



growth without expansion

utilizing space we already have


by:
Paul Flotterud

growth without expansion

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

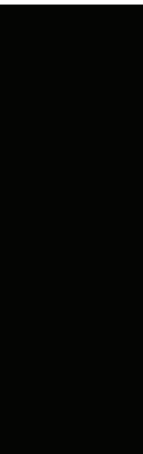
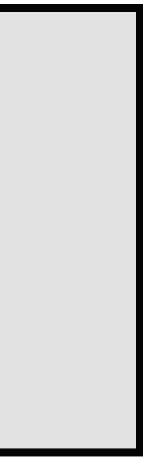
By
Paul Andrew Flotterud

In Partial Fulfillment of the Requirements for the Degree of
Master of Architecture


Primary Thesis Advisor


Thesis Committee Chair

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This Thesis will look into the underutilized and often overlooked land resource above built cities. The air space above our structures and roads is a frontier that rarely is tapped into. In an attempt to counter urban sprawl and strain on infrastructure this project will focus on revitalizing downtown as a livable, workable, and enjoyable place to be, while providing it's population easy access to ammenities and services within the city.

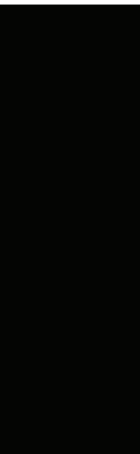
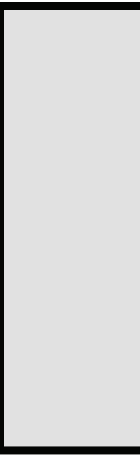
This project will feature new residential condominiums within the downtown of Rochester, MN. Targeting empty nesters looking to leave the hassles of home maintenance and enjoy the downtown lifestyle. The goal is to minimize the footprint on ground level while utilizing unused airspace above existing structures without impacting the existing structures. Upon completion the project will showcase an alternative to the sprawling city.

Keywords: walkability, residential, urban sprawl, density, Rochester, condomium, Minnesota, urban

How can space above inner-urban structures be used to revitalize downtowns, and increase density and value while reducing urban sprawl?



Statement of Intent



typology

Residential condominiums

claim under investigation

Design taking advantage of existing space in urban areas as an alternative to urban sprawl.

supporting premises

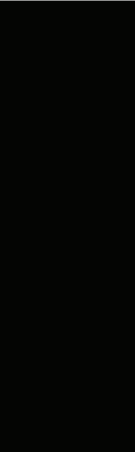
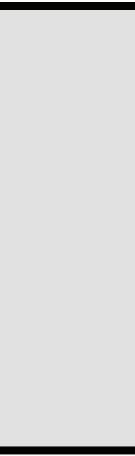
1. The built environment influences how people interact with space, each other, and nature.
2. Cities are always changing. The built environment must react to the forces driving change; population, disaster, resources, economics, politics, etc...
3. Cities must manage the built environment in response to changes in said forces
4. A respectful and conscientious approach should be taken when working on the project site. Taking into account the history and existing architecture of the region and it's surroundings.

theoretical unifying idea

This project looks to utilize the voids in and above the built city, increasing density without increasing the footprint on the land, while respecting the existing structures, functions, and aesthetics of the city.

project justification

The current trend for growing cities is to expand outward. This increases commute times, consumes valuable land, and decreases the walkability of cities. Extending infrastructure and scattering amenities results in substantial costs monetarily, increases the use of vehicles, and devours our natural resources. (Barnett, 2003)





The Proposal

Rochester is a city of 100,000 people. There are numerous cities of similar size that are at a tipping point in their growth and development. The downtown centers of the cities have become a core area for jobs and employment; However, there is a lack of housing and amenities in the downtown. This forces residents to move to the suburbs. Having the majority of the population outside of the city center means more commuting, more traffic, more parking problems, more air quality issues, and the biggest issue is this forces the city to spread amenities and services further apart. Services being separated discourages walkability. It also means that cities need to build redundant amenities to service the population. Building and maintaining redundant facilities means the funding is spread out reducing each location's funds. This is why it is essential to revitalize the downtown area. Increasing population density will lead to improved amenities and services. The catch 22 is that in order to get the people to live downtown, the amenities need to be better and easier to access than those currently in the suburbs. This thesis is looking into the different avenues and possible solutions to this problem plaguing growing cities.

Rochester is a unique city. It is the headquarters for the Mayo Clinic, which is the largest medical provider in the region. Over 30,000 employees come into the downtown to work for Mayo everyday. The majority of these employees live within 30 miles of Rochester and commute daily either by car or on one of the many shuttle busses that travel to the surrounding towns. Rochester is also expanding at an incredible rate. New developments are popping up on the outskirts along with a new shopping center on the south end of the city. Rochester is taking measures to encourage residents to come back to the downtown, by making free weekend parking and holding street festivals throughout the summer. The city wants to see improvement and the Mayo Clinic can become the driving force behind these improvements.

This thesis will be taking advantage of the large employment in the downtown area, focusing on residential construction to become the catalyst for reviving the downtown. The main issue I see with Rochester's downtown is a lack of housing to keep people there round the clock. Well over 30,000 people come in the morning and leave by 5 p.m. making the downtown devoid of life after work. There are a number of restaurants and bars which bring some into town during the evening, however there is almost no reason for families and those not interested in bars to be downtown. There need to be attractions and services for a broad spectrum of people to create a successful and diverse population.

I attribute the lack of housing downtown to a lack of services provided within walking distance. Currently if people live downtown they must still drive to satisfy basic needs for food and recreation. The problem is that these services will never come back downtown unless there is a population large enough to support such services. Either the services must move downtown or the people must, but either way the other will be sure to follow suit. I have chosen to build residential condominiums downtown. Maintaining a more consistent population downtown will lay the ground work for larger city projects to improve the downtown. These improvements will make the downtown a desirable place to live providing the funding for more services and housing projects.

I see this project as a small stepping stone in the bigger picture for Rochester's future. As it stands the city can either sprawl outward stretching its funding and population apart, or it can focus on revitalizing the downtown's housing and parks. There are many cities facing this same dilemma across the United States. There is never one single solution, but this thesis will be detailing one possible solution to urban sprawl in up-and-coming cities.

The project will be targeting couples looking to downsize or a second home near the Mayo Clinic's facilities. Apartments and condos with luxury finishes and amenities are almost nonexistent in the area. This project will fill that void.

The project will be privately owned by investors or developers.

The housing project will be a prototype and proof of concept for future development of inner-urban projects.

Possibilities for additional projects similar to this one could be targeting university students, low-income housing or offices.

Each living unit should have access to one parking space nearby. T

Targeting empty nest couples the complex must cater to their needs. Doctors and staff looking for a home nearby when on call or medical patients who must come in for routine tests and therapy may choose to rent a unit for its close proximity and connectedness to the Mayo system. Therefore access must be assured for limited mobility as well as having safe spaces for them to spend their time.

Talking with several locals has revealed a need for independent retirement living. Mayo employs hundreds of doctors averaging over \$200,000 a year with some wages peaking over \$800,000. Having a home one block away from work could be enticing for doctors who are on call regularly, consultants, or teachers at the clinic. They are also in the heart of downtown reducing the amount of driving needed to find entertainment and activities.

major project elements

Residential

Condominiums	Targeting empty nest couples and professionals
Circulation	Public/Private Access to skyway system
Mechanical	Using the minimum amount of grid energy
Swimming Pool	Resident access only
Fitness Area	Resident access only
Outdoor Spaces	Private and community patio
Community Flex Space	Can be rented for events and parties along with the large outdoor patio
Restrooms for Public Access	Services and maintenance for public spaces
Management Office	Main office for the building complex, and Mail pick up
Parking	Contract nearby parking ramps

Figure 1

Rochester, Minnesota is a city at a crossroad; along with hundreds of other cities of similar size across the nation. The population has reached a critical point where expanding away from the city center no longer is beneficial to the people or the city. Rochester must either develop new centers to service the sprawling communities or focus on revitalizing the historic downtown and increasing the density within the current city limits.

Figure 2



Figure 4



Figure 3



Figure 5

site information

Minnesota

Minnesota has a population of 5.3 million. In the North is the boundary waters and to the South it is part of the midwestern bread basket of the world. The two largest cities are St. Paul and Minneapolis with the later being the state capital. It is also home to a world renowned medical research and care facility known as the Mayo Clinic, which resides in Rochester, MN.

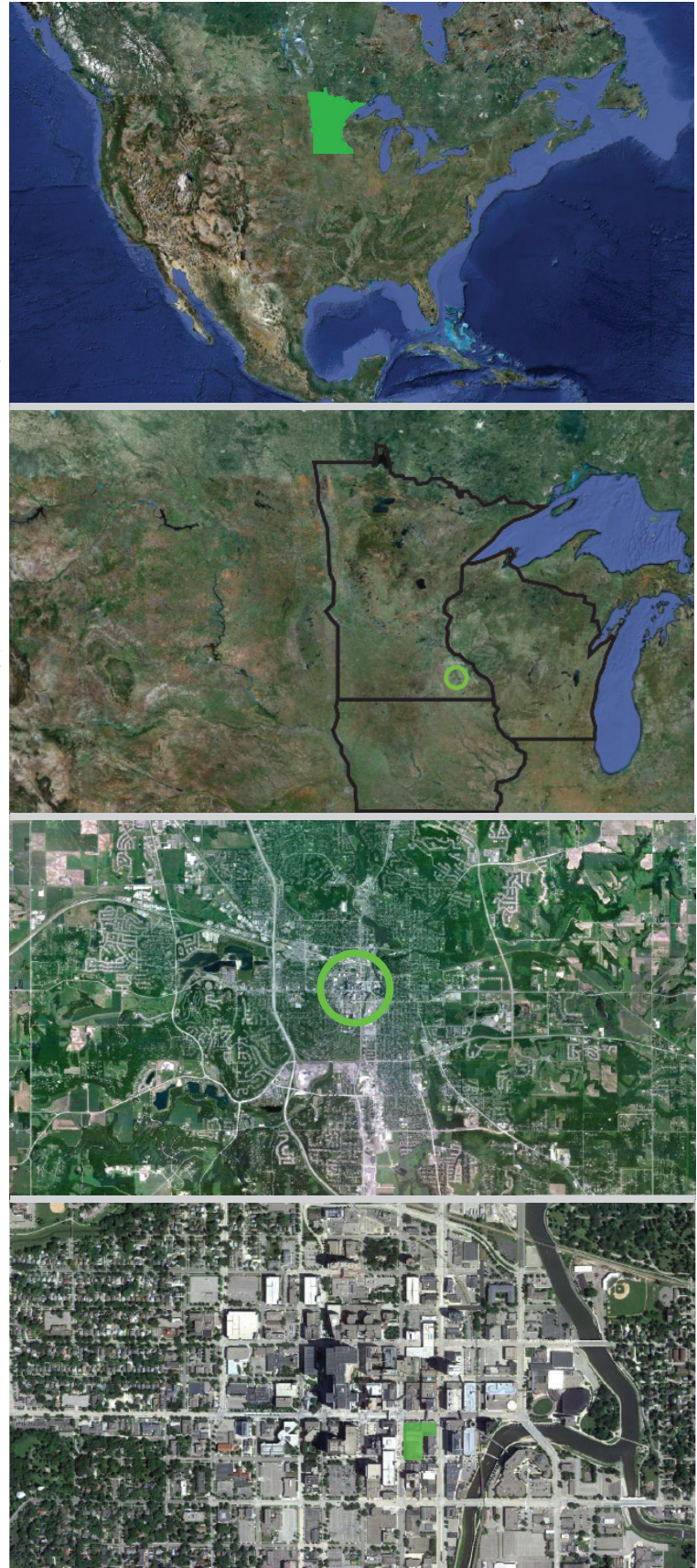
Rochester

Rochester has a little over 105,000 people and is the headquarters for the Mayo Clinic System. The Mayo Clinic employs 30,000 people in downtown Rochester alone. It is a quickly growing city that sprouted out of farmers fields when the Mayo Clinic built its first building here. The city has 3 main centers: The downtown, the Apache shopping mall just south of downtown, and a new big box store shopping development on the southern edge of the city. The city is built around the Zumbro River and its tributaries. There are 2,450 acres of public parks area maintained by the city, including 27 miles

2nd Street and 1st Avenue

This location is home to several old 2 story brick buildings housing restaurants, bars, and offices (see figure 5). It is also 1 block away from the Mayo and Ghonda Buildings which are two of the primary facilities for the Mayo Clinic and the core of the employee population.

Figure 6 Maps of Rochester, MN



Source: Google Maps

project emphasis

The emphasis of this project is designing usable space in pre-developed urban areas, maintaining the human scale and personality of the city, and not disturbing existing historic structures or empty lots. Key issues will be identified to urban sprawl and their causes, while developing solutions to the problems. The ultimate goal of this project is to find solutions to revitalizing struggling urban centers.

research direction

Research for this thesis will encompass many ideals. the theoretical premise and unifying idea will become the driving force for all research to follow. The project typology, residential condominiums will develop from market research and needs assesment of the site. The site is chosen based on key facets of the unifying idea: pre-developed urban area, small footprint, and increasing density, which will allow such a project to be feasible and successful. The site, structure, and codes will inform many design decisions. Keeping in mind the human needs and nearby buildings. The programmatic requirements must respond to all of these influences culminating in a complete project.

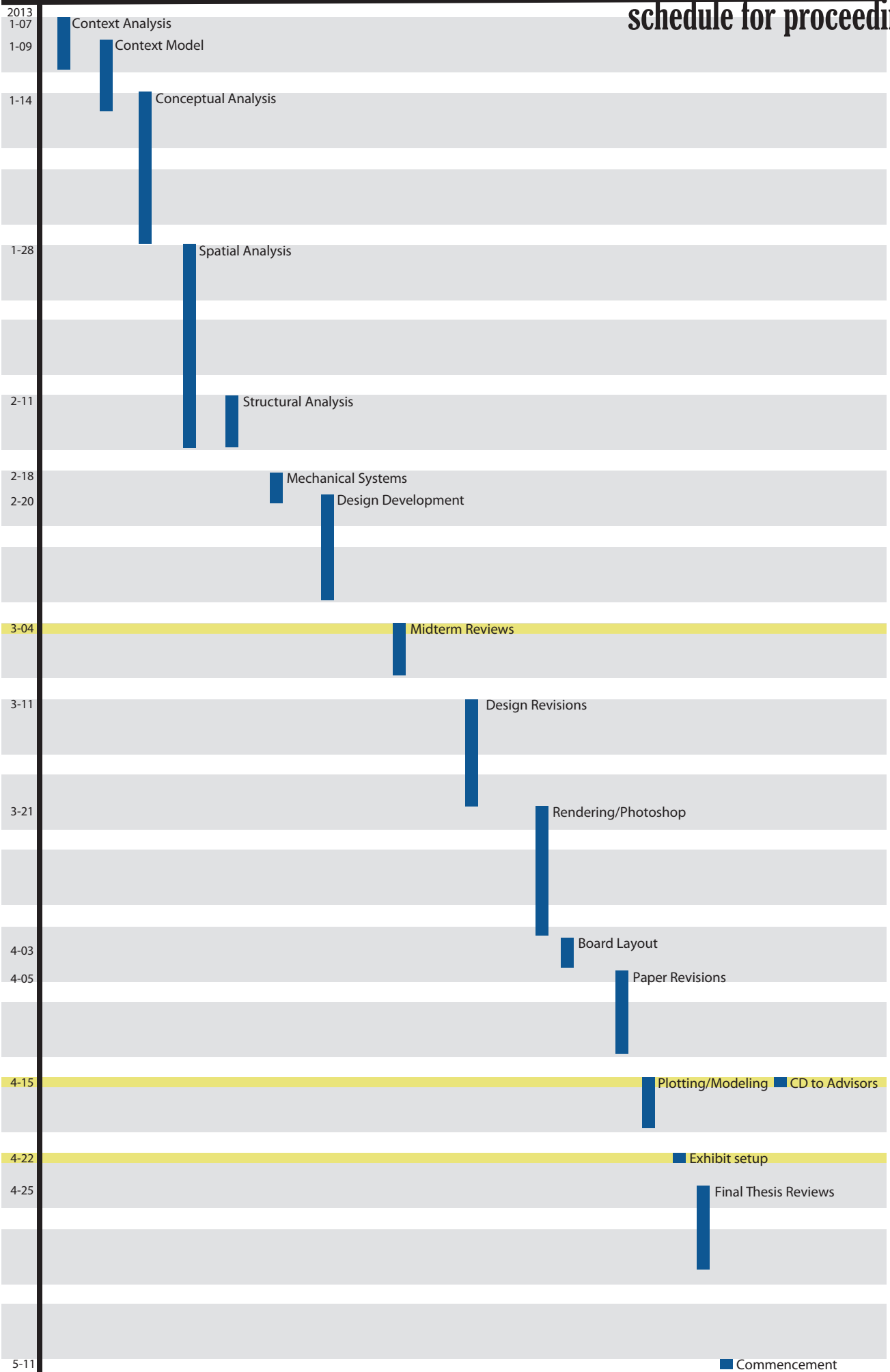
design methodology

The design methodology will be a mix of qualitative and quantitative research data. Analyzing graphic, text, and observable data will be the driving forces behind all design decisions made in the project. Combining qualitative and quantitative information will provide the most well balanced analysis of the theoretical premise.

documenting the design process

Documentation of project development is a critical aspect to the thesis. Sketches, schematic design, and models will be compiled and stored digitally within the NDSU library system. A physical collection of works will also be maintained by the author and available upon request.

schedule for proceeding



2009

Fall -Heather Fischer-

Teahouse -Fargo, ND
Boathouse -Minneapolis, MN

Spring -Joan Vorderbruggen-

Sustainable Dwelling -Cripple Creek, CO
Bird House -for Birds
Montessori School -Fargo, ND

2010

Fall -Steven Martens-

Archeology Museum -Marmath, ND
Agricultural Research Center -Fargo, ND

Spring -Paul Gleye-

Sporting Goods Retail Store -Fargo, ND
Firestation Headquarters -Fargo, ND

2011

Fall -Bakr Ali Ahmed-

Highrise -San Francisco, CA

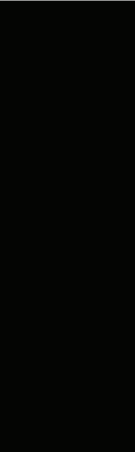
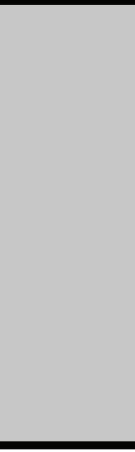
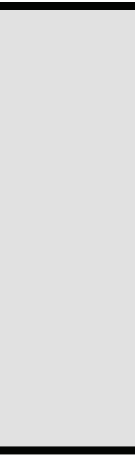
Spring -Donald Faulkner-

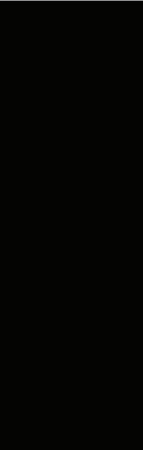
Nordic Consulate -Fargo, ND
Urban Masterplan -Kindred, ND

2012

Fall -Mark Barnhouse-

Water Research Lab -Linton, ND





Theoretical Research

Cities all across the United States are facing a dilemma. The population is moving from rural areas into cities. By 2005 the United States had 81% of its population living in urban areas (Infobase Limited).

“...The sprawling postwar metropolis has reached its limits, viable downtowns may be in a position to solidify that role. This means that downtowns must find their niche, both within their region and in the new international economy. The need to cultivate dense concentrations of businesses...”(Lang, 2003).

Whats wrong?

This puts a lot of strain on cities to keep up with the large population increases. Transportation, sewer, water, and power are some of the biggest concerns. The city infrastructure is aging and deteriorating while the production and demand for them has gone up.

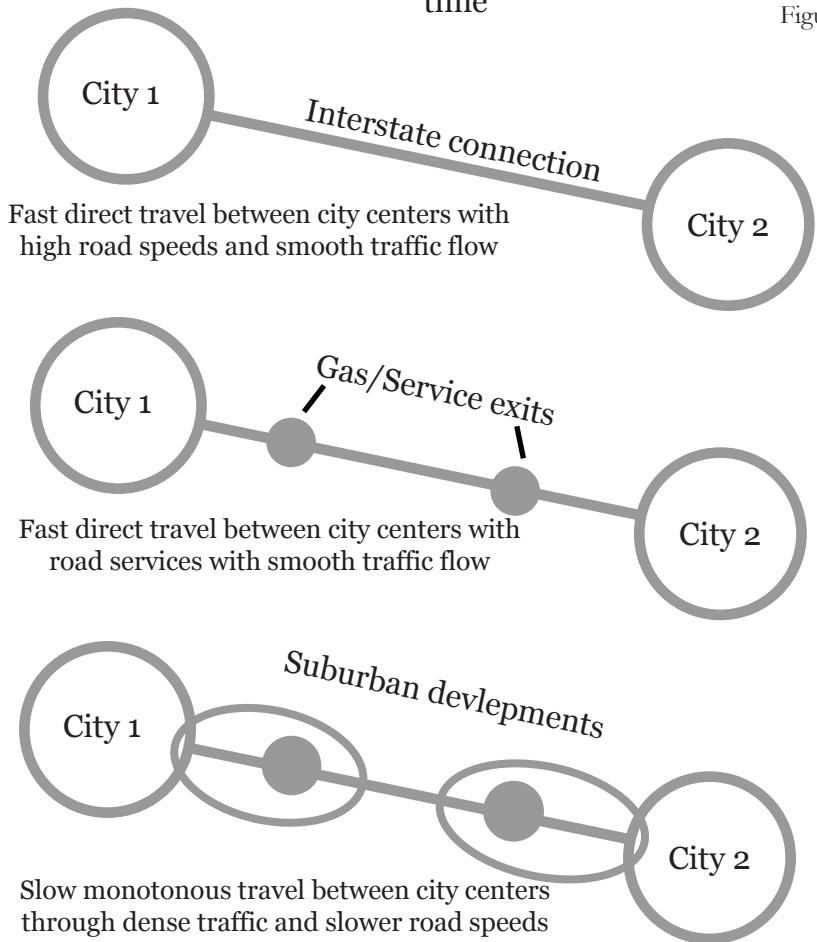
The way that many cities have handled this population boom is to simply expand outward. Building new housing projects on the outskirts of town provides the housing for all the people who work in the downtown area of the city. This plan works well until the transportation services are no longer able to handle the influx of people during the workday. This results in many businesses moving out to the suburban housing districts to escape the congested downtown streets. Now we have the people and the jobs on the outskirts of town dragging with them all the shopping destinations out of the downtown. This effectively strangles the downtown from everything it needs to survive and be successful.

There is no longer any reason for someone in the suburbs to go to the downtown. This leaves the downtown vacant and subject to decay. It is ironic how the exact thing that created the downtown is what ultimately kills it. Population increase builds the city up until it reaches a critical mass expanding outwards, slowly killing the center as the outskirts flourish. The process is very similar to how trees grow with the outer layer carrying all the nutrients as the inside creates the structure to support the rest of the tree.

Before I can begin to find a solution to the problem I need to break down why people leave the downtown and what is needed to bring them back downtown.

Interstate system development over time

Figure 7

**Why did all the people go?**

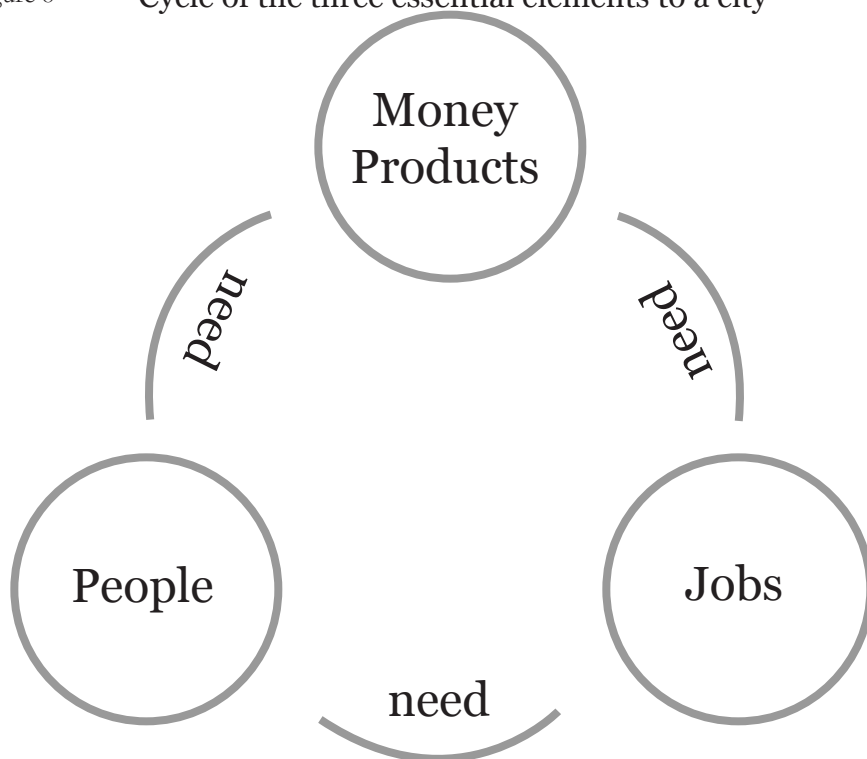
Technology has aided the sprawl across the United States. The advent of email and video conferences no longer requires corporations and businesses to be within close proximity to their manufacturing and sales areas. The businesses quickly discovered that lower overhead costs and rental rates can be found on the outskirts of the city. This brought the jobs outside the city requiring everyone within the city to commute out for their work. This trend is a total reversal from 60 years ago. The exodus out of the city had begun in the search for jobs and a home with a yard. Little thought was given at the time to the side effects of such a move. Oil prices were low and everybody was able to afford cars, making the commute to work a non-issue. The American dream after WWII had changed towards home ownership and family life. No longer did dad have to work in a mill or factory. He now had a desk job and a shiny new car to get him there. The benefits of home ownership did not come hassle free either. The maintenance and modifications never end when owning a home.

These factors are what drive some people back into the city for retirement. Less driving and entertainment and friends are just blocks away. Owning a condominium or renting apartments also removes the constant maintenance issue that is associated with traditional home ownership.

Side effects of suburbia do not stop at home and travel issues. Larger scale problems have come to light especially in today's economic uncertainty. Problems like Who is responsible for paying for all the upkeep of these sprawling roads and infrastructure systems? Who will pay to take care of the hungry and homeless? How can the police force safely cover such a large area of population?

Over the course of my research I have collected several scenarios showing how sprawl can have negative effects on our cities. Traditionally these costs have been lumped into business taxes in the city centers. Now that the companies have moved outside of these tax areas nobody is paying so the government has been footing the bill by borrowing and slowly cutting programs. The lack of funding for these programs ensures their failure. Public transportation is one of these programs in many cities. The denser packed the businesses and homes are; the shorter the routes and more consistent service is provided. The thin coverage and inconsistency of public transportation has driven most people to drive themselves in a car, leaving public transit for the poor and underprivileged, further exacerbating the situation. The only way to fix the problem is with more funding to provide more routes and more regular service to areas. Without the ridership, however, the city cannot justify spending more on an underutilized system. Many cities are spread so far that there is no economical way to provide public transportation to any destination. Some cities have found a way to solve a few issues similar to this one.

Figure 8 Cycle of the three essential elements to a city



How do we bring people back?

Sharing tax revenues is something that Minneapolis and St. Paul, MN have enacted. Property tax is now skewed towards the location in which the tax is derived. In metropolitan areas 60% of tax revenues go to the local municipality and 40% goes to the other metro area jurisdictions. A regional approach to the same system is used by nearly every European metropolitan area and Portland, Oregon. These regional approaches to taxation force jobs closer to the city center and protect the rural land surrounding the cities (Leinberger, 1992).

Following is a study done on companies that have left city centers to move to the suburbs, comparing them to their comrades who stayed behind in the city. The reasons for leaving can be tracked back to one thing, money.

“The trade-off many companies face is either moving to a suburb with lower costs and fewer social problems or staying the in the high-cost center city with overwhelming social problems. It is not hard to see that moving out makes more sense economically” (Leinberger, 1992 p. 38).

The study was conducted on 74 companies in New York by William Whyte. Thirty-eight companies had left the urban center while thirty-six had stayed downtown. Of the thirty-eight that left, Seventeen of those companies had been bought out or merged and completely lost their identity. Whyte then tracked the stock values of each company and calculated their average increase. The average for the leavers was 107% from 1976-1987. This is good compared to the 93% of the Dow-Jones Industrial average. The thirty-six companies that had stayed in New York however increased 277% over the same time frame. It is difficult to tell if the leaving companies were already on the decline prior to leaving or if leaving somehow affected their company in other ways (Whyte, 1989). Either way the companies that stayed did quite well compared to their counterparts who left the city. Today many people choose their products based on more than just the qualifications of the product, but on the social responsibility the company producing the product has as well. This could be one reason why inner city companies did well because: they are more personally connected to their clients, which in turn buy from them rather than the outsourcing competitor.

The mass exodus of the city center is beginning to reverse once again with land and home values plummeting in the inner city because of neglect and blight. Once abandoned warehouses are being renovated into upper-class apartments and condominiums. The same technology that allowed businesses to leave is now bringing the people back to the city. Many can now do the majority of their work from home and only need to visit the office a few times a week or may not even have an office building anymore. The big companies leaving the city centers opened up a void in the market place allowing small businesses and entrepreneurs to fill the void left by the deserting companies. Many of these small businesses will fail, but those that succeed will become the catalyst for revitalizing the downtown.

“Exurbs arose as a low-density, upscale residential ring between older suburbs and rural areas. Major retailing then found a new home on the highway, signaling a far more fundamental shift. Within a generation, suburbs attained economic, social, and demographic parity with cities, often supplanting them. Yet suburbs have maintained a distinct pattern even as they have become more urban in function” (Lang, 2003).

The once open and spacious interstate from city to city becomes a congested parking lot with development all along the interstate making the trip to the larger downtown areas longer and more frustrating than before. People slowly stop coming downtown all together because all they need is on the outskirts along the interstate and the hassle of getting downtown. There are several ways to get around this which I will cover after going over the other issues facing downtown. Refer to figure 7 for illustration of this process.

“Alex Marshall puts it best in his book *How Cities Work*. We should recognized that the internal transportation sources a different purpose than the external transportation systems of a city. The layout of a region’s internal transportation will determine how people get to work, how they shop, how they recreate. how they live. The standard choice today of lacing a metropolitan area with big free-ways for purely internal travel means we will have a sprawling, formless environment. Simply getting rid of the freeways forget mass transit would establish a more neighborhood-centered economy and dynamic. But we don’t have to forget mass transit.”

Laying out train lines, streetcar tracks, bus lanes, bike paths, and sidewalks and forgoing freeways and big roads will mean a more place oriented form of living. Both the drawbacks and the benefits of such a style dwell in its more communal, group oriented form of living. You will have the option of not using a car. But to get this option, you have to accept that using a car will be more difficult” (Marshall, 2000 p.211-212).

Marshall goes on to discuss the impact that people have on the built environment. Many are under the belief that it is the individual land owner who is responsible for how spaces are developed and built. The public has almost as much to say in the situation as the land owner however. Through government regulations, taxes, zoning, codes, and public forums the average person has the ability to shape their own environment. Transportation policies have as much or even more impact on how areas develop compared to the land owner or developer. Every house and building must have access to the public realm. Roadways, water, fuel, electricity, mail, education, the list goes on and on for the agencies who have an effect on the way cities are built. Following is a more detailed description of this interaction (Marshall, 2000).

Land cost is huge when it comes to development. Generally it is much cheaper to buy up farmland on the outskirts of town and build shorter cheaper structures to house jobs and families compared to in-filling the downtown area where land is harder to come by. This issue is one of the major challenges my thesis hopes to conquer. Denser urban areas have much stricter zoning requirements compared to most suburban lots. Many downtowns have enacted renaissance and historical districts inhibiting any new development beyond renovation in those areas. The paperwork and logistics of renovating can sometimes push businesses out to the suburbs where office space is cheap and easy to obtain.

Urban in-fill projects are proving to be more affordable in recent years. Many municipalities are offering tax credits and incentives to encourage in-fill projects. The projects typically are done to improve blighted areas. In many cases they are the catalyst to improving entire neighborhoods. One company in California has 19 projects in the works worth nearly 1 billion dollars. Demand is here for in-fill projects (Aragon). I feel that these projects can be taken one step further and find a home in denser urban areas as well.

Typology

This brings me to my typology for this thesis: urban residential. “He (economist Edwin Mills) finds that generally people dispersed first, followed by different categories of business, until even the highest-order economic functions had decentralized.” (Lang, 2003). The lack of downtown housing in Rochester is of concern.

