

A grayscale architectural rendering of a multi-story atrium. The space is characterized by a complex, geometric ceiling structure with a grid of intersecting lines. Multiple levels of balconies with glass railings are visible, creating a sense of depth and verticality. A woman in a long, light-colored dress stands on one of the balconies, her arms outstretched, adding a human element to the architectural scene. The overall atmosphere is modern and sophisticated.

MOTION, SPACE AND SOUND

DESIGN RESEARCH FOR THE
ALEXANDRIA PERFORMING ARTS CENTER

Motion, Space and Sound

Design Research for the Alexandria Performing Arts Center

Gerardo Martin Hernández Trías

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Master of Architecture
in
Architecture

Paul Emmons, Chair

Jaan Holt

Susan Piedmont-Palladino

September 30th, 2016

Alexandria, Virginia

Keywords: Architecture, Opera House, Music, Sound, Performance, Hanging Bridges, Spaces

Motion, Space and Sound

Design Research for the Alexandria Performing Arts Center

Gerardo Martin Hernández Trias

Abstract

As part of our daily routines, we continually move from one space to another. The existing conditions of the spaces we move through often impact the way we experience architecture. Whether we transition between spaces by walking, cycling, running, driving a car, or riding the train, we face many challenges on a daily basis. As it is crucial that designers understand how one single person or a group of people are able to move efficiently through the various spaces, my thesis research aimed at to exploring the following question:

How can architecture enrich the experience of moving from one space to another, and bring people together into a shared space in a meaningful way?

In response to the above question, I would like to research the ways in which mobility, in both vertical and horizontal dimensions, can create a positive and meaningful impact when bringing people together in a commercial-cultural type space. Therefore, my focus within this topic will be an exploration of how architecture may enrich this human experience, which should begin from the moment people arrive at the site, as this is a major space component of my project. Proceeding the moment we enter the first space of a building, and subsequently the different spaces within the building, and finally exiting the site.

To accomplish the above aim, I have chosen to design a performing arts facility in which the main space will be an opera house in a metropolitan setting. Since the District of Columbia already has two such venues, I landed on the idea of providing the City of Alexandria with one of its very own. I propose *The Alexandria Performing Arts Center*, located on a waterfront site, that will include an opera house with a capacity of 1,400. The site is located at the Robinson Terminal North between Oronoco and Pendleton Street.



Motion, Space and Sound

Design Research for the Alexandria Performing Arts Center

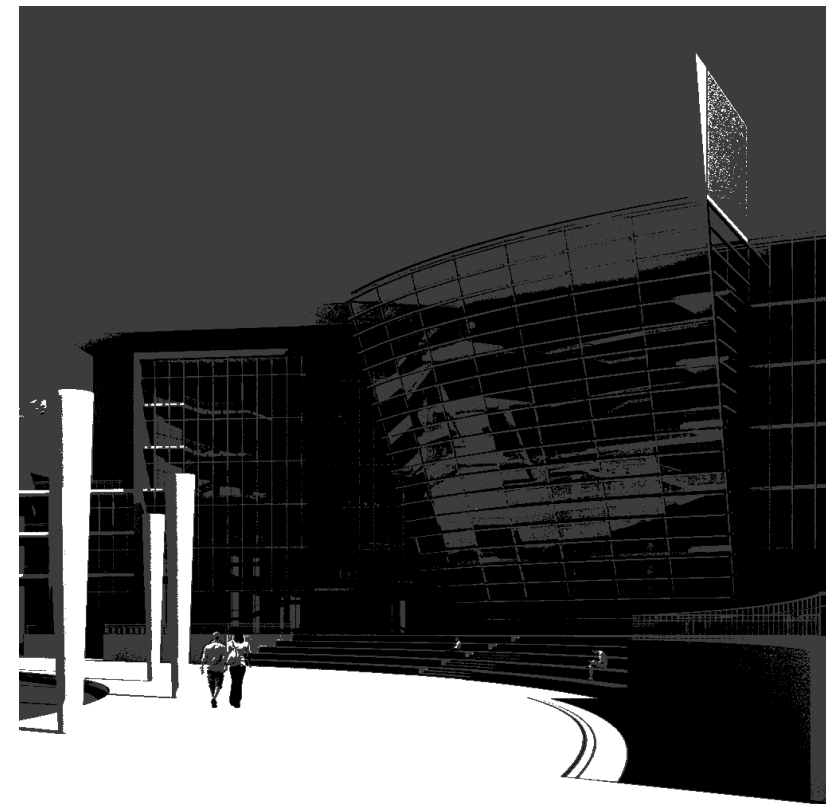
Gerardo Martin Hernández Trias

General Audience Abstract

The overarching goal of this journey is to explore how architecture can bring meaningful experiences at various moments throughout the building, as well as how the exterior spaces can impart similar effects. My wish is that the outcome may create a positive impact on those visiting the building for the first time, as well as those occupying it on a daily basis.

My desire to explore these opportunities in an opera house is rooted in my interest in this type of performance and in music in general. I chose to locate my project next to the water because I believe that this has a beneficial effect on architecture. As I have spent more than two years in Alexandria while attending Virginia Tech, I thought that situating my endeavor there would constitute a valuable opportunity to learn more about this vibrant city. It is my earnest hope that the results will unlock untapped benefits that the city may offer to residents and visitors alike.

During the planning process of the Alexandria Waterfront Masterplan, which has been in the works for the last few decades, Alexandrians have asked for “more things to do.” Alexandria’s waterfront is not just special because it has played a significant role in the nation’s history, it also has great potential to accommodate more public spaces. Ideally, this project will become an integral part of the unique identity of the city’s waterfront, and will help to connect the adjacent public spaces creating a diverse scale of spaces, that will contribute greatly to the community.



Dedication

I dedicate this thesis research to my wife Brenda. You have taken a tremendous load so we can finish this journey. You are always by my side, through good and difficult times. Above all, I am extremely honored to be your husband.

Acknowledgments

First and foremost, I thank God for this amazing opportunity and for giving me strength during this journey.

To my committee, Jaan, Paul, and Susan, there are not enough words to describe how thankful and appreciative I am of all of you. I am extremely privileged for being your student, and I have learned an enormous amount from each of you. Your love and passion for architecture is both immeasurable and contagious, your encouragement to always strive to achieve meaningful architecture, and most importantly your wisdom, are priceless treasures that you have given to me. Thank you for constantly challenging me throughout this process.

A special thanks goes to Jaan. I was highly fortunate to have you as my professor in each semester from day one during this journey. Your guidance and wisdom were crucial in getting me to the next level. You are very special to many of us because your dedication and hard work in building up the WAAC throughout all these years have impacted thousands of lives, and I thank you for that.

I would especially like to thank my faithful family because without your support and encouragement, I would never have reached the finish line. Your prayers and financial support were essential throughout this journey. I am so grateful that you are there for me, regardless of the circumstances. I particularly thank my wife Brenda for her unconditional love and patience during this long process. Without her by my side, it would not have been possible.

I am deeply grateful to my friends and colleagues at the WAAC for their friendship and support. You are a great source of inspiration and I am thankful to be constantly learning from each of you.

To the WAAC administrative staff and faculty, many of us consider you to be an extended family, and to the hard-working members of Virginia Tech in Blacksburg, most of whom are working for us behind the scenes, thank you for endlessly supporting and looking out for us all. Your backing and dedication are key to each student's success. Every one of you makes a real difference.

Thank you all so very much!



Contents

The Beginning

A Brief History of Opera	1
Sketches and Drawings	2
Site Selection	3
History of the Chosen Site	4
Site Location	5
Site Analysis	6
Precedent #1	7
Precedent #2	9
Site-Test of Precedents	11
Study Models Phase 1	12
Schematic Design	13
Study Models Phase 2	14
Preliminary Plans and Section	17
Material Research and Structure	18
Design Research for Auditorium	21

Thesis

Site Plan	24
Entrance Plan	27
Stage Plan Backstage Plan	28
Orchestra Plan Art Gallery Space Plan	29
First Tier Plan Gift Shop Plan	30
Rehearsal Space Plan Second Tier Plan Restaurant Plan	31
Dressing Rooms Plan Third Tier Plan Restaurant Plan	32
Administrative Office Plan Fourth Tier Plan VIP Reception Plan	33
Hanging Bridges Plans Detail	34
Hanging Bridges Sections Details	35
Section A-A	36
Section B-B	37
South Elevation	38
West Elevation	39
North Elevation	40
East Elevation	41
Renderings	42-59
Bibliography and Image Credits	60

A brief History of Opera

“The custom of using music in connection with dramatic presentations is universal. It is found throughout the history of all cultures. This is perhaps because the desire to add music to drama is really part of the dramatic instinct itself and may have as its end either edification or entertainment.”

“An opera, briefly defined, is a drama in music: a dramatic action, performed on a stage with scenery by actors in costume, the words conveyed entirely or for the most part by singing, and the whole sustained and amplified by orchestral music.”

“Greek drama, however, is of particular interest to us because it was the model on which the creators of modern opera at the end of the sixteenth century based their own works; it was the supposed music of Greek tragedy that they sought to revive in their monodic style.”



Photograph, Hungarian State Opera. The Nutcracker.

opera (ˈɒpərə), sb.

A dramatic performance in which music forms an essential part, consisting of recitatives, arias, and choruses, with orchestral accompaniment and scenery; also, a dramatic or musical composition intended for such performance, a libretto or score.

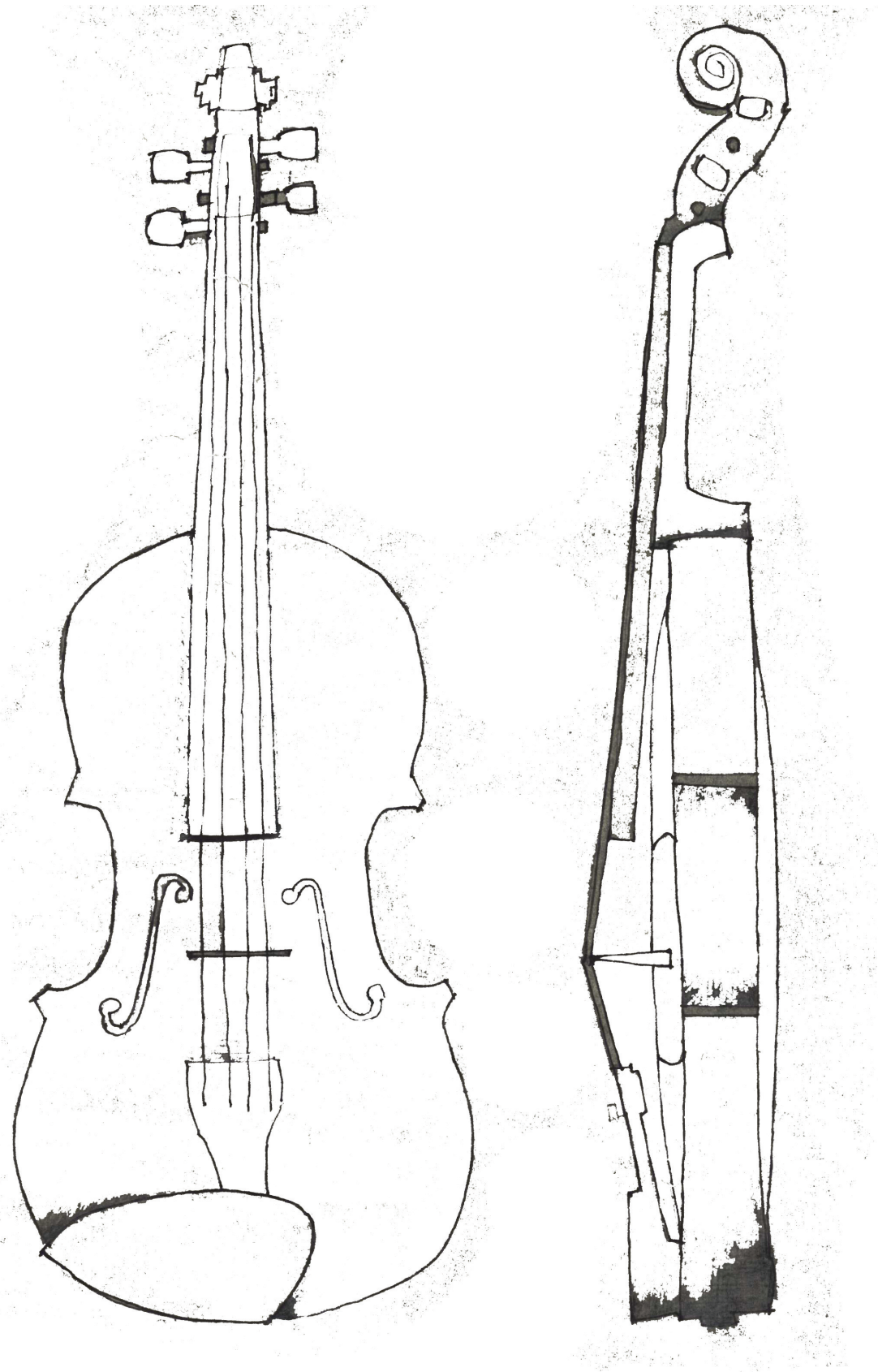


Fig. 1 Study Drawing in Pencil

"Every building must have... its own soul."

Louis Kahn

Wolfe, Tom. 1981. Page 51.

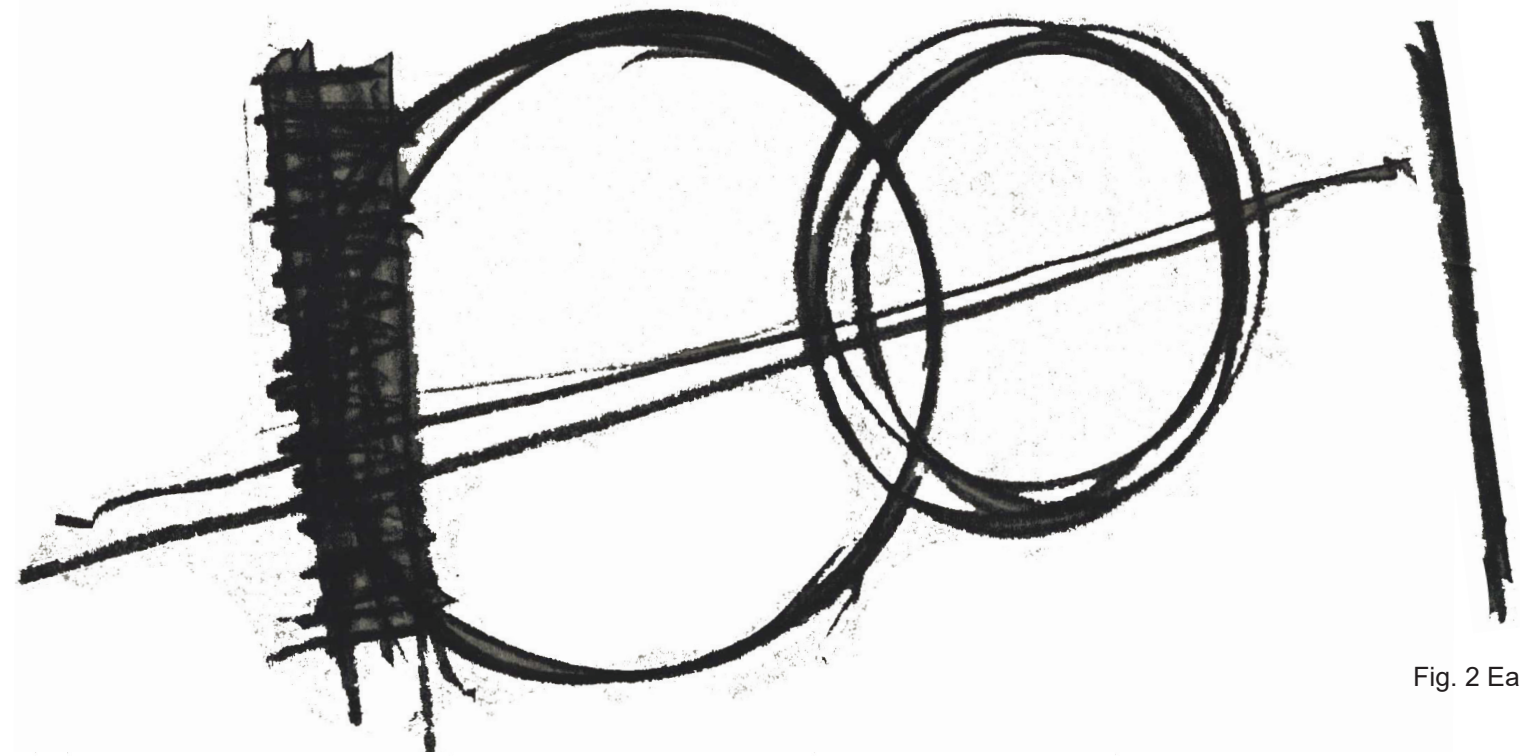


Fig. 2 Early Sketch in Charcoal



Fig. 3 Early Sketch in Charcoal

The instruments and talented musicians of the orchestra are, in part, the generators of the spirit of this program. That being said, I believe that the building, inside and out, should manifest the character of its purpose.

Based on this idea, I began looking at the form and details of classical instruments. I have always been fascinated by the delicacy and precision with which musical instruments are constructed.

Added to this, I have a belief that the particular ways in which the instruments are designed could be embodied at various moments in the architecture of the program.

The sketch seen in Fig. 2 is the plan at the early stages of the building. The building is situated near the edge of the water. The smaller circle, facing the water, will provide access to the auditorium. In addition, I want this section of the building to contain a restaurant and other services for the public. Such facilities will provide a significant source of revenue for the program.

The larger circle will house the auditorium with seating for approximately 1,400 people, the stage, and the backstage. The rectangular-shaped portion of the building is intended to house the offices administrative and dressing rooms for the performers.

Robinson
Terminal North
38°48'33.16"N - 77° 2'19.67"W

GenOn
Power
Plant



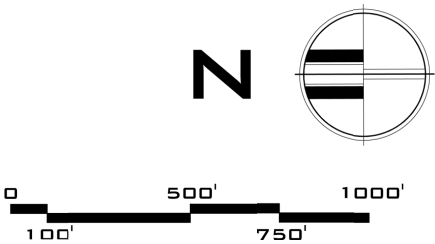
Plan of Alexandria, Virginia

SITE SELECTION

A performing arts center always attracts people of all ages. It is a special place because it gives both local and international artists the opportunity to delight hundreds of people in a single space, and sometimes thousands, depending on the size of the performance space.

A space designed for performance need not necessarily be enclosed. An amphitheater is always an interesting alternative for a variety of spectacles. Personally, had a strong desire that my program is bounded by water with potential access by boat; accordingly, I began my quest for a site along the Potomac River on Alexandria Old Town's shoreline. Despite the challenges that it might bring, I wanted to explore how my program could benefit from being at the water's edge.

After reviewing the few options available on the waterfront, I began to home in on key choices as per my committee's suggestions. The final contenders were the site of the GenOn Power Plant and the location of the old Robinson Terminal North. While both properties are vacant and ready for redevelopment, my final selection was the Robinson Terminal North because it is the most suitable for my extensive program.





1749 - A plan of Alexandria now Belhaven by George Washington

Print, Online Catalog Library of Congress.



1774



1789

Most of the shoreline of the City of Alexandria, which makes up most of the city's open public spaces, is the result of an extensive transformation dating back to the nation's beginnings. After its foundation in 1749, the construction of wharves began to change much of what is today the waterfront of Old Town Alexandria. At that time, the City of Alexandria became one of the busiest ports in North America, accounting for a large percentage of the nation's trading.

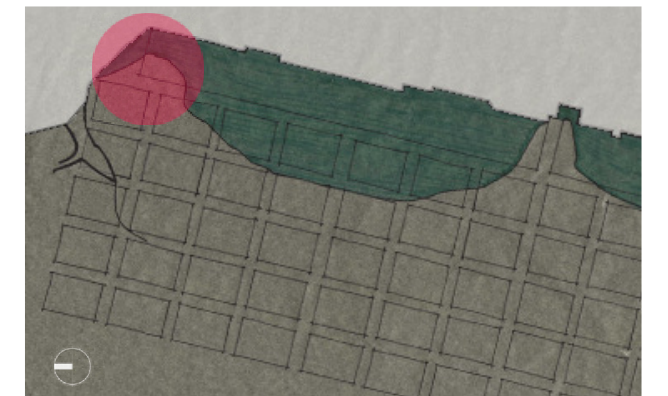
By 1789, additional blocks had been created along the shoreline. Their construction was made possible by a process called "banking out," whereby earth is moved from the bluff to the shoreline, and this continued to be the predominant construction method, transforming the shoreline in the subsequent years.

The site where the Robinson Terminal North is located has many layers of history, being situated right at West's Point which is a significant geographic location in the timeline of Alexandria.

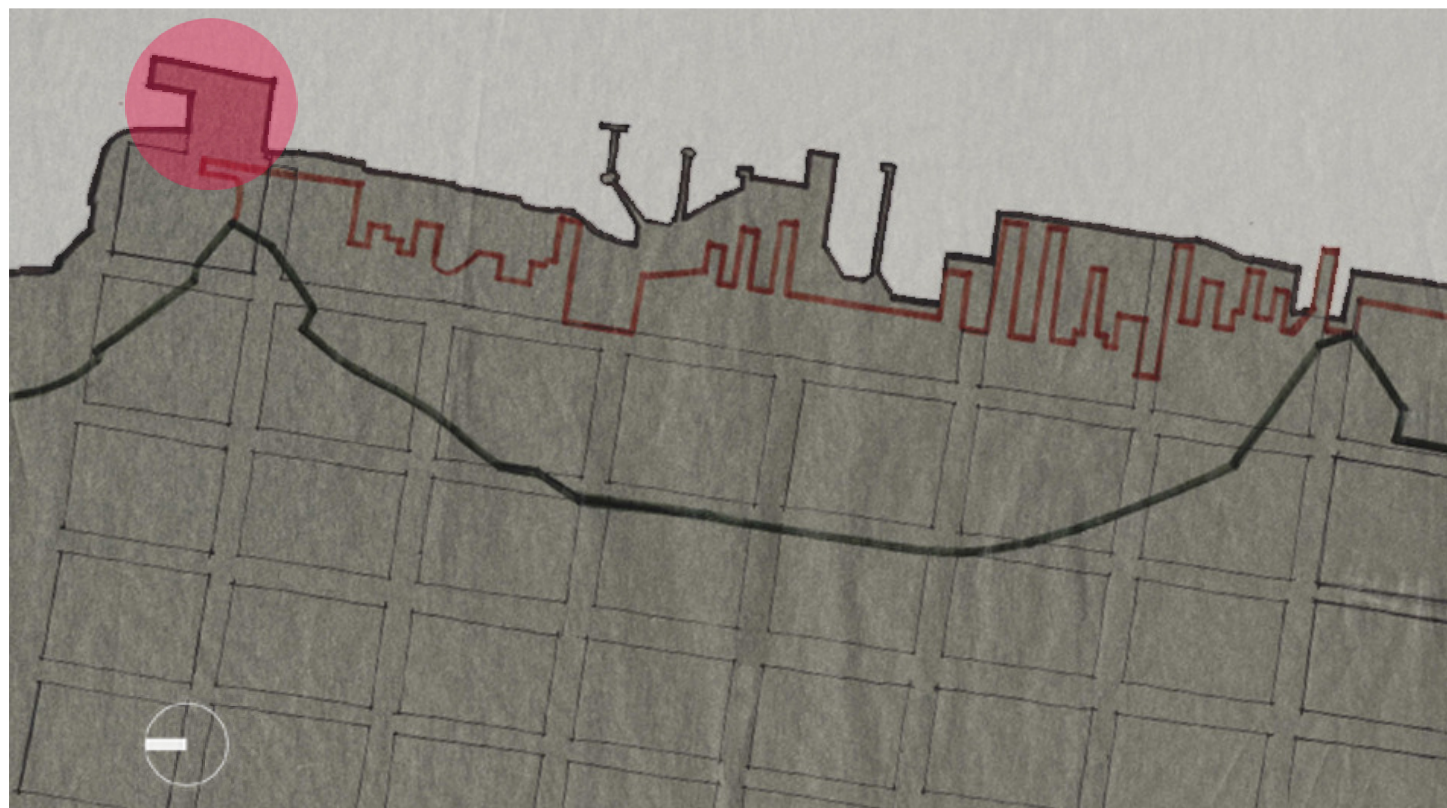


Photograph, Russell, Andrew J.
View from Pioneer Mill, looking up the wharf.

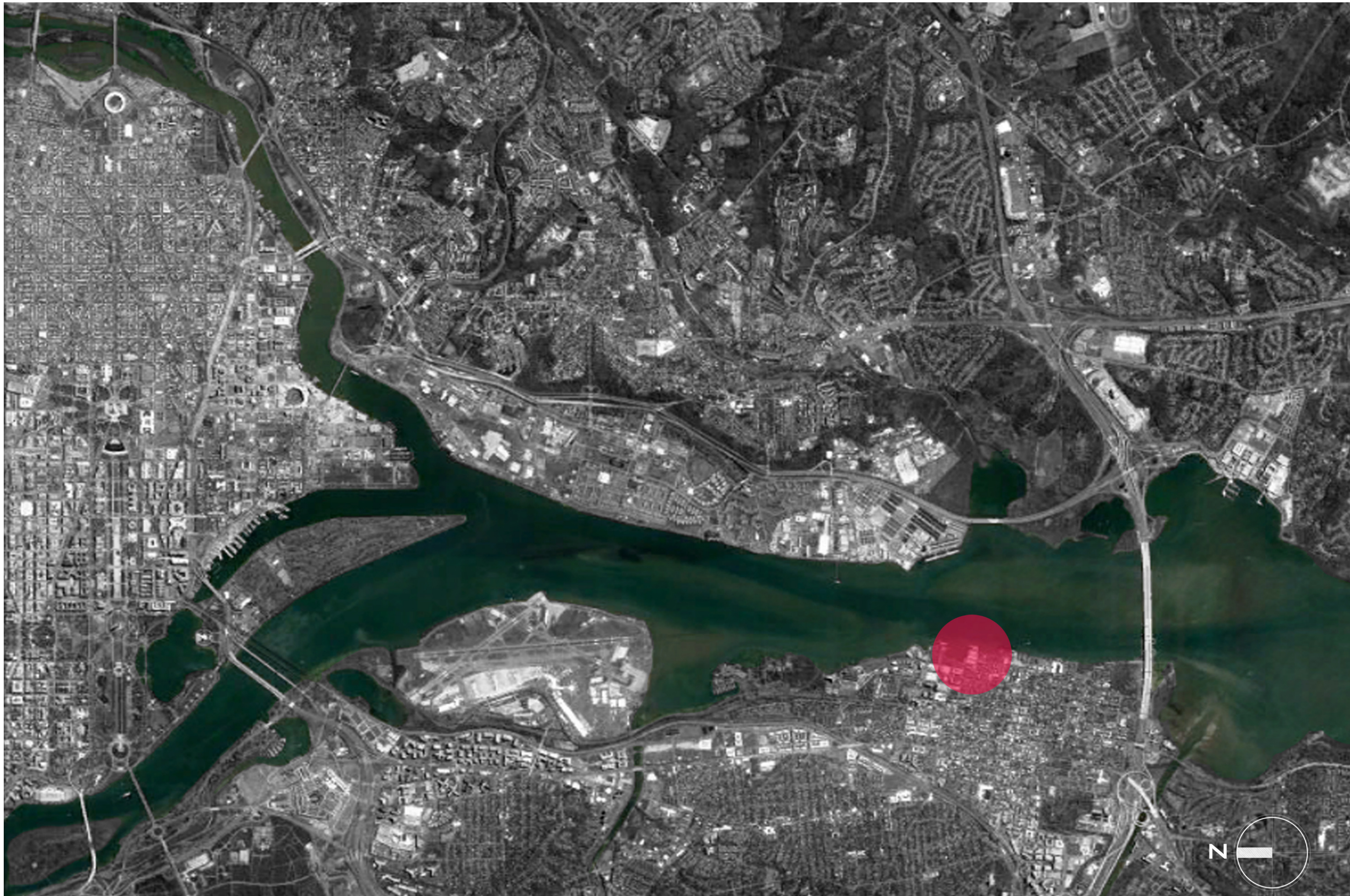
1865



1798



Current
1845
1749



0 1/4 1/2 1 MILE

Print, Google Earth.

