Prototypes
for
Public Infrastructures

by Jonathan Fidalgo

B.A. Design
University of Florida, 2014

Submitted to the Department of Architecture
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Abstract

It is understood that infrastructure is needed in order to support the occupation of dense urban centers. Cities are filled with technical structures that handle transportation, water, air, and power amongst other necessities. Expanding infrastructural systems require larger swaths of land to accommodate increasingly specific and singular functions. With increased urban density and the rising value of land a new architectural approach is needed to realize the full potential of these infrastructural projects, and while we have observed many large scale transformations there is a potential for small scale projects to serve as a catalyst for urban renewal.

In New York City the newest addition to the subway system, the Second Avenue Subway, has required the construction of a number of ancillary structures that house mechanical equipment, ventilation shafts, and egress. These buildings have been criticized for their failure to contribute to street life along Second Avenue, a matter made worse by the fact that the land the buildings occupy was taken through eminent domain. This thesis proposes an alternative to the existing attitude toward ancillary structures by introducing a series of micro scale public spaces that allow these infrastructures to be reclaimed by the community. These programmatically "thick" infrastructures create opportunities for unpredictable and variable uses to emerge in the city. The dense urban environment demands a layered public realm and by extension multifunctional and programmatically varied infrastructures. Through the introduction of new programs, these once hidden and inaccessible spaces can transform into a public utility for the city.

Thesis Supervisor:

William O'Brien Jr, MArch
Associate Professor of Architecture

To
Liam
Andrew
Rafi
Marie
Richard
Chris
Sophia
and
my
parents
for
your
guidence
and
support

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Part I: Urban Infrastructure

Introduction

Architecture's value and significance is as much a product of its utility as it is its formal or stylistic intentions. Cities are complex ecologies morphing over time, and paramount to their operation are utilitarian infrastructural systems. Systems that endure constant urban evolution, expanding and spreading along with the city. These infrastructural systems are as significant as any cultural or public institution and require as much thought and input from designers. Even though architects have typically lacked the capacity to generate renewed interest in infrastructural investments, there is a potential to redirect efforts towards questions of infrastructure.[1] Expanding infrastructural systems require larger swaths of land to accommodate increasingly specific and singular functions. With increased urban density and the rising value of land in many cities, a new architectural approach is needed to realize the full potential of urban infrastructural systems. There are a number of possibilities afforded by these projects due to their range in scale and the hybrid opportunities they provide, and while we have observed many large scale infrastructural transformations there is a potential for small scale projects to serve as a catalyst for urban renewal.[2]

It is understood that infrastructure is needed in order to support the occupation of dense urban centers. Cities are filled with technical structures that handle transportation, water, air, and power amongst other necessities. In rural or suburban settings this infrastructure can be hidden away, displaced from areas of occupation, but in the city there is a dilemma. Infrastructure needs to be in close proximity in order to service the demands of

1 Stan Allen, Points + Lines, (Princeton Architectural Press, 1999)

2 Marion Weiss and Michael A. Manfredi, Public Natures, (Princeton Architectural Press, 2015)

the city, but the sights and sounds of this infrastructure challenge the aesthetic expectations of the people that live there. Attempts to marginalize or hide these infrastructures fail to realize their potential to contribute to a larger public realm. This marginalization is often done through a surface level "cosmetic" covering up of utilitarian buildings behind unassuming façades that either mimic their surroundings or suggest a different building type altogether. These buildings function as a sort of anti-architecture whose intention it is to be unseen or unnoticed. We have observed recently with the revitalization of defunct infrastructures that their value resonates long after they have served their initial purpose. Rather than excluding these infrastructures from the public realm, perhaps they could play an active role in shaping it through the creation of new public destinations. By inviting the public in, there is a potential to express and elevate these utilitarian structures. This could be done through a reimagining of the formal expressions of utilitarian buildings or through the introduction of public programs which could transform these once hidden and private spaces into a public utility for the city. Singular functioning infrastructures are limited and occupy valuable land. By creating programmatically "thick" infrastructures, variety and spatial richness can be achieved. Transforming infrastructures into a pliable system creates opportunities for unpredictable and variable uses and activities to occur.[3] The dense urban environment demands a layered public realm with multifunctional and programmatically varied infrastructures.[4]

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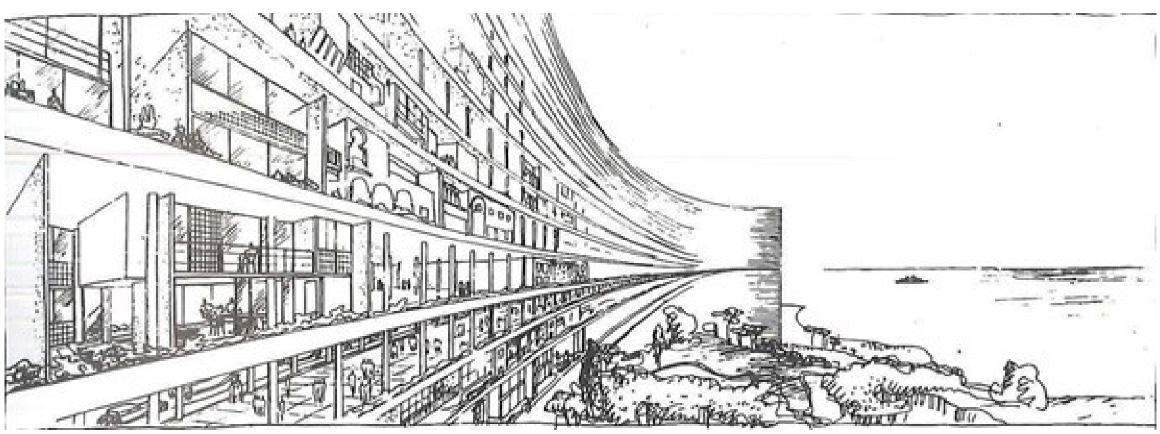
3 Bernard Tschumi, Architecture and Disjunction, (The MIT Press, 1996)
4 Marion Weiss and Michael A. Manfredi "Inhabiting Infrastructure" (OZ: Vol. 34, 2012)

Hybridization

The dense urban environment demands hybridization. Combining multiple programs and uses within a single structure is a strategy that has been employed throughout history. An emblematic example being the mixture of work and living programs within a single structure, often expressed as living spaces stacked above a ground or street level work or retail space. In the current urban environment a new typology has emerged. A typology that distinguishes itself from traditional mixed use structures through scale and form. Scale, which is derived from the city block within the orthogonal grid and form, which is the result of late nineteenth century technological advances. A byproduct of escalating land values and the constraints of the urban grid, this hybrid typology mixes functions and deviates from the traditional notion that buildings should look like what they house. A clear offspring of modernity, this typology emerged from developments such as the steel frame, the elevator, and new concrete construction techniques.[5] With horizontal movement constrained within the city, new buildings moved skyward. These new structures house a variety of programs which can either be related or disparate. Traditionally related building types can be combined into a unified structure, while at the same time dissimilar programs can find symbiotic relationships within a single building. With the increasing densification of cities, hybridization is essential to accommodate the diverse and seemingly incompatible activities desired within the urban environment. No matter which form or function dominates, these structures are strengthened through the poetic union of their varied uses.

5 Joseph Fenton, "Pamphlet Architecture 11: Hybrid Buildings", (Princeton Architectural Press, 1985)



1. Le Corbusier, Obus A, Plan for Algiers, 1932
Drawing depicts a hybridized highway with residential units below

Hybridization has been utilized as a means of integrating and concealing urban infrastructure. By incorporating an infrastructure into a larger hybrid development, its visual and spatial impact can be lessened or removed all together. Take for example an ancillary structure for the New York City Subway (2) located on the corner of 34th and 11th. This infrastructural building was planned as part of a larger hybrid development. When the structure first emerges as an isolated object its function is somewhat visually expressed. A blank box with vents instead of windows, clearly this is a building that is intended for machinery and not people. This aesthetic though is problematic for some. In order to remove its visual presence the infrastructure is engulfed within a larger hybrid tower. The infrastructure can no longer be identified, its existence completely hidden.

When large scale hybrid opportunities do not exist though, integrating these infrastructural buildings becomes much more challenging. In many cases the default solution tends to be purely cosmetic, disguising or hiding the infrastructure behind a fake façade. While this addresses the aesthetic issues surrounding infrastructure, it does not address the problems posed by a single use building in a dense city that demands hybridization. Incorporating multiple uses, even at a micro scale, within an infrastructural building could allow for new experiences to emerge within the city. Parts of the city that were once hidden and inaccessible can now be occupied by the public through the introduction of secondary programs.

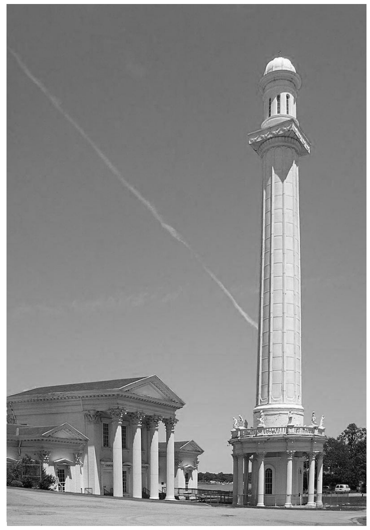
2

Disguising Infrastructure

The typical attitude toward the design and integration of urban infrastructure is often one of concealment. Infrastructure is frequently sited away from occupied areas where it is less likely to be seen, or it is integrated into a larger development in order to mask its presence. There are instances though where infrastructure cannot simply be displaced or hidden within another structure. These instances have led to the emergence of a new building typology, one that uses its exterior expression as a means of disguising its interior function. Attempts to hide the presence of infrastructure have resulted in the development of "fake" buildings. Buildings that are fake not in terms of structure, but in terms of their outward appearance. These buildings sport facades with ornamentation and false windows which are intended to give the appearance of another building type or function. These facades allow infrastructural buildings to masquerade as homes, offices, or any other common building type. This act of camouflage serves both as a means of maintaining a certain aesthetic and also as protection against vandalism or burglary.


3. Joshua Callaghan, Disguised transformer box

The practice of camouflaging utility can be traced back to the nineteenth century when many architects sought to celebrate infrastructure through the creation of civic monuments. The buildings that housed infrastructure held an elevated status both as symbols for the modern industrialized city as well as for the general beautification of these developing urban areas. These infrastructural buildings, both constructed by the city as well as private companies were part of crafting a certain image. Cities wanted to present themselves as illustrious and forward thinking. Ornate towers in both Louisville (4) and Chicago(5) for instance, were built to hide water pipes for pumping stations. The Louisville Water Tower designed in the style of a Greek temple and the Chicago Water Tower modeled after gothic architecture both serve as civic landmarks transforming infrastructure into a monument within the city. The allusion towards religious imagery in both examples was not uncommon. In Chicago for instance, the Commonwealth Edison Substation (6) built in 1931 is temple like in its appearance. A large faux door adorns the exterior of the building seeming to suggest a grand public entry, though it is inaccessible. From the outside the infrastructural function of the building is for the most part concealed though there is a hint of the building's use suggested by the relief above the door which depicts a man holding two bolts of lightning. The references made toward religious monuments reveal the elevated status these infrastructures held in the city at the time.



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Other examples show much more modest attempts at camouflage. Rather than representing infrastructure as paramount and temple like they attempt to blend in with their surroundings by mimicking common building types. Photographer Robin Collyer documented a series of electrical substations in the suburbs of Toronto disguised as bungalow style homes (7). These building included windows, blinds, and landscaping all in order to maintain the illusion of an occupied residence. In New York City, 58 Joralemon Street (8) is a noted example of an existing building reused as an infrastructure.

Originally built as a private residence in 1847, the property was purchased in 1908 and transformed into a subway ventilator. The exterior facade was kept in order to maintain the character of the neighborhood and to disguise the presence of the infrastructure.[6] While it may appear like a normal house, upon closer inspection the industrial door and painted windows suggest another form of occupation.

Large towers standing out in the middle of the Hudson River (9) function as ventilation shafts for the Holland Tunnel. The two-duct system pumps fresh air in and exhausts fumes out. The towers house fans, ducts, and other electrical equipment needed to maintain the air quality within the Holland Tunnel. From the exterior familiar architectural forms and materials are used to disguise this function. These towers provide a strange new building type somewhere between a work of engineering and a work of architecture.[7]

6 John Freeman Gill, "A Puzzle Tucked Amid the Brownstones", The New York Times, 2004
7 David Gissen, Subnature: Architecture's Other Environments, (Princeton Architectural Press, 2009)

7

8

9

Authenticity & Aesthetic

Cities demand visual congruity. Anything that interrupts this visual coherence is immediately noticed and scrutinized. This is the challenge proposed by the necessary insertion of infrastructure into cities and neighborhoods that have an established character and aesthetic. In many ways the instinct to disguise and hide infrastructure is a valid one. The use of "fake" buildings as a means of camouflage though, is a questionable solution as it challenges notions of authenticity. It is merely a surface level solution that fails to realize the potential for infrastructural projects to contribute to a greater public realm. Hybridization is a compelling solution as it allows both for the concealment of unsightly infrastructure as well as the occupation of an otherwise inaccessible part of the city. This is particularly applicable in dense urban centers where land is scarce and valuable.

The Mulry Square Fan Plant (10) completed in 2015 is an example of a project where issues of authenticity, aesthetic, and the role of urban infrastructure come to a head. The Mulry Square Fan Plant is an ancillary structure for the New York City Subway, it houses emergency ventilation equipment. The project is a manifestation of the conflict between what these types of infrastructural buildings want to be, essentially an affordable blank box for machinery, and the aesthetic expectations of the city and the people that live there. That coupled with budget restrictions and bureaucratic conflicts results in this project's odd half-hearted attempt at camouflage.[8] The thin brick veneer with punched openings tacked on to a concrete box is an attempt to blend in by mimicking the scale and materiality of surrounding buildings. In reality this tepid gesture feels out of place and reveals the inadequacy of the purely aesthetic solution to infrastructural integration. Perhaps the most significant missed opportunity is the project's failure to engage with its greater urban context. The building is located on an incredibly charged and dynamic site where even a small gesture could have a significant impact on the surrounding neighborhood. The project's failure to integrate into the existing context raises a number of questions. Why don't we demand more of these infrastructural projects, and what is their potential role in contributing to an active and engaging urban street life?

8 Michael Kimmelman, "The Best Architecture in New York of 2016", The New York Times, 2016

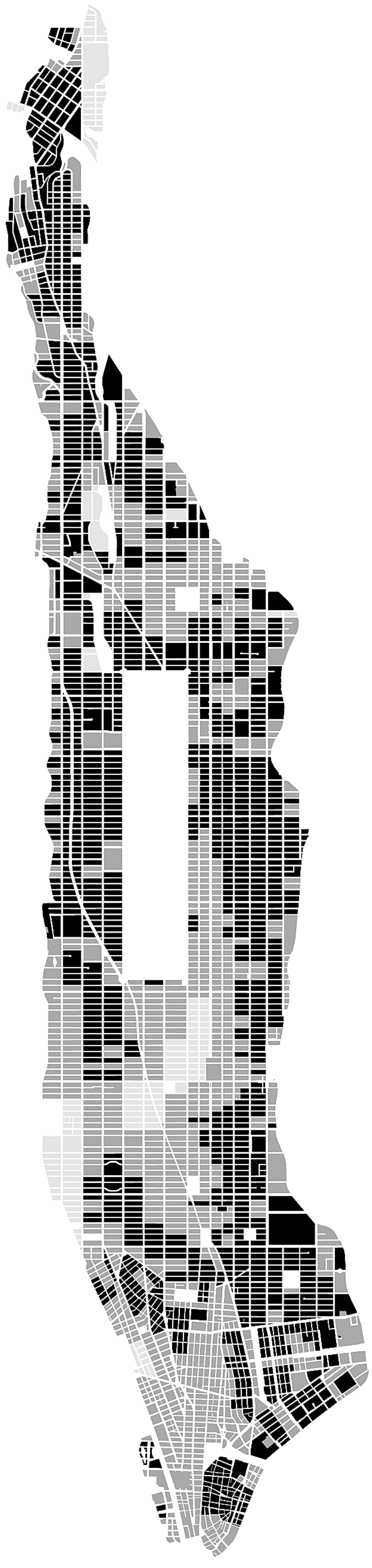
10

Part II: New York City

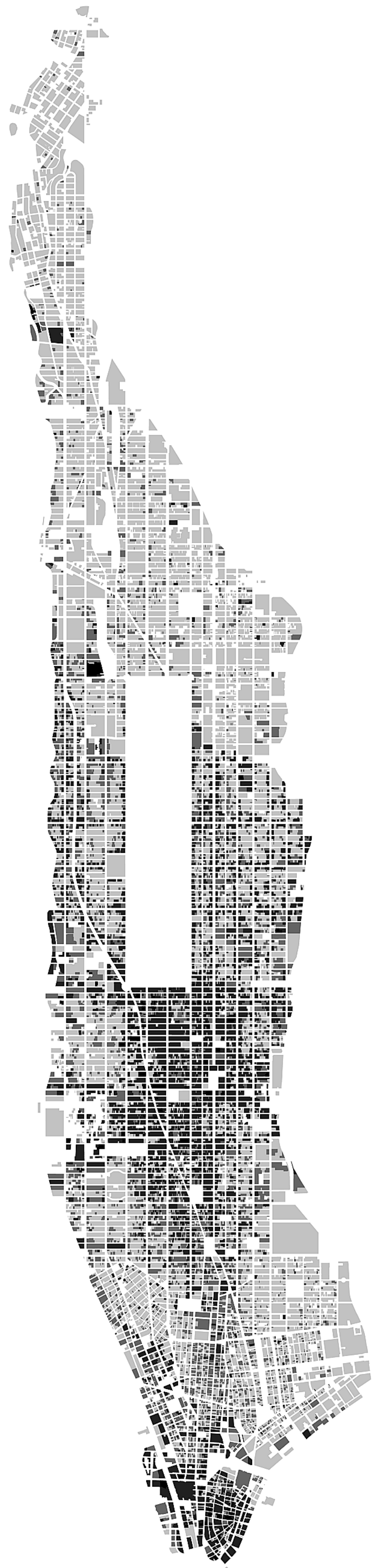
Mapping New York

Following the study of the Murly Square Fan Plant, the ancillary structures of the New York City Subway became the focus of the investigation. The subway system is an integral infrastructure that is prevalent in the city. New York City, specifically Manhattan, is an ideal site for the project as it is a developed and dense city where introducing infrastructure is a challenge. In New York City infrastructure cannot always be displaced or hidden away, often it must be sited in dense and lively neighborhoods where questions of integration and engagement are critical.

