do not have the money to do it all. Some other areas in the country provide tax breaks for existing buildings and new construction. Separation doesn't make sense.

Jeff: Yes. It's on our list to discuss what other states and localities are doing, and what their requirements are. Which ones don't require systems and which ones do, and how do they do it (who's responsible, and how do they offset the costs)? He sked for anyone to provide that type of information, and said it may be assigned at the end of this discussion or between now and the next meeting.

Troy: He recently (last year) joined the Safer Buildings Coalition. They are a group of manufacturers, engineers and AHJ's working through these types of issues, and trying to get consistency across the nation. They troubleshoot problems and interference with existing systems. He'll ask for information on what others are doing. One person in that group says VA is only one of a few states that require localities to provide anything. He said the IBEC systems are like fire alarm or sprinkler systems; the owners' cost of doing business and providing safe buildings. He hasn't looked at any cost documentation, but a particular owner said their cost was 50 to 75 cents per square foot. Troy will get more information as he can.

Jeff: Any information would be good. He is looking for a few sources to compare data. Anything on cost and what others are doing would be helpful to the group.

Steve: One question for Andrew regarding his draft proposal: why is the exception #6 (VCC Section 918.1) stricken - wasn't that exception just added in the 2018 edition of the VCC?

Andrew: Localities already aren't providing additional equipment and there is no additional equipment to provide in this proposal. He's proposing an all-in-one owner-provided life-safety system, like fire alarms, standpipes and sprinklers.

Dana: Agreed and asked if anyone is familiar with Fairfax. They have requirements that are well-done and are somehow being enforced. They say it's "highly encouraged and recommended" that all commercial, multi-unit residential, governmental and educational occupancies reliable on building code and safety…' similar to most jurisdictions in Florida. Fairfax put down the requirements in about 8 pages, although Tampa has like 40 pages. She spoke with the AHJ in Fairfax, who says everyone is on board, and it works fine for them. She has a stack of requirements from various jurisdictions. She knows of only 3 jurisdictions in VA that have written down their requirements (Arlington may be one).

Jeff: Some localities do have policies. He said he hasn't looked at them, but if they are not in line with code, it would be problematic. He thinks the best starting point for specific IBEC system design or installation requirements would be the existing model code requirements. Some Virginia localities currently have their own local policies to identify minimum system requirements or point to IFC or NFPA for specific requirements since the current VCC requirements are somewhat vague and do not reference the IFC. He asked that if Dana or anyone else has any information to share, she should get it to DHCD to share with group.

Troy: Has documents from Stafford, Loudoun and Arlington. Stafford's is published by the fire and rescue department, office of the fire marshal. It does have code references. He'll forward. He agrees with Jeff that they don't need to rewrite code if there's already code to reference regarding requirements.

Andrew: Is from Stafford. They have standards for when these systems are provided. They see developers come in and ask for the IBEC requirements, which is evidence that the industry requirement for infrastructure is usually on owner, and that VA is behind on this code issue.

Jeff: It would be helpful to see what other states require and to compare that information.

Jay: He retired from the city of Charlottesville in 2020. He worked on this type of project before he left. There, the construction process was part of the design features of a building. A document was handed to developers stating that the building could achieve communications, with specific language showing what the city uses, and that they expect builders to provide compatible 95% in-building communications without interference. The responsibility was on the developer and designer. They specifically referenced NFPA 72 and the fire code, but the building code didn't require it. When a building has already been built somewhere else, the developer would know how it interacted there/then. It was more complicated when a new building was proposed that had never been constructed before. They would then discuss at least providing space and conduit for equipment, so they could add after the building was constructed. He says they want to do the right thing, but what do they have to provide? He can provide the document from Charlottesville. The big thing is really giving clear guidance no matter what.

Jeff: The code is minimum now. He thinks the challenge is the missing link of design & installation standards. Even if nothing else changes, looking at IFC and NFPA and referencing it or somehow adding a little more guidance in the code regarding system requirements would be helpful. If there are at least design and instillation requirements, it would give more clear guidance to designers, owners and localities to work with.

Steve: He assumes that the VA localities mentioned: Fairfax, Arlington, Stafford, Loudoun and Charlottesville are still in compliance with 2018 IBC section 918.1.1. He's hoping that they don't require more than what the current building code requires.

Dana: Fairfax references 1221 and 72 but it's not specific. Companies like Publix come in with designs they already have. They have a safety plan with towers already scoped out before construction. If builders would incorporate BDA in life safety plans, it would help with cost and time. A 2-hour burn room, for example, is something to put in during construction so it's known upfront and there is no cost or time wasted to put it in later.

Jeff: The question is who are we minimizing cost for? Even if someone comes in with a plan today for a building that already has a pre-designed IBEC system, installation responsibility would still fall on the locality. The building owner is currently not required to install the system.

{BREAK - 9:57am-10:05am}

System Requirements (IFC, NFPA, etc.)

Jeff: Wants to look at system requirements, setting Andrew's proposal aside for the moment. The code says that we need to ensure that the building has continuous IBEC. What are the various types of systems? What else besides amplifiers and antennas, etc. is available? Are there other systems that don't fit the mold of NFPA 1221 or 1225, or are they all encompassed in the existing standards and code requirements? Are there newer technologies to include in discussions?

Dana: She has seen mobile units and portable units. Instead of systems being installed during construction, these units can be dispatched as needed. She doesn't think they are a good solution. Whatever the system is, it needs to be UL 2524 rated.

Jeff: What types of systems does that UL rating cover?

Dana: It seems that the various systems are all similar: they have bi-directional amplifiers (BDAs), annunciator panels, 12- to 24-hour battery backups, alarms that are part of BDA in the fire panel, a remote shutoff if needed, repeater and signal booster. All of the manufacturers have or are working on the UL 2524 rating. They all seem to be the same.

Jeff: There are minimal system requirements in the code – what you mentioned. Primary differences may be in the in-between, wiring, and equipment for signal transmission, which could vary by manufacturer.

Jay: Localities have their own systems operating on 800 MHz or other types. The systems are able to address specific brands, like Motorola. The components that go with it also have to be installed according to code and be UL certified. The locality would be the driving factor to determine which system the building owner would need to use to interact with what the locality is using.

Dana: Agreed. It depends what tower, where and what frequency the AHJ wants. The first thing to consider is what the locality offers, and then the IBEC system requirements would be installed accordingly.

Tread: IFC section 510 says that the system must be designed by an FCC licensed person or otherwise adequately trained person, so designers would have to be responsible for equipment. In his county, (Prince William), the Fire Marshal's office reviews the system designs, and the IBEC system must be integrated into the fire alarm system as well, for notification if there's a failure. The requirements of the locality will drive the system needed. Similar to a building official listing the geographic design criteria for residential applications, the fire official needs to provide local specifications for builders to follow in the system design.

Jeff: Good point. He imagines other localities have language to that effect.

Dana: That is how it's done in most places. In order to install systems, you have to be certified by the manufacturer of the system. The locality would not be that person, it would be the design and install certified person. The installer needs to know the RF specifics for the locality.

Troy: Recently learned that NICET has just initiated a certification program for installation of IBEC systems. It's possible that language should include the NICET certification, which should be up and running by the time the code is put into action.

2021 IFC

Jeff: Reviewed the IBEC provisions of the 2021 IFC. Section 510.1 lays out requirements for where systems are required. This is in conflict with existing requirements in VCC chapter 9. If the VCC is updated to reference the IFC, it should not reference 510 in general, but only certain parts of 510 (i.e. design & installation 510.2, etc.) in order to not interfere with VCC.

Steve: Noted that Andrew's draft proposal only references sections 510.4 and 510.5.

Jeff: IFC section 510.2 covers existing buildings. 510.3 is about permits required, which is already covered by the VCC. Sections 510.4 and 510.5 are the ones that apply to this discussion. IFC 2021 Section 510.4 references the new UL 2524 listing requirement. 510.4.1 addresses the need for 95% adequate signal strength for 95% of the areas in the building. Does anyone have details about 95% signal strength and DAQ of 3? Also, when is this determined – can it be determined before the system is installed or before construction starts?

Dana: Typically, the building should be substantially constructed before testing because the building materials matter a great deal in signal testing. DAQ (delivered audio quality) is done with handheld radios, which is very subjective – how clear the communication is between 2 people. Additionally, the state requirements can be increased, but not decreased.

Jeff: Is the system testing in Andrew's proposal, or even in the existing VCC exception (owner provides technical documentation from a qualified individual that the structure doesn't impede signals) able to be done only after the building is substantially complete?

Dana: This is where a survey would come in. It's a heat map of the building showing what parts of the building have signal and what parts don't. Some say they want 99% in 'critical' areas and then 90-95 in other general areas. Jurisdictions can increase but not decrease these requirements. This testing only works when buildings are substantially built.

Jeff: In the design phase, if the builder doesn't think anything will impede, they would still need to prove it before they move on with construction, (unless they have exception 6 stating that they don't need an IBEC system in the building). Is that accurate?

Dana: Some signal information can be obtained in a green field. If it fails at that point, you will know that a system enhancement is needed. Typically, after substantial construction, a survey is done, which is a grid walk of the building or each floor in 20 sections, showing what the signal is. Sometimes, owners even include extra antennas throughout the building, which is overkill. However, if boosters are needed somewhere, they have to be there. Even in a huge building, it would only cost about $5k or less for boosters everywhere to be super safe.

Troy: There are software packages available to analyze buildings in the planning phase (like the heat maps Dana mentioned). Those would help for cost and time management before ground is even broken. Walk through grid testing is used after buildings are mostly constructed. Some engineers put verbiage into the contract so that builders will include something that will pass the test.

Dana: What's used pre-construction is called a Rough Order of Magnitude (ROM) for building construction costs / budget purposes. It's usually overestimated.

Jeff: What percentage of buildings would require a system when tested? Most or few? Is it by area? Location?

Andrew: As an AHJ, he has seen a lot of times when a ROM is included, or another evaluation tool that is used before construction.

Dana: Yes, a ROM would be used before construction. The designer would get wave specs and tower locations together with a life-saving or electrical plan. This would be the time and place to determine if a system will be needed. It is usually done in coordination with electricians. Tread confirmed.

Tread: System monitoring will be done by a fire alarm contractor. It's not technically difficult, but practically, it would make sense to have fire alarm panel or command center centrally located in physical proximity for monitoring purposes. Distribution of cables is simple. Varied electric materials are acceptable. The problem is when the building has a fire alarm control panel in a dedicated space and the radio equipment is not.

Jay: What percentage of buildings would need an IBEC system? This is a crucial point, because in Virginia, there are lots of different terrain that could encourage or inhibit transmission (beach, mountain, valley, etc.). Locality is also important in this discussion. A Locality may have a good tower grid and good boosting system, whereas other areas may not. At other times, the building itself could be a crucial component. If, for example, a hospital has great coverage, but installs an MRI and has signal interference – what then? The group would want to address the need for enhancement in that case. So, it depends on where (terrain & locality signal strength provisions), building type and modifications.

Jeff: Yes, this was looked at heavily in the feasibility study. Part of the issue is that if you require certain coverage in building, how can that happen if locality doesn't provide the signal at the site to begin with? Per 510.4.1.1, if you need a minimum of 95% and DAQ of 3, what if the signal available at the exterior of the building is inadequate? Is there a baseline for a locality to provide a certain signal strength?

Steve: Wanted to clarify a point. A ROM test would tell you how to design a system, but wouldn't say if you need one or not. Is it correct that the building would still have to be substantially complete to definitively say if a system is needed or not?

Dana: Yes. The ROM would really be used for budget purposes. A building with 5 stories is more likely to need a system than a one-story building (in general, but it could be different based on location). She hasn't seen a large building yet that doesn't need one. RF is cut by concrete, steel, other buildings, water, low E glass, etc…

Andrew: The locality signal is discussed in 510.1, but his proposal doesn't address this. The IBEC 2-way system is based on the existing signal measured at exterior of building.

Jeff: IFC Section 510.4.2 says the system has to comply with sub-sections 2.1-2.8 and with NFPA 1221. In Section 510.4.2.1, structures need enhancement when required as per specifications in 510.4.1-510.4.3. Systems with RF emitting devices have to be approved by the fire official before installation. They also have to be certified by the radio licensing authority and be suitable for public safety use. Can someone explain this approval process?

Jay: Localities have a communication system center and whomever oversees it would know the system and signal strength. He noted that if many others start building around that area, existing buildings might need to adjust their amplification, due to potential signal interference. This should be left to the local communications system personnel to determine.

Jeff: So, a fire official has to review and approve, but also the local system person whom Jay referenced.

Troy: There's a document that also has to be signed by the FCC license-holder to ensure that the system isn't interfering with other signals. Reference section 510.5.2

Jeff: Section 510.5.5 also refers to compliance with FCC regulations.

Dana: agrees. The FCC licensee has to sign off together with the AHJ after the system is installed. Also an annual test and a 5 year test is needed, using a retransmission authorization document.

Jeff: Section 510.4.2.2 technical criteria – a fire official keeps a document giving designers specific (local) technical criteria.

{BREAK - 11:02am-11:07am}

Jeff: Reviewed standby power 510.4.2.3, signal booster 510.4.2.4 and system monitoring requirements 510.4.2.5.

Andrew: Most of these requirements are the same as the UL requirements, so this is good – they match.

Jeff: 501.4.2.6, 7, 8 – read off requirements for additional frequencies and change of frequencies, design documents and other technical design requirements.

Jeff: Section 510.5 says that installation requirements need to be in accordance with NFPA 1221, 510.5.2 and 510.5.5. Jeff asked what exactly does NFPA 1221 say – is it in agreement with everything else in section 510? If anyone can supply, it would be helpful. However, he asked group members to be careful - don't supply copyrighted documents - summaries of the requirements for discussion would be best.

Jeff: went over 510.5.1, .2, .3, .4, .5 installation requirements. 510.5.1 discusses mounting of donor antenna, signage and approval. Sections 510.5.2 and 510.5.3 discusses installation of amplification system, licensing and approval. Section 510.5.1.4 outlines the acceptance testing procedure. Section 510.5.1.5 mentions FCC compliance, and references FCC 47 CFR part 90.219, which the group will need to review further.

Jeff: Another situation to consider is when different jurisdictions (1st responders) come together in a single location; how does that work with an IBEC system?

Jay: In mutual aid agreements, the local jurisdiction is the unified command for all. They will give out their handsets or have other localities adjust their handsets to what the command center dictates. This is accomplished with an 'Incident Management System'.

Jay: Regarding certification and licensing. Will this be added into the proposal, or just referencing IFC?

Jeff: Good point. If Andrew's proposal is used, it specifically references section 510.5, which lists specific minimum qualifications. A question to consider is should section 510.5 be referenced, or should it be deferred to the fire official to determine? Either way, this is separate from licensing requirements – If a contractor's license is required, that would be through DPOR and would be separate from and in addition to any minimum qualification requirements of the code.

Dana: Whomever installs the system has to be certified by the manufacturer (ex: Honeywell), and whomever performs the annual and 5 year inspections has to be certified to cover that manufacturer's system. The certification requirement therefore, kind of handles itself, since it will void the warranty if not adhered to.

Jeff: summarized section 510.6: maintenance. 510.6.1-testing; 510.6.2-additional frequencies (cost on the building owner); 510.6.3-nonpublic; 510.6.4-field testing. All of this is maintenance and could have costs associated. These costs should be addressed by the group, or see if it is already addressed elsewhere.

Andrew: It is already in addressed in (2018 SFPC) section 510.3

Cindy: In Virginia now, when a building is approved as code compliant, you don't have to keep upgrading things to bring them up to current codes. Whose problem is it when another building is built next-door, or something else happens to impede the signal after a system is approved? She asked if anyone in the group is familiar with the NIST research happening now around first responder communications, or if anyone is involved in any other work that may affect future codes in this area, which could be incorporated now?

Jay: On existing buildings, if construction is completed and C.O.s have been issued, then yes – who is responsible, especially if a neighbor builds something that interferes? If localities change signal strength, the localities would have to adjust everyone's system accordingly (not a cost to building owners).

Cindy: If a locality adjusts signal at no cost, it is a non-issue for this group. However, all costs and any kind of retrofit is an important question to discuss. If systems are required, who, how, when, cost, etc…for updating? In the past, retrofit has only been done by legislation.

Installation Responsibility

Jeff: Another thing to consider – what if you're putting the new building in an established area and others have their signals set until you come in? Would the new building owner carry the cost to adjust all the other building signals or systems? Is there any example today that anyone can share on this? Who is responsible?

Dana: In Florida, there are class 'a' and class 'b' systems, depending on area density. If an established building owner has an annual inspection, and changes are needed, the building owner is responsible to adjust. It also depends on tower location, so it's difficult to give a blanket answer to anything. For the most part, it's understood that owners just have to live with what's there, what they have, what happens after… The main thing is the main system (infrastructure). If that's as it should be, you can always add, remove or adjust antennas / boosters at an unsubstantial cost.

Andrew: If a locality determines a lack of coverage, they should be in the mix of fixing it. In the past, it was like throwing the baby out with the bathwater by saying that there wasn't an easy solution to existing buildings, so drop the whole issue. Now, it's pretty important to discuss primarily new buildings, so that there can be a focus on the system issues across the board, as charged in Title 36. Existing buildings should be a separate issue and discussed separately.

Steve: has the same question as Cindy. AOBA isn't in favor of building owners taking any additional responsibility. It isn't right for existing owners to take on the cost for a neighbor putting up new building and impeding the signal in their building. It doesn't make any sense at all.

Jamie: It goes back to the current code language for installation – the owner will install and the locality is also responsible. It's not like other issues, where there are details about who is responsible for what, and a clear delineation. Installation is also not clearly described – no guidelines or reference to standards.

Jeff: Even if no changes are made to responsibility, should there be more specifics about installation requirements? Localities are handling this now through local policies (as discussed earlier), since there aren't specifics. What is the current consensus in the group? (Is everyone in agreement that the current VCC requirements should be amended to include more specific design and installation information?)

Jay: He doesn't have a problem with leaving the code as it is now regarding installation requirements. Localities are handling that now. For existing buildings, he agrees with Andrew that it's better to not discuss existing structures now, because there won't be any progress on new construction.

Jeff: With other systems, the owner maintains them as approved, and doesn't need to pay to upgrade. The existing building discussion can be had later, but it won't hold up the new construction discussion now.

Steve: As far as agreeing to update the VCC to reference IFC sections 510.4 and 510.5, he wants to consult with his association for additional guidance.

Andrew: Also agreed that it's a valuable discussion, but to keep in mind the Title 36 mandate for IBEC systems in new construction.

Dana: There is discussion happening regarding K-12 schools now, as far as upgrading existing structures, however implementation keeps getting kicked down the road. The Safer Buildings Coalition is lobbying for this presently. Perhaps discussion around IBEC systems in existing buildings could be something that would require implementation in a future date?

Jeff: Summarized things that were discussed in this section, and asked if there were any other things to consider.

{LUNCH BREAK 11:57am – 1:00pm}

System Costs

Jeff: wanted to start identifying what the costs may be for the locality and/or building owner – for the current code, proposal(s) and any other discussion.

Jeff: Permit fees: does anyone know about or have experience with this?

Andrew: Yes. His experience is that permit fees requirements are similar to fees for fire alarm systems.

Troy: Currently updating the DEB permitting policy. Going by the exception in the building code for systems 30v or less. They don't need a permit unless they penetrate fire-rated construction, or are being run in plenums.

Tread: Since the IBEC system will be tied into the fire alarm system, he thinks a permit should be required.

Jeff: ROM study or other pre-construction estimate analysis?

Dana: ROM studies cost a few thousand or less.

Jeff: Is it a cost that is separately paid, or is it integrated in the overall design cost?

Dana: Information is all gathered first, but there still can't get be an exact cost estimate. An iBwave design system is typically used. It can be tied in with the overall design price in contract, or it can be individually priced. It can also be integrated with electricians. BDA instillation can be part of the electrician's or fire alarm installer's responsibility. Later, when actual data comes in after the build, the cost can change.

Jeff: Are there any other pre-installation fees – FCC, local authority?
Dana: She doesn't think so. There's a small permitting fee from the local jurisdiction, but that's it. She will double check to make sure there are no other costs.
Jeff: There is also the cost of annual and periodic (5 yr) tests, and possible system upgrades or modification costs. Is there anything else?
Dana: There's usually a maintenance agreement with an inspector for a fee. They are usually set for 5 years and can cost up to about $5k for larger buildings. Hospitals are typically more complicated. It can also be setup with extra costs for different things, like emergency off-hours contacts, for example.
Jeff: Could these be stand-alone, or also tied in with the fire alarm system?
Dana: They are usually included in one agreement. They can stand alone if there is not a separate fire alarm system.
Steve: How about cost of the system itself?
Jeff: Yes, design and installation is a cost that will be included in the list.
Dana: She looked at NFPA 1225 quickly, which discusses 2 hour rated vs. standard coax (there's a big cost difference). She will look at it further.
Jeff: Is this something new in NFPA 1225 that is not in 1221? Please look and share next time.
Tread: Any metal conduit, (EMT, IMC or RMC) will be a 2 hour rating. It is more expensive than a standard UL 444 coaxial cable, but much less than a 1941 cable, which is cost-prohibitive – about $135 per foot for a 1,000 foot reel. Cost for EMT, IMC or RMC cable costs a few dollars ($8-$10) per foot.
Troy: Did Tread say that putting a coax in conduit would provide a 2 hour rating?
Tread: Yes. EMT, IMC or RMC will give the equivalent of a 2 hour rating. He will get the information to support it.
Troy: The 2 hour rated cable is only required for riser, but not horizontal cabling? He will double check. It could be in the 1221 or 1225. He thinks it is consistent with the building rating.
Cindy: Does conduit keep the radiating cable from working the way it's supposed to?
Andrew: If referring to "leaky cable", that is an older technology. Now, we see systems where the cable goes from an amplifier to a repeater device in the building.

3) Other

Jeff: Jamie asked earlier (in the chat box) if the SFPC covers maintenance. Yes, section 510 of the SFPC does cover maintenance. 510.2 states that the owner must provide space for and access to the system. The locality is responsible for testing and associated upgrades, at no cost to the owner (unless owner doesn't provide access).
Jeff: provided a link in the chat box to a NIST program of public safety communications, which may point to new technology that could be emerging; cellular and LTE. These should be discussed, and latest technology should be identified and included if it will be the new industry standard.
Troy: He did read an article recently from the Safer Buildings Coalition that says that the 2022 edition of NFPA 1225 discussed 'standards for emergency service communications', which used to be 'emergency communications enhancement systems'. It says that land mobile radio systems are being used less, and cellular and LTE systems are being used more. It also references the future of PS communications and FirstNet.
Jeff: Yes, any new technologies – bring to the table.

4) Assignments and Next Steps

Jeff: between now and the next meeting, collect data on:

- **Cost:** Steve & Troy
- **NFPA 1221 & 1225, UL 2524 and FCC 47 CFR part 90.219**: Dana
- **Other States/localities:** (requirements, funding, etc.)
    - Jay will find out about NC and MD and what's new.
    - Andrew will look for national data about who does what where.
- **NIST:** DHCD will contact a public service coordinator

5) Next Meeting

Jeff: Asked the group to get all data collected and remitted to DHCD in a timely fashion, so it can get on the agenda and be sent out to the group to review prior to next meeting. A Doodle poll will be sent to the group members to determine when the best date is for the next meeting. Jeff thinks maybe the week of Jan 17th (although the 17th is holiday). He wished a happy and healthy new year to all.

AGENDA

In-Building Emergency Communications Study Group

January 18, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

- **A) NFPA 1221 and 1225**
- **B) UL2524**
- **C) FCC 47 CFR part 90.219**
- **D) National Data**
- **E) NIST Public Safety Communications Research**
- **F) Other Fees (FCC, local radio authority,etc.)**
- **G) System Costs**
- **H) FEMA P-25**
- **I) 2021 IBC Section 2702.2.3**
- **J) ERCES Standard Proposal**

III) Other

IV) Assignments and Next Steps

V) Next Meeting

In-Building Emergency Communications Study Group

Meeting Summary: January 18, 2022 9:00 a.m. to 11:09 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Division of Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*

Study Group Members:

Jamie Wilks: *Madison County Building Official; VA Building Code Officials Association (VBCOA) committee member; prior Building Official in Matthews County; Retired from Norfolk fire department*
Robert (Jonah) Margarella: *Architect at Baskervill (Studio Director); 24+ years in architecture; member of State Building Code Technical Review Board (SBCTRB)*
Steve Shapiro: *Retired Building Official, City of Hampton-34 years; LLC Shapiro Associates; Apartment & Office Building Association (AOBA); prior President of International Code Council (ICC)*
Dana Buchwald: *Senior Account Manager (in-building signal for emergency responders) at Backhaul Engineering*
Joseph (Tread) Willis: *International Association of Electrical Inspectors-VA (IAEI)*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
Troy Knapp: *Electric Plan Reviewer with VA Department of General Services (DGS), Division of Engineering and Buildings; prior Electric Plan Review Engineer 13 years William & Mary College; 20+ years Electrical Engineer*
Andrew Milliken: *VA Fire Chiefs Association (VFCA), VA Fire Services Board (VFSB) Chairman of Fire Codes and Standards Committee, (also submitted a proposal on this issue)*
Dwayne Tuggle: *Amherst, VA Mayor; VA State Police-retired*
Jim Crozier: *Virginia Association of Counties (VACO)*

Other Interested Parties:

Todd Strang: *Spotsylvania County Fire Official*
Sean Farrell: *Prince William County*

Study Group Members not in attendance:

Patrick Green: *Virginia State Police (VSP)*
Jodi Roth: *Virginia Retail Federation*
Robert Melvin: *Restaurant, Lodging & Travel Association (VRLTA), Director of Government Affairs*
Joshua (Jay) Davis: *Virginia Department of Fire Programs (VDFP)*
Gerry Maiataco: *Virginia Fire Prevention Association (VFPA)*
Tammy Breski: *Broadband Project Manager, VA DHCD Division of Community Development; prior Verizon Construction Manager*

AGENDA AND DISCUSSION ITEMS:

Welcome

Jeff Brown: Welcomed everyone. He gave a reminder that these meetings are being recorded for the purpose of preparing meeting summaries. This meeting is scheduled to run until 3pm, but it may end early. There will be breaks every hour. Study group members are listed in the box on the left of the main meeting screen. Meetings are open to all, but discussion and chat should only be between study group members. Individuals who are not study group members are welcome to reach out to a group member or DHCD staff to ask questions or share opinions outside of the meeting. The summary from the last meeting is posted on the DHCD website, with a link in cdpVA for review. He asked for the group members to check their microphones for correct operation.

Discussion

Jeff: There were good discussions and topics raised in the last meetings. There were some assignments, and group members brought back information for discussion in this meeting. The related documents were sent out to study group members and are also available to view or download in the 'files' pod on bottom left of the Adobe Connect meeting window. The end goal for this group is to provide a summary or report of all the discussions. He asked DHCD staff to begin working on that. He hopes to cover any remaining topics today, and identify all areas of agreement and disagreement. He is hoping that the group may be able to wrap up meetings today and potentially finish up via email. He asked everyone to speak up as needed. He noted that costs are something that the group may want to discuss further.

NFPA 1221 and 1225

Jeff: The 2021 IFC references NFPA 1221. NFPA 1225 is being considered for reference in later editions of the IFC. Dana looked into these further and provided document #6 in the 'files' box to the left on the screen. The document "NFPA 1225 vs NFPA 1221 – Dana" explains how the NFPA standards work with the IFC, the differences between the two standards and what it would look like moving from the 1221 to the 1225 as the newer standard.

Dana Buchwald: In 1225, the information is compiled in one place and is more user friendly than 1221. They changed some verbiage from ERCES to different terminology, opening up the type of communication to other types of technology. Cell technology has come up a lot, but there would still be a need for DAS infrastructure. Also, cell can't run too close to RF; they have to be a certain distance apart. The cost is significantly more (cell) under the guise of a third party, so there's not as much control as in a P25 system. They have lightened up on the cable requirements. Conduit is so expensive and is needed for the donor antenna. However, the requirements have lightened up on horizontal runs. The DAQ up to 3.0 is required, but that is subjective.

Jeff: The 2021 IFC requires a DAQ of 3.0. Is 1225 requiring the same thing?

Dana: It may be 3.4 in 1225. Critical area coverage (like under stairs) has gone to 99% in 1225, as opposed to 95% in 1221.

From Chat Box:

Paul Messplay-DHCD: 18.9.1 in NFPA 1225 requires DAQ of at least 3.0 09:12AM

Paul Messplay-DHCD: 510.4.1.2 in 2021 IFC also requires minimum 3.0 DAQ 09:15AM

Jeff: The 2021 IFC requires 95% in all areas and 99% in critical areas. It sounds like the 1225 has a lot of the same requirements. Any conflicting requirements of referenced standards would have to be handled through the USBC order of precedence. If the IFC matches the 1221 or 1225, there would not be a problem. However, if 1221 or 1225 have a different requirement than the IFC, the IFC requirement would take precedence. The IFC says that the system has to be designed in accordance with section 510 and the NFPA. They do not appear to conflict so far.

Dana: A 2-hour burn cable is not required in 1-hour building. For buildings with sprinklers, they back off on the cabling aspect.

Jeff: Asked if there were any other comments about the subject? He would like to have input from other members about how the standards work together with the IFC. If the group recommends that the 2021 VCC reference the IFC, and the IFC references NFPA 1221, as long as there are no conflicts, that should work.

Steve Shapiro: Should IFC sections 510.4 and 510.5 be directly referenced? They seem to capture all the requirements.

Jeff: If the group agrees on that, we could draft a code change proposal.

Dana: The IFC covers new and existing buildings.

Jeff: The focus of this group is only on new buildings. This is why there should only be a reference to technical requirements in new buildings, such as the requirements in sections 510.4 and 510.5.

Jonah Margarella: As an architect reviewing plans, referencing either the IFC or NFPA would be helpful as guidance to design a system.

Andrew Milliken: Making an amendment to the IFC to reference 1225 would not be preferable. It would be better to let 1225 come in to later IFC editions as planned.

Jeff: Agrees. It is better to not amend the IFC, as it would cause some confusion since it is not usually done.

UL2524

Jeff: The UL listing is required in 2021 IFC section 510.4. DHCD found a training document from UL explaining the requirements of the UL standard. It was sent to the group and is available to download from files box in the meeting room. He asked the group to review and consider the requirements.

FCC 47 CFR part 90.219

Jeff: Systems must comply with FCC 47 CFR part 90.219. Dana provided that document. Jeff asked if there were any questions or comments.

Steve: Heard that the federal regulation stipulates who can license the systems. He thought it had to be the locality as per the CFR.

Dana: The only licensing is the FCC licensee. Permits for in-signal boosters are needed in some jurisdictions, but not others. Licensing the system also varies by jurisdiction, but she doesn't think it's mandated anywhere.

Troy Knapp: System licensing is taken care of under the FCC license holder agreement. The FCC license holder has to approve the installation of the particular system. That's the only licensing he's aware of.

Dana: She agrees with Troy. The only other licensing she has heard of is by jurisdiction for whatever they may want. They may refer to it as a license or a permit. The FCC licensee ensures that the radio signal is owned and that the frequencies are approved so that there's no interference. That's the only actual licensing she's aware of. Whomever is in control of the system in that area is to make sure that there's no interference to the frequencies of other owners.

National Data

Jeff: Andrew and Jay provided information in documents sent to the group, and available in the file box.

Andrew: Provided a document, and since then, he looked at all of the states. 47 of 50 states required new buildings to have in-building communication systems. Indiana and Minnesota allow the localities to decide and dictate what is required. Virginia is the only state now that has a combination of owner and locality requirements. The vast majority of states simply reference the IFC and enforce without amendment.

Jeff: Asked Andrew to send the remainder of that information he just shared, and it will be sent out to the group.

Steve: Just to clarify, 47 of 50 states require system installation and the owner is responsible?

Andrew: Yes, that's correct. The other 2 states (besides VA) allow the localities to make those decisions.

Jeff: Jay Davis provided a document from North Carolina, showing their Fire Code requirements in section 510. Jay was not on the call to discuss. Jeff showed the document to the group, noted that it's available in the files box and asked the group to review it.

NIST Public Safety Communications Research

Jeff: There was some discussion about this in past meetings. What is the future of these systems? Are there changes coming? What is the potential for cellular or LTE? The biggest concern is that whatever is put forward by the group should encompass discussion of the newest technology. Remembering that care must be taken when mixing cell and RF, that they cannot be located too closely together. If a locality switches to cell or LTE, what would happen with the existing systems? Does every system have to be upgraded? What about wiring infrastructure?

Dana: Separation needs are true for straight cell. Public safety cell has to be separate from regular cell. It also has to be away from RF. Nothing should interfere with public safety. All over the country, P25 has been upgraded for emergency handheld devices. It doesn't seem likely that only cell would work.

Troy: He spoke with a systems integrator at RF Connect, which does both cell and public safety systems. A lot of cell systems are replacing hard-wired phones in buildings. Washington DC was first to go ahead with that with AT&T, but Verizon filed a lawsuit and won. There are problems with vendors and public safety liability. LTE or cell needs lots of data broadband connection. With handheld, there's not a lot needed and it's less expensive.

Jeff: It sounds like the technology is there, but it sounds like there are some challenges with implementation. Cell is being discussed, but not being used yet. He asked for the group to check and see if there's any other published information to say that it's going in that direction.

Troy: Reviewed a plan recently and got news that the City of Richmond fire department may be using cell phones, but he needs to confirm that.

Andrew: Could it be because there's no radio coverage?

Troy: No, it's new construction where there's no system installed yet.

Jeff: It sounds like currently most localities use handheld radios. On a national level, people are looking at new technology, but it doesn't sound like it's coming soon. We can provide commentary that some technology is being explored, but not being implemented in Virginia yet. Everyone is still using handheld with RF.

From Chat Box:

Paul Messplay-DHCD: Just spoke with Jim on the phone. He wanted me to relay that Orange county's P25 system is a combination system that uses cellular and RF. The units on their handhelds automatically switch between the two and dispatch can switch between them. If one of the signals drops, it automatically switches to the other 09:48AM

Other Fees (FCC, local radio authority, etc.)

Jeff: It seems like fees may be administered by local authorities, if there are any at all. This has already been discussed and it seems like there's nothing new to add.

From Chat Box:

Paul Messplay-DHCD: From Dana with regard to "Other fees": "There is nothing much to say in terms of permitting costs, it's across the board from 0 to whatever the locality decides, the joke is 0 to a million. There is no formula or standard and there's no charge from the FCC. Typically the electricians or Fire Alarm folks will be pulling permits." 09:51AM

System Costs

Jeff: This will be a question and concern for some stakeholders, especially if there's consideration for some proposals like the one Andrew submitted, which would switch responsibility to the building owner. He asked the group to look for representative examples of real life applications.

Steve: Spoke with an engineer yesterday, who will get him prices on various actual new projects:

1. High-rise commercial office building with 25 stories, about 560k square feet, courtyard, fitness center, food service restaurants and an underground parking deck
2. Low-rise commercial office building with 4 stories, about 40k square feet
3. High-rise multi-family building with 16 stories, about 178k square feet, 154 units, underground parking and fitness center

He hopes to have the data by the end of the week and he will provide it to the group as soon as he gets it.

Troy: The system integrator he knows says that cost is based on size. About $1k to $5k for small to large systems. Most typically sign up for maintenance and monitoring which costs about $1k to $2k per year. Another individual he spoke with said it would cost about 50–75 cents per square foot for installation.

Jeff: Just to clarify, the $1k to $5k you spoke of was for the annual testing and recertification of the system?

Troy: Yes.

FEMA P25

Jeff: Jamie Wilks submitted a document in the file box.

Jamie Wilks: The FEMA P25 is an initiative at the federal level to ensure that whatever systems are installed work in mutual aid situations. Most states have mutual aid programs. This would ensure systems can talk to each other between localities.

Jeff: Thanked Jamie for providing the document. There have been questions in previous discussions about how to addresses how systems work in mutual aid response situations.

2021 IBC Section 2702.2.3

Jeff: DHCD staff discovered another section in the IBC that discusses emergency responder communication systems. Most of the IBEC requirements are found in chapter 9, but this one is related to providing back up emergency power to these systems. It says that standby power at 100% for 12 hours is required. The group should consider and decide if this should be referenced, and if the owner or locality should be responsible to provide. It should also be compared with chapter 9 to see if there is any conflict.

{BREAK 10:00 to 10:07}

Jeff: Does anyone have thoughts or comments on the section 2702.2.3 requirements?

Tread Willis: The National Electric code is for legally required emergency stand by systems. Their standard is 1.5 hours for battery backups. 12 hours would need a generator and who would provide one? It could be a big cost. Multiple inverter systems could provide the 12 hours, but it could be problematic if owners or localities were forced to supply a generator.

Jeff: It does sound substantial. The biggest question now is if chapter 9 says that the owner provides the infrastructure and the locality provides communication equipment, who would provide the standby power? This will probably come up at some point and have to be addressed.

Troy: VCC 1008 specifies 90 minutes for emergency lighting only. 12 hours is not dictated by the National Electric code.

Jeff: This is a current section in building code, so it needs to be addressed. The NEC is a referenced standard, but the IBC still requires the 12 hour backup.

Steve: He looked at the 2015 IBC, and backup required was 24 hours and in 2018 it changed to 12 hours.

Andrew: The discussion is about standby power, not emergency power. The 90 minutes refers to getting people out of a building in an emergency situation. He recalls that the 24 hours was reduced to 12 hours because it pushed some buildings into tying it into the generator. The intent of the 12 hours in this section (he thinks the listing of the system requires 12 hours of battery backup) is similar to providing batteries for the actual components of the system, which wouldn't necessarily require a generator. Moving from the model code language, it is a point of confusion and conflict.

Jeff: If the 12 hours is typically something that's handled through batteries in the system, the issue would be taken care of. The problem would occur if there were a generator needed.

Dana: Agrees with Andrew. She's looking at a battery backup system now. It is for the system itself. She has never run into a generator issue. The 12 hour backup is for the system, and it is normal.

Jeff: If the 12 hours is specified in UL or in IFC 510, why is this section needed at all? Having this requirement in chapter 27 seems to complicate things. This may have been overlooked or come into effect after the original IBEC state amendments.

Steve: The 2021 IFC section 510.4.2.3 says that dedicated stand by batteries or 2 hour standby batteries connected to the generator in accordance with section 1203 are required. It also says that 12 hours stand by is required. He thinks it would work to reference that section of the IFC, which also agrees with the IBC section 2702.2.3.

From Chat Box:

Paul Messplay-DHCD: IFC section link: https://codes.iccsafe.org/content/IFC2021P1/chapter-5-fire-service-features#IFC2021P1_Pt03_Ch05_Sec510.4.2.3 10:19AM

Paul Messplay-DHCD: In-building, two-way emergency responder communication radio coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the in-building, two-way emergency responder communication coverage system at 100-percent system capacity for a duration of not less than 12 hours." 10:19AM

Jeff: If this group puts together a proposal and references 510.4 and 510.5, it should also be clear who is responsible to provide the battery backup. It should also cover the IBC requirements.

Andrew: The UL listing also requires 12 hours of battery backup at 100% capacity (slide 13 in the presentation provided).

Jeff: If we reference the IFC for design of these systems, it would be best to delete this section in Chapter 27 to avoid confusion, since it's covered already in the IFC and NFPA.

From Chat Box:

Paul Messplay-DHCD: FYI: The national data summary provided by Andrew has been updated in the files pod. Please download the most recent version 10:25AM

ERCES Standard Proposal

Jeff: There's one proposal in cdpVA that has already been submitted. We will likely get more. Proposals are due February 1st as a deadline to get to the first Workgroup meetings in March. The proposal is to amend section 918 to reference NFPA 1225 and require UL2524 listing (there are no changes to general, installation, or responsibility sections). He asked the group members to read the proposal. He noted that the group is not required to take any action on this proposal, unless there is unanimous agreement to support or not support the proposal. There will still be opportunity to comment on cdpVA or at the Workgroup meeting in the first week of March. Andrew mentioned that it may be too soon to reference 1225, since 1221 is already in the IFC.

Steve: What does "minimizing noise" mean in the reason statement, item 3, second bullet? In accordance with the CFR standard, the license holder is responsible for retransmission of the frequencies to which the licensee is licensed and is required to review and approve every IBEC enhancement system prior to installation.

Dana: In the exceptions, looking at number 3 - just because a building is one story, it doesn't mean it would qualify for an exception. At first, I thought 20k square feet would be too large, but it is probably ok, depending on what the building is made of. In exception 6 - buildings in localities that do not provide additional communication equipment required to operate the system - is that up for debate?

Jeff: The code change proposal is showing the existing code sections that are being amended, and only the underlined text is new (all other text is existing regulation). The change is proposing to add a new section to the 2021 VCC Section 918 referencing NFPA 1225 and requiring UL2524 listing

Jeff: Whatever this group puts forward, there will be a summary about what is agreed on and what is not agreed on.

Other

Jeff: Explained how to move forward with proposals. This group may provide a proposal, but will definitely provide background information and the group discussions, including areas of agreement and disagreement.

Steve: Comments to proponents of the ERCES standard proposal – what does the bullet about minimizing noise mean, and how would it be implemented?

Jeff: Will send along that question to the proponents.

Dana: Gave her understanding of what the "minimizing noise" bullet means. If someone is putting in a BDA for a building, they provide the antenna and call sign. The licensee has to sign off with their approval and give provisional transmission authorization. It lets the licensee know that whatever is used doesn't interfere with what is existing. It's just an approval from the licensee before installation.

Jeff: He has a question for the proponents similar to Steve's. They make a statement and reference 1225. Are they trying to say that this is something new that 1225 brings, or are they saying that by not referencing the IFC or any NFPA standards, they are missing out on that piece?

Jeff: Does everyone support DHCD or someone in the group drafting a proposal taking section 918 in the VCC, and incorporating references to IFC Sections 510.4 and 510.5 for the design and installation of IBEC systems? This would also incorporate the references to NFPA 1221 and UL2524 requirements. He asked for the group to vote with thumbs up or down. All group members voted thumbs up. Dana, Debbie, Dwayne, Jamie, Tread, Jonah, Steve, Troy and Andrew agreed. DHCD will draft the proposal and anyone else who volunteers can help.

Steve: Is there a consensus to delete IBC standby power, since it's covered by IFC?

Jeff: Asked the group to vote on that – deleting IBC standby power requirement from the VCC (since IFC and 1221 will be referenced)? All in favor. Everyone in the group voted yes. Jeff will include that change in the draft proposal as well.

Andrew: Likes having consensus. He asked for a vote to see where everyone stands on the question of responsibility.

Jeff: Any discussion on who is responsible?

Steve: He's willing to have more discussion and bring back to AOBA for their opinion. Retail Federation and Restaurant, Lodging and Travel may also have concerns.

Jeff: DHCD can help by contacting members that are not present today to ensure that we have input on the outstanding topics, so Andrew can finalize his proposal for submission in cdpVA. We can also determine who supports the proposal and assist in adding them as co-proponents.

Andrew: What is the timeline? Feb 1st?

Jeff: Feb 1st is the cutoff to get proposals in for the first set of Workgroup meetings. For the second set of workgroup meetings in April, the cutoff is March 12th.

Andrew: Will work on it, It may be good to see the first proposal before he completes his to sync up.

Jeff: That sounds good. Getting everything in by Feb 1st sounds tight. If the proposal is in by March 12th, there are still 2 more rounds of meetings in April and June.

Andrew: How about the 6 existing exceptions in the VCC? It would be good to look at them, since they are specific to VA.

Steve: Will go to AOBA to discuss. Exception 6 was just added in the 2018 VCC, but is proposed to be stricken in Andrew's proposal.

Jeff: Anyone else?

Troy: The VCC states something about anyone using communication systems. Some people he speaks with think that systems are only used by fire departments. Others are using them besides the fire department, the systems are used by all first responders.

Jeff: There could be commentary language in the IFC, but the VCC is clear that it's for all emergency responders. A proposal from the group could make it very clear that it's not just for fire officials.

NOTE: Troy contacted DHCD staff after the meeting and provided the following definition from the 2018 VCC that clarifies that IBEC systems are intended to benefit all first responders:

"*EMERGENCY PUBLIC SAFETY PERSONNEL. Emergency public safety personnel includes firefighters, emergency medical personnel, law-enforcement officers, and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including fires, medical emergencies, violent crimes, and terrorist attacks*."

Assignments and Next Steps

Jeff: DHCD will draft a proposal, anyone in the group is welcome to assist. He will not schedule next meeting yet, until more information is gathered. If there's another meeting needed, DHCD will send a Doodle poll for the date.

Jeff: anything else?

Dana: FirstNet doesn't replace a system, it augments it.

Jeff: Does anyone have documentation related to handheld and RF working in conjunction with Cell and LTE? Any documentation on emerging new technologies to summarize and support what technologies are used now, when new technology might be coming, and what upgrades might be required?

Dana: It cost a fortune to upgrade to P25, and this was recently done not just throughout VA, but all over the country. She doesn't think there will be a massive change from that soon since everyone just invested in new P25 systems. They are tried and true.

Jeff: We can summarize this discussion in our report, but so far we really only have statements and no data on this topic. Are there any whitepapers or anything else published about this to support that there is no change expected in the near future?

Dana: Even if newer technology is wanted, there's still infrastructure, providers, maintenance, fees, etc. involved driving the cost up. She doesn't think that will be easy to pass.

Jeff: He knows the question will come up, so the group will include in their summary. He thanked everyone for their time and closed the meeting.

Additional Information needed:

- Jeff asked Andrew to send over documentation to support that 47 of the 50 states required new buildings to have in-building communication systems, with Indiana and Minnesota allowing localities to decide.

- DHCD staff will ask proponents of the ERCES standard proposal:
  - What does the bullet about minimizing noise mean, and how would it be implemented?
  - Also, they make a statement and reference 1225. Are they trying to say that this is something new that 1225 brings, or are they saying that by not referencing the IFC or any NFPA standards, they are missing out on that piece?

- Regarding Andrew's proposal:
  - Steve will bring back to AOBA for their opinion regarding responsibility and striking exception 6. Retail Federation and Restaurant, Lodging and Travel may also have concerns.
  - DHCD will help gather input form members, especially those not in attendance today, to assist Andrew in finalizing his proposal and can also assist with adding co-proponents in cdpVA before March 12.

AGENDA

In-Building Emergency Communications Study Group

February 24th, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I. Welcome

II. Discussion

   a. Costs
   b. Responsibility
   c. Radiating Cable
   d. Andrew Milliken Proposal
   e. Staff Proposal

III. Other

IV. Next Steps

In-Building Emergency Communications Study Group

Meeting Summary: February 24, 2022 9:00 a.m. to 10:26 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Division of Building and Fire Regulations (BFR)*

Study Group Members:

Jamie Wilks: *Madison County Building Official; VA Building and Code Officials Association (VBCOA) committee member; prior Building Official in Matthews County; Retired from Norfolk fire department*
Robert (Jonah) Margarella: *Architect at Baskervill (Studio Director); 24+ years in architecture; member of State Building Code Technical Review Board (SBCTRB)*
Steve Shapiro: *Retired Building Official, City of Hampton-34 years; LLC Shapiro Associates; Apartment & Office Building Association (AOBA); prior President of International Code Council (ICC)*
Dana Buchwald: *Senior Account Manager (in-building signal for emergency responders) at Backhaul Engineering*
Debbie Messmer: *Virginia Department of Emergency Management (VDEM)*
Andrew Milliken: *VA Fire Chiefs Association (VFCA), VA Fire Services Board (VFSB) Chairman of Fire Codes and Standards Committee, (also submitted a proposal on this issue)*
Tammy Breski: *Broadband Project Manager, VA DHCD Division of Community Development; prior Verizon Construction Manager*

Other Interested Parties:

Ron Clements: *VFSB Chairman of Fire Codes and Standards Committee*
Sean Farrell: *Prince William County*

Study Group Members not in attendance:

Troy Knapp: *Electric Plan Reviewer with VA Department of General Services (DGS), Division of Engineering and Buildings (DEB), 20+ years Electrical Engineer*
Joseph (Tread) Willis: *International Association of Electrical Inspectors-VA (IAEI)*
Dwayne Tuggle: *Amherst, VA Mayor; VA State Police-retired*
Jim Crozier: *Virginia Association of Counties (VACO)*
Patrick Green: *Virginia State Police (VSP)*
Jodi Roth: *Virginia Retail Federation*
Robert Melvin: *Restaurant, Lodging & Travel Association (VRLTA), Director of Government Affairs*
Joshua (Jay) Davis: *Virginia Department of Fire Programs (VDFP)*
Gerry Maiataco: *Virginia Fire Prevention Association (VFPA)*

DISCUSSION:

Welcome

Jeff Brown: Welcomed everyone to the meeting, reminded the group that the meeting will be recorded. Asked members to stay muted when not speaking, and identify themselves when they do speak. There will be a 5 minute break each hour, and an hour for lunch from 12-1pm, if the meeting runs that long. The meeting is open to the public, but the discussion is limited to the Study Group members. Group members are listed in a pod at the bottom of the Adobe meeting room.

Andrew Milliken Proposal

Jeff: This proposal basically changes responsibility of installation of the in-building emergency system to the building owner. It also references IFC sections 510.4 and 510.5 for the design and installation of the systems. Andrew did get input from some study group members since the last meeting. He would like to complete the draft after today's discussion. If there are any co-proponents to the proposal, they will be added when it's ready to be submitted.

Andrew Milliken: He did get some group feedback and not many changes have been made. He wants to bring system responsibility to building owners, as it is in most parts of the country. There is a sentence added to the end of section 918.1.1, saying that the requirement is no greater than what is already being provided by the jurisdiction. This language from the model code would not be incorporated in 510.4 and 510.5, and would be the basis for the requirements. He's interested in hearing any additional comments or suggestions from the group.

Steve Shapiro: He and Robert Melvin, and those they represent all agree that they do not want the responsibility to be on the business owner.

Jeff: Will send an email after today's discussion to get a vote from all Study Group members to see who supports or does not support the proposal. Co-proponents will be added to the proposal, and all the notes will be included in the final report.

Jamie Wilks: He supports this proposal, and he doesn't think the responsibility should be on the individual localities. The systems are very important for the first responders and for the safety of all.

Steve: Asked for confirmation that the people who do not support the proposal will be noted somewhere, and that the Board will know that there is not full consensus for the proposal.

Jeff: Yes, there will be a summary report prepared by DHCD to the Board indicating the reasons for non-consensus, including names of proponents and non-proponents.

Dana Buchwald: Would like to know what reasons the non-supporters have.

Steve: The cost for the building owner, including equipment installation and upgrades.

Dana: She thinks that the building owner should pay. She thinks that the cost of the system is minimal relative to the entire cost of the building.

Jamie: In all due respect to Steve and his constituents, he thinks building owners should pay for the systems as a matter of public safety, and it should not be the responsibility of the localities.

Jeff: DHCD will work with Andrew to finalize the proposal and will send a poll to the group. Proponent's names will be included on the proposal when it goes forward.

Andrew: He thanked everyone for their participation.

Staff Proposal

Jeff: Based on feedback from the group, the current code requirements do not provide much guidance on the technical requirements of the system. This proposal is intended to provide that guidance, and not to address the question of responsibility. Section 918.1.1 was rearranged and broken down into two sections: installation and responsibility. The installation section references installation in accordance with IFC sections 510.4 and 510.5. Section 918.2 says that the locality shall do the acceptance testing, however IFC 510.5.4 says that the building owner shall do the testing. He asked the group to discuss. Paul provided a link in the chat box to IFC section 510.5.4. There is a certain order of precedence in VCC Chapter 1 in that most administrative things in the reference codes and standards are superseded by the VCC, except for some testing and inspection requirements.

Part of this amendment references the IFC. There may be an opportunity to provide an exception stating that the locality is responsible for the acceptance testing.

Andrew: Asked Jeff to clarify the 'except for…' language suggested for the acceptance testing. He thought the guidance from 510.4 and 510.5 was being followed, but it seems like 918 would override that.

Jeff: He would leave 918.2 as it is, but put an exception after 918.1.1 that exception testing should be the responsibility of the locality.

Andrew: Acceptance testing should be done by the designer, who provided the system and who needs to be properly trained. Localities may not be certified.

Steve: Sees the potential conflict, but in 918.2 now, the localities are responsible for the acceptance testing. He thinks that the solution Jeff offered in the language would work.

Andrew: Is thinking of a situation where the locality doesn't provide equipment and doesn't have the technical expertise to do the acceptance testing. Sections 510.4 and 510.5 outline the steps for the process, but in this case, it would not apply and the locality would have to come up with their own process.

Jeff: Without a change, the locality would be doing it anyway.

Dana: Agrees with Andrew. She doesn't think that localities would be prepared to do the testing, since there's certain expertise required for each system.

Jeff: Says that the localities are doing it now. He asked the group how localities are doing it now, according to 918.2.

Andrew: Section 918.1.1.1 looks like it has a lot of existing language. Is there a way to outline in the proposal where it comes from, because right now it looks like a brand new section? He doesn't want to confer that the group is endorsing responsibility on the building owner, instead of simply revising the section and changing the order of the language.

Jeff: DHCD can put it back into one paragraph, if it makes it cleaner and easier for some group members to support.

Andrew: Thinks it should be left as it was.

Jeff: Does anyone object to the formatting? Leaving 918.1.1 as it was in the 2018 Code? Since there's no objection, it will be left. He still would like to hear from the group about sections 510.4 and 510.5.

Steve: Asked Jeff if he wanted to explain the deletion of the IBC section at the bottom of the page.

Jeff: IBC 2702.2.3 has some requirements for emergency or stand-by power. IFC and NFPA both already have those requirements, so it was stricken, since it is redundant. In section 918.1.1, when localities provide the equipment, they will do the acceptance testing, and building owners will provide space and access for that testing. Once completed, it will be sent out with a poll and if everyone supports it, we'll put it forward as a proposal from the Study Group. If it isn't fully supported, that will be noted.

Andrew: Adopting those particular sections would work without an additional exception.

Steve: In Andrew's proposal, exception # 6 was stricken, but it's still in this proposal. Does Andrew still support this proposal?

Andrew: Responsibility per sections 510.4 and 510.5 are a broader discussion. In this case, he supports for the purpose of consensus. Changing the first sentence to reference the IFC is fine.

Jaimie: We have two proposals, are we discussing moving both proposals forward?

Jeff: Some will support both, but we will explain the intent of both. This proposal focuses on one change in bringing in section 510.4 and 510.5. Most will support it. Andrew's proposal changes the responsibility to the building owner.

Jaimie: Thinks there may be some confusion moving forward with both proposals.

Jeff: If some are not comfortable supporting Andrew's proposal, the other one could still go through with consensus. Both proposals plus a Study Group report and meeting summaries will be provided to the Workgroups.

Jeff: There were questions about the FCC licenses. The IFC seems to reference two different licenses. One that allows the locality to operate on a certain frequency. The other says that there is also a general radio license required. Is this standard or is it something new?

Dana: This is standard everywhere. There needs to be someone on site with a GROL general radio operator's license.

Jeff: How does incorporation of NFPA 1221 correlate with the IFC? He doesn't think there's a conflict and the IFC should take precedence. He asked the group if there is any other discussion about this.

Dana: No significant differences that she noticed.

Costs

Jeff: There was some discussion about costs in general, but there were no specifics. Steve did gather some more specific information for the group to review.

Steve: He reached out to an associate at Siemens, who collected costs based on real life data. This is the current cost for the building owner, not including anything for the locality. Based on the type of project, the costs were anywhere from $0.10 to $0.38 per square foot for the system. (Attachment provided: "IBEC Costs – Steve Shapiro)

Jeff: DHCD will include the information in the final report.

Steve: The costs were not much different in 2003 or 2004, when the General Assembly addressed the issue.

Tammy Breski: Asked if anyone has given thought to wireless, or is that an add-on. In one case, retrofit of wireless on top of a DAS system added a significant cost when both antennas were put together.

Jeff: Building owners are adding wireless more and more. The group focus has been on IBEC, but wireless may come into play.

Dana: Cellular and public safety DAS are frequently done together, but they do need to be a certain distance apart from each other.

Responsibility

Jeff: DHCD noticed that the responsibility for the installation is addressed by the code, but not necessarily the design of the system. Typically the building owner has been responsible for the design and putting the cabling in. However, the VCC is not clear on the other aspects of the system, such as who designs the system and gets it up to a point where the locality installs their additional equipment. He asked the group to discuss what they have seen in the field.

Steve: Doesn't think AOBA has any issue with this being the building owner's responsibility, but he is not sure how this has been handled in the various localities.

Jeff: It does seem like the building owners are responsible for system design. If localities are providing equipment and perform the acceptance testing, do they also have input on the design of the system?

Dana: The owners usually use software called ibWave to assist with the system design. The owners would provide a ROM (Rough Order of Magnitude) prior to the build. The manufacturer, or independent contractor would provide the design.

Jeff: Is it up to the building owner to pick a vendor? Who handles that? Would the locality have a say?

Dana: There can't be too many chiefs. Especially in new construction. The ultimate desire would be for the architect to include the system design in their specs. The industry is heading in that direction, but is not there yet.

Jeff: If Andrew's proposal goes through, it would change the responsibility. If the other proposal goes through, it would not change responsibility.

{BREAK – 10:03 – 10:08}

Radiating Cable

Jeff: This was mentioned by the group during previous meetings, but there was not much discussion. Section 918 says that the building owner shall install radiating cable, which is now outdated. He asked if the group thinks that this should be addressed, since it seems to indicate that radiating cable is the only option.

Dana: She thinks that type of cable is usually used for long tunnels, but not necessary for buildings.

Steve: Thinks that using radiating cable may defeat the purpose because it doesn't work inside of a conduit.

Jamie: Thinks that the language should be corrected if it is outdated, and that it should be more inclusive or open ended so that it doesn't have to continue to be changed with new technology.

Jeff: Asked if anyone could suggest better language for this section.

Steve: Will ask the Siemens engineer that provided the cost estimates and send Jeff an email response.

Jeff: Asked if anyone is familiar with Backbone cable mentioned in NFPA 1225.

Tammy: Not necessarily answering the question about backbone cable. However, most cabling on DAS systems are a plenum-rated cable, and some are using a Cat 5 cable. Perhaps generic language should be used, not identifying the type of cable.

Jeff: He asked Tammy to clarify if she was saying that since there are different types of cabling that could be utilized, did she mean to say that generic language should be used in the proposal, such as "the owner should provide cabling"?

Tammy: Yes.

Dana: Usually ½" plenum cable is used. There has been pushback about how much conduit is needed and if it needs backbone or horizontal runs. The language in the proposal could encompass everything under just the word "cabling".

Jeff: It sounds like it should just say "the building owner shall install cabling". He asked for thumbs up or down poll now, and he will follow up with a poll to the entire group. Three thumbs up and none down. Should this be included in the DHCD-drafted proposal? Or should there be a stand-alone proposal for this language?

Steve: The safest thing would be to make this a separate change.

Jeff: That sounds good. DHCD will send a poll, and if the full group supports, it will be a separate SG proposal to change the language to read "cabling". If the full group is not in support, it will be a proposal with proponents named.

Next Steps

Jeff: DHCD will get proposals drafted and put out on cdpVA, noting who supports them. DHCD will get the SG report drafted and out to the group, then to the public before the report and proposals go to the Workgroup.

Steve: What are the dates for the Workgroup?

Jeff: There's a 30 day cutoff for proposals before Workgroup meets, so any from this group will need to be submitted by March 12 for the April meetings. Otherwise, they will be done before May 1, for consideration in the June Workgroup meetings.

Jaimie: Thanked the SG members. He considers both proposals to be an improvement over what is there now.

Jeff: Yes. Thanks to all.

APPENDIX B: Study Group Members

IN-BUILDING EMERGENCY COMMUNICATIONS

Study Group Members

Jamie Wilks – Virginia Building and Code Officials Association

Jonah Margarella – American Institute of Architects, VA Chapter

Gerry Maiataco – Virginia Fire Prevention Association

Tread Willis – International Association of Electrical Inspectors, Virginia Chapter

Andrew Milliken – Virginia Fire Chiefs Association

Jay Davis – Virginia Department of Fire Programs

Jim Crozier – Virginia Association of Counties

Dwayne Tuggle – Virginia Municipal League

Steve Shapiro – Virginia Apartment & Office Building Association / Virginia Apartment Management Association

Dana Buchwald – Backhaul Engineering

Debbie Messmer – Virginia Department of Emergency Management

Patrick Green – Virginia State Police

Troy Knapp – Virginia Department of General Services

Tammy Breski – DHCD Broadband Office

Robert Melvin – Virginia Restaurant, Lodging & Travel Association

Jodi Roth – Virginia Retail Federation

APPENDIX C: Supporting Documentation

VIRGINIA DHCD

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Partners for Better Communities

In-Building Emergency Communications Study Group

December 1, 2021 Meeting

2021 Code Development Cycle

VIRGINIA DHCD

DHCD staff

Cindy Davis, Deputy Director of Building and Fire Regulations

Jeff Brown, State Building Codes Office Director

Richard Potts, Code Development and Technical Support Administrator

Paul Messplay, Code & Regulation Specialist

Florin Moldovan, Code & Regulation Specialist

Study Group members

- Jamie Wilks, VBCOA
- Jonah Margarella, AIA-VA
- Gerry Maiataco, VFPA
- Tread Willis, IAEI-VA
- VFCA
- Jay Davis, VDFP
- Jim Crozier, VACO
- Dwayne Tuggle, VML
- Steve Shapiro, AOBA
- Dana Buchwald, Backhaul Engineering
- Debbie Messmer, VDEM
- Patrick Green, VSP
- Troy Knapp, DGS
- Tammy Breski, DHCD
- Robert Melvin, VRLTA
- Jodi Roth, VRF

2021 code development cycle (tentative dates)

October 1st cdpVA was opened for submission on code change proposals for the 2021 Code Development Cycle

November 2021: Notices of Intended Regulatory Action (NOIRAs) Published

December 2021: Study Groups begin meeting

February 2022: Sub-Workgroups begin meeting

March-June 2022: Stakeholder Workgroup meetings

September 2022: BHCD meets to consider proposals

December 2022: BHCD considers proposed regulations

Fall/Winter 2023 = 2021 Virginia Codes Effective (Tentative)

cdpVA

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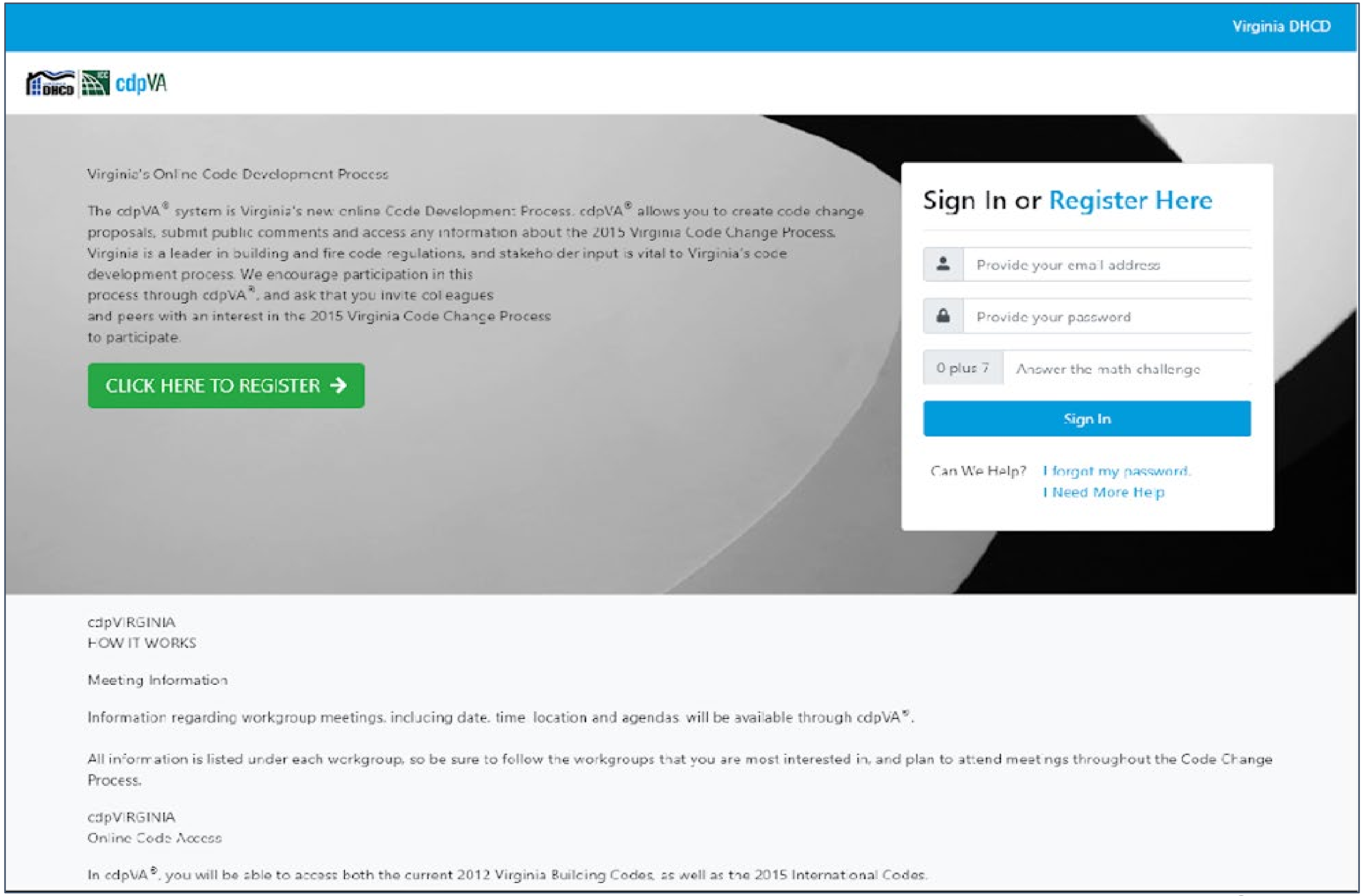
Virginia's online code development System (cdpVA)



Study Groups

- Study specific topics that require additional review and discussion
- Identify areas of consensus and disagreement
- Determine if code change proposals or other solutions are appropriate
- May review proposals, provide analysis, make recommendations, and/or develop code change proposals
- Proposals and recommendations of Study Groups are reviewed by the General Workgroups prior to BHCD consideration

Sub-workgroups

- Review all code change proposals within their subject topics, prior to the proposals being considered by the General Workgroups
- Make recommendations on each proposal, including negotiating compromises where appropriate
- May also develop new code change proposals, or support proposals submitted by others by joining the proposal as a proponent

General Stakeholder Workgroups

- All meetings are open to attendance and participation by anyone
- Review and discuss all submitted code change proposals, including all proposals and recommendations from Study Groups and Sub-Workgroups
- A workgroup recommendation is determined for each proposal and the recommendation is provided to the Board of Housing and Community Development
- Workgroup recommendations are classified as follows:

  Consensus for Approval: No workgroup participant expressed opposition to the proposal

  Consensus for Disapproval: Any workgroup participant expressed opposition to the proposal and no workgroup participant, other than the proponent, expressed support for the proposal.

  Non-Consensus: Any workgroup participant expressed opposition to the proposal

In-Building Emergency Communications

Q: What is In-Building Emergency Communications?

A: Two-way emergency responder communication coverage inside of buildings.

- Earlier editions of the IBC/IFC (and the current VCC) refer to it as "In-Building Emergency Communications"
- The 2021 IBC refers to it as "Emergency Responder Communication Coverage"

Emergency Responder Communications Enhancement Systems

Q: What is an ERCES?

A: A system installed to ensure “Emergency Responder Communication Coverage” is commonly referred to as an “Emergency Responder Communications Enhancement Systems, or “ERCES”.

ERCES are typically made up of:

- A donor antenna that receives external radio signals from the local emergency responder tower
- A bi-directional amplifier/repeater that boost the radio signal
- A coaxial cable or fiber medium that distributes the radio signal throughout the building
- Coverage antennas that transmit and receive radio signals within the building for reception by handheld radios used by emergency responders.

House Bill 2529 (2003)

January 2003: House Bill 2529 resulted in § 36-99.6:2. Installation of in-building emergency communication equipment for emergency public safety personnel.

“The Board of Housing and Community Development shall promulgate regulations as part of the Building Code requiring such new commercial, industrial, and multifamily buildings as determined by the Board be (i) designed and constructed so that emergency public safety personnel may send and receive emergency communications from within those structures or (ii) equipped with emergency communications equipment so that emergency public safety personnel may send and receive emergency communications from within those structures.”

HJR 588 (2003)

“HJR588 Task Force”

January 2003: Virginia Department of Fire Programs, with the assistance of VDEM and DHCD, was requested to study the feasibility of adopting requirements within the commonwealth that will ensure buildings are constructed and equipped to permit effective and reliable public safety radio communications for emergency personnel operating within them.

BHCD Ad-Hoc Committee on IBEC

2004 - 2007: "Ad-Hoc Committee on In-Building Emergency Communication Systems"

- Ultimately a compromise proposal was approved by the Board of Housing and Community Development in 2007, for inclusion in the 2006 edition of the Virginia Construction Code (VCC)
- The language approved for the 2006 edition remains (mostly unchanged) in the current VCC

2018 code development cycle

During the 2018 Code Development Cycle, the Board of Housing and Community Development (BHCD) considered the following proposals to amend the VCC in-building emergency communications requirements:

- B916.1-18 (Approved)
- B916-18 (Not approved)
- B918.1-18 (Not approved)

The BHCD also determined that additional discussions were needed and directed DHCD staff to convene a group of interested stakeholders to continue the discussions during the 2021 Code Development Cycle.

Objectives

- Gather information and data for review and discussion
- Identify issues with current requirements
- Identify areas of agreement and/or disagreement
- Identify areas of support and/or opposition
- Identify possible improvements to current requirements
    - Submit proposal(s) to update existing requirements (if applicable)
- Summarize findings or recommendations
- Review any related proposals submitted during the 2021 cycle (if applicable)

Access to codes

codes.iccsafe.org/codes/virginia

Free Online Access to
Virginia and ICC Code books!

INTERNATIONAL CODE COUNCIL

VIRGINIA DHCD

2021 IBC requirements

SECTION 918

EMERGENCY RESPONDER COMMUNICATION COVERAGE

[F]918.1General. In-building two-way emergency responder communication coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

2021 IFC requirements

510.1Emergency responder communication coverage in new buildings.

Approved in-building, two-way emergency responder communication coverage for emergency responders shall be provided in all new buildings. In-building, two-way emergency responder communication coverage within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1.Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an approved radio coverage system.

2.Where it is determined by the fire code official that the radio coverage system is not needed.

3.In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

2018 Virginia requirements

SECTION 918

IN-BUILDING EMERGENCY COMMUNICATIONS COVERAGE

918.1 General.

For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building emergency communication *equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new *buildings* and *structures* in accordance with this section.

Exceptions:

1. *Buildings* of Use Groups A-5, I-4, within *dwelling units* of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area *buildings* in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. *Buildings* or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the *building official* has *approved* an alternative method to provide emergency communication equipment for *emergency public safety personne*l.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.
6. *Buildings* in *localities* that do not provide the additional communication *equipment* required for the operation of the system.

2018 Virginia requirements

918.1.1 Installation.

The *building owner* shall install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The *locality* shall be responsible for the installation of any additional communication *equipment* required for the operation of the system.

918.1.2 Operations.

The *locality* will assume all responsibilities for the operation and maintenance of the emergency communication *equipment*. The *building owner* shall provide sufficient operational space within the *building* to allow the *locality* access to and the ability to operate in-building emergency communication *equipment*

918.1.3 Inspection.

In accordance with Section 113.3, all installations shall be inspected prior to concealment.

918.2 Acceptance test.

Upon completion of installation, after providing reasonable notice to the *owner* or their representative, *emergency public safety personnel* shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the *owner*. Any noted deficiencies in the installation of the radiating cable or operational space shall be provided in an inspection report to the *owner* or the *owner's* representative.

2018 cycle proposals

- **B916.1-18 (Approved)** - Added exception “6. Buildings in localities that do not provide the additional communication equipment required for the operation of the system.”
- **B916-18 (Not approved) -** Proposed adding technical requirements (system monitoring, installation per NFPA 1221 and NFPA 72, testing per NFPA 1221 and NFPA 72,critical areas), and changing responsibility for installation of all minimum system installation from the locality, to the building owner.
- **B918.1-18 (Not approved) -** Proposed referencing the IFC for all requirements, while maintaining the five existing (2015 VCC) Virginia exceptions.


ANY
QUESTIONS
?

Assignments/homework

Prior to the next meeting, please:

- **Research information provided today**
  - Reach out to other members and/or DHCD staff with any questions
- **Identify areas of interest or concern that you would like to discuss at the next meeting**
  - Provide to DHCD by December 14th
- **Identify and provide helpful/relevant information (reports, data, etc.) for the group to review**
  - Provide to DHCD by December 14th

Note: If any member wants to share information with the group between meetings, please send it to DHCD staff and we will distribute it to our email list to make sure we do not miss any interested parties that might be added to our list as we go along.

Next meeting

Next Meeting (Virtual)

December 29, 2021

9:00 am - 3:00 pm

(lunch break 12:00 pm -1:00 pm)

Link: https://vadhcd.adobeconnect.com/va2021cdc/

Division of Building and Fire Regulations

State Building Codes Office

sbco@dhcd.virginia.gov

804-371-7150

VIRGINIA ACTS OF ASSEMBLY -- 2003 SESSION

CHAPTER 611

An Act to amend the Code of Virginia by adding a section numbered 36-99.6:2, relating to the Uniform Statewide Building Code; installation of communication equipment for emergency public safety personnel.

[H 2529]

Approved March 18, 2003

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 36-99.6:2 as follows:

§ 36-99.6:2. Installation of in-building emergency communication equipment for emergency public safety personnel.

The Board of Housing and Community Development shall promulgate regulations as part of the Building Code requiring such new commercial, industrial, and multifamily buildings as determined by the Board be (i) designed and constructed so that emergency public safety personnel may send and receive emergency communications from within those structures or (ii) equipped with emergency communications equipment so that emergency public safety personnel may send and receive emergency communications from within those structures.

For the purposes of this section:

"Emergency communications equipment" includes, but is not limited to, two-way radio communications, signal boosters, bi-directional amplifiers, radiating cable systems or internal multiple antenna, or any combination of the foregoing.

"Emergency public safety personnel" includes firefighters, emergency medical services personnel, law-enforcement officers, and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes, and terrorist attacks.

House Document No. 2
2004

HOUSE JOINT RESOLUTION 588

Studying the feasibility of adopting requirements within the Commonwealth of Virginia that will ensure buildings are constructed and equipped to permit effective and reliable public safety radio communications for emergency personnel operating within them.

PREFACE

During the 2003 Session of the Virginia General Assembly, the Virginia Department of Fire Programs—with assistance from the Departments of Emergency Management and Housing and Community Development—was requested in House Joint Resolution 588 (HJ 588) to study the feasibility of adopting requirements within the Commonwealth that will ensure buildings are constructed and equipped to permit effective and reliable public safety radio communications for emergency personnel operating within them.

The goals of the study included: broad stakeholder participation and input using an open process; use of a multi-agency project team; timely completion without sacrificing quality; identifying partnership opportunities for providing the Commonwealth with substantive guidance on technology/policy alternatives; and results useable for, but not constrained by, House Bill 2529 (HB 2529) directing the:

> "Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring the installation in new commercial, industrial and multi-family buildings of emergency communications equipment for emergency service personnel to facilitate effective communications between emergency public safety personnel involved in emergency situations."

The *HJ 588 Task Force* created for this study includes participants from the Department of Housing and Community Development (DHCD); the State Fire Marshal's Office (within DHCD); the Virginia Department of Emergency Management; the Department of General Services; the Virginia Department of Fire Programs; the Virginia Association of Counties; telecommunications consultants and industry representatives; local fire, rescue and law enforcement personnel; local building officials; and stakeholder organizations representing builders/owners of retail and commercial office buildings, apartments, and condominiums.

Task Force staff from DHCD and the State Fire Marshal's Office includes Emory Rodgers, Charles "Ed" Altizer, and Rick Farthing. Participants from the Virginia Department of Emergency Management include Greg Britt, Tanya Brown, Parker Winborne, and Vic Buisset. Staff assigned from the Virginia Department of Fire Programs includes Adam Thiel, Aubrey W. "Buddy" Hyde, Jr., Ron Collins, Jennifer Cole, and Christy King.

The HJ 588 Task Force gratefully acknowledges the dedication and input of all study participants who volunteered their time. Many traveled great distances to participate in multiple meetings. This acknowledgement includes those organizations that volunteered staff members to participate in this endeavor. We also acknowledge the hospitality of Chesterfield Fire & EMS, the Henrico Division of Fire, and Hanover Fire & EMS for providing meeting accommodations.

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EXECUTIVE SUMMARY

During the 2003 Session of the Virginia General Assembly, the Virginia Department of Fire Programs (VDFP)—with assistance from the Department of Emergency Management and the Department of Housing and Community Development—was requested in House Joint Resolution 588 (HJ 588) to study the feasibility of adopting requirements within the Commonwealth that will ensure buildings are constructed and equipped to permit effective and reliable public safety radio communications for emergency personnel operating within them. (The full text of HJ 588 is included in this report as Appendix I.)

Resulting from this legislation, the VDFP formed the *HJ 588 Task Force* including participants from the Department of Housing and Community Development (DHCD); the State Fire Marshal's Office (within DHCD); the Virginia Department of Emergency Management; the Department of General Services; the Virginia Department of Fire Programs; the Virginia Association of Counties;[1] stakeholder organizations representing builders/owners of retail and commercial office buildings, apartments, and condominiums; telecommunications consultants and industry representatives; local fire, rescue and law enforcement personnel; and local building officials. (A complete list of participants is found in Appendix II.)

Goals for the study included: broad stakeholder participation and input using an open process; use of a multi-agency project team; timely completion without sacrificing quality; identifying partnership opportunities for providing the Commonwealth with substantive guidance on technology/policy alternatives; and results useable for, but not constrained by, House Bill 2529 (HB 2529) directing the:

> "Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring the installation in new commercial, industrial and multi-family buildings of emergency communications equipment for emergency service personnel to facilitate effective communications between emergency public safety personnel involved in emergency situations." (The full text of HB 2529 is included as Appendix III of this report.)

The HJ 588 Task Force identified three principal areas affecting the feasibility of adopting requirements within the Commonwealth to ensure buildings are constructed and equipped to permit emergency public safety personnel to utilize effective and reliable radio communications while they are within buildings.

These three focus areas include: 1) policy, 2) implementation, and 3) technology.

1. **Policy** – The public policy issues associated with requiring in-building public safety radio communications solutions are complex and multi-faceted, but not insurmountable. Local governments across the United States have adopted ordinances requiring the installation of in-building public safety radio

[1] Participation was also invited from the Virginia Municipal League.

communications solutions since 1991.[2] However, Virginia would be the first state to implement such a requirement statewide.

2. **Implementation** – In Virginia, the implementation instrument for adopting such a requirement is the Uniform Statewide Building Code (USBC) development and change process. Given the relationship between the 2003 General Assembly's direction in HJ 588 and HB 2529, the Task Force spent substantial time discussing implementation issues that will be further explored in the USBC development process. In addition, DHCD and the State Fire Marshal's Office held meetings (outside the HJ 588 study) with Task Force participants to draft sample code language for emergency communications equipment in *new* buildings—this draft language is included in this report as Appendix IV.[3]

3. **Technology** – The technology behind public safety radio communications in the built environment is inherently complex and a comprehensive treatment is beyond the scope of this study. Therefore, the Task Force focused on studying the feasibility of potential technological solutions for addressing the challenge of providing effective and reliable public safety radio communications in buildings. A variety of alternatives was explored with the conclusion that no *single* technology will apply to every jurisdiction in the Commonwealth. However, a range of technology solutions is available with applicability to almost any situation in Virginia.

[2] The Jack Daniel Company (2003) http://www.rfsolutions.com/sbwp.htm

[3] It is critical to note that this *draft* language *has not* been through the prescribed USBC development/change process and is provided in this report as an exhibit only, with no warranty of Task Force, board, or agency consensus on any of its specific provisions.

SUMMARY OF KEY ISSUES	
POLICY	***New construction***—Applying in-building technology solutions to ensure effective and reliable public safety radio communications is generally less costly in new construction (or during renovations) than in existing buildings. Typically, owners and developers have more financing options for installing emergency communications equipment in new buildings or those undergoing extensive renovation. Computerized radio system models and measurement tools are available to forecast system performance with enough accuracy to effectively design in-building solutions for new construction projects.
POLICY	***Retrofitting existing buildings***—While many of the local in-building public safety radio communications ordinances adopted outside Virginia since 1991 have retrofit provisions, requiring the installation of emergency communications equipment in existing buildings could cost between 10 and 25 percent more than the cost of installing the same technology in new construction. For building owners, securing capital for retrofitting an existing building can be difficult, unless incentives are provided by public or private entities. In the event of a fire or other emergency, however, such a system could prove economically beneficial for helping reduce property damage and life loss.
POLICY	***Target hazards***—Requiring the installation/retrofit of emergency communications equipment in buildings (new and existing) with occupancies having a high potential for life loss or property damage could prove beneficial in the event of a fire or other emergency exposing the property and its occupants to harm. Retrofit provisions for specific "high-hazard" occupancy types have been previously incorporated in the USBC.
POLICY	***Funding***—The exact cost to install emergency communications equipment in buildings across Virginia is hard to define as several variables affect installation and maintenance costs. Research for this study suggests costs can range anywhere from $0.15 to $1.25 per square foot in new construction; with an additional 10 to 25 percent for retrofitting existing buildings. If required by the USBC for new construction, these costs would likely be added to initial financing arrangements and amortized over the life of the building. Securing funds to retrofit an existing building from operational cash flows could be difficult unless financial incentives are provided by public or private entities.

POLICY	***Responsibility***—The Task Force limited their scope of work, in accordance with HJ 588, by agreeing that local jurisdictions (as the federally licensed operators of public safety radio systems) are responsible for delivering adequate radio signal to the exterior of a (proposed or existing) building *before* requiring the installation of emergency communications equipment to overcome signal degradation inside the structure. The Task Force also agreed that changes to the local public safety radio system (environmental or technological) occurring after an in-building solution is accepted by authorities should not place an undue compliance burden on building owners.
POLICY	***Local government option***—The USBC can include provisions allowing local governments to "opt-in" or "opt-out" of specific code sections. An "opt-in" code section only applies to a jurisdiction if the local governing body adopts it; an "opt-out" code provision applies to a jurisdiction *unless* the local governing body chooses *not* to accept it. Given regional and local differences across Virginia, the Task Force recommended the local government option for inclusion in any USBC action on in-building public safety radio communications, but could not reach consensus for "opt-in" versus "opt-out."
IMPLEMENTATION	***Statewide code applicability***—As with any potential change to the Uniform Statewide Building Code, the principal implementation challenge facing the Board of Housing and Community Development (which promulgates the USBC) is crafting code language applicable across the entire Commonwealth.
TECHNOLOGY	***Radio spectrum availability***—A finite amount of radio spectrum is available for all uses, public and private. Public safety radio communication systems are currently restricted to certain "bands" of the spectrum as regulated by the Federal Communications Commission (FCC). While an additional band in the spectrum has recently been allocated for public safety use (700MHz), the burgeoning need for "space" on the airwaves makes fundamental change to public safety radio communications appear limited for the foreseeable future.

TECHNOLOGY	***Radio system trends***—Public safety agencies nationwide, including those in Virginia, are progressively replacing older (VHF/UHF) public safety radio systems designed in the 1970s with newer, 800MHz "trunked" systems. These systems have features allowing more efficient utilization of limited radio frequencies (assigned by the FCC) and include safety features for emergency response personnel. Most of Virginia's more populous jurisdictions have recently replaced their older (first or second generation) systems, while others are in the planning or deployment stages. While these 800MHz systems have many advantages over their predecessors, overall system performance depends on the ability of mobile and portable radios to reach fixed antenna sites over distances, through building and terrain features, and from within buildings.
TECHNOLOGY	***Radio system lifecycles***—Limited spectrum availability, coupled with the high cost and complexity of deploying a public safety radio system in a jurisdiction, markedly reduces the ability of public safety agencies to fundamentally change their basic communications technology over time. This leads to long system lifecycles as demonstrated by the fact that many of today's frontline public safety radio systems were designed and built up to 30 years ago; while newer systems (and therefore any in-building solutions designed to work with them) are projected to last many years into the future.
TECHNOLOGY	***External solutions***—A variety of devices designed for use by emergency response personnel from outside the building are currently available with promise for reducing the difficulty of providing effective and reliable public safety radio communications within buildings during emergency incidents. Since radio signals are ultimately subject only to the laws of physics, however, it seems unlikely that a completely external "solution" is on the horizon. Nonetheless, existing buildings with marginal coverage can be positively affected by externally deployed technologies and Task Force members agreed that addressing the in-building communications challenge should include the continued research, development, and testing of external radio communications adjuncts.
TECHNOLOGY	***Internal solutions***—Given the laws of physics governing radio energy, installing emergency communications equipment inside certain buildings will probably always be part of any comprehensive solution for providing effective and reliable public safety radio communications across Virginia. With the diversity of public safety radio systems around the Commonwealth, however, no *single* internal solution currently exists to guarantee effective and reliable public safety radio communications within *all* buildings. The selection, design, and installation of in-building solutions depends on a variety of factors such as construction type, architectural features, building materials, and existing public safety radio system characteristics.

TECHNOLOGY	***The future***—The continued advancement of technology will undoubtedly affect the future of public safety radio communications in buildings. Whether or not these changes improve or degrade the current situation faced by emergency response personnel in many jurisdictions remains to be seen. The basic principles governing public safety radio systems are stable enough, however, that the installation of emergency communications equipment in certain buildings to provide effective and reliable communications for emergency response personnel need not be postponed.

CHAPTER 1. INTRODUCTION

Effective and reliable radio communication is important for both public safety personnel and building occupants during emergencies. The types of incidents to which first responders are called range from domestic disputes to hostage situations; fractured limbs to cardiac arrests; and smoke alarm activations to major fires involving a hundred or more firefighters. The efficiency and effectiveness of all these operations—whether law enforcement, emergency medical, or fire department mitigated (and frequently a combination of agencies and disciplines is involved)—depend on coordinated strategy and tactics that can only be achieved with effective and reliable radio communications, both inside and outside buildings. Furthermore, when situations become extreme and threaten responders' lives, the radio serves as their lifeline to "outside" help and back-up assistance. As resolved by the Virginia General Assembly in 2003:

> "The lives of those emergency public safety personnel who respond to such emergencies, as well as the lives of those persons who may be within a building in which an emergency occurs, frequently depend solely upon the ability of those public safety personnel to communicate by radio transmissions with others who are within such buildings and others who are outside such buildings."[4]

Property owners and managers have a related interest in the efficiency and effectiveness of public safety operations conducted in their buildings. Simply stated, the sooner the suspects are apprehended, the patients are transported, and the fire is out...the sooner business returns to normal. Particularly in a fire or hazardous materials incident, the degree of property damage and life loss can depend greatly on the effectiveness of communications among emergency responders. Building owners and operators also have a vested interest in the safety of their tenants and are often willing to go the "extra mile" to provide safety features for preventing emergencies.

Emergency public safety personnel use handheld/portable radios ("walkie-talkies") as the primary form of tactical communications on incident scenes; using them for communications with both other responders and their public safety communications ("dispatch") center. First-arriving units use portable radios to describe conditions found at the scene and also to request additional assistance/back-up. As incidents increase in size and complexity, communications systems must be able to "scale-up" to handle increased message traffic. Typical, day-to-day "routine" incidents can often be managed on a single channel, but larger incidents may require several channels to allow for clear and timely exchanges of information. Separate channels may also be needed for command, tactical, and support functions.

Public safety radio systems are designed to cover a specific service area. Transmit/receive sites in a radio system are capable of putting certain amounts of radio "signal" on the ground (measured in decibels or "dBs"), where it is possible to receive and transmit signals between mobile radios, portable radios, and fixed sites. In most

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[4] Source: Text – House Joint Resolution 588

modern portable radio-based public safety radio systems, the areas covered by a site for transmitting and receiving are about the same; this is known as a "balanced path" approach to system design. This essentially means that if a portable radio can "hear" the system from a given location, the system should also be able to "hear" the portable radio when it transmits; the converse of this situation is also true.

The overall amount of radio coverage provided by a system is expressed in terms of the area covered, signal strength in that area, and the reliability of the coverage.

Area covered is the geographic area where the signal strength of radio signals from a system exceeds a certain value. This value is based on two parameters – the sensitivity of the receiver in the portable radio (how well the radio can "hear"), and the amount of additional margin required in the system to overcome natural and man-made obstructions. Margins are also included which take into account how a user carries and operates a portable radio. For example, consider one radio site with an antenna on a tower, and a radio user with a portable (hand-held) radio at a location near the tower. If the user is outside the building, the system design must include enough margin to overcome any man-made or natural obstructions (e.g., terrain, foliage, buildings) that may interfere with the ability of the signal to reach the portable radio user once it has left the tower. If the portable radio user needs to operate from inside the building, the system design must also include sufficient margin to penetrate the structure.

Reliability is the statistical probability that signal strength will exceed a minimum acceptable value and is expressed in percentages. Public safety radio systems are typically designed for 95 percent signal reliability. The usual goal of a public safety radio system design is to provide signal strengths exceeding minimum acceptable values 95 percent of the time, in 95 percent of locations within the defined service area.

System designers use computer modeling to predict the radio coverage that a specific system design will provide. These sophisticated systems use digitized terrain data, digitized land use data, and radio wave propagation models.

Problem Statement

As identified in House Joint Resolution 588 (HJ 588), "reliable emergency public radio transmissions between those who are within a building and to others outside of buildings have been a significant and continuing problem for emergency public safety personnel."[5] HJ 588 also identified modern construction techniques and materials as a contributor to this life safety issue, "modern construction materials and techniques often make it more difficult for emergency public safety personnel to communicate with other persons within buildings and with other persons outside of buildings because those materials and techniques sometimes block or impede the transmission of radio signals."[6]

[5] Source: Text – House Joint Resolution 588
[6] Source: Text – House Joint Resolution 588

All radio systems have inherent limitations caused by the physics of radio waves and their propagation characteristics. These limitations are particularly salient in buildings, where modern construction materials can impede the radio signal from sender to receiver and vice versa. While a complete discussion of radio physics, signal propagation and attenuation is beyond the scope of this study, many people are familiar with wireless communications through their mobile phones, pagers, and personal digital assistants (PDAs). A "dropped call" or signal interference during a mobile telephone conversation is an inconvenience to most people. Public safety personnel can experience the same difficulties in buildings during emergency response activities—with negative impacts on their operational efficiency and effectiveness. Communications difficulties are often implicated in firefighter line-of-duty death investigations such as those listed in Appendix V of this report. (It is important to note that not all these difficulties can be attributed to radio signal attenuation in buildings; however, the recurrent theme underscores the importance of effective and reliable communications for emergency public safety personnel.) Recognizing the causal link between inadequate public safety radio communications and fatal incidents, the National Institute for Occupational Safety and Health (NIOSH) contracted for an extensive study of firefighter radio communications; the final results of which are still forthcoming.

Appendix VI provides data presented to the HJ 588 Task Force from Fairfax County highlighting several buildings with reported and tested in-building public safety radio communications problems[7]. These data suggest the difficulty of providing effective and reliable public safety radio communications in buildings is not confined to any particular construction or occupancy type.

Appendix VII and Appendix VIII provide anecdotal descriptions of in-building public safety radio communications difficulties from the Tidewater area and Fairfax County, respectively.

Study Methodology

The HJ 588 Task Force convened its first official meeting on March 26, 2003. (Many of the participants were previously involved in a Statewide Fire-Rescue Radio Communication Task Force meeting on November 7, 2002, which aimed to address fire-rescue department concerns related to the planning and deployment of new two-way radio communications systems.)

During the March 26, 2003 meeting the Task Force identified three principal areas of consideration and outlined some general goals for the study.

The three broad areas for study included: 1) policy, 2) implementation, and 3) technology. General goals included broad stakeholder participation and input using an

[7] These data are not all-inclusive and represent only a sample of these buildings within Fairfax County where problems with effective and reliable public safety radio communications have been identified.

open process; use of a multi-agency project team; timely completion without sacrificing quality; identifying partnership opportunities for providing the Commonwealth with substantive guidance on technology/policy alternatives; and results useable for, but not constrained by, House Bill 2529 (HB 2529) directing the:

> "Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring the installation in new commercial, industrial and multi-family buildings of emergency communications equipment for emergency service personnel to facilitate effective communications between emergency public safety personnel involved in emergency situations."

The HJ 588 Task Force met five times to discuss and policy, implementation, and technology considerations affecting the feasibility of adopting requirements to ensure buildings are constructed and equipped to permit effective and reliable in-building radio communications for emergency public safety personnel. Several members of the task force additionally participated in code discussions relating to House Bill 2529.

It is essential to note that every HJ 588 Task Force meeting was an open meeting, participants were continually encouraged to bring other interested parties to the meetings, and to contribute any information they felt important for inclusion in the study.[8] Staff working on HJ 588 also conducted an extensive literature review and repeatedly asked participants to provide any essential, relevant literature.

Table 1. Study Chronology

Chronology	
August 15, 2002	The Virginia Fire Services Board Committee on Fire Prevention and Control was approached regarding the issue of 800MHz radio system difficulties in buildings. At the request of the Virginia Fire Services Board, the Virginia Department of Fire Programs began coordinating (in cooperation with the Virginia State Fire Marshal's Office) a statewide task force to address fire-rescue department concerns related to the planning and deployment of new two-way radio communications systems.
November 7, 2002	After 2 months of collecting information on coverage concerns and potential solutions from departments with radio systems (800 MHz and otherwise) deployed within the last five years, the Virginia Department of Fire Programs and the Virginia State Fire Marshal's Office host an Statewide Fire-Rescue Radio Communication Task Force.

[8] Participation was also invited from the Virginia Municipal League.

January 8, 2003	Delegate Vincent F. Callahan, Jr. introduced House Joint Resolution 588 – *Reliable radio communications for emergency public safety personnel. Requesting the Virginia Department of Fire Programs to study the feasibility of adopting requirements within the Commonwealth that will ensure that buildings are constructed and equipped in such a way that will permit emergency public safety personnel to utilize effective and reliable radio communications while they are within buildings. The Department of Fire Programs shall complete its work by December 1, 2003, and shall submit an executive summary and report of its written findings and recommendations to the Governor and the 2004 Session of the General Assembly.*
January 8, 2003	Delegate James F. Almand introduced House Bill 2529 - *Uniform Statewide Building Code; installation of communication equipment for emergency public safety personnel. Requires the Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring the installation in new commercial, industrial and multi-family buildings of emergency communications equipment for emergency service personnel to facilitate effective communication between emergency public safety personnel involved in emergency situations. The bill defines emergency communications equipment and emergency public safety personnel.*
January 30, 2003	The Virginia House of Delegates passed HJ 588 (97-Y 0-N).
February 4, 2003	The Virginia House of Delegates passed HB 2529 (100-Y 0-N).
February 13, 2003	The Senate of Virginia passed HJ 588 (40-Y 0-N).
February 17, 2003	The Senate of Virginia passed HB 2529 (37-Y 0-N).
February 21, 2003	HB 2529 bill text as passed by House and Senate.
February 22, 2003	HJ 588 bill text as passed by House and Senate.
March 26, 2003	HJ 588 Task Force held its initial meeting to begin exploring issues and reliable radio communications for emergency public safety personnel and identified three general topic areas: policy, implementation, and technology.

April 21, 2003	HJ 588 Task Force met to further define issues within the three broad topic areas.
July 28, 2003	HJ 588 Task Force met to detail and discuss issues relating to any potential code change relating to in-building radio coverage in new construction and to discuss issues relating to the three broad themes of HJ 588 – policy, implementation, and technology.
September 8, 2003	HJ 588 Task Force met to discuss further issues around any proposed code change and to identify steps to move forward.
October 16, 2003	HJ 588 Task Force held its final meeting to discuss potential costs associated with implementing types of in-building solutions and to discuss the retrofit policy issue.

What Others Have Done

Since 1991, local ordinances in communities across the United States have addressed in-building public safety radio communications. Many cities and counties are supplying a remedy to reliable in-building radio coverage issues by passing ordinances requiring certain structures to have provisions to provide internal radio communications for the purpose of public safety communications. Examples include:

Table 2. What Others Have Done[9]

What Others Have Done	
Burbank, California	No person shall maintain, own, erect, or construct any building or structure or any part thereof or cause the same to be done which fails to support adequate radio coverage for City emergency service workers, including but not limited to firefighters and police officers. **NOTE**: This is the earliest known example of such a local ordinance. effective 9/21/91.
Fort Lauderdale, Florida	Requirements of a Radio Signal Booster System which will correct for a reduction in the radio signal to a level below that required amount to assure the 95% coverage reliability needed for public safety communications caused by a new building development.

[9] The Jack Daniel Company (2003) www.rfsolutions.com/sbwp

Broomfield, Colorado	To provide minimum standards to insure a reasonable degree of reliability for emergency services communication from within certain buildings and structures within the city to and from emergency communication centers. It is the responsibility of the emergency service provider to receive the signal to and from the building structure.
Sparks, Nevada	No person shall maintain, own, erect, or construct any building or structure or any part thereof or cause the same to be done which fails to support adequate radio coverage for City emergency service workers, including but not limited to firefighters and police officers.
Grapevine, Texas	No person shall maintain, own, erect, or construct any building or structure or any part thereof or cause the same to be done which fails to support adequate radio coverage for City emergency service workers, including but not limited to firefighters and police officers.
Hampshire, Illinois	Fire Protection District – Establishing requirements for fire communications enhancement systems.
Tempe, Arizona	To provide minimum standards to insure a reasonable degree of reliability for emergency services communications from within certain buildings and structures within the city to and from emergency communications centers. It is the responsibility of the emergency service provider to get the signal to and from the building site.
Scottsdale, Arizona	No person shall maintain, own, erect, or construct any building or structure or any part thereof or cause the same to be done which fails to support adequate radio coverage for City emergency service workers, including but not limited to firefighters and police officers. A certificate of occupancy may not be issued for any building or structure which fails to comply with this requirement.
Ontario, California	No existing or future wireless communications facilities shall interfere with any public safety radio communications systems including, but not limited to, the 800 MHZ radio system operated by the West End Communication Authority which provides public safety communications during emergencies and natural disasters.
Ontario, California	No person shall maintain, own, erect, or construct any building or structure or any part thereof or cause the same to be done which fails to support adequate radio coverage for City emergency service workers, including but not limited to firefighters and police officers.
Roseville, California	No person shall, erect, construct, change the use of or provide an addition of more than 20% to, any building or structure or any part thereof, or cause the same to be done which fails to support adequate

	radio coverage for the City of Roseville Radio Communications System, including but not limited to firefighters and police officers.
Folsom, California	No person shall erect, construct, change the use of or provide an addition of more than 20% to, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for Sacramento Regional Radio Communications System, including but not limited to firefighters and police officers. **NOTE:** This goes beyond the coverage requirement by defining a performance confirmation procedure; scheduled periodic verification of performance; a forward looking technical requirement that anticipates potential interaction with cellular services.
Broward County, Florida	To ensure uninterrupted operation of Broward County's public safety, law enforcement, other emergency-related and county operational telecommunications networks by making it a violation of Broward County Code of Ordinances for a property owner, lessee, licensee, contractor, or government entity not otherwise exempt by law, to erect a building or other structure, or portion thereof, or cause a building or other structure, or portion thereof, to be erected or constructed in a manner that creates interference with Broward County's public safety, law enforcement, other emergency-related and county operational telecommunications networks.
West Hartford, Connecticut	(Code change) No person shall erect, construct, change the use of, or construct an addition of more than 50% in gross floor area to any building or structure of Type I or Type II construction which exceeds 10,000 square feet in gross floor area, including any portions thereof which may be located below grade, which fails to support adequate radio coverage.
Sarpy County, Nebraska	No person shall erect, construct, remodel, renovate, or provide an addition of more than 20% to, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for the Sarpy County Communications Systems (SCRCS), including but not limited to emergency service workers, firefighters and police officers.
Schaumburg, Illinois	No person shall erect, construct, maintain or modify any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for village public safety services, including but not limited to police, fire, and public works departments. A certificate of occupancy may not be issued for any building or structure which fails to comply with this requirement. The frequency range which must be supported shall be 806 to 816 MHz and 856 to 866 MHz, or as otherwise established and required in writing by the

	village as being necessary for public safety purposes.
Bayside, Milwaukee County, & Ozaukee County Wisconsin	No person or organization shall maintain, own, erect, or construct any building or structure which is used for commercial, multi-family, or institutional use or any part thereof or cause the same to be done which fails to support adequate radio coverage to public safety service workers, including, but not limited to firefighters and police officers.

CHAPTER 2. POLICY

The Task Force explored several policy issues affecting the feasibility of requiring the installation of emergency communications equipment in buildings. This chapter summarizes their findings.

New Construction

Applying in-building technology solutions to ensure effective and reliable public safety radio communications is generally less costly in new construction (or during renovations) than in existing buildings. Typically, owners and developers have more financing options for installing emergency communications equipment in new buildings or those undergoing extensive renovation. Computerized radio system models and measurement tools are available to forecast system performance with enough accuracy to effectively design in-building solutions for new construction projects.

Retrofitting Existing Buildings

Retrofitting involves the addition of new equipment, which was not available at the time of initial construction, to a building to bring it up to current code requirements. Retrofit measures to address specific requirements are typically mandated by the legislature.

Table 3 is a summary of retrofit measures previously applied in the Uniform Statewide Building Code (USBC) governing:

Table 3. USBC Retrofit Applications[10]

Retrofit Applications	
Colleges and Universities	Battery-powered or AC-powered smoke detector devices installed in college and university buildings containing dormitories for sleeping purposes.
Juvenile Care Facilities	Battery-powered or AC-powered smoke detectors shall be installed and maintained in all local and regional detention homes, group homes, and other residential care facilities for children and juveniles which are operated by or under the auspices of the Virginia Department of Juvenile Justice.

[10] Uniform Statewide Building Code 2000 Edition

Deaf and Hearing Impaired	Smoke detectors providing an effective intensity of not less than 100 candela to warn deaf or hearing impaired individual shall be provided, upon request by the occupant to the landlord or proprietor, to any deaf or hearing-impaired occupant of any of the following occupancies: dormitory buildings, multiple-family dwellings, or one-family or two-family dwelling units.
Assisted Living Facilities	A fire protective signaling system and an automatic fire detection system meeting the requirements of the USBC, Volume I, 1987 Edition, Third Amendment, shall be installed in assisted living facilities.
Assisted Living Facilities	Battery or AC-powered single and multiple station smoke detectors meeting the requirements of the USBC, Volume I, 1987 Edition, Third Amendment, shall be installed in assisted living facilities.
Dwelling Units	AC-powered smoke detectors with battery backup or an equivalent device shall be required to be installed to replace a defective or inoperative battery-powered smoke detector located in dwelling units or rooming houses offering to rent overnight sleeping accommodations.
Nursing Homes and Facilities	Fire suppression systems as required by the edition of this code in effect on October 1, 1990, shall be installed in all nursing facilities licensed by the Virginia Department of Health.
Nursing Homes and Facilities	Fire alarm or fire detector systems, or both, as required by the edition of this code in effect on October 1, 1990, shall be installed in all nursing homes and nursing facilities licensed by the Virginia Department of Health.
Hospitals	Fire suppression systems shall be installed in all hospitals licensed by the Virginia Department of Health as required by the edition of this code in effect on October 1, 1995.
Hotels and Motels	Smoke detectors shall be installed in hotels and motels as required by edition VR 394-01-22, USBC, Volume II, in effect on March 1, 1990.
Hotels and Motels	An automatic sprinkler system shall be installed in hotels and motels as required by the edition of VR 394-01-22, USBC, Volume II, in effect on March 1, 1990.
Dormitories	An automatic fire suppression system shall be provided throughout all buildings having a Group R-2 fire area which are more than 75 feet or six stories above the lowest level of exit discharge and which are used, in whole or in part, as a dormitory to house students by any public or private institution of higher education.

Care Facilities	In each kitchen there shall be installed and maintained at least one approved type ABC portable fire extinguisher with a minimum rating of 2A10BC. The facility shall provide and maintain at least one battery operated, properly installed smoke detector as a minimum (i) outside each sleeping area in the vicinity of bedrooms and bedroom hallways, and (iii) on each additional floor.
Adult day care centers	Battery-powered or AC-powered smoke detector devices shall be installed in all adult day care centers licensed by the Virginia Department of Social Services.

A great deal of discussion occurred concerning retrofit and its potential impacts such as the fiscal impact to building owners, who would absorb retrofit costs, and whether incentives could be offered to ease the way for retrofit. The estimated cost to retrofit a building with an in-building solution is 10 to 25 percent over that of new construction. Therefore if in new construction the cost to provide an in-building solution is $1.00 per square foot, the cost to retrofit the same building can be estimated to range anywhere from $1.10 - $1.25 a square foot. This estimate does not take into account historic structures and instances of unique construction (e.g., cinderblock building with a plaster roof), where the retrofit cost could range even higher than 25 percent over the cost of installing a like system in a like structure.

Retrofit financing is a major concern. It was noted that once a building is constructed, retrofit costs must be funded from operational cash flows and substantial amounts of money are often difficult to absorb. As the costs associated with retrofit were of paramount concern, the Task Force entertained a great deal of discussion regarding the potential of offering tax credits or other incentives to building owners who retrofit to help absorb costs incurred.

It was also noted that the timeframe to implement and enforce a retrofit provision for installing emergency communication equipment in buildings would need to be lengthy.

Retrofit is logistically complex as many buildings, commercial office buildings, in particular, have multiple tenants. Each of these tenants has a unique set-up and diverse needs. In order to retrofit, a building owner must gain permission and coordinate with each building occupant as well as taking into account each of their security needs. Many buildings also lease their roof space to private telecommunications firms; before adding an in-building solution radio interference concerns would need to be reconciled.

Target Hazards

Requiring the installation/retrofit of emergency communications equipment in buildings (new and existing) with occupancies having a high potential for life loss or property damage could prove beneficial in the event of a fire or other emergency exposing the property and its occupants to harm. Retrofit provisions for specific "high-hazard" occupancy types have been previously incorporated in the USBC, as listed in Table 3.

Over time, various retrofit measures have been applied to structures including assisted living facilities, nursing homes, colleges and universities, juvenile care facilities, hospitals, hotels and motels, dormitories, state-regulated care facilities, and adult day care centers. The Task Force agreed that government-owned buildings, including schools, should not be exempt from any retrofit measures. There was also discussion as to whether or not buildings such as historic structures should be included in any retrofit action.

Funding

The HJ 588 Task Force spent a great deal of time discussing funding issues around the installation of emergency communications equipment in new construction, as well as for retrofitting existing buildings.

The exact cost to install emergency communications equipment in buildings across Virginia is hard to define as several variables affect installation and maintenance costs, such as labor rates, competition among qualified firms, complexity of installation for a specific building, and existing public safety radio system characteristics. Research for this study suggests costs can range anywhere from $0.15 to $1.25 per square foot in new construction;[11] with an additional 10 to 25 percent for retrofitting existing buildings (retrofitting costs for some buildings could be even higher.[12] If required by the USBC for new construction, these costs would likely be added to initial financing arrangements and amortized over the life of the building. Securing funds to retrofit an existing building from operational cash flows could be difficult unless financial incentives are provided by public or private entities. More detail on the costs of installing in-building solutions can be found in Chapter 5 of this report.

The possibility of alternate funding strategies for system installation in new or existing structures in the form of neutral host systems may exist. This potential strategy is not specific to any particular vendor or technology, but basically runs broadband services anywhere from 400 to 2.4 GHz, which essentially covers the entire spectrum of wireless applications, including public safety. The notion is that a public safety solution could "piggy-back" on the neutral host system, offering a "win-win" situation for the building owner. Currently, the market for this strategy is limited to large stadiums, shopping malls, convention centers, and coliseum type venues.

[11] Source: rfsolutions.com and HJ 588 Task Force Meeting on October 16, 2003
[12] Source: HJ 588 Task Force Meeting on October 16, 2003

It was noted that the cost to implement a neutral host system could add approximately 25 – 50 percent to the initial costs[13] of a public safety in-building solution.

Responsibility

When looking at the potential policy implications associated with requiring in-building solutions some questions regarding responsibility were presented.

The Task Force limited their scope of work, in accordance with HJ 588, by agreeing that local jurisdictions (as the federally licensed operators of public safety radio systems) are responsible for delivering adequate radio signal to the exterior of a (proposed or existing) building *before* requiring the installation of emergency communications equipment to overcome signal degradation inside the structure.

The Task Force also agreed that changes to the local public safety radio system (environmental or technological) occurring after an in-building solution is accepted by authorities should not place an undue compliance burden on building owners.

Local Government Option - Opt-In/Opt-Out

The USBC can include provisions allowing local governments to "opt-in" or "opt-out" of specific code sections. An "opt-in" code section only applies to a jurisdiction if the local governing body adopts it; an "opt-out" code provision applies to a jurisdiction *unless* the local governing body chooses *not* to accept it. Given regional and local differences across Virginia, the Task Force recommended the local government option for inclusion in any USBC action on in-building public safety radio communications, but could not reach consensus for "opt-in" versus "opt-out."

[13] Source: HJ 588 Task Force Meeting on October 16, 2003

CHAPTER 3. IMPLEMENTATION

The implementation instrument for adopting requirements within the Commonwealth to ensure that buildings are constructed and equipped in such a way to permit emergency public safety personnel to utilize effective reliable radio communications while they are within buildings is the Virginia Uniform Statewide Building Code (USBC).

The USBC prescribes mandatory regulations for the construction of buildings and structures and their internal equipment. Buildings constructed before the 1973 adoption of the USBC must comply with the Virginia Public Building and Safety Regulations (VPBSR). However, since the adoption of the USBC, local building inspection departments have been responsible for enforcing compliance with building code requirements during construction.

During the 2003 Virginia General Assembly, Session House Bill 2529 (HB2529) was passed, which specifically requires the:

> "Board of Housing and Community Development to promulgate regulations as part of the Building Code requiring the installation in new commercial, industrial and multi-family buildings of emergency communications equipment for emergency service personnel to facilitate effective communication between emergency public safety personnel involved in emergency situations."

While this is a separate and ongoing effort from HJ 588, given the similarity between the two tasks the Virginia Department of Fire Programs, the Department of Housing and Community Development, and the State Fire Marshal's office incorporated discussions of potential code language in the work of the Task Force. In order to facilitate this process members of the HJ 588 Task Force participated in formulating this proposed code change.

Given the extensive and required process for implementing changes to the USBC, this study was limited to discussions of "potential" (draft) code language – as described in Appendix III.[14]

The following is a brief summary of the USBC code change process.

The 2003 USBC and Statewide Fire Prevention Code (SFPC) update cycles will follow the requirements established by the Administrative Processes Act (APA), which requires the Department of Housing and Community Development to publish a baseline/proposed 2003 USBC/SFPC that is reviewed and approved by the Department of Planning and Budget, the Office of the Attorney General, the Board of Housing and Community Development (BHCD) and is published in the Virginia Register. Several

[14] It is critical to note that this *draft* language *has not* been through the prescribed USBC development/change process and is provided in this report as an exhibit only, with no warranty of Task Force, board, or agency consensus on any of its specific provisions.

comment periods will be provided to allow for submission of both administrative and technical code changes. The Codes and Standards Committee of the BHCD will review all code changes and make recommendations to the full Board as to what should be included in the 2003 regulations. Once the BHCD recommends approval the final regulations go through another set of reviews by applicable state agencies, another public hearing, and an open comment period. The BHCD then approves the final recommendations, which are subject to an appeals process of 30 days. It is estimated this process would encompass the majority of 2004 and resultant changes could possibly become effective in the Spring of 2005.

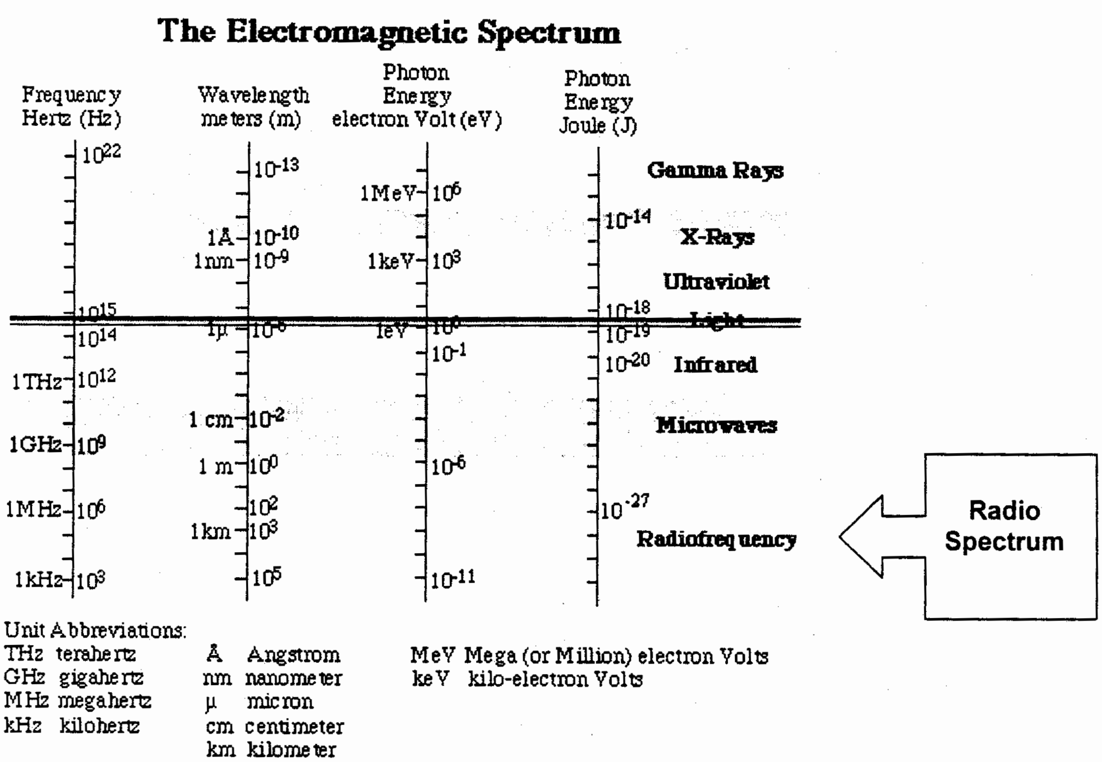
CHAPTER 4. TECHNOLOGY

A complete discussion of the underlying principles governing the design, installation, use, and benefits/limitations of public safety radio systems is beyond the scope of this report. (Several basic references are provided in the reference list at the end of the report). Therefore, this chapter relates primarily to issues identified by the HJ 588 Task Force as salient for studying the feasibility of requiring the installation of emergency communications equipment in buildings to provide effective and reliable communications for emergency public safety personnel.

Radio Spectrum Availability

A finite amount of radio spectrum (part of the overall electromagnetic spectrum that also includes visible light, infrared, x-rays, etc.) is available for all uses, public and private. Figure 1 illustrates the complete electromagnetic spectrum with the radio spectrum occupying approximately the bottom one-third of the diagram.

Figure 1. The Electromagnetic Spectrum[15]

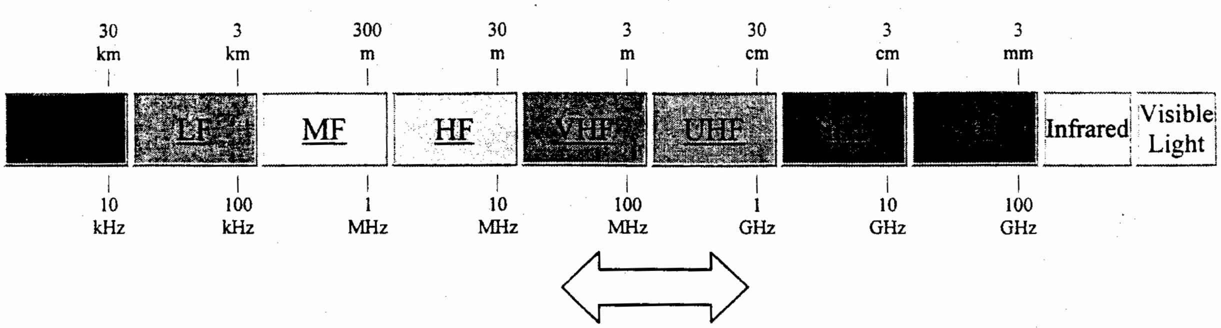


[15] National Aeronautics and Space Administration (1996) http://science.nasa.gov/newhome/help/glossfig1.htm

Within the radio spectrum, public safety radio communication systems are restricted to certain "bands" and are regulated by the Federal Communications Commission (FCC) in Title 47 of the Code of Federal Regulations (47CFR90.20). While additional spectrum has recently been allocated for public safety use (700MHz), the burgeoning need for "space" on the airwaves makes fundamental change to public safety radio communications appear limited for the foreseeable future.

Figure 2 illustrates just the radio spectrum with infrared and visible light for context at the extreme right; the arrow along the bottom approximates the range of frequencies allocated for public safety.

Figure 2. The Radio Spectrum[16]



Each band of the radio spectrum allocated for public safety use has different characteristics, as described in Table 4.

[16] Adapted from Neuhaus, John (2002) "Allocation of Radio Spectrum in the United States," http://www.jneuhaus.com/fccindex/spectrum.html#table_of_contents

Table 4. Public Safety Radio Characteristics[17]

	FREQUENCY RANGE	PROPAGATION CHARACTERISTICS	TYPICAL USAGE
VHF "Low Band"	30 MHz - 50 MHz	Low path loss, good refraction over terrain features, poor building penetration. Requires approximately 84" mobile or portable antenna for efficient transmission/reception. Compact (50") mobile antennas can be used with reduced efficiency.	Older technology that is still very effective for providing mobile coverage to large geographic areas. Vehicular repeaters operating on higher frequencies must be used if effective portable coverage is desired. Still used in Virginia by VDOT and some rural public safety agencies.
VHF "High Band"	148 MHz to 174 MHz	Somewhat higher path loss and reduced refraction over terrain features than VHF "Low Band." Requires approximately 19" mobile or portable antenna for efficient transmission/reception. Larger antennas can be used if higher gain is desired. Smaller portable antennas consist of approximately 8" of coiled spring coated with plastic to provide 19" electrical length, but are very inefficient.	Popular land mobile radio band, was used in a wide variety of public safety communications applications. Still used in many areas of the Commonwealth. Jurisdictions have left this band mostly due to congestion, lack of available frequencies, and difficulty implementing trunked radio systems here. Still used by many agencies in Virginia, including Virginia State Police.
UHF Band	450 MHz to 470 MHz	Again, higher path loss associated with higher frequencies. Poor refraction over terrain features. Requires 6" antenna for efficient transmission/reception. Larger antennas can be used if higher gain is desired.	Popular land mobile radio band, was used in a wide variety of public safety communications applications. Came into wide use in the 1970s for city and suburban county systems. Ideal for portable radio coverage in buildings. Still used in many areas of the Commonwealth. Jurisdictions have left this band mostly due to lack of new frequencies and difficulty implementing trunking systems.
UHF "T" Band	470 MHz to 512 MHz	Similar to UHF band above.	Expansion band created in major metropolitan areas. Uses spectrum shared with UHF TV channels 14-20. Usage similar to UHF band above. In Virginia, only used in metropolitan Washington, DC and Northern Virginia.
700 MHz band	764 MHz - 776 MHz 794 MHz - 806 MHz	Similar to 800 MHz band below.	New public safety spectrum taken from reallocated UHF TV channels 64-69, not available yet in most areas of the United States.
800 MHZ Band	806 MHz - 824 MHz 851 MHz - 869 MHz	Considerably higher path loss than lower frequency bands, but improved building penetration and portable radio coverage. Poor refraction over terrain features. Requires 3" mobile or portable antenna for efficient transmission/reception. Larger mobile and portable antennas are frequently used to obtain higher gain.	Very popular land mobile band in urban, suburban and suburban/rural jurisdictions. Use of trunking is mandatory, provides excellent system capacity and advanced features. Most urban, semi-urban and suburban jurisdictions use or plan to use systems in the 800 MHz band. Availability of new frequencies is limited, future use of 700 MHz will help.

Radio System Trends

Public safety agencies nationwide, including those in Virginia, are progressively replacing older (VHF/UHF) public safety radio systems designed in the 1970s with newer, 800MHz "trunked" systems. These systems have features allowing more efficient utilization of limited radio frequencies (assigned by the FCC) and include safety features for emergency response personnel. Most of Virginia's more populous jurisdictions have recently replaced their older (first or second generation) systems, while others are in the planning or deployment stages. While these 800MHz systems have many advantages over their predecessors, system performance ultimately

[17] Anderson, Jack (2003) RCC Consultants, prepared for HJ 588 Task Force.

depends on the ability of mobile and portable radios to reach fixed antenna sites over distances, through building and terrain features, and from within buildings.

Table 5 displays selected results from a statewide interoperability survey in which respondents were asked to identify the public safety radio communications frequencies currently used by systems within their jurisdiction.[18]

Table 5. Selected Public Safety Radio Bands Used in Virginia—2003

Jurisdiction	Population	Low Band VHF (25 - 50 MHz)	High Band VHF (150 - 174 MHz)	UHF (406 - 512 MHz)	800 MHz	Notes
Accomack County	38,305	EMS, Fire, Law	EMS, Fire, Law			
Albemarle County	79,236	EMS, Fire	EMS, Fire, Law	Law		800 MHz in planning stages
Amherst County	31,894				EMS, Fire, Law	
Arlington County	189,453				EMS, Fire, Law	
Botetourt County	30,496			EMS, Fire, Law		
Charlottesville, City of	45,049	Fire		Fire		800 MHz in planning stages
Chesapeake, City of	199,184				Fire	
Chesterfield County	259,903				EMS, Fire, Law	
Colonial Heights, City of	16,897				EMS, Fire	
Covington City	6,303				EMS, Fire, Law	
Danville, City of	48,411		Law			
Fairfax City	21,498				EMS, Fire, Law	
Fairfax County	969,749				EMS, Fire, Law	
Franklin County	47,286	EMS, Fire, Law				
Frederick County	59,209	EMS, Fire	EMS, Fire			
Goochland County	16,863	EMS, Fire, Law	Fire			
Hampton, City of	146,437				Law	
Hanover County	86,320				EMS, Fire, Law	
Harrisonburg, City of	40,468	Law	Law	Law		800 MHz in planning stages
Henrico County	262,300				EMS, Fire, Law	
Henry County	57,930	EMS, Fire, Law	EMS, Fire, Law	EMS, Fire, Law		
Hopewell, City of	22,354				Fire	
Madison County	12,520	EMS, Fire, Law	EMS, Fire, Law			
Norfolk, City of	234,403				Law	
Petersburg, City of	33,740		Law	Law		
Portsmouth, City of	100,565				EMS, Fire, Law	
Prince William County	280,813			Law		
Richmond County	8,809	Fire				
Roanoke, City of	94,911				Fire	
Rockbridge County	20,808			EMS, Fire, Law		
Rockingham County	67,725	EMS, Fire		EMS, Fire		800 MHz in planning stages
Smyth County	33,081	EMS, Fire, Law	EMS, Fire, Law	EMS, Fire, Law		
Spotsylvania County	90,395				EMS, Fire, Law	
Stafford County	92,446	EMS, Fire, Law	EMS, Fire, Law	EMS, Fire, Law		
Staunton, City of	23,853			EMS, Fire		
Suffolk, City of	63,677				EMS, Fire, Law	
Surry County	6,829	Law	Law			
Virginia Beach, City of	425,257				Fire	
Waynesboro City	19,520			EMS, Fire, Law		
Westmoreland County	16,718	EMS, Fire, Law		EMS, Fire, Law		
Wise County	40,123	Law	Fire, Law			
Wythe County	27,599	EMS, Fire, Law	EMS, Fire, Law			

[18] The statewide radio interoperability survey—an effort unrelated to HJ 588—from which these samples are drawn is still ongoing. To prevent duplication of effort, these preliminary and unverified results are included here to give a general impression of the current state of affairs with respect to public safety radio communications in Virginia.

Table 5 shows the trend toward combining public safety radio systems for different agencies into a single system (to promote interoperability), with 800MHz "trunked" systems the current local favorite based on frequency characteristics and availability (from the FCC). In fact, many of the above listed jurisdictions enjoy regional interoperability where portable radios from one system are programmed to operate on an adjacent system; in these cases, in-building solutions designed for one system can actually serve (without modification or additional cost) emergency public safety personnel from adjacent localities.

In jurisdictions where public safety agencies have separate systems in disparate bands, without plans to combine them, determining the system for which an in-building solution must be designed is a salient and early consideration. The Task Force agreed that, instead of requiring building owners to install emergency communications equipment to serve multiple systems at potentially 2 or 3 times the expense, any USBC action should include provisions requiring the locality to designate a single (primary) public safety radio system.

Radio System Lifecycles

Limited spectrum availability, coupled with the high cost and complexity of deploying a public safety radio system in a jurisdiction, markedly reduces the ability of public safety agencies to fundamentally change their basic communications technology over time. This leads to long system lifecycles as demonstrated by the fact that many of today's frontline public safety radio systems were designed and built up to 30 years ago; while newer systems (and therefore any in-building solutions designed to work with them) are projected to last many years into the future.

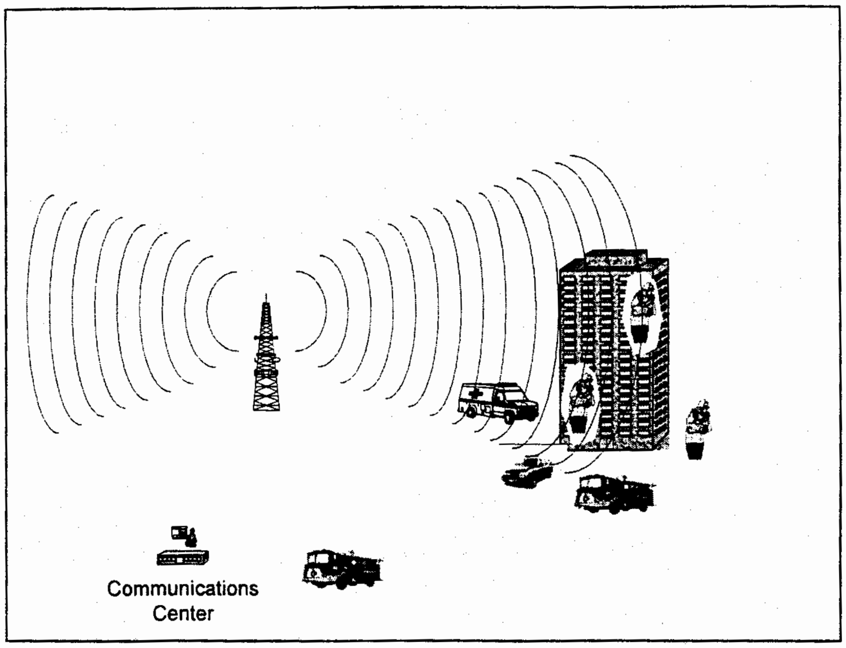
Basic Radio System Performance

Under ideal circumstances, public safety radio systems (conventional or trunked, in all bands) could penetrate all buildings using only their basic infrastructure, without assistance from internal or external adjuncts. In these cases, radio signal strength is sufficient to overcome attenuation from building materials (e.g., steel, concrete, window coatings, etc.) with enough margin to provide acceptable coverage and reliability, specifically, to allow portable radio use throughout 95 percent of the building, 95 percent of the time. (Even the most expensive radio system could not assure 100 percent coverage to all areas, at all times.) No specialized equipment or user training is required to operate within buildings, since the system functions the same inside and outside the structure.

In many buildings throughout Virginia, the local jurisdiction's basic radio system infrastructure provides adequate coverage and reliability for emergency public safety personnel to operate within while retaining the radio's safety features, the ability to communicate with other users, and the communications center ("dispatch").

The diagram in figure 3 illustrates radio system performance using only basic infrastructure.

Figure 3. Basic Radio System Performance[19]



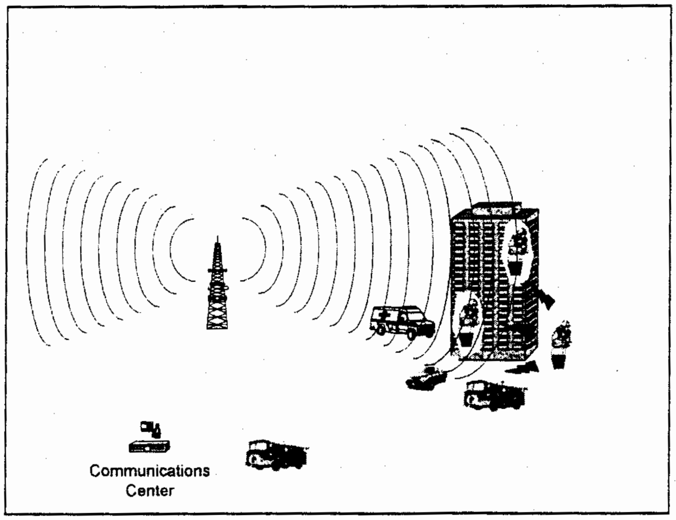
Direct/Talkaround Mode

Most public safety radio systems include a "direct" or "talkaround" mode allowing the radio user to communicate directly with other users when the basic system infrastructure cannot provide enough signal strength to "hear" the user's portable radio (and vice versa) in a given location, at a given time. (The "talkaround" term refers to talking "around" the system...which is usually designed to have all transmissions pass through an antenna/repeater site, thus ensuring message receipt by all users.) Radio functionality is markedly diminished in this mode since users lose safety features, can no longer talk with or hear their communications center, and may not be able to talk with or hear the incident commander and other units operating on the scene. Direct/talkaround mode provides only limited ability to penetrate all areas of large, dense structures and floor-to-floor communications are difficult over multiple floors.

Figure 4 illustrates the direct/talkaround mode.

[19] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

Figure 4. Radio System Performance in Direct/Talkaround Mode[20]



External Solutions

Several devices designed for use by emergency response personnel from outside the building are currently available with promise for reducing the difficulty of providing effective and reliable public safety radio communications within buildings during emergency incidents. It is important here to note the difference between inter-operability and operability. Many of the external public safety radio communications adjuncts currently being marketed are primarily for enhancing *inter*-operability between agencies; before these can work, operability inside/outside the building must still be achieved.

Since radio signals are ultimately subject only to the laws of physics, it seems unlikely that a completely external "solution" is on the horizon. Nonetheless, existing buildings with marginal coverage can be positively affected by externally deployed technologies. Task Force members agreed that addressing the in-building communications challenge should include the continued research, development, and testing of external radio communications adjuncts.

Vehicular Repeaters

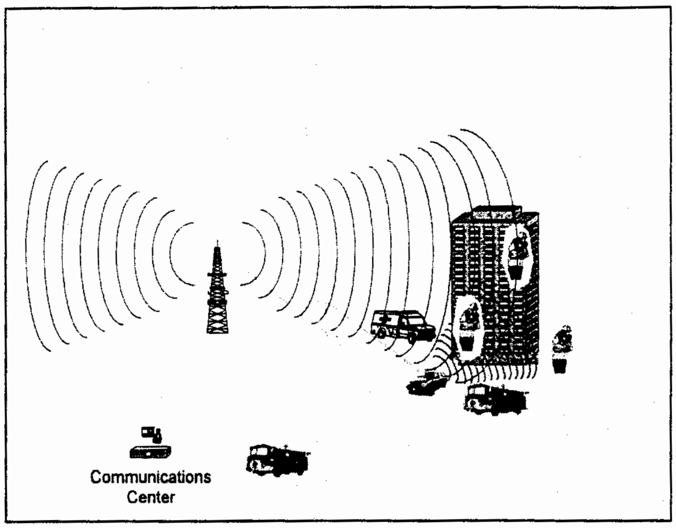
Vehicular repeaters are devices located on public safety vehicles with the ability to "boost" the signal received from either a fixed antenna site on the radio system or a portable radio located on the incident scene, thus enhancing basic system performance. The use of a vehicular repeater is more effective than direct/talkaround mode, but still provides limited ability to penetrate all areas of a structure since the active signal they produce is also subject to attenuation by

[20] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

building materials and terrain. The relative cost and complexity of these devices limits their deployment potential within a public safety vehicle fleet, meaning initial emergency response operations would need to either await the arrival of a vehicle so equipped or begin without effective and reliable communications.

Figure 5 provides an illustration of vehicular repeater performance.

Figure 5. Vehicular Repeater Performance[21]



Internal Solutions

Given the laws of physics governing radio energy, installing emergency communications equipment inside certain buildings will probably always be part of any comprehensive solution for providing effective and reliable public safety radio communications across Virginia.

With the diversity of public safety radio systems around the Commonwealth, no *single* internal solution currently exists to guarantee effective and reliable public safety radio communications within *all* buildings. A viable alternative in densely populated urban areas may not be an option for sparsely populated rural areas. Simply put, "one size does not fit all."

The selection, design, and installation of in-building solutions depends on a variety of factors such as construction type, architectural features, building materials, and existing public safety radio system characteristics. The need to proactively address these variables suggests the need for an open, interactive, and continued dialogue between local emergency response personnel, building officials, property owners and managers, architects, plan reviewers, and radio system engineers. This dialogue is critical for

[21] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

ensuring the design of any in-building solution meets the needs of the community in a cost-effective manner.

This section describes several current alternatives for providing effective and reliable public safety radio communication within buildings—without advocating for any particular vendor or system type.

Signal Boosters (BDAs)

Signal boosters, more commonly known as Bi-Directional Amplifiers (BDAs), appear the predominant in-building technology solution currently used to help remedy in-building radio coverage issues in areas served by trunked 800MHz public safety radio systems. A BDA system consists of one or more amplifiers located inside the building, an external antenna, and an internal antenna network. The external antenna, usually located on the roof of the building, receives the signal coming from the radio system antenna/tower site and brings it into the amplifier while radiating a signal back to the radio site. The internal antenna network then passes signal from the amplifier into the building, throughout all needed locations, and receives messages from portable radios being used in the building, passing them back to the amplifier, out through the external antenna, and into the public safety radio system.

Proper BDA system design is technically straightforward, but essential. Both the internal and external antenna systems are critical. Coverage requirements, interference with other equipment, interference with other radio sites, and general cost of materials needed are important design factors. It is possible for a BDA to amplify signals other than the signals desired by the application. BDAs are also capable of multi-band usage with the same antenna, but different amplifiers are needed. In the event of a fundamental change in the local public safety radio system, BDA systems would probably not require complete replacement to remain functional.

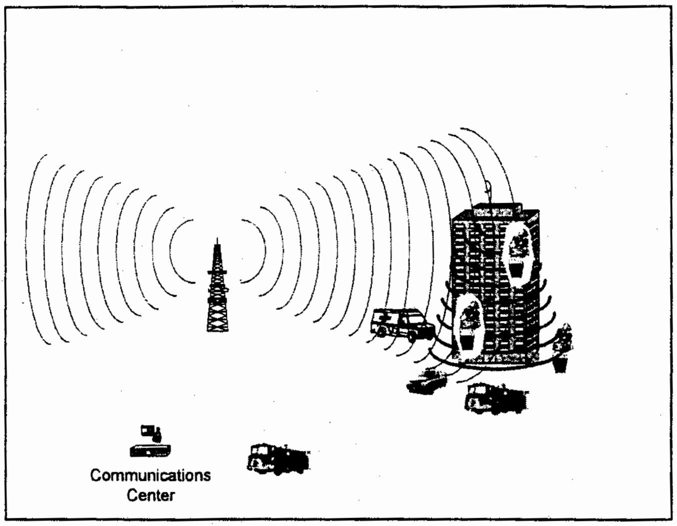
System cost factors include: design, the cost of the amplifier (usually a fixed cost), antennas, coaxial cable, fiber optic cable, splitters, labor to install the system, and annual preventive maintenance. BDA systems can be tailored to provide coverage throughout a building, or only in areas where radio coverage is marginal/non-existent.

BDAs provide a seamless link between the public safety radio system infrastructure and the distributed antenna/cable system in a building. BDAs are fully linked with system infrastructure and provide complete control over coverage reliability (signal is propagated throughout the structure by design). It is also important to note that with a BDA system if "dead spots" are discovered after installation (or caused by renovations) complete retooling is not always necessary as the addition of more cable (an possibly an additional amplifier) can usually provide remedy.

There are no additional training considerations for emergency public safety personnel with BDA systems and all system features are available to all users.

Figure 6 illustrates the performance of an in-building system using a signal booster (BDA).

Figure 6. Signal Booster (BDA) Performance[22]



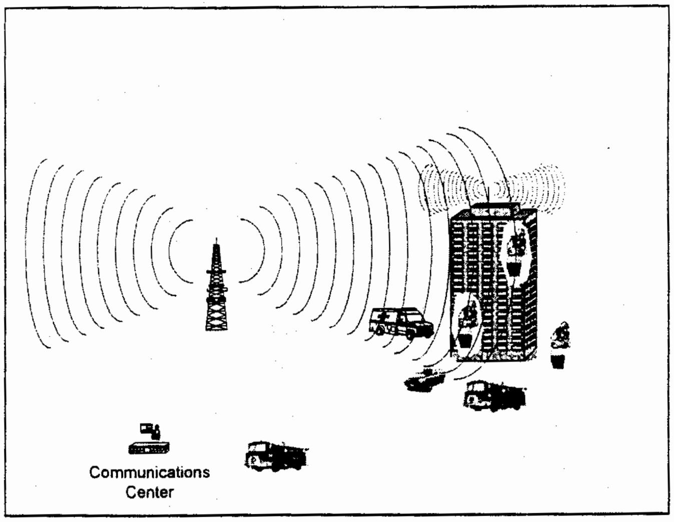
Special Repeater at Building/In-Building Portable Radios

Special repeaters at buildings, coupled with "unique" building radios passed out to emergency services personnel during an incident, can be an effective solution in rural areas with limited responses to an affected building. This requires the installation of an individual/special repeater (essentially a stand-alone radio system) with a cache of hand-held portable radios distributed on-site to emergency services personnel when they arrive at an incident. The number of portable radios required for a major incident is a limiting factor and this option also causes substantial training issues for the emergency services personnel in the locality and in surrounding localities delivering mutual-aid. Some solutions of this nature can provide a link to the public safety radio system infrastructure, but in general they provide only a limited communications capability.

Figure 7 provides an illustration of special repeater performance at a building so equipped.

[22] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

Figure 7. Special Repeater Performance[23]



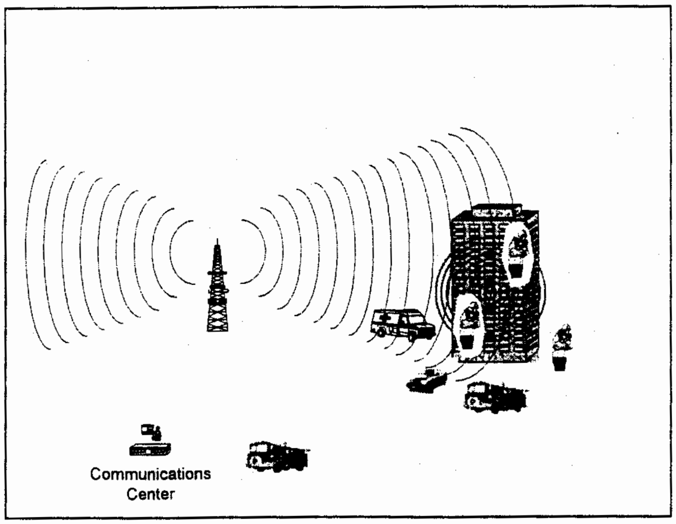
Voting Receivers Installed at Building

Voting receivers are essentially a series of repeaters feeding repeaters. Voting receivers are typically used for conventional VHF and UHF systems and require a very strong outside signal to blanket the structure; they are not a viable option for trunked radio systems in any radio band. Each individual radio channel requires a receiver and therefore multiple receivers may be necessary to cover all areas of the structure. Each individual receiver requires a dedicated leased telephone circuit back to the voting comparator. Voting receivers can enhance emergency communications, but require a great deal of maintenance.

Figure 8 depicts the performance of a voting receiver-based system.

[23] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

Figure 8. Voting Receiver Performance[24]



The Future

The continued advancement of technology will undoubtedly affect the future of public safety radio communications in buildings. Whether or not these changes improve or degrade the current situation faced by emergency response personnel in many jurisdictions remains to be seen. The basic principles governing public safety radio systems are stable enough, however, that the installation of emergency communications equipment in certain buildings to provide effective and reliable communications for emergency response personnel need not be postponed.

[24] Anderson, Jack (2003) RCC Consultants, presented to HJ 588 Task Force.

CHAPTER 5. COST / BENEFIT ANALYSIS

The exact cost to install emergency communications equipment in buildings across Virginia is hard to define as several variables affect installation and maintenance costs. Research for this study suggests installation costs can range anywhere from $0.15 to $1.25 per square foot in new construction;[25] with an additional 10 to 25 percent for retrofitting existing buildings.[26] (In some buildings, particularly those with historical value or housing other complex systems, retrofit costs could significantly exceed 25 percent.)[27]

This extremely wide range ($1.10) for new construction (and by extension, for retrofitting existing buildings) is attributable to several factors including variable labor costs, different installation complexities, variable building sizes, the competitive environment in a given region, and the use of building materials with a high degree of radio signal attenuation in certain structures. Over time, as more installations are completed in Virginia, it seems likely the cost range will narrow.

Table 6 on the following pages contains cost *estimates* for installing emergency communications equipment in new and existing buildings based on notional scenarios suggested by the HJ 588 Task Force. While these estimates are based on the signal booster/BDA solution described in the previous chapter, given the wide range between the "low" and "high" estimates derived in the table it seems likely that most other in-building solutions would fall somewhere within this range.

The notional building parameters (including the estimated square footage) and the average cost per square foot estimates are from the website of Saylor Publications, Inc.[28] Saylor has provided construction cost data and consulting services for over 40 years.

Table 6. Cost Estimates for Installing Emergency Communications Equipment

[25] The Jack Daniel Company (2003) www.rfsolutions.com/sbwp AND presentation by Tim Dennis, et al. to the HJ 588 Task Force on 10/16/03.
[26] Presentation by Tim Dennis, et al. to the HJ 588 Task Force on 10/16/03.
[27] Presentation by Tim Dennis, et al. to the HJ 588 Task Force on 10/16/03.
[28] Saylor Publications, Inc. (2003) www.saylor.com/lacosts/csfpage1.htm

Property Type Building Parameters	Estimated Square Footage	Average Building Cost Per Square Foot (New)	Total Building Cost (New)	Low-Range Cost for In-Building Solution (New)	Mid-Range Cost For In-Building Solution (New)	High-Range Cost for In-Building Solution (New)	Mid-Range In-Building Solution Cost as % of Total Building Cost (New)	Mid-Range Cost for In-Building Solution (Retrofit)
Apartment, 2-3 Story 2 Story, 10 Ft. Story Height	15,000	$60.21	$903,142.50	$2,250.00	$10,500.00	$18,750.00	1.2%	$12,390.00
Apartment, 4-7 Story 6 Story, 11 Ft. Story Height	65,000	$67.29	$4,373,863.00	$9,750.00	$45,500.00	$81,250.00	1.0%	$53,690.00
Apartment, 8-30 Story 15 Story, 11 Ft. Story Height	175,000	$76.29	$13,350,102.50	$26,250.00	$122,500.00	$218,750.00	0.9%	$144,550.00
Auditorium 1 Story, 35 Ft. Story Height	25,000	$119.35	$2,983,785.00	$3,750.00	$17,500.00	$31,250.00	0.6%	$20,650.00
Bank 1 Story, 14 Ft. Story Height	4,000	$114.80	$459,193.60	$600.00	$2,800.00	$5,000.00	0.6%	$3,304.00
Convenience Market 1 Story, 12 Ft. Story Height	5,000	$64.78	$323,891.00	$750.00	$3,500.00	$6,250.00	1.1%	$4,130.00
Courthouse 2 Story, 12 Ft. Story Height	40,000	$105.93	$4,237,116.00	$6,000.00	$28,000.00	$50,000.00	0.7%	$33,040.00
Day Care Center 1 Story, 10 Ft. Story Height	6,000	$70.52	$423,146.40	$900.00	$4,200.00	$7,500.00	1.0%	$4,956.00
Dormitory 3 Story, 10 Ft. Story Height	30,000	$68.42	$2,052,618.00	$4,500.00	$21,000.00	$37,500.00	1.0%	$24,780.00
Fire Station 2 Story, 14 Ft. Story Height	9,000	$90.29	$812,616.30	$1,350.00	$6,300.00	$11,250.00	0.8%	$7,434.00
Garage Parking, Above Ground 4 Story, 10 Ft. Story Height	185,000	$28.67	$5,303,617.00	$27,750.00	$129,500.00	$231,250.00	2.4%	$152,810.00
Garage Parking, Underground 10 Ft. Story Height	90,000	$37.05	$3,334,680.00	$13,500.00	$63,000.00	$112,500.00	1.9%	$74,340.00
Government Building 2 Story, 12 Ft. Story Height	25,000	$90.57	$2,264,332.50	$3,750.00	$17,500.00	$31,250.00	0.8%	$20,650.00
Hospital, General 4 Story, 15 Ft. Story Height	140,000	$182.56	$25,558,344.00	$21,000.00	$98,000.00	$175,000.00	0.4%	$115,640.00
Hotel 4-7 Story 5 Story, 10 Ft. Story Height	100,000	$99.19	$9,919,260.00	$15,000.00	$70,000.00	$125,000.00	0.7%	$82,600.00
Hotel 8-30 Story 15 Story, 10 Ft. Story Height	470,000	$107.06	$50,317,401.00	$70,500.00	$329,000.00	$587,500.00	0.7%	$388,220.00
Jail 2 Story, 12 Ft. Story Height	20,000	$140.99	$2,819,720.00	$3,000.00	$14,000.00	$25,000.00	0.5%	$16,520.00
Manufacturing, Heavy 1 Story, 20 Ft. Story Height	40,000	$74.15	$2,966,044.00	$6,000.00	$28,000.00	$50,000.00	0.9%	$33,040.00
Manufacturing, Light 1 Story, 12 Ft. Story Height	35,000	$51.68	$1,808,954.00	$5,250.00	$24,500.00	$43,750.00	1.4%	$28,910.00
Medical Office 2 Story, 10 Ft. Story Height	8,000	$133.23	$1,065,841.60	$1,200.00	$5,600.00	$10,000.00	0.5%	$6,608.00
Motel 3 Story, 9 Ft. Story Height	46,000	$75.14	$3,456,449.20	$6,900.00	$32,200.00	$57,500.00	0.9%	$37,996.00
Multiple Residence 2 Story, 9 Ft. Story Height	7,000	$75.17	$526,201.20	$1,050.00	$4,900.00	$8,750.00	0.9%	$5,782.00
Office 2-3 Story 3 Story, 12 Ft. Story Height	23,000	$79.38	$1,825,721.60	$3,450.00	$16,100.00	$28,750.00	0.9%	$18,998.00

Property Type Building Parameters	Estimated Square Footage	Average Building Cost Per Square Foot (New)	Total Building Cost (New)	Low-Range Cost for In-Building Solution (New)	Mid-Range Cost For In-Building Solution (New)	High-Range Cost for In-Building Solution (New)	Mid-Range In-Building Solution Cost as % of Total Building Cost (New)	Mid-Range Cost for In-Building Solution (Retrofit)
Office 4-7 Story 6 Story, 12 Ft. Story Height	64,000	$95.85	$6,134,304.00	$9,600.00	$44,800.00	$80,000.00	0.7%	$52,864.00
Office 8-30 Story 20 Story, 12 Ft. Story Height	135,000	$111.75	$15,086,601.00	$20,250.00	$94,500.00	$168,750.00	0.6%	$111,510.00
Restaurant 1 Story, 12 Ft. Story Height	5,000	$102.54	$512,683.50	$750.00	$3,500.00	$6,250.00	0.7%	$4,130.00
Restaurant, Fast Food 1 Story, 10 Ft. Story Height	3,000	$113.26	$339,779.40	$450.00	$2,100.00	$3,750.00	0.6%	$2,478.00
School, Elementary 1 Story, 14 Ft. Story Height	43,000	$111.42	$4,791,184.70	$6,450.00	$30,100.00	$53,750.00	0.6%	$35,518.00
School, Secondary 2 Story, 14 Ft. Story Height	100,000	$108.97	$10,897,370.00	$15,000.00	$70,000.00	$125,000.00	0.6%	$82,600.00
Shopping Center, Strip 1 Story, 10 Ft. Story Height	6,000	$82.17	$493,042.80	$900.00	$4,200.00	$7,500.00	0.9%	$4,956.00
Social Club 1 Story, 12Ft. Story Height	20,000	$72.83	$1,456,646.00	$3,000.00	$14,000.00	$25,000.00	1.0%	$16,520.00
Store, Department 2 Story, 16 Ft. Story Height	150,000	$75.16	$11,273,385.00	$22,500.00	$105,000.00	$187,500.00	0.9%	$123,900.00
Store, Discount 1 Story, 18 Ft. Story Height	80,000	$63.33	$5,066,704.00	$12,000.00	$56,000.00	$100,000.00	1.1%	$66,080.00
Store, Retail 1 Story, 14 Ft. Story Height	35,000	$65.00	$2,274,930.00	$5,250.00	$24,500.00	$43,750.00	1.1%	$28,910.00
Supermarket 1 Story, 12 Ft. Story Height	20,000	$62.03	$1,240,614.00	$3,000.00	$14,000.00	$25,000.00	1.1%	$16,520.00
Surgical Center 2 Story, 14 Ft. Story Height	10,000	$177.88	$1,778,810.00	$1,500.00	$7,000.00	$12,500.00	0.4%	$8,260.00
Theater, Movie 1 Story, 20 Ft. Story Height	16,000	$93.98	$1,503,683.20	$2,400.00	$11,200.00	$20,000.00	0.7%	$13,216.00
Warehouse 1 Story, 24 Ft. Story Height	45,000	$44.57	$2,005,753.50	$6,750.00	$31,500.00	$56,250.00	1.6%	$37,170.00

On the benefit side of the equation, installing emergency communications equipment in buildings has potential to meaningfully reduce life loss and property damage. The average fire dollar loss in a commercial building fire can reach hundreds of thousands of dollars. While the installation of in-building solutions alone will not *prevent* a fire, ensuring effective and reliable radio communications among emergency public safety personnel can increase the effectiveness of fire suppression and rescue efforts, thus reducing the risk exposure of building occupants and contents.

Further economic benefits could be realized if the investment in such a system helps prevent deaths and injuries to emergency public safety personnel while handling incidents in buildings so equipped.

GLOSSARY/DEFINITIONS

- First Responder: Fire, emergency medical personnel, law enforcement, and other identified entities who, by specialty or profession normally arrive first on the scene of an emergency incident to assess or take action to save lives, protect property, and/or mitigate the situation.[29]
- Interoperability vs. Operability – Simply stated, operability allows public safety personnel to reach other responders on the same radio system; while interoperability allows emergency responders on different radio systems to seamlessly communicate. (Interoperability solutions will not work without basic communications operability.)
- Emergency Communication Equipment: Emergency communication equipment, includes, but is not limited to, two-way radio communications, signal booster, bi-directional amplifiers, radiating cable systems or internal multiple antenna, or a combination of the foregoing.
- Emergency Public Safety Personnel: Emergency public safety personnel includes firefighters, emergency medical personnel, law-enforcement officers and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes and terrorist attacks.
- Trunking: Trunking a radio system helps with capacity issues. Trunking is used whenever a large number of mobile/hand-held radios need to share radio frequencies. In a trunked radio network, a large number of workgroups/talk groups can share fewer channels because the trunking equipment dynamically allocates an available channel when users key their radio.[30]
- Ultra High Frequency (UHF): A band of radio frequencies from 300 – 3000 MHz.
- Very High Frequency (VHF): Contains low and high band. A band of radio frequencies ranging from 30 -300. Low band is characterized as 39 -150 MHz and high band is characterized from 151 - 300 MHz.
- Voting receiver system: Is basically repeaters feeding repeaters with the strongest signal being the one transmitted. The advantage of a voting receiver system is that it is much more likely that at least one of the receivers will be able to receive the input signal[31].
- Vehicular repeater: A vehicular repeater is a mobile network repeater that provides extended network coverage and on-scene incident capability.[32]

[29] Source: Secure Virginia Panel – Radio Interoperability Working Group
[30] Source: http://www.zetron.com/pages/trunk/
[31] Source: http://www.ussc.com/~uarc/rptr.synfaq1.html
[32] Source: http://www.opensky.com/../network/vrepeater.asp

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APPENDIX I- House Joint Resolution 588

Requesting the Department of Fire Programs, with the assistance of the Department of Emergency Management and the Department of Housing and Community Development, to study the feasibility of adopting requirements within the Commonwealth to ensure that buildings are constructed and equipped in such a way that will permit emergency public safety personnel to utilize effective and reliable radio communications while they are within buildings. Report.

Agreed to by the House of Delegates, January 30, 2003
Agreed to by the Senate, February 13, 2003

WHEREAS, firefighters, emergency medical services personnel, law-enforcement officers, and other emergency public safety personnel routinely are called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes, and terrorist attacks; and

WHEREAS, responding to these emergencies frequently requires those emergency public safety personnel to enter offices, commercial facilities, apartments, condominiums, and other buildings under the most exigent and dangerous circumstances; and

WHEREAS, the lives of those emergency public safety personnel who respond to such emergencies, as well as the lives of those persons who may be within a building in which an emergency occurs, frequently depend solely upon the ability of those public safety personnel to communicate by radio transmissions with others who are within such buildings and others who are outside such buildings; and

WHEREAS, reliable emergency public radio transmissions between those who are within buildings and to others outside of buildings have been a significant and continuing problem for emergency public safety personnel; and

WHEREAS, modern construction materials and techniques often make it more difficult for emergency public safety personnel to communicate with other persons within buildings and with other persons outside of buildings because those materials and techniques sometimes block or impede the transmission of radio signals; and

WHEREAS, technology is available in the form of antennas and signal booster devices, which can be used to provide improved and reliable radio communications in buildings for emergency public safety personnel; and

WHEREAS, a number of jurisdictions elsewhere in the United States have enacted laws requiring developers and building owners to install and use antennas and signal booster devices to facilitate reliable radio communication by emergency public service personnel; and

WHEREAS, it is essential for the members of the public and for those emergency public service personnel who are required to enter into buildings during emergencies that the Commonwealth provide a means to ensure effective and reliable in-building radio communications; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Department of Fire Programs, with the assistance of the Department of Emergency Management and the Department of Housing and Community Development, be requested to study the feasibility of adopting requirements within the Commonwealth to ensure that buildings are constructed and equipped in such a way that will permit emergency public safety personnel to utilize effective and reliable radio communications while they are within buildings.

In conducting this study, the Department of Fire Programs shall consult with and consider the views and comments from representatives of the Virginia Association of Counties, the Virginia Municipal League, and organizations representing builders and owners of apartments, condominiums, factories, and retail and commercial office buildings.

All agencies of the Commonwealth shall provide assistance to the Department of Fire Programs upon request.

The Department of Fire Programs shall complete its work by November 30, 2003, and shall submit an executive summary and report of its written findings and recommendations for publication as a document to the Governor and the 2004 Session of the General Assembly. The executive summary and report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports no later than the first day of the 2004 Regular Session of the General Assembly and shall be posted on the General Assembly's website.

APPENDIX II – HJ 588 Participants

Name	Representing
Duncan Abernathy	Virginia Society of the American Institute of Architects
Ed Altizer	Virginia State Fire Marshal
Jack Anderson	RCC Consultants
Matt Benedetti	Capital Strategies
Lt. R.W. Blystone	Prince George Police Department
Vic Buisset	Virginia Department of Emergency Management
Gregory Britt	Virginia Department of Emergency Management
Tanya Brown	Virginia Department of Emergency Management
Jeffrey Coffman	Fairfax County Fire & Rescue Department
Jennifer Cole	Virginia Department of Fire Programs
Ron Collins	Virginia Department of Fire Programs
Christy Cooper	Apartment and Office Building Association / Building Owners and Managers Association
Dave Dailey	Fairfax County Fire & Rescue Department
James Dawson	Chesterfield Fire & EMS
Glen Dean	State Fire Marshal's Office
Mike Deli	Fairfax County Fire & Rescue
Tim Dennis	CRE Partners
Rick Farthing	State Fire Marshal's Office
Rodney Gohn	Fairfax County Police Department
Cheri Hainer	Virginia Beach - VBCOA
Steve Hall	Chesterfield Fire & EMS
Aubrey W. "Buddy" Hyde, Jr.	Virginia Department of Fire Programs
Mark Ingrao	Apartment and Office Building Association
Norman Johnson	City of Richmond
Christy King	Virginia Department of Fire Programs
Patrick McCloud	Virginia Apartment Management Association / Richmond Apartment Management Association
Curtis McIver	Department of Housing and Community Development
Nelson Migdal	Apartment and Office Building Association
Jim Milby	Building Owners and Managers Association
Dennis Mitchell	Virginia Fire Services Board
Phillip Paquette	Virginia Fire Services Board
Darlene Pope	Apartment and Office Building Association/Building Owners and Managers Association
Todd Pugh	Henrico County General Services
Jack Proctor	Department of Housing and Community Development
Ed Rhodes	Virginia Fire Chiefs Association
Emory Rodgers	Department of Housing and Community Development
Bobby Schenk	Department of General Services – Division of Engineering and Buildings

Bill Shelton	Department of Housing and Community Development
Edwin Smith	Virginia Association of Counties / Henrico County Division of Fire
Jim Spradlin	SPRINT
Adam Thiel	Virginia Department of Fire Programs
Julie Cheyalier Walton	County of Prince George
Charles Werner	Charlottesville Fire Department
Chris Whyte	Virginia Association for Commercial Real Estate
Parker Winborne	Virginia Department of Emergency Management

VIRGINIA ACTS OF ASSEMBLY – CHAPTER

An Act to amend the Code of Virginia by adding a section numbered 36-99.6:2, relating to the Uniform Statewide Building Code; installation of communication equipment for emergency public safety personnel.

[H 2529]
Approved

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 36-99.6:2 as follows:

§ 36-99.6:2. Installation of in-building emergency communication equipment for emergency public safety personnel.

The Board of Housing and Community Development shall promulgate regulations as part of the Building Code requiring such new commercial, industrial, and multifamily buildings as determined by the Board be (i) designed and constructed so that emergency public safety personnel may send and receive emergency communications from within those structures or (ii) equipped with emergency communications equipment so that emergency public safety personnel may send and receive emergency communications from within those structures.

For the purposes of this section:

"Emergency communications equipment" includes, but is not limited to, two-way radio communications, signal boosters, bi-directional amplifiers, radiating cable systems or internal multiple antenna, or any combination of the foregoing.

"Emergency public safety personnel" includes firefighters, emergency medical services personnel, law-enforcement officers, and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes, and terrorist attacks.

Legislative Information System
http://leg1.state.va.us/cgi-bin/legp504.exe?031+ful+HB2529ER 03/26/2003

APPENDIX IV – Draft Proposed USBC Code Change

HOUSING AND COMMUNITY DEVELOPMENT REGULATORY CHANGE FORM
(Use this form to submit changes to building and fire codes)

Address to submit to: DHCD, the Jackson Center 501 North Second Street Richmond, VA 23219-1321 Tel. No. (804) 371 – 7150 Fax No. (804) 371 – 7092 Email: bhcd@dhcd.state.va.us	Document No. ________ Committee Action: ________ BHCD Action: ________
Submitted by: DHCD	Representing: DHCD for VDFP/Client Work Group
Address: 501 2nd Street, Richmond, VA	Phone No.: 804-371-7140
Regulation Title:2003 USBC/SFPC	Section No(s): 2003 USBC/IBC 902, 912 & SFPC 511

Proposed Change: USBC IBC 902.0 Definitions

Add 902.1 Definitions.

Emergency Communication Equipment. Emergency communication equipment, includes, but is not limited to, two-way radio communications, signal booster, bi-directional amplifiers, radiating cable systems or internal multiple antenna, or a combination of the foregoing.

Emergency Public Safety Personnel. Emergency public safety personnel includes firefighters, emergency medical personnel, law-enforcement officers and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes and terrorist attacks.

Add new section into the USBC IBC Section 912.0 In-building Emergency Communication Radio Coverage

912.1. General. The locality shall determine by a written policy that it is necessary to require an in-building emergency communication radio system to be designed and constructed so that emergency public safety personnel may send and receive emergency communications from within those structures or be equipped with emergency communication equipment so that emergency public safety personnel may send and receive emergency communications from within those structures within the locality or designated geographical areas of the locality. An in-building emergency communication equipment for emergency public safety personnel shall be provided in unlimited area buildings and buildings of Construction Types I, II, III, IV and V as regulated by the International Building Code.

Exceptions:

1. Local and state governments, federal space within private buildings and private buildings/spaces with top security clearance requirements where the building official has approved an alternate method to provide emergency communication equipment for emergency public safety personnel.
2. Where the owner provides documentation from a qualified individual approved by the building official where emergency communication equipment would not be required for two-way radio communication.
3. Above-grade single story buildings of 12,000s.f. or less.
4. USBC Group R-5 of the International Residential Code and Groups R-3 and R-4 of the International Building Code.
5. Construction Type IV and V buildings of combustible construction without basements.
6. Where the building official approves alternate technology to provide in-building emergency

communications for emergency public safety personnel.
912.1.1. Applicability. The provisions of this section shall apply to building applications filed on and after the set forth effective date of this code.
912.2. General. Where required, in-building radio coverage shall be designed, installed, inspected and tested in accordance with provisions of this section.
912.2.1. A minimum signal strength of –95dBm, as measured at the antenna terminal of the public safety portable transceiver, shall be available to receive and transmit in 95% of the area on each floor of the building from or to the designated public safety radio system. A minimum received signal strength of –95dBm, as measured at the designated radio system fixed end receiver terminal, shall result for portable radio transmissions made in 95% of the area on each floor of the building. The building official shall be permitted to accept lower minimum signal strength specifications where required for the radio system technology used in a jurisdiction.
912.2.1.1. Where bi-directional amplifier systems are installed, the proof of performance signal strength measurement for the downlink path shall be based on a control channel or traffic channel signal from the designated public safety radio system. Signal strength measurements for the uplink path shall be based on one input signal generated using a portable radio operated at the worst-case extremity of the distributed antenna system. Bi-directional amplifiers shall be maintained an out of band noise, intermodulation, and spurious emissions to desired carrier ratio of at least 35 dBc when measured against public safety system carrier signal levels.
912.2.2. The in-building emergency communication radio system shall be designed for a 95% reliability factor.
912.2.3. Where the installed in-building emergency communication radio system contains electrically powered components there shall be an independent power source to provide power for a period of twelve ours without external power input. Where a battery system is installed there shall be automatic charging in the presence of an external power input.
912.2.4. The in-building emergency communication radio system shall have the capability for self-monitoring of the emergency communication equipment. Where there is a requirement for a supervised fire alarm system the emergency communications equipment self-monitoring can be tied into the building fire alarm system. Where there is no required supervised fire alarm system, there shall be a visual/audible alarm for self-monitoring in the vicinity of the emergency communication equipment.
912.3. Acceptance test procedures. Upon completion of the installation, the performance of the in-building emergency communication radio system shall be tested to ensure that the 95% area and 95% reliability requirements are satisfied.
912.3.1. The text shall be conducted using a public safety portable radio with speaker microphone or equivalent portable radios approved by the building official.
912.3.2. Where bi-directional amplifier systems are installed, the gain value and output levels of all uplink and
downlink amplifiers shall be measured and documented, and the acceptance test results shall be kept on file with the building owner for verification each year during the annual inspection and tests.
912.3.3. A copy of the acceptance test records shall be kept on the premises and a copy shall be submitted to the fire official.
912.3.4. The acceptance tests shall be conducted and certified by a qualified individual approved by the building official.

Add new section to the SFPC 511.0. Maintenance of in-building emergency communication radio systems
511.1 General. In-building emergency communication radio systems shall be maintained in accordance with the USBC and the provisions of this section.
511.2. Annual inspection. The annual inspection shall test all components of the system, including but not limited to, amplifiers, independent power sources, antennas and wiring a minimum of once every twelve months.

511.2.1. The annual and five-year inspection tests shall be performed by the locality or by qualified individuals or agencies approved by the fire official.
.511.2.2. Amplifiers shall be tested to ensure that the gain and output levels are the same as designated on the approved acceptance test. The independent power source shall be tested under load for a period of one hour.
511.2.3. All components shall function in accordance with the manufacturer's specifications and intended purpose.
511.3. Five-year tests. No less than every five years, a radio coverage test shall be performed to ensure that the in-building emergency communication radio system meets the requirement of the original acceptance coverage test in accordance with the USBC under which the building was built. Note: The USBC requires on each floor 95% coverage and minimum signal strength of 95dBm for receiving and transmission.
511.4. Field tests. After providing reasonable notice to the owner or their representative the fire official, fire or police chief or their agents shall have the right during normal business hours to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner. Any noted deficiencies shall be provided in an inspection report to the owner or the owner's representative.
511.5. A copy of the annual and five-year inspection tests shall be kept on the premises and the fire official shall retain a copy.

Supporting Statement:
IBC 902 add definitions from the Code of Virginia
IBC 912 add new section
IBC 912.1 Scope Requires localities to have systems installed in Construction Types I, II, III, IV and V unless they fall into the 6 exceptions. Offers the opportunity for the locality to opt in. Another option that will be considered concurrently is to seek legislative action amending 36-99.6.2 to allow local optional enforcement. The exceptions provide for alternate means and new technology; allows the owner to provide data to contest the requirement; and, allows for most all smaller commercial and residential buildings to be exempted. Some commenters believe the 12,000 s.f. is too low and should be raised, but a substitute number has not been proposed. The VSAIA recommends that the Scope to be limited to Construction Types I which are the larger multi-story buildings. or very large one story unlimited area buildings such as retail box stores Multi-family mid-rise buildings of 3 to 5 story buildings of Construction Types IV and V without basements would be exempted and most of the ones with basements would probably not be designated for wiring/conduits. Some want Groups E and I exempted as they are generally not considered "commercial buildings" as referenced in the law.
IBC 912.1.1 Only applicable to buildings built after the effective date of this code.
IBC 912.2 Set forth the technical, inspection and testing requirements. These are industry standards used by multiple vendors and different type systems. Localities can use lower signal strengths per 912.2.1.
912.2.3 Provides separate power source to ensure operation with loss of building power.
912.2.4 Provides self-monitoring so maintenance personnel or public safety personnel can tell system is operable.
912.3 Provides the acceptance test criteria for new installations.
SFPC 511.0 to 511.5. Provides for an annual inspection and five-year tests of the entire system to be based on the standards and USBC built under.

This code change will increase the cost of construction for those building designated to have these systems installed. Cost estimates run from a few thousand dollars to several hundreds of thousands of dollars. Based on meeting discussions not every new building designated within 912.1 would need to be wired or provide amplification equipment. To date there isn't a consensus on this code change proposal.

APPENDIX V – Line-of-Duty Death Investigations

Incident	Citation and Communications Key Issue
Wood Truss Roof Collapse Claims Two Firefighters Memphis, Tennessee Incident Date: Dec. 26, 1992	*Source: United States Fire Administration, Technical Report Series, Report 069.* *Investigated by J. Gordon Routley.* **Communications Issue:** Incident Commander was unable to communicate with companies over tactical radio.
Four Firefighters Killed, Trapped by Floor Collapse Brackenridge, Pennsylvania Incident Date: Dec. 20, 1991	*Source: United States Fire Administration, Technical Report Series, Report 061.* *Investigated by J. Gordon Routley.* **Communications Issue:** Radio system was inadequate for current needs.
Indianapolis Athletic Club Fire Indianapolis, Indiana Incident Date: Feb. 5, 1992	*Source: United States Fire Administration, Technical Report Series, Report 063.* *Investigated by Mark Chubb.* **Communications Issues:** Communications Equipment – One firefighter was seriously burned attempting to activate the emergency notification button on his portable radio. Communications Systems – Problems in communication between the Incident Commander and the Communications Center may be related to the activation of a new radio system shortly before the incident. Additional training should have been conducted.
The East Bay Hills Fire Oakland-Berkeley, California Incident Date: Oct. 19-22, 1991	*Source: United States Fire Administration, Technical Report Series, Report 060.* *Investigated by J. Gordon Routley.*

	<u>Communications Issue:</u> Radio channels and Communications Center overwhelmed by situation.
Floor Collapse Claims Two Firefighters Pittston, Pennsylvania Incident Date: March 15, 1993	*Source: United States Fire Administration, Technical Report Series, Report 073.* *Investigated by J. Gordon Routley.* **<u>Communications Issue:</u>** Radio System is inadequate for the needs of the fire department. Entry crews did not have portable radios to communicate with Incident Commander.
Structural Collapse at Residential Fire Claims Lives of Two Volunteer Fire Chiefs and Once Career Fire Fighter New Jersey Incident Date: July 4, 2002 Report Date: Aug. 19, 2003	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *<u>http://www.cdc.gov/niosh/face200232.html</u>* **<u>Communications Recommendation:</u>** Establish and maintain regional mutual-aid radio channels to coordinate and communicate activities involving units from multiple jurisdictions.
Volunteer Fire Fighter Killed and Career Chief Injured During Residential House Fire Tennessee Incident Date: March 1, 2002 Report Date: Sept. 3, 2002	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *<u>http://www.cdc.gov/niosh/face200232.html</u>* **<u>Communications Recommendation:</u>** Ensure that fire fighters are equipped with a radio that does not bleed over, cause interference, or lose communication under field conditions.
Career Fire Fighter Dies After Becoming Trapped by Fire In Apartment Building New Jersey Incident Date: May 9, 2002 Report Date: March 21, 2002	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *<u>http://www.cdc.gov/niosh/face200118.html</u>* **<u>Communications Recommendation:</u>** Establish and maintain multiple operating frequencies for emergency services, allowing portable radios at incidents to be equipped with two frequencies, one channel for tactical messages and one channel for command.

Career Fire Fighter Dies After Falling Through the Floor Fighting a Structure Fire at a Local Residence Ohio Incident Date: March 8, 2001 Report Date: Feb. 28, 2002	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200116.html* **Communications Recommendation:** Ensure that personnel equipped with a radio, position the radio to receive and respond to radio transmissions.
Residential Fire Claims the Lives of Two Volunteer Fire Fighters and Seriously Injures an Assistant Chief Missouri Incident Date: March 18, 2001 Report Date: Nov. 20, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200115.html* **Communications Recommendation:** Provide adequate on-scene communications including fireground tactical channels.
Volunteer Fire Fighter (Lieutenant) Killed and One Fire Fighter Injured During Mobile Home Fire Pennsylvania Incident Date: Jan. 11, 2001 Report Date: Aug. 8, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200104.html* **Communications Recommendation:** Ensure that personnel equipped with a radio, position the radio to receive and respond to radio transmissions.
Roof Collapse Injures Four Career Fire Fighters at a Church Fire Arkansas Incident Date: Dec. 28, 2000 Report Date: Oct. 30, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200103.html* **Communications Recommendation:** Ensure that fire fighters are equipped with a radio that does not bleed over, cause interference, or lose communication under field conditions.
Residential House Fire Claims the Life of One Career Fire Fighter Florida Incident Date: Nov. 25, 2003	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200044.html* **Communications Recommendation:**

Report Date: Aug. 2, 2001	Consider providing all fire fighters with portable radios or integrated into their face pieces.
A Volunteer Assistant Chief Was Seriously Injured and Two Volunteer Fire Fighters Were Injured While Fighting a Townhouse Fire Delaware Incident Date: Oct. 29, 2000 Report Date: March 7, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200043.html* **Communications Recommendation:** Ensure that the assignment of a tactical channel is established by Central Dispatch prior to personnel entering a hazardous environment.
Residential Structure Fire Claims the Life of One Career Fire Fighter Alabama Incident Date: April 20, 2000 Report Date: Aug. 3, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200026.html* **Communications Recommendation:** Ensure that fireground communication is present through both the use of portable radio and face-to-face communications.
Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children Iowa Incident Date: Dec. 22, 1999 Report Date: April 11, 2001	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face200004.html* **Communications Recommendation:** Ensure that fireground communication is present through both the use of portable radios and face-to-face communications.
Warehouse Fire Claims the Life of a Battalion Chief Missouri Incident Date: Dec. 18, 1999 Report Date: Nov. 6, 2002	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9948.html* **Communications Recommendation:** Ensure that fire fighters are equipped with a radio that does not bleedover, cause interference, or lose communication under field conditions.
Six Career Fire Fighters Killed in Cold-Storage and Warehouse Building Fire	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9947.html*

Massachusetts Incident Date: Dec. 3, 1999 Report Date: Sept. 27, 2000	**Communications Recommendation:** Ensure that standard operating procedures (SOPs) and equipment are adequate and sufficient to support the volume of radio traffic at multiple-alarm fires.
Two Firefighters Dies and Two are Injured in Townhouse Fire District of Columbia Incident Date: May 30, 1999 Report Date: Nov. 23, 1999	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9921.html* **Communications Recommendation:** Ensure that personnel equipped with a radio position the radio to receive and respond to radio transmissions.
Eight-Alarm Fire in a 27-Story High-Rise Apartment Building for the Elderly Nearly Claims the Life of One Fire Fighter Missouri Incident Date: Oct. 12, 1998 Report Date: Feb. 23, 199	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9826.html* **Communications Recommendation:** Ensure that procedures are established to record fireground radio communications.
Sudden Floor Collapse Claims the Lives of Two Fire Fighters and Four Are Hospitalized with Serious Burns in a Five-Alarm Fire New York Incident Date: June 5, 1998 Report Date: Nov. 30, 1998	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9817.html* **Communications Recommendation:** Ensure that communication equipment used on the fireground, e.g., handie-talkies, will remain operational in the event that one until malfunctions.
Commercial Structure Claims the Life of One Fire Fighter California Incident Date: March 8, 1998 Report Date: July 24, 1998	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9807.html* **Communications Recommendation:** Ensure sufficient personnel are available and properly functioning communications equipment are available to use to adequately support the volume of

	radio traffic at multiple-responder fire scenes.
Single-Family Dwelling Fire Claims the Lives of Two Volunteer Fire Fighters Ohio Incident Date: Feb. 5, 1998 Report Date: June 16, 1998	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9806.html* **Communications Recommendation:** Provide adequate on-scene communications including fireground tactical channels.
Floor Collapse in a Single Family Dwelling Fire Claims the Life of One Fire Fighter and Injures Another Kentucky Incident Date: Feb. 17, 1997 Report Date: April 27, 1998	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9704.html* **Communications Recommendation:** Ensure that fire fighters who enter hazardous areas, e.g., burning or suspected unsafe structures, be equipped with two-way communications with incident command.
Sudden Roof Collapse of a Burning Auto Parts Store Claims the Lives of Two Fire Fighters Virginia Incident Date: March 18, 1996 Report Date: April 27, 1998	*Source: The National Institute for Occupational Safety and Health (NIOSH)* *http://www.cdc.gov/niosh/face9617.html* **Communications Recommendation:** Fire departments should ensure that standard operating procedures and equipment are adequate and sufficient to support the volume of radio traffic at multiple-responder fire scenes.

APPENDIX VI – Fairfax County Data Sample

"Margin needed to cover 95%" indicates the amount of building penetration design margin needed to provide usable signal to 95% of the indoor test points, when ordered from lowest penetration loss to highest penetration loss.

-34	average
-55	max
-14	min
-32	median
9	stdev

Positive numbers in the "Min Loss" column indicate that indoor signal strength at one or more indoor test points exceed the outside average. These locations can be considered as having 0 dB penetration loss.

Averages		
91	71	48

Building / Location	Description	Margin needed to cover 95%	Mean loss	Median loss	Min loss	Max loss	# of samples	Est. % covered w/ head portable	Est. % covered w/ SMA portable	Est. % covered w/ hip portable
Tysons I Mall, Tysons	2 - 3 story large shopping mall	-39	-19	-18	9	-41	2434	86	69	48
Giant, Vienna	1 story grocery store on end of strip mall	-26	-19	-19	4	-31	404	88	29	3
Famous Dave's BBQ, Oakton	1 story restaurant on end of strip mall	-14	-6	-7	7	-21	92	100	100	91
Books A Million, Oakton	1 story strip mall storefront in middle of strip mall	-28	-19	-19	1	-34	143	97	71	20
Giant, Oakton	1 story grocery store on end of strip mall	-28	-19	-20	1	-35	621	98	69	20
Hallmark, Oakton	1 story strip mall storefront in middle of strip mall	-26	-18	-19	-4	-28	111	100	75	23
Toy Corner, Oakton	1 story strip mall storefront in middle of strip mall	-24	-14	-13	2	-27	95	100	87	53
Teacher's Store, Oakton	1 story strip mall storefront in middle of strip mall	-24	-16	-16	-4	-27	116	100	90	37
Oakmarr Rec Center, Oakton	2 story county recreation center, partial below grade	-33	-14	-12	13	-41	480	98	91	76
Oakton High School, Oakton	2 story large high school	-43	-24	-23	-1	-52	1289	98	90	76
Costco, Fair Oaks	1 story warehouse store	-26	-15	-15	8	-34	1507	100	100	100
County Radio Shop, Fairfax	1 story block/Butler service shop with offices	-36	-20	-21	5	-43	478	100	89	59
South Run Recreation Center, Pohick	2 story county recreation center, partial below grade	-32	-16	-13	3	-34	392	82	64	44
Fairfax PSCC, Annandale	First floor of 2-story 911 center, former elem. school	-33	-18	-17	3	-37	520	91	71	39
3701 S George Mason, Bailey's Crossroads	First floor of 26 story high rise apartment	-30	-23	-23	-7	-32	105	94	35	3
3701 S George Mason, Bailey's Crossroads	23rd floor of 26 story high rise apartment	*	*	*	*	*	143	100	100	99
Herndon Police HQ, Herndon	1 story brick police station and offices	-26	-15	-16	6	-35	510	100	92	49
Worldgate Garage, Herndon	Basement parking garage, at and below grade	-40	-36	-38	-5	-40	396	30	10	3
Herndon Museum, Herndon	1 story wood frame old train station	-20	-9	-8	5	-29	125	100	100	98
Herndon Municipal Center, Herndon	2 story brick and concrete office building	-23	-11	-11	4	-32	134	100	96	81
WalMart, Hybla Valley	1 story department store	-31	-21	-21	-4	-40	724	100	100	97
Mt. Vernon Hospital, Hybla Valley	First floor of six story hospital	-48	-26	-26	3	-55	516	98	91	71
Mt. Vernon Hospital, Hybla Valley	Below grade tunnel in six story hospital	-55	-45	-50	-9	-57	93	59	33	17
Mt. Vernon Hospital, Hybla Valley	Below grade tunnel and first floor, six story hospital	-53	-29	-29	3	-57	620	92	82	63
Fairfax Hospital, Merrifield	Emergency department treatment and waiting areas	-49	-38	-40	-12	-51	296	79	43	19
Fairfax Hospital, Merrifield	Radiology	-49	-37	-37	-18	-51	227	87	53	12
Fairfax Hospital, Merrifield	Women's center, neonatal 2nd floor	-46	-33	-34	-2	-51	370	95	58	27
Fairfax Hospital, Merrifield	Labor and delivery, 3rd floor	-43	-29	-29	6	-47	171	98	80	46
Fairfax Hospital, Merrifield	Original building, 2nd floor	-37	-23	-22	-8	-39	75	100	93	71
Fairfax Hospital, Merrifield	Original building, ground floor and cafeteria	-40	-23	-23	1	-47	192	99	85	67
Fairfax Hospital, Merrifield	Conference center	-25	-16	-16	1	-35	76	100	100	96
Fairfax Hospital, Merrifield	Warehouse	-45	-23	-23	7	-51	227	95	80	67
Fairfax Hospital, Merrifield	Cafeteria kitchen	-51	-44	-44	-30	-51	145	60	8	0
Fairfax Hospital, Merrifield	Linens	-51	-49	-51	-42	-51	87	8	0	0
Fairfax Hospital, Merrifield	Blood bank, oncology lower level	-51	-48	-49	-15	-51	226	27	3	1
Fairfax Hospital, Merrifield	Morgue	-37	-24	-24	-2	-51	96	99	92	65
Fairfax Hospital, Merrifield	Fire control room	-31	-20	-19	-13	-35	43	100	100	91
Fairfax Hospital, Merrifield	Critical Care Trauma	-49	-42	-43	-23	-51	180	75	15	6
Fairfax Hospital, Merrifield	CCU3	-44	-35	-35	-18	-48	62	97	56	23
Fairfax Hospital, Merrifield	Pharmacy, surgery	-46	-33	-35	-12	-51	191	93	55	34
Fairfax Hospital, Merrifield	Tower building, first floor	-37	-21	-23	2	-39	73	100	92	68

								Averages		
								91	71	48
Building / Location	Description	Margin needed to cover 95%	Mean loss	Median loss	Min loss	Max loss	# of samples	Est % covered w/ head portable	Est % covered w/ SMA portable	Est % covered w/ hip portable
Fairfax Hospital, Merrifield	Pulmonary	-39	-28	-27	-5	-44	148	100	89	55
Fairfax Hospital, Merrifield	Entire visit	-51	-33	-35	7	-51	2886	83	55	34
8000 Towers Crescent Dr., Tysons	1st floor of 18 story large office building	-32	-13	-13	9	-36	235	100	93	77
Herndon Target, Herndon	1 story large department store	-33	-23	-23	3	-45	553	100	100	99
Belle Haven Marina, Belle Haven	Concrete block Natnl. Park Service Bathroom at Marina	-18	-9	-8	1	-20	43	100	72	28
Vienna PD 1st Floor, Vienna	1 story block/brick police station	-22	-14	-14	4	-24	137	100	65	20
Vienna PD Basement, Vienna	1 story block/brick police station, lower level	>=-31	-28	-31	-5	-31	120	21	8	3
Vienna PD Entire Building, Vienna	1story block/brick police station, entire visit	>=-31	-20	-19	4	-31	257	63	39	12
PJ Skidoos, Fairfax	Main floor bar/restaurant	-35	-23	-23	-3	-40	203	100	80	40
PJ Skidoos, Fairfax	Main floor bar/restaurant	>=-44	-38	-39	-3	-44	198	41	9	3
Fire Station 414, Burke	1 story block fire station w/ metal roof	-35	-25	-25	-5	-38	780	89	41	10
Centreville High School	3 story block high school - main office area	-37	-29	-31	-5	-41	122	97	38	14
Centreville High School	3 story block high school - main front corridor	-29	-20	-20	-5	-33	74	100	92	54
Centreville High School	3 story block high school - 1st fl. corridor 1A	-27	-15	-14	1	-34	39	100	97	82
Centreville High School	3 story block high school - 1st fl. corridor 1B	-30	-16	-17	1	-36	99	100	94	71
Centreville High School	3 story block high school - 1st fl. corridor 1C	-32	-17	-16	3	-38	64	98	89	66
Centreville High School	3 story block high school - 1st fl. corridor 1D	-21	-11	-10	2	-28	68	100	100	94
Centreville High School	3 story block high school - 1st fl. dining area	-23	-11	-10	4	-30	141	100	99	91
Centreville High School	3 story block high school - 1st fl. athletics area	-34	-21	-20	-1	-39	341	99	80	51
Centreville High School	3 story block high school - 1st fl. theatre/music area	-33	-22	-24	-6	-39	118	99	79	41
Centreville High School	3 story block high school - entire visit	-34	-19	-18	5	-41	1067	99	82	58
McNair Farms Elementary School	2 story new block elementary school 1st floor	-30	-16	-16	3	-34	753	97	69	42
McNair Farms Elementary School	2 story new block elementary school 2nd floor	-27	-13	-14	5	-31	229	100	84	48
McNair Farms Elementary School	2 story new block elementary school entire visit	-29	-15	-15	5	-34	982	97	73	43
Inova Urgent Care, Centreville	1 story medical facility	>=-28	-23	-24	-15	-28	189	55	2	0
Robinson High School	3 level, "super school", entire visit	-37	-24	-25	-1	-41	1727	92	57	25
Robinson High School	3 level, "super school", main hall and assoc. areas	-37	-25	-26	-1	-41	842	93	52	22
Robinson High School	3 level, "super school", north side, upper level	-32	-21	-21	-2	-37	430	100	76	38
Robinson High School	3 level, "super school", north side, lower level	-39	-28	-29	-8	-41	356	80	39	13
Robinson High School	3 level, "super school", gym and areas on south side	-32	-22	-21	-11	-34	99	100	77	32
Carson Middle School, Chantilly	2 level middle school, second floor	-19	-7	-7	13	-28	351	100	100	97
Carson Middle School, Chantilly	2 level middle school, first floor	-30	-16	-17	10	-36	670	100	96	76
Carson Middle School, Chantilly	2 level middle school, entire visit	-28	-13	-13	13	-36	1021	100	97	84
Westfields High School, Chantilly	2 level high school, first floor	-33	-22	-23	9	-35	1169	78	40	13
Westfields High School, Chantilly	2 level high school, second floor	-29	-20	-21	-1	-33	485	98	48	18
Westfields High School, Chantilly	2 level high school, entire visit	-33	-21	-22	9	-35	1654	84	42	14
Paul Springs Retirement Home, Ft. Hunt Rd.	1 - 3 story retirement home	-24	-17	-18	1	-27	428	93	23	2
5840 Cameron Run Terrace	5th floor of high rise apartment building	*	*	*	*	*	*	100	96	70
5840 Cameron Run Terrace	1st floor of high rise apartment building	-30	-24	-24	-8	-35	176	98	40	7
Chantilly Public Library	1 story public library, library (public) section	-31	-13	-12	14	-37	201	100	93	84
Chantilly Public Library	1 story public library, operations (private) section	-36	-27	-28	1	-40	275	99	61	18
Chantilly Public Library	Entire visit	-35	-21	-23	14	-40	476	99	75	46
Hayfield Secondary School	1st floor of large 2 story middle/high school complex	-43	-24	-25	12	-47	2287	94	71	53
Hayfield Secondary School	Basement of large 2 story middle/high school complex	-35	-23	-24	3	-44	250	100	89	59
Hayfield Secondary School	Entire visit of large 2 story middle/high school complex	-43	-24	-25	12	-47	2537	95	73	53
5366 Summit Drive (Pat's House)	3 level single family home, includes walkout basement	-17	-7	-7	6	-31	138	100	99	97

Building / Location	Description	Margin needed to cover 95%	Mean loss	Median loss	Min loss	Max loss	# of samples	Est. % covered w/ best portable	Est. % covered w/ SMA portable	Est. % covered w/ typ portable
							Averages	91	71	44
South County Government Center	5 story County office building, brand new construction	-40	-25	-25	-5	-47	820	95	88	55
GMU Field House	Concrete block steel athletic house, main area	-35	-18	-18	-6	-39	283	100	78	17
GMU Field House	Concrete block steel athletic house, weight room	-22	-15	-14	-5	-27	68	100	94	46
GMU Field House	Concrete block steel athletic house, stairwell, rooms	-40	-28	-28	-4	-33	558	98	57	20
GMU Johnson Center	Concrete student union building, first floor	-25	-13	-13	1	-32	253	100	100	91
GMU Johnson Center	Concrete student union building, lower level	-42	-34	-36	-1	-43	287	61	23	13
JDR Courtroom C	1st floor of two story brick courthouse/jail	-31	-24	-24	-14	-35	56	100	88	30
JDR Courtroom D	1st floor of two story brick courthouse/jail	-32	-23	-22	-13	-34	62	100	85	39
JDR Security Corridor	1st floor of two story brick courthouse/jail	-25	-19	-18	-5	-32	103	100	95	79
JDR vending machine area	Basement level of 2 story brick courthouse/jail	-40	-35	-37	-1	-48	137	77	15	7
JDR Courtroom B/C lobby	1st floor of two story brick courthouse/jail	-27	-18	-18	-5	-30	44	100	98	77
JDR Security Corridor	1st floor of two story brick courthouse/jail	-25	-16	-15	-7	-30	84	100	98	86
JDR entire visit	Entire visit	-38	-24	-22	-1	-48	486	93	70	45
JDR first floor only	1st floor of 2 story brick courthouse/jail	-30	-20	-19	-5	-35	323	100	83	51
FCWA Admin Building	Lower level of office building below grade areas	-46	-30	-31	-9	-53	109	95	88	59
FCWA Admin Building	Main floor of office building at grade	-31	-23	-22	-7	-35	35	100	100	100
FCWA Engineering Building	Lower level of office building below grade areas	-30	-18	-18	-2	-30	140	100	100	95
FCWA Engineering Building	Main floor of office building at grade	-17	-9	-7	-1	-22	74	100	100	100

APPENDIX VII – Operational Anecdotes From Tidewater, Virginia Area

Fire departments in the Tidewater area were polled for information regarding in-building radio communication problems experienced with emergency/non-emergency communications.

