

Draft: Results are Pre-Publication and Not for Circulation

Single-Stair Construction

New Data on Costs, Benefits, and Outcomes

Presentation for the Single-Staircase Advisory Group
Virginia Department of Housing and Community Development (DHCD)

October 15, 2024

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Key Questions

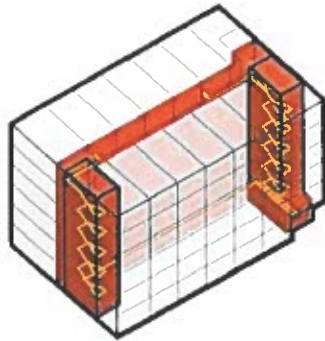
- What are single-stair buildings?
- How many are there?
- What are the cost impacts of allowing them for residents, builders?
- What is their fire safety track record?
- What is causing these outcomes?

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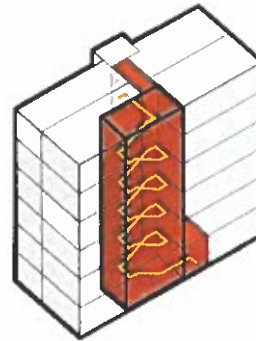
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Two-stair vs. Single-stair layout



DOUBLE-LOADED CORRIDOR
SIX STORY APARTMENT BUILDING

Source: SAR+ Architects



SINGLE-STAIR
SIX STORY APARTMENT BUILDING,
CURRENTLY ALLOWED IN SEATTLE

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Single-stair buildings on infill lots in Seattle



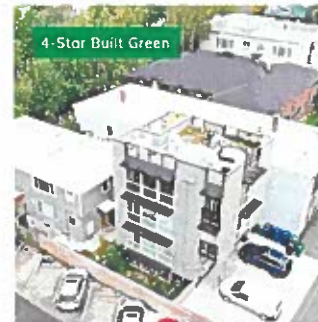
Z APARTMENTS
1109 N 92nd St
Market rate apartments

Source: Land & Design Group



8TH AVE NE
4302 8th Ave NE
Market rate apartments

Image: K&L Young Associates



CAROL APARTMENTS
4110 Fremont Ave N
Market rate apartments

Source: SAR+ Architects

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Three single-stair buildings on infill lots in New York



Source: Center for Housing Policy, New York University

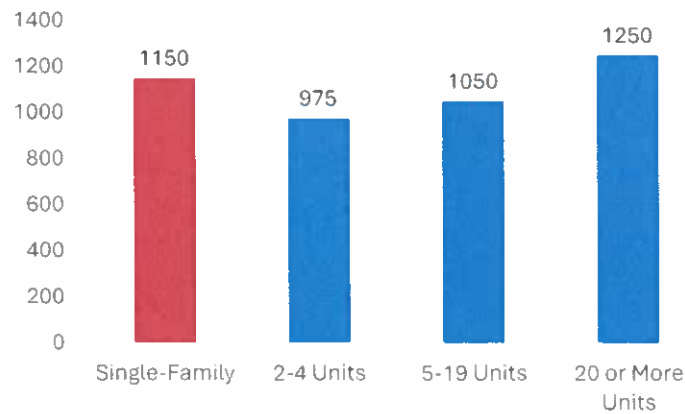
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Small apartment buildings have the lowest rents

Median Contract Rent (Dollars)



Notes: Rental Units may be occupied, vacant for rent, or rented but unoccupied. Contract rent excludes utilities paid separately.

Source: 2022 American Community Survey 1-Year Estimates

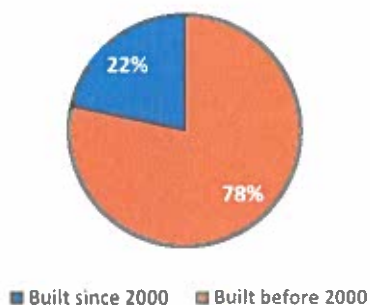
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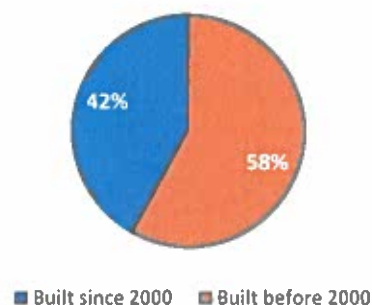
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U.S. has shortage of small apartments; building codes may be a factor

Small Apartments (2-19 Units) by Building Age



Large Apartments (50+ Units) by Building Age



Note: Small apartment buildings are about 40% of U.S. rental housing units

Source: HUD, 2023

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Single-stair construction reduces cost, can enable viability

Savings from 1 staircase per building:
6-13% lower construction costs, accounting for additional fire protection



For a small 6-story apartment building, with 4 units per story, and 2,000 square feet per floor:

Base construction cost: \$250 / square foot (southeast U.S.)

