



Kurs Kandidatarbete 15 hp

År 3 - våren 2013

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Plats Montreal, Kanada

Hjälpmedel SketchUp, AutoCAD, Adobe Id, Ps

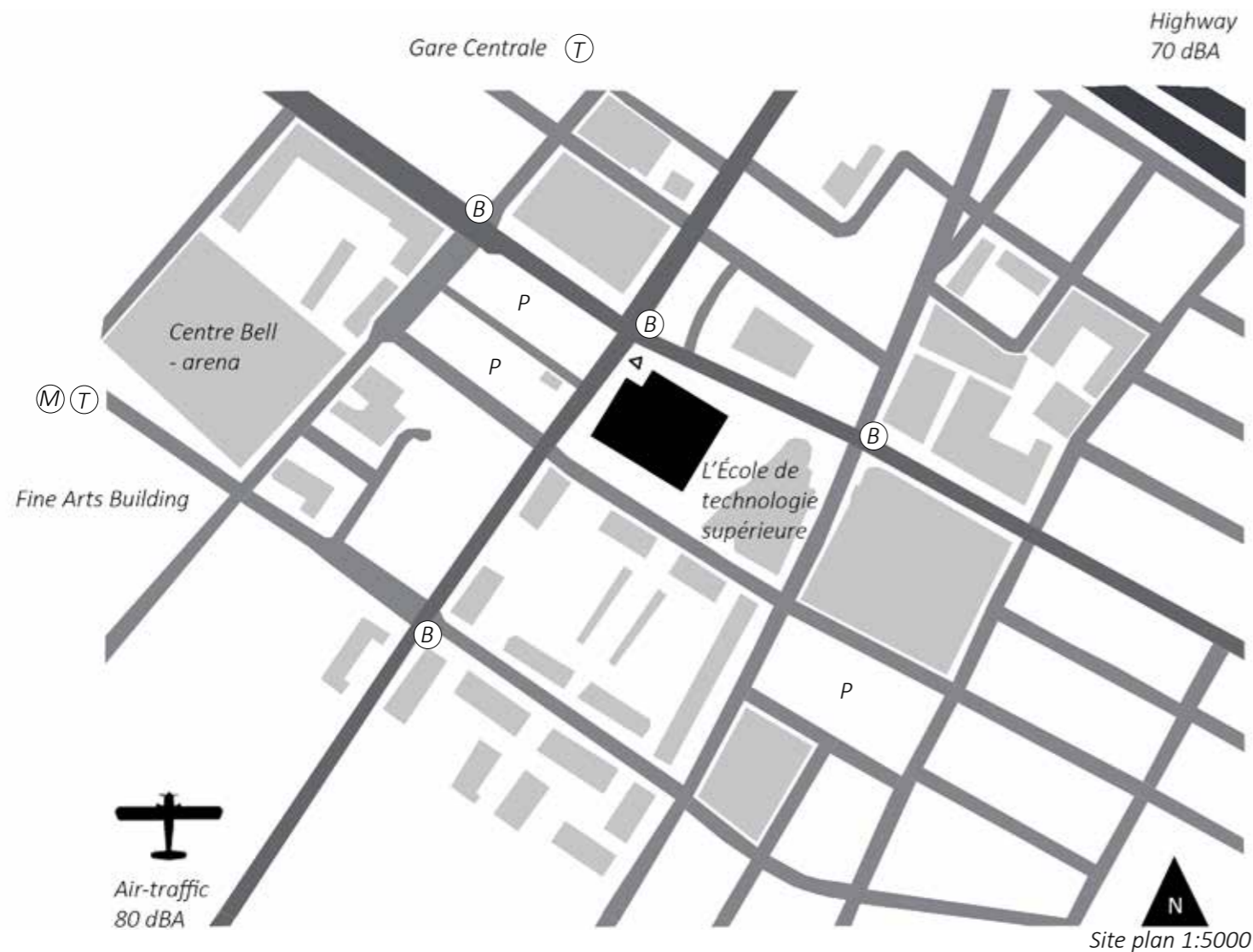
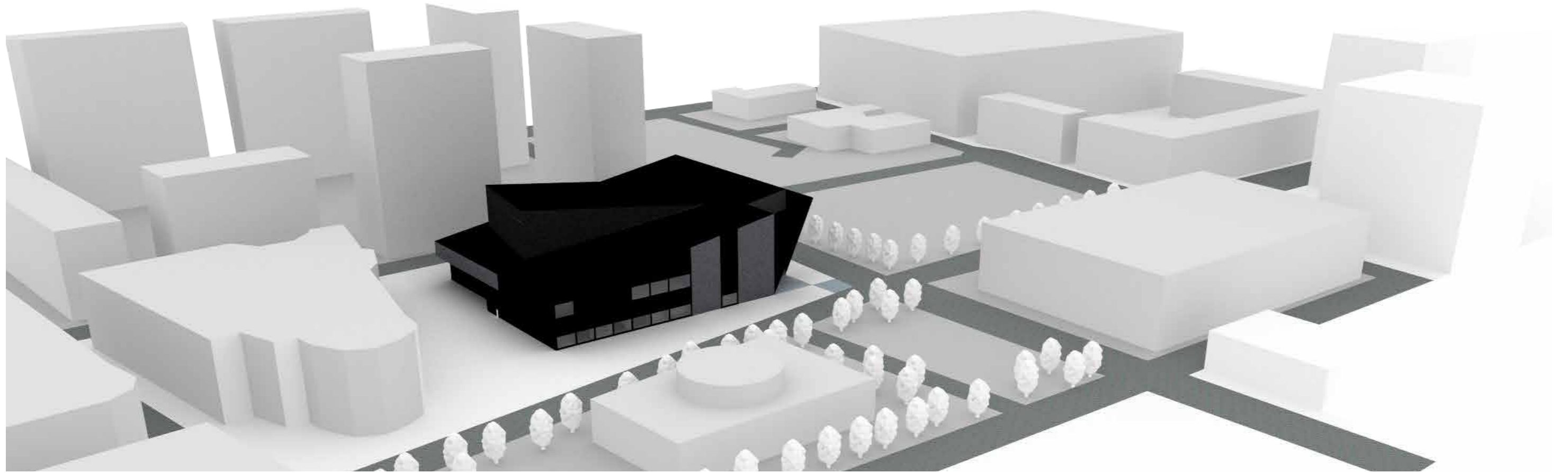
Uppgift

