CAN INDUSTRIAL MIXED-USE BUILDINGS WORK IN NYC?

NYC PLANNING

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INTRODUCTION

Policy Context

As New York City's economy grows and demand for space increases, some of the city's M districts[1] – in general, historically industrial areas zoned to allow for a range of industrial and commercial uses – are an increasingly important resource for job growth. Many of these areas contain aging multi-story industrial loft buildings that are not well-suited to contemporary industry and are increasingly being converted for office and retail use. At the same time, non-manufacturing industrial sectors – such as construction, transportation/warehousing, and wholesale – are growing, and manufacturing employment has stabilized after a long decline. M districts are generally the only places that these industrial land uses can locate.

These trends are driving a conversation about new approaches to planning for M districts to ensure that they can continue to retain a diversity of uses and provide space that both industrial and non-industrial businesses seek.

While demand exists for industrial space, industrial businesses generally pay lower rents than commercial or residential uses. One way to create new industrial space that is not being created by the private market could be to require or incentivize creation of industrial space within buildings that are being developed for uses that generate higher rents, such as office, residential, or self-storage. This could increase the supply of space for industry, while accommodating growth in other sectors and broadening job opportunities for New Yorkers.

There are few existing industrial mixed-use buildings, and their operations, design needs, and financial feasibility have not been well understood. With the services of a consultant with expertise on these issues, the NYC Department of City Planning (DCP) conducted a study of industrial mixed-use buildings to assess their feasibility from three perspectives:

1. **Tenanting and operational compatibility:** What types of industrial businesses and mixes of uses (office, retail, housing, or self-storage) work best?

2. **Physical feasibility:** What are the building design and site requirements of an efficient, well-functioning industrial mixed-use building?

3. **Financial feasibility:** How likely is it that the private market could create these buildings at a broad scale without public subsidy?

Diverse business activities in New York City's M districts

Plastic thermoforming in Long Island City

Coworking space in a converted industrial loft building in Astoria

Retail in East Williamsburg

[1] A manufacturing district, designated by the letter M (M1-1, M2-2, for example), is a zoning district in which industrial uses, most commercial uses and some community facility uses are permitted. Residential development is generally not allowed.

Summary of Findings

Operational, Physical, and Financial Feasibility

Construction of new industrial mixed-use buildings without subsidy can be feasible with certain compatible tenant mixes, suitable sites, and favorable real estate market conditions. These buildings do, however, face a number of physical and financial constraints.

In the markets studied, industrial mixed-use development was found to be financially feasible under certain conditions. Factors include real estate market conditions and development costs, which increase with building design inefficiencies, provision of parking and loading, environmental remediation, and floodproofing. Feasibility also depends on the mix of uses, depth of demand for different types of spaces, and size of development.

Some industrial business types are more likely than others to be successfully mixed with other uses without significant conflicts. In general, this includes low-volume, low-impact light manufacturing, such as artisanal, advanced, and specialized food and beverage manufacturing.

Industrial businesses mix better with office, retail, and self-storage than with residential uses from a design efficiency and building operations standpoint.

Larger lots, generally over 20,000 square feet (SF), with multiple frontages allow for more physically efficient buildings and reduce conflicts between different uses.

Feasibility is greater for a tenant mix that does not need significant off-street parking or loading, which reduce building efficiency and financial feasibility.

Neighborhood Planning and Policy Considerations

Efforts to promote feasible industrial mixed-use development must take into account an array of planning objectives. It is important that decision makers and communities consider potential policy implications of encouraging this type of development, particularly when planning at the neighborhood scale. Trade-offs include:

- Neighborhoods containing residences require ground floor uses that provide neighborhood services, such as retail or community facilities, and activate the streetscape. This can be in tension with ground-floor industrial activities.
- Providing both industrial space and affordable housing is challenging without subsidy for the industrial space. New York City's Mandatory Inclusionary Housing (MIH)[2] program requires market rate units to cross-subsidize permanently affordable units, so housing revenues are generally not available to support the construction of industrial space.
- In general, off-street parking and loading requirements must be waived and permitted density (floor area ratios[3]) increased to achieve baseline feasibility. If buildings were to replicate this pattern at the neighborhood scale, this could result in more parking and loading activities on the street and, in some neighborhoods, more density than would be appropriate.
- Increases in truck traffic and loading that may be associated with some industrial businesses can create on-street conflicts with pedestrians.

[2] It is the City's policy to require MIH wherever zoning changes result in substantial increases in permitted residential development. This requires that developments, enlargements, and conversions above a certain size set aside a percentage of floor area for permanently affordable housing.
[3] Floor area ratio (FAR) is the principal bulk regulation in zoning controlling the size of buildings. FAR is the ratio of total building floor area to the area of its zoning lot. Each zoning district has an FAR that, when multiplied by the lot area of the zoning lot, produces the maximum amount of floor area allowable on that zoning lot. For example, on a 10,000 SF zoning lot in a district with a maximum FAR of 2.0, the building floor area cannot exceed 20,000 SF.

Economic Context

Employment Trends in New York City

Between 2010 and 2017, rapid employment growth added over 600,000 new private sector jobs in New York City, with growth across almost all sectors.[4] While growth was led by health care, accommodation and food services, and professional services, jobs in industrial sectors – manufacturing, construction, transportation/warehousing, wholesale trade, utilities, and waste management – also increased, driven by construction and transportation, contributing 10% of overall job growth during this time.

Although it constitutes only 2% of citywide employment, or 72,000 jobs, after declining for many decades, manufacturing employment seems to have stabilized. The types of manufacturing businesses that are staying in New York City despite higher costs of doing businesses appear to be relatively specialized. Manufacturers of niche products – such as small-batch food, apparel, and furniture – tend to serve local consumers willing to pay higher prices. As business models change with technology, the spectrum between office-based and manufacturing businesses is blurring. For example, a business that uses three dimensional printing or manufactures custom circuit boards may have operational and space needs resembling those of both office and manufacturing businesses.

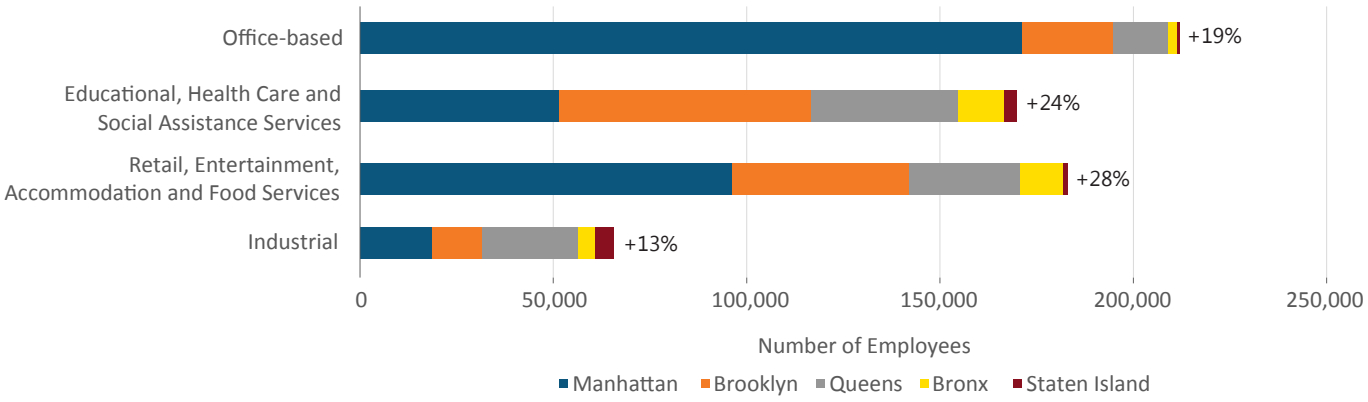
The long-term shift towards a service and information economy has sparked significant debate about New York City's loss of manufacturing businesses, which once supported numerous good-paying jobs for workers without college degrees. However, recent DCP research indicates that while employment opportunities still exist within the manufacturing sector, its relatively small size has meant that it provides fewer middle-wage jobs than other larger, more rapidly growing sectors. The study identified 715,000 middle-wage jobs paying at least $40,000 per year and not requiring a college degree. Forty percent of them were in finance, insurance, and real estate; professional services; and construction. This suggests that supporting growth of these sectors can also contribute to provision of jobs to workers with an array of skill levels.[5]

Growing and Diversifying Jobs in M Districts

Almost half of citywide job growth occurred outside of Manhattan between 2010 and 2017, and 40% of total growth was in Brooklyn and Queens. While Manhattan continues to be the established hub for office jobs, Brooklyn and Queens gained 380,000 office jobs, or 19% of citywide office job growth.

