ORB

ARKITEKTUR FÖDD UR BUBBLOR

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Uppgiften var att ta fram ett tävlingsförslag för en ny teaterbyggnad med fokus på arkitektonisk kvalitet, akustik, hållbarhet och teknisk integration.

Projektet ORB har sin utgångspunkt i organiska former, inspirerade av naturens bubblor och harts som droppar från en trädstam. Utformningen speglar kontrasten mellan det tunga och lätta, där teaterns stomme blir en solid kärna i ett annars luftigt och öppet rumsligt koncept.

PROJEKTPLANSCHER

THEATRE

The theatre is shaped like a bubble, with seating arranged in individual bubblepods to create an intimate, homely group atmosphere within the audience and towards the stage with a volume of 3200 m³. Seats on the floor and the bubble balconies provide a capacity of 700 people. With a maximum distance of 22 m from one seat to the stage a short direct sound path and therefore a good sound strength is created for the whole audience.

VARIABLE ACOUSTIC

The theatre is designed for three primary purposes: musical, dramatic spoken word, and amplified speaking engagements. A variable acoustic environment supports these uses through an acoustic wall consisting of diffusing glass hemispheres in different diameters.

FLOOR PLAN AUDITORIUM
Flat color sound rays

SECTION AUDITORIUM
Flat color sound rays

THE PACMAN

Glass: a porous crystalline absorber
Closed: a scattering diffuser

THE NIPPLE

Open hole: a Helmholtz-resonator
Closed hole: a scattering diffuser

STAGE

Headwall surfaces line the stage walls, effectively reflecting sound toward the audience. Shapes like a trumpet, the stage opening curves into the auditorium, enhancing early reflections and acoustic presence. Above the stage, the stage house is equipped with thick porous absorber panels to prevent late reflections from reaching the auditorium.

ACOUSTIC SPHERES

The ceiling above the stage opening provides early reflections from singers and actors towards the orchestra pit, enabling clear audibility and interplay.

Glass hemispheres of different diameters will cover the entire wooden inner shell of the theatre hall walls. The back wall, as well as the side walls near the orchestra pit, will primarily feature reflective elements to act as diffusers. The main element of the side walls will be the Pac-man, enabling the presence or disappearance of the acoustic absorption area, adjustable to the current use of the theatre hall.

ORCHESTRA PIT

The orchestra pit has a wide opening of 4 m and a small overplomb of 1 m to slightly raise the orchestra without creating major acoustic separation. A 1 m-high shield in front of the audience protects the front row from excessive sound pressure levels while maintaining clear sightlines, as it aligns with the stage height. The orchestra pit also contains a room with flexible openings serving as chairmen's booth. The roof of the orchestra pit will be covered with diffuser elements consisting of closed Pac-mans to enhance the musicians' perception of the music, while the back and side walls will be lined with open Pac-mans to reduce sound pressure levels and prevent late reflections into the auditorium.

REVERBERATION TIME - THEATRE

Mids
Speech
Enhanced speech

SPEECH/MUSIC CLEARITY - THEATRE

TECHNICAL ASPECTS

Lighting and stage manager control room is situated beneath the ceiling, separated by a double-glass window to minimize noise from technical equipment. Pull-out spot booths must remain open toward the theatre to avoid acoustic coupling. Stair tractor walls will be lined with thick porous absorption absorbers. Balconies are positioned at a height that provides a 30° viewing angle and supports the delivery of early reflections to the audience. The in-house audio mix position is located at the rear of the theatre hall. Spherical zone speakers will be used to enhance speech intelligibility. They will be mounted above the stage and with a delay in front of the balconies at the rear, directed precisely toward the audience.

SOUND STRENGTH - THEATRE

Mids
Speech
Enhanced speech

SUSTAINABILITY

Sustainability is a guiding principle in the design, with the main building structure constructed from recycled wood. The glass bubbles will feature curved, see-through solar panels, allowing daylight to be used throughout the theatre's interior. The glass hemisphere wall coverings will be produced from recycled high-sound proof double glass, while the porous absorbing material wall consists of recyclable – a cost-like structure of a tongue-groove directly into the required shapes.

FLOOR PLANS

LOBBY

Non-glass walls will be lined with "The Pac-man" and "The Nipple" to ensure a short reverberation time. The ceiling height will be successively lowered to 2.5 meters by suspending open Pac-mans lightly from the ceiling in this height.

STUDENT APARTMENTS

To take account for the universities needs and the inclusion of the student community, the five top floors of the theatre building will consist of student housing. This will not both as accommodation but also as a way to bring the student life into the building and make it a living place for people to use both when the theatre is in play and not.

