

(RE)CODING NYC'S HOUSING
GSAPP HOUSING LAB
2020

CODE CHANGES AND BUILDING PROPOSALS

TRANSFORMING EXISTING LOW-RISE, HIGH-DENSITY
NEW LAW TENEMENT BUILDINGS INTO ACCESSIBLE AND RESILIENT HOUSING

1

New York City has a tradition of ambitious zoning laws and building codes passed in response to cultural shifts and changes in construction techniques. Yet over the years,

regulatory changes have sidelined one of the most common building typologies in the city: the early 20th century New Law tenements.

These buildings make up more than half of New York City's units, yet have had remarkably few improvements.

Five key interventions could transform this housing stock and modest changes in regulations could make them possible.

Together, these interventions represent an incremental strategy to rethink the New Law tenement, and walkups more broadly. With limited amendments to buildings and land use laws, these buildings could be adapted to the 21st century, unlocking density and enhancing the quality of New York City's housing stock.

Small changes in codes - the zoning resolution, multi-family dwelling law, and building code of New York City - can enable big changes to improve and expand affordable and resilient housing. We focus on the changes to code that can make improvements and expansions to existing walkup building possible.

This document emerged from a conversation amongst an interdisciplinary team of urban planning, real estate, and architecture graduate students at the Columbia University GSAPP Housing Lab. We are grateful to the input of senior practitioners and scholars throughout the process: please see the final pages for acknowledgements. In probing the potential in New York City's 'generic' building typologies, we developed the proposed interventions through an iterative approach, navigating between context, code, policy, and design. We see this as a living document, and look forward to future editions.

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INTRODUCTION: NEW YORK CITY TENEMENTS

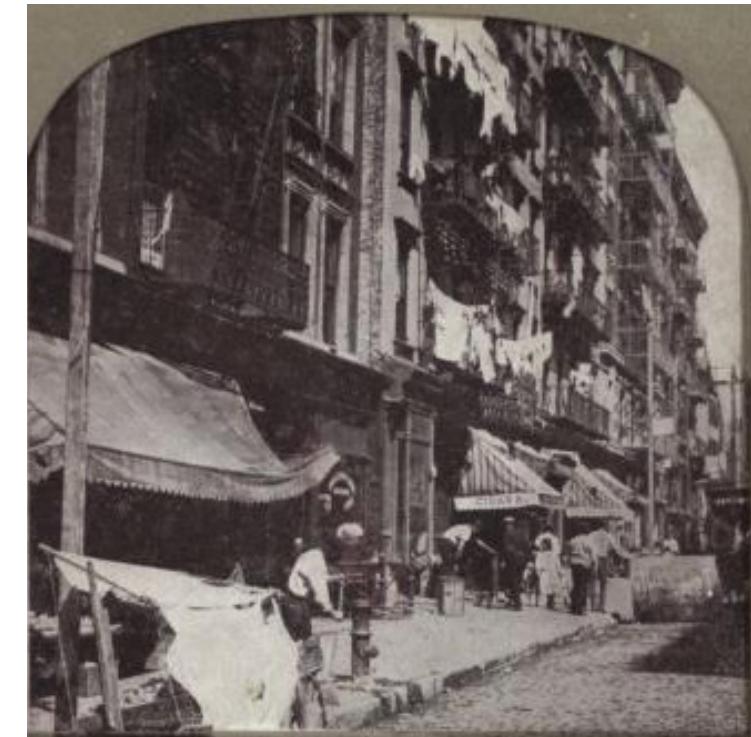


Image 01 | A street in the Tenement District, Lower Manhattan, 1900.

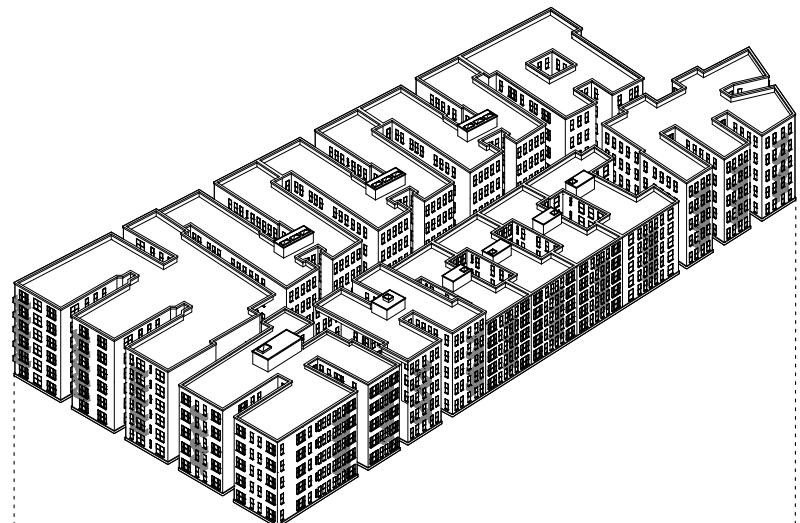
For over 150 years, the “tenement” has been New York’s defining, workaday housing type. Tenement is an umbrella-term encompassing multi-unit buildings of three to seven stories, often built of brick or masonry, and typically marketed to working-class or immigrant New Yorkers. The first tenements appeared in the mid-1800s and were built to the full extent of a standard 25 x 100 feet lot.

Early tenement units had severely restricted access to light and air—often units only had street-facing windows—and were frequently overcrowded. The poverty and misery of life in tenement buildings became a target of Progressive-Era reformers, who worked to combat the unsanitary living conditions of the so-called “other half.”

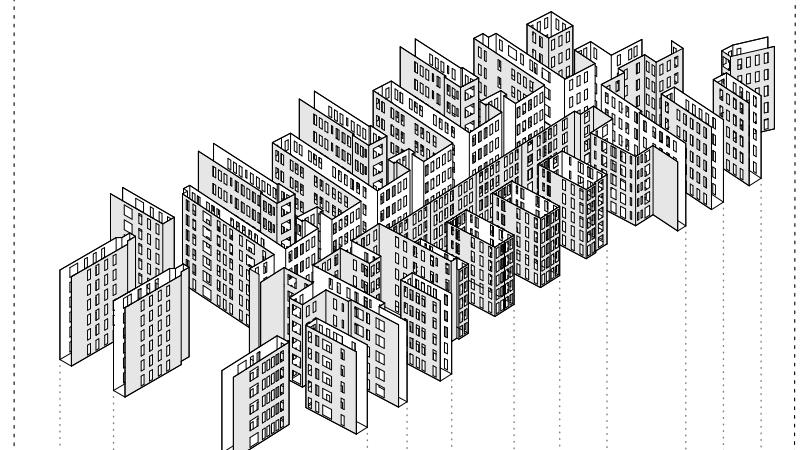
THE NEW LAW TENEMENT

At the turn of the last century, a coalition of reformers successfully transformed the way housing for poor and middle-income New Yorkers was designed and built. The 1901 *New York State Tenement House Act*, often called the "New Law" set ambitious new standards right before a period of massive construction and urban expansion.

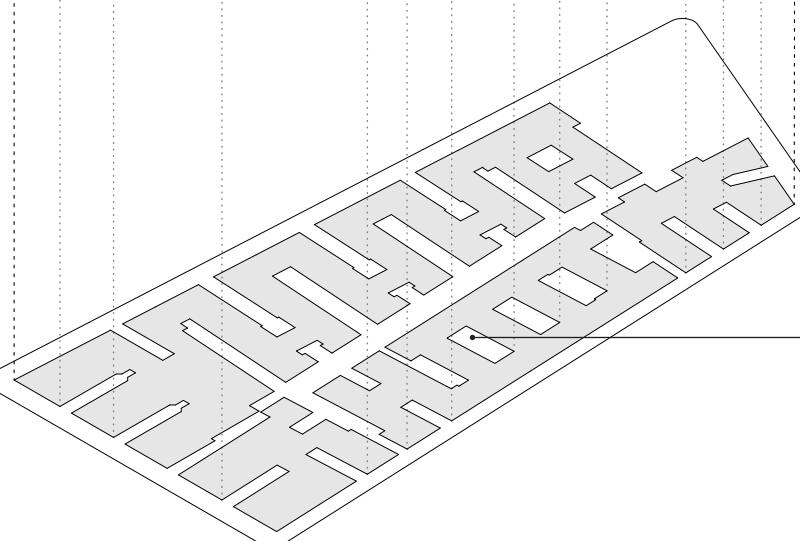
The "New Law" mandated that all rooms in tenement buildings have outward facing windows, proper ventilation, and fire safeguards. New Law tenements were often built on 50 by 100 feet lots, double that of the then-typical 25 foot by 100 foot lots. Large courtyards and rear yard setbacks, required by the New Law, further differentiated the buildings from Old Law tenements, and created a distinct urban morphology.



The balancing act between achieving unit density and court side/rear yard configurations resulted in a distinct urban morphology.



Varying configurations of courtyards and setbacks were deployed to ensure all windows faced either a front, rear, or courtyard instead of a ventilation shaft.



Minimum courtyard dimensions were set at 24x24' to ensure adequate access to light and fresh air.

Image 02 | A block of New Law Tenement buildings in Washington Heights, Manhattan. Built between 1909 to 1920.

An explosion of tenement buildings followed in the wake of the New Law, especially in the rapidly-developing areas of Upper Manhattan, the West Bronx, and Central Brooklyn.

By 1930, New Law tenements were supplanted by “fireproof” buildings and new typologies like the high-rise. Yet, despite the relatively short reign of the New Law tenement, their impact on the city was profound. **New Law tenements are still a substantial portion of New York City’s housing stock - the generic backdrop of the urban fabric.** The map on the right depicts all New York City buildings in 2019. Of those buildings, the ones highlighted in black are New Law Tenement buildings still in use. Using the criteria on the following page, 13,438 New Law Tenement buildings exist currently. They contain 399,597 housing units,^a or 20% of all multifamily units citywide.^b

TOTAL NUMBER OF BUILDINGS (NLT):
13,438

**New Law Tenements
Defining Criteria**

Height: 2.75 to 6 floors
Lot Frontage: 50 feet
Unit Count: 3 to 250
Constructed: 1901 to 1930



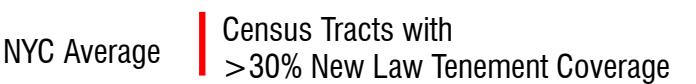
Data Source:
New York City DCP MapPLUTO Release 19v2 (2019)

^a NYC Department of City Planning. (2019) MapPLUTO 19v2. NYC DoITT. (2019) Building Footprints. <https://data.cityofnewyork.us/Housing-Development/Building-Footprints/nqwf-w8eh>.

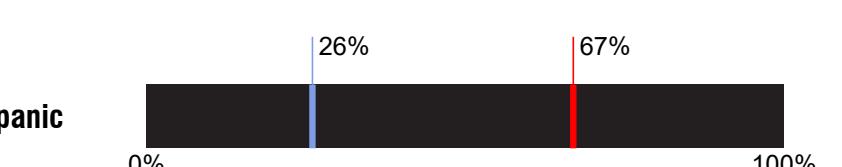
^b Compared to the 1,936,763 residential units in buildings with four or more units (Class 2), per the NYC DoF 2020 Annual Property Tax Report.

Currently, areas with high concentrations of New Law tenements in the city are disproportionately home to low- and middle-income Black and Latinx households.

The fundamental aim of targeting New Law tenements is to **invest in improving the quality, accessibility, and resiliency of housing already serving these low- and middle-income households in communities of color**. It is a step towards equitable access to *quality* dwellings and counteracting the legacy of exclusion in housing.



NYC census information compiled by the Social Science Research Council



^a Eligibility for SNAP (Supplemental Nutrition Assistance Program) varies for household size. For a family of 3, it is set at an annual gross income of \$27,732.

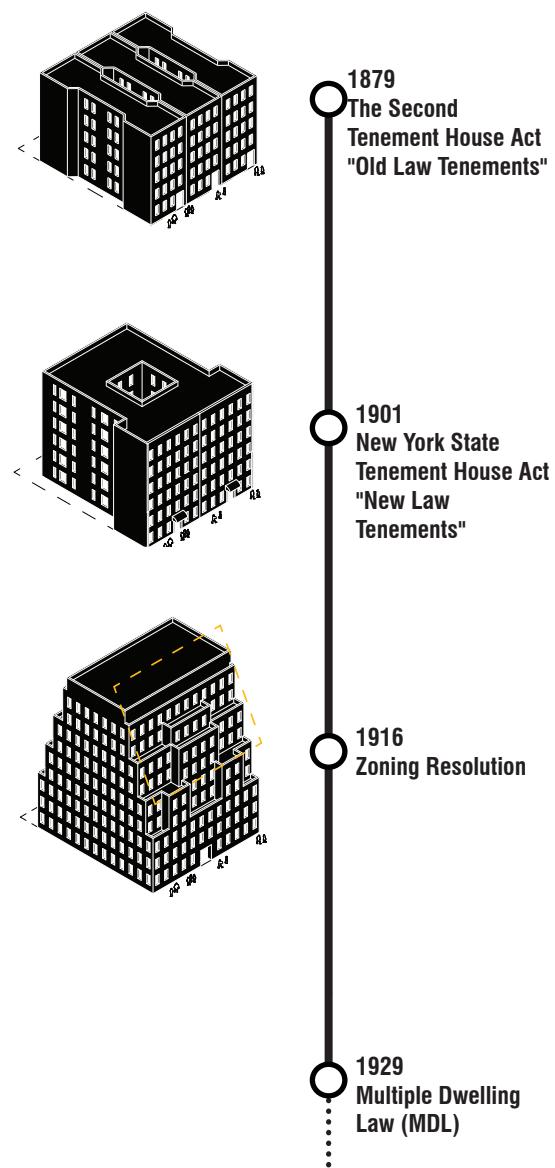
^b The household dedicates more than 50% of their income on rent.

^c Defined as more than 1.5 persons per room.

FUTURE-ORIENTED ZONING & CODES

New projects alone cannot fulfill the current needs of housing to be resilient, accessible, and healthy.

It is important to also rework code to better meet the needs of the majority of New Yorkers who reside in New Law tenements and other existing building stock. Below is a snapshot of pioneering regulations in New York City's history, each of which earmark a progressive movement to improve the quality of housing and building.

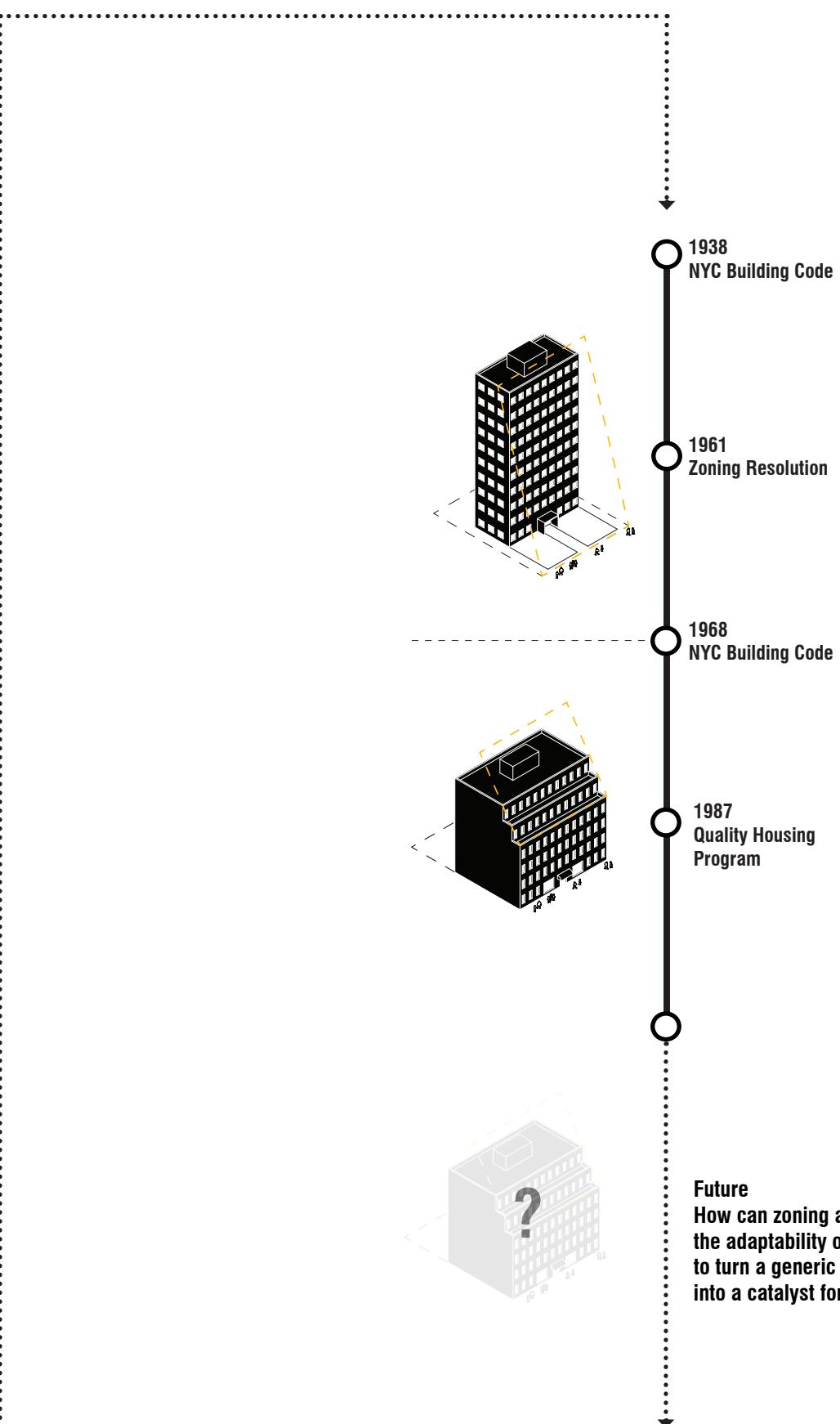


The first regulations that mandated exterior-facing windows for every room as a source of light and fresh air. Windows facing interior hallways were banned.

