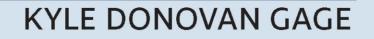
FOOD FOR THOUGHT

ARCHITECTURE AS AN E

ECOSYSTEM



Food for Thought

Architecture as an Ecosystem

Kyle Donovan Gage 2022





Committee Co-Chair: Michael O'Brien





Committee Member: Bruce Dvorak

studio professor: marcel+erminy

ACKNOWLEDGMENTS

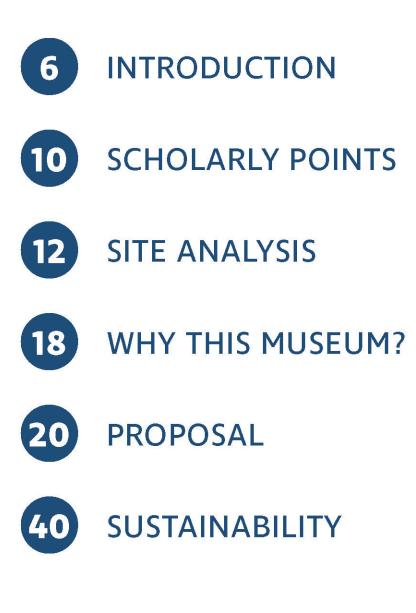
In addition to my graduate committee the following individuals were instrumental in helping me complete this project. Thank you for your support.

PROFESSOR	Andrew Billingsely	
INDUSTRY PROFESSIONALS	Nancy McCoy Anita Moran Robert Holton	
AND all the people I annoyed daily		
STUDIO	Andrea Aponte Ty Cluassen Chandler Fleming Ashleigh Thoele Lauren White	Miranda Campbell Sanchali Dutta Karla Padilla David Wang
FRIENDS	Victoria Rosado Jared Thome	Ethan Vickers

A SPECIAL THANKS

To my mother and father who taught me to chase every opportunity. I am grateful for your love and support.

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INTRODUCTION

Architecture as an Ecosystem

Food for Thought started as an investigation into sustainable design resulting from dissatisfaction with current building practices. Existing design standards that focus on materials, water capture, and energy conservation only consider manufacturing standards and ignore the holistic approach to sustainable design.

Sustainability stands upon three pillars that need to be considered to take a holistic approach. These three pillars, Social, Environmental, and Economic sustainability, work in tandem to develop a better ecosystem. Eventually, my understanding came to be that architecture itself is a vessel for an ecosystem. We refer to the concept of the built environment, and I believe this means that buildings become a literal and proverbial ecosystem. It becomes the architect's responsibility to shape that ecosystem and, when necessary, intervein when it becomes unhealthy.

When selecting my project, I needed to take a broad approach by evaluating what issues weakened the community and ultimately propose solutions to alleviate the community's ailments. The evaluation required talking with industry professionals in the area, visiting the site and surrounding community, and reading and researching the problems faced by the community. This finding ultimately led me to decide that my project would utilize the practice of adaptive reuse and repositioning of vacant buildings within a community. The ethos behind this project is that architecture is an ecosystem, and when an ecosystem is plagued, it fails to function. When a community is stagnant or deteriorating, the reinvigoration of architecture can act as a catalyst and spur regrowth.

The title "Food for Thought" is a common idiom that many people can recognize instantly, but it also has elements reflected in my project. The "food" component comes from implementing urban agriculture and the refectory within the project. At the same time, the "Thought" comes from the need for architects to reevaluate the standards of sustainable architecture. Ultimately this project serves as an academic foundation from which new understanding can be drawn and conversations can be held.

This project focuses on a proposal for the adaptive reuse of the vacant Women's Museum on the fairgrounds of Fair Park in Dallas, Texas. Challenges with this site included access to the site, documentation, modeling, and understanding the timeline of construction and renovations. Nancy McCoy, Anita Moran, Professor Andrew Billingsley, and Professor Priya Jain were crucial in providing documents, referrals, and references that allowed me to complete the majority of my project. Without their help, I may not have been able to collect the resources or stories that allowed me to construct a Revit model reflecting the existing construction of the Women's Museum Building and understand the process of design and construction.

Dr. Ahmed Ali, Professor Michael O'Brien, Professor Bruce Dvorak, and Professor Marcel Erminy were essential to developing ideas, drawings, and architecture presented in this book. My committee's signatures can be found at the front certifying their support of the ideas present within.







Lacaton and Vassal

Pritzker Prize winners Lacaton and Vassal are pioneer architects pushing for a holistic approach to sustainable design. Their projects spotlight how architecture works as a vessel to prop up and better communities. Many of their projects find ways to take existing building stock and reposition them for present needs while resolving existing issues.

One idea key to their project's development is embodied energy. This idea, which emphasizes the effort put into constructing and designing existing buildings, allows Lacaton and Vassal to justify the reincorporation of structural, mechanical, and other existing elements within their projects. This theory also strengthens and plays into the idea of the memory of place. Every place has a physical memory, and in only a few years, it becomes ingrained into someone's experience. There is always some community with a story tied with an architectural element. Deconstruction or demolition of these monuments is essentially erasure and, in many instances, can damage a community—counter to the ideas of holistic sustainability.

Lacaton and Vassal won the Pritzker Prize because of their devotion to the ecosystem formalized around architecture. Their ideas and practices were crucial for developing and furthering the design of Food for Thought.

SCHOLARLY POINTS

I. Architecture as a Vessel

The idea of architecture as an ecosystem primarily relies on viewing architecture as something more than a figure or shell housing a program. It must become a vessel or host to which an ecosystem and community can flourish. In the case of a deteriorating community, then architectural intervention should become a catalyst spurring on regrowth and rehabilitation of the community.

II. Holistic Sustainability

Green design and sustainability have become common vernacular, referring to materiality, energy, and water concerns. Meeting energy, code, and material standards is essential to ensure the progression of sustainable practices in architecture; however, there is an incredibly lacking concentration on social and community impact. Holistic sustainability attempts to incorporate broader social sustainability.

III. Recognition of Embodied Energy

A concerted effort is put into designing, acquiring materials, and constructing architectural elements. The idea of embodied energy seeks to preserve and celebrate these elements when possible, reposition them when necessary, and demolish them rarely. When buildings are destroyed, others show a disregard for the time, effort, and resources utilized in their completion. This practice is not common in the United States but is a significant standard in Europe.



SITE ANALYSIS

South Dallas and "Un"Fair Park



The Women's Museum (Pictured above), located on the fairgrounds of Fair Park, is a building with an extensive history. Initially constructed in 1906, the building was redone in an art deco style for the Texas Centennial in 1936. Originally the coliseum building, it was in service until the 1980s, wherein it eventually fell into ruin. In 2000 \$30 million were invested into the project to convert it into the Women's Museum. At this time, the entire interior was gutted and transformed into a modern 2000 approach to architecture.

Fair Park has seven vacant buildings on the property, including the Women's Museum Building. Many vacancies are a sad predicament considering the park's neighborhood has been



ir Park Master Plan Update Record

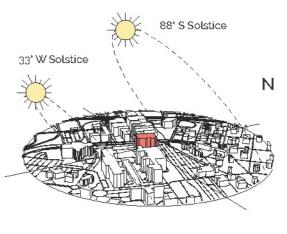


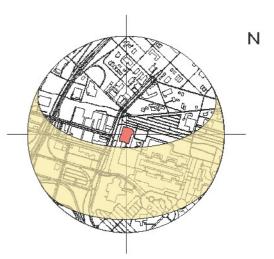
harshly hit by infrastructural expansions since the 1980s. Over 300 families were expelled from their homes so that the city could expand parking for Fair Park and expand I-30, which acts as a physical and mental barrier to the community of South Dallas.

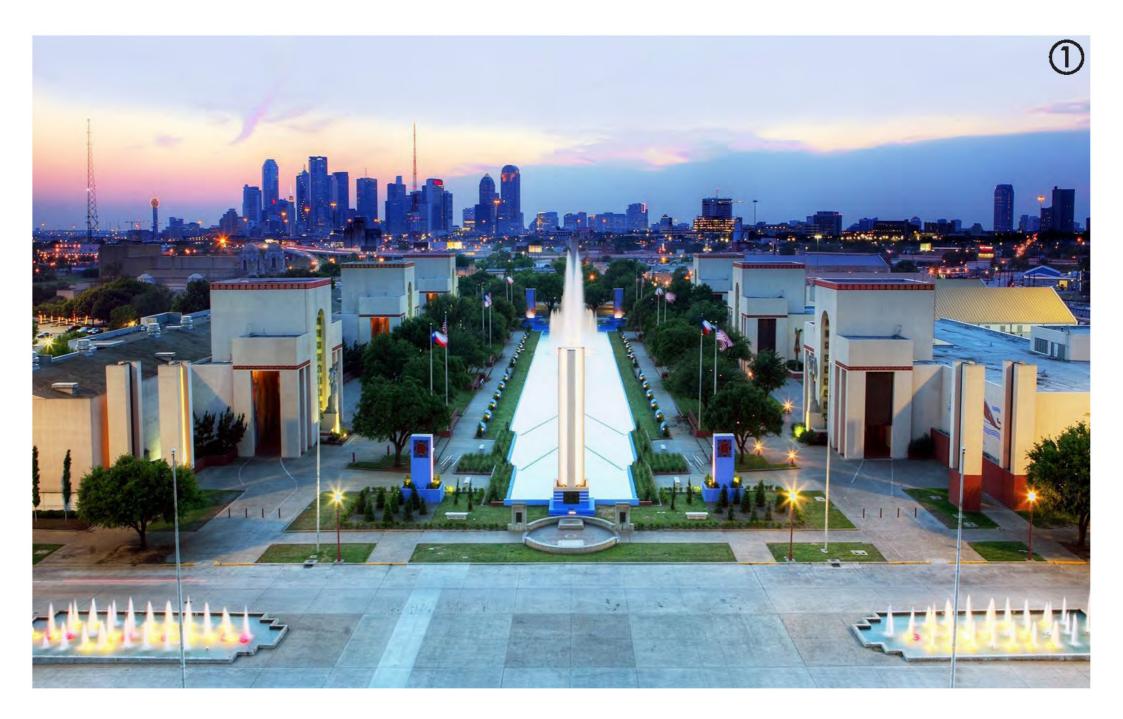
South Dallas is characterized by homelessness and poverty, lacking the resources necessary for a prosperous community. The lack of economic growth in the area has led to the inability of residents to access healthy and affordable food and community spaces.

Fair Park, located directly in the middle of South Dallas, is a prime candidate for repositioning vacant buildings to alleviate the community's ailments. The Women's Museum, located on the North-West corner of the park, directly faces the community and acts as a bridge between the park and the community. Another factor in selecting the Women's Museum is the investment made into the project of \$30 Million for the museum, which was only open for ten years.

The 2000 renovation left the building with wide-open bays that could be incorporated into various programs and upgraded the mechanical systems. A loading dock benefits industry, and the sizeable non-historic facade faces Deep Ellum's dart station and the fairgrounds.