However, there has been little net new increase in the supply of office space outside of Manhattan. Some office-based job growth is occurring in light industrial areas, which are generally zoned M1 and located closer to residential neighborhoods, in areas such as Long Island City, Greenpoint-Williamsburg, and Gowanus. Between 2010 and 2016, transit-accessible M districts, defined as M districts within ½ mile of a subway station, gained 29,000 jobs in a variety of sectors. In Brooklyn

Change in NYC Private Employment by Sector and Borough, 2010 - 2017



[4] Source of all employment data: NYS Department of Labor. *Quarterly Census of Employment and Wages (QCEW),* 2000, 2010, 2014, 2015, 2016 (annual averages), and 2017 (Q2).

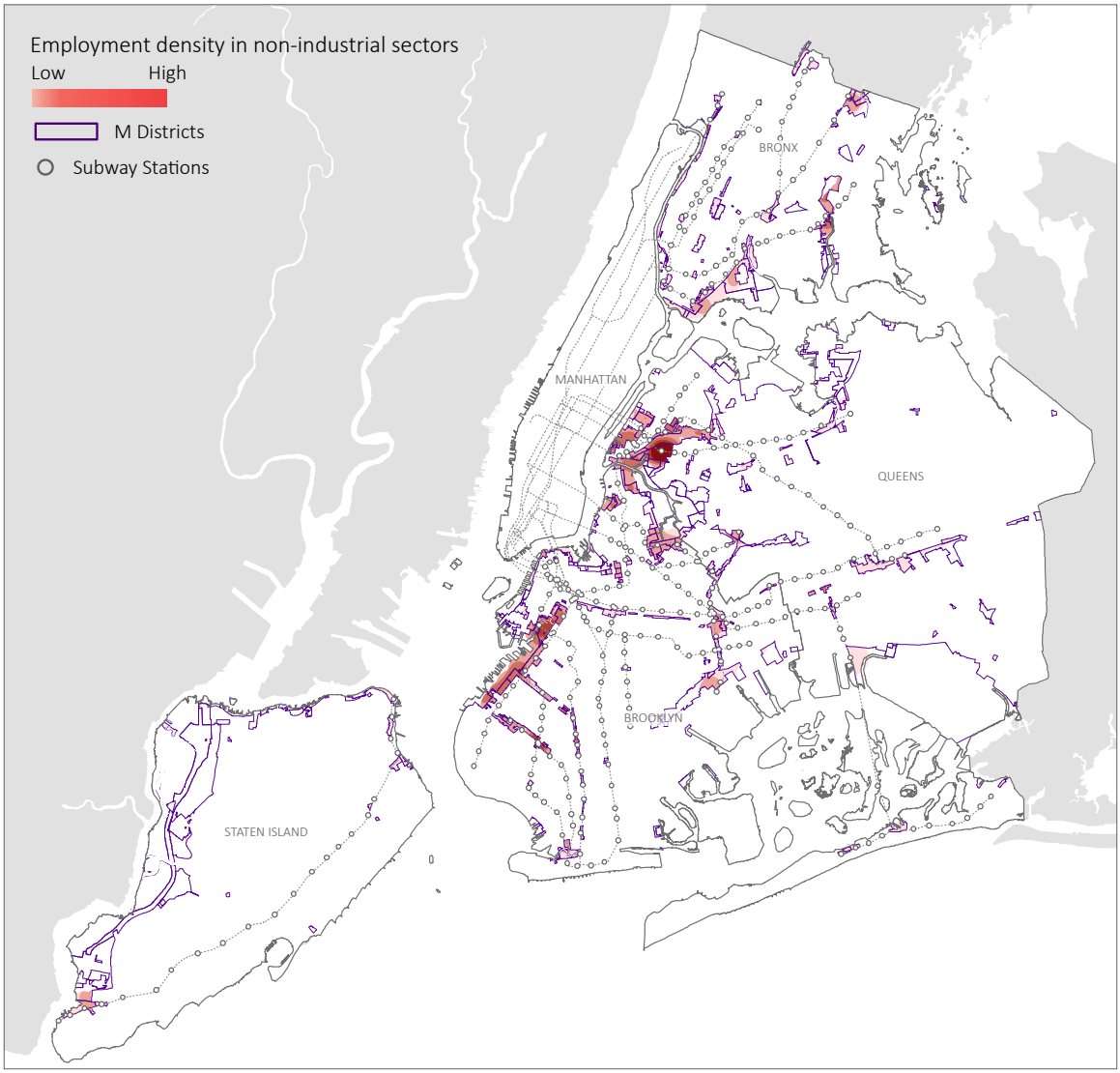
[5] NYC Department of City Planning. "Middle Wage Jobs in NYC." 2017. https://www1.nyc.gov/assets/planning/download/pdf/about/dcp-priorities/data-expertise/middle-wage-jobs-info-brief.pdf

and Queens, 64% of new jobs in transit-accessible light M districts were in non-industrial sectors such as health care, retail, and information. Many of these businesses have been attracted to under-utilized industrial lofts that can be converted to create flexible space with rents lower than those available in established business districts.

While Manhattan continues to absorb the majority of new job growth, relatively few development sites and highly constrained transit infrastructure will limit the potential for growth. M districts outside of Manhattan – particularly those near transit – tend to be relatively under-developed and have proven to be a critical resource allowing the city to absorb recent robust job growth. *New York Works*, the jobs plan released by Mayor de Blasio in 2017, identified growing jobs in transit-accessible areas outside Manhattan as an important step to supporting the growth of New York City's 21st century economy. The plan estimated that demand for office space would grow by over 60 million square feet by 2025, with almost half of the demand outside of Manhattan. Supporting creation of office space outside of Manhattan would also bring jobs closer to workers and encourage reverse commutes, relieving strains on transit infrastructure.

This growth would, however, have to be balanced by the need to retain space for industrial businesses that provide essential services to the city and a diversity of jobs. It is therefore worthwhile to consider the potential for industrial mixed-use development to help accommodate this growth.

Density of Non-Industrial Employment in Transit-Accessible M Districts Outside Manhattan (2015)



Methodology

To assess the physical and financial feasibility of industrial mixed-use buildings, this study consisted of four components:

MARKET ANALYSIS

- Analyzed real estate market data and conducted interviews with developers and brokers from selected emerging markets: Crown Heights, East Williamsburg, Gowanus, and Port Morris.
- Established rents, land costs, and other financial assumptions.

BUSINESS NEEDS ASSESSMENT

- Interviewed industrial businesses, real estate professionals, and industrial experts about business space needs and operations.

DESIGN

- Selected test sites with varying lot configurations and sizes.
- Identified industry best practices to inform building features, such as column spans, ceiling heights, and floorplate configurations.
- Developed a toolkit of common architectural and mechanical components, including loading docks, parking, passenger and freight elevators, egress stairs, and other services.
- Designed building prototypes on each site with different use mixes.
- Assessed operational and architectural compatibility between uses.
- Identified implications of lot size and configuration for building efficiencies and use conflicts.

FINANCIAL MODEL

Cost Estimates

- Obtained construction cost assumptions for prototype buildings from a professional cost estimator.

Financial Analysis

- Developed a discounted cash flow model to analyze industrial mixed-use programs.
- Reviewed assumptions with broker and developer community.
- Tested diverse scenarios and sensitivities to understand the drivers of financial feasibility.

Findings

I. Tenanting and Operational Compatibility

Business Space Needs and Operations

Small, niche manufacturers, such as artisanal, advanced, and food and beverage manufacturing are more likely to be able to operate in industrial mixed-use buildings. They generally produce fewer fumes, noise, and truck traffic, which can be a nuisance to other tenants. (Small-scale woodworking and metalworking may be exceptions.) They also generally do not require as many special mechanical systems and have low off-street parking and loading needs. Their rent thresholds tend to be relatively high among industrial tenants at $15-29/SF.