The lynch pin in all the issues are people. Jobs need people; stores need people; recreation areas need people; they all need people in order to be successful. Yet Rochester has very little housing to keep people in the downtown area. The only thing keeping the downtown vibrant is the Mayo clinic employing 30,000 people in the heart of downtown (Mayo Foundation, 2012). The more people that are in downtown the better it will become.

“Being able to walk from place to place is also an advantage usually found only downtown. If one restaurant has an hour-long wait, what about the one next door? The phenomenon can be self-reinforcing; the more people come downtown for entertainment, culture. Or food. The better these offerings can become. The more inviting the downtown scene. The more attractive it is for offices and housing” (Barnett, 2003 p.207).

The more people who are regularly in the area; the more funding and attention it will receive. Attention also reduces crime rates and improves the appeal of the neighborhood a recent study conducted by Harvard and Suffolk University discovered (Bond, 2009) In 2005 researchers worked with police in Lowell Massachusetts to locate and experiment with crime hot spots.

In half of them authorities cleared trash, fixed street lights, sent loiterers scurrying, secured abandoned buildings, and enforced building codes on businesses. The other half they left alone as a control group. Researchers from Harvard and Suffolk University watched and compiled data on the hot spots and discovered a 20% decrease in calls to police in the areas where more attention was given. “In traditional policing, you went from call to call, and that was it – you’re chasing your tail, Now there appears to be a solid basis for a policing strategy that preemptively addresses the conditions that promote crime” said Lowell patrol officer Karen Witts (Johnson, 2011 p. 44). Urban sprawl spreads out the allocation of resources to projects which foster these attractive areas. Money received by gas taxes and municipal taxes are used for infrastructure, road projects, and special projects.

The further cities spread out the thinner the funds are to serve the area. Increasing the density of the town will focus the resources on key areas making them exceptional instead of just average.

Summary

The more money spent in the downtown, the better it will be, the more people will want to be there, the more businesses want to be there, making jobs, which makes people want to live nearby to work there, increasing the number of people using the space regularly, increasing the amount of funding used to make it even better, and the cycle goes on to repeat. This ideal situation only works if all the pieces fall together with the right policies, people, and budget (Barnett, 2003).

Many of these ideas require social changes and altering the way the public interacts with the environment. The sprawling city puts enormous pressure on the urban centers. Spreading out infrastructure and maintenance tasks across a much broader region divides the funding and resources for servicing them. This means that the infrastructure is no longer getting the proper amount of attention and protection. Failing infrastructure and services lure people to the suburbs where the newest construction is leaving the city center to slowly dwindle into blight and abandonment. If people never left the urban center all the funding and focus could be spent on upgrading the systems, but now they are forced to react to problems instead of proactively preventing them from ever happening.

Part of what caused this mass exodus of the urban center is the affordability of cars and the dreams of homeownership and more affordable property. The ever expanding housing districts soon became too large to stay walkable. The city began to develop around automobiles and nearly force people to drive to reach daily items and needs. Some drive over an hour every day just to get to work. Living this far away turns the 8 hour work day into a 10 hour day. This leaves about 6 hours a day to eat and enjoy your home. Time is truly the most limited resource we have. Spending such a large amount of it on commuting seems wasteful and foolish. To me it seems as though we as humans have put our objects and creations ahead of our own needs. Many cities are no longer built for humans but for automobiles. ment more suitably designed by the people for their needs.

People need to realize the power that they have in shaping their environment. From policies to taxes, the public still wield the power. Currently the way zoning and land use is laid out rewards the developers who are able to flex their political muscles in the political thickets surrounding it (Marshall, 2000). Simplifying and localizing policies will help to even the playing field while allowing more competition to enter the marketplace. There are many hoops to jump through which forces out newer competitors to the pre-established developing firms that have been able to twist the political environment to their favor over generations. Giving the power back to the people of that particular locality will result in an environment more suitably designed by the people for their needs.

My thesis will be a stepping stone towards bringing more people to the downtown as it is the most direct way that a single architectural project can impact this shift back towards the downtown instead of the suburbs. Increasing the density of the downtown will reduce the amount of daily traffic on roadways, because walking and public transit become much more enticing alternatives to driving to work. The ultimate goal is to steer the development of cities towards more sustainable and healthy environments for humans to live, work, and play in.



Typological Research

Marquette Plaza

formerly Federal Reserve Bank

250 Marquette Ave
Minneapolis, MN

Architect: Gunnar Birkerts & Associates

Square footage: 522,656
each floor is 36,000 open floor plans with no columns

Primary focus of case study: Structure and site development

The engineers used a catenary arched cable supported by the two end towers which served as the vertical circulation as well. The cable carried all of the weight of each floor leaving the entire interior column free. The center tower was used for lateral stability and vertical circulation to satisfy fire code. Figure 11 is one of the most informing drawings of the lot. The drawing shows the architect's original plan for expansion with a second arch creating an oval out of the primary structure members.

Originally the building was elevated two stories above the grade level. This suspended floor design is why I have chosen Marquette Plaza as a case study. The new renovation included a 1.5 acre public park on the parking structure roof, along with an expansion on the northern side of the building almost doubling the square footage. The expansion however also destroyed one of the most interesting aspects of the building.

The building became LEED Platinum after the renovation was finished, primarily because of their site development and energy saving measures, updating the interior lighting and water systems.

This case study is important to my thesis primarily for how the engineers elevated the structure over the site. One of my goals is to suspend my structure above the existing buildings. Showing one way to increase square footage in predeveloped areas without using much land at grade.

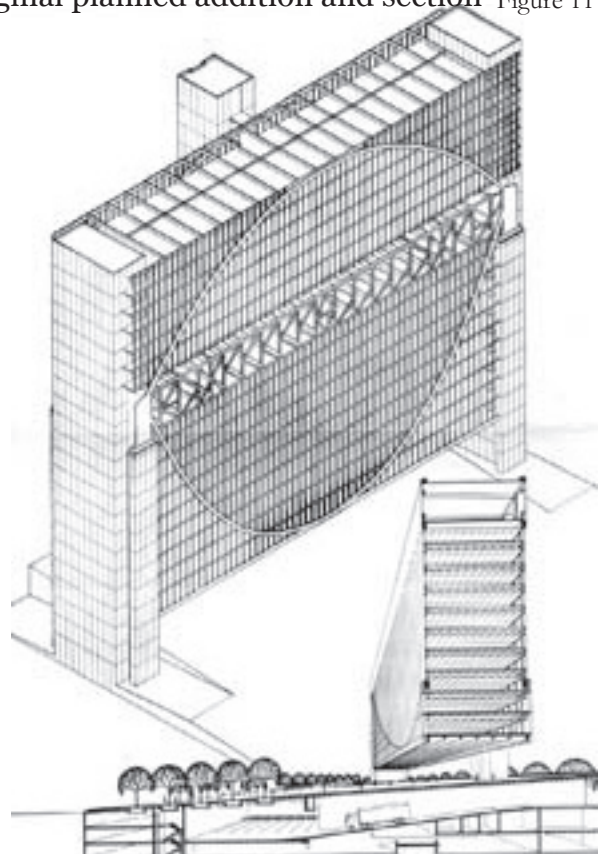
south facade Figure 9



north facade Figure 10
www.cgstock.com



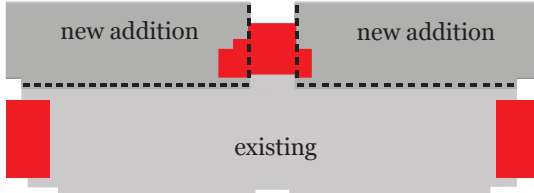
original planned addition and section Figure 11



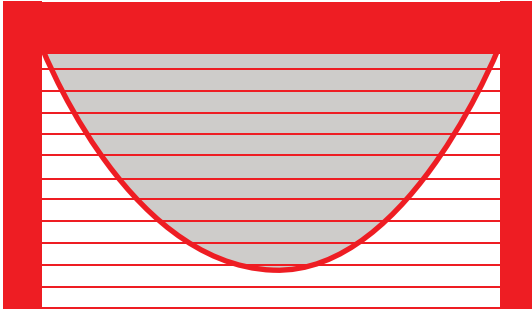
massing



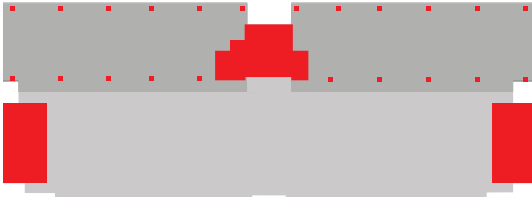
renovation/ vertical circulation



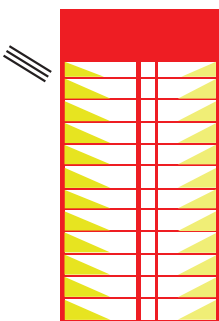
structure - massing



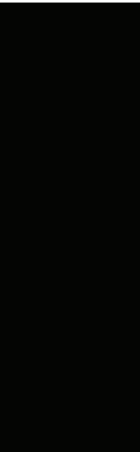
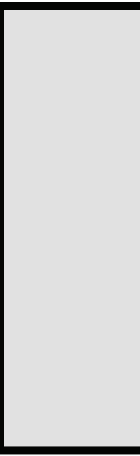
geometry



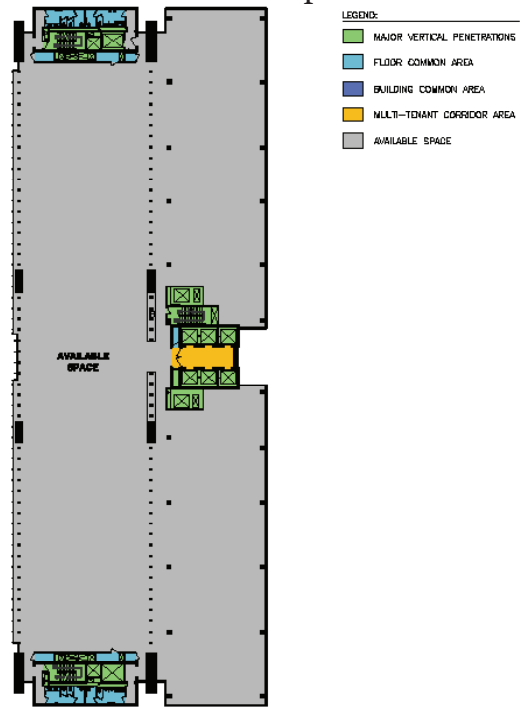
natural lighting



hierarchy



floor plan Figure 12

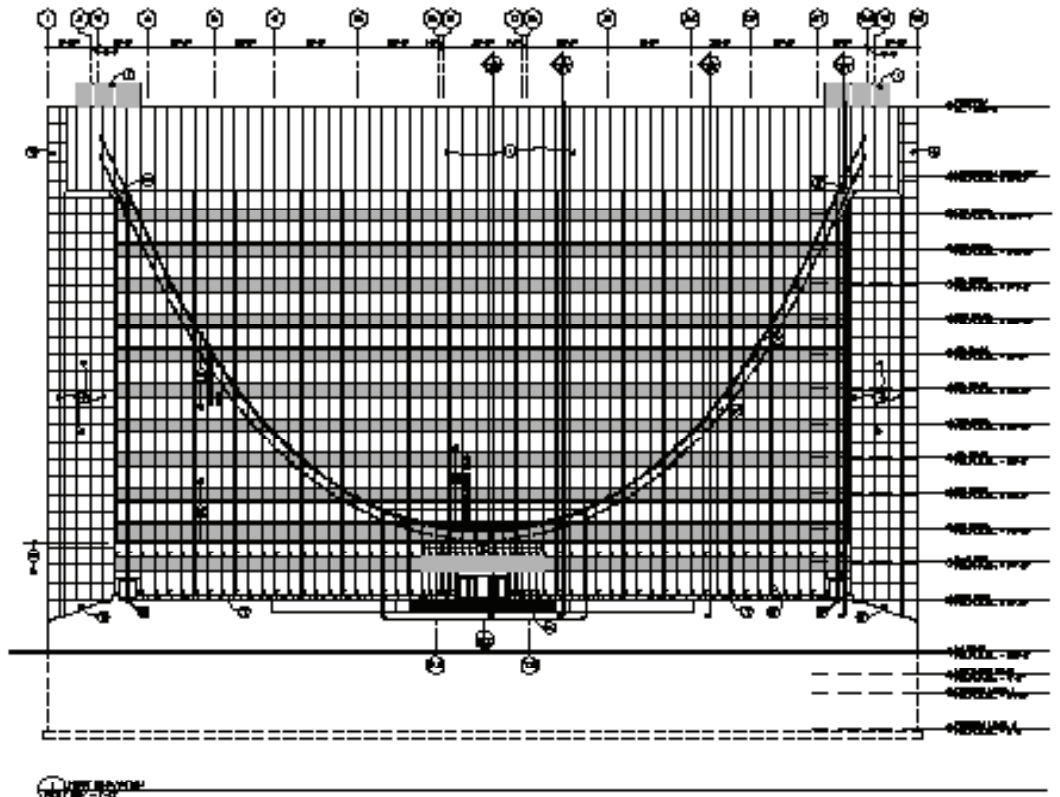


WALSH BISHOP ASSOCIATES, INC.
Architecture & Interior Design & Planning
910 5th Avenue South Suite 4000
Minneapolis, MN 55402 612.355.8728

PROJECT: MARQUETTE PLAZA
250 MARQUETTE AVENUE
MINNEAPOLIS, MN 55401
4TH FLOOR 04.17.08



elevation Figure 13



Romano Residence

802 ninth avenue
New York, New York

Architects: Cleanroom Inc Design Lab (David Winston)

Square footage: 522,656

13 apartments
 10 renovated
 3 new added

1 restaurant

Primary focus of case study: Historical renovation and addition

This case study is very similar to what I envision this thesis will be. The existing brick building was retail on the main floor with apartments above. The new renovation followed suit with a restaurant on the main floor and renovations on the existing apartments with two new apartments above the existing structure.

The most critical thing I focused on with this case study was how the new construction interacted and connected to the existing building. All of the new construction is set back one foot from the existing keeping the old structure as the primary focus as seen in the geometry figure following. The material choices also delineate the two different eras of building. The materials are also somewhat misleading as to the interior function of the spaces. The original apartments have been expanded out into the sliver of new construction.

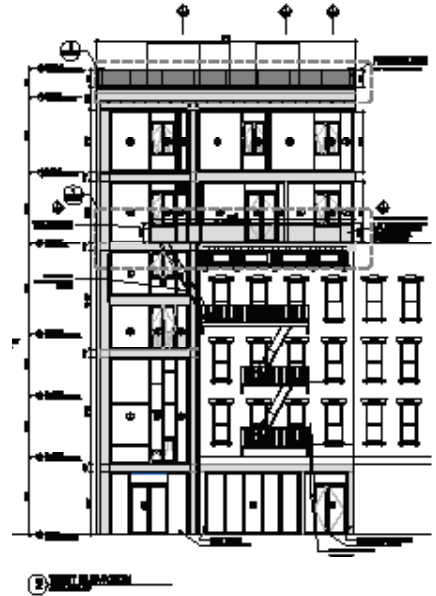
Figure 14 Romano residence photo



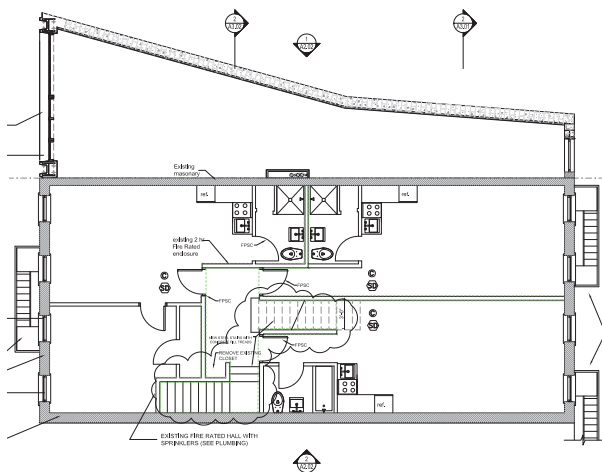
East (rear) elevation Figure 15



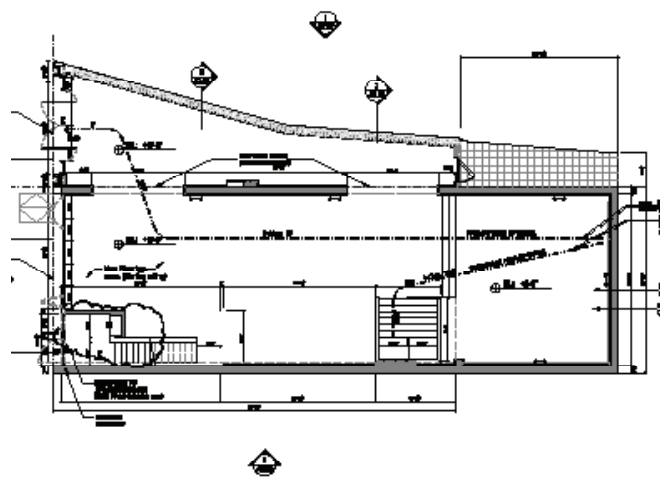
West (street front) elevation Figure 16



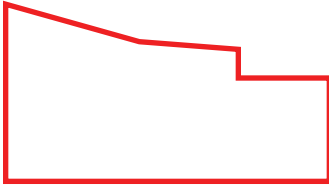
3rd floor plan



1st floor plan Figure 17



1st floor mass



geometry



The new construction is set back about one foot from the existing structure. This places the existing building in front and frames it, celebrating the history and petina.

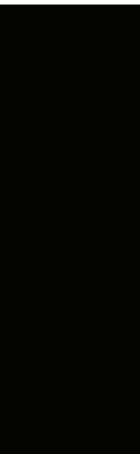
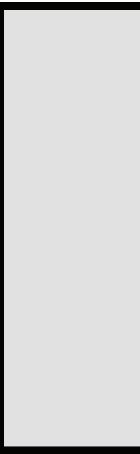
massing



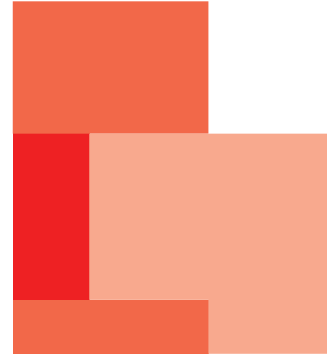
circulation



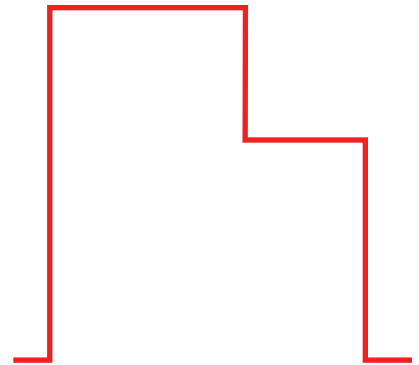
One of the stairs is existing while the second egress is a fire stair on the exterior of the building.



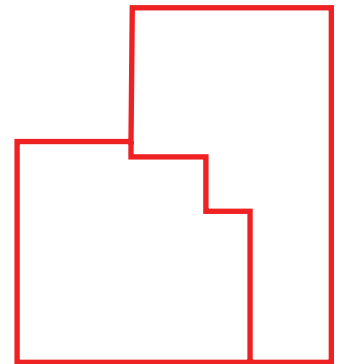
geometry



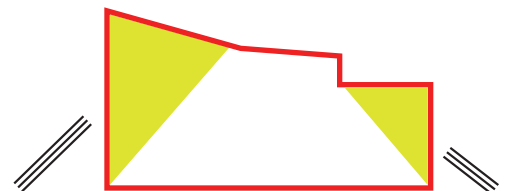
west hierarchy



east hierarchy



natural lighting



China Central Television Headquarters

Beijing, China

Architect: OMA (Rem Koolhaas and Ole Scheeren)

4,188,010 sqft

783 feet tall

44 stories

Primary focus of case study:
Structure influencing form.

The purpose of this case study is to analyze how the Architect's expressed form through structure. In Figure 16 (below) there is a diagonal grid of darker lines on the facade. These are part of the structural system of steel expressing the structural loads in each area of the building. The denser and more frequent the grid is; the greater the stress on that particular area.

Anyone who views this building can quickly decipher where the structural loads are from and going to, giving the viewer clues as to how such a large overhang can be achieved. It is inspiring to get a glimpse of how the designers have overcome the forces of nature to create such a massive structure stable. The separation of spaces by function and how each interacts the public is something I want to look into as well. Rochester has a web of skyways and tunnels connecting almost every building in the downtown area. It is crucial for the success of the project to take the public connections into account. I also need to ensure that the residents are able access this critical pathway through the city.

Figure 18

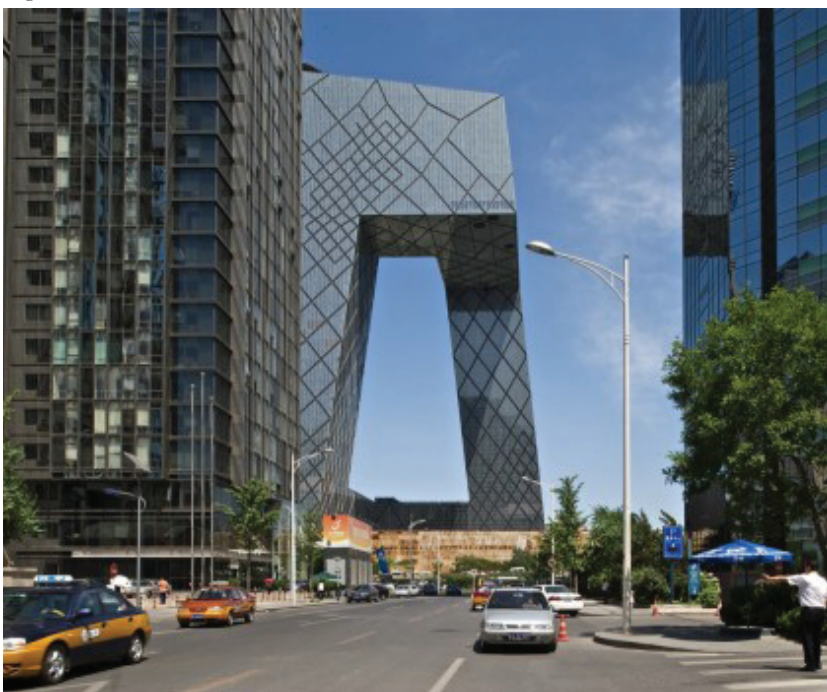


Figure 19



In these two images figures 19 and 20 you can clearly see the diagonal structure members highlighting the forces being exerted on the structure. This type of design is very informative and interactive with the public as they are able to identify and learn from form of the structure.

Figure 20

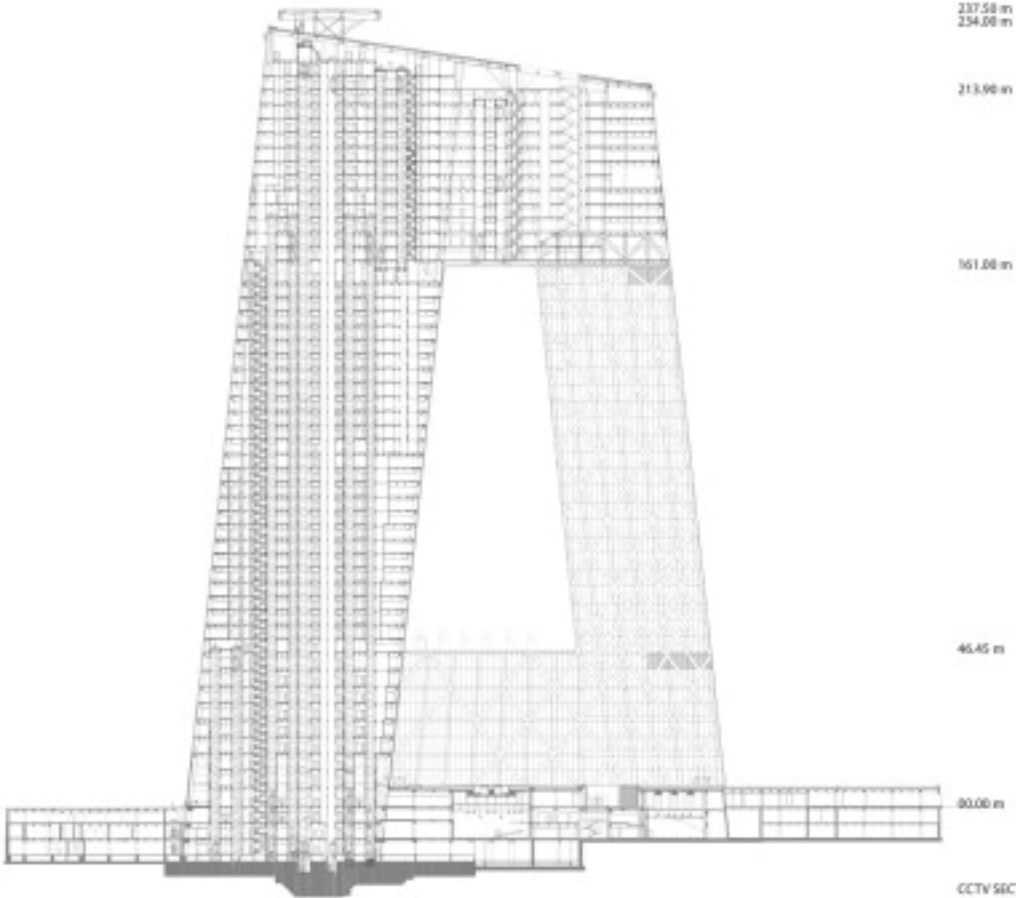


Figure 21 1st floor plan



CCTV PLAN F1

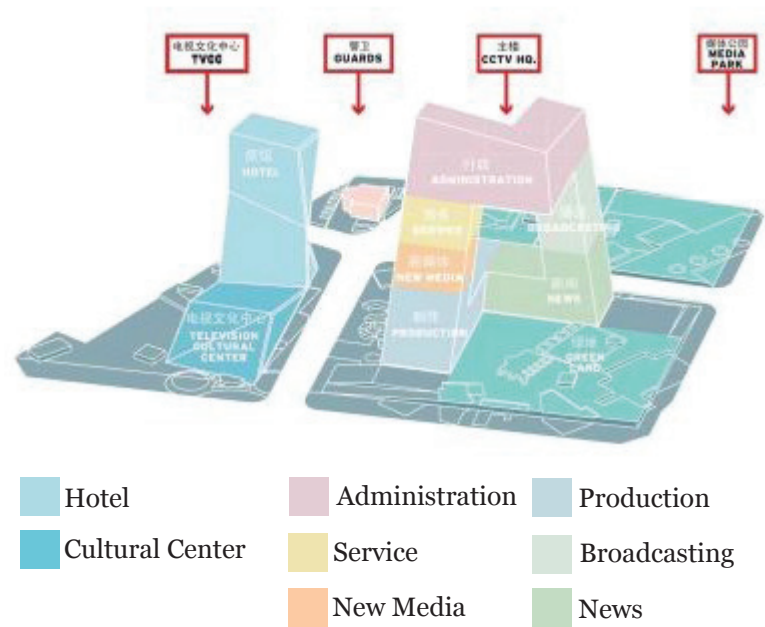
Figure 22 section



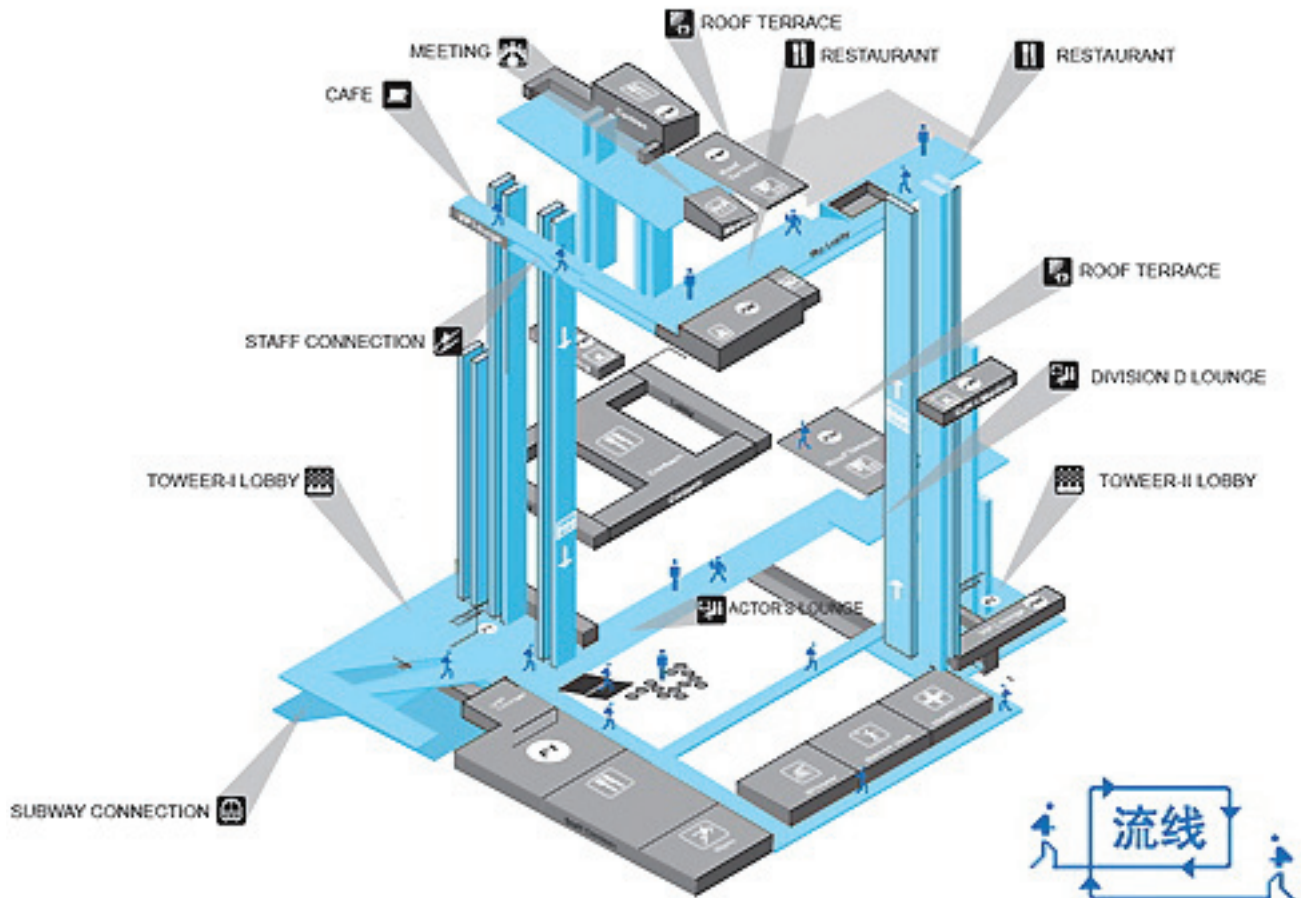
CCTV SECTION 88

The most public areas are located adjacent to vertical circulation. There is a clear path to cut through the building on the ground level allowing public circulation through the building.

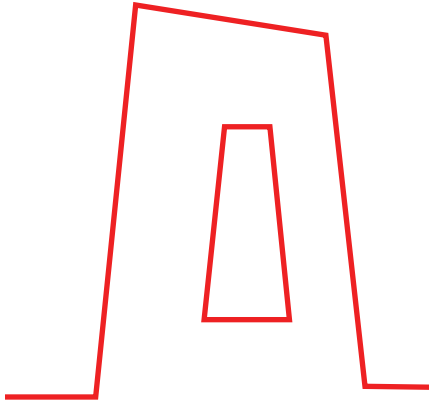
spatial relationships Figure 23



circulation Figure 24



hierarchy



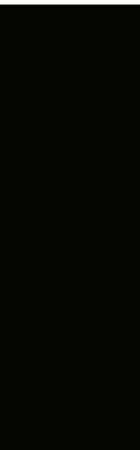
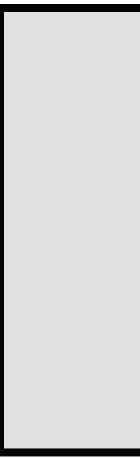
natural lighting



Figure 25 structure



Above figure 25 is a photo of the structure nearing completion. It is a complex system of columns and slabs strengthened using diagonal reinforcement beams to direct loads to the primary vertical structure. Connecting every member in a triangular way stiffens the structure and allows the cantilever to be possible. The functions inside the space are also critical to the structural stability of this building. The overhang is a restaurant and administrative office space which has a relatively small load compared to spaces requiring more equipment.



massing

The focus on this study is the way the overhang relates to the rest of the structure. From this angle the gap created by the building creates an interesting form which frames the view beyond. The different colors represent different distances the viewer is away from that portion of the building.



