Testimony of The Pew Charitable Trusts

Linlin Liang, Principal Associate, Housing Policy Initiative

Written Testimony on LD 1375

Thank you, Chair Gere, Chair Curry and members of the joint committee, for the opportunity to testify today. I'm Linlin Liang, a principal associate with the Housing Policy Initiative at The Pew Charitable Trusts.

Pew conducts research on regulatory barriers to home construction and potential policy solutions. Most recently, Pew published a first-of-its-kind study examining the costs, benefits and safety of 4-6 story single-stairway buildings, a housing type that has been limited by building codes in most cities and states across the U.S. [i] (See Appendix).

Single-stairway 4-6 story buildings have multiple benefits compared to large apartment buildings that require two staircases:

- They are easier to develop on smaller pieces of land or in infill lots, an important consideration for Maine's cities, suburbs, and towns.
- They fit well into existing neighborhoods and above single storefronts. They can add much needed housing and help revitalize historic main streets.
- They cost less to build. Removing the second staircase can save about 6-13% off construction costs for the same size building.
- Single-stairway saves about 7% of total building space, which can be used toward larger units and designed with families in mind. Other benefits of single-stairway buildings include better ventilation and more natural light.

Yet, single-stairway apartment buildings are not allowed in most U.S. cities because there has never been up-to-date information on their fire safety. Our new research fills this gap.

Three major U.S. cities have allowed modern 4-6 story single-stairway buildings for some time: New York City, Seattle, and Honolulu. Pew found that overall, fire death rates in single-story buildings in these cities were indistinguishable from those in other multifamily buildings. For example, in New York City, which has 4,440 modern single-stairway buildings, the overall rate of fire deaths since 2012 was the same as in other residential buildings.

Detailed data from New York City and Seattle also allowed us to look at factors that contributed to fire deaths in those cities. We examined every fire-related death in New York City and Seattle's modern single-stairway buildings from 2012 to 2024, and none of those were related to the lack of a second stairway– they all occurred in units of origin.

In general, modern multi-family buildings built after 2000 also have better fire safety outcomes than single-family homes. Part of the reason is that these buildings have additional safety features like sprinklers, self-closing doors, fire-rated walls, and enclosed stairways. This is true in Maine as well.

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We coded every residential fire death in Maine from 2021 to April 2025 for which public data is available. Modern multi-family structures were the safest. Single-family houses make up 80% of Maine housing stock but had 90% of fire deaths. Multifamily buildings of all ages make up 20% of the housing stock and 10% of fire deaths. Modern, multi-family homes built since 2000 are 3% of Maine's housing stock but had 0% of fire deaths. (See Table 1 below)

Table 1: Maine Fire Fatalities (2021 – April 2025) and current housing stock

	Single-family	Old multifamily (built 1999 or earlier)	Modern multifamily (built 2000 or later)
Share of Maine housing stock	80%	17%	3%
Share of fire deaths	90%	10%	0%

Sources: Pew's analysis of 2021-2023 fire incident data from the National Fire Incident Reporting System (NFIRS), 2021-April 14th, 2025, U.S. Fire Administration, and media coverage of fire incidents. Given that these data are collected from public data sources, these numbers are likely an undercount of the true number of fatal fire incidents.

Modern single-stair buildings would have the same safety features as other modern multi-family housing and would be safer than the single-family homes that comprise 80% of Maine's current housing stock. Small single-stair buildings also have faster evacuation times than larger apartment buildings with long corridors and two-stairs because they have fewer occupants per stairway and all units are closer to the stairs.

As a growing number of states take action to address their housing shortages, costly staircase requirements are receiving increased attention from policymakers. Since 2023, more than a dozen states have proposed legislation to study or directly address the issue.[ii] Connecticut and Tennessee have already adopted laws to enable single-stairway buildings.[iii]

Pew's new research shows that modern single-stairway 4-6 story apartment buildings have the potential to generate significant cost savings for homebuilding, are a safe form of housing, and can add much needed housing supply.

Sincerely,

Linlin Liang
The Pew Charitable Trusts

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[i] The Pew Charitable Trusts, "Small Single-Stairway Apartment Buildings Have Strong Safety Record." (2024). https://www.pewtrusts.org/en/research-and-analysis/reports/2025/02/small-single-stairway-apartment-buildings-have-strong-safety-record. 2024 International Building Code, "Chapter 10: Means of Egress," International Code Council, 2024, https://codes.iccsafe.org/content/IBC2024P1/chapter-10-means-of-egress.

[ii] Center for Building in North America. Single-stair Reform Tracker. https://www.centerforbuilding.org/trackers

[iii] Connecticut General Assembly, Bill No. 5524, 2024. Tennessee General Assembly, HB 2925," 2024; SB 2834, 2024.

Appendix. Pew report Small Single-Stairway Apartment Buildings Have Strong Safety Record

Small Single-Stairway Apartment Buildings Have Strong Safety Record

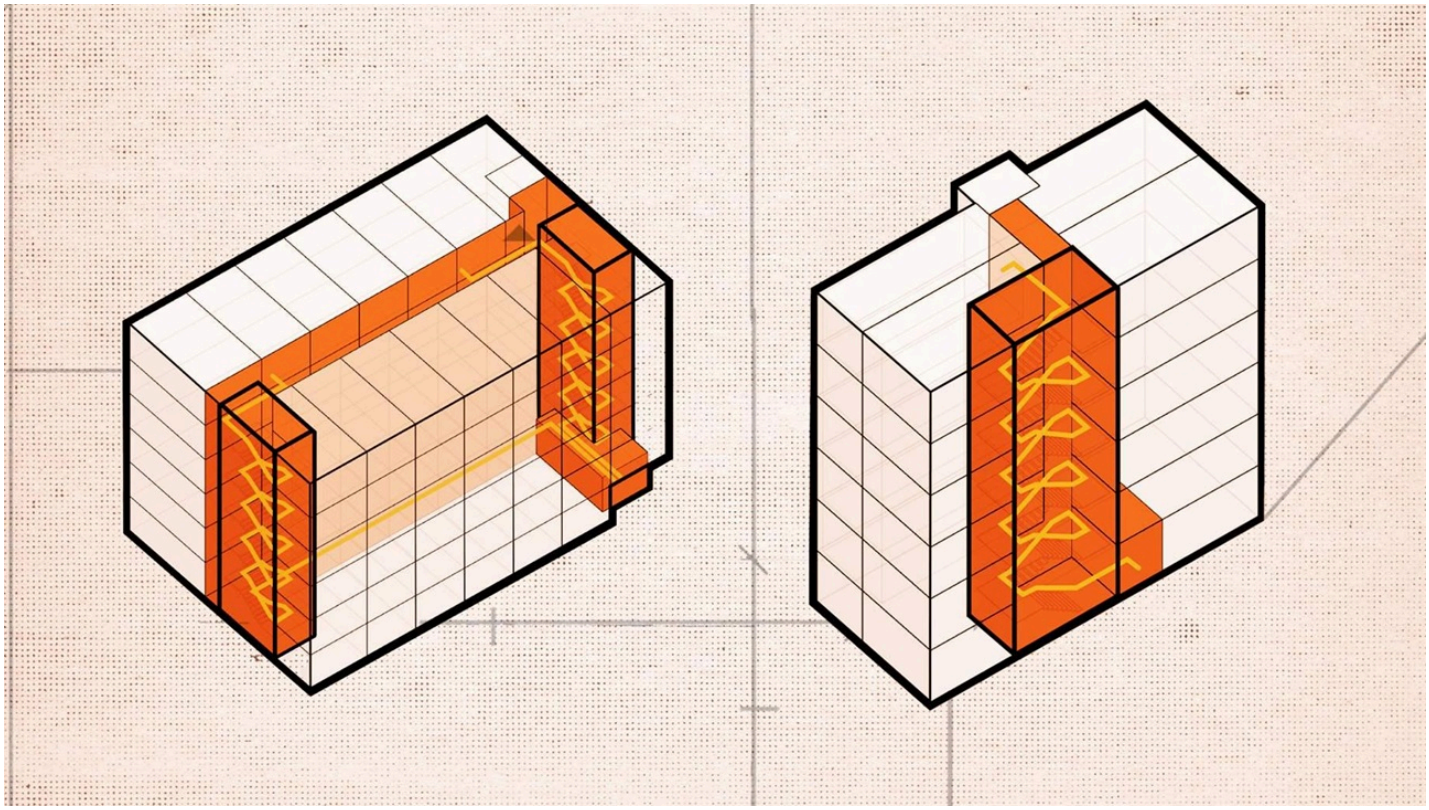
Revised building codes could encourage construction, boost supply of lower-cost homes

REPORT

February 27, 2025

Read time: 93 min

Projects: Housing Policy



Overview

Policymakers could increase the supply of multifamily housing in their states and localities by revising outdated building codes that require more than one stairway in small apartment buildings. If enough states and cities enacted this simple change, it could reduce the nationwide shortage of multifamily housing.

A first-ever analysis of fire death rates in modern four-to-six-story buildings with only one stairway shows that allowing these buildings to have only one staircase does not put residents at greater risk: Single-stairway buildings as tall as six stories are at least as safe as other types of housing. And allowing the construction of such buildings could provide much-needed housing, including homes for people with modest incomes.

The United States faces a shortage of 4 million to 7 million homes, with the problem particularly acute in areas near jobs and commerce.[1] This shortage has contributed to housing affordability challenges across the country, with rents and prices near all-time highs.[2] Building more housing—especially apartments and smaller homes—would improve affordability. Small and medium-sized apartment buildings with two to 19 units tend to have the most affordable rents across urban, suburban, and rural areas, serving renters with more modest incomes.[3] Research shows that the public supports allowing more apartment buildings, especially near transit hubs, job centers, offices, stores, and restaurants.[4] Such housing can also revitalize main streets by adding customers and expanding the potential workforce for nearby stores and restaurants.

Despite the benefits of small- and medium-sized apartment buildings, which make up 40% of the rental stock in the United States today, the U.S. builds few new ones.[5] Only 21% of all housing units built since 2000 in the U.S. have been in apartment buildings with two to 19 units, in part because of building code regulations: rules that govern construction and focus on safety, separate from land-use regulations like zoning. Virtually all modern building codes in the U.S. require two stairways in buildings above three stories tall, making small apartment buildings four to six stories tall prohibitively expensive to construct.[6] To build a four-to-six-story apartment building with a dual stairway, developers must often assemble several smaller plots of land and combine them into one large lot to fit a dual-stair building; as a result, construction takes longer and costs more.

Current U.S. building codes in all but three major cities (New York City, Seattle, and Honolulu) stipulate that apartment buildings four to six stories must have two stairways.[7] However, model codes written by the National Fire Protection Association (NFPA) allow small apartment buildings up to four stories tall to be served by a single stairway; Vermont, Georgia, and Puerto Rico have adopted the NFPA rules. (Puerto Rico allows the same four stories, in a slightly different way.)[8]

The two-stairway requirement makes it especially difficult to build apartments or condominiums on small or irregularly shaped pieces of land in already built-up areas (known as infill lots), which are often the main type of land available for development (or close to jobs, commerce, and schools) in expensive U.S. cities and towns.[9] The same regulations mean

that four-to-six-story apartment buildings in most of the U.S. must have a large amount of occupiable floor space, also known as the floor plate, to efficiently accommodate two stairways and a corridor connecting them, which limits both design choices and the building's aesthetic appeal. The mandate in dual-stair buildings for a central corridor on every floor means that most apartments have windows on just one side, limiting ventilation and light and resulting in small units that are less hospitable to families with children.

The International Building Code (IBC), the U.S.-written model building code adopted in most of the country, does not allow single-stairway buildings above three stories.[10] Safety concerns have led fire services (local departments and personnel, marshals, and other fire officials) in many cases to support keeping these current building code provisions.[11] Fire safety professionals often express concern about having only one staircase available, both to evacuate residents and to use for firefighter operations; about smoke entering and accumulating in the single stairwell; and about increased reliance on window or balcony rescues, among other safety issues.

Fears about the safety of single-stair buildings were well founded before the inclusion of modern safety features, such as sprinklers, in building codes. But in today's world, the rules requiring two stairways in buildings taller than three floors may actually increase fire risk by discouraging the construction of new multifamily housing, which has other safety measures in addition to sprinklers, such as self-closing doors and fire-rated walls (walls that are designed and constructed to resist fire penetration for a given amount of time, such as one hour).

Close examination by The Pew Charitable Trusts and the Center for Building in North America finds no evidence of safety risks for single-stairway buildings with sprinklers. From 2012 to 2024, fire death rates in modern single-stairway four-to-six-story apartment buildings in New York City were no different from those in other residential buildings; not one death in which the exit (or lack of a second exit) played a role was recorded in a modern four-to-six-story single-stair building in Seattle or New York City during that same 12-year period. Research from the Netherlands—where single-stairway buildings taller than three stories are common—also confirms that these buildings are safe.

Single-stairway four-to-six-story buildings with relatively small floor plates cost 6% to 13% less to construct than similar dual-stairway buildings. They can also fit on smaller infill lots, potentially increasing the supply of apartments in high-opportunity urban and suburban neighborhoods. And to the degree that these modern buildings replace older, riskier buildings, or enable residents to move out of older housing, single-stairway apartments will actually increase fire safety.

This report presents the findings of the first-ever analysis of fire death rates in modern single-stairway buildings, examines their potential benefits and risks, and provides relevant international comparisons. It also highlights recent legislative and regulatory efforts to consider and implement changes to building codes that govern the construction of four-to-six-story apartment buildings.

Key findings

- In New York City, the overall rate of fire deaths in its 4,440 modern single-stair buildings since 2012 was the same as in other residential buildings.
- We were able to find a total of four fire-related deaths in New York City and Seattle's modern single-stairway buildings from 2012 to 2024. The lack of a second stairway did not play a role in any of those fatalities.
- In the Netherlands, where single-stairway construction is common in four- and five-story buildings, the fire death rate in those buildings is on par with the fire-related death rate in other types of residential buildings. Overall, residential fire-related death rates in the Netherlands are one-third those of the U.S.
- If sprinklers do not function, there are significant risks associated with smoke spreading in the long, horizontal corridors of dual-stairway buildings that have become standard in the U.S. and Canada. Single-stairway designs, which do not have long corridors, mitigate this problem.
- For a four-to-six-story building on a small lot, the typical cost of building a second stairway and connecting the two via a central corridor on every level is equal to approximately 6%-13% of the total construction costs. The additional stairway and corridor consume around 7% of the building's floor area. The second stairway adds significant cost, which can mean the difference between a project being financially feasible or not.
- Sprinklers, which are mandatory in virtually all new U.S. apartment buildings—both inside units and in the main public areas—have been shown to reduce residential fire fatalities sharply.[12]
- Single-stairway code reforms have some political momentum: As of fall 2024 at least 11 states and five cities have enacted laws or amended regulations to explore or allow single-stairway designs for four-to-six-story buildings. Most of that legislative and regulatory activity occurred in 2023 or 2024.
- If building codes were revised to allow single-stairway construction in four-to-six-story residential buildings, the new rules could include additional measures to enhance safety,

such as limits on floor area, limits on distances to an exit, and smoke-control systems. These measures would be in addition to existing requirements for sprinklers and standpipes (separate pipes that supply water to firefighters inside a building).

- Allowing single-stairway four-to-six-unit buildings could stimulate the construction of badly needed new housing, especially in already-developed neighborhoods near public transportation and commercial areas. A study of the Boston area estimated that such a building code change had the potential to create 130,000 new homes simply by developing the vacant parcels within walking distance of transit.[13]

Glossary

Active fire protection: Fire protection system(s) that requires a manual or automatic action to function in the event of a fire. Examples include pulling the fire alarm, using a fire extinguisher, or automatic activation of a smoke detector, heat detector, or sprinkler.[14]

Compartmentation: A passive fire safety feature that is part of a building's design: The building is divided into smaller fire-resistant compartments or sections (such as an apartment, a stairwell, or shaft) to help prevent the spread of smoke and fire and create a safe barrier between occupants and contaminated spaces.

Construction type: There are five construction types defined by the International Building Code (IBC). These types sort buildings according to their fire-resistance rating and combustibility, among other things:

- Types I and II: Noncombustible construction, with restrictions on combustible materials listed in section 603 of the IBC.[15]
- Type III: External walls are noncombustible or made of fire-treated wood, but framing and interiors can be made with any materials.
- Type IV: Heavy or mass timber construction with greater resistance against fire than the light wood frame used in types III and V, with noncombustible exterior walls.
- Type V: Permits any type of materials, including combustible materials.

Double-loaded corridor: A building design where units are placed on both sides of a central common hallway. This design is common for dual-stair apartment buildings in the U.S. and Canada.[16]

Egress: A path to leave a building or space. The IBC defines means of egress as "a continuous and unobstructed way of egress travel from any accessible point in a building or facility to a public way."[17]

Exit access: The path from any area within a building to an exit.[18]

Exit: Generally, a stairway that leads from the exit access to the ground floor.[19]

Fire service: A term grouping local fire departments and personnel, marshals, and other fire officials; the emergency response team that provides firefighting and rescue services.