Manufacturing and other industrial businesses tend to prefer ground floor space to allow for loading and usage of heavy machinery. However, artisanal and advanced manufacturing can more easily occupy upper floors, freeing up ground floor space for revenue-generating retail. Food and beverage manufacturing can be more difficult to locate on upper floors due to heavy equipment and special plumbing requirements.

Large, truck intensive industrial businesses, such as wholesale, transportation, and construction, on the other hand, are more difficult to accommodate. These businesses often produce significant truck traffic, loading, odors, and noise. They generally have less flexible space needs, requiring large ground floor spaces, and potentially robust mechanical systems and structural support for heavy machinery. They also have relatively low margins, with rents at $9-14/SF.

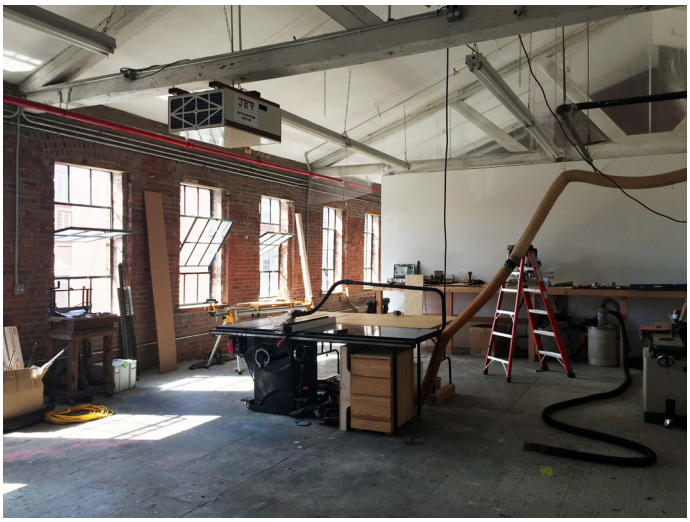
Industrial businesses are also more compatible with office, retail, or self-storage than with residential uses. Residential uses are more sensitive to the impacts of business operations, requiring greater, more costly physical separation. Further, ground floor industrial uses may create conditions that are undesirable for residential neighborhoods. Office, retail, and self-storage are likely to have fewer conflicts with industrial uses, and many office users have similar space preferences to industrial businesses, seeking loft-like space with flexible floorplates and high ceilings. Retail can generate extra revenue, but typically occupies ground floor space that industrial businesses prefer.

Small-Scale Manufacturing Space Needs

	Artisanal Manufacturing	Advanced Manufacturing	Food and Beverage Manufacturing
Description	**Boutique manufacturing for niche markets** *ex: apparel, jewelry*	**Firms using advanced technologies for production** *ex: 3D printing, bio- and med-tech*	**Small-scale, serving local customer base, potentially with accessory retail** *ex: bakeries, coffee roasters, breweries, distilleries*
Ground Floor	Preferred (if heavy machinery)	Preferred (if heavy machinery)	Needed (for machinery)
Space Features	Flexible, depending on product	Flexible (office-like)	Large spans and high ceilings
Mechanicals	High electric loads Vents/exhausts	High electric loads	High electric loads Specialized plumbing/refrigeration Vents/exhausts
Odors, Noise, Truck traffic	Limited at small scale	Limited at small scale	Odors, but limited at small scale
Examples	 Apparel Manufacturing	 3D Printing	 Distillery

Industrial Business Space Characteristics

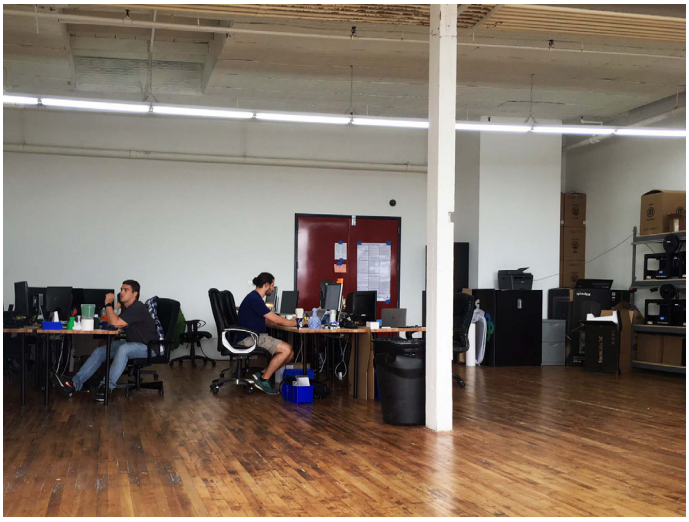
Industrial businesses prefer large, flexible floorplates, as reflected in this historic industrial loft building with a 20,000 SF floorplate.



Some artisanal manufacturers require natural light.

Food manufacturers, such as this brewery, often need high ceilings and a ground floor location to accommodate heavy equipment.

Accessory retail, such as this taproom, can generate extra revenue for food manufacturers.



Advanced manufacturing, such as this 3D printing company, may occupy space that looks much like an office.

Large, truck-intensive industrial businesses, such as this food distribution company, require large-footprint sites and warehouses that would be difficult to accommodate in a mixed-use development.

Office Space Needs

Office space included in industrial mixed-use buildings would likely be speculative, potentially with features that differ from more standard "Class A" new office space.

This tech/media office features high ceilings, a flexible, open plan layout, small workspaces, and larger common amenity areas within a converted industrial loft building.

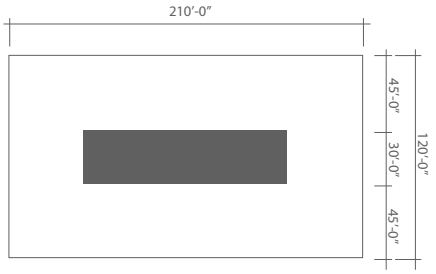
In markets outside of Manhattan, new office construction is generally speculative ("spec") rather than preleased, as office tenants outside Manhattan tend to be smaller and less likely to sign leases far in advance.

Interviews revealed that developers seek greater flexibility, scale, and efficiency for spec office space. Tenants' space preferences are evolving, and they often seek larger collaboration spaces and smaller individual work spaces. This requires space that can be easily and efficiently reconfigured for different business sizes and needs. Large floorplates in existing multi-story industrial loft buildings have proven to provide this flexibility. Many office tenants also prefer high ceilings, wide column spans, large floorplates, and natural light, characteristic of many loft buildings, suggesting compatibility with industrial uses from a building design perspective.

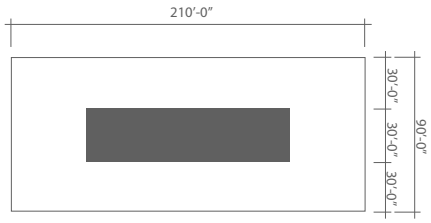
For spec office space, developers indicated that a minimum floor plate of between 15,000-20,000 SF was standard. They also often seek a minimum project size of 75,000-100,000 SF of rentable area to consider undertaking spec office development.

Office Floorplate Sizes and Configurations

Floorplate Size

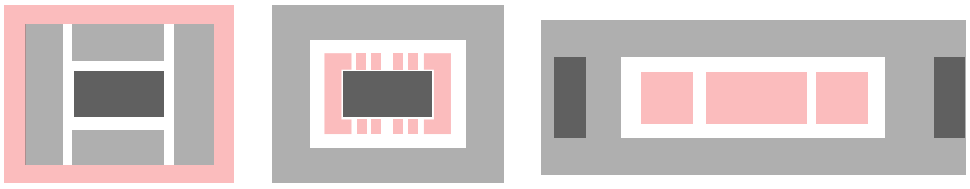


Most efficient office tower with central core and approximately 25,000 SF per floor



More daylight sensitive office tower with central core

Floorplan Configuration



100 % closed office
Inward facing collaboration spaces around core

100 % open plan
Collaborative and social spaces around the perimeter

Side core
Side cores allow for more contiguous, flexible space and open office plans

Office Space | Collaborative/Social Space | Building Core

- Spec office development should have floorplates of at least 15,000-20,000 SF with a depth of 90-120 feet to maximize construction efficiency and lease span flexibility, with column bays of 30-40 feet.
- Ideal floorplates will allow for different configurations of large group collaboration spaces, small individual offices and/or open plan office space, and socializing zones.
- Building core configurations depend on both overall size and height of the building as well as size and shape of the floor plate. A side core maximizes flexibility.

