

Stage B

A platform for new voices

ACEX15 Bachelor's Thesis

Lukas Holmberg 2025

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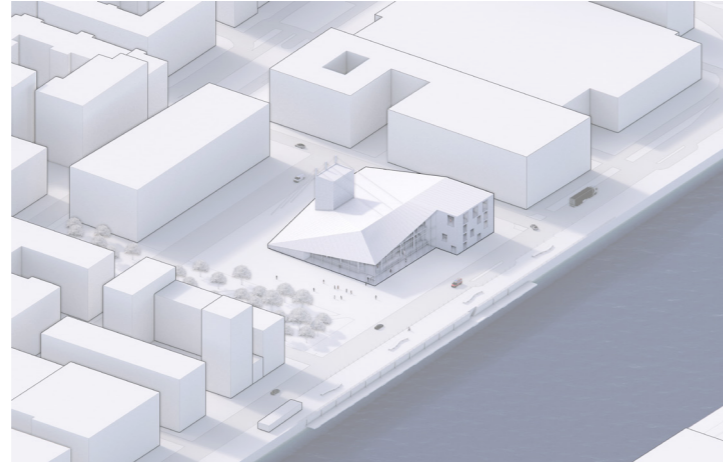
A platform for new voices

In collaboration with Dimitri Rampotas

Acoustics consultants: Alva Fährlin, Tove Sjöborg

Year: 2025

Programs: Rhino, Illustrator, Photoshop,
Enscape, V-Ray

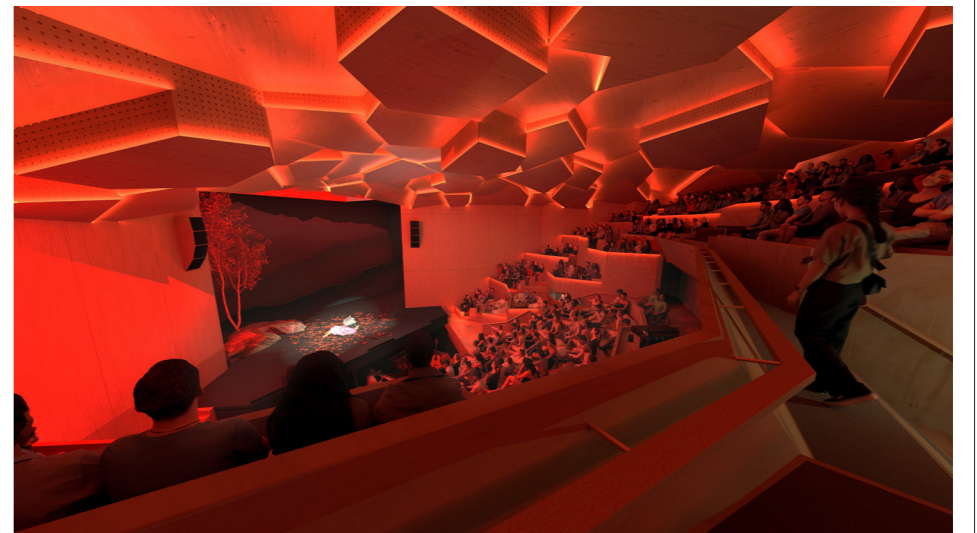
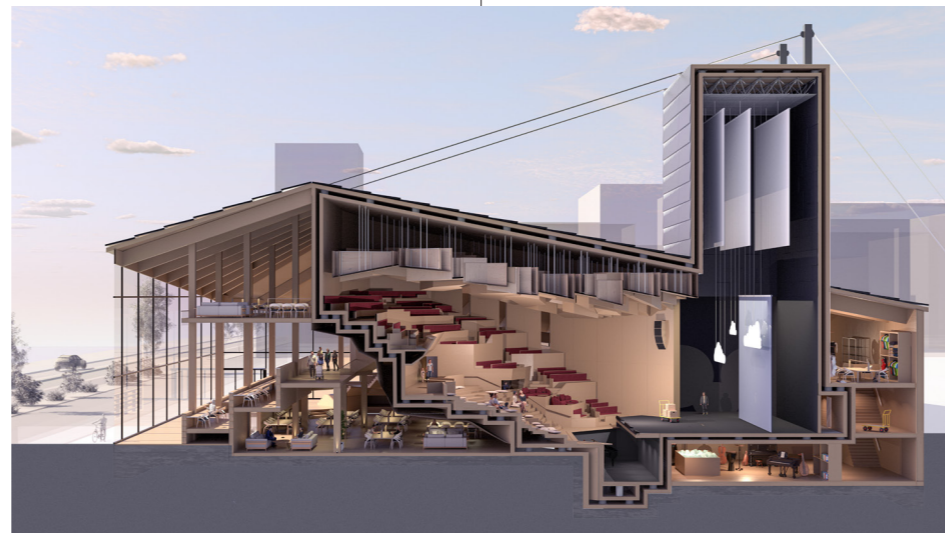


Stage B is both a competition proposal and my bachelor's degree project. It was developed for the Newman Fund Student Design Competition, an annual international contest focusing on architectural acoustics and noise control in spaces where sound is critical to function and experience. This year's challenge was to design a 700-seat theatre with a strong academic connection. In addition to theatrical performances, the hall was to be suitable—or adaptable—for speeches and music. The brief emphasized the organization and function of internal spaces, while the context and site were left open for interpretation as part of the architectural task.