Minimum sizes were set for exterior courtyards and light/air shafts, to ensure adequate ventilation and prevent cramped, unsanitary conditions.

The first city-wide zoning code enacted that took into account urban-scale considerations of light and air. With the use of sky exposure planes, limitations to building massing and bulk were enforced so that adequate light and air would reach street level.

Superseding the 1901 law, the MDL set updated regulations for light/air, addressing overcrowding and imposing stricter safety regulations related to fire egress and sanitation.



The earliest building code created for New York City that is still the basis for the contemporary NYC building code. The 1938 code made significant amendments to the prior 1915 code due to drastic changes to the construction industry, and material/technologies post WWII. The code became more performance-based rather than prescriptive specifications.

The first significant update to the 1916 zoning resolution. Changes primarily addressed overcrowding and the lack of open public spaces. Incentive zoning was introduced as well the division of the city into commercial, manufacturing, and residential zones.

In an effort to streamline decades of amendments to the 1938 Building Code, a new version was created. Like the 1938 code, the new code considered new technologies and industry practices.

Quality Housing was a zoning amendment to establish new "contextual" residential districts that would maintain the built form and character of existing neighborhoods in an effort to tie building design with quality of life. In medium and higher density contextual districts, multifamily housing development was encouraged and was required to comply to parts of the program including Neighborhood Impact, Recreation Space, Safety and Security, and Building Interior.

RELEVANT CODES

The following are the regulations and codes that have been referenced for this document. While this is not an exhaustive list of all regulatory factors affecting building and construction work in New York City, it is a cross-section of the major guidelines and respective enforcement agencies. Ultimately, amendments to these regulations will have the greatest impact for change.

[BC] NEW YORK CITY BUILDING CODE

ENFORCED BY: NEW YORK CITY DEPARTMENT OF BUILDINGS (DOB)

The New York City Building Code governs the construction, alteration, movement, addition, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures. New York City passed its first building code in 1938. The code has been modified over the years to evolve into what is today's New York City Construction Code. The code governs new construction, building rehabilitation, fire safety, and housing maintenance in the City of New York and is uniquely independent of New York State's Uniform Fire Prevention and Building Code.

[FC] NEW YORK CITY FIRE CODE

ENFORCED BY: CITY OF NEW YORK FIRE COMMISSIONER

The Fire Code establishes fire safety requirements for buildings and businesses in New York City. Fire safety laws in the region are older than the city itself, with the first fire ordinance adopted in the Dutch settlement of New Amsterdam in 1648. The most recent version of the code was adopted in March 2014 and governs matters ranging from the transport and storage of hazardous materials to the conduct of various businesses that pose fire hazards. In matters of building design and construction, the fire commissioner works with the Department of Buildings to ensure structures are in compliance with code.

[HMC] HOUSING MAINTENANCE CODE

ENFORCED BY: NYC HOUSING PRESERVATION & DEVELOPMENT (HPD)

The Housing Maintenance Code is a section of the New York City administrative code dealing with housing law. It establishes the maintenance requirements of residential buildings and overlaps in some parts with the New York State Multiple Dwelling Law.

[MDL] MULTIPLE DWELLING LAW

ENFORCED BY: NEW YORK CITY DEPARTMENT OF BUILDINGS (DOB)
DEPARTMENT OF HOUSING PRESERVATION & DEVELOPMENT (HPD)

The New York State Multiple Dwelling Law is intended to set sufficient standards in light, air, and sanitation, while preventing overcrowding and providing protection from fire hazards in the occupation of multiple dwelling sites. It was passed in 1929 to expand provisions of New York City's 1916 Zoning Resolution and preceding tenement laws to cities across New York State with a population that exceeded 350,000. The law aimed to intervene where there was overcrowding, inadequate light and air, and insufficient protection against fires, and improper sanitation. For the most part, the Multiple Dwelling Law defers to local governments in cities with populations over one million to pass local laws, ordinances, or regulations to build in more stringent provisions.

[RCNY] RULES OF THE CITY OF NEW YORK

The Rules of the City of New York are a full text compilation of the rules and regulations enacted by over 50 government agencies, divided into 71 Titles. Value-added information such as case notes, historical notes, rule change dates, and "Statements of Basis and Purpose" are included. The online publication is updated in real-time, with rules posted within 48 hours of the effective date.

[ZR] ZONING RESOLUTION

ENFORCED BY: NEW YORK CITY DEPARTMENT OF BUILDINGS (DOB)
NEW YORK CITY DEPARTMENT OF CITY PLANNING (DCP)

The New York City Zoning Resolution grants New York City the "power to regulate use, bulk, density of buildings, to promote affordable housing, and to protect places of historical significance through zoning." The first zoning resolution for the city, adopted in 1916, is considered to be the earliest comprehensive zoning code in the United States. In 1961, the current version of the resolution was introduced. However, the document has continued to evolve - altered to reflect new ideas about urban form and to address new issues like climate change and housing affordability.

Zoning District

# NLT	FAR	Building Height	DU Factor ^a	Required Parking ^b
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R6 Medium Density - Non- Contextual Residence District

2,902	2.20 - 3.0	70' (75)'	680	25%
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R7-1 Medium Density - Non- Contextual Residence District

2,124	3.44	SEP ^c	680	60%
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R7-2 Medium Density - Contextual Residence District

1,629	3.44	SEP	680	50%
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R7A - Medium Density - Non- Contextual Residence District

1,452	4.0	80' (85)'	680	15%
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R5 - Low Density - Non- Contextual Residence District

1,173	1.25	40'	760	4.25%
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^a DU Factor is based on density, the maximum number of dwelling units permitted on a zoning lot. The factors for each district are approximations of average unit size plus allowances for any common areas. Special density regulations apply to mixed buildings that contain both residential and community facility uses.

^b Off-street parking is required but are lower for Income -restricted housing units (IRHU) a dwelling unit that complies with the definition of an affordable housing unit under one of the Inclusionary Housing Programs, or any other dwelling unit with a legally binding restriction on household income at or below 80 percent of Area Median Income.

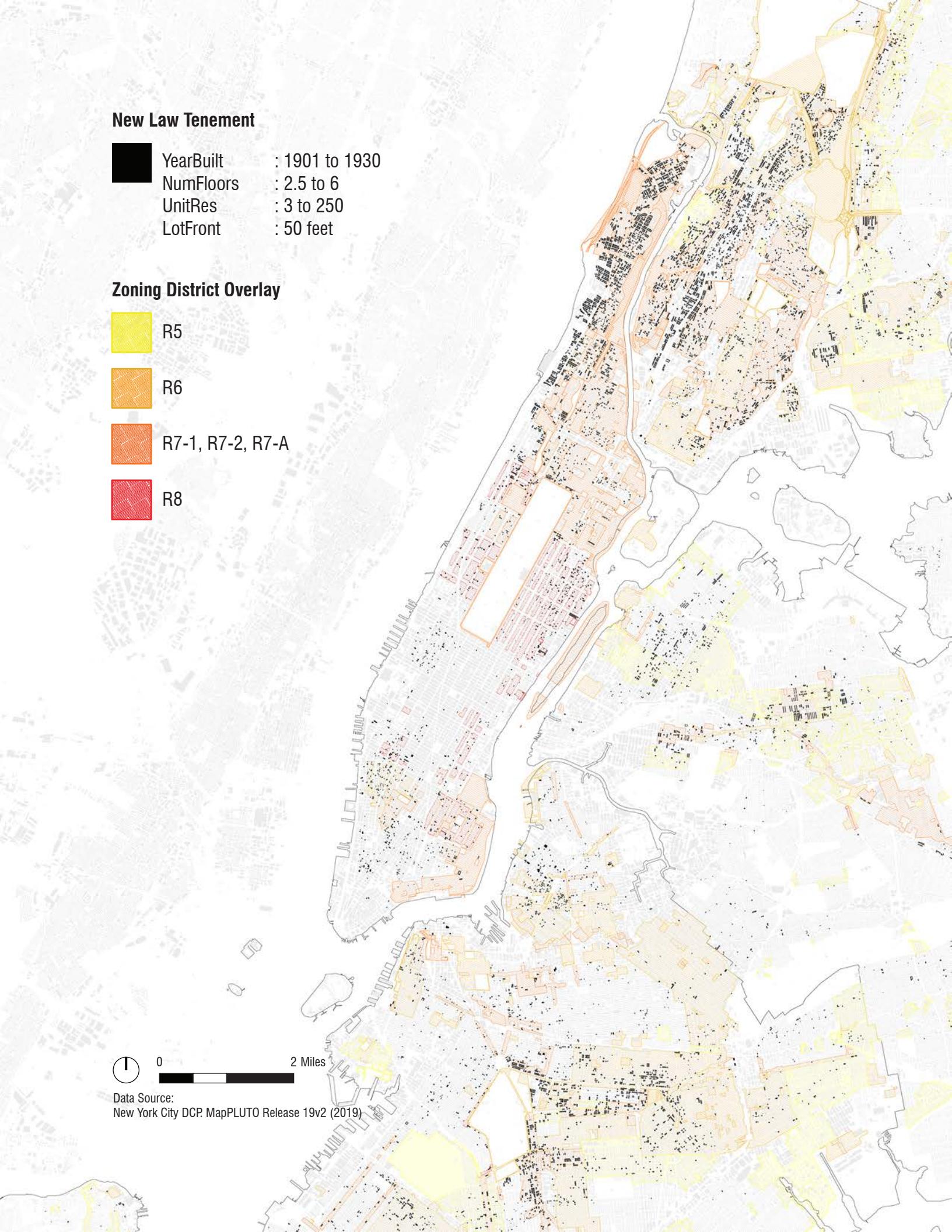
^c A sky exposure plane (SEP) is a virtual sloping plane that begins at a specified height above the street line and rises inward over the zoning lot at a ratio of vertical distance to horizontal distance set forth in district regulations. A building may not penetrate the sky exposure plane which is designed to provide light and air at street level, primarily in medium- and higher-density districts.

New Law Tenement

YearBuilt	: 1901 to 1930
NumFloors	: 2.5 to 6
UnitRes	: 3 to 250
LotFront	: 50 feet

Zoning District Overlay

 R5
 R6
 R7-1, R7-2, R7-A
 R8



PROPOSAL CONSIDERATIONS

The changes to New Law tenements proposed in this document could have significant ramifications for the city's social and built environment. Beyond the direct outcomes of creating more affordable and resilient housing tightly connected to existing neighborhoods, the development options here could have unexpected risks and consequences. Some implications are unknowable, but others are worthy of further speculation. Asking tough questions of the document—and iteratively changing the proposals in response to concerns—is key to ensuring that the proposed interventions are crafted responsibly.

Some questions to consider:

Are the proposals too incremental? Conversely, how realistic are they?

Ambition in steps. The incremental approach of this document is not because we have limited ambitions. Rather, it springs from our belief that architects, planners, and policymakers can productively focus more on how to improve the existing, everyday buildings that house most New Yorkers, and less on ground-up, brand-new typologies.

Implementation in tiers. We subdivided each of the five main interventions into a handful of smaller subproposals, recognizing that policy change is hard—especially in a city as large and complex as New York. Some of the subproposals are possible immediately and with little capital. Others carry a large price-tag but are legally feasible. Still others are only possible with policy change or new laws and regulations. The ‘degree of difficulty’ for each subproposal is marked in the document.

Flexible uptake. The interventions and subproposals are meant to be flexible. Some tenants, property owners, or policymakers may embrace the interventions wholeheartedly, while others might focus on a single modest and achievable subproposal. Ultimately, we hope the document will serve as a useful template for further action—not a comprehensive blueprint.

What would be the impact of added density on existing neighborhoods and building services?

New York City has an unceasing demand for housing, but very little vacant or underused land. We believe that responsibly increasing the density of existing buildings is less-disruptive (and cheaper) than adding to supply through demolition and new construction. This responds to the constraints of our metropolis now: New York City has an unceasing demand for housing, but very little vacant or underused land. Soaring housing costs result in part from this supply and demand mismatch.

Increasing the number of residents in a neighborhood or building admittedly increases the amount of necessary services. Recognizing this, we have tried to balance increased density with calls for new shared amenities and building upgrades like elevators and balconies.

It should also be noted that many New York City neighborhoods are much less populated than they used to be—many neighborhoods in Manhattan have only half the population they did at the turn of the twentieth century!¹ While we don't want to go back to the severely overcrowded conditions of the past, many neighborhoods do have the existing service capacity to accommodate more residents.

How do these proposals respond to COVID-19? Should density still be a goal given what we know about disease transmission?

New Law tenements are disproportionately (although far from exclusively) home to the low-and middle-income, black and brown communities hit hardest by the pandemic. The COVID-19 pandemic and subsequent urban unrest has revealed how systemic racism structures housing quality, household finances, and neighborhood condition—and how those criteria in turn affect health and wellbeing. Some of the interventions in this document speak directly to specific needs exacerbated by the pandemic (like private outdoor space), while others aim to influence the structural conditions that led to disparate pandemic impacts in the first place.

The crowded conditions of New York undeniably contributed to rapid disease transmission here. However, studies have found that the most significant causes for the rapid spread of COVID-19 was housing overcrowding, not neighborhood density.² That is, density within housing units, not among housing units. Increasing the supply of affordable apartments is thus part of the solution, not the problem.

Could these changes spur gentrification? Who is/would be benefiting financially from these proposals to improve housing?

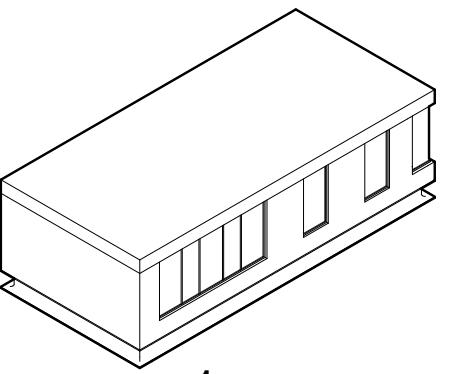
Older multifamily buildings like New Law tenements are subject to New York City rent stabilization laws. These restrictions mean that there are some in-built protections to prevent the cost of renovations and improvements from being passed on to residents.³ Many other New Law tenements are owned by nonprofit or faith-based community organizations. Still others are limited-equity cooperatives known as HDFCs, in where tenants collectively own the building.

We have crafted many of these interventions with HDFCs in mind. Rent stabilization laws protect against the immediate threat of displacement. However, to mitigate the risk of these proposed interventions spurring gentrification or secondary-displacement, standards should be set up to limit interventions to certain properties that pledge to maintain tenant protections. For example, policy changes proposed in the document could be made “discretionary” rather than “as-of-right.” This would mean that the city government could make the policy changes contingent on property-owners meeting certain conditions around continued affordability.

