

February 29th 2024

International Building Code 2024

Single Stair

Allow more floors to be served by a single staircase in residential multifamily, creating better unit layouts by eliminating the need for a double loaded corridor, and facilitating smaller building footprints with less need for large land assemblage, while producing a typology that is shown to provide better life safety.

Problem

The vast majority of multi-family housing in the United States is designed with double-loaded corridors – hallways with units on either side – and built under the IBC’s burdensome egress code. The requirement of two staircases with a connecting corridor result in homes that suffer from limited natural light, rigid layouts that limit unit size diversity, inadequate ventilation, bulky and inefficient land use, and, in a twist, have been shown to perform worse in a fire than buildings that concentrate units on a single staircase.

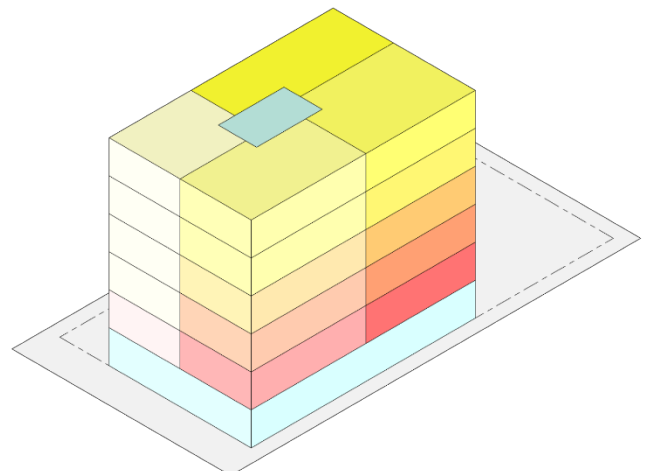
In contrast, single stair buildings, or ‘point access blocks’ as they are sometimes known, cluster a limited number of units around a single vertical circulation point, typically a single stair and an elevator, which removes the need for a corridor. The resulting units are more flexible in size and arrangement and allow for windows on more than one side, and the buildings are generally smaller in footprint and require less land assemblage to develop. This typology, up to six stories and taller, is legal throughout the majority of the world and globally one of the most common forms of multifamily housing.

Solution

Allow up to five floors to be served by a single exit, with a limit of four units per floor, up to six or seven stories, and modify egress regulations and fire protections based on precedent jurisdictions.

Benefits

- Floor plate efficiency – Removing the need for a corridor provides more square footage for dwelling units, which lowers the overall cost of housing. Single stair



buildings have 95% efficiency as compared to 80–87% or 70–80% efficiency for double or single loaded corridors respectfully.

- Family sized units – Having dual access to window walls allows for bedrooms to be placed on multiple sides of buildings, as opposed to only one, easily facilitating two, three and four bedrooms. This measure also takes the pressure off building windowless bedrooms, a result of deep floorplates and double loaded corridors. A quick precedent study of single stair buildings shows great variety in unit layout and sizes.
- Cross ventilation –Having access to windows on two or more sides opens the possibility of natural ventilation, as opposed to the mechanical heating and cooling of a double loaded corridor. Austin would particularly benefit from this as much of the year is pleasant outside.
- Smaller building footprint – Removing the requirement for a corridor promotes a finer-grained urbanism by enabling a diverse mix of infill scale developments, more affordable to local builders. Smaller footprints also encourage incremental growth. Neighborhoods that grow more dense piece by piece have a better chance of preserving existing character.
- Aligns with five-over-ones – Five stories of Type III residential over one or two stories of Type I commercial is an inflection point in construction financing. Configuring the single stair buildings to align with this typology would promote more efficient mixed-use buildings.
- Aligns with ETOD and other up-zonings – Implementing this single stair amendment prior to anticipated up-zonings is essential for fostering higher-quality living spaces and better urban fabric with more involvement from local builders. For example, the University Neighborhood Overlay produced a significant increase in units, but many of the bedrooms lack windows and the buildings are all of one giant scale.
- Fire safety – A 2011 FEMA report shows that globally, many countries that allow single stair buildings, some lacking sprinkler requirements and with unlimited height, have a significantly lower death rate due to building fire than the United States. Single stair buildings may be safer due to shorter distance from the unit to the stairs, no deadly smoke-filled corridor, compartmentalization of the units, a sealed and mechanically vented stair enclosure, and fewer people on the stairs themselves. The FEMA report is linked at the end.

