PORTFOLIO.

Salar Zadeh

About me

Aspiring Architect-Engineer and Designer with a multidisciplinary background bridging architecture, engineering, and digital fabrication. Skilled in architectural design, structural analysis, and Building performance optimization, with hands-on experience in advanced machinery and robotic prototyping. Passionate about exploring the intersection of Art, Design, and Engineering to address complex challenges and create meaningful, enduring impact.

Education

2023 - 2025 Georgia Institute of Technology, Atlanta, GA
Master of Architecture (M.Arch) - STEM

2019 - 2022 University of Tehran, Tehran, Iran
Master of Architectural Engineering

2014 - 2018 Sharif University of Technology, Tehran, Iran
Bachelor of Science in Civil Engineering

Work Experience

2024 - Present Georgia Tech Invention Studio, Atlanta, U.S.
Prototyping Instructor

2021 - 2023 Dalfa Engineering Group, Tehran, Iran
Designer - Research & Development Specialist

2019 Noi Consultants, Tehran, Iran
Civil Engineer

2018 Noi Consultants, Tehran, Iran
Civil Engineering Intern

Software Skills

Autodesk Revit	Adobe Photoshop
Autodesk AutoCAD	Enscape
Rhino & Grasshopper	ArcGIS Pro
Adobe Indesign	Etabs
Adobe Illustrator	Bluebeam Revu
Lumion	Microsoft Office Suite

Contact Info

Email Salarzh96@gmail.com
Phone +1 (470) 662-4705
LinkedIn www.linkedin.com/in/salarzadeh

Contents

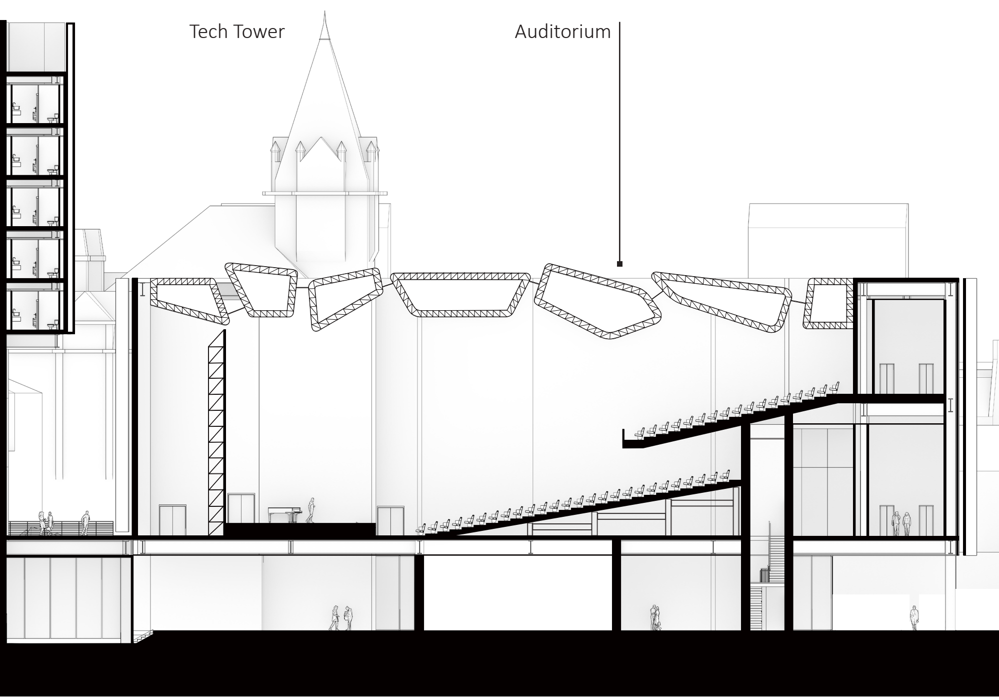
CHAPTER 1

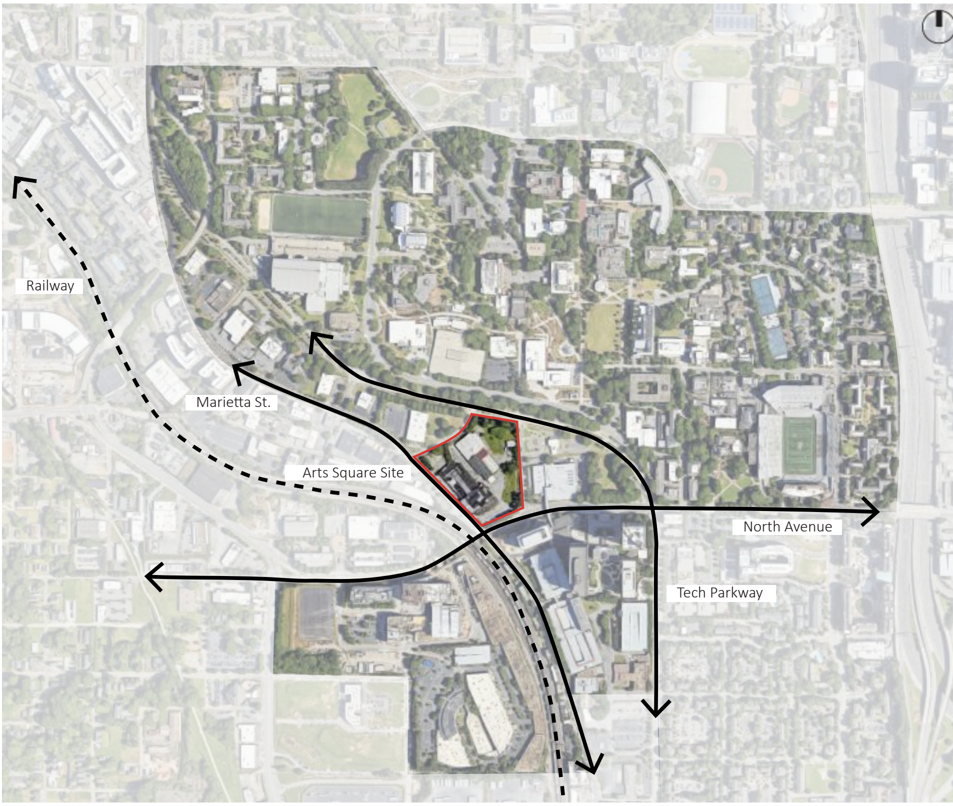
ARTS CENTER GEORGIA TECH

SPRING 2024

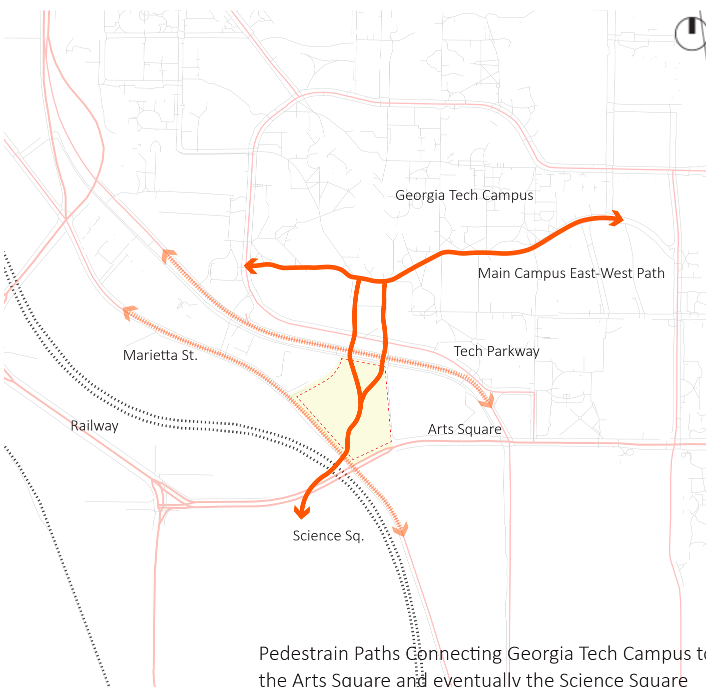
The Arts Square is an ambitious project by the Georgia Institute of Technology, with a potential completion date of 2030. The university plans to expand its campus toward the southwest by establishing a new landmark at its boundary called The Arts Square. This new development will be built on a 7-acre plot of land at the southwestern edge of the campus.

Georgia Tech's vision for the Arts Square is to create a new hub for all students, particularly those studying art. The project includes a new 400,000-square-foot Arts Center as well as an additional 800,000 square feet dedicated to student housing, a hotel, offices, and community-oriented programs.


Tech Tower
Auditorium



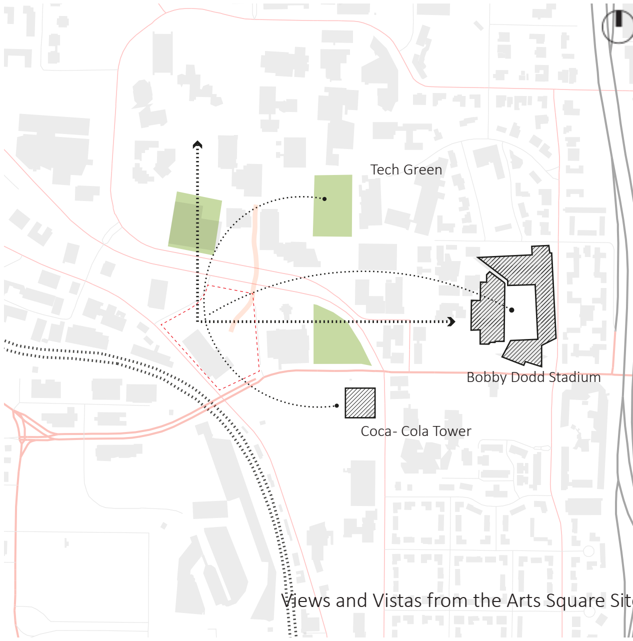
This large-scale project will be constructed in separate phases, beginning with the Arts Center, which constitutes the eastern wing and is dedicated to arts programs. The Arts Center itself is planned to be built in two phases. A preliminary proposal for the first phase of the Arts Center is provided here.



Pedestrain Paths Connecting Georgia Tech Campus to the Arts Square and eventually the Science Square

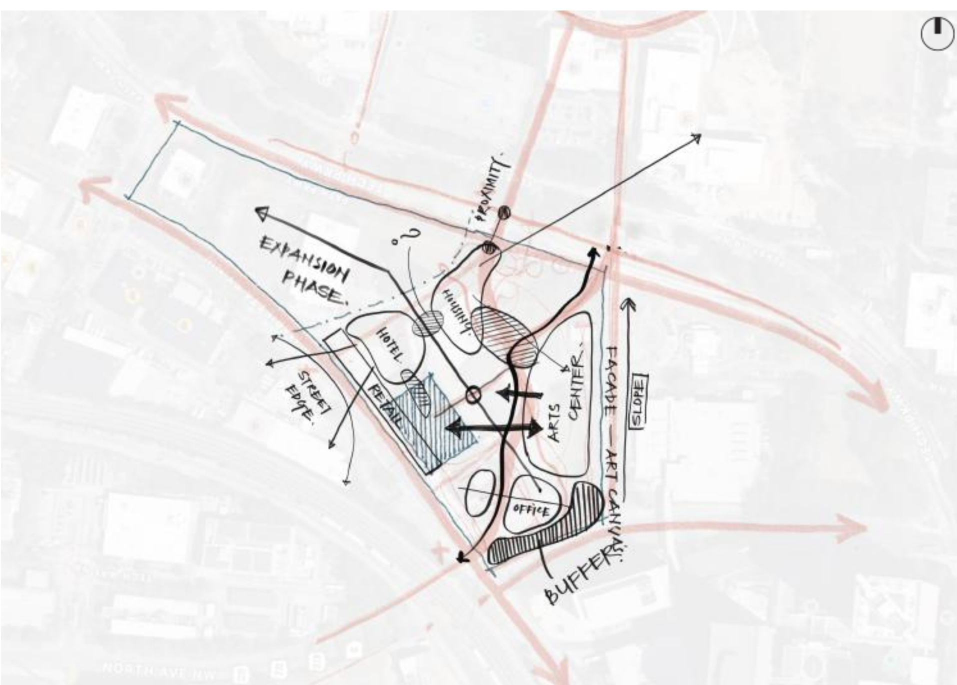
The images on this spread highlight the site's major vehicular and pedestrian paths, as well as its key views and vistas. As shown in the first image, the primary roads adjacent to the site are Marietta Street, Tech Parkway, and North Avenue.

The second image illustrates the main pedestrian routes, positioning the Arts Square as a vital link between Science Square and the main Georgia Tech campus. The image on the right depicts prominent views and vistas from the site, including the Coca-Cola Tower and Bobby Dodd Stadium.



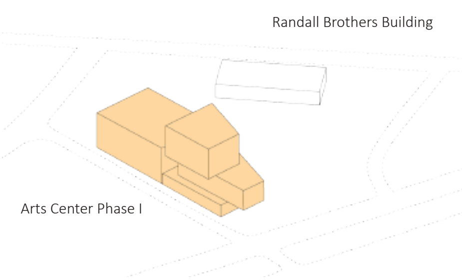
Views and Vistas from the Arts Square Site

A key component of the project is the preservation of the historic Randall Brothers timber manufacturing plant located on the site, adjacent to Marietta Street. This building will undergo an adaptive reuse transformation, converting it into a new student center that will host community-oriented programs and activities. The sketch below shows how these diverse programs will be arranged around the new Arts Square grounds.



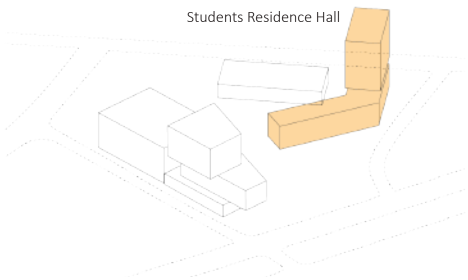
Project Phasing

Given the substantial scale of the Arts Square project, encompassing 1.2 million square feet, it has been divided into four phases. This architectural proposal focuses specifically on the first phase.



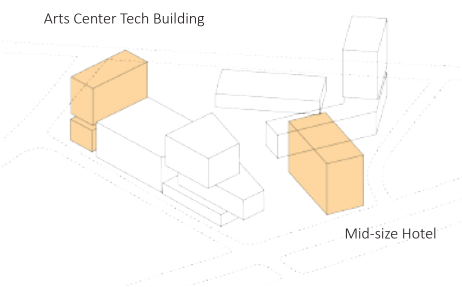
Phase I

This phase encompasses 250,000 square feet of the Arts Center, consisting of two of its three blocks.



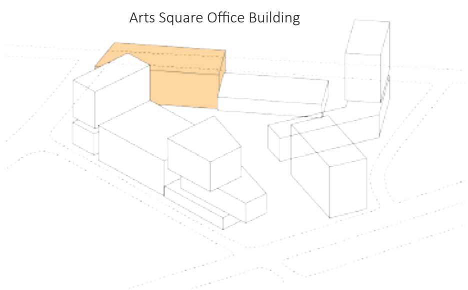
Phase II

The Student Housing Building will be constructed on the opposite corner of the site, providing accommodations for Georgia Tech students.



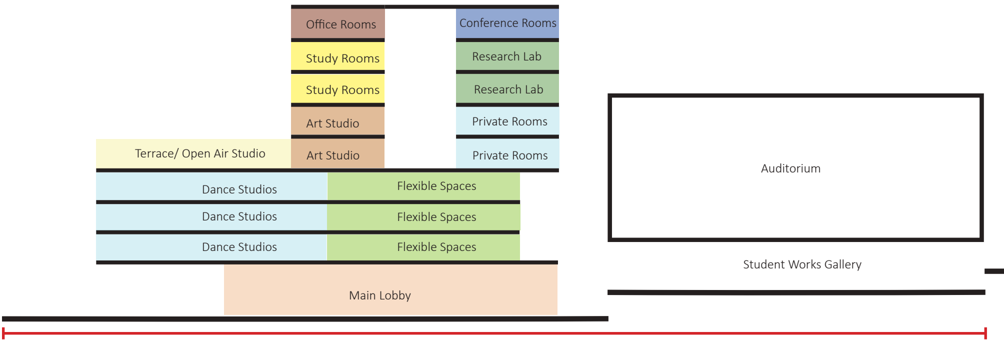
Phase III

In the third phase, a mid-sized hotel will be developed for artists and performers, and the Arts Center Tech Building will be constructed to complete the Arts Center.

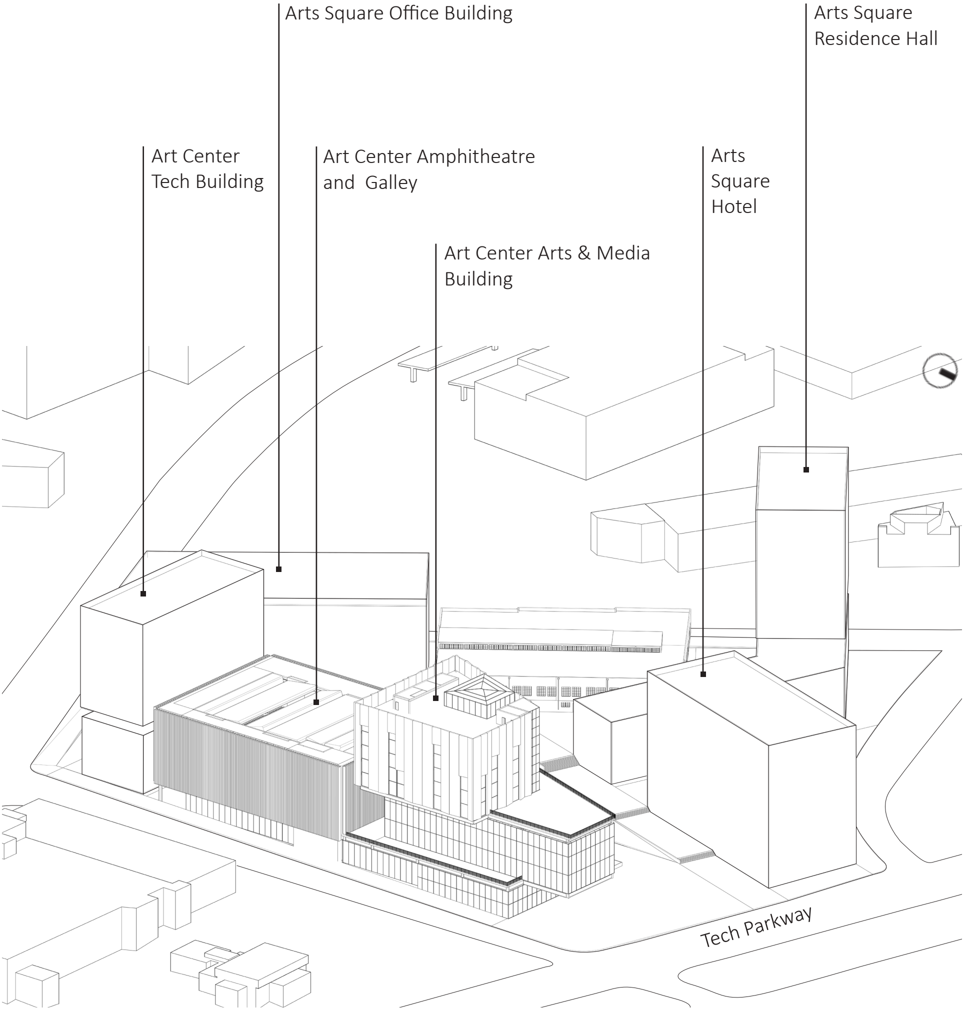


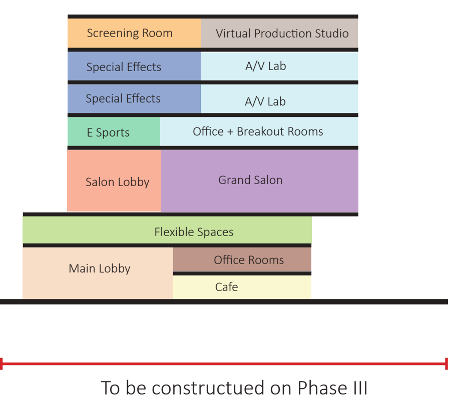
Phase IV

The Office Building will be developed as the final phase of the Arts Square project, and the historic Randall Brothers plant will be adaptively reused as the campus's second major student center.