Floor plate: The gross occupiable area of one story of a building, including apartments, hallways, and stairways.

Hard costs: Costs directly related to the construction of the building. These can be tangible resources, such as concrete and wood, and intangible resources like labor but do not include land or soft costs.

High-rise apartment building: Special rules are applied for buildings that meet the definition of a high-rise. The threshold varies by country, but the IBC, used as the model for U.S. building codes, defines a high-rise building as "a building with an occupied floor or occupied roof located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access."[20]

Interlocking stairs (scissor stairs): Two stairwells that share a single stairway enclosure.[21] Although interlocking stairs can provide two points of egress, the International Building Code counts them as one exit when they utilize one enclosure.[22] In New York City, though, scissor stairs are intertwined but use two separate exit enclosures.

International Building Code (IBC): A model building code developed by the International Code Council (ICC), a U.S.-based nonprofit organization. The IBC has been adopted into law by most jurisdictions in the Unites States (and several outside the U.S.), often with some modifications.

Life safety: The design and operating features of a building that provide safety for occupants during a fire or other emergency.[23]

Light wood frame construction: A construction type where the primary structural elements are built with dimensional lumber.[24]

Low-rise apartment building: An apartment building of three or fewer stories.

Mass timber: A type of engineered wood product that is made by connecting smaller pieces of wood with adhesives, dowels, nails, or screws into thicker, more fire-resistant pieces to create one larger building component (such as a beam, column, or wall panel).[25]

Mid-rise apartment building: In the U.S., an apartment building between four and roughly eight stories tall. Definitions can vary by country.

National Fire Protection Association (NFPA): A nonprofit organization that advocates for policies and code reforms that improve fire and other hazard safety standards.

Passive fire protection: Systems or components of a building that limit damage, provide occupants more time for evacuation, or protect firefighters; achieved in design through features such as compartmentation, noncombustible materials, and components like fire doors and fire walls that resist the spread of fire.[26]

Point access block: A form of apartment building design in which a small number of apartments are arranged around one easily accessible vertical circulation core that contains one stairway (or sometimes two in a compact interlocking configuration) and sometimes one or more elevators.

Pressurized stairs: A fire safety mechanism that uses air pressure to prevent the entry of smoke and other toxic gases into a stairwell in the event of a fire.

Single-stair or single-exit: Building design that has one stairway connecting the levels of a building and the exit from the building.[27]

Smoke-control system: Design features that prevent smoke from entering or accumulating in a stairway in the event of a fire. One example of a smoke-control system would be a stairwell with a ventilated lobby or balcony; another is a mechanically pressurized stairwell.

Soft costs: Costs that are indirectly related to the construction of a building, such as professional services, insurance, interest, fees, and administrative expenses.

Stairway: Stairs, landings, platforms, and connecting passageways between two levels of a building, and leading out of a building.

Standpipe: A type of dedicated piping that supplies water throughout a building and provides easy access for firefighters.

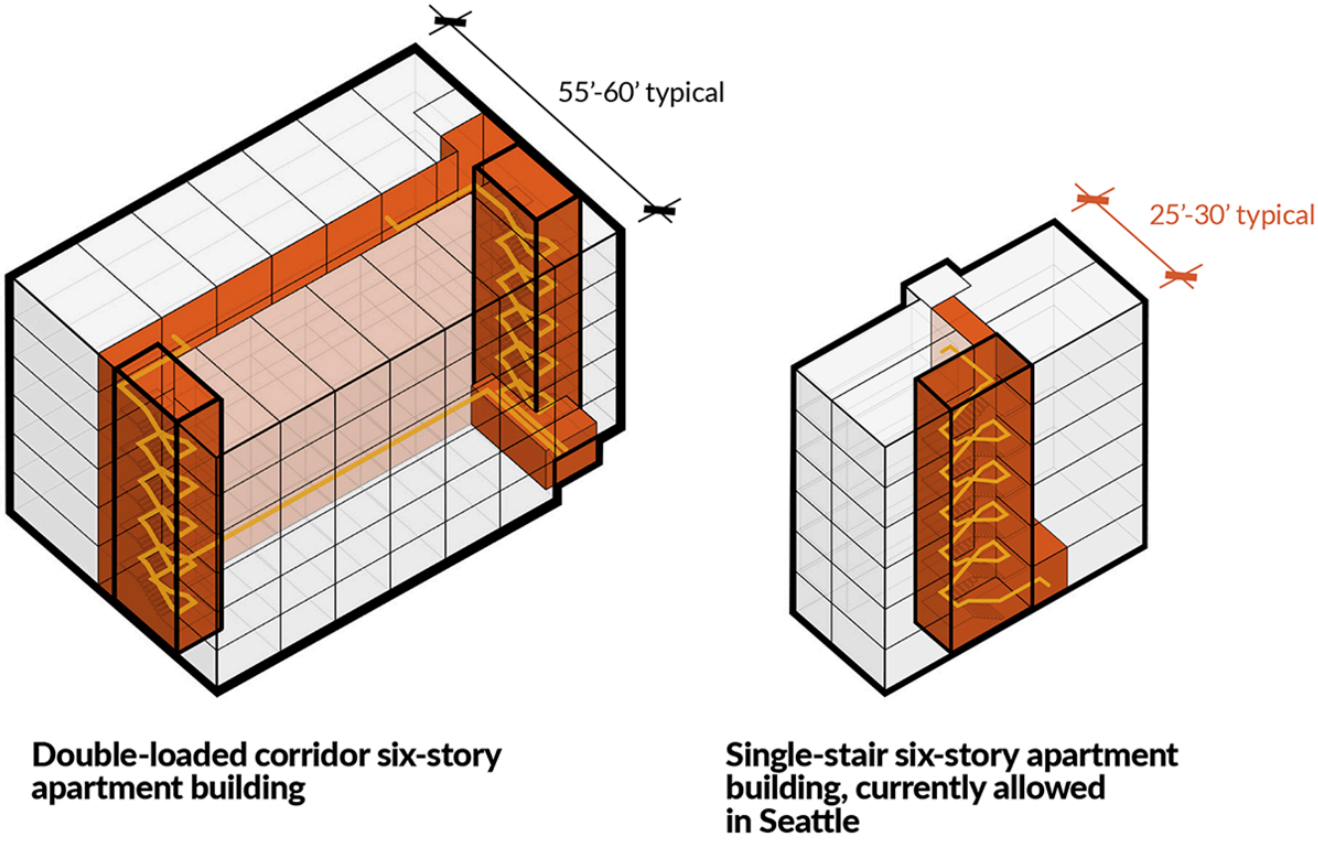
What does a single-stairway building look like?

A new four-to-six-story building in most of the U.S. must have two stairways and a corridor connecting them on every level to comply with the building code. Figure 1 shows a rendering of such buildings and their limitations: The hallway cuts the building in half, limiting windows to one side of each apartment (except for end units). In contrast, current three-story buildings, which are allowed to have a single staircase, have less space devoted to staircases and hallways and have more options for light within apartments. A building with one staircase is sometimes referred to as a “point access block.” Single-stair buildings have a variety of designs and can be placed side-by-side, sharing an exterior wall, to form a larger complex.[28] Three major U.S. cities allow residential buildings as tall as six stories to have just one staircase: Honolulu, New York, and Seattle.

Figure 1

Building Codes Limit Small Apartment Building Designs in Much of the U.S.

Single-stair design is allowed in 3-story buildings, but 4-to-6-story buildings must have two staircases and a corridor



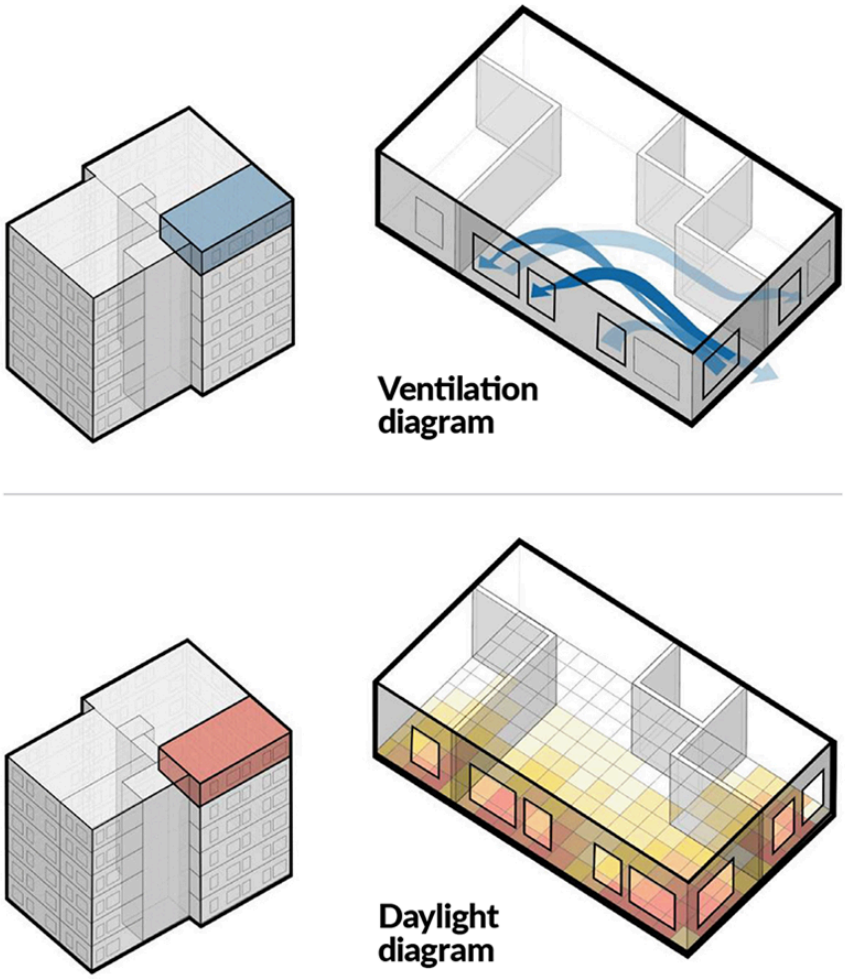
Source: SAR+ Architects

Having only one staircase and less corridor space in a building allows for a broader array of unit designs and sizes.[29] For example, more units can have windows on more than one wall than is possible in a building with a long corridor, allowing for cross-breezes and improving airflow. (See Figure 2.)[30] Such units also have more natural light, improving livability and decreasing artificial lighting use.[31]

Figure 2

Single-Stair Buildings Can Improve Ventilation and Increase the Amount of Daylight

This rendering shows air circulation and daylight coming through the windows of a 6-story building currently allowed in Seattle



Source: SAR+ Architects

Buildings with a diversity of units—from studios to family-sized units with four (or even more) bedrooms—can appeal to a broad range of households.[32] They can accommodate families with children or multigenerational households, in addition to the small households currently served by large apartment buildings that primarily have small units because of the dual-stair and corridor mandate. Apartment plans can also be more efficient, requiring less space for family-sized units.[33] Additionally, having fewer units on each floor might increase social interactions with neighbors at a time when rates of self-reported loneliness have risen.[34] Smaller buildings could also better facilitate alternative forms of organizing a community, such as cohousing, where residents live in individual units but share certain common spaces or amenities. Seattle's Capitol Hill Urban Cohousing, a nine-unit single-stairway building that

describes itself as “an inter-generational urban community committed to sustainable living,” provides an example.[35]

Because they can be more flexible, single-stairway designs permit better and more efficient use of building sites, particularly smaller and irregularly shaped lots. For small land parcels, improved efficiency can mean the difference between a viable project and one that is not financially feasible, because two staircases and a corridor cannot fit in an efficient plan, or because land costs require more than three stories for financial viability. (See Figure 3.) Efficient use of land is particularly important as zoning changes allow for more infill development of apartments on lots previously zoned for single-family homes or commercial purposes. Moreover, larger plots of land that can accommodate double-staircase buildings are difficult and expensive for developers to assemble, especially in more densely populated, already-developed areas—the type of places with the highest rents, and the greatest need for new housing.[36] One recent study found that 76% of land parcels in Boston and its inner suburbs are suitable for single-stair, four-to-six-story buildings.[37] Developing the small fraction (3%) of these parcels that are vacant and within walking distance of transit could result in up to 130,000 new units, a substantial portion of the Boston area’s housing shortfall.

Figure 3

Single-Stair Buildings Can Fit Into Narrow Lots

Examples of 4-to-6-story single-stair buildings on infill lots in Seattle

101 John St.

20 street-facing, market-rate apartments atop ground-floor retail, built in 2016 on a 4,600-square-foot lot.

ALNA Ballard

1123 NW 57th St., 21 market-rate apartments, built in 2021 on a 5,000-square-foot lot.

Franklin Station

2303 Franklin Ave. E, 22 market-rate apartments, built in 2018 on a 4,800-square-foot lot.

Source: SAR+ Architects

Allowing single-stairway construction for up to six stories reduces cost

Small and medium-sized apartment buildings make up 40% of the rental stock in the United States, but the U.S. builds few new ones. Only 22% of all apartment units built in the United States since 2000 are in small or medium-sized apartment buildings. Forty-two percent of all new units built since 2000 are in large buildings (50 or more units). Building more housing—especially apartments and smaller homes—would improve affordability. Small apartment buildings with two to 19 units tend to have the most affordable rents across urban, suburban, and rural areas, serving renters with more modest incomes.[38] High construction costs for small apartment buildings, driven in part by strict building codes and land use regulations, offer a partial explanation why developers are not building more new ones.

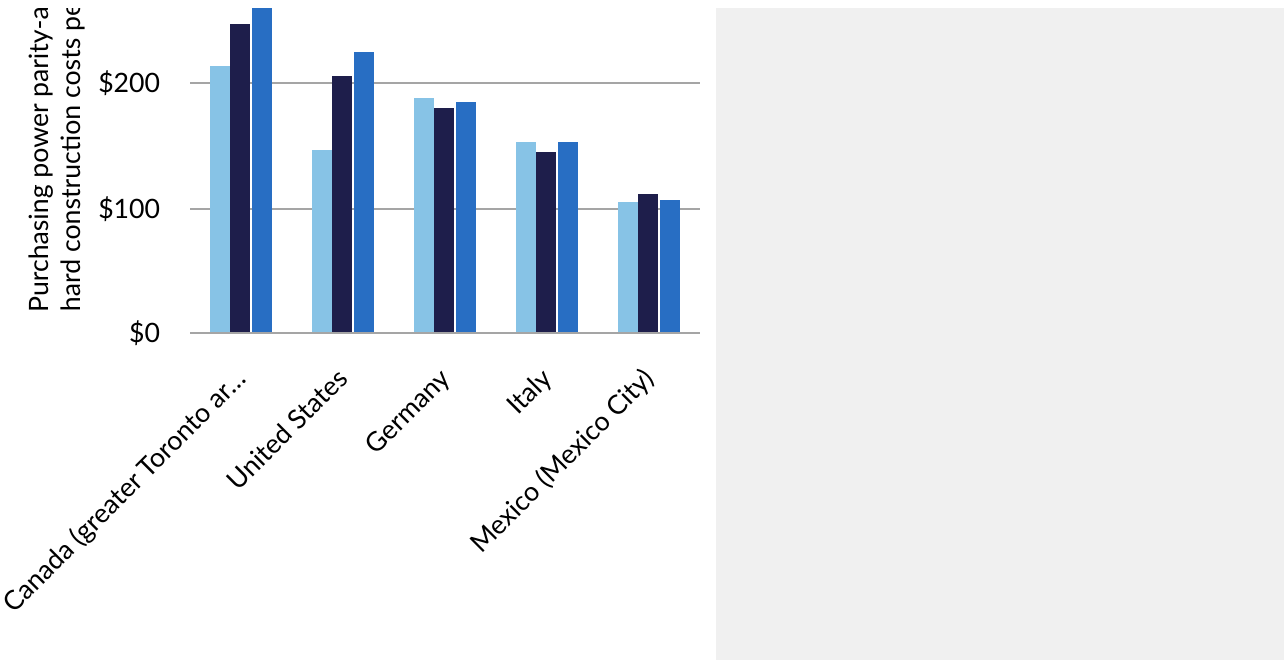
The United States and Canada have a particular construction cost problem not seen in many of their peers abroad: As building typologies grow denser, per-square-foot costs rise. (See Figure 4.) In much of the world, costs stay roughly the same as developers move from single-

family houses to low-rise apartment buildings to mid-rise apartment buildings (in the U.S., four to six stories tall). That is true because economies of scale (for example, a single roof, foundation, or lobby serves more floors and housing units) and diseconomies of scale (for example, apartment buildings often include elevators, while single-family houses can just have stairs) roughly balance each other out. High-rise buildings (defined in the U.S. roughly as buildings above eight stories) are even more costly, as structural, fire protection, and other requirements increase.[39]

Figure 4

Construction Costs Increase With Density in the U.S. and Canada, but Not Internationally

Per-square-foot costs for multifamily units are higher than for single-family units in the U.S.



