



# A MIXED-USE HIGH RISE IN STREETERVILLE AREA

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MASTER'S PROJECT | SPRING 2010 | PROFESSOR: JOHN DURBROW

ILLINOIS INSTITUTE OF TECHNOLOGY

## THE PROJECT

# A Mixed-Use High-Rise Development in Streeterville Area

### ELEVATOR STATEMENT

This project is about creating a mixed-use high-rise development that responds to three major concerns of our society in urban areas: the land scarcity and its high value, the effort to create a sustainable development by intensifying land use and practicing environmentally-friendly construction, and the need of densifying uses of space in order to revitalize urban centers.

### CASE STATEMENT

#### *Why Mixed-Use High Rise*

Downtown city centers have always been a source of density because of land scarcity and the need of densifying uses of spaces. The sensible and efficient solution for land scarcity is by building vertical in the form of high-rise buildings. A mixed-use high-rise development diversifies the uses of space within a single building structure and vertically stacks the uses. The combination of living, working, dining, entertaining, shopping, and lodging in a single urban structure has redefined as well as condensed multi-functions in a single land use. This solution is becoming ideal as amenities are readily available in close proximity and the space area multiplies in ratio with land footprint area. The mixed-use high-rise building should answer to the practical demands of today's modern lifestyle as well as create and enhance sensible design in the urban environment.

#### *Market Research*

Based on my research, a mixed use high-rise development requires a complex planning in order to create a working and successful project. In projects where hotels are incorporated into retail and residential projects, the retail component does better because "shopping" is the number one purpose for US domestic leisure travelers (based on 32% US domestic leisure travelers report); and 81% of all US domestic trips are leisure.

Over the last 20 years, it has been documented that the leisure guest spends 5 times the amount per day as a normal guest at restaurants, retail, and entertainment in hotel mixed-use projects. The business traveler spends more than 6 times the normal average per day. No wonder hotel mixed-use projects produce superior results bringing leisure and business travelers in close proximity to their shopping targets. Similarly, where residential or office component's are part of the hotel mixed-use project premiums of 25 to 35% are regularly accomplished. In the retail and office space arena, rents and sales usually range 25 to 40% more where hotel is an integral part of the mixed-use project.

# GOAL & GUIDING PRINCIPLES

## GOAL STATEMENT

The key goal for my project is to redefine as well as condense multi-functions in a single land use, answer the practical demands of today's modern lifestyle, and create and enhance sensible design in the urban environment.

## GUIDING PRINCIPLES

### ***Form = Performance***

Develop a form for the high-rise structure that has a meaning that is contributing to the overall objectives of the design and considering the local climate. Defining building form geometry for the sake of form is no longer good enough. The design of the building should focus on maximizing the building performance by looking at nature and take cues from how mother nature designs living organisms.

### ***Balanced mixed-use = Urban Vitality***

Create a balanced ratio of mixed-use spaces within the building. Market analysis is crucial to understand the pattern of supply/demand for different spaces in this area. A balanced ratio of the number of hotel rooms, retail spaces, condominium units, and apartment units is important to minimize the vacancy level and to create a vibrant community space.

### ***Sustainability***

Create a more energy-conserving and environmentally sustainable future for the area, by applying leadership in Energy and Environmental Design (LEED) building and site development standards, best practices in local and regional stormwater management for water quality and water quantity, and sustainable construction practice by implementing a comprehensive waste recycling management plan.

### ***Pedestrian-friendly activity centers***

Establish a pedestrian-oriented character and "sense of place" within each activity center through the design of building, open spaces, and sidewalks that provide a quality public realm with pedestrian amenities. Active uses should be provided on the ground floors of the building such as retail stores, restaurants, cafes, etc. Also, public gathering places should be provided to promote informal social contact and accommodate performances, cultural celebrations, and other public events in the form of plaza, urban park, or rooftop amenities.

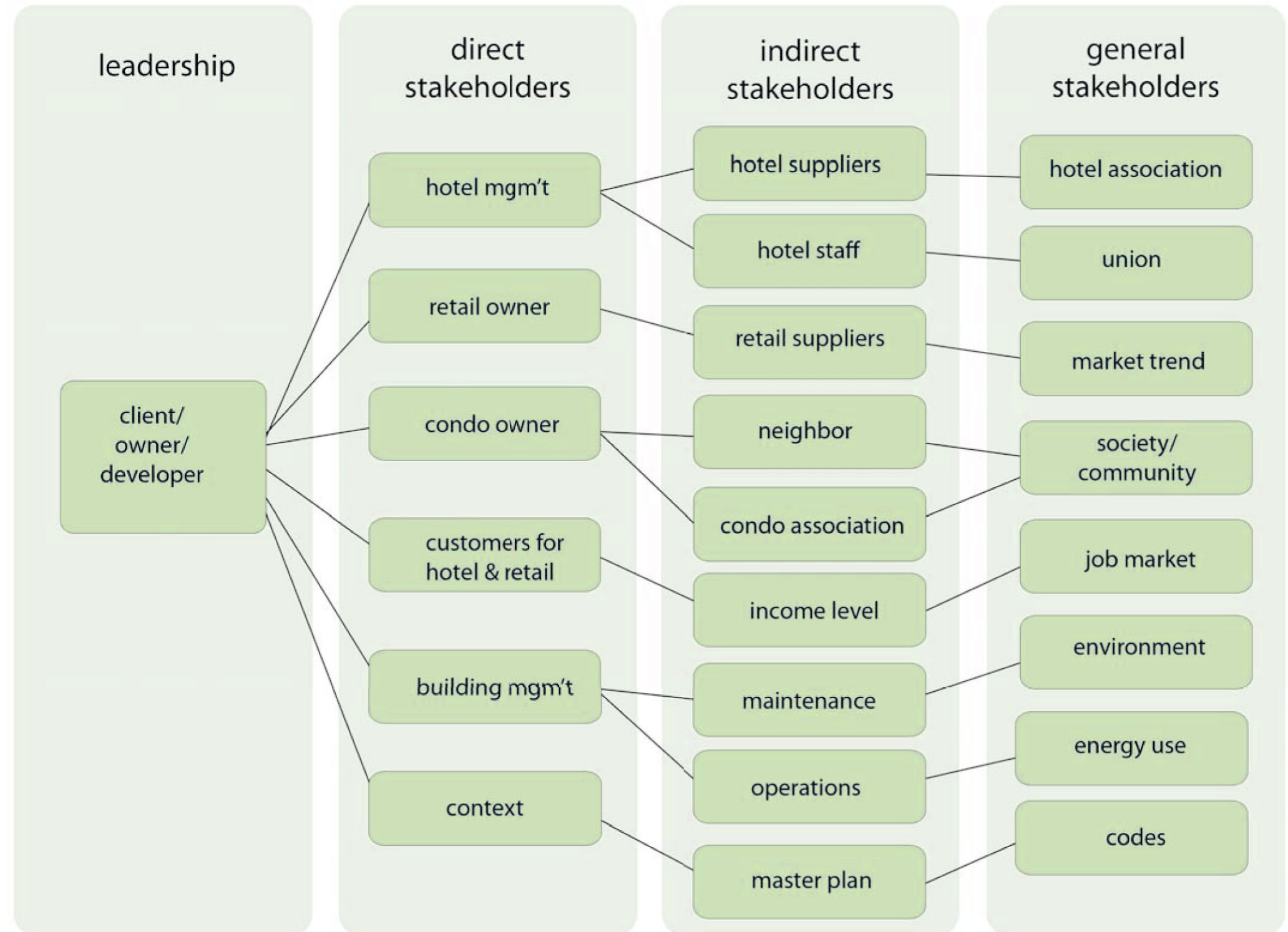
### ***Accessibility***

Provide a welcoming atmosphere and barrier-free spaces for public areas such as the open space, urban park, hotel lobby, and retail spaces. Residential areas (condominium and apartment units) including floors with hotel rooms have limited access from the general public and limited to the occupants and guests.

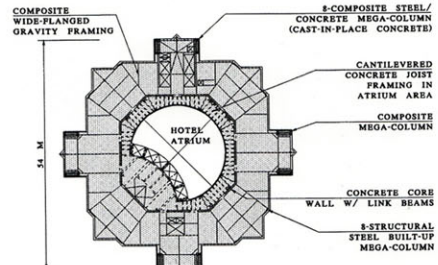
### ***Adaptability***

Changes in population demographics every period of time due to economic changes, migration, and other factors will require the building occupiable spaces to be flexible in order to be sustainable in the long run. The average life cycle of mechanical system is 15 years, requiring the system to be replaced with a new one that might be different than the existing one. In order to solve this problem, fundamental changes in the process of delivering buildings are needed to revolutionize the structure and practice of architectural design.

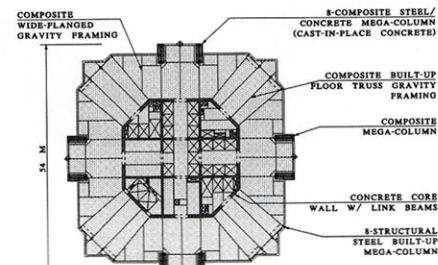
# STAKEHOLDERS



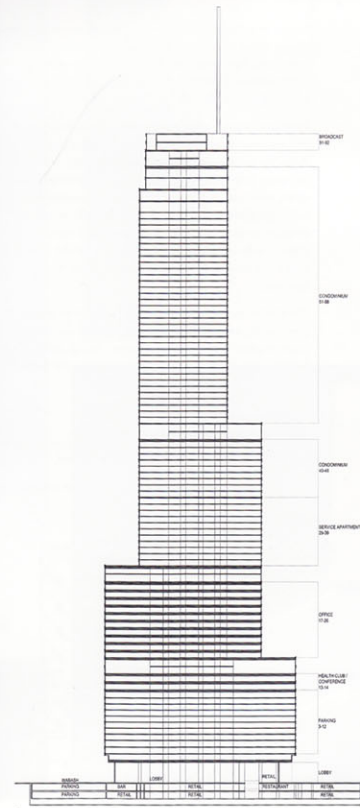
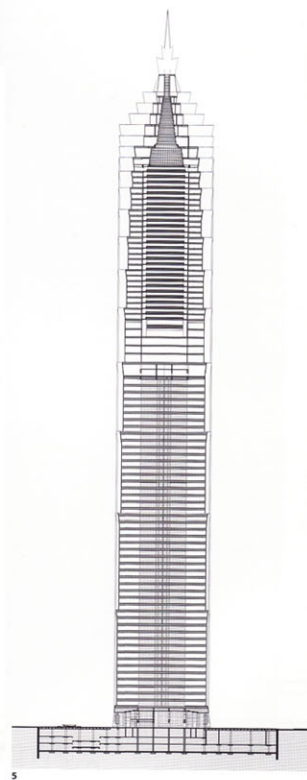
# PRECEDENTS



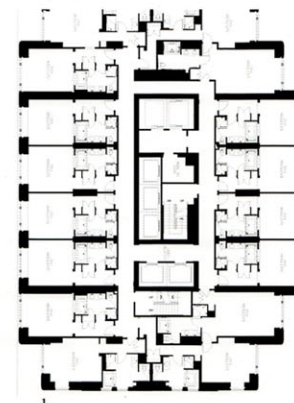
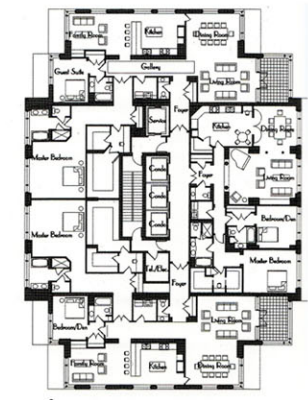
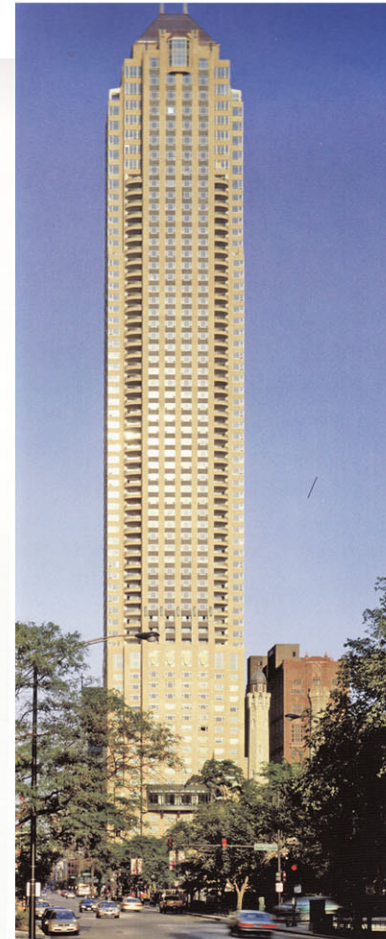
1 Typical hotel framing plan



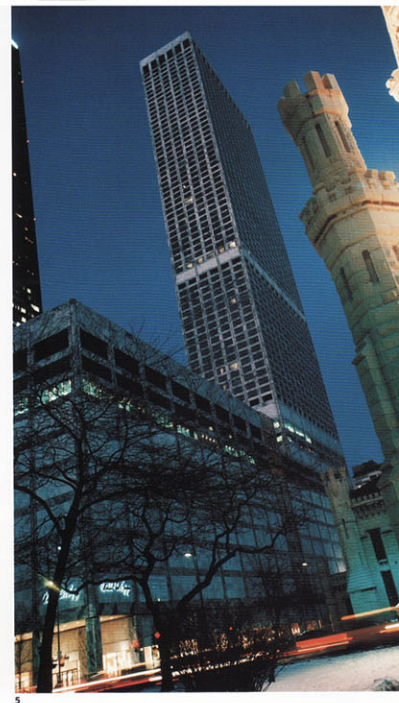
2 Typical office framing plan



3



1 Typical hotel floor plan  
2 Typical condominium floor plan  
3 General view



Location Shanghai, China  
Completion date 1998  
Architect Skidmore, Owings & Merrill LLP, Adrian Smith, Design Partner  
Associate architect The Shanghai Institute of Architectural Design & Research (SIADR); East China Architectural Design & Research Institute Co. Ltd. (ECADI)  
Client China Jin Mao Group Co.  
Developer China Shanghai Foreign Trade Company  
Structural engineer Skidmore, Owings & Merrill LLP  
Mechanical engineer Skidmore, Owings & Merrill LLP

Vertical transportation consultant Edgett Williams Consulting Group  
Contractor Shanghai Jin Mao Contractor (SIMC)  
Project manager Zhang Guan Lin, Chairman; Zhu Qi Hong, Director; Ruan Zhen Si, Deputy Director  
Height: 1380 ft/420.5 m  
Above-ground stories 88 plus 4 penthouse levels  
Basements 3  
Above-ground useable levels 86  
Mechanical levels Partial floors at 2 and 2 Mezz; full levels 50 and 51, and full levels at penthouse 1-4

Use: Office, hotel, retail  
Site area 5.8 acres/2.36 ha  
Area of above-ground building 3,000,000 sq ft/278,700 sq m  
Area of typical floor plate 29,180 sq ft/2711 sq m (level 3) -15,480 sq ft/1438 sq m (level 88)  
Basic planning module 5 ft/1.5 m  
Number of parking spaces 993 (car); 1000 (bicycle)  
Principal structural materials Reinforced concrete core, steel floor framing with concrete fill on metal deck; steel and composite (steel and concrete) mega-columns  
Other materials Anodized aluminum, high performance insulating glass and stainless steel custom curtain wall

Location Chicago, Illinois, USA  
Expected completion date 2008  
Contractor Bovis Lend Lease LMB, Inc.  
Architect Skidmore Owings and Merrill LLP; Adrian D Smith, FAIA, Consulting Design Partner  
Residential interior architect PMG Architects  
Client Trump International Hotel & Tower  
Developer Donald J Trump  
Structural engineer Skidmore, Owings & Merrill LLP; William Baker, Partner in charge of Structural Engineering  
Mechanical engineer WMA Consulting Engineers, Ltd  
Vertical transportation consultant Lorch, Bates & Associates

Landscape architect Peter Lindsay Schaudt Landscape Architecture, Inc.  
Contractor Bovis Lend Lease LMB, Inc.  
Height 1361 ft/415 m (to top of spire)  
Above-ground stories 92  
Basements 3  
Above-ground useable levels 86  
Mechanical levels and level numbers 5: levels 2, 15, 28, 56, 90  
Use Residential, hotel, condominium, parking, retail  
Site area 102,748 sq ft/9545 sq m

Area of above-ground building 2,380,000 sq ft/221,102 sq m  
Area of typical floor plate 44,410 sq ft/4126 sq m; 35,150 sq ft/3285 sq m; 24,880 sq ft/2311 sq m; 16,250 sq ft/1510 sq m  
Basic planning module 5 ft/1.5 m  
Number of parking spaces 847 in tower, 109 in below-grade garage  
Principal structural materials Reinforced concrete  
Other materials Exterior curtain wall: aluminum frame with low-e double-glazed insulated glass units with brushed stainless steel spandrel panels and polished stainless steel using shaped vertical mullions; exposed columns are brushed stainless steel

Location Chicago, Illinois, USA  
Completion date 2000  
Architect Lucien Lagrange Architects  
Production architect HKS, Inc  
Client Hyatt Development Corporation; LR Development Company  
Structural engineer Chris Stefanos & Associates  
Mechanical engineer Environmental Systems Design, Inc.  
Vertical transportation consultant Greg Davis & Associates  
Landscape architect Daniel Weinbach and Partners, Ltd.  
Contractor James McHugh Construction Company

Project manager John R. en (Hyatt); Kerry Dickson (LR Development)  
Height 844.3 ft/257.3 m to top of spire; 824.3 ft/251.2 m to top of roof parapet  
Above-ground stories 70  
Basements 1  
Above-ground useable levels 68  
Mechanical levels and level numbers 6: levels 8, 9, 19, 19F, (68, 70 within roof)  
Use Residential, hotel, retail, restaurant, parking, spa  
Site area 28,125 sq ft/2613 sq m

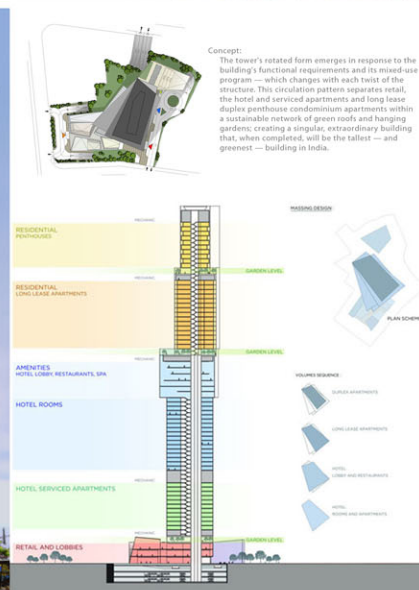
Area of above-ground building Residential: 475,000 sq ft/44,000 sq m; Office: 19,500 sq ft/1,800 sq m; Retail: 20,000 sq ft/1,850 sq m; parking: 92,000 sq ft/8547 sq ft  
Area of typical floor plate 9671 sq ft/898 sq m  
Basic planning module 13.5 ft/4.1 m (hotel)  
Number of parking spaces 200 parking spaces integrated within an adjoining building  
Principal structural materials Reinforced concrete  
Other materials Architectural precast concrete cladding, limestone, and granite  
Cost US\$94.655 M

Location Chicago, Illinois, USA  
Completion date 1976  
Architect Loebb Schlossman, Bennett & Dart (now Loebb Schlossman & Hackl); C.F. Murphy Associates  
Consultant architect for shopping mall Warren Platner Associates  
Developer JMB/Urban Investment & Development Company

Structural engineer C.F. Murphy Associates  
Services engineer C.F. Murphy Associates  
Contractor Island Robbins Construction, Inc.  
Height 859 ft/262 m  
Above-ground stories 74  
Basements 4  
Above-ground useable levels 73  
Use Mixed: Office, retail, hotel, residential, entertainment  
Site area 113,936 sq ft/10,585 sq m  
Area of above-ground building 3,100,000 sq ft/287,990 sq m  
Basic planning module 30 x 30 ft/9.1 x 9.1 m  
Number of parking spaces 640  
Principal structural materials Concrete, marble cladding

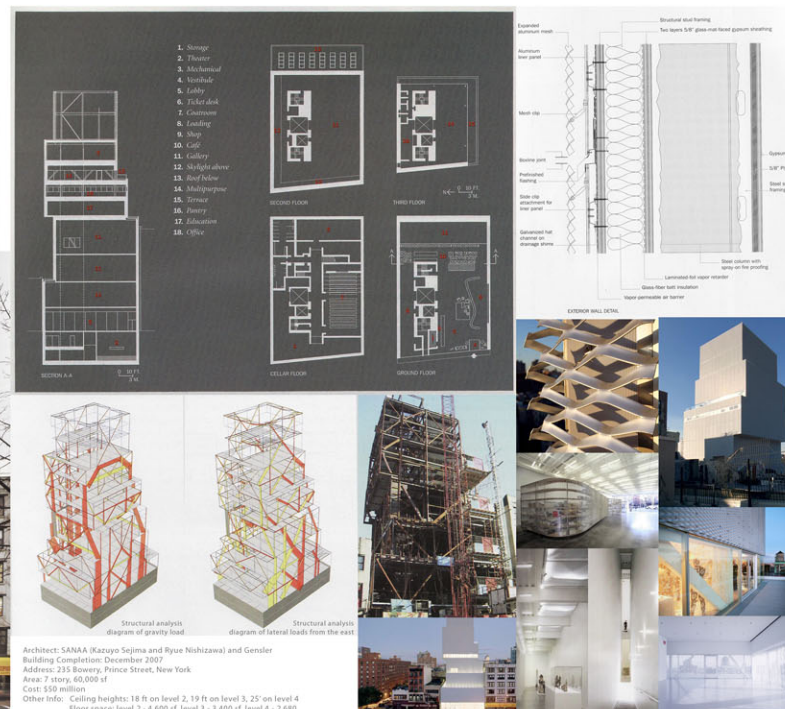
## PRECEDENT INDIA TOWER MUMBAI, INDIA

Architect FF Wolfe Architects  
Location South Mumbai  
User Park Hyatt Hotel  
Sustainable features Rainwater harvesting, green materials, US LEED Gold rating  
Height: 68 Story, 301 meter



## PRECEDENT NEW MUSEUM OF CONTEMPORARY ART NEW YORK

Architect SANA A (Kazuyo Sejima and Ryue Nishizawa) and Gensler  
Building Completion: December 2007  
Address: 238 Bway, Prince Street, New York  
Area: 7 story, 65,000 sf  
Cost: \$10 million  
Other info: Ceiling heights: 18 ft on level 2, 19 ft on level 3, 25 ft on level 4  
Floor space level 2 - 4,600 sf, level 3 - 3,400 sf, level 4 - 2,680



Case studies and precedents are carefully selected as references and guidance for this master's project. Programmatic precedents are taken from mixed-use buildings in Chicago (such as the Trump Tower, Park Tower, Water Tower Place, Waterview Tower, Softel Hotel), in Hong Kong (Highcliff Tower), in China (Jin Mao Tower), and in other countries to formulate the ratio for the mixed-use programmatic function within the building. A number of other precedents are also chosen for the tower geometry precedents, structural precedents, building skin precedents, and urban landscape precedents.

