EMERGING ISSUES

Single Stair, Many Questions

The push to increase the allowable height of residential buildings with a single exit stairwell illuminates the tangled intersection between safety, housing affordability, building codes, and politics.

By Jesse Roman
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Stephen Smith is a cerebral 36-year-old who lives in a modest apartment on the third floor of a five-story walkup in Brooklyn. Minutes into our conversation, Smith points out matter-of-factly that the slender brick building has only a single stairwell leading down to the street-level exit.

Typically, the height and number of exit stairwells in a building would be of little note to anyone outside of a building code office. But Smith counts these stats—five stories, one exit stair—as a kind of badge of honor and proof of concept. That's because it's primarily from his small apartment that Smith has led a national crusade through his nonprofit, the Center for Building in North America, to convince state governments to allow many thousands more residential buildings with a single exit stair like his to be built across North America.

With the exceptions of New York City, Honolulu, and Seattle, nearly all jurisdictions in the United States enforce codes that feature stricter caps on the height of residential apartment buildings with a single exit stairwell. NFPA 101®, Life Safety Code®, puts the limit at four stories; the International Building Code (IBC) puts it at three. Canada limits such buildings to two stories. In contrast, nearly all of Europe, South America, and Asia allow a single exit stairwell in buildings of at least six stories, with some, including South Korea, Germany, and Switzerland, permitting 20 stories or higher.

The height limitations in the U.S. and Canada have had negative consequences on the nations' housing stock, Smith and other advocates claim, thwarting the development of new small-to-mid-sized multifamily housing, contributing to housing shortages and fueling rising housing costs.

"The United States has clearly developed a unique style of construction and regulation, and as I was asking around in the code development world and talking with architects and the fire service, there was just not a lot of recognition about how differently we do things and what the implications are," Smith told me in explaining why he created his nonprofit two years ago. "I wanted to learn, in particular, what these regulations do to our ability to build small multifamily buildings."

So far, the Center for Building in North America has made significant inroads with lawmakers across the country, who have latched onto Smith's affordability arguments. In just the last year, nearly a dozen states and Canadian provinces have either enacted or are exploring legislative actions to allow taller residential buildings, up to six stories, with a single exit stair. These efforts would modify and usurp the current consensus code requirements, to the consternation of nearly every U.S.-based fire service organization.

Most of these bills instruct state building and fire officials to study the issue and come back with recommendations. A few states, such as Connecticut and Washington, have already passed bills to change the code, with lawmakers instructing safety officials to work out the details of how to adopt it, not whether they should.

Fire officials around the country have been blindsided by the swiftness of the movement and by this virtually unknown nonprofit that's suddenly making waves throughout the code and fire protection world.

"I was absolutely astounded and shocked at how fast they moved this across the U.S. and Canada," Greg Rogers, a former deputy fire chief and the current chair of the International Association of Fire Chiefs' Fire and Life Safety Section, told me in an interview. "I don't know of any issue that has moved this quickly that hasn't been well funded and well thought out. And it's interesting to think that it's come from one person that started a new organization."

Smith, who is the Center for Building in North America's lone employee, told me that the vast majority of his funding comes from a group called Open Philanthropy, which states on its website (openphilanthropy.org) that its mission is "to help others as much as we can with the resources available to us." The philanthropy is funded by Dustin Moskovitz, a co-founder of Facebook and Asana, and run by his wife, Cari Tuna. Additional funding comes from "individuals who've made some money in real estate," Smith told me in an email. "No funding has come from anybody in the construction industry, such as contractors or materials manufacturers."

Stephen Smith, who heads the Center for Building in North America, lives on the third floor of this five-story walkup in Brooklyn—a building with just a single exit stairwell. STEPHEN SMITH

As a neutral code developer, NFPA has not taken an official stance on the merits of the single-exit issue, other than to stress that any proposed changes should go through the normal consensus code revision process. Many fire service organizations, however, have spoken out. The International Association of Fire Fighters (IAFF), the Metro Chiefs (a member section of NFPA), the National Association of State Fire Marshals, the National Fire Chiefs Council, the National Fallen Firefighters Foundation, the International Association of Fire Chiefs, and others have come out strongly against increasing the heights of buildings with single exit stairs and have launched a full-throated defense of the existing codes.