Source: U.S.: RSMeans Construction Cost Data, 2024; Canada: 2024 Canadian Cost Guide; Germany: Bki Baukosten Gebäude Neubau 2024; Italy: Collegio degli Ingeniería Architetti di Milano, Prezzi Tipologie Edilizie 2024; Mexico: Raúl González Meléndez, Costos Paramétricos, 2024

These cost dynamics favor the construction of suburban housing types, such as single-family houses and low-rise apartment complexes, in the United States and Canada, while mid- and high-rise rental and condominium buildings are largely priced as luxury products, or as affordable housing (the production of which is limited by scarce government subsidies). The stark rise in cost according to density seen in Canada and the U.S. but not abroad hints that the diseconomies of scale in these countries' housing construction are not inherent qualities of construction, but rather have a regulatory origin.[40] In fact, building codes in the United

States draw a number of hard and expensive lines between low- and high-density forms of development that are not found abroad.

These problems begin with the organization of the major construction codes themselves. Building codes in the United States are adopted at the state or local levels. They are based on model codes developed by a private nonprofit organization called the International Code Council (ICC), whose two model codes form the basis for adopted codes governing almost all residential construction in the U.S.[41] Most single- and two-family houses are regulated by the International Residential Code (IRC); the International Building Code (IBC) covers almost everything else—from three-family buildings to supertall office skyscrapers to microchip fabrication facilities.

There are density- and height-related cost differences between the U.S. and Canada and other countries because of regulations related to structural materials; mechanical, electrical, and plumbing (MEP) systems; and fire protection systems. Certain building heights trigger a change in structural materials: For example, U.S. codes require a transition from light wood-frame construction to concrete and steel above a certain height (typically six stories, but it depends on the jurisdiction), creating a shift in materials not found abroad.[42] U.S. and Canadian codes also impose many unique requirements in MEP systems as building density rises.[43] The U.S. and Canada, for example, require so-called active fire protection measures like sprinklers more than other countries, with nearly every city and state requiring sprinklers even in small new multifamily developments with as few as three units. For single-family homes, townhomes, and duplexes, however, 48 states have fully or partially removed sprinkler requirements through legislation or code adoption.[44] Outside the U.S. and Canada, sprinklers are typically required only in high-rises.[45] Elevator cabin sizes in Canada and the U.S. must also be larger, at lower heights, than those in Europe, Asia, and Oceania, and must comply with a different set of technical standards. Similar differences can be found throughout U.S. and Canadian building codes, affecting almost every system in a building.[46]

Some of the most stringent aspects of multifamily building codes in the U.S. and Canada involve egress. Both countries require a second staircase at some of the lowest heights in the world, even for relatively small apartment buildings.[47] These stairs must be enclosed in a shaft protected by a door, whereas in many high-income European countries, a stairway can be open to apartment landings for low- and mid-rise buildings.[48] Where two stairs must be provided, in most U.S. jurisdictions they must now be located on opposite sides of the building; space-saving interlocking stairs with a fire-rated wall between them, sometimes known as scissor stairs, are not allowed.[49]

The requirement for a second stairway can be very costly for a small building. This cost can be quantified in two ways: either in dollars or in space.

Spatial cost estimate

Jersey City, New Jersey, offers one illustration of the spatial cost of a second stairway in a small apartment building. Jersey City, located across the Hudson River from Manhattan, has small lots and a permissive land-use regime designed to promote development. But development is bound by the International Building Code's egress provisions, which require two stairways for any apartment building with more than three stories.[50] In most of the United States, building a five-story apartment building on a narrow 25-foot-wide lot would not be financially feasible; high rents in the New York metropolitan area occasionally justify the cost of complying with the IBC for small-lot mid-rise apartments, offering case studies in the spatial costs.

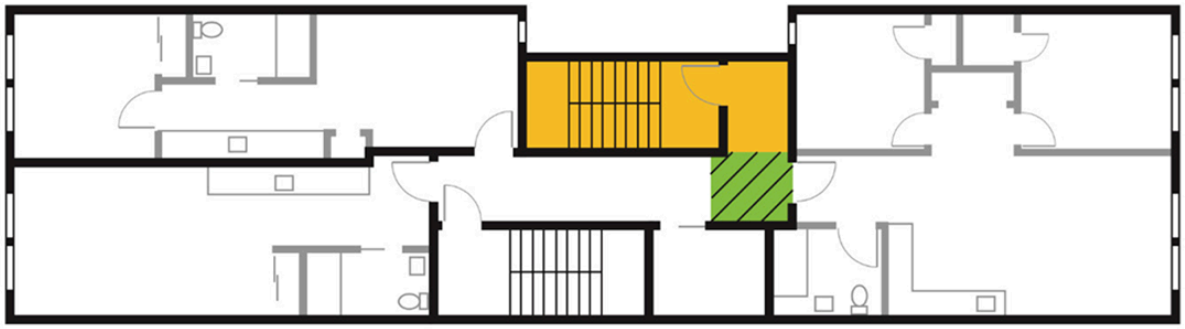
A recently proposed five-story, 14-unit apartment building at 101 Storms Ave. in Jersey City illustrates the two-stairway problem for small lots. (See Figure 5.) The building would sit on an infill lot, 25 feet wide and 112 feet deep; it is similar to many lots in dense American cities that were laid out in the 19th century, such as New York, San Francisco, and Washington, D.C.[51]

Because the building would rise to five stories, New Jersey's Uniform Construction Code, based on the IBC, requires two stairways, with doors to each stairway spaced at a distance equal to one-third the diagonal of the building (the so-called remoteness requirement). One stairway is left unshaded, at the bottom of the diagram in Figure 5, while the second is shaded in yellow, along with a short segment of corridor space that is needed to access the stairway and meet the remoteness requirement. This space consumes 7% of the building's floor area and is included only because of the second stairway requirement. If New Jersey adopted the New York City building code, this second stairway would not be required. Such a building could be designed either with less space (suggesting a proportionate construction cost savings, without loss of living space), or it could have larger units or more shared amenities. (See Dollar cost estimate, below.)

Figure 5

Cutting 1 Stairway and Some Corridor Space Makes a Small Apartment Building Project More Financially Viable

Plan of a typical small multifamily building in Jersey City, New Jersey



Notes: Drawing of 101 Storms Ave., Jersey City, New Jersey. In this example, the second stairway (in yellow) consumes 7% of the space, and 2% (in green) is rendered unrentable, because it is in the common corridor rather than inside the apartment on the right.

Source: Plan redrawn and analyzed by Alfred Twu. Reproduced with permission from page 432 of Stephen Smith and Eduardo Mendoza, "Point Access Block Building Design: Options for Building More Single-Stair Apartment Buildings in North America," 2024

The building would also benefit in two additional ways: It would have more light inside and a more efficient floor plan for the remaining space. If the yellow area remained unbuilt, the bedroom and living room looking onto the outdoor space would receive more light. The corridor space shaded in green takes up an additional 2% of the floor area, meaning 9% of the total floor area on each floor of the five-story building is dedicated to accommodating the building code requirement for a second stairway and connecting corridor. This 2% of floor space could be moved inside the apartment on the right. While this change would not save any construction costs, it would turn that unrentable circulation space into rentable space, raising what is known in real estate development as the efficiency ratio—the share of floor area that sits inside dwelling units rather than common areas. A 2024 study in the Boston area found that dual-stairway buildings have efficiency ratios that are 10 percentage points lower than similarly sized single-stair buildings.[52]

Those improvements would be a significant boost to the project's economics. For marginal projects, this boost could make them feasible. It could also provide a buffer against rising material, labor, and interest rate costs. By reducing the proportion of the lot that must be built on to accommodate three apartments per floor, this elimination of one stairway could make neighbors more amenable to allowing buildings like it in the future because there could

be more open space preserved and a slightly greater distance from adjacent buildings (at least in that portion of the building). Reductions in land consumption would also help developers shoehorn projects onto smaller infill lots.

Dollar cost estimate

The dollar cost of an additional stairway can be difficult to estimate, given that it is not included as a distinct line item (such as an elevator or air conditioning system) built by a specific trade. Still, various sources have made estimates of its cost. On the most basic level, a second stairway requires a number of different items: The stairway itself, railings, an enclosure (assuming the stairway is indoors, which is usually the case), doors to the corridor on each landing, lighting and electrical connections, and fire sprinklers are typical elements included in hard costs. (There would also be soft costs like the architect's fee and construction financing, and potentially land costs to accommodate the second stairway, depending on the site. These costs may scale with hard costs but are beyond the scope of this analysis. Soft costs—which do not include land—generally total about 15% to 25% of hard costs.)[53]

In preparing this report, researchers from The Pew Charitable Trusts and the Center for Building North America obtained estimates of stairway costs from contractors and independent construction cost estimators. Estimates for building an interior stairway for a six-story multifamily apartment building in the southeastern United States ranged from $190,000 to $380,000; a quote for a four-story building came in at $228,000.[54] This six-figure cost might be a minor expense in a large building where a single-stair configuration would not be appropriate anyway. But for small buildings, it may matter a great deal. Consider a hypothetical six-story building with 2,000 square feet of area per floor, which would cost about $250 per square foot to build (or $3 million total).[55] The cost of the second staircase for this building amounts to a meaningful 6% to 13% of total hard costs.[56]

Why Are Single-Stairway Buildings So Scarce in the U.S.?

The United States has, for reasons of geography and culture, always taken a different approach to construction and life safety than the rest of the world. It has taken advantage of bountiful land, energy, and natural resources where other countries use more durable construction. Stringent egress requirements for multifamily buildings—which require more space—are just one example.

Big cities and big fires have gone hand in hand for most of human history. The Great Fire of London in 1666 survives in nursery rhymes, and the firestorm ignited by All Saints' Day candles after the 1755 Lisbon earthquake was one of the epochal moments of the Age of Enlightenment. Humans eventually learned to tame great city fires; economic historians Lionel Frost and Eric Jones wrote in a seminal paper about what they called the "fire gap" that emerged in the 19th century: a gap between

increasing city populations and decreasing numbers of urban fires.[57] Frost and Jones attributed the decline to two trends: "rebuilding in less flammable materials, and increases in house lot size."[58]

The strategies of less flammable construction materials and sprawl were not mutually exclusive, but older, crowded European cities short on land mostly used fireproof materials like bricks and stone on building exteriors to prevent the spread of fires, while spreading settlement out was a more popular mitigation in less settled areas. The U.S. and Canada fell solidly within the latter category, embracing flammable light wood-frame construction methods enabled by vast forests and the industrialization of timber processing and nail production, but with more space between houses and other buildings to reduce the risk that a fire in one might spread to another. Fire protection techniques for light wood-frame construction have improved over time, and wood structures can now be designed with quantifiable fire-resistance ratings.

New York City, with its dense collection of buildings in Lower Manhattan, has historically adopted one of the more materials-focused approaches to fire safety in the U.S. and Canada, but it was never able to stamp out unprotected wood as completely as cities in Europe, such as Paris or London, which had sharply cut their fire risk by the 19th century.[59] Then, in 1860, disaster struck at an apartment building in Lower Manhattan. Fire broke out in a basement bakery and spread upward, fed by the single, unprotected wooden staircase. Firefighters' ladders could not reach past the fourth floor. Ten people died.[60]

The problem of fire has many possible solutions. In Europe, governments generally chose to solve it by forbidding the most flammable construction materials. New York City chose to respond by requiring redundant escape routes. It began passing laws to require a second way out of a building that year, and within a few decades, the exterior fire escape—a series of ladders or steep steps attached to balconies on the facades of apartments and other buildings—became a prominent feature of the city.[61]

Over the years, New York City's requirement for basic fire escapes transformed into a requirement for a second full exit—that is, a stairway—within residential and nonresidential buildings. The desire for redundant exits was solidified in the wake of several nonresidential fires, including the Triangle Shirtwaist Factory fire in Manhattan (1911) and the Winecoff Hotel fire in Atlanta (1946).[62] Redundant exits were so central to 20th century building codes in the United States that the National Fire Protection Association's (NFPA's) Life Safety Code, still in use today and known as NFPA 101, was originally titled the Building Exits Code.[63] Fire escapes were eventually found to be ineffective and difficult to maintain.[64] New York City outlawed them in new construction in 1968.[65] As exterior fire escapes fell out of fashion, much of the U.S. adopted the redundant exit standard, leaving the double-loaded corridor with two "remote" stairs as the only permitted way to build an apartment building above three stories.

Outside the United States, building codes for apartment buildings have relied less on redundant exits and more on protection of a single exit, and indeed of the entire structure. The use of wood in construction was largely phased out in Europe over several centuries in favor of bricks and stone, and eventually concrete and steel, first in exteriors and then eventually for interior structural components. London, for example, required brick and stone exteriors after the city's great fire in 1666, and by the mid-1800s, architects in Paris were using wood in apartment buildings only for floorboards and trim.[66] Builders eliminated wood from vertical elements like walls, first switching to brick and stone, and eventually steel and concrete, in both exterior and interior parts of the building. It took longer to eliminate wood from horizontal building elements, but techniques such as brick arches and iron joists, and new materials like concrete, eventually replaced the wood in many floors as well. Europe's northern and eastern peripheries maintained the use of wood—and continued to

see large urban conflagrations—later than its core.[67] But even there, a successful effort in the 20th century eventually eliminated the use of combustible materials; Denmark, for example, dropped its second-stairway requirement when concrete, rather than wood, came into use for the construction of primary stairs.[68]

Stephen Smith / Center for Building in North America

Common concerns about single-stairway building safety

Safety experts continue to express concerns about relying on single stairways in four-to-six-story buildings. In a statement of opposition, the National Association of State Fire Marshals wrote in 2024 that single-stairway apartment buildings run "contrary to decades of research and investigation validating the need for multiple exits."[69] While there is some research about exit stairways generally, a review of the literature did not surface any research speaking specifically to redundant exits in apartment buildings in the United States. Given the importance of life safety in any code or construction change, this section of the report examines the following concepts:

- Segregating firefighting attack stairways and evacuation stairs.
- Smoke-control systems.
- Combustible and noncombustible construction.
- Compartmentation.
- Window rescues.
- Safety threats other than fire.
- Building maintenance and fire department capability.

Segregating attack and evacuation stairs

One major concern about single-stairway buildings is that they hamper firefighting operations by eliminating the option of designating separate stairs for occupants to evacuate and firefighters to attack a fire (known as evacuation and attack stairs). Leaders in the International Association of Fire Chiefs and the International Association of Fire Fighters, representing members in the United States and Canada, argue that dual staircases are "pivotal in facilitating efficient firefighting strategies." Removing a means of egress, they say, will hinder the efficiency of firefighting operations or, in some cases, force firefighters to choose between prioritizing evacuation or fire suppression.[70]

Fire safety experts in the United States conducted a burst of research on egress after the Sept. 11 attacks, when escape from office buildings—especially while firefighters climbed

stairs— became a topic of great interest in the fire protection field. Some of this research speaks to the fire service's concerns about occupants fleeing a building while firefighters are trying to suppress a fire.

Richard Bukowski, at the time a researcher and fire protection engineer at the National Institute of Standards and Technology, wrote in 2007 about the general issue of firefighters trying to attack a fire while occupants are still evacuating high-rise buildings, even with two stairways:

> "Another shortcoming of stairs in high rise buildings is that standard firefighting procedures involve the designation of one of the stairs as the attack stair, in which the fire hose is extended to permit its advance onto the fire floor. Once the hose is extended in the stair and charged with water it is nearly impossible for occupants to pass from above. Further, once the door to the fire floor is opened to advance the hose, smoke may enter the stair and contaminate the floors above. Thus it may be necessary to delay firefighting until all occupants clear the stair above the fire floor."

Bukowski notes that a "conservative estimate" suggests it takes about one minute per floor for most occupants to descend "undamaged and smoke-free egress stairs," but a "growing proportion" of people struggle with stairs, and some cannot use them at all unaided.[71]

A master's student at the University of Maryland wrote a thesis comparing computer egress models with a real-world fire drill in a six-story office building. She also examined the effect of firefighters moving up a stairwell as occupants were moving down, finding a "small but noteworthy" decrease in evacuation speed in the stairwell with firefighter counterflow.[72] Using egress simulation software, researchers at the National Institute of Standards and Technology compared evacuation speed from a hypothetical 50-story office building with 350 occupants per floor—a total of 17,150 above the ground floor—to evaluate a proposal at the ICC to require a third stairwell in nonresidential buildings over 420 feet tall.