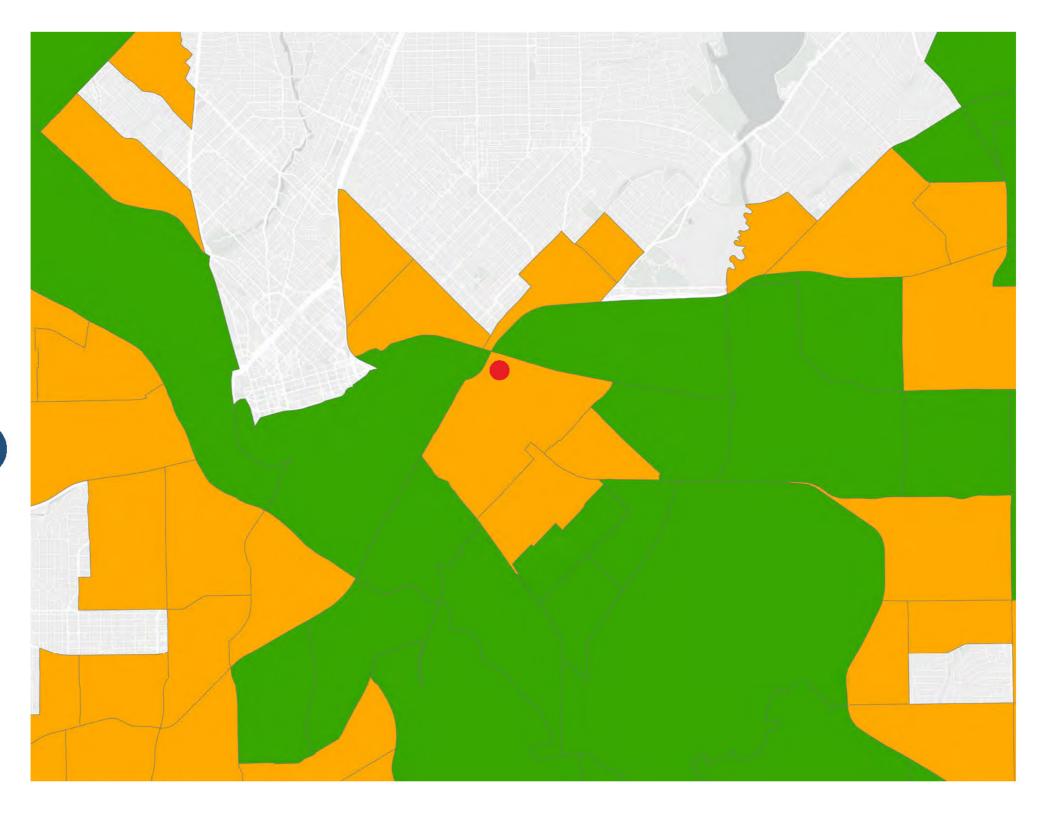












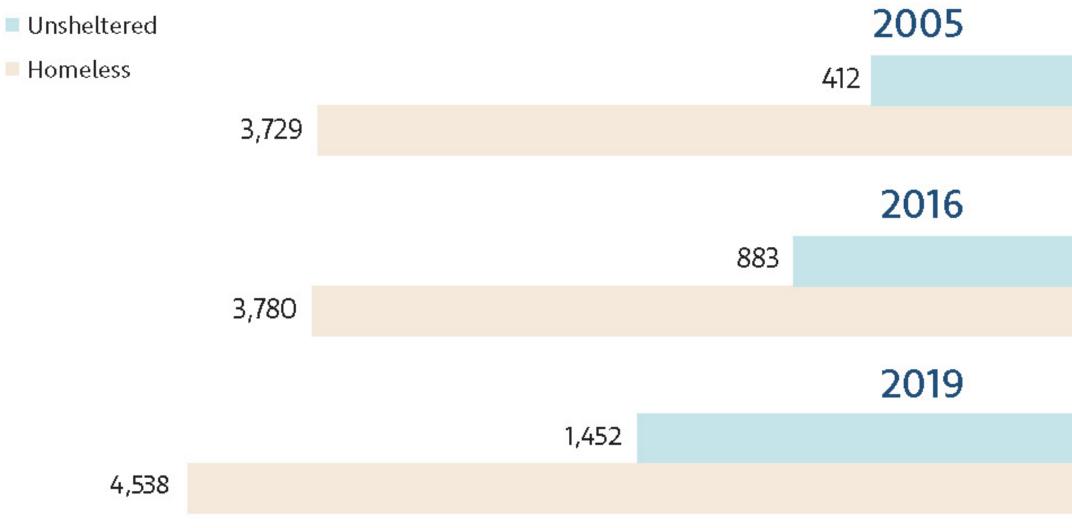
Dallas Food Deserts

Dallas has the largest and fastest-growing homeless population in Texas. This community, plagued by urban food deserts, is weakened, and minimal socioeconomic shocks can suddenly ruin a family. School districts are separated by Interstate 30, ensuring that the people born into this community can't leave. These issues, coupled with large swaths of the downtown area being segregated by income disparity, have led to visual inequality between Dallas and South Dallas.

- Mainly low income families over 1/2 mile to grocery store
- Majority low income families over 1 mile to grocery store
- Proposed Site



Dallas Homelessness



WHY THIS MUSEUM?

I. Structural Independence

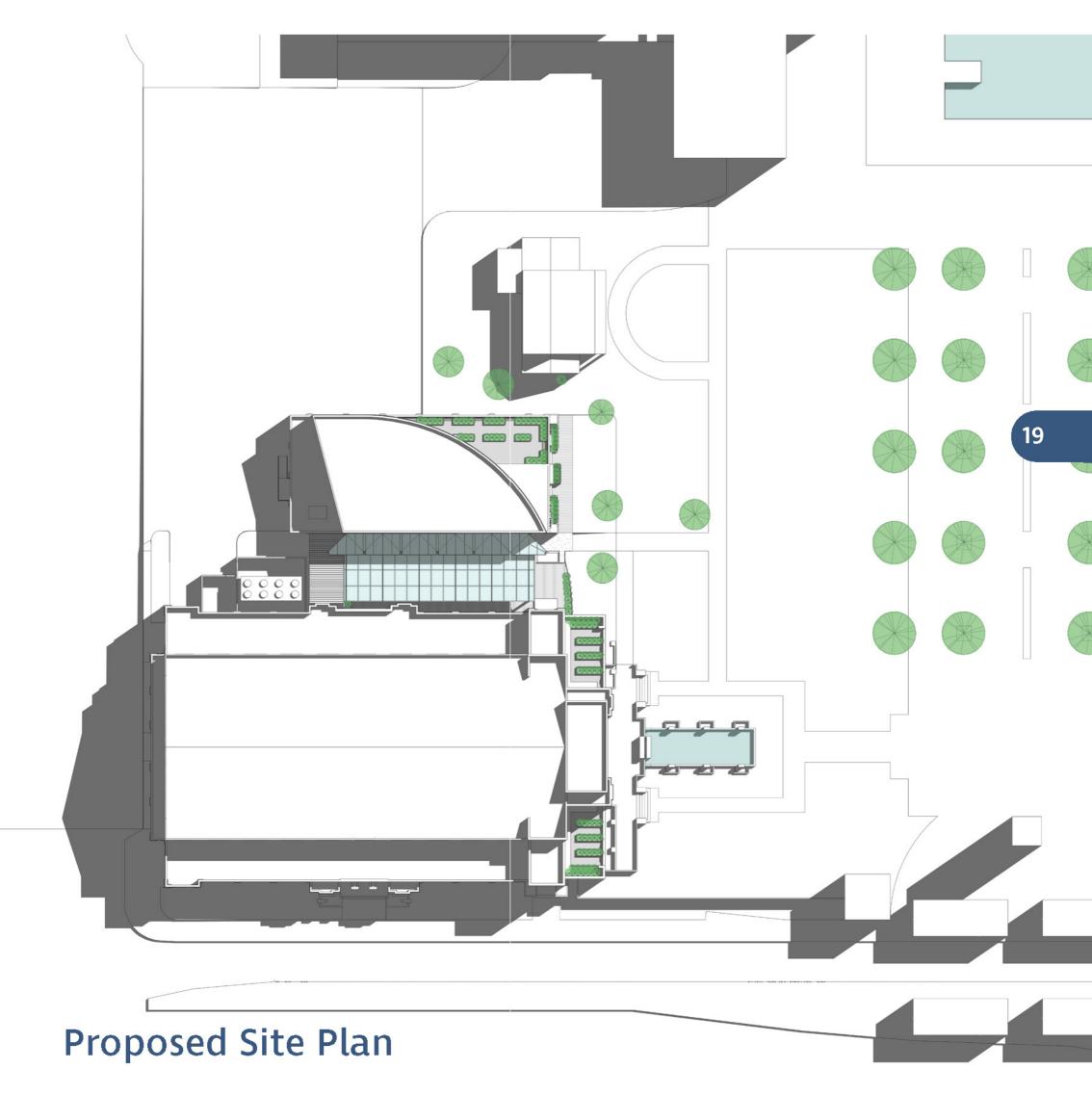
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II. Location (Community Position)

The community of South Dallas is plaqued by economic inequality, homelessness, and poor access to food. It is a fragile ecosystem that the city has neglected after damaging them through policy. The Women's Museum is a prime candidate for the project serving as a catalyst and ecosystem to reinvigorate the community while establishing a bridge between the park representing the city and the community.

III. Historical Context and Investment

The community of South Dallas is plaqued by economic inequality, homelessness, and poor access to food. It is a fragile ecosystem that the city has neglected after damaging them through policy. The Women's Museum is a prime candidate for the project serving as a catalyst and ecosystem to reinvigorate the community while establishing a bridge between the park representing the city and the community.



PROPOSAL

Permanence and Temporality

After assessing the needs and ailments of the community of South Dallas, I began developing the program that would be housed inside the former Women's Museum building. After examining the large gallery spaces, storage facilities, and loading dock, I realized that the building would lend itself well to various programs. On thinking of what was needed, access to community spaces and affordable food, I discovered a refectory was the most appropriate program.

Refectory, common establishments in Europe, provide communal spaces for people to share meals and come together. Often seen in monasteries and boarding schools, costs are kept down by utilizing local produce and maintaining one menu item per day. A new grand entrance into the building will be established for the community by replacing the Western facade windows with double doors. The old gallery spaces on the first floor will be converted into a large dining room by tearing down partition walls.

The original configuration of the 2000 renovations divided the public and private spaces by a diagonal line in the plan. In keeping with this configuration, the new commercial kitchen and food service will be in the old private space, separating the private/ commercial areas from the public spaces. The old gallery storage adjacent to the loading dock will be reconfigured to be the dry and cold storage and kitchen, which will prepare all the meals for the refectory.

An additional building will need to be added to the property to support the refectory, specializing in urban agriculture. This addition will house hydroponic growing racks, which can supply affordable healthy food to the refectory and community.



To generate an ecosystem on the property, the implementation of educational and advancement resources is necessary. The existing building housed an auditorium that will be slightly modified to allow for gathering outside and congregation. The gift shop will be removed and converted into a new entrance to accomplish this. In addition to this endeavor, one of the galleries will be converted into a small library and computing center accessible to everyone in the community.

The large central atrium will house an extensive vertical hydroponic growing showcase. The atrium becomes a centerpiece to the building, promotes urban agriculture education, and becomes an attraction during the State Fair. The State Fair is an essential aspect of this project, allowing for an enormous opportunity for advocacy and outreach 4 to 5 weeks out of the year. By bringing visitors into the project, there exists a chance to bring attention to the aliments of South Dallas.

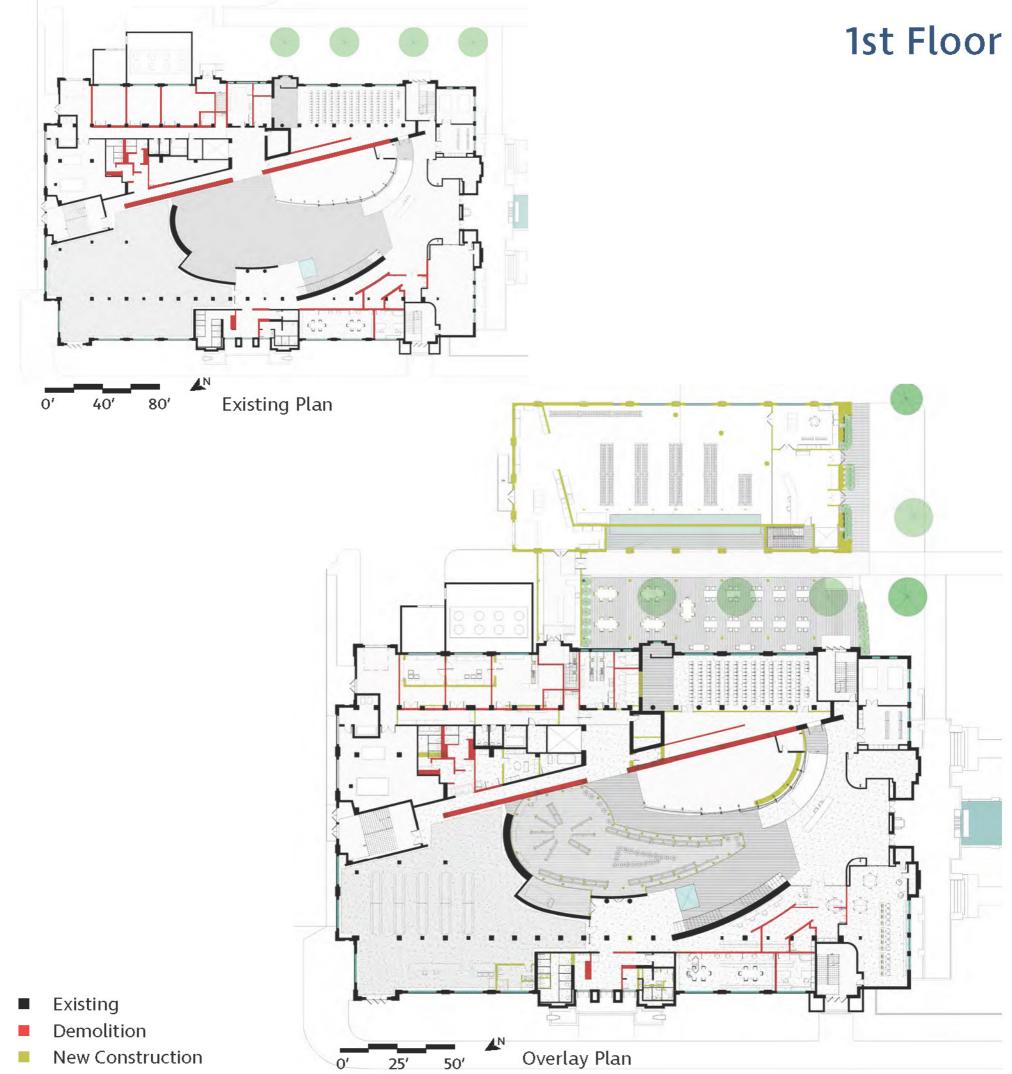
The large corridor space between the addition and the existing building will serve as a community gathering space and fine dining facility to provide patrons with a healthy meal and an educational opportunity.