Gestalta ett förslag på en ny universitetsopera till Montreal, Kanada. Operan skulle vara en så kallad "multi purpose hall" och kunna fungera även för konserter, teater och föreläsningar. Förslaget skulle vara med i en uttagning på Chalmers för att sen skickas till Kanada för en internationell studenttävling, anordnad av The Acoustical Society of America (därav text på engelska). Därför skulle stort fokus läggas på akustiken i kombination med den estetiska gestaltningen.

Fokus

Vi fokuserade på att skapa en ren operabyggnad som visar sin insida, jobbet som pågår bakom fasaden. Det tillsammans med en spännande, halvtransparent tegelfasad av glas blev grunden för vårt projekt. Vi ville skapa en oväntad och spännande operasal med bra siktlinjer där akustiska lösningar var integrerade i designen.

LE RIDEAU



THE SITE

The site is located in Downtown Montreal, in close distance to the central station as well as the cultural area with museums and sports centers. In the north east two high ways are passing and to the south the Technical University is located.

The building is situated so that it opens up towards the cultural area. By placing the building in the corner it stands out and claims its position as the opera of the city.

The environmental noise at the site caused by air-traffic is estimated to 80 dBA and by road-traffic to 70 dBA. The building is designed according to these values.

CONCEPT

Our concept is to arouse as well as to quite curiosity and to show the work behind the scenes.

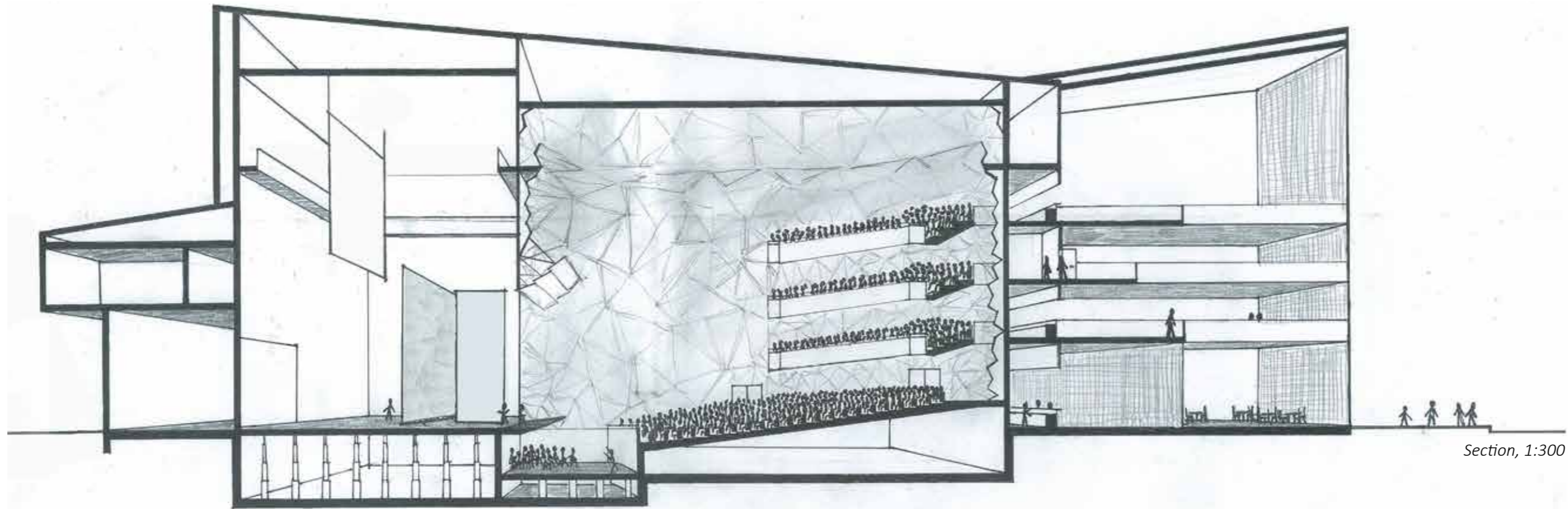
By creating a clean volume with a semi see through façade it will be possible to discern, right through the façade, different lights as well as people moving around. By opening up the façade, like shop windows, people may catch a glimpse of what's going on inside.

In some windows they will see straight into the different shops; where the costumes are made and the scenes put together. In other windows clothing and scenery will be displayed. Like this you raise the curiosity on what's happening behind the walls.