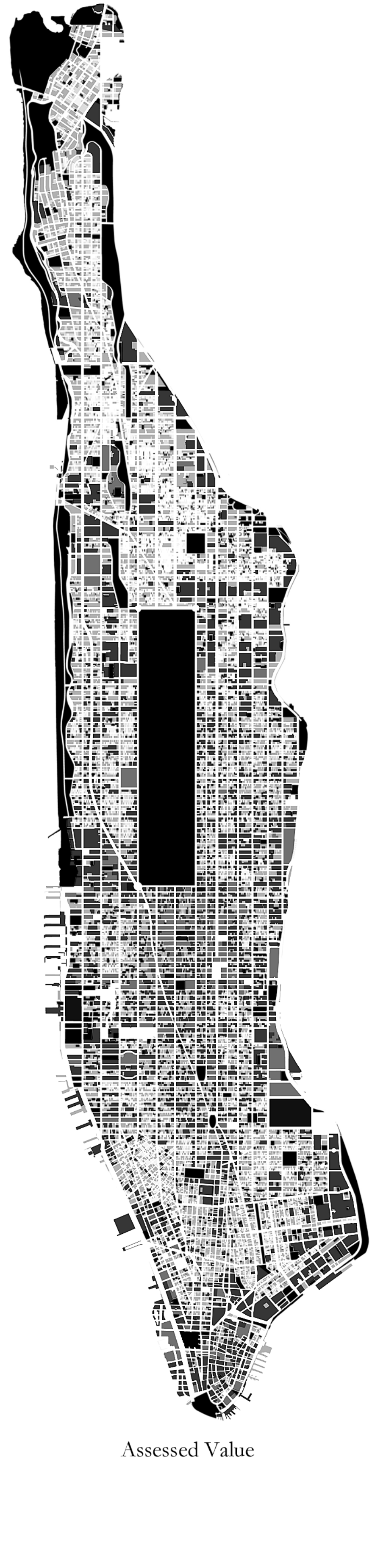
The investigation began with a broad analysis of Manhattan itself. A series of maps were created to illustrate what is already common knowledge, the city is dense and land is expensive. The maps are intended to bring clarity and nuance to this understanding of the city. The first map depicts population density at the scale of the city block. This map reveals the areas with high concentrations of residences, and allows us to understand where the majority of people live. The next map depicts floor area ratio which is the floor area of a building, divided by the area of the site the building sits on. A tall building built up to the boundaries of its sight will have a substantial floor area ratio, while an empty lot would be zero. This map reveals the densest parts of the city with the largest concentration of tall buildings, as well as the parts of the city that are open which tend to be either parks or vacant lots. The next map depicts the assessed value of individual lots. The results of this map are actually very similar to the floor area ratio map except many of the large unbuilt lots, which are represented as white in the floor area ratio map, are some of the most valuable in the city. The final two maps are a simplified depiction of private and public spaces in Manhattan. These maps reveal the dispersed nature of public space in Manhattan outside of the waterfront and Central Park.



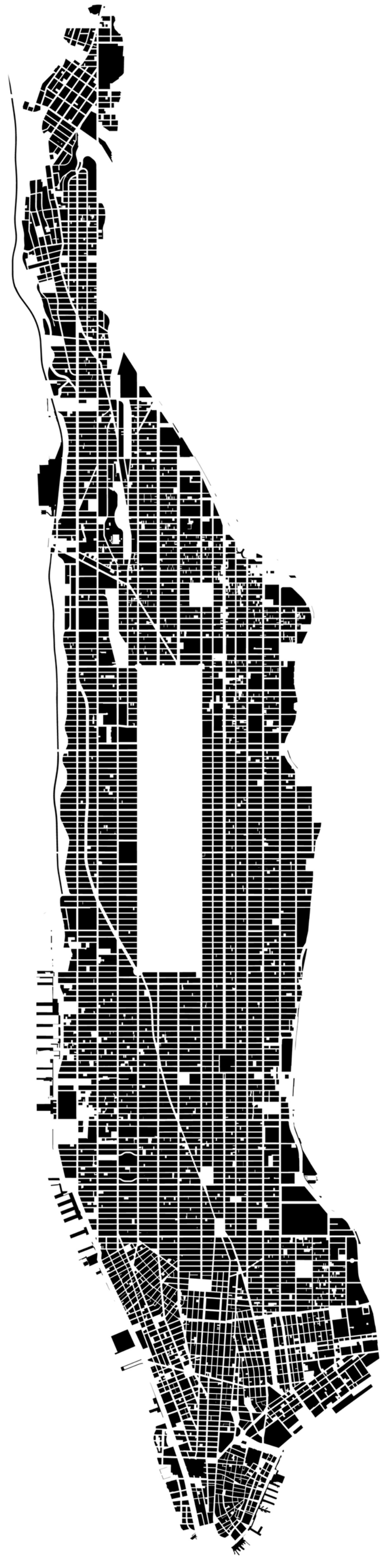
Population Density



Floor Area Ratio



Assessed Value



Private

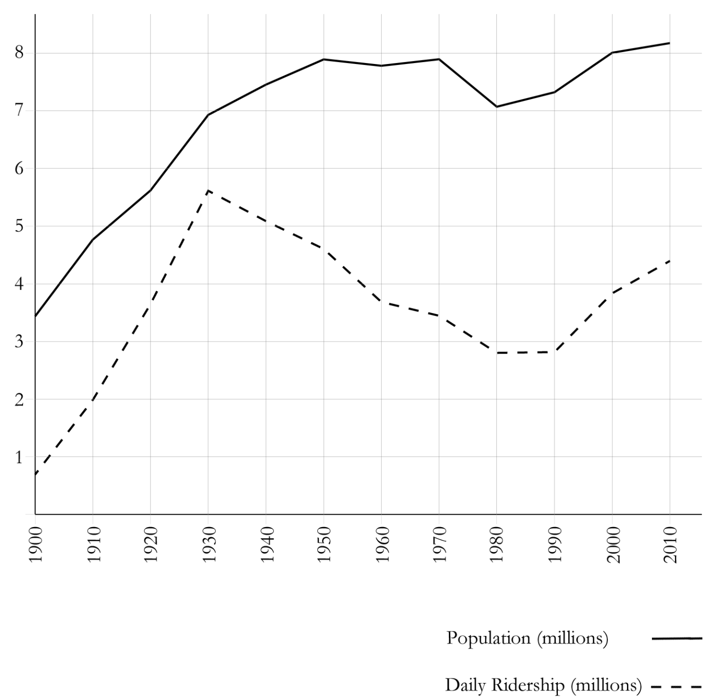
Public

The New York City Subway

First opened in 1904 with a single line that ran from lower Manhattan to the Bronx, the New York City Subway System was and is still an integral part of the development and expansion of the city. Over the next few decades the subway system would spread connecting disparate outlying areas of the city, allowing for their development. Initially costing only a nickel, the subway became the city's most democratic site bringing together socially and economically diverse groups of people.[9] The subway was a catalyst, shaping not only the expansion and development of many neighborhoods but also the demographic and social hierarchy of the city. The dramatic transformation of the city that occurred over the next century was only possible through investments in great public works, such as the subway, that were expensive but improved the overall quality of life within the city. The initial ambition of the subway was to serve as not only a municipal infrastructure, but also as a grand civic monument.

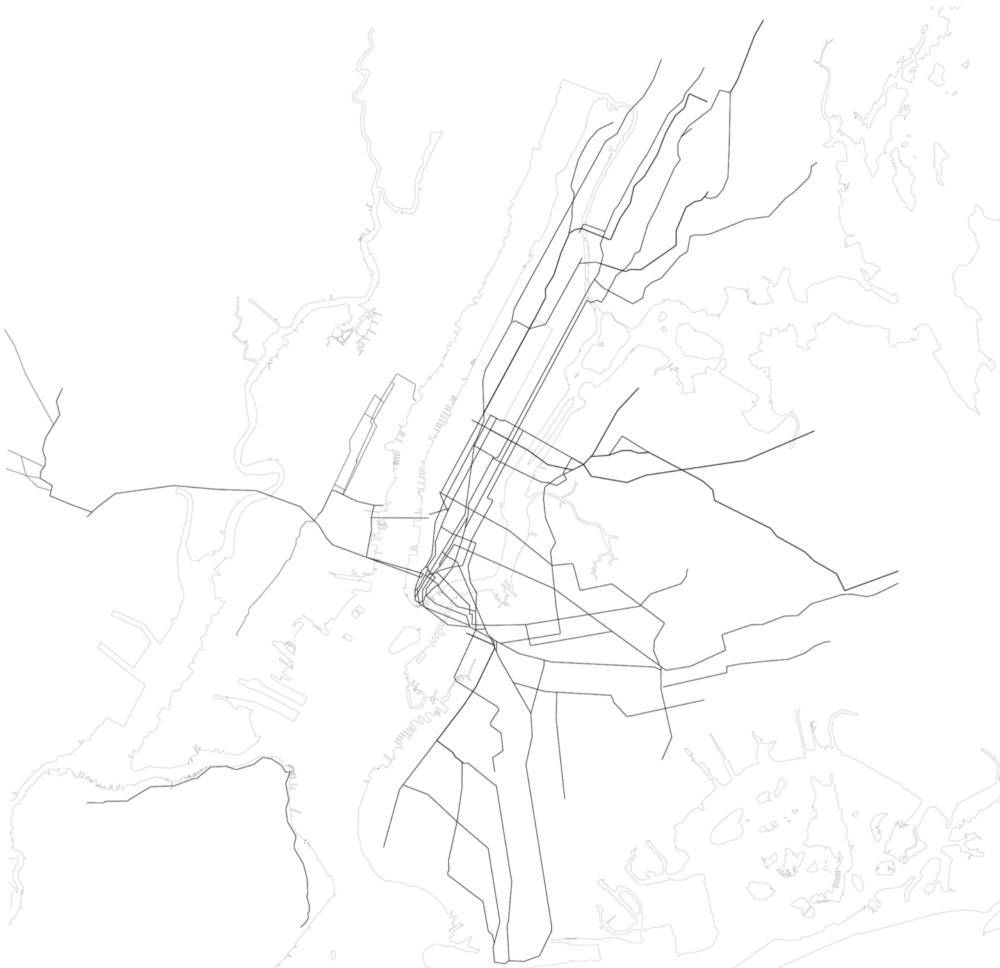
1 Clifton Hood, 722 Miles: The Building of the Subways and How They Transformed New York, (Johns Hopkins University Press, 2004)

The maps on the following pages depict the transformation of the New York City Subway System from its inception in the early 1900s to the current map of today. What the maps portray is significant growth and investment in the subway system in its first forty years, then following that initial expansion very few changes occurring for decades. Preceding the maps is a graph which depicts the relationship between the city's population and subway ridership. What this graphs illustrates is that even though there has been a pretty consistent population rise, subway ridership saw a large decline from 1930 to 1990. This dip in popularity, coupled with financial woes the city experienced in the seventies, explains the lack of large scale investment in the subway system for more than fifty years. Over the past few decades though ridership has gone up and today surpasses the peak recorded in the 1930s. This renewed interest in the subway system has resulted in plans for construction and expansion. The Second Avenue Subway, the largest addition to the subway system in fifty years saw its first phase completed in 2017.

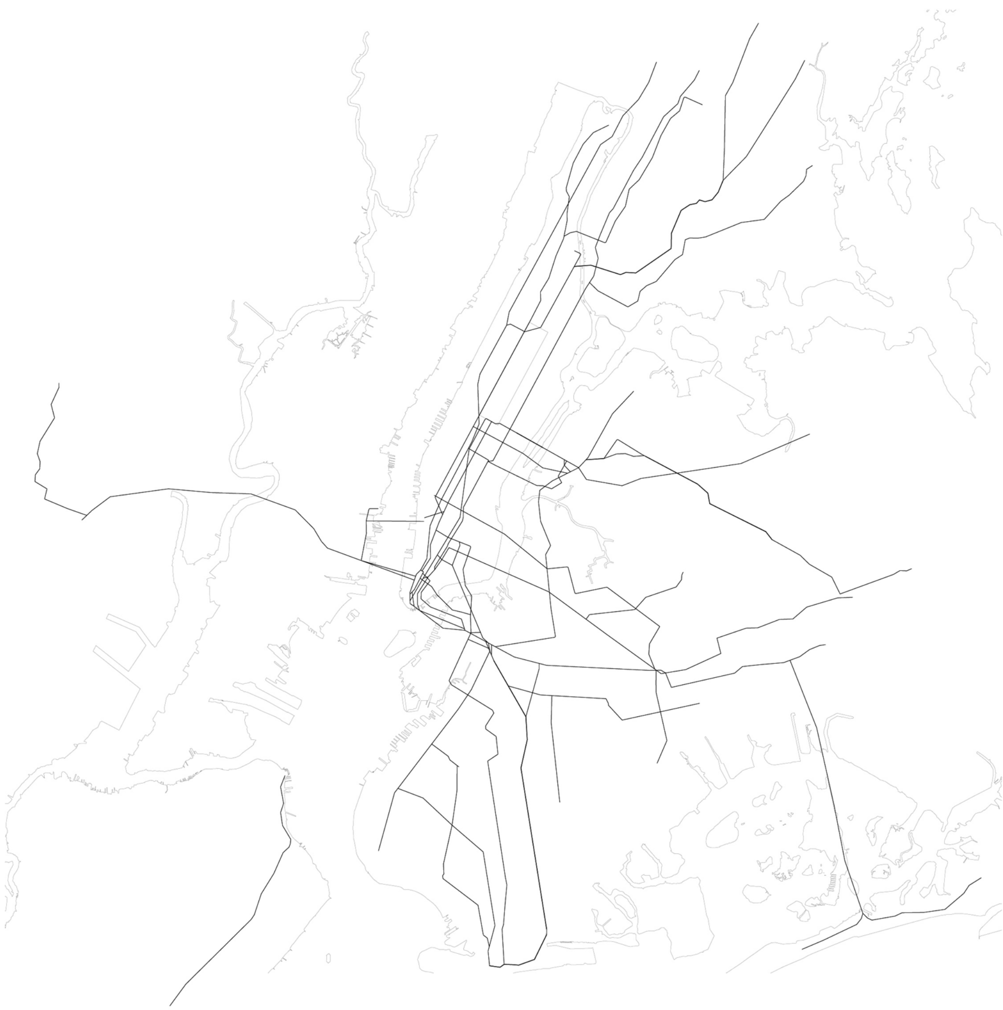


8
7
6
5
4
3
2
1
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Population (millions)
Daily Ridership (millions)