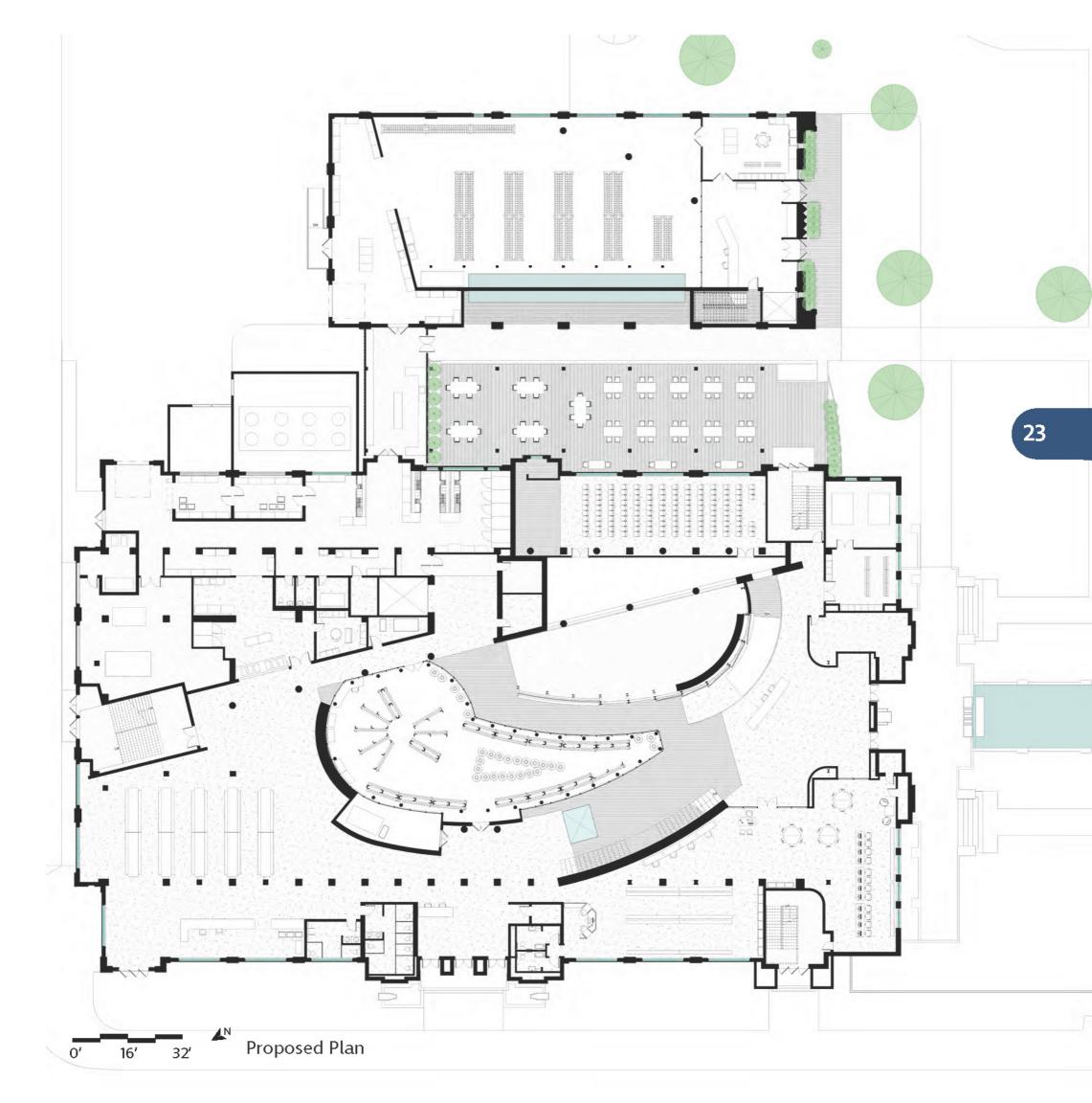
The museum's second floor, where offices will remain, will maintain its gallery space where artwork

from the community can be displayed or community activities can be held. In extremely cold weather, the second-floor gallery space can be converted into a temporary shelter for the unsheltered homeless population of Dallas.

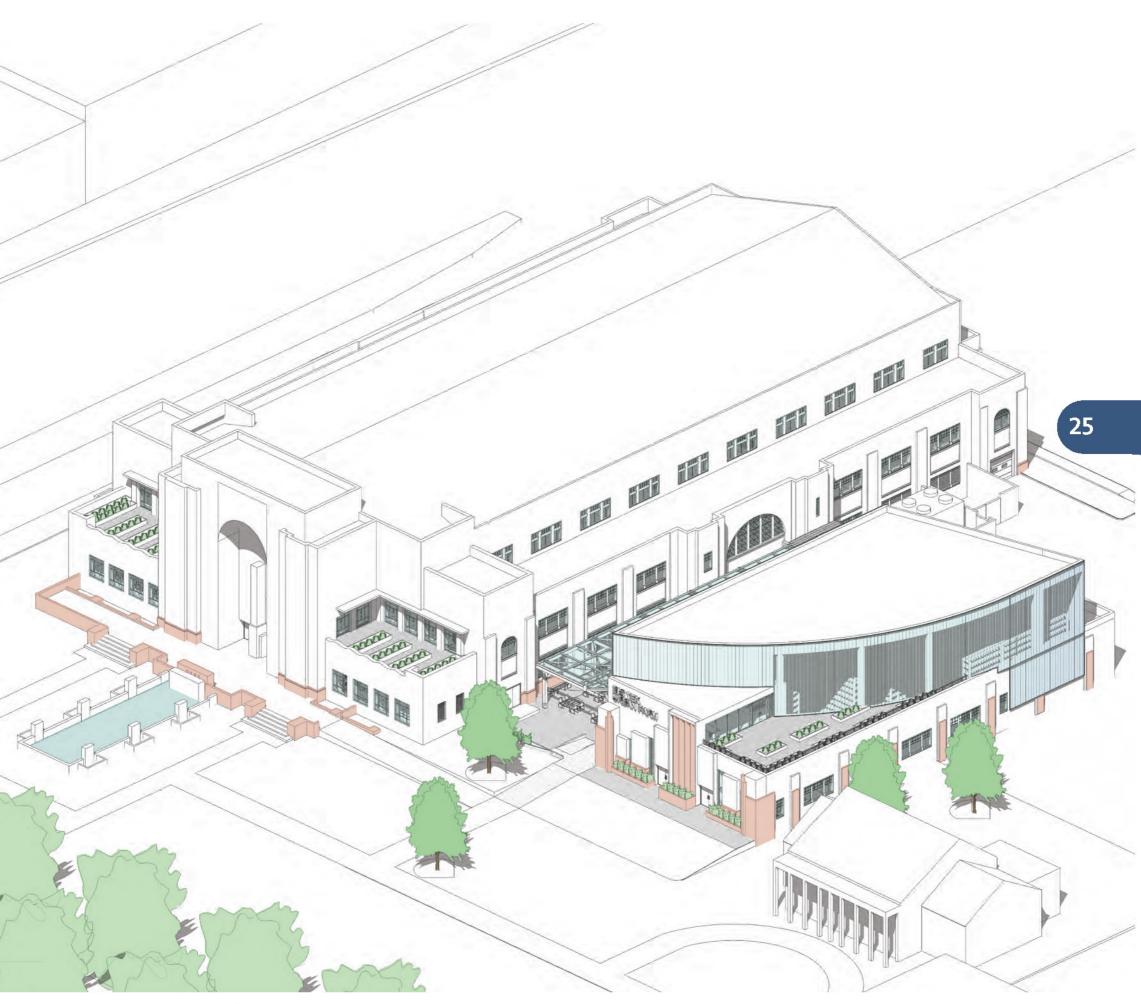
As the project developed, an exciting concept emerged, "Permanence and Temporality." I realized that the foundations of the building, the enclosure, and the structure became permanent elements that captured a memory of place. In contrast, the interior spaces were ever-changing and evolving to meet the needs of the owner and community. The 2000 renovation exemplified this.

The concept that buildings evolve and change to fit the environment's needs requires architects and contractors to examine construction and design practices differently. Presently, most buildings are designed for a singular client and purpose without the intention of redevelopment; however, this becomes a waste of time, resources, and economy. This type of design contradicts the idea that architecture is a vessel for an ecosystem, as ecosystems do not have a finite lifespan. Instead, after working on this project, I now understand the importance of designing a structure and architectural form that will last in perpetuity but an interior that evolves to the current needs.