This view is mostly to give a better representation of how the buildings form comes together.

geometry

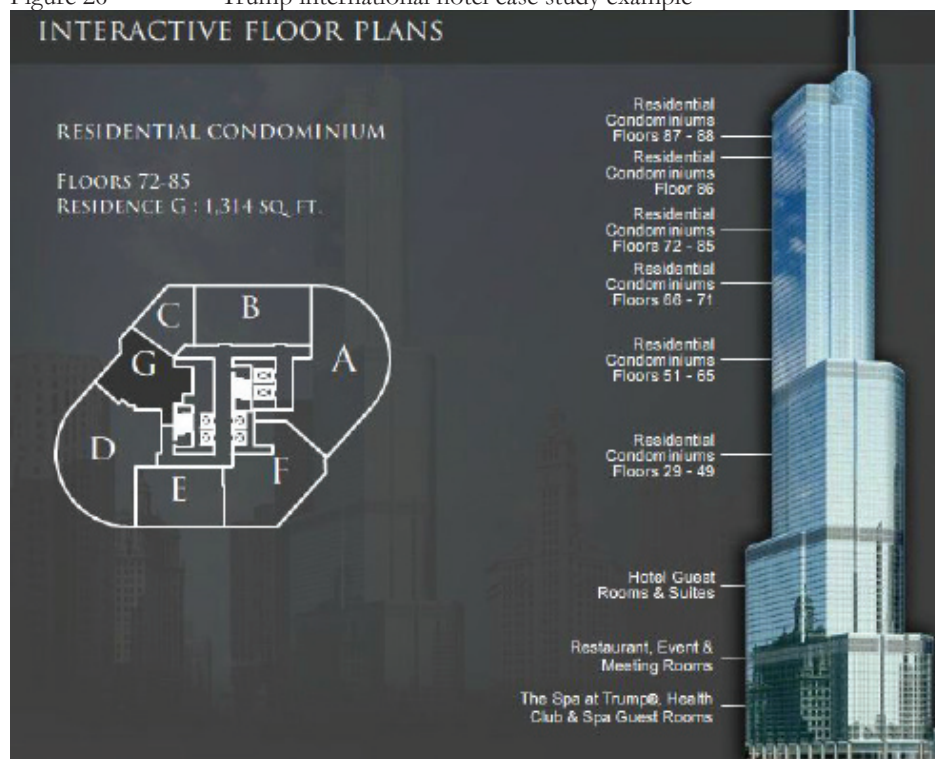


Typological Research Summary

The majority of my research was focused on structural solutions. Structure will be one of the driving forces in my design. The site is unique in that the majority of the land is already developed with historically significant buildings. Looking at almost any downtown district there are historical buildings which are in the prime revitalization areas. Many of these old buildings are renovated into apartments or restaurants. These renovations are quite costly however. Electrical, Mechanical, Lighting, and Accessibility issues must all be solved in order for the building to meet modern code requirements. My thesis is looking at avoiding all of these costly updates and modifications. This is why I am looking at different ways to suspend the new construction above the existing without actually coming into contact with the older buildings.

Several other case studies were on higher end condominiums and apartment buildings. Comparing amenities, spaces, size, and layouts of these buildings helps to narrow down what aspects of each are most cost effective and attractive for the residents. I also incorporated several projects taking a sustainable approach to design. Blending the two together can result in a higher quality of life and a more responsible approach to our environment.

Figure 26 Trump international hotel case study example



Another aspect of research focused on what type of residential units I should offer. Choosing between condominiums and apartments is a small but crucial detail to nail down. The difference between the two is mostly a legal matter. Apartments are owned by a company and the residents simply rent the space without owning any part of the building. Condominiums the residents own parts of the building. The exterior is sometimes owned by a company and maintained via fees divided up among the residents. This fee system is sometimes called a Home Owners Association (HOA). The HOA charges monthly or yearly fees to pay for upkeep and maintenance. The fee is also used for community spaces and services offered in the building like a pool or workout area.

The communal style living a condominium and apartment offer allows residents to live more affordably in an otherwise expensive area with the sharing of group spaces. The benefit of living in a condominium verses an apartment is that the resident actually owns the condominium which gives them equity and value to their investment. Living in an apartment simply takes your money with no return on your monthly investment. This is why I have chosen to build condominiums in downtown Rochester.

Potential residents will be much more inclined to purchase a condominium which can be sold by the resident to recoup their money invested into it. Condominiums are also much less hassle for initial investors and development companies as the HOA will take the majority of the maintenance issues upon themselves. The developer will also get their money back much quicker than through traditional rentals.

Linking these case studies back to the unifying idea of this thesis is essential. The unifying idea is focused on the voids above the built environment and how to take advantage of those voids. The two structural case studies looked at different ways to fill the voids without affecting the underlying structures. Through this method I am attempting to solve the issue facing nearly every urban environment; that is no place to build except outward. This is also why I have titled this thesis document Growth without Expansion.

The last case studies I looked into involved research into apartment and condominiums and were the basis for my square footage allotment to each space as well as the community spaces and services provided. To the left in figure 26 is an example of one such case study on the Trump international hotel in Chicago. Fifty-nine of the floors are high end condominiums of various size and dimension. Finding how to develop spaces in the human scale was another focus of these residential case studies.

Figure 27 Apartment photo

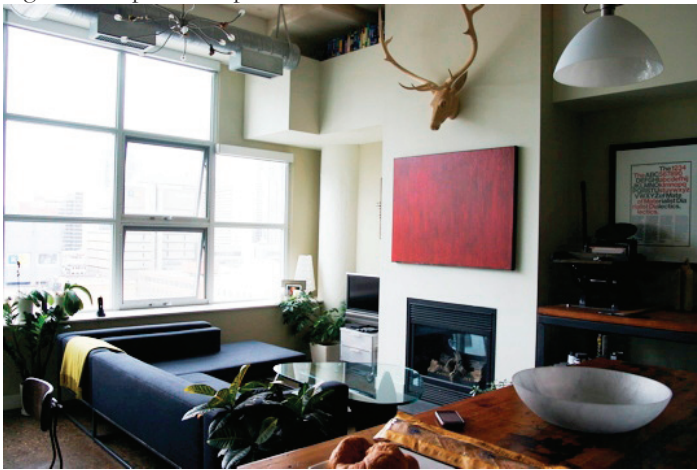


Figure 28 Apartment photo



Figure 29 Lake point floor plans

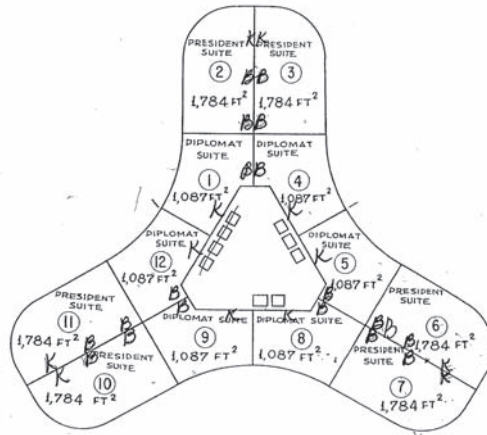
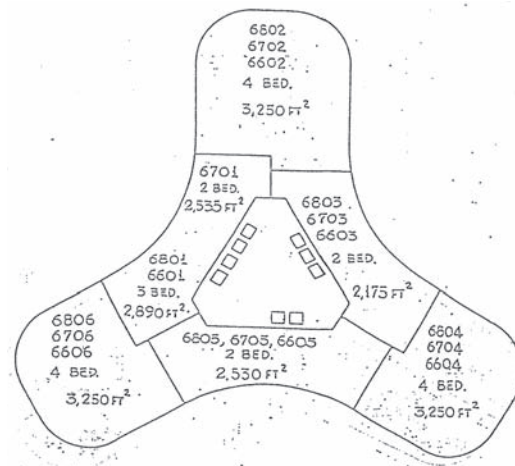


Figure 30 Lake point penthouse plans



I would like to point out a few things about the above apartment which I found useful when laying out spaces within the condominium.

Operable push-out windows allow for natural ventilation even when its raining.

The kitchen and living room are open to eachother making the area look larger while allowing daylight to reach the innermost spaces.

Clever use of spaces like the bookshelf on top of the wall and the kitchen counter which can be lowered to become a dining table.

Flexible multi-purpose spaces allow for smaller square footage units which allows for more attention for the details and finishes.

The floorplans are of Lake Point Tower in Chicago. The kitchen and bathroom spaces all are located near the hallways optimizing the mechanical systems. The square footages and layout are also very similar to those in my project.

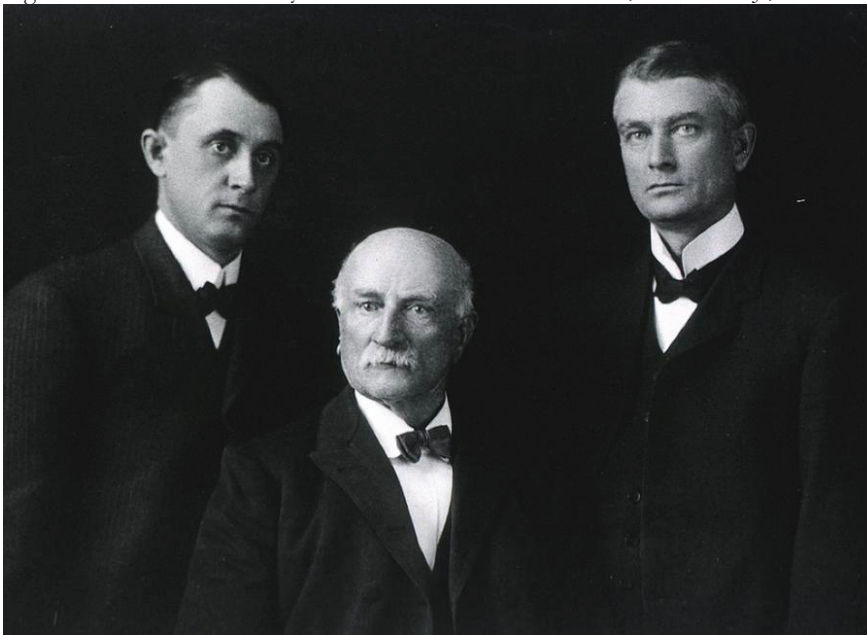


Historical Context

Mayo's influence on Rochester's development

Rochester, MN has been developed around medicine, beginning in the 1860s during the Civil War, when Dr. William Worrall Mayo moved to Rochester and started his medical practice. His two sons William James and Charles Horace Mayo (see figure 27) followed in his footsteps from a young age and after receiving their doctorates joined their father's practice in 1880. In 1879 Dr. Mayo created the first telephone line in Rochester from his farm to his office in town. They were some of the leading pioneers in scientific medicine and teaching. Early on in their careers they began focusing on specializations and bringing in the best of the best for surgeries and guidance. With three doctors the Mayo family did quite well for themselves. They had a very broad view of the world and believed in the good of mankind. Much of their wealth was donated to the starting of the Mayo Clinic. Dr. Mayo died in 1911 just before his 92nd birthday. The estate was given to the Mayo Foundation and set aside as a gathering place for the sharing of medical knowledge and expertise for the good of mankind (Nelson, 1990).

Figure 31 Dr. William W Mayo centered with sons Dr. Charles H, Dr. William J , 1900



Before he passed away however, Dr. Mayo had more to give to Rochester. He founded the Rochester Public Library, served on the Board of Education, Mayor of Rochester, founded the Rochester Board of Trade, served on the city board of health, and many other community positions. Like their father, his two sons served on numerous boards and committees in Rochester.

Education was a cornerstone of the Mayo Legacy. One major impact from their involvement on the school board was rebuilding all the school buildings with fireproof structures setting the groundwork for how downtown Rochester appears today. Starting in 1905 the Mayo brothers realized the importance of images and art in teaching. They established a photography and illustration division which developed many of the early drawings used to train new surgeons and doctors. The Mayo family was also pivotal in establishing the University of Minnesota and Rochester Community College from 1860-1890. In 1915 the Mayo brothers developed America’s first graduate program in clinical medicine with a \$1.5 million endowment to get it started (Nelson, 1990).

In 1919 the Mayo brothers signed a deed gifting the entire Mayo Clinic to the Mayo Properties Association and developed a structure for the continued progress of the Clinic. This ensured the Mayo values and dedication to humanity would continue beyond their lives.

In 1907 the Mayo family donated 38 acres of land just east of downtown for a public park. One year later they gave more land for a park now called Saint Marys Park adjacent to the Saint Marys Hospital (see figure 28). Following that donation was another 10 acres to the city dedicated to athletics (Nelson, 1990).

Saint Marys Hospital, 2012

Figure 32



During the turn of the century automobiles became more popular and in need of good roads. The Mayo brothers lead the Taxpayers' Good Roads Association and started the paved roads movement in southeastern Minnesota. In 1916 the population had grown along with the amount of garbage the city produced. With Dr. Charles Mayo as the public health officer he acquired 30 acres of land and established a 400 head hog farm used to consume all the edible refuse from the city. The revenue from the trash fattened pigs was to subsidize city health programs and was so successful it paid profits out to the city beyond the subsidies. The recycling farm flourished until 1954 when state law required the food be cooked prior to feeding the pigs. Before his resignation of public health officer Dr. Charles Mayo passed the requirement for milk to be pasteurized. If any of the programs they started accrued any deficits the Mayo brothers would foot the bill to keep the programs alive to serve the community (Nelson, 1990).

The Mayo brothers were focused on more than just public programs. After the transatlantic flight of Charles Lindbergh in 1927 there was renewed interest in air travel. In 1928 Rochester had its first airport in a marshy bottom unsuitable and too costly to maintain the Mayo brothers stepped in. They purchased 284 acres of land with the airport as a Mayo Properties Association subsidiary. After a year of successful operation the airport was sold to Northwest Airlines and later expanded to become the international airport that it is today. Rochester is now home to the second busiest international airport in Minnesota. The Mayo brothers were not done building there. In 1938 they paid for and began constructing the Mayo Civic Center (Nelson 1990).

The Mayo family quickly became popular on a national level. President Roosevelt visited to honor their work during the World War I. During WWII they even had a navy vessel named after them the S.S. Mayo Brothers. Throughout their long careers the Mayo brothers attracted the brightest and best the world had to offer to learn at their Clinic. One such fellow has had a significant impact on Rochester's skyline (Nelson 1990).

Dr. Henry Plummer joined the Mayo brothers as a partner in the Clinic. Beyond his expertise in hematology and numerous other medical fields Dr. Plummer was an engineer and architect. He developed the Clinic's communication system including a vacuum tube system (similar to a bank drive thru). He also designed the 1914 Mayo Clinic building, 1926 the Franklin power station, and the 1928 building still standing today known as the Plummer Building (see figure 29). The Franklin Station was the first building in Minnesota to use natural gas at the urging of Dr. Plummer (Nelson, 1990).

Plummer building, 2012

Figure 33



Another important character in the development of Rochester was the Kahler Corporation. They built a hotel reserving a large number of rooms as patient rooms for the Mayo Clinic. The critical element for the future development of Rochester's downtown was the tunnel system they developed to connect the hotel to the Clinic. Over subsequent years the tunnels were expanded connecting more hotels and soon developed into an underground shopping mall filled with stores and restaurants for the general public to take advantage of. (Nelson, 1990).

Following a series of devastating tornadoes in 1883 in the local area Dr. Mayo joined forces with the sisters of Saint Francis to build a community hospital which was built in 1889. It originally had 27 beds and is currently known as Saint Mary's Hospital containing 1,100 beds. Together Saint Mary's, Methodist, and Mayo serve the community and each provide healthcare partnering together to achieve the best possible patient care (Nelson, 1990).

The Mayo family and their associates have had a long lasting impression on the development of Rochester. Their fame and prestige brought some of the finest doctors together to create a knowledge and patient focused practice. Their ambitions and innovations in medicine, and technology set the standard for the Mayo system which is still thriving today. Currently the Mayo Clinic operates in over 70 buildings in Rochester and continues to acquire land and expand its services. Mayo was a driving force in developing Rochester in the 1880s and still is today. There are over 30,000 employees working in the downtown area alone, with another 28,000 in surrounding areas (Mayo Foundation, 2012).

Mayo Clinic satisfies two of the requirements to create a successful downtown I mentioned in my theoretical research portion of this document: Jobs and Wealth. The other, People, is what I aim to satisfy with my condominium project. Mayo brings the people in, but there is no place for them to stay if they want to live downtown. Having more people living downtown will complete the last thing needed to guarantee a successful downtown.

Figure 34 Kahler Hotel (on left) Plummer building (center) Franklin Station (right) , 1939

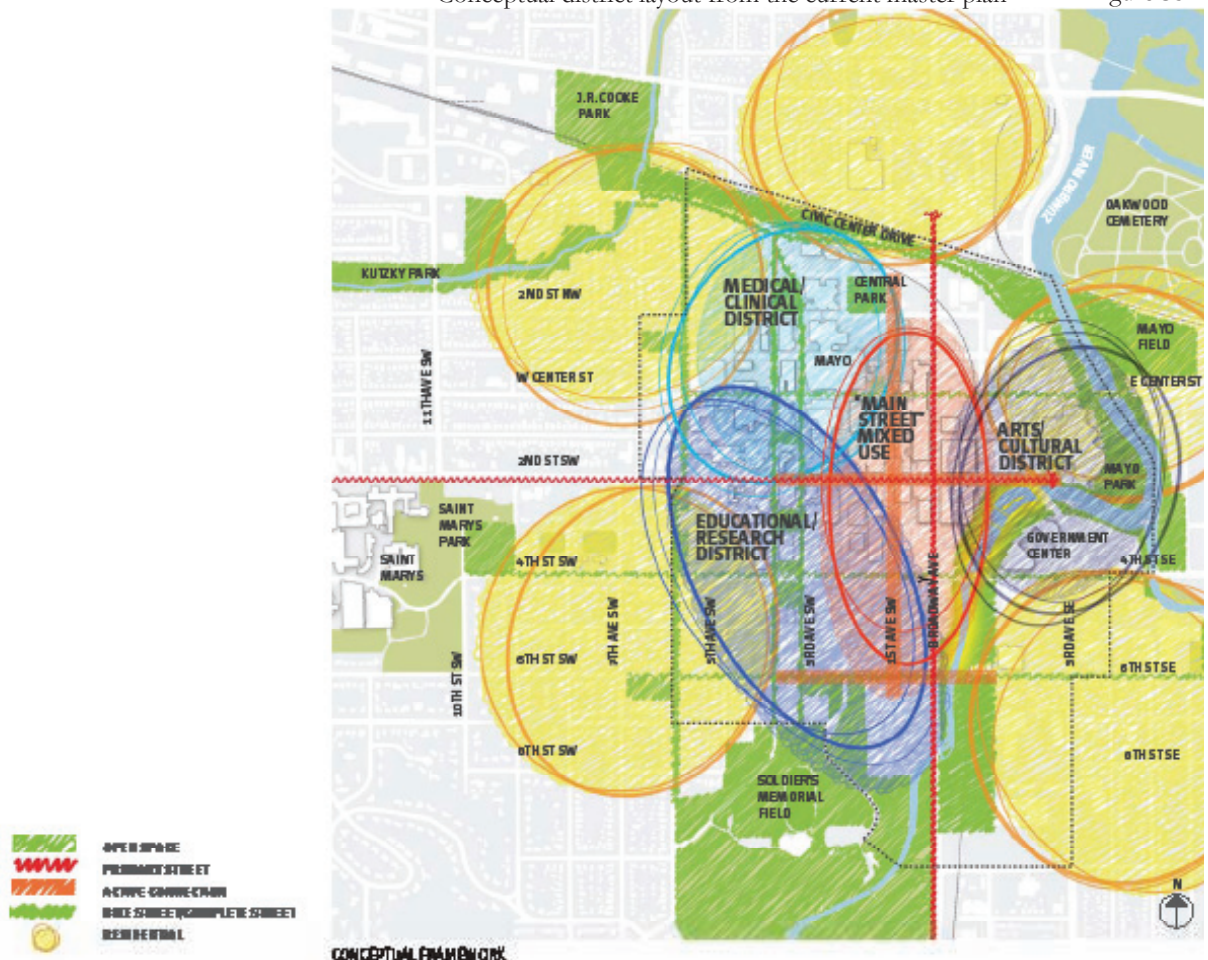


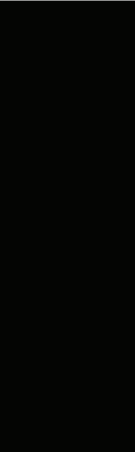
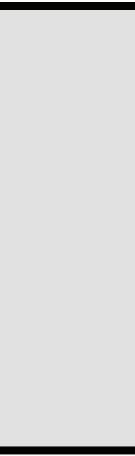
In conclusion the Mayo family has had a huge impact on the medical world as well as the city of Rochester. The city is now filled with the influences of the Mayo Clinic. From the architecture to the tunnels right on down to the parks in the surrounding area the Mayo family’s influence can be seen all around. Mayo Clinic now owns or operates in over 70 buildings in the downtown area alone. They also plant and maintain numerous gardens and plazas throughout the downtown. They plant 30,000 annuals every year in these plantings (Pahl, 2012). There is also six new bus stops near the Mayo building used primarily for employee shuttles.

The next big step for Rochester is increasing the density of the downtown to support the planned mixed use and arts district. A steady downtown population will justify future growth and public works projects downtown. Below is the city’s planned development of the downtown according to their master plan which was done in August of 2010 (see figure 31).

Conceptual district layout from the current master plan

Figure 35







Thesis Goals

The goals of this thesis project can be broken down into three separate categories. Those geared towards the academic world, The professional world, and my own personal aspirations.

Academic

I view thesis in the academic environment as a project grounded in reality, but one which pushes the edges of current technology and thought processes. A thesis should not simply be a project the profession currently does. The thesis should instead be focusing on where the profession could or even should go in the future. The entire project as whole does not need to be ground-breaking or be novel ideas. Certain aspects of the project however should look at problems through different colored lenses to try and gain a new perspective and way about solving the problem.

Through my thesis I have chosen to focus on urban in-fill, focusing especially on pre-developed areas that would benefit from new construction and densification, but where there is no open land with which to do so. The key question that has brought me to this project was what happens with all of the airspace above current structures? Many cities other than Rochester, MN have streets lined with historic 2-3 story buildings which were once the epicenter of business and activity; and are now devoid of activity and life. My challenge towards academics is to find creative ways to revitalize the heart of the city without damaging the historic structures and monuments that are already there. Throughout my research I found a few common elements that act as the lynch pins for progress which I mentioned in my theoretical research for revitalization to be successful: People, Jobs, and Wealth. I have chosen to focus on bringing people back to downtown Rochester, MN. Primarily because jobs and wealth are already existing because of several businesses located in the downtown. There are plenty of other cities out there in need of solutions similar but different from Rochester's, which need addressing by the academic world. My hopes for this thesis is to bring to light the importance of downtowns and historic preservation when revitalizing our cities in the future

Professional

The next category is the professional world. Unlike the academic realm the professional world is plagued with the reality of business and profits. Any project to be built must be profitable for the builders and the investors. The push and pull between these two groups is what has driven our cities outward to the more cost effective developments on the outskirts of the developed city.

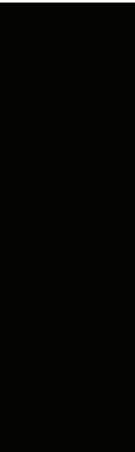
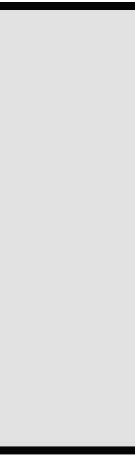
The world is becoming more and more wireless and less personal interaction is required for day to day business to take place. Technology has been a great catalyst in sprawling developments encouraged by profit margins and returns on investment. There are many issues with sprawling that I laid out in my theoretical research portion of this document. These issues is why I want to try and show the profession that it is possible to in-fill our current cities and still make a profit.

Personal

Personally I have a few things I want to touch on with my thesis: Quality of life, feasibility of the project, taking a second look at what is expected of higher end housing and what is responsible, and finally historical and environmental issues with urban in-fill projects. I hope to have a realistic and plausible project that satisfies the investor and the user's expectations of an urban in-fill condominium.



Site Analysis

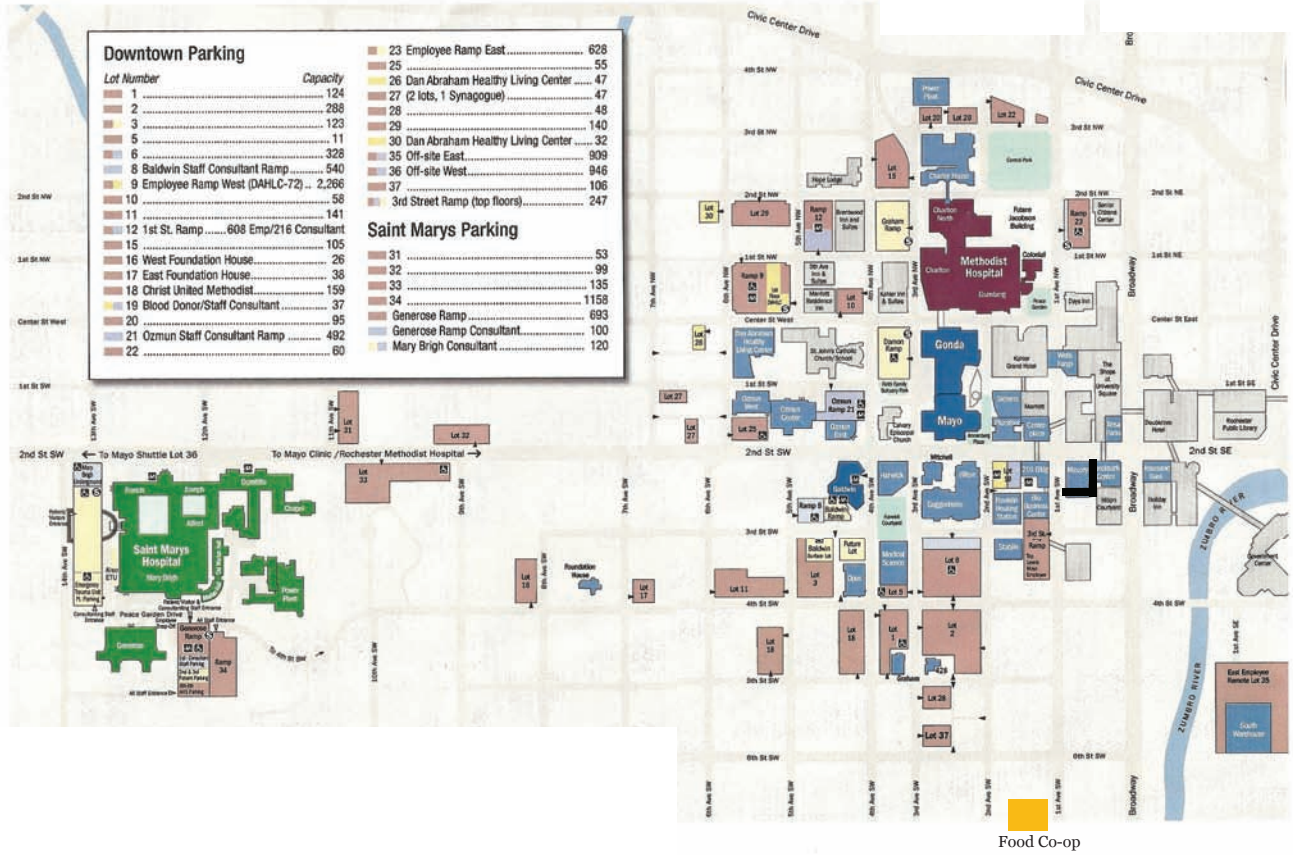




On Campus Employee Parking Map



Figure 36 Mayo parking map



Above is a map highlighting all the buildings that are used by the Mayo Clinic. It is easy to see the impact the clinic has had on Rochester, which is why I spent so much time explaining the Mayo history previously in this document. The city has separate zoning guidelines for any of Mayo's projects with exemptions and special variances so they no longer need to submit them for each project to the city.

Site Narrative

Downtown Rochester, MN is a 4 by 4 city block area. The majority of the downtown is medical research and care buildings owned by Mayo Clinic. There are numerous restaurants and shops to support the patients, families, and employees of the Mayo Clinic. There are about 30,000 Mayo employees in the downtown area occupying 70 different buildings. The entire downtown is connected with a tunnel system linked with a skyway allowing anyone to move around the entire four block area without stepping outside. There are many shops and restaurants are focused in on these corridors creating an underground linear mall underneath all the buildings. The streetscape is still quite lively with cafes and shops which spill onto the street with seating and sale areas. The only thing missing from the downtown area is a grocery store for daily necessities. This issue is currently being solved with the construction of a new food co-op three blocks south from the heart of downtown.

Context

The downtown is surrounded by two story residential neighborhoods on all sides. These housing developments are some of the oldest in the area and stretch out until the newer shopping districts on the outskirts of town. There is almost no housing in the downtown area itself. This puts strain on the downtown businesses. There is a small window during lunch and just after work to do business before everyone goes home. The city is working to keep people in the downtown and bring them back on weekends. The city has made all of the parking ramps free on weekends and holidays in an attempt to lure people back downtown. Over the past few summers the city has held a weekly festival called Thursdays on First. They shut down first avenue to cars and have arts, crafts, and food vendors fill the street every Thursday during the summer. This event brings hundreds of people back downtown after work during the week.

Zoning

The city has also developed a master plan for building up the downtown in the future. It is broken up into a couple different zoning areas. Near the Mayo building is zoned for medical and clinical. To the East is mixed use followed by an arts district along the river. To the south is education and research allowing further expansion by both Mayo and the University of Minnesota. The city has no height restrictions and has a very flexible FAR requirement. The biggest complication with building in the downtown area are the other land owners not wanting anything to overshadow their land. (Ellerbusch, 2013)

Bird's eye view from the South of the downtown masterplan Figure 37



Note: White buildings are existing. Tan buildings are proposed development areas

Bird's eye view from the North of the downtown masterplan Figure 38



The tallest buildings in the area are the hotels and the Mayo and Ghonda buildings. Mayo and Ghonda are twenty stories tall and are designed to go another ten floors each. The exterior marble cladding is already cut and aging for the next ten floors of the Mayo building (Behren, 2012). The majority of the downtown is under ten stories with the outskirts under three. The thesis site I have chosen is one of the areas under three stories in the heart of the downtown. The Masey building on the Northwest corner of the block is the original building that Dr. William Mayo started his practice in back in the 1880s and 90s. The building is now a historical landmark and thus nearly untouchable for new construction. I wanted the site to be challenging and useful as a theoretical project. Similar characteristics and issues can be found in almost every city in the U.S. Which is why I chose this area for my site.

Views and Vistas

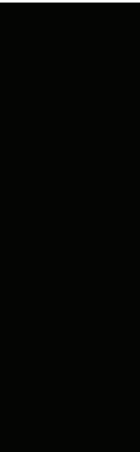
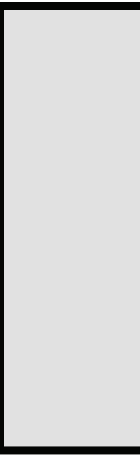
Figure 39 View from top of Plummer building NW site location



Figure 40 View from top of Guggenheim building W site location



Figure 41 View from 3rd St parking ramp SW of site location



Views and Vistas

SE corner of site location back alley/ service entrance Figure 42



Figure 43 Mayo marble detail



Built Features

The site is located just South of the city center. To the West is the Mayo clinic with four 20 story buildings seen above in Figure 37. To the East is the Zumbro River, the civic center, and government building. Directly South of the site is Memorial Park which contains an 18 hole golf course, swimming pool, ball fields, and acres of grass and tree cover. Most of the other buildings nearby are 2-4 stories high and primarily shops and restaurants. The streets are lined with deciduous trees and planters. Almost every building downtown is brick masonry of varying colors and patterns. The Mayo and Ghonda buildings are clad in Marble and Granite facades respectively.