LOCATION OF THE SITE IN THE CITY OF ALEXANDRIA, VA

SITE ANALYSIS

38°48'33.16"N - 77° 2'19.67"W



The site is located between Oronoco Street and Pendleton Street and is divided into two parcels by North Union Street, while to the east it is bounded by the Potomac River. The fact that the site is located between two parks carried significant weight at the time of choosing for the correct site for my extensive program. I realized that the parks and the project would be mutually beneficial to each other.

Both the Oronoco Bay Park to the north, and Founders Park to the south, were intended to be part of a continuous and extensive trail system along the shoreline. However, due to the existing conditions of the site, the trail system is interrupted from either side, making it somewhat difficult for people to get from one place to the other. My proposed program may address this problem by forming a connecting link between the two parks.

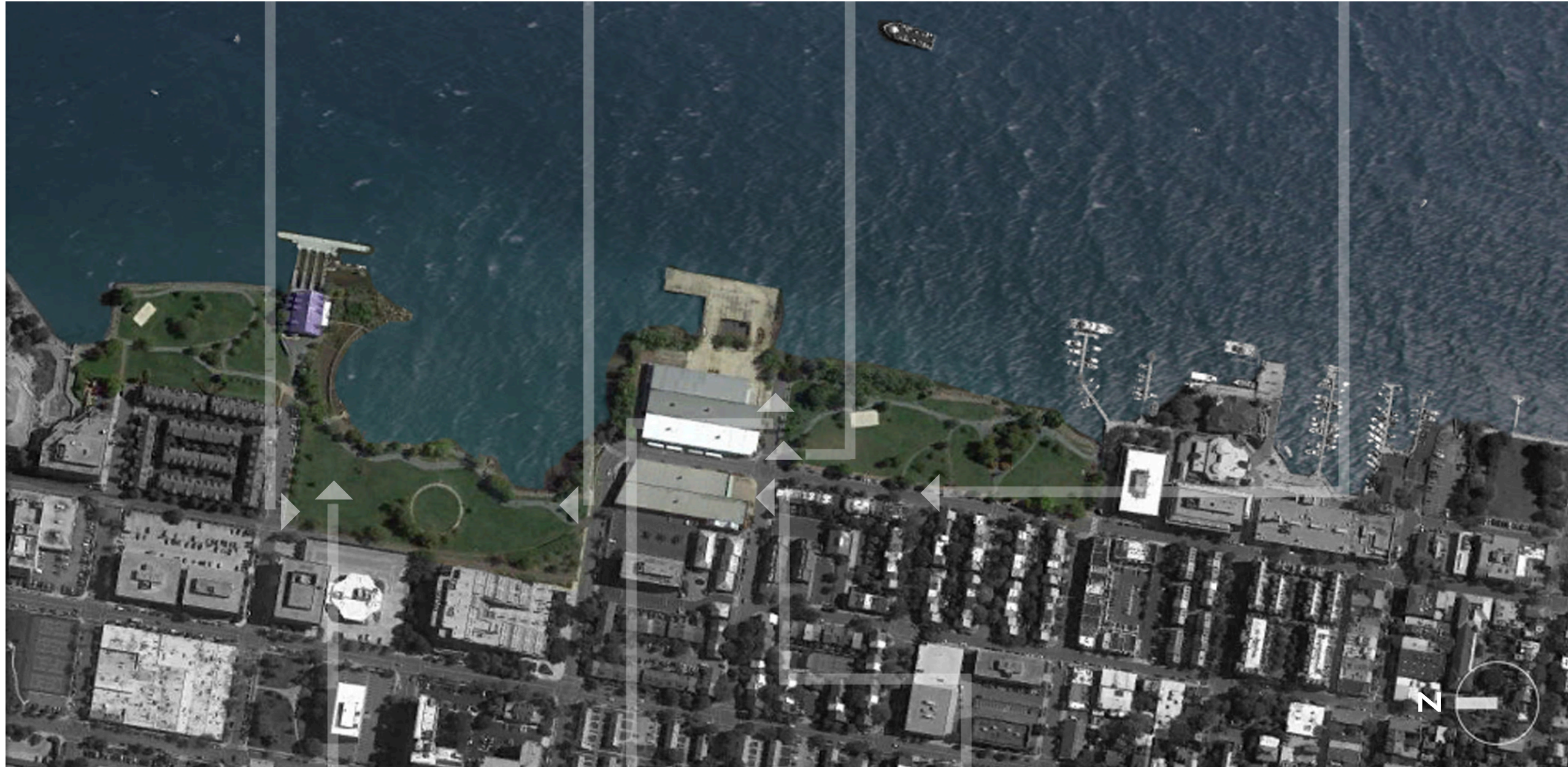
It was suggested that I look into the Alexandria Waterfront Masterplan. The goals and design guidelines laid out in the Alexandria Waterfront Masterplan are intended to cover approximately three miles long. Throughout the planning process, Alexandrians have been asking for more things to do along the waterfront. The primary goal of the Masterplan is the creation of spaces of diverse scale, which can be used for multiple activities and offer different ways to interact with the water, which attracts a diverse range of visitors. In addition, the Masterplan emphasizes that the reputation of the area could be enhanced by increasing spaces for retail and tourist attractions, including restaurants and cultural attractions.

The preservation and improvement of public spaces is important, and the connectivity through the open spaces along the waterfront should be continuous, as they are a major contributor to the promotion of residents' health through the multifarious physical activities they offer.

I believe that the waterfront serves as the threshold to the urban fabric of this vibrant city. Thanks to the Waterfront Masterplan's valuable set of guidelines, I now have the opportunity to expand my program from its original concept. The addition of spaces of which some could become part of the public domain, could strengthen the mission of the program.

"Alexandria's waterfront is special because of its unique and significant role in the nation's history and because it is a world renowned example of the revitalizing role of art in the community. The waterfront is a source of prosperity, hometown pride and national significance. It is Alexandria's front door; it is where the City was born; it is where we often go to celebrate; and it is where we take our guests from out of town. The waterfront is where we live; it is where we make a living; and it is where we go daily to walk, relax, meet neighbors, and see what's happening."

Alexandria Waterfront Plan Executive Committee, 2012



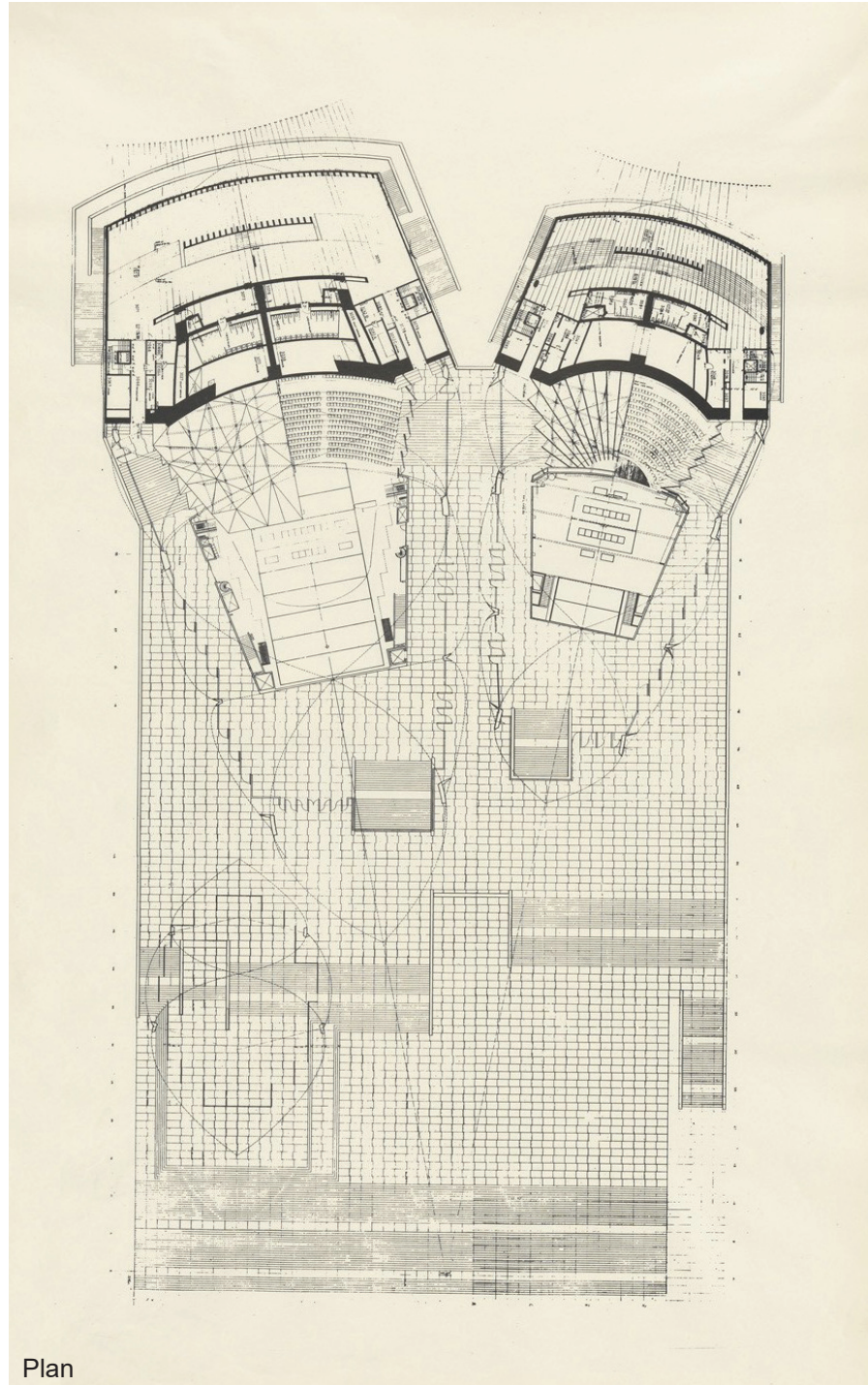
Print, Google Earth.



Photographs, Personal Collection.

PRECEDENT # 1
The Sydney Opera House

Location: 33°51'25.04"S - 151°12'54.97"E

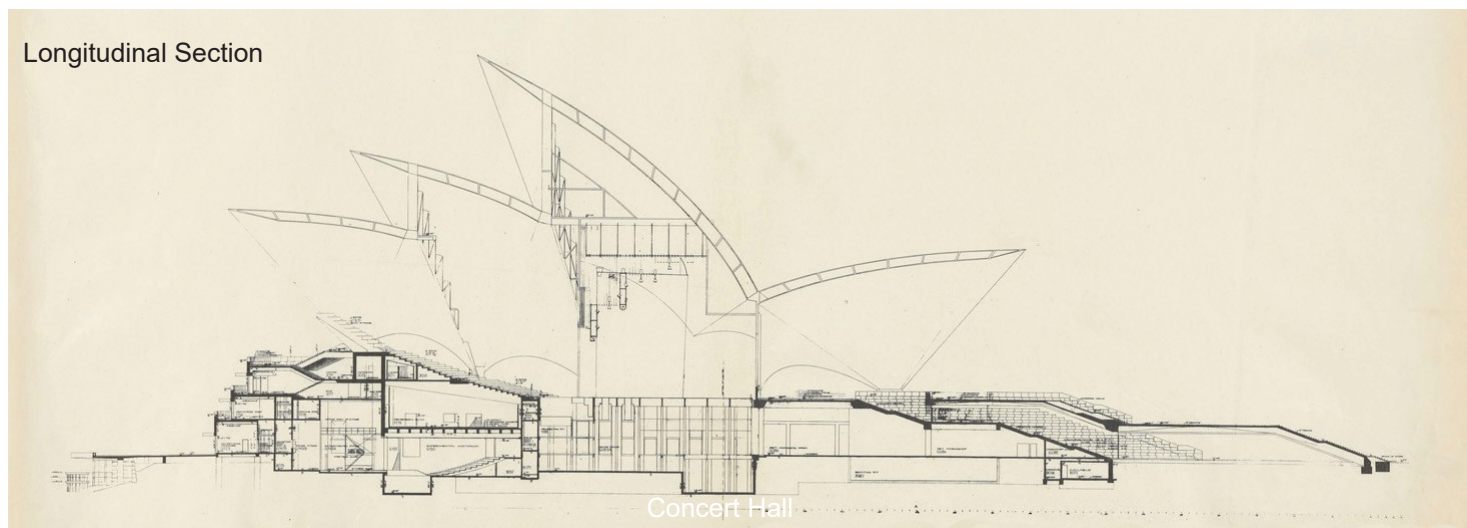


Plan

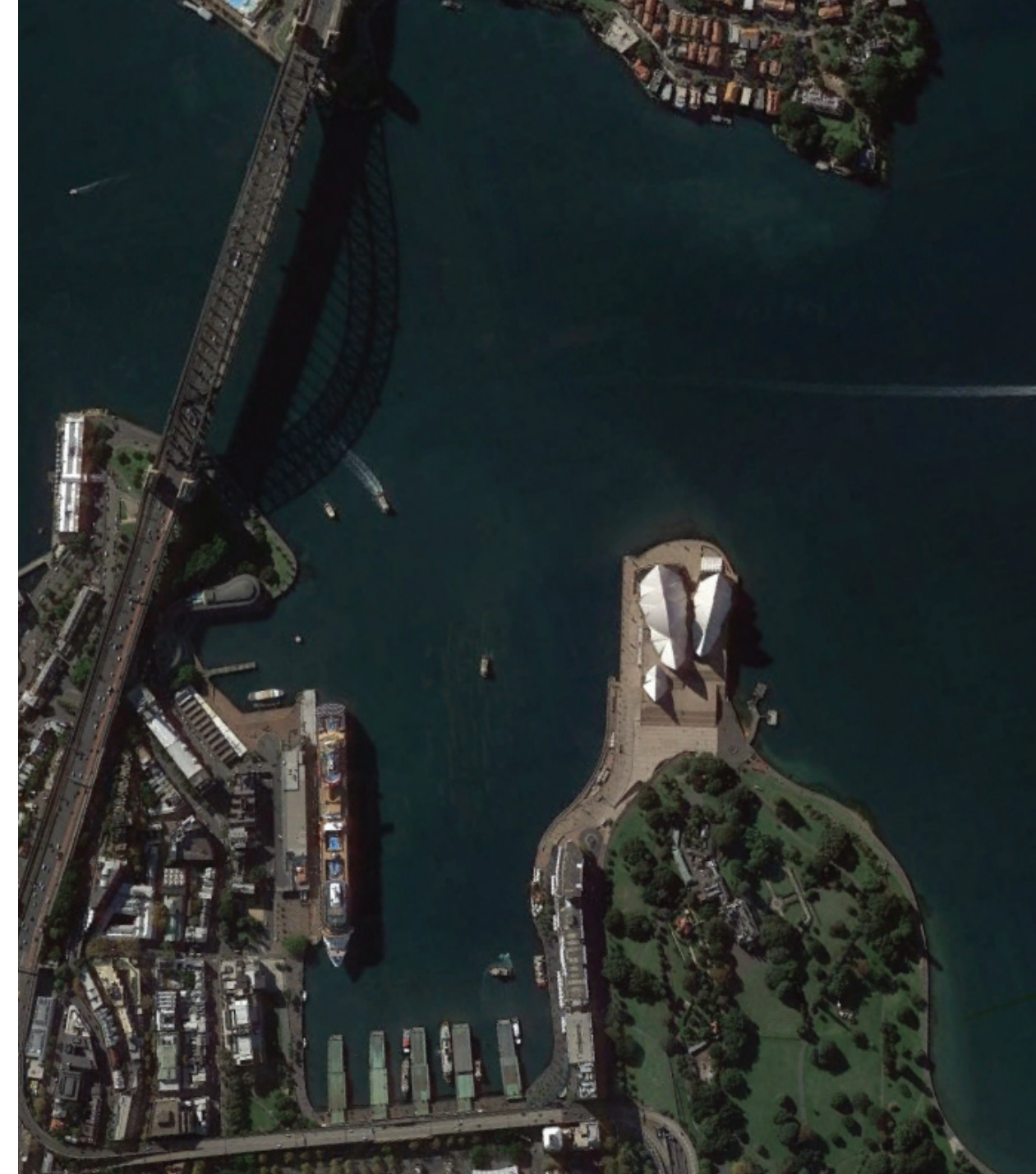
Print, Utzon, Jorn. *The Yellow Book*, 1962.



Longitudinal Section



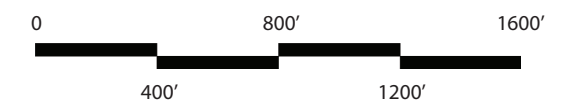
Concert Hall



Site Plan



Print, Google Earth.



"The sun did not know how beautiful its light was, until it was reflected off this building."

Louis Kahn

Hurol, Yonca. 2016. Page 238.

The Sydney Opera House



Interior Staircase



View of the Harbor

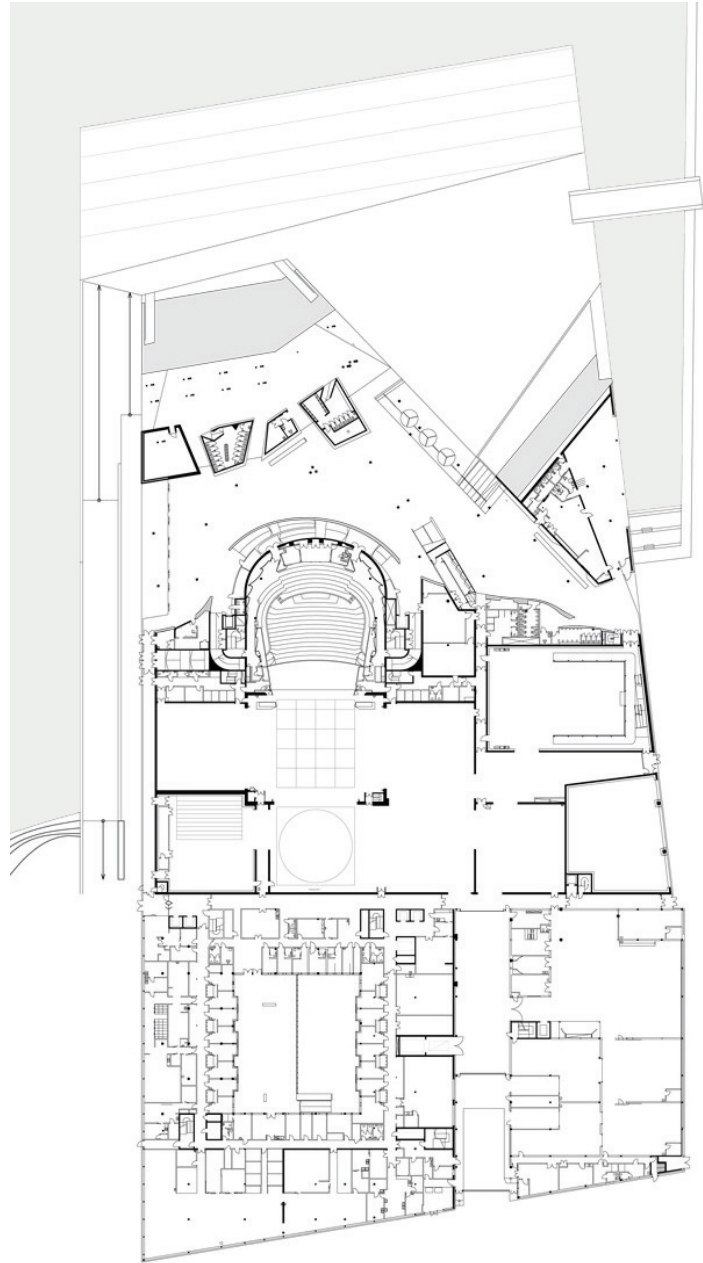


Concert Hall

PRECEDENT #2

The Oslo Opera House

Location: 59°54'27.88"N - 10°45'7.55"E



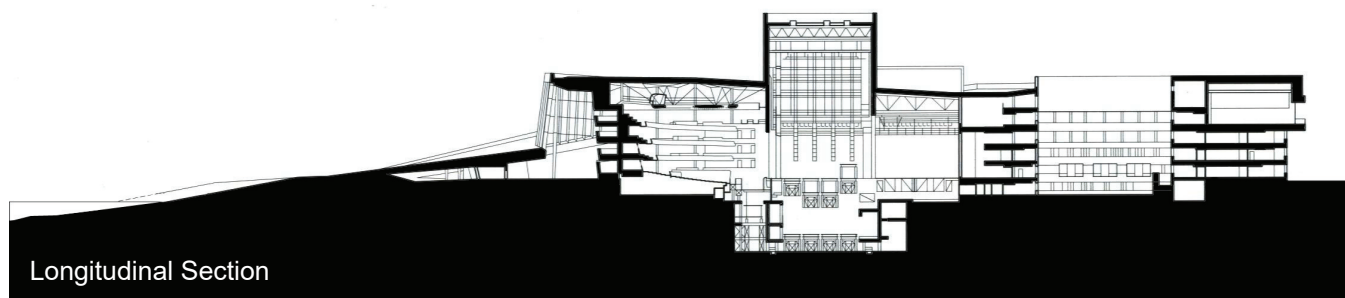
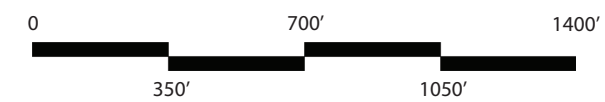
Plan at Entrance Level



Site Plan



Print, Google Earth.



Longitudinal Section

"Oslo's Opera house is part of the city's revitalization strategy to redevelop the city's historically industrial waterfront into an active public space."

Snohetta

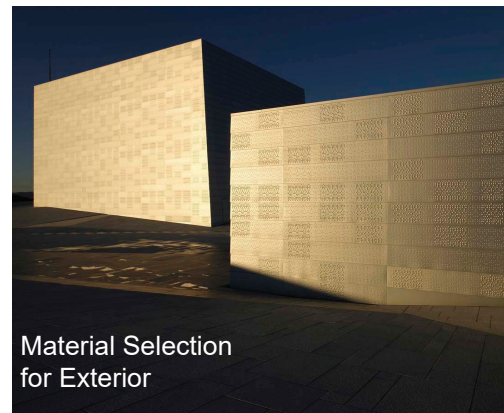
<http://snohetta.com/project/42-norwegian-national-opera-and-ballet>

The Oslo Opera House

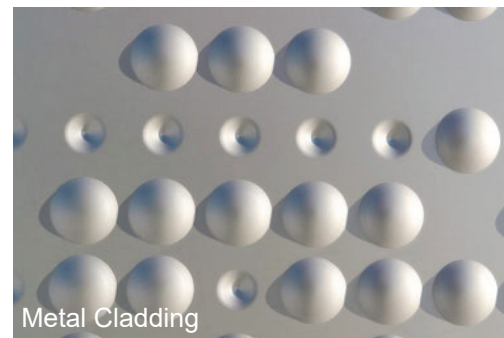


Steps at Roof

Photographs, Snohetta. Oslo Opera House.



Material Selection for Exterior



Metal Cladding



Marble



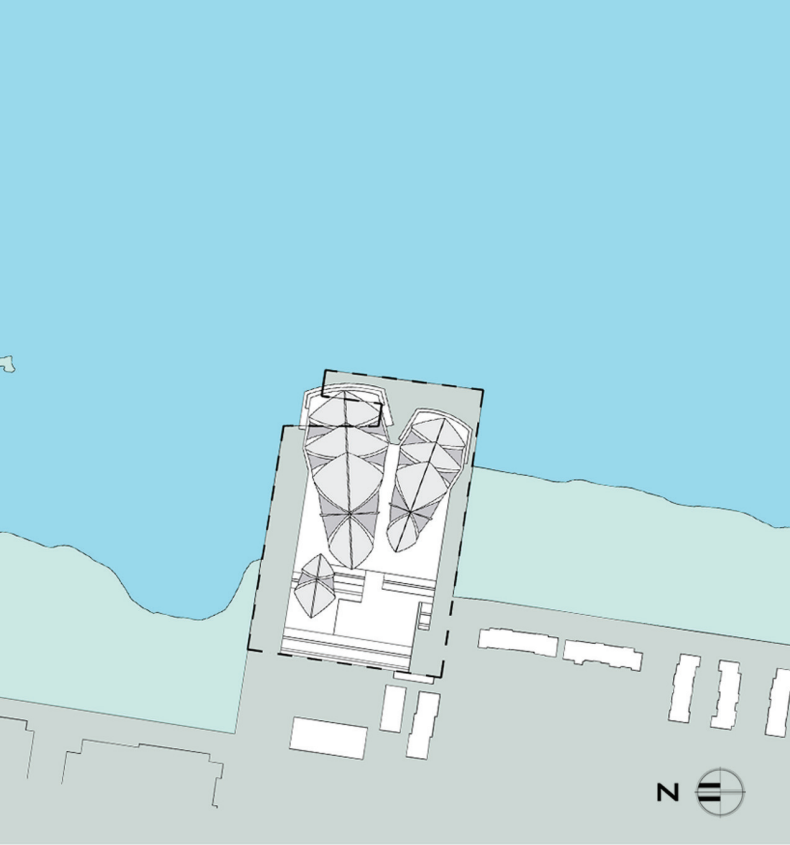
View of the accessible roof and the water's edge during construction