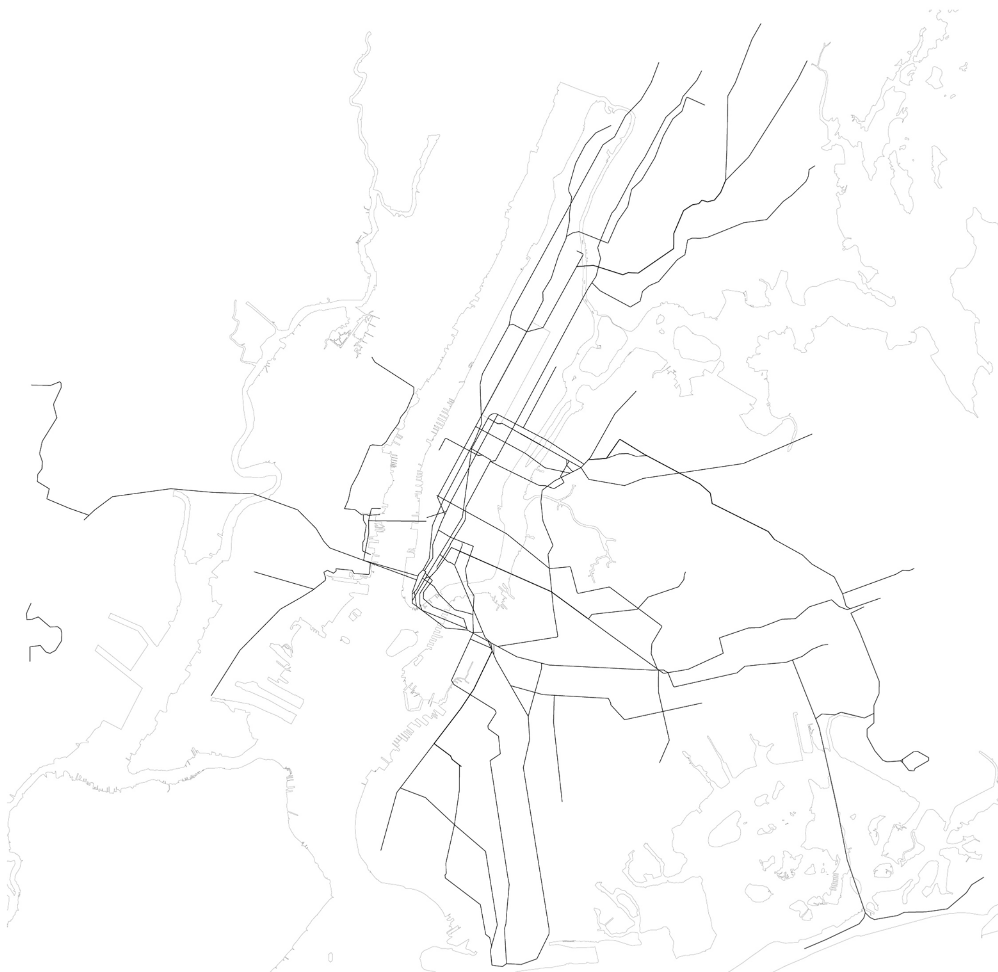
1900



1940



1980



2017

"The railway and its equipment as contemplated by the contract constitute a great public work. All parts of the structure where exposed to public sight shall therefore be designed, constructed, and maintained with a view to the beauty of their appearance, as well as to their efficiency."[10]

Taken from the original contract for the New York City Subway, this quote reveals the desire for the subway system to not only be utilitarian and efficient but also to contribute to the overall aesthetic and character of the city. The subway was intended to be completely integrated not only physically but also aesthetically. Every element of the subway system from its entrances to its ancillary structures were meant to be a part of the existing urban fabric, rather than detached and isolated from it.[11] The ancillary structures of the subway should be regarded as an integral part of the visual urban landscape and therefore worthy of design investment. This attitude is clearly reflected in the early designs of the subway ancillary structures.

It is apparent when looking at these buildings that an effort was made to not only fit them within their context but also to contribute to the overall design and aesthetic of the city. Because these buildings are going to be a part of the city for decades, it is worth the investment of both time and money to ensure that they are a positive contribution to their urban setting.[12] One of the most troubling byproducts of contemporary architecture is the rise of the inauthentic. Sprung from a desire to quickly and cheaply produce design, this attitude is reflected in many of the contemporary iterations of subway ancillary structures such as the Mulry Square Fan Plant. The subway system is an investment

10 Interborough Rapid Transit Company, The New York Subway, (IRT CO., 1904)

11 Joseph Fenton, "Pamphlet Architecture 11: Hybrid Buildings", (Princeton Architectural Press, 1985)

12 Adolf Loos, "Ornament and Crime", (Ariadne Pr; UK edition, 1997)

intended to improve life within the city. This is the mindset that should dictate the design and approach of every aspect of the subway system, including its ancillary structures. The renewed interest in the subway system should be reflected in every component of its design and urban integration.

Subway Ancillary Structures

The subway system has the unique property of being almost entirely invisible within the city. With miles of tunnels underground, the subway's extensive presence is only hinted at by scattered elements at street level. Sounds of trains can be heard through street level grates that are a reminder of the subsurface infrastructure. Access points for the subway are announced with above ground entrances that communicate their purpose through the use of signage and design. Outside of these iconic subway elements, there are also a number of above ground ancillary structures that house machinery, whose relation to the subway system is less apparent.

Some of the earliest ancillary structures for the New York City Subway included electrical substations (11) which housed the equipment used to power the early subway. Scattered throughout the city these buildings were integrated through the use of unassuming and historic facades. These buildings were designed with the intention of blending in with the New York City streetscape. Their facades often incorporated architectural details and materials that mimicked surrounding buildings in order to minimize their industrial presence. In contrast to contemporary ancillary structures which are attempting to integrate into established neighborhoods, these early ancillary structures were built concurrently with the rest of the city echoing the character of the buildings being built at the time.[13] These early electrical substations were in operation for over a century until they were eventually replaced due to improved electrical equipment which was smaller and did not require human supervision. This new equipment is housed in less noticeable structures or underground where it cannot be seen.

13 Christopher Payne, New York's Forgotten Substations: The Power Behind the Subway, (Princeton Architectural Press, 2002)

11

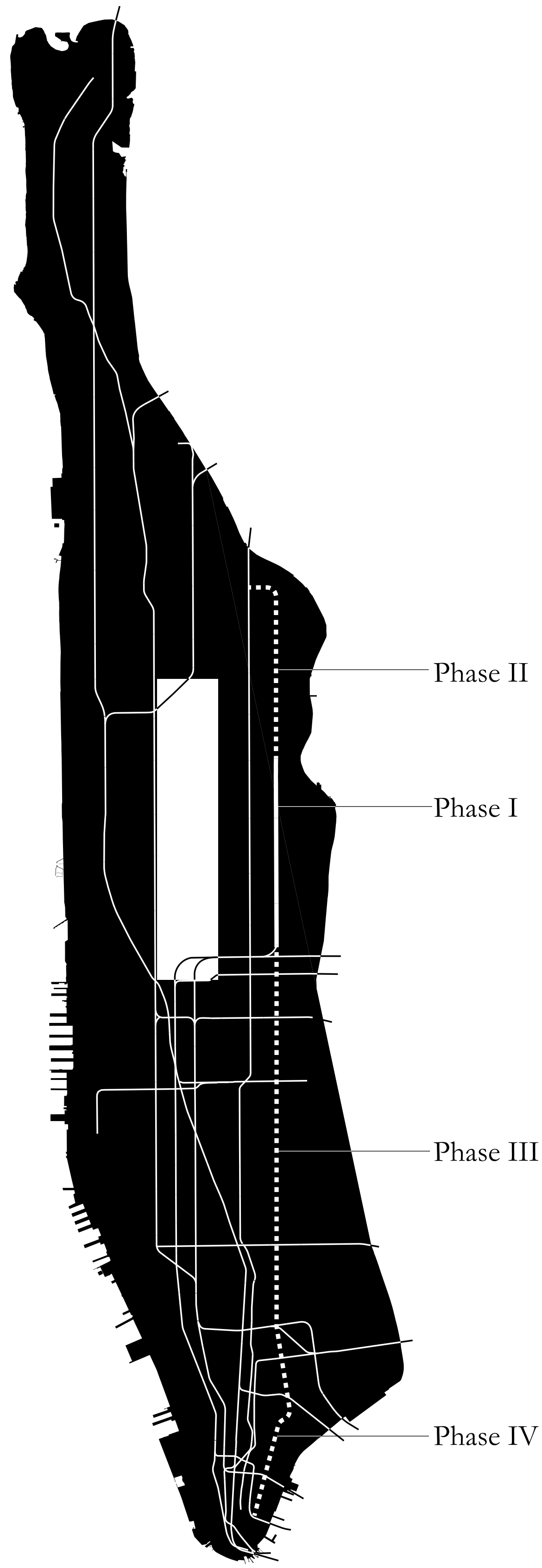
Today, a new typology of subway ancillary structure has emerged. In response to new codes and requirements additional machinery is needed for the operation of the subway. The Second Avenue Subway, the newest addition to the subway system in over fifty years features an updated ventilation system which requires the construction of above ground structures(12) to house exhaust, emergency ventilation, air conditioning equipment, and emergency egress. These new buildings appear with frequency along Second Avenue and have struggled to integrate into their context.

12

The Line That Time Forgot

The Second Avenue Subway was officially opened January 1, 2017 after nearly a century of plans, delays, and construction. The line was first proposed in the 1920s, and though it was not built at the time it would continue to emerge periodically whenever expansions to the subway system were considered. The Great Depression, World War II, financial troubles in the 70s and 80s all caused delays and cancellations for the project. The Second Avenue Subway first broke ground in the 70s but construction had to quickly end because of a lack of funding, tunnels were left half built and abandoned. In the early 2000s the project would emerge again this time with concrete plans to finish at least one phase. The current iteration of the plan for the Second Avenue Subway first broke ground April 13th, 2007. The project is planned in four phases that in total will span eight and a half miles running from 125th Street in Harlem to Hanover Square in lower Manhattan. Phase one, located in the Upper East Side, runs from 65th Street to 105th Street, and has stations at 72nd Street, 86th Street, and 96th Street. The Second Avenue Subway is the result of renewed interest in the subway system, and is the largest addition to the system in over fifty years.

Phase one of the Second Avenue Subway runs from 65th Street to 105th Street, and has stations at 72nd Street, 86th Street, and 96th Street. In response to new codes and requirements the Second Avenue Subway includes a number of above ground ancillary structures, two per subway stop. The structures house exhaust, emergency ventilation, air conditioning equipment, and emergency egress. Subway grates, which are iconic urban artifacts, are no longer up to code as you can no longer exhaust air at street level.


Phase II
Phase I
Phase III
Phase IV

1919 First mention of proposed Second Ave Subway

1927 Revised proposal for Second Ave submitted

1929 Board of Transportation tentatively approved subway expansion

1930 Proposed line is shortened

1931 Scaled down proposal postponed

1932 Board of Transportation modified proposed plan to further reduce costs

1939 Construction postponed indefinitely

1940 Northern half of Second Avenue Elevated Line closed

1941 US entry into World War II halts all but most urgent public works

1942 Southern half of Second Avenue Elevated Line closed

1945 Plans for the Second Avenue Subway revised

1947 New plan put forward by Colonel Sidney H. Bingham

1950 Revised plans put forward

1951 New York voters approved a bond measure for construction

1957 Made clear that Second Ave Line was unlikely in the near future

1962 Construction began on connection between Manhattan and Williamsburg Bridges

1964 Congress passes Urban Mass Transportation Act

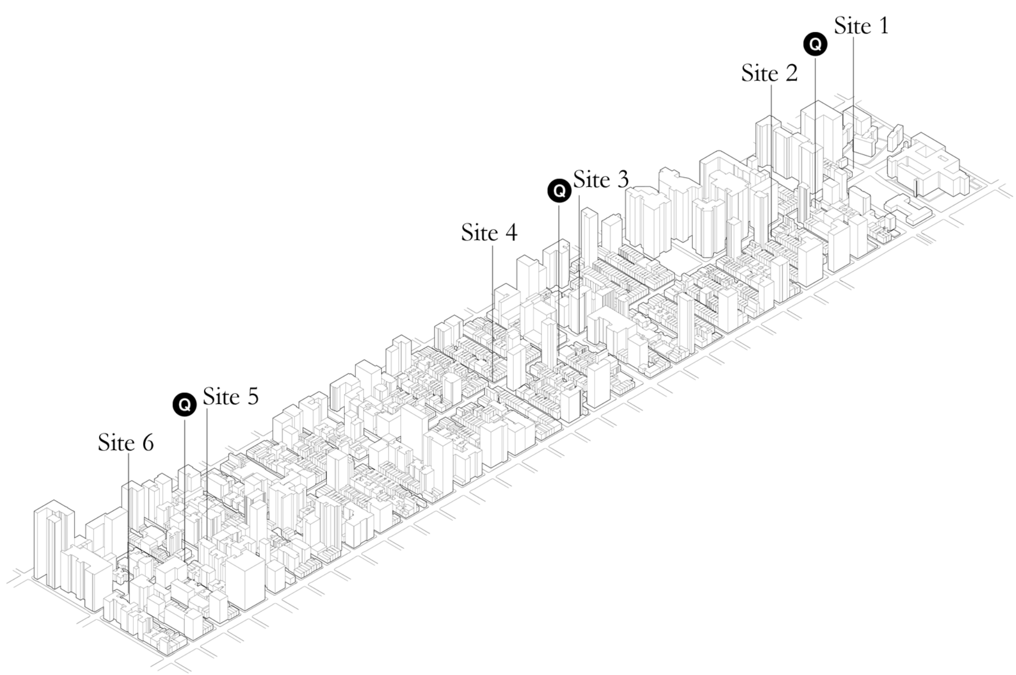
1969	"Plan for New York City" proposal
1970	Approval of design contract
1971	New plan for the line unveiled with Lenox Hill station and extension of 48th St station
1972	Groundbreaking ceremony held
1974	Construction of section 135-C5 started
1975	Stop-work order issued
1978	No plans to finish construction
1997	Lower Manhattan Access Study
2001	Federal Transit Administration approved the start of preliminary engineering
2003	Two million dollars in preliminary funding for the subway provided
2004	MTA's final environmental impact statement approved
2006	All future stations will be outfitted with air-cooling systems
2007	Ceremonial groundbreaking and construction begin
2017	Second Ave Subway line opens and preliminary work on phase 2 begins

There are no subway grates along Second Avenue, instead large ducts are placed within the above ground ancillary structures that exhaust air above the street. These structures also house equipment needed to exhaust smoke in the case of a fire in one of the tunnels.[14] The structures that have been built along Second Avenue have been criticized not only for their aesthetic but for their failure to contribute to an active and engaging street life. The buildings are all sited on street corners, which are some of the most critical and valuable lots within the city. These inaccessible structures create "dead corners" that harm the character of the neighborhood and lower property values. In addition much of the property needed to house these structures was acquired through eminent domain which meant the eviction of residents and businesses.[15] Since the construction of the subway line, rents along Second Avenue have gone up at a higher rate than those on neighboring streets.[16] The sites of these ancillary structures along Second Avenue are a valuable opportunity, and while many of them are not large enough to support a substantial development a small scale intervention can help realize the full potential of these buildings to contribute to the city.

14 Sam Roberts, "No Heel Hazards (or Gusts) as Subway Expands", The New York Times, 2013

15 Ben Muessig, "2nd Avenue Subway Cooling System Will "Blight" UES", Gothamist, 2009

16 Raphael Pope-Sussman, "The Insanely Expensive Second Avenue Subway Explained", Gothamist 2016


Site 1
Site 2
Q
Site 3
Q
Site 4
Site 5
Q
Site 6

Subway Ventilation

The ventilation system for the Second Avenue Subway is an integrated system that is a result of severe spatial constraints and limited real estate availability.[17] The system is designed to be as efficient as possible both in terms of cost and space. Since stations and tunnels are highly interlinked, the integration and coordination of mechanical equipment within a single structure is advantageous. In order to achieve this the system uses the functional sharing of equipment which results in minimal space requirements and cost savings both in terms of capital and life cycle costs. The ventilation system is composed of two fan plants per subway station located at each end of the subway platform. This allows each plant to operate in both normal and emergency exhaust situations.

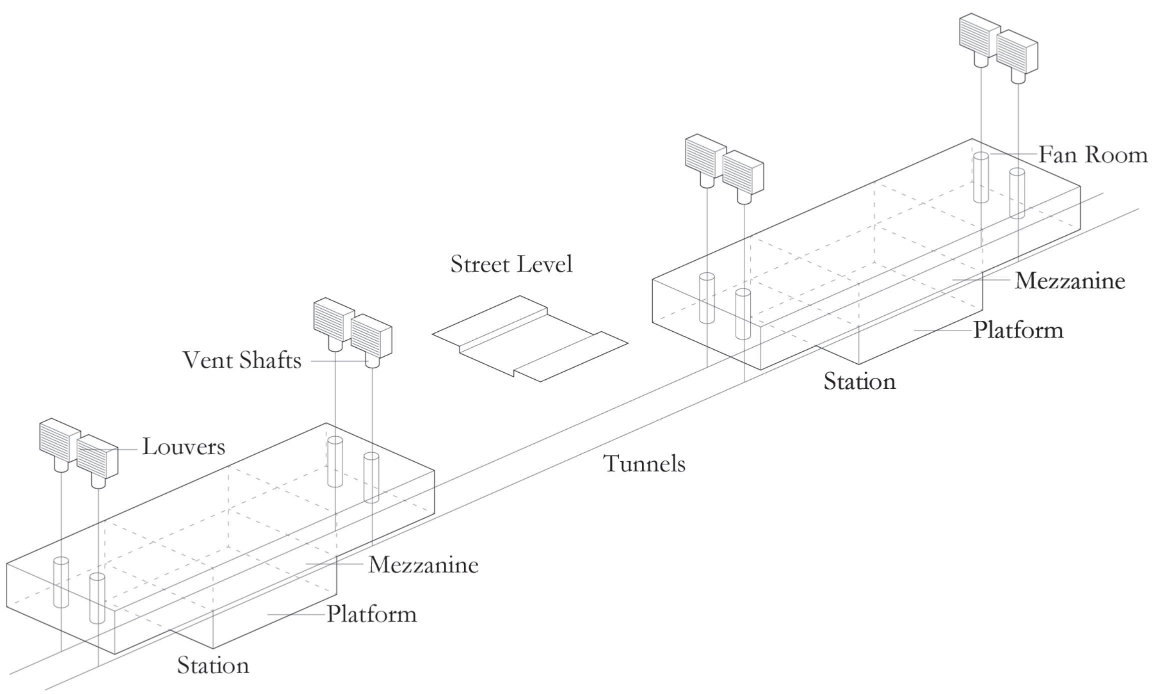
There are three modes of operation that need to be accounted for; normal (trains stop at stations), congested (trains stop at tunnels), and emergency (trains catch fire and are stranded). The ventilation system must provide an acceptable environment in terms of temperature and air quality in all three modes. During normal operation fans would be off and natural ventilation would occur.[18] In the case of a fire, emergency mode would activate the tunnel ventilation system which would mechanically exhaust smoke and provide safe egress for passengers and staff.