“These legislative actions are an attempt to supersede the safety codes, placing occupants and firefighters at greater risk of injury and death. We must do all we can to defeat these misguided efforts,” the IAFF and Metro Chiefs said in a joint statement. “Allowing residential structures to be built with exemptions or modifications contrary to decades of research and investigation will jeopardize safety. Put simply, lives will be endangered.”

Just as alarming as the proposed rule changes, officials say, is the process by which it is happening. Rather than working within the methodical code-making system, where expert volunteers from a variety of backgrounds review suggested amendments and reach a consensus on revisions, state and local governments are eschewing that process to strip away requirements on their own with little or no input from safety officials.

“The approach they’ve taken on this has scared me to death—we are now writing codes and standards via state legislation, and no longer going through the formal process,” Rogers told me. “That’s the biggest piece that disturbs me—we’ve now turned this into a political environment, not a professional environment.”
Smith, who has also formally submitted a proposal to change the International Code Council (ICC) codes—the first hearing on the issue at the ICC was held this spring—claims that the push to amend the code through state legislatures was not his choice.

“I have been approached by a lot of legislators and their staffers who are interested in doing things now and not running studies and waiting,” he said. “And I hear from people who want to be even more aggressive, and I tell them there’s a lot of minuses to going outside of the code development process. Writing things into statute is really not ideal, but they want to move on this.” He continued: “At the end of the day, I’m a nonprofit, NFPA is a nonprofit, ICC is a nonprofit—we’re not the elected ones. Politicians are the duly elected representatives of the people, so if they want to move faster on it, I’ll advise them, tell them pluses and minuses, but I certainly can’t stop them. None of this was my idea. It’s definitely taking on a life of its own and even if I folded up shop tomorrow, it would continue.”

The Case for the Single Exit Stair

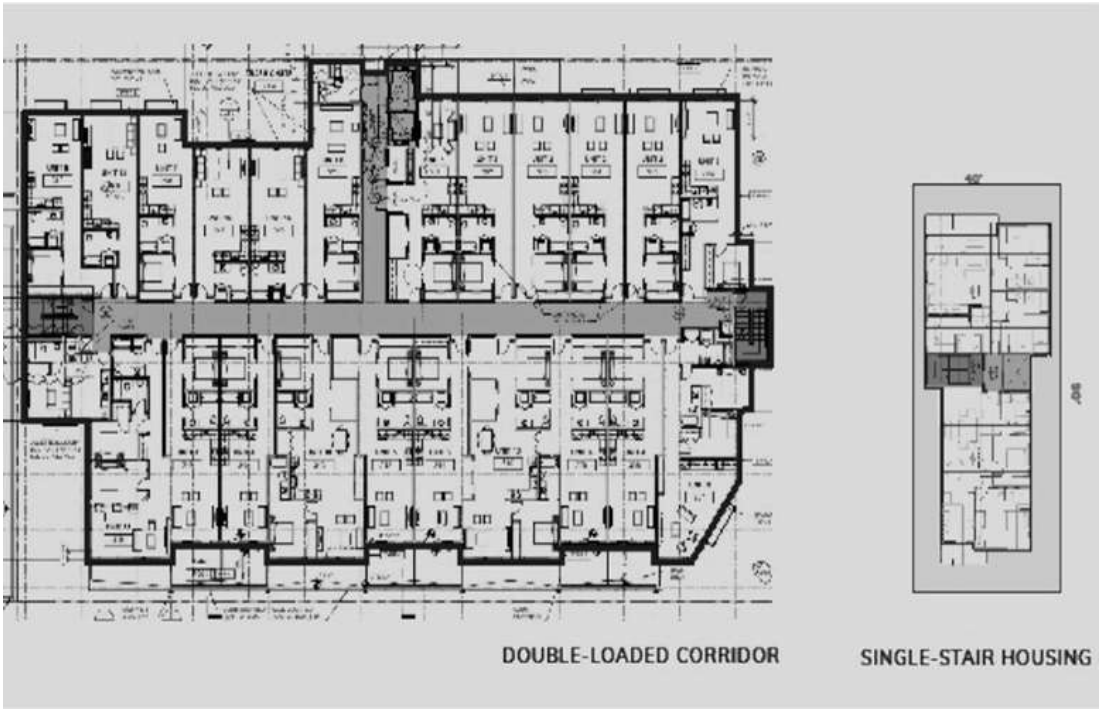
Michael Eliason, a Seattle-based architect, is considered one of the forefathers of the single-exit movement in the U.S. For years, he designed buildings in Germany, which he said opened his eyes to what he believes are the significant design limitations that code requirements put on multifamily residential development in the U.S. and Canada.