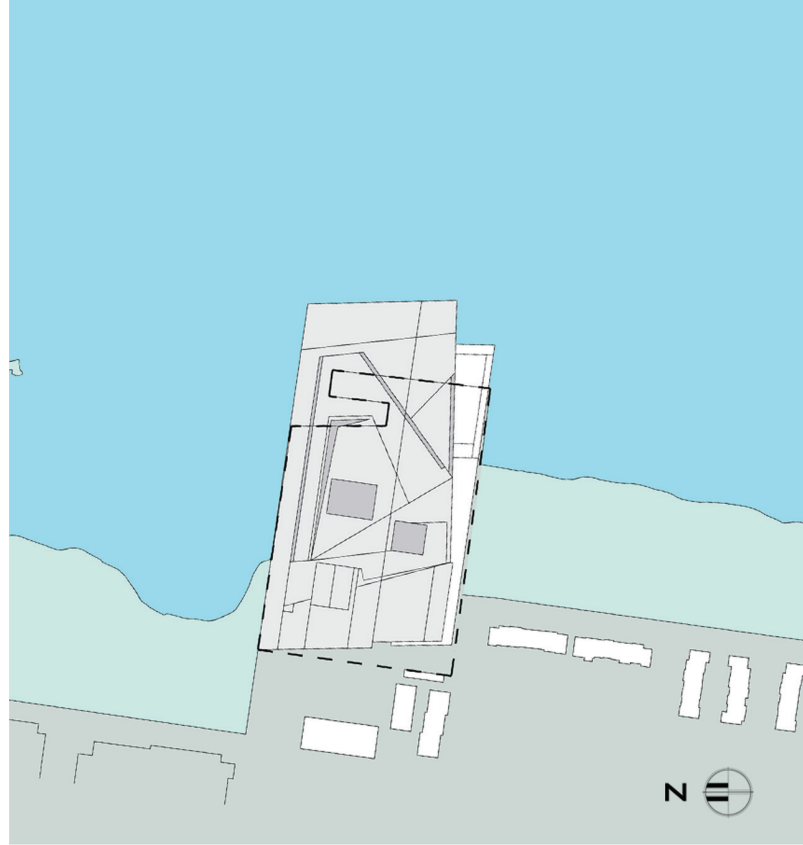
The Hall and access to the Concert Hall



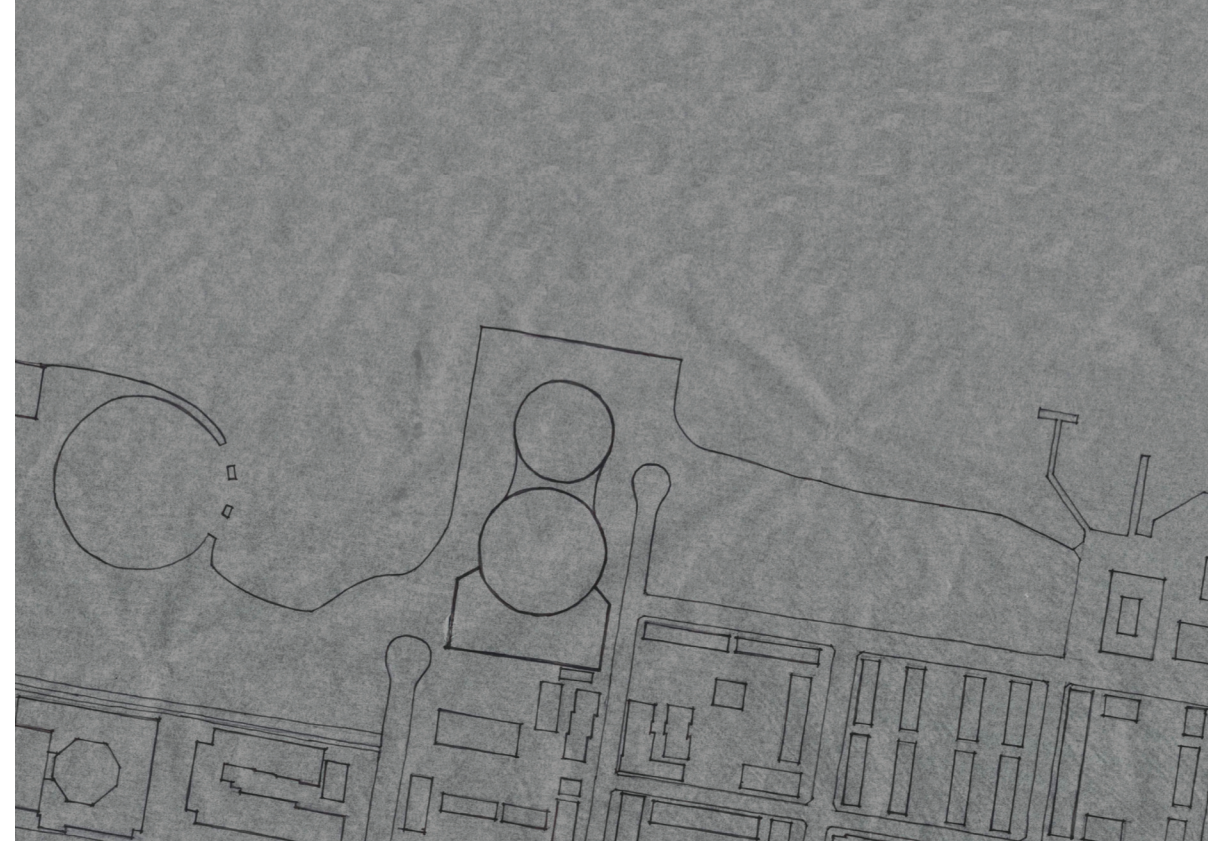
Exterior view at accessible roof top



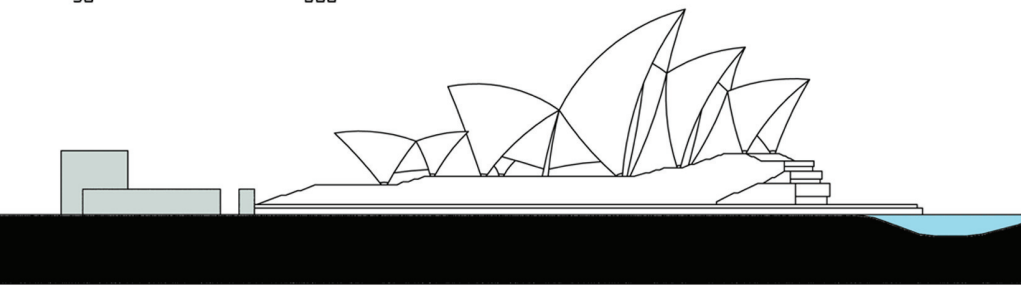
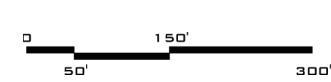
Plan of Sydney Opera House



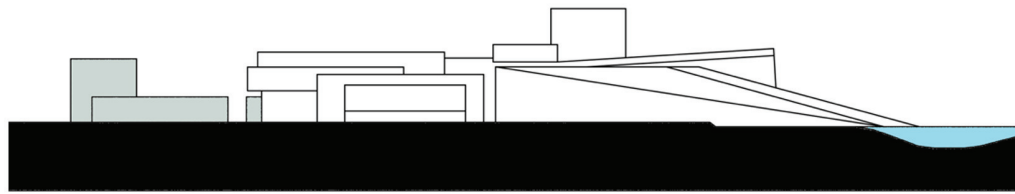
Plan of Oslo Opera House



Schematic Site Plan #1



South Elevation of Sydney Opera House



South Elevation of Oslo Opera House



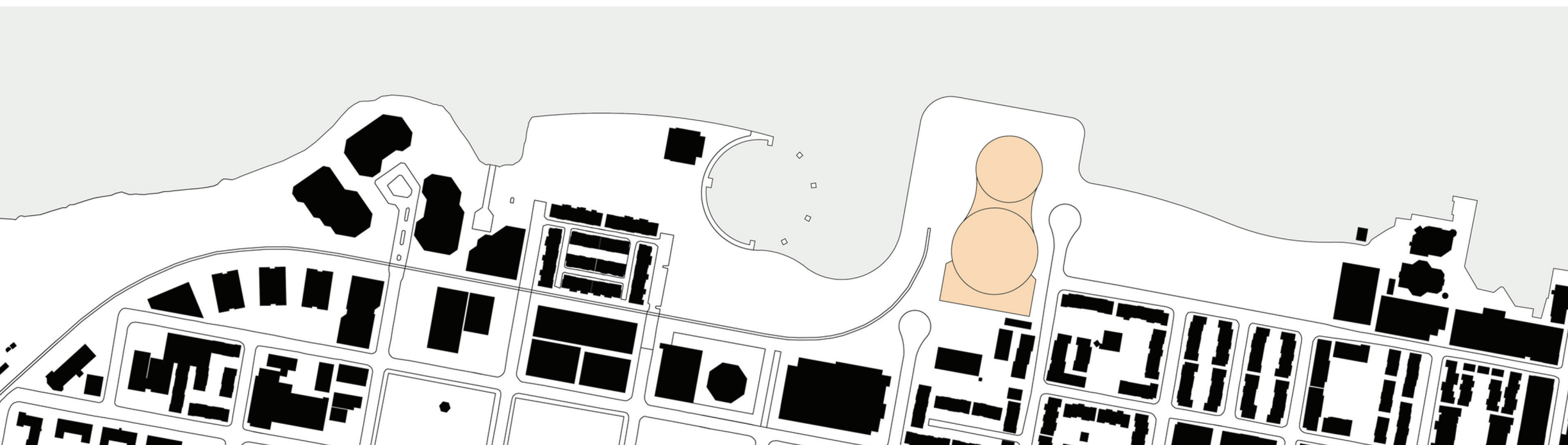
It was suggested that I site-test the buildings that set precedents for my project to explore how each would fit on the site.

To my surprise, the Sydney Opera House, including much of its premises, could feasibly be placed within the site. On the other hand, only the Oslo Opera house would barely fit on the site, leaving much of its site extending beyond my limits.

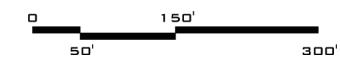
However, given the fact that my precedents were designed to house large audiences, it is clear that the chosen site offers huge scope for my extensive program.

I began drawing the site plan, using much of the water's edge as a continuous path to connect both parks. The building would be accessed from the portion facing the water, which will also contain retail spaces.

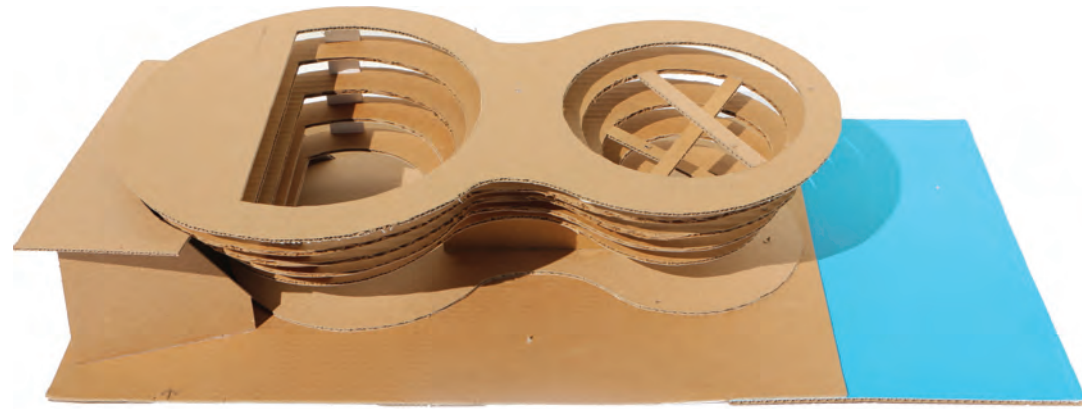
The Schematic Site Plan suggests that the existing railroad should be preserved and deployed a kind of urban transportation for those both arriving at and leaving the site.



Schematic Site Plan #2



STUDY MODELS



1



2



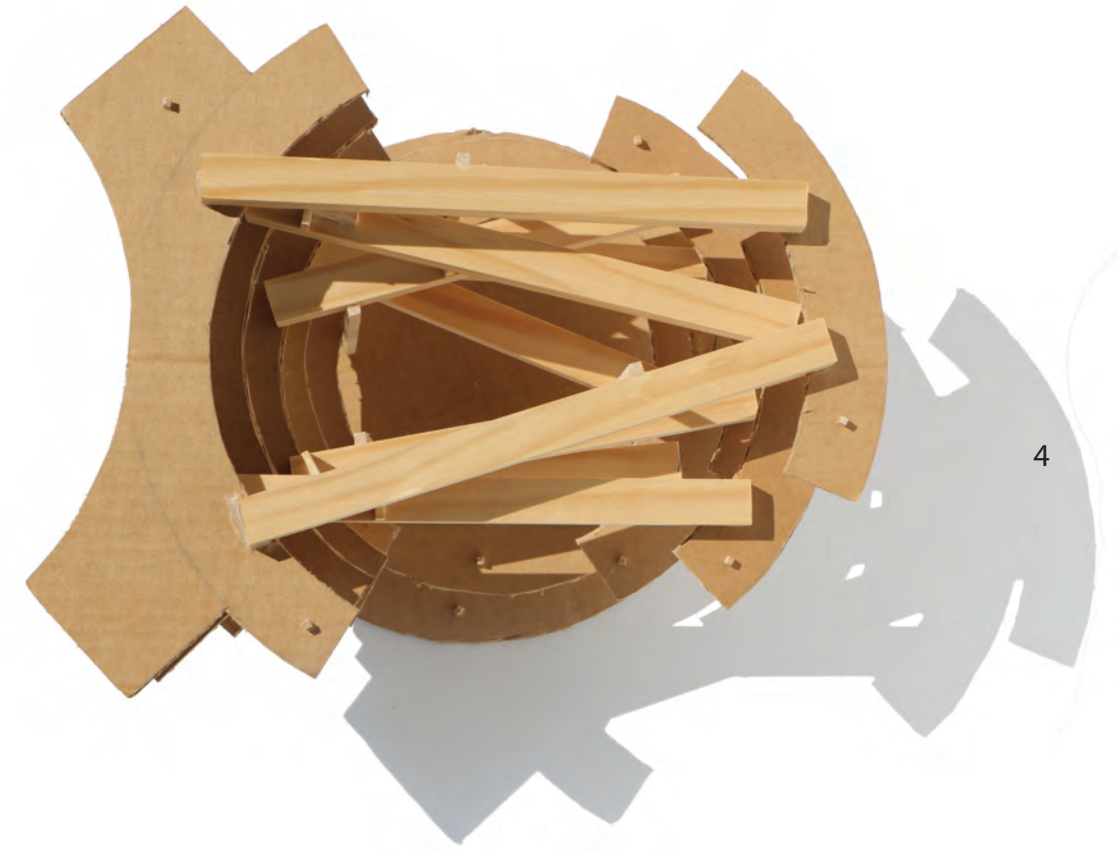
3

I created the first two study models based on the idea that the building should manifest the character of the program. In the first model, shown in Figs. 1 through 3, the building reveals its complexity, which helped me to continue exploring the program's structure within the site.

The later model, shown in Figs. 4 through 6, which only represents the retail spaces facing the water and a portion of the walkway for accessing the tiers of the auditorium, was a step forward in probing the possibilities of connecting the separate spaces with each other.

As regards the connecting elements, between the retail spaces and the rest of the building, I had it in mind that some could be tunnels, other staircases, and the rest hanging bridges.

The relationship between the spaces and the connective elements became an important aspect in the architecture of the program.



4

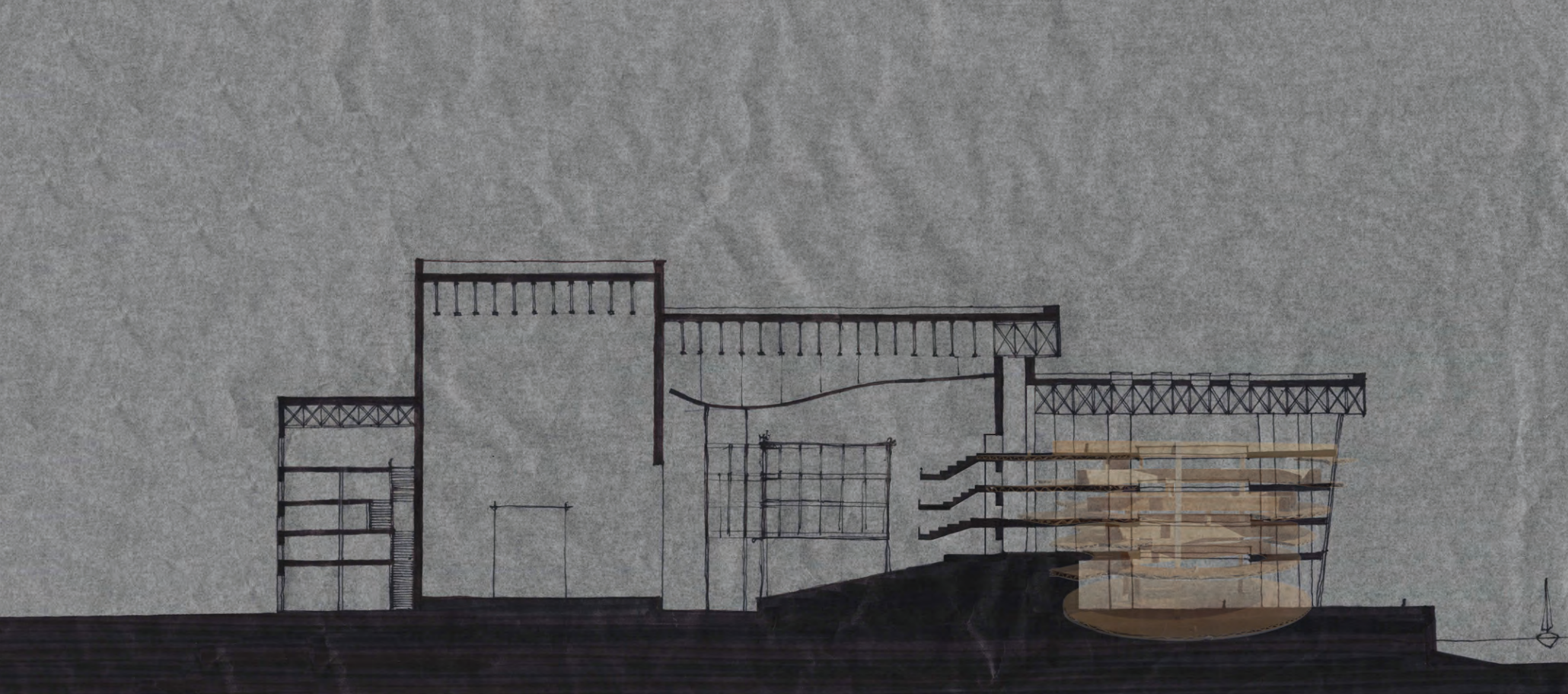


5



6

Photographs, Personal Collection.



Schematic Section B-B



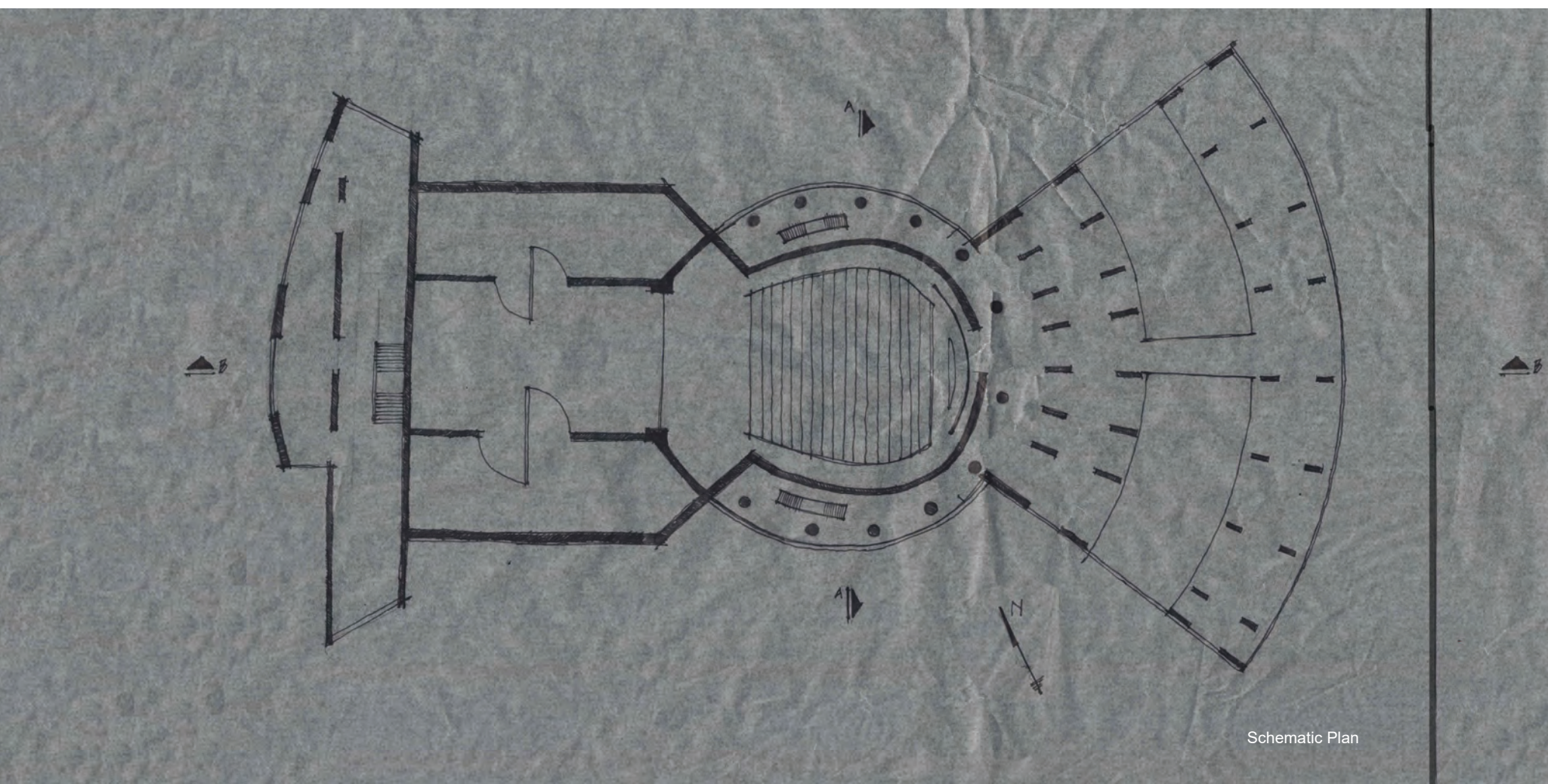
Schematic Section A-A

SCHEMATIC DRAWINGS

The schematic drawings display the early development of the program's structure, showing the spatial relationship between the opera house and the open plan of the retail spaces.

I began Section B-B by tracing an elevation photo of the second model. This part of the program and the continuous path around the building maintains a strong relationship with the water's edge. The water's edge becomes the threshold to the entire program.

The administrative offices and access to the backstage will be located at the west end of the building.



Schematic Plan

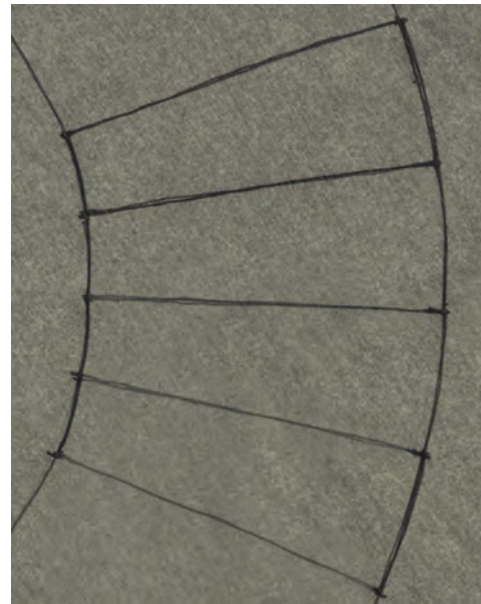
STUDY MODELS

Staging the Audience

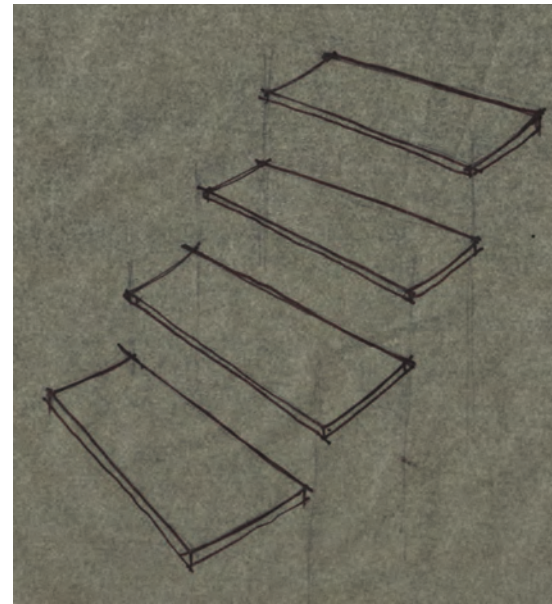
I created the third study model to explore the organization of the connecting elements between the retail spaces and the auditorium, which resulted in a fanned-out arrangement of bridges between the spaces. This particular setting will give the audience the feeling of becoming part of a theatrical event as they move from one space to another.

The lobby and retail spaces will be open to the public, even when no performances are underway, during normal business hours on weekdays and weekends. This will guarantee a constant flow of revenue for the program.

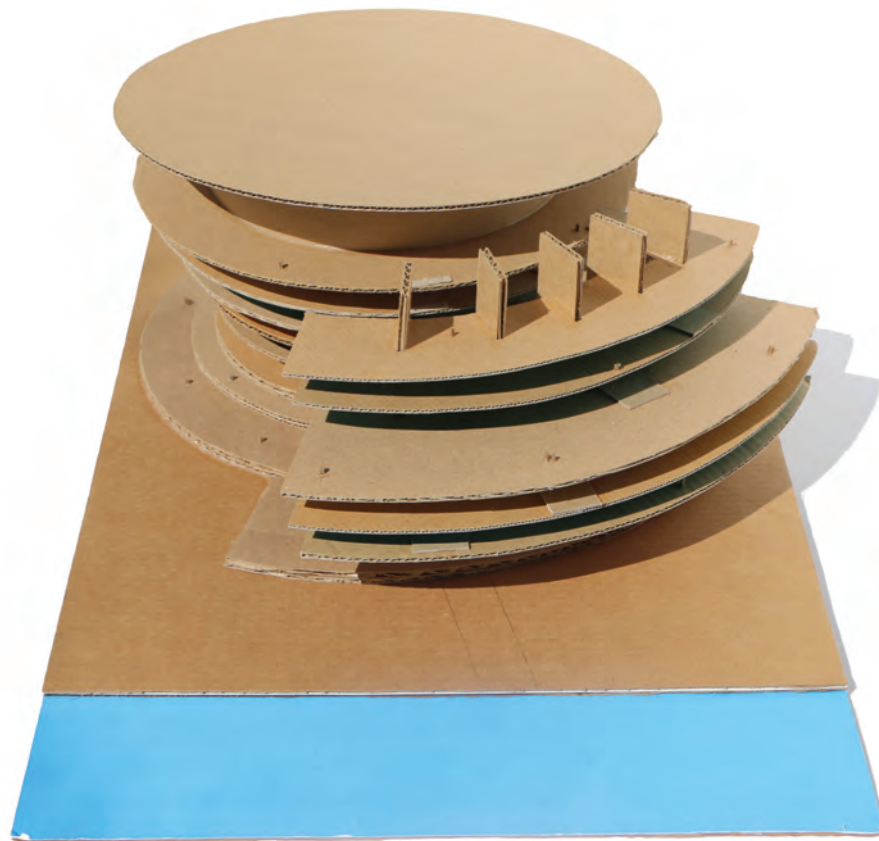
I aim to use the circular tapered sides of the opera house as locations for staircases to provide a means of egress, which potentially could become a second stage for the audience while the people going from one level to another are visible from the outside.



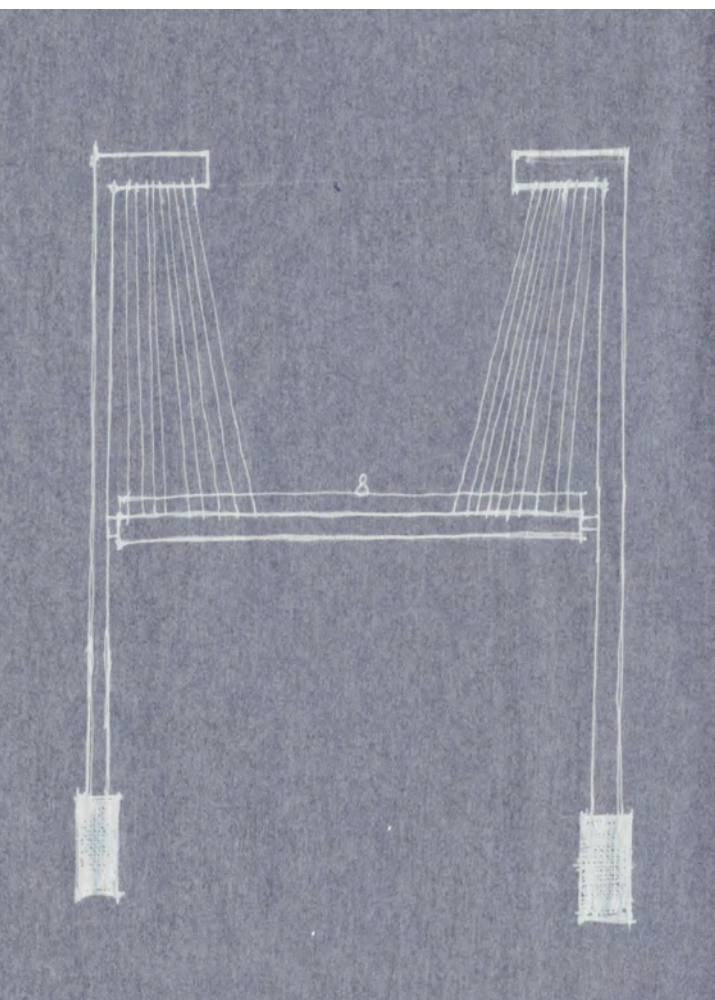
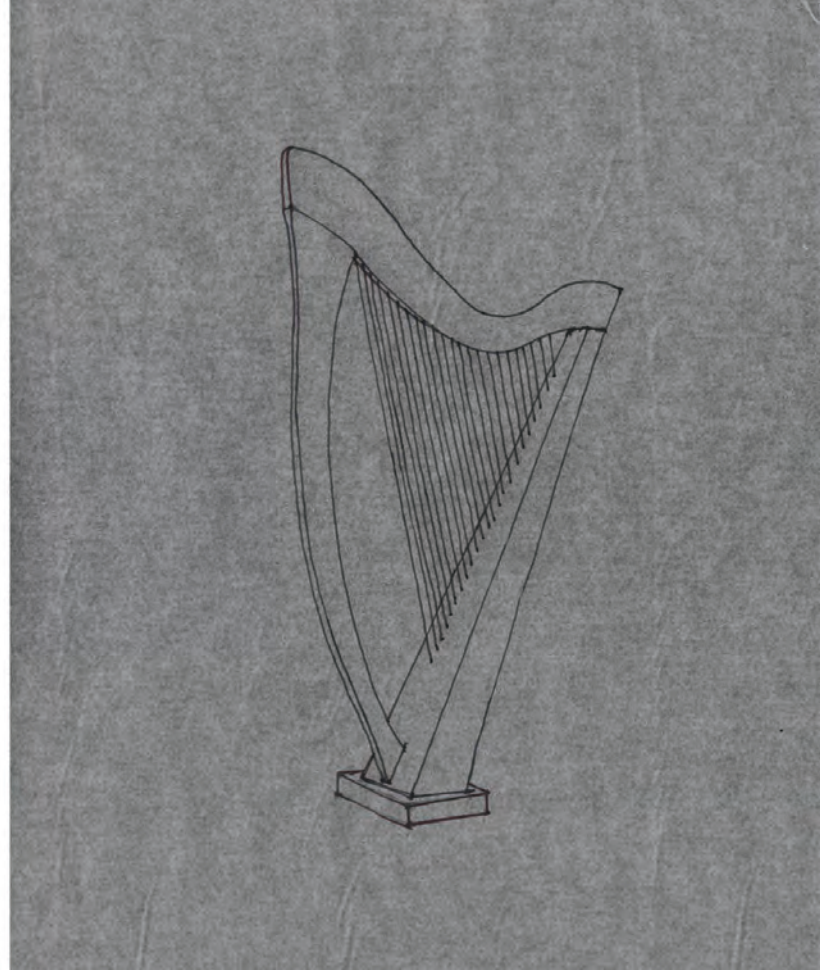
Bridges Plan



Perspective View of Bridges



Photographs, Personal Collection.



