SYMPHONY
OF THE TREES
A MEANDERING PATH TO THE OPERA

DESIGN SCENARIO

To design a 1200-seat perfromance hall, primarily suited for opera, connected to an established campus with a strong muscial and vocal programme.

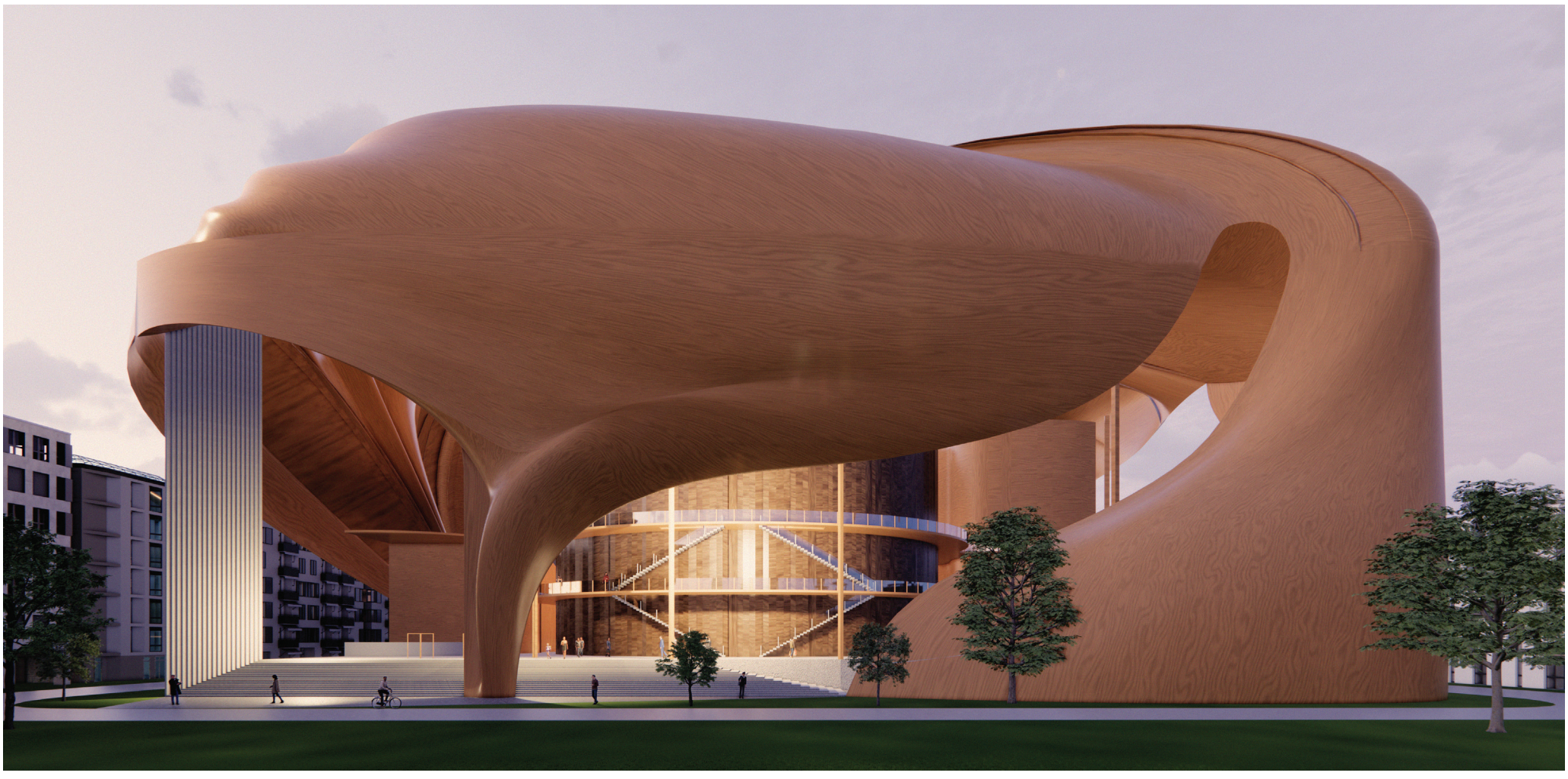
ACCOUSTICAL CHALLENGES

The site is surrounded by noisy roads and must not challenge the accoustical integrity of the opera hall. The opera and rehearsal hall of the building is to be connected to a scene shop and a mechanical/electrical room. These instances are also to be isolated.