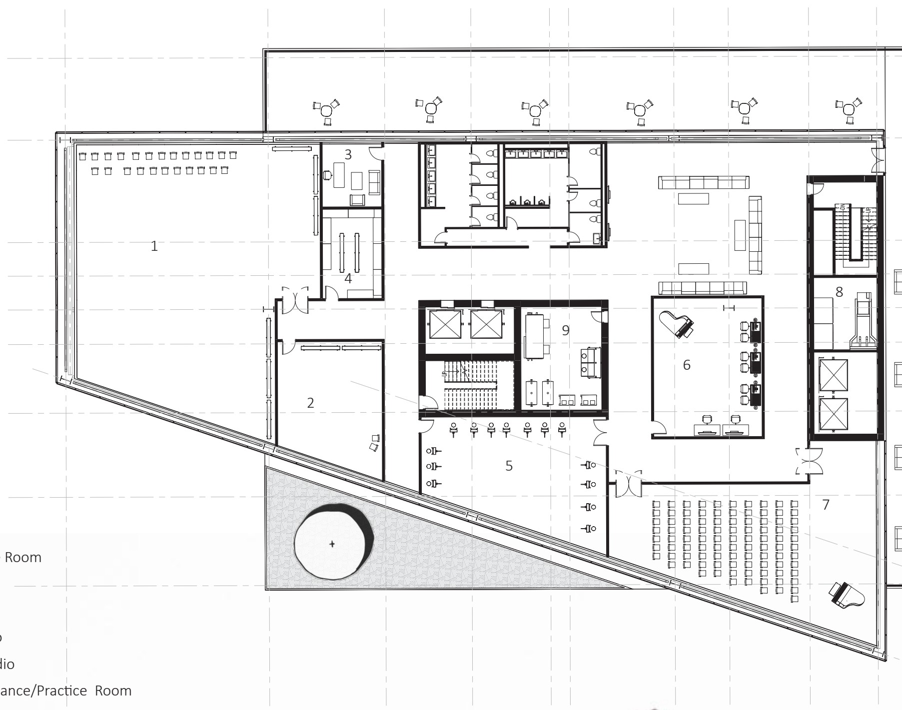


To be construcued on Phase I

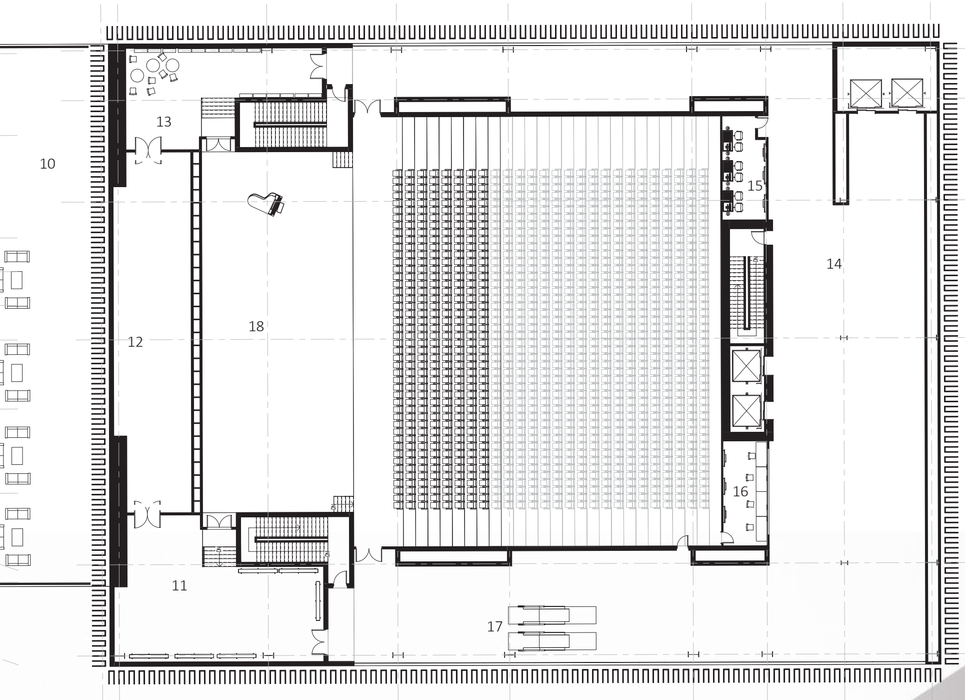




The Georgia Tech Arts Center consists of three blocks accommodating 400,000 square feet of programs, to be built in two separate phases of the project. However, this proposal focuses only on Phase I. The image on the left illustrates the distribution of programs within the Arts Center. As shown, the Arts Center accommodates a variety of functions, including dance studios, flexible spaces, research labs, an amphitheater, and galleries.



1 Dance Studio
2 Dance Practice Room
3 Office
4 Locker Room
5 Painting Studio
6 Recording Studio
7 Music Performance/Practice Room
8 Electrical Room
9 Mechanical Room
10 Terrace
11 Practice Room/ BackStage
12 Stage Extension Space
13 Storage
14 Amphitheatre Lobby
15 Audio/Visual Support
16 Ticketing and Information
17 Escalators (To Terrace)
18 Stage


10
13
12
18
11
15
14
16
17

Water Efficiency

The building's baseline water consumption is approximately 2.5 million gallons per year. With more efficient water fixtures, this can be reduced to 1.2 million gallons per year. Incorporating a 10% greywater treatment system further reduces consumption to 1.1 million gallons per year. Additionally, by harvesting rainwater and installing adequate cisterns, the building can capture up to 1.1 million gallons annually, allowing it to meet its own water needs.

According to the Simulations, The building's roof provides a 21,241-square-foot catchment area, capable of harvesting approximately 3,547,866 gallons of rainwater per year. After reductions, the building's annual water demand is about 1,160,516 gallons, which can be met using rainwater stored on-site. To supply this need, six square cisterns—each 20 feet long, eight feet wide, and six feet deep—are required to store sufficient water for the building's operations.

PV Panels Simulation Data

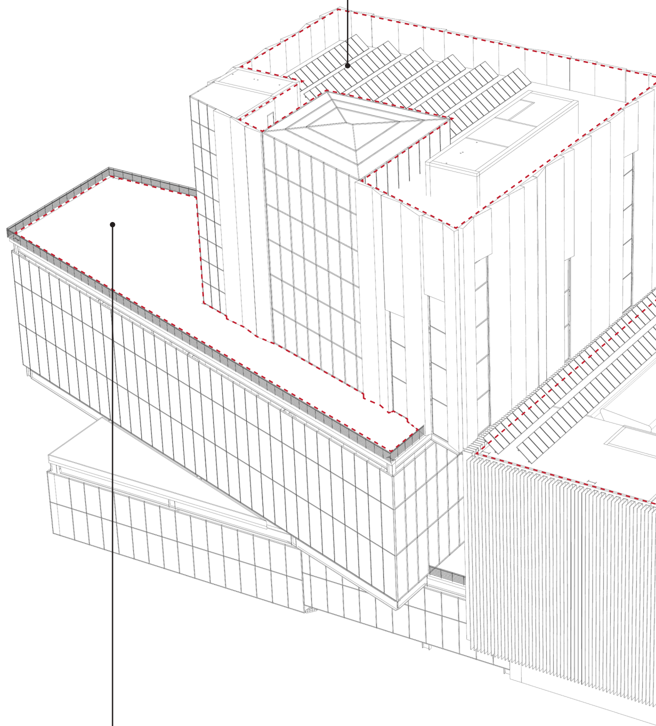
PV Arrays Efficiency 19%

Effective Area 70%

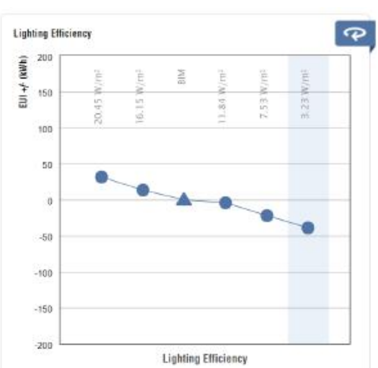
Battery Capacity 250

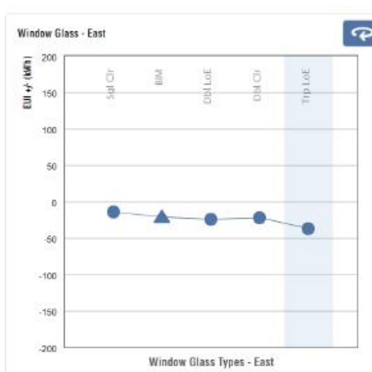
Total PV Energy Generated 212,663

PV Array EUI Decrease 18 kwh/m2/



Rainwater Catchment Area in Gray

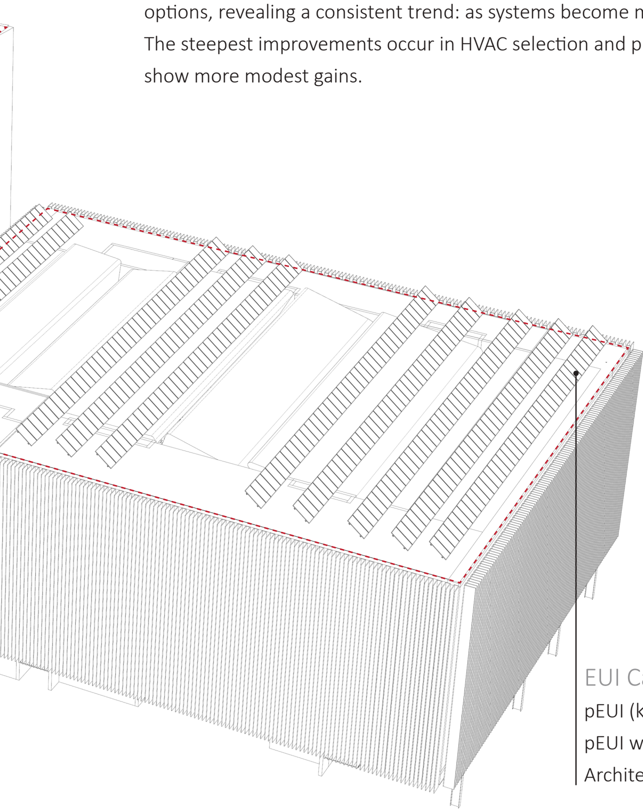




Energy Optimization

To meet the Architecture 2030 commitment, the target EUI for the project should be approximately 137, reflecting a 60% reduction in energy consumption. Analysis of the building's energy performance shows that, by implementing strategies such as triple-glazed windows, the projected EUI (pEUI) can be reduced to 133 kwh/m2/year. With the addition of rooftop PV panels, the pEUI can be lowered further to 115. In total, a 60–70% reduction in energy consumption can be achieved.

The diagrams illustrate how different building performance strategies—lighting efficiency, HVAC system selection, infiltration rates, window glazing, and plug load efficiency—affect overall EUI. In each category, the baseline model (BIM) is shown against a range of higher- and lower-performance options, revealing a consistent trend: as systems become more efficient, EUI is gradually reduced. The steepest improvements occur in HVAC selection and plug load efficiency, while glazing changes show more modest gains.

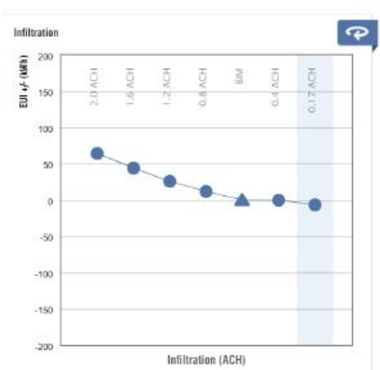


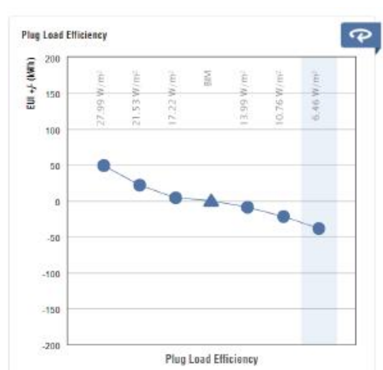
EUI Calculation Data

pEUI (kwh/m2/year) 133

pEUI with PhotoVoltaics (kwh/m2/year) 115

Architecture 2030 Commitment 70% Reduction





CHAPTER 2

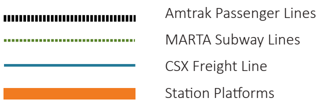
ATLANTA DOWNTOWN TRAIN STATION

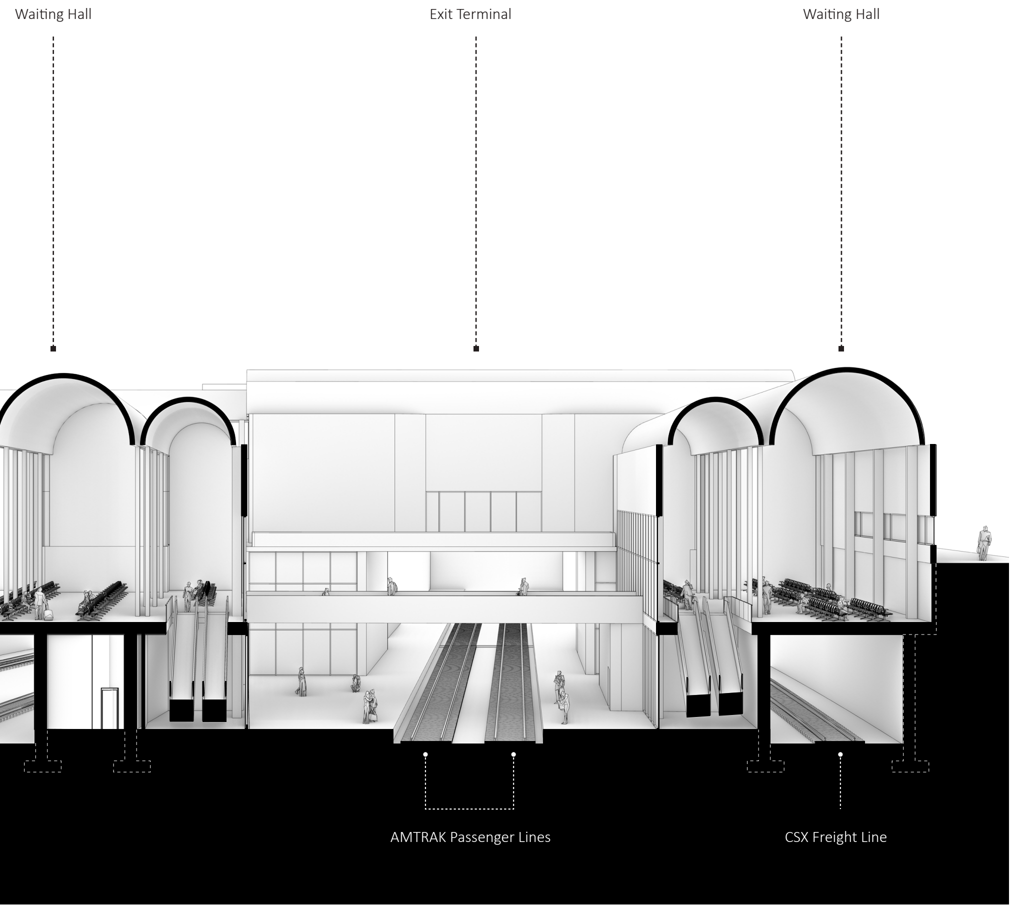
SPRING 2025

The Atlanta Downtown Train Station is a major civic project proposed in response to the city's growing reliance on rail transportation. Located at the midpoint of Amtrak's Crescent Route, Atlanta is strategically positioned to serve as a key rail hub in the Southeastern United States. Recognizing this potential, the Atlanta Regional Commission (ARC) recently issued a Request for Proposals (RFP) for the development of a new Tier 1 train station in downtown Atlanta. The city aims to reestablish itself as a central node in the national rail system by committing to significant investment in this sector, emphasizing the environmental benefits of rail compared to air and automotive travel, as well as leveraging technological advancements that now allow train speeds exceeding 300 mph.

The United States has the largest rail network in the world by mileage, presenting a unique opportunity for revitalization and expansion. This project responds directly to the ARC's RFP and aligns with Amtrak's long-term strategic vision for the Southeastern corridor.

The map shows the CSX freight lines and the MARTA Red and Gold lines passing beneath the site, approximately 30 feet below street level. The orange rectangles represent the proposed station platforms, extending across three blocks. The platform dimensions and rail track layouts follow Amtrak design guidelines. One of the major challenges of this project was the concentration of rail lines beneath the site; therefore, a thorough analysis was conducted to ensure full compatibility with Amtrak guidelines, Georgia Department of Transportation (GDOT) codes, and City of Atlanta standards.

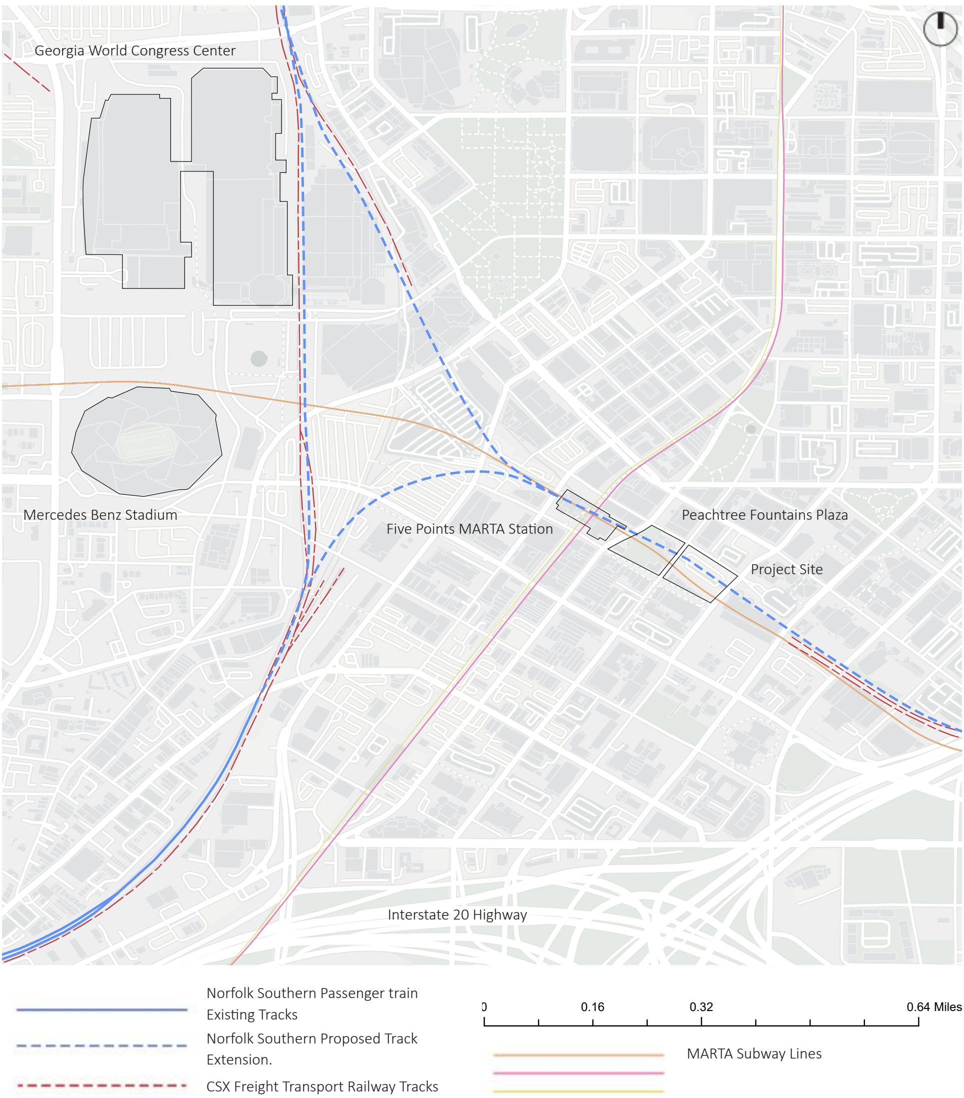



Waiting Hall
Exit Terminal
Waiting Hall
AMTRAK Passenger Lines
CSX Freight Line

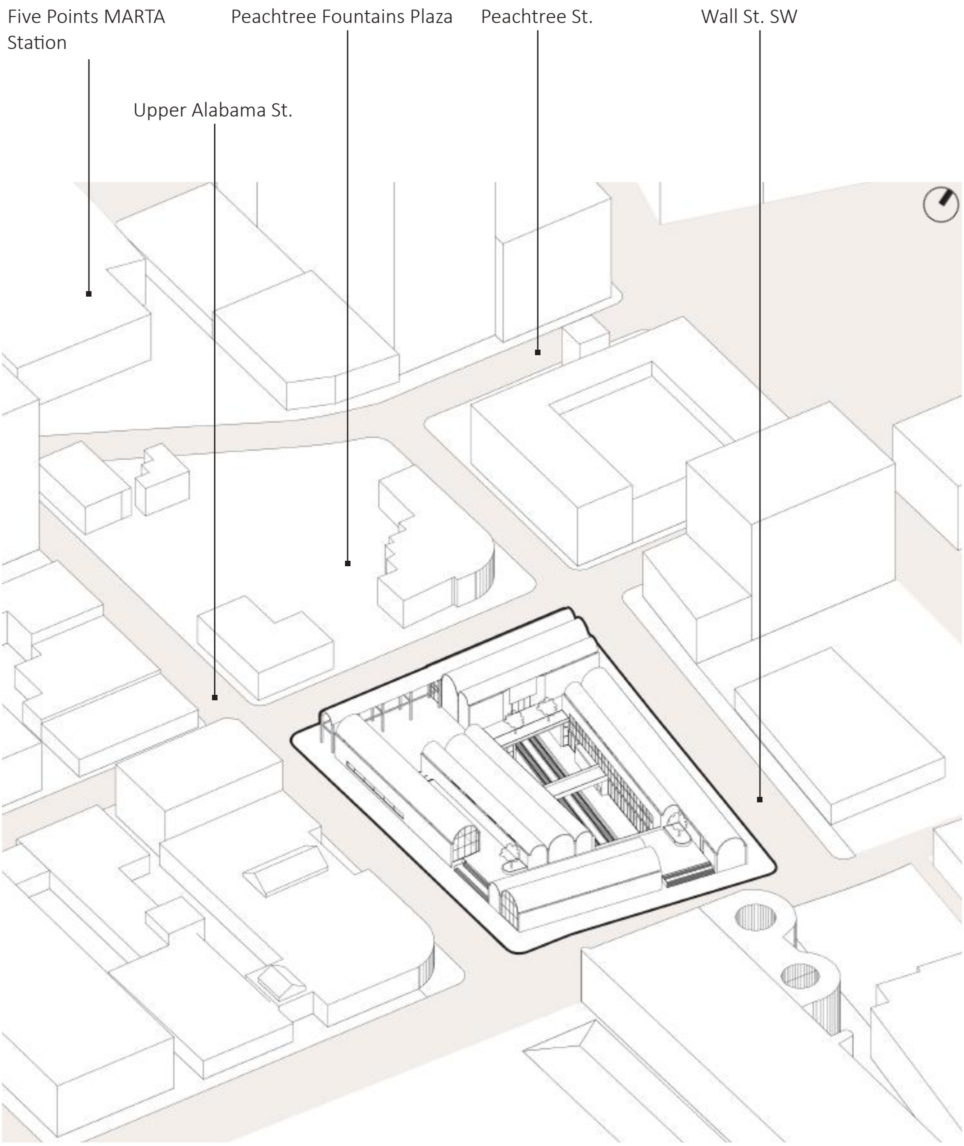

Project Site
500 ft

The map below illustrates downtown Atlanta, highlighting the Amtrak corridors, CSX freight lines, and MARTA subway routes passing through Five Points Station, as well as the selected project site. For the purpose of this proposal, several downtown Atlanta sites were studied and analyzed, narrowing the options to four. Following a comparative assessment of each site’s opportunities and constraints, the site shown below was identified as the most favorable location for Atlanta’s future passenger train station. The decision considered factors such as site size, ownership, and connectivity, along with key advantages including proximity to Five Points Station, walkability, and overall safety of the area.