Even though the system is designed to be as efficient and minimal as possible, it still required the acquisition of thirteen properties totaling an estimated ten million dollars in value. This acquisition also required the eviction of seventy five residents and businesses.[19] A new approach toward the integration these ancillary structures is needed for the next phases of the project. The act of taking required to build these structures can be counteracted through a return of public services and amenities that activate these sites and integrate them within the urban context.

17 Davar Abi-Zadeh, Jarrod Alston, Richard Potter, and Mohammad Tabarra, "Integrated Ventilation System Design of the Second Avenue Subway", (DMJM Harris + Arup JV, 2006)

18 Davar Abi-Zadeh, Stefan Sadokierski, and Mohammad Tabarra, "Design of a Modern Subway Ventilation System", (DMJM Harris +Arup JV, 2004)

19 Ben Muessig, "2nd Avenue Subway Cooling System Will "Blight" UES", Gothamist, 2009



Fan Room
Street Level
Mezzanine
Platform
Vent Shafts
Station
Louvers
Tunnels
Mezzanine
Platform
Station

Part III: Prototypes for Public Infrastructures

A Public Infrastructure

"These are buildings that are going to last forever; they should be contributing to the street scene. They should not just be a wrapping to hide mechanical things."[20]

When it comes to the integration of urban infrastructure there is a conflict. A conflict between how these buildings want to manifest, basically efficient blank boxes for machines, and the expectations of the city and the people that live there. Expectations that are both aesthetically driven but also a desire for accessible services and amenities. The ancillary structures of the Second Avenue Subway are a direct manifestation of this conflict. The buildings are uninhabited and inaccessible blank boxes for machines. Their presence though, is seen as a blight on the city by residents along Second Avenue. The current solution to this problem is purely window dressing, façades composed of an arrangement of familiar materials that give the impression of liveliness. As an isolated instance perhaps this solution is acceptable, a single unremarkable moment in a diverse and active city. But considering the frequency in which these buildings will occur, their failure to contribute to the city at large is a missed opportunity. The Second Avenue Subway is proposed to have sixteen new subway stops, which means thirty two above ground ancillary structures. Thirty two opportunities to contribute unexpected moments within the city.

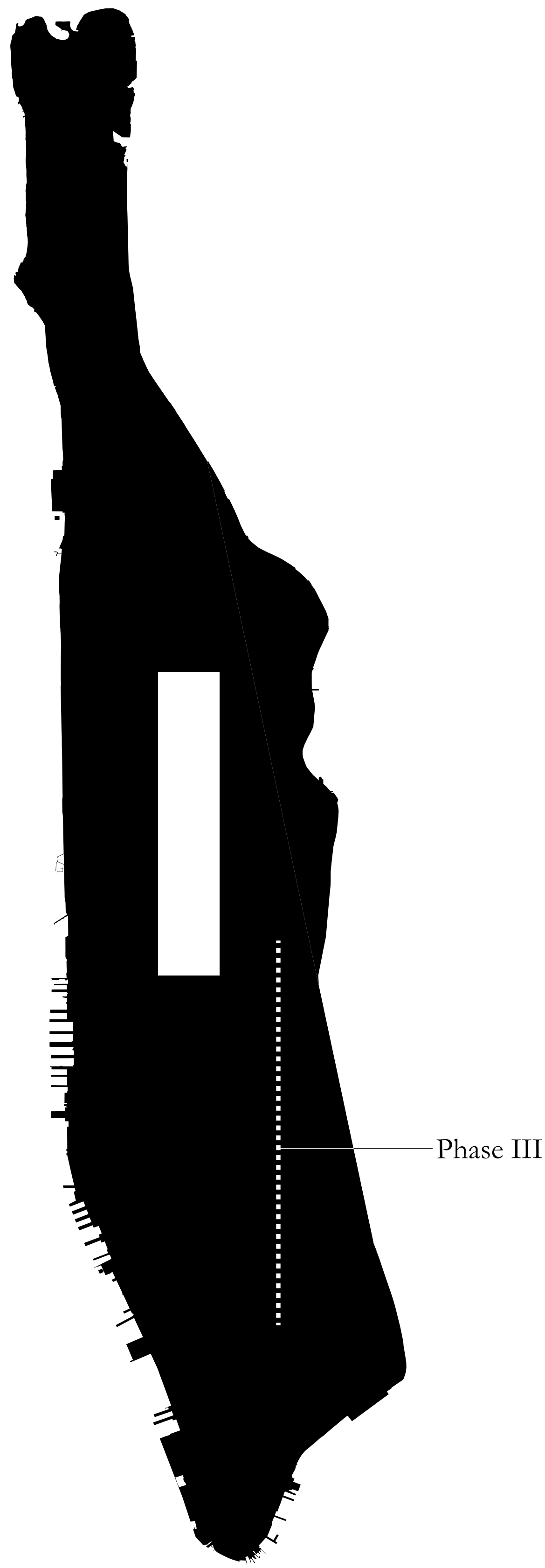
There are questions as to why large scale developments that could include apartments or offices are not built above these ventilation plants. This could solve the problems of integration, and bring much needed housing

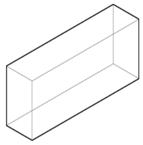
20 Ben Muessig, "2nd Avenue Subway Cooling System Will "Blight" UES", Gothamist, 2009

to a dense area. This is not unheard of, it is something that is happening in other parts of New York and in other cities as well. The problem along Second Avenue is that the area is very dense and opportunities for these kinds of developments are not common because of the scarcity of land. Most of the sites for the existing ventilation buildings are not large enough to support this type of intervention, and in order to do so would have required additional land acquisition. Rather than focusing on large scale developments, the proposal is to introduce a series of micro scale interventions to activate these otherwise inaccessible corners of the city. These spaces focus on everyday human activities that are intended to improve the lives of residents and enliven the urban fabric.

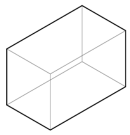
Site Selection

The third phase of the Second Avenue Subway, the longest phase stretching from 63rd Street southward to Houston Street, is the focus of the investigation. In total the site is about three miles long running from the Upper East Side through Midtown and down into the Lower East Side. This phase of the Second Avenue Subway includes five new subway stops each requiring two above ground ventilation structures, ten in total. The investigation began with site selection. Using the already completed structures from phase one as a guideline, a minimum lot size was determined to be about 1600 sqft. The subway stops have already been established for the third phase: 55th Street, 42nd Street, 34th Street, 23rd Street, and 14th Street. For each subway stop there are two ventilation structures required. Each one placed on a corner lot near the ends of the subway station box which is about three blocks long. This establishes the approximate location of each ventilation plant, and narrows the site selection down to only a few eligible lots. These lots were then analyzed in terms of their size, value, and number of occupied units. Lots were chosen in an attempt to reduce cost and minimize displaced occupants. Ideally vacant lots or lots with deteriorating buildings would be selected, but those are rare in this part of the city. In total eighty seven units, fifty nine of which are residential, had to be taken for the proposed ventilation structures, the total value of which exceeded fifteen million dollars. Looked at in their entirety the ten chosen sites are minuscule in comparison to the rest of the city. Each one though represents an opportunity to give back by providing a service or space for public occupation.

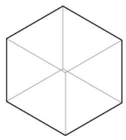

Phase III



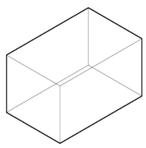
Site A
Residential Units: 0
Total Units: 6
Assessed Value: $1,964,700
Year Built: 1961



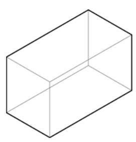
Site B
Residential Units: 8
Total Units: 11
Assessed Value: $767,197
Year Built: 1901



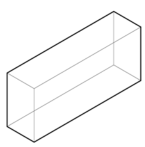
Site C
Residential Units: 8
Total Units: 14
Assessed Value: $1,410,932
Year Built: 1900



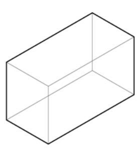
Site D
Residential Units: 0
Total Units: 3
Assessed Value: $1,066,050
Year Built: 1951



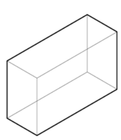
Site E
Residential Units: 13
Total Units: 14
Assessed Value: $1,125,450
Year Built: 1910



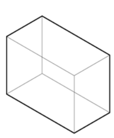
Site F
Residential Units: 6
Total Units: 7
Assessed Value: $618,221
Year Built: 1910



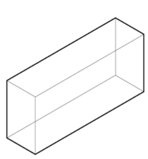
Site G
Residential Units: 12
Total Units: 15
Assessed Value: $1,527,750
Year Built: 1915



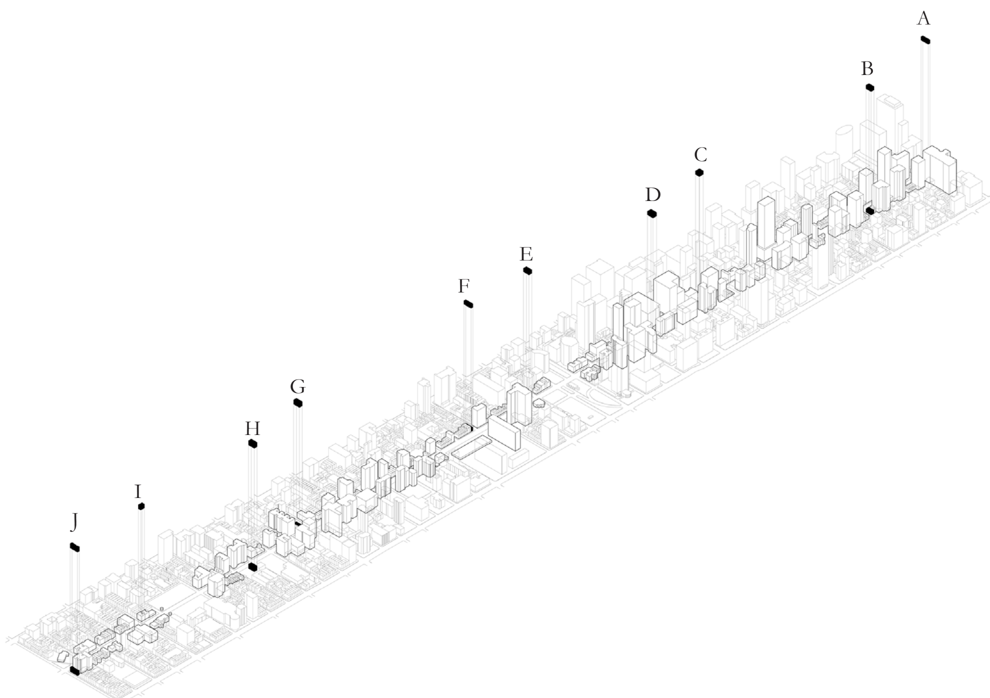
Site H
Residential Units: 0
Total Units: 1
Assessed Value: $3,845,250
Year Built: 1900



Site I
Residential Units: 0
Total Units: 1
Assessed Value: $398,700
Year Built: 1920



Site J
Residential Units: 12
Total Units: 15
Assessed Value: $2,661,750
Year Built: 1900