Precedents

Seattle is the best know precedent for the single stair typology in the US. Their city code has allowed these buildings since 1977 with varying protections throughout the years. Today Seattle allows for five stories residential up to six stories high, with four dwellings per floor. The units utilize compartmentalization of a 1-hour fire rating between units, require sprinklers, and limit travel distance to 125 feet in total and 20 feet from the unit to the stairs. Seattle allows for two of these conditions per site. Most other jurisdictions looking to adopt this measure are also using Seattle’s code as a precedent, however, there is a case to be made for 1) increasing the allowed height of the building to either seven stories or 85 feet to better align with the IBC’s podium allowance, and 2) removing the two condition limit per site.

New York City modified its code in 2022 to allow new residential buildings to be built with only one staircase if they are six stories or under, constructed to fireproof standards, do not exceed 4,000 square feet per floor, and have a maximum of 20 feet from the door of a dwelling unit to the exit staircase.

Honolulu has also adopted a single stair code amendment in 2023 which is essentially the same as Seattle, with the additional requirement of a minimum 48 inch stair width.

There are also measures in Washington, New York, California, and Hawaii to form committees to study and make recommendations regarding statewide adaptation of single stair buildings.

Resources

Larch-Labs: Unlocking Development with Point Access Blocks

https://www.larchlab.com/wp-content/uploads/2023/01/Larch-Lab-PAB_Policy-Brief.pdf

Larch-Labs: Unlocking livable, resilient, decarbonized housing with Point Access Blocks, City of Vancouver

https://www.larchlab.com/wp-content/uploads/2022/01/Eliason_CoV-Point-Access-Blocks-report_v1.2.pdf

The Second Egress

<https://secondegress.ca/>

The Architect's Newspaper: Why does American multifamily architecture look so banal? Here's one reason

<https://www.archpaper.com/2023/03/why-does-american-multifamily-architecture-look-so-banal-heres-one-reason>

Slate: The Single-Staircase Radicals Have a Good Point

<https://slate.com/business/2021/12/staircases-floor-plan-twitter-housing-apartments.html>

LA Times: How changing the rules on stairways could help California build more homes

<https://www.latimes.com/opinion/story/2023-08-11/single-stairways-california-build-more-homes-ab835>

The Urbanist: One Stairway is Enough to Reach Housing Heaven

<https://www.theurbanist.org/2023/02/07/one-stairway-is-enough-to-reach-housing-heaven/>

Washington, Senate Bill Report SSB 5491

<https://lawfilesexternal.wa.gov/biennium/2023-24/Pdf/Bill%20Reports/Senate/5491-S%20SBR%20APS%2023.pdf>

FEMA: Fire Death Rate Trends: An International Perspective

<https://www.usfa.fema.gov/downloads/pdf/statistics/v12i8.pdf>

Seattle IBC Code Amendments (1006.3.2)

<https://www.seattle.gov/documents/Departments/SDCI/Codes/SeattleBuildingCode/2015SBCCChapter10.pdf>

New York City, Means of egress requirements in certain new buildings

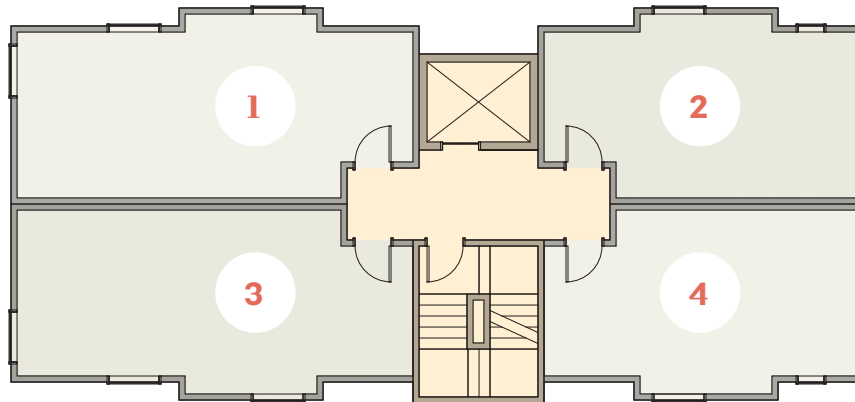
<https://legistar.council.nyc.gov/LegislationDetail.aspx?GUID=37FE9CD9-BF36-4B6F-A20A-70FAIA52E99C&ID=5898998>