Area: 2,000 square feet / floor x 6 floors = 12,000 square feet

Cost with two staircases: \$3 million

Cost with one staircase: \$2.6 – 2.8 million

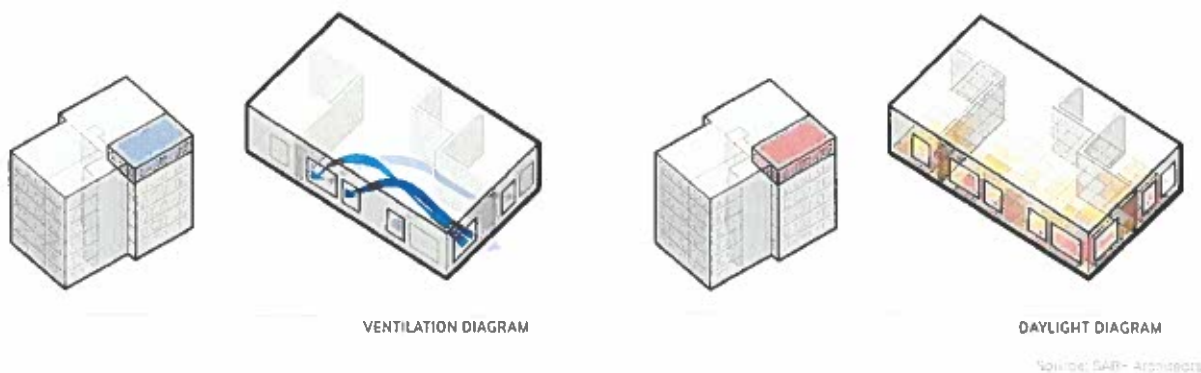
Cost savings: \$180,000 – \$390,000

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Single-stair buildings have more natural light and ventilation

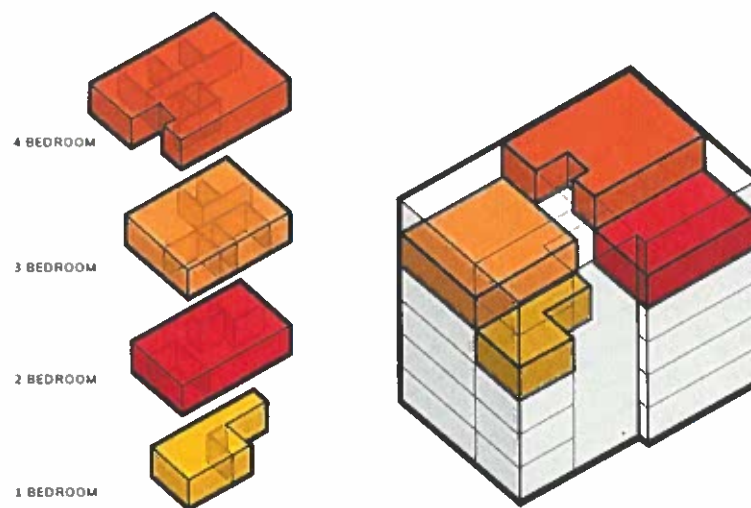


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Single-stair buildings can fit family-sized apartments



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Fitting on small lots, single-stair buildings can boost main streets, housing options



Source: Robbie Casanova,
Gourmet Living



Source: E. Michael Jones,
Getty Images



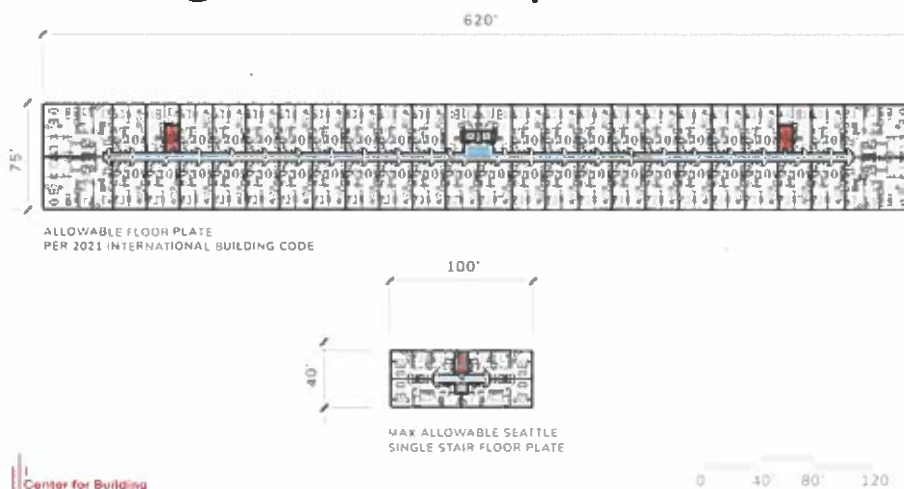
Source: Anirudh, Getty Images

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Single-stair buildings have smaller floor plates