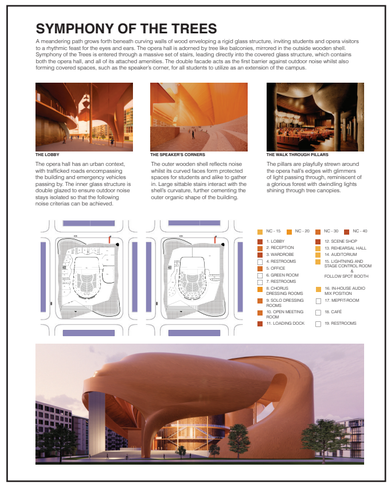
The opera hall must be suitable for opera and speeches and therefore have an element of variable accoustics.

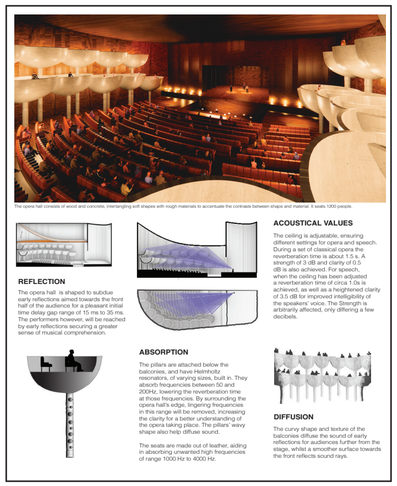
ARCHITECTURAL CHALLENGES

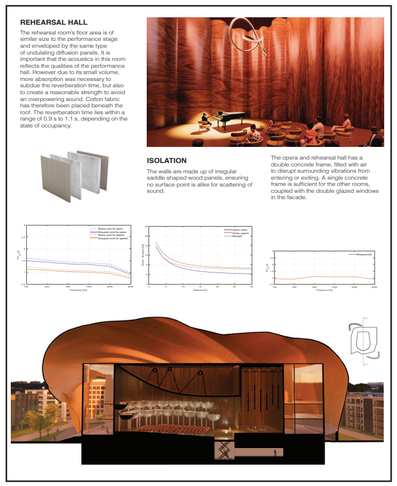
This building should be properly integrated with the surrounding campus and aid in strengthening surrounding student presence.



COMPETITION SUGGESTION







ACCOMPANIED TEXT

INTRODUCTION

A meandering path grows forth beneath curving walls of wood enveloping a rigid glass structure, inviting students and opera visitors to a rhythmic feast for the eyes and ears. The opera hall is adorned by tree like balconies, mirrored in the outside wooden shell. Symphony of the Trees is entered through a massive set of stairs, leading directly into the covered glass structure, which contains both the opera hall, and all of its attached amenities. The double facade acts as the first barrier against outdoor noise whilst also forming covered spaces, such as the speaker's corner, for all students to utilize as an extension of the campus.

CAPTIONS

THE LOBBY
The opera hall has an urban context, with trafficked roads encompassing the building and emergency vehicles passing by. The inner glass structure is double glazed to ensure outdoor noise stays isolated so that the following noise criterias can be achieved.

THE SPEAKER'S CORNERS
The outer wooden shell reflects noise whilst its curved faces form protected spaces for students and alike to gather in. Large sittable stairs interact with the shell's curvature, further cementing the outer organic shape of the building.

A WALK THROUGH THE PILLARS
The pillars are playfully strewn around the opera hall's edges with glimmers of light passing through, reminiscent of a glorious forest with dwindling lights shining through tree canopies.

OPERA HALL
The opera hall consists of wood and concrete, intertangling soft shapes with rough materials to accentuate the contrasts between shape and material. It seats 1200 people.

ACCOUSTICAL CONCEPTS

REFLECTION

The opera hall is shaped to subdue early reflections aimed towards the front half of the audience for a pleasant initial time delay gap range of 15 ms to 35 ms. The performers however, will be reached by early reflections securing a greater sense of musical comprehension.

ABSORPTION

The pillars are attached below the balconies, and have Helmholtz resonators, of varying sizes, built in. They absorb frequencies between 50 and 200Hz, lowering the reverberation time at those frequencies. By surrounding the opera hall's edge, lingering frequencies in this range will be removed, increasing the clarity for a better understanding of the opera taking place.