Hawaii State Building Code

https://codelibrary.amlegal.com/codes/honolulu/latest/honolulu/0-0-0-14009?fbclid=IwAR24kHUIZsmJN_mXmTtleNYWd1y3Y7fGDLJ2Jm5G5sR2ALXygJIGMMB5pXc

Fire Safety Exhibit – 4 Unit Cap per Floor

Capping the number of units allowable in a single stair building to only four per floor ensures quicker and less congested egress during emergencies. Additionally, it reduces the overall risk by containing potential fire spread within a manageable number of dwellings.



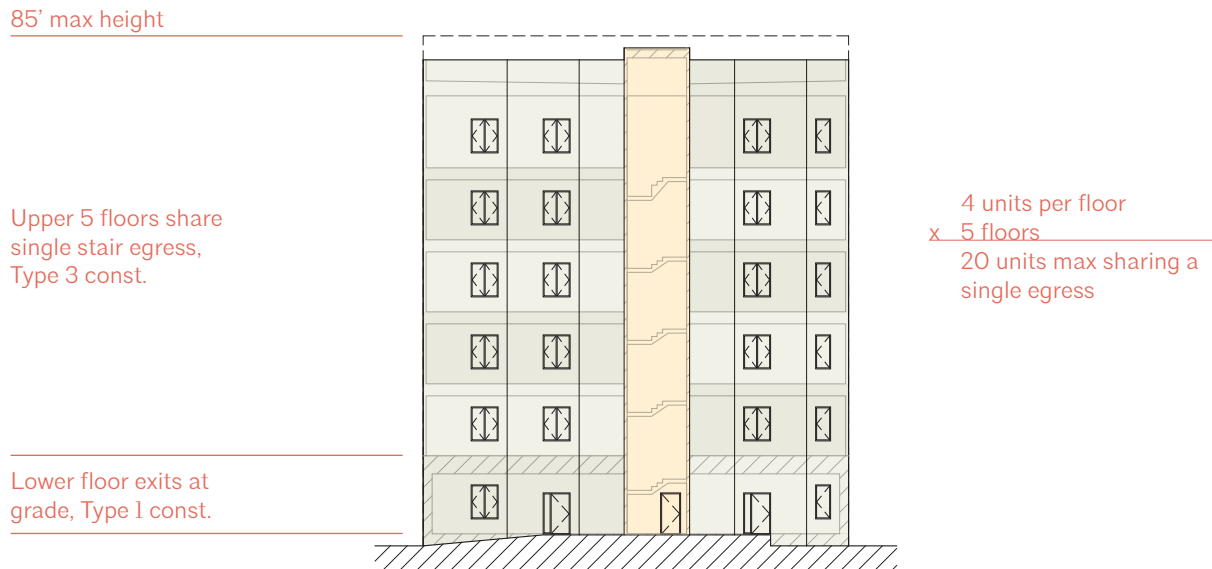
This limit reduces the overall size potential of single stair buildings to a fairly small footprint with a very manageable occupant load. Whereas a double loaded corridor building may have several hundred units served by only two stairways, a single stair building with the limits proposed here would have a maximum of twenty units. The ratio of units to stairways in a single stair building is far better than the current alternative.

Keeping single stair buildings to a relatively small size is key to their fire safety. Most fire related deaths involve someone who is asleep, incapacitated, or too young or old to escape; limiting the number of dwellings, thereby occupants, in a building is the biggest factor for life safety.

The current IBC code already allows for a single stair to serve up to three stories of four units per floor. Our request only increases that by two stories and requires several additional fire safety provisions.

Fire Safety Exhibit – Height Cap

Limiting the number of stories served by a single stair to five floors and the overall height of the building to 85’ or under, while still requiring egress windows, ensures they remain within the effective reach of fire truck ladders.