STUDY MODELS

Audience in Motion

The harp is a beautiful instrument that is played with great delicacy. So, I asked myself: Would it be wonderful if the bridges are suspended in such a fashion that they mimic the character of this instrument, and additionally some of the cables are able to produce a small amount of frequency so people could make music with them?

As these simple bridges are supporting their own loads, the weight of people, and other loads, the structural constraints render this idea somewhat out of reach; but it is not impossible.

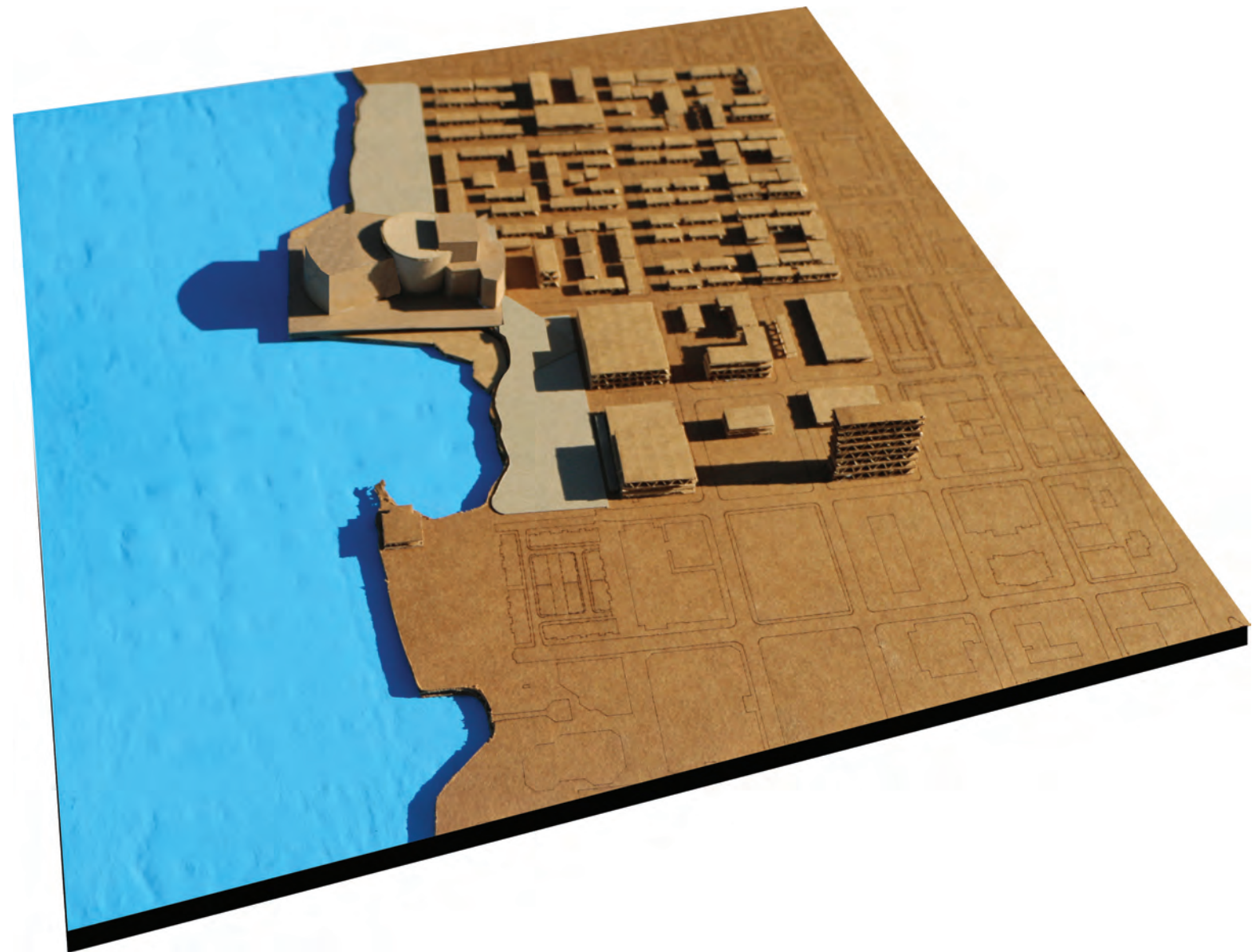
I believe that if this idea could be brought to fruition, it would immeasurably enhance the theatrical experience and perhaps become a strong and unique attraction for the public.

Photographs, Personal Collection.





Study Model



STUDY MODEL AND SITE ANALYSIS

The study model helped me to make additional decisions regarding the organization of the program within the site, and to explore how the site could become a major contributor to the urban life of Old Town Alexandria and a nexus between Oronoco Bay Park and Founders Park.

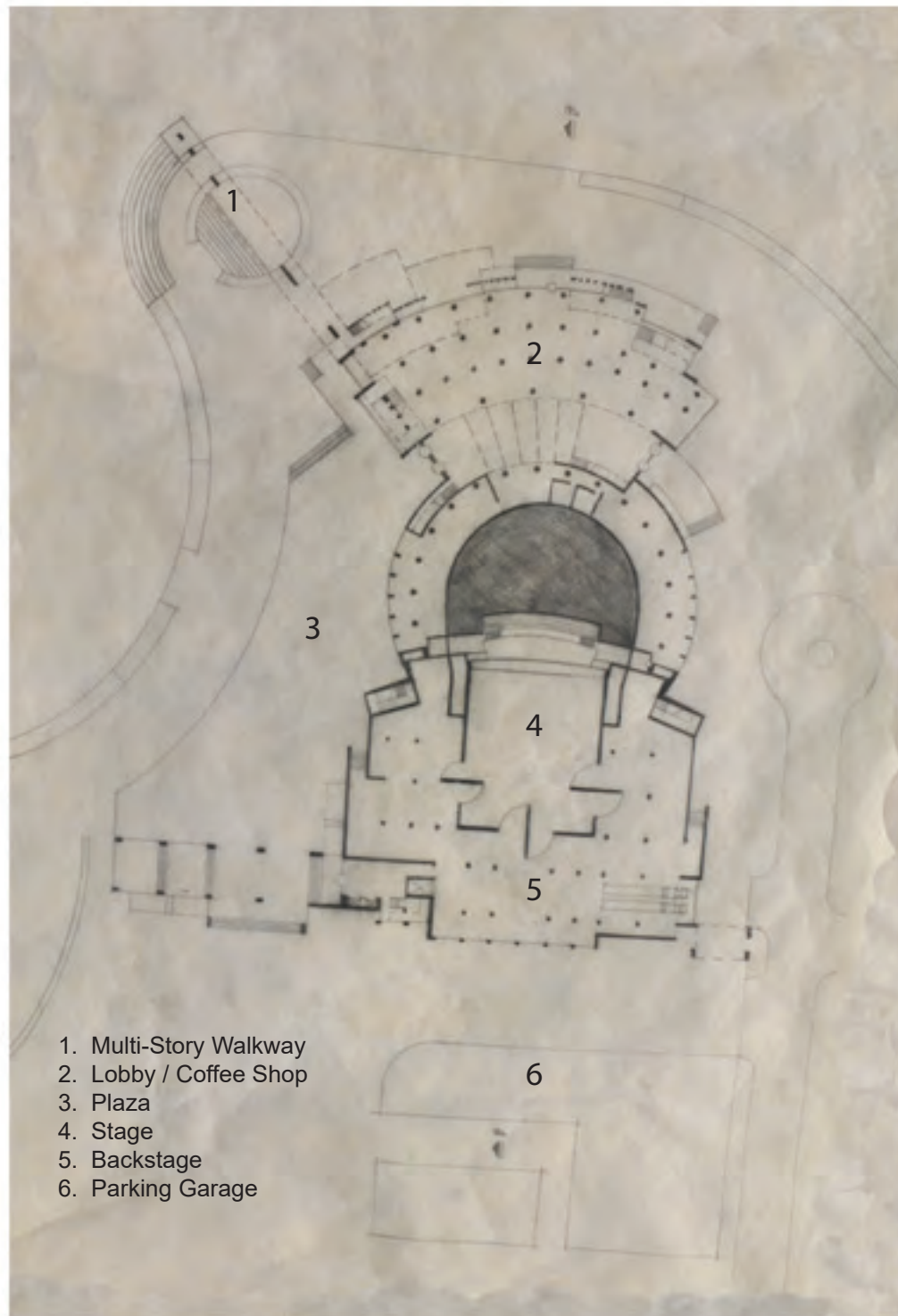


PRELIMINARY PLANS AND SECTION

I decided to place the parking garage separately from the main building. The space between the west elevation of the building and the parking garage will become a shared street.

The site is to be transformed into a public attraction, and will provide a continuous path for the extensive trail system along the shoreline.

The multi-story walkway, anchored on the northeast of the site, is an extension of the site's public domain and will also be accessible from various levels of the retail spaces.



- 1. Multi-Story Walkway
- 2. Lobby / Coffee Shop
- 3. Plaza
- 4. Stage
- 5. Backstage
- 6. Parking Garage



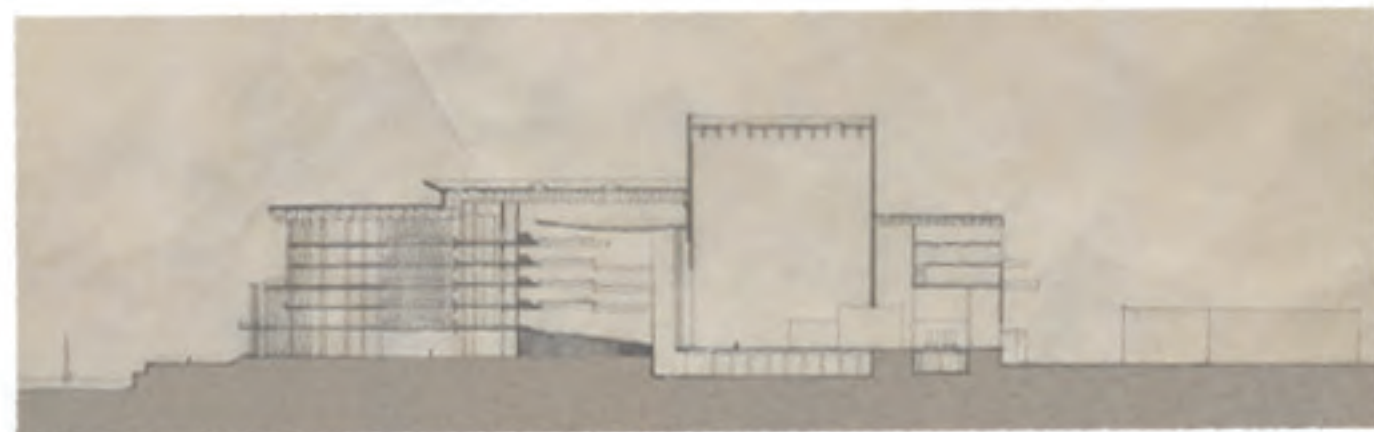
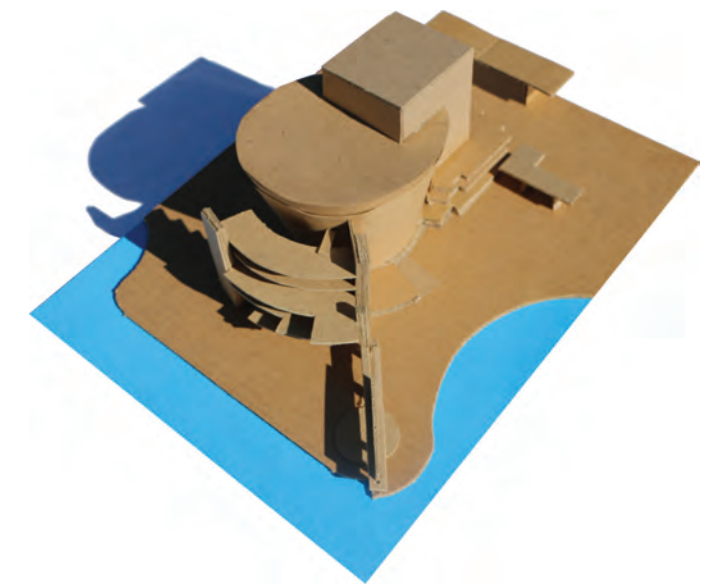
Entry Plan | Stage Plan



- 1. Multi-Story Walkway
- 2. Retail Space
- 3. Auditorium
- 4. Stage Tower
- 5. Administrative Office
- 6. Parking Garage



Administrative Office Plan | Fourth Tier Plan



Section B-B

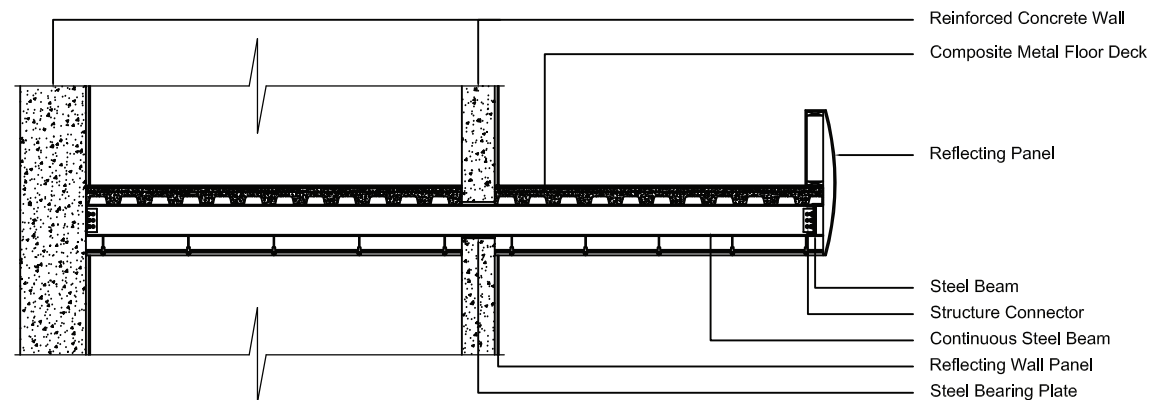
MATERIAL RESEARCH & STRUCTURE



Photographs, Smart, Christopher. Construction of Salt Lake City's mega-theater.

The auditorium, backstage and retail spaces are the main characters of this complex program. The intricacy of the program is echoed in the geometry of the building. In response to the diversity of the project's features, the diversity of the palette of materials should also reflect the character of the program.

For the primary structure of the retail spaces and auditorium, I chose reinforced concrete. For the multi-level and irregular-shaped balconies of the auditorium, composite metal decking supported by steel beams offers flexibility for the construction process.



TYPICAL BALCONY DETAIL

Photograph, Online Catalog Kawneer.



Georgia Gwinnett College Library
1600 Wall System™2 Curtain Wall

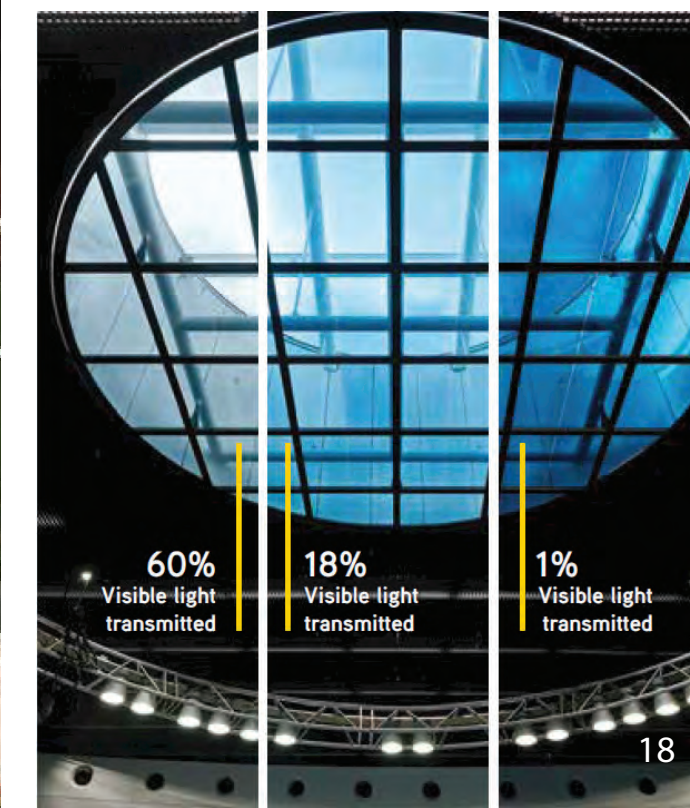
After reviewing the different options of curtainwall and glassing as part of the envelope for the retail spaces, I concluded that much of the natural lighting received there needs to be controlled due to the artworks that will be exhibited.

This is not only about protecting the artworks from any damage caused by direct sunlight, it is also fundamental that the people experience the artworks in the right way.

After further research, I came across SageGlass. "The Electrochromic technology gives SageGlass the power to tint on demand-from a darkened state that absorbs and reradiates away the sun's unwanted heat and glare, to a clear state that maximizes daylight and solar energy."

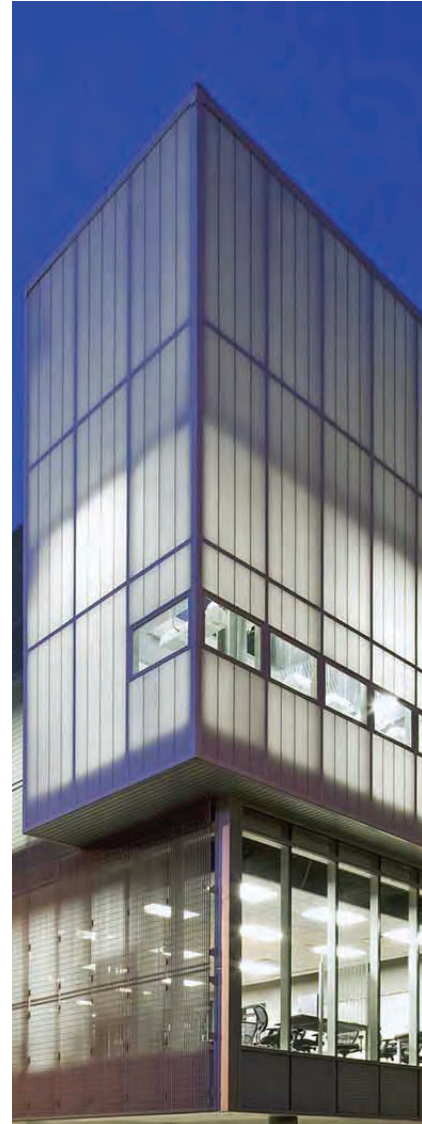
SageGlass

Photograph, Online Catalog SageGlass.





KALWALL - Translucent Building System



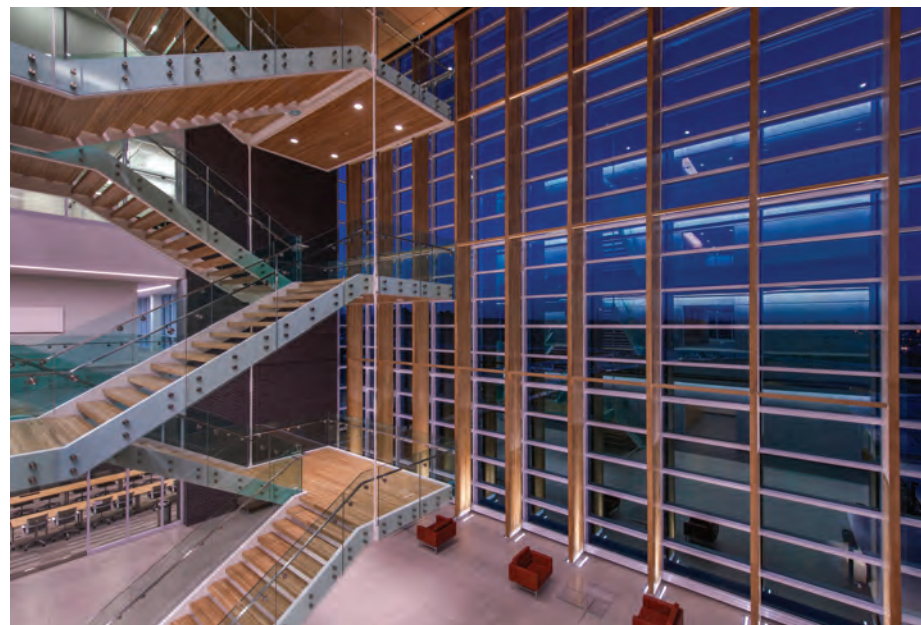
Photographs, Online Catalog KALWALL.

MATERIAL RESEARCH & STRUCTURE

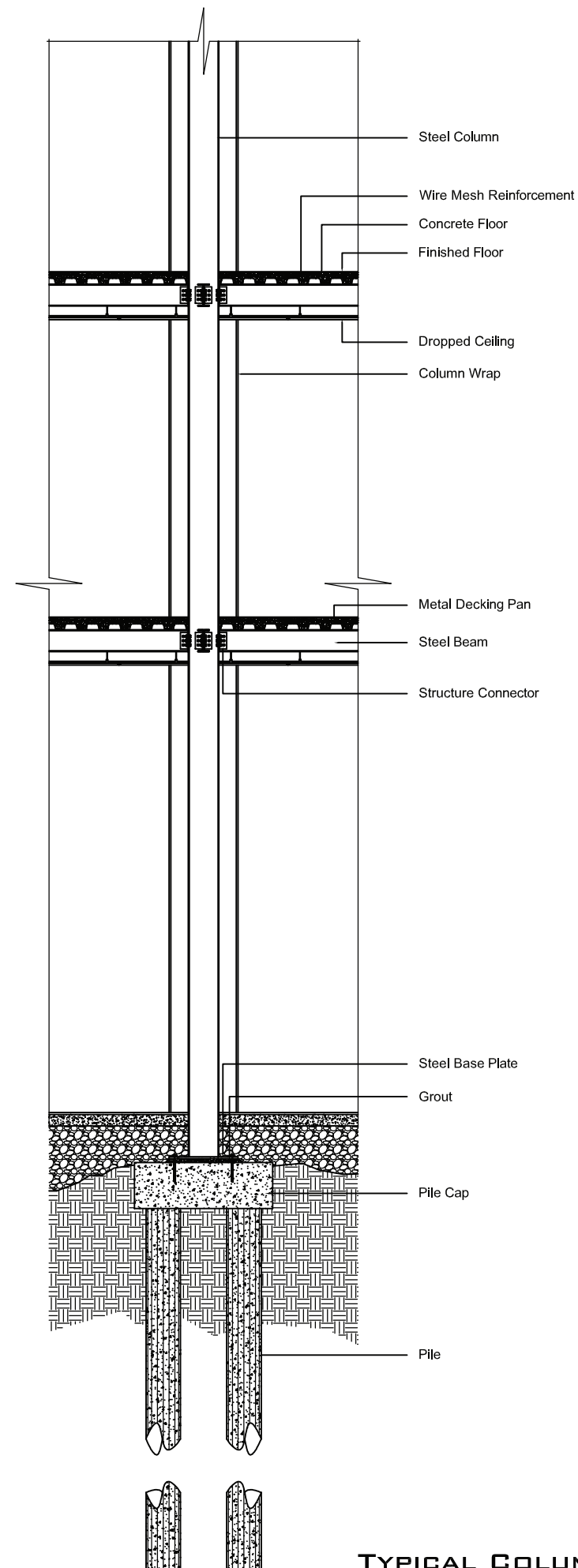
The curved and tapered curtainwall enclosing the staircases on both sides of the auditorium is an expression of the stage curtain. As an extension of the theatrical nature of this program, I wanted to put the patrons in motion as the ascend or descend the staircases.

The majority of the curved and tapered curtainwall glassing is a type of frosted glass. The artificial lighting illuminating the staircases will showcase only the silhouette of the people in motion through the frosted glassing.

Floating Staircase - SAC Federal Credit Union Headquarters



Photograph, LEO A DALY.



TYPICAL COLUMN DETAIL



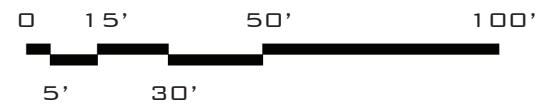
Photograph, Online Catalog Steelconstruction.

For the west portion of the building, which houses the offices, rehearsal rooms, and dressing rooms, I propose to use steel framing and composite floor decking.

For the spaces designated for rehearsals, the need for proper acoustics will be taken into account.



Portion of the South Elevation facing Old Town.

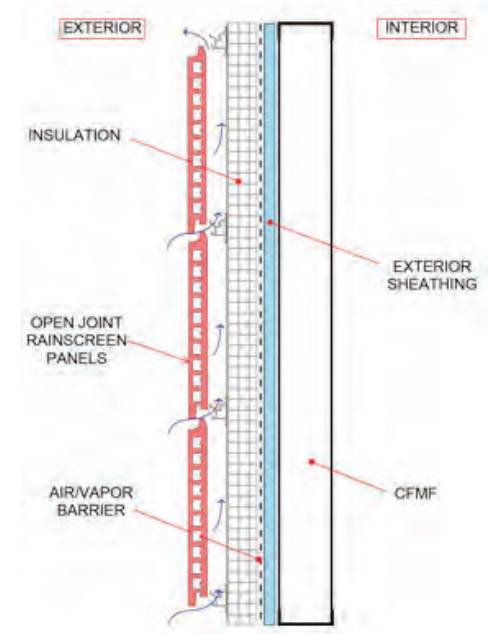
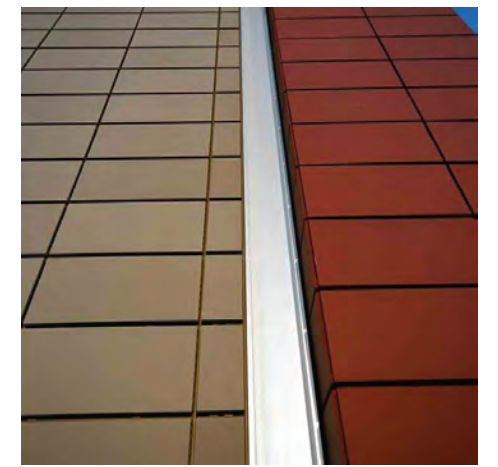


The picturesque residential areas and well-preserved industrial buildings of the Old Town are distinguished by the warm texture of the brick and the other earthy materials used in the buildings' envelopes.