Source: SAR-
Architects, Center for
Building in North
America

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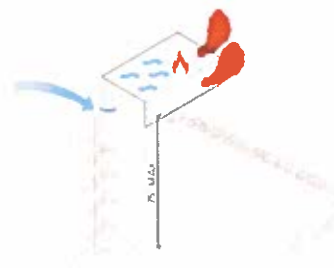
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Single-stair buildings use modern safety technology



Double Loaded Corridor

- Long distance from unit to exit
- Smoke spreads throughout complex



Point Access Block

- Short distance from unit to exit
- Pressurized stair pushes smoke out
- Fewer units impact by event

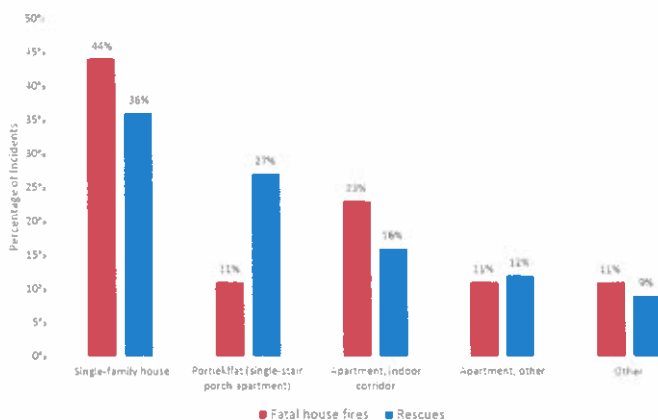
Source: S&P Architects

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Research from the Netherlands: fatal fires and rescues by building type



- Dutch portiekflats (or portiekwoningen) are a type of apartment building where units share a communal staircase, typically 4 – 5 stories tall
- Each unit has a porch / balcony (or for some buildings, several units will share a common porch) from which people can await rescue
- These buildings have lower fatal fire rates than apartments with indoor corridors, suggesting single-stair buildings are safer

Source: Nederlandse Brandveiligheidsraad 2022

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U.S. Single-Family Homes Have Outsized Share of Fire Deaths

	Single-Family (inc. duplex)	Multi-Family
Share of Homes	77%	23%
Share of Residential Fires	78%	22%
Share of Residential Fire Deaths	83%	17%

Note: Single-family homes have 59% of all U.S. fire deaths; apartments have 12%; vehicles have 18%

Source: Pew Research Center
U.S. Fire and Arson
Community Survey
2012-2019
2012-2019
2012-2019

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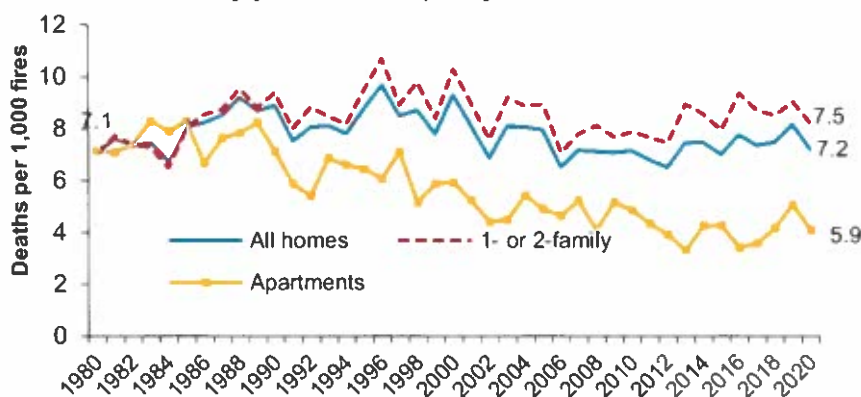
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Apartment have fewer fire deaths per 1,000 fires

Risk of death is 27% higher per fire in 1 or 2-family homes vs. multi-family

Figure 10. Deaths per 1,000 reported home fires by year and occupancy: 1980–2022



Source: NFPA
Fire
Deaths

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Fire fatality rate in single-stair & other residential buildings in NYC

Data from 2012-2024; NYC has more than 4,400 single-stair buildings

	Single-stair 4-6 story	All other residential
Total Fire Deaths	3	465
Occupant-years of experience	617,801	102,489,392
Fire Death Rate per Occupant-Years of Experience	5 per million	5 per million

All three fire deaths (from two fires) in single-stair buildings occurred in unit and were not related to egress outside of the unit; the fires did not spread beyond their unit of origin.