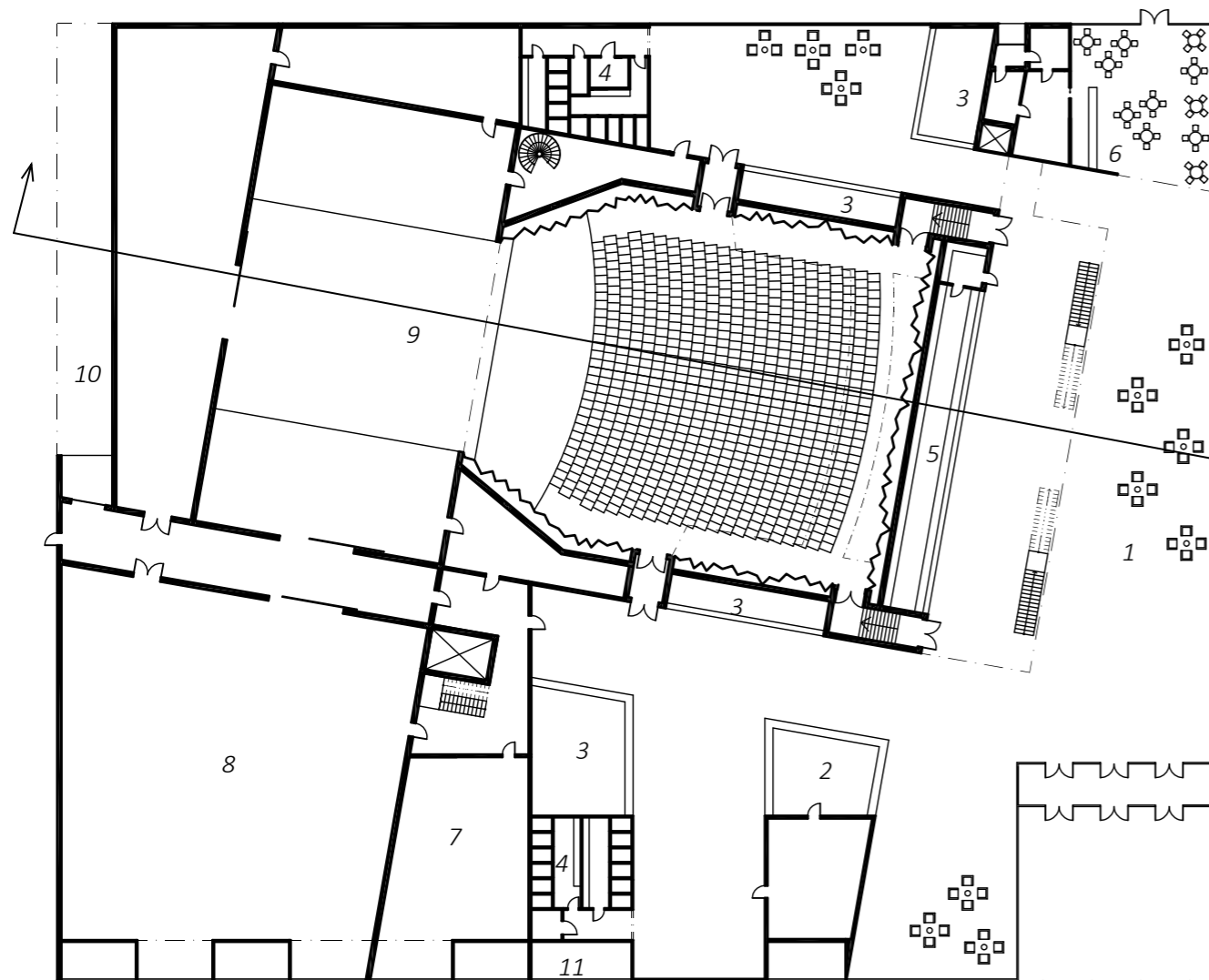


The building is divided into different parts; one public and one private. The public area is mainly on the entrance floor and opens up to the city outside. Here you will find the most important spaces for visitors such as the ticket office, wardrobes, restrooms, music café and bars as well as the entrances to the auditorium.

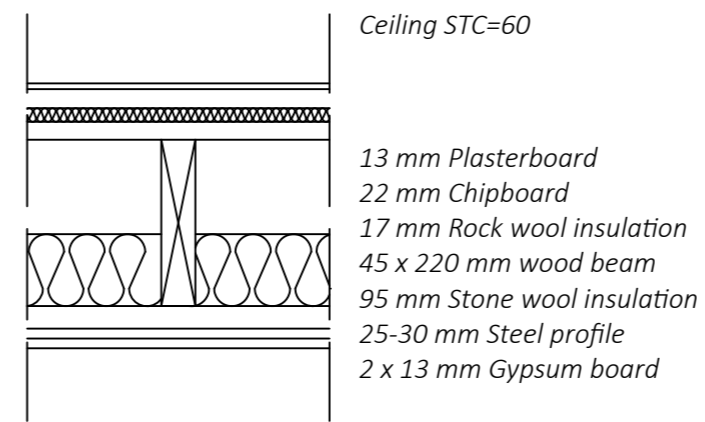
The private part is more closed to the outside and located on four different floors, surrounding the stage tower. The different heights required for the different rooms have contributed to shape the volume.