ROOM-IN-ROOM SYSTEM

The theatre, including the stage house, will be constructed as a room-in-room system with a resonance frequency below 10 Hz, effectively isolating it from the building to meet NC10 criteria. The critical frequency of the double wall has to be below 40 Hz and requires a STC56, while for the decoupled floor construction below 6 Hz. The stage design requires a decoupled floor construction to reduce impact noise from dancers and actors, ensuring minimal disturbance to the orchestra. Furthermore, the stage can be lowered to the ground floor, allowing convenient access for truck loading through a gate-shake, which ensures decoupling from the building and prevents flanking transmission. To reduce structure-borne noise, each AHU and the machines in the costume shop will be mounted on vibration isolators tuned to avoid resonance with operational frequencies. The opera and costume shops are located outside this system, with the costume shop separated by a thick double wall to prevent disruptive noise from affecting the rest of the building.

FACADE SOUND ISOLATION

To ensure NC40 in the lobby when emergency vehicles pass by, the glass façade uses double-laminated glass of different thicknesses with a resonance frequency below 50 Hz. Transparent Pvb sound membranes are inserted between the glass layers to provide a high sound isolation above STC40. A double wall system with STC > STC50 is used for the external timber wall construction to maintain NC30 levels for the office spaces.

REHEARSAL ROOM

REHEARSAL ROOM

The rehearsal room is designed with a reverberation time 0.3 seconds shorter than in the theatre hall for all three performance types, ensuring best stage during practice. Walls and ceiling will follow the same material concept as in the main hall. Helmholtz resonators will be installed in corners and edges, while the pac-man, will be evenly distributed across the remaining ceiling and wall surfaces. To meet NC15 noise criteria, a room-in-room-construction with the same type of decoupled walls and ceiling as in the theatre hall prevents disturbances from emergency vehicles, truck loading, and MEP/HF rooms during rehearsals.

REVERBERATION TIME - REHEARSAL ROOM

Mids
Speech

DESIGNPROCESS OCH KRITISKA BESLUT

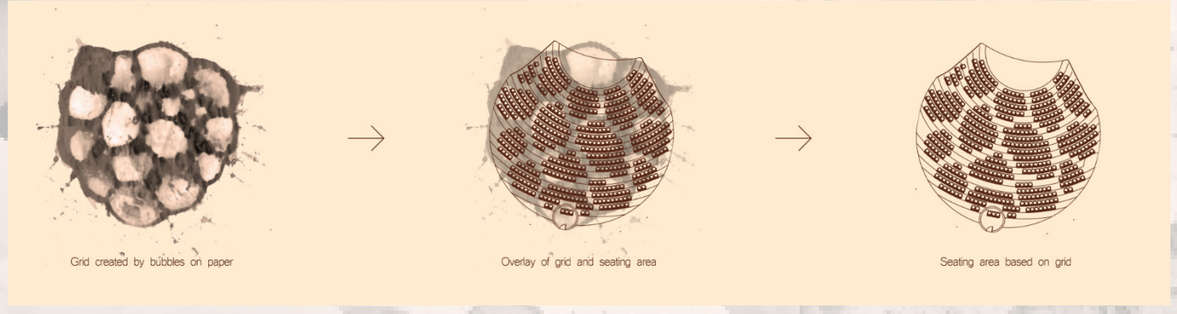
Ett av de mest avgörande gestaltningsbesluten i projektet rörde utformningen av byggnadens yttre volym och fasad. Vår formgivning tog sin början i ett experiment med färgbubblor som blåstes på papper – en metod som inte bara inspirerade till salongens organiska planstruktur, utan också låg till grund för hela byggnadens koncept. De bubbliga, sfäriska formerna återkommer i såväl fasadens uttryck som i de inre rumssekvenserna, vilket skapar en tydlig sammanhängande arkitektonisk identitet.

Fasadens gestaltning bygger på en kontrast mellan det massiva och det transparenta. Den bärande trästommen omsluts delvis av böjda glasytor, där genomskinliga solpaneler integrerats för att kombinera dagsljusinsläpp med energiproduktion. Glaset ger byggnaden en lätthet och öppnar upp för visuell kontakt mellan det offentliga rummet och livet inne i teatern. Samtidigt skapar de solfångande ytorna en föränderlig karaktär beroende på ljusets riktning och tid på dagen, vilket förstärker den levande, nästan organiska känslan i byggnaden.

Studentbostäderna på de övre våningarna knyter samman teatern med det akademiska livet i området och förlänger användningen av byggnaden utanför föreställningstid. Genomgående har planlösningarna en tydlig rörelselogik, där publika flöden leds intuitivt genom byggnaden i en mjuk rörelse, i kontrast till de mer avskilda och tekniska utrymmena som kräver högre ljudisolering och funktionell precision.

Det arkitektoniska greppet att skapa en visuell kontrast mellan det robusta och det skira – stammen med bubblan – har varit ett avgörande beslut för projektets identitet och kvalitet.

