The Chameleon

THE CHAMELEON

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

By
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In Partial Fulfillment of the Requirements
for the Degree of
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THESIS ABSTRACT

These days the growth of society is accelerating and there are many new technical and cultural problems to be considered. Buildings must therefore be in a position to respond to these rapidly evolving new environments. Buildings should no longer be constructed planned and developed for a single program only, but should take into account a variety of choices over centuries. One way to do that is through the adaptability of buildings; if correctly constructed, buildings can be re-programmed and re-inhabited without the possibility of needless deconstruction.

NARRATIVE OF THEORETICAL ASPECT OF THE THESIS

This study will focus on the analysis of past and present ideas and concepts that affect theoretical premises. The proposals presented in theoretical research are a comprehensive exploration of the challenges created by the thesis. This information will help create the knowledge of expertise that will have an impact on the practice of architecture in the future.

This research would explore the curiosity in society's method of disposing of material goods, like architecture. The construction that continues today plays a significant part in the way the future can be created. Issues on how buildings survive as the new needs of people are becoming relevant. Due mainly to the dramatic shifts in the urban world, the customs of communities have been loosened. The concept of identification has started to shift in the post-industrial architectural world.

Buildings are still adapting to the demands of consumers. The possibilities that the architecture has to re-evolve into something meaningful are critical for creating a sustainable future. Architecture has to be reformulated because of the vast volume of waste generated from dismantling potentially valuable buildings or the amount of energy required to restore the building to be valuable. The energy of the world is diminishing, meaning that objects function less. Buildings would last hundreds of years in pre-industrialized Europe era, providing for centuries but nowadays, with the simplicity of manufacturing and advanced construction equipment, it's easy to dream of a new building. We did not push the reconstruction up to the speed of the industrial buildings and it will have to start with new construction methods to bring together these products and services to allow users to have a chance at making a building continue and last for generations to come.

Designing a building that can adapt faster and more cost-effectively by embracing change offers an efficient path to a more sustainable built environment for the desired purpose. Adaptability can be used in this sense as a way of minimizing the amount of new construction (reduction), (re)activating underused or empty building stock (reuse) and improving the disassembly / deconstruction of components.
A building that can adapt and change to become useful for not only todays society but for future generations is a key factor for the development of the future.

THE PROJECT TYPOLOGY

For my project typology i am going to do mutiple Project Typologies for example an Office building, Residential, and Retail with different types of flexible arhitecture to show the buidling can be transformed into multiple uses.

Transformable flexibility - is usually a building that has used modular design principles; it contains transformable parts that move.

Universal Flexibility - has to do with the free plan; it is a building that is line between these types; some buildings can contain characteristics of un-programmed.

Adaptable Flexibility - refers to the repositioning of partitions and other separate them into different categories to better understand their secondary building elements, changeable according to the user's

Movable Flexibility - deal with re-locatable structures capable of being disassembled and reassembled elsewhere, usually made up of trans-portable elements.

Responsive Flexibility - deals with buildings that react to external stimuli, such as weather or people.

CASE STUDY #1

Figure 01 | Exterior View of Shed

THE SHED

Location - New York
Project year - Proposed 2011, Broke Ground 2015, Open April 2019
typology- Kinetic Architecture
Square footage- 200,000
Architect- Charles Berman

INTRODUCTION

The Shed is a non-profit artistic agency that commissions, creates and shows original works of art, in all fields, to all audiences. The Shed's Bloomberg Building — an imaginative 200,000-square-foot (18,500 m2) facility that can be physically adapted to accommodate the most creative ideas of artists. The Shed 's eight-level base building features two floors of gallery space; the flexible Griffin Theater; and The Tisch Skylights, which features a performance space, a creative lab for local artists, and a skylit event space. The McCourt, the famous venue for large-scale performances, exhibitions, and activities, is created as The Shed 's exterior telescoping shell is deployed from above the base building and glides over the rails to the adjacent plaza.

HOW IT WORKS

When deployed, the Shed's shell provides a 17,200-square-foot light, sound and temperature-controlled hall that can support an unlimited variety of functions. The hall can hold an audience of 1,200 seating or 2,700 standing persons; flexible overlapping space in the two adjacent galleries of the base building enables an enlarged audience of up to 3,000 in the hall. The entire ceiling of the shell acts as an open-air theater deck with rigging and structural capability within. Wide operating doors at the Plaza level make it easy to engage with public areas to the east and north while they are open. The Shed's back-of-house spaces, which include offices, mechanical spaces, dressing rooms, and storage, are located on Level 1 and the lower levels of the residential tower to the west

The building is capable of being extended and contracted by rolling a telescopic shell onto tracks. The Shed kinetic device is inspired by the mining history of the High Line and the West Side Railyard. Through using traditional fixed-structure construction systems and adapting gantry cranes technology to enable the outer shell, the institution is able to handle large-scale indoor and open-air programming on demand.

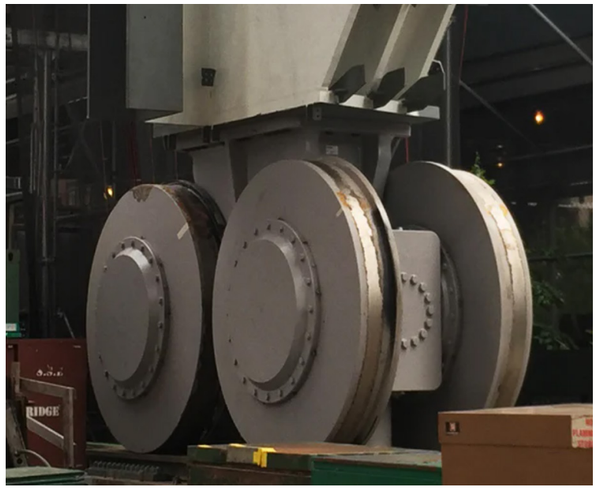


Figure 02 | Wheel and Track

CASE STUDY #1

INSPIRATION

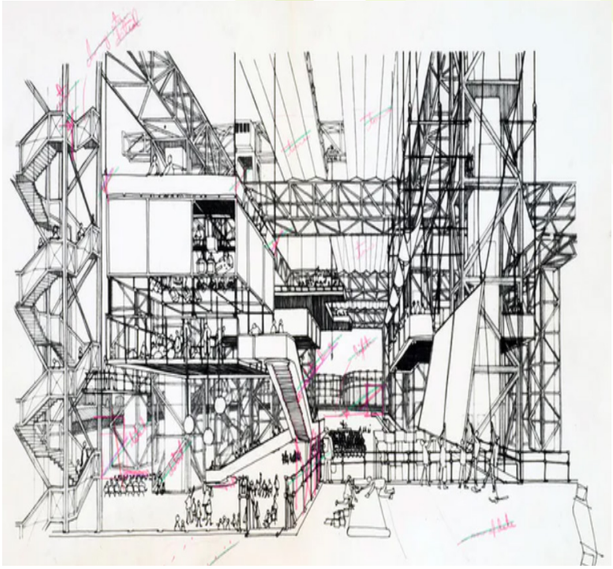


Figure 03 | Inspiration of Shed

The Shed is influenced, architecturally, by the Pleasant Palace, an influential but unrealized building-machine designed by British architect Cedric Price and theater director Joan Littlewood in the 1960s. Like its predecessor, The Shed 's open infrastructure will be indefinitely versatile for an unrecognized future and adaptive to variability in size, media , technology and the changing needs of artists.

Client - The Shed
Rep Office - Air Distribution Enterprises
Lead Architect - Diller Scofidio + Renfro
Collaborating Architect - Rockwell Group
Structural Engineers - Thornton-Tomasetti Engineers
Mechanical Contractor - ASM Mechanical
Kinetic Systems Consultant - Hardesty & Hanover
Construction - Sciame Construction, LLC
Photography - Iwan Baan / DS+R

Figure 04 | Interior Strcture of Shed

Figure 05 | Shed Auditorium

CASE STUDY #1

BUILDING HIGHLIGHTS

» 200,000 square feet
» Additional 17,000 square feet when McCourt expanded
» 110 foot ceiling high ETFE
» 475 million dollar project
» Four-story glass facade (custom designed)
» Completed in April 2019

HVAC

Incorporation of the best HVAC system and related items was alsocarried out as an integral part of the operation. The chosen items were not just chosen for their results, except for their aesthetics and apparently integration features. Several Titus items have been built over the several floors and levels, but the most potent ones include FlowBar, DESV, DTQP, and
The diffuser for the ML.

Figure 06 | HVAC in Shed

The FlowBar - Is an architectural linear diffuser system that maximizes engineering performance without sacrificing aesthetic considerations for the designer. Its outstanding performance allows higher airflows than conventional linear diffusers, with lower noise levels, making it an ideal choice for high profile designs like The Shed. For even better aesthetics, it can be custom curved to match the curvature of the ceiling making it truly a one-of-a-kind air distribution unit and a perfect fit for this project.

ML - Is a modulinear diffuser which is a high performing, high quality linear slot diffuser with unique “ice tong” deflector blades that allow both changes in air volume and direction from the face of the air device. This diffuser is also available in 1 through 8-slot configurations to blend into any interior design.

The DESV - is a single duct terminal unit that regulates airflow to a zone in response to zone temperature requirements.It incorporates many design features that increase performance, decrease service and installation costs, and offer increased value over the lifespan of the unit.

The DTQP is a parallel flow terminal unit with the fan positioned outside of the primary airstream and runs intermittently, when the primary air is off. Parallel flow or variable volume fan powered terminals operate in two distinct modes: variable volume, constant temperature when handling high cooling loads; and constant volume, variable temperature when heating or handling light cooling loads.

STRUCTURE

It is enclosed by a 4,000-ton exposed reinforced steel shell that rolls out like a cell phone to turn the surrounding concrete plaza into a performing arts pavilion. When not required, a 4.040-ton steel shell will nest over the base building after being pulled back onto a double-wheel track that was installed on the gantry cranes technology typically used in shipping yards. The entire system runs on four single-axle and two double-axle bogie wheels, each measuring six feet in diameter. Built of hardened forged steel, it takes just five minutes to fully deploy at a pace of a quarter mile per hour, using only a little more than the Toyota Prius horsepower. The 120-foot movable shell of the Shed is made of exposed steel diagrid structure, covered in transparent cushions of a solid and lightweight Teflon-based polymer called ethylene tetrafluoroethylene (ETFE). This material has the thermal properties of a fraction of the weight of the insulating glass. The Shed ETFE panels are some of the largest ever made, with a length of almost 70 feet in some places. This innovative material gives the Shed an ethereal transparent feel while also being hurricane-force wind-proof.

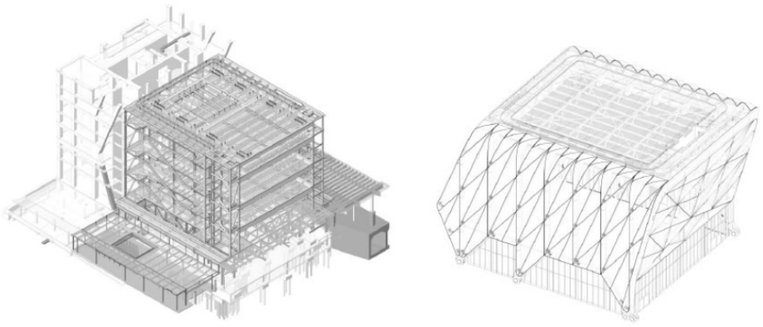
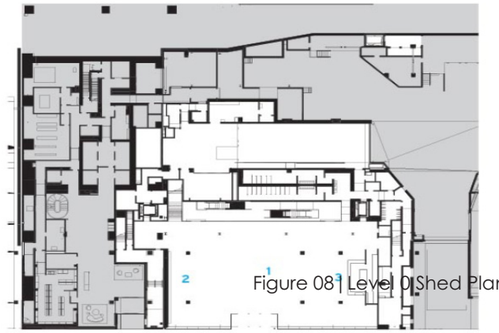


Figure 07 | Structure of Shed

CASE STUDY #1

FLOOR PLANS AND SPATIAL RELATIONSHIPS



1 LOBBY
2 TICKETING
3 BAR
4 GALLERY
5 MCCOURT PLAZA
6 STUDIO THEATER
7 GREEN ROOMS
8 EVENT SPACE
9 CATERING KITCHEN
10 TISCH ARTISTS LAB
11 OFFICES

Figure 08 | Level 0 Shed Plan

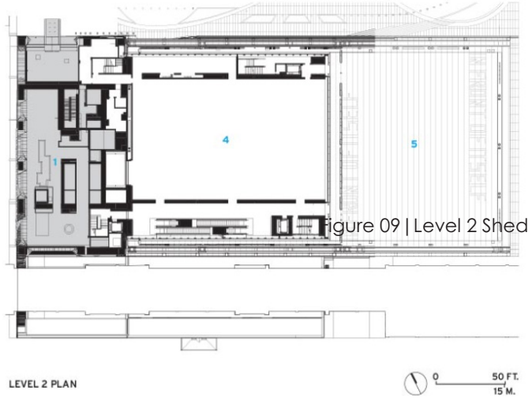


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Figure 09 | Level 2 Shed Plan

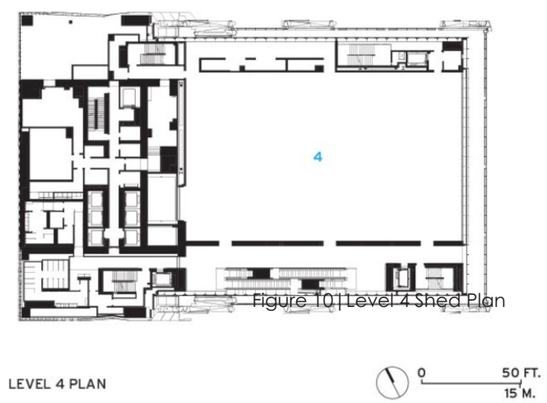

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Figure 10 | Level 4 Shed Plan

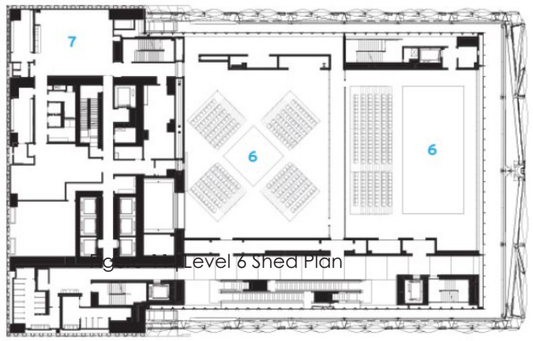

Figure 11 | Level 6 Shed Plan

1 LOBBY
2 TICKETING
3 BAR
4 GALLERY
5 MCCOURT PLAZA
6 STUDIO THEATER
7 GREEN ROOMS
8 EVENT SPACE
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11 OFFICES

LEVEL 6 PLAN

0 50 FT. 15 M.

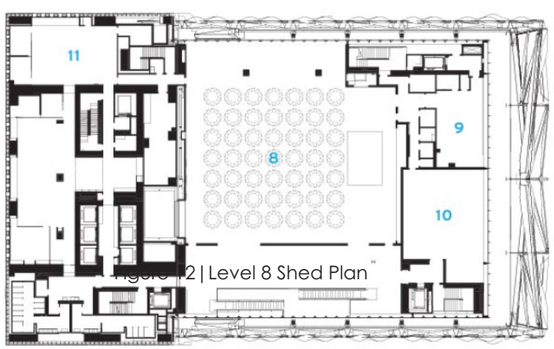


Figure 12 | Level 8 Shed Plan

1 LOBBY
2 TICKETING
3 BAR
4 GALLERY
5 MCCOURT PLAZA
6 STUDIO THEATER
7 GREEN ROOMS
8 EVENT SPACE
9 CATERING KITCHEN
10 TISCH ARTISTS LAB
11 OFFICES

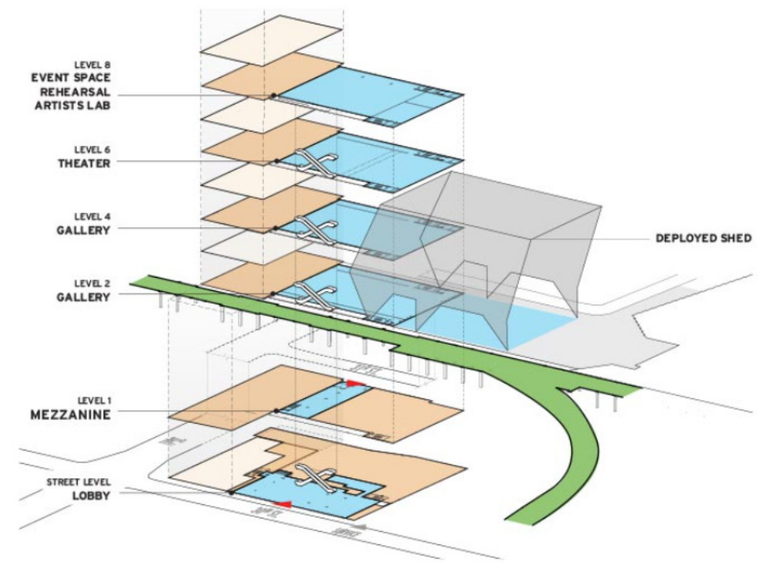
LEVEL 8 PLAN

0 50 FT. 15 M.

CASE STUDY #1

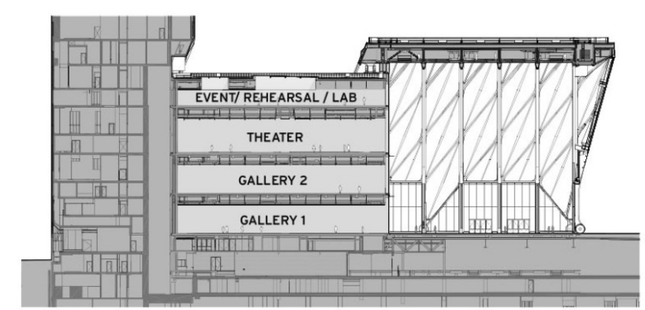
USES DIAGRAM

This eight-level base building includes two levels of gallery space which are called the versatile Griffin Theater and The Tisch Skylights, which comprise a rehearsal space, a creative lab for local artists, and a skylit event space. The McCourt, an iconic space for large-scale performances, installations, and events, is formed when The Shed's telescoping outer shell is deployed from over the base building and glides along rails onto the adjoining plaza.



EXPLODED AXONOMETRIC

Figure 13 | Shed Uses Diag.



SECTION

Figure 14 | Shed Section Plan

CASE STUDY #1

ANALYSIS

The Shed's open infrastructure makes it possible for the structure to be permanently flexible for an unknowable future and responsive to variability in scale, media, technology, and the evolving needs of artists. McCourt's side walls rise and fall like a guillotine to expose the interior to the adjacent plaza. Shades drop, guillotine style as well, to block light and sound. Flexible light grid elements can descend overhead. The MCCourt is essentially a highrise flying tower that enables the entire space to act as a venue.