Section, 1:300

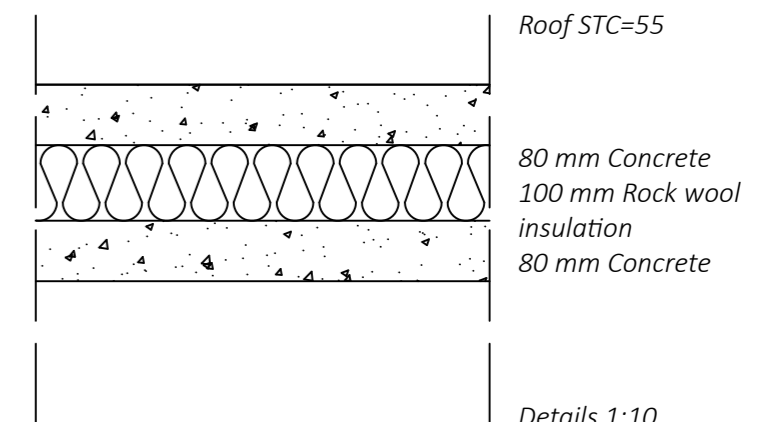


Entrance floor, 1:500



Ceiling STC=60

13 mm Plasterboard
 22 mm Chipboard
 17 mm Rock wool insulation
 45 x 220 mm wood beam
 95 mm Stone wool insulation
 25-30 mm Steel profile
 2 x 13 mm Gypsum board



Roof STC=55

80 mm Concrete
 100 mm Rock wool insulation
 80 mm Concrete

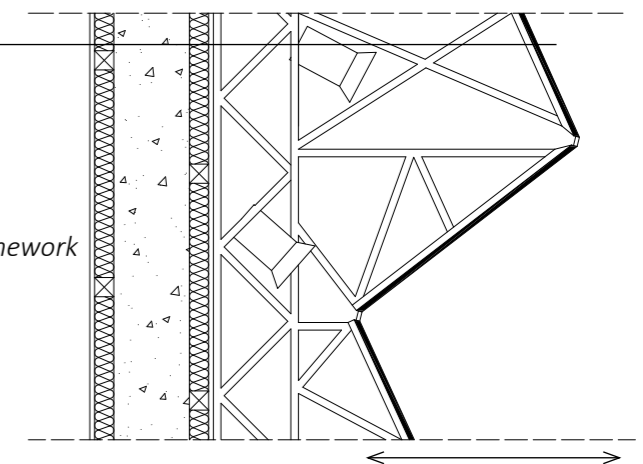
Details 1:10

The ceiling and the roof together is estimated to have STC=75.

ENTRANCE FLOOR

- 1 - Lobby
- 2 - Tickets/office
- 3 - Wardrobe
- 4 - WC
- 5 - Bar
- 6 - Café
- 7 - Costume/wig shop (130 m²)
- 8 - Scene shop (620 m²)
- 9 - Stage (580 m²)
- 10 - Loading dock
- 11 - Scenes/shop windows
- 12 - Storage

13 mm Gypsum
 50 mm Mineral Wool
 200 mm Concrete
 50 mm Mineral Wool
 13 mm Gypsum
 205 mm Steel Lattice Framework



The depths of the triangles varies with 750 mm
 Detail of the wall in the auditorium 1:20



AUDITORIUM

The hall is to surprise you!

When entering the auditorium you walk through a passage which is acoustically dead, like an empty space where you can leave the busy day outside, take a deep breath and then enter the exciting and non-expecting inside. With inspiration from the Agora theatre in the Netherlands the goal has been to create a hall that will satisfy the ear as well as the eye.

In order to create an outstanding visual expression and to scatter the sound from the stage the walls are made of triangular wooden panels. The panels, together with the proscenium, help creating a more diffuse sound field in the opera hall. The triangular surface irregularities of up to 0,75 m helps to create diffusivity even for the lowest frequencies.

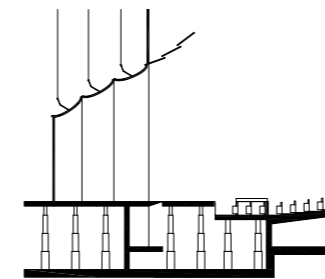
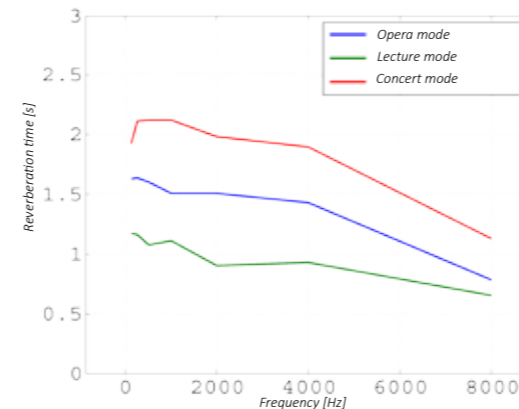
The wooden panels are put together by flexible joints. These joints are transparent to let light pass through from the back, creating an exciting pattern inside the hall, yet preventing sound to escape through the gap between the panels. To make the triangles heavy and so preventing them from vibration, each panel is attached to a fiber cement board at the back. The panels are carried up by a steel latticework connected to the concrete wall.

The whole auditorium is covered with a heavy double shell to be acoustically insulated from the rest of the building and its surroundings. The double shell as well as thick, heavy doors makes sure that the auditorium has STC 15. Noise from the ventilation system is prevented by placing a ventilation vent under each chair, through which air from

the plenum chamber beneath is transferred in a slow pace of maximum 1 m/s. The air out from the auditorium is flowing through a ventilation muffler keeping the environmental noise outside.