FINDINGS

II. Physical Feasibility

Overview

Test fits of industrial mixed-use buildings on prototypical sites identified conditions for relatively efficient, well-functioning buildings that meet the needs of different tenant types. The sites selected in East Williamsburg, Gowanus, Crown Heights, and Port Morris were different sizes with varying numbers of street frontages. Each prototype building is approximately 5 FAR, generally exceeding the FAR of existing buildings in these areas. A more detailed analysis would be required to determine appropriate densities on these sites, but the relatively high density of these prototypes allowed for testing of a significant amount of non-industrial space combined with industrial use.

These prototypes are meant to test physical feasibility and are not necessarily financially feasible; financial feasibility is discussed in the following section. Design analysis found:

Use mixing:

- Overall, mixed-use buildings are inherently less efficient than single-use buildings.
- Greater efficiency was achieved by mixing industrial uses with office or self-storage, which have similar floorplate requirements and can share lobbies and cores.
- Mixing residential with industrial uses requires greater separation between uses to limit conflicts, increasing costs and decreasing efficiency.
- While not analyzed as part of this study, use conflicts and design inefficiencies would likely be lower in developments with industrial and residential uses in separate buildings on the same site.

Site requirements:

- A minimum site size of 20,000 SF allows for more efficient design, assuming provision of less off-street parking and loading than is currently required in most M districts today.
- Multiple street frontages allow for separation of entryways and loading.

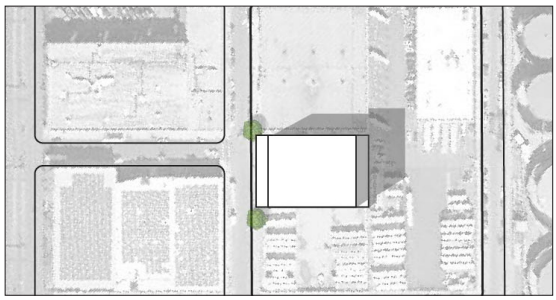
Design prototype test sites

East Williamsburg

Gowanus

Crown Heights

Port Morris



Parking and loading:

- Large amounts of off-street parking and loading occupy valuable ground floor space. Modifying minimum requirements in zoning, targeting certain tenant types with lower parking and loading needs, and identifying locations proximate to transit can help to reduce parking and loading needs.

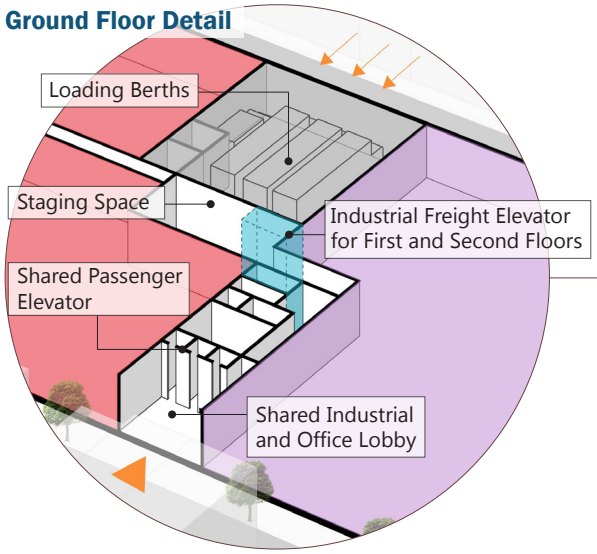
Design Prototype 1. East Williamsburg

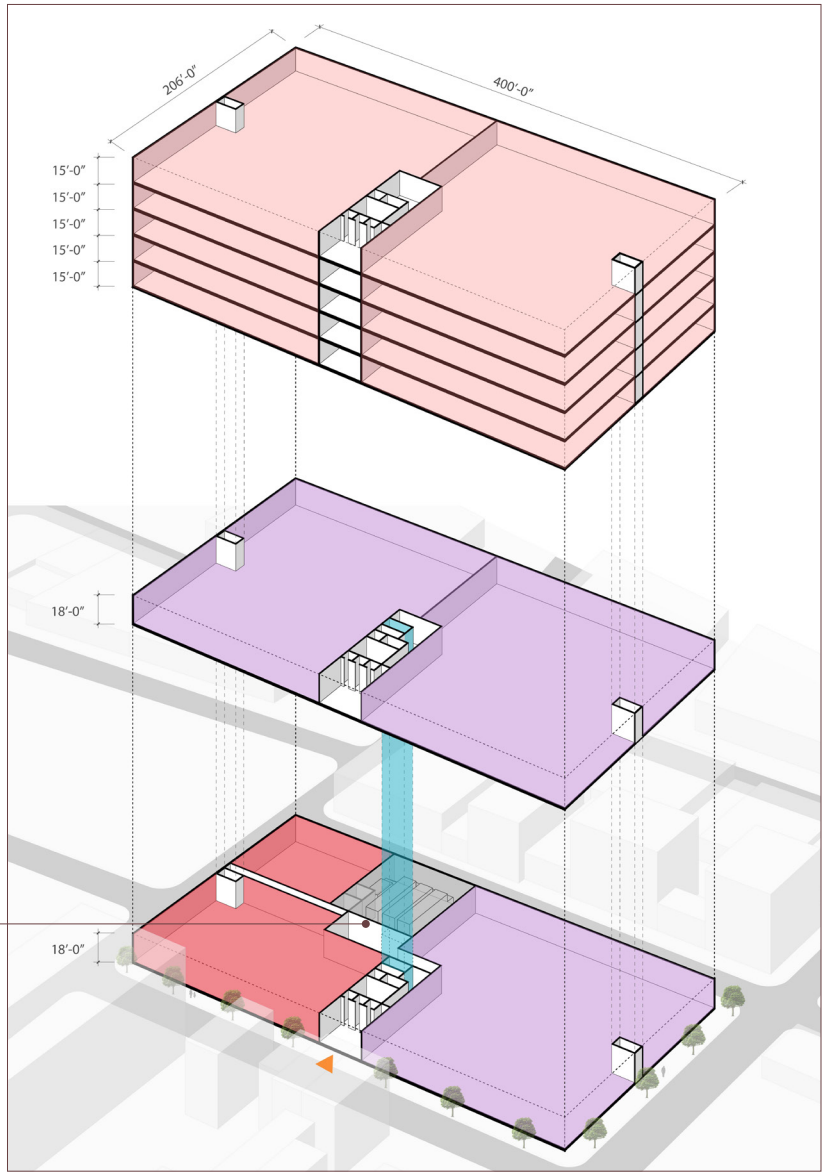
Office, Retail, Industrial on a Large, Flexible Lot

Lot Type: Full Block (4 Frontages)
Lot Area: 80,000 SF
No Parking
Program (GFA): 553,810 SF (5.2 FAR)

- Industrial: 131,960 SF
- Retail: 27,850 SF
- Office: 394,000 SF
- Loading: 6,750 SF (4 Berths)

Ground Floor Detail





Physical Feasibility Findings

A mix of office and industrial uses may be physically feasible, especially on large, flexible lots. This prototype on a full-block site demonstrates a relatively efficient mix of ground floor retail, ground floor and second floor manufacturing, and office above.

- Office and industrial uses have compatible floorplate and column spacing needs, with a minimum floorplate of 20,000 SF. The 80,000 SF site allows for significant, flexible ground floor space for retail *and* manufacturing.
- Office and industrial uses can share a lobby and core when there is more than one floor of manufacturing, unlike a residential mix, thereby reducing inefficiencies.
- Multiple frontages allow for separation of loading from entries and retail storefronts.
- Few loading berths and no parking reduce inefficiencies and costs, but also require transit access and tenants with lower loading and parking needs; however, current zoning would require parking and more loading docks.