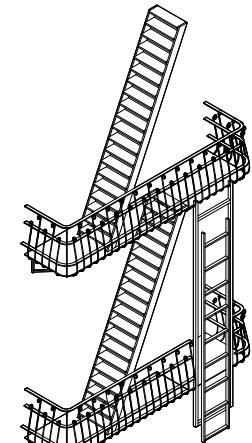
¹ Eric Jaffe, “Watch 210 Years of Manhattan Densification in 2 Minutes This Visualization Shows Density Peak in 1910, Slip in the 20th Century, Then Creep Upward after 1980,” Bloomberg CityLab, June 3, 2015, <https://www.citylab.com/equity/2015/06/watch-210-years-of-manhattan-densification-in-2-minutes/394736/>.

² Conor Dougherty, “12 People in a 3-Bedroom House, Then the Virus Entered the Equation,” The New York Times (The New York Times, August 1, 2020), <https://www.nytimes.com/2020/08/01/business/economy/housing-overcrowding-coronavirus.html>

³ Assembly Passes Historic Affordable Housing Protections to Bring Stability to Tenants Across New York State, June 14, 2019, <https://nyassembly.gov/Press/files/20190614a.php>.



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TARGETED BUILDING INTERVENTIONS

0 METHODOLOGY

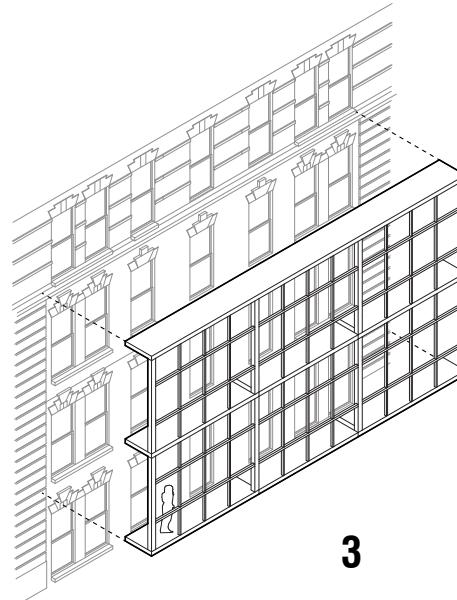
1 ROOFTOP ACCESSORY DWELLING UNITS

2 FIRE ESCAPES

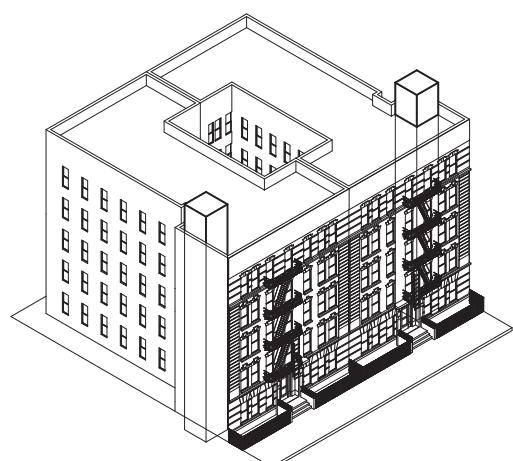
3 FAÇADE EXTENSIONS

4 ELEVATORS

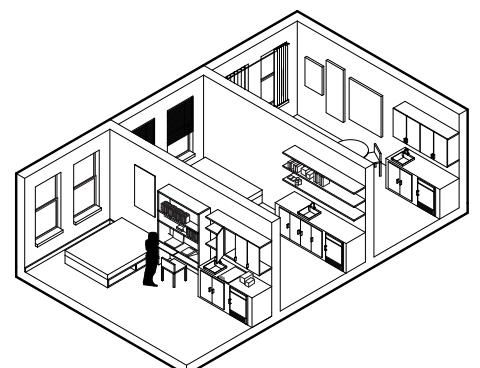
5 SINGLE ROOM OCCUPANCIES (SROs)



3



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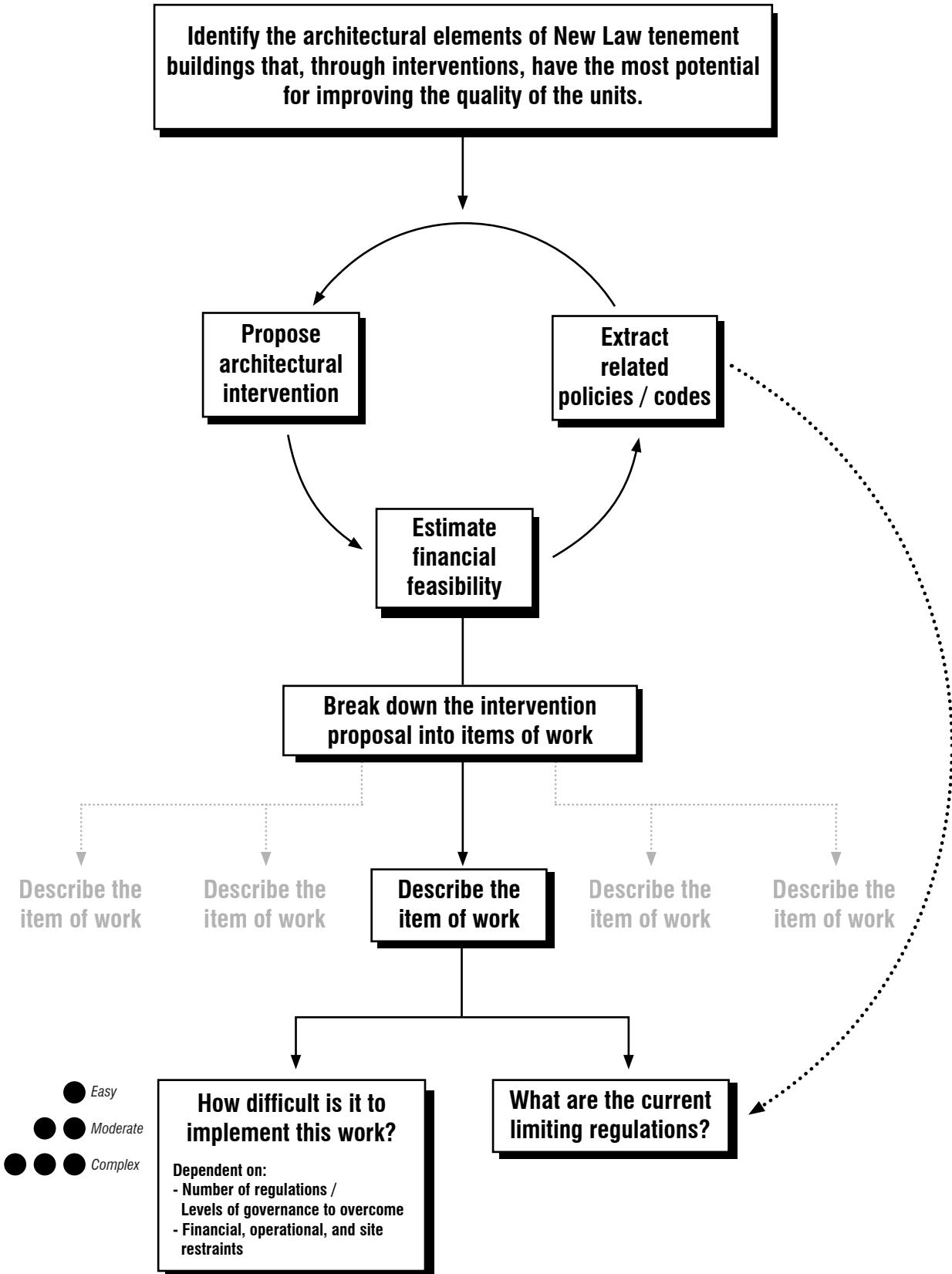


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0 METHODOLOGY

The commonality in the five building intervention proposals is that they focus on improving the conditions of buildings already housing low and middle-income households, such as New Law Tenements, rather than creating a category of exemptions that can be used as a profiteering tool.

Steps in developing building intervention proposals:



1

ROOFTOP ACCESSORY DWELLING UNITS

Rooftop Accessory Dwelling Units take advantage of the historically underused flat roof construction of tenement buildings. As of the year 2020, over **9,500** New Law tenement buildings exist in New York City that are not built to the maximum 6-story height of a non-elevator building. There is untapped potential to add to these underbuilt tenement buildings while remaining within zoning height and setback controls.

The standardized typology of the New Law Tenement building facilitates scalable interventions.

An additional 40,000 units -generally in highly accessible neighborhoods- could be added even if only one-half of the NLT buildings added rooftop units.

For buildings located within flood zones, ground level units can be re-located to the rooftop to reduce the risk of flood damage



Image 03 | A detached outdoor additional dwelling unit in Ojai, California



Image 04 | Corsega 685 - pre-fabricated penthouse apartment flat in Barcelona - La Casa por el Tejado. <https://duckbillfrance.fr/proyecto/corsega-685/>



Image 05 | Barcelona, La Casa por el Tejado

MODULAR ROOFTOP UNITS CAN PROVIDE SUSTAINABLE AND AFFORDABLE HOUSING IN WELL-LOCATED AREAS

Modular rooftop units, like those proposed here, fit into a broader family of finding spaces for housing inside existing built lots. Beyond situating households in accessible locations with proximity to jobs and services, intervening in existing structures has a vastly smaller carbon footprint—and can be combined with initiatives to increase health and decrease energy usage. In Kaohsiung, Taiwan, rooftop additions and legalizations are combined with ambitious subsidies for solar panels, green roofs, and thermal retrofits. Using a similar rationale, the 2014 'Alur' law in France relaxes constraints on rooftops; cost estimates for green units there are at 40% of new build.

In the US policy context, supplementary housing units built on the lot of an existing dwelling are often termed accessory dwelling units (ADUs), which can be either within the dwelling itself ("internal ADUs") or as stand-alone construction ("external ADUs"). Policy innovations in lower-density cities with high rents have advanced the archetypal conception of an ADU is a housing unit located in the backyard of a single-family detached home. West Coast cities have led: in 2017, over 2,000 ADUs were permitted in Los Angeles and in 2018, over 600 were permitted in Portland, OR.

Adding units alongside, or on top of, existing structures can be a powerful tool to advance racial and economic equity in housing. Formal ADUs are often perceived to be most common in middle-class neighborhoods where homeowners have the "policy capital" to navigate the requisite permitting. However, recent studies have shown that ADUs proliferate across diverse neighborhoods. For example, in Seattle, minority household concentration actually correlates with ADU construction. Municipalities have also pushed to diversify the tenant side of the ADU equation. In Los Angeles, an innovative program helps homeowners finance the construction of an ADU in return for a commitment to rent the unit to families holding Section 8 vouchers.

Advocating for permitted additions as a complement to affordable housing policy has been rare in East Coast cities, in part because the concept has so closely tracked with ADUs in areas where single-family housing is not the norm. In New York City, a new pilot program aims to legalize informal basement units, a type of internal ADU. The pilot program indicates that ADUs in New York are already here, but they tend to be unregulated housing adaptations in outer borough neighborhoods, rather than the type of backyard "granny flats". The proposals in this document take the concept of regulatory tweaks for expansion one step further—to new units on the rooftops of strong existing buildings across New York City.

"Sur Ou Sous Les Toits, Des Solutions Pour Produire plus De Logements Mieux Isolés," lemoniteur.fr (Le Moniteur, September 20, 2012), <https://www.lemoniteur.fr/article/sur-ou-sous-les-toits-des-solutions-pour-produire-plus-de-logements-mieux-isoles.1442599>.

Wu Min-Chang et al., "Photo-Voltaic Systems on Rooftops of Buildings: Kaohsiung City's Renewable Energy Endeavor: Article Information: J-GLOBAL," IEEE Conference Proceedings, January 1, 1970, https://jglobal.jst.go.jp/en/detail?JGLOBAL_ID=202002235216182558.

David Garcia, "ADU Update: Early Lessons and Impacts of California's State and Local Policy Changes," Terner Center, October 19, 2020, <https://terminercenter.berkeley.edu/blog/adu-update-early-lessons-and-impacts-of-californias-state-and-local-policy>.

Jared Brey, "New Project Aims to Finance Backyard Homes for Section 8 ...," Next City, May 7, 2019, <https://nextcity.org/daily/entry/new-project-aims-to-finance-backyard-homes-for-section-8-tenants-in-los-ang>.

Sadef Ali Kully, "City Launches Pilot Program to Legalize Basement Apartments," City Limits, February 28, 2019, <https://citylimits.org/2019/02/25/city-launches-pilot-program-to-legalize-basement-apartments/>.

Oussama Khalifi and Oussamakhalifi, "Rooftop Architecture: A Sustainable Alternative for Urban Expansion," Issuu, accessed December 13, 2020, https://issuu.com/oussamakhalifi/docs/oussama_khalifi_thesis_final_paper_2_82ef7f305ccb07.

Mimi Kirk, "The Granny Flats Are Coming," Bloomberg.com (Bloomberg, January 16, 2018), <https://www.bloomberg.com/news/articles/2018-01-16/the-rise-of-the-backyard-granny-flat>.



Image 06 | La Casa por el Tejado, rooftop ADU project in Barcelona. Modular rooftop unit being lifted into place by crane.

LA CASA POR EL TEJADO, BARCELONA: MODULAR CONSTRUCTION HAS UNLOCKED FINANCIAL FEASIBILITY FOR ROOFTOP ADUs

In Barcelona, a development company, La Casa por el Tejado (LCT), has specialized in prefabricated rooftop extensions to older buildings in the Eixample district. Identifying approximately 1,800 buildings in the district that have not been built to their full height allowance, this amounts to roughly 800,000 m² (over 8.6 million ft²) of potential buildable space.

Seven rooftop extensions have been piloted and each project includes four general phases:

- 1] Acquiring the air rights of an existing building that is structurally feasible for an addition.
- 2] Undertaking any necessary structural reinforcements and making energy, safety, and accessibility improvements to the existing building. At the least, this has included elevator extensions and common area renovations.
- 3] Build modular rooftop units at an off-site production factory. Flooring, plumbing and electrical components are all incorporated into the module(s) during the construction process. Furnishings, cabinetry and other fixtures are installed after the unit is mounted and secured on the rooftop.
- 4] Installation of the new modular rooftop unit by crane. The new unit is then sold by the development company.

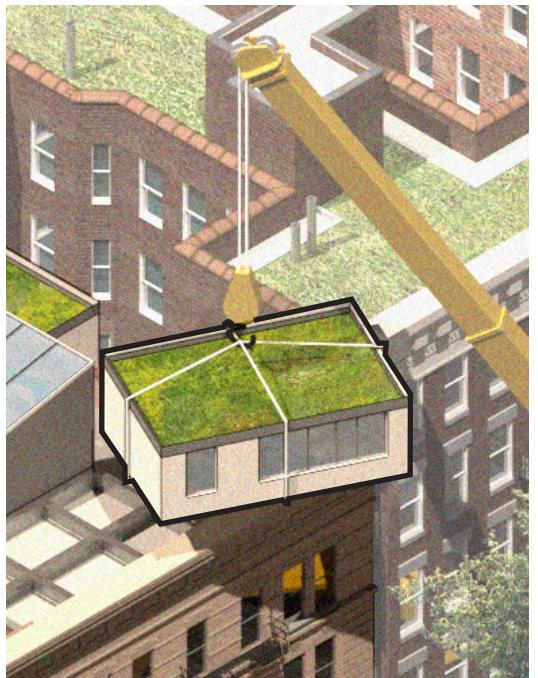
Charlie Sorrel, "To Make More Space, They're Dropping Prefab Penthouses Onto Barcelona Rooftops," *Fast Company* (*Fast Company*, July 20, 2015), <https://www.fastcompany.com/3048175/to-make-more-space-theyre-dropping-prefab-penthouses-onto-barcelona-rooftops>.

Joan Artés, Gerardo Wadel, and Núria Martí, "Vertical Extension and Improving of Existing Buildings," *The Open Construction and Building Technology Journal* 11, no. 1 (2017): pp. 83-94, <https://doi.org/10.2174/1874836801711010083>.