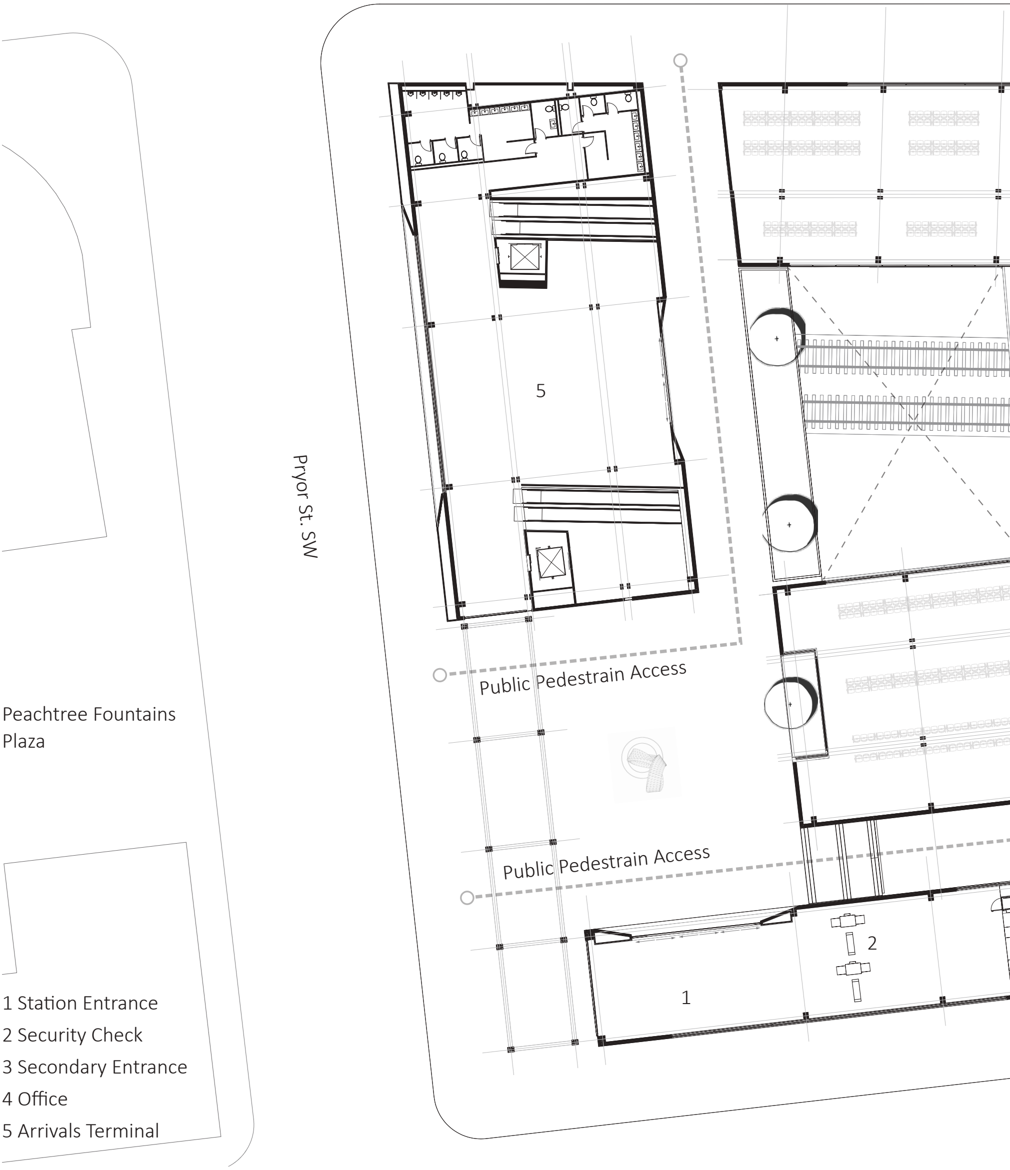
A defining feature of the design is the dramatic opening above the rail tracks, which enhances the spatial experience and draws visitors toward the heart of the station. As trains arrive and depart, their sounds reverberate through this void, creating a distinctive and immersive sensory atmosphere.



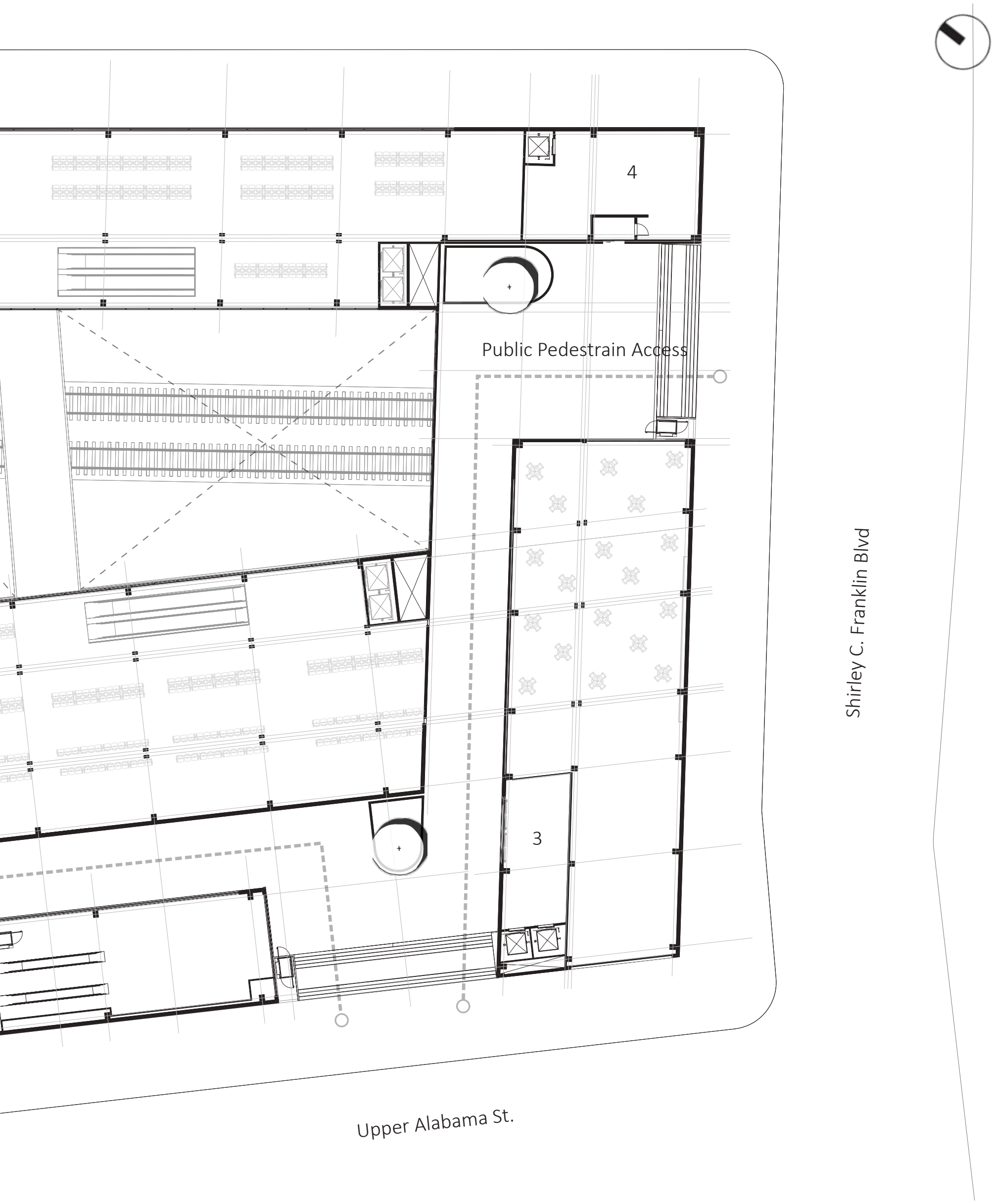
Another key element of the design is its porosity, ensuring seamless pedestrian access from all surrounding sidewalks. This openness invites not only passengers but also the broader public to engage with the station—whether to watch trains pass or to experience the dynamic environment of the waiting halls and platforms. In essence, the station celebrates the train station as a vital expression of civic life, transforming transit into a meaningful and enjoyable urban experience. This proposal reimagines Atlanta's rail infrastructure as a modern, experiential landmark that reinforces the city's role as a central hub within the national rail network.

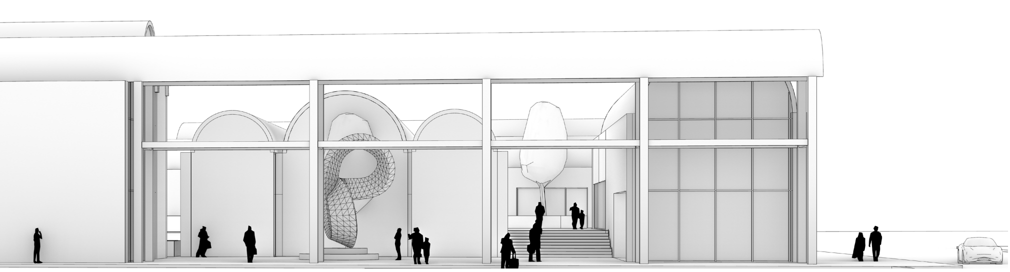


Ground Floor Plan (Street Level)



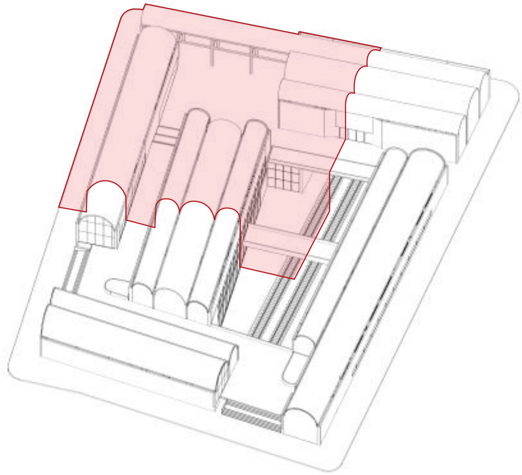
View from Pryor St SW

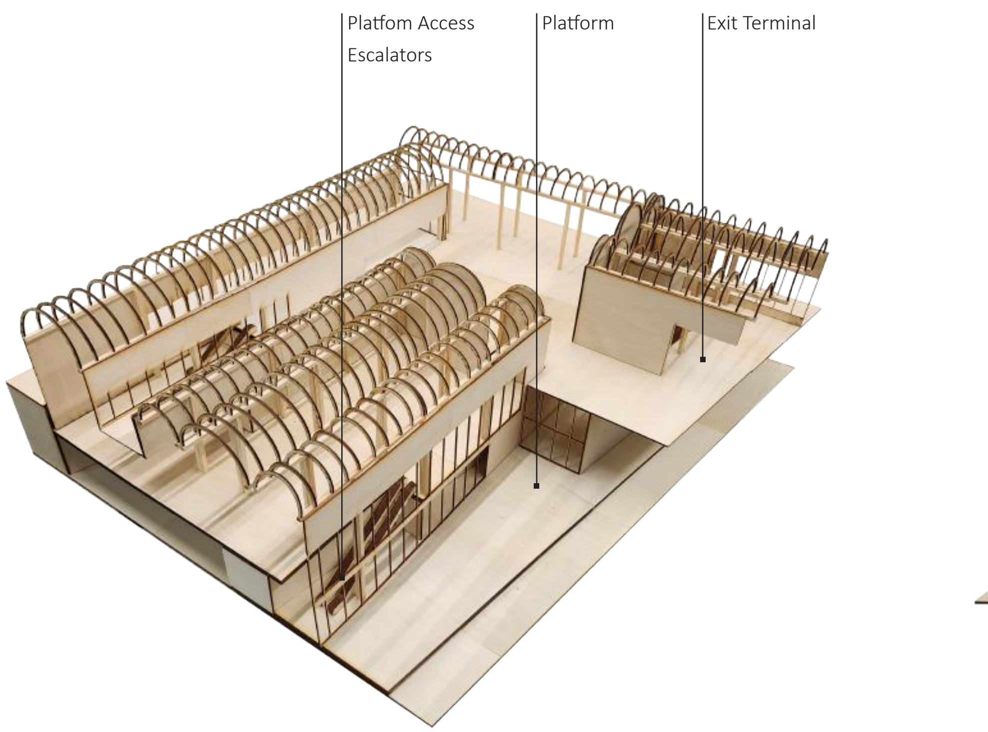

4
Public Pedestrain Access
3
Shirley C. Franklin Blvd
Upper Alabama St.

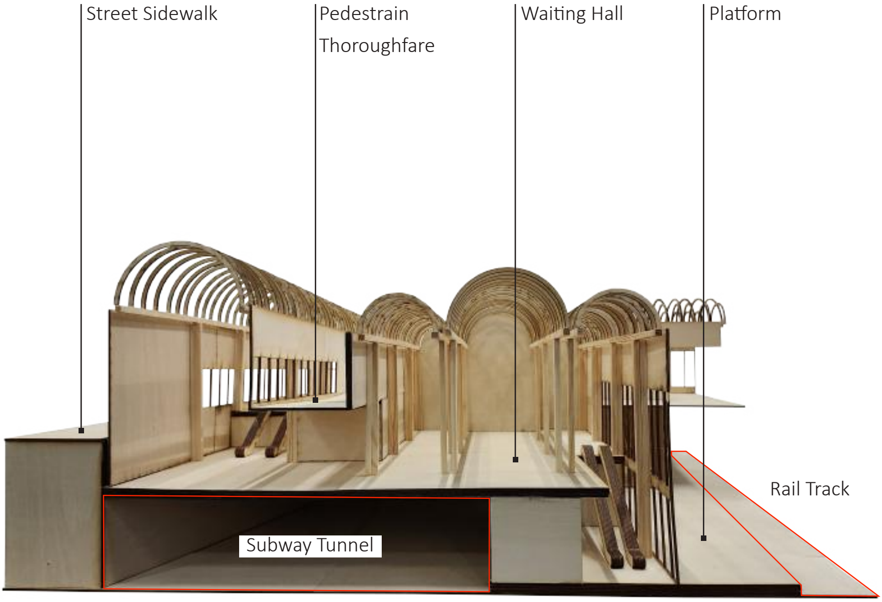


Physical Model

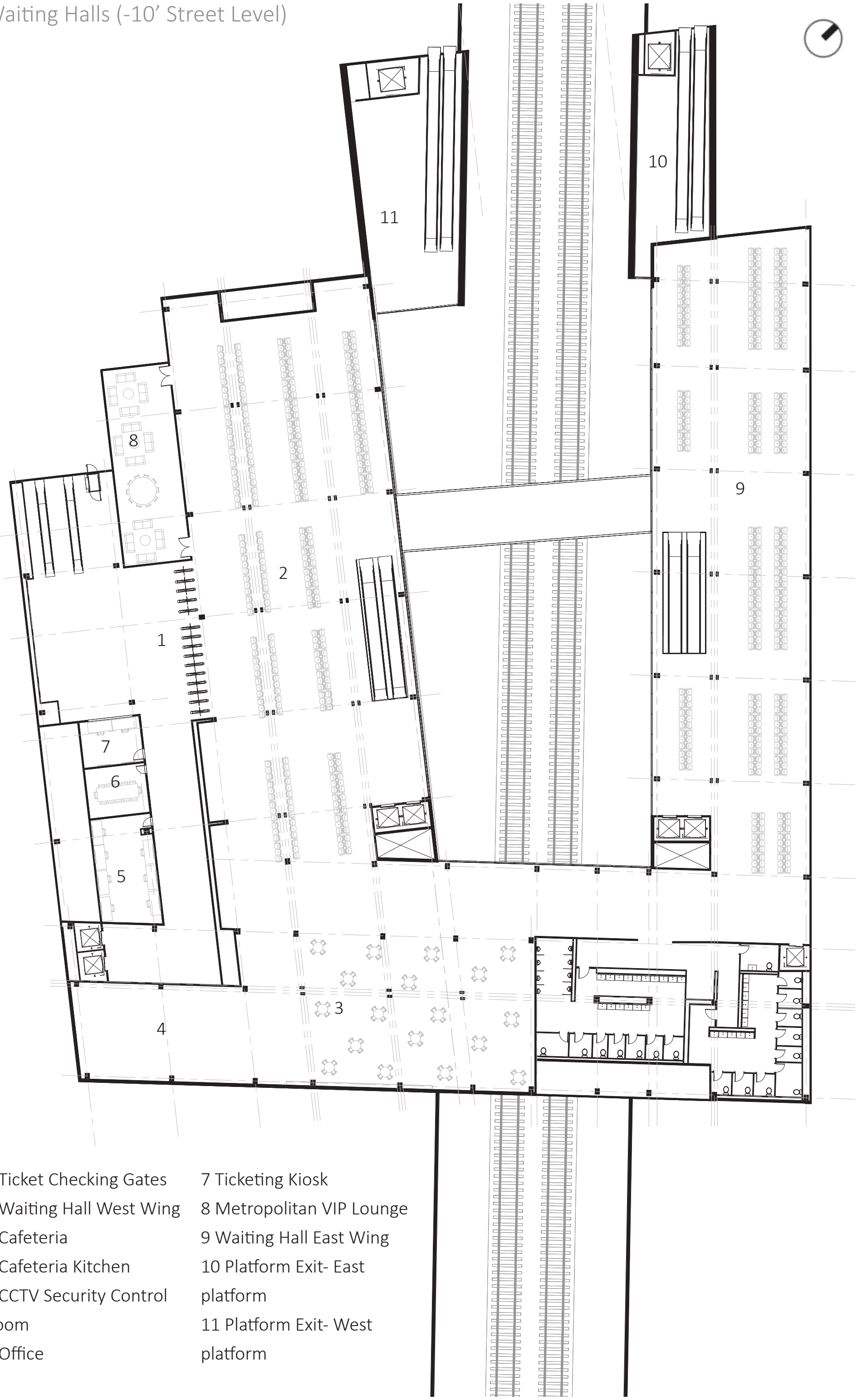
The image on the right shows the portion of the project selected for construction as a physical model. This segment includes the entrance courtyard across from Peachtree Fountains Plaza, the station entrance, part of the west wing of the waiting hall, a section of the north–south train platform with its corresponding rail track, and a portion of the exit terminal. This area was chosen to highlight the key circulation paths—from the street to the waiting hall and ultimately to the platform, as well as the return sequence from arriving trains through the exit terminal and back to the street. The model demonstrates the hierarchy of entry into the station, the placement of security checkpoints, and the process of exiting after disembarking from a train. The wooden model measures approximately 3 feet by 4 feet and is built at a scale of 3/16" = 1'.






Street Sidewalk
Pedestrain
Thoroughfare
Waiting Hall
Platform
Rail Track
Subway Tunnel

Waiting Halls (-10' Street Level)

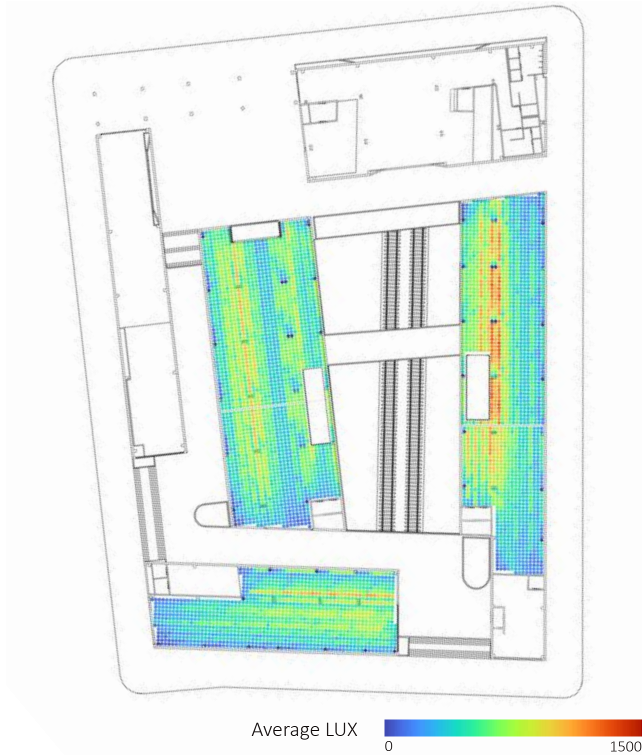


1 Ticket Checking Gates
2 Waiting Hall West Wing
3 Cafeteria
4 Cafeteria Kitchen
5 CCTV Security Control Room
6 Office
7 Ticketing Kiosk
8 Metropolitan VIP Lounge
9 Waiting Hall East Wing
10 Platform Exit- East platform
11 Platform Exit- West platform

Illuminance Analysis

Considering the importance of comfort in station waiting halls, the diagram below presents an average illuminance analysis of these spaces. The results indicate an average illuminance of 540 lux in the waiting halls and cafeteria, meaning that for most of the day, no artificial lighting is required. Illuminance levels peak around noon, particularly during the summer months of June, July, and August.

*The analysis was conducted using Climate Studio plugin for Rhino.



Glare Analysis

The diagram on the right illustrates the glare analysis of the proposed train station's waiting hall and cafeteria. Since the station operates from 5 a.m. to midnight, seven days a week, the analysis revealed a Spatial Daylight Glare Probability (sDGP) of 0.8%. This metric represents the percentage of views with disturbing glare occurring for more than 10% of the occupied time. The results indicate that, although glare is minimal overall, some discomfort may occur on sunny afternoons in the eastern wing of the waiting hall. During these periods, passengers can be accommodated in the west wing.

*The analysis was conducted using Climate Studio plugin for Rhino.