They found that if the fire department uses one stairway, it significantly affects egress time, and a third stairwell improves evacuation times more than wider stairs.[73]

Vincent Dunn, a retired deputy chief at the New York City Fire Department, wrote in 2007 about the difficulties of trying to execute a simultaneous evacuation and fire attack in *Strategy of Firefighting*:

> "Dividing up stairways for fire attack and evacuation is easier said than done. To do this, there must be a public-address system in the building, allowing the fire chief to speak to the people trapped above the fire. If there is no public-address system, there can be no organized movement of people in the burning building. People not knowing what to do may attempt to escape the fire—tragically leaving a safe apartment and entering a deadly smoke-filled hallway or stairway."[74]

Dunn's warning proved prescient a few years later in a fire in a high-rise apartment building in Manhattan that had no sprinklers. Firefighters propped a door open in a stairwell they had designated as the attack stair to make way for a hose, contaminating the stairwell with smoke. A 27-year-old man and his husband were probably already descending the stairway when firefighters propped the door open. The 27-year-old died of smoke inhalation.[75] The building had no public address system to tell residents to stay in their apartments (or, if they had been ordered to evacuate, to use a specific stairway). Public address systems are not required for buildings that are not high-rises.[76]

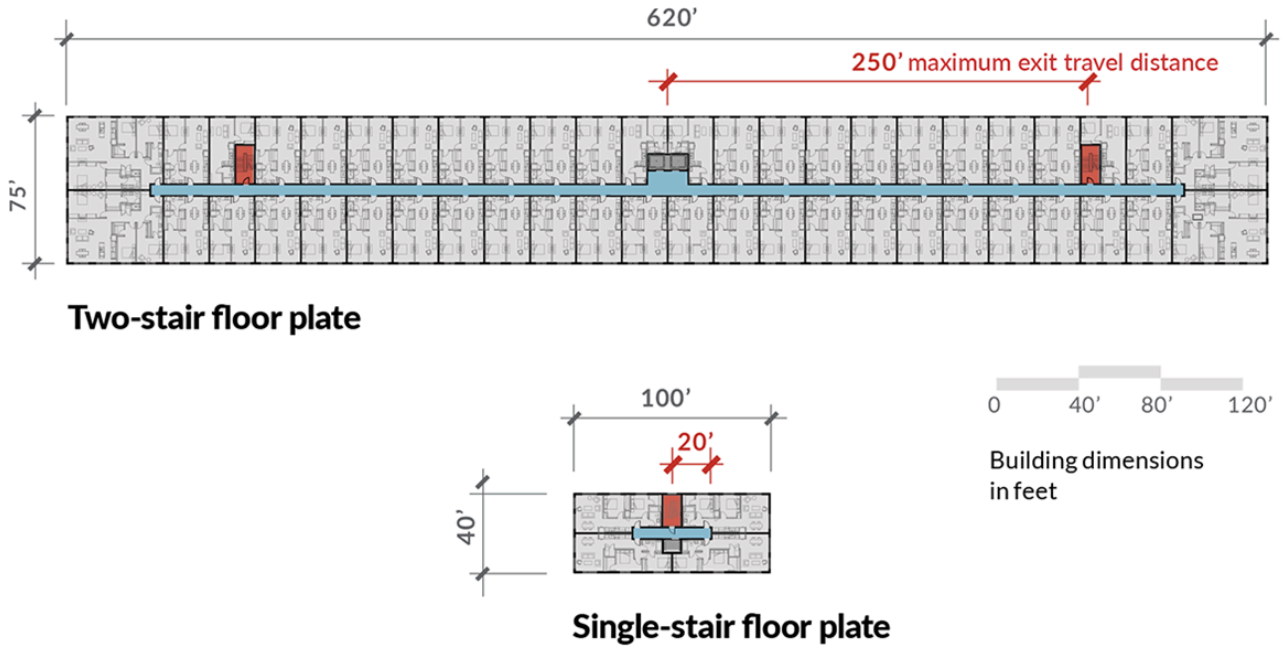
U.S. building codes also pose another challenge for segregating evacuation and firefighter attack flows by stairway: travel distances. The latest IBC allows residential buildings to have exit access travel distances—the distance from the furthest corner of each apartment to the stairway door—up to 250 feet. But this 250-foot distance is measured to the nearest exit, not the farthest (or second-closest) one, and exits must be placed near opposite ends of a hallway.[77] In other words, while the IBC requires two stairways, only one is guaranteed to be within 250 feet of any given part of the building. (See Figure 6.) Thus, if firefighters block access to a stairway and it becomes contaminated with smoke, a resident might have to travel far more than 250 feet to reach the other stairway. If the building code were rewritten

to avoid this situation, three (or more) stairways would be required for buildings with larger floor areas—at least two for evacuation, plus at least one for firefighter attack.

Figure 6

Seattle Residents Often Must Walk Farther to an Exit in 2-Stairway Buildings Than in Single-Stairway Designs

Single-stair designs limit exit distance



Note: Reasonable worst-case floor plans for a two-stair building according to the model IBC (above) and a single-stair building according to Seattle's code section. The top plan shows the distance that occupants would need to travel if one of the stairs were blocked by the fire department in a code-compliant two-stair building—far beyond the 250-foot limit imposed in the code—illustrating the challenges of segregating attack and egress stairs in practice. In the single-stairway building, the maximum distance from the front door of each unit to the stairwell is 20 feet.

Source: Drawing by Sean Jursnick, with SAR+ Architects, completed for Center for Building in North America

Smoke-control systems

Single-stair buildings have only one exit per floor, and in some cases not even a window or balcony that would provide firefighters access to each floor. (See "Window rescues," below.) Modern multifamily building stairways in the United States are designed to control fire with sprinklers; smoke is the bigger concern. Burning plastic presents a particular challenge, as it quickly generates an extraordinary amount of toxic smoke. Smoke-control systems in exits are therefore a common component of modern single-stair buildings. But some fire safety

experts have expressed concern about how well they might function and how much they might cost.[78]

There are multiple ways to control smoke in stairwells, each with its own advantages and disadvantages. Smoke-control design strategies range from the simplest, most passive solution—having a stairway outside the building—to more complex active mechanical systems that can fit into tighter spaces inside a building. But more complex systems are more expensive and must be maintained regularly. The need for backup power is also a concern. In shorter buildings (for example, three-story single-stair buildings currently allowed by code across the U.S.), no smoke-control system is required. Although a deep investigation into the specifics of smoke control—cataloging the various approaches and their costs, benefits, and risks—is beyond the scope of this report, this section presents a general overview of a few options, as well as some of the risks of the current code with regard to smoke in stairwells.

One common solution allowed by code in Seattle and Honolulu, provided that certain design and safety criteria are met, is the exterior stairway. The stairway is placed outside the main structure, in the open air, so that smoke dissipates quickly into the atmosphere and is unlikely to threaten human life in the time it would take to descend the staircase. This option avoids the need for mechanical equipment and its maintenance. The exterior stairway, however, may not be appropriate for colder climates with snow and temperatures low enough for water to freeze, creating ice hazards.

New York City's code deals with smoke through a very old and simple solution: a skylight, window or similar opening at the top of the stairwell shaft (either above the roof line or in an exterior wall) that can be smashed by the fire department to ventilate smoke.[79] (See "Comparing U.S. and global single-stairway models" for more details. High-rise buildings over 75 feet in height do require a smokeproof enclosure or pressurized stairs.)[80] Although the skylight smoke-control option is inexpensive and has no mechanical or electronic parts that can fail, it relies on firefighters to smash the glass. It also poses risks to firefighters—in 2023, a Chicago firefighter fell through a skylight while he was trying to open ventilation holes and died.[81]

In Europe, several different smoke-control systems are used in single-stairway apartment buildings. Although each country maintains its own specific smoke-control requirements, some common elements are standardized in a continentwide set of standards known as EN 12101.[82] Allowable smoke-control systems include an advanced version of New York City's skylight, in which a motorized opening device can be activated by either a button or a smoke sensor, as well as more elaborate pressurization systems. The exact system used in each

situation depends on the country, the height of the building, and other characteristics, such as how well the fire department can access the building from the street.

In the United States, the International Building Code requires smoke-control systems in stairwells of high-rise buildings, which it calls smokeproof enclosures.[83] There are a few ways to meet this requirement, but one of the most common is through stairway pressurization, which uses a fan and fresh outdoor air to create positive pressure within the stairway that prevents the entry of smoke and other toxic gases during a fire.[84] In practice, stairway pressurization can be compromised if systems are not properly maintained or if too many doors are opened, leading to pressure loss. The smoke-control requirement involves a so-called rational analysis by an engineer to prove that the chosen system is adequate for the building and environment. (Outdoor air temperatures and wind speeds can affect the system's performance.) This analysis can be costly.[85]

Seattle allows a different approach where an exterior stairway is not practical. Its building code has a variation on the IBC's smokeproof enclosure requirement for single-stair buildings, instead allowing a stairway pressurization system that is more prescriptive than the IBC and does not require a rational analysis, making it less expensive to meet (discussed in "Comparing U.S. and global single-stairway models").[86]

The IBC does not necessarily require smoke control in stairwells for standard mid-rise buildings with two stairways, relying instead on the redundancy of two exits, provided other fire safety measures are in place. But this design has caused problems for firefighters. In Berkeley, California, a fire involving a plastic tray in an oven—a fire so small that it could be extinguished with a single gallon of water—produced so much smoke that, after firefighters compromised one stairway for hose operations, black smoke filled the stairwell, "with zero visibility."[87] Smoke generated by the increased use of plastics in building materials, furniture, and other home items has been a growing problem for decades and increases the importance of smoke-control systems.[88]

Combustible and noncombustible construction

A major long-standing difference between apartment buildings in the U.S. and Canada and the rest of the world has been the use of light wood construction materials. Fire safety experts have highlighted this difference in the debate about single-stairway apartment building design in the United States. Valerie Ziavras, with the National Fire Protection Association, wrote about this issue in 2022 for *NFPA Journal*, where she highlighted the widespread use of noncombustible building materials in Europe as a reason the European experience with single-stairway buildings might not be transferable to the United States.[89]

Deciphering intent in codes is often difficult because they are a group effort, but the greater use of wood in construction in Canada and the U.S. probably explains much of the divergence in construction codes and practice here from the rest of the world. As described above, one of the seminal events in the history of egress codes in the United States was a New York City tenement fire fed by a single unprotected wood stairway; the law requiring fire escapes on tenements that was enacted immediately after that fire included an exemption if noncombustible materials were used, suggesting a link in policymakers' minds between building materials that can burn and the need for a second way out.[90]

In the generations since those early rules linked building materials and egress, technology and practices have changed dramatically. Independent third party organizations now test assemblies like walls and floors, giving them time ratings that reflect how long they can withstand fire while still meeting certain predefined performance criteria.[91] The IBC allows most mid-rise apartments to meet its fire-resistance rating requirements in different ways, without necessarily requiring the use of noncombustible materials.[92] American architects have relied on this flexibility to build bigger and taller buildings with structural frames and partitions made of light wood, including the popular "five-over-one" apartment design (a first floor made of concrete, often used for parking or retail, with upper stories made of light wood-frame).[93] Light wood-framed residential-over-retail buildings in the U.S. are generally limited to five to eight total stories, depending on the jurisdiction. Above a mid-rise height, other building code requirements kick in; they can dramatically raise the cost of construction, such as by mandating the use of more costly noncombustible materials and a number of special high-rise fire protection features.[94]

Unique elements of U.S. and Canadian construction—from the heavy reliance on sprinklers to strict second-exit requirements—may stem from a history of light wood-frame construction, but codes today do not offer relief from these requirements if a developer builds in more fire-resistant materials such as concrete, steel, or mass timber. The single-stairway sections of the IBC, the Seattle Building Code, and the NFPA's codes all speak in terms of fire-resistance ratings, without regard to whether materials are combustible or noncombustible. (New York City's code does limit construction to noncombustible materials, with exceptions for interior millwork [doors, door frames, and window frames], finishes, non-load-bearing interior partitions, insulation, etc.[95] New York City's code was written before the U.S. construction industry's acceptance of mass timber. In a city that does not allow light wood-frame generally, that amounts to a ban on mass timber, even though it is fire-resistant.) It is beyond the scope of this report to determine whether this combustibility-agnostic approach is sound, but one study of fires from three Canadian provinces found no statistically significant

association between combustibility of construction and fire severity outcomes when smoke alarms and fire sprinklers were present.[96]

Compartmentation

In Valerie Ziavras's 2022 *NFPA Journal* article about single-stairway buildings, she notes another difference that might limit the relevance of European strategies in the U.S.: the use of greater compartmentation in apartment buildings in Europe.[97] In Europe, Ziavras writes, compartmentation is achieved by "dividing a building into sections using fire-resistant walls and floors [and noncombustible materials], to effectively contain any fire at its origin and limit the damage."[98]

Compartments are spaces that contain smoke and fire, surrounded by barriers like walls, floors, and doors (which are sometimes self-closing) that prevent the spread of fire and smoke.[99] In practice, a compartment might be an apartment or stairway shaft, with a requirement that the materials that form its boundaries are "rated" (designed and built to resist the spread of fire). Unlike active systems that suppress a fire, alert occupants, or control smoke, compartmentation is a passive strategy that limits the damage when fires start by protecting people and spaces more distant from the fire. Compartmentation is one of the oldest and most effective strategies for containing fire and smoke. It is a basic tenet of all building codes.[100]

Buildings are their own compartments, because they tend to have the most protection on the outside. Modern codes that allow single-stairway apartment buildings also increase compartmentation by limiting building size to reduce the spread of fire to nearby buildings. Thus, codes limit the number of stories in a building and its height as measured in feet or meters, as well as floor area, occupant load, number of units, and travel distances to exits.

At a finer level, there is also the issue of compartmentation of egress systems—whether each corridor is open to the corridors above and below, or whether the stairway is enclosed in its own shaft by doors on each story of the building. When the stairway is open throughout a building, smoke that escapes one apartment can contaminate the stairway and reach apartment doors on other floors. When the stairway is enclosed in its own shaft, smoke escaping from one apartment has more barriers until it reaches other floors and units.

All single-stair code sections in the United States that allow buildings up to six stories, as well as proposals to permit such heights elsewhere, require the stairway to be enclosed, thus protecting against the spread of smoke and fire between floors and the stairway. In Europe, on the other hand, enclosure often is not required, as rules offer designers a choice between clear firefighter access to upper stories from the outside and enclosure of the stairway (or

both). (See “Window rescues,” below.) Italy, for example, requires no stairway protection or enclosure up to 32 meters (105 feet), equivalent to about 10 stories in the United States (or nine in Italy, where taller ceilings are expected).[101] In Germany, model codes offer a choice between a window rescue and an enclosed, pressurized stairway for single-stairway buildings up to 22 meters (72 feet, around seven stories).[102] An exhaustive investigation into stair enclosure rules across the world is beyond the scope of this report, but floor plans shared on architectural websites show that unenclosed exit stairways are very common in mid-rise buildings across Europe.[103]

Finally, there is the issue of compartmentation within units. So-called open floor plans—one open space for a living room and kitchen, apartment front doors that open directly into these spaces, and bedrooms accessed directly from living rooms rather than through corridors with doors—are becoming popular around the world, but they are more common in some places than others.

The United States has been at the forefront of adopting open plan layouts, to the extent that in Europe a combined living room and kitchen is sometimes called an “American kitchen.” Italy, on the other hand, still tends to have more compartmentation within units. Whether provided for fire protection or cultural reasons (to contain smells within kitchens, for example, or to keep bathroom smells isolated), this compartmentation can contain the spread of fire and smoke.[104] In an open plan layout, there is typically only one door (to the bedroom) between a potential kitchen fire and a bedroom (or none, if the apartment is a studio). In a traditional Italian apartment, on the other hand, there are often three doors between a potential kitchen fire and a bedroom—a kitchen door, a door between the public and private areas of the apartment, and a bedroom door. (Sometimes in older, higher-end apartments, there is even a fourth door, if the kitchen sits within a service area of the apartment shared with a maid’s room.) European apartments are generally becoming more open, with less compartmentation (sometimes necessitating regulatory changes), but there may still be differences that could have ramifications for the number of stairway exits required for safety purposes.[105]

Window rescue

Some fire safety experts suggest that if taller single-stairway buildings are allowed in the United States, designs might allow for window rescues, which are not an expected part of fire rescue strategies in new mid-rise apartment buildings in the U.S.[106] Access to apartments from outside a building, through windows or balconies, is indeed a common requirement in Europe for single-stair buildings. However, both in Europe and the United States, this access is generally required instead of protecting stairways, not in addition to it.