Stage B is a theatre rooted in education, experimentation, and civic engagement. It is located in Dublin's Docklands, a former industrial area now transforming into a vibrant district of housing, culture, and public life. The site lies just a 10-minute walk from Ireland's National Theatre School, reinforcing its academic grounding. This architectural context sets the stage. Libeskind's theatre is the formal cultural landmark, and we propose Stage B as its counterpart while simultaneously being the face of the academy. It is a conscious response: an open and more civic theater. A place not of spectacle, but of process. Not only for performance, but for play, learning, and public life.

The name Stage B makes a statement. It draws from the off-Broadway tradition: a space for the alternative, the experimental, the emerging. While Stage A represents the formal stage, Stage B is agile, adaptable, and inclusive: a platform for new voices and new ideas. The architecture reflects this ethos.





STAGE B

A. Fährlin, D. Rampotas, L. Holmberg, T. Sjöborg

Context

Stage B is a theater deeply rooted in education and experimentation. Located in Dublin's Docklands, an area undergoing a transformation into a vibrant district of housing, culture, and restaurants, the site sits just a 10-minute walk from Ireland's national theatre school.

This architectural context sets the stage. Libeskind's theatre is the formal cultural landmark, and we propose Stage B as its counterpart while simultaneously being the face of the academy. It is a conscious response: an open and more civic theater. A place not of spectacle, but of process. Not only for performance, but for play, learning, and public life.

Concept

The name Stage B makes a statement. It draws from the off-Broadway tradition: a space for the alternative, the experimental, the emerging. While Stage A represents the formal stage, Stage B is agile, adaptable, and inclusive:

a platform for new voices and new ideas. The architecture reflects this ethos. The building is highly transparent, with a generous ground-floor lobby that opens directly toward the River Liffey. The approach is carefully directed: arriving from the academy or nearby park, the building welcomes the city into its process. From the lobby, long views extend along the flat Irish landscape, terminating at Two Rock Mountain. The lobby is both threshold and stage: the face of the building and an introduction to its conceptual core.

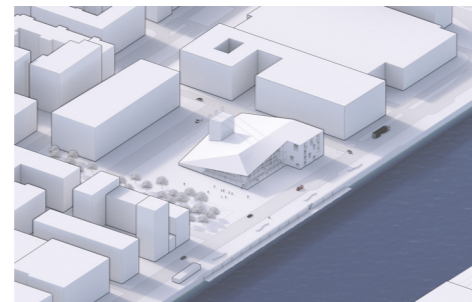
Sequential Layers

The lobby is a forest of pillars going from the transparent to the closed off areas – a contrast in both geometry and possibilities of seclusion. The experience is one of stepping into a dynamic cavern: a space between order and chaos, a gentle introduction to the play of geometry of the theater hall, combined with the ordered terraces. We can also see that the movement becomes intuitive rather than linear, leading either to the intimate, enclosed spaces tucked beneath the terraces, or upwards toward the open, elevated seating

areas above. Stage B is a theatre, yes, but also a studio, a threshold, a commons. It is a stage for students, for the city, for learning and unlearning. It doesn't perform for the city – it performs with it.

External Noise

The site is surrounded by four highly trafficked streets, exposing the building to elevated urban noise levels. Rather than isolating the lobby entirely, we embrace its potential as a lively, vibrant space: a café, a meeting point, and a place for study. To protect the theater hall, however, we introduce an acoustic strategy.



The lobby itself acts as a spatial buffer between the theater hall and the surroundings: its irregular geometry, soft furnishings, balcony and terraced seating fronted with bookshelves, all help diffuse and absorb sound. Perforated surfaces surrounding the hall construction integrate Helmholtz resonators, finely tuned to absorb low-frequency noise from traffic and the lobby itself. This approach allows the building to remain visually and socially open to the city, while maintaining acoustic integrity for performance spaces deeper within.