PROPOSED INTERVENTION



PROPOSED INTERVENTION



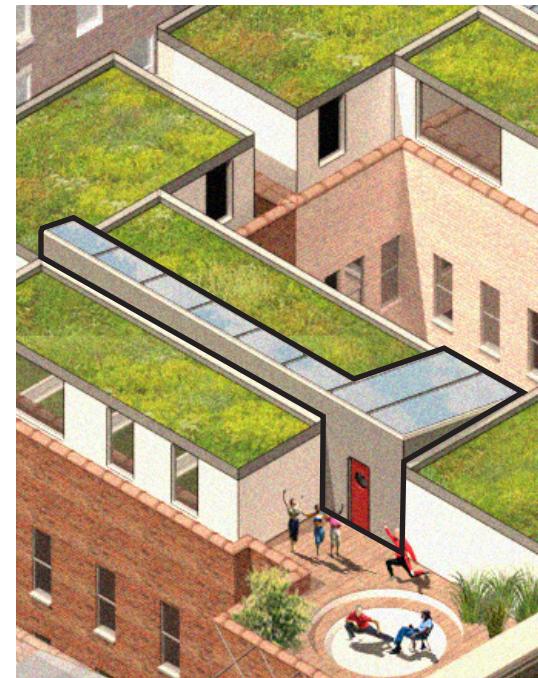
1A
ROOFTOP UNITS, MODULAR & PRE-FABRICATED WHERE POSSIBLE.

Minimize changes to base building
- make it more adaptable for future
changes in use.



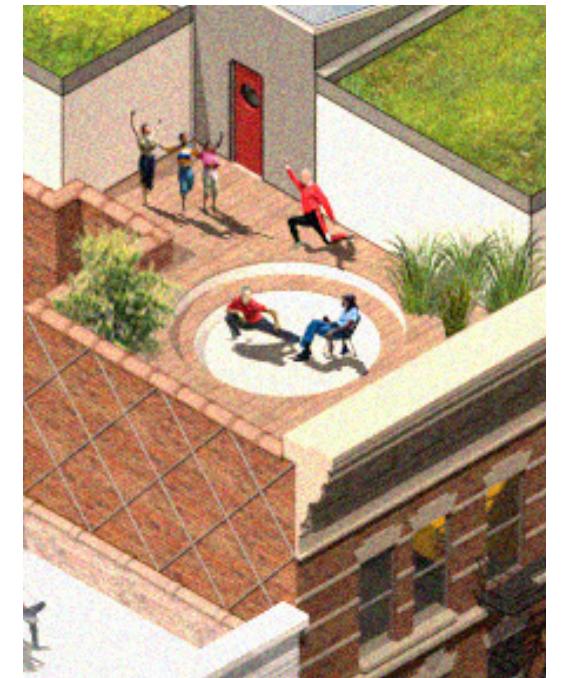
1B
BUILD OUT ROOF LEVEL UNITS TO FULL EXTENT OF SIX FLOOR HEIGHT LIMIT.

Additions on roof should not have to meet setback requirements (ie, at courtyards) until it has reached its maximum allowable height.



1C
TIE IN TO EXISTING STAIRCASE AT ROOF LEVEL FOR CIRCULATION.

Use daylighting and measures to increase ventilation/light for existing stairs in the building and the new circulation corridor - transforming the area from just "circulation" to expanded living space.



1D
BUILD IN COMMUNAL ROOFTOP AMENITY.

Build in new rooftop amenities (deck, roof garden, etc.) that can be used by all residents. Capital gains from the new units can be used to fund the installation and maintenance of new rooftop amenities.

PROPOSED INTERVENTION

1A ROOFTOP UNITS, MODULAR & PRE-FABRICATED WHERE POSSIBLE.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

Despite the steady growth of the modular construction industry for housing projects in NYC, it is still novel in the arena of affordable and retrofit projects. While not inhibiting the implementation of these types of projects, precautionary logistical and financial measures will likely be needed.

1B BUILD OUT ROOF LEVEL UNITS TO FULL EXTENT OF SIX FLOOR HEIGHT LIMIT.

LIMITING REGULATIONS:

MDL §51-6

MDL §104

FRA - SECTION 504

DIFFICULTY: ● ● ●

The combined height of the new rooftop units with any required substructure may place the addition higher than a typically constructed rooftop addition. Depending on the existing height of the building, this may place the addition in the sky exposure plane, requiring setbacks that would limit the available area.

1C TIE IN TO EXISTING STAIRCASE AT ROOF LEVEL FOR CIRCULATION.

LIMITING REGULATIONS:

MDL §211-1

MDL §211-3

MDL §277 - 7 (d)

ZR 12-10

ZR 23-662

DIFFICULTY: ● ●

Ensuring that the circulation system of the existing building, particularly the means of egress, is not compromised during construction may require ancillary precautionary measures.

1D BUILD IN COMMUNAL ROOFTOP AMENITY.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ●

Per Local Laws 92 and 94, newly constructed buildings are mandated to have a green roof to mitigate heat island effect. This mandate should be extended to any new rooftop construction - improve upon the typical existing dark-colored roof membranes of New Law tenements by incorporating (at minimum) planting and heat-reflective materials.

REGULATIONS AS OPPORTUNITIES FOR CHANGE

MDL 51-6

Requires that all buildings which exceed six stories or sixty feet must be equipped with an elevator.

MDL §104

Outlines requirements for egress: some egress routes terminate at the roof, so attics would have to be configured as to not interfere.

MDL §211-1

States that no non-fireproof tenement can be increased in height to exceed five stories, unless the building adheres to certain provisions that apply to tenements built after 1929.

MDL §211-3

States that penthouses can be built in elevator buildings, but that they must be set back at least five feet from the front walls and ten feet from the rear walls of the dwelling and at least three feet from any court wall.

MDL §231

Requires two independent forms of egress, one of which extends to the roof.

MDL §233-1

Requires that tenements have stairs extending to a rooftop bulkhead, with a fireproof door.

MDL §277 - 7 (d)

"a mezzanine may be constructed above the level of the roof of a building as long as the aggregate area of roof structures does not exceed one-third of the total roof area and the roof structures conform with applicable building code requirements.

ZR 12-10

Includes penthouses and attics as part of the total floor area of a building.

ZR 23-132

Sets out regulations for balcony structures such as maximum projection depths, minimum elevational locations, maximum percentage enclosure, and maximum aggregate widths.

ZR 23-22

Provides dwelling unit factor by zoning district to calculate maximum dwelling units allowed based on maximum residential floor area.

ZR 23-662

Lays out height and setback regulations for Quality Housing buildings. Setbacks are triggered after a building reaches its maximum base height and can vary from 10' on a wide street to 15' based on a narrow street. Specific height limitations vary by zoning district.

ZR 25-20

Parking?

2 FIRE ESCAPES

Fire escapes are connected to the majority of non ground-floor units in tenement buildings but are often rendered obsolete by newer modes of interior egress. This outdated but ubiquitous system can be transformed into outdoor spaces, becoming assets for residents, and adapting an iconic part of the New Law tenement to contemporary and future needs.

Only a small handful of New Law tenements have access to dedicated, personal outdoor space. Although some may consider this type of amenity a luxury, rising temperatures in urban centers and COVID-19 shelter-in-place precautionary guidelines have acted as a catalyst in making universal access to safe, outdoor spaces a necessity.

The de facto use of fire escapes as informal extensions of living space illustrates the potential and demand across the city.

Legalizing this informal use will allow for the planning of safe retrofits, access, and adaptation.



01



03



05



02



04



06

FIRE ESCAPES: ONLY DECORATIVE, BUT STILL OFF-LIMITS

In 1860, fire escapes were first mandated for New York City tenement buildings with more than eight families. This legislation, in response to a disastrous fire in a tenement building, regulated tenement construction during a time when overcrowding, shoddy construction, and the doubling of homes as workplaces was rampant and increased the risk of spreading fire.

Many building owners, in resistance to the new financial burden imposed by this law, erected flimsy exterior staircases that were often ineffective and posed additional hazards. In 1901, after a series of sanitary and safety inspections revealed the dangerous conditions of fire escapes across the city, regulations became stricter. Rules were further strengthened following the infamous Triangle Shirtwaist Factory fire in 1911.

The iconic cast-iron fireproof fire escape became ubiquitous across the city, replacing any previous versions of fire escapes. Despite the improvement to safety, the fire escapes caused an uproar with those who considered the iron structures an eyesore on the architecture.

Requirements for exterior fire escapes ceased after the 1968 Building Code, when new typologies such as the high rise coincided with new methods of fire egress. Currently, many of the fire escapes affixed to buildings are relics - replaced by interior, fireproof means of egress. Many remaining fire escapes have fallen into disrepair, becoming hazardous appendages hanging off the side of the buildings. There is a movement to remove the fire escapes from buildings altogether, however, much like the controversy between safety and aesthetics that surrounded its conception, many preservationists see them as important parts of the character of the cityscape that should be preserved.

*Image 01 Wurts Bros, East 77th Street and Cherokee Place. Vanderbilt model tenement buildings, 1911, Museum of the City of New York.
<https://collections.mcny.org/Collection/East%2077th%20Street%20and%20Cherokee%20Place.%20Vanderbilt%20Model%20Tenement%20Buildings-24UAKV7L7L7.html>*

*Image 02 Wurts Bros, Vanderbilt Model Tenements, 1911, Museum of the City of New York.
<https://collections.mcny.org/Collection/Vanderbilt%20Model%20Tenements-24UAKV7BTZ1.html>*

Hana R. Alberts, "Dear NYC Fire Escapes, You Are Iconic and We Would Miss You," Curbed NY (Curbed NY, April 13, 2015), <https://ny.curbed.com/2015/4/13/9971046/dear-nyc-fire-escapes-you-are-iconic-and-we-would-miss-you>.

Pippa Biddle, "Fire Escapes Are Evocative, But Mostly Useless," The Atlantic (Atlantic Media Company, February 26, 2018), <https://www.theatlantic.com/technology/archive/2018/02/how-the-fire-escape-became-an-ornament/554174/>.

"Fire-Escapes Erected after October First, Nineteen Hundred and Thirteen, on Buildings Theretofore Erected," NY State Senate, November 21, 2020, <https://www.nysenate.gov/legislation/laws/LAB/273>.

Amber Jamieson, "Safety Concerns Could Make NYC's Fire Escapes a Thing of the Past," New York Post (New York Post, April 12, 2015), <https://nypost.com/2015/04/12/fire-escapes-could-be-a-thing-of-the-past-due-to-safety-concerns/>.

Tanya Reilly, "Fire Escapes," No Idea Blog, accessed December 13, 2020, <https://noidea.dog/fires>.

Stephen Varone, AIA and Peter Varsalona, PE, "Refurbishing a Fire Escape," RAND Engineering & Architecture, DPC, July 2008, <https://randpc.com/ask/exterior-repair-and-maintenance/fire-escape>.



Image 07 (Above) | Access to balconies facilitated by floor-to-ceiling windows. East River Homes / Shively Sanitary Tenements

Image 08 (Right) | View of balconies at East River Homes / Shively Sanitary Tenements



EAST RIVER HOMES A.K.A. SHIVELY SANITARY TENEMENTS: THE LONGEVITY OF BALCONIES

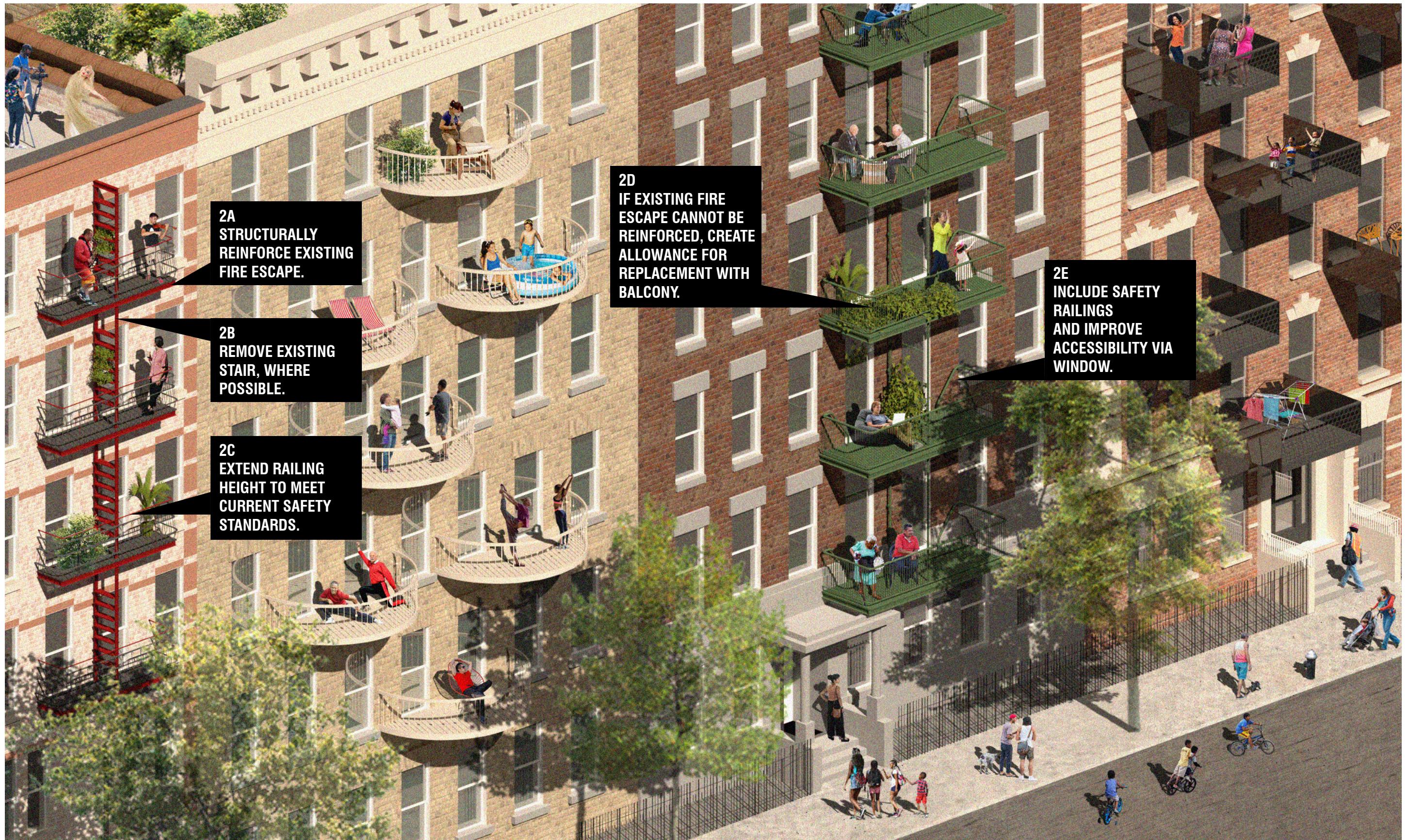
The East River Homes, built in 1910, were progressive New Law tenement buildings focused on creating healthy environments during the turn-of-the-century tuberculosis (TB) crisis in New York City. During this period, the rapid spread of tuberculosis led to citywide shortages of beds in TB treatment clinics and institutions. For TB patients without access to clinics or countryside retreats, home care became the only viable alternative for recovery and treatment - the prescribed treatment at the time being abundant rest in well-lit, well-ventilated environments.

While the 1901 New Tenement Law was an effort to ensure a minimum level of light and ventilation to all tenement buildings across the city, the East River Homes established itself as a particularly exemplary embodiment of these goals. Based on Dr. Henry Shively's progressive theories of healthy living environments, and the innovative architecture of Henry Atterbury Smith, the East River Homes sought to maximize access to light and air throughout the entire building as well as from each unit.

Standout architectural elements included open-air communal staircases, rooftop pergolas with integrated seating, floor-to-ceiling operable windows in the units, and "sleeping balconies." The balconies, in particular, were an exceptional rarity - its architectural significance made clear through the robust form and ornate design, including a tiled soffit. The depth of the balconies were deliberately designed to accommodate a sleeping cot for open-air rest, and extended the space of the home, particularly valuable for home-bound patients and their families.

Ultimately, the cumulative 'luxuries' of the buildings rendered it too expensive for its intended users. The New York Association for Improving the Conditions of the Poor leased 48 of the 383 apartments as a "Home Hospital" until 1923 when the charitable trust that governed East River Homes was dissolved and the buildings were sold to the City and Suburban Homes Company. However, despite the short-lived stint serving its intended purpose, the East River Homes have retained a highly desirable status and are still one of the only examples of early 1900s New York City architecture where occupants have access to personal outdoor space.

PROPOSED INTERVENTION



PROPOSED INTERVENTION



2A
STRUCTURALLY REINFORCE EXISTING FIRE ESCAPE.

If existing fire escape structure is in an acceptable condition to meet safety standards, reinforce its connection to the building.



2B
REMOVE EXISTING STAIR, WHERE POSSIBLE.