In Europe, there is often an explicit option of either protecting a stairway or offering secondary access to firefighters through balconies or windows. The German model code, for example, offers the option of providing for window rescue or designing a pressurized, enclosed stairway for single-stairway buildings up to 22 meters (72 feet).[107] For small to mid-rise buildings in Italy (12 to 32 meters tall, or 40 to 105 feet), architects have the option of either protecting the stairway or offering access to firefighters' aerial apparatus, such as a truck's elevated platform or power-operated extension ladder, via at least one opening per floor.[108]

The few U.S. jurisdictions that allow four-to-six-story single-stairway buildings do not offer any specific window rescue compliance options, but instead opt for mandatory protection of the stairway. All require that the stairway in such buildings be enclosed above four stories; Seattle also requires interior stairways to be pressurized to prevent smoke infiltration.[109] The different approaches to single-stairway building design in Europe and the U.S.—facilitating window rescues versus protecting egress—also reflect broader differences in firefighting strategies: European fire departments emphasize rescues over fire suppression, and purchase equipment accordingly.[110]

New York City's building code does increase the allowable floor plate (from 2,000 to 2,500 square feet) for single-stairway buildings that include a street-facing window (or a window facing a yard with unobstructed street access) for potential rescue in each unit.[111] However, builders rarely use this option, relying instead on the code provision that allows up to six stories with 2,000 square feet of space on each floor and no requirement to provide street-facing window access. Because of the geometry of New York City lots and zoning regulations that allow floor plates deeper than those typically found in Europe, many modern single-stairway buildings in New York City have one unit in the front and one in the rear, with the rear unit having no street-facing windows.

Life safety threats other than fire

While fire is the most obvious risk to occupants of apartment buildings, some observers cite the risk of other events. At an ICC hearing on a proposal to raise the single-stairway height limit to six stories, one egress committee member said he "envision[s] a lot of problems" for police and medical responders without a second stairway.[112] Officials in Austin, Texas, listed "active shooter situations" among the non-fire reasons to be wary of taller single-stair buildings, as did an opposition statement from the National Association of State Fire Marshals.[113]

These non-fire justifications for a second exit in apartment buildings have not traditionally been a major topic of discussions about egress in multifamily building codes (unlike, say, guidelines related to the construction of schools, where mass shootings are an ever-present concern).[114] Modeling software and analysis focus on building fires; few tools assess the safety of apartment buildings against, say, active shooters.[115] The NFPA Life Safety Code states that its goal is to ensure a "reasonably safe" environment for occupants during a fire and comparable emergencies (defined as those "that can be mitigated using methods comparable to those used in case of fire"), meaning protection from hazardous materials and effectively moving people to a safe area in an emergency.[116]

In the event of an active shooter in a multifamily building, larger buildings would seem to be the greater risk: A typical new IBC-compliant building over three stories tall has redundant exits from each floor, but it is much larger than a single-stairway building, so it can also concentrate far more people in one place (for example, a roof deck on New Year's Eve, a shared lounge during a birthday party, or a lobby after somebody with malicious intent sets off a fire alarm). Single-stair buildings, in contrast, tend not to have large common spaces because there are fewer occupants to share them.

In preparing this report, researchers could not find any claims about or research on the need for multiple exits to accommodate medical emergencies prior to recent proposals for taller single-stairway buildings. Unlike fires or mass shootings, medical events such as falls or cardiac arrest happen to individuals, not large groups. Limited exits may pose an issue if multiple people suffer a medical emergency at once, slowing evacuation, but this problem scales with the ratio of occupants to stairs. In other words, limited exit capacity would be a much more likely problem in, say, a building with 10 stories, 200 apartments, and two stairways—an easy building to design to meet current codes—than in a building with six stories, four or fewer units per story, and one stairway (the limits under both Seattle and Honolulu's building code).

Building maintenance and fire department capability

Many concerns about single-stairway building fire safety relate to broader fire service and fire engineering concerns about apartment building fires. These concerns include the need to maintain active fire protection systems (sprinklers, fire alarms, public address systems, smoke-control systems, etc.); to provide adequate equipment, training, and staffing for fire departments; to keep stairways and corridors accessible and free of ignitable materials (strollers, e-bikes, trash, etc.); to have adequate water supply; and to collect and disseminate better data on the effectiveness of and tradeoffs between different safety measures and firefighting strategies.

Apartment buildings in the U.S. have gotten safer from a fire standpoint since 1980: There are fewer fires and lower fire fatality rates.[117] Meanwhile, single-family homes and duplexes that experience a fire have not gotten safer, in terms of fatalities, relative to 1980 rates.[118] Sprinklers—which are required in multifamily buildings, but not single-family homes or duplexes in most states—have made an impact. Buildings with sprinklers have lower fire death rates, lower firefighter and civilian injury rates, and lower property losses.[119] Smoke alarms, which are required in single-family homes and duplexes, have probably led to fewer small fires being reported.[120]

Maintaining adequate fire protection systems, providing adequate fire service, and educating residents about fire safety all contribute to the safety record of multifamily buildings, regardless of the number of stairways. Code enforcement (by multiple agencies) and swift rectification of issues also enhance safety and prevent fire fatalities. When buildings are not maintained or issues are not addressed, fatal fires can occur in any size building, regardless of the type of staircase or the number of exits.[121]

Throughout the United States, multifamily buildings tend to be larger than those built in the past, in large part because of the economics of building profitably while complying with land-use regulations and building codes.[122] Larger buildings mean more maintenance of fire protection systems, longer corridors for smoke spread, and greater risk of ignitable clutter in stairways and hallways.

In contrast, new single-stairway four-to-six-story buildings could be economically viable in denser urban areas, particularly on smaller lots where double-loaded corridor buildings aren't feasible, replacing vacant or underutilized small lots or single-family homes.[123] Their location in urban areas generally means they are served by a more robust fire department than in rural or outlying areas. Their smaller size, small floor plates, and short corridors mean fewer fire systems to maintain per building and less opportunity for ignitable clutter. Moreover, new single-stair four-to-six-story buildings must have sprinklers, fire-rated assemblies, and self-closing doors (along with enclosed and possibly noncombustible stairways, depending on the jurisdiction). If this type of apartment building replaces single-family units or duplexes—which generally do not have such features—the result is a higher degree of fire protection for residents.

Building the evidence base pertaining to safety

At present, there is no publicly available information that specifically addresses the life safety performance of four-to-six-story single-stairway buildings in the United States. Pew and the Center for Building in North America undertook original data collection and analysis to

examine the chance of fire-related death in such buildings in New York City, which has the greatest number of them in the country. This research identified just two fatal fires in modern single-stairway four-to-six-story buildings over a period of more than 11 years. Those fires resulted in three deaths, yielding a fire fatality rate similar to the fatality rate in other residential buildings in New York City during the same period. Researchers reviewed the details of both fires, based on available sources, and concluded that both appeared to be contained to the unit of origin, with no notable smoke or fire penetrating the single exit stairway. In other words, it appears as though none of the three deaths would have been prevented by a second stairway.

Researchers also reviewed every documented fire fatality in Seattle (which also allows single-stairway apartment buildings up to six stories) during that same period, from November 2012 through the end of 2022. This research identified one fire fatality in four-to-six-story single-stair buildings; it similarly did not appear to be related to the exit.

Honolulu fire fatalities were not examined because that city's ordinance is relatively new, and very few single-stairway four- to six-story buildings have been developed.

The following section summarizes the methodology used in this research and explores each fatal fire more deeply; looks at the fire departments in the three U.S. cities where single-stairway buildings taller than three stories are allowed; and reviews research from the Netherlands, which has extensively examined fire safety in both single-stairway and double-loaded corridor apartment buildings.

Fatal fires in single-stairway buildings in New York City

This research included five major steps:

1. **Identify case studies**: New York City has a large stock of modern, sprinklered single-stair buildings four to six stories in height. As the most populous city in the U.S., it also has a large absolute number of fatal fires, increasing the sample size for comparison. New York City fires also tend to be covered in multiple media outlets, which adds an additional data source for analysis.
2. **Source fatal fire data:** This research identified three data sources for fire deaths in New York City. The Fire Department of the City of New York (FDNY) periodically publishes an annual count of fire deaths, and additional deaths are reported by local news outlets.[124] The U.S. Fire Administration (USFA), a division of the Federal Emergency Management Agency (FEMA), maintains two sources of publicly available fire death records: the National Fire Incident Reporting System (NFIRS) and Home Fire Fatalities in

the News (USFA Media).[125] NFIRS is a voluntary reporting system for local fire departments; not all departments participate, and not every fire is reported.[126] USFA says 70% of all fire incidents in the country are recorded in NFIRS, but FDNY reporting of fatalities to NFIRS has historically lagged behind that estimate, and since the start of the COVID-19 pandemic, FDNY reporting of deaths to NFIRS has dropped further behind the national average.[127] The USFA supplements NFIRS data with its own media scan of fatal fires. Figure 7 shows that the data sources differ on the total number of fire deaths in New York City by year.

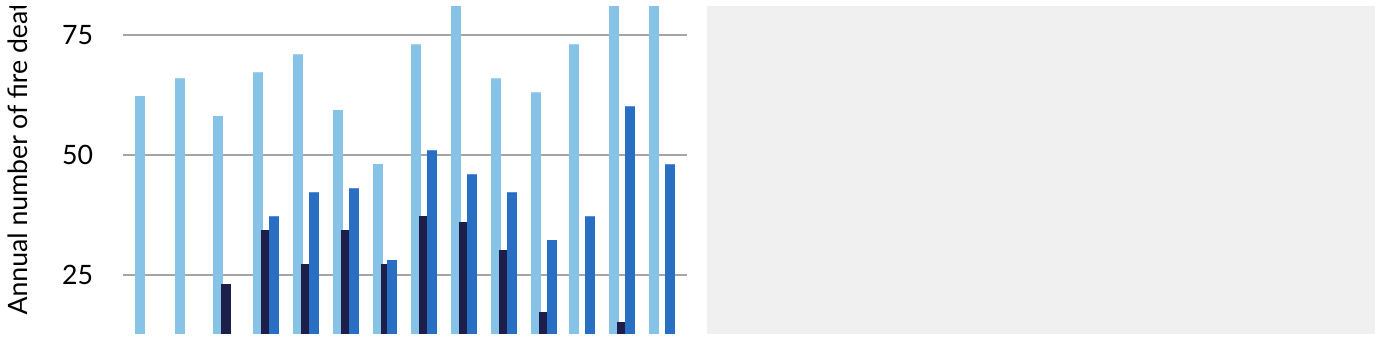
USFA Media publishes the most comprehensive publicly available data for New York City fires and fire deaths. (FDNY announces a total number of fire deaths but does not keep fire fatality records in a consolidated dataset that can be accessed.) NFIRS was used as a supplement to create the largest possible dataset. Even this approach is still probably an undercount relative to the true number of fire deaths in New York City.

The first USFA Media record of a fatal fire in New York City is on Nov. 12, 2012—the beginning date of this research. This review ends on March 21, 2024, when the research team began its analysis. Usable NFIRS data was available at the time of this report's writing only from 2012 through 2022.

Figure 7

Data Sources Differ on Total Number of Fire Deaths in New York City

FDNY's data is most comprehensive, but record-level information is not publicly available



Sources: National Fire Incident Reporting System, Home Fire Fatalities in the News; Fire Department of the City of New York, "Fire Commissioner Nigro Announces 5% Decrease in Fire Deaths for 2020," Jan. 5, 2021; Dean Balsamini, "Number of Fatalities from NYC Fires Jumped 16 Percent in 2021, Data Shows," Jan. 8, 2022; Keith J. Kelly, "Lithium Batteries Drive Fire Death Toll to 106 Across City in '23, Highest in 20 Years," Jan. 30, 2024

3. **Identify fatal fire location and details:** USFA Media data identifies deadly fires by city and date but does not provide an address. NFIRS data contains addresses. This research required address data for each fatal fire to determine whether it occurred in a single-

stairway building. Researchers manually reviewed archived media coverage (starting from the URLs provided in the USFA Media dataset and supplemented by web searches) to identify addresses for fatal fires in New York City available since USFA Media first began data collection.

Researchers combined manual USFA Media data collection with NFIRS data starting with 2012 and ending with 2022 (the most recent year NFIRS data was available). Researchers continued to search for fatal fires through March 21, 2024, using all USFA Media fires and conducting manual web searches to identify more. Fatal fires that were not already recorded in the USFA Media data or in NFIRS were added to the full dataset.

The final dataset contains 347 fatal residential fires that occurred in New York City between Nov. 21, 2012, and March 21, 2024. Of those fires, 169 were found only in the manual dataset (USFA Media) and through web searches but were not recorded in either NFIRS or USFA Media; 41 were listed only in NFIRS; and 137 were listed in both USFA Media and NFIRS. Addresses of buildings where fatal fires occurred were then entered into New York City's property lookup tool, called ZoLa, to obtain the parcel identification number (the BBL, for borough, block, and lot identifiers).[128]

4. **Determine whether the fatal fire occurred in a four-to-six-story single-stair building:** The most common type of newly constructed New York City single-stairway multifamily building allows up to six stories and 2,000 square feet per floor (since 1968). In 1999, New York City began requiring fire sprinklers (designed to the NFPA 13R standard) in new multifamily buildings, both within units and in common circulation areas. This report refers to new single-stairway multifamily buildings with sprinklers as "modern single-stairway buildings." New York City has an extensive land-use dataset called Primary Land Use Tax Lot Output, or PLUTO. Researchers merged fatal fires location data with residential buildings in PLUTO using BBL numbers.

   PLUTO does not contain direct information on the number of stairways in a building, but given the available fields and the simplicity of the building code's single-stair section as well as the city's zoning code, researchers were able to identify which apartment buildings contain a single stairway to a high degree of accuracy. The team found 4,440 modern single-stairway buildings between four and six stories using PLUTO. (See Table 1.)[129]

5. **Develop relevant comparison measurement:** Researchers compared the rate of fire fatalities in the identified four-to-six-story modern single-stairway buildings to the fire

death rate for all New York City residential buildings. The fatality rate was calculated by dividing the number of fire deaths by the city's years of experience with each building type during the study period (Nov. 12, 2012, to March 21, 2024). Years of experience is defined as the number of buildings of a given type multiplied by the average number of units per building multiplied by the average residents per unit citywide multiplied by the years during this analysis that the building existed (which is 12 unless the building was built since 2012).

This research identified two fatal fires, which claimed the lives of three civilians and no firefighters, in modern single-stairway four-to-six-story buildings (one death per 205,934 occupant-years). All other residential buildings in New York City had 465 deaths in 345 fatal fires (one death per 220,907 occupant years). The fire fatality rate for both types of building is close to five deaths per million years of experience. (See Table 1.) The very small difference between the rates is not statistically significant.

Table 1

New York City's Fire Death Rates Are the Same in Single-Stair Buildings as in Other Residential Buildings

Total fire fatalities and fatality rate, by building type, Nov. 12, 2012-March 21, 2024

	Single-stair 4-6 story	All other residential
Total fatal fires	2	345
Total fire deaths	3	465
Number of buildings	4,440	763,393
Total dwelling units	27,875	3,660,076
Residents per unit (citywide average)	2.43	
Occupant-years of experience	617,801	102,489,392
Fire death rate per occupant-years of experience	5 per million	5 per million

Note: The single-stair four-to-six-story building category includes New York City residential buildings that researchers believe have one stairway, because they were built

since 1968 (the onset of the single-stair allowance's 2,000 square feet option); have at least three units (to trigger the sprinkler requirement); have an average floor area of 2,000 square feet or less (the maximum for the most common single-stair allowance); are on a lot that according to zoning district should allow upper stories of not more than 2,000 square feet; and have four to six stories.

Difference in unrounded fire death rates not statistically significant according to Chi-squared test to compare incidence rate difference, with p-value = 0.9066

Sources: Primary Land Use Tax Lot Output (PLUTO), Blazer Database

All three fire deaths in modern single-stairway buildings appear to have occurred in the unit of origin, based on researchers' review of publicly available information and fire marshal reports. None of the incidents appears to have involved smoke or fire penetrating the single exit stairway (or even the common corridor). These facts suggest that a second stairway in these buildings would not have saved any lives. Those stories hint at a broader story of the fire threats that New York City still faces and the risk factors that contribute to fatal fires.

Fatal fire at 351 E. 54th St., Manhattan (March 3, 2021)

In 2001, a private developer completed construction of a six-story, 12-unit building at 351 E. 54th St., in the Midtown East section of Manhattan. The building contains two studio apartments on every floor, with one unit facing the front of the building and the other facing the rear. There is no fire truck access to the rear units, as is allowed by New York City's building code. The fully sprinklered building has a single stairway in an enclosed shaft and an elevator.

The developer sold the building to a nonprofit landlord, which used it to provide housing for "moderate-income senior citizens with incomes less than 80% of the area median income." Residents must be at least 62 years old.[130]

Police told reporters in at least two media outlets that a 73-year-old woman died in a fire in a first-floor apartment that broke out around 4:30 p.m. on March 3, 2021. The fire was under control by 5:15 p.m.[131] News reports did not mention any other deaths or injuries in the building. There was no mention of fire or smoke spreading to other floors. (One outlet reported flames only on the first floor.)[132] These characteristics are indicative of a fire that did not spread beyond the unit where it started. The number of stairways did not contribute to this ground-floor death. The incident was not recorded in NFIRS. At the time of this

report's publication, FDNY had not responded to a request to view the fire marshal's report by the Center for Building in North America.