Sound Insulation

To reach the required low levels of noise, the theater hall is floating on springs with a resonance frequency below 6 Hz, separated from the rest of the building. This double wall construction significantly reduces impact and environmental sounds, making the hall sufficiently silent for all kinds of performances. All entries to the theater are equipped with either double doors, or curved, heavily damped corridors, reducing the sound from the lobby to acceptable levels. The MEPFIT room, located behind one of the side walls of the theater and above the rehearsal room, is a room in room design equipped with vibration dampers and tailored Helmholtz resonators. The same principle is applied to the scene shop, making sure the machinery inside does not contribute to increased noise levels in the rest of the

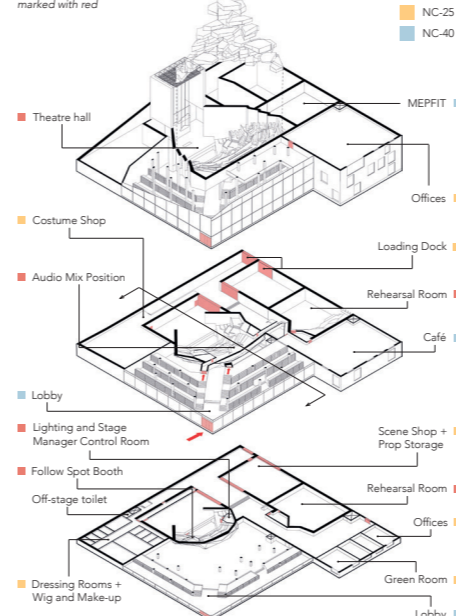


building. The backstage communication paths are fitted with ample absorption and carpeted floors. This, combined with the layout of the building, allows the different spaces to be in use simultaneously, without interfering with another.

Rehearsal Room [RT60: 0.8 – 1.05]

The rehearsal room provides good conditions for both unamplified speech and amplified music. Helmholtz resonators are placed in the vertical section of the seating area, while acoustic wall panels handle the mid-frequencies. The acoustic panels can be variably covered by reflective wooden panels, to reach different reverberation times. The stairs and seating area are covered in carpet, to minimize disturbance from spectators. A room in room design and well-insulated double door entrances ensure the acoustic integrity of the room.

Important doorways are marked with red



Theater Hall [RT60: 0.75 – 1.05]

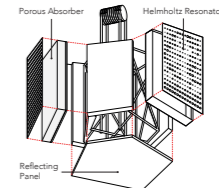
The theater is designed to obtain maximal gain and early reflections for a multi-purpose setting, using variable volume and absorption. The ceiling consists of a field of 'blocks', that can be lowered or raised independently, thereby changing the volume of the room as well as the exposed surface area of absorbing materials. Each block has a reflecting surface on its bottom that guides early reflections towards the audience, and absorbing material on its sides to help lower the reverberation time. This dual effect means that by lowering the ceiling on average 0.4 m in the hall, a reduction in reverberation time by approximately 0.3 s can be achieved. The seating modules are of two types: highly absorbing sofas on the balcony and sides, and mid-absorption seating in the center gallery. The center gallery allows for a more informal seating arrangement and will always be in use. The balcony and sides might not be in use during smaller events, and thus have higher absorption demands. The front of each seating module provides early reflections to the module in front of it, and

Helmholtz resonators are placed underneath the seats and in the back of the hall by the entrances.

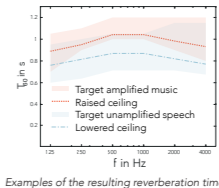
Multi-purpose functionality

The hall is well suited for both amplified and unamplified events, as the audience is supplied with early reflections from the ceiling, walls, and surrounding seating modules. The lower ceiling setting provides higher definition, but lower gain, and is intended for amplified events where the gain will be increased by the speaker system. For unamplified events the raised ceiling setting should be used, allowing for a higher natural gain and longer reverberation time. The orchestra pit can be set to stage, floor, or sub-stage level, depending on the requirements of the performance. It is carpeted and covered with absorbers. It is accessible via a door under the control room at floor level, and via the storage at sub-stage level.

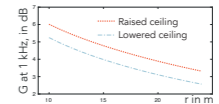
The robustness and multi-purpose functionality of the hall is derived from the variability of its volume and absorption, and the possibility to precisely direct reflections by altering the configuration of the ceiling.



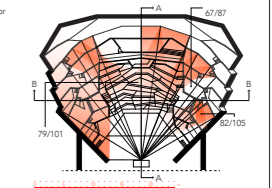
Each ceiling block contains multiple types of absorption, allowing for detailed adaptation over the frequency spectrum.



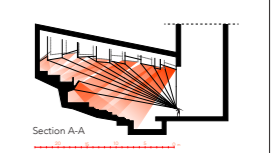
Examples of the resulting reverberation times (T60) in the theater with two ceiling configurations; raised and lowered.



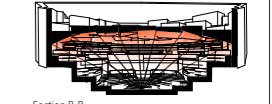
Examples of the resulting strengths (G) in the theater with two ceiling configurations; raised and lowered.



A sample of reflection paths provided by the walls. D50 values (%) are indicated for raised/lowered ceiling.



The angles of the ceiling blocks cooperate to ensure strong reflections throughout the hall.



The ceiling blocks are tilted inwards to direct the sound down to the audience.

Design Process

The design process was largely characterized by an iterative approach. We began by developing three conceptual proposals, and with each iteration, we identified shortcomings in the design. Through continuous consultations with each other and with our acousticians, we refined our concepts to better integrate acoustics into the architecture.