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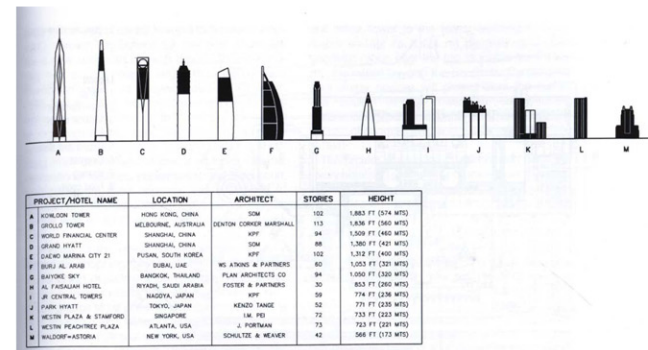


Figure: High-rise mixed-use development comparison, hotel components are highlighted in black on the diagrams. (Rutes, Walter A., et al., 2001)

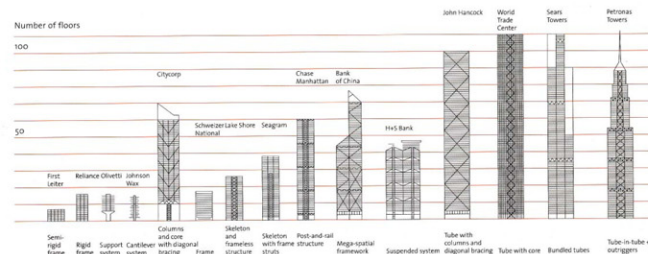


Figure: Matrix: load-bearing structures of towers (Eisele, Johann & Kloft, Ellen, 2003)

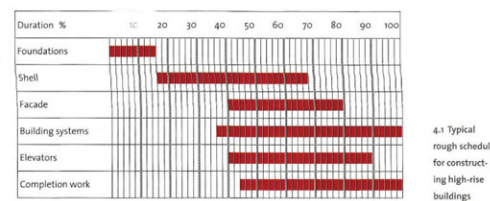


Table 4.2 Comparison of selected high-rise buildings: construction periods and time required to complete the shell of a standard floor

Property	Height	Use	Completion	Construction time	Rough work per standard floor
Business Research Center, Warsaw, Poland	104 m	Office	2000	2 years	5 working days
Taunustor Japan Center, Frankfurt, Germany	114 m	Office	1996	3 years	4 working days
World Port Center, Rotterdam, the Netherlands	125 m	Office	2001	3 years	5 working days
Galileo, Frankfurt, Germany	136 m	Office	2003	3 years	4 working days
Dresdner Bank, Frankfurt, Germany	166 m	Office	1979	5.5 years	13 working days
Titanon, Frankfurt, Germany	186 m	Office	1993	4 years	5.5 working days
Millennium Tower, Vienna, Austria	202 m	Office	1999	17 months	3 working days
Maintower, Frankfurt, Germany	198 m / 247.5 m <sup>2</sup>	Office	1999	3 years	4 working days
Messeforum, Frankfurt, Germany	256.5 m	Office	1991	37 months	3 working days
Park Tower, Chicago, USA	257 m	Hotel/residential	2000	3 years	3 working days
Trump World Tower, New York, USA	269 m	Residential	2001	3 years	5 working days
Commerzbank, Frankfurt, Germany	258.7 m / 298.5 m <sup>2</sup>	Office	1997	3 years	3 working days
Petronas Towers, Kuala Lumpur, Malaysia	452 m	Office	1998	5 years	5 working days

Figure: Table comparison of selected high-rise buildings: construction periods and time required to complete the shell of a standard floor (Eisele, Johann & Kloft, Ellen, 2003)

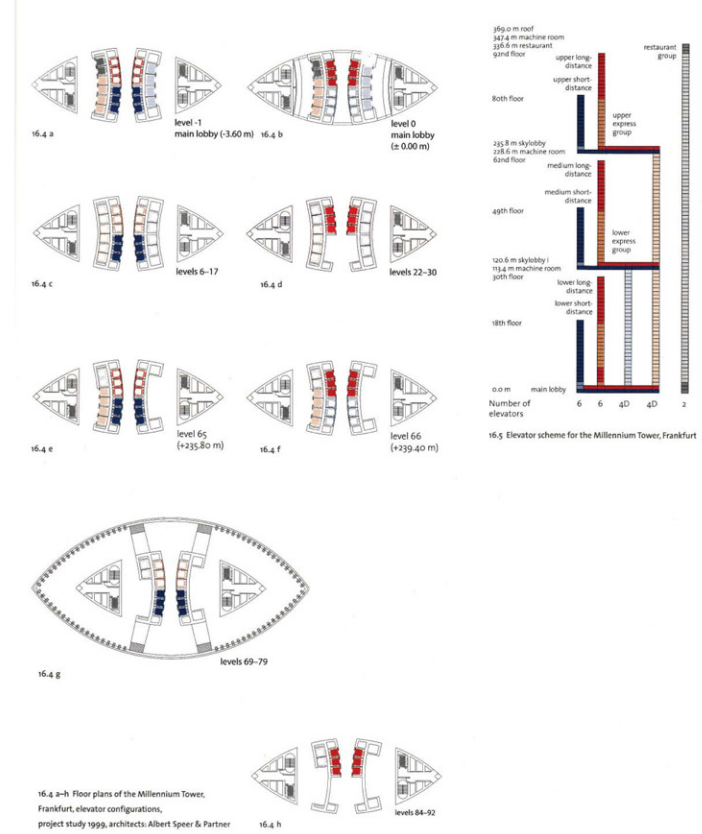


Figure: Elevator study in high-rise: floor plans of the Millennium Tower, Frankfurt, elevator configurations, project study 1999, architects: Albert Speer & Partner (Eisele, Johann & Kloft, Ellen, 2003)

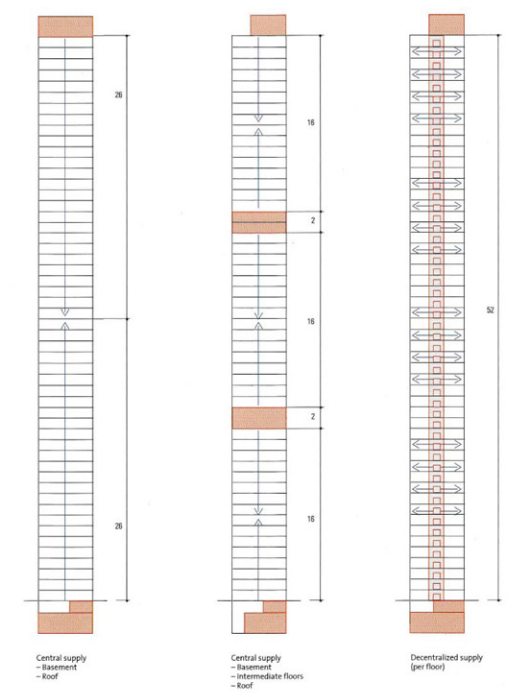
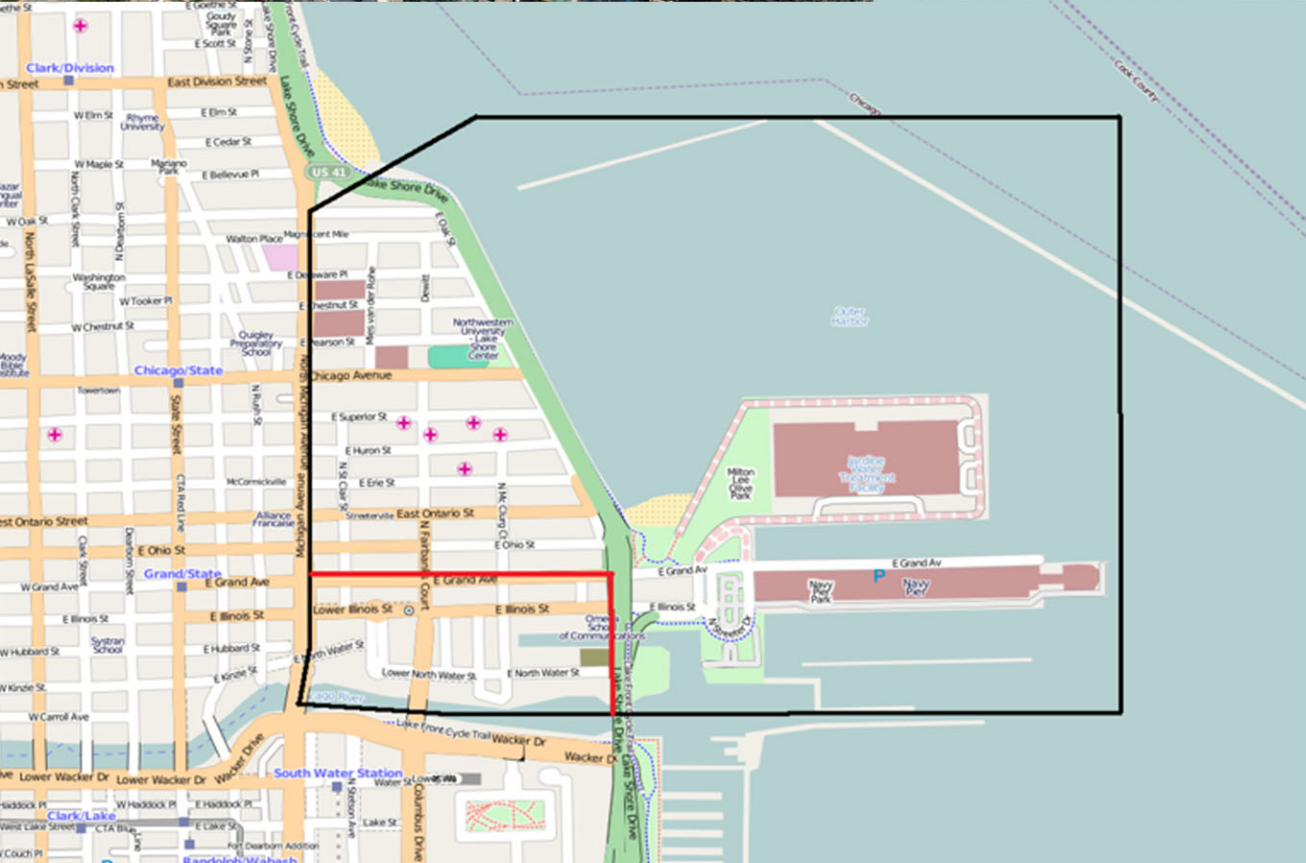


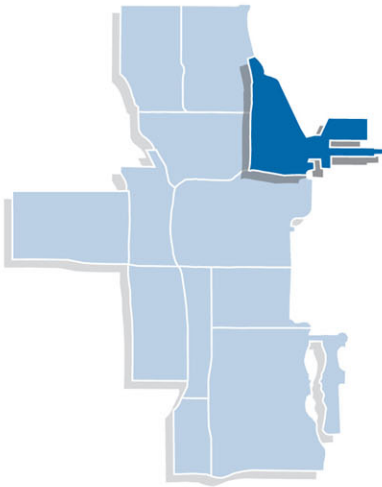
Figure: Diagrammatic sections for possible equipment room locations (Eisele, Johann & Kloft, Ellen, 2003)



# [ STREETERVILLE ]

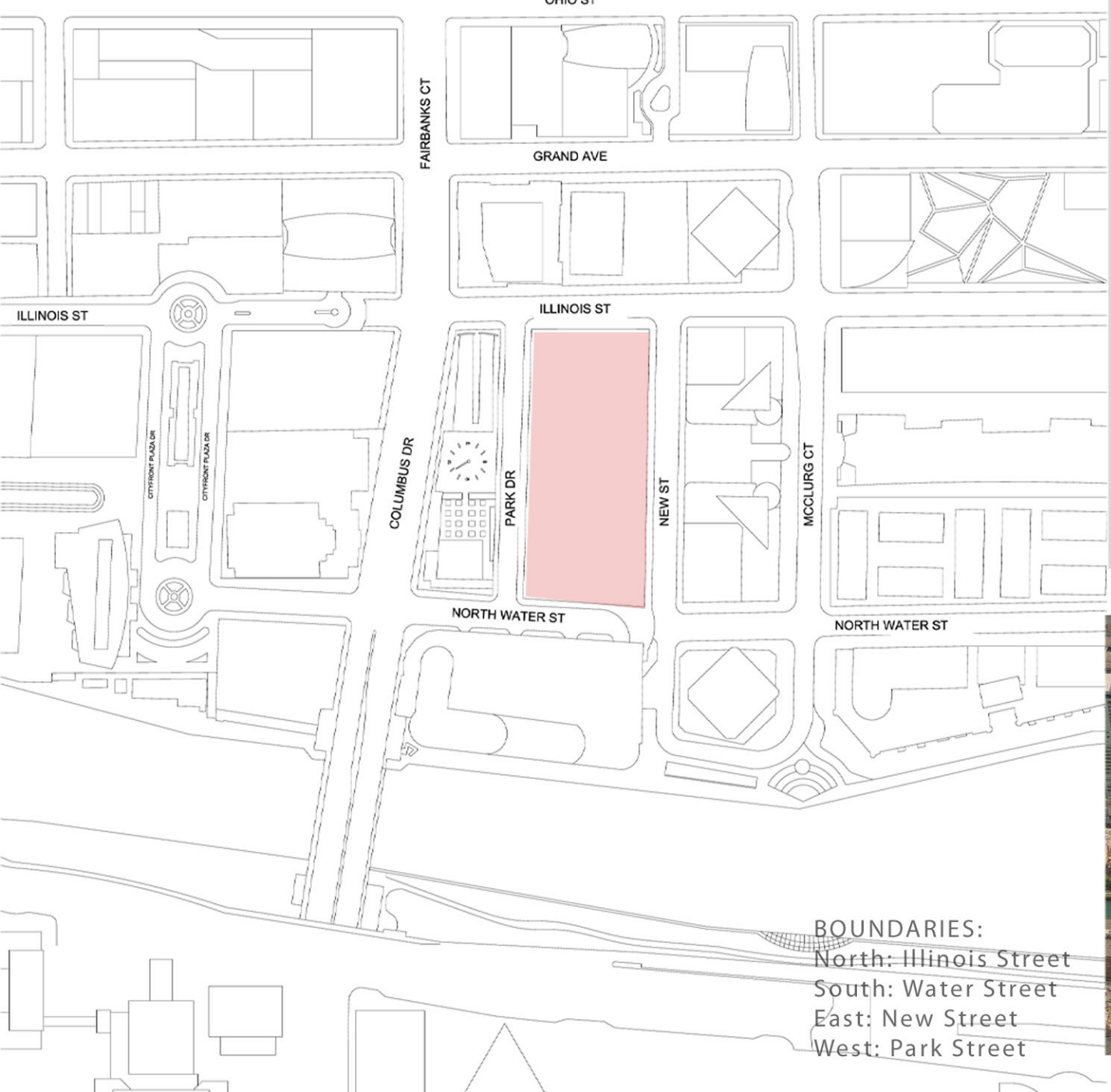


**Streeterville** is a neighborhood in the Near North Side community area of Chicago, Illinois, United States, north of the Chicago River in Cook County. It is bounded by the river on the south, the Magnificent Mile portion of Michigan Avenue on the west, and Lake Michigan on the north and east, according to most sources, although the City of Chicago only recognizes a small portion of this region as Streeterville. Thus, it can be described as the Magnificent Mile plus all land east of it.



The neighborhood contains a combination of hotels, restaurants, professional office centers, residential high rises, universities, medical facilities, and cultural venues. The area has undergone increased development in the early 21st century as numerous empty lots in Streeterville have been converted into commercial and residential properties, especially in the southern part of the neighborhood. The neighborhood had earlier experienced booms following World War I and World War II.

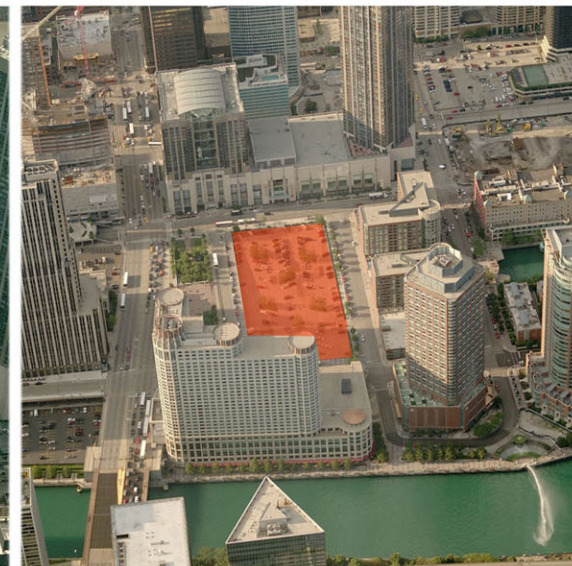
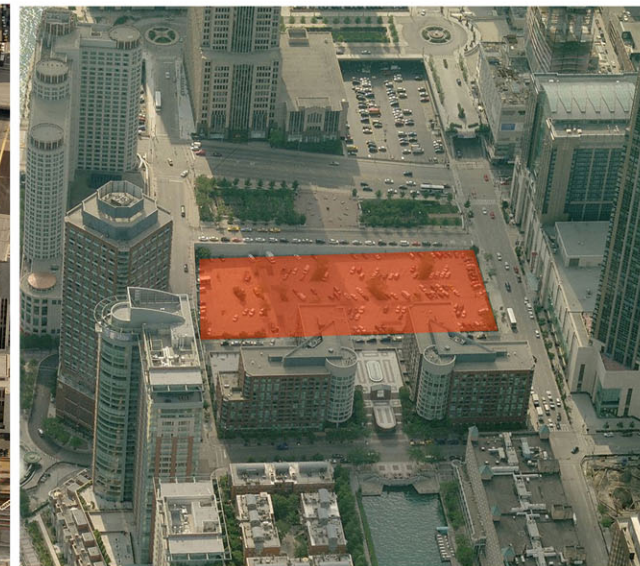
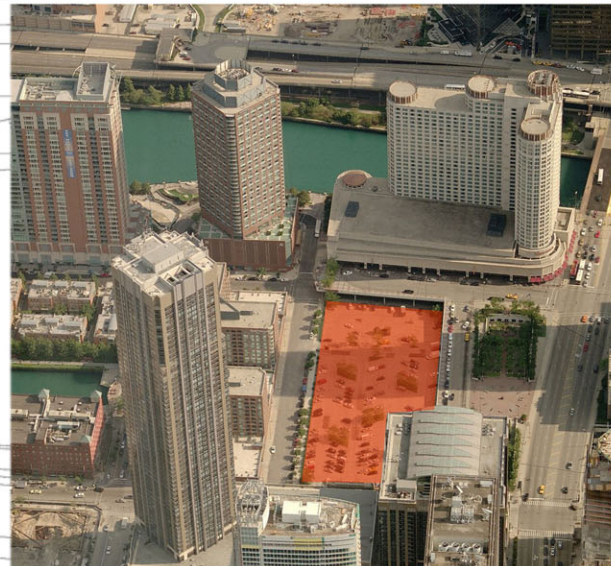
# SITE LOCATION



## EXISTING CONDITION

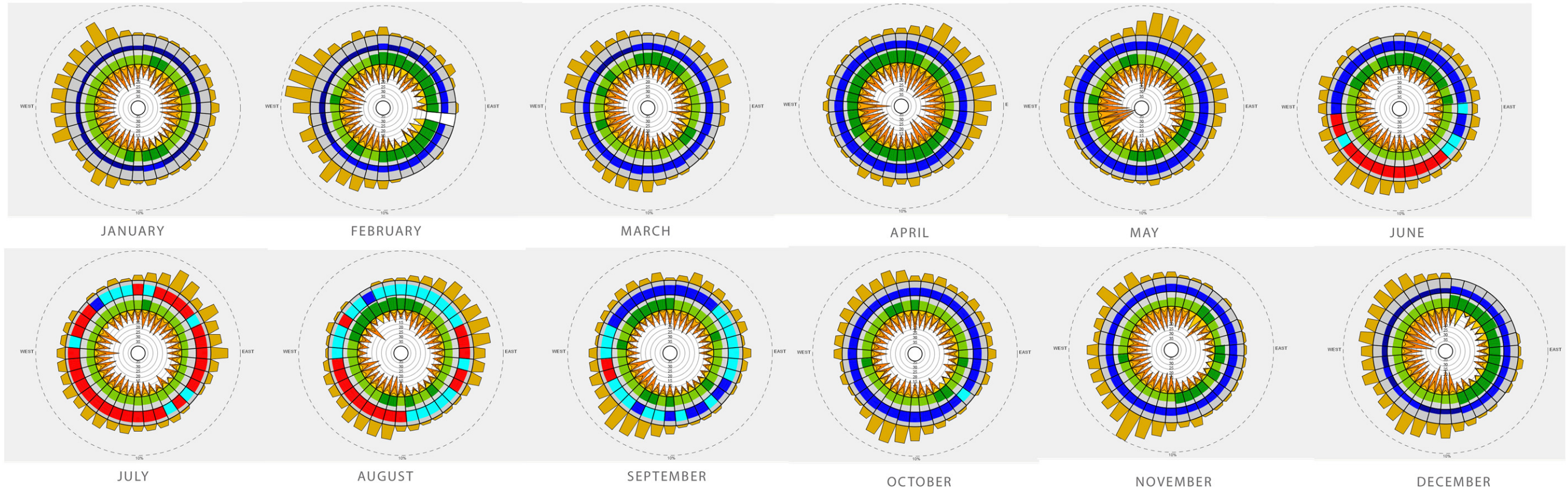
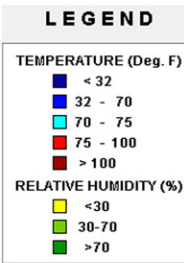
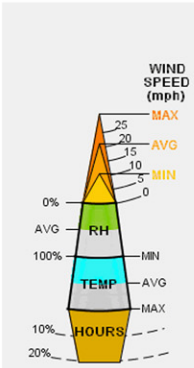