Fatal fire at 71-02 162nd St., Queens (Dec. 15, 2021)

A private, for-profit developer completed a four-story, three-unit apartment building at 71-02 162nd St., in the Flushing section of Queens, in 2007. As built, it had a recreation space in the cellar; a garage and one two-room apartment on the ground floor; a four-room apartment on the second floor; and a two-level apartment that spanned the third and fourth floors, with a private terrace on the fourth floor. The neighborhood is one of the major centers of New York City's Chinese immigrant community, with residents who have a wide range of incomes, including many very-low-income retirees and new arrivals to the United States. The neighborhood also has many complaints of illegally converted dwelling units.[133]

According to multiple news accounts, a fire broke out on the fourth floor of the building in the early morning of Dec. 15, 2021. The fire killed a 75-year-old woman and her 81-year-old husband and injured one other adult.[134] Firefighters told the *New York Post* that they found the building in "an advanced fire condition," with a "heavy clutter condition."[135]

The full fire marshal report paints a picture of a deeply troubled building.[136] Constructed as a three-unit building, it had been divided into five apartments, with one illegal unit in the basement, and the upper unit subdivided into two apartments (one on the third floor and another on the fourth). Neither of the illegal units had a smoke detector, and the building had heating problems. One surviving witness who lived in the fourth-floor unit said the heat had been malfunctioning, and somebody (whose name is redacted in the report, but who appears to have been one of the victims) had a space heater plugged into an extension cord near the bed and had been sleeping with a lit tea candle nearby. Investigators also found a 20-pound tank of propane in the fourth-floor stairwell.

The fire marshal report states that the fire consumed multiple rooms of the fourth-floor apartment—the bedroom of origin, the living room, the kitchen, and a second bedroom. A surviving occupant said somebody ran downstairs and returned with a fire extinguisher but could not stay to fight the fire because of smoke and flames. Despite the high-risk conditions and advanced state of the fire by the time firefighters arrived, the NFIRS record shows that the fire did not damage any floors except the top one. Images from the scene also suggest that the fire did not advance to other floors. The NFIRS record states that a sprinkler system was present and that one sprinkler head operated. The fire marshal's report does not indicate where the two bodies were found, nor does it suggest that egress was an issue.

Fatal fires in single-stairway buildings in Seattle

Researchers repeated as much of the New York City analysis as the data in Seattle allowed. They downloaded USFA Media and NFIRS data for the same time periods and identified addresses as described above. In Seattle, however, the number of fatalities recorded in NFIRS was relatively small (42 fatalities in 36 fatal fires between 2012 and 2024[137])—small enough to manually examine records from the King County Department of Assessments database and determine whether the buildings in question most likely had a single stairway and were between four and six stories in height.[138]

There was just one fire death in what could plausibly be described as a four-to-six-story single-stairway building. The building, located at 4456 44th Ave. SW in West Seattle, contains six condominium dwelling units on three residential stories above a ground-floor parking garage. It is mostly a wood-frame structure. The building was completed in 1982, according to assessment records.

It is questionable whether the building should be considered a four-story building or a three-story one, given the slope of the site. Assessment records refer to it as a three-story building, while the NFIRS record refers to it as a four-story structure.[139] Imagery from the street shows that the main pedestrian entrance of the building is on the level of the first residential story, meaning that firefighters and occupants would be able to evacuate the building as if it were a three-story one. Despite the ambiguity over how the building should be classified, the details of the incident are presented below for the sake of completeness.

On May 14, 2021, a fire broke out in a condominium on the top story of the building. The fire injured a 79-year-old woman, who later died in the hospital from her injuries. The victim happened to be the mother-in-law of the Seattle City Council's then-president, M. Lorena González, who also lived in the building, two floors below.[140]

The NFIRS record of the incident states that there were no sprinklers in the building, but real estate listing photos show sprinklers in the garage (three stories below the fire), though not within the dwelling unit.[141] The fire department's Incident Report and Fire Investigator's Scene Report both mention sprinklers (in the latter case saying they were operational), without any further details.[142]

According to the Seattle Fire Department's Fire Investigator's Scene Report, a damaged electrical cord or wire ignited and spread to a couch in the victim's living room. The NFIRS record says the fire remained confined to the room of origin.[143] There were no injuries or fatalities other than the 79-year-old victim, and no other units were damaged by the fire. There is no indication in the NFIRS incident record, media reports, or three fire department

reports obtained by researchers that the presence of just one stairway was a factor in the fatality.

The complexity of the single-stairway section of the Seattle Building Code does not allow for an easy way to estimate the total number of single-stair buildings in the city using available property data. Without that information, it was impossible to calculate a fire fatality rate across all four-to-six-story single-stairway buildings in Seattle, and thus to compare the death rate in single-stairway buildings with other types of residential buildings in Seattle. Nor was it possible to compare Seattle's experience to the findings in this report about New York City.

Comparing fire departments in cities that do and do not allow four-to-six-story single-stairway buildings

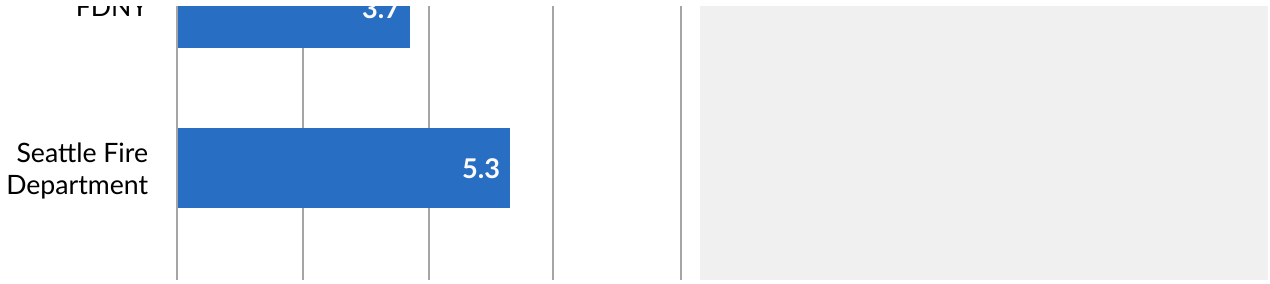
Are the fire departments in the three U.S. cities that currently allow four-to-six-story single-stairway residential buildings somehow unusual? And as a result, are they able to prevent fire deaths?

Researchers compared the Fire Department of the City of New York (FDNY), the Seattle Fire Department (SFD), and the Honolulu Fire Department (HFD) to the 100 municipal fire departments in the U.S. with the highest count of residential fires from 2012 to 2022, using the NFIRS database. These three fire departments do not differ materially on fire statistics from similar fire departments. FDNY has shorter average response times; SFD is close to the peer group average; and Honolulu has modestly longer average response times. (See Figure 9.) SFD has fewer deaths, fewer injuries, and somewhat higher financial losses per 1,000 fires than the national average. FDNY and HFD have higher-than-average rates of death and injury. (See Appendix Table A.1.)

Figure 8

Fire Departments in Cities That Allow Taller Single-Stair Buildings Have Response Times Similar to Peers

FDNY has lower response times than average, while Honolulu Fire Department has higher-than-average response times



Note: The top 100 fire departments averaged 3,530 residential structure fires from 2012 to 2022, while FDNY had 22,459, Seattle Fire Department had 1,704, and Honolulu Fire Department had 2,048.

Source: Pew calculations on Blazer database output of NFIRS data from 2012 to 2022. Average response times calculated as the difference between alarm time and fire department arrival time for fire incidents in single-family or multifamily residential structures, with response times below 60 minutes.

Research from the Netherlands

Researchers in the Netherlands have explored the safety of single-stairway buildings more thoroughly than researchers in the U.S. and many other countries. The Nederlands Instituut Publieke Veiligheid (NIPV, or the Netherlands Institute for Public Safety), the Instituut Fysieke Veiligheid at the Brandweeracademie (Institute for Physical Safety at the Fire Academy), and Nieman Raadgevende Ingenieurs (Nieman Consulting Engineers) have released a series of reports about safety in common Dutch multifamily dwellings. Their findings speak to some of the life safety questions about single-stairway buildings and larger, two-stair, double-loaded corridor buildings that U.S. and Canadian stakeholders have been debating. Methods used by Dutch researchers include statistical analyses of fire safety outcomes, interviews, smoke spread modeling, and field experiments.

The Dutch context differs from the American one. The Netherlands is far more densely populated than the U.S. and has a higher share of residents who live in multifamily buildings (36% vs. 26% in the U.S.).[144] Yet the Netherlands has one of the lowest rates of fire death in the world, at less than one-third that of the United States.[145] In a country with 17 million residents, the Netherlands has 30 to 40 residential deaths per year (37 residential fire deaths in 2016 and 33 in 2018), or 1.8 to 2.4 residential fire deaths per million.[146] The U.S. rate was 8.3 residential fire deaths per million in 2022, with 2,760 deaths among 333 million residents.[147]

Dutch building codes allow single-stair buildings taller than U.S. model code's three-story limit under certain conditions.[148] Given the shortage of research in the U.S., the Dutch experience offers a valuable addition to the discussion of single-stairway apartment buildings.[149]

In 2010, researchers at Nieman Consulting Engineers wrote about fire safety in a type of building known in the Netherlands as a *portiekwoning* (or *portiekwoningen* in the plural)—a single-stair typology, typically ranging from three to five stories tall.[150] Using government statistics, Nieman's researchers found that fire fatalities in *portiekwoningen* from 2001 through 2008 occurred at roughly the same rate as in the average Dutch dwelling.[151] However, researchers also found a greater number of injuries and a greater number of rescues from *portiekwoningen* than other building types.[152] Additionally, Nieman's researchers observed a greater relationship between fire brigade rescues and homes with one escape route than in other building types.[153] While the similar rates of fatalities indicate that fire brigade rescues act as a successful safety measure, Nieman's researchers caution that preventive safety measures should be evaluated separately from responsive safety measures (like the reliance on the fire brigade) and assert that a building must be sufficiently safe even without fire service intervention.[154]

More recent data from the Nederlands Institute for Public Safety also suggests that the rate of fire fatalities in *portiekwoningen* is similar to that of the average Dutch home. The NIPV report does not provide updated estimates of the number of single-stair buildings. However, based on the Netherlands' extremely low rate of fire fatalities, it is safe to conclude that these single-stairway buildings performed far better than the average U.S. home.[155] This report also found that a slightly lower share of fatal fire victims died in building circulation areas (such as stairs and corridors) in single-stairway *portiekwoningen* than in larger two-stair buildings with interior corridors.[156]

While single-stairway *portiekwoningen* are much safer than the average U.S. dwelling, data showed elevated rates of rescue in single-stairway buildings compared with other building types in the Netherlands.[157] The Dutch government was uncomfortable with this dependence on fire service rescue. Policymakers did not want to ban construction of these single-stairway buildings for reasons of housing affordability. The government commissioned Nieman to determine what rules could be added to bring these buildings to a higher level of self-reliant safety (allowing more people to evacuate by themselves). The report applied the U.S. National Institute of Standards and Technology's Consolidated Fire and Smoke Transport zone model to determine the effects of a fire breaking out in a ground-floor apartment in a five-story, 10-unit apartment building where units open directly into the lone exit stairwell. It concluded that the most cost-effective risk reduction could be achieved by requiring self-

closers on apartment doors (which had not been previously required) to reduce the risk of smoke spread if occupants of a burning apartment fled without closing the door. This single change would reduce the risk of having to be rescued in a fire by up to 76%, the Nieman study found.[158]

Dutch researchers have also examined the safety of buildings that more closely resemble standard IBC-compliant double-loaded corridor multifamily buildings. The Dutch fire service was concerned about an increase in the number of fires in residential buildings where the fire was limited but produced large amounts of smoke. Double-loaded corridor buildings were particularly vulnerable. Researchers at the Instituut Fysieke Veiligheid conducted 19 field experiments in a double-loaded corridor building to examine the spread of smoke within the building. The building contained a corridor 19 meters (62 feet) long, with five apartments on either side (for a total of 10 units). A synthetic couch containing flexible polyurethane foam was set on fire inside an apartment. (There were no sprinklers, either inside the apartment or in the corridor.)[159] The report concluded that smoke propagates horizontally more than vertically in a long corridor, and that "almost immediately" after the room of origin was opened to the corridor, "the possibility of escape for people in other residences [opening onto the corridor] is seriously impaired, since the corridor will fill up with smoke within a matter of seconds."[160]

Summary of the evidence for the safety of taller single-stairway buildings

This research finds that single-stairway four-to-six-story apartment buildings have fire performance at least as good as their two-stairway counterparts. This report is the first published study of the safety of taller single-stairway buildings in the United States. In New York City, the report found that the city's single-stair four-to-six-story apartments have approximately the same fire death rate as other residential structures. Research from the Netherlands suggests similar or better fire safety in single-stairway buildings compared with other Dutch dwelling types.

This report could not definitively determine why single-stairway four-to-six-story buildings appear to be as safe as other types of housing. One plausible reason is that they have modern safety measures characteristic of all new multifamily buildings: sprinklers, fire-rated walls (designed and built to slow the spread of fire), noncombustible stairs, self-closing doors, and smoke detectors. Another is that their limited heights, floor plates, and occupant load, and the proximity of all units to stairways, make them safer.

It is beyond the scope of this paper to conclude which reason, or combination of reasons, explains the safety performance of modern single-stairway buildings. But there is evidence to conclude that single-stairway buildings up to six stories, with modern fire safety measures in place, are as safe as other types of housing in the U.S.

Stephen Smith/Center for Building in North America

Comparing U.S. and global single-stairway models

U.S. models

The United States has numerous building codes, and an exhaustive investigation of all of them is beyond the scope of this research. At least six major jurisdictions have modified the International Building Code to allow single-stairway buildings taller than the IBC's three-story limit: New York City, Seattle, Honolulu, Puerto Rico, Georgia, and Vermont.

New York City has the largest—and oldest—stock of tall single-stairway buildings in the United States. Many of New York's early building codes and laws offered some relief from the second-stairway requirement for buildings under certain conditions. New York's modern single-stairway allowance was born in 1938, when the city adopted a building code that allowed a single stairway for apartment buildings that were not higher than 75 feet, as long as each upper floor was no more than 2,500 square feet in area and the occupancy ratio was no greater than one person per 50 square feet of floor area.[161] In 1968, the city banned fire

escapes in new construction, making the allowance for single-stairway buildings even more important for those seeking to build on small lots. That same year, New York also limited the exception to the two-stairway rule so that it could be applied to buildings of at most 60 feet in height and 2,000 square feet per floor.[162] This allowance was carried into future versions of New York's building code, and still applies today with roughly the same limits. (The code also contains other pathways for achieving compliance for new single-stair buildings, but the one described above is by far the most frequently used option.)[163]

In addition to limits on height and floor area, New York City's single-stair code section requires what are known as "passive" protection features, which prevent smoke from accumulating inside a building and limit the spread of fire. It requires type I or II construction—noncombustible materials like steel or concrete, with specific exceptions for non-load-bearing partitions, roofs, floor finishes, millwork (doors and their frames, window frames), insulation, etc.[164] The city's code has fewer requirements for "active" protection, such as mechanical systems to stop the spread of smoke or fire, which are found in the national model code. The New York City building code allows NFPA 13R sprinkler systems for up to six stories, including single-stairway buildings, whereas the IBC now limits these sprinklers to lower heights. NFPA 13R sprinkler systems have less extensive requirements. (For example, 13R does not require sprinklers in exterior closets, open outdoor areas that are not a means of egress, or attics, crawlspaces, and other nooks not intended for storage, occupancy, or with fuel-fired equipment.)[165] As a result, NFPA 13R sprinkler systems are potentially more affordable than the more powerful NFPA 13 sprinkler systems.[166] New York City does not require standpipes in single-stair apartment buildings, nor does it require special protection of elevator shafts against smoke spread, while the IBC often requires both in buildings of four or more stories.[167] To prevent the accumulation of smoke in stairways, New York requires a method of smoke ventilation such as a skylight at the top of each stairwell; in a fire, firefighters smash the glass, allowing smoke to escape.[168]

Seattle also has decades of experience allowing taller single-stairway buildings, albeit with a somewhat different fire protection philosophy. Older building codes in Seattle are less well documented than in New York City, but the single-stairway allowance dates to at least 1977. To allow the continued development of small lots where a requirement for a second stairway would be onerous, Seattle modified the model building code to allow single-stairway apartment buildings of unlimited height, as long as they had either an exterior stairway or a smokeproof tower (a stairway that vented to the outside or a lobby with a self-closing door). Seattle's code also imposed a limit of four units on each floor.[169] The single-stairway rules have been modified over the years and made stricter but still survive, with a cap of six

stories. Seattle now restricts floor area by limiting travel distances from exit stairway doors to apartment doors and to the farthest corners of apartments.[170]