Where fire escapes have been replaced as a secondary means of egress by an interior fireproof egress system, stairs and ladders should be removed to maximize useable space on the fire escape.



2C
EXTEND RAILING HEIGHT TO MEET CURRENT SAFETY STANDARDS.

Install an additional handrail if existing fire escape does not meet current standards for safe barrier height. Include provisions so that entire guardrail meets safety standards.



2D
IF EXISTING FIRE ESCAPE CANNOT BE REINFORCED, CREATE ALLOWANCE FOR REPLACEMENT WITH BALCONY.

Where the existing fire escape structure cannot be safely retrofit, create allowance for a new lightweight balcony structure that can replace at the location of the fire escapes. New balcony structure can be expanded in size as long as it does not impede onto the window of another unit.



2E
INCLUDE SAFETY RAILINGS AND IMPROVE ACCESSIBILITY VIA WINDOW.

Modify access window (increase opening if necessary) to improve accessibility. Include support railing leading from access window if balcony ground does not align with unit ground level.

Lower ground level of the balcony to align with ground level inside unit, if possible.

PROPOSED INTERVENTION

2A STRUCTURALLY REINFORCE EXISTING FIRE ESCAPE. IF NOT POSSIBLE, SKIP TO '2D'

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

Dependent on the structural integrity of the existing fire escape as well as the capability and condition of the existing walls to support additional structural loads.

2B REMOVE EXISTING STAIR, WHERE POSSIBLE.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

Dependent on the complexity of dismantling the fire escape system - in some cases, stair ladder removal may affect an integral part of the fire escape support structure.

2C EXTEND RAILING HEIGHT TO MEET CURRENT SAFETY STANDARDS.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ●

Pre-fabricated guardrail attachment should be affixed to existing structure as necessary to meet proper safety regulations.

2D IF EXISTING FIRE ESCAPE CANNOT BE REINFORCED, CREATE ALLOWANCE FOR REPLACEMENT WITH BALCONY.

LIMITING REGULATIONS:

RCNY §15 -10

DIFFICULTY: ● ● ●

In addition to ensuring adequate structural integrity of the existing wall, and overcoming regulatory barriers, complex staging may be required to install the new balconies.

2E INCLUDE SAFETY RAILINGS AND IMPROVE ACCESSIBILITY VIA WINDOW.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

Eliminating physical barriers to access new balconies will - in most cases - require window enlargements as well as reconfiguring interior conditions. The variables in interior conditions may change the level of complexity.

REGULATIONS AS OPPORTUNITIES FOR CHANGE

MDL §26 - 9 (b)

Excludes fire escapes from floor area calculations.

MDL §62 - 2

Prevents the affixing of any wires to fire escapes.

MDL §277 - 9 (a)(i)

Requires a fire escape from every (non-fireproof) dwelling unit.

MDL §53 - 3

States that fire escapes cannot project more than 4.5 feet from the lot line and must be at least 10 feet from the ground plane.

MDL 53 - 4 (a)

Requires "Every fire-escape shall be constructed of open balconies and stairways of iron or stone capable of sustaining a load of at least eighty pounds per square foot."

MDL 53 - 4 (b)

Requires "balconies for fire-escapes shall be three feet or more in clear width" except for converted buildings, which can have two feet.

MDL 53 - 4(c)

Requires "every stairway shall be placed at an angle of sixty degrees or less with flat open steps at least six inches in width and twenty inches in length and with a maximum rise of nine inches. The opening in any balcony for such a stairway shall be at least twenty-one by twenty-eight inches."

RCNY §15 -10

No existing fire-escape shall be extended or have its location changed except with the written approval of the Department of Buildings

3

FAÇADE EXTENSIONS

The façades of rear-, side-, and court yards in New Law tenements are generally simple and subdued. Paired with standardized setback distances, these façades hold the potential to become activated as new outdoor spaces and extensions of living space.

The rear-, side-, and court yards mandated by the New Law were deployed as a means to ensure a minimum level of light and air to units. There is potential to access these outdoor yards, adding further value to an otherwise void space.

Much like the fire escape, utilizing standardized elements of the New Law tenements is a strategy to affect a widespread transformation of existing units.

NEW LAW TENEMENT FAÇADES

THE UBIQUITY OF LOAD-BEARING MASONRY CONSTRUCTION

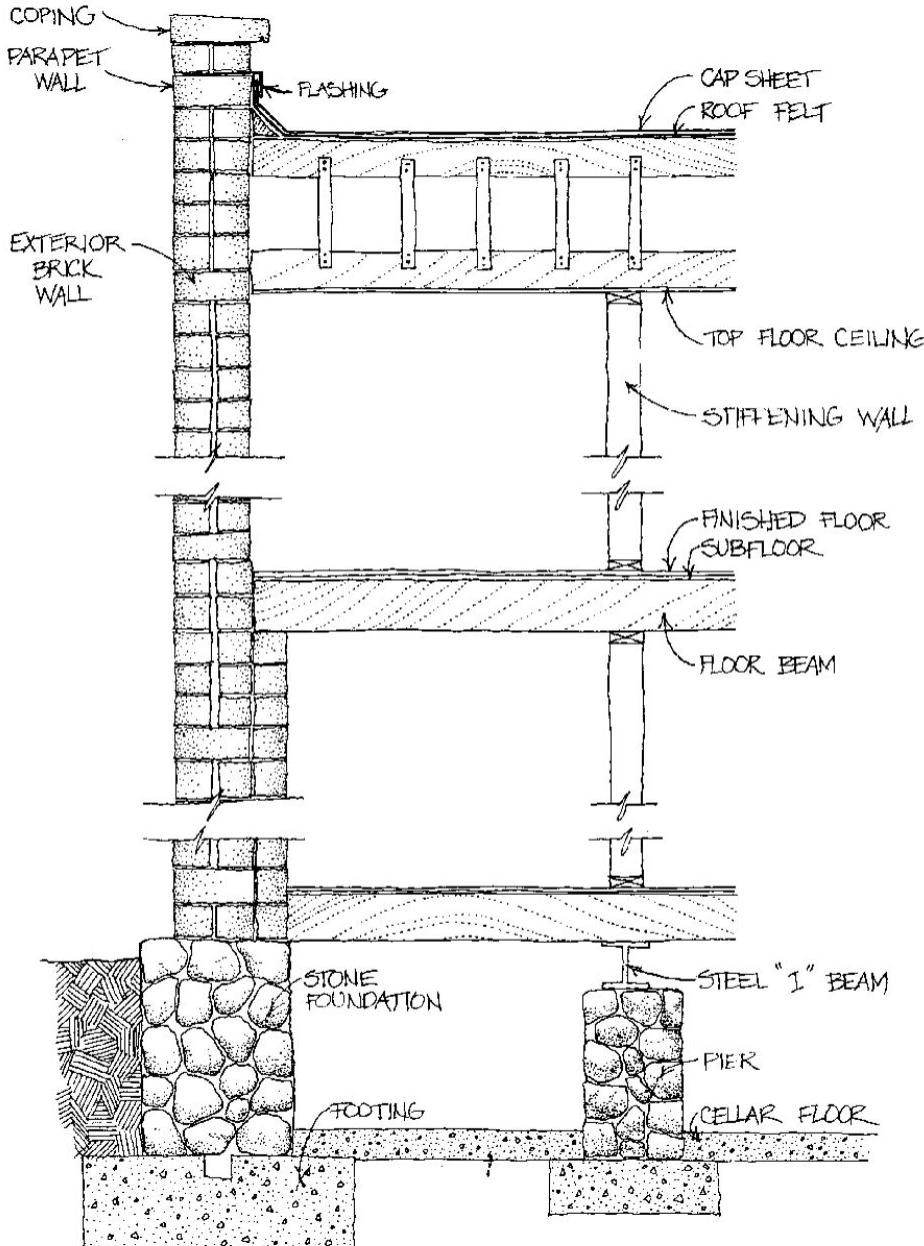


Image 09 | Typical section of load-bearing brick masonry wall construction utilized for New Law Tenements.

The use of load-bearing brick masonry construction for tenement buildings resulted from the New Tenement Law mandating the use of fireproof construction for all new buildings. The widespread availability of clay and existing brick-making industries in the Hudson Valley region, and an abundance of labor were able to fulfill demands during the building boom, leading to the proliferation of brick as the fireproof material of choice and cementing its foothold in New York City tenement architecture.⁴

Typically supported by a stone masonry foundation, the load-bearing brick masonry walls would be constructed 3 to 4 wythes (the width of a brick) thick on at least the first story to support the compressive loads from above, and taper to 2 wythes thick for floors above. Wooden floor and roof joists would be supported by the brick masonry wall.⁵ The New Law also legislated minimum fenestration openings of 12 square feet per room (excluding windows in bathrooms) to ensure adequate ventilation.⁶

The combination of legislation, technological limitations, and material availability of the period led to relatively consistent facades for the bulk of buildings constructed during this period. Ornamentation, made of terracotta and stone, gave differentiation to the buildings, varying on the aesthetic preferences of the architects and developers, and the skillsets of the available local labor. However, the ornamentation was typically isolated for street facades - arguably a superficial treatment deployed by developers to feign prestige for buildings.⁷ Facades that were less visible from the street, such as in the side-, rear-, and courtyards were generally left unadorned though for a period it was mandated that they be whitewashed or plastered with a light color.⁸

While load-bearing brick masonry facades have generally withstood the test of time, continual upkeep is required to ensure that its structural and protective integrity are not compromised from environmental factors such as freeze/thaw cycles.

⁴Jessica Georges, "Notes on Manhattan Bricks," The Gotham Center for New York City History (The Gotham Center for New York City History, May 7, 2012), <https://www.gothamcenter.org/blog/notes-on-manhattan-bricks>

⁵https://www.uhab.org/sites/default/files/doc_library/A_Guide_to_Maintenance_and_Repair.pdf

⁶https://www.people.iup.edu/rhoch/ClassPages/Intro_Planning/Readings/tenementhouselaw00fryerich.pdf (Section 68)

⁷Zachary J. Violette, "Ornament and Identity in the Immigrant-Built Tenements of Boston and New York, 1870-1920," Material Matters, 2012, <https://sites.udel.edu/mcses2012/papers/paper-iv/>.

⁸https://www.people.iup.edu/rhoch/ClassPages/Intro_Planning/Readings/tenementhouselaw00fryerich.pdf (Section 107)



Image 10 | Before and after of the apartment block transformation. Photograph by Philippe Ruault.



Image 11 | Interior View of unit with facade extension. La Tour Bois le Prêtre, Paris. Architects Lacaton & Vassal. Photograph by Frédéric Druot.

TRANSFORMATION OF 530 DWELLINGS IN BORDEAUX, FRANCE BY LACATON VASSAL, FRÉDÉRIC DRUOT, CHRISTOPHE HUTIN

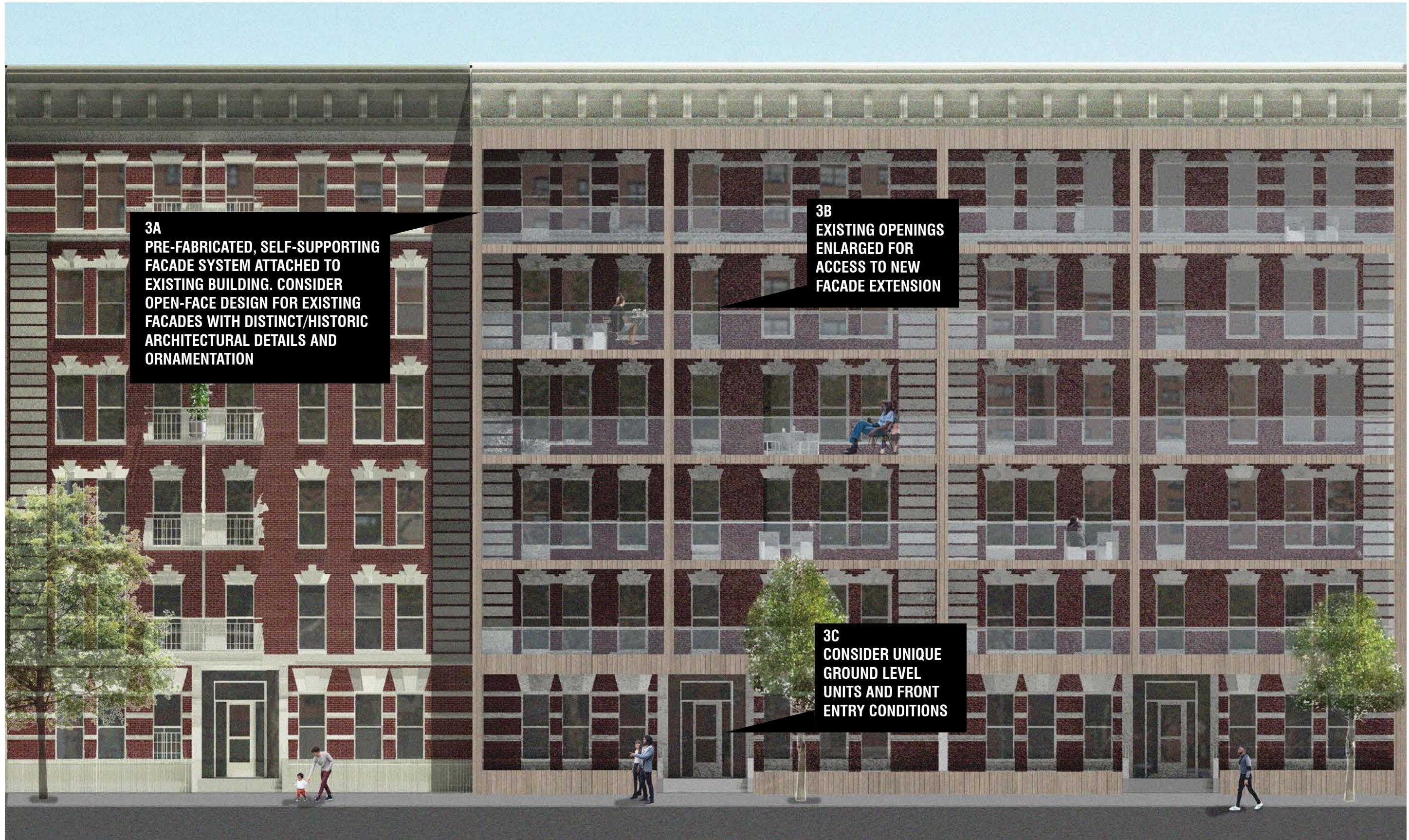
Cite du Grand Parc, a postwar social housing apartment block in Bordeaux France, was in a state of slow decline and slated for demolition when architects Lacaton Vassal, Frédéric Druot, and Christophe Hutin intervened with an alternative retrofit solution.

A self-supporting structure was added onto the exterior facades of the building, extending the living spaces and operating as enclosable sunrooms, terraces, and balconies. The existing punched windows on the facade were removed and replaced with floor-to-ceiling sliding glass doors that also access onto the facade extensions while also allowing deeper penetration of light and air into the units. Views from the units were enhanced, the height of the modernist tower being an asset that is no longer permissible by the region's zoning laws. Overall, 16,000 m² (172,000 ft²) of extended space was added to the building.

The social fabric of the block was also able to remain relatively undisturbed. The use of pre-fabricated elements ensured that residents were not displaced during the construction process and that the community could remain intact after completion of the project. The improvement to the quality of light and air in the units as well as the extensions of space offered a new type of dwelling environment not typically found in social housing projects. The cost - 27,200,000 Euros - and environmental impacts of the project were also considerably lower than what a full demolition and construction of new buildings would have amounted to.

The act of adapting rather than razing the postwar modernist towers was an evolutionary step for a typology that is often vilified, and exemplified the necessary marriage of social, economic, and environmental sustainability factors to drive this evolution.