A clear example is the reflector panel above the central tiered seating. It was originally suggested by the acousticians to provide early sound reflections and needed to have a very specific shape to fulfill its acoustic function. However, the initial form did not align with the architectural language of the hall. Once we realized the panel's importance for the acoustics, we knew it had to be thoughtfully integrated. We raised the issue during tutorials and class reviews, which led to discussions on how the panel could best harmonize with the overall design.

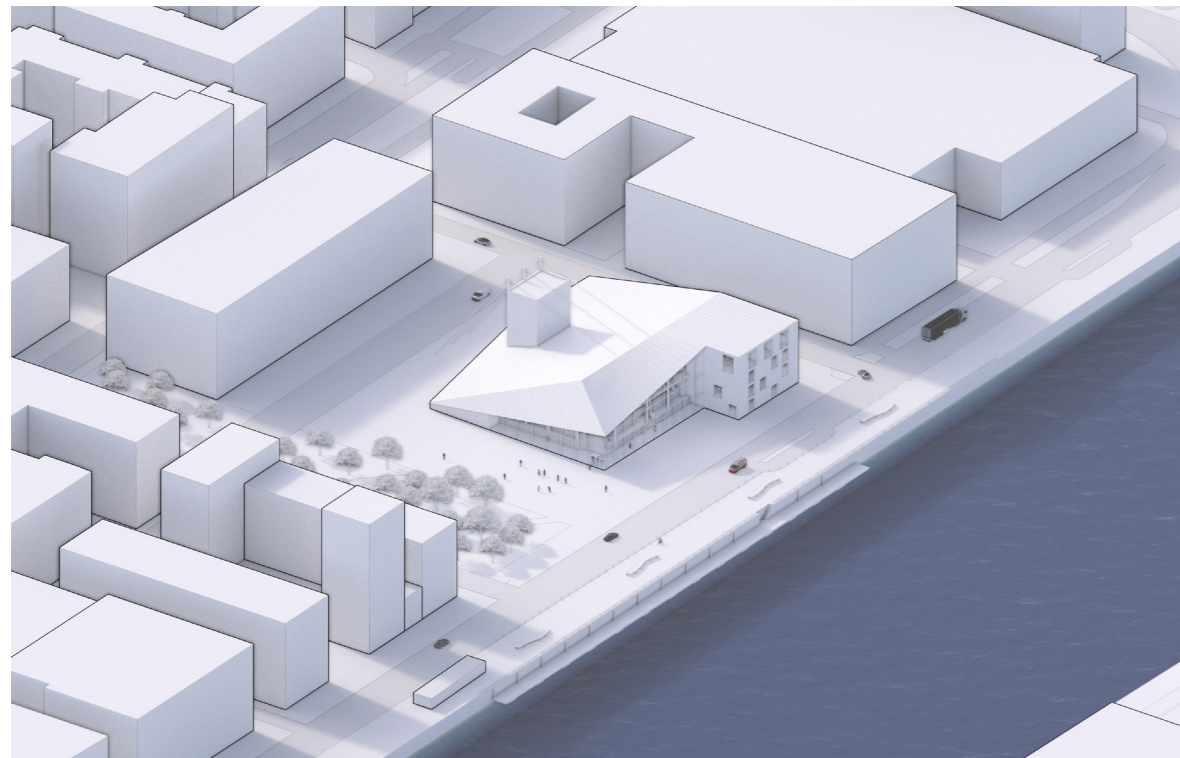
Collaboration

The collaboration within the group worked very well among all members. Working across two disciplines, architecture and acoustics, was incredibly rewarding and contributed to creating a holistic solution where both aspects reinforced each other.

Reflection

This project was highly rewarding and educational. What I take with me most is the value of interdisciplinary work and how different disciplines can be interwoven to create a cohesive whole. There is often a contraction between aesthetics and function, which was an exciting and challenging problem to try to resolve throughout the course of the project.





Isometric view of the site

The building is located in Dublin's docklands: an area undergoing transformation into a vibrant district for housing, culture, and restaurants.