KONSTNÄRLIGA METODER



Grid created by bubbles on paper

Overlay of grid and seating area

Seating area based on grid

Den konstnärliga processen i projektet ORB tog sin början i ett moment av lekfull improvisation – att blåsa färgbubblor på papper. Denna enkla, experimentella metod fungerade som en slags katalysator för hela projektet och gav upphov till ett organiskt rutnät som kom att informera både byggnadens form och planstruktur. Det var ett sätt att tillåta slumpen och det oväntade att spela en aktiv roll i utformningen, vilket i sin tur öppnade upp för ett friare och mer associativt tänkande i de tidiga skedena.

Därefter följde en iterativ designprocess där vi växlade mellan olika representationsformer – handskisser, modeller, digitala 3D-verktyg, diagram och renderingar. Genom att kombinera dessa metoder kunde vi testa och utveckla våra idéer ur flera perspektiv, vilket fördjupade förståelsen för rummets funktion och uttryck.

Denna mångsidiga arbetsmetod var också avgörande för samarbetet i gruppen. Genom att visualisera idéer på olika sätt blev det lättare att förstå varandras intentioner och hitta en gemensam riktning i projektet. Representationerna blev därmed ett viktigt verktyg både för design och för kommunikation.

En viktig insikt under arbetets gång har varit att designprocessen sällan är linjär – snarare är den cirkulär, komplex och ibland till och med kaotisk. I flera skeden upplevde vi att vi ”kört fast”, men lösningen låg ofta i att gå tillbaka till tidigare skisser och idéfragment som vid första anblick verkade för enkla eller ofärdiga. Att återvända till dessa ursprungliga impulser visade sig vara avgörande för att låsa upp nya riktningar i gestaltningen. Denna insikt har lärt mig värdet i att inte låsa fast sig vid en enskild lösning för tidigt, utan att istället behålla en öppen och utforskande hållning genom hela projektets gång.

HÅLLBARHET

Hållbarhet genomsyrar hela projektet; material – stommen byggs i återvunnet trä, fasader – glasytorna består av böjda, transparenta solpaneler som förser byggnaden med energi, akustiska element – glasdiffusorer av återvunnen ljudisolerande dubbelglas och mycelium används som poröst absorberande material.

Dessa strategier placerar ORB i den samtida diskussionen om hur byggnader både kan skapa mervärde i staden och minimera sin miljöpåverkan.

TEKNISKA ASPEKTER

Projektet innefattar en hög grad av teknisk integration, särskilt inom; akustik - Justerbara akustiska väggsystem, variabel efterklangstid, sfäriska högtalare med riktad ljudbild, ljus - scenljus och naturligt ljus kombineras, med teknikutrymmen isolerade bakom glas, struktur - trästomme med ljudavskiljande rum-i-rum-system och inomhusklimat - Genomtänkt ventilation och bullerdämpning genom frikopplade system.

PROJEKT

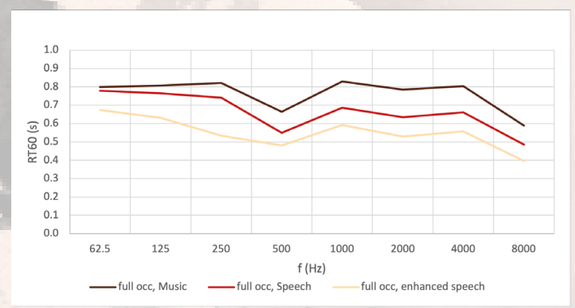
REHEARSAL ROOM

The rehearsal room is designed with a reverberation time 0.3 seconds shorter than in the theatre hall for all three performance types, ensuring high clarity during practice. Walls and ceiling will follow the same material concept as in the main hall. Helmholtz resonators will be installed in corners and edges, while the pac-man, will be evenly distributed across the remaining ceiling and wall surfaces.To meet NC15 noise criteria, a room-in-room construction with the same type of decoupled

REVERBERATION TIME - REHEARSAL ROOM

Music

Speech



LOBBY

Non-glass walls will be fitted with “The Pac-man” and “The Nipple” to ensure a short reverberation time. The ceiling height will be acoustically lowered to 2.5 meters by suspending open Pac-mans tightly from the ceiling to this height.

STUDENT APARTMENTS

To take account for the universities nearby and the inclusion of the student community, the five top floors of the theatre building will consist of student housing. This will act both as accommodation but also as a way to bring the student life into the building and make it a living place for people to use both when the theatre is in play and not.