The following are the responses received.

James City County, Virginia

Has your department experienced radio communications failures in buildings in your city over the past 12 months? **Yes**

What type of construction was present when the problem was identified?

Type I, Fire – Resistive Construction **Yes**
Type II, Non-Combustible Construction **Yes**
Type III, Ordinary Construction **No**
Type IV, Heavy Timber Construction **Yes**
Type V, Woodframe **No**

What is the size of the building and number of floors? **1,000 square feet, 1 floor**

What type of occupancy is located in the building where the problem was encountered? **M – I Industrial**

Did you know that the Virginia Department of Fire Programs was conducting a feasibility study related to "Reliable In-Building Radio Communications for Public Safety" prior to receiving this survey questionnaire? **Yes**

Virginia Beach, Virginia

Has your department experienced radio communications failures in buildings in your city over the past 12 months? **Yes**

What type of construction was present when the problem was identified?

Type I, Fire – Resistive Construction **Yes**
Type II, Non-Combustible Construction **Yes**
Type III, Ordinary Construction **No**
Type IV, Heavy Timber Construction **No**
Type V, Woodframe **No**

What is the size of the building and number of floors? **24 story office and warehouse**

What type of occupancy is located in the building where the problem was encountered? **Mixed use office**

Did you know that the Virginia Department of Fire Programs was conducting a feasibility study related to "Reliable In-Building Radio Communications for Public Safety" prior to receiving this survey questionnaire? **Yes**

Newport News, Virginia

Has your department experienced radio communications failures in buildings in your city over the past 12 months? **Yes**

What type of construction was present when the problem was identified?

Type I, Fire – Resistive Construction **Yes**
Type II, Non-Combustible Construction **Yes**
Type III, Ordinary Construction **No**
Type IV, Heavy Timber Construction **No**
Type V, Woodframe **No**

What is the size of the building and number of floors? **Large commercial with multiple floors**

What type of occupancy is located in the building where the problem was encountered? **Hospital, research facilities, warehouse, and office complex**

Did you know that the Virginia Department of Fire Programs was conducting a feasibility study related to "Reliable In-Building Radio Communications for Public Safety" prior to receiving this survey questionnaire? **No**

NOTE: Additional problems exist in bridge tunnels and on large ships

Portsmouth, Virginia

Has your department experienced radio communications failures in buildings in your city over the past 12 months? **Yes**

What type of construction was present when the problem was identified?

Type I, Fire – Resistive Construction **Yes**
Type II, Non-Combustible Construction **Yes**
Type III, Ordinary Construction **Yes**
Type IV, Heavy Timber Construction **No**
Type V, Woodframe **No**

What is the size of the building and number of floors? **Large buildings and multiple floor buildings**

What type of occupancy is located in the building where the problem was encountered? **Shopping centers, tunnels, and apartment buildings**

Did you know that the Virginia Department of Fire Programs was conducting a feasibility study related to "Reliable In-Building Radio Communications for Public Safety" prior to receiving this survey questionnaire? **Yes**

<u>Hampton, Virginia</u>

Has your department experienced radio communications failures in buildings in your city over the past 12 months? **Yes – the City of Hampton and the Hampton Division of Fire & Rescue operate a GE/Ericsson 800 MHz Trunked radio system. This system operates via two transmitter/repeater sites. Once is located on Buckroe Avenue and the other on Pine Chapel Road. Most of our radio difficulties are concentrated in the northwest section of Hampton. It has been determined that these difficulties are not necessarily due to distance from the transmitter, but a combination of distance from the transmitter, building construction, and location within the building.**

What type of construction was present when the problem was identified?

Type I, Fire – Resistive Construction **Yes**
Type II, Non-Combustible Construction **No**
Type III, Ordinary Construction **No**
Type IV, Heavy Timber Construction **No**
Type V, Woodframe **No**

What is the size of the building and number of floors? **All occupancies are over 50,000 square feet**

What type of occupancy is located in the building where the problem was encountered?

- **Verizon Building, 5200 West Mercury Boulevard, two floors**
- **New Market Mall, 5200 West Mercury Boulevard, two floors**
- **AMC 24 - Theater Complex, Towne Centre Way, three floors**
- **Farm Fresh, Town Centre Way, one floor**
- **West Telemarketing, 247 Foxhill Road, one floor**
- **Farm Fresh, 247 Foxhill Road, one floor**
- **Food Lion, 3855 Kecoughtan Road, one floor**
- **Old Sentara Hampton General Building, 3120 Victoria Boulevard, six floors (anywhere below the ground floor)**
- **Hampton General District Court, 36 South King Street, three floors**

Did you know that the Virginia Department of Fire Programs was conducting a feasibility study related to "Reliable In-Building Radio Communications for Public Safety" prior to receiving this survey questionnaire? **Yes**

APPENDIX VIII – Operational Anecdotes From Fairfax County, Virginia

The following are anecdotes collected from firefighters in the Fairfax County area. These are displayed by individual and are unedited.

*****

One was a fire in 8's area at Ravenworth Towers. I was OIC of T410 when the IC called me to give me an assignment. I was in the stairwell making my way to the floor above the fire and could not get out to acknowledge his call. I made my way to the next floor and down the hall about 20 to 30 feet at which point I was able to acknowledge his transmission and get the assignment.

I had a similar situation at a 79 box on four mile run with the same basic situation. The radio would receive in the stairwell but not able to transmit.

I believe you were there when we were working on the preplan for Skyline Mall and parking garage. The radios would not receive or transmit. The truck left to go to Giant to get dinner. While we were in the store we (engine and truck) got a call for a fire in 8's area. Since I knew the radios didn't work in the garage and I knew the engine crew was still there working on the preplan, we paused at S. Jefferson/Leesburg Pike and made as much noise as possible so they would hear us and check their CAD.

*****

We learned quickly in the FM's office that we could not transmit from basements such as Commonwealth Care. During fire alarms testing, we would look to the contractor using a Nextel direct connect to communicate with a FM at the main fire alarm panel. Our 800 radio would hum at us when we tried to transmit from the basement.

In another case, we used the direct channel on our 800 radios to test the fire alarm at Daniel's Run Elementary School. This channel gave us instant connection on a limited basis. If one of us went to the end of a hallway or changed floors, we lost direct contact. If we are to depend on channel 0 to communicate with a fire fighter during an emergency, we better have several people staged around a building to listen for trouble.

Now, we use the Nextel direct connect during all of our fire alarm tests. This has limited our radio use, and our problems encountered, in city buildings

As our troops continue to test the regular 4-Adam and channel 0 in our city buildings, they will learn where the problem areas are.

*****

There are several buildings where I had to use 4-0 to get out on incidents. None of the incidents were noteworthy fire wise. The buildings are:

10701 Main Street, Floor 1
4315 Chain Bridge Road, Basement
10570 Main Street, Floor 1, 2 & 3
10306 Eaton Place, Basement 3300 Willow Crescent Drive, Terrace Level
3300 Willow Crescent Drive, Terrace Level

*****

No particular "war stories", but our Retesting teams (4 2-person teams) have purchased two-way radios from Costco to communicate in high-rise buildings. The radios had such a "hit or miss" problem with reception, that the $50.00 Cobra walkie talkies are outstanding. They have been using them for months now, and are very pleased. They still carry our radio in hopes they hear an inadvertent dispatch of an engine company for a fire alarm test, but use the 2-ways for communication inside buildings.

*****

One "story" that comes to mind is when we were doing a walk-through at Huntington Metro. There is an 800' service tunnel at the end of the station. Walk more than 15-20 feet into it, and you have no radio capability at all. Needless to say, if we had to operate in there, communications would become a major issue.

*****

Although I do not have the particular dates or incident numbers, I can relate two stories of this very nature. E409 was assisting our Medic unit with an ALS event at the Oak Meadows Nursing Home. As you know, we were on channel B. While we were involved in this ALS incident, unknowing to us, a house fire was dispatched in company 11's area. The fire was on Memorial Street and was a mutual box using the L/M channel for communications. As we went AOR-09/11 the house fire was sent to our CAD and we responded. The L/M patch was extremely poor, if not non-existent. Somewhere between switching from B to A then to L and then to M at the top of the hill, we did not receive the radio transmission that E411 had a working fire. We also did not know that E411 was having trouble finding the fire in the thick smoke and had requested exterior ventilation. We were able to tell the lay-out by seeing the hose lying unattended in the street next to a hydrant. Apparently, several transmissions had been broadcast but missed by incoming units. Fortunately, nobody was injured and the blaze extinguished.

Again months later while at the Paul Springs retirement home, we missed another incident. Our radios default to the no signal tone throughout much of this building. Another ALS event had been dispatched near our location without our knowledge. Having packaged the patient and returning to quarters, we noticed flashing lights and a siren coming towards us. E424 soon passed us headed to an ALS event only blocks away. It was not serious but could have been.

I think you are familiar with Wakefield Towers in company 11's area. These are older non-sprinkled high-rise buildings with little or no radio communication abilities. When you go inside you must switch to -0- and operate in the walkie-talkie mode. That whole notion of switching to a command channel, a separate channel for the RIT team, press the red button for emergencies. For-get-about-it, you got 1 one channel and that's -0- Oscar.

*****

I use to like the fact that when I was assigned to work at Fire Station 23 and we would use the Jewish Community Center next door, that we would lose the ability to talk to PSCC. Considering that, we were less than a mile from PSCC and in a fairly small building. We still lost communications with PSCC.

Also, another quickie would have to be our training evolutions at Huntington Towers. We were doing an evolution and I was assigned to the fire floor ac the fire attack officer. As I was entering the building, still in visual touch with the IC, I would lose radio contact with him. I realize that we were going through the repeater but the fact of the matter is that I had only just crossed the threshold into the structure and had not gone more than 10 feet and was out of radio communication. This is more than a little disconcerting and even though we are attempting to address the situation, I just don't get that warm and comfy feeling anytime I have to enter a large building.

We ran a FVEHF in the parking garage at 5573 Seminary Road (Savory Park Condos) recently. It was a US Postal Service minivan about 300' inside the garage with the occupant compartment well involved. Once I was less than 50' inside the garage (which, as you know, is not truly below grade) I lost all ability to communicate on the operations channel with my driver, PSCC, and incoming units. I had to walk over near side A of the garage and get near an exterior wall before the radio came back in range. As a result, I had to resort to yelling to relay instructions and ultimately using the "0" channel, which of course was only of value once the BC got on the scene. In the interim, I was trying to transmit on the operations channel to have PSCC reduce the response of anything other than the truck and the second-due engine to priority 2. No one heard those transmissions, as I ultimately learned.

*****

On July 28, 2003, we were at a fire alarm sounding in a 16 story high-rise office building. When we reached the 12th floor we found smoke in the hallways. We could not contact PSCC via the radio. We tried several different channels with no success. Access to the surrounding offices was hampered because they were all high security defense department units, so we couldn't readily reach a window. We had to call the driver outside on the talk around channel and they had to relay all the information to incoming units and PSCC. There also have been many instances where personal cell phones have been used to either contact personnel outside or to contact PSCC directly.

*****

This past winter, assisted on a call for excessive amounts of CO on the 8th floor and above in a high-rise. Had units on multiple floors. I'm in the lobby talking with Hazmat. Units and my talk-group could not hear me unless I physically held the radio above my head. Being 6'5", you would think that would be good enough. Good thing I wasn't on a fire floor with heavy heat conditions.

*****

Two stories from the greater 2nd battalion:

Box alarm in a parking garage at Tyson's Corner Mall for a fully involved vehicle, extending to adjoining cars. I was transmitting my reports and requests to the battalion chief, sitting in his buggy that I could see less than 200' away, but he said he was unable to copy any of my radio traffic.

Second, event was reported fire in a high-rise. After gaining access to the reported apartment and determining it was only food on the stove, I attempted to contact Command with my report from the 13th floor apartment. Command said I was breaking up. I went to the balcony to retransmit my report and Command indicated they still had trouble understanding what units I wanted to hold.

*****

Parliament House a 9 story high-rise. As soon as you get 10 feet inside the front door all radio communication stops except for Channel "0" until one gets upper floors close to a window in an apartment. So, if you are in an elevator and get trapped and no one is listening to Channel 0, you are out of luck because no one will hear you. Ravenworth Towers is the same way. Rear of the K-Mart on John Marr is the same way.

Sleep Hollow Nursing Home..."Nursing Home". We had a fire in the laundry room. We entered the building on side C at ground level, by the time we made it back to the laundry room; we were under ground, which means the fire was in the center of the building underneath the majority of the patients. We were unable to talk to the outside units on the repeated channels. I had to position myself halfway down the hallway and carry 2 radios one on "0" and the other on the Fire Ground Channel.

While carrying a portable radio inside Station 8..."Inside Station 8" the radios will start to fade out, the voices sound like Charlie Brown's teacher...if the station radios are down and we are working off of a portable we might not hear the call if we are in the middle of the building.

*****

We make frequent runs to Greenspring Village, 2-3 times a day. This complex is still under construction. As a routine, I have to leave the engine driver outside communicating with him/her on: 4-Ocean" if I need to request anything from PSCC. For those calls involving the entire crew, I have to depend upon using the occupant's telephone.

*****

Dispatched to an ALS emergency for a severe asthma patient in the Bailey Cross Road area of the county. After accessing the patient, we were riding the elevator down from the 6th floor when the elevator car stalled. The radio would not transmit out, leaving us stuck in the elevator with a potentially critical patient. We were rescued when the engine crew that walked down came looking for the missing engine medic, most probably because they wanted to get back before dinner got cold.

*****

For what it's worth, I concur regarding the "0" radios. We ran a vehicle fire deep in the garage under 5573 Seminary our last day, and 30 feet into the garage I lost all ability to talk on the repeated channel. I had to walk to within 20 feet or so of one of the exterior walls to get back in range. We had to shout back and forth and ultimately resorted to the 0 channel so that I could talk to my engine driver. Of course, this took me off the repeated channel.

*****

On July 28, 2003 at 2257 hours Engine 10 and Truck 10 were dispatched to a fire alarm located at 5203 Leesburg Pike. As we were approaching the scene a supplemental MCT message indicated that a called had now seen fire from the 11th floor and that he could hear the fire alarm sounding as well. I called PSCC and asked them about the supplement; they seemed unaware of it.

PSCC then called T-10 and told them that the supplement was in fact accurate and they then asked the truck if they wanted the box filled out. It was at this time that I interjected on the radio and informed PSCC to fill out the assignment and that I would get back to them when I had determined what was going on.

After several minutes of investigation, I confirmed that an alarm was sounding, and I was still trying to determine the status of any fire. I again called PSCC; I asked them if they had filled out the box, if they had checked back with the caller for more information and what channel the incident had been moved to. They informed me that, no they had not completed the assignment, that they were still checking with the caller and that the incident had not been moved to another channel.

I again asked for the assignment to be completed and was informed that they had checked back with the caller and he no longer saw anything, and that the fire officer "recommended" not filling out the assignment. It was, at this point due in part, to my heightened level of frustration that I told them to do whatever they felt like doing. While this exchange was taking place E-10 Alpha was ascending, as ordered, to the #12 floor. Upon their arrival they encountered a moderate smoke condition with an unknown source. They repeatedly attempted to call both PSCC and myself on both the dispatch and fire ground frequencies, but their attempt went unheard. Eventually, one of their calls was heard and at 2311 hours PSCC finally realized that the assignment should be upgraded. They assigned us to fire ground channel 4-C for the remainder of the event.

10/10/2007
STAKEHOLDER MTG FOR CONSIDERATION OF NC PROPOSALS

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

2006 Code Change Cycle – Code Change Evaluation Form

USBC – Virginia Construction Code
Code Change No. C-912.1

Nature of Change: (text is on code change form)

To provide the basic infrastructure capable of supporting emergency communication equipment in the construction of certain new buildings.

Proponent: City of Virginia Beach (and In-Building Emergency Communications Task Group)

Staff Comments:

This proposal was developed cooperatively through the In-Building Communications Task Group and Workgroups 2 and 3. While the current proposal is not as extensive as former proposals, the groups determined that it would provide a good first step in enhancing the ability of firefighters and emergency responders to effectively communicate where building feature impediments are present. It was recognized that the technology utilized in emergency communications is still in a state of change, which plays a factor in developing a more comprehensive proposal. All groups recommend this change to move forward as consensus.

Codes and Standards Committee Action:

_____ Approve as presented. _____ Disapprove.

_____ Approve as modified (specify):

_____ Carry over to next cycle. _____ Other (specify):

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CODE CHANGE FORM

Address to submit to: DHCD, The Jackson Center 501 North Second Street Richmond, VA 23219-1321 Tel. No. (804) 371 – 7150 Fax No. (804) 371 – 7092 Email: bhcd@dhcd.virginia.gov		Document No. C-912.1 Committee Action: ______ BHCD Action: ______

Submitted by: Cheri Hainer Representing: City of Virginia Beach

Address: 2405 Courthouse Drive, Bldg. 2, Room 100, Virginia Beach, VA 23456

Phone No. (757) 385-4211

Regulation Title: 2003 USBC and SFPC Section No(s): USBC 902, 912 and SFPC 511

Proposed Change:

(1) In the USBC, add new definitions to Section 902 of the IBC as follows:

<u>Emergency Communication Equipment. Emergency communication equipment, includes, but is not limited to, two-way radio communications, signal booster, bi-directional amplifiers, radiating cable systems or internal multiple antenna, or a combination of the foregoing.</u>

<u>Emergency Public Safety Personnel. Emergency public safety personnel includes firefighters, emergency medical personnel, law-enforcement officers and other emergency public safety personnel routinely called upon to provide emergency assistance to members of the public in a wide variety of emergency situations, including, but not limited to, fires, medical emergencies, violent crimes and terrorist attacks.</u>

(2) In the USBC, add Section 912 to the IBC as follows:

<u>Section 912. In-Building Emergency Communications Coverage.</u>

<u>912.1 General. In-building emergency communication equipment to allow emergency public safety personnel to send and receive emergency communications shall be provided in new buildings and structures in accordance with this section.</u>

<u>Exceptions:</u>

<u>1. Buildings of Use Groups A-5, I-4, within dwelling units of R-2, R-3, R-4, R-5, and U.</u>

<u>2. Buildings of Type IV and V construction without basements.</u>

<u>3. Above grade single story buildings of less than 20,000 square feet.</u>

4. Buildings or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the building official has approved an alternative method to provide emergency communication equipment for emergency public safety personnel.

5. Where the owner provides technological documentation from a qualified individual that the structure or portion thereof does not impede emergency communication signals.

912.2 Where required. For localities utilizing public safety wireless communications, new buildings and structures shall be equipped throughout with dedicated infrastructure to accommodate and perpetuate continuous emergency communication.

912.2.1 Installation. Radiating cable systems, such as coaxial cable or equivalent shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code.

912.2.2 Operations. The locality will assume all responsibilities for the installation and maintenance of additional emergency communication equipment. To allow the locality access to and the ability to operate such equipment, sufficient space within the building shall be provided.

912.2.3 Inspection. In accordance with Section 113.3, all installations shall be inspected prior to concealment.

912.3 Acceptance test. Upon completion of installation, after providing reasonable notice to the owner or their representative, emergency public safety personnel shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner. Any noted deficiencies shall be provided in an inspection report to the owner to the owner or the owner's representative.

(3) In the SFPC, add Section 511 to the IFC as follows:

Section 511. Maintenance of In-Building Emergency Communication Equipment.

511.1 General. In-building emergency communication equipment shall be maintained in accordance with the USBC and the provisions of this section.

511.2 Additional in-building emergency communications installations. If it is determined by the locality that increased amplification of their emergency communication system is needed, the building owner shall allow the locality access as well as provide appropriate space within the building to install and maintain necessary additional communication equipment by the locality. If the building owner denies the locality access or appropriate space, or both, the building owner shall be responsible for the installation and maintenance of these additional systems.

511.3 Field tests. After providing reasonable notice to the owner or their representative, the fire official, police chief, or their agents, shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner.

Supporting Statement:

In 2002, on behalf of my locality, I made a proposal to require the pre-wiring of buildings to supplement and enhance the locality's emergency communication system. Other localities were experiencing similar issues and several joined in the effort to codify the issue. In 2003, General Assembly Joint Bill 588 required the State Fire Marshall's office (Fire Programs) to study the necessity for appropriate code provisions. A task group representing all affected parties, such as Building and Fire Officials, Building Owners, Contractors, and Radio Systems Technical Advisors meet to discuss this issue and determined there was a need for this to be referenced in the Uniform Statewide Building Code. Based on the outcome of that study as well as the language in House Bill 2529 2003, several versions of this code provision were developed and presented to the Board of Housing. However, there were numerous undetermined construction and cost factors involved and nc consensus could be reached among the code, construction and building owners communities and consequently no codes were adopted. But the concern for and by the emergency public safety personnel is still prevalent, prompting the introduction of House Bill 2554 2007. Accordingly, the interested parties have come back to the table and as the In-Building Communications Work Group, have arrived at this compromise as a first step to addressing this issue. The installation and maintenance costs and responsibilities of the building owner have been greatly reduced as they now need only provide basic and generic infrastructure capable of enhancing any supplemental emergency communication equipment, which will be provided and maintained by the locality.

Why Emergency Radio Communications Enhancement Systems (ERCES)?

NOTIFIER® by Honeywell

The Issue

Two-Way Radio Dead Spots for First Responders

In an emergency, we depend on First Responders to mitigate the problem and help survivors. These firefighters, EMTs and law enforcement officers rely on two-way radios for communications, especially in multi-story buildings when responders can be located on different floors while trying to save lives. For that reason, radio signals within buildings need to be strong to support two-way communications in an emergency situation.

Buildings can weaken the radio signals that First Responders rely on to orchestrate emergency responses, evacuations, and other life-saving protocols. Concrete, glass windows, metal structures, below-grade build outs, among others impacting radio propagation can cause emergency radio communications to become unreliable or drop altogether.

This is unfortunately a common problem. A 2017 International Association of Fire Chiefs Survey shows:

- 98.5% of Fire Departments reported dead spots in buildings due to poor radio frequency coverage
- 56% of First Responders have experienced a communications failure within a building during an emergency incident within the past 24 months

Codes require an approved level of radio coverage in a building which can be achieved by enhancing the in-building public radio frequency signal coverage with an ERCES (Emergency Radio Communications Enhancement Systems) which comprises of a BDA (Bi-Directional Amplifier) / Signal Booster and Distributed Antenna System (DAS). **But not all key stakeholders know about the code requirements and are putting First Responders at risk when buildings are not outfitted with proper radio frequency signal coverage.**

The Regulatory Response

ERCES and Code Review

This challenge was most famously evident during September of 2001 when the World Trade Center buildings were brought down in terrorist attacks. Because of this the National Institute of Standards and Technology (NIST) studied the disaster and developed recommendations to improve public safety.

The NIST WTC investigation was conducted under the authority of the National Construction Safety Act. The final 2011 NIST WTC report (http://wtc.nist.gov) published a summary of findings, including recommended revisions to current codes, standards, and practices to improve public safety.

In a key conclusion (Recommendation #22), NIST:

> *"…recommends the installation, inspection, and testing of emergency communications systems, radio communications, and associated operating protocols to ensure that the systems and protocols: (1) are effective for large- scale emergencies in buildings with challenging radio frequency propagation environments; and (2) can be used to identify, locate, and track emergency responders within indoor building environments and in the field."*

This resulted in a new section being added to the 2009 edition of the International Fire Code (IFC) that requires all buildings to have approved radio coverage for emergency responders within buildings. Approved is a defined term in the IFC which means acceptable to the *fire code official*. The 2010 edition of NFPA 72, National Fire Alarm and Signaling Code, further defined Two-Way Radio Communications Enhancement Systems requirements for technical coverage and signal strengths under Section 24.5.2*

*These requirements were then relocated from the 2016 Edition of NFPA 72 to NFPA 1221, Section 9.6.

The Result

ERCES and Code Updates

Enhancing in-building radio frequency signal coverage with an Emergency Radio Communication Enhancement System (ERCES) comprised of a BDA (Bi-Directional Amplifier) / Signal Booster and Distributed Antenna System (DAS) is now a key requirement for buildings. Most current adopted Fire and Building Codes require Emergency Responder Radio Signal strength and coverage to be measured in all new and some existing construction. ERCES are required by IBC (International Building Code), IFC and NFPA 1. These codes require ERCES to be installed, serviced and maintained in accordance with NFPA 1221 and NFPA 72. A snapshot of the current IFC and NFPA Codes include:

Conditions	NFPA 1221 Section 9.6 - 2016 Edition	IFC 510 - 2015 Edition (2018 Ed. Avail. Oct. 2017)
Antenna Malfunction	Applicable - System and BDA	Not specifically - AHJ may require
Signal Booster Failure	Yes	Yes
Low Battery 70%	Yes	Not specifically - AHJ may require
Loss of Normal A.C.	Yes	Yes
Failure of Battery Charger	Yes	Not specifically - AHJ may require
Backup Duration	12 Hours	24 Hours* (12 hours 2018 IFC)
Signal Coverage	>=95 dBm (DAQ3.0 2016 Edition) / 90% / 99%	>=95 dBm (DAQ3.0) / 95%
Monitoring / Maintenance	Yes	Yes
Battery Backup Cabinets	NEMA4	NEMA4 (NEMA3R 2018 IFC)

1. IFC Section 510 – Emergency Responder Radio Coverage

The 2018, 2015, 2012, 2009 editions dictate that all new and existing buildings shall have approved radio coverage for emergency responders. Approval is based upon the existing coverage levels of the public safety communication systems utilized by the jurisdiction and measured at the exterior of the building.

> *The 2018 edition (IFC 510.4.1)* ***requires 95% coverage of all areas on each floor of the building*** *and the same signal strength as outlined in NFPA.*

In addition, Bi-Directional Amplifier (BDA) components must be contained in a NEMA-4 type enclosure. Correlating battery backups must be contained in a NEMA 3R or higher-rated cabinet (per 2018 edition), or a NEMA 4-type cabinet. The system requires a battery backup of either 12 hours (2018 edition) or 24 hours. Under all system operating conditions, isolation must be maintained between the donor antenna and all inside antennae and be no less than 20dB greater than the system gain under all operating conditions (2018 edition). It also requires oscillation prevention circuitry for the BDA.

FCC certification is required for the BDA, whose status must be monitored by the fire alarm system with a supervised communications link.

IFC requires system designers and lead installation personnel to have both a valid FCC-issued General Radio Operators License (GROL) and to be certified in-building system training by either the equipment manufacturer or an approved organization/school. IFC also requires inspection and annual testing of ERCES, or whenever structural changes occur that could materially change the original field performance tests.

2. NFPA 1221 & 72 – National Fire Alarm and Signaling Code

NFPA 1221 Section 9.6 (2016 edition) and NFPA 72 Section 24.5.2 (2013, 2010 edition) dictates that **radio coverage shall be provided with 90% floor area in general building areas, and 99% floor area in critical areas**. Critical areas include command centers, fire pump rooms, exit stairs and passageways, elevator lobbies, standpipe cabinets, sprinkler sectionals, valve locations, and other areas specifically identified by an Authority Having Jurisdiction (AHJ).

For signal strength or quality of audio delivered, NFPA 1221 2016 Edition requires the system to provide a Minimum Delivered Audio Quality (DAQ 3.0) and NFPA 72 requires minimum inbound and outbound signal strength of -95 dBm. NFPA requires the system must be capable of all radio system frequencies assigned by AHJ.

NFPA includes system component requirements stating that signal boosters/BDA units must have FCC certification prior to installation and be compatible with both analog and digital communications simultaneously at time of installation. BDA components should be contained in NEMA-4 or 4X type enclosure(s). The system requires a battery backup of 12 hours. Isolation must be maintained between the donor antenna and all internal antennae to ensure non-interference and non-degradation of Public Safety Systems.

A dedicated annunciator panel must be housed within the emergency command center to annunciate status of any signal booster(s). The monitoring panel must provide visual and labeled indications of the following for each signal booster: (1) Normal AC power, (2) Signal booster trouble, (3) Loss of normal AC power, (4) Failure of battery charger, (5) Low-battery capacity and (6) Antenna failure. The BDA status must be monitored by the fire alarm system via a supervised communications link.

3. IBC

IBC Section 916 (2015 edition) and IBC Section 915 (2012 edition) dictate that radio coverage shall be provided in all new buildings in accordance with IFC Section 510.

4. NFPA

NFPA 1 Section 11.10 dictates in all new and existing buildings, minimum radio signal strength for fire department communications shall be maintained at a level determined by the AHJ. Where required by the AHJ, two-way radio communication enhancement systems shall comply with NFPA 1221.

5. Other

Local Ordinances - Many cities and counties have additional ordinances requiring BDA systems. These ordinances are defined by the Authority Having Jurisdiction (AHJ). Specifications set by the AHJ are required and must be met.

FCC - FCC rules apply to all radio frequency (RF) emitters including BDAs. All BDAs must be FCC certified to be legally sold in the USA. Furthermore, all systems must be installed in accordance with applicable FCC rules and regulations. Similarly, in Canada Industry Canada (IC) certification is required.

The Newest Requirements

Performance Compliance – UL 2524

Product performance listings and standards were only recently introduced for ERCES. Prior to the new standards, AHJs, architects, engineers, and building owners could not be 100% certain that systems were code compliant and whether they would perform as claimed by manufacturers. Today, code regulates performance standards and listings provide all necessary parties the certainty that installed BDA systems will provide reliable communications for emergency responders.

UL 2524 for In-building 2-Way Emergency Radio Communication Enhancement systems was introduced as an Outline of Investigation (OOI) on December 21, 2017. An OOI is essentially a draft version of a product standard.

UL 2524 Timeline

- December 2017: UL 2524 published as an Outline of Investigation
- December 2017: Product testing begins
- Spring 2018: Standards Technical Panel (STP) formed for US/CAN
- June – July 2018: UL 2524 proposal balloted
- August 2018: STP meets to review negative ballots and public comments
- August – October 8: Recirculation of revisions to proposal
- October 2018: Published 1st edition on October 18th
- January 2019: 2nd edition published - Bi-National Standard

UL 2524 covers the products (e.g., repeater, transmitter, receiver, signal booster components, external filters, and battery charging components) used for ERCES/BDA systems installed in a location to improve wireless communication at that location. It does not cover passive RF components which includes antennas, splitters, couplers, coaxial cable and connectors.

UL 2524 addresses the following areas:

- Safety (risk of fire and risk of shock) requirements – construction and testing
- Compliance with specific performance requirements in accordance with the IFC-2018 and NFPA 1221-2016 (2019)
- Reliability performance requirements applicable for life safety systems – construction and testing
- Product marking and installation documentation

Product assessment is done by an OSHA accredited, independent third-party organization and successful investigation results in product listing for the purpose.

NOTE: UL 2524 listed products and their certification information can be accessed with UL Product iQ™ https://iq.ulprospector.com/info/ by using the UL Category Control Number UTMH in the search filter.

The Impact

ERCES for AHJs, Architects, Engineers, Contractors, Building Owners

What does this mean for AHJs?

- An AHJ's fundamental requirement is to ensure the safety of the population within its jurisdiction. With national consensus model codes and installation standards that govern the installation, testing and maintenance of ERCES and UL 2524 listing for product performance in place, it is in the AHJ's best interest to implement these requirements at their local level. Not only will this serve their community and safety personnel at a higher level, it will also mitigate risk and cost of retrofits down the road for the building owners once the code and listing has been mandated locally.

What does this mean for Architects & Engineers?

- With inevitable changes to jurisdictional requirements forthcoming from AHJ's, Architects and Engineers are in a prime position to include forward thinking life-safety specifications in their design proposals. Addressing code compliant and UL 2524 listed ERCES during the design portion of a new build drives inclusion during contract and construction phases.
- Recommending ERCES during the design phase will save clients retrofit costs once the standard has been recorded
- With specific knowledge of new code and listing requirements, Architects and Engineers can position themselves as industry leaders and trusted potential partners

What does this mean for Fire Safety Engineers?

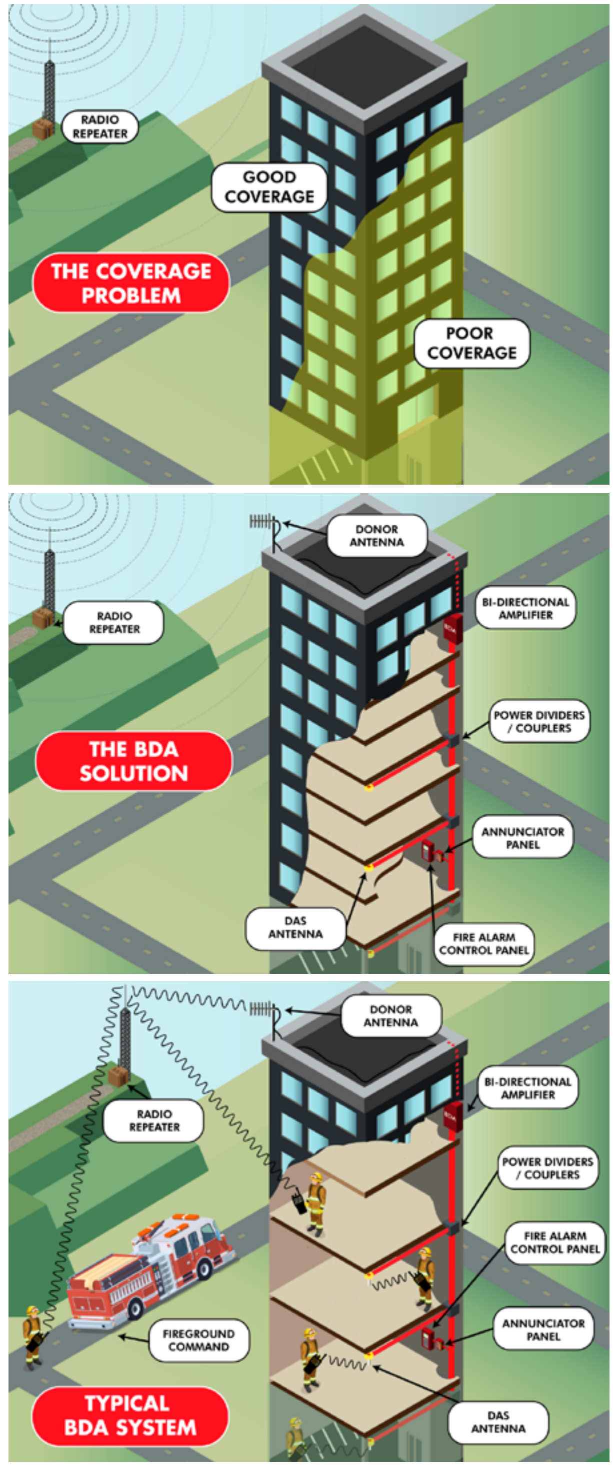
- As experts in fire safety and standards, Fire Safety Engineers are leaned upon by the design team to provide best-practice recommendations. By being aware of code changes, performance listings and their future implications, Fire Safety Engineers help mitigate risk and stay ahead of current safety standards.

What does this mean for General and Electrical Contractors?

- Both General and Electrical Contractors are expected to be familiar with current code and understand how future code and product standards affect the life span of a building. Including a code compliant and UL 2524 listed ERCES system ahead of time will save construction costs, when compared to making changes in the field, or retroactively.
- By being aware of national consensus model codes and installation standards, and recent product performance listing standards and their eventual trickle down to the local level, contractors can make sure to partner with the right fire safety experts during installation.

What does this mean for Building Owners or Developers?

- Building Owners/Developers are required to build structures that are capable of meeting the mandated radio performance criteria in order to receive their certificate of occupancy (CO). By including a code-compliant and UL 2524 listed system from the earliest stages of a project, Builders/Owners can forgo unnecessary delays in tenant occupancy and fire safety upgrade costs.
- External and environmental changes can also impact the emergency radio performance throughout a building's lifetime, which would need to be amended after each year's inspection. This can be mitigated by adding a code-compliant and UL 2524 listed ERCES system during the design process.
- Safety is a significant selling point to future tenants or owners. A more sophisticated life safety system will provide not only peace-of-mind, but also minimize tenant build-out retrofit costs.



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12 Clintonville Road
Northford CT 06472
203.484.7161
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NF_WP_BDA | Rev 01 | 2019-03-28

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B916-18

VCC: SECTION 916, 916.1, 916.1.1, 916.1.2, 916.1.3, 916.2, 916.2.1 (New); IBC®: NFPA Chapter 35 (New)

Proponents: Andrew Milliken (amilliken@staffordcountyva.gov)

2015 Virginia Construction Code

SECTION 916
IN-BUILDING EMERGENCY
COMMUNICATIONS COVERAGE

916.1 General.. For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building *emergency communication equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new buildings and structures in accordance with this section.

Exceptions:

1. Buildings of Use Groups A-5, I-4, within dwelling units of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area buildings in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. Buildings or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the building official has approved an alternative method to provide *emergency communication equipment* for *emergency public safety personnel*.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.

916.1.1 Installation.. ~~The building *owner* shall install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The~~ Buildings shall have approved radio coverage for emergency responders within the building based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems. Where an emergency responder radio communication enhancement system is provided, installation shall be in accordance with NFPA 1221, NFPA 72 and this section.The *locality* shall be responsible for the installation of any additional communication *equipment* ~~required for the operation of the system.~~ beyond these minimum requirements.

916.1.2 ~~Operations.~~ System Monitoring.. ~~The *locality* will assume all responsibilities for the operation and maintenance of the *emergency communication equipment*. The building *owner* shall provide sufficient operational space within the building to allow the *locality* access to and the ability to operate in-building *emergency communication equipment*.~~
Where provided, the emergency responder radio enhancement system shall be monitored by a listed fire alarm control unit and supervisory signals shall include the following:

1. Loss of normal AC power supply.

2. System battery charger(s) failure.

3. Malfunction of the donor antenna(s).

4. Failure of active RF-emitting device(s).

5. Low-battery capacity at 70-percent reduction of operating capacity.

6. Failure of critical system components.

7. The communications link between the fire alarm system and the emergency responder radio enhancement system.

916.1.3 Inspection.. In accordance with Section 113.3, all installations shall be inspected prior to concealment.

916.2 Acceptance test.. ~~Upon completion of installation, after providing reasonable notice to the *owner* or their representative, *emergency public safety personnel* shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the *owner*. Any noted deficiencies in the installation of the radiating~~

~~cable or operational space shall be provided in an inspection report to the *owner* or the *owner's* representative.~~
<u>Where an emergency responder radio coverage system is provided, the system shall be tested and approved in accordance with NFPA 1221 and NFPA 72.</u>

Revise as follows:

<u>**916.2.1** **Critical Areas..** Critical areas, including fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the AHJ, shall be provided with 99 percent floor area radio coverage prior to occupancy approval.</u>

2018 International Building Code

Revise as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

<u>1</u> <u>NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 2019 Edition</u>

Reason Statement: The effectiveness and reliability of emergency responder communication is one of if not the most important aspect of successful emergency response and protection of public safety. In fact, as wireless technologies advance and community hazards expand, these public safety communication tools quickly become the backbone of incident response for not only fire and rescue personnel but also law enforcement and other first responders. Just as the water provided in building standpipes is critical to firefighting operations in large buildings, clear and dependable communications is vital to the safety of first responders in these buildings. This is in keeping with the philosophy inherent in the model codes that, when a facility grows too large or complex for effective fire response, fire protection features must be provided within the building. Building construction features and materials can absorb or block the radio frequency energy used to carry the signals inside or outside the building. Blockage or absorption of the radio frequency signal can prevent a critical message from an emergency responder from being received and acknowledged. Depending on the incident, this loss of information can place other emergency responders in greater danger or may prevent an injured or disoriented emergency responder from communicating for assistance.
The current VCC language requires the use of out-dated technology and in some cases the installation of equipment that may never be used. Unless meeting one of the exemption requirements, building owners are required to route hundreds of feet of likely disconnected cabling throughout the building including in areas where existing coverage may already be adequate. This proposal does NOT remove or modify any of the many exemptions currently indicated by the current code (VCC 916.1) so as to maintain consistency throughout Virginia.   In addition, the current VCC language provides no recognition as to the current level of public safety communication strength currently on site. Without additional guidance, this could suggest that a building owner is responsible for providing a higher level of radio coverage than what currently is present in reality - a cost that is not fair to be burdened by the building owner or developer. The proposed language (ICC and NFPA model code language) ensures that the building is only required to maintain the existing level of public safety radio communication coverage available at the exterior of the building. Furthermore, just as building standpipe systems, fire hydrant systems, fire alarm systems and other fire protection systems are required to be provided as part of the building infrastructure for emergency responder use, the reliability and dependability of emergency radio enhancement systems demand that they be similarly connected to and monitored by the building fire alarm system. Finally, the current VCC language does not provide any reference standard for the installation or testing of such systems. This proposal includes a reference to NFPA 1221 for these details to ensure that they are capable, compatible and interoperable for emergency response at any time or location.

Resiliency Impact Statement: This proposal will increase Resiliency
As compared to the ineffective and in some cases unnecessarily burdensome code language currently present in the VCC, this proposal represents a tremendous increase in building and public safety resiliency. Ensuring that first responders are able to effectively communicate is invaluable to the successful outcome of emergency response incidents and the protection of lives and property. The assurance for emergency responder radio coverage that this proposal provides does so not only for the major, or once-in-a-lifetime catastrophes but also many times over in the daily smaller "routine" emergencies that occur throughout buildings.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Since this proposal does not remove or modify any of the current exemptions from providing in-building communication infrastructure, this proposal only applies to the same buildings where infrastructure is already required to be provided. In fact, this proposal provides the ability of building owners and developers to utilize cost-effective technology to accomplish the requirement with less labor and materials. Moreover, it also works to ensure that such technology is only provided where it is found to be needed and only to the level at which the public safety system currently provides at the exterior of the building. These cost-saving efforts are expected to equal or exceed any added cost to monitor such system by the building fire alarm system. Also, since the proposal is based on national and international standards that have been in place for years, most large construction projects already anticipate these costs for construction around the country.

B916.1-18

VCC: 916.1

Proponents: Ronald Clements Jr (clementsro@chesterfield.gov)

2015 Virginia Construction Code

916.1 General.. For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building *emergency communication equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new buildings and structures in accordance with this section.

Exceptions:

1. Buildings of Use Groups A-5, I-4, within dwelling units of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area buildings in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. Buildings or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the building official has approved an alternative method to provide *emergency communication equipment* for *emergency public safety personnel*.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.

<u>6 Buildings in localities that do not provide the additional communication equipment required for the operation of the system.</u>

Reason Statement: Many localities do not have the funding to provide the communication equipment required to operate in building communication systems. In such localities installation of radiating cable that will not be used makes little sense. Additionally, even if equipment will be provide some time in the future it is not possible to design the system to operate properly without knowing the equipment specifications at the time of building design. Furthermore, the requirement for the locality to provide the equipment puts localities in a position of violating the code when funding is not allocated to purchase the equipment.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency
This code provision is not related to resiliency.

Cost Impact: The code change proposal will decrease the cost of construction
This will decrease the cost of construction by not requiring building infrastructure to be installed that will never be used.

B918.1-18

IBC®: CHAPTER 9, SECTION 918, [F] 918.1; VCC: 916.1, 916.1.1, 916.1.2, 916.1.3, 916.2

Proponents: Linda Hale (Linda.Hale@Loudoun.gov); Andrew Milliken (amilliken@staffordcountyva.gov)

2018 International Building Code

CHAPTER 9
FIRE PROTECTION AND LIFE SAFETY SYSTEMS

SECTION 918
EMERGENCY RESPONDER RADIO COVERAGE

Revise as follows:

[F] 918.1 General.. Emergency responder radio coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code ~~Code.~~ .

2015 Virginia Construction Code

Revise as follows:

~~**916.1 General.**~~**.** ~~For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building *emergency communication equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new buildings and structures in accordance with this section.~~

Exceptions:

1. Buildings of Use Groups A-5, I-4, within dwelling units of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area buildings in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. Buildings or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the building official has approved an alternative method to provide *emergency communication equipment* for *emergency public safety personnel*.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.

~~**916.1.1 Installation.**~~**.** ~~The building *owner* shall install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The *locality* shall be responsible for the installation of any additional communication *equipment* required for the operation of the system.~~

~~**916.1.2 Operations.**~~**.** ~~The *locality* will assume all responsibilities for the operation and maintenance of the *emergency communication equipment*. The building *owner* shall provide sufficient operational space within the building to allow the *locality* access to and the ability to operate in-building *emergency communication equipment*.~~

916.1.3 Inspection.. In accordance with Section 113.3, all installations shall be inspected prior to concealment.

Revise as follows:

~~**916.2 Acceptance test.**~~**.** ~~Upon completion of installation, after providing reasonable notice to the *owner* or their representative, *emergency public safety personnel* shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the *owner*. Any noted deficiencies in the installation of the radiating cable or operational space shall be provided in an inspection report to the *owner* or the *owner's* representative.~~

Reason Statement: The provisions of Section 510 are concerned with the reliability of portable radios used by emergency responders inside buildings. This is in keeping with the philosophy inherent in the I-Codes that, when a facility grows too large or complex for effective fire response, fire protection features must be provided within the building.
Emergency responders use portable radios to communicate with other emergency responders, the incident commander and the public safety communications center. Building construction features and materials can absorb or block the radio frequency energy used to carry the signals inside or outside the building. Blockage or absorption of the radio frequency signal can prevent a critical message from an emergency responder from being received and acknowledged. Depending on the incident, this loss of information can place other emergency responders in greater

danger, or may prevent an injured or disoriented emergency responder from communicating for assistance. The requirements apply to analog or digital radio systems and are applicable to all buildings. This section requires that all buildings have approved radio coverage for emergency responders within the building. Approved radio coverage is based on the ability of the existing public safety communications system to transmit a signal inside and outside the building.

The existing radiating or "leaky cable" that is currently required in the code is approximately 15% more expensive than a non-radiating cable. A radiating cable that is then placed in a conduit or raceway that shields the cable eliminates the sole purpose of a radiating cable. A radiating cable (that is not shielded) does have a very specific application, but it is a limited application.

Passing off the costs of this critical communication system to a jurisdiction equates to passing off the expense to the citizens of that jurisdiction, as most fire departments are funded predominantly by local tax dollars and or donations. This is unconscionable that the citizens of a jurisdiction should bear the financial burden of a private building that is being built in a locality. And is tantamount to placing career and volunteer firefighters, who are willing risk their lives to save another, in harm's way without the most basic of abilities to call a MayDay (e.g. help) or for an incident commander to call for an evacuation prior to firefighters becoming trapped. How many firefighters must perish before we appreciate their un-waiver dedication and provide the rudimentary tools in which to save lives?

Resiliency Impact Statement: This proposal will increase Resiliency

Cost Impact:
The cost will not increase in all buildings, as not all buildings will have impaired emergency radio communications. The impairment degree of those that are compromised will not be the same as it is based on building construction features, existing buildings, and the signal strengths in a jurisdiction. The off set of price from a radiating cable to a metal shielded coaxial cable will also assist with some of the price difference. The cost increased to compromised structures will vary from 40 cents/sq ft to $1.00/sq ft., and is hardly worth a life.

§ 90.219 Use of signal boosters.

This section contains technical and operational rules allowing the use of signal boosters in the Private Land Mobile Radio Services (PLMRS). Rules for signal booster operation in the Commercial Mobile Radio Services under part 90 are found in § 20.21 of this chapter.

(a) ***Definitions.*** The definitions in this paragraph apply only to the rules in this section.

Class A signal booster. A signal booster designed to retransmit signals on one or more specific channels. A signal booster is deemed to be a Class A signal booster if none of its passbands exceed 75 kHz.

Class B signal booster. A signal booster designed to retransmit any signals within a wide frequency band. A signal booster is deemed to be a Class B signal booster if it has a passband that exceeds 75 kHz.

Coverage area of a PLMRS station. All locations within the normal reliable operating range (service contour) of a PLMRS station.

Deploy a signal booster. Install and/or initially adjust a signal booster.

Distributed Antenna System (DAS). A network of spatially separated antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area or structure.

Operate a signal booster. Maintain operational control over, and responsibility for the proper functioning of, a signal booster.

Signal booster. A device or system that automatically receives, amplifies, and retransmits signals from wireless stations into and out of building interiors, tunnels, shielded outdoor areas and other locations where these signals would otherwise be too weak for reliable communications. Signal booster systems may contain both Class A and Class B signal boosters as components.

(b) ***Authority to operate.*** PLMRS licensees for stations operating on assigned channels higher than 150 MHz may operate signal boosters, limited to the service band for which they are authorized, as needed anywhere within the PLMRS stations' service contour, but may not extend the stations' service contour.

(1) PLMRS licensees may also consent to operation of signal boosters by non-licensees (such as a building owner or a signal booster installation contractor) within their service contour and across their applicable frequencies, but must maintain a reasonable level of control over these operations in order to resolve interference problems.

(i) Non-licensees seeking to operate signal boosters must obtain the express consent of the licensee(s) of the frequencies for which the device or system is intended to amplify. The consent must be maintained in a recordable format that can be presented to an FCC representative or other relevant licensee investigating interference.

(ii) Consent is not required from third party (unintended) licensees whose signals are incidentally retransmitted. However, signal booster operation is on a non-interference basis and operations may be required to cease or alter the operating parameters due to a request from an FCC representative or a licensee's request to resolve interference.

(2) [Reserved]

(c) ***Licensee responsibility; interference.*** PLMRS licensees that operate signal boosters are responsible for their proper operation, and are responsible for correcting any harmful interference that signal booster operation may cause to other licensed communications services. Normal co-channel transmissions are not considered to be harmful interference. Licensees are required to resolve interference problems pursuant to § 90.173(b). Licensees shall act in good faith regarding the operation of signal boosters and in the resolution of interference due to signal booster operation. Licensees who are unable to determine the location or cause of signal booster interference may seek assistance from the FCC to resolve such problems.

(d) ***Deployment rules.*** Deployment of signal boosters must be carried out in accordance with the rules in this paragraph.

(1) Signal boosters may be used to improve coverage in weak signal areas only.

(2) Signal boosters must not be used to extend PLMRS stations' normal operating range.

(3)

(i) Except as set forth in paragraph (d)(3)(ii) of this section, signal boosters must be deployed such that the radiated power of each retransmitted channel, on the forward link and on the reverse link, does not exceed 5 Watts effective radiated power (ERP).

(ii) Railroad licensees may operate Class A signal boosters transmitting on a single channel with up to 30 Watts ERP on frequencies 452/457.9000 to 452/457.96875 MHz in areas where communication between the front and rear of trains is unsatisfactory due to distance or intervening terrain barriers.

(4) Class B signal boosters may be deployed only at fixed locations; mobile operation of Class B signal boosters is prohibited after November 1, 2014.

(5) Class B signal booster installations must be registered in the FCC signal booster database that can be accessed at the following URL: *www.fcc.gov/signal-boosters/registration.*

(6) Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference.

(i) In general, the ERP of intermodulation products should not exceed −30 dBm in 10 kHz measurement bandwidth.

(ii) In general, the ERP of noise within the passband should not exceed −43 dBm in 10 kHz measurement bandwidth.

(iii) In general, the ERP of noise on spectrum more than 1 MHz outside of the passband should not exceed −70 dBm in a 10 kHz measurement bandwidth.

(7) Signal booster passbands are limited to the service band or bands for which the operator is authorized. In general, signal boosters should utilize the minimum passband that is sufficient to accomplish the purpose. Except for distributed antenna systems (DAS) installed in buildings, the passband of a Class B booster should not encompass both commercial services (such as ESMR and Cellular Radiotelephone) and part 90 Land Mobile and Public Safety Services.

(e) ***Device Specifications.*** In addition to the general rules for equipment certification in § 90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.

(1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

(2) The noise figure of a signal booster must not exceed 9 dB in either direction.

(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

(4) A signal booster must be designed such that all signals that it retransmits meet the following requirements:

(i) The signals are retransmitted on the same channels as received. Minor departures from the exact provider or reference frequencies of the input signals are allowed, ***provided that*** the retransmitted signals meet the requirements of § 90.213.

(ii) There is no change in the occupied bandwidth of the retransmitted signals.

(iii) The retransmitted signals continue to meet the unwanted emissions limits of § 90.210 applicable to the corresponding received signals (assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin).

(5) On or after March 1, 2014, a signal booster must be labeled to indicate whether it is a Class A or Class B device, and the label must include the following advisory

(1) In on-line point-of-sale marketing materials,

(2) In any print or on-line owner's manual and installation instructions,

(3) On the outside packaging of the device, and

(4) On a label affixed to the device:

“WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at *www.fcc.gov/signal-boosters/registration.* Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.”

[78 FR 21564, Apr. 12, 2013, as amended at 83 FR 61097, Nov. 27, 2018]

HOW TO BEST DETERMINE WHETHER A BUILDING NEEDS AN ERCES ~~BDA~~ OR NOT

An In-Building Radio Signal Strength Survey/Signal Survey is a process of measuring the signal strength by taking the signal readings within a specific area and documenting the readings in the form of a signal survey report. This process measures and quantifies the strength of an RF signal of a specific frequency within a specific area of the building. If the project is in a pre-construction phase (Greenfield), an accurate survey may be accomplished by using a radio receiver, i.e. a hand-held portable radio, that has a calibrated RSSI (Radio Signal Strength Indication) readout in dBm (Decibel Milliwatts). Lower signal levels will go into negative numbers, therefore, a higher negative number is really a lower signal level. A signal survey will tell us if a building has acceptable signal coverage or not, both before and after an ERCES system is installed.

An empty lot survey can be extremely useful to pre-construction engineering. ~~I~~iBwave is a design software that uses the design of the building, as well as the materials of the building, e.g. concrete, steel, low E-glass etc. to help anticipate the final signal prior to construction. It helps define the walls in the building and calculates the ~~ambient~~ radio signal strength and DAQ (Delivered Audio Quality) before the building is built. (Most jurisdiction require a minimum of 3.0 ~~dBm~~DAQ.) By taking your signal measurements and, through the software, incorporating the material (type of wall and exterior build e.g.), you can calculate how much of the signal will be degraded or attenuated by the Low-E glass, cinder block walls, concrete, and sheetrock.

In a nutshell, ~~T~~to perform an accurate site testing, pre-construction, have an FCC-GROL licensed technician take RSSI readings and measure DAQ N, S, E, W, of the property. The Project Managers and Engineers that are iBwave experts can predict the signal strength after the building is “dried in” (windows & walls are installed). If the predicted signal strength / Delivered Audio Quality for the critical areas of the building do not meet minimum code-required thresholds, then an ERCES will most likely be required. This is oftentimes too late in the construction process—and sometimes results in costly retrofits pulling cable & hanging antennas in areas that were previously finished. That is why a preliminary RSSI / DAQ test, accompanied with an iBwave design of the building, can accurately predict whether an ERCES will be needed before construction has begun—for a nominal fee.

The final “official” test to determine whether an ERCES is required would be after the building is dried-in, testing RSSI / DAQ in 20 equal size grids / floor. If any of the critical areas fail, then this will be reported to the building owner & the AHJ.

<u>From the Safer Buildings Coalition (January 2022):</u>

"The SBC (Safer Buildings Coalition) does not maintain a specific list of jurisdictions that have adopted in-building emergency responder communication enhancement system (ERCES) requirements. We travel to numerous jurisdictions annually conducting seminars on the ERCES and our audiences are made up of AHJ's, industry stakeholders and building owner representatives. As such, I am aware of numerous states and jurisdictions such as Florida, South Carolina, DC, North Carolina, California, Texas, Georgia, Las Vegas, Oregon, Washington State, New Jersey, Maryland, New York, and many others that have adopted the requirements of the IFC/NFPA. In all these locations, the requirement to provide these systems when needed is located within the fire and/or building codes and they are the responsibility of the owner typically prior to a final certificate of occupancy being issued. **Virginia is the only state/jurisdiction I am aware of that has something different**."

- Alan Perdue, Executive Director for the Safer Buildings Coalition

<u>Honeywell – BDA/ERCES Systems Presentation (June 2021):</u>

"At present 35 states, including Washington D.C., are requiring BDA systems. There are 34 states that have adopted the IFC; 4 more the IBC; and 9 more NFPA 1/101."

https://www.myccfs.org/assets/CoffeeBreakLit/Campus%20Coffee%20Break%202021%20.pdf

<u>Personal Research (January 2022):</u>

At present, 47 states have requirements for ERCES in new buildings as well as Washington, DC and Puerto Rico. Other than Virginia, the two remaining states allow optional local adoption of ERCES requirements. The vast majority of these statues simply adopt Section 510 of the International Fire Code without amendment. <u>None</u>, other than Virginia, share the responsibility of the system with the locality.

<u>International Code Council (August 2021):</u>

https://www.iccsafe.org/wp-content/uploads/Master-I-Code-Adoption-Chart-AUG-2021.pdf

2018 NC Fire Code
510 Emergency Responder communications Coverage and Chapter 80 Referenced Standards. (201208 Item B-5)

SECTION 510 EMERGENCY RESPONDER COMMUNICATION COVERAGE

510.1 Emergency responder radio communication coverage in new buildings. *Approved* in-building 2- way emergency responder communication coverage shall be provided in all new buildings. In-building 2- way emergency responder communication coverage shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where *approved* by the building official and the *fire code official*, a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an *approved* communications coverage system.

2. Where it is determined by the *fire code official* that the communications coverage system is not needed.

3. In facilities where emergency responder communication coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the *fire code official* shall have the authority to accept an automatically activated emergency responder communication coverage system.

4. New buildings 7,500 square feet or less and not more than 1 story above *grade plane.*

4.1. This exception does not apply to windowless buildings, underground buildings or buildings with a *basement.*

510.2 Emergency Responder Communications Coverage in Existing Buildings. Deleted

510.3 Permit required. A construction permit for the installation of or modification to in-building 2- way emergency responder communication coverage systems and related equipment is required as specified in Section 105.7.6. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.4 Technical requirements. Equipment required to provide emergency responder communication coverage shall be listed in accordance with UL 2524. Systems, components and equipment required to provide the in-building 2-way emergency responder communication coverage system shall comply with Sections 510.4.1 through 510.4.2.8.

510.4.1 Emergency communication coverage system signal strength. The building shall be considered to have acceptable in-building 2- way emergency responder communication system coverage when signal strength measurements in 95 percent of all areas on each floor of the building and critical areas shall be provided with 99 percent floor area radio coverage. Critical areas are fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, sprinkler rooms, riser rooms, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the AHJ. The signal strength shall meet requirements in Sections 510.4.1.1 through 510.4.1.3.

510.4.1.1 Minimum signal strength into the building. The minimum inbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the *fire code official.* The inbound signal level shall be a minimum of -95dBm throughout the coverage area and sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference-Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.

510.4.1.2 Minimum signal strength out of the building. The minimum outbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the *fire code official*. The outbound signal level shall be sufficient to provide not less than a DAQ of 3.0 or an equivalent SINR applicable to the technology for either analog or digital signals.

510.4.1.3 System performance. Signal strength shall be sufficient to meet the requirements of the applications being utilized by public safety for emergency operations through the coverage area as specified by the *fire code official* in Section 510.4.2.2.

510.4.2 System design. The in-building 2- way emergency responder communication coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.

510.4.2.1 Amplification systems and components. Buildings and structures that cannot support the required level of in-building 2- way emergency responder communication coverage shall be equipped with systems and components to enhance the radio signals and achieve the required level of emergency communication coverage specified in Sections 510.4.1 through 510.4.1.3. Emergency communication systems utilizing radio-frequency-emitting devices and cabling shall be approved by the *fire code official*. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

510.4.2.2 Technical criteria. The *fire code official* shall maintain a document providing the specific technical information and requirements for the in-building 2- way emergency responder communication coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

510.4.2.3 Standby power. In-building 2- way emergency responder communication coverage systems shall be provided with dedicated standby power or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 604. The standby power supply shall be capable of operating the in-building 2- way emergency responder communication coverage system at 100-percent system capacity for a duration of not less than 12 hours.

510.4.2.4 Signal booster requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.

2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.

3. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.

4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.

5. Active RF emitting devices used in in-building 2- way emergency responder communication coverage systems shall have built-in oscillation detection and control circuitry.

6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building 2- way emergency responder communication coverage network shall be coordinated and approved by the *fire code official*.

510.4.2.5 System monitoring. The in-building 2-way emergency responder communication coverage system shall be monitored by a listed *fire alarm control unit*, or where approved by the *fire code official*, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signal shall include the following:

1. Loss of normal AC power supply.

2. System battery charger(s) failure.

3. Malfunction of the donor antenna(s).

4. Failure of active RF-emitting device(s).

5. Low-battery capacity at 70-percent reduction of operating capacity.

6. Failure of critical system components.

7. The communications link between the *fire alarm system* and the in-building 2- way emergency responder communication coverage system.

8. Oscillation of active RF-emitting device(s)

510.4.2.6 Additional frequencies and change of frequencies. The in-building 2- way emergency responder communication coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

510.4.2.7 Design documents. The *fire code official* shall have the authority to require "as-built" design documents and specifications for in-building 2- way emergency responder communication coverage systems. The documents shall be in a format acceptable to the *fire code official*.

510.4.2.8 Radio communication antenna density. Systems shall be engineered to minimize the near-far effect. In-building 2- way emergency responder communication coverage system designs shall include sufficient antenna density to address reduced gain conditions.

Exception:

1. Systems where all portable devices within the same band use active power control features.

510.5 Installation requirements. The installation of the in-building 2- way emergency responder communication coverage system shall be in accordance with NFPA 1221 and Sections 510.5.1 through 510.5.5.

510.5.1 Mounting of the donor antenna(s). To maintain proper alignment with the system designed donor site, donor antennas shall be permanently affixed on the building or where approved, mounted on a movable sled with a clearly visible sign stating "Movement or repositioning of this antenna is prohibited without approval from the fire code official". The antenna installation shall be in accordance with the applicable requirements in the *International Building Code* for weather protection of the building envelope.

510.5.2 Approval prior to installation.
Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC or other radio licensing authority shall not be installed without prior coordination and approval of the *fire code official* and the frequency license holder(s).

510.5.3 Minimum qualifications of personnel. The minimum qualifications of the system designer and lead installation personnel shall include both of the following:

1. A valid FCC-issued general radio operator's license.

2. Certification of in-building system training issued by an approved organization or approved school, or a certificate issued by the manufacturer of the equipment being installed.

These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the *fire code official* is provided.

510.5.4 Acceptance test procedure. Where an in-building 2- way emergency responder communication coverage system is required, and upon completion of installation, the building *owner* shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas. Where a floor exceeds 128,000 ft2 (11,900 m2), which is the floor area that can be covered by the maximum grid dimension of 80 ft. (24.4m), the floor shall be subdivided into sectors each having an area less than or equal to 128,000 ft2 (11,900 m2), and each sector be tested individually with 20 grid cells in each sector. Signal strength measurements should be taken at the center of each grid and should be performed using standardized parameters as specified by NFPA 1221.

2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the *fire code official.*

3. Failure of more than one test area shall result in failure of the test.

4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95-percent coverage requirement.

5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.

6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building *owner* so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building *owner* shall be required to rerun the acceptance test to reestablish the gain values.

7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and at subsequent annual inspections.

8. Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from the indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

510.5.5 FCC compliance. The in-building 2- way emergency responder communication coverage system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

510.6 Maintenance. The in-building 2- way emergency responder communication coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.4.

510.6.1 Testing and proof of compliance. The *owner* of the building or owner's authorized agent shall have the in-building 2- way emergency responder communication coverage system inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. In-building coverage test as described in Section 510.5.3.

2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance~~.~~ or set to optimize the performance of the system.

3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.

4. All active components shall be checked to verify operation within the manufacturer's specifications.

5. At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the *fire code official*.

510.6.2 Additional frequencies. The building *owner* shall modify or expand the in-building 2- way emergency responder communication coverage system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC~~.~~ or other radio licensing authority. Prior approval of an in-building 2- way emergency responder communication coverage system on previous frequencies does not exempt this section.

510.6.3 Nonpublic safety system. Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the in-building 2- way emergency responder communication coverage system, the nonpublic safety amplification system shall be corrected or removed.

510.6.4 Field testing. Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.

Chapter 80 Referenced Standards

NFPA
NFPA 1221-19 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems……….510.4.2, 510.5, 510.5.4.
UL
UL2524 -19 Standard for In-building 2- Way Emergency Radio Communication Enhancement Systems …………510.4.
FCC
47 CFR Part 90.219-2007 ……………………………………………510.5.4, 510.5.5

NFPA 1225 (2022 Edition) vs. NFPA 1221 (2019 Edition)

The most significant changes:

NFPA 1225 (2022 Edition) expands the definition of emergency communications, a movement from Emergency Responder Radio Communications Systems (ERRCS) to Emergency Responder Communication Enhancement Systems (ERCES)

- The Government Affairs Work Group is recommending the adoption of the 2022 edition of NFPA 1225 because there are new requirements that will improve the performance as well as reducing interference issues caused from improperly deployed signal boosters.

NFPA 1225 (2022 Edition) requires the "system" and "components" be listed and labeled in accordance with the UL2524 Standard

- 18.12.1.3: All repeaters, transmitters, receivers, signal-booster components, remote annunciators and operational consoles, power supplies, and battery charging system components shall be listed and labeled in accordance with UL2524, Standard for In-Building 2-Way Emergency Radio Communication Enhancement Systems.
- 1221 (2019): All repeater, transmitter, receiver, signal booster components, optical-to-RF and RF-to-optical converters, external filters, batteries, and battery system components shall be contained in a NEMA4 or NEMA4X type enclosure(s).

NFPA 1225 (2022 Edition) has consolidated the standards for easier access.

NFPA 1225 (2022 Edition) requires under 18.8.4 that "General building areas shall be provided with 95% floor area radio coverage. This differs from NFPA 1221 9.6.7.4 which only requires 90% coverage.

NFPA 1225 (2022 Edition) adds LTE into the code:

- 18.9.1 Downlink
    - A minimum downlink signal shall be sufficient to provide a minimum of DAQ 3.0 for voice communications using either narrowband analog or digital P25 signals or wideband LTE digital signals throughout the coverage area.
- 18.9.2 Uplink
    - The uplink signal shall be sufficient to provide a minimum of DAQ for voice communications using either narrowband, analog or digital P25 signals or widespread LTE digital signals.

NFPA 1225 (2022) 18.11.2.1 requires "Systems shall be upgradeable to allow for instances where the jurisdiction changes or adds system frequencies to maintain communication system coverage as it was originally designed.".

NFPA 1225 (2022) has added a 3rd prong to "Secondary Power Source" 18.13.2

- (3) A 2-hour standby battery and connection to the facility generator power system, providing the facility generator power system can support the complete system load for 12 hours.

Other Changes

- Lightning protection to comply with NFPA 780
- Plan submittal requirements have changed to include a link budget.
- Renewable permit or written authorization by licensee shall be issued for the system
- Coverage in critical areas shall be at 99% including elevators.
- Building and structures that cannot support the required level of radio coverage shall be equipped with an RF-Emitting device certified by the licensee.
- Systems shall be designed to support two different talk paths or channels –
- Minimum inbound signal to support usable voice communications of DAQ 3
- Minimum outbound signal to support usable voice communications of DAQ 3
- AHJ shall maintain a list of all inbound/outbound frequency pairs for distribution to designers
- RF emitting devices shall be compatible with both analog and digital communications
- All cables shall be installed in accordance with chapters 7 and 8 of NFPA 70
- AHJ may approve a single supervisory signal to the fire panel
- Back cables and components installed in buildings that are fully protected by an automatic sprinkler system shall be installed in metal raceways
- Backbone cables and components installed in non-sprinklered buildings or buildings that are only partially protected by a sprinkler system shall meet the following: 1) Listed with a fire rating, and 2) protected by an assembly having a fire resistance rating in accordance with the following: Where primary structural frame of a building is required to have a fire rating of 2 hours or more, the minimum fire resistance rating shall be 2 hours; where the primary structure frame of a building is less than 2 hours, minimum shall be 1 hour; where primary structural frame has no rating, no fire resistance is required.

SAFECOM Guidance Frequently Asked Questions: Understanding P25 Standards and Compliance

This document summarizes the compliance requirements for Project 25 (P25) compliance standards outlined in the *SAFECOM Guidance on Emergency Communications Grants (SAFECOM Guidance)*. Grantees and applicants funding emergency communications projects using federal funds should reference this frequently asked questions document to understand P25 compliance and find resources when needed. For the purpose of this document, the terms "I" and "my" refer to the grantee or applicant of an agency seeking federal funds for emergency communications projects.

Project 25

Q1. What are P25 standards?

P25 is a suite of standards and specifications which enable interoperability among digital two-way land mobile radio (LMR) communications products provided by multiple manufacturers to support the mission critical public safety requirements. These standards provide a number of technical specifications for emergency communications equipment designed to ensure that equipment is interoperable, regardless of manufacturer. The P25 suite of standards, referenced as TIA-102 standards, is published by the Telecommunications Industry Association (TIA),[1] a recognized American National Standards Institute standards development organization. The P25 Steering Committee periodically publishes a list of "Approved Project 25 Suite of Standards" that includes the most recent documents, including revisions.

Q2. What is the P25 Compliance Assessment Program (CAP)?

The P25 CAP is a formal, independent process administered by the Department of Homeland Security (DHS) Office for Interoperability and Compatibility (OIC), to ensure communications equipment offered by the supplier is compliant with the applicable published standards and the test results are reflected in publicly published documents. Through this third party testing process by independent labs, the P25 CAP provides public safety agencies with evidence that the communications equipment they purchase is tested against and complies with the P25 standards for performance, conformance, and interoperability. Compliance test results are provided with official summary test reports and suppliers' declaration of compliance, which are available at https://www.dhs.gov/science-and-technology/p25-cap.

Q3. What does P25 compliance mean?

Compliance with the P25 suite of standards may differ by each federal agency. To maximize opportunities to improve interoperability across investments, grantees are highly encouraged to ensure that digital voice systems and equipment purchased with federal grant funds comply with the P25 suite of standards, unless otherwise noted in a program's grant guidance.[2] P25 compliance

[1] The published standards approved by the P25 Steering Committee are available to employees of government agencies at no cost by completing the TIA online request form for government agencies at: http://www.tiaonline.org/all-standards/p25-downloads-application.

[2] Grantees should read a program's grant guidance carefully to ensure compliance with standards, allowable cost, documentation, reporting, and audit requirements.

helps to ensure federal grant funds are used to purchase interoperable solutions for state, local, tribal, and territorial first responders.

Q4. Why is purchasing P25 compliant equipment and systems so important to the public safety community?

Following the tragic events from 9/11, legislation was passed to improve the interoperability of public safety communications systems and equipment. Congress mandated that new or upgraded equipment must be interoperable and meet certain interoperability standards. As a result, the Federal Government supported the purchase of P25 compliant LMR equipment through grants and policy, to ensure public safety systems can interoperate, regardless of manufacturer.

Purchasing P25 equipment ensures that digital LMR systems will be compatible with other, most importantly contiguous, P25 systems. Additionally, standards-based systems enable interoperable communications between emergency responders from various agencies, jurisdictions, and levels of government in the event they need to communicate during day-to-day incidents, large-scale emergencies, and disaster responses. Additionally, P25 standards provide a broader resource of competitive vendors providing more flexibility in purchasing equipment.

P25 Compliance for DHS Grantees

Q5. DHS/FEMA requires its grantees to comply with the SAFECOM Guidance. As a DHS grantee, am I also required to comply with P25 standards?

Yes, DHS/FEMA grantees are required to comply with P25 standards when purchasing LMR equipment. This requirement and other conditions specific to DHS/FEMA grantees are outlined in Appendix D of the *SAFECOM Guidance*. For additional information, reference the *DHS Authorized Equipment List* to determine allowable equipment types for individual grant programs. If the proposal includes any non-compliant P25 LMR equipment, DHS/FEMA grantees must apply for prior approval.

P25 Purchases Using Federally-Funded Grants

Q6. When applying for a federally-funded emergency communications project, how do I demonstrate that purchases are P25 compliant?

To ensure equipment and systems are compliant with the P25 suite of standards, grantees are strongly encouraged to:

- Review the technical specifications detailed in the P25 Technology Interest Group's (PTIG) *Capabilities Guide*[3] to determine which standards are applicable to the proposed purchase and project.
- Include all applicable P25 standards and expectations for interoperability in any Statement of Work or bid for communications procurements funded through federal grants.
- Ensure all P25 eligible equipment, features, and capabilities selected are P25 compliant, to include new equipment and upgrades. When federal grant funds are used to purchase P25 LMR equipment and systems that contain non-standard features or capabilities[4], when a comparable

[3] The PTIG *Capabilities Guide* can be found on the PTIG website. To register, visit: http://www.project25.org/.

[4] Within the P25 standards, services and features are categorized as mandatory or standard option (see Appendix A for list of mandatory and standard option features). To be P25 compliant, a product *must* support mandatory features, in accordance with

P25 feature or capability is available, grantees must ensure the standards-based feature or capability is included as well.

- Obtain documented evidence of P25 compliance from the manufacturer that the equipment has been tested and passed all the applicable, published, normative P25 compliance assessment test procedures for performance, conformance, and interoperability as defined in the latest P25 CAP Compliance Assessment Bulletins for testing requirements. If documentation for applicable equipment is not available through the P25 CAP, grantees are encouraged to obtain documented evidence from the manufacturer, as part of the proposal, stating that the applicable tests (identified in the procurement package) were conducted in accordance with the published test procedures in the P25 suite of standards.

Q7. What will the federal agency issuing grant funding use to confirm if purchases in my grant application are P25 compliant?

When reviewing grant applications, the federal agency will verify that proposed equipment purchases are P25 compliant by:

- Reviewing the *P25 Compliant Approved (Grant-Eligible) Equipment List* to confirm if the equipment to be purchased has been tested and is reflected on the list. If the item is included, it is P25 compliant.
- Referring to the *DHS Authorized Equipment List* (applicable to DHS/Federal Emergency Management Agency [FEMA] grants only).
  - Note: Some items on this list may not be applicable to the P25 standards.
- Reviewing the application package to confirm if the applicant provided a letter from the manufacturer verifying the purchase is P25 compliant.

If the purchase cannot be verified as P25 compliant using these methods, then the federal agency has the authority to request additional information, grant a waiver, or deny the purchase. As a reminder, the federal agency awarding the grant has the right to deny a waiver and one should only be considered for unique circumstances that will not impact interoperability.

Q8. What will happen if I try to purchase non-compliant P25 equipment?

While not encouraged, in the event a grantee is using federal funds to purchase equipment that does not align with P25 standards, the grantee must consult with the federal agency to determine if non-compliant P25 equipment is allowable. In some cases, written justification must be provided to the grantor.

Many agencies will not approve non-standards-based equipment unless there are compelling reasons for using other solutions. Authorizing language for most emergency communications grants strongly encourages investment in standards-based equipment. Funding requests by agencies to replace or add radio equipment to an existing non-compliant P25 system will be

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the P25 definition in the standards. Standard option features are not essential but must conform to the P25 definitions if offered by the manufacturer. All other features offered by a manufacturer are considered proprietary options. A manufacturer's proprietary option is a feature that is not a requirement but may provide an added value to the customer (e.g., status messaging). However, this feature may not be interoperable with other manufacturers' equipment.

considered if there is a clear rationale why such equipment should be purchased and written justification of how the equipment will advance interoperability and support eventual migration to interoperable systems. The written justification should also explain how that purchase will serve the needs of the applicant better than equipment or systems that meet or exceed such standards. Absent compelling reasons for using other solutions, agencies are strongly encouraged to invest in standards-based equipment.

P25 Compliance Resources

Q9. What resources should be considered when applying for emergency communications grant funding?

Grant applicants applying for emergency communications funding are strongly encouraged to work with their Statewide Interoperability Coordinator (SWIC). The SWIC should review the application prior to submission to ensure projects support the state or territory's strategy to improve interoperable emergency communications. The SWIC can also confirm the funding request aligns to the latest versions of their *Statewide Communication Interoperability Plan* and the *National Emergency Communications Plan*, as these are vital plans to improving interoperability.

Q10. Where can I find more information about P25 standards and/or compliance?

Grantees should be aware that a wide range of information is available from government and industry resources, including:

- SAFECOM and the National Council of Statewide Interoperability Coordinators' Land Mobile Radio Trio - LMR 101, LMR for Decision Makers, and LMR for Project Managers: https://www.dhs.gov/safecom/funding
- PTIG: http://www.project25.org/ (Free registration required)
- P25 Suite of Standards: http://www.project25.org/images/stories/ptig/20160128_Approved_P25_TIA_Standards_Q1-2016.pdf
- P25 CAP Information: https://www.dhs.gov/science-and-technology/p25-cap; http://www.firstresponder.gov/Pages/P25CAP.aspx?s=Saver
- P25 CAP Approved (Grant-Eligible) Equipment List: https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment
- P25 CAP Compliance Assessment Bulletins: https://www.dhs.gov/science-and-technology/p25-cap
- Best Practices for Encryption in P25 Public Safety Land Mobile Radio Systems: https://www.dhs.gov/sites/default/files/publications/20160830%20Best%20Practices%20for%20Encryption_Final%20Draft508.pdf

Update on UL 2524, Standard for In-Building 2-Way Emergency Radio Communications Enhancement Systems

September 17, 2019 SUPDET

Larry Shudak, P.E.
Principal Engineer - Life Safety Systems

Empowering Trust™

Background on ERECS

- Portable Land Mobile Radios (LMRs) are an essential life-safety <u>tool</u> for firefighters

- Many buildings prevent the receipt or transmission of LMR messages based on construction elements and/or building configuration

- ERCES provide assurance that emergency messages can be transmitted and received into and out of every building

- ERCES do not rely on alternate communication equipment or fixed locations from which to transmit

Background on ERECS

Code Requirements – ICC and NFPA

NFPA 72 and NFPA 1221

The 2016 edition of NFPA 1221 includes Section 9.6 (Two-Way Radio Communication Enhancement Systems) with technical requirements for design, installation and performance generally consistent with the 2018 IFC Section 510.

Background on ERECS

Code Requirements – ICC and NFPA

NFPA 1 Fire Code

- First introduced in 2012 edition
- All buildings to have *approved* radio coverage for emergency responders available throughout the interior of building at a level determined by the AHJ.
- References NFPA 72 and NFPA 1221

Background on ERECS

Code Requirements – ICC and NFPA

International Fire Code (IFC) Section 510

- First introduced in 2009 edition
- All new buildings to have *approved* radio coverage for emergency responders available throughout the interior of building at the same coverage levels that existed outside the building
- References NFPA 72 and NFPA 1221

UL 2524

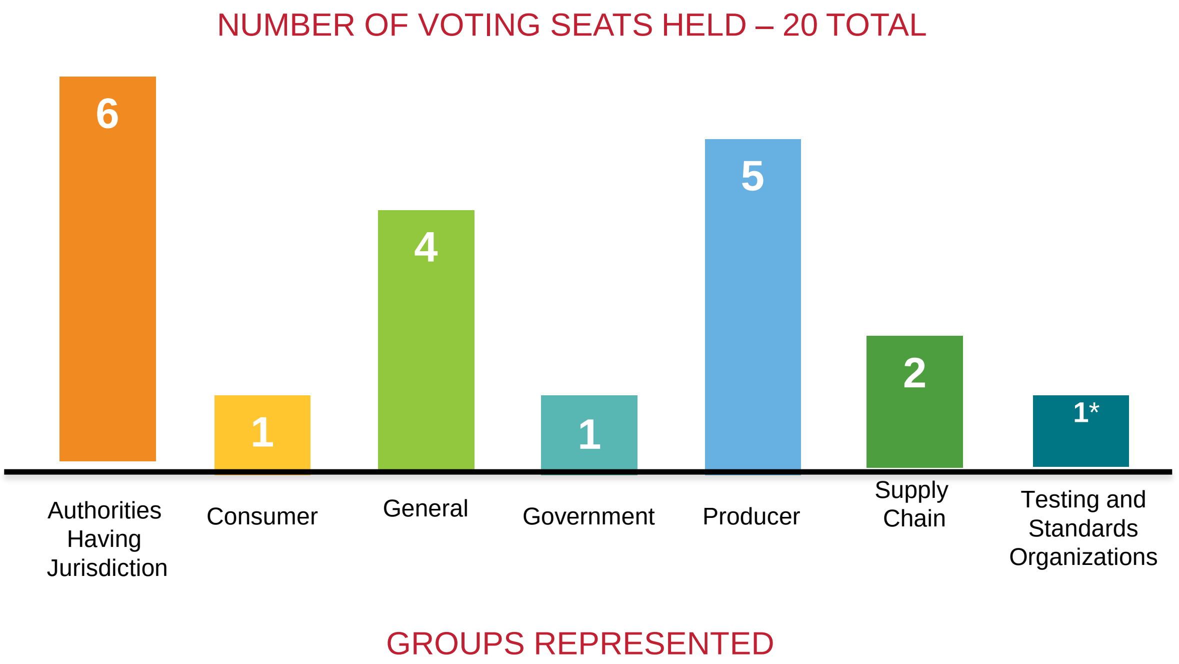
December 2017: UL 2524 published as an Outline of Investigation

Spring 2018: Standards Technical Panel (STP) formed for US/CAN

October 2018: ANSI accredited First Edition standard published

January 2019: ANSI and SCC accredited Second Edition standard published

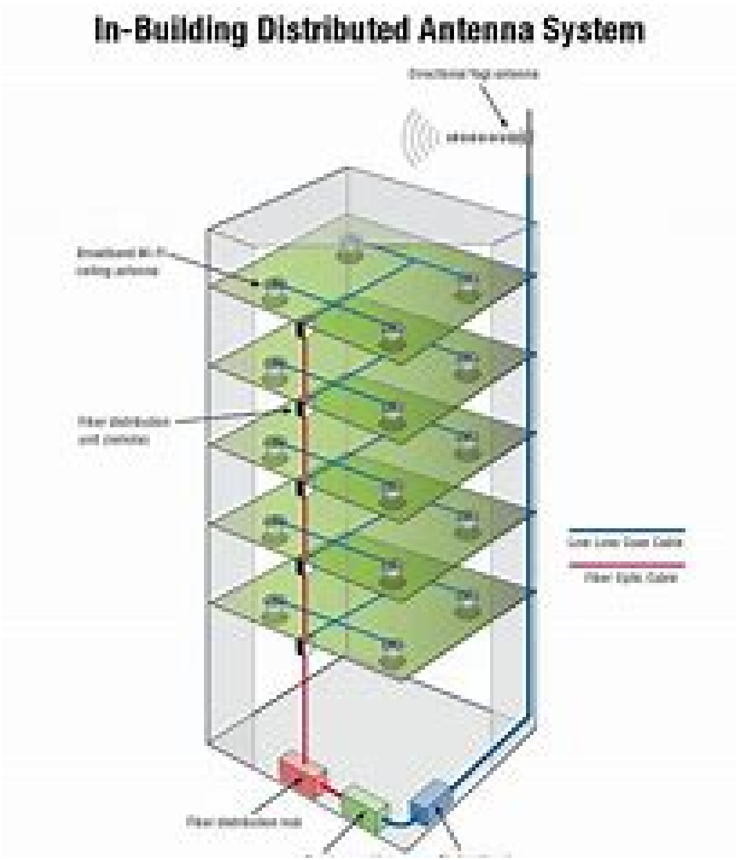
UL 2524 Standards Technical Panel (STP)



* UL holds the one voting seat in this category

UL 2524

Distributed Antenna System (DAS)



UL 2524

This standard addresses the following areas:

- Safety (risk of fire and risk of shock) requirements – construction and testing
- Compliance with specific performance requirements in accordance with the IFC-2018 & NFPA 1221-2019
- Reliability performance requirements applicable for life safety systems – construction and testing
- Product marking and installation documentation

UL 2524

<u>Construction</u>:

- Type 4 or 4X for all repeater, transmitter, receiver, signal booster components, external filters, and battery system components

  ❖ *Rechargeable standby batteries are permitted to be contained in enclosures that comply with the requirements for a Type 3R*

- The system shall be sufficiently modular to have the capability to support revised and/or additional system frequencies <u>within the same frequency band of the bi-directional amplifier</u> supplied to maintain radio system coverage as it was originally intended without the need to replace the system.

UL 2524

Performance - Operation:

a) Loss of normal AC power *

b) Battery charger failure *

c) Loss of battery capacity (to 70 percent depletion) *

d) Donor antenna disconnection *

e) Active RF emitting device malfunction *

f) System component malfunction, other than passive RF components, which affects system performance *

g) Donor antenna malfunction **

* = Visual and Audible annunciation within 200 sec of fault

** = Visual and Audible annunciation within 24 hrs. of fault

UL 2524

Reliability:

a) Variable Voltage Operation Test

b) Variable Ambient Temperature and Humidity Tests

c) Component Temperatures Test

d) Charging Current Test – 12 hours full transmitting load

e) Supply line and input/output ckt Transient Testing

UL 2524

Equipment Survivability

- Type 4 and 4X enclosures
- Backbone pathway survivability
- Standby power – 12 hours at 100% capacity

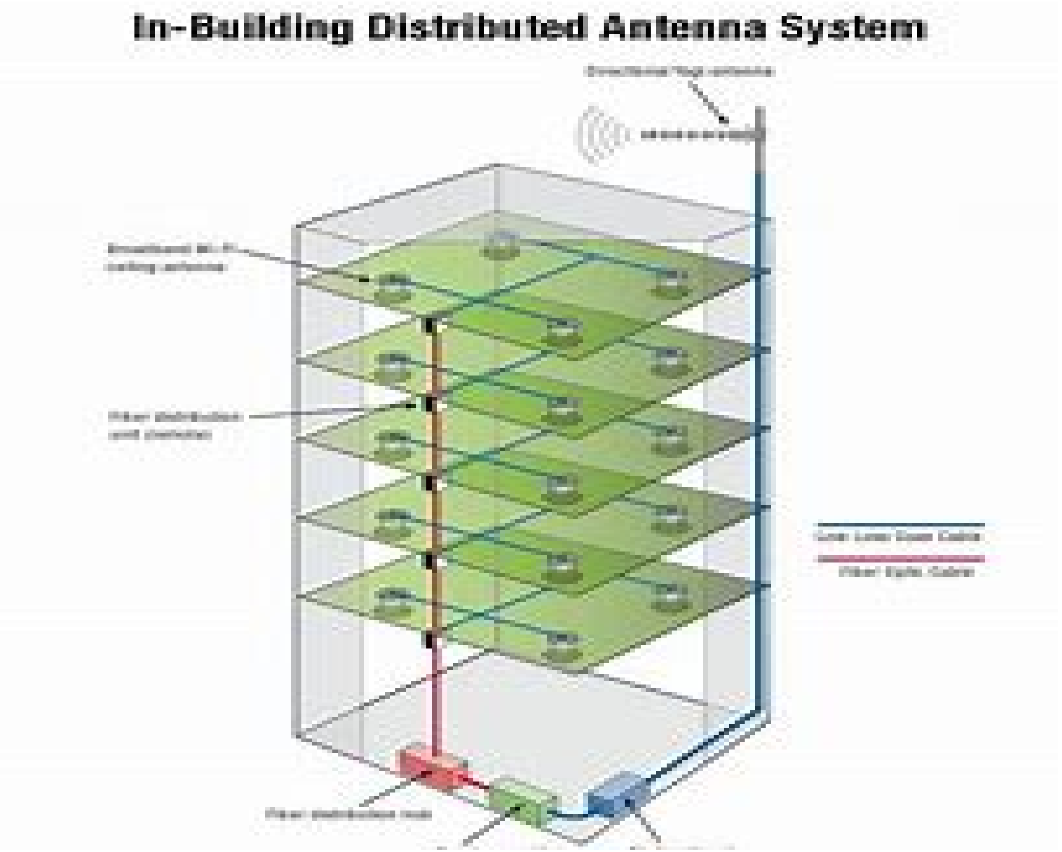
- Does the equipment need to maintain performance to a minimum ambient temperature to extend system operation?
    - Note that equipment includes: repeater, transmitter, receiver, signal booster components, power supply, and battery charging system components

UL 2524

PASSIVE RF COMPONENT – Any device that RF passes through that does not have an active electronic component that requires external power. This includes antennas, splitters, couplers, coaxial cable and connectors. Passive components cannot amplify RF signals.

ACTIVE RADIO FREQUENCY EMITTING DEVICE – A powered device that emits a radio frequency signal as part of an in-building 2-way emergency radio communication enhancement system

Should passive RF components be monitored for integrity?



UL 2524A Outline of Investigation Outline for In-Building Auxiliary Radio Communication Systems

- ARCS for FDNY
- Equipment such as base station, repeaters, transmitters, receivers, signal boosters, power supplies, battery charging system components, and dedicated radio console
- New York City Fire Department Rule 1–RCNY and Rule 3-RCNY 511-01, In-Building Auxiliary Radio Communication Systems.

UL 2524A Outline of Investigation Outline for In-Building Auxiliary Radio Communication Systems

- Unique requirements for FDNY
  - No donor antenna
  - Only manual activation
  - For use with specific channels and radios
  - Passive RF antenna malfunction monitored for integrity

Thank You

Larry Shudak
UL LLC
847-664-2791
lawrence.j.shduak@ul.com

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IBEC Costs – Steve Shapiro

- Commercial building in D.C.
    - 12 floors
    - 396,000 sq. ft.
    - system price = $56,560
    - cost per sq. ft. = $0.14
- Commercial building in Winchester
    - 2 floors   59,800 sq. ft.
    - system price = $22,680
    - cost per sq. ft. = $0.38
- Mixed Use in D.C
    - 17 floors
    - 296,650 sq. ft.
    - system price = $36,190
    - cost per sq. ft. = $0.12
- Mixed Use in Alexandria
    - 9 floors   396,000 sq. ft.
    - system price = $38,150
    - cost per sq. ft. = $0.10
- Residential in Reston
    - 16 floors
    - 268,800 sq. ft.
    - system price = $26,460
    - cost per sq. ft. = $0.10

APPENDIX D: Code Change Proposals

B918.1-21

VCC: 918.1, 918.1.1, 918.1.3, 918.1.2, 918.2

Proponents: Andrew Milliken (amilliken@staffordcountyva.gov)

2018 Virginia Construction Code

Revise as follows:

918.1 General. For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building emergency communication to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new *buildings* and *structures* in accordance with this section.
Exceptions:

1. *Buildings* of Use Groups A-5, I-4, within *dwelling units* of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area *buildings* in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. *Buildings* or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the *building official* has *approved* an alternative method to provide emergency communication equipment for *emergency public safety personnel*.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.
6. ~~*Buildings* in *localities* that do not provide the additional communication *equipment* required for the operation of the system.~~

918.1.1 Installation. ~~The *building owner* shall install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The *locality* shall be responsible for the installation of any additional communication *equipment* required for the operation of the system.~~ <u>Where provided, an in-building two-way emergency responder communication coverage system shall be designed, installed and tested in accordance with section 510.4 and 510.5 of the International Fire Code. In-building, two-way emergency responder communication coverage within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.</u>

918.1.3 Inspection. In accordance with Section 113.3, all installations shall be inspected prior to concealment.

Delete without substitution:

~~**918.1.2 Operations.** The *locality* will assume all responsibilities for the operation and maintenance of the emergency communication *equipment*. The *building owner* shall provide sufficient operational space within the *building* to allow the *locality* access to and the ability to operate in-building emergency communication *equipment*.~~

~~**918.2 Acceptance test.** Upon completion of installation, after providing reasonable notice to the *owner* or their representative, *emergency public safety personnel* shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the *owner*. Any noted deficiencies in the installation of the radiating cable or operational space shall be provided in an inspection report to the *owner* or the *owner's* representative.~~

Reason Statement: At present, 47 states as well as Washington, DC and Puerto Rico have mandatory requirements for emergency responder communication systems in new buildings. None, other than Virginia, share the responsibility of the system with the locality. This proposal revises outdated technology, language and responsibilities for providing in-building emergency responder communication systems. **This proposal was supported by a majority of members of the Study Group convened to look into this topic.**
The effectiveness and reliability of emergency responder communication is one of if not the most important aspects of successful emergency response and protection of public safety. In fact, as wireless technologies advance and community hazards expand, these public safety communication tools quickly become the backbone of incident response for not only fire and rescue personnel but also law enforcement and other first responders. Just as the water provided in building standpipes is critical to firefighting operations in large buildings, clear and dependable communications is vital to the safety of first responders in these buildings. This is in keeping with the philosophy inherent in the model codes that, when a facility grows too large or complex for effective fire response, fire protection features must be provided within the building. Building construction features and materials can absorb or block the radio frequency energy used to carry the signals inside or outside the building. Blockage or absorption of the radio frequency signal can prevent a critical message from an emergency responder from being received and acknowledged. Depending on the incident, this loss of information can place other emergency responders in greater danger or may prevent an injured or disoriented emergency responder from communicating for assistance.

The current VCC language requires the use of out-dated technology and in some cases the installation of equipment that may never be used.

Unless meeting one of the exemption requirements, building owners are required to route hundreds of feet of likely disconnected cabling throughout the building including in areas where existing coverage may already be adequate. This proposal does NOT remove or modify any of the five building exemptions currently indicated by the current code (VCC 916.1) so as to maintain consistency throughout Virginia. In addition, the current VCC language provides no recognition as to the current level of public safety communication strength currently on site. Without additional guidance, this could suggest that a building owner is responsible for providing a higher level of radio coverage than what currently is present in reality - a cost that is not fair to be burdened by the building owner or developer. The proposed language ensures that the building is only required to maintain the existing level of public safety radio communication coverage available at the exterior of the building.

Furthermore, just as building standpipe systems, fire hydrant systems, fire alarm systems and other fire protection systems are required to be provided as part of the building infrastructure for emergency responder use, the reliability and dependability of emergency radio enhancement systems demand that they be similarly connected to and monitored by the building fire alarm system. Finally, the current VCC language does not provide any reference standard for the installation or testing of such systems. This proposal includes a reference to the IFC for these details to ensure that they are capable, compatible and interoperable for emergency response at any time or location.

Resiliency Impact Statement: This proposal will increase Resiliency
As compared to the ineffective and in some cases unnecessarily burdensome code language currently present in the VCC, this proposal represents a tremendous increase in building and public safety resiliency. Ensuring that first responders are able to effectively communicate is invaluable to the successful outcome of emergency response incidents and the protection of lives and property. The assurance for emergency responder radio coverage that this proposal provides does so not only for the major, or once-in-a-lifetime catastrophes but also many times over in the daily smaller "routine" emergencies that occur throughout buildings.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Since this proposal does not remove or modify any of the five building exemptions from providing in-building communication infrastructure, this proposal only applies to the same buildings where infrastructure is already required to be provided. Althought the responsibility for the system installation moves to the building owner, the costs have not increased. In fact, this proposal provides the ability of building owners and developers to utilize cost-effective technology to accomplish the requirement with less labor and materials. Moreover, it also works to ensure that such technology is only provided where it is found to be needed and only to the level at which the public safety system currently provides at the exterior of the building. These cost-saving efforts are expected to equal or exceed any added cost to monitor such system by the building fire alarm system. Also, since the proposal is based on national and international standards that have been in place for years, most large construction projects already anticipate these costs for construction around the country.

Attached Files

- **BDA_White_Paper_-_Final.pdf**
  https://va.cdpaccess.com/proposal/985/1552/files/download/663/

B918.1(2)-21

VCC: SECTION 918, 918.1, 918.1.1, 918.1.2, 918.1.3, 918.2; IBC®: [F] 2702.2.3

Proponents: DHCD Staff on behalf of the following stakeholders represented at the In-Building Emergency Communications Study Group: The Apartment & Office Building Association/Virginia Apartment Management Association, Backhaul Engineering, Virginia Restaurant, Lodging & Travel Association, Virginia Fire Prevention Association, and the Virginia Fire Chiefs Association

2018 Virginia Construction Code

SECTION 918
IN-BUILDING EMERGENCY COMMUNICATIONS COVERAGE

918.1 General. For localities utilizing public safety wireless communications, dedicated infrastructure to accommodate and perpetuate continuous in-building emergency communication *equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in new *buildings* and *structures* in accordance with this section.
Exceptions:

1. *Buildings* of Use Groups A-5, I-4, within *dwelling units* of R-2, R-3, R-4, R-5, and U.
2. Buildings of Types IV and V *construction* without basements, that are not considered unlimited area *buildings* in accordance with Section 507.
3. Above grade single story buildings of less than 20,000 square feet (1858 m^2).
4. *Buildings* or leased spaces occupied by federal, state, or local governments, or the contractors thereof, with security requirements where the *building official* has *approved* an alternative method to provide emergency communication equipment for *emergency public safety personne*l.
5. Where the *owner* provides technological documentation from a qualified individual that the *structure* or portion thereof does not impede emergency communication signals.
6. *Buildings* in *localities* that do not provide the additional communication *equipment* required for the operation of the system.

Revise as follows:

918.1.1 Installation. <u>In-building two-way emergency responder communication coverage systems shall comply with Sections 510.4 and 510.5 of the International Fire Code, except that the acceptance testing procedure required by Section 510.5.4 of the *International Fire Code* shall be the responsibility of the *locality*.</u> The *building owner* shall install radiating cable, such as coaxial cable or equivalent. The radiating cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The *locality* shall be responsible for the installation of any additional communication *equipment* required for the operation of the system.

918.1.2 Operations. The *locality* will assume all responsibilities for the operation and maintenance of the emergency communication *equipment*. The *building owner* shall provide sufficient operational space within the *building* to allow the *locality* access to and the ability to operate in-building emergency communication *equipment*.

918.1.3 Inspection. In accordance with Section 113.3, all installations shall be inspected prior to concealment.

918.2 Acceptance test. Upon completion of installation, after providing reasonable notice to the *owner* or their representative, *emergency public safety personnel* shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the *owner*. Any noted deficiencies in the installation of the radiating cable or operational space shall be provided in an inspection report to the *owner* or the *owner's* representative.

2021 International Building Code

Delete without substitution:

~~**[F] 2702.2.3 Emergency responder communication coverage systems.** Standby power shall be provided for in-building 2-way emergency responder communication coverage systems required in Section 918 and the *International Fire Code*. The standby power supply shall be capable of operating the in-building 2-way emergency responder communicationcoverage system at 100-percent system operation capacity for a duration of not less than 12 hours.~~

Reason Statement: This proposal was developed during the in-building emergency communications (IBEC) study group to provide references to the IFC, which in turn provides technical provisions for IBEC systems that otherwise do not exist in the building code.

Resiliency Impact Statement: This proposal will increase Resiliency
This proposal will increase the resiliency of buildings by providing technical references to the IFC that will enhance in-building emergency communications to allow emergency personnel to better respond to building emergencies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

B918.1.1-21

VCC: 918.1.1

Proponents: DHCD Staff on behalf of the following stakeholders represented at the In-Building Emergency Communications Study Group: The Apartment & Office Building Association/Virginia Apartment Management Association, Virginia Department of Fire Programs, Virginia Restaurant, Lodging & Travel Association, Virginia Fire Prevention Association, Virginia Fire Chiefs Association, and the Virginia Building and Code Officials Association.

2018 Virginia Construction Code

Revise as follows:

918.1.1 Installation. The *building owner* shall install ~~radiating cable, such as coaxial cable or equivalent~~ cabling. The ~~radiating~~ cable shall be installed in dedicated conduits, raceways, plenums, attics, or roofs, compatible for these specific installations as well as other applicable provisions of this code. The *locality* shall be responsible for the installation of any additional communication *equipment* required for the operation of the system.

Reason Statement: This proposal was developed during the in-building emergency communications (IBEC) study group and seeks to remove the antiquated language of "radiating cable" by replacing it with the simple terminology, "cabling." The language change removes design restrictions and opens the door for new technologies that can be used for IBEC systems.

Resiliency Impact Statement: This proposal will increase Resiliency
This proposal will increase resiliency by not binding IBEC systems to antiquated technology. Providing the opportunity for newer, more efficient communication systems technology enhances the IBEC system and the resiliency of buildings.

Cost Impact: The code change proposal will decrease the cost of construction
This change can decrease the cost of construction by allowing alternative technologies beyond radiating cable.

APPENDIX E:

General Stakeholders Workgroup Meetings Excerpts

Note: This Appendix contains excerpts from the General Stakeholders Workgroup Meeting Summaries related to the three code change proposals considered during the Study Group discussions.

Code Change Proposal B918.1-21

Excerpt from June 7, 2022, General Stakeholders Workgroup Meeting Summary

B918.1-21

Andrew Milliken (proponent): This proposal was discussed in the In-Building Emergency Communication (IBEC) Study Group, but it was non consensus. It brings in language about how to accept and install systems and places responsibility back on the owner.

Jeff Brown (DHCD staff): There were a few similar proposals discussed in the IBEC Study Group. Some members were in favor of this one and some were not.

Steve Shapiro [Apartment and Office Building Association (AOBA) and Virginia Apartment Management Association (VAMA)]: AOBA and VAMA are in opposition to this proposal. The owner should not be responsible to provide all aspects of the system. The owner is ok with providing the cabling and referencing the Fire Code Sections 510.4 and 510.5 for installation. However, it should be the locality that's responsible to install the systems.

Jeff Brown: If there is no further support, this will be marked as Consensus for Disapproval.

Andrew Milliken: There were some Study Group members that were in support of this. Does that count for this decision?

Allison Cook (Arlington County): Supports this proposal. This has been happening at the national level, and in Arlington and other Virginia localities.

Jeff: Hearing no further discussion, this proposal will be marked as Non Consensus.

Code Change Proposal B918.1(2)-21

Excerpt from June 7, 2022, General Stakeholders Workgroup Meeting Summary

B918.1(2)-21

Jeff Brown: The DHCD staff prepared this proposal on behalf of some stakeholders in the IBEC Study Group. It brings in the Fire Code as a technical reference, without making changes to who's responsible to install the systems. Wiring would be the responsibility of the building owner and the rest of the system would be installed by the locality.

Steve Shapiro: AOBA and VAMA are in support of this proposal.

Jeff Brown: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

Code Change Proposal B918.1.1-21

Excerpt from June 7, 2022, General Stakeholders Workgroup Meeting Summary

B918.1.1-21

Jeff Brown: The DHCD staff prepared this proposal on behalf of some stakeholders in the IBEC study group. It eliminates some outdated language in an old Virginia amendment. Radiating cable is an outdated term.

Steve Shapiro: AOBA and VAMA are in support of this. Radiating cable technology actually defeats the purpose.

Jeff: Hearing no further discussion, this proposal will be marked as Consensus for Approval.

TAB 14

RESIDENTIAL SPRINKLERS STUDY GROUP REPORT

June 9, 2022

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT 600 E. MAIN STREET
SUITE 300 RICHMOND, VA 23219

TABLE OF CONTENTS

EXECUTIVE SUMMARY

During the 2018 Code Development Cycle, the Board of Housing and Community Development (BHCD) directed the Department of Housing and Community Development (DHCD) to convene a group of interested stakeholders with the scope of researching and discussing the potential impacts of mandating residential sprinkler systems in townhouses.

The study group convened virtually (through Adobe Connect) four times: December 15, 2021; January 11, 2022; March 25, 2022; and May 17, 2022.[1] At each of these meetings, the study group discussed the issues and shared pertinent information and concerns related to the requirements for residential sprinkler systems in townhouses.

Currently, the installation of residential sprinkler systems in townhouses is optional. When optional sprinkler systems are installed in townhouses, the Virginia Residential Code (VRC) allows for some relief from certain other code requirements, such as: reduced minimum distance to property lines, emergency escape and rescue openings are not required, the fire wall between units does not have to be structurally independent; and a reduction in the minimum required fire-resistance-rating of the fire wall between units.

Discussions included the review of fire and housing affordability data, sprinkler studies from other states, cost estimates, sample townhouse sprinkler plans, code change proposals and more.

Ultimately, the study group did not reach consensus on the feasibility of mandating sprinkler systems in townhouses. Below are some reasons cited by the supporters of mandating the installation of sprinkler systems, as well as reasons for opposing such a statewide mandate.

Reasons for support:

- Sprinklers save lives
- Sprinklers reduce injury to occupants and firefighters
- Sprinklers reduce building damage and repair costs associated with fires
- Today's building components and furnishings are much more flammable
- Incentives are available when sprinklers are installed, which could offset the cost
- Sprinklers have been required by the model codes for over a decade

Reasons for the opposition:

- Reduced housing affordability
- Lack of home fires data related to age of townhouses, presence of operational vs. non-operational smoke alarms vs. no smoke alarms, specific to Virginia
- Water availability issues, especially in rural areas without municipal water service
- Enhanced smoke detection, fire-resistant construction and other similar safety features could provide equivalent protection
- Virginia is in line with the majority of states that do not require townhouse sprinklers

[1] For a full list of Study Group members, please see Appendix B, "Study Group Members". For a full list of participants during each Study Group meeting, please see Appendix A, "Meeting Summaries, Agendas, Participants".

- There is no market demand for sprinklers in townhouses

The report that follows gives an overview of questions and concerns raised during the discussions. Supporting documents and the summaries from each of the four study group meetings are included as appendices following this report.

Note: the links referenced throughout the report were active as of the writing of this report.

BACKGROUND

The fire sprinkler requirements for townhouses first appeared in the 2006 edition of the International Residential Code (IRC), in the form of Appendix P.[2] The 2006 VRC did not incorporate said Appendix.

The 2009 edition of the IRC introduced fire sprinkler requirements in Section R313, "Automatic Fire Sprinkler Systems".[3] The section mandated the installation of fire sprinkler systems in townhouses and in one- and two-family dwellings. Sprinkler systems for townhouses were required to be designed and installed in accordance with (IRC) Section P2904, and those for one- and two-family dwellings in accordance with Section P2904 or NFPA 13D[4]. During the 2009 Virginia Code Development Cycle, Virginia amended Section R313 to make the installation of sprinkler systems optional.[5] Section R329 "Fire Extinguishers" was also added, which mandates the installation of a fire extinguisher with a rating of 2-A:10-B:C in the kitchen area, if the dwelling is not equipped with an automatic fire sprinkler system.[6]

A minor change in the 2015 edition of the IRC allowed sprinkler systems for townhouses to comply with NFPA 13D (Section P2904 remained as one of the available options), as an option.[7]

The following code change proposals associated with the residential sprinkler system provisions were considered by the BHCD, during the 2018 Virginia Code Development Cycle.[8]

- **RB302.2.2-18 (Approved)** - allows water-filled fire sprinkler piping in the cavity of common walls shared by townhouses.
- **RB302.2.6-18 (Approved)** - exempts townhouses protected by a fire sprinkler system complying with Section P2904, NFPA 13D, NFPA 13R, or NFPA 13, from the structural independence requirement.
- **RB302.3(1)-18 (Approved)** - allows for a reduction in the required fire-resistance rating of assemblies separating two-family dwellings, from 1-hour to ½-hour, if the units are protected by a sprinkler system in accordance with NFPA 13R or Section P2904 (this reduction was already allowed where NFPA 13 systems were installed).
- **RB310.11-18 (Not approved)** – proposed the removal of all Virginia amendments related to the residential sprinkler provisions, and would have required the installation of fire sprinklers in townhouses, as well as one- and two-family dwellings.

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[2] 2006 IRC, Appendix P: https://codes.iccsafe.org/content/IRC2006/appendix-p-fire-sprinkler-system

[3] 2009 IRC, Section R313: https://codes.iccsafe.org/content/IRC2009/chapter-3-building-planning

[4] NFPA 13D: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=13D

[5] 2009 VRC, Section R313: http://ecodes.biz/ecodes_support/free_resources/Virginia2009/09Residential/PDFs/Chapter%203_Building%20Planning.pdf

[6] 2009, VRC Section R329: http://ecodes.biz/ecodes_support/free_resources/Virginia2009/09Residential/PDFs/Chapter%203_Building%20Planning.pdf

[7] 2015 IRC, Section R313.1: https://codes.iccsafe.org/content/IRC2015P3/chapter-3-building-planning

[8] 2018 VA Code Change Proposals: see Appendix C, "Supporting Documentation"

- **RB313.1-18 (Not approved)** – proposed the removal of all Virginia amendments related to the residential sprinkler provisions, and would have required the installation of fire sprinklers in townhouses, as well as one- and two-family dwellings.

At their October 19, 2020 meeting, the BHCD (Codes and Standards Committee) moved to approve RB313.1-18, as amended by the BHCD. As per the BHCD proposed amendment, the sprinkler requirements would have only applied to townhouses. Upon further deliberations at their December 14, 2020 meeting, the BHCD determined that additional discussions around mandating fire sprinkler systems in townhouses were needed and the BHCD disapproved the proposal. Given this, the motion for disapproval of RB313.1-18 included a directive for DHCD to convene a group of interested stakeholders to continue the discussions during the 2021 Code Development Cycle.

OTHER STATES AND JURISDICTIONS

Although the model code (beginning with the 2009 edition of the IRC), requires the installation of fire sprinkler systems in townhouses, research shows that the majority of states and jurisdictions across the United States eliminate or amend, in some fashion, these provisions during their code adoption processes.

As of the writing of this report, it appears that there are only four states that require sprinkler systems in townhouses statewide: California, Maryland, Pennsylvania and Tennessee. In addition, Washington D.C also requires townhouses to be protected with a sprinkler system in accordance with the IRC.[9]

The position of other states range from prohibiting local amendments imposing the installation of sprinkler systems, to requiring landlords to notify tenants of the existence or nonexistence of fire sprinklers in dwelling units, to mandating sprinklers when a building exceeds a certain height or number of townhouse units, etc.

The Virginia Fire Chiefs Association (VFCA) representative suggested that Virginia is at a bit of a disadvantage because individual localities are not able to make their own decision about this issue. Had they been able to make local amendments to the building codes, he believes that some Virginia localities would have already required sprinkler systems in townhouses.

SMOKE ALARMS VS. FIRE SPRINKLERS

Discussions helped draw a parallel between smoke alarms, which are currently required to be installed in all townhouses, and fire sprinkler systems.

Smoke alarms are notification devices, intended to warn the occupants and aid with timely evacuation during fire events. The VRC requires smoke alarms to be installed in townhouses in the following locations: in each sleeping room, outside each separate area in the immediate

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[9] Townhouse Sprinklers by State (NFPA source): https://www.nfpa.org/Public-Education/Staying-safe/Safety-equipment/Home-fire-sprinklers/Fire-Sprinkler-Initiative/Legislation-and-adoptions/Sprinkler-requirements
Townhouse Sprinklers by State (NAHB source): https://www.nahb.org/-/media/NAHB/advocacy/docs/top-priorities/codes/fire-sprinklers/fire-sprinkler-state-adoption-2019.pdf

vicinity of bedrooms and on each additional story of the dwellings, including basements and habitable attics.

Smoke alarms do not have a direct impact on reducing or slowing the spread of smoke or fire; however, data shows that proper activation of smoke alarms has saved countless lives over the years. Smoke alarms do not require human intervention to activate, but do require periodic maintenance and testing to ensure reliability. Most smoke alarm manufacturers suggest testing the devices on a monthly basis. Some alarms are only intended to be used for ten years and must be replaced prior to the ten year mark. Research also reveals that in many cases where devices have not been properly maintained, they have failed to operate during a fire and provide the necessary warning to building occupants.

Sprinkler systems on the other hand, are intended to directly combat and slow the spread of fire and smoke. They reduce the likelihood of injury or death by providing additional time for occupants to escape safely, preventing flashover and controlling the fire until firefighting personnel arrive on scene. By slowing the fire spread, they can also reduce building damages from fire and firefighting operations. Sprinkler systems do not require human intervention to activate and require very little maintenance. Reports from localities where residential sprinkler systems are mandatory suggest that no lives have been lost, as a result of fires, in buildings protected by automatic sprinkler systems.

FIRE SPRINKLER SYSTEMS

Fire Sprinkler Types

At the infancy of the study group discussions, the sprinkler systems were referred to by the study group members in general terms, such as “residential” sprinklers. Given the different types of sprinkler systems covered by the code, it was suggested by study group members to clearly identify which type of sprinkler system should be mandated, if it comes to that point.

Although multiple sprinkler system types were mentioned during discussions, the study group members agreed that the focus should be on systems designed and installed in accordance with NFPA 13D and Section P2904 of the VRC.[10] NFPA 13R and NFPA 13 systems apply to buildings under the purview of the Virginia Construction Code and should not be considered by the study group.[11] [12] Additionally, while NFPA 13R and NFPA 13 systems are available options under the VRC, it is expected that they would not be installed due to the higher costs and complexity associated with them.

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[10] NFPA 13D: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=13D
VRC, Section P2904: https://codes.iccsafe.org/content/VRC2018P2/chapter-29-water-supply-and-distribution#VRC2018P2_Ch29_SecP2904
[11] NFPA 13R: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=13R
NFPA 13: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=13
[12] Virginia Construction Code: https://codes.iccsafe.org/content/VCC2018P3

Who Can Install Them?

Section P2904.1 of the 2018 VRC allows for the design and installation of residential fire sprinkler systems in accordance with "*NFPA 13D, 13, 13R* ***or Section P2904, which shall be considered to be equivalent to NFPA 13D"*** (emphasis added). Given the emphasized text, some study group members interpreted the Department of Professional and Occupational Regulation (DPOR) as allowing plumbing contractors (DPOR classification PLB) to install NFPA 13D sprinkler systems.[13]

Other study group members interpreted the DPOR Regulations as requiring a sprinkler contractor license (DPOR classification SPR) for the installation of all sprinkler systems, with the exception of those systems that are specifically designed in accordance with Section P2904 of the VRC. Or, otherwise stated: the PLB classification is only allowed to install sprinkler systems designed in accordance with Section P2904 of the VRC; and a SPR classification is required for the installation of all other fire sprinkler systems (i.e.: NFPA 13D, NFPA 13R and NFPA 13).

DHCD staff reached out to DPOR and requested clarification on the matter. DPOR staff confirmed that a contractor with a PLB classification is only allowed to install sprinkler systems designed in accordance with Section P2904 of the VRC and all NFPA sprinkler systems, including NFPA 13D, can only be installed by contractors with the SPR classification.

Plan Review and Inspections

Mandating the installation of sprinklers would mean additional steps in the permit review and approval process.

The VFCA representative suggested that the inspections would be the same as for other plumbing systems, and they would be performed at the same time as the plumbing inspections. Additionally, ongoing inspections are not required for 13D systems. Even NFPA 25 – the Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, does not require ongoing inspections for these systems.[14]

One of the Virginia Building and Code Officials Association (VBCOA) representatives emphasized that additional training, as well as additional review and inspection time would be needed for staff reviewing and approving these systems.

- If a sprinkler system requires two to four additional inspections per townhouse, that would be a significant increase in the workload for local building departments.
- The staff that would be required to perform the review and inspection of sprinkler systems has never performed those tasks before, so additional training would need to be developed and provided.
- Most jurisdictions are not currently performing plan review on building trades for townhouse projects. Requiring the installation of sprinklers would either mean that plan

[13] Commonwealth of Virginia Board for Contractors Regulations: https://www.dpor.virginia.gov/sites/default/files/Boards/Contractors/A501-27REGS.pdf

[14] NFPA 25: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=25

review will have to be performed, or the inspectors would have to be knowledgeable enough to review for code compliance during field inspections.

FIRE SPRINKLERS COSTS

As it is the case with most code changes that propose the installation of additional building systems or features, requiring sprinkler systems in townhouses would also trigger certain new costs. Several costs associated with the installation of sprinkler systems were discussed.

Water Meter Size and Connection Fees

The study group debated whether the water service meter size would be required to be increased to accommodate a sprinkler system and if so, what are the potential cost impacts of upgrading to a larger water meter size. The VFCA representative shared with the group the costs charged by Loudoun County; they are as follows: the fee for a 1” meter is $285, the fee for a 3/4” meter is $240 and the connection fee for either is $7,395. He also provided information on the fees charged by Fairfax County: connection fees are $1,430 for 5/8” taps; $1,870 for 3/4" taps; and $1,960 for 1” taps. Meter costs are $4,400 for 5/8” meters; $8,800 for 3/4" meters; $14,000 for 1” meters. There is a special note for a 13D system, which is $4,400.

The Home Builders Association of Virginia (HBAV) representative, who also submitted cost estimates from builders in the Richmond area and the Town of Blacksburg, appreciated the costs shared by the VFCA representative and indicated that the water connection fees charged by some localities range between $2,300 and $18,000.[15] Also, if required to upgrade to a larger meter size, the connection fees can increase significantly. He gave the examples of Henrico County where upsizing to 1” meter costs up to $17,000 and Chesterfield up to $14,000.

The American Institute of Architects’ Virginia Chapter (AIA-VA) representative shared that currently there are active residential sprinkler installation projects in many localities across Virginia and the connection fees vary considerably between localities.

The VFCA representative maintained that the water connection is already there by default as it is needed to serve the dwelling’s plumbing fixtures. As such, a separate connection and fee would not apply. He did agree that there might be an increase in the connection fee if the meter must be increased from a 5/8” to a 3/4" meter. However, he disagreed that a 1” meter would be required for residential sprinklers as shown on the documentation submitted by the HBAV representative. He noted that he works with many Maryland contractors, who install residential sprinklers on a daily basis and recommends that the group should rely on their data.

The HBAV representative concurred that a separate connection is not needed, but maintained that a larger meter would be required in many cases. He also argued that these systems are being installed already in other parts of the Commonwealth, and reaffirmed that the estimates shared with the study group are for actual (and not assumed) projects. Different costs apply in different parts of the State and the study group should not base the decisions solely on information applicable to the Northern Virginia area.

[15] HBAV submitted cost estimates: see Appendix C, “Supporting Documentation”

Additional Water Supply Equipment

Private Water Supply

The Local Government/Rural Communities representative indicated that several townhouse complexes in his area, which is surrounded by other rural localities, are currently not connected to a public water system.

If sprinkler systems will be required in similar townhouses served by private water supplies, arrangements would have to be made to ensure adequate water supply for the systems. In most cases, additional water holding tanks or larger pumps would have to be provided to adequately supply the water flow rate for the minimum period of time required by the code (seven or ten minutes based upon the area and number of stories).[16] Also, while not required by the code, backup power may need to be provided for the pump, otherwise it could be out of commission during power outages or fire events when it is needed.

The estimate submitted by the HBAV representative from a Town of Blacksburg area builder shows a cost of $4,200 for the cistern storage tank (1200 gallons), pump, and installation; and a cost of $6,000 for backup power supply for the pump.

Public Water Supply

The Private Water Company representative indicated that the lack of adequate water supply is a valid point, as in some areas not even hydrants are installed because storage water is not available to supply the hydrants.

The VFCA representative opined that just because there is not adequate water supplies or hydrants, it does not mean that effective residential sprinklers cannot be installed. He also cited the Water Supplies for Home Fire Sprinkler Systems document he submitted, which shows that only 7psi is required to operate some systems, and a residential sprinkler system could use as little as 8 gallons per minute, which is in line with what is already required to serve a residential plumbing system.[17]

The representative from the Local Utility Department stated that from a utility engineering standpoint, ground storage tanks and pumps or potentially a hydromatic tank could provide water, but it would need to be engineered. The issue can be overcome, but it would impact cost.

The Virginia Fire Prevention Association (VFPA) representative shared that, based on tests of townhouse systems connected to a public water supply, that he has witnessed, most had more than adequate flow, even without adding a separate pump. The few systems that did use a pump had nothing more than a pool pump, which is simple and inexpensive to install. Labor is probably the most expensive part. He estimated the cost to be about $200.

System Design and Installation

The study group members concluded that it is difficult to estimate a specific cost for the design and installation of residential sprinkler systems in townhouses in Virginia. Some of the reasons cited were the limited number of sprinkler contractors currently installing these systems

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[16] VRC Section P2904.5.2: https://codes.iccsafe.org/content/VRC2018P2/chapter-29-water-supply-and-distribution#VRC2018P2_Ch29_SecP2904

[17] Water Supplies for Home Fire Sprinkler Systems: see Appendix C, “Supporting Documentation

throughout the Commonwealth, diverse geography and markets, and sprinkler contractors not always being forthcoming due to competition.

Cost estimates submitted by the study group members included the following:[18]

- Virginia Townhouse Sprinkler Price Survey – submitted by VFCA
- Sprinklers Pricing, Loudoun County – submitted by VFCA
- Richmond Region Townhome Builder Cost Estimates and Notes – submitted by HBAV
- Southwest Virginia Blacksburg Estimate – submitted by HBAV

The estimates submitted by study group members ranged from an average price of $1.13/square foot in Haymarket, VA, to (direct/tangible costs of) $2.75/square foot (plus infrastructure costs of $2,100/townhouse minimum plus other intangible costs) in Richmond, VA, and a total cost per townhouse unit of $22,000 (projects with private water supply) in the Southwest Virginia region.

Building Permit and Inspection Fees

Given the additional building department staff time required for ensuring compliance with the sprinkler requirements in the code, there is a reasonable expectation that the permit/inspection fees would also increase if sprinkler systems were required in townhouses. However, similar to the costs for system design and installation, it is not feasible to accurately estimate the increase in permit and inspection fees.

COST IMPACT ON HOUSING AFFORDABILITY

Documentation submitted by the HBAV representative highlights the housing affordability challenges in the Commonwealth.[19] The representative also underscored that many households are already considered housing cost burdened as they spend more than 30 percent of their income on housing expenses; and the percentage of cost burdened low-income households is growing. The Commonwealth is seeing a crisis where people cannot afford houses. The HBAV representative clarified that bringing these items up for discussion is unrelated to builder profit as the costs to build are passed on to the consumer. He also made the point that mandating the installation of fire sprinklers in townhouses across the Commonwealth would definitely add to the problem of housing affordability.

The VFCA representative acknowledged the affordability issues brought up, and agreed that the study group should keep housing affordability in mind and not price the homebuyer out of the market, but look to ensure affordable and safe housing, as that is the charge of the fire and building codes. He, as a fire chief, cannot put a price on a life or injury and if there is a way to prevent injuries and deaths to civilians and firefighters, his charge is to find the way. He submitted that the ultimate goal is for these systems to not increase the construction costs and he thinks that is possible through incentives and other insurance and tax credits for these systems.

[18] Cost estimates: see Appendix C, "Supporting Documentation

[19] Housing affordability documentation submitted by HBAV: see Appendix C, "Supporting Documentation

FIRE SPRINKLERS INCENTIVES

Discussion around costs associated with mandating the installation of sprinkler systems highlighted that such requirements could also provide for different types of potential financial incentives.

The VFCA representative argued that the increase in construction costs due to sprinkler systems could be offset by the benefits that come along with the installation of sprinklers, and in some scenarios, the financial incentives could even surpass the construction cost increase.

The UNLV Residential Sprinkler Study was cited for examples of potential incentives:[20]

- Fire separation between garages and residential portions of dwellings could be reduced
- Dwellings could be located closer to the property lines, allowing for larger homes, or additional lots/dwellings within the development
- Increased fire hydrant spacing
- Eliminating secondary emergency access points in residential developments
- Reduction of minimum required road and/or cul-de-sac widths

The HBAV representative opined that most of these incentives are site related and not building code driven. As such, it would be difficult to ensure that the incentives would be available consistently across the Commonwealth, or that savings would be passed along to the builder and homeowner. The VFCA representative suggested that most of them are actually already in the code and could not be dismissed by local jurisdictions, but would have to be applied accordingly throughout the Commonwealth. The VBCOA representative added that pursuant to Section 101.5 of the Statewide Fire Prevention Code (SFPC), which allows local governing bodies to adopt fire prevention regulations that are more restrictive or more extensive in scope than the SFPC, some of the potential incentives such as increased hydrant spacing or fire apparatus access road widths, could be overruled by local regulations.[21]

Some other existing code provisions, referred to as incentives during discussions, included:

- Emergency escape and rescue openings not required for dwellings equipped with sprinkler systems
- The ability to run a single water line to serve multiple units vs. individual lines to each unit

The AIA-VA representative noted that there is a difference between incentives and what is already accepted in the code. He gave the example in the current code of a multi-family dwelling building, which if protected by an NFPA 13 system instead of an NFPA 13R system, could have longer dead-end corridors and other benefits. He suggested that it would be good to explore the existing code provisions that would actually incentivize the installation of sprinklers. Any incentives offered by localities at the local level would be independent of that.

While not an incentive per se, the reduction in water damage sustained, as a result of less water being required to extinguish a fire in a building protected by a sprinkler system, was also

[20] UNLV Residential Sprinkler Study: see Appendix C, "Supporting Documentation

[21] SFPC Section 101.5: https://codes.iccsafe.org/content/VFC2018P2/chapter-1-administration#VFC2018P2_Ch01_Sec101.5

identified as a benefit of sprinkler system installation. It was estimated that a residential sprinkler head may discharge an average of 200 gallons of water until turned off by emergency responders, while a fire hose can discharge anywhere from 100 gallons per minute up to 1,000 gallons per minute.

SAFETY IMPACT OF FIRE SPRINKLERS IN TOWNHOUSES

Given very limited fire and sprinkler data in Virginia, the study group members referred to data from other localities, outside of Virginia.

The VFCA representative indicated that in Maryland, where fire sprinklers are required, no lives have been lost, due to fire events, in residential homes with sprinklers installed. He emphasized the US Fire Experience with Sprinklers and US Fire Loss Data document shared with the group, which underscores the reduction of civilian and fire fighters injury and death in homes with sprinklers.[22] He added that an important factor to be considered is the positive effect sprinklers have on fire fighters. The installation of sprinklers limits injury and property loss, saves the lives of the occupants, but also protects the firefighters. Real life examples, where lives were lost were also shared with the group and he indicated that had there been sprinklers, the life of the residents might have been saved.

The HBAV representative stated that homes being built under current code requirements are safer than those built decades ago. He questioned the lack of home fires data on older homes, such as those built in the 40’s to the 80’s, vs. newer homes built over the last ten years. He suggested that perhaps the focus should be on promoting increased fire safety in older homes and noted that creating a statewide mandate that would add thousands of dollars to the construction cost of new homes, when there is no data to support the suggested benefits, would be haphazard.

The VFCA concurred that the fire data is limited as there’s currently no mandatory requirement for fire departments to report the data to the federal system. He also agreed that homes now are being built safer, but stated that the issue is not with the buildings but with the people and the contents of buildings. Given the changes in materials used in construction and manufacturing from mostly wood and cotton, to liquid gas, plastics, synthetics and trusses, the escape time before flashover occurs has been reduced from 11-13 minutes to only 3-5 minutes.

The AIA-VA representative shared that he has over 30 projects under construction at the moment and has for some time. He does not believe those buildings are unsafe because they do not have sprinklers. He reiterated that every other states besides Maryland, California and the District of Columbia have opted out of the townhouse sprinkler requirements. He suggested that, in addition to sprinkler systems, there are other construction features that provide increased fire safety that could be considered. Things such as making everything a 1-hour fire-resistance-rated assembly could potentially result in buildings safer than if they were sprinklered but not fire-resistance-rated. He agrees that fire sprinklers are very effective and has designed many projects with sprinklers, but wishes to ensure that all options are considered before making a statewide mandate.

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[22] US Fire Experience with Sprinklers and US Fire Loss Data: see Appendix C, “Supporting Documentation

HOMEBUYERS' PERSPECTIVE

The VFCA representative suggested that there is significant homebuyer interest for homes protected with fire sprinklers. He cited a Fact Sheet by the International Residential Code Fire Sprinkler Coalition, which he shared with the study group.[23] The Fact Sheet indicates that 3/4 of respondents to a survey conducted in 2014 stated that they would more likely buy a home with sprinklers than one without. The same survey results show that a similar percentage agreed that a home with fire sprinklers has more value and provides "ultimate protection" for residents. He added that people do feel safer in houses equipped with sprinklers, but they do not know about the effectiveness of sprinklers, so even if the sprinklers would be an option offered by the builder, they do not ask for them.

The HBAV representative submitted that the builders build to what the market demands. Currently, there is no demand for sprinklers, although the builders are willing to provide sprinkler systems for those who want them. He also suggested that, given the differences between each locality, perhaps the best approach would be to continue to incentivize the installation of sprinklers at the local level, rather than mandating it across the Commonwealth.

SUPPORTING DOCUMENTATION AND REFERENCE MATERIALS

Documentation discussed by the study group included the following:

- DHCD staff power point presentation
- 2018 Code change proposals
  - RB302.2.2-18
  - RB302.2.6-18
  - RB302.3(1)-18
  - RB310.11-18
  - RB313.1-18
- Economic Cost Benefit Analysis of Residential Fire Sprinkler Systems Broward County, Florida; submitted by the VFCA
- Loudoun County Fire and Rescue - Fire Cause Determination; submitted by the VFCA
- UNLV Residential Fire Sprinkler Study; submitted by the VFCA
- Fact Sheet - Homebuyer Interest in Residential Sprinkler Systems; submitted by the VFCA
- Fact Sheet - Fire Sprinkler Systems for Townhouses; submitted by the VFCA
- Fact Sheet - Water Supplies for Home Fire Sprinkler Systems; submitted by the VFCA
- Additional IRCFSC resources associated with residential sprinkler systems; submitted by the VFCA
- Benefits of Residential Fire Sprinklers; submitted by the VFCA
- Virginia Townhouse Sprinkler Price Survey; submitted by the VFCA
- Townhouse fire sprinkler sample plans; submitted by the VFPA
- HBAV Comments on Virginia Specific Fire Data; submitted by the HBAV
- HBAV Compilation of Housing Affordability Reports; submitted by the HBAV

[23] Fact Sheet by the IRC Fire Sprinkler Coalition: see Appendix C, "Supporting Documentation

- Richmond Region Townhome Builder Cost Estimates and Notes; submitted by the HBAV
- Southwest Virginia Blacksburg Estimate; submitted by the HBAV
- HFSC Fact Sheet; submitted by the VFCA
- NFPA US Fire Experience with Sprinklers 2021; submitted by the VFCA
- NFPA US Fire Experience with Sprinklers Supporting Tables 2021; submitted by the VFCA
- NFPA US Fire Loss Data 2020; submitted by the VFCA
- NFPA US Fire Loss Trend Tables 2020; submitted by the VFCA
- 2021 Code change proposals
    - RB313.1-21
    - RB313.1(2)-21
    - RB313.1(3)-21

CODE CHANGE PROPOSALS

Three code change proposals related to townhouse sprinklers were submitted in cdpVA by stakeholders during the 2021 Virginia Code Development Cycle.[24] [25] During the May 17, 2022, meeting, the proposals were discussed by the study group.

Proposals RB313.1-21 and RB313.1(3)-21 are similar in nature and require the installation of sprinkler systems in townhouses. Proposal RB313.1(2)-21 requires sprinklers systems in townhouses, as well as in one- and two-family dwellings.

Proposal RB313.1(2)-21 was not deliberated at length by the group given that its scope expands beyond requiring sprinklers in townhouses, which this study group was charged with discussing. Although a formal vote was not taken on whether to support the proposal, the HBAV and the VFCA representatives were in agreement that if a recommendation was to be given by this study group for this proposal, it should be recommended for disapproval.

The main difference between proposals RB313.1-21 and RB313.1(3)-21 is that the latter only requires sprinklers in buildings with more than three townhouse units. As per the proponent's statements, similar provisions have been approved in Washington State. He suggests that this would be a good compromise for Virginia and would assist with rural areas where water supply might be an issue. The VFCA representative shared that the VFCA is behind both of these proposals and he supports both of them.

The HBAV representative raised a concern with the proposals which allow the sprinkler systems to be designed and installed in accordance with Section P2904 or NFPA 13D, 13, or 13R. He cited statements made during earlier study group discussions made by others indicating that the study group should not and will not focus on NFPA 13, or 13R systems. The proponents clarified that the concern raised by the HBAV representative is related to existing code language and that the proposals do not modify those provisions. The HBAV representative asked for assurance from the code officials in the group that the permit applicant would not be forced, based on this existing language, to use a certain standard for the design and installation of the

[24] cdpVA (Virginia's Online Code Development Process): https://va.cdpaccess.com/login/
[25] 2021 VA Code change proposals: see Appendix C, "Supporting Documentation

sprinkler system, for instance NFPA 13R. The VBCOA representative confirmed that the townhouse designer has the ability to choose which type of system to install, and the code official does not have the authority to mandate which type of system to install.

Both proponents agreed to submit floor modifications during the General Stakeholder Workgroup meetings in June to remove the reference to NFPA 13 and 13R from VRC Section R313.1.1 and revert back to the IRC language for that code section.[26]

CONCLUSIONS AND ACKNOWLEDGEMENTS

Study group meetings yielded several fruitful discussions regarding the potential impacts of mandating residential sprinkler systems in townhouses.

The stakeholders did not reach consensus on what would constitute the best solution. This report documents the key issues discussed and it includes supplementary documents provided by stakeholders. Below are a summary of the key findings, based on the information provided and stakeholder process.

- Fire sprinklers are effective and save lives
- Enhanced smoke detection, fire-resistant construction and other similar safety features were suggested as potential alternatives to sprinklers
- Fire sprinklers have a direct impact on the cost of construction and housing affordability
- Fire sprinkler installation offers several financial incentives that could offset the cost
- Water supply limitations could present challenges for some systems, especially in rural areas
- Virginia is in line with the majority of states, which remove the IRC sprinkler requirements for townhouses

Finally, the staff of DHCD wish to thank the study group participants for the time and energy they committed to this process. The stakeholders presented arguments based on their backgrounds in fire services; fire and building codes; building design, building industry, affordable housing, public and private water providers, public administration, and more. This committed group lent many hours of their time submitting documents, conducting conversations, and reviewing their colleagues' arguments and positions. They shared their knowledge and experience in the form of anecdotes, documented case studies, and current practices. We deeply appreciate their expertise and willingness to engage in the study group discussions.

[26] 2021 IRC Section R313.1.1: https://codes.iccsafe.org/content/IRC2021P2/chapter-3-building-planning#IRC2021P2_Pt03_Ch03_SecR313.1.1

APPENDIX A: Agendas, Meeting Summaries, Participants

Residential Sprinklers
December 15, 2021
9:00 a.m.
Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

AGENDA

1) Welcome

2) Introductions

3) Overview of VA Code Development Process

4) Background

5) Discussion

6) Assignments and Next Steps

7) Next Meeting

Residential Sprinklers Study Group Meeting Summary

December 15, 2021 9:00 a.m. – 10:05 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:
Cindy Davis: Deputy Director, Division of Building and Fire Regulations (BFR)
Jeanette Campbell: Administrative Assistant, BFR
Jeff Brown: State Building Codes Director, State Building Codes Office (SBCO)
Richard Potts: Code Development and Technical Support Administrator, SBCO
Paul Messplay: Code and Regulation Specialist, SBCO
Florin Moldovan: Code and Regulation Specialist, SBCO

Study Group Members:
Mike Eutsey: First Vice President of Virginia Building and Code Officials Association (VBCOA) and Assistant Chief Building Official for Hanover County
Jimmy Csizmadia: Secretary of Virginia Fire Prevention Association (VFPA) and Inspector with the Prince William County Fire Marshal's Office
Garrett Dyer: Virginia Department of Fire Programs (VDFP)
Mike Poole: American Institute of Architects (AIA) Virginia and Principal of Poole & Poole Architecture
Overton McGehee: Habitat for Humanity
Reid Walters: Town Manager of the Town of Independence
Mike Nannery: Assistant Director of Engineering and Development for Chesterfield County Utilities
Meredith Raetz: Planning Engineer with Virginia American Water
Andrew Clark: Homebuilders Association of Virginia (HBAV)

Other Interested Parties:
Andrew Milliken: Virginia Fire Chiefs Association (VFCA), Virginia Fire Services Board (VFSB) - Chairman of Fire Codes and Standards Committee
Keith Johnson: VFCA, VFSB Vice Chair and on the Board of Housing and Community Development (BHCD)
Sean Farrell: VBCOA and BHCD
Jason Lewis: VBCOA
Timothy Loscomb: Vice President of American Fire Sprinkler Association (AFSA) – Virginia chapter
Todd Strang: Spotsylvania County Fire Official

Study Group Members not in attendance:
Ellis McKinney: Virginia Plumbing and Mechanical Inspectors Association (VPMIA)
Robbie McCraw - Carroll County Board of Supervisors and E&L Diamond Electric, Heating, Cooling and Plumbing

<u>AGENDA AND DISCUSSION ITEMS</u>:
Power Point presentation is available on the DHCD website, with a link on the cdpVA website

1) Welcome

<u>Jeff Brown:</u> Welcomed participants to the Adobe Connect meeting. He noted that these meetings will be recorded. There will be breaks after each hour, although today's introductory meeting probably will not be much longer than one hour. DHCD staff is available for technical assistance. Please keep microphones muted if not speaking, and introduce yourself if you are speaking. Please be professional, respectful and concise when speaking. Meetings are open for anyone to attend, but discussions should only include Study Group members.

2) Introductions

DHCD staff members introduced themselves. Study Group members introduced themselves.

3) Overview of VA Code Development Process

<u>Jeff Brown:</u> The Virginia code development cycle runs about every 3 years, starting with the latest international codes and considering state amendments proposed by stakeholders during the development process. The Board of Housing and Community Development makes decisions on each proposal and adopts the final Virginia building and fire regulations. The 2018 building and fire regulations became effective July 1, 2021.

Jeff gave an overview of the 2021 Virginia Code Development Cycle with approximate dates by month of when each of the steps happen, i.e.: cdpVA opened for proposals in October 2021; Notices of Intended Regulatory Action (NOIRAs) were published in November 2021; groups meet to discuss code change proposals between December 2021 and June 2022; BHCD considers code change proposals in September 2022 and proposed regulations in December 2022. The 2021 codes become effective in Virginia in the fall or winter of 2023.

The BHCD approved a new policy for 2021 to limit new code change proposals to the proposed phase and not after the proposed regulations have been published. New code change proposals will not be accepted in the final phase, which is limited to errors or minor corrections. Anything new that arrives in the final phase will be considered during the 2024 code development cycle.

va.cdpacess.com is the Virginia online code development system, which accepts code change proposals from anyone. In addition, all of the information provided and captured during the process is available for viewing.

Study Groups study specific topics, identify areas of consensus and disagreement, and determine if code change proposals or other solutions are appropriate. They may review proposals, provide analysis, make recommendations, and/or develop code change proposals. Proposals and recommendations of Study Groups are reviewed by the General Workgroups prior to BHCD consideration. Study Groups are disbanded after they complete discussions.

Sub-Workgroups Review all code change proposals within their subject topics. They make recommendations on each proposal, including negotiating compromises where appropriate, in an attempt to form a group consensus on each proposal. They may also develop new code change proposals, or support proposals submitted by others by joining the proposal as a proponent. Proposals and recommendations of Sub-Workgroups are reviewed by the General Workgroups prior to BHCD consideration.

General Workgroups are open to all public for discussion and comment. They will review all proposals received, and aim for a consensus to approve or disapprove each one. They will recommend the proposals to the BHCD in blocks, sorted by those receiving consensus to approve or disapprove, as well as non-consensus proposals. The consensus proposals are usually voted through as recommended. Non-consensus proposals go to the BHCD in their entirety, including summaries and all related documents. Recommendations from this Study Group, for example, will go to General Workgroups and then to the BHCD as outlined.

codes.iccsafe.org/codes/Virginia provides free online access to Virginia and ICC code books.

4) Background

IRC 2006: Was the first edition of the IRC that included provisions for sprinklers in residential structures or one- and two-family dwellings and townhouses. It was added as Appendix P "Fire Sprinkler System" and contained provisions for the installation of fire sprinkler systems in dwellings covered by the IRC. The Appendix is not mandatory unless specifically referenced in the adopting ordinance.

VRC 2006: No significant changes (IRC appendix not incorporated)

IRC 2009: New Section R313 "Automatic Fire Sprinkler Systems" mandates the installation of an automatic fire sprinkler system in townhouses and one- and two-family dwellings. The system is to be designed and installed in accordance with new Section P2904 "Dwelling unit Fire Sprinkler Systems" or NFPA 13D.

VRC 2009: Amends Section R313 of the 2009 IRC to make the installation of sprinkler systems optional. Section R329 "Fire Extinguishers" was added, which mandates the installation of a fire extinguisher with a rating of 2-A:10-B:C in the kitchen area, if the dwelling is not equipped with an automatic fire sprinkler system.

IRC 2012: No significant changes

VRC 2012: No significant changes

IRC 2015: Allows the NFPA 13D standard to be complied with for the design and installation of systems in townhouses (Section P2904 remains one of the options available). This change brings the townhouse requirements in line with those for one- and two-family dwellings.

VRC 2015: No significant changes

IRC 2018: No significant changes

VRC 2018: No significant changes

2018 Code Development Cycle: The Board of Housing and Community Development (BHCD) **approved** the following proposals, related to sprinkler systems, for inclusion in the 2018 VRC:

- **RB302.2.2-18** – allows water-filled fire sprinkler piping in cavity of common walls shared by townhouses.
- **RB302.2.6-18** – exempts townhouses protected by a fire sprinkler system complying with Section P2904, NFPA 13, NFPA 13R or NFPA 13D, from the structural independence requirement.
- **RB302.3(1)-18** –allows a fire-resistance rating reduction from 1 hour to 30 minutes for 2-family dwellings, if protected by an automatic sprinkler system complying with NFPA 13R or Section P2904 of the VRC

The BHCD **disapproved** proposals **RB310.11-18 and RB313.1-18**, requiring sprinkler system installation in both townhouses and one- and two-family dwellings.

<u>Jeff</u>: During the Board's consideration of proposal RB313.1, a suggestion was made to amend the proposal to only require sprinklers in townhouses (and not one- and two-family dwellings). This generated a lot of discussion. Ultimately, the Board voted to not require sprinkler systems in townhouses. However, part of the Board's motion and vote included a directive to DHCD staff to convene a group of interested stakeholders to continue the discussions regarding townhouse sprinklers during the 2021 Code Development Cycle.

2018 VRC: for townhouses and one- and two-family dwellings, automatic fire sprinkler systems are optional. Where installed, automatic fire sprinkler systems can be designed and installed in accordance with NFPA 13, NFPA 13R, NFPA 13D or VRC Section P2904.
2021 IRC: No significant changes

In other states: Sprinklers are required in all new townhouses and one- and two-family dwellings in California, Maryland and Washington DC. Sprinklers are required in some (based on size /height) townhouses and one- and two-family dwellings in New York and Massachusetts. Approximately 20 states allow local jurisdictions to mandate the installation of sprinklers in townhouses and one- and two-family dwellings.

<u>Jeff</u>: This is the latest information we were able to locate based on reports from NFPA and HBAV. He asked that if anyone has any updates or corrections, to please let DHCD know. These statistics are also not specific to

townhouses, so if anyone is able to provide information on states and localities that only require sprinklers in townhouses, it would be very helpful.

Study Group Objectives: Gather information and data for review and discussion. Identify areas of agreement and/or disagreement. Summarize findings or recommendations. Review any related proposals submitted during the 2021 cycle.

Jeff: There is a lot of information and data available from various sources, regarding the cost and effectiveness of residential sprinklers. This group will need to look at that data and identify or highlight the most helpful data to assist the Board in making decisions. Again, if anyone is able to provide data specific to townhouses, it would be helpful. Based on previous discussions around this topic, there will be areas of disagreement and those areas will need to be identified. If the group is able to resolve any of those disagreements during discussions, that would be even more helpful to the Board.

Jeff: Findings and/or recommendations will need to be summarized, keeping in mind that any recommendations developed by this group will be provided to all stakeholders for review and comment, prior to the Board making any final decisions on residential sprinkler related proposals.

Important discussion topics (future meetings): Safety impact of residential sprinklers. Cost(s) of residential sprinklers. Cost impact of residential sprinklers. Other?

Jeff: Has named a few topics that he believes are critical for the group to discuss and attempt to provide some clarity around. This is not intended to be an exhaustive list. These are topics where a lot of questions typically come up when discussing residential sprinklers, and he thinks it will be important for this group to discuss them, as he assumes that these will be some of the topics discussed by the Board when they consider any proposals in this cycle. If this group can help provide some clarity on any of these items, he thinks it will be very helpful to the Board. He doesn't expect anyone to be prepared to discuss them in depth today, but as data and information is gathered related to these topics, the group should be preparing for more in-depth discussion at future meetings.

5) Discussion

Mike Nannery: As a utility engineer, he's curious if there was any data compiled and discussed, during the 2018 cycle discussions on fire events that happened regionally (as a result of heating, kitchen fires, etc), which those in the Study Group can review.

Jeff: There was not a lot of discussion or review by stakeholders before proposals came before the BHCD and decisions were made. When the sprinkler proposals came to Workgroups, the proponents weren't available to discuss. They went forward as non-consensus. There was not much discussion about stats, which lead to board hesitancy on code changes. He suggested the group look at cdpVA to see what was submitted with the proposals last cycle. Jeff also asked the group to find and bring stats to the next meeting.

Mike: His concern is that he doesn't want to start from scratch if there were already statistics available from the original business case for these discussions.

Jeff: The initial proposals were for sprinklers in 1- and 2-family dwellings and townhouses. They were non consensus, but there was additional discussion around requiring sprinklers only in townhouses. This group's discussions will continue to focus on townhouses, so it would be good to search for data in other localities that is specific to townhouses.

Garrett Dyer: Is there a preferred way to organize or present the research and data collection at the next meeting?

Jeff: Asked everyone to think about what they want to discuss and submit it to DHCD before the next meeting (see assignments section). This will help DHCD to organize the data collected and prepare the agenda for the next discussion.

Andrew Clark: Thanked Jeff and Cindy for getting this group together. It is good to dig into some issues that were not addressed significantly in the last code cycle. He would like to know if this group will be able to schedule meetings around the General Assembly meetings, as it may result in a scheduling conflict for him and some others in the group.

Jeff: The tentative second meeting date for this group is January 11th, which is right before the General Assembly Session starts. Rather than wait until Session ends, he may send a poll to members of this group, and schedule the next meeting for the date that most members can attend.

Meredith Raetz: Wants to know if there is any intention to reach out to other states to see what they adopted and what happened with implementation. We may be able to leverage from their experiences, especially states physically close to us, which may have had similar challenges or demographics.

Jeff: We do hope to do some of that. For now, the general homework assignment is to gather readily available information. Perhaps after the next meeting, we'll be more prepared to reach out to other localities. DHCD will also do some research and bring to the group to fill in some blanks as we move forward. It would be great if we can find data from localities that mandated sprinklers for townhouses only. Most of the information he has now is general to one- and two-family dwellings and townhouses. He knows that some members of this group have studied this issue in the past, and can bring some data we can start with. We'll definitely be interested in the various costs and fees of systems and installation and also challenges for places without public water.

Keith Johnson: Stated that he is in a unique position because he sits on the BHCD and wanted to give some overview. He is grateful for this group because he doesn't think that big issues like this can be solved year after year in the final code development or code approval process. He said a group like this one is needed to gather all the facts and data. There are several new members on the board this year, who were not part of this discussion last cycle. It's about education; there are pros and cons, costs and accurate information and data to present to the Board, because they make the final decisions. He says that when they get to the final vote for the non-consensus items that there is so much to discuss with misconceptions and facts and figures being thrown about and it becomes mind-boggling, especially for people without a fire background. He is grateful if this group can get all the facts first, so that the board can be educated and discuss with correct information.

Jeff: It will be key for this group to gather all the information and sort through it so that it doesn't have to be done at the last minute, while trying to make decisions. The group won't decide anything for the board, but will clarify the data so that the board can make their decisions.

Mike Nannery: Please clarify the charge for this 2021 Study Group – is it to consider townhouses and 1- and 2-family dwellings, or only townhouses?

Jeff: Based on the last discussion and the BHCD directive, it's about townhouses. Some of the data available is from other states that address both dwelling types, so some data may or may not be relevant and helpful to us.

Mike: There's a new housing product called 2 over 2 condos. From a utility standpoint, we see that they have been sprinkled. Will they also be discussed?

Jeff: It sounds like they may be treated as multi-family dwellings.

Jimmy Csizmadia: _They are multi-family, which already require sprinklers because they are 4 stories.

Mike Poole: Confirmed that the 2 over 2 buildings fall under the IBC because they are 4 stories and do not necessarily have an independent fire wall between them. He works in multiple localities in the country and maintains a code spreadsheet based on projects in the various states. He can help provide information on other states. Some states that have adopted a state-wide building code, the smaller localities are not applying their own exceptions. In other states that have not adopted a state-wide building code, exceptions can range wildly in the interpretations. He is happy to share information, since they do track based on various building types. Single family rentals are a unique product coming into the marketplace now, which opens a lot of questions when dealing with the tenant instead of the owner. Will there be other discussion besides sprinklers? There are other safety measures that can be used and we should also mix them into our discussions.

Jeff: That information will be very helpful as we discuss the proposals. Please provide what is available for the next meeting.

Mike pool will be happy to share that information.

6) Assignments and Next Steps

Prior to the next meeting, please:

- Reach out to other members and/or DHCD staff with any questions related to information discussed today
- Identify areas of interest or concern that you would like to discuss at the next meeting (Provide to DHCD by December 27th)
- Identify and provide helpful/relevant information (reports, data, etc.) for the group to review (Provide to DHCD by December 27th)

Note: If any member wants to share information with the group between meetings, please send it to DHCD staff and we will distribute it to our email list to make sure we do not miss any interested parties that might be added to our list as we go along.

7) Next Meeting

January 11, 2021 9:00 am to 3:00 pm
(Lunch break from 12:00 pm to 1:00 pm)
Virtual Meeting Link: https://vadhcd.adobeconnect.com/va2021cdc/

AGENDA

Residential Sprinklers Study Group

January 11, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

a) Study Group Members - Initial Thoughts

b) Townhouse Sprinklers:

i) Effectiveness

ii) Costs

iii) Cost Impact

iv) Other considerations

III) Other

IV) Assignments and Next Steps

V) Next Meeting

Residential Sprinklers Study Group

Meeting Summary: January 11, 2022 9:00 a.m. to 10:30 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Cindy Davis: *Deputy Director, Division of Building and Fire Regulations (BFR)*
Jeanette Campbell: *Administrative Assistant, BFR*
Jeff Brown: *State Building Codes Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Travis Luter: *Code and Regulation Specialist, SBCO*
Thomas King: *Code and Regulation Specialist, SBCO*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Study Group Members:

Ron Clements: *Chesterfield Building Official, member of VBCOA*
Mike Nannery: *Assistant Director of Engineering and Development for Chesterfield County Utilities*
Mike Eutsey: *First Vice President of Virginia Building and Code Officials Association (VBCOA) and Assistant Chief Building Official for Hanover County*
Keith Johnson: *Virginia Fire Chiefs Association (VFCA), Virginia Fire Services Board (VFSB) Vice Chair, and member of the Board of Housing and Community Development (BHCD)*
Meredith Raetz: *Planning Engineer with Virginia American Water*
Overton McGehee: *Habitat for Humanity*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*

Other Interested Parties:

Andrew Milliken: *VFCA, VFSB Chairman of Fire Codes and Standards Committee*
Timothy Loscomb: *Vice President of American Fire Sprinkler Association (AFSA) – Virginia chapter*
Jason Laws: *VBCOA*
Judy Hackler: *Executive Director, Virginia Assisted Living Association (VALA)*
Jeffrey Shapiro: *International Code Consultants*
Todd Strang: *Spotsylvania County Fire Official*
Sean Farrell: *Prince William County*
Robby Dawson: *National Fire Protection Association (NFPA)*
John Walser*: Fairfax County Fire & Rescue*
Glenn Dean
Terin Hopkins

Study Group Members not in attendance:

Jimmy Csizmadia: *Secretary of Virginia Fire Prevention Association (VFPA) and Inspector with the Prince William County Fire Marshal's Office*
Garrett Dyer: *Virginia Department of Fire Programs (VDFP)*
Mike Poole: *American Institute of Architects (AIA) Virginia and Principal of Poole & Poole Architecture*
Reid Walters: *Town Manager of the Town of Independence*
Robbie McCraw: *Carroll County Board of Supervisors and E&L Diamond Electric, Heating, Cooling and Plumbing*
Andrew Clark: *Homebuilders Association of Virginia (HBAV)*

AGENDA AND DISCUSSION ITEMS:

Welcome

Jeff Brown: Welcomed everyone to the second meeting of the Residential Sprinklers Study Group. The meeting is scheduled until 3pm, with 5 minute breaks every hour and a lunch break from 12pm-1pm. However, the meeting may end early. These meetings are recorded and written summaries are prepared. He asked members to use the raise hand function to speak, and to state their names as they speak. These meetings are open to the public, however discussion is only between the Study Group members, who are welcome to speak at any time. Other interested parties are asked to speak with group members outside of the meeting to express their views. Study Group members are listed in a pod on the side of the main screen.

Townhouse Sprinklers Discussion

Study Group Members - Initial Thoughts

Jeff: asked if anyone had initial thoughts to start the discussions.

Keith Johnson: thanked Jeff and DHCD for arranging the group. He asked Jeff what is the ultimate goal of the Study Group? Is it only to provide information? Obviously, the group is not the decision body, but the group will have a lot of influence. Ultimately, what does success look like, what are the parameters and how will information be transferred? There will be opinions on each side. For him, success would be having a proposal to put sprinklers in townhouses. He is wondering if there will be talk of incentives, offsets or compromises.

Jeff: The primary goal is to give clear information to the Board. There will be code change proposals submitted this cycle related to the townhouse sprinkler requirements. The group will want to think about questions and concerns about data have come up in past discussions when residential sprinkler proposals have been considered. He would like the group to gather and vet the data and information first and provide clarity around the issues. If there are areas of consensus, that would be great. In the areas where there are disagreements, providing a clear succinct report to clarify those issues and discussions will be very helpful.

Jeff: Asked if there were any other initial thoughts to share. He encouraged the group members to speak up. He noted that not every group member was available today, and it may be challenging to get everyone together while General Assembly is in session. He was hoping to wrap the meetings up before the General Assembly session ends, but it may not be possible.

Jeff: There are 4 items on the agenda today to start discussions. In addition, Keith sent over some documents after the agenda went out. He encouraged Keith to refer to any of the documents as applicable, when the topics come up in their discussions. He also said that if there was something else in the documents that he wanted to share with the group, he could do that when they get to the "other considerations" part of the meeting. (They were available to review in the 'files' pod to the left of the main meeting space.)

Jeff: Robbie McCraw was unable to attend the meeting today, but he sent along something for Jeff to share. He read Robbie's statement and shared it in the chat box:

Jeff Brown - DHCD: from Robbie: I live in a rural area and am surrounded by other localities that are rural. The question that arises is available water for sprinkler systems, we have several townhouse complexes that are currently not connected to a public water system. If we have developers that continue to or desire to build townhouses in areas not served by public water systems what type of requirement would have to be made to maintain a water supply for a sprinkler system 09:16AM

Meredith Raetz: This is a valid point. In some areas, there aren't even fire hydrants available because storage water isn't available to supply the hydrants.

Keith: Just because there aren't domestic water supplies or fire hydrants, it doesn't mean that there can't be effective residential sprinkler systems.

Jeff: He thinks this is one of the questions that this group will want to gather information on and continue discussing. If public water is not available at a site, what type of water supply is utilized to supply the sprinkler system? Maybe gathering information on examples of townhouse developments on private systems would be helpful to address questions around requirements for water storage tanks, pumps, etc... And what would be the associated costs? He asked group members to bring back ideas.

Mike Nannery: From a utility engineering standpoint, ground storage tanks and pumps or potentially a Hydromatic tank could provide water. It would need to be engineered. It can be overcome, but would impact cost.

Jeff: That's what he was wondering. It would be great if the group could obtain some examples. He will reach out to Robbie, as he has some rural townhouse developments without public water, and see what type of water systems they utilize.

Keith: If there's a domestic water supply with enough water to operate toilets and sinks in a development, you have enough water to supply a 13D system.

Jeff: He has heard that the supply can vary and he has heard arguments for both sides. Some have said that if it works for the plumbing system, there is adequate water. He asked for examples with townhouse size, plumbing fixture calculation for water supply and calculations for sprinklers, in order to see what the difference is, if any.

Keith: He supplied an IRC Fire Sprinkler Coalition fact sheet called "Water Supplies for Home Fire Sprinkler Systems", which lays out requirements for this. Essentially only 7psi is required to operate, and a residential sprinkler system could use about 8 gallons per minute (which is in line with residential plumbing). He also provided an IRC Fire Sprinkler Coalition fact sheet called "Fire Sprinkler Systems for Townhouses", which addresses costs.

Submitted in the Chat Box:

Paul Messplay - DHCD: For those who are interested, that fact sheet is item 6 in the files pod on the bottom left 09:23AM

Jeff: It would be helpful for this group to review and discuss the data that has been provided as well as some real-life examples of townhouse sprinkler designs, with calculations, so that those discussions can be included in the information submitted to the Board, rather than just providing informational documents submitted by members with no discussion or analysis.

Keith: Will work with other stakeholders to obtain examples. Since there are no requirements in Virginia currently, examples may have to come from other localities.

Effectiveness

Jeff: What will be the impact if sprinklers are added to newly-constructed townhouses? Is there data available that compares new construction with sprinklers vs. those with no sprinklers? What is the closest data that supports the topic?

Mike N: Pre-recession, he had a conversation with a builder about townhome construction. They needed to provide a 2-head system in a 4th floor loft per code. That was 14 years ago. Are there any such requirements now? What was being enforced back then for 4th story loft and taller townhouses? The small residential meter couldn't pass the flow, which they needed to reach the higher floors. Was that local?

Ron Clements: Doesn't know what exactly was discussed back then. However, buildings that are 4 stories or higher, are out of the Residential Code, and into the IBC and VCC, which do require sprinklers now.

Keith: The model fire codes limit townhouses to 3 stories. Buildings with 4 stories and above have to have sprinklers. There was a proposal put forward last time to deal with lofts. Regarding effectiveness, there's a need to look at other localities outside of VA. In MD, there has never been a death in residential buildings with sprinklers. The University of Nevada, Las Vegas (UNLV) study in 2017 was fair on both sides of the argument - not only looking at death and injury, but also looking at building damage, effectiveness, preventing a flashover, etc. The effect on fire fighters also needs to be considered in this discussion. The average sprinkler system may put out 200 gallons of water before the fire fighters get there. This helps the fire fighters, and isn't adding a lot to water damage, considering that a fire hose can put out 100 to 1,000 gallons of water. Smoke alarms are good, but they are notification tools, allowing residents to get out alive. They also need maintenance to work properly. A residential sprinkler can prevent flashover and control a fire, and also do not need human intervention to do so. They can be effective at limiting injury or death and property loss.

Jeff: These are also things that this group needs to discuss and can include in the information that is provided to the Board. Other benefits and improvements that come along with installation of sprinklers, and how the benefits differ from smoke alarms will all help to bring clarity to the final report.

Mike N: Asked if Keith provided all the handouts?

Keith: Yes. A lot of what he just discussed was in the UNLV study, which he thought was fair. It discussed trade-offs and incentives for builders and developers as well as costs.

Mike: He read the materials and noticed that most fires are caused by unintended cooking and a lot of them happen overnight.

Keith: Yes, they are. In one case, he had a call in 2019 with a fire caused by unattended cooking, and the door was not closed. There was no residential sprinkler system and there was a fatality. His opinion is that a sprinkler system may have saved the resident.

Jeff: This a good start to the effectiveness discussion, it will continue and be built upon as we continue our discussions.

Costs

Jeff: There are various costs associated with sprinkler systems. Keith provided some cost information to review. Based on past discussions, potential costs include:

- water service – system requirements, size, water meter
- water supply - public vs. private (tank and pump size)
- utility fees
- design fees
- permit and inspection fees
- system installation
- maintenance costs

Keith: Provided the UNLV study and the Economic Cost Study from Broward County FL, which discuss costs. Also provided is the VA Townhouse Sprinkler Price Survey by Jeff Shapiro with the IRC Sprinkler Coalition, which discuss costs in the Reston, Haymarket, Leesburg, Alexandria, and other areas of northern Virginia. The cost of the system and installation is not the only cost. There are also reductions and savings for construction, such as eliminating secondary access points, reduction of cul-de-sac widths, reduction of required fire flows, decreased required street widths, exterior and interior walls etc. that reduce the cost of building when a sprinkler system is installed.

Jeff: That is a good point and should be considered by this group as we look at the costs. Supporting data and discussion around the various costs and potential cost savings should be supplied. The final report can list not only potential costs, but also potential cost savings.

Ron: The numbers provided in the UNLV study and Economic Cost Study are helpful. He also wants to look at sample townhouse projects and the design of a P2904 system, in rural and suburban areas, in order to determine what the costs are in both areas. It will be helpful to have real world samples, which everyone can look at and agree on, including some actual costs. That will help identify what the actual and specific objections are, to this being a code requirement.

Submitted in the Chat Box:

Keith Johnson - SG: Good point Ron 09:53AM

Jeff: It would be helpful having real world examples. It will be given as an assignment later.

Ron: It would also be helpful to see if this group can agree on what the minimum system requirements would be to meet the code.

Mike N: He thinks the main goal is public safety and property protection. It would be helpful to define the scope: is it global, suburban, and/or rural; is it all sprinkler system types; which area of the buildings are covered. There doesn't seem to be a defined scope of what's in or out.

Jeff: That is a good point, it will help clarify things, especially to define the minimum system requirements. It might take a few examples, some in rural and some in municipal water areas.

Keith: He's personally talking about a system to cover the entire building, especially because it's not easy to predict what a hazard area would be that might start a fire. 13D systems can be used up to 3 stories, then a 13R system would be needed.

Ron: There is an IRC P2904 system that can be designed and installed by a plumber, as opposed to a 13D or 13R, which would come from a sprinkler contractor. Again, there needs to be agreement on what the minimum system requirements would be. Also, who will do field inspections?

Keith: Stated that an NFPA 13D system can be installed by a plumber contractor or sprinkler contractor unless there is some specific license requirement in the state.

Submitted in the Chat Box:

Ron Clements Chesterfield - SG: "Fire sprinkler contracting" (Abbr: SPR) means the service that provides for the installation, repair, alteration, addition, testing, maintenance, inspection, improvement, or removal of sprinkler systems using water as a means of fire suppression when annexed to real property. This specialty does not provide for the installation, repair, or maintenance of other types of fire suppression systems. The PLB classification allows for the installation of systems permitted to be designed in accordance with the plumbing provisions of the USBC. This specialty may engage in the installation of backflow prevention devices in the fire sprinkler supply main and incidental to the sprinkler system installation when the installer has received formal vocational training approved by the board that included instruction in the installation of backflow prevention devices. 10:07AM

{BREAK 10:02 to 10:07}

Jeff: He will give out homework assignments to get more detailed information on effectiveness and cost to discuss at the next meeting.

Cost Impact

Jeff: Asked what does the cost of the system do to the cost of the housing and affordable housing?

Keith: Inspections would be the same for a sprinkler system as other plumbing, and would be performed at the same time. He thinks they shouldn't make it more than it really is. Also wanted to point out that ongoing inspections are not required for a 13D system, and they are also not required by NFPA 25. Only the initial inspections are required.

Ron: Inspectors would need additional training and additional inspection time. So, there is an impact. He is not trying to make it more than what it is, but there is an impact that should be considered. He has a staff that is already running over 100,000 inspections per year. If this adds two to four additional inspections per townhouse, that would be a significant increase in the number of inspection a year and is something that he will have to consider. Also those plumbing inspectors have never inspected a sprinkler system before so they are going to have to be trained to do that, so there is going to have to be a training effort, hopefully at the state level. Most jurisdictions are also not doing plan review on trades. They will either have to start doing plan review on trades, in order to verify that the sprinkler system is in compliance with the code, or the inspector will have to know the code requirements and inspect for compliance. This is definitely something that should be considered and not lost in the conversations.

Other considerations

Jeff: Is there anything else to consider? He asked Keith if there was anything else in the documents he submitted that he wanted to discuss.

Keith: A lot has been covered in this discussion. He thinks there is a bit of a disadvantage in Virginia, because individual localities are not able to make their own decision about this issue. He thinks that if they were, there would have already been some localities in the Commonwealth to require sprinklers in townhouses. The Commonwealth of Virginia is large and vast, which makes this process difficult. He is a fire chief and official, and looks at things from that angle, but he's also sympathetic to affordable housing and the impact on inspections and other business partners. Just because he is passionate about life safety, doesn't mean that he disregards these other issues. There is a duty to ensure fire safety. There will be costs and challenges, but there are also incentives that offset some of the costs. In the UNLV study, there's a 97% increased chance of survival in residences with sprinkler systems. Townhomes are a higher hazard occupancy and it's important to start with them, because multiple dwellings are connected. They could discuss a minimum number of units, where required sprinklers would kick in. For example, it would not be applicable in a duplex, but would it be required if there are 3-4 units or more?

Mike N: There has been good discussion. The attachments are good to read. He finds that people like options. He would encourage the possibility of having options in the code, rather than all or nothing. He tries to provide safe infrastructure to support quality of life, and it's hard to put a price tag on a life.

Keith: Another consideration could be homebuyer interest. He submitted a fact sheet about homebuyer interest from the Residential Sprinkler Coalition. Beginning in 2009, the IRC required residential sprinklers in all new homes, but Virginia removed that requirement from single family and townhomes. The fact sheet indicates that in a 2014 survey, ¾ of the respondents were more likely to buy a home with sprinklers than without them. It also talks about the myth around the need for backflow preventers, which are not required, as well as the myth about inadequacy of rural water supply. People don't think about safety, but it's important. Things like smoke alarms, escape planning and sprinkler systems are important. People do feel safer having sprinklers if they are an option, but they don't know about the effectiveness of sprinklers, so they don't ask for it.

Mike N: He will give more consideration of the cost impact from a utilities standpoint. Everyone in the Richmond Metro area does something different about trying to accommodate the flow of a residential sprinkler system without a larger connection charge. Whatever recommendations the group has about system type, flows and pressure, he will be happy to add to that by determining the cost impact from a utilities standpoint. Also, he agrees that safety in townhouses is only as good as one's neighbors.

Other

Jeff: There will be some more discussion about the parameters, and more homework in that direction. There were a lot of good things that came up in this discussion that were not on the original agenda. Getting to agreement on the parameters, and finding samples of townhouses and systems will be key.

Assignments and Next Steps

Jeff: Will reach out to some group members after this meeting to bring back information for the next meeting. All group members are reminded to forward any additional information for consideration to DHCD as soon as possible for inclusion on the next agenda

Information needed:

- Types and cost of water supply systems in areas without public water. Examples of townhouse sprinkler designs with calculations and specifications.
    - Jeff to contact Robbie for information on rural townhouse developments without public water.

- What will be the impact if sprinklers are added to newly-constructed townhouses? Is there data available that compares new construction with sprinklers vs. those with no sprinklers? What is the closest data that supports the topic? What other benefits and improvements come along with installation of sprinklers?

Next Meeting

Jeff: A Doodle poll will be sent after we have some more solid things to bring back to the next meeting. He will try to give 2-3 weeks' notice, and will get discussion items and agenda out before the meeting.

AGENDA

Residential Sprinklers Study Group

March 25, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

a) Contractor Licensing Requirements

b) Townhouse Sprinkler Plans

c) Cost estimates

d) Code Change Proposals

III) Other

IV) Next Steps

Residential Sprinklers Study Group

Meeting Summary: March 25, 2022 9:00 a.m. to 11:40 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

ATTENDEES:

VA Department of Housing and Community Development (DHCD) Staff:

Jeff Brown: *State Building Codes Office Director, State Building Codes Office (SBCO)*
Richard Potts: *Code Development and Technical Support Administrator, SBCO*
Paul Messplay: *Code and Regulation Specialist, SBCO*
Florin Moldovan: *Code and Regulation Specialist, SBCO*
Jeanette Campbell: *Administrative Assistant, Building and Fire Regulations (BFR)*
Kyle Flanders: *Senior Policy Analyst, Policy and Legislative Office*

Study Group Members:

Andrew Clark: *Homebuilders Association of Virginia (HBAV)*
Keith Johnson: *Virginia Fire Chiefs Association (VFCA), Virginia Fire Services Board (VFSB) Vice Chair, and member of the Board of Housing and Community Development (BHCD)*
Jimmy Csizmadia: *Secretary of Virginia Fire Prevention Association (VFPA) and Inspector with the Prince William County Fire Marshal's Office*
Garrett Dyer: Director, *Virginia Department of Fire Programs (VDFP)*
Mike Poole: *American Institute of Architects (AIA) Virginia and Principal of Poole & Poole Architecture*

Other Interested Parties:

Andrew Milliken: *VFCA, VFSB Chairman of Fire Codes and Standards Committee*
Craig Toalson: *HBAV*
Judy Hackler: *Executive Director, Virginia Assisted Living Association (VALA)*
Jeffrey Shapiro: *International Code Consultants*
John Ainslie
Sean Farrell: *Prince William County*
Randy Grumbine: *Virginia Manufactured and Modular Housing Association (VAMMHA)*
Robby Dawson: *National Fire Protection Association (NFPA)*
John Walser*: Fairfax County Fire & Rescue*
Glenn Dean

Study Group Members not in attendance:

Ron Clements: *Chesterfield Building Official, member of VBCOA*
Mike Nannery: *Assistant Director of Engineering and Development for Chesterfield County Utilities*
Mike Eutsey: *First Vice President of Virginia Building and Code Officials Association (VBCOA) and Assistant Chief Building Official for Hanover County*
Reid Walters: *Town Manager of the Town of Independence*
Robbie McCraw: *Carroll County Board of Supervisors and E&L Diamond Electric, Heating, Cooling and Plumbing*
Meredith Raetz: *Planning Engineer with Virginia American Water*
Overton McGehee: *Habitat for Humanity*
Ellis McKinney: *Virginia Plumbing and Mechanical Inspectors Association (VPMIA)*

AGENDA AND DISCUSSION ITEMS:

Welcome

Jeff Brown: Agenda and documents were sent earlier to group members, and are also in the file pod. The meeting is being recorded. DHCD staff can help with any technical problems. There will be a break every hour, and an hour for lunch from 12-1 if the meeting runs that long. Only Study Group members will discuss topics in the meeting, but others are welcome to sit in and listen and contact Study Group members outside of the meeting.

Discussion

Jeff: The last meeting of this Study Group was January 11th and the meeting summary was sent out and posted shortly thereafter. One of the assignments from that meeting was to submit some samples of plans showing sprinkler system designs that the group could look at. It took some time to collect the plans, and in addition, the General Assembly was in session at the same time, making it more difficult for Study Group members to collect, submit and review documentation. There should be adequate time in this meeting to have open discussion about anything of interest that's the group would like to discuss. By the end of the meeting today, the group should have a good idea if another meeting will be needed or if everything has been covered sufficiently. Once the meetings have concluded, a report will be generated for the Board of Housing and Community Development.

Andrew Clark: Representing the Home Builders Association of Virginia (HBAV). He was not able to attend the first 2 meetings of this Study Group, however he submitted some comments to DHCD, which were sent to the group. He wants to ensure that the comments he submitted will be part of the record, even though he was not at the prior meetings in person. He does feel that there is some data lacking, which he is prepared to discuss today.

Jeff: The documents Andrew sent recently did come in a bit late, however they were forwarded to the entire group. The meeting agenda was not changed to accommodate the new materials Andrew submitted, however Andrew is welcome to address them if they are relevant to any of the topics that we are discussing, or towards the end of the meeting in the "Other" section of the agenda, if they were not already discussed during other parts of the meeting. If there is more time needed for other members to review the documents, another meeting can be scheduled to allow time to review them and continue the discussion. There have not been any official code change proposals submitted in cdpVA yet, so that is a discussion point on the agenda today. The group may want or need to meet again if there are any residential sprinkler proposals submitted, so that the group can discuss the proposals.

Keith Johnson: Andrew provided materials 18 hours prior to the meeting, which he didn't have time to review. He thinks the information that Andrew provided was already covered in the previous Study Group meetings. He thinks the materials Andrew provided are philosophical in nature, and the group has moved past that topic into actual fact finding and data. He also said that the effort of the group was not about affordable housing, but about looking at sprinklers, cost estimates and pros and cons of installing sprinklers. He said he will probably take the time to read what Andrew submitted and write something of his own in response. He's concerned that there are not enough Study Group members on the meeting with actual experience of installing sprinklers.

Jeff: The documents did come in late, so they are not on the agenda, but they have been provided to the group. Andrew is welcome to discuss any information related to the topics and present the documents he provided, as time permits. If there are any documents or information that the group needs more time to review before discussing, those topics can be continued at the next meeting.

Andrew: Speaking to Keith – his comments earlier were not made in order to be negative or to steer the discussion in any way. His group is small and trying to focus on a regulatory process at the same time as the General Assembly session has been difficult. The intent of the documents is to give the group information about the housing industry's philosophy and how they approach discussing code proposals in general and specifically about fire sprinklers. He has heard some in these types of meetings talk about the builder's profit motive. He wanted to get on the record to dispel some myths. The industry vets proposals based on data.

Jimmy Csizmadia: The documents came in late, and he hasn't read them yet. He wants to talk about the agenda items and the plans he submitted.

Jeff: The group will stick to the agenda, but any documents with merit that have been submitted should be discussed and if anyone needs additional time to review and wants to have additional discussions after their review, we can continue the discussions at the next meeting if needed. We have had other members submit documents well past the requested submittal deadline for a previous meeting and included those in the discussions.

Contractor Licensing Requirements

Jeff: This was discussed at a previous meeting and there was some question as to what licensing requirements were needed to install the different types of sprinkler systems. DHCD reached out to DPOR, and confirmed that provisions and exceptions in the DPOR licensing requirements around the plumbing contractor certification are specific to systems complying with Section P2904 of the IRC/VRC. That is the only system that can be installed by a plumbing contractor in Virginia. 13R or 13D systems cannot be installed under a plumbing contractor license.

Townhouse Sprinkler Plans

Jeff: Jimmy submitted a few sets of plans, which are included in the meeting documents. The group won't get into the details of sprinkler design, but the plans show the general layout and requirements. It should help to look at what is required for certain size rooms and what the plans would look like. Ron Clements brought this up at a previous meeting and thought it would be helpful to get an idea of what the plumbing inspector would look at, and if it would require any additional staff or other resources on his end. There are water flow calculations on the plans which should also tie into discussions about water needs. The first plan is titled "Lots 1-10 FP1".

Keith: It looks like a very large building. This should be required for sprinklers under the IBC. In Loudoun, it's hard to get answers from the sprinkler contractors; there's a lot of competition and they are not very forthcoming with plans. He spoke to an estimator from Nobel Fire Protection in MD about a local project with 30 sprinkler heads. The costs were about $3,000 for the system, $70 for the permit and $150 for the PE sealing the drawings. He noted their name and number in the documentation he supplied. He spoke with Andrew over the last few days about some of the water costs in Loudoun. A 1-inch meter is $285, a 3/4-inch meter is $240 and the connection fee for either is $7,395. These prices are on the Loudoun water website.

Andrew: Meter size was something we tried to look into. A good portion of the cost is probably the water connection fees. He appreciated the numbers provided by Keith from Loudoun. Water connection fees in some localities run from $2,300 to $18,000. Connection fees, to go up a meter size, can jump significantly. He is wondering if the plans they have for review are adaptable to a smaller meter size.

Keith: The group needs to be careful about which type of system they are referring to. A P2904 system doesn't require all the same things that a 13R requires. 13R is much more expensive. Systems built under the IRC are similar to adding other plumbing systems. 13R is not customary for residential housing, where domestic water is used. He noticed in one of the documents Andrew supplied, the estimates seemed very inflated. One estimate was using a 6-inch connection, which is way more than is needed in a residential building.

Garrett Dyer: He does think the systems should be identified in order to have a more constructive discussion.

Jeff: All of the systems discussed (13R, 13D and P2904) are options under the VRC, but most likely 13D and P2904 systems would be used. 13R is probably not going to be used as it will likely be more expensive. Most of the plans that were submitted are designed to 13D.

Andrew: Are the plans submitted for 1-inch meter size? The connection fees seem low in Loudoun, but could add significant costs in other places.

Jeff: Looking at flow rates in the sample plans could help answer questions about meter sizes required.

Jimmy: For the most part, the 13D and P2904 systems will be a 3/4-inch meter, some might be 1-inch. He sees 13D systems with 3/4-inch tie-ins from the ground to the backflow preventer then the sprinkler system branches off. If more pressure is needed, a 13D would require nothing more than a pool pump, which is about $200. The discussion is getting into the weeds. Townhouses do not require a 13R system. 13D and residential sprinklers are going to give occupants time to get out in the event of a fire. The systems are not designed to save the structure, but to prevent flash-over and give occupants time to get out of the building. These plans are not for what is put into townhouses in Prince William, they are usually installed in single-family residential occupancies. If the houses are closer than 25 ft. apart, there's a proffer that the houses get sprinklers.

Mike Poole: Understands what Jimmy and Andrew are saying. Every location isn't Loudoun County. There are active projects in many other localities and connection fees vary wildly between all of the counties. It costs about $4-5k for a connection fee in Henrico to start with. Empirical data would be good, if we can get it.

Jeff: The next set of plans is more for townhouse-style residential occupancies. There are more details on this plan which should help with the discussions.

Keith: He's confused about the direction of the conversation related to connection fees. If there's a domestic water connection for plumbing, it's already there for 13D or P2904 sprinkler systems. There is no separate connection fee. The only cost difference he thinks there might be is with a change from 5/8 to 3/4. One inch isn't required for residential occupancies. A typical 5/8-inch meter will flow 20 gallons per minute, which will operate an adequate sprinkler system in most homes. A 3/4-inch meter is not usually required, unless the flow is over 30 gallons per minute. Jeff Shapiro provided a fact sheet from the Fire Sprinkler Coalition, which was shared with the group in a previous meeting. That document had all of this information.

Andrew: Nobody is saying that there is a separate connection fee, but it would require a larger meter.

Mike: These numbers are from 2019 and can probably be double these days. Meters do have to be upgraded. This should be an empirical number that we can get our hands on.

Keith: Has any 2904 or 13D system ever needed a one inch meter?

Andrew: The numbers provided are what builders have put in. The Richmond region builders confirmed 13D. It is happening. It's not that a separate meter would be needed, but an up-sizing would be.

Keith: Wants to see the evidence. He disputes that 1-inch meter and 6-inch dedicated lines are needed. If there's a contractor who is upsizing to a 1-inch meter, evidence should be provided to the group, to discuss. Residential sprinklers are not required in Virginia. He works with a lot of Maryland contractors, who install systems every day, and do a lot of work in northern Virginia. He thinks they should rely on their data.

Andrew: That's not accurate, to say that we should base everything off of northern Virginia. People are doing it in other areas as well. The estimates given are for specific projects. Different parts of the state have different costs.

Keith: He still wants to see evidence.

Andrew: It's challenging for a builder to be part of this dialogue, because they would get beat up. Builders do go to other meetings, but they don't want to be involved in the meetings about sprinklers.

Keith: Tried to sit down with Andrew earlier, and couldn't get the time with him.

Andrew: There's a lot going on in his professional and personal life. Last time he engaged with Keith, he received a twitter barrage from all across the country. He's hesitant to engage in a conversation.

Jeff: It's been slow going because of the General Assembly session. If information is still needed, it needs to be submitted and discussed by this group. Sample sets of plans have been provided. The discussion should be around what is submitted. He doesn't want to prevent anything from being shared or discussed. It would be great if utility folks were on the call or if they could be consulted to bring back some information related to water supply and meter requirements and fees. Based on the sample plans that have been provided, they can be asked what would be required for the particular designs.

Keith: Connection fees from Fairfax are $1,430 for 5/8; $1,870 for 3/4; and $1,960 for 1 inch. Meter costs are $4,400 for 5/8; $8,800 for 3/4; $14,000 for 1 inch. There's a special note for a 13D system, which is $4,400.

Jimmy: Back to the plans. It was hard to find plans in Virginia because they're not required in Virginia. He got the plans from Maryland. He would like to see Richmond area plans. He thinks they should talk about what they have on the table now. He usually sees 3/4 meters in single family homes. Some are bringing in 1.5 inch water lines from the street. They may have a 3/4 inch meter, but they're putting in 1.5 inch into the house. The group should look at coverage area. It's a 13D system to help save occupants, not the structure. Why would anyone not want to do that?

Jeff: As far as this group looking at what is required in a P2904 sprinkler system design, he doesn't think it matters where the plans come from - Virginia or Maryland. P2904 systems would look the same. The plans will help identify what the average water supply requirements for these systems are and the group can discuss how that relates to utility requirements for meters and fees throughout the state.

Mike: There are other states besides Maryland. Most other jurisdictions don't require sprinklers. Maryland and California are early adopters. An NAHB document updated yearly shows that only a few localities require this.

Keith: Information submitted previously were from localities in other states such as Pennsylvania, Arizona and Nevada. He agrees that the group should look at other localities that have done this.

Mike: There's a difference between localities and state-wide mandates.

Jimmy: Almost everything they have been doing is 3/4-inch tie-in. The 3/4-inch meters are T110 or T10 from Prince William Water Authority. When the systems are installed, there's a 4 head flow test performed and 9 times out of 10, they get twice as much water than they need from a 3/4-inch meter.

{Break 10:10 to 10:15}

Jeff: Looking again at the plans. The second set of plans is titled "Lots 414-418". DHCD also provided specification documents for sprinkler heads that were specified in the design. The other plans provided for lots 226-232 and for lot 71 can be reviewed as well, if needed. The last set of plans submitted was for a 13R system. He asked the group which set of plans they wanted to review.

Jimmy: These plans were provided to get something on the table for the group to look at. They do a good job of laying out what would be required for a townhouse. He can answer any questions and go back to the contractor if needed. Although most of the plans do show a 1-inch meter, he has done thousands of these in Prince William County, and most are using 3/4-inch meters. There's no cost difference, besides extra piping.

Jeff: The group can continue this discussion with people from the utilities side. If information from across the state is gathered, they can assist with reviewing the meter options and determining at what point larger meters are needed. Looking at these plans, the 20-30 gallon per minute range seems average.

Jimmy: From 18-22 gallons per minute is normal. Again, most testing showed more than adequate flow, even without a separate pump. The few that did use a pump had nothing more than a pool pump, which is simple and inexpensive to install. Labor is probably the most expensive part.

Jeff: Ron Clements and VBCOA wanted to see some samples to give them an idea of what would be required for inspection and plan review. I.e. is a plan review required and can the plumbing inspectors review and inspect these systems? This discussion will be continued when other group members are available.

Jimmy: Sprinkler systems have static pressure, like a kitchen faucet turned off. There are RPZs that can be put on the systems, that would divert water to the sprinklers and shutoff all other water. It's not required, but it is another safety factor available. He doesn't see how anybody can argue to not put sprinklers in multi-family dwellings. The costs are minute, and in the big picture, it's pennies.

Keith: Residential systems only require a 2 head design, not 4. There's a difference between the water utility cost and what the contractor charges. The meter size is based on the design of the system.

Jimmy: Correct, there is a 2 head flow in 13D systems.

Jeff: There are a few more plans that can be reviewed. If there are no other questions or other discussion, this will be discussed again at the next meeting.

Andrew: If Keith or Jimmy or others want to review the materials he submitted and give their opinions or ask questions, it would be helpful. Builders will be happy to provide responses as to why something was done or clarify any confusion.

Jimmy: Would be happy to that. He hasn't had time to review the documents thoroughly yet.

Keith: Will also review the documents and send his thoughts to Andrew. He wanted to talk about incentives as part of the cost discussion. He has already provided documentation from the Home Sprinkler Coalition with examples. There are incentives in various localities, such as street width reductions, longer dead end streets, decreased turn around for fire apparatus, increased hydrant spacing, reduced access points to subdivisions, etc. These incentives should be a real cost savings to developers and should also be reflected in the final costs to home buyers.

Jeff: That would be a good discussion to have as well. It has already been touched on, and as was mentioned, there was some documentation provided prior to a previous meeting. It will be included in the final report as well.

Andrew: He is interested in the discussion about incentives, and thinks they are helpful. He does wonder how they can incorporate those incentives statewide or if they will remain one-off incentives in specific localities.

Keith: Many of the incentives are already in the statewide building code. There were several that were approved with consensus last year, although there were several others that didn't go forward. He asked if Jeff Shapiro could be a guest speaker in the Study Group to review the P2904 sprinkler system, since he has a lot of experience with the systems.

Mike: There's a difference between incentives and what's already accepted in the code. In a larger building, if he was moving from a 13R to a full 13 system, there would be an extra 25 feet of dead-end corridor length in a multi-family building, which is significant, and would result in a reduction in firewalls. It would be good to see what is actually in the code to incentivize these systems. Locality incentives would be independent of that. He would also be interested to hear what Mr. Shapiro has to say. On another note, flow issues have a lot to do with the height of the building.

Jeff: With no further discussion about plans, he moved the discussion to the cost estimate topic.

Cost estimates

Jeff: Keith submitted more recent pricing. The Virginia townhouse sprinkler survey he previously submitted is also in the file pod. He asked for discussion about costs, benefits and trade-offs, incentives, and any other specifics that are in the code. The topic can also be carried over to the next meeting if needed, in order to bring more information to the table. He put an email on the screen, showing the Nobel Fire Protection estimate which Keith referenced earlier in the meeting.

Keith: Tried to get an actual invoice, but he was not able to do so. The fire sprinkler system is not usually billed for separately.