The pillars' wavy shape also help diffuse sound. The seats are made out of leather, aiding in absorbing unwanted high frequencies of range 1000 Hz to 4000 Hz.

DIFFUSION

The curvy shape and texture of the balconies diffuse the sound of early reflections for audiences further from the stage, whilst a smoother surface towards the front reflects sound rays.

ACCOUSTICAL VALUES

The ceiling is adjustable, ensuring different settings for opera and speech. During a set of classical opera the reverberation time is about 1.5 s. A strength of 3 dB and clarity of 0.5 dB is also achieved. For speech, when the ceiling has been adjusted a reverberation time of circa 1.0s is achieved, as well as a heightened clarity of 3.5 dB for improved intelligibility of the speakers' voice. The Strength is arbitrarily affected, only differing a few decibels.

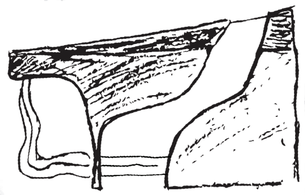
DETAILS

REHEARSAL HALL

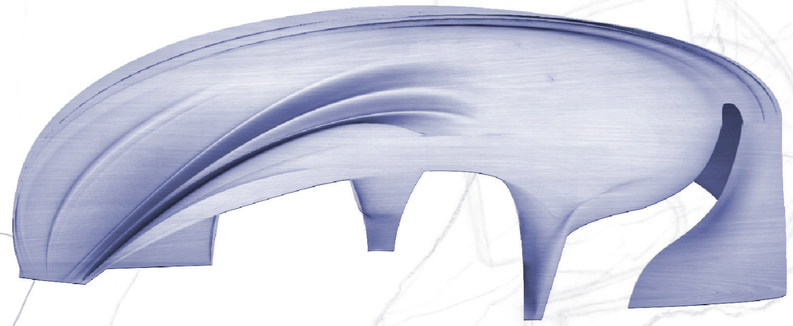
The rehearsal room's floor area is of similar size to the performance stage and enveloped by the same type of undulating diffusion panels. It is important that the acoustics in this room reflects the qualities of the performance hall. However due to its small volume, more absorption was necessary to subdue the reverberation time, but also to create a reasonable strength to avoid an overpowering sound. Cotton fabric has therefore been placed beneath the roof. The reverberation time lies within a range of 0.9 s to 1.1 s, depending on the state of occupancy.

The walls are made up of irregular saddle shaped wood panels, ensuring no surface point is alike for scattering of sound. The opera and rehearsal hall has a double concrete frame, filled with air to disrupt surrounding vibrations from entering or exiting. A single concrete frame is sufficient for the other rooms, coupled with the double glazed windows in the facade.

PROCESS

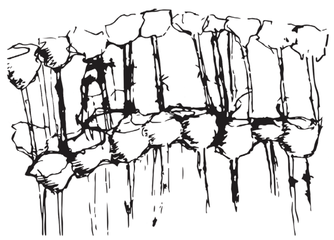


EVOLUTION
An outer skeleton, that shows glimpses of the underlying structure. Able to interact with its setting but also entice interest, by hinting at the opera and the balconies hidden within.



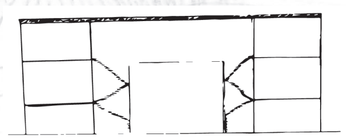
MERGE

OUTER SHELL
The outer shell got more organic to create inner pockets between the outer and inner facade for students to enter, whilst still maintaing a connection to the shape of the balconies hidden within.

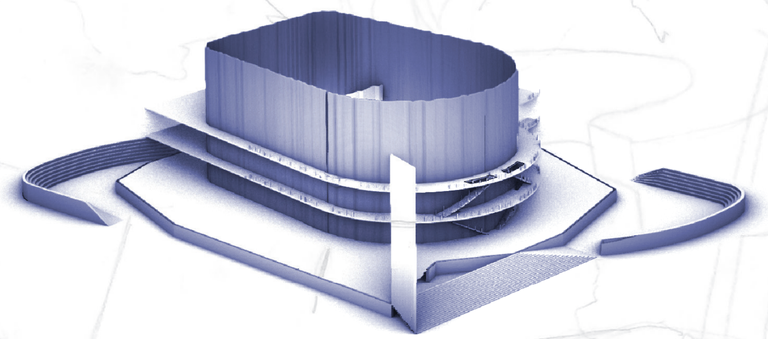


CORE IDEA
The idea of a canopy like structure for the balconies came to be after endless sketching.