## BIRD'S EYE VIEW





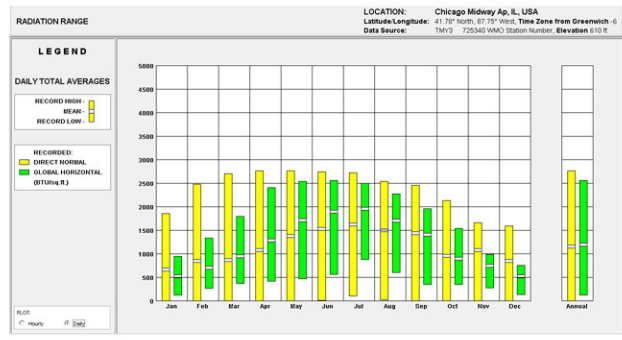
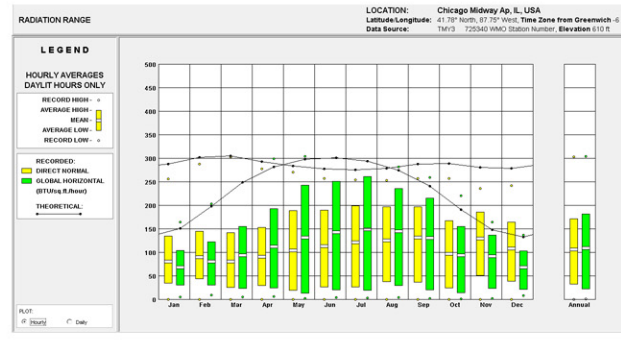
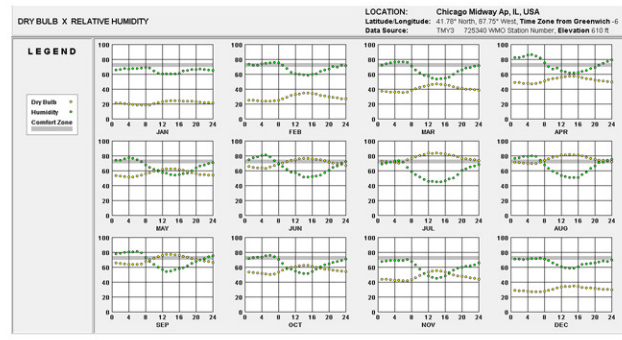
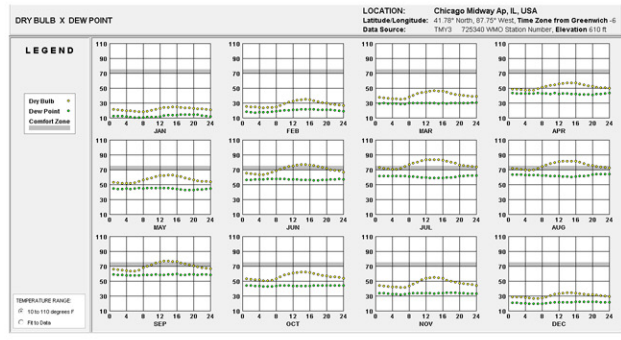
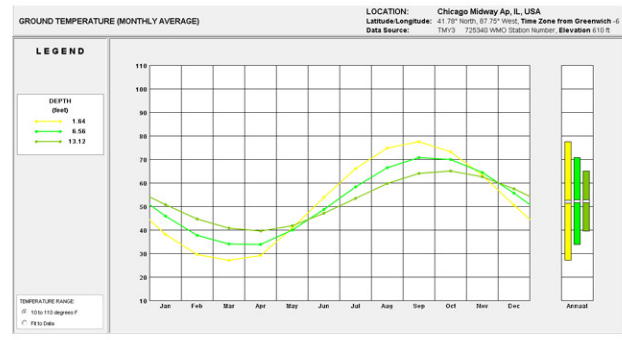
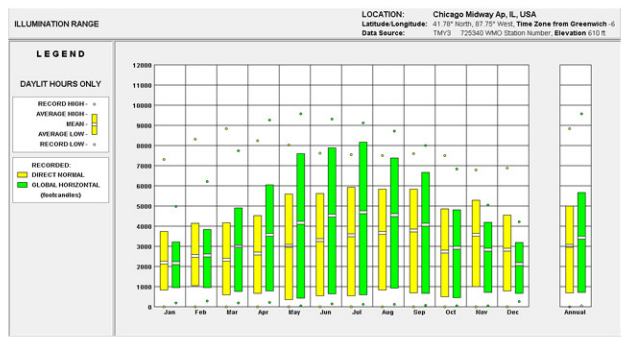
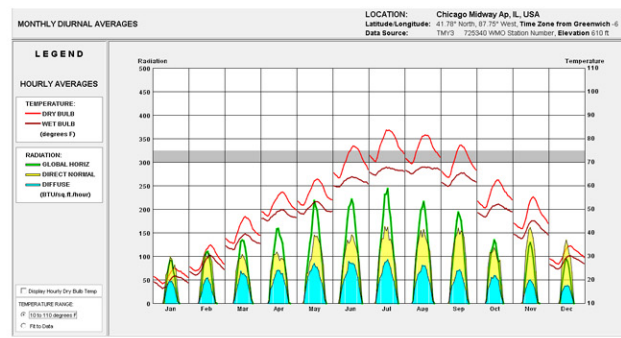
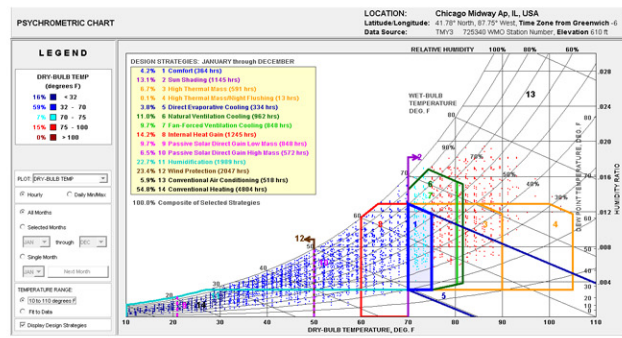
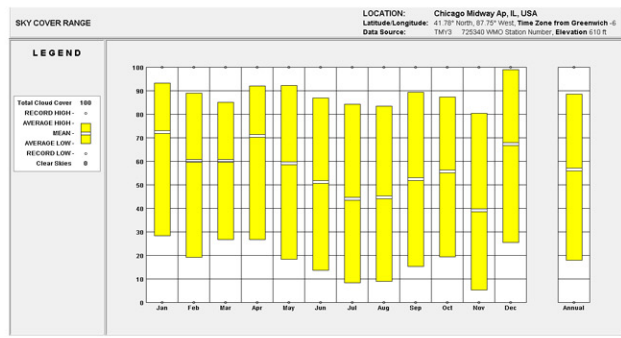
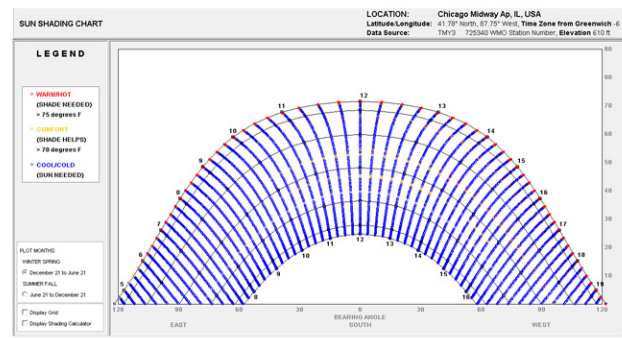
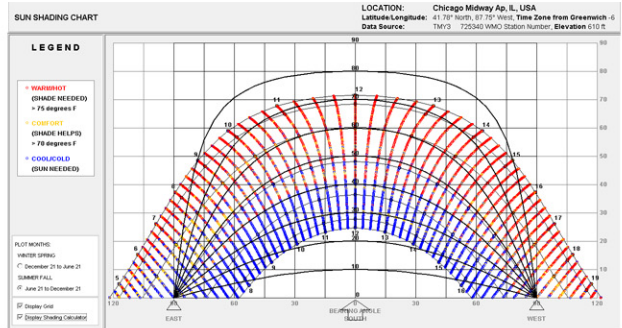
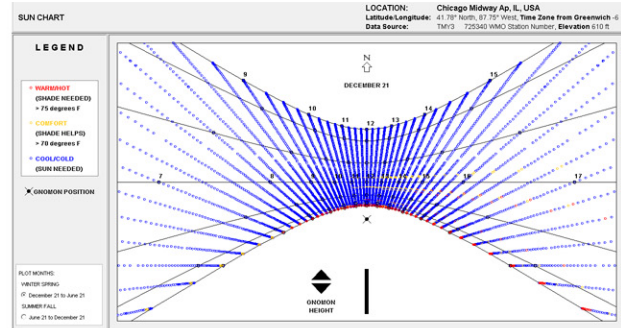
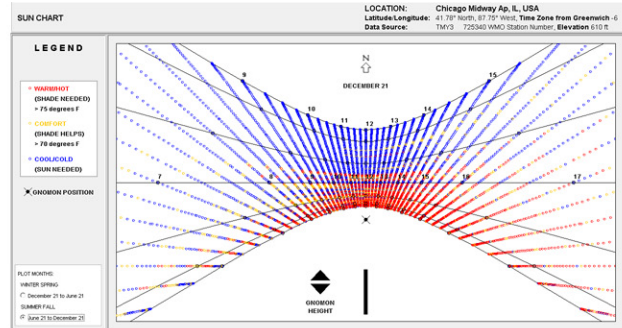
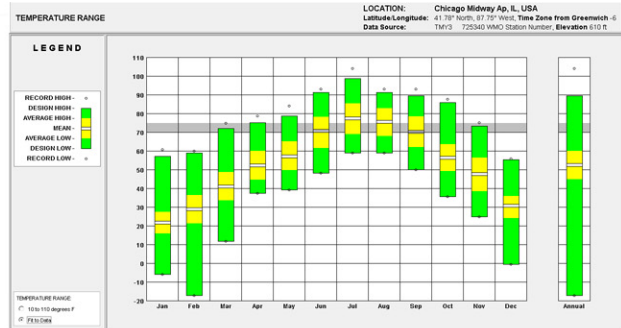
WIND WHEEL



**WEATHER DATA SUMMARY**

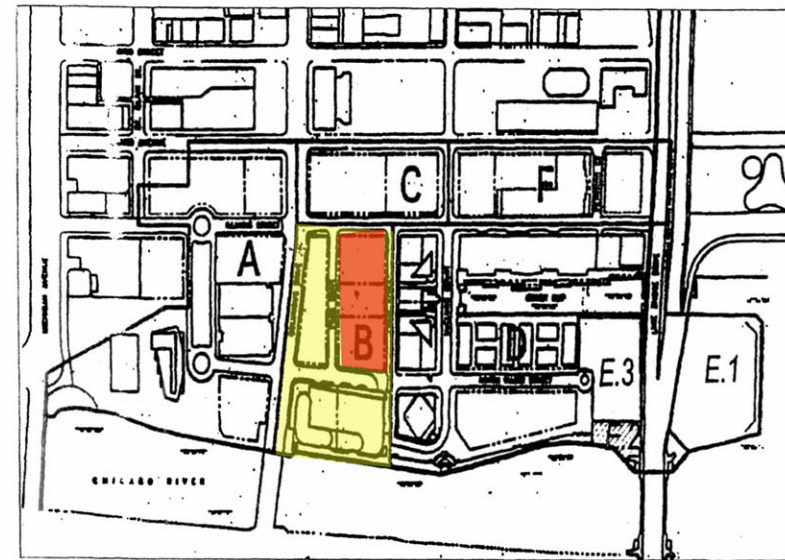
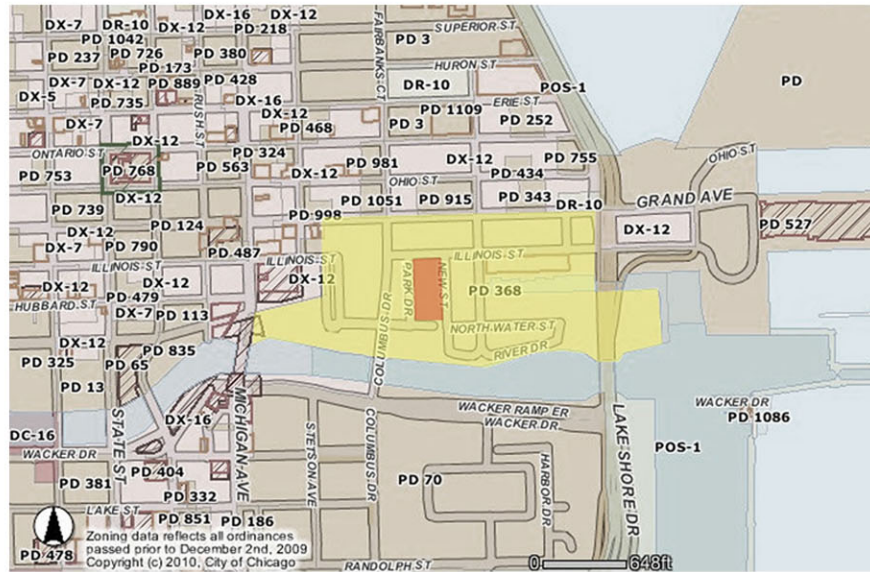
LOCATION: Chicago Midway Ap. IL, USA  
 Latitude/Longitude: 41.78° North, 87.75° West, Time Zone from Greenwich -6  
 Data Source: TMY3 725340 WMO Station Number, Elevation 610 ft

MONTHLY MEANS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Global Normal Radiation (Avg Hourly)	66	80	94	112	131	143	148	146	130	96	59	49	96.8
Global Radiation (Avg Hourly)	29	36	42	52	62	67	67	62	48	29	16	20	50.8
Global Normal Radiation (Clear Hours)	163	202	248	288	304	308	308	288	208	108	58	37	184.8
Direct Normal Radiation (Avg Hourly)	206	267	302	278	275	257	254	252	207	127	58	242	242
Diffuse Radiation (Avg Hourly)	77	108	109	103	107	104	102	104	110	97	80	83	101.8
Global Normal Radiation (Avg Daily Total)	522	708	801	1280	1715	1887	1884	1703	1403	887	442	321	828.8
Global Normal Radiation (Avg Daily Total)	469	646	686	1079	1572	1525	1524	1388	1042	668	305	247	814.8
Diffuse Radiation (Avg Daily Total)	286	384	408	615	777	677	676	697	713	607	441	322	644.8
Global Normal Illumination (Avg Hourly)	2159	2538	3007	3575	4158	4333	4365	4057	4392	3833	3058	2120	3428.8
Global Normal Illumination (Avg Hourly)	2104	2520	2926	3508	3919	3959	3919	3706	3728	3289	2620	2079	3408.8
Dry Bulb Temperature (Avg Monthly)	27	29	40	52	62	67	70	71	70	60	47	35	56.8
Overhead Temperature (Avg Monthly)	12	13	20	32	42	48	51	50	42	28	17	10	35.8
Relative Humidity (Avg Monthly)	65	67	62	52	45	44	44	45	50	60	74	82	56.8
Wind Speed (Avg Monthly)	22	22	18	12	10	10	9	9	9	11	14	20	16.8
Wind Direction (Avg Monthly)	112	112	112	112	112	112	112	112	112	112	112	112	112
Snow Depth (Avg Monthly)	1	1	1	1	1	1	1	1	1	1	1	1	1
Ground Temperature (Avg Monthly of 3 Depths)	44	36	33	33	40	49	58	66	70	69	63	54	54.8



# PD 368 ZONING Residential-Business Planned Development Number 368

ZONING: PD 368



**PD 368 Zoning** - The site's area is zoned for high-rise development as commercial, residential, and hotel by the zoning department. Three main development guidelines are set:

1. maintain density of pedestrian traffic at street level
2. create retail
3. integrate the building with planned open space

Area: 1,494,256 sq ft (34.3 acres) of real property as shown  
Exclusive of public rights-of-way and dedicated public open space

Subareas within PD368 are determined for the purpose of establishing use and density controls within the development plan. Uses permitted vary in general conformity with the Permitted and Special Uses of the DX-12 and DX-16, Downtown Mixed-Use District classification depending on the designated subareas.

## The Proposed Site: Sub Area B: Parcel 7, 7A, 8

### Subarea B information:

(includes the site and Sheraton Hotel and Towers)  
 Net site area: 183,449 sq ft (4.21 acres)  
 Max retail area: 40,000 sq ft  
 Max commercial area: 2,482,000 sq ft  
 Max hotel rooms: 2,000  
 Max dwelling units: 400  
 Maximum FAR: 13.53  
 (assumes floor area allocated to existing Sheraton Hotel at 860,379 sq ft and future development parcels P7, P7A, P8 at 1,621,290 sq ft).

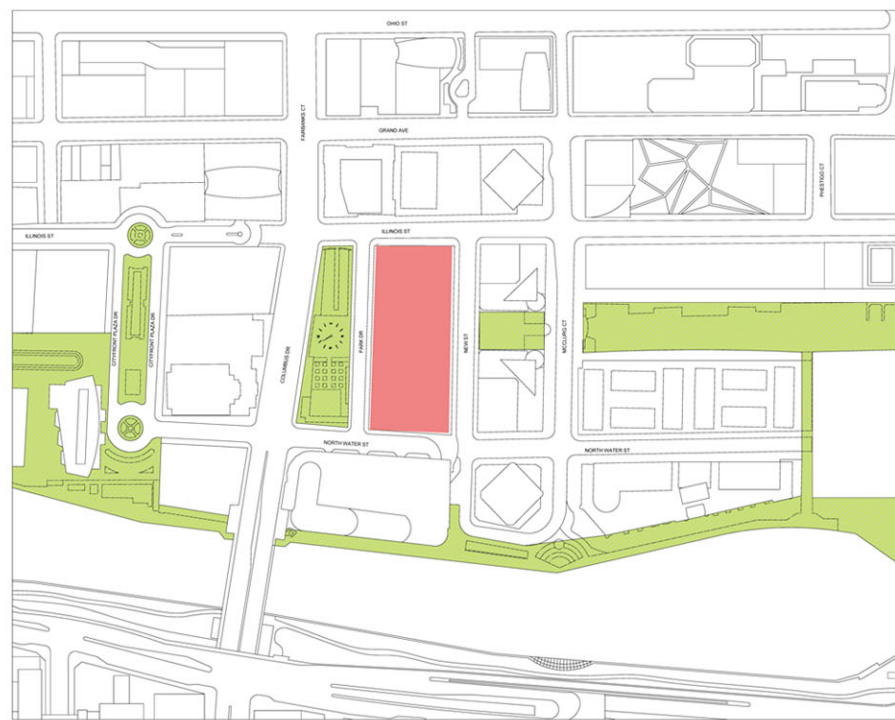
### Off Street Parking:

Business uses:	1:5,000 sq. ft Min
Hotel uses:	1:4 rooms
Residential uses:	55% d.u.
Non-accessory parking:	200 spaces, max 500 spaces

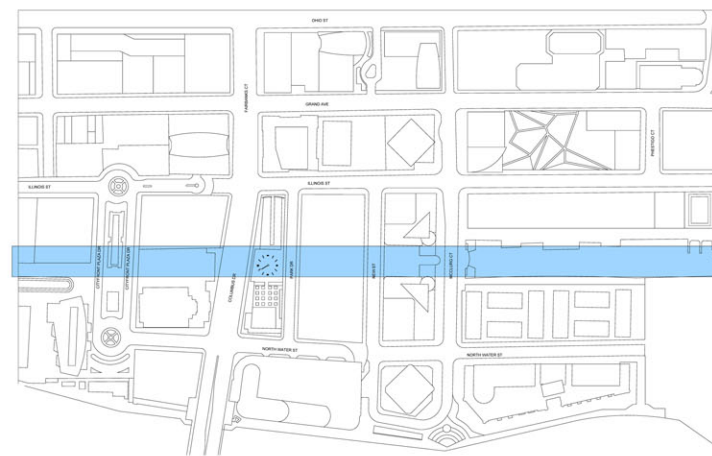
### Off Street Loading: (Per DX-12 Requirements)

Min Peripheral Setbacks: Sufficient to allow for street trees and pedestrian walkways (min 12'-6" from building to curb face)  
 Min Upper Level Setbacks: 40' from Lake Shore Drive at level of Upper Lake Shore Drive

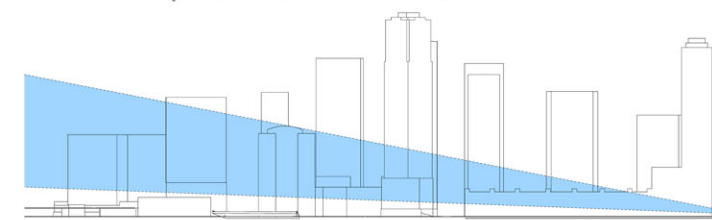
For purposes of exchange of uses: a hotel room = 0.5 dwelling units. Ballrooms, meeting rooms exhibition space, restaurant facilities, and hotel-associated retail shall be deemed "accessory hotel uses" and shall be charged against commercial uses. Accessory hotel uses on Parcels P7, P7A, and P8 combined shall not exceed 50,000 sq ft.



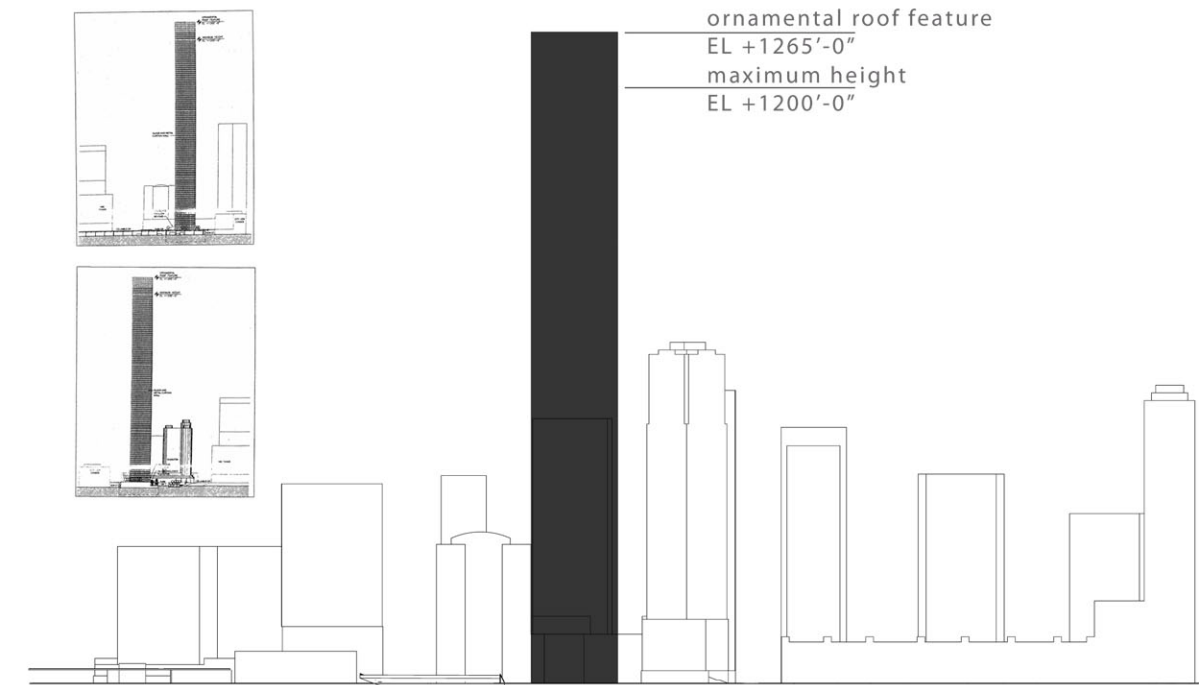
Existing and Planned Open Spaces



Site plan indication 100' view corridor



Site section through view corridor



Maximum Building Height

## HOTEL PROGRAM

1.00 HOTEL						
1.01 PUBLIC AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Lobby	1	10,000	10,000	12,500	-	Incl. waiting area and reception
2 Front Desk Office	1	1,000	1,000	1,250	-	
3 Kiosks/Retail	1	2,000	2,000	2,500	-	
4 Coffeeshop	1	2,000	2,000	2,500	40	
5 Bar Area	1	3,000	3,000	3,750	60	
6 Main Restaurant	1	6,000	6,000	7,500	100	
7 Tea room/smaller resturant	1	3,000	3,000	3,750	40	
8 Public restrooms	2	600	1,200	1,500	-	
<b>Total</b>		<b>28,200</b>	<b>28,200</b>	<b>35,250</b>		
1.02 HOTEL ROOMS						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Hotel room – standard	280	600	168,000	210,000	-	Sgl/dbl beds
2 Hotel room – deluxe	56	800	44,800	56,000	-	1 bedroom
3 Hotel room – junior suite	32	1,200	38,400	48,000	-	2 bedrooms, 2.5 bath
4 Hotel room – presidential suite	4	3,000	12,000	15,000	-	3 bedrooms, 3 bath
	372	<b>Total</b>	<b>263,200</b>	<b>329,000</b>		372 total hotel rooms in 16 floors, average 24 rooms/floor
1.03 ADMINISTRATION AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Front Office	1	1,000	1,000	1,250	-	
2 Manager's Office	1	600	600	750	-	
3 Accounting Office	1	450	450	563	-	
4 Sales and Reservations Office	1	600	600	750	-	
5 General Staff Office	1	1,000	1,000	1,250	-	
6 Staff Conference Room	1	1,200	1,200	1,500	20	
7 Staff Restrooms	2	400	800	1,000	-	
8 Employee Rest Area	1	1,000	1,000	1,250	-	
9 Employee Dining Room	1	2,000	2,000	2,500	40	
10 Kitchen	1	800	800	1,000	-	
11 Locker Room	2	600	1,200	1,500	-	
12 Training Room	1	1,000	1,000	1,250	20	
<b>Total</b>		<b>11,650</b>	<b>11,650</b>	<b>14,563</b>		
1.04 BANQUET AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Main Ballroom	1	10,000	10,000	12,500	600	Ratio 2 persons/guestroom= 2 x 316 = ~600 capacity
2 Banquet Prefunction Area	1	5,000	5,000	6,250	-	
3 Junior Ballroom	1	3,500	3,500	4,375	300	Ratio 1 person/guestroom = ~300
4 Conference Room	4	1,500	6,000	7,500	15-30	
5 Coat Room	1	750	750	938	-	
6 Rest Room	2	1,000	2,000	2,500	-	
7 Storage Area	1	7,500	7,500	9,375	-	
<b>Total</b>		<b>34,750</b>	<b>34,750</b>	<b>43,438</b>		

1.05 HOTEL SUPPORT						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Main Kitchen	1	6,500	6,500	8,125	-	
2 Chef's Office	1	500	500	625	-	
3 Room Service	1	450	450	563	-	
4 Bakery	1	1,000	1,000	1,250	-	
5 Refrigerator	1	450	450	563	-	
5 Dish Washing Room	1	1,000	1,000	1,250	-	
6 Dish Storage	1	400	400	500	-	
7 Beverage Storage	2	400	800	1,000	-	
8 Produce Storage	1	600	600	750	-	
9 Supply Closet	1	400	400	500	-	
10 Meat Locker	1	400	400	500	-	
11 Freezers	1	450	450	563	-	
12 Linen Storage	1	800	800	1,000	-	
13 Maintenance Room	1	1,500	1,500	1,875	-	
14 Furniture Storage	1	3,500	3,500	4,375	-	
15 Receiving Office	1	500	500	625	-	
16 Receiving Storage	1	2,000	2,000	2,500	-	
16 Garbage Room	1	450	450	563	-	
<b>Total</b>		<b>21,700</b>	<b>21,700</b>	<b>27,125</b>		

1.06 SPA/RECREATION AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Hot Tub Room	2	750	1,500	1,875	-	
2 Sauna	2	50	100	125	-	
3 Steam Room	2	50	100	125	-	
4 Massage Rooms	4	200	800	1,000	-	
5 Locker Rooms	2	1,000	2,000	2,500	-	
6 Fitness Center	1	2,000	2,000	2,500	-	
7 Aerobic Center	1	1,800	1,800	2,250	-	
8 Fitness Boutique	1	1,000	1,000	1,250	-	
9 Relaxation Rooms	2	400	800	1,000	-	
10 Indoor swimming pool	1	5,000	5,000	6,250	-	
<b>Total</b>		<b>15,100</b>	<b>15,100</b>	<b>18,875</b>		

1.07 Hotel Amenities						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Business center	2	600	1,200	1,500	-	
2 Meeting/conference room	4	800	3,200	4,000	10	
3 Outdoor terrace	1	5,000	5,000	6,250	-	
4 Children Day Care	1	1,000	1,000	1,250	-	
<b>Total</b>		<b>10,400</b>	<b>10,400</b>	<b>13,000</b>		

