Parametric Biosystems

An Integrated Design Project

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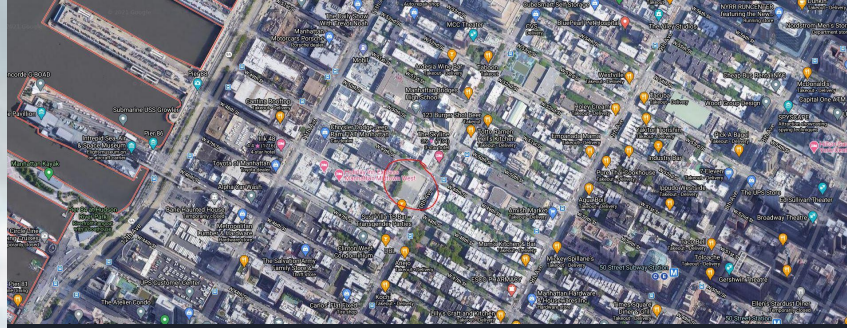


Location

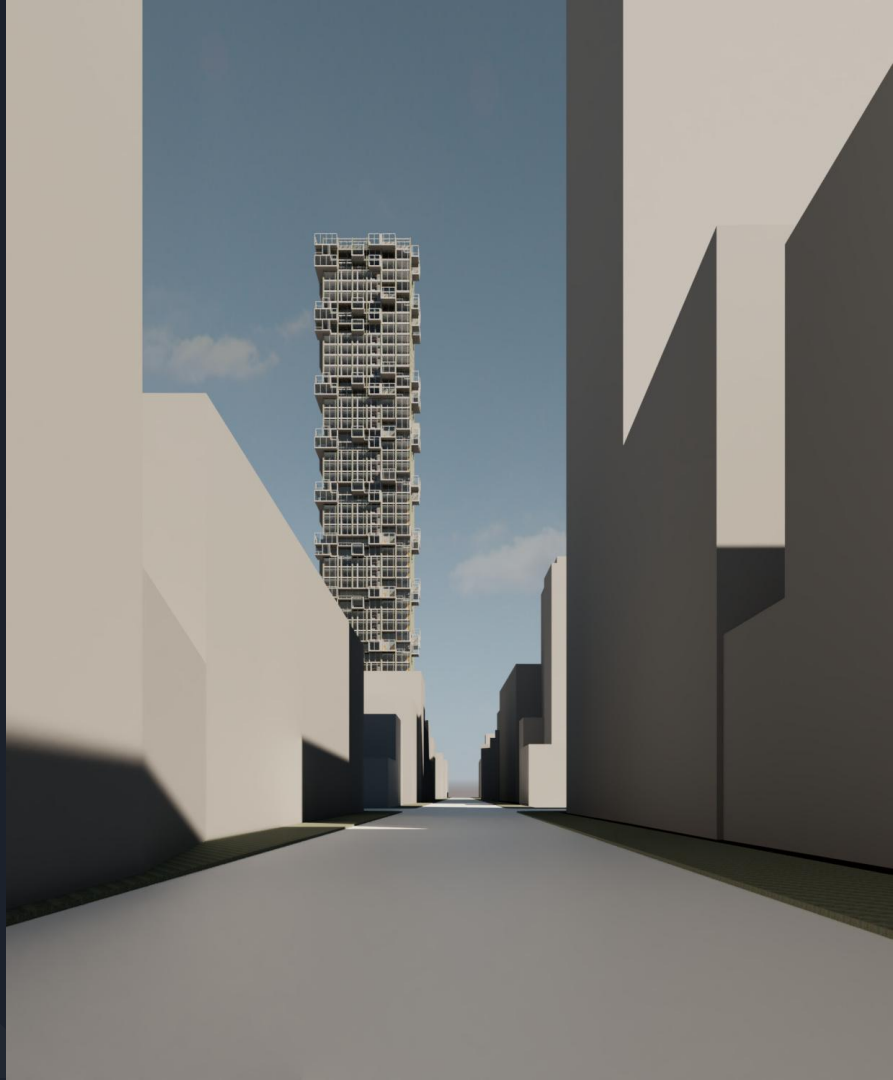
Hell’s Kitchen NY, NY

Precedent Study:

MahanNakhon Tower

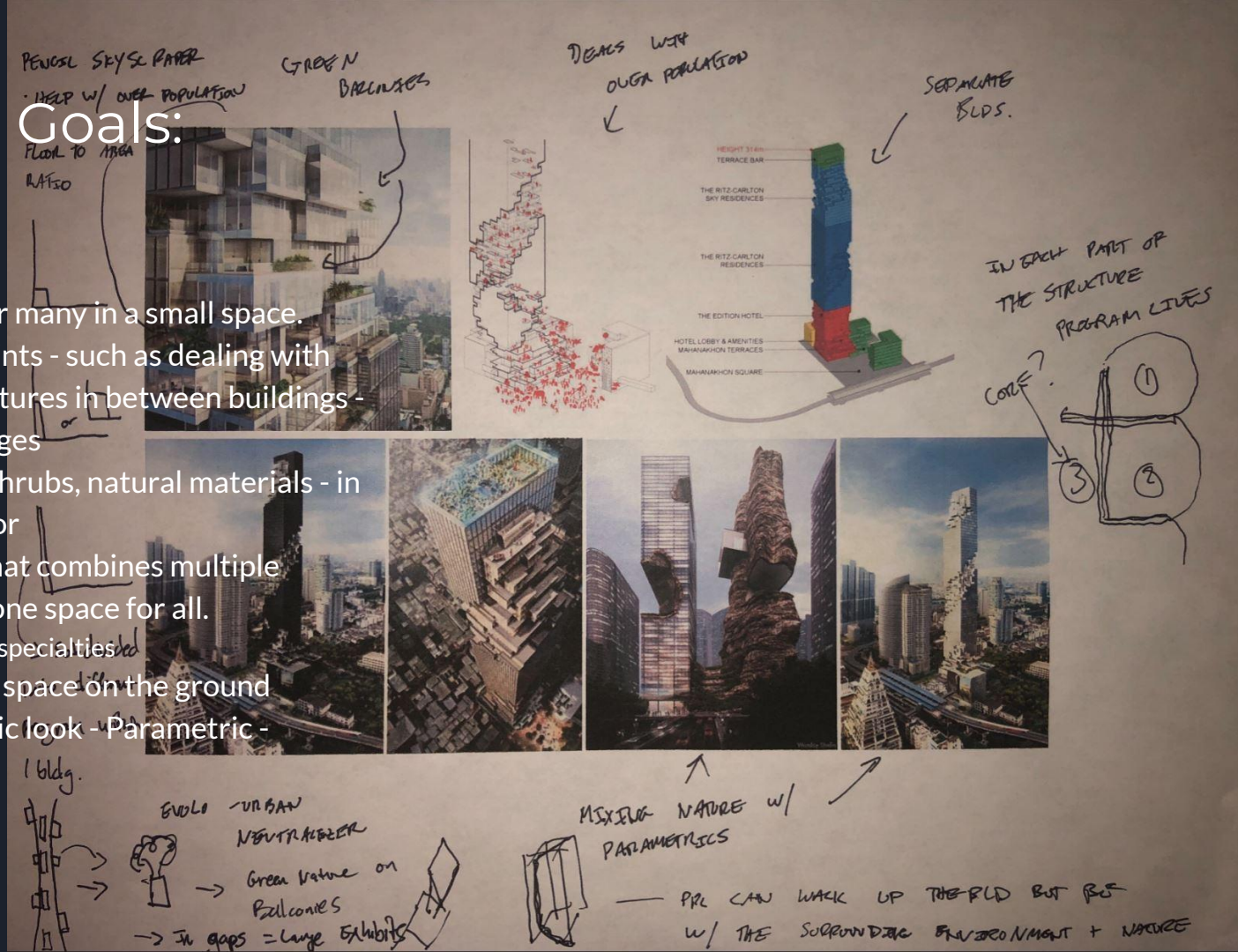
Bangkok, Thailand


DIAMOND
TOWER



Design Goals:

- Create a living spaces for many in a small space.
- Include city-like constraints - such as dealing with high wind, cold temperatures in between buildings - Seasonal Weather Changes
- Include Nature - Trees, shrubs, natural materials - in both Interior and Exterior
- Create a shared space that combines multiple different areas into are one space for all.
    - Integrating different specialties
- Maximize use of limited space on the ground
- Have a modern, Futuristic look - Parametric - Facade?




HALF THE FACADE
PARAMETRIC TO INCORPORATE
THE DESIGN
WITH THE
CROWDED SURROUNDINGS
MADE UP OF DIFFERENT
BLDS. EX SHANGHAI TOWER
STRUCTURE
PIXILATED
TECTONICS
INTRODUCING NATURE ON THE
EXTERIOR BUT INCORPORATING INTO THE SPACE
ON BOTTOM FLOORS? SAFETY?

The lower portion of my creation hosts access to a mall, subway, multiple restaurants, and shops, a pool, and on the 3rd floor the lobby to the main tower.

What I am Focusing on

Rather than creating a new building design, my main focus is to identify an already existing building and modifying it so that it could be recreated in a new site. I chose the MahaNakhon Tower, in Bangkok, Thailand and then studied its systems to understand how they interact and flow together and as separate units. This project was quite complex and was built with a special visual exterior effect known as "Pixilation", which means creating an iconic form in which a 3D ribbon wraps around a building. This Tower represents "The Greater Metropolis", because the area in which it is located is overcrowded and the architect needed a way to solve overpopulation, but at the same time, include many individuals to intervene and collaborate together. This was created through multiple different scenarios and views. The program of the tower has your typical features like a large parking garage, structural program, and the pixilation effect brings upper floors in contact with one another though balconies and cantilevered floors.

My main focus is to recreate the structural aspects of this tower through a different site and use the below design goals to help guide me in becoming a more knowledgeable BIM Manager. The new site I have chosen is New York City because it also has the same overpopulation constraint but also there is barely any land for me to build a design on. Therefore, I have chose to make a skyscraper. New York has different climate conditions than Bangkok, so I will be exploring the passive design strategies in order to have this skyscraper function.

These are some goals that I would like to try and focus my efforts on. A big part of being a BIM Manager is to not necessarily design a new type of building but to help others coordinate their projects for the better outcome of a more complex project. Modeling is an important part of most firms, but knowing how to manage modeling is a whole different skill. Once the skyscraper has been built I would like to focus my efforts on using Visibility Graphics and Revit links to show better views and learn some parametrics.

Introducing the Structure

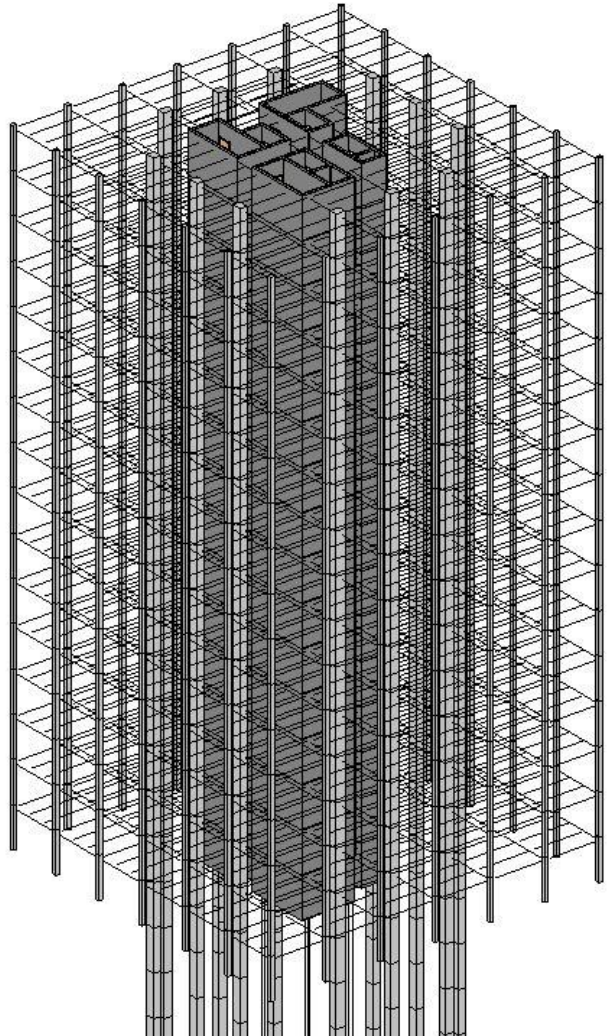
Each unit is designed to either ‘extend out’ or ‘extend in’