Jeff: He agrees that it is not feasible for this group to attempt to identify or agree on what the costs will be since system designs and fees will vary greatly based on building design and location, and since the sprinklers are not required in Virginia. Anything around cost that is provided to the group will be noted in the final report, with the understanding that the data is limited at this time.

Andrew: The numbers can vary widely by region and locality. Ongoing discussion about invoices and cost estimates may not be fruitful at this point.

Keith Agrees with Andrew. He supplied a pricing sheet from Northern Virginia, updated in 2020 by Jeff Shapiro. He asked again if Jeff if Shapiro can come in for a 30 minute presentation about sprinkler systems to the group. He asked if they could have a poll of the members for support.

Andrew: Due to the differences in each locality, wouldn't the best approach be to continue adding incentives at the local level or in the code for builders or developers to install residential sprinkler systems instead of making it a requirement statewide? Builders are being pushed to add housing to the middle market, and a statewide mandate in the code would definitely add to the problem of affordability.

Keith: Local incentives can't be part of the building code. Builders can put in sprinklers now, but they probably won't if they are not required. Buyers look for esthetics in homes much more than they look for safety features such as residential sprinklers.

Mike: Agrees with Keith. International and statewide building codes attempt to make the standards less individualized, and this type of thing may be an unintended consequence of that mandate. Home buyers regularly chose the modern beautiful amenities over things like environmentally friendly or safety related items, and they always want them at no additional cost. The problem with statewide mandates is the vast differences in localities and what they can afford to do.

Andrew: Builders build to the market demand. If buyers want esthetics like hardwood floors and granite counter tops, they are not likely to want to spend additional money on sprinklers. There is not a demand for it, so why would the state then mandate it? Builders are willing to do it for those who want it.

Keith: If that was the argument, many minimum safety standards would not be in place. For example, when someone purchases a car, they don't have a choice about if they get seat belts or not; it's a minimum safety standard. Residential sprinklers have been in the IRC since 2009 and has been removed from the Virginia code. He doesn't see why, because the first thing they want to do is protect people.

Jimmy: Agrees with Keith. It's already in the international code. It all boils down to safety. There shouldn't be a cost on safety.

Mike: He has over 30 projects under construction now, and has for some time. He doesn't believe those buildings are unsafe. This discussion is about making buildings safer. It's not like talking about making a car without brakes. Every other state besides Maryland, D.C. and California have opted out of this. He wants to keep the discussion in perspective. There are probably some tradeoffs that can be discussed and agreed upon. I think you could make an argument that if you made everything a 1-hour fire-resistance-rated assembly it would actually be safer than sprinklers. As Jimmy pointed out, the sprinkler system is there to give the residents more time to get out. He is a fan of sprinklers and has built a lot of occupancies with them, but he wants to make sure that everything is considered before making a mandate across the state. There must be a reason that most states have opted out of this.

Garrett: Wants to speak about the fire services in the Commonwealth. These discussions always come to a crossroads when it comes to providing safety and the cost associated with that. Sometimes the discussions lean towards the enforcement aspects of the fire code. The approach is based on the concept of community risk reduction, which includes enforcement, design and economics. The systems are designed to get individuals out of the homes safely before flashover occurs, and they also provide safety and risk reduction for fire personnel.

Keith: There are 12 states that require residential sprinklers by statewide mandate. West Virginia also has it in their code, but they don't enforce it. He agrees with Mike that Virginia does build safe structures, and he is trying to make structures safer. When the code change was proposed last cycle, it was for sprinklers in townhomes and single family dwellings. He suggested they remove single family dwellings and just include townhomes. The proposal did not pass, by one vote. There does seem to be support for it. The higher risk for townhomes over individual units is that residents have to rely not only on their own safe practices, but also their attached neighbors. He thinks it would be good if code change passes for townhome, so that base costs can be evaluated and considered before possibly including single family homes.

Andrew: The homes being built now are safer than they were in previous decades. One question to ask is what are the characteristics of the structures where these townhome fires are occurring? The households that are cost burdened are predominantly in structures built in the 40s to the 80s. Homes built now don't have those cost burdens. Why isn't this data more on promoting fire safety in older existing structures? Is there a possibility of getting some fire safety information about older structures vs. structures built in the last 10 years? Creating a statewide mandate that would add a few thousand to maybe 15 thousand or so to the cost of housing seems haphazard.

Keith: He understands what Andrew is asking for, but the data is limited. There's currently no requirement for mandatory reporting of data to the federal system. There should be a national data fire system reporting requirement, and the new US Fire Administrator wants to do this. The buildings are being built safer, but it's not about the buildings, it's about the people and what is put into their homes. In the past, there were 11-13 minutes to escape a fire because things were made of cotton and wood. Now, with liquid gas, plastics, synthetics and trusses in the homes, there's only about 3-5 minutes to escape before flashover. Even with the best data in the world, what would be needed to say that there have been too many fires in townhomes and too many people have died?

Andrew: His point about looking at data is to prioritize efforts and see where the most impact on homeowner safety can be made. Prior to the General Assembly, he met with members of the fire services industry regarding the safety of having smoke alarms installed. Nobody is saying that action will be dependent on analyzing how many people have died.

{Break – 11:17 to 11:22}

Code Change Proposals

Jeff: The cutoff to submit proposals is May 1st. There are currently no proposals submitted in cdpVA around sprinklers in townhouses, although some have expressed an interest in putting one together. Group members are encouraged to make sure they submit any proposals by May 1st. Adjustments can still be made to submitted proposals during the June General Stakeholder Workgroup meetings, if needed. DHCD will prepare a summary report of the Study Group discussions, ahead of the June Workgroup meeting. Any proposals submitted can also be reviewed by this group and those discussions included in the report. Regarding Keith's request to provide training, it's a good idea for group members to get further training if there is an interest. He encouraged Keith to setup a meeting prior to the next Study Group meeting, if he wanted to bring in someone to provide some training, and send an invite to the group, so any interested members could participate.

Keith: Asked if Jeff Shapiro could do a presentation during a meeting of the Study Group.

Jeff: Doesn't think that would be helpful to the work of the group, however, Keith can set up a separate meeting outside of the group.

Andrew: Asked Keith what the intent of the presentation from Jeff Shapiro would be.

Keith: The design of the P2904 system and compared to a 13D system. It would be mostly about the technical design and operation aspect. It may lead to discussion of costs, including incentives that are in the code or may be added to the code.

Other

Jeff: Asked Andrew if he wanted to review the documents he submitted.

Andrew: Part of it is about home safety issues in existing vs. new homes. Another part is about cost perspective for the sake of affordability. He would be glad to address any questions offline.

Keith: Affordable housing is important and Virginia does a lot to provide incentives and grants in general. One thing he saw in a document Andrew provided, which hasn't been discussed much, is smoke alarms. He is a proponent of smoke alarms for safety, and Loudoun will install free smoke alarms for residents, which are provided by a FEMA grant. As much as he likes smoke alarms, they don't put out fires.

Andrew: He is in agreement with Keith about smoke alarms. He would like to see more dialogue between builders and fire officials to build awareness and get traction on some relatively easy things that can be done to keep fire personnel and homeowners safe.

Keith: Lastly, he wanted to remind everyone that there is a vulnerable population that needs extra consideration.

Next Steps

Jeff: Thanked everyone for their time and participation. There are still some items that could benefit form additional discussion, and there may be code change proposals related to sprinklers in townhouses submitted before May 1st, so we will plan on having another meeting. Watch for an email regarding the next meeting date in the next couple of weeks and an agenda to come out ahead of the selected meeting date.

AGENDA

Residential Sprinklers Study Group

May 17, 2022

9:00 a.m.

Virtual Meeting: https://vadhcd.adobeconnect.com/va2021cdc/

I) Welcome

II) Discussion

a) Townhouse Sprinkler Plans

b) Documents submitted by SG Member Andrew Clark:

- HBAV Comments on Virginia Specific Fire Data (1)
- HBAV Compilation of Housing Affordability Reports (final)
- Richmond Region Townhome Builder Cost Estimates and Notes
- Southwest Virginia Blacksburg Estimate

c) Documents submitted by SG Member Keith Johnson:

- HFSC Fact Sheet
- NFPA US Fire Experience with Sprinklers 2021
- NFPA US Fire Experience with Sprinklers Supporting Tables 2021
- NFPA US Fire Loss Data 2020
- NFPA US Fire Loss Trend Tables 2020

d) Other Documents and Considerations

e) Code Change Proposals:

- RB313.1-21
- RB313.1(2)-21
- RB313.1(3)-21

III) Other

IV) Next Steps

APPENDIX B: Study Group Members

RESIDENTIAL SPRINKLERS

Study Group Members

Mike Eutsey - Virginia Building and Code Officials Association

Ron Clements - Virginia Building and Code Officials Association

Ellis McKinney - Virginia Plumbing and Mechanical Inspectors Association

Jimmy Csizmadia - Virginia Fire Prevention Association

Garrett Dyer - Virginia Department of Fire Programs/State Fire Marshal’s Office

Keith Johnson – Virginia Fire Chiefs Association

Andrew Clark – Home Builders Association of Virginia

Mike Poole – American Institute of Architects - VA Chapter

Overton McGehee – Habitat for Humanity

Reid Walters - Local Government - General

Robbie McCraw - Local Government - Elected Official

Meredith Raetz - Private Water Provider

Mike Nannery - Local Utility Department

APPENDIX C: Supporting Documentation


VIRGINIA
DHCD
VIRGINIA DEPARTMENT OF HOUSING
AND COMMUNITY DEVELOPMENT
Partners for Better Communities
1

Residential Sprinklers Study Group

December 15, 2021 Meeting

2021 Code Development Cycle

DHCD staff

Cindy Davis, Deputy Director of Building and Fire Regulations

Jeff Brown, State Building Codes Office Director

Richard Potts, Code Development and Technical Support Administrator

Florin Moldovan, Code & Regulation Specialist

Paul Messplay, Code & Regulation Specialist

Jeanette Campbell, Administrative Assistant

Study Group members

- Mike Eutsey - VBCOA
- Ellis McKinney - VPMIA
- Jimmy Csizmadia - VFPA
- Garrett Dyer - VDFP
- Mike Poole - AIA Virginia
- Overton McGehee - Habitat for Humanity
- Reid Walters - Town of Independence
- Robbie McCraw - Carroll County
- Mike Nannery - Chesterfield County
- Meredith Raetz - American Water
- Andrew Clark - HBAV

2021 code development cycle (tentative dates)

October 1st cdpVA was opened for submission on code change proposals for the 2021 Code Development Cycle

November 2021: Notices of Intended Regulatory Action (NOIRAs) Published

December 2021: Study Groups begin meeting

February 2022: Sub-Workgroups begin meeting

March-June 2022: Stakeholder Workgroup meetings

September 2022: BHCD meets to consider proposals

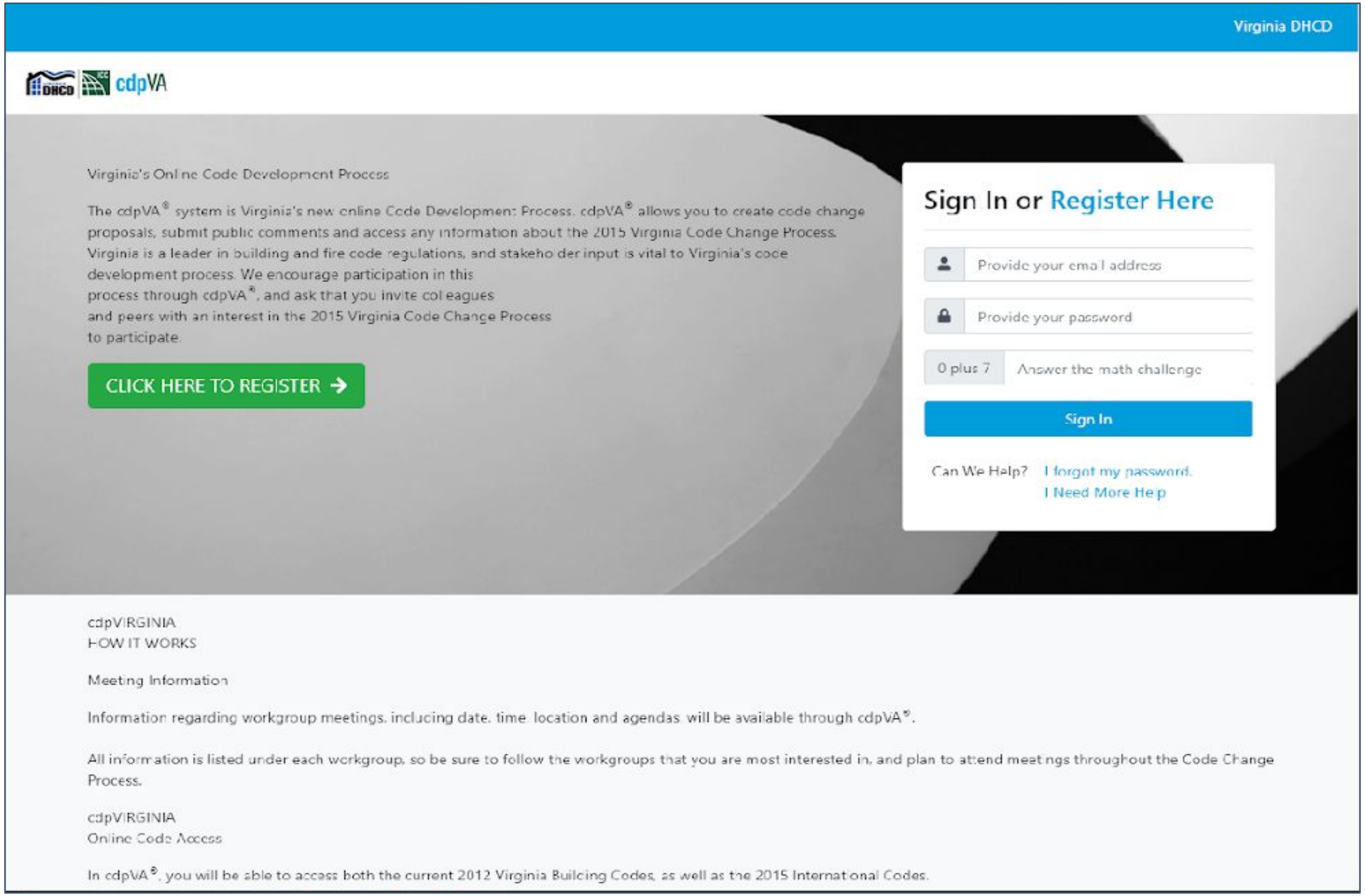
December 2022: BHCD considers proposed regulations

Fall/Winter 2023 = 2021 Virginia Codes Effective (Tentative)

cdpVA

va.cdpaccess.com

Virginia's online code development System (cdpVA)



Study Groups

- Study specific topics that require additional review and discussion
- Identify areas of consensus and disagreement
- Determine if code change proposals or other solutions are appropriate
- May review proposals, provide analysis, make recommendations, and/or develop code change proposals
- Proposals and recommendations of Study Groups are reviewed by the General Workgroups prior to BHCD consideration

Sub-workgroups

- Review all code change proposals within their subject topics, prior to the proposals being considered by the General Workgroups
- Make recommendations on each proposal, including negotiating compromises where appropriate
- May also develop new code change proposals, or support proposals submitted by others by joining the proposal as a proponent

General Stakeholder Workgroups

- All meetings are open to attendance and participation by anyone
- Review and discuss all submitted code change proposals, including all proposals and recommendations from Study Groups and Sub-Workgroups
- A workgroup recommendation is determined for each proposal and the recommendation is provided to the Board of Housing and Community Development
- Workgroup recommendations are classified as follows:

  Consensus for Approval: No workgroup participant expressed opposition to the proposal

  Consensus for Disapproval: Any workgroup participant expressed opposition to the proposal and no workgroup participant, other than the proponent, expressed support for the proposal.

  Non-Consensus: Any workgroup participant expressed opposition to the proposal

Access to codes

codes.iccsafe.org/codes/virginia

**Free Online Access to
Virginia and ICC Code books!**

History

International Residential Code	Virginia Residential Code
2006: Appendix P “Fire Sprinkler System” contains provisions for the installation of fire sprinkler systems in dwellings covered by the IRC. The Appendix is not mandatory unless specifically referenced in the adopting ordinance.	**2006:** No significant changes (IRC appendix not incorporated)
2009: Section 313 “Automatic Fire Sprinkler Systems” mandates the installation of an automatic fire sprinkler system in townhouses and one and two-family dwellings. The system is to be designed and installed in accordance with Section P2904 or NFPA 13D.	**2009:** Amends Section R313 of the 2009 IRC to make the installation of sprinkler systems optional. Section R329 “Fire Extinguishers” is added, which mandates the installation of a fire extinguisher with a rating of 2-A:10-B:C in the kitchen area, if the dwelling is not equipped with an automatic fire sprinkler system.

History

International Residential Code	Virginia Residential Code
2012: No significant changes	**2012:** No significant changes
2015: Allows NFPA 13D standard to be complied with for the design and installation of systems in townhouses (Section 2904 remains one of the options available). This change brings the townhouse requirements in line with those for one- and two-family dwellings.	**2015:** No significant changes
2018: No significant changes	**2018:** No significant changes

2018 code development cycle

During the 2018 Code Development Cycle, the Board of Housing and Community Development (BHCD) approved the following proposals, related to sprinkler systems, for inclusion in the 2018 VRC:

- **RB302.2.2-18** – allows water-filled fire sprinkler piping in cavity of common walls shared by townhouses.

- **RB302.2.6-18** – exempts townhouses protected by a fire sprinkler system complying with Section P2904, NFPA 13, NFPA 13R or NFPA 13D, from the structural independence requirement.

2018 code development cycle

The BHCD also considered the following proposals, to require sprinkler system installation in both townhouses and one- and two-family dwellings.

- **RB310.11-18** Disapproved
- **RB313.1-18** Disapproved

The BHCD also determined that additional discussions were needed and directed DHCD staff to convene a group of interested stakeholders to continue the discussions during the 2021 Code Development Cycle.

Townhouses and One- and Two-family Dwellings

Automatic fire sprinkler systems are optional

Where installed, automatic fire sprinkler systems can be designed and installed in accordance with:

- NFPA 13
- NFPA 13R
- NFPA 13D or
- VRC Section P2904

Other states

Sprinklers required in all new townhouses and one- and two-family dwellings:

- California
- Maryland
- Washington DC

Sprinklers required in some (based on size /height) townhouses and one- and two-family dwellings:

- New York
- Massachusetts

Approximately 20 states allow local jurisdictions to mandate the installation of sprinklers in townhouses and one- and two-family dwellings

Data Source: NFPA and HBAV

Study group objectives

- Gather information and data for review and discussion
- Identify areas of agreement and/or disagreement
- Summarize findings or recommendations
- Review any related proposals submitted during the 2021 cycle

Discussion topics

Important discussion topics (future meetings):

- Safety impact of residential sprinklers
- Cost(s) of residential sprinklers
- Cost impact of residential sprinklers
- Other?

Assignments/homework

Prior to the next meeting, please:

- **Reach out to other members and/or DHCD staff with any questions related to information discussed today**
- **Identify areas of interest or concern that you would like to discuss at the next meeting** (Provide to DHCD by December 27th)
- **Identify and provide helpful/relevant information (reports, data, etc.) for the group to review** (Provide to DHCD by December 27th)

Note: If any member wants to share information with the group between meetings, please send it to DHCD staff and we will distribute it to our email list to make sure we do not miss any interested parties that might be added to our list as we go along.

Next meeting

Next Meeting (Virtual)

January 11, 2021

9:00 am - 3:00 pm

(lunch break 12:00 pm -1:00 pm)

Link: https://vadhcd.adobeconnect.com/va2021cdc/

Division of Building and Fire Regulations

State Building Codes Office

sbco@dhcd.virginia.gov

804-371-7150

RB302.2.2-18

IRC®: R302.2.2, R302.4.1, R302.4.2

Proponents: Jeffrey Shapiro (jeff.shapiro@intlcodeconsultants.com)

2018 International Residential Code

Revise as follows:

R302.2.2 Common walls.. Common walls separating *townhouses* shall be assigned a fire-resistance rating in accordance with Item 1 or 2. The common wall shared by two *townhouses* shall be constructed without plumbing or mechanical equipment, ducts or vents ~~in~~ , other than water-filled fire sprinkler piping, in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code.

R302.4.1 Through penetrations.. Through penetrations of fire-resistance-rated wall or floor assemblies shall comply with Section R302.4.1.1 or R302.4.1.2.
~~**Exception:**~~ **Exceptions:**

1. Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the annular space shall be protected as follows:

~~1.~~ 1.1 In concrete or masonry wall or floor assemblies, concrete, grout or mortar shall be permitted where installed to the full thickness of the wall or floor assembly or the thickness required to maintain the fire-resistance rating, provided that both of the following are complied with:

~~1.1.~~

1.1.1. The nominal diameter of the penetrating item is not more than 6 inches (152 mm).

~~1.2.~~ 1.1.2. The area of the opening through the wall does not exceed 144 square inches (92 900 mm2).

~~2.~~ 1.2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time temperature fire conditions under a positive pressure differential of not less than 0.01 inch of water (3 Pa) at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

2. The annular space created by the penetration of water-filled fire sprinkler piping, provided the annular space is filled using a material complying with Exception 1.2 above.

R302.4.2 Membrane penetrations.. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.
Exceptions:

1. Membrane penetrations of not more than 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m2) in area provided that the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m2) in any 100 square feet (9.29 m2) of wall area. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:

1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities.
1.2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation.
1.3. By solid fireblocking in accordance with Section R302.11.
1.4. By protecting both boxes with listed putty pads.
1.5. By other listed materials and methods.

2. Membrane penetrations by listed electrical boxes of any materials provided that the boxes have been tested for use in fire-resistance-rated

assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:

2.1. By the horizontal distance specified in the listing of the electrical boxes.
2.2. By solid fireblocking in accordance with Section R302.11.
2.3. By protecting both boxes with listed putty pads.
2.4. By other listed materials and methods.

3. The annular space created by the penetration of a fire sprinkler or water-filled fire sprinkler piping, provided that the annular space is covered by a metal escutcheon plate.
4. Ceiling membrane penetrations by listed luminaires or by luminaires protected with listed materials that have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.

Reason Statement: Allowing common fire sprinkler piping to protect multiple units in a townhouse can significantly reduce installation costs, and the IBC now allows penetration of townhouse separation walls in any townhouse that does not exceed the height and area limits. For reference, IBC Section 706.1.1, Exception 2 states: *Fire walls are not required on lot lines dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum height and area requirements of this code. For the code official's review and approval, he or she shall be provided with copies of dedicated access easements and contractual agreements that permit the owners of portions of the building located on either side of the lot line access to the other side for purposes of maintaining fire and life safety systems necessary for the operation of the building.* It makes no sense for the IRC to be more restrictive than the IBC with respect to allowing penetration of sprinkler piping through townhouse separation walls.
This proposal limits application of the proposed sprinkler penetration allowance to water-filled pipes. Although plastic pipe has been listed for dry residential sprinkler applications, use of those systems is not common enough to warrant arguing the point and missing this opportunity for progress with wet-pipe systems. Use of this allowance will require following the already recognized/tested method (in the current exception) for protecting annular spaces surrounding through penetrations. With that increased level of protection, a fire could only pass the membrane by melting the pipe and causing water to leak, which would inherently protect the opening. Flame would be stopped at the barrier.

Additionally, water-filled sprinkler pipes will be allowed in common walls. This option provides for improved sprinkler designs for townhouses by allowing sidewall sprinklers to be deployed from common walls, which unlike exterior walls, are not exposed to freezing exterior conditions. By using sidewall sprinklers to protect the top floor instead of pendent sprinklers in the ceiling, sprinkler piping can be kept out of attics, which are subject to freezing.

This change was processed as Item RB67-19 and has been approved by ICC for inclusion in the 2021 IRC. It was Approved as Modified by PC1 by the ICC membership.

Resiliency Impact Statement: This proposal will increase Resiliency
The reduced cost of installing fire sprinkler systems associated with this proposal and the allowance to run piping through and in interior walls separating townhouses will increase system reliability and performance.

Cost Impact: The code change proposal will decrease the cost of construction
The allowance for sprinkler piping to penetrate townhouse separation walls will reduce the infrastructure required to install a fire sprinkler system in some cases by allowing a shared feed for multiple units.

RB302.2.6-18

IRC®: R302.2.6

Proponents: Jeffrey Shapiro (jeff.shapiro@intlcodeconsultants.com)

2018 International Residential Code

Revise as follows:

R302.2.6 Structural independence.. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit fastened to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common wall as provided in Section R302.2.2, Item 1 or 2.
6. Townhouses protected by a fire sprinkler system complying with Section P2904, NFPA 13, NFPA 13R or NFPA 13D.

Reason Statement: The IBC now allows townhouses to be built without structural independence provided that height and area limits for the overall townhouse building are not exceeded. This is true because the firewall requirement to separate units is no longer applicable in such cases. Therefore, only the 1-hour dwelling unit requirement applies, and that assembly is a fire barrier, which has no structural independence requirement. For reference IBC Section 706.1.1, Exception 2 states: Fire walls are not required on lot lines dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum height and area requirements of this code. For the code official's review and approval, he or she shall be provided with copies of dedicated access easements and contractual agreements that permit the owners of portions of the building located on either side of the lot line access to the other side for purposes of maintaining fire and life safety systems necessary for the operation of the building.
It makes no sense for the IRC to be more restrictive than the IBC with respect to requiring structural independence when townhouses are sprinklered.

This change was processed as Item RB60-19 and has been approved by ICC for inclusion in the 2021 IRC. It was Approved as Submitted by the code development committee and that action was sustained by the ICC membership.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency

Cost Impact: The code change proposal will decrease the cost of construction
Construction costs are reduced, consistent with the IBC, based on the allowance to not require structural independence of townhouse units.

RB302.3(1)-18

IRC®: R302.3, NFPA Chapter 44

Proponents: Jeffrey Shapiro (jeff.shapiro@intlcodeconsultants.com)

2018 International Residential Code

Revise as follows:

R302.3 Two-family dwellings.. *Dwelling units* in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the *exterior wall*, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. 1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, <u>NFPA 13R or Section P2904</u>.
2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided aboveand along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

~~13—16~~ ~~Standard for Installation of Sprinkler Systems~~

Reason Statement: The current exception will never be used because the cost of installing a full NFPA 13 system (typically associated with commercial structures) in a duplex will far outweigh savings associated with reducing the separation wall rating from one-hour to 30 minutes. From a parity perspective, it makes no sense to allow Section P2904 (equivalent of NFPA 13D) protection as a basis for reducing townhouse separations but require NFPA 13 for duplexes.
Perhaps the logic associated with the current provision was intending to gain sprinkler protection in the attic (which would typically be required by NFPA 13) as a basis of qualifying for the reduced fire rating. But, townhouse separations are allowed to be reduced in unsprinklered attics of sprinklered townhouses, recognizing that the vast majority of residential fires start in occupied spaces, where sprinklers are present to control a fire before extension into the attic. True, a reduced townhouse separation maintains a one-hour rating, versus 30 minutes in a duplex, but 30 minutes is still a sufficient separation rating to accommodate fire department response and setup at a duplex.

Note that IRC Section R313 only requires NFPA 13D for duplexes, so this change will align with Section R313. Also, the reference to NFPA 13 is proposed for deletion since this is the only place in the IRC where that standard is referenced.

This change was processed as Item RB64-19 and has been approved by ICC for inclusion in the 2021 IRC. It was Approved as Modified by the code development committee (as reflected in this proposal) and no public comments were submitted.

Resiliency Impact Statement: This proposal will neither increase nor decrease Resiliency

Cost Impact: The code change proposal will decrease the cost of construction
This change will allow a reduction from an NFPA 13 sprinkler system to an residential sprinkler system as a basis for reducing the fire rating of duplex separation walls.

RB310.11-18

VCC: 310.11

Proponents: Glenn Dean (gad.pompier@gmail.com)

2015 Virginia Construction Code

Revise as follows:

310.11 Amendments to the IRC.. The following changes shall be made to the IRC for its use as part of this code:
(DHCD Note: The changes to the IRC are available in the Virginia Residential Code published by ICC, or the pamphlet form of the VCC published by DHCD. They are not included in this printing of the VCC.)

Section R313

Automatic Fire Sprinkler Systems

R313.1 Townhouse automatic fire sprinkler systems. ~~Notwithstanding the requirements of Section 103.3, where installed, an automatic residential fire sprinkler system for townhouses shall be designed and installed in accordance with NFPA 13D or Section P2904.~~ An automatic residential fire sprinkler system shall be installed in townhouses.

Exception: An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.2 One-family and two-family dwellings automatic fire sprinkler systems. ~~Notwithstanding the requirements of Section 103.3, where installed, an automatic residential fire sprinkler system shall be designed and installed in accordance with NFPA 13D or Section P2904.~~ An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.

Exception: An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential fire sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Reason Statement: The facts supporting the requirement to install automatic fire sprinkler systems in townhouses and 1&2 family dwellings have not fundamentally changed over the past decade although they are stronger now than before. By the same token, the argument against requiring sprinklers is fundamentally the same, just somewhat weaker given the national expansion of them being required along with technical improvements, consumer, builder and local official's increased knowledge.

Attached is an article published online by Forbes dated August 3, 2019. It provides a concise overview of why fire sprinklers should be required in all newly constructed housing. (I've hi-lited a few important points.) In concert with the attachment, I urge watching a 10-minute video on YouTube (https://www.youtube.com/watch?v=OiHqRJVChlQ) that expands thearticle's cited example of Scottsdale, AZ, a locality with one of the oldest ordinances in the country requiring fire sprinklers. (There are other localities with similar requirements for fire sprinklers but their requirement is younger and thus don't have the more reliant record as Scottsdale, AZ does --- yet.) A fire sprinkler opponent in Virginia might say that Arizona is not Virginia and Arizona's fire experience is not the same as Virginia's. Really, about the only significant difference between Arizona and Virginia is the climate. People are people. Fire is fire. Construction is construction. They essentially use the same materials in Arizona as are used in Virginia. The only difference may be the appearance (architecture) once assembled.

One of the oldest arguments against fire sprinklers has been "cost". To require fire sprinklers will increase the cost of housing. Fire sprinklers will price people out housing. Fire sprinklers will hurt the economy. (Think *Chicken Little*.) These same tired arguments have been levied against other housing elements over the years. They've been used to argue against handrail geometry, stair geometry, GFIs, smoke detectors, window sizing, energy efficiencies, and the list goes on. The cost of installing fire sprinklers is LESS than the cost of most kitchen counter upgrades. They do not require a sprinkler contractor to install them. Under current DPOR licensing requirements, a plumber can install them. The plumbing loops in the house are lengthened in order to have a sprinkler head high on a wall in the middle of a ceiling. Maintenance is less than the amount of maintenance given to replacing worn washers in a faucet. (Other than someone physically damaging a fire sprinkler head, there's no maintenance.) The tap fee is a non-issue used for distraction. The same is true for the meter size because it does not need to be different from what is currently required or needed. The same is for houses on wells. Nor is there a need for a "stand by fee". In the event of a fire, the amount of water flow (GPM) needed to operate a sprinkler head is no more than what would be needed to take a shower or refill a toilet. If there is sufficient potable water to supply the house for domestic use, then by default there is enough water to supply the fire sprinkler system.

Probably the most ludicrous statement ever made against fire sprinklers was, in a public forum no less, “only OLD houses burn”. Really? If that were true, at what age does a newly construction house become “old”? (Please return to the attached article wherein it states that there have been NO fire deaths in any house constructed in Scottsdale, AZ since 1986.)

The technical merits and costs of requiring the installation of fire sprinklers in townhouses and 1&2 family dwellings are well known and have been for years. The argument against them hasn’t changed much either. So it simply comes down to politics and which argument, for or against, do you wish to subscribe to. As quoted in the attached article, it can be, “A puddle of water or a pile of ashes.” To that end, be mindful of the statutory charge that the USBC and its provisions *“…**shall** be such as to protect the health, safety and welfare of the residents of the Commonwealth, provided that buildings and structures **should** be permitted to be constructed, rehabilitated and maintained at the least possible cost consistent with recognized standards of health, safety, energy conservation and water conservation, including provisions necessary to prevent overcrowding, rodent or insect infestation, and garbage accumulation; and barrier-free provisions for the physically handicapped and aged.”* (§ 36-99 of the Code of Virginia) (Emphasis added to denote the order of placement and the hierarchy of the words “shall” and “should”.)

Resiliency Impact Statement: This proposal will increase Resiliency
COV Executive Order Twenty-four speaks to increasing Virginia's resilience to sea level rise and natural hazards. The Executive Order goes further in saying, "We must act now to protect lives and property from multiple threats and reduce taxpayer exposure through fiscally responsible planning." According to the **Resilient** Design Institute, **resilient** design is defined as “the intentional design of buildings, landscapes, communities, and regions in response to vulnerabilities to disaster and disruption of normal life”. Fire is a natural hazard to a community whether it is a single house or an entire neighborhood. I submit this proposal proposal provides resilience but it is targeted only to the hazards of fire on a scale smaller than what may be intended or described in Executive Order 24.

Cost Impact: The code change proposal will increase the cost of construction
Not including the cost of land, I estimate the cost of incorporating fire sprinkler systems into newly constructed townhouses and 1&2 family dwellings at 1% of the construction costs above the structure's foundation.

RB313.1-18

VRC: SECTION R313, R313.1, R313.2

Proponents: Glenn Dean (gad.pompier@gmail.com)

2015 Virginia Residential Code

SECTION R313
AUTOMATIC FIRE SPRINKLER SYSTEMS

R313.1 Townhouse automatic fire sprinkler systems.. ~~Notwithstanding the requirements of Section 103.3, where installed, an~~ An automatic residential fire sprinkler system ~~for townhouses~~ shall be ~~designed and installed in accordance with NFPA 13D or Section P2904.~~ installed in *townhouses* .

> **Exception:** An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation.

Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.2 One- and two-family dwellings automatic fire sprinkler systems.. ~~Notwithstanding the requirements of Section 103.3, where installed, an~~ An automatic residential fire sprinkler system shall be ~~designed and~~ installed in ~~accordance with NFPA 13D or Section P2904.~~ one- and two-family *dwellings* .

> **Exception:** An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential fire sprinkler system.

R313.2.1 Design and installation.

Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Reason Statement: In part, the purpose of this proposal is to elevate Virginia's residential building code from one being sub-par to being equal to the national standard/model as it relates to fire safety and sustainability through preservation.T
he cost of residential sprinkler systems keeps dropping to where it may well be less than a typical kitchen counter upgrade. This statement is based on the attached 2017 study by the University of Nevada, Las Vegas. Beyond that, the facts supporting the requirement to install automatic fire sprinkler systems in townhouses and 1&2 family dwellings have not fundamentally changed over the past decade although they are stronger now than before. By the same token, the argument against requiring sprinklers is fundamentally the same, just somewhat weaker given the national expansion of them being required along with technical improvements, consumer, builder and local official's increased knowledge.

Attached is an article published online by Forbes dated August 3, 2019. It provides a concise overview of why fire sprinklers should be required in all newly constructed housing. (I've hi-lited a few important points.) In concert with the attachment, I urge watching a 10-minute video on YouTube (https://www.youtube.com/watch?v=OiHqRJVChlQ) that expands the article's cited example of Scottsdale, AZ, a locality with one of the oldest ordinances in the country requiring fire sprinklers. (There are other localities with similar requirements for fire sprinklers but their requirement is younger and thus don't have the more reliant record as Scottsdale, AZ does --- yet.) A fire sprinkler opponent in Virginia might say that Arizona is not Virginia and Arizona's fire experience is not the same as Virginia's. Really, about the only significant difference between Arizona and Virginia is the climate. People are people. Fire is fire. Construction is construction. They essentially use the same materials in Arizona as are used in Virginia with the only difference being the appearance (architecture) once assembled.

One of the oldest arguments against fire sprinklers has been "cost". It's been repeatedly stated that to require fire sprinklers will increase the cost of housing; fire sprinklers will price people out housing; fire sprinklers will hurt the economy. These same tired arguments have been levied against other housing elements over the years. They've been used to argue against handrail geometry, stair geometry, GFIs, smoke detectors, window sizing, energy efficiencies, and the list goes on. To repeat - the cost of installing fire sprinklers is LESS than the cost of most kitchen counter upgrades. They do not require a "sprinkler contractor" to install them. Under current DPOR licensing requirements, a plumber can install them. The plumbing loops in the house are lengthened in order to have a sprinkler head high on a wall in the middle of a ceiling. Maintenance is less than the amount of maintenance given to replacing worn washers in a faucet. (Other than someone physically damaging a fire sprinkler head, there's no maintenance.) The "tap fee" is a non-issue used for distraction. The same is true for the meter size because it does not need to be different from what is currently required or needed. The same is for houses on wells. Nor is there a need for a "stand by fee". In the event of a fire, the amount of water flow (GPM) needed to operate a sprinkler head is no more than what would be needed to take a shower or refill a toilet. <u>If there is sufficient potable water to supply the house for domestic use, then by default there is enough water to supply the fire sprinkler system.</u>

Probably the most ludicrous statement ever made against fire sprinklers was, in a public forum no less, "only OLD houses burn". If that were true, the question becomes at what age does a newly construction house become "old"? **(Please return to the attached article wherein it states that there have been NO - I repeat - NO fire deaths in any house constructed in Scottsdale, AZ since 1986 - 34 years ago.)**

The technical merits and costs of requiring the installation of fire sprinklers in townhouses and 1&2 family dwellings are well known and have been for years. The argument against them hasn't changed much either. So it simply comes down to politics and which argument, for or against, do you wish to subscribe to. As quoted in the attached article, it can be, "A puddle of water or a pile of ashes." To that end, be mindful of the statutory charge that the USBC and its provisions *"…**shall** be such as to protect the health, safety and welfare of the residents of the Commonwealth, provided that buildings and structures **should** be permitted to be constructed, rehabilitated and maintained at the least possible cost consistent with recognized standards of health, safety, energy conservation and water conservation, including provisions necessary to prevent overcrowding, rodent or insect infestation, and garbage accumulation; and barrier-free provisions for the physically handicapped and aged."* (§ 36-99 of the Code of Virginia) (Emphasis added to denote the order of placement and the importance of the words "shall" and "should".)

Resiliency Impact Statement:
COV Executive Order Twenty-four speaks to increasing Virginia's resilience to sea level rise and natural hazards. The Executive Order goes further in saying, "We must act now to protect lives and property from multiple threats and reduce taxpayer exposure through fiscally responsible planning." According to the Resilient Design Institute, resilient design is defined as "the intentional design of buildings, landscapes, communities, and regions in response to vulnerabilities to disaster and disruption of normal life". Fire is a natural hazard to a community whether it is a single house or an entire neighborhood. I submit this proposal proposal provides resilience but it is targeted only to the hazards of fire on a scale smaller than what may be intended or described in Executive Order 24.

Cost Impact:
Not including the cost of land, I estimate the cost of incorporating fire sprinkler systems into newly constructed townhouses and 1 &2 family dwellings at 1% or less of the construction costs above the structure's foundation.

Economic Cost Benefit Analysis of Residential Fire Sprinkler Systems Broward County, Florida

Prepared for:
Broward County

September 2021

NP
Newport Partners L.L.C.

Prepared by:
Newport Partners, LLC
Davidsonville, MD

Table of Contents

Executive Summary

The cost of residential fire sprinkler systems varies across the country for a variety of reasons. Housing design, construction, and plumbing materials, and the availability of sprinkler contractors are a few variables that can factor into pricing. The purpose of this report is to present an estimate of the economic cost benefit pertaining to the installation of residential fire sprinkler systems in new, single-family homes in Broward County using the data from previously completed cost benefit studies from Coral Springs (2021) and Tamarac, Florida (2019), two jurisdictions located within Broward County.

To best estimate the costs associated with installing residential fire sprinkler systems Newport obtained estimates from sprinkler contractors in Broward County. Three estimates were provided by contractors in Coral Springs and three from Tamarac for a total of six estimates. The estimates were based on house plans identified by each jurisdiction that best represent the characteristics of new home construction in the area. Contractors were asked to only provide estimates for the design and installation of the system, and not include any outside fees or costs.

In addition to the design and installation costs, other costs that are typically associated with installing a residential fire sprinkler system include permit fees and water meter fees or upsizing charges. Often, these fees and costs are determined by the individual jurisdictions. For this report, Newport determined that both Coral Springs and Tamarac had permit fees as well as a hard cost for upsizing water meters. These costs were determined through conversations with city and fire officials and sprinkler contractors in both jurisdictions and are included in the final cost estimates.

The total cost for installing residential fire sprinklers in Broward County was estimated by using the six contractor estimates for design and installation and adding the estimated permit fees and meter upsizing costs to each to obtain a total cost estimate for each home. From these estimates, the average cost across Broward County is $2.78 per square foot of sprinklered space.[1] When compared to the most recent cost study from the National Fire Protection Association (NFPA) in 2013, this represents a higher-than-average cost. However, there are

[1] Sprinklered space refers to the area of the home required to covered by an automatic fire sprinkler system according to NFPA 13D.

many variables that factor into the price of installing a residential fire sprinkler system that will be discussed later in the report.

Benefit calculations took into consideration a variety of inputs including determining probability of a home fire, the average ratio of property loss to value for homes without sprinklers, expected deaths or injury that occur from fires, and the value of life. In addition, the home and property value in Tamarac and Coral Springs were considered. These measures were compared for homes with and without fire sprinkler systems. The differences resulted in significant benefits associated with fire sprinklers in homes, including monetary benefits of lives saved, injuries averted, and the uninsured direct and indirect costs from property loss. Additionally, reduced cost of homeowner's insurance provides a direct economic benefit for homeowners.

In addition to the benefits associated with an individual homeowner or property, the jurisdiction may also benefit from the reduction of impact fees, as well as a reduction of infrastructure requirements. Examples of infrastructure requirement reductions include: reduced requirements for hydrant spacing, minimum road widths, fire flows, cul-de-sac widths, and dead-end street width. Applicable incentives associated with Florida's adoption of NFPA 1, were considered in the net positive benefit calculations.

The costs and benefits associated with residential fire sprinkler systems are outlined in Table 1. This report discusses the methodology used in this study, the variables considered for both costs and benefits, and other factors that impact the costs of installing residential fire sprinklers. Overall, the study concludes residential fire sprinklers are estimated to provide a net positive benefit in Broward County.

Table 1. Net Benefit

	Broward County (Average)
Average Cost of Installation	$5,290.61
Infrastructure Reduction	$1,271
Benefit	$10,815.75
Net Positive Benefit	$6,796.14

Overview

Homeowners today are at significant risk for injury, property loss, and even death from home fires. A recent National Fire Protection Association (NFPA) study, reported annual fires in residential buildings to be over 270,500.[2] One-and-two family homes only represent about twenty percent of all structure fires reported yet these fires represent 66 percent of civilian deaths and 51 percent of civilian injuries according to the same report.[3]

Fire sprinkler installation in one- and two-family dwellings can be used as a tool to greatly reduce death and injury for home inhabitants. Across a 4-year period, there was an 81 percent reduction in civilian deaths in homes with fire sprinklers than those without.[4] Firefighters are also impacted by fire sprinklers when responding to home fires. Homes with fire sprinkler systems reported fire fighter injury rate being 79% lower than when responding to homes without sprinkler systems.[5]

Automatic residential fire sprinkler systems for one- and two-family dwellings have been required as part of the International Residential Code (IRC) since the 2009 version. This requirement has carried forward in each subsequent update (2012, 2015, 2018, and most recently in 2021). The 2020 Florida Building Code is based on the 2018 IRC with amendments that exclude provisions for residential fire sprinkler systems in one – and two-family dwellings.[6] The Florida Fire Prevention Code, based on NFPA 1 and NFPA 101, also removes the requirements for automatic fire sprinkler systems in one- and two-family dwellings at the state level.[7]

While not a statewide requirement, Florida allows local jurisdictions the ability to implement residential fire sprinkler requirement for one- and two-family dwellings. To do so, the jurisdiction must perform and submit an analysis of the economic impacts to inform local constituents prior to adopting the requirement. This analysis should not only include the cost to design and install the system, but also any additional fees as previously discussed, as well as the benefits that

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[2] *Trends and Patterns of Fire Losses in 2017*, National Fire Protection Association, January 2017
[3] Ibid
[4] Marty Ahrens*, U.S. Experience with Sprinklers*, National Fire Protection Association, July 2017
[5] Ibid
[6] Florida Building Code, 7th Edition, 2020, Section 903.2.11.3
[7] Florida Fire Prevention Code, 2020, Section 8(a)

may accrue to residents. Additionally, before imposing any requirement, the local government must provide the homeowner with a letter documenting any infrastructure, tax, or fee allowances and waivers as well as a cost analysis that determines these cost savings are approximate to the cost of installing a residential sprinkler system. [8] The purpose of this study is to show expected costs and benefits relevant to the proposed adoption of requirements for residential fire sprinkler systems in Broward County, Florida.

The main point of resistance to requiring automatic fire sprinklers in one- and two- family dwellings is cost. Because this is such a prevalent issue, there have been several economic studies conducted to analyze the cost impact associated with these sprinkler systems.
In 2013, NFPA completed a comprehensive national study which found the national average to design and install a residential fire sprinkler system to be $1.35 per square foot. That report also compared the national data to data from states (California and Maryland) which have statewide requirements for all new construction, which dropped the average cost to $1.16 per square foot. The cost of sprinkler systems can vary widely depending on several variables (house size, house design, climate, type of pipe, water supply, labor costs, etc.). What was apparent however, was that widespread adoption helps to lower costs.[9]

In addition to the cost studies, NFPA conducted a 2016 market research study, "Home Fire Sprinklers- - Stakeholder Perceptions in Mandatory Requirement States." Various stakeholder groups (water purveyors, local government officials, and homeowners) in both California and Maryland were surveyed and interviewed to gauge how the statewide requirements were affecting stakeholders. The report highlights an overwhelmingly positive experience and perceived value from these groups. To summarize the key findings, homeowners noted that the sprinklers provided them with a sense of safety, added value to their home, and lowered their homeowners insurance rates. Local government officials believed that home fire sprinklers help reduce death and injury to both residents and firefighters and help in reducing the costs due to fire damage. Lastly, water purveyors indicated the impact on the water supply is a non-issue stating, "Our system can handle 2,000 gallons/min. Residential fire sprinklers are a drop in the bucket." That report can be read in its entirety here.[10]

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[8] Florida Fire Prevention Code, 2020, Section 8(a), Section 8(b) 2
[9] *Home Fire Sprinkler Cost Assessment*, Newport Partners, 2013
[10] *Stakeholder Perceptions of Home Fire Sprinklers*, Newport Partners, 2016

Based on the estimates used in his report, the average cost per square foot of sprinklered space is estimated to be $2.78 per square foot, as shown in Table 2. While at first this may seem significantly higher compared to the national average of $1.35 per square foot, there are several variables that factor into the higher estimated cost. The lack of a residential sprinkler requirement results in a low number of residential projects, which impacts the cost in several ways. First, it drives up the design costs as each home in this report needed an individual design. With more expertise and repetition of designs, the design cost decreases. Second, the labor costs for any different or innovative type of work are almost always higher. This is true even if the contractor has commercial experience as residential systems are designed and installed differently. Newport contacted over 40 fire sprinkler installers that included "residential installations" in their promotional material to secure bids used in this report, however the vast majority indicated they had little to no experience installing residential systems. If volume were to increase by instituting a sprinkler requirement, more contractors would gain experience designing and installing them, and competition for the jobs would drive prices down. Materials may then be purchased in bulk, and builders and developers would likely work directly with sprinkler contractors to reduce costs.

For Coral Springs, an additional factor and arguably the biggest factor in the high price estimates is due to the COVID-19 pandemic ongoing during the time of the study. During the pandemic, it has been widely documented that building material prices across the board have risen and labor has been in short supply. Businesses in the construction industry have now been forced to charge higher prices. As these prices normalize again, and with the adoption of a sprinkler requirement, the cost of designing and installing a residential fire sprinkler system will likely move closer to the national average of $1.35 per square foot.

Table 2. Cost per Square Foot

Location	Cost per square foot of sprinklered space
Tamarac	$2.40
Coral Springs	$3.16
Broward County (Average)	$2.78

Methodology

This report uses data collected from two previous economic studies, Coral Springs and Tamarac, to estimate the costs and benefits of residential sprinkler systems for Broward County. The benefit of using these two jurisdictions is the difference in demographics and housing characteristics. Coral Springs population has larger households, higher income, and higher property values than Tamarac. Single family units (both detached and attached) also represent a larger share of the housing stock. Taken together the costs and benefits are a better estimate for the costs and benefits in Broward County than either individual study.

Table 3. Household Size Trends shown in Median Persons per Housing Unit

Location	1990	2000	2010	2015
National	2.29	2.59	2.59	2.64
Florida	2.15	2.46	2.53	2.63
Broward	2.05	2.45	2.57	2.73
Coral Springs	2.85	2.96	2.95	3.12
Tamarac	1.85	2.00	2.13	2.31

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 4. Percent of Single-Family Housing both Detached and Attached

Location	1-Unit detached %	1-unit attached %
Broward	41.3	8.3
Coral Springs	49.4	6.9
Tamarac	38.5	15.3

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 5. Location Characteristics from US Census Bureau

	Tamarac	Coral Springs	Broward County
Property Value (Structure+Contents)	$340,000	$449,909	$265,000
Population	66,721	133,759	1,952,778
Median Income	$48,930	$77,360	$59,547

Several items contribute to the total cost of a residential fire sprinkler system. Much of the system's cost comes from the design and installation for the system, but other costs must also be included. Table 6 outlines different costs that are applicable to Broward County and describes sources of information for these costs. It is important to note that while Broward County does not impose any permit or meter upsizing fees, these may vary among jurisdictions.

Table 6. Residential Fire Sprinkler System Cost Categories

Cost Category	**Information Source**
System design, installation, and materials	Cost estimates for design, installation, and materials from fire sprinkler contractor.
Sprinkler system permit fees	Discussions with city officials and sprinkler contractors
Added hard cost for increased water meter size from 5/8 in. to 1 in. in diameter.	Discussions with city officials and published residential meter cost schedule.

The size of homes in terms of square footage, the number of stories, the foundation types, as well as the system type and material choices can all contribute to the overall cost of fire sprinklers. Actual building plans that had been submitted to Tamarac and Coral Springs that represent a typical single-family residence in that area were obtained to generate cost estimates. Four of the six homes were two-story structures, while two homes were single-story structures. The homes ranged from 1,612 square feet to 2,675 square feet in size.

Newport contacted sprinkler contractors in both areas to verify they had experience with installing residential fire sprinkler system and discuss the details of the study. Because residential fire sprinklers are not a requirement, it was important to ensure the contractors providing estimates had experience with residential systems to best estimate the cost of design and installation. Once the contractors were identified, Newport provided all three sets of building plans as well as project specifications and instructions for providing cost estimates. Each contractor was to provide an estimate for the design and installation of a NFPA 13D compliant fire sprinkler system, that was a standalone system using CPVC piping material, the most common system type and piping material found in residential systems. Contractors were asked to exclude any fees or additional costs, but were asked to identify what they were if they did exist.

Building Plans

Table 7 outlines the relevant characteristics for the homes with fire sprinkler specifications used in this report. All systems were to be designed to NFPA 13D standards, be a standalone sprinkler system type (as opposed to multi-purpose), use CPVC piping, and built on concrete slab on grade foundations.

Table 7. Sample Home Characteristics for Broward County

	Coral Springs			Tamarac		
Square Footage	1,721	1,915	2,076	1631 SF	1612 SF	2675 SF
Number of Stories	Two	One	Two	Two	One	Two

Estimated Costs

All estimates received from the fire sprinkler contractors were reviewed to ensure they included the correct system specifications and did not include any additional fees. In the case where detailed information was lacking, follow up contact was made with the fire sprinkler contractors to confirm the estimates were based on the correct details and specifications of the project. In some cases, minor adjustments were made to the original estimates. Contractors were asked to not include permit fees or any other additional fees beyond the design and installation of the fire sprinkler system as those were obtained from conversations with city officials in both Coral Springs and Tamarac and added to the estimates later.

To arrive at the average cost to design and install a residential fire sprinkler system in Broward County, permit fees and meter upsizing costs were added to the contractor estimates for each home. For Coral Springs these additional costs added $255 ($200 permit fees and $55 meter upsizing) to the contractor estimates, and $174 ($110 permit fees and $64 meter upsizing) was added to the contractor estimates in Tamarac. The average cost of each home in both studies was then added together and divided by the six estimates received. Based on this, the average system design and installation cost was calculated to be $5,290.61 in Broward County. Table 8 below shows the total cost estimates (design and install plus additional fees) used to derive the average cost for Broward County.

Table 8. Individual Sprinkler Contractor Estimates by Home

Coral Springs Estimates				
	Home A	Home B	Home C	Average
Home Size (ft^2)	1,721	1,915	2,076	1,904
Estimate ($)	$4,205.00	$4,505.00	$4,905.00	
Estimate ($)	$5,055.00	$5,055.00	$5,455.00	
Estimate ($)	$7,755.00	$8,805.00	$8,255.00	
Average ($)	$5,671.67	$6,121.67	$6,205.00	$5,999.45
Average $/ft2	$3.30	$3.20	$2.99	$3.16
Tamarac Estimates				
Home Size (ft^2)	1,631	1,612	2,675	1,973
Estimate ($)	$6,674.00	$5,374.00	$6,574.00	
Estimate ($)	$3,274.00	$3,374.00	$5,074.00	
Estimate ($)	$3,344.00	$3,499.00	$4,049.00	
Average ($)	$4,430.67	$4,082.33	$5,232.33	$4,581.78
Average $/ft2	$2.72	$2.53	$1.96	$2.40
Broward County Estimates				
Average Cost ($)	$5,290.61			
Average $/ft^2	$2.78			

Estimated Benefits

Benefit calculations of a sprinkler system for homeowners in Broward County, Florida generally follow the methodology used in the 2007 report *Benefit-Cost Analysis of Residential Fire Sprinkler Systems* prepared by the National Institute of Standards and Technology[11] as well as the 2012 *Economic Cost Benefit Analysis of Residential Fire Sprinkler Systems in Cape Coral.*[12] More recent data were used from updated sources in order to more accurately assess the benefits of a fire sprinkler system.

The estimates assume that the value of the structure and contents of a new home will be $449,090 in Coral Springs and $340,000 in Tamarac. That assumption influences the calculations for property damage and insurance, but not the values for lives saved and injuries averted. All monetary values in the calculations are in terms of 2021 prices. A real interest rate of 4.8 percent is used to discount future benefits (and costs) over 30 years to present values.

Table 10 shows the key assumptions and estimated future benefits of sprinklers in new homes in Coral Springs and Tamarac. The estimated benefit from Coral Springs and Tamarac were averaged together for an estimated benefit in Broward County of $10,815.75.

Table 9: Summary of Estimated Benefits

Jurisdiction	Estimated Benefits
Coral Springs	$13,527.15
Tamarac	$8,104.36
Broward County	$10,815.75

[11] David T. Butry, M. Hayden Brown, and Sieglinde K. Fuller, *Benefit-Cost Analysis of Residential Fire Sprinkler Systems* (U.S. Department of Commerce, National Institute of Standards and Technology, NISTIR7451, September 2007)
[12] Newport Partners LLC, *Economic Cost Benefit Analysis of Residential Fire Sprinkler Systems Cape Coral, FL,* July 2012

Table 10. Estimated Present Value of Benefits as Calculated for Tamarac and Coral Springs

	Tamarac	Coral Springs
	Estimate 2019	Estimate 2021
Inputs:		
Annual Fire Probability	0.0031	0.003067485
Pr: Death/Fire (No Sprinklers)	0.0075	0.0075
Pr: Injury/Fire (No Sprinklers)	0.0340	0.034
Property Value (Structure+Contents)	$ 340,000.00	$449,909
Fire Loss-to value (No Sprinklers)	0.155	0.155
Uninsured Share of Direct Loss	0.20	0.2000
Indirect/Direct Loss	0.10	0.1000
Uninsured Share of Indirect Loss	0.40	0.4000
Reduction in Death (Sprinklers)	0.81	0.87
Reduction in Injury (Sprinklers)	0.31	0.27
Reduction in Fire Loss-to-value	0.63	0.63
Value of life (2019)	$ 9,852,576.00	$11,600,000
Rate in real increase in life, injury value	0.0088	0.880%
Value of Injury (2019)	$ 463,071.07	$ 545,200.00
Annual Insurance Prem (No Sprinklers)	$ 3,004.00	$6,143.00
Insur Discount for Sprinklers	9.00%	9.00%
Time horizon (years)	30	30
Real Discount Rate	4.80%	4.80%
Intermediate Calculations:		
Uniform PV of Constant T year benefit	15.7292203	$ 15.73
Uniform PV with real growth g	17.46124368	$ 17.46
Direct Prop Damage per Fire (No Sprinklers)	$ 52,700.00	$ 69,735.90
Uninsured direct loss/Fire (No Sprinklers)	$ 10,540.00	$ 13,947.18
Unins Indirect Costs/Fire (No Sprinklers)	$ 2,108.00	$ 2,789.44
Death/fire (Sprinklers)	0.001425	$ 0.00
Injury/Fire (Sprinklers)	0.02346	$ 0.02
Uninsured direct loss/Fire (Sprinklers)	$ 3,899.80	$ 5,160.46
Uninsured Indirect Costs/Fire (Sprinklers)	$ 779.96	$ 1,032.09
Value from Lower Deaths in 2019	$ 183.60	$ 232.18
Value from Lower Injury in 2019	$ 14.97	$ 15.35
Annual Value Lower Uninsured Direct	$ 20.37	$ 26.95
Annual Value Lower Uninsured Indirect	$ 4.07	$ 5.39
Annual Savings on Insurance	$ 270.36	$ 552.87
Present Value of Benefits:		
PV from Lower Deaths	$ 3,205.93	$ 4,054.12
PV from Lower Injury	$ 261.42	$ 268.07
PV from Lower Uninsured Direct Prop Loss	$ 320.38	$ 423.95
PV from Lower Uninsured Indirect	$ 64.08	$ 84.79
PV from Insurance Discount	$ 4,252.55	$ 8,696.21
	$ 8,104.36	$ 13,527.15

A large part of the estimated benefits of sprinklers consists of the value of lives saved. Although it is difficult to place a monetary value on a human life, people in fact implicitly do so regularly as they make choices about risks they face in choosing where to work or live, what products to buy, etc. Based on "revealed preferences" derived from those choices, particularly the wage premia demanded for riskier jobs, various studies have calculated the "value of a statistical life" (VSL), and such values have been widely employed in the evaluation of the costs and benefits of regulations and investments. VSL assumptions specified by the U.S. Department of Transportation in 2016 and used by a variety of government agencies are used as part of this analysis. Those VSL amounts were set at $9.6 million for 2016, with annual real increases of 0.877 percent for succeeding years.[13]

Another significant component of the estimated benefits of sprinklers looks at the annual savings on insurance. Homes in Coral Springs are significantly more expensive than the average home in Tamarac. Annual insurance premiums within Coral Springs are estimated to be nearly double that in Tamarac leading to greater annual savings on insurance for a home with a fire sprinkler system.

Findings

This study finds that, for Broward County, the average total cost to design and install a residential fire sprinkler to NFPA 13D standards is $5,290.61 or $2.78 per square foot of sprinklered space, based on six contractor bids and estimated fees.

Benefit calculations for this report follow the general methodology of the 2007 NIST report and use the 9 percent reduction in insurance rates referenced. Values were updated to reflect most recent local data. The Present Value of benefits for installing a fire sprinkler system in Broward County comes to $10,815.75 with most of the benefits attributable to savings on insurance and the value of fewer fatalities.

The net benefit expected is $6,796.14 as shown in Table 10.

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[13] Memorandum from Molly J. Morgan, Carlos Monje to Secretarial Officers Model Administrators, "Guidance on Treatment of the Economic Value of Statistical Life" August 8, 2016

Table 10. Net Positive Benefit

	Tamarac	Coral Springs	Broward County (Average)
Average Cost	$4,581.78	$5,999.44	$5,290.61
Infrastructure Reduction	$1,271.00	$1,271.00	$1,271
Benefit	$8,104.36	$13,527.15	$10,815.75
Net Positive Benefit	$4,793.58	$8,798.71	$6,796.14

Loudoun County Fire and Rescue
P O Box 7100
801 Sycolin Road SE, Suite 200
Leesburg, VA 20177-7100
Phone 703-777-0333 Fax 703-771-5359

For Additional Information:
Laura Rinehart, Public Information Officer
Laura.Rinehart@loudoun.gov or 571-233-1649
October 11, 2019

For Immediate Release:
Cause Determined in Fatal Sterling House Fire

Sterling, VA. – The Loudoun County Fire Marshal's Office has determined that unattended cooking was the cause of a fatal house fire in Sterling and have estimated damages to the home at $144,000. The investigation also revealed that there were no working smoke alarms in the residence.

A 9-1-1 call came into the Loudoun County Emergency Communications Center just before 3:00 a.m., Sunday, October 6, 2019 reporting a house fire in the 200 block of Giles Place in Sterling. Firefighters arrived to find smoke coming from a two-story townhouse and one adult outside suffering from burn injuries. The patient was transported to the Burn Center at MedStar Washington Hospital with non-life threatening injuries.

Once inside, firefighters located an adult male who was brought outside to waiting EMS crews. Paramedics immediately began advanced life support care and transported the victim to a local hospital where he was pronounced dead. One additional resident refused medical treatment on the scene.

Loudoun County Fire Officials remind residents of easy steps you can take to prevent these fires and protect your family if a fire does occur:

- **Stay in the kitchen** while cooking, especially on the stovetop. If you leave the kitchen, even briefly, turn off the stove. If baking, roasting, or broiling, set timers to remind you food is cooking.
- **Have working smoke alarms!** Smoke Alarms provide an early warning giving you more time to safely escape. Install smoke alarms on every level, outside the door of any sleeping area, and inside each bedroom. Test alarms monthly, change the battery, and replace after 10 years. Loudoun County Fire and Rescue has a free smoke alarm program, to learn more visit www.loudoun.gov/smokealarms for more information.
- **Close Before You Doze!** Closing your bedroom door before going to sleep can help slow the spread of smoke, heat, and fire. Homes have more open layouts, and lightweight construction materials which allow fires to spread much quicker affecting the time a family has to escape.
- **Have a home escape plan!** A family has as little as 2-3 minutes to escape should a fire occur. Discuss with your family a home escape plan that includes two ways out of each room and an outside meeting place.

For more fire prevention information for you and your family, please visit www.loudoun.gov/firemarshal or call Lisa Braun, Public Education Manager at 571-258-3222.

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GREENSPUN College of URBAN AFFAIRS
UNIVERSITY OF NEVADA, LAS VEGAS

Residential Fire Sprinkler Study - 2017

Residential Fire Sprinkler Cost Benefit Analysis

For

City of Las Vegas (NV) Fire and Rescue

July 2017

Authors:

Sanford D. Mangold
(Adjunct Professor, Crisis & Emergency Mgt)
Chad Hofius
(Cost Analyst)

UNLV GREENSPUN College of URBAN AFFAIRS
UNIVERSITY OF NEVADA, LAS VEGAS

Residential Fire Sprinkler Study - 2017

Executive Summary:

This is a study commissioned by the Las Vegas Fire and Rescue Department, which provides a dispassionate and objective cost benefit analysis of residential fire suppression (sprinkler) systems, which could be mandated in all new home construction up to 5,000 square feet of livable space*. This study is in direct response of Nevada Revised Statue (NRS) 278.586, which specifies that any governing body considering such a mandate must perform a cost benefit analysis and hold a public hearing on the results of that analysis prior to enacting legislation requiring residential fire suppression systems in all new home construction.

UNLV performed a detailed study over the course of 3 months and determined that there is a definite cost benefit to both homeowners and home builders by installing fire suppression systems in all new residential homes up to 5,000 square feet of livable space.

The following pages detail the UNLV study, which also compares and contrasts the study results with those provided by Applied Analysis (a local Las Vegas analytical company), which was contracted to perform a similar study by the Southern Nevada Homebuilders Association in March 2015.

The UNLV study clearly shows that survival is the primary reason for mandating installation of residential fire sprinkler systems, as well as detailing the source of all cost savings back to homeowners and homebuilders, if such a mandate were enacted.

***The scope of this report addresses new homes which are less than 5,000 square feet in total livable area to match the scope of the requirements of Section 278.586, added to Nevada Revised Statue as a result of the passage by of SB477. This statute requires that a cost cost-benefit analysis be performed whenever a residential sprinkler ordinance will be considered for residential dwelling structures which are less than 5000 sq. feet in livable area. Please see Attachment 1 of this report for the complete NRS 278.586.**

Residential Fire Sprinkler Study - 2017

Purpose:

The purpose of this study is to present an independent, objective analysis regarding the possible installation of residential fire suppression systems (sprinkler systems) in all new single-family home construction within the city limits of Las Vegas, Nevada. As a starting point, the University of Nevada Las Vegas (UNLV) was asked to study, analyze, and document the different perspectives presented in two studies prepared by reputable organizations:

- The National Institute of Standards and Technology (NIST): Benefit-Cost Analysis of Residential Fire Sprinkler Systems (NISTIR-7451), September 2007.
- Applied Analysis: Benefit-Cost Analysis of Residential Fire Suppression Systems – A Review and Analysis in Unincorporated Clark County, March 2015.

Background:

The City of Las Vegas, through the Las Vegas Fire and Rescue, commissioned a cost-benefit analysis to determine the affordability of residential fire sprinklers in single family dwellings with usable living space equaling 5,000 square feet or less. This analysis is to determine the costs associated with a local mandate, as well as the benefits the homeowner and the community gain from residential fire sprinklers. This cost-benefit analysis is also required to satisfy Nevada Revised Statute 278 enacted during the 2015 Nevada legislative session through Senate Bill 477 (attachment 1). Embedded in the Senate language is a mandate requiring that a cost-benefit analysis be performed to demonstrate that the installation of a residential fire suppression system in a new home would be:

> to the benefit of the owners of the residential dwelling units to which the requirement would be applicable and that such benefit exceeds the costs related to the installation of automatic fire sprinkler systems in such residential dwelling units. (Reference: Nevada Senate Bill 477)

Further, the City may elect to issue a mandate requiring fire suppression systems in new residential homes with livable area of 5,000 square feet or less, if:

> the unique characteristics or the location of the residential dwelling unit, when compared to residential dwelling units of comparable size or location within the jurisdiction of the governing body, would cause an unreasonable delay in firefighter response time. (Reference: Nevada Senate Bill 477)

The Senate bill also specifies that the City may mandate residential fire suppression systems in new homes with livable area greater than 5,000 square feet without requiring either of the two criteria mentioned above.

Following the City of Las Vegas' decision to consider adopting this fire suppression system mandate, the Southern Nevada Home Builders Association commissioned a local analytical company, Applied Analysis, to perform a cost-benefit analysis in order to determine the financial feasibility of such a mandate.

Applied Analysis used the 2007 NIST Study (referenced above) as a baseline document. Then, using only local Clark County (Nevada) data in the NIST-developed algorithms, Applied Analysis performed a study to determine if there was, indeed, a cost benefit to the homeowner derived from having a residential fire suppression system installed. Applied Analysis concluded:

> The National Study found that sprinkler systems are economical (i.e., the benefits outweigh the costs) based on national data; however, the utilization of local datasets leads to a different conclusion. Based on the cost-benefit analysis conducted and described herein, results indicate that in unincorporated Clark County, home fire sprinkler systems are not economical (i.e., the costs outweigh the benefits of installation) based on local fire probabilities and system installation costs. (Reference: Applied Analysis Study, page 3)

Observations:

It is important to note that the Applied Analysis study did not dispute the factual content of the NIST Study. Further, Applied Analysis did not suggest that the data used by NIST was flawed; the cost-benefit algorithms developed by NIST were incomplete; nor the conclusions reached by NIST were faulty. Rather, Applied Analysis simply stated that when local Clark County (Nevada) data is plugged into the NIST-developed algorithms, then the installation costs of a residential fire suppression system appear more expensive than any potential financial benefit for a homeowner.

Additionally, the Applied Analysis Study did not consider the potential economic benefits to the homebuilders nor the community, if residential fire suppression systems were mandated in all new residential home construction of 5,000 square feet or less. Without this information, any attempt to provide the City of Las Vegas with a comprehensive cost-benefit analysis is short-sighted and incomplete.

Following the action of the 2015 Legislative Session, the City of Las Vegas asked the University of Nevada Las Vegas (UNLV) to conduct an independent study in an attempt to, if possible, reconcile the differences between the two studies (NIST and Applied Analysis) and to determine if there was additional information, which could shed more light on the wisdom of adopting the legislation mandating the installation of fire suppression systems in all new residential home construction.

Armed with both studies, the UNLV researchers commenced their independent study.

Approach:

UNLV met with the Las Vegas Fire Rescue (LVFR) Fire Marshals with whom they conducted extensive interviews, took detailed notes, and obtained a wealth of background studies on residential fire suppression systems performed over the past 15 years. Further, UNLV met with several fire suppression installation contractors to determine the types of fire sprinkler systems available to home builders and the costs of installation based on current and projected residential home building trends with the Las Vegas city limits.

The researchers also contacted fire marshals, insurance companies, and analytical companies from across the nation. Specifically, they contacted Verisk Analytics:

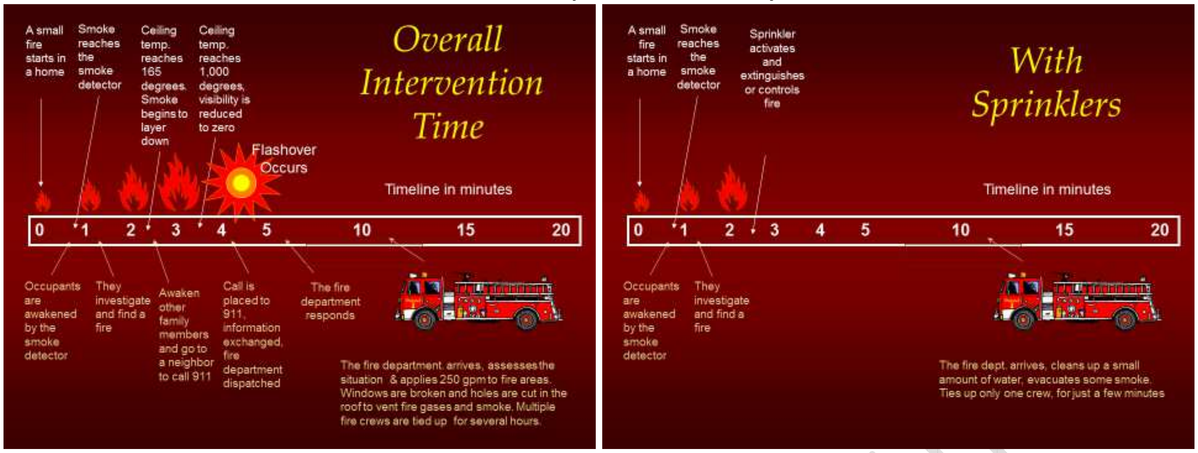
> Verisk Analytics, Inc. is an American data analytics and risk assessment firm based in Jersey City, New Jersey, United States, serving customers worldwide in insurance, natural resources, financial services, government, and risk management.

Each of the organizations and individuals provided the UNLV researchers with supplementary information. The information indicated that additional data (beyond simply just the cost of installation) needed to be factored into any thorough study on fire suppression systems. This new data coupled with realistic fire suppression system installation costs would provide Las Vegas City Council with comprehensive information upon which to make a final decision as to how to proceed with residential fire suppression system legislation.

Findings:

- **Cost:** UNLV performed an in-depth cost analysis, which refutes the cost figures generated by Applied Analysis and its subsequent conclusions (Attachment 2). As shown Attachment 3, UNLV discovered that a residential fire suppression system actually pays for itself in a matter of months after the new residential home is complete (For more detailed information, see Attachment 4). Further, the positive cost benefits to the homebuilder and community-in-general were studied and detailed in the following pages.

- **Smoke Alarms – A Case of Too Little, Too Late:** Smoke alarms without residential fire suppression systems do not appear to be enough to save lives and/or avert major home damage.
    - Smoke alarms do not provide sufficient warning to save all lives. In a typical residential house fire, they activate at about the 45 second point after a fire has started. Smoke becomes a visibility problem at 2 ½ minute point. Temperatures reach in excess of 1,000 degrees in about 4 minutes. Delays in notification (occupants waking up; assessing & identifying the problem; insuring humans and pets are alerted; then calling 911) means the Fire Department commences response at approximately the 5-minute point. It takes (on average) 10 minutes (total elapsed time) for the fire department to arrive. (Source: Power Point Presentation "Why Sprinklers?") By that time, the residence is fully involved in the fire.



Fire Suppression in Homes with and without Sprinkler Systems
(Source: "Residential 1-2 WHY SPRINKLERS" Presentation by Roy Marshall)

- **<u>Damage to Home:</u>** Beyond fire and smoke damage, there is a significant amount of water and structural damage to a house that has experienced a fire.
    - Residential sprinkler systems are set to activate at 150 degrees F.
        - The average residential sprinkler system outputs water at an average of 13 gallons per minute (GPM).
        - Given average fire department response times, a residential sprinkler head may output less than 200 gallons of water before being shut off by a fire fighter.
    - Unprotected residential dwellings will require between 1,500 and 100,000 gallons of water to extinguish the blaze. (This figure does not include damage to doors, windows, and the roof as the fire department works to gain entry into the home.)

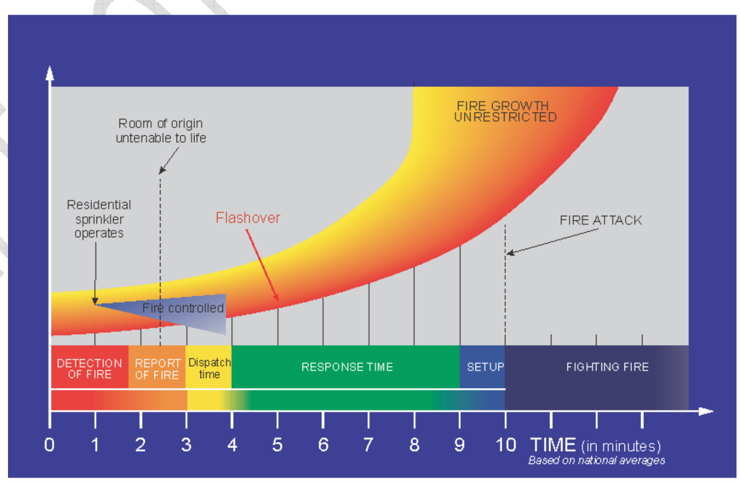


Figure 3: Positive Effects of Residential Sprinklers
(Source: "Why Sprinklers" Power Point Presentation by Pat Coughlin)

- **The Danger in Synthetics:**
  When a house is on fire, many times It is not the structural fire that causes fire deaths, it is the synthetic composition of the residential contents. (Synthetics burn twice as hot and twice as fast.) **(Source: Power Point Presentation "Why Sprinklers?")** Additionally, synthetic materials will typically outgas extremely hazardous and toxic smoke clouds.

  - During a fire, temperatures in a house (without fire suppression systems) can reach 1200 degrees F in less than 5 minutes.
  - "Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 90 percent of all fatalities in residential fires." **[Source: Topical Fire Report Series, Volume 16, Issue 2 / July 2015, *"Civilian Fire Fatalities in Residential Buildings (2011-2013)*]**

- **Fatalities:**
  Residential Fire Suppression Systems save lives. According to an extensive study performed by the Medford (Oregon) Fire Department:

  - Home fire sprinklers are designed to ensure a tenable atmosphere for escape.
  - Fire sprinklers with smoke detectors increases chance of surviving a fire by over 97%.
  - Smoke detectors aren't enough.
    (Source: Power Point Presentation "The Case for Residential Sprinklers in Medford, Oregon.)

- **Modern Home Building Trends:**
  New trends in home building and modern furnishing are compressing the timelines between a fire starting, toxic smoke release, and flashover occurring. The Federal Emergency Management Agency (FEMA) and the US Fire Administration hosted a two-day workshop at the Maryland Fire & Rescue Institute (College Park, MD) on 11-12 Dec 2012. This workshop was attended by leading experts from the fire service and home fire research specialists, who gave compelling presentations on how the latest trends in homebuilding and residential furnishing are cause for concern. What they revealed is that there is not only increased concern for the residents, but substantially increased risks for the firefighters as they combat fires in newer residential homes. Their observations are summarized as follows:

  - Changes in the Design of New Homes
    - Larger home footprints.
    - Open concept floor plans.
    - More unventilated attics.
    - Increasingly airtight construction.
    - Increased concealed space.
    - Variety in plans and construction types.
    - Increased housing density.
    - Building at the wildland interface.

- **<u>Modern Home Building Trends (continued):</u>**

  - Changes in Home Construction Materials and Techniques
    - Engineered wood assemblies.
    - Combustible exterior finishes.
    - Green building features.

  - Changes in Home Furnishings
    - New information on effectiveness and hazards of fire retardant chemicals in upholstered furnishings.
    - Overall increased plastic contents.
    - Energy-saving technologies.
    - Photovoltaics.
    - Electric vehicles.
    - Energy storage and distributed power solutions.

  - Changing Fire Service-related Risks
    - Shorter time available for size up due to reduced times to flashover.
    - Fire flow/Wind-driven fires phenomena.
    - Current fire ground procedures and firefighter training inadequate to address those new risks.
    - Less experience in fighting fires due to fewer fires.
    - Staffing reductions in selected jurisdictions independent of increased risks.
    - New firefighter gear/tools with varying performance levels.
    - Firefighter gear improvements increasing other personnel risks.
    - Exposure to carcinogens from contents and construction materials.

    (Source: "Changing Severity of Home Fires Workshop Report," US Fire Administration/National Fire Data Center, December 2012)

- **<u>IRC 2012:</u>** Las Vegas adheres to 2012 International Residential Code (IRC), which mandates fire sprinkler systems. However, during the adoption process, the City placed a qualifier on when residential fire sprinklers will be required. Las Vegas City Ordinance 6351 stipulates:

The commencement date for residential sprinkler installation shall be the July 1st that follows the first calendar year, if any, during which the combined number of building permits issued by the Southern Nevada jurisdictions for single family dwellings reaches or exceeds 10,000.
(Note: Southern Nevada jurisdictions include all of Clark County to include the cities of Las Vegas, North Las Vegas, and Henderson.)

Although, special provisions are provided when fire sprinkler systems are installed (0-hour versus 1-hour fire resistance walls and decreased separation distances between homes), the lack of a mandate means that many new homes are built with the inherent issues identified in the bullet statement above.

It is important to note that Residential occupancies are required by the IRC and International Energy Conservation Code (IECC) to limit air leakage to prevent conditioned air escaping the dwelling. This approach to energy savings has created a condition to limit the escape of smoke and fire gases in the case of a fire condition within the dwelling. The combination of fire gases from synthetic materials with limited ability to vent causes fires to reach flashover potential within three minutes of ignition.

- **Incentives or Trade-ups for Homebuilders and Developers.**

  - **Garages:**
    The base IRC, 2012 Edition, Section 302.6 and Table 302.6 requires fire rated separation from habitable rooms and garages when the habitable rooms are located above the garage. The City of Las Vegas may consider the installation of fire sprinklers in the garage space as an equivalent alternative to 5/8" Type X gypsum board. This may be proposed as a local code amendment.
    - As a result, homes and garages with sprinklers can use less expensive and fewer gypsum panels in the construction of garage walls and ceilings. Assuming a 22' by 22' garage with 8' ceilings, two walls adjacent to living space, and living space above, the estimated cost savings per house from this incentive was estimated to be $226.
    - Without sprinklers in the house and garage, the design is assumed to include two layers of 5/8'' Type X gypsum board on the ceiling and have two garage walls with 5/8" Type X panels on both the inside and outside of the wall. These specifications are based on 1-hour rated assemblies found in the Gypsum Association's "Fire Resistance Design Manual." With sprinklers used in the garage and the home, there would be only one layer of ½'' drywall on the ceiling and ½" gypsum panels on the walls dividing the garage from the home.
    - Approximate prices for the 5/8'' Type X and ½'' standard gypsum panels were based on a review of the cost of a 4' by 12' panel from several national retailers who supply the products. The cost for 5/8'' Type X panel was roughly $15.23 per panel while the standard ½'' panel was about $11.98. (These prices are only estimates.)

  - **Exterior Wall Elements:**
    - The IRC requires separation between homes to reduce the likelihood of fire spreading from one home to the next. If they are placed closer than outlined in Section R302.1 (Table R302.1(1)) then a 1-hour minimum fire resistance rating, as tested by approved standards, is required.

- **Exterior Wall Elements (continued):**
  - Table R302.1(2) allows dwellings to be spaced two feet closer when fire sprinklers are installed versus Table R302.1(1) which is used for dwellings without fire sprinklers.
  - This provision allows a home builder to install fire sprinklers to decrease separation distance between houses without exterior walls being rated. The house can grow one foot wider on each side.

- **Increased Fire Hydrant Spacing:**
  The City of Las Vegas allows fire hydrants serving homes built under the IRC to be spaced every 500 feet, and if all homes served by the hydrant have fire sprinklers, then the spacing can be every 600 feet (CLV Fire Code - Section 507). The City of Las Vegas may consider larger spacing of fire hydrants, up to 900 foot intervals with master planned communities where all homes have fire sprinklers. This can be done as a code amendment, or as part of development agreement with a master developer. In considering the information gathered from jurisdictions for this incentive, it was determined that a 400 foot increase in hydrant spacing feet was representative, resulting in an "incentivized spacing" of roughly 900 feet. The more distance there is between hydrants, the lower the hydrant cost per building lot because one hydrant covers more lots. The value of the incentive is therefore presented as a reduced cost per building lot.
  - The value of this incentive was estimated to be $49 per building lot. In calculating this figure, the cost of a fire hydrant is estimated to be $4,000. This figure was obtained from a price sheet of a residential fire hydrant manufacturer (Kennedy). Also, it was necessary to assume that a standard sized lot would have 50 feet of frontage for tract home developments. This figure was sourced from a Tualatin Valley Fire and Rescue report on fire sprinkler incentives, and is a representative lot width in many residential developments nationwide. In considering both sides of the street, 20 building lots can be covered by a hydrant under standard spacing requirements. This results in a per-building lot hydrant cost of $110.
  - There can be 36 lots covered by a single hydrant under the incentivized spacing, reducing the per-building lot hydrant cost to about $122. This translates into an incentive value of $98 per building lot.
  - It is worth noting that the incentive's per-lot value may not hold under certain development scenarios. For example, a sub-division's layout might not allow for each hydrant to cover the maximum amount of building lots. Most hydrants may cover the full 36 lots, but others may cover fewer based on the layout of roads and buildable lots. (This would serve to increase the sub-division's hydrant cost per lot, and reduce the overall value of the incentive.)

- **Increased Fire Hydrant Spacing (continued):**

  - One additional benefit is reducing the need for water district easements for each hydrant location and, if applicable, additional space for on street parking. ("Study of Cost Implications Associated with a Voluntary Residential Sprinkler System for New Construction," hydrants. This report provides a comparison between the cost of a sprinkler system and the total value of a number on and off-site tradeoffs, or incentives.)

- **Reduction of Road Width:**
  The City of Las Vegas currently does not allow a reduction of road through a code amendment, but can as a condition of a development agreement. The City of Las Vegas has a fire apparatus access road minimum width requirement of 24 feet. Of the jurisdictions that offer this type of incentive, several different road width reductions are noted.

  - In light of this, a 4' reduction provides a reasonable estimate. In order to present this incentive on a per-lot basis, the reduction in width is divided by two to account for lots being present on each side of the street. The frontage length of a building lot (50') is multiplied by ½ of the road width reduction (2') to determine the area of road, per building lot, which no longer needs to be paved. This area, 100 square feet (SF), is then multiplied by an estimated road development cost ($3.50/SF) to determine the savings from avoided excavation and paving costs ($350/lot). The estimated road development cost per SF of $3.50 was calculated by obtaining the paving cost per single-family lot from Public Works Sources. This cost was divided by one-half the total area of road in front of a building lot, assuming road frontage of 50' and road width of 24', to obtain the cost per SF.

  - The value of the raw land that is able to remain unpaved as a result of this incentive also serves as a component of the value determination, because this land becomes available to the developer for some other use. It is assumed that the developer is able to make some sort of productive use of the non-paved land, such as additional building lots, open spaces, etc. In calculating an estimate for the value of raw land, a raw lot cost of $48,769 was obtained from the NAHB's 2004 Construction Cost Survey while a median lot size of 9,114 for new single-family detached homes was obtained from the U.S. Census Bureau's Characteristics of New Housing for 2009. Relevant data was combined to arrive at a raw land cost of $5.35 per SF, which was in turn multiplied by 100 SF (per lot) to arrive at value of $535/lot for the value of the additional available land.

  - Combining these two components of the reduced road width incentive, the estimated value of the 4' width reduction is roughly $1,172 per building lot.

- **Reduced Fire Flows:**
  Code required fire flow for one- and two-family dwelling currently is a minimum requirement of 1500 gallons per minute (GPM). The fire code as adopted will allow for a 50 percent reduction in fire flow as long as the 1500 gallons per minute is maintained. A reduced minimum fire flow requirement of 750 gallons per minute (GPM), down from a standard flow rate of 1,500 GPM could be implemented for dwellings less than 3000 square feet. The Las Vegas Valley Water District will maintain a minimum flow rate and pressure for residential tract areas, but a reduction in fire flow could reasonably result in the water main size being reduced from 8" to 6" in diameter.
  - The value of this incentive was found to be $50 per lot. For this calculation, it was assumed that the 2" reduction in water main diameter would result in a cost savings of $2 per linear foot of pipe.
  - To obtain the per-lot metric, a lot frontage of 50 feet was used. The water main was assumed to serve both sides of a street; therefore, lots across the street from each other "shared" the value of this incentive, essentially dividing the value by 2. Both the 50' lot frontage and the $2 cost savings/lineal foot pipe figures were obtained from the Tualatin Valley Fire and Rescue report referenced above.

- **Reduced Cul-De-Sac Width:**
  Based on information gathered from jurisdictions offering this incentive, the most common reduction of a cul-de-sac radius was found to be 2 feet. For instance, to allow developers to decrease the radius of a cul-de-sac 2 feet in exchange for including sprinkler systems in the project's homes.
  - Unlike some of the previous incentives which have been valued on a per-lot basis, this incentive is valued for a single cul-de-sac. With the three-foot reduction noted above, the estimated value was found to be $5,433 per cul-de-sac. This figure is based on the area of cul-de-sac which would not have to be paved in moving from a 52' radius to 50' radius, allowing for the fact that part of this area would still be paved where the road enters the cul-de-sac. Road paving cost per square foot was obtained using the same method as was applied in estimating the value of a reduced road width. (This will also require a code amendment if the City of Las Vegas and the homebuilding industry find value in using this approach.)
  - In addition to reduced excavation and paving costs, this figure is also based on the estimated value of raw land of $5.35 per SF that no longer needs to be paved and becomes available to the developer for some other use. Again, this component of the valuation assumes the developer can make some sort of productive use of the preserved land. The value for raw land was determined using the NAHB and U.S. Census Bureau sources noted above in the discussion on reduced road widths.

- **Increased Dead-End Street Length:**
  The typical amount of extended dead-end street length found in the study was 125 feet.
  - Similar to the incentive for reduced radii of cul-de-sacs, this incentive is not valued on per-lot basis. Instead, the benefit of the incentive is stated in terms of how many lots can be added as a result of the increased street length. Under a scenario where 125 feet of street length can be added to a dead-end, an additional four lots can be included.
  - **T**his determination assumes that a standard size lot includes 50 feet of street frontage, and that lots are situated on both sides of the extended dead-end. It should be noted that the value of these additional lots would be partially offset by added land development costs, and that the application of this incentive could be limited by some development layouts.

- **Secondary Access Point:**
  The International Fire Code as adopted and amended though Section 503.1.2 requires a secondary access point for emergency services when a planned community has more than 100 dwelling units. The code allows this secondary access point to be eliminated until a planned community reaches 200 dwelling units with equipped throughout with residential fire sprinklers. This secondary access point may represent a buildable lot for an additional dwelling unit. The return on investment for the homebuilder and master developer will vary based on the street and lot configuration of the community.

<u>**Conclusions:**</u>

- <u>**Cost is the wrong metric:**</u>
  The cost of installation is not a core issue. In our opinion, the issue of cost appears to be a "red herring" issue. Certainly, while important, cost cannot be used as the sole criterion for accepting or rejecting the provisions contained in Senate Bill 477, NRS 278.576.
  - First, it does not matter whether fire suppression systems increase value of a Las Vegas home by $3,500 - $5,049 (NIST Study) or provide negative value by as much as $2,230 (Applied Analysis Study). (See Attachments 2 & 3) The real issues are: "Do fire suppression systems work and do they save lives and property?" The answer to both questions is: "Yes."
  - Second, the UNLV Cost Analysis (Attachment 4) demonstrates that having a fire suppression system installed in a new home (during construction, not retrofitting) amortizes to zero within the first 12-18 months of home ownership. What is important about this analysis, is that it used current Las Vegas area costing data.

  - Third, on page 4 of the Applied Analysis study, the following statement is made:

    > "It is also noteworthy that to retrofit older, existing houses in unincorporated Clark County with a fire sprinkler system, assuming similar pricing, it would cost nearly $ 1 billion."

Nowhere in Senate Bill 477, NRS 278.576, or any Las Vegas Fire Department proposal put in front of the City Council mention anything about retrofitting older homes. We view this statement as completely unnecessary and a distraction, which may be interpreted as an attempt to strengthen a very weak case against residential sprinkler systems.

- Finally, community developers and homebuilders can realize significant overall cost savings and increased profit margins by allowing residential fire suppression systems to be an integral part of new residential homes built in Las Vegas. These cost savings come in the form of reduced street widths; reduced cul-de-sac widths; less costly building materials in certain areas of the home; and more.

In the opinion of the UNLV researchers, cost is an ancillary issue. This study has essentially put the perception of increased cost of new home construction due to installation of fire suppression systems to rest. Fire suppression systems pay for themselves. So, if cost is not the main issue, what is? The core issue is Safety.

- **Survival is the Paramount Issue:** Abraham Maslow, noted American psychologist, developed a concept called the Hierarchy of Needs. The most fundamental human need is: Survival. While fire alarms provide some level of warning, they do not provide sufficient notification to the occupants of a burning home to allow the occupants to get to safety in a reliable manner. Residential sprinkler systems are designed to put water on the ignition source of a home fire, while allowing the resident to escape safely. Thus, residential fire sprinkler systems in new homes speaks to the most fundamental human need – Survival.

- **Mandated Residential Sprinklers do not "disincentize" home buyers:** The UNLV researchers took the extra step of reviewing new home permits for the Las Vegas area. What was discovered that the City of Henderson, NV (which mandates residential fire suppression systems in all new residential home construction) has surpassed the City of Las Vegas in new home permits. It would appear that mandating residential fire sprinkler systems will not adversely affect new home building in Las Vegas. (Attachment 5)

Recommendation:

In the opinion of the researchers from the University of Nevada Las Vegas, the Las Vegas City Council should immediately pass the ordinance mandating fire suppression systems for all new single family residential home construction.

Attachment 1

Adopted language as a result of Senate Bill 477

NRS 278.586 Adoption of building code or other action by local government requiring installation of automatic fire sprinkler system in new residential dwelling units and other structures.

1. A governing body may adopt a building code or take any other action that requires the installation of an automatic fire sprinkler system in a new residential dwelling unit that has an area of livable space of 5,000 square feet or more.

2. Except as otherwise provided in subsection 3, a governing body may, on or after July 1, 2015, adopt a building code or take any other action that requires the installation of an automatic fire sprinkler system in a new residential dwelling unit that has an area of livable space of less than 5,000 square feet only if, before adopting the building code or taking the action, the governing body:

(a) Conducts an independent cost-benefit analysis of the adoption of a building code or the taking of any other action by the governing body that requires the installation of an automatic fire sprinkler system in a new residential dwelling unit that has an area of livable space of less than 5,000 square feet; and

(b) Makes a finding at a public hearing that, based on the independent cost-benefit analysis conducted pursuant to paragraph (a), adoption of the building code or the taking of any other action by the governing body that requires the installation of an automatic fire sprinkler system in a new residential dwelling unit that has an area of livable space of less than 5,000 square feet is to the benefit of the owners of the residential dwelling units to which the requirement would be applicable and that such benefit exceeds the costs related to the installation of automatic fire sprinkler systems in such residential dwelling units.

3. A governing body may require the installation of an automatic fire sprinkler system in a new residential dwelling unit that has an area of livable space of less than 5,000 square feet without conducting the analysis or making the findings required by subsection 2 if the governing body makes a determination at a public hearing that the unique characteristics or the location of the residential dwelling unit, when compared to residential dwelling units of comparable size or location within the jurisdiction of the governing body, would cause an unreasonable delay in firefighter response time. In making such a determination, the governing body may consider:

(a) The availability of water for use by firefighters in the area in which the residential dwelling unit is located;

(b) The availability to firefighters of access to the residential dwelling unit;

(c) The topography of the area in which the residential dwelling unit is located; and

(d) The availability of firefighting resources in the area in which the residential dwelling unit is located.

4. A governing body shall not adopt a building code or take any other action that requires the installation of an automatic fire sprinkler system in a structure other than a residential dwelling unit or any portion of such a structure, whether located on public or private property:

(a) That is covered but not completely enclosed;

(b) That is used primarily for agricultural, livestock or equestrian activities;

(c) That has spectator seating situated around the perimeter of the structure or portion thereof; and

(d) Which is otherwise in compliance with all relevant building codes concerning exits and fire alarm systems.

5. The provisions of this section do not prohibit:

(a) A local government from enforcing an agreement for the development of land which requires the installation of an automatic fire sprinkler system in any residential dwelling unit; or

(b) A person from installing an automatic fire sprinkler system in a structure described in subsection 4 or any residential dwelling unit.

6. As used in this section:

(a) "Automatic fire sprinkler system" has the meaning ascribed to it in NRS 202.580.

(b) "Residential dwelling unit" does not include a condominium unit, an apartment unit or a townhouse unit that shares a common wall with more than one other such unit.

(Added to NRS by 2015, 1989)

UNLV GREENSPUN College of URBAN AFFAIRS
UNIVERSITY OF NEVADA, LAS VEGAS

Residential Fire Sprinkler Study - 2017

Attachment 2

Summary of Benefit-Cost Analysis per Housing Unit: National Study vs. Unincorporated Clark County

(Source: Applied Analysis Study: March 2015)

	National Study (2005 dollars)	National Study (2014 dollars)	Unincorporated Clark County (2014 dollars)
Benefits			
Fatalities Averted	$3,725.57	$4,516.01	$1,019.61
Injuries Averted	$224.74	$272.74	$145.18
Direct Uninsured Property Losses Averted	$79.64	$96.54	$36.95
Indirect Costs Averted	$15.93	$19.31	$7.39
Insurance Credit	$948.41	$1,149.63	$1,341.15
Benefits Subtotal	$4,994.29	$6,054.23	$2,550.29
Cost	$829-$2,075	$1,005-$2,515	$4,780.00

Attachment 3

Cost Benefit Comparison Analysis

	Cost of Sprinkler Installation		
Newly Constructed Tract Home	AA Study (2014 Dollars)	National Study (2014 Dollars)	UNLV Study (2016 Dollars)
Per Square Foot	$2.00	$1.02	$0.95
2,000 Square foot Home	($4,000)	($2,040)	($1,900)

	Benefit		
Newly Constructed Tract Home	AA Study (2014 Dollars)	National Study (2014 Dollars)	UNLV Study (2016 Dollars)
Insurance Premium Credit	12%	8%	15%
Annual Insurance savings	$71	$48	$89
Appreciation in First Year	2.80%	6.80%	2.80%
2,000 Square foot Home	$6,384	$15,504	$6,384
Total Benefit in first year	$6,455	$15,552	$6,473

Attachment 4

The provided Cost Benefit Analysis (CBA) will compare the cost of the installation with a residential fire suppression system versus the monetary benefits. For the ease of a mathematical baseline, the square footage of 2,000 was used to represent a single family new construction tract home in Las Vegas, NV. Please note that number for any square footage of a home does not affect the formula used in the Cost Benefit Analysis.

The following dataset inputs were used in the CBA:

1. The estimate proposal of $.95 per ft^2 for the cost of installation in a new tract home.[1]
2. The average cost of $114 per ft^2 to build was used for the square footage of a new constructed tract home. [2]
3. The average home appreciation of 2.8% was applied for a ten-year projection. [3]
4. The discount rate used was the same 4.6% discount rate found in the Applied Analysis study.
5. The average insurance premium discount of 15% for a credit of $89 annually. [4]

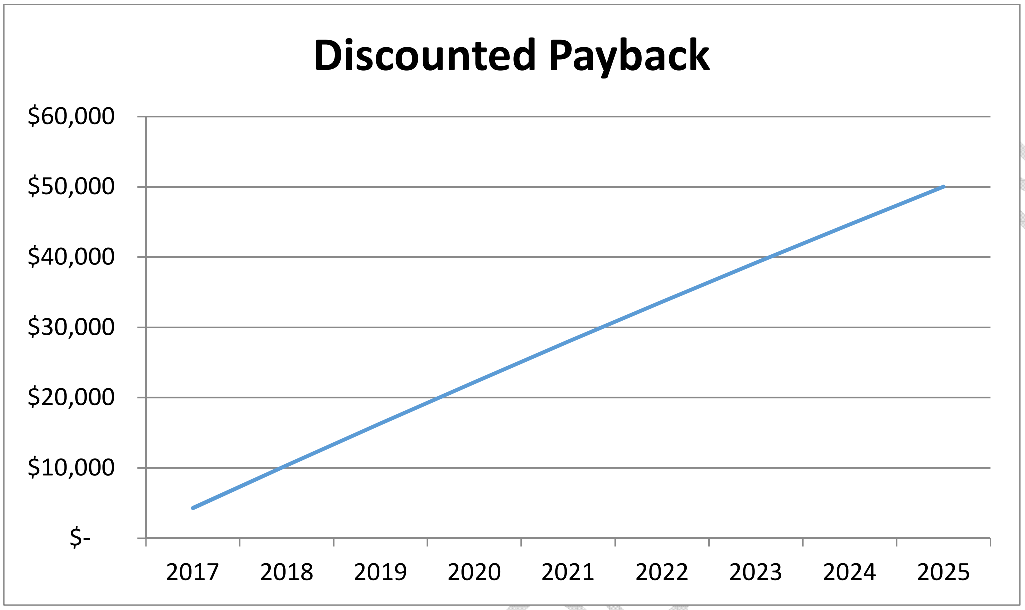
The cost of a new 2,000 ft^2 tract home is $228,000 in today's dollars net a projected 10-year benefit of $64,032 bringing the potential value of the home to $292,032 in 2025. The investment cost of a $1,900 residential fire suppression system has a payback period in the first year of home ownership. See table 1 below.

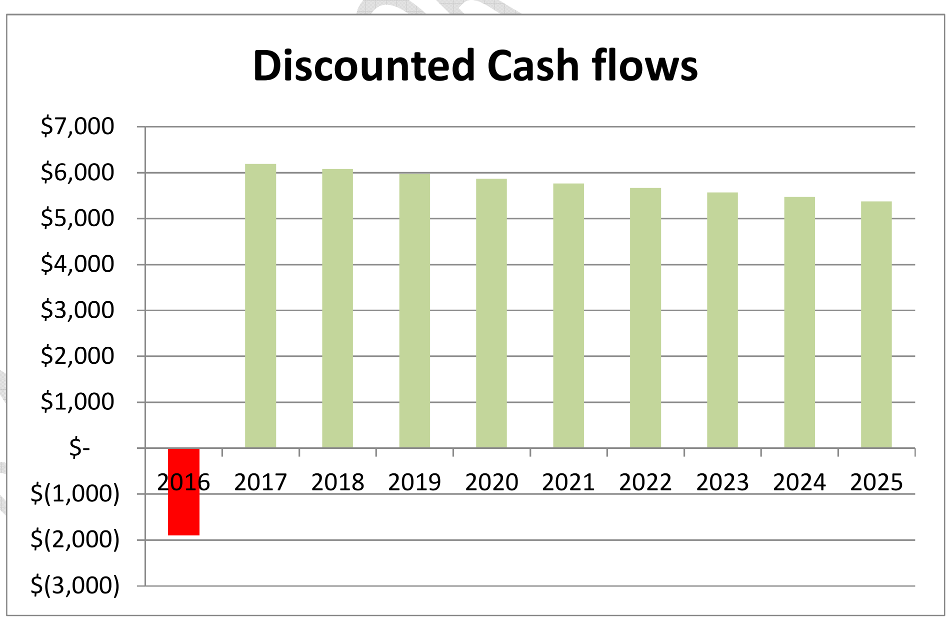
Table 1

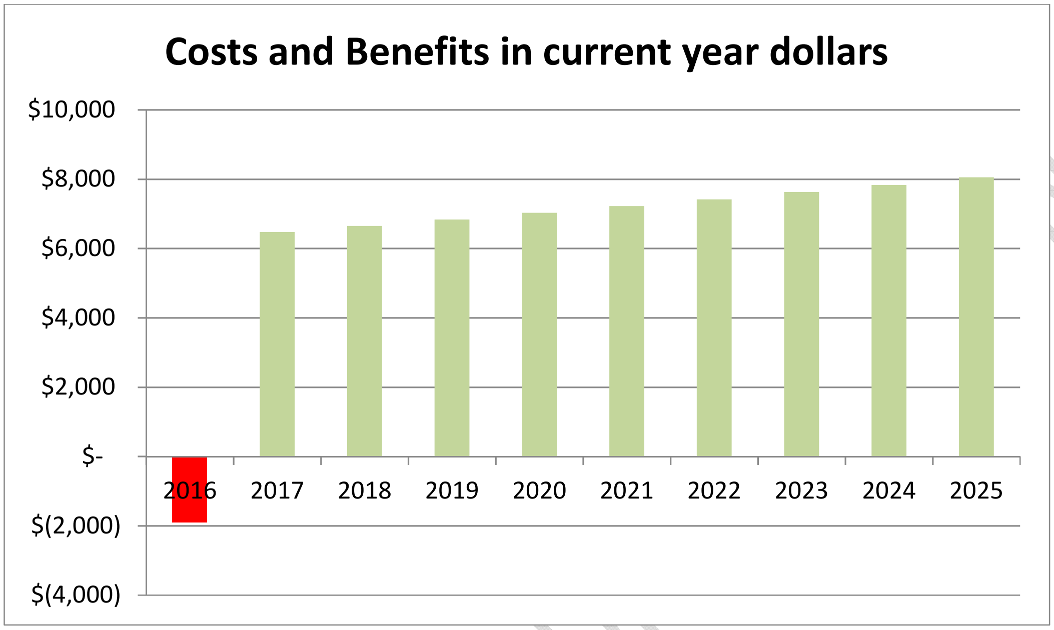
2000 SF Single Family Home $228,000

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fire Sprinkler Cost	$(1,900)									
Home Appreciation		$6,384	$6,563	$6,747	$6,935	$7,130	$7,329	$7,534	$7,745	$7,962
Insurance Premium Credit		$89	$89	$89	$89	$89	$89	$89	$89	$89
Total Benefits Per Year/FCF	$(1,900)	$6,473	$6,652	$6,836	$7,024	$7,219	$7,418	$7,623	$7,834	$8,051
Cumulative Benefits	$64,032									
Discount Factors										
Discount Rate	4.6%									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9560	0.9140	0.8738	0.8354	0.7986	0.7635	0.7299	0.6978	0.6671
Discounted FCF	$(1,900)	$6,188	$6,080	$5,973	$5,868	$5,765	$5,664	$5,565	$5,467	$5,371
Cumulative FCF	$(1,900)	$4,288	$10,368	$16,341	$22,209	$27,974	$33,637	$39,202	$44,669	$50,040
NPV	$50,048									
IRR	343%									

[1] The cost of the residential fire sprinkler system was based on an estimate from a local reputable installer.
[2] According to the Las Vegas Review-Journal, the average sale price of home in 2015 is $114 per square foot.
[3] Since 1990 the average appreciation rate for homes in Las Vegas is 2.8% (neighborhoodscout.com).
[4] The average insurance rate premium credit for an automatic sprinkler system to a home in Las Vegas is 15% annually (USAA underwriting, property and casualty).


Discounted Payback
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$-
2017
2018
2019
2020
2021
2022
2023
2024
2025


Discounted Cash flows
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$-
$(1,000)
$(2,000)
$(3,000)
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025


Costs and Benefits in current year dollars
$10,000
$8,000
$6,000
$4,000
$2,000
$-
$(2,000)
$(4,000)
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

5,000 Square Foot Example:

The cost of a new 5,000 ft² tract home is $570,000 in today's dollars net a projected 10 year benefit of $162,180 bringing the potential value of the home to $732,180 in 2025. The investment cost of a $4,750 residential fire suppression system has a payback period in the first year of home ownership. See table 2 below.

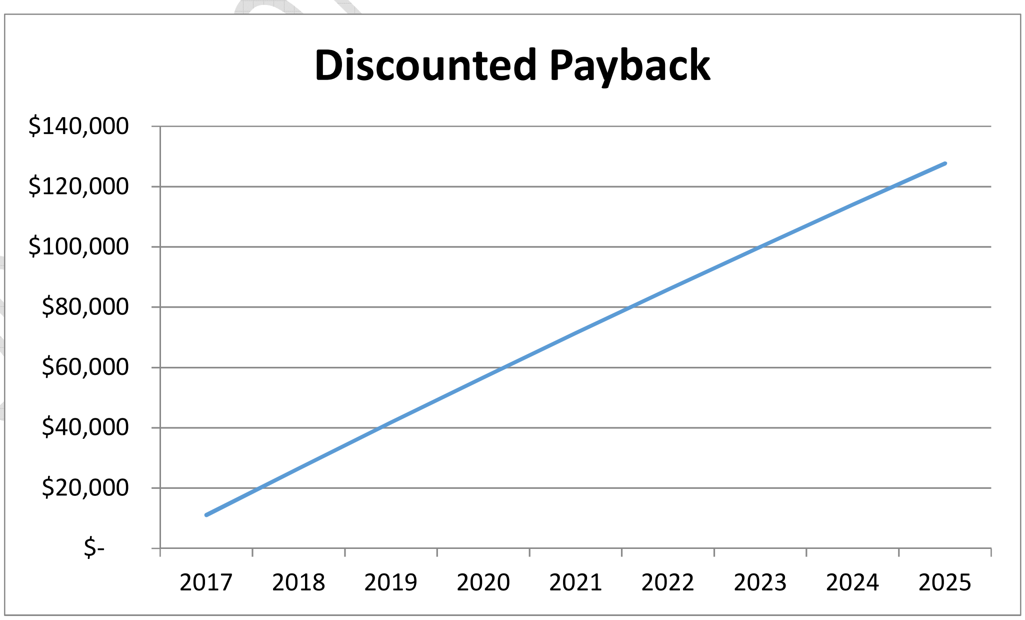
Table 2

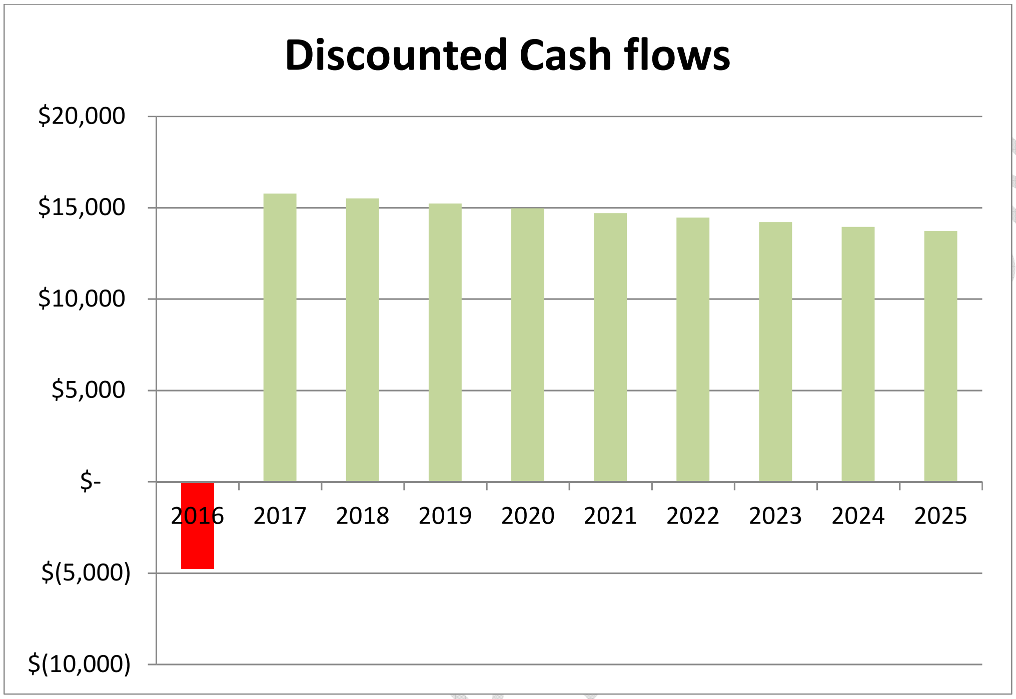
5000 SF Single Family Home $570,000

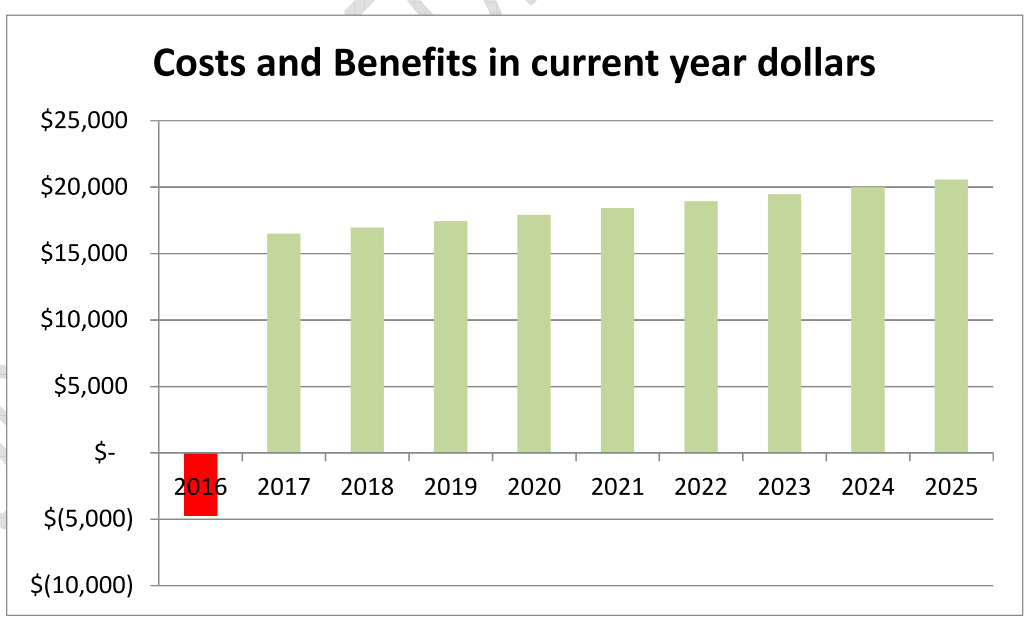
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fire Sprinkler Cost	$(4,750)									
Home Appreciation		$16,407	$16,866	$17,339	$17,824	$18,323	$18,836	$19,364	$19,906	$20,263
Insurance Premium Credit		$89	$89	$89	$89	$89	$89	$89	$89	$89
Total Benefits Per Year/FCF	$(4,750)	$16,496	$16,955	$17,238	$17,913	$18,412	$18,925	$19,453	$19,955	$20,552

Cumulative Benefits	$162,180									
Discount Factors										
Discount Rate	4.6%									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9560	0.9140	0.8738	0.8354	0.7986	0.7635	0.7299	0.6978	0.6671
Discounted FCF	$(4,750)	$15,771	$15,497	$15,228	$14,964	$14,704	$14,449	$14,199	$13,953	$13,711
Cumulative FCF	$(4,750)	$11,021	$26,517	$41,745	$56,709	$71,413	$85,863	$100,062	$114,015	$127,726

NPV	$127,734
IRR	350%




Discounted Cash flows
$20,000
$15,000
$10,000
$5,000
$-
$(5,000)
$(10,000)
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025


Costs and Benefits in current year dollars
$25,000
$20,000
$15,000
$10,000
$5,000
$-
$(5,000)
$(10,000)
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

Attachment 5

New Home Permits
Las Vegas Area
2001-2016

New Home Permits	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Boulder City	3	22	15	10	9	3	11	7	9	19	13	26	45	52	46	69
Clark County	4085	3593	3410	3567	2966	1604	2137	1931	2470	5859	9765	13535	14367	11132	10644	10329
Henderson	2223	1689	1222	1274	1117	799	707	505	1097	2387	4249	4923	4595	4267	3980	4109
Las Vegas	1454	1662	1438	1517	1233	808	926	744	1085	2356	2998	4268	6200	6861	4451	4281
Mesquite	246	202	196	202	169	134	201	106	379	487	303	599	429	387	289	404
North Las Vegas	794	630	471	497	618	510	648	498	834	2365	4262	7007	6105	4599	2735	2665
Totals	8805	7798	6752	7067	6112	3858	4630	3791	5874	13473	21590	30358	31741	27298	22145	21857

http://socds.huduser.gov/permits/

We, the undersigned, have read the Residential Fire Sprinkler Study – Final Copy (July 2017). We monitored the research throughout the study. We have reviewed and agree with the finding, and find that analysis to be sound and thoughtful in its approach. Therefore, we endorse the conclusions reached. Please let us know if you have any questions or need any additional clarifications.

______________________ **Date:** 7/27/17

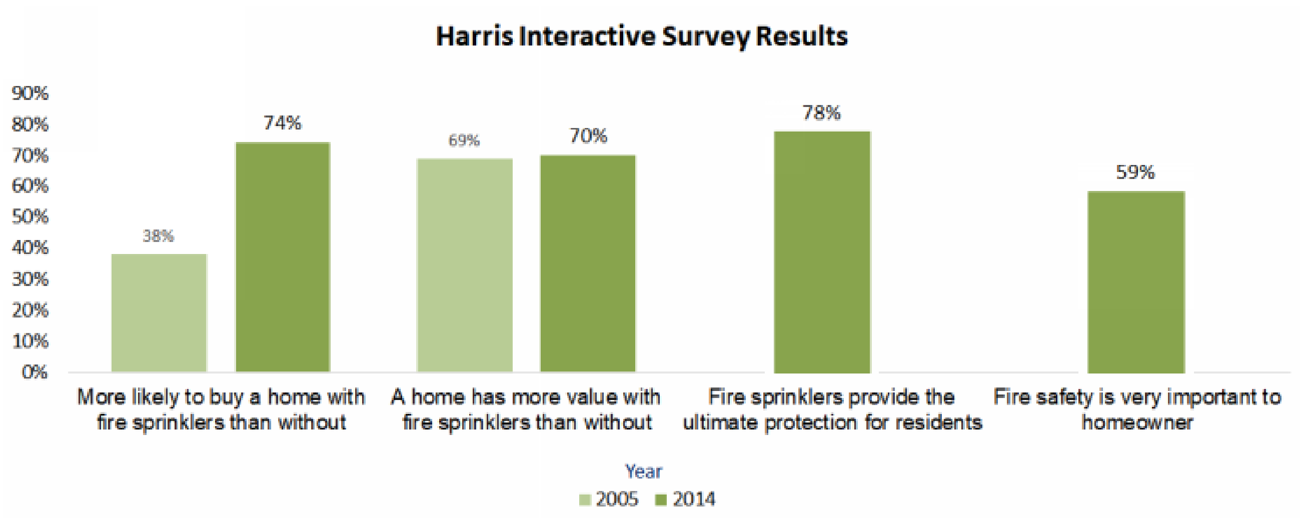
Christopher Stream, Ph.D.
Director
School of Public Policy and Leadership
Greenspun College of Urban Affairs
University of Nevada, Las Vegas (UNLV)

INTERNATIONAL RESIDENTIAL CODE
FIRE SPRINKLER COALITION

FACT SHEET
Homebuyer Interest in Residential Sprinkler Systems

Beginning with the 2009 edition, the International Residential Code (IRC) has required fire sprinkler systems as a standard feature in all newly constructed homes and townhouses. This document provides information to dispel myths regarding home buyer interest in residential fire sprinkler systems.

It is often stated by representatives of the home building industry that home buyers have little or no interest in purchasing a home with a residential sprinkler system, but surveys conducted in 2005 and 2014 by Harris Interactive say otherwise. The surveys, conducted for the Home Fire Sprinkler Coalition, show significant and increasing interest by homeowners in purchasing a home with sprinklers. The figure below summarizes key survey findings (some questions were new to 2014).



Nearly 3/4 of respondents to the 2014 survey stated that they would be more likely to buy a home with fire sprinklers than one without, and similar percentages agreed that a home with fire sprinklers has more value and provides “ultimate protection” for residents. The 2005 survey included 1,019 U.S. adults, of which 620 were homeowners. The 2014 survey focused exclusively on current homeowners and included 1,026 participants.

The home building industry justifies its claims of low interest based on data from localities where builders are required to offer sprinklers as an option, but these results are misleading because builders will inflate costs and scare buyers with claims of leaks, false activations and water damage in an effort to talk buyers out of installing fire sprinklers. Although builders will claim that they will install a sprinkler system if a buyer wants one, we have many documented examples of cases where that is simply untrue.

About IRC Fire Sprinkler Coalition
Founded in 2007, the IRC Fire Sprinkler Coalition has grown to include more than 100 international, national and regional public safety organizations, including associations representing 45 states, all of whom support the mission of promoting residential fire sprinkler systems in new home construction. More information can be found at www.IRCFireSprinkler.org.

INTERNATIONAL RESIDENTIAL CODE
FIRE SPRINKLER COALITION

FACT SHEET
Fire Sprinkler Systems for Townhouses

Beginning with the 2009 edition, the International Residential Code (IRC) requires fire sprinkler systems to be provided as a standard feature in all newly constructed townhouses. This document provides information to dispel myths about the background and costs associated with townhouse fire sprinkler systems.

MYTH: Fire sprinkler systems are an expensive add-on in new townhouses that will negatively impact affordability.

FACTS: The IRC provides numerous financial offsets that reduce the cost of fire sprinklers. For example, townhouse separation walls are permitted to be 1-hour fire rated, rather than 2-hour, when sprinklers are provided. This single incentive can dramatically reduce the overall construction costs, when comparing the total cost of building a sprinklered townhouse with 1-hour separation walls vs an unsprinklered townhouse with 2-hour walls.

According to a 2010 estimate provided by a national "Top 10" multifamily builder, the cost savings associated with reducing a townhouse separation wall from a 2-hour rated assembly to a 1-hour rated assembly is approximately \$2.20 per square foot of separation wall. Assuming a 2-story, 1,200 square foot townhouse measuring 20-feet by 30-feet with a pitched roof and attic, the incremental cost of providing a 2-hour wall versus a 1-hour wall would be \$1,567. In comparison, the sprinkler system for this building, using the most recent national average cost of \$1.35 per square foot cited by the National Fire Protection Research Foundation would be \$1,620. Therefore, the firewall incentive alone could reduce the net cost of sprinklers to \$53 in this example.

When other factors are considered, such as reduced fire access roadway widths, reduced fire hydrant and water main requirements, and the fact that sprinkler installation costs are often less for townhouses vs. single-family homes due to economies of scale, the overall cost of constructing a sprinklered townhouse community may be less than a non-sprinklered community.

MYTH: Residential sprinkler systems in townhouses are a new and unproven technology that is not yet ready for widespread use.

FACTS: The first residential sprinkler standard was written more than 45 years ago, in 1975, and according to U.S. government statistics, millions of families now live in sprinkler-properties. With respect to townhouses, the **Maryland Building Officials Association**, one of the original proponents of the IRC sprinkler requirement for townhouses in 2008, summed up their extensive experience with fire sprinklers in townhouses in their justification statement, as follows:

> "*Since 1990, townhouses in Maryland have been sprinklered and being so has not been detrimental to the home building industry, but has been a major success to saving lives over the past 18 years. To address reasonable fire protection and affordable housing, many Maryland jurisdictions over the years have permitted townhouse separation of one hour with sprinklers installed in accordance with NFPA 13D. Therefore, based on our past success with sprinklered townhouses with one-hour separations between the townhouses, MBOA is in support of mandatory sprinklers in townhouses with one-hour dwelling unit separations.*

MYTH: The IRC requirement to install fire sprinklers in townhouses was initiated by the fire service and the fire sprinkler industry and it was forced on builders.

FACTS: The code change proposal that added the IRC fire sprinkler requirement (Proposal RB66-07/08) was actually submitted by a major multifamily builder, AvalonBay Communities, and public comments supporting this change were submitted by the Maryland Building Officials Association and the New York State Building Officials Conference. As a major builder of multifamily residential properties, AvalonBay Communities developed extensive experience in installing fire sprinkler systems in townhouses and concluded that sprinkler systems were desirable, cost-effective and should be required as a standard feature in new townhouses.

MYTH: It's best to give home buyers the right to choose whether or not to have sprinklers, as opposed to having codes mandate these systems in all townhouses.

FACTS: It is a fundamental function of building codes to ensure safe housing. Home buyers don't get to choose whether their homes are built to withstand seismic forces, wind loads or snow loads. Likewise, home buyers aren't given the choice of having or not having safe electrical, plumbing, or mechanical systems or smoke alarms. Codes provide minimum requirements for all of these aspects of safe housing in the interest of public safety.

Fire sprinkler systems are no different. Just as car safety regulations have evolved over time from only requiring seat belts to now requiring air bags and backup cameras, building codes have evolved from requiring only smoke alarms to now requiring sprinkler systems for fire safety.

In the case of townhouses, it particularly makes sense for codes to require sprinkler systems because each family's safety is reliant on their neighbors. An accident or careless behavior in one unit often impacts multiple units in non-sprinklered townhouses. Fire sprinklers are the most effective way to ensure that a fire in one townhouse will not threaten families in adjacent units.

Furthermore, townhouses are typically constructed as "spec homes," without buyer involvement during the design or construction process. Adding sprinklers after-the-fact to a finished townhouse unit would greatly increase the cost and complexity of the installation, if it were feasible at all. Likewise, it makes no sense to allow an initial buyer, or the builder in the case of a speculative home, to opt out of fire sprinklers, knowing that such a choice will deny all future owners the option of having sprinklers, given that retrofit installations are typically not feasible.

About IRC Fire Sprinkler Coalition. Founded in 2007, the IRC Fire Sprinkler Coalition has grown to include more than 100 international, national and regional public safety organizations, including associations representing 45 states, all of whom support the mission of promoting residential fire sprinkler systems in new home construction. More information can be found at www.IRCFireSprinkler.org.

INTERNATIONAL RESIDENTIAL CODE
FIRE SPRINKLER COALITION

FACT SHEET

Water Supplies for Home Fire Sprinkler Systems

This document has been developed to dispel myths by providing factual information about water supply requirements for home fire sprinkler systems.

MYTH: ***Home fire sprinkler systems require expensive upgrades to a new home's water supply system.***

FACTS: Home fire sprinkler systems have become so efficient that they can often be designed to use the same or even less water than a new home's plumbing system.

- Fire sprinklers typically require only 7 pounds-per-square-inch (psi) to operate, which is less than the minimum required pressure for residential plumbing fixtures.

  Plumbing systems require:
  - 8 psi minimum pressure for any plumbing fixture.[1]
  - 20 psi minimum pressure for temperature controlled shower valves (these are mandatory in new homes).[2]
  - 40 psi minimum pressure for the main supply connection (applies to all homes with indoor plumbing, even those supplied by wells).[3]
- A single fire sprinkler can use as little as 8 gallons-per-minute (gpm). With home fire sprinkler systems typically designed to accommodate two simultaneously flowing sprinklers, 16 gpm may be all that's needed to supply fire sprinklers. This is actually less than the 18 gpm minimum that would be required by the Plumbing Code to supply plumbing fixtures in a typical entry-level home with 3 bedrooms, 2 bathrooms and 2 outdoor hose connections.[4]
- Fire sprinklers will typically require more water in larger, more expensive homes, but such homes tend to have more plumbing fixtures, which require an increased water supply for plumbing as well. One or two sprinklers must flow for a minimum of 7-10 minutes, which can be provided by a well and/or a small tank when sprinklers are not supplied by a water distribution system.

MYTH: ***Home fire sprinkler systems require big, expensive water meters.***

FACTS: When a fire sprinkler system is supplied by a water distribution system, water meter size is based on the required pressure and flow, which as stated above, may actually be greater for plumbing than for fire sprinklers. Fire sprinklers won't lead to increased meter or tap fees when the sprinkler system is able to be supplied by the same size meter that serves household plumbing.

A typical 5/8-inch meter will flow up to 20 gpm, which is adequate to operate a fire sprinkler system in many homes.[5] A 3/4-inch meter, which will flow well over 30 gpm, is capable of handling just about any home fire sprinkler system. Most often, the size of underground pipe leading to a house is much more limiting than the meter itself. Upsizing the underground piping

[1] International Residential Code (IRC) Table P2903.1
[2] IRC Section P2708
[3] IRC Section P2903.3
[4] IRC Table P2903.6 [17.5 fixture units: 2 bathroom groups, 1 kitchen group, 1 laundry group and 2 hose bibs], and IRC Table P2903.6(1)
[5] IRC Table P2904.6.2(2) [This is the prescriptive allowance for any meter. When a meter of known flow characteristics flows more, the higher flow may be used.]

between the meter and the house is an easy and inexpensive way to improve pressure and flow for all plumbing, including fire sprinklers, without a larger meter.

It's important to note some meter manufacturers' literature specify lesser flow limits, focusing on the range over which a meter will accurately measure continuous flow. With respect to supplying home fire sprinklers, meter flow limits should be evaluated based on the maximum flow rate rather than continuous flow accuracy limits. Water authorities should recognize that sprinklers will always use less water than fire hoses connected to unmetered fire hydrants that would otherwise be needed to put out a fire, so there is no legitimate value in requiring accurate measurement of sprinkler flow in the event of a fire

MYTH: Fire sprinkler systems require expensive backflow preventers.

FACTS: National plumbing codes never require backflow protection for home fire sprinkler systems fabricated with materials approved for household plumbing, such as CPVC, PEX or copper.[6] Occasionally, a local plumbing authority may nevertheless request a backflow preventer, not recognizing that fire sprinkler systems can be safety connected directly to a potable water supply.

Where backflow prevention is an issue because of a local requirement, there are several options whereby additional backflow controls for fire sprinklers can be avoided.

- Fire sprinklers can be incorporated as part of a multipurpose plumbing system that feeds both sprinklers and plumbing fixtures from a home's cold water plumbing pipes.
- Fire sprinklers can be supplied by a separate water connection, with a toilet connected to the end of sprinkler piping to ensure that the piping is occasionally purged by flushing the toilet to prevent stagnant water. This arrangement is referred to as "passive purge."
- Where a yard irrigation system is installed, backflow prevention will be required because such systems are subject to backflow of non-potable water. Fire sprinklers can share the irrigation backflow preventer; thereby, eliminating the need for an additional device.

MYTH: Rural water distribution systems and wells don't have enough water to supply home fire sprinklers.

FACTS: As indicated above, if the water distribution system or well provides enough water to supply household plumbing needs, the supply may be adequate for fire sprinklers. In some cases a larger pump or tank may be needed for sprinklers, but standard, off-the-shelf pumps and tanks suitable for plumbing systems are permitted. When such upgrades are provided, they actually benefit the owner on a daily basis beyond fire protection, because the home's plumbing system will be more robust. Additional water storage can also be invaluable for emergency use in the event of a natural disaster that interrupts utilities.

It should also be noted that, were a rural water distribution system found to be inadequate to supplying 16 gpm for fire sprinklers, it would probably fall short of the minimum code-required plumbing demand, and it would surely fall far short of the 1,000+ gpm needed from fire hydrants to support a fire department extinguishing a fire in an unsprinklered home.

About IRC Fire Sprinkler Coalition
Founded in 2007, the IRC Fire Sprinkler Coalition has grown to include more than 100 international, national and regional public safety organizations, including associations representing 45 states, all of whom support the mission of promoting residential fire sprinkler systems in new home construction. More information can be found at www.IRCFireSprinkler.org.

[6] IRC Section P2904.1

The Home Fire Sprinkler Coalition outlines “Community Risk Reduction” strategies that include how trade ups (modifications) to existing building and fire codes offset the costs associated with installing sprinkler systems. These benefits to builders, developers, and communities are outlined here:

https://homefiresprinkler.org/community-risk-reduction/

The Home Fire Sprinkler Coalition has a number of community case studies where the developer incentive programs were utilized and has published case studies on those communities outlining the costs and benefits associated. Those case studies can be downloaded here:

https://homefiresprinkler.org/fire-sprinkler-incentives-case-studies/

The Home Fire Sprinkler Coalition has developed a number of educational resources for delivering the information about home fire sprinklers, targeting developers, builders, and home buyers. These include PowerPoint presentations, pdf documents, and videos. The can be accessed here:

https://homefiresprinkler.org/free-resources-stakeholders/

BENEFITS of RESIDENTIAL FIRE SPRINKLERS:

Prince George's County 15-Year History with its Single-Family Residential Dwelling Fire Sprinkler Ordinance

FOUNDED 1634

PRINCE GEORGE'S COUNTY MARYLAND

Prepared by Steve Weatherby

August 2009

Produced in cooperation with the Home Fire Sprinkler Coalition, University of Maryland University College, Prince George's County Fire Department and the Maryland State Fire Marshal's Office.

Home Fire Sprinkler® COALITION

Protect What You Value Most™

HomeFireSprinkler.org

Acknowledgements

This study would not have been possible without the help of the following individuals:

Maryland State Fire Marshal William Barnard

Major Steven Hess,
Prince George's County Fire/EMS Department

Christine Barker, Information Management,
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Prince George's County Fire/EMS Department

Chief (ret.) Ron Siarnicki,
Prince George's County Fire/EMS Department

Steve Carter,
University of Maryland University College

Rebecca Spicer-Himes,
Maryland Fire and Rescue Institute

Table of Contents

Executive Summary

In 1992, Prince George's County in Maryland enacted an ordinance mandating the installation of automatic fire sprinkler systems in new one- and two-family structures. Through a partnership with the Home Fire Sprinkler Coalition (HFSC), the Maryland State Fire Marshal's Office, the Prince George's County Fire Department, and the University of Maryland University College, a study was conducted to review Prince George's County's experience with this ordinance over the 15-year period of 1992-2007.

The most obvious benefit of the ordinance is the direct impact that home fire sprinkler systems have made in saving lives and reducing fire-related injuries.

From 1992-2007, there were 101 fire deaths and 328 civilian injuries in single-family or townhouse fires that were not protected with fire sprinkler systems. No fire deaths occurred in sprinklered-structure fires during the period studied, and there were only six civilian injuries.

Property protection is another important benefit. Looking at the average loss per event in a structure that did not have a residential sprinkler system installed, the damages averaged $9,983 per incident, and $49,503 per incident when there was a fatality. The average loss for a single-family/ townhouse structure protected by fire sprinklers was $4,883 per event. Having sprinklers cut the property loss by almost one-half.

Prince George's County experienced 13,494 single-family or townhouse fires during the period, with an average of 900 fires per year. The County's total fire loss for single-family/townhouse structures topped $134 million, averaging almost $9 million per year. Prince George's County's data indicates that more than 45,000 permits were issued for single-family/townhouse structures from 1992 through 2007, with an average issuance of 3,019 permits per year.

During the period studied, Prince George's County Fire Department (PGFD) recorded 245 sprinkler activations in single-family and townhouse structure fires. In the 245 activation incidents, PGFD recorded no lives lost and only six civilian injuries. PGFD reports 446 residents were present in the structures during the time of sprinkler activation. More than 80 of those residents were present when sprinklers activated during the hours of 10:00 p.m. to 5:59 a.m., which is the most common time for fire deaths to occur, according to NFPA fire data. In the 245 activation incidents, the PGFD estimated the fire loss at $1,352,820, compared to a total potential loss of $42,578,420.

The cost impact to developers/builders was determined by interviewing several Prince George's County sprinkler contractors, who indicated that the per-square-foot cost to install a fire protection system in a single-family home in the County has decreased over the years to under $2.00 per square foot. This is consistent with a recent NFPA study that found the average cost of installation nationally to be $1.61 per sprinklered square foot. ❖

Demographics

Prince George's County, Maryland, is roughly 500 square miles and is situated in close proximity to Washington, DC. Prince George's County has a mixture of light industrial, retail, residential and institutional structures that are protected by the county's fire department. Prince George's County is known for providing affordable living for many people who commute to work in the Washington, DC area(1).

Most of Prince George's County's population is concentrated in the northern two-thirds of the County(1). The southern part of the County is predominantly rural(1) but urban sprawl has pushed development into these areas, which are affected by Prince George's County's residential sprinkler code. According to Census figures(6), the average population in the County from 1992-2006 was 846,000 residents. In 2007, it was 828,770. The overall population of Price George's County has grown 11 percent on average since the enactment of the residential sprinkler ordinance(6).

The average median income in Prince George's County in 2004 was $55,129.00(6). The percentage of home ownership in Prince George's County is 61.8 percent, which is almost 6 percent less than the average for the State of Maryland and in 2008 the median value of a single-family dwelling in Prince George's County is $145,600(6).

YEAR	POPULATION	% CHANGE	No. of Permits
1992	740,390	N/A	3680
1993	743,156	1.00%	3858
1994	751,282	1.01%	2418
1995	757,795	1.00%	4344
1996	764,644	1.00%	3635
1997	769,840	1.00%	2920
1998	776,907	1.00%	2664
1999	781,781	1.00%	2927
2000	803,291	1.02%	2506
2001	815,203	1.01%	2467
2002	824,365	1.01%	3068
2003	830,513	1.00%	2088
2004	835,021	1.00%	2233
2005	838,156	1.00%	2782
2006	834,660	-1.00%	2233
2007	828,770	-1.00%	1462
		11.05%	**45,285**

Source: US Census Bureau Estimates

Source: Prince George's County Planning Department Estimates

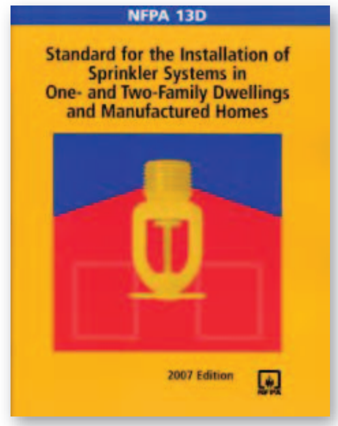
Since 1992, Prince George's County has issued more than 45,285 building permits for one- and two-family dwellings. The average yearly issuance of one- and two-family dwelling building permits is 3,019.

The Prince George's County Fire Department has 44 stations with a career staff of more than 800 individuals and a volunteer force of 2,000 members. There are 1,200 active emergency responders. In 2007, Prince George's County Fire Department responded to nearly 127,000 calls for service(7). ❖

Prince George's County Residential Sprinkler Ordinance

In 1987, Prince George's County signed a mandatory fire sprinkler law for all residential structures. This law covered every type of residential dwelling from multi-family structures to townhomes to one- and two-family structures. This law was to be phased in over the next five years with the final phase requiring all newly constructed single-family structures to be protected by an NFPA 13D fire sprinkler system(1).

The ordinance was phased as follows: one- and two-family model homes were to feature residential fire sprinklers by February 1, 1988. All newly constructed multi-family structures were to have residential fire sprinklers installed by January 1, 1989. In the final phase, January 1, 1992, all newly constructed single-family homes were to be fully protected by an NFPA 13D residential sprinkler system (1). ❖



Statistical Comparisons

This report consolidates the data collected from Prince George's County Fire Department. The fire department tracked each sprinkler activation by dispatching an on-duty Fire Marshal to the scene. The Fire Marshal was required to complete a Sprinkler Activation Report, which included the type of structure, documentation of the number of sprinklers activated, the potential cause, the type of sprinkler system, the room(s) involved, total dollar value of the property, the estimated dollar loss, and the number of residents present in the structure during activation.

From the years 1992 to 2007, Prince George's County recorded a total of 13,494 single family/ townhouse fires and 245 of those were protected by fire sprinkler systems. In those 245 incidents, no deaths were recorded and only six injuries were reported. In the 13,249 fires that occurred in homes that were not protected by sprinklers, 101 residents were killed and 328 were injured. Fire deaths in residential dwellings made up 89% of the fire deaths in Prince George's County during the years.

Four hundred forty-six persons were present in the structures at the time of sprinkler activation. According to the NFPA, the most vulnerable time of day for home fire deaths is between the hours of 10:00 p.m. and 6:00 a.m. Eighty-one occupants were present in their homes during this time period. Another 294 residents were home at the time of sprinkler activation between the hours 6:00 a.m. and 9:59 p.m. Seventy-one residents were home during activation at unrecorded times.

During the study period, there were 45 recorded residential fire deaths between the hours of 6:00 a.m. and 9:59 p.m., 38 recorded residential fire deaths between 10:00 p.m. and 5:59 a.m. and 18 recorded residential fire deaths where the timeframe was not known in residences without sprinklers.

Fire Deaths and Fire-Related Injuries

89% of Total Fire Deaths Occurred in Residential Dwellings

101 people died in single-family and townhouse fires with no fire sprinklers

328 civilian injuries in single-family and townhouse fires with no fire sprinklers

0 fire deaths in homes protected with fire sprinklers

These findings clearly show the benefits of an automatic sprinkler system. The most compelling data is that no deaths occurred in any fire where a fire sprinkler system was present. In a tragic contrast, 101 people lost their lives to fires in nonsprinklered home fires during the same period. When one looks at the large number of residents present during fires in sprinklered homes, the protective value of home fire sprinklers is underestimated even more. These residents would have been at a much higher risk of death due to flame and smoke spread had their residences not been sprinklered.

In some of the cases analyzed, residents were impaired or asleep at the time of the fires and were awakened by fire crews. In these instances, the sprinkler system's ability to keep the fire controlled with just one or two sprinklers allowed responding fire crews to rescue the residents in a

Statistical Comparisons *(continued)*

less hazardous environment. In 96 percent of the 245 reported fire-related sprinkler activations only one or two sprinklers operated.

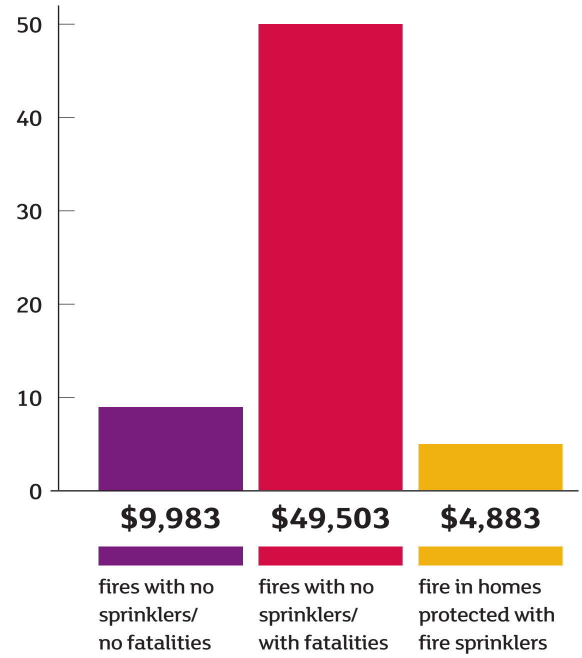
Another important advantage of home fire sprinklers is property protection. From the years 1992 to 2007, Prince George's County Fire Department recorded fire loss for single-family homes and townhouses at $134,711,199. Property loss from the 245 activated sprinkler events was $1,352,820. The average loss per event in a structure that did not have a sprinkler system installed averaged $9,983 per incident. The average fire loss in a structure that was not protected by a sprinkler system and resulted in a fatality came to $49,503. The average loss for a sprinklered single-family/townhouse structure was $4,883 per event. (See chart.) This cut the property loss by almost one-half in single-family and townhouse residences and is at least 10 times less than a fatal non-sprinklered residential fire.

The average water output of a residential fire sprinkler is between 13-15 gallons per minute. The average flow from a fire hose is 95 to 200 gallons per minute, under high pressure. Obviously, the activation of a fire sprinkler will create far less water damage.

Another benefit to the residents of Prince George's County is lower insurance costs for homeowners. Having a home fire sprinkler system helps protect the structure and its contents, lowering the replacement risk of the dwelling. When the sprinklered housing stock increases, the overall fire loss will decrease. which potentially decreases the insurance premiums for everyone.

The cost of installing a residential fire sprinkler system has long been debated. A 2008 study by the Fire Protection Research Foundation showed that the national average cost for fire sprinkler installation is $1.61 per sprinklered square foot. In the report, the average median sprinkler-protected area of a new construction single-family home is 4,124 square foot, which makes the cost of a full NFPA 13D system $6,640 for an average sprinklered structure(4). The Research Foundation study used Prince George's County as one of Its models and showed that within five years of the ordinance being enacted, the average installation cost dipped below $1.00 per square foot. At this price point, sprinkler installation should be less than a 5 percent increase over the entire cost of construction for the single-family structure. ❖

Average Property Loss Per Incident



Conclusion

This study shows numerous benefits that residential fire sprinklers provide to the public. Prince George's County's residential sprinkler ordinance has had a significant impact on life safety and reduction of property damage. Prince George's County's experience of suffering no loss of life in a sprinklered home should provide ample justification for other jurisdictions throughout the country to pass similar ordinances. ❖

References

1 **Residential Sprinklers: One Community's Experience Twelve Years after Mandatory Implementation**
Fire Chief Ron Siarnicki, Prince George's County Fire Department, January 2001.

2 Source: **National Fire Protection Association: Fire Loss in the U.S. 2007** and **USFA's Firefighter Fatalities in the United States in 2007**

3 **Automatic Sprinklers: A 10-Year Study**
City of Scottsdale, AZ, Rural/Metro Fire Department and the Home Fire Sprinkler Coalition, 1997.

4 **Home Fire Sprinkler Cost Assessment**
The Fire Protection Research Foundation, Newport Partners, 2008.

5 **http://www.realestatemapsmdva.com/princegeorges.shtml**

6 **http://www.quickfacts.census.gov/qfd/states/24/24033.html**

7 **http://www.co.pg.md.us/Government/PublicSafety/Fire-EMS/index.asp**

Virginia Townhouse Sprinkler Price Survey

Compiled by Jeffrey Shapiro, P.E., FSFPE, IRC Fire Sprinkler Coalition 12/7/2020

The information below has been provided by two sprinkler contractors who were asked to provide Virginia-specific price histories for townhouse projects built in Virginia in the past few years. These are the prices charged to builders, exclude any builder markup that might increase the actual cost to consumers, and exclude permit fees that may be charged in addition to the base building permit cost.

Response from Contractor 1

- The following data reflects costs for 10 projects constructed between 2016 and 2019. Prices do not include added costs associated with local amendments exceeding what is required by the nationally recognized standard.

Job Location	Year	Cost per Unit	Average Cost Per Square Foot
Reston, VA	2019	$2,050.00	$1.33
Reston, VA	2017	$2,045.00	$1.27
Reston, VA	2017	$1,800.00	$1.17
Haymarket, VA	2016	$2,762.00	$1.25
Haymarket, VA	2016	$2,490.00	$1.13
Haymarket, VA	2016	$2,350.00	$1.16
Leesburg, VA	2020	$3,525.00	$1.21
Leesburg, VA	2020	$3,250.00	$1.25
Alexandria, VA	2019	$4,900.00	$1.48
Alexandria, VA	2019	$5,000.00	$1.41

- **Fairfax County average price is $1.26 per square foot (NFPA 13D).**
- **Prince William County average price is $1.18 per square foot (NFPA 13D).**
- **Loudon County average price is $1.23 per square foot (NFPA 13D).**
- **Arlington County average price is $1.31 per square foot (NFPA 13D).**

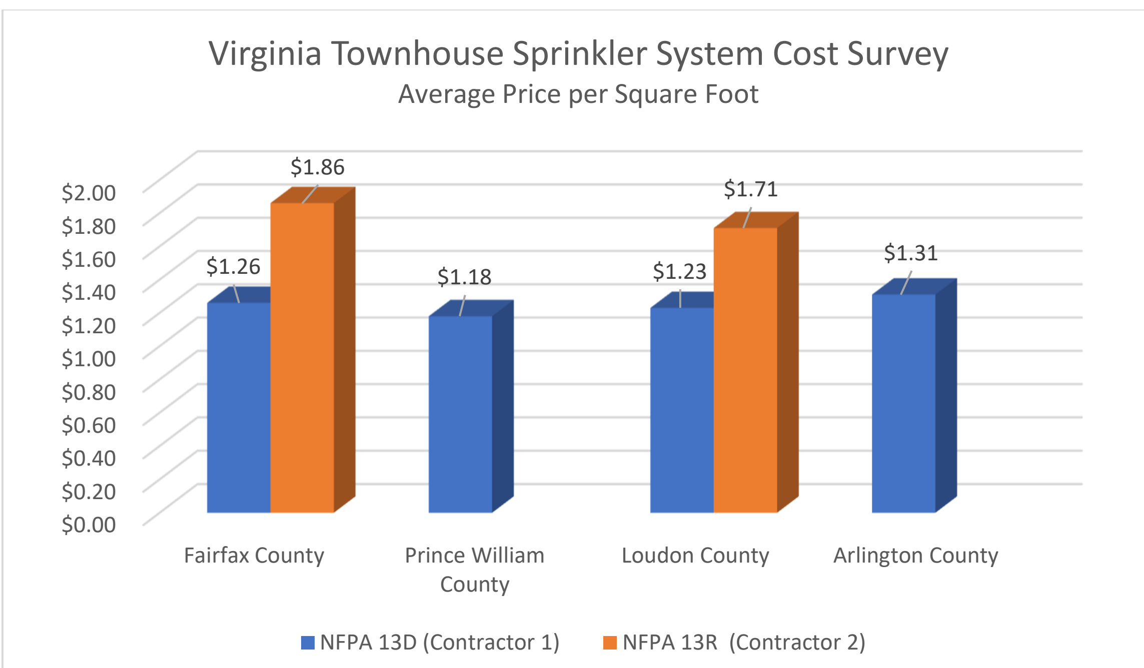
Response from Contractor 2

- **Loudoun County average price is $1.71 per square foot (NFPA 13R).**
  - $1.71 figure represents the average price for over 500 units constructed by four different builders in the past five years.
  - Loudoun permits a modified NFPA 13R design, that does not require a fire department connection and permits a design based on 2 sprinklers operating, rather than 4, which is ordinarily required under NFPA 13R.
- **Fairfax County average price is $1.86 per square foot (NFPA 13R)**
  - The $1.86 figure represents the average price for 220 units constructed by three different builders in the past four years

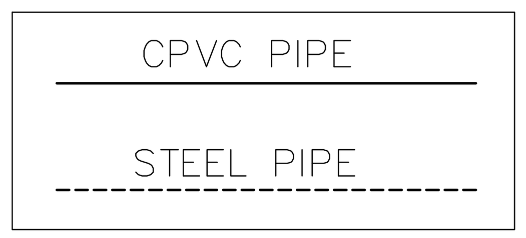
Costs provided by this contractor exceed what would be expected to comply with the proposed Virginia Residential Code because the costs reflect systems that were designed to the NFPA 13R standard, not the NFPA 13D standard, which the residential code will permit. NFPA 13R systems are typically used to protect large residential complexes and are more expensive than NFPA 13D systems, which are for protection of townhouses and one- and two-family dwellings.

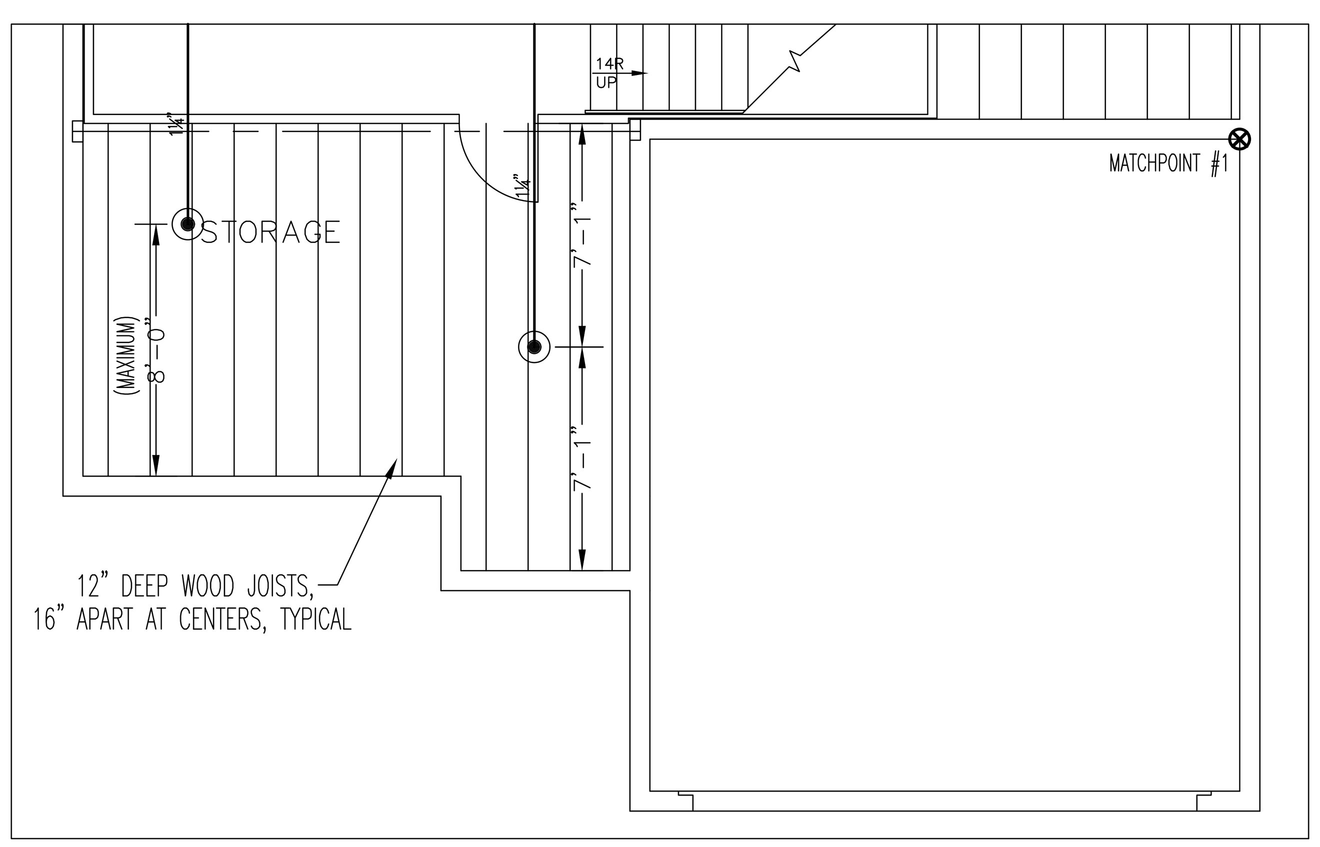
The table and figure on the following page summarize all results

Fairfax County	**NFPA 13D**	**$1.26**
Fairfax County	**NFPA 13R**	**$1.86**
Prince William County	**NFPA 13D**	**$1.18**
Loudon County	**NFPA 13D**	**$1.23**
Loudon County	**NFPA 13R**	**$1.71**
Arlington County	**NFPA 13D**	**$1.31**



ALL LINE PIPING TO BE 1¼" PIPE
ALL DROPS FOR PENDENT HEADS TO BE 1" PIPE





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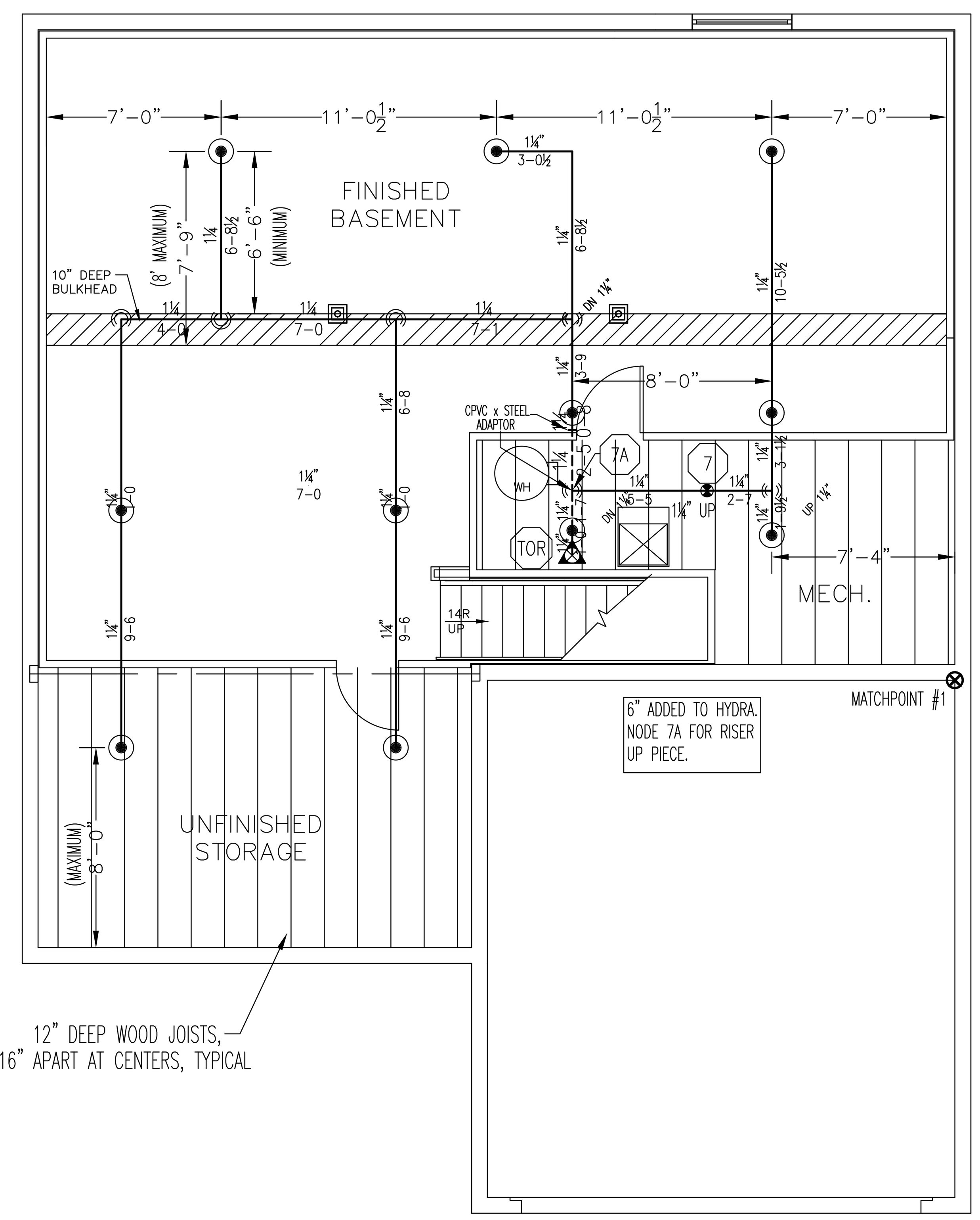
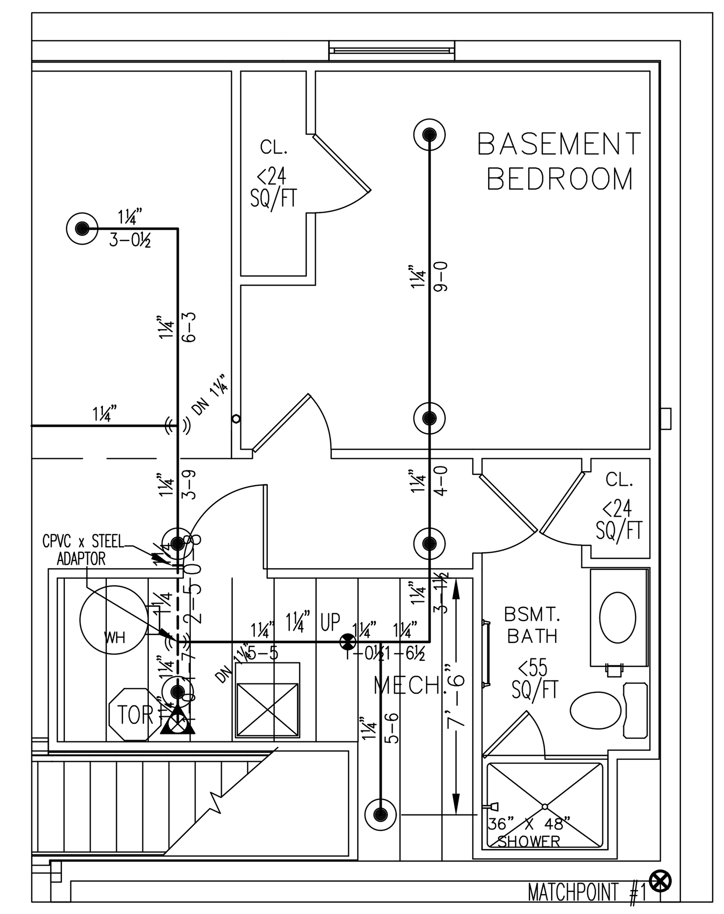
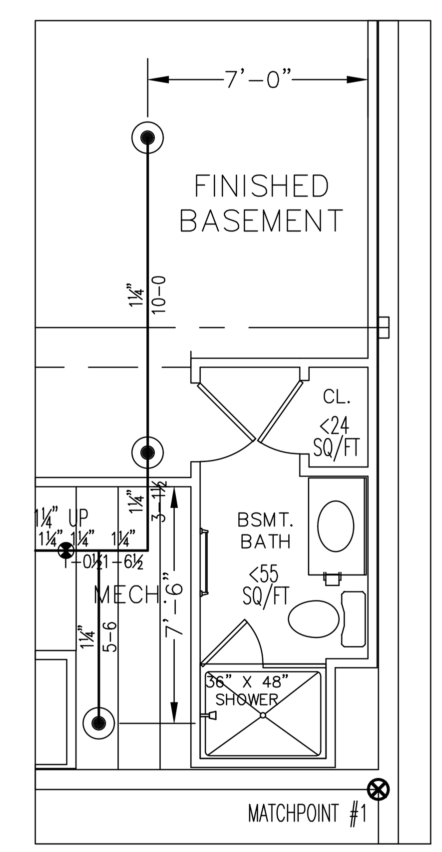


BASEMENT



OPT. BASEMENT BEDROOM W/BATH



OPT. BASEMENT BATH

AS-BUILT
01/25/2021
FPP2021-00386

SPRINKLERS				
SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	11
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	0
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	0
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	0
JOB TOTAL	40	TOTAL THIS SHEET		11

DESIGN CRITERIA			
NFPA REF.	#13D	FLOW TEST:	
TYPE SYS.	WET	STATIC PSI	
HAZARD	LIGHT HAZARD	RESIDUAL PSI	
DENSITY	.05	@ FLOW	
REMOTE AREA	2 HEADS	HYDRANT ELEV.	
MAX. S.F./HD.	256–288	HYD. LOW GRAD.	
K FACTOR	4.0–4.9	HYD. HIGH GRAD.	
C FACTOR	120 – 150	ADJ STATIC PSI	
		ADJ RESID. PSI	
INSIDE HOSE	N/A	INFO BY	
OUTSIDE HOSE			

SPECIALTY ITEMS	
FIRE PUMP:	F.D.C.:
RATED FLOW:	TYPE:
RATED BOOST:	SIZE:
SUCT. X DIST.	FINISH:
RELIEF VALVE:	F.H.V.:
FUEL TANK:	FINISH:
MUFFLER:	ALARM VALVE:
TEST HEADER:	DRY VALVE:
TYPE:	OTHER:
SIZE:	
FINISH:	

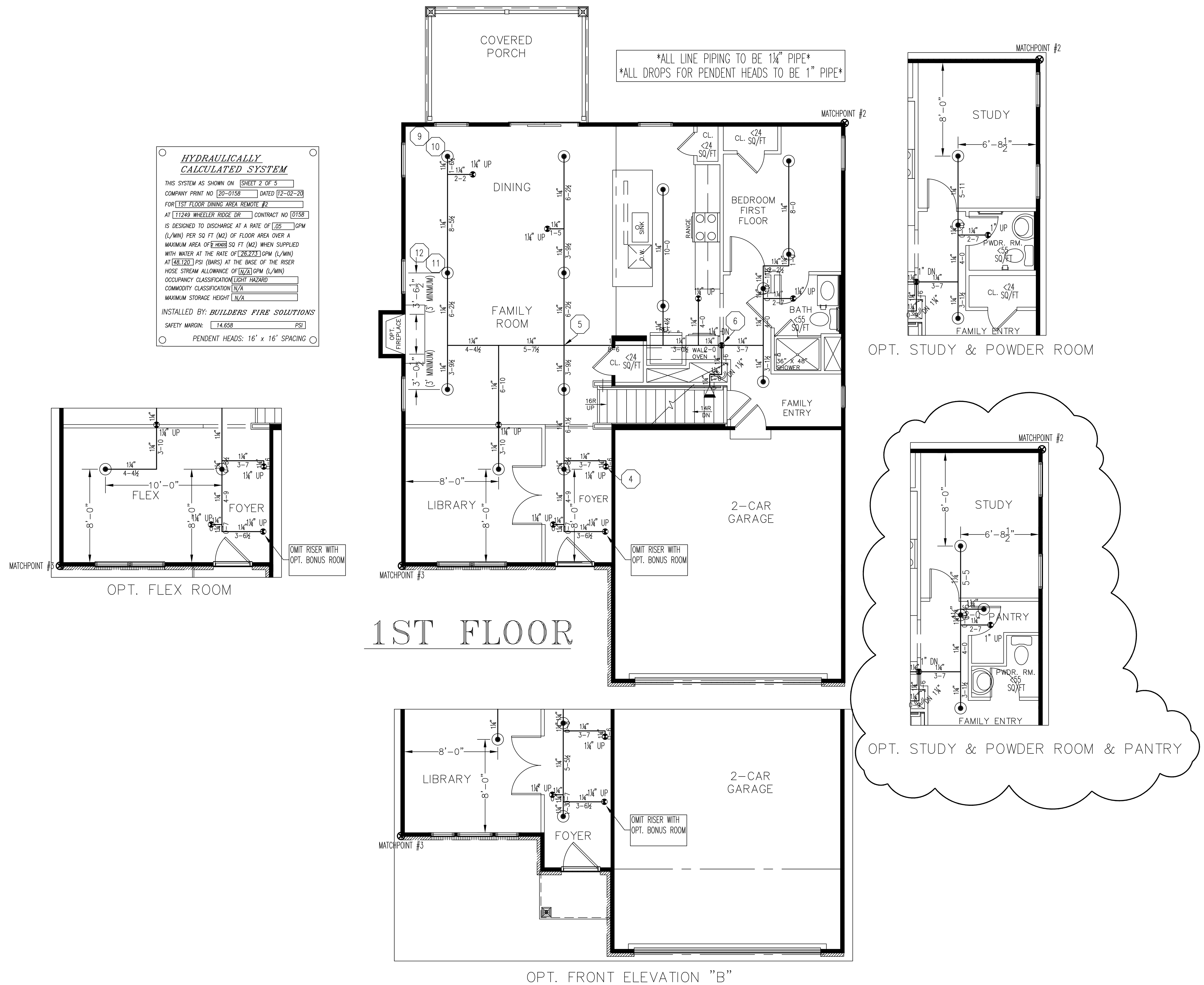
SYMBOLS
RISER BETWEEN FLOORS
TOP OF SPRINKLER RISER ASSEMBLY
MATCH POINT FOR LAYOUT OPTIONS
RISE/DROP IN PIPE ELEVATION
0 HYDAULIC NODE

PLAN REVISIONS		
DATE:	BY:	DESCRIPTION:
01/25/21	WML	1.AS-BUILT OPTION LAYOUT HAS BEEN PROVIDED
		STUDY OPT WITH POWDER ROOM AND NOW A PANTRY
		THAT REQUIRED COVERAGE.

SCALE
1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: BLACKBURN HUDSON MODEL HOME 11249 WHEELER RIDGE DR MANASSAS, VA 20109				
DATE: 12-02-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0158	APPROVALS: PRINCE WILLIAM COUNTY F.M.O.	
PLAN NORTH	DRAWN BY: WML	REVIEWED BY:	CONTRACTOR: NVR, INC.	
	AREA: LOT 71 BASEMENT		CAD FILE: BLACKBURNSUBMIT	DRWG NO: 1 OF 5
	PERMIT NO: BLD2021-03547	CONTRACTOR PHONE: 540-428-8712		

BFS
BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE



HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 2 OF 5
COMPANY PRINT NO 20-0158 DATED 12-02-20
FOR 1ST FLOOR DINING AREA REMOTE #2
AT 11249 WHEELER RIDGE DR CONTRACT NO 0158
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 2 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 26.273 GPM (L/MIN) AT 48.120 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF N/A GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A

INSTALLED BY: BUILDERS FIRE SOLUTIONS

SAFETY MARGIN: 14.658 PSI

PENDENT HEADS: 16' x 16' SPACING

AS-BUILT
01/25/2021
FPP2021-00386

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	14
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	0
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	1
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	0
JOB TOTAL	40	TOTAL THIS SHEET		15

DESIGN CRITERIA

NFPA REF.	#13D	FLOW TEST:	
TYPE SYS.	WET	STATIC PSI	
HAZARD	LIGHT HAZARD	RESIDUAL PSI	
DENSITY	.05	@ FLOW	
REMOTE AREA	2 HEADS	HYDRANT ELEV.	
MAX. S.F./HD.	256-288	HYD. LOW GRAD.	
K FACTOR	4.0-4.9	HYD. HIGH GRAD.	
C FACTOR	120 - 150	ADJ STATIC PSI	
		ADJ RESID. PSI	
INSIDE HOSE	N/A	INFO BY	
OUTSIDE HOSE			

SPECIALTY ITEMS

FIRE PUMP:	F.D.C.:
RATED FLOW:	TYPE:
RATED BOOST:	SIZE:
SUCT. X DIST.	FINISH:
RELIEF VALVE:	F.H.V.:
FUEL TANK:	FINISH:
MUFFLER:	ALARM VALVE:
TEST HEADER:	DRY VALVE:
TYPE:	OTHER:
SIZE:	
FINISH:	

SYMBOLS

- RISER BETWEEN FLOORS
- TOP OF SPRINKLER RISER ASSEMBLY
- MATCH POINT FOR LAYOUT OPTIONS
- RISE/DROP IN PIPE ELEVATION
- HYDAULIC NODE

PLAN REVISIONS

DATE:	BY:	DESCRIPTION:
01/25/21	WML	1.AS-BUILT OPTION LAYOUT HAS BEEN PROVIDED STUDY OPT WITH POWDER ROOM AND NOW A PANTRY THAT REQUIRED COVERAGE.

SCALE
1/4"=1'-0"
0' 5' 10' 15' 20'

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DATE: 12-02-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0158	APPROVALS: PRINCE WILLIAM COUNTY F.M.O.	
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	AREA: LOT 71: 1ST FLOOR		CAD FILE: BLACKBURNSUBMIT	DRWG NO: 2 OF 5
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BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

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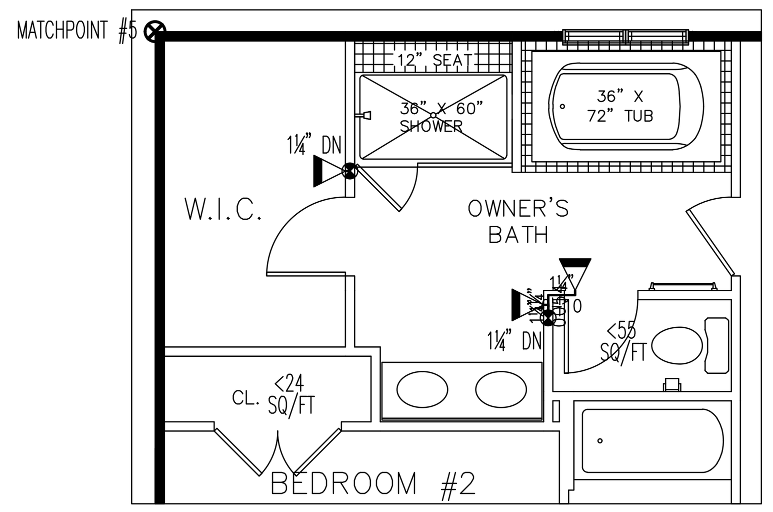
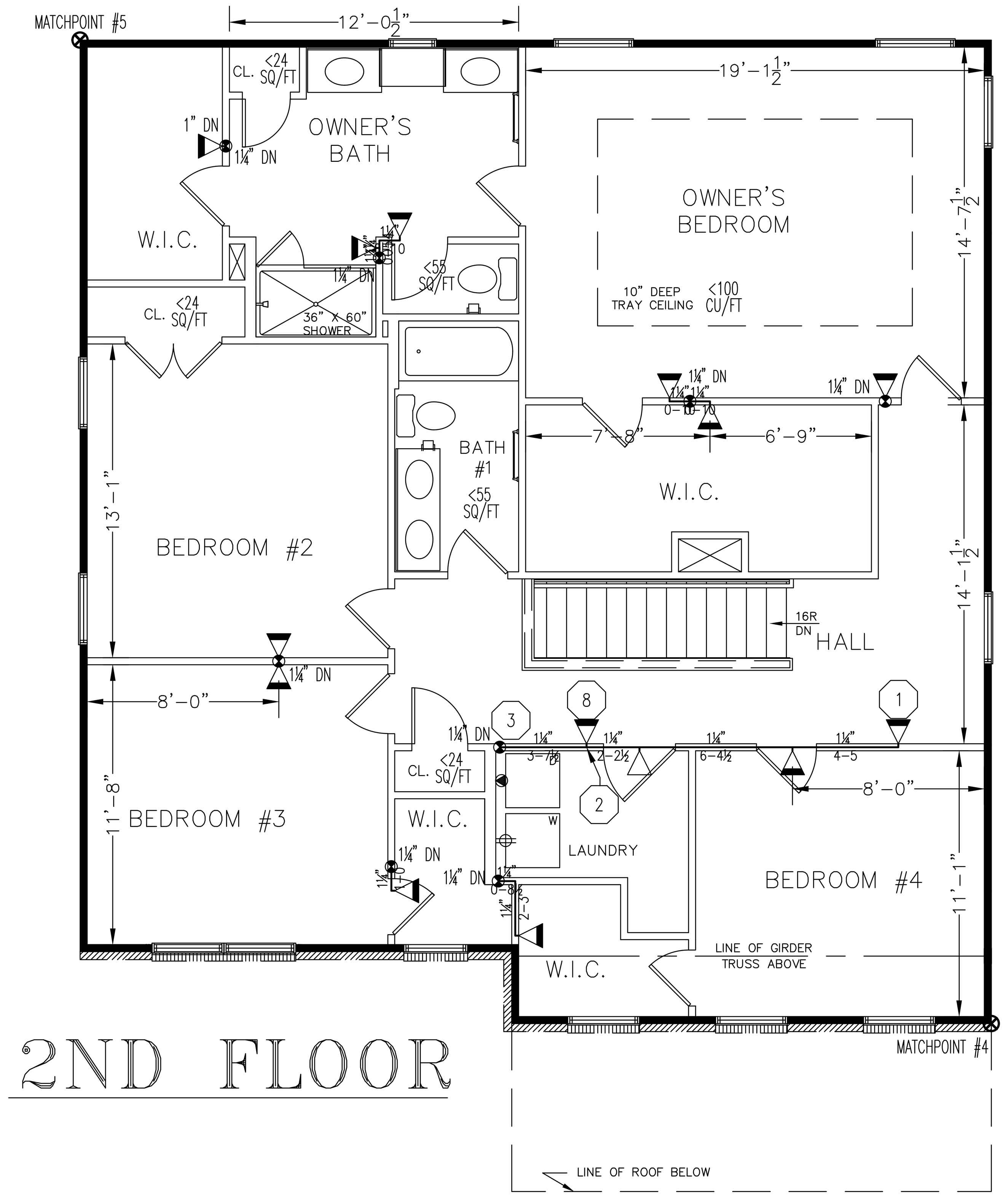


ALT. OWNER'S BATH



2ND FLOOR

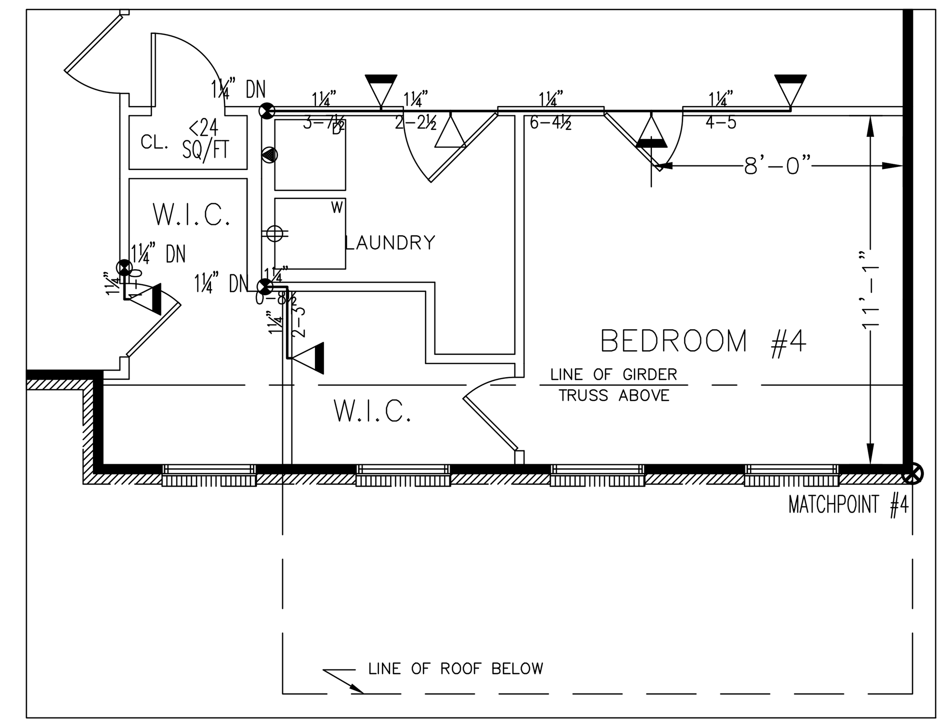
HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 3 OF 5
COMPANY PRINT NO 20-0158 DATED 12-02-20
FOR 2ND FLOOR HALL REMOTE #1
AT 11249 WHEELER RIDGE DR CONTRACT NO 0158
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 2 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 26.152 GPM (L/MIN) AT 57.059 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF N/A GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A

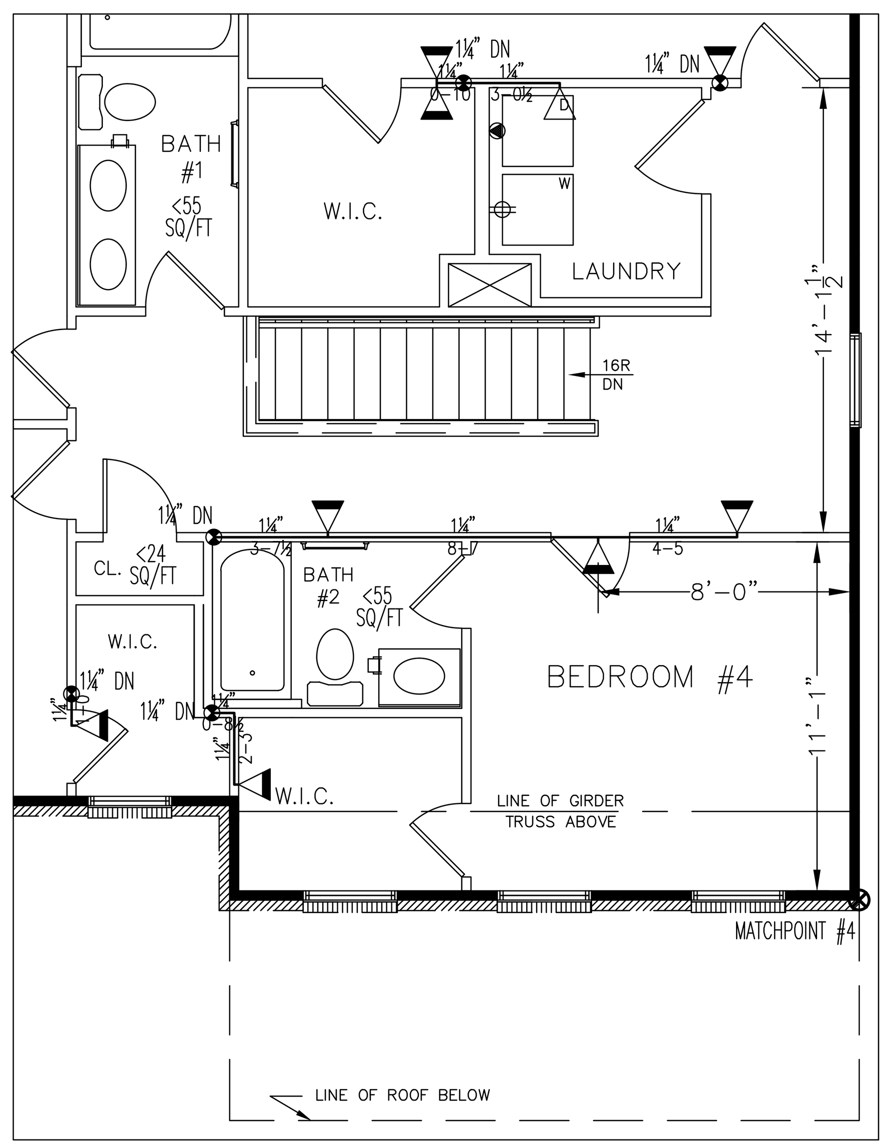
INSTALLED BY: BUILDERS FIRE SOLUTIONS

SAFETY MARGIN: 5.719 PSI

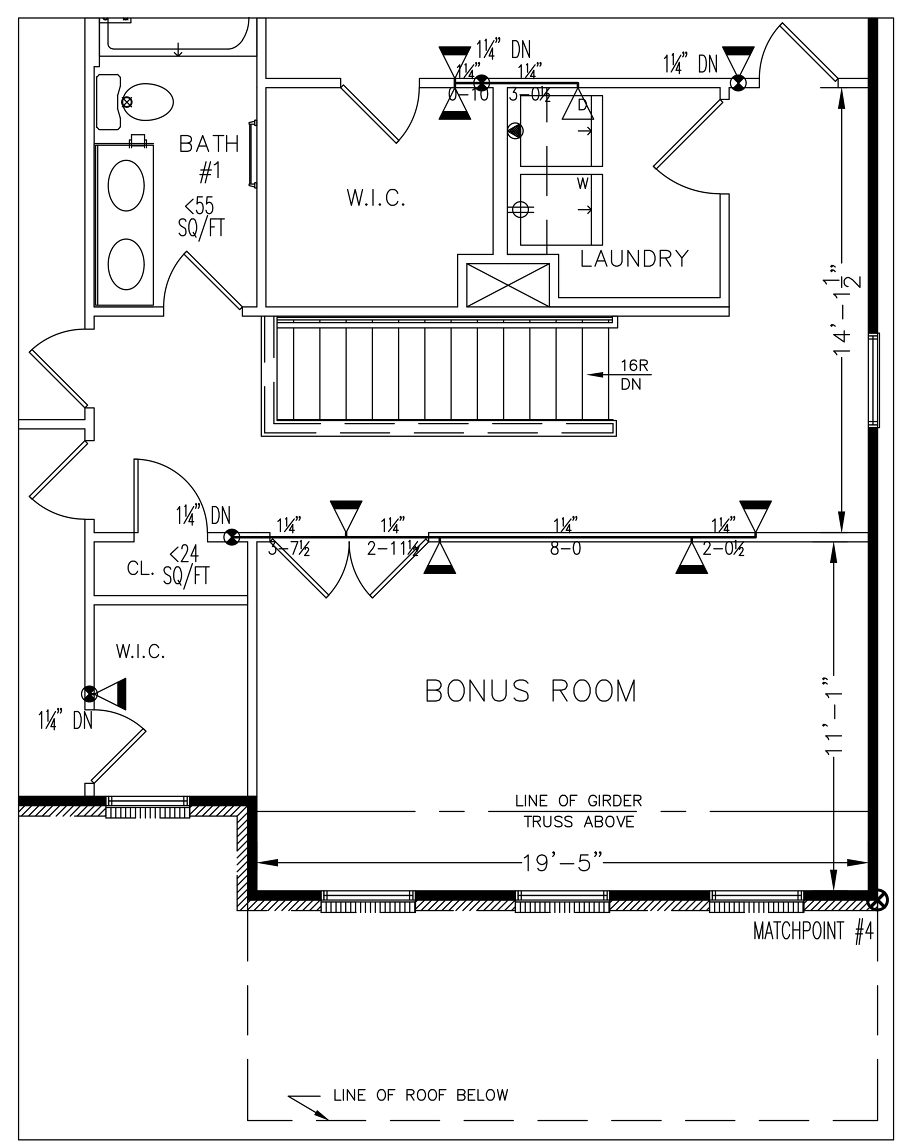
SIDEWALL HEADS: 16' x 16' SPACING



OPT. FRONT ELEVATION "B"



OPT. BEDROOM #4, W/BATH



OPT. BONUS ROOM

AS-BUILT
01/25/2021
FPP2021-00386

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	0
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	0
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	13
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	1
JOB TOTAL	40	TOTAL THIS SHEET		14

DESIGN CRITERIA

NFPA REF. #13D	FLOW TEST:	
TYPE SYS. WET	STATIC PSI	
HAZARD LIGHT HAZARD	RESIDUAL PSI	
DENSITY .05	@ FLOW	
REMOTE AREA 2 HEADS	HYDRANT ELEV.	
MAX. S.F./HD. 256–288	HYD. LOW GRAD.	
K FACTOR 4.0–4.9	HYD. HIGH GRAD.	
C FACTOR 120 – 150	ADJ STATIC PSI	
	ADJ RESID. PSI	
INSIDE HOSE N/A OUTSIDE HOSE	INFO BY	

SPECIALTY ITEMS

FIRE PUMP:	F.D.C.:
RATED FLOW:	TYPE:
RATED BOOST:	SIZE:
SUCT. X DIST.	FINISH:
RELIEF VALVE:	F.H.V.:
FUEL TANK:	FINISH:
MUFFLER:	ALARM VALVE:
TEST HEADER:	DRY VALVE:
TYPE:	OTHER:
SIZE: FINISH:	

SYMBOLS

- RISER BETWEEN FLOORS
- TOP OF SPRINKLER RISER ASSEMBLY
- MATCH POINT FOR LAYOUT OPTIONS
- RISE/DROP IN PIPE ELEVATION
- HYDAULIC NODE

PLAN REVISIONS

DATE:	BY:	DESCRIPTION:
01/25/21	WML	1.AS-BUILT OPTION LAYOUT HAS BEEN PROVIDED STUDY OPT WITH POWDER ROOM AND NOW A PANTRY THAT REQUIRED COVERAGE.

SCALE
1/4"=1'-0"
0' 5' 10' 15' 20'

JOB NAME: BLACKBURN HUDSON MODEL HOME 11249 WHEELER RIDGE DR MANASSAS, VA 20109			
DATE: 12-02-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0158	APPROVALS: PRINCE WILLIAM COUNTY F.M.O.
PLAN NORTH	DRAWN BY: WML	REVIEWED BY:	CONTRACTOR: NVR, INC.
	AREA: LOT 71: 2ND FLOOR	CAD FILE: BLACKBURNSUBMIT	DRWG NO: 3 OF 5
	PERMIT NO: BLD2021-03547	CONTRACTOR PHONE: 540-428-8712	

BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Pendent Sprinkler VK468 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The orifice design, with a K-Factor of 4.9 (70.6 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

NYC Approved: MEA 89-92-E, Volume 35

UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2006.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.9 U.S. (70.6 metric†)
†Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-1/4" (58 mm)

Material Standards:
Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Brass UNS-C23000, Phosphor Bronze UNS-C51000, or Brass UNS-C26000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethylene (PTFE) Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: Brass UNS-C36000
<u>For ENT coated sprinklers: Belleville spring - Exposed, Screw and Pipcap - ENT plated.</u>

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 13637
Order Sprinkler VK468 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, and ENT = JN
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK468 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 13637AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13577W/B* (available since 2006)
C. Optional Protective Sprinkler Cap Remover/Escutcheon Installer Tool** Part No. 15915 (available since 2010.)
*A ½" ratchet is required (not available from Viking).
**Allows use from the floor by attaching a length of 1" diameter CPVC tubing to the tool. Ideal for sprinkler cabinets. Refer to Bulletin F_051808.

VIKING®	TECHNICAL DATA	FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
The Viking Model VK468 Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Finishes: Brass, Chrome, White Polyester, Black Polyester, and ENT			
Corrosion Resistant Coatings[3]: ENT			

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

[3] The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For ENT coated sprinklers, the waterway is coated. Note that the spring is exposed on sprinklers with ENT coating.

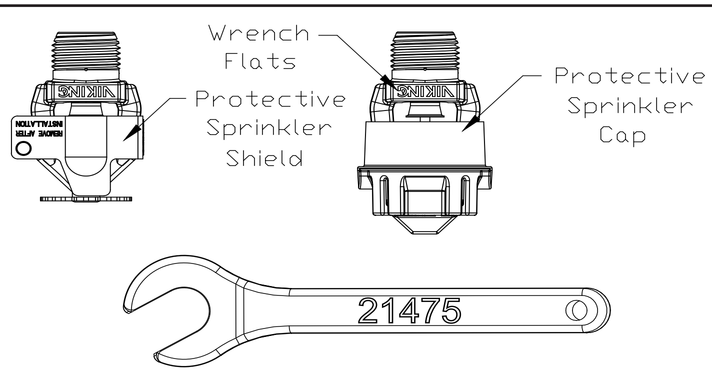

Figure 1: **Standard Sprinkler Wrench 21475M/B**

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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Approval Chart
Viking VK468, 4.9 K-Factor Residential Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
13637	VK468	1/2	15	4.9	70.6	175 psi (12 bar)	2-1/4	58

Max. Coverage Area[4] Ft.X Ft. (m X m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Deflector to Ceiling	Installation Type	Listings and Approvals[3]				Minimum Spacing Ft. (m)
	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)			C-UL-US-EU[5]	VdS	NYC[6]	NSF[8]	
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)	1-1/8 to 2 inch	Standard surface-mounted escutcheons, or recessed with the Micromatic® Model E-1, E-2, or E-3 Recessed Escutcheon	See Footnotes 7 and 10.	See Footnotes 7 and 10.	See Footnote 7.	See Footnote 7.	8 (2.4)
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)	17 (64.4)	12.0 (0.83)							
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)	20 (75.7)	16.7 (1.15)							

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.