CHAPTER 3

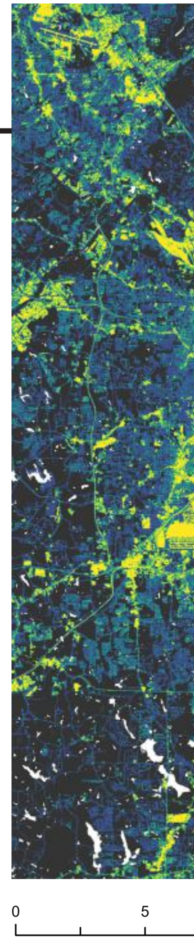
THE SOUTH RIVER NATURE CENTER

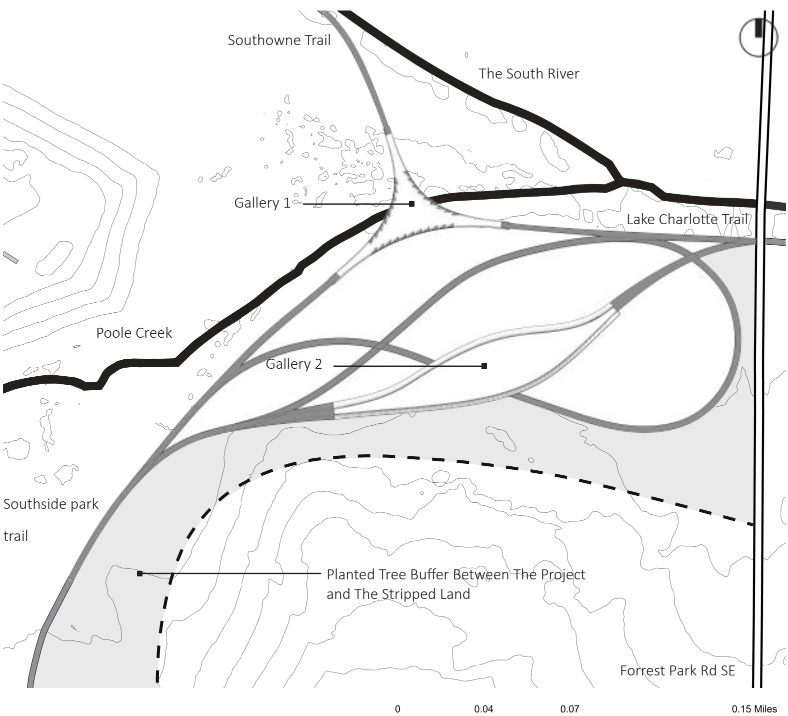
FALL 2023

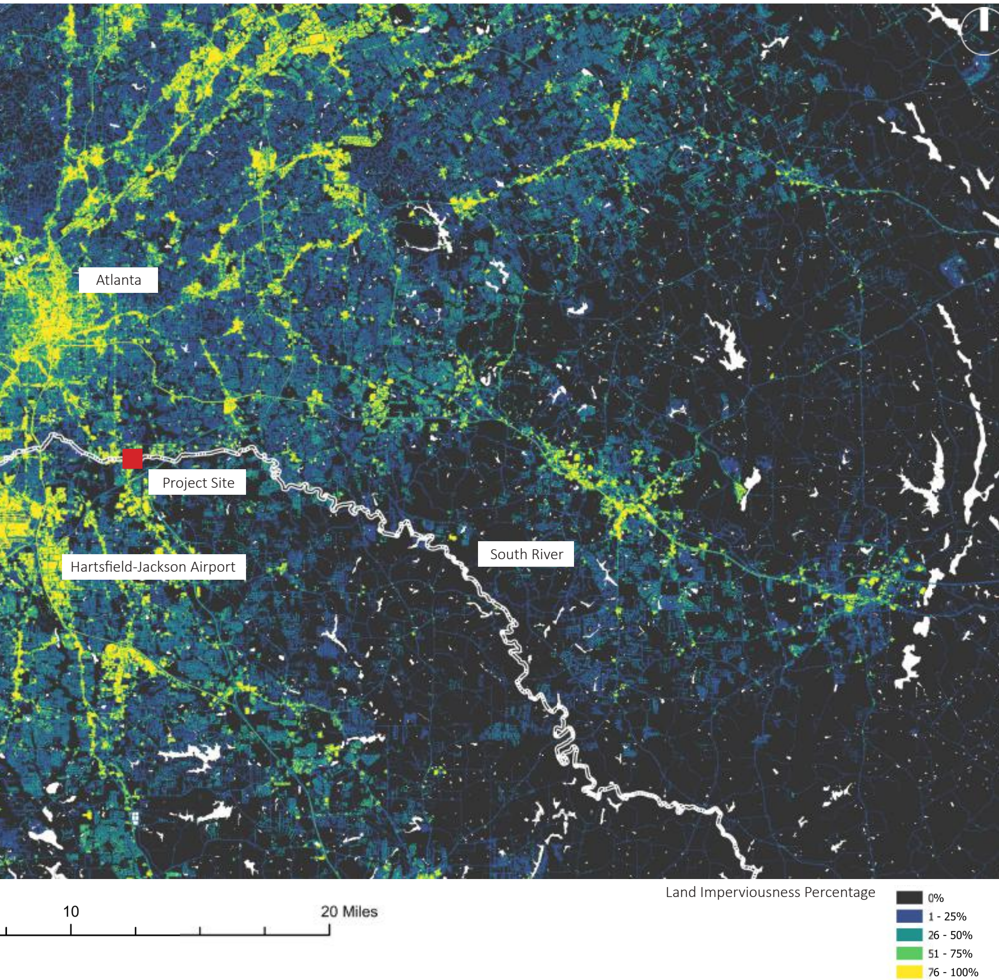
The South River Nature Center is a proposed project in southeast Atlanta, located along the South River. Designed as both a museum and an educational facility, its mission is to raise public awareness of the environmental challenges facing the region while demonstrating how human-made spaces can adapt to and coexist with their natural surroundings with minimal impact.

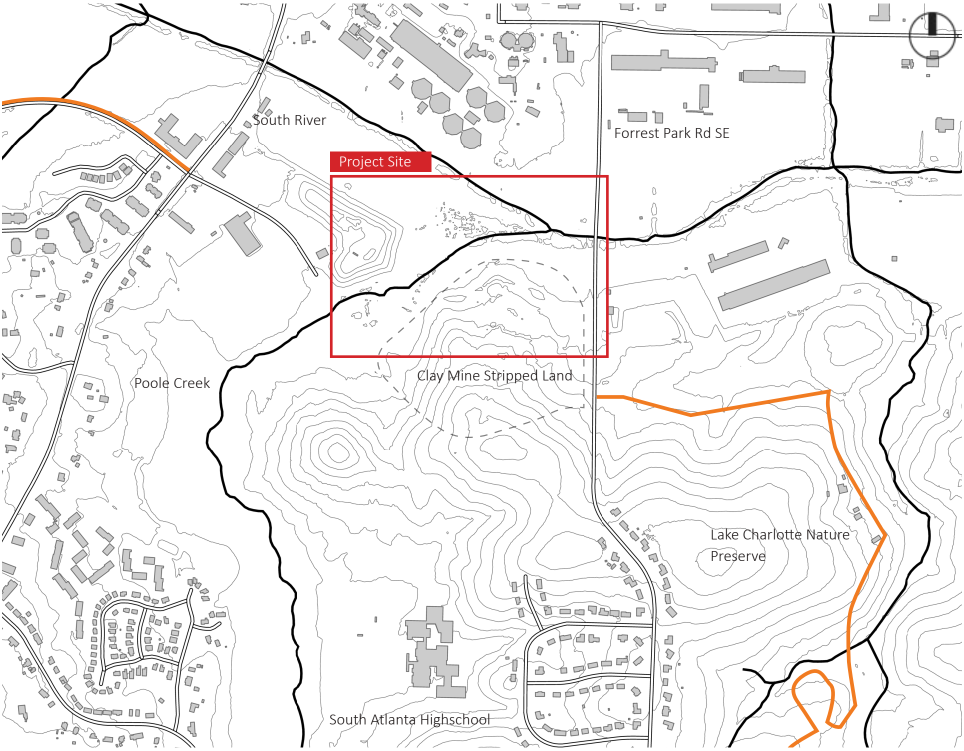
The map shown here illustrates land imperviousness across the Atlanta metropolitan area. Extensive development has increased impervious surfaces, which, during storm events, direct large volumes of sewage overflow and runoff into the South River and nearby creeks. This has led to frequent flooding, soil erosion, and significant ecological damage in south-east Atlanta. In addition, the concentration of industrial activity along the river—and the discharge of its waste—has further degraded water quality, placing both wildlife and nearby communities at risk.

The South River Nature Center seeks to address these issues by improving the surrounding environment and educating the public about the urgent environmental crisis impacting Atlanta's waterways, ecosystems, and communities.

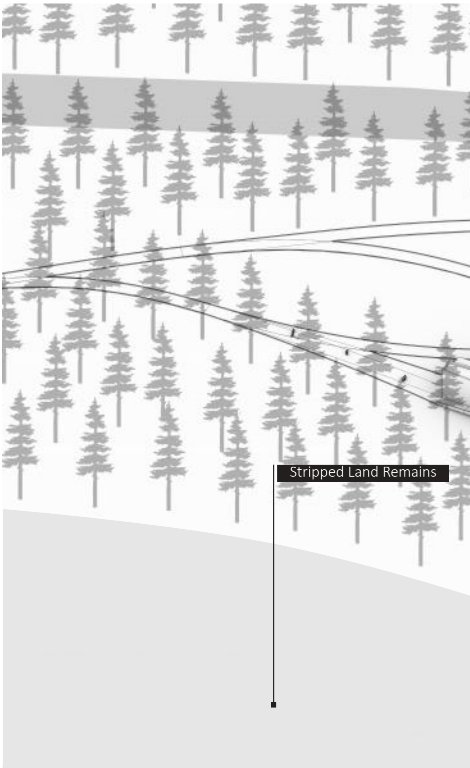





Atlanta
Project Site
Hartsfield-Jackson Airport
South River
10
20 Miles
Land Imperviousness Percentage
0%
1 - 25%
26 - 50%
51 - 75%
76 - 100%

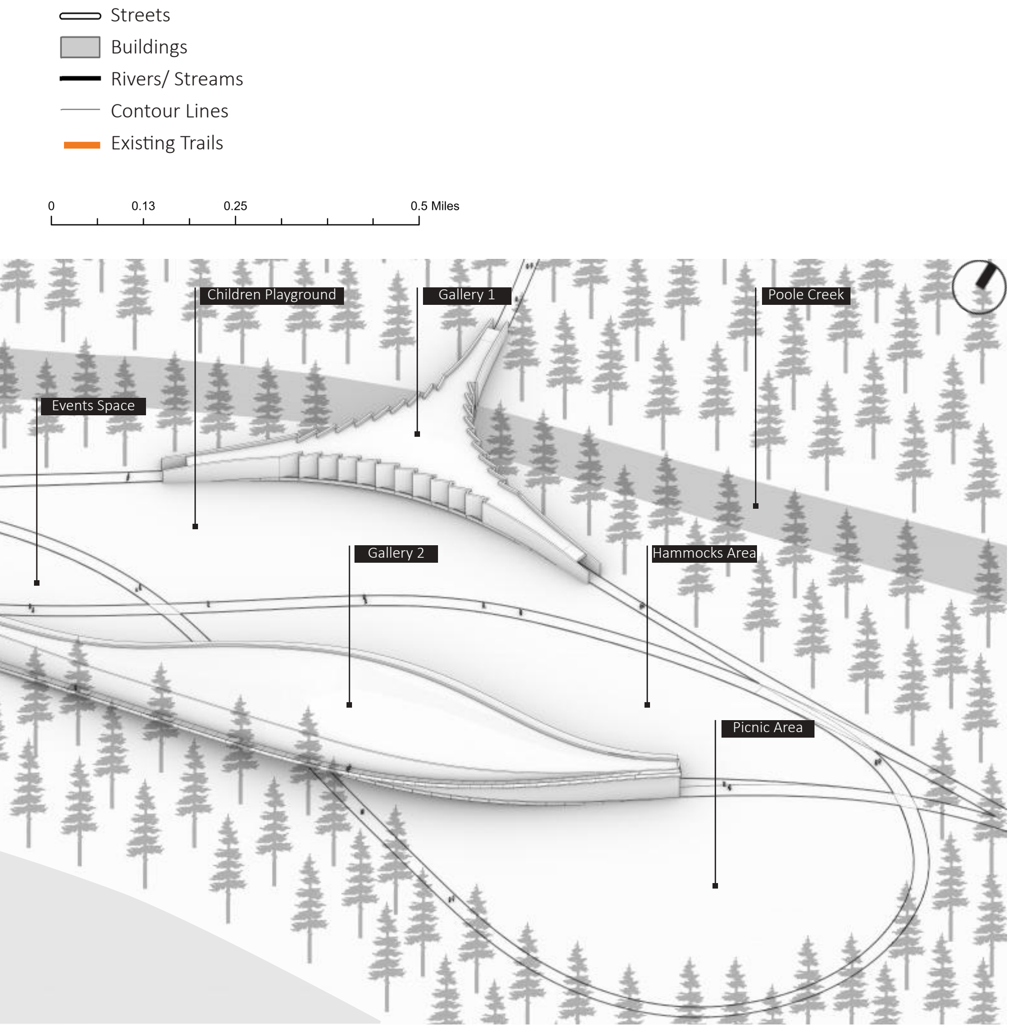


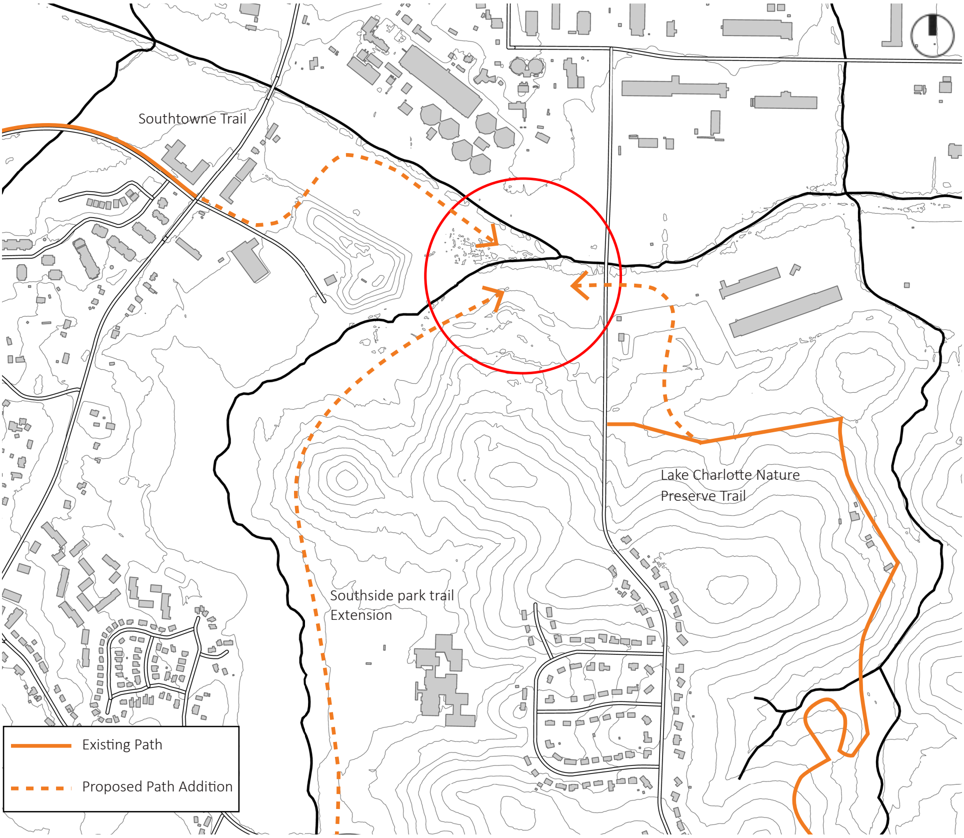
Given the area's environmental challenges—particularly the high proportion of developed land—one of the project's primary goals is to minimize disturbance to the natural ground and limit the creation of new impervious surfaces. To achieve this, the galleries are elevated above grade, supported only by structural anchors, allowing the landscape to remain largely undisturbed. A major portion of the stripped land (approximately 60%) will be restored by reestablishing the natural topography, replacing topsoil, and planting indigenous trees. To further reduce environmental impact, trees removed during construction will be replanted in the restored area following topsoil replacement. In addition, recreational amenities are integrated into the project to encourage greater community engagement with the museum. These include, but are not limited to, picnic areas, a children's playground, and flexible event spaces.



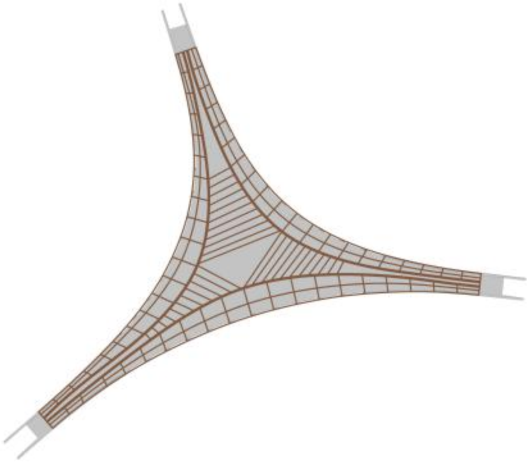
The project site is surrounded by industrial plants, whose development required the removal of hundreds of square miles of trees and vegetation, replacing them with concrete and other impervious surfaces. This has resulted in massive stormwater runoff, which in turn has caused severe soil erosion throughout the South River. Furthermore, industrial activity has contributed to dangerously poor water quality, placing nearby communities and local wildlife at risk. Despite these threats, community awareness remains limited, and hazardous activities such as swimming and fishing in the river continue to occur.

The goal of this project is to raise awareness among surrounding communities and the general public about the environmental crisis affecting the region. To achieve this, the proposal introduces a series of educational museums located along trails by the South River and Poole Creek. As visitors walk these trails or approach river crossings, they are naturally guided through gallery spaces featuring information boards, images, and interactive educational materials designed to draw attention to the urgent ecological challenges facing the area. The project site is located adjacent to Poole Creek, a tributary of the South River. A portion of the site lies on land that was previously stripped for clay mining. A secondary goal of this project is to restore the natural ground in this degraded area. The map below illustrates the proposed project. As shown, the museum's twin galleries connect the Lake Charlotte Nature Preserve trail to Southtowne trail and Southside park trail.

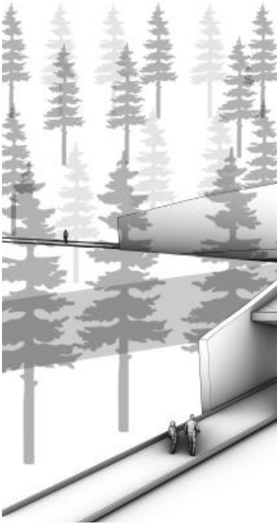


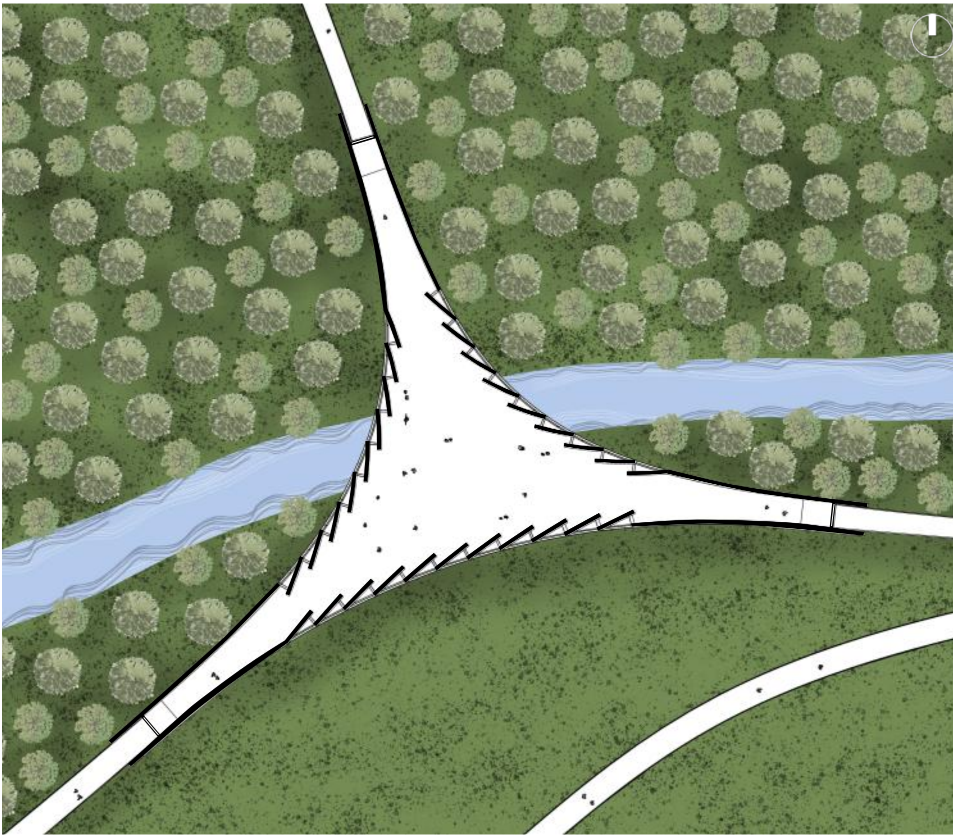


Gallery 1 functions as a three-way bridge, linking the Southtowne Trail, Lake Charlotte Nature Preserve Trail, and Southside Park Trail. This bridge spans Poole Creek, forming a central intersection that serves as a core element of the museum experience. The interior space is dedicated to museum functions. The gallery enclosure is designed to admit natural light while offering views of the river as visitors cross it.