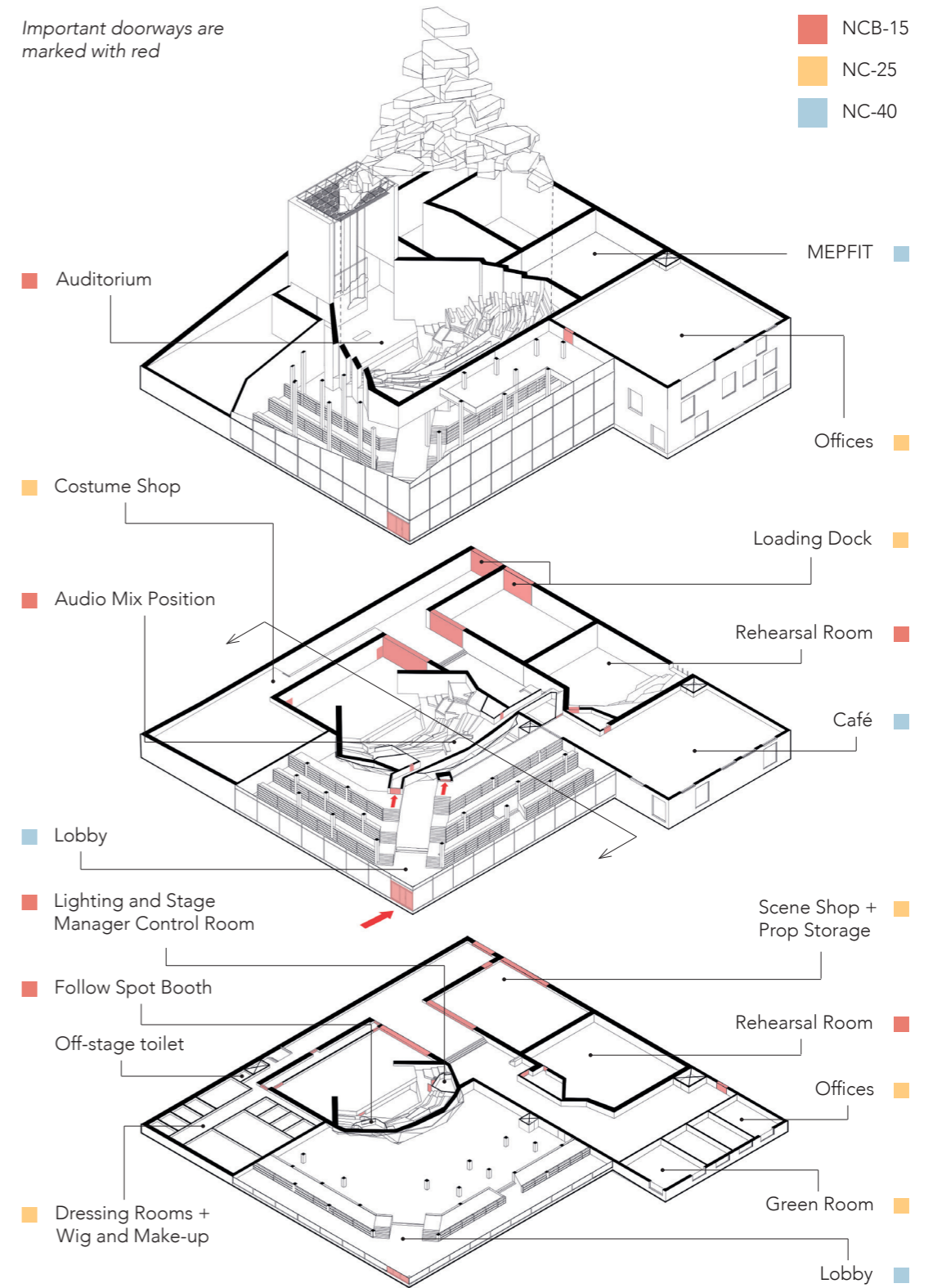
The theatre's site is just a ten-minute walk from Ireland's national theatre school. The architectural context sets the stage: Libeskind's theatre acts as a formal cultural landmark, while we propose Stage B as its counterpart – and simultaneously, the public face of the academy. It is a conscious response: an open, more civic theatre. A place not for spectacle, but for process. Not only for performances, but for play, learning, and public life.

The site is bordered by four heavily trafficked roads, exposing the building to high urban noise levels. Instead of completely isolating the lobby, the project embraces its potential as a lively and social space: a café, a meeting point, and a setting for study. Meanwhile, the auditorium is protected through a carefully designed acoustic strategy.

The lobby serves as a spatial buffer between the auditorium and the city's noise. Its irregular geometry, soft furnishings, balcony, and terraced seating with bookshelves help scatter and absorb sound. Around the theatre's structure, perforated surfaces with built-in Helm-

holtz resonators are integrated, finely tuned to dampen low-frequency noise from traffic and the lobby. In this way, the building remains visually and socially open to the city without compromising the acoustics in the inner rooms where performances take place.

The design of the building is largely based on spatial volume management – a pursuit of creating a coherent whole in which spatial sequences are central. The shape of the roof directly reflects this ambition, where variation in height and direction enhances the experience of movement through the building. There is a clear dialogue between the stage tower, which rises to mark the theatre's core, and the lower building volumes that extend horizontally. Together, they create a balance between vertical expression and horizontal grounding. The placement of the building has been carefully chosen to create a natural flow from the theatre academy. The proposed walkway leads through a green park area, across a plaza, and culminates in the meeting with the theatre building. Here, the design principles come into play – how the volume rises from the plaza and moves toward the water, and how its orientation invites and welcomes the visitor. It becomes an architectural motion from the open to the enclosed, from the public to the performative.