Eliason said he discovered the possibilities of buildings with a single exit stairwell when he started working for an architecture firm in Germany that had recently won a competition to build a 12-story building with a roughly 50-by-50-foot footprint. "And I'm looking at this plan and there's only one stair, and I'm like, 'OK, something's way off with this,'" Eliason recalled. "I asked my boss where the other stair was and he's like, 'What are you talking about? In the U.S. you would require two stairs? This project would not be economically or physically feasible with two stairs.'"

It's an example, proponents say, of the flexibility and opportunity created by single-stair design. According to Eliason, in a single-exit building with a 2,500-square-foot footprint, circulation—including the stairwell, elevator, and corridor from the units to the stairwell—would take up about 295 square feet, or 11.8 percent of the floor area. The inclusion of a second stairwell increases the circulation area to 460 square feet, or 18.4 percent of the total floor area. One result of adding a second stairwell, Eliason said, is that developers in the U.S. and Canada must either build on larger plots outside of urban centers or cobble together adjacent parcels of land to create a footprint large enough to accommodate a multifamily structure. In Germany, by comparison, a small lot that can fit a 2,500-square-foot building footprint, or sometimes even smaller, can potentially accommodate a mid-rise with a dozen or more housing units. A similar-sized urban lot anywhere in the U.S. (outside of New York, Honolulu, or Seattle) would likely remain vacant, or at best have a two-unit townhouse or single-family home, Smith contends.

The ability to build denser housing developments on smaller lots is one tool to increase housing supply and ultimately reduce prices, advocates say. As the housing crisis worsens, it's this argument that politicians have latched onto, but there are other benefits as well, Eliason says.

For architects, buildings with a single exit stairwell also provide more flexibility to design larger and more efficient living spaces, with windows on at least two sides, rather than the typically cramped apartments commonly found in many large residential buildings in the U.S., he said. Because the double-loaded staircases in hotels and large apartment buildings generally necessitate a central hallway, the building is functionally split in two, with non-corner apartments on either side usually only having a single wall with windows. As most jurisdictions require each bedroom to have a window, "it's really difficult to get 3-bedroom units to work from a feasibility standpoint in a multi-stair building," Eliason said. As a result, studies have found that as much as 75 percent of the apartment stock in several North American cities are studios or one-bedrooms. Windows on two sides also create opportunity for cross breeze, a key factor for keeping dwellings cooler as global temperatures rise, Eliason and other sustainability advocates say.



Floor plans of a conventional double-loaded corridor, with stairwells at either end, and a building with a single stairwell. Proponents argue that single-exit design maximizes available space and can help avoid the long, narrow units common in buildings with two exit stairwells. CREDIT: Sean Jursnick, at SAR+ via Stephen Smith

“After looking at this further, I realized that our struggles around housing quality and livability in the U.S. and Canada are very different from Japan or South America or Europe. And that’s when I started connecting the dots to it’s not just how we build, but what we build that is incredibly different,” Eliason said. “The U.S. is a complete outlier in how housing is built.”