PROPOSED INTERVENTION: TYPE 1



PROPOSED INTERVENTION: TYPE 2



DRAFT V1

DRAFT V1

PROPOSED INTERVENTION: INTERIOR VIEW



EXISTING CONDITION

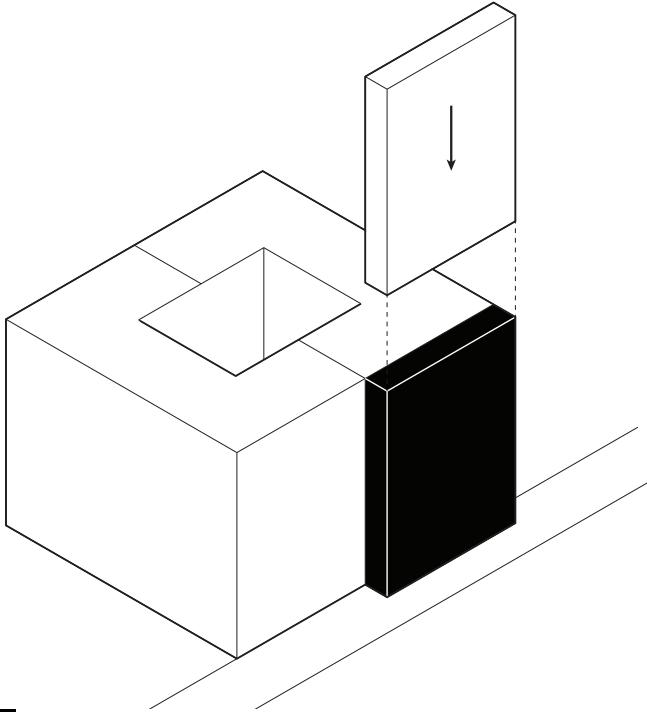


WINDOW ENLARGEMENT
(ACCESS TO FACADE EXTENSION)



FACADE REPLACEMENT

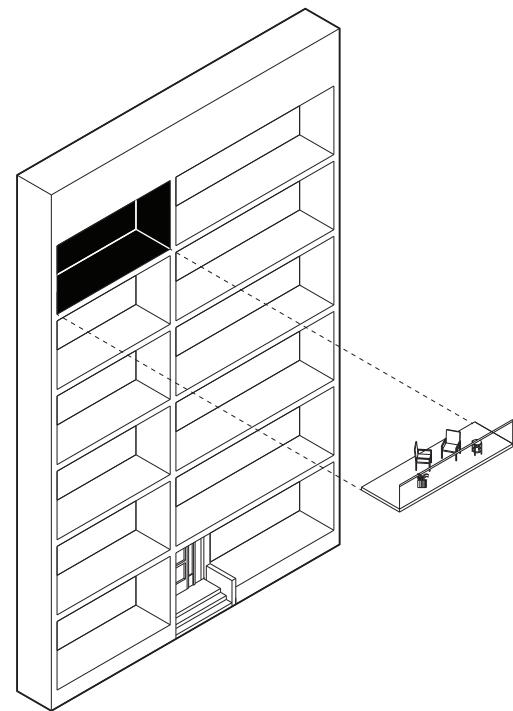
PROPOSED INTERVENTION

**3A**

Pre-fabricated, self-supporting facade system attached to existing building.

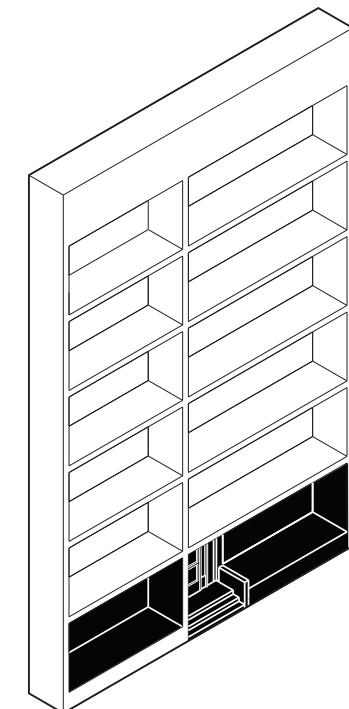
Fabricate parts and system off-site, employing modular techniques as much as possible. System should be designed to be self-supporting, carrying weight to the ground level. Attachment to existing facade should only be for lateral support.

Variations to the ground level of enclosure (i.e. operable windows) for the extension to be expected.

DRAFT V1**3B**

Existing openings enlarged for access to new facade extension.

Modify access window by increasing opening size where necessary to improve accessibility. Align facade extension ground level to the ground level inside unit, if possible.

**3C**

Consider unique ground level unit and front entry conditions.

Where the intervention meets the ground level, it should seek to improve accessibility to the building, if possible.

DRAFT V1

PROPOSED INTERVENTION

3A PRE-FABRICATED, SELF-SUPPORTING FACADE SYSTEM ATTACHED TO EXISTING BUILDING

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

While pre-fabricated parts and systems will ease implementation, the varying conditions of the existing facades, including preservation of any historic or architecturally significant details will add complexity.

3B EXISTING OPENINGS ENLARGED FOR ACCESS TO NEW FACADE EXTENSION

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

Eliminating physical barriers to access new balconies will - in most cases - require window enlargements as well as reconfiguring interior conditions. The variables in interior conditions may change the level of complexity.

3C CONSIDER UNIQUE GROUND LEVEL UNIT AND FRONT ENTRY CONDITIONS.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ● ●

General considerations such as safety and accessibility affected by site-specific variables of ground level units configurations, sidewalk width, and topography will change the level of complexity.

REGULATIONS AS OPPORTUNITIES FOR CHANGE

MDL §9

Pertaining to buildings converted or altered after 1961, no multiple dwelling shall be enlarged or its lot diminished so that the yard or other unoccupied areas shall be less in size or area than the minimum dimensions prescribed in section twenty-six. One possible change could be to allow for exceptions if provable to not impact light to units.

MDL §6 (b)

Requires 30 foot rear yard for buildings more than 125 feet above curb level, but states that ZR requirements override.

MDL §26 - 9(c)

Every yard and court shall be open and unobstructed at every point from the lowest level to the sky except for permitted obstructions (Outside stairways, fire towers, platforms or balconies or other similar projections).

MDL §30

Lists rules and allowances for enclosed balconies, but only for buildings constructed after 1929.

ZR 23-44 (b)

Lists allowable obstructions in a rear yard - which does not include something akin to enclosed balconies.

ZR 23-47

Requires minimum 30-feet deep rear yards for interior block lots

4 **ELEVATORS**

New York City's supply of accessible housing – let alone *affordable accessible housing* – is limited at best. Federal fair housing laws passed in the late 1980s guarantee that most condo, co-op and rental buildings constructed in New York after 1990 are accessible to people with mobility needs. In practice, however, inaccessible conditions are still widespread, and buildings from the early 20th century still predominately have a barriers to entry.

Making New Law tenement buildings more accessible can alleviate some of the disparities in affordable accessible housing by making a greater number of units across the city accessible.

Retrofitting tenements with elevators also creates an opportunity for vertical growth, making possible multi-story rooftop ADUs or more substantive vertical additions.



Image 12 | Entry to 510 Ocean Parkway (built 1931). An elevator addition is prominently displayed in the front yard.

BACKGROUND: ELEVATORS

The elevator was invented in Lower Manhattan in 1850 to move freight in shipyards on the waterfront. Just seven years later, the first passenger elevator was installed in the five-story Eder V. Haugwout Building in SoHo nearby. Though the advent of passenger elevators coincided with the proliferation of tenement building construction in New York, tenements were designed and built for affordability and as such did not incorporate the new technology. Still today, few tenement buildings in New York are equipped with elevators, likely due to the significant costs, structural modifications and permits often associated with installation.



Image 13 | An aerial view of 155 Ross Street (built 1915) shows an elevator addition in the central courtyard.

78

ELEVATORS



Image 14 | An aerial view of 510 Ocean Parkway (built 1931) shows an elevator addition in the front yard.

DRAFT V1

CASE STUDY: ELEVATORS

There is already well-documented precedent for adding elevators in the city's tenement houses. In January 1988, the New York Times called the process of retrofitting a tenement airshaft with an elevator "standard practice" in renovations to the buildings across the city. Elevator shafts have also been added externally, extending into the "open core" created by tenement courtyards, backyards and side yards. In some cases, neighboring tenement buildings have been joined to share an elevator built between them and able to service tenants in both buildings.

Internal Elevator Retrofits:

In 1988, J. Harvey Rosenthal, who owned more than a dozen tenements on the Upper East Side, renovated an Old Law tenement on East 63d Street at First Avenue, making few changes to the original unit layouts but installing an elevator in the building's former air shaft. "You can do a lot with a tenement for less than building a new apartment," Rosenthal told the New York Times. "You end up with something that more people can afford."

In 1983, developer Firestone Associates constructed an elevator shaft in the space between two five-story tenements at 226 East 95th Street, to make the development's 29 apartments more accessible. The elevator was constructed as to not be visible from the street.

External Elevator Retrofits:

In 1983, Architect George Schwarz installed an exterior elevator in a 55-unit, five-story building at 155 Ross Street in Williamsburg, Brooklyn (pictured top left). The building had a central court measuring nearly 600 square feet and corridors that joined at a corner facing courtyard to allow for the shaft to be installed without displacing tenants.

Alternatively, exterior elevator retrofits have also been carried out to be highlighted as an architectural feature, such as the case with 510 Ocean Parkway in Brooklyn (pictured bottom left and on previous spread). Designed by the firm DiFiore & Giaccobi, the elevator cab was centered strategically in the front entry yard, marking the entrance, and connecting the two wings of the building. Modifications were made to two units on every floor to accommodate access to the elevator from the public corridor. Prominent display of the elevator cab, rather than attempting to conceal its presence is an uncommon but notable strategy.

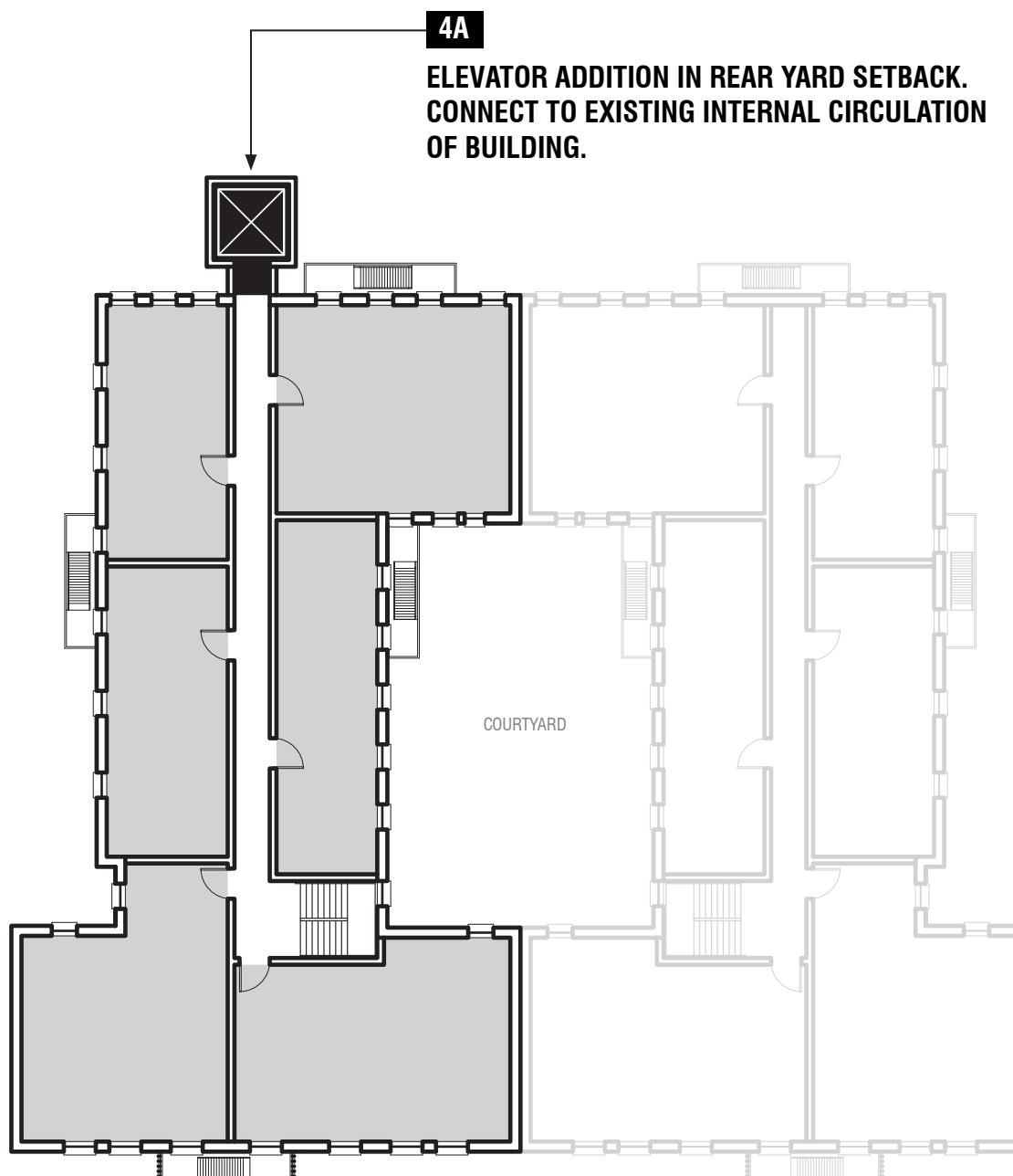
DRAFT V1

PROPOSED INTERVENTION

GSAPP HOUSING LAB

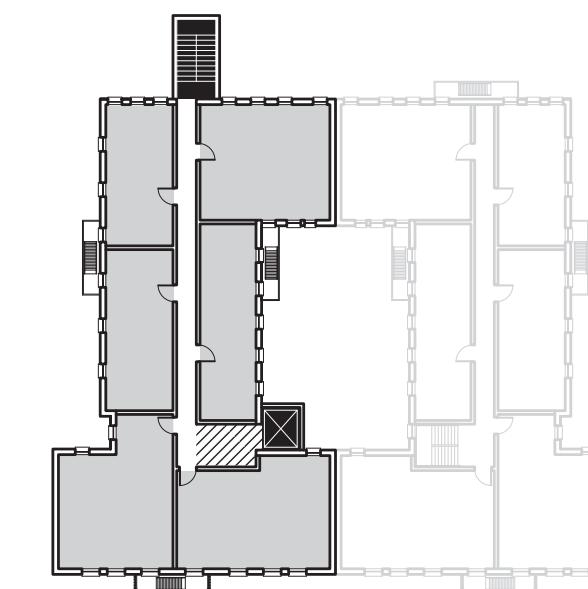
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ELEVATORS



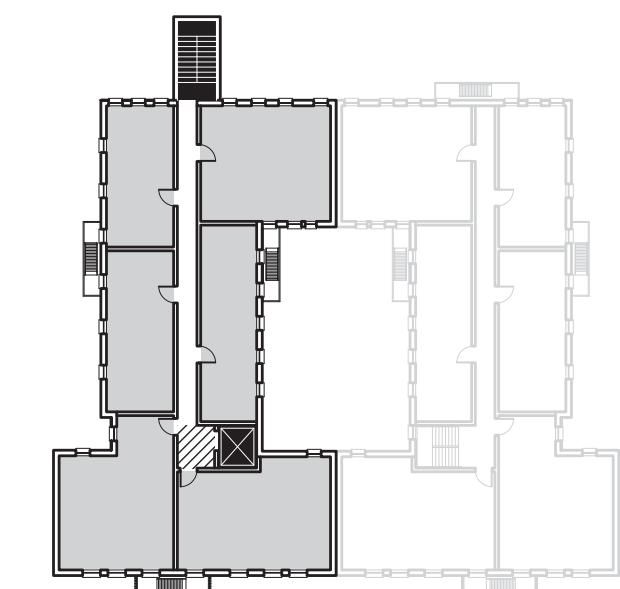
4A

ELEVATOR ADDITION IN REAR YARD SETBACK.
CONNECT TO EXISTING INTERNAL CIRCULATION
OF BUILDING.