**NET AREA TOTAL** 385,000  
**GROSS AREA ESTIMATE (1.25 X NET AREA)** 481,250

## RESIDENTIAL, RETAIL &amp; BUILDING SUPPORT PROGRAM

2.00 RESIDENTIAL						
2.01 PUBLIC AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Lobby	1	4,000	4,000	5,000	-	
2 Mail Box	1	200	200	250	-	
3 Security Desk Office	1	400	400	500	-	
4 Management Office	1	600	600	750	-	
5 Grocery Store	1	2,000	2,000	2,500	-	
6 Flower Shop	1	1,200	1,200	1,500	-	
7 Bakery	1	1,200	1,200	1,500	-	
8 Dry Cleaning	1	1,200	1,200	1,500	-	
		<b>Total</b>	<b>10,800</b>	<b>13,500</b>		
2.02 RECREATION AREA						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Club House	1	1,000	1,000	1,250	30	
2 Fitness Center	1	2,000	2,000	2,500	-	
3 Locker Room	2	1,000	2,000	2,500	-	
4 Indoor Pool	1	5,000	5,000	6,250	-	
		<b>Total</b>	<b>10,000</b>	<b>12,500</b>		
2.03 RESIDENTIAL AMENITIES						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Business center	1	600	600	750	-	
2 Meeting/conference room	2	800	1,600	2,000	20	
3 Outdoor terrace	1	3,000	3,000	3,750	-	
4 Children Day Care	1	1,000	1,000	1,250	-	
		<b>Total</b>	<b>6,200</b>	<b>7,750</b>		
2.04 SERVICED APARTMENTS						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Studio	50	600	30,000	37,500	-	
2 1 Bedroom Unit	50	1,000	50,000	62,500	-	
3 2 Bedroom Unit	60	1,500	90,000	112,500	-	
4 3 Bedroom Unit	20	2,000	40,000	50,000	-	
	180	<b>Total</b>	<b>210,000</b>	<b>262,500</b>		180 units total in 19 floors, average 10 units/floor
2.05 LUXURY CONDOMINIUMS						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Studio	30	700	21,000	26,250	-	
2 1 Bedroom Unit	40	1,200	48,000	60,000	-	
3 2 Bedroom Unit	60	2,000	120,000	150,000	-	
4 3 Bedroom Unit	14	3,000	42,000	52,500	-	
5 Penthouse	3	15,000	45,000	56,250	-	Top 3 floors, occupies the whole floorplate
	147	<b>Total</b>	<b>276,000</b>	<b>345,000</b>		144 units total in 18 floors (not incl. penthouse), average 8 units/floor; 1 penthouse/floor
		<b>NET AREA TOTAL</b>	<b>513,000</b>			
		<b>GROSS AREA ESTIMATE (1.25 X NET AREA)</b>		<b>641,250</b>		Total Residential units = 327

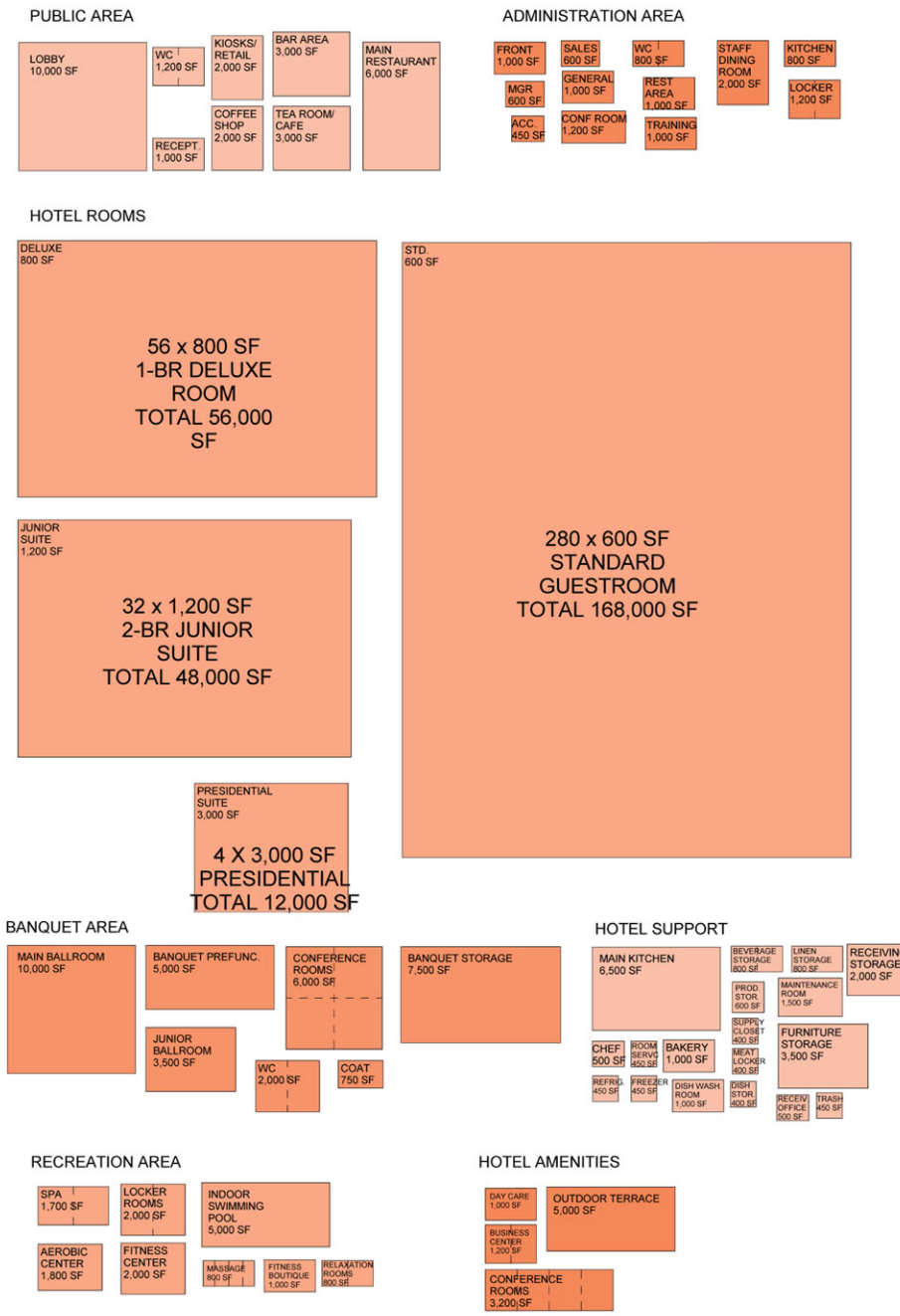
3.00 RETAIL						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Small Retail	5	3,000	15,000	18,750	-	
2 Medium Retail	5	6,000	30,000	37,500	-	
3 Large Retail (Anchor Tenant)	1	15,000	15,000	18,750	-	
4 Restaurant	2	6,000	12,000	15,000	-	
5 Public restrooms	6	1,000	6,000	7,500	-	2 restrooms/floor in all 3 retail floors
6 Loading Area	1	4,000	4,000	5,000	-	
		<b>NET AREA TOTAL</b>	<b>82,000</b>			
		<b>GROSS AREA ESTIMATE (1.25 X NET AREA)</b>		<b>102,500</b>		
4.00 BUILDING SUPPORT						
	Qty.	Net S.F.	Total Net S.F.	Total Gross S.F.	Capacity	Notes
1 Maintenance/custodial	4	1,000	4,000	5,000	-	
2 Mechanical	4	15,000	60,000	75,000	-	4 dedicated floors
3 Building Support	2	1,000	2,000	2,500	-	
4 Staff Area	4	2,000	8,000	10,000	-	
5 Parking	4	80,000	320,000	400,000	800 cars	Level B1-B4, ratio 1.25/unit (318 hotel rooms + 324 residential units = 640 units)
		<b>NET AREA TOTAL</b>	<b>394,000</b>			
		<b>GROSS AREA ESTIMATE (1.25 X NET AREA)</b>		<b>492,500</b>		

**AREA TABULATION SUMMARY**

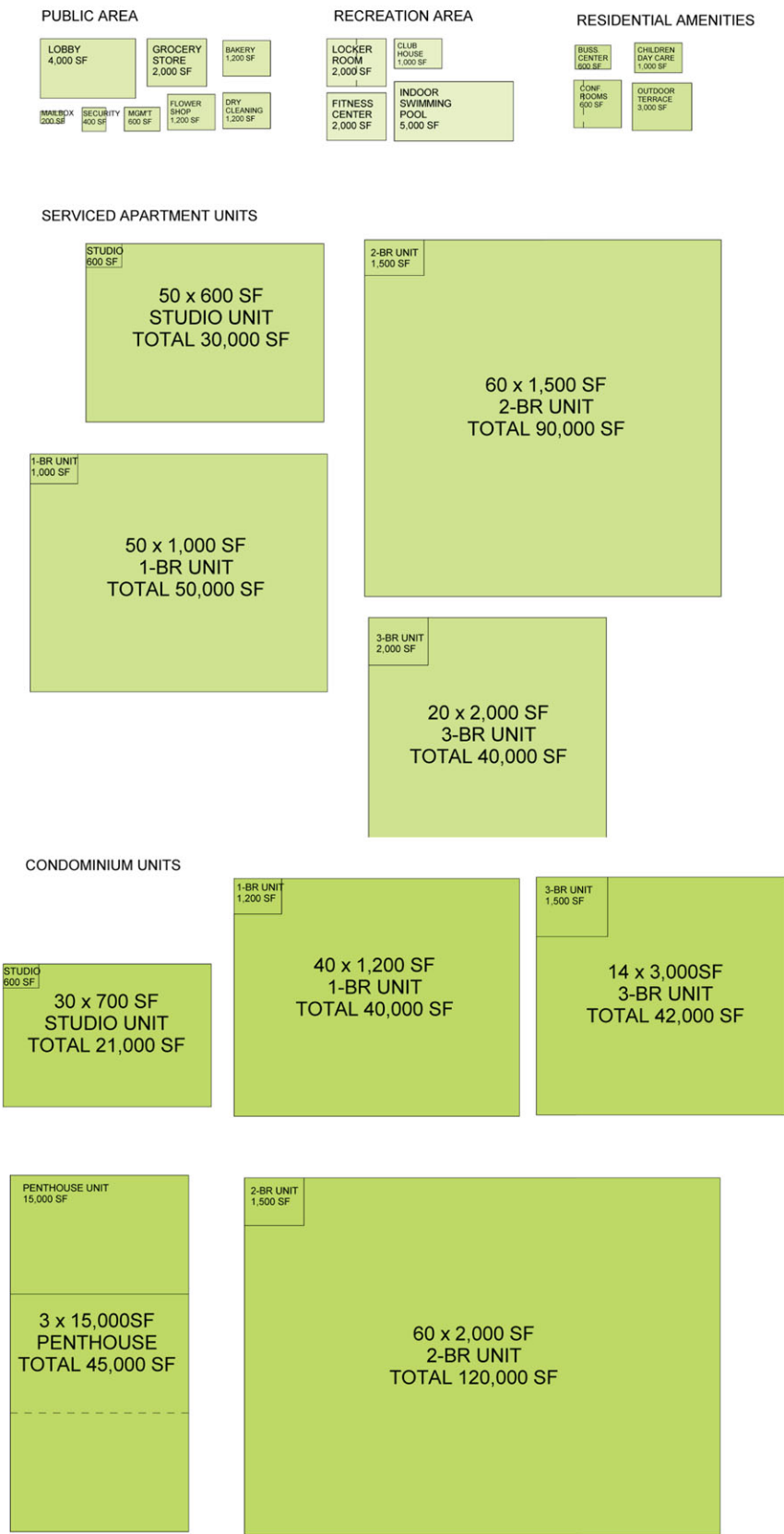
<b>NET AREA TOTAL</b>	<b>1,374,000 SQ. FT.</b>
<b>GROSS AREA ESTIMATE (1.25 X NET AREA)</b>	<b>1,717,500 SQ. FT.</b>

# GRAPHIC PROGRAM

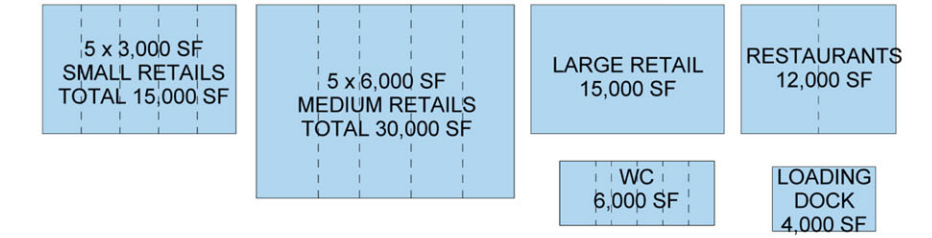
## HOTEL COMPONENT



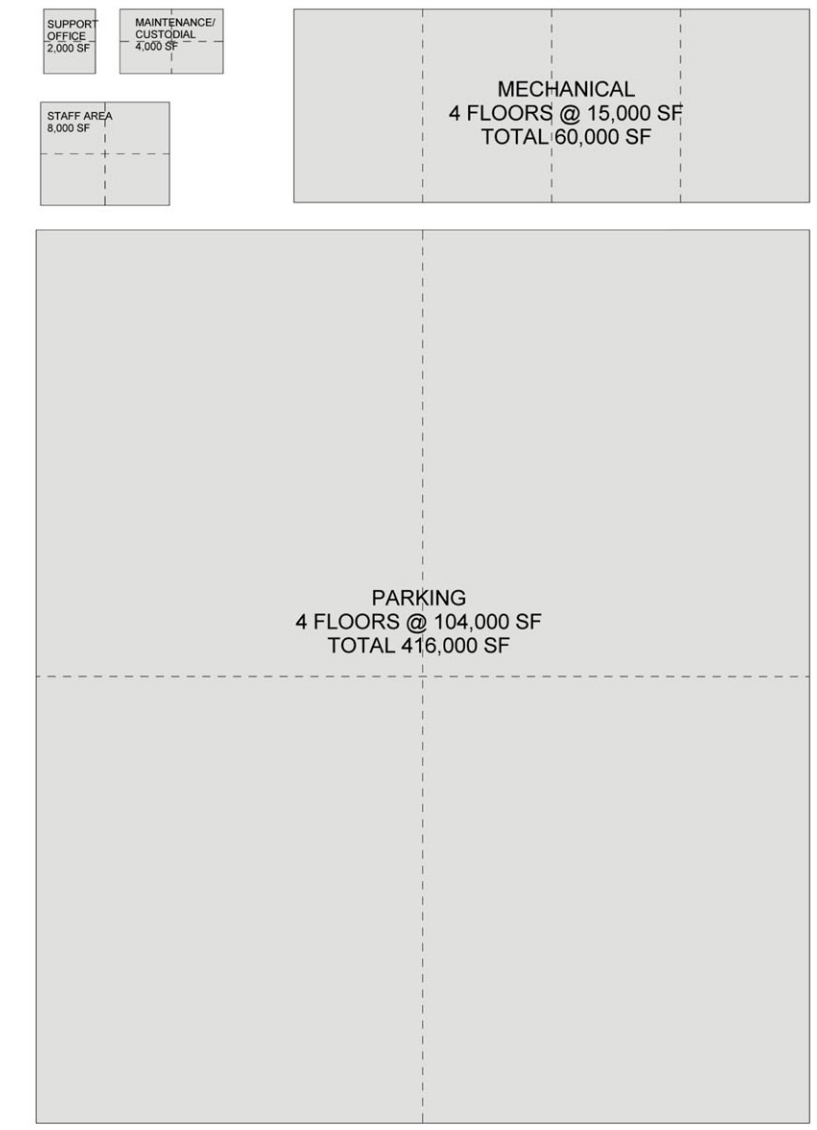
## RESIDENTIAL COMPONENT



## RETAIL COMPONENT

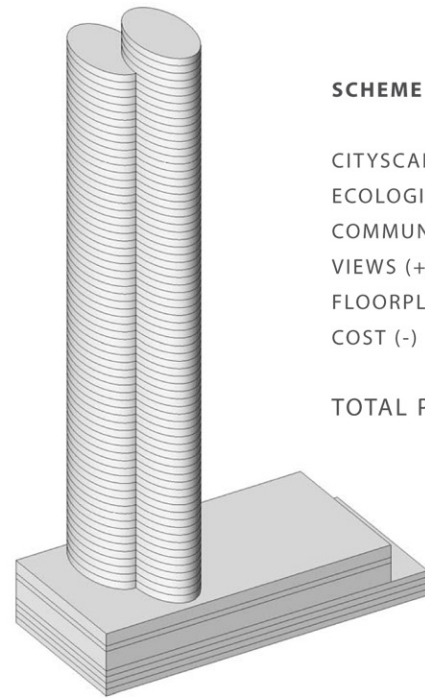


## BUILDING SUPPORT



SCHEME COMPARISON

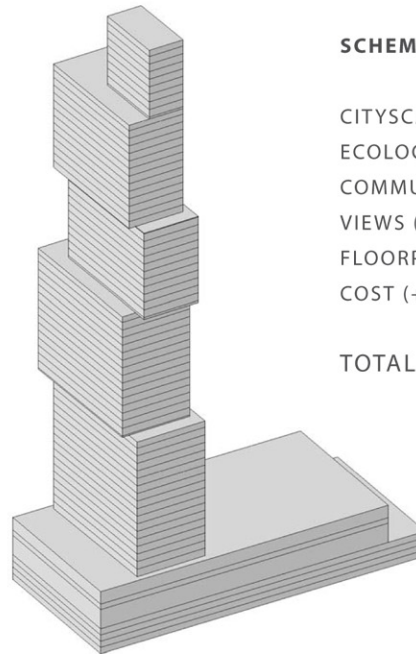
SCHEME DEVELOPMENT



SCHEME 1: INTERSECTING ELLIPSES

- CITYSCAPE (++)
- ECOLOGICAL (++)
- COMMUNITY (0)
- VIEWS (+)
- FLOORPLAN EFFICIENCY (+)
- COST (-)

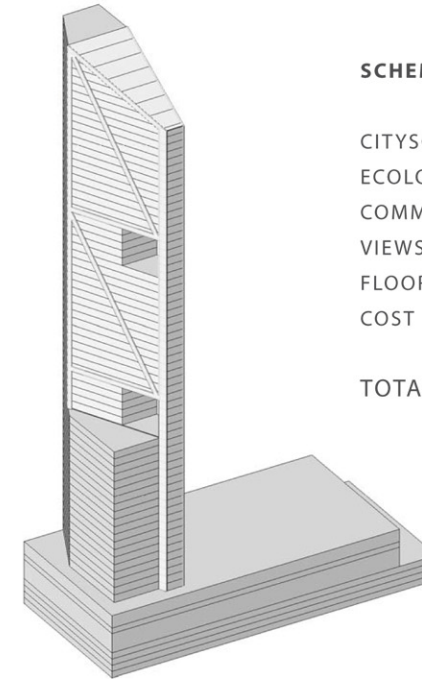
TOTAL POINTS: 5



SCHEME 2: SHIFTING MASSES

- CITYSCAPE (++)
- ECOLOGICAL (+)
- COMMUNITY (++)
- VIEWS (+)
- FLOORPLAN EFFICIENCY (++)
- COST (++)

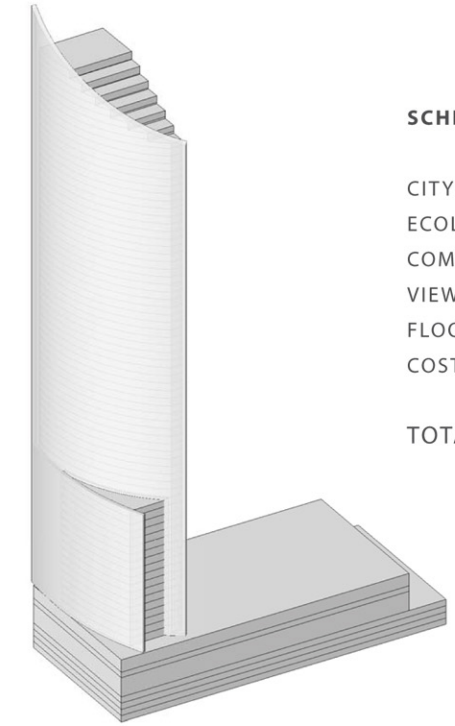
TOTAL POINTS: 10



SCHEME 3: TRAPEZOID

- CITYSCAPE (++)
- ECOLOGICAL (+)
- COMMUNITY (++)
- VIEWS (++)
- FLOORPLAN EFFICIENCY (-)
- COST (+)

TOTAL POINTS: 7



SCHEME 4: SAIL

- CITYSCAPE (+)
- ECOLOGICAL (+)
- COMMUNITY (+)
- VIEWS (+)
- FLOORPLAN EFFICIENCY (-)
- COST (-)

TOTAL POINTS: 2

DESIGN DETERMINANTS

VIEWS (+)  
 16% Lake View (East)  
 16% City View (West)  
 34% River View and City View (South)  
 34% City View and Lake View to the Far North (North)

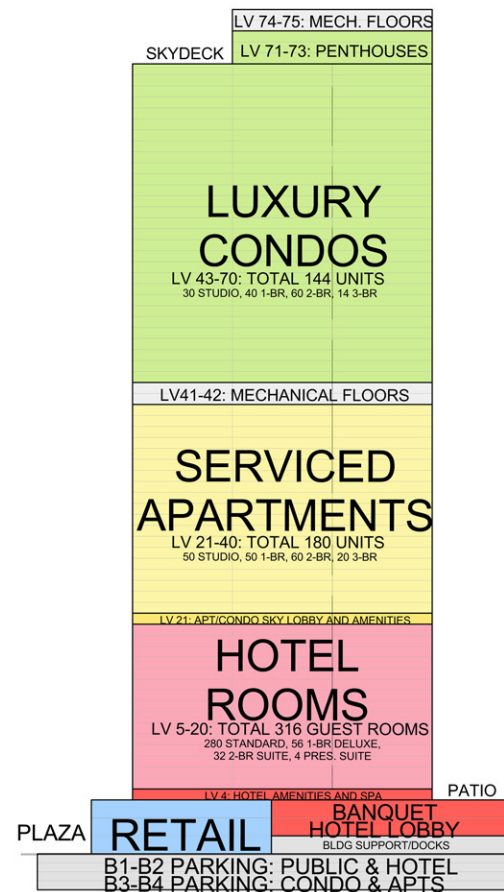
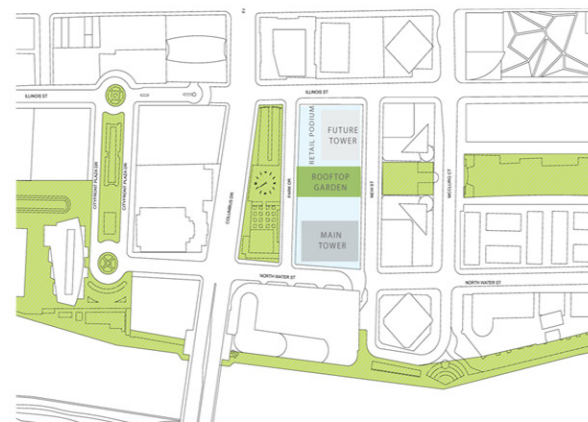
FLOOR LAYOUT EFFICIENCY (++)  
 Separated building block are suited for different program functions. Efficient in floor plan because of it's simple rectangular shape, and there are only two different floor plate sizes that are shifting by 10' to 20' yet the building appears to have five different cuboids. Previously considered alternating corridor might not be necessary.

COST (++)  
 Simple rectangular structure that shifts by 10-20 feet should be more cost efficient than a curve structure. The delicate shifting point condition (and cantilevered support portion of the building) need to be studied carefully.

CITYSCAPE (++)  
 The shifting cuboid shape is unique to Chicago, the segmented verticality can potentially be favorable to the eyes of the pedestrian from street view. The building divided flat planes to the North side can be used as an LED billboard or other interesting feature for the retail customers.

ECOLOGICAL (+)  
 Wind Force - right angled corners has less aerodynamic shape compared to curve corners, but the building can be stronger because of simple rectangular/box construction. Sun Exposure - the shape allows to minimize exposure to the extreme sun exposure of East and West. (33% East and West facing, 67% North and South facing).

SENSE OF COMMUNITY (++)  
 Rooftops created by shifting the building blocks can be used for community functions. There can potentially be 5 or more rooftops that can serve different community functions or commercial restaurants. 10 to 20 feet of shifts provides a nice space for outdoor dining area in summer seasons.