Exterior perspective

Through the transparent sections, one gets a clear view into the theatre's internal geometry: the terracing, the sculptural hall, and the forest of pillars. This openness creates both a visual and social connection between residents, visitors, and the life of the theatre.

In terms of volume, the building plays with contrasts. The stage tower rises as a vertical landmark, while the other parts spread out horizontally across the site. A balance is created between height and extension, between movement and stillness – a meeting of order and chaos that reinforces the theatre's identity as a place for both process and performance.

The materiality ties together site, function, and aesthetics. The façade is clad in aluminum panels – a material that both reflects and contrasts with the harbor environment and its industrial history. Inside, wood is used as both structural and interior material, providing warmth, intimacy, and acoustic benefits. Between these two worlds lies the tension structure, a technical solution with a dual meaning. It supports the cantilevered volume of the auditorium, frees the space below for active use, and simultaneously becomes an architectural expression that alludes to both musical string instruments and the cranes and masts of the harbor.

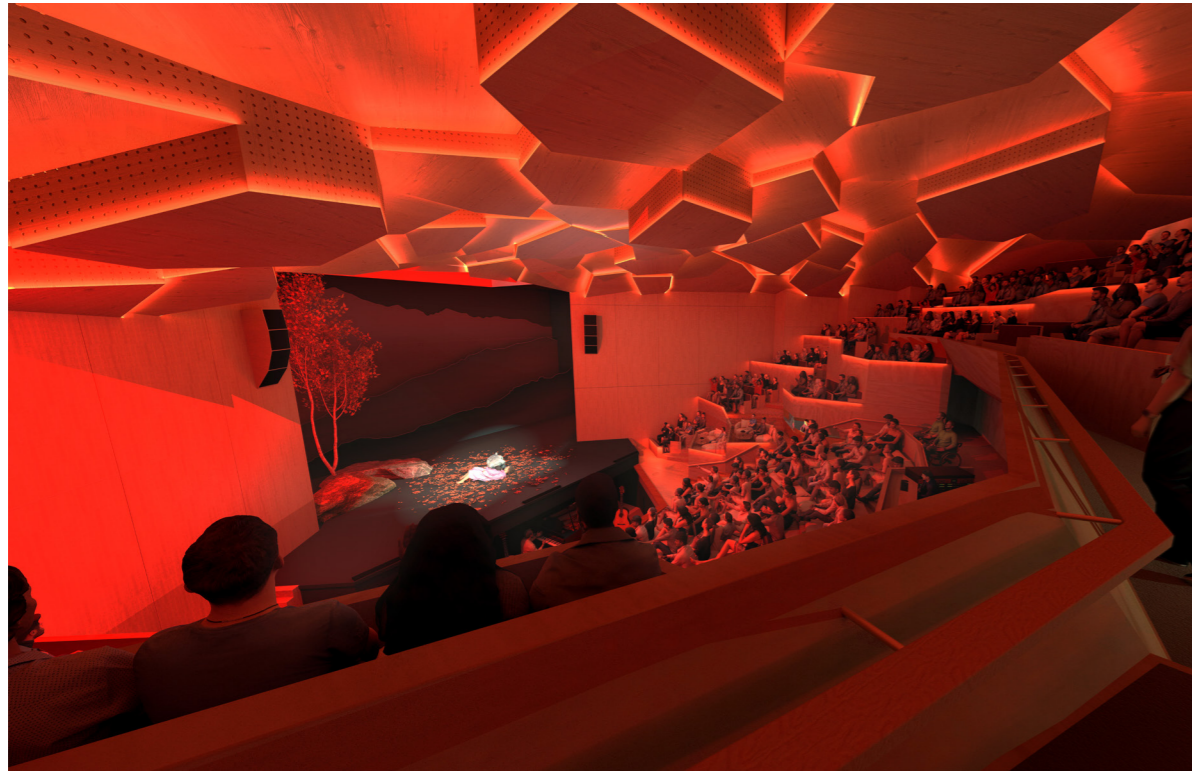


Section

The lobby is a forest of pillars stretching from the transparent to the more enclosed areas, a contrast both in geometry and in the degree of privacy offered. The experience is like stepping into a dynamic cavern: a space between order and chaos, a gentle introduction to the geometric play of the auditorium, combined with the structured terraces. One also notices that movement becomes intuitive rather than linear, leading either to the intimate, enclosed spaces hidden beneath the terraces or upward to the open, elevated seating above. Stage B is indeed a theatre, but also a studio, a threshold, a common ground. It is a stage for students, for the city, for learning and unlearning. It does not perform for the city – it performs with it.

To achieve the low noise levels required, the auditorium is placed on springs with a resonance frequency below 6 Hz and is separated from the rest of the building. This double-wall construction significantly reduces surrounding noise, making the auditorium quiet enough for all types of performances. All entrances to the theatre are equipped with either double doors or curved, heavily sound-insulated corridors, which reduce noise from the foyer to acceptable levels.