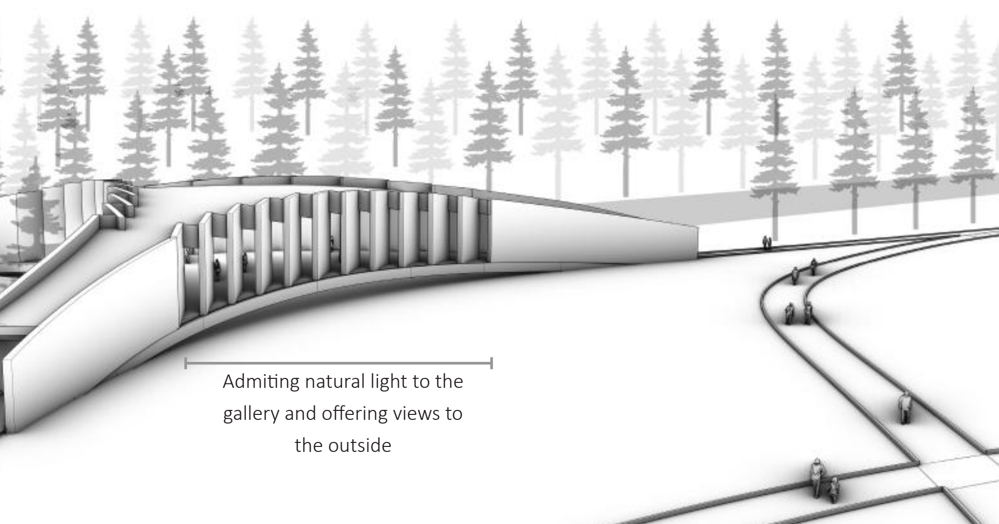


Gallery 1 CLT Structure



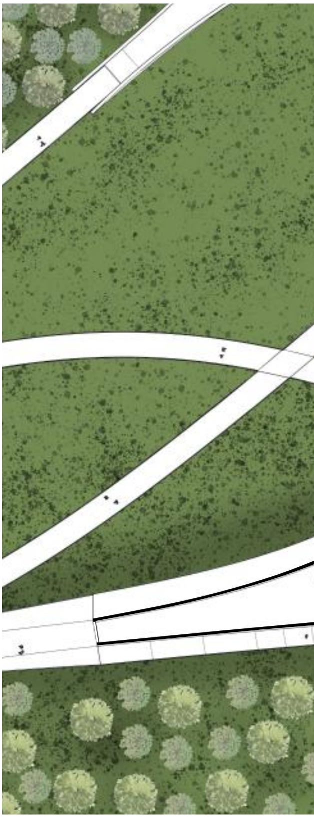


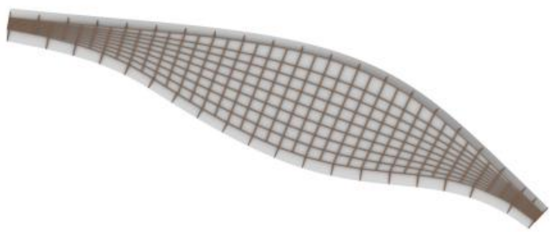
At the same time, the unique geometry of the bridge walls ensures that daylight does not interfere with the quality of the interior exhibitions. The image on top Right corner shows the plan of Gallery 1 and the image below presents a perspective view. Mass timber serves as the primary structural element of the building, which reflects the project's mission to minimize environmental impact by using sustainable materials.



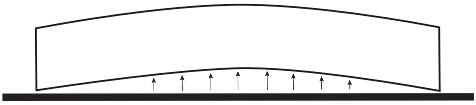
Gallery 2 is located along the trails connecting Southside Park to Lake Charlotte Nature Preserve. The image on the right, shows the plan of the structure. Service spaces are accommodated within the central core, while the curved mass timber system, together with shear walls and the core, provides structural stability.

The images below illustrate the ideation process behind the form. As explained earlier, one of the project's goals was to minimize environmental impact by preserving the natural landscape and limiting impervious surfaces. To achieve this, Gallery 2 is elevated above grade and anchored to the ground only at its ends. The gallery expands at the center, creating additional space for exhibitions.

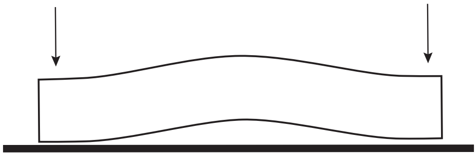




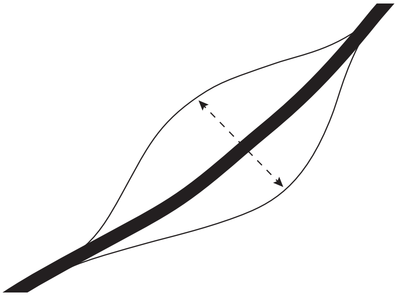
Gallery 2 CLT Structure



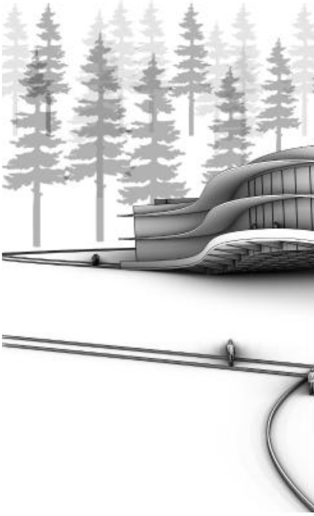
Building Detached from the Ground to Preserve Natural Landscape.

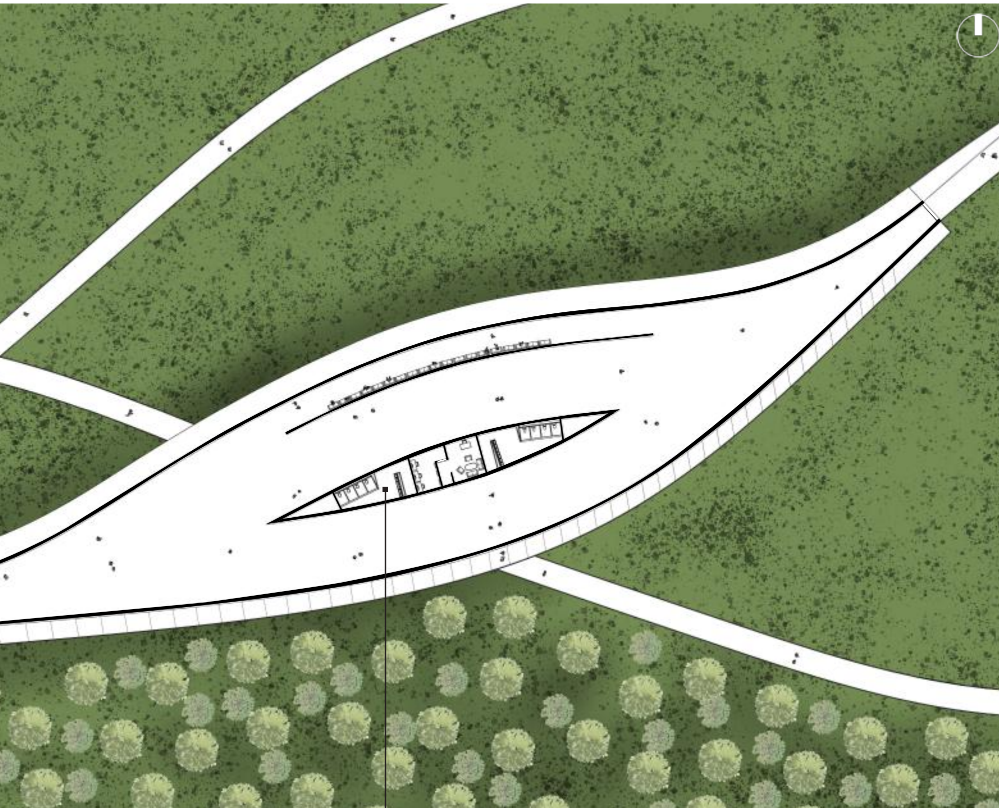


Building anchored to the ground at the ends for structural Support.



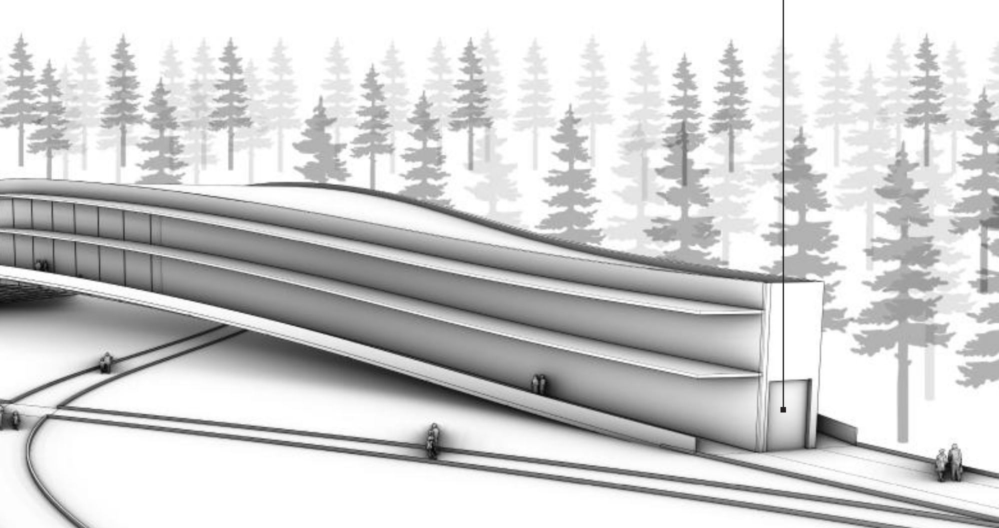
Expansion in the middle to allow adequate space for exhibition quality of the gallery.





Service Core

Gallery Entrance from Trails



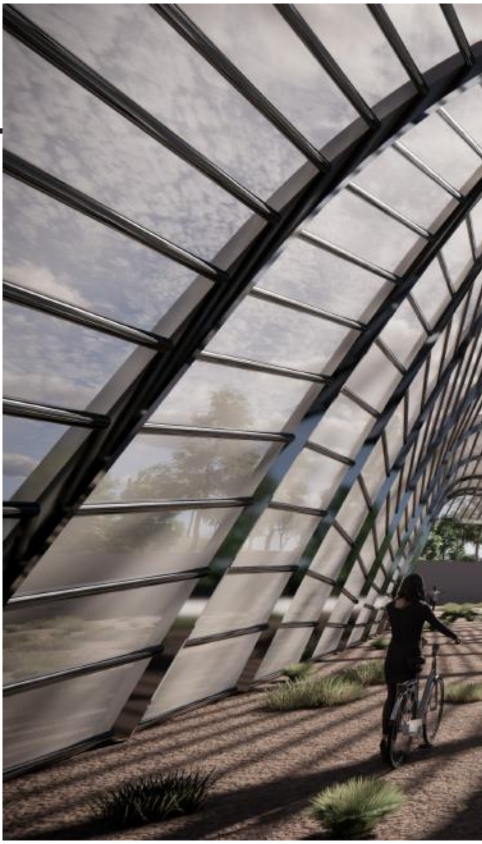
CHAPTER 4

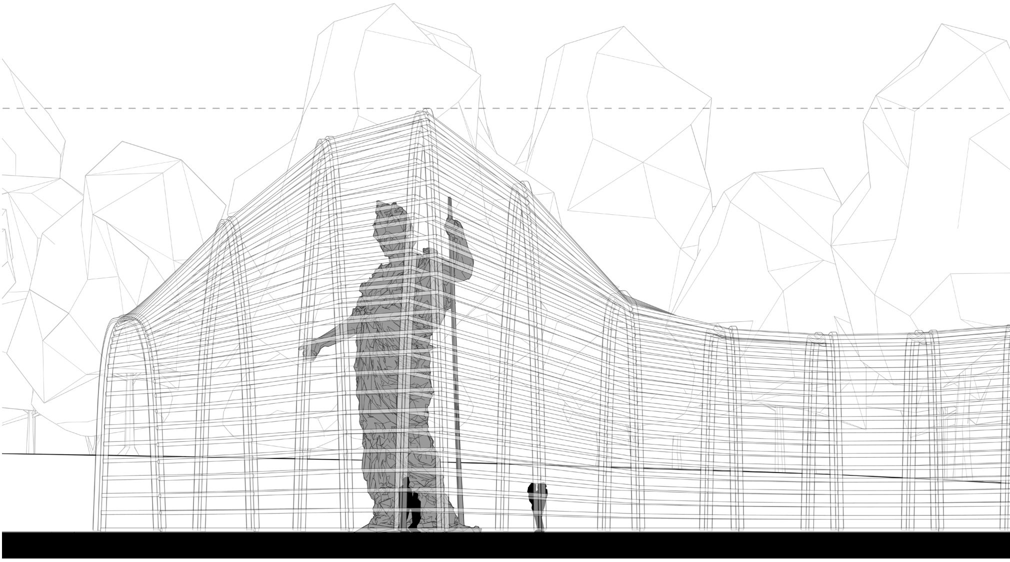
ARCHAEOLOGICAL SITE PARAMETRIC STRUCTURE

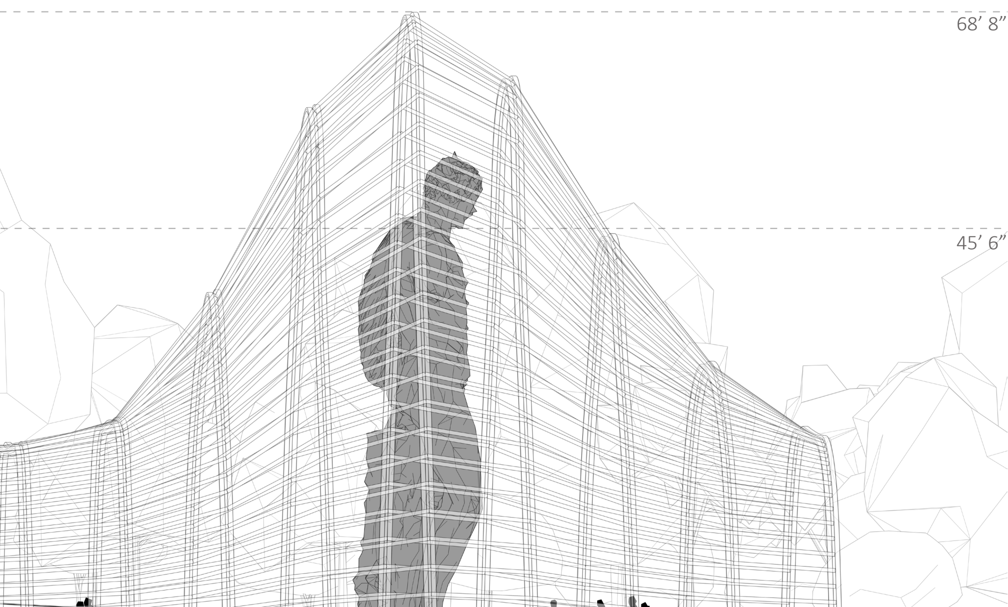
FALL 2023

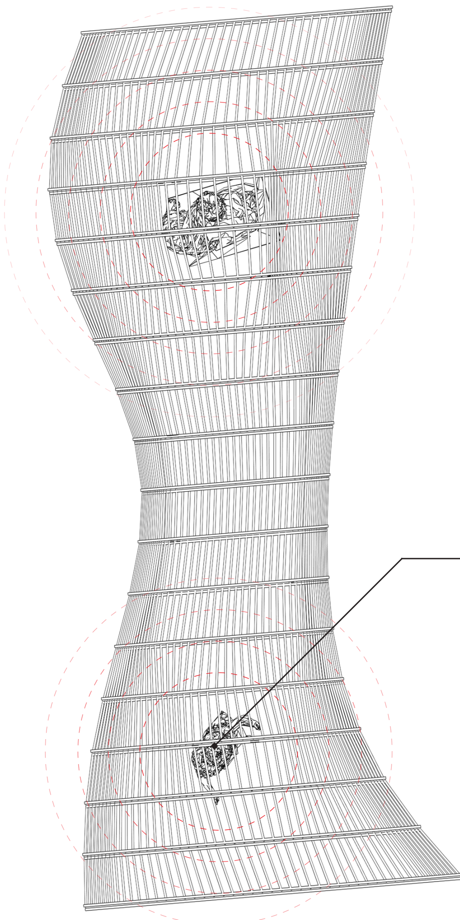
This project was developed to protect two monumental archaeological findings uncovered near Athens, Greece—twin marble sculptures measuring 53 ft and 36 ft in height. To safeguard these national treasures from natural elements such as rain and snow, a protective structure was designed.

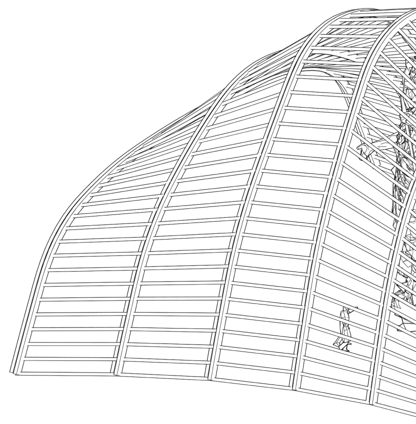
The solution is a parametrically generated metal-and-glass roof that adapts to the scale and geometry of the sculptures beneath it. Using Grasshopper, the design process began with defining the sculptures in CAD space. A custom script extracted key dimensional data—including height, width, and spatial footprint—and generated a roof form tailored to these parameters. The result is a responsive structure that not only provides shelter but also highlights the cultural significance of the artifacts it protects.



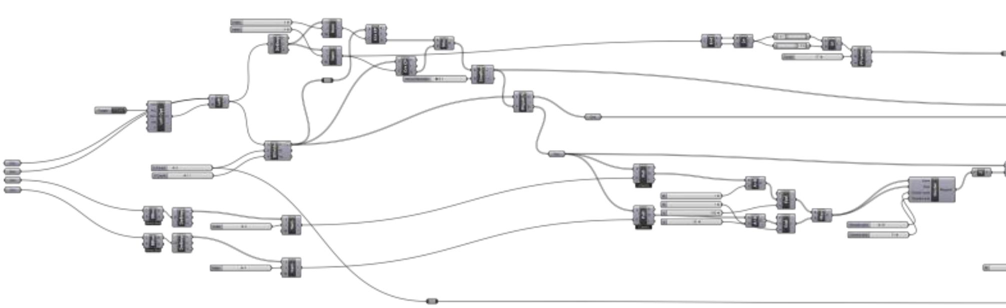



68’ 8”
45’ 6”

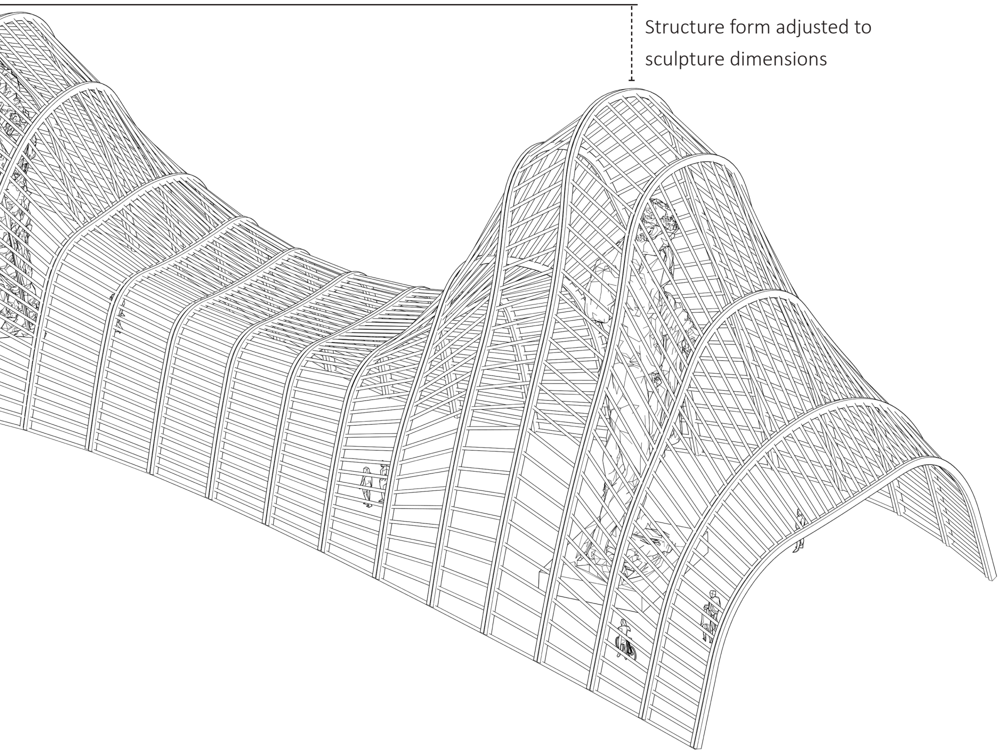




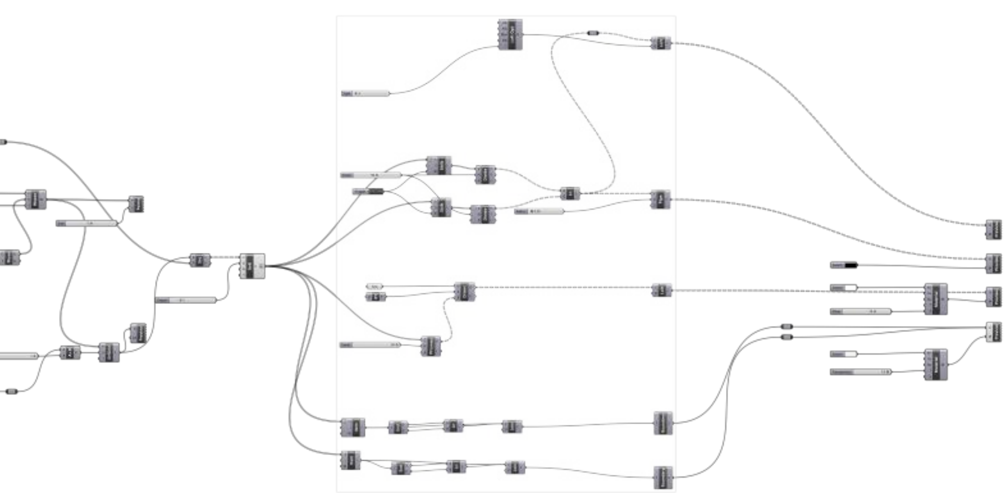
The images on this spread illustrate the paramet
tures. The roof height increases in response to t
beneath the structure, a minimum clear zone is
Grasshopper definition generating this form is sh
a fully parametric form that can be modified by



Parametric Structure Grasshopper Script



tric logic of the Grasshopper script, which enables the structure to adapt dynamically to the dimensions of the sculp-
he taller sculpture, ensuring proportional spatial relationships. The design also accounts for circulation requirements
maintained around each sculpture, allowing visitors to move comfortably and navigate through the mesh form. The
hown below. The primary inputs include the sculptures, boundary lines, and structural parameters, while the output is
adjusting the input values.