CONCLUSION

The Shed's open infrastructure can be permanently flexible for an unknowable future and responsive to variability in scale, media, technology, and the evolving needs of artists. The design of the Shed is, its main purpose is civic rather than esthetic. The center of the arts will be used as a theater and gallery space. Various events, such as exhibits, dance shows and festivals, may be staged at the same time in each of the five regions. Each zone was covered in such acoustics that no one output would impact another. This case study shows a building can be changed to utilize different needs and types as they are always changing throughout the future. the building adapts to changing programs and can perform whatever task artists need and want as they are always changing.

CASE STUDY #2

Figure 15 | Crystal Exterior

The Crystal / Wilkinson Eyre Architects

THE CRYSTAL

Location - London, United Kingdom
Typology- Cultural Center
Sustainable building
Square footage- 67,812 Sq Ft
Architect- WilkonsEyre

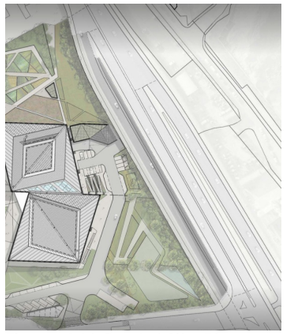


Figure 16 | Crystal Site Plan

INTRODUCTION

The Crystal is a modern method for dialogue on sustainable urban life and growth. WilkinsonEyre designed this striking building as both an exhibition center and a think tank, exemplifying sustainable design. It is located in the Green Enterprise District of East London. This all glass structure challenges traditional sustainability concepts, promoting the use of new technologies to minimize energy use. Six different forms of heavily insulated glass have been used for cladding, each with differing degrees of clarity to moderate solar gain and visibility of the frame in and out of the house. Reflective glass is used on the back-leaning surfaces to reflect the light, while translucent glass is used on the inner surfaces inclined towards the rim.

CASE STUDY #2

PROJECT ELEMENTS

The building has excellent environmental certificates, earning BREEAM Outstanding and LEED Platinum ratings upon completion. As a showcase of environmental architecture, it incorporates a range of emerging technologies to minimize energy consumption rather than relying entirely on passive structures. Most of its performance is also directly linked to a sophisticated control framework that allows the tracking, performance analysis and fine-tuning of any feature in this all-electric building to reduce energy usage. These controls respond not only to the convenience of consumers, but also to the needs of the National Grid.

-The architecture supports a progressive water agenda, with rainwater being collected and cleaned for drinking quality. Black water is being treated on site, too. The building is 90% self-sufficient in water and is the first commercial building in the United Kingdom to have an approved drinking water protection strategy.
-The Crystal is all-electric and does not use any fossil fuels on site.
-In addition to LED lighting, chilled beams and high efficient ventilation, the building is heated and cooled by seasonal pumps which store energy in the ground through a 17 km long network of buried pipes.
-It has coordinated a wide variety of controls in the building, allowing it to function in mixed ventilation modes, both natural and mechanical, and providing customers with an unparalleled degree of control over temperature , light and air. Very critically for the future, the architecture is completely controlled to allow live monitoring of performance figures in the exhibition hall and to ensure that the building is continually calibrated to ensure optimum performance.

The Crystal
Green Design

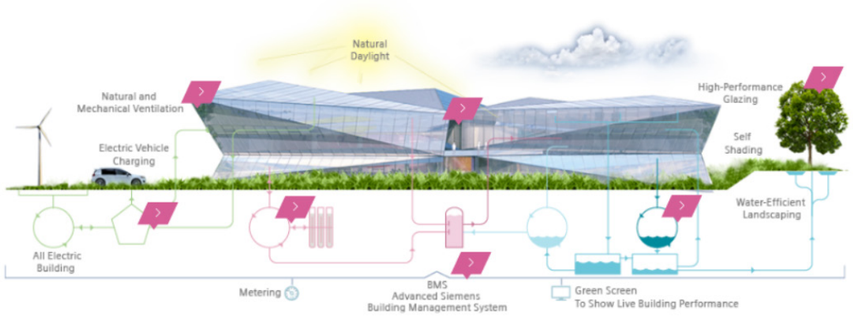


Figure 17 | Crystal Green Design

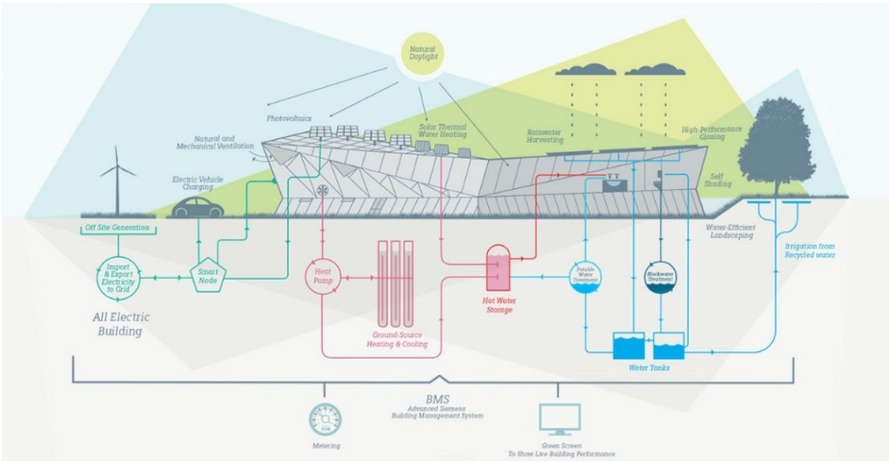


Figure 18 | Crystal Water System

CASE STUDY #2

INSPIRATION

The outline of the form takes influence from the many sides of the crystal. The crystalline geometry of the architecture creates a number of geometric shapes, helping to establish a powerful architectural focal point for the city. As the building occupies a significant, highly visible spot, it was built as a "park pavilion." The architecture does not have front and back facades or a conventional roof, but has been designed as a collection of facets that create a striking effect when seen from the street level and seen from above.

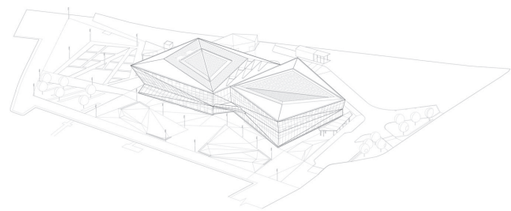


Figure 19 | Crystal Model Plan

This glazed envelope encloses a series of interior spaces – show spaces, a conference center with a 270-seat auditorium, an office room and a café. Extensive exhibition spaces are open to the public and are situated to the north of the central circulation center. Siemens' Global Center of Competence Cities is home to more private offices and meeting rooms.

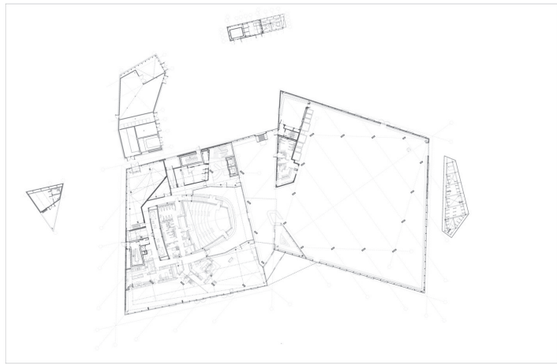


Figure 20 | Floor Plan

The angularity of the exterior skin of the building allows for fascinating and varied interior spaces that make up the display spaces a large mezzanine with a sensory film experience theater enclosed within the form of a white curved fabric that contrasts with the bright red shell of the auditorium on the opposite side of the street.

Within the Crystal is the largest exhibition on the future of cities in the world, occupying 2,000 square meters. The dynamic exhibition will direct guests to potential urban infrastructure, focusing on opportunities for sustainable transportation, construction technology, electricity and water supply, and healthcare.

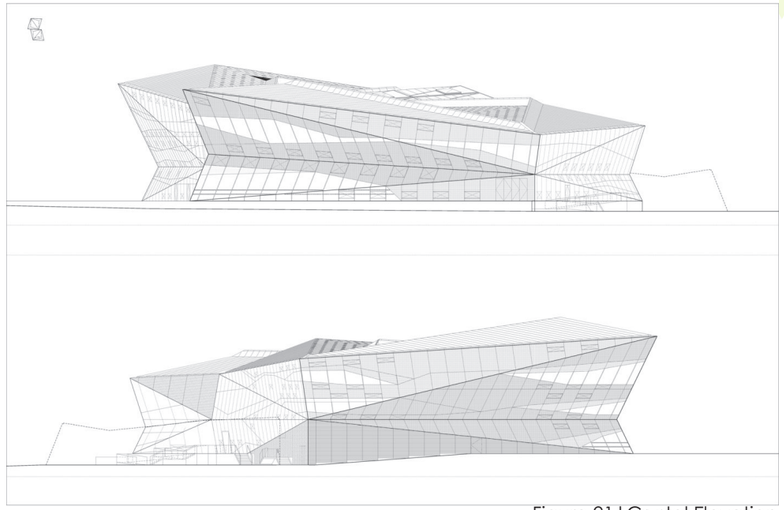


Figure 21 | Crystal Elevation

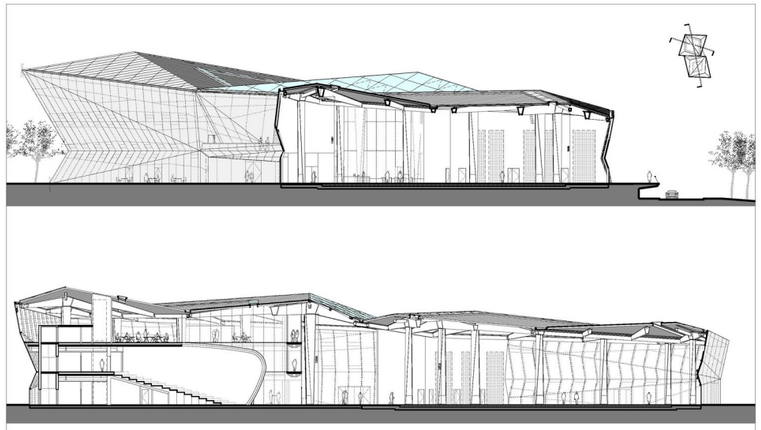


Figure 22 | Crystal Section

CASE STUDY #2

ANALYSIS

The main part of the goal in the design of this building was to create a building that is flexible and can evolve in the future. So, in other words, the building has been designed in a way that you can add new technology into it, or a new system into it, and even build on top of the existing system.

CONCLUSION

What I think is especially fascinating about The Crystal is that it is extremely sustainable without appearing like a traditional sustainable structure, where classic strategies such as thermal mass are used with the use of dense concrete walls, restricting glazing to the south and using green roofs everywhere, they also have been able to create a sustainable building with many fantastic features, such as the blackwater recycling system and photovoltaic roof panels, but the fact that they were able to incorporate and cut PV panels to accommodate the form of the roof really adds uiqueness to this building. While trying to design a building that is able to change its uses/programs for the future it is also important to make the building as sustainable as possible as testing a variety of sustainable practices could be relevant to most buildings in various ways and contexts in the future.

CASE STUDY #3

Figure 23 | U of C Exterior

THE UNIVERSITY OF CHICAGO IN HONG KONG

Architect: Revery Architecture
Typology: Adaptive Reuse
Location: Mount Davis, Hong Kong
Site – 69,200 sq ft
Building – 52,900 gsf / 27,000 asf
The building's capacity: 488

INTRODUCTION

The Hong Kong campus is built on a historically significant location on Mount Davis and acts as a regional center for research , education and collaboration. Built by Revery Architects, the campus blends modern functionality with the preservation and appreciation for the past of the site, featuring an adaptive re-use of existing historic buildings. Situated on a steep, heritage-protected hillside, the architecture of the building was inspired by the rugged topography of the site, its spectacular panoramic view across the sea, and the dispersed remains of its history as a former military prison and, in later years, a detention center. The resulting architecture deliberately weaves the new software around the demanding location, reaching only at the least invasion point.

Adaptive reuse of heritage buildings

The campus and the facilities merge new functionality with heritage preservation, while preserving the distinctive history of the property by the innovative reuse of existing structures on property. In the context of the revitalisation process, the external heritage features of the Hong Kong Jockey Club University of Chicago Heritage Campus have been made available to tourists. The heritage trails on the Hong Kong campus have been expanded to connect with the public hiking trails in the city and the architecture of the structure itself tie into the contours of Mount Davis, suspending it above the historic site.

The original "Block A" - with its wooden staircase and rustic stone fireplace restored, is now home to classrooms and student lounges. Featuring an open style and walls with square lattice designs,

The Original "Block B" - retains historic cell marks on the ceiling and walls. Glass partitioning was added to keep air from flowing out of the air-conditioned classroom thus allowing both sides to see.

Figure 24 | U of C Existing Structure

Figure 25 | U of C Restored Structure

Figure 26 | U of C Interior

CASE STUDY #3

Both heritage buildings needed substantial structural rehabilitation. A few windows and parquet flooring have been reconstructed and stairs and terraces were repaired. The old detention facility known as the White House, which was built in the early 1950s, now houses the Heritage Interpretation Centre. Historical details include barbed wire at the entrance and an initial cell door with a slot for which food was supplied. The locked doors of the reception room were preserved, and the floors and ceilings of the markers where the holding cells once stood. The structures now serve as classrooms and a school lounge.

CIRCULATION

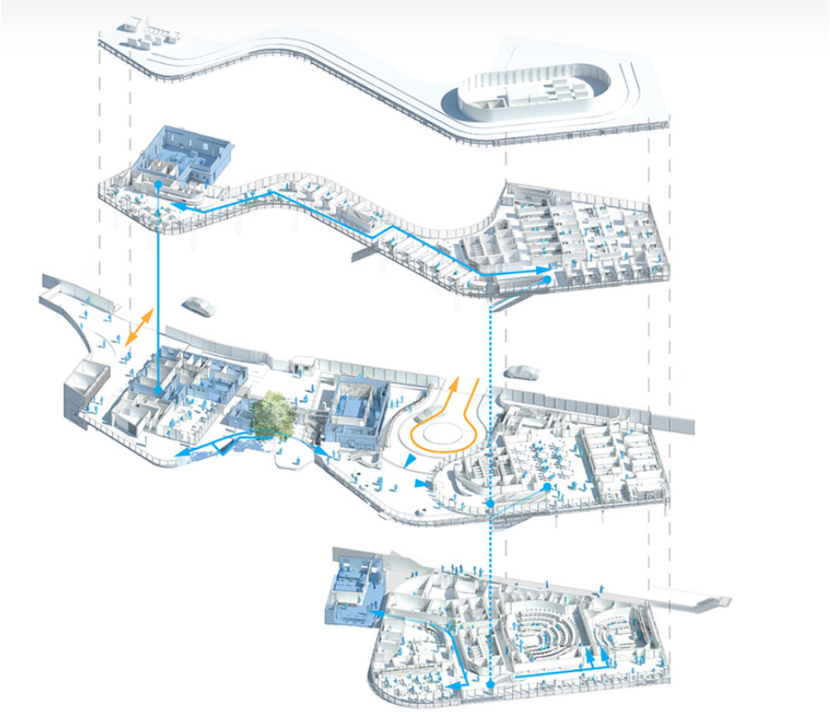


Figure 27 | U of C Circulation Diagram

"Getting the right distance and symbiotic relationship between old and new was very important," during the design of this building. Parts of the new structure carefully glide over the historic buildings. the motto they went by when designing was "Too high and they feel divorced from each other, too low and it would feel oppressive." to the existing structures.

Project Elements

Respecting the steep topography of the site and the tree-house principle of architectural design, a mini pile foundation has been adopted for its limited effect on natural contours. The supporting columns were slim in diameter, softly "floating" the house over the historical buildings and the adjacent natural scenery. A steel frame system allowing the use of long span systems has been introduced to reduce the number of columns in both the internal and exterior areas. The creative decision to float a single-storey bridge over heritage buildings ensured limited disturbance of the site while allowing continuing site activity and staging during construction. The single, curvilinear expression of the building, accented by window glazing and sunscreens, absorbs an abundant amount of natural sunshine to help minimize the energy consumption of the building.

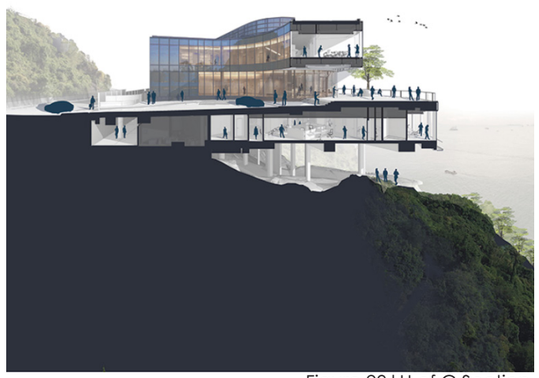


Figure 28 | U of C Section

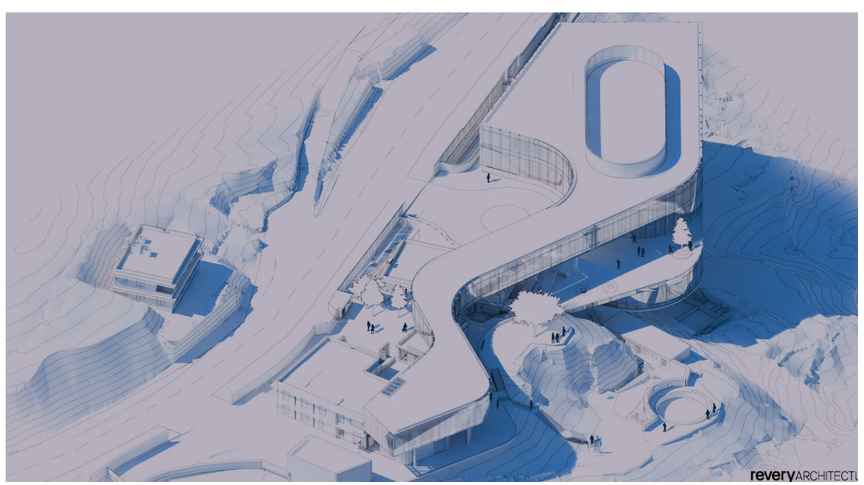


Figure 29 | U of C Computer Model

CASE STUDY #3

FLOOR PLANS

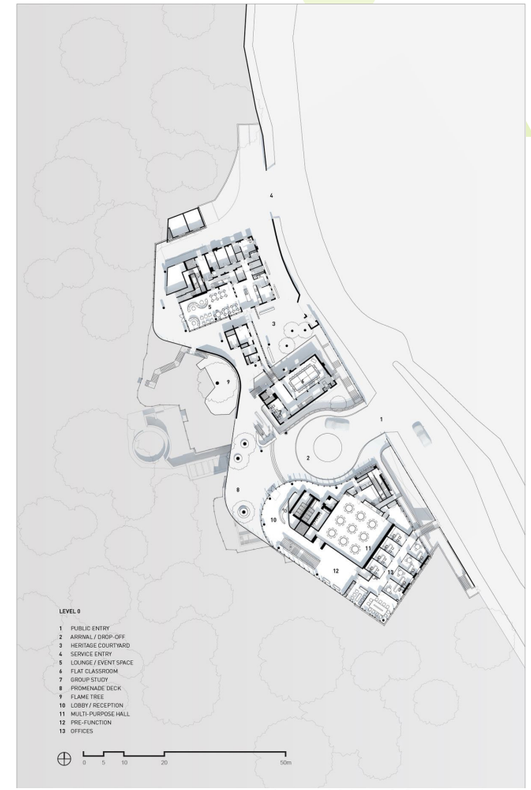


Figure 30 | U of C Floor Plan 0

1. PUBLIC ENTRY
2. ARRIVAL/DROPOFF
3. HERITAGE COURTYARD
4. SERVICE ENTRY
5. LOUNGE/EVENT SPACE
6. FLAT CLASSROOM
7. GROUP STUDY
8. PROMENADE DECK
9. FLAME TREE
10. LOBBY/RECEPTION
11. MULTI-PURPOSE HALL
12. PRE-FUNCTION
13. OFFICES

Figure 31 | U of C Floor Plan 1

1. OFFICES
2. GROUP STUDY
3. LOUNGE
4. FLAT CLASSROOM

CASE STUDY #3

Figure 32 | Exterior View

TYPOLOGICAL SUMMARY

As for the reasons behind the collection of the three previous case studies mentioned, they were described in correspondence with the unifying concept of the project. The unifying principle stresses the effect on the adaptability of architecture, as each building refers to the typology needed to illustrate the future of people's changing needs. Each case study has a particular aspect that can be derived from the final project purpose of this thesis project.