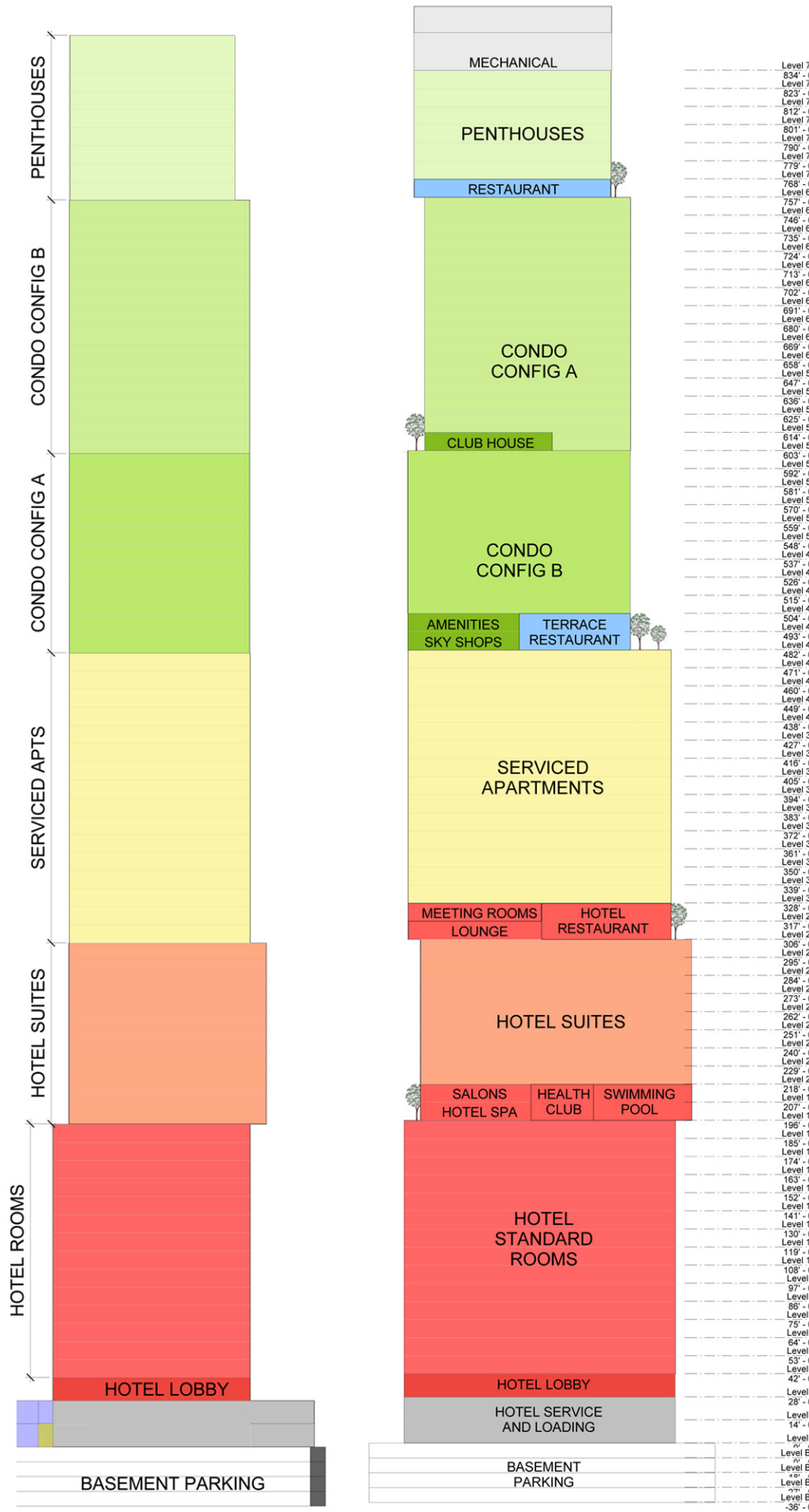
Ideal Vertical Stacking Diagram for Different Mixed Use Functions

Concept Development

The geometry of the tower is explored through 6 design determinants: view, floor layout efficiency, cost, cityscape, ecological, and the sense of community. Based on a careful analysis, the shifting masses (scheme 2) provides the most potential scheme for the mixed-use programmatic function (vertical stacking diagram on the far left) and the site location (on the left).

Shifting Masses Concept

The concept of the project is to extend the urban vitality of the street in the neighborhood onto the building form as expressed by disparate functions and shifting massings.



**PENTHOUSE PROGRAM**  
 Floors: 70-75 (6 floors)  
 Gross Area: 33,600 SF  
 Net Area: 25,200 SF NET - 75% Efficiency  
 Typical floor: 1 penthouse - 5,600 SF

**Mass 6 (8 floors - 5,600 SF)**  
 Total Floor Area: 44,800 SF

**CONDOMINIUM CONFIG A PROGRAM**  
 Floors: 55-68 (13 floors)  
 Gross Area: 190,000 SF  
 Net Area: 142,500 SF NET - 75% Efficiency  
 Typical floor: 0 studio (0) - 700 SF  
 1 1-bedroom (13) - 1,200 SF  
 3 2-bedroom (39) - 2,000 SF  
 1 3-bedroom (13) - 3,000 SF  
 Total required area/floor: 11,200 SF

**Mass 5 (14 floors - 13,613 SF)**  
 Total Floor Area: 190,583 SF

**CONDOMINIUM CONFIG B PROGRAM**  
 Floors: 46-54 (9 floors)  
 Gross Area: 122,500 SF  
 Net Area: 91,875 SF - 75% Efficiency  
 Typical floor: 3 studio (27) - 700 SF  
 4 1-bedroom (36) - 1,200 SF  
 3 2-bedroom (36) - 2,000 SF  
 0 3-bedroom (0)  
 Total required area/floor: 12,900 SF

**Mass 4 (11 floors - 13,613 SF)**  
 Total Floor Area: 149,744 SF

**SERVICED APARTMENTS PROGRAM**  
 Floors: 30-43 (14 floors)  
 Gross Area: 224,000 SF  
 Net Area: 168,000 SF NET - 75% Efficiency  
 Typical floor: 4 studio (56) - 600 SF  
 4 1-bedroom (56) - 1,000 SF  
 5 2-bedroom (70) - 1,500 SF  
 1 3-bedroom (14) - 2,000 SF  
 Total required area/floor: 15,900 SF

**Mass 3 (16 floors - 16,016 SF)**  
 Total Floor Area: 256,256 SF

**HOTEL PROGRAM**  
 Floors: 20-27 (8 floors)  
 Gross Area: 128,000 SF  
 Net Area: 96,000 SF NET - 75% Efficiency  
 Typical floor: 4 deluxe on lower 4 fl (28),  
 4 junior suite (32),  
 1 presidential suite on top 4 fl (4)

**Mass 2 (10 floors - 16,016)**  
 Total Floor Area: 160,160 SF

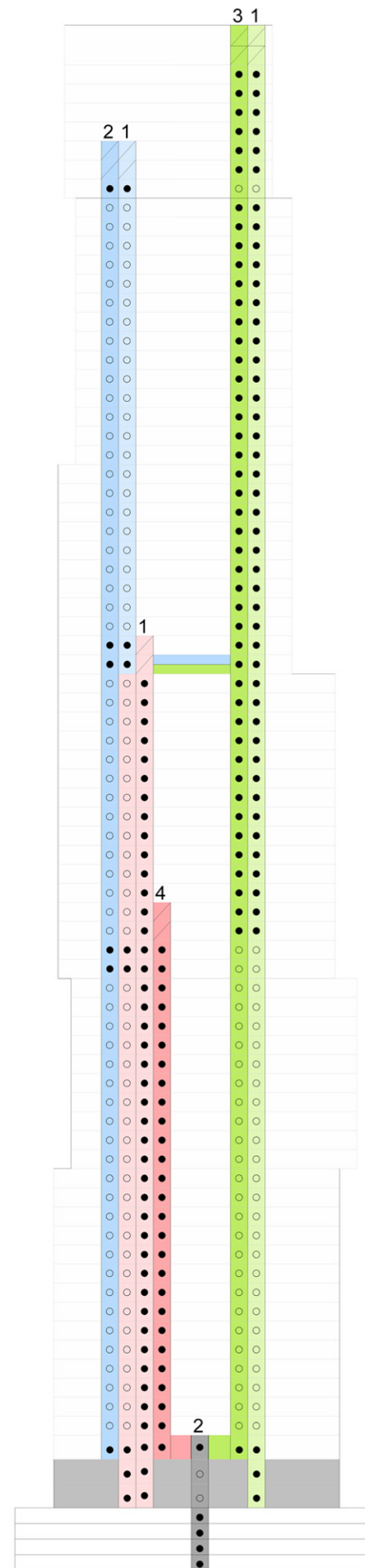
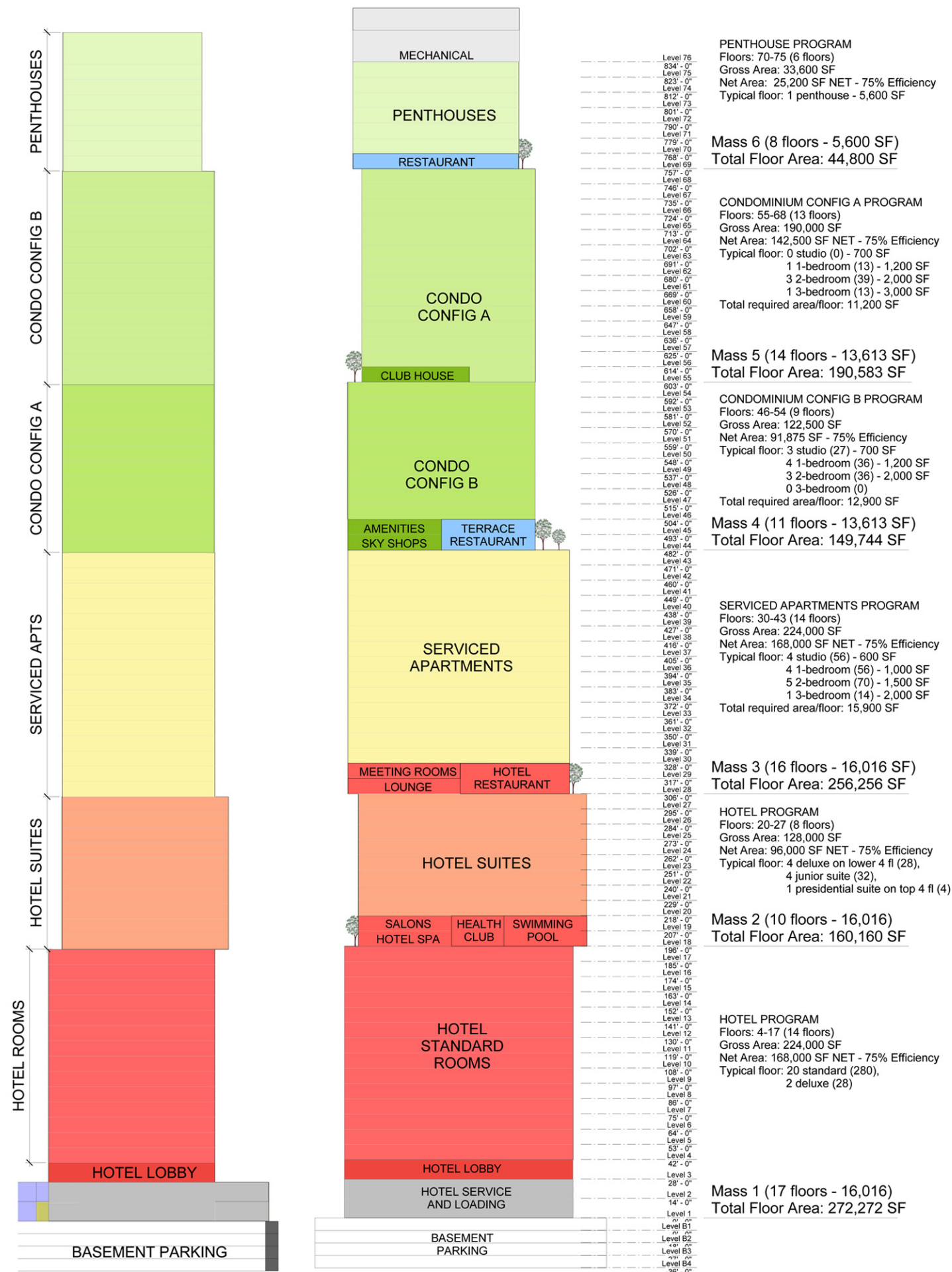
**HOTEL PROGRAM**  
 Floors: 4-17 (14 floors)  
 Gross Area: 224,000 SF  
 Net Area: 168,000 SF NET - 75% Efficiency  
 Typical floor: 20 standard (280),  
 2 deluxe (28)

**Mass 1 (17 floors - 16,016)**  
 Total Floor Area: 272,272 SF

**Shifting Masses Concept**

The concept of the project is to extend the urban vitality of the street in the neighborhood onto the building form as expressed by disparate functions and shifting massings.

PROBLEM SEEKING	PROBLEM SOLVING
<p><b>Unmet Density</b>                      The initial programming proposal does not meet the density requirement. Current proposal for the site consists of two high rises with twice as much density as what I proposed.</p>	<p><b>Increase Density</b>                      Divide the lot into two sections, the proposed tower currently designed for the semester is located on the south of the site. Another future tower is proposed on the NE of the site, on top of the proposed retail podium. The structure for the future tower is pre-constructed and incorporated in the retail podium to anticipate future development of the tower as density in the area increases.</p>
<p><b>Unfriendly Pedestrian Streetscape</b>                      Wide vehicular streets but narrow pedestrian streets.                      No storefront retails in the surrounding areas. Park and New street to the East and West of the site seems to be a 'no man's land'</p>	<p><b>Improve Pedestrian Streetscape</b>                      Create a public plaza on the north side of the site (along Illinois St), which leads to the retail podium/mall main entrance.                      A safe pedestrian cross, perhaps in the form of textured surfaces as warning devices, would be useful to connect River East Center and the retail podium (preferably on the NW corner side). The public plaza should incorporate pedestrian friendly features such as (but not limited to) trees (and planters), water features, seating area, bike racks, artistic sculptures.                      Small retail storefront should be located on Park St and New St. Park St (West side) connects Illinois St and Sheraton Hotel to the South, it is appropriate to locate Condo entrance on Park street perpendicular to Ogden Park. Hotel entrance should be located on North Water Street on the south side of the site for easy vehicular access. Small retail storefront that engages activities such as cafes should be located along Park St to revitalize this street. Small retail shops for residents such as dry cleaning, flower shops, small retail banks, and small grocery store should be located on New Street to revitalize this street. Ample street parking will also help the retail on this street.</p>
<p><b>Inadequate Public Amenities</b>                      Newly developed Streeterville area lacks public urban amenities such as parks and public spaces.                      The Ogden Park to the West of the site seems to be unwelcoming to street pedestrian to explore.</p>	<p><b>Provide Public Amenities within Site</b>                      Connect the site to the adjacent open space on the building to the east with a sky bridge accessible from retail podium rooftop.                      Rooftop portion of the podium should be publicly accessible from the lower retail spaces and also from the West of the site (direct access from Ogden Park through the site to the open space on the east side of the site)                      Secondary retail podium entrance from Park and New Street to improve pedestrian access and activity in this area and to connect the east and west side of the site.</p>
<p><b>Mixed-Use Strategy</b>                      To create a balanced mixed-use programmatic functions within a single building, it needs a proper strategy to stack them vertically and to manage the access/interconnection between programmatic functions</p>	<p><b>Balanced Mixed-Use</b>                      Residential component which include condominium, apartments, and hotel is incorporated within a single tower. A balanced ratio is based on market study and precedents. Hotel should be on the lower floors for efficiency and condominiums should be on the higher floors both for efficiency and the high property value.</p>
<p><b>Lacking Sense of Community</b>                      Traditional building tower provides amenities on the lower floor, concentrating the community activities on the lower floors.</p>	<p><b>Distributed Community Space</b>                      Since the residential units are stacked vertically, the community space should also be distributed vertically to create a sense of community within a single tower.</p>
<p><b>Tower and Podium Connection Problem</b>                      A very important issue arises on how the building tower connects to the ground floor. The challenging site that is sloped on one side of the street and double level on the south side of the street provides opportunities on how the tower touches the ground.</p>	<p><b>Utilize the site for the connection</b>                      Hotel support should be located on the south side, with loading access on the lower North Water Street (no exposure to pedestrian views). Tower + Podium + Roof Garden connection should be incorporated in the design.</p>
<p><b>Expressing the Function Problem (Tower)</b>                      The problem on how to make a building that expresses the function aesthetically pleasing and interesting to improve the value of the building and to intrigue the interest of passersby and the occupants of the surrounding building.</p>	<p><b>Function Expression Is Determined by the Function Itself (Tower)</b>                      The building concept of function expression should be determined by the function itself. The public spaces in between the different private residential units should express the change in functions within the tower.                       This can also be achieved by changing building skin or different building skin approach for each function with response to the climate and space usage. A further study of the occupant behavior of the residential component is important to determine the right approach for the building skin.                       Hotel – hotel guests come and go, high in turnover rate, least demand in terms of building skin, but high demand in service and amenities. Most likely business people who come for conference or singles/couples that are having vacation. Room will mostly be empty most of the day and used mainly in the afternoon for rest.                       Hotel Suites – Most likely the guests come in groups or families having a weekend getaway or a group of business people sharing a suite (a team of a project or group of trainees). Turnover is expected less than hotel standard rooms, since guests might stay for 2-3 days or more. High demand in service and amenities.                       Serviced Apartments – Families that demands service/minimum maintenance or out-of-town corporate professionals that stay for a short term periods. Hotel service is shared with serviced apartments with clean up service every 2 or 3 days.                       Condominiums – The occupants who bought the condominium units will have more demand on ventilation and comfort for a long period of time. The building skin can be more expressive since this space is more active and more occupied.</p>
<p><b>Expressing the Function Problem (Podium)</b>                      Retail podium imposes a difficult problem since it needs to connect harmoniously with the Tower, green roof, and the streetscape.</p>	<p><b>Function Expression Is Determined by the Function Itself (Podium)</b>                      Retail within the podium space should be divided into clusters for easy manageability, for example restaurants, food court, fashion retails, and other retails. This cluster (function) will also expressed horizontally creating interesting spaces in between clusters for circulation between retail and residential tower, also between the indoor and outdoor.</p>



**Shifting Masses Concept**

The concept of the project is to extend the urban vitality of the street in the neighborhood onto the building form as expressed by disparate functions and shifting massings.

**Vertical Circulation (Elevator Diagram)**

**Hotel Capacity**

- 1 passenger elevator every 75 rooms
- 1 passenger elevator for a 3-floor building
- 1 service elevator every 2 passenger elevators (or 1 service elevator every 200-300 rooms)

**Apartment/Condominium Capacity**

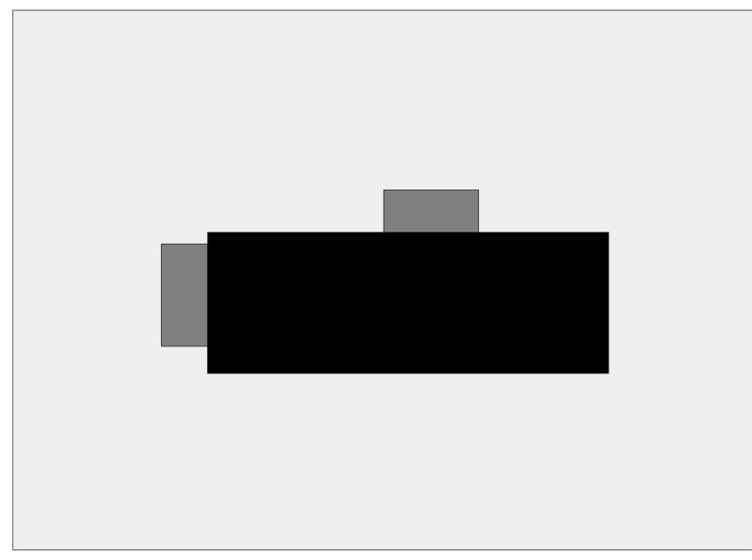
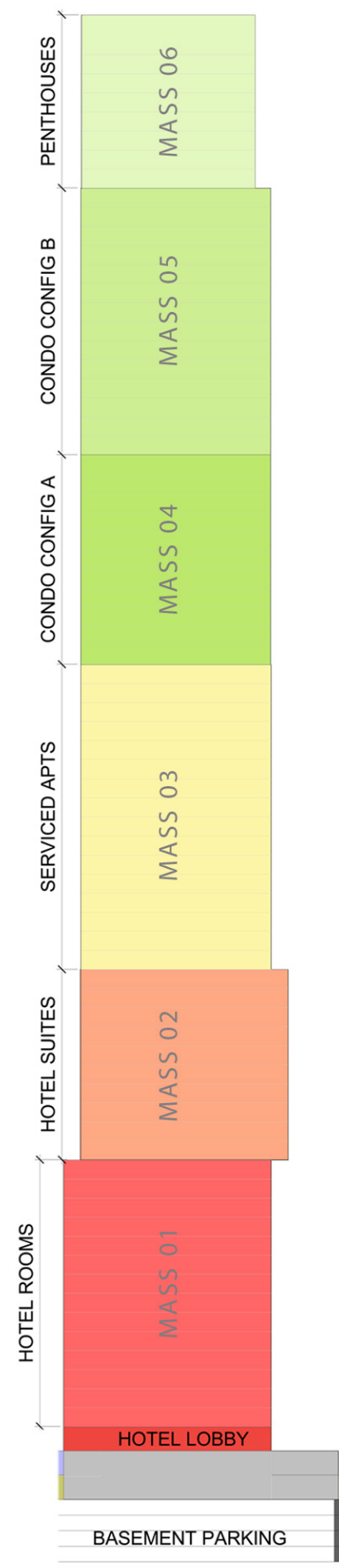
- 1 elevator every 90 units (or every 60 units in urban areas)
- Minimum 1 service elevator

**Means of Egress**

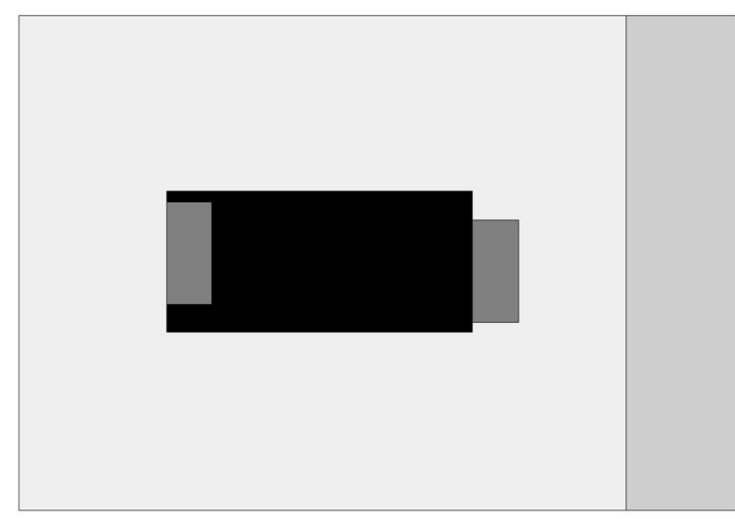
- 150 feet maximum from the farthest unit

- Hotel Guests
- Residents
- Restaurant Visitors
- Parking
- Hotel Freight
- Residential Freight
- Restaurant Freight
- Unaccessible Floors
- Accessible Floors