[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[3] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.

[4] For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.

[5] Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

[6] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 35.

[7] Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester[9]

[8] UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

[9] Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.

[10] Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

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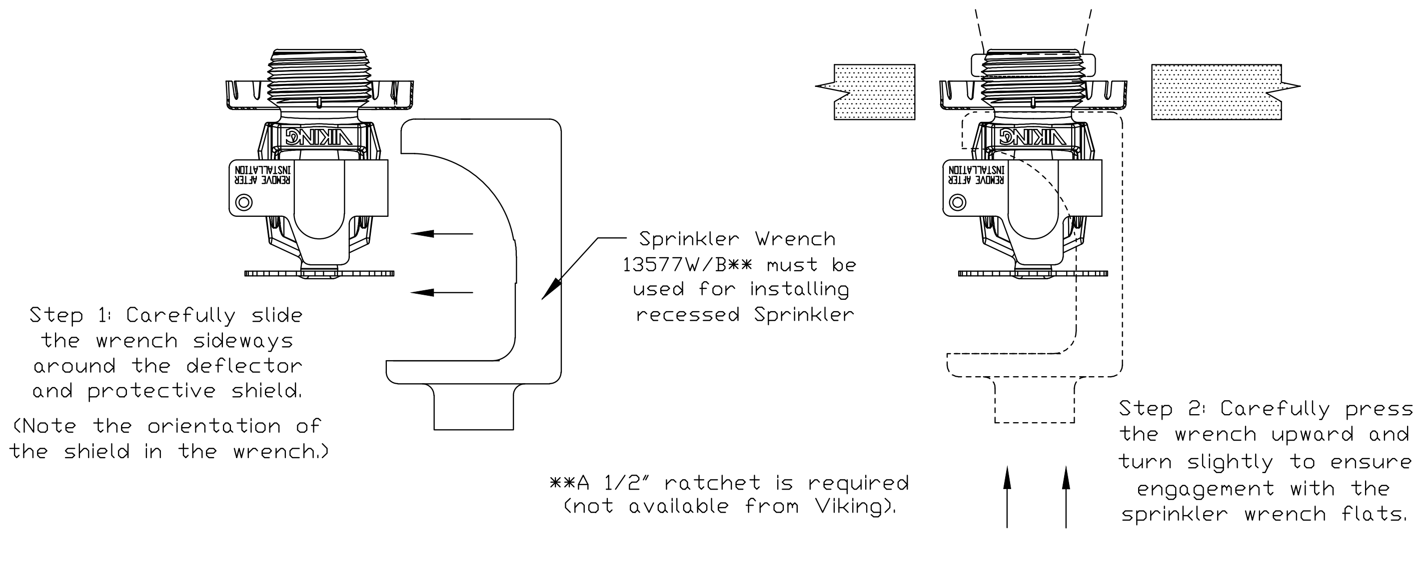

Figure 2: **Wrench 13577W/B for Recessed Sprinkler**

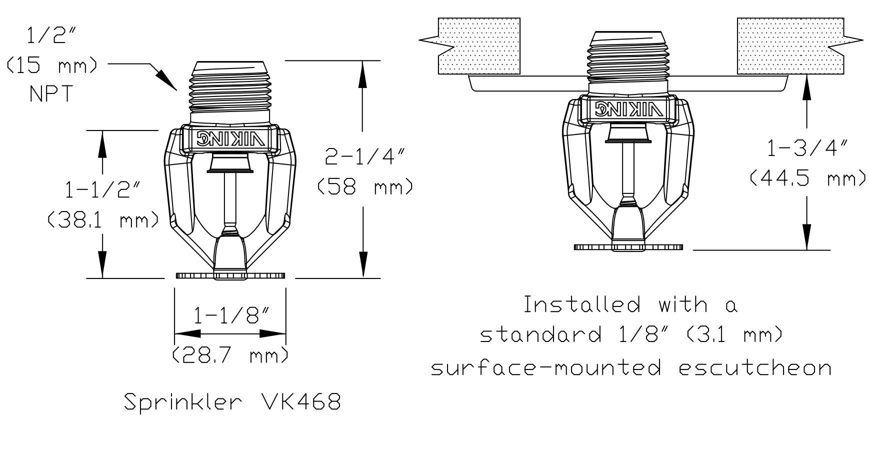

Figure 3: **Sprinkler VK468 Dimensions with a Standard Escutcheon**

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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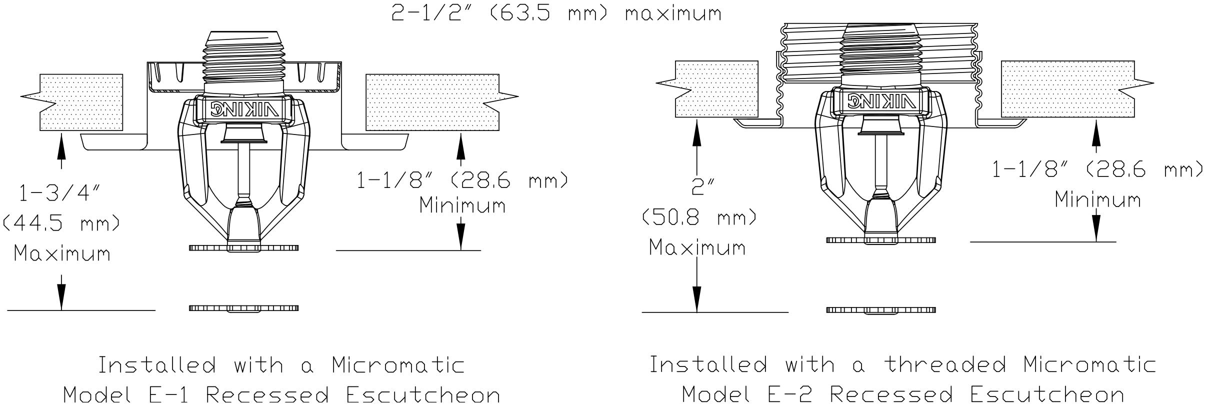

Figure 4: Sprinkler VK468 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Pendent Sprinkler VK468 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the “design area” in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614, F_080415 and F_080190 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, VdS, and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Viking Residential Sprinkler Installation Guide

October 25, 2018

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

TECHNICAL DATA	FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

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Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking residential automatic sprinklers are equipped with a “fast response” heat-sensitive operating element designed to respond individually and quickly to a specific high temperature. Viking residential sprinklers are designed to combine speed of operation with water distribution characteristics to help in the control of residential fires and to improve life safety by prolonging the time available for occupants to escape or be evacuated.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

A. Viking residential sprinklers are intended for use in the following occupancies: one- and two-family dwellings and mobile homes with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; or residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13. Information contained in this guide is based on NFPA 13, “Standard for the Installation of Sprinkler Systems”.

B. The design criteria for residential sprinklers contained in the NFPA installation standards must be followed except as modified by the individual UL 1626 listing information provided in the technical data pages and this Residential Sprinkler Installation Guide. For listed areas of coverage, technical data, and specific design and installation instructions, refer to the appropriate Viking technical data page for the sprinkler model used.

C. Viking residential sprinklers listed by Underwriters Laboratories, Inc. (UL) have passed fire tests designed to represent fire conditions for the sprinkler’s listed area of coverage. The standards for residential sprinkler performance and spray patterns are printed in Underwriters Laboratories Publication UL 1626, “Standard for Residential Sprinklers for Fire Protection Service”. All listed Viking residential sprinklers meet or exceed UL 1626 performance requirements and spray pattern criteria for their listed areas of coverage.

D. NFPA standards allow use of residential sprinklers with rates, design areas, areas of coverage, and minimum design pressures other than those specified in the standards when they have been listed for such specific residential installation conditions.

3. TECHNICAL DATA

Specifications:

Refer to the appropriate sprinkler technical data sheet.

Material Standards:

Refer to the appropriate sprinkler technical data sheet.

Viking Technical Data may be found on The Viking Corporation’s Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

4. INSTALLATION

NOTE:Take care not to over-tighten the sprinkler and/or damage its operating parts!

Maximum Torque: 1/2” NPT: 14 ft-lbs. (19.0 N-m) 3/4” NPT: 20 ft-lbs. (27.1 N-m)

A. Care and Handling (also refer to Bulletin - Care and Handling of Sprinklers, Form No. F_091699.)

Sprinklers must be handled with care and protected from mechanical damage during storage, transport, handling, and after installation. Store sprinklers in a cool, dry place in their original container.

Use care when locating sprinklers near fixtures that can generate heat.

Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to Table 1.)

Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately. (Note: Installing glass bulb sprinklers in direct sunlight (ultraviolet light) may affect the color of the dye used to color code the bulb. This color change does not affect the integrity of the bulb.)

Viking residential sprinklers are intended for use on wet pipe residential systems only. Adequate heat must be provided for wet-pipe systems. DO NOT use Viking residential sprinklers on dry systems unless specifically allowed by recognized installation standards or the Authority Having Jurisdiction.

Residential concealed sprinklers must be installed in neutral or negative pressure plenums only!

Corrosion-resistant sprinklers must be installed when subject to corrosive atmospheres. **NOTE:** Viking residential sprinklers are not intended for use in corrosive environments.

VIKING | TECHNICAL DATA | **FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE**

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TABLE 1: RESIDENTIAL SPRINKLER TEMPERATURE RATINGS			
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating[1]**	**Maximum Ambient Ceiling Temperature[3]**	**Bulb Color**
Residential Glass Bulb Style Sprinklers			
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)[1]**	**Maximum Ambient Ceiling Temperature[3]**	
Residential Fusible Element Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Temperature Identification Stamp**
Residential Flush Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	On Cover or Sprinkler Inlet (VK476)
Intermediate	220 °F (104 °C)	150 °F (65 °C)	On Cover
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Cover Plate Temperature Rating**
Residential Concealed Style Sprinklers			
Ordinary	135 °F (57 °C)[1], 140 °F (60 °C)[2], 155 °F (68 °C)[1], or 165 °F (74 °C)[1]	100 °F (38 °C)	135 °F (57 °C)

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector or flow shaper.

[2] The temperature rating is stamped on the sprinkler.

[3] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

B. Installation Instructions

Viking sprinklers are manufactured and tested to meet the rigid requirements of approving agencies. They are designed to be installed in accordance with recognized installation standards NFPA 13, NFPA 13R, and NFPA 13D, and any associated TIAs.

Deviation from the standards or any alteration to the sprinklers or cover plate assemblies after they leave the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinklers inoperative and will automatically nullify the approval and any guarantee made by Viking.

The use of residential sprinklers may be limited due to occupancy and hazard. Residential fire protection systems must be designed and installed only by those who are completely familiar with the appropriate standards and codes, and thoroughly experienced in fire protection design, hydraulic calculations, and sprinkler system installation.

Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Viking residential sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler*.
*Refer to the appropriate sprinkler technical data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½” or 3/4” (15 mm or 20 mm) NPT** outlet of the reducing coupling is at the desired location and centered in the opening** in the ceiling or wall.
**Size depends on the sprinkler model used. Refer to appropriate sprinkler data page.

VIKING	TECHNICAL DATA	FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

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DESIGN CRITERIA

For Systems Designed to NFPA 13D or NFPA 13R: Apply the listed areas of coverage and minimum water supply requirements shown in the approval charts on the residential sprinkler data pages. The sprinkler flow rate is the minimum required discharge from each of the total number of design sprinklers as specified in NFPA 13D or NFPA 13R.

For Systems Designed to the latest edition of NFPA 13: The number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- **The flow rates given in the approval charts on the data pages for NFPA 13D and NFPA13R for each area of coverage listed, or**
- **Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13. The greatest dimension of the coverage area cannot be any greater than the maximum areas of coverage shown on the data pages.**

Flow Rates

All residential sprinklers manufactured on or after July 12, 2002 are listed with a single minimum flow rate. Where rooms have more than one sprinkler, multiple-sprinkler calculations are still required, but the first sprinkler and any additional sprinkler or sprinklers must be calculated flowing at identical minimum flow rates, based on the area of sprinkler coverage, using the minimum flow and pressure listed for the sprinkler model used.

Consult the appropriate standards and the Authorities Having Jurisdiction to determine the number of sprinklers to hydraulically calculate to verify adequate water supply for multiple-sprinkler operation.

Operating Pressure: The minimum operating pressure of any sprinkler shall be the minimum operating pressure specified by the listing, or 7 psi (0.5 bar), whichever is greater. The maximum allowable operating pressure is 175 psi (12 bar).

Areas of Coverage

If the actual area of coverage is less than the listed area of coverage, use the minimum water supply for the next larger area of coverage listed. DO NOT interpolate. Residential sprinkler systems must be hydraulically calculated according to NFPA standards to verify that the water supply is adequate for proper operation of the sprinklers. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler when it is operating at the minimum gpm and psi listed for single-sprinkler operation for the sprinkler model used.

Viking residential sprinklers may be listed for more than one area of coverage. Suggested practice in selecting area of coverage is to select the one that can be adequately supplied by the available water supply and still allow for the installation of as few sprinklers in a compartment as possible while observing all guidelines pertaining to obstructions and spacing. This maximizes the use of the available water supply, which is often limited on residential fire protection systems. After selecting an appropriate area of coverage, sprinklers must be spaced according to guidelines set forth in the installation standards.

Definition of "COMPARTMENT": A space completely enclosed by walls and a ceiling. Openings to an adjoining space are allowed, provided the openings have a minimum lintel depth of 8 in. (203.2 mm) from the ceiling.

Spacing Guidelines

For guidelines concerning spacing of Viking residential sprinklers near beams, obstructions, heat sources, and sloped ceilings [slopes more than a 2/12 (9.5°) pitch], refer to the Viking residential sprinkler data pages and installation guide, the appropriate NFPA standard, and the Authority Having Jurisdiction. NOTE: Sloped, beamed, and pitched ceilings could require special design features such as larger flow, or a design for more sprinklers to operate in the compartment, or both.

Distance from Walls: Install not more than one-half the listed sprinkler spacing nor less than 4" (102 mm) from walls, partitions, or obstructions as defined in the standards.

Minimum Sprinkler Spacing: The minimum distance between residential sprinklers to prevent cold soldering (i.e., the spray from one operating sprinkler onto an adjacent sprinkler that could prevent its proper activation) is 8 ft. (2.4 m).

Maximum Sprinkler Spacing: Locate adjacent sprinklers no farther apart than the listed spacing.

Deflector Position: Install frame style residential *pendent* sprinklers with the deflector between 1" and 4" (25.4 mm to 102 mm) below smooth ceilings, unless the sprinkler data page indicates otherwise. Install pendent sprinklers in the pendent position only, with the deflector oriented parallel with the ceiling or roof.

Refer to the individual listings in the residential sprinkler data pages for horizontal sidewall sprinkler deflector or sprinkler centerline distance below the ceiling. Install horizontal sidewall sprinklers in the horizontal position only below smooth ceilings, with the leading edge of the deflector or element assembly oriented parallel with the ceiling.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to the appropriate sprinkler data page. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

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2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape. *Exception: For concealed sprinklers (i.e., VK457, VK458, VK468, VK474, and VK4570) the protective cap is removed for installation.*
3. Care must be taken when installing sprinklers on CPVC and copper piping systems. Never install the sprinkler into the reducing fitting before attaching the reducing fitting to the piping. Sprinklers must be installed on CPVC systems after the reducing fitting has been installed and the primer and/or cement manufacturer's recommended curing time has elapsed. When installing sprinklers on copper piping systems, take care to brush the inside of the sprinkler supply piping and reducing fitting to ensure that no flux accumulates in the sprinkler orifice. Excess flux can cause corrosion and may impair the ability of the sprinkler to operate properly.
4. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the sprinkler deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, while taking care not to over-tighten or damage the sprinkler operating parts.
   b. Thread the flush or concealed sprinkler into the ½” or 3/4” (15 mm or 20 mm) NPT** *outlet of the coupling by turning it clockwise with the special sprinkler wrench. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Exception: For concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 the protective cap is removed for installation, and then placed back on the sprinkler temporarily.*
5. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards.
   a. Make sure the sprinkler has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal leaks, the sealing compound is washed out of the joint.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS <u>BEFORE</u> PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
6. For residential flush sprinklers, the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread on or push it on until the flange touches the ceiling. Note the maximum vertical adjustment is ½” (12,7 mm) for sprinkler VK420 and 5/8” for VK476. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipples as required.
7. For residential concealed sprinklers, the cover plate assembly can now be attached.
   a. Remove the cover plate assembly from the protective box, taking care not to damage the assembly.
   b. From below the ceiling, gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling or wall.
   c. Carefully push the cover plate assembly onto the sprinkler, using even pressure with the palm of the hand, until the unfinished brass flange of the cover plate base touches the ceiling or wall.
   d. The maximum adjustment available for residential concealed sprinklers is ½” (12.7 mm) [1/4” (6.4 mm) for sprinkler VK480]. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler nipples.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See Maintenance instructions below and follow all warnings and instructions.

5. OPERATION

During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector or flow shaper, forming a uniform, high-wall wetting spray pattern to extinguish or control the fire.

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

A. Sprinklers must be inspected on a regular basis for signs of corrosion, mechanical damage, obstructions, paint, etc. Frequency of the inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced immediately after a specified term of service. Refer to NFPA 25 and the Authorities Having Jurisdiction for the specified period of time after which testing and/or replacement of residential sprinklers is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from, attached to, or otherwise obstruct the discharge pattern of the sprinkler. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the effected area.

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench and remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For residential flush pendent and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. To remove a ceiling ring, grasp it from below the ceiling and gently turn it counterclockwise. Cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler, use the sprinkler wrench to unthread the sprinkler from the piping. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Place a plastic protective shell (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the shell. Exception: Concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 are removed without the plastic cap.

3. Follow instructions in section 4B. Installation Instructions to install the new unit. Be sure the replacement sprinkler is the correct model and style, with the appropriate K-Factor, temperature rating, and response characteristics. A fully stocked sprinkler cabinet should be provided for this purpose. *(For flush or concealed style sprinklers, stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.)*

4. Place the system back in service and secure all valves. Check for and repair all leaks.

E. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

Viking Residential Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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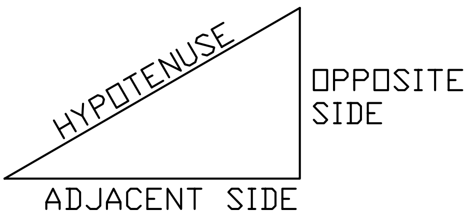
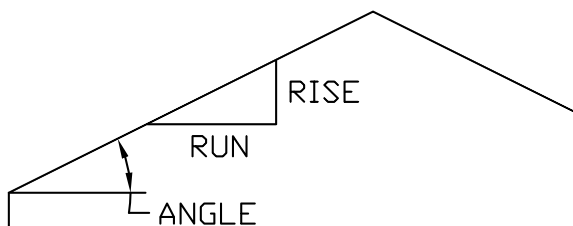


TANGENT = $\dfrac{\text{OPPOSITE SIDE (RISE)}}{\text{ADJACENT SIDE (RUN)}}$

$$\frac{\text{RISE}}{\text{RUN}} = \text{TANGENT}$$

$$\text{ANGLE} = \text{TAN}^{-1}\left(\frac{\text{RISE}}{\text{RUN}}\right)$$

$$\text{SLOPE DISTANCE} = \sqrt{(\text{RISE})^2 + (\text{RUN})^2}$$



RISE	RUN	TANGENT	ANGLE	SLOPE DISTANCE
2	12	.1666	9.45°	12.1
3	12	.2500	14°	12.3
4	12	.3333	18.4°	12.6
5	12	.4166	22.6°	13
6	12	.5000	26.5°	13.4
7	12	.5833	30.2°	13.8
8	12	.6666	33.6°	14.4
9	12	.7500	36.8°	15
10	12	.8333	39.8°	15.6
11	12	.9166	42.5°	16.2
12	12	1	45°	16.97

Table 2
Rise Over Run Conversion to Degrees of Slope

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SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

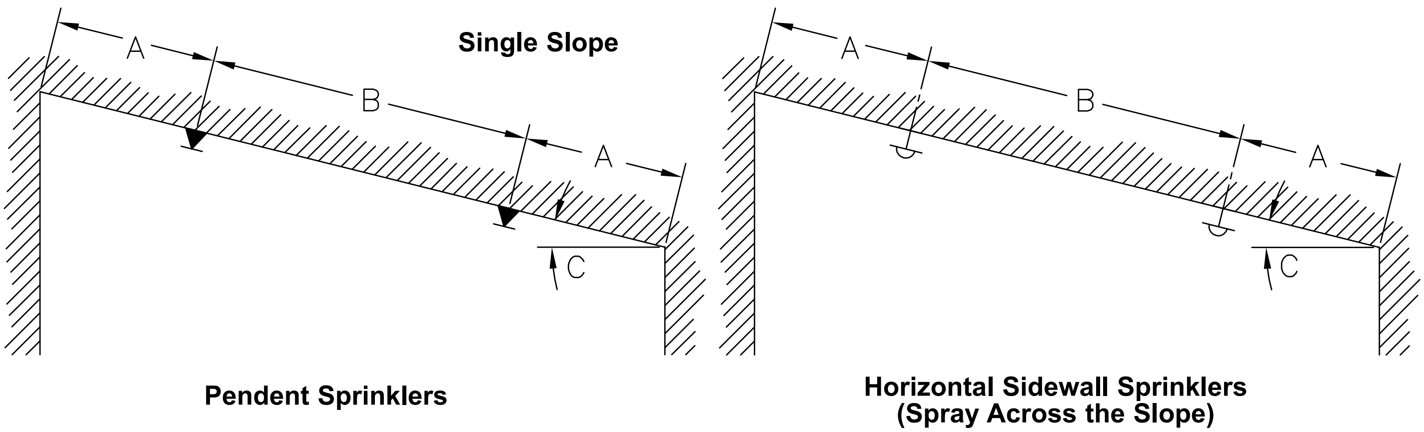

Figure 1

(A) One-half listed spacing of sprinkler maximum, 0'-4" (0-102 mm) minimum.
(B) Listed spacing of sprinkler, maximum, 8'-0" (2.4 m) minimum.
(C) Where angle "C" is greater than an 8/12 (33.7°) pitch, see Figure 2 below.

SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

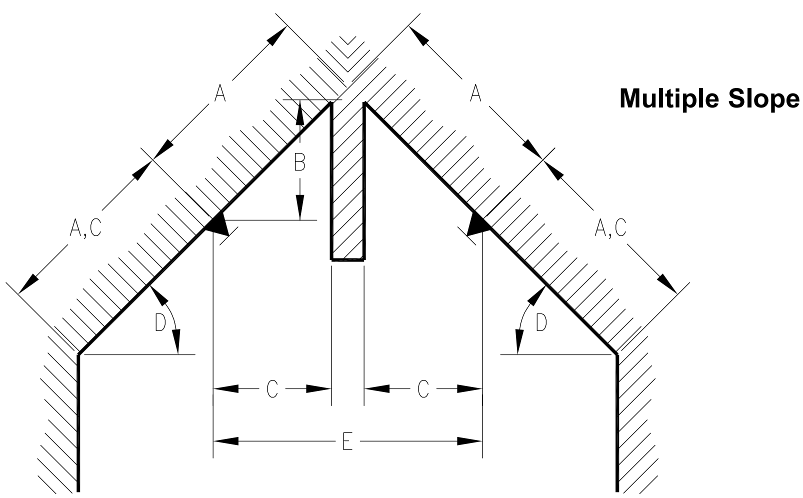

Figure 2

(A) One-half listed spacing of sprinkler, maximum.
(B) 3'-0" (.91 m) maximum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than an 8/12 (33.7°) pitch.
(E) For distance less than 8'-0" (2.4 m), baffle required.

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SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

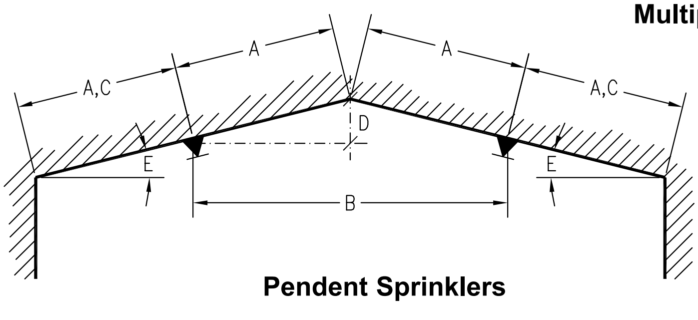

Figure 3

(A) One-half listed spacing of sprinkler, maximum.
(B) 8’-0” (2.4 m) minimum.
(C) 0’-4” (0-102 mm) minimum.
(D) 3’-0” (.91 m) maximum.
(E) Acceptable for slopes of 0/12 to 8/12 (0° to 33.7°) pitch.

SPACING OF RESIDENTIAL PENDENT SPRINKLERS AT PEAK OF SLOPED CEILINGS WITH PITCH LESS THAN 8/12 (33.7°)

(Refer to the appropriate residential sprinkler technical data page for listings.)

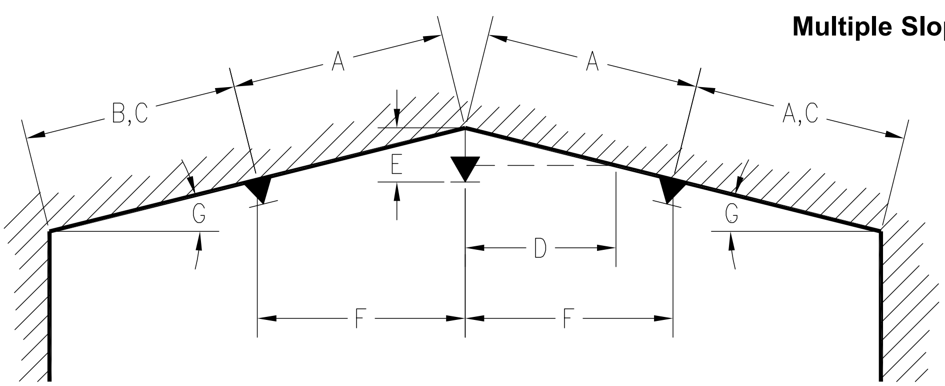

Figure 4

(A) Listed spacing of sprinkler, maximum.
(B) One-half listed spacing of sprinkler, maximum.
(C) 0’-4” minimum.
(D) Refer to page 10 for minimum distance between sprinkler and intersecting sloped ceiling.
(E) Refer to the appropriate residential sprinkler technical data page for deflector distance below ceiling.
(F) 8’-0” minimum.
(G) Reference: 4/12 (18.0°) pitch maximum for 12’ (3.7 m) spacing.
2.5/12 (12.0°) pitch maximum for 14’ (4.3 m) spacing.
2/12 (10.0°) pitch maximum for 16’ (4.9 m) spacing.
2/12 (10.0°) pitch maximum for 18’ (5.5 m) spacing.
1.9/12 (9.0°) pitch maximum for 20’ (6.1 m) spacing.
Angles based on sprinklers installed 0’-4” (0-102 mm) from peak.

NOTE: Whenever possible, utilize design as shown in Figure 3 above.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

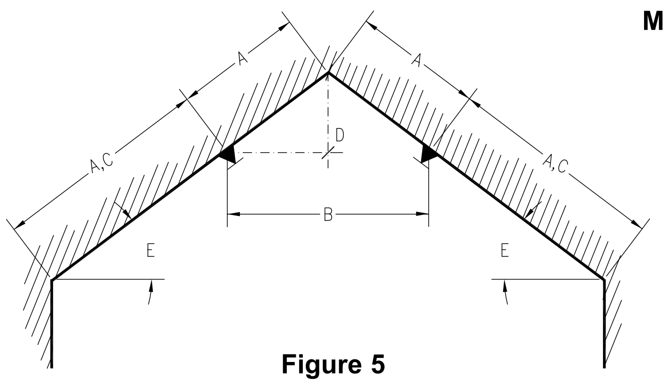

Figure 5

(A) One-half listed spacing of sprinkler, maximum.
(B) 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) 3'-0" (.91 m) maximum.
(E) Acceptable for slopes greater than an 8/12 (33.7°) pitch.
(F) When this design is used, refer to the appendices of NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction regarding the number of design sprinklers to hydraulically calculate.

SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 3 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

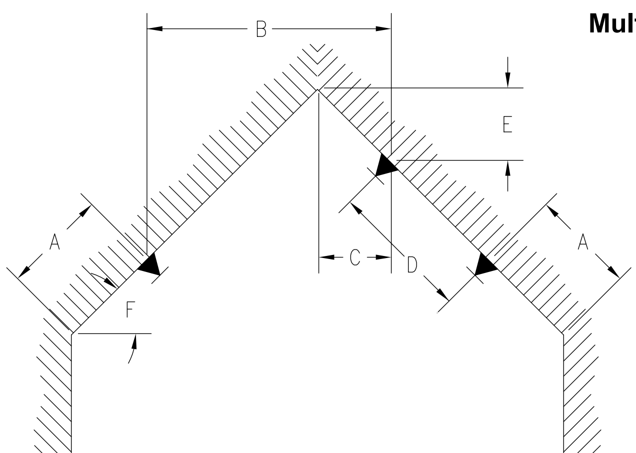

Figure 6

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Listed spacing maximum, 8'-0" (2.4 m) minimum.
(E) 3'-0" (.91 m) maximum.
(F) Slopes greater than 8/12 up to a 21/12 (33.7° up to 60°) pitch.

NOTES: In addition to the above limits, rooms requiring this type of installation must be hydraulically calculated to supply a minimum of three operating sprinklers. Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM
(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

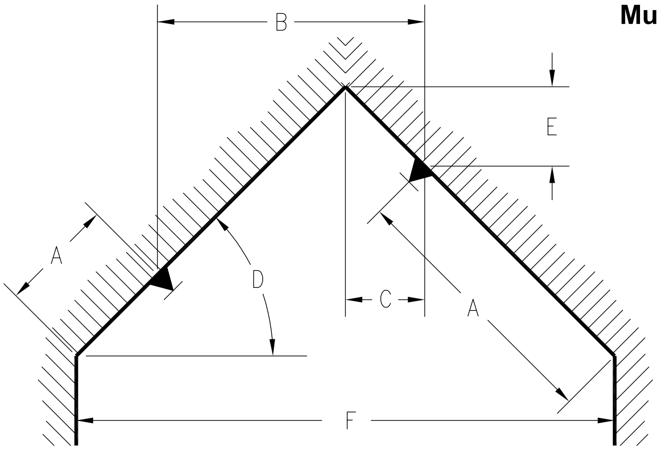

Figure 7

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than 8/12 pitch up to a 21/12 (33.7° up to a 60°) pitch.
(E) 3'-0" (.91 m) maximum.
(F) When dimension "F" exceeds 16' (4.9 m), utilize design configuration shown in Figure 6.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

Multiple Slope **Multiple Slope** **Single Slope**

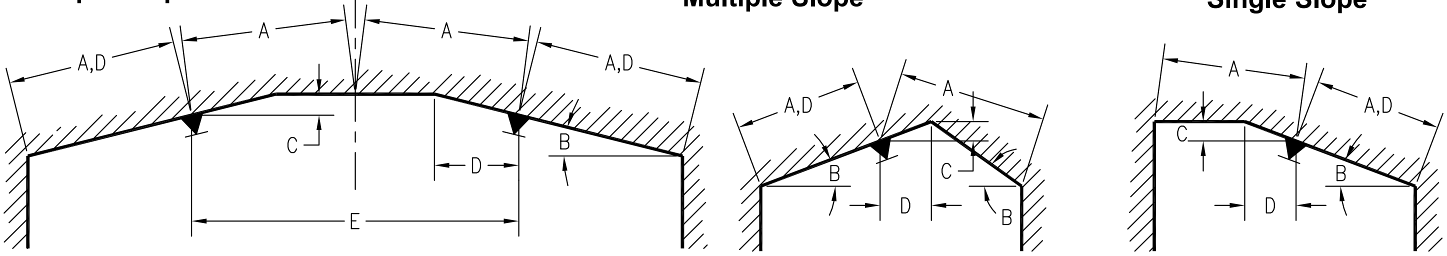

Figure 8

(A) One-half listed spacing, maximum.
(B) Refer to the appropriate residential sprinkler technical data pages for listings of sprinklers for use below slopes up to and including a 8/12 (33.7°) pitch.
(C) 3'-0" (.91 m) maximum.
(D) 0'-4" (0-102 mm) minimum.
(E) 8'-0" (2.4 m) minimum without baffle.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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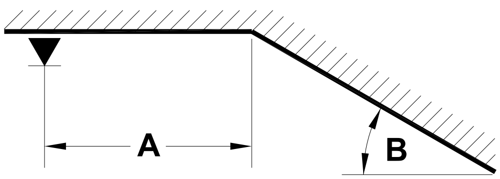
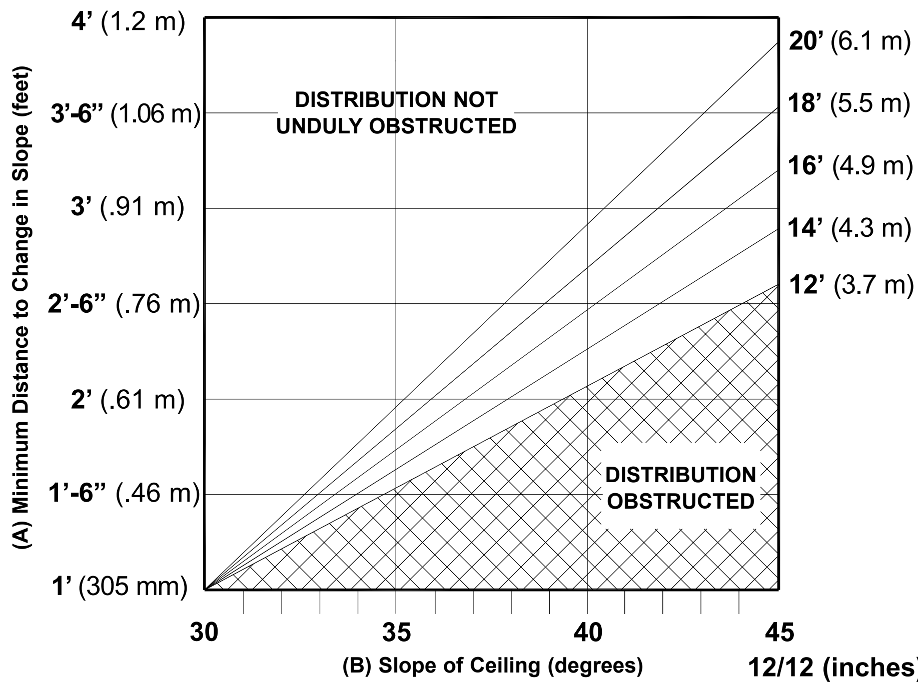
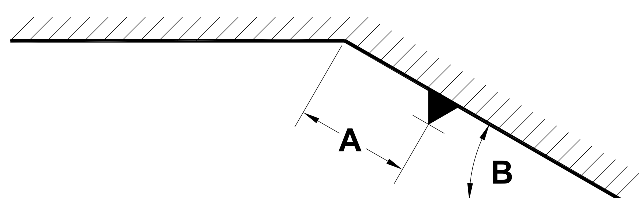
MINIMUM DISTANCE BETWEEN SPRINKLER AND INTERSECTING SLOPED CEILINGS

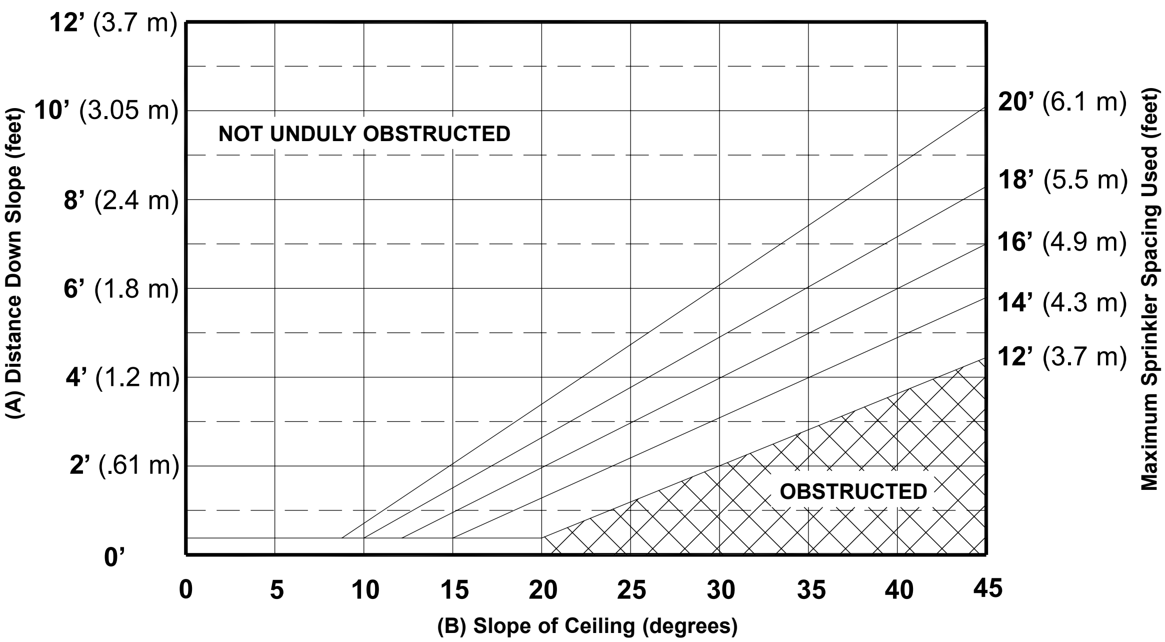


NOTES: For any ceiling slope under 7/12 (30°), distribution is considered Not Unduly Obstructed.



MAXIMUM DISTANCE DOWN SLOPE TO AVOID OBSTRUCTION TO SPRINKLER DISCHARGE





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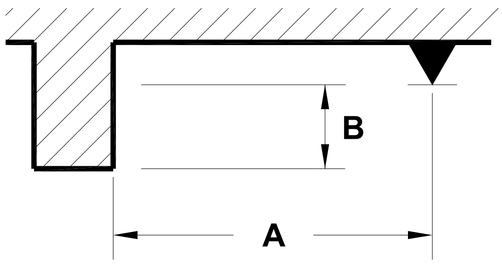
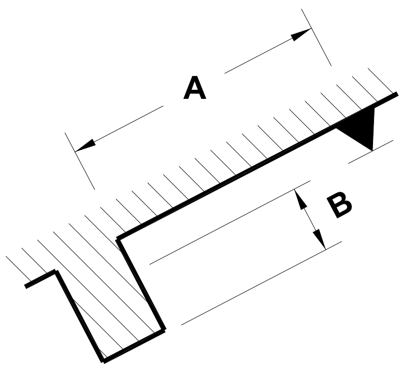
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

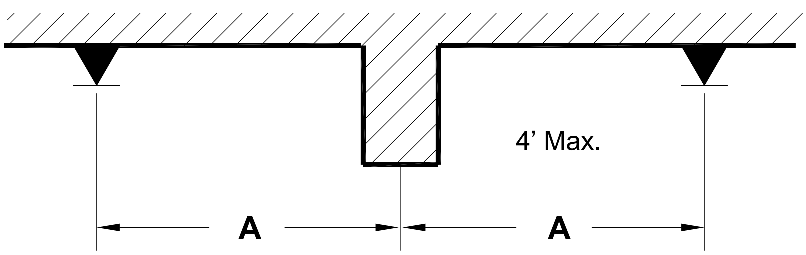
(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

Positioning Residential Pendent Sprinklers - Obstructions at the Ceiling



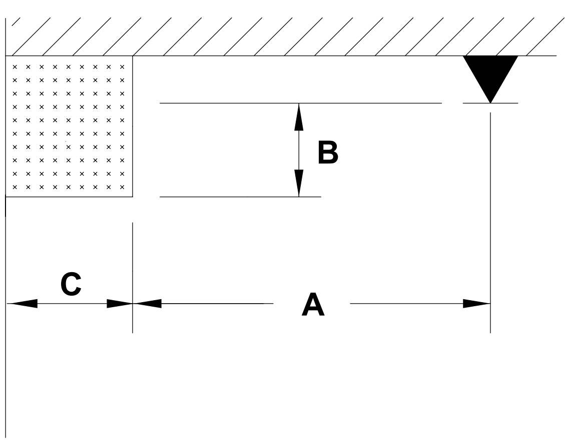


Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356



Residential pendent sprinklers may be located on opposite sides of continuous obstructions up to 4 ft. (1.2 m) wide at the ceiling, as long as the distance from the centerline of the obstruction to the sprinklers (A) does not exceed one-half the maximum spacing allowed between sprinklers.

Positioning Residential Pendent Sprinklers - Obstructions Along Walls



(A) Distance from centerline of sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.
(C) Width of the obstruction.

Obstructions up to 30 in. (.8 m) wide (C) located against the wall are permitted to be protected when (A) is greater than or equal to (C) minus 8 in. (.2 m) plus (B).

$C \leq 30$ in. — for metric $C \leq .8$ m

$A \geq (C - 8 \text{ in.}) + B$ — $A \geq (C - .2 \text{ m}) + B$

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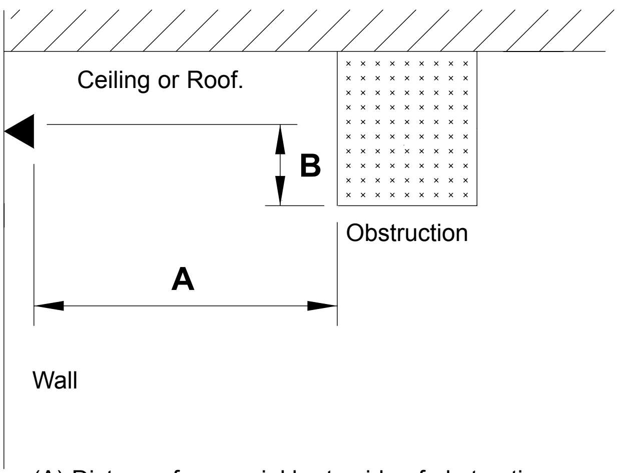
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

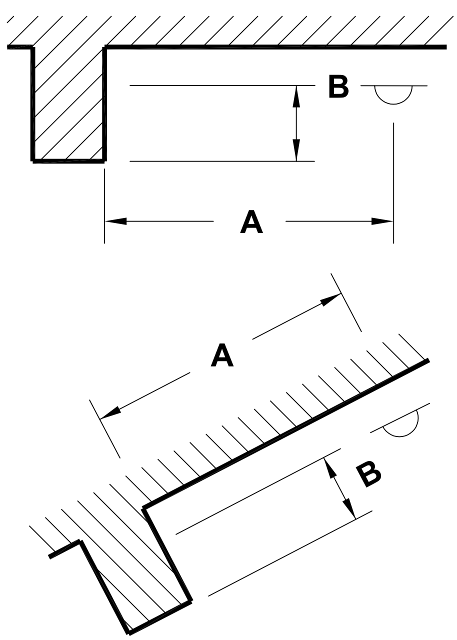
Positioning Residential Horizontal Sidewall Sprinklers - Obstructions at the Ceiling



(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 8 ft. (Less than 2.4 m)	No Obstructions Allowed	
8 ft. to less than 10 ft. (2.4 m to less than 3.05 m)	1	25.4
10 ft. to less than 11 ft. (3.05 m to less than 3.35 m)	2	50.8
11 ft. to less than 12 ft. (3.35 m to less than 3.7 m)	3	76
12 ft. to less than 13 ft. (3.7 m to less than 4 m)	4	102
13 ft. to less than 14 ft. (4 m to less than 4.3 m)	6	152
14 ft. to less than 15 ft. (4.3 m to less than 4.6 m)	7	178
15 ft. to less than 16 ft. (4.6 m to less than 4.9 m)	9	229
16 ft. to less than 17 ft. (4.9 m to less than 5.2 m)	11	279
17 ft. or greater (5.2 m or greater)	14	356

Positioning Residential Horizontal Sidewall Sprinklers - Obstructions Along Walls



Distance from Sprinkler to Side of Obstruction Along Wall (Dimension A)	Maximum Distance from Deflector to Bottom of Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356

(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

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LOCATING RESIDENTIAL SPRINKLERS NEAR HEAT SOURCES

Ordinary temperature rated residential sprinklers (135 °F to 170 °F rated) are only to be installed where the maximum ambient ceiling temperature will not exceed 100 °F. Where the maximum ambient ceiling temperature will be from 101 °F to 150 °F, use intermediate temperature rated residential sprinklers (175 °F to 225 °F rated).

Residential sprinklers must be positioned a sufficient distance away from heat sources that include fireplaces, stoves, kitchen ranges, wall ovens, hot water pipes, water heaters, furnaces and associated flues and ducts, and light fixtures. The following minimum distances must be maintained for both ordinary and intermediate temperature rated residential sprinklers as indicated.

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Rated Sprinkler		Minimum Distance from Edge of Source to Intermediate Temperature Rated Sprinkler	
	Inches	metric	Inches	metric
Side of open or recessed fireplace	36	.91 m	12	305 mm
Front of recessed fire place	60	1.5 m	36	.91 m
Coal- or wood-burning stove	42	1.1 m	12	305 mm
Kitchen range	18	457 mm	9	229 mm
Wall oven	18	457 mm	9	229 mm
Hot air flues	18	457 mm	9	229 mm
Uninsulated heat ducts	18	457 mm	9	229 mm
Uninsulated hot water pipes	12	305 mm	6	152 mm
Side of ceiling- or wall-mounted hot air diffusers	24	.61 m	12	305 mm
Front of wall-mounted hot air diffusers	36	.91 m	18	457 mm
Hot water heater or furnace	6	152 mm	3	76 mm
Light fixture less than 250W	6	152 mm	3	76 mm
Light fixture 250W to 499W	12	305 mm	6	152 mm
Where residential sprinklers will be exposed to the rays of the sun passing through glass or plastic skylights, use intermediate temperature rated sprinklers.				
When locating residential sprinklers in an unventilated concealed compartment, under an unventilated attic or uninsulated roof, where the maximum ambient temperature does not exceed 150 °F, use intermediate temperature rated sprinklers.				

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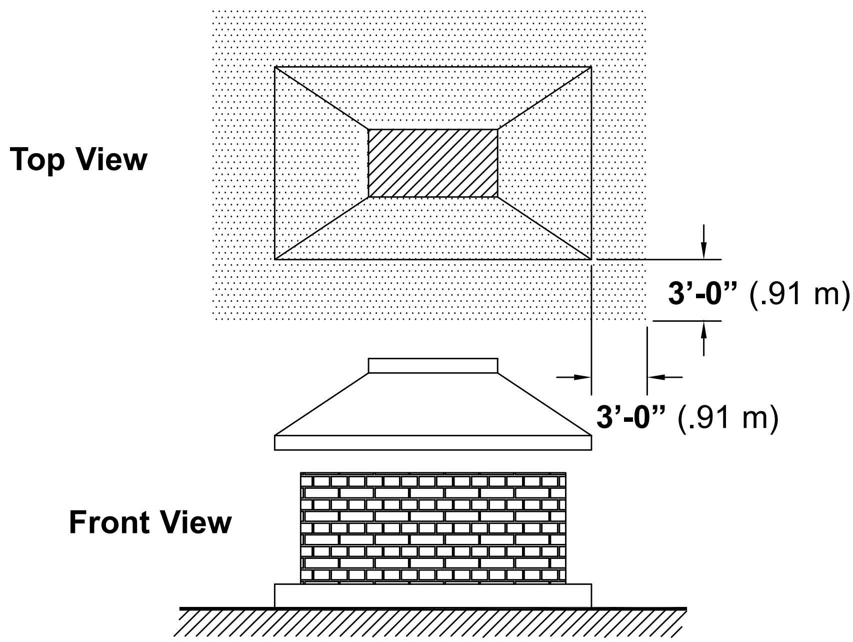
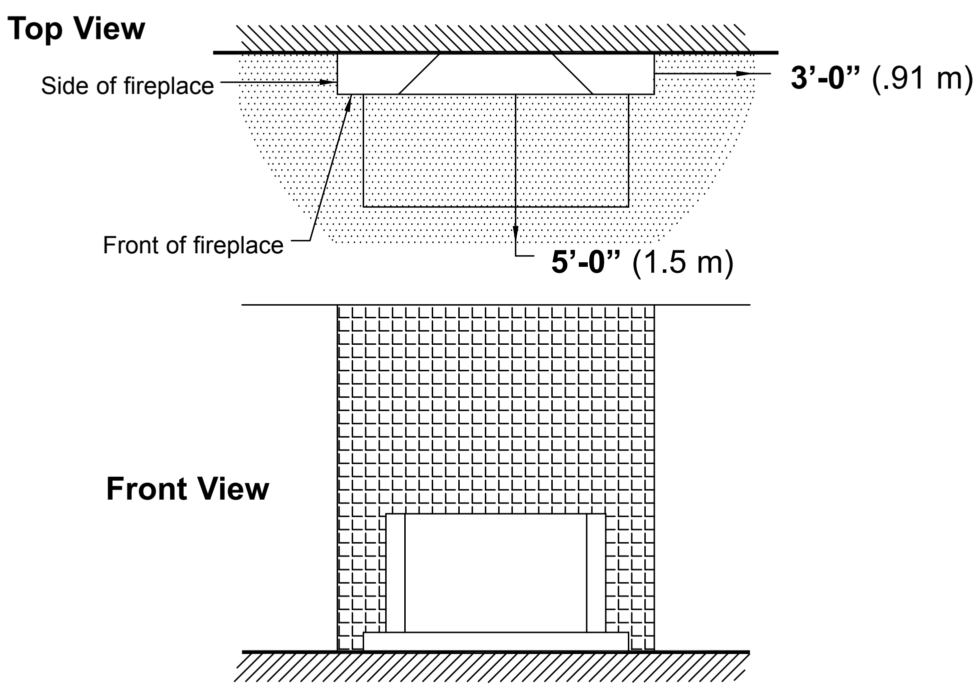
NOTE: The dimensions shown are intended to apply to residential sprinklers installed in ceilings above fireplaces used to burn products that cause elevated temperatures at or near the ceiling in areas surrounding the fireplace. The recommendations should not be construed to apply to decorative non-opening fireplaces such as gas fire units that will not cause elevated temperatures at the ceiling.



Sprinklers near an open hearth fireplace must be located outside of the shaded area or be intermediate degree rated.



Sprinklers near a recessed hearth fireplace must be located outside of the shaded area [at least 3'-0" (.91 m)] from the side of a recessed fireplace and at least 5'-0" (1.5 m) from the front) or be intermediate degree rated.

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TECHNICAL DATA

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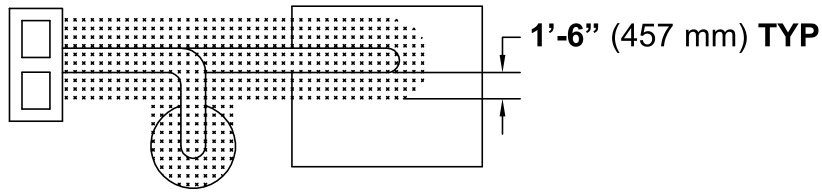
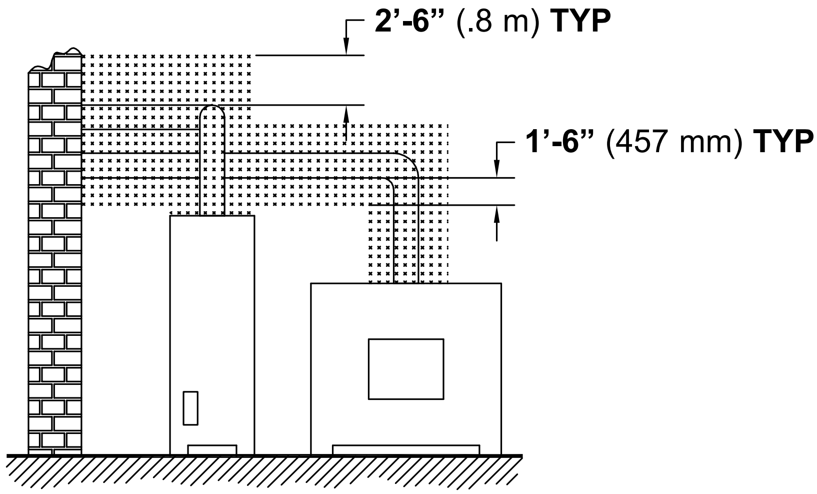
Top View

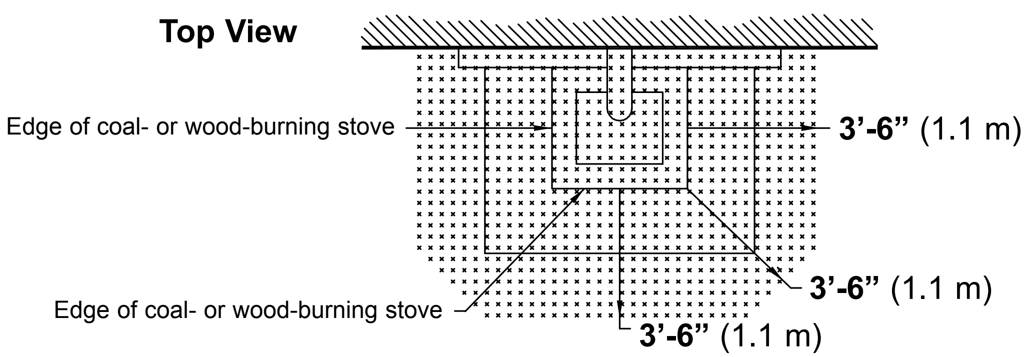


Front View

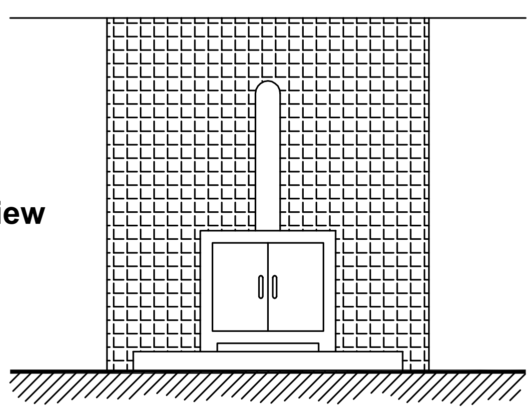


Sprinklers near a furnace or water heater must be located outside of the shaded area or be intermediate degree rated.

Top View



Front View



Sprinklers near a coal- or wood-burning stove must be located outside of shaded area or be intermediate degree rated.

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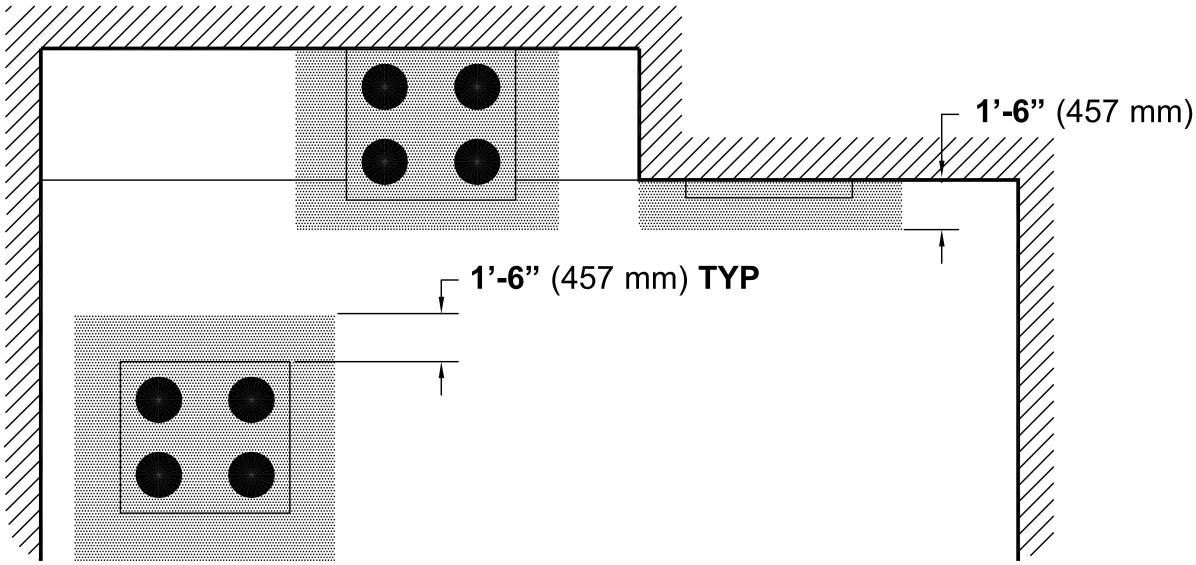
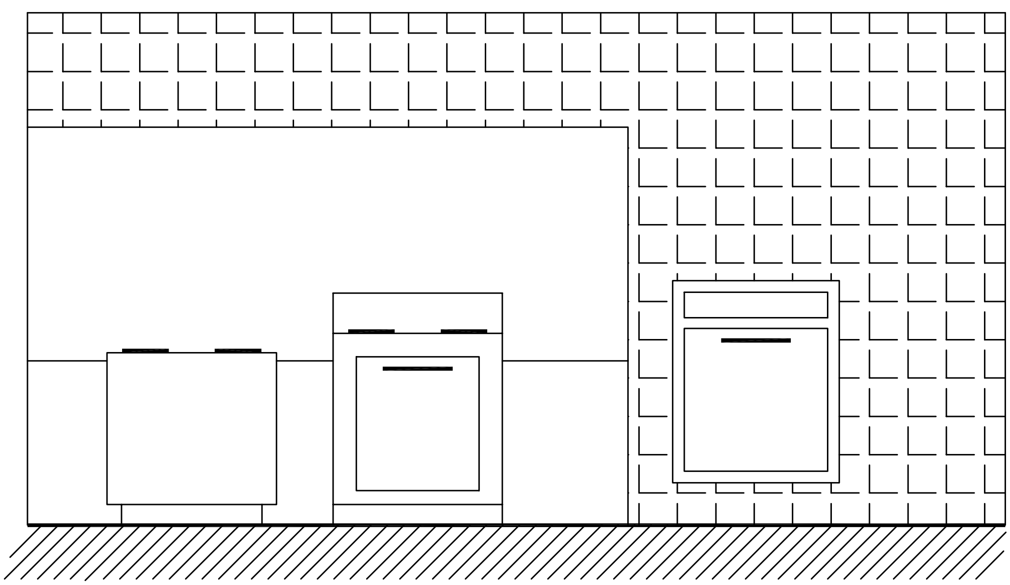
Top View



Front View



Sprinklers near a range or wall oven must be located outside of shaded areas or be intermediate degree rated.

BULLETIN

CARE AND HANDLING OF SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

General Handling and Storage:

- Store sprinklers in a cool, dry place.
- Protect sprinklers during storage, transport, handling, and after installation.
- Use the original shipping containers. DO NOT place sprinklers loose in boxes, bins, or buckets.
- Keep sprinklers separated at all times. DO NOT allow metal parts to contact sprinkler operating elements.

For Pre-Assembled Drops:

- Protect sprinklers during handling and after installation.
- For recessed assemblies, use the protective sprinkler cap (Viking Part Number 10364).

Sprinklers with Protective Shields or Caps:

- DO NOT remove shields or caps until after sprinkler installation and there no longer is potential for mechanical damage to the sprinkler operating elements.
- **Sprinkler shields or caps MUST be removed BEFORE placing the system in service!**
- Remove the sprinkler shield by carefully pulling it apart where it is snapped together.
- Remove the cap by turning it slightly and pulling it off the sprinkler.

Sprinkler Installation:

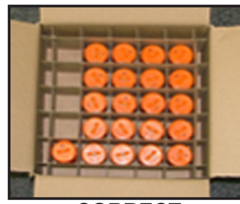
- DO NOT use the sprinkler deflector or operating element to start or thread the sprinkler into a fitting.
- **Use only the designated sprinkler head wrench!** Refer to the current sprinkler technical data page to determine the correct wrench for the model of sprinkler used.
- DO NOT install sprinklers onto piping at the floor level.
- Install sprinklers after the piping is in place to prevent mechanical damage.
- DO NOT allow impacts such as hammer blows directly to sprinklers or to fittings, pipe, or couplings in close proximity to sprinklers. Sprinklers can be damaged from direct or indirect impacts.
- DO NOT attempt to remove drywall, paint, etc., from sprinklers.
- **Take care not to over-tighten the sprinkler and/or damage its operating parts!**

Maximum Torque:

1/2" NPT:	**14 ft-lbs. (19.0 N-m)**
3/4" NPT:	**20 ft-lbs. (27.1 N-m)**
1" NPT:	**30 ft-lbs. (40.7 N-m)**

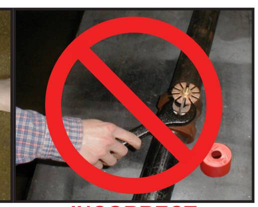
CORRECT
(Original container used)


INCORRECT
(Placed loose in box)


CORRECT
(Protected with caps)


INCORRECT
(Protective caps not used)


CORRECT
(Piping is in place at the ceiling)


INCORRECT
(Sprinkler at floor level)


CORRECT
(Special installation wrenches)


INCORRECT
(Designated wrench not used)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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PROTECTIVE SPRINKLER SHIELDS AND CAPS

General Handling and Storage:

Many Viking sprinklers are available with a plastic protective cap or shield temporarily covering the operating elements. The snap-on shields and caps are factory installed and are intended to help protect the operating elements from mechanical damage during shipping, storage, and installation. NOTE: It is still necessary to follow the care and handling instructions on the appropriate sprinkler technical data sheets* when installing sprinklers with bulb shields or caps.

WHEN TO REMOVE THE SHIELDS AND CAPS:

NOTE: SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

Remove the shield or cap from the sprinkler only after checking all of the following:

- The sprinkler has been installed*.
- The wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.

SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

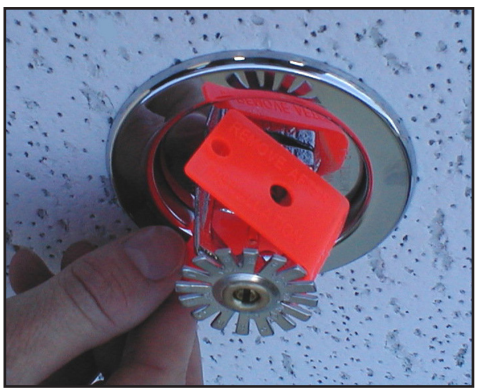

Figure 1: Sprinkler shield being removed from a pendent sprinkler.

Figure 2: Sprinkler cap being removed from a pendent sprinkler.

Figure 3: Sprinkler cap being removed from and upright sprinkler.

HOW TO REMOVE SHIELDS AND CAPS:

No tools are necessary to remove the shields or caps from sprinklers. DO NOT use any sharp objects to remove them! **Take care not to cause mechanical damage to sprinklers when removing the shields or caps.** When removing caps from fusible element sprinklers, use care to prevent dislodging ejector springs or damaging fusible elements. NOTE: Squeezing the sprinkler cap excessively could damage sprinkler fusible elements.

- To remove the shield, simply pull the ends of the shield apart where it is snapped together. Refer to Figure 1.
- To remove the cap, turn it slightly and pull it off the sprinkler. Refer to Figures 2 and 3.

NOTICE Refer to the current sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.

WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

*** Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.**

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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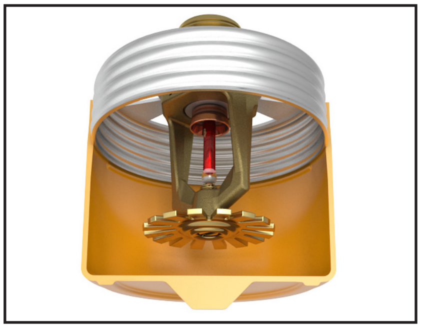
CAUTION **CONCEALED COVER ASSEMBLIES ARE FRAGILE!**
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



Concealed Sprinkler and Adapter Assembly with Protective Cap

Concealed Sprinkler and Adapter Assembly (Protective Cap Removed)

Cover Plate Assembly (Pendent Cover 12381 shown)

GENERAL HANDLING AND STORAGE INSTRUCTIONS:

- Do not store in temperatures exceeding 100 °F (38 °C). Avoid direct sunlight and confined areas subject to heat.
- Protect sprinklers and cover assemblies during storage, transport, handling, and after installation.
  -- Use original shipping containers.
  -- Do not place sprinklers or cover assemblies loose in boxes, bins, or buckets.
- Keep the sprinkler bodies covered with the protective sprinkler cap any time the sprinklers are shipped or handled, during testing of the system, and while ceiling finish work is being completed.
- Use only the designated Viking recessed sprinkler wrench (refer to the appropriate sprinkler data page) to install these sprinklers. **NOTE:** The protective cap is temporarily removed during installation and then placed back on the sprinkler for protection until finish work is completed.
- Do not over-tighten the sprinklers into fittings during installation.
- Do not use the sprinkler deflector to start or thread the sprinklers into fittings during installation.
- Do not attempt to remove drywall, paint, etc., from the sprinklers.
- Remove the plastic protective cap from the sprinkler before attaching the cover plate assembly. **PROTECTIVE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

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USE THE FOLLOWING PRECAUTIONS WHEN HANDLING WAX-COATED SPRINKLERS

Many of Viking's sprinklers are available with factory-applied wax coating for corrosion resistance. These sprinklers MUST receive appropriate care and handling to avoid damaging the wax coating and to assure satisfactory performance of the product.

General Handling and Storage of Wax-Coated Sprinklers:

- Store the sprinklers in a cool, dry place (in temperatures below the maximum ambient temperature allowed for the sprinkler temperature rating. Refer to Table 1 below.)
- Store containers of wax-coated sprinklers separate from other sprinklers.
- Protect the sprinklers during storage, transport, handling, and after installation.
- Use original shipping containers.
- Do not place sprinklers in loose boxes, bins, or buckets.

Installation of Wax-Coated Sprinklers:

Use only the special sprinkler head wrench designed for installing wax-coated Viking sprinklers (any other wrench may damage the unit).

- Take care not to crack the wax coating on the units.
- For touching up the wax coating after installation, wax is available from Viking in bar form. Refer to Table 1 below. The coating MUST be repaired after sprinkler installation to protect the corrosion-resistant properties of the sprinkler.
- Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they would be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.
- Inspect the coated sprinklers frequently soon after installation to verify the integrity of the corrosion resistant coating. Thereafter, inspect representative samples of the coated sprinklers in accordance with NFPA 25. Close up visual inspections are necessary to determine whether the sprinklers are being affected by corrosive conditions.

TABLE 1

Sprinkler Temperature Rating (Fusing Point)	Wax Part Number	Wax Melting Point	Maximum Ambient Ceiling Temperature[1]	Wax Color
155 °F (68 °C) / 165 °F (74 °C)	02568A	148 °F (64 °C)	100 °F (38 °C)	Light Brown
175 °F (79 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
200 °F (93 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
220 °F (104 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown
286 °F (141 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown

[1] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

⚠WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

	TECHNICAL DATA	SPRINKLER OVERVIEW

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1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word "Viking", the sprinkler identification number (SIN) consisting of "VK" plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

Available Temperature Ratings:

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

UPRIGHT SPRINKLER: A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked "SSU" (Standard Sprinkler Upright) or "UPRIGHT" on the deflector.

PENDENT SPRINKLER: A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked "SSP" (Standard Sprinkler Pendent) or "PENDENT" on the deflector.

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

CONVENTIONAL SPRINKLER: An "old style" sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked "C U/P" (Conventional Upright/Pendent) on the deflector.

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VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

RECESSED SPRINKLER: A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

CORROSION-RESISTANT SPRINKLER: A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

VIKING	TECHNICAL DATA	SPRINKLER OVERVIEW

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s).

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

VIKING

BULLETIN

BEST PRACTICES FOR RESIDENTIAL SPRINKLER HANDLING & INSTALLATION

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page.

SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

- Always keep sprinklers in a cool dry place.
- Protect sprinklers during storage, transport and handling as well as before, during and after installation. Refer to Viking's Care and Handling of Sprinklers Bulletin Form No. F_091699[2].
- Proper transit, storage and installation of sprinklers in a high-heat environment is a must. Care should be taken to prevent sprinklers from being exposed to ambient heat conditions in excess of those referenced in installation standards.
- Do not stage or store sprinklers on the job site in advance in a non-conditioned space prior to installation.
- Keep sprinklers in the original packaging and check temperature indicators on box label prior to installation. If the indicator has turned black, DO NOT install any product contained in the box. Refer to Viking product return policies.

INCORRECT
(Heat exposure)

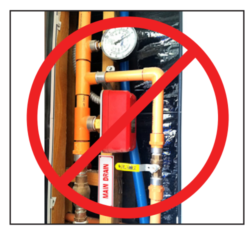
- Temperatures exceeding the maximum ambient temperature of the sprinkler temperature-rating during storage, transport, handling and installation must be avoided.
- Per NFPA standards 13, 13R, and 13D, sprinklers installed where maximum ambient temperatures are at or over 101 °F (38 °C) through 150 °F (66 °C) shall be intermediate temperature-rated sprinklers. Additionally, if sprinklers are installed in an unventilated concealed space under an uninsulated roof or in an unventilated attic, they shall be of intermediate temperature classification.

INCORRECT
(Unconditioned at rough-in)

- Sprinklers installed where ambient temperatures are at or below 100 °F (38 °C) may be either ordinary or intermediate temperature-rated sprinklers. Refer to NFPA standards 13R 6.2.3.1 and 13D 7.5.6.1.
- Rough-in of sprinkler piping during hot weather conditions should not include the installation of sprinklers unless reasonable ambient temperatures can be maintained. Ambient temperatures that are considered when choosing the temperature rating for a sprinkler should take into account the range of ambient temperatures that are expected from installation through establishment and maintenance of temperature in a conditioned space. Appropriate insulation may be considered. **Example**: An ordinary temperature sprinkler should not be exposed to maximum ambient temperature higher than 100 °F (38 °C) or more. Refer to NFPA 13, Table 6.2.5.1, NFPA 13R, 6.2.3.1 and NFPA 13D, 7.5.6.1.

INCORRECT
(Exposed piping)

- CPVC fire sprinkler products exposed to high ambient temperatures (e.g. installed in unventilated, concealed spaces such as attics) should be insulated to maintain a cooler environment. Refer to Viking Plastics Installation and Design Manual, Form No. F_080712[2], for care and handling procedures.
- Protect all sprinklers and connecting CPVC piping in attic spaces and unvented concealed spaces from excessive heat exposure above 100 °F (38 °C). To separate excessive attic heat, properly tent and fully insulate all pipe in unconditioned spaces.
- Pressure relief valves should be installed on wet sprinkler systems where there is a risk of over-pressurization of a checked water supply, due to thermal expansion. Refer to NFPA 13, 7.1.2.1 and NFPA 13D, A.5.2.2.2.
- Fire sprinkler systems should be installed per current referenced editions of building codes and installation standards adopted in the jurisdiction where work is being performed.



INCORRECT
(No pressure relief valve)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

[1]Hot weather condition is defined as temperatures that can reach the maximum ambient temperature-rating of the sprinkler.
[2]Clicking on blue hyperlink will open referenced document.

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING®	BULLETIN	REGULATORY AND HEALTH WARNINGS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING
STATE OF CALIFORNIA, USA Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.
For more information, go to **www.P65Warnings.ca.gov**

2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

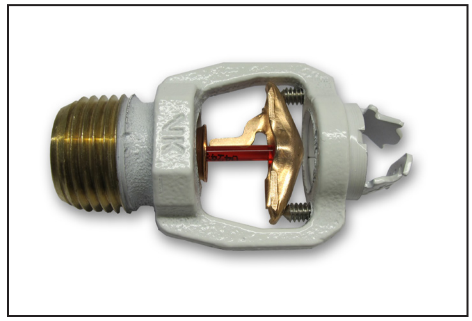
TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Horizontal Sidewall Sprinkler VK486 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The sprinkler orifice design, with a K-Factor of 4.0 (57.7 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.



WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2011.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.0 U.S. (57.7 metric†)

† Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-7/16" (62 mm)
Covered by the following US Patent numbers: 7,854,269 and 7,712,218

Material Standards:
Frame Casting: QM Brass and Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screws: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 17315
Order Sprinkler VK486 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK486 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 17315AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13655W/B* (available since 2006)
*A ½" ratchet is required (not available from Viking).

VIKING®	TECHNICAL DATA	FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the yoke, pip cap, and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking Sprinkler VK486 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

Sprinkler Finishes: Brass, Chrome, White Polyester, and Black Polyester.

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

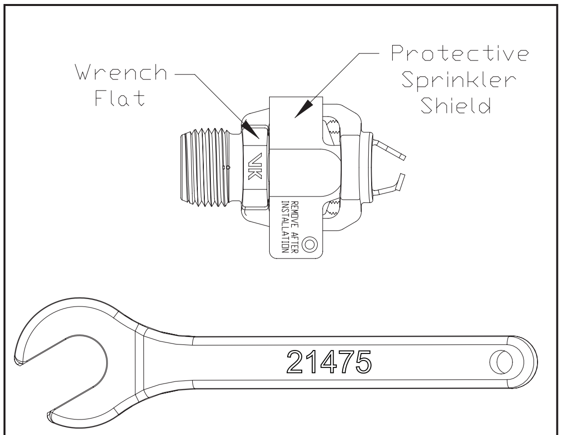

Figure 1:
Standard Sprinkler Wrench 21475M/B

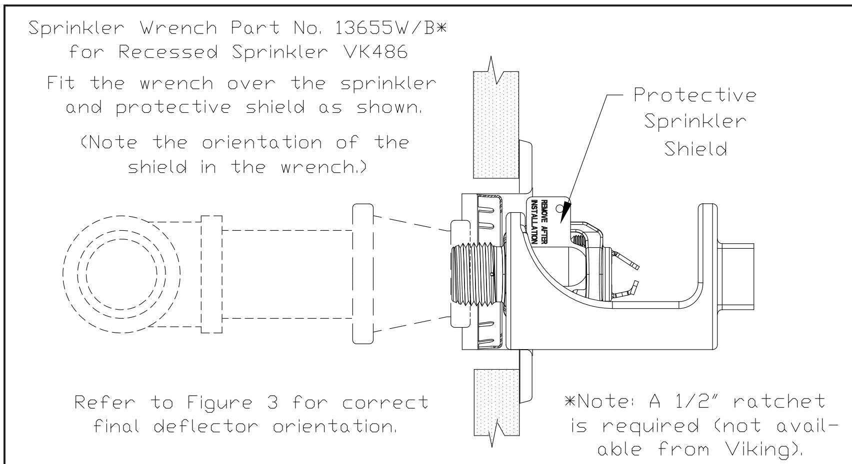

Figure 2:
Wrench 13655W/B for Recessed Sprinkler VK486

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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Approval Chart
Viking VK486, 4.0 K-Factor Residential Horizontal Sidewall Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current Editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric [2]		Inches	mm
17315	VK486	1/2	15	4.0	57.7	175 psi (12 bar)	2-7/16	62

Max. Coverage Area [3] Width X Length Ft. X Ft. (m X m)	Max. Spacing Ft. (m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Top of Deflector to Ceiling	Installation Type	Listings and Approvals [4]				Minimum Spacing Ft. (m)
		Flow [3] GPM (L/min)	Pressure [3] PSI (bar)	Flow [3] GPM (L/min)	Pressure [3] PSI (bar)			C-UL-US-EU [5]	VdS	NYC	NSF[9]	
12 X 12 (3.7 X 3.7)	12 (3.7)	11 (41.7)	7.6 (0.52)	11 (41.7)	7.6 (0.52)	4 to 6 inches	Standard surface-mounted escutcheons or recessed with the Micromatic® Model E-1, E-2, E-3, or G-1 Recessed Escutcheon	See Footnote 6 and 10.	See Footnote 6.	See Footnote 7.	See Footnote 6.	8 (2.4)
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)							
16 X 16 (4.9 X 4.9)	16 (4.9)	13 (49.3)	10.6 (0.73)	13 (49.3)	10.6 (0.73)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
16 X 22 (4.9 X 6.7)	16 (4.9)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
20 X 20 (6.1 X 6.1)	20 (6.1)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
12 X 12 (3.7 X 3.7)	12 (3.7)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)	6 to 12 inches						
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	13 (49.3)	10.6 (0.73)							
16 X 16 (4.9 X 4.9)	16 (4.9)	14 (53.0)	12.3 (0.84)	14 (53.0)	12.3 (0.84)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
16 X 22 (4.9 X 6.7)	16 (4.9)	26 (98.4)	42.3 (2.91)	26 (98.4)	42.3 (2.91)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
20 X 20 (6.1 X 6.1)	20 (6.1)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							

Footnotes

1 Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.
2 Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3 For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
4 This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
5 Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
6 Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester [8]
7 Meets New York City requirements, effective July 1, 2008.
8 Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.
9 UL Classified to : NSF/ANSI Standard 61, Drinking Water System Components (MH48034)
10 Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Horizontal Sidewall Sprinkler VK486 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the “design area” in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).
- The VK486 horizontal sidewall sprinkler deflector shall be located a minimum of 1-1/4“ (31.8 mm) and a maximum of 6” (152 mm) from the wall on which it is installed.

DEFLECTOR POSITION: Install sprinkler VK486 with the leading edge of the deflector oriented parallel to the ceiling and the sprinkler frame arms oriented perpendicular to the ceiling (see Figure 4). **THE TOP SURFACE OF THE DEFLECTOR IS MARKED “TOP”.** The sprinkler must be oriented as shown in Figure 3 below.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080190, F_080814, and F_080415 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

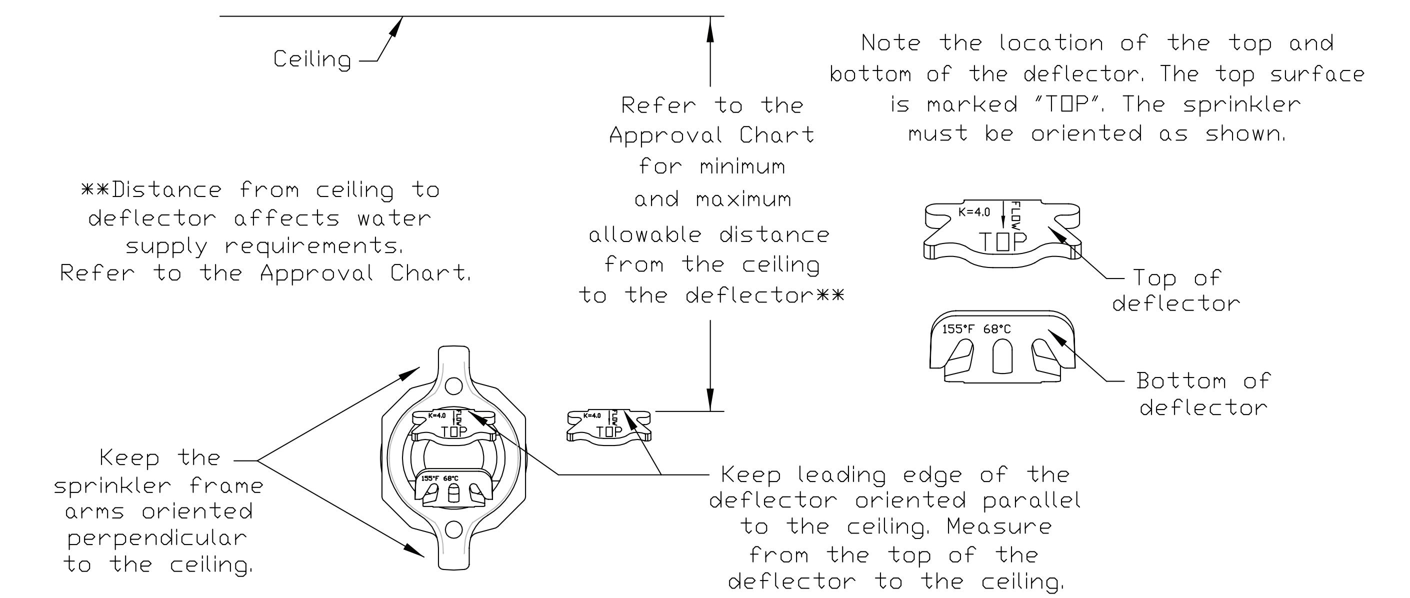

Figure 3:

Correct Orientation of the Deflector

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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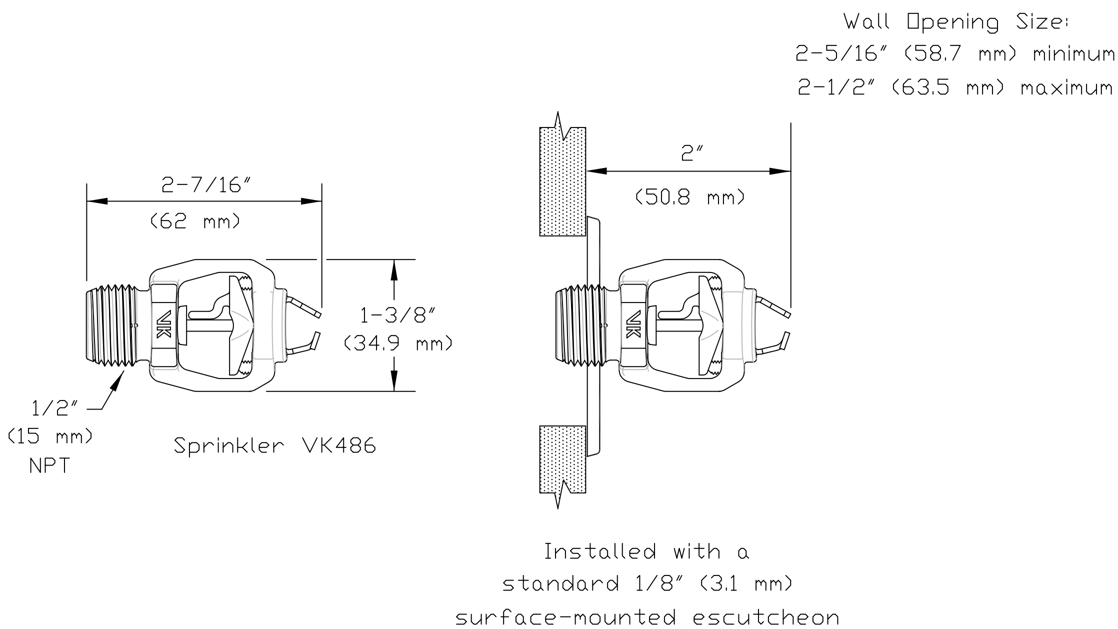

Figure 4:
Sprinkler VK486 Dimensions with a Standard Escutcheon and the Model F-1 Adjustable Escutcheon

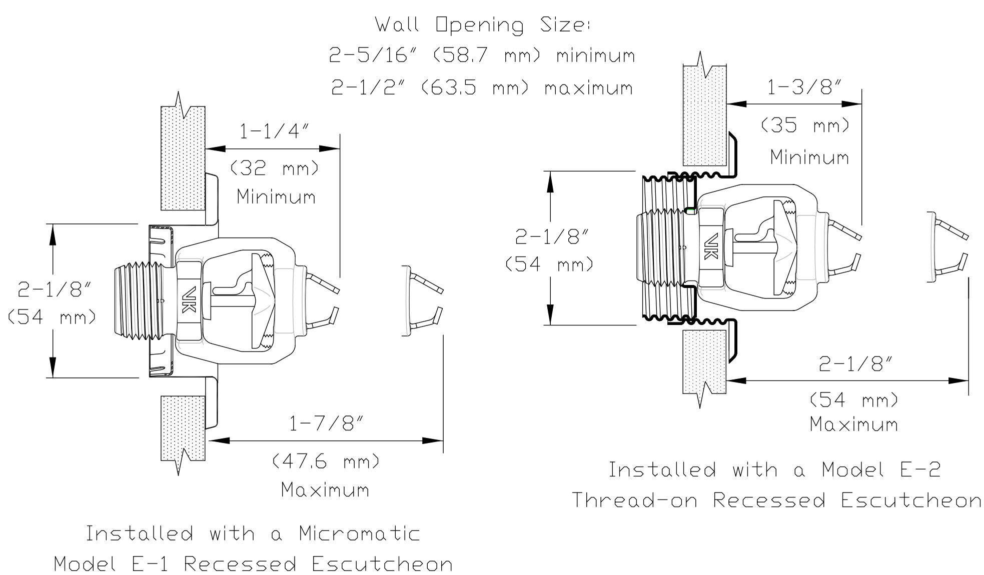

Figure 5:
Sprinkler VK486 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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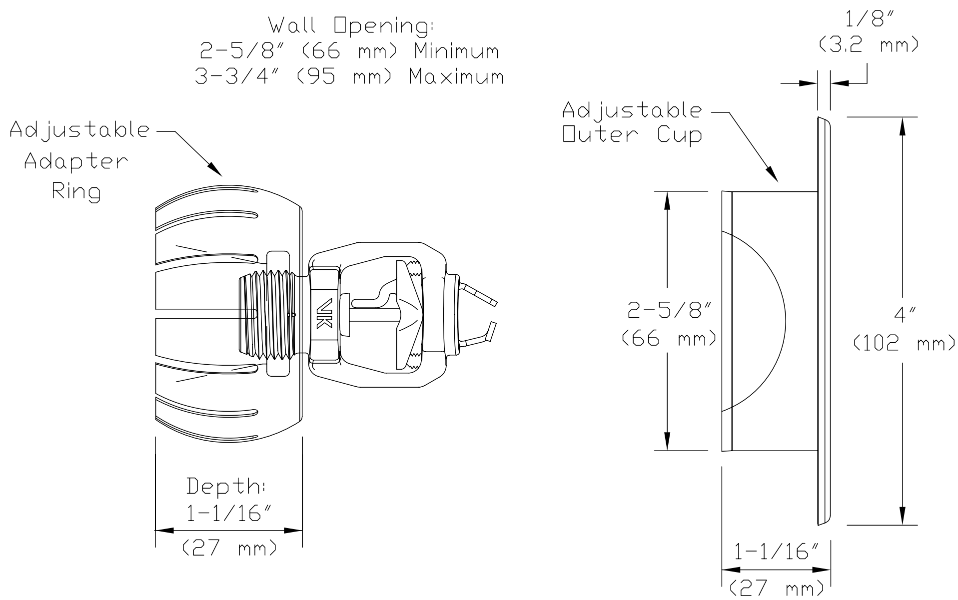
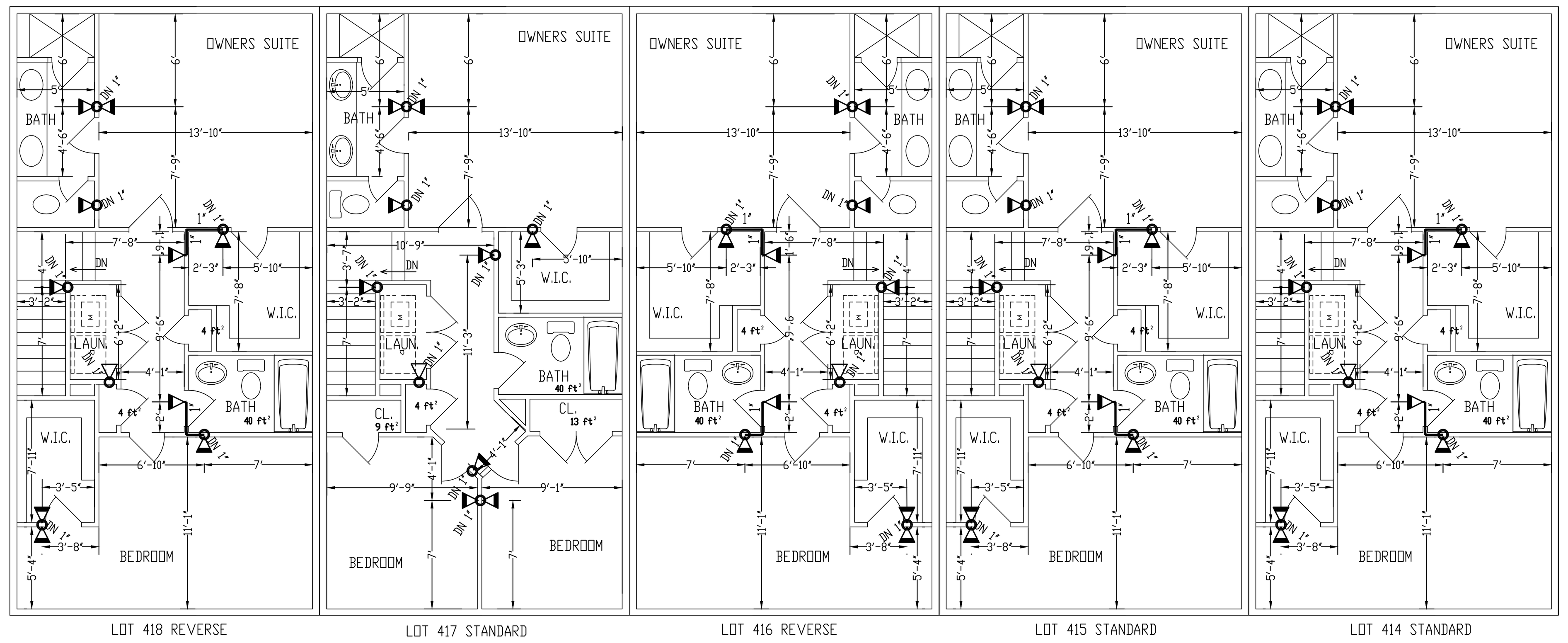
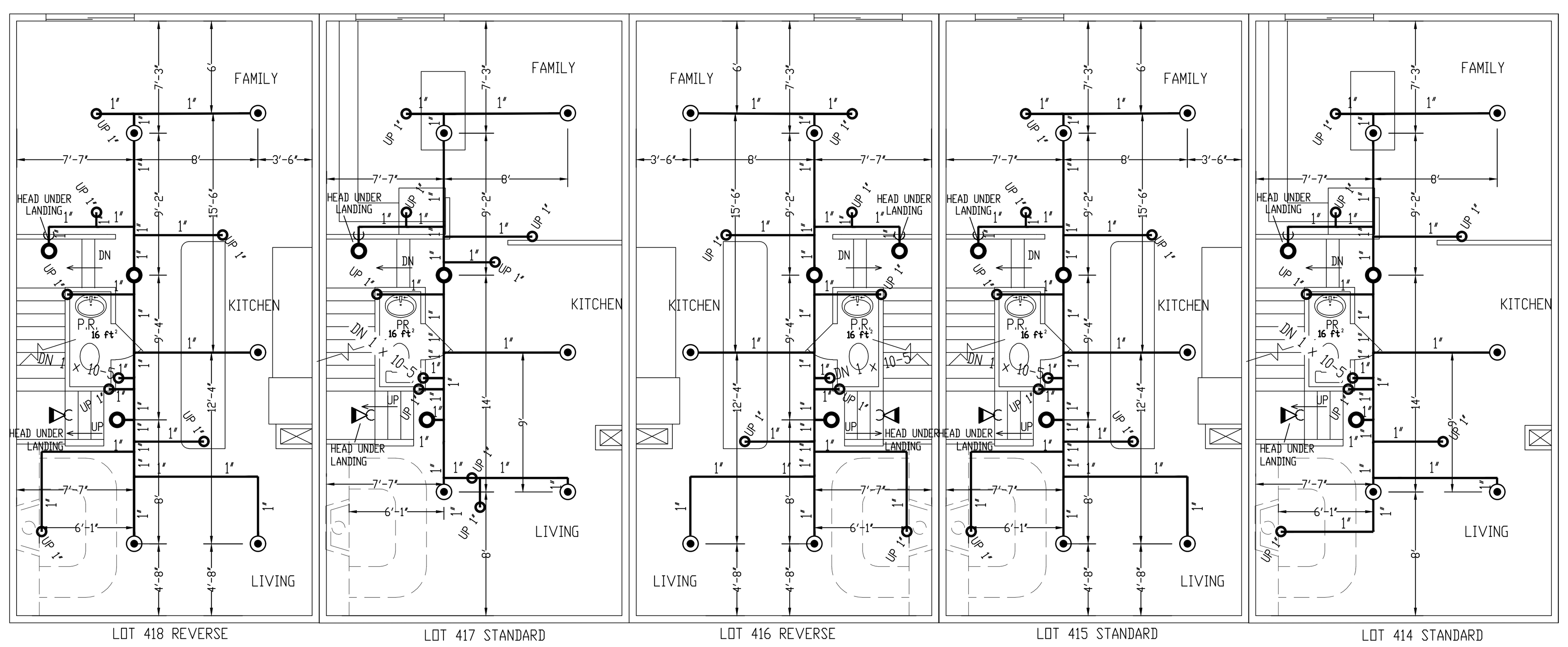
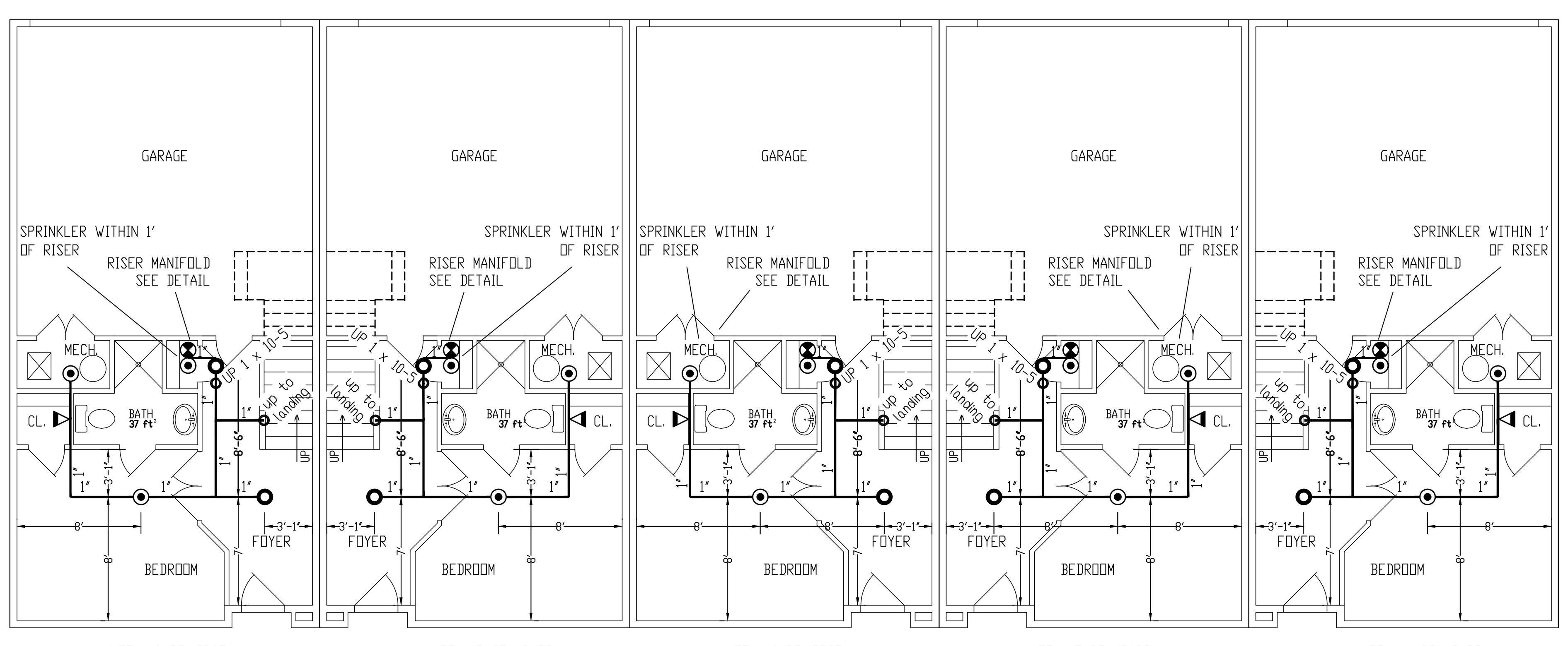


Figure 6: Sprinkler VK486 Dimensions with the Model G-1 Escutcheon







SPRINKLER OBSTRUCTION GUIDELINES

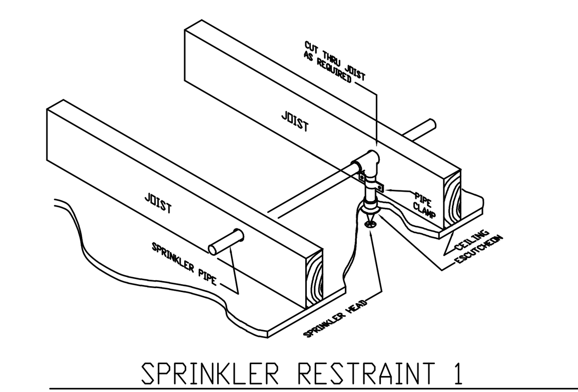
Table 8.2.5.4.2 Position of Sprinklers to Avoid Obstructions to Discharge (Residential Upright and Pendent Spray Sprinklers) NFPA 13D 2013

Distance From Sprinkler to Side of Obstruction (in.)	Maximum Allowable Distance of Deflector above Bottom of Obstruction (in.)
Less than 1ft	0
1 ft to less than 1 ft 6 in	0
1 ft 6 in to less than 3 ft	1
3 ft to less than 4 ft	3
4 ft to less than 4ft 6 in	5
4 ft 6 in to less than 6 ft	7
6 ft to less than 6 ft 6 in	9
6 ft 6 in to less than 7 ft	11
7 ft or more	14

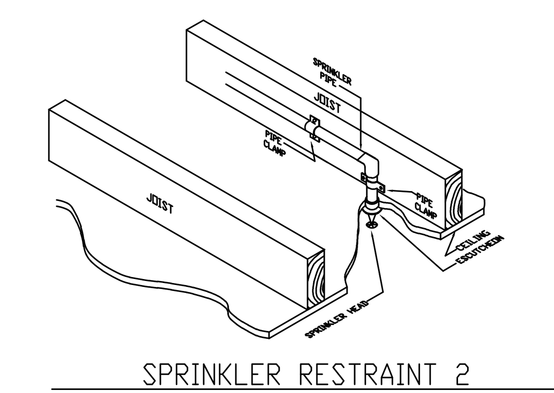
For SI units, 1 in. = 25.4 mm; 1 ft = 0.3048 m.

CPVC HANGER
SPACING

PIPE DIA.	DISTANCE BETWEEN HANGER'S
¾"	5'–6"
1"	6'–0"
1¼"	6'–6"
1½"	7'–0"
2"	8'–0"
2½"	9'–0"
3"	10"–0"



SPRINKLER RESTRAINT 1
NOT TO SCALE



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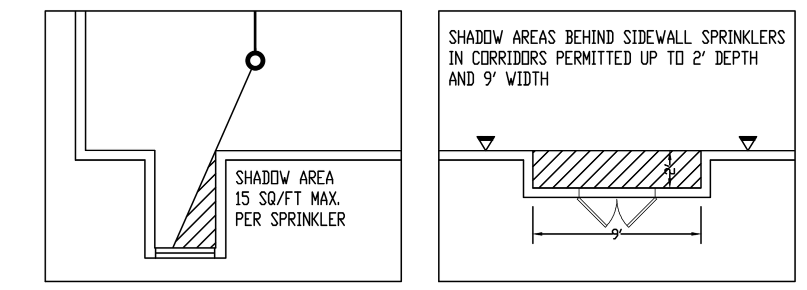
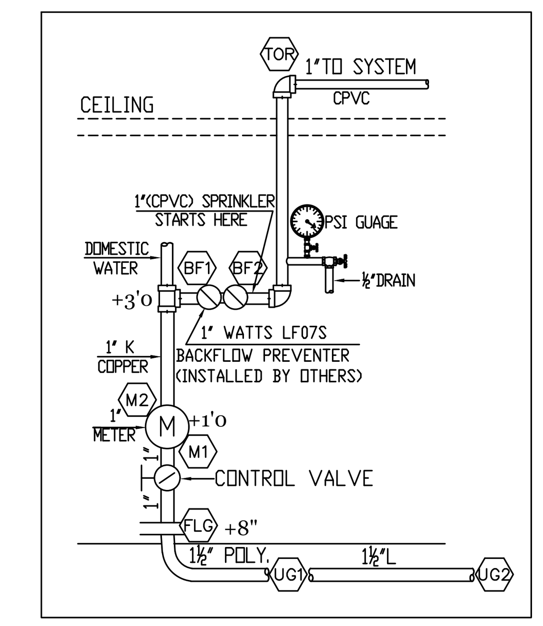


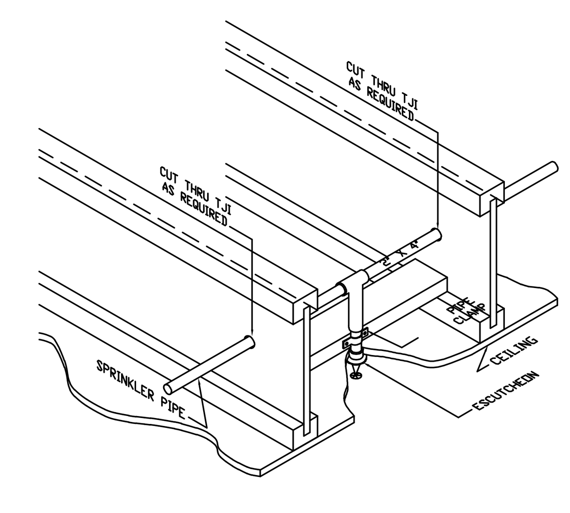
SHADOW AREA DETAIL

HEAT SOURCES
NFPA 13D 2013

HEAT SOURCE	Minimum Distance from Edge of Source to Ordinary-Temperature Sprinkler in.	mm.	Minimum Distance from Edge of Source to Intermediate-Temperature Sprinkler in.	mm.
Side of open or recessed fireplace	36	914	12	305
Front of recessed fireplace	60	1524	36	914
Coal or wood burning stove	42	1067	12	305
Kitchen range	18	457	9	229
Wall oven	18	457	9	229
Hot air flues	18	457	9	229
uninsulated heat ducts	18	457	9	229
uninsulated hot water pipes	12	305	6	152
Side of ceiling/wall mounted hot air diffusers	24	607	12	305
Front of wall mounted hot air diffusers	36	914	18	457
Hot water heater or furnace	6	152	3	76
Light fixture				
0W/250W bulb	6	152	3	76
250W/499W	12	305	6	152



13D MANIFOLD DETAIL



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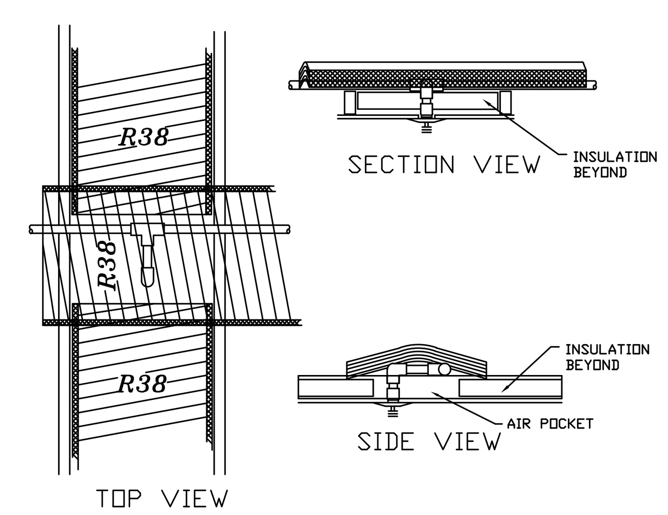

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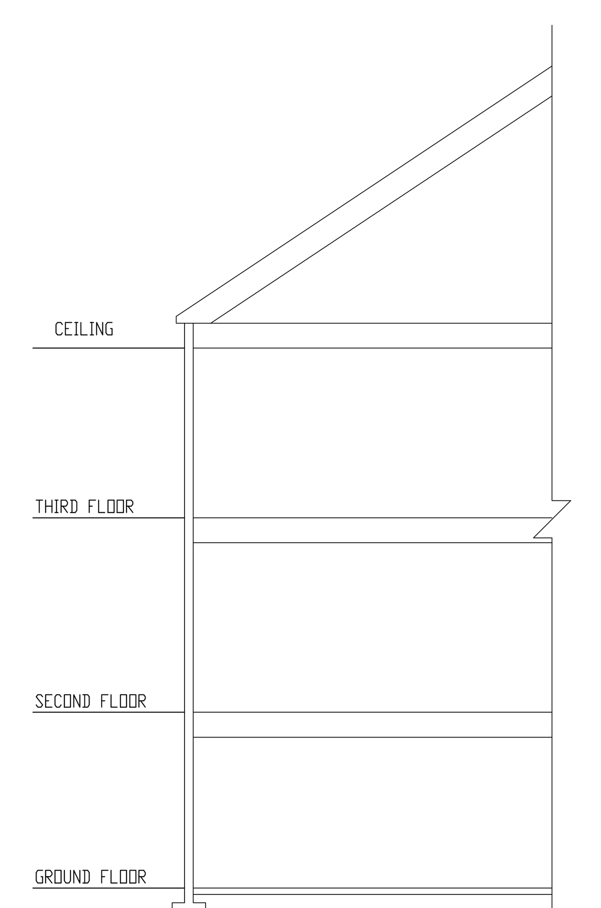

ARCADIA ELEVATION VIEW

GENERAL NOTES
AUTHORITY HAVING JURISDICTION
PRINCE GEORGES COUNTY, MD

1. DWELLING UNIT SHALL HAVE A COMPLETE FIRE PROTECTION SYSTEM IN COMPLIANCE WITH STATE AND LOCAL CODES AND REGULATIONS AND N.F.P.A.–13D 2013 EDITION.
2. ALL MATERIALS AND METHODS OF INSTALLATION SHALL BE IN COMPLIANCE WITH N.F.P.A.–13D
3. EXPOSED SPRINKLER PIPING LOCATED IN THE ATTIC SPACE SHALL BE COVERED WITH INSULATION (R–49) PLACED OVER THE PIPING TO PREVENT FREEZING. (INSULATION BY OTHERS).
4. ALL CPVC PIPE AND FITTINGS SHALL BE UL LISTED AND FM APPROVED.
5. CPVC HANGER SPACING IN COMPLIANCE WITH N.F.P.A.
6. ALL PIPING SHALL BE CPVC UNLESS NOTED OTHERWISE,
7. NO STORAGE ROOM IN ATTIC
8. UNPROTECTED CLOSETS SHALL NOT CONTAIN MECHANICAL EQUIPMENT.
9. WATER METERS SHALL BE (1") IN. UNLESS OTHERWISE NOTED.
10. SPRINKLER CONNECTIONS SHALL BE ON THE HOUSE SIDE OF WATER METER.
11. WHEN LINTELS EXCEED 8" DEEP AND 8'–0" WIDE, ROOMS WITHIN THESE LINTELS SHALL NOT BE CONSIDERED A SINGLE COMPARTMENT. SPRINKLERS SHALL BE 16 X 16 MAXIMUM SPACING.

LOTS	HOUSE TYPE	PERMIT #	ADDRESS
414	ARCADIA	25436-2019-00	12935 BRICKYARD BLVD.
415	ARCADIA	25437-2019-00	12937 BRICKYARD BLVD.
416	ARCADIA	25438-2019-00	12939 BRICKYARD BLVD.
417	ARCADIA	25439-2019-00	12941 BRICKYARD BLVD.
418	ARCADIA	25440-2019-00	12943 BRICKYARD BLVD.

SPRINKLER SPACING

Type	No. Head/Rm.	Spacing	Slope
Pendent	2+	16x16	8:12
Pendent	1	20x20	8:12
Sidewall	2+	16x16	8:12

TOTAL SPRINKLERS THIS DRAWING 129

FOREMAN NOTES:

1. CHANGES TO THIS PRINT MUST BE FOLLOWED UP WITH ASBUILTS AS THEY ARE MADE AND TAKEN TO THE OFFICE.
2. FOLLOW SPRINKLER SPACING SCHEDULE FOR THIS PRINT.
3. FOLLOW PIPE SCHEDULE FOR THIS PRINT.
4. ANY EXPOSED PIPE TO BE COPPER (M) OR STEEL SCH.10 / SCH.40 U.N.O.

DESIGN CRITERIA

TYPE SYSTEM: ■ WET ☐ DRY NFPA STANDARD: ☐ #13 ☐ #13R ■ #13D

OCCUPANCY: Single Family Home
HAZARD: Light
DENSITY: .05 GPM/S.F.
REMOTE AREA: 2ND FLR S.F.
MAX. S.F./HD. See Note
HOSE REQ'MT.: ☐ 100 ☐ 250 ☐ 500
APPROVING AUTHORITY: P.G COUNTY

PIPE SCHEDULE

1"
1¼"
1½"
2"
INCOMING FROM STREET

PIPE SYMBOLS

RISER/MANIFOLD
ELBOW DOWN
BALL VALVE
REVISION

SPRINKLER SUMMARY

SYM	TYPE	FINISH	TEMP	ORIF.	"K"	NPT	Mfg.	MODEL#	ESCUTCHEON	QTY.
◉	RES. PEND	WHITE	155°	½"	4.9	½"	VIKING	VK468	RECESSED	40
○	RES. PEND	WHITE	155°	½"	4.9	½"	VIKING	VK494	CONCEALED	25
◁	RES. SIDEWALL	WHITE	175°	½"	4.0	½"	VIKING	VK486	RECESSED	05
◀	RES. SIDEWALL	WHITE	155°	½"	4.0	½"	VIKING	VK486	RECESSED	59

REVISIONS

BY	DESCRIPTION	DATE	#
			△
			△
			△
			△
			△
			△
			△

NOEL'S FIRE PROTECTION

12015 KEMPS MILL ROAD
WILLIAMSPORT, MD 21795
(240) 366-8287 FAX: (301) 223-8370

CONTRACTOR: CALATLANTIC
14280 PARK MEADOW DRIVE
CHANTILLY, VA 20151

PERMIT #
Model: TOWNS
JOB #: 336D

DATE 6-12-20
DESIGNER C. MONROE
SCALE 1/8" = 1'-0"

BRICKYARD LOTS 414-418
SEE ADDRESS BLOCK
BELTSVILLE, MD 20705

SHEET No. 1 OF 1

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Pendent Sprinkler VK468 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The orifice design, with a K-Factor of 4.9 (70.6 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

NYC Approved: MEA 89-92-E, Volume 35

UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2006.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.9 U.S. (70.6 metric†)
†Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-1/4" (58 mm)

Material Standards:
Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Brass UNS-C23000, Phosphor Bronze UNS-C51000, or Brass UNS-C26000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethylene (PTFE) Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: Brass UNS-C36000
For ENT coated sprinklers: Belleville spring - Exposed, Screw and Pipcap - ENT plated.

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 13637
Order Sprinkler VK468 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, and ENT = JN
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK468 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 13637AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13577W/B* (available since 2006)
C. Optional Protective Sprinkler Cap Remover/Escutcheon Installer Tool** Part No. 15915 (available since 2010.)
*A ½" ratchet is required (not available from Viking).
**Allows use from the floor by attaching a length of 1" diameter CPVC tubing to the tool. Ideal for sprinkler cabinets. Refer to Bulletin F_051808.

VIKING® **TECHNICAL DATA**

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
The Viking Model VK468 Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Finishes: Brass, Chrome, White Polyester, Black Polyester, and ENT			
Corrosion Resistant Coatings[3]: ENT			

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

[3] The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For ENT coated sprinklers, the waterway is coated. Note that the spring is exposed on sprinklers with ENT coating.

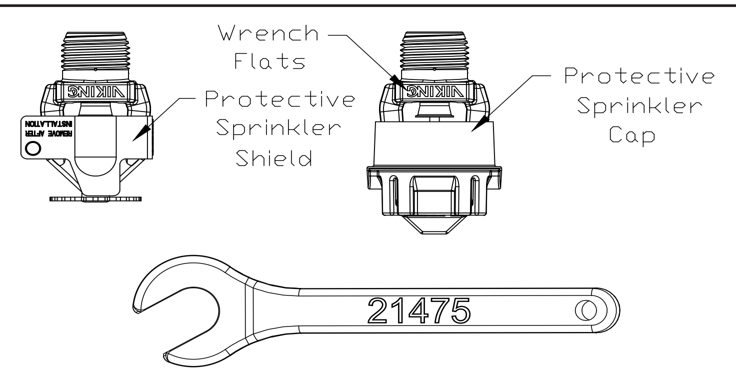

Figure 1: Standard Sprinkler Wrench 21475M/B

VIKING®	TECHNICAL DATA	FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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Approval Chart
Viking VK468, 4.9 K-Factor Residential Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
13637	VK468	1/2	15	4.9	70.6	175 psi (12 bar)	2-1/4	58

Max. Coverage Area[4] Ft.X Ft. (m X m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Deflector to Ceiling	Installation Type	Listings and Approvals[3]				Minimum Spacing Ft. (m)
	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)			C-UL-US-EU[5]	VdS	NYC[6]	NSF[8]	
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)	1-1/8 to 2 inch	Standard surface-mounted escutcheons, or recessed with the Micromatic® Model E-1, E-2, or E-3 Recessed Escutcheon	See Footnotes 7 and 10.	See Footnotes 7 and 10.	See Footnote 7.	See Footnote 7.	8 (2.4)
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)	17 (64.4)	12.0 (0.83)							
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)	20 (75.7)	16.7 (1.15)							

Footnotes

1 Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.

2 Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

3 This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.

4 For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.

5 Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

6 Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 35.

7 Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester[9]

8 UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

9 Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.

10 Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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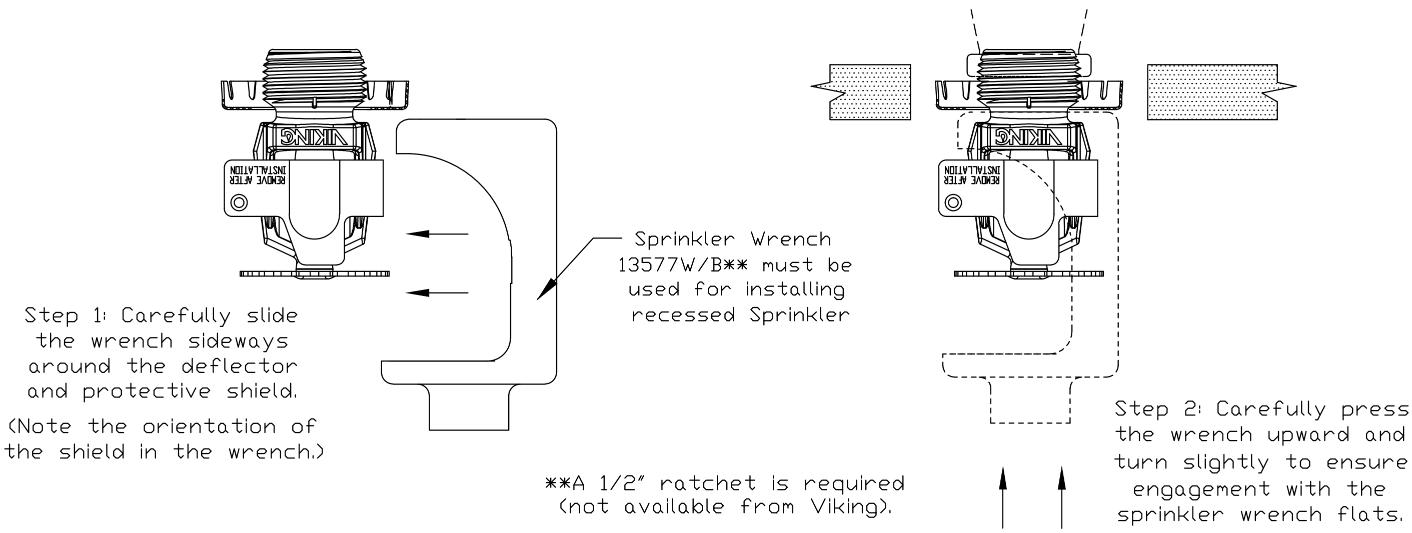

Figure 2: **Wrench 13577W/B for Recessed Sprinkler**

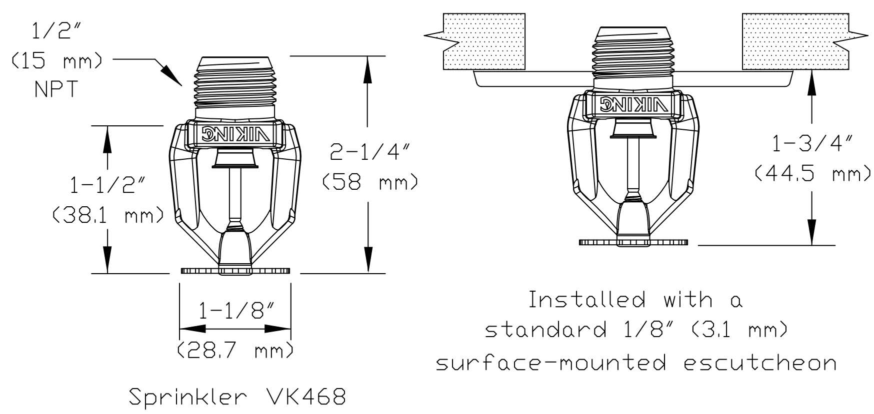

Figure 3: **Sprinkler VK468 Dimensions with a Standard Escutcheon**

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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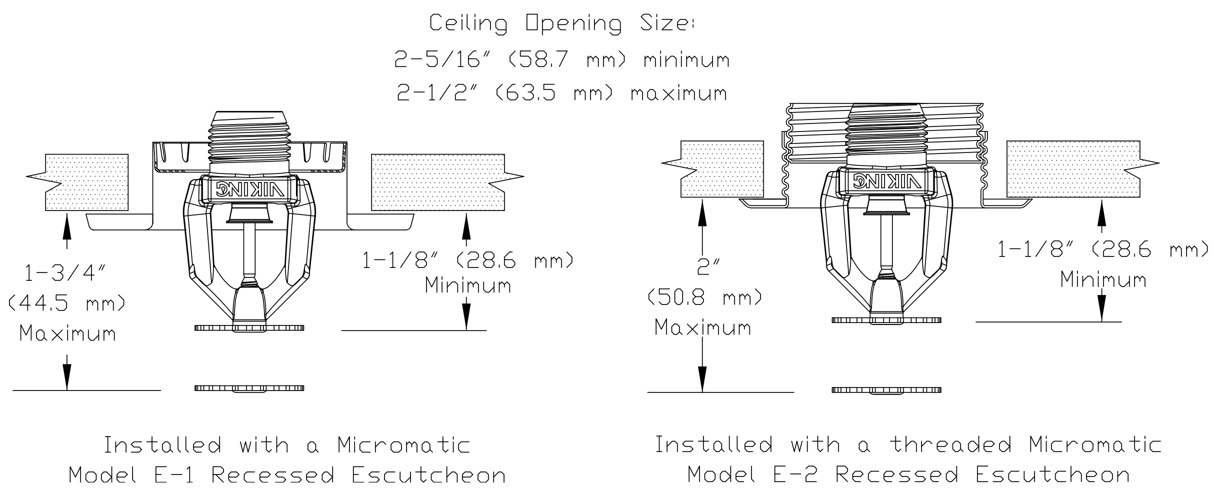

Figure 4: **Sprinkler VK468 Dimensions with the Model E-1 and E-2 Recessed Escutcheons**

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Pendent Sprinkler VK468 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614, F_080415 and F_080190 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, VdS, and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Viking Residential Sprinkler Installation Guide

October 25, 2018

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

VIKING	TECHNICAL DATA	FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking residential automatic sprinklers are equipped with a "fast response" heat-sensitive operating element designed to respond individually and quickly to a specific high temperature. Viking residential sprinklers are designed to combine speed of operation with water distribution characteristics to help in the control of residential fires and to improve life safety by prolonging the time available for occupants to escape or be evacuated.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

A. Viking residential sprinklers are intended for use in the following occupancies: one- and two-family dwellings and mobile homes with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; or residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13. Information contained in this guide is based on NFPA 13, "Standard for the Installation of Sprinkler Systems".

B. The design criteria for residential sprinklers contained in the NFPA installation standards must be followed except as modified by the individual UL 1626 listing information provided in the technical data pages and this Residential Sprinkler Installation Guide. For listed areas of coverage, technical data, and specific design and installation instructions, refer to the appropriate Viking technical data page for the sprinkler model used.

C. Viking residential sprinklers listed by Underwriters Laboratories, Inc. (UL) have passed fire tests designed to represent fire conditions for the sprinkler's listed area of coverage. The standards for residential sprinkler performance and spray patterns are printed in Underwriters Laboratories Publication UL 1626, "Standard for Residential Sprinklers for Fire Protection Service". All listed Viking residential sprinklers meet or exceed UL 1626 performance requirements and spray pattern criteria for their listed areas of coverage.

D. NFPA standards allow use of residential sprinklers with rates, design areas, areas of coverage, and minimum design pressures other than those specified in the standards when they have been listed for such specific residential installation conditions.

3. TECHNICAL DATA

Specifications:

Refer to the appropriate sprinkler technical data sheet.

Material Standards:

Refer to the appropriate sprinkler technical data sheet.

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

4. INSTALLATION

NOTE:Take care not to over-tighten the sprinkler and/or damage its operating parts!

Maximum Torque: 1/2" NPT: 14 ft-lbs. (19.0 N-m) 3/4" NPT: 20 ft-lbs. (27.1 N-m)

A. Care and Handling (also refer to Bulletin - Care and Handling of Sprinklers, Form No. F_091699.)

Sprinklers must be handled with care and protected from mechanical damage during storage, transport, handling, and after installation. Store sprinklers in a cool, dry place in their original container.

Use care when locating sprinklers near fixtures that can generate heat.

Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to Table 1.)

Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately. (Note: Installing glass bulb sprinklers in direct sunlight (ultraviolet light) may affect the color of the dye used to color code the bulb. This color change does not affect the integrity of the bulb.)

Viking residential sprinklers are intended for use on wet pipe residential systems only. Adequate heat must be provided for wet-pipe systems. DO NOT use Viking residential sprinklers on dry systems unless specifically allowed by recognized installation standards or the Authority Having Jurisdiction.

Residential concealed sprinklers must be installed in neutral or negative pressure plenums only!

Corrosion-resistant sprinklers must be installed when subject to corrosive atmospheres. **NOTE:** Viking residential sprinklers are not intended for use in corrosive environments.

Replaces pages 1-17, dated December 1, 2016.
(Added P65 Warning.)

VIKING

TECHNICAL DATA

FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

TABLE 1: RESIDENTIAL SPRINKLER TEMPERATURE RATINGS			
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating[1]**	**Maximum Ambient Ceiling Temperature[3]**	**Bulb Color**
Residential Glass Bulb Style Sprinklers			
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)[1]**	**Maximum Ambient Ceiling Temperature[3]**	
Residential Fusible Element Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Temperature Identification Stamp**
Residential Flush Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	On Cover or Sprinkler Inlet (VK476)
Intermediate	220 °F (104 °C)	150 °F (65 °C)	On Cover
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Cover Plate Temperature Rating**
Residential Concealed Style Sprinklers			
Ordinary	135 °F (57 °C)[1], 140 °F (60 °C)[2], 155 °F (68 °C)[1], or 165 °F (74 °C)[1]	100 °F (38 °C)	135 °F (57 °C)

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector or flow shaper.

[2] The temperature rating is stamped on the sprinkler.

[3] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

B. Installation Instructions

Viking sprinklers are manufactured and tested to meet the rigid requirements of approving agencies. They are designed to be installed in accordance with recognized installation standards NFPA 13, NFPA 13R, and NFPA 13D, and any associated TIAs.

Deviation from the standards or any alteration to the sprinklers or cover plate assemblies after they leave the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinklers inoperative and will automatically nullify the approval and any guarantee made by Viking.

The use of residential sprinklers may be limited due to occupancy and hazard. Residential fire protection systems must be designed and installed only by those who are completely familiar with the appropriate standards and codes, and thoroughly experienced in fire protection design, hydraulic calculations, and sprinkler system installation.

Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Viking residential sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler*.
*Refer to the appropriate sprinkler technical data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½” or 3/4” (15 mm or 20 mm) NPT** outlet of the reducing coupling is at the desired location and centered in the opening** in the ceiling or wall.
**Size depends on the sprinkler model used. Refer to appropriate sprinkler data page.

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DESIGN CRITERIA

<u>For Systems Designed to NFPA 13D or NFPA 13R:</u> Apply the listed areas of coverage and minimum water supply requirements shown in the approval charts on the residential sprinkler data pages. The sprinkler flow rate is the minimum required discharge from each of the total number of design sprinklers as specified in NFPA 13D or NFPA 13R.

<u>For Systems Designed to the latest edition of NFPA 13:</u> The number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- **The flow rates given in the approval charts on the data pages for NFPA 13D and NFPA13R for each area of coverage listed, <u>or</u>**
- **Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13. The greatest dimension of the coverage area cannot be any greater than the maximum areas of coverage shown on the data pages.**

Flow Rates

All residential sprinklers manufactured on or after July 12, 2002 are listed with a single minimum flow rate. Where rooms have more than one sprinkler, multiple-sprinkler calculations are still required, but the first sprinkler and any additional sprinkler or sprinklers must be calculated flowing at identical minimum flow rates, based on the area of sprinkler coverage, using the minimum flow and pressure listed for the sprinkler model used.

Consult the appropriate standards and the Authorities Having Jurisdiction to determine the number of sprinklers to hydraulically calculate to verify adequate water supply for multiple-sprinkler operation.

Operating Pressure: The minimum operating pressure of any sprinkler shall be the minimum operating pressure specified by the listing, or 7 psi (0.5 bar), whichever is greater. The maximum allowable operating pressure is 175 psi (12 bar).

Areas of Coverage

If the actual area of coverage is less than the listed area of coverage, use the minimum water supply for the next larger area of coverage listed. DO NOT interpolate. Residential sprinkler systems must be hydraulically calculated according to NFPA standards to verify that the water supply is adequate for proper operation of the sprinklers. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler when it is operating at the minimum gpm and psi listed for single-sprinkler operation for the sprinkler model used.

Viking residential sprinklers may be listed for more than one area of coverage. Suggested practice in selecting area of coverage is to select the one that can be adequately supplied by the available water supply and still allow for the installation of as few sprinklers in a compartment as possible while observing all guidelines pertaining to obstructions and spacing. This maximizes the use of the available water supply, which is often limited on residential fire protection systems. After selecting an appropriate area of coverage, sprinklers must be spaced according to guidelines set forth in the installation standards.

Definition of "COMPARTMENT": A space completely enclosed by walls and a ceiling. Openings to an adjoining space are allowed, provided the openings have a minimum lintel depth of 8 in. (203.2 mm) from the ceiling.

Spacing Guidelines

For guidelines concerning spacing of Viking residential sprinklers near beams, obstructions, heat sources, and sloped ceilings [slopes more than a 2/12 (9.5°) pitch], refer to the Viking residential sprinkler data pages and installation guide, the appropriate NFPA standard, and the Authority Having Jurisdiction. NOTE: Sloped, beamed, and pitched ceilings could require special design features such as larger flow, or a design for more sprinklers to operate in the compartment, or both.

Distance from Walls: Install not more than one-half the listed sprinkler spacing nor less than 4" (102 mm) from walls, partitions, or obstructions as defined in the standards.

Minimum Sprinkler Spacing: The minimum distance between residential sprinklers to prevent cold soldering (i.e., the spray from one operating sprinkler onto an adjacent sprinkler that could prevent its proper activation) is 8 ft. (2.4 m).

Maximum Sprinkler Spacing: Locate adjacent sprinklers no farther apart than the listed spacing.

Deflector Position: Install frame style residential *pendent* sprinklers with the deflector between 1" and 4" (25.4 mm to 102 mm) below smooth ceilings, unless the sprinkler data page indicates otherwise. Install pendent sprinklers in the pendent position only, with the deflector oriented parallel with the ceiling or roof.

Refer to the individual listings in the residential sprinkler data pages for horizontal sidewall sprinkler deflector or sprinkler centerline distance below the ceiling. Install horizontal sidewall sprinklers in the horizontal position only below smooth ceilings, with the leading edge of the deflector or element assembly oriented parallel with the ceiling.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to the appropriate sprinkler data page. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

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2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape. *Exception: For concealed sprinklers (i.e., VK457, VK458, VK468, VK474, and VK4570) the protective cap is removed for installation.*
3. Care must be taken when installing sprinklers on CPVC and copper piping systems. Never install the sprinkler into the reducing fitting before attaching the reducing fitting to the piping. Sprinklers must be installed on CPVC systems after the reducing fitting has been installed and the primer and/or cement manufacturer's recommended curing time has elapsed. When installing sprinklers on copper piping systems, take care to brush the inside of the sprinkler supply piping and reducing fitting to ensure that no flux accumulates in the sprinkler orifice. Excess flux can cause corrosion and may impair the ability of the sprinkler to operate properly.
4. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the sprinkler deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, while taking care not to over-tighten or damage the sprinkler operating parts.
   b. *Thread the flush or concealed sprinkler into the ½*" or 3/4" (15 mm or 20 mm) NPT** *outlet of the coupling by turning it clockwise with the special sprinkler wrench. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Exception: For concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 the protective cap is removed for installation, and then placed back on the sprinkler temporarily.*
5. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards.
   a. Make sure the sprinkler has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal leaks, the sealing compound is washed out of the joint.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS <u>BEFORE</u> PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
6. For residential flush sprinklers, the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread on or push it on until the flange touches the ceiling. Note the maximum vertical adjustment is ½" (12,7 mm) for sprinkler VK420 and 5/8" for VK476. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipples as required.
7. For residential concealed sprinklers, the cover plate assembly can now be attached.
   a. Remove the cover plate assembly from the protective box, taking care not to damage the assembly.
   b. From below the ceiling, gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling or wall.
   c. Carefully push the cover plate assembly onto the sprinkler, using even pressure with the palm of the hand, until the unfinished brass flange of the cover plate base touches the ceiling or wall.
   d. The maximum adjustment available for residential concealed sprinklers is ½" (12.7 mm) [1/4" (6.4 mm) for sprinkler VK480]. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler nipples.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See Maintenance instructions below and follow all warnings and instructions.

5. OPERATION

During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector or flow shaper, forming a uniform, high-wall wetting spray pattern to extinguish or control the fire.

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

A. Sprinklers must be inspected on a regular basis for signs of corrosion, mechanical damage, obstructions, paint, etc. Frequency of the inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced immediately after a specified term of service. Refer to NFPA 25 and the Authorities Having Jurisdiction for the specified period of time after which testing and/or replacement of residential sprinklers is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from, attached to, or otherwise obstruct the discharge pattern of the sprinkler. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the effected area.

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench and remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For residential flush pendent and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. To remove a ceiling ring, grasp it from below the ceiling and gently turn it counterclockwise. Cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler, use the sprinkler wrench to unthread the sprinkler from the piping. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Place a plastic protective shell (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the shell. Exception: Concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 are removed without the plastic cap.

3. Follow instructions in section 4B. Installation Instructions to install the new unit. Be sure the replacement sprinkler is the correct model and style, with the appropriate K-Factor, temperature rating, and response characteristics. A fully stocked sprinkler cabinet should be provided for this purpose. *(For flush or concealed style sprinklers, stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.)*

4. Place the system back in service and secure all valves. Check for and repair all leaks.

E. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

Viking Residential Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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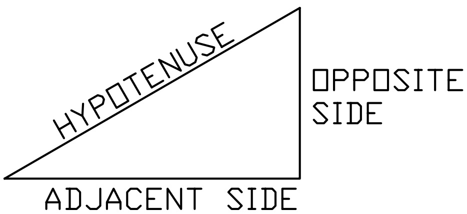
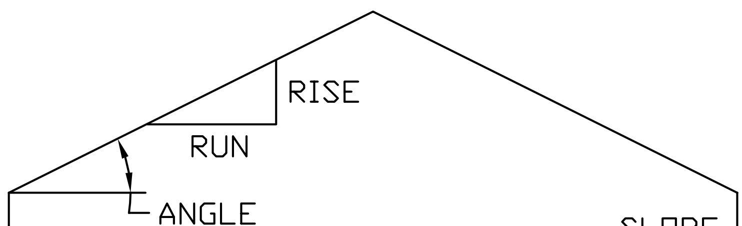


$$\text{TANGENT} = \frac{\text{OPPOSITE SIDE (RISE)}}{\text{ADJACENT SIDE (RUN)}}$$

$$\frac{\text{RISE}}{\text{RUN}} = \text{TANGENT}$$

$$\text{ANGLE} = \text{TAN}^{-1}\left(\frac{\text{RISE}}{\text{RUN}}\right)$$

$$\text{SLOPE DISTANCE} = \sqrt{(\text{RISE})^2 + (\text{RUN})^2}$$



RISE	RUN	TANGENT	ANGLE	SLOPE DISTANCE
2	12	.1666	9.45°	12.1
3	12	.2500	14°	12.3
4	12	.3333	18.4°	12.6
5	12	.4166	22.6°	13
6	12	.5000	26.5°	13.4
7	12	.5833	30.2°	13.8
8	12	.6666	33.6°	14.4
9	12	.7500	36.8°	15
10	12	.8333	39.8°	15.6
11	12	.9166	42.5°	16.2
12	12	1	45°	16.97

Table 2
Rise Over Run Conversion to Degrees of Slope

TECHNICAL DATA

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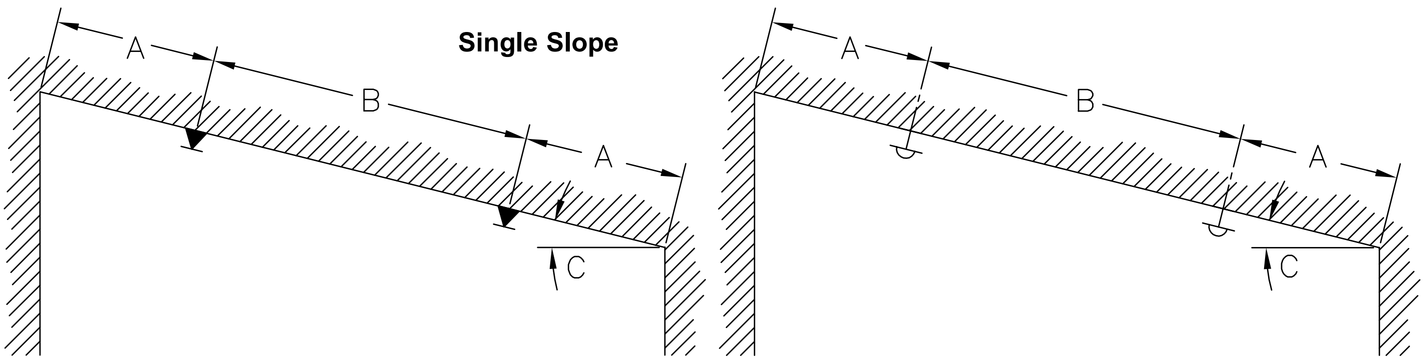
SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)



Pendent Sprinklers

Horizontal Sidewall Sprinklers (Spray Across the Slope)

Figure 1

(A) One-half listed spacing of sprinkler maximum, 0’-4” (0-102 mm) minimum.
(B) Listed spacing of sprinkler, maximum, 8’-0” (2.4 m) minimum.
(C) Where angle “C” is greater than an 8/12 (33.7°) pitch, see Figure 2 below.

SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

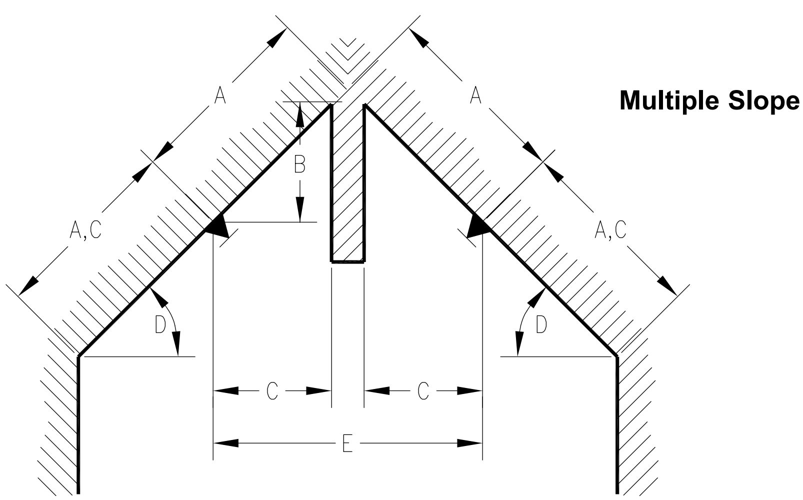


Figure 2

(A) One-half listed spacing of sprinkler, maximum.
(B) 3’-0” (.91 m) maximum.
(C) 0’-4” (0-102 mm) minimum.
(D) Slopes greater than an 8/12 (33.7°) pitch.
(E) For distance less than 8’-0” (2.4 m), baffle required.

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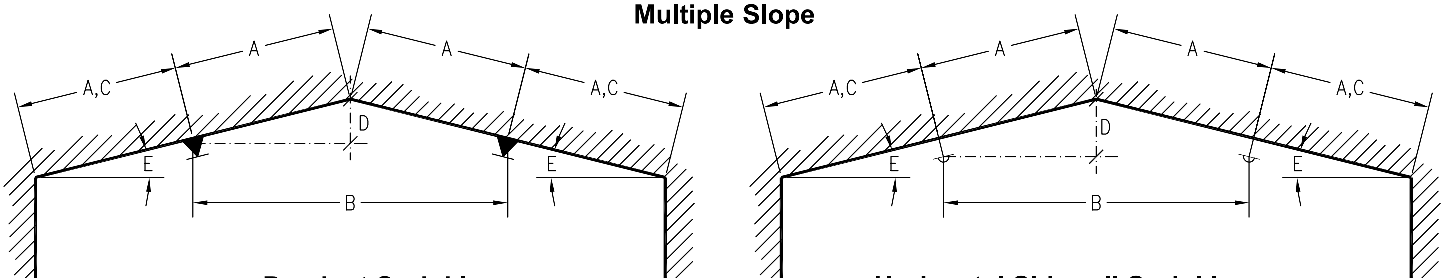
SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

Multiple Slope



Pendent Sprinklers | **Horizontal Sidewall Sprinklers (Spray Across the Slope)**

Figure 3

(A) One-half listed spacing of sprinkler, maximum.
(B) 8’-0” (2.4 m) minimum.
(C) 0’-4” (0-102 mm) minimum.
(D) 3’-0” (.91 m) maximum.
(E) Acceptable for slopes of 0/12 to 8/12 (0° to 33.7°) pitch.

SPACING OF RESIDENTIAL PENDENT SPRINKLERS AT PEAK OF SLOPED CEILINGS WITH PITCH LESS THAN 8/12 (33.7°)

(Refer to the appropriate residential sprinkler technical data page for listings.)

Multiple Slope

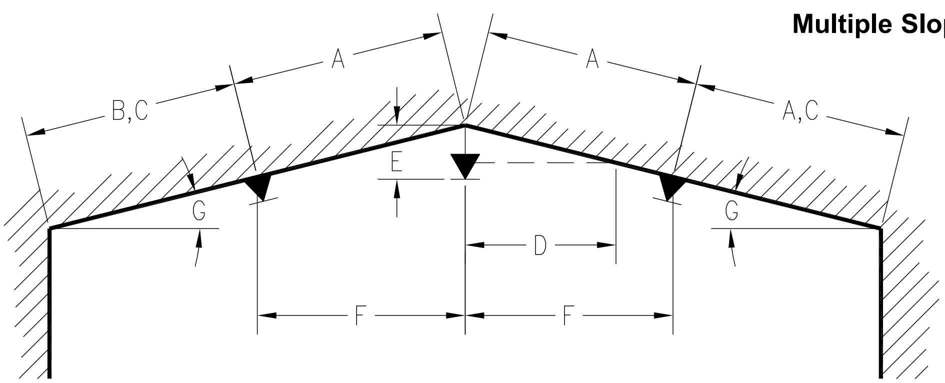


Figure 4

(A) Listed spacing of sprinkler, maximum.
(B) One-half listed spacing of sprinkler, maximum.
(C) 0’-4” minimum.
(D) Refer to page 10 for minimum distance between sprinkler and intersecting sloped ceiling.
(E) Refer to the appropriate residential sprinkler technical data page for deflector distance below ceiling.
(F) 8’-0” minimum.
(G) Reference: 4/12 (18.0°) pitch maximum for 12’ (3.7 m) spacing.
2.5/12 (12.0°) pitch maximum for 14’ (4.3 m) spacing.
2/12 (10.0°) pitch maximum for 16’ (4.9 m) spacing.
2/12 (10.0°) pitch maximum for 18’ (5.5 m) spacing.
1.9/12 (9.0°) pitch maximum for 20’ (6.1 m) spacing.
Angles based on sprinklers installed 0’-4” (0-102 mm) from peak.

NOTE: Whenever possible, utilize design as shown in Figure 3 above.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

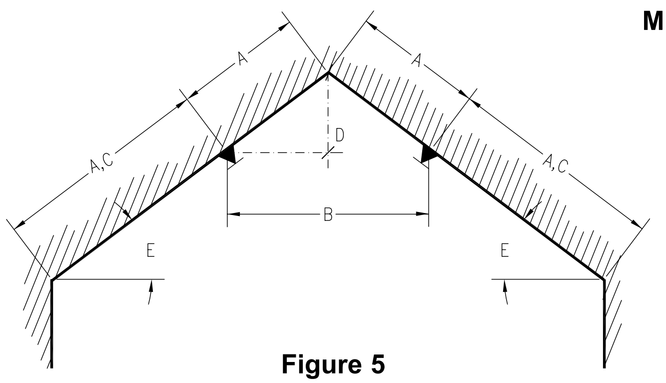

Figure 5

(A) One-half listed spacing of sprinkler, maximum.
(B) 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) 3'-0" (.91 m) maximum.
(E) Acceptable for slopes greater than an 8/12 (33.7°) pitch.
(F) When this design is used, refer to the appendices of NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction regarding the number of design sprinklers to hydraulically calculate.

SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 3 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

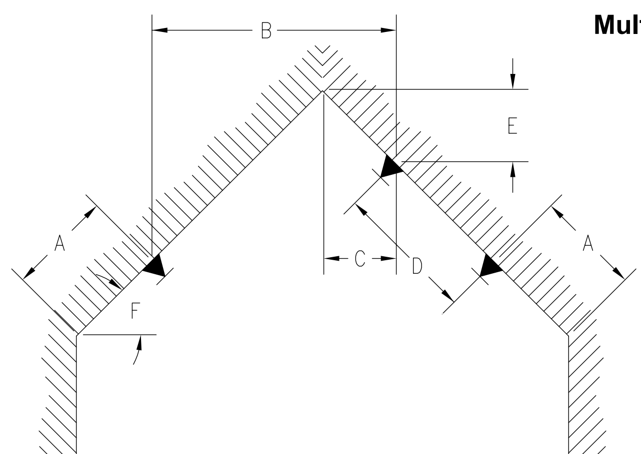

Figure 6

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Listed spacing maximum, 8'-0" (2.4 m) minimum.
(E) 3'-0" (.91 m) maximum.
(F) Slopes greater than 8/12 up to a 21/12 (33.7° up to 60°) pitch.

NOTES: In addition to the above limits, rooms requiring this type of installation must be hydraulically calculated to supply a minimum of three operating sprinklers. Layout similar for horizontal sidewall sprinklers with throw <u>across</u> slope. Refer to the appropriate residential sprinkler technical data sheets.

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TECHNICAL DATA

FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

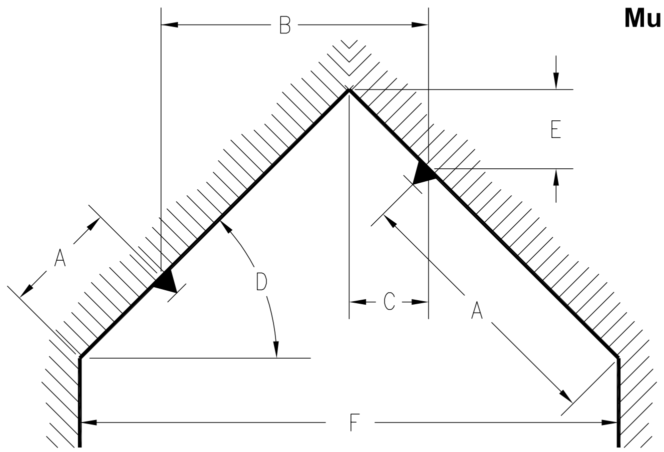

Figure 7

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than 8/12 pitch up to a 21/12 (33.7° up to a 60°) pitch.
(E) 3'-0" (.91 m) maximum.
(F) When dimension "F" exceeds 16' (4.9 m), utilize design configuration shown in Figure 6.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

Multiple Slope

Multiple Slope

Single Slope

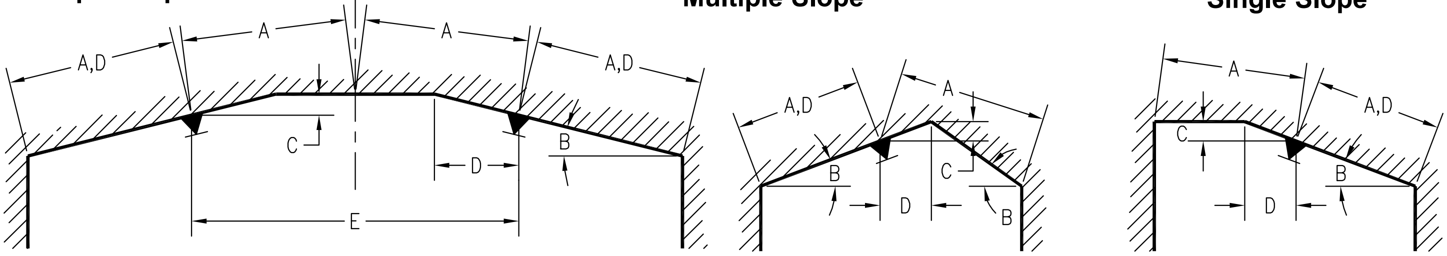

Figure 8

(A) One-half listed spacing, maximum.
(B) Refer to the appropriate residential sprinkler technical data pages for listings of sprinklers for use below slopes up to and including a 8/12 (33.7°) pitch.
(C) 3'-0" (.91 m) maximum.
(D) 0'-4" (0-102 mm) minimum.
(E) 8'-0" (2.4 m) minimum without baffle.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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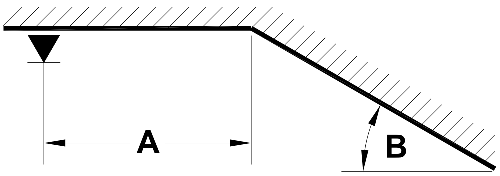
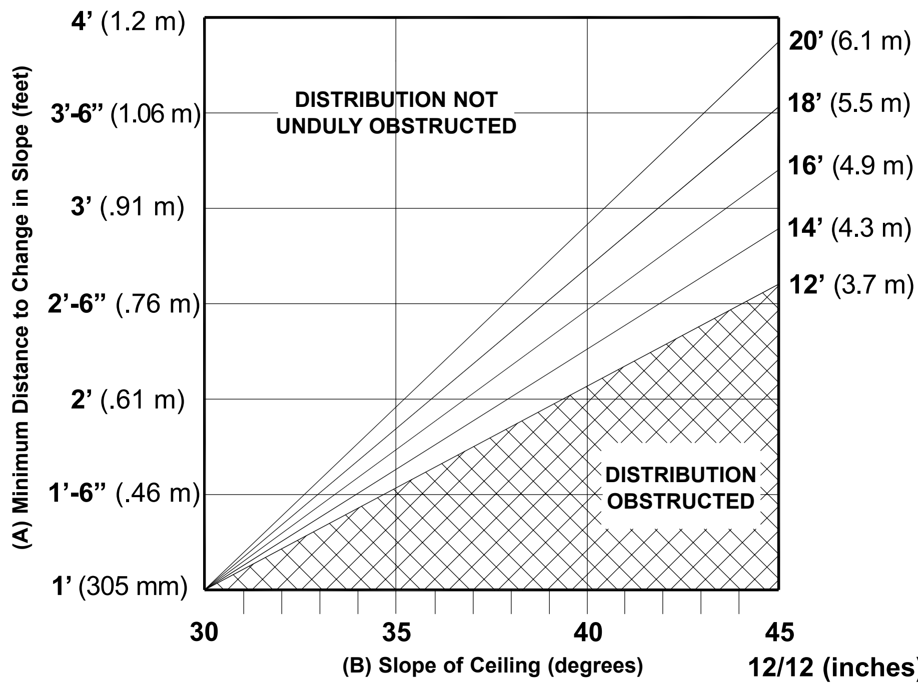
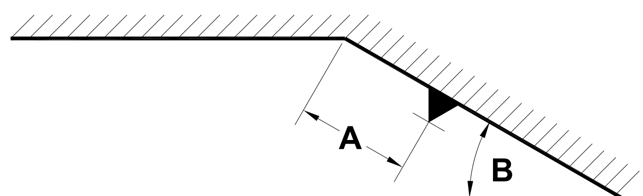
MINIMUM DISTANCE BETWEEN SPRINKLER AND INTERSECTING SLOPED CEILINGS

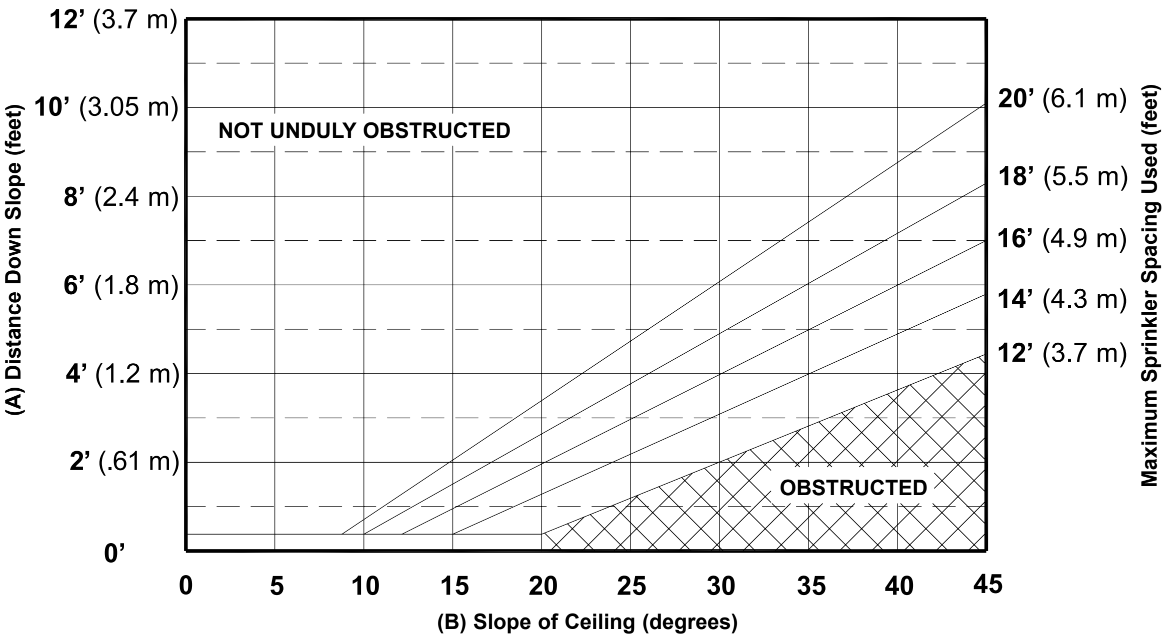


NOTES: For any ceiling slope under 7/12 (30°), distribution is considered Not Unduly Obstructed.



MAXIMUM DISTANCE DOWN SLOPE TO AVOID OBSTRUCTION TO SPRINKLER DISCHARGE





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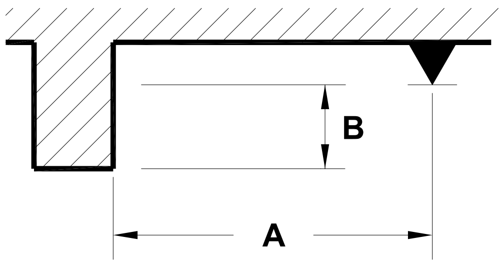
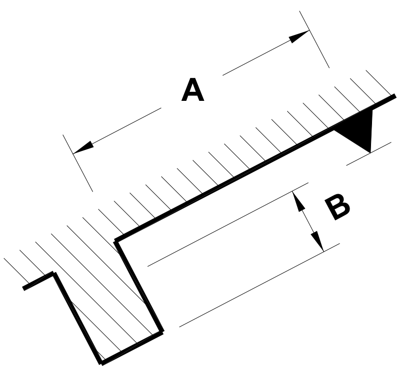
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

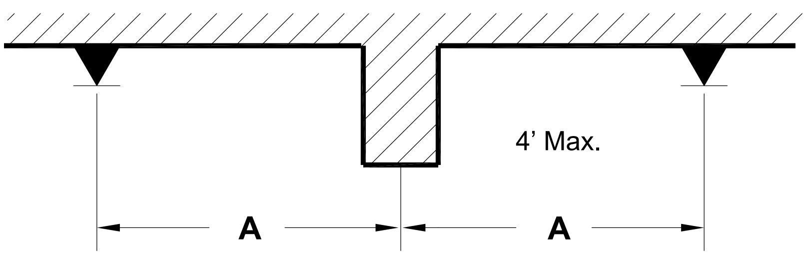
(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

Positioning Residential Pendent Sprinklers - Obstructions at the Ceiling



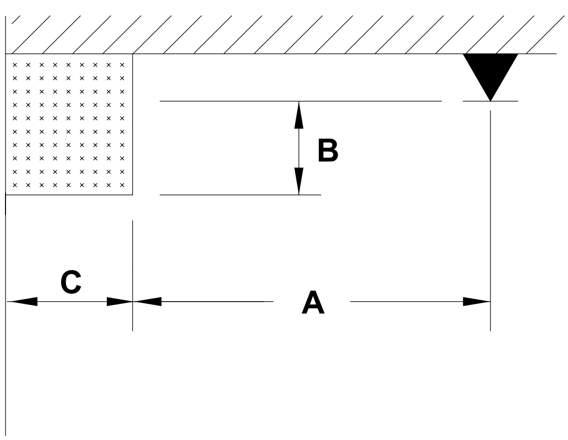


Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356



Residential pendent sprinklers may be located on opposite sides of continuous obstructions up to 4 ft. (1.2 m) wide at the ceiling, as long as the distance from the centerline of the obstruction to the sprinklers (A) does not exceed one-half the maximum spacing allowed between sprinklers.

Positioning Residential Pendent Sprinklers - Obstructions Along Walls



(A) Distance from centerline of sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.
(C) Width of the obstruction.

Obstructions up to 30 in. (.8 m) wide (C) located against the wall are permitted to be protected when (A) is greater than or equal to (C) minus 8 in. (.2 m) plus (B).

$C \leq 30$ in. $\quad$ for metric $C \leq .8$ m

$A \geq (C - 8 \text{ in.}) + B$ $\quad$ $A \geq (C - .2 \text{ m}) + B$

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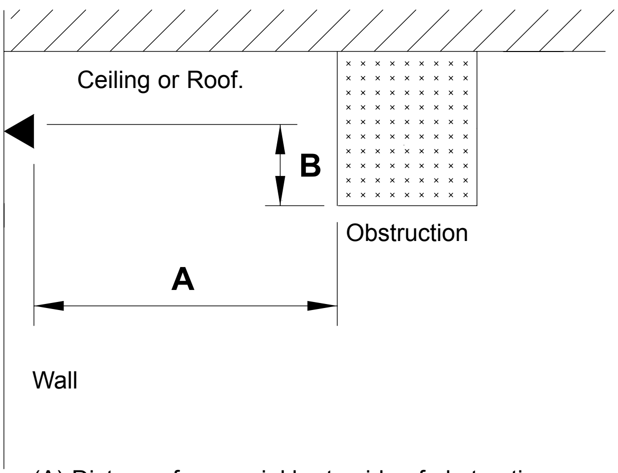
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

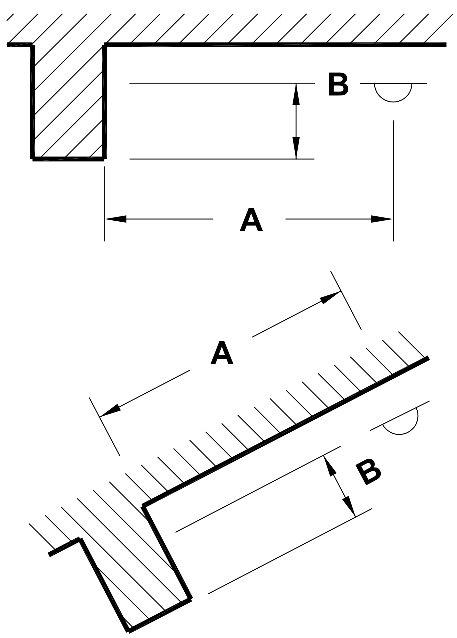
Positioning Residential Horizontal Sidewall Sprinklers - Obstructions at the Ceiling



(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 8 ft. (Less than 2.4 m)	No Obstructions Allowed	
8 ft. to less than 10 ft. (2.4 m to less than 3.05 m)	1	25.4
10 ft. to less than 11 ft. (3.05 m to less than 3.35 m)	2	50.8
11 ft. to less than 12 ft. (3.35 m to less than 3.7 m)	3	76
12 ft. to less than 13 ft. (3.7 m to less than 4 m)	4	102
13 ft. to less than 14 ft. (4 m to less than 4.3 m)	6	152
14 ft. to less than 15 ft. (4.3 m to less than 4.6 m)	7	178
15 ft. to less than 16 ft. (4.6 m to less than 4.9 m)	9	229
16 ft. to less than 17 ft. (4.9 m to less than 5.2 m)	11	279
17 ft. or greater (5.2 m or greater)	14	356

Positioning Residential Horizontal Sidewall Sprinklers - Obstructions Along Walls



Distance from Sprinkler to Side of Obstruction Along Wall (Dimension A)	Maximum Distance from Deflector to Bottom of Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356

(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

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LOCATING RESIDENTIAL SPRINKLERS NEAR HEAT SOURCES

Ordinary temperature rated residential sprinklers (135 °F to 170 °F rated) are only to be installed where the maximum ambient ceiling temperature will not exceed 100 °F. Where the maximum ambient ceiling temperature will be from 101 °F to 150 °F, use intermediate temperature rated residential sprinklers (175 °F to 225 °F rated).

Residential sprinklers must be positioned a sufficient distance away from heat sources that include fireplaces, stoves, kitchen ranges, wall ovens, hot water pipes, water heaters, furnaces and associated flues and ducts, and light fixtures. The following minimum distances must be maintained for both ordinary and intermediate temperature rated residential sprinklers as indicated.

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Rated Sprinkler		Minimum Distance from Edge of Source to Intermediate Temperature Rated Sprinkler	
	Inches	metric	Inches	metric
Side of open or recessed fireplace	36	.91 m	12	305 mm
Front of recessed fire place	60	1.5 m	36	.91 m
Coal- or wood-burning stove	42	1.1 m	12	305 mm
Kitchen range	18	457 mm	9	229 mm
Wall oven	18	457 mm	9	229 mm
Hot air flues	18	457 mm	9	229 mm
Uninsulated heat ducts	18	457 mm	9	229 mm
Uninsulated hot water pipes	12	305 mm	6	152 mm
Side of ceiling- or wall-mounted hot air diffusers	24	.61 m	12	305 mm
Front of wall-mounted hot air diffusers	36	.91 m	18	457 mm
Hot water heater or furnace	6	152 mm	3	76 mm
Light fixture less than 250W	6	152 mm	3	76 mm
Light fixture 250W to 499W	12	305 mm	6	152 mm
Where residential sprinklers will be exposed to the rays of the sun passing through glass or plastic skylights, use intermediate temperature rated sprinklers.				
When locating residential sprinklers in an unventilated concealed compartment, under an unventilated attic or uninsulated roof, where the maximum ambient temperature does not exceed 150 °F, use intermediate temperature rated sprinklers.				

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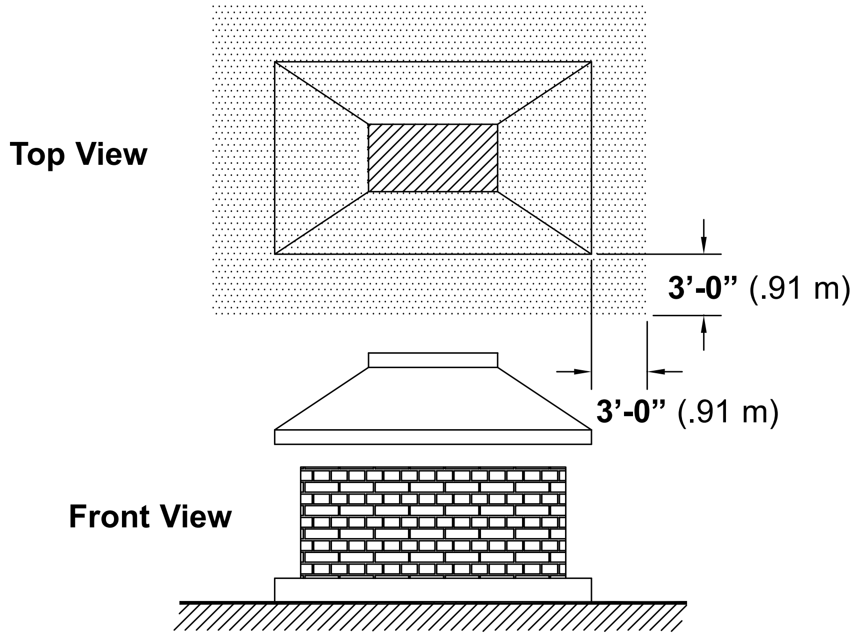
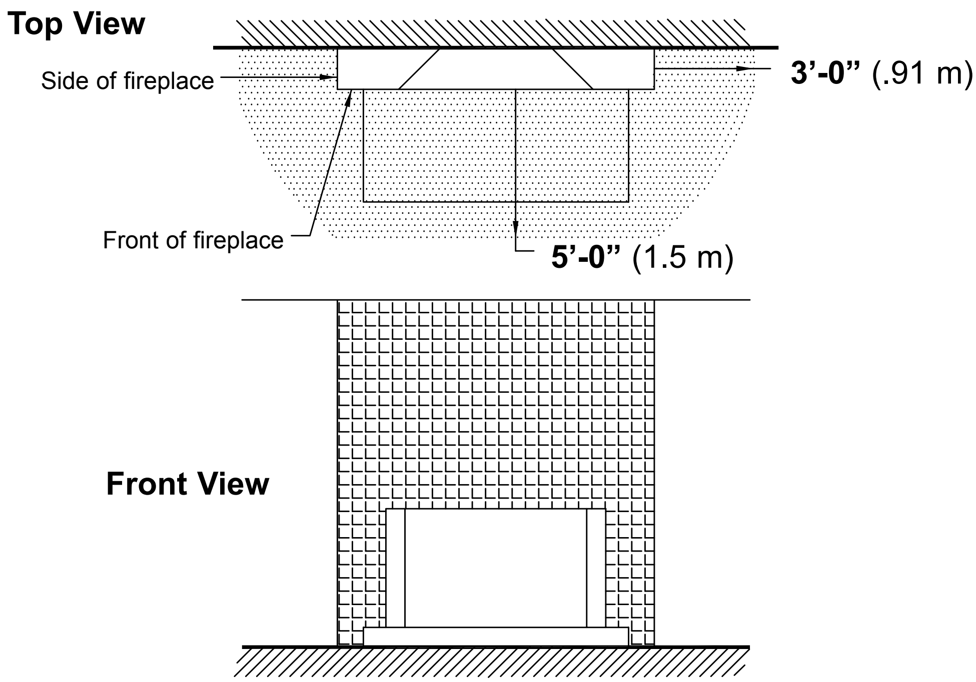
NOTE: The dimensions shown are intended to apply to residential sprinklers installed in ceilings above fireplaces used to burn products that cause elevated temperatures at or near the ceiling in areas surrounding the fireplace. The recommendations should not be construed to apply to decorative non-opening fireplaces such as gas fire units that will not cause elevated temperatures at the ceiling.



Sprinklers near an open hearth fireplace must be located outside of the shaded area or be intermediate degree rated.



Sprinklers near a recessed hearth fireplace must be located outside of the shaded area [at least 3'-0" (.91 m)] from the side of a recessed fireplace and at least 5'-0" (1.5 m) from the front) or be intermediate degree rated.

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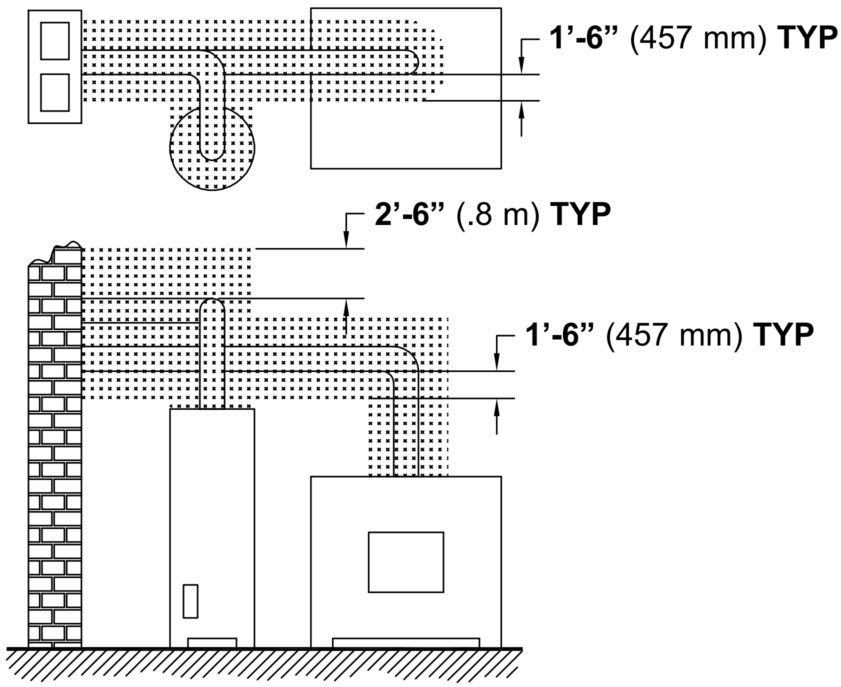
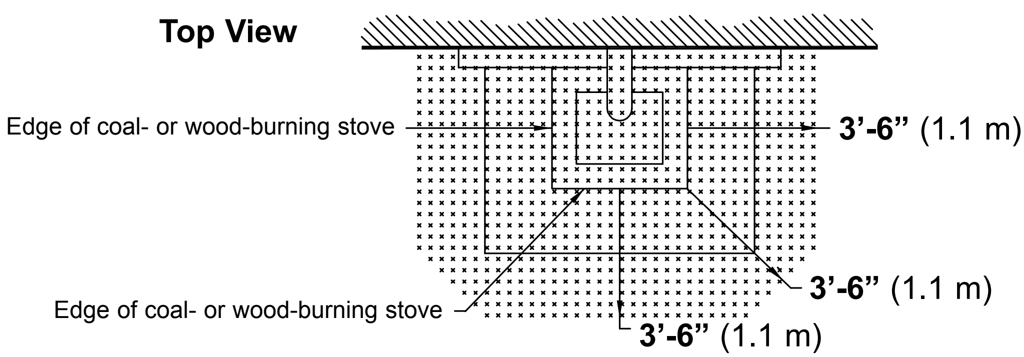
Top View

Front View

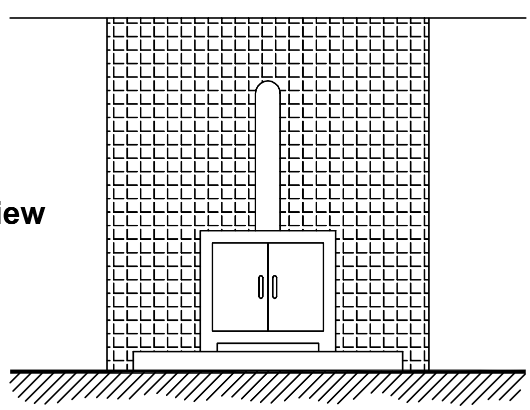


Sprinklers near a furnace or water heater must be located outside of the shaded area or be intermediate degree rated.

Top View



Front View



Sprinklers near a coal- or wood-burning stove must be located outside of shaded area or be intermediate degree rated.

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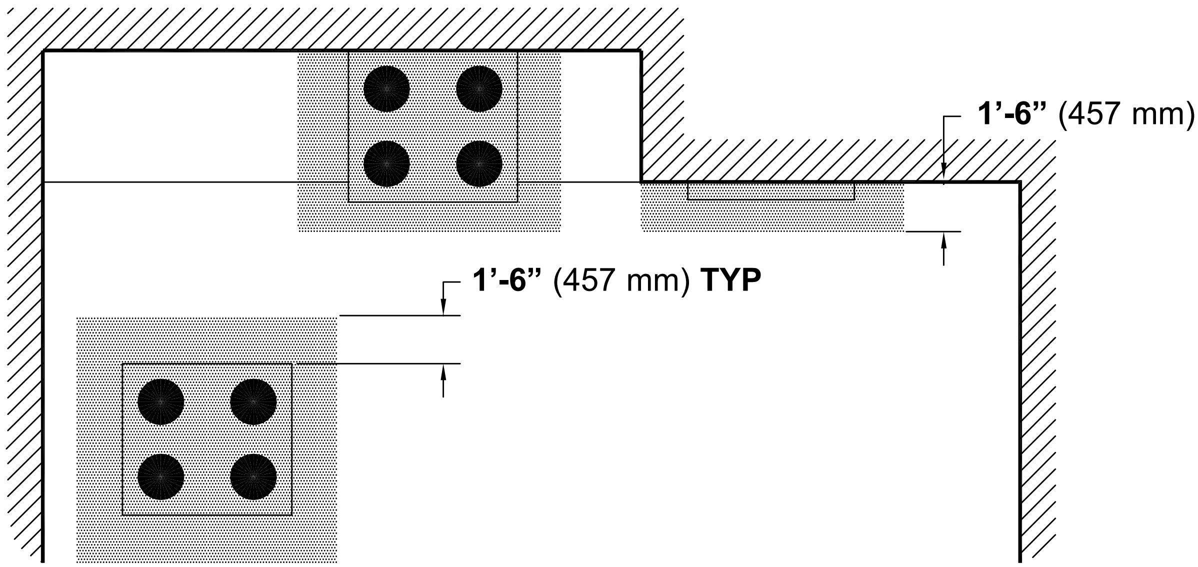
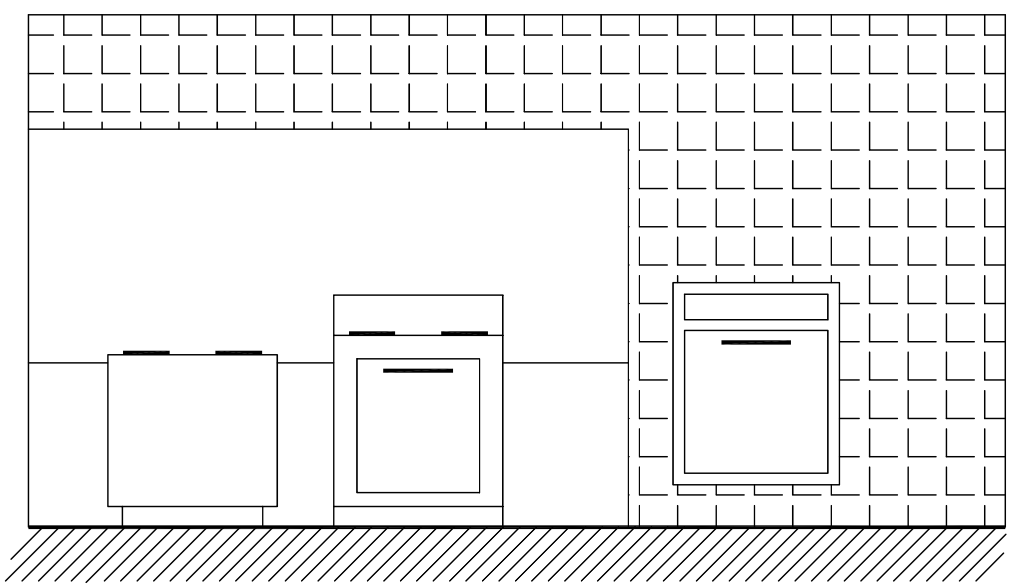
Top View



Front View



Sprinklers near a range or wall oven must be located outside of shaded areas or be intermediate degree rated.

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CARE AND HANDLING OF SPRINKLERS

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SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

General Handling and Storage:

- Store sprinklers in a cool, dry place.
- Protect sprinklers during storage, transport, handling, and after installation.
- Use the original shipping containers. DO NOT place sprinklers loose in boxes, bins, or buckets.
- Keep sprinklers separated at all times. DO NOT allow metal parts to contact sprinkler operating elements.

For Pre-Assembled Drops:

- Protect sprinklers during handling and after installation.
- For recessed assemblies, use the protective sprinkler cap (Viking Part Number 10364).

Sprinklers with Protective Shields or Caps:

- DO NOT remove shields or caps until after sprinkler installation and there no longer is potential for mechanical damage to the sprinkler operating elements.
- **Sprinkler shields or caps MUST be removed BEFORE placing the system in service!**
- Remove the sprinkler shield by carefully pulling it apart where it is snapped together.
- Remove the cap by turning it slightly and pulling it off the sprinkler.

Sprinkler Installation:

- DO NOT use the sprinkler deflector or operating element to start or thread the sprinkler into a fitting.
- **Use only the designated sprinkler head wrench!** Refer to the current sprinkler technical data page to determine the correct wrench for the model of sprinkler used.
- DO NOT install sprinklers onto piping at the floor level.
- Install sprinklers after the piping is in place to prevent mechanical damage.
- DO NOT allow impacts such as hammer blows directly to sprinklers or to fittings, pipe, or couplings in close proximity to sprinklers. Sprinklers can be damaged from direct or indirect impacts.
- DO NOT attempt to remove drywall, paint, etc., from sprinklers.
- **Take care not to over-tighten the sprinkler and/or damage its operating parts!**

Maximum Torque:

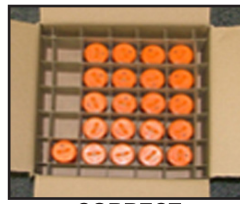
1/2" NPT: 14 ft-lbs. (19.0 N-m)

3/4" NPT: 20 ft-lbs. (27.1 N-m)

1" NPT: 30 ft-lbs. (40.7 N-m)

CORRECT
(Original container used)

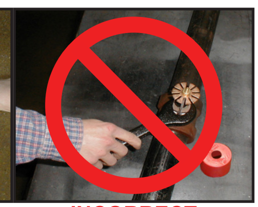
INCORRECT
(Placed loose in box)



CORRECT
(Protected with caps)

INCORRECT
(Protective caps not used)

CORRECT
(Piping is in place at the ceiling)



INCORRECT
(Sprinkler at floor level)

CORRECT
(Special installation wrenches)

INCORRECT
(Designated wrench not used)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

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CARE AND HANDLING OF SPRINKLERS

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PROTECTIVE SPRINKLER SHIELDS AND CAPS

General Handling and Storage:

Many Viking sprinklers are available with a plastic protective cap or shield temporarily covering the operating elements. The snap-on shields and caps are factory installed and are intended to help protect the operating elements from mechanical damage during shipping, storage, and installation. NOTE: It is still necessary to follow the care and handling instructions on the appropriate sprinkler technical data sheets* when installing sprinklers with bulb shields or caps.

WHEN TO REMOVE THE SHIELDS AND CAPS:

NOTE: SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

Remove the shield or cap from the sprinkler only after checking all of the following:

- The sprinkler has been installed*.
- The wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.

SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

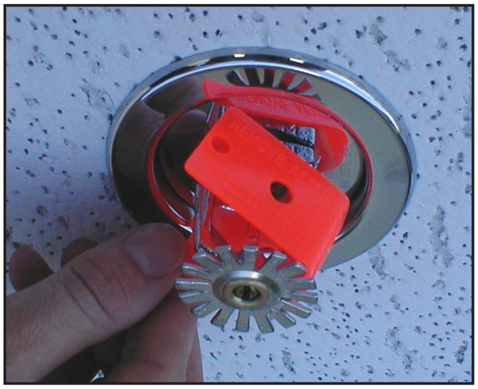

Figure 1: Sprinkler shield being removed from a pendent sprinkler.

Figure 2: Sprinkler cap being removed from a pendent sprinkler.

Figure 3: Sprinkler cap being removed from and upright sprinkler.

HOW TO REMOVE SHIELDS AND CAPS:

No tools are necessary to remove the shields or caps from sprinklers. DO NOT use any sharp objects to remove them! **Take care not to cause mechanical damage to sprinklers when removing the shields or caps.** When removing caps from fusible element sprinklers, use care to prevent dislodging ejector springs or damaging fusible elements. NOTE: Squeezing the sprinkler cap excessively could damage sprinkler fusible elements.

- To remove the shield, simply pull the ends of the shield apart where it is snapped together. Refer to Figure 1.
- To remove the cap, turn it slightly and pull it off the sprinkler. Refer to Figures 2 and 3.

NOTICE Refer to the current sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.

WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

*** Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.**

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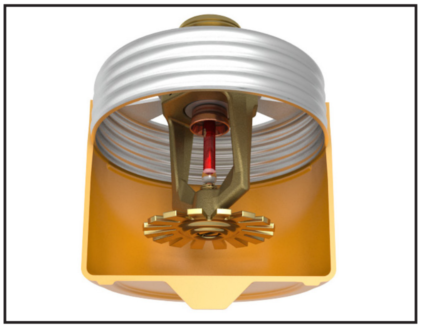
CAUTION CONCEALED COVER ASSEMBLIES ARE FRAGILE!
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



Concealed Sprinkler and Adapter Assembly with Protective Cap

Concealed Sprinkler and Adapter Assembly (Protective Cap Removed)

Cover Plate Assembly (Pendent Cover 12381 shown)

GENERAL HANDLING AND STORAGE INSTRUCTIONS:

- Do not store in temperatures exceeding 100 °F (38 °C). Avoid direct sunlight and confined areas subject to heat.
- Protect sprinklers and cover assemblies during storage, transport, handling, and after installation.
  -- Use original shipping containers.
  -- Do not place sprinklers or cover assemblies loose in boxes, bins, or buckets.
- Keep the sprinkler bodies covered with the protective sprinkler cap any time the sprinklers are shipped or handled, during testing of the system, and while ceiling finish work is being completed.
- Use only the designated Viking recessed sprinkler wrench (refer to the appropriate sprinkler data page) to install these sprinklers. **NOTE:** The protective cap is temporarily removed during installation and then placed back on the sprinkler for protection until finish work is completed.
- Do not over-tighten the sprinklers into fittings during installation.
- Do not use the sprinkler deflector to start or thread the sprinklers into fittings during installation.
- Do not attempt to remove drywall, paint, etc., from the sprinklers.
- Remove the plastic protective cap from the sprinkler before attaching the cover plate assembly. **PROTECTIVE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www. vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

USE THE FOLLOWING PRECAUTIONS WHEN HANDLING WAX-COATED SPRINKLERS

Many of Viking's sprinklers are available with factory-applied wax coating for corrosion resistance. These sprinklers MUST receive appropriate care and handling to avoid damaging the wax coating and to assure satisfactory performance of the product.

General Handling and Storage of Wax-Coated Sprinklers:

- Store the sprinklers in a cool, dry place (in temperatures below the maximum ambient temperature allowed for the sprinkler temperature rating. Refer to Table 1 below.)
- Store containers of wax-coated sprinklers separate from other sprinklers.
- Protect the sprinklers during storage, transport, handling, and after installation.
- Use original shipping containers.
- Do not place sprinklers in loose boxes, bins, or buckets.

Installation of Wax-Coated Sprinklers:

Use only the special sprinkler head wrench designed for installing wax-coated Viking sprinklers (any other wrench may damage the unit).

- Take care not to crack the wax coating on the units.
- For touching up the wax coating after installation, wax is available from Viking in bar form. Refer to Table 1 below. The coating MUST be repaired after sprinkler installation to protect the corrosion-resistant properties of the sprinkler.
- Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they would be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.
- Inspect the coated sprinklers frequently soon after installation to verify the integrity of the corrosion resistant coating. Thereafter, inspect representative samples of the coated sprinklers in accordance with NFPA 25. Close up visual inspections are necessary to determine whether the sprinklers are being affected by corrosive conditions.

TABLE 1

Sprinkler Temperature Rating (Fusing Point)	Wax Part Number	Wax Melting Point	Maximum Ambient Ceiling Temperature[1]	Wax Color
155 °F (68 °C) / 165 °F (74 °C)	02568A	148 °F (64 °C)	100 °F (38 °C)	Light Brown
175 °F (79 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
200 °F (93 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
220 °F (104 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown
286 °F (141 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown

[1] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

⚠WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

TECHNICAL DATA

SPRINKLER OVERVIEW

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1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word “Viking”, the sprinkler identification number (SIN) consisting of “VK” plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

Available Temperature Ratings:

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

<u>UPRIGHT SPRINKLER:</u> A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSU” (Standard Sprinkler Upright) or “UPRIGHT” on the deflector.

<u>PENDENT SPRINKLER:</u> A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSP” (Standard Sprinkler Pendent) or “PENDENT” on the deflector.

Viking Technical Data may be found on The Viking Corporation’s Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

<u>CONVENTIONAL SPRINKLER:</u> An “old style” sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked “C U/P” (Conventional Upright/Pendent) on the deflector.

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VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

RECESSED SPRINKLER: A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

CORROSION-RESISTANT SPRINKLER: A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

VIKING	TECHNICAL DATA	SPRINKLER OVERVIEW

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Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
Refer to the appropriate sprinkler technical data page(s).

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

VIKING

BULLETIN

BEST PRACTICES FOR RESIDENTIAL SPRINKLER HANDLING & INSTALLATION

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Visit the Viking website for the latest edition of this technical data page.

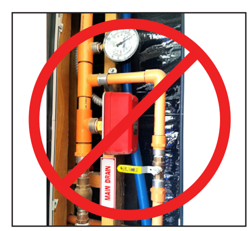
SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

- Always keep sprinklers in a cool dry place.
- Protect sprinklers during storage, transport and handling as well as before, during and after installation. Refer to Viking's Care and Handling of Sprinklers Bulletin Form No. F_091699[2].
- Proper transit, storage and installation of sprinklers in a high-heat environment is a must. Care should be taken to prevent sprinklers from being exposed to ambient heat conditions in excess of those referenced in installation standards.
- Do not stage or store sprinklers on the job site in advance in a non-conditioned space prior to installation.
- Keep sprinklers in the original packaging and check temperature indicators on box label prior to installation. If the indicator has turned black, DO NOT install any product contained in the box. Refer to Viking product return policies.
- Temperatures exceeding the maximum ambient temperature of the sprinkler temperature-rating during storage, transport, handling and installation must be avoided.
- Per NFPA standards 13, 13R, and 13D, sprinklers installed where maximum ambient temperatures are at or over 101 °F (38 °C) through 150 °F (66 °C) shall be intermediate temperature-rated sprinklers. Additionally, if sprinklers are installed in an unventilated concealed space under an uninsulated roof or in an unventilated attic, they shall be of intermediate temperature classification.
- Sprinklers installed where ambient temperatures are at or below 100 °F (38 °C) may be either ordinary or intermediate temperature-rated sprinklers. Refer to NFPA standards 13R 6.2.3.1 and 13D 7.5.6.1.
- Rough-in of sprinkler piping during hot weather conditions should not include the installation of sprinklers unless reasonable ambient temperatures can be maintained. Ambient temperatures that are considered when choosing the temperature rating for a sprinkler should take into account the range of ambient temperatures that are expected from installation through establishment and maintenance of temperature in a conditioned space. Appropriate insulation may be considered. **Example**: An ordinary temperature sprinkler should not be exposed to maximum ambient temperature higher than 100 °F (38 °C) or more. Refer to NFPA 13, Table 6.2.5.1, NFPA 13R, 6.2.3.1 and NFPA 13D, 7.5.6.1.
- CPVC fire sprinkler products exposed to high ambient temperatures (e.g. installed in unventilated, concealed spaces such as attics) should be insulated to maintain a cooler environment. Refer to Viking Plastics Installation and Design Manual, Form No. F_080712[2], for care and handling procedures.
- Protect all sprinklers and connecting CPVC piping in attic spaces and unvented concealed spaces from excessive heat exposure above 100 °F (38 °C). To separate excessive attic heat, properly tent and fully insulate all pipe in unconditioned spaces.
- Pressure relief valves should be installed on wet sprinkler systems where there is a risk of over-pressurization of a checked water supply, due to thermal expansion. Refer to NFPA 13, 7.1.2.1 and NFPA 13D, A.5.2.2.2.
- Fire sprinkler systems should be installed per current referenced editions of building codes and installation standards adopted in the jurisdiction where work is being performed.


INCORRECT
(Heat exposure)


INCORRECT
(Unconditioned at rough-in)


INCORRECT
(Exposed piping)


INCORRECT
(No pressure relief valve)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

[1]Hot weather condition is defined as temperatures that can reach the maximum ambient temperature-rating of the sprinkler.
[2]Clicking on blue hyperlink will open referenced document.

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING®	BULLETIN	REGULATORY AND HEALTH WARNINGS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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1. DESCRIPTION

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING
STATE OF CALIFORNIA, USA Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.
For more information, go to **www.P65Warnings.ca.gov**

2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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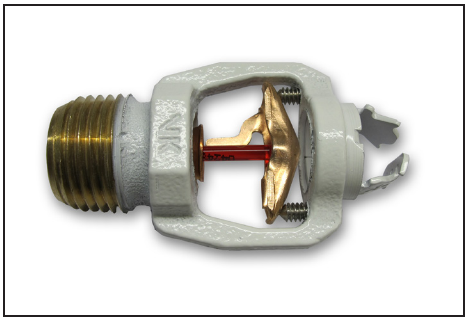
1. DESCRIPTION

Viking Freedom® Residential Horizontal Sidewall Sprinkler VK486 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The sprinkler orifice design, with a K-Factor of 4.0 (57.7 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.



WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2011.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2” (15 mm) NPT
Nominal K-Factor: 4.0 U.S. (57.7 metric†)
† Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-7/16” (62 mm)
Covered by the following US Patent numbers: 7,854,269 and 7,712,218

Material Standards:
Frame Casting: QM Brass and Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screws: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 17315
Order Sprinkler VK486 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK486 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 17315AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13655W/B* (available since 2006)
*A ½” ratchet is required (not available from Viking).

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the yoke, pip cap, and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking Sprinkler VK486 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

Sprinkler Finishes: Brass, Chrome, White Polyester, and Black Polyester.