Thursdays on First festival

Figure 44

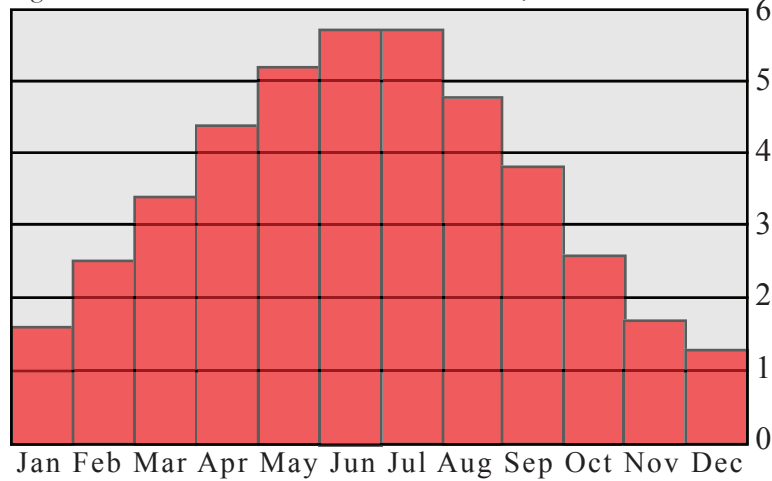


Light Quality

The site receives direct sunlight the majority of the day. There are no tall buildings blocking light from the South. However one thing to keep in mind is that the proposed project does not impede on other areas nearby this site.

Site Analysis

Figure 45 Insolation Value, kWh/m²/day

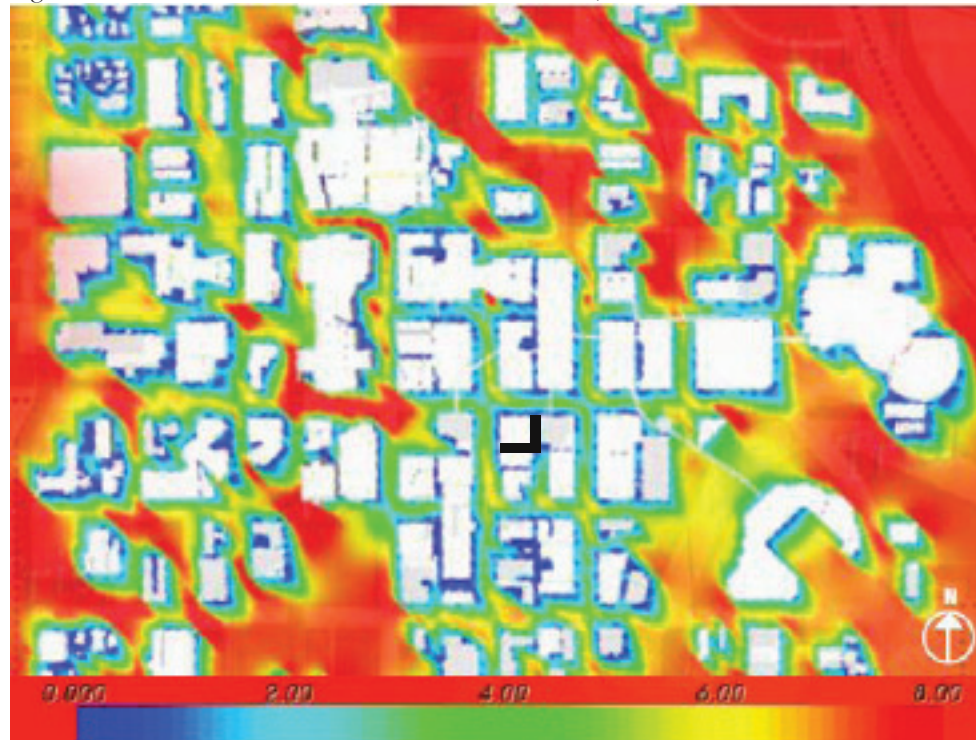


Winds

As the buildings get higher in Rochester the Venturi Effect becomes a bigger issue. The figure below shows wind intensity in winter time. The climate data section contains more charts on the winds in Rochester.

Winter winds are of little concern to residents however. There are skyways and a tunnel system connecting the entire area seen in figure 40 below. One can travel from end to the other without ever stepping foot outside. This can become an issue for the street level activity however and should be kept in mind while designing.

Figure 46 Winter wind conditions. blue areas are calm, red areas are intense



Human Characteristics

The site currently has nine buildings on block 019. I plan to build over lots 6 and 8 on the NorthWest corner of the block. All the buildings are two stories tall except for a seven story hotel on the SE corner of the site. The two larger buildings on the North are used as office buildings for Mayo Clinic, Morgan Stanley Smith Barney investors, and HGA Architects. The other smaller buildings are local restaurants including a sandwich shop and a bar/grill. There are four other bars neighboring this block on all sides.

Geology & Soil Information

-Urban Land-
defined as over 90% pavement with indistinguishable mixed infill soils. This type is not assigned to a capability class or subclass due to its altered composition from intensive development.

(Olmsted County Minnesota, 1980)

0-15 inches of Mixed Loam

15 inches to bedrock

USDA Texture: Unweathered bedrock

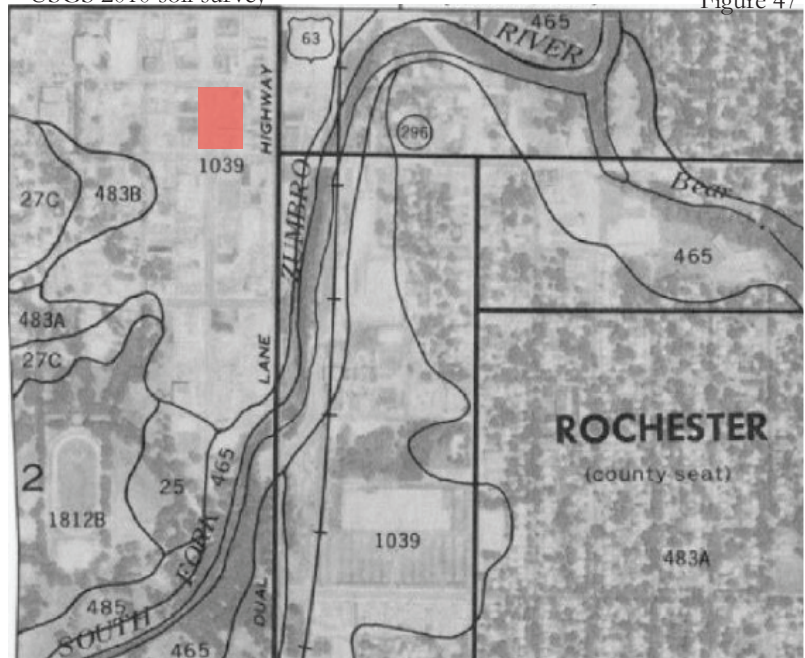
Liquid limit: pot 25-40

Plasticity index: 11-23

Bedrock lies just under the surface providing excellent support for highrise buildings. One potential issue is a series of underground caverns across the area. This means the footings may need to go deeper and use more concrete to offset the varying ground support.

USGS 2010 soil survey

Figure 47



Utilities

Natural gas is used by 84% of Rochester's population, while only 12% use electricity for heating (citydata.com).

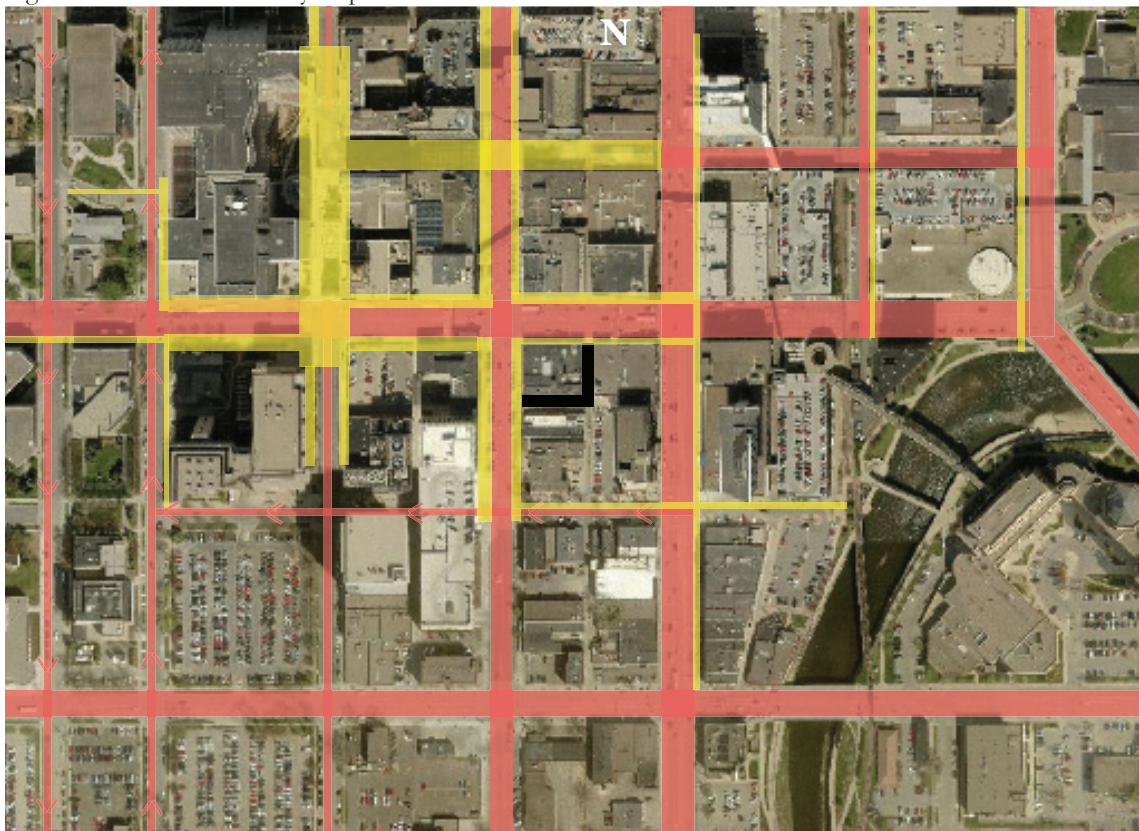
There are coal powered steam plants used to generate the electricity. One such coal plant is just North of the downtown on the river's edge (Behren, 2012).

My building will have natural gas for heating and use the local grid for electricity. Both of these will be supplemented by solar water heating on the roof top and several vertical axis wind turbines on the second floor of the building taking advantage of the venturi effect.

Site Distress

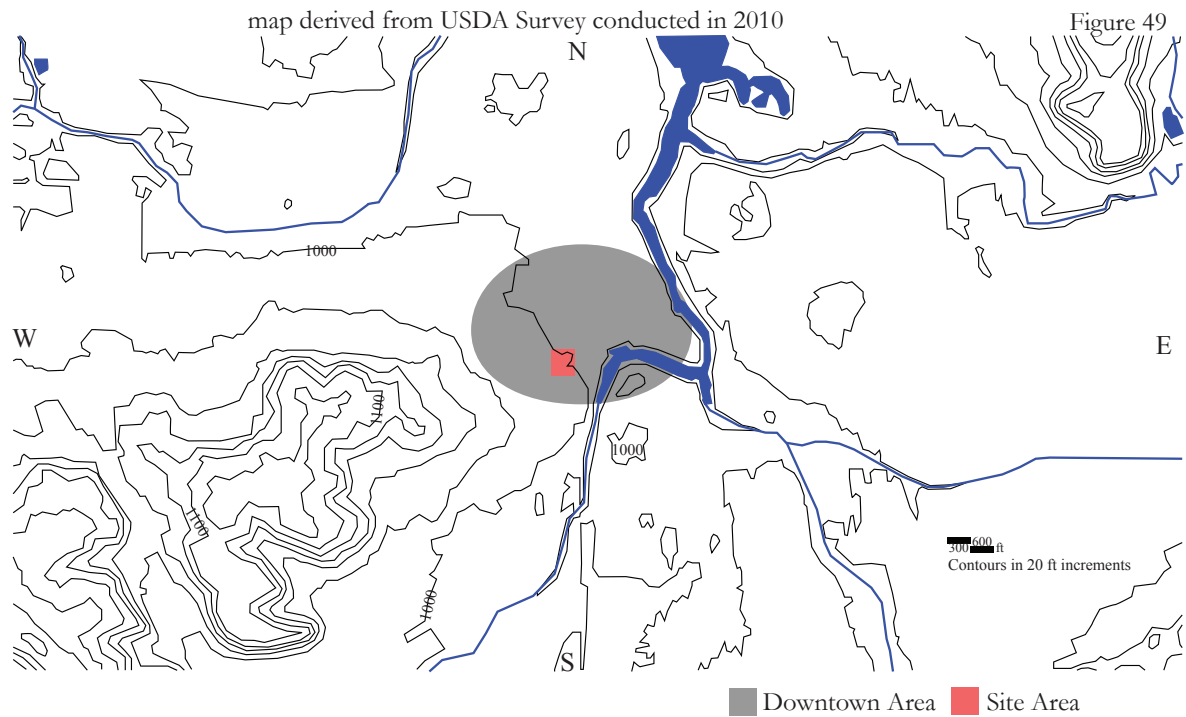
There are no empty buildings in downtown Rochester. Any lots that are for sale are quickly snatched up by Mayo Clinic and the University of Minnesota has recently begun to expand its campus and buying land (Behren, 2012). The area is well groomed and maintained. Even the alleys are swept up and garbage free. The city and Mayo tries very hard to keep the downtown looking clean for patients and its residents.

Figure 48 Traffic density map. wider=more traveled routes



 Pedestrian Traffic  Vehicular traffic

Topographic survey



Visual Form

The site location is near the center of the downtown area limiting any views from the ground level. However 15-20 stories up one can see the vast plains of the river valley and the few rolling hills. The majority of the region is covered in dense deciduous vegetation hiding most residential areas from a clear aerial view. It is difficult to see the Zumbro River until one is practically swimming in it. After a few flooding issues the city built a canal to contain the river, which is now surrounded by biking paths and parks.

Site Character

Downtown Rochester is a lively and clean area. There are enough people there during the day to minimize crime. Planter boxes and trees along the streets are all healthy and well maintained. The sidewalks are wide and it is easy to cross the roadways. There are several one ways in the downtown, which sometimes cause confusion for non-local drivers. Every building is built up to the sidewalk creating an urban corridor that is comfortable and easy to maneuver through.

Site Reconnaissance

Following are a series of photos surrounding the site with a reference photo indicating the directing it is being taken from. The first photo on both pages are facing directly North (figures 44 and 47).

Figure 50 back alley where the service access will need to be.



Figure 51 A look North along 1st Ave



Figure 52 View from the skyway towards the site above the Massey building



alleyways possibly usable for entry and vertical circulation Figure 53



Figure 54 One of the alleyways being used for circulation and structure

It is important to incorporate the functions and aesthetics of the nearby businesses. Looking into keeping or providing an alternative space for the cafe is important.

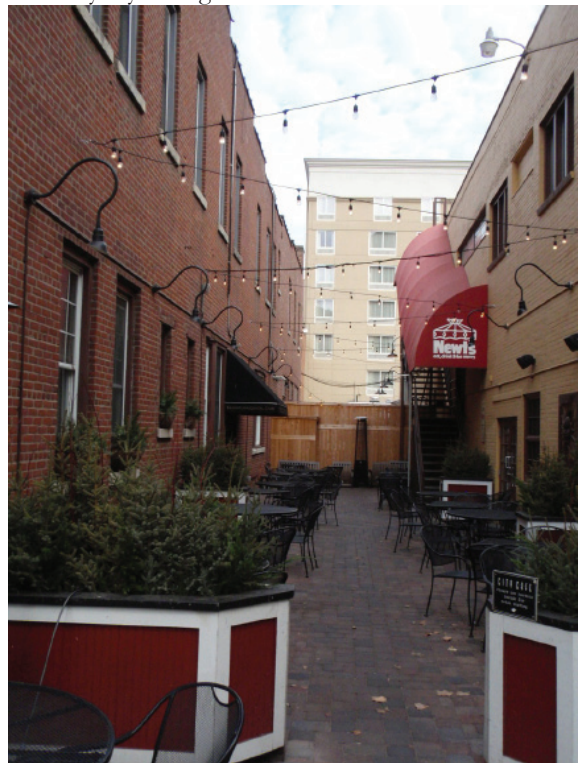
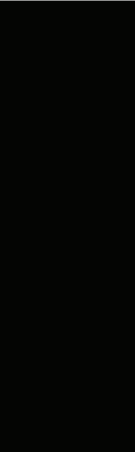
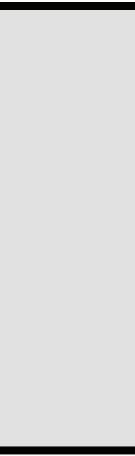
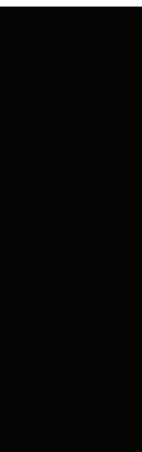


Figure 55 A possible alley for structural support



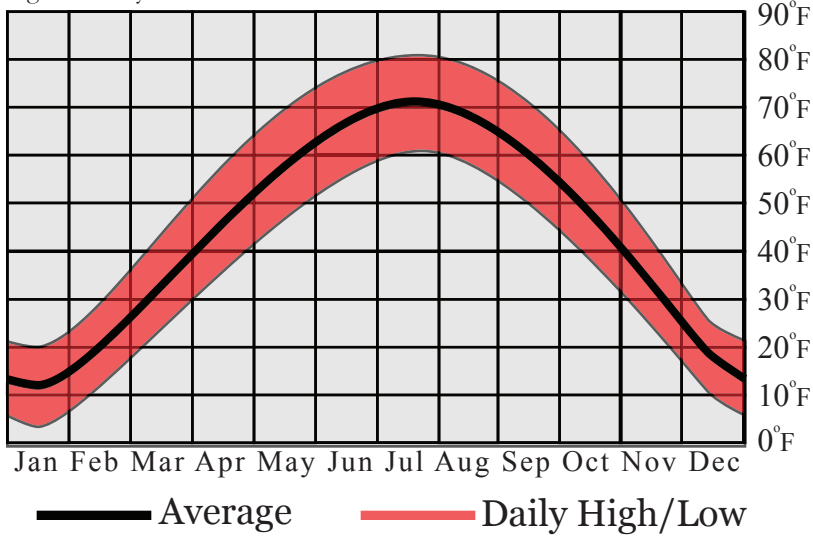




Climate Data

Average Temperature

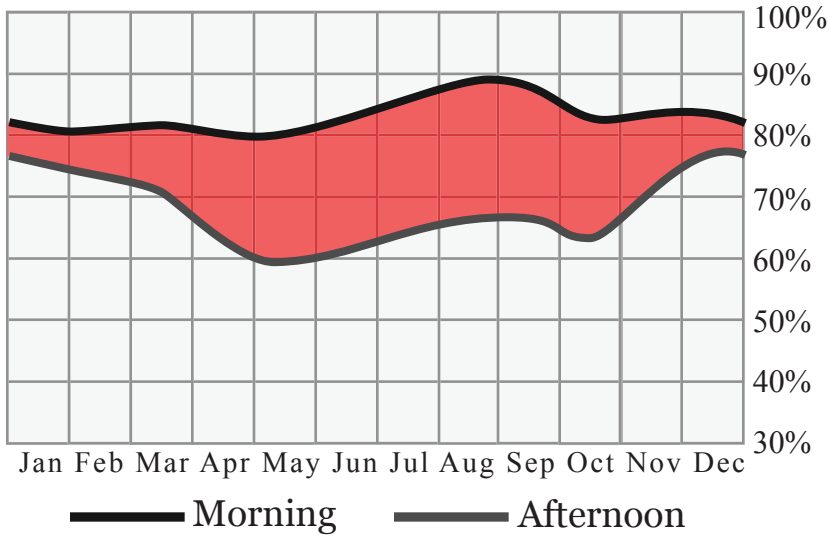
Figure 56 citydata.com



Temperature fluctuates dramatically depending on the season. Winter is bitterly cold while summer is extremely hot. Sun shading will be required in the summer months, while solar gain is needed during the winter. Incorporating overhangs on the southern windows will allow for both of these to happen.

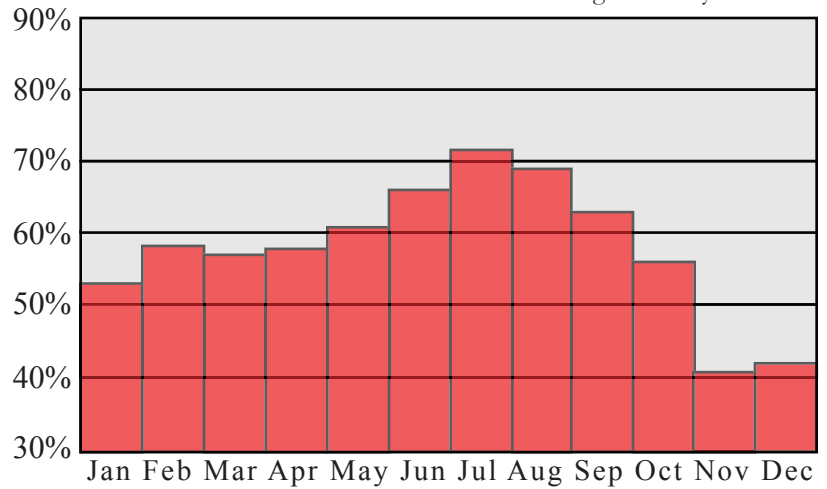
Average Humidity

Figure 57 citydata.com



Average Sunshine

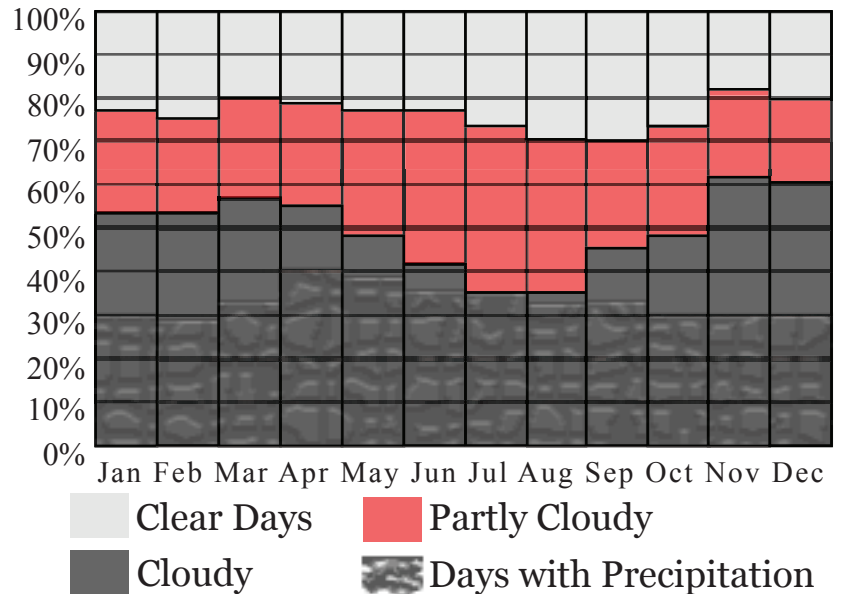
Figure 58 citydata.com



Sunshine is quite dependable almost year round making solar water heating a viable option for this project. Solar water heating alone will not be sufficient for this size of building, but will cut down on the amount of natural gas needed to maintain temperature in the building.

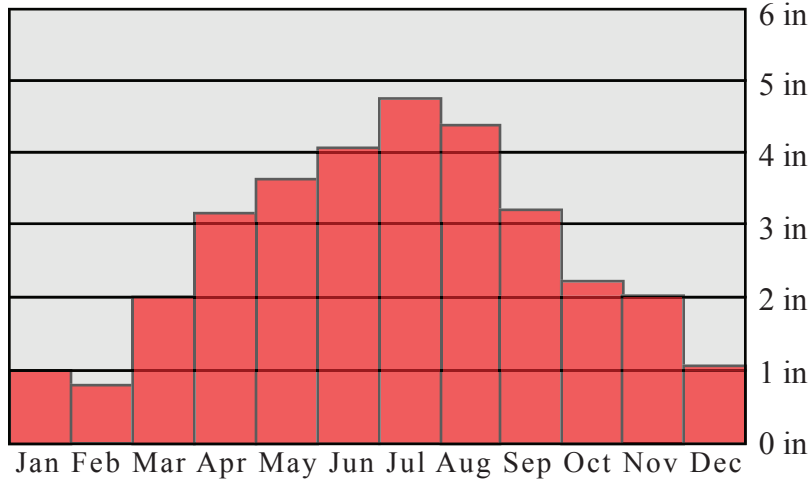
Cloud Cover

Figure 59 citydata.com



Annual Precipitation

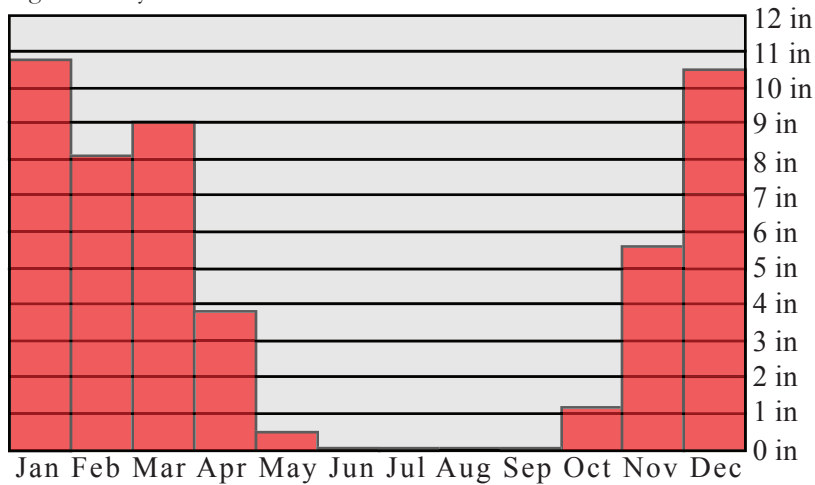
Figure 60 citydata.com



Rain collection for gray water use is also an opportunity for my project. Collecting the natural rainfall and using it to water the buildings gardens will cut down on run-off during storms and reduce the water usage on my building.

Annual Snowfall

Figure 61 citydata.com



The average wind speeds are strong enough to keep most wind turbines functioning. However summer and early fall the winds are much lower making it more difficult to generate electricity. It also means it is more comfortable to be outside

Average Wind Speeds

Figure 62 citydata.com

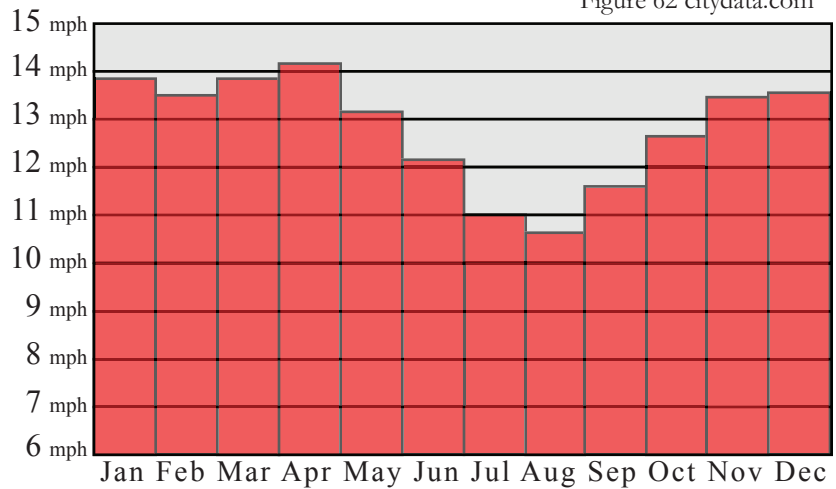


Figure 63 citydata.com

April-September Wind Direction/velocity (mph)

The summer winds are light and sparatic. This makes wind collection more difficult and less productive. Using solar panels may help offset the loss in wind energy during this time period.

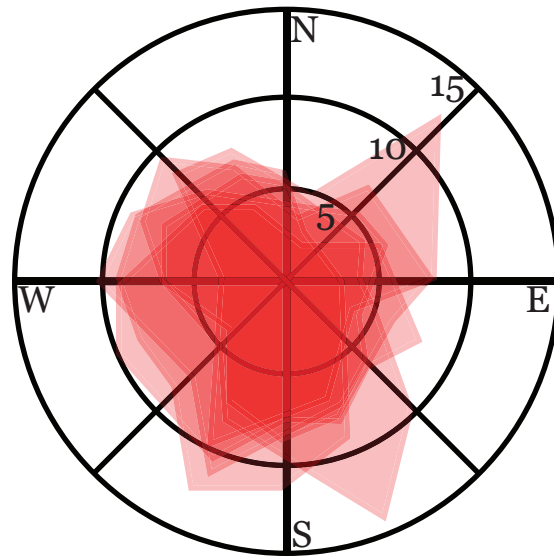
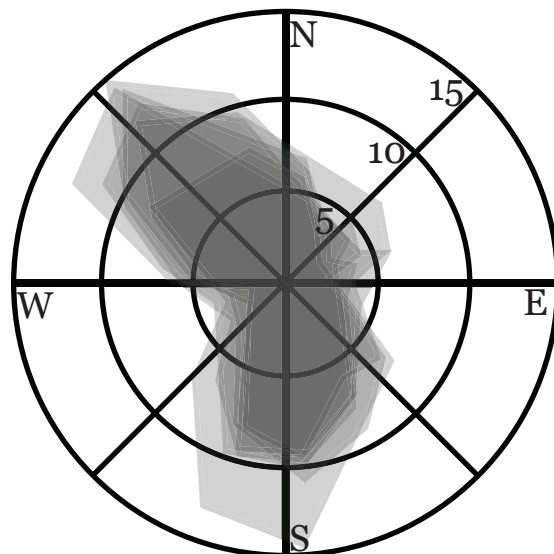
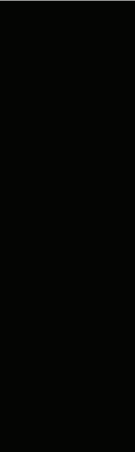
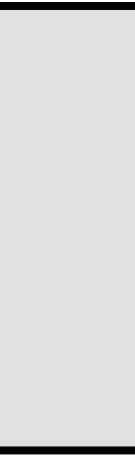


Figure 64 citydata.com

October-March Wind Direction/ velocity (mph)

Winter winds are stronger and very directional. This makes collecting the wind easier and more lucrative. It also means I need to consider protection from the cold winter winds to help prevent excess thermal loss.