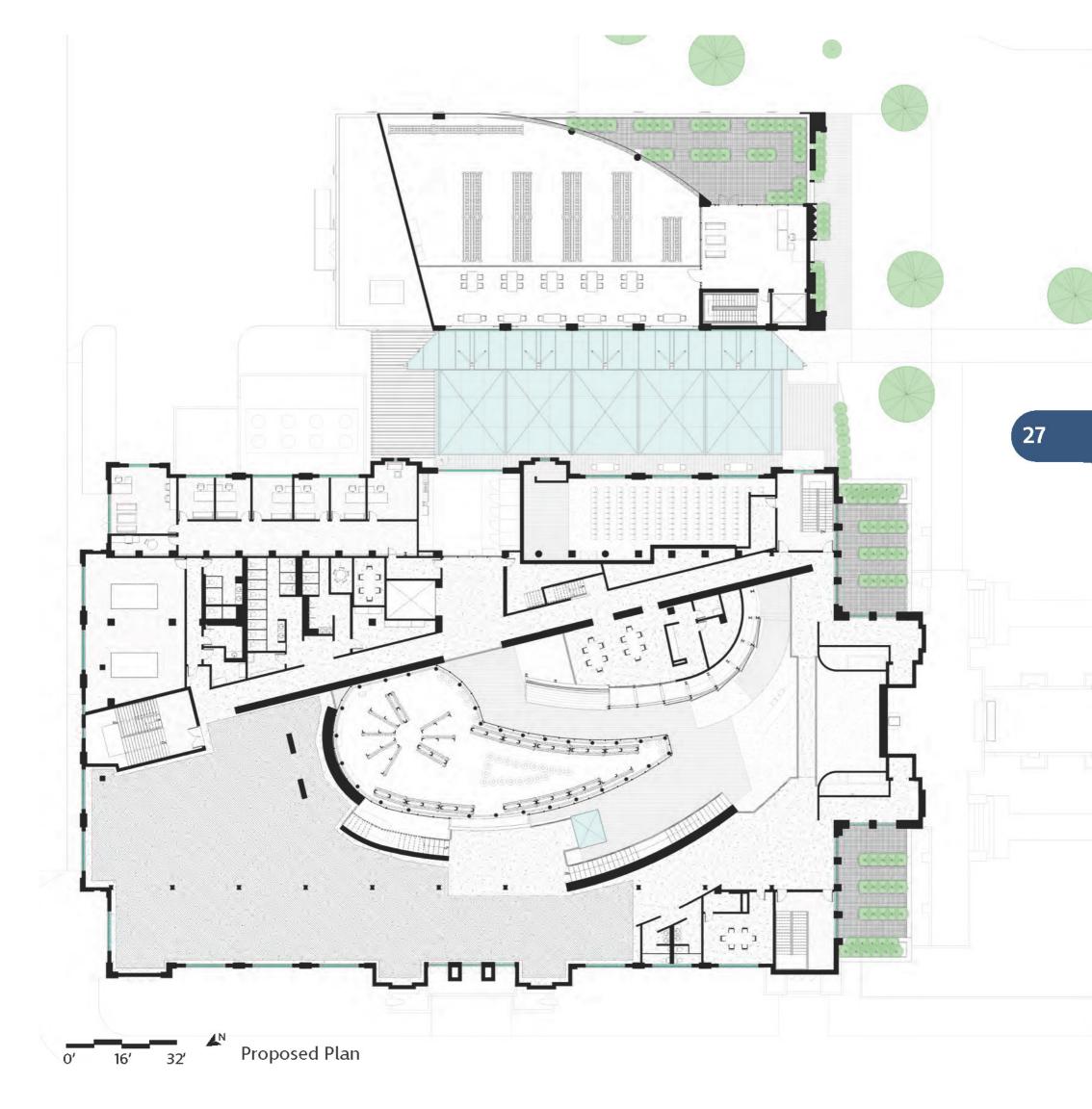


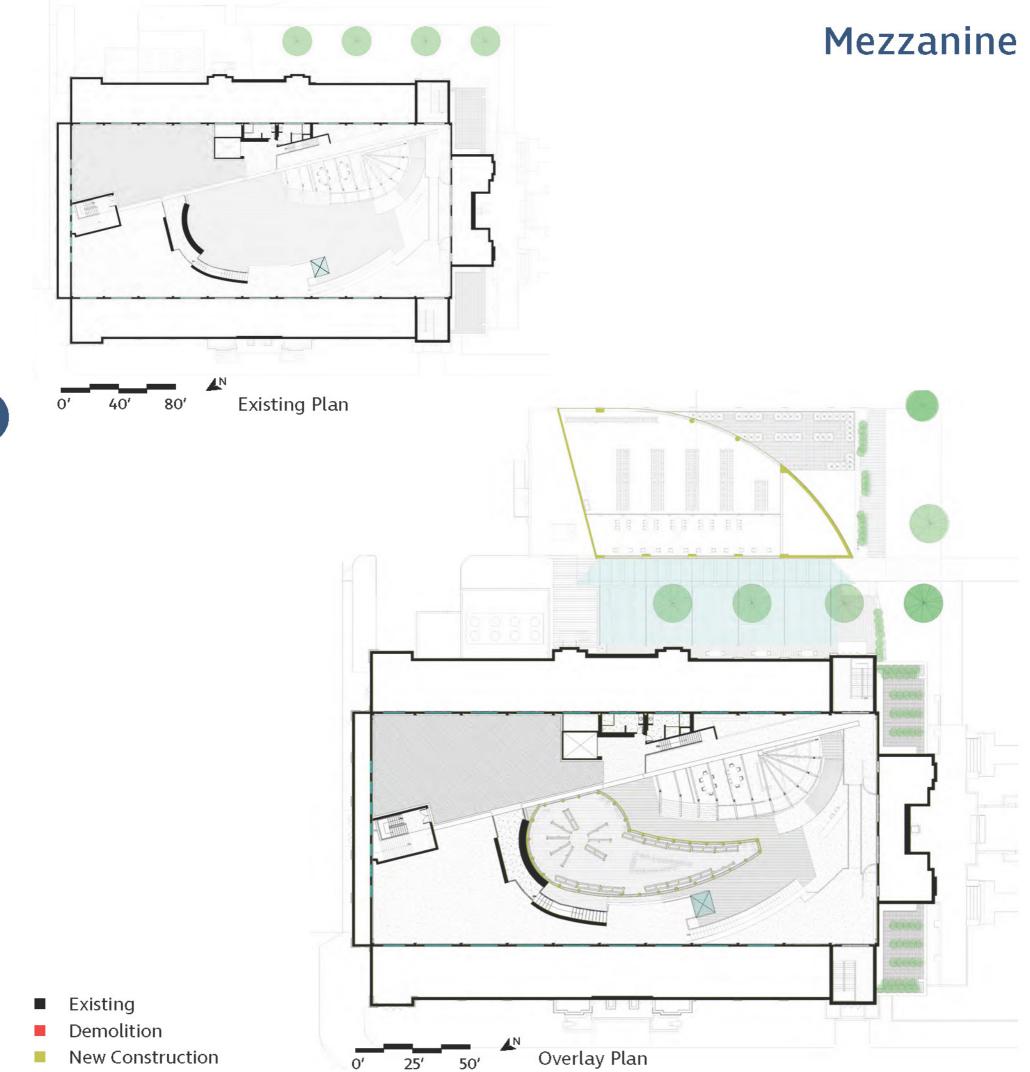




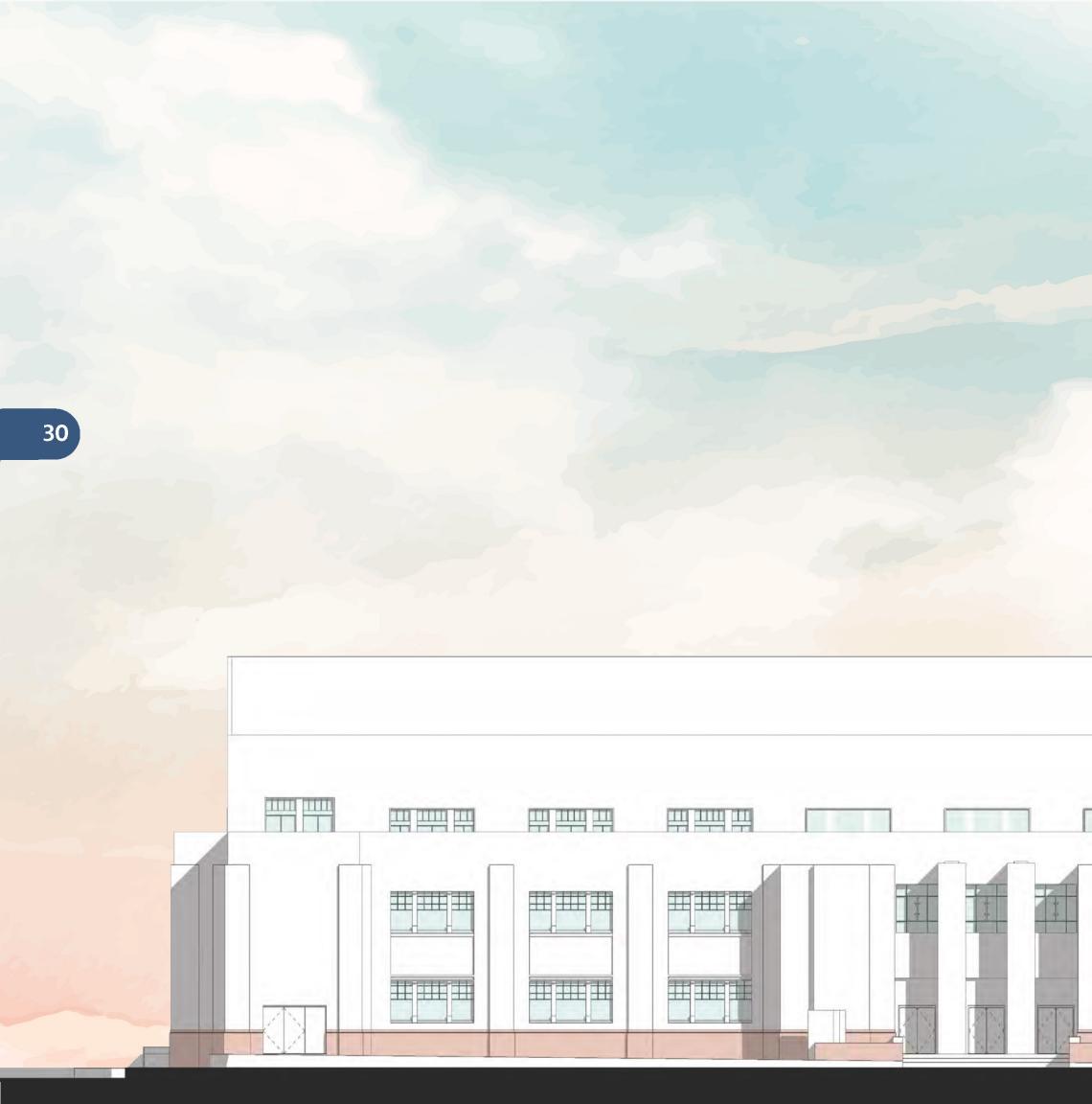
Proposed Intervention



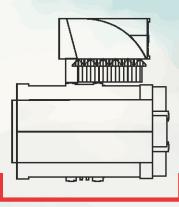








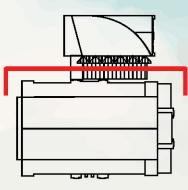
West Facade







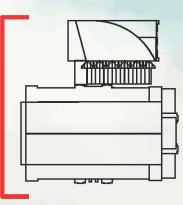
East Facade







North Facade





Vacant Building Stock

Unhealthy Ecosystem



High Homelessness Population





stem



Low Income Area



Memory of Place Embodied Energy

> Healthy Ecosystem



Urban Agriculture



Communal Spaces Community Interest

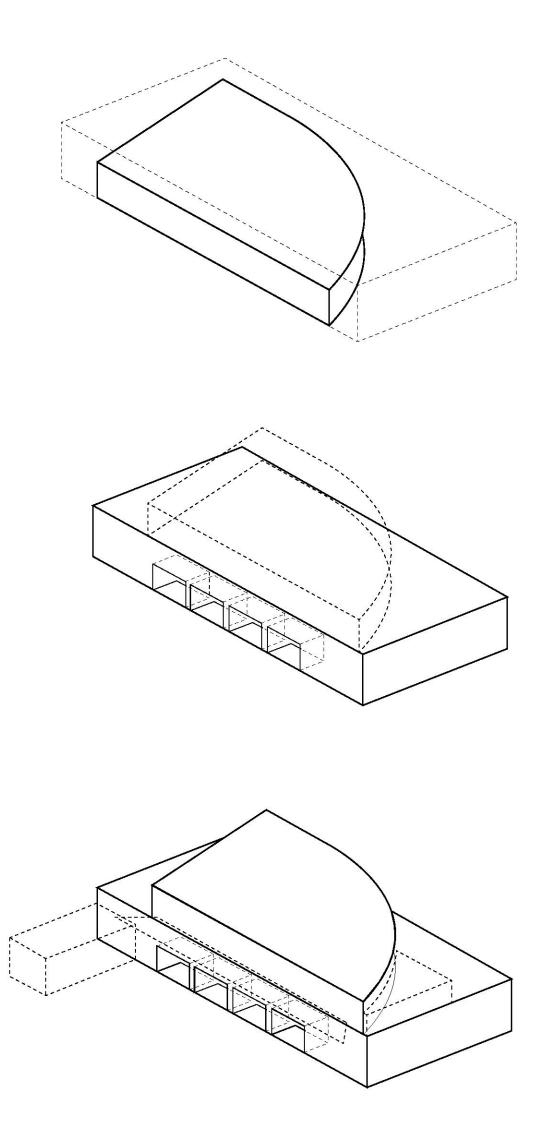
Form Development

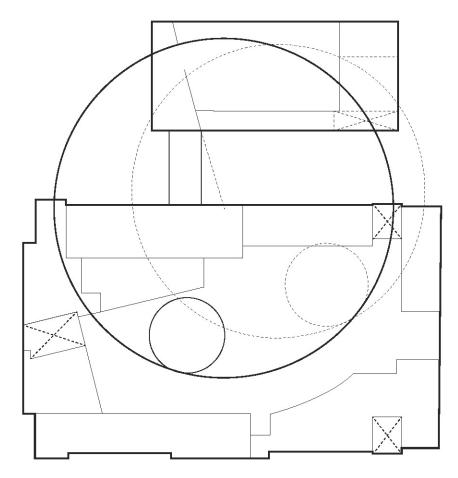
The 2000 renovations of the museum saw the majority of the original configuration and elements of the interior demolished and replaced with a 2000s approach to modern architecture, which focused on steel elements and mathematical patterns made possible through the use of AutoCAD. The original structure was kept in place, while a superstructure was developed to support the 2nd floor and mezzanine.

A line was drawn on an axis with two tangential circles to formalize sweeping curves and a rigid barrier between public and private spaces.