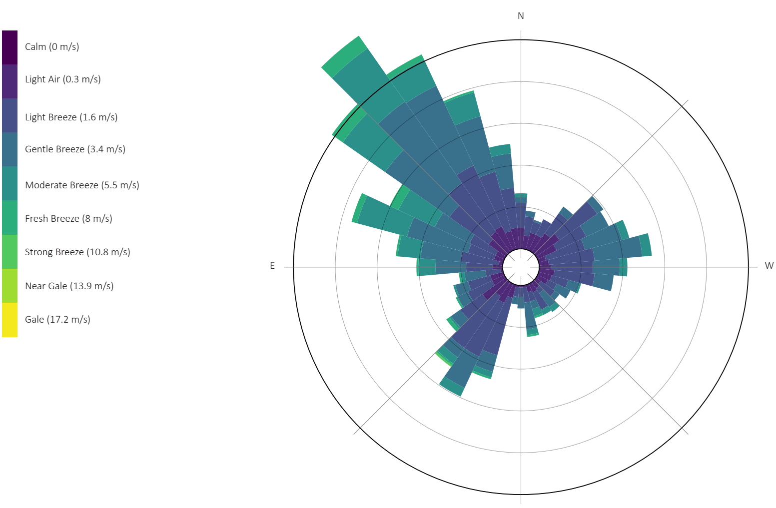
CHAPTER 5

INTERFACE HEADQUARTERS SUSTAINABILITY ANALYSIS

SPRING 2024

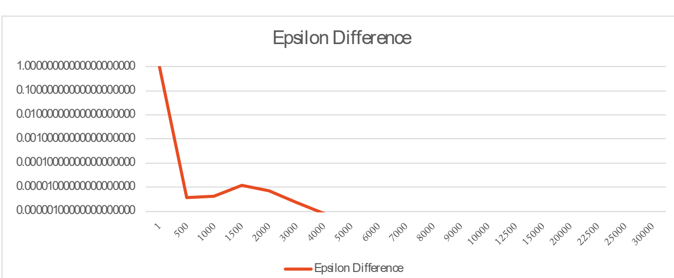
This project is a sustainability analysis and optimization study rather than a design proposal. The Interface Headquarters building in Atlanta, GA, was selected as a case study to explore strategies for improving efficiency in three key areas: pedestrian comfort, energy and illumination, and water consumption.

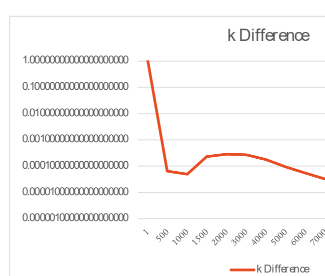
The first focus area is pedestrian comfort, specifically on the sidewalks surrounding the building. To evaluate this, Computational Fluid Dynamics (CFD) analysis was conducted to simulate comfort levels under dominant winter wind conditions, which primarily come from the northwest (as shown in the wind rose below). The CFD simulations were carried out using Eddy3D and OpenFOAM, with ParaView employed for visualization and graphics.

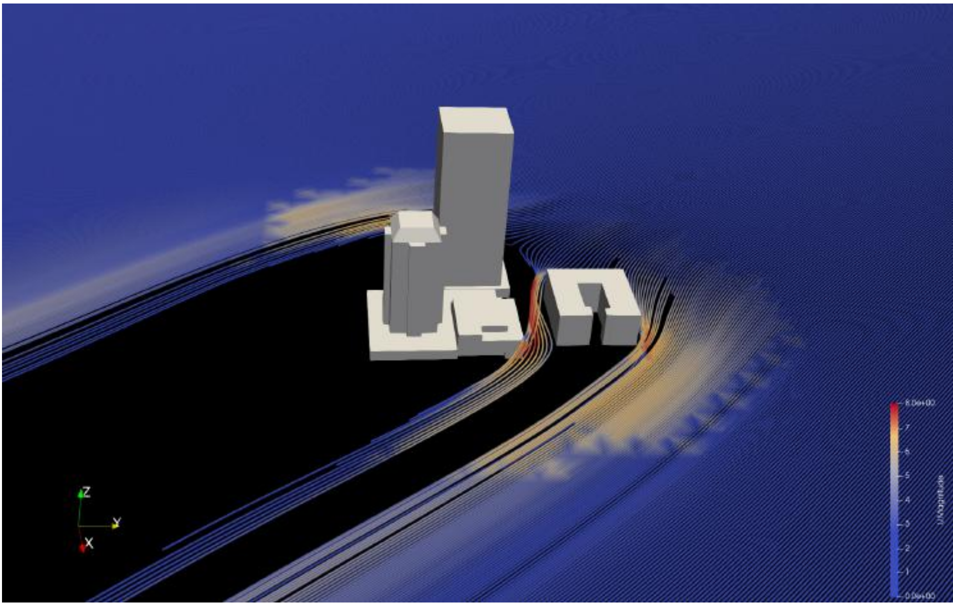


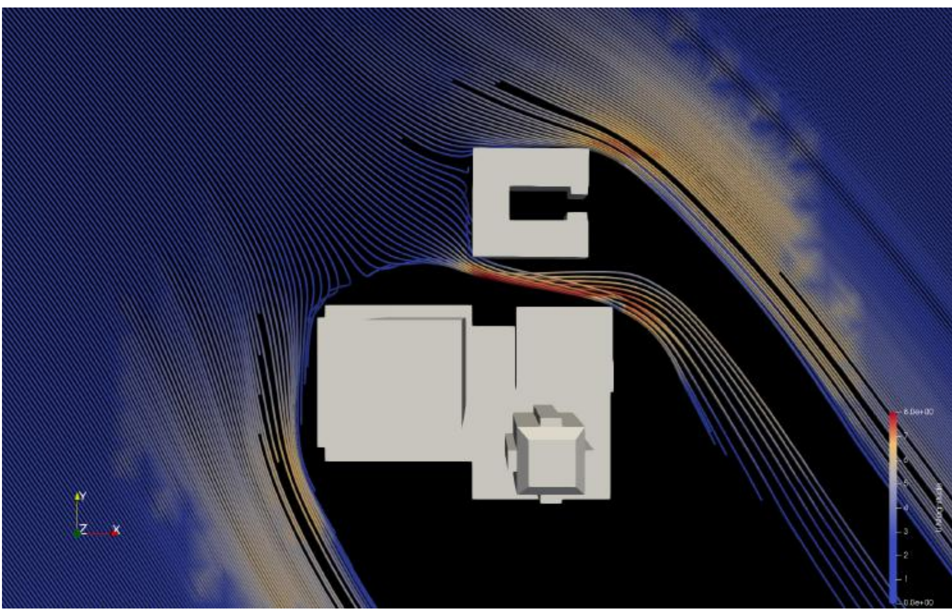
Atlanta, GA Windrose

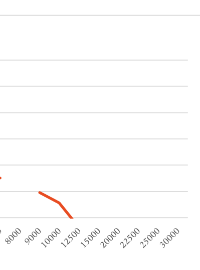
The graphs below demonstrate the Epsilon and K difference convergence to zero, which validates the results of the simulation. The visual results of the simulation are shown on the right.











Simulation Results

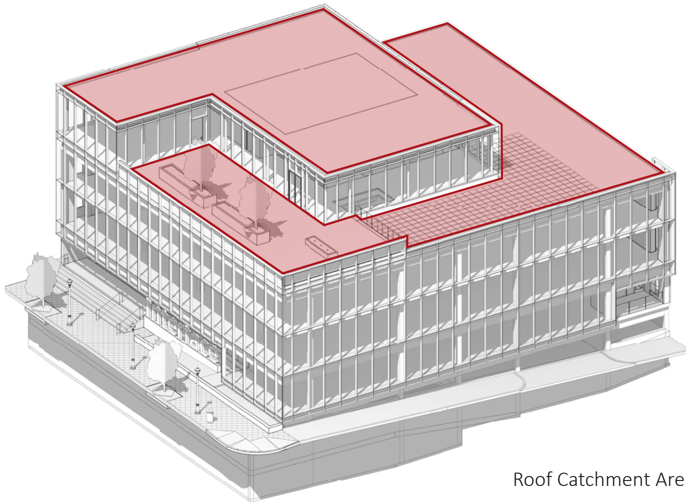
Since the wind direction studied in this analysis represents the prevailing winter wind, a relatively uncomfortable environment is created at the southeast corner of the Interface Headquarters during the colder months. This issue could be mitigated by introducing tall vegetation along the sidewalk, where feasible, or by adding barriers to block wind from this direction.

Rainwater Harvest/ Water Consumption Analysis

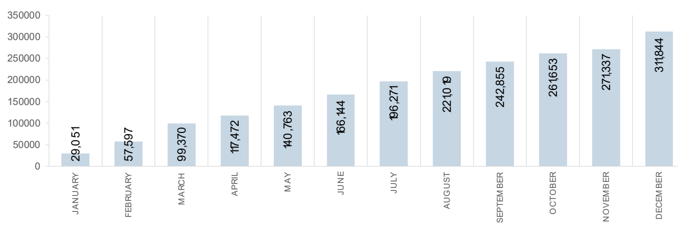
In this phase of the project, the Interface building's capacity to harvest rainwater and reduce overall water consumption was analyzed, with the results presented in this section.

For this analysis, precipitation data for Atlanta, Georgia (in inches, spanning 1930–2024) were extracted. Based on simulation results, the roof area shown in the diagram below has the potential to collect approximately 2,115,375 gallons of rainwater per year, provided cistern storage requirements are met.

Additionally, by implementing more efficient water fixtures and incorporating blackwater treatment, the building's annual water consumption could be reduced to 443,718 gallons.



Roof Catchment Area



Building Rainwater Harvest Potential (in Gallons) Divided by Each Month

Baseline Water Reduction Goal			Annual Building Water Consumption
Toilet Gal/Flush 1.60	Urinal Gal/Flush 1.00	Lavatory Gal/min 0.5	753,518 Gal/Year

Water Use Intensity 17

40% Water Reduction Goal			Annual Building Water Consumption
Toilet Gal/Flush 1.10	Urinal Gal/Flush 0.125	Lavatory Gal/min 0.35	443,718 Gal/Year

Blackwater Treatment System potential: 10% Reduction

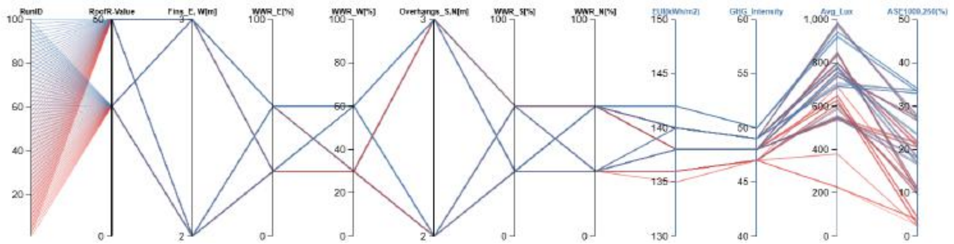
Water Use Intensity 10

Conclusion

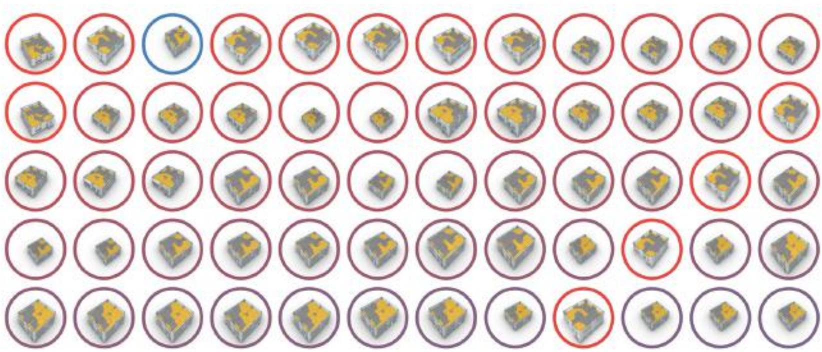
Comparison of the Rainwater Harvest potential and the water consumption predictions, the building could go water zero if cistern requirements are met. In this case, at least 3 cisterns with the dimensions of 15ft X 20ft X 20 ft are required for the building to become water zero.

Energy/ Illumination Optimization

Here, the goal was to identify the best design option for achieving lower EUI (Energy Use Intensity) and GHC (Greenhouse Gas Intensity), while having optimum average illumination intensity (lux) and ASE 1000, 250 (annual sunlight exposure). The design options consist of 100 different variations, which were obtained by considering different values for: WWR- East, WWR-West, WWR-South, WWR-North, Roof R-value, Fins dimensions (East & West), Overhangs Dimensions (North & South)

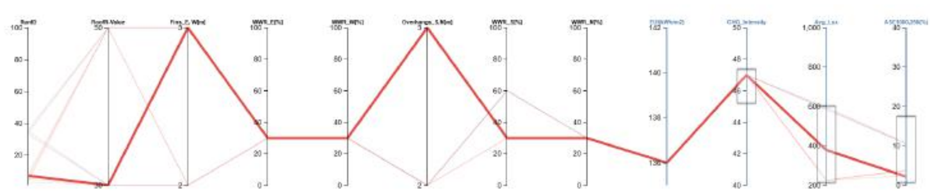


Design Explorer All simulations Diagram



ASE 1000/250 Simulation for each design Scenario (60 shown out of 100)

The Study shows Roof R-Value change from 30 to 50 m²·K/W has minimal effect on the studied buildings overall energy performance. 50% change in the fins and overhangs size does not affect Buildings EUI and GHC intensity substantially and From the criteria surveyed, WWR ratios had the largest impact on overall building energy performance. In this project, each design combination was created by a grasshopper script and EUI and GHC Intensity were calculated. Then each design option was analyzed for Annual Solar Exposure (ASE1000,250) and Average lux using Climate Studio for Rhino.



Selected Design Scenario

CHAPTER 6

ADVANCED PRODUCTION WORKFLOWS

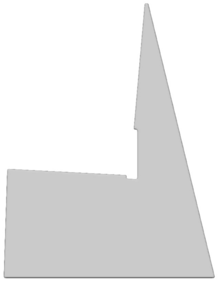
FALL 2024

Structural Optimization in Furniture Design

This project explores topology optimization in furniture design. The chair's form was generated using a topology optimization algorithm, with Autodesk Fusion 360 used for the analysis. The design minimizes material by including only the essential components required to withstand defined forces, mimicking the way human bones adapt to stress by increasing or decreasing mass.

The chair is engineered to support a seat load of 300 pounds and a backrest load of 150 pounds, with a safety factor of 2. MDF (Medium-Density Fiberboard) was used as the sole material for prototyping.

In the first phase of production, the parts were precision-cut from a 3/4-inch MDF sheet using a CNC milling machine. The next step involved assembly, followed by the application of a wood sealant for finishing. The completed product is shown in the image on the right.



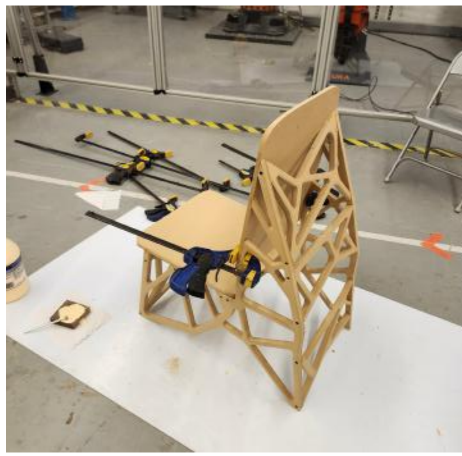
Topology Optimization Iteration 1

Topology Optimization Iteration 6

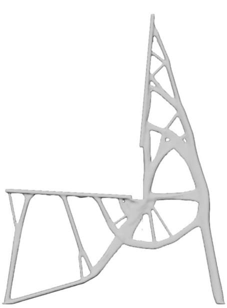
Fabrication Stage I: 3-axis milling of chair parts.

Fabrication Stage II: Gluing the structural parts.

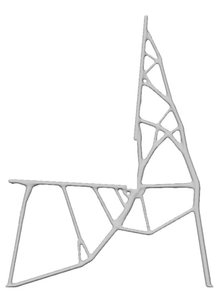
Fabrication Stage III: Assembling and screwing the chair components together to enhance structural stability.



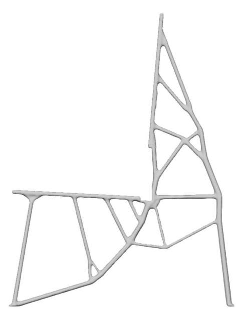
Fabrication Stage IV: Attaching the chair seat and backrest to the structure.



Topology Optimization Iteration 11



Topology Optimization Iteration 16



Topology Optimization Iteration 34

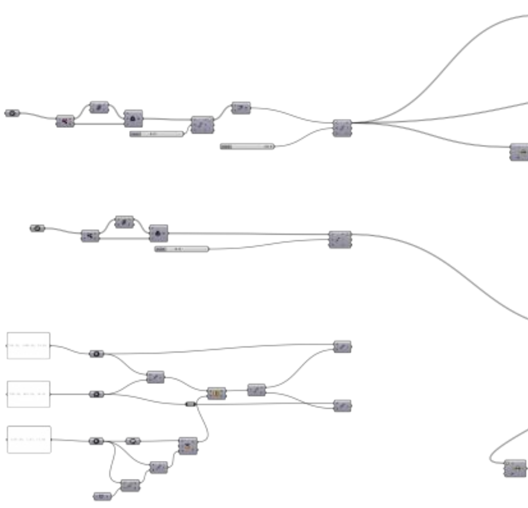
Parametric Robot control (Kuka|prc)

This project explores parametric robotic fabrication through the use of a KUKA industrial robot equipped with a custom wire-cutting end effector. Using a parametric control framework developed in Grasshopper and PRC, the robot was programmed to cut precise geometries from polystyrene foam blocks. The scripted toolpaths allowed the foam to be shaped into a series of unique tile molds, each generated from adjustable parameters within the algorithm. This workflow ensured that every tile could vary in form while maintaining fabrication efficiency and robotic precision.

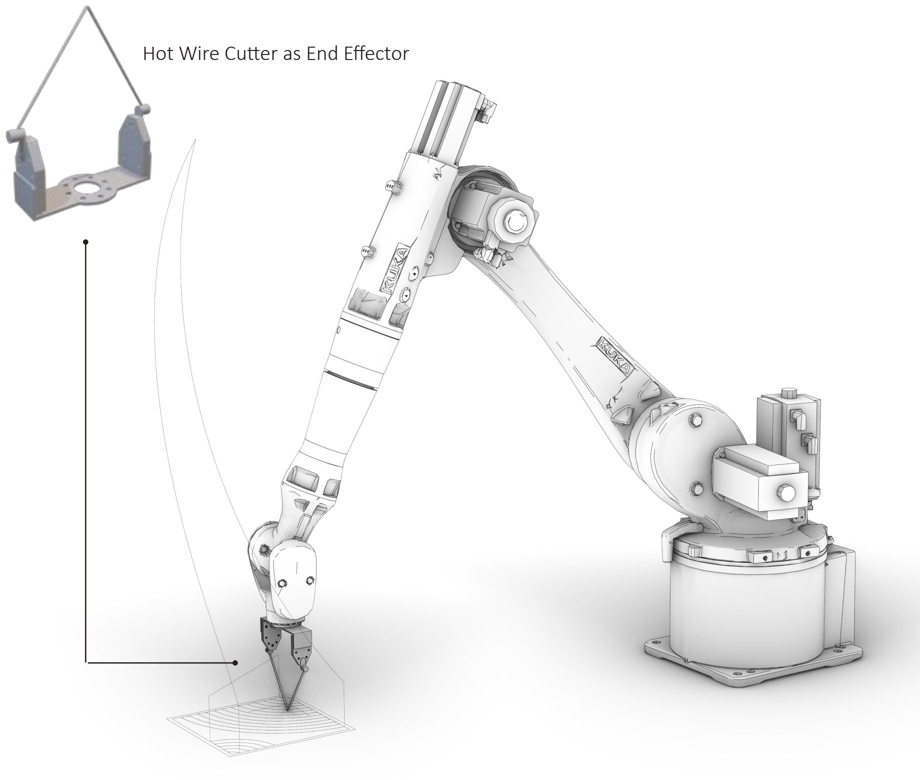
Once the foam molds were robotically carved, concrete was cast directly onto the foam tiles, producing a collection of bespoke concrete tiles with intricate surface geometries.

The polystyrene foam blocks carved by the robot and the final concrete tiles are shown in the images below.

The combination of computational design, robotic control, and
tion. The Grasshopper script shown in the spread documents
fabrication process repeatable, accurate, and deeply customiz

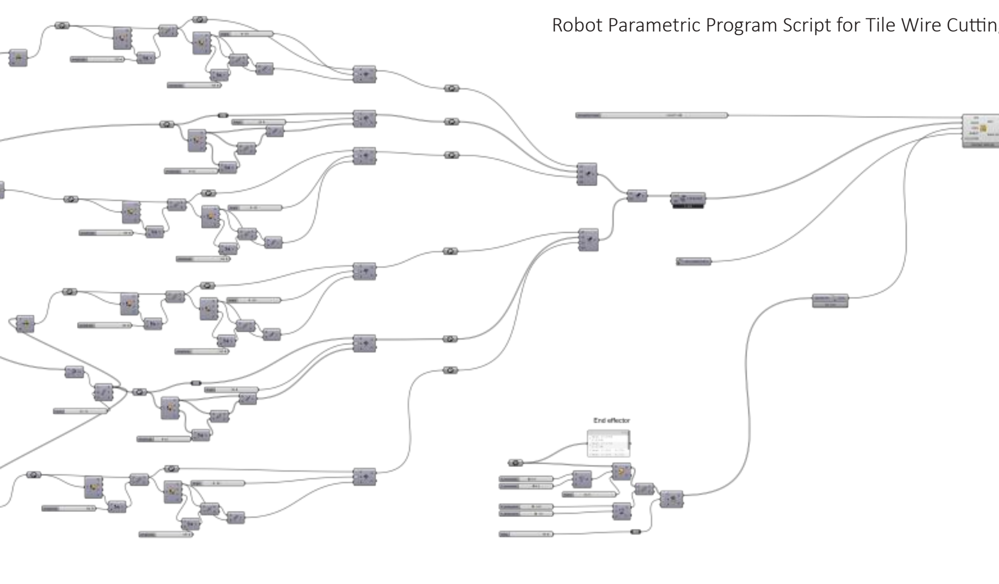


Hot Wire Cutter as End Effector



d material experimentation demonstrates how parametric modeling can translate seamlessly into full-scale fabrica-
the logic behind the system—linking the sculpting parameters, toolpath generation, and robot motion that made the
able.

