GATEWAY TOWER

CONTEXTUALISM OF THE SUPERTALL SKYSCRAPER

2021

BRIAN VU

GATEWAY TOWER

How does Contextualism affect the Architecture and Development of a Mixed-Use Supertall Skyscraper in a dense urban area?

ABSTRACT

Supertall and Megatall structures, buildings defined as being 300 meters (984 feet) or taller and 600 meters (1968 feet) or taller, respectively, by the Council on Tall Buildings and Urban Habitat, are one of the most challenging building typologies to design and study. A great number of different factors affect their construction and the general outcome of the design. It is typical for these special typologies to meet a series of challenges along their timelines. New York City has certainly made its own contributions to the field of high-rise and super tall designs having started the race to have the tallest building in the world with the historic Chrysler Building being the first man-made structure in the world to surpass 1000 feet in height in 1930 only to be followed less than a year later by the Empire State Building to claim the title of tallest building in the world for nearly 40 years until the construction of the former World Trade Center towers in the 1970s. Since then, a number of new constructions have forever changed the skyline with more to come in the near future. These constructions progressively follow the ever-changing needs of those who build them.

ACKNOWLEDGMENTS

There is a small number of people who made this project possible, but a great number who got me to where I am today. First and foremost, I'd like to acknowledge my late Abuela, who never got to see any of my collegiate accomplishments or my degrees. She was always, and continues to be, my inspiration to keep trying my best in all I do even before her passing. To my Mom, who has always tried her best to ensure that my older siblings and I have always had what we needed, that they are all always supportive of me and my endeavors, and that they try their best to check on me and have taken the long drive from home and back to do so. To Mr. Phillips and Mr. O'Donnell, two NY'ers who've made me laugh, helped me lift myself up after my Abuela's passing, and shown interest and support in my education and this study. To all the family, friends, and past teachers and professors who have supported me over my 19 years of education and who've always seen potential in me. And lastly, to my Professors, who made this project a reality, assisted me in it's development and conception, and invested their own time in me to ensure that I was successful.

Thank you for all your support and inspiration.

Sincerely,

Brian Vu

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CONCEPTS

Contextualism is an important aspect of all Architecture. In the case of New York City, there is a significantly wide range of different architectural styles from various eras. The general density of the city over time created it's own Architecture with the 1916 and 1961 Zoning Resolutions. The Art Deco style flourished in the city following the 1916 Resolution with the characteristic setback and tiering of buildings such as the Empire State Building and Rockefeller Center, while the 1961 Resolution brought forth the International Style and the domination of large corporate structures, such as the Avenue of the Americas Rockefeller Center expansion. Both resolutions came about as a result of the quality of street life, the 1916 Resolution as a result of massive buildings casting shadows on neighboring buildings and preventing sunlight from reaching the street, and the 1961 Resolution as a result of the lack of outdoor public space around buildings. The diversity of buildings within the city creates harmony and dissonance amongst them. New buildings replace old ones and can either reflect the past, present, or future of the site and its surrounding context.


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CONTEXT AND SITE INFORMATION

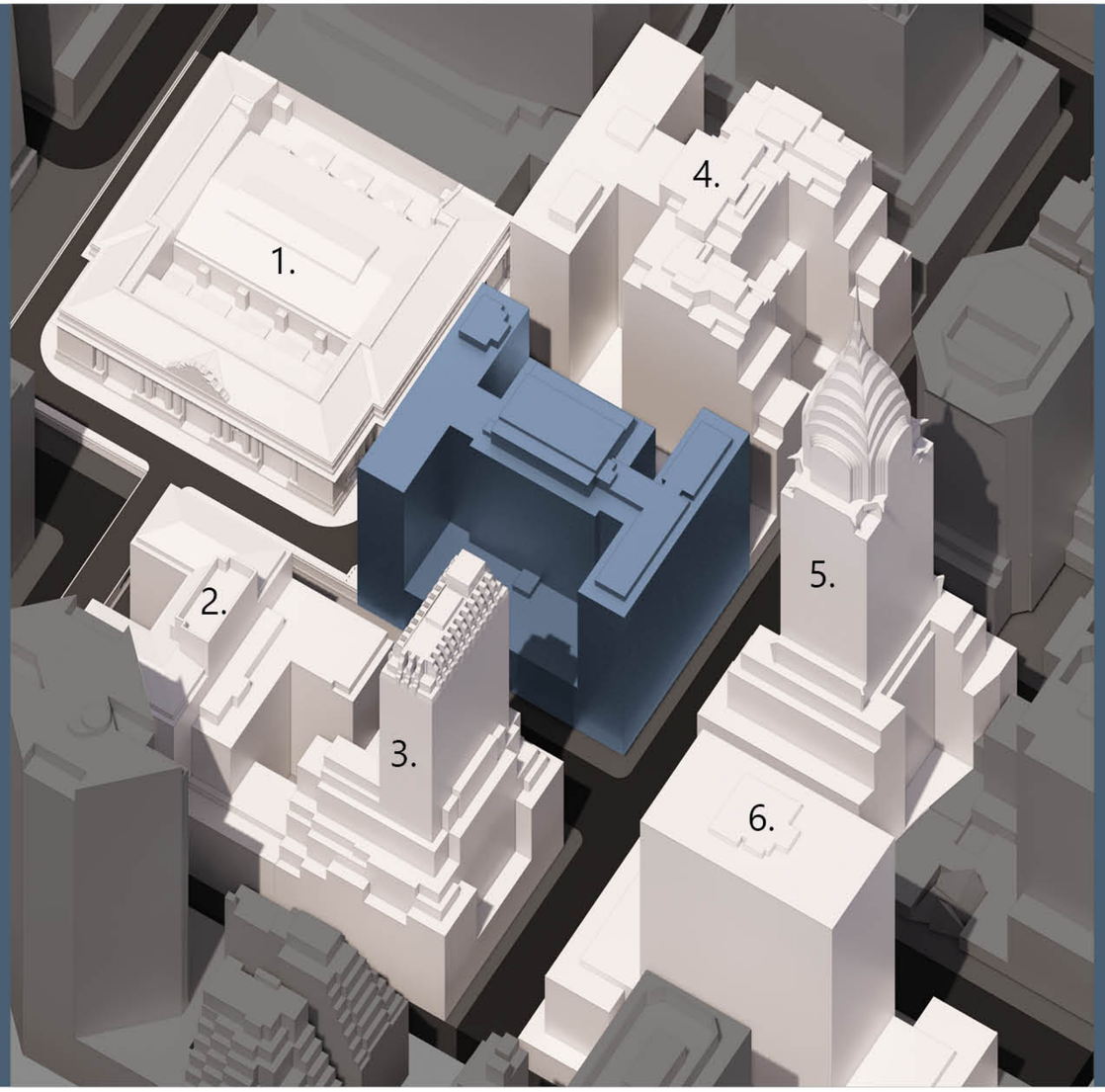
MIDTOWN

Located in the central portion of Manhattan Island in New York City, the vast Midtown district itself serves as an important international hub of commerce and entertainment. It is considered the largest Central Business District in the world, where a number of international corporations, businesses, and financial institutions are headquartered and is home to Broadway and Times Square. This portion of Manhattan has a density of well over approximately 100,000 people/square mile at any given point of day stemming from tourists, workers, and residents. Over 400 million square feet of office space was accounted for within its footprint in 2018 with nearly 70 million square feet currently being developed or planned in the Greater Midtown area, for which East Midtown accounts for a small percentage. These include new developments in the Hudson Yards District and the Empire Station/Penn Station Complexes. Midtown also contains some of the most expensive real estate in the world, both commercial and residential, boasting a total of nearly $1 trillion in value in 2015. It is also home to some of the most recognizable pieces of architecture in the world.

1.
Grand Central Terminal
Year completed:
1913
Architect:
Reed & Stem:
Warren and Wetmore
Style:
Beaux Arts
NYC Landmark:
1967

2.
Pershing Square Building & Bowery Savings Bank
Year completed:
1923
Architect:
Sloan & Robertson:
York & Sawyer
Style:
Romanesque Revival
NYC Landmark:
2016 & 1996

3.
Chanin Building
Year completed:
1929
Architect:
Sloan & Robertson:
Style:
Art Deco
NYC Landmark:
1978



4.
Graybar Building
Year completed:
1927
Architect:
Sloan & Robertson
Style:
Art Deco
NYC Landmark:
2016

5.
Chrysler Building
Year completed:
1930
Architect:
William Van Alen
Style:
Art Deco
NYC Landmark:
1976

6.
Socony-Mobil Building
Year completed:
1956
Architect:
Harrison & Abramovitz
Style:
International & Moderne
NYC Landmark:
2003

The project site is located at 109 East 42nd Street in East Midtown Manhattan on the site of the current Grand Hyatt NY. It is bound by Grand Central Terminal and the Park Avenue Viaduct to the west, the Grand Central Market to the north, Lexington Ave to the east, and East 42nd Street to the south, a major thoroughfare of Midtown Manhattan. This is a strategic site in terms of Architecture as all the surrounding context buildings are designated historic NYC landmarks. The significance of the architectural pieces surrounding the entirety of the site also pose additional challenges and make the notion of Contextualism even more important with this location. The present physical challenge is the Grand Central train shed and the 42nd St-Grand Central Subway Station, which run diagonally underneath the site and contain a number of connection points with the Grand Hyatt building at ground level. Building a 2.5 million square foot mixed-use tower on an already congested site creates the need to take a number of significant factors into consideration.

A 1300 key Grand Hyatt hotel with a storied history currently occupies the site. Opened in 1919 as the Hotel Commodore, it was the largest and most modern hotel in the city at the time with 2000 rooms. Similar to its terminal building neighbor, it was designed in the Beaux Arts style. Its massing rose straight up from the property line to a height of 295 feet with a limestone storefront podium topped by brick. The hotel was one of the most successful in the city up until the 1970s when the owners of the adjacent Grand Central Station, Penn Central, following a merger, fell into bankruptcy with both structures quickly falling into disrepair due to a lack of revenue. The hotel was purchased from Penn Central

The Hotel Commodore in 1927 with ground work underway for the Chanin Building, construction on the Chrysler Building would begin a year later, shrouding the East face of the Hotel.

The Grand Hyatt in 2018 viewed from the approximately same location, with One Vanderbilt under construction on the opposite side of the Terminal Building.

by a local NY developer in partnership with the Hyatt Hotel chain and completely overhauled. The building was clad over in a dark bronze tinted glazing, leaving any traces of the ornate features of the original facade hidden. A large addition was built above the 42nd street facing sidewalk without proper permits and against city zoning laws. The newly refurbished building, completely unrecognizable, opened as the Grand Hyatt NY in 1980 and went through several additional renovations into the turn of the century.