BALCONIES
The shape of the balconies remained, now with enticing paths between its pillars.

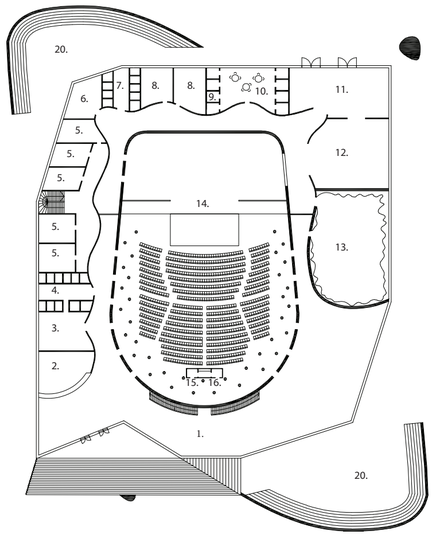


CENTER PIECE
Simultaneously, the idea of a detached opera hall acting as the projects center piece grew forth. We wanted to show off the interactions taking place by having an inner facade of glass.

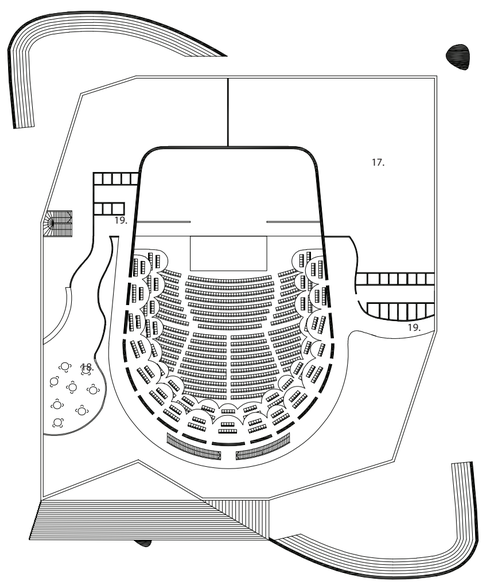


INNER SHELL
Encapsulated with glass, the core of the building is able to peek through. By showcasing all of the floor levels and walls, a story develops of the innerworkings of the building.

RESULT



MAIN FLOOR



TOP FLOOR

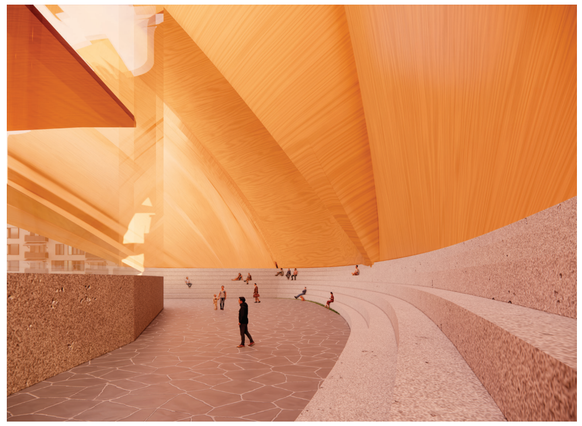
NOISE CRITERIAS

NC - 15 NC - 20 NC - 30 NC - 40

1. LOBBY
2. RECEPTION
3. WARDROBE
4. RESTROOMS
5. OFFICE
6. GREEN ROOM
7. RESTROOMS
8. CHORUS DRESS-ING ROOMS
9. SOLO DRESSING ROOMS
10. OPEN MEETING ROOM
11. LOADING DOCK
12. SCENE SHOP
13. REHEARSAL HALL
14. AUDIOTORIUM
15. LIGHTNING AND STAGE CONTROL ROOM & FOLLOW SPOT BOOTH
16. IN-HOUSE AUDIO MIX POSITION
17. MEPFIT-ROOM
18. CAFÉ
19. RESTROOMS
20. SPEAKERS' CORNERS