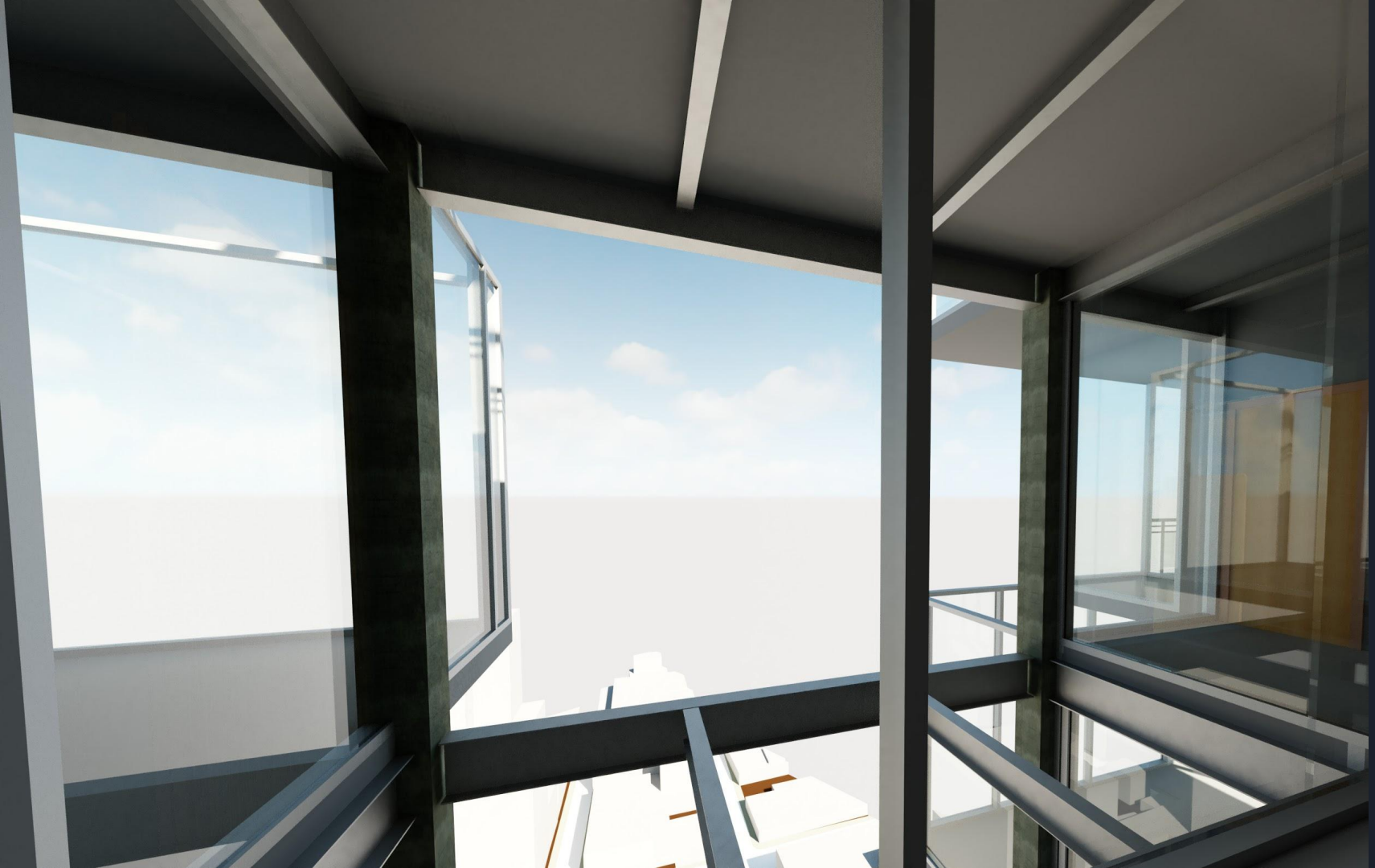
All units suspend from 12 concrete units around the core , with smaller units floating so that rooms could either be ‘ pulled out’ or ‘pulled in’

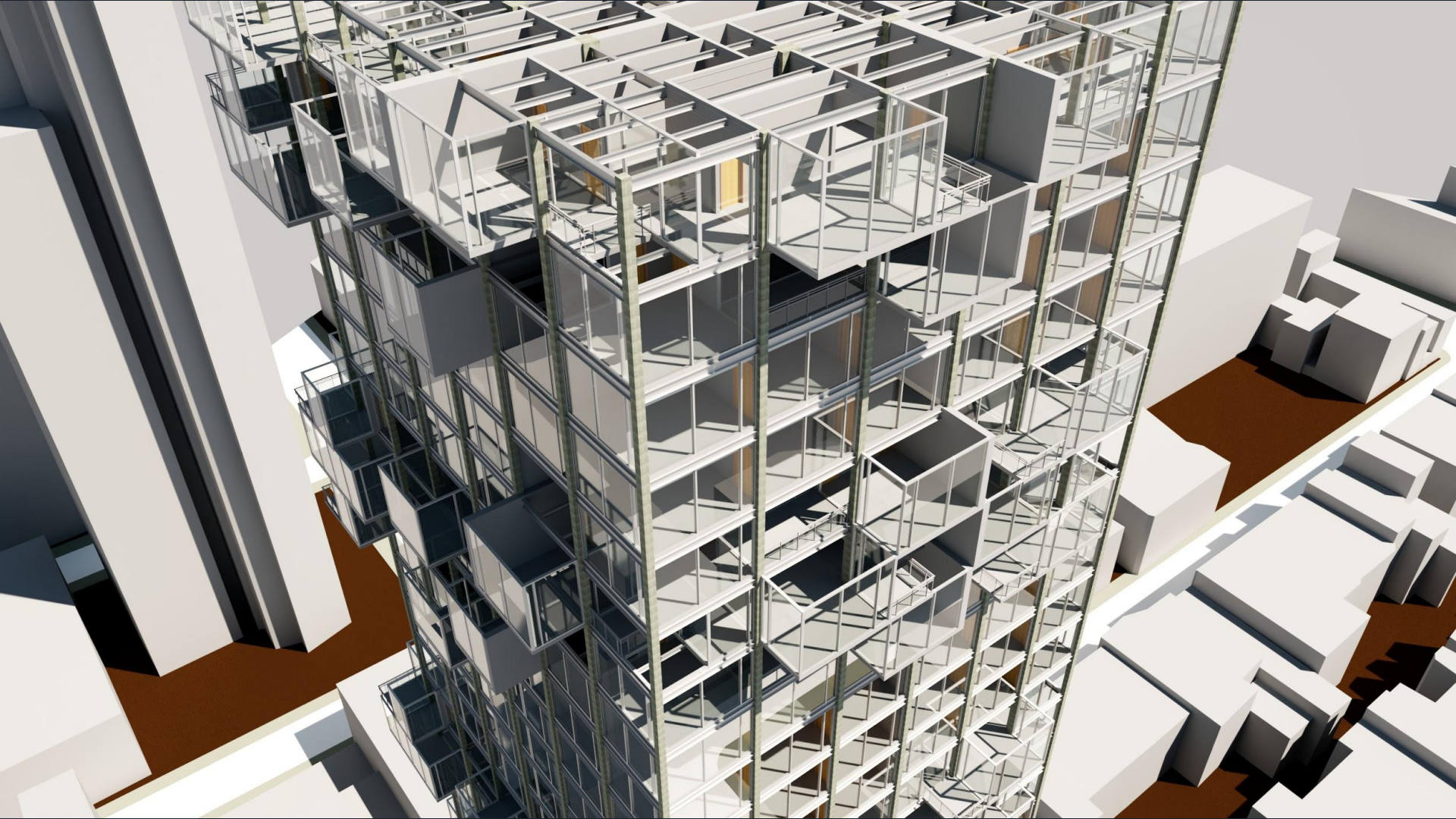
There are endless possibilities for creating unit design, as long as the total area remains the same

I focused on 3 geometric, symmetrical units- small, medium, and large, all revolving around the core structural element.

My pixilation ribbon wraps around every 4-5 floors, for it to come back to the full 360 degrees.