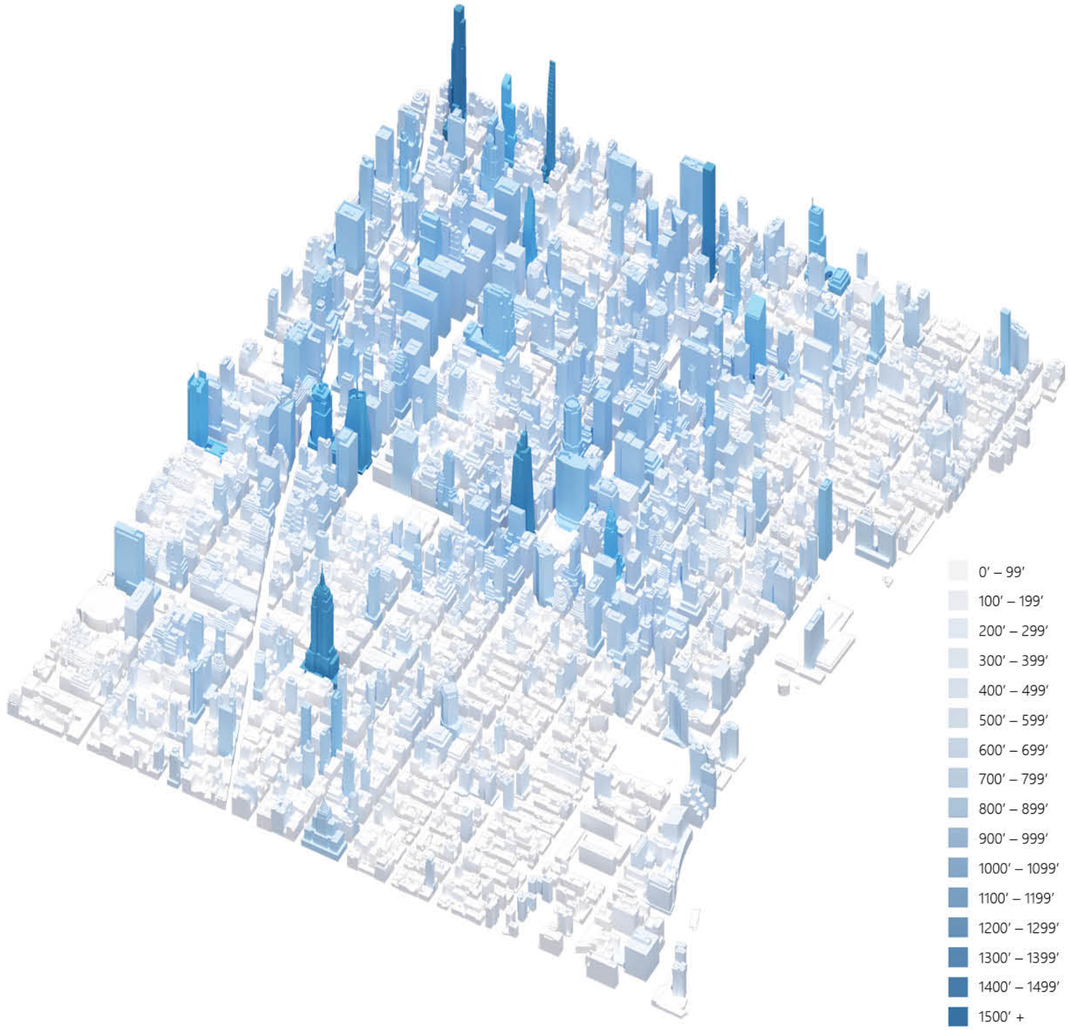
In 2017, the New York City council approved of the East Midtown rezoning amendment to the city zoning laws. This rezoning covers 78 blocks of midtown centered around Grand Central Station and Park Avenue. A slew of transit improvements came about as a result, in addition to the updating of some 7 million square feet of old office space and creation of nearly 7 million square feet of new office space. The rezoning also allowed for the raising and changing of FAR (Floor Area Ratio) requirements for a number of the 78 blocks, mostly near Grand Central and lining Park Avenue, from a generous 15 to nearly 30, in special instances, floor area ratio. As a result of this, new developments such as the recently completed 1401 ft One Vanderbilt (2020) tower and the under construction 1388 ft 270 Park Avenue, JP Morgan Chase's new world headquarters, estimated to be completed in 2024, will and have forever changed the Midtown skyline. In February of 2019, it was announced that the Grand Hyatt would be demolished and the lot would be redeveloped with a greater than two million square foot mixed-use redevelopment. Because of the great contextual and physical challenges present in this site, this site was ideal to use as the final study site.

USE ANALYSIS

CIRCULATION PUBLIC MASS TRANSIT

**Red denotes Subway lines & Stations, Blue denotes Bus routes*

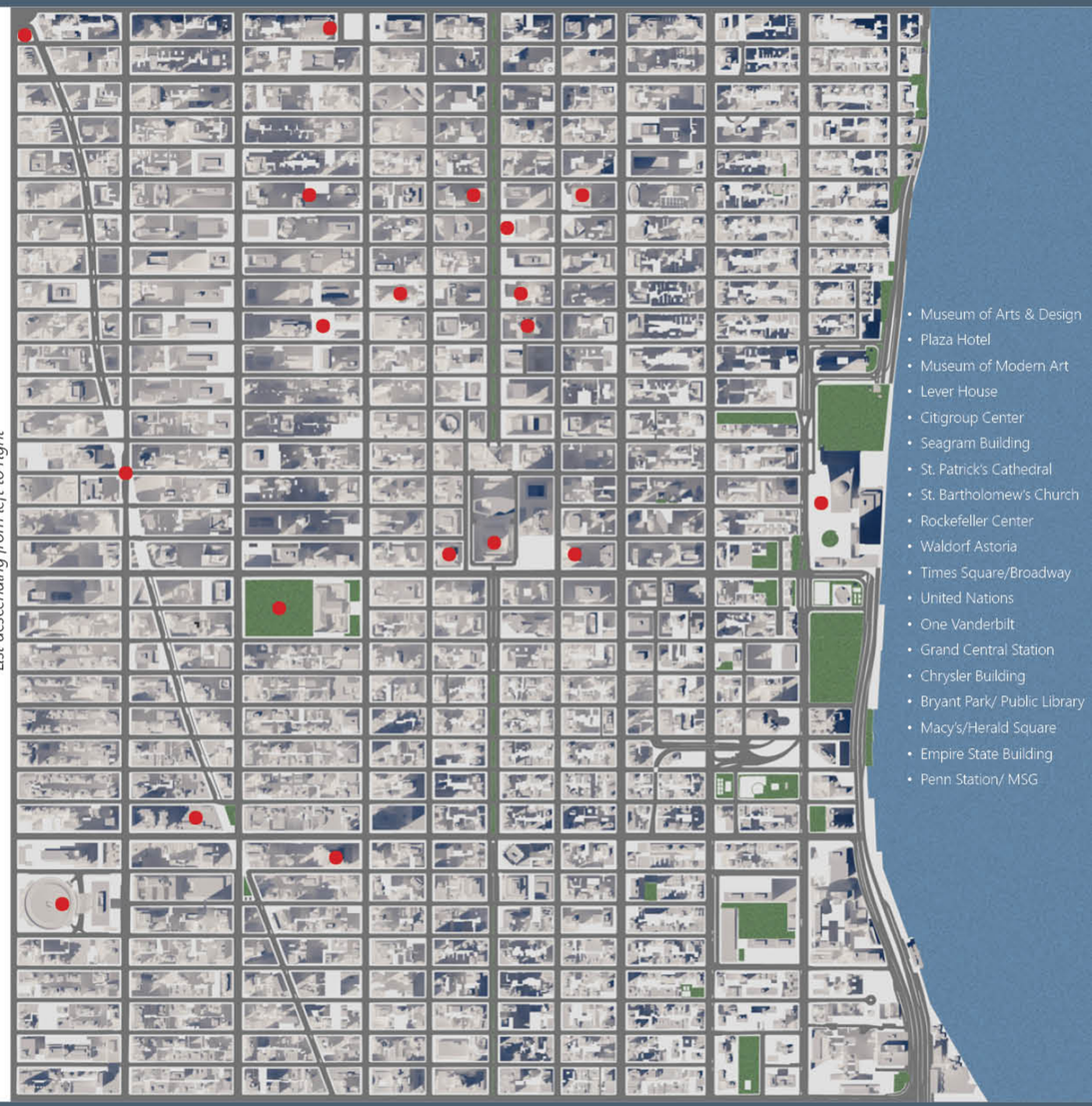
- 7 LOCAL/EXPRESS
- 4,5,6 LOCAL/EXPRESS
- 1,2,3 LOCAL
- B,D,F,M LOCAL/EXPRESS
- N,Q,R,W LOCAL
- A,C,E LOCAL
- 1, 2, 3, 4, 5, 7, 9, 10, 12, 15, 20, 31, 32, 34, 34A, 42, 50, 55, 57, 101, 102, 103, and 104 Bus Routes



HEIGHT DENSITY STUDY

POINTS OF INTEREST

**List descending from left to right*



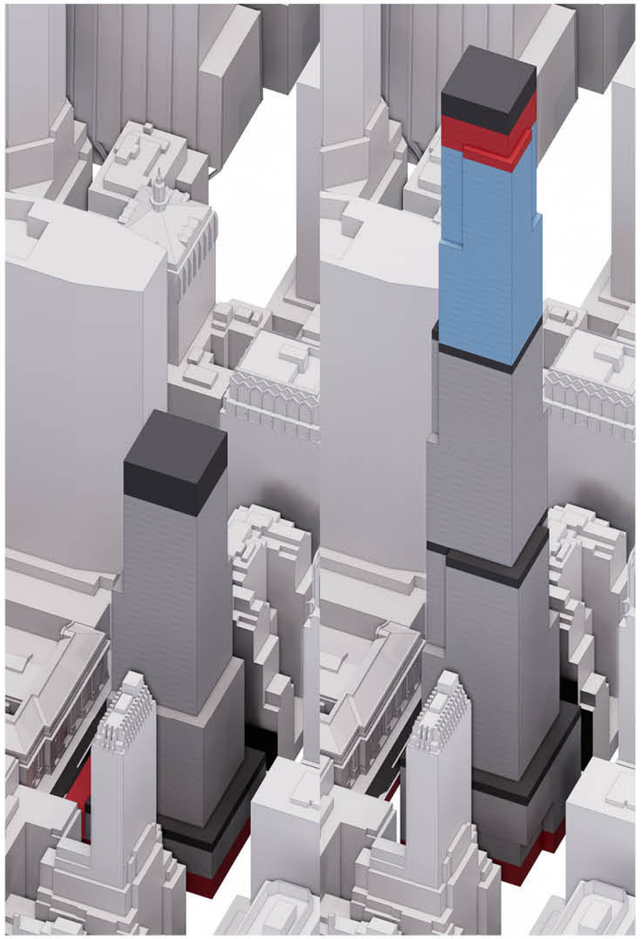
- Museum of Arts & Design
- Plaza Hotel
- Museum of Modern Art
- Lever House
- Citigroup Center
- Seagram Building
- St. Patrick’s Cathedral
- St. Bartholomew’s Church
- Rockefeller Center
- Waldorf Astoria
- Times Square/Broadway
- United Nations
- One Vanderbilt
- Grand Central Station
- Chrysler Building
- Bryant Park/ Public Library
- Macy’s/Herald Square
- Empire State Building
- Penn Station/ MSG

PROGRAM AND CASE STUDIES

The project site has a plot dimension of 275' by 208' 4" with an area of approximately 57,292 square feet. The FAR (floor area ratio) of the site is designated at 15 per the East Midtown Rezoning with special cases and incentives to be able to increase the FAR. Due to it's location adjacent to Grand Central, the air rights can be purchased and given to the Grand Hyatt lot for a minimum total of 30. Additional FAR and square footage can be gained through the special incentives such as providing outdoor space accessible to the public. With a FAR of 30, a possible scenario of square footage for the site could be a net buildable area of 1,718,750 square feet with a gross buildable area of 2,148,437 square feet that accounts for 25% circulation area.

As the site is zoned for Commercial land use, my proposal includes a tower that consists of commercial office space with trading floors, podium level retail space and an observation deck, maintaining the meeting/ conference space square footage that currently exists in the hotel, and preserving the Grand Hyatt through a smaller 500 key allotment. This scope also includes renovating the subway station entrance and connections to the Terminal building as well as integrating the Grand Central Market and present pathway of the Lexington Passage into the ground level of the new structure.

Within the broad scope of the thesis statement being assessed, the additional questions of, "how will the location of the subway and train-shed under the site ultimately affect the location and arrangement of spaces within the massing", and "will the design of the form and program make an expression of the structure, or vice versa."



Left: No Action Massing (FAR 15) with ground level retail and commercial office space - 820'
Right: Action Massing (FAR 30) with ground level retail, commercial office and hotel floor space - 1640'

The entirety of the newly developed Hudson Yards complex in West Midtown was strategically constructed entirely atop a massive platform above the Western Railyard of Penn Station. (c. 2018)

A great deal of case studies were taken into account and researched in the developmental phase of the project. These case studies were separated into two categories relating to programmatic case studies and structural case studies. While there are a number of supertall structures in the United States, there are few examples of mixed-use supertall structures containing retail and office space with a dedicated hotel within the same structure. These specific program related typologies are more common in Asia and Europe. A number of examples were examined outside of the United States to better understand the compositional aspect of how the different programs are arranged in relation to each other. The three main case studies that were examined, were chosen as the prominent programmatic studies due to different aspects of their program arrangement.

The structure entailed a different strategy. Because of the United States' expansive history of railways, specifically being constructed through major cities, as is the case in New York and several northeastern cities, a great number of local case studies could be used and researched in an effort to better understand how loads are transferred down to bedrock without displacing or disrupting rail service that runs through the site. These case studies are innovative of their time and monolithic in their construction due to the complex series of truss systems and platforms that had to be built and engineered. Though two of the three studies chosen were more dynamic in their load transfers, it was important to include them as having been possible precursors to understanding a situation and condition that was also present in the site chosen next to Grand Central Terminal.

PROGRAMMATIC CASE STUDIES

One Vanderbilt | 1401 ft (427 m) | Mixed-Use Commercial | 2020 | New York City, NY, US

The striking but elegant massing of the One Vanderbilt tower creates a picturesque frame for the Chrysler Building from the East River. The building program contains separate train and subway halls, podium retail, commercial office space, and an observation deck.