OPERA HALL

LOBBY

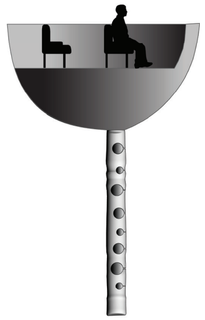


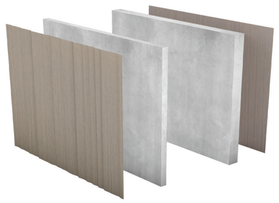
SPEAKER'S CORNER

REHEARSAL HALL

ACOUSTICS

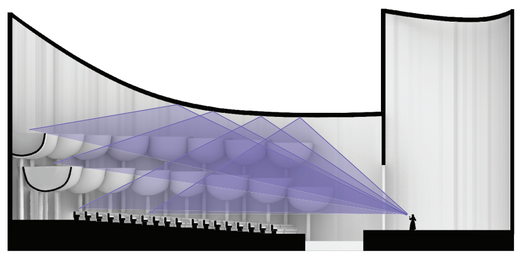
BALCONIES
Equipped with Helmholts resonators in varying sizes, to absorb unwanted frequencies in a range of 50 to 200Hz

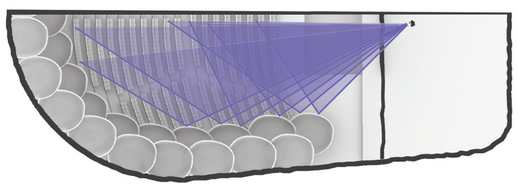




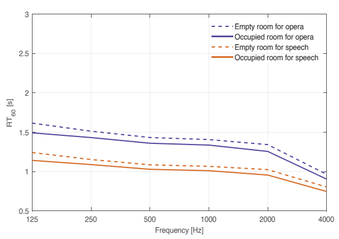
WALLS
The opera and rehearsal hall has a double concrete frame, filled with air to disrupt surrounding vibrations from entering or exiting. A single concrete frame is sufficient for the other rooms, coupled with the double glazed windows in the facade.

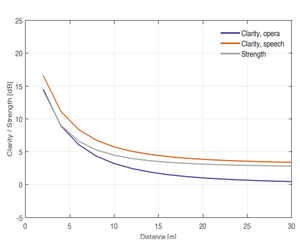
CEILING
Made to reflect sounds in two different configurations; opera performances and speech. It is designed to aim reflections in favourable directions for greater sound. Below is a diagram of the sound travelling during the opera configuration as well as a modell of the ceilings posititions.

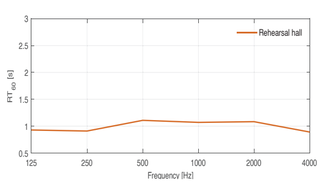




ACCOUSTICAL VALUES







FINAL THOUGHTS

PROCESS
The strategy we applied, was more like the lack of a strategy. Early on we explored a multitude of forms and shapes - purely in an aesthetic sense. For a competition it's important to evaluate your problems and goals early on. Concepts should be the solution. Working the other way around proved to be a hassle. However as a student, it is quite valuable to allow yourself the freedom to explore, not only through sketches but through 3D programmes and parametric tools as well as analogue modells. By entering this process without a solidified goal - only the sense of an idea - you grow richer in capability. This way of working proved quite favourable to me as I enjoy an open method, however, a final goal or at least the essence of an idea would have been of great aid. Especially in a project with such a niche nature. In future projects I will plan for an explorative stage, to be able to properly flesh out interesting concepts.

GOING FURTHER
I believe in the core ideas of this project but would have preferred the finished project to be more fleshed out. The outer shell, and the generally organic interior could have been further optimized - perhaps modeled from the soundwaves of each noise criteria. It would also have been interesting to explore different concepts for the opera hall, for example having the entire interior in a porous concrete to mimic the sensations of a cave.

SUSTAINABILITY
Sustainibility I personally find quite hard to fully encapsulate within concepts, partly due to the terms vastness. Ecologically, the biggest impacts are made within a projects logistics or material usage. But it's quite easy to simply state what materials you opt to choose. For example, this projects utilizes a wooden outer shell whose structure is very complicated. It has been done in smaller projects but never on this scale. Is it more sustainable to use wood versus concrete in this case? When the methodology behind concrete is a lot more fleshed out? Could wood stand as long? Is the production, and the organization it would take, of such a shell even feasible? It is hard to say. Further on in my projects I would love to explore sustainability properly and to fully understand the capacity of different ideas.

MULTIFACETED FIELDS
Throughout this process we worked together with an accoustician. Their knowledge early on in this project was very helpfull - especially when tweaking and implementing ideas. Working like this could be applied in more aspects, even with sustainibility. Giving all of your core values and ideas proper space, especially in early stages, when designing seems to be the most efficient way.