The first case study, The Shed, was researched due to buildings open infrastructure which makes it possible for the structure to be permanently flexible for an unknowable future and responsive to variability in scale, media, technology, and the evolving needs of artists. This case study shows a building can be changed to utilize different needs and types as they are always changing throughout the future. the building is able to adapts to changing programs and can perform whatever task artists need and want as that is my goal of my thesis.

The seond case study, the crystal, was researched because of its excellent environmental certificates, earning BREEAM Outstanding and LEED Platinum ratings upon completion. It is important to make a building sustainable as possible as testing a variety of sustainable practices could be relevant to most buildings in various ways and contexts in the future.

The third case study, The University of Chicago - Hong Kong, was researched to explore how the campus and the facilities merged new functionality with heritage preservation, while preserving the distinctive history of the property by the innovative reuse of existing structures on the property.

To complete the typological analysis on the thesis plan, each aspect can be drawn up, evaluated and integrated to assist in the construction of the final project. Although they do not relate fully to the theoretical premise, each of them has their own underlying value to the construction methods and principles that would be included in the finished product.

MAJOR PROJECT ELEMENTS

A building that commissions, creates, and offers a broad variety of activities. Flexibe and open floor plans along with Public, Semi-Public, Private areas with social and interactional spaces alongside technological aspects.

LEED Certified elements that allow for sunshine, renewable energy flow and energy savings.

Residential functions would include private, semi-public, and public spaces.
Private spaces include:
- Kitchens/Pantry Space
- Living Space
- Bedrooms/Offices
- Bathrooms
- Closets/Storage Spaces
- security

Public spaces include:
- Entrance/Lobby Space
- Mail Room
- Ammentities
- Outdoor Green Space
- Restrooms

Semi-public spaces include:
- Gym
- Event room
- Parking Garage

Office Functions would have Public, Semi-Public and Private spaces.
Private spaces include:
- Conference Rooms
- Offices
- Storage
- security

Public spaces include:
- Lobby
- Outdoor Green Space
- Restrooms

Semi-public spaces include:
- Open floor plan for flexible cubicles
- Parking Garage

Retail functions would include private, semi-public, and public spaces.
Private spaces include:
- Security
- Storage
- Dressing Rooms

Public spaces include:
- Lounge Areas
- Green Space
- Retail Stores
- Restrooms
- Restaurants
- Food Court

Semi-public spaces include:
- Parking Garage

Each use will have horizontal and vertical circulation spaces.

THE SITE

Location: Los Angeles, CA
Address: 120 N Broadway LA, CA 90012
District: Civic Center

The site is located in the Northern part of Los Angeles and is apart of the Civic Center District. The Site is neighboring the Grand Park which is a 12-acre park that include tree-shaded sidewalks, drought-tolerant plants, an interactive fountain plaza, performance lawns and courtyards, plenty of street lights, movable park furniture, and kiosks to encourage the walking and exploration of the area. Due to mostly sunny conditions, the park also offers activities all year long which attracts people to the area so connecting the park to the building will also be a crucial part of the design.

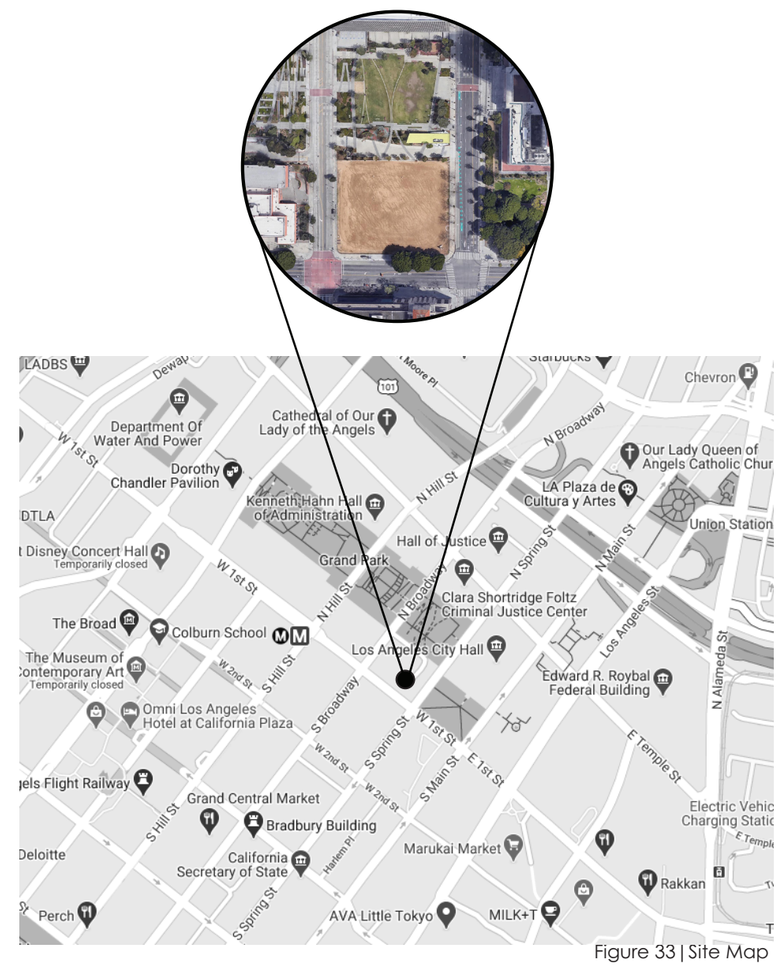


Figure 33 | Site Map

THE SITE

Figure 34 | US Map

Figure 35 | California

The SIte is Located in Los Angeles, California which is the largest city in California with a population of 12,447,000 in 2020. Los Angeles has more museums and galleries than any other city in the U.S., making it the best place to be interested in the arts and culture. Los Angeles is home to more than 105 parks, 225 galleries, 55 spectacular buildings designed by world-leading architects, and 16 of the most stunning gardens in the world. It also has more than 1,500 theatrical performances a year. The city also has one of the world's leading contemporary art museums, The Broad, located in Downtown L.A.

CLIENT DESCRIPTION

Using a Mixed-Use typology in a project involves multiple uses for a single building and location. As a result, the client and user base will change and generate various categories of users using the building on a regular basis. However, the mixed-use styles used in this proposal include office, residential, and Retail facilities; rather than having various types of uses merged into one location at one time, but the architectural purpose behind all of them remains the same and refers to the project's Unifying Concept and Theoretical Premise. All of these different uses will be handicap accessible.

Retail

The primary retail audience will be the individuals who live/work within the area of the building. The secondary group of people will include the general public who come to the building for the specific retail available. An additional group of users in the retail category will be those who manage and work in the stores and in the building.

Office

Although the planning and programming process would determine the position of the office environment, The office is expected to serve approximately 150-300 users which will include those who are located within the area and the clients that they bring in.

Residential

The Residential users will include couples, young adults and older people searching for a community that will house all the amentities that are important to daily life and their guests.

Approximate Number of users per use:

Residential: 200-350
Office: 150-300
Retail: 200-350

PROJECT EMPHASIS

The Project Emphasis is to design a building that has the ability to accommodate many different uses during the structure's lifetime without having to do major demolition to the building. There are two types of methods that can be used to deal with this design, one would be to exploit space flexibility and the other would allow for variability by creating quick and cost effective refurbishment of the building layers. Using Adaptability in Architecture is about designing a site and building that can allow easy adaption of both the structure as well as user changes, through the correct organization of building systems and spatial configurations, while using the least amount of effort and resources possible. This thesis would explore how adaptable architecture and its potential to adapt to the needs of its users. This is an attempt to create a building that pushes the limits of the structure after the completion of its 'original' design.

PLANS FOR PROCEEDING

PLANS FOR PROCEEDING

The length of the fall semester will require preparatory acts for the next semester. Study, site visits and the Construction Curriculum will be part of the key objective of bringing the project forward and acquiring basic expertise prior to the project. To the method of construction. Although the Spring Semester will be heavily focused towards architecture, it is important to remain on track although keeping a proper pace of development and documentation.

The goal of the final project is to convey explicitly the architectural principles relevant to my thesis through final boards, model, oral and digital presentations. The full project will be put on the 5th floor of the Renaissance Hall at North Dakota State University for architectural critics, peers and the public, making it important that all aspects are explicitly expressed through all forms of presentation.

The final project elements will be forwarded to the Thesis Committee for approval, which will also require a multimedia application to professors at North Dakota State University and the Institutional Archive. The proposal submitted will then be made open to the public and will ultimately contribute to the knowledge base of architecture. The completion of the thesis project is part of the journey towards the achievement of the Masters of Architecture which will provide the framework for the launch of the project in May, 2020.

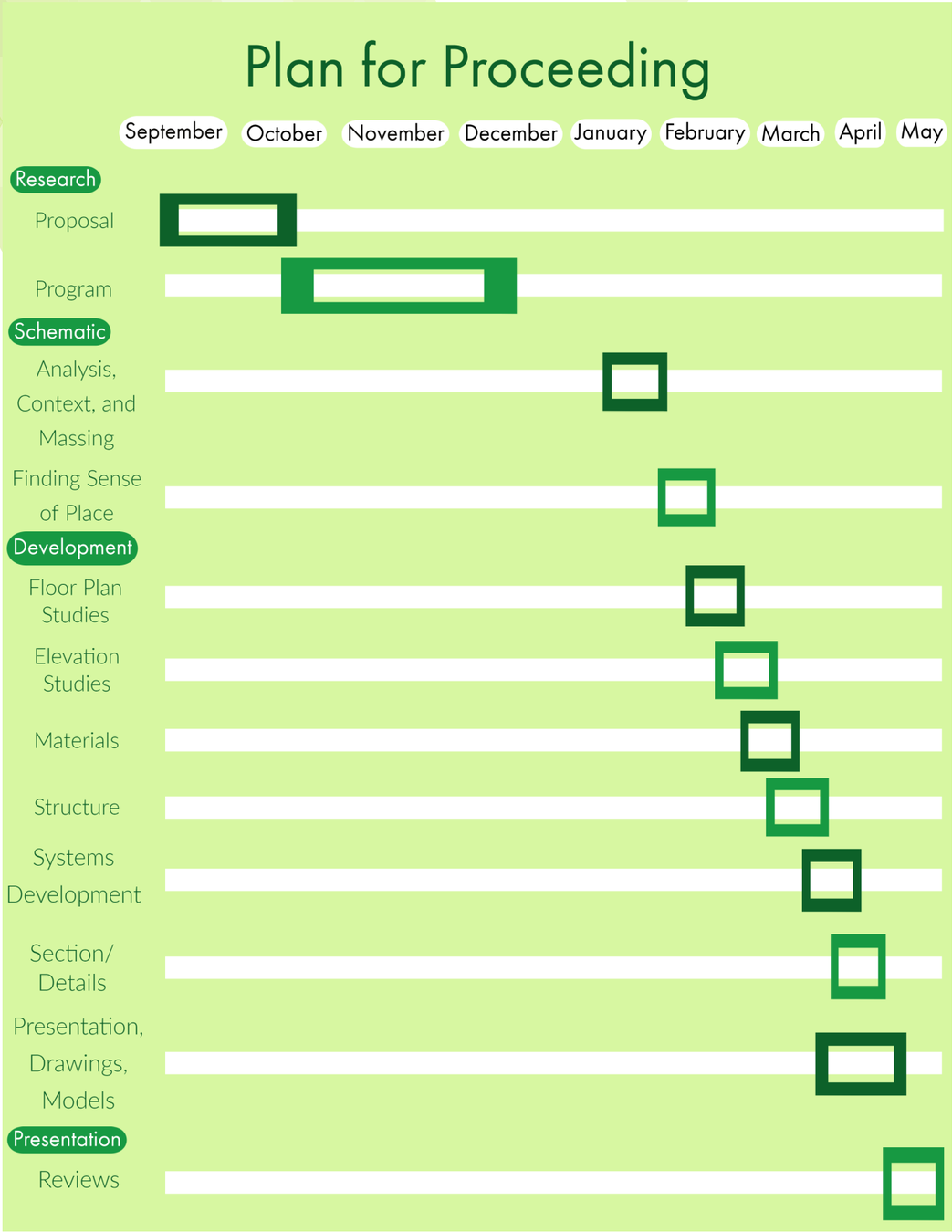


Figure 36 | Plan For Proceeding

PLANS FOR PROCEEDING

RESEARCH DIRECTION

Research Direction: The research areas that must be explored prior to solving the design problem proposed.

RESEARCH AREAS	RESEARCH CONDUCTED
1 The Theoretical Premise	Defining and understanding key characteristics of future design and spaces while using sustainable design strategies. The gathering of qualitative and quantitative data in order to obtain valuable information on the adaptability of buidings and their uses.
2 Project Typology	Conduct case studies to identify various typologies and how buildings should no longer be conceived and designed solely for a particular program and through the adaptability of structures a building can be reprogrammed and re-inhabited without the risk of excessive deconstruction while being sustainable.
3 Site Analysis	Visit the site visually and document observations through images and notes. Conduct a visual study of GIS data in order to clarify the fundamental composition of the site.
4 Programmatic Requirements	Referring back to the results of the case studies research performed. Analyzing the floor plans and sectionn cuts, layouts of spaces in relation to one another with the specific use while also interpreting future uses.

PLANS FOR PROCEEDING

DESIGN METHODOLOGY

The design methodologies used for this project would represent the knowledge obtained from both qualitative and quantitative sources. Using the Mixed Approach behind the study methodology would give way to various ways of knowledge, including data analysis and data collection from known sources. Provided below is a list of how these systems of methods and types of analysis should be used in accordance with the theoretical principles of the thesis project.

SYSTEM OF METHODS

1. Theortical Premise
2. Research on the issues surrounding the premises to help address relevant questions and explore new concept solutions
3. Testing those concept solutions
4. Formulate your own design opinions and tactics for the recently tested design solutions.
5. Formulate your own opinions to the premise to be included in the design.

TYPES OF ANALYSIS

Quanatative Analysis - Interpret and analyze data through investigation.

Qualitative Analysis - Compare the conclusion of the opinion against the needs and values of society and the client / user.

Exploration - Examine how quantitative and qualitative responses can influence the questions / responses of the design process.

DESIGN DOCUMENTATION

All analysis will be digitally captured and recorded. It is going to be mixed and applied in the context of the study curriculum and the proposal. The design process will be seen by diagrams, creative designs, images and graphics. The end result will be a graphical visual representation of the research gathered, the design and the final solution. The final project will be presented in a digital and oral presentation, and the research, text, and graphics will be recorded in the thesis book which will be an electronic file as well as a physical copy, accessible in the NDSU library archive, and will be available in May, 2020.

COMPILATION DOCUMENTS

Tools that will be used for creating documentation:

1. By Hand
   - Modeling, Sketches

2. Investigation by software design applications
   - Revit, Sketchup, AutoCAD

3. Representing information by computer design
   - Photoshop, InDesign

DESIGN PRESERVATION METHODS

- Creating and researching the illustrations and models depicted for the project.
- Advisor reviews obtained and used throughout the design
- daily check ins with the Professor
- Collect and be able to refer to all documents, concepts and drawings for later.
- Document the research materials and keep a list of the references and what they are for
- Keep files organized throughout the different phases of the design
- Computer files backed up weekly via Google Drive & external hard drive

DESIGN DOCUMENTATION

SOFTWARE FOR INVESTIGATION

- Autodesk Revit
- Autodesk AutoCAD
- Sketchup

SOFTWARE FOR REPRESENTATION

- Adobe InDesign
- Adobe Photoshop
- Adobe Illustrator

CONTENT PUBLICATION

- The final design result will meet the procedure and reflect the design decisions taken with the reasons behind them. The design process will evolve over time as new discoveries are made and the final presentation will require time, study, revision, visual representation and consideration taken before the end of the project.

PRESENTATION INTENTIONS

1. The Thesis Book
- In relation to the proposal for a thesis, the project booklet would contain the thesis plan, the design process, the final design and the solutions.

2. Project Boards
- The project boards will be laid out, shown and addressed It's analysis and design. Project boards can be used in combination with the thesis presentation and the thesis book.

3. Interactive Model
- An innovative physical model that describes the design and its solution, as well as the interactive physical elements of the design itself. The model will be designed with a high degree of precision and the design will be correctly displayed. The model will be finished prior to the actual display.

4. Final Thesis Presentation
- An oral presentation that incorporates the study and architecture elements of the thesis book and the thesis boards to present the conclusions and solutions of the thesis. The presentation will consist of a digital presentation incorporating both research and design efforts.

GOALS OF THESIS PROJECT

PHYSICAL

- Design a building that is not only able to respond to different functions and environmental changes but it is also to be able to respond to different user's ambitions.
- Create and practice 3D rendering and modeling techniques

SOCIAL

- To explore what makes people satisfied and comfortable and what factors make their living space and city livable, especially while focusing on the future of change and iplement that into the project.

THEORETICAL

- Explore how to design a building that can adjust to our life, to our needs, to our moods. How can they adapt to our space, our functionalities and our needs that change continuously?

PERSONAL

- Understand how to build a building that is built to ensure longevity.
- My goal in pursuing this thesis are focused on furthing my knowledge and understanding of architecture by exploring my curiosity in architecture that is willing to respond to needs in order to improve its life expectancy.