Eliason began writing articles on these ideas and talking to other experts. Soon politicians, housing activists, developers, and others, including Smith, started reaching out to discuss his ideas. The conversations helped convince Smith to study the differences in building codes around the world, and he soon became convinced that the U.S. could learn from the experience in Europe to improve housing (see “The European Way”).

“I know it can be hard to compare fire data from different countries, but it does seem to be generally agreed upon that the core of Western Europe—Germany, Switzerland, France, Spain, Italy—has as good or better fire safety outcomes as the United States,” Smith said. “That was immediately interesting—people can do things very differently and achieve similar life-safety outcomes, which to me is an invitation to look more into this single-exit issue.”

The Pushback

The consensus among firefighters, fire marshals, fire prevention officers, and many code officials is that double stairwells are still needed.

This spring, Smith presented his proposal—to increase the allowable height for residential buildings with a single exit stairwell to six stories—to the committee that oversees the IBC. By all accounts, the skepticism in the room was thick. Another hearing is scheduled in the fall, but insiders doubt that the proposal will make it into the code. Thus far, there have been no public inputs made to change the number of exit stairs allowed in NFPA 101 or NFPA 5000®, *Building Construction and Safety Code®*.

A key example in Smith’s proposal is the city of Seattle, which has allowed a single exit stairwell in buildings up to six stories since the 1970s—a feature colloquially known as the “Seattle Special.” The code amendment emerged when developers in the rapidly growing city lobbied officials to drop the double stair requirement, which they claimed would give them more flexibility building on the city’s small lots. In exchange for the single-exit approval, Seattle code officials added beefed-up fire protection requirements for the lone stairwell to ensure it would remain a reliable means of egress in a fire. Among other things, the code requires that the building and stairwell are sprinklered; the stairwell has a two-hour fire rating; the stairwell and elevator (if one

exists) are pressurized; and all the apartment doors are located within 20 feet of the exit stair.

Since Smith and others began pushing Seattle's provisions as a potential model for other states and cities, the building code and fire prevention offices in the city have been peppered with emails and phone calls from lawmakers, fire officials, and others from around the country asking how it has worked over the past five decades. On the receiving end of many of those calls is Karen Grove, Seattle's executive director of fire prevention, who reports to the city's fire marshal.

"Somewhat unsatisfactorily, we don't have any data because we don't actually track or even know which of our buildings were built with a single exit stair," Grove told me. "Because for us, it's not a weird code alteration, it's just in our code. I guess we never perceived it to be particularly risky or necessary to track."

Still, when the legislature in Washington State was considering a bill earlier this year to amend the building code to allow six-story single-exit buildings statewide, Seattle's fire and code officials were unequivocally opposed to the measure. Despite their efforts to kill the bill, it passed in April.

"The city building department, the fire marshal, and myself are all against the single exit stair as the code for everyone because we feel that most fire jurisdictions are not situated like we are in Seattle," Grove explained. "We were comfortable with this in Seattle because we have a hydrant on every corner. We have a well-funded municipal career fire department with outstanding response times. We have a good complement of aerial ladders distributed throughout the city that we could put quickly on scene if we need to affect a rescue."

Smaller volunteer departments, or those with less funding and fewer resources, may have slower response times and less ability to quickly put out a fire or raise ladder trucks before the stairs are compromised by smoke, Grove said. This kind of context, she said, is often missing in the single-stair debate. "My concern is that all of these advocates for single exit stairs can misuse the Seattle experience to say there is no risk. And I think that would be a mistake because for other jurisdictions, I would think this could be quite risky," Grove said.