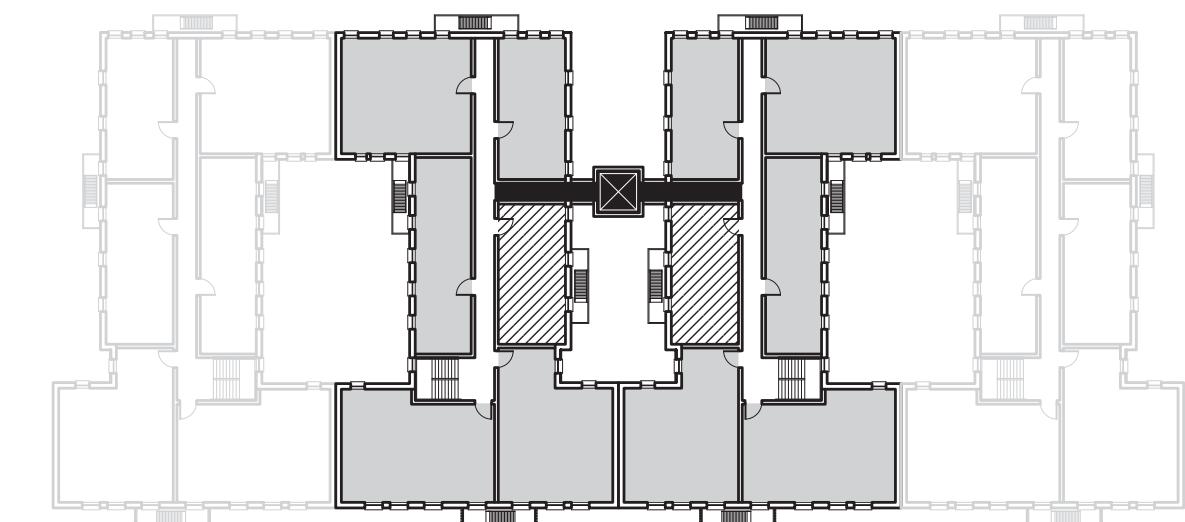
4B ALTERNATIVE 1

ELEVATOR ADDITION IN COURTYARD.
EXISTING STAIR REMOVED AND REPLACED
WITH NEW STAIR IN REAR YARD.
MODIFICATIONS TO BASE BUILDING
REQUIRED.



4C ALTERNATIVE 2

ELEVATOR ADDITION REPLACES LOCATION
OF EXISTING STAIR. EXISTING STAIR
REMOVED AND REPLACED WITH NEW
STAIR IN REAR YARD.
MODIFICATIONS TO BASE BUILDING
REQUIRED.



4D ALTERNATIVE 3

ELEVATOR ADDITION WITHIN SIDE YARD SETBACK
TO SERVICE TWO BUILDINGS.
MODIFICATIONS TO BASE BUILDING REQUIRED.

DRAFT V1

DRAFT V1

GSAPP HOUSING LAB

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ELEVATORS

PROPOSED INTERVENTION

4A ELEVATOR ADDITION IN REAR YARD SETBACK. CONNECT TO EXISTING INTERNAL CIRCULATION OF BUILDING, IF POSSIBLE.

LIMITING REGULATIONS:

MDL §9
MDL §26 - 5b
ZR 23-44 (b)

DIFFICULTY: ● ●

If the public hall does not terminate at or have a rear-yard facing elevation, base building unit layouts will require modification. Units on multiple floors will lose area and may need to be vacated. The elevator shaft addition in the rear yard cannot encroach on light or ventilation for existing units.

4B ELEVATOR ADDITION IN COURTYARD. EXISTING STAIR REMOVED, REPLACED WITH NEW STAIR IN REAR YARD.

LIMITING REGULATIONS:

MDL §9
MDL §26 - 7b
ZR 23-44 (b)

DIFFICULTY: ● ●

The elevator shaft addition in the courtyard and new stair in rear yard cannot encroach on light or ventilation for existing units. As with Alternative 4A, area loss in units and temporary vacancies may be necessary if the public hall cannot connect directly to the new stair addition in the rear yard.

4C ELEVATOR ADDITION REPLACES LOCATION OF EXISTING STAIR. EXISTING STAIR REPLACED WITH NEW STAIR IN REAR YARD.

LIMITING REGULATIONS:

MDL §9
ZR 23-44 (b)

DIFFICULTY: ● ●

Space constraints may limit abilities to construct the new elevator shaft in the location of the existing stair. As with Alternative 4A/B, area loss in units and temporary vacancies may be necessary if the public hall cannot connect directly to the new stair addition in the rear yard.

4D ELEVATOR ADDITION WITHIN SIDE YARD SETBACK TO SERVICE TWO BUILDINGS.

LIMITING REGULATIONS:

MDL §9

DIFFICULTY: ● ● ●

Area loss in units and temporary vacancies on multiple floors may be necessary if the public hall cannot connect directly to the new elevator addition. Size constraints of the shared side or courtyard may limit the ability to add in a new elevator shaft.

REGULATIONS AS OPPORTUNITIES FOR CHANGE

MDL §9

Pertaining to buildings converted or altered after 1961, no multiple dwelling shall be enlarged or its lot diminished so that the yard or other unoccupied areas shall be less in size or area than the minimum dimensions prescribed in section twenty-six. One option for change would be to grant exceptions for small encroachments for stair/elevators if it does not negatively affect light/ventilation in units.

MDL §26 - 5b

(For buildings built before 1961) Requires minimum 30-feet deep rear yards for interior block lots. A minimum depth of a required rear yard shall be thirty feet for the first one hundred twenty-five feet above curb level, and fifty feet above that point (if elevator or second stair is built in rear yard)

MDL §26 - 7b

(For buildings built before 1961) Requires minimum 15-feet width at any point. One possibility for change would be if the elevator is built in a back court yard, have some allowance depending on configuration of units around it, for example if it can be shown that it does not block light.

ZR 23-44 (b)

Lists allowable obstructions in a rear yard - does not include elevators or new egress stairs.

5

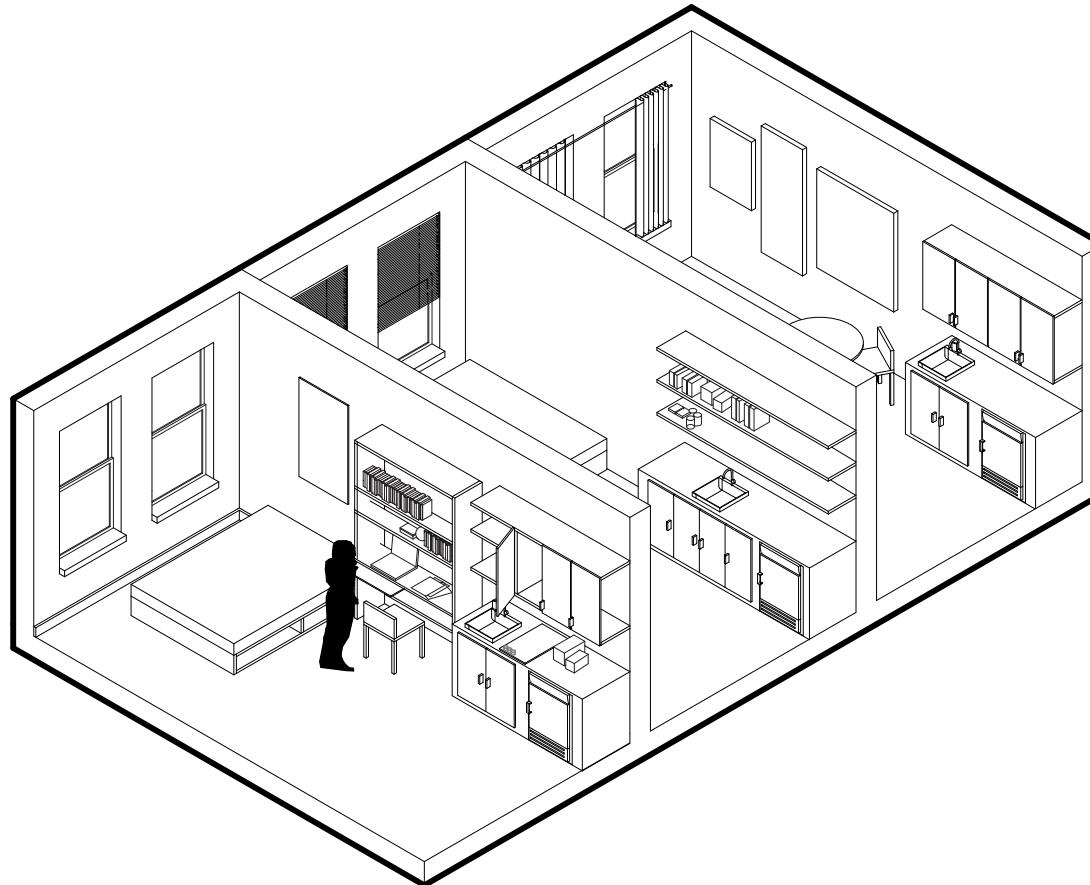
SINGLE ROOM OCCUPANCY (SRO)

SRO units—private rooms with shared bathroom and kitchen facilities—are an affordable and flexible housing option for single adults. Over the course of the 20th century, SROs were disincentivized in New York City. However, the SRO didn’t disappear—it was just renamed.

In recent decades, nonprofits have combined SRO units with social services in “supportive housing” buildings, start-ups have rebranded SROs as luxury “co-living,” and thousands of New Yorkers have teamed up with friends or strangers in de-facto SROs known as “apartment shares.” These models show that SROs remain a desirable form of housing for the growing number of New Yorkers who live in individual households.

Including SRO units in New Law tenement buildings can increase the number of affordable housing units in the city and provide new options for the growing number of single adult households.

High-quality SROs—individual rooms with generous shared facilities and clear maintenance protocols—can be reasonably integrated into New Law tenement buildings and paired with new shared amenities accessible to all residents.



BACKGROUND: SINGLE ROOM OCCUPANCY

Single Room Occupancies (SROs) are units in multifamily residential buildings, in which residents occupy a single bedroom (or sometimes two small rooms). Typically under 300 sqft, SRO units often lack a complete bathroom or kitchen, and residents share access to a bathroom, kitchen, or other living areas. In the early 20th century, an estimated 200,000 New Yorkers –10% of the city’s total housing stock– lived in SRO buildings, providing an affordable source of housing for single adults including immigrants, the unemployed, and the formerly homeless.⁹ Around the mid-century, a series of policy changes, including a 1955 law that banned the construction of new SROs and the J-51 tax break, which incentivized the conversion of existing SROs into market-rate apartments, decimated the city’s stock of SROs.¹⁰ An estimated 30,000 SROs are left in New York City today.

Although existing laws ban new SRO construction (except for supportive housing), SROs have the potential to provide greater housing choice to low-income renters. Similar to basement apartments, SROs provide a viable form of affordable housing for single adults, including students, low-income renters, and immigrants. In Seattle and San Francisco, where new SRO construction is allowed, policymakers have started to turn towards SROs as a model to increase the supply of dense, affordable housing. These precedents suggest that there is both the demand and the policy environment to support new SRO construction in cities that like New York are facing escalating housing costs.

⁹ Brian J. Sullivan and Jonathan Burke, "Single-Room Occupancy Housing in New York City: The Origins and Dimensions of a Crisis," CUNY Academic Works, 2013, <https://academicworks.cuny.edu/clr/vol17/iss1/5/>.

¹⁰ "History of Supportive Housing: What Is Supportive Housing?," The Network: Supportive Housing Network of New York, accessed December 13, 2020, <https://shnny.org/supportive-housing/what-is-supportive-housing/history-of-supportive-housing>.



Image 15 | Michael Maltzan Star Apartments



Image 16 | Weldon Hotel communal outdoor area

CASE STUDY: LOS ANGELES' "RESIDENTIAL HOTELS"

In Los Angeles, the public and nonprofit sectors have moved aggressively to preserve and construct SRO options for the formerly homeless. Los Angeles' street homelessness crisis is so dire that it has drawn the attention of the United Nations Special Rapporteur on Extreme Poverty.¹¹ The long running and intractable nature of the crisis has forced the city to recognize SROs as an important source of affordable housing and prioritize the preservation of SRO units. Following the loss of thousands of SRO units in the early-2000s, Los Angeles officials launched a temporary moratorium on SRO conversions.¹² In 2008, the city council unanimously passed a permanent ordinance to replace the moratorium. The law strengthens protections of SRO buildings—which are referred to in L.A. as “residential hotels”—and requires developers replace any SRO units lost to conversion or demolition. While it is legal to demolish a residential hotel, the ordinance mandates that developers either reconstruct the units themselves (within a 2-mile radius of the original location) or reimburse the city for the cost of doing so.¹³

As a result of the residential hotel ordinance, and the concerted effort of the city’s nonprofit sector, almost 5,000 formerly-homeless individuals are now housed in either SROs or supportive housing units in the city’s infamous Skid Row.¹⁴ The Skid Row Housing Trust, established in 1989, is at the forefront of this preservation and new construction effort.¹⁵ The trust has commissioned a handful of high-profile Los Angeles architects to construct new efficiency apartment units in innovative buildings on difficult lots (see image 15). The organization also manages over a dozen renovated residential hotels with a mix of SRO and efficiency units. Examples of the trust’s buildings include the Weldon Hotel Apartments—renovated by Brooks + Scarpa—which combines 58 SRO units with high-quality common spaces and outdoor areas (see image 16).¹⁶ The trust’s renovated residential hotels and the Los Angeles anti-demolition ordinance show that with progressive public policy, proper management, and good design, SRO units can be a crucial source of affordable housing.

¹¹ Ed Pilkington, “A Journey through a Land of Extreme Poverty: Welcome to America,” *The Guardian* (Guardian News and Media, December 15, 2017), <https://www.theguardian.com/society/2017/dec/15/america-extreme-poverty-un-special-rapporteur>.

¹² <https://www.innercitylaw.org/wp-content/uploads/2018/06/skid-row-zoning.pdf>

¹³ Anna Scott, “New Law Protects Residential Hotels Ordinance Aims to Preserve Low-Income Housing, Much of It in Downtown,” *Downtown Los Angeles News*, May 12, 2008, http://www.ladowntownnews.com/news/new-law-protects-residential-hotels/article_a8557453-67f5-590e-a0c0-1e94a41fac23.html.

¹⁴ <https://www.innercitylaw.org/wp-content/uploads/2018/06/skid-row-zoning.pdf>

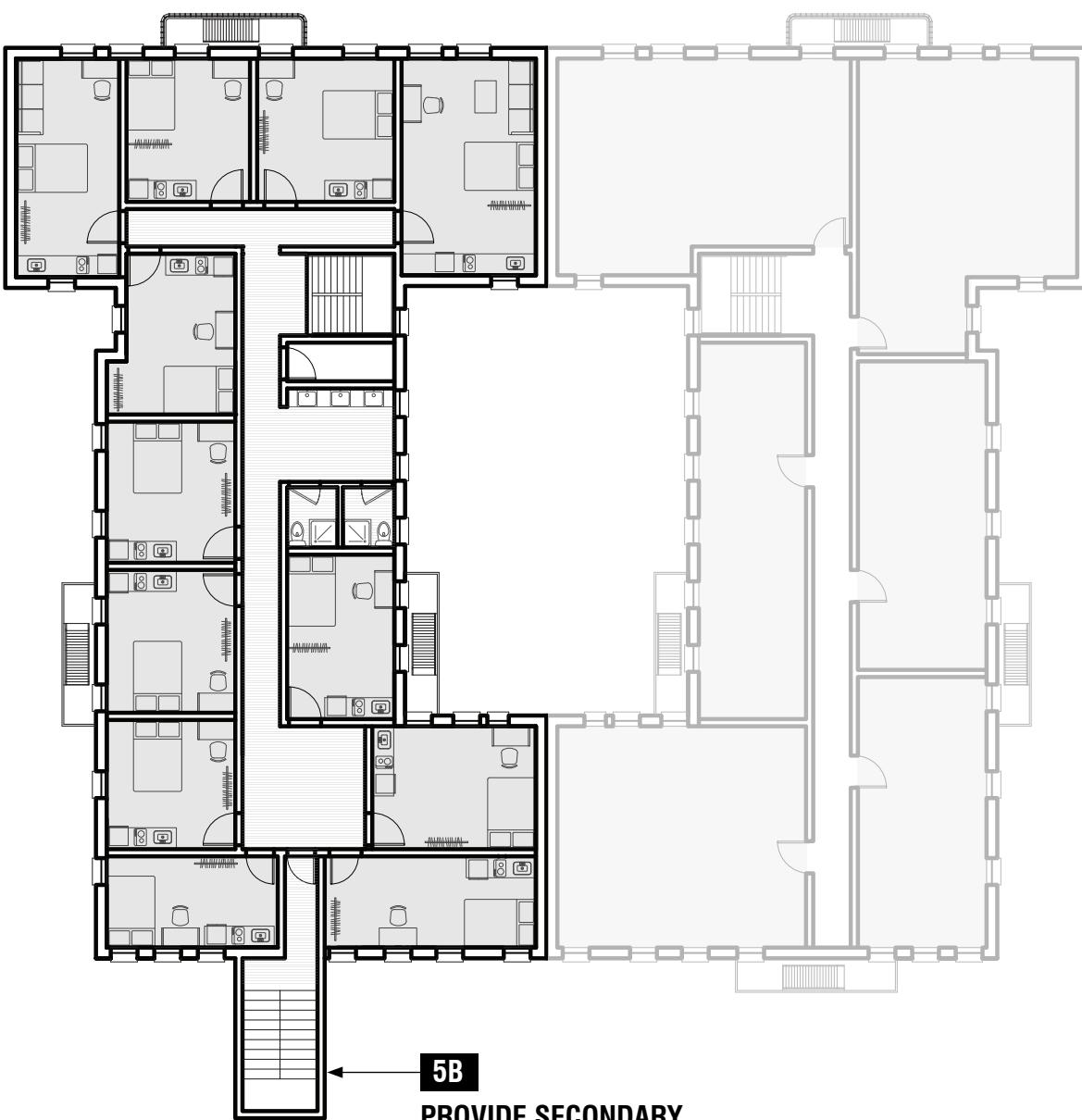
¹⁵ “Impact,” Skid Row Housing Trust, March 9, 2020, <https://skidrow.org/about/impact/>.