ROOM-IN-ROOM SYSTEM

The theatre, including the stage house, will be constructed as a room-in-room system with a resonance frequencz
below 10 Hz, effectively isolating it from the building to meet NC10 criteria. The critical frequency of the double wall has to be below 40 Hz and requires a STC76, while for the decoupled floor construction below 5 Hz. The stage design requires a decoupled floor construction to reduce impact noise from dancers and actors, ensuring minimal disturbance to the orchestra. Furthermore, the stage can be lowered to the ground floor, providing convenient access for truck loading through a gate-sluice, which ensures decoupling from the building and prevents flanking transmission. To reduce structure-borne noise, each AHU and the machines in the costume shop will be mounted on vibration isolators tuned to avoid resonance with operational frequencies. The scene and costume shops are located outside this system, with the costume shop separated by a thick double wall to prevent disruptive noise from affecting the rest of the building.

FAÇADE SOUND ISOLATION

To ensure NC40 in the lobby when emergency vehicles pass by, the glass façade uses double-laminated glass of different thicknesses with a resonance frequency below 50 Hz. Transparent PVB acoustic interlayers are installed between the glass layers to provide a high sound isolation above STC40. A double wall system with STC > STC50 is used for the external timber wall construction to maintain NC30 levels for the office spaces.

PROJEKT

THEATRE

The theatre is shaped like a bubble, with seating arranged in individual bubblegroups to create an intimate, homely group atmosphere within the audience and towards the stage with a volume of 3200 m³. Seats on the floor and the bubble balconies enable a capacity of 700 people. With a maximum distance of 22 m from one seat to the stage a short direct sound path and therefore a good sound strength is created for the whole audience.

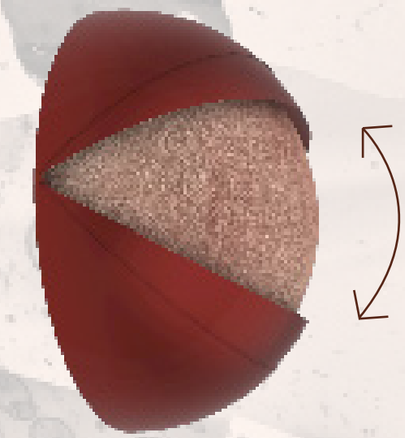
SUSTAINABILITY

Sustainability is a guiding principle in the design, with the main building structure constructed from recycled wood. The glass façades will feature curved, see-through solar panels, allowing daylight to be used throughout the theatre's interior. The glass hemisphere wall coverings will be produced from recycled high sound proof double glass, while the porous absorbing material will consist of mycelium – a root-like structure of a fungus—grown directly into the required shapes.

VARIABLE ACOUSTIC

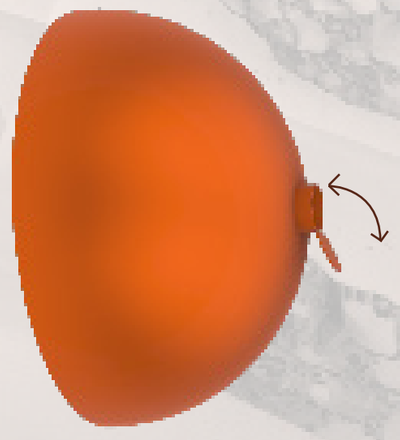
The theatre is designed for three primary purposes: musical, dramatic spoken word, and amplified speaking engagements. A variable acoustic environment supports these uses through an acoustic wall covering of diffusing glass hemispheres in different diameters.

THE PACMAN



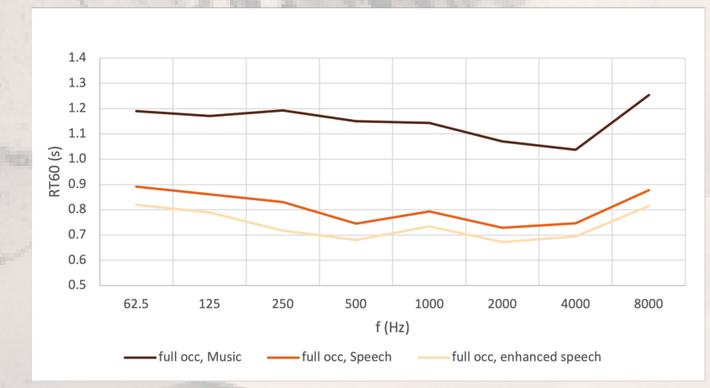
Open: a porous mycelium absorber
Closed: a scattering reflector