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

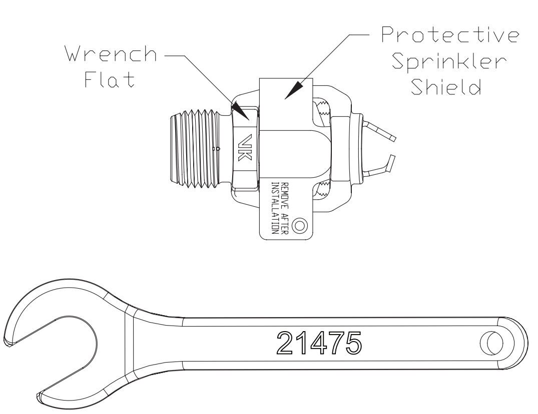

Figure 1:
Standard Sprinkler Wrench 21475M/B

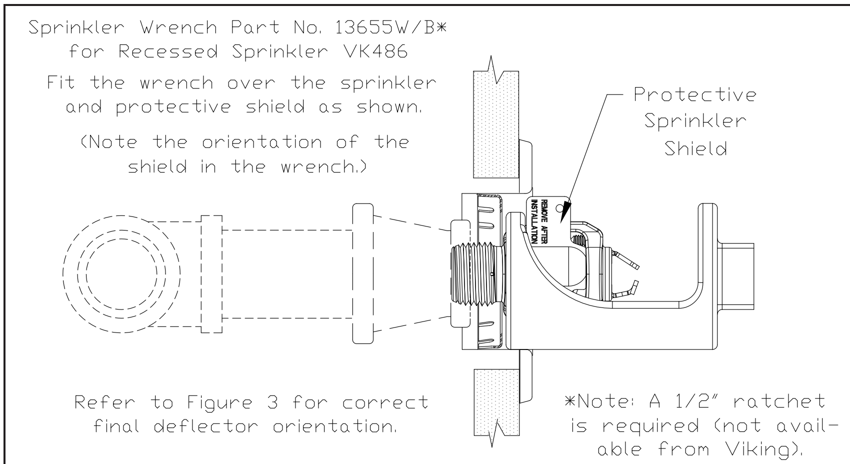

Figure 2:
Wrench 13655W/B for Recessed Sprinkler VK486

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Approval Chart
Viking VK486, 4.0 K-Factor Residential Horizontal Sidewall Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current Editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric [2]		Inches	mm
17315	VK486	1/2	15	4.0	57.7	175 psi (12 bar)	2-7/16	62

Max. Coverage Area [3] Width X Length Ft. X Ft. (m X m)	Max. Spacing Ft. (m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Top of Deflector to Ceiling	Installation Type	Listings and Approvals [4]				Minimum Spacing Ft. (m)
		Flow [3] GPM (L/min)	Pressure [3] PSI (bar)	Flow [3] GPM (L/min)	Pressure [3] PSI (bar)			C-UL-US-EU [5]	VdS	NYC	NSF[9]	
12 X 12 (3.7 X 3.7)	12 (3.7)	11 (41.7)	7.6 (0.52)	11 (41.7)	7.6 (0.52)	4 to 6 inches	Standard surface-mounted escutcheons or recessed with the Micromatic® Model E-1, E-2, E-3, or G-1 Recessed Escutcheon	See Footnote 6 and 10.	See Footnote 6.	See Footnote 7.	See Footnote 6.	8 (2.4)
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)							
16 X 16 (4.9 X 4.9)	16 (4.9)	13 (49.3)	10.6 (0.73)	13 (49.3)	10.6 (0.73)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
16 X 22 (4.9 X 6.7)	16 (4.9)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
20 X 20 (6.1 X 6.1)	20 (6.1)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
12 X 12 (3.7 X 3.7)	12 (3.7)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)	6 to 12 inches						
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	13 (49.3)	10.6 (0.73)							
16 X 16 (4.9 X 4.9)	16 (4.9)	14 (53.0)	12.3 (0.84)	14 (53.0)	12.3 (0.84)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
16 X 22 (4.9 X 6.7)	16 (4.9)	26 (98.4)	42.3 (2.91)	26 (98.4)	42.3 (2.91)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
20 X 20 (6.1 X 6.1)	20 (6.1)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							

Footnotes

1 Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.
2 Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3 For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
4 This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
5 Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
6 Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester [8]
7 Meets New York City requirements, effective July 1, 2008.
8 Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.
9 UL Classified to : NSF/ANSI Standard 61, Drinking Water System Components (MH48034)
10 Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Horizontal Sidewall Sprinkler VK486 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).
- The VK486 horizontal sidewall sprinkler deflector shall be located a minimum of 1-1/4" (31.8 mm) and a maximum of 6" (152 mm) from the wall on which it is installed.

DEFLECTOR POSITION: Install sprinkler VK486 with the leading edge of the deflector oriented parallel to the ceiling and the sprinkler frame arms oriented perpendicular to the ceiling (see Figure 4). **THE TOP SURFACE OF THE DEFLECTOR IS MARKED "TOP".** The sprinkler must be oriented as shown in Figure 3 below.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080190, F_080814, and F_080415 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

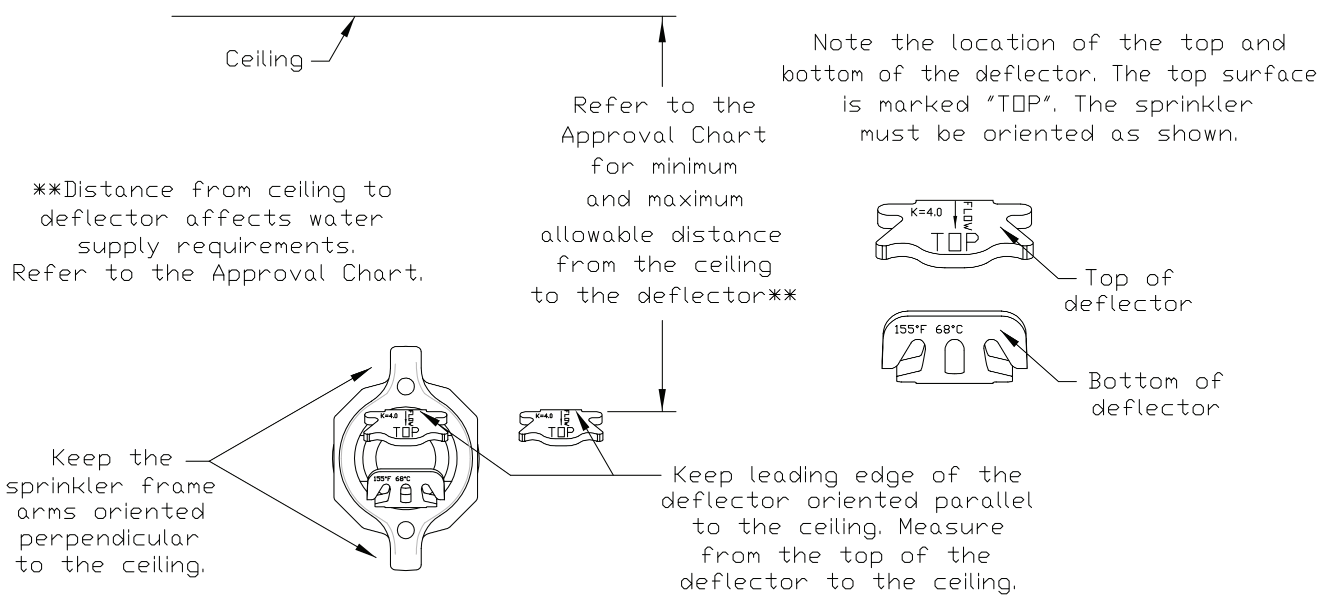

Figure 3:

Correct Orientation of the Deflector

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TECHNICAL DATA

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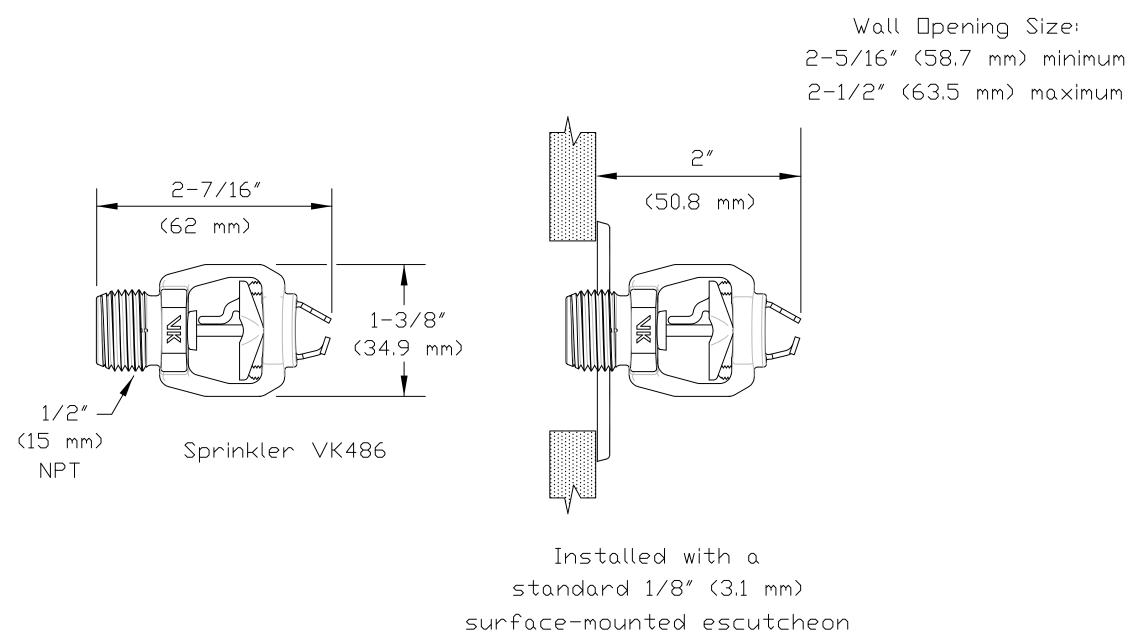

Figure 4:
Sprinkler VK486 Dimensions with a Standard Escutcheon and the Model F-1 Adjustable Escutcheon

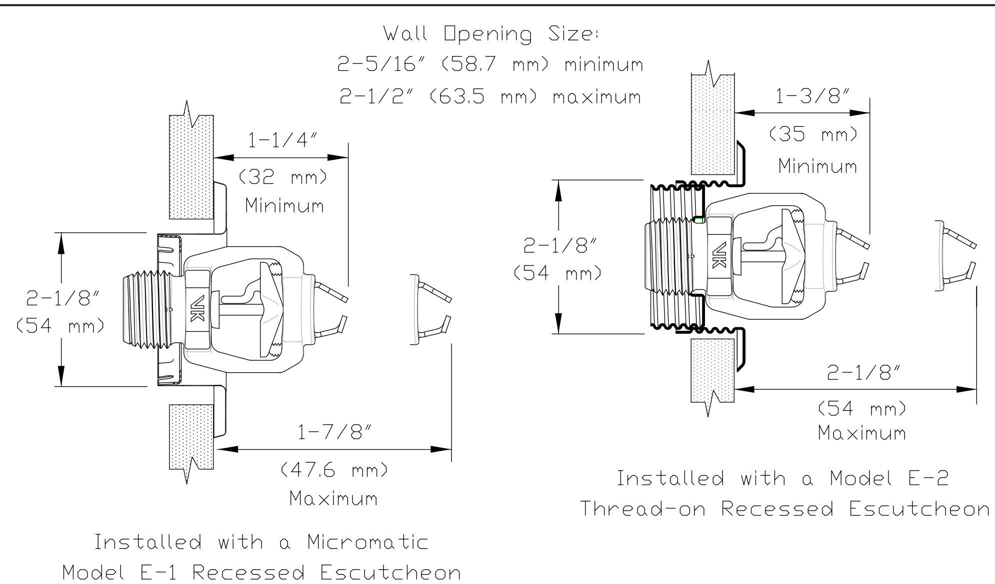

Figure 5:
Sprinkler VK486 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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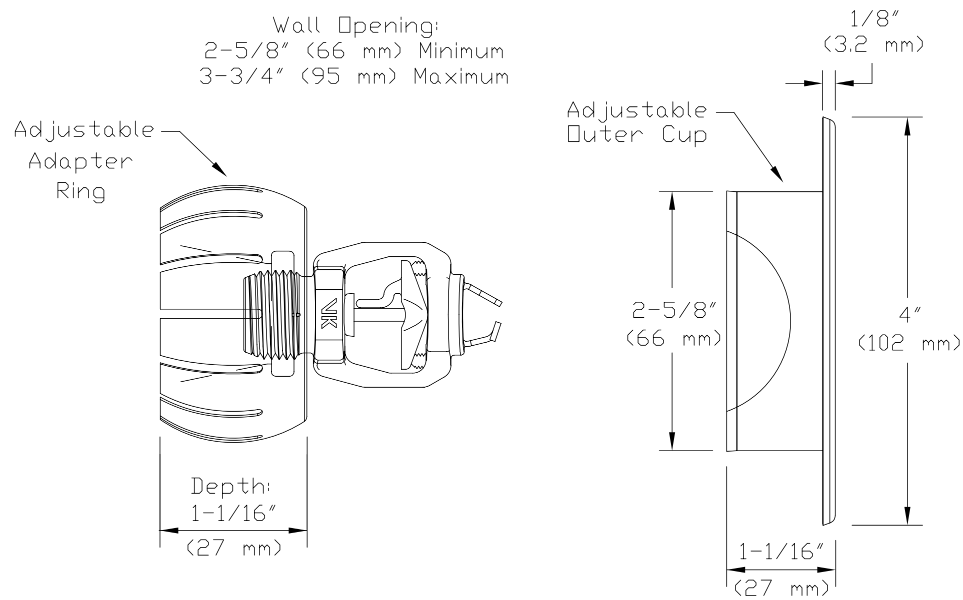

Figure 6: Sprinkler VK486 Dimensions with the Model G-1 Escutcheon

VIKING®	TECHNICAL DATA	FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

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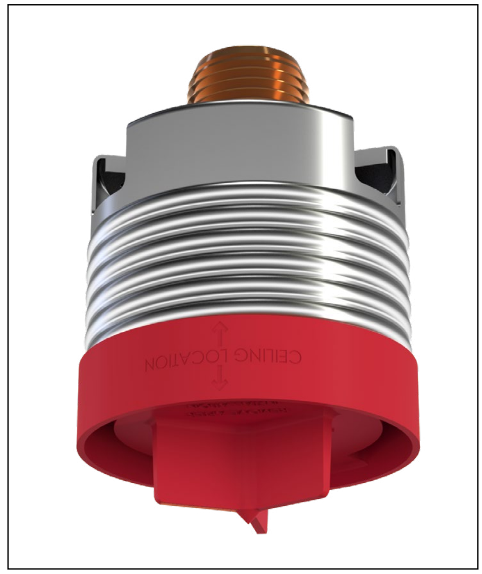
1. DESCRIPTION

Viking Freedom® Residential Concealed Pendent Sprinkler VK494 is a small thermosensitive, glass-bulb residential sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The orifice design allows the sprinkler's efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.



Features:

- K4.9 (70.6 metric)
- Fast response glass bulb operating element.
- Integral threaded adapter cup accepts push-on or thread-on cover plates.
- Low-profile, small diameter, removeable cover plates offer almost flush appearance upon installation and allow ease of maintenance.
- Protective cap prevents damage during installation and finishing and keeps errant overspray from coating internal parts.
- Various finishes available to meet design requirements.
- Optional Electroless Nickel PTFE (ENT) coating provides corrosion resistance (see Approval Chart).

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

c UL us EU

cULusEU Listed: Category VKKW
Refer to the Approval Charts and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-factor: 4.9 U.S. (70.6 metric*)
Glass-bulb fluid temperature rating: to -65 °F (-55 °C)

* Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:
Sprinkler Body: Brass UNS-C84400 or QM Brass
Deflector: Phosphor Bronze UNS-C51000
Deflector Pins: Stainless Steel UNS-S30200
Button: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000
Belleville Spring Sealing Assembly: Beryllium Nickel Alloy, coated on both sides with PTFE Tape
Cover Adapter: Cold Rolled Steel JIS G3141 and Carbon Steel UNS-G10100 (per JIS G3141)
Shipping Cap: High Density Polyethylene
Vibration damper ring: Buna-N Rubber SAE AS-568-017

Cover Plate Materials:
Cover Plate Assembly: Copper UNS-C11000 and Brass UNS-C26800 or Stainless Steel UNS-S30400
Spring: Beryllium Nickel
Solder: Eutectic

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, when the temperature around the sprinkler approaches the cover plate's nominal temperature rating, the cover plate detaches and releases the deflector. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand. When the temperature reaches the sprinkler's nominal temperature rating, the glass bulb shatters releasing the yoke, pip cap assembly and sealing spring. Water begins flowing through the sprinkler orifice and strikes the deflector forming a uniform spray pattern over a specific area of coverage, which is determined by the water supply pressure at the sprinkler, in order to extinguish or control the fire.

VIKING®	TECHNICAL DATA	FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinkler Model VK494 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: SPRINKLER ORDERING INFORMATION

Ordering Instructions:
(1) Select a sprinkler base part number
(2) Add the suffix for the desired finish
(3) Add the suffix for the desired sprinkler temperature rating
(4) Order a cover plate (Must be ordered separately; refer to Table 2)

Example:
23707AE = 200 °F (93 °C) Temperature rated sprinkler with a standard brass finish.

Sprinkler Base Part Number[1]	Size	1: Finishes		2: Temperature Ratings[7]			
	NPT Inch	Description	Suffix	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature[2]	Suffix
23707	1/2	Brass	A	155 °F (68 °C)	Red	100 °F (38 °C)	B
		ENT[5,6]	JN	200 °F (93 °C)	Green	150 °F (65 °C)	E
		Corrosion resistant sprinkler finish: ENT					

Accessories

Sprinkler Wrenches and tools (See Figure 1):
- A. Installation wrench: 24339[3]
- B. Protective cap removal tool: 24340[4]
- C. Concealed Cover Plate Installer Tool Part Number: 14412[8] (available since 2007)
- D. Large Concealed Cover Plate Installer Tool Part No. 14867[8] (available since 2007)

Sprinkler Cabinet:
Holds up to 6 sprinklers: Part number 01731A (available since 1971).

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
2. Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
3. Requires a ½" ratchet (not available from Viking).
4. Optional for removal of the protective cap; requires a small piece of CPVC pipe or similar to attach.
5. cULus Listed as corrosion resistant.
6. The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway. For ENT coated sprinklers, the Belleville spring is exposed.
7. The sprinkler temperature rating is stamped on the deflector.
8. The installer tool is for push-on style cover plates only.
9. Requires a peice of 1" PVC pipe or similar to attach.

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TABLE 2: COVER PLATE ORDERING INFORMATION

Instructions:
(1) Select a cover plate base part number
(2) Add the suffix for the desired finish
(3) Add the suffix for the required cover plate nominal rating.

Example:
23190MC/W = 165 °F (74 °C) Temperature rated, 2-3/4” (70 mm) diameter, thread-on style, round cover plate with a painted white finish.

1: Select a Cover Plate Base Part Number[3]

Thread-On Style			Push-On Style		
Base Part Number[1]	**Size Inch (mm)**	**Type**	**Base Part Number**	**Size Inch (mm)**	**Type**
23190	2-3/4 (70)	Round	23447	2-3/4 (70)	Round
23174	3-5/16 (84)	Round	23463	3-5/16 (84)	Round
23179	3-5/16 (84)	Square	23482	3-5/16 (84)	Square
23193[5]	2-3/4 (70)	Stainless Steel Round	23455[5]	2-3/4 (70)	Stainless Steel Round
23183[5]	3-5/16 (84)	Stainless Steel Round	23473[5]	3-5/16 (84)	Stainless Steel Round

2: Select a Finish

Description	Suffix[5]
Polished Chrome	F
Brushed Chrome	F-/B
Bright Brass	B
Antique Brass	B-/A
Brushed Brass	B-/B
Brushed Copper	E-/B
Painted White	M-/W
Painted Ivory	M-/I
Painted Black	M-/B

3: Temperature Rating Matrix[1,2]

Cover Plate Nominal Rating (Required)	Temperature Classification	Sprinkler Nominal Rating	Sprinkler Maximum Ambient Ceiling Temperature[2]	Suffix
135 °F (57 °C)	Ordinary	155 °F (68 °C)	100 °F (38 °C)	**A**
165 °F (74 °C)	Intermediate	200 °F (93 °C)	150 °F (65 °C)	**C**

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
2. The sprinkler temperature rating is stamped on the deflector.
3. Based on NFPA-13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
4. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
5. Stainless Steel versions are not available with any finishes or paint.

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TECHNICAL DATA

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Installation Wrench

Cap Removal Tool

Figure 1: Sprinkler Wrench and Cap Removal Tool

All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates the custom color and will have a representative sample (a paint dot) of the paint on the label.

Figure 2: Identification of Custom Paint

Figure 3: Square Cover Assembly

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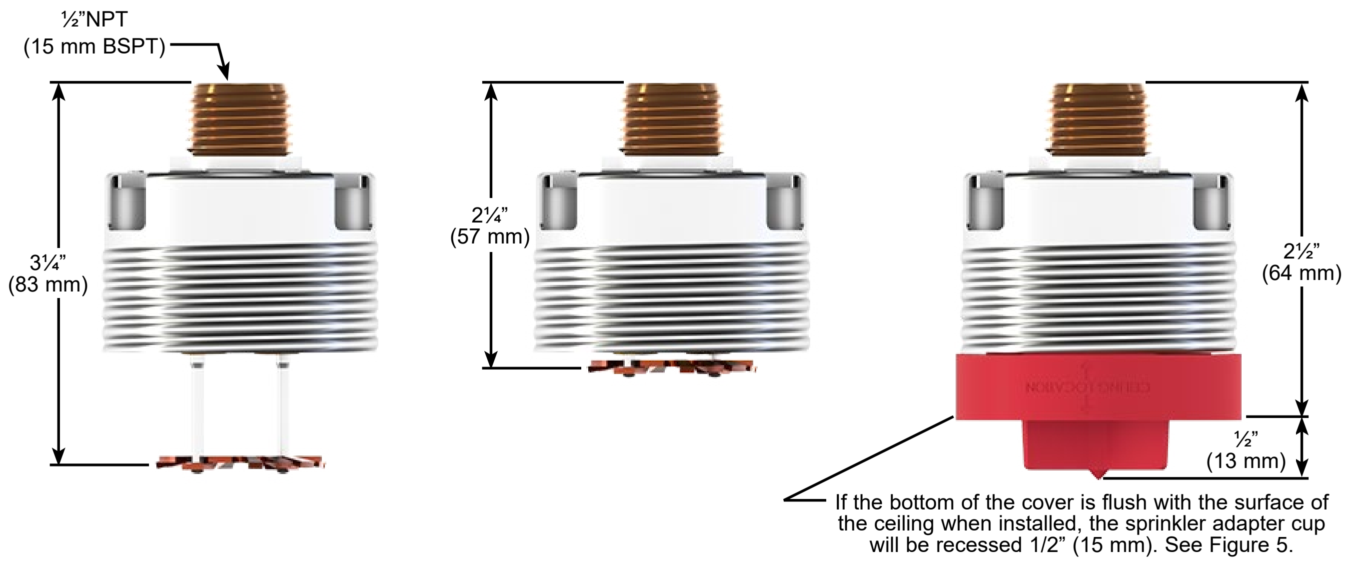
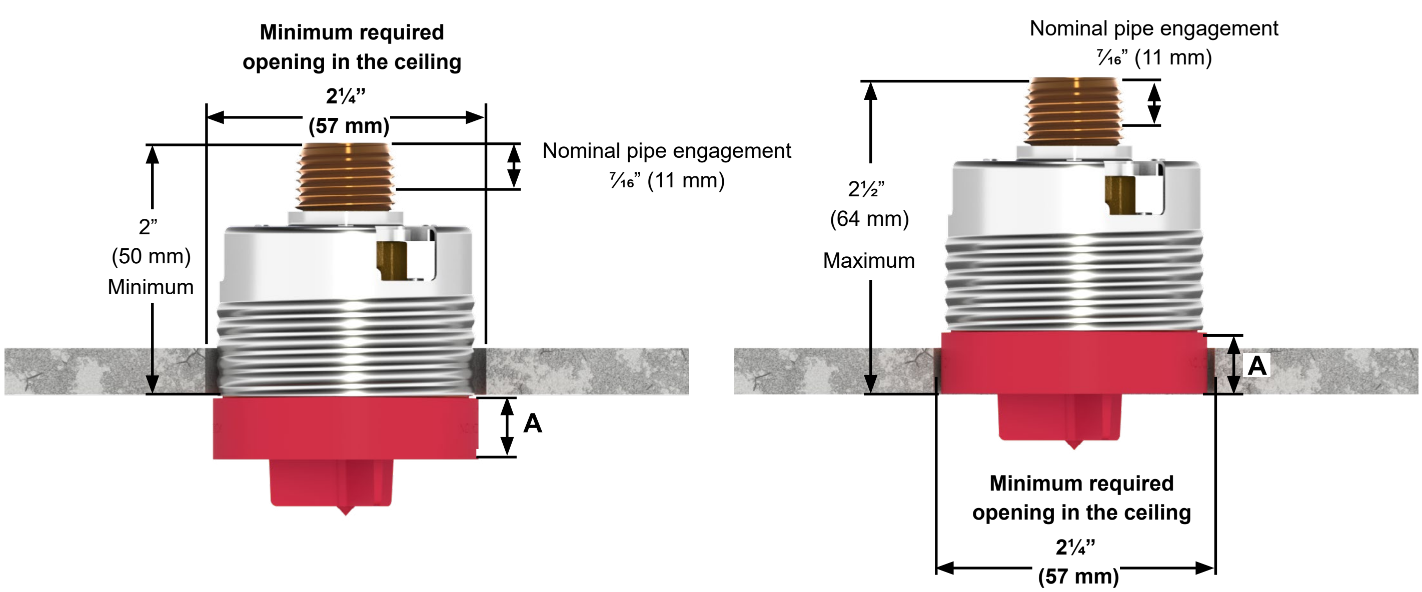


Figure 4: Sprinkler Dimensions



Install the sprinkler so the finished surface of the ceiling lines up within the marked ½" (13 mm) range on the protective cap (A).

Figure 5: Sprinkler Installation Dimensions

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Approval Chart
Viking VK494, 4.9 K-factor Residential Concealed Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the Design Criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	Thread Size			Nominal K-factor		Maximum Water Working Pressure
		NPT	BSPT		U.S.	metric [2]	
20759	VK494	1/2"	15 mm		4.9	70.6	175 psi (12 bar)

Max. Coverage Area [6] W X L Ft. X Ft. (m X m)	Flow GPM (LPM)	Pressure PSI (bar)	Deflector to Ceiling	Installation Type	Listings and Approvals[3,5]	Minimum Spacing Ft. (m)
	155 °F (68 °C), 200 °F (93 °C) Temperature Rated Sprinklers				cULusEU[4]	
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	Refer to Figure 2	Concealed with Cover Plate Assembly. See Footnote 7.	See Footnotes 8, & 9	8 (2.4)
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)				
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)				
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)				
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)				

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price schedule.
2. Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3. This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
4. Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
5. Meets New York City requirements, effective July 1, 2008.
6. For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
7. Other paint colors are available on request with the same listings as the standard finish colors. Stainless Steel cover plates are not available with any finishes or paint. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information. Custom colors are indicated on a label inside the cover assembly. Refer to Figure 2.
8. Accepted Cover Plate Finishes are: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black [7].
9. C-UL-US-EU Listed as corrosion resistant - Electroless Nickel PTFE (ENT)

DESIGN CRITERIA
(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Concealed Pendent Sprinkler VK494 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 9.5.2.1 or 10.2.4.1.2 of the current edition of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

IMPORTANT: Always refer to Bulletin Form No. F_080415 - Best Practices for Residential Sprinkler Handling and Installation. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

TECHNICAL DATA

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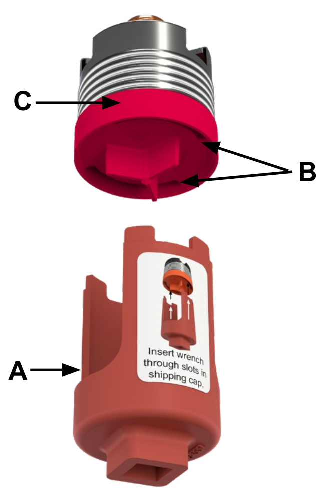
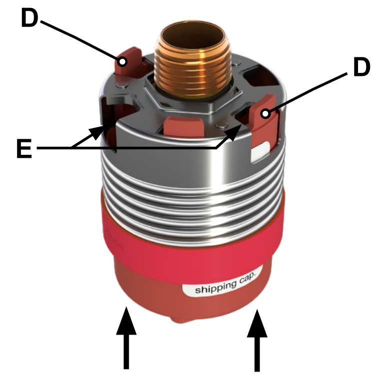
USE ONLY the designated sprinkler wrenches shown in this document. Permanent damage to the sprinkler assembly can occur if the proper wrench is not used. Other sprinkler wrenches available from Viking may fit into the sprinkler adapter cup; however, only the wrenches shown here are designed to properly install this sprinkler.

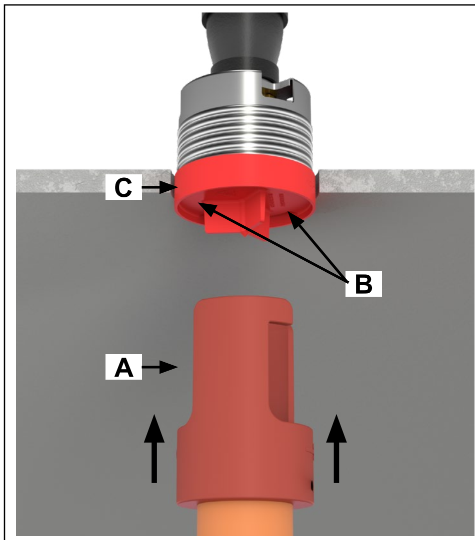


Step 1:
Insert the wrench (A) into the slots (B) on the protective cap (C).

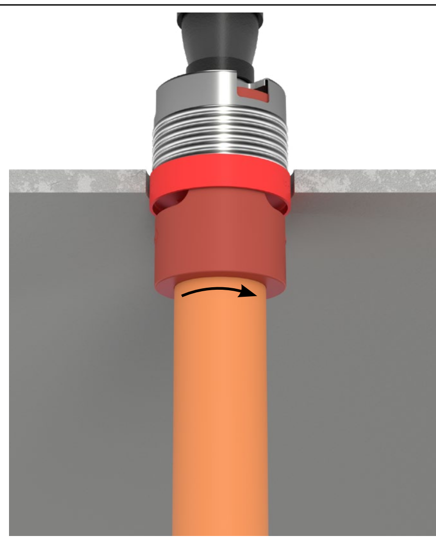


Step 2:
Rotate the wrench slightly in either direction until the tines on the wrench (D) line up with the vent openings (E) on the adapter cup and lock into place. NOTE: A leak tight seal must be achieved. Turn the sprinkler clockwise 1 to 1-½ turns past finger-tight.

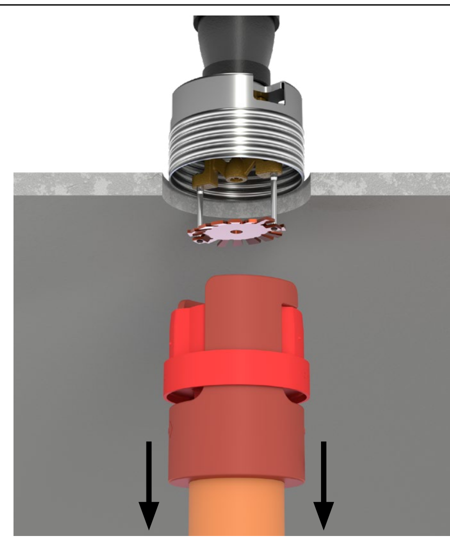
Figure 6: Using the Sprinkler Wrench



Step 1:
Attach a peice of plastic pipe as shown and tighten the thumb screw (not shown); then, insert the tool (A) into the slots (B) in the protective cap (C).



Step 2:
Rotate the tool slightly to lock into place.



Step 2:
Gently, pull downward to remove the protective cap. The deflector will slide downwards on the pins.

Figure 7: Using the Cap Removal Tool

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

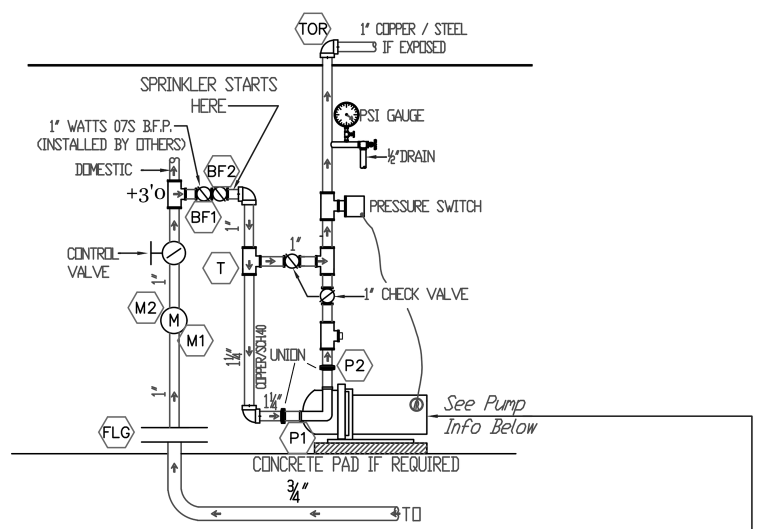
Minimum

Maximum

Install the cover plate by inserting the adpater into the adapter cup and pushing or threading into place (depending on style). Snug the cover plate in place by rotating clockwise. Ensure the cover plate is flush with the ceiling as shown to allow airflow through the sprinkler assembly.

Figure 8: Installing the Cover Plate

FLOW TEST INFO:	
TEST DATE	6-18-2021
HYD. ELEV.	606.00
HYD. ADDRESS	FAIRCHILD AAVENUE
FLOW:	1588 gpm
STATIC:	53.00 PSI
RESID:	35.00 PSI



13D MANIFOLD DETAIL

N.T.S.

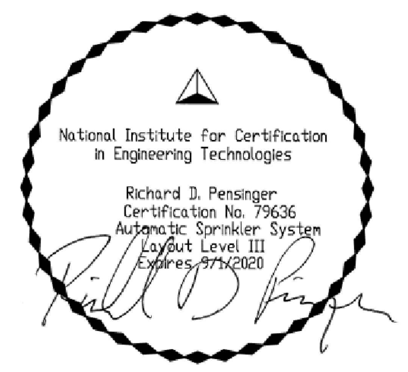
PUMP INFO:	
BRAND:	FLO-TECH
MODEL:	FP5500 SERIES
HORSEPOWER:	1 HP
VOLTAGE:	115/230
PHASE:	1 Phase
SUCT. PIPE:	1 1/4"
DISCH. PIPE:	1"
PUMP PERFORMANCE:	
20 gpm = 103.0 Total Hd in Ft X .433 = 45.0 psi	
28 gpm = 94.0 Total Hd in Ft X .433 = 41.0 psi	

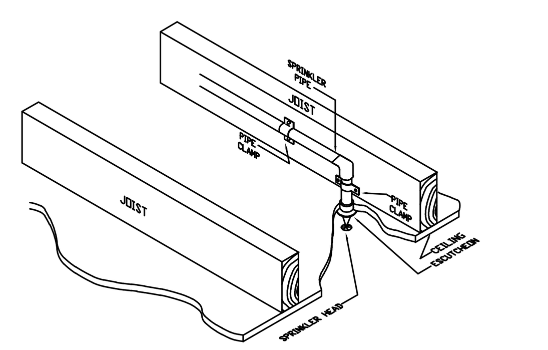
1 PENDENT

FILE .sdf	: 1 PENDENT
HAZARD	: NFPA-13D
DESIGN AREA	: 2ND FLR. REMOTE
AREA PER HEAD	: 20 X 20
# OF HEADS	: 1
DEMAND	: 20.0 GPM @ 40.29 PSI @ PUMP

2 PENDENT

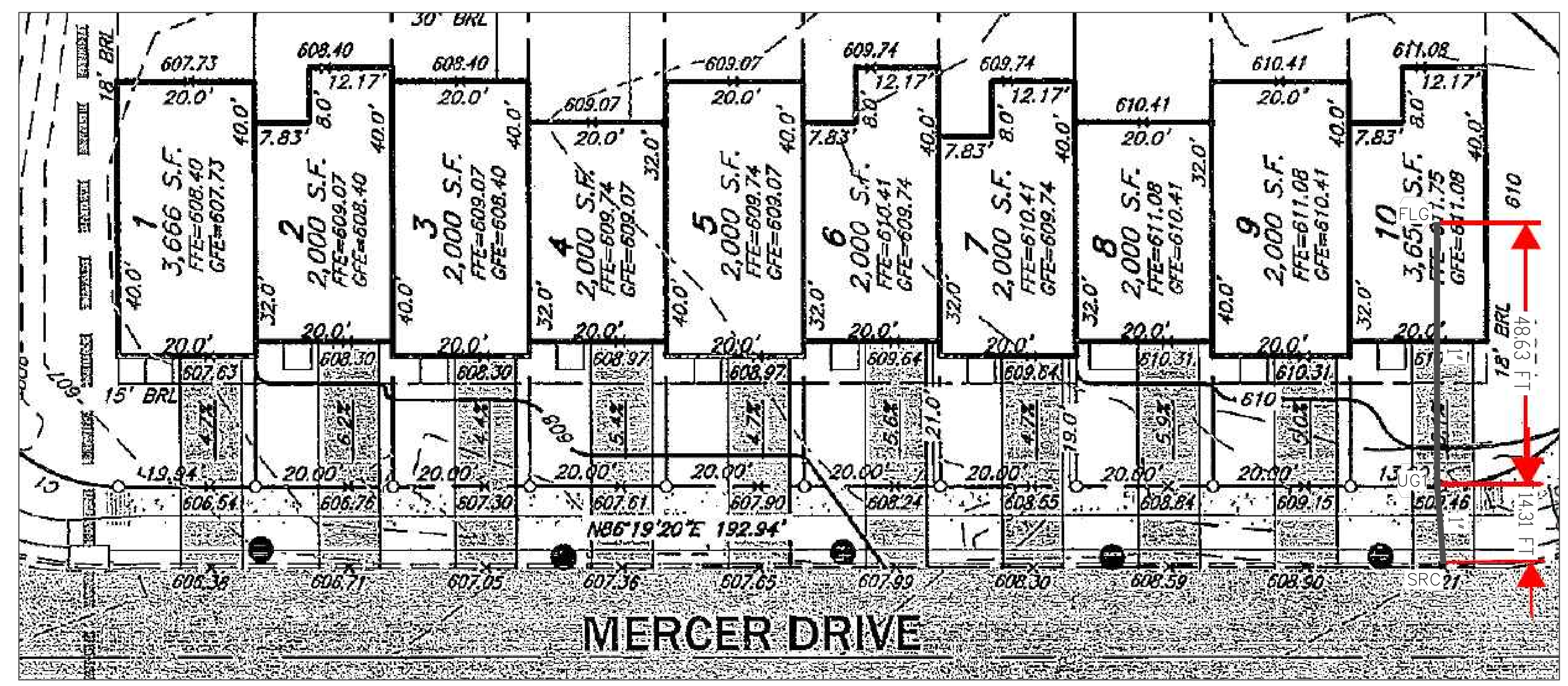
FILE .sdf	: 2 PENDENT
HAZARD	: NFPA-13D
DESIGN AREA	: 2ND FLR. REMOTE
AREA PER HEAD	: 16 X 16
# OF HEADS	: 2
DEMAND	: 26.2 GPM @ 37.18 PSI @ PUMP





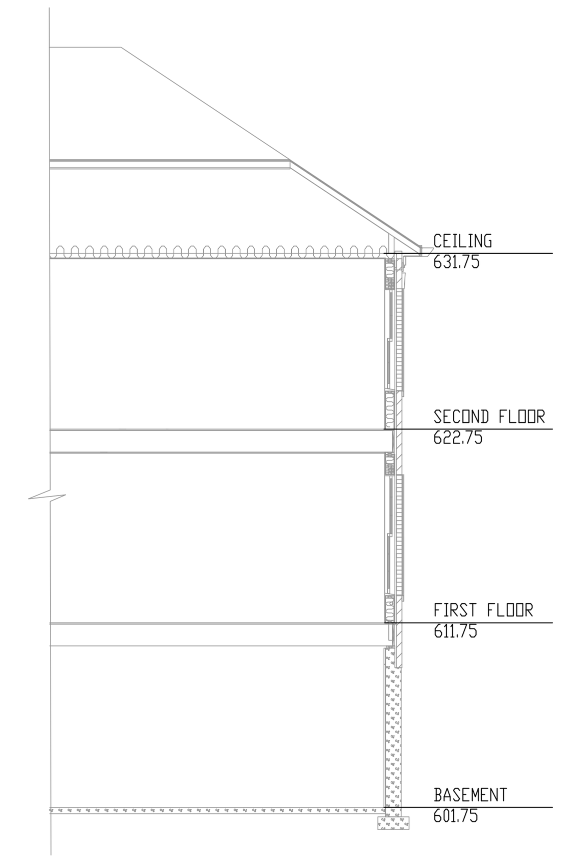
SPRINKLER RESTRAINT 2

NOT TO SCALE



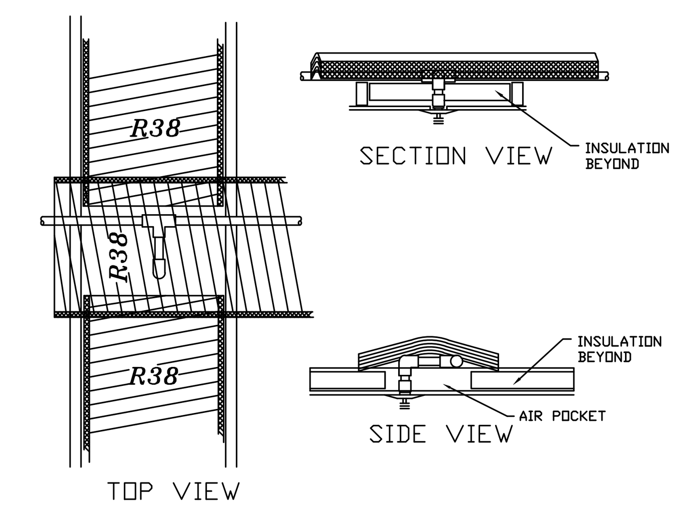
SITE PLAN

N.T.S.



ELEVATION VIEW

SCALE: 1/8"=1'-0"



ATTIC INSULATION DETAIL 1

NOT TO SCALE

CPVC HANGER

SPACING

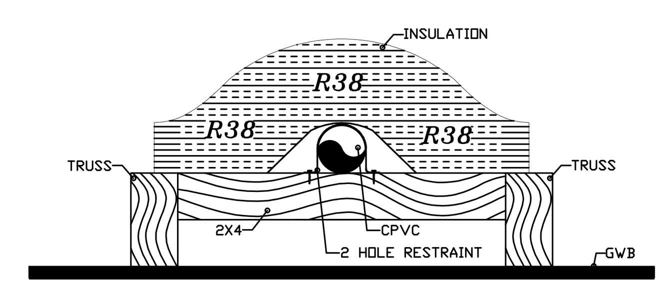
PIPE DIA.	DISTANCE BETWEEN HANGER'S
3/4"	5'-6"
1"	6'-0"
1 1/4"	6'-6"
1 1/2"	7'-0"
2"	8'-0"
2 1/2"	9'-0"
3"	10"-0"

SPRINKLER OBSTRUCTION GUIDELINES

Table 8.2.5.4.2 Position of Sprinklers to Avoid Obstructions to Discharge (Residential Upright and Pendent Spray Sprinklers) NFPA 13D 2016

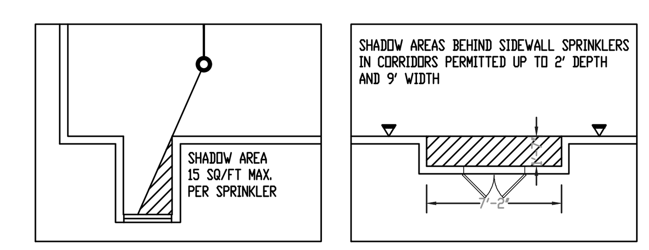
Distance From Sprinkler to Side of Obstruction (in.)	Maximum Allowable Distance of Deflector above Bottom of Obstruction (in.)
Less than 1 ft	0
1 ft to less than 1 ft 6 in	0
1 ft 6 in to less than 3 ft	1
3 ft to less than 4 ft	3
4 ft to less than 4ft 6 in	5
4 ft 6 in to less than 6 ft	7
6 ft to less than 6 ft 6 in	9
6 ft 6 in to less than 7 ft	11
7 ft or more	14

For SI units, 1 in. = 25.4 mm; 1 ft = 0.3048 m.



ATTIC INSULATION DETAIL 2

NOT TO SCALE



SHADOW AREA DETAIL

GENERAL NOTES

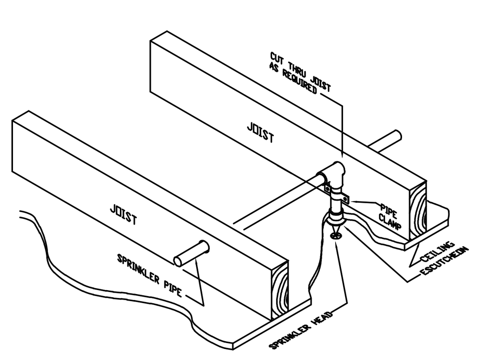
1. DWELLING UNIT SHALL HAVE A COMPLETE FIRE PROTECTION SYSTEM IN COMPLIANCE WITH STATE AND LOCAL CODES AND REGULATIONS AND N.F.P.A.-13D 2016 EDITION.
2. ALL MATERIALS AND METHODS OF INSTALLATION SHALL BE IN COMPLIANCE WITH N.F.P.A.-13D
3. EXPOSED SPRINKLER PIPING LOCATED IN THE ATTIC SPACE SHALL BE COVERED WITH INSULATION (R-38) PLACED OVER THE PIPING TO PREVENT FREEZING. (INSULATION BY OTHERS).
4. ALL CPVC PIPE AND FITTINGS SHALL BE UL LISTED AND FM APPROVED.
5. CPVC HANGER SPACING IN COMPLIANCE WITH N.F.P.A.
6. ALL PIPING SHALL BE CPVC UNLESS NOTED OTHERWISE.
7. NO STORAGE ROOM IN ATTIC
8. UNPROTECTED CLOSETS SHALL NOT CONTAIN MECHANICAL EQUIPMENT.
9. WATER METERS SHALL BE (1") IN. UNLESS OTHERWISE NOTED.
10. SPRINKLER CONNECTIONS SHALL BE ON THE HOUSE SIDE OF WATER METER.

HEAT SOURCES

NFPA 13D 2016

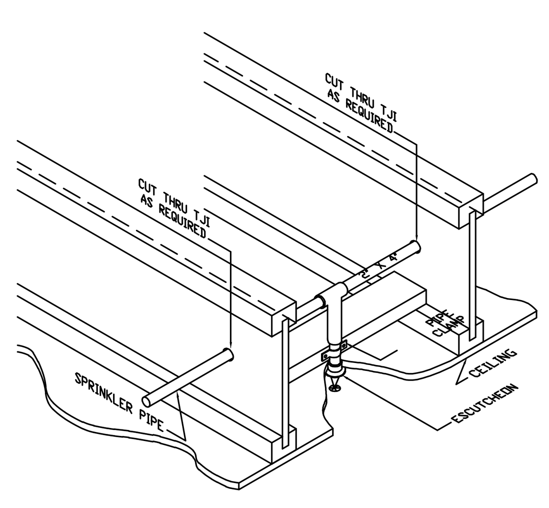
HEAT SOURCE	Minimum Distance from Edge of Source to Ordinary-Temperature Sprinkler in.	mm.	Minimum Distance from Edge of Source to Intermediate-Temperature Sprinkler in.	mm.
Side of open or recessed fireplace	36	914	12	305
Front of recessed fireplace	60	1524	36	914
Coal or wood burning stove	42	1067	12	305
Kitchen range	18	457	9	229
Wall oven	18	457	9	229
Hot air flues	18	457	9	229
uninsulated heat ducts	18	457	9	229
uninsulated hot water pipes	12	305	6	152
Side of ceiling/wall mounted hot air diffusers	24	607	12	305
Front of wall mounted hot air diffusers	36	914	18	457
Hot water heater or furnace	6	152	3	76
Light fixture				
0W/250W bulb	6	152	3	76
250W/499W	12	305	6	152

Lot	House Type	Permit	Address	
1	York II	B-20213153	900	Mercer Drive
2	York II	B-20213154	904	Mercer Drive
3	York II	B-20213155	906	Mercer Drive
4	York II	B-20213156	908	Mercer Drive
5	York II	B-20213157	910	Mercer Drive
6	York II	B-20213158	912	Mercer Drive
7	York II	B-20213159	914	Mercer Drive
8	York II	B-20213160	916	Mercer Drive
9	York II	B-20213161	918	Mercer Drive
10	York II	B-20213162	922	Mercer Drive



SPRINKLER RESTRAINT 1

NOT TO SCALE



TJI RESTRAINT

NOT TO SCALE

SPRINKLER SPACING

Type	No. Head/Rm.	Spacing	Slope
Pendent	2+	16x16	8/12
Pendent	1	20x20	8/12
Sidewall	2+	16x16	8/12

TOTAL SPRINKLERS THIS DRAWING

NOEL'S FIRE PROTECTION

FOREMAN NOTES:

1. CHANGES TO THIS PRINT MUST BE FOLLOWED UP WITH ASBUILTS AS THEY ARE MADE AND TAKEN TO THE OFFICE.
2. FOLLOW SPRINKLER SPACING SCHEDULE FOR THIS PRINT.
3. FOLLOW PIPE SCHEDULE FOR THIS PRINT.
4. ANY EXPOSED PIPE TO BE COPPER (M) OR STEEL SCH.10 / SCH.40 U.N.O.

D E S I G N C R I T E R I A

TYPE SYSTEM: ■ WET ☐ DRY NFPA STANDARD: ☐ #13 ☐ #13R ■ #13D

OCCUPANCY: Single Family Home

HAZARD: Light

DENSITY: .05 GPM/S.F.

REMOTE AREA: 2ND FLR S.F.

MAX. S.F./HD. See Note

HOSE REQ'MT.: ☐ 100 ☐ 250 ☐ 500

APPROVING AUTHORITY: City of Hagerstown

PIPE SCHEDULE	PIPE SYMBOLS
1"	RISER/MANIFOLD
1 1/4"	ELBOW DOWN
1 1/2"	BALL VALVE
2"	REVISION
INCOMING FROM STREET	

S P R I N K L E R S U M M A R Y

SYM	TYPE	FINISH	TEMP	ORIF.	"K"	NPT	Mfg.	MODEL#	ESCUTCHEON	QTY.

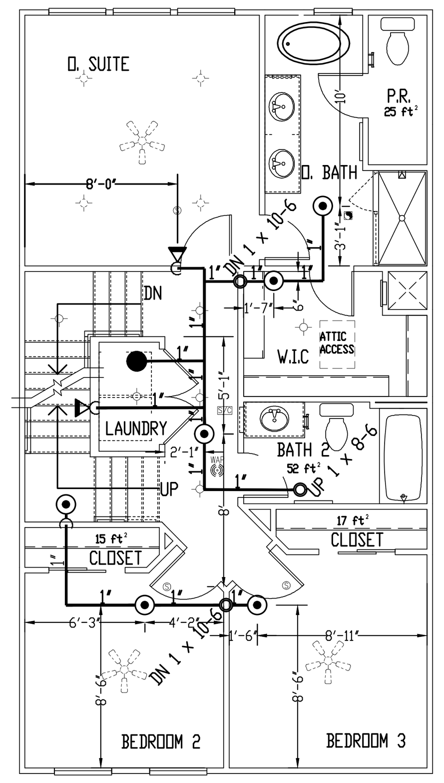
R E V I S I O N S

BY	DESCRIPTION	DATE	#

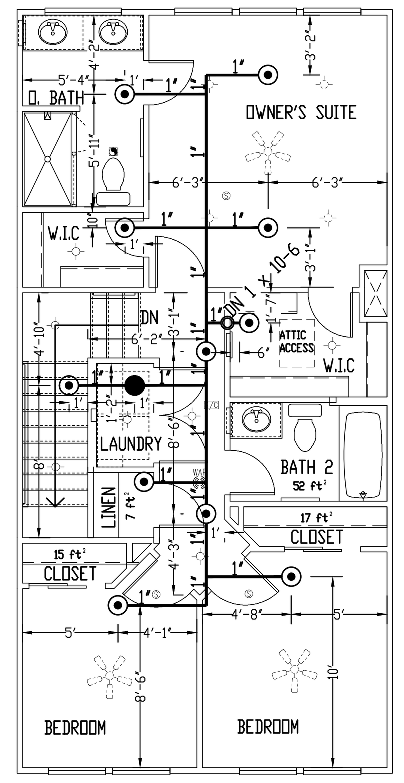
12015 KEMPS MILL ROAD
Williamsport, Md 21795
(240) 366-8287 FAX: (301) 223-8370

CONTRACTOR: Dan Ryan Builders
64 Thomas Johnson Drive; Suite 110
Frederick, MD 21702

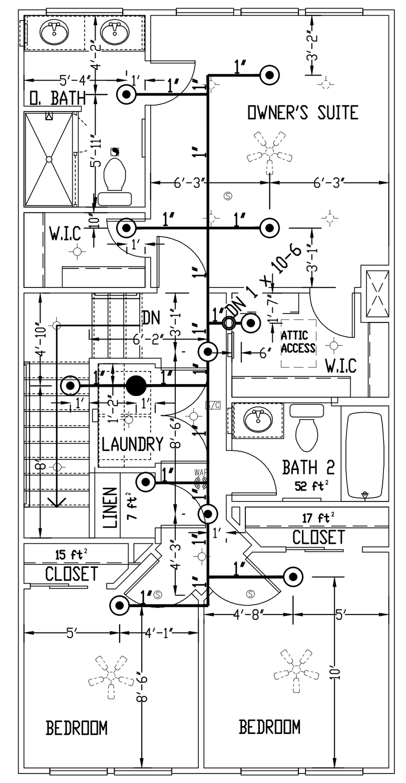
PERMIT #	See Address Block	Model: York II	Job# 366C	SHEET No.
DATE	12-29-2021	Lots 1-10 Fairchild Heighst Towns		1 OF 2
DESIGNER	Cory Andrews	See Address Block		
SCALE	1/8" = 1'-0"	Hagerstown, Maryland 21742		



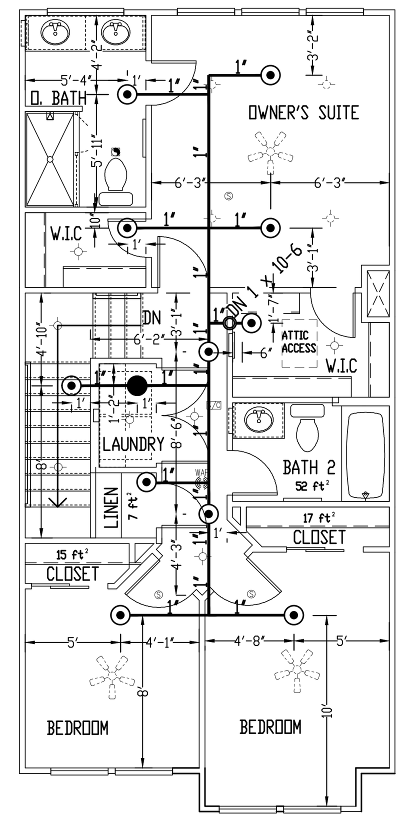
LOT 226 (HALSTON LOFT) @ 3463 WATERSHED BOULEVARD



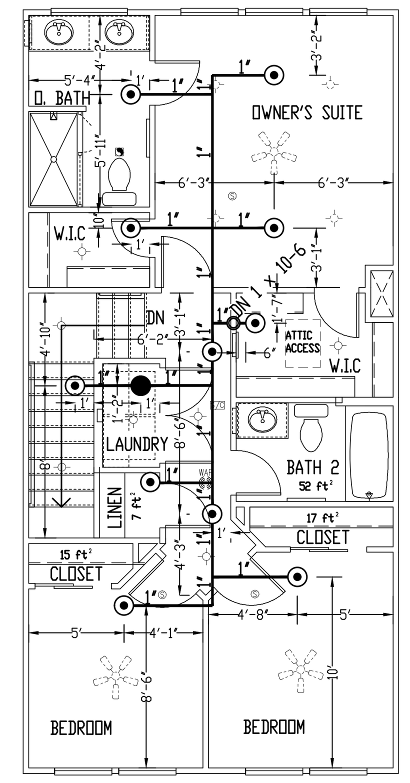
LOT 227 (FRANKTON) @ 3461 WATERSHED BOULEVARD



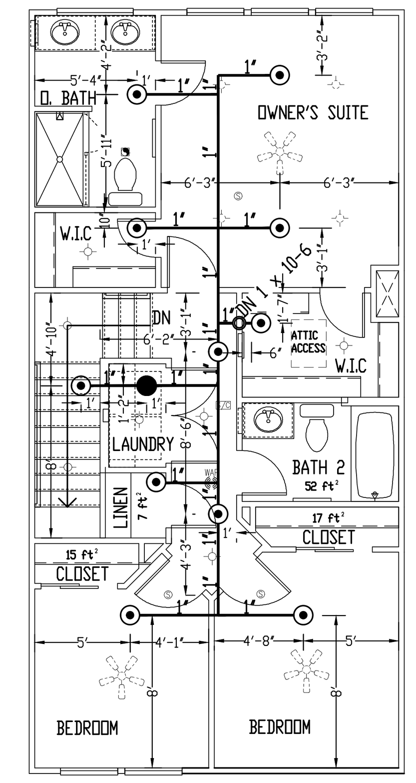
LOT 228 (FRANKTON) @ 3459 WATERSHED BOULEVARD



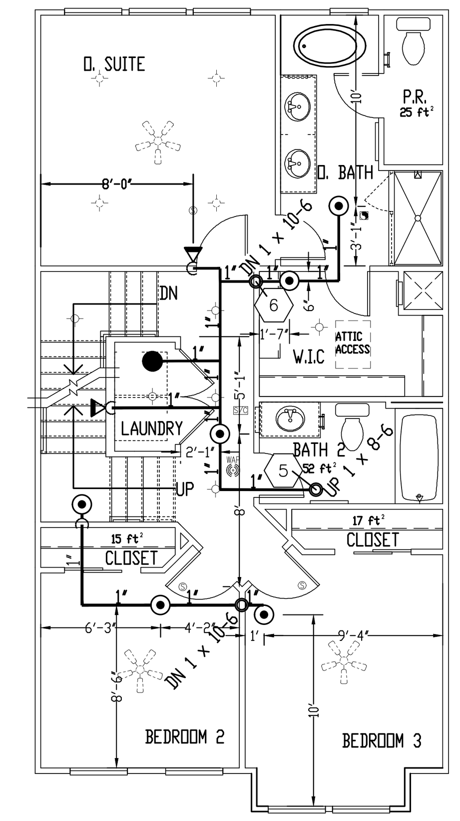
LOT 229 (FRANKTON) @ 3457 WATERSHED BOULEVARD



LOT 230 (FRANKTON) @ 3455 WATERSHED BOULEVARD



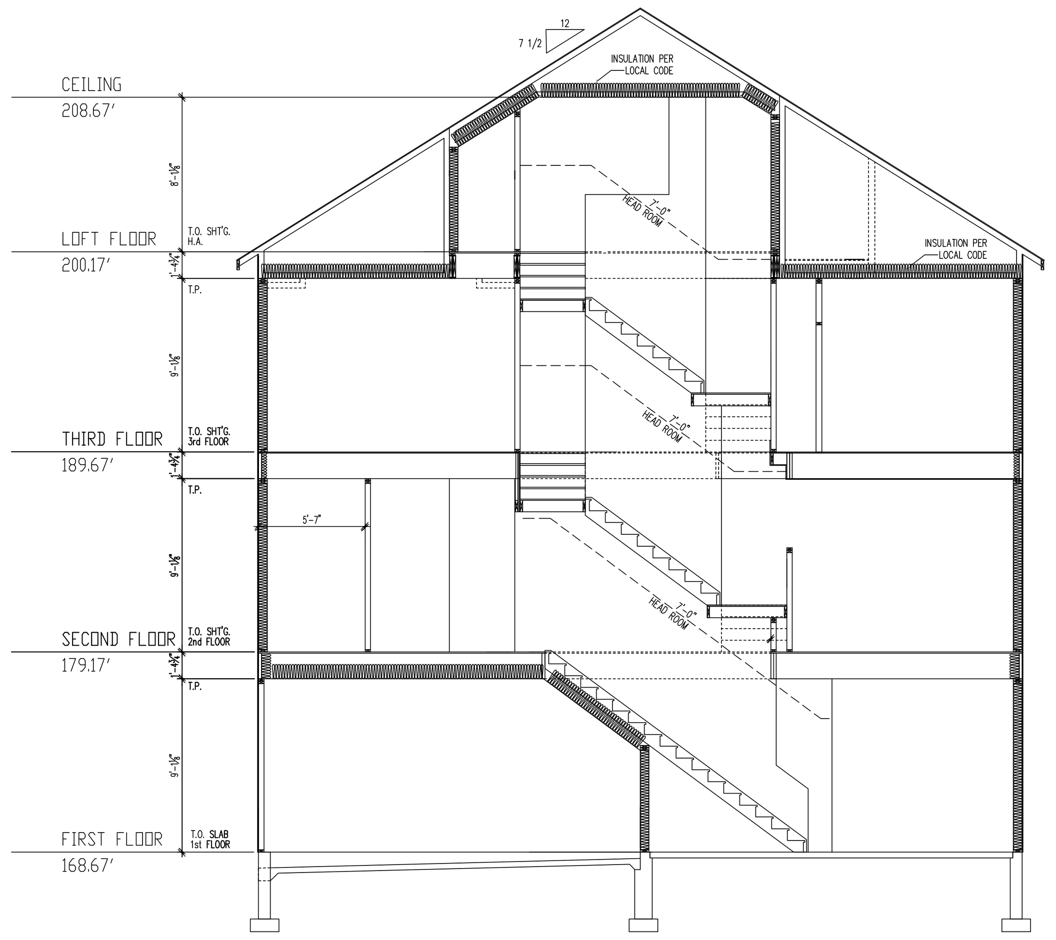
LOT 231 (FRANKTON) @ 3453 WATERSHED BOULEVARD



LOT 232 (HALSTON W/ LOFT) @ 3451 WATERSHED BOULEVARD

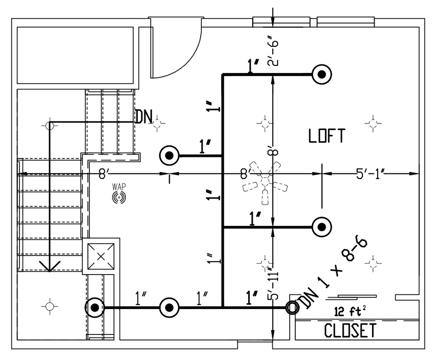
THIRD FLOOR PLAN

SCALE: 1/8"=1'-0"

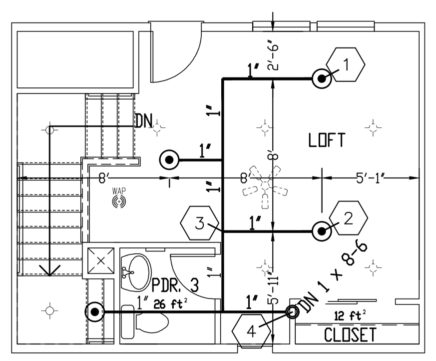


SECTION A-A

SCALE: N.T.S



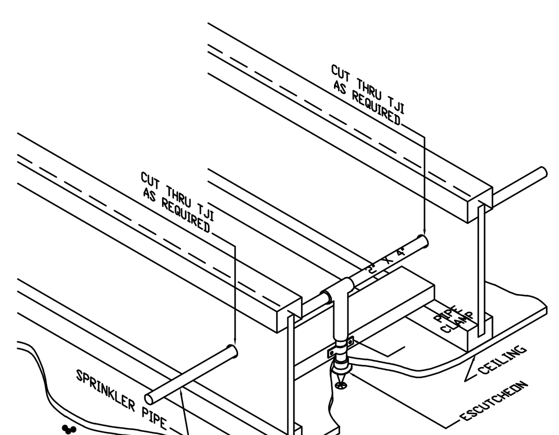
LOT 226 (HALSTON W/ LOFT) @ 3463 WATERSHED BOULEVARD



LOT 232 (HALSTON W/ LOFT) @ 3451 WATERSHED BOULEVARD

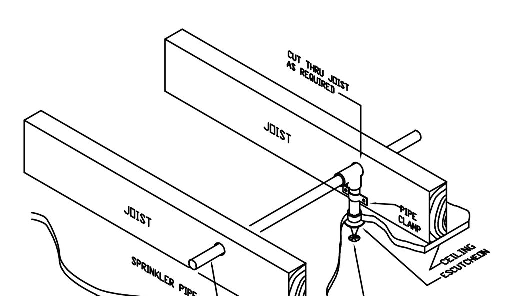
LOFT FLOOR PLAN

SCALE: 1/8"=1'-0"



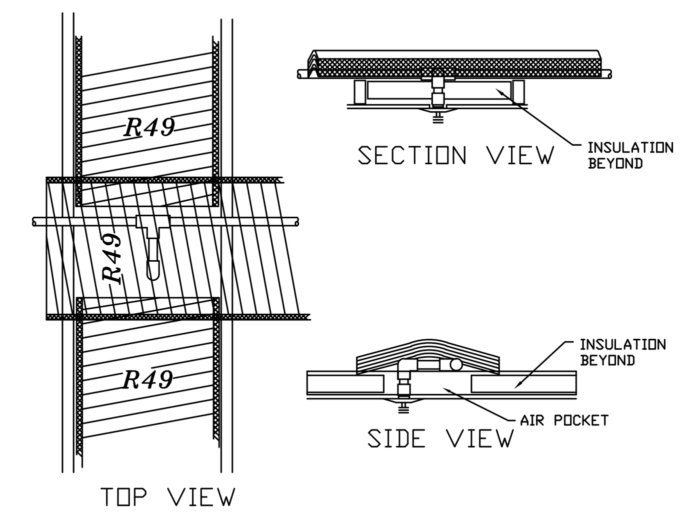
TJI RESTRAINT

NOT TO SCALE



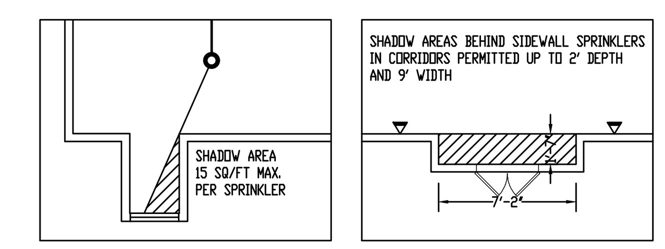
SPRINKLER RESTRAINT 1

NOT TO SCALE



ATTIC INSULATION DETAIL 1

NOT TO SCALE



SHADOW AREA DETAIL

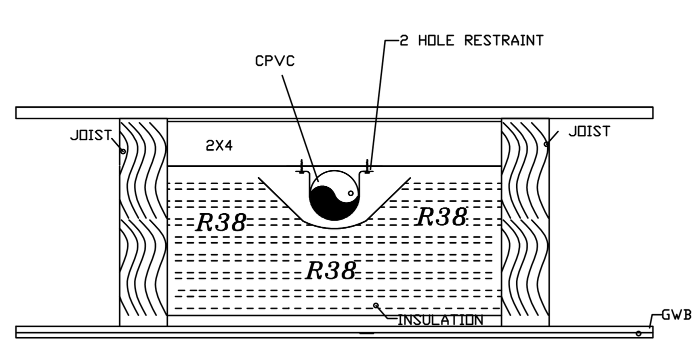
Lot	Model	Permit		Address	
226	Halston Loft	B-02400573	3463	Watershed Boulevard	
227	Frankton	B-02400574	3461		
228	Frankton	B-02400575	3459		
229	Frankton	B-02400576	3457		
230	Frankton	B-02400577	3455		
231	Frankton	B-02400578	3453		
232	Halston Loft	B-02400579	3451		

1 PENDENT

FILE .sdf	: 1 PENDENT
HAZARD	: NFPA-13D
DESIGN AREA	: LOFT FLR. REMOTE
AREA PER HEAD	: 20 X 20
# OF HEADS	: 1
DEMAND	: 25.0 GPM @ 61.8 PSI @ SRC
SAFETY	: 26.2 PSI --- 29.77%

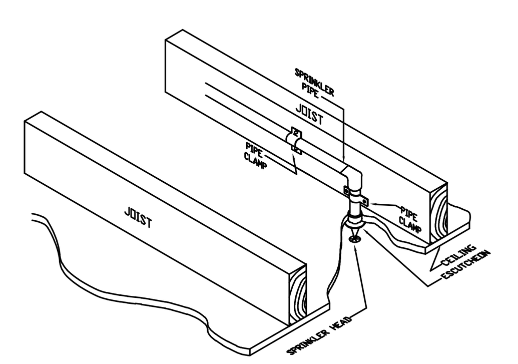
2 PENDENT

FILE .sdf	: 2 PENDENT
HAZARD	: NFPA-13D
DESIGN AREA	: LOFT FLR. REMOTE
AREA PER HEAD	: 16 X 16
# OF HEADS	: 2
DEMAND	: 31.3 GPM @ 64.2 PSI @ SRC
SAFETY	: 23.8 PSI --- 27.04%



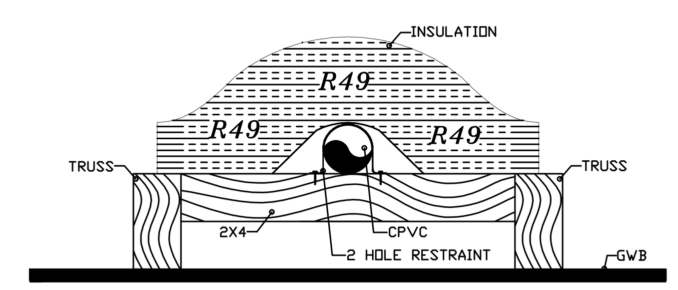
GARAGE INSULATION DETAIL

NOT TO SCALE



SPRINKLER RESTRAINT 2

NOT TO SCALE



ATTIC INSULATION DETAIL 2

NOT TO SCALE

SPRINKLER SPACING

Type	No. Head/Rm.	Spacing	Slope
Pendent	2+	16x16	8/12
Pendent	1	20x20	8/12
Sidewall	2+	16x16	8/12

TOTAL SPRINKLERS THIS DRAWING 88

FOREMAN NOTES:

1. CHANGES TO THIS PRINT MUST BE FOLLOWED UP WITH ASBUILTS AS THEY ARE MADE AND TAKEN TO THE OFFICE.

IMPORTANT

D E S I G N C R I T E R I A

TYPE SYSTEM: ■ WET ☐ DRY NFPA STANDARD: ☐ #13 ☐ #13R ■ #13D

OCCUPANCY: Single Family Towns

HAZARD: Light

DENSITY: .05 GPM/S.F.

REMOTE AREA: LOFT FLR S.F.

MAX. S.F./HD. See Note

HOSE REQ'MT.: ☐ 100 ☐ 250 ☐ 500

APPROVING AUTHORITY: ANNE ARUNDEL COUNTY

PIPE SCHEDULE	PIPE SYMBOLS
1"	
1¼"	RISER/MANIFOLD
1½"	ELBOW DOWN
2"	BALL VALVE
INCOMING FROM STREET	REVISION

S P R I N K L E R S U M M A R Y

SYM	TYPE	FINISH	TEMP	ORIF.	"K"	NPT	Mfg.	MODEL#	ESCUTCHEON	QTY.
⦿	RES. PEND	WHITE	155°	7/16"	4.9	½"	VICTAULIC	V2740	RECESSED	77
●	RES. PEND	WHITE	175°	7/16"	4.9	½"	VICTAULIC	V2740	RECESSED	07
◁	SIDEWALL	WHITE	155°	7/16"	4.0	½"	VIKING	VK486	RECESSED	04

R E V I S I O N S

BY	DESCRIPTION	DATE	#

NOEL'S FIRE PROTECTION

12015 KEMPS MILL ROAD
WILLIAMSPORT, MD 21795
(240) 366-8287 FAX: (301) 223-8370

CONTRACTOR: PULTE GROUP MID-ATLANTIC MARKET
9302 LEE HIGHWAY; SUITE 1000
FAIRFAX, VA 22031

PERMIT #	See Address Block	Model: TOWNS / Job# 343-N	SHEET No.
DATE	12-1-2021	WATERSHED TOWNS, LOTS 226-232	2 OF 2
DESIGNER	Scott Mullendore	3463-3451 WATERSHED BOULEVARD LAUREL, MD 20724	
SCALE	1/8" = 1'-0"		

Victaulic® FireLock™ Series FL-RES Residential, Quick Response Pendent and Recessed Pendent, K3.0 (4.3), K4.9 (7.0), K5.6 (8.0), K6.9 (9.9)

43.01

1.0 PRODUCT DESCRIPTION

RESIDENTIAL PENDENT/RECESSED PENDENT SPRINKLERS				
SIN	**V3010**	**V2740**	**V5610**	**V3426**
ORIENTATION	**PENDENT**	**PENDENT**	**PENDENT**	**PENDENT**
K-FACTOR[1]	3.0 Imp./4.2 S.I.	4.9 Imp./7.1 S.I.	5.6 Imp./8.1 S.I.	6.9 Imp./9.9 S.I.
CONNECTION	½" NPT/15 mm	½" NPT/15 mm	½" NPT/15 mm	¾" NPT/20 mm
MAX. WORKING PRESSURE	175 psi (1200 kPa)	175 psi (1200 kPa)	175 psi (1200 kPa)	175 psi (1200 kPa)
GLOBE RE-DESIGNATION	GL3010	–	GL5610	–
GLOBE EQUIVALENT	–	GL4910	–	–

AVAILABLE WRENCHES						
SPRINKLER	V27 Recessed	V27 Open End	V56 Recessed	V56 Open End	V34 Recessed	V34 Open End
V3010			■	■		
V2740	■	■				
V5610			■	■		
V3426					■	■

Factory Hydrostatic Test: 100% @ 500 psi/3447 kPa/34 bar

Min. Operating Pressure: UL: 7psi/48 kPa/.5 bar

Temperature Rating: See tables in section 2.0

[1] For K-Factor when pressure is measured in bar, multiply S.I. units by 10.0.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

2.0 CERTIFICATION/LISTINGS

SIN	Nominal K Factor		Listing Agency/ Approved Temperature Ratings			Max. Coverage Area Width X Length	Flow	Pressure	Adjustment	Deflector to Ceiling/ Mounting Surface Distance	Minimum Spacing
	Imperial	S.I.[2]	155°F/68°C	175°F/79°C	200°F/93°C	Ft. x Ft m x m	GPM L/min	PSI kPa	in mm	in (mm)	Ft. m
V3010	3.0	4.2	cULus EU	cULus	cULus	12 x 12 3.7 x 3.7	8 30.3	7.1 49	½ 15	Smooth Ceilings Recessed See Installation Detail Smooth Ceilings Exposed Max. 4 (101.6) Beamed Ceilings Adjacent per NFPA 13, 13D, or 13R as appropriate Beamed Ceilings In Beam 14 Max. Beam Depth Recessed in Beam: See Installation detail	8 2.4
						14 x 14 4.3 x 4.3	10 37.8	11.1 76.5			
V2740	4.9	7.1	cULus	cULus	N/A	12 x 12 3.7 x 3.7	13 49.2	7.0 48	½ and ¾ 15 and 20		
						14 x 14 4.3 x 4.3	13 49.2	7.0 48			
						16 x 16 4.9 x 4.9	13 49.2	7.0 48			
						18 x 18 5.5 x 5.5	17 64.3	12.0 83			
						20 x 20 6.1 x 6.1	20 75.7	16.7 115	½ 15		
V5610	5.6	8.1	cULus	NA	N/A	12 x 12 3.7 x 3.7	15 57	7.2 50	½ 15		
						16 x 16 4.9 x 4.9	19 72	11.5 79			
						18 x 18 5.5 x 5.5	21 79	14.1 97			
						20 x 20 6.1 x 6.1	24 91	18.4 127			
V3426	6.9	9.9	cULus	cULus	N/A	12 x 12 3.7 x 3.7	20 75.7	8.4 58	½ and ¾ 15 and 20		
						14 x 14 4.3 x 4.3	20 75.7	8.4 58			
						16 x 16 4.9 x 4.9	20 75.7	8.4 58			
						18 x 18 5.5 x 5.5	20 75.7	8.4 58			
						20 x 20 6.1 x 6.1	22 83.3	10.2 70			

NOTE
- Listings and approval as of printing.

3.0 SPECIFICATIONS – MATERIAL

Deflector: Bronze

Bulb Nominal Diameter: 3.0mm

Load Screw: Bronze

Pip Cap: Bronze

Spring Seal Assembly: PTFE coated Beryllium nickel alloy

Frame: Brass

Lodgement Spring: Stainless Steel

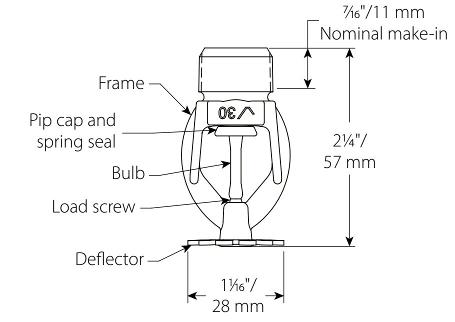
Installation Wrench: Ductile iron

Sprinkler Frame Finishes:

- Plain brass
- Chrome plated
- White polyester painted
- Flat black polyester painted
- Custom polyester painted

NOTE

- For cabinets and other accessories refer to separate sheet.



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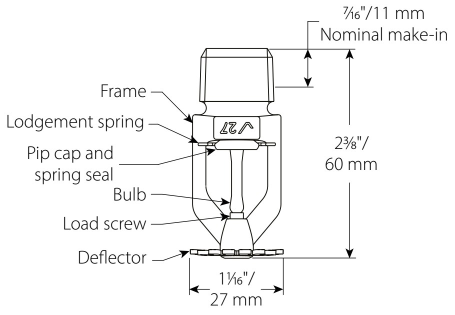

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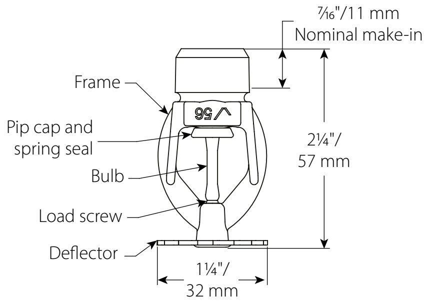

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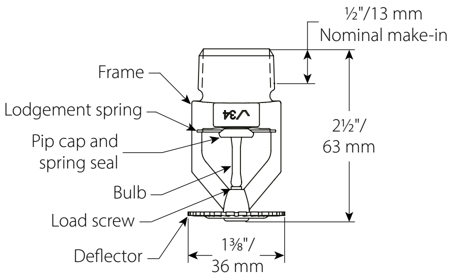
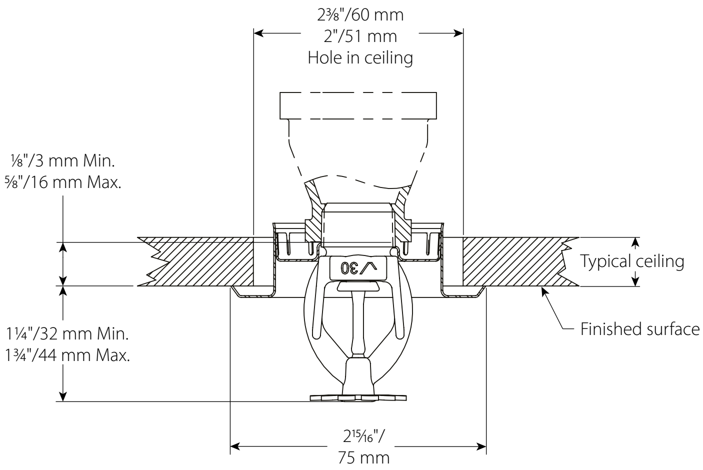


V3426

4.0 DIMENSIONS



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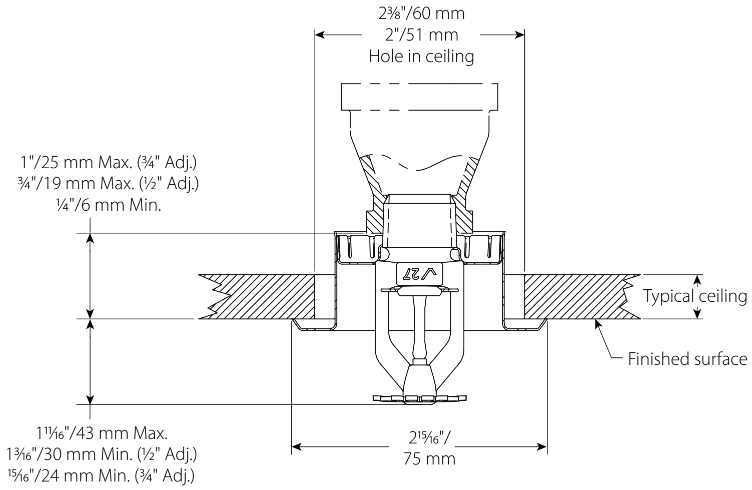
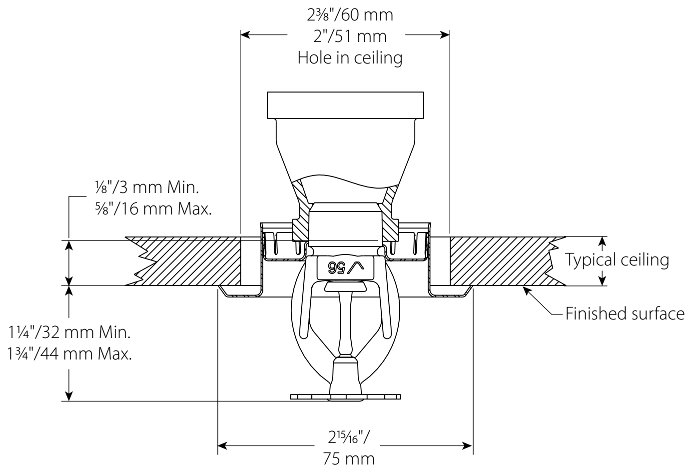


V2740

4.0 DIMENSIONS (CONTINUED)



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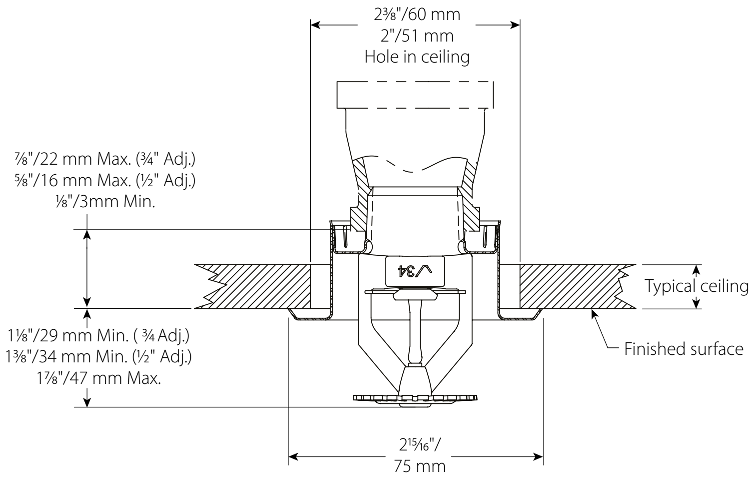


V3426

5.0 PERFORMANCE

Sprinkler is to be installed and designed as per NFPA, FM Datasheets, or any local standards.

6.0 NOTIFICATIONS

⚠ WARNING

- **Read and understand all instructions before attempting to install any Victaulic products.**
- **Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.**
- **Wear safety glasses, hardhat, and foot protection.**

Failure to follow these instructions could result in death or serious personal injury and property damage.

- **These products shall be used only in fire protection systems that are designed and installed in accordance with current, applicable National Fire Protection Association (NFPA 13, 13D, 13R, etc.) standards, or equivalent standards, and in accordance with applicable building and fire codes. These standards and codes contain important information regarding protection of systems from freezing temperatures, corrosion, mechanical damage, etc.**
- **The installer shall understand the use of this product and why it was specified for the particular application.**
- **The installer shall understand common industry safety standards and potential consequences of improper product installation.**
- **It is the system designer's responsibility to verify suitability of materials for use with the intended fluid media within the piping system and external environment.**
- **The material specifier shall evaluate the effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on materials to confirm system life will be acceptable for the intended service.**

Failure to follow installation requirements and local and national codes and standards could compromise system integrity or cause system failure, resulting in death or serious personal injury and property damage.

7.0 REFERENCE MATERIALS

Ratings: All glass bulbs are rated for temperatures from -67°F/-55°C.

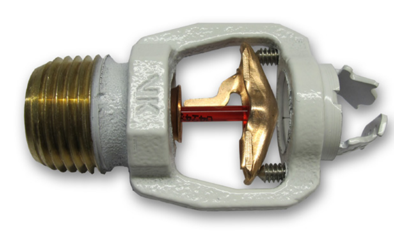
TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Horizontal Sidewall Sprinkler VK486 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The sprinkler orifice design, with a K-Factor of 4.0 (57.7 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.



WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2011.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.0 U.S. (57.7 metric†)
† Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-7/16" (62 mm)
Covered by the following US Patent numbers: 7,854,269 and 7,712,218

Material Standards:
Frame Casting: QM Brass and Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screws: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 17315
Order Sprinkler VK486 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK486 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 17315AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13655W/B* (available since 2006)
*A ½" ratchet is required (not available from Viking).

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the yoke, pip cap, and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinkler VK486 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

Sprinkler Finishes: Brass, Chrome, White Polyester, and Black Polyester.

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

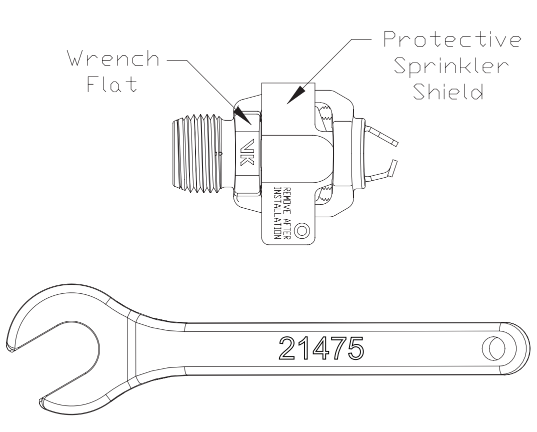

Figure 1:
Standard Sprinkler Wrench 21475M/B

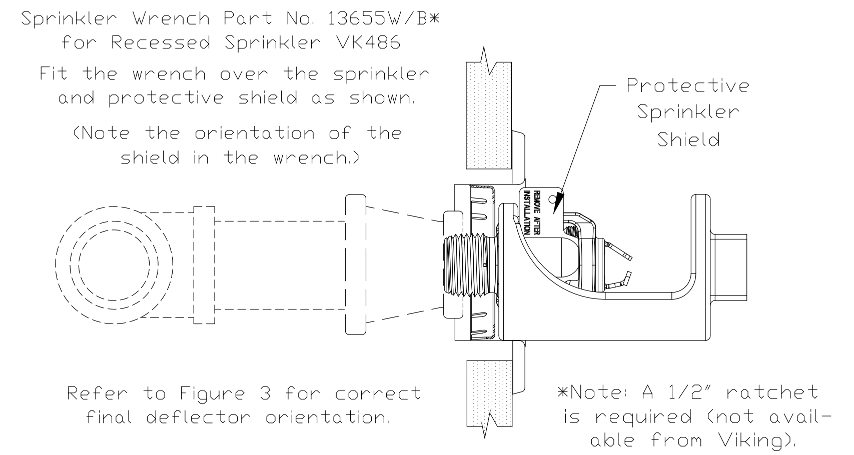

Figure 2:
Wrench 13655W/B for Recessed Sprinkler VK486

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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Approval Chart
Viking VK486, 4.0 K-Factor Residential Horizontal Sidewall Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current Editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric [2]		Inches	mm
17315	VK486	1/2	15	4.0	57.7	175 psi (12 bar)	2-7/16	62

Max. Coverage Area [3] Width X Length Ft. X Ft. (m X m)	Max. Spacing Ft. (m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Top of Deflector to Ceiling	Installation Type	Listings and Approvals [4]				Minimum Spacing Ft. (m)
		Flow [3] GPM (L/min)	Pressure [3] PSI (bar)	Flow [3] GPM (L/min)	Pressure [3] PSI (bar)			C-UL-US-EU [5]	VdS	NYC	NSF[9]	
12 X 12 (3.7 X 3.7)	12 (3.7)	11 (41.7)	7.6 (0.52)	11 (41.7)	7.6 (0.52)	4 to 6 inches	Standard surface-mounted escutcheons or recessed with the Micromatic® Model E-1, E-2, E-3, or G-1 Recessed Escutcheon	See Footnote 6 and 10.	See Footnote 6.	See Footnote 7.	See Footnote 6.	8 (2.4)
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)							
16 X 16 (4.9 X 4.9)	16 (4.9)	13 (49.3)	10.6 (0.73)	13 (49.3)	10.6 (0.73)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
16 X 22 (4.9 X 6.7)	16 (4.9)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
20 X 20 (6.1 X 6.1)	20 (6.1)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
12 X 12 (3.7 X 3.7)	12 (3.7)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)	6 to 12 inches						
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	13 (49.3)	10.6 (0.73)							
16 X 16 (4.9 X 4.9)	16 (4.9)	14 (53.0)	12.3 (0.84)	14 (53.0)	12.3 (0.84)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
16 X 22 (4.9 X 6.7)	16 (4.9)	26 (98.4)	42.3 (2.91)	26 (98.4)	42.3 (2.91)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
20 X 20 (6.1 X 6.1)	20 (6.1)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.

[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[3] For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.

[4] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.

[5] Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

[6] Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester [8]

[7] Meets New York City requirements, effective July 1, 2008.

[8] Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.

[9] UL Classified to : NSF/ANSI Standard 61, Drinking Water System Components (MH48034)

[10] Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Horizontal Sidewall Sprinkler VK486 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).
- The VK486 horizontal sidewall sprinkler deflector shall be located a minimum of 1-1/4" (31.8 mm) and a maximum of 6" (152 mm) from the wall on which it is installed.

DEFLECTOR POSITION: Install sprinkler VK486 with the leading edge of the deflector oriented parallel to the ceiling and the sprinkler frame arms oriented perpendicular to the ceiling (see Figure 4). **THE TOP SURFACE OF THE DEFLECTOR IS MARKED "TOP".** The sprinkler must be oriented as shown in Figure 3 below.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080190, F_080814, and F_080415 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

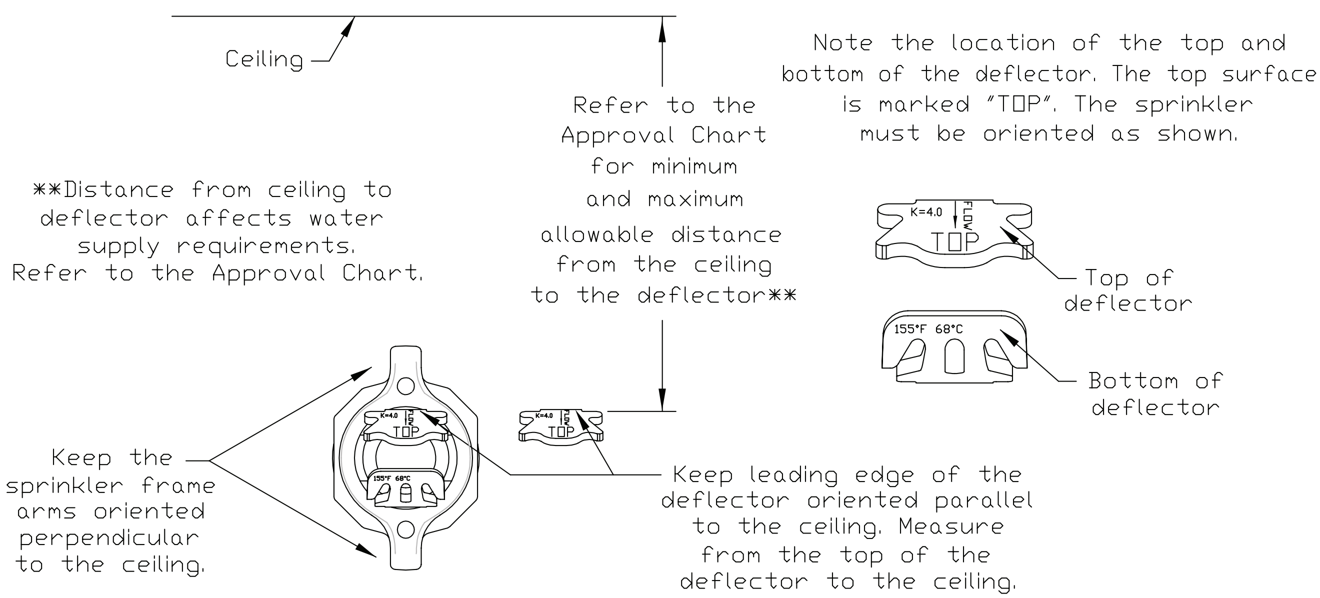

Figure 3:

Correct Orientation of the Deflector

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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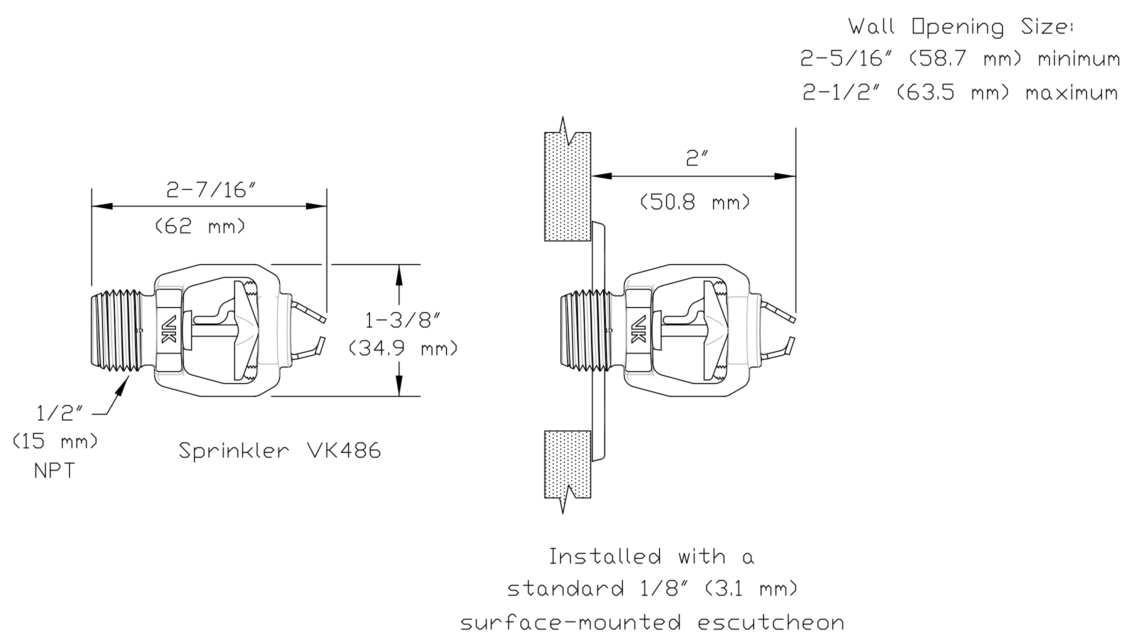

Figure 4:

Sprinkler VK486 Dimensions with a Standard Escutcheon and the Model F-1 Adjustable Escutcheon

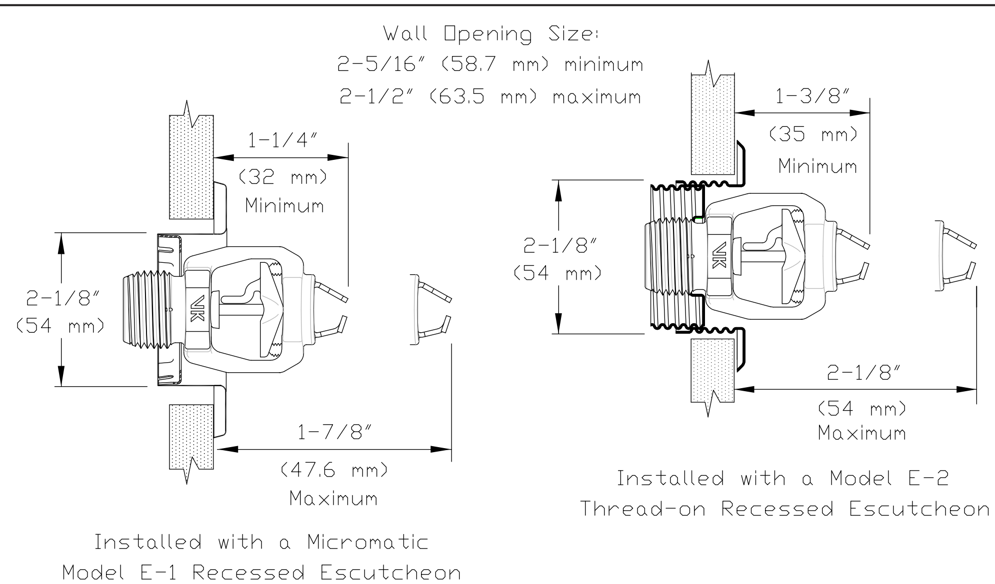

Figure 5:

Sprinkler VK486 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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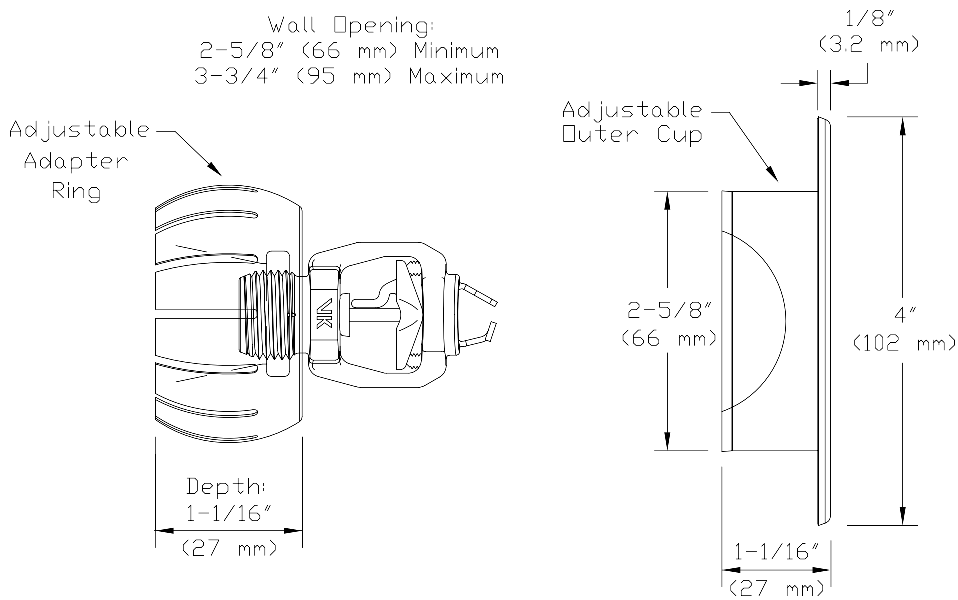

Figure 6: Sprinkler VK486 Dimensions with the Model G-1 Escutcheon

Viking Residential Sprinkler Installation Guide

October 25, 2018

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

VIKING	TECHNICAL DATA	**FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking residential automatic sprinklers are equipped with a "fast response" heat-sensitive operating element designed to respond individually and quickly to a specific high temperature. Viking residential sprinklers are designed to combine speed of operation with water distribution characteristics to help in the control of residential fires and to improve life safety by prolonging the time available for occupants to escape or be evacuated.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

A. Viking residential sprinklers are intended for use in the following occupancies: one- and two-family dwellings and mobile homes with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; or residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13. Information contained in this guide is based on NFPA 13, "Standard for the Installation of Sprinkler Systems".

B. The design criteria for residential sprinklers contained in the NFPA installation standards must be followed except as modified by the individual UL 1626 listing information provided in the technical data pages and this Residential Sprinkler Installation Guide. For listed areas of coverage, technical data, and specific design and installation instructions, refer to the appropriate Viking technical data page for the sprinkler model used.

C. Viking residential sprinklers listed by Underwriters Laboratories, Inc. (UL) have passed fire tests designed to represent fire conditions for the sprinkler's listed area of coverage. The standards for residential sprinkler performance and spray patterns are printed in Underwriters Laboratories Publication UL 1626, "Standard for Residential Sprinklers for Fire Protection Service". All listed Viking residential sprinklers meet or exceed UL 1626 performance requirements and spray pattern criteria for their listed areas of coverage.

D. NFPA standards allow use of residential sprinklers with rates, design areas, areas of coverage, and minimum design pressures other than those specified in the standards when they have been listed for such specific residential installation conditions.

3. TECHNICAL DATA

Specifications:

Refer to the appropriate sprinkler technical data sheet.

Material Standards:

Refer to the appropriate sprinkler technical data sheet.

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

4. INSTALLATION

NOTE:Take care not to over-tighten the sprinkler and/or damage its operating parts!

Maximum Torque: 1/2" NPT: 14 ft-lbs. (19.0 N-m) 3/4" NPT: 20 ft-lbs. (27.1 N-m)

A. Care and Handling (also refer to Bulletin - Care and Handling of Sprinklers, Form No. F_091699.)

Sprinklers must be handled with care and protected from mechanical damage during storage, transport, handling, and after installation. Store sprinklers in a cool, dry place in their original container.

Use care when locating sprinklers near fixtures that can generate heat.

Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to Table 1.)

Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately. (Note: Installing glass bulb sprinklers in direct sunlight (ultraviolet light) may affect the color of the dye used to color code the bulb. This color change does not affect the integrity of the bulb.)

Viking residential sprinklers are intended for use on wet pipe residential systems only. Adequate heat must be provided for wet-pipe systems. DO NOT use Viking residential sprinklers on dry systems unless specifically allowed by recognized installation standards or the Authority Having Jurisdiction.

Residential concealed sprinklers must be installed in neutral or negative pressure plenums only!

Corrosion-resistant sprinklers must be installed when subject to corrosive atmospheres. **NOTE:** Viking residential sprinklers are not intended for use in corrosive environments.

Replaces pages 1-17, dated December 1, 2016.
(Added P65 Warning.)

VIKING	TECHNICAL DATA	FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

TABLE 1: RESIDENTIAL SPRINKLER TEMPERATURE RATINGS			
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating[1]**	**Maximum Ambient Ceiling Temperature[3]**	**Bulb Color**
Residential Glass Bulb Style Sprinklers			
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)[1]**	**Maximum Ambient Ceiling Temperature[3]**	
Residential Fusible Element Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Temperature Identification Stamp**
Residential Flush Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	On Cover or Sprinkler Inlet (VK476)
Intermediate	220 °F (104 °C)	150 °F (65 °C)	On Cover
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Cover Plate Temperature Rating**
Residential Concealed Style Sprinklers			
Ordinary	135 °F (57 °C)[1], 140 °F (60 °C)[2], 155 °F (68 °C)[1], or 165 °F (74 °C)[1]	100 °F (38 °C)	135 °F (57 °C)

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector or flow shaper.

[2] The temperature rating is stamped on the sprinkler.

[3] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

B. Installation Instructions

Viking sprinklers are manufactured and tested to meet the rigid requirements of approving agencies. They are designed to be installed in accordance with recognized installation standards NFPA 13, NFPA 13R, and NFPA 13D, and any associated TIAs.

Deviation from the standards or any alteration to the sprinklers or cover plate assemblies after they leave the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinklers inoperative and will automatically nullify the approval and any guarantee made by Viking.

The use of residential sprinklers may be limited due to occupancy and hazard. Residential fire protection systems must be designed and installed only by those who are completely familiar with the appropriate standards and codes, and thoroughly experienced in fire protection design, hydraulic calculations, and sprinkler system installation.

Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Viking residential sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler*.
*Refer to the appropriate sprinkler technical data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½" or 3/4" (15 mm or 20 mm) NPT** outlet of the reducing coupling is at the desired location and centered in the opening** in the ceiling or wall.
**Size depends on the sprinkler model used. Refer to appropriate sprinkler data page.

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DESIGN CRITERIA

For Systems Designed to NFPA 13D or NFPA 13R: Apply the listed areas of coverage and minimum water supply requirements shown in the approval charts on the residential sprinkler data pages. The sprinkler flow rate is the minimum required discharge from each of the total number of design sprinklers as specified in NFPA 13D or NFPA 13R.

For Systems Designed to the latest edition of NFPA 13: The number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- **The flow rates given in the approval charts on the data pages for NFPA 13D and NFPA13R for each area of coverage listed, or**
- **Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13. The greatest dimension of the coverage area cannot be any greater than the maximum areas of coverage shown on the data pages.**

Flow Rates

All residential sprinklers manufactured on or after July 12, 2002 are listed with a single minimum flow rate. Where rooms have more than one sprinkler, multiple-sprinkler calculations are still required, but the first sprinkler and any additional sprinkler or sprinklers must be calculated flowing at identical minimum flow rates, based on the area of sprinkler coverage, using the minimum flow and pressure listed for the sprinkler model used.

Consult the appropriate standards and the Authorities Having Jurisdiction to determine the number of sprinklers to hydraulically calculate to verify adequate water supply for multiple-sprinkler operation.

Operating Pressure: The minimum operating pressure of any sprinkler shall be the minimum operating pressure specified by the listing, or 7 psi (0.5 bar), whichever is greater. The maximum allowable operating pressure is 175 psi (12 bar).

Areas of Coverage

If the actual area of coverage is less than the listed area of coverage, use the minimum water supply for the next larger area of coverage listed. DO NOT interpolate. Residential sprinkler systems must be hydraulically calculated according to NFPA standards to verify that the water supply is adequate for proper operation of the sprinklers. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler when it is operating at the minimum gpm and psi listed for single-sprinkler operation for the sprinkler model used.

Viking residential sprinklers may be listed for more than one area of coverage. Suggested practice in selecting area of coverage is to select the one that can be adequately supplied by the available water supply and still allow for the installation of as few sprinklers in a compartment as possible while observing all guidelines pertaining to obstructions and spacing. This maximizes the use of the available water supply, which is often limited on residential fire protection systems. After selecting an appropriate area of coverage, sprinklers must be spaced according to guidelines set forth in the installation standards.

Definition of "COMPARTMENT": A space completely enclosed by walls and a ceiling. Openings to an adjoining space are allowed, provided the openings have a minimum lintel depth of 8 in. (203.2 mm) from the ceiling.

Spacing Guidelines

For guidelines concerning spacing of Viking residential sprinklers near beams, obstructions, heat sources, and sloped ceilings [slopes more than a 2/12 (9.5°) pitch], refer to the Viking residential sprinkler data pages and installation guide, the appropriate NFPA standard, and the Authority Having Jurisdiction. NOTE: Sloped, beamed, and pitched ceilings could require special design features such as larger flow, or a design for more sprinklers to operate in the compartment, or both.

Distance from Walls: Install not more than one-half the listed sprinkler spacing nor less than 4" (102 mm) from walls, partitions, or obstructions as defined in the standards.

Minimum Sprinkler Spacing: The minimum distance between residential sprinklers to prevent cold soldering (i.e., the spray from one operating sprinkler onto an adjacent sprinkler that could prevent its proper activation) is 8 ft. (2.4 m).

Maximum Sprinkler Spacing: Locate adjacent sprinklers no farther apart than the listed spacing.

Deflector Position: Install frame style residential *pendent* sprinklers with the deflector between 1" and 4" (25.4 mm to 102 mm) below smooth ceilings, unless the sprinkler data page indicates otherwise. Install pendent sprinklers in the pendent position only, with the deflector oriented parallel with the ceiling or roof.

Refer to the individual listings in the residential sprinkler data pages for horizontal sidewall sprinkler deflector or sprinkler centerline distance below the ceiling. Install horizontal sidewall sprinklers in the horizontal position only below smooth ceilings, with the leading edge of the deflector or element assembly oriented parallel with the ceiling.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to the appropriate sprinkler data page. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

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2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape. *Exception: For concealed sprinklers (i.e., VK457, VK458, VK468, VK474, and VK4570) the protective cap is removed for installation.*
3. Care must be taken when installing sprinklers on CPVC and copper piping systems. Never install the sprinkler into the reducing fitting before attaching the reducing fitting to the piping. Sprinklers must be installed on CPVC systems after the reducing fitting has been installed and the primer and/or cement manufacturer's recommended curing time has elapsed. When installing sprinklers on copper piping systems, take care to brush the inside of the sprinkler supply piping and reducing fitting to ensure that no flux accumulates in the sprinkler orifice. Excess flux can cause corrosion and may impair the ability of the sprinkler to operate properly.
4. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the sprinkler deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, while taking care not to over-tighten or damage the sprinkler operating parts.
   b. *Thread the flush or concealed sprinkler into the ½*" or 3/4" (15 mm or 20 mm) NPT** *outlet of the coupling by turning it clockwise with the special sprinkler wrench. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Exception: For concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 the protective cap is removed for installation, and then placed back on the sprinkler temporarily.*
5. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards.
   a. Make sure the sprinkler has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal leaks, the sealing compound is washed out of the joint.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS <u>BEFORE</u> PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
6. For residential flush sprinklers, the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread on or push it on until the flange touches the ceiling. Note the maximum vertical adjustment is ½" (12,7 mm) for sprinkler VK420 and 5/8" for VK476. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipples as required.
7. For residential concealed sprinklers, the cover plate assembly can now be attached.
   a. Remove the cover plate assembly from the protective box, taking care not to damage the assembly.
   b. From below the ceiling, gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling or wall.
   c. Carefully push the cover plate assembly onto the sprinkler, using even pressure with the palm of the hand, until the unfinished brass flange of the cover plate base touches the ceiling or wall.
   d. The maximum adjustment available for residential concealed sprinklers is ½" (12.7 mm) [1/4" (6.4 mm) for sprinkler VK480]. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler nipples.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See Maintenance instructions below and follow all warnings and instructions.

5. OPERATION

During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector or flow shaper, forming a uniform, high-wall wetting spray pattern to extinguish or control the fire.

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

A. Sprinklers must be inspected on a regular basis for signs of corrosion, mechanical damage, obstructions, paint, etc. Frequency of the inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced immediately after a specified term of service. Refer to NFPA 25 and the Authorities Having Jurisdiction for the specified period of time after which testing and/or replacement of residential sprinklers is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from, attached to, or otherwise obstruct the discharge pattern of the sprinkler. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the effected area.

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench and remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For residential flush pendent and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. To remove a ceiling ring, grasp it from below the ceiling and gently turn it counterclockwise. Cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler, use the sprinkler wrench to unthread the sprinkler from the piping. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Place a plastic protective shell (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the shell. Exception: Concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 are removed without the plastic cap.

3. Follow instructions in section 4B. Installation Instructions to install the new unit. Be sure the replacement sprinkler is the correct model and style, with the appropriate K-Factor, temperature rating, and response characteristics. A fully stocked sprinkler cabinet should be provided for this purpose. *(For flush or concealed style sprinklers, stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.)*

4. Place the system back in service and secure all valves. Check for and repair all leaks.

E. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

Viking Residential Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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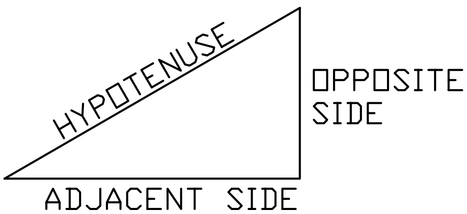
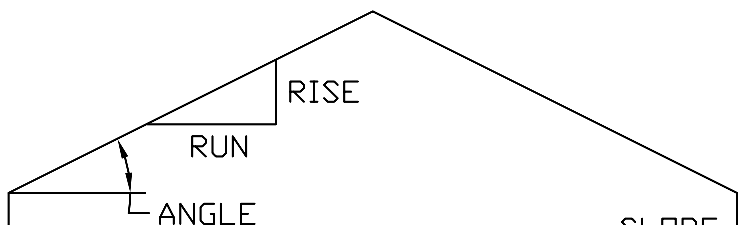


$$\text{TANGENT} = \frac{\text{OPPOSITE SIDE (RISE)}}{\text{ADJACENT SIDE (RUN)}}$$

$$\frac{\text{RISE}}{\text{RUN}} = \text{TANGENT}$$

$$\text{ANGLE} = \tan^{-1}\left(\frac{\text{RISE}}{\text{RUN}}\right)$$

$$\text{SLOPE DISTANCE} = \sqrt{(\text{RISE})^2 + (\text{RUN})^2}$$



RISE	RUN	TANGENT	ANGLE	SLOPE DISTANCE
2	12	.1666	9.45°	12.1
3	12	.2500	14°	12.3
4	12	.3333	18.4°	12.6
5	12	.4166	22.6°	13
6	12	.5000	26.5°	13.4
7	12	.5833	30.2°	13.8
8	12	.6666	33.6°	14.4
9	12	.7500	36.8°	15
10	12	.8333	39.8°	15.6
11	12	.9166	42.5°	16.2
12	12	1	45°	16.97

Table 2
Rise Over Run Conversion to Degrees of Slope

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SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

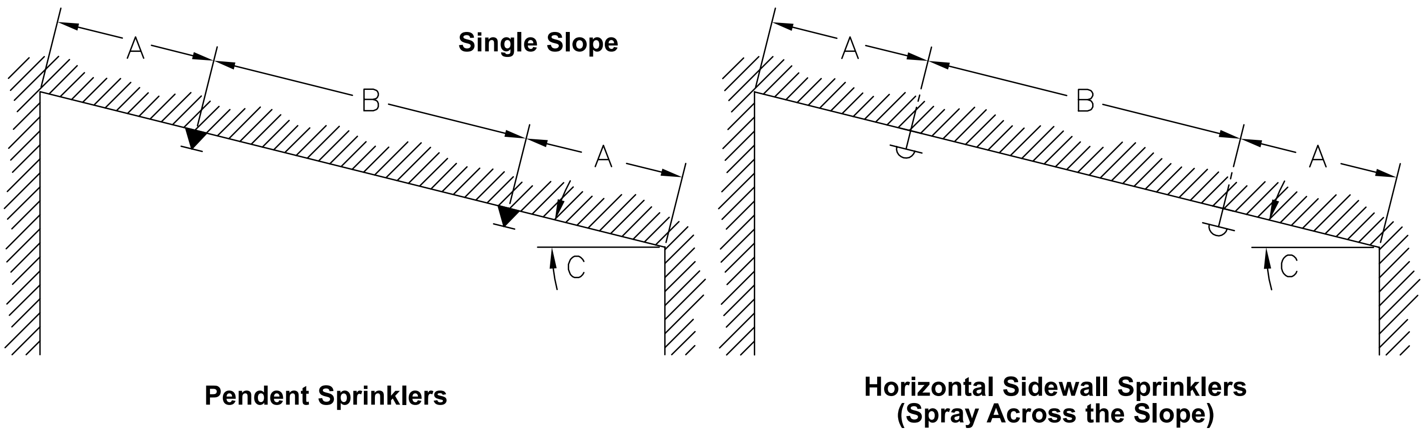

Figure 1

(A) One-half listed spacing of sprinkler maximum, 0'-4" (0-102 mm) minimum.
(B) Listed spacing of sprinkler, maximum, 8'-0" (2.4 m) minimum.
(C) Where angle "C" is greater than an 8/12 (33.7°) pitch, see Figure 2 below.

SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

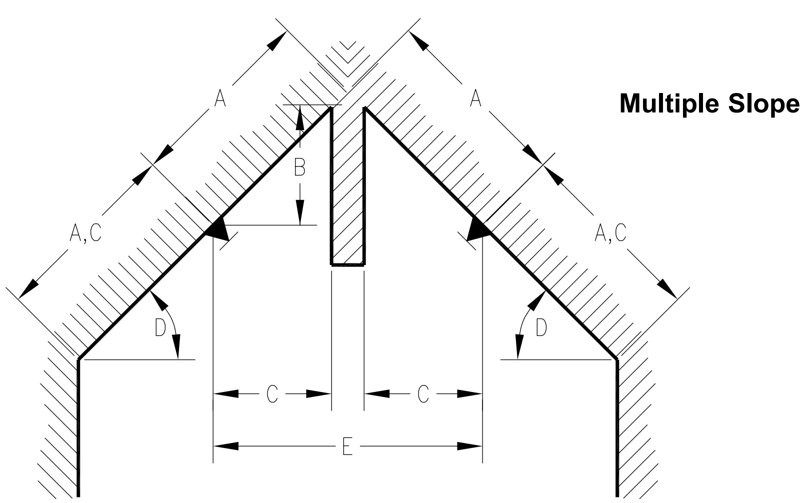

Figure 2

(A) One-half listed spacing of sprinkler, maximum.
(B) 3'-0" (.91 m) maximum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than an 8/12 (33.7°) pitch.
(E) For distance less than 8'-0" (2.4 m), baffle required.

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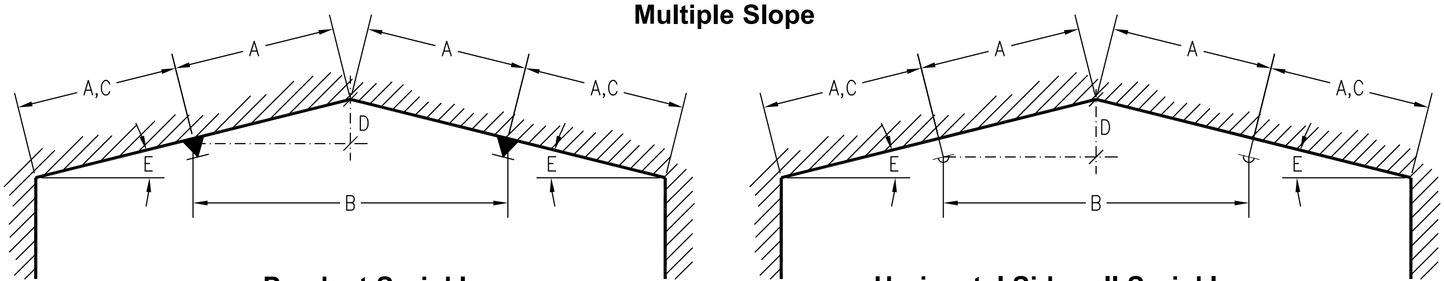
SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

Multiple Slope



Pendent Sprinklers | **Horizontal Sidewall Sprinklers (Spray Across the Slope)**

Figure 3

(A) One-half listed spacing of sprinkler, maximum.
(B) 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) 3'-0" (.91 m) maximum.
(E) Acceptable for slopes of 0/12 to 8/12 (0° to 33.7°) pitch.

SPACING OF RESIDENTIAL PENDENT SPRINKLERS AT PEAK OF SLOPED CEILINGS WITH PITCH LESS THAN 8/12 (33.7°)

(Refer to the appropriate residential sprinkler technical data page for listings.)

Multiple Slope

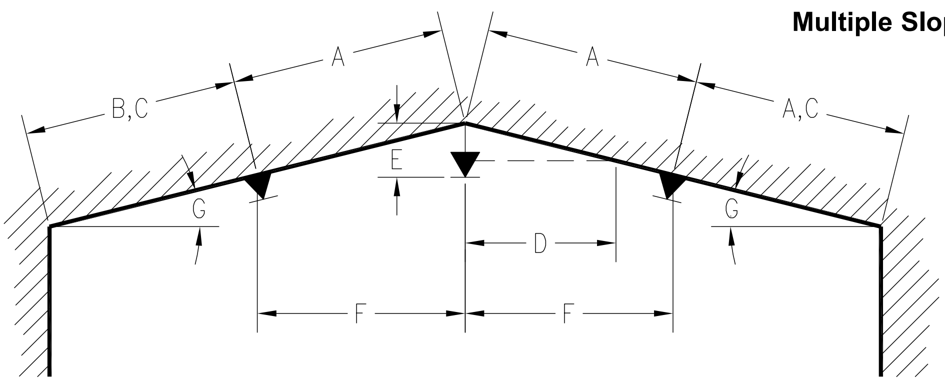


Figure 4

(A) Listed spacing of sprinkler, maximum.
(B) One-half listed spacing of sprinkler, maximum.
(C) 0'-4" minimum.
(D) Refer to page 10 for minimum distance between sprinkler and intersecting sloped ceiling.
(E) Refer to the appropriate residential sprinkler technical data page for deflector distance below ceiling.
(F) 8'-0" minimum.
(G) Reference: 4/12 (18.0°) pitch maximum for 12' (3.7 m) spacing.
2.5/12 (12.0°) pitch maximum for 14' (4.3 m) spacing.
2/12 (10.0°) pitch maximum for 16' (4.9 m) spacing.
2/12 (10.0°) pitch maximum for 18' (5.5 m) spacing.
1.9/12 (9.0°) pitch maximum for 20' (6.1 m) spacing.
Angles based on sprinklers installed 0'-4" (0-102 mm) from peak.

NOTE: Whenever possible, utilize design as shown in Figure 3 above.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

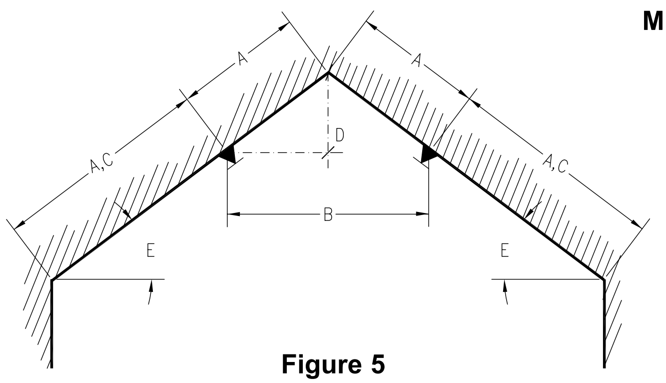

Figure 5

(A) One-half listed spacing of sprinkler, maximum.
(B) 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) 3'-0" (.91 m) maximum.
(E) Acceptable for slopes greater than an 8/12 (33.7°) pitch.
(F) When this design is used, refer to the appendices of NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction regarding the number of design sprinklers to hydraulically calculate.

SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 3 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

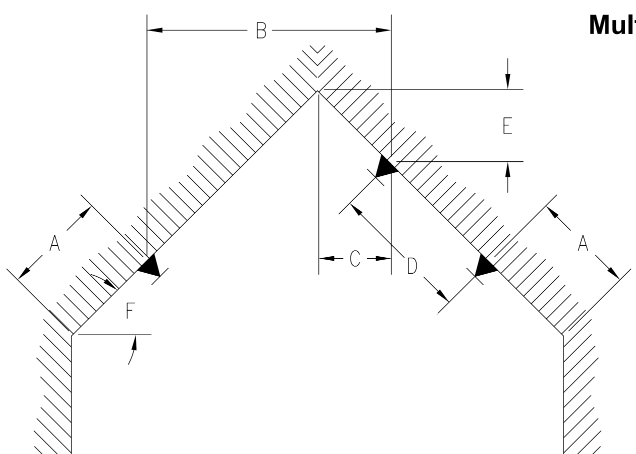

Figure 6

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Listed spacing maximum, 8'-0" (2.4 m) minimum.
(E) 3'-0" (.91 m) maximum.
(F) Slopes greater than 8/12 up to a 21/12 (33.7° up to 60°) pitch.

NOTES: In addition to the above limits, rooms requiring this type of installation must be hydraulically calculated to supply a minimum of three operating sprinklers. Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

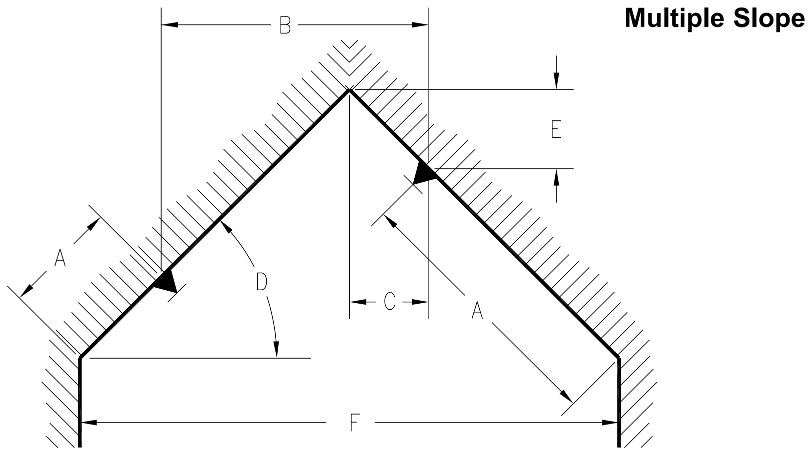

Figure 7

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than 8/12 pitch up to a 21/12 (33.7° up to a 60°) pitch.
(E) 3'-0" (.91 m) maximum.
(F) When dimension "F" exceeds 16' (4.9 m), utilize design configuration shown in Figure 6.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

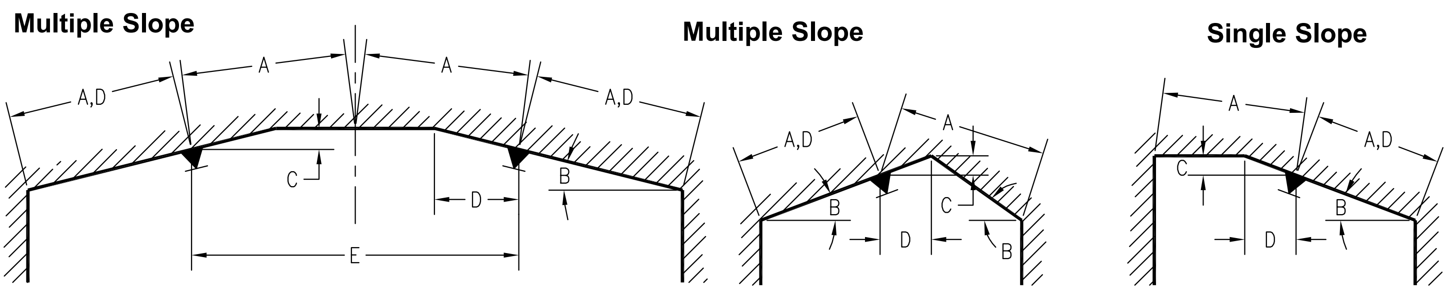

Figure 8

(A) One-half listed spacing, maximum.
(B) Refer to the appropriate residential sprinkler technical data pages for listings of sprinklers for use below slopes up to and including a 8/12 (33.7°) pitch.
(C) 3'-0" (.91 m) maximum.
(D) 0'-4" (0-102 mm) minimum.
(E) 8'-0" (2.4 m) minimum without baffle.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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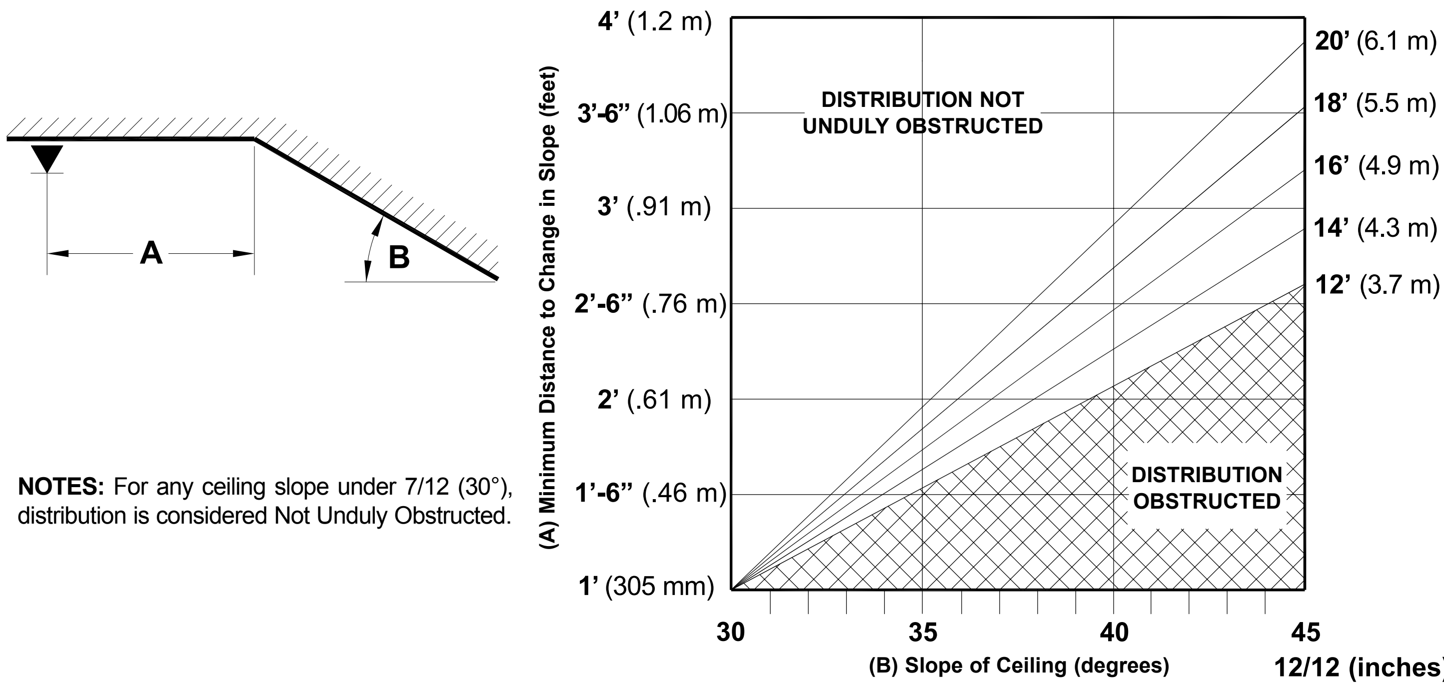
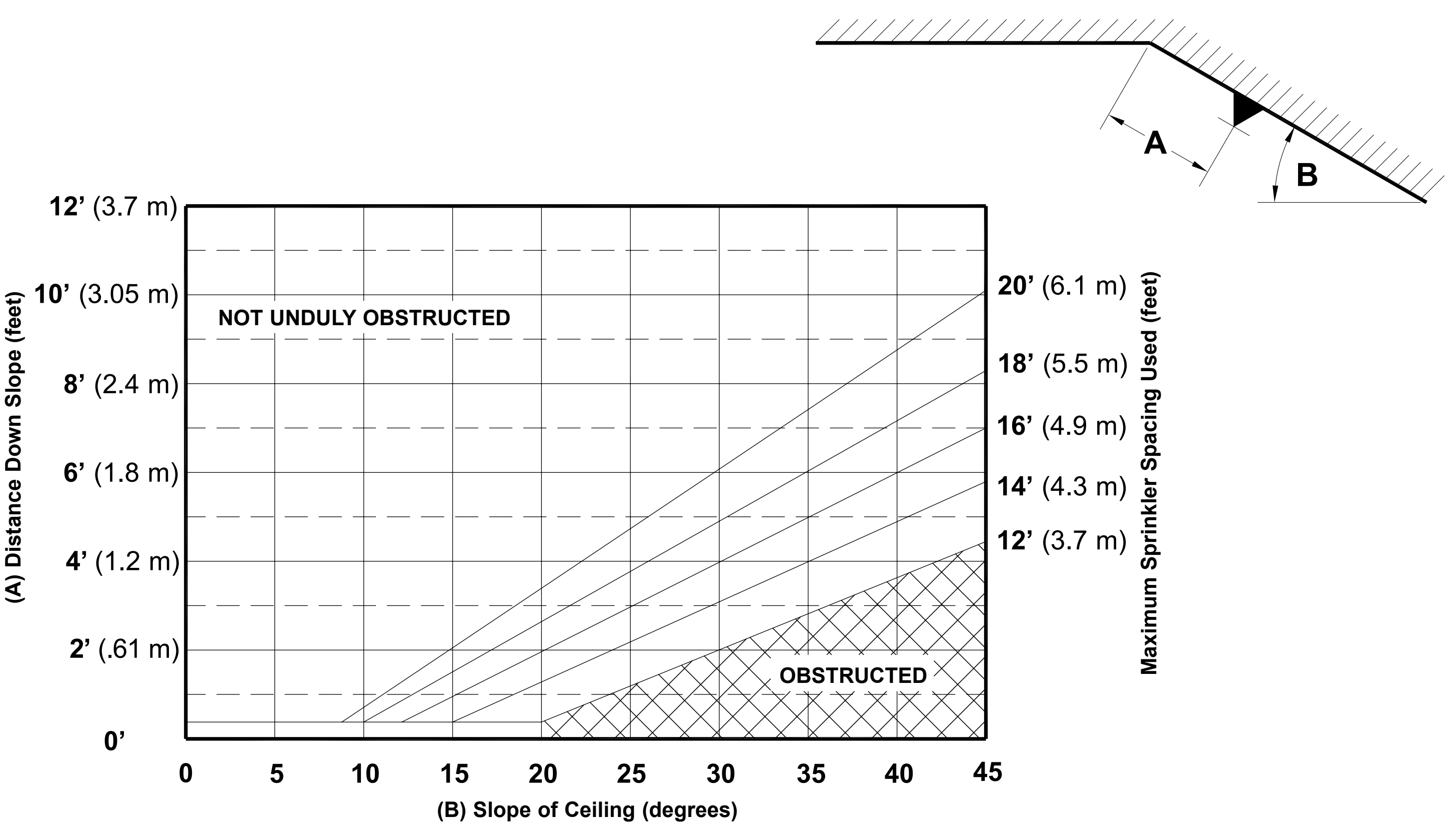
MINIMUM DISTANCE BETWEEN SPRINKLER AND INTERSECTING SLOPED CEILINGS



NOTES: For any ceiling slope under 7/12 (30°), distribution is considered Not Unduly Obstructed.

MAXIMUM DISTANCE DOWN SLOPE TO AVOID OBSTRUCTION TO SPRINKLER DISCHARGE



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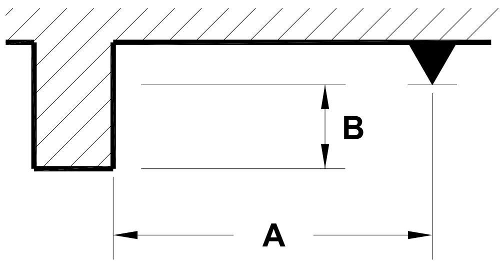
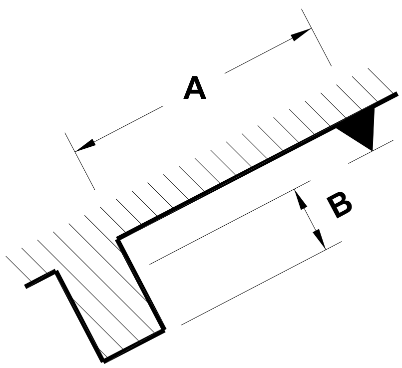
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

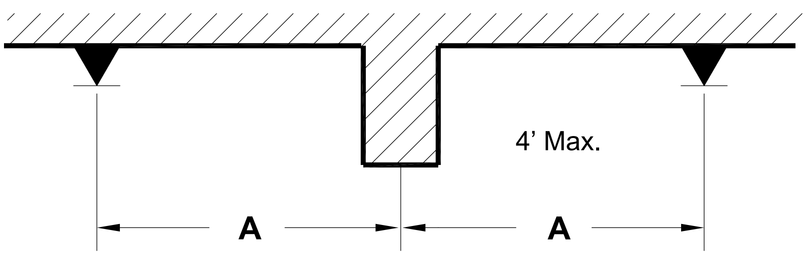
(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

Positioning Residential Pendent Sprinklers - Obstructions at the Ceiling



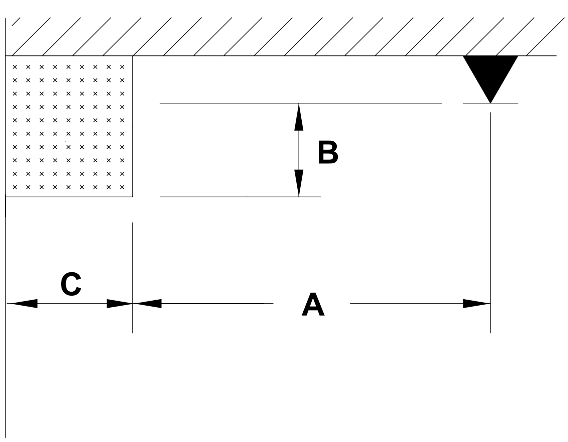


Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356



Residential pendent sprinklers may be located on opposite sides of continuous obstructions up to 4 ft. (1.2 m) wide at the ceiling, as long as the distance from the centerline of the obstruction to the sprinklers (A) does not exceed one-half the maximum spacing allowed between sprinklers.

Positioning Residential Pendent Sprinklers - Obstructions Along Walls



(A) Distance from centerline of sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.
(C) Width of the obstruction.

Obstructions up to 30 in. (.8 m) wide (C) located against the wall are permitted to be protected when (A) is greater than or equal to (C) minus 8 in. (.2 m) plus (B).

$C \leq 30$ in. — for metric $C \leq .8$ m

$A \geq (C - 8 \text{ in.}) + B$ — $A \geq (C - .2 \text{ m}) + B$

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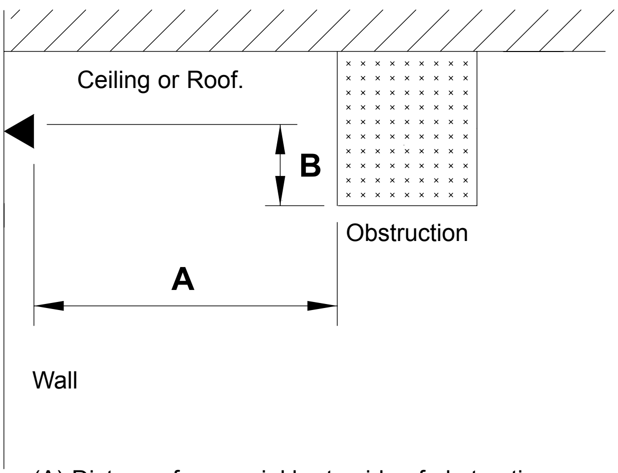
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

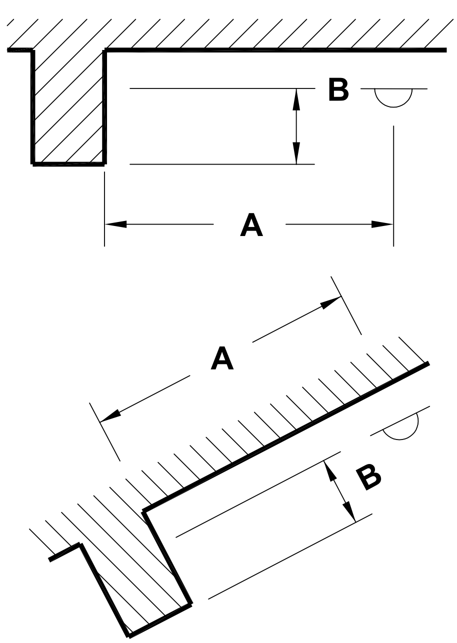
Positioning Residential Horizontal Sidewall Sprinklers - Obstructions at the Ceiling



(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 8 ft. (Less than 2.4 m)	No Obstructions Allowed	
8 ft. to less than 10 ft. (2.4 m to less than 3.05 m)	1	25.4
10 ft. to less than 11 ft. (3.05 m to less than 3.35 m)	2	50.8
11 ft. to less than 12 ft. (3.35 m to less than 3.7 m)	3	76
12 ft. to less than 13 ft. (3.7 m to less than 4 m)	4	102
13 ft. to less than 14 ft. (4 m to less than 4.3 m)	6	152
14 ft. to less than 15 ft. (4.3 m to less than 4.6 m)	7	178
15 ft. to less than 16 ft. (4.6 m to less than 4.9 m)	9	229
16 ft. to less than 17 ft. (4.9 m to less than 5.2 m)	11	279
17 ft. or greater (5.2 m or greater)	14	356

Positioning Residential Horizontal Sidewall Sprinklers - Obstructions Along Walls



Distance from Sprinkler to Side of Obstruction Along Wall (Dimension A)	Maximum Distance from Deflector to Bottom of Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356

(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

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LOCATING RESIDENTIAL SPRINKLERS NEAR HEAT SOURCES

Ordinary temperature rated residential sprinklers (135 °F to 170 °F rated) are only to be installed where the maximum ambient ceiling temperature will not exceed 100 °F. Where the maximum ambient ceiling temperature will be from 101 °F to 150 °F, use intermediate temperature rated residential sprinklers (175 °F to 225 °F rated).

Residential sprinklers must be positioned a sufficient distance away from heat sources that include fireplaces, stoves, kitchen ranges, wall ovens, hot water pipes, water heaters, furnaces and associated flues and ducts, and light fixtures. The following minimum distances must be maintained for both ordinary and intermediate temperature rated residential sprinklers as indicated.

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Rated Sprinkler		Minimum Distance from Edge of Source to Intermediate Temperature Rated Sprinkler	
	Inches	metric	Inches	metric
Side of open or recessed fireplace	36	.91 m	12	305 mm
Front of recessed fire place	60	1.5 m	36	.91 m
Coal- or wood-burning stove	42	1.1 m	12	305 mm
Kitchen range	18	457 mm	9	229 mm
Wall oven	18	457 mm	9	229 mm
Hot air flues	18	457 mm	9	229 mm
Uninsulated heat ducts	18	457 mm	9	229 mm
Uninsulated hot water pipes	12	305 mm	6	152 mm
Side of ceiling- or wall-mounted hot air diffusers	24	.61 m	12	305 mm
Front of wall-mounted hot air diffusers	36	.91 m	18	457 mm
Hot water heater or furnace	6	152 mm	3	76 mm
Light fixture less than 250W	6	152 mm	3	76 mm
Light fixture 250W to 499W	12	305 mm	6	152 mm
Where residential sprinklers will be exposed to the rays of the sun passing through glass or plastic skylights, use intermediate temperature rated sprinklers.				
When locating residential sprinklers in an unventilated concealed compartment, under an unventilated attic or uninsulated roof, where the maximum ambient temperature does not exceed 150 °F, use intermediate temperature rated sprinklers.				

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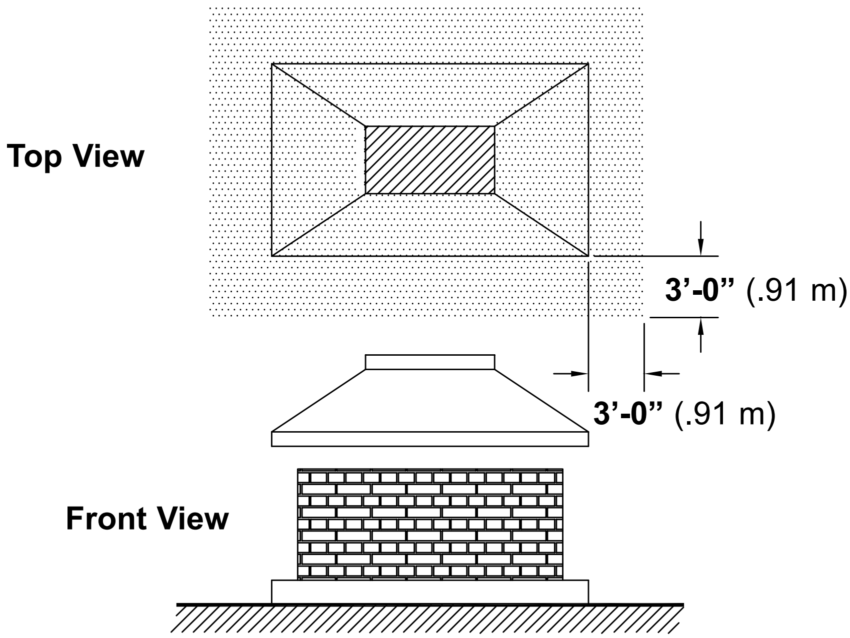
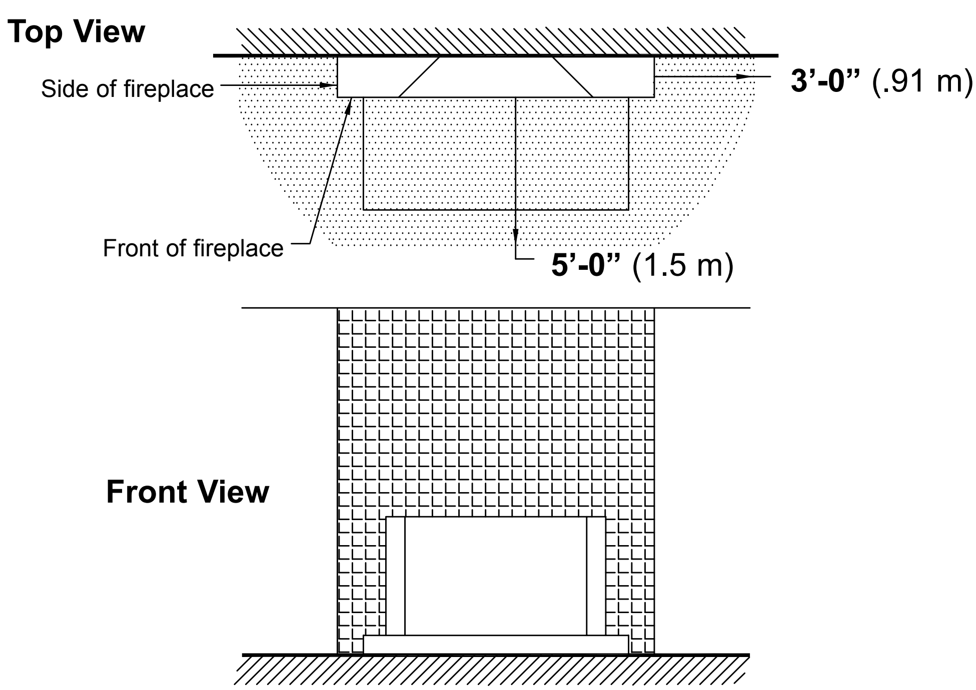
NOTE: The dimensions shown are intended to apply to residential sprinklers installed in ceilings above fireplaces used to burn products that cause elevated temperatures at or near the ceiling in areas surrounding the fireplace. The recommendations should not be construed to apply to decorative non-opening fireplaces such as gas fire units that will not cause elevated temperatures at the ceiling.



Sprinklers near an open hearth fireplace must be located outside of the shaded area or be intermediate degree rated.



Sprinklers near a recessed hearth fireplace must be located outside of the shaded area [at least 3'-0" (.91 m)] from the side of a recessed fireplace and at least 5'-0" (1.5 m) from the front) or be intermediate degree rated.

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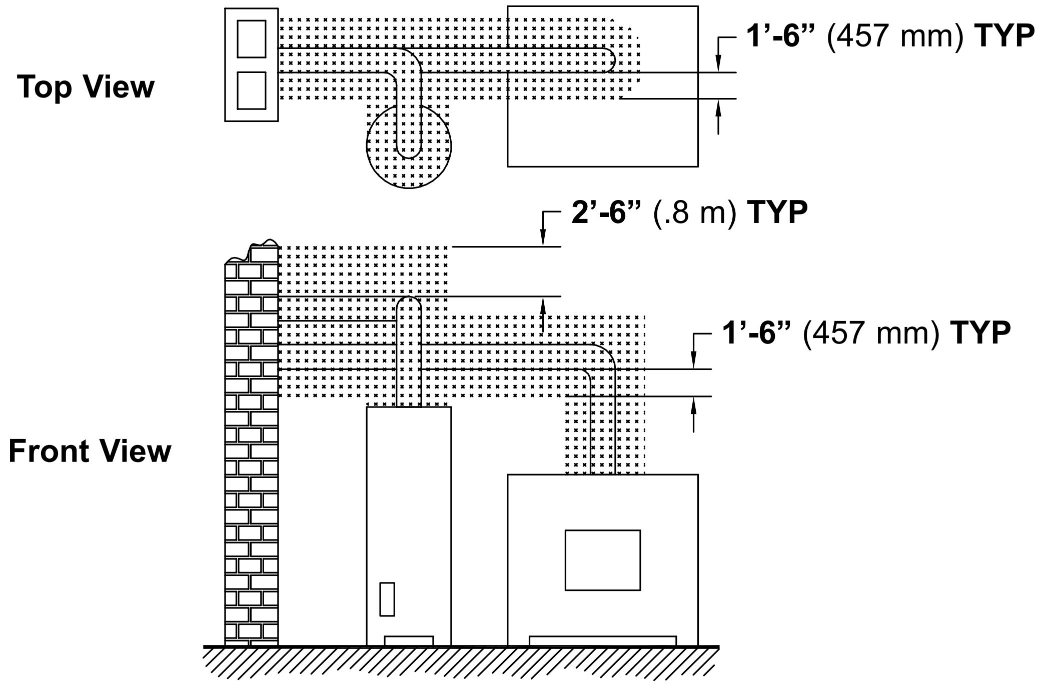
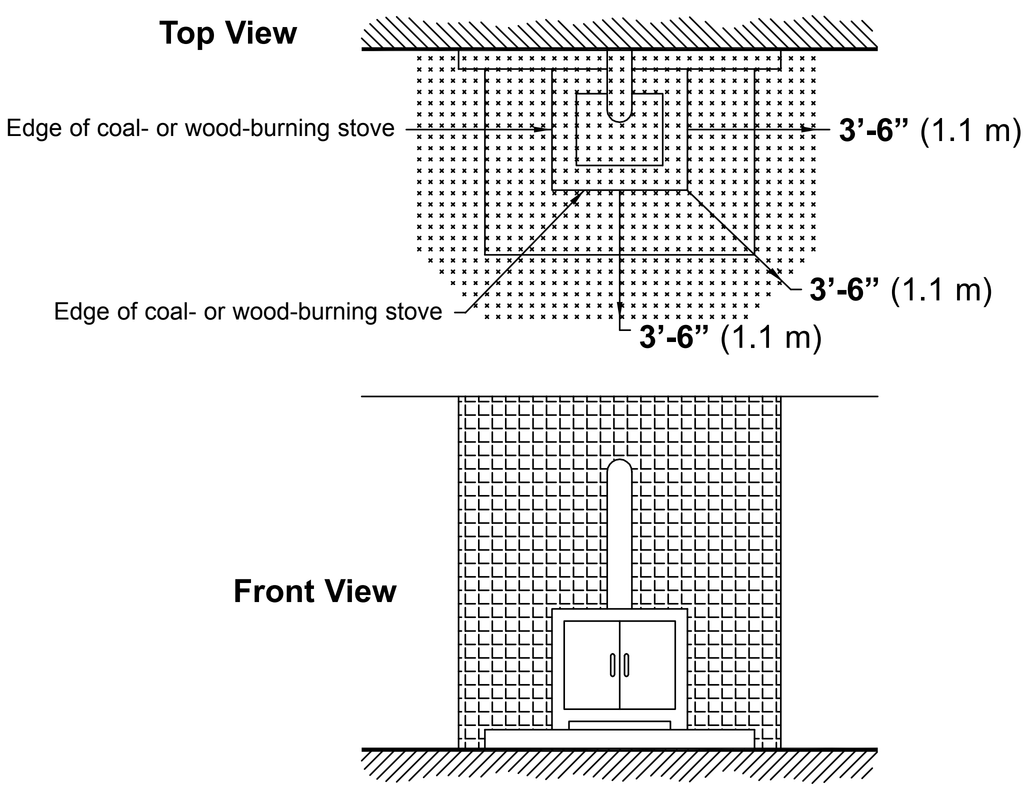


Sprinklers near a furnace or water heater must be located outside of the shaded area or be intermediate degree rated.



Sprinklers near a coal- or wood-burning stove must be located outside of shaded area or be intermediate degree rated.

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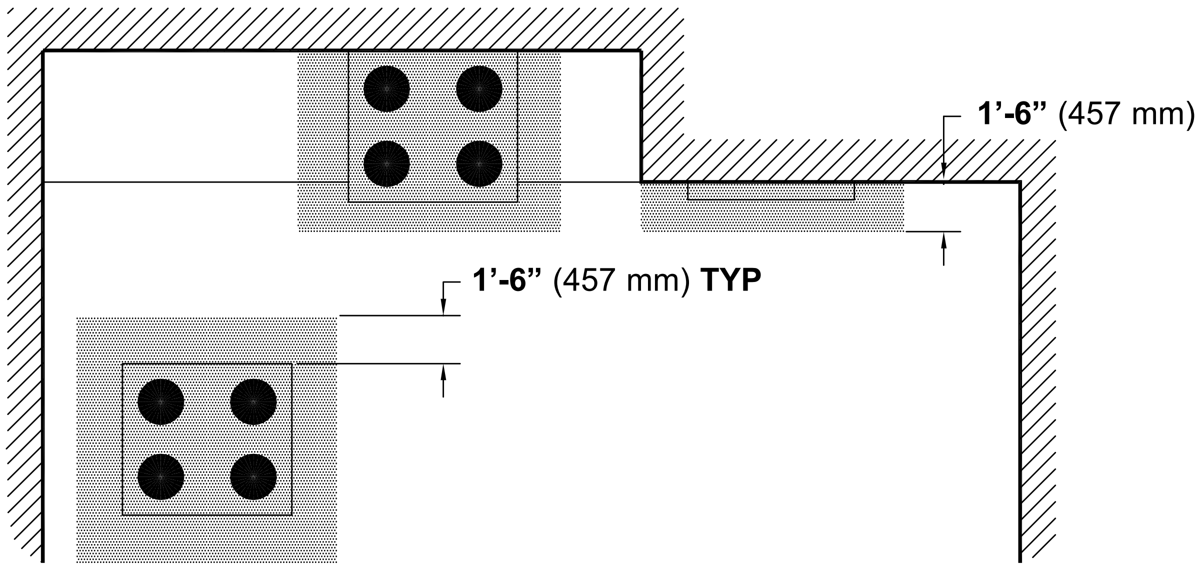
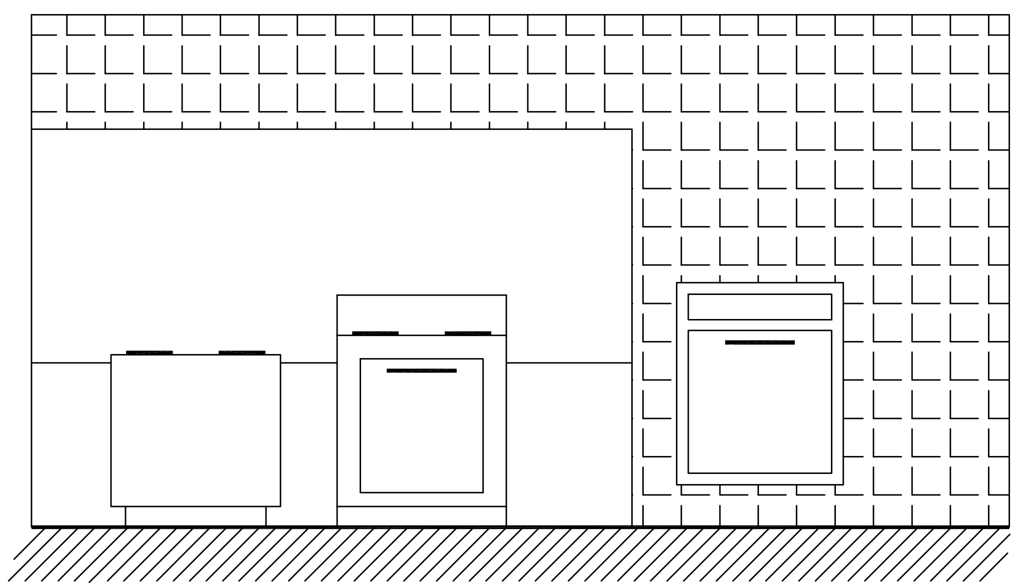
Top View



Front View



Sprinklers near a range or wall oven must be located outside of shaded areas or be intermediate degree rated.

VIKING | BULLETIN | **CARE AND HANDLING OF SPRINKLERS**

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SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

General Handling and Storage:

- Store sprinklers in a cool, dry place.
- Protect sprinklers during storage, transport, handling, and after installation.
- Use the original shipping containers. DO NOT place sprinklers loose in boxes, bins, or buckets.
- Keep sprinklers separated at all times. DO NOT allow metal parts to contact sprinkler operating elements.

For Pre-Assembled Drops:

- Protect sprinklers during handling and after installation.
- For recessed assemblies, use the protective sprinkler cap (Viking Part Number 10364).

Sprinklers with Protective Shields or Caps:

- DO NOT remove shields or caps until after sprinkler installation and there no longer is potential for mechanical damage to the sprinkler operating elements.
- **Sprinkler shields or caps MUST be removed BEFORE placing the system in service!**
- Remove the sprinkler shield by carefully pulling it apart where it is snapped together.
- Remove the cap by turning it slightly and pulling it off the sprinkler.

Sprinkler Installation:

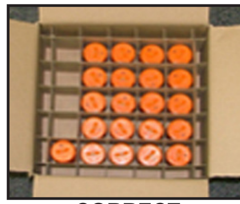
- DO NOT use the sprinkler deflector or operating element to start or thread the sprinkler into a fitting.
- **Use only the designated sprinkler head wrench!** Refer to the current sprinkler technical data page to determine the correct wrench for the model of sprinkler used.
- DO NOT install sprinklers onto piping at the floor level.
- Install sprinklers after the piping is in place to prevent mechanical damage.
- DO NOT allow impacts such as hammer blows directly to sprinklers or to fittings, pipe, or couplings in close proximity to sprinklers. Sprinklers can be damaged from direct or indirect impacts.
- DO NOT attempt to remove drywall, paint, etc., from sprinklers.
- **Take care not to over-tighten the sprinkler and/or damage its operating parts!**

Maximum Torque:

1/2" NPT:	**14 ft-lbs. (19.0 N-m)**
3/4" NPT:	**20 ft-lbs. (27.1 N-m)**
1" NPT:	**30 ft-lbs. (40.7 N-m)**

CORRECT
(Original container used)

INCORRECT
(Placed loose in box)



CORRECT
(Protected with caps)

INCORRECT
(Protective caps not used)

CORRECT
(Piping is in place at the ceiling)

INCORRECT
(Sprinkler at floor level)

CORRECT
(Special installation wrenches)

INCORRECT
(Designated wrench not used)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

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PROTECTIVE SPRINKLER SHIELDS AND CAPS

General Handling and Storage:

Many Viking sprinklers are available with a plastic protective cap or shield temporarily covering the operating elements. The snap-on shields and caps are factory installed and are intended to help protect the operating elements from mechanical damage during shipping, storage, and installation. NOTE: It is still necessary to follow the care and handling instructions on the appropriate sprinkler technical data sheets* when installing sprinklers with bulb shields or caps.

WHEN TO REMOVE THE SHIELDS AND CAPS:

NOTE: SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

Remove the shield or cap from the sprinkler only after checking all of the following:

- The sprinkler has been installed*.
- The wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.

SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

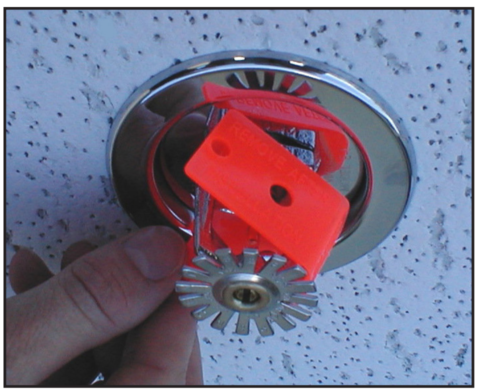

Figure 1: Sprinkler shield being removed from a pendent sprinkler.

Figure 2: Sprinkler cap being removed from a pendent sprinkler.

Figure 3: Sprinkler cap being removed from and upright sprinkler.

HOW TO REMOVE SHIELDS AND CAPS:

No tools are necessary to remove the shields or caps from sprinklers. DO NOT use any sharp objects to remove them! **Take care not to cause mechanical damage to sprinklers when removing the shields or caps.** When removing caps from fusible element sprinklers, use care to prevent dislodging ejector springs or damaging fusible elements. NOTE: Squeezing the sprinkler cap excessively could damage sprinkler fusible elements.

- To remove the shield, simply pull the ends of the shield apart where it is snapped together. Refer to Figure 1.
- To remove the cap, turn it slightly and pull it off the sprinkler. Refer to Figures 2 and 3.

NOTICE Refer to the current sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.

WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

*** Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.**

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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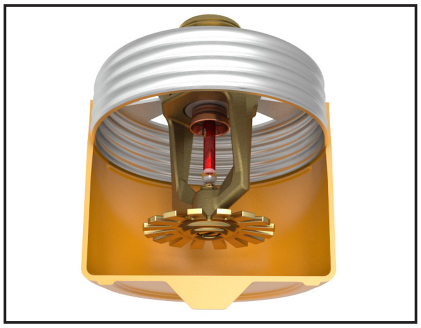
CAUTION **CONCEALED COVER ASSEMBLIES ARE FRAGILE!**
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



Concealed Sprinkler and Adapter Assembly with Protective Cap

Concealed Sprinkler and Adapter Assembly (Protective Cap Removed)

Cover Plate Assembly (Pendent Cover 12381 shown)

GENERAL HANDLING AND STORAGE INSTRUCTIONS:

- Do not store in temperatures exceeding 100 °F (38 °C). Avoid direct sunlight and confined areas subject to heat.
- Protect sprinklers and cover assemblies during storage, transport, handling, and after installation.
  -- Use original shipping containers.
  -- Do not place sprinklers or cover assemblies loose in boxes, bins, or buckets.
- Keep the sprinkler bodies covered with the protective sprinkler cap any time the sprinklers are shipped or handled, during testing of the system, and while ceiling finish work is being completed.
- Use only the designated Viking recessed sprinkler wrench (refer to the appropriate sprinkler data page) to install these sprinklers. **NOTE:** The protective cap is temporarily removed during installation and then placed back on the sprinkler for protection until finish work is completed.
- Do not over-tighten the sprinklers into fittings during installation.
- Do not use the sprinkler deflector to start or thread the sprinklers into fittings during installation.
- Do not attempt to remove drywall, paint, etc., from the sprinklers.
- Remove the plastic protective cap from the sprinkler before attaching the cover plate assembly. **PROTECTIVE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

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USE THE FOLLOWING PRECAUTIONS WHEN HANDLING WAX-COATED SPRINKLERS

Many of Viking's sprinklers are available with factory-applied wax coating for corrosion resistance. These sprinklers MUST receive appropriate care and handling to avoid damaging the wax coating and to assure satisfactory performance of the product.

General Handling and Storage of Wax-Coated Sprinklers:

- Store the sprinklers in a cool, dry place (in temperatures below the maximum ambient temperature allowed for the sprinkler temperature rating. Refer to Table 1 below.)
- Store containers of wax-coated sprinklers separate from other sprinklers.
- Protect the sprinklers during storage, transport, handling, and after installation.
- Use original shipping containers.
- Do not place sprinklers in loose boxes, bins, or buckets.

Installation of Wax-Coated Sprinklers:

Use only the special sprinkler head wrench designed for installing wax-coated Viking sprinklers (any other wrench may damage the unit).

- Take care not to crack the wax coating on the units.
- For touching up the wax coating after installation, wax is available from Viking in bar form. Refer to Table 1 below. The coating MUST be repaired after sprinkler installation to protect the corrosion-resistant properties of the sprinkler.
- Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they would be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.
- Inspect the coated sprinklers frequently soon after installation to verify the integrity of the corrosion resistant coating. Thereafter, inspect representative samples of the coated sprinklers in accordance with NFPA 25. Close up visual inspections are necessary to determine whether the sprinklers are being affected by corrosive conditions.

TABLE 1

Sprinkler Temperature Rating (Fusing Point)	Wax Part Number	Wax Melting Point	Maximum Ambient Ceiling Temperature[1]	Wax Color
155 °F (68 °C) / 165 °F (74 °C)	02568A	148 °F (64 °C)	100 °F (38 °C)	Light Brown
175 °F (79 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
200 °F (93 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
220 °F (104 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown
286 °F (141 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown

[1] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

TECHNICAL DATA

SPRINKLER OVERVIEW

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1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word “Viking”, the sprinkler identification number (SIN) consisting of “VK” plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

Available Temperature Ratings:

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

<u>UPRIGHT SPRINKLER:</u> A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSU” (Standard Sprinkler Upright) or “UPRIGHT” on the deflector.

<u>PENDENT SPRINKLER:</u> A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSP” (Standard Sprinkler Pendent) or “PENDENT” on the deflector.

Viking Technical Data may be found on The Viking Corporation’s Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

<u>CONVENTIONAL SPRINKLER:</u> An “old style” sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked “C U/P” (Conventional Upright/Pendent) on the deflector.

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

RECESSED SPRINKLER: A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

CORROSION-RESISTANT SPRINKLER: A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

VIKING	TECHNICAL DATA	SPRINKLER OVERVIEW

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s).

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

VIKING

BULLETIN

BEST PRACTICES FOR RESIDENTIAL SPRINKLER HANDLING & INSTALLATION

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page.

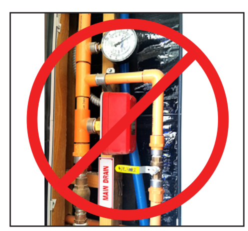
SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

- Always keep sprinklers in a cool dry place.
- Protect sprinklers during storage, transport and handling as well as before, during and after installation. Refer to Viking's Care and Handling of Sprinklers Bulletin Form No. F_091699[2].
- Proper transit, storage and installation of sprinklers in a high-heat environment is a must. Care should be taken to prevent sprinklers from being exposed to ambient heat conditions in excess of those referenced in installation standards.
- Do not stage or store sprinklers on the job site in advance in a non-conditioned space prior to installation.
- Keep sprinklers in the original packaging and check temperature indicators on box label prior to installation. If the indicator has turned black, DO NOT install any product contained in the box. Refer to Viking product return policies.
- Temperatures exceeding the maximum ambient temperature of the sprinkler temperature-rating during storage, transport, handling and installation must be avoided.
- Per NFPA standards 13, 13R, and 13D, sprinklers installed where maximum ambient temperatures are at or over 101 °F (38 °C) through 150 °F (66 °C) shall be intermediate temperature-rated sprinklers. Additionally, if sprinklers are installed in an unventilated concealed space under an uninsulated roof or in an unventilated attic, they shall be of intermediate temperature classification.
- Sprinklers installed where ambient temperatures are at or below 100 °F (38 °C) may be either ordinary or intermediate temperature-rated sprinklers. Refer to NFPA standards 13R 6.2.3.1 and 13D 7.5.6.1.
- Rough-in of sprinkler piping during hot weather conditions should not include the installation of sprinklers unless reasonable ambient temperatures can be maintained. Ambient temperatures that are considered when choosing the temperature rating for a sprinkler should take into account the range of ambient temperatures that are expected from installation through establishment and maintenance of temperature in a conditioned space. Appropriate insulation may be considered. **Example**: An ordinary temperature sprinkler should not be exposed to maximum ambient temperature higher than 100 °F (38 °C) or more. Refer to NFPA 13, Table 6.2.5.1, NFPA 13R, 6.2.3.1 and NFPA 13D, 7.5.6.1.
- CPVC fire sprinkler products exposed to high ambient temperatures (e.g. installed in unventilated, concealed spaces such as attics) should be insulated to maintain a cooler environment. Refer to Viking Plastics Installation and Design Manual, Form No. F_080712[2], for care and handling procedures.
- Protect all sprinklers and connecting CPVC piping in attic spaces and unvented concealed spaces from excessive heat exposure above 100 °F (38 °C). To separate excessive attic heat, properly tent and fully insulate all pipe in unconditioned spaces.
- Pressure relief valves should be installed on wet sprinkler systems where there is a risk of over-pressurization of a checked water supply, due to thermal expansion. Refer to NFPA 13, 7.1.2.1 and NFPA 13D, A.5.2.2.2.
- Fire sprinkler systems should be installed per current referenced editions of building codes and installation standards adopted in the jurisdiction where work is being performed.

INCORRECT
(Heat exposure)

INCORRECT
(Unconditioned at rough-in)

INCORRECT
(Exposed piping)



INCORRECT
(No pressure relief valve)

WARNING: Cancer and Reproductive Harm-
www.P65Warnings.ca.gov

[1]Hot weather condition is defined as temperatures that can reach the maximum ambient temperature-rating of the sprinkler.
[2]Clicking on blue hyperlink will open referenced document.

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING®	BULLETIN	REGULATORY AND HEALTH WARNINGS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING
STATE OF CALIFORNIA, USA Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.
For more information, go to **www.P65Warnings.ca.gov**

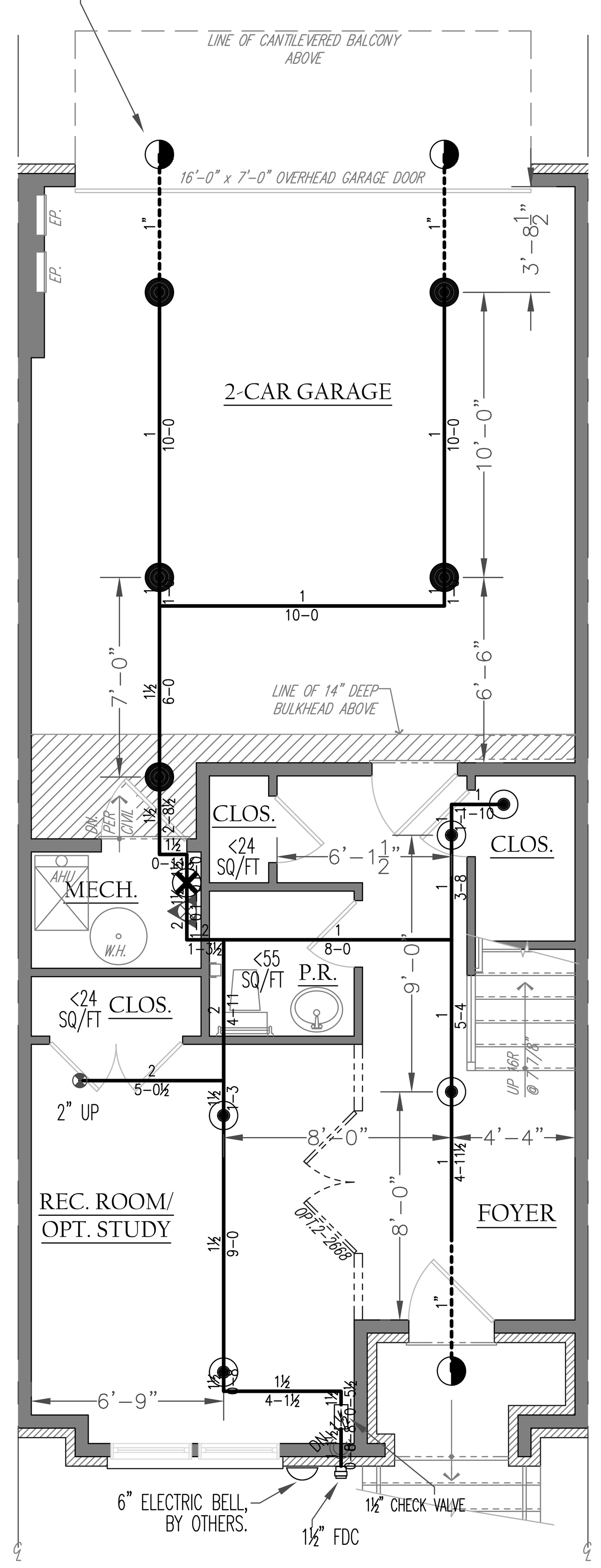
2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

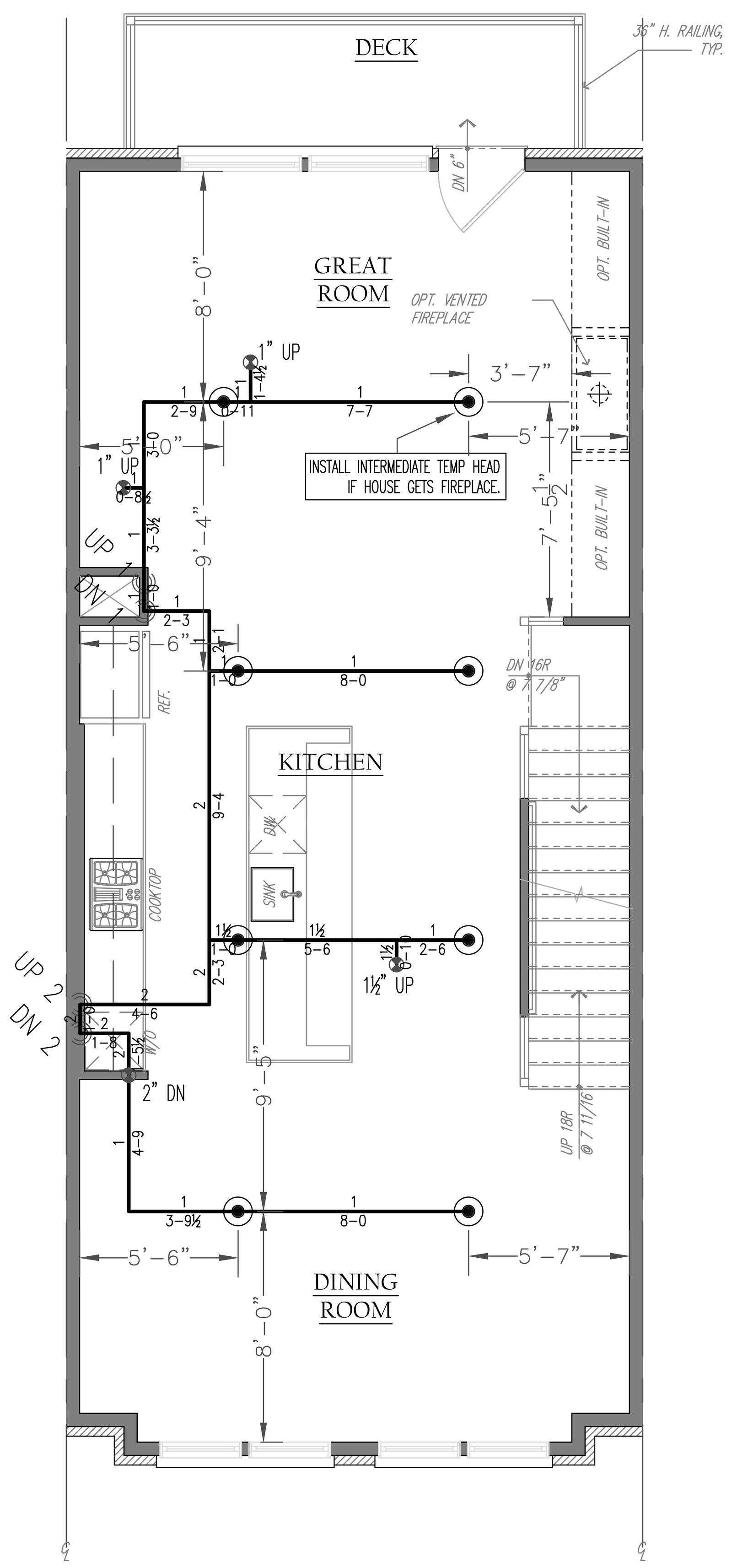
58" (4'-10") MAXIMUM LENGTH OF THE FLEX DRY BARREL, PER THE MANUFACTURER.
DASHED SPRINKLER LINES INDICATE FLEX PIPING.

FOR TYPICAL HYDRAULIC CALCULATION INFORMATION FOR THIS MODEL HOUSE, SEE SHEET 6 OF 8.

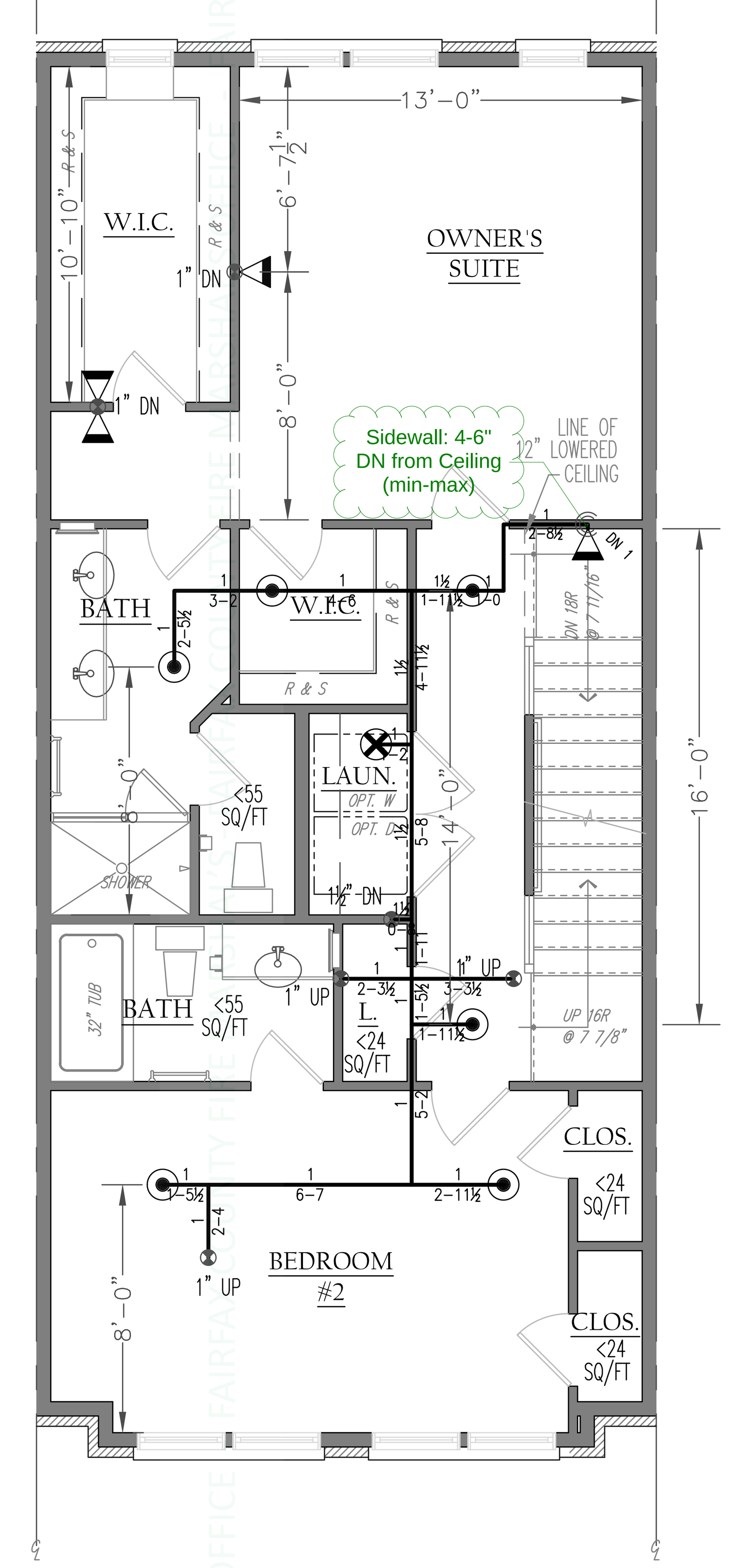
ONLY NIBCO 5012-S-BI CPVC TEE TO BE USED ON DRY SPRINKLER HEADS.



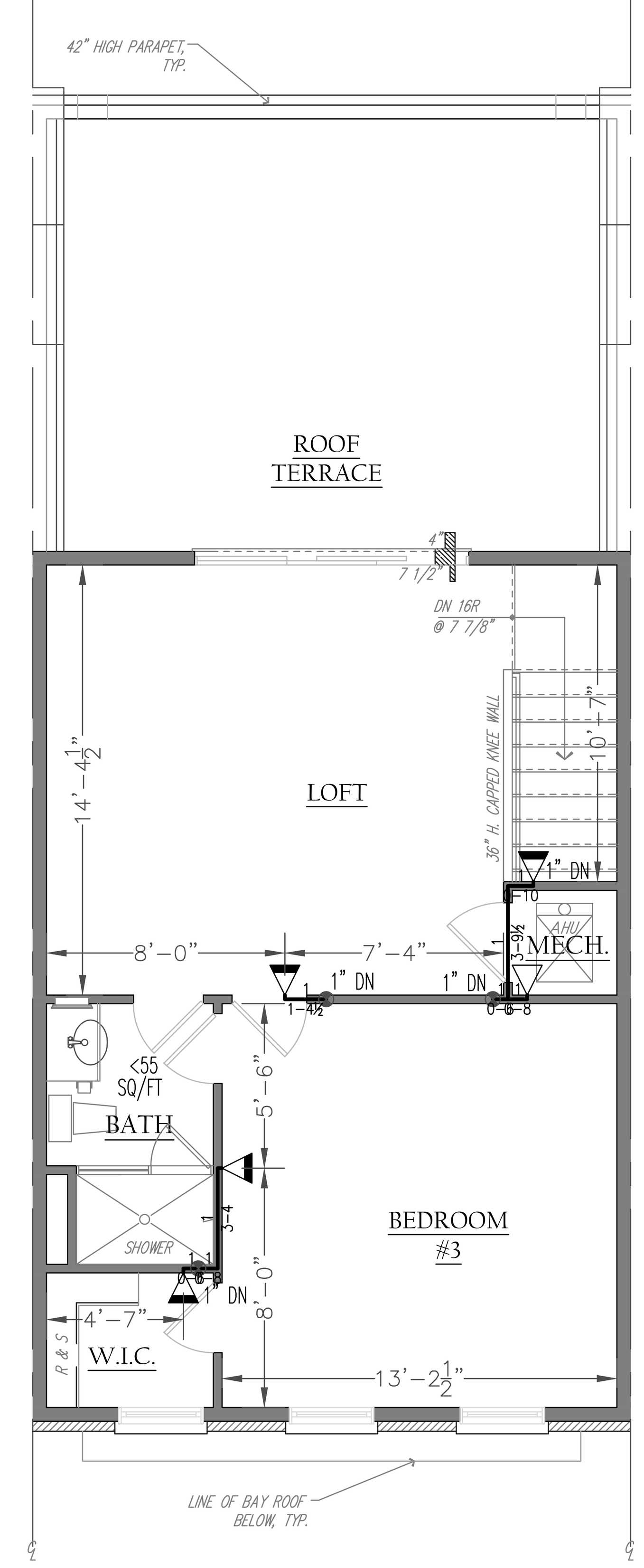
GROUND FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN



LOFT FLOOR PLAN

GENERAL NOTE

"Sprinklers are not required when multiple bathrooms are adjacent to each other and are considered separate rooms, provided they contain a lintel of a minimum of 8" and they are dedicated to personal hygiene, or a water closet, or bathing capability such as a shower or tub, or any combination of facilities thereof. NFPA #13R, 2016 was used as a future reference guide for clarification."

CEILING HEIGHTS (UNLESS NOTED OTHERWISE)
1ST FLOOR – 9'-1 1/8"
2ND FLOOR – 10'-1 1/8"
3RD FLOOR – 9'-1 1/8"
4TH FLOOR – 9'-1 1/8"

MAXIMUM SPACING OF ALL RESIDENTIAL SPRINKLERS

PENDENT HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SIDEWALL HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 4" TO 6" FROM CEILING

DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

FLEX DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

Plans APPROVED by Fire Marshal
- Fire Marshal field inspection REQUIRED for final approval.
- No inspection without approved, color-print plans onsite.
- Approval of this plan does not constitute approval to omit, amend, or otherwise not comply with any of the provisions in the adopted codes, standards, or manufacturer's installation requirements.

Date: 07/15/2020
Reviewed by: M. Long
Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

PLAN REVISIONS
DATE: | BY: | DESCRIPTION:

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	19
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	2
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	8
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	1
½" DRY PEND.	VIKING / QR VK180	155 DEG	WHITE	5
½" FLEX DRY PEND.	VICTAULIC/ QR V3506	155 DEG	WHITE	3
JOB TOTAL	38		TOTAL THIS SHEET	38

DESIGN CRITERIA

NFPA REF.: #13R
TYPE SYS.: WET
HAZARD: LIGHT HAZARD
DENSITY: .05, .10
REMOTE AREA: 2-4 HEADS
MAX. S.F./HD.: 196, 256
K FACTOR: 4.0-5.6
C FACTOR: 120 – 150
INSIDE HOSE: N/A
OUTSIDE HOSE:

SCALE 1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: FARADAY PARK, 1870 EASTERLY RD., RESTON, VA. 20190

DATE: 6-25-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 3	CAD FILE: FARADAYSUBMIT	DRWG NO: 1 OF 8
	PERMIT NO: 200580056	CONTRACTOR PHONE: 703-996-4246	

BUILDERS FIRE SOLUTIONS
BFS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

Plans APPROVED by Fire Marshal

Date: 07/15/2020

Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

58" (4'-10") MAXIMUM LENGTH OF THE FLEX DRY BARREL, PER THE MANUFACTURER.
DASHED SPRINKLER LINES INDICATE FLEX PIPING.

FOR TYPICAL HYDRAULIC CALCULATION INFORMATION FOR THIS MODEL HOUSE, SEE SHEET 6 OF 8.

ONLY NIBCO 5012-S-BI CPVC TEE TO BE USED ON DRY SPRINKLER HEADS.

GROUND FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

LOFT FLOOR PLAN

GENERAL NOTE

"Sprinklers are not required when multiple bathrooms are adjacent to each other and are considered separate rooms, provided they contain a lintel of a minimum of 8" and they are dedicated to personal hygiene, or a water closet, or bathing capability such as a shower or tub, or any combination of facilities thereof. NFPA #13R, 2016 was used as a future reference guide for clarification."