The balconies are so called flying balconies, with a space of one meter between the back wall and the balcony. This allows more reverberant sound energy to reach the audience which creates a greater spaciousness. Simulations have been made, showing that the IACC for the mid frequencies increases with about 40 % with a flying balcony of seats furthest to the back.

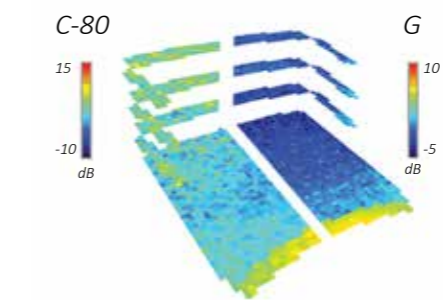
REVERBERATION TIME



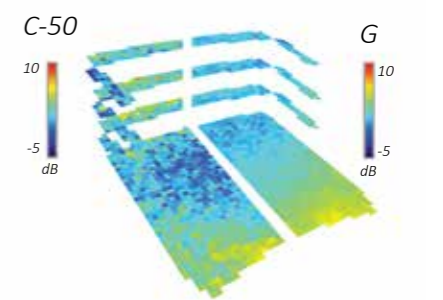
Section through the risable floor 1:500

CLARITY - STRENGTH

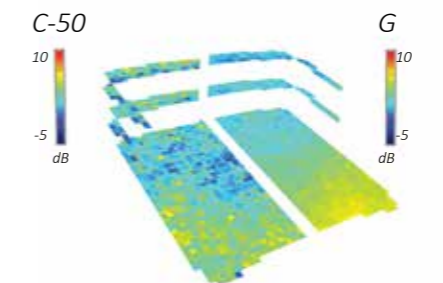
OPERA MODE - ORCHESTRA



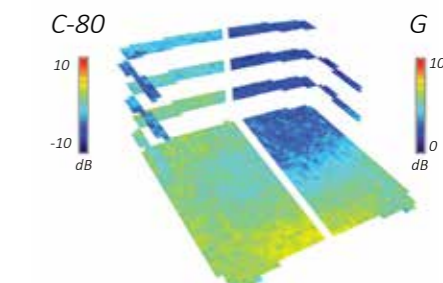
OPERA MODE - SINGER

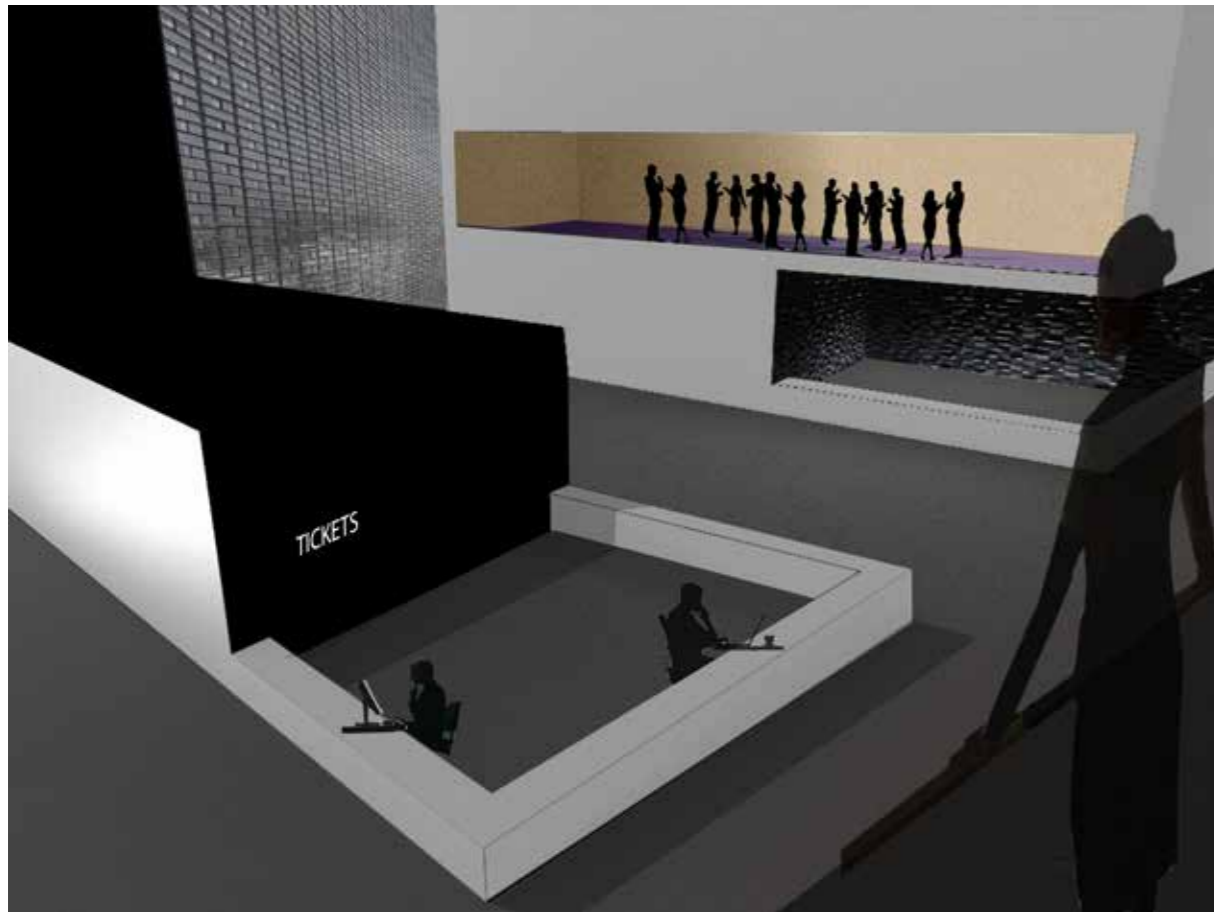


LECTURE MODE

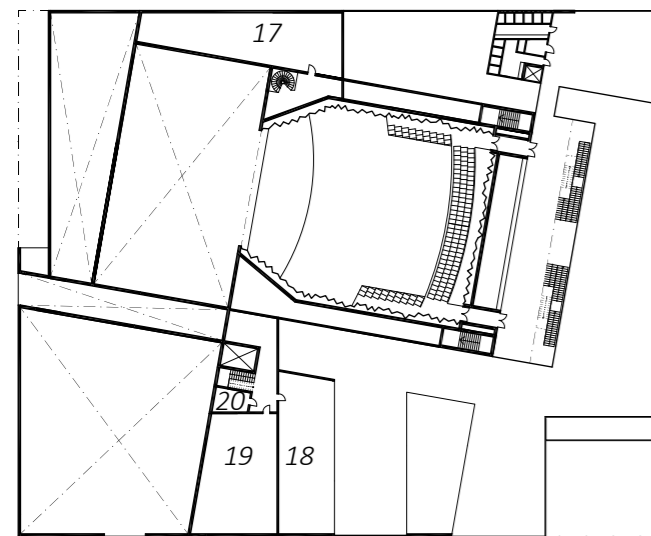