Discovering the Hierarchy of a Unit

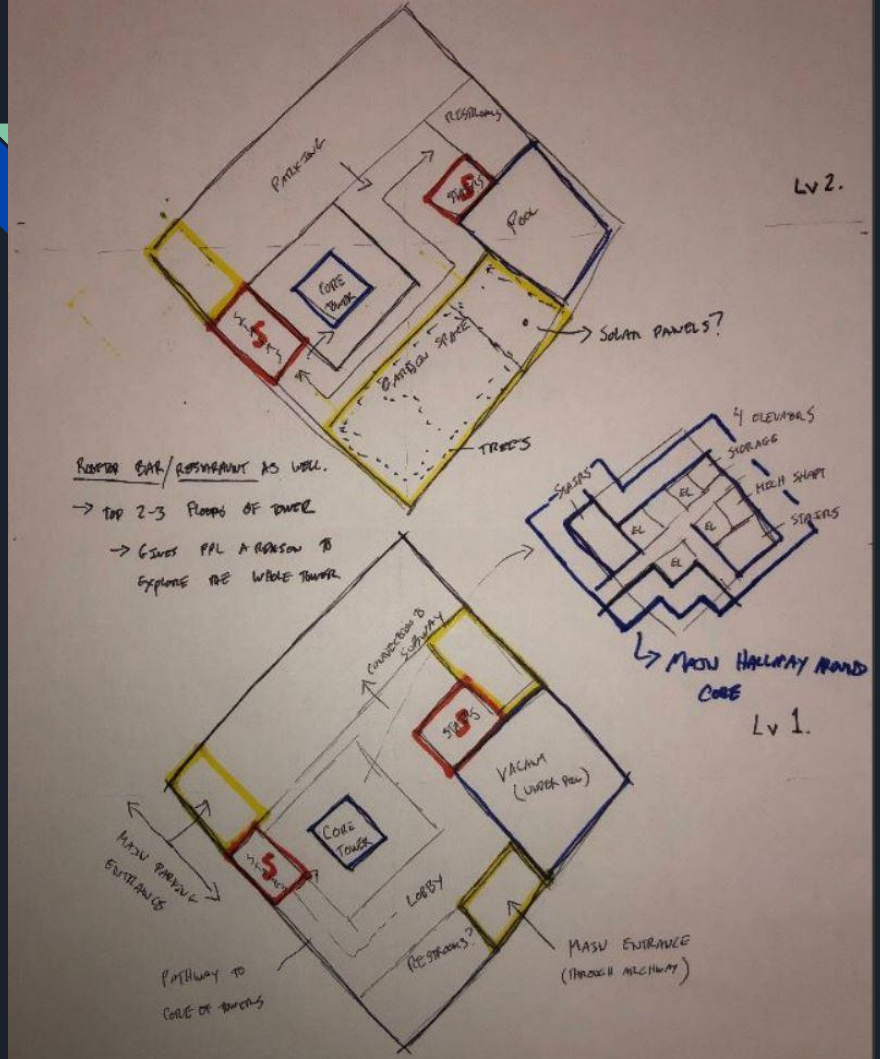
1. Small Unit (Base)
    a. Option A
    b. Option B
2. Medium Unit (Base)
    a. Option A
    b. Option B
3. Large Unit (Base)
    a. Option A
    b. Option B

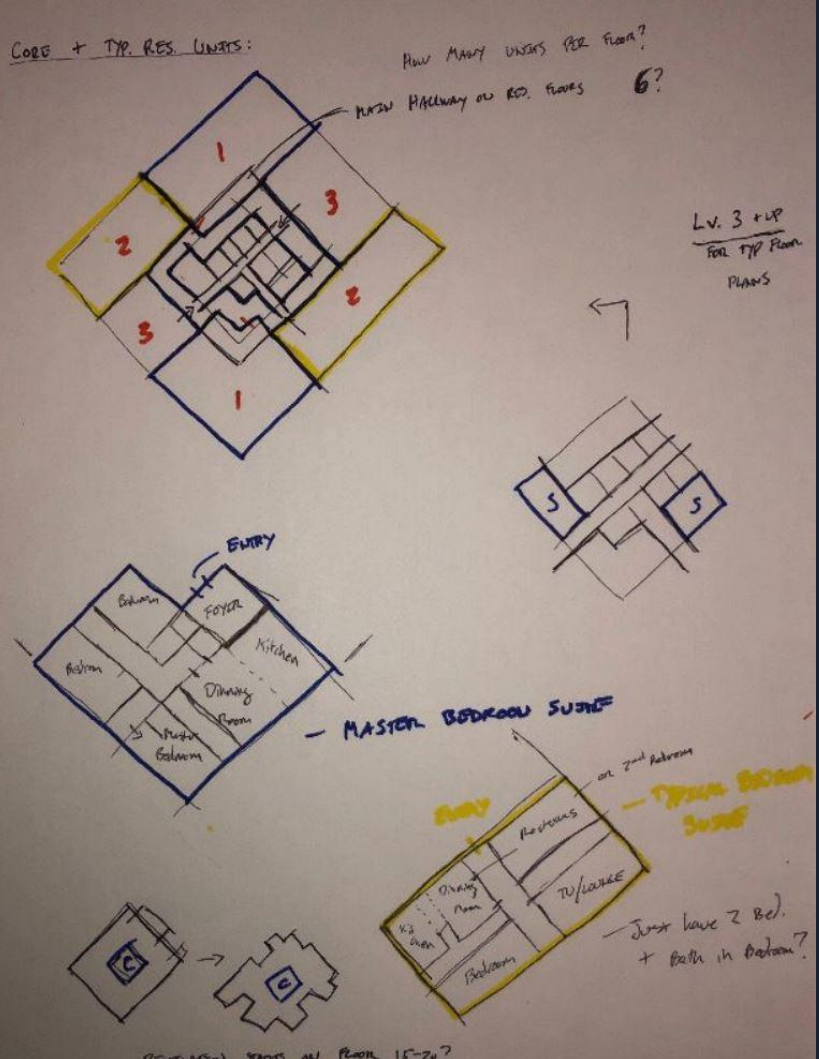
These units would be flipped, and edited to fit into a floor plan as desired.

First Analysis on units

- I wanted a system that multiple units could make up a floor plan
- A floor plan that could change its units from one to another
- A grid system that these units would fit into