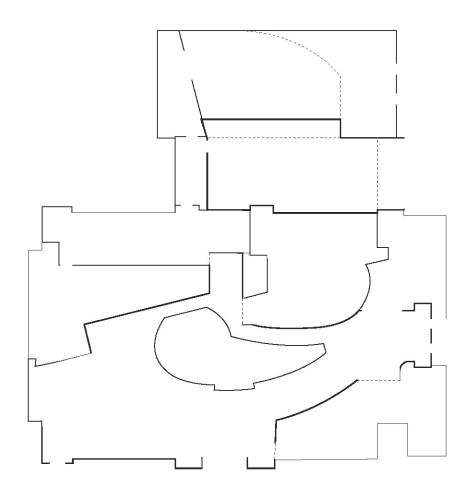
When developing the additions to the project, I looked at the 1936 construction and the 2000 and came to view it as a modern approach to architecture housed within an art deco box. Public spaces were made available outside the circles, with a central atrium in a small circle. Following this vernacular, the addition I proposed began as a rectangular box with a circular element on the inside. The more private spaces, such as the fine dining and hydroponic growing systems, are housed within the circle with the public outside. By pulling the circle up through the rectangle, I strengthened the relationship between the architectural language of the 2000 renovation and the addition.

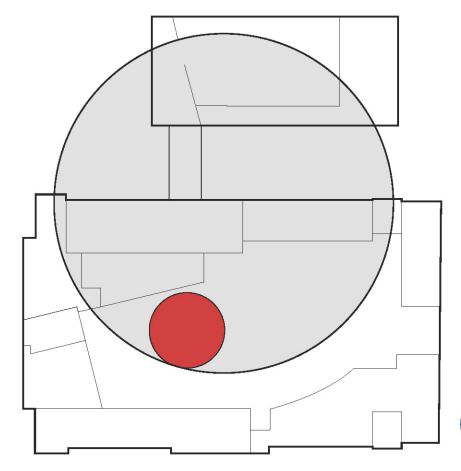
Ornamentation along the front and sides of the additional call to, but do not copy, the language of the existing building. The design is a modern interpretation of the verticality of the art deco movement built in modern materials such as curtain walls and metal panels.



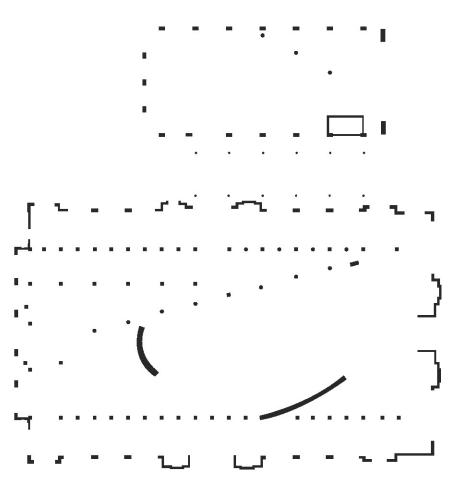


Geometry





Organization



Structure

Enclosure

SUSTAINABILITY

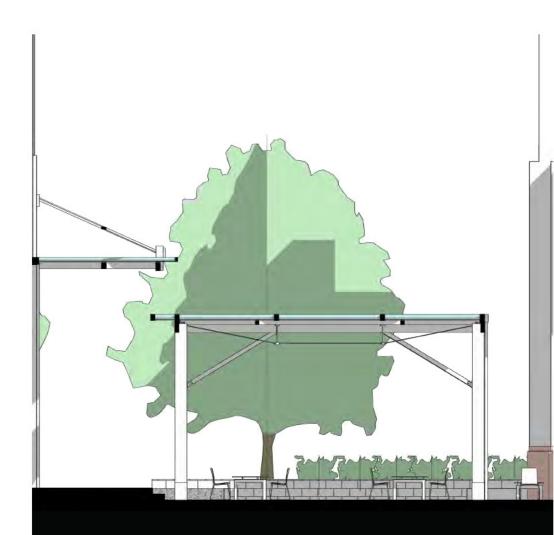
Urban Agriculture & Social Responsibility

To supply the refectory and alleviate the issue of the urban food desert, I have proposed an urban agriculture addition. Since the existing building was not suited or easily prepared to house hydroponic growing systems, it was necessary to develop an additional building. The client posed to take over the addition and operations of the hydroponic system is Big Tex Urban Farms. Big Tex Urban Farms already operates on the fairgrounds in an 80ft by 80ft greenhouses where they grow produce and distribute it to the community.

Allowing them to expand their operations will extend their outreach arm, allow for an educational arm, and supply all the necessary products to the refectory. By expanding operations, there also is the opportunity for employment for those who may have difficulty being hired on in other jobs. The goal is to promote better eating and ease of access to food within the community by combining this with a roof terrace garden.

The addition takes a portion of the underutilized parking lot. A small corridor space is generated over 40 feet away from the building. This corridor became a prime outdoor space that could bridge the existing building and addition and their programs. This space, dubbed the In-Between cafe, allows for a more high-end dining space from the refectory. Large windows on the building also promote education and emphasize what issues plague the community. This space becomes primarily useful during the weeks when the State Fair is held, and many people will be coming and going from the site. While proposed as a dining space, this in-between space can also be transitioned to be a small community space where people can gather. By removing the tables and chairs, an open covered area develops. Gatherings, protests, music, and other small events can be held here as they will be made available to the community. The ultimate goal is to work towards bringing Fair Park back to the community of Dallas.

The refectory, housed within the existing building, will be able to quickly receive produce from the urban agriculture addition via the adjacent loading docks and connected hallways between the buildings.













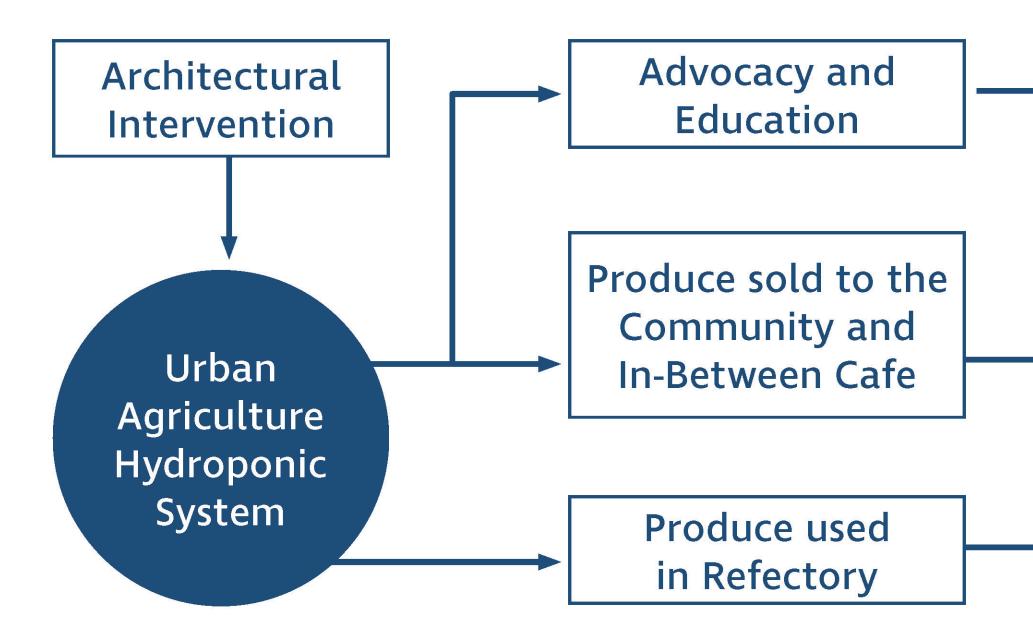
CIRCULAR ECONOMY

The Circular Economy is the idea that things within a community or economy can be recycled or reutilized to strengthen the underlying connections of the ecosystem sustainably. An example is scraped metal from car manufacturers being reused as building materials for a new office for the manufacturer.

Food for Thought utilizes the principle of the Circular Economy to support the addition of urban agriculture and hydroponic building. By generating produce within the community and on-site, we can provide jobs, allow for agriculture distribution, and keep the money generated from sales within the local area.

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The community should begin to prosper and address other existing issues through the money generated, advocacy and outreach, and services generated. As these issues are identified, action plans can be developed, and vacant buildings can be repurposed to house new community solutions. Starting a cycle of continued investment into the future of the community of South Dallas.







STRUCTURE

Peaks and Valleys

When developing the structural elements within the addition, pavilion, and interior hydroponic central atrium, it was essential to look at and respond to the existing structure within the project and design a lasting system that provided flexibility. The current structure, a woven lattice of steel gables, creates a peak-like effect structure. An inverted structural form was generated to make a light-appearing roof structure for the additions. These valleys, utilizing steel rods, provide a tension member system to support the glass food roof of the In-Between cafe, the urban agriculture addition, and the vertical hydroponic system.

The structure of the In-Between cafe sees thick mullions with gutters fitting to them, holding the horizontal glazing. These mullions are supported by a variation of a bow truss utilizing steel rods



spanning in an X formation. Wooden knee braces are fashioned to meet with the beams to provide lateral bracing.

For the addition, most of the walls on the second floor are fashioned as structural channel glass fitted to be insulating. A rod steel system spans from beam to beam, supporting a stiffener that supports the central spanning member of the roof. It was essential to develop a tension system to contrast with all of the compression systems present in the existing structure in all the systems.

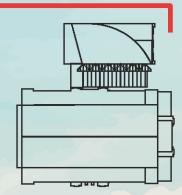
The structural system for the vertical hydroponic structure was the most complex of the new additions. The curtain wall system is supported along tall circular columns braced every 15 feet. The structure, an apostrophe shape, relies on a tension ring system to equally distribute the loads from the roof to the

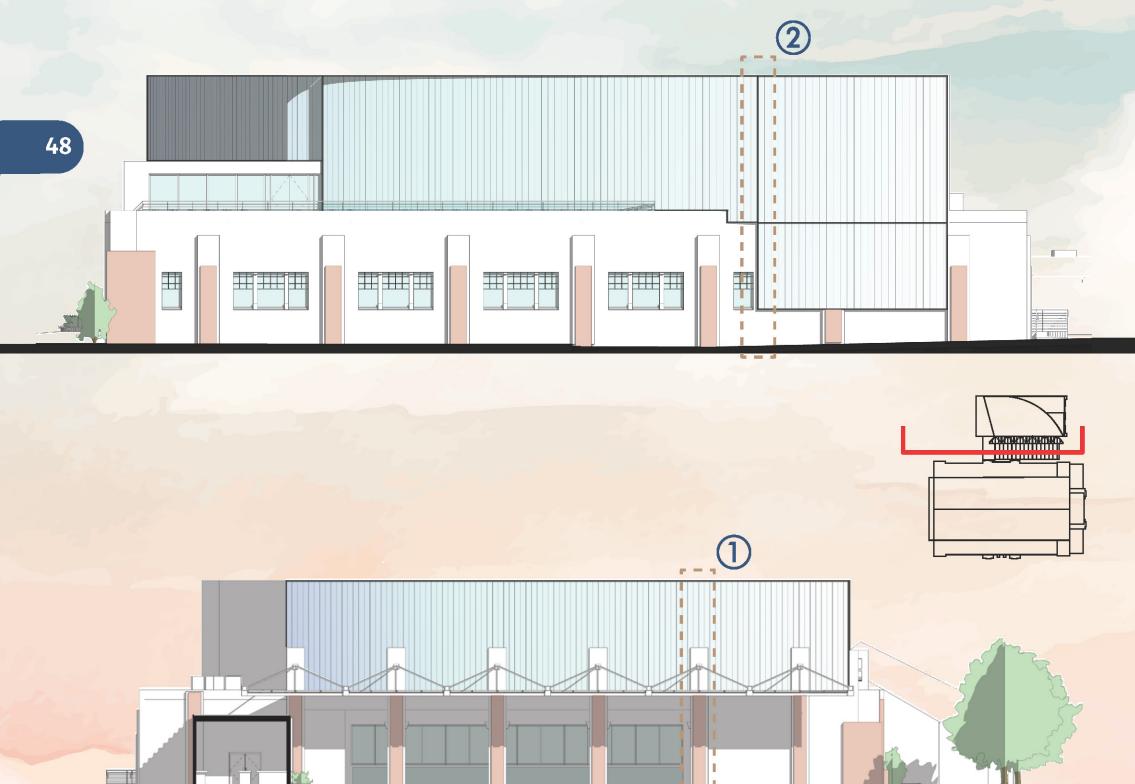
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surrounding columns. Part of the design process was to establish where the columns needed to be placed and how the members would be framed to generate the apostrophe form efficiently.