One World Trade Center | 1776 ft (541 m)
Commercial | 2014 | New York City, NY, US

The centerpiece office tower of the rebuilt WTC site, its core and podium construction changed the way safety was seen in high-rise construction after September 11.

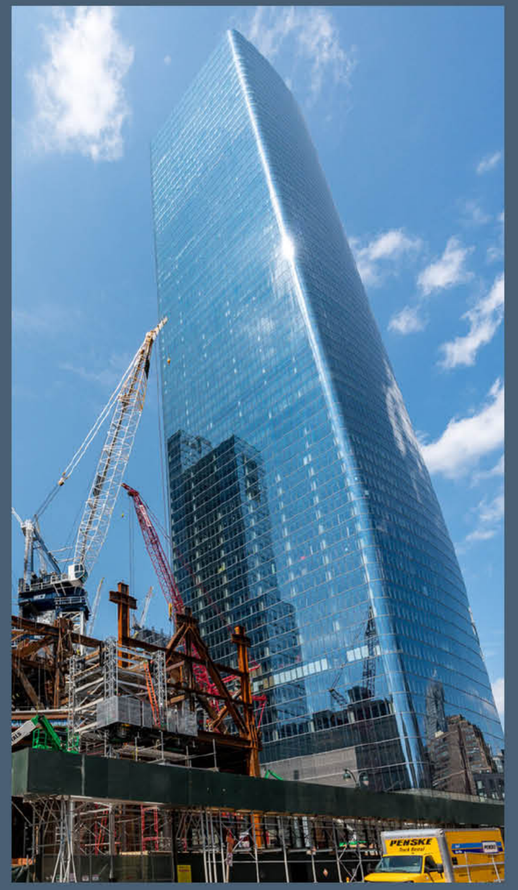
Comcast Technology Center | 1121 ft (342 m)
Mixed-Use Commercial | 2018 | Philadelphia, PA, US

Containing expansive floor plates with an eccentric core, this tower contains podium retail, commercial offices, and a Four Seasons hotel.

STRUCTURAL CASE STUDIES

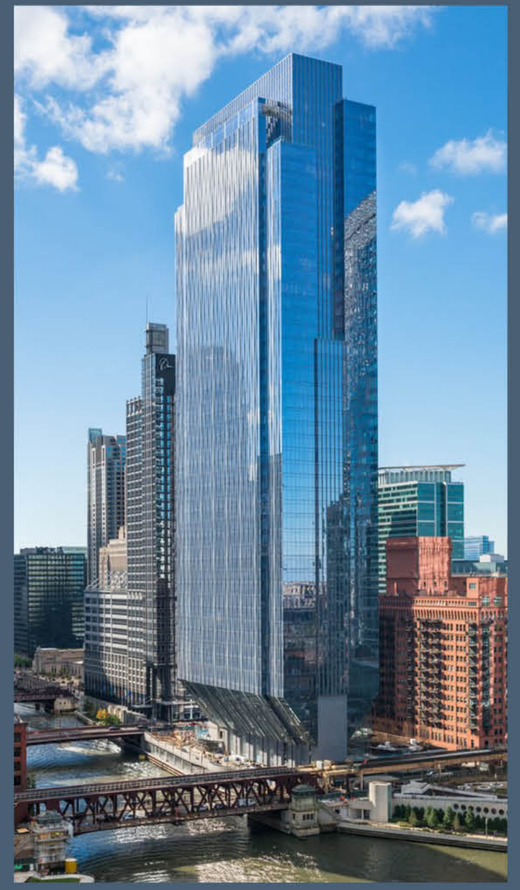
Hudson Yards | Mixed-Use Commercial & Residential District | 2019 | New York City, NY, US

The Hudson Yards development was constructed entirely on a platform spanning over the Penn Station Western Railyard while remaining operational. Each of the towers has a structural feat of their own. It is the most expensive and largest private development in the US, containing over 18 million square feet of floor space at a cost of $25 billion.



Manhattan West | Mixed-Use Commercial & Residential | Est. 2022 | New York City, NY, US

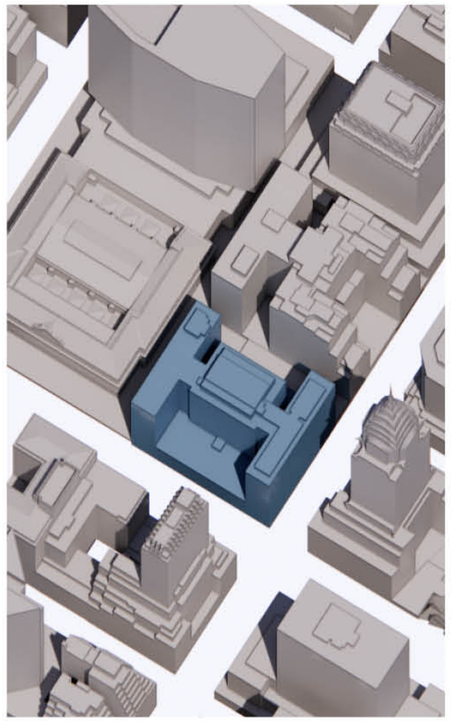
Similar to the Hudson Yards Development, the Manhattan West project uses a series of column trusses to cantilever over the Western Railyard.



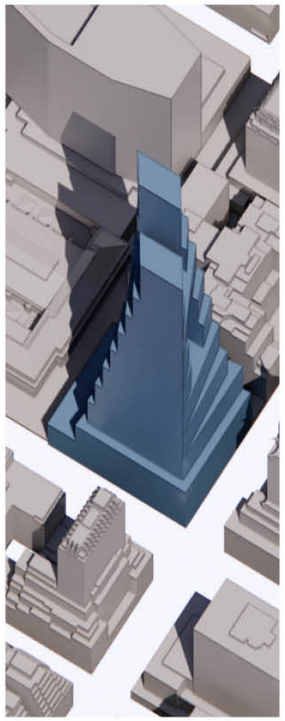
150 North Riverside | 726 ft (221 m) Commercial | 2017 | Chicago, IL, US

This newly constructed high-rise along the Chicago River was built on only 25% of the lot and cantilevers outward due to the location of active rail lines underground.

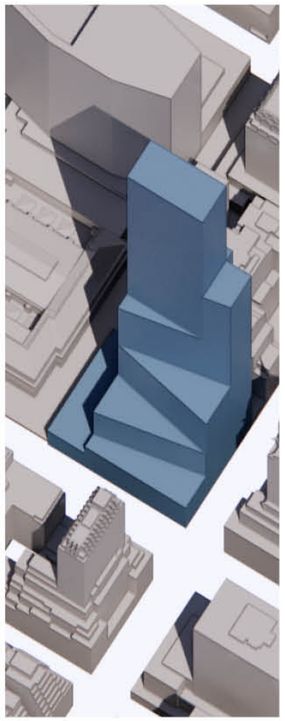
SCHEME DEVELOPMENT



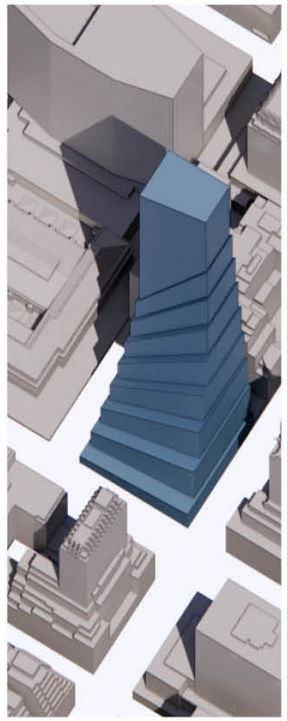
Original Building
The original 1919 building mass consisted of a podium extruded from the property line that was topped with the typical "H" plan that was characteristics of the early 1900s, to allow for light to reach interior spaces. The massing, already overbearing at street level became more so in the 1970's renovation due to the uninviting nature of the new facade glazing and it's already close proximity to the street, making sidewalks feel narrow and congested. Because of its adjacency to Grand Central Terminal and the subway station, pedestrian traffic sees high levels year round.



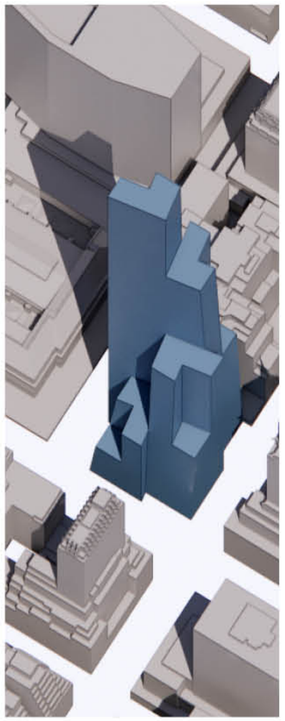
Scheme 1
The first massing was based on continuing to frame the Chrysler Building from the East River. Large lower floor plates slowly pivoted opposite each other and ended in two individual towers connected by 2 bridges. The massing was also pushed to the side to allow more light to reach the East side of the Terminal building.



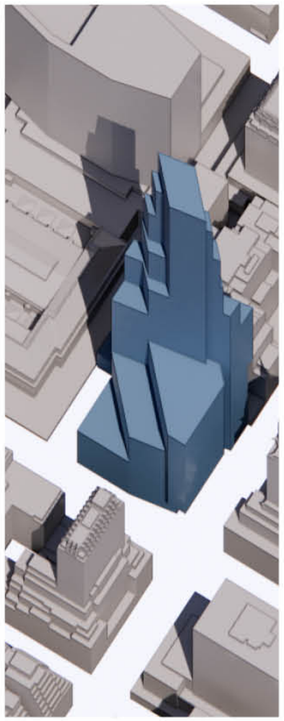
Scheme 2
The second mass is set upon a view point line from the Chrysler Building to Bryant Park, allowing the crown to still be seen. This pushed the mass further to the north allowing more opportunities to slowly reveal the Chrysler Building from 42nd St through use of terracing and also allowed more light to reach the Terminal building.



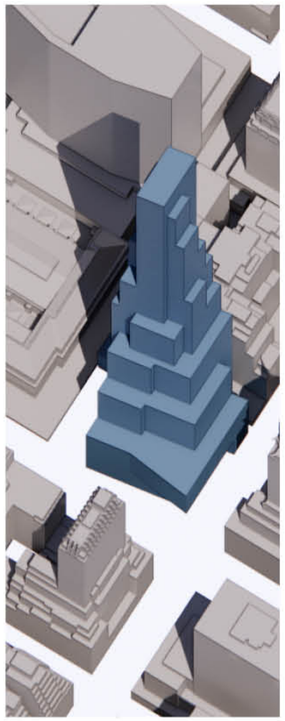
Scheme 3
The third mass was based off of feathering of the Art Deco style. The angular and skewed steps of the building radiated off of the Terminal towards the Chrysler Building, narrowing the profile and lessening the tower's impact on the skyline. Plaza space was created on the west side of the site to mirror Vanderbilt Plaza and engage pedestrians.



Scheme 4
The fourth scheme involved sloping and terracing the building mass to create a changing volume and profile from all points of the city. The building spirals and gravitates towards the middle of the mass creating opportunities for localized elevators in each section. The skewing and folding of the base allows for pedestrian interaction.



Scheme 5
The fifth scheme is a revision of the 2nd scheme and the viewpoint line. Chiseling the top portion of the tower in a more elegant and angular fashion kept this massing more in line with the iconic mirroring of setbacks of several other prominent Art Deco skyscrapers. These include the Chrysler Building, Empire State Building, & Rockefeller Center.



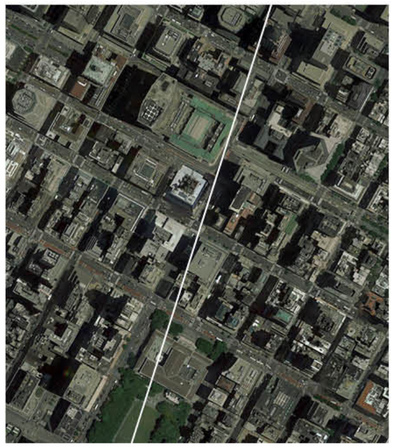
Scheme 6
The sixth scheme is an iteration of the fifth scheme, changing the skew of the floor plates to be parallel with the street grid. Doing this allowed the setbacks on the bottom portion to have a better connection and proportion to the top, and resulted in the most narrow outline of the 6 schemes. The building still follows the viewline but is more concise in form.