Space Design Guidelines for Parametric BioSystems													
Programmed	Function	Qty	Length	Width	Area	Total Area	Lighting	View	Materials	Thermal	Ventilation	Acoustic	Other Characterisitcs
Typical Residential Floor													
Core:						-							
	Stairs	2	Ref sheet	Ref sheet	-	Depends on the floor height	Yes	No	Cast In Place Concrete	No	Yes	No	Floor heights will vary
	Elevators	4	Ref sheet	Ref sheet	-	Depends on the floor height	Yes	No	Steel	No	Yes	Yes	will be the same on all floors
	Storage	1	~2	~3		Depends on the floor height	Yes	No	Concrete, or whatever the walls are of the space	No	No	No	start on the basement floor
	Mechanical Shaft	1	~3	~3		Depends on the floor height	Yes	No	Steel, and conrete	No	Yes	No	end on the top floor level
Units:													
	Bedroom	1	10'9"	14'	Varies	Depends on the floor height	Yes	Yes	warm material	Yes	Yes	Yes	will vary if there is a master bedroom
	Kitchen	1	9'10"	7'8"	Varies	Depends on the floor height	Yes	Yes	warm material	Yes	Yes	Yes	Only will be a master bedroom
	Dinning Room	1	12'3"	21'5"	Varies	Depends on the floor height	Yes	Yes	warm material	Yes	Yes	Yes	if there is enough space
	Foyer	1	5'8"	7'9"	Varies	Depends on the floor height	Yes	Yes	wood pattern	Yes	Yes	Yes	
	Lounge or TV area	1	10'	15'	Varies	Depends on the floor height	Yes	Yes	warm material	Yes	Yes	Yes	
	Restroom	1	10'	8'	Varies	Depends on the floor height	Yes	Yes	warm material	Yes	Yes	No	
Lower Levels:													
	Lobby	1	-	-	-	Depends on the floor height	Yes	No	polished warm wood	Yes	Yes	Yes	
	Outdoor Pool	1	20'	15'	Varies	Depends on the floor height	Yes	Yes	Concrete	Yes	No	No	will be on top of the 2nd floor
	Rooftop gardens - green space	3	-	-	-	Depends on the floor height	Yes	Yes	grass, trees, plants	No	No	No	will be on top of the 2nd floor
	Public Restrooms	2	18'	14'	Varies	Depends on the floor height	Yes	No	tile, concrete	Yes	Yes	No	
	Parking	3 levels	-	-	-	Depends on the floor height	Yes	No	concrete, steel	No	Yes	No	
	Connection to Subway	2	-	-	-	Depends on the floor height	Yes	No	steel, light warm material	Yes	Yes	Yes	
	Stairs	2-3	Ref sheet	Ref sheet	-	Depends on the floor height	Yes	Yes	steel, finished with wood	Yes	Yes	Yes	
Pixilation:													
	Goes through residential area up to small top portion					Depends on the floor height			facade glass panels				Will try and be deigned in the
	Roof gardens					Depends on the floor height			facade glass panels				Facade phase
	Units - gardens					Depends on the floor height			facade glass panels				

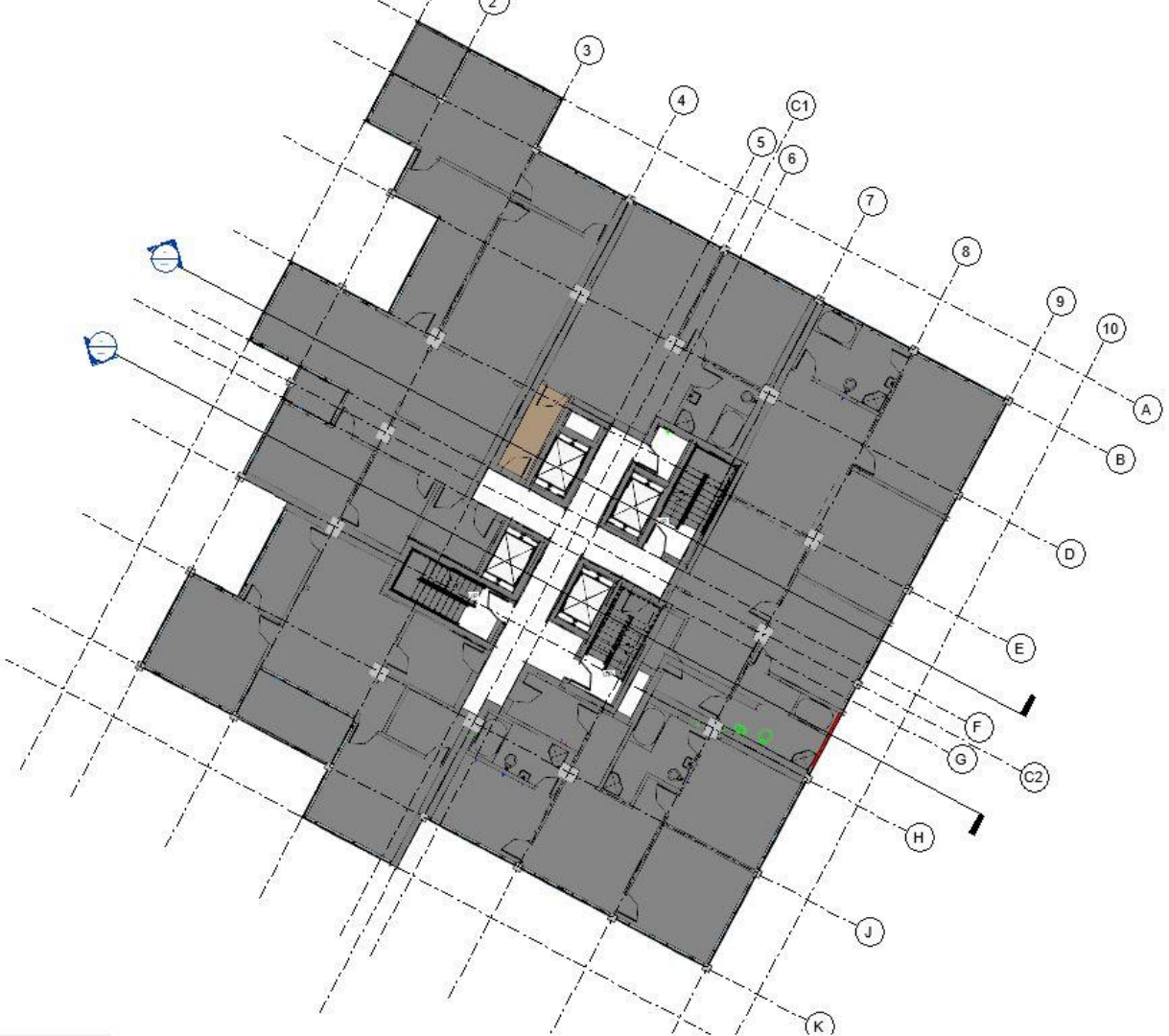

Lv 2.
PATIO
RESTROOMS
STAIRS
POOL
CORE TOWER
SOLAR PANELS?
BARBECUE STATION
TREES
ROOFTOP BAR/RESTAURANT AS WELL.
→ TOP 2-3 FLOORS OF TOWER
→ GIVES PPL A REASON TO EXPLORE THE WHOLE TOWER
4 ELEVATORS
STORAGE
MECH SHAFT
STAIRS
MAIN HALLWAY AROUND CORE
Lv 1.
CONVENTION & SUBWAY
STAIRS
VACANT (UNDER REV)
CORE TOWER
MAIN PEDESTRIAN ENTRANCE
LOBBY
RESTROOMS?
MAIN ENTRANCE (THROUGH ARCHWAY)
PATHWAY TO CORE OF TOWERS


CORE + TYP. RES. UNITS:
HOW MANY UNITS PER FLOOR?
MAIN HALLWAY ON RES. FLOORS
6?
1
2
3
3
2
1
Lv. 3 + UP
FOR TYP FLOOR PLANS
S
S
ENTRY
Bedroom
FOYER
Kitchen
Bedroom
Dining Room
Master Bedroom
— MASTER BEDROOM SUITE
— TYPICAL BEDROOM SUITE
Bedrooms
TV/Lounge
Dining Room
Kitchen
Bedroom
— Just have 2 Bed. + Bath in Bedroom?
C
C
RESIDENTIAL STARTS ON FLOOR 15-20?

The typical units would be called base units.

The base units would have all glass on the outskirts.