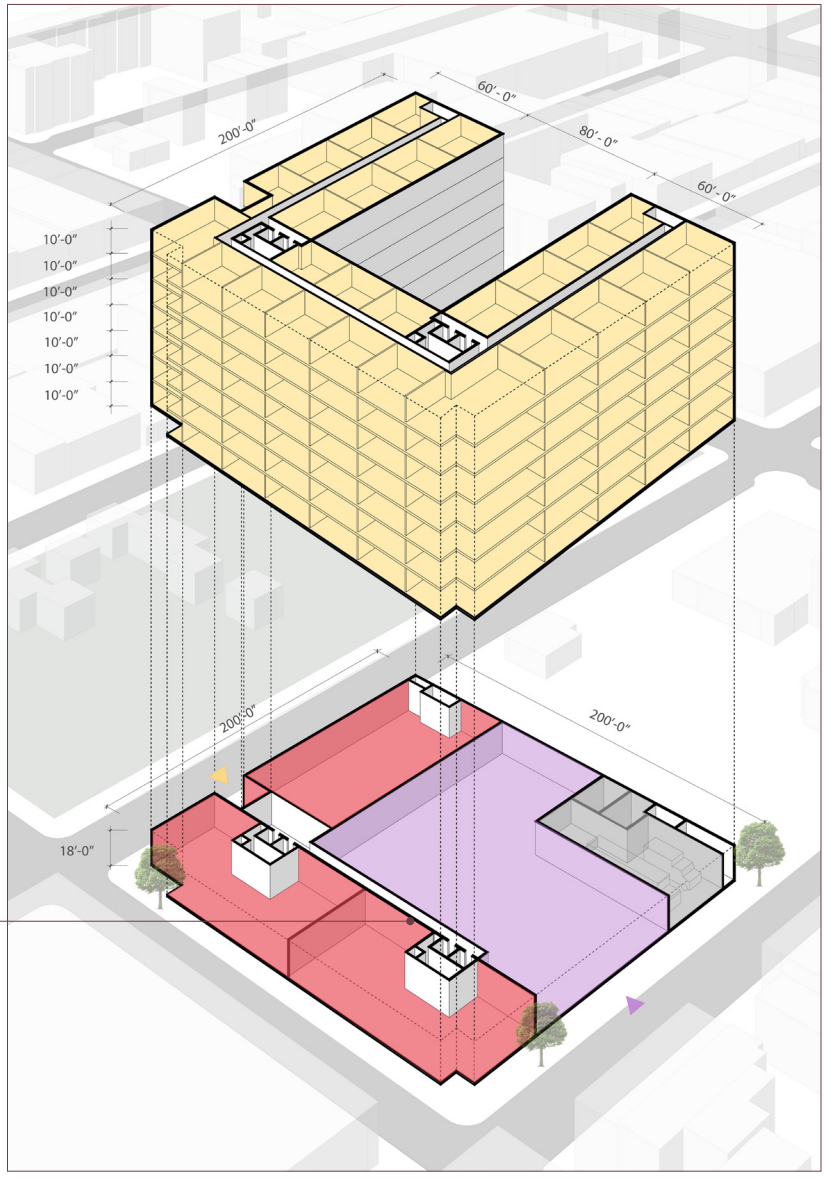
Note: Due to inefficiencies created by loading berths and other features, gross floor area (GFA) was reduced by approximately 25% for the FAR calculation.

Design Prototype 2. Gowanus

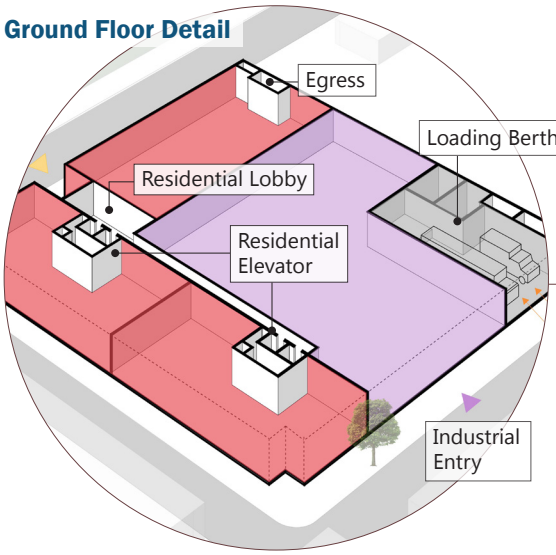
Residential, Industrial, and Retail on Large, Flexible Lot

Lot Type: Block End (3 Frontages)
Lot Area: 40,000 SF
No Parking
Program (GFA): 226,560 SF (5.0 FAR)

- Industrial: 20,430 SF
- Retail: 16,880 SF
- Residential: 189,250 SF
- Loading: 4,120 SF (2 Berths)



Ground Floor Detail



Physical Feasibility Findings

A mix of residential and industrial uses raises significant compatibility issues from a design perspective, although these issues can be reduced on large, flexible lots. This prototype demonstrates a retail, manufacturing, and residential use mix on a large site that allows for separation between uses and a relatively efficient layout.

- Multiple frontages and relatively large 40,000 SF site allow for separation of industrial entry and loading docks from residential entry and retail storefronts, decreasing conflicts.
- Provision of two frontages of ground floor retail, important for activating streetscapes in residential neighborhoods, reduces available ground-floor space for industrial uses. A single loading dock – less than required by current zoning – further limits the already constrained ground floor space.
- Absence of off-street parking, possible because of proximity to transit, helps to avoid additional inefficiencies and costs; however, current zoning would require parking.
- Inclusion of a single floor of manufacturing avoids inefficiencies that would be produced by separate cores.

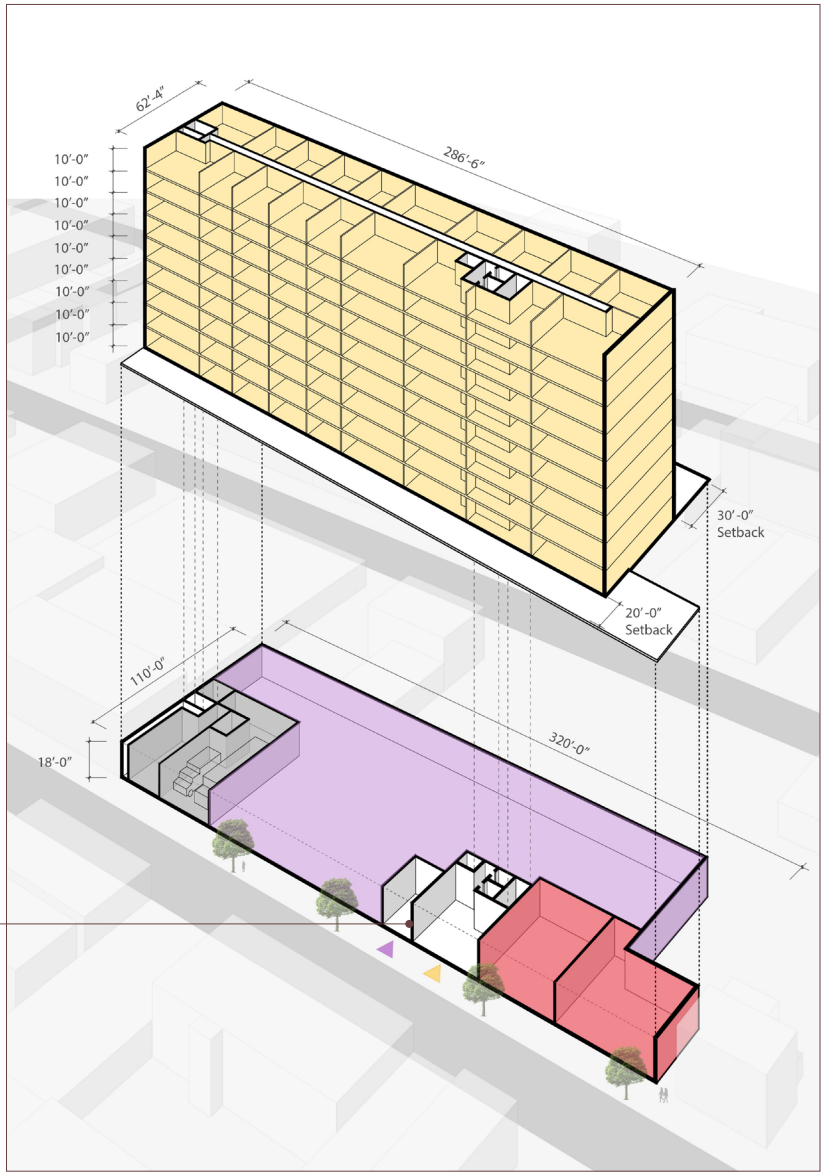
Note: Due to inefficiencies created by loading berths and other features, GFA was reduced by approximately 10% for the FAR calculation.