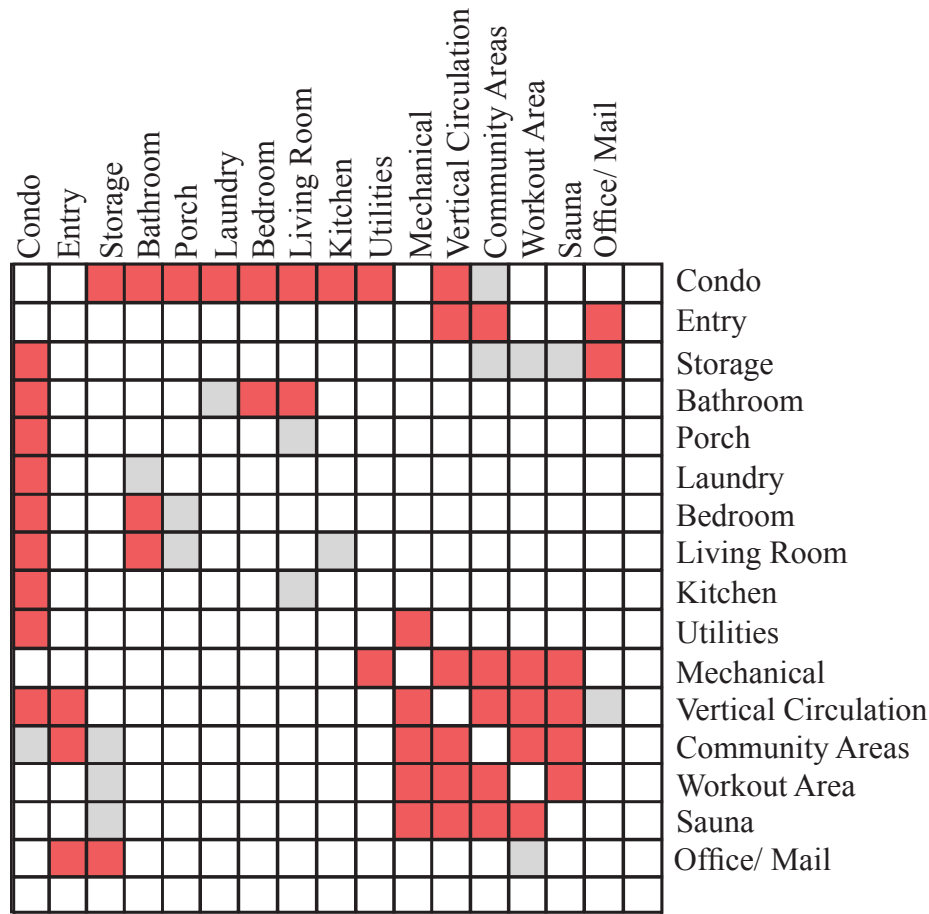




Programmatic Requirements

Figure 65 Program matrix

■ Desired Connection ■ Required Connection



Spaces	sqft	Quantity	Total sqft
Condo 2 Bed	1500	20	30,000
Condo 3 Bed	2100	10	21,000
Bathroom	150-200	74	11,000
Porch	100	30	3000
Laundry	40	30	1200
Bedroom	200	70	14,000
Living Room	600	30	18,000
Kitchen	200	30	6000
Utilities	50	30	1500
Mechanical	500	2	1000
Vertical Circulation	2600	2	5200
Community Areas	1000	1	1000
Workout Area	600	1	600
Pool/Sauna	2600	1	2600
Entry	500	2	1000
Storage	600	1	600
Office/ Mail	600	1	600
Building Total			63,600



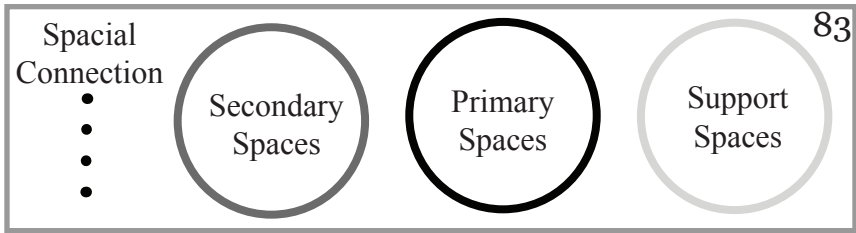
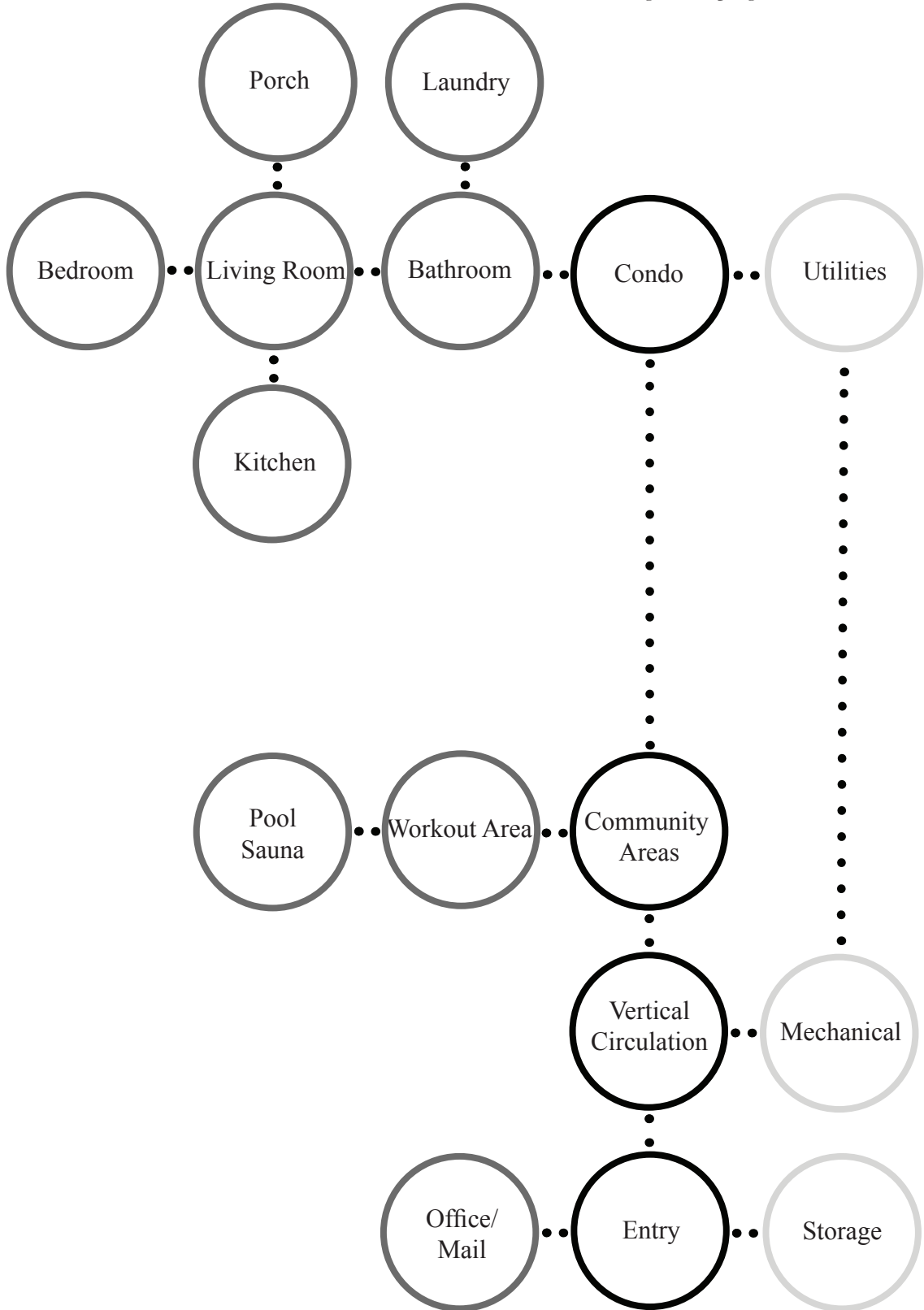


Figure 66 program interaction web



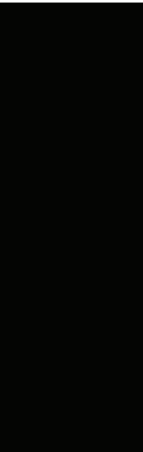
The project will be focusing on how to add housing in an urban environment. Under the conditions that the streetscape does not lose its human scale. Also considering the neighboring buildings needs for sunlight and access to views. Maintaining the walkability of the downtown and improving the quality of life are critical to a successful project.

Things to consider moving forward:

- Interaction with the public
- Connections to the street and skyway
- Human scale
- Historical landmarks
- Material choices
- Quality of details on interior spaces
- Accessibility
- Rochester's downtown master plan
- Privacy
- Landscaping



83

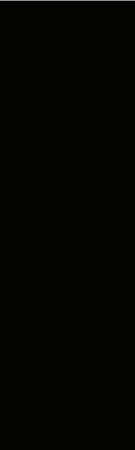
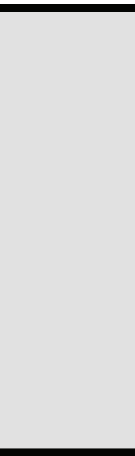


Design Process

To refresh you of my site location and the feel of downtown Rochester, MN I will have a series of photos of the area followed by my conceptual models and process work leading up to my final design.

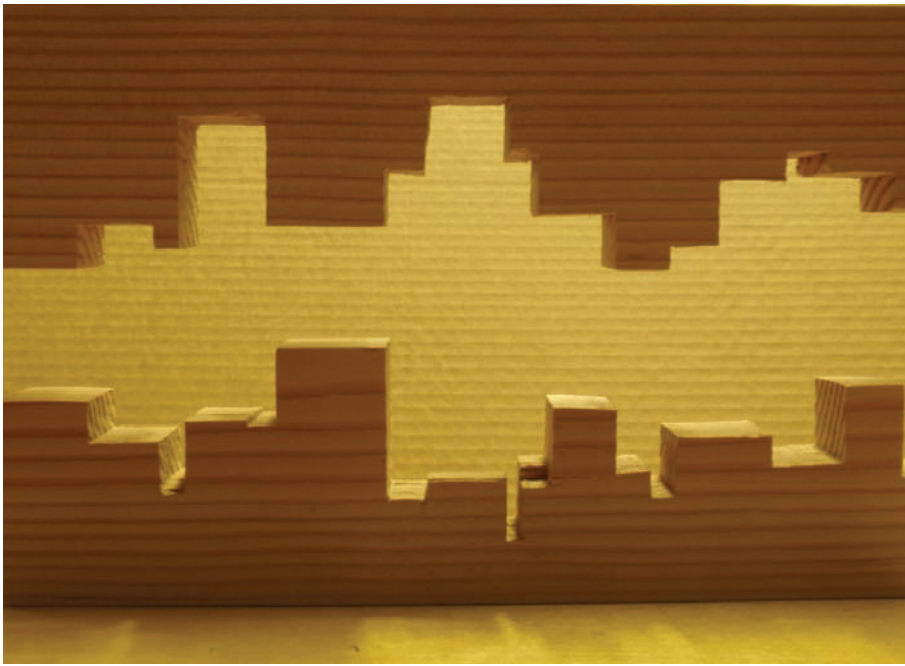








The site location is highlighted in red above.



conceptual idea

Positive

Negative

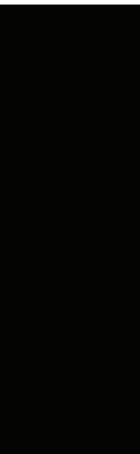
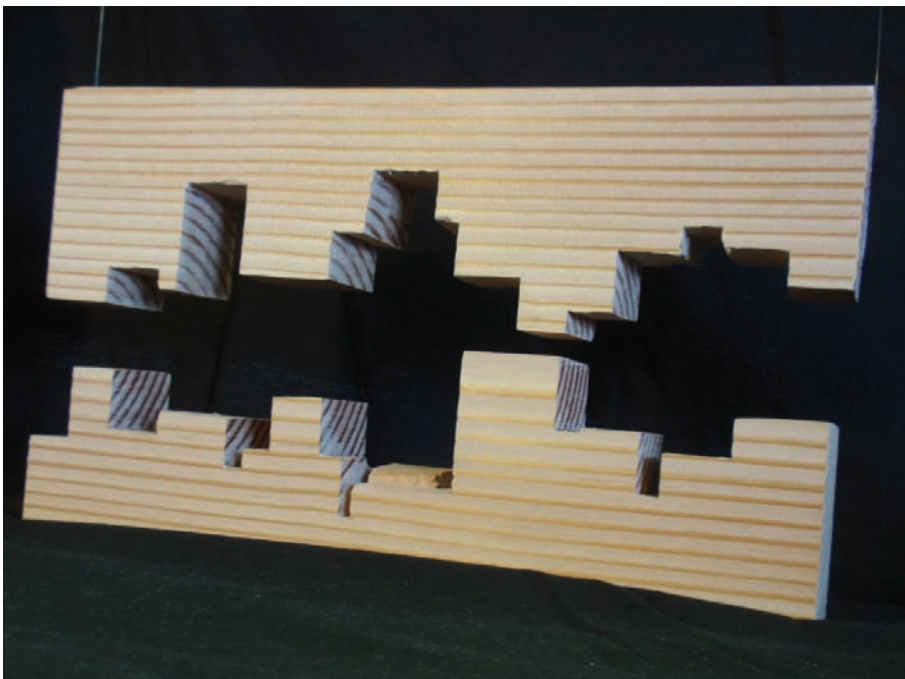
Solid

Transparent

Spaces B e t w e e n

Mass

Void

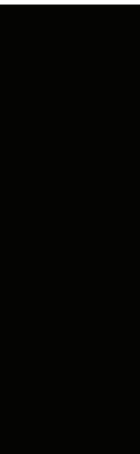
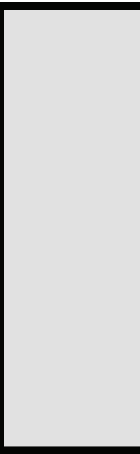
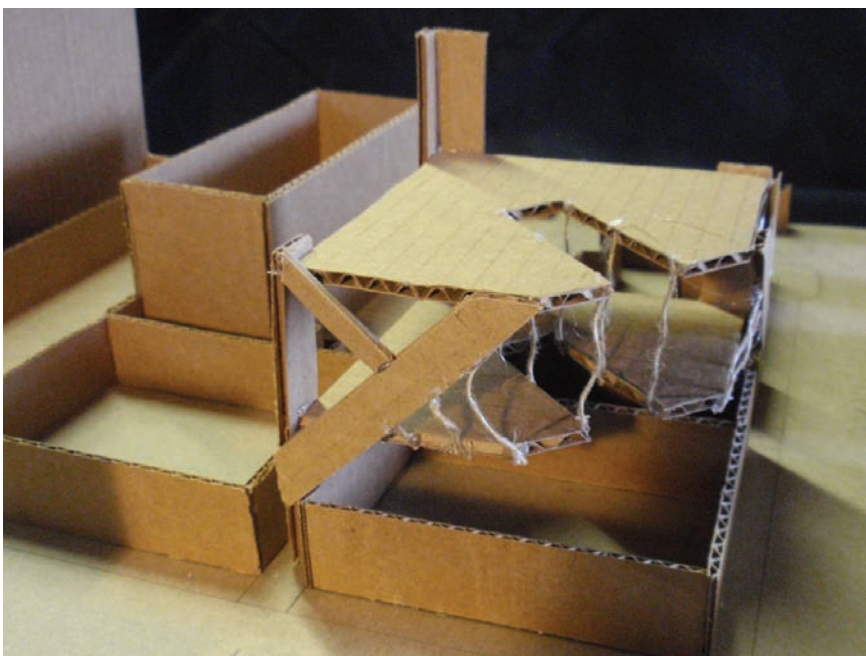
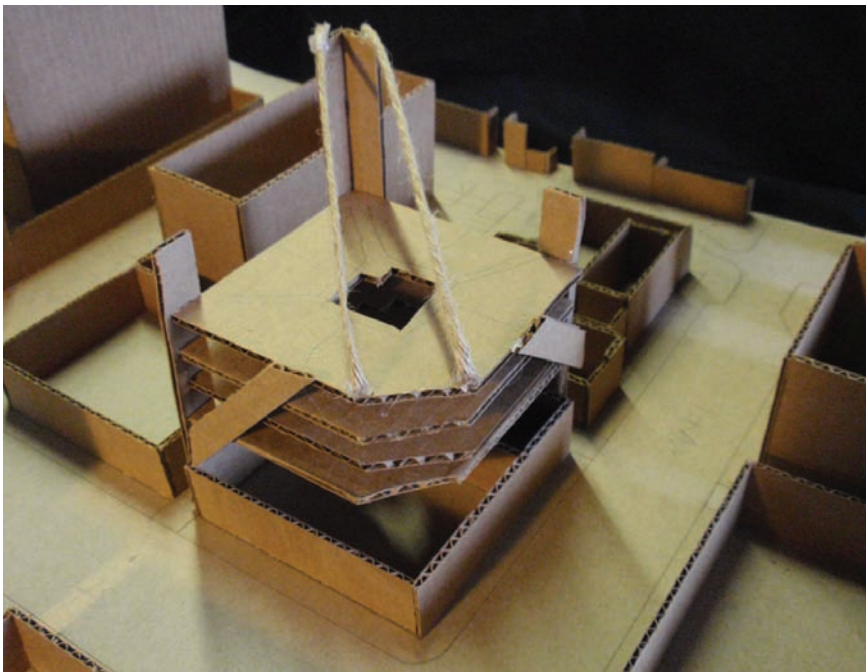
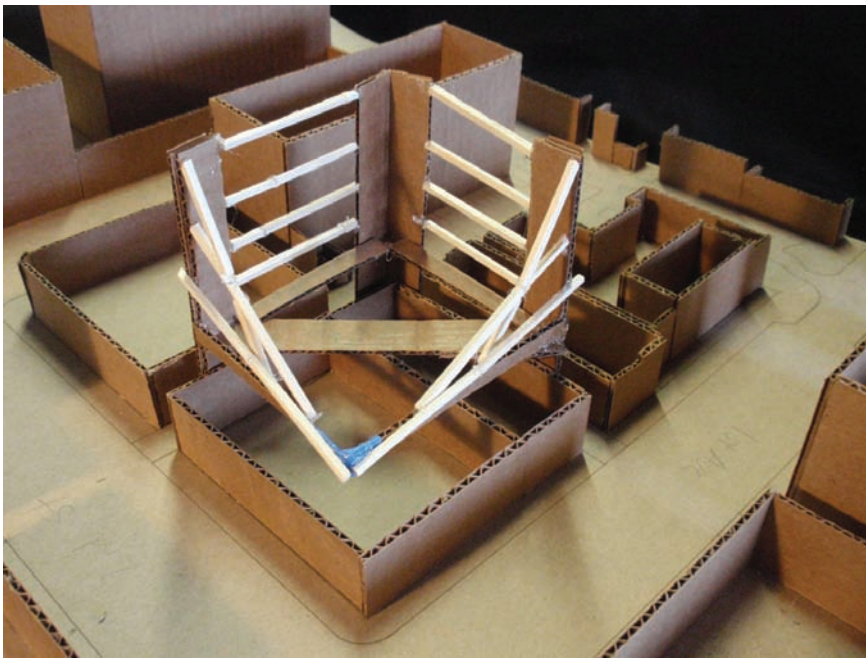


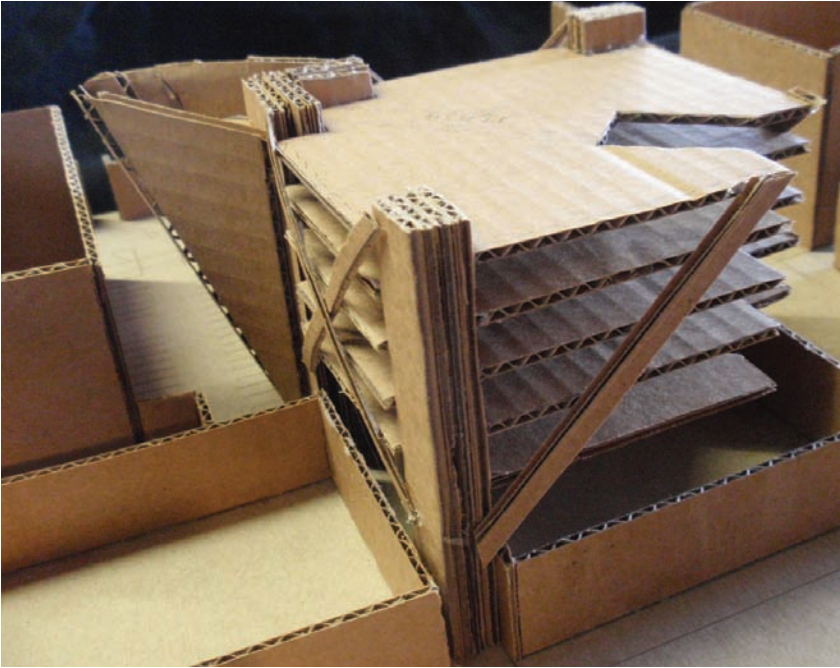
Once i began looking at the positive and negative spaces I looked at the skyline and asked, What makes the skyline? is it the positive of the buildings or the negative spaces created between the masses which create the energy and beauty we find when viewing a skyline?

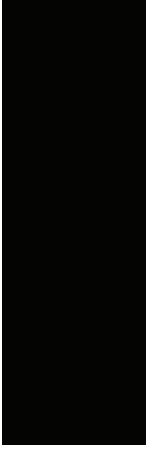
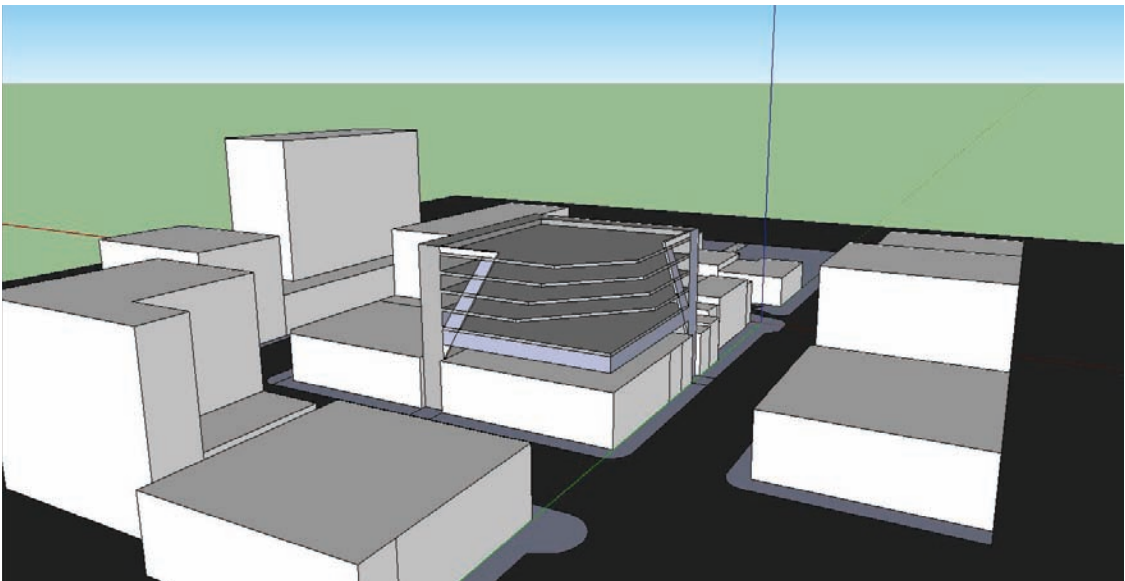
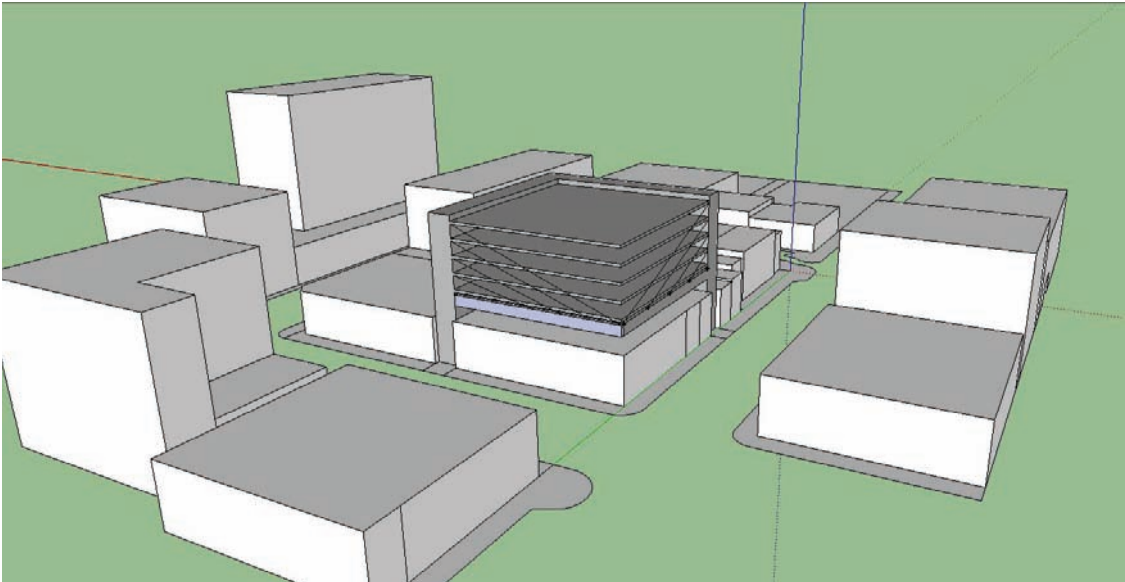
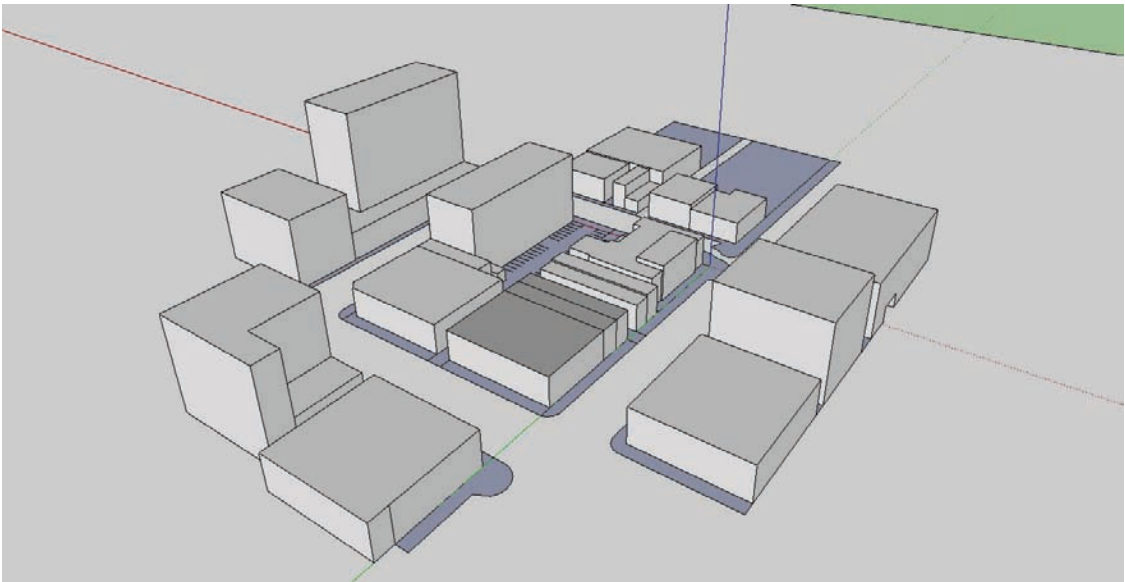
Below I took the Minneapolis, MN skyline and inverted the image and colors to show the powerful effect which the negative spaces have on forming the skyline. I concluded that it takes a mix of both mass and void to create the tension and contrast which makes skylines unique and beautiful. This inspiration is what guided me through the development of the entire project.

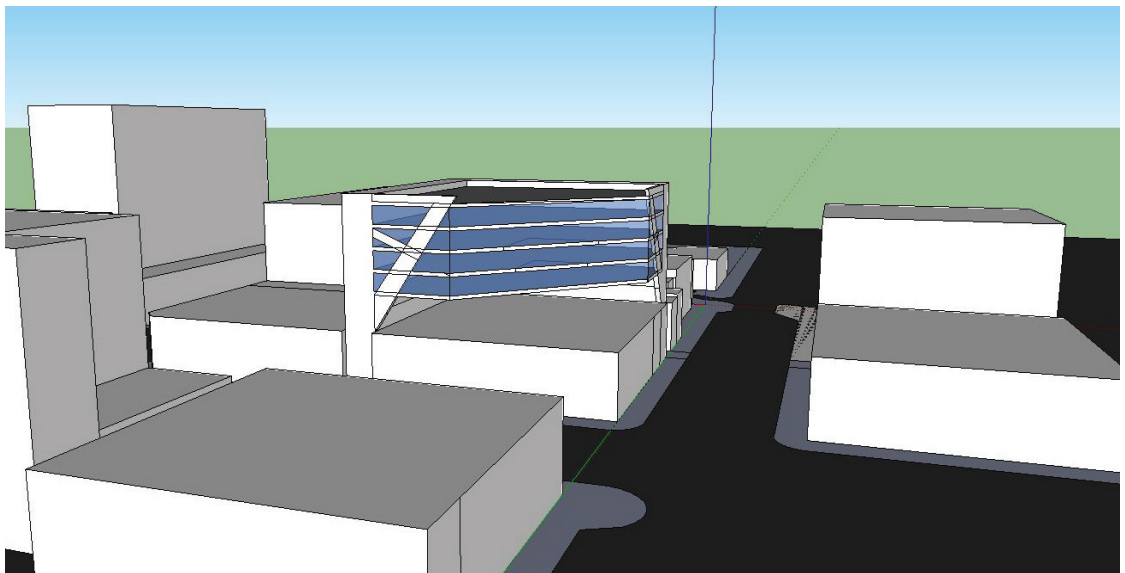
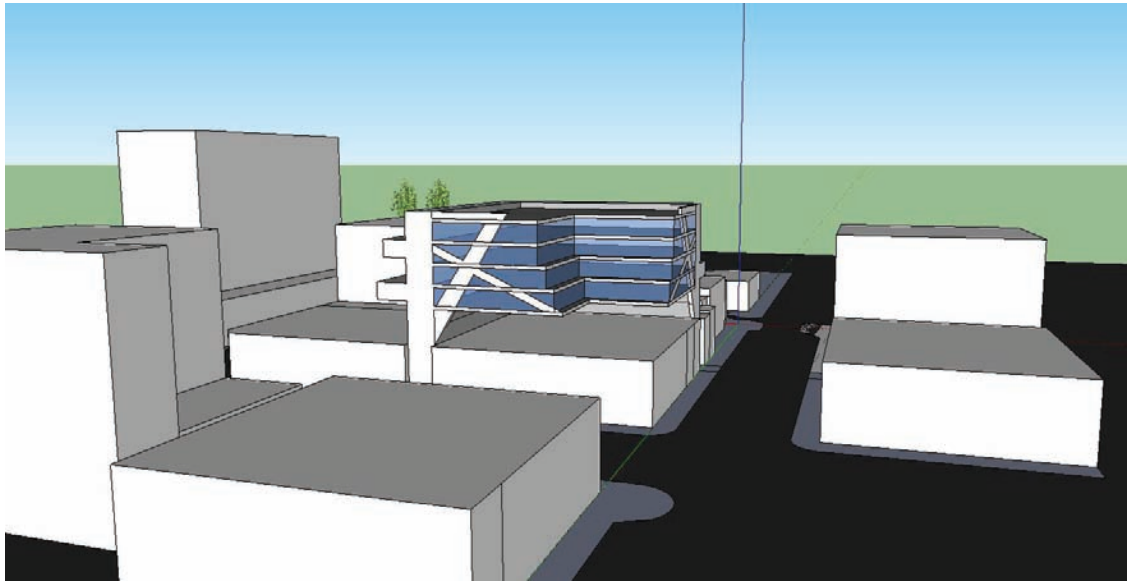