Designing the typical floor plan was challenging, but a typical unit could change to another unit by editing properties.



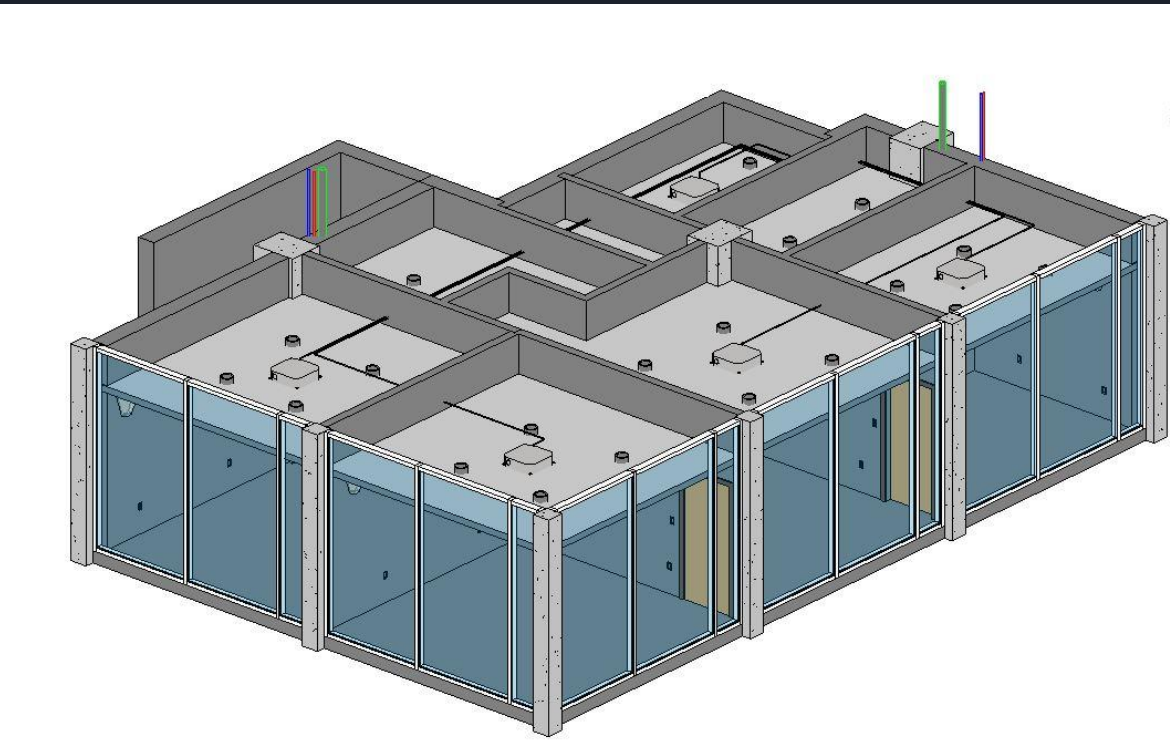
Medium Base Unit

The central core is created from the structural plan and then all of the units were created off of that plan.

These units would extend out on the exact dimensions of the struc plan as well as extend in.

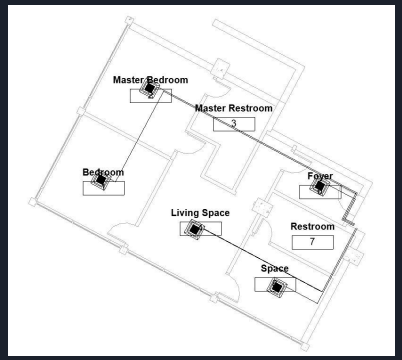
The units themselves would then fit into the core model perfectly, and could be placed into the correct floor plan spot

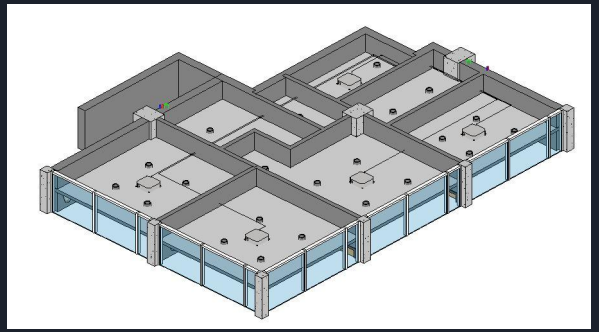
Each unit was inserted into the main model individually and then modified to fit the correct spot