THE PROGRAM

RESULTS FROM THEORETICAL PREMISE

Three independent literature reviews have been thoroughly explored to better explain the theoretical premise of this project. The First, Reinventing Multi-Screen Adaptable Architecture talks about one of the most distinctive characteristics of traditional Chinese architecture is the partitioning of interior spaces by several, often moving, screens. They bring many advantages not only in terms of functional aspects of spatial flexibility and climate control, but also in terms of less tangible visual, psychological and ornamental impacts. The reader may be looking at this article for components in a building that explores ways of creating spatial flexibility along with designing a building that can adapt faster and more cost-effectively. The second literature review is an article published by the Construction Specifier, titled, Retractable awnings systems are redefining commercial roofing. This article seeks more ways to utilize outdoor spaces to meet the demand of outdoor entertainment and be able to create outdoor spaces with potential year-round use. The design community has increasingly found ways to blur the distinction between indoor and outdoor spaces in order to accommodate the needs of its customers as they are always changing. The third literature review talks about the differenent methods used that allows the structure to move which plays a crucial role in the conception, architectural expression, and performance of the structure. These literature reviews will definitely have a significant impact throughout the development of the design of this project by diving into the methods used to create moving structures and the use of retractable and movable structures, roofs, skylights, windows, walls and doors would be key design features to be integrated into my project that would make it possible to make a building be re-programmed and re-inhabited without the possibility of needless deconstruction and be in a position to respond to these rapidly evolving new environments.

LITERATURE REVIEW

REINVENTING MULTI-SCREEN ADAPTABLE ARCHITECTURE

THESIS ABSTRACT OF REVIEW

Adaptability is the built-in ability to adapt and adjust to change by meeting different uses, allowing various spatial and functional configurations, and updating technologies without requiring significant disruption of the building. adaptability allows to enhance the user's wellbeing and safety by achieving comfort, health, security, indoor environmental quality, life quality as well as a good interactivity with the building and other users.

INTRODUCTION

One of the most distinguishing characteristics of traditional Chinese architecture is the partitioning of interior spaces by several, often moving, windows. They bring many advantages not only in terms of functional aspects of spatial flexibility and climate management, but also in terms of less concrete aural, psychological, and ornamental impacts. Guest-Editor Pingping Dou discusses their past and purpose and introduces their capacity for use in today's quest for architectural adaptability through three recent projects in Beijing.

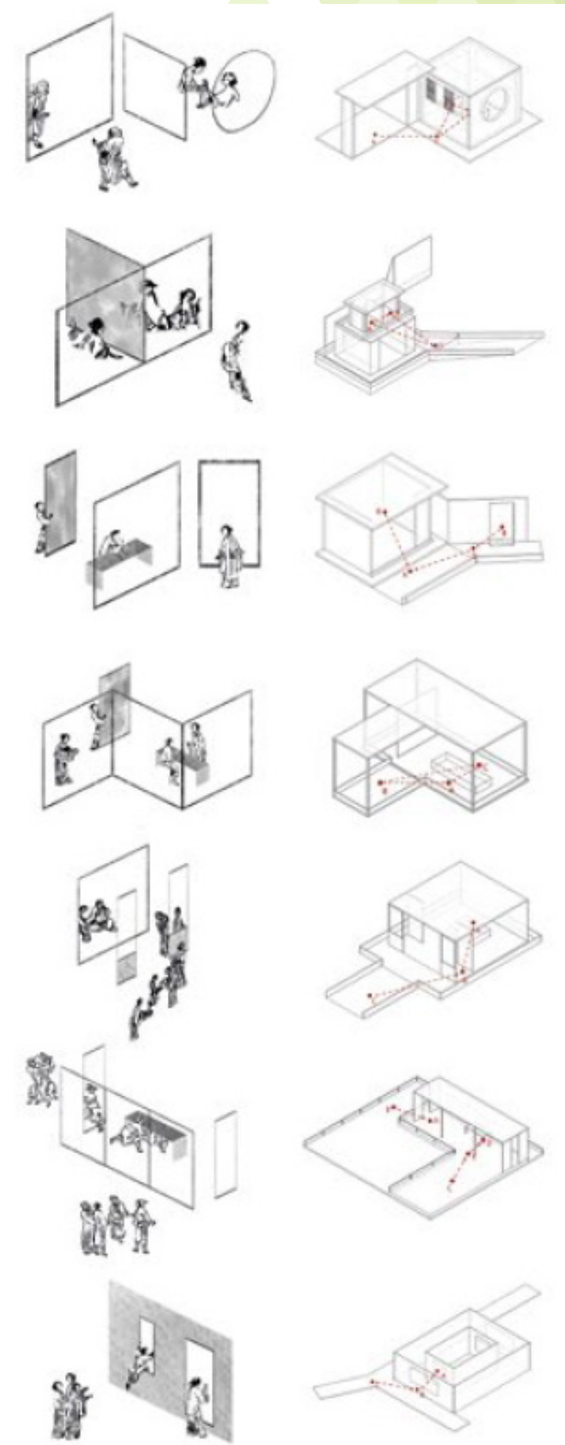


Figure 37 | Multiscreen

LITERATURE REVIEW

SPATIAL AND ENVIRONMENTAL HIERARCHY

The 19th-century German architect Gottfried Semper clarified the origins of architecture through anthropology and described four fundamental elements: the hearth, the mound, the roof, and the enclosure. In recent years researchers and architects have expanded this layered categorization – e.g., shell, services and environment, system, skin, services, room and framework, skin, landscape, services, and access to an important method for assessing and enhancing adaptability. From the point of view of the layer structure, a special aspect of Chinese architecture is that the skin and the interior can be best built in the same layer, allowing climate management, spatial organization, and scenery construction to function concurrently. All the associated components can be Identified as what could be considered the 'multi-screen.' The multiscreen divides, defines and organizes spaces in the shape of walls, partitions, screens, doors, or furniture. It turns the original sheer volume into a rich sub-space complex. The entire framework is therefore made up of five layers: site, access, structure, multi-screen, and services. Multi-screen features an otherwise homogeneous structure and open space with spatial characteristics, environment advantages and personalized expression. Defining and designing environments at the same time provides warmth and familiarity, as well as elegance and pleasure. The multi-screen interior is physically and environmentally separated, but visually and psychologically linked, frequently contributing to complex spaces and hierarchical atmospheres.

NEW LIFE FOR A HISTORICAL URBAN TYPOLOGY

Refurbishment, restoration, and renovation of the historic urban structure is a constant trend in contemporary Chinese architectural practice. Architects are eager to explore this area. Recent projects have proven a variety of successful tactics that have been identified, such as taking advantage of Insert a mezzanine from the ceiling height, adding linens to enhance insulation, replacing the original roof to add another story, to make use of the courtyard for densification. The universal thread is to constantly think of this urban typology not as an integral component of outward appreciation, but as an inner ecosystem of united pieces for dynamic day-to-day operations.

Among several examples in Beijing, the Institute for Provocation (IFP) has refurbished a dilapidated siheyuan into a mixture of workplaces and artist residences, completed in 2013. The original reception room with luxurious lattice screens was opened in a common studio, relevant for the purpose of reciprocal trade. Standard architecture has positively acknowledged the 'modified' state of collective consumers over time and has taken it as the starting point of the 'Micro-Yuaner' Renewal Project (2014), a children's library and Orthodox Western architecture has long been framed as stable and rigid artifacts, and therefore as a way of stabilizing culture and expressing permanence. Emphasizes the finished house as a finished project for a particular user and location. Standard architecture has positively accepted the 'updated' state of collective customers over time and has taken it as the starting point of the 'Micro-Yuaner' Renewal Project in 2014, a children's library and Orthodox Western architecture have long been framed as secure and static objects, and thus as a means of stabilizing society and communicating permanence. Emphasizes the finished house as a finished product for a single customer and area. Given the volatility of current culture and the diversity of urban lifestyles, the imperative is much more important today than when adaptability was first adopted in the 1950s as a general architectural concept of resistance and expansion of flexibility. His peers in Europe, and later (since1996) the international commission CIB W104 Open Building Implementation, have London (1979) and the NEXT21 housing project in Osaka (1994). Adaptable architecture means a dilution of authoritative and regulatory power by the parties engaged in the process; therefore, it is often faced with a question of execution. In the meanwhile, pervasive conventional architectural typologies of basic plans and parts, generous volumes, and structural features. Capacity

ARCHITECTURAL OR ORNAMENTAL?

Different from the variation of styles in the production of Western architecture, traditional Chinese architecture tends to be constant forever. In certain cases, small interior differences are adequate to satisfy changing needs, and thus the overall morphology achieves historical consistency. Take for example, Siheyuan: courtyards flanked by buildings on all four sides, which were the basic design used in Chinese history for houses, palaces, temples, and government offices. With courtyards ranging in scale, shape, and number, Siheyuan could be suited to a wide range of urban circumstances. The same form of rectangular plan, timber beams and columns, And the tiled roof provides a structural space, leaving the interior free to be fitted later. The layout and shape of the house and the courtyard usually do not change, although the relations and divisions are continually changed. The wood beam-and-column structure has similar benefits to the contemporary frame structure, offering a high degree of versatility in spatial organization. The collection of 'screens' attached to this main frame eventually developed into the most distinctive aesthetic characteristic of Chinese architecture. Fixed or free standing, constructed of various kinds of materials and sometimes bound by hinges, they had both functional and ornamental applications. However, they were considered artistic since the convention within Chinese architecture was to rely on the structural system as a core element and to take partitioning and furnishings into account.

CONCLUSION

Since a building is a highly complex structure, it is important to emphasize that adaptability must be viewed as a mixture of many factors. It can be approached from various viewpoints. It is very important to find out that any building is unique in terms of its physical structure, its purpose and its interaction with users and the surrounding environment. I am not trying to say that I am trying to come up with a formula that adapts to any situation, but rather I am trying to come up with ways of thinking and some tools to encourage the adaptability and evolution of the building. An adaptable building should provide a space plan able to be arranged in several scenarios to meet different needs, lifestyles and uses. Functional and spatial adaptability can be achieved by using the multi-screens as it will create multifunctional spaces allowing for a large variety of functions, as well as trans functional spaces which can lead to the creation of new undetermined and unpredictable activities according to the users' personal experiences and their consumption of space. Using a multi- screen will also support elasticity and divisibility because the building will be easily extended vertically or horizontally and can also be subdivided into different functional entities without hampering its coherence.

RETRACTABLE AWNING SYSTEMS ARE REDEFINING COMMERCIAL ROOFING

THESIS ABSTRACT OF REVIEW

Kinetic Architecture (KA) is characterized as a concept for designing spaces and objects that are physically reconfigured to meet evolving needs. Kinetic architecture relies on motion for its impact to meet today's complex, versatile, and ever-changing needs. By integrating motion into design, it helps inhabitants to have a new dimension to communicate with their surroundings. Using kinetic architectural systems in the design blur the separation between outdoor and indoor spaces, maximizing a living or working area and making it usable throughout the year. When retractable structures, roofs, skylights, windows, or doors are integrated into a building project, enclosed spaces are no longer limited to being indoor spaces only.

INTRODUCTION

The role of the roofing system is to shield the environment under it and the occupants of the building from the weather. Modern, static roofing must be durable, resilient and code compliant. Temporary roofing systems provide a variety of advantages for commercial installations and can be an option for building owners who wish to create their outdoor spaces with opportunities for year-round use, enabling them to continue to produce income even though the weather is not optimal.

LITERATURE REVIEW

THE USE IN BUILDING

Outdoor dining and entertainment areas are becoming more popular as the demands of work and daily life increase. In the rush of everyday life in the 21st century, people are gradually making up for their time spent commuting by taking the chance to step away from the rush and recharge in the sun and fresh air while enjoying the serenity of a breathtaking view. As the hospitality industry finds more opportunities to use outdoor spaces to satisfy this need, the design community has often found ways to blur the distinction between indoor and outdoor spaces in order to meet the needs of its customers. In extending the programmed room to the outside, developers are expected to find a way to keep the sky open as nature permits, while also providing reliable protection in the event of fog, wind, or intense sunshine. In the past people have found the solution in custom-designed, lightweight, retractable fabric roof systems. This assemblies appeared to be cost-prohibitive to build. At the end of the day a more robust, retractable awning device was built through technical advancements and comprehensive research, experience, and testing. This form of retractable tensile structure uses the same technologies and programmable systems as large, stadium-sized retractable awnings. They can be implemented by pressing a button and are effective in planning, supplying, and deploying to work into the budgets and schedules available. At the end of the day these technologically engineered retractable awning structures provide the same degree of complexity as any large facility in the country.

LITERATURE REVIEW

ENGINEERING

According to Nic Goldsmith, Senior Director, FTL Design Innovation Studio, small-scale retractable systems, using engineering similar to bigger, mostly commercial systems, are growing in popularity and light commercial applications in places like Florida, where weather can sometimes change, and temporary safety can be obtained quickly and easily. A retractable awning with advanced engineering and durability is usually a completely automatic, motorized covering device designed to act as a true tensile membrane structure, with configurations capable of withstanding winds of up to 145 km/h (90 mph) and combined loads of up to 147 kg/m2 (30 psf), providing that the structure and the collateral frame are correctly designed and constructed. These awnings can be found in a wide range of places such as restaurants, shopping malls, apartments, stadiums, or other meeting areas, with a clean and strong modular style. The material must be strong for an efficient large-scale retractable device, and heavy equipment and large engines are used to place thousands of pounds of strain on the material. Tension brings a great deal of power to the system and to all the materials, and this demonstrates the complexity and reliability that will usually not be found on anything similar used on a small scale. A technologically sophisticated system may also have advantages that are comparable to a static roof, to the point that one can walk on it.

HOW IT WORKS

In awnings such as these, the mechanization machinery may consist of a toothed belt drive serving as both a means of stretching the fabric and the final tensioning mechanism of the membrane. The toothed belt circulates around the layout of the poles. As the piston spins, the toothed belt circulates, and the driving carriage shifts back and forth around the inner guidance of the drive beams. Beams also serve as key support representatives and act as enclosures for the mechanization system. The front beam, which is perpendicular to the primary support portion, is connected to the bottom of the driving carriage as well as to the front edge of the cloth membrane.

Additional idler beams lie parallel to the ledge beam and are spaced at intervals depending on the unit's custom scale. The structural fabric membrane is separated into long strips and then wrapped around the extruded polyvinyl chloride (PVC) core to be effectively connected to the idler beams. This reveals the fibers on the outside and allows the edge of the retractable membrane to slip effortlessly. The corners of the cloth panels are cut with a catenary curve and have a short diameter stainless steel cable cord hemmed in. As the moving cart is tensioned by a toothed belt, the catenary cables at the ends of the fabric panels are tensioned, resulting in tightness in both directions. This bi-axial tension gives the fabric the ability to serve as a structural element. Water is expected to move unobstructed over the tops of the idler beams while the device is in an inclined position.

CASE STUDIES

As an example, Juvia, a high-end restaurant on Miami Beach, incorporated an aesthetically advanced and highly engineered retractable awning system stretching 54 ft from its outdoor terrace. The awning also guarantees that the occupants enjoy constant warmth and breathtaking views of Miami Beach even during inclement weather. The awning can handle winds of 50 mph when completely tensioned. It also features a slight incline to shed rain away from the terrace and to prevent the pooling of rainwater on the fabric panels. When the awning is open, the cloth panels are entirely removed from the view of the patrons below. The device allows Juvia the versatility of an outdoor space and the potential to defend against the elements if necessary. "I think one of the great strengths of the fabric is that it folds or packs very small," says Goldsmith. "There have been a number of structures with more rigid components, but they are very wide and bulky. If you want to have a minimal footprint, the fabric is the ideal solution."

LITERATURE REVIEW

CONCLUSION

Having operable awnings would be a good addition to my design and opens the door to other ideas with kinetic architecture such as operable glass kinetic design which provides natural daylight to help mitigate the costs of dependency for maximum artificial lighting. By also integrating kinetic architectural glass installation with operable awnings the advantages include passive cooling, adding fresh natural air to compensate for increasing indoor air temperatures. This compensates for the need for as much or even any mechanical cooling. Incorporation of UV-filtering tinted or polycarbonate glazing options decreases heat gain and glare irritation. The use of thermochromic or electrochromic glass offers another option of tinting glass to reduce glare. The use of retractable structures, roofs, skylights, windows, or doors would be key design features to be integrated into my project that would make it possible to make a building be re-programmed and re-inhabited without the possibility of needless deconstruction.

Figure 38 | Shading System

Figure 39 | Kinetic Roof

TRANSFORMABLE STRUCTURES: DESIGN FEATURES AND PRELIMINARY

ABSTRACT

Innovative architectural designs, which make it easier to alter the form and shape of the building, can provide benefits for many kinds of applications relative to traditional structures. The planning, design and implementation of transformable building systems involves the use of advanced building technology and the development of modern analytical methods and procedures.

INTRO

The word transformable structures comprises of rigid elements joined by movable joints, which can be converted from one configuration to another, usually from a closed or packed configuration to an open or deployed configuration. Transformable systems can offer a range of advantages over traditional structures. Conventional buildings often consume more natural and human energy than is required, may have a detrimental effect on the environment, create a substantial volume of waste and are almost never adaptable and reusable. Structures that change form and shape to respond to various roles and weather changes have a strong beneficial effect on the economy and environmental resources.

SCISSOR UNIT

The approach that causes the structure to move plays a key role in the architecture, architectural expression and efficiency of the structure. Folding of the building pieces or putting the whole structure into a compact arrangement is typically the product of the implementation of the architectural rules of the process in the construction of buildings. Scissor units and sliding components, including telescopic components and folding umbrella principles, are only several examples of structures that can be used in the construction and design of transformable buildings. The scissor unit is the most widely used system for transformable structures. Scissor structures may be represented as scissor unit mesh, or as straight rod assemblies of equal length connected by pivots in the middle or in the lower position and at the ends. By rotating the struts with respect to each other the assembly closes in a compact configuration or extends under limits before the desired geometry is obtained.

SLIDING MECHANISM

Another approach that has also been used in fast-assembled systems is the sliding mechanism. The umbrella mechanism is a special type of sliding mechanism. In the umbrella principle, improvements in the shape of the frame are done by sliding a hollow circular joint over the cylindrical pillar. The support member is typically vertical and moves the weight of the structure to the ground. An interesting design for a transformable roofing element that is based on the umbrella principle has been developed by Frei Otto in the early 1960s.

RECONFIGURING STRUCTURES

Sliding or rotating building parts against each other makes it possible to redefine the enclosure of the building which is the key concept in the design and development of retractable domes and roofs in general. Rotating movable units around an axis or a point in a building structure can allow for varying degrees of coverage or visibility of the space specified by the structure. Deployable structures is a common concept used to describe a group of structures that can be converted from a “closed compact configuration to a predetermined extended form in which they are stable and can carry loads” Deployable structures, do not require heavy foundations, minimize the overall labor force required, minimize total erection energy and are reusable. In addition, they improve building safety by decreasing or removing the need for scaffolding and minimizing total construction time, while still reducing overall costs.

CONCLUSION

understanding and using these methods which make it easier to alter the form and shape of the building will benefit my building in the following ways that the article has explained. Using the sliding or rotating methods while designing my building will help me design a building that will make the transformation to each use and typology successful. With using these methods i will try to use the maximum amount of common space between each building typology so each use will be able to be efficient with the spaces it needs to do so.

Flexible and adaptive design and Kinetic architecture go all the way back to nomadic lifestyles. Mobile structures brought architecture to people as they travelled to follow food or change because of shifting circumstances, such as changing weather. The architecture meets the user during this time span, not the user fits the architecture. Flexible and adaptable architecture transforms the situation and enables the flexibility needed for the nomadic to survive successfully. Mobility reflects human civilization's tendency towards change and is nothing new, particularly if you look beyond our conventional western society if you think of the Yurt, which is an ancient type of portable shelter, or the traditional Japanese home with its tatami and mobile furniture that can be turned around to better adapt to the needs of the people and that allows the users to change to fit their evolving needs and functions.