¹⁶ Edie Cohen, “Brooks + Scarpa Updates Low-Income Housing Units in L.A.,” *Interior Design* (Interior Design Magazine, April 9, 2020), <https://www.interiordesign.net/projects/17768-brooks-scarpa-updates-low-income-housing-units-in-l-a>.

PROPOSED INTERVENTION

Proposed SRO unit layout Existing floor unit layout

- 5A**
CONVERT UPPERMOST FLOOR TO SRO UNITS.



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Proposed SRO amenities Existing roof plan

- 5C**
CREATE BUILDING ROOFTOP TERRACE AVAILABLE TO ALL TENANTS.



DRAFT V1

SHARED AMENITIES INCLUDE:
BATHROOMS
KITCHEN
DINING SPACE
RECREATIONAL SPACE

PROPOSED INTERVENTION

5A CONVERT UPPERMOST FLOOR TO SRO UNITS.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ● ●

Converting the uppermost floor to SRO units will require coordinating simultaneous vacancy of all units on the floor. This will likely require developing a strategy to minimize the displacement of tenants.

5B PROVIDE SECONDARY MEANS OF EGRESS.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

A new egress stair in the side-, rear-, or courtyard cannot encroach on light or ventilation for existing units.

5C BUILDING ROOFTOP TERRACE AVAILABLE TO ALL TENANTS.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ●

Per Local Laws 92 and 94, newly constructed buildings are mandated to have a green roof to mitigate heat island effect. This mandate should be extended to any new rooftop construction - improve upon the typical existing dark-colored roof membranes of New Law tenements by incorporating (at minimum) planting and heat-reflective materials.

5D SHARED SRO AMENITIES BUILT AS ROOFTOP ADDITION.

LIMITING REGULATIONS:

N/A

DIFFICULTY: ● ●

The rooftop addition to accommodate SRO amenities may require physical setbacks if the additional bulk falls within the sky exposure plane. Increased precautionary measures resulting from post-pandemic health & safety guidelines are likely to affect the design of shared amenities.

REGULATIONS AS OPPORTUNITIES FOR CHANGE

ZR 23-22

Prohibits rooming units from R1-R5 districts and requires a dwelling unit factor for each residential district. The smallest factor is 680 for R6 districts and above. The residential square footage divided by the dwelling factor gives you the maximum number of dwelling units allowed at a site.

HMC §27-2004 (15)

Defines a rooming unit as a housing unit in which a single family does not have exclusive use of a kitchen or bathroom.

HMC §27-2004 (17) and MDL § 16

Defines a single room occupancy (SRO) as any unit where a family resides in a single room such that the families reside separately and independently.

HMC § 27-2077

Prohibits the creation of new rooming units unless related to a hospital, educational, or charitable capacity.

HMC §27-2066 (c) (e)

States that all New Law tenement units must have bathrooms and that all new units created in tenement buildings must include bathrooms.

HMC §27-2074

Requires that all SRO rooms have a minimum 150 square feet of living area

MDL § 248 – 3

States that the number of rooms shall not be increased nor shall the light or ventilation of any room be impaired.

MDL § 248 – 4(b)

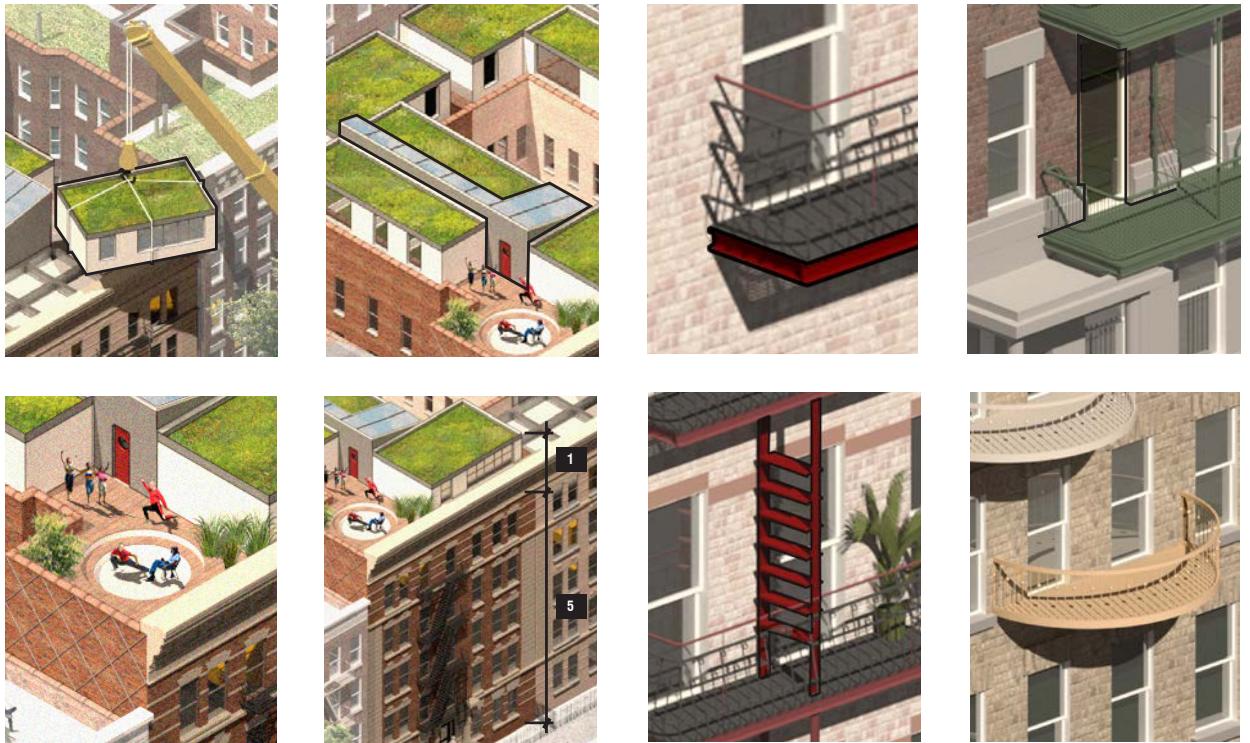
Requires that all SRO units have two means of egress, one of which cannot be via a public hall. In lieu of such egress, every stair hall or public hall, and every hall or passage within an apartment, shall be equipped on each story with one or more automatic sprinkler heads approved by the department.

NEXT STEPS

Ultimately, this document is intended to serve as a useful template for further action—not a comprehensive blueprint. It is an iterative document that will continue to be modified and crafted based on prompts and feedback from policymakers, industry experts, housing advocacy groups, etc.

To initiate this cross-disciplinary discussion, we pose questions generated during the research and development of this document. Beginning with:

What is needed to turn these proposals into practice?



- What components do you see as an effective pairing for varying plans of action (i.e., change to policy vs. a pilot program)?
- What components do you see as having the most immediate potential for change, and the most long-term prospects?
- What components do you believe have been overlooked? Not limited within New Law tenements but including all multi-family walk-up typologies.
- What information would help you and your organization/firm better gauge feasibility?
- Would it strengthen the business, policy and design case to more directly compare and contrast with the existing ecosystem of subsidized housing construction in New York?
- What would ensure equitable access to the improved housing units?



SOURCES

“5 Things to Know About Fire Escapes in New York City.” New York Habitat, November 23, 2015. <https://www.nyhabitat.com/blog/2015/11/23/5-things-know-fire-escapes-renting-apartment-nyc/>.

Alberts, Hana R. “Dear NYC Fire Escapes, You Are Iconic and We Would Miss You.” Curbed NY. Curbed NY, April 13, 2015. <https://ny.curbed.com/2015/4/13/9971046/dear-nyc-fire-escapes-you-are-iconic-and-we-would-miss-you>.

Andre, Elizabeth Mary. “FIRE ESCAPES IN URBAN AMERICA: HISTORY AND PRESERVATION.” Thesis, The University of Vermont, 2006.

Apmann, Sarah Bean. “Tenement House Act of 1901.” Village Preservation, May 19, 2020. <https://gvshp.org/blog/2016/04/11/tenement-house-act-of-1901/>.

Artés, Joan, Gerardo Wadel, and Núria Martí. “Vertical Extension and Improving of Existing Buildings.” The Open Construction and Building Technology Journal 11, no. 1 (2017): 83–94. <https://doi.org/10.2174/1874836801711010083>.

Assembly Passes Historic Affordable Housing Protections to Bring Stability to Tenants Across New York State, June 14, 2019. <https://nyassembly.gov/Press/files/20190614a.php>.

Biddle, Pippa. “Fire Escapes Are Evocative, But Mostly Useless.” The Atlantic. Atlantic Media Company, February 26, 2018. <https://www.theatlantic.com/technology/archive/2018/02/how-the-fire-escape-became-an-ornament/554174/>.

Brey, Jared. “New Project Aims to Finance Backyard Homes for Section 8 ...” Next City, May 7, 2019. <https://nextcity.org/daily/entry/new-project-aims-to-finance-backyard-homes-for-section-8-tenants-in-los-ang>.

Cohen, Edie. “Brooks + Scarpa Updates Low-Income Housing Units in L.A.” Interior Design. Interior Design Magazine, April 9, 2020. <https://www.interiordesign.net/projects/17768-brooks-scarpa-updates-low-income-housing-units-in-l-a/>.

Dougherty, Conor. “12 People in a 3-Bedroom House, Then the Virus Entered the Equation.” The New York Times. The New York Times, August 1, 2020. <https://www.nytimes.com/2020/08/01/business/economy/housing-overcrowding-coronavirus.html>.

“Fire Hazard.” NY State Senate, November 21, 2020. <https://www.nysenate.gov/legislation/laws/LAB/A11T3>.

“Fire-Escapes Erected after October First, Nineteen Hundred and Thirteen, on Buildings Therebefore Erected.” NY State Senate, November 21, 2020. <https://www.nysenate.gov/legislation/laws/LAB/273>.

Garcia, David. “ADU Update: Early Lessons and Impacts of California’s State and Local Policy Changes.” Terner Center, October 19, 2020. <https://ternercenter.berkeley.edu/blog/adu-update-early-lessons-and-impacts-of-californias-state-and-local-policy>.

Georges, Jessica. “Notes on Manhattan Bricks.” The Gotham Center for New York City History.

The Gotham Center for New York City History, May 7, 2012. <https://www.gothamcenter.org/blog/notes-on-manhattan-bricks>.

Harbarger, Molly. “Portland Looks to SRO Hotels as Model for Low-Income Housing.” The Seattle Times. The Seattle Times Company, April 27, 2019. <https://www.seattletimes.com/business/portland-looks-to-sro-hotels-as-model-for-low-income-housing/>.

“History of Supportive Housing: What Is Supportive Housing?” The Network: Supportive Housing Network of New York. Accessed December 13, 2020. <https://shnny.org/supportive-housing/what-is-supportive-housing/history-of-supportive-housing>.

“Impact.” Skid Row Housing Trust, March 9, 2020. <https://skidrow.org/about/impact/>.

Jaffe, Eric. “Watch 210 Years of Manhattan Densification in 2 Minutes This Visualization Shows Density Peak in 1910, Slip in the 20th Century, Then Creep Upward after 1980.” Bloomberg CityLab, June 3, 2015. <https://www.citylab.com/equity/2015/06/watch-210-years-of-manhattan-densification-in-2-minutes/394736/>.

Jamieson, Amber. “Safety Concerns Could Make NYC’s Fire Escapes a Thing of the Past.” New York Post. New York Post, April 12, 2015. <https://nypost.com/2015/04/12/fire-escapes-could-be-a-thing-of-the-past-due-to-safety-concerns/>.

Khalfi, Oussama, and Oussamakhalfi. “Rooftop Architecture: A Sustainable Alternative for Urban Expansion.” Issuu. Accessed December 13, 2020. https://issuu.com/oussamakhalfi/docs/oussama_khalfi_thesis_final_paper_2_82ef7f305cbb07.

Kirk, Mimi. “The Granny Flats Are Coming.” Bloomberg.com. Bloomberg, January 16, 2018. <https://www.bloomberg.com/news/articles/2018-01-16/the-rise-of-the-backyard-granny-flat>.

Kully, Sadef Ali. “City Launches Pilot Program to Legalize Basement Apartments.” City Limits, February 28, 2019. <https://citylimits.org/2019/02/25/city-launches-pilot-program-to-legalize-basement-apartments/>.

Min-Chang, Wu, Huang Chi-Ming, Chiang Chun-Chang, Kao Kuo-Sheng, Cheng Da-Long, Li Yen-Yi, Liu Chung-Ang, and Chung Po-Ren. “Photo-Volatic Systems on Rooftops of Buildings; Kaoshing City’s Renewable Energy Endeavor: Article Information: J-GLOBAL.” IEEE Conference Proceedings, January 1, 1970. https://jglobal.jst.go.jp/en/detail?JGLOBAL_ID=202002235216182558.

“New York Consolidated Laws, Multiple Dwelling Law - MDW § 53.” Findlaw. Accessed December 13, 2020. <https://codes.findlaw.com/ny/multiple-dwelling-law/mdw-sect-53.html>.

Pilkington, Ed. “A Journey through a Land of Extreme Poverty: Welcome to America.” The Guardian. Guardian News and Media, December 15, 2017. <https://www.theguardian.com/society/2017/dec/15/america-extreme-poverty-un-special-rapporteur>.

Plunz, Richard, and Kenneth T. Jackson. A History of Housing in New York City. New York, NY: Columbia University Press, 2016.

Reilly, Tanya. “Fire Escapes.” No Idea Blog. Accessed December 13, 2020. <https://noidea.dog/fires>.

Scott, Anna. "New Law Protects Residential Hotels Ordinance Aims to Preserve Low-Income Housing, Much of It in Downtown." *Downtown Los Angeles News*, May 12, 2008. http://www.ladowntownnews.com/news/new-law-protects-residential-hotels/article_a8557453-67f5-590e-a0c0-1e94a41fac23.html.

Sorrel, Charlie. "To Make More Space, They're Dropping Prefab Penthouses Onto Barcelona Rooftops." *Fast Company*. *Fast Company*, July 20, 2015. <https://www.fastcompany.com/3048175/to-make-more-space-theyre-dropping-prefab-penthouses-onto-barcelona-rooftops>.

Sorrel, Charlie. "To Make More Space, They're Dropping Prefab Penthouses Onto Barcelona Rooftops." *Fast Company*. *Fast Company*, July 20, 2015. <https://www.fastcompany.com/3048175/to-make-more-space-theyre-dropping-prefab-penthouses-onto-barcelona-rooftops>.

Sullivan, Brian J., and Jonathan Burke. "Single-Room Occupancy Housing in New York City: The Origins and Dimensions of a Crisis." CUNY Academic Works, 2013. <https://academicworks.cuny.edu/clr/vol17/iss1/5/>.

"Sur Ou Sous Les Toits, Des Solutions Pour Produire plus De Logements Mieux Isolés." *lemoniteur.fr*. *Le Moniteur*, September 20, 2012. <https://www.lemoniteur.fr/article/sur-ou-sous-les-toits-des-solutions-pour-produire-plus-de-logements-mieux-isoles.1442599>.

Varone, AIA, Stephen, and Peter Varsalona, PE. "Refurbishing a Fire Escape." *RAND Engineering & Architecture*, DPC, July 2008. <https://randpc.com/ask/exterior-repair-and-maintenance/fire-escape>.

Violette, Zachary J. "Ornament and Identity in the Immigrant-Built Tenements of Boston and New York, 1870-1920." *Material Matters*, 2012. <https://sites.udel.edu/mcses2012/papers/paper-iv/>.

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