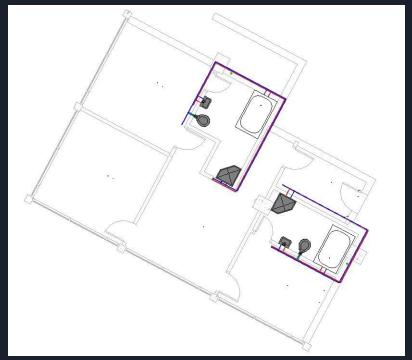
The Trades in the Medium Units

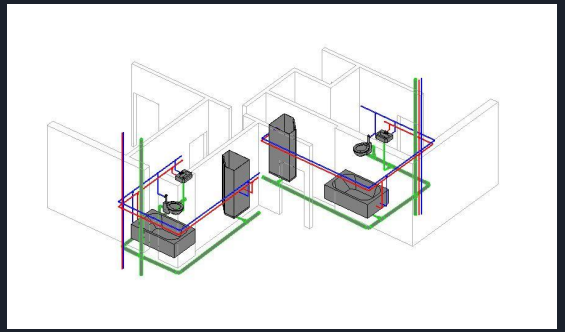
HVAC - Split System



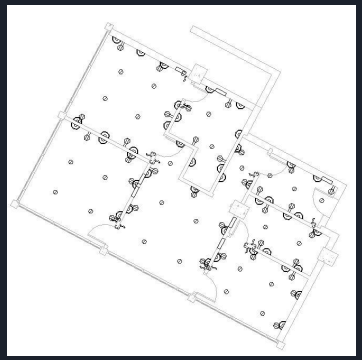


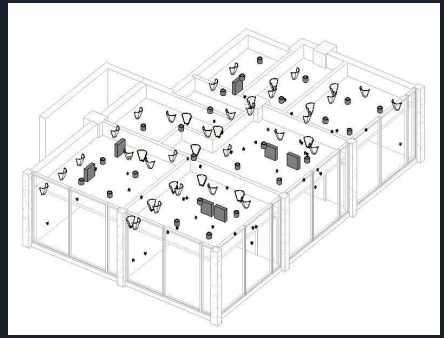
Plumbing

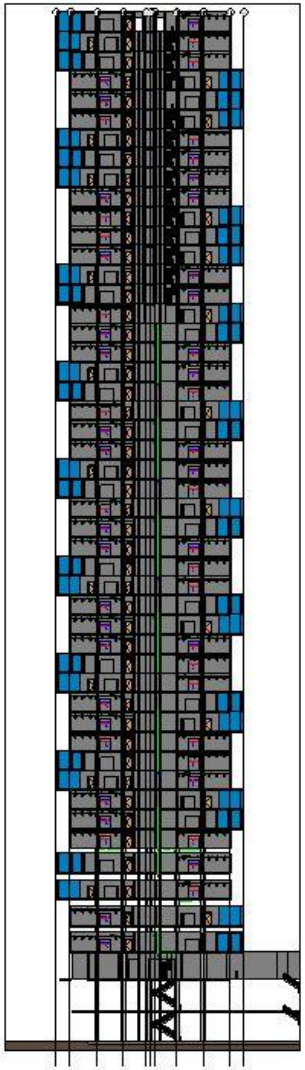


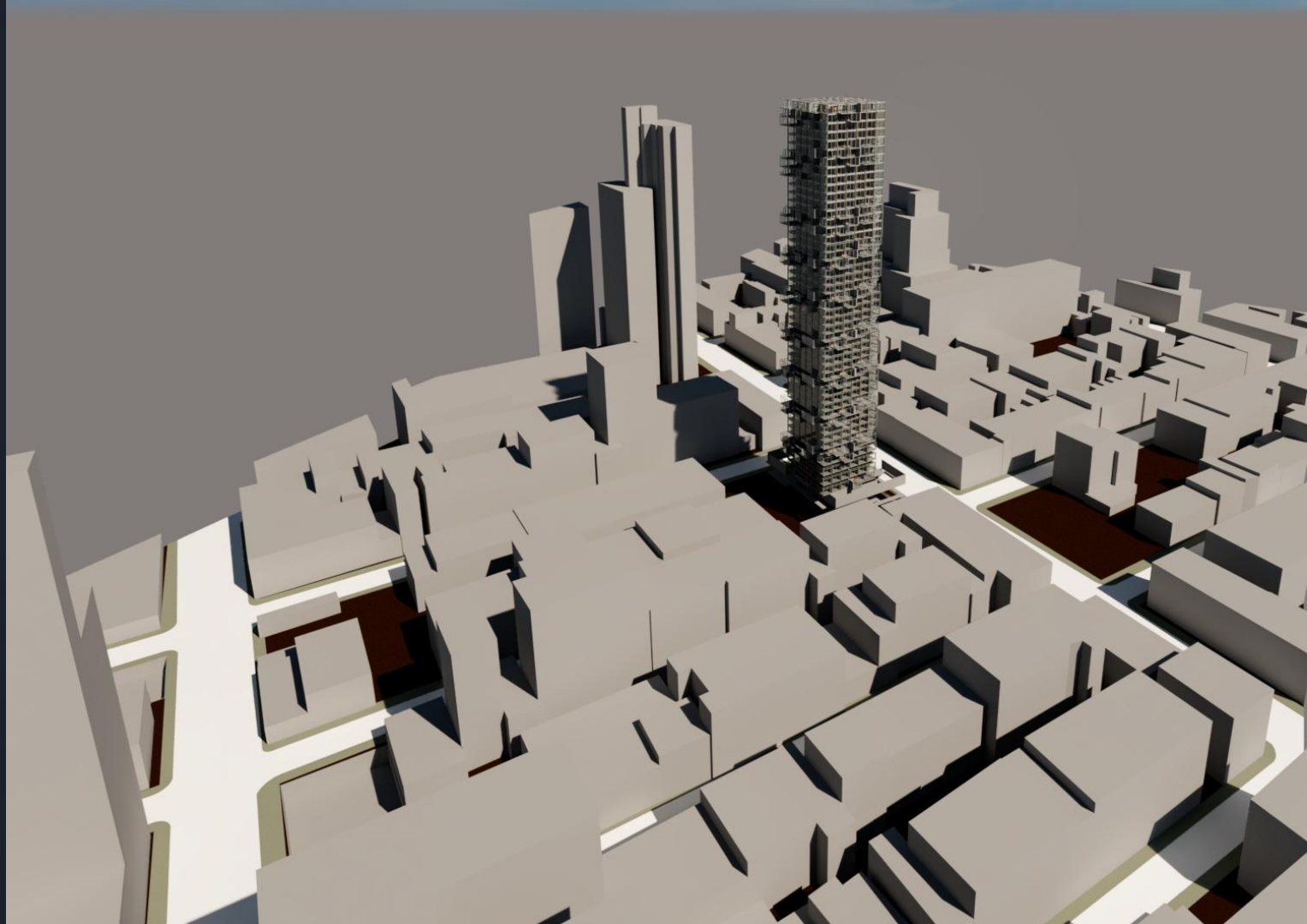


Electrical







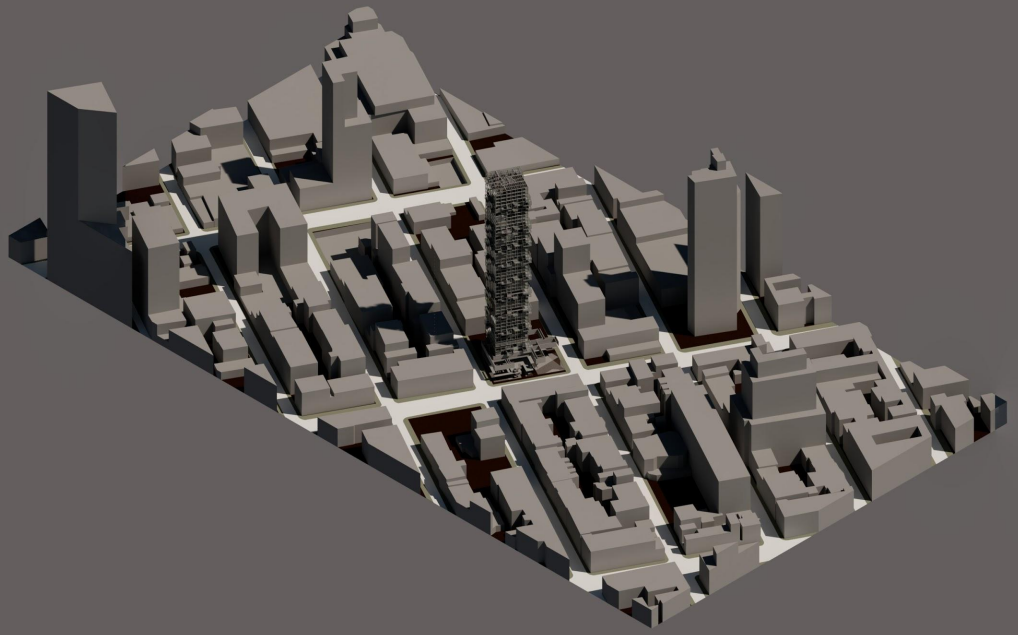


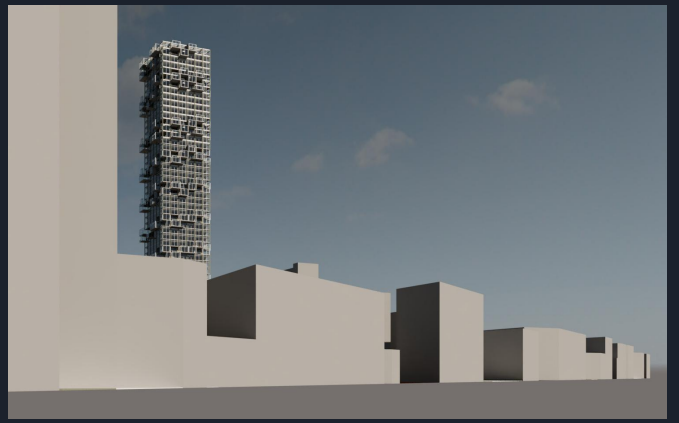
Positives of the project

- Learned how to collaborate using the cloud in BIM 360
  - Learned and practice how to coordinate models and nest models within each other
  - Collaborated with other people
- Modelled and analyzed the main trades
  - Mechanical, Electrical, Plumbing
- Created a skyscraper consisting of a complex, nested system
- Hands-on experience with visibility graphics allowed me to improve this skill
- Became more aware of the great importance of the trades when designing the building