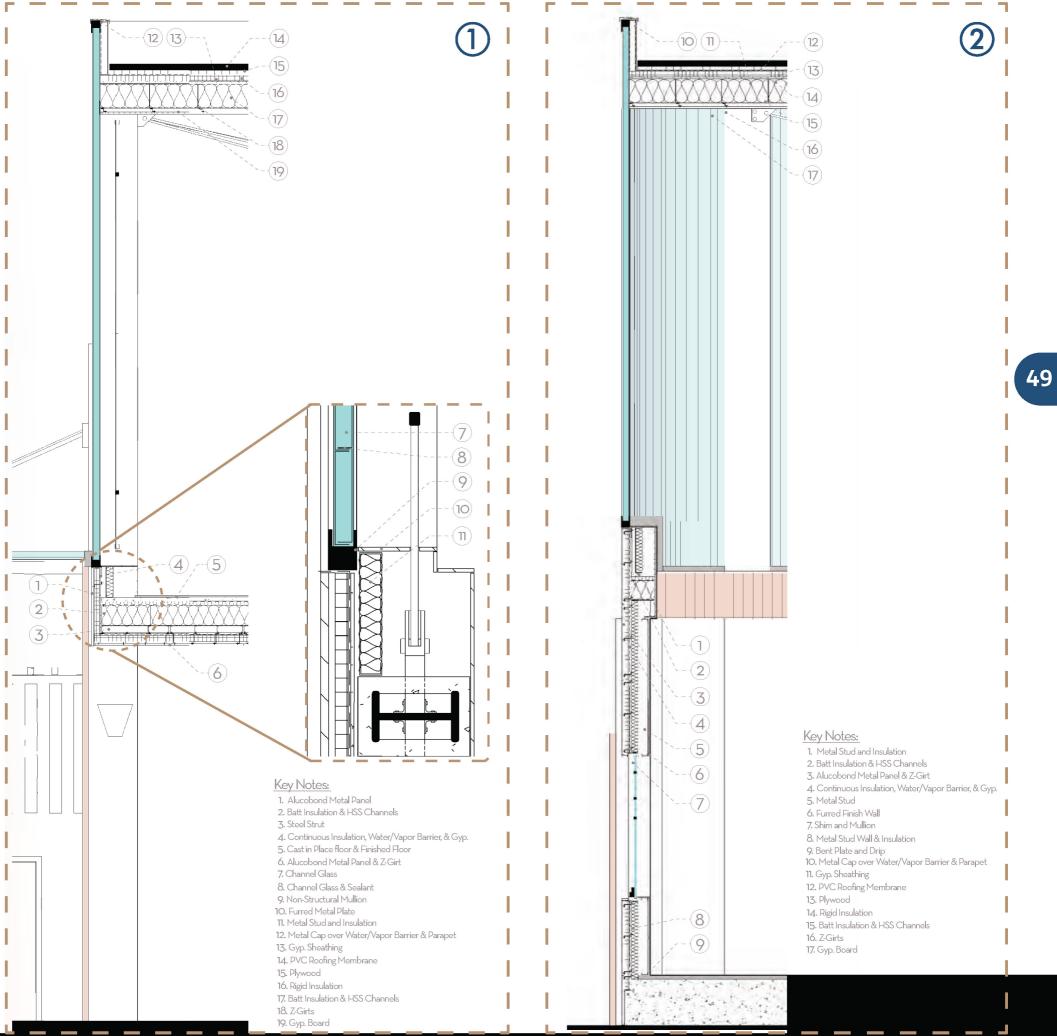
To formalize my understanding of the structural elements within the project, I worked to develop wall sections and part diagrams that explained how all the components worked in tandem. I worked in Rhino to develop a casted steel component for the tension ring system. This component was designed to reflect the form of a flower. The steel rods would meet at one point and go out towards the supporting columns, which referenced the agricultural ideas of the project.

Addition Facades



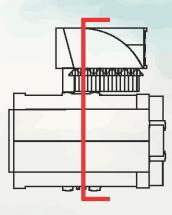


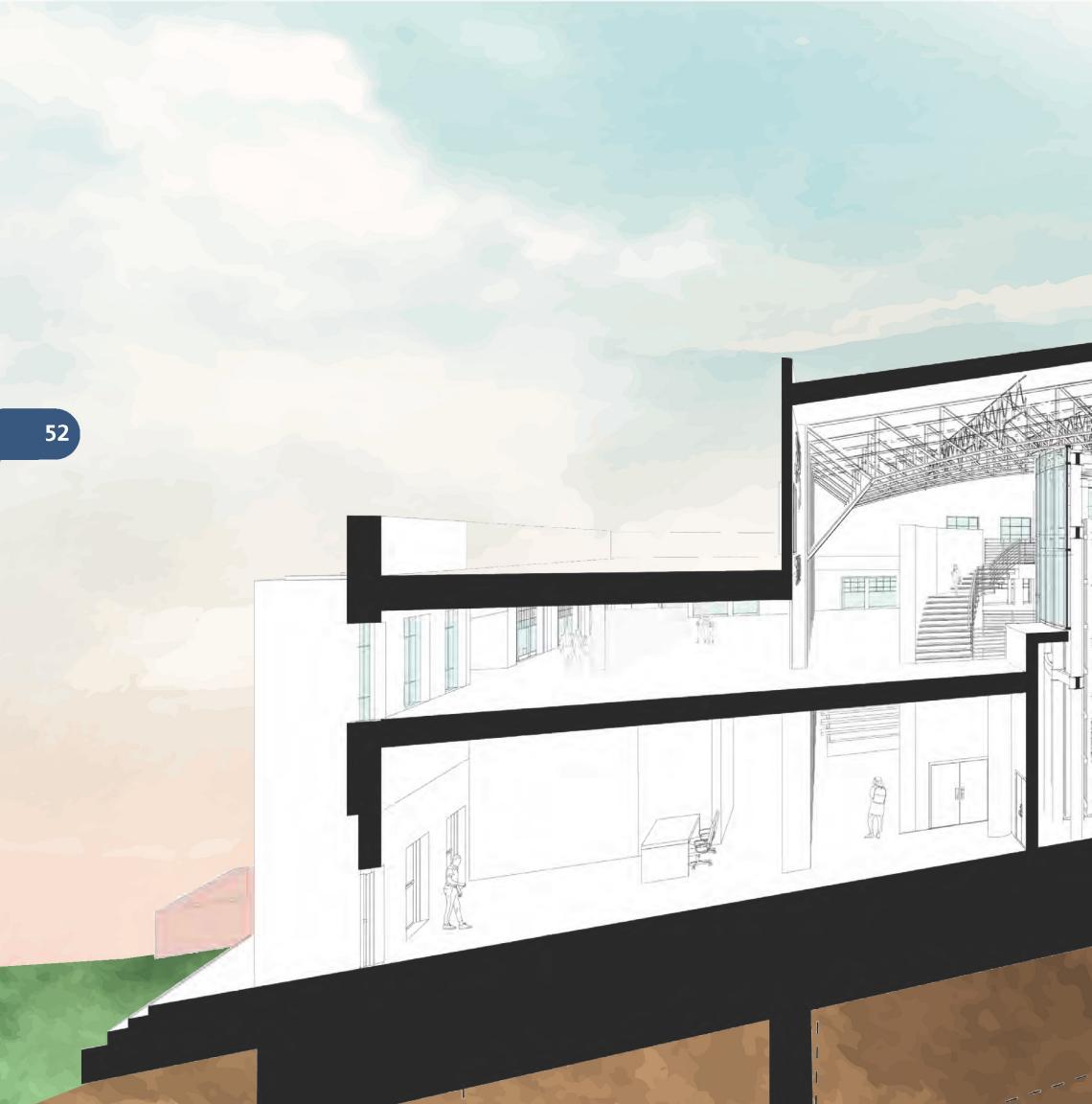
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S-SW Section