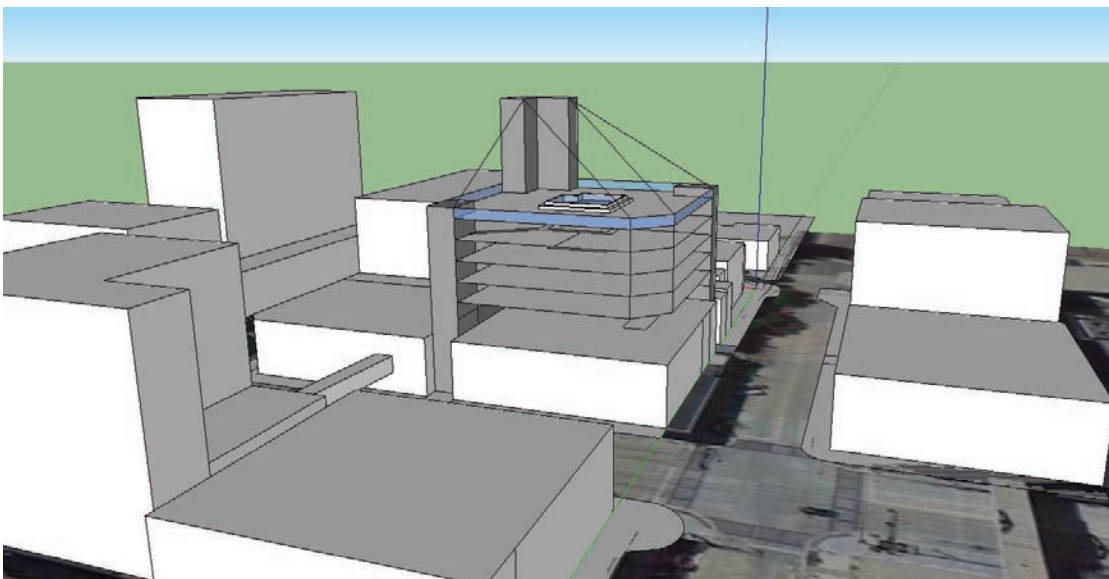
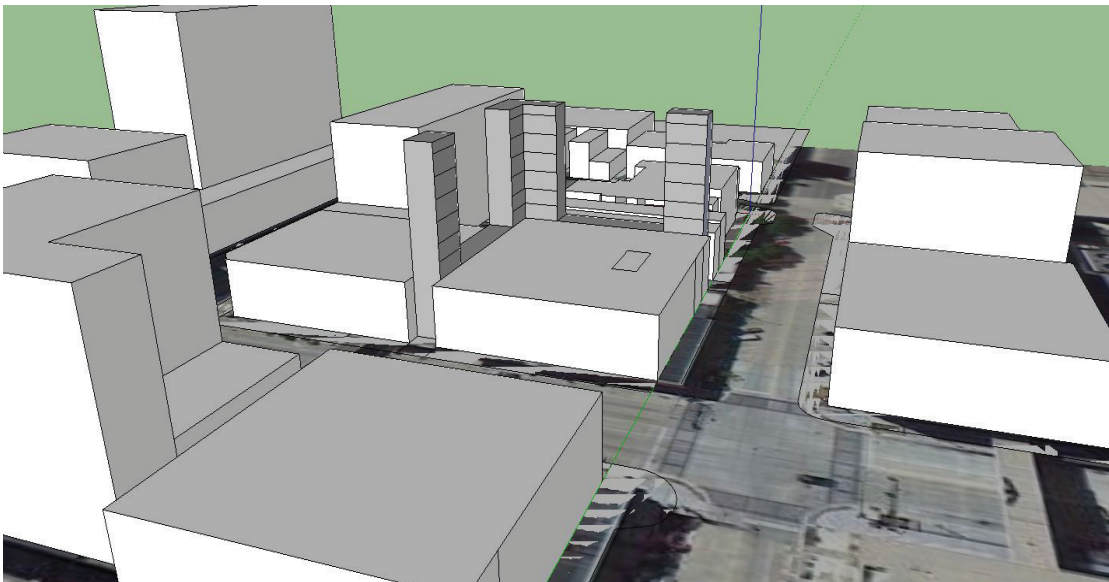
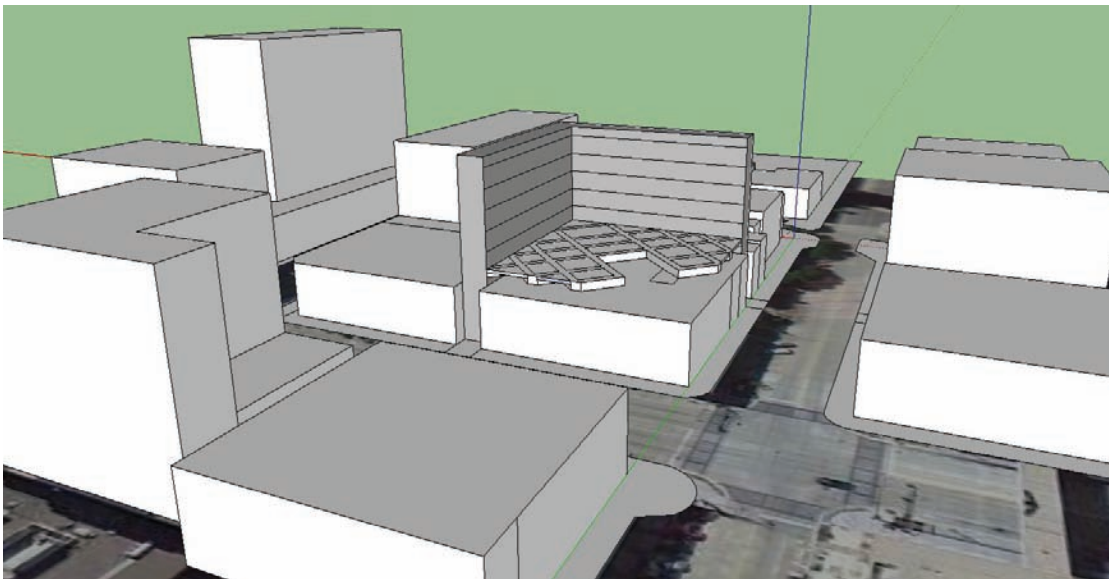
design process

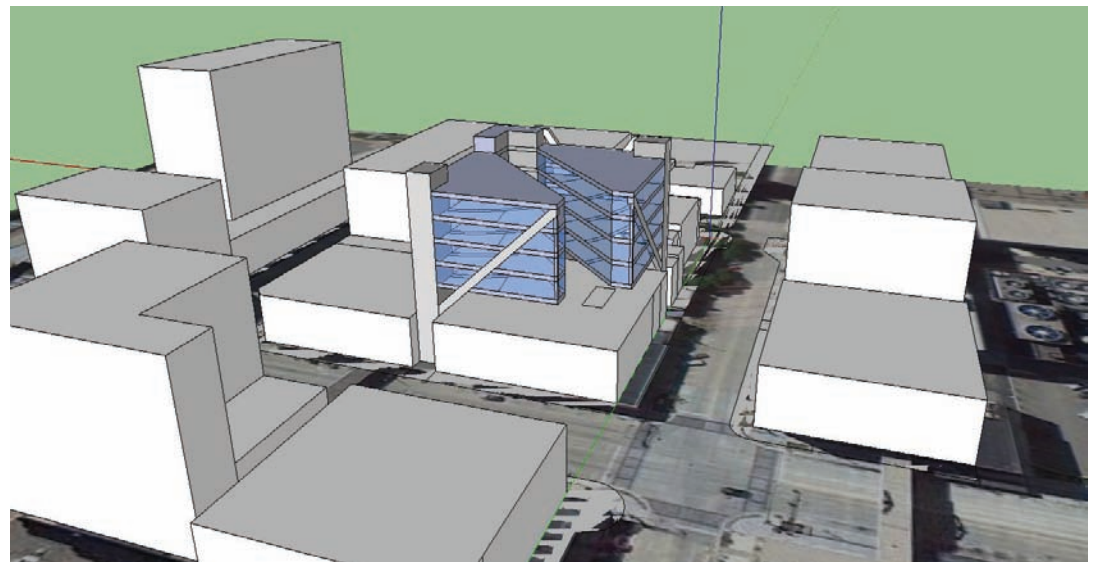
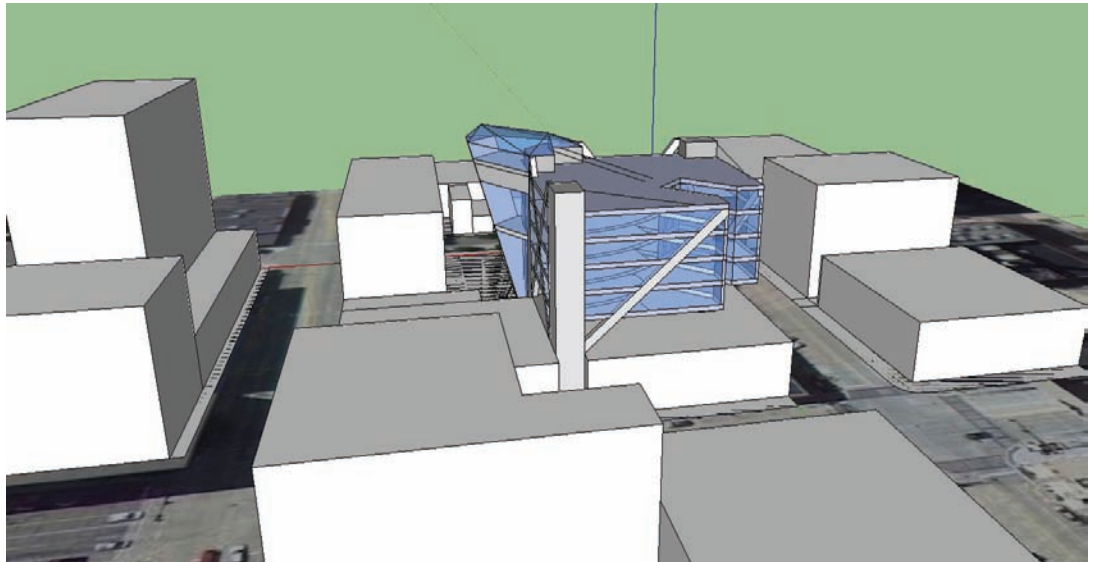
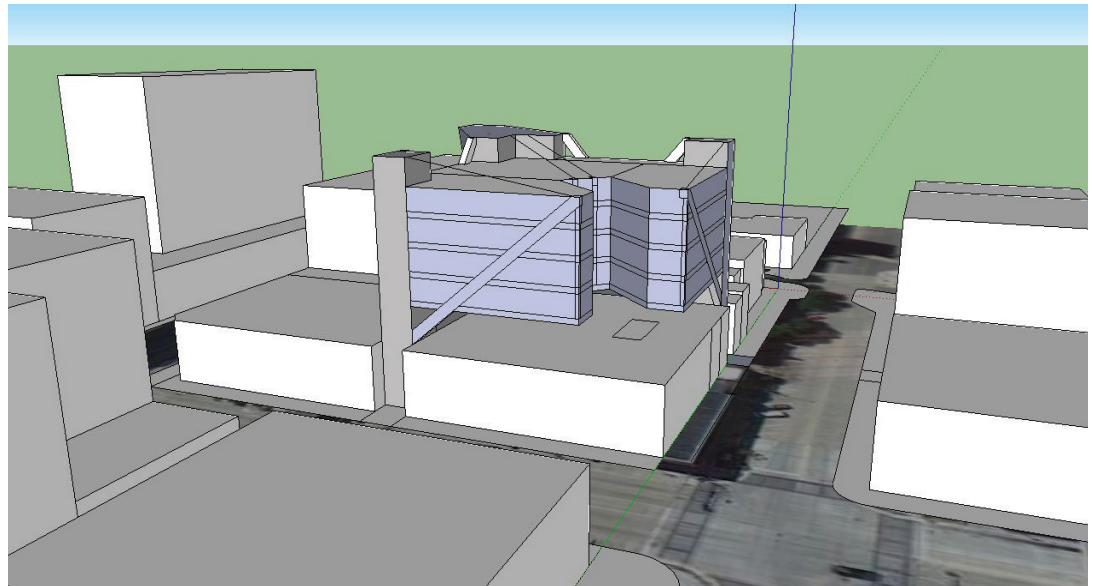


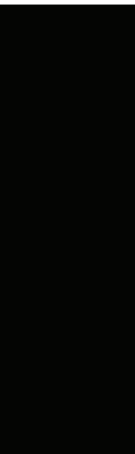
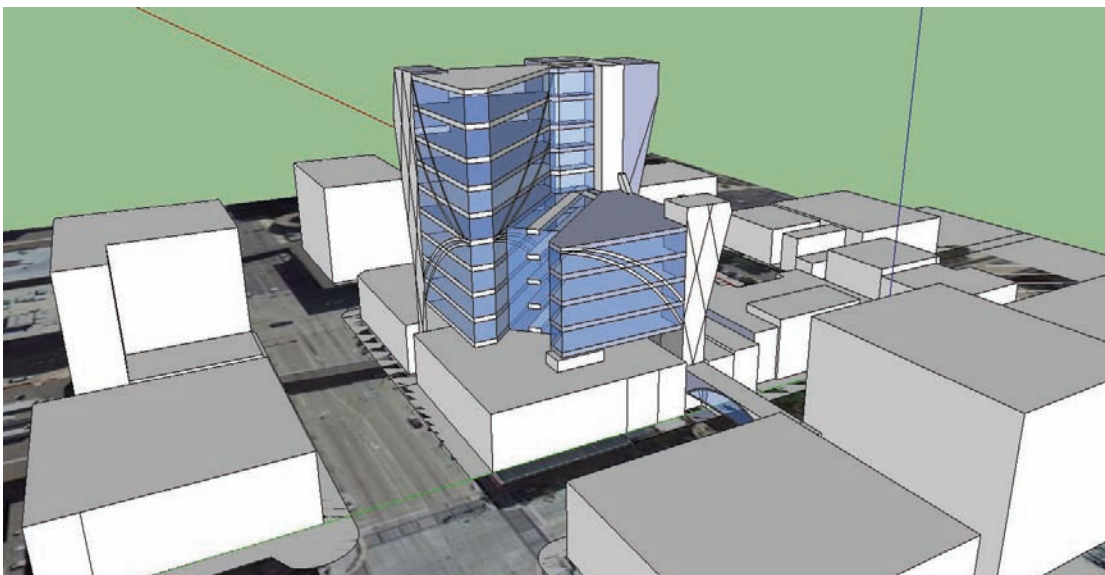
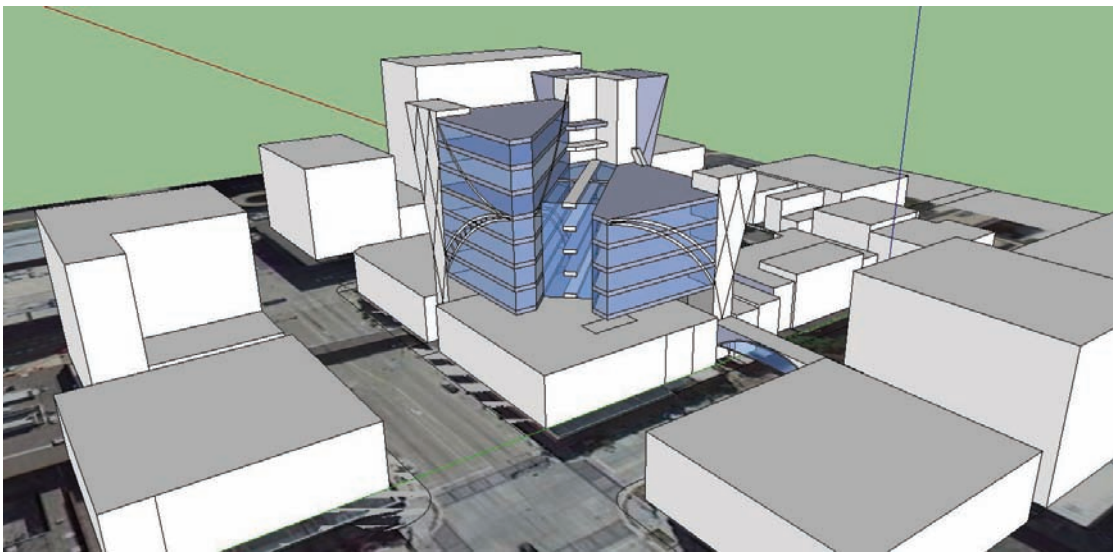
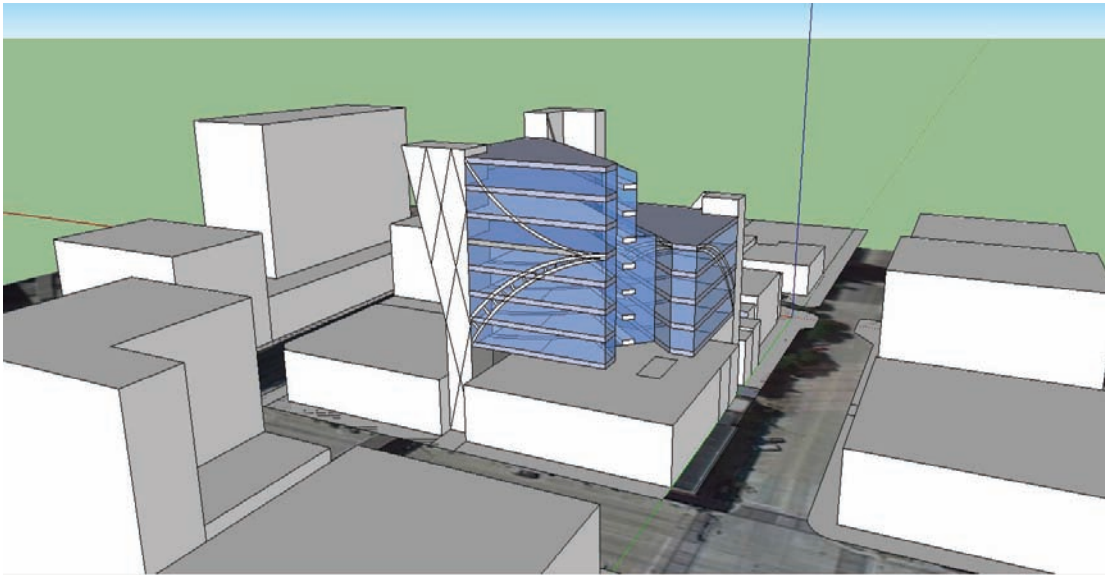


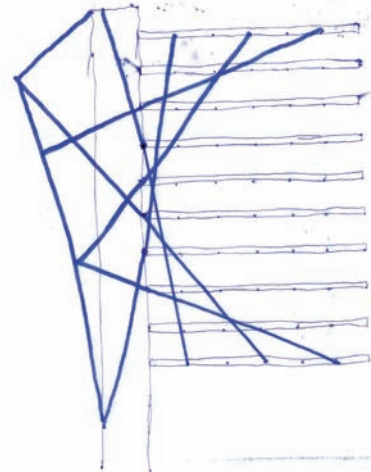
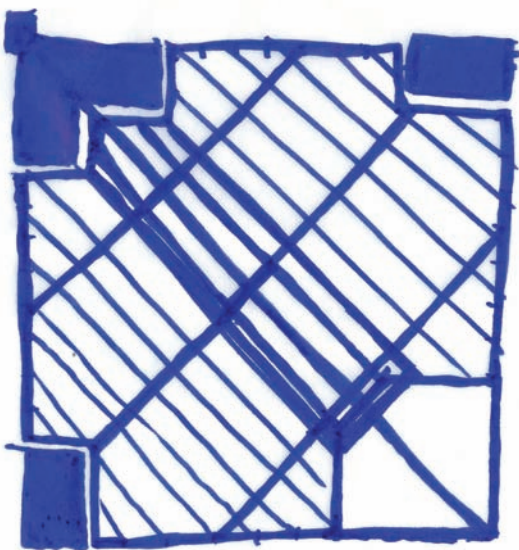
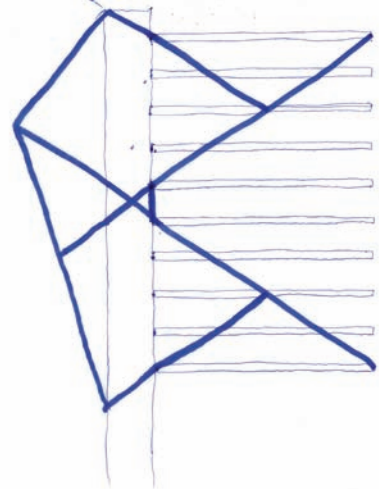
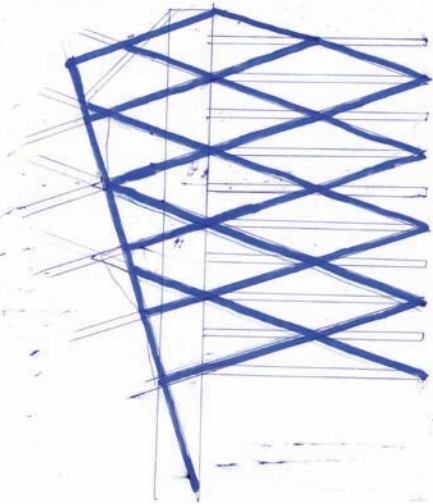
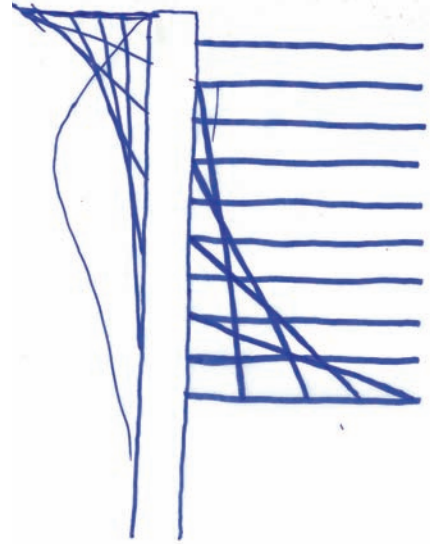
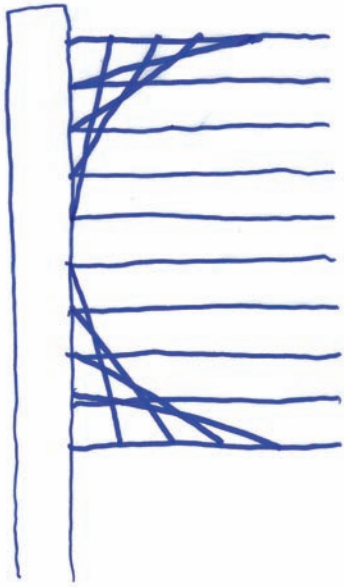


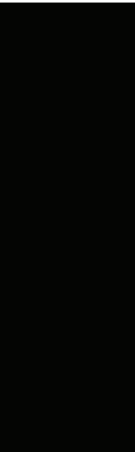
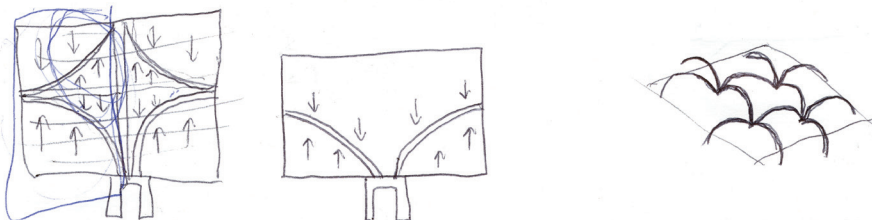
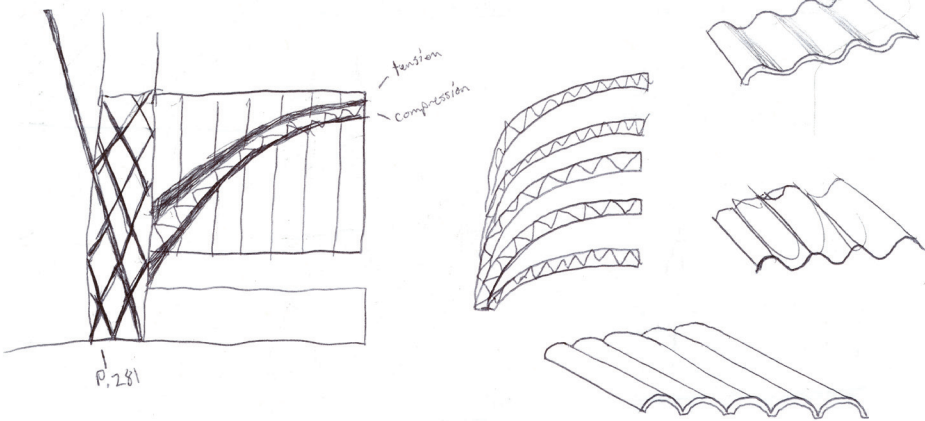
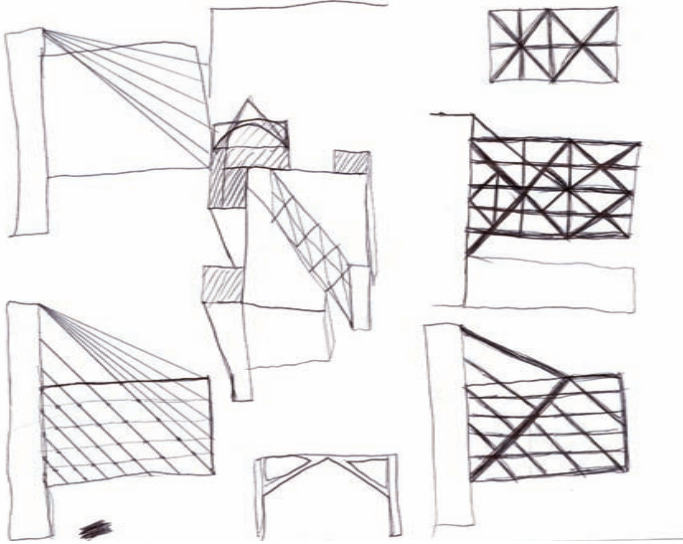
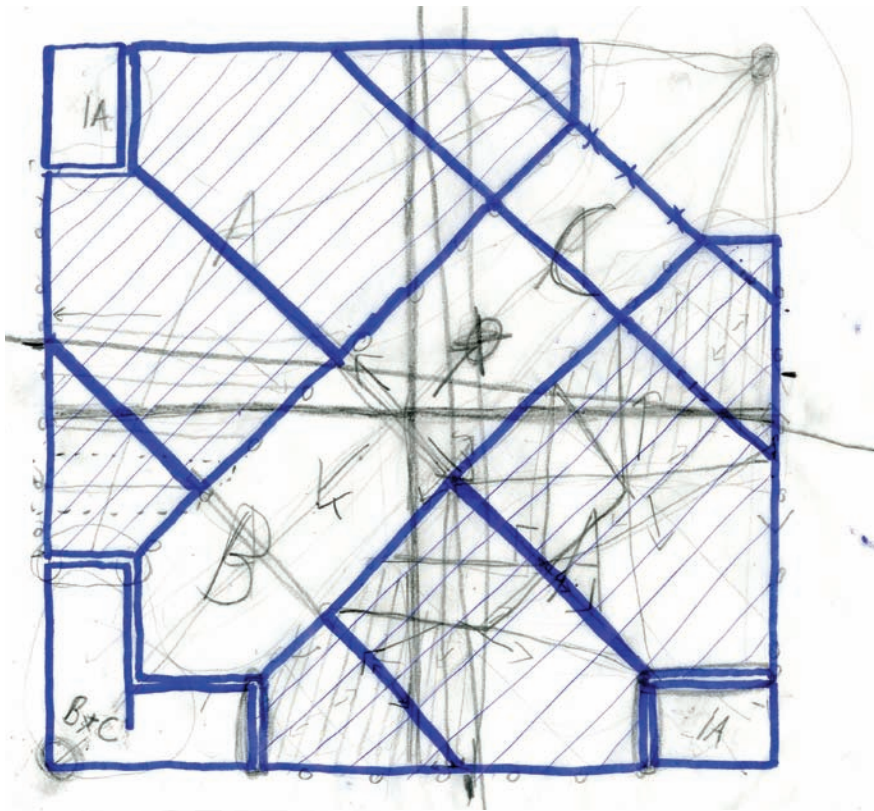


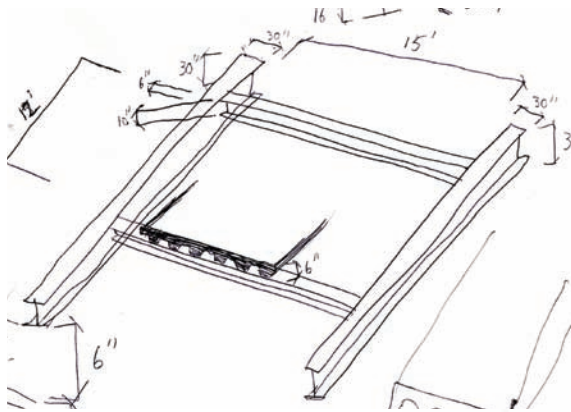
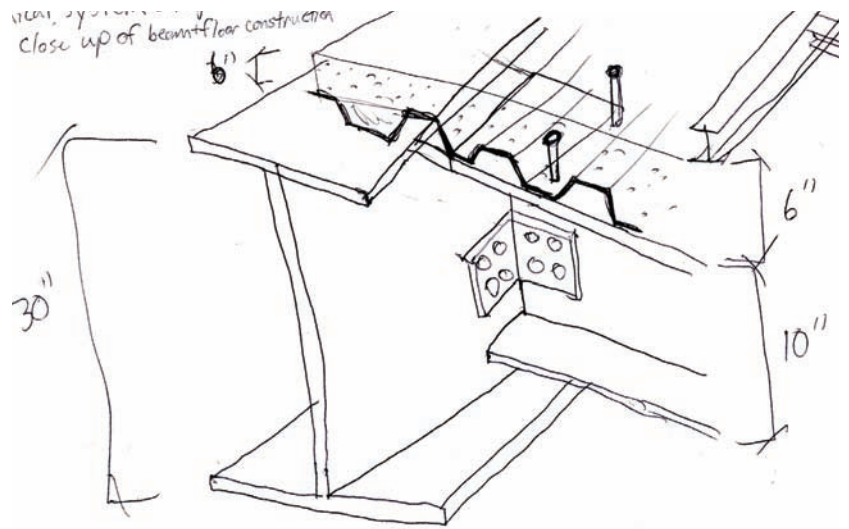






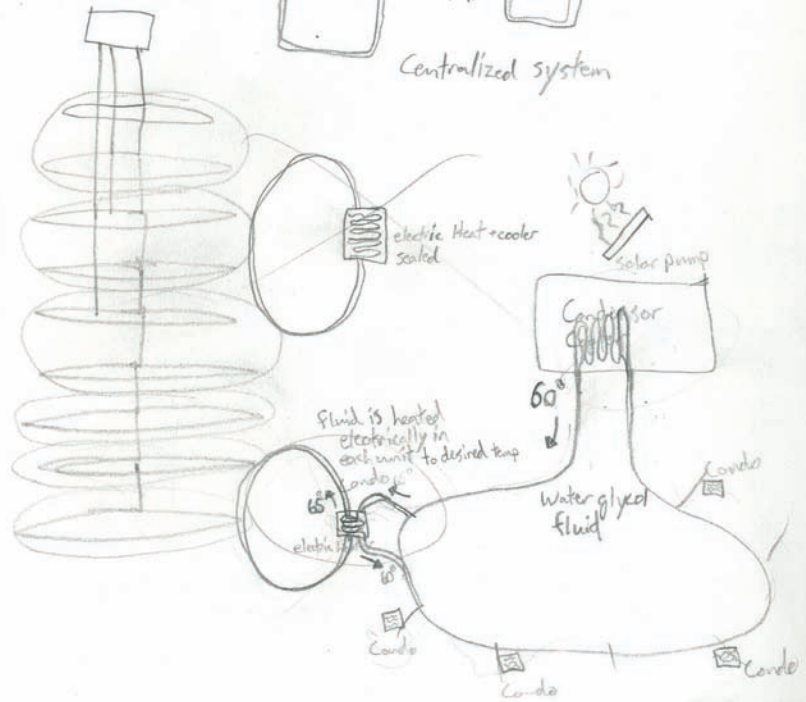
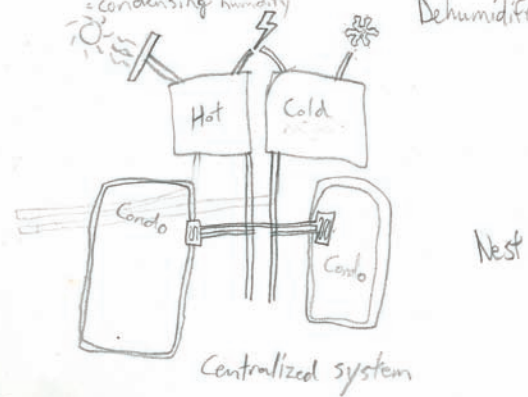






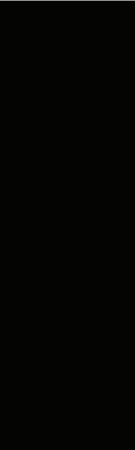
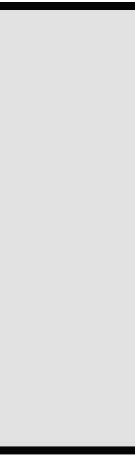
Cooling = Remove Humidity
 = evaporation of cool water
 = condensing humidity