CONCERT MODE





GREEN ROOM



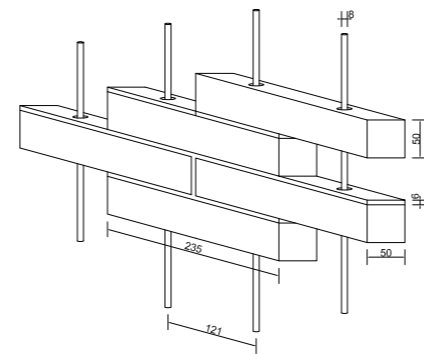
Floor level 1 (+ 4m), 1:500

- FIRST FLOOR
 17 – Office
 18 – Green room (154 m²)
 19 – Storage
 20 – WC

To create a semi see through façade (from the outside) a special system of optical glass blocks has been used. The glass blocks look like rectangular bricks which are put together with reinforcement and then hung from the top beam.

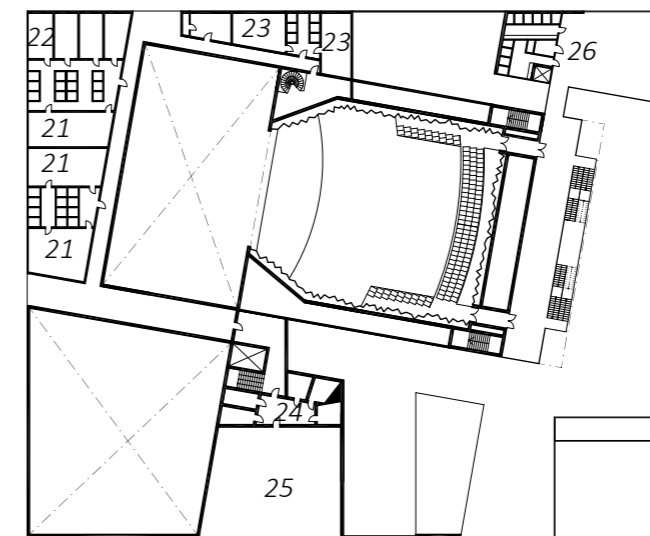


The glass façade turns black-indigo-purple and lets through the light from outside-in during daytime and from inside-out during nighttime, making it a lantern of the city. The closed parts of the building are covered with black steel panels, to harmonize with the glass.