Lessons Learned

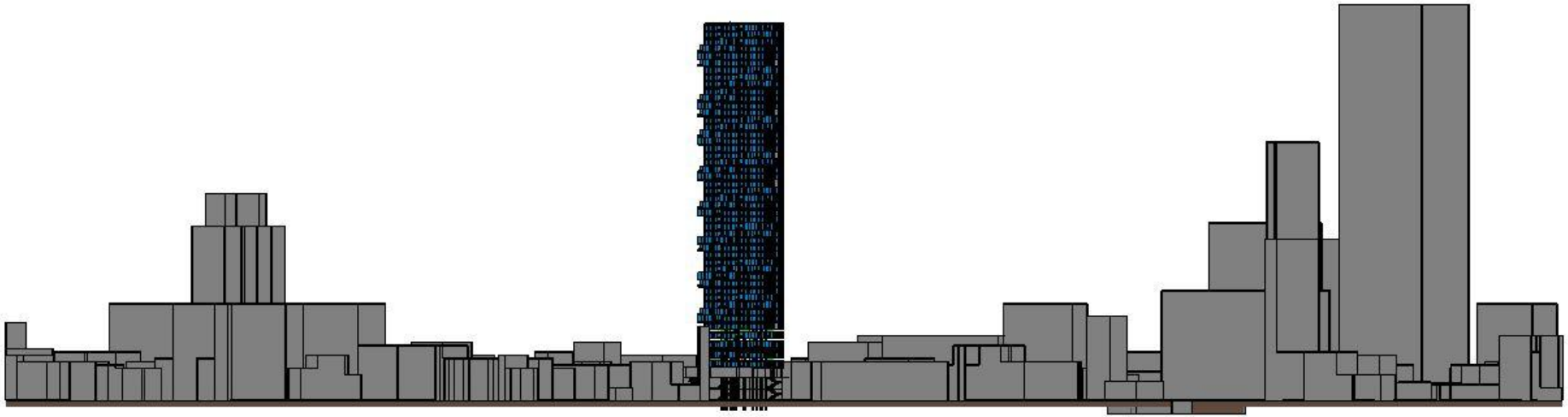
- Make sure that you plan out multiple units ahead of time
- Allow extra time to model and deal with IT issues
- Make sure you understand what you are coordinating before you put it online. There is a whole process for this. Do not move forward unless you follow the process.

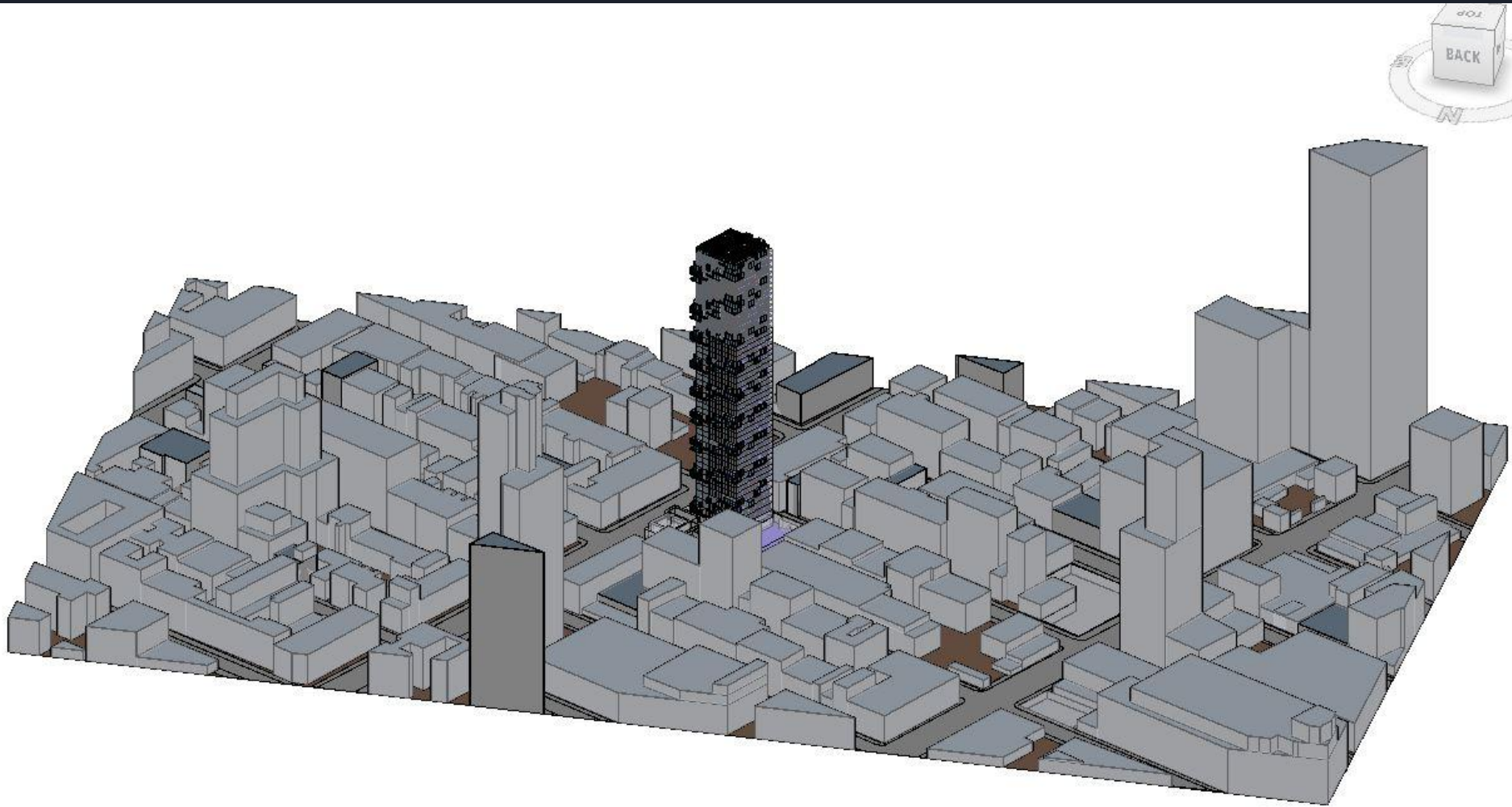




Final Thoughts

Thank you Glen for teaching an amazing class. I have learned so much.




TOP
BACK
N