A
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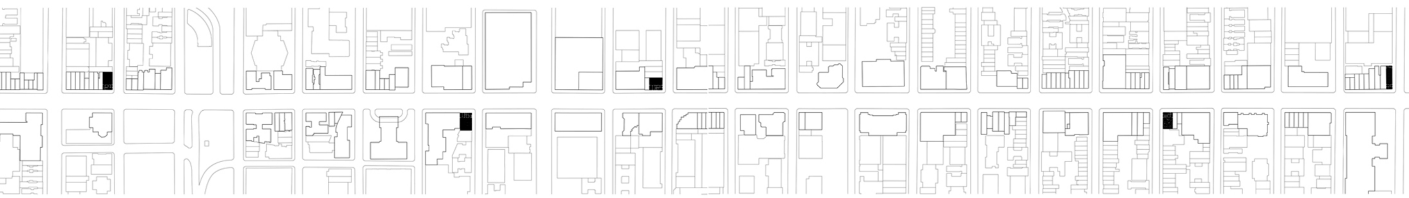
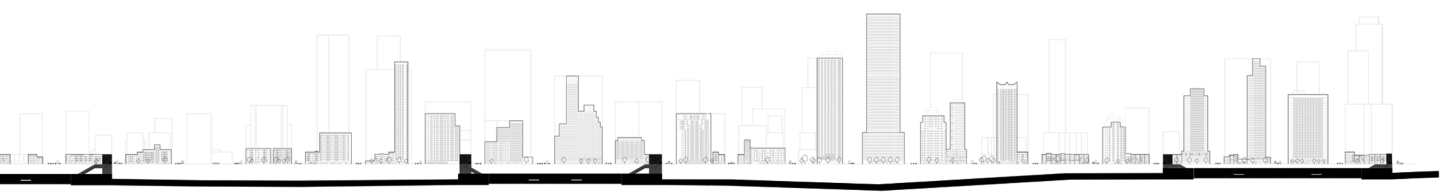
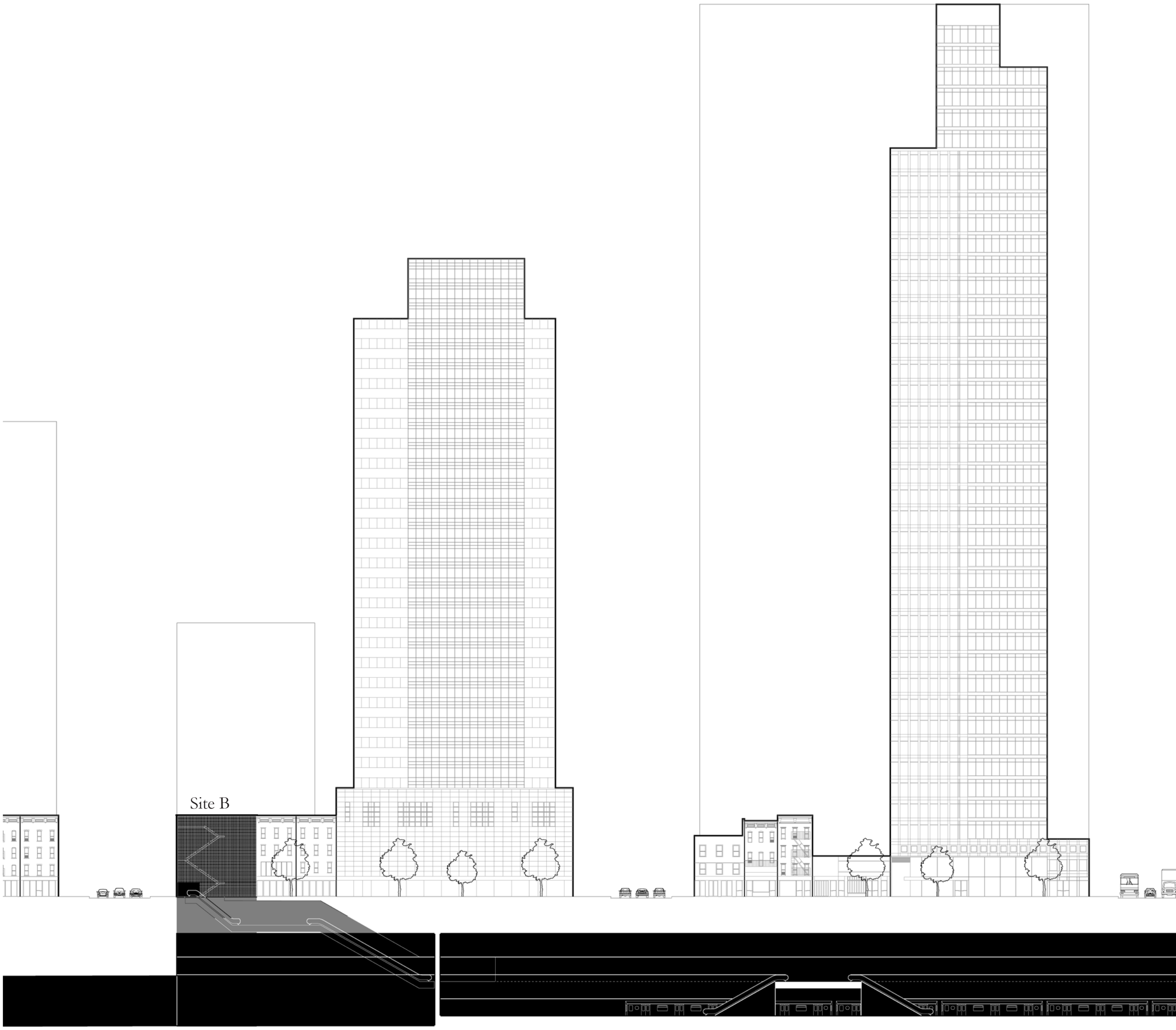
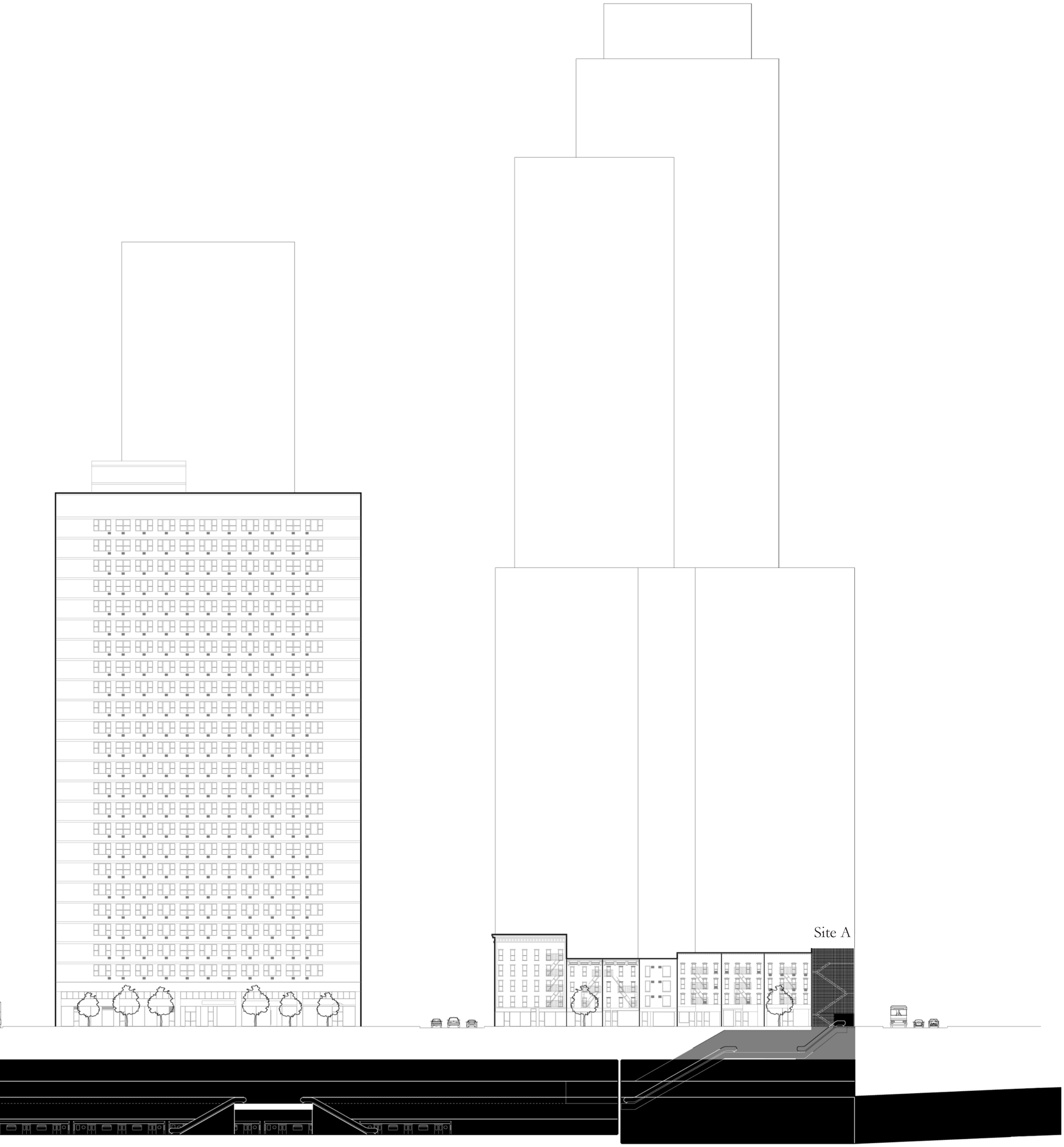
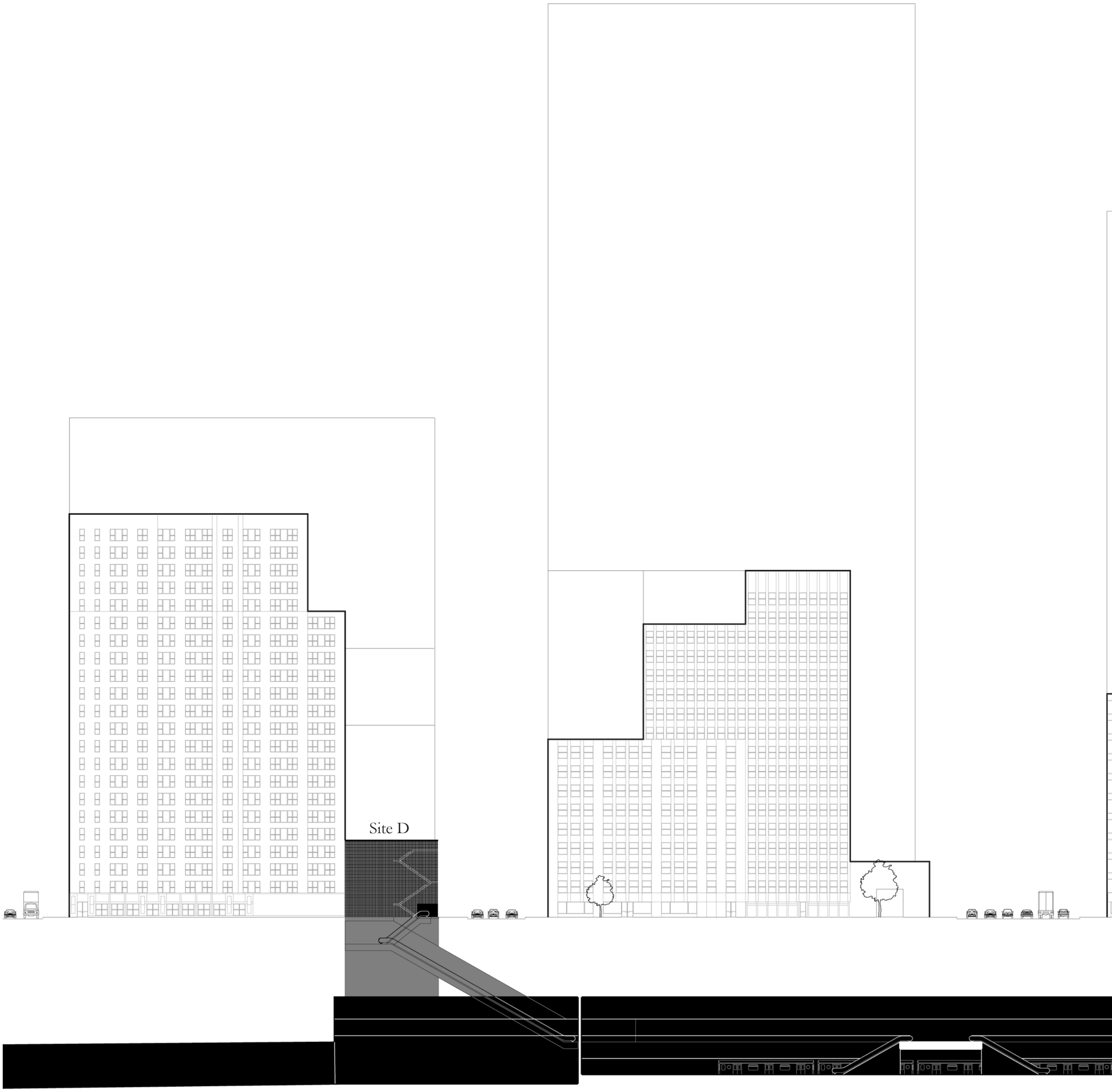