For the building envelope of the west side of the building, which faces the Old Town, I decided to employ a cladding material that resembles the prevailing character of the Old Town. I chose Terracotta Rainscreen, not only because it presents a similar appearance, but also because it is designed for coastal environments, contributes significantly to the acoustic insulation of the walls, is a highly resistant material, and requires little maintenance.



Photographs and Print, Online Catalog Shildan.



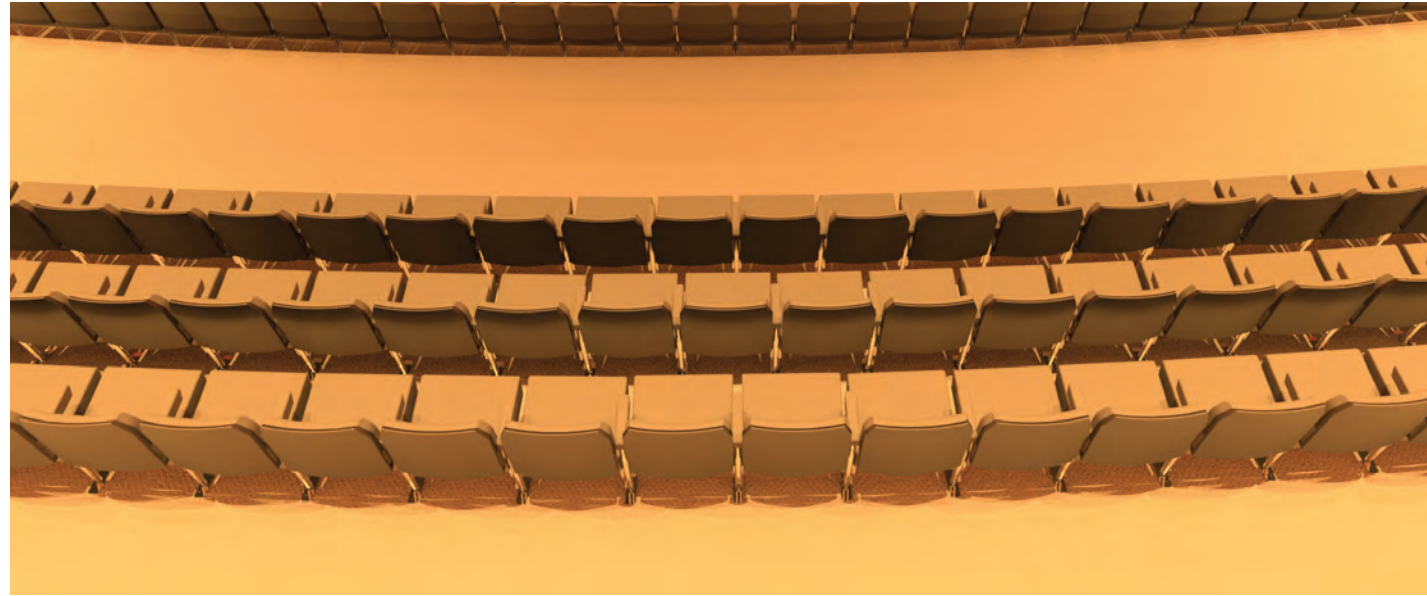
Typical Wall Section Detail



Old Town Alexandria

Photograph, City of Alexandria.

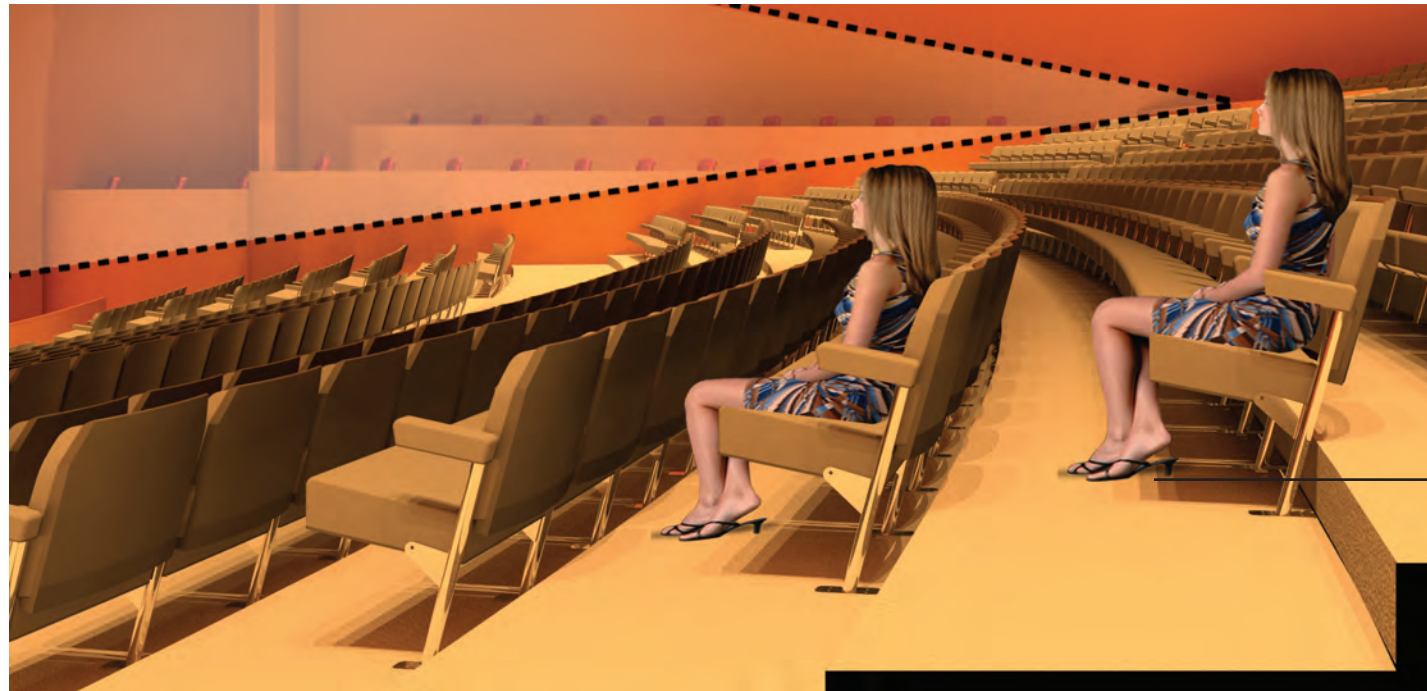
TYPICAL ROW SPACING AND SIGHTLINES ANALYSIS



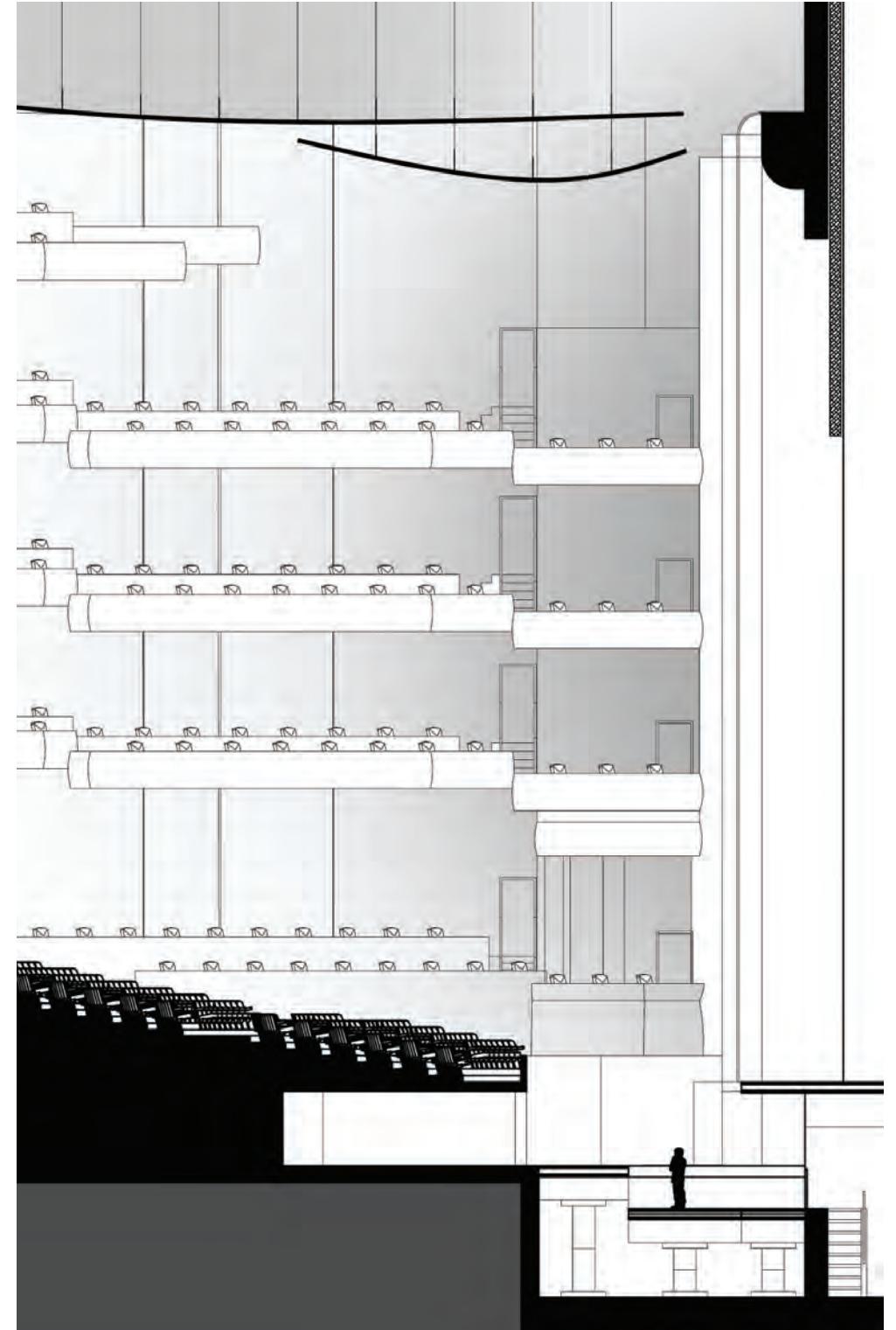
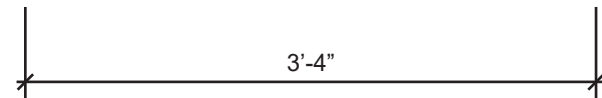
Typical staggered Seating

Providing the audience with a clear view of the performance is essential.

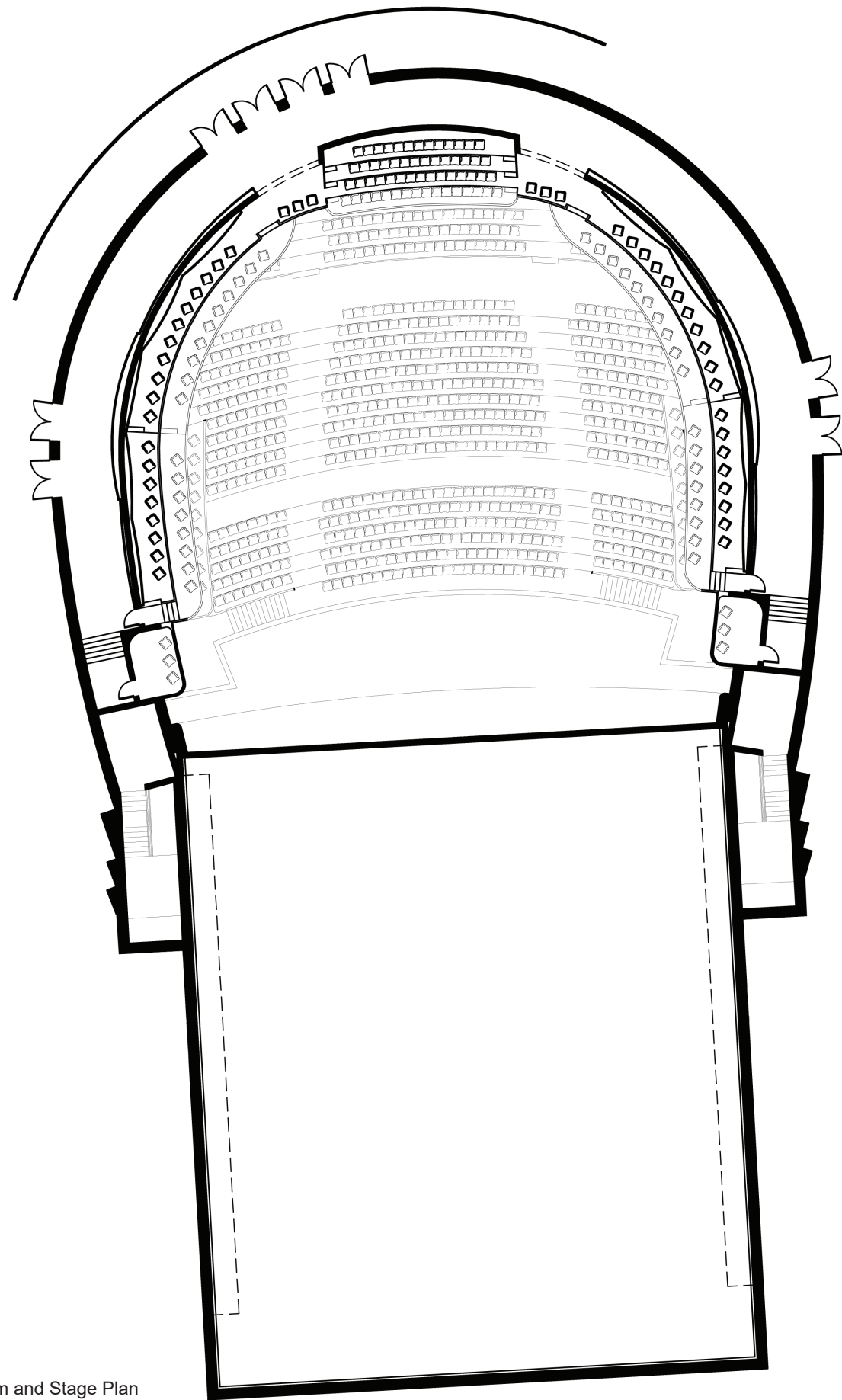
The staggered row-seating layout assures a clear sightline for the audience on every other seat.



Typical staggered Seating



Section - Balconies sightline Analysis

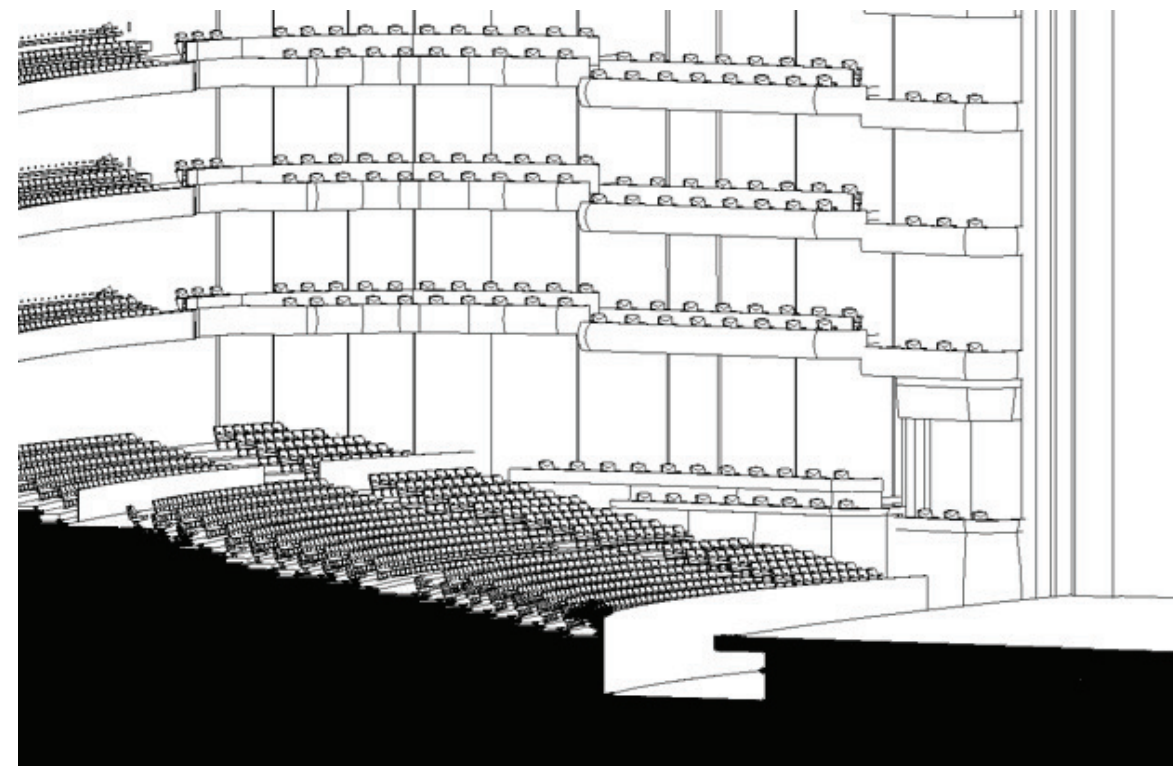


Auditorium and Stage Plan

A space for unamplified music demands strict design guidelines. The auditorium, the orchestra pit, and the deep and tall stage tower occupy one single space. The space was designed in the knowledge that the absence of background noise and echo, appropriate reverberance, sufficient loudness, strong early-arriving lateral sound reflections to the audience, limited number of seats, and use of materials for sound absorption, are crucial for the success of this space in terms of music.

The side and rear walls of the auditorium are designed to deliver appropriate lateral sound reflections to the audience. The suspended ceiling and overhead stage canopy are shaped to achieve appropriate reflections, which is important for proper loudness for the audience and musicians.

The spatial configuration of the balconies, and the fact that the depth of each balcony is not greater than the height separating each of them, eliminate what is known as “acoustical shadow.”



Section Perspective of Auditorium during design stages

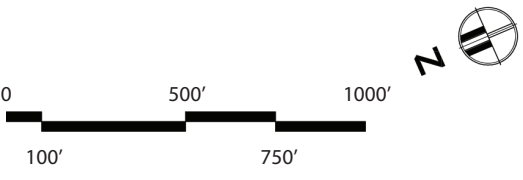
THESIS



The Alexandria Performing Arts Center is located on the waterfront of Old Town Alexandria. It can be accessed by car, train, foot, bicycle, or boat.

It will be a great addition to the various entertainment venues that the city has to offer.

SITE PLAN



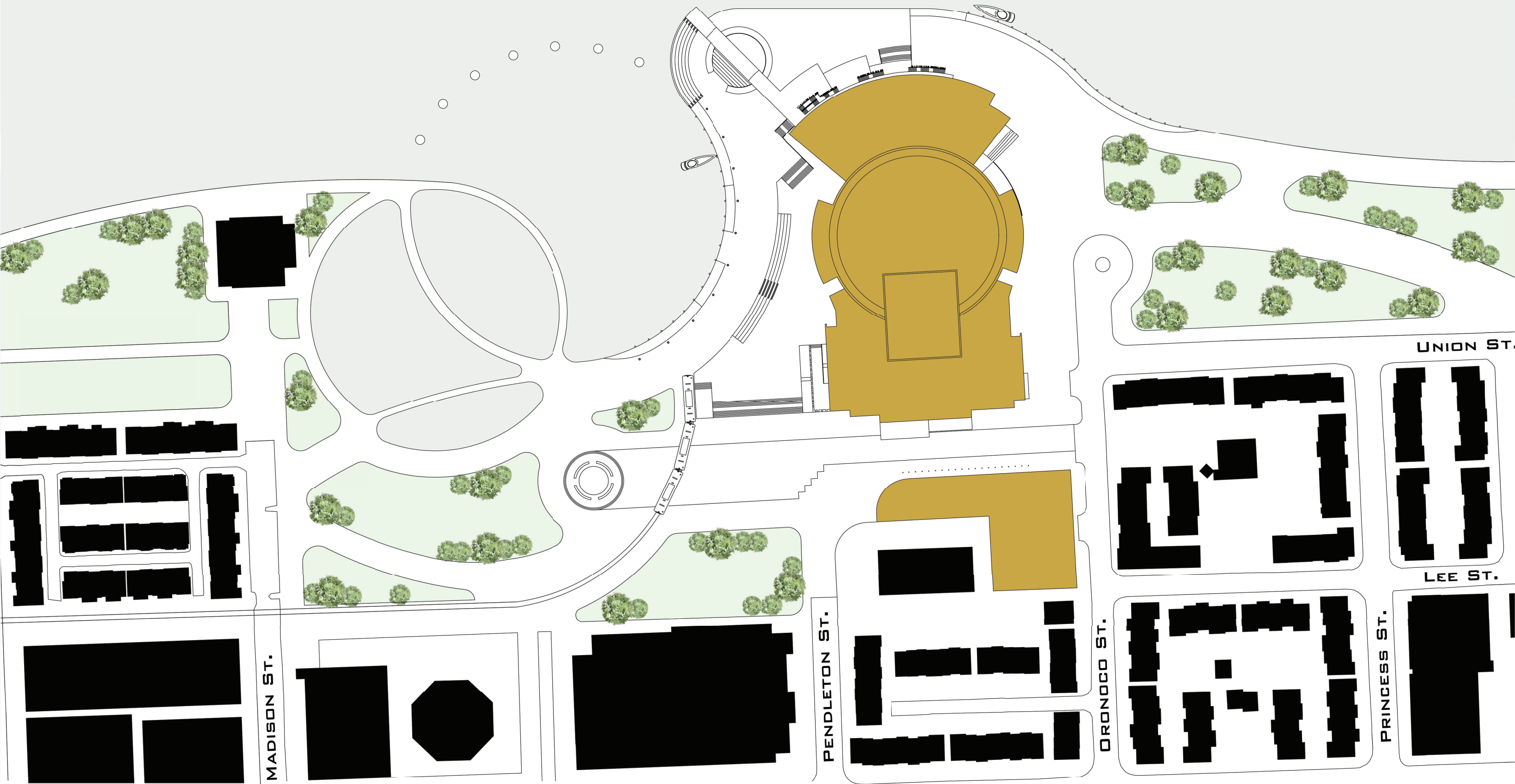


A train ride is offered by the Alexandria Performing Arts Center to visitors using the Metro system as their primary means of transportation. Visitors take the train at the north-west corner of the site, before being dropped off at the intersection of Madison Street.

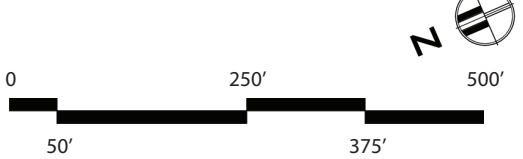
From there, a free shuttle takes them to the Metro train station, located at the end of Madison Street.

This innovative method of urban transportation made possible by using the existing railroad at the old site. When the train is not in use for public transportation, it can be co-opted to host educational activities.

SITE PLAN



SITE PLAN



I decided to locate the parking garage separately from the main structure. The space between the main structure and the parking garage became a shared street. The shared street is an extension of the public space on the north side of the program.

The public spaces bring a new level of dynamics to the public activities; as well as being instrumental in connecting the extensive trail system along the waterfront, which was cutoff due to the existing conditions on the site.

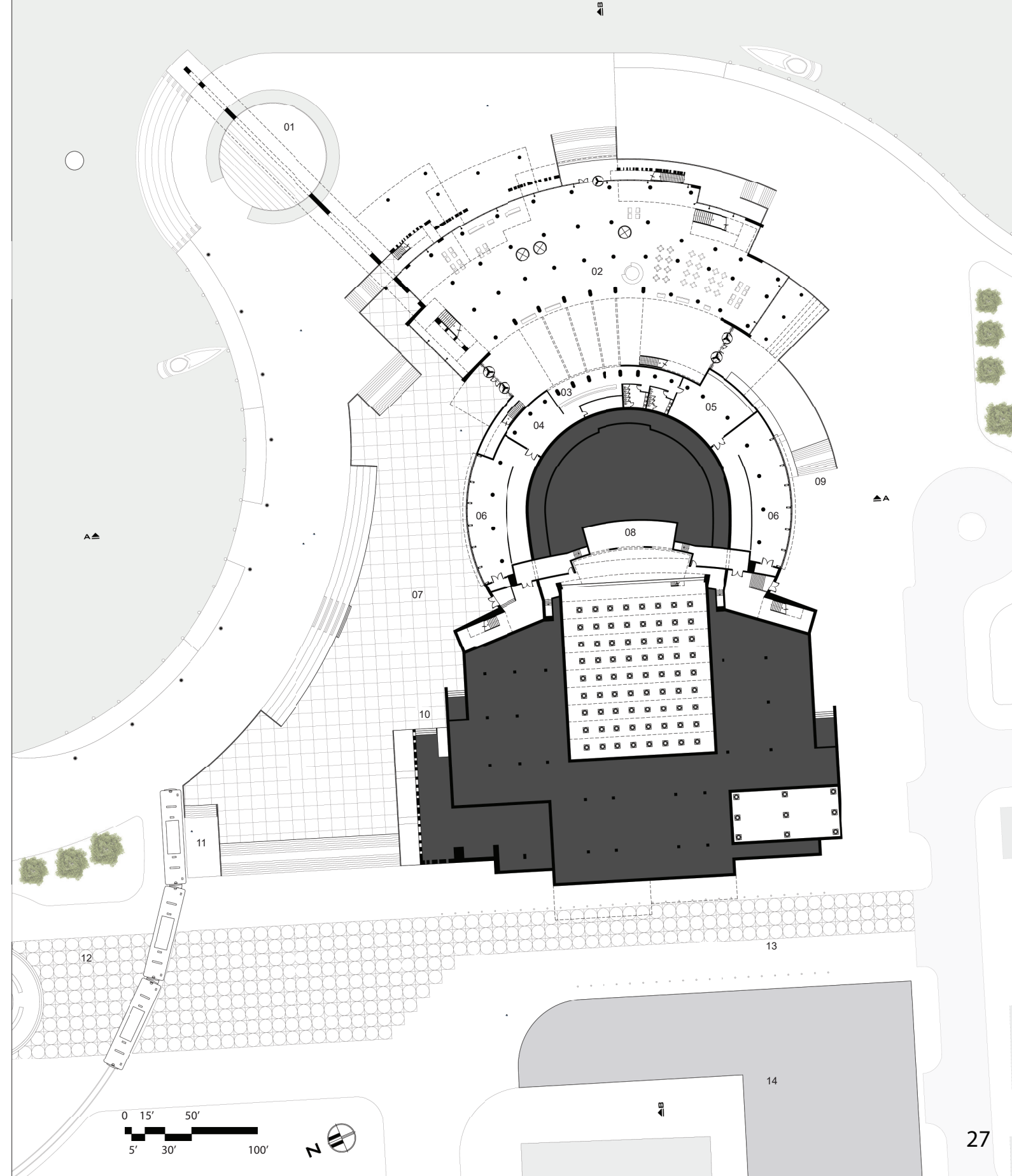
ENTRANCE PLAN

The lobby can be accessed from the northern entrance, via the north plaza, or from the opposite side by the southern entrance. For visitors arriving by boat, there is an entrance on the eastern side of the building.

The lobby is the common space from which to access the retail spaces and the various tiers of the opera house.

The north plaza serves multiple purposes. The curved seating facing the harbor can accommodate a large audience for outside performances. That said, the stage can be at ground level or a floating stage on the harbor. The curved seating is a great place from which to observe the surroundings and the planes flying by.