Seattle requires several other fire protection measures in single-stairway buildings, featuring more active protection requirements and fewer passive ones than New York City. Seattle has a history of allowing wood in construction and does not limit single-stair buildings to noncombustible construction.[171] To compensate, Seattle requires more active features such as more robust NFPA 13 sprinkler systems; a mechanical pressurization system for smoke control in the stairway (or moving the stairway outside—a passive option); and a standpipe to supply firefighters with a dedicated water supply. Seattle's stairway pressurization requirements are specifically designed for low- and mid-rise buildings, with a prescriptive pathway that is easier and less expensive to design to than the performance-based smoke-control system required by the IBC and applied to high-rise buildings.[172]

Honolulu recently copied Seattle's single-stairway building code, probably as the result of land-use reform aimed at building more unsubsidized affordable housing.[173] Honolulu—a consolidated city-county comprising the entire island of Oahu, home to nearly two-thirds of Hawaii's population—incorporated Seattle's code section almost verbatim into its own code. Honolulu made two small changes: Stairways must be 48 inches wide, wider than the 36 or 44 inches (depending on the jurisdiction and building size) required in New York, Seattle, and the base model code. Developers are also limited to two single-stairway segments per building (two parts of a building that share a common wall, with no connection between them), not two stairways per lot (two or more separate buildings on the same land parcel).[174]

The states of Georgia and Vermont and the commonwealth of Puerto Rico also allow single-stairway buildings as tall as four stories. Puerto Rico modifies the IBC to allow four-story apartment buildings to be served by a single exit. Rather than amend the IBC rules, Georgia and Vermont adopt the egress provisions from the National Fire Protection Association's model life safety code, known as NFPA 101, an alternative to the IBC.[175] The NFPA rules allow single-stair apartment buildings to rise to four stories, with a limit of four apartments on each floor. NFPA 101 also limits travel distance from the exit stairway door to the door of each apartment to 35 feet.[176] In preparing this report, researchers could not identify any four-story, single-stair buildings in Vermont that were built in accordance with these rules. Some have been built in Georgia and Puerto Rico.[177]

The NFPA's current single-stair height limit dates to the 1991 version of the model code, when a committee raised it from three stories to four. In explaining the change, the committee's substantiation statement pointed to the low level of protection in most residential occupancies and a stalled decline in residential fire deaths. The committee also

highlighted the benefits of automatic sprinklers: “The elements of this new technology together with a new, less expensive sprinkler installation standard (NFPA 13R),” the NFPA Subcommittee on Residential Occupancies within the Committee on Safety to Life wrote, “make it practical to sprinkler multi-family occupancies. We must recognize this life safety benefit.”[178] It is unclear how the committee arrived at a four-story limit; however, it coincides with the height limit for NFPA 13R sprinkler installations.[179] Committee members may have been concerned about the cost of using more expensive NFPA 13 systems in relatively small buildings, rather than any technical or scientific basis (although Seattle’s experience with single-stair buildings suggests that NFPA 13 systems are not necessarily a barrier to economic feasibility, at least in a city with high rents and sale prices).

The differing approaches in the United States to taller single-stair buildings—especially in New York City compared with Seattle—reflect a broader debate among building code and fire officials about the relative merits of passive and active fire protection. The U.S., with its long tradition of light wood-frame construction and widespread sprinkler requirements, has generally prioritized active features. Outside the context of single-stair buildings, new apartment buildings in the U.S. and Canada allow very long common corridors to be shared by dozens of units on each floor. The rest of the world, on the other hand, typically builds in brick, stone, and concrete. Fire sprinkler requirements are relatively uncommon, even in new apartment buildings.[180] There is often greater compartmentation, particularly horizontally, with only a handful of apartments typically sharing each corridor, and other units located in different buildings, with thick barriers separating them.

Each fire protection philosophy has pluses and minuses. On the cost side, active systems allow for cheaper structural systems and partitions—light wood framing. But some construction costs are higher—sprinklers, fire alarm panels, elevator shaft smoke curtains, and the like. There are also significant ongoing maintenance and operational costs associated with testing, repairs, monitoring, and supervision. It takes more time and is more expensive to keep a fire sprinkler system in working order than a brick wall and a thick self-closing door.

On the life safety side, active systems in the U.S. and Canada offer layers of protection that are not typically available abroad. Sprinklers, in particular, afford greater protection for people who cannot escape a room where a fire has broken out. On the other hand, the less stringent requirements for compartmentation in large, two-stairway buildings mean that if sprinklers and containment measures fail, many more people on each floor are at risk from the spread of smoke within corridors.

The high cost of active systems also limits their implementation. The ICC’s International Residential Code (IRC), which regulates the construction of single- and two-family houses in

the United States, requires sprinklers. But policymakers in 48 out of 50 states have fully or partially eliminated this requirement because the high cost of sprinklers would further raise the price of building already-expensive new homes.[181]

Fire statistics are not comprehensively or consistently compiled across the world, making it difficult to adjudicate the debate about active and passive fire protection systems. High-income countries with the lowest fire death rates generally prefer passive protection: Switzerland, with just two fire deaths per million, has no height limit on single-stairway buildings and doesn't require sprinklers. Singapore, with one fire death per million, requires natural rather than mechanical stairway ventilation for its tall single-stairway buildings—which can be as high as 20 stories.[182] On the other hand, the United States' relatively high rate of fire fatalities (11 per million) is only slightly higher than fire death rates in Scandinavia, where codes rely more on passive protection strategies.[183]

Foreign models

Other countries use a broad range of approaches to single-stairway design in building codes. Among high-income countries, two patterns stand out: Most allow single-stairway buildings to be taller than in the U.S.—often, much taller—and most take a more passive approach to life safety features. (See Appendix Table A.2.) Sprinkler requirements for apartment buildings are rarer abroad (although they are becoming more common, particularly in English-speaking countries). Some European countries do require sprinklers for high-rise and, in a few cases, mid-rise apartment buildings.[184] An exhaustive review of structural materials is beyond the scope of this report, but countries in Europe and Asia may require sprinklers less often because they tend to use noncombustible steel and concrete rather than wood.

In preparing this report, researchers identified a number of high-income countries in Europe, Asia, and Oceania with clear rules about single-stair buildings in their codes. Table 2 lists seven representative countries, showing restrictions on maximum heights, distance from unit to stairwell, constraints on floor size or number of units, and other notable information. Appendix Table A.2 shows all 34 identified countries with single-stairway allowances in their building code.

Of the 34 building codes examined that have height restrictions, the median maximum height is 28 meters (92 feet, approximately eight or nine stories). Both are well above the U.S. maximum height of three stories and the New York City, Seattle, and Honolulu maximum height of six stories.

Table 2

Code Comparisons for Selected Countries That Allow Single-Stair Designs Taller Than Three Stories

Italy, Ireland, Singapore Allow Single-Stairway Apartments of 20+ Stories, U.K. and Australia of 7 and 8

Location	Height maximum for single-stair (meters, feet)	Height maximum for single-stair (stories)	Distance from stairwell (Orange if from farthest location. Green if from door.)	Horizontal constraints	Additional details
Italy	80m (262 ft) (measured to the bottom of the topmost opening on the top inhabitable story)	26 stories		500-600 sq. m. per story, depending on level of stairway protection (5,381-6,458 sq. ft.)	
Ireland	60m (197 ft)	20 stories	Max distance of 45m if unsprinklered and 60m if sprinklered	50 people per story (e.g., 150 or 200 sq. ft. per occupant)	Requires sprinklers in all apartment buildings over 15m.
Singapore	60m (197 ft)	20 stories	15m to exit	4 apartments per story	Approach to exit staircase must be through a cross-ventilated corridor or lobby in order to achieve 60m height. Ventilation openings must be at least 2m wide

					and 1.2 m tall.
Australia	25m (82 ft) (measured to top floor level on the highest story)	8 stories	6m to exit		If over 3 stories (4 if sprinklered), exit stairs must be fire-isolated.
United Kingdom	18m (59 ft) (measured to top of floor level on the highest story)	7 stories	7.5m to exit	60 people per story	Sprinklers required if top floor level is more than 11m above ground level (five stories and higher).
Seattle	20m (66 ft)	6 stories	125 feet	Occupant load (number of persons for which a means of egress is designed) is 20, working out to 4,000 sq. ft.	
United States	10m (32 ft)	3 stories (aside from select jurisdictions)		Maximum of 4 dwelling units per story (for buildings over three stories)	

Note: United Kingdom revised maximum height in July 2023 from no restrictions to 18 meters.

Sources: Technical Fire Prevention Standards, 2015; Technical Guidance Document B, 2024; Fire Code 2023, 2023; National Construction Code, 2022; Fire Safety: Approved Document B, 2024 Ella Jessel, *Gove Mandates Two Staircases for All New High-Rise Housing*

over 18m, July 25, 2023; 2021 International Building Code (IBC), 2021; Seattle Building Code, 2018 Seattle Department of Construction & Inspections, "Chapter 10: Means of Egress," 2018

What a model single-stairway building code section would look like

Based on a review of single-stair rules from the United States and other countries, the following features stand out as typical:

Mid-rise height limits. Height limits for single-stair buildings around the world differ, but more conservative jurisdictions tend to align them with the reach of firefighters from the ground, with the exact height depending on equipment availability. In the U.S., New York City, Seattle, and Honolulu limit heights to six stories. A more consistent approach might align single-stairway height limits to the definition of a high-rise building in the International Building Code, which is triggered once a building's highest occupied floor level exceeds 75 feet from the lowest level of fire department vehicle access (in practice, around eight stories). The latest published commentary to the IBC says, "The basis of the measurement is analyzing the capability of fighting a fire and rescuing occupants from outside the building. Once past a height of 75 feet above ground level, ground-based firefighting will not be sufficient."[185] Many requirements are triggered once a building reaches this definition of a high-rise; a requirement for a second exit stairway could be among them.

Limited floor sizes. Every jurisdiction examined for this report limits the size of floors served by a single stairway. Different codes frame their restrictions in varying ways: 1) direct limits on floor area or indirect limits (limits on occupant load, which translate into an area limit); 2) restrictions on travel distances (from the most distant corner of dwellings to the exit and/or from the dwelling unit door to the exit door); or 3) limits on the number of dwelling units per floor. Travel distances and floor areas are the most consistent and objective parameters to use, because unit sizes can vary widely. Seattle's limits—four units per story, 125 feet from any point within a unit to the exit, and 20 feet from dwelling unit doors to the exit stairway—are conservative but roughly in line with global norms.

Stairway protection. To minimize the need for window rescues, stairway protection is the simplest and most cost-effective option. U.S. stairways already tend to have more fire protection features than in Europe, such as sprinklers and standpipes. These requirements could be maintained, along with other standard features like stairway compartmentation and self-closing doors. Protected stairways can also feature smoke-control systems, either to

prevent smoke from entering or to ventilate the stairway if it does. New York City's requirement for a skylight is a particularly simple and easy-to-maintain option. Seattle's special single-stairway pressurization code requirements, which are intended to prevent smoke from entering the stairwell, offer another option. The European EN 12101 standard offers other, more standardized versions of these two systems, with Part 2 describing skylights and windows in the stairway that open automatically upon smoke detection or manually with the push of buttons. Part 6 describes a pressurization system.[186]

Construction type. Scientific approaches to rating materials according to fire resistance suggest that a variety of materials and construction techniques could be effective in new single-stair code sections. Seattle's fire-resistance rating requirement offers one path forward and could be adjusted depending on material and construction type.[187] If fire safety experts decide that a new code should require noncombustible materials, as a compromise the new code might require that only the stairway be built of noncombustible materials.

The multifamily model code development process in the U.S. and Canada is extremely conservative. It will take years to develop rules for single-stairway buildings up to six stories—if they are ever allowed. But affordability concerns may continue to lead state and local policymakers to write their own rules allowing taller buildings to accommodate development on small lots, with more family-sized units. Outside the U.S. and Canada, single-stairway buildings much taller than six stories are often permitted; foreign countries offer plenty of examples of code sections to accommodate buildings above six stories. Another approach would be to allow two sets of stairs in an interlocking configuration. However, this design, which remains common in Canada and New York City (where they are called scissor stairs), is more costly than single-stair construction.

Single-stairway proposals have bipartisan support in some U.S. cities and states

As of fall 2024, single-stairway building code amendments have recently been enacted or are being considered in more than a dozen U.S. cities and states. (See Table 3.) Legislation has been moving quickly, and at least eight states have enacted some form of single-stairway bill since 2022. Connecticut, for example, enacted legislation to develop code language for single-stair buildings above the state's current IBC three-story limit, provided that safety measures are in place.[188] Tennessee enacted enabling legislation in 2024, allowing cities and counties to adopt single-stair ordinances.[189] So far, Knoxville and Jackson, Tennessee, have adopted such ordinances, and Nashville/Davidson County, a consolidated city-county government, is considering one.[190] At least six other states have enacted bills to study or

consider the issue. In California, a new law requires the state fire marshal to study code standards for single-stairway apartment buildings above three stories.[191] New York state's budget bill directs the Fire Prevention and Building Code Council to study the single exit code sections in New York City (which has its own building code) and other jurisdictions where taller single-stairway residential buildings are permitted to determine whether something similar might be appropriate for the state's code.[192] Minnesota, Oregon, Pennsylvania, Virginia, and Washington state have all enacted bills directing advisory groups to examine and make recommendations for single-stairway building codes up to six stories or 75 feet.[193] Also in Minnesota, the state technical advisory group has voted to recommend a code change to raise the single-stairway residential building height limit to four stories; this recommendation will be reviewed for adoption in the state's 2026 building code.[194] Lawmakers in Colorado, Pennsylvania, and Rhode Island have proposed building code amendments to allow single-stairway residential buildings up to five or six stories.[195]

Cities have also acted on their own. Austin, Texas, adopted a resolution to study single-stairway buildings.[196] A bill was introduced in New York City that would potentially double the allowable floor area for single-stairway buildings from 2,000 to 4,000 square feet.[197]

Code change proposals have also advanced in more traditional code development forums, sometimes explicitly to head off legislative intervention. In October 2024, the IBC's Means of Egress Code Committee approved a compromise proposal to allow single-stair buildings as tall as four stories, with up to four units and 4,000 square feet of floor space per story, threading the needle between the three-story status quo and the original six-story proposal. Proponents of a compromise and committee members cited legislative intervention as a reason to make an adjustment to the status quo. If it survives the rest of the code development process, this change will make it into the 2027 edition of the IBC, and eventually filter down to jurisdictions across the country.

The building safety community has noted the unusual speed with which these long-standing codes have been changed by legislation.[198] Cities and states are acting quickly in response to the nationwide housing shortage, rising rents, and rising sale prices—searching for any lever that might increase supply, including of four-to-six-story apartment buildings. These rapid changes stand in contrast to the normal pace of the code development process, which often prioritizes consensus and requires many attempts at change over a long time.

Table 3

16 Cities and States Have Acted on Single-Stair Buildings in the Past Two Years

11 jurisdictions have enacted single-stair legislation, and 5 more have proposed it as of fall 2024. Summaries are taken verbatim from original sources.