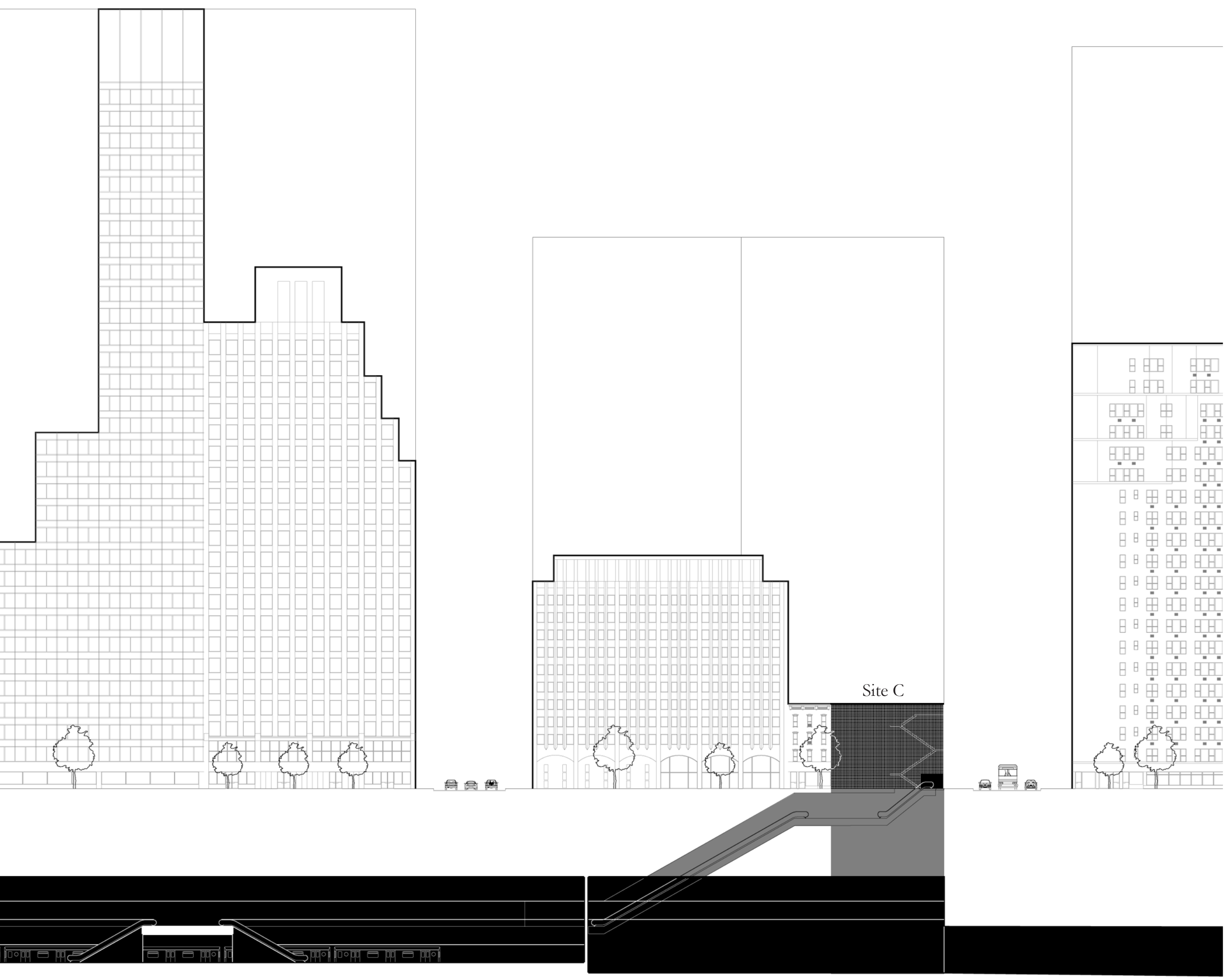


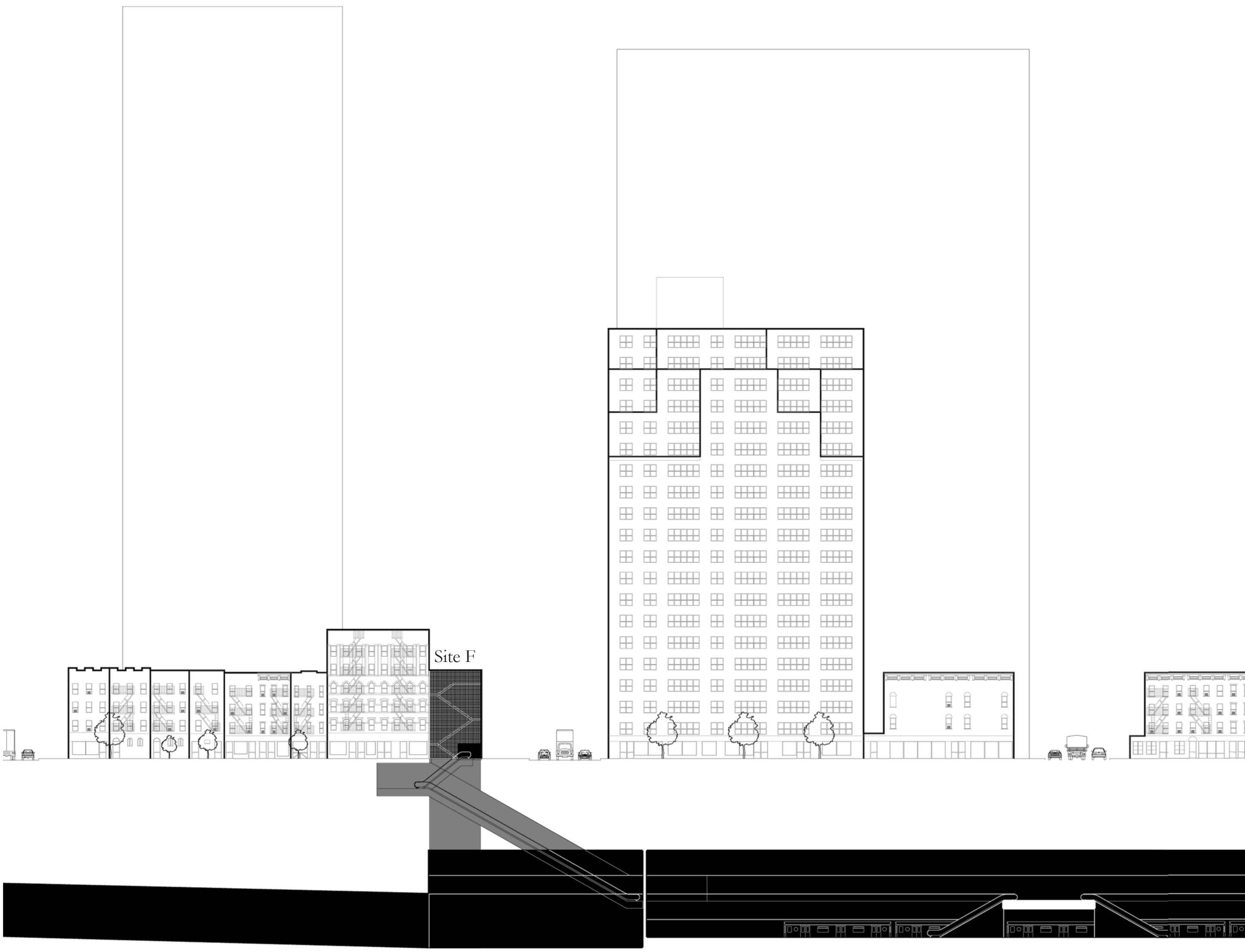
Site plan/ Site section

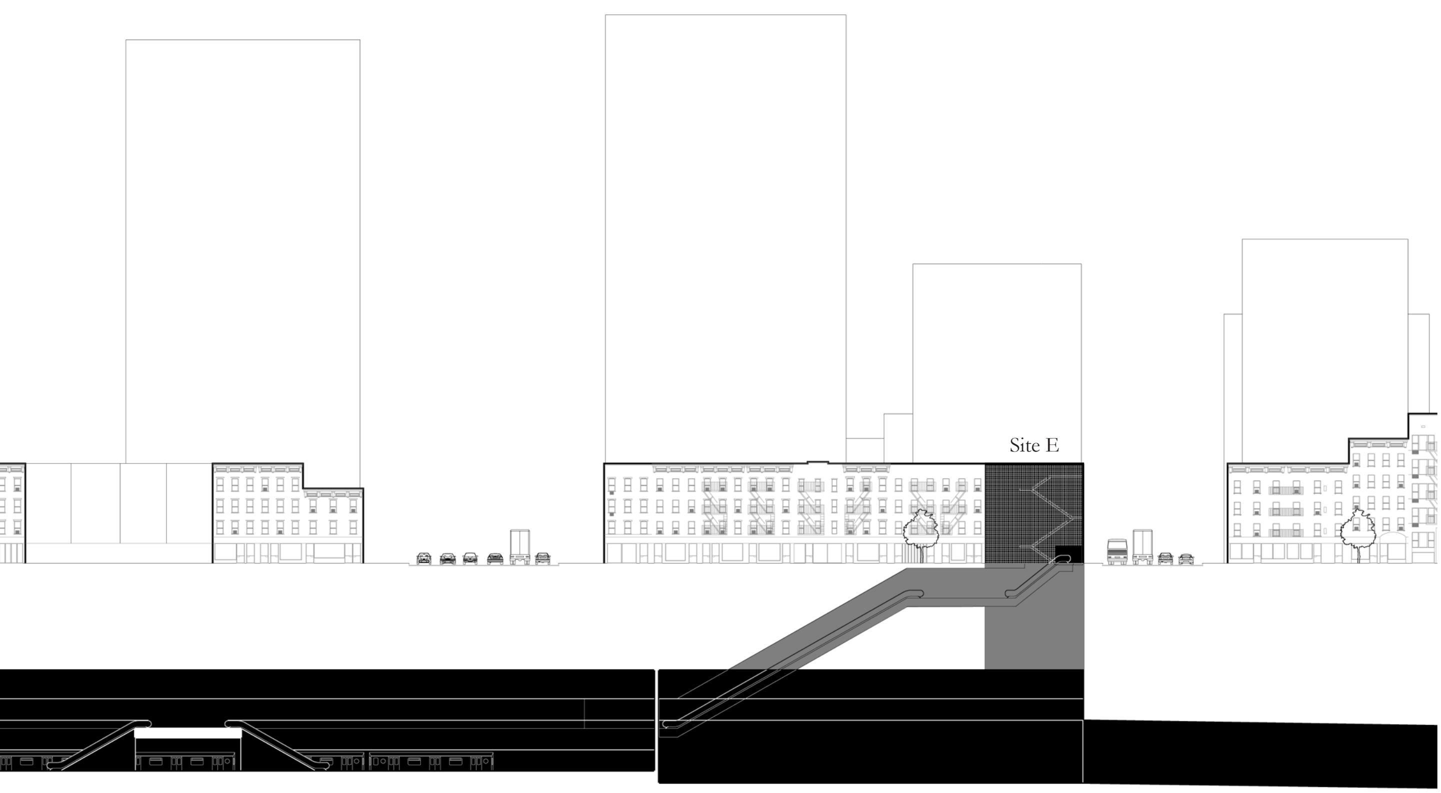

Site B

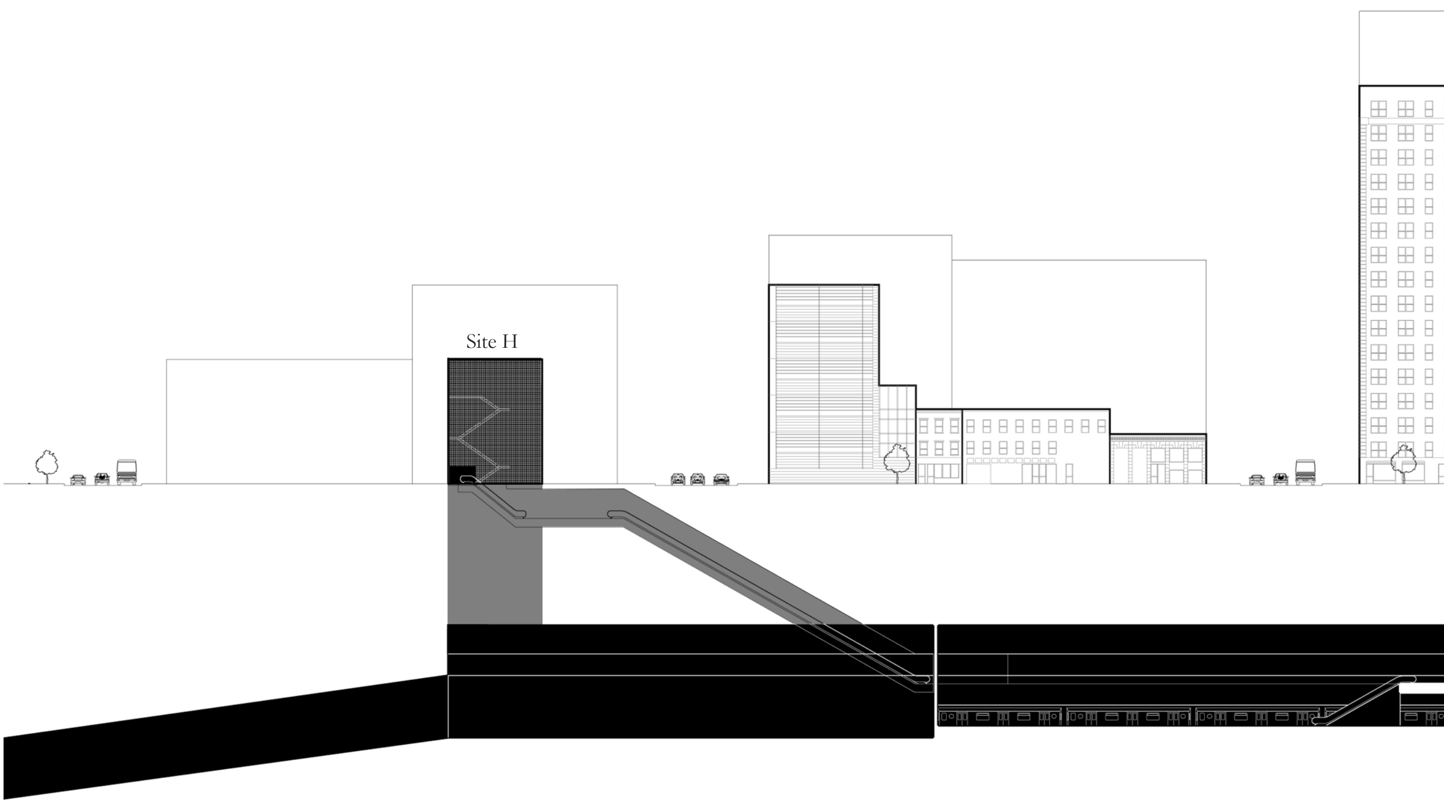

Site A

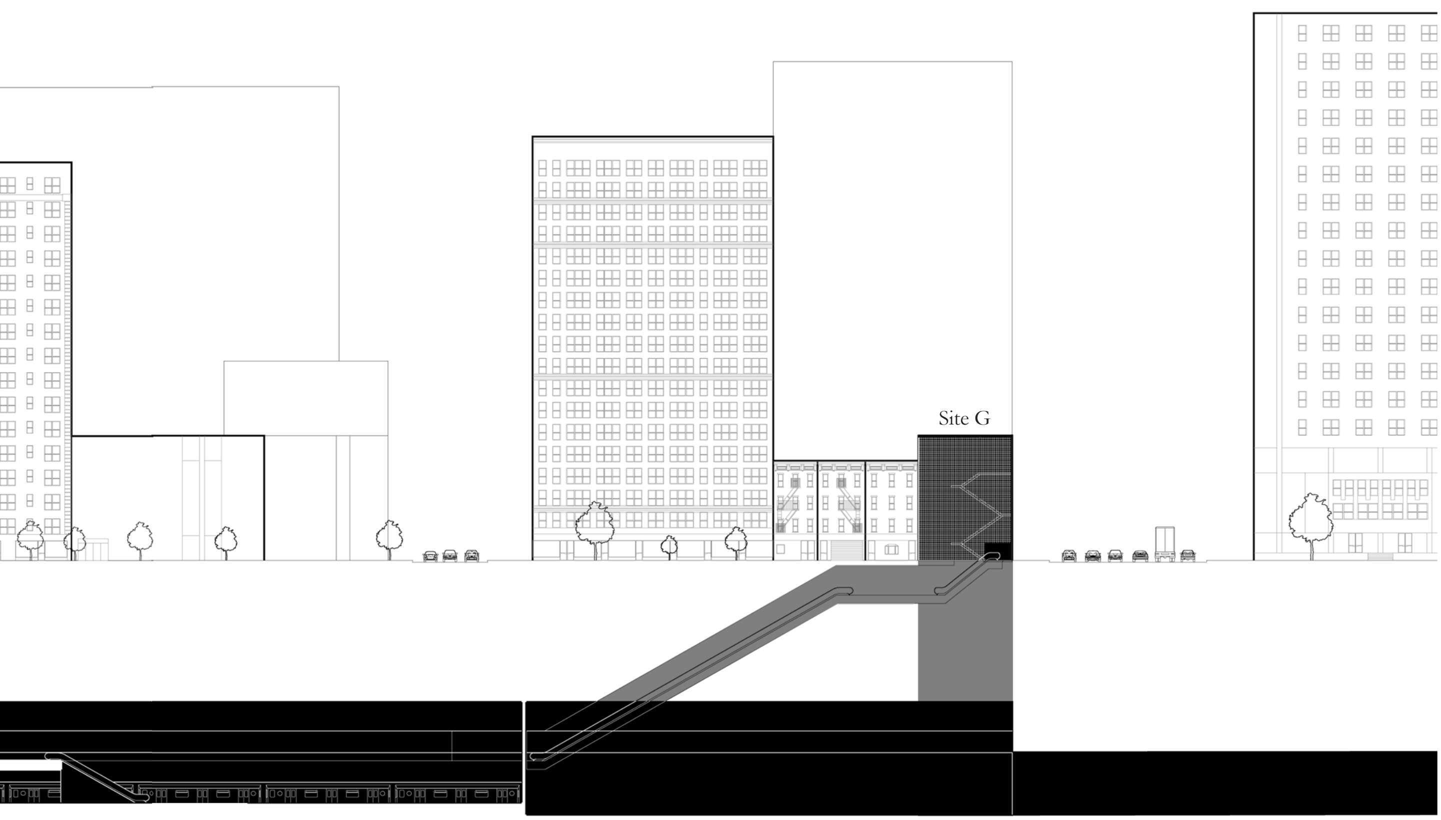

Site D

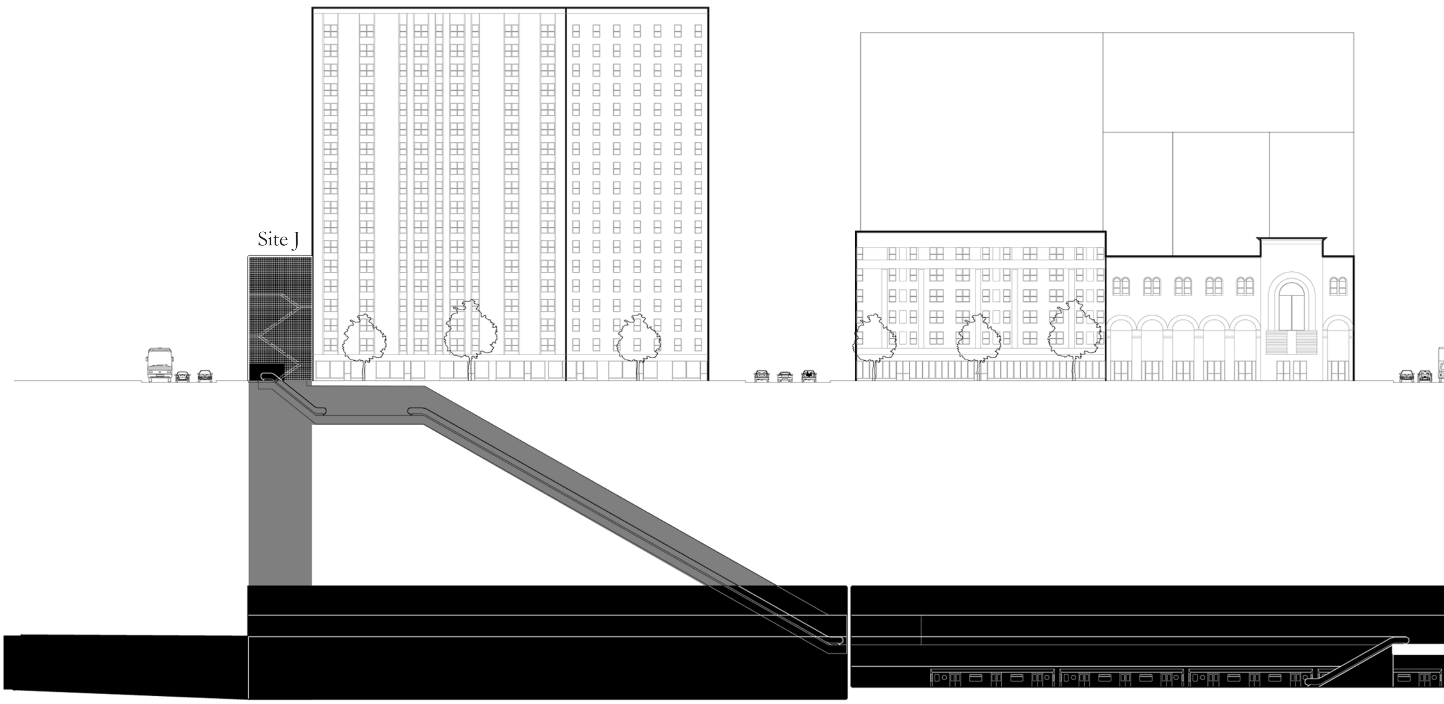

Site C


Site F

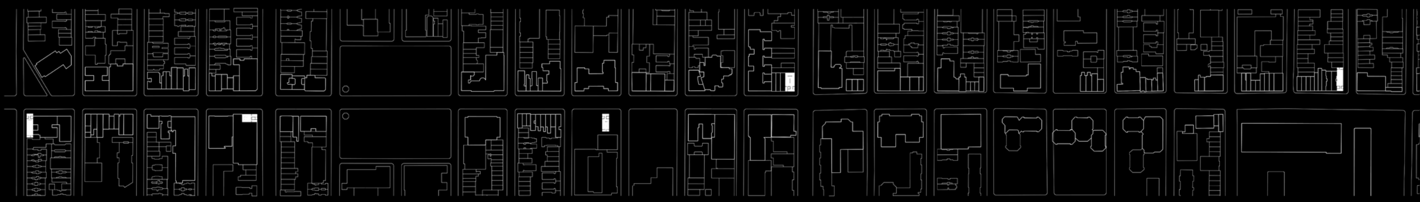

Site E

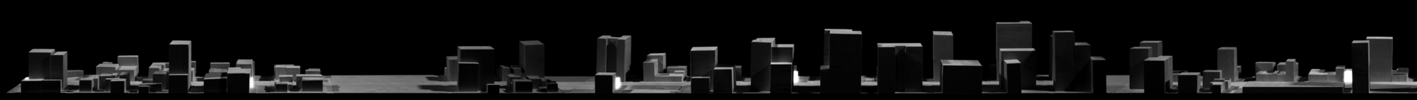

Site H


Site G

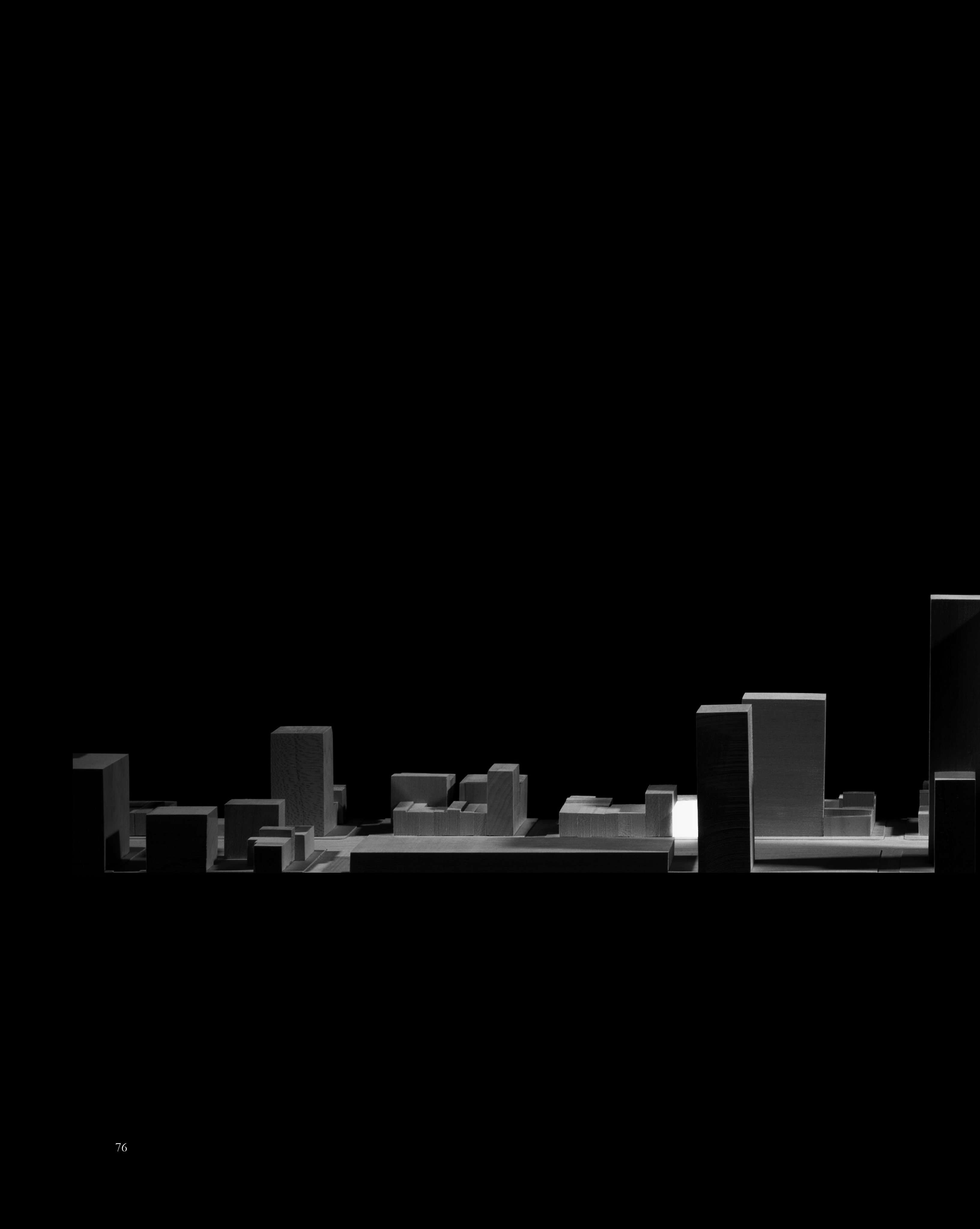

Site J

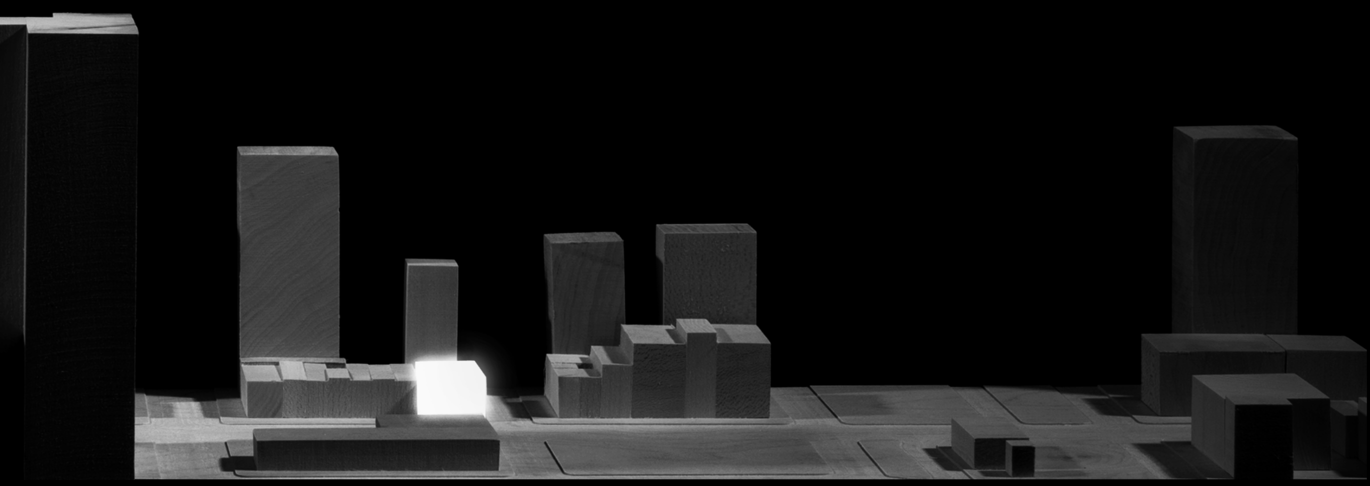

Site I





Site model

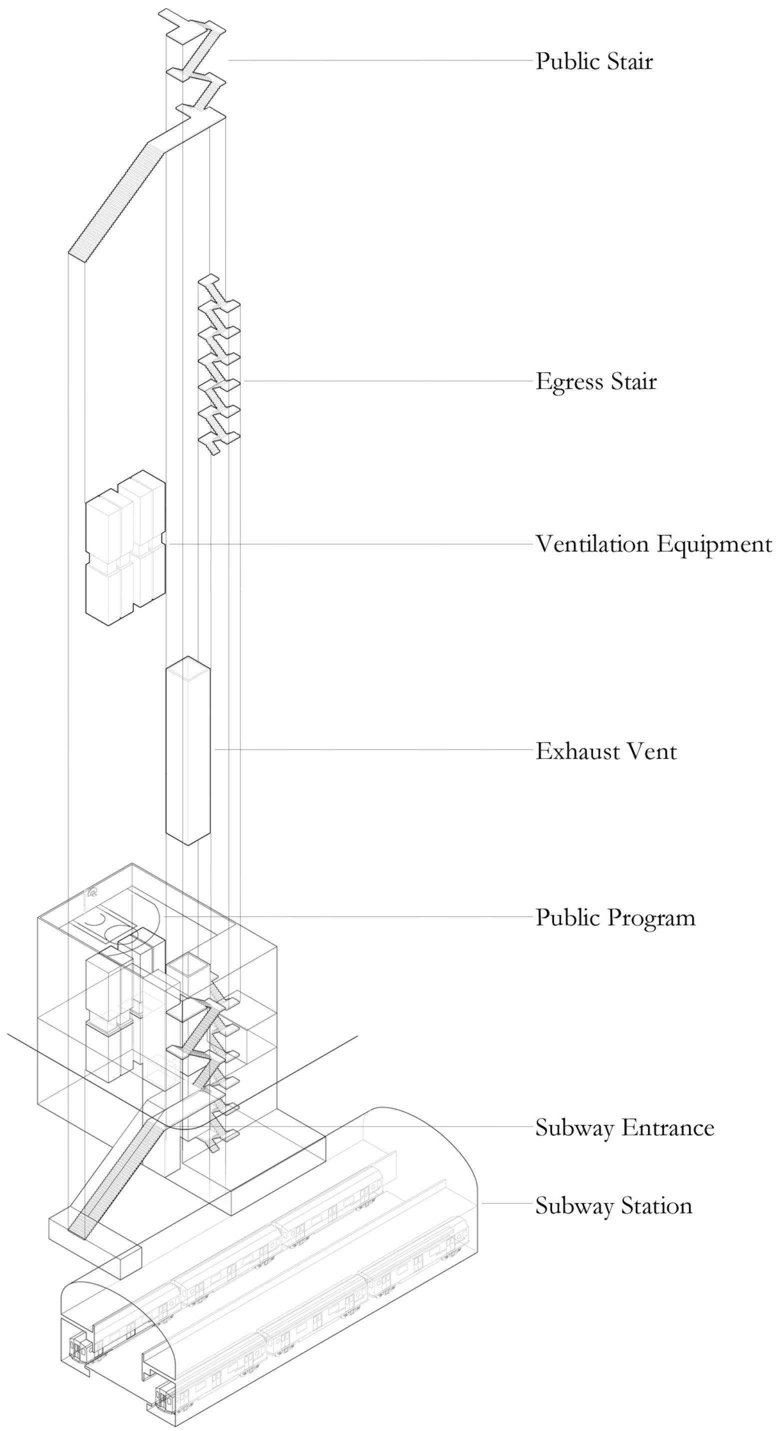


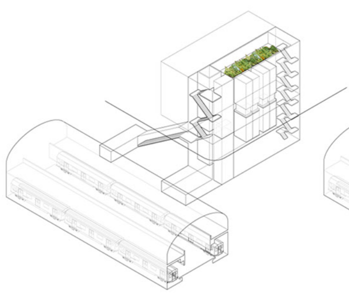


Site model detail

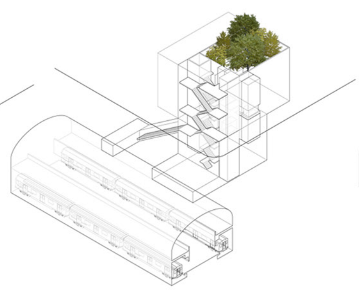
Program

Following site selection programmatic interventions were proposed. Because of limited lot size, large scale developments were not considered. Instead a series of micro scale public spaces, intended to be used and reclaimed by residents, are offered. Each site is composed of a compact collection of basic components. Each ancillary structure houses a mechanical space for ventilation equipment, an exhaust vent which runs from the subway tunnel below through the top of the building, an emergency egress stair, a public subway entrance, a publicly programmed space, and a stair which connects the subway, street, and public program. The majority of the building is used to house the infrastructural component, and because it must connect to the subway below the infrastructure is placed at street level. Depending on the size of the site a small amount of street level real estate can be reclaimed and used for commercial purposes, but for the most part the street level is occupied by the infrastructure. In order to reclaim space public programming is proposed at the roof level of the infrastructure buildings, essentially creating a series of public roof tops. Some of the programs proposed include; gardens, parks, pools, sports facilities, studios, work spaces, playgrounds, galleries, and performance spaces. Depending on