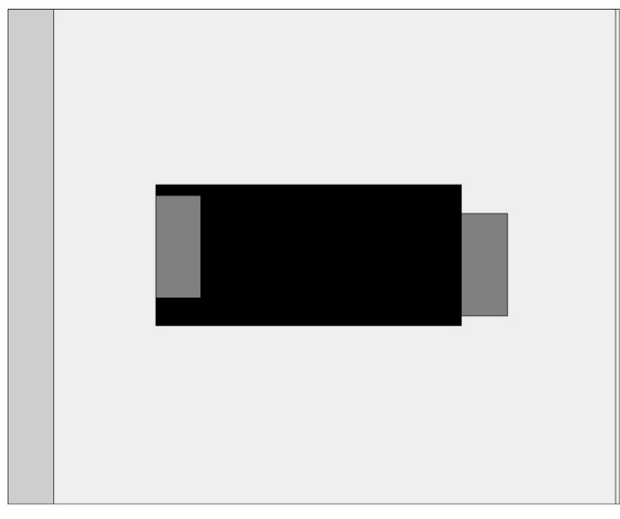
MASS 01: HOTEL STANDARD ROOMS



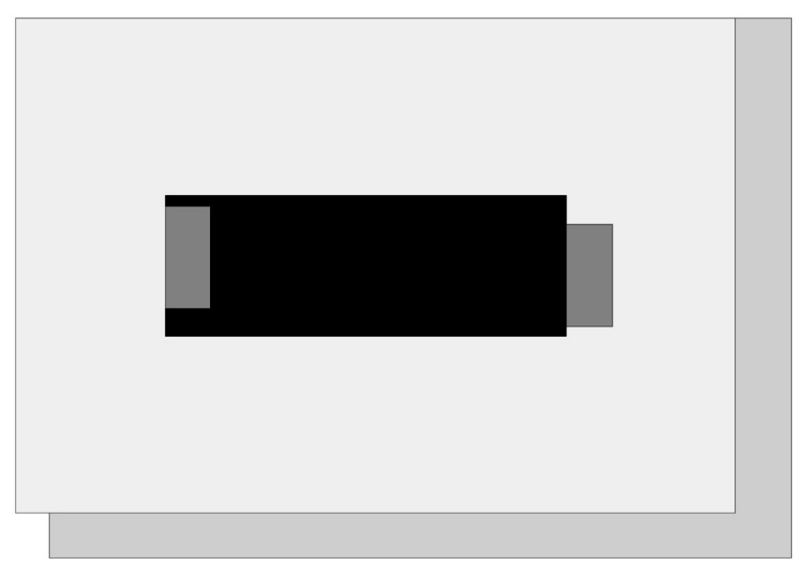
MASS 04: CONDO CONFIG. A



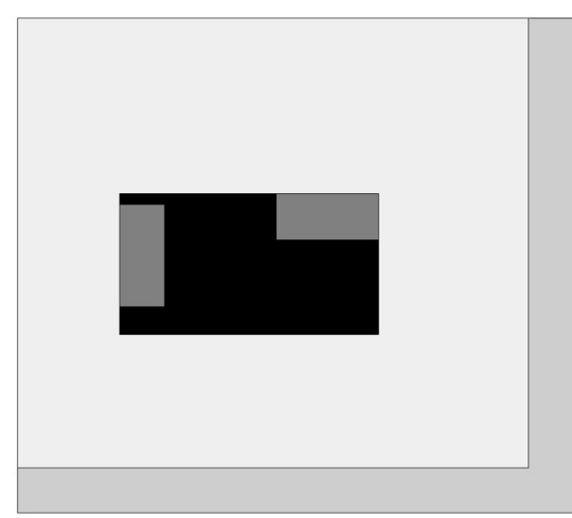
MASS 02: HOTEL SUITE ROOMS



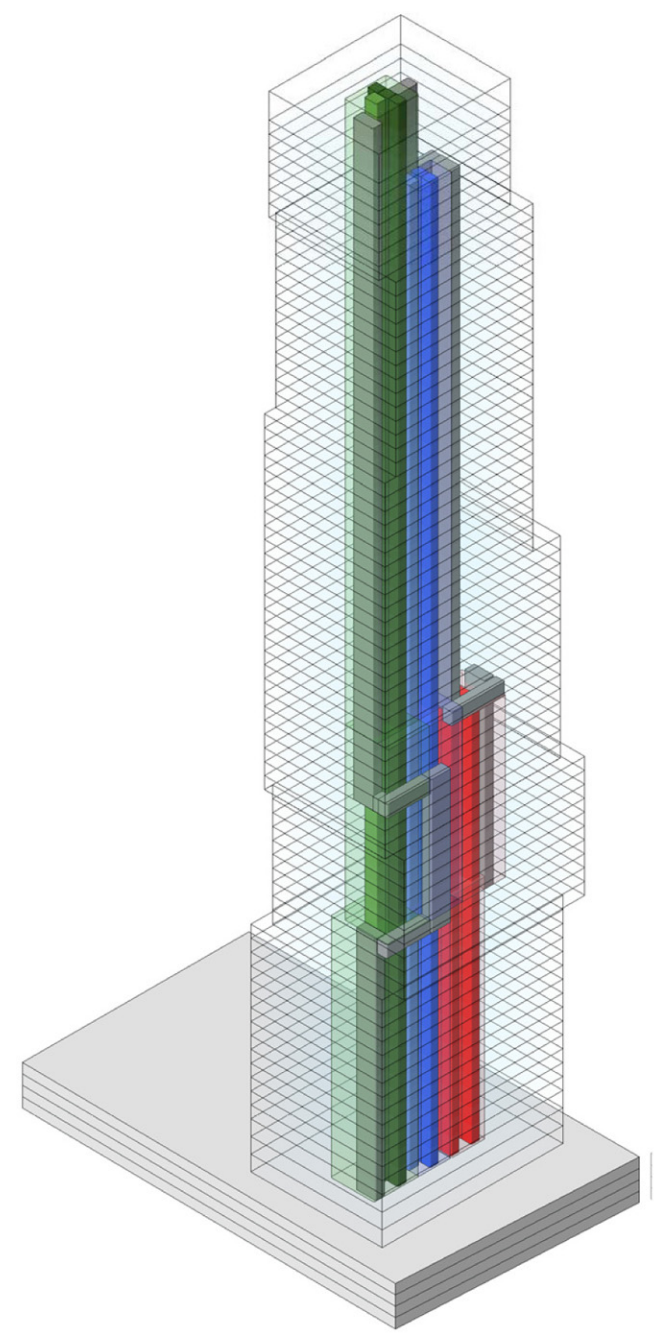
MASS 05: CONDO CONFIG. B



MASS 03: SERVICED APARTMENTS



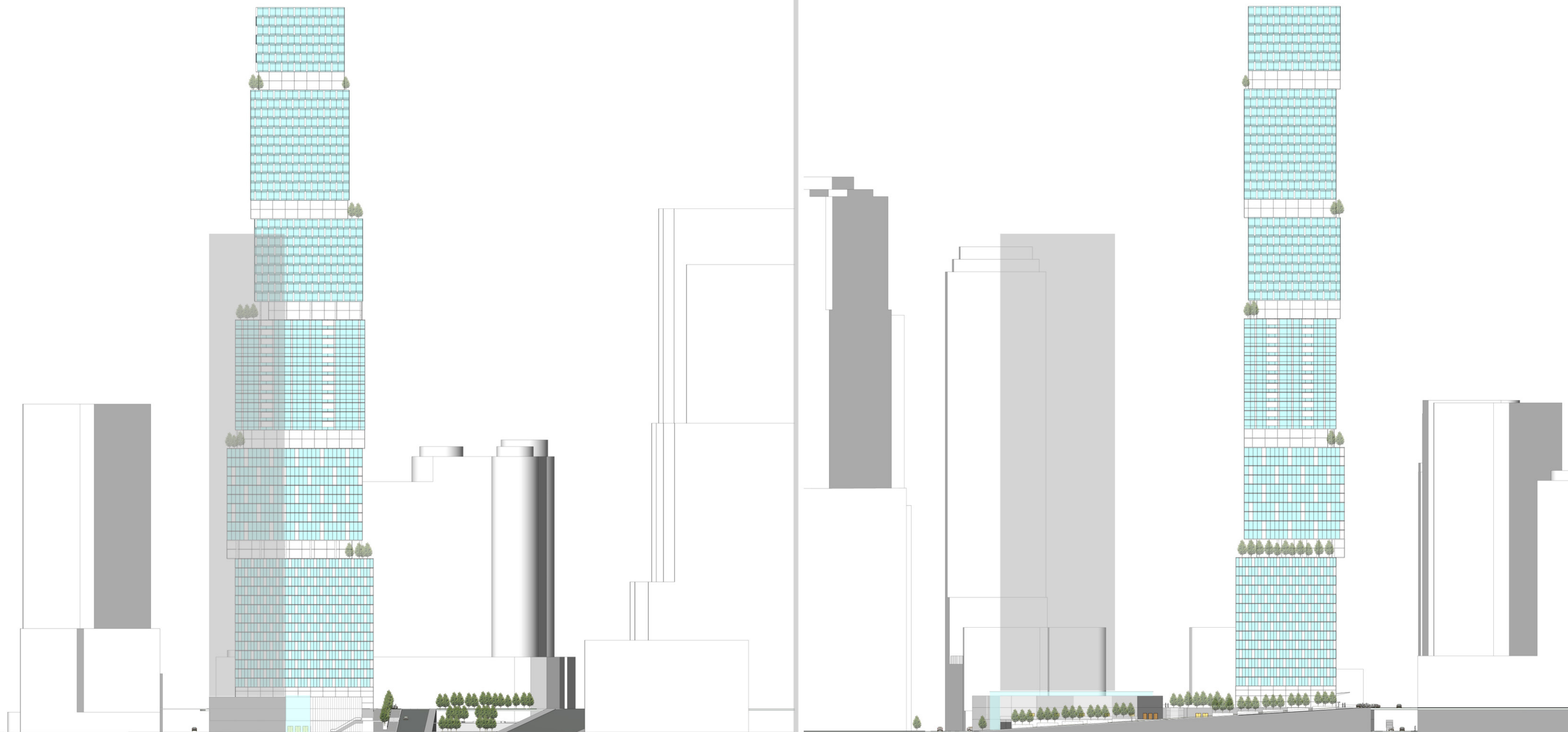
MASS 06: PENTHOUSES



3D Axon Diagram of elevator shafts and emergency stairs

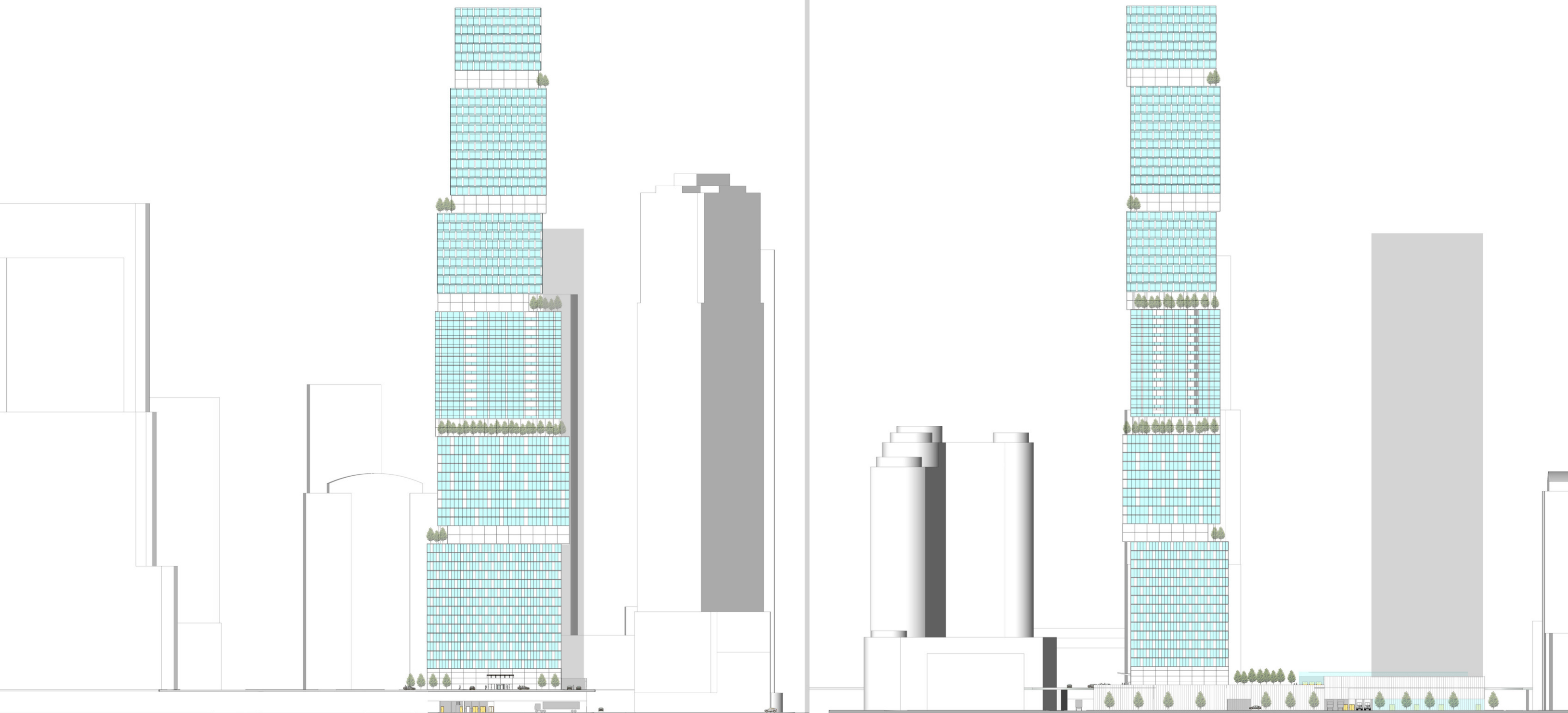
**Shifting Masses Strategy**

The shifting masses geometry of the tower is determined by the emergency stairs location within the tower core. Also, as the height of the tower increases, the core size also decreases because less elevator space is needed and less structural wall thickness is required.