CEILING HEIGHTS (UNLESS NOTED OTHERWISE)

1ST FLOOR – 9'-1 1/8"
2ND FLOOR – 10'-1 1/8"
3RD FLOOR – 9'-1 1/8"
4TH FLOOR – 9'-1 1/8"

MAXIMUM SPACING OF ALL RESIDENTIAL SPRINKLERS

PENDENT HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SIDEWALL HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 4" TO 6" FROM CEILING

DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

FLEX DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SCALE 1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: FARADAY PARK, 1872 EASTERLY RD., RESTON, VA. 20190

DATE: 6-25-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 4	CAD FILE: FARADAYSUBMIT	DRWG NO: 2 OF 8
	PERMIT NO: 200580057	CONTRACTOR PHONE: 703-996-4246	

BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

GROUND FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

LOFT FLOOR PLAN

GENERAL NOTE

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Plans APPROVED by Fire Marshal

Date: 07/15/2020

Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

PLAN REVISIONS

DATE:	BY:	DESCRIPTION:

ABBREVIATIONS

CLG	CEILING
UNO	UNLESS NOTED OTHERWISE
UH	UNIT HEATER
GB	GYPSUM BOARD
AT	ACCOUSTICAL TILE CEILING
CF	CUT IN FIELD
CL	CENTER LINE
BD	BELOW DECK
AFF	ABOVE FINISHED FLOOR
TYP	TYPICAL

SYMBOLS

SPECIALTY ITEMS

DESIGN CRITERIA

NFPA REF.:	#13R
TYPE SYS.:	WET
HAZARD:	LIGHT HAZARD
DENSITY:	.05, .10
REMOTE AREA:	2-4 HEADS
MAX. S.F./HD.:	196, 256
K FACTOR:	4.0-5.6
C FACTOR:	120 - 150
INSIDE HOSE:	N/A
OUTSIDE HOSE:	

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
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½" FLEX DRY PEND.	VICTAULIC/ QR V3506	155 DEG	WHITE	3
JOB TOTAL	38	TOTAL THIS SHEET		38

SCALE 1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: FARADAY PARK, 1874 EASTERLY RD., RESTON, VA. 20190			
DATE: 6-25-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 5	CAD FILE: FARADAYSUBMIT	DRWG NO: 3 OF 8
	PERMIT NO: 200580058	CONTRACTOR PHONE: 703-996-4246	

BFS

BUILDERS FIRE SOLUTIONS

225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

Plans APPROVED by Fire Marshal

Date: 07/15/2020

Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

FOR TYPICAL HYDRAULIC CALCULATION INFORMATION FOR THIS MODEL HOUSE, SEE SHEET 6 OF 8.

58" (4'-10") MAXIMUM LENGTH OF THE FLEX DRY BARREL, PER THE MANUFACTURER.
DASHED SPRINKLER LINES INDICATE FLEX PIPING.

ONLY NIBCO 5012-S-BI CPVC TEE TO BE USED ON DRY SPRINKLER HEADS.

GROUND FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

LOFT FLOOR PLAN

GENERAL NOTE

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MAXIMUM SPACING OF ALL RESIDENTIAL SPRINKLERS

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SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	19
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	2
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	8
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	1
½" DRY PEND.	VIKING / QR VK180	155 DEG	WHITE	5
½" FLEX DRY PEND.	VICTAULIC/ QR V3506	155 DEG	WHITE	3
JOB TOTAL	38	TOTAL THIS SHEET		38

DESIGN CRITERIA

NFPA REF.: #13R
TYPE SYS.: WET
HAZARD: LIGHT HAZARD
DENSITY: .05, .10
REMOTE AREA: 2-4 HEADS
MAX. S.F./HD.: 196, 256
K FACTOR: 4.0-5.6
C FACTOR: 120 – 150
INSIDE HOSE: N/A
OUTSIDE HOSE:

FLOW TEST: STATIC PSI, RESIDUAL PSI, @ FLOW, HYDRANT ELEV., HYD. LOW GRAD., HYD. HIGH GRAD., ADJ STATIC PSI, ADJ RESID. PSI, INFO BY

SPECIALTY ITEMS

FIRE PUMP: RATED FLOW, RATED BOOST, SUCT. X DIST., RELIEF VALVE, FUEL TANK, MUFFLER, TEST HEADER, TYPE, SIZE, FINISH
F.D.C.: TYPE, SIZE, FINISH, F.H.V., FINISH, ALARM VALVE, DRY VALVE, OTHER

SYMBOLS

RISER SYMBOL; PIPE DROP; PIPE RISE; HANGER; SLOPE PIPE; DIMENSIONS; CAP; PLUG; HEAD-GUARDS; HEAT SHIELD; GROOVED COUPLING; CENTER OF PIPE ELEVATION; HYDRAULIC REFERENCE POINT; BRANCH LINE TAG NUMBER; MAIN TAG NUMBER; GRVD RED CPLG / FORCED CPLG; AUTOMATIC BALL DRIP; FLOW SWITCH; FIRE HOSE VALVE

ABBREVIATIONS

CLG CEILING
UNO UNLESS NOTED OTHERWISE
UH UNIT HEATER
GB GYPSUM BOARD
AT ACCOUSTICAL TILE CEILING
CIF CUT IN FIELD
CL CENTER LINE
BD BELOW DECK
AFF ABOVE FINISHED FLOOR
TYP TYPICAL

PLAN REVISIONS

DATE:	BY:	DESCRIPTION:

SCALE 1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: FARADAY PARK, 1876 EASTERLY RD., RESTON, VA. 20190

DATE: 6-25-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 6		CAD FILE: FARADAYSUBMIT / DRWG NO: 4 OF 8
	PERMIT NO: 200580059	CONTRACTOR PHONE: 703-996-4246	

BUILDERS FIRE SOLUTIONS
BFS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

Plans APPROVED by Fire Marshal

Date: 07/15/2020

Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

58" (4'-10") MAXIMUM LENGTH OF THE FLEX DRY BARREL, PER THE MANUFACTURER.
DASHED SPRINKLER LINES INDICATE FLEX PIPING.

FOR TYPICAL HYDRAULIC CALCULATION INFORMATION FOR THIS MODEL HOUSE, SEE SHEET 6 OF 8.

GROUND FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

LOFT FLOOR PLAN

GENERAL NOTE

"Sprinklers are not required when multiple bathrooms are adjacent to each other and are considered separate rooms, provided they contain a lintel of a minimum of 8" and they are dedicated to personal hygiene, or a water closet, or bathing capability such as a shower or tub, or any combination of facilities thereof. NFPA #13R, 2016 was used as a future reference guide for clarification."

CEILING HEIGHTS (UNLESS NOTED OTHERWISE)

1ST FLOOR – 9'-1 1/8"
2ND FLOOR – 10'-1 1/8"
3RD FLOOR – 9'-1 1/8"
4TH FLOOR – 9'-1 1/8"

MAXIMUM SPACING OF ALL RESIDENTIAL SPRINKLERS

PENDENT HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SIDEWALL HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 4" TO 6" FROM CEILING

DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

FLEX DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SCALE 1/4"=1'-0" 0' 5' 10' 15' 20'

JOB NAME: FARADAY PARK
1878 EASTERLY RD.
RESTON, VA. 20190

DATE: 6-25-2020	SCALE: 1/4"=1'-0"	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 7		CAD FILE: FARADAYSUBMIT
	PERMIT NO: 200570028	CONTRACTOR PHONE: 703-996-4246	DRWG NO: 5 OF 8

BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

PLAN REVISIONS — DATE: BY: DESCRIPTION:

ABBREVIATIONS: CLG CEILING; UNO UNLESS NOTED OTHERWISE; UH UNIT HEATER; GB GYPSUM BOARD; AT ACCOUSTICAL TILE CEILING; CF CUT IN FIELD; CL CENTER LINE; BD BELOW DECK; AFF ABOVE FINISHED FLOOR; TYP TYPICAL

SYMBOLS: RISER SYMBOL; PIPE DROP; PIPE RISE; HANGER; SLOPE PIPE; DIMENSIONS; CAP; PLUG; HEAD-GUARDS; HEAT SHIELD; GROOVED COUPLING; CENTER OF PIPE ELEVATION; HYDRAULIC REFERENCE POINT; BRANCH LINE TAG NUMBER; MAIN TAG NUMBER; GRVD RED CPLG / FORGED CPLG; AUTOMATIC BALL DRIP; FLOW SWITCH; FIRE HOSE VALVE

SPECIALTY ITEMS: FIRE PUMP: RATED FLOW: RATED BOOST: SUCT. X DIST.: RELIEF VALVE: FUEL TANK: MUFFLER: TEST HEADER: TYPE: SIZE: FINISH: F.D.C.: TYPE: SIZE: FINISH: F.H.V.: FINISH: ALARM VALVE: DRY VALVE: OTHER:

DESIGN CRITERIA: NFPA REF.: #13R; TYPE SYS.: WET; HAZARD: LIGHT HAZARD; DENSITY: .05, .10; REMOTE AREA: 2-4 HEADS; MAX. S.F./HD.: 196, 256; K FACTOR: 4.0-5.6; C FACTOR: 120 – 150; FLOW TEST: STATIC PSI: RESIDUAL PSI: @ FLOW: HYDRANT ELEV.: HYD. LOW GRAD.: HYD. HIGH GRAD.: ADJ STATIC PSI: ADJ RESID. PSI: INFO BY: INSIDE HOSE: N/A; OUTSIDE HOSE:

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	19
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	2
½" REC. SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	8
½" REC. SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	1
½" DRY PEND.	VIKING / QR VK189	155 DEG	WHITE	5
½" FLEX DRY PEND.	VICTAULIC / QR V3506	155 DEG	WHITE	3
			TOTAL THIS SHEET	38
			JOB TOTAL	38

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 6 OF 8
COMPANY PRINT NO 20–0073 DATED 6–25–20
FOR 1ST FLOOR GARAGE REMOTE #4
AT 1880 EASTERLY RD. CONTRACT NO 0073
IS DESIGNED TO DISCHARGE AT A RATE OF .10 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 4 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 65.453 GPM (L/MIN) AT 36.047 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF 25 GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A
INSTALLED BY: BUILDERS FIRE SOLUTIONS
SAFETY MARGIN: 14.906 PSI
DRY PENDENT HEADS: 14' x 14' SPACING

HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 6 OF 8
COMPANY PRINT NO 20–0073 DATED 6–25–20
FOR 2ND FLOOR GREAT ROOM REMOTE #3
AT 1880 EASTERLY RD. CONTRACT NO 0073
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 4 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 61.24 GPM (L/MIN) AT 44.351 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF 25 GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A
INSTALLED BY: BUILDERS FIRE SOLUTIONS
SAFETY MARGIN: 6.606 PSI
PENDENT HEADS: 16' x 16' SPACING

HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 6 OF 8
COMPANY PRINT NO 20–0073 DATED 6–25–20
FOR 3RD FLOOR BEDROOM REMOTE #2
AT 1880 EASTERLY RD. CONTRACT NO 0073
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 2 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 26.275 GPM (L/MIN) AT 37.371 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF 25 GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A
INSTALLED BY: BUILDERS FIRE SOLUTIONS
SAFETY MARGIN: 13.612 PSI
PENDENT HEADS: 16' x 16' SPACING

HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 6 OF 8
COMPANY PRINT NO 20–0073 DATED 6–25–20
FOR 3RD FLOOR HALL REMOTE #5
AT 1880 EASTERLY RD. CONTRACT NO 0073
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 5 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 45.962 GPM (L/MIN) AT 45.657 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF 25 GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A
INSTALLED BY: BUILDERS FIRE SOLUTIONS
SAFETY MARGIN: 5.313 PSI
SIDEWALL HEADS: 16' x 16' SPACING
PENDENT HEADS: 16' x 16' SPACING

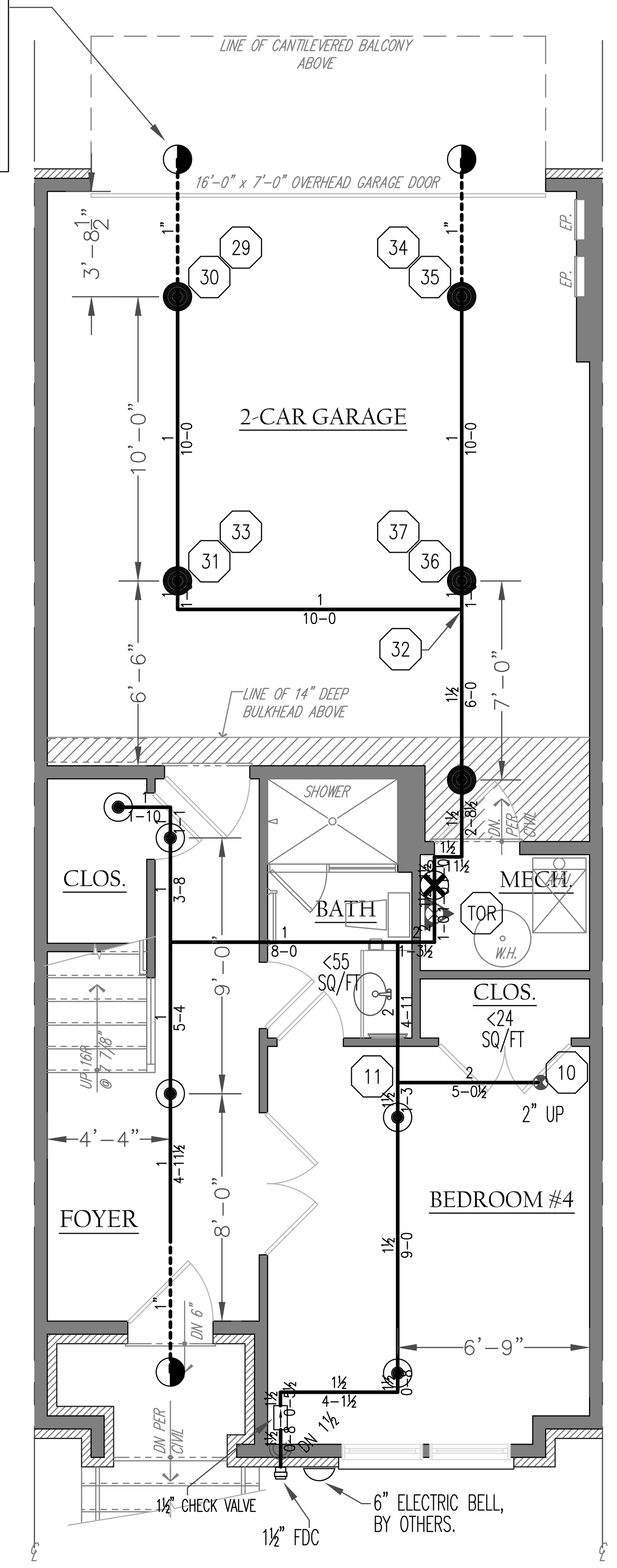
HYDRAULICALLY CALCULATED SYSTEM

THIS SYSTEM AS SHOWN ON SHEET 6 OF 8
COMPANY PRINT NO 20–0073 DATED 6–25–20
FOR 4TH FLOOR LOFT REMOTE #1
AT 1880 EASTERLY RD. CONTRACT NO 0073
IS DESIGNED TO DISCHARGE AT A RATE OF .05 GPM (L/MIN) PER SQ FT (M2) OF FLOOR AREA OVER A MAXIMUM AREA OF 5 HEADS SQ FT (M2) WHEN SUPPLIED WITH WATER AT THE RATE OF 26.33 GPM (L/MIN) AT 45.271 PSI (BARS) AT THE BASE OF THE RISER
HOSE STREAM ALLOWANCE OF 25 GPM (L/MIN)
OCCUPANCY CLASSIFICATION LIGHT HAZARD
COMMODITY CLASSIFICATION N/A
MAXIMUM STORAGE HEIGHT N/A
INSTALLED BY: BUILDERS FIRE SOLUTIONS
SAFETY MARGIN: 5.713 PSI
SIDEWALL HEADS: 16' x 16' SPACING

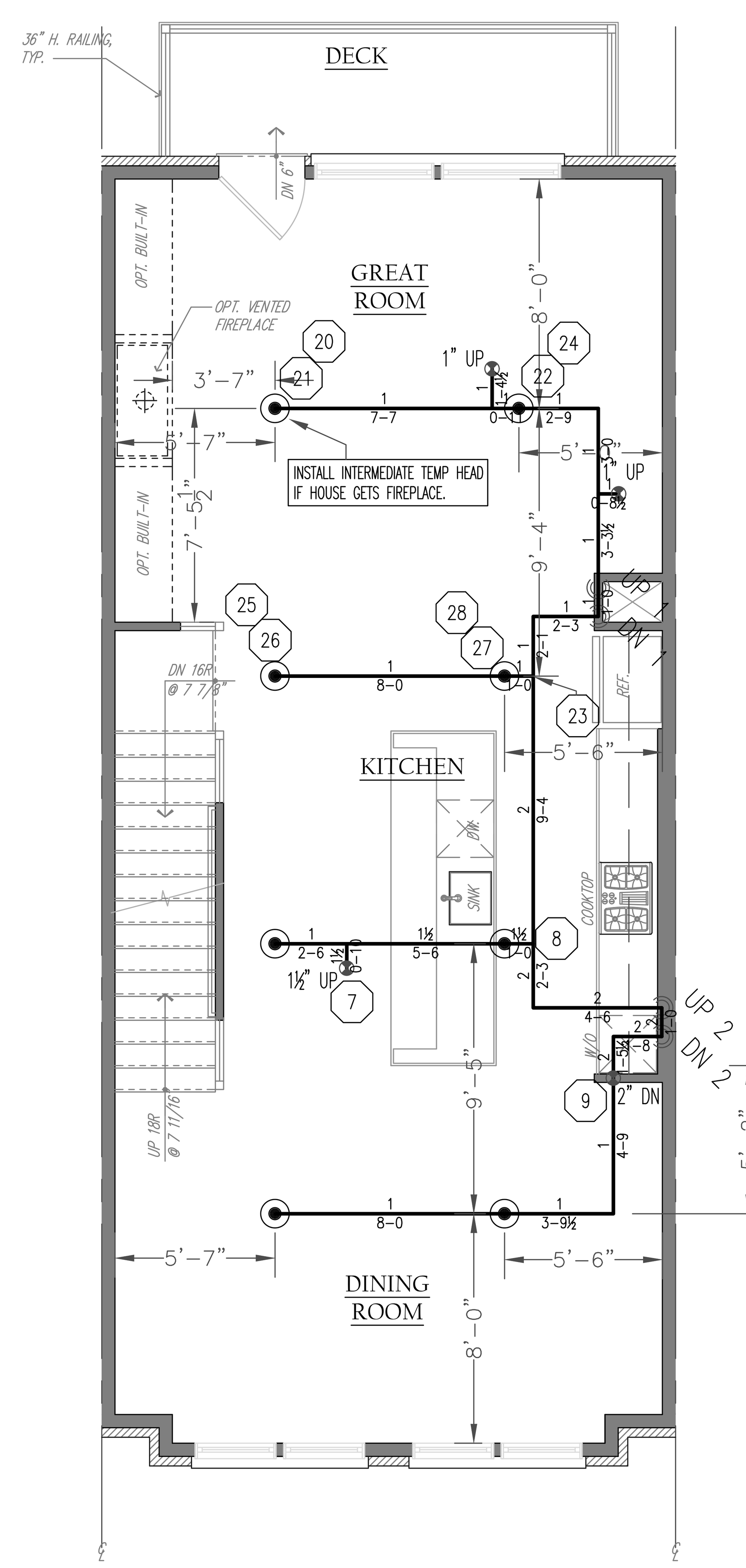
58" (4'–10") MAXIMUM LENGTH OF THE FLEX DRY BARREL, PER THE MANUFACTURER. DASHED SPRINKLER LINES INDICATE FLEX PIPING.

ONLY NIBCO 5012–S–BI CPVC TEE TO BE USED ON DRY SPRINKLER HEADS.

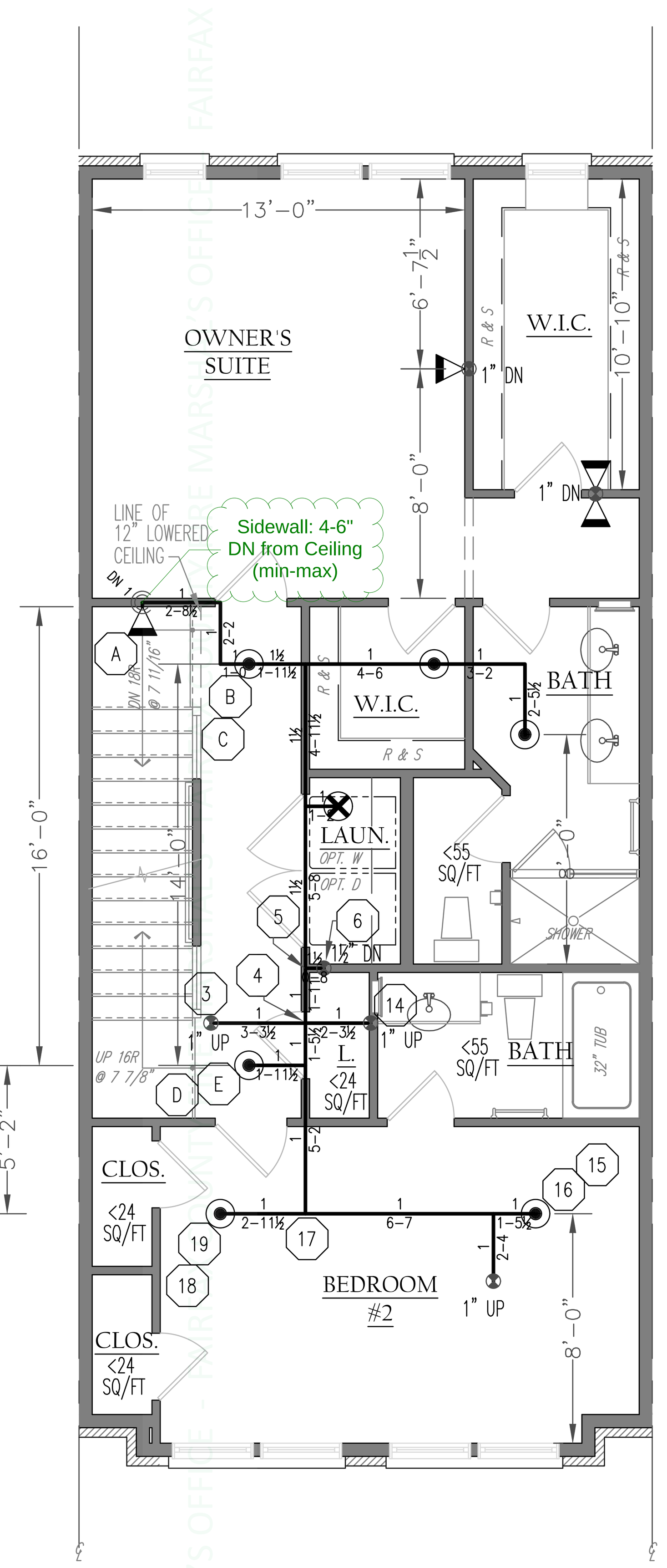
A TOTAL ESTIMATED DOMESTIC DEMAND OF 25 GPM WILL BE ADDED TO EACH REMOTE AREA HYDRAULIC CALCULATION PER NFPA 13R 2013 EDITION, SECTION 9.6, TABLES A.9.6(a) AND A.9.6(b). SEE PAGE 7 OF 8.



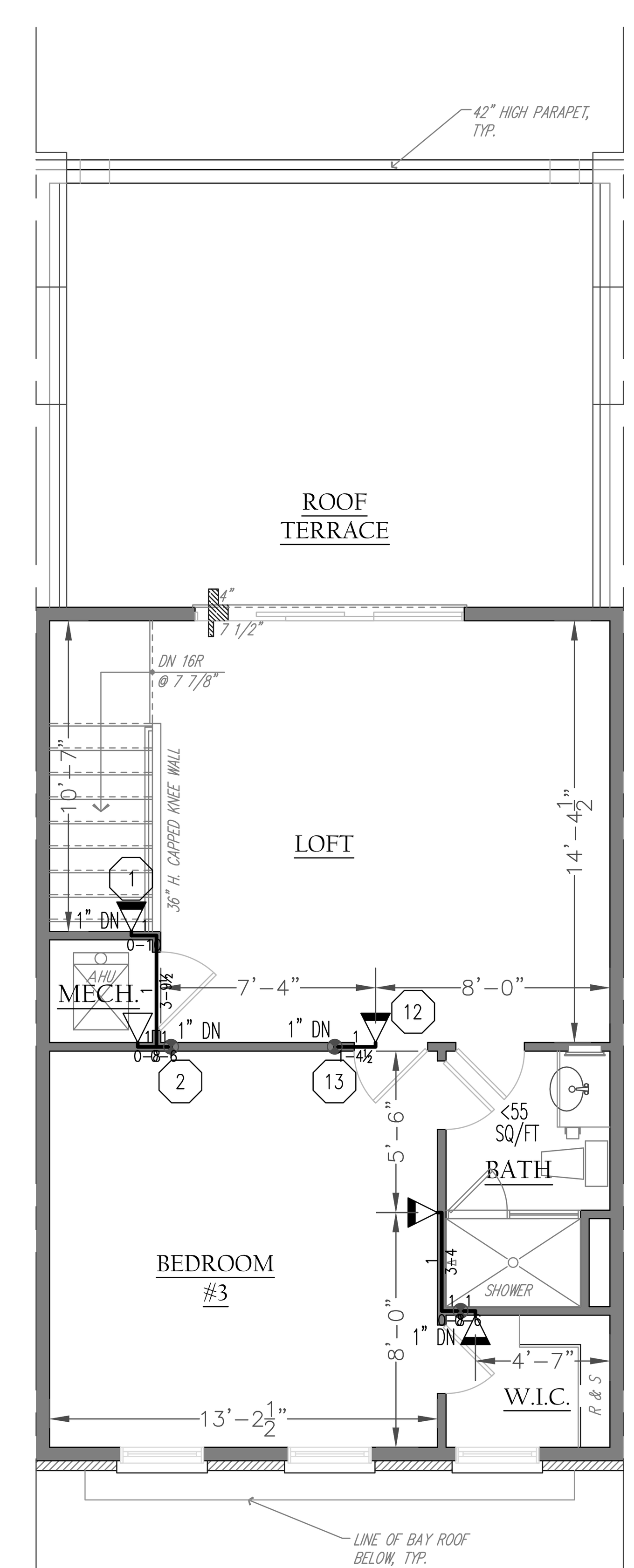
GROUND FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN



LOFT FLOOR PLAN

GENERAL NOTE

"Sprinklers are not required when multiple bathrooms are adjacent to each other and are considered separate rooms, provided they contain a lintel of a minimum of 8" and they are dedicated to personal hygiene, or a water closet, or bathing capability such as a shower or tub, or any combination of facilities thereof. NFPA #13R, 2016 was used as a future reference guide for clarification."

CEILING HEIGHTS (UNLESS NOTED OTHERWISE)
1ST FLOOR – 9'–1 1/8"
2ND FLOOR – 10'–1 1/8"
3RD FLOOR – 9'–1 1/8"
4TH FLOOR – 9'–1 1/8"

MAXIMUM SPACING OF ALL RESIDENTIAL SPRINKLERS

PENDENT HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

SIDEWALL HEADS: 16' X 16' AND 8' FROM WALL, W/ DEFLECTOR 4" TO 6" FROM CEILING

DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

FLEX DRY PENDENT HEADS: 14' X 14' AND 7' FROM WALL, W/ DEFLECTOR 1" TO 4" FROM CEILING

PLAN REVISIONS
DATE: | BY: | DESCRIPTION:

ABBREVIATIONS
CLG CEILING
UNO UNLESS NOTED OTHERWISE
UH UNIT HEATER
GB GYPSUM BOARD
AT ACCOUSTICAL TILE CEILING
OF OUT IN FIELD
CL CENTER LINE
BD BELOW DECK
AFF ABOVE FINISHED FLOOR
TYP TYPICAL

SYMBOLS

SPECIALTY ITEMS

DESIGN CRITERIA
NFPA REF.: #13R
TYPE SYS.: WET
HAZARD: LIGHT HAZARD
DENSITY: .05, .10
REMOTE AREA: 2–4 HEADS
MAX. S.F./HD.: 196, 256
K FACTOR: 4.0–5.6
C FACTOR: 120 – 150
INSIDE HOSE: N/A
OUTSIDE HOSE:

SPRINKLERS

SYMBOL	MANUF/MODEL	TEMP.	FINISH	TOTAL
½" REC. PEND.	VIKING / QR VK468	155 DEG	WHITE	19
½" REC. PEND.	VIKING / QR VK468	175 DEG	WHITE	2
½" REC SIDEWALL	VIKING / QR VK486	155 DEG	WHITE	8
½" REC SIDEWALL	VIKING / QR VK486	175 DEG	WHITE	1
½" DRY PEND.	VIKING / QR VK180	155 DEG	WHITE	5
½" FLEX DRY PEND.	VICTAULIC/ QR V3506	155 DEG	WHITE	3
JOB TOTAL	38	TOTAL THIS SHEET		38

SCALE 1/4"=1'–0"

JOB NAME: FARADAY PARK, 1880 EASTERLY RD., RESTON, VA. 20190			
DATE: 6–25–2020	SCALE: 1/4"=1'–0"	CONTRACT NO: 20–0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: LOT 8	CAD FILE: FARADAYSUBMIT	DRWG NO: 6 OF 8
	PERMIT NO: 200580055	CONTRACTOR PHONE: 703–996–4246	

BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428–8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

Plans APPROVED by Fire Marshal
Date: 07/15/2020
Permit #: Multiple Permits
AP#:
201840100
201840102
201840103
201840105
201840107
201840108

NFPA 13R 2013 EDITION
TABLE A.9.6(a) FIXTURE LOAD VALUES

PRIVATE FACILITIES (THOSE WITHIN INDIVIDUAL DWELLING UNITS)

FACILITY TYPE	UNIT
-BATHROOM GROUP W/FLUSH TANK (INCLUDING LAVATORY, WATER CLOSET, AND BATHTUB W/SHOWER)	6
-BATHROOM GROUP W/FLUSH VALVE	8
-BATHTUB	2
-DISHWASHER	1
-KITCHEN SINK	2
-LAUNDRY TRAYS	3
-LAVATORY	1
-SHOWER STALL	2
-WASHING MACHINE	2
-WATER CLOSET W/FLUSH VALVE	6
-WATER CLOSET W/FLUSH TANK	3

PUBLIC FACILITIES

FACILITY TYPE	UNIT
-BATHTUB	4
-DRINKING FOUNTAIN	0
-KITCHEN SINK	4
-LAVATORY	2
-SERVICE SINK	3
-SHOWER HEAD	4
-URINAL W/ 1 in. (25.4mm) FLUSH VALVE	10
-URINAL W/ 3/4 in. (19mm) FLUSH VALVE	5
-URINAL W/ FLUSH TANK	3
-WASHING MACHINE 8 lb (3.63 kg)	3
-WASHING MACHINE 16 lb (7.26 kg)	4
-WATER CLOSET W/FLUSH VALVE	10
-WATER CLOSET W/FLUSH TANK	5

NFPA 13R 2013 EDITION
9.6 DOMESTIC DEMAND

DOMESTIC DEMAND SHALL BE INCLUDED AS PART OF THE OVERALL SYSTEM DEMAND FOR SYSTEMS WITH COMMON DOMESTIC/FIRE MAINS WHERE NO PROVISIONS ARE MADE TO PREVENT THE DOMESTIC WATER FLOW UPON SPRINKLER SYSTEM ACTIVATION.

A.9.6

TABLE A.9.6(a) AND TABLE A.9.6(b) CAN BE USED TO DETERMINE A DOMESTIC DESIGN DEMAND. USING TABLE A.9.6(a), THE TOTAL NUMBER OF WATER SUPPLY FIXTURE UNITS DOWNSTREAM OF ANY POINT IN THE PIPING SERVING BOTH SPRINKLER AND DOMESTIC NEEDS IS DETERMINED. USING TABLE A.9.6(b), THE APPROPRIATE TOTAL FLOW ALLOWANCE IS DETERMINED AND ADDED TO THE SPRINKLER DEMAND AT THE TOTAL PRESSURE REQUIRED FOR THE SPRINKLER SYSTEM AT THAT POINT.

NFPA 13R 2013 EDITION
TABLE A.9.6(b) TOTAL ESTIMATED DOMESTIC DEMAND

TOTAL FIXTURE LOAD UNITS FROM TABLE A.9.5(a)	TOTAL DEMAND: FOR SYSTEMS W/PREDOMINATELY FLUSH TANKS gpm	L/min	FOR SYSTEMS W/PREDOMINATELY FLUSH VALVES gpm	L/min
1	3	11.25	--	--
2	5	18.75	--	--
5	10	37.5	15	56
10	15	56	25	94
20	20	75	35	13
35	25	94	45	169
50	30	113	50	187
70	35	131	60	225
100	45	169	70	262
150	55	200	80	300
200	65	244	90	337
250	75	261	100	375
350	100	375	125	469
500	125	469	150	562
750	175	656	175	656
1000	200	750	200	750
1500	275	1031	275	1031
2000	325	1219	325	1219
3500	500	1875	500	1875

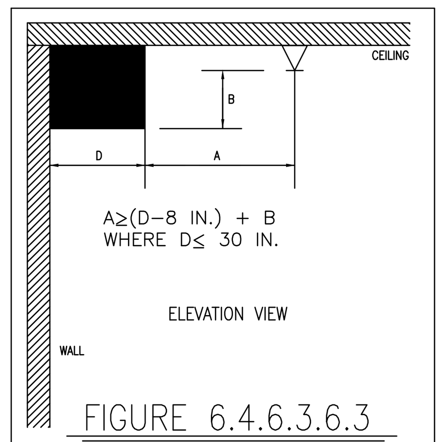
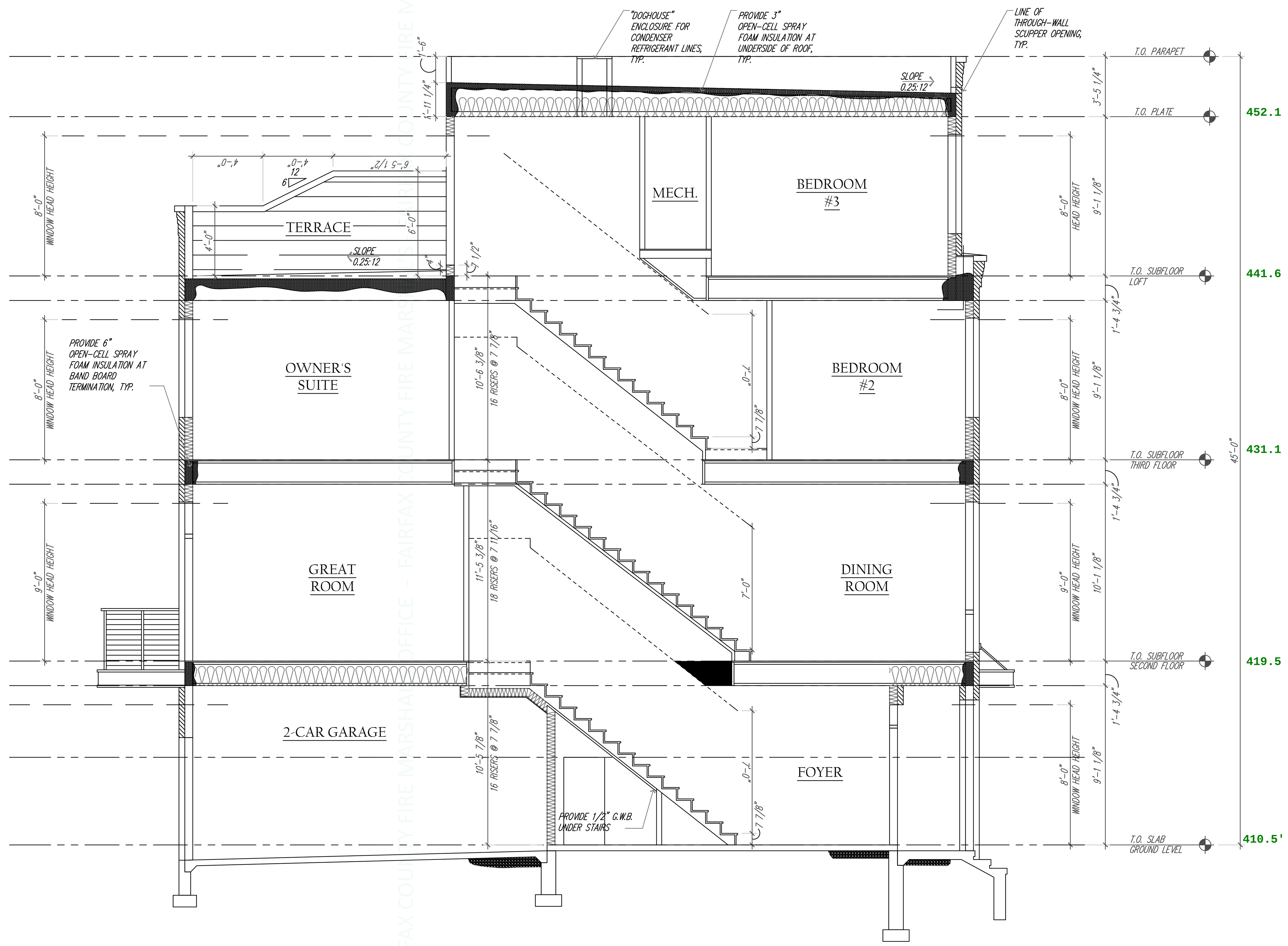
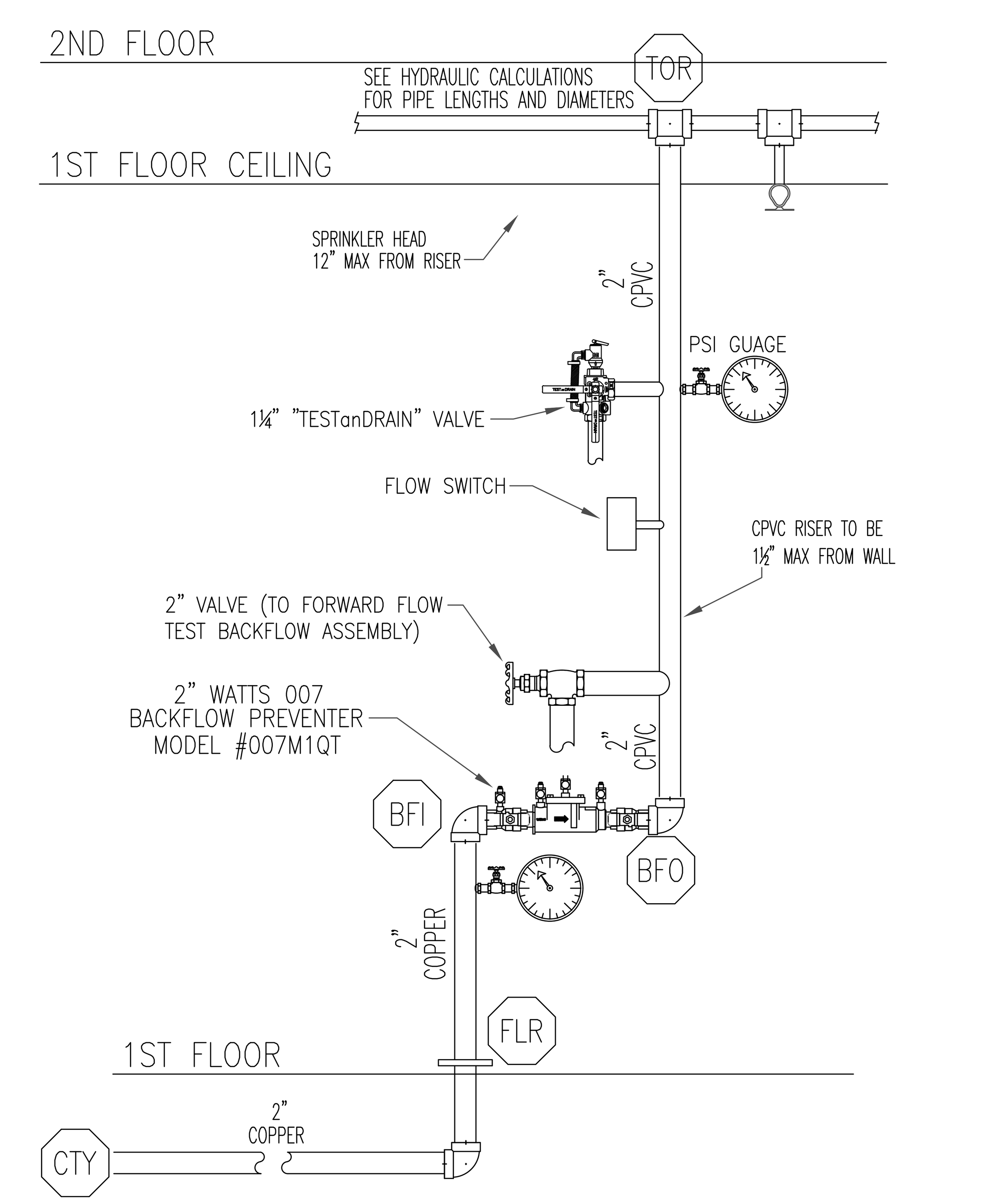


FIGURE 6.4.6.3.6.3
OBSTRUCTIONS AGAINST WALLS (STANDARD SPRINKLERS)

NFPA 13R 2013 EDITION FIGURE 6.4.6.3.6.2

DISTANCE FROM SPRINKLERS TO SIDE OF OBSTRUCTION	MAXIMUM ALLOWABLE DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION
LESS THAN 1 FT	0
ONE FT TO LESS THAN 1 FT 6 IN.	0"
1 FT 6 IN. TO LESS THAN 2 FT	1"
2 FT TO LESS THAN 2 FT 6 IN.	1"
2 FT 6 IN. TO LESS THAN 3 FT	1"
3 FT TO LESS THAN 3 FT 6 IN.	3"
3 FT 6 IN. TO LESS THAN 4 FT	3"
4 FT TO LESS THAN 4 FT 6 IN.	5"
4 FT 6 IN. TO LESS THAN 5 FT	7"
5 FT TO LESS THAN 5 FT 6 IN.	7"
5 FT 6 IN. TO LESS THAN 6 FT	7"
6 FT TO LESS THAN 6 FT 6 IN.	9"
6 FT 6 IN. TO LESS THAN 7 FT	11"
7 FT AND GREATER	14"





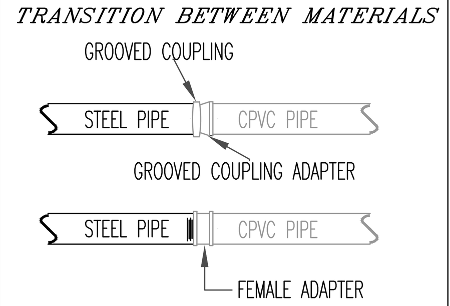
NFPA 13R SPRINKLER RISER DETAIL

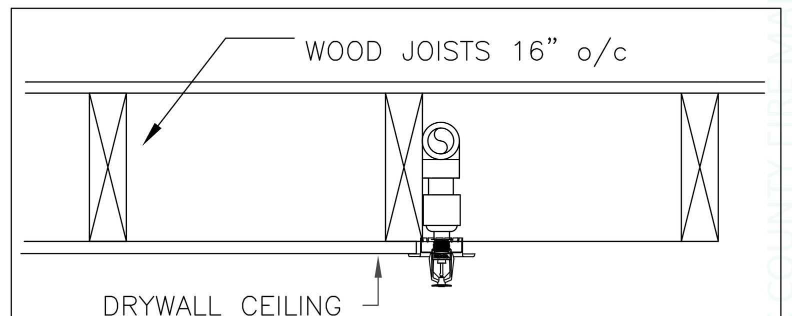
SEE HYDRAULIC CALCULATIONS FOR ALL PIPE LENGTHS

NOT TO SCALE

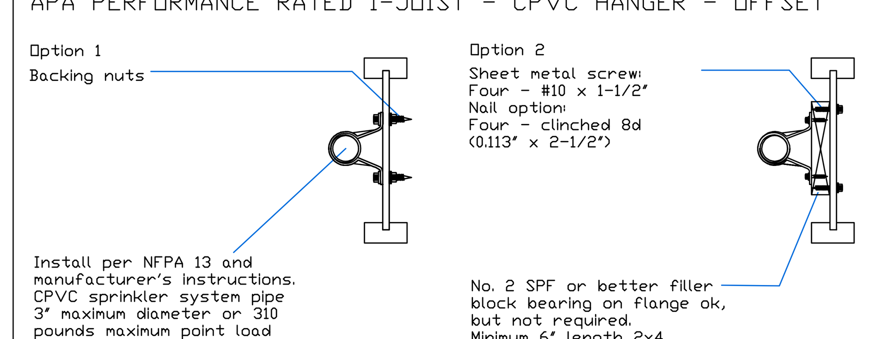
CPVC

TRANSITION BETWEEN MATERIALS





APA PERFORMANCE RATED I-JOIST - CPVC HANGER - OFFSET



TEST INFO FROM FAIRFAX WATER AUTHORITY

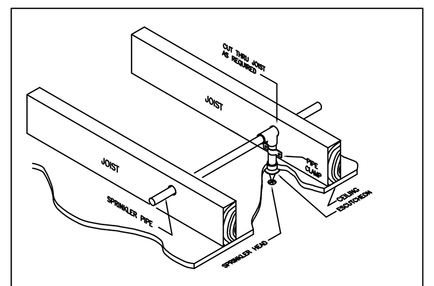
HYDRANT #191
TEST DATED: 10/1/2018
STATIC = 51 PSI
RESIDUAL= 47 PSI
FLOW = 1000 GPM
LOW GRADIENT= 525 FT

TEST ADJUSTED TO TEST HYDRANT
LOW GRADIENT 525'
HYDRANT ELEV. −402'
123'
X .433

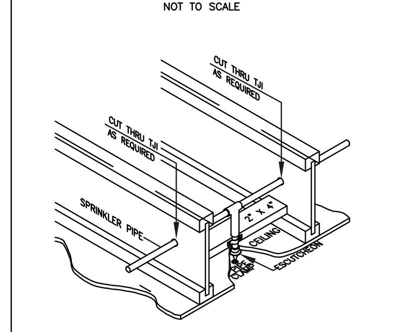
ADJUSTED STATIC 53.25 PSI
ADJUSTED RESIDUAL 49.25 PSI
FLOW 1000 GPM

GENERAL NOTES & SYMBOLS:

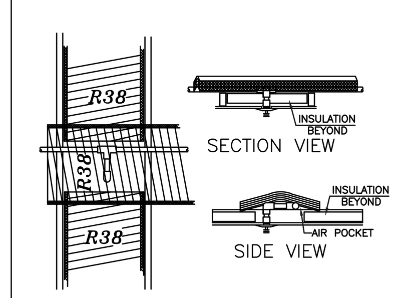
1. ALL MATERIAL, EQUIPMENT, FITTINGS AND DEVICES USED AND INSTALLED IN THIS SPRINKLER SYSTEM INSTALLATION SHALL BE NEW AND COMPLY WITH THE INSTALLATION STANDARDS OF THE NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET NO 13R 2013 EDITION AND SHALL BE LISTED FOR SUCH USE.
2. THE FIRE SPRINKLER SYSTEM SHALL BE SIZED PER HYDRAULICALLY DESIGNED CALCULATIONS. SEE DESIGN CRITERIA THIS DRAWING.
3. ALL SPRINKLER PIPE HANGERS SHALL BE U.L. LISTED OR F.M. APPROVED AND SHALL BE IN ACCORDANCE WITH N.F.P.A. 13R. SEE DETAILS THIS DRAWING.
4. ALL SPRINKLER PIPE WHICH PASSES THROUGH FIRE WALLS, FIRE RATED PARTITIONS OR FLOORS SHALL BE INSTALLED AND CAULKED PER U.L. LISTED OR F.M. APPROVED STANDARDS.
5. UNPROTECTED CLOSETS SHALL NOT CONTAIN MECHANICAL EQUIPMENT.
6. CENTERLINE OF PIPING ABOVE FINISHED FLOOR IS NOTED IN HYDRAULIC CALCULATIONS
7. ① DENOTES HYDRAULIC REFERENCED POINTS.
8. ALL UNSPRINKLERED BATHROOMS SHALL BE 55 SQ. FT. OR LESS.
9. BUILDING TO BE EQUIPPED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM EXCEPT WHERE OMISSION IS PERMITTED BY 8.6.2 THROUGH 8.6.7.
10. BUILDERS FIRE SOLUTIONS EXCLUDES THE FOLLOWING ITEMS:
    A. PIPE PAINTING.
    B. ALL ELECTRICAL WIRING. (POWER OR ALARM)
    C. SEISMIC BRACING.
    D. CUTTING AND PATCHING.
    E. ANY SOFFITS NEEDED TO CONCEAL PIPE.
    F. UNDERGROUND PIPE
    G. FREEZE PROTECTION OF ANY TYPE INCLUDING. TENTING AND INSULATING PIPE
    H. INSULATION OF ANY TYPE INCULDING COMBUSTIBLE CONCEALED SPACES
    I. MONITORING OF SPRINKLER SYSTEM.



SPRINKLER RESTRAINT 1
NOT TO SCALE



TJI RESTRAINT
NOT TO SCALE



ATTIC INSULATION DETAIL 1
NOT TO SCALE

NFPA 13R 2013 EDITION
TABLE 6.2.3.3.3 MINIMUM DISTANCES FOR ORDINARY AND INTERMEDIATE TEMPERATURE RESIDENTIAL SPRINKLERS

HEAT SOURCE	FROM EDGE OF SOURCE TO ORDINARY TEMPERATURE SPRINKLER IN.	MM	FROM EDGE OF SOURCE TO INTERMEDIATE TEMPERATURE SPRINKLER IN.	MM
SIDE OF OPEN OR RECESSED FIREPLACE	36	914	12	305
FRONT OF RECESSED FIREPLACE	60	1524	36	914
COAL-OR-WOOD-BURNING STOVE	42	1067	12	305
KITCHEN RANGE	18	457	9	229
WALL OVEN	18	457	9	229
HOT AIR FLUES	18	457	9	229
UNINSULATED HEAT DUCTS	18	457	9	229
UNINSULATED HOT WATER PIPES	12	305	6	152
SIDE OF CEILING-OR-WALL-MOUNTED HOT AIR DIFFUSERS	24	607	12	305
FRONT OF WALL-MOUNTED HOT AIR DIFFUSERS	36	914	18	457
HOT WATER HEATER OR FURNACE	6	152	3	76
LIGHT FIXTURE:				
0 W - 250 W	6	152	3	76
250 W - 499 W	12	305	6	152

CURE TIMES WITH ONE STEP SOLVENT CEMENT

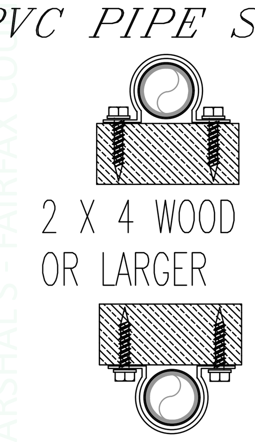
PIPE SIZE	60°F TO 120°F	40°F TO 59°F	0°F TO 39°F
1"	45 MINS.	1½ HRS.	24 HRS.
1¼"	1½ HRS.	16 HRS.	120 HRS.
1½"	1½ HRS.	16 HRS.	120 HRS.
2"	6 HRS.	36 HRS.	NOTE 1
2½' & 3"	8 HRS.	72 HRS.	NOTE 1

NOTE 1: FOR THESE SIZES, THE SOLVENT CEMENT CAN BE APPLIED AT TEMPERATURES BELOW 40° F, HOWEVER, THE SPRINKLER SYSTEM TEMPERATURE MUST BE RAISED TO A TEMPERATURE OF 40° F OR ABOVE AND ALLOWED TO CURE PER THE ABOVE RECOMMENDATIONS PRIOR TO PRESSURE TESTING.

CPVC HANGER SPACING

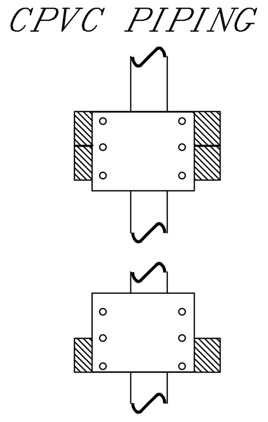
PIPE SIZE	PIPE SIZE
1"	6'-0"
1¼"	6'-6"
1½"	7'-0"
2"	8'-0"

CPVC PIPE STRAP

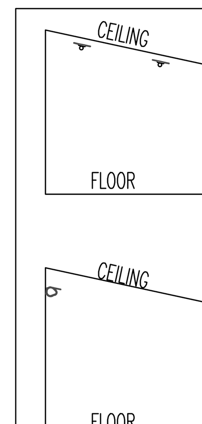


(NO SCALE)

NAIL PLATE DETAIL FOR CPVC PIPING



5" X 8" 16 GAUGE
NO SCALE



LISTED AREA OF COVERAGE CORRESPONDS TO CEILING SLOPE TOP OF DEFLECTOR MUST BE LOCATED 4" TO 6" BELOW SLOPED CEILING. THE TOP OF THE DEFLECTOR MUST BE PARALLEL WITH THE PLANE OF THE CEILING. DISCHARGE IS ACROSS THE SLOPE.

LISTED AREA OF COVERAGE CORRESPONDS TO CEILING SLOPE TOP OF DEFLECTOR MUST BE LOCATED 4" TO 6" BELOW SLOPED CEILING. THE TOP OF THE DEFLECTOR MUST BE PARALLEL WITH THE PLANE OF THE CEILING. DISCHARGE IS DOWN THE SLOPE.

SLOPED CEILING DETAILS
NO SCALE

IMPORTANT
THE OWNER HAS THE RESPONSIBILITY OF PROVIDING FREEZE PROTECTION IN AREAS THAT HAVE A WET PIPE SPRINKLER AND IN ENCLOSURES FOR DRY, DELUGE OR ANY OTHER TYPE OF VALVES CONTROLLING WATER SUPPLIES TO AUTOMATIC SPRINKLER SYSTEMS.

JOB NAME: FARADAY PARK, 1870-1880 EASTERLY RD., RESTON, VA. 20190			
DATE: 6-25-2020	SCALE: AS NOTED	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
	AREA: DETAILS: LOTS 3-8	CAD FILE: FARADAYSUBMIT	DRWG NO: 7 OF 8
	PERMIT NO: SEE SHEETS 1-6	CONTRACTOR PHONE: 703-996-4246	

BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

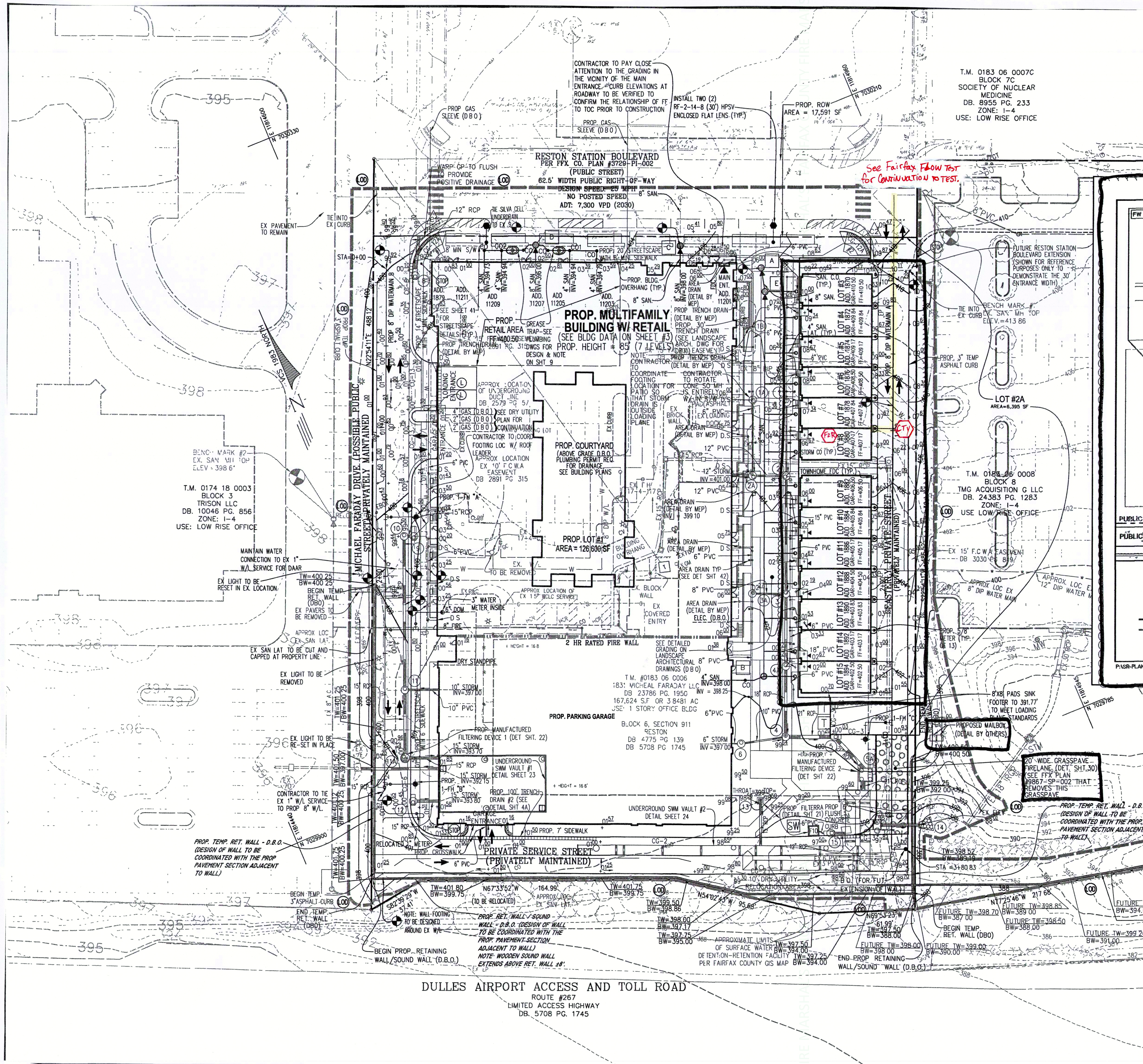
Plans APPROVED by Fire Marshal

Date: 07/15/2020

Permit #: Multiple Permits

AP#:
201840100
201840102
201840103
201840105
201840107
201840108

NOTE: This sheet for sprinkler reference only.



NOTE: REMOVAL OF EX. SANITARY SEWER BUILDING LATERAL SHALL MEET SECTION 65-6-9 OF FAIRFAX COUNTY CODE.

NOTE: SEE LANDSCAPE PLAN (SHEET 38) FOR SIDEWALK AREAS.

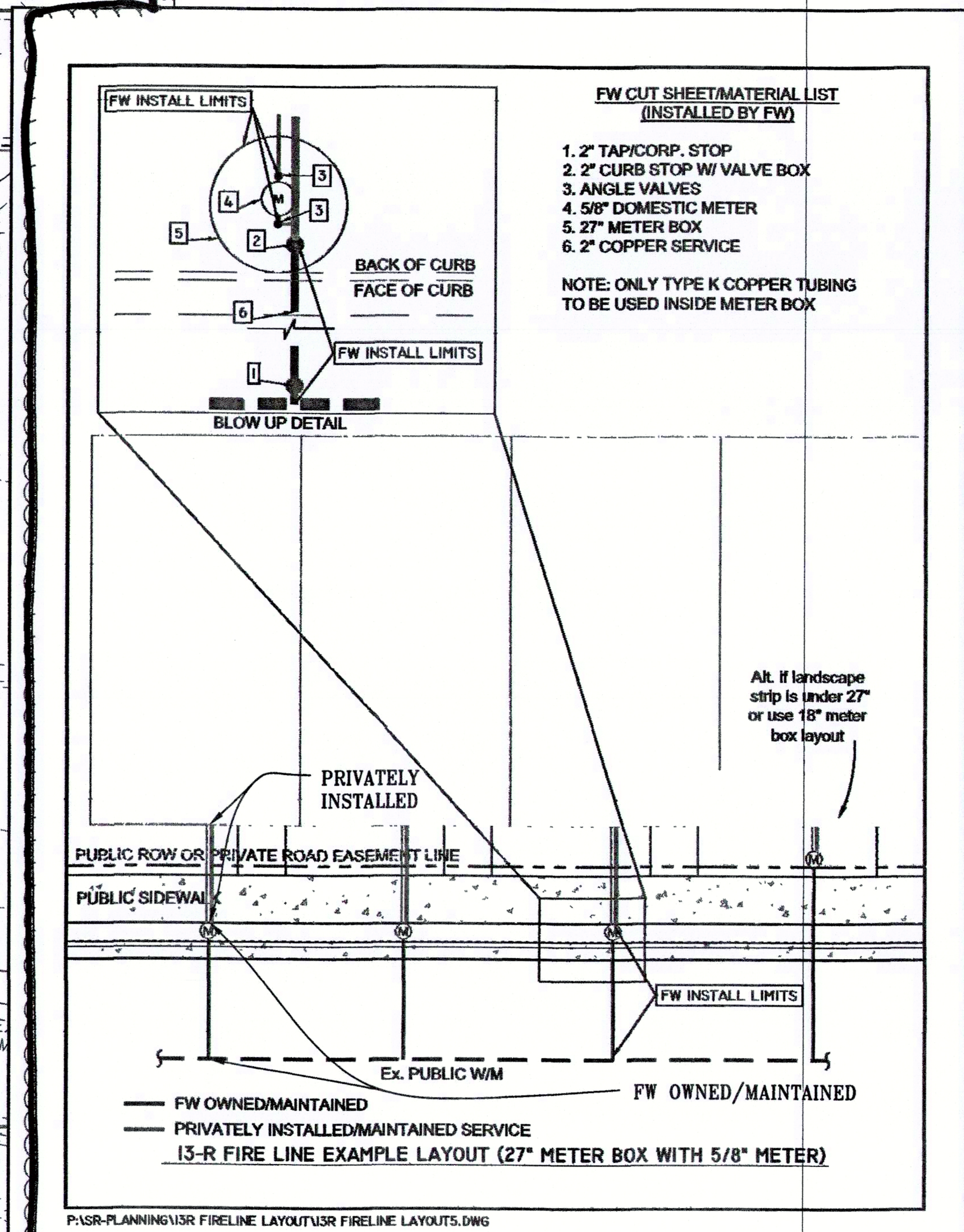
NOTE TO CONTRACTOR:

1.) BECAUSE RESTON STATION BOULEVARD HAS NOT BEEN CONSTRUCTED PRIOR TO THE PREPARATION OF THIS SITE PLAN, CONTRACTOR TO AS-BLT CURB ON RESTON STATION BOULEVARD PRIOR TO CONSTRUCTION AND SHALL NOTIFY THE ENGINEER AND OWNER/DEVELOPER IMMEDIATELY, AND PRIOR TO CONSTRUCTION OF ANY DIFFERENCES IN ELEVATION BETWEEN THE AS-BLT AND THE GRADES SHOWN ON RESTON STATION BOULEVARD.

2.) CONTRACTOR TO COORDINATE FOOTING LOCATIONS WITH UTILITIES

3.) CONTRACTOR TO FIELD LOCATE AND ADJUST SANITARY LATERAL CLEANOUTS OUTSIDE OF LEAD WALK FOR TOWNHOMES

4.) CONTRACTOR TO COORDINATE SIZE OF TAP TO WATERMAIN "A" FOR FIRE AND DOMESTIC SERVICE TO TOWNHOMES



NOTE: THIS SHEET SHOWN FOR REFERENCE AND TO BE MODIFIED PER SITE SPECIFIC CONDITIONS. METER BOX IS TO BE PLACED WITH DRIVEWAY APRON AND BE VEHICULAR RATED. SEE SECTION SHEET 4A

No	DATE	DESCRIPTION	REV BY	APPROVED	DATE
1	03-11-19	REVISION A			
2	07-31-19	REVISION B			

REVISION APPROVED BY DIVISION OF DESIGN

PLAN DATE
03-23-18
04-04-18
04-09-18
06-04-18
07-31-18
08-09-18
10-09-18
03-11-19
03-22-19
07-31-19

Urban, Ltd.
7712 Little River Turnpike
Annandale, Virginia 22003
Tel. 703 642 8080
Fax 703 642 8251
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Planners Engineers Landscape Architects Land Surveyors

COMMONWEALTH OF VIRGINIA
PETER F. CRAWFORD
Lic No 045081
07/31/19
PROFESSIONAL ENGINEER

GRADING PLAN
RESTON SECTION 911, BLOCK 6
REDEVELOPMENT
HUNTER MILL DISTRICT
FAIRFAX COUNTY, VIRGINIA

SCALE: 1"=30' C.I. 2' DATE: OCT, 2017

SHEET 7 OF 49

FILE No. SP-2217

JOB NAME: FARADAY PARK, 1870-1880 EASTERLY RD., RESTON, VA. 20190			
DATE: 6-25-2020	SCALE: AS NOTED	CONTRACT NO: 20-0073	APPROVALS: FAIRFAX COUNTY F.M.O.
PLAN NORTH	DRAWN BY: CMS	REVIEWED BY:	CONTRACTOR: KNUTSON COMPANIES
AS NOTED	AREA: SITE PLAN: LOTS 3-8	CAD FILE: FARADAYSUBMIT	DRWG NO: 8 OF 8
	PERMIT NO: SEE SHEETS 1-6	CONTRACTOR PHONE: 703-996-4246	

BFS
BUILDERS FIRE SOLUTIONS
225 ELM STREET, WARRENTON, VA 20186 (540) 428-8712
AUTOMATIC FIRE PROTECTION SYSTEMS
DESIGN INSTALLATION SERVICE

VIKING® TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Pendent Sprinkler VK468 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The orifice design, with a K-Factor of 4.9 (70.6 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

NYC Approved: MEA 89-92-E, Volume 35

UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2006.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.9 U.S. (70.6 metric†)
†Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-1/4" (58 mm)

Material Standards:
Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Brass UNS-C23000, Phosphor Bronze UNS-C51000, or Brass UNS-C26000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethylene (PTFE) Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: Brass UNS-C36000
For ENT coated sprinklers: Belleville spring - Exposed, Screw and Pipcap - ENT plated.

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 13637
Order Sprinkler VK468 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, and ENT = JN
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK468 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 13637AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13577W/B* (available since 2006)
C. Optional Protective Sprinkler Cap Remover/Escutcheon Installer Tool** Part No. 15915 (available since 2010.)
*A ½" ratchet is required (not available from Viking).
**Allows use from the floor by attaching a length of 1" diameter CPVC tubing to the tool. Ideal for sprinkler cabinets. Refer to Bulletin F_051808.

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
The Viking Model VK468 Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

Sprinkler Finishes: Brass, Chrome, White Polyester, Black Polyester, and ENT

Corrosion Resistant Coatings[3]: ENT

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

[3] The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For ENT coated sprinklers, the waterway is coated. Note that the spring is exposed on sprinklers with ENT coating.

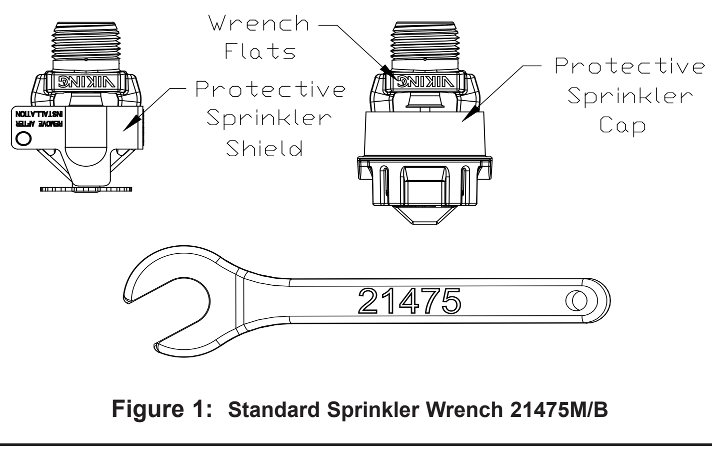

Figure 1: Standard Sprinkler Wrench 21475M/B

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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Approval Chart
Viking VK468, 4.9 K-Factor Residential Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
13637	VK468	1/2	15	4.9	70.6	175 psi (12 bar)	2-1/4	58

Max. Coverage Area[4] Ft.X Ft. (m X m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Deflector to Ceiling	Installation Type	Listings and Approvals[3]				Minimum Spacing Ft. (m)
	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)	Flow[4] GPM (L/min)	Pressure[4] PSI (bar)			C-UL-US-EU[5]	VdS	NYC[6]	NSF[8]	
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)	1-1/8 to 2 inch	Standard surface-mounted escutcheons, or recessed with the Micromatic® Model E-1, E-2, or E-3 Recessed Escutcheon	See Footnotes 7 and 10.	See Footnotes 7 and 10.	See Footnote 7.	See Footnote 7.	8 (2.4)
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)	13 (49.2)	7.0 (0.48)							
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)	17 (64.4)	12.0 (0.83)							
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)	20 (75.7)	16.7 (1.15)							

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.

[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[3] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.

[4] For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.

[5] Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

[6] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 35.

[7] Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester[9]

[8] UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components (MH48034).

[9] Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.

[10] Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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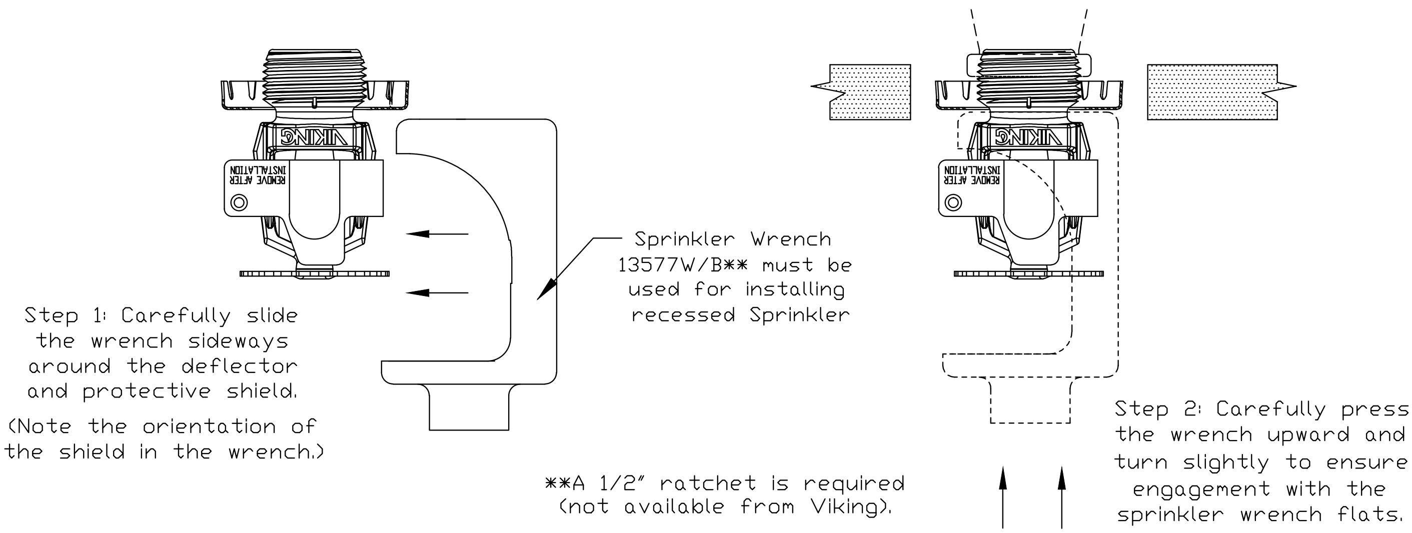

Figure 2: **Wrench 13577W/B for Recessed Sprinkler**

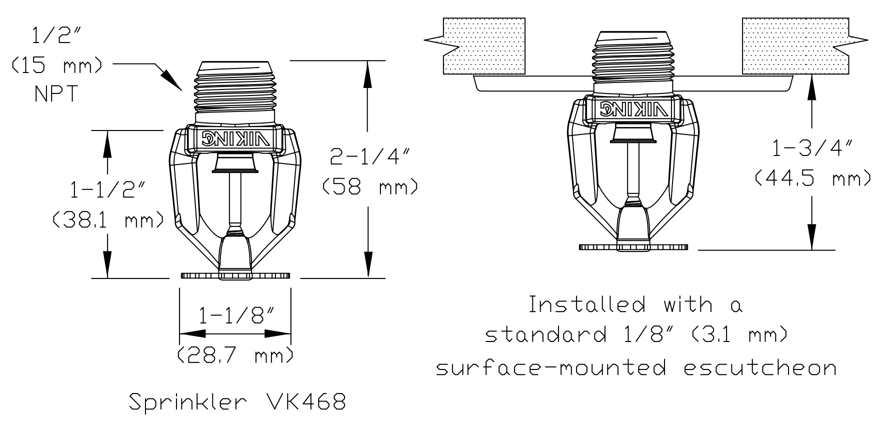

Figure 3: **Sprinkler VK468 Dimensions with a Standard Escutcheon**

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK468 (K4.9)

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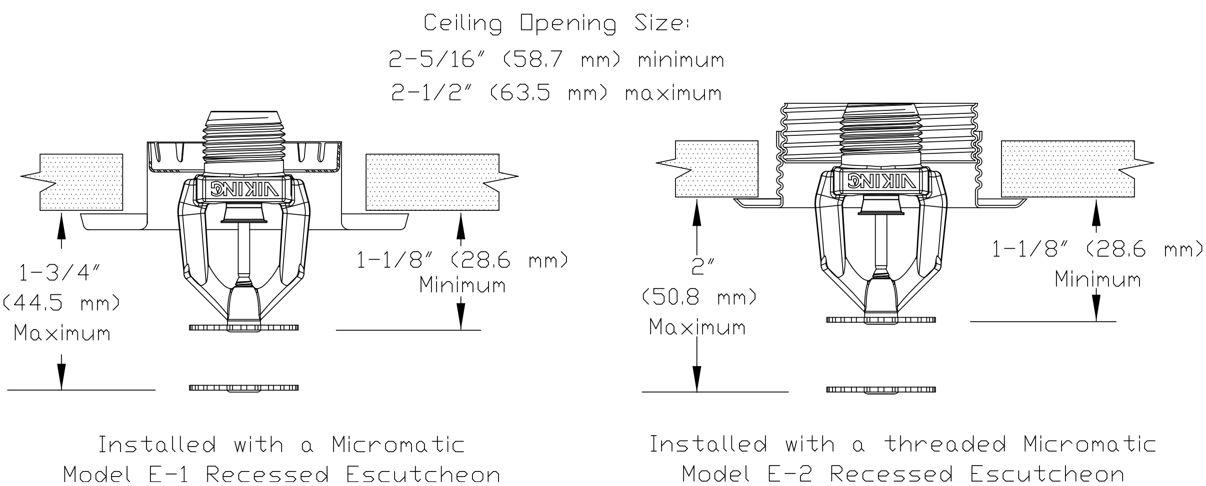

Figure 4: Sprinkler VK468 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Pendent Sprinkler VK468 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614, F_080415 and F_080190 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, VdS, and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Viking Residential Sprinkler Installation Guide

October 25, 2018

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

VIKING	TECHNICAL DATA	FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking residential automatic sprinklers are equipped with a "fast response" heat-sensitive operating element designed to respond individually and quickly to a specific high temperature. Viking residential sprinklers are designed to combine speed of operation with water distribution characteristics to help in the control of residential fires and to improve life safety by prolonging the time available for occupants to escape or be evacuated.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

A. Viking residential sprinklers are intended for use in the following occupancies: one- and two-family dwellings and mobile homes with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; or residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13. Information contained in this guide is based on NFPA 13, "Standard for the Installation of Sprinkler Systems".

B. The design criteria for residential sprinklers contained in the NFPA installation standards must be followed except as modified by the individual UL 1626 listing information provided in the technical data pages and this Residential Sprinkler Installation Guide. For listed areas of coverage, technical data, and specific design and installation instructions, refer to the appropriate Viking technical data page for the sprinkler model used.

C. Viking residential sprinklers listed by Underwriters Laboratories, Inc. (UL) have passed fire tests designed to represent fire conditions for the sprinkler's listed area of coverage. The standards for residential sprinkler performance and spray patterns are printed in Underwriters Laboratories Publication UL 1626, "Standard for Residential Sprinklers for Fire Protection Service". All listed Viking residential sprinklers meet or exceed UL 1626 performance requirements and spray pattern criteria for their listed areas of coverage.

D. NFPA standards allow use of residential sprinklers with rates, design areas, areas of coverage, and minimum design pressures other than those specified in the standards when they have been listed for such specific residential installation conditions.

3. TECHNICAL DATA

Specifications:

Refer to the appropriate sprinkler technical data sheet.

Material Standards:

Refer to the appropriate sprinkler technical data sheet.

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

4. INSTALLATION

NOTE:Take care not to over-tighten the sprinkler and/or damage its operating parts!

Maximum Torque: 1/2" NPT: 14 ft-lbs. (19.0 N-m) 3/4" NPT: 20 ft-lbs. (27.1 N-m)

A. Care and Handling (also refer to Bulletin - Care and Handling of Sprinklers, Form No. F_091699.)

Sprinklers must be handled with care and protected from mechanical damage during storage, transport, handling, and after installation. Store sprinklers in a cool, dry place in their original container.

Use care when locating sprinklers near fixtures that can generate heat.

Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to Table 1.)

Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately. (Note: Installing glass bulb sprinklers in direct sunlight (ultraviolet light) may affect the color of the dye used to color code the bulb. This color change does not affect the integrity of the bulb.)

Viking residential sprinklers are intended for use on wet pipe residential systems only. Adequate heat must be provided for wet-pipe systems. DO NOT use Viking residential sprinklers on dry systems unless specifically allowed by recognized installation standards or the Authority Having Jurisdiction.

Residential concealed sprinklers must be installed in neutral or negative pressure plenums only!

Corrosion-resistant sprinklers must be installed when subject to corrosive atmospheres. **NOTE:** Viking residential sprinklers are not intended for use in corrosive environments.

Replaces pages 1-17, dated December 1, 2016.
(Added P65 Warning.)

VIKING | TECHNICAL DATA | **FREEDOM® RESIDENTIAL SPRINKLER INSTALLATION GUIDE**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

TABLE 1: RESIDENTIAL SPRINKLER TEMPERATURE RATINGS

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[3]	Bulb Color
Residential Glass Bulb Style Sprinklers			
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)[1]**	**Maximum Ambient Ceiling Temperature[3]**	
Residential Fusible Element Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Temperature Identification Stamp**
Residential Flush Style Sprinklers			
Ordinary	165 °F (74 °C)	100 °F (38 °C)	On Cover or Sprinkler Inlet (VK476)
Intermediate	220 °F (104 °C)	150 °F (65 °C)	On Cover
Sprinkler Temperature Classification	**Sprinkler Nominal Temperature Rating (Fusing Point)**	**Maximum Ambient Ceiling Temperature[3]**	**Cover Plate Temperature Rating**
Residential Concealed Style Sprinklers			
Ordinary	135 °F (57 °C)[1], 140 °F (60 °C)[2], 155 °F (68 °C)[1], or 165 °F (74 °C)[1]	100 °F (38 °C)	135 °F (57 °C)

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector or flow shaper.

[2] The temperature rating is stamped on the sprinkler.

[3] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

B. Installation Instructions

Viking sprinklers are manufactured and tested to meet the rigid requirements of approving agencies. They are designed to be installed in accordance with recognized installation standards NFPA 13, NFPA 13R, and NFPA 13D, and any associated TIAs.

Deviation from the standards or any alteration to the sprinklers or cover plate assemblies after they leave the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinklers inoperative and will automatically nullify the approval and any guarantee made by Viking.

The use of residential sprinklers may be limited due to occupancy and hazard. Residential fire protection systems must be designed and installed only by those who are completely familiar with the appropriate standards and codes, and thoroughly experienced in fire protection design, hydraulic calculations, and sprinkler system installation.

Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Viking residential sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler*.
*Refer to the appropriate sprinkler technical data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½” or 3/4” (15 mm or 20 mm) NPT** outlet of the reducing coupling is at the desired location and centered in the opening** in the ceiling or wall.
**Size depends on the sprinkler model used. Refer to appropriate sprinkler data page.

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DESIGN CRITERIA

For Systems Designed to NFPA 13D or NFPA 13R: Apply the listed areas of coverage and minimum water supply requirements shown in the approval charts on the residential sprinkler data pages. The sprinkler flow rate is the minimum required discharge from each of the total number of design sprinklers as specified in NFPA 13D or NFPA 13R.

For Systems Designed to the latest edition of NFPA 13: The number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- **The flow rates given in the approval charts on the data pages for NFPA 13D and NFPA13R for each area of coverage listed, or**
- **Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13. The greatest dimension of the coverage area cannot be any greater than the maximum areas of coverage shown on the data pages.**

Flow Rates

All residential sprinklers manufactured on or after July 12, 2002 are listed with a single minimum flow rate. Where rooms have more than one sprinkler, multiple-sprinkler calculations are still required, but the first sprinkler and any additional sprinkler or sprinklers must be calculated flowing at identical minimum flow rates, based on the area of sprinkler coverage, using the minimum flow and pressure listed for the sprinkler model used.

Consult the appropriate standards and the Authorities Having Jurisdiction to determine the number of sprinklers to hydraulically calculate to verify adequate water supply for multiple-sprinkler operation.

Operating Pressure: The minimum operating pressure of any sprinkler shall be the minimum operating pressure specified by the listing, or 7 psi (0.5 bar), whichever is greater. The maximum allowable operating pressure is 175 psi (12 bar).

Areas of Coverage

If the actual area of coverage is less than the listed area of coverage, use the minimum water supply for the next larger area of coverage listed. DO NOT interpolate. Residential sprinkler systems must be hydraulically calculated according to NFPA standards to verify that the water supply is adequate for proper operation of the sprinklers. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler when it is operating at the minimum gpm and psi listed for single-sprinkler operation for the sprinkler model used.

Viking residential sprinklers may be listed for more than one area of coverage. Suggested practice in selecting area of coverage is to select the one that can be adequately supplied by the available water supply and still allow for the installation of as few sprinklers in a compartment as possible while observing all guidelines pertaining to obstructions and spacing. This maximizes the use of the available water supply, which is often limited on residential fire protection systems. After selecting an appropriate area of coverage, sprinklers must be spaced according to guidelines set forth in the installation standards.

Definition of "COMPARTMENT": A space completely enclosed by walls and a ceiling. Openings to an adjoining space are allowed, provided the openings have a minimum lintel depth of 8 in. (203.2 mm) from the ceiling.

Spacing Guidelines

For guidelines concerning spacing of Viking residential sprinklers near beams, obstructions, heat sources, and sloped ceilings [slopes more than a 2/12 (9.5°) pitch], refer to the Viking residential sprinkler data pages and installation guide, the appropriate NFPA standard, and the Authority Having Jurisdiction. NOTE: Sloped, beamed, and pitched ceilings could require special design features such as larger flow, or a design for more sprinklers to operate in the compartment, or both.

Distance from Walls: Install not more than one-half the listed sprinkler spacing nor less than 4" (102 mm) from walls, partitions, or obstructions as defined in the standards.

Minimum Sprinkler Spacing: The minimum distance between residential sprinklers to prevent cold soldering (i.e., the spray from one operating sprinkler onto an adjacent sprinkler that could prevent its proper activation) is 8 ft. (2.4 m).

Maximum Sprinkler Spacing: Locate adjacent sprinklers no farther apart than the listed spacing.

Deflector Position: Install frame style residential *pendent* sprinklers with the deflector between 1" and 4" (25.4 mm to 102 mm) below smooth ceilings, unless the sprinkler data page indicates otherwise. Install pendent sprinklers in the pendent position only, with the deflector oriented parallel with the ceiling or roof.

Refer to the individual listings in the residential sprinkler data pages for horizontal sidewall sprinkler deflector or sprinkler centerline distance below the ceiling. Install horizontal sidewall sprinklers in the horizontal position only below smooth ceilings, with the leading edge of the deflector or element assembly oriented parallel with the ceiling.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to the appropriate sprinkler data page. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

TECHNICAL DATA

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2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape. *Exception: For concealed sprinklers (i.e., VK457, VK458, VK468, VK474, and VK4570) the protective cap is removed for installation.*
3. Care must be taken when installing sprinklers on CPVC and copper piping systems. Never install the sprinkler into the reducing fitting before attaching the reducing fitting to the piping. Sprinklers must be installed on CPVC systems after the reducing fitting has been installed and the primer and/or cement manufacturer's recommended curing time has elapsed. When installing sprinklers on copper piping systems, take care to brush the inside of the sprinkler supply piping and reducing fitting to ensure that no flux accumulates in the sprinkler orifice. Excess flux can cause corrosion and may impair the ability of the sprinkler to operate properly.
4. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the sprinkler deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, while taking care not to over-tighten or damage the sprinkler operating parts.
   b. *Thread the flush or concealed sprinkler into the ½*" or 3/4" (15 mm or 20 mm) NPT** *outlet of the coupling by turning it clockwise with the special sprinkler wrench. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Exception: For concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 the protective cap is removed for installation, and then placed back on the sprinkler temporarily.*
5. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards.
   a. Make sure the sprinkler has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal leaks, the sealing compound is washed out of the joint.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS <u>BEFORE</u> PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
6. For residential flush sprinklers, the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread on or push it on until the flange touches the ceiling. Note the maximum vertical adjustment is ½" (12,7 mm) for sprinkler VK420 and 5/8" for VK476. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipples as required.
7. For residential concealed sprinklers, the cover plate assembly can now be attached.
   a. Remove the cover plate assembly from the protective box, taking care not to damage the assembly.
   b. From below the ceiling, gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling or wall.
   c. Carefully push the cover plate assembly onto the sprinkler, using even pressure with the palm of the hand, until the unfinished brass flange of the cover plate base touches the ceiling or wall.
   d. The maximum adjustment available for residential concealed sprinklers is ½" (12.7 mm) [1/4" (6.4 mm) for sprinkler VK480]. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler nipples.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See Maintenance instructions below and follow all warnings and instructions.

5. OPERATION

During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector or flow shaper, forming a uniform, high-wall wetting spray pattern to extinguish or control the fire.

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

A. Sprinklers must be inspected on a regular basis for signs of corrosion, mechanical damage, obstructions, paint, etc. Frequency of the inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced immediately after a specified term of service. Refer to NFPA 25 and the Authorities Having Jurisdiction for the specified period of time after which testing and/or replacement of residential sprinklers is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from, attached to, or otherwise obstruct the discharge pattern of the sprinkler. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the effected area.

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench and remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For residential flush pendent and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. To remove a ceiling ring, grasp it from below the ceiling and gently turn it counterclockwise. Cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler, use the sprinkler wrench to unthread the sprinkler from the piping. NOTE: For flush and concealed sprinklers with protective shells, the internal diameter of the special flush and concealed sprinkler installation wrench is designed for use with the sprinkler contained within the shell. Place a plastic protective shell (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the shell. Exception: Concealed sprinklers VK457, VK458, VK468, VK474, and VK4570 are removed without the plastic cap.

3. Follow instructions in section 4B. Installation Instructions to install the new unit. Be sure the replacement sprinkler is the correct model and style, with the appropriate K-Factor, temperature rating, and response characteristics. A fully stocked sprinkler cabinet should be provided for this purpose. *(For flush or concealed style sprinklers, stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.)*

4. Place the system back in service and secure all valves. Check for and repair all leaks.

E. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

Viking Residential Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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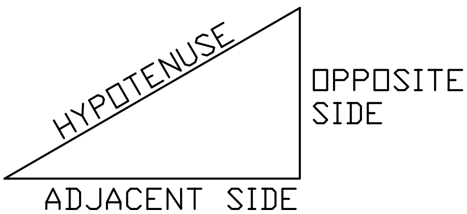
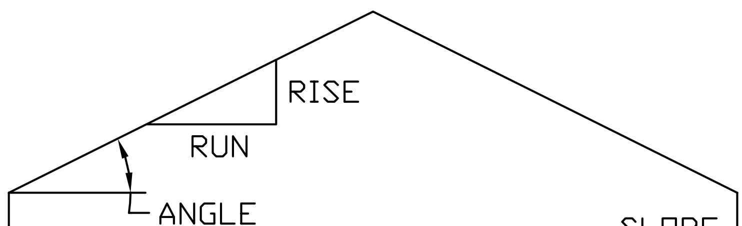


$$\text{TANGENT} = \frac{\text{OPPOSITE SIDE (RISE)}}{\text{ADJACENT SIDE (RUN)}}$$

$$\frac{\text{RISE}}{\text{RUN}} = \text{TANGENT}$$

$$\text{ANGLE} = \text{TAN}^{-1}\left(\frac{\text{RISE}}{\text{RUN}}\right)$$

$$\text{SLOPE DISTANCE} = \sqrt{(\text{RISE})^2 + (\text{RUN})^2}$$



RISE	RUN	TANGENT	ANGLE	SLOPE DISTANCE
2	12	.1666	9.45°	12.1
3	12	.2500	14°	12.3
4	12	.3333	18.4°	12.6
5	12	.4166	22.6°	13
6	12	.5000	26.5°	13.4
7	12	.5833	30.2°	13.8
8	12	.6666	33.6°	14.4
9	12	.7500	36.8°	15
10	12	.8333	39.8°	15.6
11	12	.9166	42.5°	16.2
12	12	1	45°	16.97

Table 2
Rise Over Run Conversion to Degrees of Slope

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SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

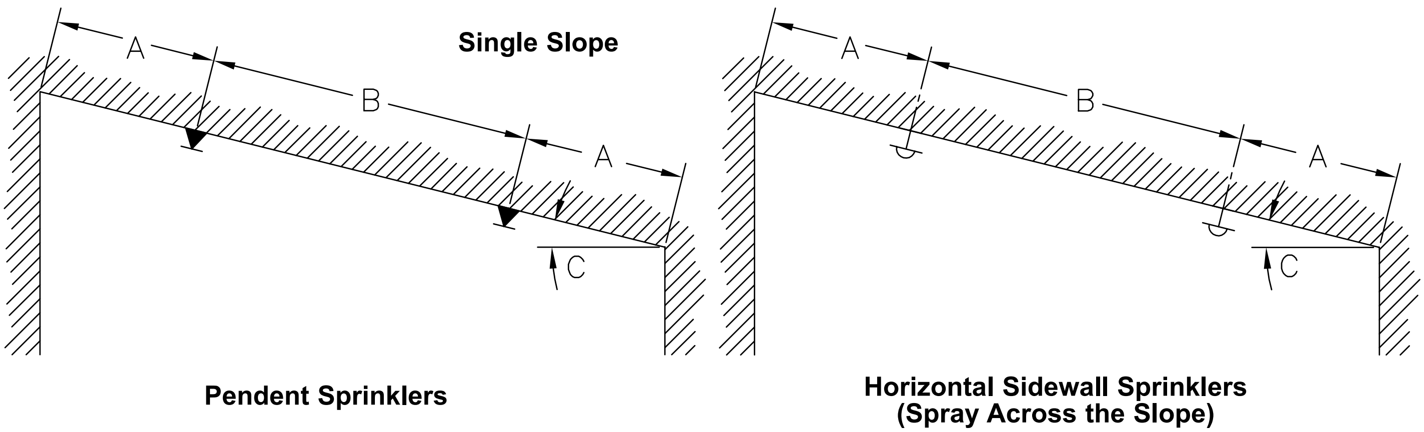

Figure 1

(A) One-half listed spacing of sprinkler maximum, 0'-4" (0-102 mm) minimum.
(B) Listed spacing of sprinkler, maximum, 8'-0" (2.4 m) minimum.
(C) Where angle "C" is greater than an 8/12 (33.7°) pitch, see Figure 2 below.

SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

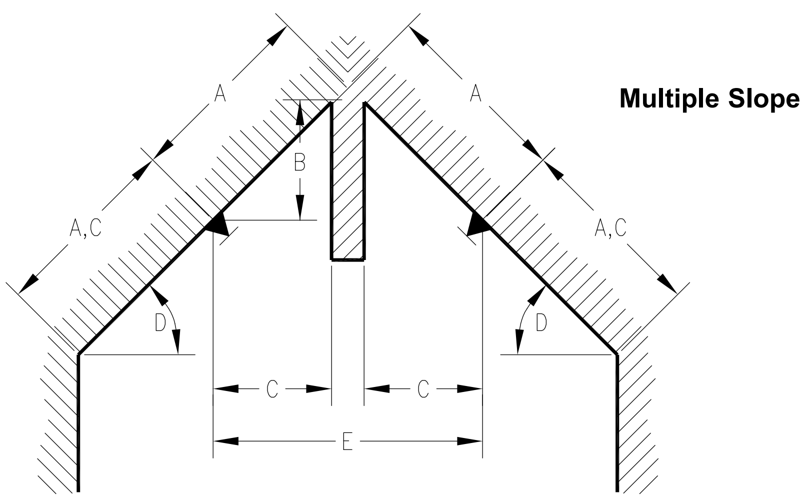

Figure 2

(A) One-half listed spacing of sprinkler, maximum.
(B) 3'-0" (.91 m) maximum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than an 8/12 (33.7°) pitch.
(E) For distance less than 8'-0" (2.4 m), baffle required.

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SPACING OF RESIDENTIAL SPRINKLERS LISTED FOR USE BELOW SLOPED CEILINGS UP TO AN 8/12 (33.7°) PITCH

(Refer to the appropriate residential sprinkler technical data page for listings.)

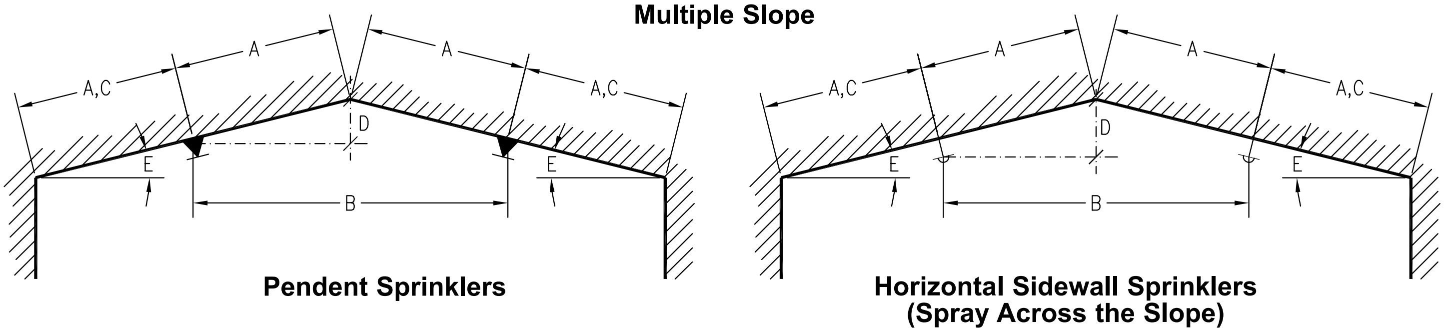

Figure 3

(A) One-half listed spacing of sprinkler, maximum.
(B) 8’-0” (2.4 m) minimum.
(C) 0’-4” (0-102 mm) minimum.
(D) 3’-0” (.91 m) maximum.
(E) Acceptable for slopes of 0/12 to 8/12 (0° to 33.7°) pitch.

SPACING OF RESIDENTIAL PENDENT SPRINKLERS AT PEAK OF SLOPED CEILINGS WITH PITCH LESS THAN 8/12 (33.7°)

(Refer to the appropriate residential sprinkler technical data page for listings.)

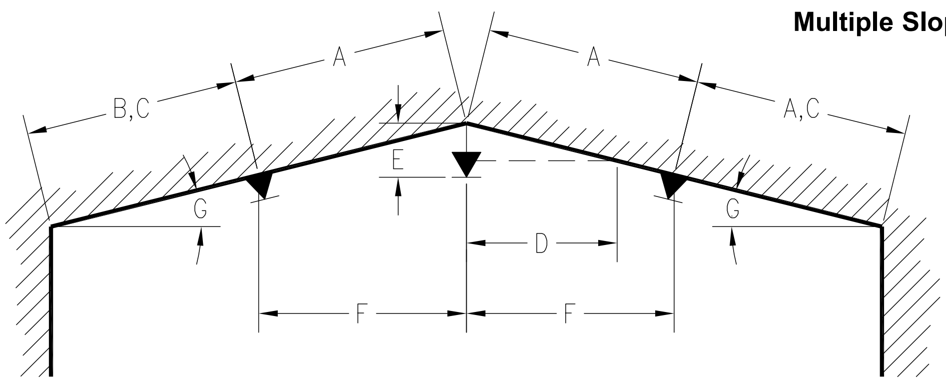

Figure 4

(A) Listed spacing of sprinkler, maximum.
(B) One-half listed spacing of sprinkler, maximum.
(C) 0’-4” minimum.
(D) Refer to page 10 for minimum distance between sprinkler and intersecting sloped ceiling.
(E) Refer to the appropriate residential sprinkler technical data page for deflector distance below ceiling.
(F) 8’-0” minimum.
(G) Reference: 4/12 (18.0°) pitch maximum for 12’ (3.7 m) spacing.
2.5/12 (12.0°) pitch maximum for 14’ (4.3 m) spacing.
2/12 (10.0°) pitch maximum for 16’ (4.9 m) spacing.
2/12 (10.0°) pitch maximum for 18’ (5.5 m) spacing.
1.9/12 (9.0°) pitch maximum for 20’ (6.1 m) spacing.
Angles based on sprinklers installed 0’-4” (0-102 mm) from peak.

NOTE: Whenever possible, utilize design as shown in Figure 3 above.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW SLOPED CEILINGS WITH GREATER THAN 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

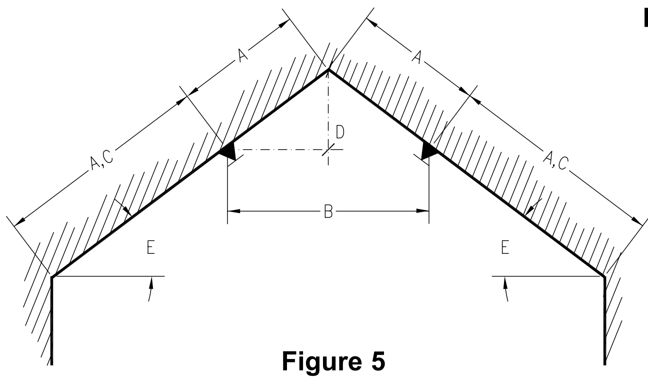

Figure 5

(A) One-half listed spacing of sprinkler, maximum.
(B) 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) 3'-0" (.91 m) maximum.
(E) Acceptable for slopes greater than an 8/12 (33.7°) pitch.
(F) When this design is used, refer to the appendices of NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction regarding the number of design sprinklers to hydraulically calculate.

SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 3 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

Multiple Slope

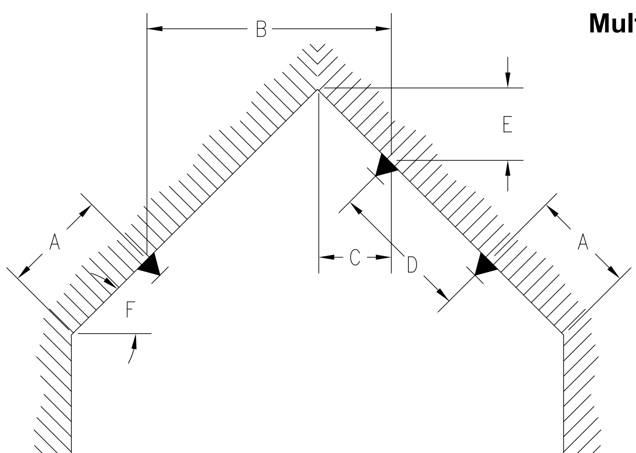

Figure 6

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Listed spacing maximum, 8'-0" (2.4 m) minimum.
(E) 3'-0" (.91 m) maximum.
(F) Slopes greater than 8/12 up to a 21/12 (33.7° up to 60°) pitch.

NOTES: In addition to the above limits, rooms requiring this type of installation must be hydraulically calculated to supply a minimum of three operating sprinklers. Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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SPACING OF RESIDENTIAL SPRINKLERS BELOW CEILINGS WITH SLOPES EXCEEDING 8/12 (33.7°) PITCH WITH NO BAFFLE AND A MAXIMUM OF 2 SPRINKLERS IN THE ROOM

(NOTE: Refer to NFPA 13D or NFPA 13R, and the Authority Having Jurisdiction.)

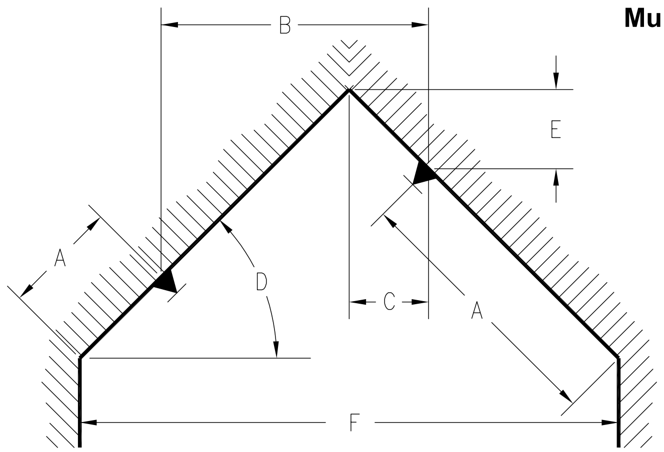

Figure 7

(A) 0'-4" (0-102 mm) minimum, to one-half listed spacing, maximum.
(B) One-half listed spacing, maximum, 8'-0" (2.4 m) minimum.
(C) 0'-4" (0-102 mm) minimum.
(D) Slopes greater than 8/12 pitch up to a 21/12 (33.7° up to a 60°) pitch.
(E) 3'-0" (.91 m) maximum.
(F) When dimension "F" exceeds 16' (4.9 m), utilize design configuration shown in Figure 6.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

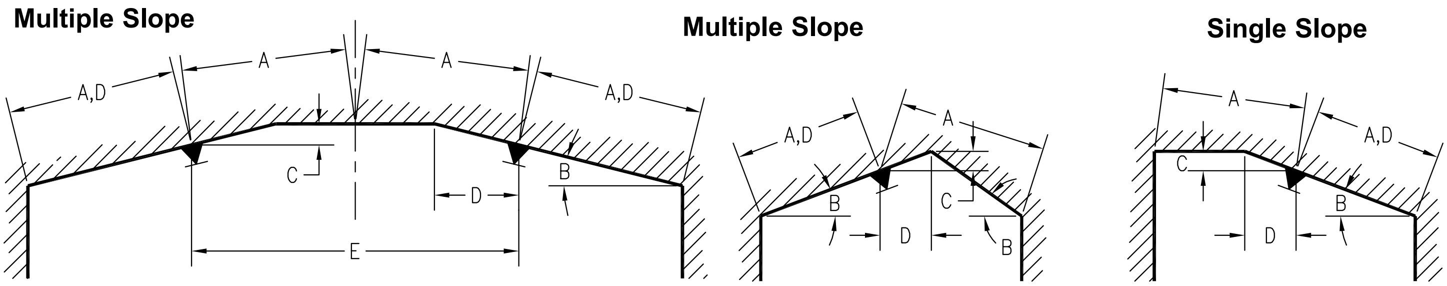

Figure 8

(A) One-half listed spacing, maximum.
(B) Refer to the appropriate residential sprinkler technical data pages for listings of sprinklers for use below slopes up to and including a 8/12 (33.7°) pitch.
(C) 3'-0" (.91 m) maximum.
(D) 0'-4" (0-102 mm) minimum.
(E) 8'-0" (2.4 m) minimum without baffle.

NOTES: Layout similar for horizontal sidewall sprinklers with throw across slope. Refer to the appropriate residential sprinkler technical data sheets.

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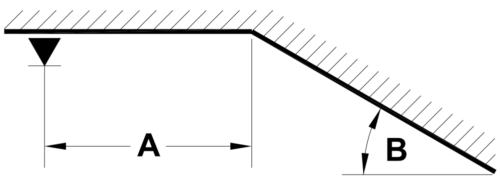
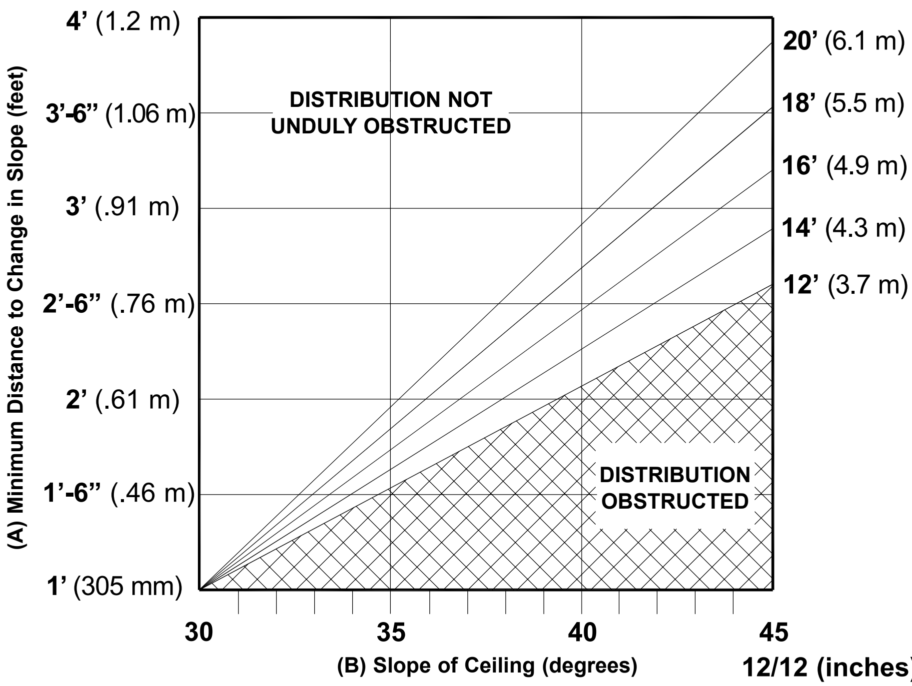
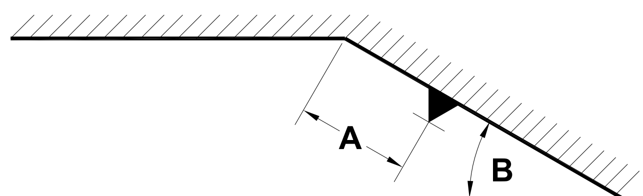
MINIMUM DISTANCE BETWEEN SPRINKLER AND INTERSECTING SLOPED CEILINGS

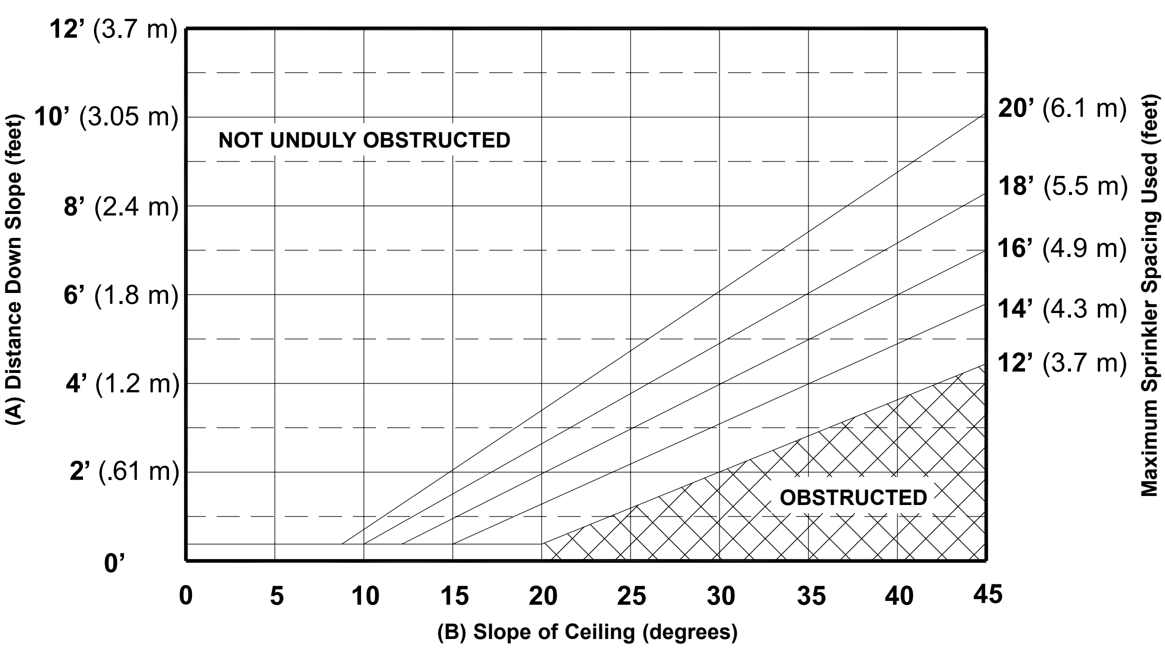


NOTES: For any ceiling slope under 7/12 (30°), distribution is considered Not Unduly Obstructed.



MAXIMUM DISTANCE DOWN SLOPE TO AVOID OBSTRUCTION TO SPRINKLER DISCHARGE





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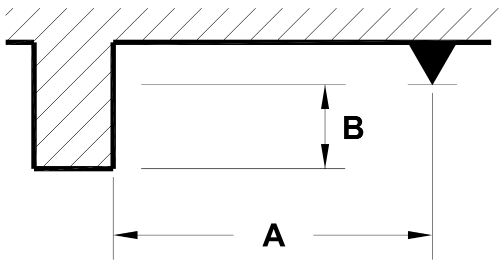
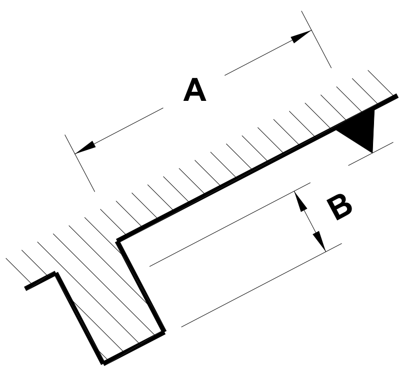
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

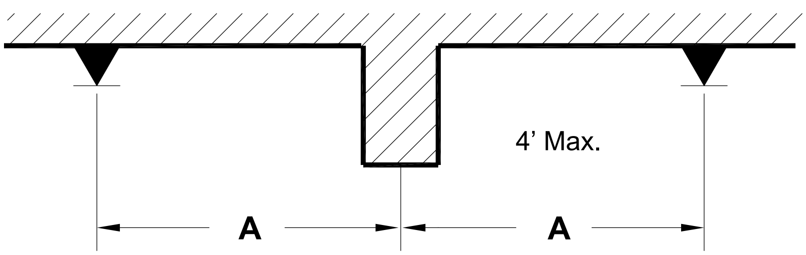
(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

Positioning Residential Pendent Sprinklers - Obstructions at the Ceiling



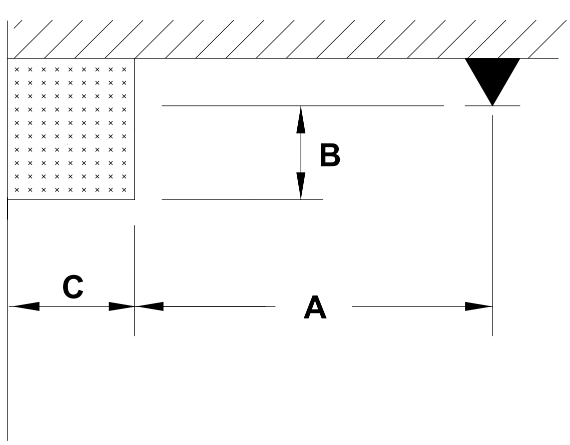


Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356



Residential pendent sprinklers may be located on opposite sides of continuous obstructions up to 4 ft. (1.2 m) wide at the ceiling, as long as the distance from the centerline of the obstruction to the sprinklers (A) does not exceed one-half the maximum spacing allowed between sprinklers.

Positioning Residential Pendent Sprinklers - Obstructions Along Walls



(A) Distance from centerline of sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.
(C) Width of the obstruction.

Obstructions up to 30 in. (.8 m) wide (C) located against the wall are permitted to be protected when (A) is greater than or equal to (C) minus 8 in. (.2 m) plus (B).

$C \leq 30$ in. $\quad$ for metric $C \leq .8$ m

$A \geq (C - 8\text{ in.}) + B \quad A \geq (C - .2\text{ m}) + B$

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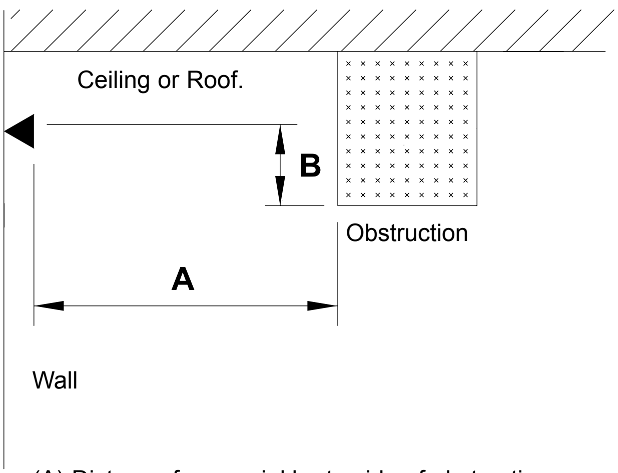
AVOIDING OBSTRUCTIONS TO SPRINKLER DISCHARGE

(Obstruction rules for residential sprinklers are found in section 8.10 of the 2010 edition of NFPA 13.)

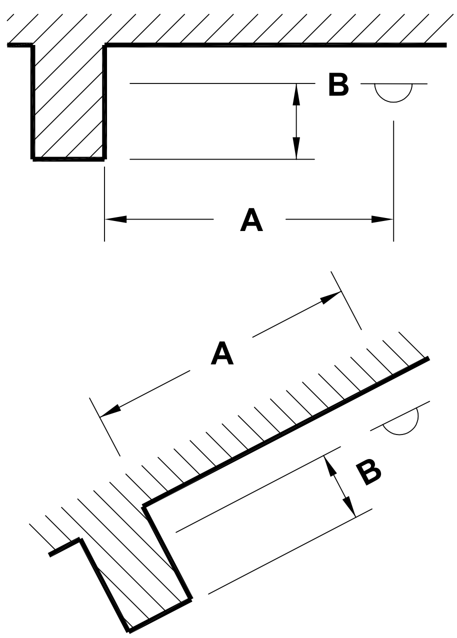
Positioning Residential Horizontal Sidewall Sprinklers - Obstructions at the Ceiling



(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

Distance from Sprinkler to Side of Ceiling Obstruction (Dimension A)	Maximum Distance from Deflector to Bottom of Ceiling Obstruction (Dimension B)	
	Inches	mm
Less than 8 ft. (Less than 2.4 m)	No Obstructions Allowed	
8 ft. to less than 10 ft. (2.4 m to less than 3.05 m)	1	25.4
10 ft. to less than 11 ft. (3.05 m to less than 3.35 m)	2	50.8
11 ft. to less than 12 ft. (3.35 m to less than 3.7 m)	3	76
12 ft. to less than 13 ft. (3.7 m to less than 4 m)	4	102
13 ft. to less than 14 ft. (4 m to less than 4.3 m)	6	152
14 ft. to less than 15 ft. (4.3 m to less than 4.6 m)	7	178
15 ft. to less than 16 ft. (4.6 m to less than 4.9 m)	9	229
16 ft. to less than 17 ft. (4.9 m to less than 5.2 m)	11	279
17 ft. or greater (5.2 m or greater)	14	356

Positioning Residential Horizontal Sidewall Sprinklers - Obstructions Along Walls



Distance from Sprinkler to Side of Obstruction Along Wall (Dimension A)	Maximum Distance from Deflector to Bottom of Obstruction (Dimension B)	
	Inches	mm
Less than 1 ft. 6 in. (Less than 457 mm)	0	0
1 ft. 6 in. to less than 3 ft. (457 mm to less than .94 m)	1	25.4
3 ft. to less than 4 ft. (.91 m to less than 1.2 m)	3	76
4 ft. to less than 4 ft. 6 in. (1.2 m to less than 1.37 m)	5	127
4 ft. 6 in. to less than 6 ft. (1.37 m to less than 1.8 m)	7	178
6 ft. to less than 6 ft. 6 in. (1.8 m to less than 2 m)	9	229
6 ft. 6 in. to less than 7 ft. (2 m to less than 2.1 m)	11	279
7 ft. or greater (2.1 m or greater)	14	356

(A) Distance from sprinkler to side of obstruction.
(B) Distance from deflector to bottom of obstruction.

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LOCATING RESIDENTIAL SPRINKLERS NEAR HEAT SOURCES

Ordinary temperature rated residential sprinklers (135 °F to 170 °F rated) are only to be installed where the maximum ambient ceiling temperature will not exceed 100 °F. Where the maximum ambient ceiling temperature will be from 101 °F to 150 °F, use intermediate temperature rated residential sprinklers (175 °F to 225 °F rated).

Residential sprinklers must be positioned a sufficient distance away from heat sources that include fireplaces, stoves, kitchen ranges, wall ovens, hot water pipes, water heaters, furnaces and associated flues and ducts, and light fixtures. The following minimum distances must be maintained for both ordinary and intermediate temperature rated residential sprinklers as indicated.

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Rated Sprinkler		Minimum Distance from Edge of Source to Intermediate Temperature Rated Sprinkler	
	Inches	metric	Inches	metric
Side of open or recessed fireplace	36	.91 m	12	305 mm
Front of recessed fire place	60	1.5 m	36	.91 m
Coal- or wood-burning stove	42	1.1 m	12	305 mm
Kitchen range	18	457 mm	9	229 mm
Wall oven	18	457 mm	9	229 mm
Hot air flues	18	457 mm	9	229 mm
Uninsulated heat ducts	18	457 mm	9	229 mm
Uninsulated hot water pipes	12	305 mm	6	152 mm
Side of ceiling- or wall-mounted hot air diffusers	24	.61 m	12	305 mm
Front of wall-mounted hot air diffusers	36	.91 m	18	457 mm
Hot water heater or furnace	6	152 mm	3	76 mm
Light fixture less than 250W	6	152 mm	3	76 mm
Light fixture 250W to 499W	12	305 mm	6	152 mm
Where residential sprinklers will be exposed to the rays of the sun passing through glass or plastic skylights, use intermediate temperature rated sprinklers.				
When locating residential sprinklers in an unventilated concealed compartment, under an unventilated attic or uninsulated roof, where the maximum ambient temperature does not exceed 150 °F, use intermediate temperature rated sprinklers.				

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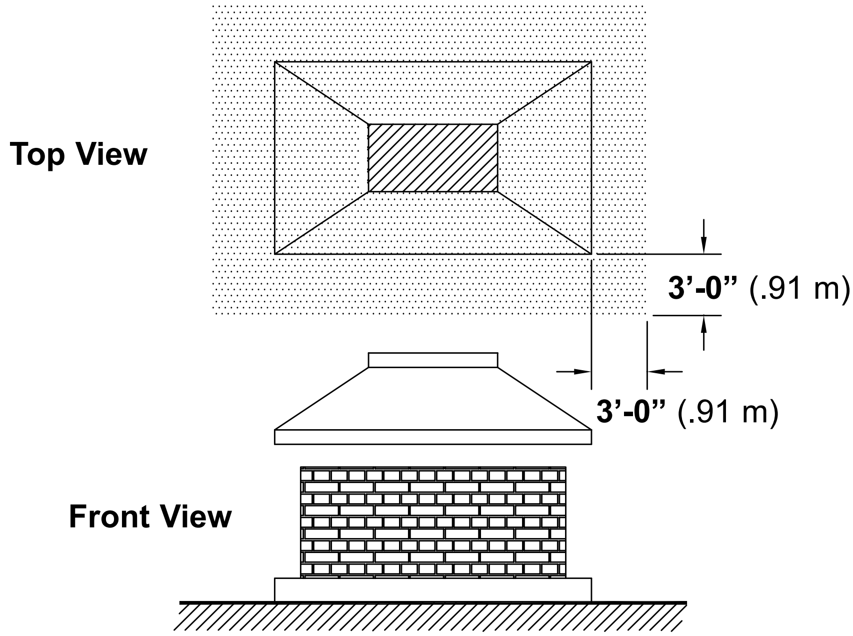
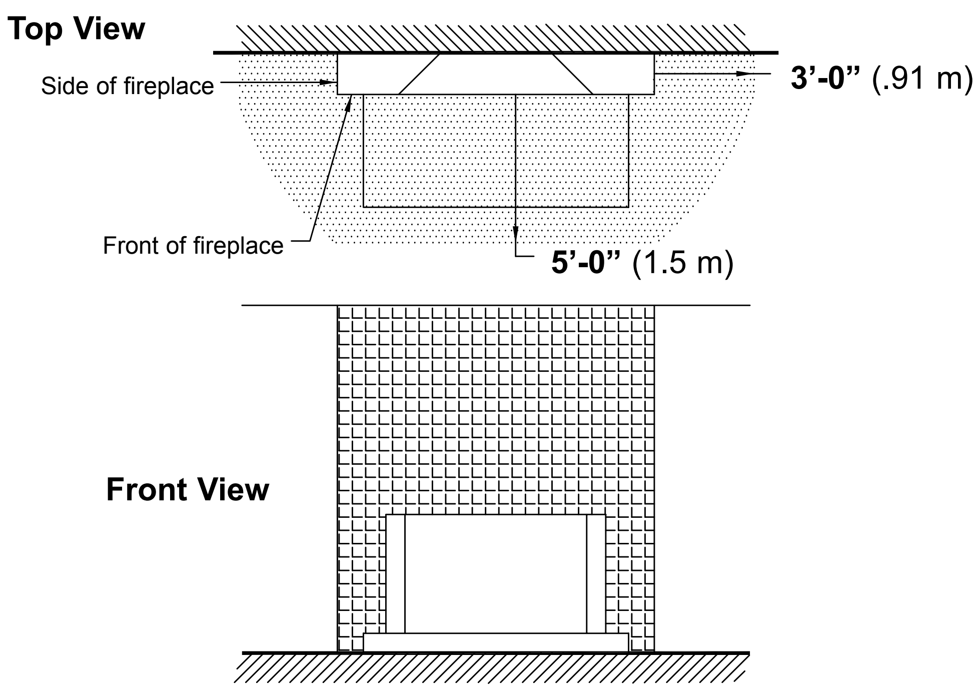
NOTE: The dimensions shown are intended to apply to residential sprinklers installed in ceilings above fireplaces used to burn products that cause elevated temperatures at or near the ceiling in areas surrounding the fireplace. The recommendations should not be construed to apply to decorative non-opening fireplaces such as gas fire units that will not cause elevated temperatures at the ceiling.



Sprinklers near an open hearth fireplace must be located outside of the shaded area or be intermediate degree rated.



Sprinklers near a recessed hearth fireplace must be located outside of the shaded area [at least 3'-0" (.91 m)] from the side of a recessed fireplace and at least 5'-0" (1.5 m) from the front) or be intermediate degree rated.

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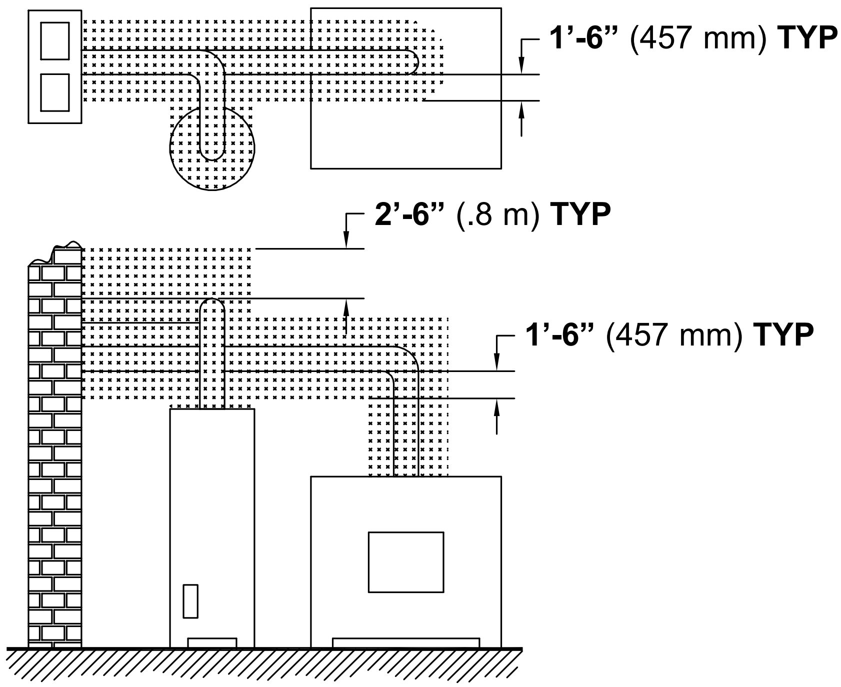
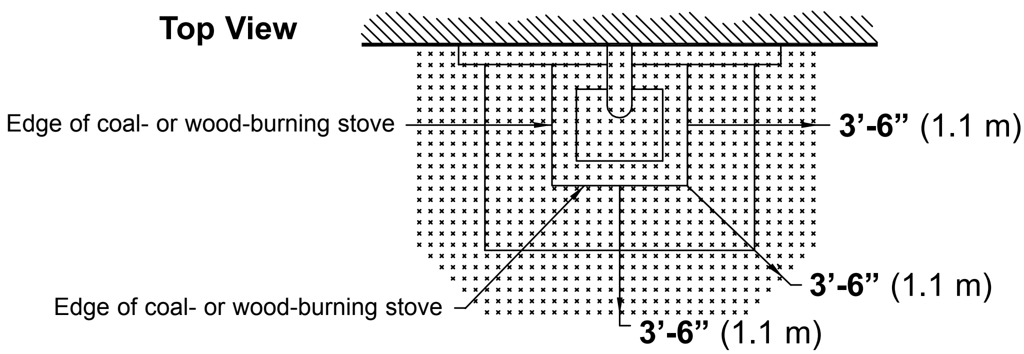
Top View

Front View

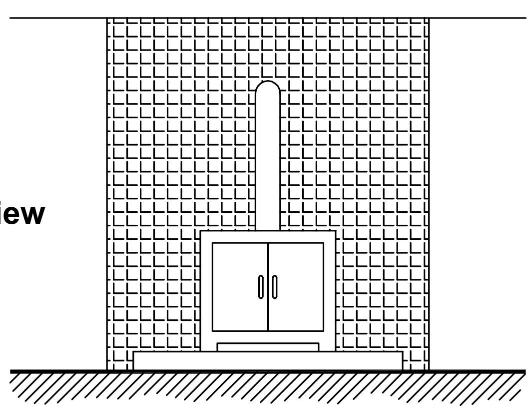


Sprinklers near a furnace or water heater must be located outside of the shaded area or be intermediate degree rated.

Top View



Front View



Sprinklers near a coal- or wood-burning stove must be located outside of shaded area or be intermediate degree rated.

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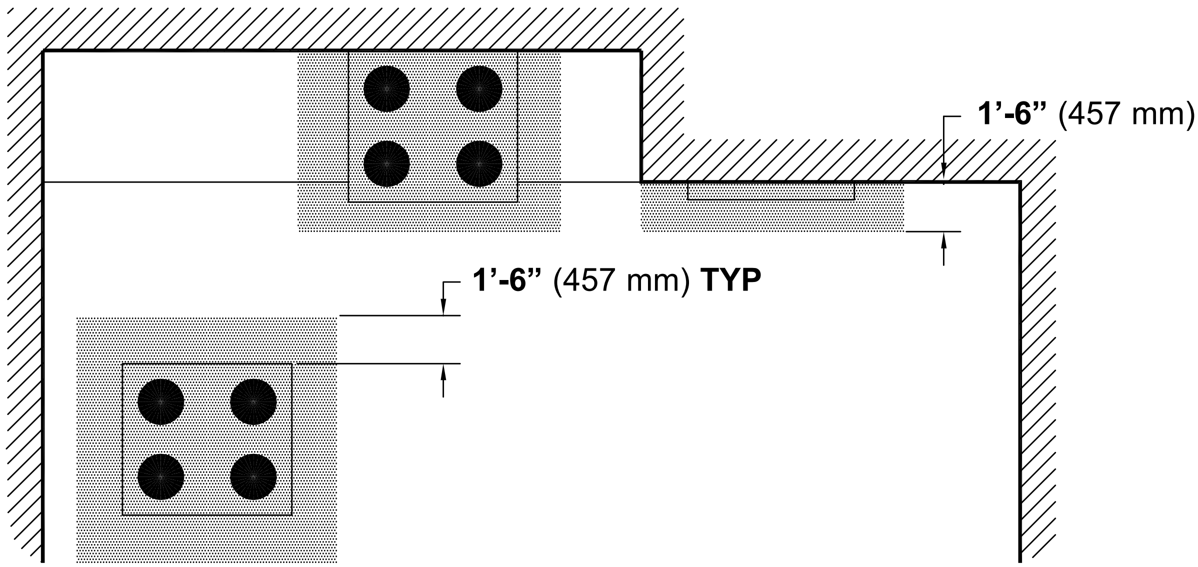
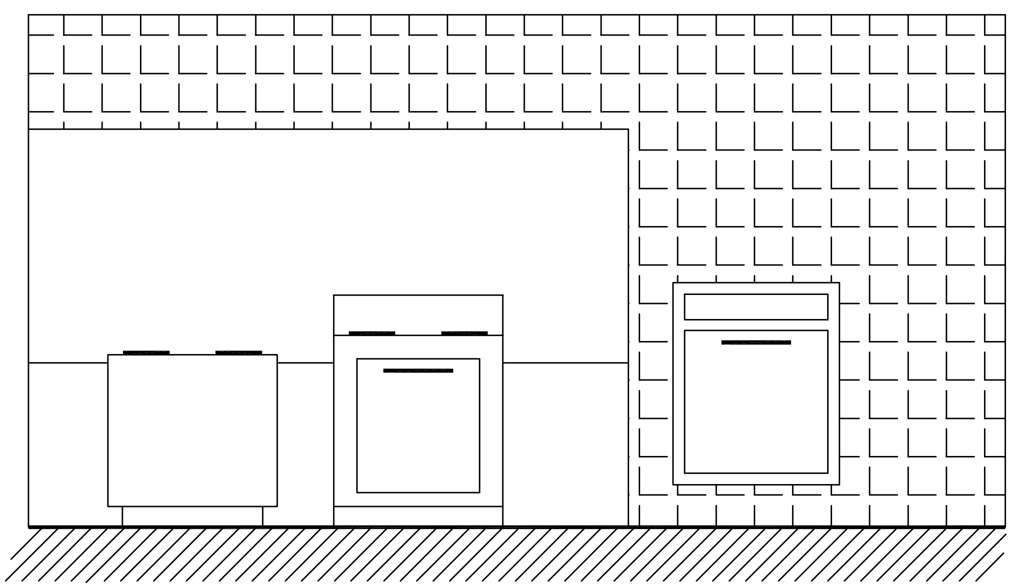
Top View



Front View



Sprinklers near a range or wall oven must be located outside of shaded areas or be intermediate degree rated.

VIKING | BULLETIN | **CARE AND HANDLING OF SPRINKLERS**

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SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

General Handling and Storage:

- Store sprinklers in a cool, dry place.
- Protect sprinklers during storage, transport, handling, and after installation.
- Use the original shipping containers. DO NOT place sprinklers loose in boxes, bins, or buckets.
- Keep sprinklers separated at all times. DO NOT allow metal parts to contact sprinkler operating elements.

For Pre-Assembled Drops:

- Protect sprinklers during handling and after installation.
- For recessed assemblies, use the protective sprinkler cap (Viking Part Number 10364).

Sprinklers with Protective Shields or Caps:

- DO NOT remove shields or caps until after sprinkler installation and there no longer is potential for mechanical damage to the sprinkler operating elements.
- **Sprinkler shields or caps MUST be removed BEFORE placing the system in service!**
- Remove the sprinkler shield by carefully pulling it apart where it is snapped together.
- Remove the cap by turning it slightly and pulling it off the sprinkler.

Sprinkler Installation:

- DO NOT use the sprinkler deflector or operating element to start or thread the sprinkler into a fitting.
- **Use only the designated sprinkler head wrench!** Refer to the current sprinkler technical data page to determine the correct wrench for the model of sprinkler used.
- DO NOT install sprinklers onto piping at the floor level.
- Install sprinklers after the piping is in place to prevent mechanical damage.
- DO NOT allow impacts such as hammer blows directly to sprinklers or to fittings, pipe, or couplings in close proximity to sprinklers. Sprinklers can be damaged from direct or indirect impacts.
- DO NOT attempt to remove drywall, paint, etc., from sprinklers.
- **Take care not to over-tighten the sprinkler and/or damage its operating parts!**

Maximum Torque:

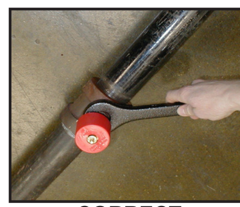
1/2” NPT:	**14 ft-lbs. (19.0 N-m)**
3/4” NPT:	**20 ft-lbs. (27.1 N-m)**
1” NPT:	**30 ft-lbs. (40.7 N-m)**

CORRECT
(Original container used)

INCORRECT
(Placed loose in box)

CORRECT
(Protected with caps)

INCORRECT
(Protective caps not used)



CORRECT
(Piping is in place at the ceiling)

INCORRECT
(Sprinkler at floor level)

CORRECT
(Special installation wrenches)

INCORRECT
(Designated wrench not used)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

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PROTECTIVE SPRINKLER SHIELDS AND CAPS

General Handling and Storage:

Many Viking sprinklers are available with a plastic protective cap or shield temporarily covering the operating elements. The snap-on shields and caps are factory installed and are intended to help protect the operating elements from mechanical damage during shipping, storage, and installation. NOTE: It is still necessary to follow the care and handling instructions on the appropriate sprinkler technical data sheets* when installing sprinklers with bulb shields or caps.

WHEN TO REMOVE THE SHIELDS AND CAPS:

NOTE: SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

Remove the shield or cap from the sprinkler only after checking all of the following:

- The sprinkler has been installed*.
- The wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.

SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

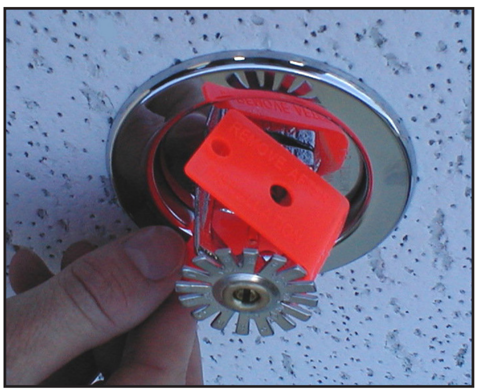
Figure 1: Sprinkler shield being removed from a pendent sprinkler.


Figure 2: Sprinkler cap being removed from a pendent sprinkler.


Figure 3: Sprinkler cap being removed from and upright sprinkler.

HOW TO REMOVE SHIELDS AND CAPS:

No tools are necessary to remove the shields or caps from sprinklers. DO NOT use any sharp objects to remove them! **Take care not to cause mechanical damage to sprinklers when removing the shields or caps.** When removing caps from fusible element sprinklers, use care to prevent dislodging ejector springs or damaging fusible elements. NOTE: Squeezing the sprinkler cap excessively could damage sprinkler fusible elements.

- To remove the shield, simply pull the ends of the shield apart where it is snapped together. Refer to Figure 1.
- To remove the cap, turn it slightly and pull it off the sprinkler. Refer to Figures 2 and 3.

NOTICE Refer to the current sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.

WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

*** Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.**

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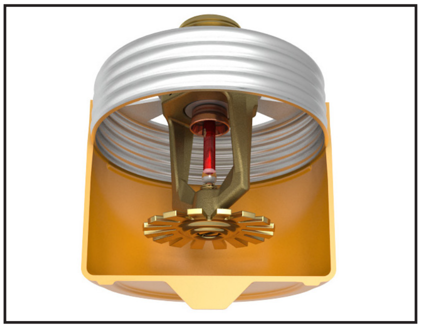
CAUTION **CONCEALED COVER ASSEMBLIES ARE FRAGILE!**
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



Concealed Sprinkler and Adapter Assembly with Protective Cap

Concealed Sprinkler and Adapter Assembly (Protective Cap Removed)

Cover Plate Assembly (Pendent Cover 12381 shown)

GENERAL HANDLING AND STORAGE INSTRUCTIONS:

- Do not store in temperatures exceeding 100 °F (38 °C). Avoid direct sunlight and confined areas subject to heat.
- Protect sprinklers and cover assemblies during storage, transport, handling, and after installation.
  -- Use original shipping containers.
  -- Do not place sprinklers or cover assemblies loose in boxes, bins, or buckets.
- Keep the sprinkler bodies covered with the protective sprinkler cap any time the sprinklers are shipped or handled, during testing of the system, and while ceiling finish work is being completed.
- Use only the designated Viking recessed sprinkler wrench (refer to the appropriate sprinkler data page) to install these sprinklers. **NOTE:** The protective cap is temporarily removed during installation and then placed back on the sprinkler for protection until finish work is completed.
- Do not over-tighten the sprinklers into fittings during installation.
- Do not use the sprinkler deflector to start or thread the sprinklers into fittings during installation.
- Do not attempt to remove drywall, paint, etc., from the sprinklers.
- Remove the plastic protective cap from the sprinkler before attaching the cover plate assembly. **PROTECTIVE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

VIKING	BULLETIN	CARE AND HANDLING OF SPRINKLERS

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USE THE FOLLOWING PRECAUTIONS WHEN HANDLING WAX-COATED SPRINKLERS

Many of Viking's sprinklers are available with factory-applied wax coating for corrosion resistance. These sprinklers MUST receive appropriate care and handling to avoid damaging the wax coating and to assure satisfactory performance of the product.

General Handling and Storage of Wax-Coated Sprinklers:

- Store the sprinklers in a cool, dry place (in temperatures below the maximum ambient temperature allowed for the sprinkler temperature rating. Refer to Table 1 below.)
- Store containers of wax-coated sprinklers separate from other sprinklers.
- Protect the sprinklers during storage, transport, handling, and after installation.
- Use original shipping containers.
- Do not place sprinklers in loose boxes, bins, or buckets.

Installation of Wax-Coated Sprinklers:

Use only the special sprinkler head wrench designed for installing wax-coated Viking sprinklers (any other wrench may damage the unit).

- Take care not to crack the wax coating on the units.
- For touching up the wax coating after installation, wax is available from Viking in bar form. Refer to Table 1 below. The coating MUST be repaired after sprinkler installation to protect the corrosion-resistant properties of the sprinkler.
- Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they would be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.
- Inspect the coated sprinklers frequently soon after installation to verify the integrity of the corrosion resistant coating. Thereafter, inspect representative samples of the coated sprinklers in accordance with NFPA 25. Close up visual inspections are necessary to determine whether the sprinklers are being affected by corrosive conditions.

TABLE 1

Sprinkler Temperature Rating (Fusing Point)	Wax Part Number	Wax Melting Point	Maximum Ambient Ceiling Temperature[1]	Wax Color
155 °F (68 °C) / 165 °F (74 °C)	02568A	148 °F (64 °C)	100 °F (38 °C)	Light Brown
175 °F (79 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
200 °F (93 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
220 °F (104 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown
286 °F (141 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown

[1] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

⚠WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

VIKING	TECHNICAL DATA	SPRINKLER OVERVIEW

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word “Viking”, the sprinkler identification number (SIN) consisting of “VK” plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

Available Temperature Ratings:

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

<u>UPRIGHT SPRINKLER:</u> A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSU” (Standard Sprinkler Upright) or “UPRIGHT” on the deflector.

<u>PENDENT SPRINKLER:</u> A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSP” (Standard Sprinkler Pendent) or “PENDENT” on the deflector.

Viking Technical Data may be found on The Viking Corporation’s Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

<u>CONVENTIONAL SPRINKLER:</u> An “old style” sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked “C U/P” (Conventional Upright/Pendent) on the deflector.

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VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

RECESSED SPRINKLER: A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

CORROSION-RESISTANT SPRINKLER: A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

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Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s).

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

BULLETIN

BEST PRACTICES FOR RESIDENTIAL SPRINKLER HANDLING & INSTALLATION

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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Visit the Viking website for the latest edition of this technical data page.

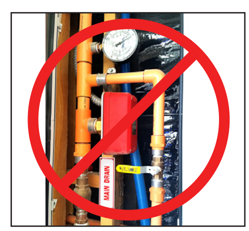
SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

- Always keep sprinklers in a cool dry place.
- Protect sprinklers during storage, transport and handling as well as before, during and after installation. Refer to Viking's Care and Handling of Sprinklers Bulletin Form No. F_091699[2].
- Proper transit, storage and installation of sprinklers in a high-heat environment is a must. Care should be taken to prevent sprinklers from being exposed to ambient heat conditions in excess of those referenced in installation standards.
- Do not stage or store sprinklers on the job site in advance in a non-conditioned space prior to installation.
- Keep sprinklers in the original packaging and check temperature indicators on box label prior to installation. If the indicator has turned black, DO NOT install any product contained in the box. Refer to Viking product return policies.
- Temperatures exceeding the maximum ambient temperature of the sprinkler temperature-rating during storage, transport, handling and installation must be avoided.
- Per NFPA standards 13, 13R, and 13D, sprinklers installed where maximum ambient temperatures are at or over 101 °F (38 °C) through 150 °F (66 °C) shall be intermediate temperature-rated sprinklers. Additionally, if sprinklers are installed in an unventilated concealed space under an uninsulated roof or in an unventilated attic, they shall be of intermediate temperature classification.
- Sprinklers installed where ambient temperatures are at or below 100 °F (38 °C) may be either ordinary or intermediate temperature-rated sprinklers. Refer to NFPA standards 13R 6.2.3.1 and 13D 7.5.6.1.
- Rough-in of sprinkler piping during hot weather conditions should not include the installation of sprinklers unless reasonable ambient temperatures can be maintained. Ambient temperatures that are considered when choosing the temperature rating for a sprinkler should take into account the range of ambient temperatures that are expected from installation through establishment and maintenance of temperature in a conditioned space. Appropriate insulation may be considered. **Example**: An ordinary temperature sprinkler should not be exposed to maximum ambient temperature higher than 100 °F (38 °C) or more. Refer to NFPA 13, Table 6.2.5.1, NFPA 13R, 6.2.3.1 and NFPA 13D, 7.5.6.1.
- CPVC fire sprinkler products exposed to high ambient temperatures (e.g. installed in unventilated, concealed spaces such as attics) should be insulated to maintain a cooler environment. Refer to Viking Plastics Installation and Design Manual, Form No. F_080712[2], for care and handling procedures.
- Protect all sprinklers and connecting CPVC piping in attic spaces and unvented concealed spaces from excessive heat exposure above 100 °F (38 °C). To separate excessive attic heat, properly tent and fully insulate all pipe in unconditioned spaces.
- Pressure relief valves should be installed on wet sprinkler systems where there is a risk of over-pressurization of a checked water supply, due to thermal expansion. Refer to NFPA 13, 7.1.2.1 and NFPA 13D, A.5.2.2.2.
- Fire sprinkler systems should be installed per current referenced editions of building codes and installation standards adopted in the jurisdiction where work is being performed.

INCORRECT
(Heat exposure)

INCORRECT
(Unconditioned at rough-in)

INCORRECT
(Exposed piping)



INCORRECT
(No pressure relief valve)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

[1]Hot weather condition is defined as temperatures that can reach the maximum ambient temperature-rating of the sprinkler.
[2]Clicking on blue hyperlink will open referenced document.

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING®	BULLETIN	REGULATORY AND HEALTH WARNINGS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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1. DESCRIPTION

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING
STATE OF CALIFORNIA, USA Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.
For more information, go to **www.P65Warnings.ca.gov**

2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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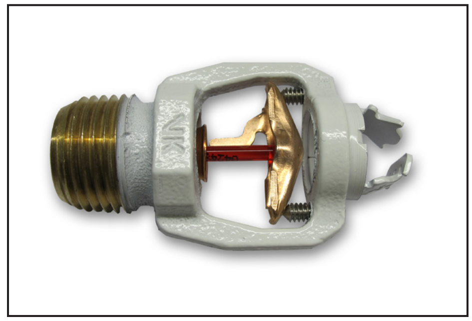
1. DESCRIPTION

Viking Freedom® Residential Horizontal Sidewall Sprinkler VK486 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as corrosion resistant as indicated in the Approval Chart. The sprinkler orifice design, with a K-Factor of 4.0 (57.7 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.



WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

VdS Approved

Refer to the Approval Chart and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2011.
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2” (15 mm) NPT
Nominal K-Factor: 4.0 U.S. (57.7 metric†)
† Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-7/16” (62 mm)
Covered by the following US Patent numbers: 7,854,269 and 7,712,218

Material Standards:
Frame Casting: QM Brass and Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screws: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000

Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 17315
Order Sprinkler VK486 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK486 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 17315AB.

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 21475M/B (available since 2017)
B. Wrench for recessed sprinklers: Part No. 13655W/B* (available since 2006)
*A ½” ratchet is required (not available from Viking).

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the yoke, pip cap, and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking Sprinkler VK486 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

Sprinkler Finishes: Brass, Chrome, White Polyester, and Black Polyester.

Footnotes
[1] The sprinkler temperature rating is stamped on the deflector.
[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

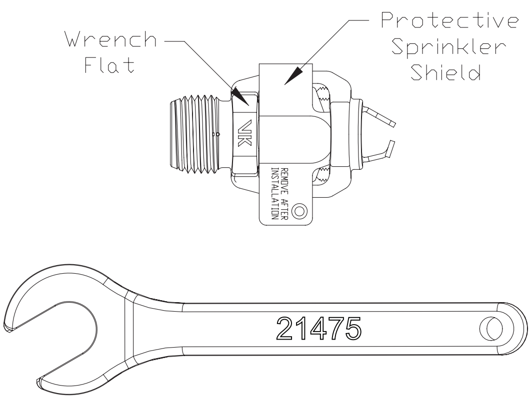

Figure 1:
Standard Sprinkler Wrench 21475M/B

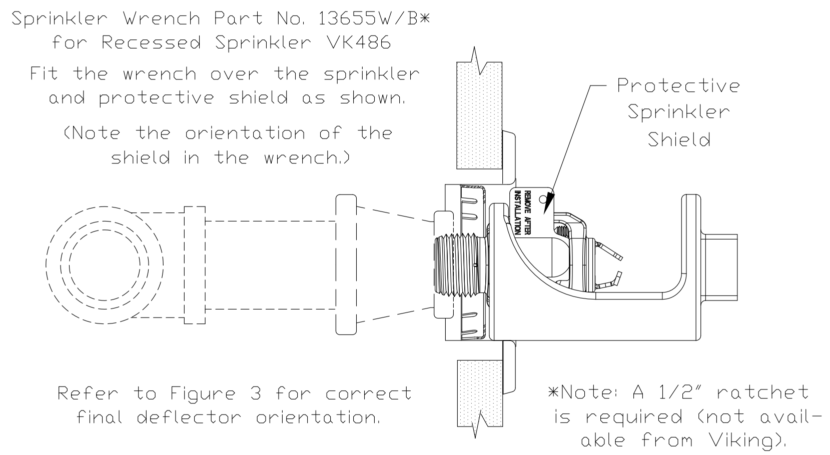

Figure 2:
Wrench 13655W/B for Recessed Sprinkler VK486

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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Approval Chart
Viking VK486, 4.0 K-Factor Residential Horizontal Sidewall Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current Editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric [2]		Inches	mm
17315	VK486	1/2	15	4.0	57.7	175 psi (12 bar)	2-7/16	62

Max. Coverage Area [3] Width X Length Ft. X Ft. (m X m)	Max. Spacing Ft. (m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Top of Deflector to Ceiling	Installation Type	Listings and Approvals [4]				Minimum Spacing Ft. (m)
		Flow [3] GPM (L/min)	Pressure [3] PSI (bar)	Flow [3] GPM (L/min)	Pressure [3] PSI (bar)			C-UL-US-EU [5]	VdS	NYC	NSF[9]	
12 X 12 (3.7 X 3.7)	12 (3.7)	11 (41.7)	7.6 (0.52)	11 (41.7)	7.6 (0.52)	4 to 6 inches	Standard surface-mounted escutcheons or recessed with the Micromatic® Model E-1, E-2, E-3, or G-1 Recessed Escutcheon	See Footnote 6 and 10.	See Footnote 6.	See Footnote 7.	See Footnote 6.	8 (2.4)
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)							
16 X 16 (4.9 X 4.9)	16 (4.9)	13 (49.3)	10.6 (0.73)	13 (49.3)	10.6 (0.73)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
16 X 22 (4.9 X 6.7)	16 (4.9)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
20 X 20 (6.1 X 6.1)	20 (6.1)	22 (83.3)	30.3 (2.09)	22 (83.3)	30.3 (2.09)							
12 X 12 (3.7 X 3.7)	12 (3.7)	12 (45.5)	9 (0.62)	12 (45.5)	9 (0.62)	6 to 12 inches						
14 X 14 (4.3 X 4.3)	14 (4.3)	12 (45.5)	9 (0.62)	13 (49.3)	10.6 (0.73)							
16 X 16 (4.9 X 4.9)	16 (4.9)	14 (53.0)	12.3 (0.84)	14 (53.0)	12.3 (0.84)							
16 X 18 (4.9 X 5.5)	16 (4.9)	16 (60.6)	16 (1.10)	16 (60.6)	16 (1.10)							
16 X 20 (4.9 X 6.1)	16 (4.9)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
16 X 22 (4.9 X 6.7)	16 (4.9)	26 (98.4)	42.3 (2.91)	26 (98.4)	42.3 (2.91)							
18 X 18 (5.5 X 5.5)	18 (5.5)	18 (68.1)	20.3 (1.40)	19 (71.9)	22.6 (1.60)							
18 X 20 (5.5 X 6.1)	18 (5.5)	23 (87.1)	33.1 (2.28)	23 (87.1)	33.1 (2.28)							
20 X 20 (6.1 X 6.1)	20 (6.1)	24 (90.8)	36 (2.48)	24 (90.8)	36 (2.48)							

Footnotes

1 Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.
2 Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3 For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
4 This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
5 Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
6 Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester [8]
7 Meets New York City requirements, effective July 1, 2008.
8 Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.
9 UL Classified to : NSF/ANSI Standard 61, Drinking Water System Components (MH48034)
10 Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com

DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Horizontal Sidewall Sprinkler VK486 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).
- The VK486 horizontal sidewall sprinkler deflector shall be located a minimum of 1-1/4" (31.8 mm) and a maximum of 6" (152 mm) from the wall on which it is installed.

DEFLECTOR POSITION: Install sprinkler VK486 with the leading edge of the deflector oriented parallel to the ceiling and the sprinkler frame arms oriented perpendicular to the ceiling (see Figure 4). **THE TOP SURFACE OF THE DEFLECTOR IS MARKED "TOP".** The sprinkler must be oriented as shown in Figure 3 below.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080190, F_080814, and F_080415 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

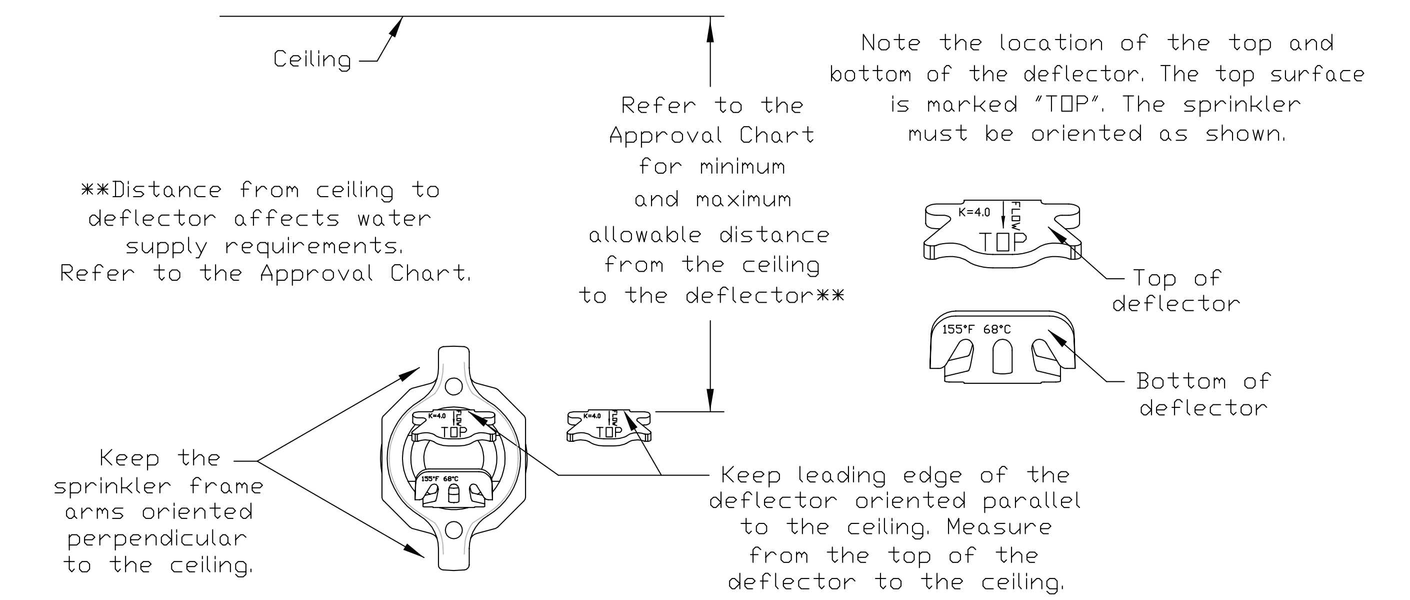

Figure 3:
Correct Orientation of the Deflector

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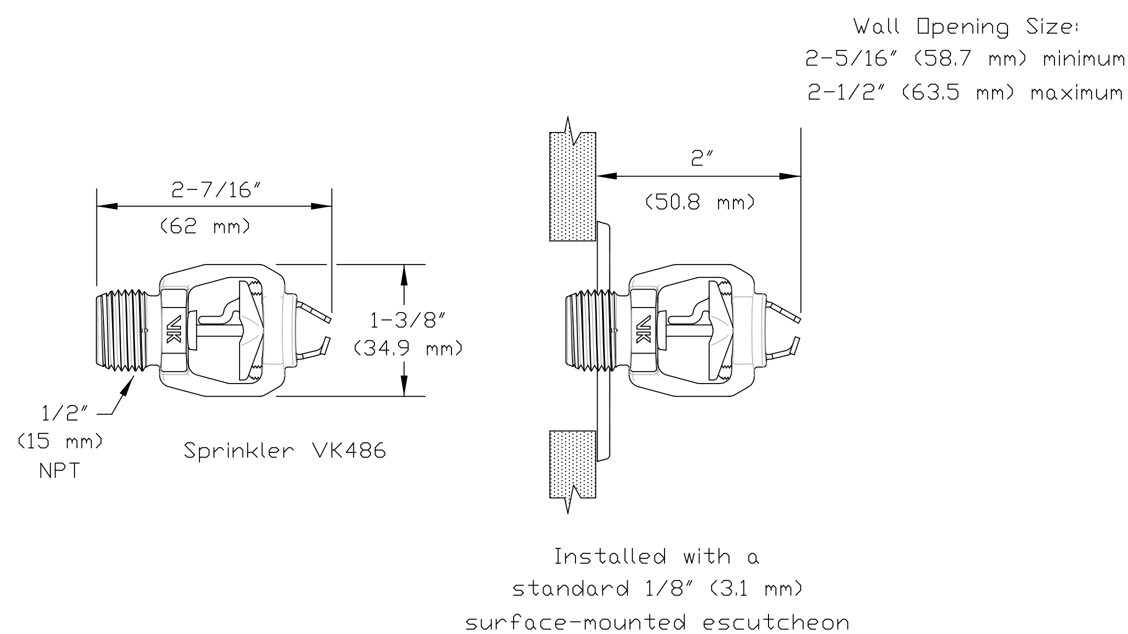

Figure 4:
Sprinkler VK486 Dimensions with a Standard Escutcheon and the Model F-1 Adjustable Escutcheon

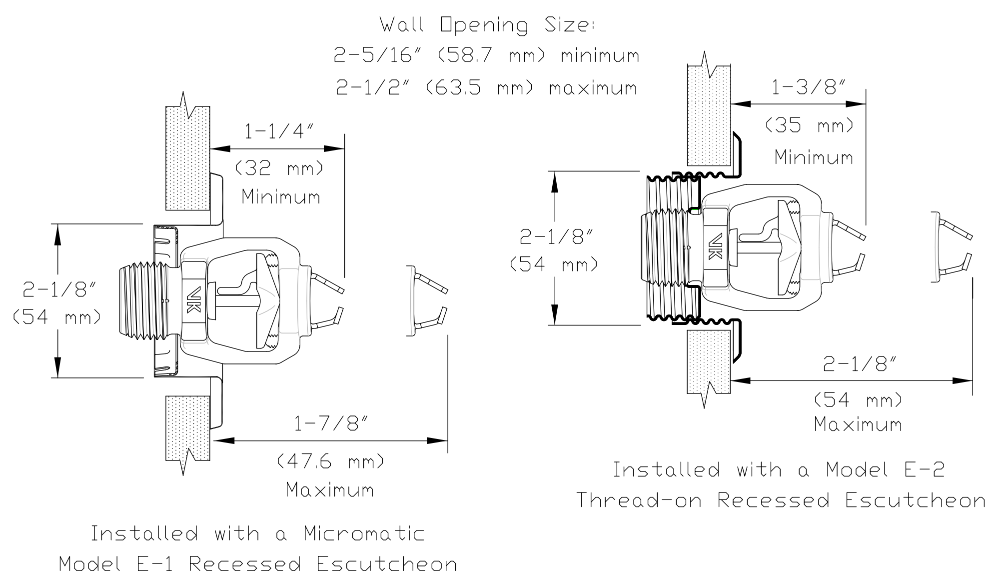

Figure 5:
Sprinkler VK486 Dimensions with the Model E-1 and E-2 Recessed Escutcheons

TECHNICAL DATA

FREEDOM® RESIDENTIAL HORIZONTAL SIDEWALL SPRINKLER VK486 (K4.0)

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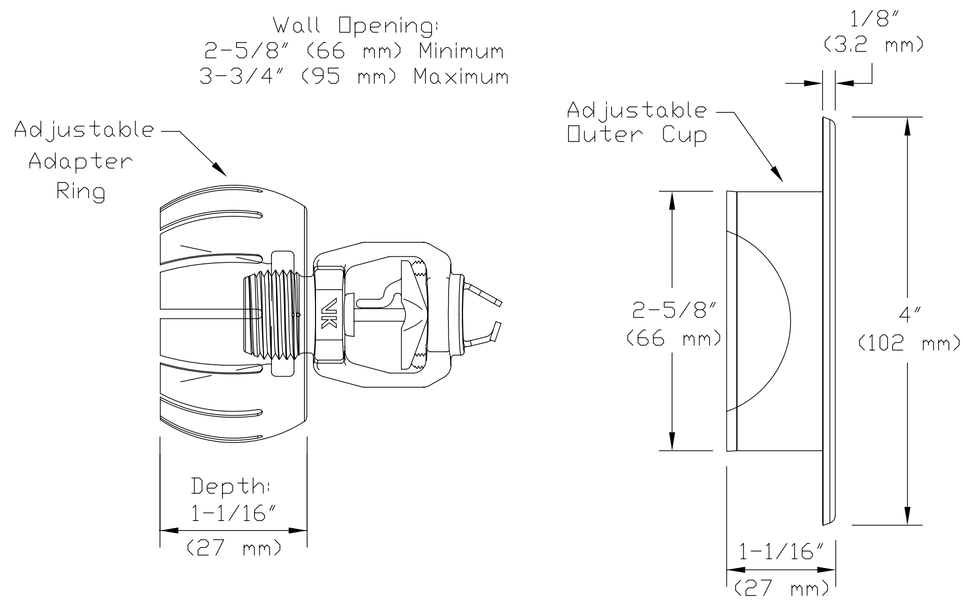

Figure 6: Sprinkler VK486 Dimensions with the Model G-1 Escutcheon

VIKING®

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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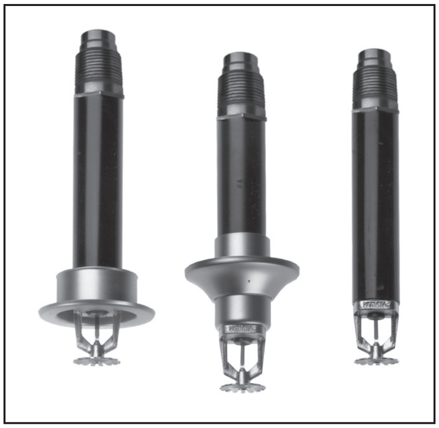
1. DESCRIPTION



Viking Quick Response Dry Pendent Sprinklers are thermosensitive spray sprinklers suitable for use in areas subject to freezing. The sprinklers are designed for dry systems and preaction systems where it is necessary to prevent water or condensation from entering the drop nipple before sprinkler operation. They may also be installed in spaces subject to freezing and supplied from a wet system in an adjacent heated area.

Viking Quick Response Dry Pendent Sprinklers are available in various finishes and temperature ratings to meet design requirements. The special Polyester and Electroless Nickel PTFE (ENT) coatings have been investigated for installation in corrosive atmospheres and are listed/approved as corrosion resistant as indicated in the Approval Charts. (Note: FM Global has no approval classification for Polyester coatings as corrosion resistant.)

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Classes 2013 and 2015

NYC Approved: MEA 89-92-E Volume 15

Refer to Approval Chart 1 and Design Criteria on page 105d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 105e for FM Approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: 7 psi (0.5 bar)
Maximum Working Pressure: 175 psi (12 bar).
Factory tested hydrostatically to 500 psi (34.5 bar)
Thread size: 1” NPT or 25 mm BSP
Nominal K-Factor: 5.6 U.S. (80.6 metric*) for all listed and approved lengths.

* Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Covered by the following U.S. Patents: 8,636,075 and 10,220,231

Material Standards:
Frame Casting: Brass UNS-C84400
Deflector: Brass UNS-C26000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Compression Screw: Brass UNS-C36000
Pip Cap: Brass UNS-C31400 or UNS-C31600
Pip Cap Adapter: Brass UNS-C36000
Orifice: Copper UNS-C22000 or UNS-C11000
Tube: ERW Hydraulic Steel Tube
Support (Internal): Stainless Steel UNS-S30400
Barrel: Steel Pipe UNS-G10260, Electrodeposited Epoxy Base finish
Barrel End and Threads: QM Brass
Sleeve (for Adjustable Standard style only): Brass UNS-C26000 or UNS-C26800

Escutcheon Materials:
Adjustable Standard Dry Escutcheons: Brass UNS-C26000 or UNS-C26800
Recessed Dry Escutcheons: Cold Rolled Steel UNS-G10080
ENT Coated Adjustable and Recessed Escutcheons: Stainless Steel UNS-S30400

Ordering Information: (Also refer to the current Viking price list.)

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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Order Quick Response Dry Pendent Sprinklers by first adding the appropriate suffix for the sprinkler finish, the appropriate suffix for the temperature rating, and then the suffix for the length (“A” dimension) to sprinkler base part number. Order in a specific length noted as the “A” dimension. The “A” dimension is the distance from the face of the fitting (tee) to the desired finished surface of the ceiling.

These sprinklers are listed and approved in lengths from 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm) for the adjustable standard style, 3” to 47” (76.2 mm to 1,194 mm) for the plain barrel style, and 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm) for the adjustable recessed style.

Lengths exceeding the standard lengths are available, with no approvals, on a “made-to-order” basis: Recessed Dry Pendent up to 65-1/2” (1,664 mm). Adjustable Standard Dry Pendent up to 63-1/2” (1,613 mm). Plain Barrel Dry Pendent up to 65” (1,651 mm). Contact the manufacturer for more information.

Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, and ENT = JN

Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D, 200 °F (93 °C) = E, 286 °F (141 °C) = G

For example, sprinkler VK176 with a Chrome finish and a 155 °F (68 °C) temperature rating, and “A” length of 10” = Part No. 08383UFB10.

Available Finishes And Temperature Ratings: Refer to Table 1.

Accessories: (Also refer to the “Sprinkler Accessories” section of the Viking data book.)

Sprinkler Wrenches:

A. Standard Wrench: Part No. 07297W/B (available since 1991)

B. Wrench for recessed sprinklers: Part No. 07565W/B** (available since 1991)
**A ½” ratchet is required (not available from Viking).

Sprinkler Guard: Chrome, with no listings or approvals, for installation on dry pendent sprinklers made after May 1994 only (Part No. 08954).

Replacement Escutcheons:

A. Adjustable Standard Dry Escutcheon: Base Part No. 07741

B. Recessed Dry Escutcheon Cup: Base Part No. 05459A

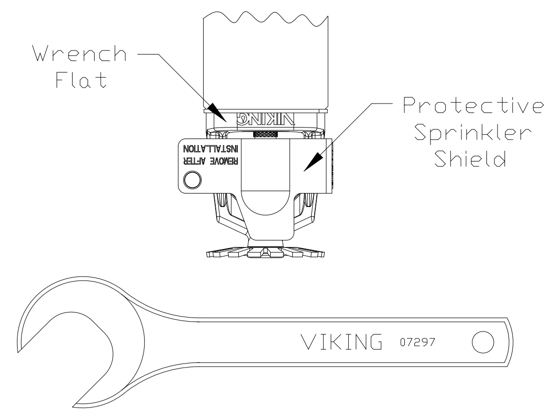

Figure 1: Standard Sprinkler Wrench 07297W/B

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the internal parts to open the waterway. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS & MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

The Viking Quick Response Dry Pendent Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

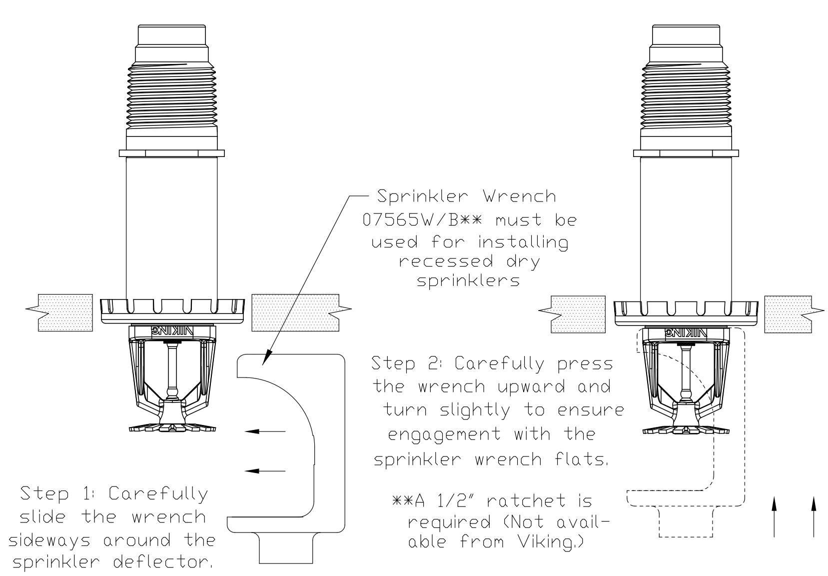

Figure 2: Wrench 07565W/B for Adjustable Recessed Dry Pendent Sprinklers

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TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

Sprinkler Finishes: Brass, Chrome, White Polyester, and ENT
Corrosion-Resistant Coating[3,4]: White Polyester and ENT in all temperature ratings

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

[3] The corrosion-resistant Polyester and ENT coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Note: These coatings are NOT corrosion proof. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. Polyester and ENT coatings are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and ENT coatings.

[4] When installed in some corrosive environments, the Polyester finish may change color. This natural discoloration over time is not in itself an indication of corrosion and should not be treated as such. All sprinklers installed in corrosive environments should be replaced or tested as described in NFPA 25 on a more frequent basis.

For "A" Dimension: 1. Determine the distance from the face of the tee to the finished ceiling.
2. Round to the nearest 1/2" (12.7 mm) between 1-1/2" and 45-1/2" (38.1 mm and 1,156 mm).
NOTE: The deflector will be located approximately 3-7/16" (87.3 mm) below the ceiling.
with 1" (25.4 mm) upward and 1" (25.4 mm) downward adjustment.

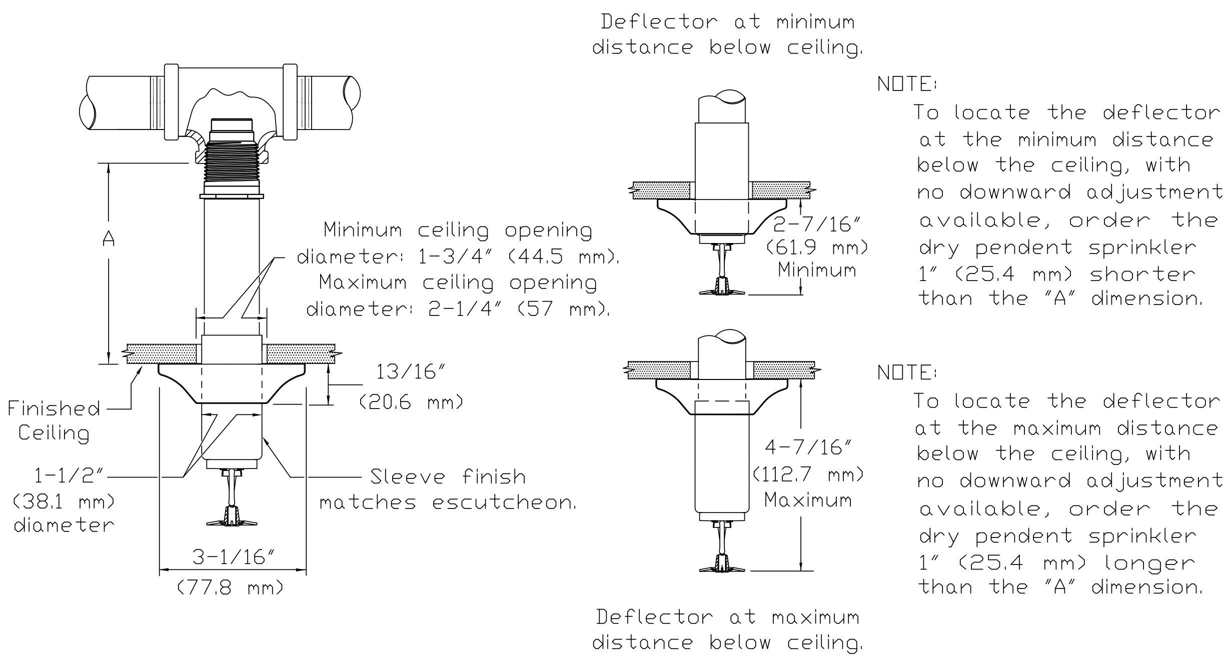

Figure 3: Adjustable Standard Dry Pendent Sprinkler

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TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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Approval Chart 1 (UL)

Quick Response Dry Pendent Sprinklers
Maximum 175 PSI (12 bar) WWP

KEY: A1X — A: Temperature; 1: Finish; X: Escutcheon (if applicable)

Sprinkler Base Part No.[1]	SIN	Style	Thread Size		Nominal K-Factor[2]		Order Length Increment		Listings and Approvals[4] (Refer also to Design Criteria below.)					
			NPT	BSP	U.S.	metric[3]	Inches	mm	cULus[5]	NYC[6]	VdS	LPCB	CE	⚙
08383U	VK176	Adjustable Standard	1”	--	5.6	80.6	1/2”	12.7	A1, A5	A1	--	--	--	--
16457U	VK176	Adjustable Standard	--	25 mm	--	80.6	1/2”	12.7	A1, A5	--	--	--	--	--
08385U	VK180	Adjustable Recessed	1”	--	5.6	80.6	1/4”	6.35	B2, B6	B2	--	--	--	--
16453U	VK180	Adjustable Recessed	--	25 mm	--	80.6	1/4”	6.35	B2, B6	--	--	--	--	--
08387U	VK172	Plain Barrel	1”	--	5.6	80.6	1/2”	12.7	A3	A4	--	--	--	--
16455U	VK172	Plain Barrel	--	25 mm	--	80.6	1/2”	12.7	A3	--	--	--	--	--

Approved Temperature Ratings

A - 155 °F (68 °C), 175 °F (79°C), 200 °F (93 °C), and 286 °F (141 °C)

B - 155 °F (68 °C), 175 °F (79°C), and 200 °F (93 °C)

Approved Finishes and “A” Dimensions

1 - Chrome or White Polyester[7] sprinkler with a Chrome or White Polyester Sleeve and Escutcheon with “A” dimensions 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm)

2 - Chrome or White Polyester[7] with “A” dimensions 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm)

3 - Chrome, Brass, White Polyester[7], or ENT[7] with “A” dimensions 3” to 47” (76.2 mm to 1,194 mm)

4 - Chrome or Brass with “A” dimensions 3” to 47” (76.2 mm to 1,194 mm)

5 - ENT[7] sprinkler with an ENT[7] Sleeve and Escutcheon with “A” dimensions 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm)

6 - ENT[7] with “A” dimensions 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm)

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.

[2] K-Factor applies for standard lengths (“A” Dimensions indicated above).

[3] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[4] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

[5] Listed by Underwriter’s Laboratories for use in the U.S. and Canada.

[6] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 15.

[7] cULus Listed as corrosion resistant.

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1 above.)

NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-BI tees. When selecting other CPVC fittings, contact Viking Technical Services.

cULus Listing Requirements:

Standard Dry Pendent Sprinklers are cULus Listed as indicated in Approval Chart 1 for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies.
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard spray pendent sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

VIKING® | **TECHNICAL DATA** | **QUICK RESPONSE DRY PENDENT SPRINKLERS**

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Approval Chart 2 (FM)

Quick Response Dry Pendent Sprinklers
Maximum 175 PSI (12 bar) WWP

KEY: A1X — A = Temperature; 1 = Finish; X = Escutcheon (if applicable)

Sprinkler Base Part No.[1]	SIN	Style	Thread Size		Nominal K-Factor[2]		Order Length Increment		FM Approvals[4]
			NPT	BSP	U.S.	metric[3]	Inches	mm	(Refer also to Design Criteria below.)
08383U	VK176	Adjustable Standard	1”	--	5.6	80.6	1/2”	12.7	A1
16457U	VK176	Adjustable Standard	--	25 mm	--	80.6	1/2”	12.7	A1
08385U	VK180	Adjustable Recessed	1”	--	5.6	80.6	1/4”	6.35	B2
16453U	VK180	Adjustable Recessed	--	25 mm	--	80.6	1/4”	6.35	B2
08387U	VK172	Plain Barrel	1”	--	5.6	80.6	1/2”	12.7	A3
16455U	VK172	Plain Barrel	--	25 mm	--	80.6	1/2”	12.7	A3

Approved Temperature Ratings

A - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)
B - 155 °F (68 °C), 175 °F (79°C), and 200 °F (93 °C)

Approved Finishes and “A” Dimensions

1 - Brass, Chrome, White Polyester, or ENT[5] sprinkler with a Brass, Chrome, White Polyester, or ENT[5] Sleeve and Escutcheon with “A” dimensions 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm)
2 - Brass, Chrome, White Polyester, or ENT[5] with “A” dimensions 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm)
3 - Brass, Chrome, White Polyester, or ENT[5] with “A” dimensions 3” to 47” (76.2 mm to 1,194 mm)

Footnotes

1 Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
2 K-Factor applies for standard lengths (“A” Dimensions indicated above).
3 Metric K-Factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
4 This chart shows the FM Approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.
5 FM approved as corrosion resistant.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-BI tees. When selecting other CPVC fittings, contact Viking Technical Services.

FM Approval Requirements:

The Dry Pendent Sprinklers in the Approval Chart above are FM Approved as quick response **Non-storage** standard spray sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including 2-0) and Technical Advisory Bulletins. FM Global Loss Prevention Data Sheets and Technical Advisory Bulletins contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

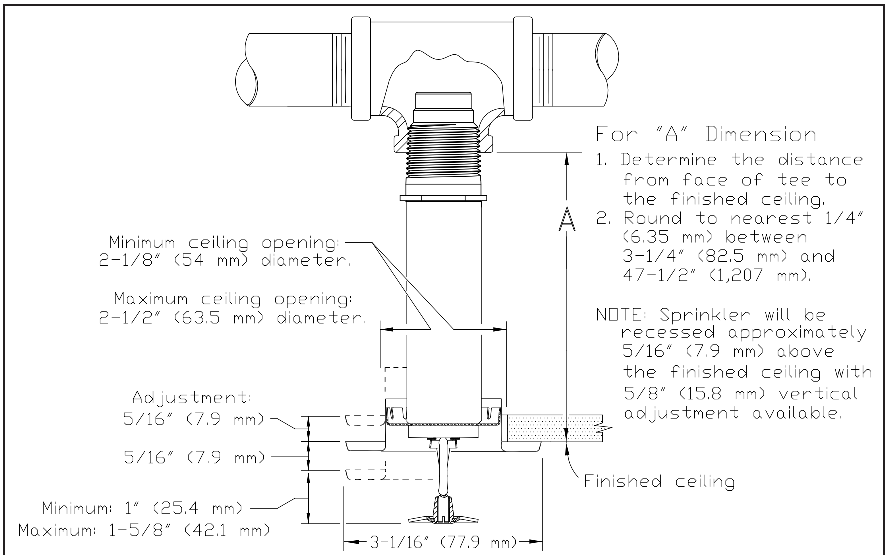

Figure 4: Adjustable Recessed Dry Pendent Sprinkler

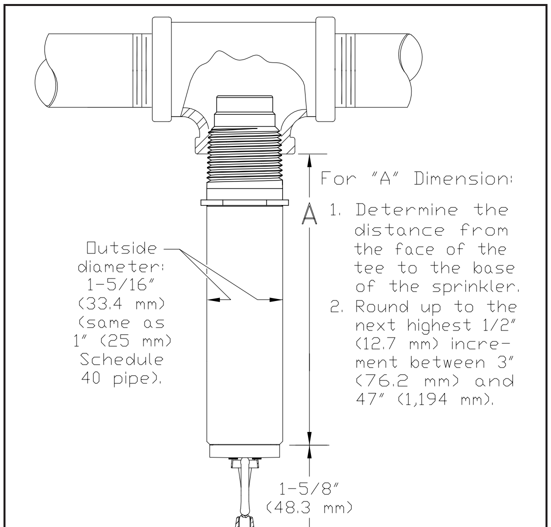

Figure 5: Plain Barrel Dry Pendent Sprinkler

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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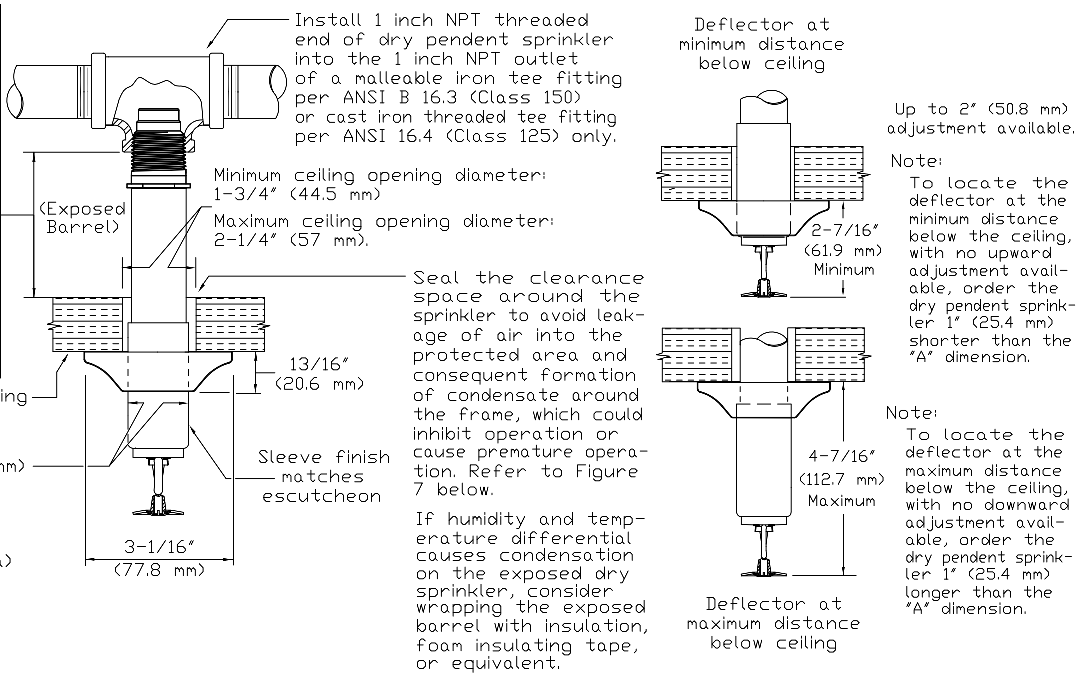
Ambient Temperature of Protected Area* at the Discharge End of the Sprinkler	Exposed Barrel Ambient Temperature 40°F/4°C	50°F/10°C	60°F/16°C
	Exposed Minimum Barrel Length** Face of Tee to Top of Ceiling In. (mm)	In. (mm)	In. (mm)
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (203)	1 (25.4)	0
0°F (-18°C)	12 (305)	3 (76)	0
-10°F (-23°C)	14 (356)	4 (102)	1 (25.4)
-20°F (-29°C)	14 (356)	6 (152)	3 (76)
-30°F (-34°C)	16 (406)	8 (203)	4 (102)
-40°F (-40°C)	18 (457)	8 (203)	4 (102)
-50°F (-46°C)	20 (508)	10 (254)	6 (152)
-60°F (-51°C)	20 (508)	10 (254)	6 (152)



*The protected area refers to the area below the ceiling.
The ambient temperature is the temperature at the discharge end of the sprinkler.
For protected area temperatures that occur between the values listed, use the next cooler temperature.

**The minimum required barrel length is not the same as the "A" dimension. Refer to Figures 3-5 for the "A" dimension.
NOTE: Exposed minimum barrel lengths are inclusive up to 30 mph wind velocities.

Figure 6: Dry Pendent Sprinkler Required Minimum Barrel Length Based on Ambient Temperature in the Protected Area (Adjustable Standard Dry Pendent Sprinkler is Shown)

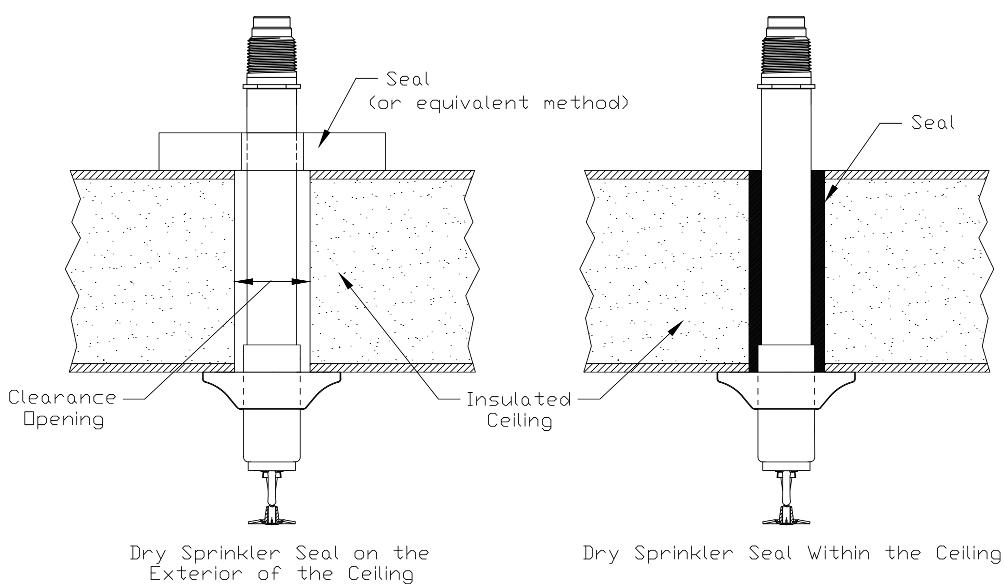


Figure 7: Dry Sprinkler Seal (Adjustable Standard Dry Pendent Sprinkler is Shown)

VicFlex™ Style VS1 Dry Sprinkler
Models V3505, V3506, V3509, V3510, V3517, V3518

10.91

1.0 PRODUCT DESCRIPTION

Style

- Pendent, Concealed Pendent, Horizontal Sidewall

K Factor

- 5.6/8.1 S.I.
  For system design purposes, no equivalent length calculations are required.

Sprinkler Length

- 38"/965 mm, 50"/1270 mm, 58"/1475 mm

Nominal Orifice Size

- ½"/13 mm

Maximum Working Pressure

- 175 psi/1200 kPa

Factory Hydrostatic Test

- 100% @ 500 psi/3450 kPa

Minimum Operating Pressure

- 7 psi/48 kPa

Connections

- To branch line (inlet) via 1"/25 mm NPT or 1" BSPT

Minimum Bend Radius:

- **UL:** 2"/51 mm
- **FM**: 7"/178 mm

Maximum Number of 90° Bends:

- **UL:** 4
- **FM**: 2 bends for 38", 3 bends for 50", 4 bends for 58"

Hazard Classifications

- Light and Ordinary Hazard

NOTE

- The VS1 is classified as a dry sprinkler and has no equivalent length.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

2.0 CERTIFICATION/LISTINGS

Approvals/Listings	Model								
	V3505	V3505	V3506	V3506	V3509	V3509	V3510	V3517	V3518
Orifice Size (inches)	½"	½"	½"	½"	½"	½"	½"	½"	½"
Orifice Size (mm)	13	13	13	13	13	13	13	13	13
Nominal K Factor Imperial	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Nominal K Factor S.I.	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Response	Standard	Standard	Quick	Quick	Standard	Standard	Quick	Standard	Quick[1]
Deflector Type	Pendent	Recessed	Pendent	Recessed	Hor. SW	Rec. Hor. SW	Hor. SW, Recessed Hor. Sidewall	Conc. Pend.	Conc. Pend. w/Clean room gasket
Approved Temperature Ratings	**F°/C°**								
FM	135/57	135/57	135/57	135/57	135/57	135/57	135/57	–	135/57
	155/68	155/68	155/68	155/68	155/68	155/68	155/68	–	155/68
	175/79	175/79	175/79	175/79	175/79	175/79	175/79	–	175/79
	200/93	200/93	200/93	200/93	200/93	200/93	200/93	–	200/93
	286/141	–	–	–	286/141	–	–	–	–
UL	135/57	135/57	135/57	135/57	135/57	135/57	135/57	135/57	135/57
	155/68	155/68	155/68	155/68	155/68	155/68	155/68	155/68	155/68
	175/79	175/79	175/79	175/79	175/79	175/79	175/79	175/79	175/79
	200/93	200/93	200/93	200/93	200/93	200/93	200/93	200/93	200/93
	286/141	286/141	286/141	286/141	286/141	–	286/141	–	–

1 Model V3518 is a Standard Response FM sprinkler.

3.0 MATERIAL SPECIFICATIONS

Deflector: Brass

Bulb: Glass with glycerin solution

Bulb Nominal Diameter:

☐ **Quick Response:** 3.0 mm

☐ **Standard Response:** 5.0 mm

Split Spacers: Stainless steel

Load Screw: Brass

Pip Cap: Stainless steel

Spring Seal Assembly: PTFE tape coated beryllium nickel and stainless steel

Frame: Brass

Flexible Hose: Stainless steel

Collar/Weld Fitting: Stainless steel

Gasket Seal: Victaulic EPDM

Isolation Ring: Nylon

Hose Fittings: Carbon steel, zinc-plated

Inlet Fitting: Brass

Outer Tube: Stainless steel

Concealed Cup: Carbon steel, zinc-plated

Brackets: Carbon steel, zinc-plated

3.1 ACCESSORIES SPECIFICATIONS

Sprinkler Finishes:

☐ **Standard:** VC-250

☐ White painted RAL 9010

4.0 DIMENSIONS

Product Details and Optional Components

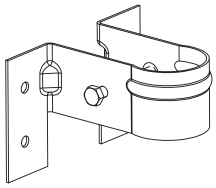
Style VS1 Dry Sprinkler

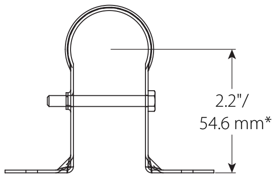
Sprinkler Length inches mm	Overall Length (pendent) **L** inches mm	Live Length **B** inches mm	Outlet End Length **C** inches mm	Maximum OD **D** inches mm
38 965	39.2 995	25.1 638	6.5 165	2.2 56
50 1270	51.2 1300	37.1 943	6.5 165	2.2 56
58 1475	59.2 1505	45.1 1145	6.5 165	2.2 56

NOTE

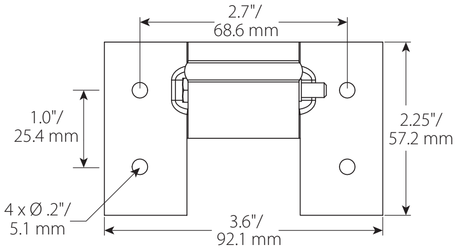
- Add ½" to Overall Length and Outlet End Length for increased length of sidewall deflector

Style VB1 Bracket





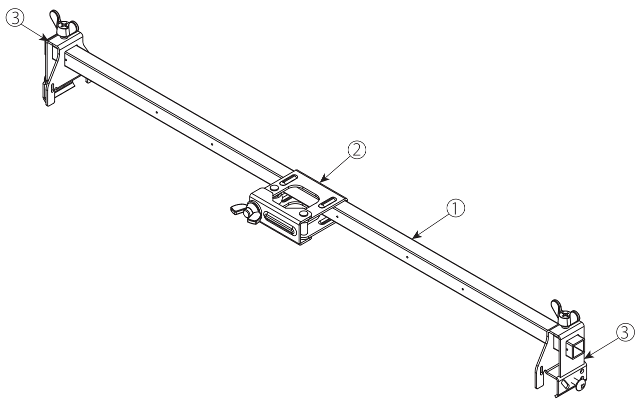
*Note: Theoretical center point of sprinkler in bracket.