Design Prototype 3. Crown Heights

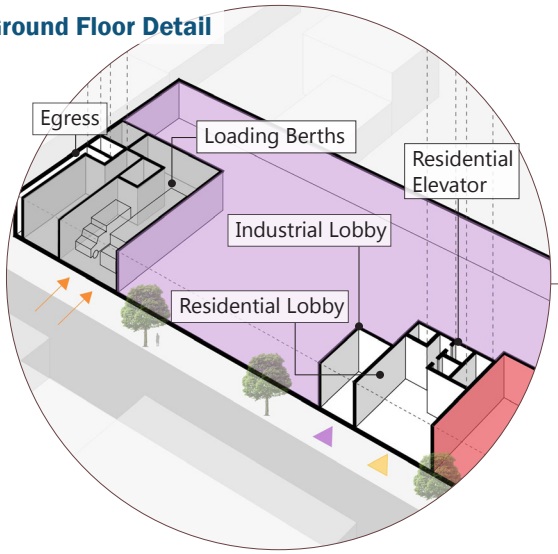
Residential, Retail, Industrial on a Constrained Lot

Lot Type: Long Interior Block (1 Frontage)
Lot Area: 33,415 SF
No Parking
Program (GFA): 185,820 SF (4.9 FAR)

- Industrial: 26,500 SF
- Retail: 5,040 SF
- Residential: 154,280 SF
- Loading: 4,740 SF (2 Berths)



Ground Floor Detail



Physical Feasibility Findings

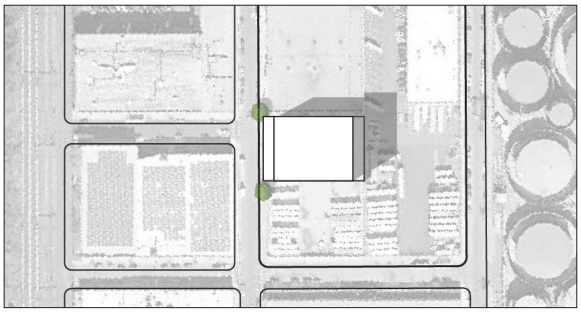
A mix of residential and industrial uses requires greater separation between uses, increasing costs and decreasing efficiency, especially on a more constrained lot. This prototype demonstrates a retail, manufacturing, and residential use mix on an interior lot with inefficient floorplates and lack of separation between uses.

- Lack of multiple frontages forces proximity of loading berths to residential entry.
- While site is 30,000 SF, the relatively shallow depth produces inefficient, irregular industrial ground floor space.
- Inclusion of a single loading dock – less than required by current zoning – further constrains ground floor space.
- Exclusion of parking due to proximity of transit helps to avoid additional inefficiencies and costs; however, current zoning would require parking.
- Inclusion of a single floor of manufacturing avoids inefficiencies that would be produced by separate cores.

Note: Due to inefficiencies created by loading berths and other features, GFA was reduced by approximately 10% for the FAR calculation.

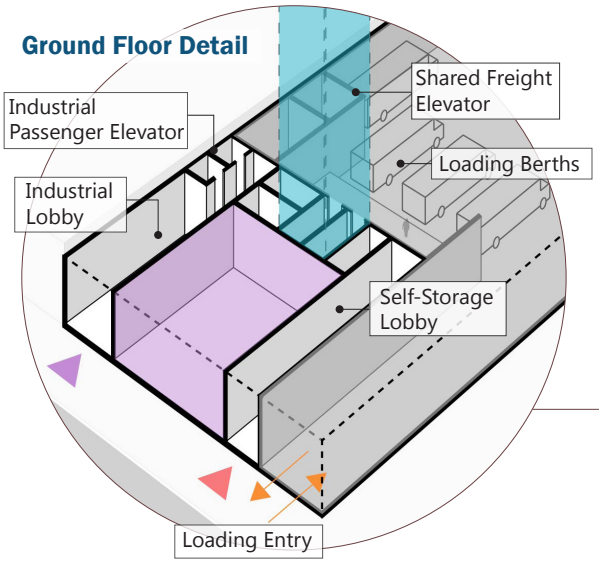
Design Prototype 4. Port Morris

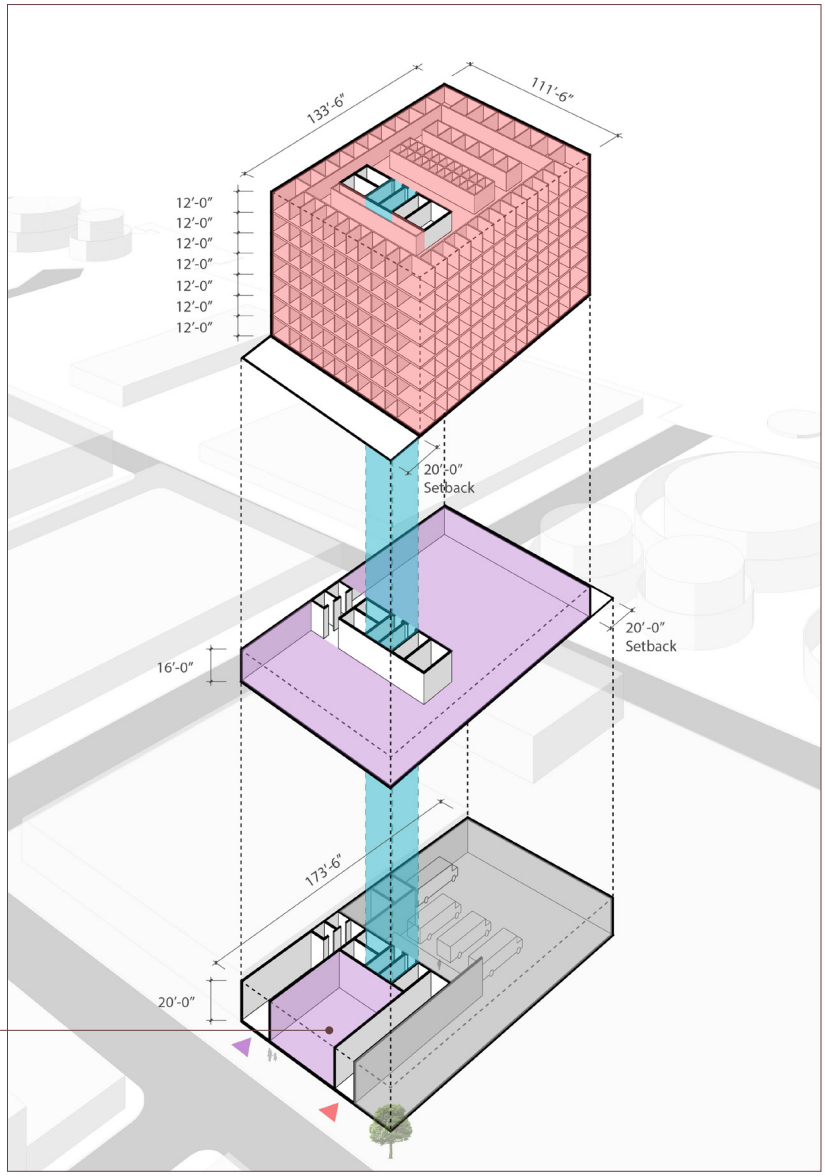
Self-Storage and Industrial on a Constrained Lot



Lot Type: Short Interior Block (1 Frontage)
Lot Area: 19,300 SF
No Parking
Program (GFA): 121,420 SF (4.7 FAR)

- Industrial: 21,180 SF
- Self-Storage: 100,240 SF
- Loading: 12,650 SF (4 Berths)





Physical Feasibility Findings

A mix of self-storage and industrial uses can be physically feasible on appropriate lots, as these uses have similar building requirements, and the low number of self-storage workers results in fewer conflicts. This prototype, with two floors of manufacturing uses and self-storage above, was designed on a constrained lot that resulted in challenging ground floor issues, demonstrating that a larger lot with multiple frontages would be preferable.