The start of using movable bridges was earlier than the Middle Ages as there is evidence of using this type of structure in Egypt in the 14th century B.C. as well as Babylon. According to Herodotus, Queen Nitocris of Babylon built a form of a retractible bridge, for protective purpose., across the Euphrates at about 460 B.C. (Koglin, 2003). These ancient movable spans and bridges were used for military purposes as well as water traffic. Movable bridges were first used for protective purposes. They were used in medieval castles and forts over moats. The drawbridge, which was usually a bascule type that pivoted upwards on trunnions, which was commonly used in that era. These bridges were used as protective purposes not only while lowered by acting as as simple bridges located over moats, but also when raised the floor of their leafs acted as strong doors impeding entry as well as providing resistance to projectiles fired from catapults. The mechanism of these bridges' movement was by the direct pull of chains near one end, assisted by winches and levers. Bascule bridges were developed in the 16th century by Leonardo da Vinci. Lifting became much more effortless because of the counter weight located on the opposite side of the pivot from the bridge, whoch also provided against sudden falling from the raised position.

HISTORICAL CONTEXT
ADAPTABLE AND KINETIC ARCHITECTURE

For a long time, kinetic architecture has never progressed beyond the use of movable doors, windows, or temporary roofs. Few exceptions, however, started to occur in the 18th and 19th centuries. One of the dining rooms in the Palace of Versailles, in France, was designed with a floor where part of it could be lowered to another level where the servants could set up a banquet table and then rise back to the level of the room.

The invention of the wheel was the motive of using kineticism in architecture. Adaption and mobility were first seen in architecturally as movable stones, logs, or skin covering cave or hut openings. Wooden pivots or hinges of leather and even stone pivots were used. The Colosseum represenrted the first kinetic retractable roof covering the seating area around the arena, spanning the oval form 620 feet by 513 feet. Sailors were assigned the task of erecting and dismantling this vast early flexible roof supported by poles around the edge of the colleseum. Also, wooden, sliding doors and windows' covers were developed in the same era. Moreover, pivots and hinges made of iron and brass were used after the introduction of metals. The use of metals helped by increasing the efficiency of both doors and window-shutters as well as enhancing their appearance for the better these adaptive devices were used for both security and weather protection.

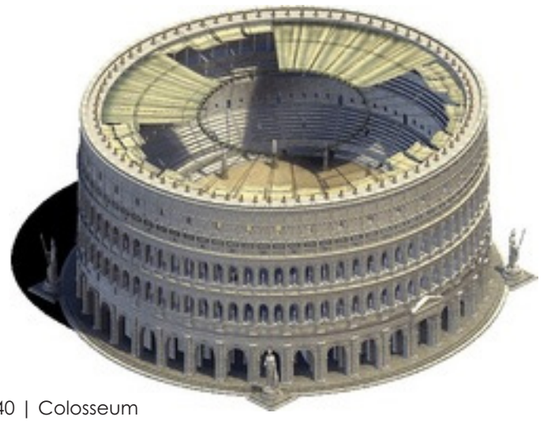


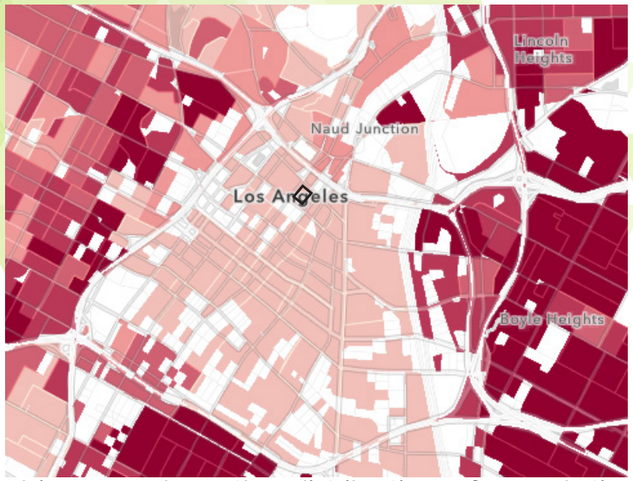
Figure 40 | Colosseum

The West Los Angeles Civic Center Historic District is notable as a coherent example of an administrative center in West Los Angeles that demonstrates the need for improved civic services in the post-World War II period. It is also significant as an excellent example of Mid-Century Modern civic architecture designed by prominent Los Angeles architects. The Civic Center Complex was designed as a collaborative development between the City and Los Angeles County. Planning for the complex started at least as early as 1956, when the City began to see the need to decentralize to satisfy the rising demand for city services in the post-World War II period. Development of the numerous structures and the associated plaza and landscaping started in 1957, when the ground was cleared for construction, and lasted until 1964. This is the time of interest for this district from 1957 to 1964. The City and West Los Angeles civic promoters were so sure of the need for development in West Los Angeles that they saw a new civic center potentially stretching another block west to Sawtelle Boulevard, but this expansion did not occur. The City of Los Angeles completed the 1949 Master Plan for Branch Administrative Centers, which recommended that 12 branch centers throughout the city offer more accessible and effective service to the public. A hub in West Los Angeles was named to serve Beverly Hills, Sunset Boulevard, Santa Monica City and Culver City. A proposal has been planned for the West Los Angeles Administration Center with seven buildings, including an existing police department building. The West Los Angeles Civic Center was conceived as a "Major Branch." Three new structures defined in the plan have been constructed: a branch library, a civic building and a court building. The West Los Angeles Civic Center opened in 1961. Clearly representing the aesthetics of Mid-Century Modern architecture, the complex of buildings forming the West Los Angeles Civic Center Historic District conveys a feeling of unity between the structures concerned. The related plaza and mall establish two intersecting axes and thereby play an integral role in the unifying the seperate buildings. The plaza and landscape was designed by Los Angeles architect Albert Criz, who also designed the West Los Angeles Courts Building and other post-war modernist structures in Los Angeles.

HISTORICAL CONTEXT
PHYSICAL

The West Los Angeles Suburban Branch Library was completed in 1956 and was designed by the local architecture firm Allison & Rible, which was responsible for many post-war buildings in Los Angeles. Plans were drawn up for the West Los Angeles Civic Building by 1958. By 1961, a library, a new county jail, and a police station had been completed, with many other civic buildings in the planning process. The Felicia Mahood Recreation Center (now known as the Senior Citizens Center, the Senior Center and the Multipurpose Center) opened in 1962. Its name is commemorated by the publisher and city activist who helped to set up the hub. The West Los Angeles City Center Historic District is an outstanding example of the decentralization of Los Angeles City services to address the demands of a geographically growing city in the mid-twentieth century. The size of the complex directly represents the City's dedication to truly support the rising population of West Los Angeles with modern new facilities. The architecture of the individual buildings as well as their grouping and unifying landscaping and plaza was reflective of the ambitious Mid-Century Modern Government complexes that were being constructed around the world during those days of hope for the future. Now the city is looking to add pedestrian life to the area. In March 2017, the City Council of Los Angeles adopted a new Master Plan for the Civic Center (CCMP). It outlines the complete design of the city hall by 2032, precisely the east facing the front. The CCMP is planning to fully tear down Parker Center (torn down in 2019), L.A. The "south" building of the City Hall and the Los Angeles Mall. The CCMP is to link the City Hall to its neighboring community in a pedestrian-friendly manner. The CCMP advocates for aggressive ground-floor usage to stimulate the foot flow that the Civic Center presently lacks. Four new government and office buildings are identified in the design as well as the proposed recreation area of Park 101. A concept solution proposal to the U.S. Highway 101 as a trench with open space above it. Connecting to Union Station and Olvera Lane.

CONTEXT
CULTURAL



Very High (More than 28.6%)

High (25.1 to 28.6%)

Average (21.6 to 25%)

Low (18.1 to 21.5%)

Very Low (Less than 18.1%)

Figure 41 | LA, Age Map

This maps show the distribution of population In Los Angeles based on age: Under 18, 18 to 64 and 65 and over.

Very High (More than 60%)

High (47.1 to 60%)

Average (34.1 to 47%)

Low (21.1 to 34%)

Very Low (21% or less)

Figure 42 | LA, Racial/Ethnic Map

This chart displays the Racial/Ethnic Diversity Index in the Los Angeles in 2017. The diversity index indicates the probability that two people selected at random from the same location would belong to different races or ethnic groups. This ranges from 0 (no diversity) to 100 (complete diversity). For example, the U.S. diversity score is 64, which means that there is a 64% chance that two individuals randomly selected from the U.S. population will belong to different races or racial groups. Diversity in the LA population is continuing to increase.

CONTEXT
SOCIAL

As far as the social component of adaptation is concerned, it allows people to regularly fulfil their common and individual needs and to cultivate their relation and interaction with each other and with space by providing them with a more expressive structure that develops over time without destroying the local area or compromising future generations. This makes it possible to ensure consistency with social and cultural patterns and as a result, to preserve local identities and unique characteristics.

Economically adaptation allows the building to do its function more efficiently, to remain longer in operation, to reduce the usage of energy over time and to allow greater use of technological advancements. It would adjust to change more easily and at lower prices. This guarantees the durability of the building process.

OVERVIEW

This Project is justified as a relevant topic because construction continuing today plays a significant role in shaping the future. Issues on how buildings survive the new needs of people are becoming relevant. Due largely to the dramatic shifts in the urban world, the customs of communities have been loosened. The notion of identification has started to shift in the post-industrial building market. Study looks at how architecture currently tries to merge industrialization with heritage. Buildings are still adapting to the demands of customers. The potential that the system has to re-evolve into something meaningful are critical for creating a sustainable future. Architecture has to be adjusted because of the vast volume of waste generated from dismantling potentially valuable.buildings or the amount of energy required to restore the building to be useful. The energy of the world is diminishing, meaning that objects function less.

PERSONAL JUSTIFICATION

This project expresses my interest in adaptable and kinetic architecture as it can created and designed to be used for one function and then can become used for a different function which is important as the world, we live in is constantly changing especially with the pandemic that is going on right now and the constant change that the future brings. By researching and designing for my topic It will open up my eyes as an architect to be able to see what is there now but what also could be to come. My topic is focused on spaces that are created for one use that can be turned into another use which will save money on construction costs as they wont have to tear the building down to make the building efficient for another use.

At this point of my academic growth, it is important to convey this project because it enables comprehensive analysis and design to be described over the last five years of my academic career and at the end of my master's degree. This project demonstrates the level of expertise and implementation of what has already been studied and how personal analysis and design can take shape as new architecture related knowledge is learned and used. It also reveals the expertise behind diverse architectural principles, material usage, writing skills, and the potential to help the research and design process from start to finish.

ECONOMIC JUSTIFICATION

Buildings are still adapting to the demands of consumers. The possibilities that the architecture has to re-evolve into something meaningful are critical for creating a sustainable future. Architecture has to be reformulated because of the vast volume of waste generated from dismantling potentially valuable buildings or the amount of energy required to restore the building to be valuable. The energy of the world is diminishing, meaning that objects function less. Buildings would last hundreds of years in pre-industrialized Europe era, providing for centuries but nowadays, with the simplicity of manufacturing and advanced construction equipment, it is easy to dream of a new building. We did not push the reconstruction up to the speed of the industrial buildings and it will have to start with new construction methods to bring together these products and services to allow users to have a chance at making a building continue and last for generations to come. Designing a building that can adapt faster and more cost-effectively by embracing change offers an efficient path to a more sustainable built environment for the desired purpose. Adaptability can be used in this sense as a way of minimizing the amount of new construction (reduction), (re) activating underused or empty building stock (reuse) and improving the disassembly / deconstruction of components.

THE IMPORTANCE

This Project is important for this profession at this time because Architecture has found itself in a situation where improvements should be made to modern design methods to enhance the life span of the building. There is an incentive to introduce emerging technology so that future generations can begin to make more effective use of existing structures. Architecture is being designed for the first intention of the first customer. The dilemma occurs as the programs shift or the ownership of the first intent of the buildings has lost its significance. To counter this architecture, there is a need for the opportunity to look forward to future transition. There is nothing new about the notion of flexibility in architecture. That was the way people existed in the beginning times.

SITE ANALYSIS

CIVIC CENTER DISTRICT

The City of Los Angeles is progressing rapidly in its attempts to reshape the historic Civic Center District as it tries to rehabilitate post-World War II post-war planning and construction legacy in the wake of rapid growth in the communities around downtown Los Angeles. The district areas surrounding 101 Freeway, Judge John Aiso Lane, 1st Street and Grand Avenue are currently experiencing substantial improvements, including the recent construction of the SOM-designed Los Angeles U.S. District Courthouse and the new Mia Lehrer+Associates and OMA First and Broadway Parks. The Civic Center District is looking to bring pedestrian life into the area. My building and design will be designed to stimulate the pedestrian traffic that the Civic Center currently lacks.

Figure 43 | LA, Districts Map

SITE ANALYSIS

CIVIC CENTER CIRCULATION

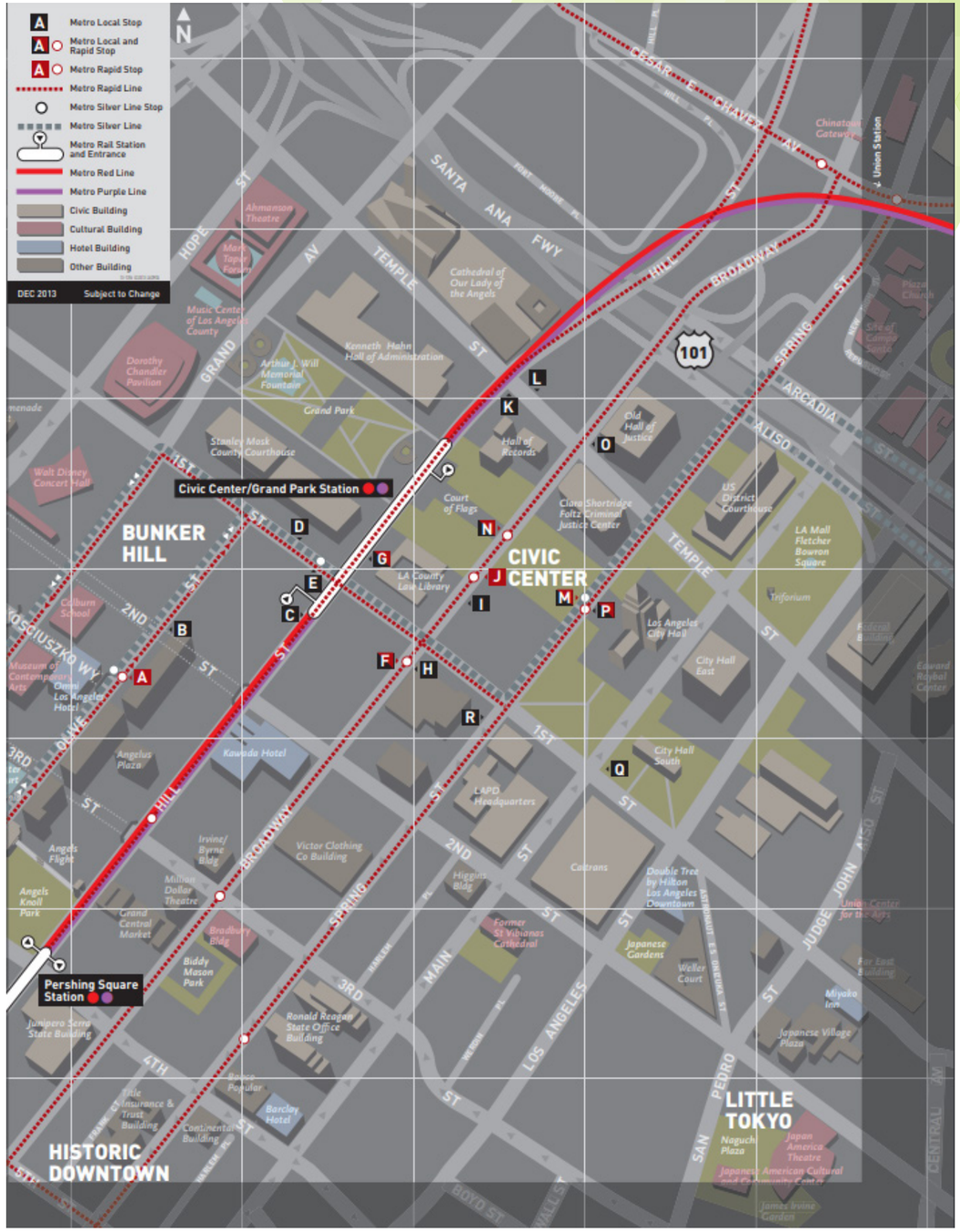


Figure 44 | LA Circulation Map

SITE ANALYSIS
SURROUNDING VIEWS

Site Address: 120 N Broadway, Los Angeles, California 90012
DIstrict: Civic Center

The chosen site is located in the northern part of downtown LA. Here you can see the landmark building of the City Hall. All buildings are in the Mid-Century Modern style and feature horizontal orientation, concrete construction, flat roofs, window bands and glass entryways. The City Hall and court buildings are particularly significant for the decorative concrete grilles and the geometric metal brise soleils (A type of shading system that uses a series of horizontal and vertical blades to control the amount of sunlight and solar heat that enters the building) which decorate their front facades. The use of brise soleils on the surrounding buildings will make the use of a kinetic or adaptable facade fit in well with the area and surrounding buildings.

Figure 45 | Aerial Site View

SITE ANALYSIS
SURROUNDING VIEWS

Figure 47 | Aerial View 02

Figure 46 | Aerial View 03

Figure 48 | Aerial View 04

SOLAR ANALYSIS

Figure 49 |Sun Path

The city is quite polluted, and pollutants can accumulate in the air especially in the dry season, from May to October. In addition to the possible waves of bad weather, which occur mainly from December to March, a nuisance in the climate of Los Angeles is represented by the Santa Ana, a hot, dry wind from the northeast, which blows for a few days from the deserts of California and Arizona, after passing over the mountains, from which it descends. This wind is more likely to occur in autumn and winter, but it can blow all year round. When it blows, the temperature can go above 77 °F, and sometimes up to 86 °F, in the middle of winter, while it can go above 95 °F, and sometimes up to 104 °F, from from April to October. Heat waves due to this wind occur more often in September, followed by August, July and October.