Scheme 1

Scheme 2

Scheme 3

Scheme 4



Mass defining sightline from Chrysler Building to Bryant Park

Scheme 5

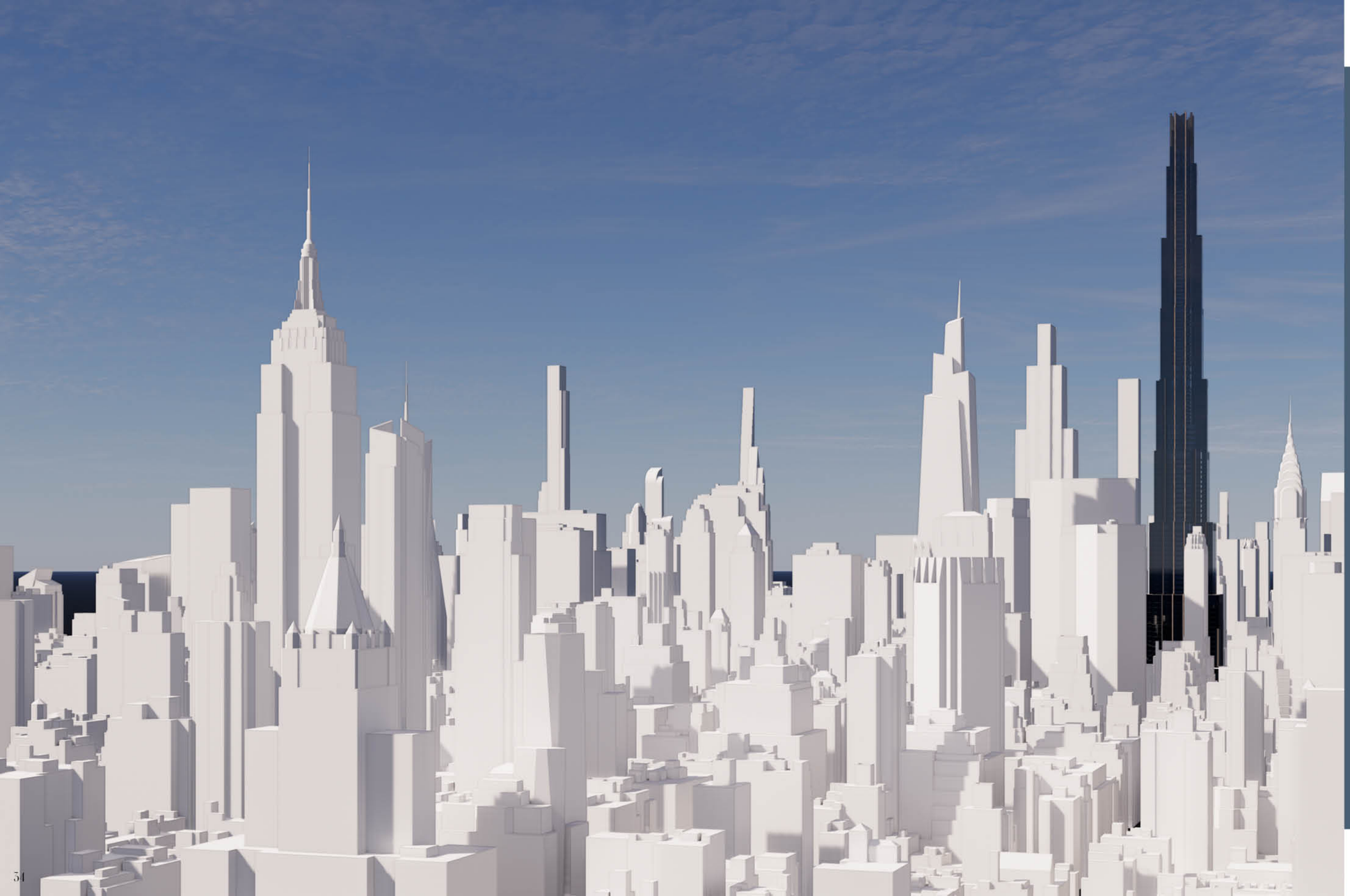
Scheme 6

Final Iteration composed from Scheme 6

The Massing Models

Shown among the two pages are the 48 massing options, the resultant processes of the aforementioned 6 schemes developed from the specific criteria that was assessed: the prominence of the tower on the skyline, the preservation of the view of the Chrysler Building from Bryant Park, the need to pull the west portion of the building away from the Terminal building to improve light conditions and create public space within that void, and opening up the base of the building to relieve the street level pedestrian congestion and aid in the urban fabric of the public realm. The right most enlarged massing conformed best to the set criteria while also resulting in the best of the masses to conform with the obstacles posed by the underground conditions. The iteration takes precedents from the significant contextual architecture surrounding it and has continuity with the Terminal building.

PROJECT REALIZATION



GATEWAY

The looming midtown supertall, with it's visibly elegant tiered form, fits well within the context of the city and serves as the new gateway to Midtown. It respects the view angles of the Chrysler Building from Bryant Park, and allows the Art Deco crown and portions of the base to be seen from street level once again. In a perfect ensemble, one can see it's height definition proportions when spiraling around an origin from Grand Central Terminal, to the Metlife Building, to the Chrysler Building, to One Vanderbilt, and finally, to the Art Deco inspired crown of the Gateway Tower. It's slight incremental setbacks and slim proportions lessen the 1890 ft towers impact on the overall broader skyline of Manhattan. The vertical terracotta and aluminum bands that stretch the length of the building, accentuate its height and emphasize the buildings feeling of disappearing into the sky as the floor plates become more and more narrow when looking up from street level. The chevron crown gives admiration back to the pointed crown of the Chrysler Building and angular crown of One Vanderbilt while still maintaining a contemporary design and symmetric order.

FLOOR PLANS

Ground Floor | Retail, Transit Hall, Grand Hyatt and Office Lobby

A. To Grand Central Terminal
B. Lexington Passage
C. Retail Space
D. To Subway Mezzanine
E. Grand Hyatt Informal Lobby
F Grand Atrium
G. Transit Hall
H. Bank
I. Lexington Ave Office Lobby Entrance

Office Lobby & Elevator bank | Atrium Retail

2nd Floor

A. Loading Bay/Dock and BOH Storage
B. Main 42nd St Commercial Office Lobby
C. Grand Central Gateway Plaza
D. Retail Shell Space
E. Grand Atrium
F. Restaurant (& Kitchen) with outdoor seating
G. Lower Level Commercial Lobby Atrium
H. Leisure space of Secondary Lexington Ave. Lobby

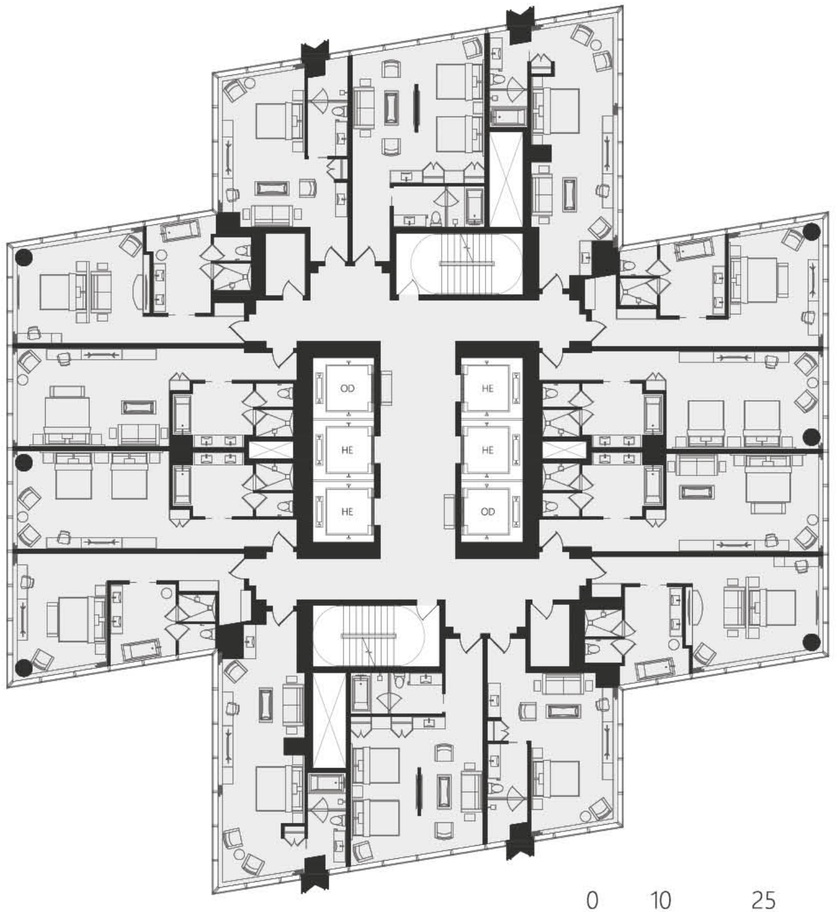
0 10 25 50
Feet

Podium Level Trading Floor

Floors 8-11

Grand Hyatt Suite Layout

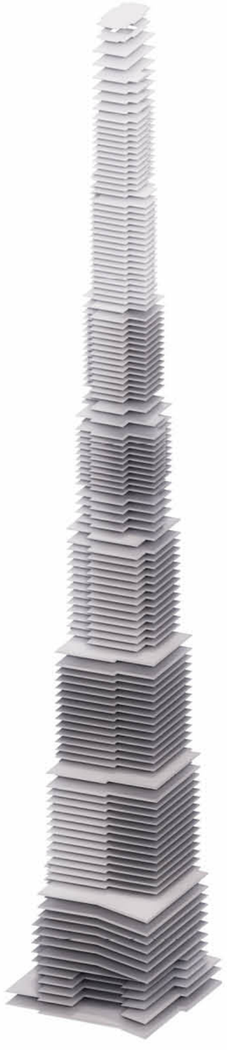
Floors 72-84



0 10 25 50

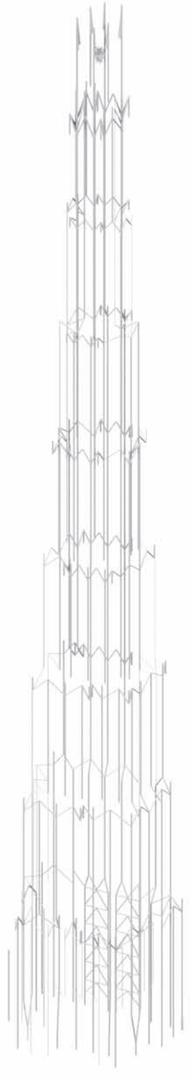
Feet

STRUCTURAL MODEL AND TECHNICAL DRAWINGS



Floor plates

A total of 124 composite floors of varying sizes and floor to floor heights make up the building.

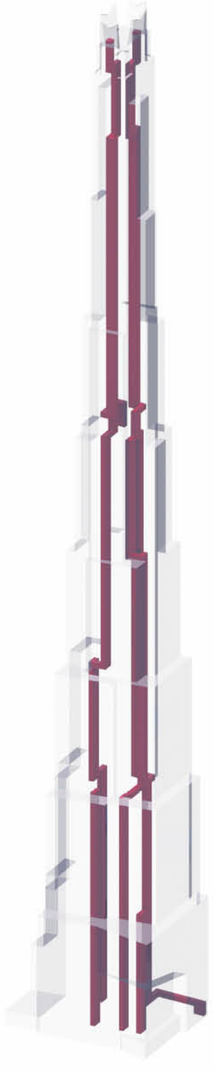


Steel Skeleton

Truss belts assist in the vertical transfer of loads down to the foundations.

Internal Core

Composed of 2 cores, a rear core of concrete encased steel columns and shear walls, and a front core of fireproofed steel.

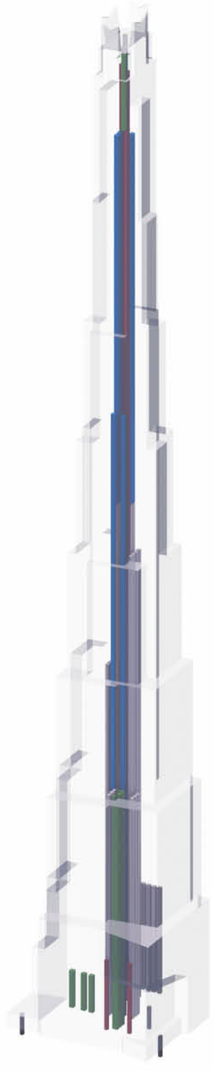


Egress Stairs

A labyrinth of egress stairs are contained in the core, 5 commercial stairwells narrowing to 2 hotel stairwells.