- Self-storage and manufacturing uses both require loading and freight elevators, and can share these systems.
- An interior 20,000 SF lot with short frontage creates an inefficient ground floor due to the significant amount of ground floor space occupied by loading.
- Parking needed for self-storage customers is difficult to accommodate on this constrained site.

Note: Due to inefficiencies created by loading berths and other features, gross floor area (GFA) was reduced by approximately 25% for the FAR calculation.

FINDINGS

III. Financial Feasibility

Methodology and Development Scenarios

Financial feasibility of different industrial mixed-use development programs was tested on sites in four real estate markets characterized as weak, moderate, strong, and very strong. These development scenarios included:

1. **East Williamsburg (very strong market)**
   Office, Industrial, and Retail

2. **Gowanus (strong market)**
   Residential, Industrial, and Retail

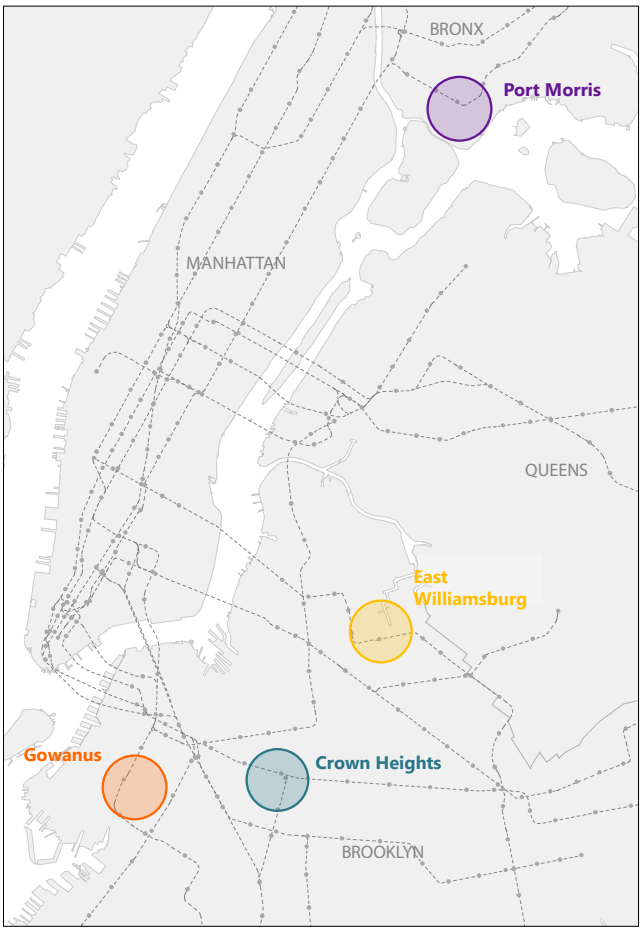
3. **Crown Heights (moderate market)**
   Residential, Industrial, and Retail

4. **Port Morris (weak market)**
   Self-Storage and Industrial

Analysis tested a number of both aggressive and conservative scenarios with varying factors that influenced feasibility:

- Range of market rents and land costs. (These markets are rapidly changing with limited comparables, especially for new office or industrial space. Research found a wide spread of rents and land costs.)
- Inclusion of structured parking and associated costs.
- Inclusion of affordable housing/MIH and associated 421a tax abatement.
- Different levels of development density/FAR.

Development scenario test markets



Limitations of Analysis

- Findings should not be interpreted as an indicator of feasibility across an entire neighborhood, as financial feasibility will vary site by site. Findings also represent a snapshot in time, as real estate dynamics are changing rapidly in these neighborhoods.
- Five FAR programs were analyzed for purposes of comparison and do not necessarily indicate appropriate neighborhood densities.
- Environmental remediation costs, which are difficult to estimate and can vary widely, were not modeled. The cost of resiliency measures and floodproofing, which would be required in many historic industrial waterfronts, was also not modeled.
- Analysis assumed availability of traditional financing for spec office, which is generally not available in the current market.

Overview of Findings

Industrial mixed-use development was found to be financially feasible without subsidy, but only under certain favorable conditions. Feasibility of development on different sites in the same geographic area may vary based on different conditions, such as lower acquisition costs or higher achievable rents.

Factors influencing financial feasibility include:

- **Rents**: Office, residential, and retail rents were often not high enough to make up for low industrial rents, but feasibility improved assuming high-end residential, office, and retail space and relatively high-paying industrial tenants. Self-storage can generate very high rents on a per-square-foot basis.

- **Land costs**: In high-rent markets, site acquisition costs are generally also high, but feasibility was found to be greater where there was a larger spread between rents and land costs (such as in the Gowanus and Port Morris scenarios). However, this can shift quickly as markets adjust.

- **Affordable housing requirements**: MIH allocates cross-subsidy from market rate to affordable units, curtailing the ability to leverage housing to offset the cost of industrial space.

- **Added development costs:**

  Design inefficiencies: Mixed-use buildings are generally less efficient than single-use ones, which can lead to increased construction costs.

  Off-street parking and loading: These building features reduce efficiency and increase costs; structured parking can be particularly expensive.

  Environmental remediation and resiliency costs: In many industrial areas, sites are often contaminated by previous industrial uses, and much of the city's industrial land is located in the floodplain, requiring sometimes costly remediation and floodproofing.

- **Financing**: Currently, availability of traditional financing outside established office districts is limited.

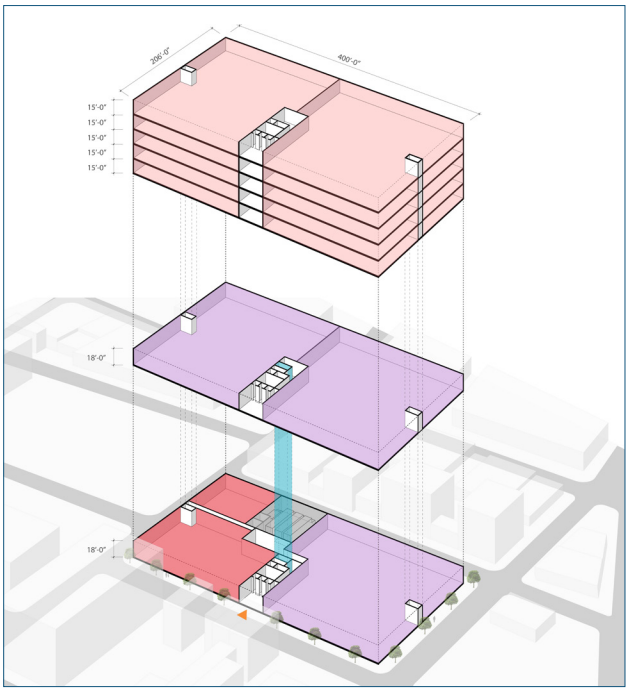
- **Density:** Feasibility can be increased by increasing development size or decreasing the amount of industrial space within a building.

In East Williamsburg, retail and office rents are high, but land costs are also high, increasing development costs.

Development Scenarios

Multiple financial scenarios were analyzed on each site, ranging from aggressive to conservative, based on the range of rents and land costs found in the local market. For comparison purposes, scenarios discussed here exclude the costs of structured parking, remediation, or floodproofing. They assume approximately 5 FAR with one to two floors of industrial space. East Williamsburg, Crown Heights, and Gowanus scenarios included retail; the Port Morris site could not physically accommodate retail.