The numerous fire organizations that have fought vigorously against the adoption of a single exit stair for taller buildings have given several reasons why the change would be a bad idea. For one, having two sets of stairs means that one can be used for occupant evacuation while the other is used by firefighters for a hose line attack; a single stair means these activities would need to take place in the same space, complicating and slowing both. A single stair also removes a key redundancy; if that stairwell is filled with smoke or otherwise untenable, occupants would have no means of escaping the building besides perhaps a fire ladder truck. This is a fact that is acknowledged in many European countries, which count windows and balconies as a second means of egress. In Germany, for instance, many jurisdictions choose to limit the maximum height of buildings with single exit stairs to the highest floor that the local fire brigade can reach with their equipment.

What NFPA Allows

NFPA 101®, *Life Safety Code®*, permits buildings with a single exit stairwell up to four stories under these conditions:

>There are four or fewer dwelling units per story.

>The building is protected by an approved, supervised automatic sprinkler system.

>The exit stairway does not serve more than one-half story below the level of exit discharge.

>The travel distance from the entrance door of any dwelling unit to an exit does not exceed 35 feet (10.7 meters).

>The exit stairway is completely enclosed or separated from the rest of the building by barriers having a minimum 1-hour fire resistance rating.

>All openings between the exit stairway enclosure and the building are protected with self-closing door assemblies having a minimum 1-hour fire protection rating.

>All corridors serving as access to exits have a minimum 1-hour fire resistance rating.

"The reality is that a single stairwell can be compromised by fire in one unit if someone leaves their door open when they evacuate," said Rogers, of the IAFC. "At that point, anybody that's above the fire floor is screwed. If I lived in one of those buildings on the fourth, fifth, or sixth floor and something like that happened, I'm standing on the balcony waiting for a ladder truck to come. And you better hope and pray that the ladder truck gets to your window first."

Even if the stairwell hasn't been compromised, the single stair puts fire departments in a tricky spot, Rogers added. Do they attack the fire right away and possibly expose the lone exit to smoke, or wait until everyone is evacuated? "Because as soon as the fire department starts setting up operational procedures, we have to open the door [where the fire is] and we can't close it behind us because there's a hose sitting in the door—now we've compromised everything else for everybody trying to get out," he

said.

Opponents also question the assertion that buildings with a single exit stairwell would actually be cheaper in the long run, as well as the contention that the added safety features such as sprinklers or higher fire-rated and pressurized stairwells would be enough in many jurisdictions to offset the risk. Fire protection systems like pressurized stairwells or larger-volume sprinkler systems require inspection, testing, and routine maintenance to function properly. “Whoever owns that building will have to maintain that smoke control system in that stair, which is a costly obligation, whereas the second stair is always functional. It just works when you need it,” Grove said.

Additionally, critics say, it would be all too easy in some jurisdictions without adequate inspectional activities for developers to add the fire protection systems needed to gain approval and then essentially forget about them. “A fully sprinklered building doesn’t guarantee me anything 10 years down the road if the building owner isn’t maintaining it and if the fire department isn’t following up on that maintenance requirement,” Rogers said.

For their part, critics like Rogers and Grove allow that if the single-stair idea seems to work in Seattle or New York City, it’s not outlandish to imagine it being possible in other major cities with a shortage of building space and robust, well-funded fire departments. But codifying an allowance for a single exit stair in a six-story building is a bridge too far, they say.

“If you put it in the code, it doesn’t matter where it’s happening—even in rural America, they'll start building these buildings and the fire department won’t be able to say anything about it,” said Rogers, adding that he favors giving city building and fire officials discretion to work with developers on a case-by-case basis. “We should be keeping this to alternative materials and methods and let the cities decide if that’s what they want, and not take it to the state level and adopt it carte blanche across the board.”

Uncertain Path Forward

As a neutral code developer, NFPA hasn’t taken a position on the single-exit issue. If and when a proposal is made to amend NFPA 101 or NFPA 5000 to allow a single exit stair in taller residential buildings, those committees will discuss the issue.