the site these spaces can range from public, semipublic, to private. The intent is to provide programs that are not always common or easily accessible in the city, and because of the unusual nature of the spaces they create a series of unexpected moments within the city. These buildings would be dispersed along subway lines, tiny and seemingly disparate but all connected through the subway system below.

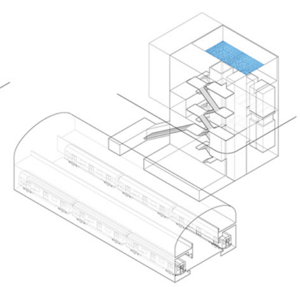

Public Stair
Egress Stair
Ventilation Equipment
Exhaust Vent
Public Program
Subway Entrance
Subway Station



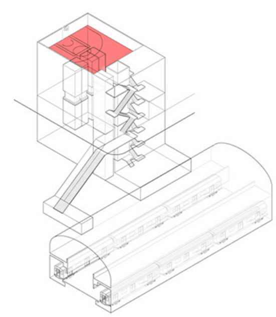
Garden



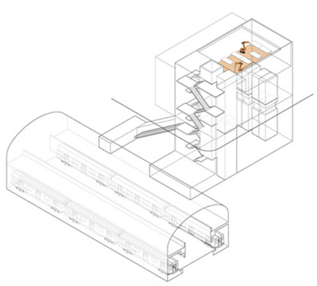
Park



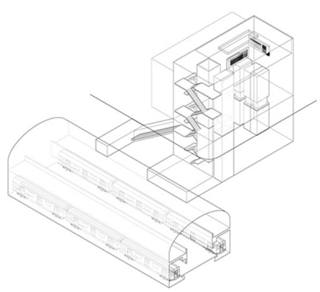
Pool



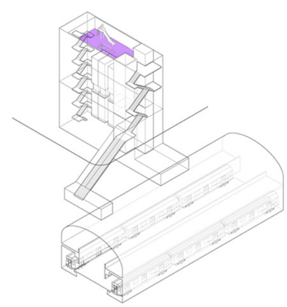
Basketball Court



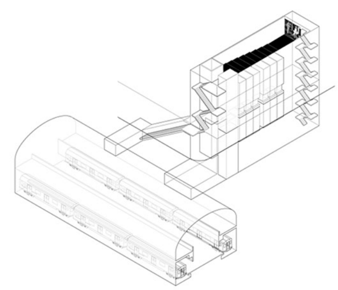
Maker Space



Gallery



Playground

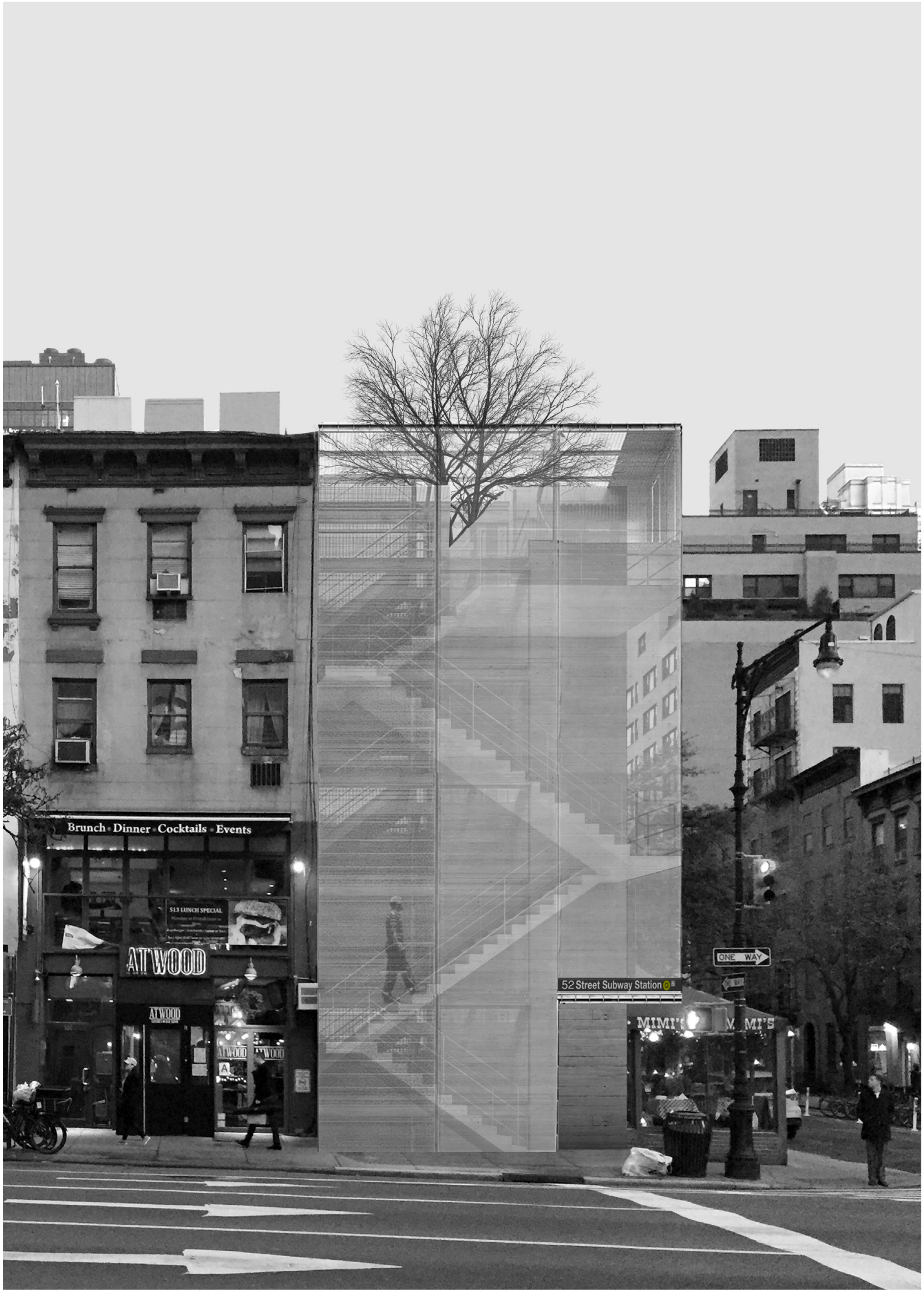


Performance

Site plan with varied program

Exterior

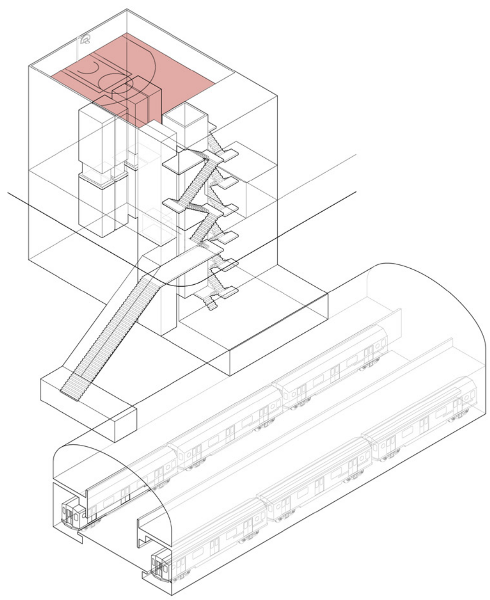
From the exterior the buildings maintain a consistent and uniform character. Each building serves as a public entrance to the subway below. The consistency in the external expression of these buildings allows them to be easily identified as subway entrances and ancillary structures. From the exterior the buildings are intended to have a quietness that does not attempt to mimic surrounding structures, but is conscience of the overall character of the city. Circulation is pushed to the face of the building communicating its public function which is to connect the subway to the street, and the street to a public space above. This creates an active and social public face, which expresses the movement of people. The building is shrouded in a semitransparent mesh material which provides visibility of internal functions and also allows for the movement of air, the primary function of the building. From the street glimpses of the building's roof hint at the programs above, enticing people to explore these new moments within the city.