SITE ANALYSIS

SOLAR ANALYSIS

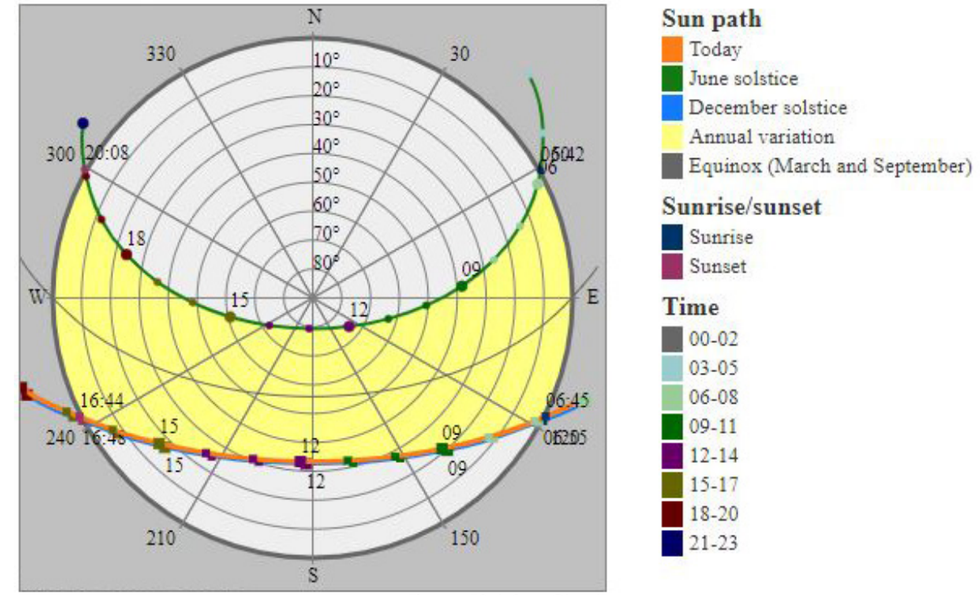


Figure 50 | Sun Chart

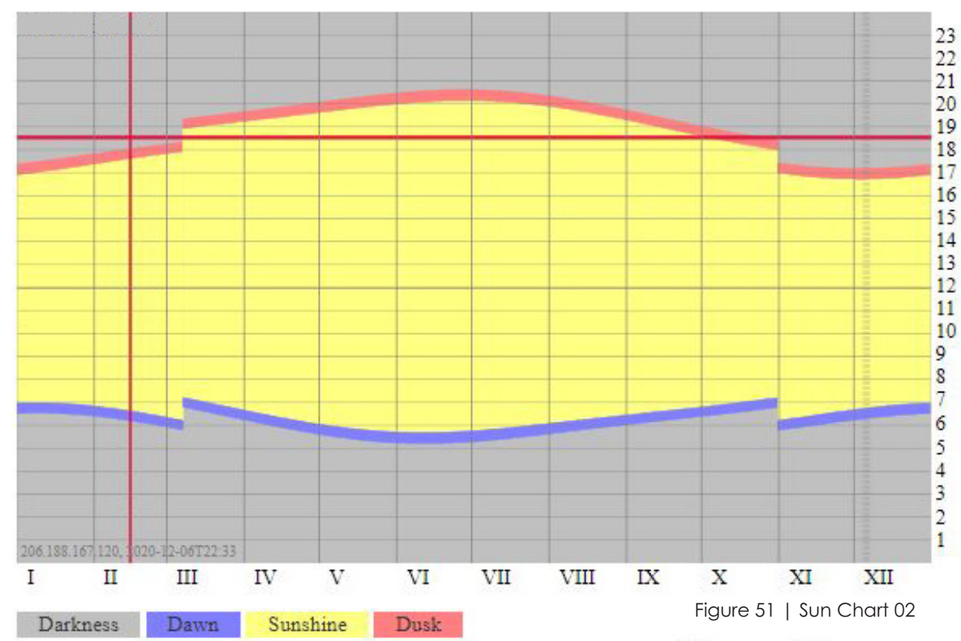
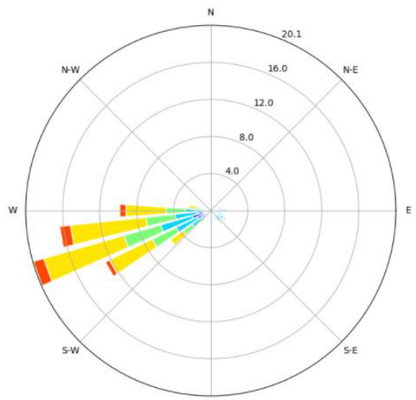


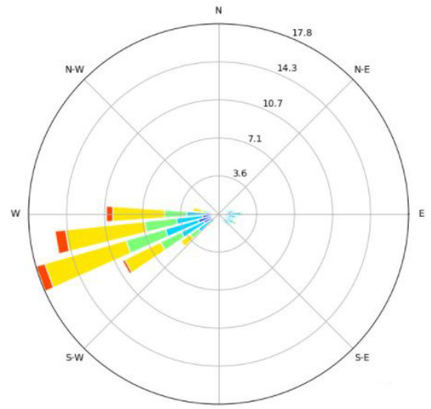
Figure 51 | Sun Chart 02

CLIMATE DATA

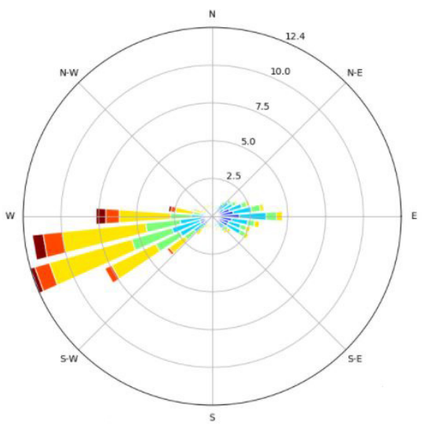
WIND PATTERNS



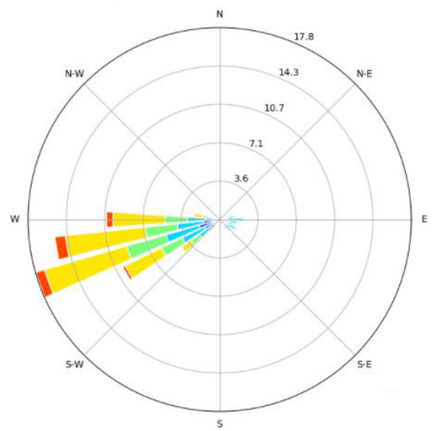
June Average Speed 8.0 MPH
Figure 52 | Wind Patterns



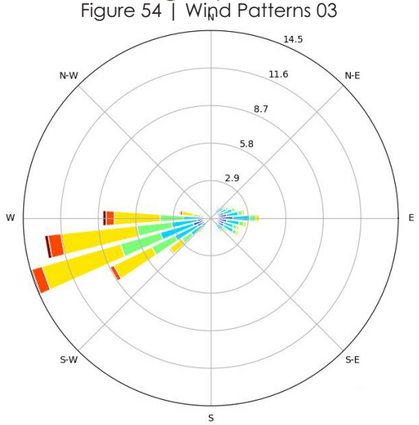
December Average Speed 6.6 MPH
Figure 53 | Wind Patterns 02



March Average Speed 8.1 MPH
Figure 54 | Wind Patterns 03



September Average Speed 7.5 MPH
Figure 55 | Wind Patterns 04



Year Around Average Speed 7.6 MPH
Figure 56 | Wind Patterns 05

Wind Speed (mph)

2-5	5-7
7-10	10-15
15-20	20+

TOPOGRAPHY

SLOPE ANALYSIS

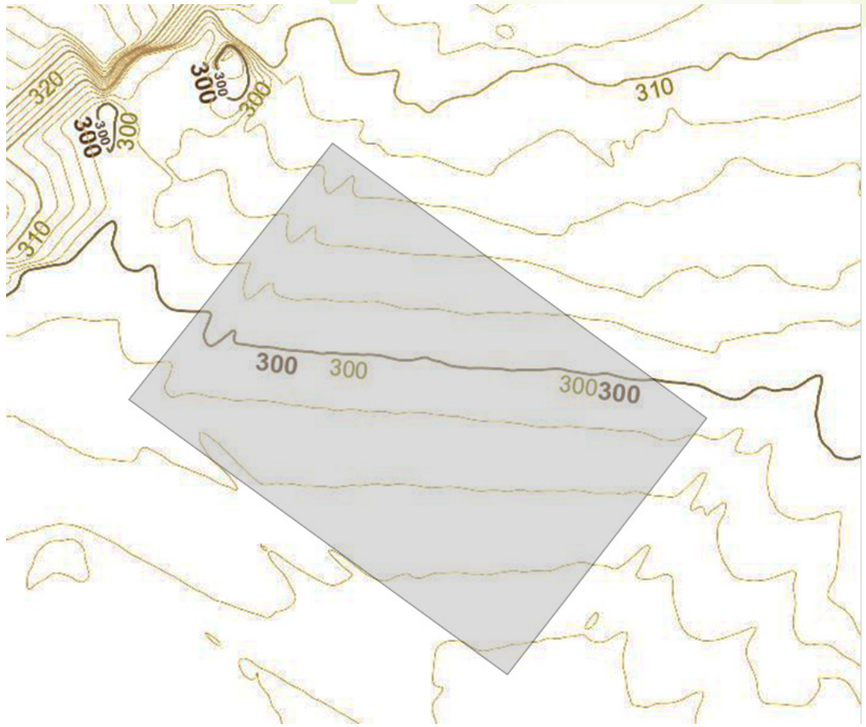


Figure 57 | Slope Patterns

The topography of the chosen site has a 0% - 2% and is relatively flat. No excavation of the site is going to be needed since there is no dramatic slope. Downtown Los Angeles soild are made up of sandy loam soils which is a type of soil used for gardening because this type of soil allows for good drainage. This soil type is normally made up of sand along with varying amounts of silt and clay.

Slope Range: 0-2%
Flooding: None
Ponding: None

PERFORMANCE CRITERIA
INTERACTION NET

To recap the conceptual features, this project will change the uses and highlight various types of spaces as the building transforms. The sizes of spaces will be different and adapt for each type of building. More precisely, residential, office and retail would be on-site to demonstrate the application in various configurations and environments. Although it is uncommon to combine these building styles in one site, this approach is appropriate for the purpose of the project.

Certain criteria in spatial layout must be met to provide comfort for all building users for each specific use. For instance, one may assume that the retail typology will produce a large amount of noise and have more people walking around during the day so it will require more of an open layout and will need a certain number of spaces while residential requires more spaces and require design that will have less noise as they will not have as much people walking around and socializing as retail would. This may also disrupt the circulation spaces that are needed for office facilities, or those in the residential facilities. In terms of the spatial layout, the spaces for each use can be strategically placed so they can be easily manipulated to become useful for the other uses. Flexibility needs to be maintained in order to address changes in function, circulation, programs, and technologies.

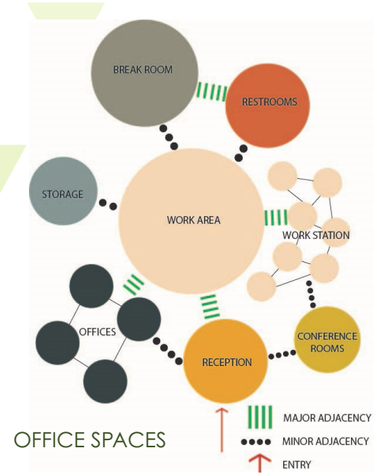


Figure 58 | Office Space Net

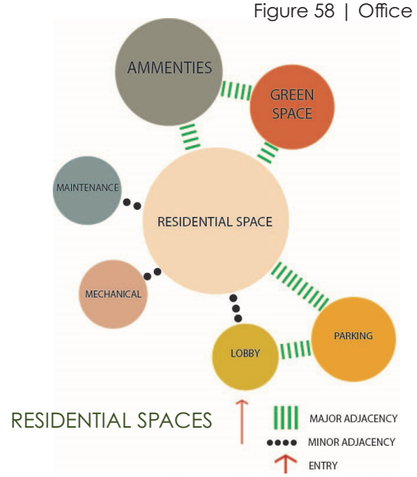


Figure 59 | Residential Space Net

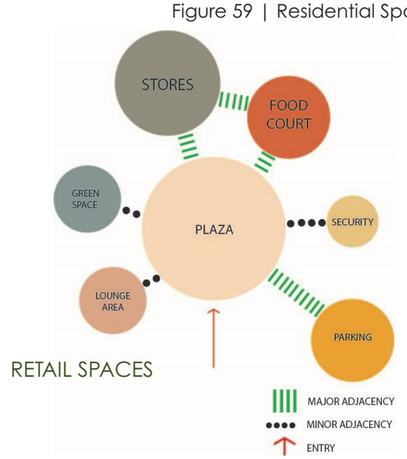


Figure 60 | Retail Space Net

PERFORMANCE CRITERIA
INTERACTION MATRIX

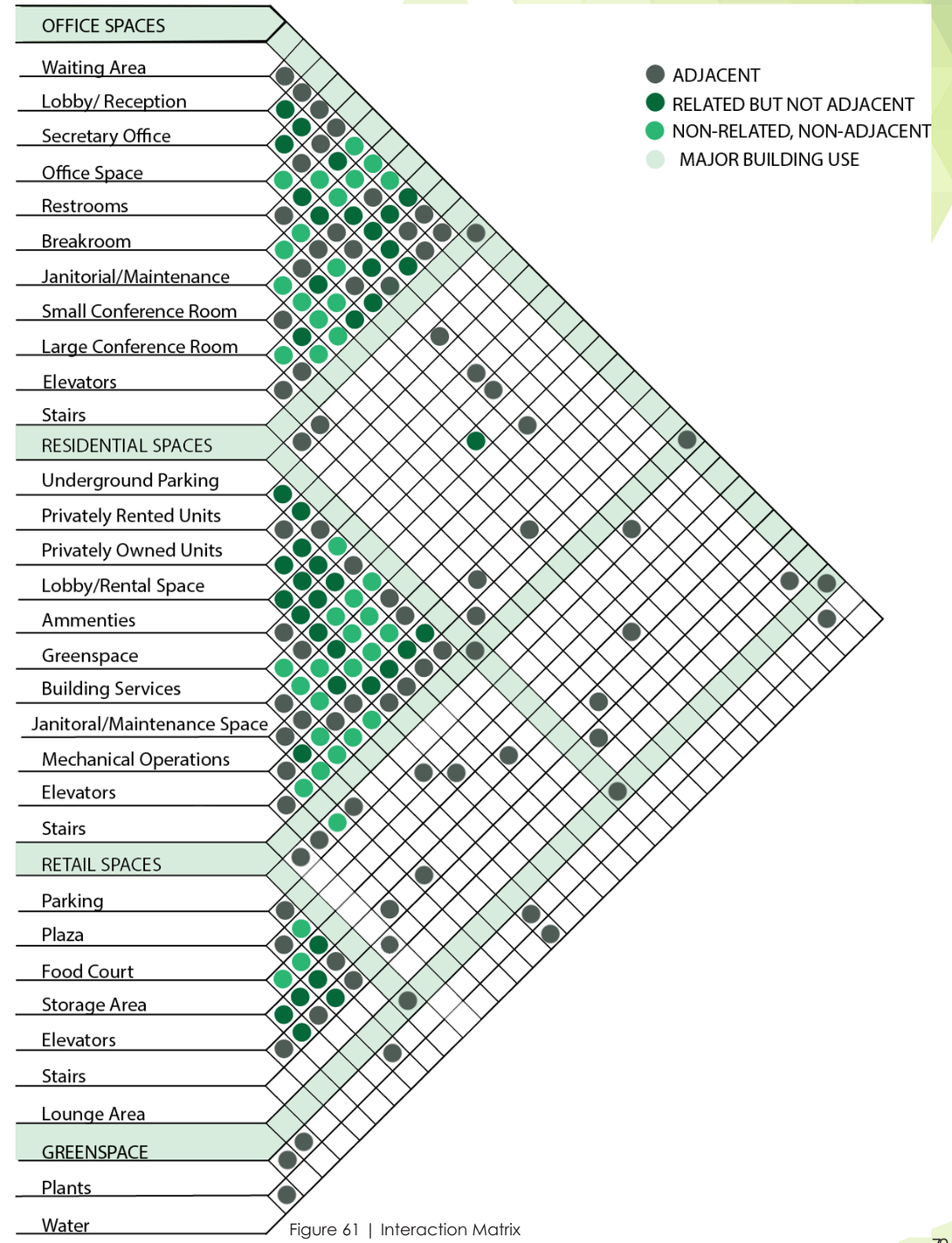


Figure 61 | Interaction Matrix

PRIVATE RESIDENTIAL SPACES	
Efficiency Apartment	3 600 sq. ft. (08 @ 600 sq. ft.)
1 Bedroom Apartment	9 600 sq. ft. (08 @ 1,200 sq. ft.)
2 Bedroom Apartment	13 600 sq. ft. (08 @ 1,700 sq. ft.)
3 Bedroom Apartment	13 200 sq. ft. (08 @ 2,200 sq ft.)

TOTAL - 45,600 SQ. FT

RETAIL SPACES: LEASABLE SPACES	
Leasable Space	4,500 sq. ft. (03 @ 4,500 sq. ft.)
Leasable Space	4,000 sq. ft. (03 @ 4,000 sq. ft.)
Leasable Space	3,500 sq. ft. (03 @ 3,500 sq. ft.)
Leasable Space	6,000 sq. ft. (06 @ 3,000 sq. ft.)

TOTAL - 54,000 SQ. FT

OFFICE SPACES: LEASABLE SPACES	
Leasable Space	30,000 sq. ft. (03 @ 10,000 sq. ft.)
Leasable Space	16,000 sq. ft. (02 @ 8,000 sq. ft.)
Leasable Space	7,500 sq. ft. (01 @ 7,500 sq. ft.)

TOTAL - 53,500 SQ. FT

These estimates are rough, and I have to try and keep these spaces overall square feet at a realistic amount of each other that the building will be able to fit each use and be able to grow and adapt to fit the spaces for each use and typology. The overall sizes are still to be determined but this will give a good idea of the size of the spaces compared to each other.

SPACE ALLOCATION

Space allocation will be the most important aspect of my project as my goal of my project is to have a certain space for a certain use for example a space for office can turn into a retail space then residential space. I will use an interaction matrix diagram and plan out spaces for each use and have them possibly be designed into a space that would need the approximate amount of square footage. For the square footage I will be using a Space Allocation Table for each use I have to keep them in a similar amount of each other so one use could be transformed into another use without it being too drastic of a change. I can use the allowable square footage table to determine sq footage and spaces.

ENVIRONMENTAL PERFORMANCE

Certain criteria in spatial layout must be met to provide comfort for all building users for each specific use. For instance, one may assume that the retail typology will produce a large amount of noise and have more people walking around during the day so it will require more of an open layout and will need a certain number of spaces while residential requires more spaces and require design that will have less noise as they will not have as people walking around and socializing as a mall would. This may also disrupt the circulation spaces that are needed for office facilities, or those sleeping in the residential facilities. In terms of the spatial layout, the spaces for each use can be strategically placed so they can be easily manipulated to become useful for the other uses. Flexibility needs to be maintained in order to address changes in function, circulation, programs, and technologies

PERFORMANCE CRITERIA

PROJECT IMPACT

The performance criteria for this project will be largely justified by the material and the transition of spaces between typologies. The proposal aims to be able to create a building that is not only able to respond to different functions and environmental changes but it is also to be able to respond to different user's ambitions. The use of Materials is going to play a major role in this effort as it will be used with the adaption of the building. Choosing the most environmentally-friendly, energy-stable materials will prove a valid source of argumentation for performance and sustainability of the building. I will also be considering the longevity of the materials used in this building as the building is meant to last for future generations to use without the need for reconstruction.