Glass brick wall 1:10

REHEARSAL ROOM

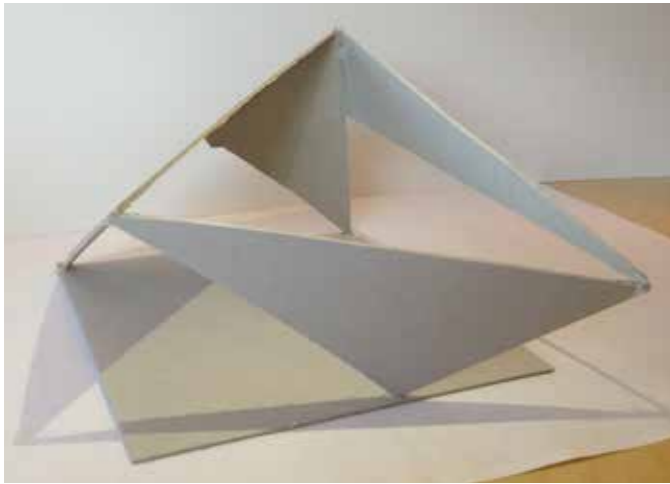
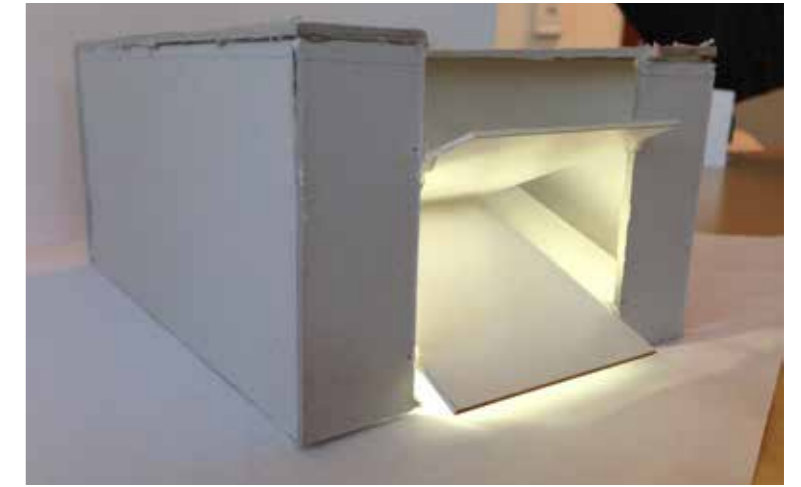
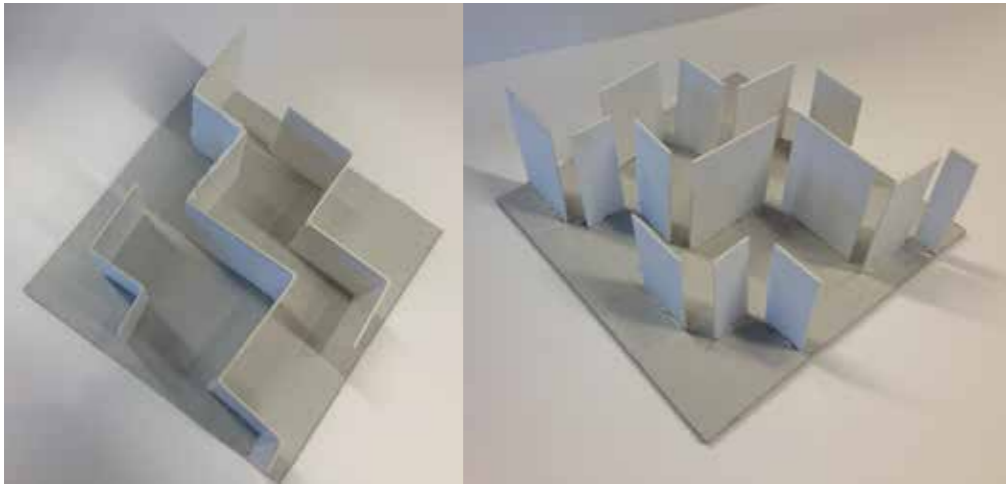


Floor level 2 (+ 8m), 1:500

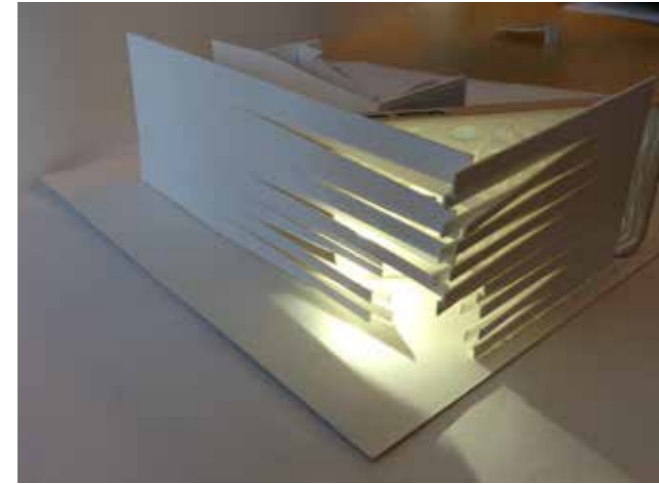
- SECOND FLOOR
 21 – Chorus dressing room (50 m²)
 22 – Solo dressing room (19 m²)
 23 – 4 person dressing room (33 m²)
 24 – Practice room (9 m²)
 25 – Rehearsal room (255 m²)
 26 – WC

The rehearsal room will be used by dancers, small instrumental ensembles and choruses as well as for lectures, workshops and meetings. This requires a room with daylight and changeable acoustics.

When the reverberation time is of big importance, the large mirrors and big windows can be draped with a heavy acoustic curtain. The room rests on a floating floor to avoid tapping sounds from being transmitted to the rooms beneath. The walls are made diffusive by rectangular panels pushed in and out from the wall and flutter echo is prevented by a tilted wall.

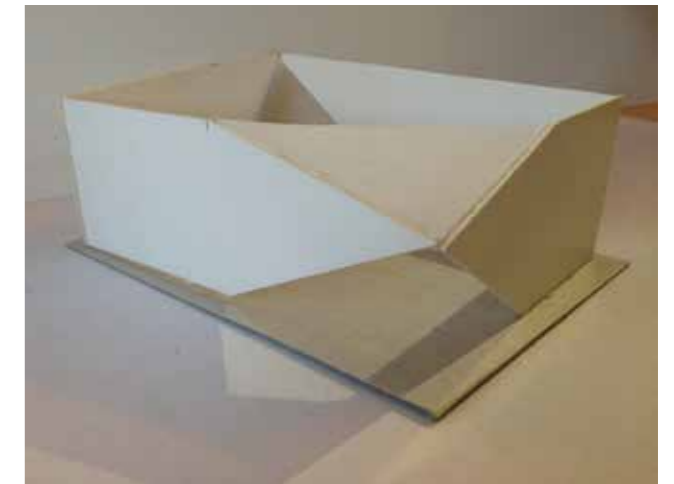


Vi ville jobba med hörn och transparens och testade olika varianter på det. Modellen till vänster gav oss idén med en entré där du först går under byggnaden innan du går in i byggnaden.