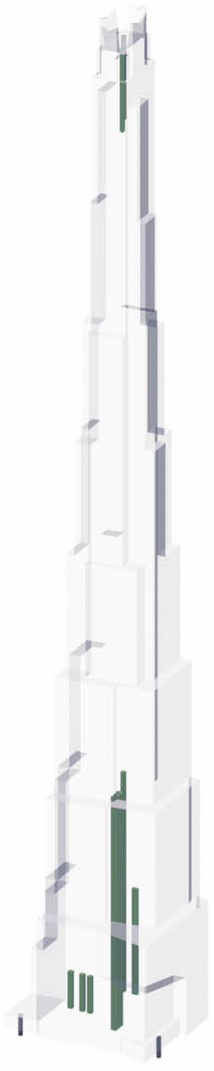
Mechanical System

Mechanical levels are located at every section of the building with shafts leading systems to floors above and below.



Elevator System

The building has a total of 50 elevators servicing 5 different programmatic functions.

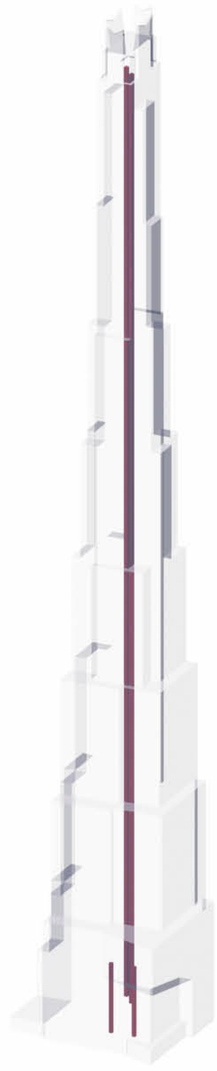


Freight & Subway

4 Commercial	1-26
3 Loading	2-B3
1 Podium	1-59
2 Tuned Mass Damper	122-124
2 Subway ADA Mezzanine	1-B1

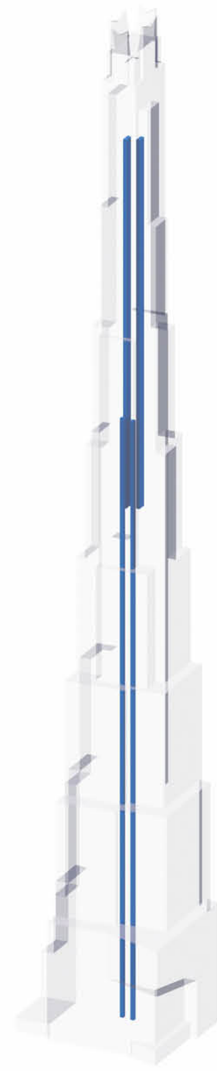
Commercial Office

8 Podium Commercial	2 : 8-11
6 Lower Commercial	2 : 13-25
5 Mid Commercial	2 : 27-39
4 Upper Commercial	2 : 41-53
4 Executive Skylobby	2 : 55-59
1 Lobby ADA	1-2



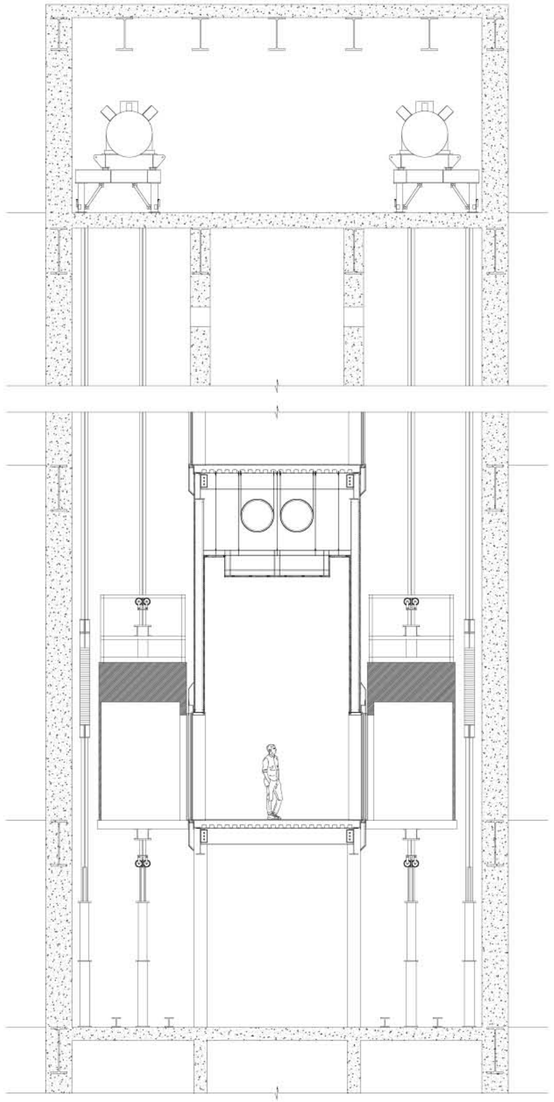
Retail/Obs. Deck

2 Mall & Hotel Convention	1-7
2 Express Obs. Deck	3 : 119-121



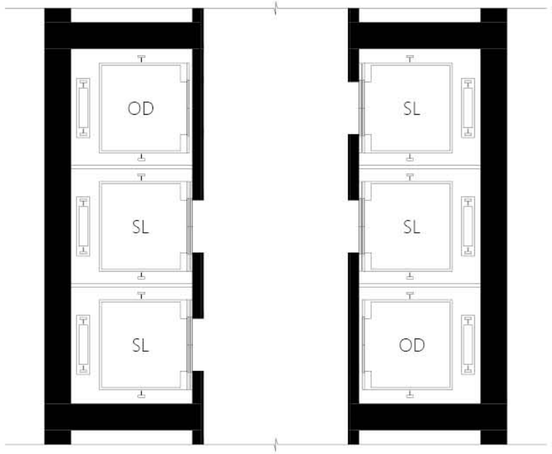
Grand Hyatt Hotel

2 Express	1 : 70-71
4 Local	60-115



0 1 3 6 12 24
FEET

SECTION OF COMMERCIAL SKYLOBBY ELEVATORS



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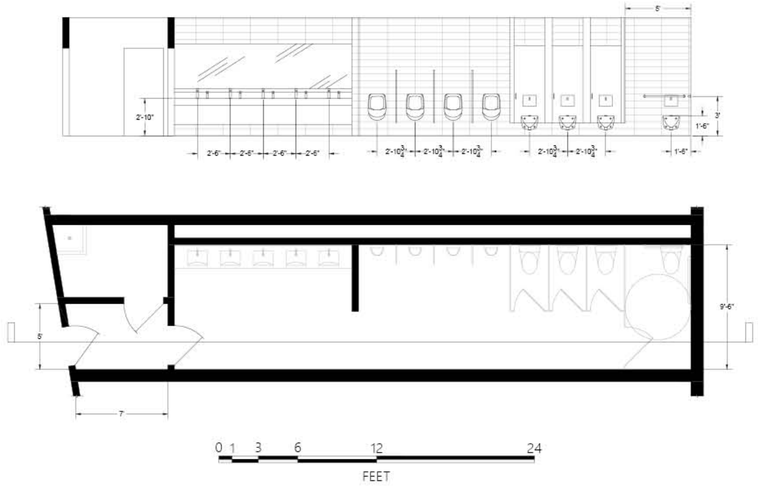
FEET

PLAN OF COMMERCIAL SKYLOBBY ELEVATORS



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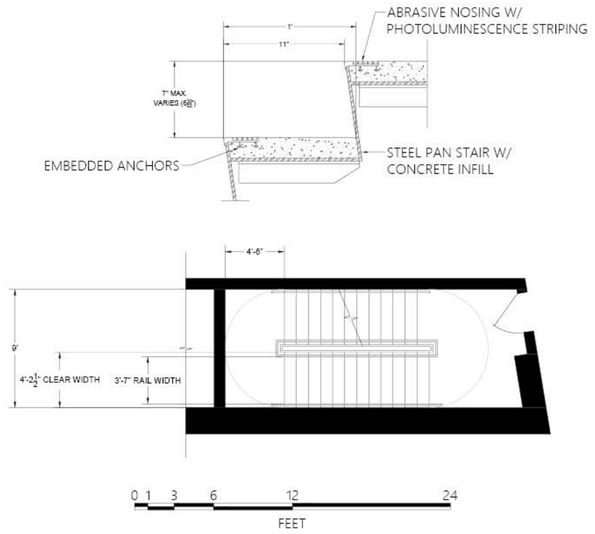
FEET

PLAN AND SECTION OF TYP. OFFICE RESTROOM



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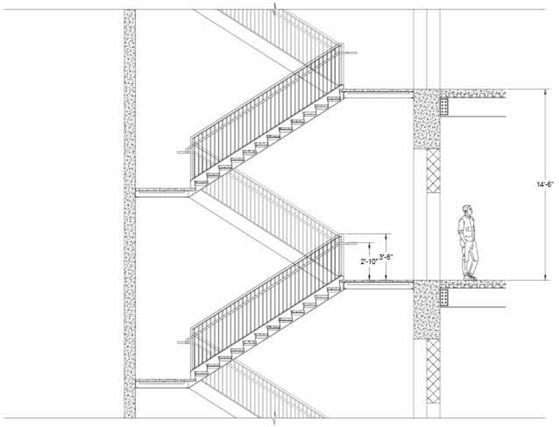
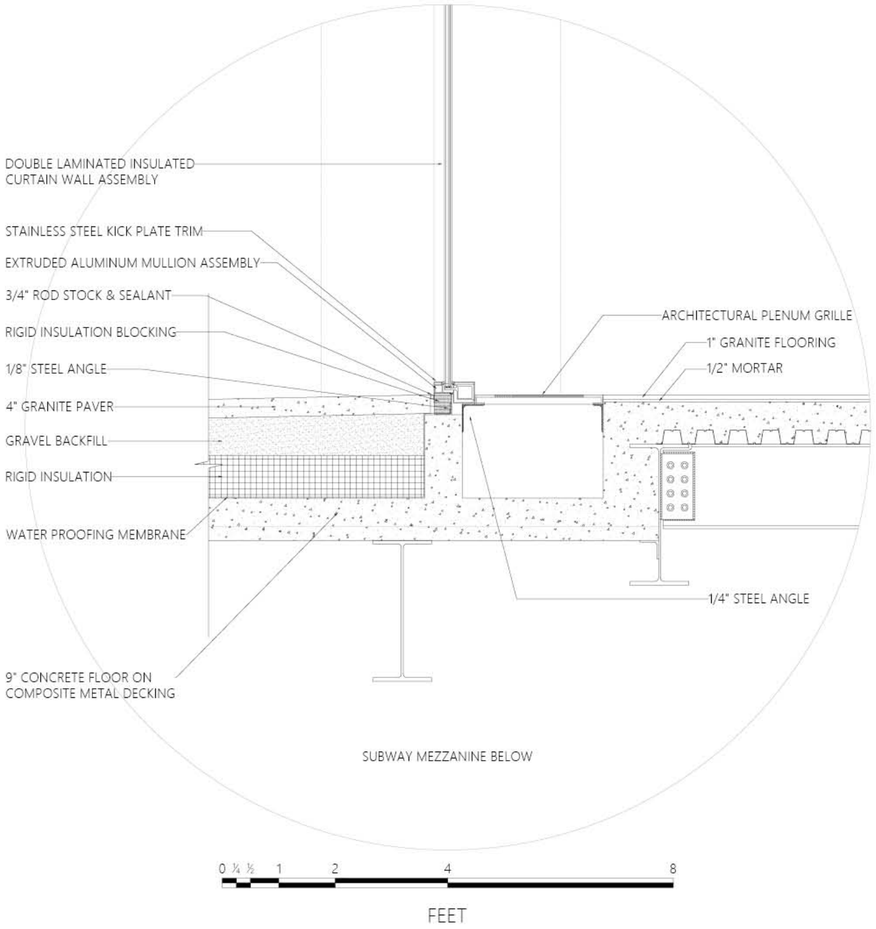
FEET