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office

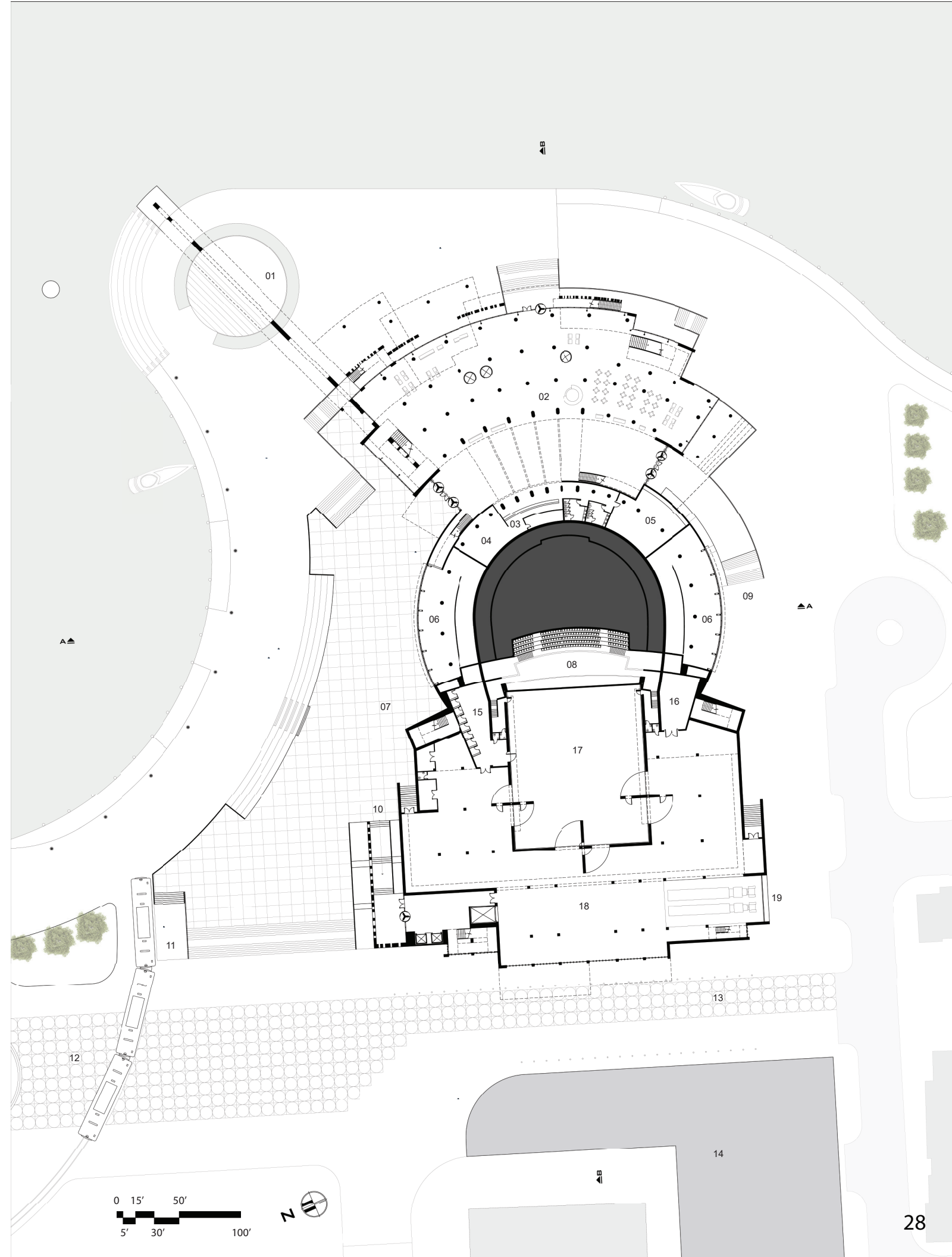


STAGE PLAN | BACKSTAGE PLAN

The large rotating doors allow personnel to access the stage from any side with large items or temporary structures for setting the stage. The stage also provides an access point to the orchestra pit.

The large trucks delivering the settings for each performance gain access from the southern side of the building, and are mechanically lifted to the backstage level.

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office

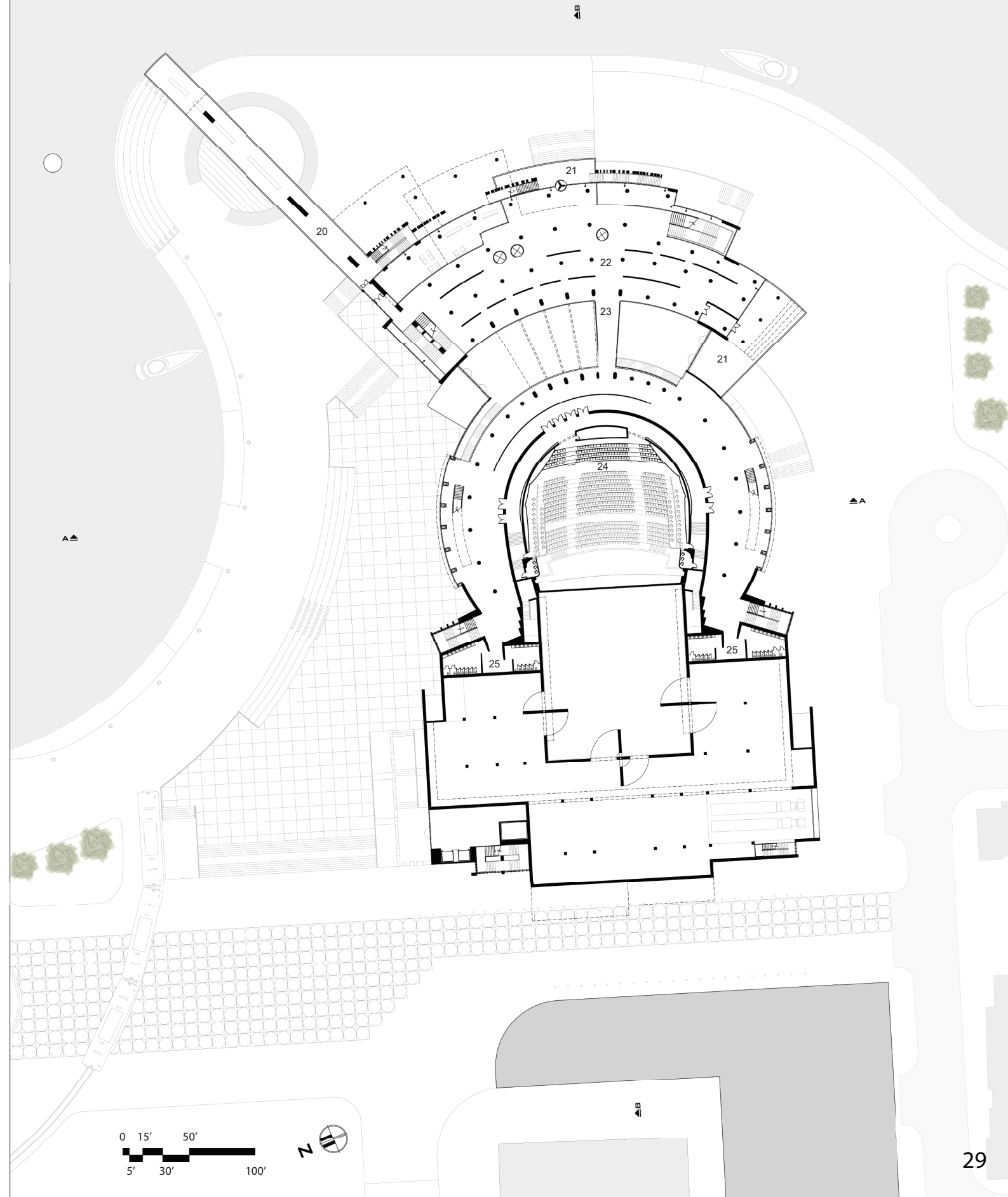


ORCHESTRA PLAN

ART GALLERY SPACE PLAN

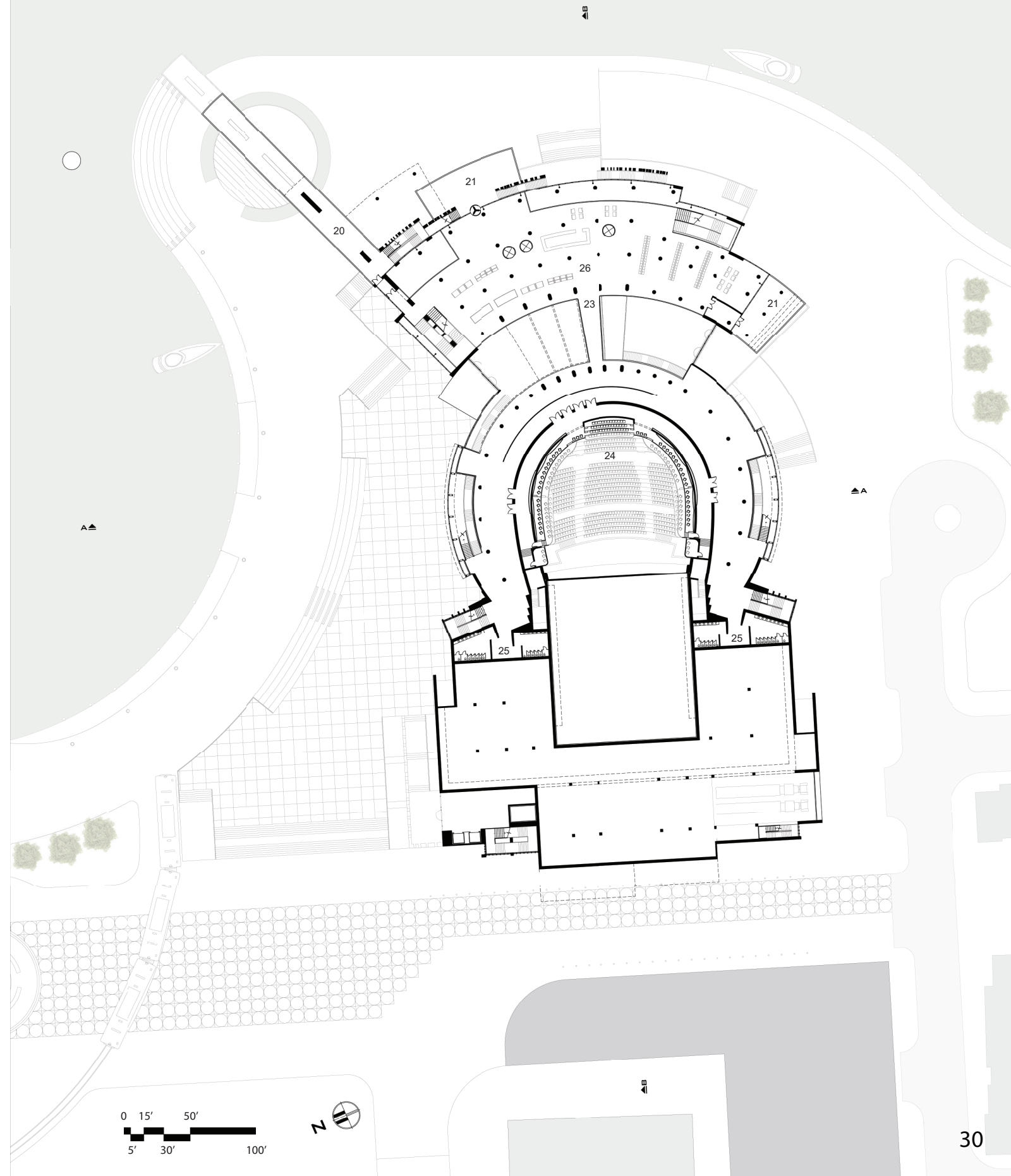
The first level of the retail spaces serves as an art gallery. From this level, a series of balconies can be accessed. The balcony to the south, and those above on each floor, offer views of the Old Town. The balcony facing east, as well as the long walkway, also serve as a connecting level for the balconies above.

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office



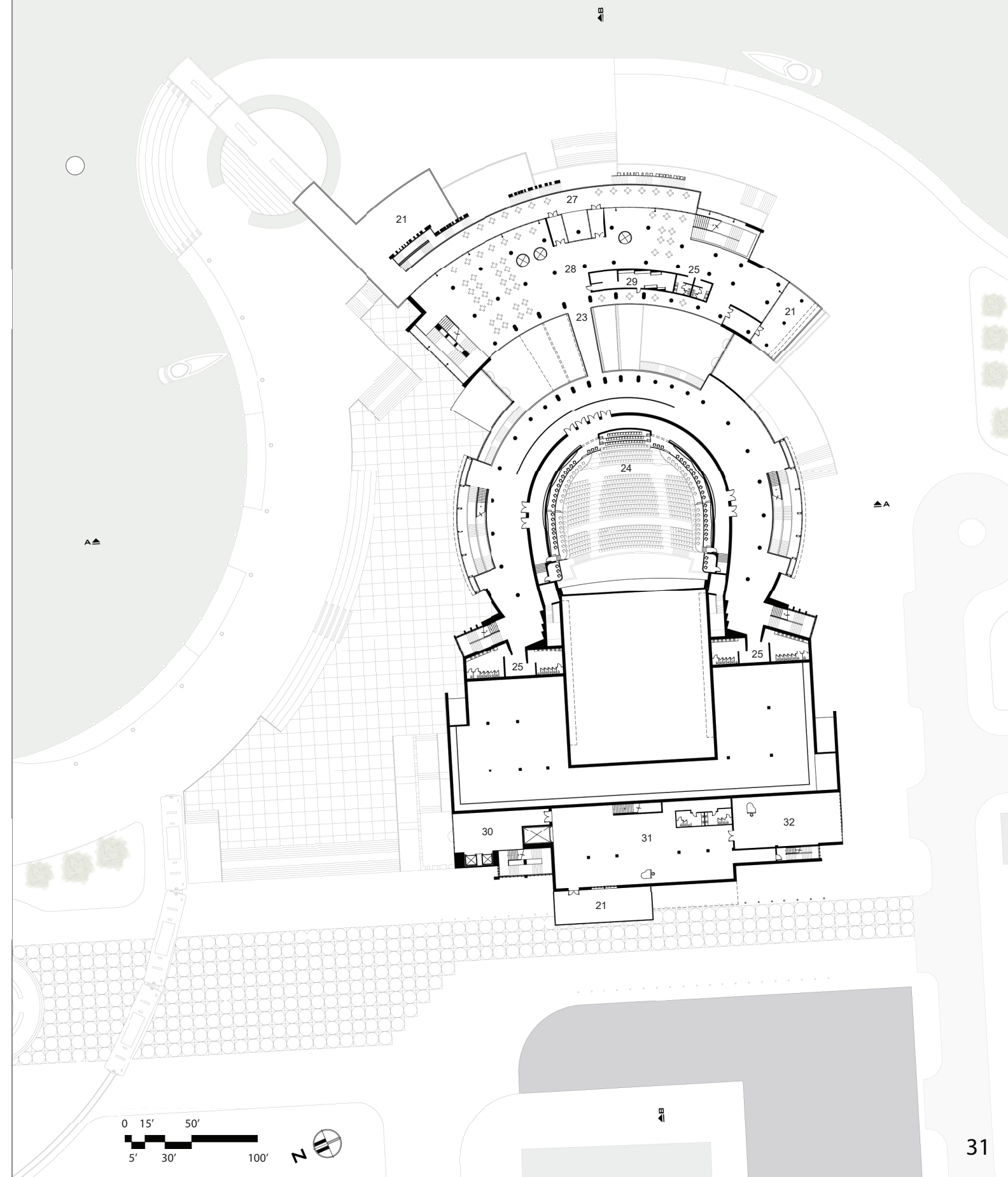
FIRST TIER PLAN | GIFT SHOP PLAN

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office



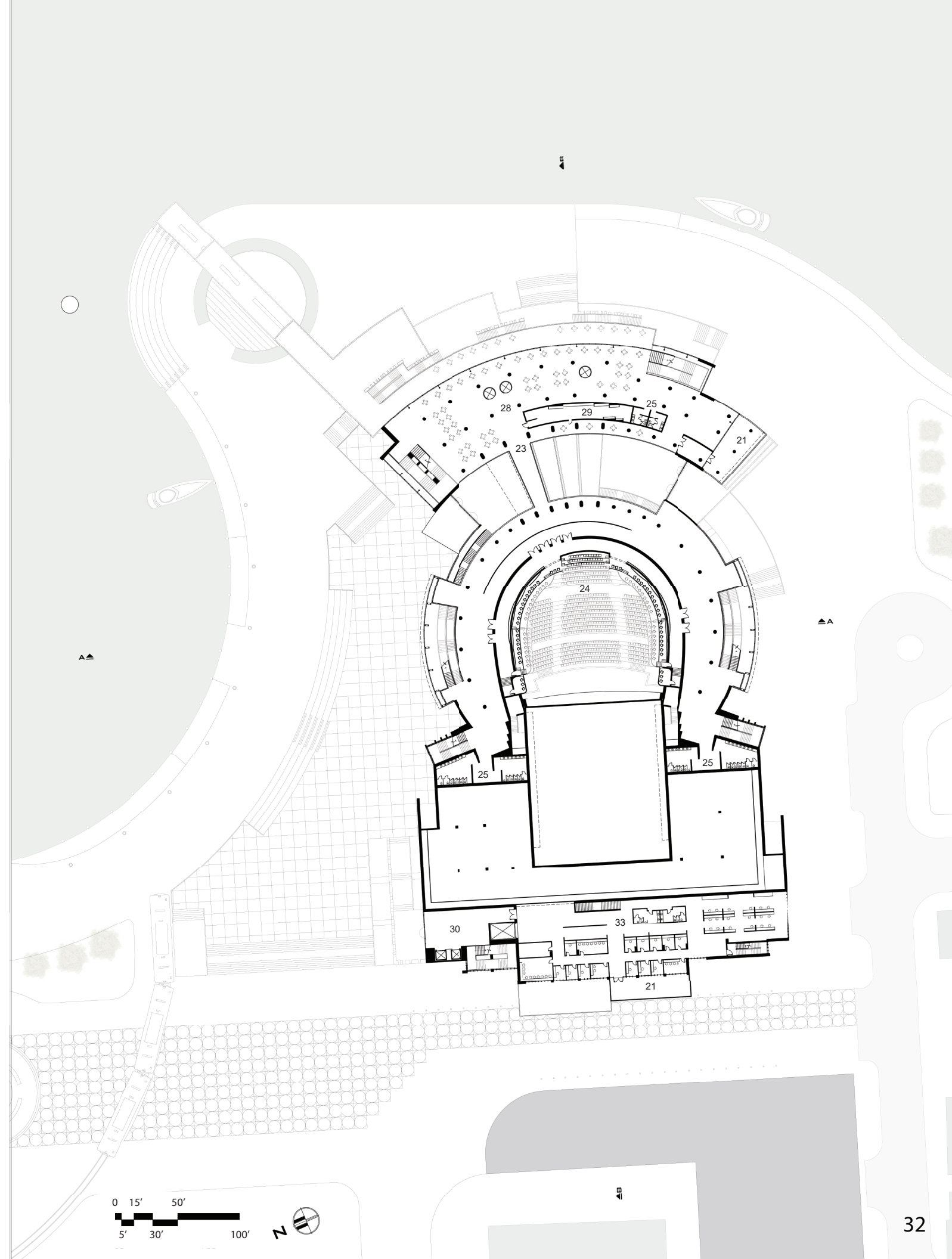
**REHEARSAL SPACE PLAN
SECOND TIER PLAN
RESTAURANT PLAN**

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office



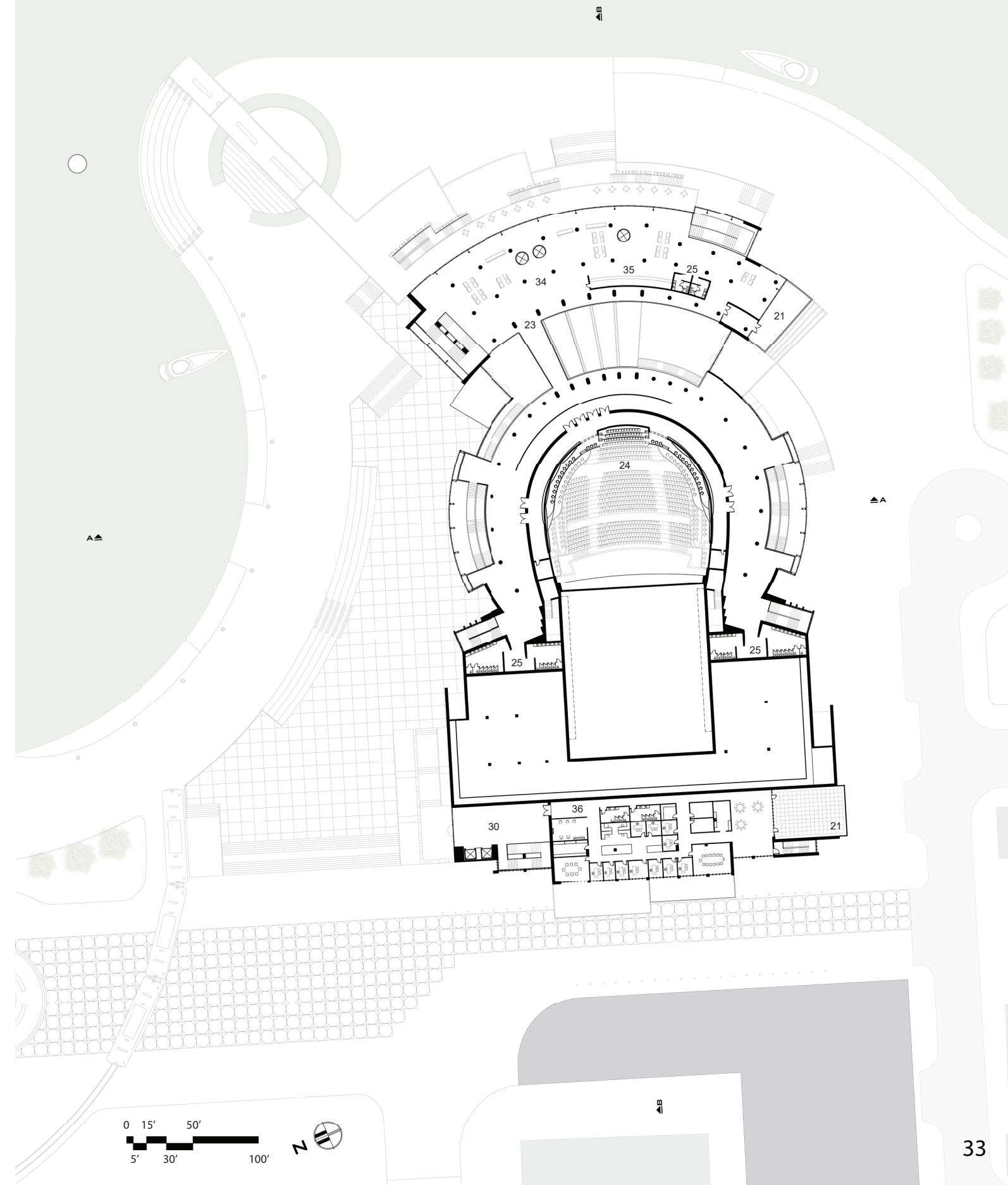
**DRESSING ROOMS PLAN
THIRD TIER PLAN
RESTAURANT PLAN**

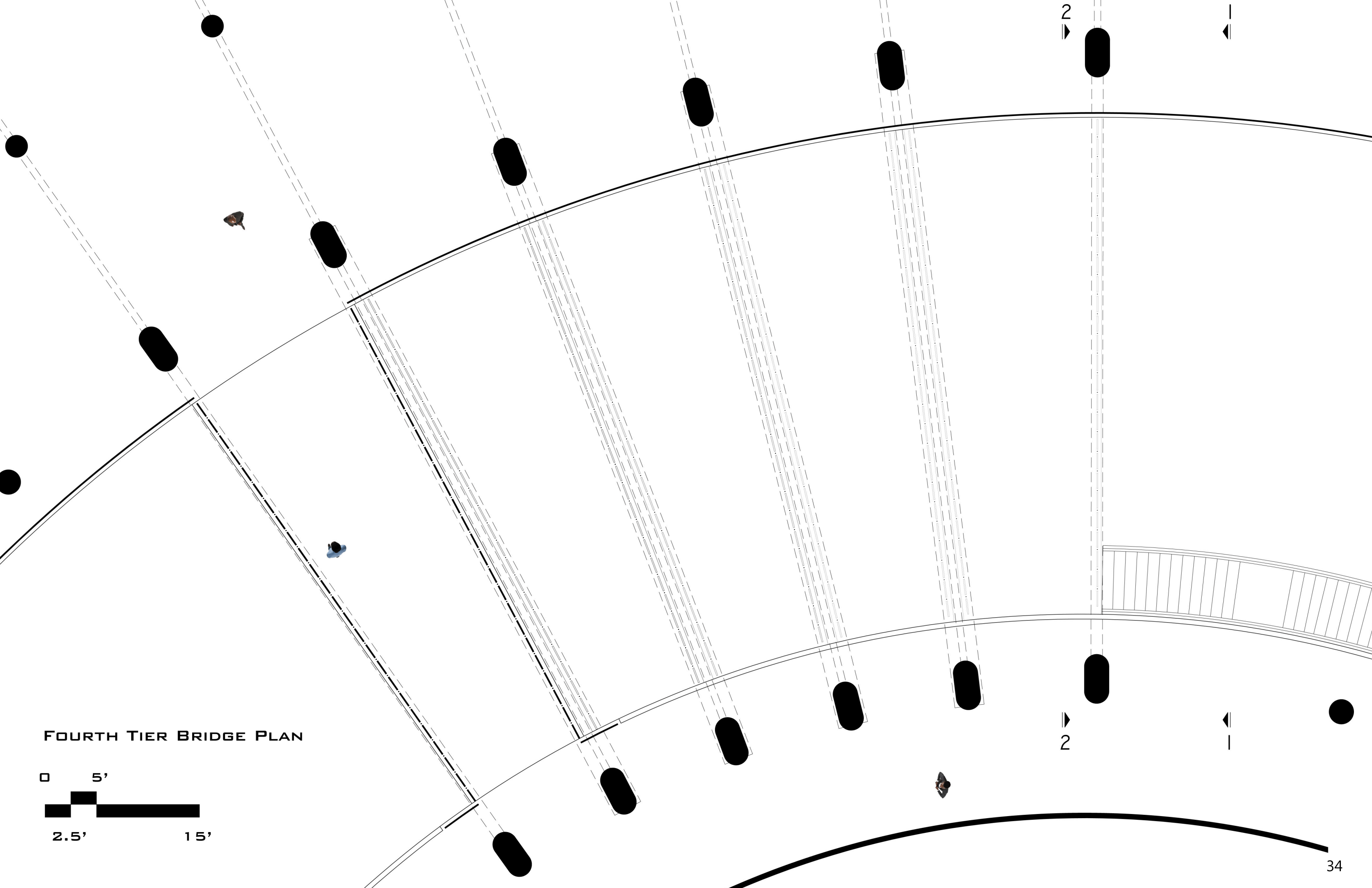
- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office



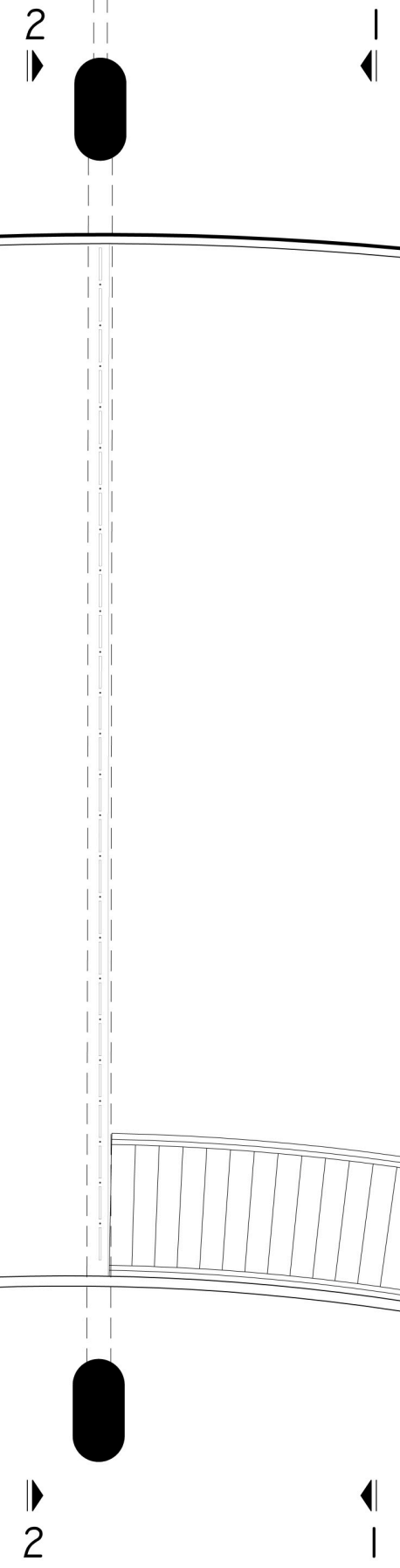
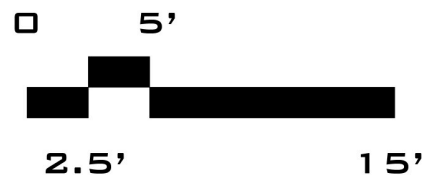
**ADMINISTRATIVE OFFICE PLAN
FOURTH TIER PLAN
VIP RECEPTION PLAN**