N-NE Proposed Section

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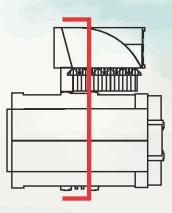
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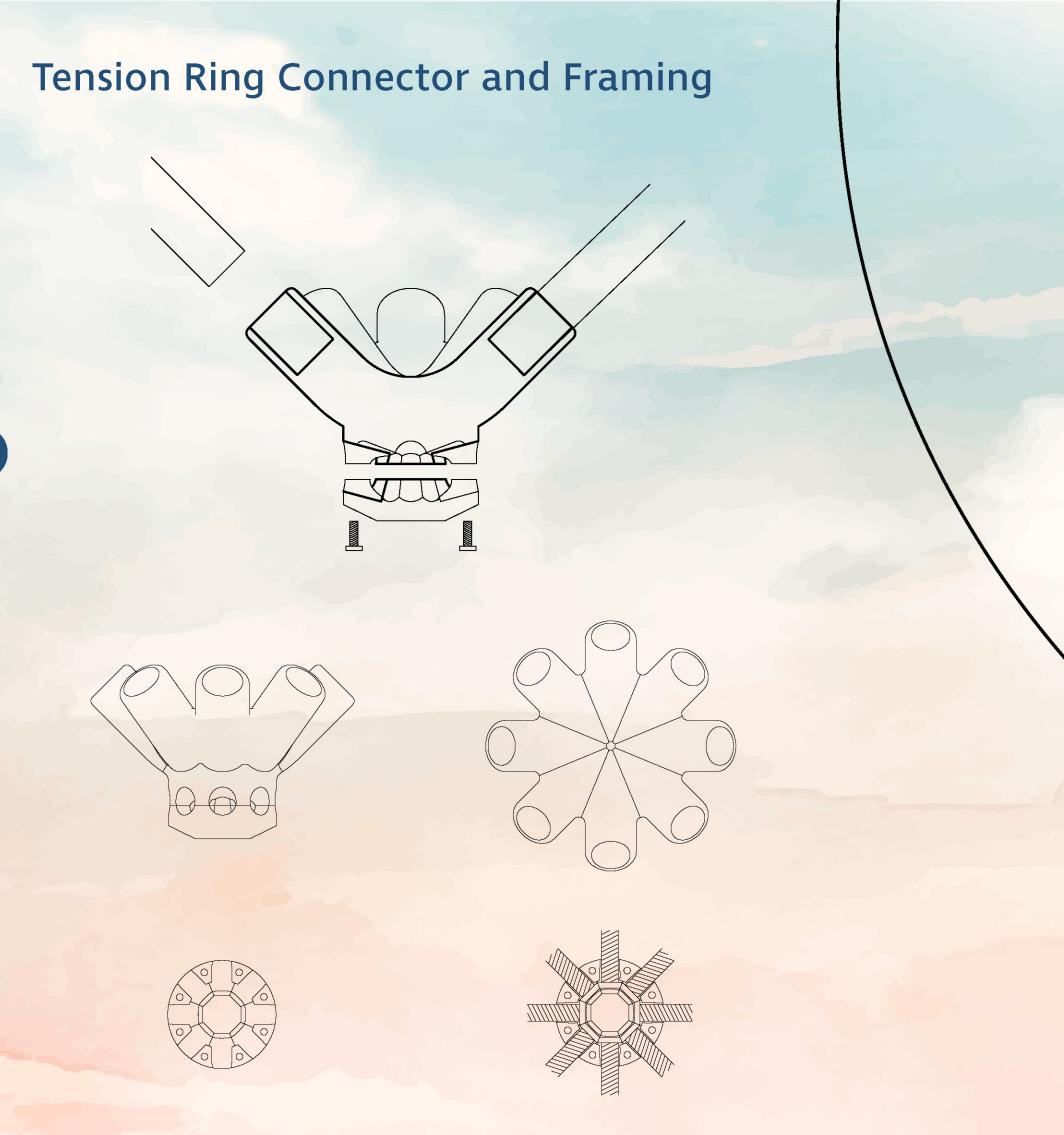
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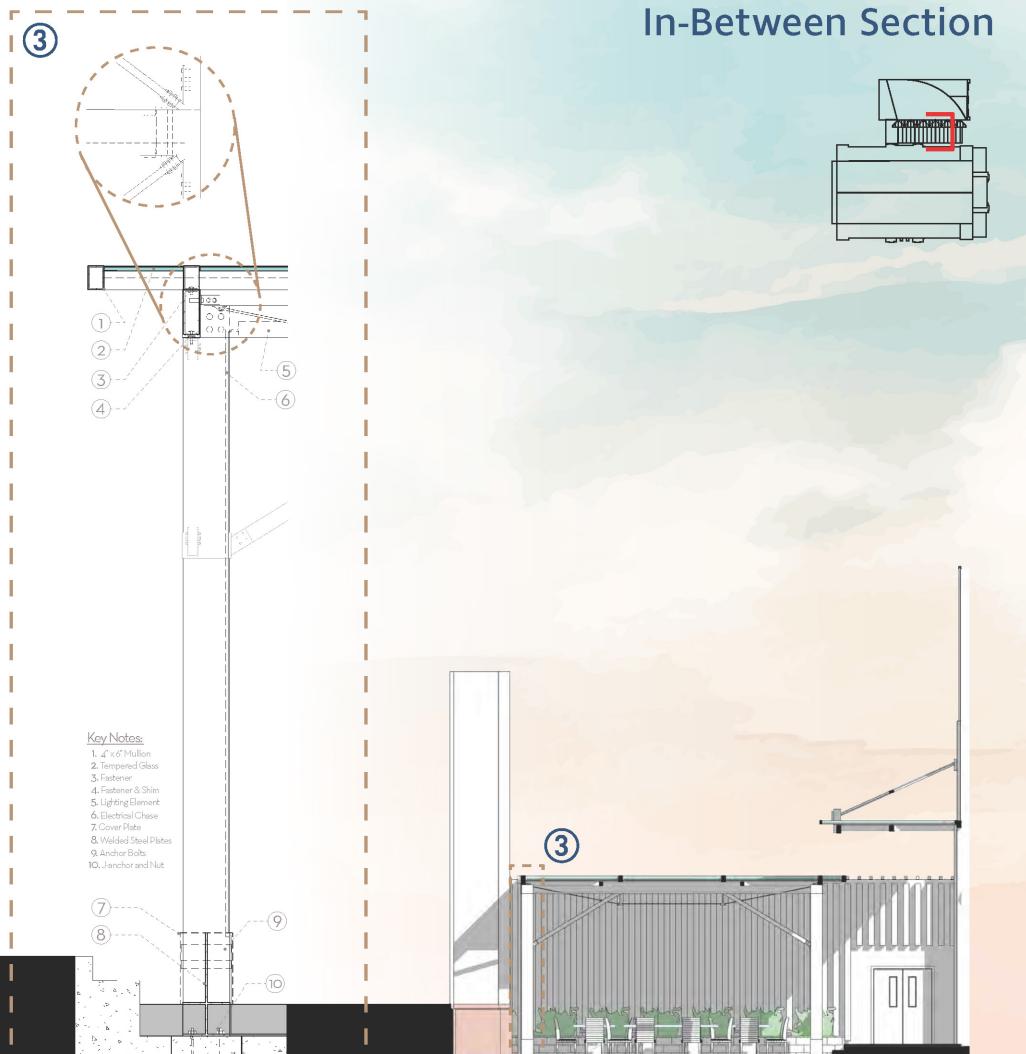
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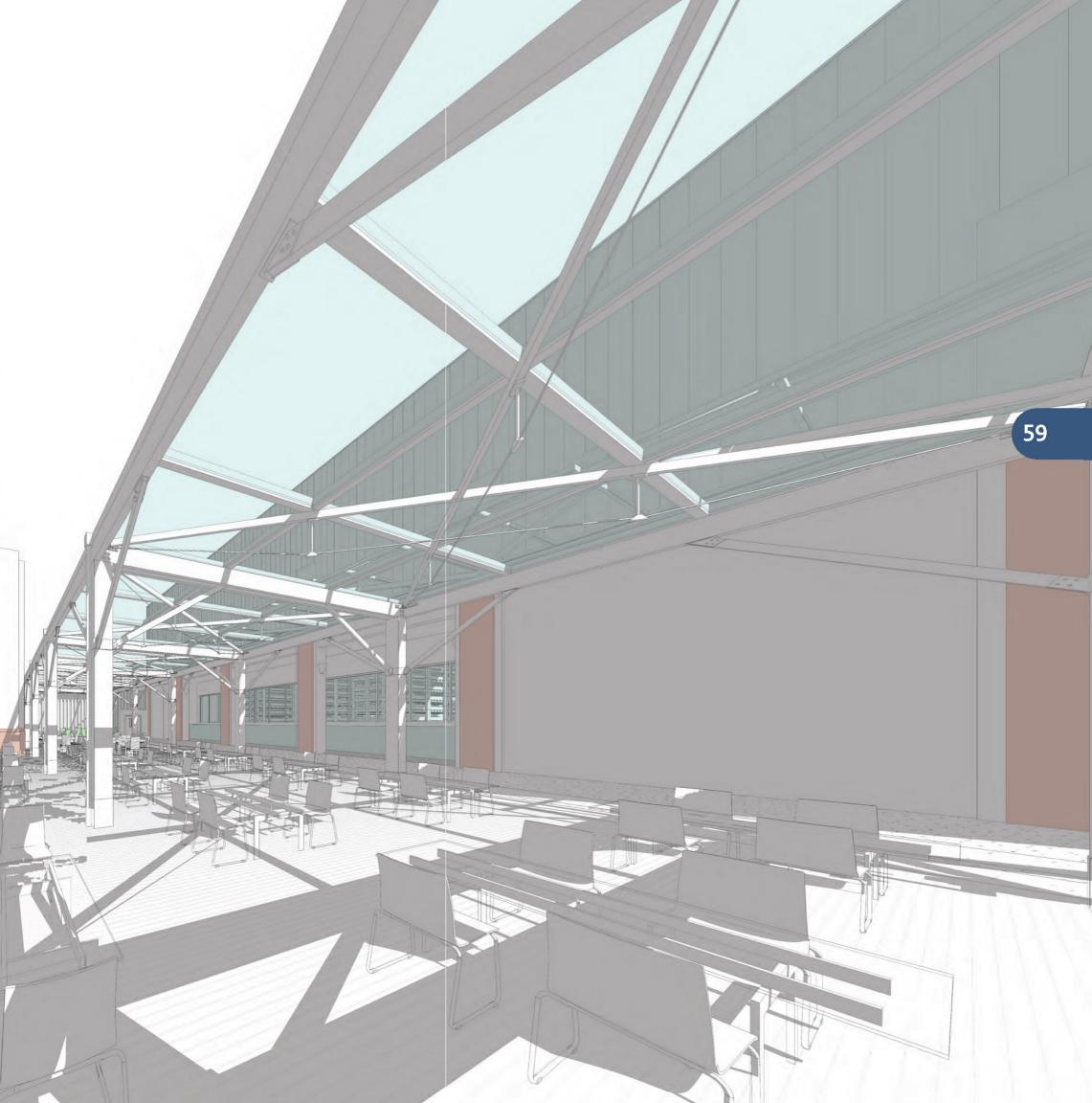
Bones Model

CONCLUSION

Lessons from the Women's Museum

To evaluate this project, I first have to remind myself of the ailments that plagued the South Dallas community and decide if the architectural interventions provide relief and if the architectural project becomes a healthy ecosystem. The issues that were initially identified were:

Urban food deserts prevent the community from accessing affordable, healthy food.	Addressed by adding a refectory and promotion of urban agriculture.	
High-income disparity and segregation punish those born into the community and provide no upward mobility.	Not outrightly addressed, but support is provided through community and educational spaces within the project.	
Large and fast-growing homeless population which is increasingly lacking necessary resources.	Refectory and community spaces will provide opportunities for the homeless population to receive necessary resources.	
A lack of community spaces and educational resources prevents individuals from improving their situation and coming together to strengthen bonds.	Community spaces are directly provided through the community galleries, gathering spaces, refectory, and educational spaces.	
Building stock that is being vacated and abandoned without the intent to redevelop	Through redevelopment of the Women's Museum shows how building stock can be repurposed.	
Advocacy and recognition of the issues plaguing the community of South Dallas and engaging with those who possess more privilege.	By including the opportunities presented by the state fair, the project allows and promotes advocacy and education regarding the community of South Dallas.	



DESIGN CRITERIA

What was accomplished?

☑ Architecture as a Vessel

The idea of architecture as an ecosystem primarily relies on viewing architecture as something more than a figure or shell housing a program. It must become a vessel or host to which an ecosystem and community can flourish. In the case of a deteriorating community, then architectural intervention should become a catalyst spurring on regrowth and rehabilitation of the community.

☑ Holistic Sustainability

Green design and sustainability have become common vernacular, referring to materiality, energy, and water concerns. Meeting energy, code, and material standards is essential to ensure the progression of sustainable practices in architecture; however, there is an incredibly lacking concentration on social and community impact. Holistic sustainability attempts to incorporate broader social sustainability.

☑ Recognition of Embodied Energy

A concerted effort is put into designing, acquiring materials, and constructing architectural elements. The idea of embodied energy seeks to preserve and celebrate these elements when possible, reposition them when necessary, and demolish them rarely. When buildings are destroyed, others show a disregard for the time, effort, and resources utilized in their completion. This practice is not common in the United States but is a significant standard in Europe. Does architecture, as a catalyst, allow for issues to be addressed within an ecosystem? Definitively, the answer is a plausible yes. Traditionally architecture exists to serve a specific client and program, but from this perspective architect instead works to facilitate a healthy ecosystem.

Further research and development on the ideas presented within this book is encouraged and is the direction that architecture will move towards in the future. Lacaton and Vassal receiving the Pritzker Prize is a good indication of this. The completion of this project has helped me formalize guiding principles that I will approach all my architectural work as a professional.

☑ Design for Permanence

Materials should be selected for their longevity and durability. Buildings' lifespan should exceed 100 years and the lifetime of the initial program.

☑ Allow for Temporarily

Structural, mechanical, and architectural should be designed not to inhibit future project iterations.

☑ Design with Intent

Architecture can alleviate the issues of a community. Whether a vessel for an ecosystem, a catalyst for economic growth, or relief to issues, architecture can be very powerful when practiced with intent.



Proposed Section

RIT II

PH

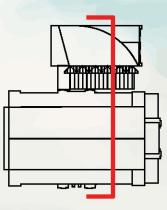
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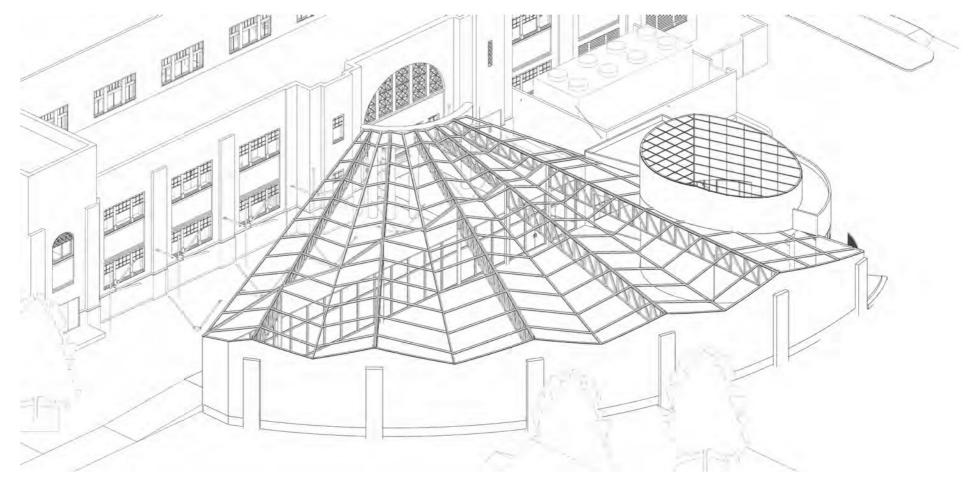
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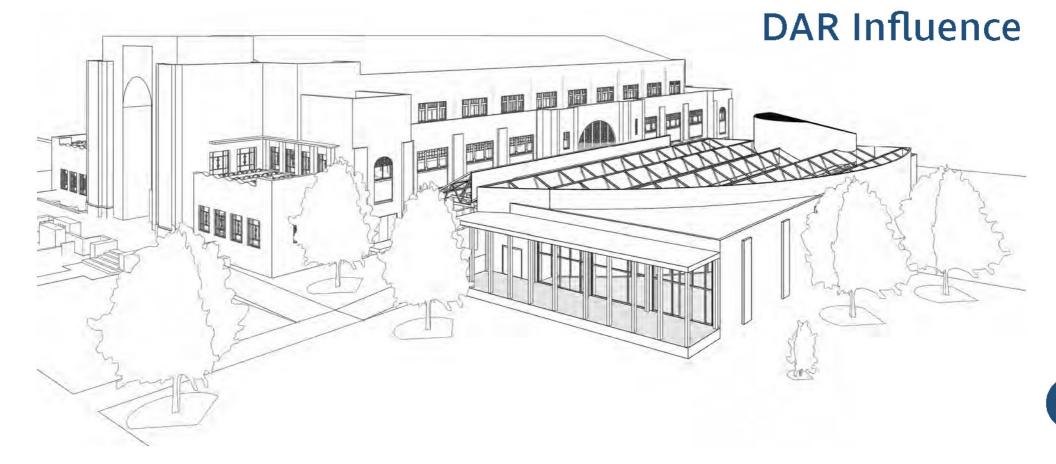
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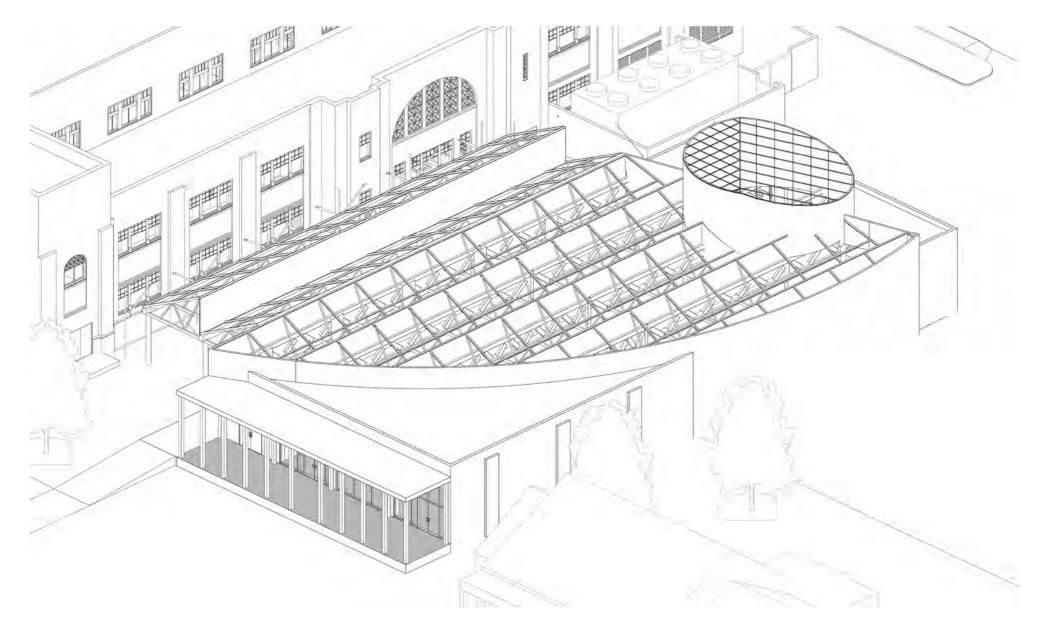