Solar water heater
 Solar water pump
 Dehumidifiers





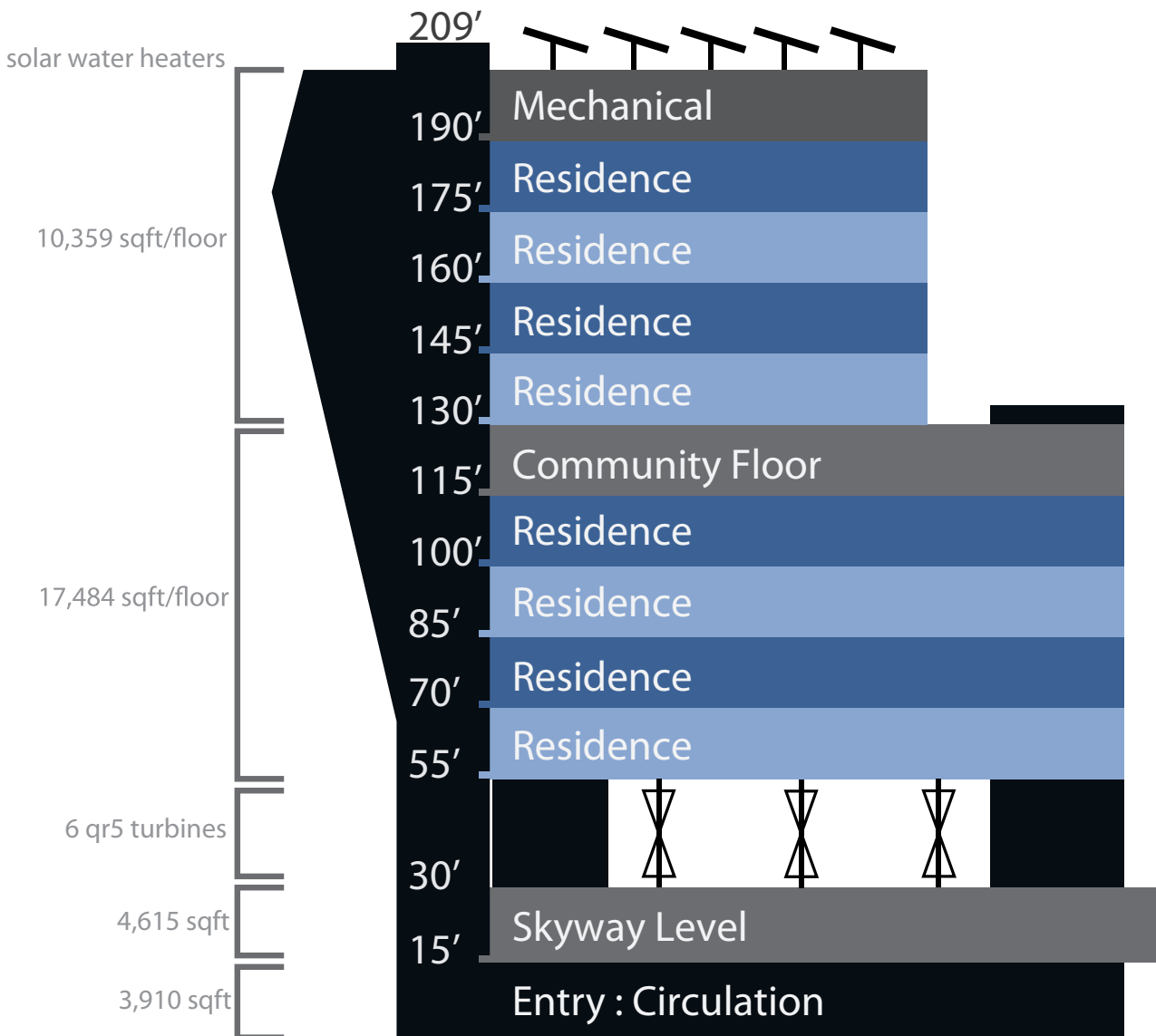
Final Design



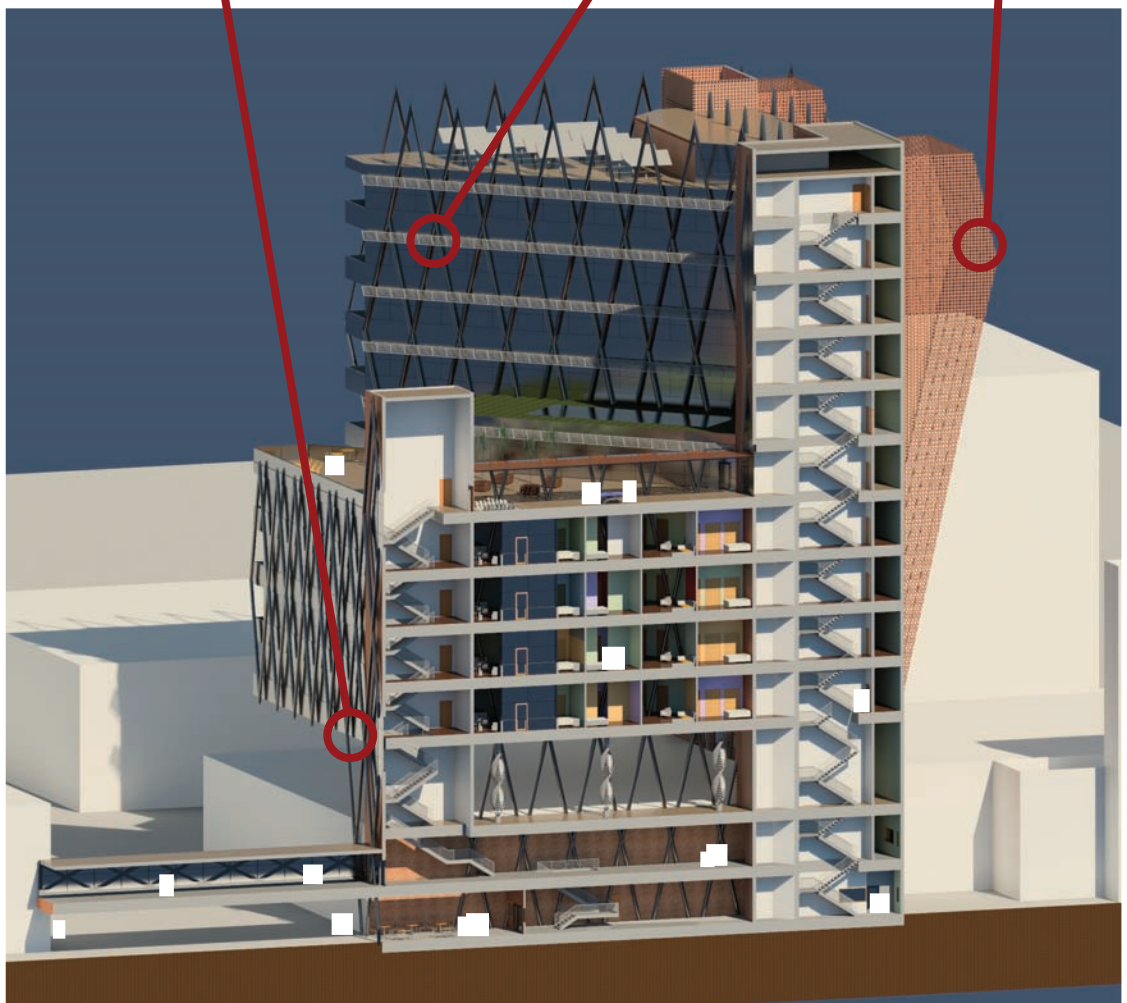
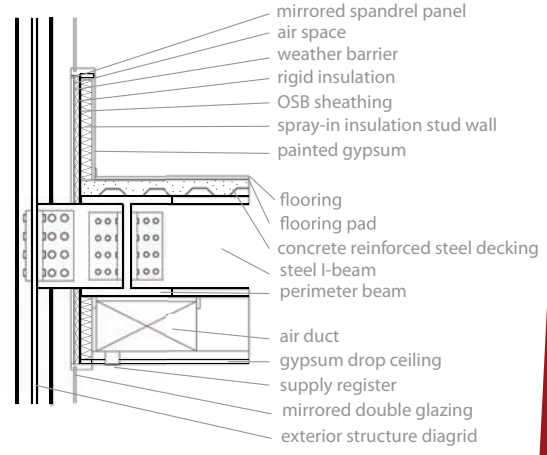
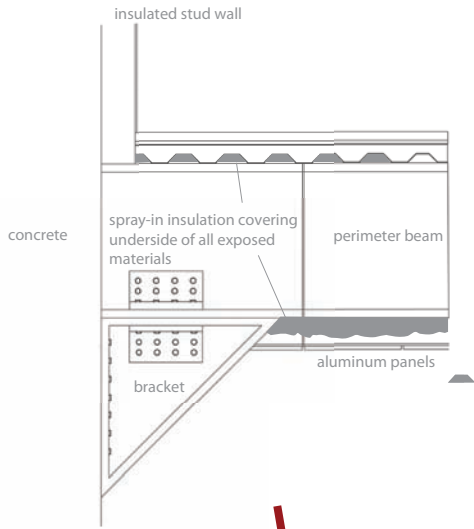
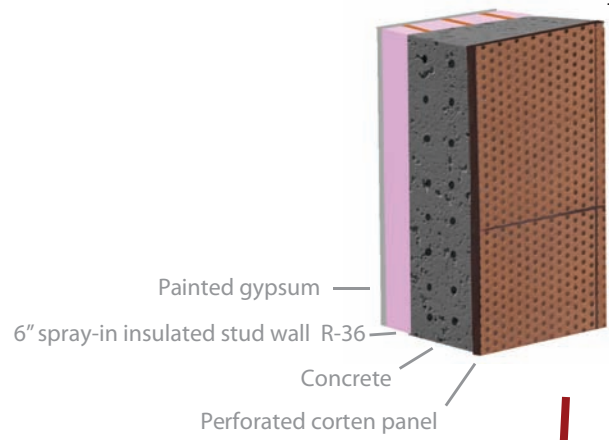


The building will house 52 condominiums holding up to 160 residents. Parking is an existing ramp across the street with skyway access. The center of the building is community floor with a pool, sauna, flex space, and an outdoor patio space for grilling and games. The pool is glass bottomed serving as a diffuser for the atrium below.

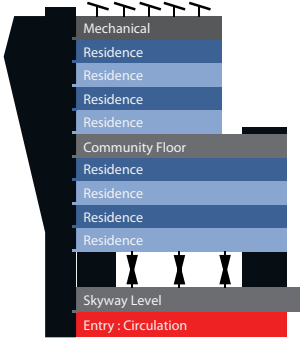
The large masses on the exterior are used as a counter weight and contain storage rooms for the residents. Perforated corten panels cover the exterior of the masses while reflective glass and spandrels highlight the structural members and give it a lighter appearance.



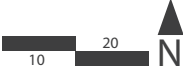
52 Condominiums : 160 Residents



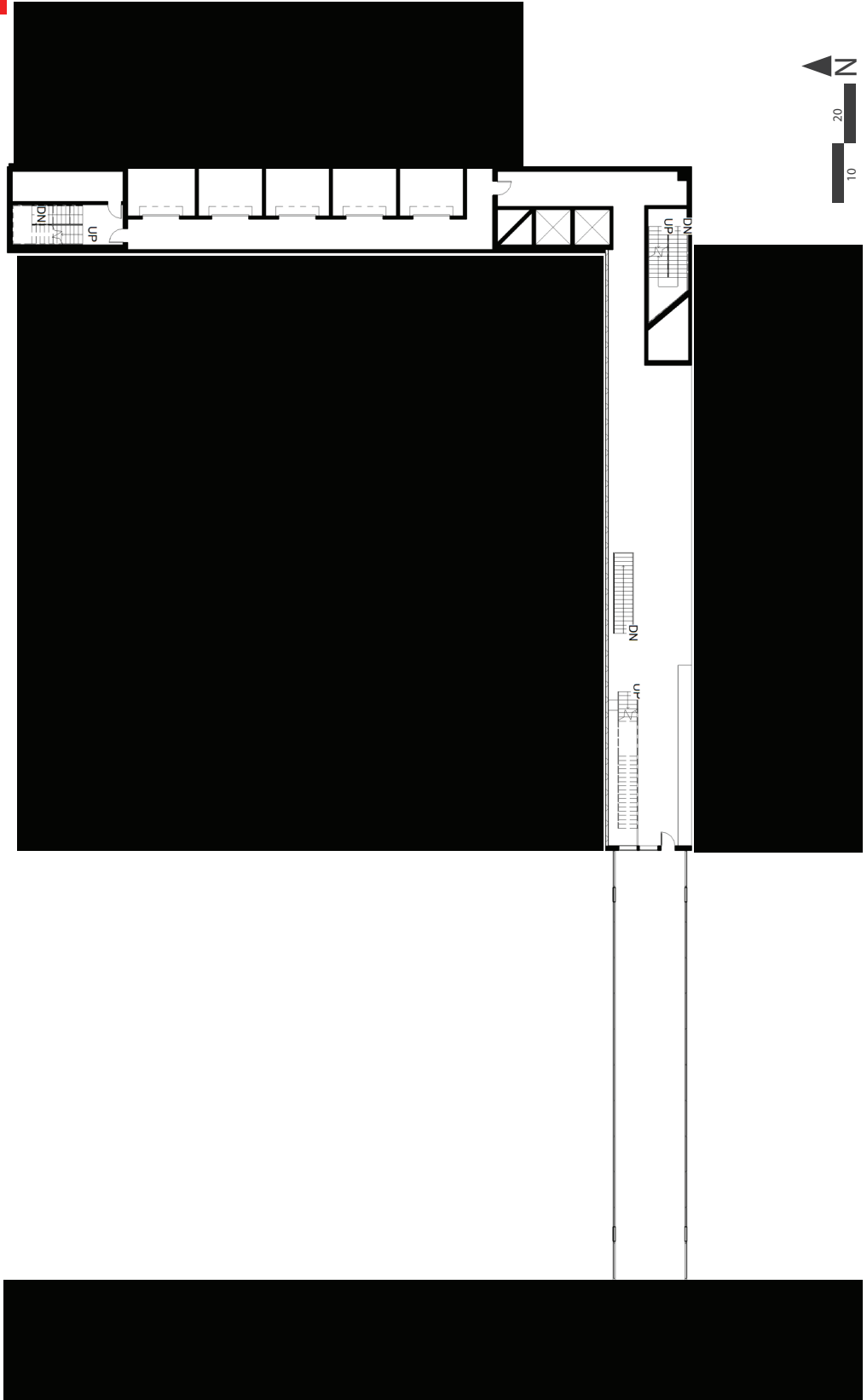
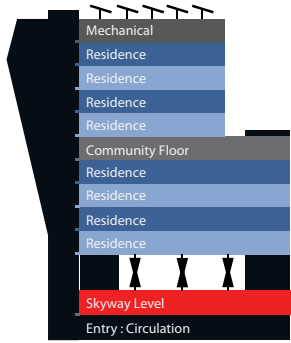
Ground Floor



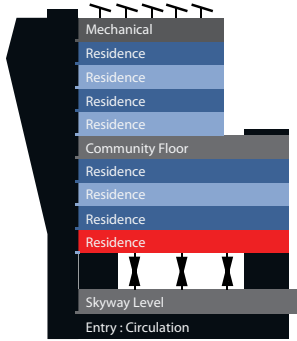
The neighboring building to the south is a cafe which has outdoor seating in the alley currently. This plan allows for that seating to stay by placing the entrance deeper into the lot.



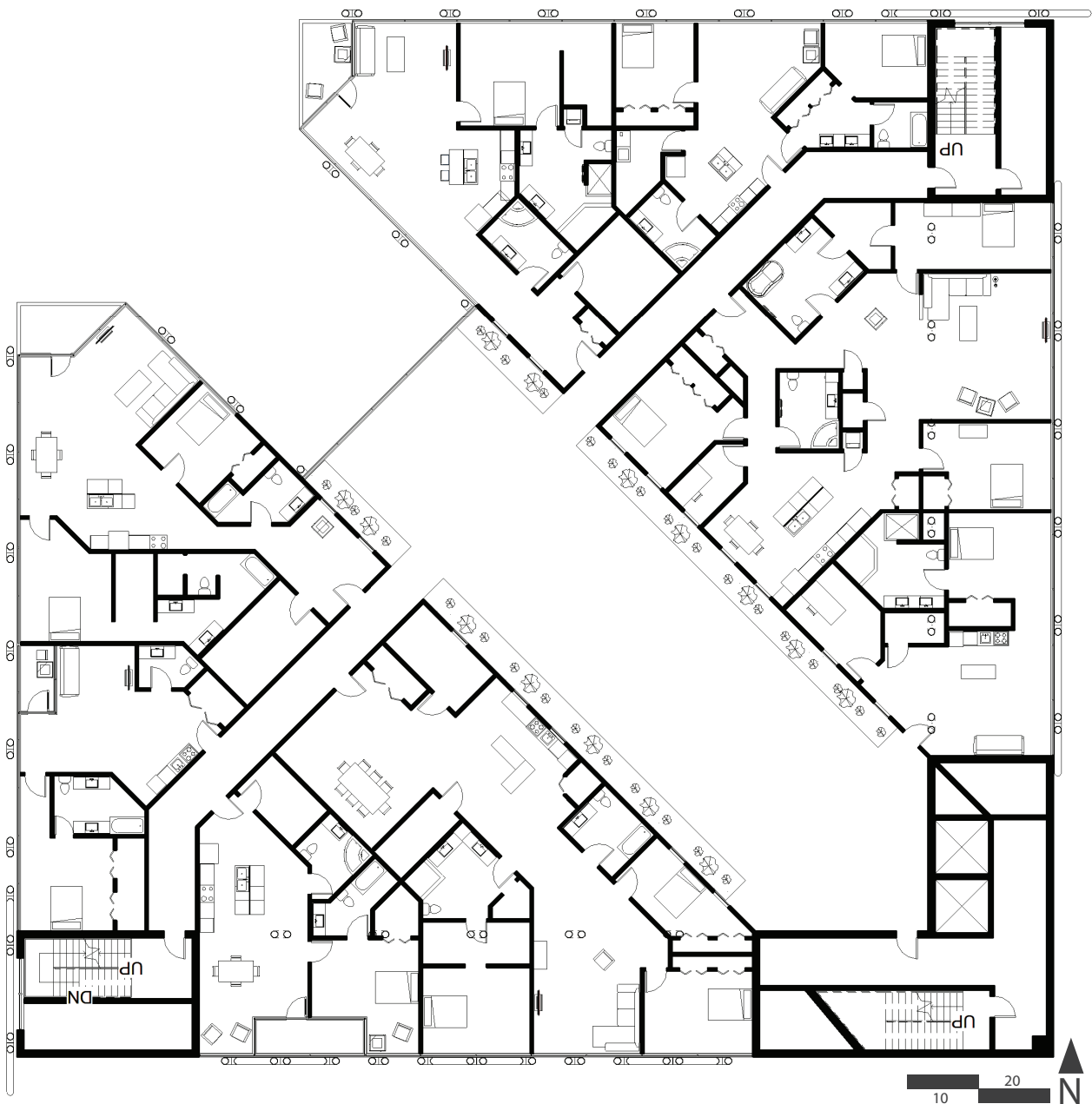
Skyway Level



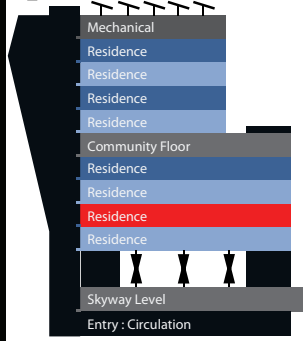
3rd Floor



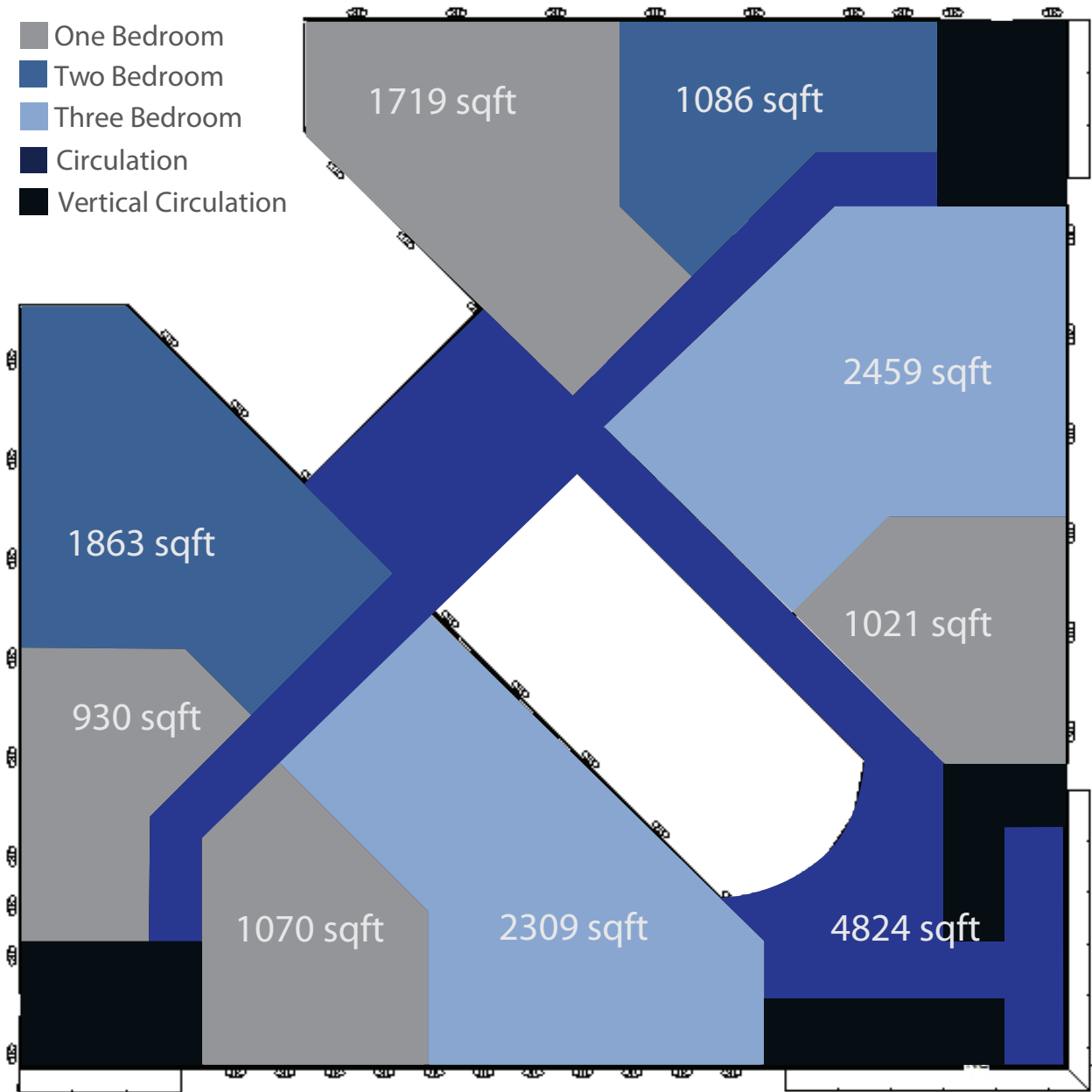
These units would be pre-sold prior to construction and built to suit each resident's needs. The layout of the spaces and unit sizes are flexible and able to be adjusted even after construction. All the mechanical systems are run through the ceiling making adjustments and changes easy and affordable.



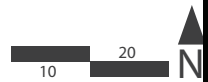
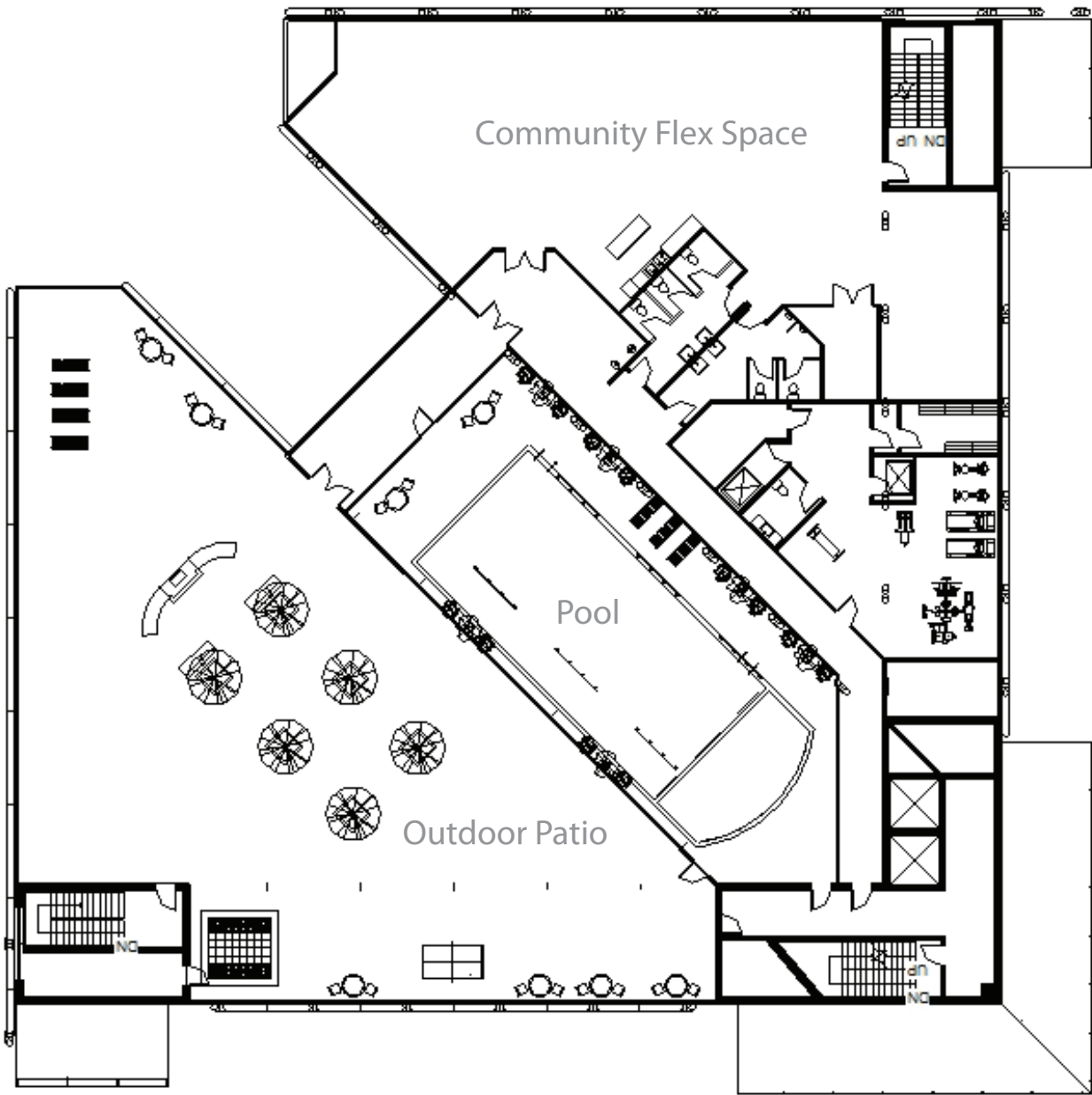
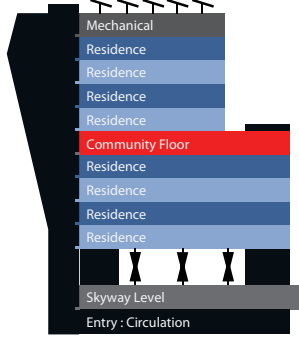
4th Floor



- One Bedroom
- Two Bedroom
- Three Bedroom
- Circulation
- Vertical Circulation

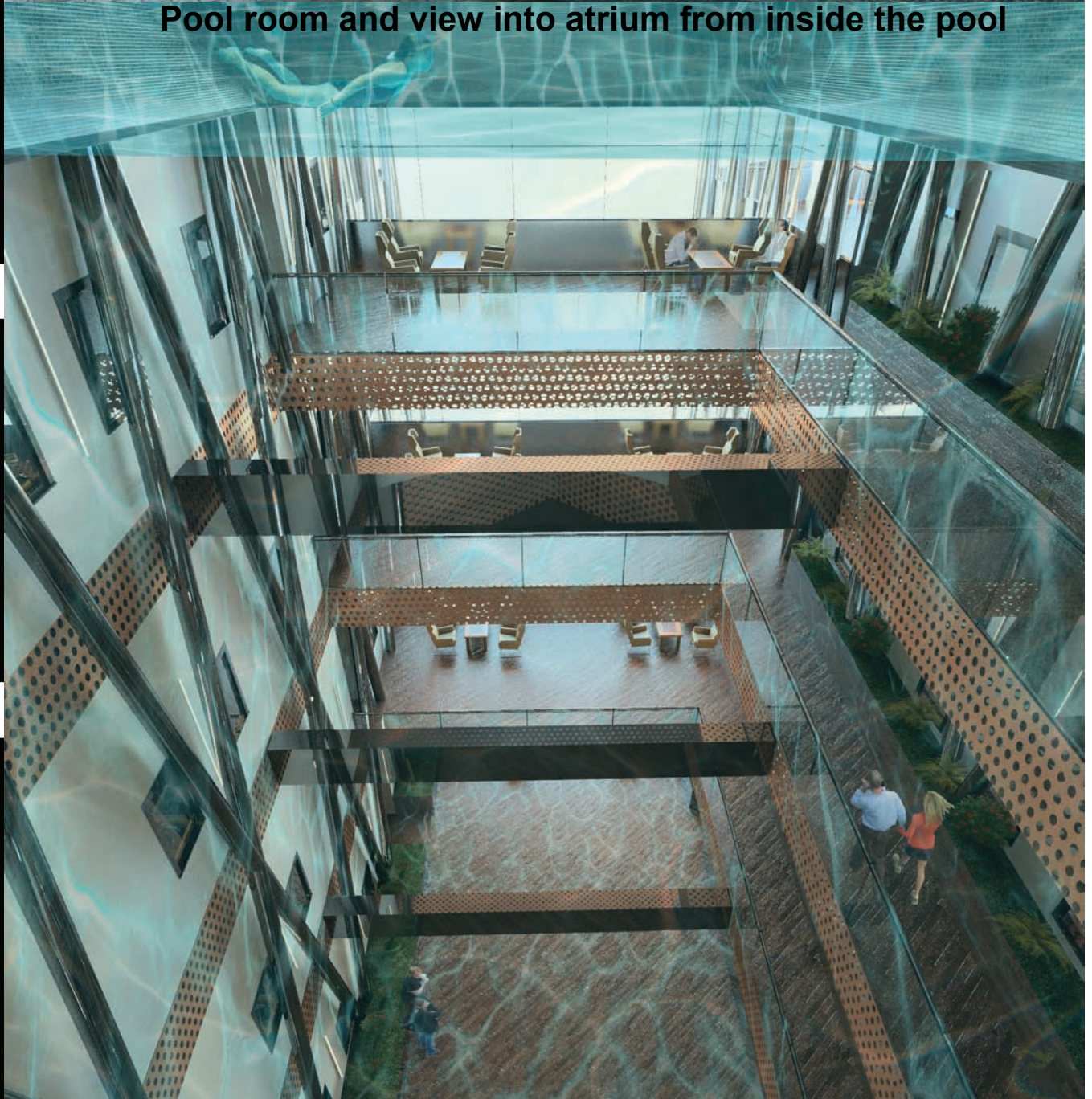


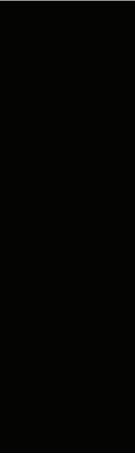
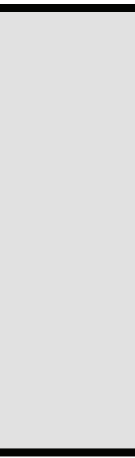
7th Floor



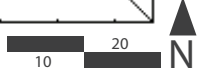
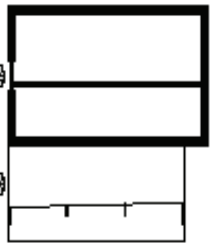
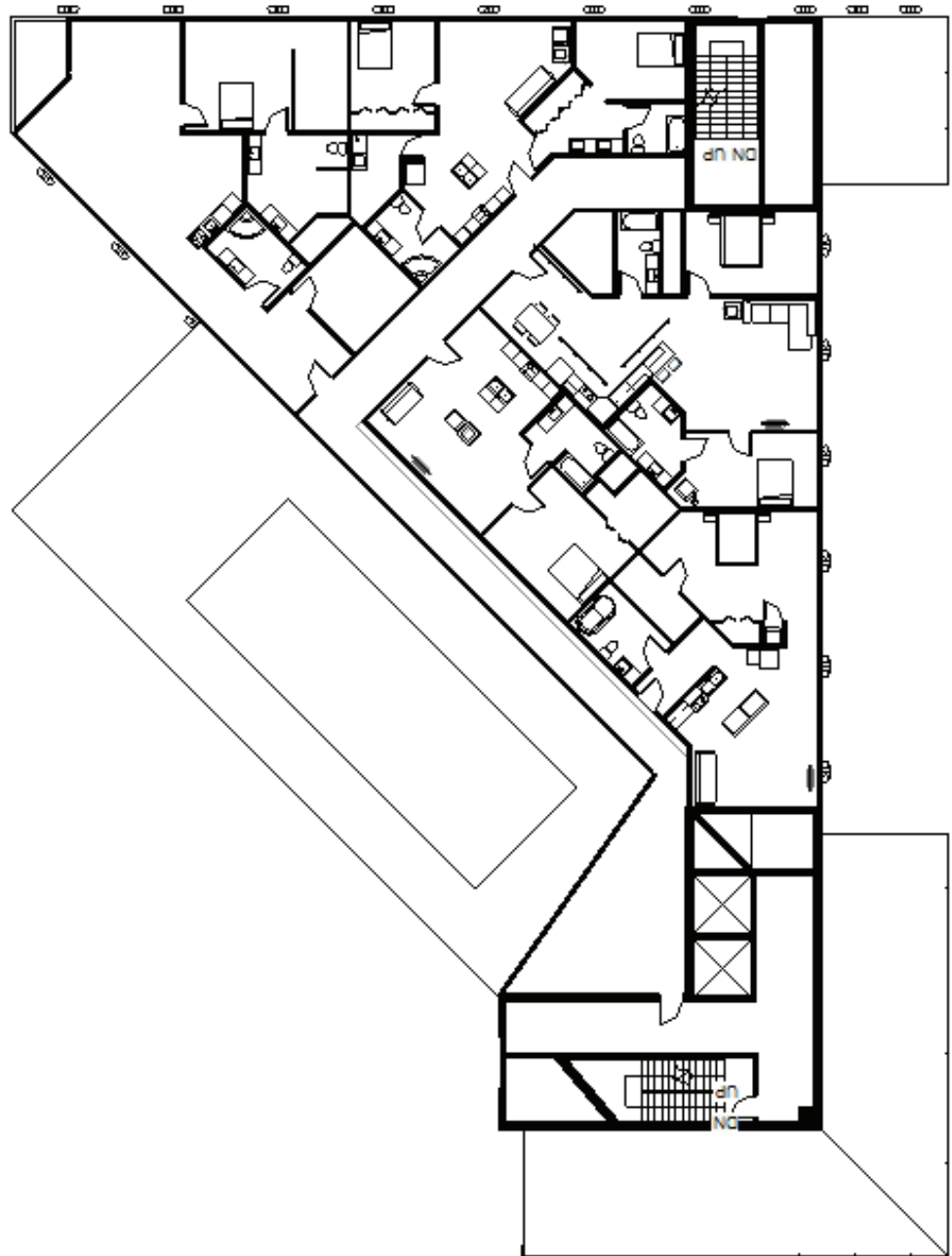
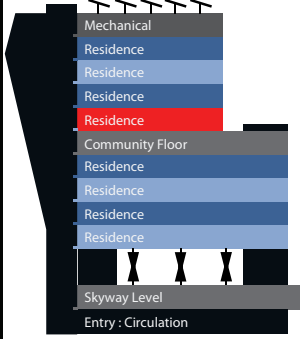