Robot Parametric Program Script for Tile Wire Cutting

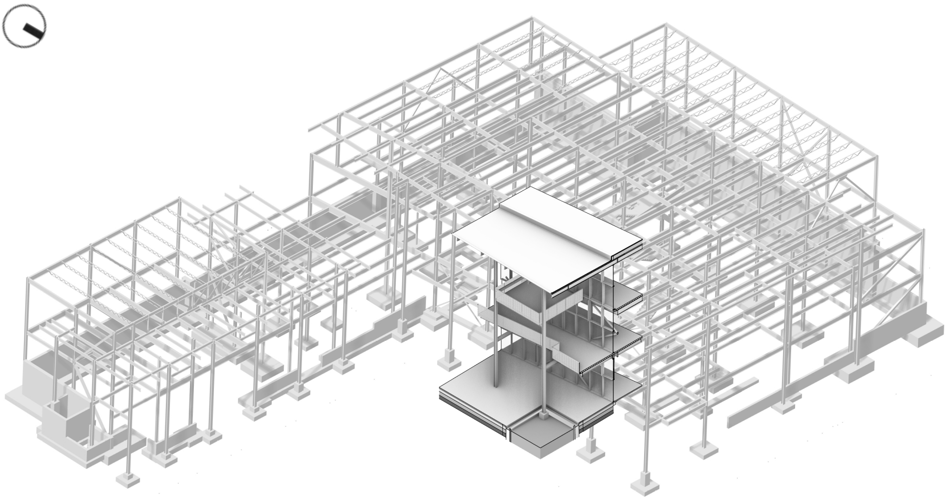


CHAPTER 7

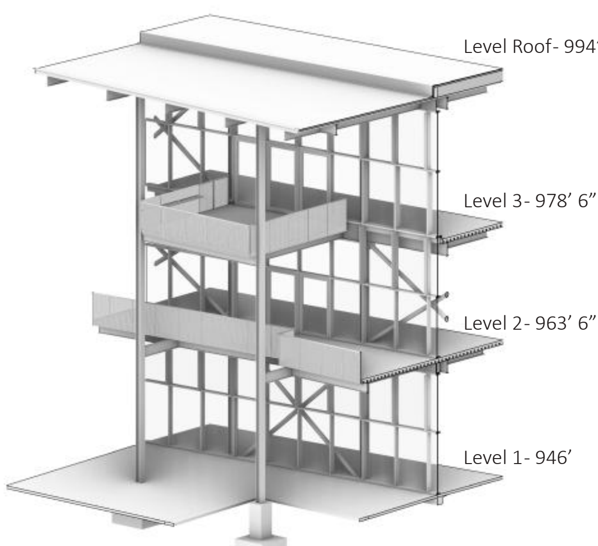
CONSTRUCTION DETAILS: WEST VILLAGE DINING COMMONS

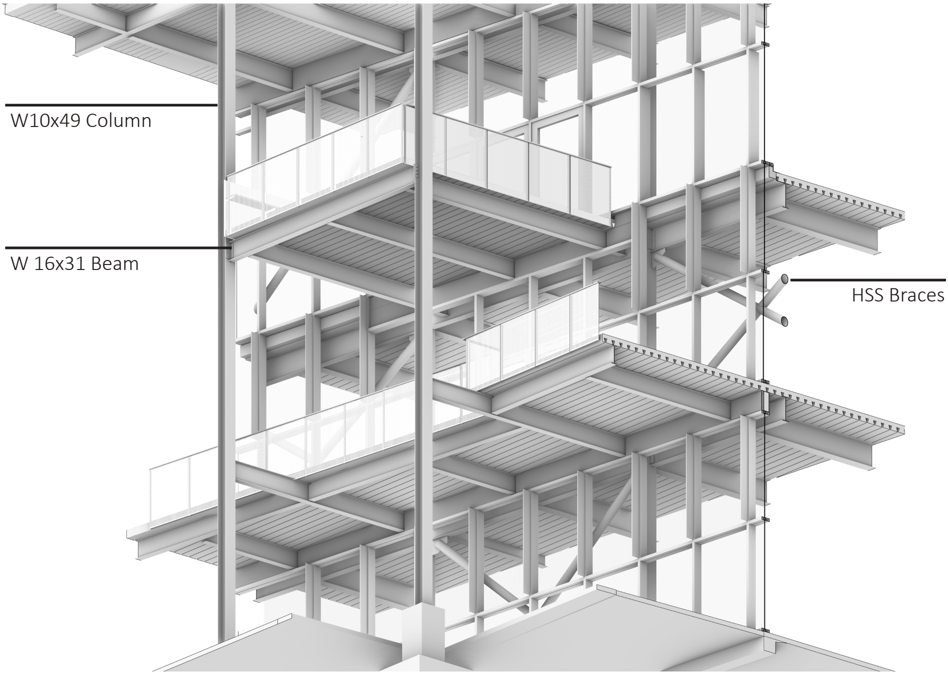
SPRING 2024

This project is a structural analysis study of the West Village Dining Commons building at Georgia Tech, focusing on its primary and secondary structural systems as well as the building envelope. The first step involved modeling the primary structure—including beams, columns, braces, and structural connections—based on the construction plans.

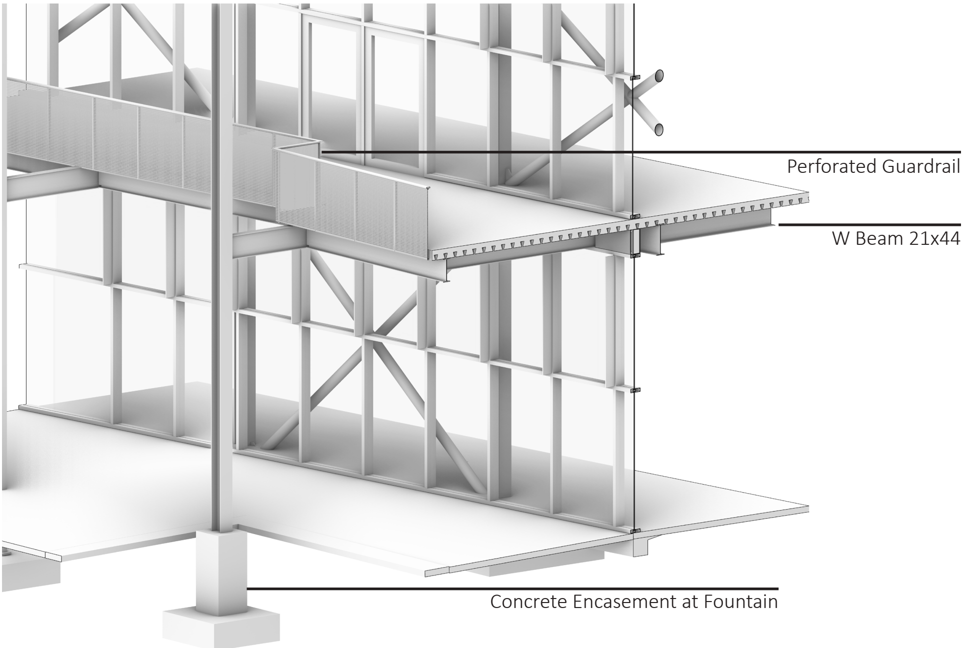


In the next stage, a portion of the building enclosure was selected for detailed study, including part of the façade, the envelope system, and both the primary and secondary structures. The objective of this project is to gain a deeper understanding of how the structure and envelope interact and function together. The image on the right shows the section of the building envelope modeled in the greatest detail. This portion faces east and covers part of the structure primarily used by students for dining. In the following pages, this section is examined more closely, with several selected large-scale views presented. The focus of this project is on building physics and construction considerations.

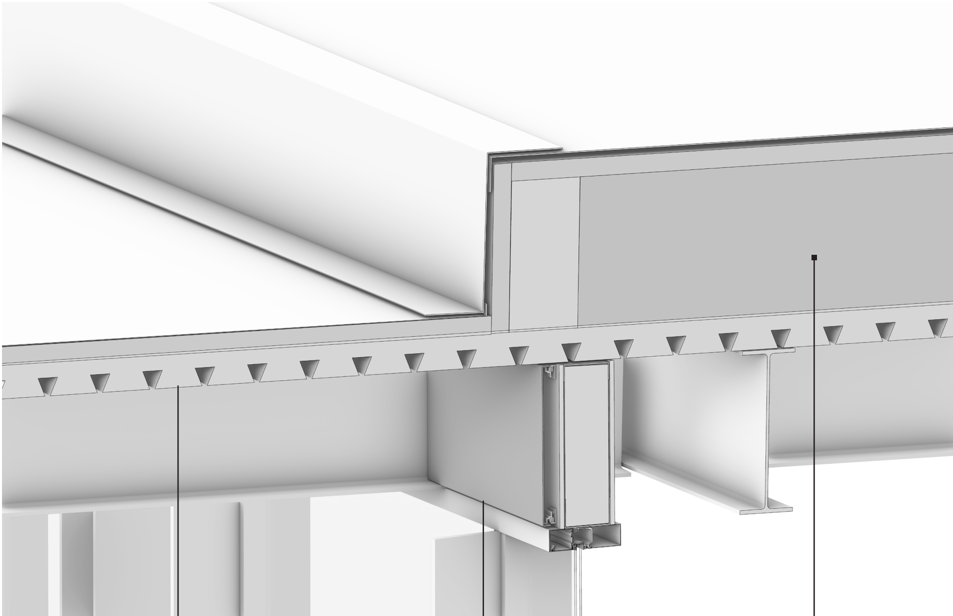




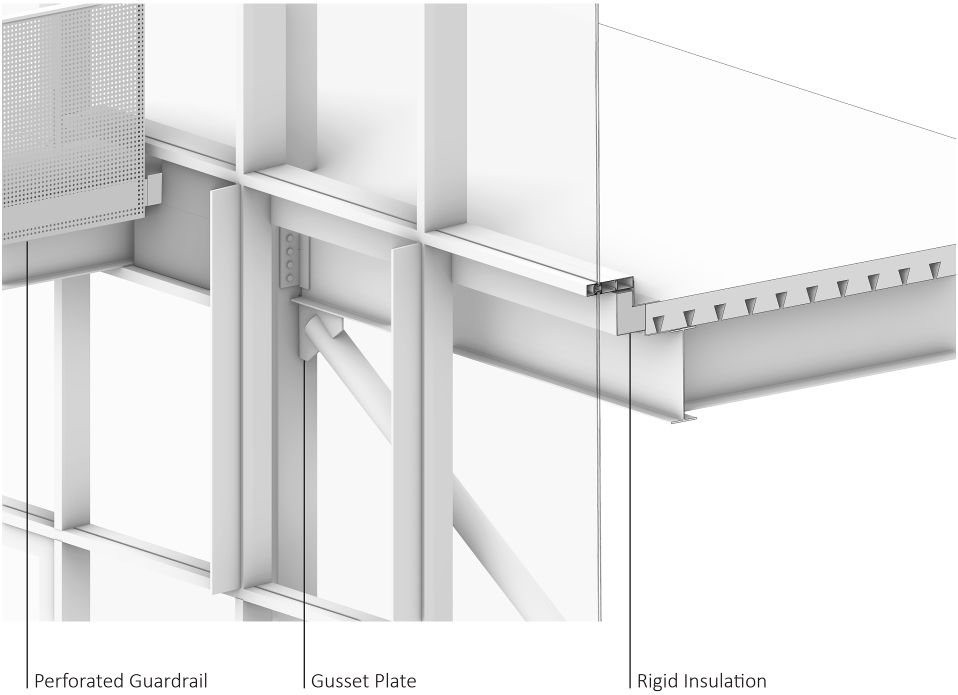
Isometric Worm's Eye View (Level 02 to 03)

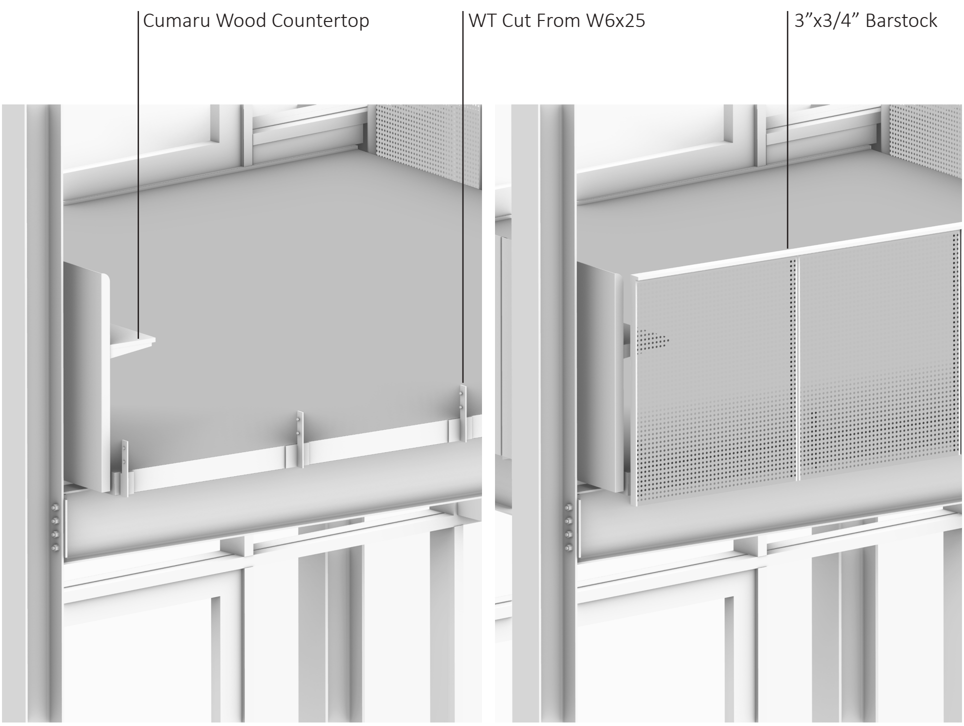


Isometric (Level 01 to 02)


Dovetail Shaped Roof Deck
Metal Panel
Rigid Insulation


Flashings
W16x26 Beam


Perforated Guardrail
Gusset Plate
Rigid Insulation


Cumaru Wood Countertop
WT Cut From W6x25
3”x3/4” Barstock

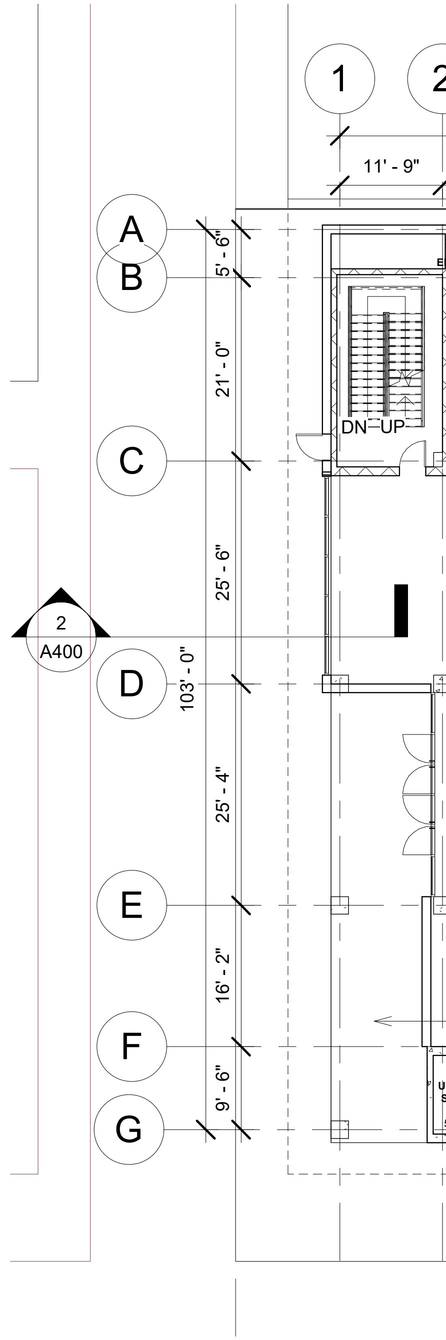
CHAPTER 8

INTEGRATED BUILDING SYSTEMS: TECHNICAL DRAWINGS

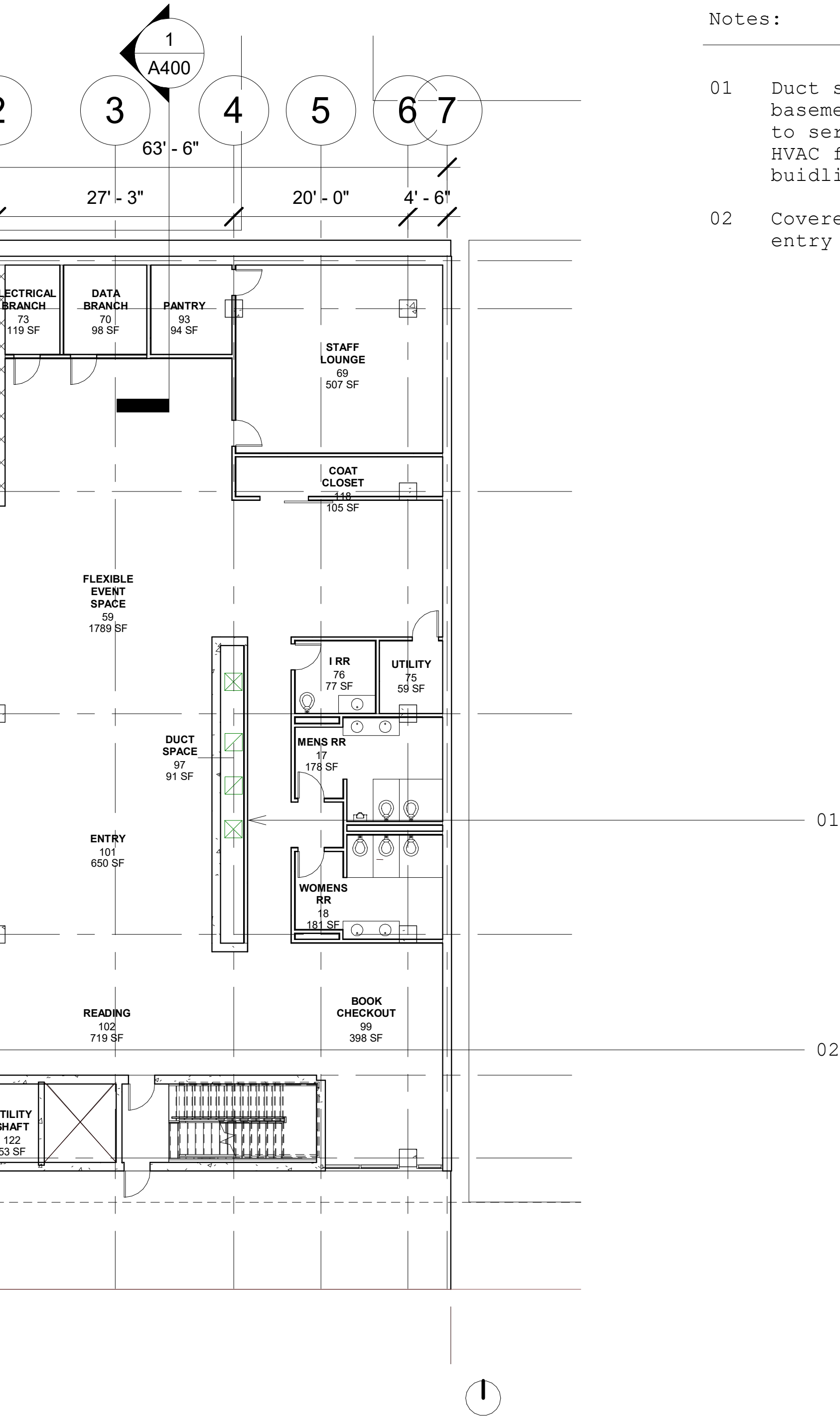
FALL 2024

This collaborative Integrated Building Systems project involved the full architectural, structural, and MEP design of a proposed Rare Books Library in Boston, culminating in a comprehensive 45-sheet drawing set. Working as part of a four-person team, we developed coordinated architectural plans, life-safety diagrams, structural drawings, and complete HVAC, mechanical, electrical, and plumbing layouts for a multi-level library facility. The architectural package includes floor plans, sections, detailed drawings, and life-safety plans, all supported by a fully resolved egress strategy and occupancy calculations. Throughout the project, Building Information Modeling (BIM) workflows ensured that architectural intent remained aligned with technical requirements across all disciplines.

On the engineering side, our team produced detailed structural drawings—including foundation plans, column grids, load-distribution diagrams, and structural axonometrics—that demonstrate the interaction between the building and its primary load-bearing elements. Parallel to the structural work, the MEP package includes duct routing, HVAC zoning, mechanical roof plans, electrical layouts, power distribution, and coordination of vertical shafts for service continuity across floors. Only a curated selection of these drawings is displayed in the portfolio, but collectively the full set reflects a rigorous integrated-systems approach and highlights our team's capability to deliver a coordinated, code-compliant technical package for a complex institutional building.