Scenario 1. Office, Retail, and Industrial in East Williamsburg (very strong market)



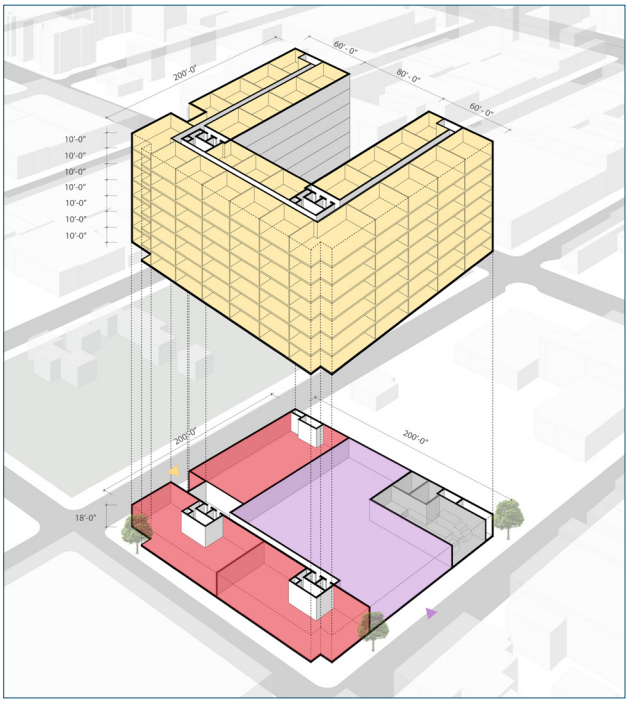
Program (FAR)

Industrial	Retail	Office	Total
1.2	0.3	3.7	5.2

Financial Feasibility Findings

- East Williamsburg had the highest office, retail, and industrial rents among the markets studied.
- Reflecting high rents, land acquisition costs were also much higher than in other markets studied.
- *This scenario was not found to be financially feasible in today's market.* In both aggressive and conservative scenarios, high rents were outweighed by high land costs.

Scenario 2. Residential, Retail, and Industrial in Gowanus (strong market)



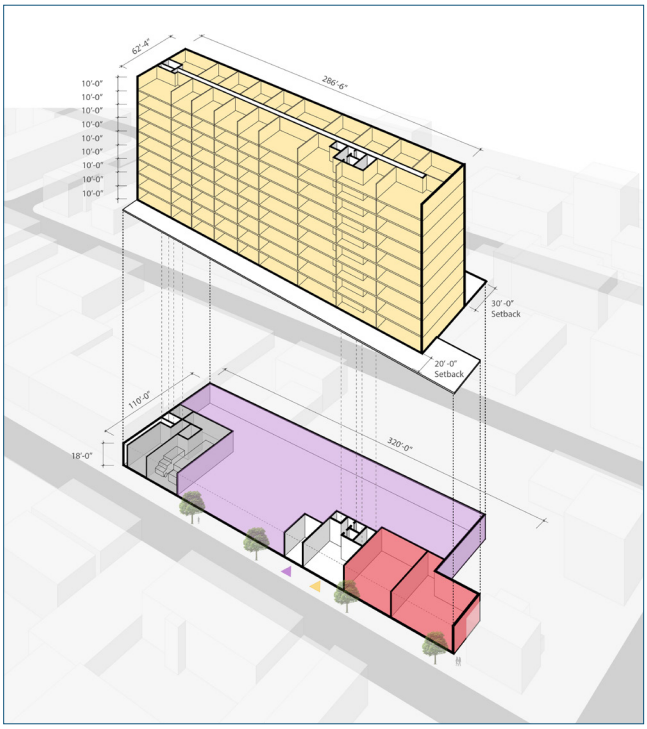
Program (FAR)

Industrial	Residential	Retail	Total
0.4	4.3	0.3	5.0

Financial Feasibility Findings

- Market-rate rents for recently built residential projects are very high in Gowanus. Research found a wide range of retail and industrial rents. It also found a greater spread between rents and land costs compared to the other markets studied.
- *This scenario was found to be financially feasible under aggressive assumptions* – including very high rents typical of a luxury product and land costs on the low end of what is found in the market today. However, land costs can be expected to increase to reflect higher rents over time. Inclusion of MIH decreased feasibility.

Scenario 3. Residential, Retail, and Industrial in Crown Heights (moderate market)



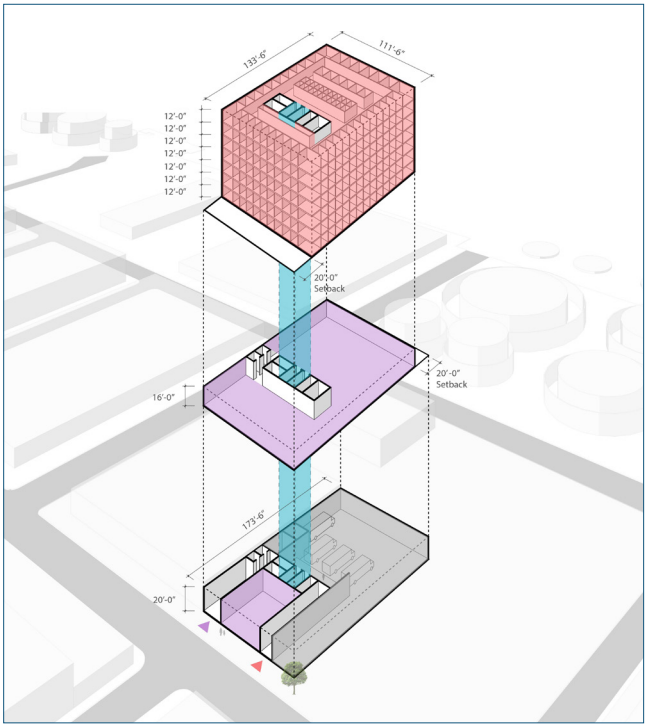
Program (FAR)

Industrial	Residential	Retail	Total
0.6	4.2	0.1	4.9

Financial Feasibility Findings

- Residential and retail rents, as well as land costs, were lower than in East Williamsburg and Gowanus, but higher than in Port Morris.
- *This scenario was found not to be feasible under current market conditions in both aggressive and conservative scenarios,* whether or not MIH was included. Even when the analysis included the highest-end residential and retail rents found in the market, these rents were not adequate to make up for industrial rents.

Scenario 4: Self-Storage and Industrial in Port Morris (weak market)



Program (FAR)

Industrial	Self-Storage	Total
0.8	4.0	4.8

Financial Feasibility Findings

- While Port Morris was categorized as a weak market generally, self-storage can achieve very high rents (on a per square foot basis), sometimes even exceeding residential rents.
- While industrial rents here are lower than in other areas, land costs are also relatively low.
- *This scenario was found to be feasible under both aggressive and conservative scenarios,* given the combination of high self-storage rents and low land costs.

CONCLUSION

As its economy continues to grow and change, New York City must create space to accommodate its many sectors, many of which provide good employment opportunities for workers without a college degree. However, demand for office space is outpacing supply, especially in the boroughs outside of Manhattan, while small-scale, niche manufacturing businesses are having trouble finding space. The City has been seeking to identify new strategies to accommodate job growth in some transit-accessible light M districts, supporting a diverse mix of uses. Industrial mixed-use development is often suggested as an innovative strategy for accommodating growth.

The conclusions of this study suggest that, in certain favorable instances, industrial mixed-use development may be achievable. Physical and financial conditions that improve feasibility include:

- Lower-volume, lower-impact light manufacturing tenants, such as artisanal, advanced, and specialized food and beverage manufacturing that create fewer conflicts with other uses.
- Inclusion of office, retail or self-storage uses; greater conflicts must be addressed when mixing industrial with residential uses within a building or a neighborhood.
- Lots over 20,000 SF with multiple street frontages.
- Provision of less off-street parking and loading than is generally required by zoning today, paired with transit access and industrial tenants with lower parking and loading needs.
- Higher-rent residential, office, retail, and industrial spaces, or self-storage space.
- Low land acquisition costs or low land basis.
- Low remediation and resiliency costs.
- Availability of financing.

Policies promoting industrial mixed-use buildings should also be carefully weighed against other planning and policy considerations, such as minimizing conflicts created by industrial activities and creating opportunities for affordable housing or ground floor retail.

This study suggests that there are opportunities to advance industrial mixed-use development. However, because of the physical and financial challenges associated with industrial mixed-use space, *requirements* for inclusion of industrial space risk slowing investment.

At the same time, the City can implement pro-development tools, such as lowering parking and loading requirements, increasing allowable FAR, or creating incentive mechanisms in targeted, appropriate areas to enable such developments. It can also support individual projects on an opportunistic basis in cases where such developments are feasible and in appropriate locations within the city.

In recent years, plans for new construction of several industrial mixed-use projects in the city have been announced. Following their completion, these projects can provide real-life lessons about opportunities for this development model to provide new space for industrial businesses.

Acknowledgments

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