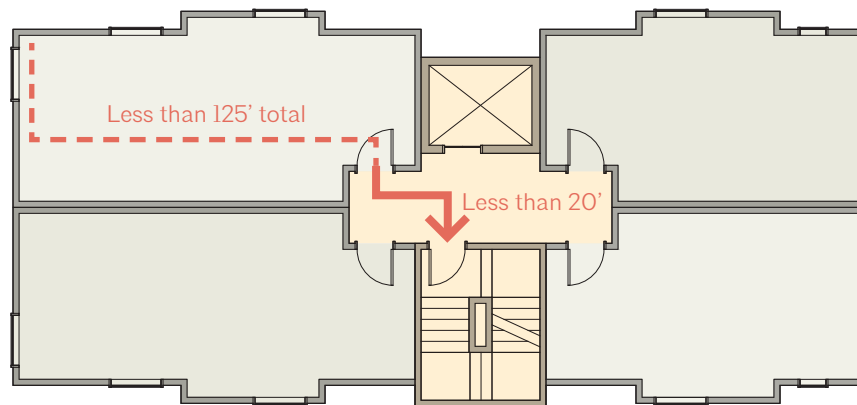
The IBC requires all Group R-2 units in a single exit building to be equipped with egress windows per 1006.3.3(1)a.

Seattle limits their building height to six stories; however, their building code allows for six stories of Type 3A building construction. This is primarily fire-retardant wood construction. Our building code follows the IBC more closely, and limits Type 3A buildings to only five stories, but allows for Type 3A to be built in conjunction with a Type 1A podium for a combined 85’ in height. This increase in height is justified as the Type 1A podium is of a far safer construction.

Allowing five floors to be served by a single exit in buildings up to 85’ tall aligns with the existing provisions in the IBC while maintaining a relatively low unit count all within reach of a ladder.

Fire Safety Exhibit – Exit Distance

The exit distance from the door of any unit to the door of the stairway is limited to 20 feet, and the total exit path for each unit is limited to 125 feet, which ensures quick and safe evacuations in single stair buildings. Additionally, all doors must swing into the stairway in the direction of exit travel.

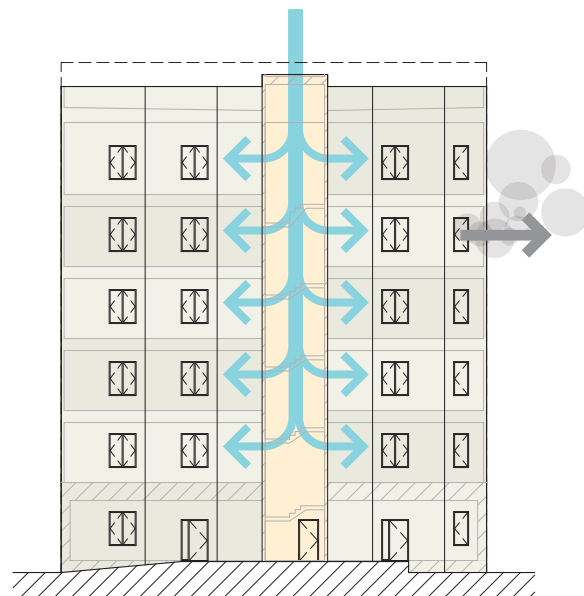


In comparison, a double loaded corridor is allowed 250 feet total exit distance to the nearest exit, twice what is being proposed here, which if blocked, would mean a unit could be up to three times as far away from the next closest exit. The IBC only measures to the nearest exit. Reducing the distance to the stairway is critical to reduce the time spent in a long, smoke-filled corridor for residents exiting in a fire emergency.

In a single exit that has a 20' maximum corridor length, the majority of the travel distance will likely occur within the unit, as opposed to the current alternative, where the majority of the travel distance will probably occur in corridor, which is generally viewed as more exposed.

Fire Safety Exhibit – Ventilated or Pressurized Stairways and Elevators

This provision requires an interior exit stairway, protected by a two-hour fire wall enclosure in buildings over 4 stories, to also be pressurized, or, if the stairway is exterior, to allow for natural ventilation. Elevator hoistways and elevator lobbies must also be pressurized or naturally ventilated. This prevents smoke infiltration into the egress path, ensuring that occupants can evacuate safely during emergencies.