PLAN AND DETAIL OF TYP. FIRE ESCAPE STAIRS

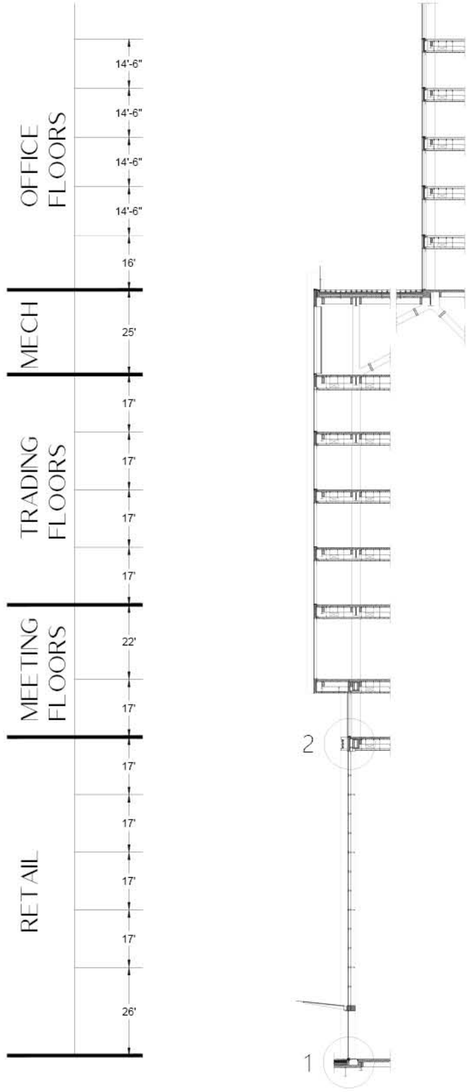


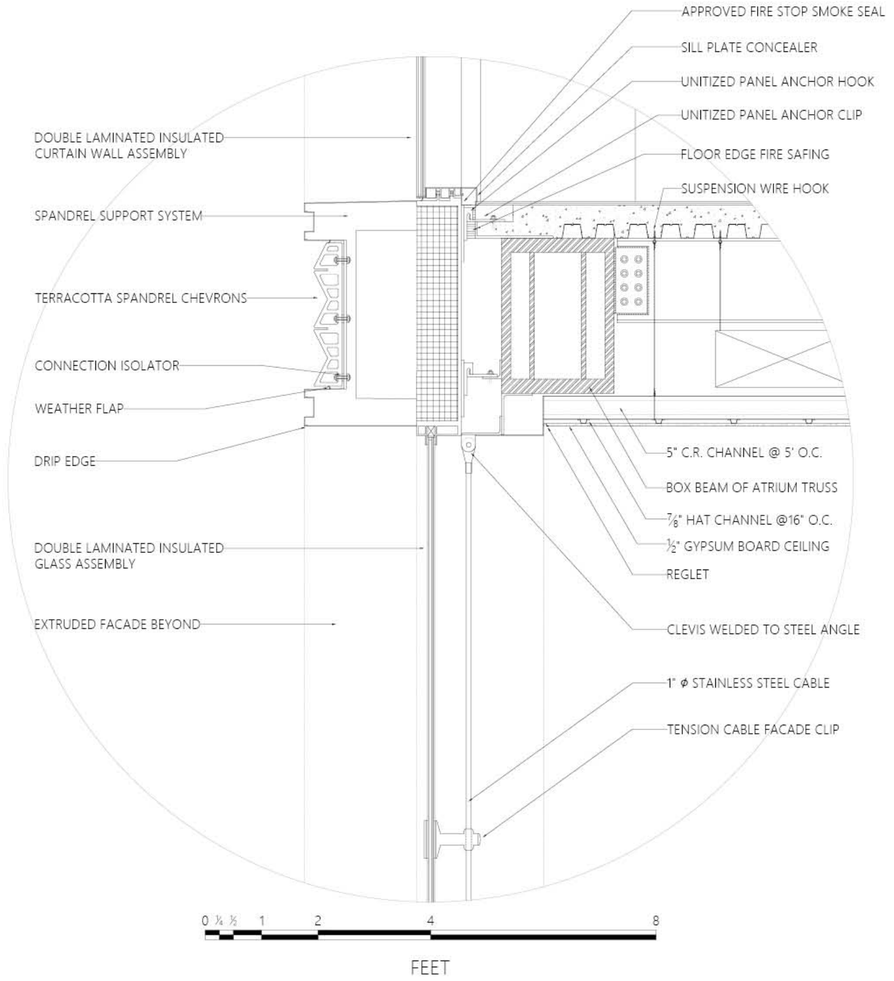
0 1 3 6 12 24
FEET

SECTION OF TYP. FIRE ESCAPE STAIRS

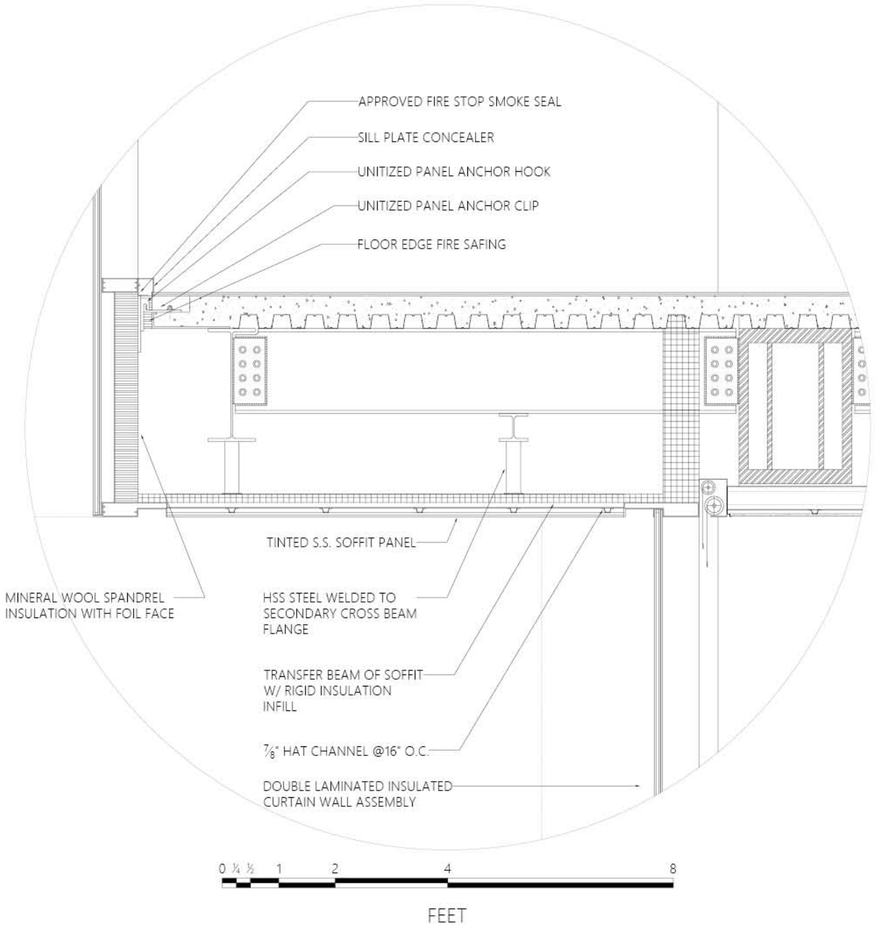


1. GROUND FLOOR CURTAIN WALL CONDITION

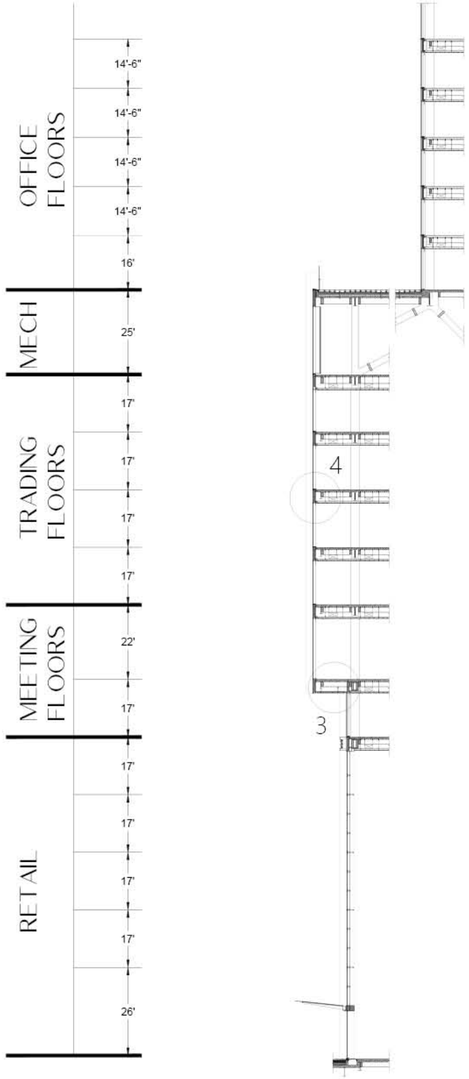


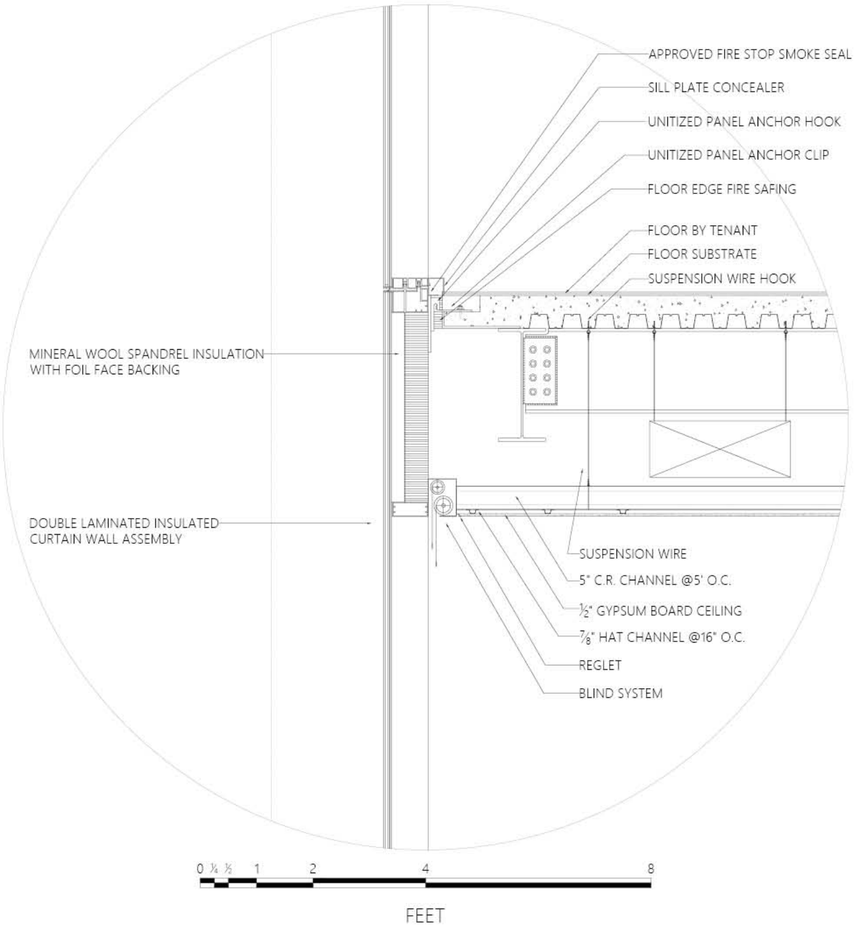


2. SPANDREL DETAIL AT TOP OF TENSION CABLE FACADE

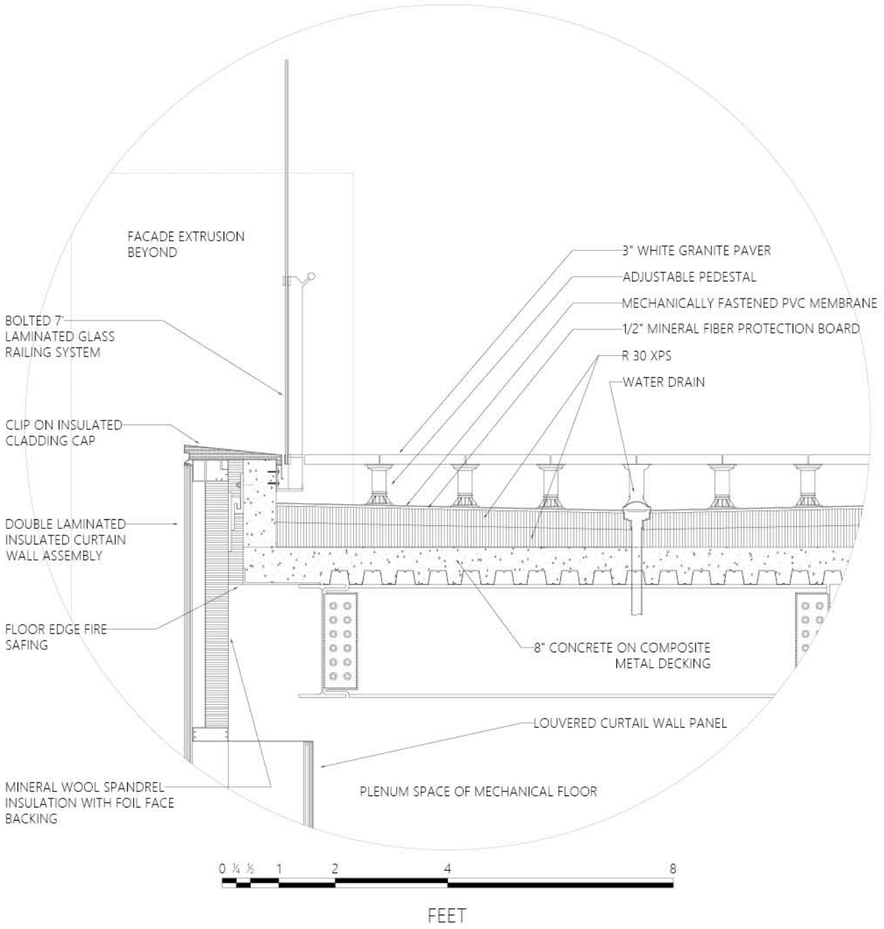


3. SOFFIT DETAIL OF CANTILEVER

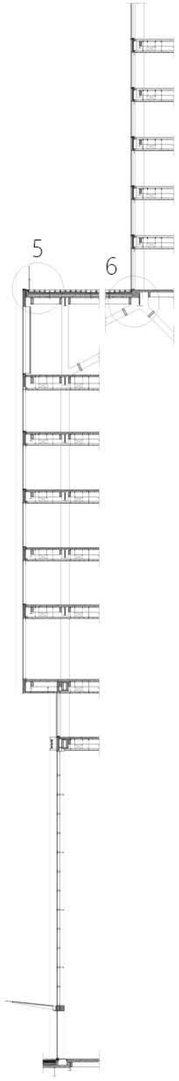


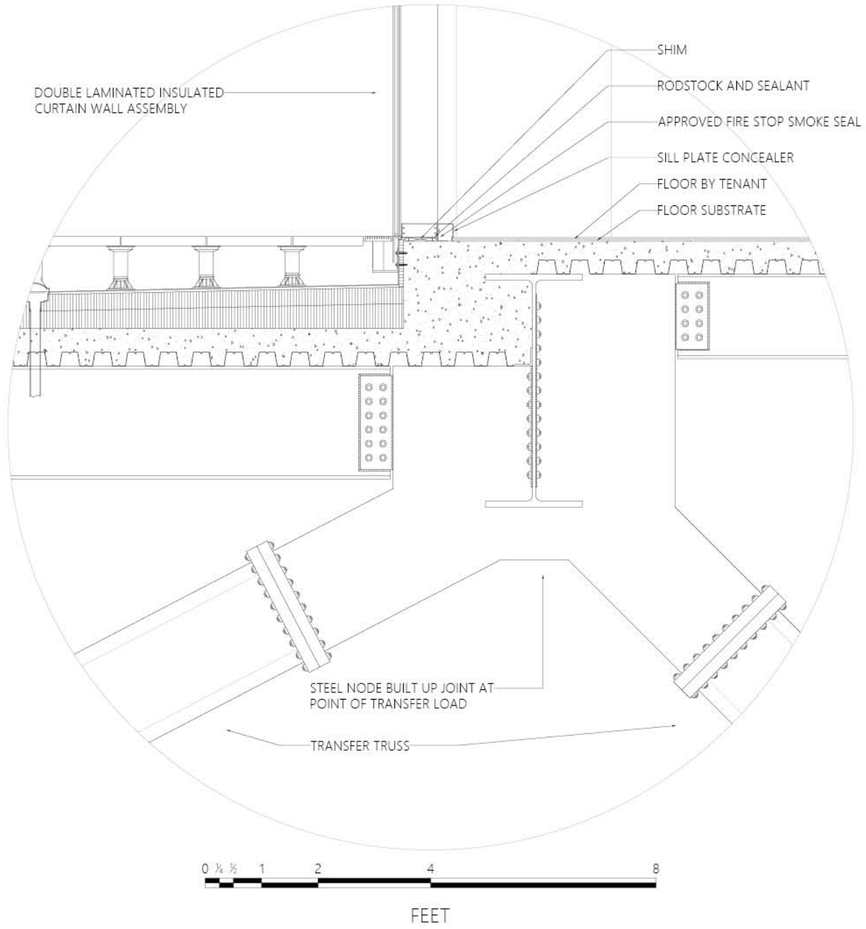


4. TYP. CURTAIL WALL CONNECTION DETAIL



5. TERRACE & SETBACK DETAIL



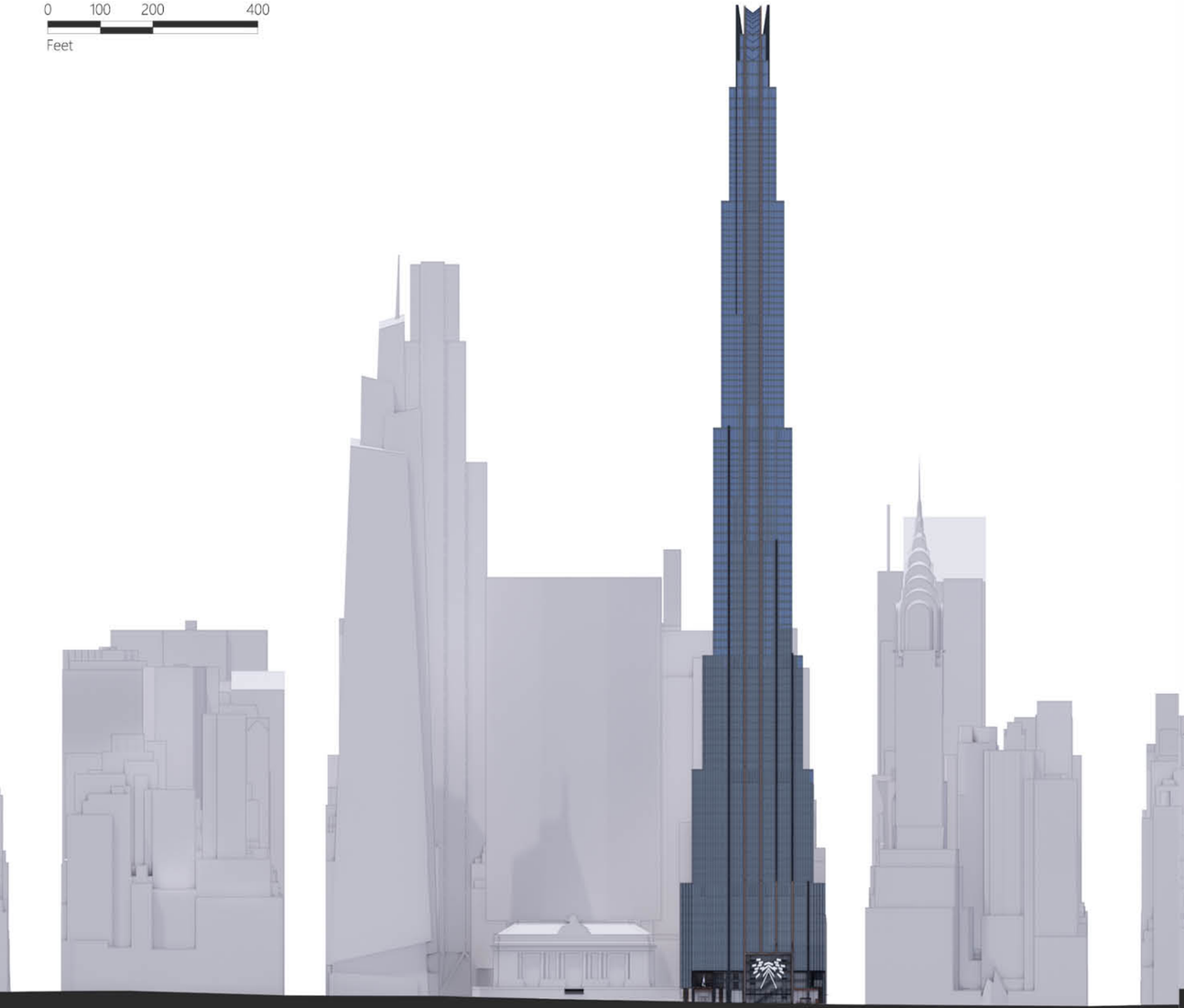


6. CONTINUATION & TRANSFER OF STRUCTURE

ELEVATIONS

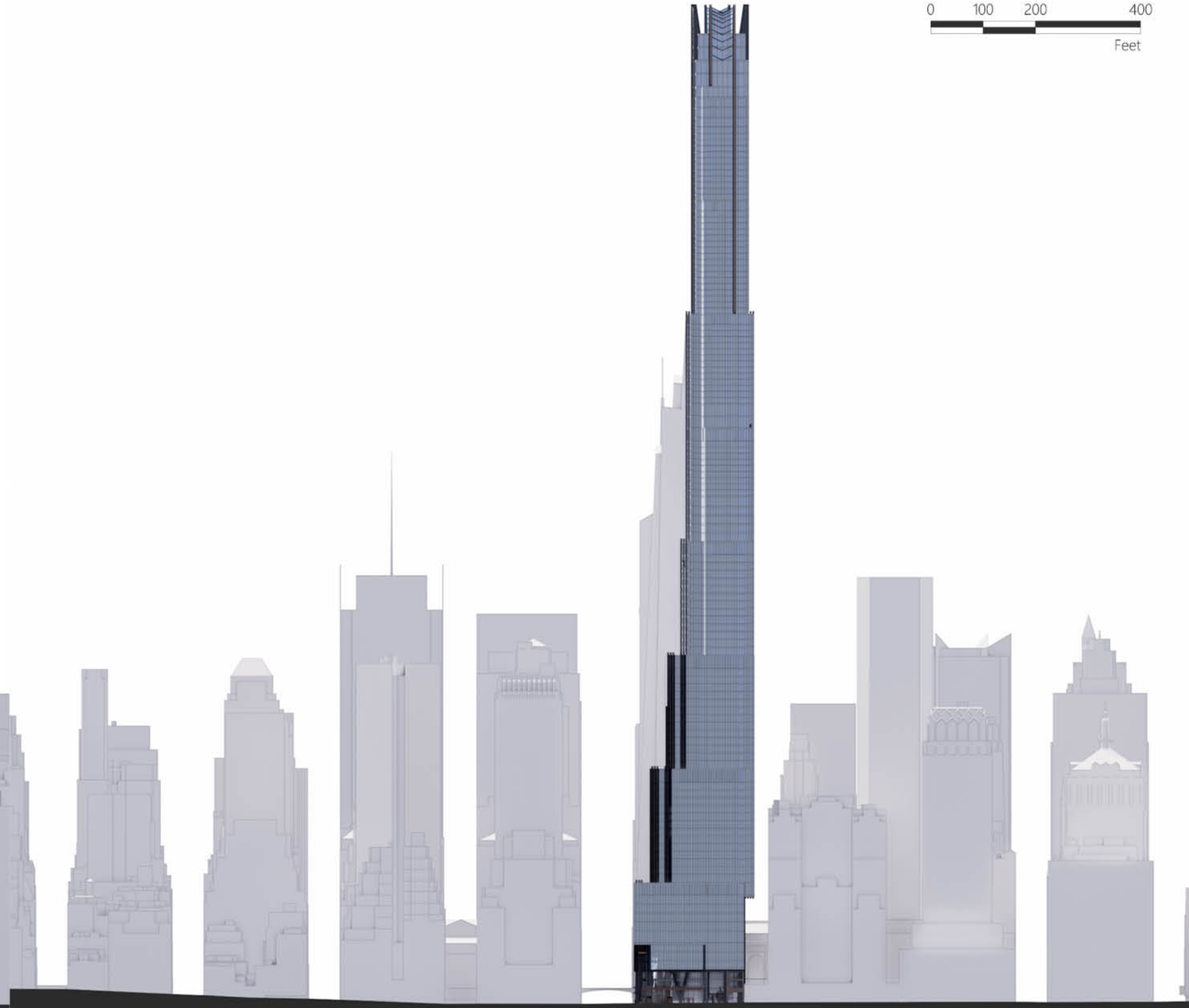
Plan South Elevation

0 100 200 400
Feet



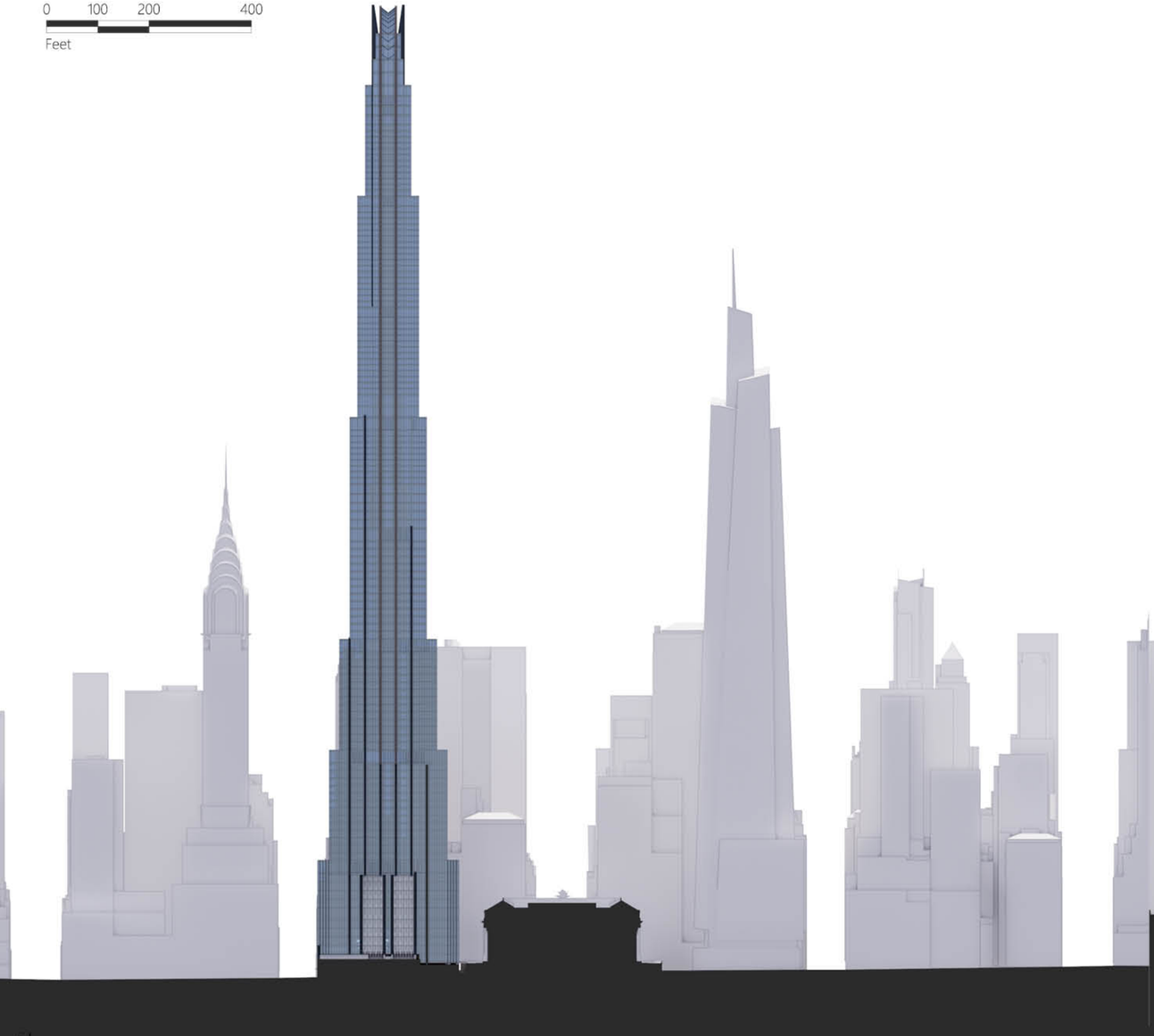
Plan East Elevation