- 01 Amphitheatre
- 02 Lobby | Coffee Shop
- 03 Ticket Sale | Information
- 04 Coat Room
- 05 Mechanical Room
- 06 Exhibition Space for Classic Opera Costumes
- 07 North Plaza | North Entrance
- 08 Orchestra Pit
- 09 South Entrance
- 10 Office | Actors Entrance
- 11 Train Ride Platform
- 12 Public Space
- 13 Shared Street
- 14 Parking Garage
- 15 Actors' Dressing Rooms
- 16 Backstage Storage
- 17 Stage
- 18 Backstage
- 19 Truck Delivery Entrance
- 20 Walkway
- 21 Balcony
- 22 Art Gallery Space
- 23 Hanging Bridge
- 24 Auditorium
- 25 Restrooms
- 26 Gift Shops
- 27 Exterior Seating Space
- 28 Restaurant
- 29 Restaurant Kitchen
- 30 Office | Actors Lobby
- 31 Rehearsal Room 01
- 32 Rehearsal Room 02
- 33 Dressing Rooms
- 34 VIP Reception
- 35 Bartender | Barista
- 36 Administrative Office

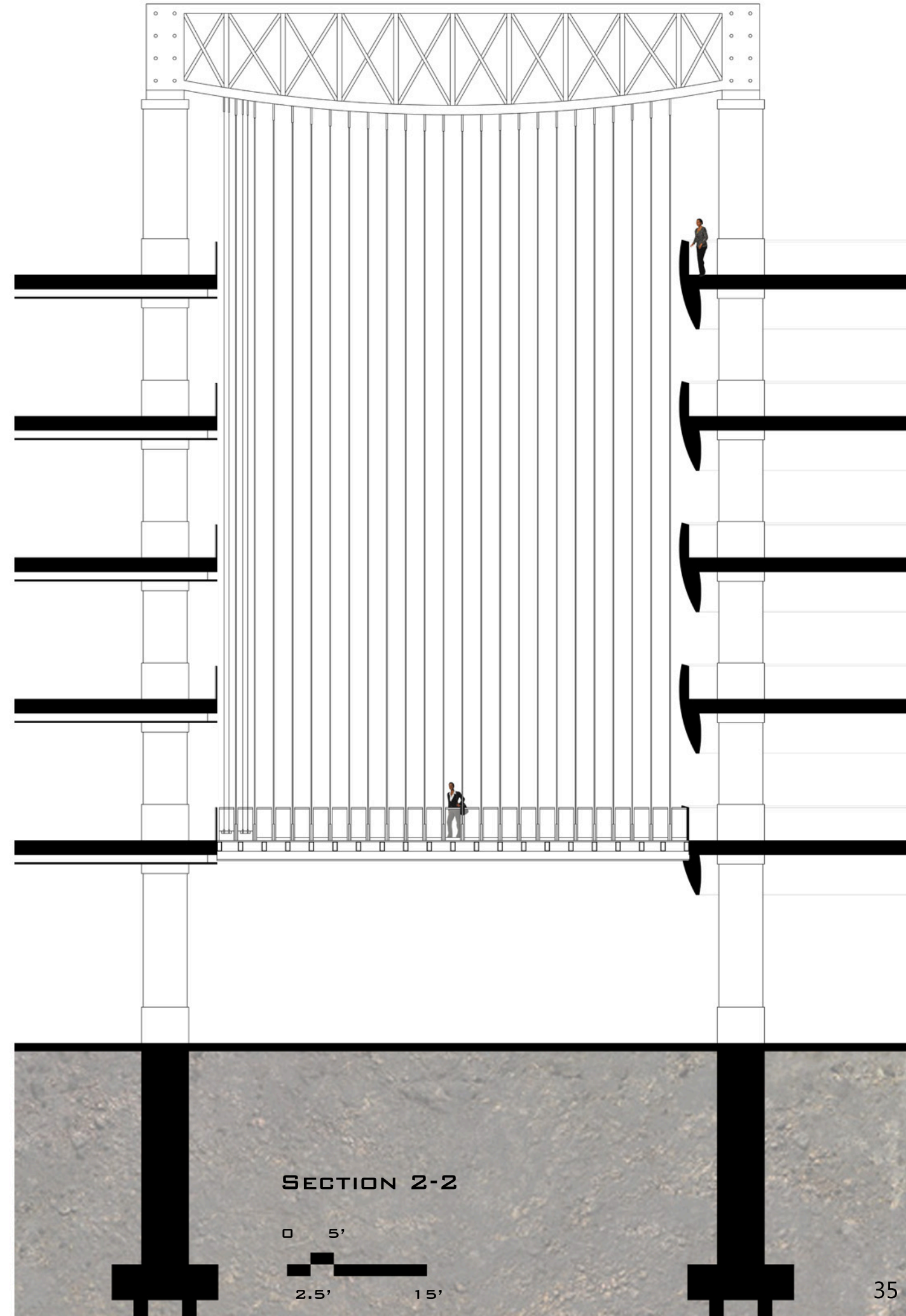
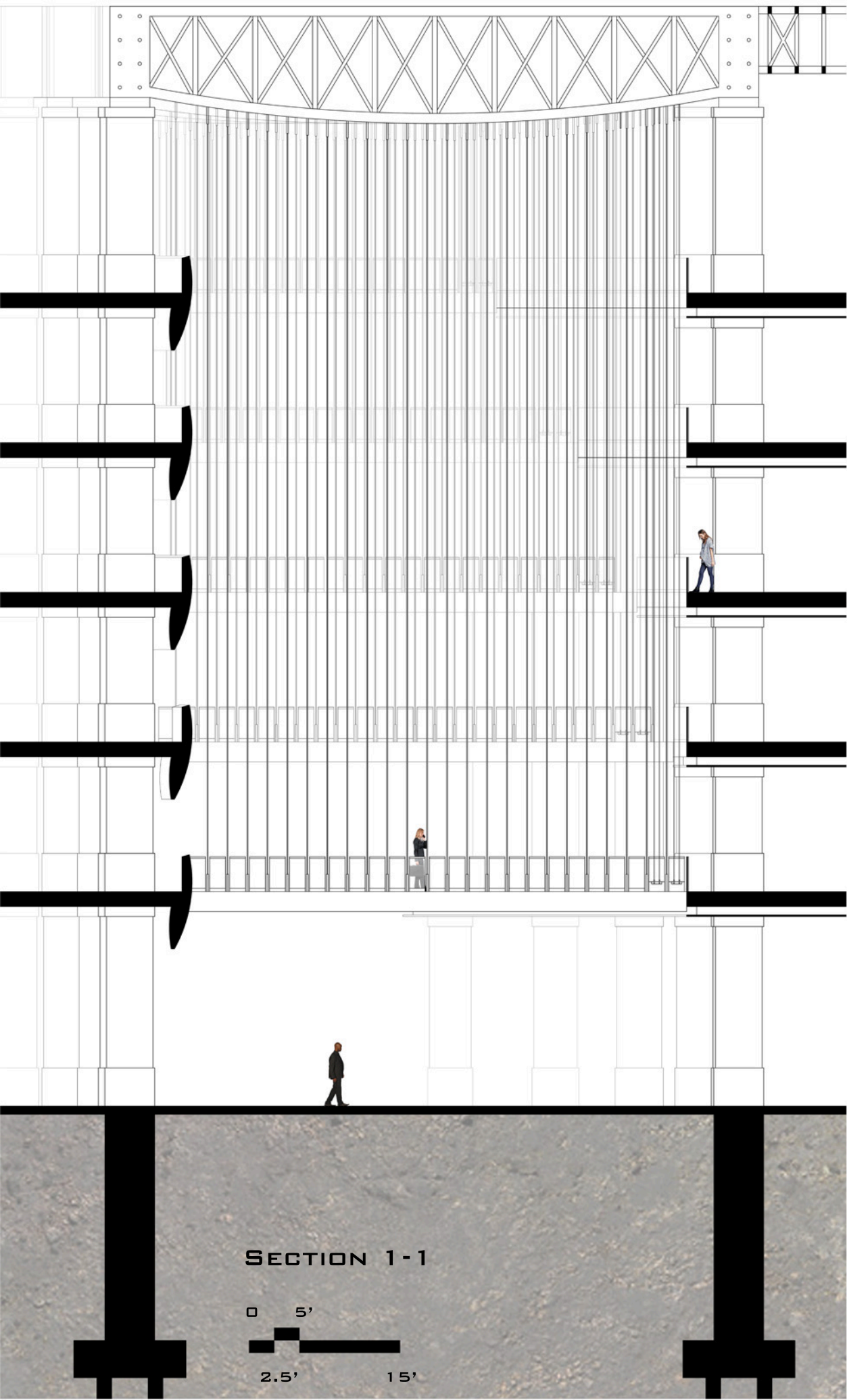


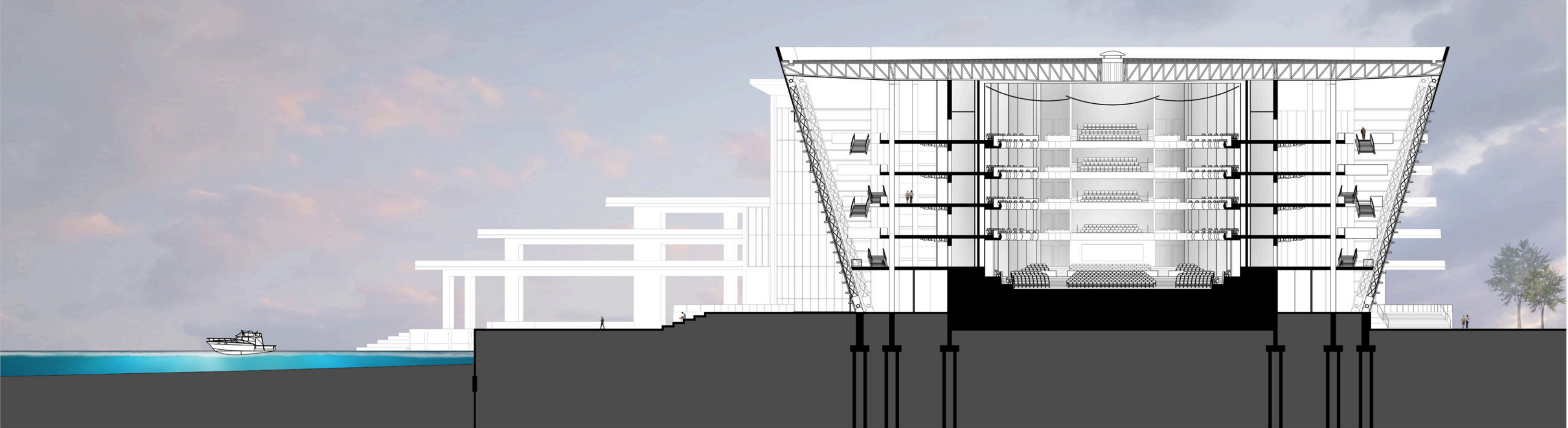


FOURTH TIER BRIDGE PLAN



HANGING BRIDGES
SECTIONS DETAILS



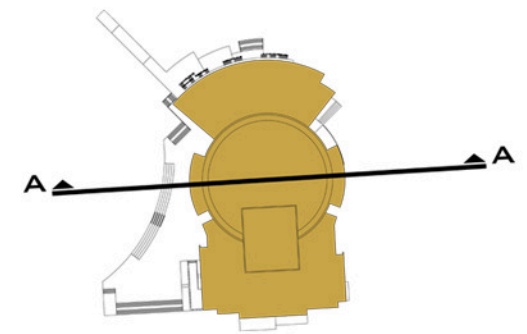


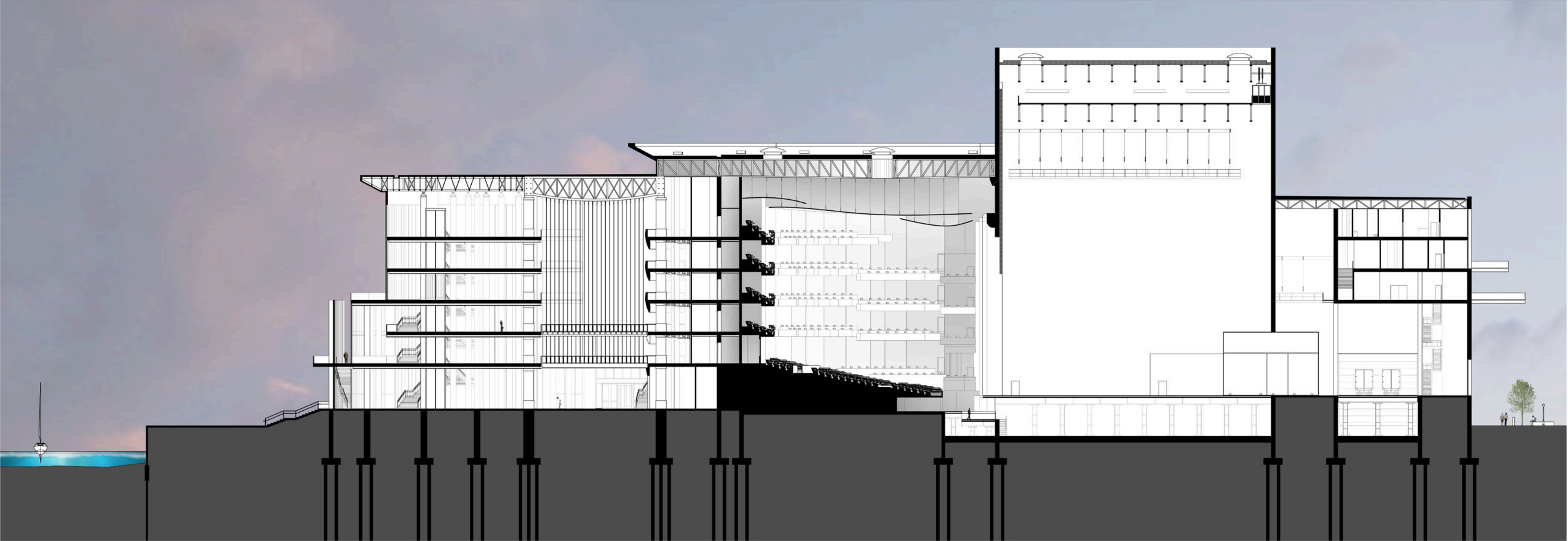
SECTION A-A



The staircases on each side of the auditorium serve as a means of egress, as well as during the nighttime becoming a performance stage as only the silhouettes of the people using the staircases can be seen from outside.

The seating in the plaza provides a resting point for those passing by the site, as well as being for the use of spectators of outside performances.





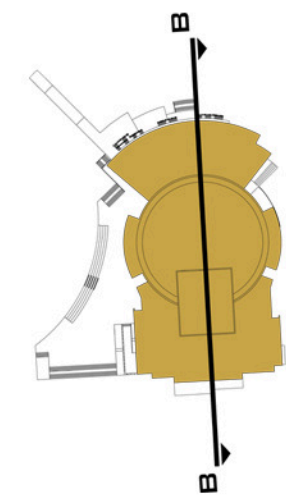
SECTION B-B

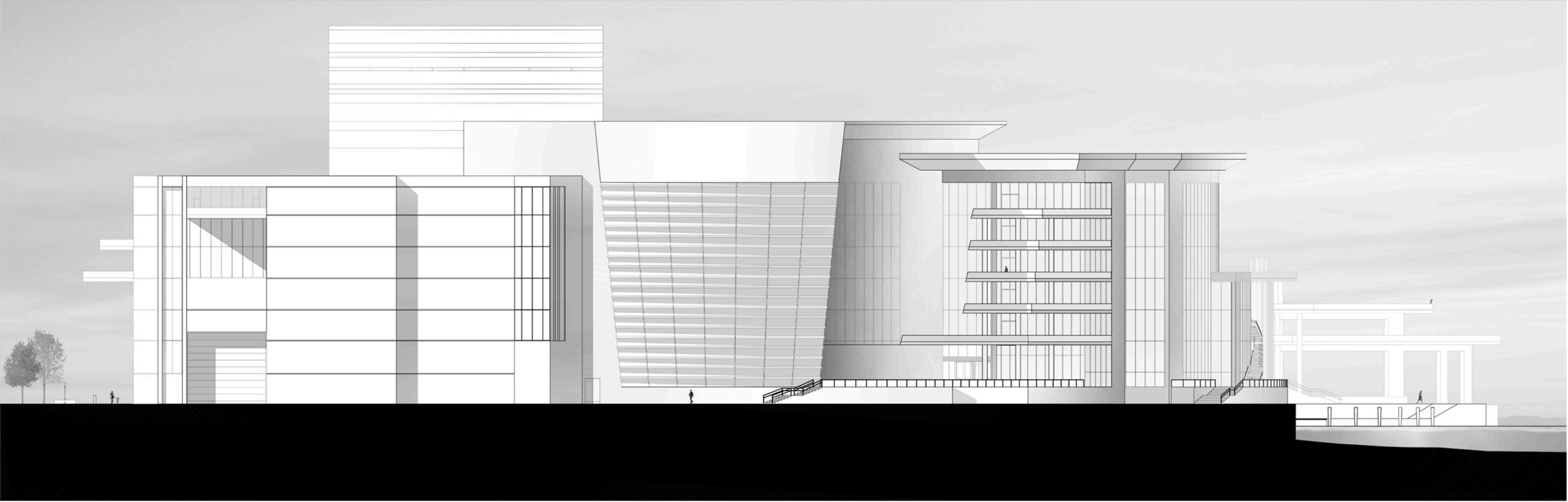


The hanging bridge system is the heart of the project linking each level of the retail spaces to each tier of the opera house. Occupants of the retail spaces can enjoy superb views of the Potomac River and environs.

The architectural acoustics and a proper sightline for the audience are carefully and strategically integrated into the design of the auditorium and stage tower.

The western side of the structure, facing the Old Town, houses the administrative offices, rehearsal spaces, and dressing rooms for the actors. It can be accessed from the northwest of the building.





SOUTH ELEVATION

The south elevation provides access to the lobby where the hanging bridges reside, while the western end of the building offers access to the truck trailers delivering the costumes and stage settings for each opera performance. Adjacent to the entrance of the lobby, the exterior staircases to the balconies can be accessed.

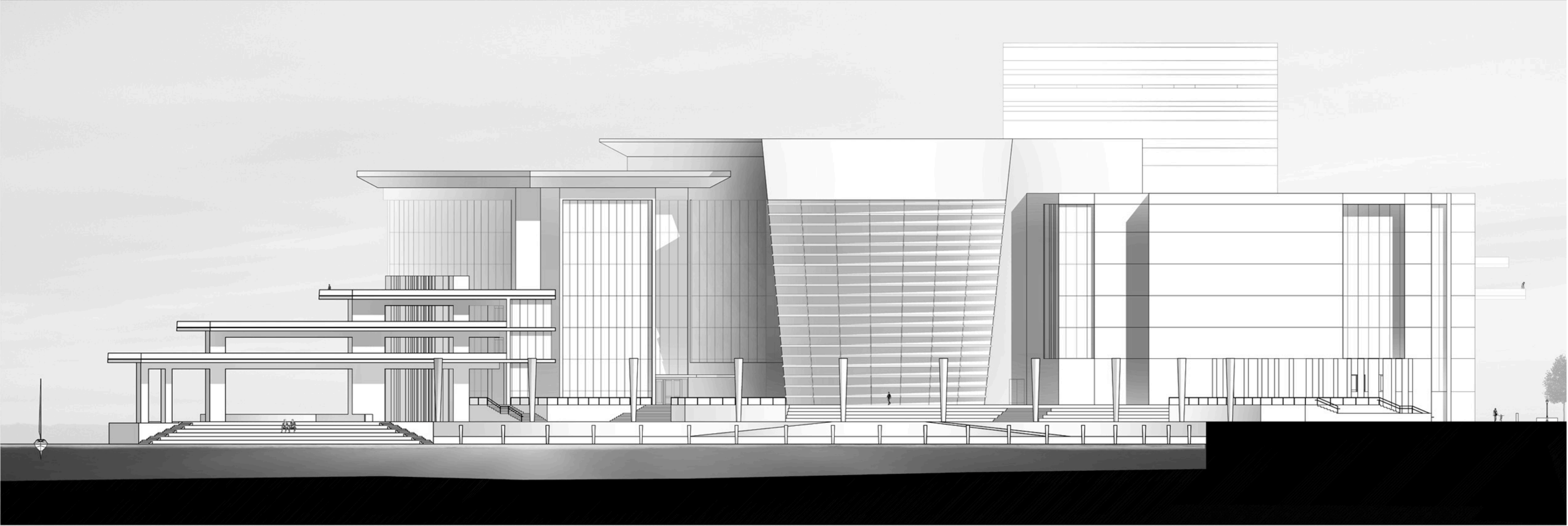




WEST ELEVATION



The western portion of the building is dedicated to the actors, musicians, and admin staff. The lobby to access this part of the structure is at the northwest corner, located on the plaza level.



NORTH ELEVATION



The different materials and the complexity of the building mimic the intricacy of a piece of music, and become one cohesive whole. The terracotta cladding, which faces the Old Town, accent the traditional appearance of the buildings across the city.

Next is the curved curtainwall hiding the auditorium. The plaza serves as the access path to the lobby and provides seating facing the harbor.

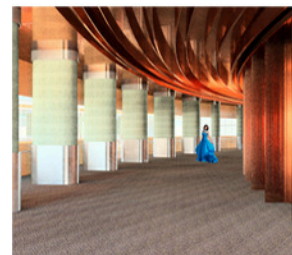
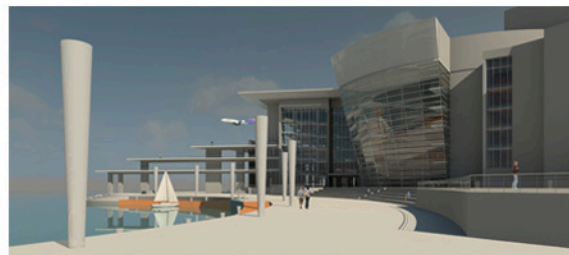


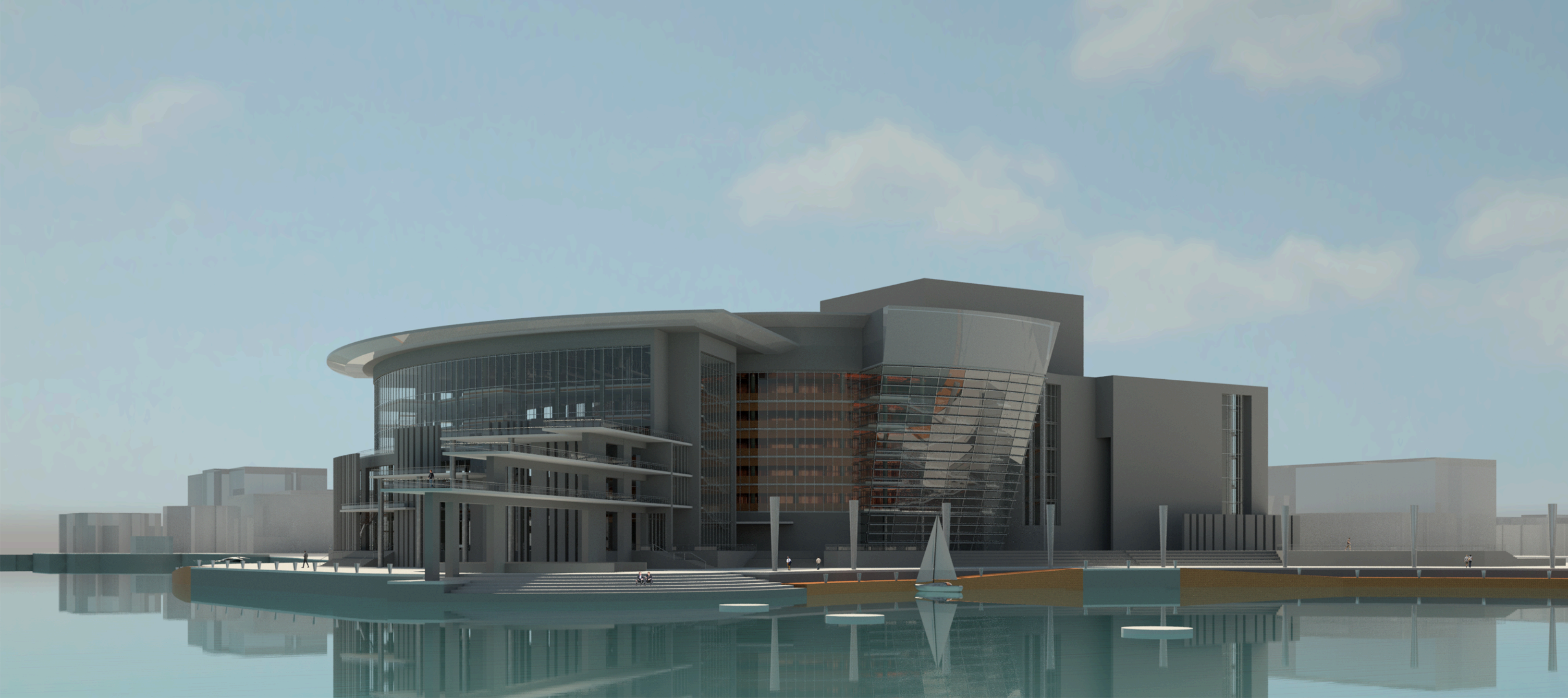
EAST ELEVATION

While the curved curtainwall façade frames fabulous views of the Potomac River, the exterior staircases behind the vertical elements provide access to the balconies and walkways, which are an extension of the site's public domain.