Space allocation will be the most important aspect of my project as my goal of my project is to have a certain space for a certain use for example a space for retail or office can turn into a residential space. I will use an interaction matrix diagram and plan out spaces for each use and have them possibly be designed into a space that would need the approximate amount of square footage. For the square footage I will be using a Space Allocation Table for each use I have to keep them in a similar amount of each other so one use could be transformed into another use without it being too drastic of a change. I can use the allowable square footage table to determine sq footage and spaces.

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DESIGN SOLUTION

Figure 62 | Economically

These days the growth of society is accelerating and there are many new technical and cultural problems to be considered. Buildings must therefore be in a position to respond to these rapidly evolving new environments. Buildings should no longer be constructed planned and developed for a single program only, but should take into account a variety of choices over centuries. One way to do that is through the adaptability of buildings; if correctly constructed, buildings can be re-programmed and re-inhabited without the possibility of needless deconstruction.

Figure 63 | Socially

Designing a building that can adapt faster and more cost-effectively by embracing change also offers an efficient path to a more sustainable built environment for the desired purpose. Adaptability can be used in this sense as a way of minimizing the amount of new construction (reduction), (re)activating underused or empty building stock (reuse) and improving the disassembly / deconstruction of components. A building that can adapt and change to become useful for not only today's society but for future generations is a key factor for the development of the future.

DESIGN SOLUTION
DESIGN STRATEGIES

1 Moveable Wall Partitions

An adaptable building should provide a space plan that is able to be arranged in several scenarios to meet different needs, lifestyles and uses. Functional and spatial adaptability can be achieved by using moveable partition walls as it will create multifunctional spaces allowing for a large variety of functions, as well as trans functional spaces which can lead to the creation of new undetermined and unpredictable activities according to the users' personal experiences and their consumption of space. Using moveable partition will also support elasticity and divisibility because the building will be easily extended vertically or horizontally and can also be subdivided into different functional entities without hampering its coherence.

2 Sliding Mechanism

An approach that has been used in fast-assembled systems is the sliding mechanism. Using this method made it easier to alter the form and shape of the building and helped me design a building that made the transformation to each use and typology successful.

3 Retractable Structure

The use of retractable structures, roofs, skylights, windows, and doors were key design features that were integrated into my project that made it possible to make a building be re-programmed and re-inhabited without the possibility of needless deconstruction. The use of operable awnings also was used as a tool to separate spaces to make them become private or public spaces.

DESIGN SOLUTION

CURRENT SITE

Figure 64 | Current Site

DESIGN SOLUTION

SITE PLAN

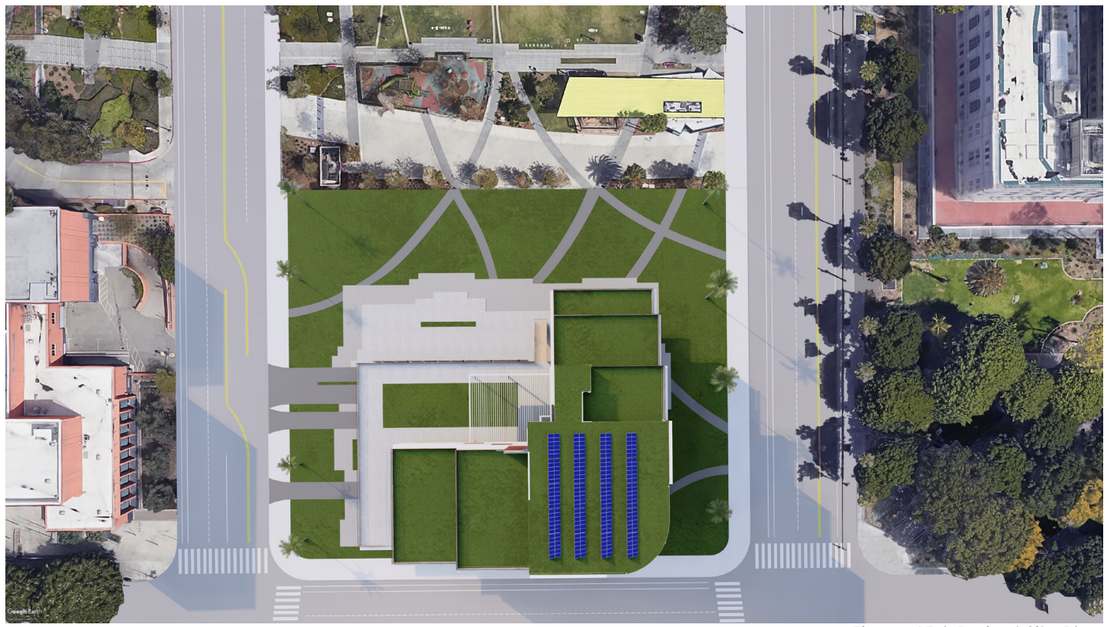


Figure 65 | Project Site Plan

DESIGN SOLUTION

CIRCULATION PLAN

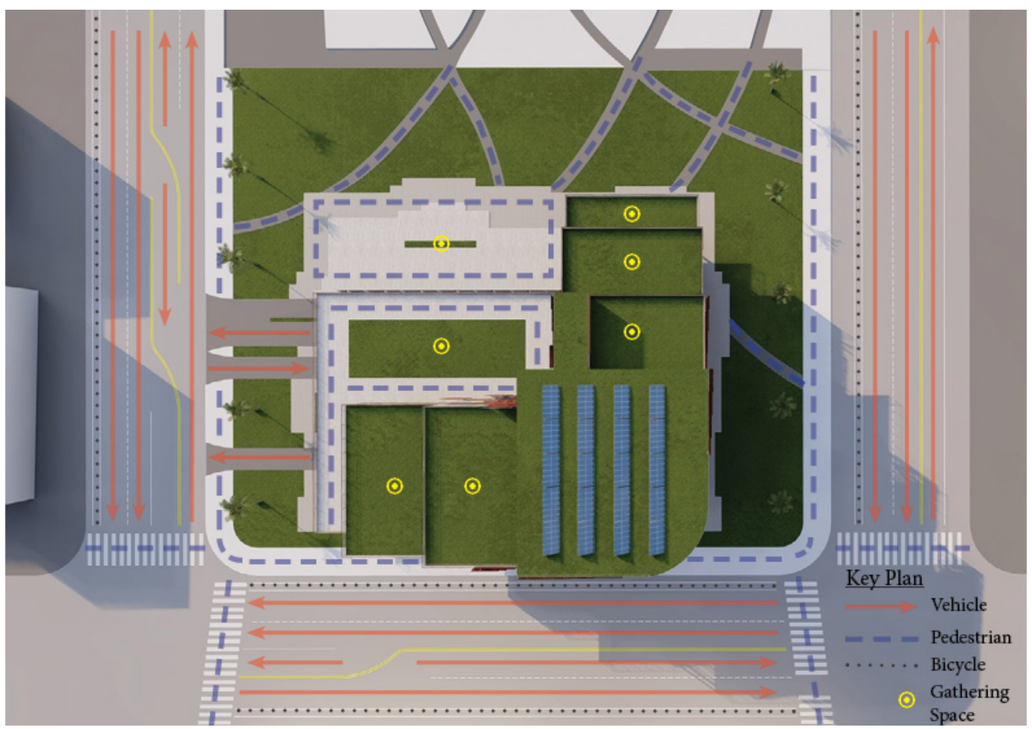


Figure 66 | Circulation Plan

DESIGN SOLUTION

GROUND FLOOR PLANS

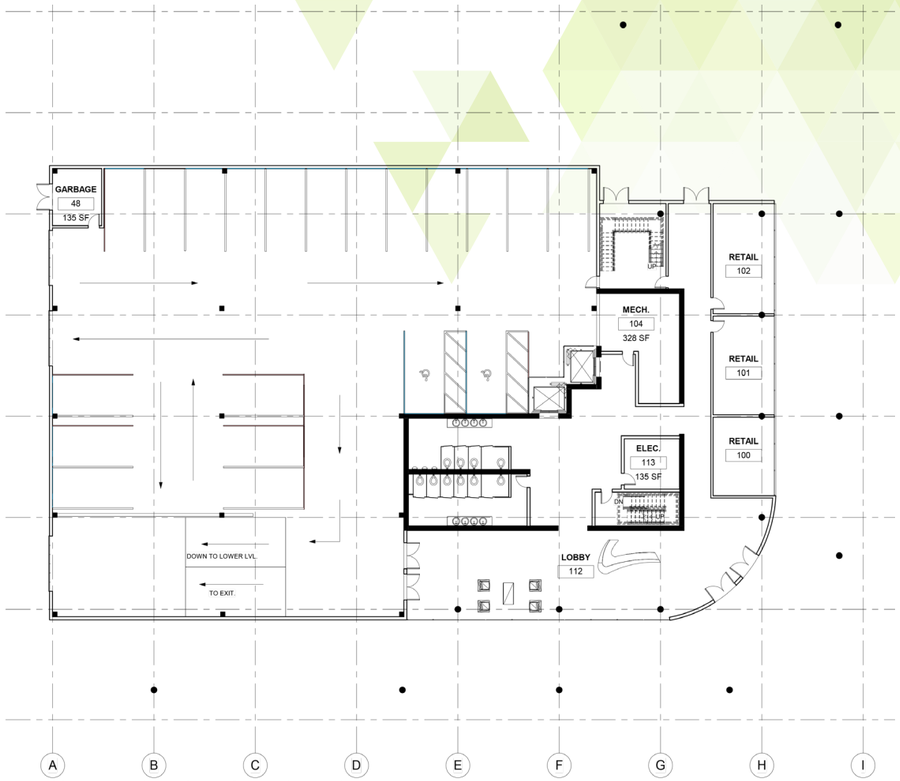


Figure 67 | Project Gound Level

Office, Retail and Residential

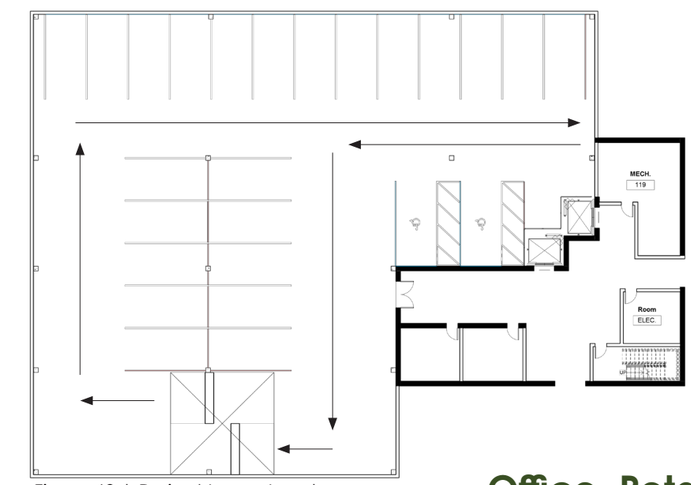


Figure 68 | Project Lower Level

Office, Retail and Residential

DESIGN SOLUTION

SECOND LEVEL PLANS

= Moveable Partition Wall

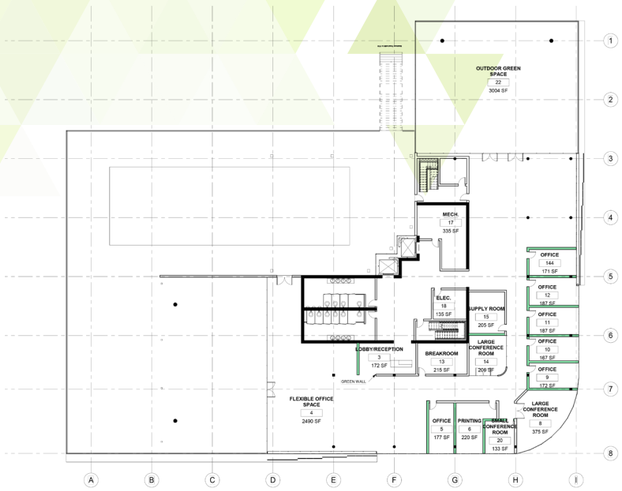


Figure 69 | Office Second Level

Office

Figure 70 | Retail Second Level

Retail

DESIGN SOLUTION

SECOND LEVEL PLANS

= Moveable Partition Wall

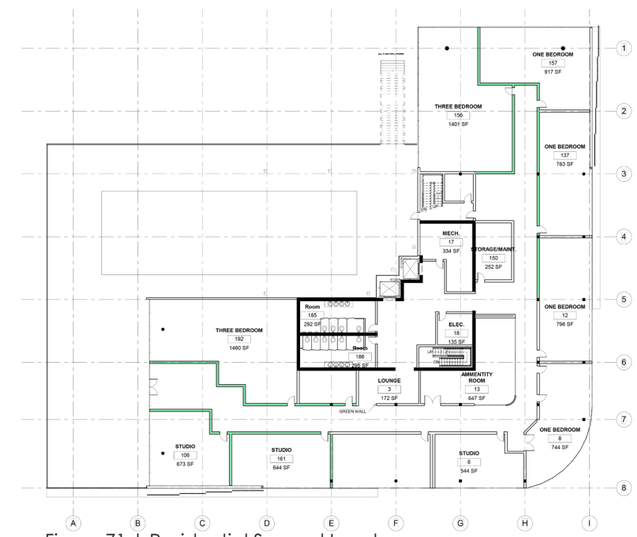


Figure 71 | Residential Second Level

Residential

DESIGN SOLUTION

THIRD LEVEL PLANS

= Moveable Partition Wall

Figure 72 | Office Third Level

Office

Figure 73 | Retail Third Level

Retail

DESIGN SOLUTION

THIRD LEVEL PLANS

= Moveable Partition Wall

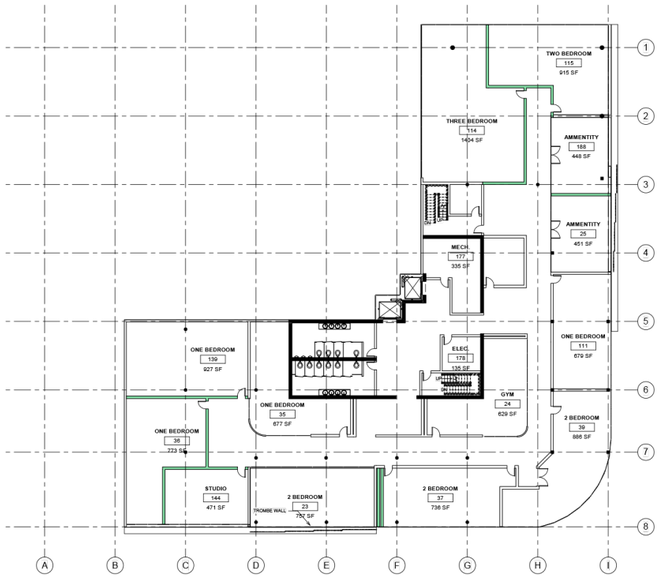


Figure 74 | Residential Third Level

Residential

DESIGN SOLUTION

FOURTH LEVEL PLANS

= Moveable Partition Wall

Figure 75 | Office Fourth Level

Office

Figure 76 | Retail Fourth Level

Retail

DESIGN SOLUTION

FOURTH LEVEL PLANS

= Moveable Partition Wall

Figure 77 | Residential Fourth Level

Residential

DESIGN SOLUTION

FIFTH LEVEL PLANS

= Moveable Partition Wall

Figure 78 | Office Fifth Level

Office

Figure 79 | Retail Fifth Level

Retail

DESIGN SOLUTION

FIFTH LEVEL PLANS

= Moveable Partition Wall

Figure 80 | Residential Fourth Level

Residential

DESIGN SOLUTION

SIXTH LEVEL PLANS

= Moveable Partition Wall

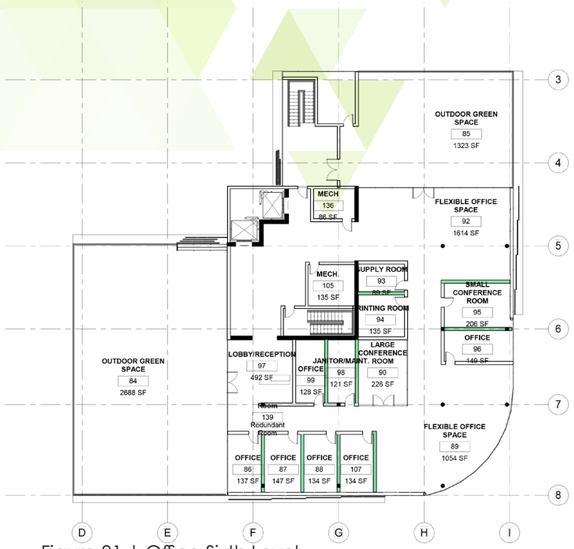


Figure 81 | Office Sixth Level

Office

Figure 82 | Retail Sixth Level

Retail

DESIGN SOLUTION

SIXTH LEVEL PLANS

= Moveable Partition Wall

Figure 83 | Residential Fourth Level

Residential

DESIGN SOLUTION

PERFORMANCE ANALYSIS

PERFORMANCE ANALYSIS

	OFFICE	RETAIL	RESIDENTIAL
LINEAR FT. OF PARTITION WALLS	1,055' 8" FT	1055' 8" SQ. FT	1562' 10" SQ. FT
SQ. FT OF GLAZING WALL	21,392 SQ. FT	24,373 SQ. FT	27,874 SQ. FT
OVERALL SQ. FT OF INDOOR SPACE	52,304 SQ. FT	63,702 SQ. FT	77,480 SQ. FT
SQ. FT OF OUTDOOR SPACE	21,074 SQ. FT	14,402 SQ. FT	7,523 SQ. FT
PERCENTAGE OF PUBLIC SPACE	8.1 %	77.3%	8.1%
PERCENTAGE OF PRIVATE SPACE	21.8%	9.11%	83.5%
PERCENTAGE OF SEMI-PUBLIC SPACE	70.1%	13.59%	8.4%
LENGTH OF RAILINGS (FT)	1408'-6" SQ. FT	1,201' SQ. FT	710' SQ. FT
NUMBER OF PANELS	61	61	61