Sources: Pew and Center for Building Safety
Residential Fire Statistics of US Fire and Life Loss Statistics
by the National Fire Protection Association, NFPA, PLUO.

Note: These figures are from publicly available data and are likely an undercount of the full number of fires that occur each year.



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Fire fatalities in single-stair & other residential buildings in Seattle

Data from 2012-2024; Seattle is estimated to have a number of single-stair buildings in the hundreds

	Single-stair 4-6 story apartment	All other residential buildings
Total fatal fires	1	35
Total fire deaths	1	41

The fire death in a single-stair building occurred in unit and was not related to egress outside of the unit; the fire did not spread beyond the unit of origin.

Sources: USFA and Fire Loss Statistics
Fatalities in the United States
by the National Fire Protection Association, NFPA.

Note: These figures are from publicly available data and are likely an undercount of the full number of fire deaths that occur each year.

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Fire deaths in Virginia by housing type, 2022 & 2023

Multi-family homes make up 21% of Virginia's housing stock

2022 & 2023	Single-family / manufactured home / duplex	Multi-family / apartment (built pre-2000)	Multi-family / apartment (built 2000 or later)
Total fatal fires	89	1	0
Total fire deaths	97	1	0

Notes: These figures are from publicly available data and are likely an undercount of the full number of fire deaths that occur each year. 2022 data are from USFA and NFIRS while 2023 are from USFA only.

Source: USFA Federal Fire
Statistics, the New York
Times and NCHS

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Modern single-stair buildings can improve safety



Fatal fire occurred
in this home.



New single-stair 5 story building
replaced a single-family home. To
the left, another single-stair
building is being constructed.

Source: Center for
Building in North
America

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No signs of single-stair building causing high fire death rates

Causes are multifaceted, but results do not indicate danger

Country	Allows Single Stair for 4-6 floors	Fire Death Frequency (Fire deaths per 100k people)	Fire Lethality (Fire deaths per 100 fires)
Singapore	✓	0.03	0.07
France	✓	0.39	0.09
Germany	✓	0.43	0.16
Italy	✓	0.48	0.11
Ireland	✓	0.49	0.11
Great Britain	✓	0.51	0.16
United States	✗	1.09	0.27

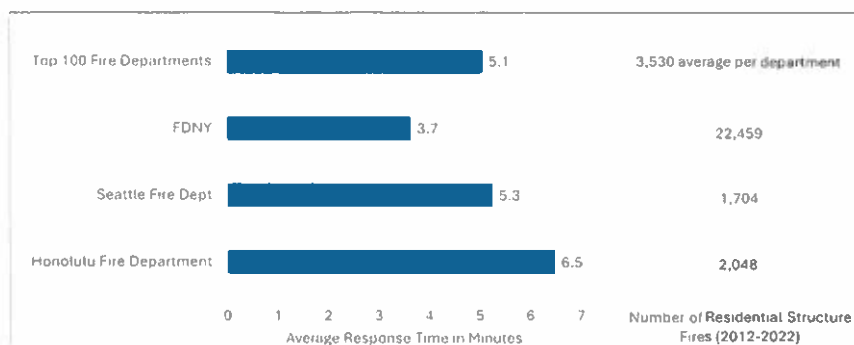
Source: C. B. Reed, 2023 No. 23
<https://seconddegrees.ca/jurisdictions>

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Response times for U.S. fire departments in cities that allow 4-6 story single-stair buildings in line with large department average



Source: Pew analysis of NFIRS

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Elements of a model single-stair code

- Mid-rise heights
- Limited floor sizes (by unit count, area, or travel distance from unit door to exit)
- Stairway protection (self-closing doors, smoke control)
- Modern fire-safe materials and systems:
 - Sprinklers, smoke detectors, walls & doors designed to limit fire spread, fire-rated assemblies in the stairwell / staircase
- Any construction type can work (e.g., Seattle)

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Single-stair research summary

1. **Safe:** same fire death rate as other multifamily (NYC) or better (Netherlands)
2. **Costs less:** 6-13% cost savings for small apartment buildings
3. Better **ventilation** & more natural **light**
4. More **family-sized** units
5. Smaller buildings, better for **infill** lots
6. **Modern technology**, replaces older, riskier buildings
7. There were zero fire deaths related to building egress in single-stair buildings analyzed in NYC or Seattle over more than 11 years.

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Thank you!

Please feel free to reach out to us with questions

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