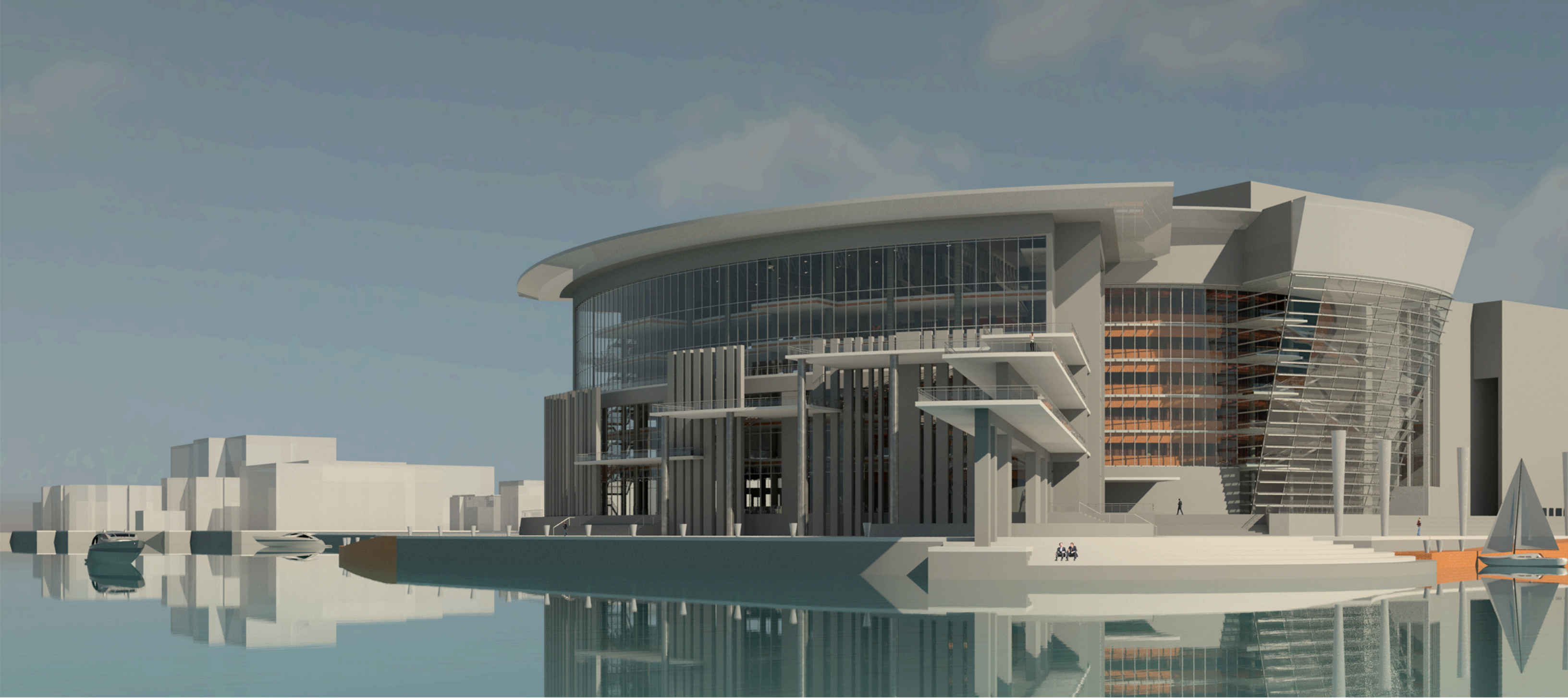


RENDERINGS

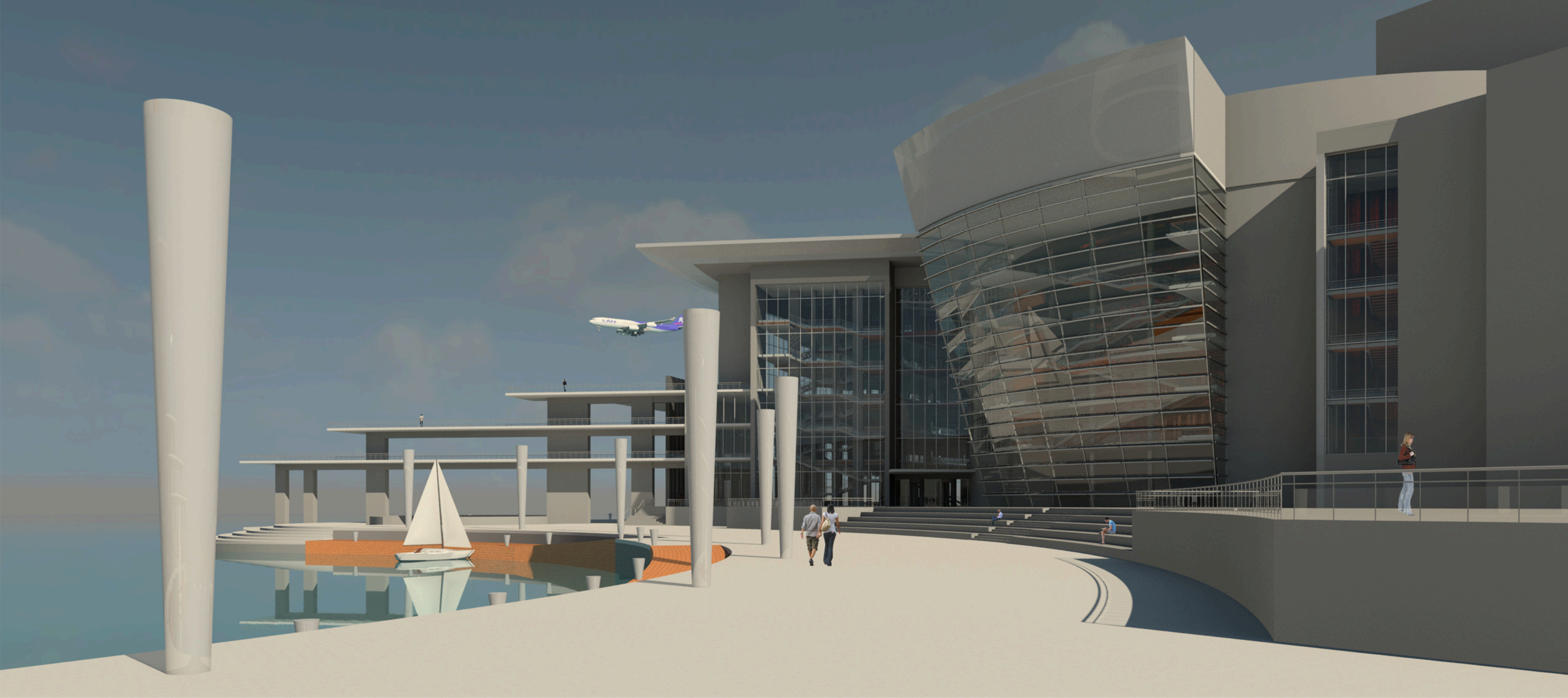




Northeast view from the Potomac River



Public spaces along the shoreline



Northwest entrance | View of plaza and harbor

Interior view of the hanging bridges connecting each level of the retail spaces to each tier of the opera house. The trusses above are responsible for supporting the hanging bridge system and the roof.

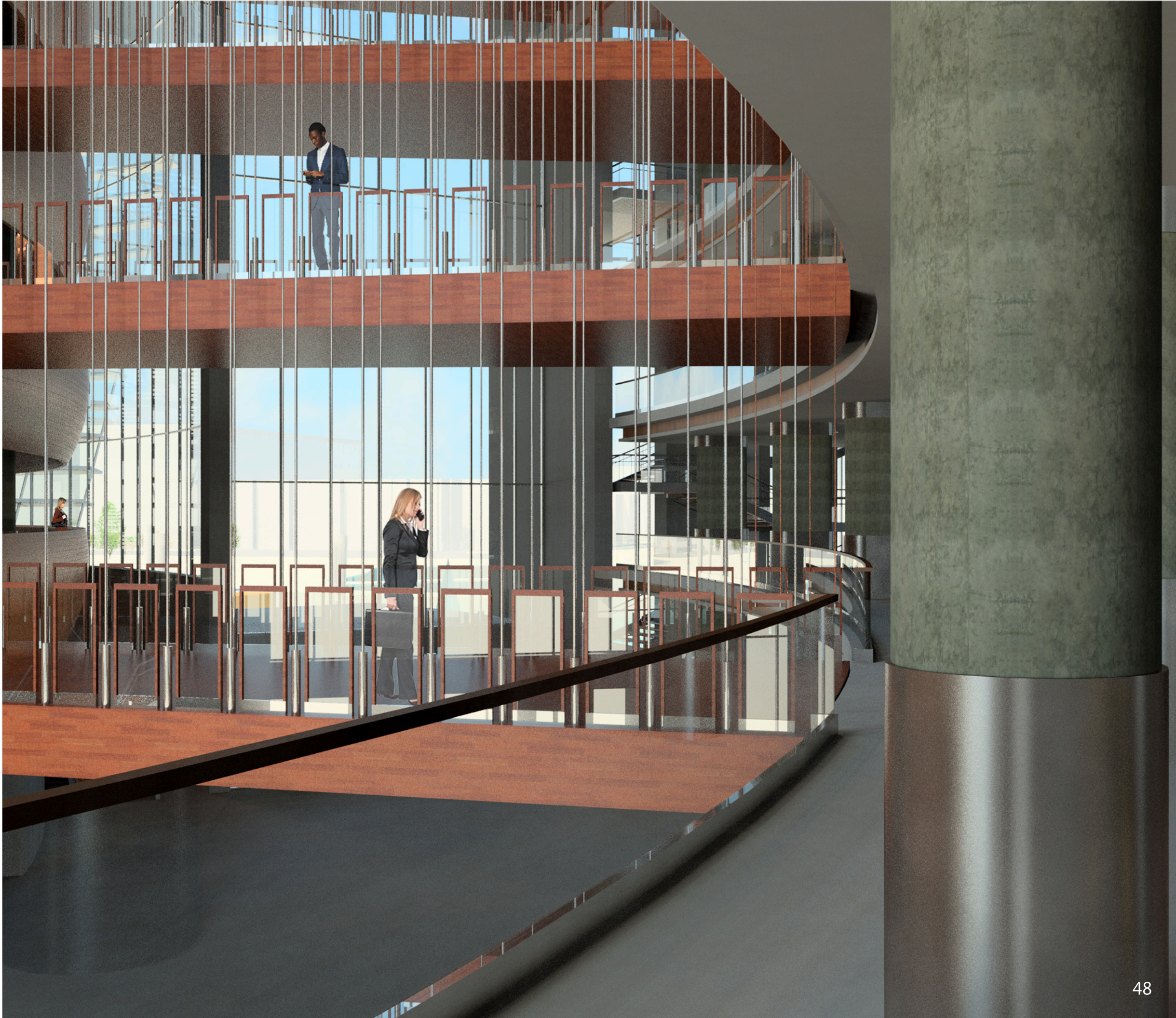


The wires and connectors supporting each hanging bridge are polished stainless steel.

Based on the early idea that some of the wires supporting the hanging bridges could be used to produce low-frequency sounds, the last two guardrail sections on one side at each end of each bridge, are the tailpieces for four strings, like those of a violin and many other four-stringed instruments that are part of a conventional orchestra.



Interior view of the hanging bridges.



A little girl making music. View of the third level.



Interior view of the Art Gallery Space.



Interior view of the corridor at the Orchestra level.



Interior view of the lobby and cafeteria.



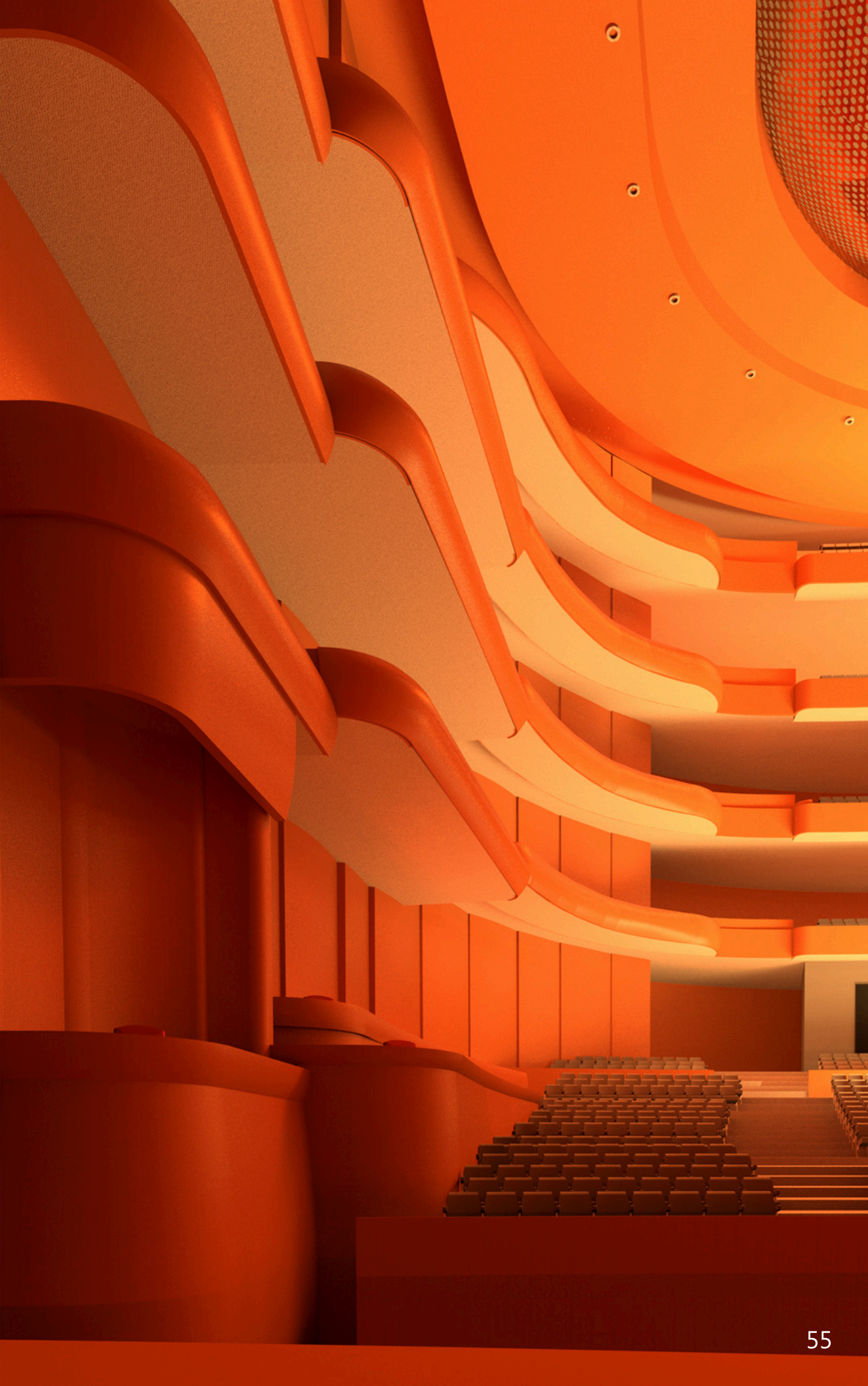
View of the hanging bridges from the fourth tier level looking toward the southern entrance.



The Auditorium from an actor's perspective during The Nutcracker play.



Interior view of the Presidential balcony and tiers above.



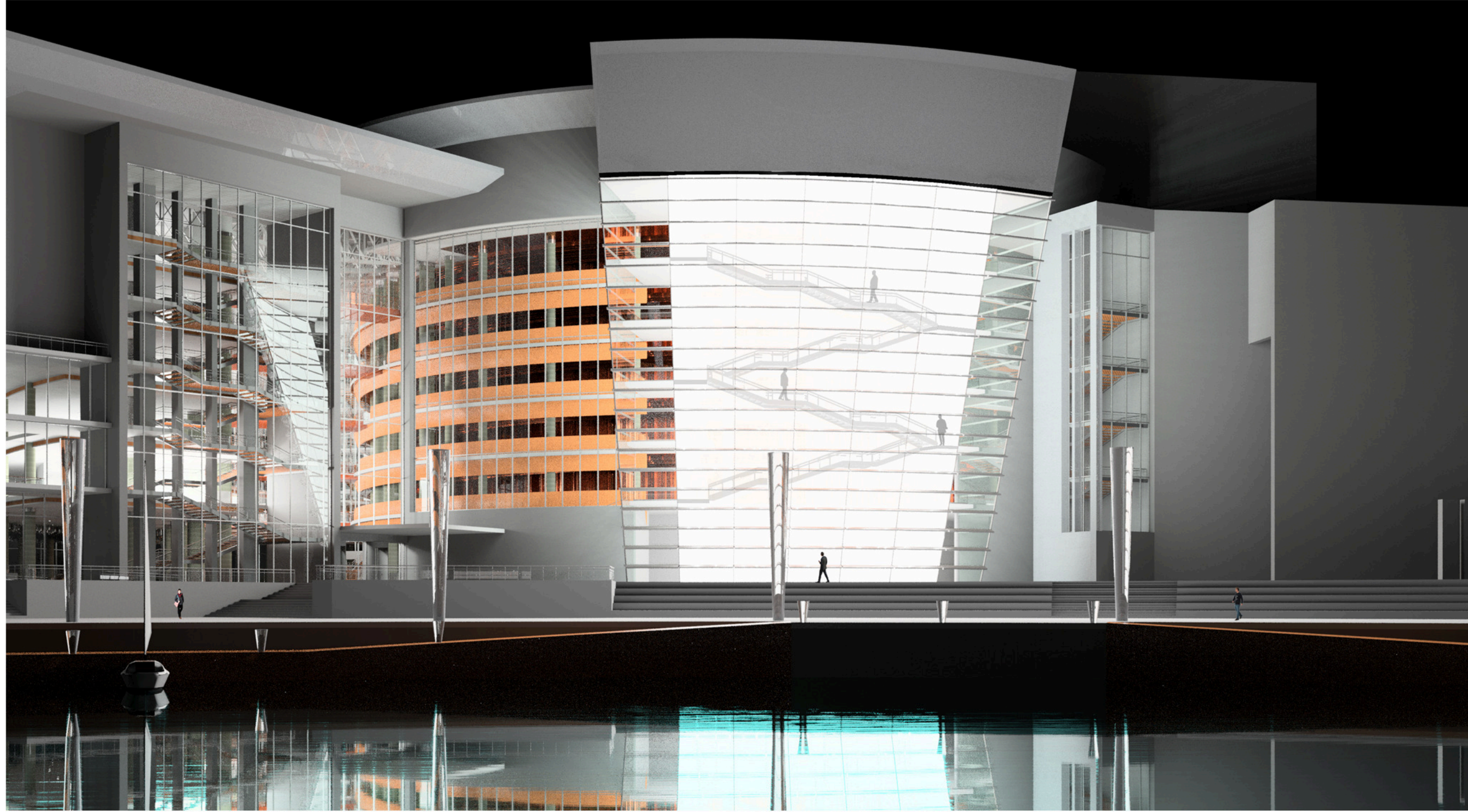
Exterior view of the staircase.

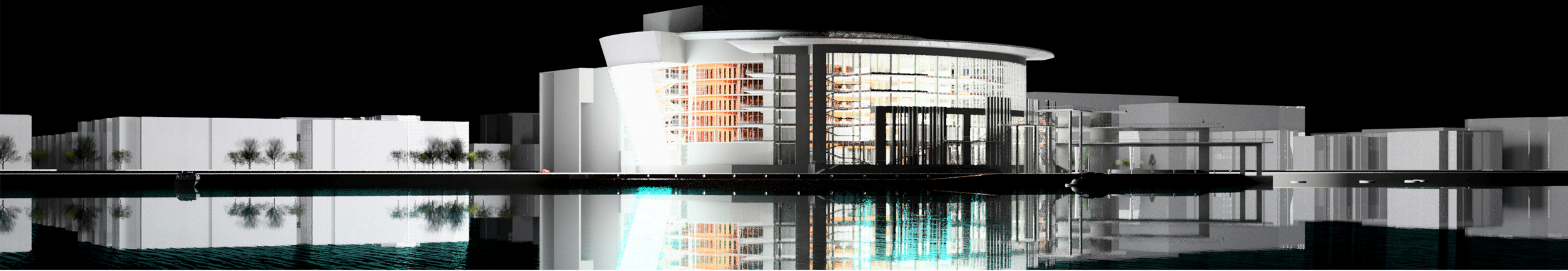
Part of the Old Town's shoreline can be seen while descending to ground level.



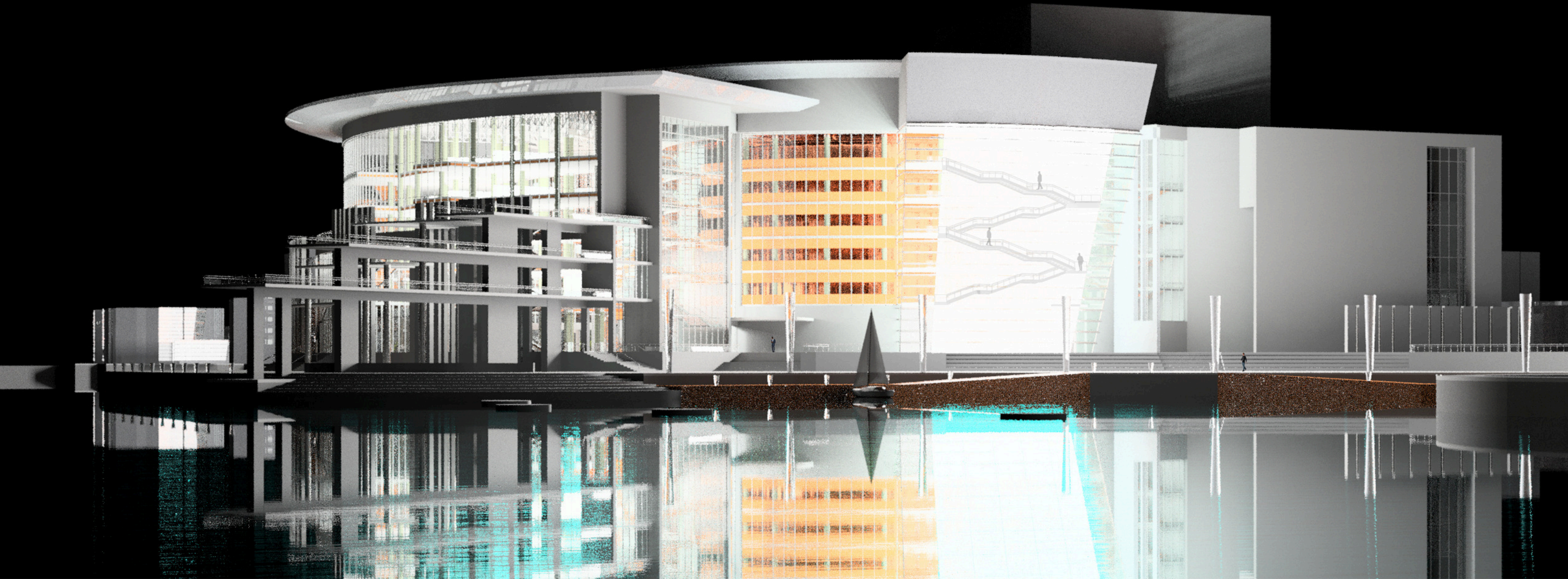
Northeast view at nighttime.

The silhouettes of the people in motion and the staircases seen through the frosted glassing evoke a theatrical experience.





Southeast view at nighttime.



Northeast view at nighttime. From the multi-story walkway, many of the iconic monuments of Washington D.C. can be seen.

Bibliography

- Asensio, Paco. *Charles Garnier*. New York: teNeues, 2003. Print.
- Beveridge, Charles. *Frederick Law Olmsted: Designing the American Landscape*. New York: Rizzoli, 2005. Print.
- Ermann, Michael. *Architectural Acoustics Illustrated*. New Jersey: Wiley and Sons, 2015. Print.
- Grout, Donald, and Williams, Hermine W. *A Short History of Opera / Edition 4*. New York: Columbia University Press, 2003. Print.
- Hurol, Yonca. *The Tectonics of Structural Systems: An Architectural Approach*. New York: Routledge, 2016. Print.
- Mortensen, Jorn. *Visual Art in the Oslo Opera House*. Oslo: Forlaget Press, 2011. Print.
- Newhouse, Victoria. *Site and Sound. The architecture and Acoustics of New Opera Houses and Concert Halls*. New York: The Monacelli Press, 2012. Print.
- Simpson, J. A., and Weiner, E. S. C. *The Oxford English Dictionary*. Oxford: The Oxford University Press, 1989. Print.
- Snohetta. *Norwegian National Opera and Ballet*. Oslo, 2008. Web. 12 February 2016. <<http://snohetta.com/project/42-norwegian-national-opera-and-ballet>>.
- Staff, City of Alexandria. *Alexandria Waterfront History Plan. Alexandria, a Living History*. A Publication of Alexandria Archaeology, 2010. Web. 07 September 2015. <<https://www.alexandriava.gov/uploadedFiles/planning/info/Waterfront/AACWaterfrontHistoryPlan.pdf>>.
- Staff, City of Alexandria. *Alexandria Waterfront Small Area Plan*. Alexandria, 2012. Web. 25 February 2016. <<https://www.alexandriava.gov/special/waterfront/?id=18940>>.
- Watson, Anne. *Building a Masterpiece: The Sydney Opera House*. Sydney: Powerhouse Publishing, 2006. Print.
- Wolfe, Tom. *From Bauhaus to Our House*. New York: Picador, 1981. Print.

Image Credits

- Google Inc. *Google Maps and Google Earth*. Digital Imagery. Google Inc., 2015. Web. 14 October 2015. <<https://www.google.com/earth/>>.
- Hungarian State Opera. *The Nutcracker*. Digital Imagery. N.p., n.d. Web. 11 August 2016. <<https://www.europaticket.com/event/en/936/Ballet-tickets-Budapest/The-Nutcracker>>.
- Kalwall. *High Performance Translucent Building System – Panel Technology*. Digital Imagery. N.p., n.d. Web. 07 July 2016. <<https://www.kalwall.com/technology/panel-anatomy/>>.
- Kawneer. *1600 Wall System™ 2 Curtain Wall*. Digital Imagery. N.p., n.d. Web. 21 August 2016. <http://www.kawneer.com/kawneer/north_america/en/product.asp?cat_id=1992&prod_id=1802&desc=blast-mitigation-ssg-hurricane-resistance-curtain-wall>.
- LEO A DALY. *LEO A DALY Wins Third Major Award for SAC Federal Credit Union Headquarters*. Digital Imagery. Press Release, 2015. Web. 21 August 2016. <<http://www.leoadaly.com/about/press/leo-a-daly-wins-third-major-award-for-sac-federal-credit-union-headquarters/>>.
- Old Town Alexandria. *Old Town Top 10*. Digital Imagery. N.p., n.d. Web. 07 July 2016. <<http://www.visitalexandriava.com/old-town-alexandria/>>.
- Russell, Andrew J. *View from Pioneer Mill, looking up the wharf*. Digital Imagery. Photos, Prints, Drawings. Library of Congress, 1865. Web. 07 September 2015. <<https://www.loc.gov/item/2005684447/>>.
- SageGlass. *Dynamic Glass for a Changing World*. Digital Imagery. N.p., n.d. Web. 21 August 2016. <https://www.sageglass.com/sites/default/files/architectbrochure_mkt_23.pdf>.
- Shildan, Inc. *Featured Projects*. Digital Imagery. N.p., n.d. Web. 07 July 2016. <<http://www.shildan.com/project/>>.
- Smart, Christopher. *Gallery: Construction of Salt Lake City's mega-theater hits halfway mark*. Digital Imagery. The Salt Lake Tribune, 2015. Web. 11 August 2016. <<http://www.sltrib.com/home/2735300-155/construction-of-salt-lake-citys-mega-theater>>.
- Snohetta. *Norwegian National Opera and Ballet*. Digital Imagery. ArchDaily, 2008. Web. 09 October 2015. <<http://www.archdaily.com/440/oslo-opera-house-snohetta>>.
- Staff, City of Alexandria. *Alexandria Waterfront History Plan. Alexandria, a Living History*. Digital Imagery. A Publication of Alexandria, 2010. Web. 07 September 2015. <<https://www.alexandriava.gov/uploadedFiles/planning/info/Waterfront/AACWaterfrontHistoryPlan.pdf>>.
- Steelconstruction. *Composite construction - Trapezoidal decking installed on downstand beams*. Digital Imagery. N.p., n.d. Web. 12 May 2016. <http://www.steelconstruction.info/Composite_construction>.
- Utzon, Jorn. *Sydney Opera House – The Yellow Book, 1962*. Digital Imagery. State Records website, n.d. Web. 18 October 2015. <<https://gallery.records.nsw.gov.au/index.php/galleries/sydney-opera-house/sydney-opera-house-the-yellow-book/>>.
- Vissel, Jozef. *AD Classics: Sydney Opera House / Jorn Utzon*. Digital Imagery. ArchDaily, 2010. Web. 09 February 2016. <<http://www.archdaily.com/photographer/jozef-vissel>>.
- Washington, George. *A plan of Alexandria, now Belhaven, 1749*. Digital Imagery. Maps. Library of Congress, n.d. Web. 07 September 2015. <<https://www.loc.gov/item/98687108/>>.

**All images, drawings, sketches and renderings that are not listed here were produced by the author.
All images not produced by the author are reproduced as fair use.**



LAST PAGE, BUT IT'S NOT THE END OF THE PROJECT.....