In the meantime, the organization hopes to facilitate more discussion on the issue. NFPA has invited a group of experts and stakeholders from around the world to participate in an upcoming symposium, scheduled for September 11 and 12, to discuss each side of the argument. The guest list will include international perspectives, as well as housing advocates, fire marshals, fire prevention officials, and others, including many of those interviewed for this article. Organizers have also left space for other interested parties to attend the in-person event. (For more information, visit nfpa.org/singleexitsymposium.)

“The idea is to bring experts together with differing views to facilitate a conversation and ultimately produce a report that can be used by decision-makers that highlights the knowledge gaps, viewpoints, and various considerations when it comes to these types of buildings,” said Val Ziavras, a senior fire protection engineer at NFPA who has spearheaded the effort.

The event will include presentations on the current allowances in NFPA 101 and the IBC, as well as presentations that support and oppose the changes. There will also be an overview from European code and fire officials about their fire experiences with residential buildings featuring a single exit stair, and discussions will follow to identify future research needs. A report from the symposium should be available by October.

Ziavras thinks a meeting of this nature is critical for all sides because the most prudent path forward is not obvious. As with many code topics, the more you dig into the details, the more questions and nuances emerge.

“There are certainly technical and safety concerns with increasing the allowable height of residential buildings with single exit stairwells, but there are also several restrictions that are being included in these proposals that need to be factored in and discussed,” Ziavras said. If noncombustible construction was mandated, and if a sprinkler system was required that complied with NFPA 13, *Standard for the Installation of Sprinkler Systems*—a stricter system than that required by NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*—then “we should discuss the merits of those proposals as a safety community,” she said. “There’s at least a conversation worth having.”

As the issues of housing availability and affordability aren’t going away, there may be ample opportunities to have those

discussions. “If we want fire and life safety to be considered in proposed changes, then we as an industry have to be willing to participate in these types of conversations,” Ziavras said.

Above, the TOPAZ Shinokachimachi residential building in Tokyo, a 15-story structure with a single exit stairwell, completed last year. CREDIT: Yuko Nagayama & Associates

The hope is that a report will serve to better educate lawmakers on some of the nuances and potential impacts of a single exit stair, including topics they may not have thought to consider, such as the importance of fire department response times and capabilities, the availability of water, and even building location. “Firefighters are the ones responding to fires and likely have the best understanding of what these changes will mean to their response,” Ziavras said. “If the fire service says all these caveats should be in place, we should understand and document what those are. Then policymakers can use that to make informed decisions that balance both housing needs and fire and life safety.”

Beyond this specific debate, safety officials continue to be alarmed at what the single-exit issue has revealed about the growing fissures in the current code system. As the housing shortage crisis deepens in many parts of the country and lawmakers search for ways to reduce the cost burdens, rules around where we build and what we build are facing more scrutiny than ever in statehouses and provincial capitals across North America.

The status quo, it seems, is being attacked from all sides. Not long after the single exit stair legislation, Washington State lawmakers passed another code amendment that reduces the level of fire protection required for small apartment buildings, called multiplexes, to mirror the lesser requirements for one- and two-family homes. These trends point to an urgent need to educate lawmakers about the importance of the code process and the potential pitfalls of stepping outside of it, said Grove.

“I could give you lots of examples of how special interests are getting lawmakers to directly legislate things that are actually negatively impacting the fire code and fire code enforcement,” she said. “I think there’s just so much developer money out there and it’s presented as ‘affordable housing—what’s not to like, right?’ So it’s also an education piece. If I had more time, I’d sit with all the members of the legislature and talk to them. But I’m so swamped. There’s so much going on and it’s hard to fight back.”

In his discussions, Smith said that most state lawmakers are surprised to learn that the codes are written by third parties and adopted by states, as opposed to zoning, which is usually written by the government. He’s found that the main sticking point for lawmakers is speed, or lack thereof. If single-exit reforms don’t make it into the code this cycle, Smith believes it would mean another decade or more before the first apartment building with a single exit stair is permitted and built, unless lawmakers act sooner. “To a lot of legislators—especially on the West Coast, who hear from their constituents every day about housing costs—that’s not an acceptable time frame. So there is a growing interest in doing this legislatively, and that thinking is accelerating, even beyond the single-exit issue to include other code items,” he said.