THE NIPPLE



Open hole: a Helmholtz resonator
Closed hole: a scattering reflector

REVERBERATION TIME - THEATRE



Music
Speech
Enhanced speech

PROJEKT

STAGE

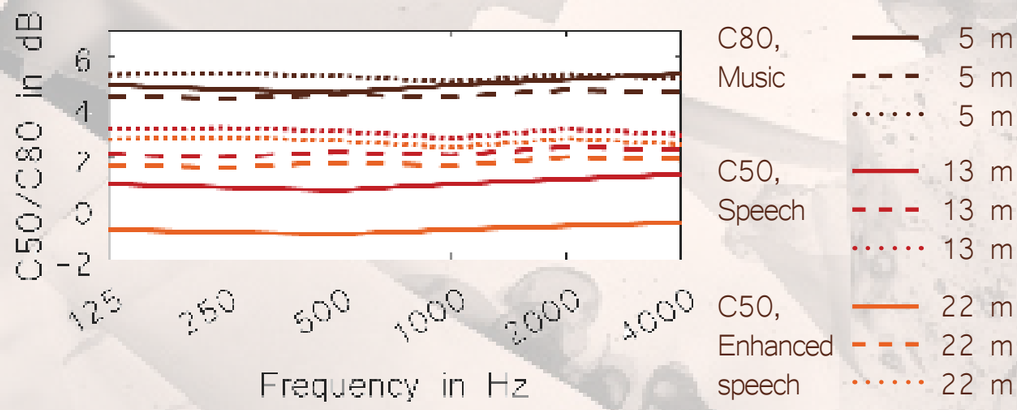
Hardwood surfaces line the stage walls, effectively reflecting sound toward the audience. Shapes lika a trumpet, the stage opening curves into the auditorium, enhancing early reflections and acoustic

ACOUSTIC SPHERES

The ceiling above the stage opening provides early reflections from singers and actors towards the orchestra pit, enabling clear audibility and interplay.

Glass hemispheres of different diameters will cover the entire wooden inner shell of the theatre hall walls. The back wall, as well as the side walls near the orchestra pit, will primarily feature reflective elements to act as diffusers. The main element of the side walls will be the Pac-man, enabling the increase or decrease of the equivalent absorption area, adaptable to the current use of the theatre hall.

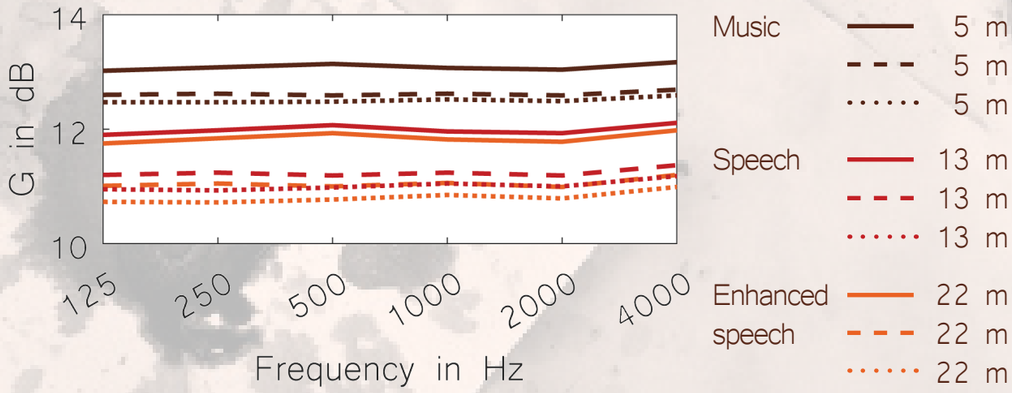
SPEECH/MUSIC CLEARITY - THEATRE



ORCHESTRA PIT

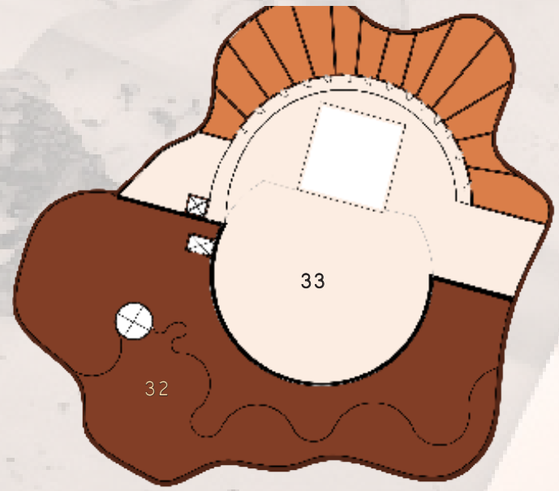
The orchestra pit has a wide opening of 4 m and a small overhang of 1 m to slightly mute the orchestra without creating major acoustic separation. A 1 m-high shield in front of the audience protects the front row from excessive sound pressure levels while maintaining clear sightlines, as it aligns with the stage height. The orchestra pit also contains a room with flexible openings serving as drummer's booth. The roof of the orchestra pit will be covered with diffuser elements consisting of closed Pac-mans to enhance the musicians' perception of the music, while the back and side walls will be lined with open Pac-mans to reduce sound pressure levels and prevent late reflections into the auditorium.