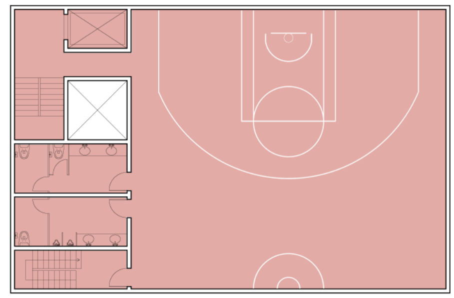

Brunch • Dinner • Cocktails • Events
ATWOOD
52 Street Subway Station
ONE WAY

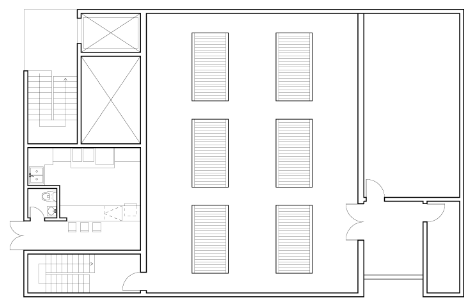
Repose in the City

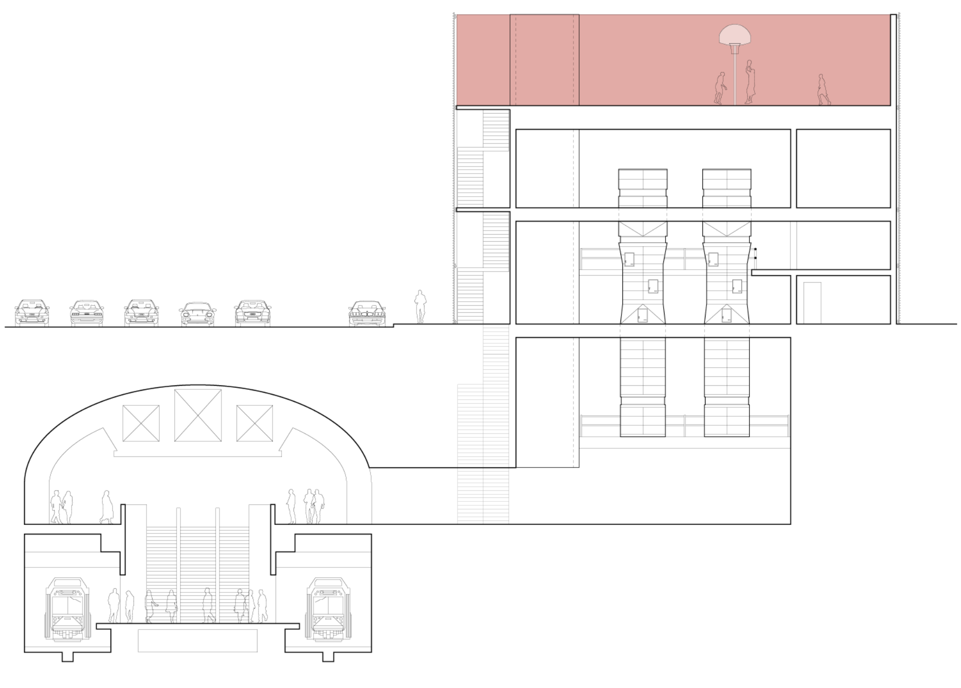
The buildings individually represent modest moments within a much larger and active city. It is this scale though that gives the project its strength. The buildings are not intended to be iconic urban landmarks, rather they represent quiet moments of pause and reflection that would otherwise be hard to come by in the city. These spaces create a public realm above the street level allowing residents to occupy and claim a new territory within the city. The separation of these spaces from the busy and active street life below creates a sense of otherworldliness and detachment from normal city life. Three of these spaces are explored in greater depth: a basketball court, a garden, and a pool. Each one providing an opportunity for a reflection on the social, cultural, and economic aspects of public space within the city.

Basketball Court

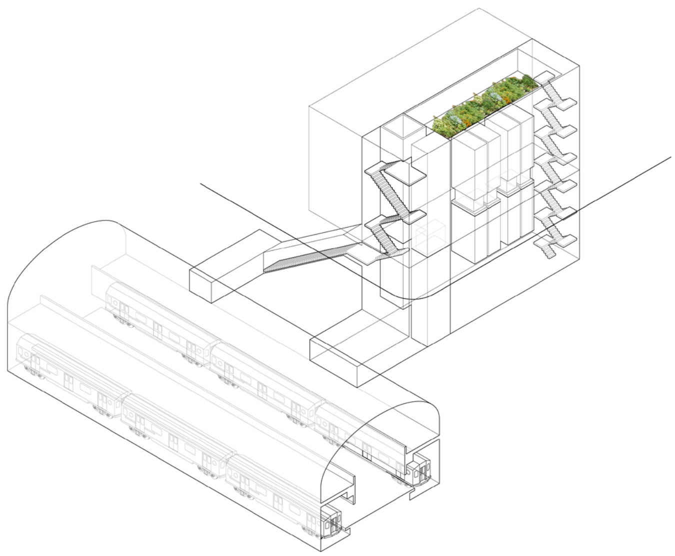


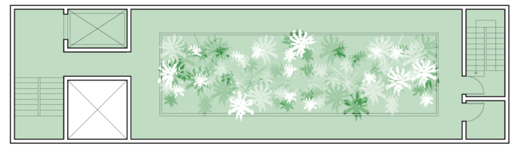


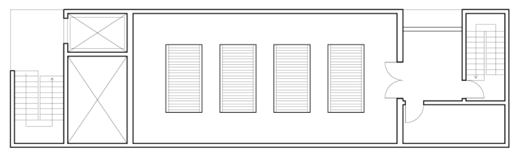


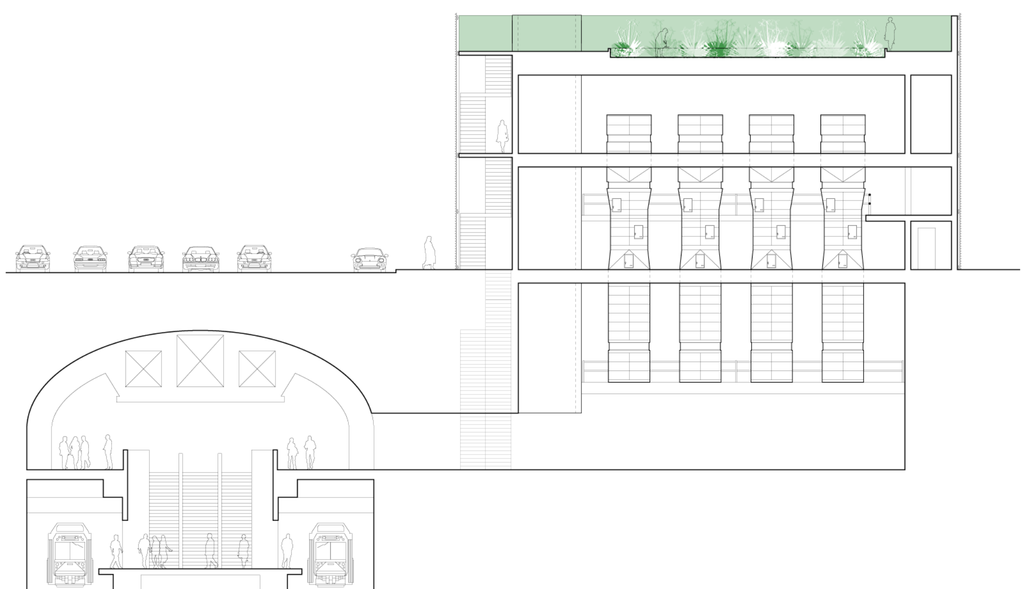


Garden

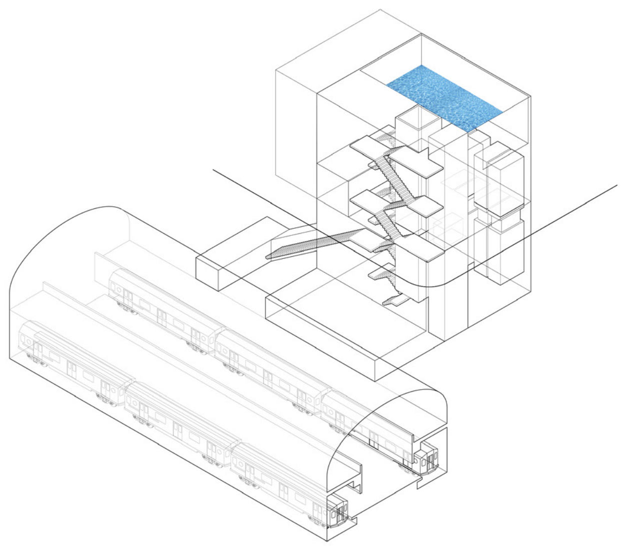


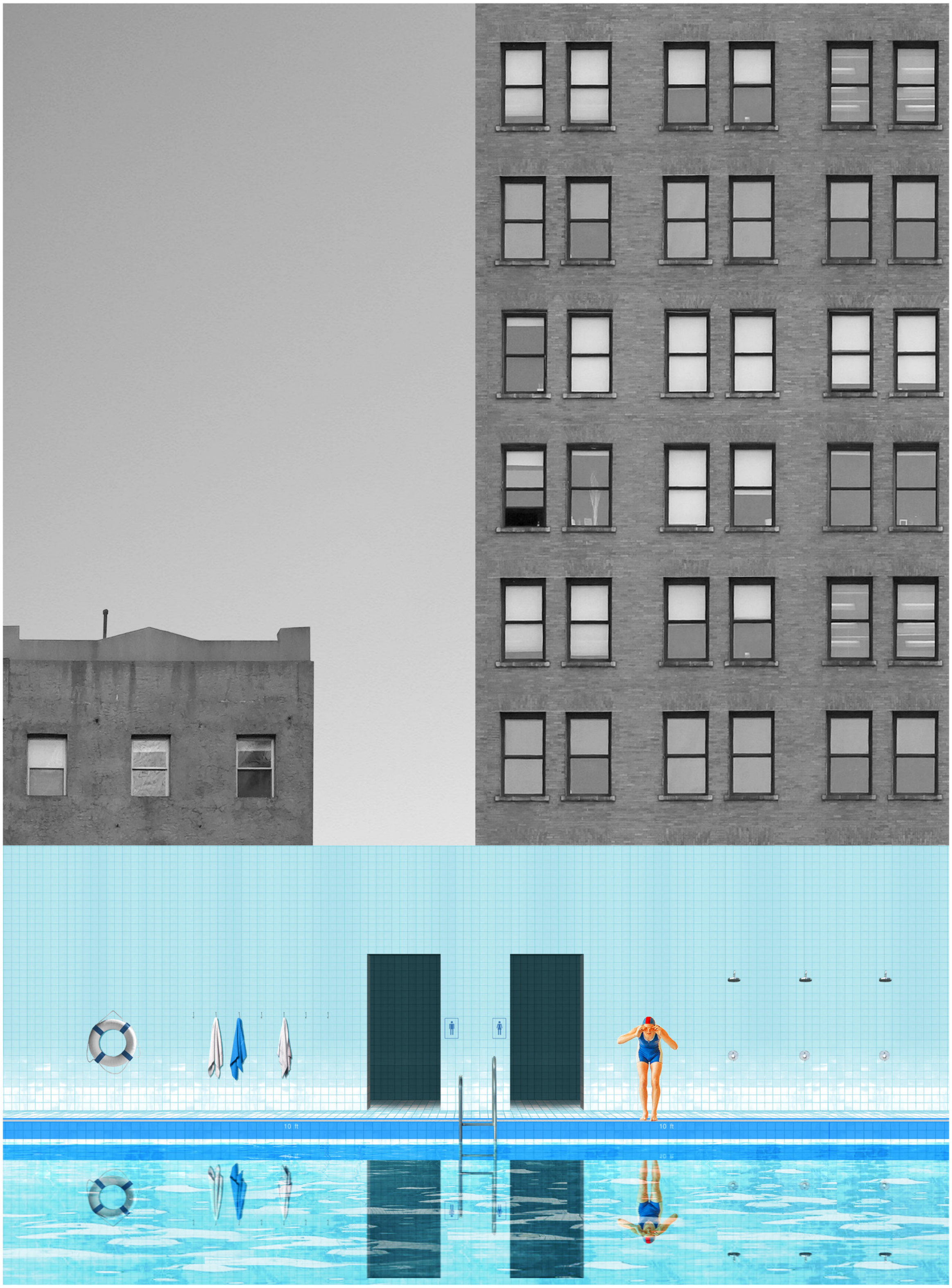


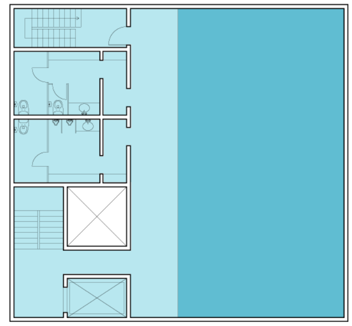


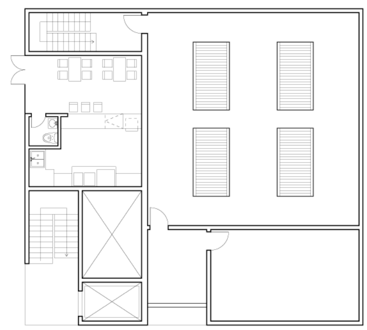


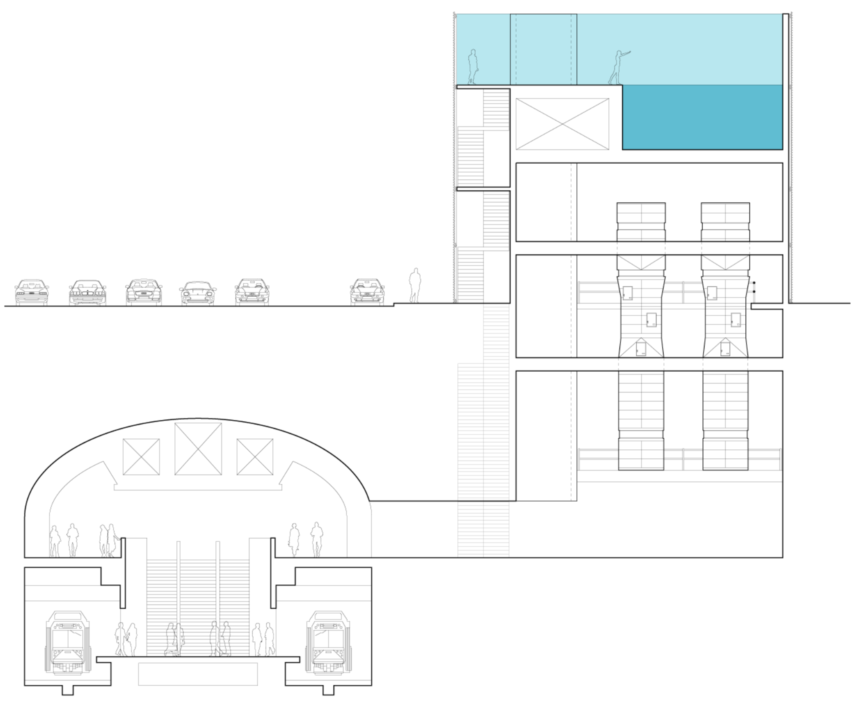
Pool











Infrastructure is needed to support the occupation of cities, but this necessity does not excuse a failure to integrate and acknowledge the city at large. While attempts to marginalize infrastructure through the use of urban camouflage allow it to visually assimilate within a city, it fails to realize the potential infrastructural buildings have at playing an active role in contributing to and enlivening the urban fabric. Increasing density and limited land availability escalate the importance of imagining hybrid solutions to infrastructural integration. These projects do not need to be incredibly expensive public facilities, rather by focusing on the normal everyday activities of city dwellers, practical and small scale interventions can be proposed. Allowing the inaccessible spaces of infrastructure to be reclaimed by and for the community, these seemingly miniscule interventions can have a significant impact on the city. The intent when viewing these infrastructural projects was not to imagine a transformation through the creation of a grand urban gesture, rather the intent was to seek out opportunity in an unexpected place. It is this opportunistic approach to architecture that will fuel the transformation of urban infrastructure.

Thesis Defense

Guest Jury

Alex Anmahian
Principal, Anmahian Winton Architects

Vivian Lee
Founding Partner, LAMAS
Assistant Professor, University of Toronto
Daniels Faculty

Bryony Roberts
Principal, Bryony Roberts Studio
Adjunct Assistant Professor, Columbia
GSAPP and AHO

Jonathan Solomon
Associate Professor and Director of Interior
Architecture and Designed Objects,
School of the Art Institute of Chicago

Timothy Hyde
Associate Professor, Massachusetts Institute
of Technology

13

Image Credits

1. Le Corbusier. Obus A, Plan for Algiers. 1932

2. New York City, 34th St and 11th Ave. Google Street View. Dates: July 2011, August 2013, September 2016, and September 2017

3. Josh Callaghan. Los Angeles. 2013

4. The Louisville Water Tower. Louisville, Kentucky. 1857.

5. Chicago Water Tower and Pumping Station. Chicago, Illinois. 1869. Image from: http://www.architecture.org/architecture-chicago/buildings-of-chicago/building/chicago-water-tower/

6. Commonwealth Edison Substation. Chicago, Illinois. 1931. Photo by Wayne Lorentz

7. Transformer House. Toronto. Photo by Robin Collyer. 1987.

8. 58 Jorlamon Street. Brooklyn Heights, New York City.

9. Hudson River Ventilation Building. New York City, New York. Library of Congress

10. Mulry Square Fan Plant. New York City, New York. Photo by author 2017

11. IRT Substation 14. New York City, New York. 1904. Photo by Christopher Payne

12. Second Avenue Subway 83rd Street Ancillary Structure. New York City, New York. Image from: http://forgotten-ny.com/2017/01/2nd-avenue-subway-part-2/

13. Photo by Irina Chernyakova

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