Figure 84 | Performance Analysis

DESIGN SOLUTION

EXTERIOR RENDERS

Figure 85 | Front Exterior Render

Figure 86 | Back Exterior Render

DESIGN SOLUTION

RETRACTABLE AWNINGS

Figure 87 | Retractable Awning

DESIGN SOLUTION

RAILING & SLIDING MOVEMENTS

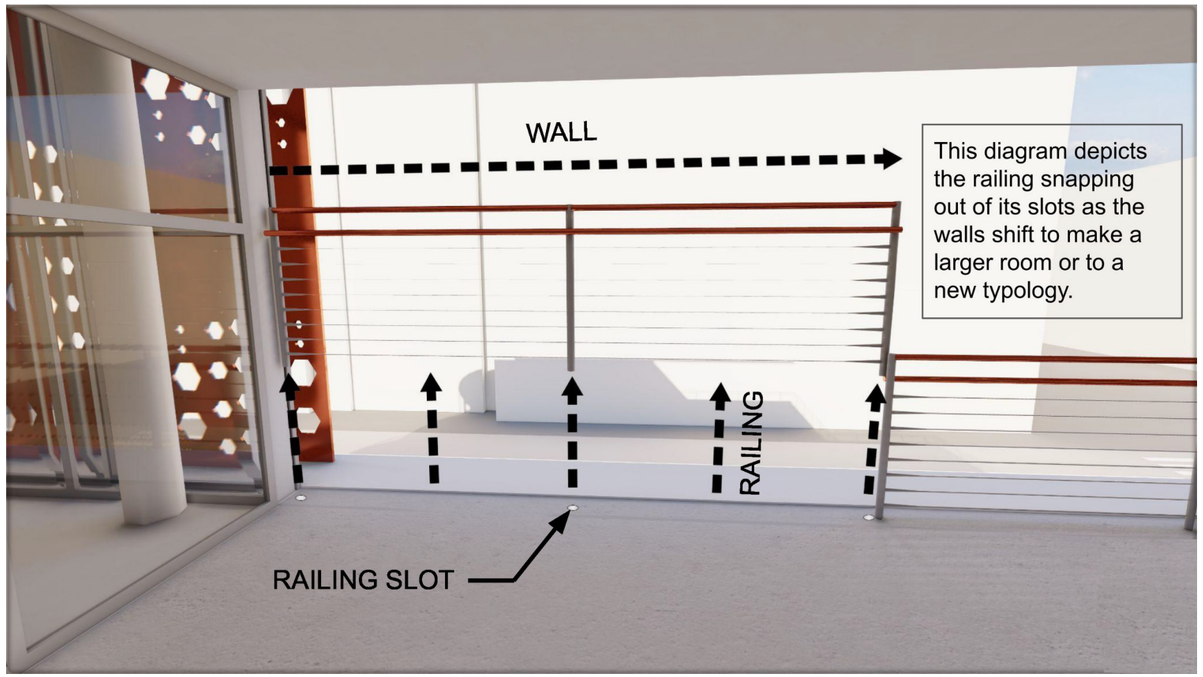
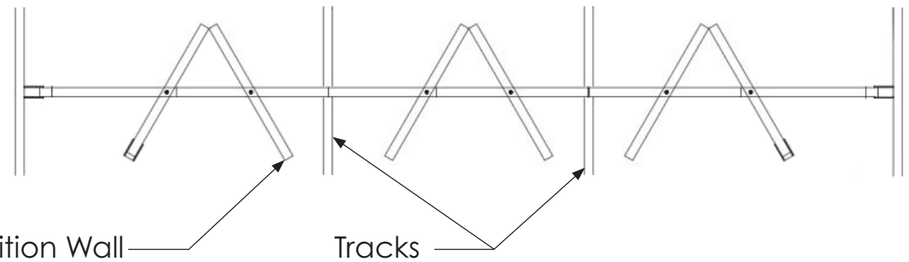


Figure 88 | Movement Diagram

Paired Operable Partitions

Figure 89 | Paired Operable Partition

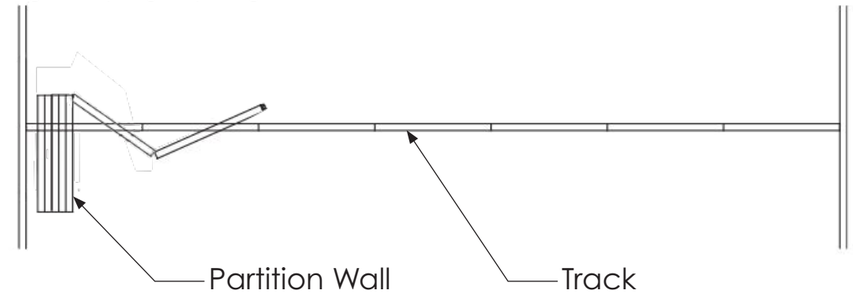


A type of moveable partition walls I used in my project are paired operable partitions. These moveable partition walls use retractable top and bottom seals, which allow for easy panel movement.
The advantages with retractable top and bottom seals are that retractable seals are intended to compensate for uneven floors, nothing drags on the floor or track as the panels are retracted and panels can also be “locked” into place.

DESIGN SOLUTION
MOVEABLE PARTITION WALLS

Single Opening Partition Walls

Figure 90 | Single Opening Partition Wall



In my project I also used single opening partition walls. These moveable partition walls have retractable seals as well that exert continuous force against the track and floor for optimal acoustics, including on carpet or other porous floor materials. When the seals are mounted, the panel remains stable.

DESIGN SOLUTION

MOVEABLE PARTITION WALLS

This diagram illustrates how the paired operable partition walls shift on aluminum tracks to create spaces that can be configured in a variety of scenarios to meet different needs, lifestyles, and uses.

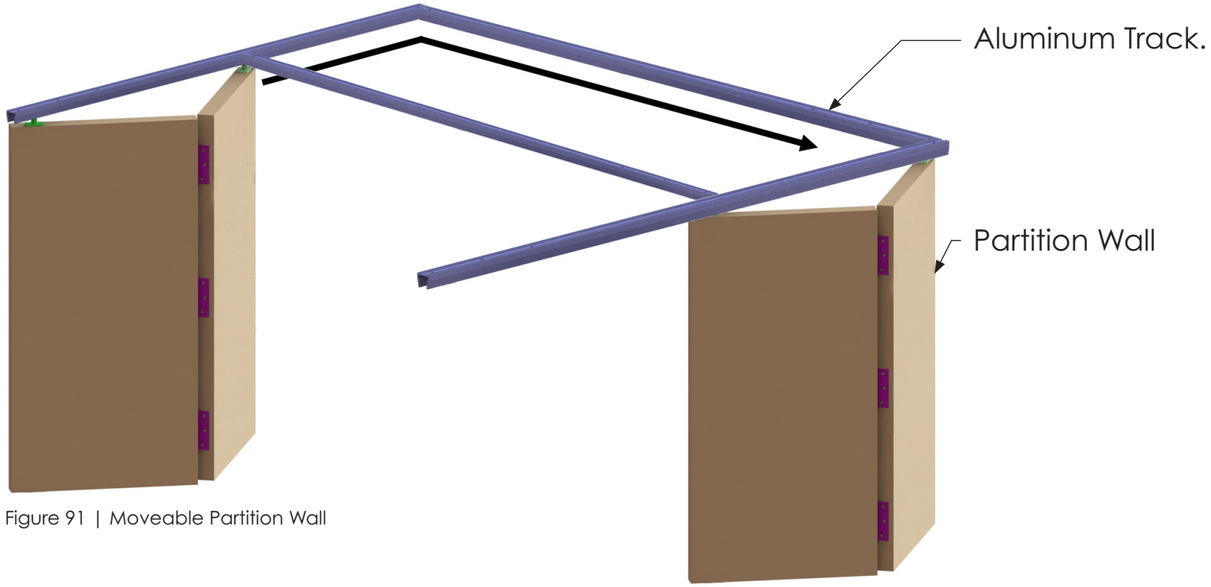


Figure 91 | Moveable Partition Wall

DESIGN SOLUTION

PARTITION WALL SECTION

The partition walls are top hung, so there is no need for a floor track.

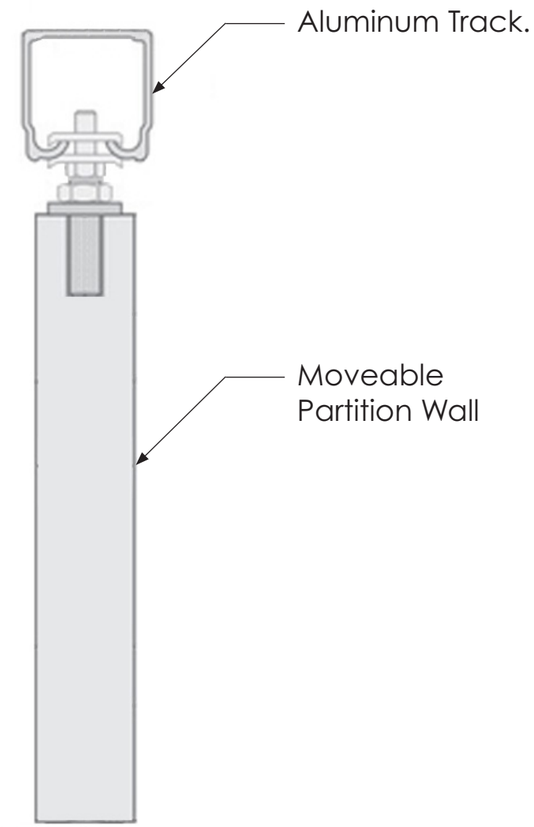


Figure 92 | Partition Wall Section

DESIGN SOLUTION

BUILDING SECTION

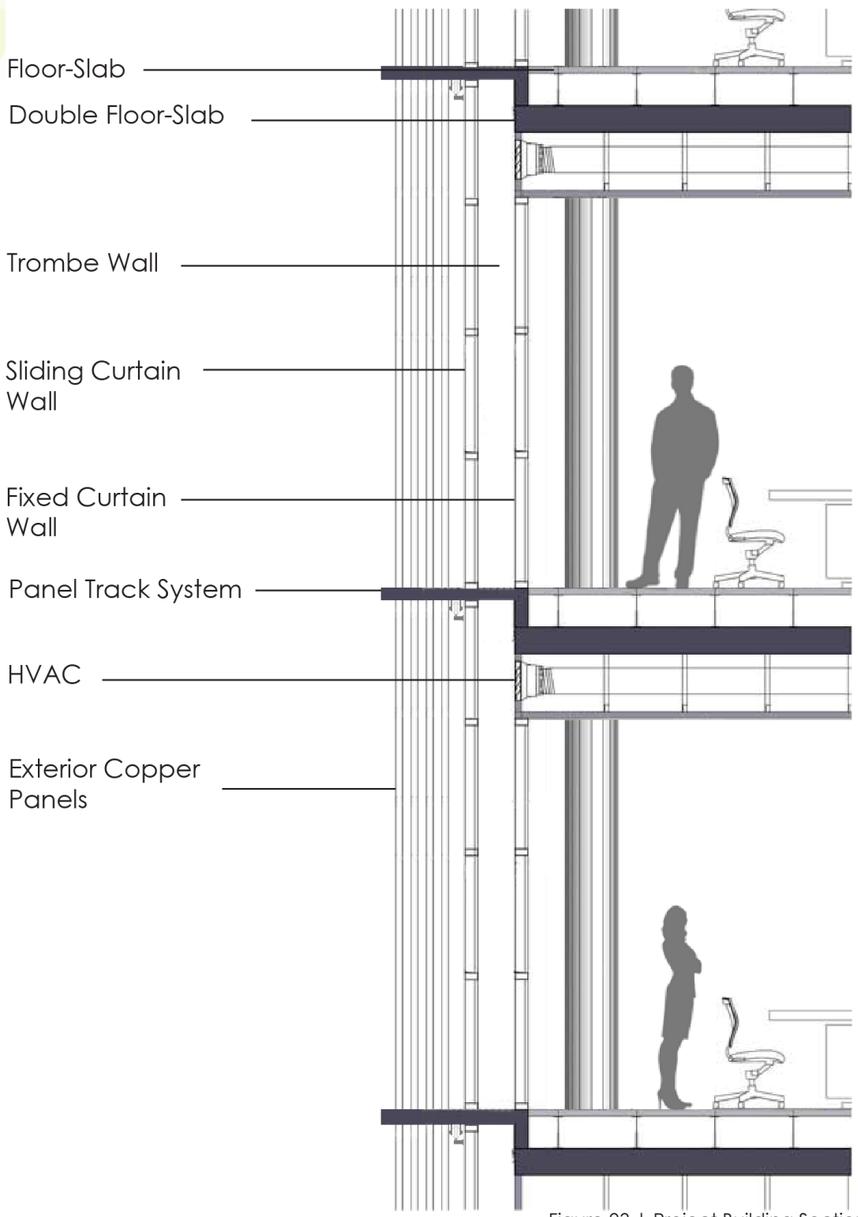


Figure 93 | Project Building Section

DESIGN SOLUTION

Exterior PANEL DETAIL

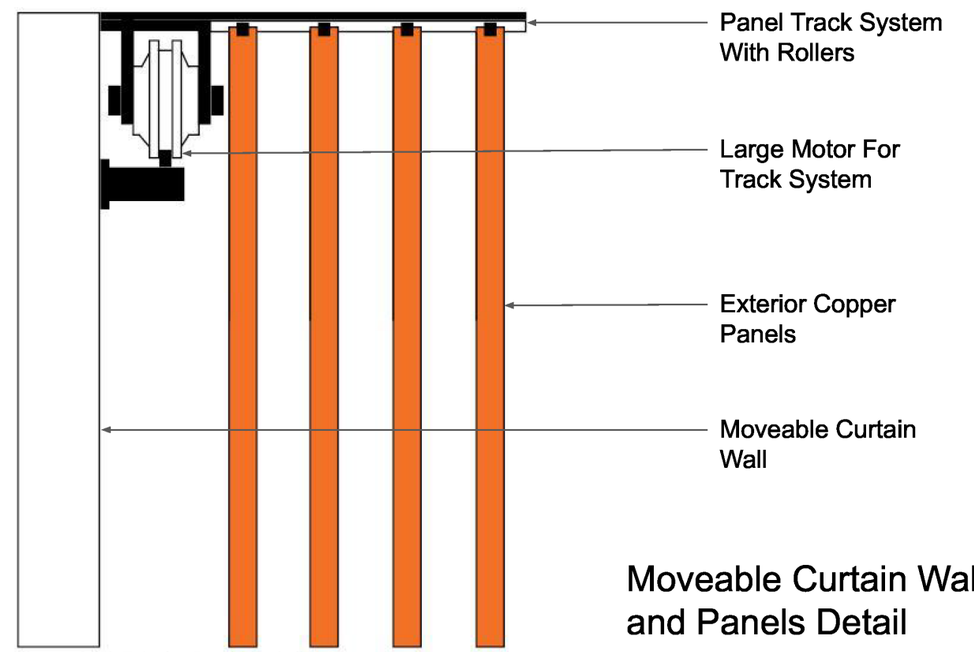


Figure 94 | Exterior Panel Detail

Moveable Curtain Wall and Panels Detail

DESIGN SOLUTION
HVAC

Package Units Ceiling Mounted

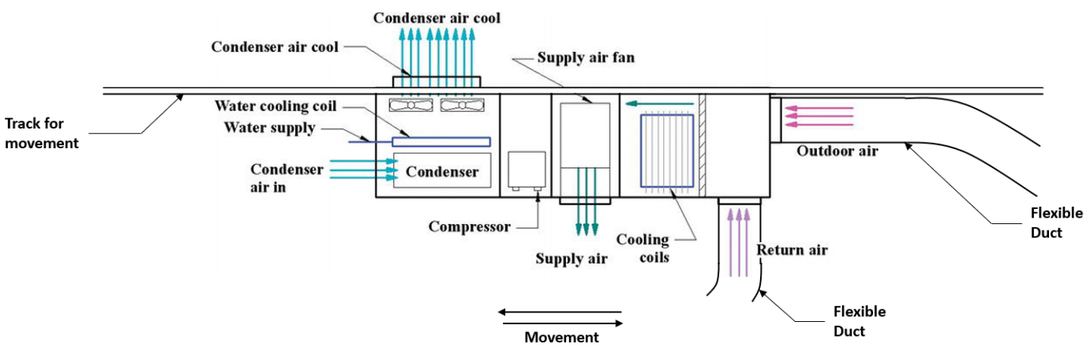


Figure 95 | HVAC - Package Units

DESIGN SOLUTION
BUILDING ELEVTIONS

Figure 96 | Office Elevation

Figure 97 | Retail Elevation

Figure 98 | Residential Elevation

DESIGN SOLUTION

INTERIOR OFFICE RENDER

Figure 99 | Office Interior Render

DESIGN SOLUTION

INTERIOR RETAIL RENDER

Figure 100 | Retail Interior Render

DESIGN SOLUTION

INTERIOR RESIDENTIAL RENDER

Figure 101 | Residential Interior Render

DESIGN SOLUTION

MATERIAL PALLETTE

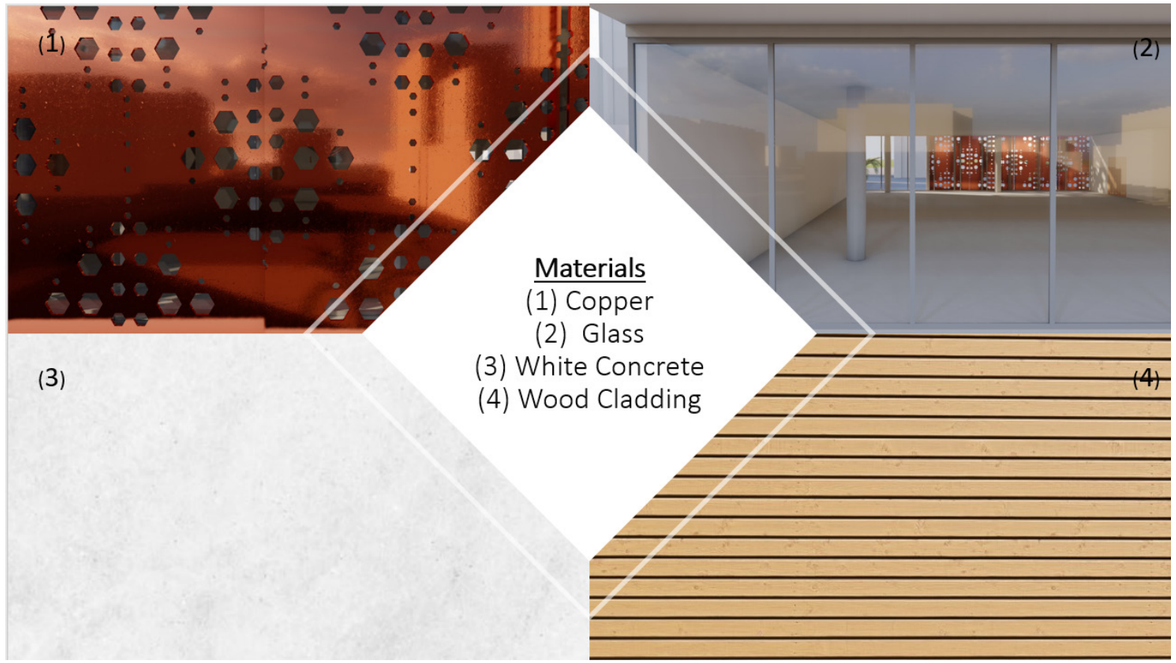


Figure 102 | Material pallette

THE APPENDIX

THE APPENDIX

THE APPENDIX

PREVIOUS STUDIO EXPERIENCE

2 Second Year

Fall 2017
Milt Yergens

- Tea House
- Boat House

Spring 2017
Cindy Urness

- Dwelling
- Mixed Use Apartment

3 Third Year

Fall 2018
Ron Ramsay

- Shaker Barn

Spring 2018
Emily Guo

- Senior Living Facility
-Museum

4 Fourth Year

Fall 2019
Amar Hussein

- High Rise

Spring 2019
Amar Hussein

- Marvin Windows Competition
- Future of Residential Apartments

5 Fifth Year

Fall 2020
Ron Ramsay

- Adaptive Reuse Building

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