SOUND STRENGTH - THEATRE

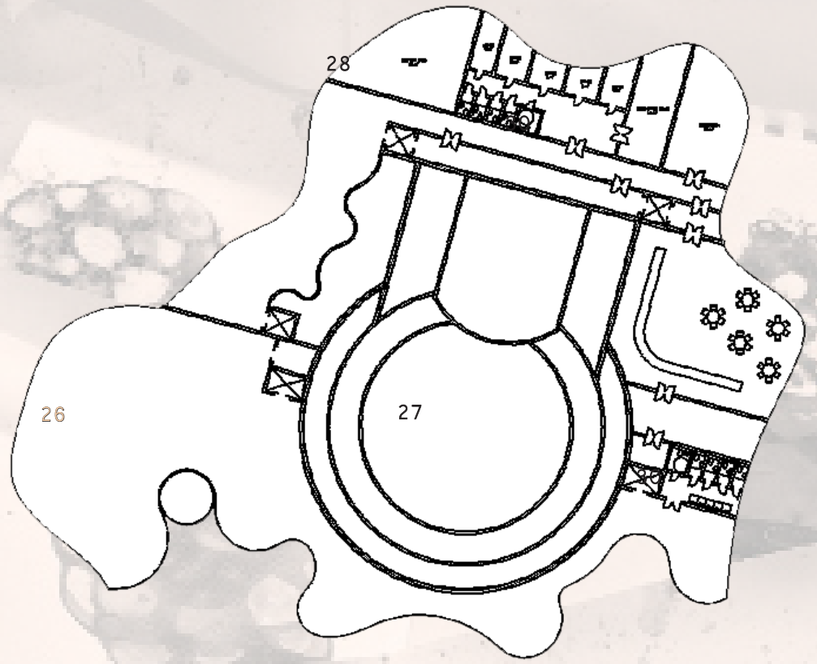


TECHNICAL ASPECTS

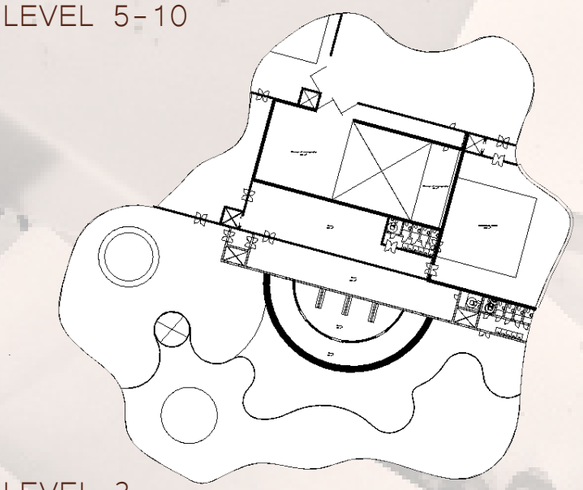
Lighting and stage manager control room is situated beneath the ceiling, separated by a double-glass window to minimise noise from technical equipment. Follow spot booths must remain open toward the theatre; to avoid acoustic coupling, their interior walls will be lined with thick porous mycelium absorbers. Balconies are positioned at a height that enables a 35° viewing angle and supports the delivery of early reflections to the audience. The in-house audio mix position is located at the rear of the theatre hall. Spherical cone speakers will be used to enhance speech intelligibility. They will be mounted above the stage and with a delay in front of the balconies at the roof, directed precisely toward the audience.