4.0 DIMENSIONS (CONTINUED)

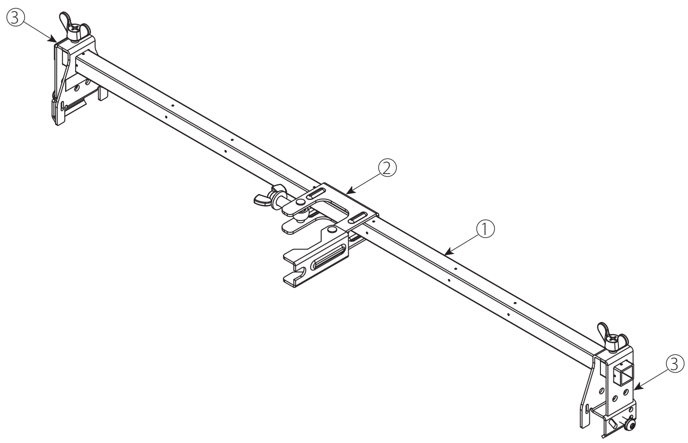
Style VB2 Bracket
Recessed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



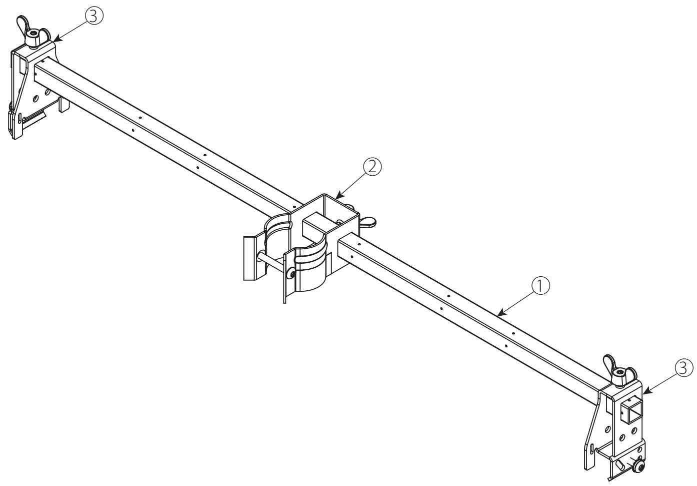
Style VB3 Bracket
Concealed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



Style VB4 Bracket
Sleeve and Skirt Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Center Bracket
3	End Bracket



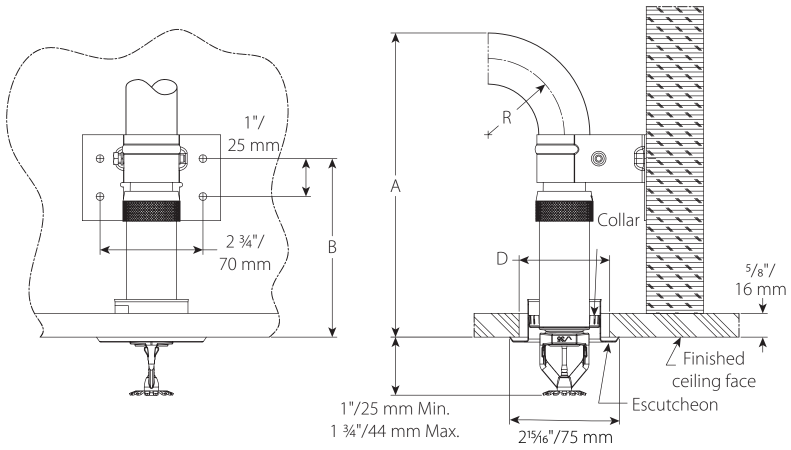
4.1 DIMENSIONS

Sprinkler Finishes: Dimensions and Mounting Conditions

NOTE

- Drawings are shown with ⅝" finished ceiling thickness. Adjustments to "B" and "C" dimensions will be required if finished ceiling thickness deviate from drawing.

Recessed Pendent:



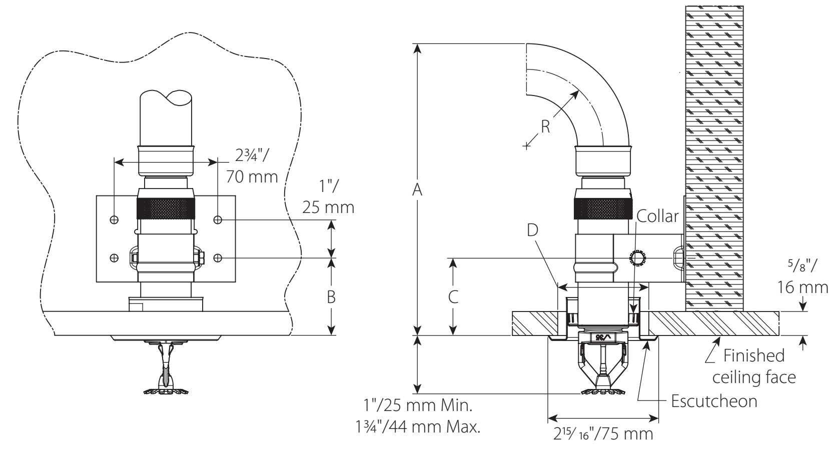
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7 ⅝ 193	12 ⅝ 320
"B" Mounting Screw Hole Location	4 ¾ 119	
Ceiling Hole Diameter "D"	2 – 2⅜ 50 – 60	

NOTE

- Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.2 DIMENSIONS

Recessed Pendent Alternative Bracket Location



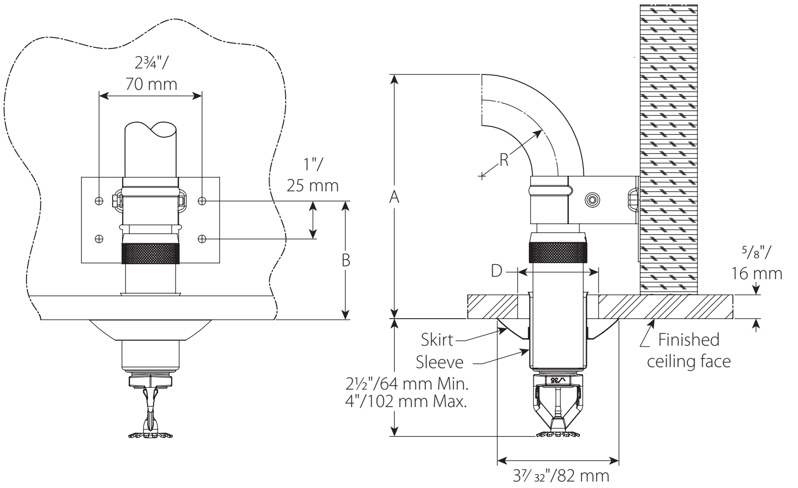
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320
"B" Mounting Screw Hole Location	2 50	
Ceiling Hole Diameter "D"	2 – 2⅜ 50 – 60	

NOTE

- Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.3 DIMENSIONS

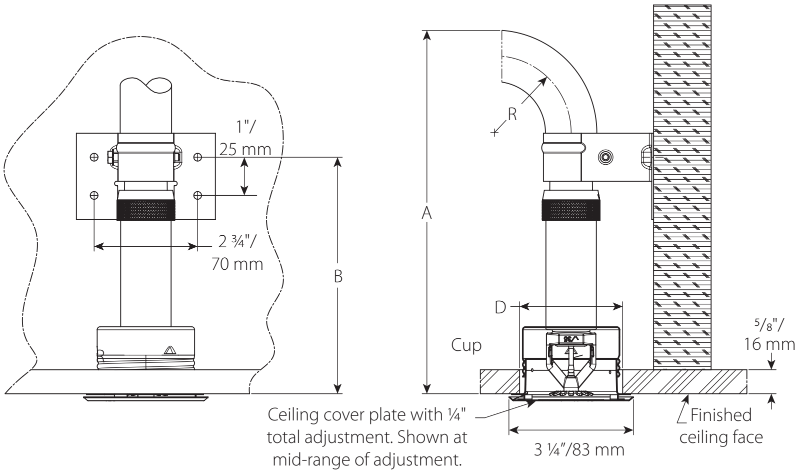
Sleeve and Skirt Pendent



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6½ 163	11½ 290
"B" Mounting Screw Hole Location	3⅛ 79	
Ceiling Hole Diameter "D"	1¾ – 2⅛ 44 – 54	

4.4 DIMENSIONS

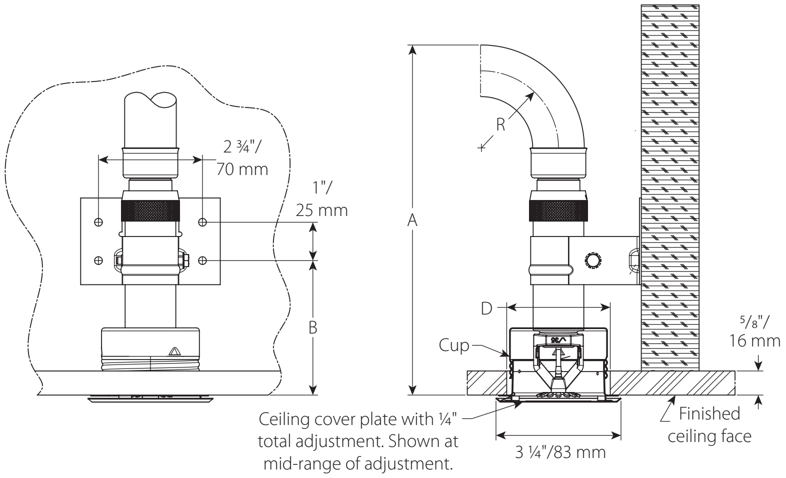
Concealed Pendent



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	9½ 241	14½ 369
"B" Mounting Screw Hole Location	6¼ 157	
Ceiling Hole Diameter "D"	2⅝ – 2¾ 67 – 70	

4.5 DIMENSIONS

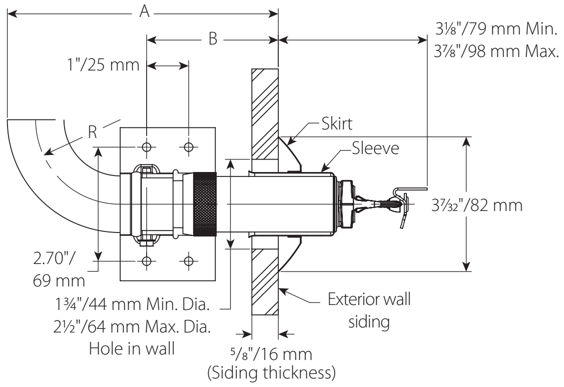
Concealed Pendent Alternative Bracket Location



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	9 ⅛ 231	14 ⅛ 358
"B" Mounting Screw Hole Location	3 ½ 89	
Ceiling Hole Diameter "D"	2 ⅝ – 2 ¾ 67 – 70	

4.6 DIMENSIONS

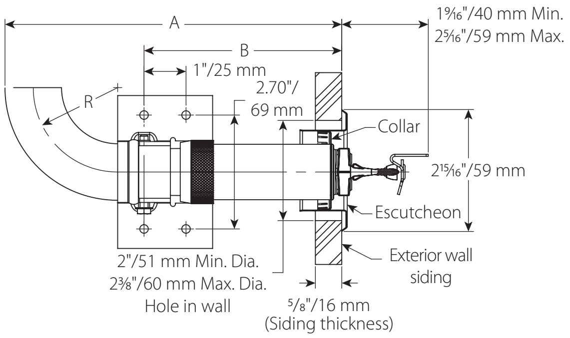
Sleeve and Skirt Sidewall



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6 ½ 163	11 ½ 290
"B" Mounting Screw Hole Location	3 ⅛ 79	
Ceiling Hole Diameter "D"	1 ¾ – 2 ⅛ 44 – 54	

4.7 DIMENSIONS

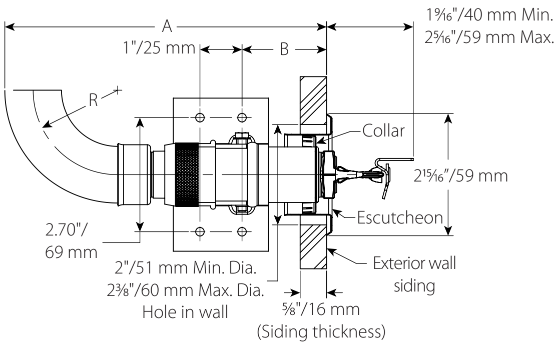
Recessed Sidewall



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	8 203	13 330
"B" Mounting Screw Hole Location	4 3/4 119	
Ceiling Hole Diameter "D"	2 – 2 3/8 51 – 60	

4.8 DIMENSIONS

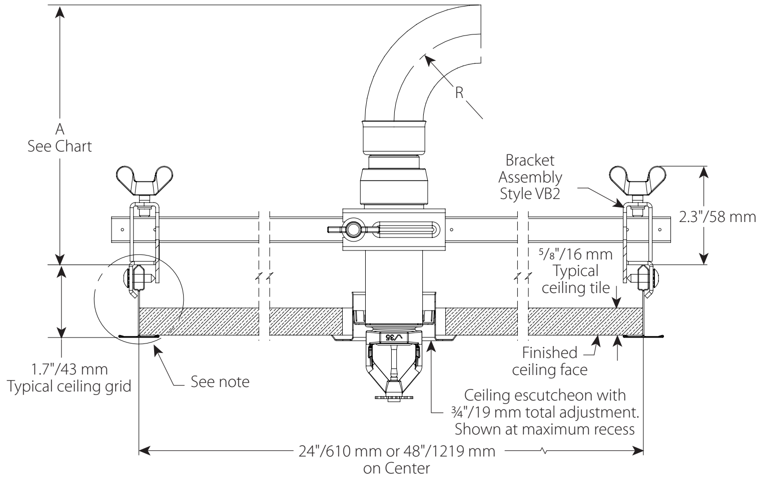
Recessed Sidewall Alternative Bracket Location



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	8 203	13 330
"B" Mounting Screw Hole Location	2 51	
Ceiling Hole Diameter "D"	2 – 2 3/8 51 – 60	

4.9 DIMENSIONS

VB2 Recessed Pendent



Recessed Pendent

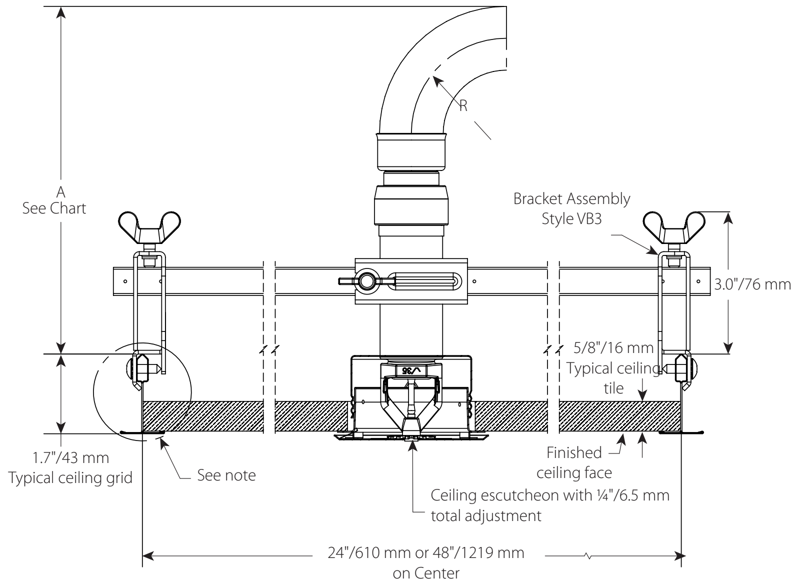
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6½ 163	11½ 290

NOTE

- Victaulic *VicFlex* Style VB2 Bracket assemblies shall be used only with Style VS1 recessed pendent sprinklers.

4.10 DIMENSIONS

VB3 Concealed Pendent



Concealed Pendent

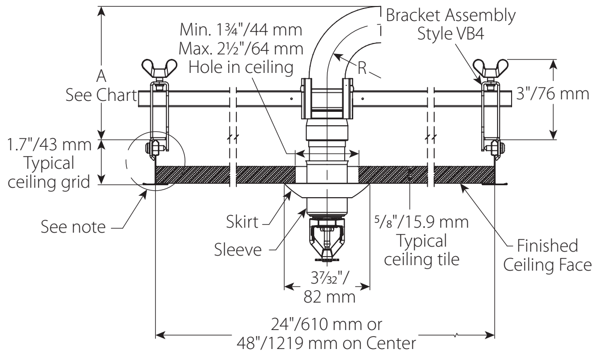
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320

NOTE

- Victaulic *VicFlex* Style VB3 Bracket assemblies shall be used only with Style VS1 concealed pendent sprinklers.

4.11 DIMENSIONS

VB4 Sleeve and Skirt Pendent



Sleeve and Skirt Pendent

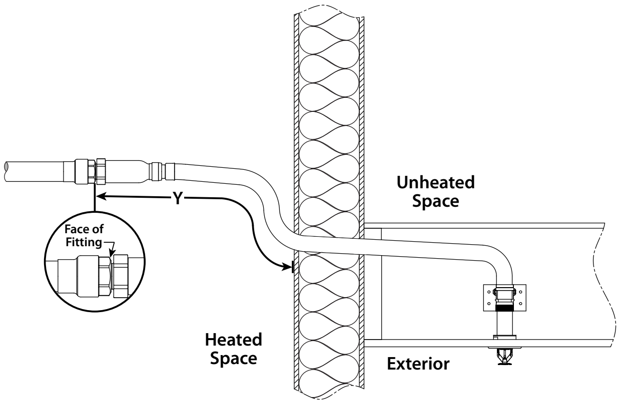
Clearance Chart		
Bend Radius		
	inches mm	inches mm
"R" Minimum Bend Radius	2 51	7 178
"A" Minimum Required Installation Space	5 127	10 254

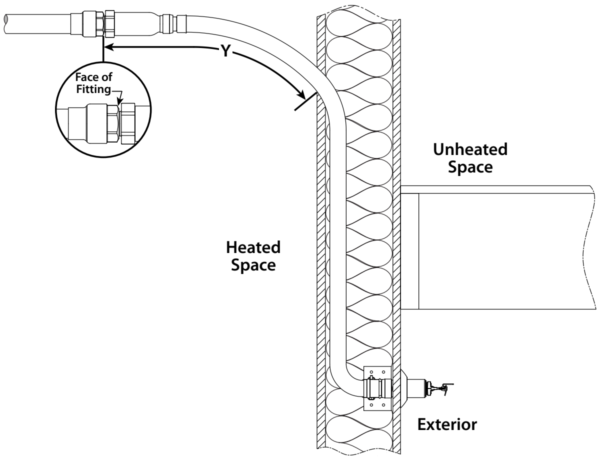
NOTE

- Victaulic *VicFlex* Style VB2 Bracket assemblies shall be used only with Style VS1 recessed pendent sprinklers.

5.0 PERFORMANCE

Freeze Protection





Ambient Temperature Exposed to Discharge End of Sprinkler °F °C	Exposed Minimum Barrel Length "Y" inches mm		
	40°F/4°C	50°F/10°C	60°F/16°C
40 4	0 0	0 0	0 0
30 -1	0 0	0 0	0 0
20 -7	4 100	0 0	0 0
10 -12	8 200	1 25	0 0
0 -18	12 300	3 75	0 0
-10 -23	14 350	4 100	1 25
-20 -29	14 350	6 150	3 75
-30 -34	16 400	8 200	4 100
-40 -40	18 450	8 200	4 100
-50 -46	20 500	10 250	6 150
-60 -51	20 500	10 250	6 150

NOTE

- Exposed minimum barrel lengths are inclusive up to 30-mph/48-kph wind velocities.

Maximum Allowable Number of Bends

Sprinkler Length inches mm	Maximum Allowable Number of 90° Bends at 2"/51mm Bend Radius for UL Listing	Maximum Allowable Number of 90° Bends at 7"/178mm Bend Radius for FM Approval
38 965	4	2
50 1270	4	3
58 1475	4	4

6.0 NOTIFICATIONS

⚠ WARNING

- **Read and understand all instructions before attempting to install any Victaulic products.**
- **Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.**
- **Wear safety glasses, hardhat, and foot protection.**

- **These products shall be used only in fire protection systems that are designed and installed in accordance with current, applicable National Fire Protection Association (NFPA 13, 13D, 13R, etc.) standards, or equivalent standards, and in accordance with applicable building and fire codes. These standards and codes contain important information regarding protection of systems from freezing temperatures, corrosion, mechanical damage, etc.**
- **The installer shall understand the use of this product and why it was specified for the particular application.**
- **The installer shall understand common industry safety standards and potential consequences of improper product installation.**

⚠ WARNING

- **It is the responsibility of the system designer to verify suitability of 300-series stainless steel flexible hose for use with the intended fluid media within the piping system and external environments.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on 300-series stainless steel flexible hose must be evaluated by the material specifier to confirm system life will be acceptable for the intended service.**
- **It is the responsibility of the owner of a building or their authorized agent to provide the sprinkler system installer with any knowledge that the water supply might be contaminated with or conducive to the development of microbiologically influenced corrosion (MIC), including as required by NFPA 13. Failure to identify adverse water quality issues may affect the VicFlex product and void the manufacturer's warranty.**

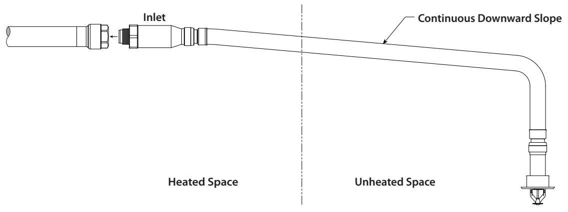
Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

DO NOT paint, coat, or firestop the outlet/inlet portion of the Style VS1 Dry Sprinkler. Braided hose and fitting portions of the Style VS1 Dry Sprinkler may be painted or coated, provided that the paint or coating is compatible with stainless steel material. This includes penetration through firestop-filled annular space of a firewall. The firestop material in direct contact with the flexible braided hose will not impede functionality of the Style VS1 Dry Sprinkler, provided that the components are installed in accordance with Victaulic's installation instructions.

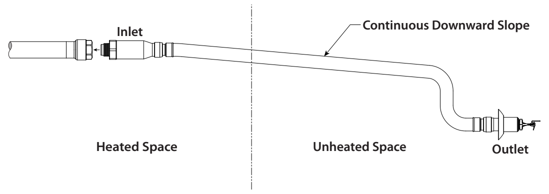
6.0 NOTIFICATIONS (CONTINUED)

Important Installation Notes:

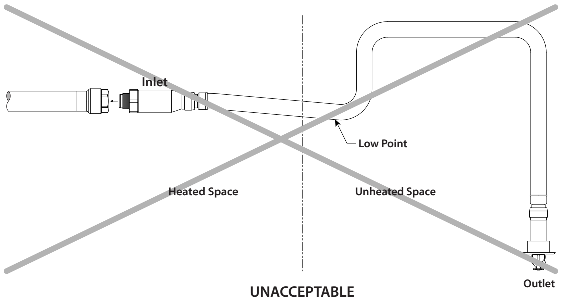
1. Shall be installed only in accordance with NFPA 13 Standard for the the Installation of Sprinkler Systems and applicable FM Data Sheets.
2. Install and tighten swivel hex nut at inlet of sprinkler fitting only.
3. Do not remove deflector or inlet end of sprinkler.



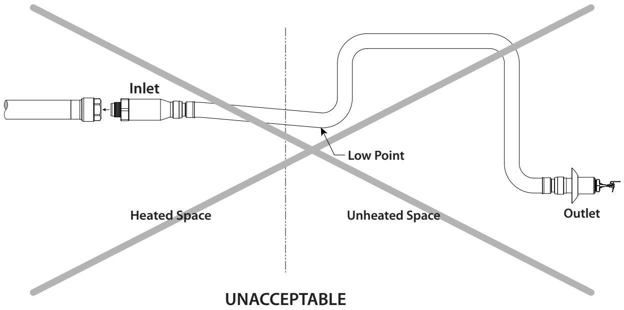
ACCEPTABLE



ACCEPTABLE



UNACCEPTABLE



UNACCEPTABLE

6.0 NOTIFICATIONS (CONTINUED)

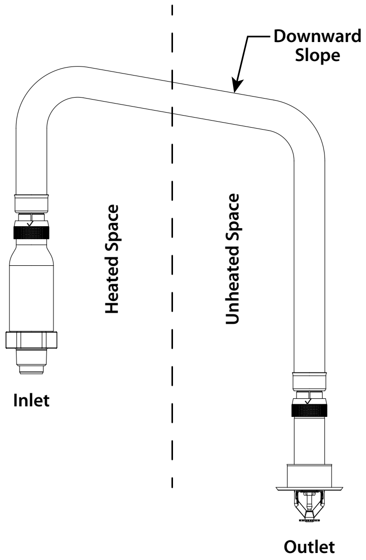
FOR DRY SYSTEMS ONLY:

- The Style VS1 Dry Sprinkler's inlet shall be installed only into the outlet of a fitting (excluding elbows) or welded outlet that meets the dimensional requirements of ANSI B16.3 and ANSI B16.4, Class 125 and Class 150. Use a sample fitting to confirm proper engagement and to verify that there is no interference between the sprinkler and the fitting.

Style VS1 Dry Sprinklers in an unheated space shall be installed with a continuous downward slope along its entire length from the branch line fitting to the sprinkler. No localized low points shall be present along the length of the Style VS1 Dry Sprinkler.

Style VS1 Dry Sprinklers in an unheated space are not permitted to be installed into the top of the branch line piping. Style VS1 Dry Sprinklers shall be installed into the side or from the bottom of the branch line piping.

In a heated space, if a portion of the Style VS1 Dry Sprinkler is installed from the top of a branch line and then extends into an unheated space, it shall be installed with a continuous downward slope along the entire length from the inside wall to the outlet of the sprinkler. No localized low points shall be present along the length of the sprinkler in the unheated space. Refer to the drawing below.



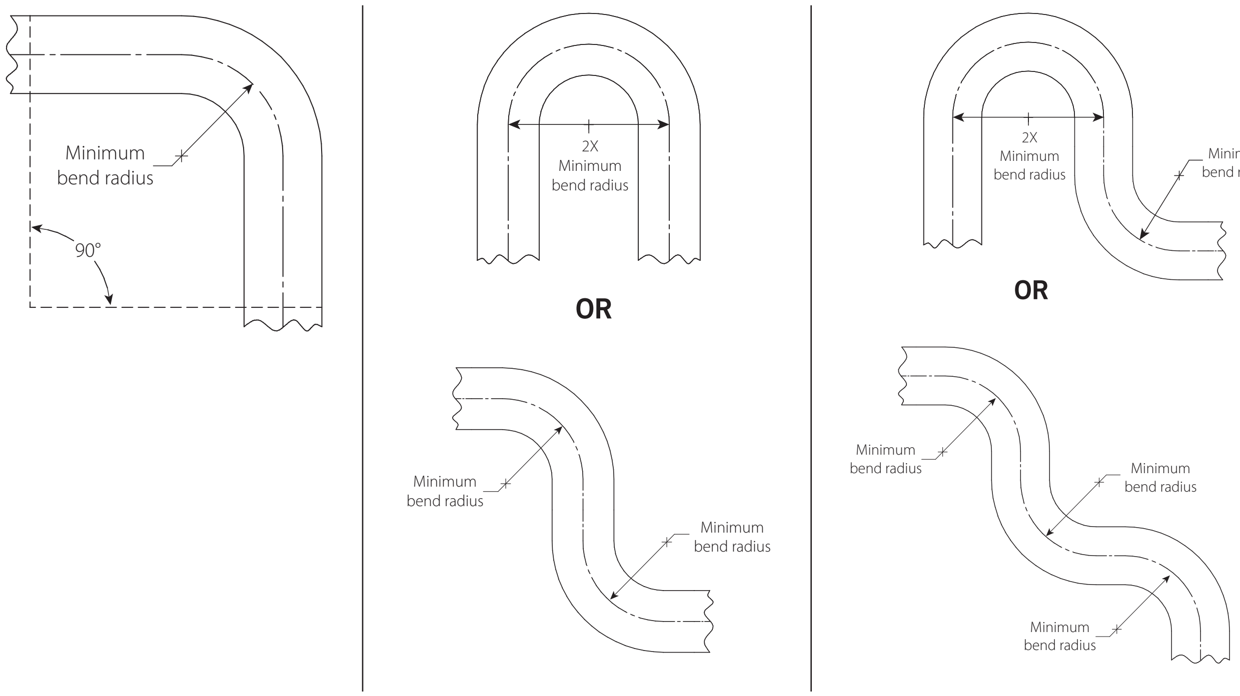
FOR WET SYSTEMS ONLY:

- **DO NOT** install Victaulic® VicFlex™ Style VS1 Dry Sprinklers into any threaded elbow, threaded-by-thread coupling, or fitting that interferes with thread penetration. The inlet of the Victaulic® VicFlex™ Style VS1 Dry Sprinkler **SHALL NOT** bottom out in the fitting. Use a sample fitting to confirm proper engagement.
- To ensure unobstructed flow during operation, the Victaulic® VicFlex™ Style VS1 Dry Sprinkler shall be installed into a fitting that will prevent water and debris from accumulating at the dry sprinkler's inlet.
- Verify that the exposed minimum barrel length in the heated space is measured and maintained in accordance with the table on page 1.

In a heated space, if a portion of the Style VS1 Dry Sprinkler extends into an unheated space, it shall be installed with a continuous downward slope along the entire length from the inside wall to the outlet end of the dry sprinkler. No localized low points shall be present along the length of the sprinkler in the unheated space. Refer to the drawing above.

7.0 REFERENCE MATERIALS

ONE BEND **TWO BENDS**



NOTE

For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torsional stress on the sprinkler.

Bill To:

Company Name	
Address	
State/Province	Zip Code/Postal Code
Phone No.	Email
Fax No.	

Ship To:

Order No.	Date
Company Name	
Address	
State/Province	Zip Code/Postal Code
Tag	

Quantity (as specified below): [ ] If units of different size, type or other option are required, please attach additional form(s) with their specification(s) separately.

VicFlex™ Dry Sprinkler Model VS1

A – 3F – [ ] – [ ] – [ ] – [ ] – 4 – [ ] – [ ] – [ ] – [ ]

Class	Style	Thread	Deflector Style	Temperature	Response	K Factor	Finish	Recessed Escutcheon Material	Size Code	Size Inches	Escutcheon Style †
A	3F = V35	3 = 1" NPT 8 = 25 mm BSP	B = Pendent C = Horizontal Sidewall P - Concealed	A = 135°F/57°C C = 155°F/68°C E = 175°F/79°C F = 200°F/93°C J = 286°F/141°C	Q = Quick S = Std.	4 = K5.6	4 = White N = VC-250 ‡	W = White Stainless Steel X = Stainless Steel 0 = Concealed	380 = 500 = 580 =	38" 50" 58"	12 = Recessed 13 = Sleeve and Skirt 15 = Concealed

‡ VC-250 sprinkler finish sold standard on the VicFlex Dry Sprinkler Model VS1.

7.0 REFERENCE MATERIALS (CONTINUED)

29.01: Victaulic Terms and Conditions of Sale

I-VICFLEX.VS1: Victaulic® VicFlex™ Style VS1 Dry Sprinkler Installation Instructions

Submitted By:
Andrew Clark
Vice President of Government Affairs
Home Builders Association of Virginia

Access to Virginia-Specific Fire Data is Lacking:

All stakeholders should have equal access to data related to residential home fire incidents, deaths, injuries, causes, and other relevant information. Currently, the US Fire Administration dashboard contains informative, but surface level, data regarding the fire casualties by incident type, residential structure fire casualties, and a handful of other data points. However, there is a dearth of publicly available, substantive, and comprehensive data that would inform stakeholders about residential home fire trends in Virginia. According to their website, the US Fire Administration annually collects data from 24,112 fire departments across the country – however, that data is only available by 1) ordering a "CD or DVD" – free of charge. Some stakeholders have the option to download the data from the USFA website – however, the information is provided in countless raw data files that require a "…database management system and expertise in SQL and/or other database programming language" to access[1]. The USFA also has a disclaimer that the database is for "researchers and fire data analysts" and that users "should have considerable experience with fire data analysis and NFIRS data to properly use the PDR".

I understand that this is a complex data set with 24,000 fire departments inputting a lot of data set – but there is little-to-no ability for non-fire data analysts to dive into the numbers, aside from the relatively high-level reports published by the NFPA. Additionally, unless I'm missing something, the NFPA does not make publicly available any reports specific to Virginia – it's all national-level data.

I have also attempted to find more Virginia-specific data on the Virginia Department of Fire Programs (VDFP) website – my assumption being that USFA and NFPA focus on national data, leaving the state-level data to VDFP to analyze and publish. There are currently several pages on VDFP's website devoted to data:

> **Fire and Data Statistics:** https://www.vafire.com/fire-and-data-statistics-2/ - There is a high-level chart which summarizes incidents between 2013-2018. However, the summary data has not been updated since 2018 – and there is little information that would be relevant to the discussion of townhome fire sprinklers. There also appears to be more substantive reports re: residential structure fire causes, incident types, etc – but those reports stopped being published on the VDFP website in 2015. And currently, there are only reports for 2013, 2014, and 2015.
>
> **VFIRS Facts and Figures**: https://www.vafire.com/vfirs-facts-and-figures/ - Same as above – this page contains high-level information.
>
> **VFIRS Annual Reports**: https://www.vafire.com/vfirs-annual-reports/ - The annual reports are probably the most substantive data set on the VDFP website, but the annual reports stopped being published in 2014. To the VDFP's credit, they have uploaded the annual reports for every

[1] USFA Website – NFIRS Data Download: https://www.usfa.fema.gov/nfirs/order/

year between 2007 to 2014, but there is no ability to look at all of this data over time, unless someone is willing to aggregate every data point from each report into a single spreadsheet.

As stated on the USFA's website, the purpose of having fire departments contribute to NFIRS is to:

- Analyze the severity and reach of the nation's fire problem.
- Use NFIRS information to develop national public education campaigns.
- Make recommendations for national codes and standards.
- Determine consumer product failures.
- Identify the focus for research efforts.
- Support federal legislation.

I imagine that the purpose of the VFIRS data is similar, if not identical. However, in its current "lock box form" where very few people can actually access it, it is extremely difficult to see how fire services representatives, local governments, legislators, or stakeholders can actually utilize that data to accomplish any of the goals mentioned above.

Again – I understand that this is an incredibly complex data set that probably requires a significant investment of time and resources by VDFP staff to collect, analyze, and publish. <u>I also understand that the VDFP may not have the staff or resources available to undertake that endeavor – if that is the case, there should be a concerted effort by the stakeholders to advocate for a significant increase in state financial resources so that the VDFP can publish the data that would benefit local and state elected officials, local and state government staff, fire departments, and others.</u>

Virginia-Specific Data is Needed to Inform Discussion re: Fire Sprinklers

The decision to require residential fire sprinkler systems in townhomes or single-family structures is a significant public policy decision that would have a direct impact on the cost of housing in Virginia. Although some stakeholders will debate the actual cost of the proposal, the very low number of states that have adopted some form of the requirement reflects the substantial nature of the public policy decision to require or not require residential fire sprinklers.

Given the impact that this proposal would have on the cost of housing – at a time where the housing affordability crisis is a top priority for local and state officials – this code proposal should not be adopted without a thorough review of Virginia-specific fire data – that level of review would allow the stakeholders and the Board of Housing and Community Development the opportunity to weigh the costs of potentially exclusionary market requirements against the public health benefits of raising the baseline standard of all new townhomes – and furthermore, would allow the stakeholders to determine whether a similar public safety benefit could be accomplished through a more cost-effective means for consumers.

Phrased differently – The stakeholders and the Board deserve the opportunity to evaluate Virginia-specific data to determine if, as some stakeholders claim, new homes are actually more susceptible to fires – or if the predominant number of residential fires (and death/injury resulting from a residential fire) are actually occurring in older structures built to a lesser standard. If the data demonstrates that the majority of residential home fires are occurring in older existing structures - or structures where smoke alarms are not installed or outdated/removed - we should focus our efforts on reducing/mitigating that risk by increasing consumer education about the importance of smoke alarms, establishing more "touch points" between fire services and renters/homeowners in areas known to be at a greater risk of home fires, and ensuring that localities and local fire departments have the resources they need to test and install modern smoke alarm technology in those structures, free of cost to the resident or tenant.

There is a large body of evidence which demonstrates that the proliferation of smoke alarms in residential structures has saved lives with virtually zero impact to the cost of housing for consumers – reports from both NFPA, NAHB, and third parties substantiate this claim. Similarly, advancements in smoke alarm technology have virtually eliminated the possibility of the battery being removed to power other electronic devices or to "stop the beeping" when a battery is running low – and as a result, has further reduced the number of fatalities in residential home fires. However, according to data that has been released by the NFPA, 41% of the home fire deaths were caused by fires in properties ***with no smoke alarms***[2]***.*** Furthermore, an additional 16% of home fire deaths occurred in properties where the smoke alarm failed to operate. Smoke alarms are a proven, cost-effective means of increasing public safety in residential structures – and the national data from the NFPA shows that there are still a large number of homes that are under-protected or unprotected.

The purpose of the Virginia Uniform Statewide Building Code is to establish a baseline standard of safety, quality, and efficiency in new residential structures. All residents deserve to be safe and secure in their homes or apartments – and the data shows that advancements in building codes coupled with the homebuilding industry's response to consumer expectations have contributed to safer structures. However, not all homebuyers or renters can afford the additional costs of a residential fire sprinkler system – and the proposal to require these systems in all new townhomes would disproportionately impact individuals and families in the lower to middle end of the income spectrum.

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[2] NFPA Smoke Alarm Report (2021): https://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/Detection-and-signaling/ossmokealarms.pdf

Overview from Home Builders Association of Virginia:

The purpose of the Virginia Uniform Statewide Building Code is to establish a baseline standard of safety, quality, and efficiency in new residential structures. Proposed building codes should not be rejected outright because there may be associated costs, however, the Board of Housing and Community Development must weigh the effects of potentially exclusionary market requirements on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through less exclusionary means.

Proponents of the proposal to mandate fire sprinkler systems in new single-family homes and townhomes have discounted concerns raised by the housing industry and other stakeholders regarding the proposal's impact on housing affordability and housing accessibility in Virginia. The housing crisis, both nationally and in Virginia, is well documented and has been identified as a top policy priority for state and local elected officials.

The Home Builders Association of Virginia has compiled several reports/studies regarding the housing affordability challenges in the Commonwealth and ask that the study group and the Board of Housing and Community Development consider this information while discussing the code proposal.

- Joint Legislative Audit and Review Committee (JLARC) Report: Affordable Housing in Virginia (December 2021)
- Metropolitan Washington Council of Governments: The Future of Housing in Greater Washington
- Virginia Housing Policy Advisory Council: Addressing the Impact of Housing for Virginia's Economy (November 2017)
- National Low Income Housing Coalition – Out of Reach Report, Virginia (2021)
- National Association of Home Builders – Priced Out Report (2022)

Joint Legislative Audit and Review Committee Report: Affordable Housing in Virginia

The Joint Legislative Audit and Review Commission (JLARC) conducts program evaluation, policy analysis, and oversight of state agencies on behalf of the Virginia General Assembly. In 2020, the Joint Legislative Audit and Review Commission (JLARC) directed staff to "conduct a review of affordable housing in Virginia. JLARC staff were asked to report on the "number of Virginia households that are housing cost burdened; the supply of affordable quality housing statewide and by region; the state's efforts to increase the supply of affordable housing and make existing housing more affordable through direct financial assistance; and the effectiveness of the management of the state's housing assistance programs."[1]

The report, which was released in December 2021, is a comprehensive analysis of the housing market in Virginia and, over the course of it's 200 pages, refutes any claims that housing affordability is not a dire crisis and challenge for localities and regions across the Commonwealth.

Summary of Report's Findings:

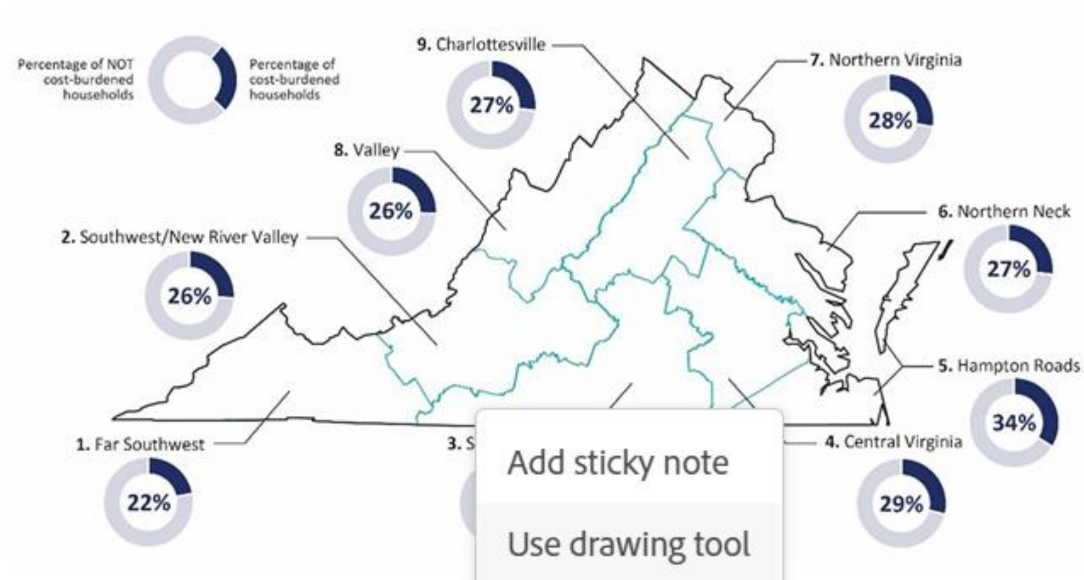
- "Approximately 29 percent of Virginia households (905,000) were housing cost burdened in 2019, and nearly half of these households spent more than 50 percent of their income on housing. Virginia

[1] JLARC Report: Affordable Housing in Virginia: http://jlarc.virginia.gov/landing-2021-affordable-housing-in-virginia.asp

ranks near the middle of states in terms of the percentage of households that are cost burdened.” (JLARC Report: PDF Page 5)

  - “Households are considered housing cost burdened when they spend more than 30 percent of their income on housing expenses. Housing cost burden constrains households’ budgets, making it difficult for households to afford other necessities and making eviction more likely.” (JLARC Report: PDF Page 5)

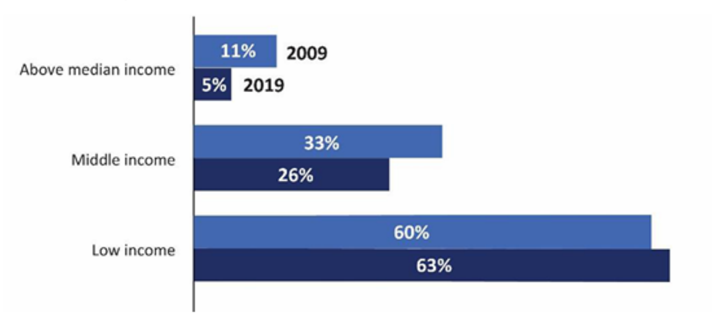
- Every region of the Commonwealth has a high percentage of households who are cost-burdened – see chart on next page



SOURCE: JLARC analysis of American Community Survey, 5 year data, 2015–2019.

- The Percentage of Cost Burdened Low-Income Households is Growing:
  - While the proportion and number of Virginia households that are cost burdened declined between 2009 and 2019, the prevalence of housing cost burden among low-income Virginians increased slightly from 60 percent to 63 percent over this period (Figure 2-6). This affects Virginians who work in common occupations that are essential to the state’s economy and are paid low wages. For example, the median income for a home health aide in Virginia is approximately $22,000, which is considered very low income for a single person household (income between 31 and 50 percent AMI) (Figure 2-7). In another example, the median income for a bus driver is $45,000, which is considered low income for a single person household (income between 51 and 80 percent AMI). (JLARC Report: PDF Page 35)

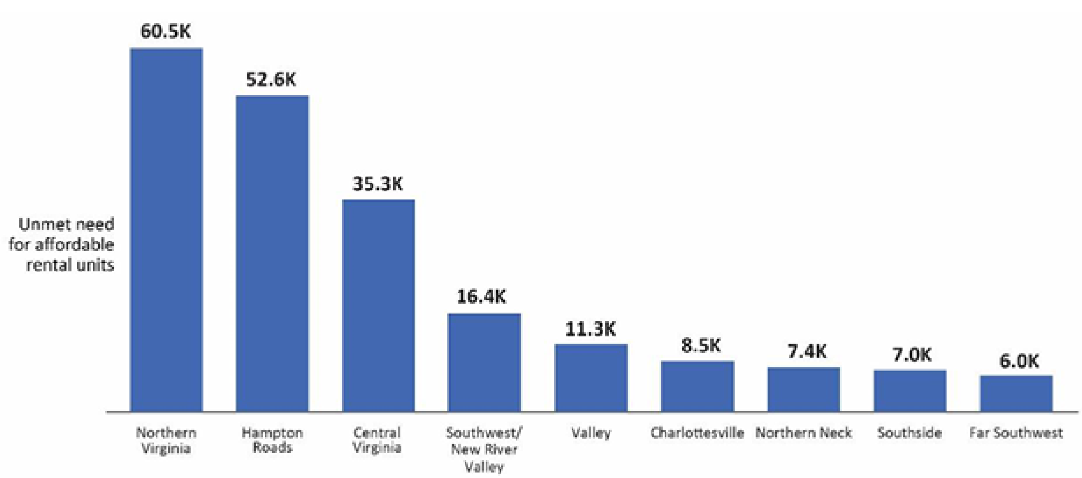
FIGURE 2-6
Percentage of cost burdened households grew among lower income households, 2009–2019



SOURCE: JLARC analysis of American Community Survey, 5 year data, 2005–2009 and 2015–2019.

- “Declining number of Virginians can afford to buy a home, and state has a shortage of at least 200,000 affordable rental units” (JLARC Report: PDF Page 5)
    - “Rising home prices have made it more difficult for Virginians to own their homes. The median home sales price in Virginia has risen 28 percent over the past four years to $270,000 in 2021. Virginia’s stock of homes that would be affordable to low- and middle-income households has declined substantially in the past few years.”
    - “Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.” (JLARC Report: PDF Page 6)
- Shortage of Affordable Units is Statewide – Every Region Needs AT LEAST 6,000 new affordable units
    - Virginia has a statewide shortage of at least 200,000 affordable rental units for extremely and very low income households. Only 42 out of every 100 extremely and very low income households can find affordable housing. The actual number of needed affordable rental units likely exceeds 200,000 because this figure is based on data from several years ago and assumptions about the most affordable units that can be created through programs like the federal Low Income Housing Tax Credit pro-gram (LIHTC) (JLARC Report: PDF Page 38)

FIGURE 2-8
Majority of affordable rental units are needed in Urban Crescent



SOURCE: JLARC analysis of American Community Survey, 5 year data, 2015–2019.
NOTE: All figures are rounded to the nearest 100. Figures may not add because of rounding.

- Median Home Sales Prices Have Risen Significantly between 2016-2021, 2020-2021

TABLE 2-4
Median home sales prices increased substantially, and especially rapidly in the past year

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

Metropolitan Washington Council of Governments – The Future of Housing in Greater Washington

Report can be found here: https://www.mwcog.org/documents/2019/09/10/the-future-of-housing-in-greater-washington/

The Metropolitan Washington Council of Governments (MWCOG) is an independent, nonprofit association, with a membership of 300 elected officials from 24 local governments, the Maryland and Virginia state legislatures, and U.S. Congress.

Key Findings:

- Continued growth and an increased demand to live here, "…the region now finds itself in a challenging situation. There is an imbalance between the number of jobs and the amount of housing available to the workforce. This gap is expected to widen without intervention; the region is forecast to add approximately 413,000 new jobs to its employment base between 2020 and 2030, but only approximately 245,000 new housing units over the same period."
- The Metropolitan Washington Council of Governments analysis "…showed the region needs, between 2020 and 2030, more than 75,000 additional households than what is currently anticipated (245,000 households). If the timeframe is stretched from 2020 to 2045, more than 100,000 additional households will be needed beyond the new households anticipated."
- "At least 75% of new housing should be affordable to low-and middle-income households."

Virginia Housing Policy Advisory Council – Addressing the Impact of Housing for Virginia's Economy (November 2017)

Report can be found here:
https://www.vchr.vt.edu/virginiahousingeconomiclinkages#:~:text=In%20October%202014%2C%20Governor%20McAuliffe,Council%20(HPAC)%20was%20thus%20established

Background:
In October 2014, Governor McAuliffe issued Executive Order (EO) 32, "Advancing Virginia's Housing Policy," to "identify and implement actions to enable quality, affordable housing, which will strengthen families and communities and foster economic growth." The Housing Policy Advisory Council (HPAC) was thus established under the leadership of the Secretary of Commerce and Trade to help guide the development and implementation of Virginia's housing policy.

A key directive of EO 32 was identifying the links between housing and economic and community development. To this end, the HPAC commissioned a study from a consortium of researchers at Virginia Tech, George Mason University, The College of William and Mary, and Virginia Commonwealth University, with the premise that successful housing policy must be based on independent analytic findings and best practices. The collaborative research of the four universities provides key information on the Commonwealth housing sector, focusing on the economic impact of housing, future scenarios impacting housing needs, and links between housing and other key policy sectors.

This report summarizes the research conducted by the four universities and the implications for Virginia's housing policy development. The report is designed to assist stakeholders and policymakers think more creatively and collaborate more intensely at the state, regional, and local levels as Virginia strives to build on the successes of the past and meet the pressing housing challenges facing the commonwealth. The entirety of the research is included in nine papers presented here.

Key Findings:

1. Virginia has a shortage of housing affordable to a substantial share of households. All regions of the state are experiencing significant shortages of affordable housing, as evidenced by the large share of households experiencing housing cost burdens across urban, suburban, and rural areas. Statewide, one in three households is cost burdened, spending more than 30 percent of their income for housing.

2. Failure to address affordable housing needs adequately has significantly affected key priorities of state policy, including economic and workforce development, transportation, education, and health.

3. Virginia needs to produce substantial new affordable housing to accommodate anticipated workforce growth. Virginia will need to house over 350,000 new workers in the next 10 years. The retirement of Baby Boomers and the entry of millennials into the workforce implies that a large share of new workers will be young with relatively low incomes and in need of affordable rental and homeownership units.

4. The homebuilding industry faces major challenges in meeting affordable housing needs. Nationally and in Virginia, the homebuilding industry faces challenges in affordable housing production for the following reasons:

   a. Developable residential site shortages and high land costs near major employment centers

   b. Construction labor supply constraints (especially in skilled trades)

   c. Limited means for reducing rapid increases in development costs

5. Regions with lower combined housing and transportation costs have experienced better economic performance.

6. Virginia can no longer rely on the federal government to address critical housing needs. Federal housing appropriations are severely constrained, and fiscal stress is expected to further reduce federal housing expenditures and increase the likelihood of devolution of housing assistance responsibilities to the states.

Appendix 2 of the report provides estimates of the amount, type (single-family and multi-family), tenure (owner and renter), price or rent, and location of housing that the Commonwealth of Virginia will need to accommodate new workers over the next decade. During this time Virginia will add 357,800 net new jobs, but to ensure that this employment growth can occur, a sufficient supply of housing must be available for these new workers—in the right locations, of the right types, and at affordable prices and rents. The analysis produced estimates for the Commonwealth and 11 Virginia regions.

Table 7. Net New Households by Home Price Affordable to Net New Households, Hampton Roads Region (2015 $s)

	2014-2024 Change		Share of Current Owner Households
	Households	Share of New Owner Households	
Less than $100,000	2,550	12.3%	9.3%
$100,000-199,999	7,250	35.2%	30.1%
$200,000-299,999	6,650	32.1%	29.2%
$300,000-399,999	2,850	13.8%	16.1%
$400,000+	1,350	6.6%	15.3%
Total	**20,600**	**100.0%**	**100.0%**

Numbers may not sum due to rounding.
Source: GMU Center for Regional Analysis

As shown in Table 8, the majority of new renters will earn over $25,000, and will be likely to find apartments that will suit their needs based on the current distribution of rents. A gap is likely to increase for homes renting for less than $625 per month, which would be affordable to households earning less than $25,000. Over a quarter (26.7 percent or 5,600 households) of the new renter households formed by the new workers

Table 3. Net New Households by Home Price Affordable to Net New Households, Charlottesville Region (2015 $s)

	2014-2024 Change		Share of Current Owner Households
	Households	Share of New Owner Households	
Less than $100,000	900	15.5%	9.7%
$100,000-199,999	1,800	31.7%	23.6%
$200,000-299,999	1,800	31.9%	23.6%
$300,000-399,999	850	15.0%	16.0%
$400,000+	350	5.9%	27.1%
Total	**5,650**	**100.0%**	**100.0%**

Numbers may not sum due to rounding.
Source: GMU Center for Regional Analysis

Similarly, some new renter households may have difficulty finding apartments at rents affordable to them. As shown in Table 4, about 1,200 new renter households will earn less than $25,000, and need rental units below $625 in order to spend less than 30 percent of their income on rent. An additional 1,500 renters will earn between $25,000 and $49,999, and can afford rents up to $1,249.

Table 11. Net New Households by Home Price Affordable to Net New Households, Lynchburg Region (2015 $s)

	2014-2024 Change		Share of Current Owner Households
	Households	Share of New Owner Households	
Less than $100,000	950	41.5%	25.5%
$100,000-199,999	650	28.0%	39.0%
$200,000-299,999	500	22.3%	19.9%
$300,000-399,999	150	6.4%	6.8%
$400,000+	50	1.9%	8.8%
Total	**2,300**	**100.0%**	**100.0%**

Numbers may not sum due to rounding.
Source: GMU Center for Regional Analysis

Likewise, the vast majority of new renter households will earn less than $25,000 (Table 12). These 1,150 new renter households will be able to afford rents under $625, and may have difficulty finding units. Currently, about 7,800 households rent for less than $625, and the nearly 15 percent increase in demand for this product may be difficult to meet through new construction.

Table 19. Net New Households by Home Price Affordable to Net New Households, Richmond Region (2015 $s)

	2014-2024 Change		Share of Current Owner Households
	Households	Share of New Owner Households	
Less than $100,000	2,150	9.0%	10.6%
$100,000-199,999	8,850	37.1%	35.7%
$200,000-299,999	6,700	28.1%	27.3%
$300,000-399,999	4,600	19.4%	13.4%
$400,000+	1,550	6.4%	13.0%
Total	**23,800**	**100.0%**	**100.0%**

Numbers may not sum due to rounding.
Source: GMU Center for Regional Analysis

As shown in Table 20, the new renter households will have more difficulty finding housing that is affordable to them. A quarter of new renters will be able to afford a maximum of $625 in rent, but only 12.2 percent of current units rent in that range. Similar to other markets, new product in this price range may be difficult to build, forcing many of the new households to pay more than 30 percent of their income on rent.

National Low Income Housing Coalition – Out of Reach Report (2021)

The National Low Income Housing Coalition's Out of Reach report documents the significant gap between renters' wages and the cost of rental housing across the United States. The report's central statistic, the Housing Wage, is an estimate of the hourly wage a full-time worker must earn to afford a modest rental home at HUD's fair market rent (FMR) without spending more than 30% of his or her income on housing costs, the accepted standard of affordability. The FMR is an estimate of what a family moving today can expect to pay for a modestly priced rental home in a given area.

Virginia Report Card can be found here:
https://reports.nlihc.org/sites/default/files/oor/files/reports/state/va-2021-oor.pdf

In Virginia, the Fair Market Rent (FMR) for a two-bedroom apartment is $1,269. In order to afford this level of rent and utilities — without paying more than 30% of income on housing — a household must earn $4,231 monthly or $50,767 annually. Assuming a 40-hour work week, 52 weeks per year, this level of income translates into an hourly Housing Wage of $24.41 per hour.

That translates into:

- 103 work hours per week at minimum wage to afford a two-bedroom rental home (at FMR)
- 88 work hours per week at minimum wage to afford a one-bedroom rental home (at FMR)
- 2.6 full time jobs at minimum wage to afford a two-bedroom rental home (at FMR)
- 2.2 full-time jobs at minimum wage to afford a one-bedroom rental home (at FMR)

National Association of Home Builders – "Priced Out" Report (2022)

This article presents the NAHB's "priced out estimates" for 2022, showing how higher prices and interest rates affect housing affordability. The 2022 US estimates indicate that a $1,000 increase in the median new home price ($412,5051) would price 117,932 households out of the market. As a benchmark, 87.5 million households (roughly 69 percent of all U.S. households) are not able to afford a new median priced new home. A $1,000 home price increase would make 117,932 more households disqualify for the new home mortgage. Home prices surged during the pandemic, creating affordability challenges, particularly for first-time buyers.

Other NAHB estimates in this paper show that for 2022, 25 basis points added to the mortgage rate at 30-year fixed rate of 3.5% would price out around 1.1 million households. In addition to the national numbers, NAHB once again is providing priced out estimates for individual states and more than 300 metropolitan areas. Other Key Findings:

- 87 million households in the US (and 1.7 million households in Virginia) are not able to afford a new median priced new home in 2022
- 36 Million Households Can't Afford a $150,000 Home:
    - Using the same standard underwriting criterion as the priced-out estimates to determine affordability (that the sum of mortgage payments, property taxes, home owners and private mortgage insurance premiums should be no more than 28% of the household income), the minimum income required to purchase a $150,000 home is $36,074. In 2022, about 36 million U.S. households are estimated to have incomes at or below that threshold. Another 24.4 million can only afford a home priced between $150,000 and $250,000 (the second step on the pyramid). Each step represents a maximum affordable price range for fewer and fewer households.
- In Virginia, a $1,000 increase in the median home price would price over 3,800 households out of the market

Report can be found here: https://www.nahb.org/-/media/05E9E223D0514B56B56F798CAA9EBB34.ashx?_ga=2.213243421.805995588.1647882212-336051620.1620423394

Richmond Region Builder

Direct/Tangible costs:

1. Cost to install system within each unit – $2.55-$2.75/sq. feet
   a. 2,015 sq. feet townhome would be $5,125.50 to $5,541.25
2. Infrastructure cost – 6" dedicated waterline for fire sprinkler distribution – very dependent on density and efficiency of layout - $2,100/townhome minimum. We are fairly dense and efficiently configured. This number could easily double or worse depending on the site constraints.

Intangible costs – these items add cost, but difficult to determine specific dollar amount.

1. Sitework prolonged: Fire line and domestic water line are not installed in the same trench. Increased exposure to weather, damage etc. due to added installation of materials and installation means and methods.
2. Vertical construction prolonged: Adds an additional trade to the construction process, adds firestopping complexity, insulation complexity and increases the number of inspections required to obtain a certificate of occupancy.
3. If static pressure of surrounding waterlines is insufficient booster pumps will be required to maintain minimum pressures on the upper levels of the home. Booster pump requires the construction of a heated, weather proof enclosure, power supply, and meter; **adding a minimum cost $20,000 if required.** This has happened in several of our projects in the Richmond Region.
4. Damage to system during construction creates catastrophic losses, usually passed on to insurance, raising premiums which then get passed on to future purchasers. This has also occurred at several of our properties.
5. Damages/failures after occupancy, creates catastrophic losses to homeowner and potentially neighboring homes and personal property. This has also happened at several properties.

Additional Notes:

- I've included sprinklers in several of our projects in the area – and can say that it certainly adds cost to the units – which is fine for us/the builder – but it does have the effect of shifting the price point of the units up, which means a different set a buyers are moving in. Units that may have been in line with "market rate" become above-market rate – and in some cases, they become "luxury units".
- We have noticed that several potential buyers have been uncomfortable about moving into a unit that has sprinklers in it – these have typically been consumers that have done some research and found stories about sprinklers going off when there isn't a fire, etc; in some of the larger townhome units, we've had some people concerned about their kids and their friends throwing toys at the sprinkler heads. The other frequent question that we get is if a homeowner has the ability to turn off the sprinkler after its been activated. We try to educate the potential buyer but are not always successful.
- Backflow Testing – we get questions about whether localities require annual inspection and if so, how expensive it is
- Longevity of the equipment – Most people live in their townhome for maybe 5-7 years; some go longer. But we have received questions about how long the infrastructure lasts and whether it will need to be replaced or updated after 5 years or so.

Stand Alone System - Public Water Supply

Item	Cost	Notes
Additional tap fees	$ 5,600.00	Cost of permit and tap of 1" non-metered water supply - per TOB Public Works Dept.
Exterior ditching and water pipe	$ 1,450.00	Secondary waterline install to the dwelling - established cost of water line install
Additional backflow preventer	$ 500.00	Backflow preventer and shutoff for sprinkler supply line
Sprinkler System Rough-In	$ 10,000.00	Piping, pressure testing, sprinkler heads, etc. - estimation by Fire Protection Services
Water flow alarm	$ 400.00	Reporting alarm system triggred by water flow - average from market research
Additional attic frost protection	$ 1,200.00	Water line encapsulation and crush protection in freezing area
Drain for water supply	$ 200.00	Cost for hub drain at point of supply
	$ 19,350.00	

Multi-Purpose System - Public Water Supply

Item	Cost	Notes
Additional tap fees	$ 6,960.00	Cost 1" water supply minus cost of standard 5/8" water meter - per TOB Public Works Dept.
Larger backflow preventer	$ 300.00	2" Backflow preventer and shutoff for multi-purpose system
Sprinkler System Rough-In	$ 10,000.00	Piping, pressure testing, sprinkler heads, etc.
Water flow alarm	$ 400.00	Reporting alarm system triggred by water flow
Additional attic frost protection	$ 1,200.00	Water line encapsulation and crush protection in freezing area
Drain for water supply	$ 200.00	Cost for hub drain at point of supply
	$ 19,060.00	

Private Water Supply - Costs are similar for both installation types

Item	Cost	Notes
Underground water storage	$ 4,200.00	Cost of cistern storage tank (1200 gallons), pump, and installation
Sprinkler System Rough-In	$ 10,000.00	Piping, pressure testing, sprinkler heads, etc.
Water flow alarm	$ 400.00	Reporting alarm system triggred by water flow
Additional attic frost protection	$ 1,200.00	Water line encapsulation and crush protection in freezing area
Back up power supply	$ 6,000.00	Power to pump
Drain for water supply	$ 200.00	Cost for hub drain at point of supply
	$ 22,000.00	

Home Fire Sprinkler®
COALITION
Protect What You Value Most™

HFSC Fact Sheet

Formed in 1996, HFSC is a 501(c)(3) charitable organization and the leading resource for independent, noncommercial information about home fire sprinklers, their installation and operation, and their proven protection of people, pets and property. HFSC strives to improve and increase awareness of home fire dangers and the life safety benefits of sprinklers for residents and responding firefighters. HFSC creates original and effective educational content and advocacy resources and offers them at no cost. HFSC's BUILT FOR LIFE FIRE DEPARTMENT program (BFLFD) is a free resource that supports fire service public sprinkler education as a method to achieve local Community Risk Reduction goals. More than 3,200 BFLFD members routinely demonstrate how access to the right information and tools drives more and better home fire sprinkler education.

Home Fire Risk in One- and Two-Family Homes

Six people die in home fires every day. According to the National Fire Protection Association (NFPA) Fire Loss in the U.S. During 2020, home fires caused:

- 2,230 civilian fire deaths, 85% of all residential fire deaths.
- 8,600 injuries.
- $6.8 billion in direct property damage.

Today's one- and two-family homes are dangerous for residents and first responders (UL/NIST), burning faster and failing quicker (even collapsing). A home fire can become deadly in as little as two minutes. Homes burn faster due to modern home furnishings, more open spaces and unprotected lightweight wood construction.

Home Fire Mitigation

Fire sprinkler technology has been protecting a wide range of structures for more than a century, but their use has been slow to catch on in homes. The NFPA found that sprinklers were present in only 7% of 2021 home fires. Only California, Maryland and Washington, D.C. require statewide installation of sprinklers in new-home construction.

Broader installation of home fire sprinklers would save thousands of lives (USFA). Installing home fire sprinklers uniquely protects residents, property and the firefighters who respond to fires in these structures. According to the NFPA, the 2021 civilian fire death rate was 89% lower in structures with installed fire sprinklers. The rate of firefighter injuries was 60% lower in fires with sprinklers than in fires without sprinklers.

Home Fire Activation
If a fire occurs, the sprinkler closest to it activates automatically, in response to the high heat from a fire. That controls (often extinguishes) the flames, reduces the spread of toxic and damaging smoke, and provides time for occupants to escape. When sprinklers are present, fire is kept to the room of origin 96% of the time (NFPA). In most home fires, only one or two sprinklers will control the blaze. In fires in unsprinklered homes, the toxic smoke spreads widely and more area is exposed to heat, smoke and fire. This requires more water to be used for suppression with powerful fire department hoses. This greatly increases water and fire damages to the structure and contents.

First Responders
Installing home fire sprinklers helps communities in many ways, including protecting first responders from fire and exposure hazards. Today's home fires are dangerous for firefighters as well as occupants. Firefighters are 11 times more likely to be injured fighting structure fires; 87% of their injuries occur there (USFA 2019). The risk is not limited to fire exposure. Firefighters today face a 9% increase in cancer diagnoses and a 14% increase in cancer-related deaths, compared to the general population in the U.S. (National Institute for Occupational Safety and Health 2017)

Environment
Home fire sprinklers also protect property and the environment. In 2010, FM Global conducted a groundbreaking study of the environmental impact of fire sprinklers. Their research proved that sprinklers are green:

- Greenhouse gas emissions were cut by 97.8%
- Water usage was reduced between 50% and 91%
- Fewer persistent pollutants, such as heavy metals, were found in sprinkler wastewater versus fire hose water
- The high pH level and pollutant load of non-sprinkler wastewater are an environmental concern

In 2021, FM Global reaffirmed this important study, publishing *Environmental Impact of Residential Fires Review*, documenting that since 2010**:**

- 1.8 billion lbs. of greenhouse gases have been emitted into the atmosphere **due to the lack of home fire sprinklers**.
- **Installed home fire sprinklers would have reduced** greenhouse gas emissions by 97% to 54 million lbs.

Homebuyers

Today's homebuyers want smarter homes. In a recent national fire safety survey* of more than 2000 adults of all ages, 86% said fire safety was important as they look to buy a new home. After learning how home fire sprinklers work, 80 percent of millennials, the largest age group buying homes, said they would prefer to buy a home with fire sprinklers.

- HFSC Omnibus survey with Opinium, surveying a nationally representative sample of more than 2,000 US adults.

NFPA Reports:

US Experience with Sprinklers, Marty Ahrens October 2021: https://www.nfpa.org/News-and-Research/Data-research-and-tools/Suppression/US-Experience-with-Sprinklers

Fire Loss in the United States During 2020, Marty Ahrens and Ben Evarts September 2021: https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem/Fire-loss-in-the-United-States

US Experience with Sprinklers

Marty Ahrens
October 2021

KEY FINDINGS

Sprinklers in Reported Structure Fires: All Occupancies

From 2015 to 2019, local fire departments responded to an estimated average of 51,000 structure fires per year (10 percent) in which sprinklers were present. These fires caused an average of 36 civilian deaths (1 percent) and $1 billion in direct property damage (9 percent) annually.

Sprinklers reduce the impact of fires. Compared to reported fires in properties with no automatic extinguishing systems (AES), when sprinklers were present, the civilian fire death and injury rates per fire were 89 percent and 27 percent lower, respectively. The rate of firefighter injuries per fire was 60 percent lower.

Fire spread was confined to the object or room of origin in 95 percent of reported structure fires in which sprinkler systems were present compared to 71 percent in properties with no AES.

Sprinklers have proven to be reliable in reported structure fires considered large enough to activate them. From 2015 to 2019, sprinklers operated in 92 percent of such fires and were effective at controlling the fire in 96 percent of the incidents in which they operated. Overall, sprinkler systems operated and were effective in 88 percent of the fires considered large enough to activate them.

The most common reason that sprinklers failed to operate was the system being shut off at some point before the fire.

One sprinkler is usually enough to control a fire. In 77 percent of the structure fires where sprinklers operated, only one operated. In 97 percent, five or fewer operated. In 99 percent, 10 or fewer operated.

Sprinklers in Reported Home Fires

Sprinklers were present in an estimated average of 23,600 of the reported home[i] structure fires per year in 2015–2019, resulting in an average of 23 civilian deaths, 555 civilian injuries, and $194 million in direct property damage annually.

The 7 percent of reported home structure fires that occurred in properties with sprinklers accounted for 1 percent of home fire deaths, 5 percent of home fire injuries, and 3 percent of home property loss.

Sprinklers operated in 95 percent of the home fires in which the systems were present and the fires were considered large enough to activate them. They were effective at controlling the fire in 97 percent of the fires in which they operated. Taken together, sprinklers operated effectively in 92 percent of the fires large enough to trigger them.

In 89 percent of the home fires with operating sprinklers, only one operated. In 99.5 percent, five or fewer operated.

Sprinklers save lives and reduce injuries and property loss. From 2015 to 2019, the civilian death and injury rates per reported home fire were 88 and 28 percent lower, respectively, and average property loss per home fire was 62 percent lower in reported home fires in which sprinklers were present compared to fires in homes with no AES.

The rate of firefighter injuries per home fire in which sprinklers were present was 78 percent lower than in homes with no AES.

In reported home fires in which sprinklers were present, the fire was confined to the object or room of origin 97 percent of the time compared to 74 percent in homes with no AES.

[i] The term *home* includes one- and two-family homes, including manufactured housing and apartments or other multifamily homes.

INTRODUCTION

This report provides a statistical overview of sprinkler presence and performance in reported fires. This information is essential for understanding the prevalence, impact, reliability, and effectiveness of these systems and increasing their positive impact. Because the majority of fire deaths are caused by home fires, additional details are provided on sprinklers in fires in these properties.

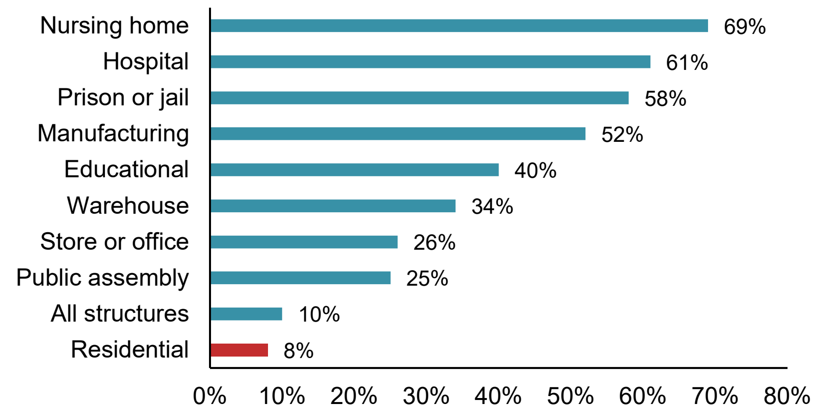
Estimates were derived from the details collected by the US Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey. Unless otherwise specified, estimates and rates in this report exclude fires in properties under construction. In addition, the casualty and loss estimates can be heavily influenced by the inclusion or exclusion of one unusually serious fire.

More detailed information is available in the supporting tables.

Sprinkler Presence and Type

Some type of sprinkler was present in an estimated average of 51,000 (10 percent) of the reported structure fires during 2015–2019. Sprinkler presence varied widely by occupancy. Figure 1 shows the percentage of fires by occupancy in which any type of sprinkler was present. Sprinklers were most likely to be found in institutional occupancies, such as nursing homes, hospitals, and prisons or jails. Although the majority of the structure fires and associated civilian fire deaths, injuries, and direct property damage occurred in residential properties, particularly homes, only 8 percent of the reported residential fires occurred in properties with sprinklers. High-rise buildings are more tightly regulated and much more likely to have sprinklers than shorter structures.[1]

Figure 1. Presence of sprinklers in US structure fires by occupancy: 2015–2019



Some properties have both sprinkler and non-sprinkler AES. This is particularly likely in commercial kitchens. In such cases, only the AES type in the fire area would be recorded. This could result in underestimates of the presence of sprinklers in some occupancies.

Table A summarizes information about the various types of automatic extinguishing systems (AES) present in all the reported structure fires *except those in buildings under construction*. Figure 2 shows that wet pipe systems were in use at almost nine out of every 10 reported fires in which sprinklers were present.

Figure 2. Types of sprinklers present at US structure fires: 2015–2019

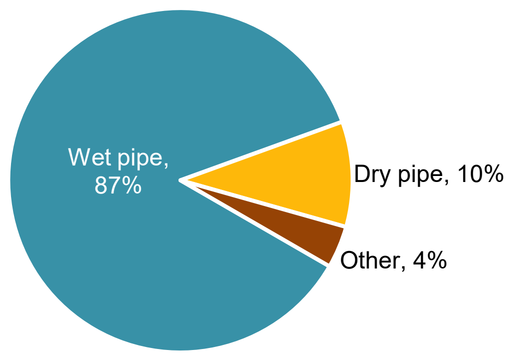
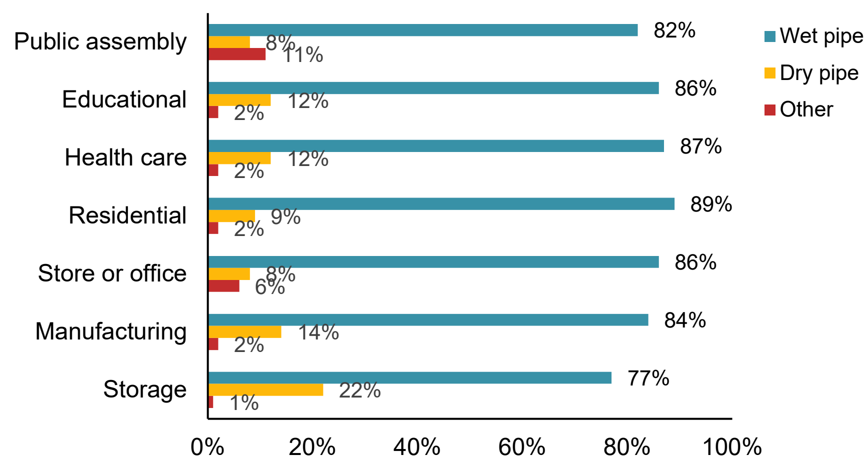


Table A. Summary of AES presence and type in reported structure fires: 2015–2019 annual averages

AES Presence and Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
AES present	**61,100**	**(13%)**	**37**	**(1%)**	**1,130**	**(9%)**	**$1,086**	**(10%)**
Sprinkler system present	51,000	(10%)	36	(1%)	1,020	(8%)	$1,008	(9%)
Wet pipe sprinkler system	*44,200*	*(9%)*	*33*	*(1%)*	*919*	*(7%)*	*$908*	*(9%)*
Dry pipe sprinkler system	*5,000*	*(1%)*	*2*	*(0%)*	*87*	*(1%)*	*$88*	*(1%)*
Other type of sprinkler system	*1,800*	*(0%)*	*1*	*(0%)*	*14*	*(0%)*	*$12*	*(0%)*
Non-sprinkler AES present	10,100	(2%)	1	(0%)	111	(1%)	$78	(1%)
Partial AES system of any type present	**2,500**	**(1%)**	**6**	**(0%)**	**54**	**(0%)**	**$109**	**(1%)**
AES of any type not in fire area and did not operate	**1,700**	**(0%)**	**2**	**(0%)**	**55**	**(0%)**	**$56**	**(1%)**
No AES present	**423,200**	**(87%)**	**2,816**	**(98%)**	**11,609**	**(90%)**	**$9,387**	**(88%)**
Total	**488,500**	**(100%)**	**2,862**	**(100%)**	**12,848**	**(100%)**	**$10,637**	**(100%)**

Figure 3 shows that dry pipe sprinkler systems were more common in storage occupancies. Table 2 in the supporting tables shows that other types of sprinkler systems were seen most frequently in eating and drinking establishments and grocery or convenience stores. It is possible that some of these other types were miscodes of systems designed specifically for cooking equipment.

Figure 3. Sprinkler system type by occupancy: 2015–2019



Fires in Properties with Sprinklers vs. with No AES

Figure 4 shows that the death rate per 1,000 reported fires was 89 percent lower in properties with sprinklers than in properties with no AES. These rates are based strictly on the reported presence or absence of this equipment; whether or not the system operated was not considered. Civilian deaths in sprinklered properties are discussed in greater detail later in this report.

Figure 4. Civilian death rates per 1,000 reported fires in properties with sprinklers and with no AES 2015–2019

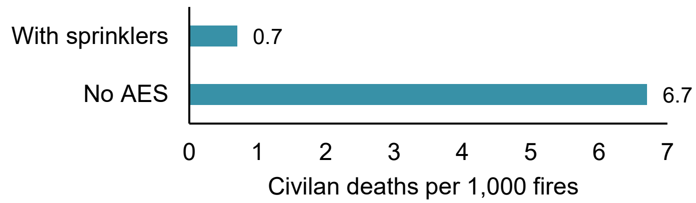


Figure 5 shows that the civilian injury rate per 1,000 reported fires was 27 percent lower in properties with sprinklers than in properties with no AES. Many of the injuries occurred in fires that were too small to activate the sprinklers. In others, someone was injured while trying to fight the fire in the initial moments before the sprinklers operated.

Figure 5. Civilian injury rates per 1,000 reported fires in properties with sprinklers vs. with no AES: 2015–2019

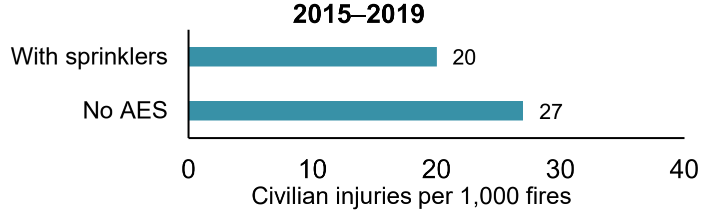
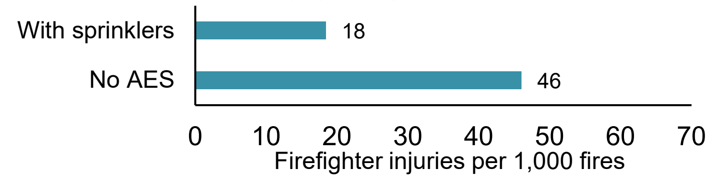


Figure 6 shows that the rate of firefighter injuries per 1,000 fires was 60 percent lower in structure fires with sprinklers compared to fires in properties without AES protection. Sprinklers begin to control a fire when they activate, making the situation less dangerous for responding firefighters.

Figure 6. Firefighter injury rates per 1,000 fires in properties with sprinklers vs. with no AES: 2015–2019

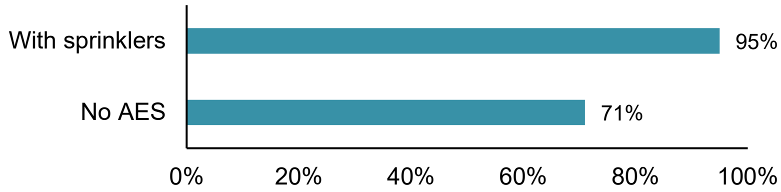


Reductions in the average dollar loss per fire when sprinklers were present varied greatly by occupancy. Table 4 in the supporting tables shows that compared to properties with no AES, the average overall loss was 11 percent lower in fires where sprinklers were present. The percentage reductions were highest in health care occupancies (73 percent), stores or offices (70 percent), public assembly occupancies (63 percent), and homes (62 percent).

The average loss per fire was higher in sprinklered warehouses and manufacturing properties than in those with no AES. Warehouse contents or expensive machinery may be rendered worthless by smoke alone. A very small fire can damage expensive manufacturing equipment. In the rare cases in which a sprinkler system fails to operate or operates ineffectively, the monetary loss can be exceedingly high, increasing the average loss for the occupancy type. For example, the average loss in sprinklered manufacturing properties was inflated by a $1.1 billion loss caused by a November 2019 Texas petrochemical plant explosion and the resulting multi-day fire and additional explosions.[2] The plant's wet pipe sprinkler system did not operate.

Sprinklers limit fire spread. Figure 7 shows a 24 percent increase in fires that were confined to the object or room of origin when sprinklers were present compared to fires with no AES.

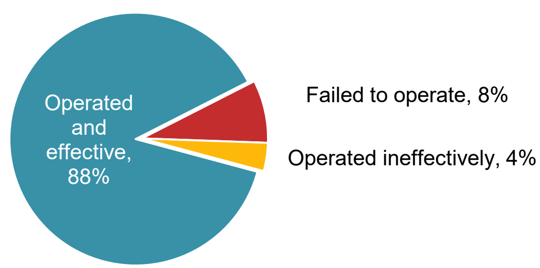
Figure 7. Percent of fires confined to object or room of origin in properties with sprinklers vs. with no AES: 2015–2019



Sprinkler Operation, Effectiveness, and Issues

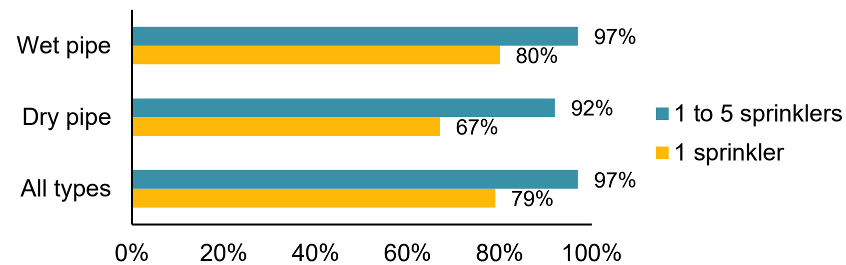
From 2015 to 2019, sprinklers operated in 92 percent of the fires in which they were present and the fire was considered large enough to activate them.[i] They were effective at controlling the fire in 96 percent of the fires in which they operated. Taken together, sprinklers operated effectively in 88 percent of the fires large enough to trigger them. (See Figure 8.) Details on sprinkler operation and effectiveness in different occupancies and for wet and dry pipe systems are provided in Table 6 of the supporting tables.

Figure 8. Sprinkler operation and effectiveness: 2015–2019



Sprinkler systems are designed to operate only where fire is present. Just one sprinkler activated in more than three-quarters (77 percent) of the fires in which sprinklers of any type operated and four out of five (80 percent) fires with operating wet pipe sprinkler systems. Figure 9 shows that in 97 percent of the fires in which sprinklers operated, five or fewer were activated. This was true for 92 percent of the dry pipe sprinkler systems.[ii] In 99 percent of the fires with operating sprinklers of any type, 10 or fewer sprinklers operated.

Figure 9. When sprinklers operated, percentage of fires in which one or one to five sprinklers operated by type of sprinkler system: 2015–2019



The following incident descriptions illustrate the effectiveness of sprinklers:

- Around 2:30 a.m., an alarm monitoring company alerted the local fire department to a system activation at a department store in a North Dakota mall. [3] Arriving firefighters initially saw no signs of fire or operating sprinklers. A store representative led them to a separate area where water was coming from under a closed office door. An electronic device left to charge overnight had overheated and started a small fire on the desk that spread to a chair. A single sprinkler extinguished the fire.

[i] These calculations exclude fires with confined structure fire incident types (NFIRS incident types 113–118). Among confined fires in which sprinklers were present, the fire was too small to activate the sprinklers 71 percent of the time, the sprinklers operated and were effective 14 percent of the time, and the sprinklers failed to operate 4 percent of the time. Since these fires are, by definition, confined, it is likely that a substantial share of the fires in which the sprinklers were said to fail, were, in fact, too small to cause the sprinkler to operate. The 41 percent of non-confined fires (NFIRS incident types 110–123, except for 113–118) that were too small to activate the sprinklers and the less than 1 percent of the non-confined structure fires in which sprinkler operation was unclassified were also excluded.
[ii] Fires with NFIRS confined fire incident types were included in these calculations.

- An intentional fire set along an exterior wall of a California nonprofit organization's storage facility spread inside.[4] The fire department was notified around 4:20 a.m. Two sprinklers controlled the inside fire and firefighters completed extinguishment. In the report, the investigator noted that the building would likely have been a total loss without the working sprinklers.
- A sprinkler at an Illinois fitness center controlled a dryer fire.[5] Responding firefighters used a pump can to extinguish the remaining fire inside the dryer. The maintenance worker who discovered the fire had attempted to put the fire out with an extinguisher. He was transported to the hospital for treatment of moderate smoke inhalation.

In 98 percent of the fires in which one sprinkler operated, it was effective. Figure 10 shows that sprinklers were somewhat less likely to have operated effectively when more sprinklers operated.

Figure 10. Percentage of fires in which sprinklers were effective by number that operated: 2015–2019

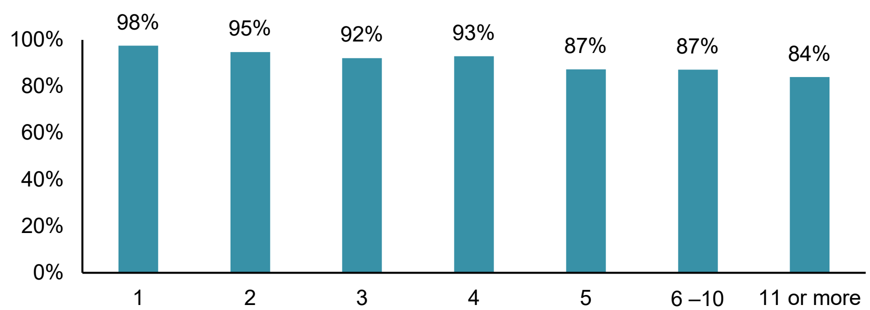


Figure 11 shows that in nearly three out of every five incidents in which sprinklers failed to operate, the system had been shut off.

- An October 2018 West Virginia warehouse fire in which the sprinklers had been shut off caused $10 million in property damage.[6] The warehouse contained plastic goods and recycled plastic.

Figure 11. Reasons for sprinkler failure: 2015–2019

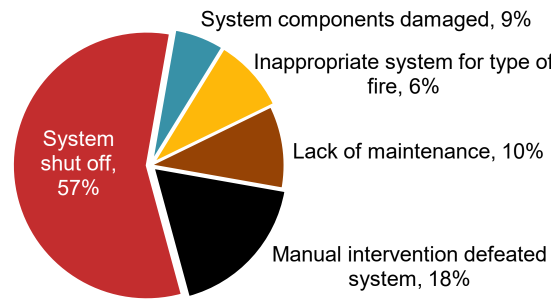
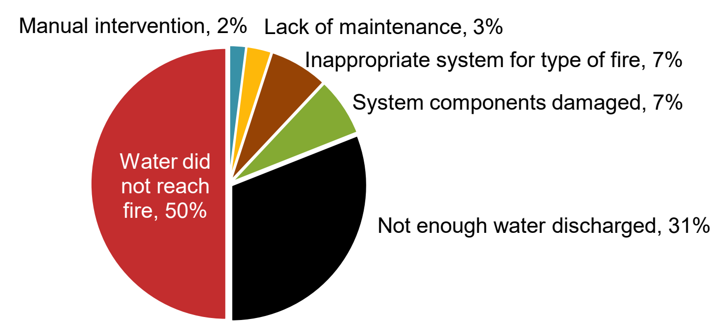


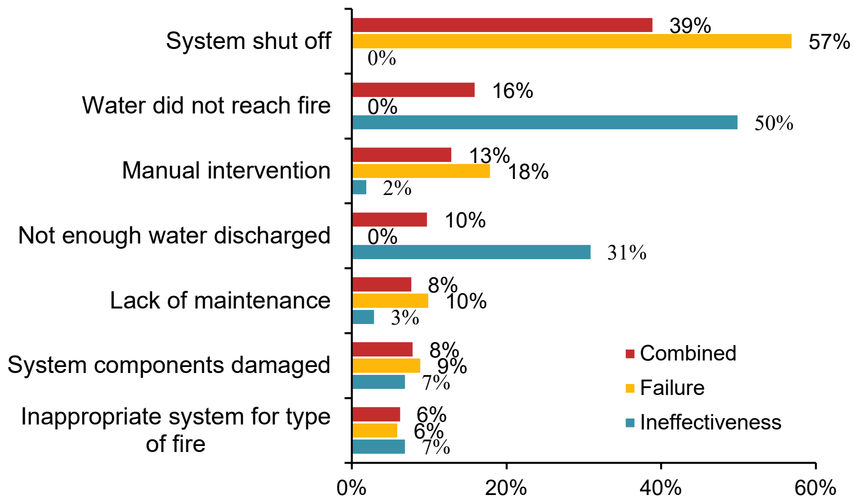
Figure 12 shows that in eight out of every 10 fires in which sprinkler systems operated ineffectively, the problem involved getting water to the fire. In half of the fires in which sprinklers were ineffective, the water did not reach the fire. In nearly one-third of the fires, not enough water was discharged.

Figure 12. Reasons for sprinkler ineffectiveness: 2015–2019



In 2015–2019, reported sprinkler failures (750 per year) were more than twice as common as reported fires in which sprinklers were ineffective (340 per year). Figure 13 shows the breakdown of each cause of failure or ineffectiveness individually and combined. For example, manual intervention was blamed for 13 percent of the total situations in which sprinklers were either ineffective or failed to operate at all. As noted earlier, manual intervention was blamed for 18 percent of the fires in which sprinklers failed to operate and 2 percent of the fires in which they were ineffective.

Figure 13. Reasons for combined sprinkler failure and ineffectiveness: 2015–2019



The categories in Figures 11–13 are based on NFIRS and sometimes overlap.

Long, Wu, and Blum explored the root causes of unsatisfactory sprinkler performance, dividing them into the following broad categories:[7]

- "Failure to maintain operational status of the system." Regular inspection, testing, and maintenance are essential to ensure sprinkler operability. Water being shut off before or during a fire is included in this category.
- "Failure to assure adequacy of the system and/or for the complete coverage of current hazard." Problems with the initial plans, installation errors, and changes to the structure or its contents could be captured here.
- "Defects affecting, but not involving, the sprinkler system." This includes water supply problems and building construction issues.
- "Inadequate performance by the sprinkler itself." Sprinkler systems have numerous components. A failure of one component can impact the larger system.
- All other situations, including fires that started on the structure's exterior, delays in notifying the fire department, etc.

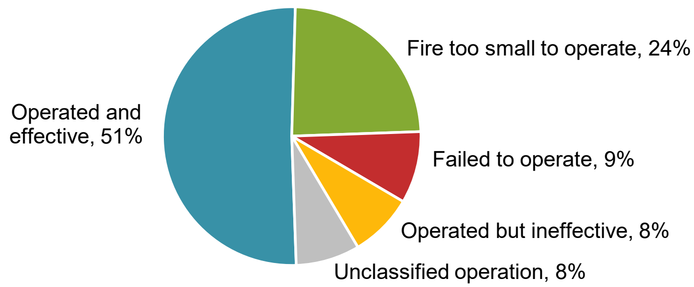
Civilian Deaths in Sprinklered Properties

While sprinklers were present in 10 percent of all the properties in which fires occurred in 2015–2019, only 1 percent of all the fire deaths occurred in these properties. Fires in sprinklered properties killed an average of 36 people per year in 2015–2019. Fires in properties that were not under construction and had no automatic extinguishing systems caused an average of 2,816 civilian deaths per year.

In fires that were large enough to activate sprinklers, 21, or 87 percent, of the fatalities per year resulted from fires in which the sprinklers operated. Of those who died in fires with operating sprinklers, 18, or 86 percent, died in fires in which the sprinklers operated effectively. Taken together, 18, or three-quarters (75 percent), of the 24 victims of fires large enough to activate sprinklers per year were fatally injured in fires in which the sprinklers operated and were effective.

Figure 14 shows that nine, or one-quarter, of the 36 victims per year of fires in sprinklered properties were fatally injured in fires that never became large enough to activate the sprinklers. In other cases, the sprinklers extinguished the fire. Victims in fires with sprinklers were typically fatally injured before the sprinklers activated. In both situations, the victims were usually intimate with the ignition. In some cases, the victim had been smoking in bed or while using medical oxygen. The victim's clothing may have caught fire while the victim was cooking or smoking.

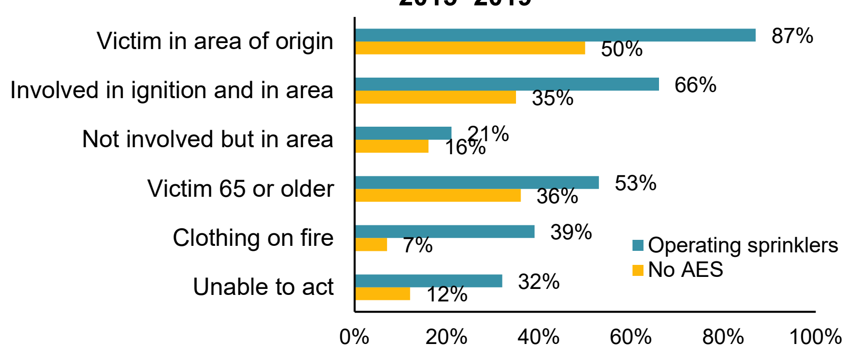
Figure 14. Civilian fire deaths by sprinkler performance: 2015–2019



- In 2015, a resident of a 7-story North Carolina apartment building was fatally injured when he lit a cigarette while using medical oxygen. The living room sprinkler extinguished his burning clothes and chair.[8]

Compared to victims of fires in which no AES was present, people who died in fires in which sprinklers operated were more likely to have been in the area of origin, been at least 65 or older, been wearing clothing that caught fire, or been unable to act, and even more likely to have been involved in the ignition and in the area. Figure 15 shows this contrast. Note that many of these differences are also evident among victims of fires with and without working smoke alarms.[9]

Figure 15. Victim characteristics in fires with operating sprinklers vs. with no AES: 2015–2019



There are limits to even the best fire protection. When someone is directly involved in the ignition of a fire or their clothing is burning, they may be fatally injured before the sprinkler system operates. If someone is physically incapable of getting themself to safety, even a fire controlled by sprinklers can still cause harm.

Three-quarters (76 percent) of the fire deaths in sprinklered properties resulted from fires that were confined to the object or room of origin. This was true for only 18 percent of the deaths from fires in which no AES was present. When present, sprinklers keep the fire from spreading and threatening those in other areas. A fire that is confined to the room of origin is much less dangerous to those outside the room.

Multiple death fires are rare when sprinklers are present. However, as mentioned earlier, exterior fires can challenge sprinkler protection. In addition, explosions can damage a sprinkler system, rendering it ineffective or non-functional.

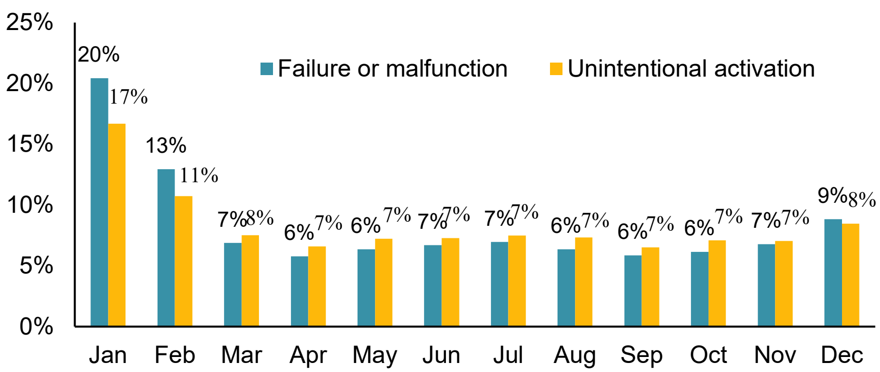
Two fires in 2015–2019 in which sprinklers were present resulted in four deaths each.

- Around 2:00 a.m. one morning in March 2017, a fire department was alerted to a fire at a Maryland assisted living facility of unprotected wood-frame construction.[10] One employee and six adult residents were in the structure at the time of the fire. All the residents required assistance to evacuate. A discarded cigarette had ignited leaves and grass outside the building. The flames spread to the exterior wall, porch, and into the confined ceiling space. Both detection and activation of the residential wet pipe sprinkler system were delayed because the fire was in the concealed space. Once activated, the sprinkler system controlled the fire. In addition to the four fatalities, three civilians were also injured.
- Around 9:30 p.m. on a May 2019 evening, an Illinois fire department was notified of an explosion and fire at a silicone manufacturing plant.[11] The plant was operating at the time. The explosion damaged both the detection and sprinkler systems, so they did not operate.

Unwanted Activations

Fire departments responded to an estimated average of 26,000 sprinkler activations caused by a system failure or malfunction per year and 29,700 unintentional sprinkler activations per year in 2015–2019. According to the *NFIRS 5.0 Complete Reference Guide,*[12] false alarms due to sprinkler failures or malfunctions include "any failure of sprinkler equipment that leads to sprinkler activation with no fire present." This category "excludes unintentional operating caused by damage to the sprinkler system." Unintentional activations also include "testing the sprinkler system without fire department notification." The winter months of December, January, and February account for only one-quarter of the year yet Figure 16 shows that 42 percent of the sprinkler system failures or malfunctions occurred in these three months, as did 36 percent of the unintentional activations. This suggests that cold weather and frozen pipes played a role.

Figure 16. Unwanted sprinkler activations by type and month: 2015–2019



Not all activations result in water flow outside the system. For example, water may flow in the pipes of a dry pipe system. This could alert a monitoring company and trigger a fire department response.

In their 2012 article on investigating inadvertent fire sprinkler discharges,[13] Blum, Long, and Dillon referred to Russ Fleming's 2000 description of the six primary reasons for non-fire discharges from sprinklers: overheating, freezing, mechanical damage, corrosion, deliberate sabotage, and mechanical defects.

Overheating can be caused by nearby equipment that may have been added after a sprinkler system was installed. While overheating typically affects the sprinkler and not the piping, freezing can impact the pipes. Mechanical damage can occur when a sprinkler is bumped by something such as a ladder, forklift, or tossed objects. Deliberate sabotage includes vandalism and disabling sprinklers to increase fire damage. While rare, manufacturing defects can also occur.

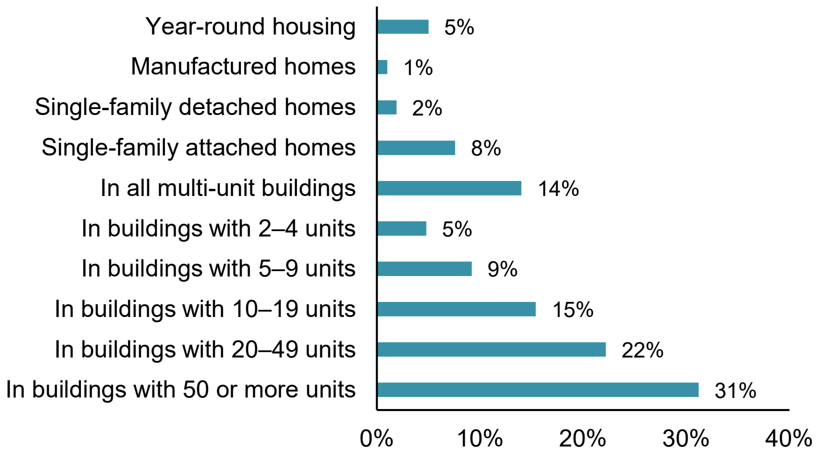
In a 2017 article, Huet, Martorano, and Ames described experiments involving intentional damage simulating random microscopic flaws to more than 100 glass bulb sprinklers. These were then exposed to a constant load in a test frame.[14] Forty-four of the sprinklers failed within 36 days, while the remaining 58 lasted more than two years. They concluded that unwanted activations due to damaged sprinkler bulbs tended to occur within days or weeks of the damage. Such damage, if undetected, could explain unwanted activations with no identifiable cause.

Sprinklers in Home Fires

Sprinkler Presence and Type

During 2015–2019, some type of fire sprinkler was present in an estimated average of 23,600 reported home structure fires (7 percent) per year. Properties under construction were excluded from these estimates. Table B summarizes information about automatic extinguishing systems (AES), including sprinklers, in all reported home structure fires except those under construction. According to the 2011 American Housing Survey, buildings with more housing units were more likely to have sprinklers. Figure 17 shows that 5 percent of housing units that are occupied year-round had sprinklers, ranging from a low of 1 percent in manufactured homes to a high of 31 percent in buildings with at least 50 units.[15]

Figure 17. Percentage of occupied units with sprinklers per the 2011 American Housing Survey



Source: American Housing Survey

Figure 18 shows that wet pipe sprinkler systems were present in nine out of every 10 reported home fires with sprinklers.

Figure 18. Types of sprinkler systems present at home structure fires: 2015–2019

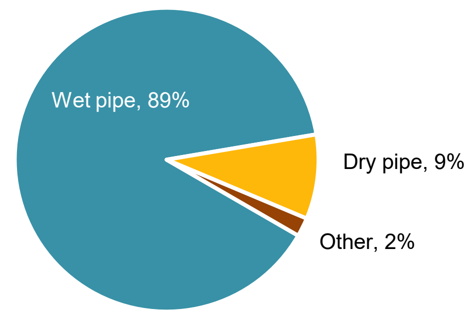


Table B. Summary of AES presence and type in reported home structure fires, excluding properties under construction: 2015–2019 annual averages

AES Presence and Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
AES present	**25,000**	**(7%)**	**24**	**(1%)**	**593**	**(5%)**	**$197**	**(3%)**
Sprinklers present	23,600	(7%)	23	(1%)	555	(5%)	$194	(3%)
Wet pipe sprinkler system	*21,000*	*(6%)*	*22*	*(1%)*	*477*	*(4%)*	*$185*	*(3%)*
Dry pipe sprinkler system	*2,100*	*(1%)*	*1*	*(0%)*	*69*	*(1%)*	*$8*	*(0%)*
Other type of sprinkler system	*500*	*(0%)*	*0*	*(0%)*	*9*	*(0%)*	*$1*	*(0%)*
Non-sprinkler AES present	1,400	(0%)	1	(0%)	38	(0%)	$3	(0%)
Partial system AES present	900	(0%)	5	(0%)	40	(0%)	$25	(0%)
AES not in fire area and did not operate	500	(0%)	0	(0%)	28	(0%)	$24	(0%)
None present	**318,500**	**(92%)**	**2,587**	**(99%)**	**10,408**	**(94%)**	**$6,907**	**(97%)**
Total	**344,900**	**(100%)**	**2,616**	**(100%)**	**11,036**	**(100%)**	**$7,153**	**(100%)**

Fires in Homes with Sprinklers vs. with No AES

Figure 19 shows that the civilian death rate per 1,000 reported fires was 88 percent lower in homes with sprinklers than in homes with no AES during 2015–2019. These rates are based only on the reported presence or absence of an AES; operation was not considered.

Figure 19. Civilian death rates per 1,000 fires in homes with sprinklers vs. with no AES: 2015–2019

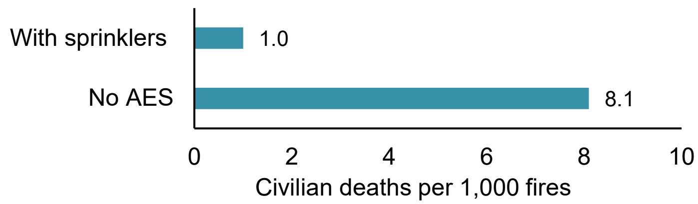


Figure 20 shows that the civilian injury rate per 1,000 reported fires was 28 percent lower in homes with sprinklers than in homes with no AES. In many cases, the injuries occurred in fires that were too small to activate the sprinkler system. In others, someone was injured while trying to fight the fire in the initial moments before the sprinklers operated. A 2012 Fire Protection Research Foundation study found that sprinkler presence was associated with a 53 percent reduction in the medical cost of civilian injuries per 100 home fires.[16]

Figure 20. Civilian injury rates per 1,000 fires in homes with sprinklers vs. with no AES: 2015–2019

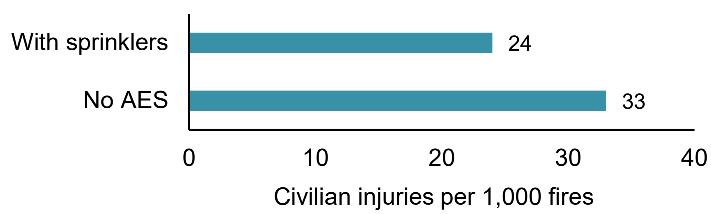
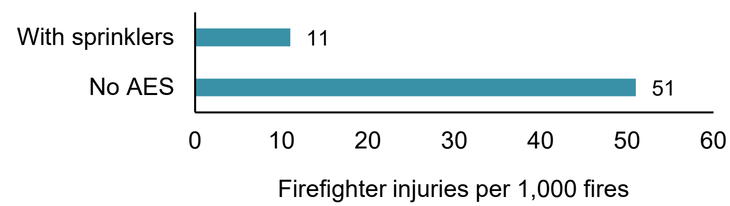


Figure 21 shows that the average firefighter fireground injury rate per 1,000 reported home fires was 78 percent lower when sprinklers were present than in fires with no AES.

Figure 21. Firefighter injury rates per 1,000 fires in homes with sprinklers vs. with no AES: 2015–2019



When sprinklers were present in reported home fires, the average property loss per fire was 62 percent lower than the average in homes with no AES. See Figure 22.

Figure 22. Average loss per fire in homes with sprinklers vs. with no AES: 2015–2019

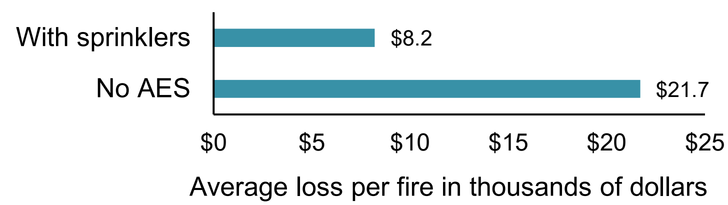
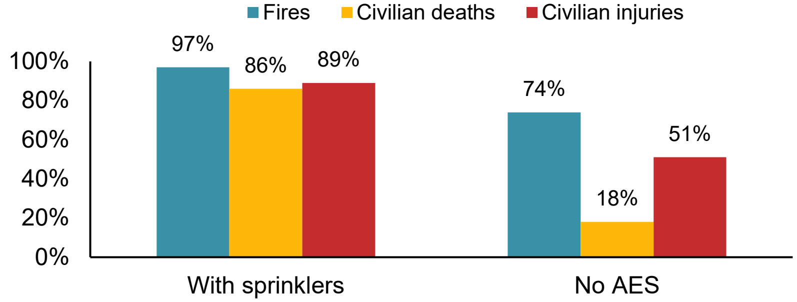


Figure 23 shows that when sprinklers were present, almost all of the fires were confined to the object or room of origin. The majority of civilian deaths and injuries resulting from fires in homes with sprinklers were caused by these fires. In home fires that lacked AES, only three-quarters of the fires were confined to the object or room of origin. Only one in five deaths and half of the injuries in home fires with no AES present resulted from such fires.

Figure 23. Percent of home fires, injuries, and casualties resulting from fires confined to object or room of origin: 2015–2019



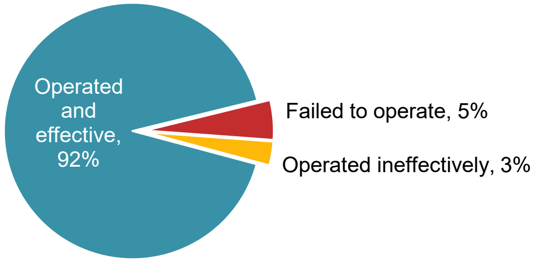
In rare cases, sprinklers may contain or even extinguish fires that cause fatal injuries. These injuries can occur *before* the fire's heat reaches a sprinkler. In some situations, the victim might be unable to move out of harm's way.

- An alarm monitoring company notified a fire department of a fire in a 12-story New York apartment building. By the time firefighters arrived, a wet pipe sprinkler system had operated and extinguished most of the fire in a third-floor apartment. A bed in the living room had been ignited by smoking materials. A male resident with a mobility impairment was severely burned and died at the hospital.[17]

Sprinkler Operation, Effectiveness, and Issues in Home Fires

Figure 24 shows that sprinklers operated in 95 percent of the home fires in which sprinklers were present and the fires were considered large enough to activate them.[i] They were effective at controlling the fire in 97 percent of the fires in which they operated. Taken together, sprinklers operated effectively in 92 percent of the fires large enough to trigger them.

Figure 24. Sprinkler operation and effectiveness in home fires: 2015–2019



Sprinklers protect occupants and property in many circumstances. Sometimes, no one is home or everyone has safely evacuated. Operating sprinklers can also protect a building and its occupants from incendiary fires. Fires that start on the exterior of a building can be particularly challenging, as they can enter into concealed spaces and spread before smoke alarms sound to alert occupants. Sprinkler protection for balconies can limit the damage from these fires. The following are several examples of such scenarios:

- One sprinkler operated to extinguish a grease fire that spread to the overhead cabinets in the kitchen of a second-floor Arizona apartment. The resident had gone outside while cooking and learned of the fire when an outdoor sprinkler alarm sounded. Another building resident called 911 to report the sprinkler activation and burning odor.[18]
- A dry pipe sprinkler system extinguished a fire in a second-floor unit in a three-story university apartment building in Colorado. A candle had been left burning unattended when the occupant left the unit. A

[i] These calculations exclude fires with confined structure fire incident types (NFIRS incident types 113–118). Among confined fires in which sprinklers were present, the fire was too small to activate the sprinklers 69 percent of the time, the sprinklers operated and were effective in 27 percent of total fires with sprinklers (and in 99 percent of the fires in which sprinklers operated), and the sprinklers failed to operate 3 percent of the time. Since these fires are, by definition, confined, it is likely that a substantial share of the fires in which the sprinklers were said to fail, were, in fact, too small to cause the sprinkler to operate. The 34 percent of non-confined fires (NFIRS incident types 110–123, except for 113–118) that were too small to activate the sprinklers and the 1 percent of non-confined structure fires in which sprinkler operation was unclassified were also excluded.

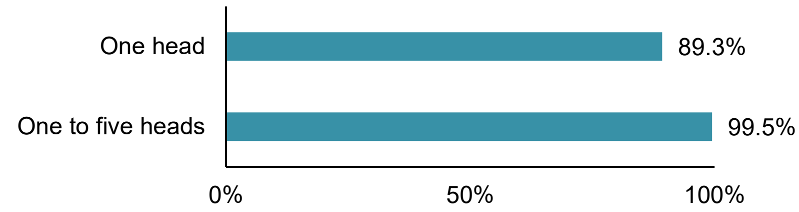
drape on an open window ignited when it was blown over the candle. The fire spread to the window blinds and papers on the desk before it was extinguished.[19]

- While firefighters were responding to a late afternoon fire alarm with smoke reported on the second floor of a four-story Oregon apartment building, they were informed that residents on the second and fourth floors had mobility impairments and would need help to evacuate. After they arrived, they found that the sprinkler system had extinguished an incendiary fire in a second-floor laundry room.[20]
- A 24-unit Texas apartment building was protected by a wet pipe sprinkler system installed under the provisions of NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*. Discarded smoking materials ignited a plastic container on a third-floor balcony. The fire spread to an outdoor couch and upward and sideways on the balcony until a sidewall sprinkler activated and contained the fire. Firefighters completed extinguishment when they arrived. The exterior fire did not activate smoke alarms inside the building.[21]

As in structure fires overall, when home sprinklers failed to operate, it was usually because the system had been shut off. This was true in a 2015 California single-family home fire that killed a young woman. The property's sprinkler system, installed to the requirements of NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, had been shut off at some point before the fire.[22]

Figure 25 shows that in nearly all the home fires in which operating sprinklers were present, five or fewer individual sprinklers operated.

Figure 25. Percent of home fires with operating sprinklers in which one or one to five operated: 2015–2019



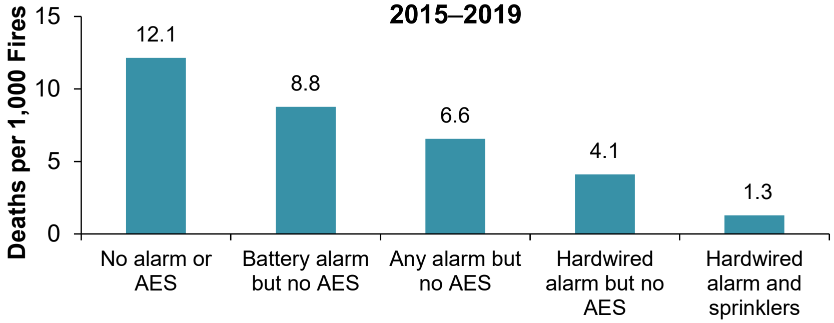
Impact of Smoke Alarm and Sprinkler Presence on Death Rates per 1,000 Home Fires

The lowest home fire death rate per 1,000 reported fires was found in homes with sprinkler systems and hardwired smoke alarms.[i] Figure 26 shows that compared to reported home fires (*including* properties under construction) in which no smoke alarms or AES was present, the death rate per 1,000 reported fires was:

- 28 percent lower when battery-powered smoke alarms were present, but AES protection was not
- 46 percent lower when smoke alarms with any power source were present but AES protection was not
- 66 percent lower when hardwired smoke alarms were present but AES protection was not
- 89 percent lower when sprinklers and hardwired smoke alarms were present

[i] In this analysis, the term *smoke alarm* also includes smoke detectors that are part of a system.

Figure 26. Average fire death rate per 1,000 reported home structure fires by presence of smoke alarms and AES: 2015–2019



Note that these rates are based on the *presence* of various types of fire protection; operation was not considered. Minor fires in homes with monitored smoke alarms are more likely to result in a fire department response than comparable fires in homes with unmonitored smoke alarms. Smoke alarms in monitored systems are generally hardwired.

Unwanted Activations

Fire departments responded to an estimated average of 4,700 non-fire activations of home fire sprinklers per year caused by a system failure or malfunction and 5,400 unintentional sprinkler activations per year in 2015–2019. According to the *NFIRS 5.0 Complete Reference Guide*[23], sprinkler failures or malfunctions include "any failure of sprinkler equipment that leads to sprinkler activation with no fire present." The category "excludes unintentional operating caused by damage to the sprinkler system," which should be considered unintentional activations. Unintentional activations include "testing the sprinkler system without fire department notification."

Forty-eight percent of the home sprinkler activations resulting from system failures or malfunctions and 38 percent of the unintentional home sprinkler activations occurred in the winter months of December, January, and February.

Conclusions and Further Reading

Sprinklers are a very reliable and effective part of fire protection. Their impact is most visible in the reduction of civilian fire deaths per 1,000 reported fires when sprinklers are present compared to fires without AES. Notable reductions can also be seen in the injury rates, in most occupancies, in the average loss per fire. Increasing the use of sprinklers can reduce loss of life and property damage caused by fire.

NFPA standards provide essential guidance on the installation, inspection, testing, maintenance, and integration of sprinklers with other systems, as well as for evaluating needs when an occupancy changes use or contents. See the following standards for more information:

- NFPA 13, *Standard for the Installation of Sprinkler Systems*
- NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*
- NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*
- NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. See NFPA 25 for minimum inspection, testing, and maintenance requirements for sprinkler systems.
- NFPA 4, *Standard for the Integrated Fire Protection and Life Safety Systems Testing*. See NFPA 4 for test protocols to ensure that the fire protection and life safety systems will function correctly together.
- NFPA 1, *Fire Code*. NFPA 1 includes evaluation requirements for assessing the adequacy of existing sprinkler systems if the use or contents of a space have changed.

Resources to help reduce the home fire death toll by increasing the number of new one- and two-family homes protected by sprinklers are available from the NFPA Fire Sprinkler Initiative.

Methodology

The statistics in this analysis are estimates derived from the US Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association (NFPA) annual survey of US fire departments. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates. Unless otherwise specified, properties under construction were excluded from the analysis.

The NFPA fire department experience survey provides estimates of the big picture. NFIRS is a voluntary system through which participating fire departments report detailed factors about the fires to which they respond.

To compensate for fires reported to local fire departments but not captured in NFIRS, scaling ratios are calculated and then applied to the NFIRS database using the formula below:

$$\frac{\text{NFPA's fire experience survey projections}}{\text{NFIRS totals}}$$

NFPA also allocates unknown data proportionally to compensate for fires for which information was undetermined or not reported.

Fires in which partial sprinkler systems were present and fires in which sprinklers were present but failed to operate because they were not in the fire area were excluded from the estimates of presence and operation. Fires with one of the six NFIRS confined fire incident types were included in estimates of sprinkler presence, fire spread, and sprinklers operating, but not of operation or effectiveness in general. Information on methodology is provided in more detail at the end of this report.

Confined structure fires in NFIRS include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires (NFIRS incident types 113–118). Losses are generally minimal in these fires, which, by definition, are assumed to have been limited to the object of origin. Although detailed data about detection is not required for these fires, it is sometimes available.

Raw NFIRS data for 2015–2019, excluding properties under construction, contained a total of 7,737 confined structure fires (1 percent of total confined fires) in which some type of AES was present and 34,919 confined structure fires (4 percent of total confined fires) in which none was present. AES presence was undetermined or left blank for 95 percent of the confined structure fires. A total of 4,355 confined fires with AES present indicated wet pipe, dry pipe, or other sprinklers were present. The AES type was undermined or not reported in 2,338 confined fires with AES present. Sprinkler operation when present was known in a total of 92 percent (3,793) of the confined fires in which sprinklers were present . Sprinkler operation for confined fires was used to calculate the number of sprinklers that operated in fires in which sprinklers operated but not for overall estimates of operation or effectiveness.

The raw NFIRS data for 2015–2019 contained a total of 53,859 non-confined structure fires (NFIRS incident type 110–123, excluding incident types 113–118) in which AES presence was known. A total of 103 civilian deaths; 2,137 civilian injuries; and $3.8 billion in direct property damage were associated with these fires. AES presence was known for 97 percent of the non-confined fires, 90 percent of the deaths, 95 percent of the injuries, and 99 percent of the direct property damage. The AES type was known in 67 percent of the non-confined fires, 80 percent of the deaths, 81 percent of the injuries, and 84 percent of the associated property loss when AES was present.

When sprinklers were present in non-confined structure fires, sprinkler operation was known for a five-year raw total of 27,151 fires associated with 57 deaths; 1,426 injuries; and $2.6 billion in direct property damage. When present, sprinkler operation was known for 84 percent of the non-confined fires, 72 percent of the deaths, 89 percent of the injuries, and 89 percent of the direct property damage. ("Operation of AES, other" was considered unknown.).

When AES was coded as present, but failed to operate, and the reason given was "fire not in the area protected," NFPA recoded the AES presence to

"Not in fire area; did not operate." These incidents and incidents coded to indicate the presence of partial systems were excluded from further analysis.

Property damage has not been adjusted for inflation. In most cases, fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Less rounding is used when the numbers are smaller.

For more information on the methodology used for this report see, *How NFPA's National Estimates Are Calculated for Home Structure Fires.*

Acknowledgments

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that makes this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the US Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

Thanks also to Ben Evarts for providing the estimates of unwanted activations.

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RESEARCH

US Experience with Sprinklers

Supporting Tables

October 2021

Marty Ahrens

US Experience with Sprinklers: Supporting Tables

The tables in this document are a companion to the report of the same name. The table topics are listed below.

Most of the national estimates of fires and losses in this analysis are presented as 2015–2019 annual averages. Estimates were derived from the US Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey and include proportional shares of unknown or missing data. Fires are rounded to the nearest 10, deaths and injuries to the nearest one, and property loss to the nearest million dollars. Property loss was not adjusted for inflation. Percentages were calculated on unrounded estimates. Sums may not equal totals due to rounding errors. Estimates include proportional shares of fires with unknown data. For more information on how these estimates were calculated, please see the full report and *How NFPA's National Estimates Are Calculated for Fires.*

Acknowledgments

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that makes this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the US Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

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NFPA No. USS14-ST

Table 1. Presence of Sprinklers in Structure Fires by Property Use (Excluding Properties Under Construction)

Property Use	Number of Structure Fires with Equipment Present and Percentage of Total Structure Fires by Property Use — Any Automatic Extinguishing System (AES) 1980–1984		1994–1998		2015–2019		Any Sprinkler 2015–2019	
All public assembly	4,280	(13%)	4,380	(26%)	7,900	(49%)	4,120	(25%)
Variable-use amusement place	120	(8%)	140	(16%)	240	(21%)	210	(19%)
Place of worship or funeral property	50	(2%)	90	(5%)	330	(19%)	290	(16%)
Library or museum	80	(14%)	110	(28%)	190	(30%)	180	(28%)
Eating or drinking establishment	3,310	(16%)	3,240	(29%)	5,740	(62%)	2,300	(25%)
Passenger terminal	70	(20%)	60	(35%)	300	(40%)	250	(33%)
Educational property	1,620	(13%)	1,820	(24%)	2,000	(43%)	1,860	(40%)
Health care property*	6,920	(47%)	4,400	(68%)	3,820	(65%)	3,420	(58%)
Nursing home	2,250	(61%)	2,060	(76%)	2,170	(76%)	1,980	(69%)
Hospital	3,370	(47%)	1,650	(74%)	830	(80%)	640	(61%)
Prison or jail	370	(10%)	430	(19%)	300	(61%)	280	(58%)
All residential	7,090	(1%)	11,110	(3%)	32,370	(9%)	30,390	(8%)
Home (including apartment)	5,120	(1%)	8,440	(2%)	24,970	(7%)	23,570	(7%)
Hotel or motel	1,590	(15%)	1,690	(35%)	2,190	(56%)	2,090	(54%)
Dormitory or barracks	430	(16%)	620	(29%)	2,300	(60%)	2,130	(56%)
Rooming or boarding home	70	(4%)	230	(17%)	900	(31%)	860	(29%)
Residential board and care home or assisted living facility	Not available		Not available		860	(46%)	820	(43%)
Store or office	5,510	(13%)	5,230	(21%)	6,500	(34%)	4,940	(26%)
Grocery or convenience store	1,160	(15%)	1,190	(27%)	2,360	(53%)	1,250	(28%)
Laundry, dry cleaning, or other professional service	330	(8%)	310	(13%)	330	(19%)	330	(18%)
Department store	1,340	(44%)	1,100	(52%)	580	(51%)	520	(47%)
Office	1,240	(12%)	1,470	(25%)	1,000	(32%)	940	(30%)
Manufacturing facility	11,910	(44%)	6,400	(50%)	3,050	(58%)	2,720	(52%)
All storage	1,430	(2%)	1,090	(3%)	830	(4%)	810	(4%)
Warehouse (excluding cold storage)	1,060	(13%)	740	(22%)	500	(35%)	500	(34%)
All structures**	38,620	(4%)	37,100	(7%)	61,40	(13%)	51,000	(10%)

* Health care property includes other facilities not listed separately. In 1980–1984 and 1994–1998, this category excludes doctors' offices and elder care facilities without nursing staff (which are assumed to be residential board and care facilities). In 2015–2019, health care property includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: Post-1998 estimates are based only on fires reported in Version 5.0 of NFIRS and include fires reported as confined fires. After 1998, buildings under construction are excluded. Sprinkler statistics exclude partial systems and installations with no sprinklers in the fire area.

Table 2. Type of Sprinkler System Reported in Structure Fires Where Equipment Was Present in Fire Area by Property Use (Excluding Properties Under Construction): 2015–2019 Annual Averages

Property Use	Fires per year with any type of sprinkler	Wet pipe sprinklers		Dry pipe sprinklers		Other sprinklers*	
All public assembly	4,120	3,330	(82%)	330	(8%)	470	(11%)
Variable-use amusement place	210	180	(85%)	30	(14%)	0	(1%)
Place of worship or funeral property	290	220	(75%)	50	(16%)	20	(9%)
Library or museum	180	170	(97%)	0	(2%)	0	(1%)
Eating or drinking establishment	2,300	1,740	(76%)	160	(7%)	400	(17%)
Passenger terminal	250	240	(98%)	0	(1%)	0	(0%)
Educational property	1,860	1,590	(86%)	230	(12%)	30	(2%)
Health care property**	3,420	2,960	(87%)	390	(12%)	70	(2%)
Nursing home	1,980	1,730	(88%)	210	(11%)	40	(2%)
Hospital	640	570	(89%)	60	(9%)	10	(1%)
Prison or jail	280	250	(91%)	20	(8%)	0	(1%)
All residential	30,390	27,030	(89%)	2,770	(9%)	590	(2%)
Home (including apartment)	23,570	20,960	(89%)	2,130	(9%)	480	(2%)
Dormitory or barracks	2,130	1,830	(86%)	260	(12%)	30	(2%)
Hotel or motel	2,090	1,850	(88%)	190	(9%)	50	(2%)
Rooming or boarding house	860	800	(94%)	50	(6%)	0	(0%)
Residential board and care or assisted living facility	820	730	(89%)	70	(9%)	20	(2%)
Store or office	4,940	4,270	(86%)	380	(8%)	290	(6%)
Grocery or convenience store	1,250	980	(78%)	100	(8%)	180	(14%)
Laundry, dry cleaning, or other professional service	330	300	(91%)	20	(5%)	10	(4%)
Department store	520	460	(88%)	50	(10%)	10	(2%)
Office	940	820	(87%)	80	(8%)	40	(5%)
Manufacturing facility	2,720	2,290	(84%)	370	(14%)	60	(2%)
All storage	810	620	(77%)	180	(22%)	10	(1%)
Warehouse (excluding cold storage)	500	410	(81%)	90	(18%)	0	(1%)
All structures ***	51,000	44,160	(87%)	5,040	(10%)	1,810	(4%)

* Includes deluge and pre-action sprinkler systems and may include sprinklers of an unknown or unreported type.
** Nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
*** Includes properties not listed separately above.

Note: Row totals are shown in the left-most column of percentages and sums may not equal totals due to rounding errors. In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. This field was not required if the fire did not begin within the designed range of the system. Buildings under construction and partial systems were excluded.

Source: NFIRS and NFPA fire experience survey.

Table 3. Estimated Reduction in Civilian Deaths per Thousand Fires Associated with All Types of and Wet Pipe Sprinklers by Property Use (Excluding Properties Under Construction): 2015–2019 Annual Averages

Property Use	Without AES	With sprinklers of any type	Percent reduction from no AES	With wet pipe sprinklers	Percent reduction from no AES
All public assembly	1.9	0.1	97%	0.1	96%
Health care*	1.2	0.8	33%	0.5	58%
Residential	8.0	0.9	89%	1.0	88%
Home (including apartment)	8.1	1.0	88%	1.0	87%
Dormitory or barracks	1.0	0.2	84%	0.2	81%
Hotel or motel	8.6	0.2	98%	0.2	98%
Rooming or boarding house	6.5	3.3	49%	3.5	46%
Residential board and care or assisted living facility	3.2	1.4	57%	1.5	52%
Store or office	1.2	0.5	57%	0.4	64%
Manufacturing facility	1.0	0.6	34%	0.7	22%
Warehouse (excluding cold storage)	2.1	0.0	100%	0.0	100%
All structures**	6.7	0.7	89%	0.7	89%

* Includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: These are national estimates of structure fires reported to US municipal fire departments based on fires reported in NFIRS and so exclude fires reported only to federal or state agencies or industrial fire brigades.

Source: NFIRS and NFPA fire experience survey.

Table 4. Estimated Reduction in Average Direct Property Loss per Fire Associated with Any Type of and Wet Pipe Sprinklers by Property Use (Excluding Properties Under Construction): 2015–2019 Annual Averages

Property Use	Loss without AES	Loss with sprinklers of any type	Percent reduction	Loss with wet pipe sprinkler system	Percent reduction from no AES
All public assembly	$31,500	$11,600	63%	$12,000	62%
Health care*	$13,900	$3,800	73%	$4,000	71%
Residential	$21,200	$8,500	60%	$9,000	57%
Home (including apartment)	$21,700	$8,200	62%	$8,800	59%
Dormitory or barracks	$3,700	$1,500	58%	$1,700	53%
Hotel or motel	$29,800	$22,400	28%	$22,700	24%
Rooming or boarding house	$7,700	$3,600	52%	$3,700	51%
Residential board and care or assisted living facility	$4,600	$6,700	-44%	$7,300	-58%
Store or office	$59,400	$17,600	70%	$17,900	70%
Manufacturing facility	$141,000	$170,300	No reduction	$192,100	No reduction
Warehouse (excluding cold storage)	$112,300	$144,000	No reduction	$149,400	No reduction
All structures	$22,200	$19,800	11%	$20,600	7%

* Includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: These are national estimates of structure fires reported to US municipal fire departments based on fires reported in NFIRS and so exclude fires reported only to federal or state agencies or industrial fire brigades.

Source: NFIRS and NFPA fire experience survey.

Table 5. Percentage of Fires with Fire Spread Confined to Room of Origin in Fires with Sprinklers Present vs. No Automatic Extinguishing System: 2015–2019 Annual Averages

	Percentage of fires confined to room of origin excluding structures under construction and sprinklers not in fire area		
Property Use	**With no AES**	**With sprinklers of any type**	**Difference (in percentage points)**
Public assembly	77%	93%	16%
Religious property	73%	94%	22%
Library or museum	83%	96%	13%
Eating or drinking establishment	72%	91%	19%
Educational	89%	97%	8%
Health care property*	92%	98%	6%
Residential	74%	97%	23%
Home (including apartment)	74%	97%	23%
Dormitory or barracks	97%	99%	3%
Hotel or motel	84%	96%	13%
Store or office	67%	92%	24%
Grocery or convenience store	72%	94%	22%
Department store	65%	90%	25%
Office building	75%	93%	19%
Manufacturing facility	64%	84%	21%
Storage	25%	80%	55%
Warehouse (excluding cold storage)	52%	79%	27%
All structures**	71%	95%	24%

* Includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: All fires with one of the six NFIRS confined structure fire incident types were considered confined to the object of origin by definition. Fires that were confined to the room of origin include fires confined to the object of origin. In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. This field is not required if the fire did not begin within the designed range of the system.

Source: NFIRS and NFPA fire experience survey.

Table 6. Sprinkler Reliability and Effectiveness When Fire Was Coded as Not Confined, Was Large Enough to Activate Sprinkler, and Sprinkler Was Present in Area of Fire by Property Use: 2015–2019 Annual Averages

A. All Sprinklers

Property Use	Number of fires per year where sprinklers were present	Non-confined fires too small to activate or unclassified operation	Fires coded as confined fires	Number of qualifying fires per year	Percent where equipment operated (A)	Percent effective of those that operated (B)	Percent where equipment operated effectively (A x B)
All public assembly	4,120	720	2,580	820	89%	92%	82%
Eating or drinking establishment	2,300	410	1,360	530	88%	91%	80%
Educational property	1,860	420	1,220	220	84%	97%	82%
Health care property*	3,420	650	2,390	380	86%	98%	84%
All residential	30,390	2,600	23,310	4,480	94%	97%	91%
Home (including apartment)	23,570	1,890	18,030	3,650	95%	97%	92%
Hotel or motel	2,090	400	1,280	410	91%	97%	88%
Store or office	4,940	1,150	2,450	1,340	90%	96%	86%
Grocery or convenience store	1,250	280	730	240	85%	94%	80%
Department store	520	180	220	120	89%	97%	86%
Office	940	210	510	220	88%	97%	85%
Manufacturing facility	2,720	650	900	1,170	91%	94%	86%
All storage	810	140	280	380	86%	95%	84%
Warehouse (excluding cold storage)	500	90	160	250	88%	95%	84%
All structures**	51,000	6,780	34,830	9,390	92%	96%	88%

* Includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. This field is not required if the fire did not begin within the designed range of the system.

Source: NFIRS and NFPA fire experience survey.

Table 6. Sprinkler Reliability and Effectiveness When Fire Was Coded as Not Confined, Was Large Enough to Activate Sprinkler, and Sprinkler Was Present in Area of Fire by Property Use: 2015–2019 Annual Averages, (Continued)

B. Wet Pipe Sprinkler Systems Only

Property Use	Number of fires per year where sprinklers were present	Non-confined fires too small to activate or unclassified operation	Fires coded as confined fires	Number of qualifying fires per year	Percent where equipment operated (A)	Percent effective of those that operated (B)	Percent where equipment operated effectively (A x B)
All public assembly	3,330	600	2,030	700	90%	94%	85%
Eating or drinking establishment	1,740	330	980	430	90%	93%	84%
Educational property	1,590	370	1,020	200	85%	97%	83%
Health care property*	2,960	570	2,050	330	88%	97%	85%
All residential	27,030	2,330	20,560	4,150	95%	97%	92%
Home (including apartment)	20,960	1,690	15,870	3,390	95%	97%	92%
Hotel or motel	1,850	350	1,130	370	92%	97%	90%
Store or office	4,270	1,030	2,030	1,210	91%	97%	88%
Grocery or convenience store	980	250	520	210	87%	95%	83%
Department store	460	160	190	110	88%	98%	86%
Office	820	190	440	180	89%	97%	86%
Manufacturing facility	2,290	540	770	980	92%	94%	87%
All storage	620	110	220	300	91%	95%	87%
Warehouse (excluding cold storage)	410	80	120	210	90%	96%	86%
All Structures**	44,160	5,920	29,870	8,370	92%	96%	89%

* Includes nursing homes, hospitals, clinics, doctor's offices, substance abuse recovery centers or developmental disability facilities.
** Includes properties not listed separately above.

Note: In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. This field is not required if the fire did not begin within the designed range of the system.

Source: NFIRS and NFPA fire experience survey.

Table 6. Sprinkler Reliability and Effectiveness When Fire Was Coded as Not Confined, Was Large Enough to Activate Sprinkler, and Sprinkler Was Present in Area of Fire by Property Use: 2015–2019 Annual Averages, (Continued)

C. Dry Pipe Sprinkler Systems Only

Property Use	Number of fires per year where sprinklers were present	Non-confined fires too small to activate or unclassified operation	Fires coded as confined fires	Number of qualifying fires per year	Percent where equipment operated (A)	Percent effective of those that operated (B)	Percent where equipment operated effectively (A x B)
All residential	2,770	230	2,280	260	91%	97%	89%
Homes	2,130	160	1,770	190	92%	98%	90%
Store or office	380	100	190	90	83%	94%	78%
Manufacturing facility	370	100	110	160	89%	93%	83%
All storage	180	30	70	80	79%	94%	74%
All structures*	5,040	690	3,540	800	87%	94%	82%

* Includes properties not listed separately above.

Note: These are percentages of fires reported to US municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. This field is not required if the fire did not begin within the designed range of the system. Buildings under construction were excluded. Percentages are based on estimated total fires reported in NFIRS with the indicated type of automatic extinguishing system and system performance not coded as fire too small to activate systems. Fires were excluded if the reason for failure or ineffectiveness was “system not present in area of fire.” Fires were recoded from “operated but ineffective” to “failed to operate” if the reason for failure or ineffectiveness was “system shut off.” Fires were recoded from “failed to operate” to “operated but ineffective” if the reason for failure or ineffectiveness was “not enough agent” or “agent did not reach fire.”

Source: NFIRS and NFPA fire experience survey.

Table 7. Number of Sprinklers That Operated in Structure Fires by Type of Sprinkler System (Excluding Properties Under Construction): 2015–2019 Annual Averages

Number of Sprinklers Operating	Percentage of structure fires where that many sprinklers operated		
	Wet Pipe	Dry Pipe	All Sprinklers (Including "other")
1	80%	47%	77%
1 or 2	91%	63%	89%
1 to 3	94%	71%	92%
1 to 4	96%	83%	95%
1 to 5	97%	90%	97%
1 to 10	99%	99%	99%

Note: Percentages are based on structure fires reported in NFIRS to US municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. Percentages are based on fires where sprinklers were reported as present and operating and there was reported information on the number of sprinklers that operated. Fires were excluded if the reason for failure or ineffectiveness was coded as "system not present in area of fire." Fires were recoded from "operated but ineffective" to "failed to operate" if the reason for failure or ineffectiveness was "system shut off." Fires were recoded from "failed to operate" to "operated but ineffective" if the reason for failure or ineffectiveness was "not enough agent" or "agent did not reach fire." In NFIRS, if multiple systems are present, the system coded is supposed to be the one system designed to protect the location where the fire started. Buildings under construction were excluded, as were partial systems and fires reported as confined fires.

Source: NFIRS and NFPA fire experience survey.

Table 8. Reasons for Sprinkler Failure or Ineffectiveness in Structure Fires Large Enough to Activate Sprinkler Present in Fire Area (Excluding Fires with Confined Structure Fire Incident Types and Fires in Properties Under Construction): 2015–2019 Annual Averages

A. Reason Sprinkler Failed to Operate

Reason	All sprinklers		Wet pipe		Dry pipe	
System shut off	430	(57%)	340	(56%)	70	(64%)
Manual intervention defeated system	130	(18%)	120	(20%)	10	(8%)
Lack of maintenance	70	(10%)	60	(9%)	10	(12%)
System components damaged	70	(9%)	50	(9%)	10	(12%)
Inappropriate system for type of fire	40	(6%)	40	(6%)	0	(4%)
Total	750	(100%)	610	(100%)	100	(100%)

B. Reason Operating Sprinkler Was Ineffective

Reason	All sprinklers		Wet pipe		Dry pipe	
Water did not reach the fire	170	(50%)	140	(53%)	10	(36%)
Not enough water released	100	(31%)	70	(27%)	20	(50%)
Inappropriate system for type of fire	20	(7%)	20	(8%)	0	(3%)
System components damaged	20	(7%)	20	(8%)	0	(3%)
Lack of maintenance	10	(3%)	0	(1%)	0	(7%)
Manual intervention defeated system	10	(2%)	10	(3%)	0	(0%)
Total	340	(100%)	270	(100%)	40	(100%)

C. Reasons for Sprinkler Failure or Ineffectiveness Combined

Reason	All sprinklers		Wet pipe		Dry pipe	
System shut off	430	(39%)	340	(39%)	70	(47%)
Water did not reach the fire	170	(16%)	140	(16%)	10	(10%)
Manual intervention defeated system	140	(13%)	130	(15%)	10	(6%)
Not enough water released	100	(10%)	70	(8%)	20	(14%)
System components damaged	90	(8%)	80	(9%)	10	(10%)
Lack of maintenance	80	(8%)	60	(7%)	20	(11%)
Inappropriate system for type of fire	70	(6%)	60	(7%)	10	(4%)
Total	1,080	(100%)	880	(100%)	140	(100%)

Note: Buildings under construction were excluded, as were partial systems and fires reported as confined fires. Fires reported with unclassified reasons for failure were treated as cases of unknown reasons for failure.

Source: NFIRS and NFPA fire experience survey.

Table 9. Characteristics of Fatal Victims in Fires with Sprinklers vs. No Automatic Extinguishing Equipment: 2015–2019 Annual Averages

A. Number of Victims by Sprinkler Presence and Performance

Sprinkler/AES Status	Deaths when sprinklers present		Deaths when no AES present	
Total civilian deaths	36	(100%)	2,816	(100%)
Operated and effective	*18*	*(51%)*		
Operated but ineffective	*3*	*(8%)*		
Fire too small to operate	*9*	*(24%)*		
Failed to operate	*3*	*(9%)*		
Unclassified operation	*3*	*(8%)*		

B. Characteristics in Fires with Operating Sprinklers vs. No AES

Fire or Victim Characteristic	Deaths when sprinklers present		Deaths when no AES present	
With operating sprinklers	21	(100%)	2,816	(100%)
Victim in area of origin	18	(87%)	1,319	(50%)
Involved in ignition	*14*	*(66%)*	*976*	*(35%)*
Not involved in ignition	*4*	*(21%)*	*446*	*(16%)*
Victim 65 or older	11	(53%)	1,001	(36%)
Clothing on fire	8	(39%)	193	(7%)
Unable to act	7	(32%)	331	(12%)

Note: Here is an example of how to read this table: Almost nine out of every 10 people (87 percent) who died in fires despite the presence of operating sprinklers were located in the area of fire origin. Being closer to the fire makes it harder to escape. In comparison, only half of the fatal victims (50 percent) in fires in which no automatic extinguishing equipment was present were located in the area of fire origin.

Source: NFIRS and NFPA fire experience survey.

Fire Loss in the United States During 2020

Marty Ahrens and Ben Evarts
September 2021

Key Findings

In 2020, local fire departments responded to an estimated 1.4 million fires in the United States. These fires caused 3,500 civilian fire deaths and 15,200 reported civilian fire injuries. Property damage was estimated at $21.9 billion.

On average, a fire department responded to a fire somewhere in the US every 23 seconds in 2020. A home structure fire was reported every 89 seconds, a home fire death occurred every three hours and 24 minutes, and a home fire injury occurred every 46 minutes.

More than one-third of the fires (490,500 — or 35 percent) occurred in or on structures. Most fire losses were caused by these fires, including 2,730 civilian fire deaths (78 percent); 13,000 civilian fire injuries (86 percent); and $12.1 billion in direct property damage (55 percent). Major fires in the California wildland/urban interface (WUI) caused $4.2 billion in direct property damage (19 percent). Unfortunately, losses from these fires were not broken out by incident type. A substantial portion of the loss was undoubtedly due to structure fires.

Only one-quarter of the fires (26 percent) occurred in home properties, including one- or two-family homes and apartments or other multifamily housing, yet these fires caused three-quarters of the civilian fire deaths (74 percent) and injuries (76 percent).

One of every five fires (19 percent) occurred in one- or two-family homes, yet these fires caused nearly two-thirds of the civilian fire deaths (64 percent) and nearly three-fifths of the civilian fire injuries (57 percent). The 6 percent of fires that occurred in apartments caused 10 percent of the civilian fire deaths and 19 percent of the injuries.

Vehicle fires accounted for 15 percent of the fires, 18 percent of the civilian deaths, and 11 percent of the civilian injuries.

Neither structures nor vehicles were involved in half of the fires reported in 2020. These fires included brush, grass, or wildland fires — excluding crops, timber, and other properties of value (20 percent); outside rubbish fires (16 percent); outside fires involving property of value (6 percent); and other fires (7 percent).

The 2020 estimates of the number of fires were 40–64 percent lower than in 1980 for most of the major incident type categories. However, property loss, adjusted for inflation, was 10 percent higher in 2020 than in 1980. This was partially due to the previously mentioned California WUI fires and a $3 billion Navy ship fire.

The 2020 estimate of total fire deaths was 46 percent lower than in 1980, home fire deaths were 50 percent lower, deaths in one- or two-family home fires were 47 percent lower, and apartment fire deaths were 66 percent lower.

Because the US population has grown since 1980, population-based rates have dropped even more than the estimates have.

Less progress has been made in preventing deaths and injuries associated with reported fires. For overall home fires, the 2020 rate of 7.2 deaths per 1,000 reported home fires was almost identical to the rate of 7.1 in 1980. The rate for one- or two-family home fires was 16 percent higher than in 1980, while the rate for apartment fires was 43 percent lower.

Most of the reduction in reported fires and fire losses occurred more than a decade ago. There is still more work to do, particularly around home fires.

Introduction

In many ways, 2020 was an anomaly. With the COVID-19 pandemic, many businesses were shuttered. Some people worked remotely, some continued normal work, and still others lost their jobs. Overall, people spent more time at home.

An Acosta report released in September 2020 noted that 55 percent of shoppers were eating at home more often during the pandemic than before it began.[1] The Outdoor Foundation reported that 53 percent of Americans at least six years of age engaged in outdoor recreation at least once during 2020.[2] This was the highest outdoor recreational participation rate ever recorded. These are examples of how people's behaviors and routines changed during the pandemic. While we do not yet have national data on the causes of fires in 2020, increases and decreases in various activities were likely associated with the corresponding changes in related fires.

In 2020, local fire departments, including departments protecting towns, townships, cities, and counties, responded to an estimated 1,388,500 fires in the US. These fires caused an estimated 3,500 civilian deaths; 15,200 civilian injuries; and $21.9 billion in direct property damage. This report provides a breakdown of these fires. Firefighter fatalities and injuries are discussed in separate NFPA reports and are not included here.

On average, a fire department responded to a fire somewhere in the US every 23 seconds in 2020. A civilian was fatally injured in a fire every two hours and 31 minutes. Every 35 minutes, a civilian suffered a non-fatal fire injury.

The fire and fire loss estimates in this analysis are derived from NFPA's 2020 fire department experience survey (FES). Only fires reported to local fire departments are included. State fire agencies were also surveyed about large loss and catastrophic multiple-death fires. Such major incidents were added to the results from the FES. For more information on how these estimates were calculated, see *Methodology Used in Calculating National Estimates from NFPA's Fire Experience Survey*.

Trends

While some year-to-year fluctuation is normal, from 2019 to 2020, the total number of fires rose 8 percent, civilian deaths fell 6 percent, and civilian injuries fell 8 percent. The increase in total fires was statistically significant. Meanwhile, direct property damage was 1.5 times as high in 2020 as it was in 2019. The 2020 fire property damage included losses of $4.2 billion from California fires in the WUI and a California blaze that destroyed a naval ship ($3 billion). The WUI fires included a wide variety of incidents and property types; these could not be broken down further.

The estimate of total fires was 54 percent lower in 2020 than in 1980, while fire death and injury estimates were 46 percent and 50 percent lower, respectively, over the same period. Property loss, adjusted for inflation, was 10 percent higher than in 1980. See Figures 1–3.

US Census data shows that the resident population of the US grew 46 percent from 1980 to 2020. The resulting rate of 4.2 fires per 1,000 population in 2020 was 68 percent lower than the 13.1 rate in 1980 and 7 percent higher than the 2019 rate of 3.9.

The 10.6 civilian fire deaths per million population in 2020 was 63 percent lower than the 28.6 rate in 1980 and 6 percent lower than the rate of 11.3 in 2019. (See Figures 4 and 5.)

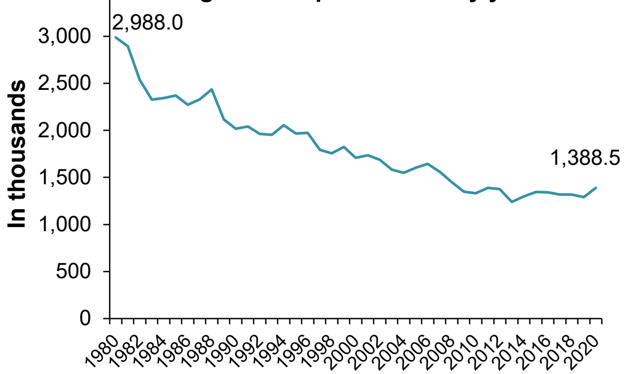


Figure 1. Reported fires by year

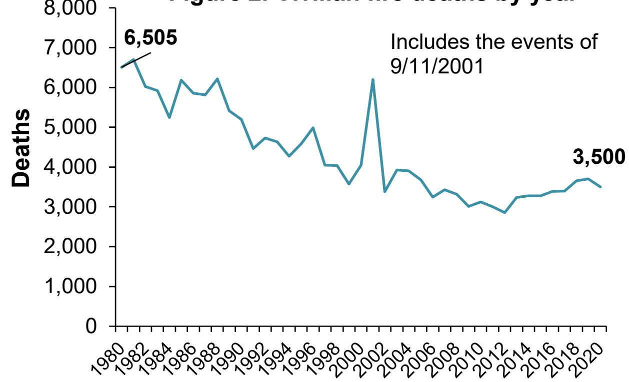


Figure 2. Civilian fire deaths by year

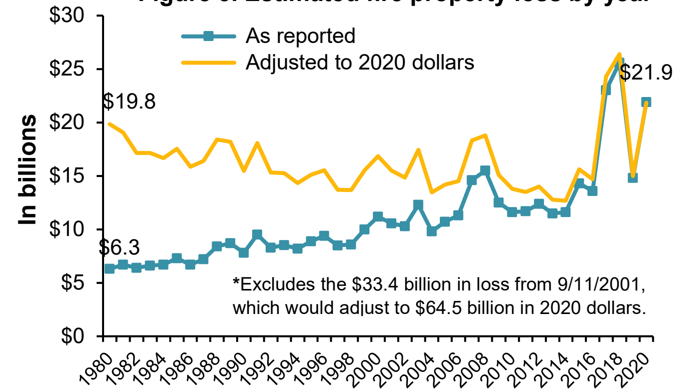
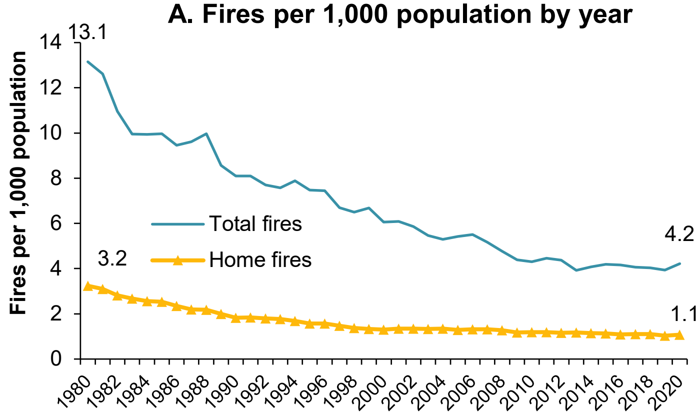
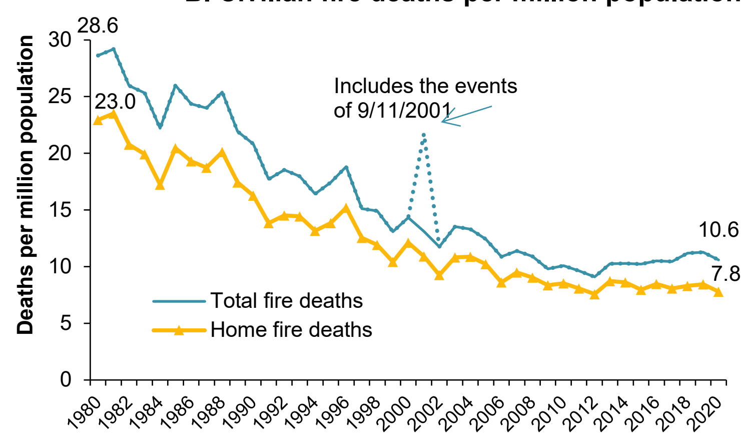


Figure 3. Estimated fire property loss by year*

Figure 4. Population-based fire and civilian fire death rates: 1980–2020

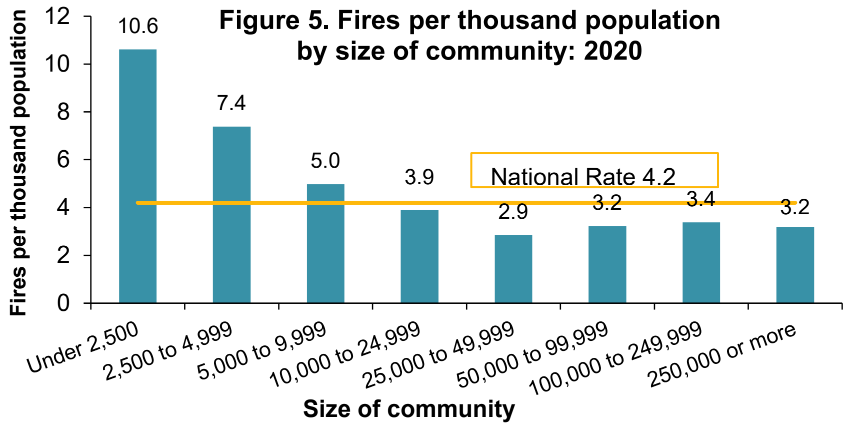


A. Fires per 1,000 population by year



B. Civilian fire deaths per million population

While smaller communities have fewer fires than larger communities, the 10.6 fires per 1,000 population for fire departments protecting communities with fewer than 2,500 people is 2.5 times the overall national rate. Fire departments in smaller communities are less likely to conduct fire prevention or code enforcement activities.[3] Open burning to get rid of debris might also be more common in these communities. Figure 5 shows that the rate of fires generally decreases as the population protected increases from very small to midsize, with the lowest population-based rate of fires found in departments protecting populations of at least 25,000.



The fire rates tell only part of the story. To really understand the US fire problem, the areas of progress, and the remaining challenges, we need to know more about where fires occur, the causes of these fires, and whether fires and casualties are increasing or decreasing in actual number and population-based rates. For information about specific fire causes or fires in specific occupancies, see nfpa.org/News-and-Research.

Table 1 provides a summary of fires, civilian casualties, and direct property loss by type of fire for 2020.

Definitions

Civilian: Anyone other than a firefighter.

Structure fire: In general, any fire in or on a structure is considered a structure fire, even if the structure itself is not damaged.

Homes: One- or two-family homes, including manufactured homes, and apartments, or other multifamily housing.

Non-home or other residential: Hotels, motels, dormitories, rooming houses, residential board and care, and unclassified residential.

Residential: Homes plus non-home or other residential.

Non-residential: Public assembly, educational (excluding dorms), institutional, stores or offices, industrial, utility, manufacturing or processing, storage, and bridges, tents, poles, and other special properties.

Highway vehicle: Vehicle intended for use on roadways, such as cars, trucks, motorcycles, buses, recreational vehicles in transit, etc. A vehicle burning inside a garage is considered a vehicle fire if the fire did not spread to the structure or other items.

Structure Fires

In 2020, the estimated 490,500 structure fires (35 percent of the reported fires) caused 2,730 civilian fire deaths (78 percent of total civilian fire deaths); 13,000 civilian injuries (86 percent); and $12.1 billion in direct property damage (55 percent). While structure fires probably dominated the $4.2 billion in property loss from California wildfires, it is not possible to disaggregate these fires by incident type or occupancy.

Table 1. Reported Fires in 2020 by Incident Type

Incident Type	Fires		Civilian Deaths		Civilian Injuries		Property Loss (In Millions)[1]	
Fires in California Wildland-Urban Interface (WUI)							**$4,200**	**(19%)**
Structure Fire	**490,500**	**(35%)**	**2,730**	**(78%)**	**13,000**	**(86%)**	**$12,107**	**(55%)**
Residential structure fire	**379,500**	**(27%)**	**2,630**	**(75%)**	**11,900**	**(78%)**	**$8,703**	**(40%)**
Home structure fire	356,500	(26%)	2,580	(74%)	11,500	(76%)	$8,400	(38%)
One- and two-family home, including manufactured homes	*270,500*	*(19%)*	*2,230*	*(64%)*	*8,600*	*(57%)*	*$6,771*	*(31%)*
Apartment or other multifamily housing	*86,000*	*(6%)*	*350*	*(10%)*	*2,900*	*(19%)*	*$1,629*	*(7%)*
Other residential structure fire	*23,000*	(2%)	50	(1%)	400	(3%)	$303	(1%)
Non-residential structure fire	111,000	(8%)	100	(3%)	1,100	(7%)	$3,404	(16%)
Vehicle Fire	**209,500**	**(15%)**	**630**	**(18%)**	**1,700**	**(11%)**	**$5,170**	**(24%)**
Highway vehicle fire	173,000	(12%)	580	(17%)	1,500	(10%)	$1,615	(7%)
Other vehicle fire*	36,500	(3%)	50	(1%)	200	(1%)	$3,555*	(16%)
Outside and Other Fire**	**688,500**	**(50%)**	**140**	**(4%)**	**500**	**(3%)**	**$389**	**(2%)**
Fire outside but no vehicle (outside storage, crops, timber, etc.)	84,000	(6%)	**	**	**	**	$210	(1%)
Fires in brush, grass, or wildland (excluding crops and timber) with no dollar loss	277,000	(20%)	**	**	**	**	**	**
Outside rubbish fire	225,000	(16%)	**	**	**	**	**	**
All other fires	102,500	(7%)	**	**	**	**	$179	(1%)
Total	**1,388,500**	**(100%)**	**3,500**	**(100%)**	**15,200**	**(100%)**	**$21,866**	**(100%)**

* Includes a $3 billion naval ship fire in California.
** Casualty data is not reported for subcategories of outside and other fires. Property damage is not captured for brush, grass, or wildland with no loss or outside rubbish fires.
Note: Sums may not equal totals due to rounding errors.
Source: NFPA's 2020 survey of fire departments for US fire experience and surveys of state fire authorities for large loss and catastrophic multiple-death fires.

Figure 6. Fires by incident type in the US: 1980–2020

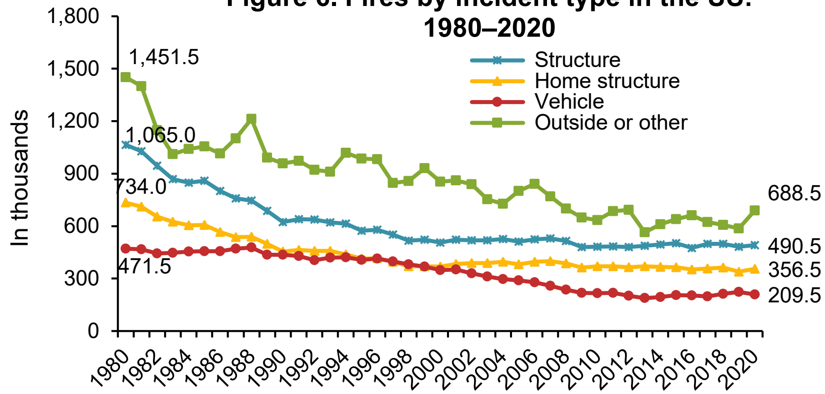
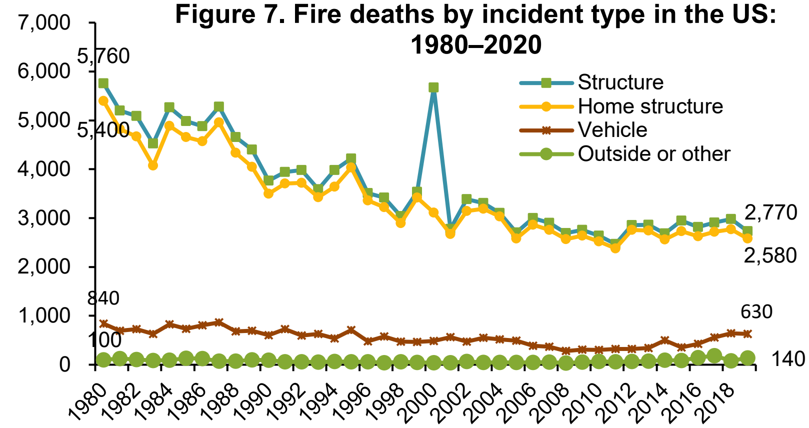


Figure 7. Fire deaths by incident type in the US: 1980–2020



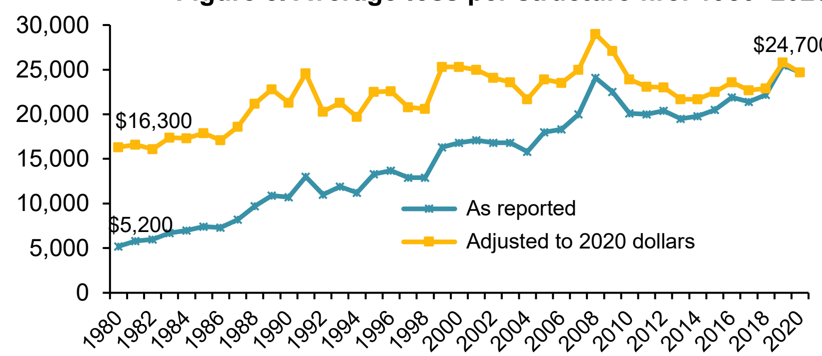
In 2020, on average, fire departments responded to a structure fire every 64 seconds, a structure fire death occurred every three hours and 13 minutes, and a structure fire injury occurred every 41 minutes.

From 2019 to 2020, the number of structure fires rose 2 percent, while associated civilian deaths fell 8 percent, civilian injuries fell 6 percent, and property damage fell 1 percent. The estimate of the total number of structure fires was 54 percent lower in 2020 than in 1980, while structure fire death and injury estimates were 52 percent and 47 percent lower, respectively, over the same period. Although somewhat lower in 2020, structure fires cause 80–90 percent of the civilian fire deaths and injuries in most years, with the events of September 11, 2001, contributing to a high of 92 percent in 2001. See Figures 6 and 7.

Figure 8 shows that the average loss per structure fire, adjusted for inflation, was 1.5 times as high in 2020 ($24,700) as in 1980 ($16,300).

In 2020, an estimated 379,500 total residential structure fires (27 percent) caused 2,630 civilian deaths (75 percent); 11,900 civilian injuries (78 percent); and $8.7 billion in direct property damage (40 percent). From 2019 to 2020, residential structure fires rose 5 percent, associated civilian deaths fell 8 percent, civilian injuries fell 6 percent, and residential fire property damage rose 9 percent. The increase in residential fires was statistically significant.

Figure 8. Average loss per structure fire: 1980–2020



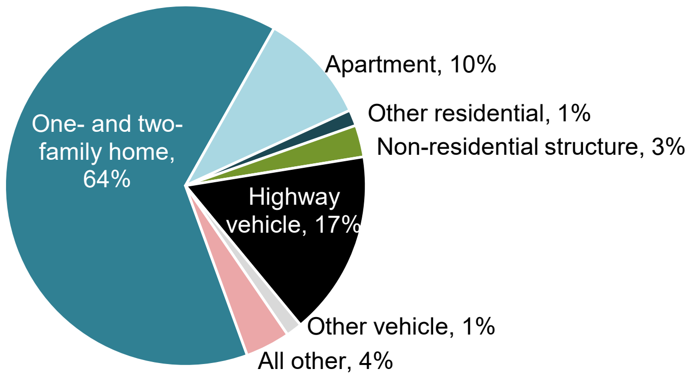
Excludes the $33.4 billion loss from 9/11/2001, which would adjust to $64.4 billion in 2020 dollars.

The estimate of 379,500 residential structure fires reported in 2020 was 50 percent lower than the 757,500 in 1980. Residential structure fire deaths fell 52 percent from 5,446 in 1980 to 2,630 in 2020.

The 2020 estimate of 11,900 residential fire injuries was 44 percent lower than the 21,100 in 1980.

See Figure 9 for a breakdown of 2020 fire deaths by type of fire.

Figure 9. Civilian fire deaths by incident type and occupancy: 2020



Home Structure Fires

The 356,500 home structure fires in 2020 (26 percent) caused 2,580 civilian fire deaths (74 percent); 11,500 civilian injuries (76 percent), and $8.4 billion in direct property damage (38 percent). On average, a home structure fire was reported every 89 seconds, a home fire death occurred every three hours and 24 minutes, and a home fire injury occurred every 46 minutes.

From 2019 to 2020, the number of home structure fires rose 5 percent, associated civilian deaths fell 7 percent, civilian injuries fell 6 percent, and home fire property damage rose 8 percent. With the COVID-19 pandemic, more people spent more time at home during 2020. This meant more cooking; more use of heating, air conditioning, and other equipment; and other activities that can contribute to home fires, which could account for the increase.

However, more people at home also means more people are available to assist in the event of a fire. This could have contributed to the reduction in fire deaths. Sesseng, Storesund, and Steen-Hansen found that being alone at the time of a fire was one of the common factors in fatal fires in Norway.[4]

With homes accounting for 94 percent of residential structure fires, it is not surprising that the pattern for home fires resembles that of residential structure fires. The estimated number of home structure fires was 51 percent lower in 2020 than in 1980, while estimates for home fire deaths and injuries were 50 percent and 42 percent lower, respectively.

Figure 4 shows that the population-based rates of home fires and home deaths were both 66 percent lower in 2020 than in 1980. The rate of reported home fires fell from 3.2 per thousand population in 1980 to 1.1 in 2020, while the home fire death rate dropped from 23.0 per million population to 7.8 per million population over the same period. The trend lines for the home fire death rate and total fire death rate are very similar.

For information on the causes and circumstances of home fires, see NFPA's report, *Home Structure Fires.* For information about deaths and injuries caused by home fires, see NFPA's report, *Home Fire Victims by Age and Gender.*

In 2020, the 270,500 one- or two-family home structure fires (19 percent) caused 2,230 civilian fire deaths (64 percent); 8,600 civilian fire injuries (57 percent); and $6.8 billion in direct property damage (31 percent). From 2019 to 2020, fires in one- or two-family homes rose 2 percent, while deaths fell 7 percent, injuries fell 2 percent, and property damage rose 5 percent. The estimated number of structure fires in one- or two-family homes was 54 percent lower in 2020 than in 1980, while estimated deaths and injuries were both 47 percent lower.

The 86,000 apartment or other multifamily housing fires in 2020 (6 percent) caused 350 civilian fire deaths (10 percent); 2,900 civilian fire injuries (19 percent), and $1.6 billion in direct property damage (7 percent). From 2019 to 2020, the number of reported apartment fires jumped 15 percent, a statistically significant increase, returning to roughly the 2018 level after a steep decline from 2018 to 2019. From 2019 to 2020, apartment fire deaths fell 8 percent, injuries fell 15 percent, and property damage jumped 22 percent, returning to 2017–2018 levels.

The estimated number of apartment structure fires was 40 percent lower in 2020 than in 1980, while apartment fire deaths and apartment fire injuries were 66 percent and 19 percent lower, respectively. The 2020 apartment injury estimate is the lowest seen since the survey began.

Less progress has been made in reducing deaths and injuries in reported home fires. In 1980, there were 7.1 deaths per 1,000 reported home fires overall. This was also true for one- or two-family homes and apartments. In 2020, the 7.2 deaths per 1,000 reported home fires was actually 2 percent higher than in 1980. In comparison, the death rate per 1,000 reported apartment fires dropped 43 percent to 4.1.

Apartment buildings, particularly high-rise apartments, are more regulated than one- or two-family homes where the 2020 rate of 8.2 deaths per 1,000 reported fires was 16 percent higher than in 1980.

While the rates fluctuated, 1984 was the only one year in which the death rate (6.5) per 1,000 one- or two-family home fires was lower than it was in 1980. Apartment fire-based death rates have had a fairly consistent downward trend. In many years, the death rate per 1,000 total home fires was higher than in 1980 because there are more reported fires in one- or two-family than there are in apartments. See Figure 10.

Figure 11 shows that the 2020 rate of 34 civilian injuries per 1,000 apartment fires was 34 percent higher than the 1980 rate of 25. For one- or two-family home fires, the 2020 rate of 32 injuries per 1,000 fires was 17 percent higher than the 1980 rate of 27. The 32 injuries per 1,000 reported home fires overall in 2020 was 20 percent higher than the rate of 27 in 1980.

Caution should be used when interpreting these results. Occupants who are alerted by smoke alarms may handle a small fire without fire department assistance, resulting in fewer small fires being reported. In addition, many apartment buildings have monitored fire detection that can result in a fire department response even when the system is triggered by a minor fire.

Figure 10. Deaths per 1,000 reported home fires by year and occupancy: 1980–2020

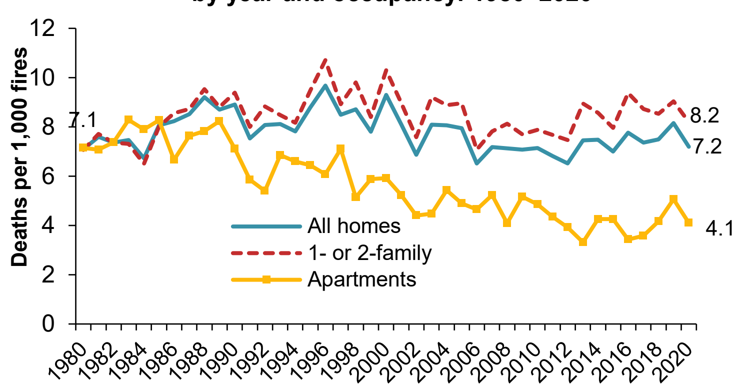
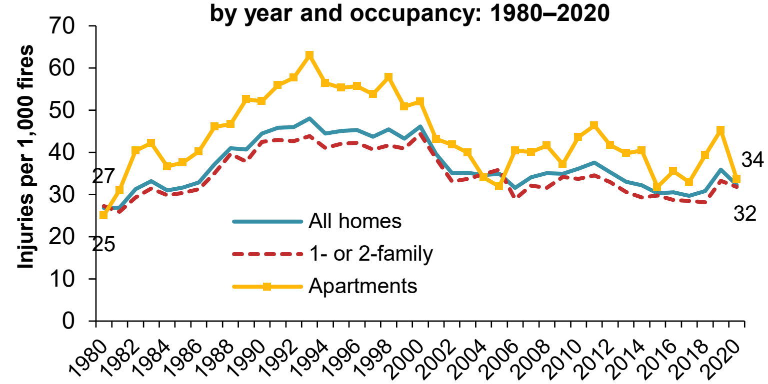


Figure 11. Injuries per 1,000 reported home fires by year and occupancy: 1980–2020



Non-Home Structure Fires

Non-home occupancies, including other residential properties such as dormitories, hotels and motels, rooming houses, and residential board and care occupancies, and non-residential properties, such as public assembly, educational, institutional, retail, office, manufacturing, and industrial or utility occupancies, are more regulated than home properties.

In 2020, the estimated 23,000 structure fires in other residential properties (2 percent) — including unclassified residential structures — caused 50 civilian fire deaths (1 percent), 400 civilian fire injuries (3 percent), and $303 million in direct property damage (1 percent). From 2019 to 2020, other residential structure fires rose 5 percent, deaths fell 50 percent, and injuries fell 20 percent. Direct property damage climbed 45 percent. The 2020 estimated number of other residential structure fires was 2 percent lower than in 1980; 2020 estimates of civilian fire deaths and injuries were 80 and 71 percent lower, respectively.

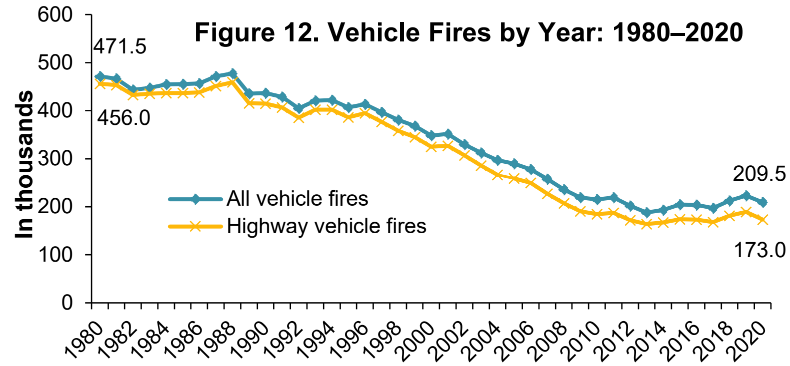
In 2020, the 111,000 non-residential structure fires (8 percent) caused an estimated 100 civilian fire deaths (3 percent); 1,100 civilian injures (7 percent); and $3.4 billion in direct property damage (16 percent). From 2019 to 2020, non-residential structure fires fell 8 percent, deaths fell 9 percent, injuries fell 8 percent, and direct property damage fell 21 percent. The 2020 estimate of non-residential structure fires was 64 percent lower than the 1980 estimate, while the estimates for civilian deaths and injuries were 56 and 70 percent lower, respectively.

NFPA has reports on the causes and circumstances of fires in many of these occupancies. For the latest annual averages of fires, civilian casualties, and property damage by occupancy or property use (currently 2015–2019), see *Fires by Occupancy or Property Type.*

Vehicle Fires in 2020

Vehicle fires are an often-overlooked part of the fire problem, yet in 2020, an estimated 209,500 vehicle fires (15 percent) caused 630 civilian fire deaths (18 percent); 1,700 civilian fire injuries (11 percent); and $5.2 billion in direct property damage (24 percent). More than half of the vehicle property loss resulted from a July 2020 naval ship fire in California that resulted in an estimated loss of $3 billion.

Figure 12. Vehicle Fires by Year: 1980–2020



From 2019 to 2020, vehicle fires overall fell 6 percent, while vehicle fire deaths fell 2 percent, vehicle fire injuries fell 15 percent, and property damage more than doubled. The estimated number of vehicle fires was 56 percent lower in 2020 than in 1980. Estimates of deaths and injuries were 15 and 58 percent lower, respectively.

Eighty-three percent of the vehicle fires, 92 percent of the associated deaths, and 88 percent of the associated injuries resulted from fires involving highway vehicles. The 173,000 highway vehicle fires (12 percent of total fires) in 2020 caused an estimated 580 civilian fire deaths (17 percent); 1,500 civilian fire injuries (10 percent); and $1.6 billion in direct property damage (7 percent). Fire departments responded to an average of one highway vehicle fire every 3 minutes and 3 seconds.

The 9 percent decline in highway vehicle fires from 2019 to 2020 was statistically significant. In addition, highway vehicle fire deaths rose 5 percent, injuries fell 12 percent, and property damage fell 2 percent. The estimated number of highway vehicle fires in 2020 was 62 percent lower than the 1980 estimate, while the associated fire death estimate was only 11 percent lower, and the injury estimate was 47 percent lower.

For more information on the causes and circumstances of highway vehicle fires, see NFPA's 2020 report *Vehicle Fires*. Vehicles that burn inside a garage or other structure but do not damage the structure or spread to other contents are counted as vehicle fires and are the exception to the structure fire definition discussed earlier.

Other non-highway vehicles, such as boats or ships; aircraft; trains; and agricultural, garden, or industrial vehicles, were involved in an estimated 36,500 fires (3 percent) in 2020. These fires caused 50 civilian deaths (1 percent), 200 civilian injuries (1 percent), and $3.6 billion in direct property damage (16 percent). From 2019 to 2020, other vehicle fires rose 9 percent, while deaths fell 47 percent, injuries fell 33 percent, and property damage rose to six times the previous estimate.

The 2020 estimate of other non-highway vehicle fires was more than twice the 1980 estimate. It is possible that more such vehicles, including boats, planes, construction vehicles, and garden vehicles, are in use today. Despite this large increase in fires, the estimated number of deaths was 44 percent lower, and the number of injuries was 84 percent lower.

Outside and Other Fires in 2020

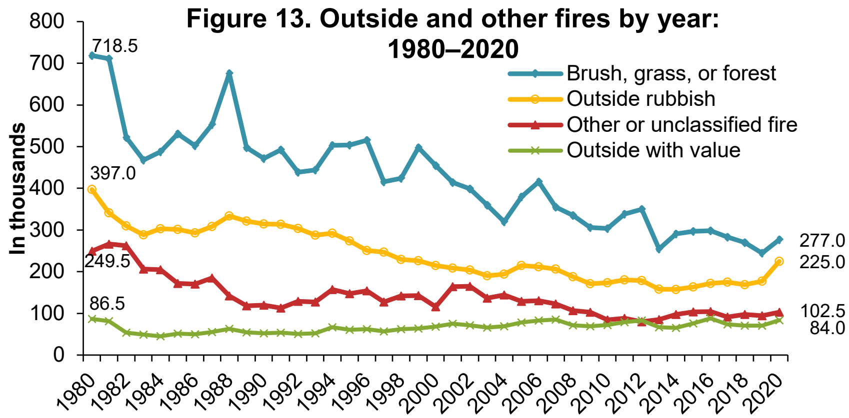
Half of the reported fires in 2020 (50 percent) were non-structural, non-vehicle fires or "other fires" that did not fit into any of the standard categories. The estimated 688,500 outside and other fires caused 140 civilian fire deaths (4 percent), 500 civilian fire injuries (3 percent), and $389 million in direct property damage (2 percent). Casualties were grouped together in this broad category and not subdivided further. A fire in an outside or unclassified property was reported every 46 seconds.

The 84,000 outside fires involving property of value (6 percent), such as outside storage, crops, timber, etc., caused $210 million in direct property damage (1 percent). Outside and other fires also included 277,000 brush, grass, and wildland fires, excluding crops and timber, (20 percent) and 225,000 outside rubbish fires (16 percent). Property damage information was not collected for these two incident types in NFPA's survey. The remaining 102,500 other non-structural, non-vehicle fires (7 percent) caused $179 million in direct property damage (1 percent).

From 2019 to 2020, outside and other fires of all types combined rose 17 percent, while associated deaths jumped 75 percent, injuries fell 29 percent, and direct property damage climbed 28 percent (excluding the major WUI fires in 2020). The estimated number of outside fires involving property of value, such as outside storage, crops, or timber — but not structures or vehicles — rose 19 percent, while property damage from these incidents rose 2 percent. Brush, grass, or wildland fires with no value or loss involved rose 13 percent. Outside rubbish fires rose 27 percent. Other fires rose 8 percent. Direct property damage from these other fires jumped 83 percent.

The increases in outside rubbish fires; outside fires involving property of value; and brush, grass, or wildland fires were statistically significant. Amidst the pandemic, the Centers for Disease Control and Prevention advised that outdoor activities carried less risk of exposure to COVID-19 than socializing indoors.[5] Increased outdoor time may have contributed to the increased prevalence of these fires.

The estimated number of outside and other non-structural, non-vehicular fires was 53 percent lower in 2020 than it was in 1980. The death estimate from these fires was 56 percent higher, while the estimated number of injuries was 64 percent lower. The estimated number of outside fires involving property of value was 3 percent lower in 2020 than in 1980. Figure 13 shows that the biggest decreases in this category were in the estimated number of brush, grass, or wildland fires with no value or loss (61 percent), other fires (59 percent), and outside rubbish fires (43 percent).



Acknowledgments

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RESEARCH

Fire Loss in the United States:
Trend Tables

September 2021

NFPA Applied Research

Fire Losses in the United States — List of Trend Tables: 1980–2020

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NFPA Applied Research
1 Batterymarch Park
Quincy, MA 02169-7471
E-mail: research@nfpa.org

NFPA Index No. 3118

The US Fire Problem

All Fires in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI), caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations, handled by industrial fire brigades, or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] As Reported	In 2020 Dollars
1980	2,988,000	6,505	30,200	$6.3	$19.8
1981	2,893,500	6,700	30,450	$6.7	$19.1
1982	2,538,000	6,020	30,525	$6.4	$17.2
1983	2,326,500	5,920	31,275	$6.6	$17.1
1984	2,343,000	5,240	28,125	$6.7	$16.7
1985	2,371,000	6,185	28,425	$7.3	$17.6
1986	2,271,500	5,850	26,825	$6.7	$15.8
1987	2,330,000	5,810	28,215	$7.2	$16.4
1988	2,436,500	6,215	30,800	$8.4	$18.4
1989	2,115,000	5,410	28,250	$8.7	$18.2
1990	2,019,000	5,195	28,600	$7.8	$15.5
1991	2,041,500	4,465	29,375	$9.5	$18.1
1992	1,964,500	4,730	28,700	$8.3	$15.3
1993	1,952,500	4,635	30,475	$8.5	$15.2
1994	2,054,500	4,275	27,250	$8.2	$14.3
1995	1,965,500	4,585	25,775	$8.9	$15.1
1996	1,975,000	4,990	25,550	$9.4	$15.5
1997	1,795,000	4,050	23,750	$8.5	$13.7
1998	1,755,500	4,035	23,100	$8.6	$13.7
1999	1,823,000	3,570	21,875	$10.0	$15.5
2000	1,708,000	4,045	22,350	$11.2	$16.9
2001[2]	1,734,500	6,196	21,100	$44.0	$64.5
2002	1,687,500	3,380	18,425	$10.3	$14.8
2003	1,584,500	3,925	18,125	$12.3	$17.3
2004	1,550,500	3,900	17,875	$9.8	$13.5
2005	1,602,000	3,675	17,925	$10.7	$14.2

All Fires in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] As Reported	In 2020 Dollars
2006	1,642,500	3,245	16,400	$11.3	$14.5
2007	1,557,500	3,430	17,675	$14.6	$18.2
2008	1,451,500	3,320	16,705	$15.5	$18.7
2009	1,348,500	3,010	17,050	$12.5	$15.1
2010	1,331,500	3,120	17,720	$11.6	$13.8
2011	1,389,500	3,005	17,500	$11.7	$13.5
2012	1,375,000	2,855	16,500	$12.4	$14.0
2013	1,240,000	3,240	15,925	$11.5	$12.8
2014	1,298,000	3,275	15,775	$11.6	$12.7
2015	1,345,500	3,280	15,700	$14.3	$15.6
2016	1,342,000	3,390	14,650	$13.6	$14.7
2017	1,319,500	3,400	14,670	$23.0	$24.3
2018	1,318,500	3,655	15,200	$25.6	$26.4
2019	1,291,500	3,704	16,600	$14.8	$15.0
2020	1,388,500	3,500	15,200	$21.9	$21.9

[1]Individual incidents with large losses can affect the total for a given year.
[2]Estimates include 2,451 civilian deaths; 800 civilian injuries; and $33.44 billion in property loss resulting from the events of 9/11/01.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Structure Fire Problem in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.)

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations, handled by industrial fire brigades, or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time.

				Direct Property Damage (in Billions)[1]	
Year	Fires	Civilian Deaths	Civilian Injuries	As Reported	In 2020 Dollars
1980	1,065,000	5,675	24,725	$5.5	$17.3
1981	1,027,500	5,760	25,700	$6.0	$17.1
1982	946,500	5,200	25,575	$5.7	$15.3
1983	868,500	5,090	26,150	$5.8	$15.1
1984	848,000	4,525	23,025	$5.9	$14.7
1985	859,500	5,265	23,350	$6.4	$15.4
1986	800,000	4,985	22,750	$5.8	$13.7
1987	758,000	4,880	23,815	$6.2	$14.1
1988	745,000	5,280	26,275	$7.2	$15.8
1989	688,000	4,655	24,025	$7.5	$15.7
1990	624,000	4,400	24,075	$6.7	$13.3
1991	640,500	3,765	24,975	$8.3	$15.8
1992	637,500	3,940	24,325	$7.0	$12.9
1993	621,500	3,980	26,550	$7.4	$13.3
1994	614,000	3,590	23,125	$6.9	$12.1
1995	573,500	3,985	21,725	$7.6	$12.9
1996	578,500	4,220	21,875	$7.9	$13.1
1997	552,000	3,510	20,375	$7.1	$11.5
1998	517,500	3,420	19,425	$6.7	$10.7
1999	523,000	3,040	18,525	$8.5	$13.2
2000	505,500	3,535	19,600	$8.5	$12.8
2001[2]	521,500	3,220	17,225	$8.9	$13.0
2002	519,000	2,775	15,600	$8.7	$12.5
2003	519,500	3,385	15,600	$8.7	$12.3
2004	526,000	3,305	15,525	$8.3	$11.4
2005	511,000	3,105	15,325	$9.2	$12.2

Structure Fire Problem in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] As Reported	In 2020 Dollars
2006	524,000	2,705	14,350	$9.6	$12.3
2007	530,500	3,000	15,350	$10.6	$13.2
2008	515,000	2,900	14,960	$12.4	$14.9
2009	480,500	2,695	14,740	$10.8	$13.0
2010	482,000	2,755	15,420	$9.7	$11.5
2011	484,500	2,640	15,635	$9.7	$11.2
2012	480,500	2,470	14,700	$9.8	$11.1
2013	487,500	2,855	14,075	$9.5	$10.6
2014	494,000	2,860	13,425	$9.8	$10.7
2015	501,500	2,685	13,000	$10.3	$11.3
2016	475,500	2,950	12,775	$10.4	$11.2
2017	499,000	2,815	12,160	$10.7	$11.3
2018	499,000	2,910	12,700	$11.1	$11.4
2019	481,500	2,980	13,900	$12.3	$12.5
2020	490,500	2,730	13,000	$12.1	$12.1

[1]Individual incidents with large losses can affect the total for a given year.

[2]Does not include the events of 9/11/01, which caused 2,451 civilian deaths; 800 civilian injuries; and $33.44 billion in property loss.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Home Structure Fire Problem in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) The term *home* encompasses one- and two-family homes, including manufactured homes, apartments, or other multifamily homes.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. For more information about home structure fires, see the NFPA report *Home Structure Fires* and the accompanying supporting tables.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)[1] As Reported	In 2020 Dollars
1980	734,000	5,200	19,700	$2,848	$8,965
1981	711,000	5,400	19,125	$3,128	$8,898
1982	654,500	4,820	20,450	$3,147	$8,438
1983	625,500	4,670	20,750	$3,205	$8,328
1984	605,500	4,075	18,750	$3,362	$8,370
1985	606,000	4,885	19,175	$3,693	$8,879
1986	565,500	4,655	18,575	$3,464	$8,193
1987	536,500	4,570	19,965	$3,599	$8,205
1988	538,500	4,955	22,075	$3,897	$8,541
1989	498,500	4,335	20,275	$3,876	$8,103
1990	454,500	4,050	20,225	$4,157	$8,249
1991	464,500	3,500	21,275	$5,463	$10,388
1992	459,000	3,705	21,100	$3,775	$6,973
1993	458,000	3,720	22,000	$4,764	$8,541
1994	438,000	3,425	19,475	$4,215	$7,371
1995	414,000	3,640	18,650	$4,264	$7,247
1996	417,000	4,035	18,875	$4,869	$8,048
1997	395,500	3,360	17,300	$4,453	$7,187
1998	369,500	3,220	16,800	$4,273	$6,797
1999	371,000	2,895	16,050	$4,965	$7,718
2000	368,000	3,420	16,975	$5,525	$8,316
2001	383,500	3,110	15,200	$5,516	$8,074
2002	389,000	2,670	13,650	$5,931	$8,543
2003	388,500	3,145	13,650	$5,949	$8,384
2004	395,500	3,190	13,700	$5,833	$8,009
2005	381,000	3,030	13,300	$6,729	$8,926

Home Structure Fire Problem in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)[1] As Reported	In 2020 Dollars
2006	396,000	2,580	12,500	$6,832	$8,779
2007	399,000	2,865	13,600	$7,389	$9,227
2008	386,500	2,755	13,160	$8,243	$9,930
2009	362,500	2,565	12,650	$7,616	$9,194
2010	369,500	2,640	13,350	$6,928	$8,238
2011	370,000	2,520	13,910	$6,914	$7,971
2012	365,000	2,380	12,875	$7,010	$7,918
2013	369,500	2,755	12,200	$6,792	$7,549
2014	367,500	2,745	11,825	$6,826	$7,367
2015	365,500	2,560	11,075	$6,960	$7,512
2016	352,000	2,735	10,750	$7,231	$7,712
2017	357,000	2,630	10,600	$7,741	$8,078
2018	363,000	2,720	11,200	$8,022	$8,166
2019	339,500	2,770	12,200	$7,767	$7,767
2020	356,500	2,580	11,500	$8,400	$8,400

[1]Individual incidents with large losses can affect the total for a given year.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

One- and Two-Family Home Structure Fires[1] in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) Manufactured homes are considered one- or two-family homes.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. For more information about home structure fires, see the NFPA report *Home Structure Fires* and the accompanying supporting tables.