The MEPPIT room, located behind one of the theatre's side walls and above the rehearsal room, is a room-in-room construction fitted with vibration dampers and custom-designed Helmholtz resonators. The same principle is applied to the scene shop to ensure that the machinery inside does not contribute to increased noise levels in the rest of the building. Circulation routes in the back-of-house areas are equipped with extensive sound absorption and carpeted floors. This, combined with the building's spatial composition, allows different rooms to be used simultaneously without disturbing one another.

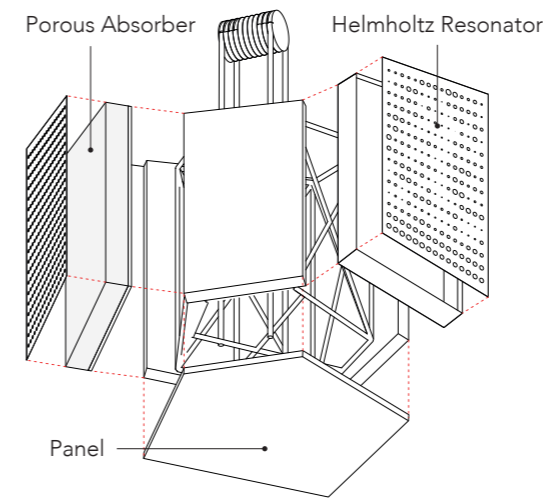


Visualization of the auditorium

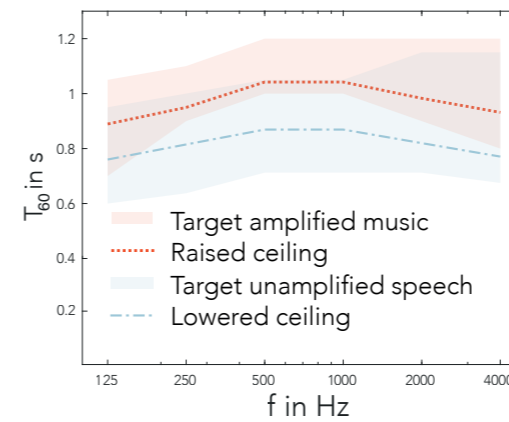
The auditorium is a synergy between acoustics and concept. Our goal was to create a space where acoustics are fully integrated into the architecture. At the same time, the early concept was to design a theatre with a relaxed atmosphere where people can sit however and with whomever they like. This allowed for a highly adaptable space, ultimately centered around variable acoustics—where the ceiling can be raised and lowered, and where the abundance of surfaces offers great potential for early reflections.

Maximum sound levels and early reflections for versatile use are achieved through variable volume and absorption. The ceiling consists of a field of “blocks” that can be raised or lowered independently, altering both the room’s volume and the exposed area of absorbing material. Each block has a reflective underside that directs early reflections toward the audience, as well as absorptive material on its sides to reduce reverberation time. This dual function means that by lowering the ceiling an average of 0.4 meters in the auditorium, the reverberation time can be reduced by approximately 0.3 seconds. There are two types of seating modules: highly absorbent sofas on the balcony and along the sides, and medium-absorption seats in the central tribune.

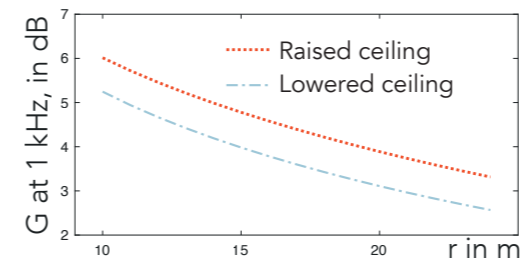
The central tribune allows for a more informal seating arrangement and will always be in use. The balcony and side areas, however, may remain empty during smaller events and therefore require higher levels of absorption. The front of each seating module provides early reflections to the row in front, and Helmholtz resonators are placed beneath the seats as well as at the back of the auditorium near the entrances. The auditorium is well-suited for both amplified and unamplified events, as the audience receives early reflections from the ceiling, walls, and surrounding seating modules. The lowered ceiling configuration provides greater clarity but less loudness and is intended for amplified events where volume is increased through the sound system. For unamplified events, the raised ceiling setting should be used, enabling greater natural loudness and a longer reverberation time. The orchestra pit can be configured at stage, floor, or sub-stage level, depending on the needs of the performance. It is carpeted and fitted with absorbers. It is accessed via a door below the control room at floor level, as well as through the storage area beneath stage level. The robustness and versatility of the auditorium are grounded in its variable volume and absorbers. It is accessed via a door below the control room at floor level, as well as through the storage area beneath stage level. The robustness and versatility of the auditorium are grounded in its variable volume and absorbers, along with the ability to precisely control reflections by adjusting the ceiling configuration.