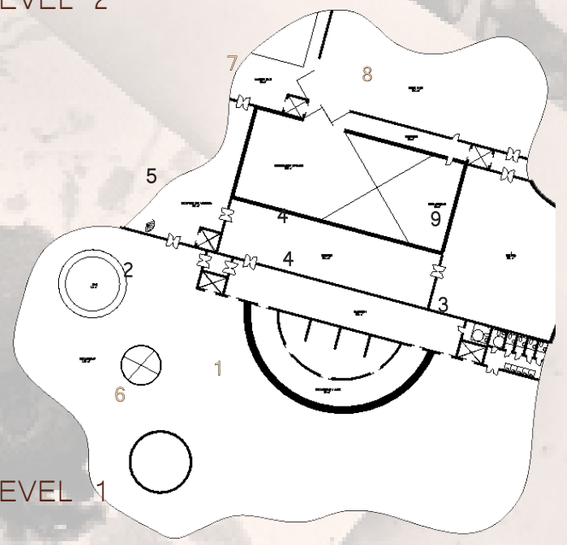
LEVEL 5-10



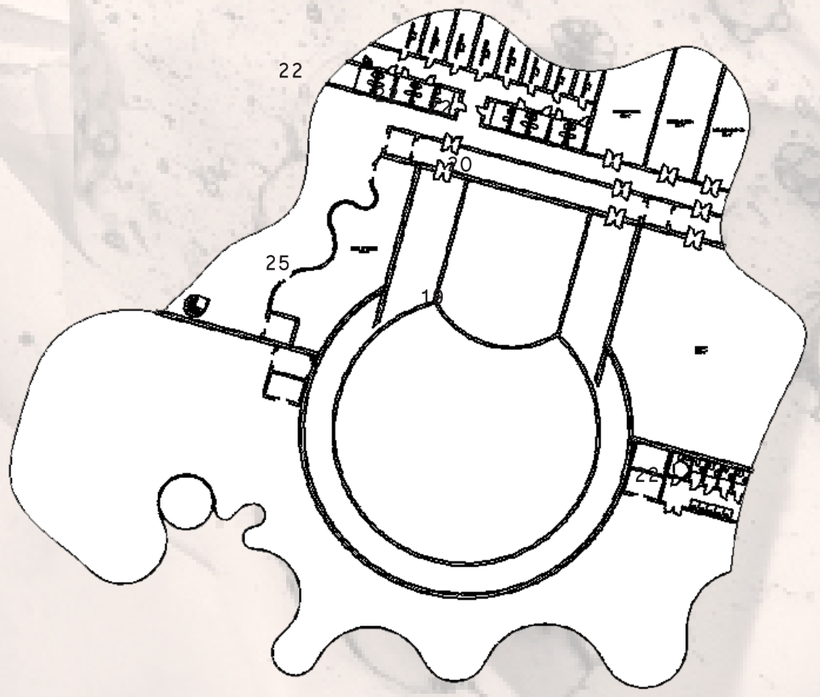
LEVEL 4



LEVEL 2



LEVEL 1



LEVEL 3

NCB10
NCB30
NCB35
NCB40
NCB50

LEVEL 1
1. LOBBY (982 m²)
2. RESTAURANT (483 m²)
3. WC (43 m²)
4. BACKROOM (202 m²)
5. RECEPTION PERSONEL (116 m²)
6. TICKET BOOTH (50 m²)
7. LOADING DOCK (98 m²)
8. SCENE SHOP (354 m²)
9. KITCHEN (312 m²)
10. PROP STORAGE (50 m²)
11. SCENOGRAPHY
STORAGE (137 m²)

LEVEL 2
12. LOBBY (452 m²)
13. CAFÉ (99 m²)
14. WC (36 m²)
15. ORCHESTRA PIT (45 m²)
16. REHEARSAL ROOM (303 m²)
17. INSTRUMENT
STORAGE (100 m²)

LEVEL 3
18. LOBBY (432 m²)
19. THEATRE - MAIN HALL (490 m²)
20. CROSSOVER (52 m²)
21. MEPFIT (285 m²)
22. WC (36 m²)
23. DRESSING ROOM (189 m²)
24. WIG AND MAKE-UP (34 m²)
25. STORAGE (100 m²)

LEVEL 4
26. LOBBY (452 m²)
27. THEATRE - BALCONIES (82 m²)
28. COSTUME SHOP (84 m²)
29. OFFICE SPACE (96 m²)
30. WC (36 m²)
31. RESTAURANT FOR
WORKERS (211 m²)
32. GREEN ROOM (70 m²)

LEVEL 5-10
32. LOBBY (only air)
33. ATRIUM (1067 m²)
34. STUDENT
APARTMENTS (22-57 m²)

PROJEKT

SUSTAINABILITY

Sustainability is a guiding principle in the design, with the main building structure constructed from recycled wood. The glass façades will feature curved, see-through solar panels, allowing daylight to be used throughout the theatre's interior. The glass hemisphere wall coverings will be produced from recycled high sound proof double glass, while the porous absorbing material will consist of mycelium.

STUDENT APARTMENTS

To take account for the universities nearby and the inclusion of the student community, the five top floors of the theatre building will consist of student housing. This will act both as accommodation but also as a way to bring the student life into the building and make it a living place for people to use both when the theatre is in play and not.

Mycelium is a root-like structure of a fungus—grown directly into the required shapes