				Direct Property Damage (in Millions)[2]	
Year	**Fires**	**Civilian Deaths**	**Civilian Injuries**	**As Reported**	**In 2020 Dollars**
1980	590,500	4,175	16,100	$2,447	$7,702
1981	574,000	4,430	14,875	$2,713	$7,717
1982	538,000	3,960	15,750	$2,794	$7,492
1983	523,500	3,825	16,450	$2,792	$7,255
1984	506,000	3,290	15,100	$2,945	$7,332
1985	501,500	4,020	15,250	$3,217	$7,734
1986	468,000	4,005	14,650	$2,992	$7,077
1987	433,000	3,780	15,200	$3,078	$7,017
1988	432,500	4,125	17,125	$3,349	$7,340
1989	402,500	3,545	15,225	$3,335	$6,972
1990	359,000	3,370	15,250	$3,534	$7,013
1991	363,000	2,905	15,600	$3,354	$6,378
1992	358,000	3,160	15,275	$3,178	$5,870
1993	358,000	3,035	15,700	$4,111	$7,370
1994	341,000	2,785	14,000	$3,537	$6,185
1995	320,000	3,035	13,450	$3,615	$6,144
1996	324,000	3,470	13,700	$4,121	$6,811
1997	302,500	2,700	12,300	$3,735	$6,028
1998	283,000	2,775	11,800	$3,642	$5,793
1999	282,500	2,375	11,550	$4,123	$6,409
2000	283,500	2,920	12,575	$4,639	$6,983
2001	295,500	2,650	11,400	$4,652	$6,809
2002	300,500	2,280	9,950	$5,005	$7,209
2003	297,000	2,735	10,000	$5,052	$7,120
2004	301,500	2,680	10,500	$4,948	$6,794
2005	287,000	2,570	10,300	$5,781	$7,668

One- and Two-Family Home Structure Fires[1] in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)[2] As Reported	In 2020 Dollars
2006	304,500	2,155	8,800	$5,936	$7,628
2007	300,500	2,350	9,650	$6,225	$7,773
2008	291,000	2,365	9,185	$6,892	$8,303
2009	272,500	2,100	9,300	$6,391	$7,716
2010	279,000	2,200	9,400	$5,895	$7,010
2011	274,500	2,105	9,485	$5,746	$6,624
2012	268,000	2000	8,825	$5,818	$6,572
2013	271,500	2,430	8,300	$5,626	$6,253
2014	273,500	2,345	8,025	$5,844	$6,389
2015	270,500	2,155	8,050	$5,799	$6,340
2016	257,000	2,410	7,375	$6,142	$6,635
2017	262,500	2,290	7,470	$6,141	$6,491
2018	276,500	2,360	7,800	$6,493	$6,695
2019	264,500	2,390	8,800	$6,428	$6,511
2020	270,500	2,230	8,600	$6,771	$6,771

[1]Includes manufactured homes.
[2]Individual incidents with large losses can affect the total for a given year.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Apartment or Multifamily Housing Structure Fires in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) In NFIRS 5.0, row houses and townhouses are considered apartments. Apartments in two-family homes or duplexes are not included here.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. For more information about home structure fires, see the NFPA report *Home Structure Fires* and the accompanying supporting tables.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)[1] As Reported	Direct Property Damage (in Millions)[1] In 2020 Dollars
1980	143,500	1,025	3,600	$401	$1,262
1981	137,000	970	4,250	$415	$1,180
1982	116,500	860	4,700	$353	$947
1983	102,000	845	4,300	$413	$1,073
1984	99,500	785	3,650	$417	$1,038
1985	104,500	865	3,925	$476	$1,144
1986	97,500	650	3,925	$472	$1,116
1987	103,500	790	4,765	$521	$1,188
1988	106,000	830	4,950	$548	$1,201
1989	96,000	790	5,050	$541	$1,131
1990	95,500	680	4,975	$623	$1,236
1991	101,500	595	5,675	$609	$1,158
1992	101,000	545	5,825	$597	$1,103
1993	100,000	685	6,300	$653	$1,171
1994	97,000	640	5,475	$678	$1,186
1995	94,000	605	5,200	$649	$1,103
1996	93,000	565	5,175	$748	$1,236
1997	93,000	660	5,000	$718	$1,159
1998	86,500	445	5,000	$631	$1,004
1999	88,500	520	4,500	$842	$1,309
2000	84,500	500	4,400	$886	$1,334
2001	88,000	460	3,800	$864	$1,265
2002	88,500	390	3,700	$926	$1,334
2003	91,500	410	3,650	$897	$1,264
2004	94,000	510	3,200	$885	$1,215
2005	94,000	460	3,000	$948	$1,257

Apartment or Multifamily Housing Structure Fires in United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)[1] As Reported	In 2020 Dollars
2006	91,500	425	3,700	$896	$1,151
2007	98,500	515	3,950	$1,164	$1,453
2008	95,500	390	3,975	$1,351	$1,628
2009	90,000	465	3,350	$1,225	$1,479
2010	90,500	440	3,950	$1,033	$1,228
2011	95,500	415	4,425	$1,168	$1,347
2012	97,000	380	4,050	$1,192	$1,346
2013	98,000	325	3,900	$1,166	$1,296
2014	94,000	400	3,800	$982	$1,074
2015	95,000	405	3,025	$1,161	$1,269
2016	95,000	325	3,375	$1,089	$1,176
2017	95,000	340	3,130	$1,600	$1,691
2018	86,500	360	3,400	$1,529	$1,577
2019	75,000	380	3,400	$1,339	$1,356
2020	86,000	350	2,900	$1,629	$1,629

[1]Individual incidents with large losses can affect the total for a given year.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Residential Structure Fire Problem in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) Residential structures include homes, hotels and motels, dormitories and related properties, rooming houses, unclassified residential properties, and, since NFIRS 5.0, residential board and care properties.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. To find annual averages of fires and losses by property use and broad incident type, use the NFPA Fires by Occupancy or Property Type tool.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] As Reported	In 2020 Dollars
1980	757,500	5,446	21,100	$3.0	$9.4
1981	733,000	5,540	20,375	$3.3	$9.4
1982	676,500	4,940	21,100	$3.3	$8.8
1983	641,500	4,820	21,450	$3.3	$8.6
1984	623,000	4,240	19,275	$3.4	$8.5
1985	622,000	5,025	19,825	$3.8	$9.1
1986	581,500	4,770	19,025	$3.6	$8.5
1987	551,500	4,660	20,440	$3.7	$8.4
1988	552,500	5,065	22,600	$4.0	$8.8
1989	513,500	4,435	20,750	$4.0	$8.4
1990	467,000	4,115	20,650	$4.3	$8.5
1991	478,000	3,575	21,850	$5.6[1]	$10.7
1992	472,000	3,765	21,600	$3.9	$7.2
1993	470,000	3,825	22,600	$4.8[2]	$8.6
1994	451,000	3,465	20,025	$4.3	$7.5
1995	425,500	3,695	19,125	$4.4	$7.5
1996	428,000	4,080	19,300	$5.0	$8.3
1997	406,500	3,390	17,775	$4.6	$7.4
1998	381,500	3,250	17,175	$4.4	$7.0
1999	383,000	2,920	16,425	$5.1	$7.9
2000	379,500	3,445	17,400	$5.7	$8.6
2001	396,500	3,140	15,575	$5.6	$8.2
2002	401,000	2,695	14,050	$6.1	$8.8
2003	402,000	3,165	14,075	$6.1	$8.6
2004	410,500	3,225	14,175	$5.9	$8.1
2005	396,000	3,055	13,825	$6.9	$9.2

Residential Structure Fires in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] As Reported	In 2020 Dollars
2006	412,500	2,620	12,925	$7.0	$9.0
2007	414,000	2,895	14,000	$7.5	$9.4
2008	403,000	2,780	13,560	$8.6	$10.4
2009	377,000	2,590	13,050	$7.8	$9.4
2010	384,000	2,665	13,800	$7.1	$8.4
2011	386,000	2,550	14,360	$7.1	$8.2
2012	381,000	2,405	13,125	$7.2	$8.1
2013	387,000	2,785	12,575	$7.0	$7.8
2014	386,500	2,795	12,175	$7.0	$7.7
2015	388,000	2,605	11,575	$7.2	$7.9
2016	371,500	2,800	11,125	$7.4	$8.0
2017	379,000	2,710	10,910	$7.9	$8.4
2018	387,000	2,820	11,600	$8.3	$8.6
2019	361,500	2,870	12,700	$8.0	$8.1
2020	379,500	2,630	11,900	$8.7	$8.7

[1]Individual incidents with large losses can affect the total for a given year.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Non-Home Structure Fires in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) Non-home properties exclude one- or two-family homes and apartments but *include* other residential properties such as hotels and motels, dormitories and related properties, rooming houses, unclassified residential properties, and, since NFIRS 5.0, residential board and care properties.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. To find annual averages of fires and losses by property use and broad incident type, use the NFPA Fires by Occupancy or Property Type tool.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
1980	331,000	475	5,025	$2.6	$8.2
1981	316,500	360	6,575	$2.8	$8.0
1982	292,000	380	5,125	$2.6	$7.0
1983	243,000	420	5,400	$2.6	$6.8
1984	242,500	450	4,275	$2.5	$6.2
1985	253,500	380	4,175	$2.7	$6.5
1986	234,500	330	4,175	$2.4	$5.7
1987	221,500	310	3,850	$2.6	$5.9
1988	206,500	325	4,200	$3.3[3]	$7.2
1989	189,500	320	3,750	$3.6[4]	$7.5
1990	169,500	350	3,850	$2.6	$5.2
1991	176,000	265	3,700	$2.9	$5.5
1992	178,500	235	3,225	$3.2	$5.9
1993	163,500	260	4,550	$2.6	$4.7
1994	176,000	165	3,650	$2.7	$4.7
1995	159,500	345	3,075	$3.4	$5.8
1996	161,500	185	3,000	$3.1	$5.1
1997	156,500	150	3,075	$2.6	$4.2
1998	148,000	200	2,625	$2.4	$3.8
1999	152,000	145	2,475	$3.5	$5.4
2000	137,500	115	2,625	$3.0	$4.5
2001[2]	138,000	110	2,025	$3.4	$5.0
2002	130,000	105	1,950	$2.8	$4.0
2003	131,000	240	1,950	$2.7	$3.8
2004	130,500	115	1,825	$2.5	$3.4
2005	130,000	75	2,025	$2.5	$3.3

Non-Home Structure Fires in the United States Problem (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
2006	128,000	125	1,850	$2.8	$3.6
2007	131,500	135	1,750	$3.2	$4.0
2008	128,500	145	1,800	$4.1	$4.9
2009	118,000	130	2,090	$3.2	$3.9
2010	112,500	115	2,070	$2.8	$3.3
2011	114,500	120	1,725	$2.8	$3.2
2012	115,500	90	1,825	$2.8	$3.2
2013	118,000	100	1,875	$2.7	$3.0
2014	126,500	115	1,600	$3.0	$3.3
2015	136,000	125	1,925	$3.3	$3.6
2016	123,500	215	2,025	$3.2	$3.5
2017	142,000	185	1,560	$3.0	$3.2
2018	136,000	190	1,500	$3.0	$3.1
2019	142,000	210	1,700	$4.5	$4.6
2020	134,000	150	1,500	$3.7	$3.7

[1]Individual incidents with large losses can affect the total for a given year.

[2]Does not include the events of 9/11/01, which caused 2,451 civilian deaths; 800 civilian injuries; and $33.44 billion in property loss.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Non-Residential Structure Fires in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS). In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.) Non-residential properties exclude one- or two-family homes and apartments, hotels and motels, dormitories and related properties, rooming houses, unclassified residential properties, and, since NFIRS 5.0, residential board and care properties.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations, handled by industrial fire brigades, or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. To find annual averages of fires and losses by property use and broad incident type, use the NFPA Fires by Occupancy or Property Type tool.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
1980	307,500	229	3,625	$2.4	$7.6
1981	294,500	220	5,325	$2.7	$7.7
1982	270,000	260	4,475	$2.5	$6.7
1983	227,000	270	4,700	$2.5	$6.5
1984	225,000	285	3,750	$2.5	$6.2
1985	237,500	240	3,525	$2.7	$6.5
1986	218,500	215	3,725	$2.3	$5.4
1987	206,500	220	3,375	$2.5	$5.7
1988	192,500	215	3,675	$3.2	$7.0
1989	174,500	220	3,275	$3.5	$7.3
1990	157,000	285	3,425	$2.5	$5.0
1991	162,500	190	3,125	$2.8	$5.3
1992	165,500	175	2,725	$3.1	$5.7
1993	151,500	155	3,950	$2.6	$4.7
1994	163,000	125	3,100	$2.6	$4.5
1995	148,000	290	2,600	$3.3	$5.6
1996	150,500	140	2,575	$3.0	$5.0
1997	145,500	120	2,600	$2.5	$4.0
1998	136,000	170	2,250	$2.3	$3.7
1999	140,000	120	2,100	$3.4	$5.3
2000	126,000	90	2,200	$2.8	$4.2
2001[2]	125,000	80	1,650	$3.2	$4.7
2002	118,000	80	1,550	$2.7	$3.9
2003	117,500	220	1,525	$2.6	$3.7
2004	115,500	80	1,350	$2.4	$3.3
2005	115,000	50	1,500	$2.3	$3.1
2006	111,500	85	1,425	$2.6	$3.3
2007	116,500	105	1,350	$3.1	$3.3
2008	112,000	120	1,400	$3.8	$3.9
2009	103,500	105	1,690	$3.0	$4.6
2010	98,000	90	1,620	$2.6	$3.6

Non-Residential Structure Fires in the United States (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
2011	98,500	90	1,275	$2.6	$3.1
2012	99,500	65	1,525	$2.6	$3.0
2013	100,500	70	1,500	$2.6	$2.9
2014	107,500	65	1,250	$2.9	$2.9
2015	113,500	80	1,425	$3.1	$3.2
2016	104,000	150	1,650	$3.0	$3.4
2017	120,000	105	1,250	$2.8	$3.2
2018	112,000	90	1,100	$2.8	$3.0
2019	120,000	110	1,200	$4.4	$2.9
2020	111,000	100	1,100	$3.4	$4.5

[1]Individual incidents with large losses can affect the total for a given year.

[2]Does not include the events of 9/11/01, which caused 2,451 civilian deaths; 800 civilian injuries; and $33.44 billion in property loss.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Highway Vehicle Fires in the United States

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey (FES). The FES uses definitions from the US Fire Administration's National Fire Incident Reporting System (NFIRS.) Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire. Highway vehicles include cars, trucks, motorcycles, buses, recreational vehicles in transit, and other vehicles intended for roadway use. The term *highway* describes the type of vehicle, not the location of the fire. See the NFPA report *Vehicle Fires* for more information on the causes and circumstances of these incidents.

In some years, large conflagrations, such as the events of September 11, 2001, or fires in the wildland/urban interface (WUI) or other areas, caused large losses that were not broken out by incident type. Such losses are part of the US fire problem but are not included in the tables about specific types of fires.

Fires that were reported to federal or state firefighting organizations or not reported at all are not captured here. Estimates can be skewed by the inclusion or omission of one very serious fire. Anyone who is not a firefighter is considered a civilian.

For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see NFPA's *Large-Loss Fires in the United States* and *Catastrophic Multiple-Death Fires* reports and the associated tables on the costliest and deadliest fires over time. To find annual averages of fires and losses by property use and broad incident type, use the NFPA Fires by Occupancy or Property Type tool.

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
1980	456,000	650	2,850	$0.5	$1.6
1981	453,000	770	2,900	$0.5	$1.4
1982	433,000	575	3,250	$0.5	$1.3
1983	435,500	670	3,400	$0.6	$1.6
1984	437,000	530	3,250	$0.6	$1.5
1985	437,000	770	3,250	$0.7	$1.7
1986	438,000	665	2,850	$0.7	$1.7
1987	451,000	755	2,900	$0.7	$1.6
1988	459,000	800	2,750	$0.8	$1.8
1989	415,500	560	2,750	$0.8	$1.7
1990	415,000	645	3,025	$0.8	$1.6
1991	406,500	530	2,675	$0.8	$1.5
1992	385,500	665	2,750	$0.8	$1.5
1993	402,000	540	2,400	$0.9	$1.6
1994	402,000	555	2,325	$1.0	$1.7
1995	386,000	490	2,275	$1.0	$1.7
1996	395,000	550	2,075	$1.1	$1.8
1997	377,000	450	1,950	$1.1	$1.8
1998	358,500	545	2,050	$1.1	$1.7
1999	345,000	450	1,600	$1.1	$1.7
2000	325,000	450	1,325	$1.2	$1.8
2001	327,000	470	1,750	$1.3	$1.9
2002	307,000	540	1,700	$1.2	$1.7
2003	286,000	455	1,400	$1.1	$1.6
2004	266,500	520	1,300	$1.0	$1.4
2005	259,000	500	1,450	$1.0	$1.3

Highway Vehicle Fires in the United States, (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Billions)[1] as Reported	in 2020 Dollars
2006	250,000	445	1,075	$1.0	$1.3
2007	227,500	365	1,500	$1.1	$1.4
2008	207,000	350	850	$1.2	$1.4
2009	190,500	260	1,455	$1.0	$1.2
2010	184,500	285	1,440	$1.0	$1.2
2011	187,500	270	1,020	$1.0	$1.2
2012	172,500	300	800	$1.3	$1.5
2013	164,000	300	925	$1.1	$1.2
2014	167,500	310	1,275	$1.1	$1.2
2015	174,000	445	1,550	$1.2	$1.3
2016	173,000	280	1,075	$1.3	$1.4
2017	168,000	400	1,370	$1.5	$1.6
2018	181,500	490	1,300	$1.4	$1.4
2019	189,500	550	1,700	$1.6	$1.6
2020	173,000	580	1,500	$1.6	$1.6

[1]Individual incidents with large losses can affect the total for a given year.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Number of Fires by Type of Fire

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey. Fires that were reported to federal or state firefighting organizations, handled by industrial fire brigades, or not reported at all are not captured here. The term *highway vehicle* refers to vehicles intended for roadway use, such as cars, trucks, buses, motorcycles, recreational vehicles in transit, etc.

Year	Total	Structures	Outside of Structures with Value but No Vehicle (outside storage, crops, timber, etc.)	Highway Vehicles	Other Vehicles (Trains, Boats, Ships, Aircraft, Farm Vehicles, and Construction Vehicles)	Brush, Grass, and Wildland (excluding crops and timber) with No Value or Loss Involved	Rubbish Including Dumpsters (outside of structures), with No Value or Loss Involved	All Other Fires
1980	2,988,000	1,065,000	86,500	456,000	15,500	718,500	397,000	249,500
1981	2,893,500	1,027,500	81,000	453,000	13,500	711,000	341,000	266,500
1982	2,538,000	946,500	54,000	433,000	10,000	522,500	309,500	262,500
1983	2,326,500	868,500	49,500	435,500	11,500	467,500	288,000	206,000
1984	2,343,000	848,000	45,000	437,000	17,500	487,500	303,000	205,000
1985	2,371,000	859,500	51,500	437,000	18,500	531,000	301,500	172,000
1986	2,271,500	800,000	50,000	438,000	18,500	502,000	293,000	170,000
1987	2,330,000	758,000	55,000	451,000	20,000	553,000	308,500	184,500
1988	2,436,500	745,000	63,000	459,000	18,500	675,500	333,500	142,000
1989	2,115,000	688,000	54,500	415,500	20,000	498,000	321,000	118,000
1990	2,019,000	624,000	52,000	415,000	21,500	472,000	314,500	120,000
1991	2,041,500	640,500	53,500	406,500	22,000	492,000	314,000	113,000
1992	1,964,500	637,500	50,500	385,500	19,500	439,000	304,000	128,500
1993	1,952,500	621,500	52,000	402,000	18,500	444,000	287,500	127,000
1994	2,054,500	614,000	66,500	402,000	20,000	503,000	292,000	157,000
1995	1,965,500	573,500	61,000	386,000	20,500	503,500	274,000	147,000
1996	1,975,000	578,500	62,500	395,000	18,500	515,000	251,000	154,500
1997	1,795,000	552,000	56,500	377,000	20,000	415,500	247,000	127,000
1998	1,755,500	517,500	62,000	358,500	22,500	424,000	229,000	142,000
1999	1,823,000	523,000	64,000	345,000	23,500	498,000	226,500	143,000
2000	1,708,000	505,500	68,500	325,000	23,500	455,000	215,000	115,500
2001	1,734,500	521,500	75,000	327,000	24,500	414,000	208,500	164,000
2002	1,687,500	519,000	71,000	307,000	22,500	399,000	204,000	165,000
2003	1,584,500	519,500	66,000	286,000	26,000	360,000	190,500	136,500
2004	1,550,500	526,000	69,000	266,500	30,500	320,000	194,000	144,500
2005	1,602,000	511,000	78,000	259,000	31,000	379,500	215,000	128,500

Number of Fires by Type of Fire (Continued)

Year	Total	Structures	Outside of Structures with Value but No Vehicle (outside storage, crops, timber, etc.)	Highway Vehicles	Other Vehicles (Trains, Boats, Ships, Aircraft, Farm Vehicles, and Construction Vehicles)	Brush, Grass, and Wildland (excluding crops and timber), with No Value or Loss Involved	Rubbish Including Dumpsters (outside of structures), with No Value or Loss Involved	All Other Fires
2006	1,642,500	524,000	82,500	250,000	28,000	415,500	212,000	130,500
2007	1,557,500	530,500	85,000	227,500	30,500	355,000	206,500	122,500
2008	1,451,500	515,000	71,000	207,000	29,000	335,000	188,000	106,500
2009	1,348,500	480,500	69,000	190,500	28,500	306,000	171,000	103,000
2010	1,331,500	482,000	72,500	184,500	31,000	304,000	173,000	84,500
2011	1,389,500	484,000	79,000	187,500	31,500	338,000	180,500	88,500
2012	1,375,000	480,500	83,000	172,000	30,000	350,000	179,000	80,000
2013	1,240,000	487,500	67,000	164,000	24,000	254,500	158,000	85,000
2014	1,298,000	494,000	65,000	167,500	26,000	290,500	157,500	97,500
2015	1,345,500	501,500	76,000	174,000	30,000	297,000	163,000	103,500
2016	1,342,000	475,500	88,000	173,000	31,000	298,500	172,000	104,000
2017	1,319,500	499,000	74,000	168,000	29,500	283,000	174,500	91,000
2018	1,318,500	499,000	70,500	181,500	31,000	270,000	169,000	97,500
2019	1,291,500	481,500	70,500	189,500	33,500	244,500	177,500	94,500
2020	1,388,500	490,500	84,000	173,000	36,500	277,000	225,000	102,500

These estimates are based on data reported to the NFPA by fire departments that responded to the 1980–2018 fire experience survey.

Note: Direct property damage figures do not include indirect losses, like business interruption.
Inflation adjustment to 2020 dollars was done using the Consumer Price Index Purchasing Power of the Dollar.

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

Number of Civilian Fire Deaths by Type of Fire

The estimates below are based on fires reported to local (including county) fire departments and derived from the NFPA annual fire experience survey.

Anyone who is not a firefighter is considered a civilian. For details about fires resulting in unusually large numbers of fire deaths or exceptionally large property losses, see the NFPA report *Catastrophic Multiple-Death Fires* and the associated tables on the deadliest fires over time.

In general, any fire that occurs in or on a structure is considered a structure fire, even if no damage was done to the structure itself. (Since the inception of Version 5.0 of NFIRS, a vehicle that burns inside a structure but does not damage the structure is considered a vehicle fire.)

Year	Total	Structure	Home Structure	Vehicle	Outside or Other
1980	6,505	5,675	5,200	740	90
1981	6,700	5,760	5,400	840	100
1982	6,020	5,200	4,820	695	125
1983	5,920	5,090	4,670	725	105
1984	5,240	4,525	4,075	630	85
1985	6,185	5,265	4,885	825	95
1986	5,850	4,985	4,655	735	130
1987	5,810	4,880	4,570	805	125
1988	6,215	5,280	4,955	865	70
1989	5,410	4,655	4,335	685	70
1990	5,195	4,400	4,050	695	100
1991	4,465	3,765	3,500	605	95
1992	4,730	3,940	3,705	730	60
1993	4,635	3,980	3,720	595	60
1994	4,275	3,590	3,425	630	55
1995	4,585	3,985	3,640	535	65
1996	4,990	4,220	4,035	710	60
1997	4,050	3,510	3,360	480	60
1998	4,035	3,420	3,220	575	40
1999	3,570	3,040	2,895	470	60
2000	4,045	3,535	3,420	465	45
2001	6,196	5,671	3,110	485	40
2002	3,380	2,775	2,670	565	40
2003	3,925	3,385	3,145	475	65
2004	3,900	3,305	3,190	550	45
2005	3,675	3,105	3,030	520	50
2006	3,245	2,705	2,580	490	50
2007	3,430	3,000	2,865	385	45
2008	3,320	2,900	2,755	365	55
2009	3,010	2,695	2,565	280	35
2010	3,120	2,755	2,640	310	55

Number of Civilian Fire Deaths by Type of Fire (Continued)

Year	Total	Structure	Home Structure	Vehicle	Outside or Other
2011	3,005	2,640	2,520	300	65
2012	2,855	2,470	2,380	325	60
2013	3,240	2,855	2,755	320	65
2014	3,275	2,860	2,745	345	70
2015	3,280	2,685	2,560	500	95
2016	3,390	2,950	2,735	355	85
2017	3,390	2,815	2,630	430	145
2018	3,655	2,910	2,720	560	185
2019	3,704	2,980	2,770	644	80
2020	3,500	2,730	2,580	630	140

Source: *Fire Loss in the United States During 2020* and previous reports in the series.

APPENDIX D: 2021 Code Change Proposals

RB313.1-21

VRC: R313.1, R313.1.1

Proponents: Andrew Milliken (amilliken@staffordcountyva.gov)

2018 Virgina Residential Code

Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. ~~Notwithstanding the requirements of Section 103.3, where installed, an~~ An automatic residential fire sprinkler system ~~for *townhouses*~~ shall be ~~designed and installed in accordance with NFPA 13D or Section P2904.~~ installed in *townhouses.*

> **Exception:** An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA 13D, 13, or 13R.

Reason Statement: This proposal is the same townhouse fire sprinkler requirement initially approved by the Board of Housing and Community Development during the 2018 Code Development Cycle. Recognizing that townhomes require homeowners to put their trust in their neighbors for fire safety, requiring fire sprinklers in townhomes provides active and built-in protection for homeowners against that risk for each townhome in the row.

Home fires are fast; sprinklers are faster. According to Underwriters Laboratories, modern home furnishing burn tests have measured the burn rates and times of older home furnishings, made up of materials using solid wood, wool and down, and compared them with today's home furnishings that contain mostly synthetic materials and electronics in addition to open-floor plans, larger homes and engineered lumber. The results? Today's home fires burn much faster, leaving less time for residents to get out of structures and posing new challenges for firefighters (www.youtube.com/watch?v=aDNPhq5ggoE).

Home fires are deadly; sprinklers save lives. According to National Fire Protection Association statistics for 2020, 74% of fire deaths occur in the home. Home fire sprinklers can save lives and property from fire. They respond quickly and effectively to fire, often extinguishing the fire before the fire department arrives. Only the sprinkler closest to the fire will activate, spraying water on the fire.

Homes need to be affordable; sprinklers are too. The national average for installing automatic fire sprinklers in new homes is $1.35 per sprinklered square foot. Putting that figure in perspective, people pay similar amounts for carpet upgrades, whirlpool baths, or granite countertops.

MYTH: "A smoke alarm provides enough protection." FACT: Smoke alarms alert occupants to the presence of danger, but do nothing to extinguish the fire. Home fire sprinklers respond quickly to reduce heat, flames, and smoke from a fire, giving residents valuable time to get out safely. Having a working smoke alarm cuts the chances of dying in a reported fire in half. However, if you have a reported fire in your home, the risk of dying decreases by about 85% when sprinklers are present.

MYTH: "Newer homes are safer homes; the fire and death problem is limited to older homes." FACT: Age of housing is a poor predictor of fire death rates. Yes, new construction codes allow for tighter construction and better draft-stopped homes, which help slow the spread of fire. However, these safeguards have not completely mitigated the home fire problem. The majority of home fires are caused by candles, smoking materials, cooking, arcing, and other occupant-based activities. These types of fires happen in old and new construction alike. Moreover, new methods of construction negatively impact occupant and firefighter life safety under fire conditions. The National Research Council of Canada (NRC) tested the performance of unprotected floor assemblies exposed to fire. The findings of the study, "The Performance of Unprotected Floor Assemblies in Basement Fire Scenarios," assert that these structures are prone to catastrophic collapse as early as six minutes from the onset of fire. The same UL study found that the synthetic construction of today's home furnishings add to the increased risk by providing a greater fuel load. Larger homes, open spaces, increased fuel loads, void spaces, and changing building materials contribute to: faster fire propagation, shorter time to flashover, rapid changes in fire dynamics, shorter escape time, shorter time to collapse

MYTH: "Home fire sprinklers are expensive and will make housing unaffordable, especially for first-time buyers moving to our area." FACT: The fact is that home fire sprinklers are affordable. In 2013, the Fire Protection Research Foundation issued its updated Home Fire Sprinkler Cost Assessment report, which revealed that the cost of installing home fire sprinklers averages $1.35 per sprinklered square foot for new construction. That's down from $1.61 per sprinklered square foot that was in the Foundation's 2008 report. To put the cost of sprinklers into perspective, many people pay similar amounts for carpet upgrades, a paving stone driveway, or a whirlpool bath. Installing home fire sprinklers can help residents significantly reduce property loss in the event of fire, cut homeowner insurance premiums, and help support local fire service efforts.

MYTH: "We don't need sprinkler requirements; they can be installed in homes voluntarily."FACT: Fire sprinklers are a U.S. model building code requirement for all new, one- and two-family homes. If a new home is lacking this safety feature, it is not adhering to national model building codes, and should therefore be considered substandard. Adopting this requirement to sprinkler new homes provides a greater overall level of safety in communities. By requiring this technology, you are ensuring that a large number of residents can enjoy the same level of safety found in many offices, schools, apartments, and public buildings. Beyond the life-saving benefits of home sprinklers, there are other incentives; cities can reduce the strain on fire service personnel, limit damage to property, and help conserve municipal water resources by reducing the amount of water needed to fight fires.

MYTH: “Home fire sprinklers often leak or activate accidentally.” FACT: Leaks from fire sprinklers are very rare. Scottsdale, Arizona, for instance, has had an ordinance for home fire sprinklers since 1986. According to *NFPA's "U.S. Experience with Sprinklers" report, a survey conducted there found that the majority of residents living in sprinklered homes had never experienced a leak or maintenance problem. The report also noted that sprinklers operated in 94 percent of home fires in which sprinklers were present and fires were considered large enough to activate them. They were effective at controlling the fire in 96 percent of fires in which they operated. In three of every five home fires in which sprinklers failed to operate, the system had been shut off.*

MYTH: "If you want your home fire sprinklers to be reliable, they will need frequent, expensive maintenance.” FACT: The standard design for home fire sprinklers is much simpler than the design for more traditional sprinklers used in commercial buildings. If you install home fire sprinklers, the only “inspection and maintenance” you need to do are simple tasks outlined by the Home Fire Sprinkler Coalition, including simple flow tests and visual inspections.

MYTH: “When a fire occurs, every sprinkler will activate and everything in the house will be ruined." FACT: In the event of a fire, typically, only the sprinkler closest to the fire will activate, spraying water directly on the fire, leaving the rest of the house dry and secure. Roughly 85 percent of the time, only one sprinkler activates during a fire.

MYTH: “The water damage caused by fire sprinklers will be more extensive than fire damage.” FACT: Home fire sprinklers can significantly reduce property loss and damage due to a fire. The sprinkler will quickly control the heat and smoke from the fire, limiting damage to other areas of the house and giving residents valuable time to get out safely. Any resulting impact from the sprinkler will be much less severe than the damage caused by water from fire-fighting hose lines. Fire departments use up to eight-and-a-half times more water to extinguish a home fire as fire sprinklers would use to extinguish the same fire.

MYTH: “Home fire sprinklers are not practical in colder climates, as the pipes will freeze and cause water damage.” FACT: With proper installation, home fire sprinklers will not freeze in cold settings. NFPA 13D, Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, sets forth guidelines on proper insulation to avoid pipes freezing.

MYTH: “Home fire sprinklers are unattractive and will ruin the aesthetics of our residents’ homes.”FACT: New home fire sprinkler models are very unobtrusive, can be mounted flush with walls or ceilings, and can be concealed behind decorative covers.

MYTH: “Any time a smoke alarm goes off it will activate the home fire sprinklers.” FACT: Each individual sprinkler is designed and calibrated to activate only during the heat from a fire. They do not operate in response to smoke, burned toast, cooking vapors, steam, or an activating smoke alarm.

https://ul.org/new-demonstration-video-shows-you-only-have-three-minutes-escape-home-fire

https://www.nfpa.org/Public-Education/Staying-safe/Safety-equipment/Home-fire-sprinklers/Fire-Sprinkler-Initiative/Take-action/Free-downloads/Myths-vs-facts

Resiliency Impact Statement: This proposal will increase Resiliency
This proposal will increase the minimum life safety infrastructure of new residential townhouses such that they are more resilient to the impact of fire. It ensures that fire sprinkler protection is built-in with each townhome and remains for the life span of the structure.

Cost Impact: The code change proposal will increase the cost of construction
According to a 2013 study by the Fire Research Foundation, the national average cost for installing a residential sprinkler system is $1.35 per square foot or $3,375 for a 2,500-square-foot home. A copy of that report is available at https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Suppression/HomeFireSprinklerCostAssessment2013.ashx. With the average construction cost of a new home at $114 per square foot in 2019, that’s paying a little more than 1% of a home’s value for 24/7 fire protection.

Attached Files

- **Fact Sheet - water supply.pdf**
  https://va.cdpaccess.com/proposal/1134/1554/files/download/659/
- **Fact Sheet - Townhouses.pdf**
  https://va.cdpaccess.com/proposal/1134/1554/files/download/658/

FACT SHEET

Water Supplies for Home Fire Sprinkler Systems

This document has been developed to dispel myths by providing factual information about water supply requirements for home fire sprinkler systems.

MYTH: *Home fire sprinkler systems require expensive upgrades to a new home's water supply system.*

FACTS: Home fire sprinkler systems have become so efficient that they can often be designed to use the same or even less water than a new home's plumbing system.

- Fire sprinklers typically require only 7 pounds-per-square-inch (psi) to operate, which is less than the minimum required pressure for residential plumbing fixtures.

  Plumbing systems require:
  - 8 psi minimum pressure for any plumbing fixture.[1]
  - 20 psi minimum pressure for temperature controlled shower valves (these are mandatory in new homes).[2]
  - 40 psi minimum pressure for the main supply connection (applies to all homes with indoor plumbing, even those supplied by wells).[3]
- A single fire sprinkler can use as little as 8 gallons-per-minute (gpm). With home fire sprinkler systems typically designed to accommodate two simultaneously flowing sprinklers, 16 gpm may be all that's needed to supply fire sprinklers. This is actually less than the 18 gpm minimum that would be required by the Plumbing Code to supply plumbing fixtures in a typical entry-level home with 3 bedrooms, 2 bathrooms and 2 outdoor hose connections.[4]
- Fire sprinklers will typically require more water in larger, more expensive homes, but such homes tend to have more plumbing fixtures, which require an increased water supply for plumbing as well. One or two sprinklers must flow for a minimum of 7-10 minutes, which can be provided by a well and/or a small tank when sprinklers are not supplied by a water distribution system.

MYTH: *Home fire sprinkler systems require big, expensive water meters.*

FACTS: When a fire sprinkler system is supplied by a water distribution system, water meter size is based on the required pressure and flow, which as stated above, may actually be greater for plumbing than for fire sprinklers. Fire sprinklers won't lead to increased meter or tap fees when the sprinkler system is able to be supplied by the same size meter that serves household plumbing.

A typical 5/8-inch meter will flow up to 20 gpm, which is adequate to operate a fire sprinkler system in many homes.[5] A 3/4-inch meter, which will flow well over 30 gpm, is capable of handling just about any home fire sprinkler system. Most often, the size of underground pipe leading to a house is much more limiting than the meter itself. Upsizing the underground piping

[1] International Residential Code (IRC) Table P2903.1
[2] IRC Section P2708
[3] IRC Section P2903.3
[4] IRC Table P2903.6 [17.5 fixture units: 2 bathroom groups, 1 kitchen group, 1 laundry group and 2 hose bibs], and IRC Table P2903.6(1)
[5] IRC Table P2904.6.2(2) [This is the prescriptive allowance for any meter. When a meter of known flow characteristics flows more, the higher flow may be used.]

between the meter and the house is an easy and inexpensive way to improve pressure and flow for all plumbing, including fire sprinklers, without a larger meter.

It's important to note some meter manufacturers' literature specify lesser flow limits, focusing on the range over which a meter will accurately measure continuous flow. With respect to supplying home fire sprinklers, meter flow limits should be evaluated based on the maximum flow rate rather than continuous flow accuracy limits. Water authorities should recognize that sprinklers will always use less water than fire hoses connected to unmetered fire hydrants that would otherwise be needed to put out a fire, so there is no legitimate value in requiring accurate measurement of sprinkler flow in the event of a fire

MYTH: Fire sprinkler systems require expensive backflow preventers.

FACTS: National plumbing codes never require backflow protection for home fire sprinkler systems fabricated with materials approved for household plumbing, such as CPVC, PEX or copper.[6] Occasionally, a local plumbing authority may nevertheless request a backflow preventer, not recognizing that fire sprinkler systems can be safety connected directly to a potable water supply.

Where backflow prevention is an issue because of a local requirement, there are several options whereby additional backflow controls for fire sprinklers can be avoided.

- Fire sprinklers can be incorporated as part of a multipurpose plumbing system that feeds both sprinklers and plumbing fixtures from a home's cold water plumbing pipes.
- Fire sprinklers can be supplied by a separate water connection, with a toilet connected to the end of sprinkler piping to ensure that the piping is occasionally purged by flushing the toilet to prevent stagnant water. This arrangement is referred to as "passive purge."
- Where a yard irrigation system is installed, backflow prevention will be required because such systems are subject to backflow of non-potable water. Fire sprinklers can share the irrigation backflow preventer; thereby, eliminating the need for an additional device.

MYTH: Rural water distribution systems and wells don't have enough water to supply home fire sprinklers.

FACTS: As indicated above, if the water distribution system or well provides enough water to supply household plumbing needs, the supply may be adequate for fire sprinklers. In some cases a larger pump or tank may be needed for sprinklers, but standard, off-the-shelf pumps and tanks suitable for plumbing systems are permitted. When such upgrades are provided, they actually benefit the owner on a daily basis beyond fire protection, because the home's plumbing system will be more robust. Additional water storage can also be invaluable for emergency use in the event of a natural disaster that interrupts utilities.

It should also be noted that, were a rural water distribution system found to be inadequate to supplying 16 gpm for fire sprinklers, it would probably fall short of the minimum code-required plumbing demand, and it would surely fall far short of the 1,000+ gpm needed from fire hydrants to support a fire department extinguishing a fire in an unsprinklered home.

About IRC Fire Sprinkler Coalition
Founded in 2007, the IRC Fire Sprinkler Coalition has grown to include more than 100 international, national and regional public safety organizations, including associations representing 45 states, all of whom support the mission of promoting residential fire sprinkler systems in new home construction. More information can be found at www.IRCFireSprinkler.org.

[6] IRC Section P2904.1

FACT SHEET

Fire Sprinkler Systems for Townhouses

Beginning with the 2009 edition, the International Residential Code (IRC) requires fire sprinkler systems to be provided as a standard feature in all newly constructed townhouses. This document provides information to dispel myths about the background and costs associated with townhouse fire sprinkler systems.

MYTH: Fire sprinkler systems are an expensive add-on in new townhouses that will negatively impact affordability.

FACTS: The IRC provides numerous financial offsets that reduce the cost of fire sprinklers. For example, townhouse separation walls are permitted to be 1-hour fire rated, rather than 2-hour, when sprinklers are provided. This single incentive can dramatically reduce the overall construction costs, when comparing the total cost of building a sprinklered townhouse with 1-hour separation walls vs an unsprinklered townhouse with 2-hour walls.

According to a 2010 estimate provided by a national “Top 10” multifamily builder, the cost savings associated with reducing a townhouse separation wall from a 2-hour rated assembly to a 1-hour rated assembly is approximately $2.20 per square foot of separation wall. Assuming a 2-story, 1,200 square foot townhouse measuring 20-feet by 30-feet with a pitched roof and attic, the incremental cost of providing a 2-hour wall versus a 1-hour wall would be $1,567. In comparison, the sprinkler system for this building, using the most recent national average cost of $1.35 per square foot cited by the National Fire Protection Research Foundation would be $1,620. Therefore, the firewall incentive alone could reduce the net cost of sprinklers to $53 in this example.

When other factors are considered, such as reduced fire access roadway widths, reduced fire hydrant and water main requirements, and the fact that sprinkler installation costs are often less for townhouses vs. single-family homes due to economies of scale, the overall cost of constructing a sprinklered townhouse community may be less than a non-sprinklered community.

MYTH: Residential sprinkler systems in townhouses are a new and unproven technology that is not yet ready for widespread use.

FACTS: The first residential sprinkler standard was written more than 45 years ago, in 1975, and according to U.S. government statistics, millions of families now live in sprinkler-properties. With respect to townhouses, the **Maryland Building Officials Association**, one of the original proponents of the IRC sprinkler requirement for townhouses in 2008, summed up their extensive experience with fire sprinklers in townhouses in their justification statement, as follows:

> “*Since 1990, townhouses in Maryland have been sprinklered and being so has not been detrimental to the home building industry, but has been a major success to saving lives over the past 18 years. To address reasonable fire protection and affordable housing, many Maryland jurisdictions over the years have permitted townhouse separation of one hour with sprinklers installed in accordance with NFPA 13D. Therefore, based on our past success with sprinklered townhouses with one-hour separations between the townhouses, MBOA is in support of mandatory sprinklers in townhouses with one-hour dwelling unit separations.*

MYTH: The IRC requirement to install fire sprinklers in townhouses was initiated by the fire service and the fire sprinkler industry and it was forced on builders.

FACTS: The code change proposal that added the IRC fire sprinkler requirement (Proposal RB66-07/08) was actually submitted by a major multifamily builder, AvalonBay Communities, and public comments supporting this change were submitted by the Maryland Building Officials Association and the New York State Building Officials Conference. As a major builder of multifamily residential properties, AvalonBay Communities developed extensive experience in installing fire sprinkler systems in townhouses and concluded that sprinkler systems were desirable, cost-effective and should be required as a standard feature in new townhouses.

MYTH: It's best to give home buyers the right to choose whether or not to have sprinklers, as opposed to having codes mandate these systems in all townhouses.

FACTS: It is a fundamental function of building codes to ensure safe housing. Home buyers don't get to choose whether their homes are built to withstand seismic forces, wind loads or snow loads. Likewise, home buyers aren't given the choice of having or not having safe electrical, plumbing, or mechanical systems or smoke alarms. Codes provide minimum requirements for all of these aspects of safe housing in the interest of public safety.

Fire sprinkler systems are no different. Just as car safety regulations have evolved over time from only requiring seat belts to now requiring air bags and backup cameras, building codes have evolved from requiring only smoke alarms to now requiring sprinkler systems for fire safety.

In the case of townhouses, it particularly makes sense for codes to require sprinkler systems because each family's safety is reliant on their neighbors. An accident or careless behavior in one unit often impacts multiple units in non-sprinklered townhouses. Fire sprinklers are the most effective way to ensure that a fire in one townhouse will not threaten families in adjacent units.

Furthermore, townhouses are typically constructed as "spec homes," without buyer involvement during the design or construction process. Adding sprinklers after-the-fact to a finished townhouse unit would greatly increase the cost and complexity of the installation, if it were feasible at all. Likewise, it makes no sense to allow an initial buyer, or the builder in the case of a speculative home, to opt out of fire sprinklers, knowing that such a choice will deny all future owners the option of having sprinklers, given that retrofit installations are typically not feasible.

About IRC Fire Sprinkler Coalition. Founded in 2007, the IRC Fire Sprinkler Coalition has grown to include more than 100 international, national and regional public safety organizations, including associations representing 45 states, all of whom support the mission of promoting residential fire sprinkler systems in new home construction. More information can be found at www.IRCFireSprinkler.org.

RB313.1(2)-21

VRC: SECTION R313, R313.1, R313.1.1, R313.2, R313.2.1

Proponents: Glenn Dean

2018 Virgina Residential Code

SECTION R313
AUTOMATIC FIRE SPRINKLER SYSTEMS

Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. ~~Notwithstanding the requirements of Section 103.3, where installed, an~~ An automatic residential fire sprinkler ~~system for *townhouses*~~ systems shall be ~~designed and installed in accordance with NFPA 13D or Section P2904.~~ installed in *townhouses* .

> **Exception:** An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA ~~13D, 13, or 13R.~~ 13D.

R313.2 One- and two-family dwellings automatic fire sprinkler systems. ~~Notwithstanding the requirements of Section 103.3, where installed, a an~~ An automatic residential fire sprinkler system shall be designed and installed in ~~accordance with Section P2904 or NFPA 13D, 13 or 13R.~~ one- and two-family dwellings.

> **Exception:** An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential fire sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA ~~13D, 13 or 13R.~~ 13D.

Reason Statement: I'm submitting this to revert to model code language because the facts supporting a sprinkler requirement in NEW residential construction have not changed over the years, nor have the falsehoods against it. The facts and falsehoods need not be enumerated – again – in this supporting statement. We already know what they are and have for decades. Because of materials used, lightweight construction, density of housing and so on, newly constructed houses burn quickly making the incorporation of sprinklers more imperative. Having a residential sprinkler system provides time for occupants to vacate before untenable conditions are created as they would be without the presence of sprinklers. The fragility of the construction industry is nothing new either. It has been fragile for decades and will continue to fragile for years to come. The same with the increase of housing costs. That's not new. It's always gone up and will continue to go up. By comparison, what I can't understand is the sacrificial cost of a human life when compared to the now relatively insignificant cost of installing residential sprinklers in new construction.

Resiliency Impact Statement: This proposal will increase Resiliency
If construction resiliency means to reduce, respond, adapt or avoid a failure due to a destructive event such as a fire, then yes, this proposal will increase resiliency.

Cost Impact: The code change proposal will increase the cost of construction
This code change might increase construction cost approximately one percent - OR LESS - particularly in light of the tradeoffs available.

RB313.1(3)-21

VRC: R313.1, R313.1.1

Proponents: Jeffrey Shapiro (jeff.shapiro@intlcodeconsultants.com)

2018 Virgina Residential Code

Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. An automatic sprinkler system shall be installed in townhouses.~~Notwithstanding the requirements of Section 103.3, where installed, an automatic residential fire sprinkler system for *townhouses* shall be *townhouses* designed and installed in accordance with NFPA 13D or Section P2904.P2904.~~

~~**Exception**~~ **Exceptions :** 1. *Townhouses* containing no more than three *townhouse units.*

2. An automatic ~~residential fire~~ sprinkler system shall not be required when additions or alterations are made to existing *townhouses* that do not have an automatic ~~residential fire~~ sprinkler system installed.

R313.1.1 Design and installation. Automatic ~~residential fire~~ sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA 13D, 13, or 13R.

Reason Statement: This proposal provides a reasonable approach to providing fire safety in newly constructed Virginia townhouses, by including an option for townhouses with less than four units to be built without fire sprinklers. This exception specifically responds to concerns that have previously been raised in Virginia about the feasibility and cost of providing sprinklers in smaller townhouse projects and projects built in rural areas that lack a public water supply. Although 12 of the 13 states/DC that currently adopt the IRC requirement for townhouse sprinklers do not amend in an un-sprinklered unit threshold, and all of these states include the same types of rural and remote area that have been cited as being of concern in Virginia, it is hoped that this Virginia exception will provide a path that building officials, industry, and the fire service will view as reasonable and worthy of support.

Below is a list of considerations that are commonly discussed when reviewing adoption of the IRC's townhouse sprinkler requirement.

1. **Precedence - Adopt the model code requirement:** This proposal will realign the Virginia Residential Code with the IRC by retaining the IRC requirement for fire sprinklers in new townhouses, as modified by an exclusion for less than 4 townhouse units. The IRC requirement was first published in the 2009 IRC and has been retained in the 2012, 2015, 2018, 2021, and 2024 editions of the code. Thirteen state-level code adoptions [California, District of Columbia, Hawaii, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New York (3+ stories above grade), Oklahoma, Pennsylvania, Washington (more than 4 units), Wisconsin] and numerous other jurisdictions, include the IRC townhouse sprinkler requirement. There is no evidence of negative impacts on home affordability or other detrimental issues associated with the adoption of townhouse sprinklers in any jurisdictions where the IRC requirement is in place.
2. **Parity with the Virginia Building Code:** Section 903.2.8 of the Virginia Building Code requires all townhouses, regardless of height or area, to be sprinklered. There is no technical basis for requiring fire sprinklers to be installed under the Virginia Building Code yet exempt the same requirement under the Residential Code. It is the intent of the IRC and this proposal to provide equal protection to residents of all townhouses with four or more units, regardless of which code they are built under.
3. **Increased fire risk associated with townhouses – They are multifamily occupancies:** Unlike detached homes, where an owner has direct control over personal safety, townhouses are multifamily structures that include many unrelated individuals and families living under a single roof. Clearly, there is no "owner's choice" argument in the case of townhouses because the fire safety of at least two other families relies on the behavior of someone else who lives under the same roof, i.e. a neighbor's accident, carelessness, or perhaps even unlawful activities such as a drug lab will impact your safety, your family's safety, your pets' safety (who may be home unattended when a fire occurs) and your property. There have been many incidents where a fire in one townhouse unit had catastrophic consequences on neighbors who had nothing to do with the cause of the fire. Residential fire sprinklers prevent such tragedies by keeping fires contained to the unit of origin, either controlling the fire or extinguishing it altogether. It is also worth noting that the National Fire Incident Reporting System codes townhouses as multifamily occupancies, separate from one- and two-family dwellings and recognizing that the risk associated with a townhouse fires is that of a multifamily occupancy.
4. **Increased danger of residential fire behavior:** Research conducted by the National Institute of Standards and Technology and Underwriters Laboratories on residential fire behavior and the value of residential fire sprinklers to firefighter and occupant safety provides a technical basis for this recommendation. Research shows that the rate of fire growth in modern residential structures has increased, partly attributed to an increased heat release rate and an increased heat of combustion associated with modern synthetic materials used in household goods and furnishings. Faster fire growth in a multifamily structure means that occupants of adjacent units will be endangered more quickly than was the case with legacy furnishings
5. **Increased risk to firefighters and demand on fire service resources from townhouses:** Townhouses place significantly increased demand on fire service resources as compared to detached dwellings. Townhouses increase the complexity of rescue operations, and firefighting is hampered because fire spread into adjacent units cannot be easily followed by firefighters from unit to unit. There are no access openings in party walls allowing firefighters to pass back and forth between opposite sides when fighting a fire. Furthermore, townhouses with

four or more units, which are the focus of this proposal, tend to be large structures that create the potential for large fires. Wind-driven flames from an uncontrolled residential fire can bypass rated separations and result in fire extension to adjacent units and structures and are challenging to emergency responders, particularly in rural areas served by diminishing volunteer and equipment resources.

6. **Sustainable housing and environmental impact:** In addition to life-safety and property protection attributes of fire sprinklers, research by FM Global has also verified the value of fire sprinklers in sustainable housing and protecting the environment from pollution associated with toxic smoke and contaminated runoff from manual firefighting. Of particular interest is the conclusion that a single fire event, in addition to destroying a townhouse, can offset the cumulative value of green construction and energy saving appliances, i.e. green efforts are negated if a fire occurs and sprinklers aren't installed as an insurance policy that remains ready to control it.
7. **Financial impact of townhouse sprinklers recognized by builders and cannot be equated to one- and two-family dwellings:** Arguments often conveyed by the building industry in opposition to residential sprinklers based on possible cost implications aren't relevant to townhouses because sprinklered townhouses can actually be less expensive to build than non-sprinklered townhouses. The difference is attributed to incentives that are offered by the IRC and the International Fire Code (IFC) for sprinklered properties. Unlike single family developments, where multiple builders might not be able to directly recoup the value of infrastructure incentives, townhouses are typically built in communities where the developer is the builder, so the cost reductions are directly realized. There's no better testament to this cost comparison than the fact that the IRC's townhouse sprinkler requirement was proposed (RB66-07/08) by a major national multifamily builder, Avalon Bay Communities, not the fire service or public safety interest group. Prior to the 2009 edition, the IRC didn't include an allowance to reduce the fire rating of townhouse separation walls from 2-hours to 1-hour, which had been permitted by the IBC. Avalon Bay Communities proposed adding the IBC wall reduction to the IRC with the quid pro quo of also adding the IBC's requirement to sprinkler all townhouses. Avalon Bay Communities knew that the cost savings associated with the reduced wall rating alone may equal or exceed the cost of installing sprinklers. When combined with other incentives offered by the IFC for access roads and water supply, the company knew that they could actually save money by sprinklering townhouses.
8. **Economic impact:** Installation costs for fire sprinklers in townhouses are offset by cost savings that can be realized in other aspects of construction. Cost incentives for townhouse development/buildings may include:
    1. Reduced material and labor costs associated with reductions in the required fire rating of townhouse separation walls from 2-hours to 1-hour. This incentive has an added benefit, particularly in the current market of tight material and labor supplies, of significantly reducing the amount of drywall that must be secured to construct a project and the associated challenge of securing labor resources to apply additional drywall layers needed to achieve a 2-hour assembly rating. In addition, Code Change RB67-19 resulted in a change to the 2021 IRC that permits sprinkler piping to penetrate and be routed in townhouse common walls. This can reduce sprinkler installation costs by allowing a single water supply for multiple sprinkler systems in a townhouse building, and by allowing sidewall sprinklers to be used as a means of improved coverage and avoid the need to install pipe in attic areas that might be subject to freezing.
    2. Reductions in minimum required water supply for firefighting, allowing for smaller water mains, and typically eliminating some fire hydrants.
    3. Somewhat unique to Virginia is an allowance in R310.1, Exception 1, which eliminates the IRC requirement to provide emergency escape and rescue openings for dwellings that are equipped with a fire sprinkler system. Accordingly, there is a significant design advantage with respect to allowing builders to used fixed glazing or windows that do not meet the minimum size and operability requirements of the IRC for escape openings. In addition, for townhouses, which typically have small fenced yards that may not easily connect to a public way, the elimination of escape and rescue openings can solve site layout issues by eliminating the need for accessways from yards to a public way. Additionally, eliminating escape window or door openings for basements deletes not only additional windows for sleeping rooms, but also the associated window well, escape ladder, fall protection for the window well opening and issues with sealing below-grade wall openings from water infiltration, and associated costs.
    4. Increased portion of roof area permitted to have solar panels (R324.6), which increases available solar generating capacity.
    5. Permissible area of a mezzanine increases from 1/3 of the floor area of the room with a mezzanine to 1/2 (R325.3). This permits increased design flexibility for a top-story mezzanine vs. having a 4th story in a townhouse, which falls out of the IRC scope and forces IBC compliance.
    6. Permissible enclosure of mezzanines in rooms not exceeding 2 stories above grade plane vs requiring openness to the room with walls not exceeding 36 inches in height (R325.5).

Many of these cost offsets relate to design options that are difficult to specifically quantify because they relate to unique architectural design features, such as the inclusion of mezzanines, or on local fire code requirements that are specific to individual jurisdictions. However, the cost offsets associated with permissible reductions in townhouse separations and unfinished basement floor-ceiling assemblies can be quantified.

To quantify these values, a calculation model was created using data from the Craftsman National Construction Estimator program. For the purpose of this submittal, four sample runs were performed on a sample townhouse using two wall types (back-to-back 1-hour walls in a non-sprinklered building vs. a staggered stud 1-hour wall in a sprinklered building) and two sprinkler installation costs ($1.50/sqft and $2.00/sqft). Although the NFPA published a report "Home Fire Sprinkler Cost Assessment – 2013" (attached) estimates a national average cost of $1.35/sqft installation costs, the Virginia model runs used costs of $1.50/sqft and $2.00/sqft in an effort to be reasonably conservative, even though townhouse sprinkler systems may cost less than NFPA's estimated costs because there is an economy of scale in townhouse communities.

The sample townhouse building contains five units that are three stories tall with a pitched roof and dimensions 20ft x 30ft x 10ft floor-to-floor. Summary sheets for each run with full documentation of the wall designs and costs are available. Cumulative results for the four runs provided below. Each run includes a national average cost and four additional data point multipliers for unique communities. The value modifiers are based on cumulative average cost adjustments for labor and materials recommended by the Craftsman estimator, intended to provide a reasonable representation of costs in different areas.

It should be noted that builders often claim that reductions in the fire resistance of wall assemblies are not realistic because the 2-hour assemblies are needed for control of sound transmission. However, research on Sound Transmission Classes (STCs) of various wall designs indicates that this is not accurate. STC ratings are a measure of the effectiveness of partitions in reducing airborne sound transmission, with higher numbers having better performance in resisting sound transmission. For reference, there is no minimum in the IRC, but optional IRC Appendix K recommends a minimum of 45. The IBC requires a minimum STC of 50 by design or 45 by field test.

For the purpose of this analysis, two different types of 1-hour rated wall assemblies were evaluated and compared to a back-to-back set of 1-hour wall assemblies, sometimes used as a permissible alternate to a listed 2-hour assembly. STCs for these walls are reported as follows:

· Base level staggered stud 1-hour wall (one layer of insulation, which could be increased to 50-52 with modifications) – STC 45-48

· Base level double stud 1-hour wall (insulation in each stud channel) – STC 57

· Back-to-back 1-hour walls sometimes used as a 2-hr substitute (STC can be increased by adding additional insulating material in the space between the inner wall membranes at additional cost. Empty air space between these inner membranes actually reduces sound performance, which is why the base wall STC is not at high-performance level) – STC 45

Other wall designs with higher STC ratings can be modeled upon request if wall construction details are provided. To put the cost results into perspective of a monthly mortgage payment, a calculation was performed to evaluate the net cost of a $2,000 price increase (the highest of costs in the four model runs) to a homeowner after reductions associated with homeowners insurance (assumed at 5% based on NAHB's insurance analysis for major carriers and which is a common reduction offered by insurers in many states for NFPA 13D protection) and income tax deductions (assumed at 24% Federal marginal rate and excluding Virginia income tax). Based on a review of online interest rates, properties and sample insurance rates, a mortgage value of $400,000 was selected at an interest rate of 4.25% and an annual homeowner's insurance cost of $1,500 for a property estimated at $500,000 value. <u>Based on the highest-cost system from model runs and parameters described above, the net monthly payment for fire sprinklers is $1.23, or approximately $15/year. This is far less than even a minor fluctuation in interest rates that buyers may experience at any time.</u>

Note that permit and plan review fees and time vary from jurisdiction to jurisdiction. Some jurisdictions do not require any plan review for residential fire sprinklers, which is consistent with the "developed pipe length" methodology prescribed in IRC Section P2904. Alternately, some jurisdictions use a flow test of the installed system in lieu of design plans and plan review, which requires a single onsite inspection that can be performed by a regular building or plumbing inspector when performing other on-site inspections.

With respect to maintenance, there is no mandatory maintenance required for typical residential sprinkler systems supplied by a public or private water service, other than not interfering with the system by closing valves, painting sprinklers, etc. Homeowners may choose to perform voluntary verification test for water flow alarms (which are not required by NFPA 13D or IRC P2904).

Specific cost model documentation will be provided separately since cdpVA would not support inclusion of tables in the reason statement.

Resiliency Impact Statement: This proposal will increase Resiliency
See reason statement.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
See reason statement. It is difficult to quantify net cost or savings because these are going to vary based on individual projects and the extent to which developers/builders take advantage of savings incentives to offset costs associated with sprinkler installation.

APPENDIX E:

ADDITIONAL COMMENTS AND DOCUMENTATION

FROM STUDY GROUP MEMBERS

NOTE: *The final draft of the study group report was shared with the study group members for review and feedback. Appendix E has been added to the final report and includes the additional documentation and information received from study group members after reviewing the final draft.*

Commonwealth of Virginia

Moldovan, Florin <florin.moldovan@dhcd.virginia.gov>

Residential Study Group Report

Andrew Clark <AClark@hbav.com> Thu, Jun 2, 2022 at 11:11 AM
To: "Moldovan, Florin" <florin.moldovan@dhcd.virginia.gov>
Cc: Craig Toalson <CToalson@hbav.com>, Andrew Clark <AClark@hbav.com>

Florin – Thanks for sending this over. And good work on compiling an extremely extensive report! I've started to review now – and have several comments. I will send them over to you as I complete them, so that I'm not dumping a bunch of information on you before the deadline. Here are some of my initial thoughts.

Smoke Alarms – Page 7 of the PDF

Data from NFPA

I think it would be helpful to include some data from the National Fire Protection Association (NFPA) about the strong correlation between home fire deaths and lack of working smoke alarms/no smoke alarms. It speaks to your point that smoke alarms are proven to save lives – and that additional efforts to expand home fire safety will depend, in large part, on ensuring that residents have smoke alarms that are operational.

The following is from a 2021 NFPA Report: https://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/Detection-and-signaling/ossmokealarms.pdf

- Almost three out of five home fire deaths were caused by fires in properties with no smoke alarms (41 percent) or smoke alarms that failed to operate (16 percent).
- The death rate per 1,000 home structure fires is 55 percent lower in homes with working smoke alarms than in homes with no alarms or alarms that fail to operate.

Stakeholders Working to Increase Smoke Alarm Safety

I mentioned this in one of the workgroup meetings – but I think it's important to note in the report that some stakeholders are keenly aware of the importance of smoke alarms – and have been working to advance policies/regulations/programs to expand smoke alarm protection in residential structures.

During the 2022 General Assembly Session, the Home Builders Association of Virginia drafted and successfully passed SB 607, which will require home inspectors to actually test the smoke alarms in homes and report their findings in the final home inspection report. Right now, they are currently only required to inspect whether the smoke alarm is present or not. This bill will create another touch point for consumers to be educated on the status of their smoke alarms.

We also worked with Senator Jeremy McPike to introduce budget language to expand funding for the Virginia Department of Fire Programs so that they provide money to local fire departments to be used to purchase and deploy smoke alarms. The budget amendment created a Residential Structure Fire Safety Fund – it can be found here: https://budget.lis.virginia.gov/amendment/2022/1/SB30/Introduced/MR/420/1s/. Although the budget amendment didn't make it in the final budget approved by the legislature, the HBAV will continue to push for it in future Sessions.

Comment about Zero Home Fire Deaths in Localities with Sprinkler Mandates:

On page 7, there is a comment about reports from localities that require sprinkler systems suggest that no lives have been lost because of fires. Have any of the stakeholders submitted these reports for review by the workgroup? If so, they should be cited or linked in the report. I have yet to see any of these reports, but I've heard that comment made on several occasions. If the reports are not available or have not been provided by any of the stakeholders, I would suggest adding a quick comment indicating that the workgroup and the Department have not see those reports. My apologies if they have been distributed – it's possible I missed them.

--

Andrew Clark Vice President, Government Affairs

Home Builders Association of Virginia

1051 E. Cary Street, Suite 1400

Richmond, Virginia 23219

Office: (804) 643-2797, Ext. 3

Mobile: (978) 460-1331

www.HBAV.com

[Quoted text hidden]

Commonwealth of Virginia

Moldovan, Florin <florin.moldovan@dhcd.virginia.gov>

Water Connection Fees

1 message

Andrew Clark <AClark@hbav.com> Tue, Jun 7, 2022 at 9:24 AM
To: "Florin Moldovan (florin.moldovan@dhcd.virginia.gov)" <florin.moldovan@dhcd.virginia.gov>
Cc: "Jeff Brown (Jeff.Brown@dhcd.virginia.gov)" <jeff.brown@dhcd.virginia.gov>

Florin – Some additional input for the sprinkler report – page 9 of the PDF under water meter size and connection fees.

Here is some additional information about the difference in water connection fees for ¾ and 1" water meters

Henrico County

Source: https://henrico.us/utility/water-sewer-connection-fees/water-and-sewer-connection-fees-2021-2022/

Water Connection Fee:

Townhome (5/8"): $4,485 per unit

Separate domestic line and fire line (5/8"): $8,970 ($4,485 *2)

Townhome (1"): $17,400

Chesterfield County

Source: https://www.chesterfield.gov/513/Rates-and-Fees

Capital Cost Recovery Charge

Townhome (5/8"): $5,725 per unit

1": $14,313

Water Service Installation Charge (Service Lines and Meters)

Service Lines:

5/8”: $1,900

1”: $2,150

Meters:

5/8”: $200

1”: $240

Hanover County

Source: https://www.hanovercounty.gov/DocumentCenter/View/1423/Capacity-Fees-PDF?bidId=

Water Capacity Fees:

5/8 and ¾” meter - $6,595

1” - $14,581

Blacksburg

Source: https://www.blacksburg.gov/home/showpublisheddocument/5224/637588345347700000

5/8” Water Meter: $3,765

1” Water Meter: $6,938

Salem

Source: https://salemva.gov/Departments/Water-Sewer-Dept/Water-and-Sewer-Connection-and-Availability-Fees

Water Connection Fees

5/8 and ¾” - $1,500

1” - $1,800

Water Availability Fee

5/8 and ¾ - $2,000

1” - $4,000

Combined Water Connection Fees

5/8 and ¾ - $3,500

1” - $5,800

Botetourt County

Source: https://www.westernvawater.org/home/showpublisheddocument/12762/637765915048130000

Water Availability Fee

5/8” - $3,000

1” - $7,500

Water Connection Fee

5/8” - $2,000

1” - $2,000

Combined Water Connection Fee

5/8” - $5,000

1” - $9,500

Roanoke County and Roanoke City

Source: https://www.westernvawater.org/home/showpublisheddocument/12766/637765915057370000

Water Availability Fee

5/8” - $3,000

1” - $7,500

Water Connection Fee

5/8” - $2,000

1” - $2,000

Total Fee

5/8” - $5,000

1” - $9,500

Franklin County

Source: https://www.westernvawater.org/home/showpublisheddocument/12764/637765915052500000

Water Availability Fee

5/8” - $3,000

1” - $7,500

Water Connection Fee

5/8” - $2,000

1” - $2,000

Total Fee

5/8” - $5,000

1” - $9,500

Winchester

Source: https://www.winchesterva.gov/utilities/availability-fees

Water Service Availability Fee

5/8 and ¾” - $5,300

1” - $8,800

Isle of Wight

Source: https://www.co.isle-of-wight.va.us/departments/public_utilities/fees_and_service_rates.php

Residential Water Installation/Connection Fees

5/8” - $4,000

1” - $10,000

James City County

Source: https://www.jamescitycountyva.gov/DocumentCenter/View/2015/Rates--Charges-PDF

Systems Facility Fee:

5/8” - $3,219

¾” - $4,829

1” - $8,048

--

Andrew Clark Vice President, Government Affairs

Home Builders Association of Virginia

1051 E. Cary Street, Suite 1400

Richmond, Virginia 23219

Office: (804) 643-2797, Ext. 3

Mobile: (978) 460-1331

www.HBAV.com

Commonwealth of Virginia

Moldovan, Florin <florin.moldovan@dhcd.virginia.gov>

Water Connection Fees Data and Other Cost Drivers

Andrew Clark <AClark@hbav.com>
To: "Florin Moldovan (florin.moldovan@dhcd.virginia.gov)" <florin.moldovan@dhcd.virginia.gov>
Cc: "Jeff Brown (Jeff.Brown@dhcd.virginia.gov)" <jeff.brown@dhcd.virginia.gov>

Tue, Jun 7, 2022 at 10:00 AM

Florin – Here is some additional clarifying information on our comments related to water meters, connection fees, and additional drivers of cost.

Water Connection Fees/Water Meters: Cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $18,000 per unit.

Fire Services Representatives Dispute the Claim That 1" Water Meter Will Be Necessary:

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force (attached) in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house. For example, the Mesa Water District in California explicitly states that they require 1" water meter: https://www.mesawater.org/customer-service/rates-and-fees. While the sprinkler study group has debated this issue at length, the issue is incredibly complex and warrants additional research prior to advancing the proposal to require fire sprinkler systems in new one- and two-family dwellings and townhomes. Fire services representatives cannot dispute the fact that 1" water meters may be required given the experience in California.

Additional Items to Factor Into Sprinkler Cost Estimates:

Additionally, cost estimates from residential sprinkler advocates often overlook two additional "tangible" costs, and one "intangible" cost.

First, in some communities where the static pressure of surrounding waterlines is insufficient, it will be necessary to install a booster pump to provide enough pressure for an effective fire suppression system. Home builders in several regions of the Commonwealth provided cost estimates of $1,260 to $2,600 for these systems.

Second, although NFPA 13D does not itself require the installation of a backflow prevention device, the National Fire Protection Association agrees that many municipal water authorities in Virginia and across the country ***require*** the devices to prevent contaminants from reaching drinking water[5], so it will be a cost borne by the consumer if these proposals are enacted. Home builders in Virginia have provided cost estimates ranging from $450 to $1,000 for these devices.

Lastly, NFPA 13D systems require the review and approval by the Authority Having Jurisdiction (AHJ), which has the potential to extend construction time and place additional burden on localities, many of which are currently struggling to employ enough plan reviewers to keep up with current construction activity levels.

--

Andrew Clark Vice President, Government Affairs

Home Builders Association of Virginia

1051 E. Cary Street, Suite 1400

Richmond, Virginia 23219

Office: (804) 643-2797, Ext. 3

Mobile: (978) 460-1331

www.HBAV.com

WaterPurveyorData2021.xlsx
19K

California Residential Water Purveyor/Fire Sprinkler Task Force

Water Purveyor Data

Water Purveyor Name/Location	Minimimum meter size	Wastewater Capacity Charge SFD	Reserve Water Capacity Fee	Water Service connection 5/8" meter	Water Service connection 3/4" meter	Water Service connection 1" meter	Bi-monthly 5/8" service charge	Bi-monthly 3/4" service charge	Bi-monthly 1" service charge	Bi-monthly 1" service charge w fire system
East Bay Municipal Utility District		$2,810.00		$5,543.00	$18100 -$ 40040	$30,230 - $66,870				
Contra Costa Water District				$27,743.00						
Central Contra Costa Sanitary District		$6,803.00								
Dublin San Ramon Services District		$15,906.00	$45,200.00							
Alameda County Water District				$7,358.00						
Zone 7 Water				$29,440.00		$29,440.00				
San Francisco Public Utilities Commission		$4,084 - $12,045		$1,906.00						
Antelope Valley (Palmdale/Lancaster)				~$20,000						
North Marin Water District (Novato)								$34.15	$68.30	$38.80
North Marin Water District (West Marin)								$34.15	$68.30	$38.80
Marin Municipal Water District							$39.66	$39.66		
City of Petaluma	1" for all new service or remodels						$14.40	$14.40	$14.40	
San Diego Public Utilities Department	note 2									
Cal Water	1" for all new service or remodels							28/mo	$97.00	
City of Fresno	any that will calc 3/4 - 2"									
City of Kerman	1' iron pipe size (no remodel ordinance)									
City of Clovis							$23.90	$23.90	$23.90	$23.90
Menlo Park						17,000 -27,000				
East Palo Alto Water								$13.74		148.42 for 1.5 meter
Palo Alto Park Mutual	Currently in litigation									
City of Dixon	3/4"						N/A	$37.88	$59.98	$59.98
Pittsburg Water Department							$24.29	$24.29	$53.03	$101.09
Martinez Water Department							$69.50		$120.00	$91.00
Anaheim Water Department	1"						$9.90	$9.90	$12.97	$12.97
Garden Grove	5/8"						$29.63	$29.63	$47.14	
San Clemente								$25.33	$25.33	
City of Orange				1,500 per acre for	2,290 per acre above 400'		$29.07	$29.07	$42.29	
Mesa Water District	1" ususally required with sprinklers						$27.23 Bi-monthly, $13.61 monthly	$41.14 bi-monthly, $20.57 monthly	$68.36 bi-monthly, $34.18 monthly	

Note 1: Passive purge with a combined system or backflow

Note 2: 3/4 or 1 inch service and meter upgrade to 1 inche if fire water supply requires it

Cell: C6
Comment: [Threaded comment]

Your version of Excel allows you to read this threaded comment; however, any edits to it will get removed if the file is opened in a newer version of Excel. Learn more: https://go.microsoft.com/fwlink/?linkid=870924

Comment:
Zone 1 wastewater fee per single-family unit = $6,803 (Zone 1)
Zone 2 wastewater fee per single-family unit = $6,803 (gravity fee) plus $1,585 (pumping fee) for total of $8.388 per single family unit

Cell: D7
Comment: Jessica Power:
Reserve Water Capacity Fee (the cost to buy into DSRSD's water distribution system) for 5/8" meter is $13,335 per residential unit PLUS Zone 7 Water District (which supplies the actual water) connection fee for 5/8" meter is $31,865 per unit for a total of $45,200 per unit

Cell: E8
Comment: Jessica Power:
Residential Water Meter Facilities Connection Charge = $7,358 per residential unit

Cell: A9
Comment: Jessica Power:
(The water connection fees are collected by the Building Departments of the Cities of Livermore and Pleasanton, and by the Dublin San Ramon Services District, which are agents for Zone 7. The cities also charge their own water connection facility fees.)

Cell: C10
Comment: Jessica Power:
Wastewater Connection Fee for 5/8" = $4,084 to $12,045 per unit, depending on location

Cell: K13
Comment: Jessica Power:
For all meters in Paradise Ranch Estates $51.75

Cell: H15
Comment: Jessica Power:
Monthly fee

Cell: I15
Comment: Jessica Power:
Monthly fee

Cell: J15
Comment: Jessica Power:
Monthly fee

Cell: H20
Comment: [Threaded comment]

Your version of Excel allows you to read this threaded comment; however, any edits to it will get removed if the file is opened in a newer version of Excel. Learn more: https://go.microsoft.com/fwlink/?linkid=870924

Comment:
Pulled from website. No information if differences for different sizes or fire sprinklers.

APPENDIX F:

GENERAL STAKEHOLDERS WORKGROUP MEETING EXCERPTS

Note: This Appendix contains excerpts from the General Stakeholders Workgroup Meeting related to the three code change proposals mandating the installation of automatic sprinkler systems in townhouses.

Code Change Proposal RB313.1-21

Excerpt from June 14, 2022, General Stakeholders Workgroup Meeting Summary

Andrew Milliken (proponent): This brings back a proposal initially approved by the BHCD, requiring sprinklers for townhouses. There is a Floor Modification to remove NFPA 13 and 13R references.

Andrew Clark [Home Builders Association of Virginia (HBAV)]: Submitted comments in cdpVA. This would add too much cost to building new homes. Meters and water connection fees, especially those requiring a 1” meter are very expensive.

Jeff Shapiro (IRC Fire Sprinkler Coalition and International Code Consultants): Sprinklers can run on water flow and a 1” meter isn’t required. He clarified that there is never a case where a 1” meter is needed under the IRC. There are also incentives that could reduce costs. A typical house uses the same range for minimum water flow and pressure rate that a sprinkler system can be designed to use. Maryland and Pennsylvania can make townhouse sprinklers work more affordably when including incentives. There can actually be a cost decrease. He prefers proposal RB313.1(3), which has a more incremental approach.

Andrew Milliken: Hopes to have a compromise in the future and he’s glad that the BHCD will see the Study Group report with all of the conversation around this issue.

Andrew Clark (HBAV): Asked what will be in the staff summary to the BHCD.

Jeff Brown (DHCD Staff): Everything related to a proposal is attached to it. The summary document to the BHCD will be new this cycle. There will definitely be a notation of who supported the proposals and who did not.

David Beahm (Warren County): Asked if there is a headcount of who is for and who is against each of the proposals. He also asked if the Sprinkler Study Group agreed on any proposals. He’s against all of the RB313.1 code change proposals.

Jeff Brown: The summary will show who was in support and who was opposed and how the recommendation for or against came about. The Study Group didn’t vote for or against any proposals.

Paula Eubank: Speaking for herself, she opposes RB313.1.

Jeff Shapiro: The IRC is a minimum standard, but requirements can be exceeded. NFPA 13 or 13R goes further than the minimum P2904 or 13D system.

William Penniman: Speaking for himself. Supports this proposal and the next 2, so that they will go forward as Non Consensus instead of Consensus for Disapproval.

Jeff Brown: Hearing no further discussion, this proposal will be marked as Non Consensus as Modified.

Code Change Proposal RB313.1(2)-21

Excerpt from June 14, 2022, General Stakeholders Workgroup Meeting Summary

Glenn Dean (proponent): On page 5 of the Residential Sprinkler Study Group report, there was a good, concise summary of smoke alarms and sprinkler systems. On page 11, it says that homes built now are safer than those built decades ago; he would like to know in what way? Because of construction materials and items placed in the houses, fires and toxicity are faster and worse than they were in the past. Smoke detectors do give an early warning, but not soon enough because of the more flammable materials. Sprinklers would help with safety. Page 12 says that there is “no demand” for sprinklers. He thinks it’s because people aren’t aware of the need. Conclusions and acknowledgements say that Virginia is in alignment with majority of states that remove the IRC requirements for sprinklers in townhouses. He thinks that won’t last and that Virginia can lead or follow.

Andrew Clark: There should be a requirement for all localities in Virginia to send fire data to the Fire Programs, so that the data can be used correctly for analysis. The Workgroup last cycle was specific to townhomes. This proposal goes beyond that scope.

Glenn Dean: Virginia Fire Incident Reporting System (VFIRS) has many data points and it’s hard to get down to more specific data. Even with all of those data points, the system itself is underutilized.

Andrew Clark: Agrees. He looked into that himself, and he had those same results. He thought there could possibly be a legislative push, or some collective effort to help the department to make that data more user friendly.

Anthony Clatterbuck (Home Builder, Culpeper Virginia): Thinks that the most beneficial reports would be developed on a state-wide basis. Each locality has different things that they report on.

Andrew Clark: Typed in the chat box:

Andrew Clark: Agreed that a state level effort is needed. Sorry if I wasnt clear - when I referred to "the Department", i was referring to Dept of Fire Programs - not local fire departments.

William Penniman: Speaking for himself. Supports this proposal to ensure that it goes forward as Non Consensus.

Steve Shapiro (Apartment and Office Building Association, Virginia Apartment Management Association): Not speaking in favor or opposition, the first sentence should say An automatic residential fire sprinkler “system” instead of “systems”.

Jeff Brown: Hearing no further discussion, this proposal will be marked as Non Consensus.

Code Change Proposal RB313.1(3)-21

Excerpt from June 14, 2022 General Stakeholders Workgroup Meeting Summary

Jeff Shapiro (proponent): This is only for townhouses, and offers a path for builders to build them without fire sprinklers required. Townhouses with less than 3 units, would not require sprinklers. It would also be an opportunity to gather Virginia data. He says that there are only 4 states listed in the Study Group report, and he listed 13 states that have adopted the IRC requirement for sprinklers in townhouses.

Andrew Clark: Land development incentives would probably make for good discussions in the future and might be what moves the needle. Especially road widths. There's nothing in the proposals that would ensure that those incentives are granted. He is in opposition to this proposal today.

Jeff Brown: There is a Floor Modification on the screen to match the RB313.1.1 with what is in the IRC. If Jeff is in agreement, the proposal will move forward with it.

Jeff Shapiro: Agrees with the modification. He is willing to work with the home builders to ensure that they get incentives.

Steve Shapiro: Asked Jeff about the exception: could there be 3 units with firewalls, then 3 more?

Jeff Shapiro: The IRC doesn't recognize fire walls like the IBC does. They would have to be separate buildings. 3 unit buildings separated from other 3 unit buildings would not require sprinklers.

William Penniman: Speaking for himself, he supports this proposal.

Dan Willham (Fairfax County): Supports this proposal.

David Beahm. He is opposed to this proposal.

Andrew Milliken: The Virginia Fire Services Board Committee approves of this proposal.

Paula Eubank: Speaking for herself, she is against this proposal.

Jeff Brown: Hearing no further discussion, this proposal will be marked as Non Consensus with the Floor Modification.

Tab 15

Public Hearing Transcript and Public Comments Submitted Via Email

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

IN RE: HYBRID PUBLIC HEARING

HEARD BEFORE: BOARD OF HOUSING AND COMMUNITY DEVELOPMENT

ANDREW FRIEDMAN, PRESIDING

MARCH 21, 2022

CONFERENCE ROOM

4224 COX ROAD

GLEN ALLEN, VIRGINIA

10:05 A.M.

COMMONWEALTH REPORTERS, LLC
P. O. Box 13227
Richmond, VA 23225
804-859-2051 (ofc.) 804-291-9460 (fax)

APPEARANCES:

Andrew Friedman, Presiding
HCD Board member

BOARD MEMBERS:

Mark Jackson
HCD Board

Patricia Shields
HCD Board

Susan Dewey
HCD Board

Sean Farrell
HCD Board

Claudia Cotton
HCD Board

Abby Johnson
HCD Board

Scott Garber
Virginia Fire Services Board

Keith Johnson
HCD and Virginia Fire Services Board

Ernie Little
Virginia Fire Services Board

Larry Murphy
HCD Board

Sylvia Hallock
HCD Board

BOARD MEMBERS (con't.):

Paykon Sarmadi
HCD Board

DHCD STAFF:

Bryan Horn
Director, Housing and Community Development

Jay Grant
Director of Outreach, Planning and Compliance

Tory McGowan
Program Manager Real Estate

Sandra Powell
Senior Deputy, Housing and Community Development

Cindy Davis
Deputy Director Building and Fire Regulation

Jeff Brown
Director, State Building Codes Office

Kristen Dahlman
Policy and Legislative Director

Grace Wheaton
Senior Policy Analyst

LeGrand Northcutt
Senior Policy Analyst

Kyle Flanders
Senior Policy Analyst and Regulatory
Administrator

A G E N D A

COMMENTS

*Public speakers offering comments via Google Meets.

(The hybrid public hearing commenced at 10:05 a.m., and the Board's agenda commenced as follows:)

MR. FRIEDMAN: Good morning. We'd like to call to order the meeting of the Board of Housing and Community Development. I'm serving as the -- actually, Bryan is going to do the first order of business, which is the election chair.

MR. HORN: I think that we're good.

MR. FRIEDMAN: Oh, okay. So we are in the meeting of the Housing and Community Development. We're calling the public hearing -- okay. You're dealing with an amateur chair and so I apologize.

So we're going to call the -- Chairman Abbasi is unable to attend today, so we're holding a public hearing to receive comments prior to the proposed regulations. And at this point, we welcome all the members of the Board of Housing and Community Development and the Fire Services

Board that are present today. I think we'd like to go around to them and have them be introduced so we know who's in the room. Can we start with Mark at the end?

MR. JACKSON: Sure. Mark Jackson with -- I'm actually with Community Housing Partners out in southwest Virginia.

MS. SHIELDS: Patricia Shields. I'm from Falls Church, Virginia.

MS. DEWEY: Susan Dewey. And I'm with Virginia Housing.

MR. FARRELL: Good morning, everybody. I'm Sean Farrell, board member and with the Virginia Building and Code Officials Association as the director of regulatory compliance.

MS. COTTON: Good morning. I'm Claudia Cotton, CEO of the Coastal Virginia Building Industry Association. I'm representing the -- the Third Congressional

District on the Board. And also serving now on the Fire Services Board.

MS. JOHNSON: Hi, I'm Abby Johnson in Williamsburg, Virginia representing the First Congressional District and I'm with a nonprofit out of Williamsburg.

MR. GARBER: Good morning. I'm Scott Garber. I'm the chair of the Virginia Fire Services Board as well as the fire chief for the City of Staunton.

MR. FRIEDMAN: And I'm Andy Friedman. I represent the Second Congressional District.

MR. HORN: I'm Bryan Horn. I'm the new director the Department of Housing and Community Development. And I serve as secretary for this Board.

MR. FLANDERS: Kyle Flanders. I'm the staff support to the Board on the DHCD. And if at all possible, myself included, please speak up when you're speaking. Thank you.

MR. JOHNSON: I'm Keith Johnson, full time fire chief in Loudoun County, represents -- representing this Board at the Virginia Fire Service Board co-chair -- vice-chair.

MR. LITTLE: Ernie Little, Fire Services Board. I'm representing the Virginia Fire Prevention Association.

MR. MURPHY: I'm Larry Murphy representing the Fourth Congressional District. President of Urban Development for -- for Petersburg-Chesterfield area. I'm also the past president of the Home Builders of Southside Virginia.

MR. SARMADI: I'm Paykon Sarmadi. I'm the department head of Balzer and Associates out of our Shenandoah Valley Office. And nice to see everybody again.

MR. FRIEDMAN: Okay. So at this point, I will -- before we begin to receive public comment, I would like to explain how the hearing will be conducted. Anyone wishing to speak should sign in at the registration desk near the door or enter their name in the chat online. Comments offered by a speak -- previous speaker need not be repeated.

The speaker may establish their position on any point simply by referring to the earlier statement which expresses their position. We ask that each speaker limit remarks to two minutes due to the number of people we expect to comment on the various issues.

We welcome the submission of written statements. In such cases, oral comments are not necessary. The Board will review all written materials that are submitted.

If you have written statements today, please let -- leave them with Kyle Flanders or send them to kyle.flanders@dhcd.virginia.gov. We will receive public comment in this order.

First on the Statewide Fire Prevention Code. Next on the Uniform Statewide Building Code, then the Virginia Amusement Device Regulations. And last, the Virginia Industrialized Building Safety regulations. We will go first to those people here in person and then to those online. I now open the public hearing and have Kyle call the first speaker.

MR. FLANDERS: Thank you. First speaker in person is Steve Shapiro.

MR. SHAPIRO: I'm speaking on the building amendments.

MR. FLANDERS: Oh, I'm sorry. We do not have anyone registered for the Statewide Fire Prevention Code at this time, either online or in person.

STAFF MEMBER: Online or for the Statewide -- no.

MR. FRIEDMAN: Okay. So then, we'll hear comments on the Uniform Statewide Building Code.

MR. SHAPIRO: Good morning, all. Happy Spring.

MR. FLANDERS: Good morning.

MR. FRIEDMAN: Welcome.

MR. SHAPIRO: I'm Steve Shapiro. I retired as a building official after 34 years in Hampton, Virginia. And I've been involved in the code-development process in Virginia for over 40 years.

I'm here today on behalf of AOBA, which is the Department of Office Building Association, and also VAMA, which is the Virginia Apartment and Management Association.

Together, they represent 172M square feet of commercial office space and 630,000 residential and rental units. I'm also a past president of the ICC, International Code Council and have traveled the nation visiting ICC chapters.

And I can tell you that Virginia is held up as a model -- a national model for our code development process. And the reason is because of our inclusive process.

All stakeholders are invited to the table, all stakeholders have a voice at the table. And only changes that achieve consensus are advanced out of the work groups. And it's really come to be known as the Virginia way. And believe me, we are held up as a national model because of this.

I also want to give a shout out to Cindy Davis and -- and all the DHCD staff who've done a fantastic job facilitating the subwork groups and the work groups.

I'm a member of several of the subwork groups. I've gone to all the work group meetings. And they do a fantastic job. They're second to none, we couldn't be where we are without them.

So that's really all I want to say and ask you all is to trust the process. We've got a great process in Virginia. It works well and I hope that you'll -- you'll trust that as we go forward with the 2021 cycle. Thanks for allowing me to speak.

MR. FRIEDMAN: Thank you.

MR. FLANDERS: Thank you. Next up, we have Mr. Bob Shippee.

MR. SHIPPEE: Good morning. My name is

Bob Shippee. I'm a resident here in Henrico. I am very interested in energy efficiency. And after having observed this group for the last couple of years, I'm -- I appreciate what you do and the impact you can have on Virginians.

I just want to call out two items that maybe in the past you haven't had to weigh as heavily as you contemplate the Code standards. One is inflation that's currently becoming more of an issue, especially for low and moderate income Virginians.

One of the ways that we can help Virginians with affording those monthly bills is to help reduce utility costs. And one of the best ways to do that is to have higher efficiency building standards.

So I would encourage you to weigh that maybe a little more heavily than -- than you have in the past. The other issue, obviously, that's going on in the world today is -- is the war in Ukraine.

And -- and whether it's that or disruption in the Middle East or something else, it's pretty clear that going forward, we do risk energy disruption. And we -- we should seek to have energy independence as -- as much as possible in this country and in this state. One of the best ways to do that, again, is to use less energy. And again, higher efficiency building codes helps with that. So I appreciate your time. Thank you.

MR. FRIEDMAN: Thank you.

MR. FLANDERS: Susan Miller.

MR. FRIEDMAN: Welcome.

DR. MILLER: Good morning. I'm Dr. Susan Miller. I'm a retired family doctor and a member of the Virginia Clinicians for Climate Action on behalf -- on whose behalf I present the comments.

VCCA is an organization of about 450 physicians and other health providers, which is the state branch of a national organization called the Medical Society Consortium on Climate and Health. We were founded in 2017 to bring the clinician voice to climate change advocacy in Virginia through education, advocacy and community outreach. As clinicians, we're concerned about the health of our patients and communities and are aware of the impacts of climate change effecting them now.

So why would we be commenting about building codes? The health benefits of strong building codes are significant. Buildings are the third largest source of carbon pollution.

And numerous scientific studies have demonstrated that housing renovations that improve ventilation, insulation, heating and cooling equipment result in reduced pollutants.

Increased insulation protects against cold-heat related deaths in areas that experience extreme temperatures. And improved air quality reduces asthma and exacerbations chronic obstructive lung disease.

Better controlled moisture in buildings reduces mold and allergies. An avoidance of building materials that contain hazardous substances reduce the risk of cancer.

Improved indoor air quality can particularly benefit those who are in low income populations. Upgraded HVACs limits exposure to particulates to gaseous pollutants and to mold.

And studies conducted in 2014 found that low income populations living in green buildings experienced fewer symptoms of respiratory illness and generally improved health. Many of the impacts of a changing climate are being felt by our patients today.

Heat illness is increasing, allergy season is earlier. Lime disease is spreading. The way we build and renovate impacts our health. Structural efficiency improvements are much less costly if --

MR. FRIEDMAN: Ms. Miller.

DR. MILLER: -- installed during the initial construction.

MR. FRIEDMAN: Excuse me, but that's -- that's your two minutes.

DR. MILLER: Okay. And for these reasons -- just about done -- VCCA supports the adoption of the full 2021 IECC without any weakening amendments. Better building codes protect Virginians' health.

MR. FRIEDMAN: Thank you very much. Next speaker.

MR. FLANDERS: Next we'll move to virtual speakers unless there's anyone else in the room in person to speak. Okay. The first are Laura Baker or Eric Lacey.

MS. BAKER: Yes, good morning. Can you hear me okay?

MR. FLANDERS: Yes.

MS. BAKER: Great. Good morning. I'm Laura Baker and I'm with the Responsible Energy Codes Alliance. RECA strongly supports Virginia's proposed adoption of the 2021 IECC for both residential and commercial construction.

The full 2021 IECC provides clear energy costs savings. According to a report from the US DOE, new homes built in Virginia after 2021 will save almost 18% in energy costs in the first year alone as opposed to -- compared to Virginia's current energy code. And on the commercial side, DOE also did a study that showed that building -- commercial buildings built under the 2019 version of Actuary Standard 9.1 -- which is a client's option. And the 2021 IECC will save an average of three cents -- 3.7 cents a square foot on average every year in energy cost savings.

Now we'd like to see Virginia eventually eliminate the weakening amendments that are currently in the Code and adopt a full, unamended version of the 2021 IECC. And we've put some proposals in. We've been working through the working groups and we're looking forward to that process.

At -- and the proposed 2021 IECC is a big step forward and will provide immediate and long-lasting cost savings for -- as well as help Virginia reach its energy policy goals.

Thank you for your time. And yeah -- I'm available for questions. I notice we're not doing questions today. So I appreciate it. Thank you.

MR. FRIEDMAN: Thank you very much. Next speaker.

MR. FLANDERS: Next we'll have William Penniman.

MR. PENNIMAN: Thank you. I am William Penniman. I participated in the last cycle on behalf of the Virginia Chapter of the Sierra Club and three other organizations with a total of 30,000 members -- or more than 30,000 members in Virginia.

Since I last spoke to you -- and I submitted comment back in December. But more importantly, I would mention three items that have occurred first in 20 -- late 2020, the IECC published in 2021.

An IECC which, significantly, improved energy efficiency compared to 2018 Code, which Virginia is still behind. Second, in early 2021, the General Assembly amended Virginia law to require that the Code meet or exceed -- and it be at least as stringent as the latest IECC, which was then the 2021 IECC.

With the exceptions only that the construction costs increment exceed the savings to residents and the public and the benefits for the public over time, including pollution reduction benefits. In the summer of 2021, as Laura just mentioned, the Department of Energy -- through a specific national northwest laboratory -- published data finding that the 2021 IECC had [unintelligible] and benefit the public.

So the starting point should be a 2021 IECC not weakening amendments of the past. I have -- I have submitted proposals in the new cycle.

I will be working in the work group to try and get them adopted and work with members of -- of all communities in trying to improve those provisions and the like -- eventually to get Virginia to and beyond the 2021 IECC.

I would note that we sent reports of climate change show that it is getting worse faster than ever predicted, that Virginia's --

MR. FRIEDMAN: Mr. Penniman.

MR. PENNIMAN: [unintelligible].

MR. FRIEDMAN: Mr. Penniman, that's your two minutes.

MR. PENNIMAN: We need to reduce our
energy consumption and allow residents to save
money by have -- using less energy. Thank you.

MR. FRIEDMAN: Thank you for your
comments.

MR. FLANDERS: Next we have Mr. Eric
Dopplerue [sp]. Oh. We'll check back. Eric --
so Mr. Michael Topperman. Try back there.
Mr. Frederick Krimgold.

MR. KRIMGOLD: Yes. My name is Fred
Krimgold. And I'm the former associate dean for
the College of Architecture and Urban Space for
Research and Public Service.
And also a -- a former resident of
the Architectural Research Center's consortium of
the AIA Research Corporation. And I would like
to speak strongly in favor of the adoption of the
2021 IECC model code without any weakening
provisions as been included in the past. The
AIA, nationally, has established a -- a 2030
challenge and a 2030 commitment which commits the
organization -- that is the National Organization

of Architects -- to the accomplishment of net zero construction of new buildings and major renovations by the year 2030.

And that implies a definite decrease in the amount of greenhouse gas emissions from new construction and major renovation over the intervening period.

I might add to that that the important implication of the new legislation is that we consider the life cycle cost, including construction and operation of buildings over the useable lifetime of that building.

And that optimizing that life cycle cost is -- really has to become the principle on which we base our regulatory effort. I'd add to that that builders, architects and engineers and building regulators have a major responsibility in defending us against the challenges of climate change.

MR. FRIEDMAN: Mr. Krimgold, thank you --

MR. KRIMGOLD: Thank you.

MR. FRIEDMAN: Thank you for your comments.

MR. FLANDERS: Next we have Angie Ticama [sp]. Angie. We'll come back. Next, Karen Potter. Okay. Kate Walker.

MS. WALKER: Good morning.

MR. FRIEDMAN: Good morning.

MS. WALKER: Good morning, Chairman Abbasi, Vice-Chairman Meringoff and members of the Board. I'm Kate Walker. I'm the environmental programs coordinator for the City of Falls Church.

And my comments represent the vision, goals and legislative priorities of the city. We strongly urge the Board to adopt the 2021 IE -- International Energy Conservation Code without weakening amendments as it updates USBC.

Under H2227, the Board is required to assess the public health, safety and welfare benefits of adopting standards at least as stringent as the IECC, including potential energy savings that add to energy benefits over time. And you've heard several times already this morning, the US Department of Energy and the Pacific Northwest National Laboratory have shown the potential energy savings from the 2021 IECC, exceeding costs of construction.

It'll make buildings more energy efficient and lower utility costs. And the net savings will make housing more affordable, which is a top policy priority for -- in the City of Falls Church.

Adopting the 2021 IECC in whole will also provide important public health, safety, welfare and [unintelligible] benefits, including healthier and more comfortable living environments, increased resilience -- which is becoming increasingly important -- and reduced greenhouse gas emissions.

The City of Falls Church has the goal of reducing its greenhouse gas emissions 80% by 2050, and many jurisdictions throughout Virginia have similar goals.

With more than half of our greenhouse gas emissions resulting from buildings and energy efficient, US can see incorporating the 2021 IECC is absolutely essential for the city to successfully achieve its goals. So we urge you to adopt the full 2021 IECC without weakening amendment. Thank you.

MR. FRIEDMAN: Thank you very much.

MR. FLANDERS: Sally Newkirk. Ms. Newkirk, we can't hear you at this time.

MS. NEWKIRK: Can you hear me now?

MR. FLANDERS: Yes.

MS. NEWKIRK: Okay. My name is Sally Newkirk and I live in Rockingham County. And I'm speaking today on behalf of Climate Action Alliance of the Valley. I'm also a real estate agent.

I've been a real estate agent for 20 years. And I believe that comfort, security and relaxation make a house a home. I like to sell and help people buy healthy, energy efficient and comfortable homes. People need to be able to pay their monthly mortgage and their utility bill. I often provide advice to clients -- sellers and buyers -- about the importance of energy efficiency and in keeping a home more comfortable and more affordable.

And here in Harrisonburg, in Rockingham County, the central Habitat for Humanity district, we've been building EarthCraft standard homes for almost a decade now. And in this particular district, we have -- are beginning to put solar panels.

Because we all talk about housing affordability these days. But if you have to choose between paying your mortgage and paying for your heat or your groceries, then it's not affordable.

It's vital for Virginia's building codes to recognize the importance of building into new homes houses with EV and solar ready -- readiness.

And it's -- and lasting value that energy efficient and low energy use home has. As a realtor, I can assist with messaging and marketing for these homes. I urge this Board to adopt the 2021 IECC standards to make this a reality in Virginia. Thank you so much.

MR. FRIEDMAN: Thank you for the comments. Next speaker.

MR. FLANDERS: We have Maren Mahoney.

MS. MAHONEY: Hi, good morning. My name is Maren Mahoney. Thank you for the opportunity to provide comments this morning. I'm speaking today to urge the adoption of the 2021 International Energy Conservation Code without weakening amendments, as you consider updates to Virginia's -- the state's Uniformed Statewide Building Code over the next year.

I'm here today on behalf of Ceres, a non-profit sustainability organization that works with major institutional investors and companies and support policies that increase access to modes of economical de-carbonization.

The Ceres' business for innovative climate and energy policy or BICEP network has a coalition of more than 80 major businesses and employers committed to advocating for stronger climate and clean energy policies at the state and federal level. BICEP members and headquarters are significant footprints in

Virginia, including MARS, Inc., Nestle, Salesforce, Unilever, Workday and Worthen Industries.

Ceres also organizes an energy optimization work group and a complementary business group comprised of leading businesses, service providers, product manufacturers and users engaging on the state and federal level energy optimization policies.

Many of these members have been businesses in Virginia as well. Building codes are one of the most cost effective ways to reduce the energy use and emissions from our environment.

They are especially important because buildings account for more than 48% of all energy consumed by our state. Moreover, energy efficient construction replaces the likelihood that a home will default and is a critical tool for building the economic and resilience of our communities.

As you've heard from previous commenters, recent independent analysis from the US Department of Energy, specific Northwest National Lab, shows that it will be a boon for the state for decades to come by delivering $2.5B in energy cost savings, avoiding more than 11M metric tons of carbon emissions and creating more than 6,000 new jobs in the construction sector alone.

On behalf of Ceres, we hope that you will adopt the 2021 International Energy Conservation Code without weakening amendments as part of this Code update cycle. And I thank you for my -- for the consideration of my comments today.

MR. FRIEDMAN: Thank you very much.

MR. FLANDERS: Kristel Riddervold.

MS. RIDDERVOLD: Hi, good morning. My name's Kristel Riddervold, and I'm the environmental sustainability manager for the City of Charlottesville. My comments represent the vision and legislative priorities of the city.

I appreciate in advance the hard work that will go into this cycle of building code development. In both this and last year's legislative packet, the City of Charlottesville included support for the state to adopt residential and commercial building codes that meet or exceed the latest national and international standards.

As such, I'm speaking today to urge the adoption of the 2021 IECC without weakening amendments as you consider updates to Virginia's Uniformed Statewide Building Code.

The City of Charlottesville supports this position for the following reasons, and as previously mentioned, the US DOE and the Pacific Northwest National Laboratory -- the I -- the 2021 IECC will develop -- will deliver significant energy saving costs -- cost savings, avoid substantial carbon emissions and create new jobs.

The 2021 IECC will make buildings more energy efficient and lower utility costs, as well as help to improve indoor and outdoor air quality.

The net savings will make housing more affordable, which is also a policy priority for the city. In 2019, Charlottesville adopted updated greenhouse gas reductions goals of 45% by 2030 and carbon neutrality by 2050. We're currently developing a climate action plan to meet these targets. With about 60% of our emissions coming from the residential and commercial sectors combined, an energy efficient USBC incorporating the 2021 IECC is essential for the city to successfully achieve its goals.

As a member of a Virginia local government energy and sustainability professionals peer network, I know that there are several other cities and counties across the Commonwealth with similar climate goals.

And we have routinely discussed the critical, positive impact of improved building codes. Thank you for your consideration of these comments and we hope you will adopt the 2021 IECC without weakening amendments as part of this Code update cycle. Thank you very much.

MR. FRIEDMAN: Thank you.

MR. FLANDERS: Next we have Andrew Clark.

MR. CLARK: Hey, good morning. Can you hear me all right?

MR. FRIEDMAN: Yes.

MR. CLARK: Thank you. Andrew Clark on behalf of the Homebuilders Association of Virginia. First, I'd just like to thank all of you for serving on this critically important regulatory body that really makes decisions that impacts every Virginian.

And there will be plenty of opportunities to talk about specific proposals. But today, I really wanted to focus on what this Board does to -- and how the Board's decisions factor into housing affordability and where we're at now.

In December, the Virginia Joint Legislative Audit Review Commission, JLARC, released a 200-page report -- which I know everybody's going to go home and read.

But it really focused on the dire need to expand access to housing for individuals across the income spectrum. And to just highlight a few of the data points that they found -- statewide, median home sales prices rose between -- rose 15% between 2020 and 2021. In Hampton Roads, that number is 41% along with a

37% increase in far southwest Virginia, 32% increase in southside, 18% in the Valley, 16% in Central Virginia. And you kind of get it from there.

Secondly, the report found that every region of the Commonwealth between 22% and 34% of households are cost-burdened, meaning they're spending more -- more than 30% of their income on housing costs.

Which is widely accepted as the -- the threshold where your housing costs start to negatively constrain the household budget, making it difficult to afford medical bills and other necessities and increasing the likelihood of eviction.

And then finally, this is -- I think --- the most relevant number. JLAR found that in the rental market alone, Virginia is short about 200,000 affordable units for folks at the lower end of the income spectrum.

And that shortage ranges from 6,000 units in far southwest to 60,000 units in Northern Virginia. And so, you know, why am I talking about this? I say as we go through this process, it's important to remember that the building code is a baseline standard of quality, safety and efficiency in new homes. And that --

MR. FRIEDMAN: Mr. Clark.

MR. CLARK: -- consumers always have the ability to purchase or build a home that's built to a higher standard if that's something they want or can afford. But what we're looking at doing is setting a baseline standard and --

MR. FRIEDMAN: I have to interrupt you.

MR. CLARK: -- I think it's important that we don't set that standard so high that, you know, small annual savings in energy costs really don't cut the mustard with a mortgage or actually the -- the upfront costs of getting into a home.

So I got a little feedback there. I'm not sure what you all meant. But I just encourage the Board to --

MR. FRIEDMAN: You've gone over your two minutes.

MR. CLARK: -- to really understand and dive into the impact that each code proposal has on ability for folks to -- to move into a home or to rent an apartment. Thank you all.

MR. FRIEDMAN: Thank you. Okay.

MR. FLANDERS: Is Allan Larson? Eric Dopplerue? Michael Topperman said he's not going to speak. Angie Hickamo [sp]? Erin Potter. Okay. That concludes the rest of the speakers on the Code.

MR. FRIEDMAN: Thank you, Kyle. Are there any other persons wishing to speak regarding the issues for which this hearing is convened? Hearing none, the hearing is now concluded.

All of the comments you all made will be taken under advisement by the Board. I would also like to emphasize that any written statements received will be considered by the Board. Thank you very much.

(The hybrid public hearing concluded at

10:37 a.m.)

CERTIFICATE OF THE COURT REPORTER

I, Debroah Carter, hereby certify that I was the Court Reporter at the HYBRID PUBLIC HEARING regarding UNIFORMED STATEWIDE BUILDING CODE , heard in Glen Allen, Virginia, on March 21st, 2022, at the time of the hybrid public hearing herein.

I further certify that the foregoing transcript is a true and accurate record of the testimony and other incidents of the hybrid public hearing herein.

Given under my hand this 28th of March, 2022.

Debroah Carter, CMRS, CCR
Virginia Certified
Court Reporter

My certification expires June 30, 2022.

Public Comments Related to the Residential Sprinklers Proposals:

RB313.1-21; RB313.1(2)-21; and RB313.1(3)-21

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting

criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is

validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Scott A. Williams
President
Crescent Development Homes, Inc.

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

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Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
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NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

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Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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Sincerely,

Name E. John Regan Jr.
Company The Christopher Companies
Address 10461 White Granite Dr. #250
Oakton VA 22124

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June 1, 2022

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1111 East Main Street
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J P H

Name Joseph P Hennessey
Company The Christopher Companies
Address 10461 White Granite Dr #250
Oakton VA 22124

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Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State

[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State

[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.

[8] National Association of Home Builders – Townhouse Construction Surged in 2021

- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others[9].

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely, Brittany Havenner

Name Brittany Havenner
Company Christopher Companies
Address 10461 White Granite Dr
Oakton VA 22124

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

HBAV Comments on Several Energy Proposals

1 message

Andrew Clark <AClark@hbav.com> Fri, Jun 3, 2022 at 9:00 AM
To: "Cindy Davis (Cindy.Davis@dhcd.virginia.gov)" <cindy.davis@dhcd.virginia.gov>, "Kyle Flanders (kyle.flanders@dhcd.virginia.gov)" <kyle.flanders@dhcd.virginia.gov>, "Jeff Brown (Jeff.Brown@dhcd.virginia.gov)" <jeff.brown@dhcd.virginia.gov>
Cc: Andrew Clark <AClark@hbav.com>

Cindy, Kyle, Jeff –

I hope all is well. I have attached two public comment documents that I would like to submit on behalf of the Home Builders Association of Virginia in opposition of the following code proposals:

- EC1301.1.1.1-21 – Full adoption of 2021 IECC
- EC-C1301.1.1.1(2) – Full adoption of 2021 IECC
- REC-R402.1.2 (1)-21 – Increased wall insulation
- REC-R402.1.2 (2)-21 – increased wall insulation
- REC-R402.4-21 – 3ACH
- REC-R402.4.1.2-21 – 3ACH
- REC-R404.2-21 – Solar Ready Roofs
- REC-R401.2-21 - Electrification

The attached documents are focused primarily on the rationale/justification statements which have been made by the proponents of the proposals. Data from the U.S. Department of Energy and the American Council for an Energy Efficient Economy disputes the various claims that Virginia's energy codes are "weak" or are resulting in high household energy cost burdens.

The attachments also provide an overview of the framework by which we review code proposals - it is important for policymakers to distinguish between building code requirements that are essential to providing that baseline standard of quality, safety, and efficiency, and code requirements that are "aspirational". The code proposals above are more "aspirational" and add will compound rising housing costs with little benefit for the consumer, particularly those at the lower- to middle-end of the income spectrum.

I am working on some brief written comments for each of the proposals above, which will supplement the verbal comments that we've made during the subworkgroup meetings – and will make at the workgroup meeting next week. Those comments will address specific provisions of the proposals. But I wanted to send these comments to you directly, since they contain charts/graphs and citations that sometimes don't work in cdpVA.

Let me know if you have any questions.

Thanks and have a great weekend!

Andrew

--

Andrew Clark Vice President, Government Affairs

Home Builders Association of Virginia

1051 E. Cary Street, Suite 1400

Richmond, Virginia 23219

Office: (804) 643-2797, Ext. 3

Mobile: (978) 460-1331

www.HBAV.com

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2 attachments

HBAV_Clarifying ACEEE Report on Virginia's Residential Energy Codes.pdf
182K

HBAV_DoE Data on New Construction EE Improvements and Reduction in Household Energy Cost Burdens.pdf
170K

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

Clarifying the *American Council for an Energy-Efficient Economy's* Report on Virginia's Energy Policy and Building Codes

The American Council for an Energy-Efficient Economy (ACEEE) periodically releases a report ranking each state's energy efficiency policies and programs. This report is *widely* cited by energy efficiency stakeholders as justification for additional advancements in Virginia's energy codes – particularly, the report's ranking of Virginia as 25th in the country for energy efficiency[1].

Although the Home Builders Association of Virginia has partnered with these stakeholders during the 2015 and 2018 code cycles (which resulted in several significant advancements) and has continued to do so during the 2021 cycle, we felt it important to clarify the ACEEE's findings on Virginia's energy codes.

While the ACEEE report is a helpful resource for policymakers and regulatory boards, a state's ***overall ranking*** in the report is not particularly informative when evaluating the "strength" or "weakness" of a state's residential and commercial energy codes or specific energy code proposals. A deeper analysis of the ACEEE report shows that Virginia's ***overall ranking*** distorts the fact that Virginia receives extremely high scores for residential and commercial energy codes.

Virginia loses nearly half (24.5 points) of its points in categories *unrelated* to building codes

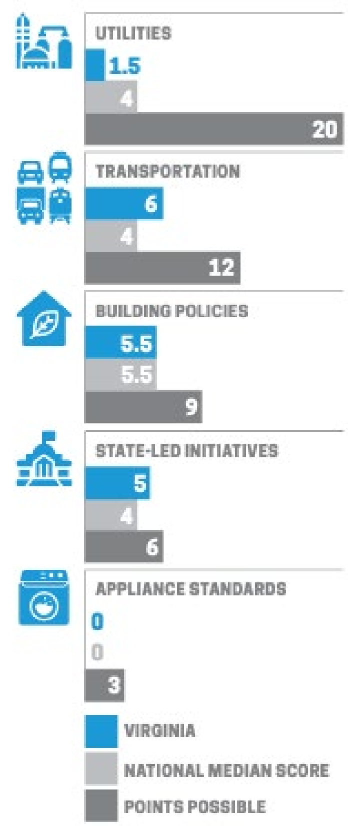
The ACEEE report ranks states based on five categories: (i) utility and public benefits programs and policies; (ii) transportation policies; (iii) building energy efficiency policies; (iv) state government initiatives; (v) appliance efficiency standards.

A state can only earn a certain number of points in each category:

- Utility and public benefits programs and policies (20 pts)
- Transportation policies (12 pts)
- Building energy efficiency policies (9 pts)
- State government initiatives (6 pts)
- Appliance efficiency standards (3 pts)

In the ACEEE's most recent report (2020), Virginia earned 18 out of 50 points – which is 25th in the nation.

However, a deeper analysis of the ACEEE's findings shows that Virginia lost nearly 50% of its points (24.5) in categories that are *unrelated* to energy efficiency building codes. Specifically, Virginia only earned 1.5 out of 20 pts for "Utility and Public Benefits Programs and Policies" and only received 6 out of 12 points for "Transportation Policies". *(See figure to the right)*



Due to the report's scoring system, it is inaccurate to claim that Virginia's 25th-in-the-Nation ranking in this report is the result of the Commonwealth's "weak energy code".

[1] American Council for an Energy-Efficient Economy – 2020 State Energy Efficiency Scorecard

Virginia receives a near-perfect score for residential code stringency and perfect score for commercial code stringency.

In the “Building Energy Efficiency Policy” category, Virginia receives 5.5 out of 9 points – by comparison, Virginia is only .5 points behind Maryland and 2 points behind California, which are the two states most frequently described by energy efficiency stakeholders as “leaders” in energy efficiency.

The “Building Energy Efficiency Policy” category consists of 8 sub-categories, including “residential code stringency” and “commercial code stringency”. Contrary to statements made during several sub-workgroup and workgroup meetings, Virginia receives a near perfect score for “residential energy efficiency” (1.5 points out of 2) and a perfect score for “commercial energy efficiency” (2 points out of 2).

It is HBAV’s understanding that these rankings were determined while Virginia was in the middle of the last code development cycle. While Virginia received exemplary scores for residential and commercial energy code stringency in ACEEE’s report, the rankings only reflect a *portion* of the progress which was made in Virginia’s energy codes during the last code cycle. During the last code cycle, the Home Builders Association of Virginia and other organizations reached consensus with energy efficiency stakeholders on several proposals, including:

1. Removed visual option for verifying building envelope air tightness and required blower door testing for all new residential buildings. Also added requirement that all new homes pass the blower door test with 5 air changes per hour;
2. Require an “energy certificate” in all new residential buildings to inform current and future homeowners about the key energy characteristics of their home;
3. Increase minimum ceiling insulation requirements (R-38 to R-49) for all new residential buildings;
4. ResCheck compliance updated to 2018 IECC, without Virginia amendments. Previously, a work around had been created for VA amendments that weakened the current IECC;
5. Increased fenestration requirements.

While the ACEEE has yet to release an updated report, it is highly likely that Virginia will receive further recognition for the full scope of energy efficiency code proposals that were adopted during the last code cycle – and possibly for the energy efficiency code proposals which are likely to be forwarded to the Board as “consensus” during the current code development cycle.

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

U.S. Department of Energy Data Shows Significant Advancements in Residential Energy Efficiency and Reduction in Energy Cost Burdens in New Construction

"The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs."

Building code regulations were first established – and are continually revised – to ensure a *baseline standard* of quality, safety, and efficiency in new residential structures. For example, they provide assurance for consumers that they are residing in safe structures, guidelines for builders/design professionals as to what constitutes a safe and durable structure, and certainty for lenders of the value and quality of structure.

Similarly, energy efficiency standards were first adopted by the U.S. Housing and Home Finance Agency in the 1950's to address a concerning *public health and welfare* issue at the time: the rising number of mortgage defaults on federally insured loans on homes with high utility bills.

While increasing the efficiency of new residential structures is a laudable objective, it is critically important for policymakers to balance that objective with the growing concerns over the cost of housing in Virginia and the dramatic undersupply of housing that is attainable for households across the income spectrum. Furthermore, it is important for policymakers to distinguish between building code requirements that are essential to providing that baseline standard of quality, safety, and efficiency, and code requirements that are "aspirational".

Consumers can make a personal financial decision to purchase or build a home that is constructed to a higher energy efficiency standard, if that is an amenity that they are willing and able to afford. While energy efficiency requirements can reduce negative environmental externalities, promote high-quality housing stock, and protect consumers from soaring energy costs over time, the ability to afford the **upfront costs** of additional energy efficiency code requirements will vary widely by income.

The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs.

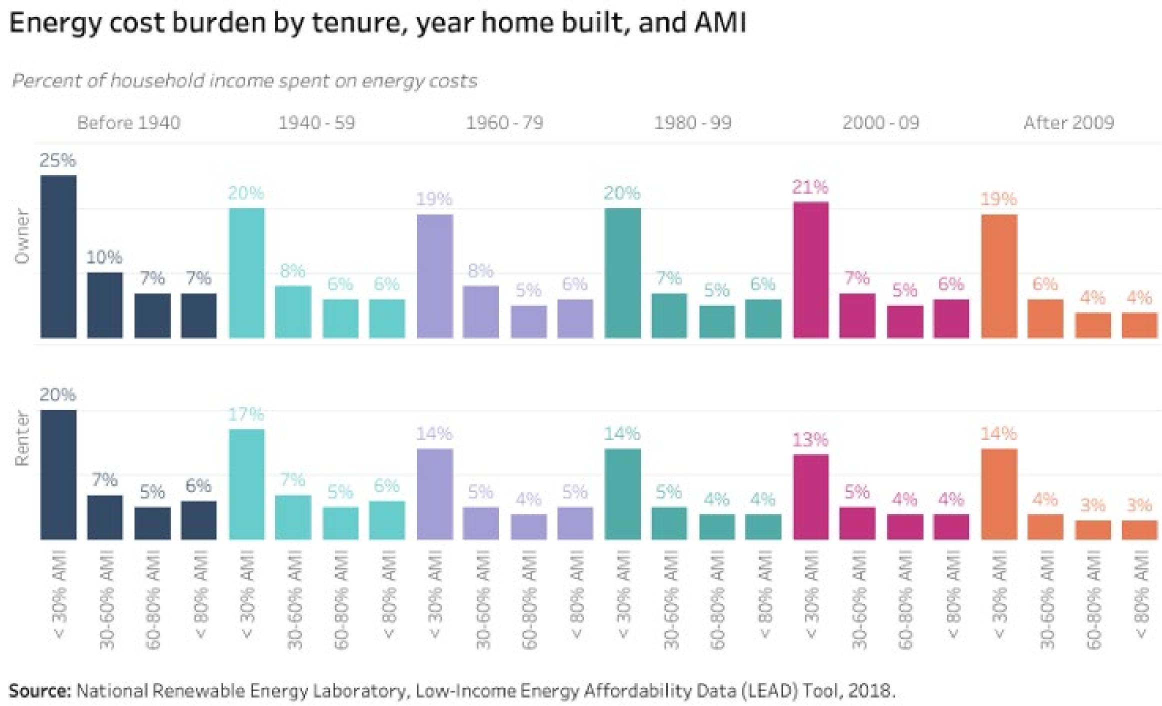
U.S. Department of Energy Data

Data from the U.S. Department of Energy's *Low-Income Energy Affordability Data (LEAD) Tool* validates the claim that Virginia *has* made vast improvements in residential energy efficiency over the last 80 years and has significantly reduced household energy costs to a level considered sustainable for individuals and families across the income spectrum.

A household is considered "energy cost burdened" when over 6% of the household income is dedicated to covering energy bills – this calculation includes all costs associated with energy used by the house (e.g., electricity and natural gas). When a household is "energy cost burdened", it impacts their ability to use electricity and heat or cool their home – and forces households to choose between paying utility bills, paying a mortgage or rent, or other essential expenses. In short, high energy cost burdens results in higher levels of housing instability, including evictions and foreclosures.

The chart below was compiled using data from the U.S. Department of Energy and included in a recent report released by Virginia Housing (formerly, Virginia Housing Development Authority) and the Department of Housing and Community Development[1].

[1] HB 854 Statewide Housing Study Report (January 2022)



The data from the U.S. Department of Energy (chart above) provides several important insights:

First, renters and owners residing in residential structures built since 2000 are below the 6% "energy cost burdened" threshold, with two exceptions: (i) Owner households in structures built between 2000 and 2009 are slightly over the 6% energy cost burdened threshold; (ii) Owners and renters with incomes below 30% of AMI residing in structures built between 2000 and 2019 are experiencing extremely high energy cost burdens. More analysis is needed to understand the latter - there are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Second, the highest "energy cost burdened" households (owner and renter) are residing in structures built prior to 1980's/1990's. The most "energy cost burdened" demographic – regardless of age of structure – are households earning under 30% AMI. Again, more analysis is needed to understand this dynamic. There are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Conclusion:

Data from the U.S. Department of Energy shows that residential structures constructed in the last 20 years are significantly more energy efficient than older homes, which has reduced household energy costs to levels considered sustainable for individuals and families across the income spectrum. The data also reflects the reality that efforts to reduce household energy cost burdens would be best focused on older, existing structures occupied by individuals and families at the lower end of the income spectrum.

Several energy proposals submitted during the 2021 code cycle seek to impose stricter energy efficiency requirements on all new homes, thus increasing the upfront cost of all new homes and exacerbating an issue raised by the Virginia Joint Legislative Audit and Review Commission's recent report on housing affordability: "Rising prices make it more difficult for low- and middle-income households to afford to purchase homes because of the increased monthly mortgage costs, as well as the increased upfront costs associated with purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.[2]"

[2] Joint Legislative Audit and Review Commission: Affordable Housing in Virginia (2021)

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fir Sprinkler Proposals: RB313.1-21, RB313.1(2)-21 and RB313.1(3)-21

1 message

Clark Massie <clark@tetracorpva.com> Wed, Jun 1, 2022 at 2:51 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>
Cc: "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>

Board of Housing and Community Development

1111 East Main Street

Suite 1400

Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

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Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Clark L. Massie

President

Tetra Corporation

221 E. Main Street

Unit 201

Purcellville, VA 20132

703-391-6245

Clark@tetracorpva.com

Licensed in Virginia

Please note new address

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[1] National Fire Protection Association: Fire Loss in the United States During 2020

[2] White House Housing Development Toolkit (2016)

[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

[4] National Association of Home Builders – 2022"Priced Out" Report

[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State

[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State

[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.

[8] National Association of Home Builders – Townhouse Construction Surged in 2021

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map

[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

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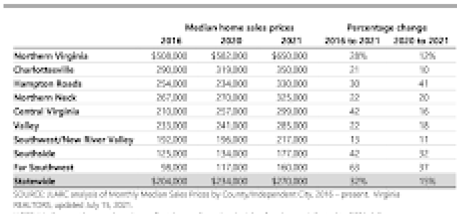

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Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$214,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
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Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Brad Nicholas <Bradley.Nicholas@pulte.com> Thu, Jun 2, 2022 at 8:54 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating

a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Bradley Nicholas

PulteGroup

9302 Lee Highway, Suite 1000

Fairfax, VA 22031

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Vice President of Construction Operations : : Mid Atlantic Division
pultegroup.com

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Sincerely,

David L. Hagan

Shah Development LLC

PO Box 1499

Christiansburg, VA 24068

O: 540.381.8421

C: 540.257.0275

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Sincerely,
Marc Dalessio

Vice-President, Construction | Land & Housing Development

Brookfield Properties
3201 Jermantown Road, Suite 150, Fairfax, VA 22030
T +1 703.270.1429
Marc.Dalessio@brookfieldpropertiesdevelopment.com
brookfieldproperties.com

Brookfield
Properties

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Zach Straits <zach.straits@bldr.com> Thu, Jun 2, 2022 at 7:39 AM
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Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

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- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

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Sincerely,

Zach Straits

General Manager

51 Laurel Hill Rd
Verona, Va. 24482

zach.straits@bldr.com
O: 540.248.0301 | C: 540.294.8601 | F: 540.248.0418
BLDR.com

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Jarod Blaney <Jarod.Blaney@pultegroup.com> Wed, Jun 1, 2022 at 6:26 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

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Sincerely,

Jarod Blaney

PulteGroup

Mid-Atlantic Division President

9302 Lee Highway, Suite 1000

Fairfax, Virginia 22031
direct (703) 251-0270 : : **mobile** (571) 382-8677

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Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Frank Ballif <FrankB@southern-development.com> Wed, Jun 1, 2022 at 4:26 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Sincerely,

Frank Ballif

FRANK BALLIF | President

142 South Pantops Drive

Charlottesville, VA 22911

O 434.245.0894 x 101

frank.ballif@southern-development.com

SOUTHERN DEVELOPMENT HOMES

southern-development.com

2010 - 2021 Daily Progress Readers' Choice Favorite Builder

2010 - 2021 Charlottesville Family Favorite Builder

2017 - 2019 Best of C-ville #1 Homebuilder

Commonwealth of Virginia

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1 message

Paul W <pbw@balancebuilders.hrcoxmail.com> Wed, Jun 1, 2022 at 4:24 PM
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov
Cc: Andrew Clark <AClark@hbav.com>

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

--

MEMBER
CVBIA
Coastal Virginia Building Industry Association

Paul Wallace, President

Wallace Brothers Homes

2525 Oconee Ave., #101

Virginia Beach, VA 23454

office: (757) 498-8810

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Ian Friend <ifriend@sasbuilders.com> Wed, Jun 1, 2022 at 3:56 PM
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov
Cc: aclark@hbav.com, Jeanne Stosser <jstosser@sasbuilders.com>

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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Sincerely,

--

Ian Friend
Project Coordinator, **SAS Builders, Inc.**
p: (540) 953-2080 x2425 | **m:** (540) 553-1280 | **f:** (540) 953-2630

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Tom Schoedel <tschoedel@atlanticbuilders.com> Wed, Jun 1, 2022 at 3:48 PM
To: "Flanders, Kyle" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, Andrew Clark <AClark@hbav.com>

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As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

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Sincerely,

Tom Schoedel

President

ATLANTIC BUILDERS

1975 Emancipation Hwy
Fredericksburg, Virginia

O: 540-891-8540 Ext. 217

M: 540-295-7752

ATLANTICBUILDERS.COM

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Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Faisant, Jesse <JFaisant@nvrinc.com> Wed, Jun 1, 2022 at 3:09 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, Andrew Clark <AClark@hbav.com>

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Sincerely,

Jesse Faisant

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Ryan Homes | Regional Manager
Richmond | Hampton Roads | Charlottesville

804-977-5627

Commonwealth of Virginia

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1 message

Jennifer Shields <jenshields4@hotmail.com> Wed, Jun 1, 2022 at 3:07 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to

cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450-$1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others.

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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Jennifer S. Shields
Broker, GRI
Augusta Realty Group, LTD.
2014 Goose Creek Road Suite 102

Waynesboro, VA 22980

Office (540) 943-4500
Cell (540) 241-2131
Fax (540) 942-5366

Licensed to sell Real Estate in the Commonwealth of Virginia.

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

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Sincerely,

Tommy Shields Jr.
President
Shields Construction Company

Address 2014 Goose Creek Road, Suite 104
Waynesboro, VA 22980
Office 540-943-1149
Fax 540-942-5366

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Augusta Home <officeahba@gmail.com> Wed, Jun 1, 2022 at 5:33 PM
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov, Andrew Clark <aclark@hbav.com>

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21,
RB313.1(2)-21, and RB313.1(3)-21

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However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

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Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

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	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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[1] National Fire Protection Association: Fire Loss in the United States During 2020

[2] White House Housing Development Toolkit (2016)

[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

[4] National Association of Home Builders – 2022"Priced Out" Report

[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State

[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State

[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.

[8] National Association of Home Builders – Townhouse Construction Surged in 2021

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map

[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Sincerely,

Carol Caporelli

Carol Caporelli
Executive Officer
Augusta Home Builders Association
P.O. Box 36
Waynesboro, VA 22980
(540)942-4644

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Hannah Shields Wood <hmshields3@hotmail.com> Wed, Jun 1, 2022 at 2:39 PM
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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to

cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450-$1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Hannah Shields Wood
Associate Broker at Augusta Realty Group LTD.
Licensed in Virginia

Address 2014 Goose Creek Road, Suite 102, Waynesboro, VA 22980
Cell 540.649.0376
Office 540.943.4500
Fax 540.942.5366

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Mike Bricker <mbricker@balzer.cc> Wed, Jun 1, 2022 at 2:12 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Sincerely,

Michael C. Bricker

Architect, NCARB, CSI

Executive Vice President

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Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

John Kennedy <johnrobertkennedy3@gmail.com> Wed, Jun 1, 2022 at 1:47 PM
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov, aclark@hbav.com

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Sincerely,
John R. Kennedy
1208 Bobbiedell Lane
Henrico, VA 23229
Cornerstone Homes

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Victoria Mallory <vmallory@cornerstonehomes.net> Wed, Jun 1, 2022 at 1:49 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

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Sincerely,

Victoria

Victoria Mallory

Senior Purchasing Agent

cornerstone HOMES

6912 Three Chopt Road, Suite C

Richmond, VA 23226

Office 804-484-3242 x 212

Mobile 804-402-3549

Fax 804-270-5243

vmallory@cornerstonehomes.net

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visit us at www.cornerstonehomes.net

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Alicia Smith <asmith@fsbuildinginc.com> Wed, Jun 1, 2022 at 1:40 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>
Cc: "aclark@hbav.com" <aclark@hbav.com>

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However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

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In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Sincerely,

Alicia F Smith

Vice President

F&S Building Innovations Inc

2944 Orange Ave NE

Roanoke, VA 24012

540-985-9160 office-Roanoke Area

540-354-4406 cell

540-985-9166 fax

www.FSFourSeasons.com (Residential Division)

www.FSBuildingInc.com (Commercial Division)

Visit us on Facebook https://www.facebook.com/fsfourseasons/

Check out our YouTube Channel https://www.youtube.com/channel/UCqgBdASmLtD2ECwcCK_0R2g

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1 message

Brod, Justin <jbrod@nvrinc.com> Wed, Jun 1, 2022 at 1:32 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, Andrew Clark <AClark@hbav.com>

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Sincerely,

Justin Brod

Regional Costing Manager

Ryan Homes Richmond Region (RHA)

7501 Boulders View Drive

Suite 450

Richmond, VA 23225

Commonwealth of Virginia

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1 message

Stephen Quick <stephen@stephenalexanderhomes.com> Wed, Jun 1, 2022 at 1:27 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>
Cc: "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, Andrew Clark <aclark@hbav.com>

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development.

Sincerely,

Stephen B. Quick IV
Principal
Stephen Alexander
Homes & Neighborhoods
993 Laskin Road
Virginia Beach, Va. 23451
Office 757-631-8793
www.stephenalexanderhomes.com

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Tom Dickey <TDickey@themonumentcompanies.com> Wed, Jun 1, 2022 at 1:26 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating

a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

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There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Tom Dickey

Principal

The Monument Companies

1425 E. Cary Street

Richmond, VA 23219

Phone: 804-303-7347

Mobile: 804-938-2490

Fax: 804-303-7348

Email: tdickey@themonumentcompanies.com

www.themonumentcompanies.com

MONUMENT

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Vince Napolitano <vnapolitano@napolitanohomes.com> Wed, Jun 1, 2022 at 1:22 PM
To: jeff.brown@dhcd.virginia.gov

Dear Members of the Board of Housing and Community Development:

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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

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In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support

mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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Sincerely,

Vince Napolitano

President

1492 S. Independence Blvd.

Virginia Beach, Va 23462

NAPOLITANO
HOMES

Office: 757.474.0888 ex.16

vnapolitano@napolitanohomes.com

Facebook

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Charlie Armstrong <CharlesA@southern-development.com> Wed, Jun 1, 2022 at 1:21 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "Andrew Clark (AClark@hbav.com)" <AClark@hbav.com>

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Sincerely,

Charlie Armstrong

CHARLIE ARMSTRONG | Vice President

O 434.245.0894 x 108

carmstrong@southern-development.com

SOUTHERN DEVELOPMENT HOMES

southern-development.com

2010 - 2021 Daily Progress Readers' Choice Favorite Builder

2010 - 2021 Charlottesville Family Favorite Builder

2017 - 2019 Best of C-ville #1 Homebuilder

Commonwealth of Virginia

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Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Keith Lancaster <klancaster@southern-development.com> Thu, Jun 2, 2022 at 9:17 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and “missing middle” housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: “In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase.”
- **Lumber Costs**: “At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*.” (Emphasis added)
- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others.

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Keith Lancaster

Keith Lancaster | Land Planner

O 434.245.0894 x 106

M 434.962.5158

klancaster@southern-development.com

SOUTHERN DEVELOPMENT HOMES

southern-development.com

2010 – 2021 Daily Progress Readers Choice Favorite Builder

2010 – 2021 Charlottesville Family Favorite Builder

2017 – 2019 Best of C-ville Homebuilder

May 31, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

On behalf of the Home Builders Association of Virginia, I am writing to express our industry's opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, the Home Builders Association of Virginia and our members are equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, the Home Builders Association of Virginia believes that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. Our members often hear from local government officials and community organizations about the growing need for housing that is attainable for households at the lower to middle end of the income spectrum – which is validated by virtually every home

[1] National Fire Protection Association: Fire Loss in the United States During 2020

[2] White House Housing Development Toolkit (2016)

builder's and developer's internal analysis of local and regional housing markets. In partnership with local government officials, our members work to identify and remove locally-enacted impediments to new residential development and propose policy changes to alleviate some of the primary drivers of cost during the land development and construction process.

Although modest progress has been made, a comprehensive report released by the Joint Legislative Audit and Review Commission (JLARC) in 2021 confirms that there is much more work to be done.

JLARC's analysis found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3] The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price

[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional "tangible" costs, and one "intangible" cost.

First, in some communities where the static pressure of surrounding waterlines is insufficient, it will be necessary to install a booster pump to provide enough pressure for an effective fire suppression system. Home builders in several regions of the Commonwealth provided cost estimates of $1,260 to $2,600 for these systems.

Second, although NFPA 13D does not itself require the installation of a backflow prevention device, the National Fire Protection Association agrees that many municipal water authorities in Virginia and across the country ***require*** the devices to prevent contaminants from reaching drinking water[5], so it will be a cost borne by the consumer if these proposals are enacted. Home builders in Virginia have provided cost estimates ranging from $450 to $1,000 for these devices.

Lastly, NFPA 13D systems require the review and approval by the Authority Having Jurisdiction (AHJ), which has the potential to extend construction time and place additional burden on localities, many of which are currently struggling to employ enough plan reviewers to keep up with current construction activity levels.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety. In

[4] National Association of Home Builders – 2022"Priced Out" Report

[5] National Fire Protection Association: Common Questions on Home Fire Sprinkler Installations

fact, our analysis of a recent NFPA report indicates that educating homebuyers about the status and importance of their smoke alarm systems, as well as additional investments in free smoke alarm testing and replacement initiatives, would likely result in increased home fire safety and reduced home fire deaths[6].

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[7]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[8]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[9], particularly as demand continues to rise among younger, first-time home buyers and seniors looking to downsize. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[10]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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[6] A 2021 report from the NFPA found that nearly 60% of home fire deaths were caused by fires in properties with no smoke alarms (41%) or in properties where the smoke alarms failed to operate (16%). In response, the Home Builders Association of Virginia (HBAV) worked to pass legislation (SB 607) during the 2022 General Assembly Session requiring "…a home inspection and the report on its findings include a determination of whether the home's smoke detectors are in "good working order," The HBAV also worked to introduce budget language to provide additional funding to the Virginia Department of Fire Programs to support local fire department's free smoke alarm testing and replacement programs. The budget language was ultimately not adopted, but the HBAV will continue pursuing that initiative

[7] National Fire Protection Association: Fire Sprinkler Requirements, State by State

[8] National Association of Home Builders – Fire Sprinkler Mandates, State By State

[9] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.

[10] National Association of Home Builders – Townhouse Construction Surged in 2021

County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others[11].

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[12]. There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

We respectfully request that you oppose these three proposals. Thank you in advance for your consideration and please do not hesitate to contact our office if you have any questions.

Sincerely,

Andrew Clark
Vice President of Government Affairs
Home Builders Association of Virginia

[11] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[12] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

Clarifying the *American Council for an Energy-Efficient Economy's* Report on Virginia's Energy Policy and Building Codes

The American Council for an Energy-Efficient Economy (ACEEE) periodically releases a report ranking each state's energy efficiency policies and programs. This report is *widely* cited by energy efficiency stakeholders as justification for additional advancements in Virginia's energy codes – particularly, the report's ranking of Virginia as 25th in the country for energy efficiency[1].

Although the Home Builders Association of Virginia has partnered with these stakeholders during the 2015 and 2018 code cycles (which resulted in several significant advancements) and has continued to do so during the 2021 cycle, we felt it important to clarify the ACEEE's findings on Virginia's energy codes.

While the ACEEE report is a helpful resource for policymakers and regulatory boards, a state's ***overall ranking*** in the report is not particularly informative when evaluating the "strength" or "weakness" of a state's residential and commercial energy codes or specific energy code proposals. A deeper analysis of the ACEEE report shows that Virginia's ***overall ranking*** distorts the fact that Virginia receives extremely high scores for residential and commercial energy codes.

Virginia loses nearly half (24.5 points) of its points in categories *unrelated* to building codes

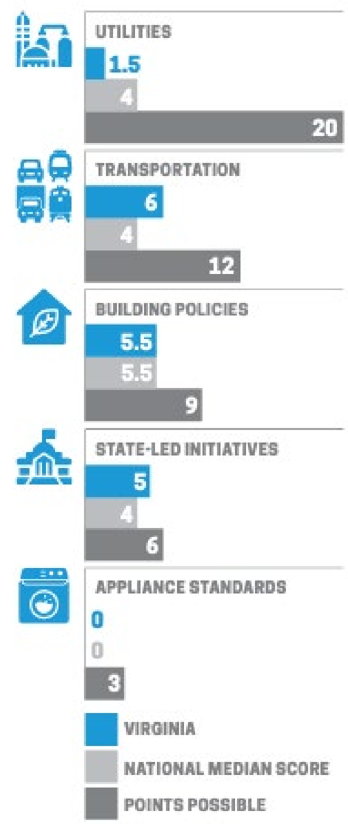
The ACEEE report ranks states based on five categories: (i) utility and public benefits programs and policies; (ii) transportation policies; (iii) building energy efficiency policies; (iv) state government initiatives; (v) appliance efficiency standards.

A state can only earn a certain number of points in each category:

- Utility and public benefits programs and policies (20 pts)
- Transportation policies (12 pts)
- Building energy efficiency policies (9 pts)
- State government initiatives (6 pts)
- Appliance efficiency standards (3 pts)

In the ACEEE's most recent report (2020), Virginia earned 18 out of 50 points – which is 25th in the nation.

However, a deeper analysis of the ACEEE's findings shows that Virginia lost nearly 50% of its points (24.5) in categories that are *unrelated* to energy efficiency building codes. Specifically, Virginia only earned 1.5 out of 20 pts for "Utility and Public Benefits Programs and Policies" and only received 6 out of 12 points for "Transportation Policies". *(See figure to the right)*



Due to the report's scoring system, it is inaccurate to claim that Virginia's 25th-in-the-Nation ranking in this report is the result of the Commonwealth's "weak energy code".

[1] American Council for an Energy-Efficient Economy – 2020 State Energy Efficiency Scorecard

Virginia receives a near-perfect score for residential code stringency and perfect score for commercial code stringency.

In the “Building Energy Efficiency Policy” category, Virginia receives 5.5 out of 9 points – by comparison, Virginia is only .5 points behind Maryland and 2 points behind California, which are the two states most frequently described by energy efficiency stakeholders as “leaders” in energy efficiency.

The “Building Energy Efficiency Policy” category consists of 8 sub-categories, including “residential code stringency” and “commercial code stringency”. Contrary to statements made during several sub-workgroup and workgroup meetings, Virginia receives a near perfect score for “residential energy efficiency” (1.5 points out of 2) and a perfect score for “commercial energy efficiency” (2 points out of 2).

It is HBAV’s understanding that these rankings were determined while Virginia was in the middle of the last code development cycle. While Virginia received exemplary scores for residential and commercial energy code stringency in ACEEE’s report, the rankings only reflect a *portion* of the progress which was made in Virginia’s energy codes during the last code cycle. During the last code cycle, the Home Builders Association of Virginia and other organizations reached consensus with energy efficiency stakeholders on several proposals, including:

1. Removed visual option for verifying building envelope air tightness and required blower door testing for all new residential buildings. Also added requirement that all new homes pass the blower door test with 5 air changes per hour;
2. Require an “energy certificate” in all new residential buildings to inform current and future homeowners about the key energy characteristics of their home;
3. Increase minimum ceiling insulation requirements (R-38 to R-49) for all new residential buildings;
4. ResCheck compliance updated to 2018 IECC, without Virginia amendments. Previously, a work around had been created for VA amendments that weakened the current IECC;
5. Increased fenestration requirements.

While the ACEEE has yet to release an updated report, it is highly likely that Virginia will receive further recognition for the full scope of energy efficiency code proposals that were adopted during the last code cycle – and possibly for the energy efficiency code proposals which are likely to be forwarded to the Board as “consensus” during the current code development cycle.

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

U.S. Department of Energy Data Shows Significant Advancements in Residential Energy Efficiency and Reduction in Energy Cost Burdens in New Construction

"The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs."

Building code regulations were first established – and are continually revised – to ensure a *baseline standard* of quality, safety, and efficiency in new residential structures. For example, they provide assurance for consumers that they are residing in safe structures, guidelines for builders/design professionals as to what constitutes a safe and durable structure, and certainty for lenders of the value and quality of structure.

Similarly, energy efficiency standards were first adopted by the U.S. Housing and Home Finance Agency in the 1950's to address a concerning *public health and welfare* issue at the time: the rising number of mortgage defaults on federally insured loans on homes with high utility bills.

While increasing the efficiency of new residential structures is a laudable objective, it is critically important for policymakers to balance that objective with the growing concerns over the cost of housing in Virginia and the dramatic undersupply of housing that is attainable for households across the income spectrum. Furthermore, it is important for policymakers to distinguish between building code requirements that are essential to providing that baseline standard of quality, safety, and efficiency, and code requirements that are "aspirational".

Consumers can make a personal financial decision to purchase or build a home that is constructed to a higher energy efficiency standard, if that is an amenity that they are willing and able to afford. While energy efficiency requirements can reduce negative environmental externalities, promote high-quality housing stock, and protect consumers from soaring energy costs over time, the ability to afford the **upfront costs** of additional energy efficiency code requirements will vary widely by income.

The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs.

U.S. Department of Energy Data

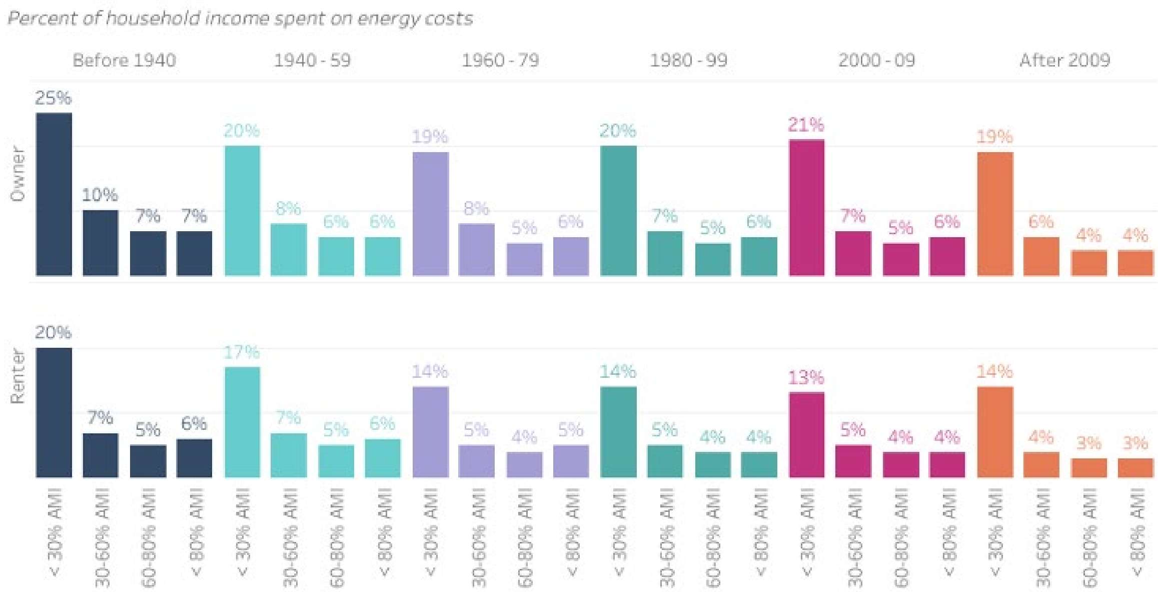
Data from the U.S. Department of Energy's *Low-Income Energy Affordability Data (LEAD) Tool* validates the claim that Virginia *has* made vast improvements in residential energy efficiency over the last 80 years and has significantly reduced household energy costs to a level considered sustainable for individuals and families across the income spectrum.

A household is considered "energy cost burdened" when over 6% of the household income is dedicated to covering energy bills – this calculation includes all costs associated with energy used by the house (e.g., electricity and natural gas). When a household is "energy cost burdened", it impacts their ability to use electricity and heat or cool their home – and forces households to choose between paying utility bills, paying a mortgage or rent, or other essential expenses. In short, high energy cost burdens results in higher levels of housing instability, including evictions and foreclosures.

The chart below was compiled using data from the U.S. Department of Energy and included in a recent report released by Virginia Housing (formerly, Virginia Housing Development Authority) and the Department of Housing and Community Development[1].

[1] HB 854 Statewide Housing Study Report (January 2022)

Energy cost burden by tenure, year home built, and AMI



Source: National Renewable Energy Laboratory, Low-Income Energy Affordability Data (LEAD) Tool, 2018.

The data from the U.S. Department of Energy (chart above) provides several important insights:

First, renters and owners residing in residential structures built since 2000 are below the 6% "energy cost burdened" threshold, with two exceptions: (i) Owner households in structures built between 2000 and 2009 are slightly over the 6% energy cost burdened threshold; (ii) Owners and renters with incomes below 30% of AMI residing in structures built between 2000 and 2019 are experiencing extremely high energy cost burdens. More analysis is needed to understand the latter - there are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Second, the highest "energy cost burdened" households (owner and renter) are residing in structures built prior to 1980's/1990's. The most "energy cost burdened" demographic – regardless of age of structure – are households earning under 30% AMI. Again, more analysis is needed to understand this dynamic. There are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Conclusion:

Data from the U.S. Department of Energy shows that residential structures constructed in the last 20 years are significantly more energy efficient than older homes, which has reduced household energy costs to levels considered sustainable for individuals and families across the income spectrum. The data also reflects the reality that efforts to reduce household energy cost burdens would be best focused on older, existing structures occupied by individuals and families at the lower end of the income spectrum.

Several energy proposals submitted during the 2021 code cycle seek to impose stricter energy efficiency requirements on all new homes, thus increasing the upfront cost of all new homes and exacerbating an issue raised by the Virginia Joint Legislative Audit and Review Commission's recent report on housing affordability: "Rising prices make it more difficult for low- and middle-income households to afford to purchase homes because of the increased monthly mortgage costs, as well as the increased upfront costs associated with purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.[2]"

[2] Joint Legislative Audit and Review Commission: Affordable Housing in Virginia (2021)

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.

NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water

[4] National Association of Home Builders – 2022"Priced Out" Report

meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)

[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State
[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State
[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.
[8] National Association of Home Builders – Townhouse Construction Surged in 2021

- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others[9].

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Frank X. Lackman, President
Cornerstone Homes and CH Construction LLC
(703) 463-1808 Direct
flackman@cornerstonehomes.net
6912 Three Chopt Road, Suite C
Richmond, Virginia 23226

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

June 7, 2022

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However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

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In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

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Sincerely,

Michael W. Farmer

Michael Farmer
Project Manager

6912 Three Chopt Road ● Suite C ● Richmond, Virginia, 23226 ● 804-270-7701

the crescent group

June 7, 2022

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I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Preston Roper
Project Manager

6912 Three Chopt Road • Suite C • Richmond, Virginia, 23226 • 804-270-7701

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

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[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

[4] National Association of Home Builders – 2022"Priced Out" Report

disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State
[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State
[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.
[8] National Association of Home Builders – Townhouse Construction Surged in 2021

- **Lumber Costs**: “At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*.” (Emphasis added)
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,
David Boisvert
Atlantic Builders
1975 Emancipation Hwy
Fredericksburg, VA 24401

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21

1 message

Roger Glover III <rglover@cornerstonehomes.net> Mon, Jun 6, 2022 at 12:26 PM
To: "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>

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a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and “missing middle” housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

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I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Roger Glover

Roger A. Glover, III

Principal

rglover@cornerstonehomes.net

rglover@crescentgroupva.com

Office 804-484-3242 Ext. 202

Cell 804-338-2199

6912 Three Chopt Road

Richmond, VA 23226

www.cornerstonehomes.net www.crescentgroupva.com

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Craig Logue <clogue@cornerstonehomes.net> Sat, Jun 11, 2022 at 2:46 PM
To: "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>

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Craig Logue

Director of Sales

cornerstone HOMES

6912 Three Chopt Road, Suite C

Richmond, VA 23226

Direct 804-356-2787

clogue@cornerstonehomes.net

visit us at www.cornerstonehomes.net

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Cary Hall <CHall@cavacompanies.com> Wed, Jun 8, 2022 at 8:43 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>
Cc: "aclark@hbav.com" <aclark@hbav.com>

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Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Cary Hall

Vice President of Construction

chall@cavacompanies.com

(804) 573-1037 - c

(804) 510-0333 - o

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Sarah Yoder <sarah.yoder@oaktreebuildershomes.com> Tue, Jun 7, 2022 at 11:33 AM
Reply-To: sarah.yoder@oaktreebuildershomes.com
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov, aclark@hbav.com

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Sincerely,
Sarah Yoder
1960 Knightly Mill Road
Fort Defiance, VA 24437
Oaktree Builders, Inc.

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Sarah Yoder
Oaktree Builders, Inc.
540-607-6433
www.oaktreebuildershomes.com

Commonwealth of Virginia

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Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

John Ainslie <johnainslie@mac.com> Mon, Jun 6, 2022 at 6:56 PM
To: kyle.flanders@dhcd.virginia.gov, jeff.brown@dhcd.virginia.gov, Andrew Clark <aclark@hbav.com>

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Sincerely,

John Ainslie

johna@ainsliegroup.com
757-409-7001 mobile
757.499-7000 direct
757.490.9494 fax
389 Edwin Drive
Virginia Beach, VA 23462

Ainslie Group

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Kirsten Nease <Knease@cornerstonehomes.net> Mon, Jun 6, 2022 at 3:34 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

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Sincerely,

Kirsten Nease

Director of Marketing

6912 Three Chopt Road, Suite C

Richmond, VA 23226

Office 804-484-3242 x 210

Mobile 804-938-4662

knease@cornerstonehomes.net

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Ina Hill <ihill@cornerstonehomes.net> Mon, Jun 6, 2022 at 12:40 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>
Cc: "aclark@hbav.com" <aclark@hbav.com>

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However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: “Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.”

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Sincerely,

Ina Hill

Community Sales Manager

Chickahominy Falls

10455 Cedar Lane

Glen Allen, VA 23059

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Cell (804) 901-4455

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visit us at www.cornerstonehomes.net

Commonwealth of Virginia

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1 message

Connie Gibson <cgibson@cornerstonehomes.net> Mon, Jun 6, 2022 at 12:24 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Connie Gibson

Senior Accounts Payable Specialist

Office 804-484-3242 ext. 203

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1 message

Mike Lang <mlang@crescentgroupva.com> Sun, Jun 5, 2022 at 10:54 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Mike Lang

President, The Crescent Group

Vice President of Development, Cornerstone Homes

Office: 804-484-3242 x 215

Mobile: 804-683-8989

6912 Three Chopt Road St. C

Richmond, VA 23226

mlang@crescentgroupva.com

Visit us at cornerstonehomes.net

Visit us at crescentgroupva.com

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Graham Weigle <gweigle@georgelasgroup.com> Fri, Jun 3, 2022 at 12:37 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

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Thank you,

Graham

T. Graham Weigle

President

8405 Greensboro Dr. Suite P-130

McLean, VA 22102

Office (703) 821-1540 x 591

Cell (703) 328-8113

www.brytonhomes.com

BRYTON HOMES
A Georgelas Company

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Dave Small <Dave.Small@pultegroup.com> Fri, Jun 3, 2022 at 11:57 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Sincerely,

Dave Small

Vice President of Procurement | Mid-Atlantic Division | Pulte Homes

Office : 703.277.7471

Cell : 703.932.7480

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Frazier, Joe <jfrazier@nvrinc.com> Fri, Jun 3, 2022 at 9:44 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>
Cc: "Frazier, Joe" <jfrazier@nvrinc.com>, "Mock, Paul" <PMock@nvrinc.com>

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Sincerely,

Joe Frazier

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Ryan Homes (NVR)

3926 Pender Dr, Suite 200

Fairfax, VA 22030
Ryan Homes NOVA | Regional Production Manager
540-656-6639

Message classified as *NVR - Business Use Only* on Friday, June 3, 2022 9:44:29 AM

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Popovitch, Toni <Toni.Popovitch@brookfieldpropertiesdevelopment.com> Fri, Jun 3, 2022 at 8:45 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating

a concern raised in the JLARC report: “Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.”

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure’s water meter from ¾” or 5/8” to 1” to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1” water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Toni Popovitch

Director of Purchasing | Land & Housing

Development

Brookfield Properties

3201 Jermantown Road, Suite 150, Fairfax, VA 22030

T +1 703.270.1707

Toni.Popovitch@brookfieldpropertiesdevelopment.com

brookfieldproperties.com

Brookfield
Properties

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Bindiya Agarwal <BAgarwal@ktgy.com> Thu, Jun 2, 2022 at 5:54 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, Andrew Clark <AClark@hbav.com>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>

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Sincerely,

Bindiya Agarwal
Director, Production

KTGY
Architecture | Branding | Interiors | Planning

8609 Westwood Center Drive, Suite 600
Tysons, VA 22182

703.245.1084 Direct
703.992.6116 Main

ktgy.com

KTGY Speaking Engagements

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Sean Beliveau <sean@scbhomes.com> Thu, Jun 2, 2022 at 4:28 PM
To: kyle.flanders@dhcd.virginia.gov, Jeff Brown <jeff.brown@dhcd.virginia.gov>, Andrew Clark <aclark@hbav.com>

Jeff and Kyle – Attached you will find my public comments on the three residential fire sprinkler code proposals that have been submitted during the current code development cycle. I would greatly appreciate you including them in any of the future workgroup or Board meeting agenda packets. Please let me know if you have any questions. Thank you!

Sincerely,

Sean

--
Sean Beliveau
Owner/Builder
Slate Creek Builders, LLC
sean@scbhomes.com
scbhomes.com
540.449.3284
CGP - Certified Green Professional
CAPS - Certified Aging in Place Specialist
NAHB Remodelers
HBAV Executive Board and New River Valley Representative
NRVHBA Board of Directors and Past President
2012/2019/2021 - NRVHBA Builder of the Year
2017 - NAHB National Remodeler of the Month - July
2017/2018 - NRVHBA Best Remodeled Home
2018/2019/2020/2021 - NRVHBA Best Kitchen Remodel

Public Comment on Fire Sprinkler Proposals.pdf
275K

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

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[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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[4] National Association of Home Builders – 2022"Priced Out" Report

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[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State
[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State
[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.
[8] National Association of Home Builders – Townhouse Construction Surged in 2021

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110 Country Club Dr, SW Blacksburg, VA 24060

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

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1 message

Matt Glover <mattglover@crescentgroupva.com> Thu, Jun 2, 2022 at 12:59 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating

a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

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Sincerely,

Matt Glover

The Crescent Group

6912 Three Chopt Rd

Richmond, VA 23226

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Monica Hailey <mhailey@atlanticbuilders.com> Thu, Jun 2, 2022 at 11:36 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Sincerely,

MONICA HAILEY

Permits Coordinator

ATLANTIC BUILDERS

1975 Emancipation Hwy
Fredericksburg, Virginia

O: 540-891-8540 Ext. 223

M: 540-623-4967

ATLANTICBUILDERS.COM

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Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Monica Hailey <mhailey@atlanticbuilders.com> Thu, Jun 2, 2022 at 11:31 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "k@hbav.com" <k@hbav.com>

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1 message

Suzanne Copley <scopley@crescentgroupva.com> Thu, Jun 2, 2022 at 10:56 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

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Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Suzanne Copley

Controller

Office: 804-270-7701 x 205

Mobile: 804-338-3652

Fax: 804-726-5065

6912 Three Chopt Road, Suite C-1

Richmond, VA 23226

scopley@crescentgroupva.com

Visit us at crescentgroupva.com

Visit us at cornerstonehomes.net

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Travis Folden <tfolden@statesonhomes.com> Mon, Jun 13, 2022 at 12:22 PM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>
Cc: Andrew Clark <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Best regards,

Travis D. Folden

Director of Product Development

Stateson Homes

618 N. Main St.

Blacksburg, VA 24060

C: 540.280.1461

www.StatesonHomes.com

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Opposition to sprinkler requirements for new single family homes-Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Mark Trostle <Mark.Trostle@pultegroup.com> Thu, Jun 2, 2022 at 11:19 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>
Cc: "aclark@hbav.com" <aclark@hbav.com>

Dear Members of the Board of Housing and Community Development:

This message is submitted to express my strong opposition to the three code proposals that would require residential fire sprinklers systems in new one- and two- family dwellings and townhomes. Instead, I am in support of the building industry position summarized below:

Of course, our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges.   In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Mark Trostle

Vice President of Land Development : : Mid-Atlantic Division

office (703) 277-7470 : : **mobile** (703) 898-2443

pultegroup.com

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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

John Olivieri
4th Generation Home Builders, LLC
1120 Laskin Road, Suite 101
Virginia Beach, VA 23451

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting

criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is

validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Matthew D. Kroll, PE, VP Land Development
Timber Ridge
44095 Pipeline Plaza, Suite 140
Ashburn, VA 20147

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

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The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
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In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

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[8] National Association of Home Builders – Townhouse Construction Surged in 2021

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Sincerely,

James L. Perry
Elm Street Development, Inc.
1355 Beverly Road, Suite 240, McLean, VA 22101

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[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

June 3, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

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- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others[9].

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Sean Halsey
Halsey Home Corporation
134 Cranes Corner Rd, Fredericksburg, VA 22406

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting

criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is

validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others.

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Scott A. Williams
President
Crescent Development Homes, Inc.

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "…leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
Hampton Roads	254,000	234,000	330,000	30	41
Northern Neck	267,000	270,000	325,000	22	20
Central Virginia	210,000	257,000	299,000	42	16
Valley	233,000	241,000	285,000	22	18
Southwest/New River Valley	192,000	196,000	217,000	13	11
Southside	125,000	134,000	177,000	42	32
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Statewide	$204,000	$234,000	$270,000	32%	15%

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

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Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

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Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State
[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State
[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.
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Timothy Sievers
General Manager
Ryan Homes
3850 Fettler Park Drive, Suite 201
Dumfries, VA 22025
571-334-7173

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Pat LeGault
LeGault Homes
11520 Nuckols Rd, Glen Allen VA 23059

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[9] Harvard Joint Center for Housing Studies:
[10] Pew Research Center (January 18, 2022):

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
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Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
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SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.
NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

[4] National Association of Home Builders – 2022"Priced Out" Report

disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State

[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State

[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.

[8] National Association of Home Builders – Townhouse Construction Surged in 2021

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I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

DocuSigned by:

Paul Mock

2DB7E47271C4409...

Paul Mock
NVR, Inc.
3926 Pender Drive, Suite 200
Fairfax, VA 22030

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[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map

[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Commonwealth of Virginia

Brown, Jeffrey <jeff.brown@dhcd.virginia.gov>

Sprinkler Opposition Proposal

1 message

Louie Berbert <lberbert@dragas.com> Fri, Jun 3, 2022 at 9:13 AM
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>, "jeff.brown@dhcd.virginia.gov" <jeff.brown@dhcd.virginia.gov>, "aclark@hbav.com" <aclark@hbav.com>

Good morning,

Please find the attached proposal to oppose a building code that requires sprinkler systems in residential construction. The proposal articulates the exorbitant cost to the builder that is passed on to the homeowner. In addition to the upfront cost to install a system, the cost to maintain it is also passed down to the homeowner. Frequently, sprinkler heads require replacement every five years and should be inspected annually. According to Hopkin et al. (2019), an average cost to maintain a system is $200, primarily the inspection cost. Based on these arguments, the costs outweigh the benefits compared to a properly installed and functioning smoke detector system. Furthermore, the drywall in a "shaft wall" or "party wall" is proven to prevent the spread of fires from one unit to the next without annual maintenance and additional upfront costs.

If I did not complete the attached document correctly, please let me know, and I am happy to make any corrections.

https://apfecorp.com/blog/replacing-fire-sprinkler-heads/

Hopkin, D., Spearpoint, M., Arnott, M., & Van Coile, R. (2019). Cost-benefit analysis of residential sprinklers–Application of a judgment value method. *Fire safety journal*, *106*, 61-71. https://www.sciencedirect.com/science/article/pii/S0379711218305940

Best regards,

Louie F. Berbert
Vice President of Field Operations
O: 757-490-0161 ext. 364
E: lberbert@dragas.com

Dragas Companies | 4538 Bonney Rd, Virginia Beach, VA 23462
www.dragas.com

Sprinkler Doc.pdf
114K

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

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Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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Sincerely,

Louis F. Berbert
Dragas Companies
4538 Bonney Road, Virginia Beach, VA 23462

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

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- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Name Joseph P Hennessey
Company The Christopher Companies
Address 10461 White Granite Dr #250
Oakton VA 22124

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

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Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	**2020**	**2021**	**2016 to 2021**	**2020 to 2021**
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
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Southside	125,000	134,000	177,000	42	32
Far Southwest	98,000	117,000	160,000	63	37
Statewide	**$204,000**	**$234,000**	**$270,000**	**32%**	**15%**

SOURCE: JLARC analysis of Monthly Median Sales Prices by County/Independent City, 2016 – present. Virginia REALTORS, updated July 15, 2021.

NOTE: Median cost home sales prices reflect the median prices in July of each year. Adjusted to 2021 dollars.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

[4] National Association of Home Builders – 2022"Priced Out" Report

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Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

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Sincerely,

Name E. John Regan Jr.
Company The Christopher Companies
Address 10461 White Granite Dr. #250
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1111 East Main Street
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Sincerely, Brittany Havenner

Name Brittany Havenner
Company Christopher Companies
Address 10461 White Granite Dr
Oakton VA 22124

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Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

1 message

Janet Davis <jdavis@cornerstonehomes.net>
To: "kyle.flanders@dhcd.virginia.gov" <kyle.flanders@dhcd.virginia.gov>
Mon, Jun 6, 2022 at 3:52 PM

Dear Members of the Board of Housing and Community Development:

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I have personally found that these have created more damage by going off accidentally than I have as a fire need.

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Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Janet Davis

Janet Davis

Cornerstone Homes at

Barley Woods and

Church Square

Cell 919-306-1742

cornerstone HOMES

jdavis@cornerstonehomes.net

visit us at www.cornerstonehomes.net

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

Subject: Opposition to Residential Fire Sprinkler Proposals: RB313.1-21, RB313.1(2)-21, and RB313.1(3)-21

Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower[1].

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents[2].

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."[3]

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures.

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[2]
[3]

Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41% (see figure below).

	Median home sales prices			Percentage change	
	2016	2020	2021	2016 to 2021	2020 to 2021
Northern Virginia	$508,000	$582,000	$650,000	28%	12%
Charlottesville	290,000	319,000	350,000	21	10
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In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market[4].

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

[4] National Association of Home Builders –

disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

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- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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Sincerely,

Pat LeGault
LeGault Homes
11520 Nuckols Rd, Glen Allen VA 23059

[9] Harvard Joint Center for Housing Studies:
[10] Pew Research Center (January 18, 2022):

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
Suite 1400
Richmond, VA 23218

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[1] National Fire Protection Association: Fire Loss in the United States During 2020
[2] White House Housing Development Toolkit (2016)
[3] Joint Legislative Audit and Review Commission Report: Affordable Housing in Virginia

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[4] National Association of Home Builders – 2022"Priced Out" Report

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[8] National Association of Home Builders – Townhouse Construction Surged in 2021

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Sincerely,

Thomas Roes

Thomas Roes
Oaktree Builders, Inc.
1960 Knightly Mill Road, Fort Defiance, VA 24437

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

June 1, 2022

Board of Housing and Community Development
1111 East Main Street
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Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and

[4] National Association of Home Builders – 2022"Priced Out" Report

disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association[5]:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes[6]. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing[7]. This is validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts[8]. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."

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[5] National Fire Protection Association: Fire Sprinkler Requirements, State by State
[6] National Association of Home Builders – Fire Sprinkler Mandates, State By State
[7] "Missing Middle" is a term that refers to the range of housing types that fit between single-family detached homes and mid-to-high-rise apartment buildings. Used in this context, "middle" references the size and type of a home, and its relative location – in the middle – on a spectrum of housing types.
[8] National Association of Home Builders – Townhouse Construction Surged in 2021

- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
- **Land Costs:** Developers, builders, and local government planners frequently cite increasing land costs as a significant factor impacting housing costs and supply. According to FHFA estimates, the median land value of a quarter-acre lot occupied by an existing single-family home was $163,500 in 2019, some 60 percent higher than in 2012. An analysis by the Harvard Joint Center for Housing Studies found significant increases in the price per acre land costs between 2012 and 2017 in many urban, suburban, and rural localities across Virginia, including Alexandria (21.4%), Lynchburg (15.5%), Fredericksburg (16.2%), King George County (42.7%), Rockingham County (37.5%), New Kent County (41.4%), Henrico County (13.6%), Prince William County (43.4%), Stafford County (26.8%), Spotsylvania County (14.2%), and others[9].

The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year[10].

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Gary Davenport
Pendleton Community Bank
2201 N. Augusta Street
Staunton, VA 24401

[9] Harvard Joint Center for Housing Studies: https://www.jchs.harvard.edu/son-2019-land-prices-map
[10] Pew Research Center (January 18, 2022): A growing share of Americans say affordable housing is a major problem where they live

Dear Members of the Board of Housing and Community Development:

I am writing to express my opposition to the three code proposals to require residential fire sprinklers systems in new one- and two- family dwellings and townhomes.

Our industry shares the fire service professional's commitment to advancing building code requirements that ensure the health, safety, and welfare of all Virginians in their homes and apartments. That shared commitment has clearly yielded significant progress over the last 40 years: according to the National Fire Protection Association's most recent "Fire Loss in the United States" report, the 2020 estimates of the number of fires were 40% to 64% lower than in 1980 for most of the major incident type categories. Furthermore, the 2020 estimate of total fire deaths was 46% lower than in 1980, home fire deaths were 50% lower, deaths in one- or two-family home fires were 47% lower, and apartment fire deaths were 66% lower.

However, our industry is equally as committed to addressing a crisis which has become *so* entrenched in our Commonwealth that it has remained unaddressed, but not unnoticed, for decades and could arguably have greater short-term and long-term impacts on public safety *and* our local, regional, state and national economies, if left alone: housing affordability. While the objective of the fire sprinkler proposals is certainly laudable, I believe that further advancements in residential fire safety could be accomplished through code requirements – and other initiatives – that are less burdensome on homebuyer's and renter's budgets.

As you know, communities across the country are grappling with the effects of a housing affordability crisis. Over the past three decades, the proliferation of local and state regulatory barriers to new residential development has limited the industry's ability to deliver new units to the market, resulting in a supply-demand imbalance which is widely viewed as a primary driver of rapidly escalating home prices and rents.

Unfortunately, Virginia has not been immune to these challenges. In 2021, the Virginia Joint Legislative Audit and Review Commission (JLARC) released a comprehensive report detailing the housing affordability crisis in Virginia. The report found that housing costs have been rising in every region of the Commonwealth, "...leading to increased housing instability for Virginians."

The report also found nearly 30% of Virginia households (905,000) were "housing cost burdened" in 2019, meaning they spend more than 30% of the income on housing costs, which is the widely accepted threshold where housing costs begin negatively impacting the household's ability to make other necessary expenditures. Furthermore, in just one-year, median home sales prices in Virginia rose between 10% and 41%.

In short, Virginians are struggling to find affordable homes to purchase or rent – and the three residential fire sprinkler proposals before the Board will add substantially to the cost of housing ***for consumers***, further exacerbating a concern raised in the JLARC report: "Low- and middle-income households may have incomes that could support mortgage payments but lack the savings to cover the upfront costs of purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes."

Residential sprinkler advocates often cite data from the Fire Protection Research Foundation, which shows an average cost of roughly $6,000 to install fire sprinklers. While many home builders in Virginia believe that to be an extremely conservative estimate, if it were assumed to be accurate, it ignores the reality that many Virginians cannot bear thousands of dollars in additional cost. Nationally, a $1,000 increase in the cost of a median-priced new home pushes 117,932 households out of the market. Based on their incomes and standard underwriting

criteria, these households would be able to qualify for a mortgage to purchase the home before the price increase, but not afterward. In Virginia, a $1,000 increase in the cost of a home pushes 3,871 households out of the market.

Furthermore, the cost estimates from the Fire Protection Research Foundation do not include the cost of increasing the size of a structure's water meter from ¾" or 5/8" to 1" to accommodate the residential fire sprinkler system. Increasing the water meter size, in many localities, results in a significantly higher per-unit water connection or availability fee. The Home Builders Association of Virginia surveyed localities across the Commonwealth to determine to magnitude of the fee increase and found increases ranging from several hundred dollars to over $13,000 per unit.

Although residential sprinkler advocates in Virginia dispute this claim, the issue of water connection fees has garnered the attention of legislators in California after fire marshals across the state reported very broad and disproportionate fee schedules for residential fire sprinklers from jurisdictions. Data collected by the California Residential Water Purveyor and Fire Sprinkler Task Force in 2021 showed that localities were requiring 1" water meters for residential structures and that residential fire sprinkler hook-ups could range in cost from $3,000 per house up to over $60,000 per house.

Additionally, cost estimates from residential sprinkler advocates often overlook two additional costs, including the cost of a booster pump ($1,260 to $2,600) to provide enough pressure for an effective fire suppression system and the cost of installing a backflow prevention device ($450- $1,000), which many localities require to prevent contaminants from reaching drinking water.

Building code requirements should not be rejected outright because of associated costs to the consumer, however, it is essential for policy makers to weigh the effects of a building code proposal on the supply and access to housing for households across the income spectrum; and furthermore, identify other code requirements that may accomplish an identical public safety benefit through means that are less costly for the consumer.

Data from the National Fire Protection Association (NFPA) demonstrates that states *have* been successful in adopting building codes which are cost-effective for the consumer and result in a significant decrease in residential fires, injuries, and deaths. This includes innovations in building science such as advanced heating and electrical systems, egress windows, and fire-resistant materials and features. The proliferation – and continued improvement – in smoke alarm technology has also played a considerable role in advancing home fire safety.

Recognizing the ability to advance home fire safety in a manner that is cost-effective for consumers, states have overwhelmingly opted to *remove* the fire sprinkler mandates contained in the International Residential Code. Specifically, according to the National Fire Protection Association:

- Only three states/regions require fire sprinklers in new, one- and two-family homes.
- The majority of states have enacted prohibitions on statewide and local adoption of fire sprinkler requirements for new one- and two-family homes.

Similarly, the vast majority of states have opted to not impose fire sprinkler mandates on townhomes. This is due, in part, to the fact that many localities and housing advocates view townhome development as an important component of their strategy to increase the supply of affordable and "missing middle" housing. This is

validated by recent U.S. Census data, which shows that townhome construction jumped 28.1% in 2021 now make up nearly 13% of all single-family starts. Several factors are contributing to this trend:

- **Construction Costs**: "In December, new residential construction input prices were up 15.1% over the year, a slightly more moderate pace compared to the month prior. Input prices for single-family construction were up 14.7%, while multifamily registered a 14.6% increase."
- **Lumber Costs**: "At the start of February, lumber futures contract prices fell below $1,000 per 1,000 board feet, which represents around a 25% decline from the $1,278 seen in January *but is still more than 100% above the lows registered at the end of August*." (Emphasis added)
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The higher density, reduced setbacks and buffers, and smaller building footprints typically associated with townhome development allows for a more efficient use of land and can significantly reduce construction costs, which ultimately benefits consumers through lower sales prices and rents. Imposing this mandate would significantly hinder the ability for townhomes to be an effective tool in combatting the persistent housing affordability crisis in the Commonwealth.

In conclusion, a growing share of Americans say that access to affordable housing is a major problem in their communities. Earlier this year, the Pew Research Center found that 49% of Americans say availability of affordable housing in their local community is a major problem, up 10 percentage points from early 2018. The survey also found that the issue is particularly acute for both younger and older Americans: 55% of adults under the age of 30 now say this is a major problem – a 16 percentage point rise from the 39% who said so in 2018. Additionally, the share of adults ages 30 to 49 who hold this view has risen from 42% in 2018 to 55% last year.

There is no question that home fire safety is an important issue, as well. However, decades of data and experience has proven that states have enacted building code requirements that keep individuals and families safe in their homes while not reducing the affordability and availability of housing.

I respectfully request that you oppose these three proposals. Thank you in advance for your consideration of my perspective and for your service on the Virginia Board of Housing and Community Development

Sincerely,

Matthew D. Kroll, PE, VP Land Development
Timber Ridge
44095 Pipeline Plaza, Suite 140
Ashburn, VA 20147

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

Clarifying the *American Council for an Energy-Efficient Economy's* Report on Virginia's Energy Policy and Building Codes

The American Council for an Energy-Efficient Economy (ACEEE) periodically releases a report ranking each state's energy efficiency policies and programs. This report is *widely* cited by energy efficiency stakeholders as justification for additional advancements in Virginia's energy codes – particularly, the report's ranking of Virginia as 25th in the country for energy efficiency[1].

Although the Home Builders Association of Virginia has partnered with these stakeholders during the 2015 and 2018 code cycles (which resulted in several significant advancements) and has continued to do so during the 2021 cycle, we felt it important to clarify the ACEEE's findings on Virginia's energy codes.

While the ACEEE report is a helpful resource for policymakers and regulatory boards, a state's ***overall ranking*** in the report is not particularly informative when evaluating the "strength" or "weakness" of a state's residential and commercial energy codes or specific energy code proposals. A deeper analysis of the ACEEE report shows that Virginia's ***overall ranking*** distorts the fact that Virginia receives extremely high scores for residential and commercial energy codes.

Virginia loses nearly half (24.5 points) of its points in categories *unrelated* to building codes

The ACEEE report ranks states based on five categories: (i) utility and public benefits programs and policies; (ii) transportation policies; (iii) building energy efficiency policies; (iv) state government initiatives; (v) appliance efficiency standards.

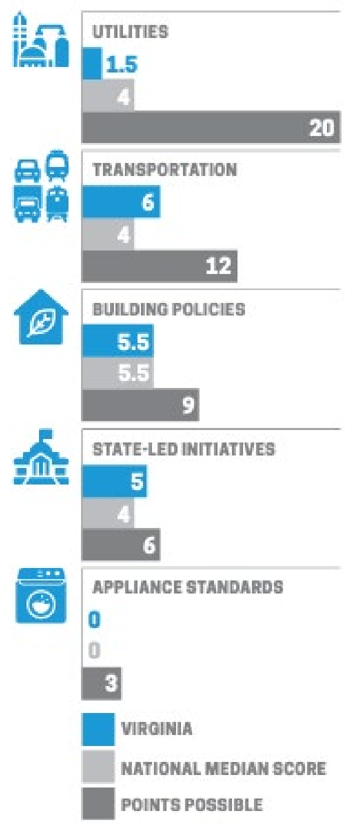
A state can only earn a certain number of points in each category:

- Utility and public benefits programs and policies (20 pts)
- Transportation policies (12 pts)
- Building energy efficiency policies (9 pts)
- State government initiatives (6 pts)
- Appliance efficiency standards (3 pts)

In the ACEEE's most recent report (2020), Virginia earned 18 out of 50 points – which is 25th in the nation.

However, a deeper analysis of the ACEEE's findings shows that Virginia lost nearly 50% of its points (24.5) in categories that are *unrelated* to energy efficiency building codes. Specifically, Virginia only earned 1.5 out of 20 pts for "Utility and Public Benefits Programs and Policies" and only received 6 out of 12 points for "Transportation Policies". *(See figure to the right)*

Due to the report's scoring system, it is inaccurate to claim that Virginia's 25th-in-the-Nation ranking in this report is the result of the Commonwealth's "weak energy code".



[1] American Council for an Energy-Efficient Economy – 2020 State Energy Efficiency Scorecard

Virginia receives a near-perfect score for residential code stringency and perfect score for commercial code stringency.

In the “Building Energy Efficiency Policy” category, Virginia receives 5.5 out of 9 points – by comparison, Virginia is only .5 points behind Maryland and 2 points behind California, which are the two states most frequently described by energy efficiency stakeholders as “leaders” in energy efficiency.

The “Building Energy Efficiency Policy” category consists of 8 sub-categories, including “residential code stringency” and “commercial code stringency”. Contrary to statements made during several sub-workgroup and workgroup meetings, Virginia receives a near perfect score for “residential energy efficiency” (1.5 points out of 2) and a perfect score for “commercial energy efficiency” (2 points out of 2).

It is HBAV’s understanding that these rankings were determined while Virginia was in the middle of the last code development cycle. While Virginia received exemplary scores for residential and commercial energy code stringency in ACEEE’s report, the rankings only reflect a *portion* of the progress which was made in Virginia’s energy codes during the last code cycle. During the last code cycle, the Home Builders Association of Virginia and other organizations reached consensus with energy efficiency stakeholders on several proposals, including:

1. Removed visual option for verifying building envelope air tightness and required blower door testing for all new residential buildings. Also added requirement that all new homes pass the blower door test with 5 air changes per hour;
2. Require an “energy certificate” in all new residential buildings to inform current and future homeowners about the key energy characteristics of their home;
3. Increase minimum ceiling insulation requirements (R-38 to R-49) for all new residential buildings;
4. ResCheck compliance updated to 2018 IECC, without Virginia amendments. Previously, a work around had been created for VA amendments that weakened the current IECC;
5. Increased fenestration requirements.

While the ACEEE has yet to release an updated report, it is highly likely that Virginia will receive further recognition for the full scope of energy efficiency code proposals that were adopted during the last code cycle – and possibly for the energy efficiency code proposals which are likely to be forwarded to the Board as “consensus” during the current code development cycle.

Submitted By: Andrew Clark - Vice President of Government Affairs, Home Builders Association of Virginia

U.S. Department of Energy Data Shows Significant Advancements in Residential Energy Efficiency and Reduction in Energy Cost Burdens in New Construction

"The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs."

Building code regulations were first established – and are continually revised – to ensure a *baseline standard* of quality, safety, and efficiency in new residential structures. For example, they provide assurance for consumers that they are residing in safe structures, guidelines for builders/design professionals as to what constitutes a safe and durable structure, and certainty for lenders of the value and quality of structure.

Similarly, energy efficiency standards were first adopted by the U.S. Housing and Home Finance Agency in the 1950's to address a concerning *public health and welfare* issue at the time: the rising number of mortgage defaults on federally insured loans on homes with high utility bills.

While increasing the efficiency of new residential structures is a laudable objective, it is critically important for policymakers to balance that objective with the growing concerns over the cost of housing in Virginia and the dramatic undersupply of housing that is attainable for households across the income spectrum. Furthermore, it is important for policymakers to distinguish between building code requirements that are essential to providing that baseline standard of quality, safety, and efficiency, and code requirements that are "aspirational".

Consumers can make a personal financial decision to purchase or build a home that is constructed to a higher energy efficiency standard, if that is an amenity that they are willing and able to afford. While energy efficiency requirements can reduce negative environmental externalities, promote high-quality housing stock, and protect consumers from soaring energy costs over time, the ability to afford the **upfront costs** of additional energy efficiency code requirements will vary widely by income.

The adoption of additional energy efficiency requirements in the building code should be based on a thorough analysis of Virginia household energy cost burden data to determine whether the housing industry is failing to provide consumers with a baseline protection against high energy costs.

U.S. Department of Energy Data

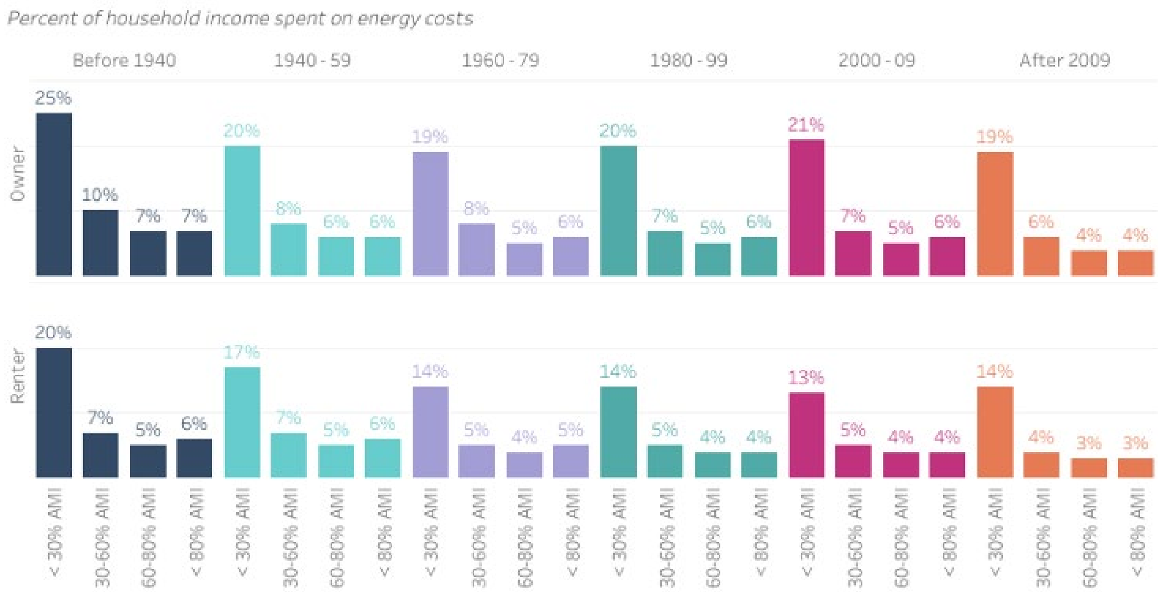
Data from the U.S. Department of Energy's *Low-Income Energy Affordability Data (LEAD) Tool* validates the claim that Virginia *has* made vast improvements in residential energy efficiency over the last 80 years and has significantly reduced household energy costs to a level considered sustainable for individuals and families across the income spectrum.

A household is considered "energy cost burdened" when over 6% of the household income is dedicated to covering energy bills – this calculation includes all costs associated with energy used by the house (e.g., electricity and natural gas). When a household is "energy cost burdened", it impacts their ability to use electricity and heat or cool their home – and forces households to choose between paying utility bills, paying a mortgage or rent, or other essential expenses. In short, high energy cost burdens results in higher levels of housing instability, including evictions and foreclosures.

The chart below was compiled using data from the U.S. Department of Energy and included in a recent report released by Virginia Housing (formerly, Virginia Housing Development Authority) and the Department of Housing and Community Development[1].

[1] HB 854 Statewide Housing Study Report (January 2022)

Energy cost burden by tenure, year home built, and AMI



Source: National Renewable Energy Laboratory, Low-Income Energy Affordability Data (LEAD) Tool, 2018.

The data from the U.S. Department of Energy (chart above) provides several important insights:

First, renters and owners residing in residential structures built since 2000 are below the 6% "energy cost burdened" threshold, with two exceptions: (i) Owner households in structures built between 2000 and 2009 are slightly over the 6% energy cost burdened threshold; (ii) Owners and renters with incomes below 30% of AMI residing in structures built between 2000 and 2019 are experiencing extremely high energy cost burdens. More analysis is needed to understand the latter - there are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Second, the highest "energy cost burdened" households (owner and renter) are residing in structures built prior to 1980's/1990's. The most "energy cost burdened" demographic – regardless of age of structure – are households earning under 30% AMI. Again, more analysis is needed to understand this dynamic. There are very few private sector and non-profit housing providers that are able to finance projects for households at that income level.

Conclusion:

Data from the U.S. Department of Energy shows that residential structures constructed in the last 20 years are significantly more energy efficient than older homes, which has reduced household energy costs to levels considered sustainable for individuals and families across the income spectrum. The data also reflects the reality that efforts to reduce household energy cost burdens would be best focused on older, existing structures occupied by individuals and families at the lower end of the income spectrum.

Several energy proposals submitted during the 2021 code cycle seek to impose stricter energy efficiency requirements on all new homes, thus increasing the upfront cost of all new homes and exacerbating an issue raised by the Virginia Joint Legislative Audit and Review Commission's recent report on housing affordability: "Rising prices make it more difficult for low- and middle-income households to afford to purchase homes because of the increased monthly mortgage costs, as well as the increased upfront costs associated with purchasing a home. Rising home prices mean that down payments and closing costs can be over $10,000 on even moderately priced homes.[2]"

[2] Joint Legislative Audit and Review Commission: Affordable Housing in Virginia (2021)

Commonwealth of Virginia

Re: Please update heating requirement codes to address new climate normals

Flanders, Kyle <kyle.flanders@dhcd.virginia.gov> Mon, Apr 18, 2022 at 8:19 AM
To: "Flanders, Kyle" <kyle.flanders@dhcd.virginia.gov>

---------- Forwarded message ---------
From: **Ben Cowlishaw** <benjamin.cowlishaw@gmail.com>
Date: Fri, Apr 15, 2022 at 1:21 PM
Subject: Please update heating requirement codes to address new climate normals
To: <jeff.brown@dhcd.virginia.gov>
Cc: <DelALopez@house.virginia.gov>, <district31@senate.virginia.gov>, <countyboard@arlingtonva.us>, <director@dhcd.virginia.gov>, <todd.weinstein@dhcd.virginia.gov>, <bill.curtis@dhcd.virginia.gov>, <housingdivision@arlingtonva.us>

Dear Mr. Jeff Brown,

I hope you are well. Thank you for your public service to Virginians.

I am writing regarding the Virginia State code that requires building owners to maintain heat until May 1.

I believe this code is uniform statewide -- if so, why is that, considering Virginia has many varying subclimates?

And also, more importantly, has it been considered that this code should be revised to reflect our new climate normals?

Annual averages have recently been revised based on a new decade of data. Breaking news: it's getting warmer.
(Source: Washington Post)

I live in a residential community that must switch twice a year between heating and cooling -- it cannot run both simultaneously.

Thus, twice a year, we are subject to uncomfortable, and at times, unbearable temperatures in our homes, as our community is required to maintain HEAT during these ever-warmer days of Spring.

Is there a reason this could not be revised to, say, April 15, to reflect that in many locations in Virginia, there is seldom a need for heating this late into the season?

Signed,
A very warm and sweaty Arlingtonian,
Ben Cowlishaw