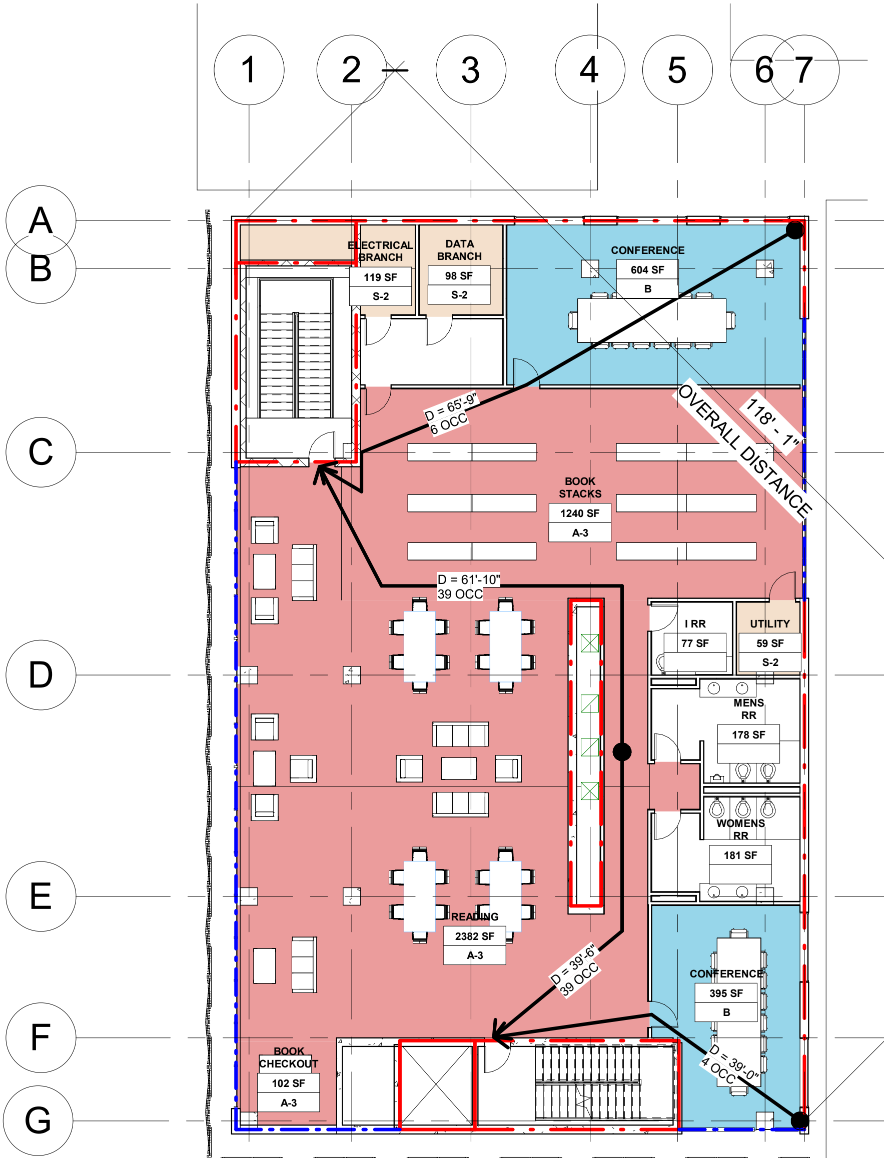
1 GROUND FLOOR PLAN
1/16" = 1'-0"



Notes:

01 Duct space from basement to roof to service MEP and HVAC for each buidling level

02 Covered outdoor entry space



1 LEVEL 3 LIFE SAFETY PLAN
1/16" = 1'-0"

Occupancy Legend

- A-3
- B
- S-2

LIFE SAFETY NOTES:

OCCUPANCY TYPES:

A - ASSEMBLY (LIBRARY)	50 SF/OCC
B - BUSINESS	100 GSF/OCC
S - STORAGE & MECH	300 GSF/OCC

ARROW INDICATES EXIT TO GRADE

ROOM NAME

150 SF ← ROOM AREA

A ← ROOM OCCUPANCY

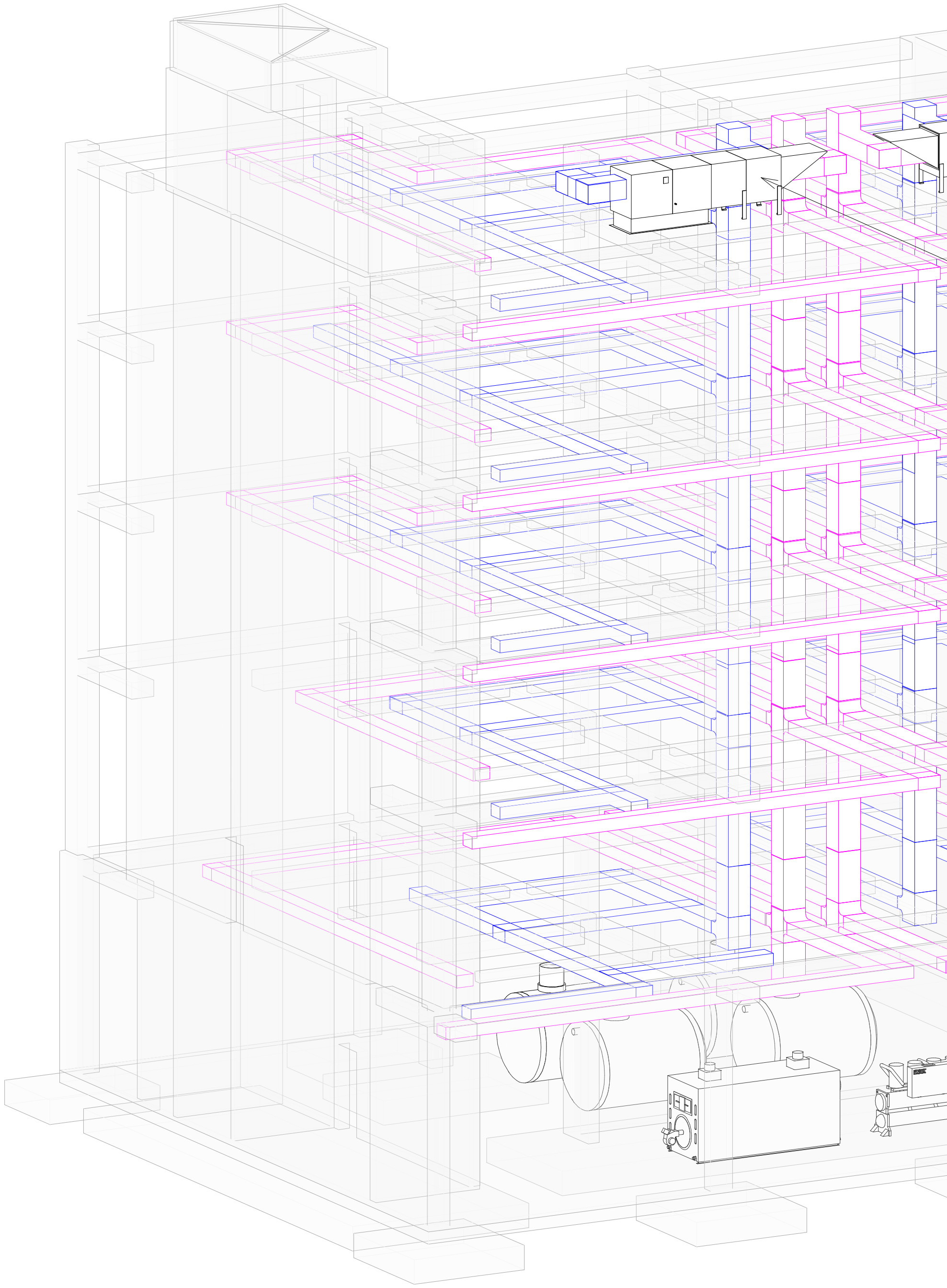
1-HR RATED WALL

2-HR RATED WALL

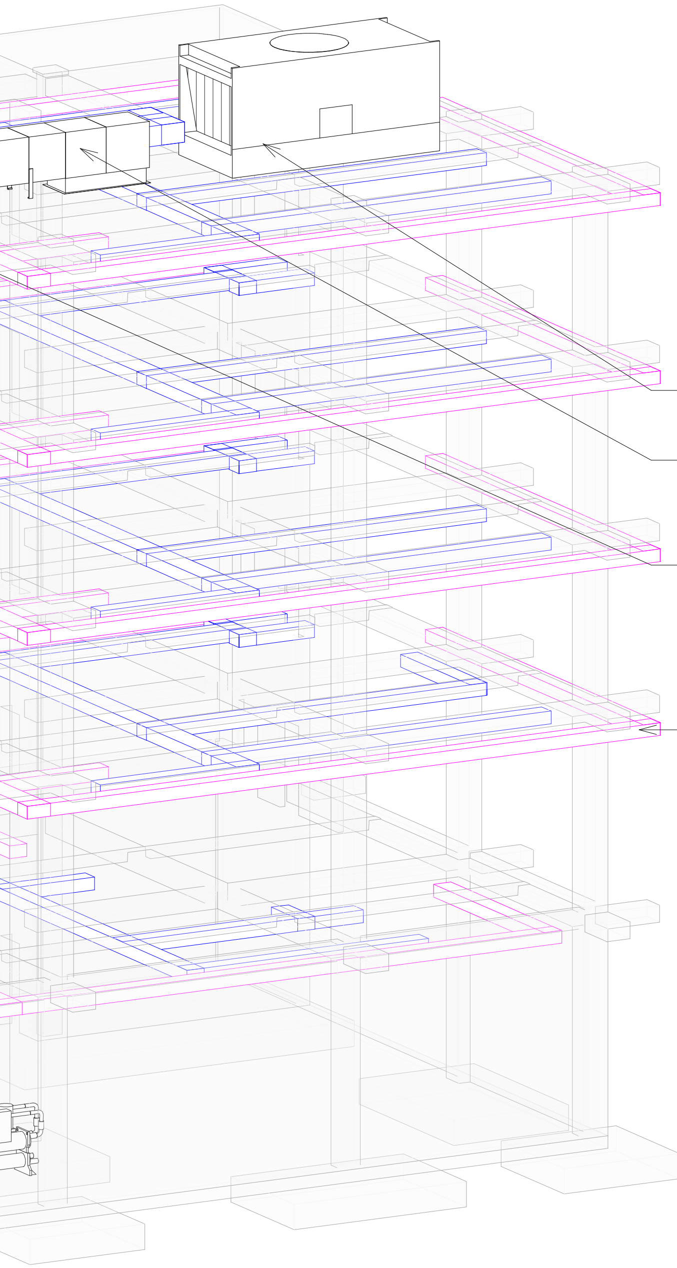
ASSEMBLY	
TYPE OF CONSTRUCTION:	II
OCCUPANCY:	A
FLOOR AREA:	3,900 SF
OCCUPANT LOAD:	50 SF/OCC = 78 OCC

BUSINESS	
TYPE OF CONSTRUCTION:	II
OCCUPANCY:	B
FLOOR AREA:	993 SF
OCCUPANT LOAD:	100 GSF/OCC = 10 OCC

STORAGE/MECH.	
TYPE OF CONSTRUCTION:	II
OCCUPANCY:	S
FLOOR AREA:	305 SF
OCCUPANT LOAD:	300 GSF/OCC = 1 OCC



1 3D MECHANICAL DUCT AXON



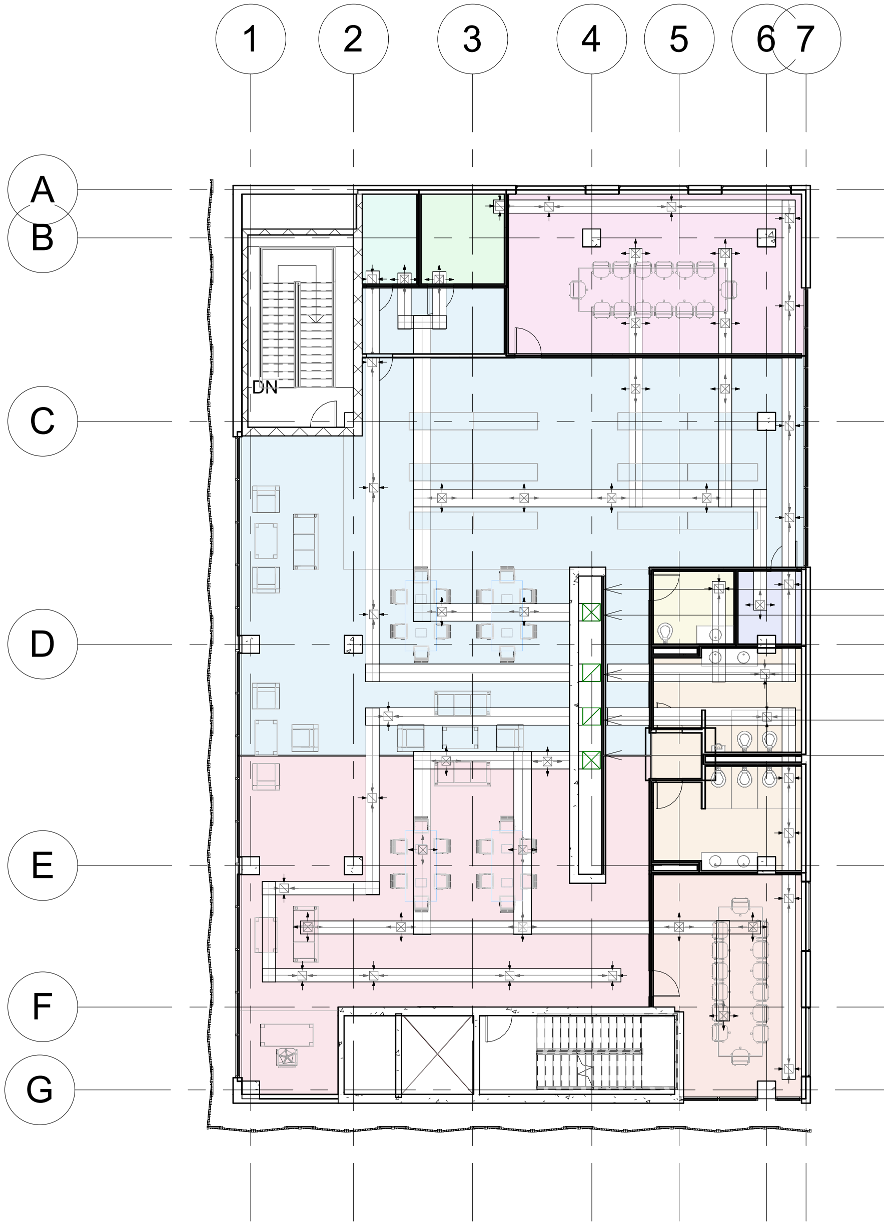
Notes:

01 Cooling tower

02 AHU system 1

03 AHU system 2

04 Mechanical system exists below structure



1 LEVEL 3 HVAC ZONE PLAN
1/16" = 1'-0"

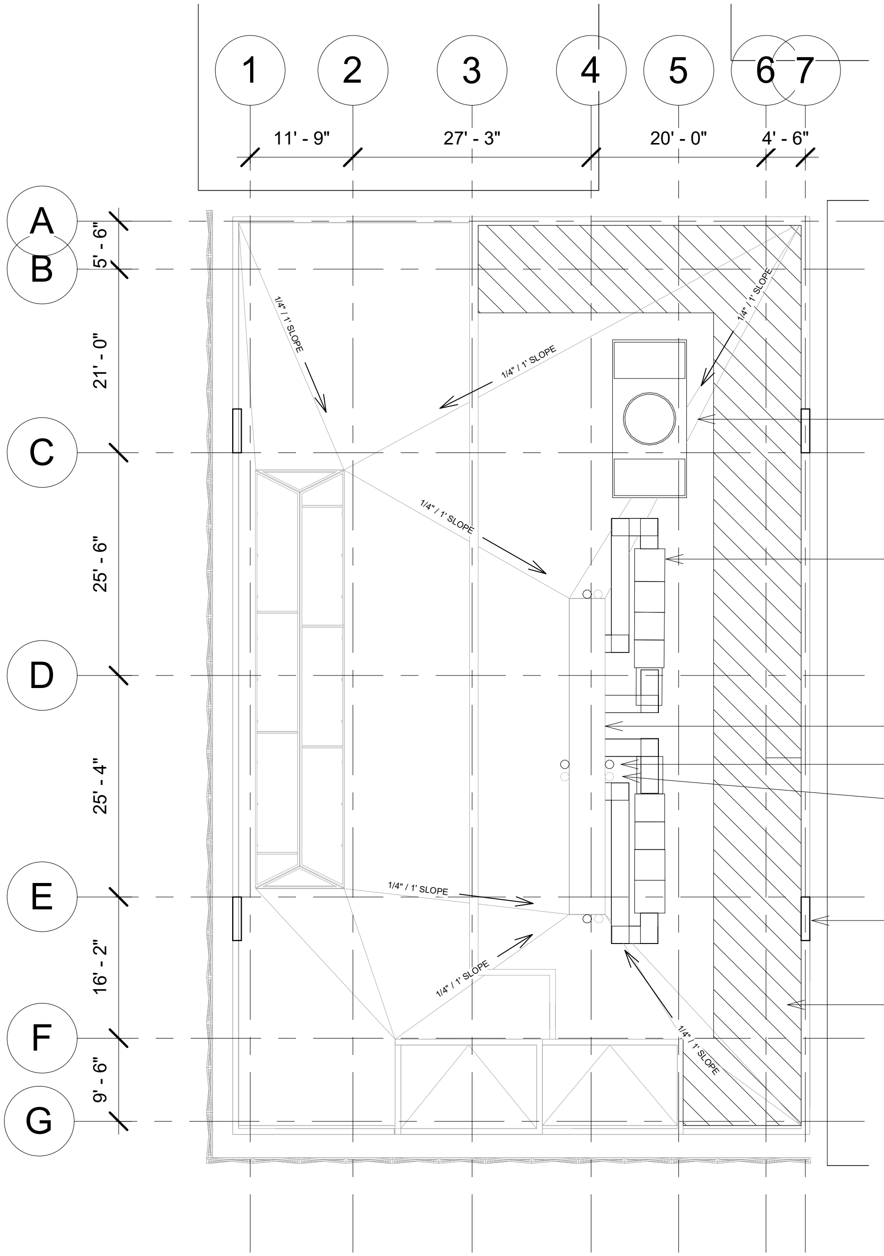
HVAC Zone Legend

ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 6
ZONE 7
ZONE 8
ZONE 9

01
02
03
04
05

Notes:

01	Mechanical HVAC shaft
02	Supply system 1
03	Return system 1
04	Return system 2
05	Supply system 2



1 ROOF PLAN - MEP
1/16" = 1'-0"

01

02

03

04

05

06

07

Notes:

01 Cooling tower

02 Air handler unit (AHU)

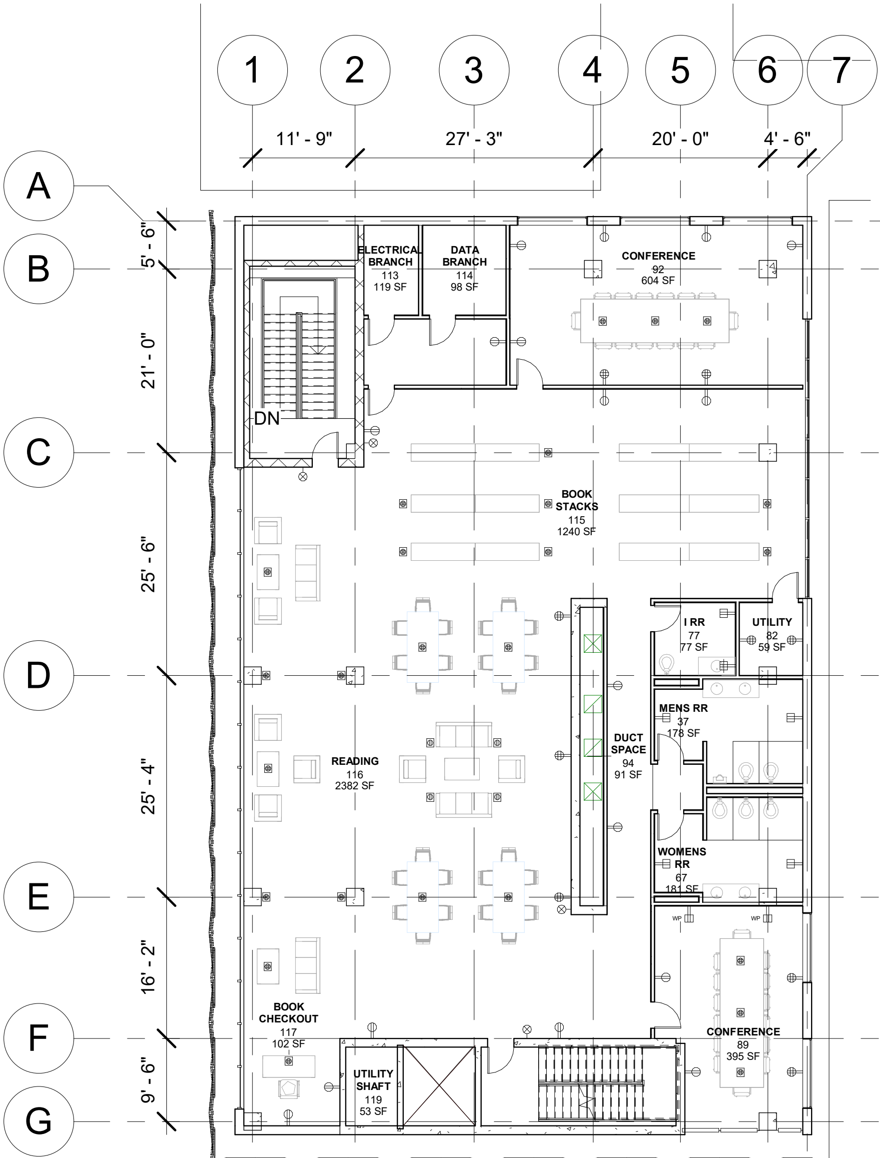
03 Duct shaft to service HVAC for each building level and rain water catchment to be stored in basement cisterns for grey water irrigation.

04 Roof drainage inlets

05 Emergency roof drainage

06 Scupper

07 10' clearance for access and service



1 LEVEL 3 POWER PLAN
1/16" = 1'-0"

POWER SYMBOLS:

DUPLEX RECEPTACLE OUTLET, WALL-MOUNTED. MOUNT 18" AFF, UNLESS OTHERWISE NOTED.

QUADRUPLEX RECEPTACLE OUTLET, WALL-MOUNTED,MOUNT 18" AFF, UNLESS OTHERWISE NOTED.

GFCI DUPLEX RECEPTACLE OUTLET, WALL-MOUNTED,MOUNT 18" AFF, UNLESS OTHERWISE NOTED.

GFCI DUPLEX RECEPTACLE OUTLET, WALL-MOUNTED,ABOVE COUNTER.

WP DUPLEX RECEPTACLE OUTLET WITH WEATHERPROOF FACEPLATE, WALL-MOUNTED.

DUPLEX RECEPTACLE MOUNTED IN FLOOR BOX WITH COVERPLATE.

QUADRUPLEX RECEPTACLE MOUNTED IN FLOOR BOX WITH COVERPLATE.

Exit Sign

Salar Zadeh
Salarzh96@gmail.com
+1 (470) 662-4705