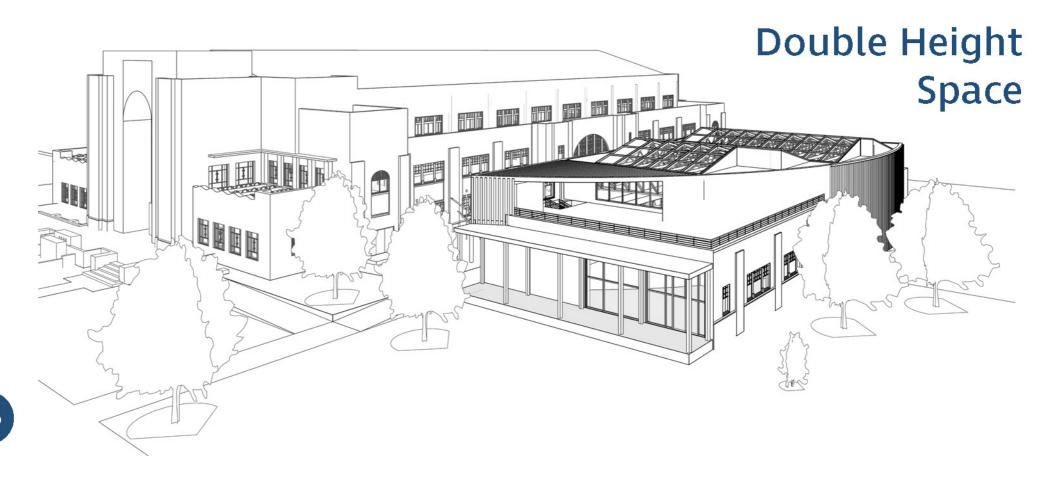
DESIGN ITERATIONS

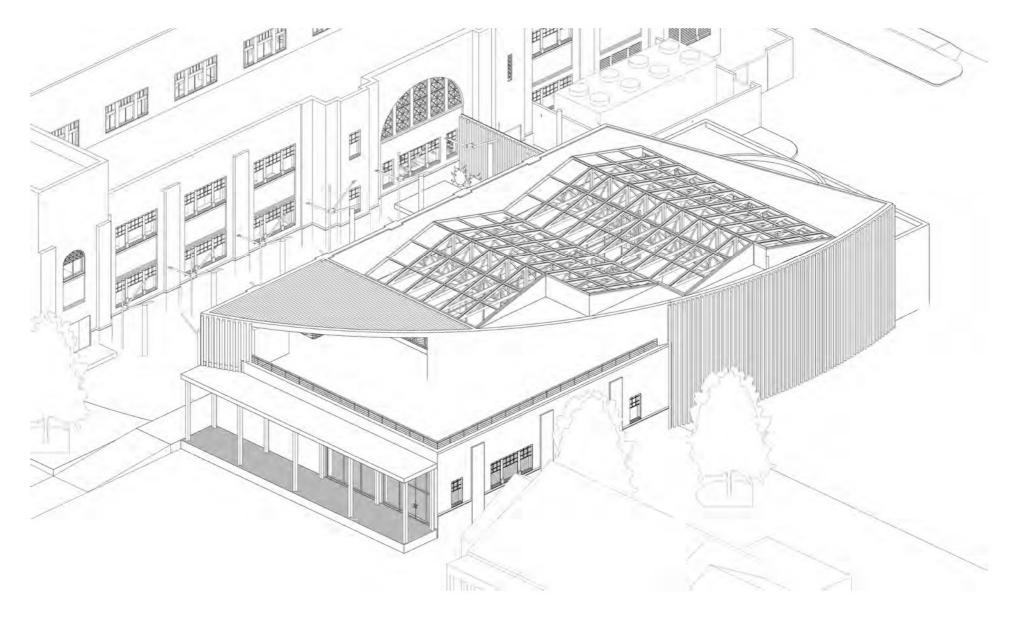


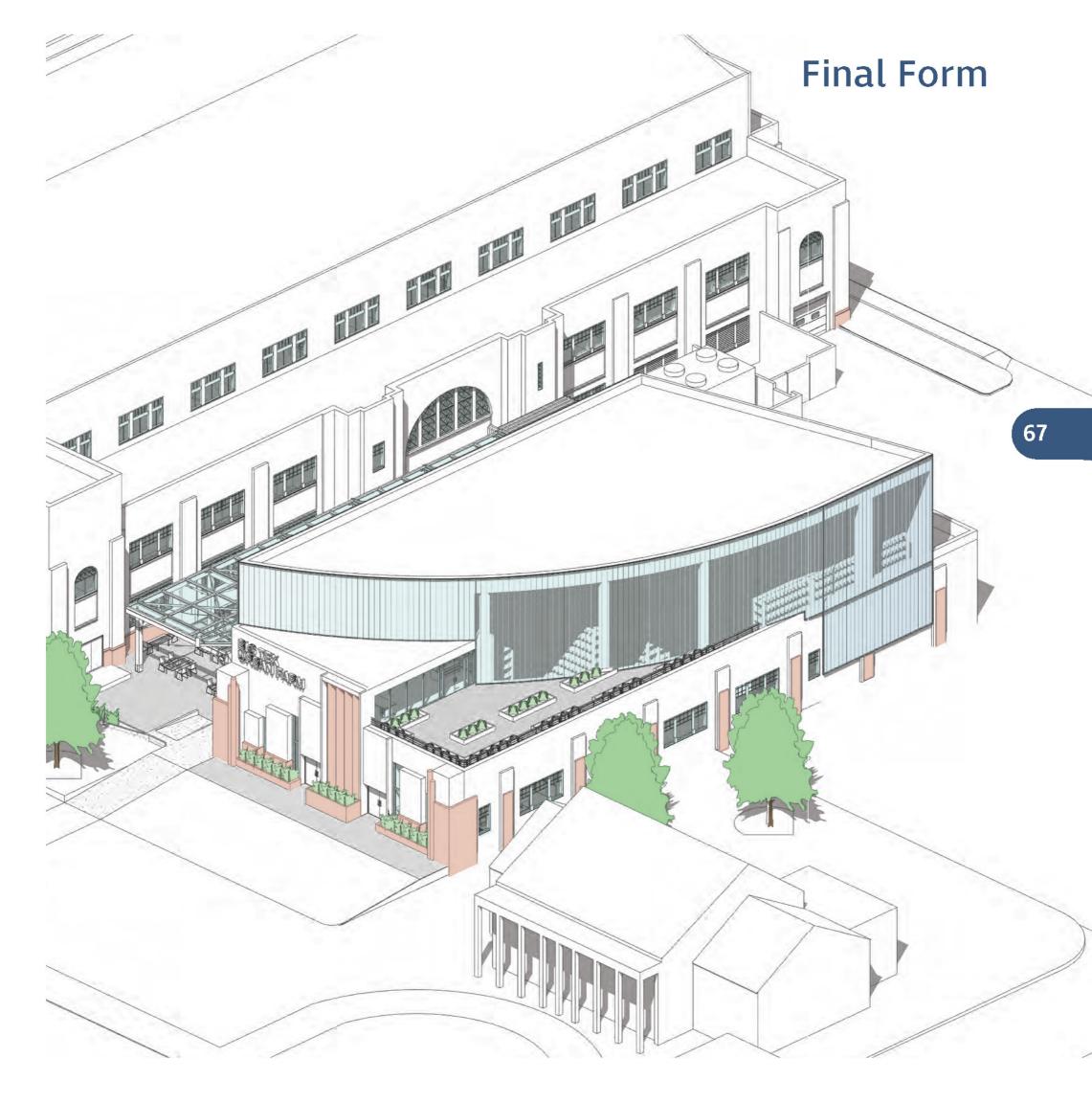








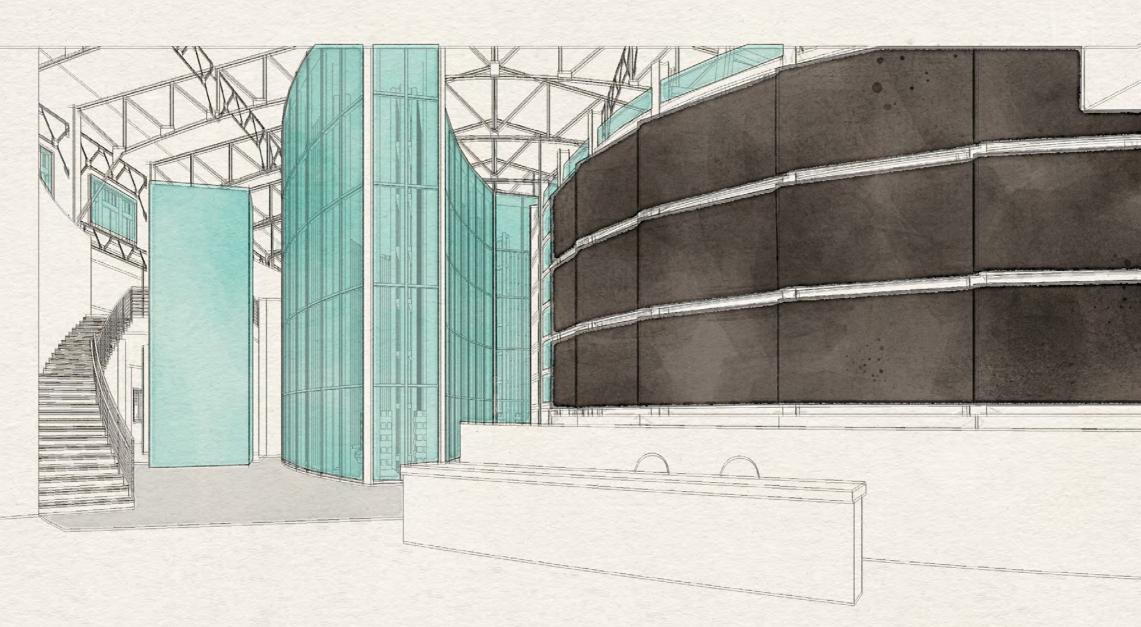




Preliminary Renders









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