Smith offered a blunt assessment of where he thinks all of this is headed. “There’s clearly a huge political push behind this, and if the codes-and-standards-writing bodies respond by accommodating that, I think the integrity of the code process will be maintained,” he said. “If the code-developing bodies do not respond to those political demands and continue to say, ‘there’s no way this can be made safe above three stories,’ [then] I think you’re going to see more questions from legislators about whether this process is working.”

SIDEBAR

The European Way

If it works in Europe, it can work here, right? Not so fast.

Fire data experts generally agree that the United States and Western European nations—most of which have adopted a single exit stair for residential buildings of at least six stories—have similar fire outcomes in terms of overall injuries and deaths. Or at least they do on paper.

According to Birgitte Messerschmidt, NFPA’s director of research, it’s difficult to make any direct quantitative comparisons between two countries’ fire experience and outcomes, as each is unique in how it collects, defines, and measures fire data. “It’s not as simple taking fire data from buildings with a single exit stair in Europe and saying it would be safe to do this in the U.S.,” she said. “You have to dig in much deeper.”

For instance, while the overall residential fire death rates in the U.S. might be comparable to Europe, we know that, in the U.S., apartment building fire deaths are much lower than in one- and two-family homes, in part because of the increased safety features required in large residential buildings. According to NFPA research, in 2020, there were about five deaths per 1,000 reported home fires in apartment buildings in the U.S. versus 9.5 deaths in one- and two-family homes. Whether European apartment buildings with a single exit stair can match that safety record is hard to know because European countries do not filter their fire data by occupancy in the same way, Messerschmidt said.

Fire protection experts also point out that the U.S. and Europe have evolved vastly different cultural philosophies on fire protection, developed over centuries, and as a result have building stocks that are nothing alike. For instance, Europe favors noncombustible building materials such as brick and stone, as well as smaller fire compartments. Partly because of these features, countries on the continent are much less likely to require fire sprinklers or two exits, even in residential high-rise buildings. In the U.S., where wood and land have historically been plentiful, code officials chose to allow the use of more combustible materials, including lightweight wood construction, and much larger smoke compartments, with the tradeoff of adopting stricter protection regulations. Two exits are the norm in larger multifamily buildings, as are fire sprinklers, sophisticated alarms, and other active fire protection systems.

“All of these things would have to be looked at much more broadly, beyond fires and fire deaths,” Messerschmidt said. “What other rules and philosophies does Europe have for protecting buildings, and how can we compare that to the U.S.? How will U.S. firefighter tactics have to change if we make this move to a single exit stair? I agree that anything we do should be based in science and data, but it would have to be a very holistic approach.”

Supporters of single-exit design are aware of these distinctions, but are unfazed by them.

“I know that when fire engineers in Europe look at buildings in America, and when Americans look at buildings in Europe, they’re both appalled,” said Stephen Smith, who leads the Center for Building in North America, a nonprofit that advocates for residential buildings with a single exit stair. “I am not advocating that we copy Italy’s building codes. It’s just to say there is a very wide discrepancy in the safety requirements that work across the world, and we should be open to considering other options. I believe the code is a starting point for asking questions. [Codes] should not be taken like articles of faith that have been handed down from God, because they’re not.”

Michael Eliason, a Seattle-based architect and a longtime supporter of single-exit design, agrees that the time to take a serious look at these restrictions in the U.S. and Canada is long overdue.

“The double stair requirement in North America is rooted in 150 years of fire history, but over time, we’ve updated standards, we have professional firefighting forces, we’ve resolved water availability issues, and there are sprinklers and fire-rated assemblies,” he said. “These are all things that didn’t exist when these rules were implemented. But we’ve never stopped and asked, ‘OK, is this double stair still really necessary? Does this make sense?’” —*Jesse Roman*

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