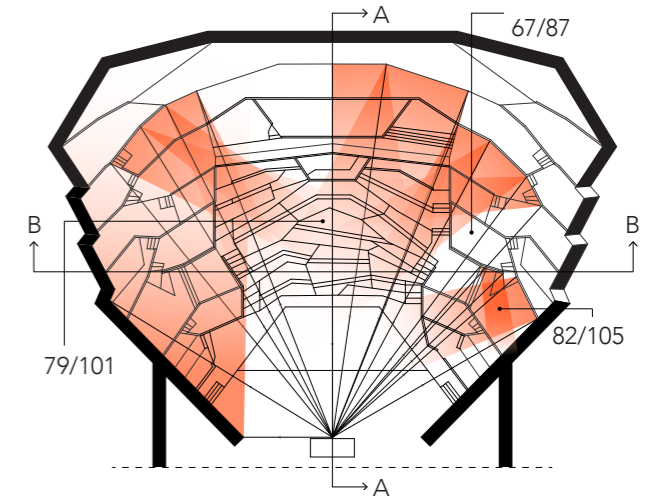
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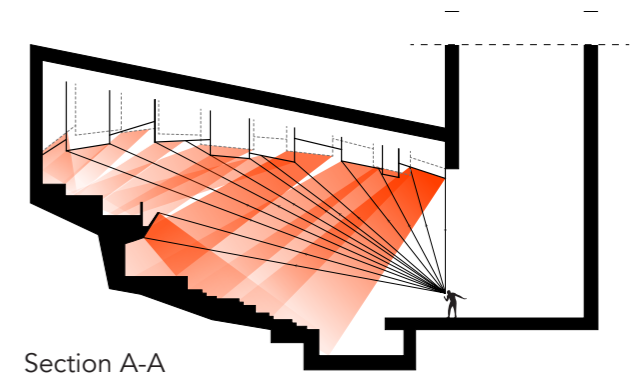
Examples of the resulting reverberation times (T_{60}) in the theater with two ceiling configurations: raised and lowered.



Examples of the resulting strengths (G) in the theater with two ceiling configurations: raised and lowered.

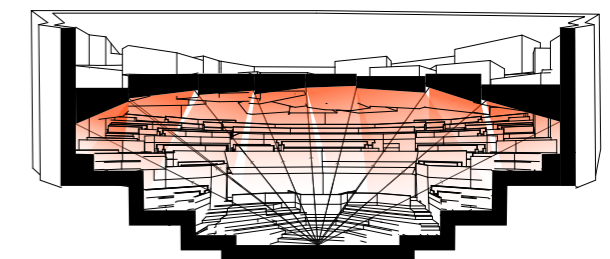


A sample of reflection paths provided by the walls. D_{50} values (%) are indicated for raised/lowered ceiling.



Section A-A

The angles of the ceiling blocks cooperate to ensure strong reflections throughout the hall.



Section B-B

The ceiling blocks are tilted inwards to direct the sound down to the audience.

A reflection from 3 years at AT

Over the course of my studies, I have had the opportunity to experiment with fundamental architectural elements in my projects, crafting spaces that are both intriguing and meaningful. I am continually fascinated by the ability to create a "wow-factor" through a minimalist approach—achieved by perfecting details, focusing on fundamentals, and carefully orchestrating spatial sequences. This philosophy has allowed me to appreciate the power of simplicity and intentionality in design.

Additionally, my mind has been opened to the possibilities of computational design. I have developed proficiency in the tools we use, which has empowered me to transform creative ideas into tangible outcomes. My creativity has been challenged through a wide array of projects spanning conceptual explorations, graphic design, urban planning, and diverse architectural typologies. These experiences have sharpened my problem-solving abilities and broadened my design perspective.

During my time in the Architecture and Engineering program, I have also had the privilege of participating in several study trips. These trips have been intensive, often characterized by a fast-paced schedule of sketching, presentations, office visits, and discussions about architectural qualities, spatial experiences, and structural dynamics. Experiencing architecture and structural engineering on-site has been incredibly rewarding and an essential part of my growth as both an architect and engineer.

Through these trips, I have gained a deeper understanding of the human scale and how proportions affect spatial perception. I have also analyzed how natural light interacts with spaces, creating dynamic atmospheres and influencing the overall experience. These insights, gleaned through direct observation and engagement, have greatly informed my design approach.

Moreover, these study trips have provided invaluable opportunities to observe and interact with buildings and infrastructure in real-world contexts, far beyond the limitations of textbooks and classroom discussions. Physically exploring and engaging with different architectural styles, construction methods, and urban environments has deepened my understanding of the relationship between theory and practice.

These experiences have also allowed me to appreciate the subtle nuances of materials and craftsmanship that can only be truly understood through direct observation. Whether it's the texture of a brick facade, the way concrete weathers over time, or the seamless integration of steel beams within a structural framework, these elements come to life when encountered in person. Such observations have enriched my appreciation of the complexity and beauty inherent in architecture and engineering.



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