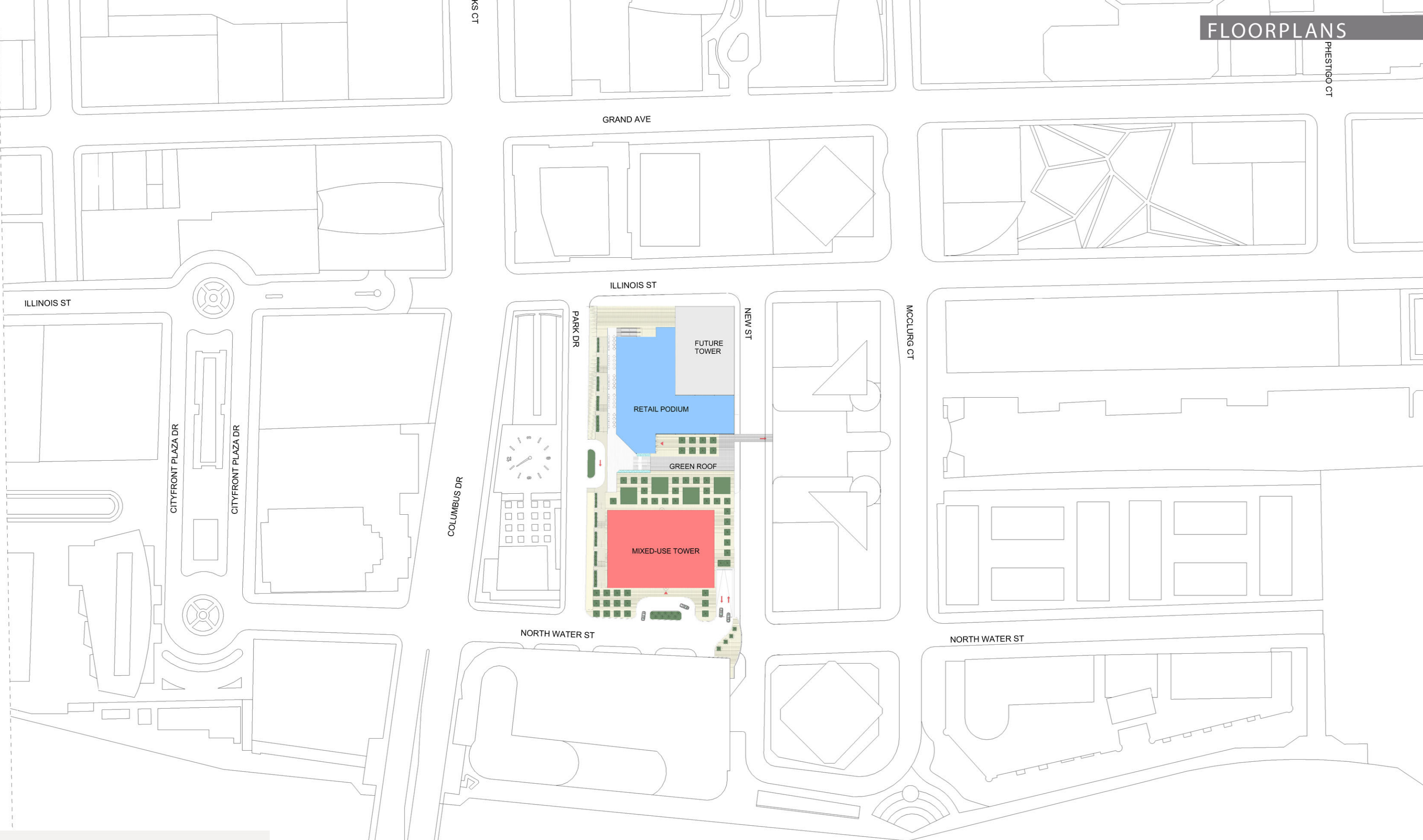
NORTH ELEVATION

WEST ELEVATION

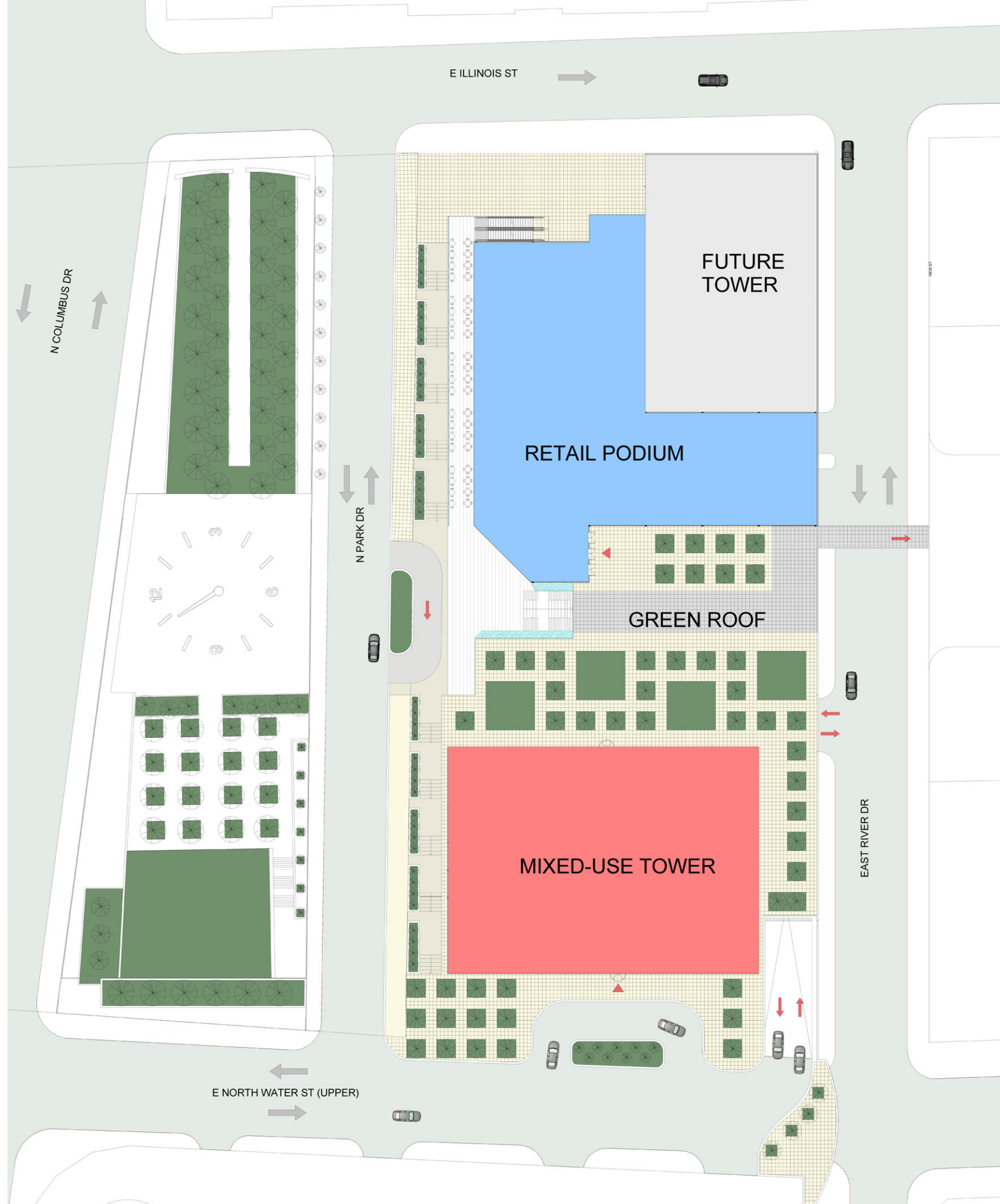


SOUTH ELEVATION

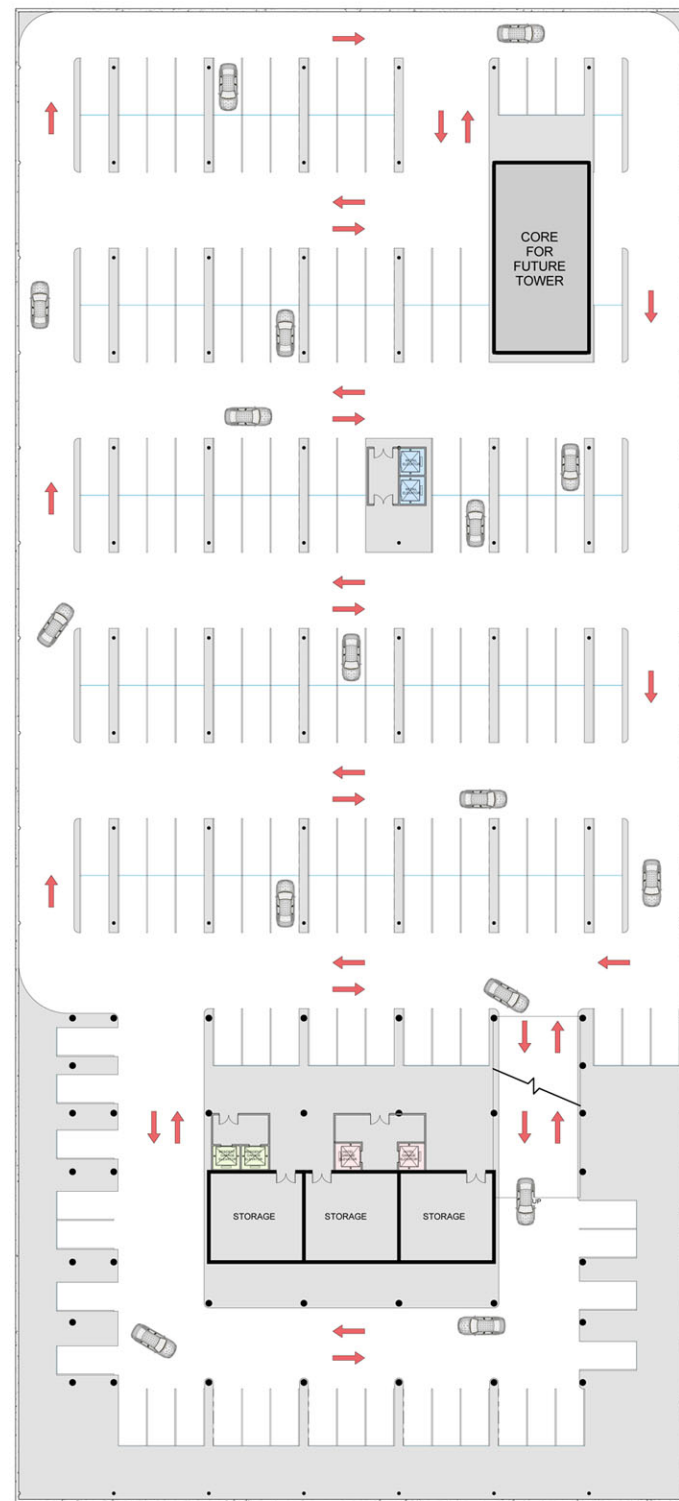
EAST ELEVATION



SITE PLAN



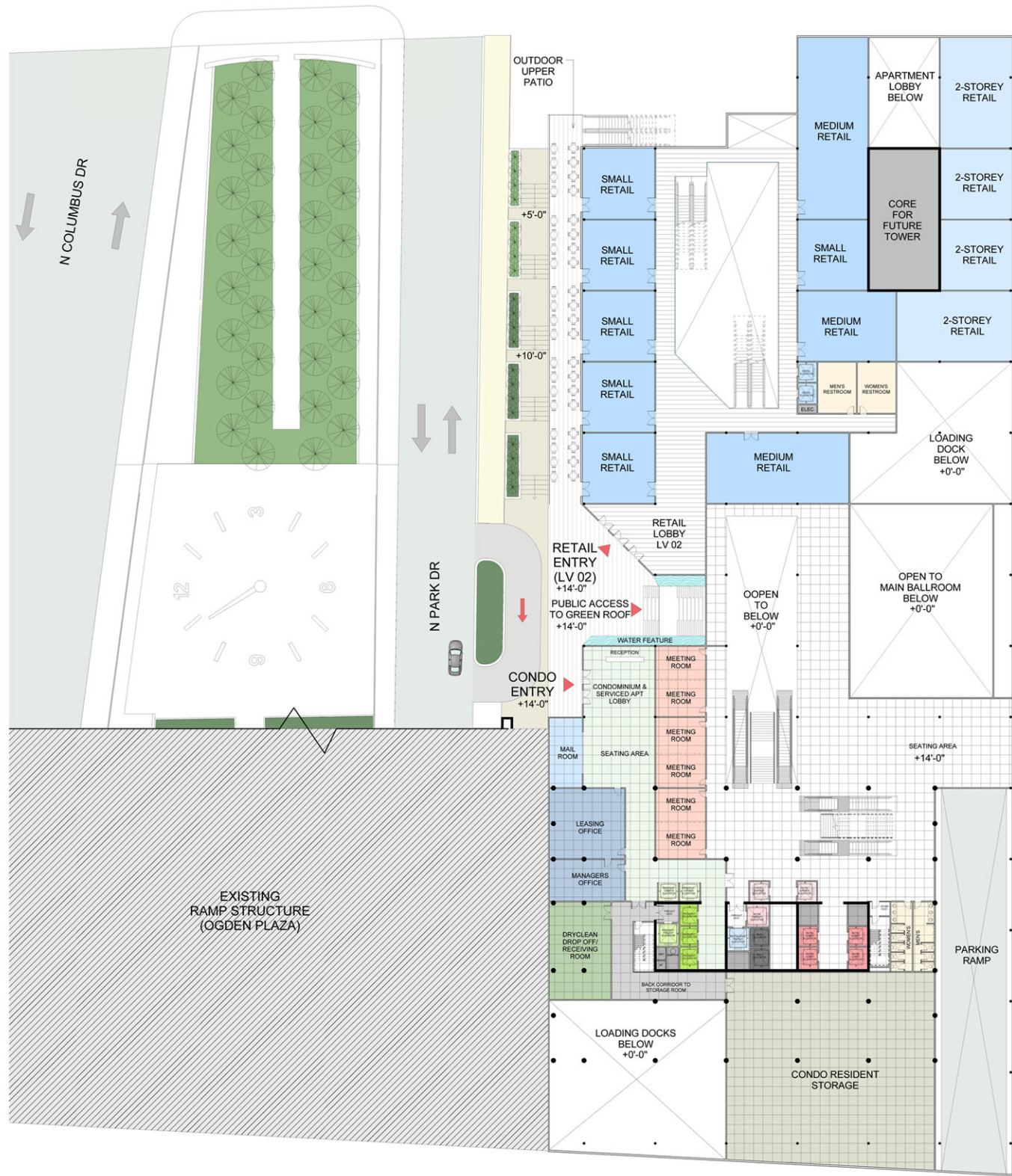
SITE PLAN



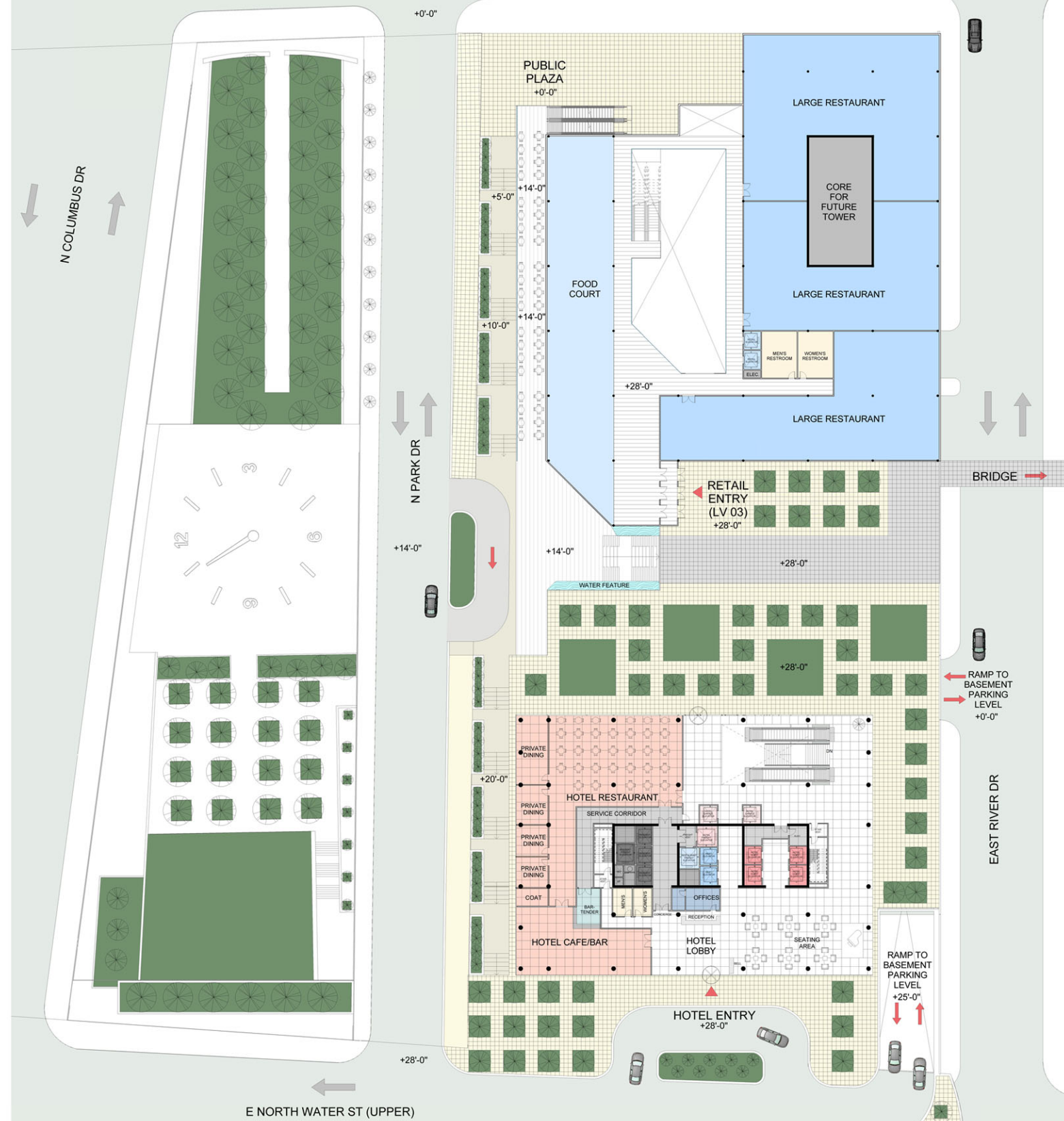
LEVEL B1-B4 (Typ.)  
Parking Levels  
Total Parking: 750



LEVEL 1 (+0'-0'')  
Retail Podium Entry from Illinois St  
Hotel Ballroom and Conference Centers  
Back-Of-The-House Services, Loading Docks



**LEVEL 2 (+14'-0")**  
 Retail Podium Entry from N Park Drive  
 Condominium Entry, Storage Room  
 Hotel Meeting Rooms

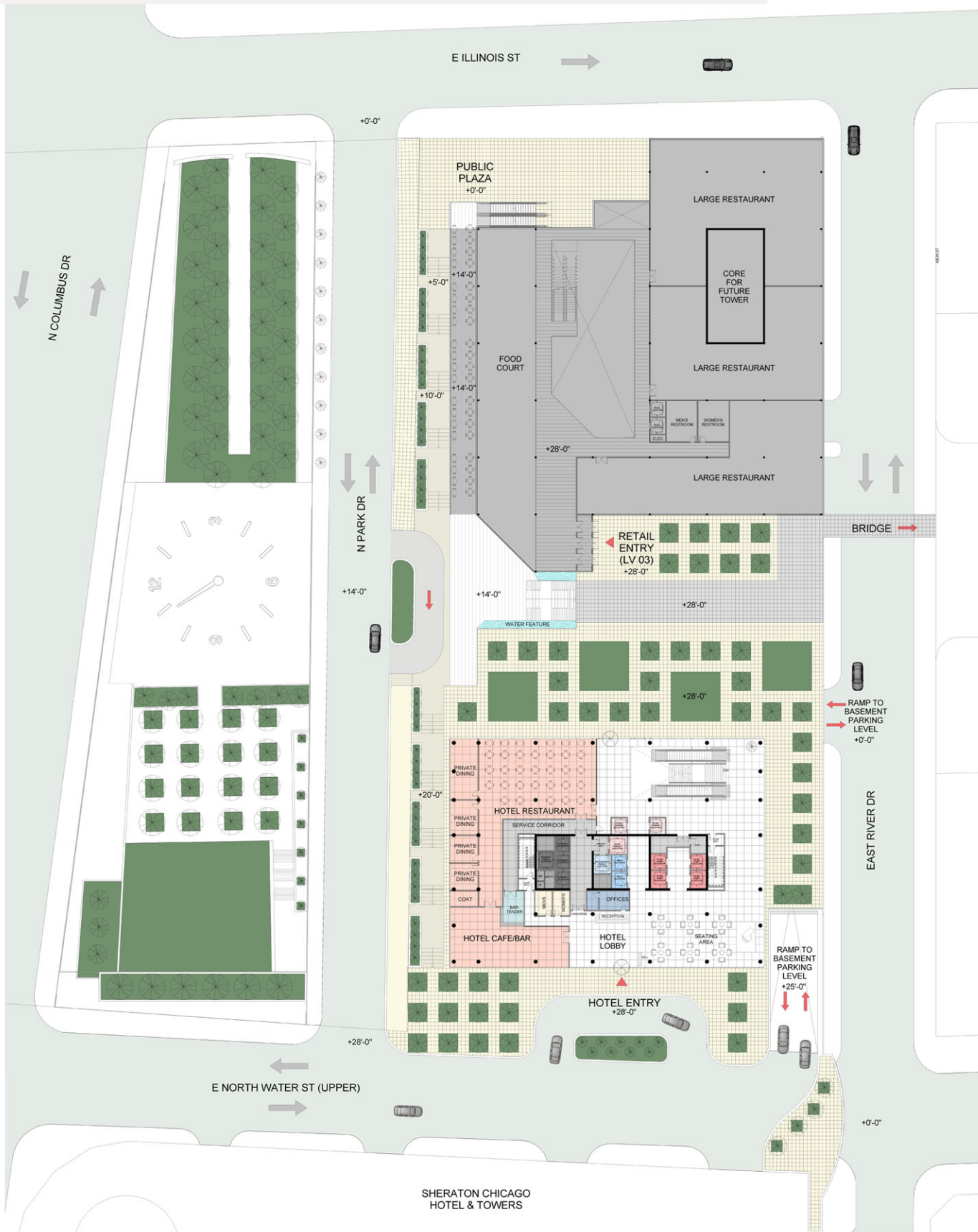


**LEVEL 3 (+28'-0")**  
 Hotel Entry from Upper North Water St  
 Public Green Roof Area

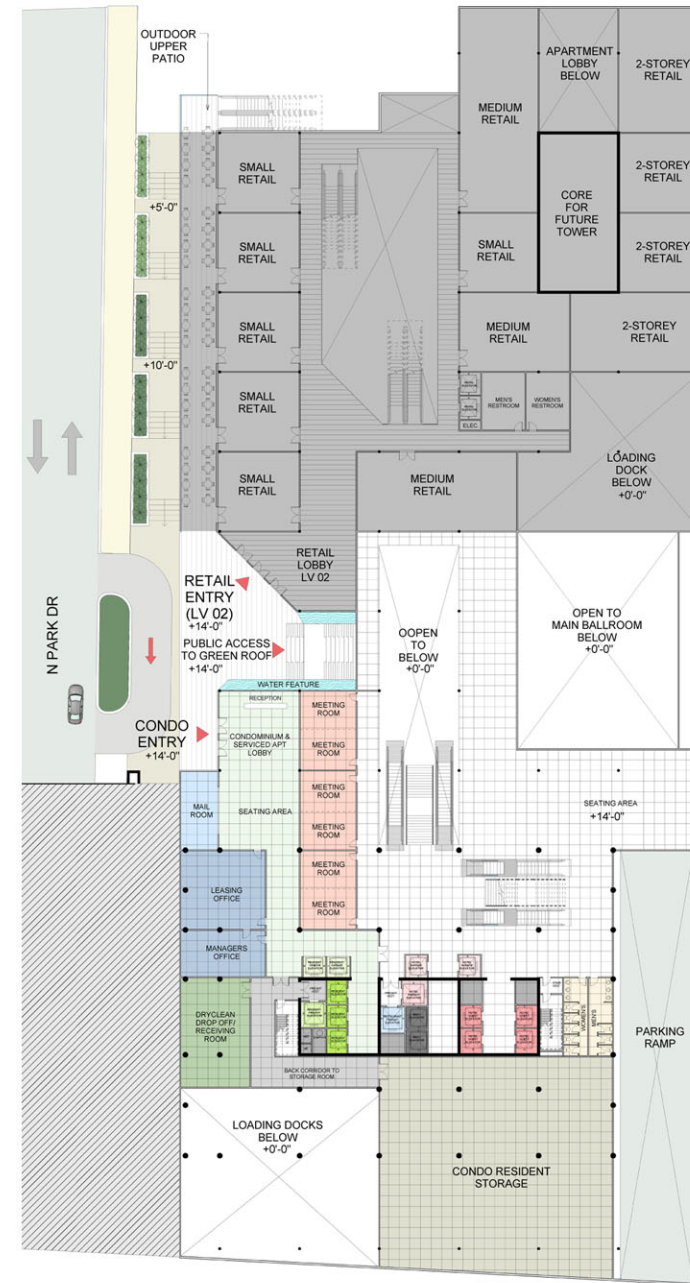
# HOTEL & CONDO: LEVEL 3,2,1

## FLOORPLANS

RIVER EAST CENTER



**LEVEL 3 (+28'-0")**  
 Hotel Entry from Upper North Water St  
 Public Green Roof Area



**LEVEL 2 (+14'-0")**  
 Retail Podium Entry from N Park Drive  
 Condominium Entry, Storage Room  
 Hotel Meeting Rooms

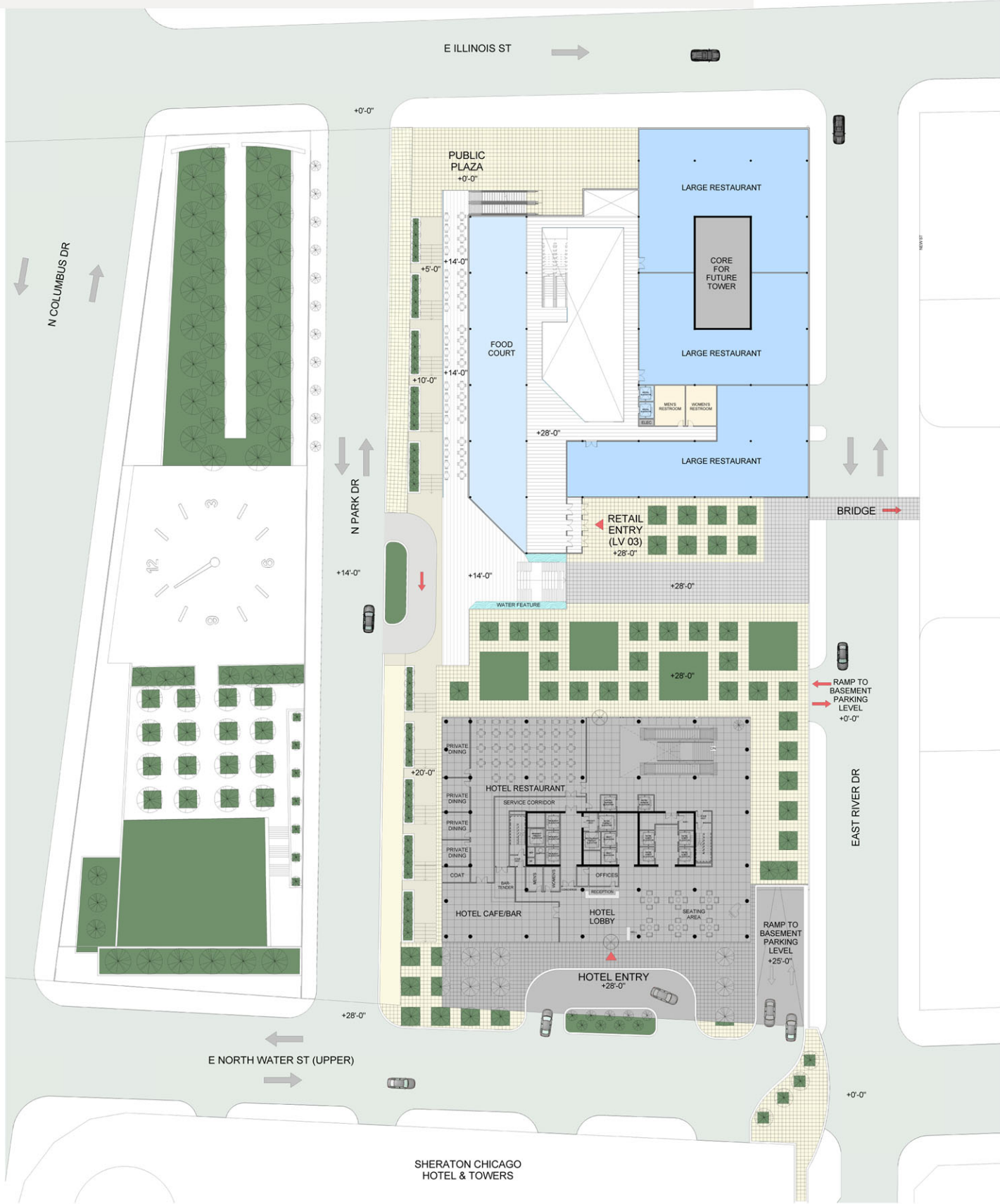


**LEVEL 1 (+0'-0")**  
 Retail Podium Entry from Illinois St  
 Hotel Ballroom and Conference Centers  
 Back-Of-The-House Services, Loading Dock

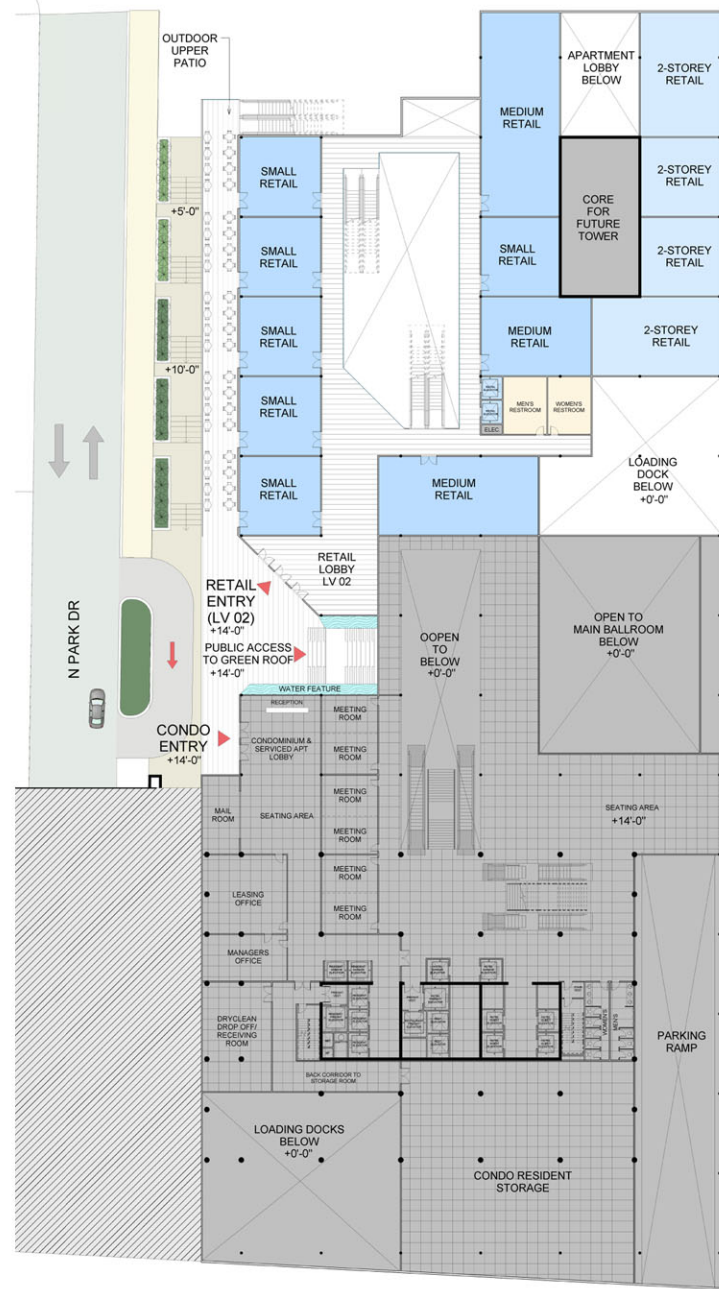


# RETAIL PODIUM: LEVEL 3,2,1

# FLOORPLANS



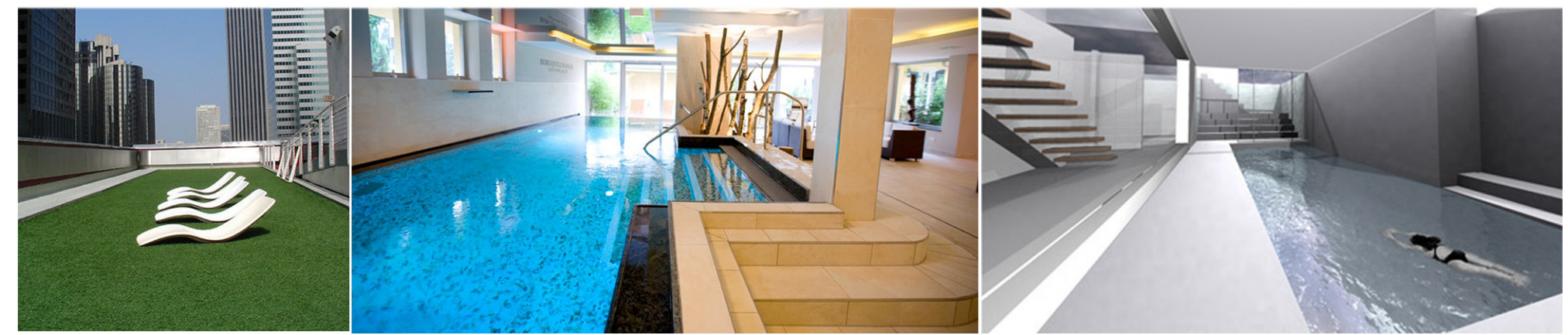
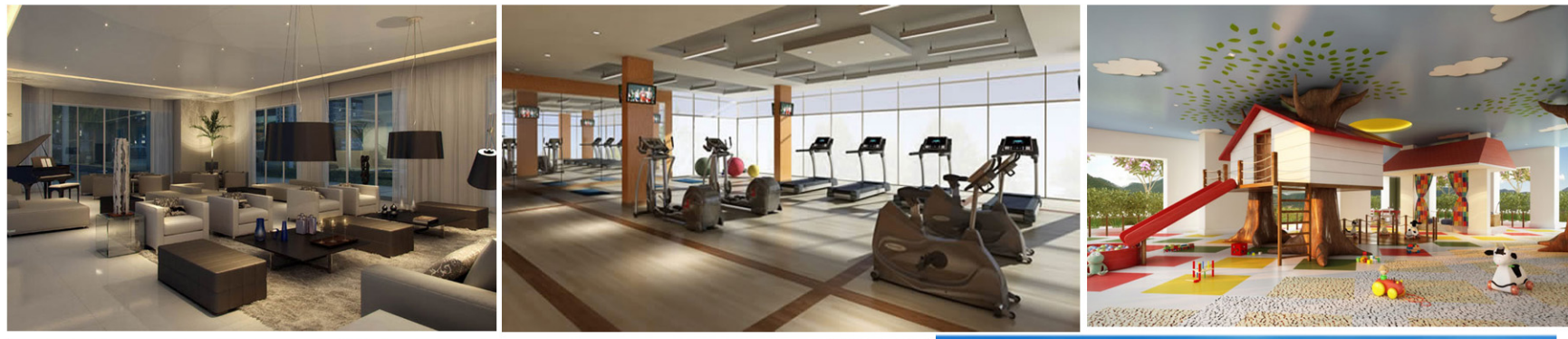
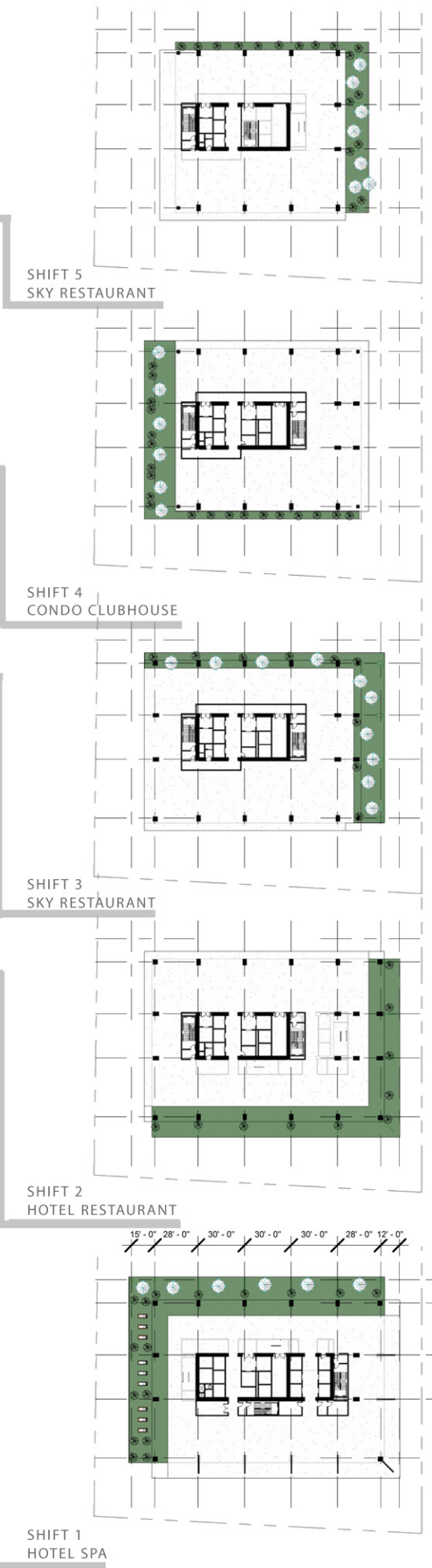
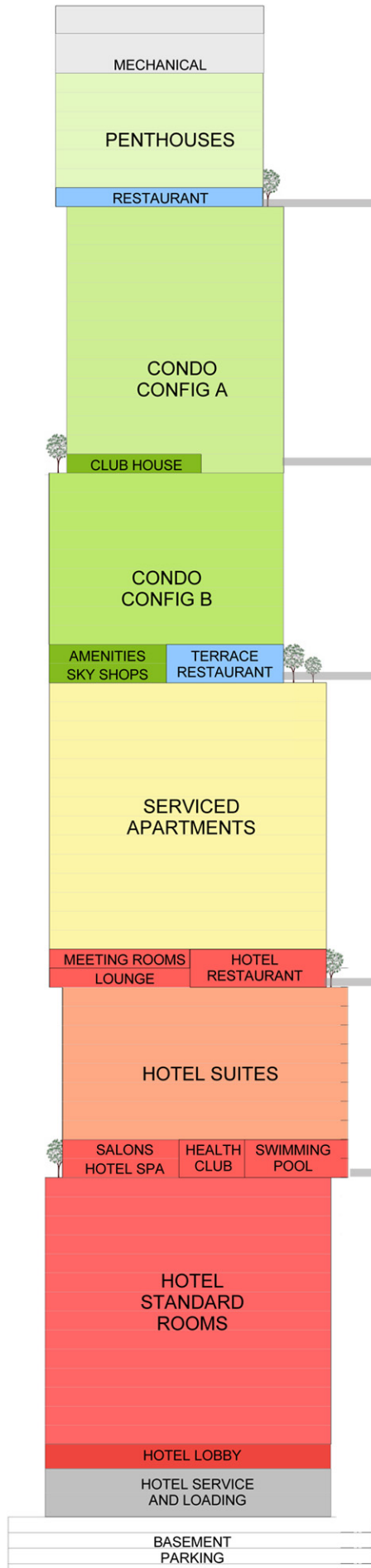
**LEVEL 3 (+28'-0")**  
 Hotel Entry from Upper North Water St  
 Public Green Roof Area