State/City	Single-Stairway Legislation	Enacted/Proposed
Austin	City council, as part of its 2024 building code update, adopted a resolution to examine single-stair reform.	Enacted
California	AB 835: Requires the state fire marshal to research standards for single-stairway buildings with more than two dwelling units and above three stories.	Enacted
Connecticut	HB 5524: Directs agencies to allow single-stairway buildings above the current IBC limit (three stories) with safety measures in place.	Enacted
Jackson, Tennessee	After Tennessee enacted HB 2925/SB 2834, the city council adopted an ordinance on Dec. 3, 2024, to change building code to allow single-stairway residential buildings up to 6 stories with no more than 4 units per story.	Enacted
Knoxville[199]	After Tennessee enacted HB 2925/SB 2834, the city council enacted an ordinance to change building code to allow single-stairway residential buildings up to 6 stories with no more than 4 units per story, effective Jan. 1, 2024.	Enacted
Minnesota	HF 5242: Directs the Department of Labor and Industry to study allowing single-stair apartment buildings above three stories and up to 75 feet tall. The state technical advisory group also voted to recommend a code change to raise the single-stair height limit to four stories. This recommendation will be reviewed for adoption in the 2026 state building code.	Enacted
New York state[200]	S8306C: Directs the Fire Prevention and Building Code Council to study and adopt building codes for single-stairway buildings up to six stories in New York City and other jurisdictions where single-stairway buildings are permitted. Study is due July 1, 2025.	Enacted
Oregon	HB 3395: Asks the Department of Consumer and Business Services to review and consider adopting	Enacted

	single-stair building codes in alignment with those adopted in Seattle by Oct. 1, 2025.	
Tennessee	HB 2925/SB 2834: Enables cities and counties to allow single-stairway buildings up to six stories.	Enacted
Virginia	SB 195 and HB 368: Direct the Board of Housing and Community Development to assemble a stakeholder advisory group that will evaluate and recommend modifications to the state's building codes to allow single-stairway residential buildings up to six stories.	Enacted
Washington	SB 5491: Directs the state building code council to assemble a technical advisory group to recommend building code modifications that would allow single stairways for multifamily residential buildings up to six stories.	Enacted
Colorado	HB 24-1239: Would require municipalities and counties to amend building codes to allow up to five stories in a multifamily building served by a single stairway. Would also require the Department of Local Affairs to provide technical assistance to local governments to aid transition.	Proposed
Nashville and Davidson County	BL2024-181: Would allow certain single-stair residential buildings up to six stories.	Proposed
New York City	Int 0974-2022: Would allow a single stairway in new residential buildings up to six stories to have a floor plate of 4,000 square feet, double the current 2,000-square-foot limit.	Proposed
Pennsylvania	HB 1988: Would establish a technical advisory committee to recommend modifications to the state's building code that would allow single stairways in multifamily buildings up to six stories. Bill was presented as part of a larger housing affordability bill package.	Proposed
Rhode Island	H7893 and S2761: Would direct the state fire marshal and state building commissioner to develop comprehensive recommendations for standards that enable a single stairway to serve multifamily buildings up to six stories.	Proposed

Sources: Center for Building in North America, Single-Stair Reform Efforts Across North America; Resolution No. 20240502-094, Austin City Council, 2024; California Assembly Bill 835, 2023; An Act Authorizing and Adjusting Bonds of the State and Concerning Provisions Related to State and Municipal Tax Administration, General Government and School Building Projects, Connecticut, 2024; TN City of Jackson, City of Jackson, TN City Council Approves Single Stair Housing Ordinance, Dec. 3, 2024; Tennessee City Council of Knoxville, Part II—Code of Ordinances; Chapter 6 Buildings and Building Regulations, Tennessee, 2024; Minnesota HF 5242, 2024; New York Senate Bill S6573, 2023; New York Assembly Bill A7322, 2023; Oregon Senate Bill S8306c, S8306C (2024); Oregon House Bill 3395, 2023; Tennessee HB 2925, 2024; Tennessee SB 2834, 2024; Virginia SB 195 Uniform Statewide Building Code, 2024; Virginia HB 368 Uniform Statewide Building Code, 2024; Washington SB 5491, 2024; Colorado House Bill 24-1239, 2024; Metropolitan Government of Nashville & Davidson County BL 2024-181; New York City, Int. 0794-2022, 2022; Pennsylvania House Bill 1988, 2024; Rhode Island H 7893, 2024; S 2761, 2024; TN City of Jackson, City of Jackson, TN City Council Approves Single Stair Housing Ordinance, Dec. 3, 2024

Conclusion

Single-stairway, four-to-six-story apartment buildings are one promising way to provide much-needed new housing in U.S. cities and towns of all sizes. States such as Connecticut and Tennessee have recently enacted legislation to allow such buildings. States such as Virginia and Minnesota are studying the issue.

Single-stairway four-to-six-story buildings have the potential to increase multifamily housing supply and decrease construction costs. They have design and ventilation benefits, and they would work well for infill development on small lots in cities that don’t have a lot of land for development. This report’s first-ever analysis of 347 fires involving 468 deaths over a 12-year period in New York City demonstrated that fire fatality rates were no higher in four-to-six-story single-stair buildings than in other types of residential buildings in New York. Dutch research confirms that similarly sized single-stairway buildings are at least as safe as dual-stairway buildings. Many countries with lower rates of fire deaths than the U.S. allow single-stairway apartment buildings six stories and higher.

Specifically, single-stairway buildings are at least as safe as dual-staircase buildings when they are constructed with modern fire-safe materials and systems, such as sprinklers, smoke detectors, and fire-rated assemblies; are limited in height (high-rise buildings would continue

to have two staircases); have a limited floor plate, with restrictions on total floor area, unit count, or travel distances to exits; and have a protected stairway, including self-closing doors and a smoke-control system.

Three U.S. cities already allow apartment buildings up to six stories to be served by a single stairway. Two states and Puerto Rico allow single-stairway buildings up to four stories, and eight more have enacted laws that either legalize single-stair buildings up to six stories or call for research on raising height limits. And the International Building Code is moving toward prescriptive language to allow up to four stories. Jurisdictions that are considering changes could learn from these domestic experiences and code sections, and from jurisdictions abroad, where most mid-rise apartment buildings (and many high-rises) have only a single exit stairway. A conservative approach might limit single-stairway buildings to mid-rise heights; limit floor area or unit counts as well as travel distances; protect stairways and exits through existing requirements for sprinklers, standpipes, enclosure, and compartmentation; add new requirements for stairway smoke-control systems; and restrict stairways to noncombustible materials.

The suggested model code provisions in this report address many of the typical concerns about the safety of single-stairway four-to-six-story apartment buildings. Many experts have called for additional research. This report provides one method: comparing fire fatalities in single-stairway and other buildings within a jurisdiction. It might be difficult, however, to take this approach further. Fire data quality varies greatly: NFIRS data is incomplete; the USFA's media accounts require intensive manual effort to identify buildings and probably degrade in quality outside major media markets; and few jurisdictions have property data as good as New York City's. In Seattle and Honolulu, identifying specific single-stairway buildings is difficult. Some stakeholders have called for extensive fire simulation and modeling. Research from the Netherlands shows that buildings with a double-loaded corridor and two stairways may have issues with smoke propagation, especially when burning plastic is involved. But Dutch simulations found that single-stair buildings with self-closing doors can perform quite well. Similar simulations and experiments can be done in the U.S., but they can be expensive, especially if a wide range of scenarios are modeled.

Ultimately, there is a tradeoff in the regulatory process between cost and safety of any type of building. Cost determines how many buildings can be built and of what size. New code provisions are not retroactive—they do nothing to improve existing buildings. Adding safety provisions will often increase construction costs and may render some projects unviable for financial or spatial reasons. As a result, requirements that discourage new building may have a paradoxical effect on fire safety, as people instead continue to live in older buildings that are more vulnerable to fire risk, because they were usually built without modern fire-rated

materials, compartmentation, and active fire protection features. Revising construction codes to allow for single stairways in four-to-six-story apartment buildings should prioritize life safety by including relevant active and passive fire protection strategies. The experience of New York City indicates that safety, housing supply, and affordability can all be improved simultaneously by enabling single-stair construction with proven fire safety measures.

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Appendix A: Data tables

Table A.1.

Average Statistics for Residential Fires, 2012-22

	Deaths per 1,000 fires	Injuries per 1,000 fires	$ loss per fire
Top 100 city fire departments	7.2	41.6	$21,676
New York City Fire Department	9.6	315.0	No data reported in NFIRS
Seattle Fire Department	6.6	31.6	$22,471
Honolulu Fire Department	12.3	55.2	$108,790

Source: Pew calculations on Blazer database output of NFIRS data from 2012 to 2022.

Table A.2.

Single-Stairway Building Codes in 34 Countries, Listed by Maximum Height

Location	Height maximum for single-stair		Distance from stairwell (orange if from farthest location; green if from door)	Horizontal constraints
South Korea	No maximum height limit		30m	4 dwelling units per story and 300 sq. m. per story
Switzerland	No maximum height limit		35m travel distance to exit	900 sq. m. max per story and a 100-occupant-per-floor maximum
Austria	90m (295 ft)	30 stories		
Italy	80m (262 ft)	26.7 stories		500 sq. m. per story
Brazil: São Paulo	80m (262 ft) for apartment buildings. 36m (118 ft) for all other buildings.	26.7 stories for apartment buildings. 12 stories for all other buildings.		
Brazil: Rio de Janeiro	75m (246 ft)	25 stories		
Ireland	60m (196 ft)	20 stories	Max distance of 45m if unsprinklered and 60m if sprinklered	50 people per story
Germany	60m (196 ft)	20 stories		
Singapore	60m (196 ft)	20 stories	15m to exit	4 apartments per story

China	54m (177 ft)	18 stories	15m to exit. 10m to exit if over 10 stories	650 sq. m. per story
Finland	52m (170 ft)	17.3 stories	30m	
France	50m (164 ft)	16.7 stories		
Sweden	48m (157 ft)	16 stories		50 people per story
Denmark	45m (147 ft)	15 stories		4 units per story
Bangladesh	33m (108 ft) or 10 stories	33m (108 ft) or 10 stories	23m to exit (only in Dhaka though often followed elsewhere)	50 people per floor or 900 sq. m. 4 dwelling units (only in Dhaka though often followed elsewhere)
Iran	30m (98 ft) or 6 stories	30m (98 ft) or 6 stories		3 units per floor
Israel	29m (95 ft)	9.7 stories	30m travel to exit	30 people per floor if over 13m tall
Romania	28m (92 ft)	9.3 stories		
Spain	28m (92 ft)	9.3 stories		500 people per story
Portugal	28m (92 ft)	9.3 stories	15m travel distance to exit	
Poland	25m (82 ft) or 9 stories above grade	25m or 9 stories above grade		750 sq. m. per story
New Zealand	25m (82 ft) if sprinklered	8.3 stories if sprinklered	40m with smoke detectors, or 30m without smoke detectors	
Australia	25m (82 ft)	8.3 stories		

Belgium	25m (82 ft)	8.3 stories	30m	50 people per fire compartment
Norway	24m (79 ft)	8 stories	Maximum travel distance of 15m from unit to exit stair	
Turkey	21.5m (71 ft)	7.2 stories		
Scotland	18m (59 ft)	6 stories		
UK	18m (59 ft)	6 stories	Max 9m within the suite to the suite door, and max 7.5m from the suite door to the exit stair door	60 people per story
Canada: British Columbia	18m (59 ft) above ground	6 stories	25m from anywhere in the unit to exit and 6m from unit to exit	24 people per story
Kenya	6 stories (uppermost story not >17m (56 ft) above grade)	6 stories (uppermost story not >17m above grade)		
Hong Kong	6 stories or 17m (56 ft)	6 stories or 17m (56 ft)		
Netherlands	15m (49 ft)	5 stories		
UAE	15m (49 ft) (if also automatic sprinkler system)	5 stories (if also automatic sprinkler system)		500 sq m per story and 4 units per story
India	15m (49 ft)	5 stories		500 sq m per story
Mexico: Mexico City	15m (49 ft)	5 stories		

United States	9m (30 ft)	3 stories (aside from select jurisdictions)	Maximum of 4 dwelling units per story
South Africa	9m (30 ft)	3 stories	
Saudi Arabia	9m (30 ft)	3 stories	
Canada (excluding British Columbia)		2 stories for apartment buildings	45m (sprinklered), 30m otherwise

Sources: Conrad Speckert, “The Second Egress: Building a Code Change—Jurisdictions”; Robert Heikkila, “Single Egress Stair Building Designs: Policy and Technical Options Report British Columbia,” 2024

Appendix B: Methodology

New York City

Researchers downloaded publicly available fatal fire data for New York City from two sources: (1) USFA Home Fire Fatalities in the News (USFA Media) (https://apps.usfa.fema.gov/civilian-fatalities/) for time it was available (Nov. 1, 2012, which begins the dataset, to March 21, 2024, when the research began); and (2) USFA’s NFIRS database (https://www.fema.gov/about/openfema/data-sets/fema-usfa-nfirs-annual-data) for when it was available (2012-22) for the Fire Department of the City of New York (FDNY). The Center for Building in North America created a database, with the fire loss datasets (USFA Media accounts and NFIRS) linked to New York City’s property dataset (PLUTO) through the city’s address geocoder. Of the 347 fatal fires in residential structures during this 12-year period, 178 were in NFIRS and contained address information.

For the data from USFA Media that was not contained in NFIRS, researchers manually sourced addresses from news media mentions supplied in the source. For fires where media did not mention addresses, researchers located additional news articles, television clips, and any other media sources that could be found based on the fire date, street name, and other relevant identifiers, until an address was identified. During these searches, researchers found a small number of fatal fires that were not reported in either USFA Media or in NFIRS. Researchers found addresses for these fires and added them to the dataset.

To identify single-stairway buildings, researchers used variables from PLUTO: number of units in the building, year of construction, square footage, use, and number of stories. With this information, researchers identified the four-to-six-story residential buildings that were likely to have a single staircase and fire sprinklers because they fit within the specific restrictions of New York City's modern single-stair building code section. The requirements are:

- Four to six stories tall.
- Average floor area at or below 2,000 square feet (imputed through built and zoned characteristics).
- Built after 1968 (the year the 2,000-square-foot option for single-stairway buildings took effect). At least three dwelling units (New York City's trigger for a sprinkler requirement).

In total, this research identified 4,440 buildings that fit these requirements. Among those, two had fatal fires. The rest of New York City's 762,393 residential buildings had 345 fatal fires.

Seattle

To identify fatal fires in Seattle, researchers downloaded fatal fire data from USFA Media and USFA's NFIRS database for the Seattle Fire Department, using a similar period as with New York City, but with the final date for USFA Media being Sept. 18, 2024, when this Seattle research began.

Researchers entered the addresses of those fires into the King County, Washington, parcel database (https://gismaps.kingcounty.gov/parcelviewer2/) to identify the year of construction, number of stories, area, and number of units. Of the 36 fatal fires that occurred in Seattle during the study period (with 42 deaths), only one may have occurred in a modern four-to-six-story building with one staircase.

Seattle's single-stairway building code section is, however, more complex than New York City's. As a result, there was no way to systematically determine the total number of single-stair buildings from parcel data or any other available sources: If the same assumptions as for New York were used, there would be a risk of miscoding a double-stair building as a single-stair building. It was impossible to calculate reliable fire fatality rates for modern single-stairway buildings in Seattle. The analysis of Seattle in this report is thus limited to buildings that had a recorded fatal fire.

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REPORT

February 27, 2025

Projects: Housing Policy

Topics: Infrastructure & U.S. State Policy

Experts: Alex Horowitz

Places: Hawaii, Honolulu, New York, New York City & Washington

RELATED EXPERTS

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Thank you, Chair Gere, Chair Curry and members of the joint committee for the opportunity to testify today. I'm Linlin Liang, a principal associate with Housing Policy Initiative at The Pew Charitable Trusts.

Pew conducts research on regulatory barriers to home construction and potential policy solutions. Most recently, Pew published a first-of-its-kind study examining the costs, benefits and safety of 4-6 story single-stairway buildings, a housing type that has been limited by building codes in most cities and states across the U.S. (See Appendix).

Single-stairway 4-6 story buildings have multiple benefits compared to large apartment buildings that require two staircases:

·They are easier to develop on smaller pieces of land or in infill lots, an important consideration for Maine's cities, suburbs, and towns.
·They fit well into existing neighborhoods and above single storefronts. They can add much needed housing and help revitalize historic main streets.
·They cost less to build. Removing the second staircase can save about 6-13% off construction costs for the same size building.
·Single-stairway saves about 7% of total building space, which can be used toward larger units and designed with families in mind. Other benefits of single-stairway buildings include better ventilation and more natural light.

Yet, single-stairway apartment buildings are not allowed in most U.S. cities because there has never been up-to-date information on their fire safety. Our new research fills this gap.

Three major U.S. cities have allowed modern 4-6 story single-stairway buildings for some time: New York City, Seattle, and Honolulu. Pew found that overall, fire death rates in single-story buildings in these cities were indistinguishable from those in other multifamily buildings. For example, in New York City, which has 4,440 modern single-stairway buildings, the overall rate of fire deaths since 2012 was the same as in other residential buildings.

Detailed data from New York City and Seattle also allowed us to look at factors that contributed to fire deaths in those cities. We examined every fire-related death in New York City and Seattle's modern single-stairway buildings from 2012 to 2024, and none of those were related to the lack of a second stairway– they all occurred in units.

In general, modern multi-family buildings built after 2000 also have better fire safety outcomes than single-family homes. Part of the reason is that these buildings have additional safety features like sprinklers, self-closing doors, fire-rated walls, and enclosed stairways. This is true in Maine as well.

We coded every residential fire death in Maine from 2021 to April 2025 for which public data is available. Modern multi-family structures were the safest. Single-family houses make up 80% of Maine housing stock but had 90% of fire deaths. Multifamily buildings of all ages make up 20% of the housing stock and had 10% of fire deaths. Modern, multi-family homes built since 2000 are 3% of Maine's housing stock but had 0% of fire deaths.

Modern single-stair buildings would have the same safety features of other modern multi-family housing and would be safer than the single-family homes that comprise 80% of Maine's current housing stock. Small single-stair buildings also have faster evacuation times than larger apartment buildings with long corridors and two-stairs because they have fewer occupants per stairway and all units are closer to the stairs.

As a growing number of states take action to address their housing shortages, costly staircase requirements are receiving increased attention from policymakers. Since 2023, more than a dozen states have proposed legislation to study or directly address the issue. Connecticut and Tennessee have already adopted laws to enable

single-stairway buildings.

Pew's new research shows that modern single-stairway 4-6 story apartment buildings have the potential to generate significant cost savings for homebuilding, are a safe form of housing, and can add much needed housing supply.

Sincerely,
Linlin Liang
Housing Policy Initiative
The Pew Charitable Trusts