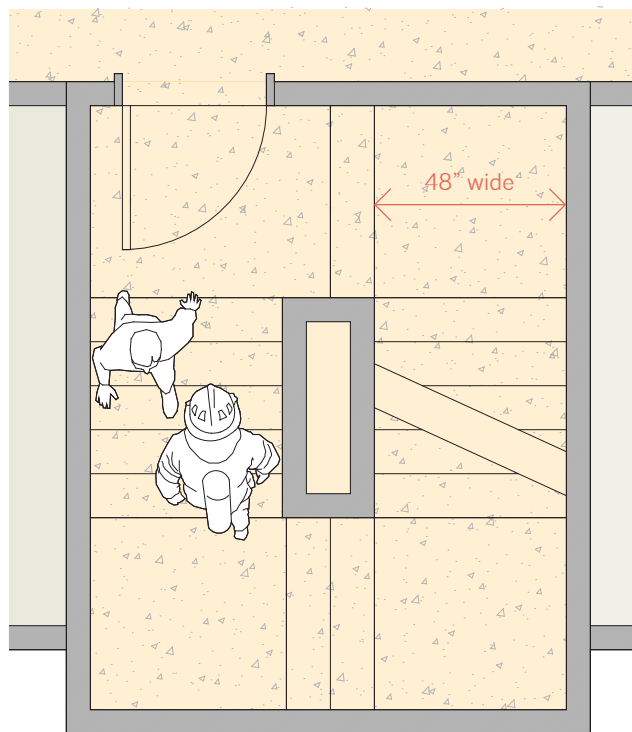


The Seattle precedent requires pressurization in accordance with 909.20, 909.21, and 713.14 for stairways and elevator hoistways and lobbies. Research has shown the majority of fires start in cooking areas, followed by bedrooms, and then common rooms, with a negligible number of fires originating from a stairway. This pressurization requirement pushes smoke away from the path of egress and reduces the risk of the fire spreading.

European models give the options of either a protected stairway or aerial access to units, which frequently leads to open stairways that are not separated from the corridors. The US requires all stairways to be protected, requiring pressurization increases fire safety even further.

Fire Safety Exhibit – Stairway Width

Require stairways to be a minimum of 48 inches wide, allowing for simultaneous passage of firefighters and exiting occupants.

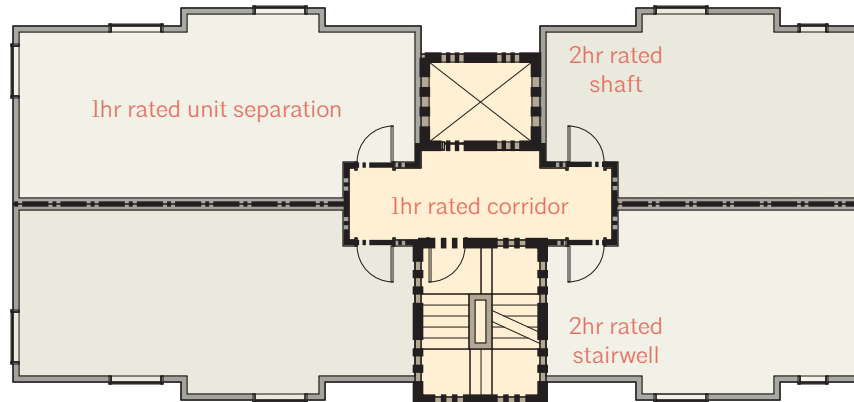


The fire service ideal of one stair reserved for occupant evacuation and one reserved for firefighter attack is difficult to pull off in practice and would result in an extra-long exit distance for half of the units. An alternative measure taken by Honolulu is to require the width of the single stair to be 48", which would allow for the tight passage of up to two people.

In reality, the limited unit count proposed here results in relatively small buildings where any able-bodied person would have already self-evacuated before the fire department arrives.

Fire Safety Exhibit – Fire Rated Corridor

Increase the fire-resistance rating of the corridor to 1 hr for all occupancy loads, further protecting the path of egress. This increases the compartmentalization of each unit reducing the chance of fire spread.



Increasing the fire-resistance for the corridor also requires higher fire rated doors, and results in better compartmentalization. Passive measures like this work in tandem with the more active systems of pressurization and sprinklers, and work by effectively slowing the spread of fire, providing additional time for occupants to safely exit the building. Even with the small occupant count – maximum 20 units per stairwell – this extra time may be crucial.

Comparatively, a double loaded corridor building may only require .5 hr rated corridors, and one at the same scale as these single stair buildings could get away without any fire-resistance at all if the occupancy was 10 or below.