Pool room and view into atrium from inside the pool





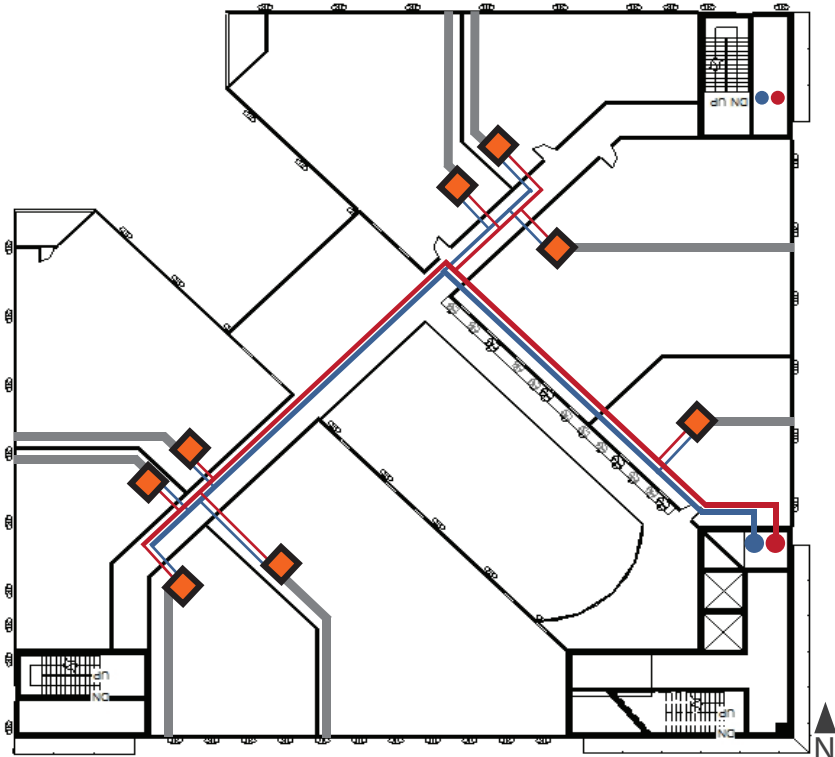
8th Floor



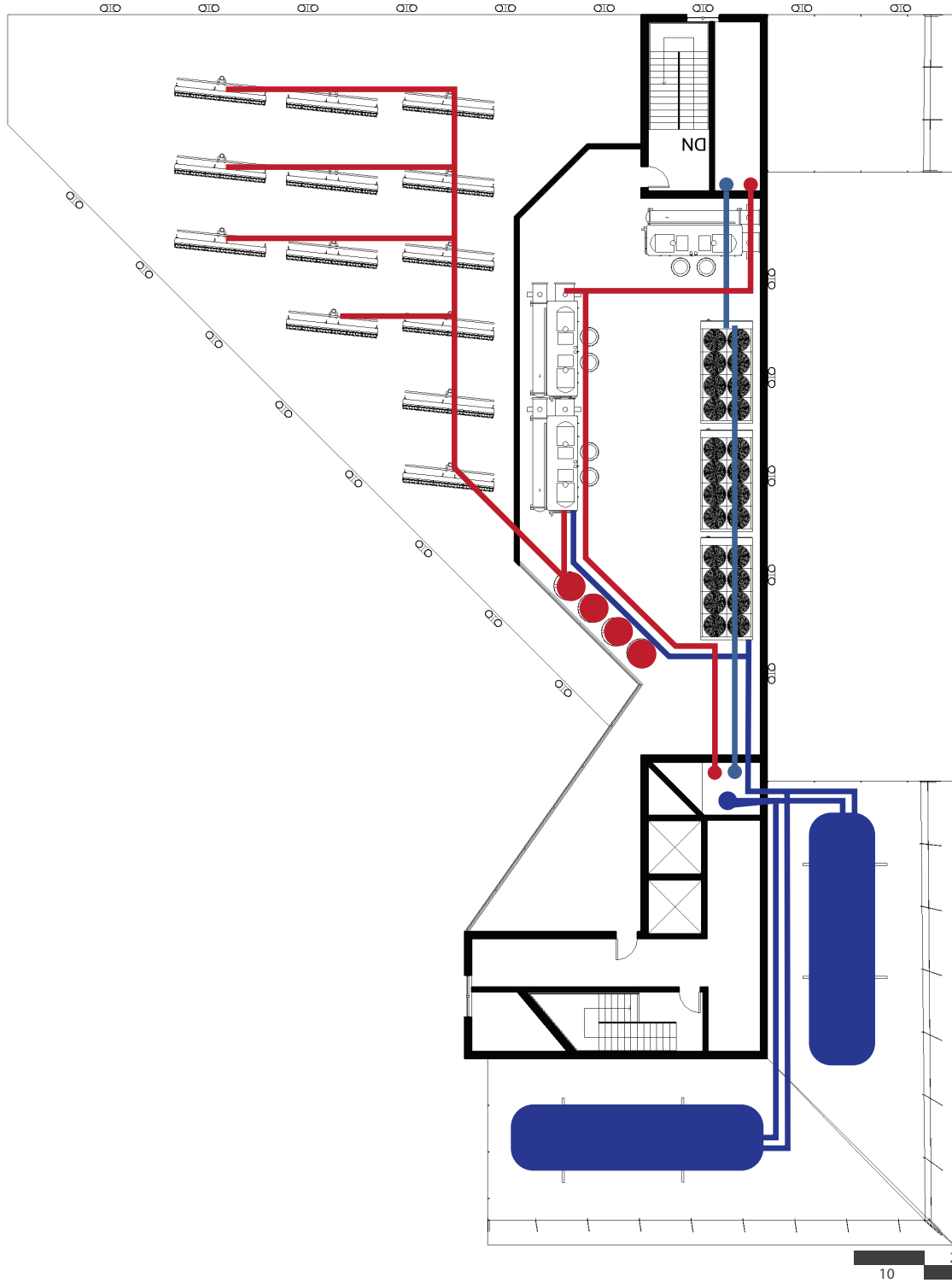
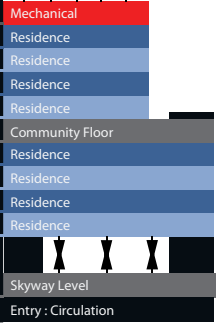


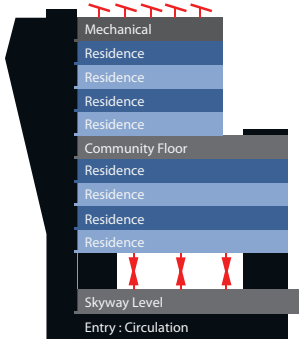
Hot and cold water is supplied from the rooftop mechanical systems. This water is piped throughout the building as potable water, while another system is used for heating and cooling.

Each Condominium has its own air handling system to maximize comfort and control for the residents. Two smaller and separate systems are used to heat and cool the public areas and swimming pool

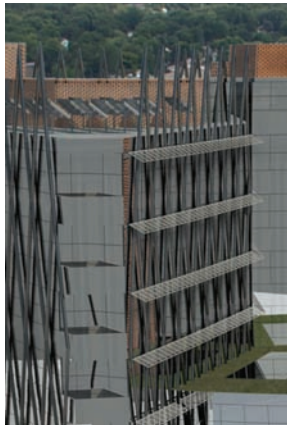


12th Floor





Solar water heaters



Sun shades protect the more exposed facades from the intense summer sun

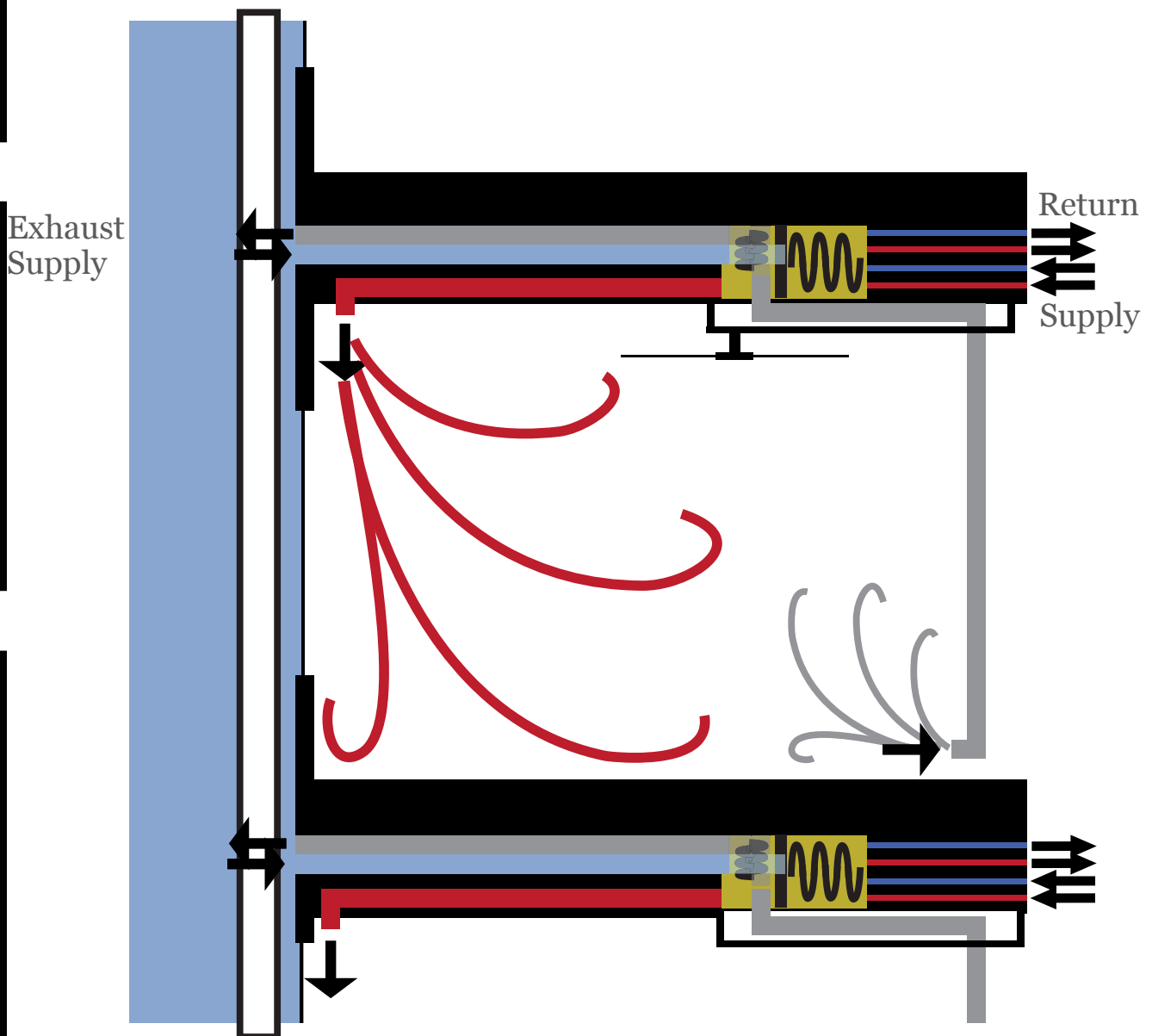
Operable windows and balconies provide the opportunity for natural ventilation



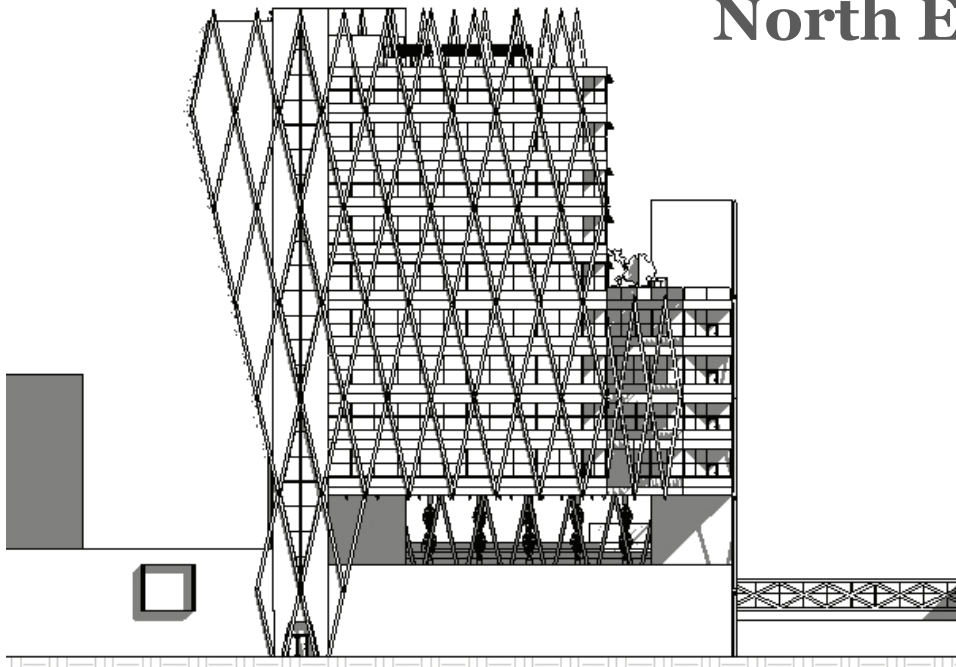
6 - qr5 vertical axis wind turbines
 5000 kW/yr per turbine
 36,000 kW/yr total

The wind turbines will not be installed upon construction. Research and tests will be conducted to verify the practicality of located them so low on the building. Most likely the turbines will not prove to be useful, but there may be unique micro climates created that could support energy collection based on the Venturi effect in the space between the existing and new construction.

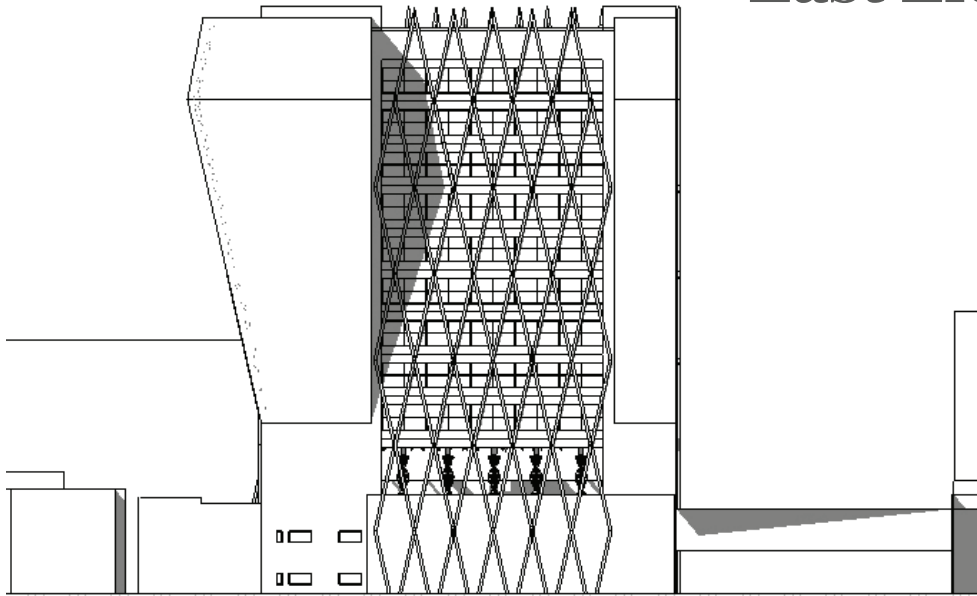
The mechanical systems are run through the ceiling of the units blowing the warm air down the exterior surfaces. This will keep the interior spaces temperature more stable by keeping heat transfer at the perimeter of the space. The warm air will then ascend as it moves towards the interior spaces mixing air at the same time. Ceiling fans can be used to help move the air throughout the spaces. As the warm air cools it will settle near the floor where the air returns are located at the base of the wall removing the coldest air out of the spaces.



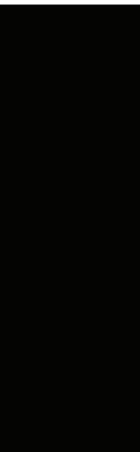
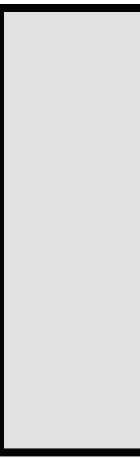
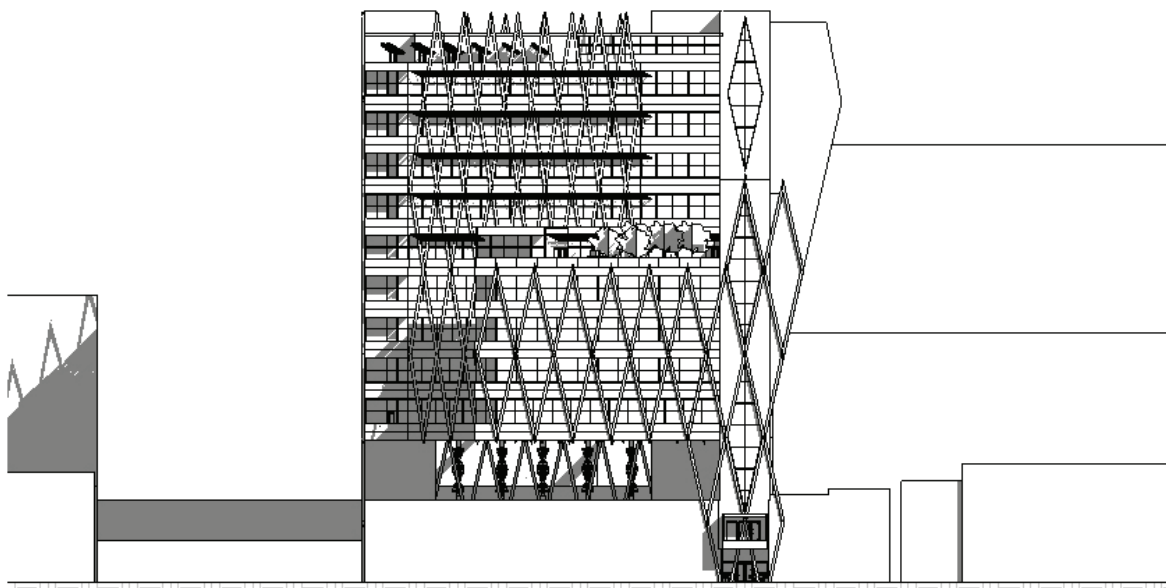
North Elevation

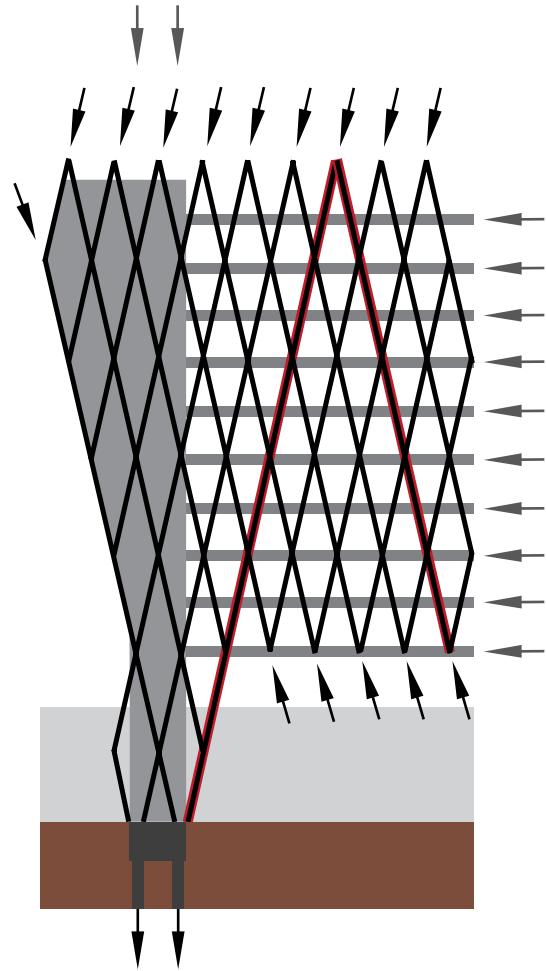
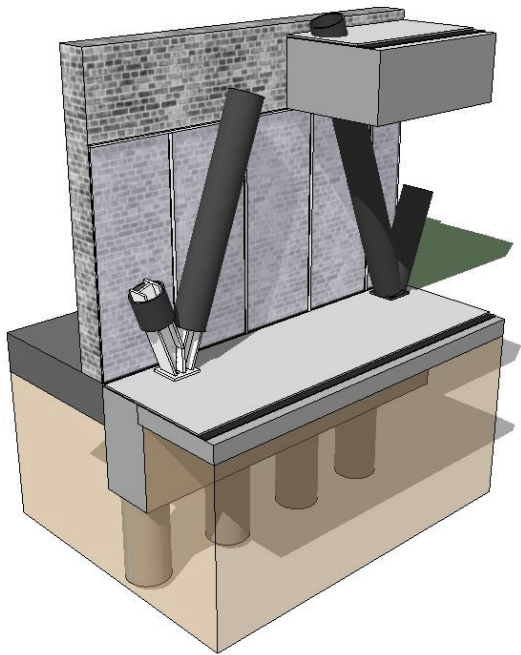


East Elevation

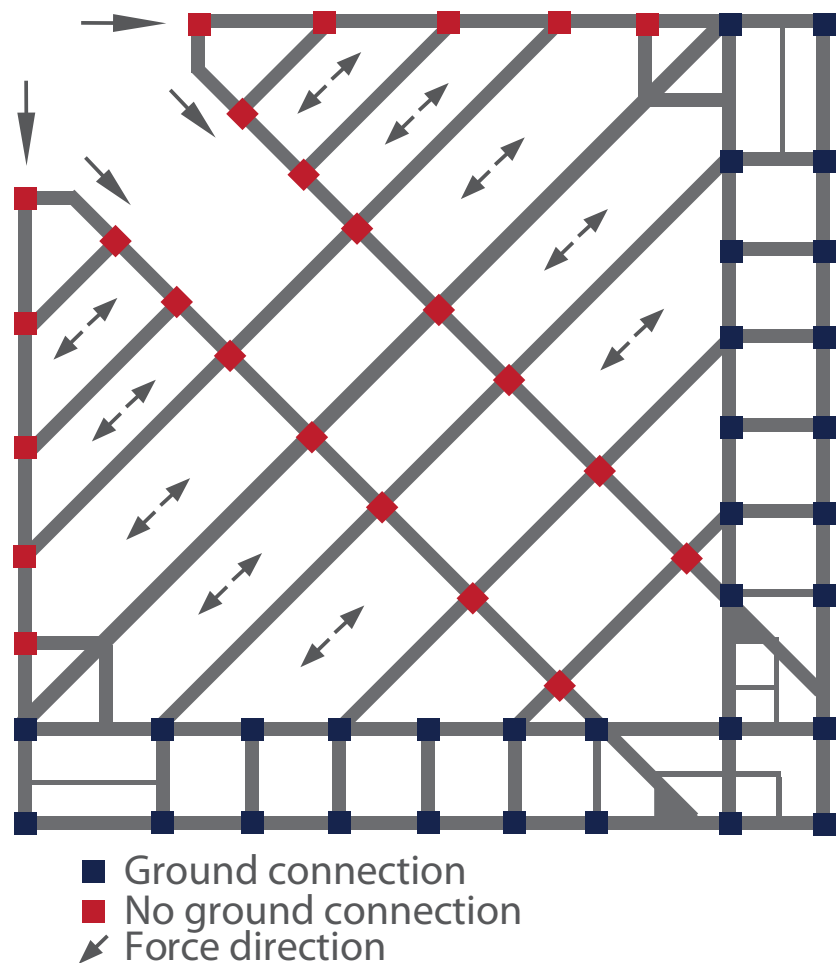


West Elevation

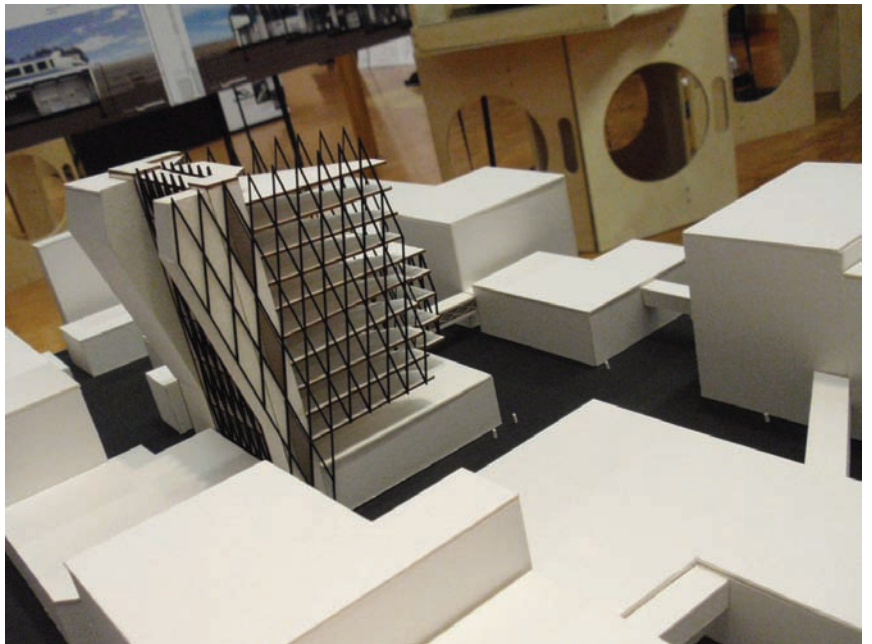
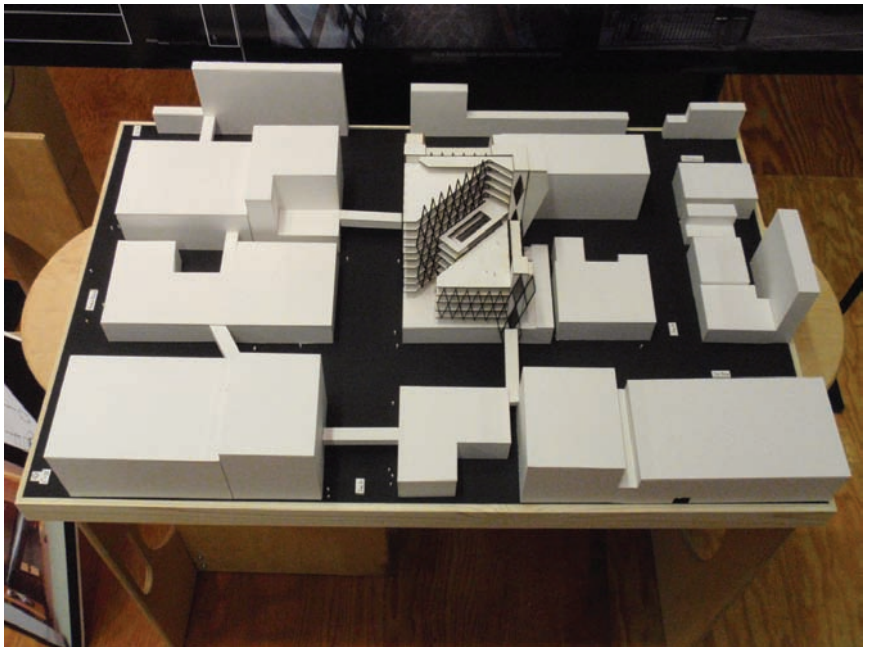
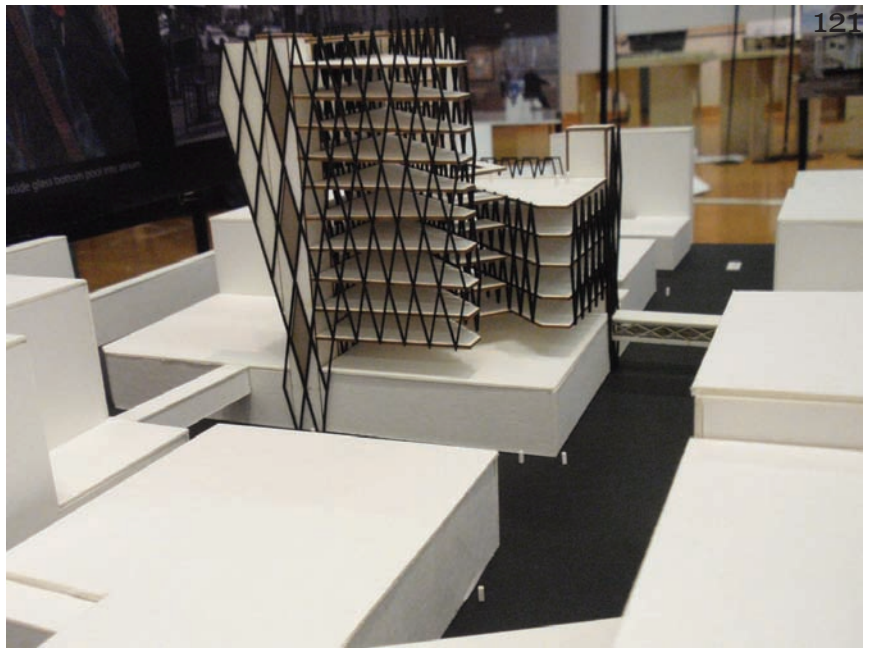
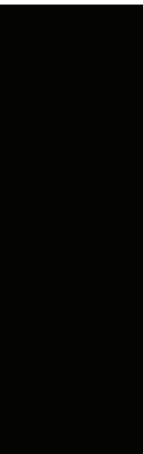




The structure uses a diagrid of steel I-beams shrouded in a black stainless steel shell. The load from the furthest cantilever is taken in tension by the grid to the top of the structure then travels to ground in compression. The diagrid is attached at each floor. Most of the load can be taken directly through the floor structure back to the structure denoted in blue to the right.









There are still several issues which need to be addressed with this project. Following is a list of where to take research and design further to better respond to the unique problems facing this type of project.

Floor plan layouts - the spaces are very deep into the building making daylighting and exterior views difficult to achieve.

Research renovations - Research deeper into the time and cost needed to renovate old structures and compare them to the time and cost of new construction. This will help determine if the project is feasible in real world applications

Other locations - this project was meant to be a prototype able to be adapted to locations across the entire US. Pointing out other suitable locations and cities would strengthen the need for such projects.

More detail on the entry and interaction with nearby structures - There is room for a lot more interaction and details showing the interaction between the project and the neighboring buildings. Highlighting skyway connections and public transit options would also strengthen the argument for downtown residential projects.

Other locations Codes- Rochester, MN has very loose building codes currently. Other locations may not be as flexible requiring significantly more research done in this area.

Human Scale

More attention should be given to the human scale and the interaction with the spaces in and around the building.

Questions moving forward:

Is this affordable?

Is residential the best typology for this project?

Can a project like this be used to improve other functions like public transit, parks, infrastructure, retail?

Can the site specific soils support such concentrated loads?

Is it better to avoid existing buildings or tap into their structure for support as well?

are corner lots or center lots better for this type of in-fill?

Does it make sense to preserve the existing buildings or should we simply demolish them to build new?

Is there a way to better interact with the nearby buildings?

Paul Flotterud

102 Woodridge Drive
Cannon Falls, MN 55009
612.741.7884



**Success is not a handout.
School gives us the tools and knowledge to succeed.
It is up to you to make it there.**

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