**LEVEL 2 (+14'-0")**  
 Retail Podium Entry from N Park  
 Condominium Entry, Storage Roc  
 Hotel Meeting Rooms

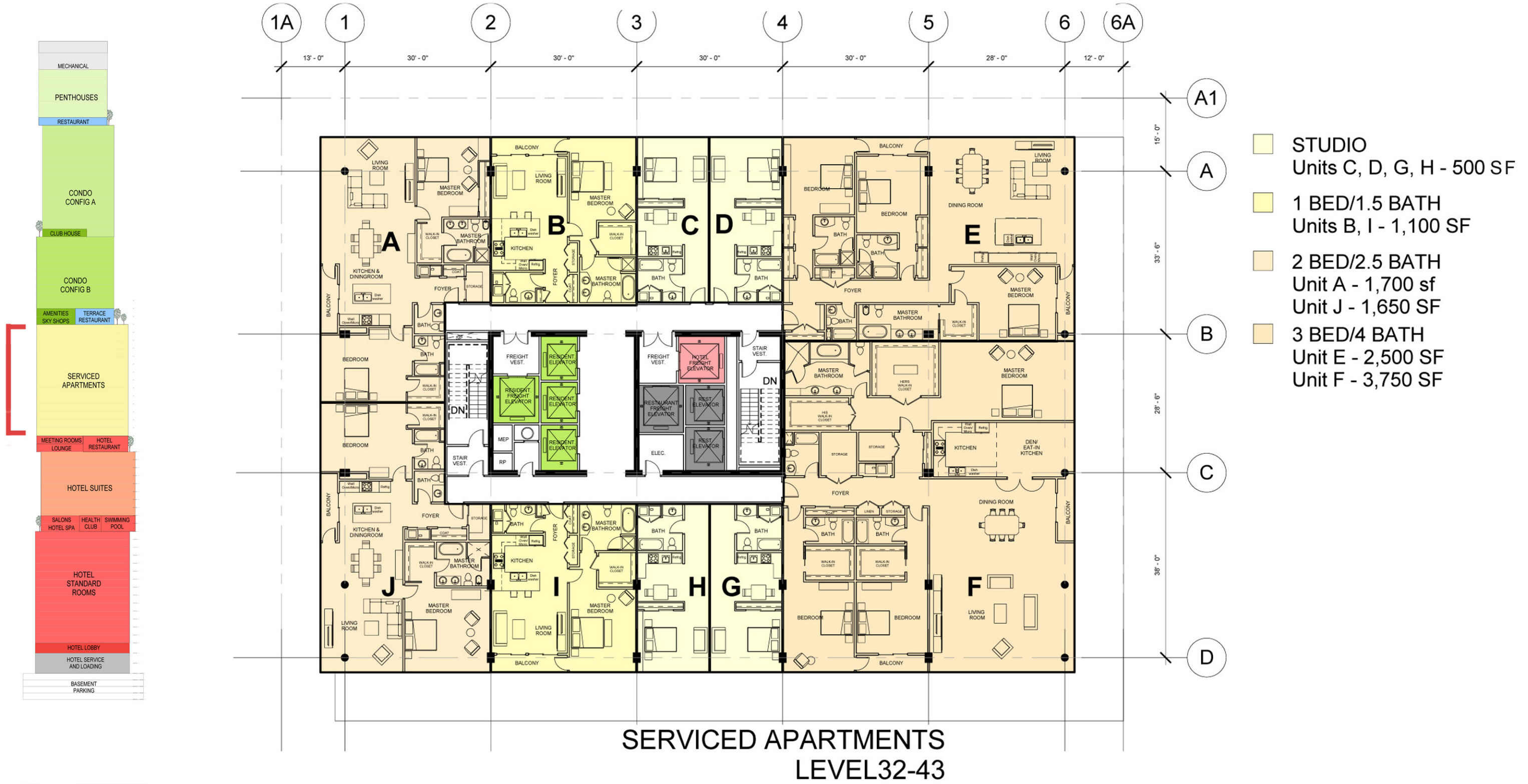


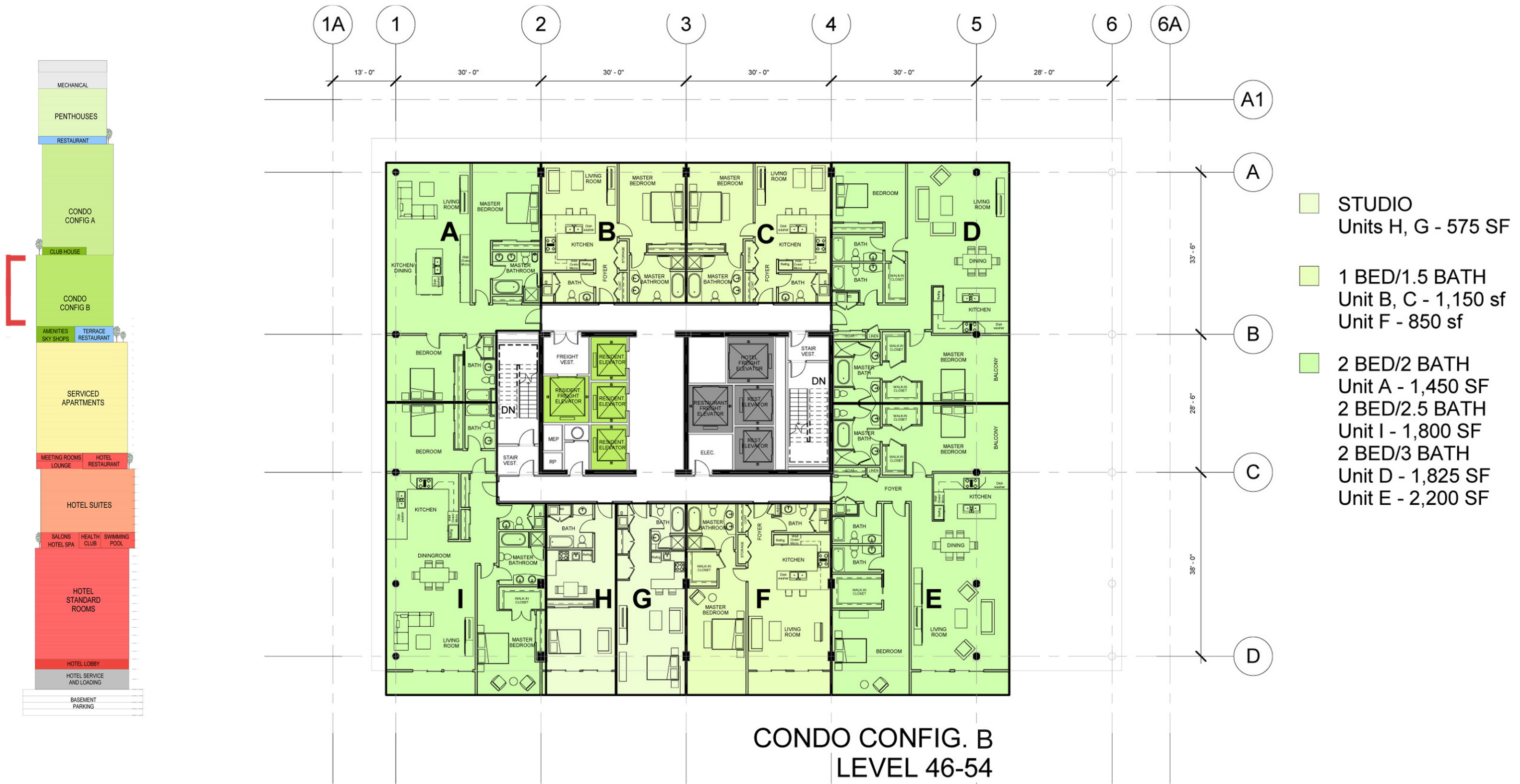
**LEVEL 1 (+0'-0")**  
 Retail Podium Entry from Illinois St  
 Hotel Ballroom and Conference Centers  
 Back-Of-The-House Services, Loading Dock

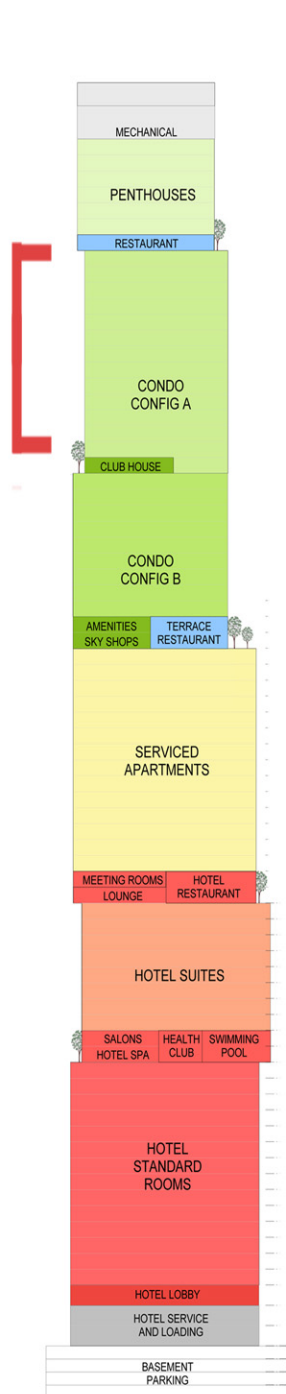






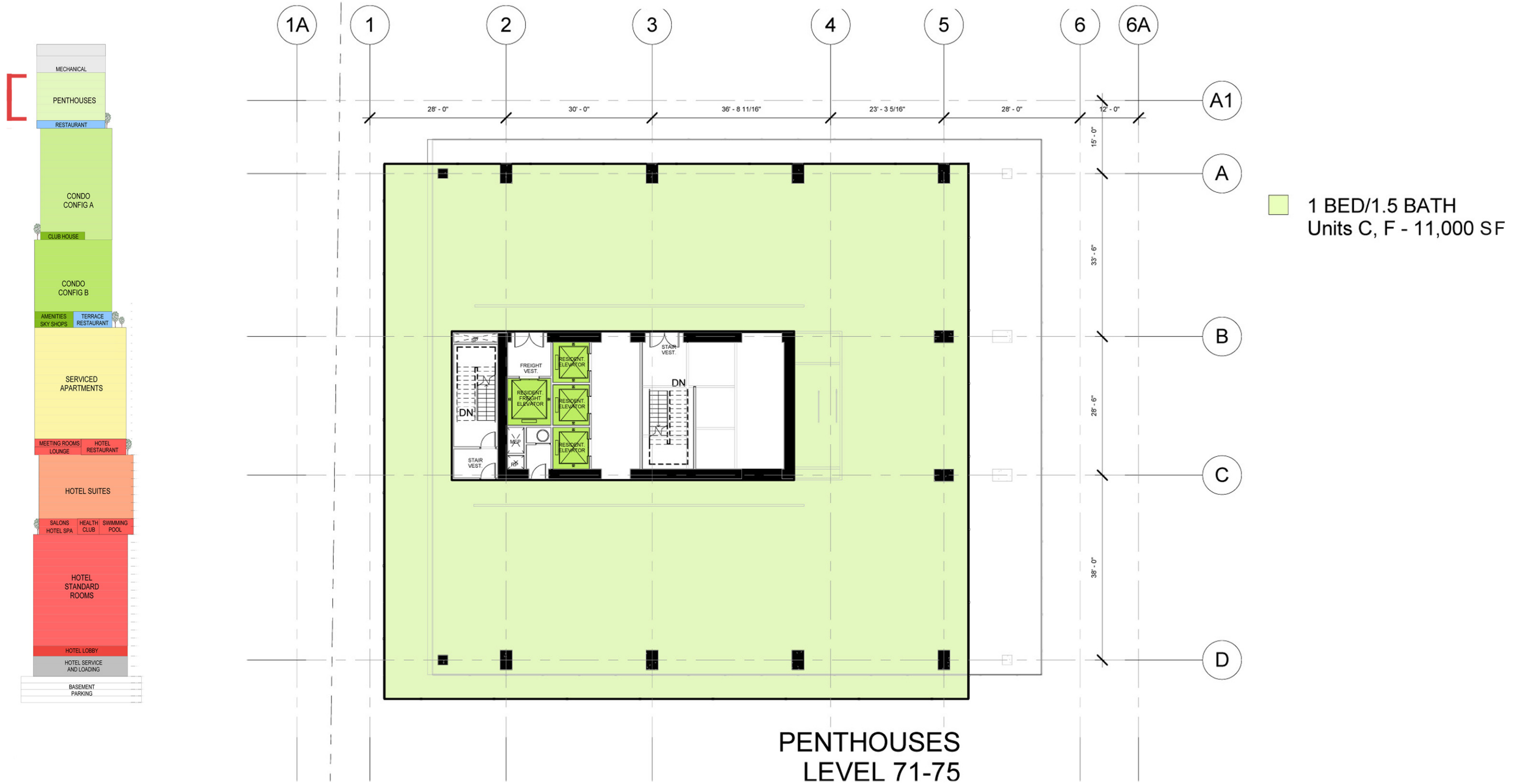






- 1 BED/1.5 BATH  
Units C, F - 1,050 SF
- 2 BED/2 BATH  
Unit A, B - 1,750 sf  
2 BED/2.5 BATH  
Unit E - 1,950 SF
- 3 BED/4 BATH  
Unit D - 3,100 SF

CONDO CONFIG. A  
LEVEL 56-68

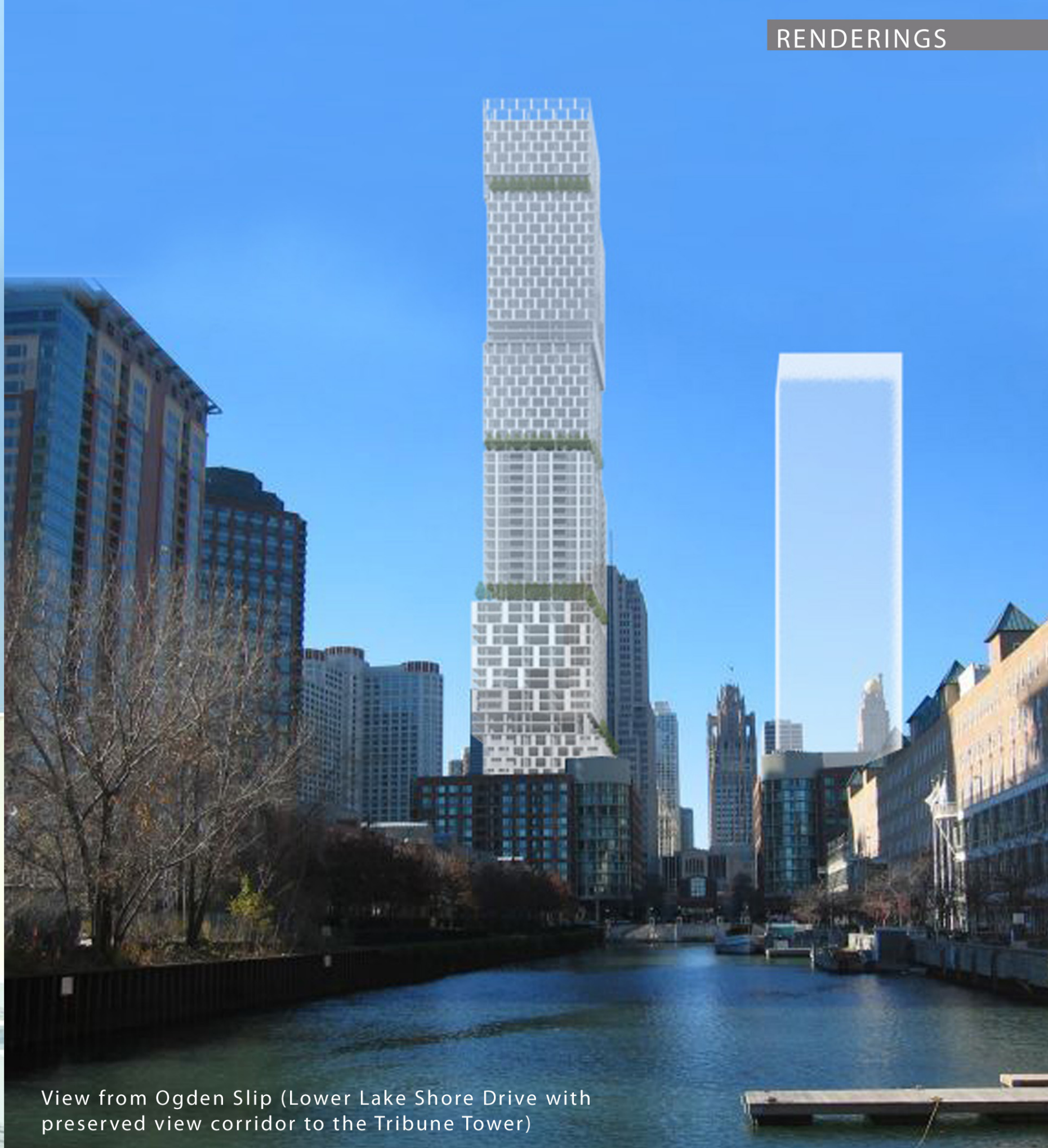








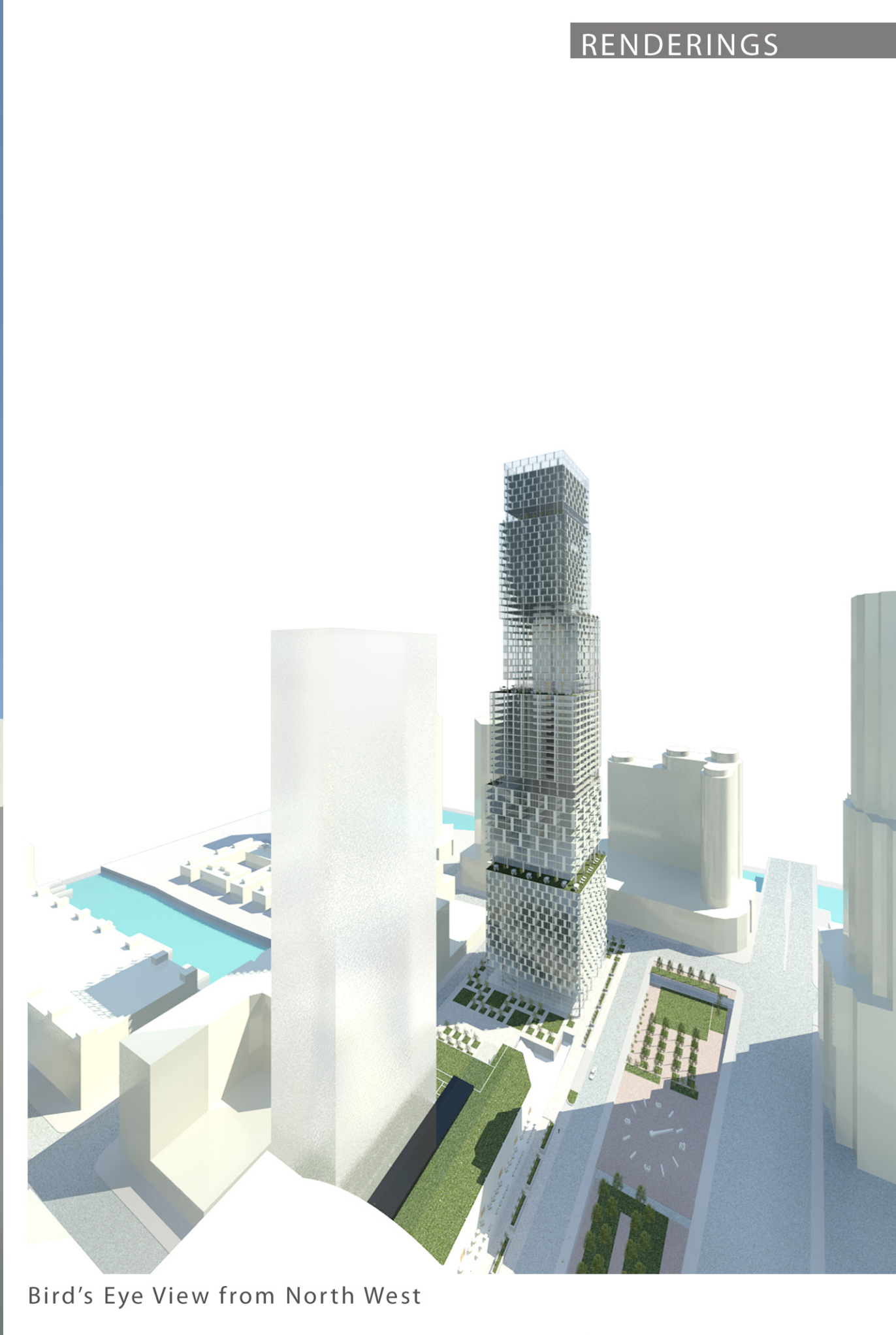
View from Lower E North Water St (3D Render Model & Photomontage)



View from Ogden Slip (Lower Lake Shore Drive with preserved view corridor to the Tribune Tower)



View from Upper Illinois St

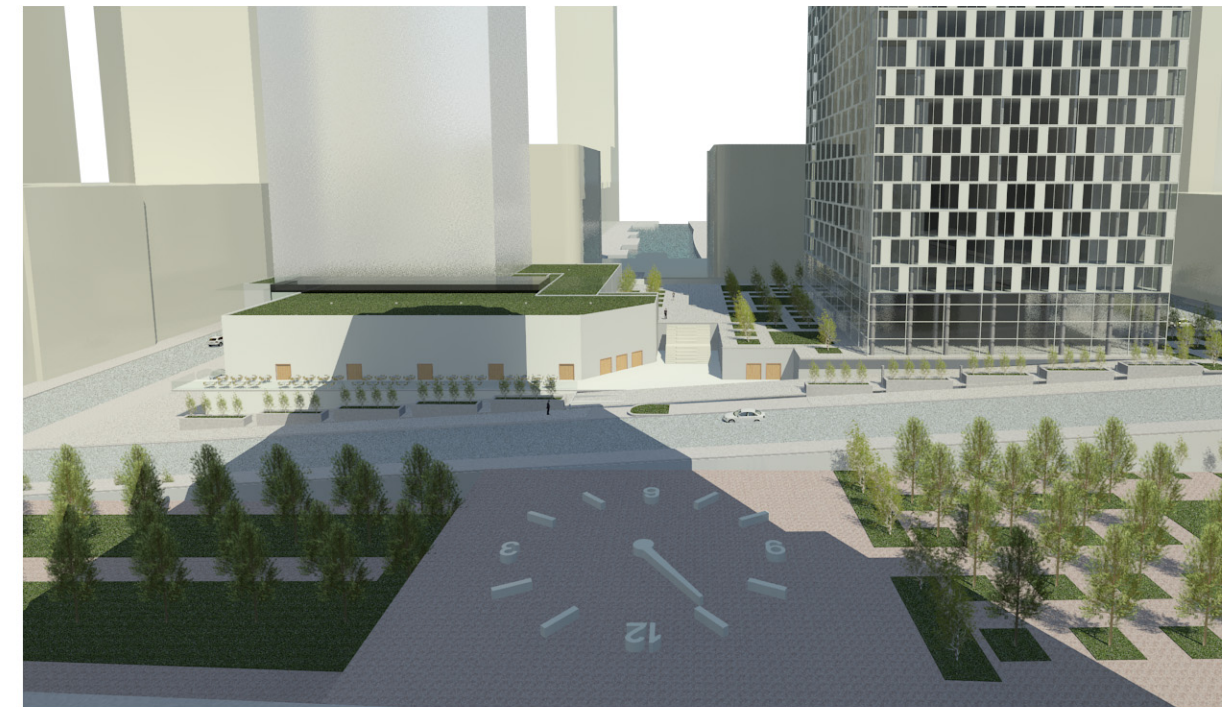


Bird's Eye View from North West

View from Illinois St and N Park Dr



View from Ogden Plaza to Condo Entrance



Hotel Entrance & Guest Drop Off





View from Sheraton Hotel (South West)