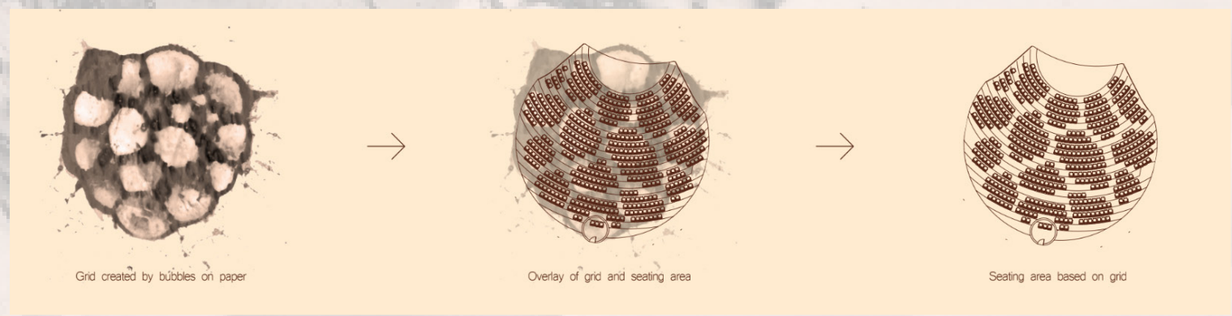
TECHNICAL ASPECTS

Lighting and stage manager control room is situated beneath the ceiling, separated by a double-glass window to minimise noise from technical equipment. Follow spot booths must remain open toward the theatre; to avoid acoustic coupling, their interior walls will be lined with thick porous mycelium absorbers. Balconies are positioned at a height that enables a 35° viewing angle and supports the delivery of early reflections to the audience. The in-house audio mix position is located at the rear of the theatre hall.

Spherical cone speakers will be used to enhance speech intelligibility. They will be mounted above the stage and with a delay in front of the balconies at the roof, directed precisely toward the audience.

CONCEPT IDEA

The concept for ORB is based around bubbles. Derived from blowing bubbles onto a piece of paper, ORBs floor plan inside the auditorium is based around an organic net-structure that bubbles form when water mixed with soap and salt, and is blown onto paper with a straw. The entirety of the main hall is designed as a bubble, the dome-shape is mirrored and inverted in the balconies aswell. The net-structure creates an organic flow of the hall and with the spherical wall-covering it plays a big role in the



Grid created by bubbles on paper

Overlay of grid and seating area

Seating area based on grid

LEDARSKAP

I ett verkligt projekt skulle många av de beslut vi ställdes inför kräva tydlig och samordnad ledning. Jag föreställer mig att ORB – med sin komplexitet och tekniska bredd – hade kunnat realiseras genom en integrerad designprocess där arkitekter, ingenjörer, specialister och entreprenörer arbetar tätt tillsammans från tidigt skede. Just det tvärdisciplinära samspelet är något jag brinner för och ser som avgörande för att skapa byggnader som fungerar både estetiskt, tekniskt och socialt.

Min ambition är att i framtiden arbeta med projektledning inom arkitektur- och byggbranschen. Jag motiveras av att vara den person som både bär helhetsbilden och förstår de olika disciplinernas perspektiv – att skapa förutsättningar för samarbete, undvika missförstånd och driva projektet framåt med tydliga mål och gemensam förståelse.

Ledarskap för mig handlar inte bara om att fatta beslut, utan om att skapa en öppen och inkluderande arbetsmiljö där alla kompetenser får ta plats. Det innebär att förmedla en tydlig vision, men samtidigt vara lyhörd och översättande – att kunna tolka och synliggöra både arkitektoniska värden och tekniska krav i dialogen mellan yrkesroller.

Att arbeta med ORB har gett mig insikt i just dessa dynamiker, och stärkt min övertygelse om att jag i framtiden vill bidra till projekt där samverkan står i centrum – som projektledare, kommunikatör och katalysator för samarbete.

REFLEKTION

Efter tre intensiva år i programmet har jag nu en kombination av kreativ gestaltningsförmåga och teknisk förståelse – en bas som har formats genom ständiga växlingar mellan idé och analys, form och funktion. Arbetet med ORB har inte bara fördjupat mina kunskaper inom arkitektur och teknik, utan också gett mig praktisk erfarenhet av hur viktigt det är att arbeta iterativt. Att gång på gång pröva, omvärdera och förbättra lösningar har visat sig vara avgörande, särskilt i ett projekt av denna komplexitet.

Att utforma en byggnad som både är en teater, ett bostadshus och ett tekniskt precisionsinstrument har inneburit ett spektrum av utmaningar – från akustik och ljus till logistik och struktur. Många beslut var tvärdisciplinära till sin natur och krävde att vi satte oss in i andras expertområden, vilket stundtals var svårt, men också otroligt utvecklande. Det har visat mig hur komplexa projekt kräver både tålamod och förmåga att leda och kommunicera tydligt.

Framåt vill jag rikta in mig på projektledning inom arkitektur- och byggbranschen på masternivå. Jag vill fördjupa min förståelse för hur processer organiseras, hur resurser och kompetenser samordnas, och hur man kan hålla samman vision, ekonomi och genomförbarhet i verkliga projekt. För mig handlar projektledning inte bara om planering och kontroll, utan om att skapa förutsättningar för samarbete, att lyssna, tolka och bygga broar mellan människor med olika expertis och perspektiv.

Jag ser fram emot att utvecklas inom ett område där både min tekniska bakgrund och min gestaltningsförmåga kommer till nytta – och där jag kan bidra till att leda projekt som gör skillnad.