0 100 200 400
Feet



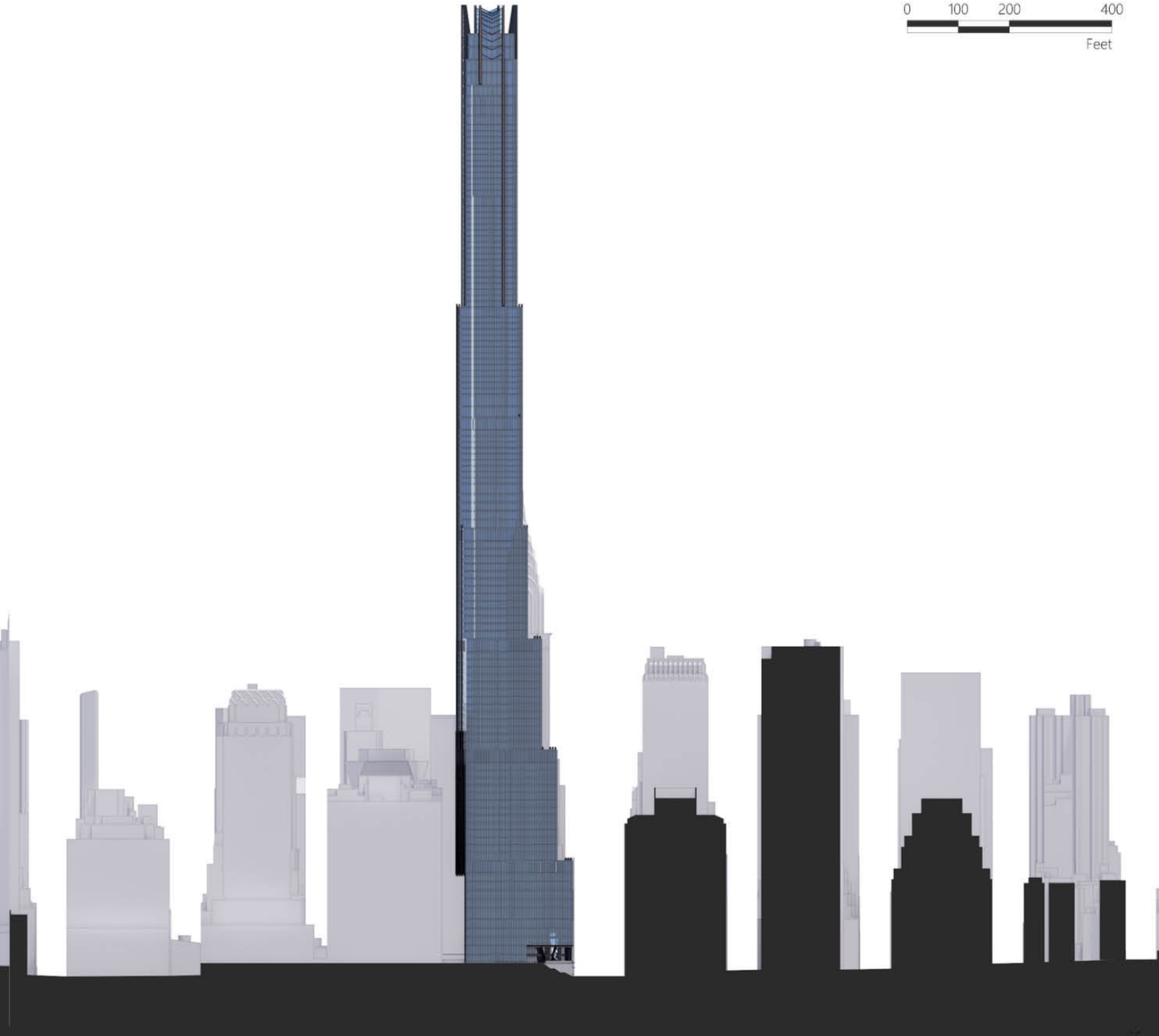
Plan North Elevation

0 100 200 400
Feet



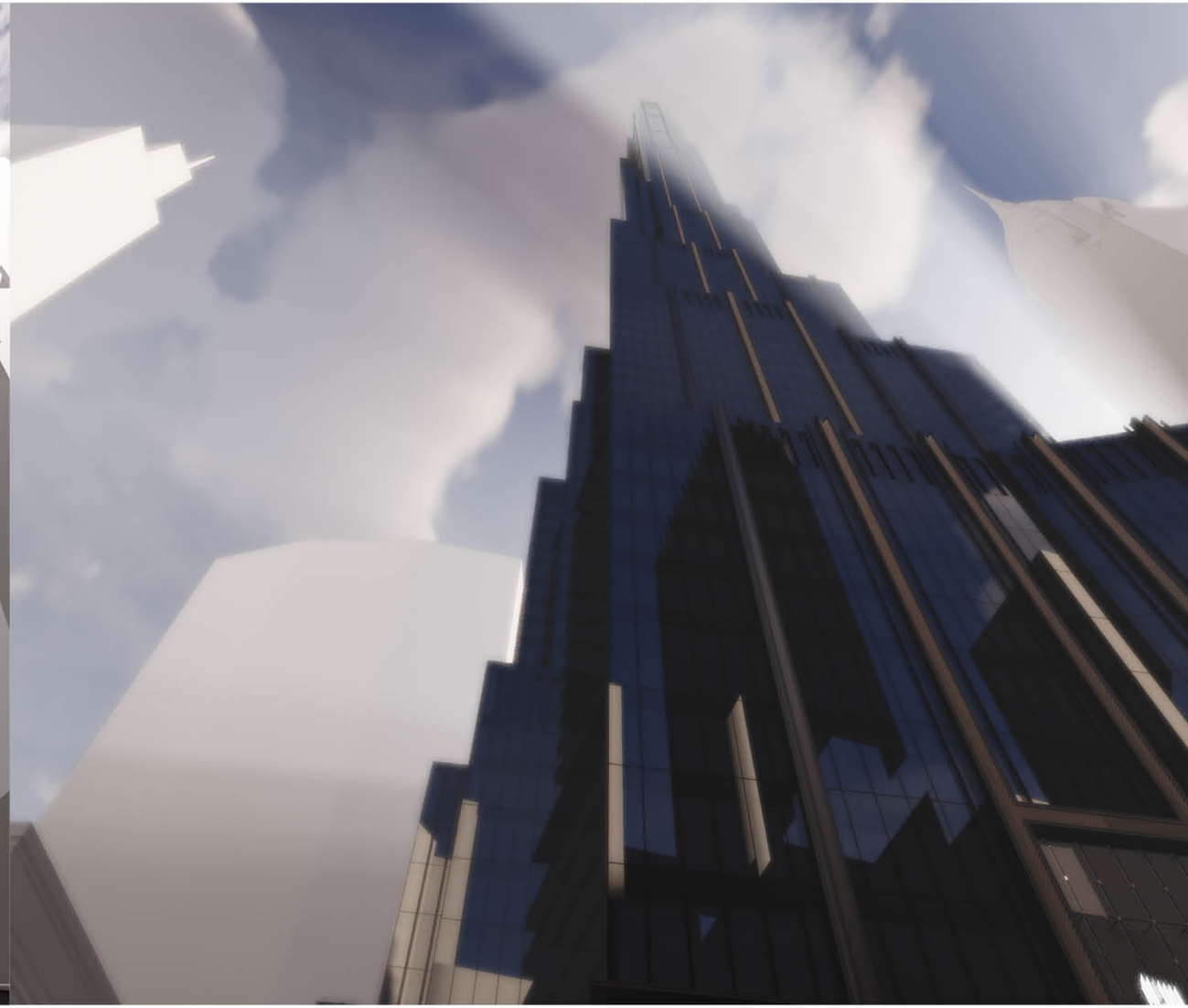
Plan West Elevation

0 100 200 400
Feet



DESCRIPTIVE RENDERS AND CONCLUSION


SHOPS
AT GRAND CENTRAL




GRAND HYATT
SAINT LAURENT
THE SHOPS
AT GRAND CENTRAL
2930
TAXI


Grand Central-42 Street Station


RALPH LAUREN
LEXINGTON PASSAGE
THE SHOPS AT GRAND CENTRAL

CONCLUSION

This project sought to delve into the realm of supertall structures and their ability to coexist within spaces without appearing to be inherently out of place with their context. The vast challenges that arose from building on such a complex site that has spectacular neighbors and such intricate activity below grade allowed me to expand my knowledge and thought process in trying to navigate through an undertaking that, while mostly familiar to me, seemed extremely foreign due to all the special circumstances that had to be acknowledged before the tower could be designed. Being able to properly understand the ramifications of designing such a tall building in the point of view from both the larger urban scale and smaller public scale was paramount in being able to have designed the building to be coherent and harmonious with its surroundings. The density of Manhattan did not act as an impediment, but rather as an opportunity that lent itself to developing the architecture and functionality of the tower. As we are witnessing in the present moment, numerous supertall buildings under construction in New York and abroad will continue to alter skylines forever.

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*All other imagery of New York not referenced within this citation are personal captures from July of 2018 and January of 2020.