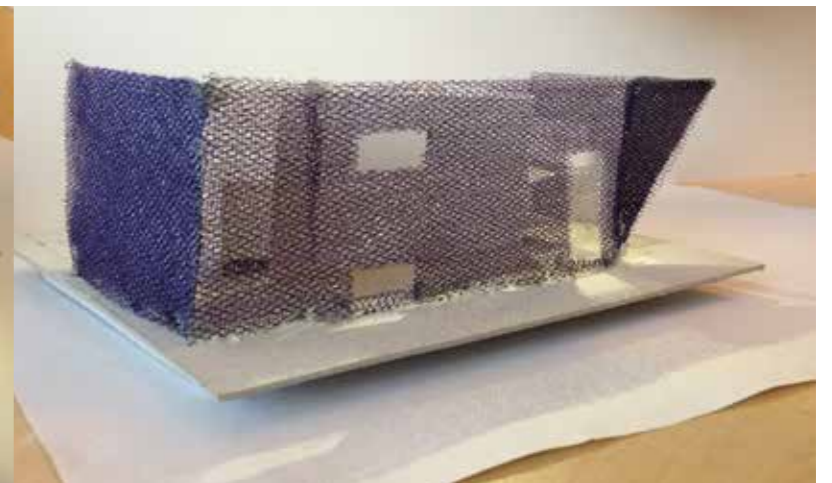
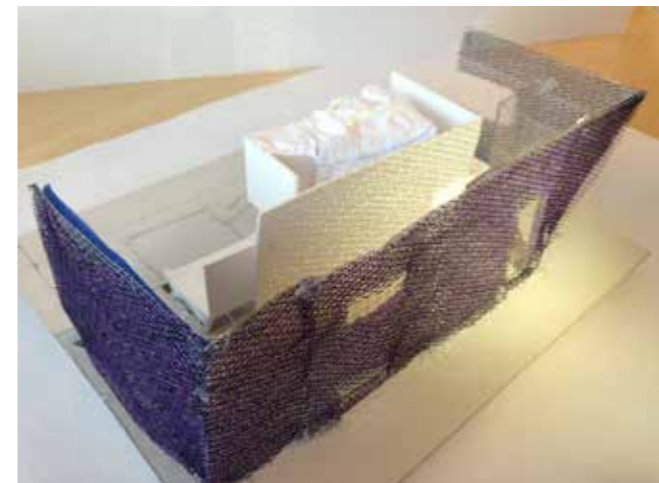
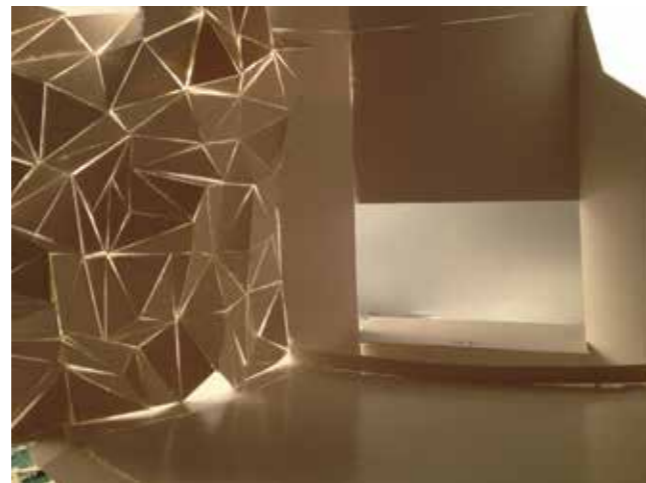


Utifrån modellerna till vänster undersöker vi här entrésituationen lite närmare. Vi var inne på att skapa ett gap som öppnar sig mot besökaren och jobbade med det en längre period tills vi stötte på alltför många problem som gjorde att gapet kompromissades bort.

Då övergick vi till en entrésituation på hörnet av byggnaden som sen utvecklades tillsammans med ett fasadmaterial av optiskt glastegel. De sista bilderna illustrerar hur ljuset sprider sig genom fasaden utifrån/in samt inifrån/ut.



De runda remsorna inspirerade mig till att skapa ett auditorium som omsluter besökaren. Vi började laborera med triangelytor för att skapa en akustiskt diffusiv vägg och när det sena eftermiddagsljuset lyste genom skarvarna föddes idén till en kristallliknande operasal.





SITE

The site is located in Downtown Montreal, in close proximity to the central station and in the cultural area with museums and sports centers. It is located near the high ways are passing and to the south the Technical University is located.

The environmental noise at the site caused by the road traffic noise is estimated to 70 dBA. The building is designed according to three options. The big glass block facade, with STC 40, divides the lobby from the outside and ensures that the lobby achieves 35 dBA.



CONCEPT

An opera is much more than just the performance in the evening and an opera house is much more than just the theater itself. Our concept is to create an auditorium as a public space. Our concept is to create an auditorium as a public space. Our concept is to create an auditorium as a public space.

By opening up the facade, like shop windows, people can watch a performance from the outside. In some situations they will see through the glass facade, when the curtains are made and the windows and light in other situations lighting will come with the display from the opera playing on the museum.

The private part is most closed to the outside, apart from the shop windows allowing you to pay into the working part of the building. The private area is located on four different floors, surrounding the stage house. The different and heights required for the different rooms have been considered.



AUDITORIUM

The hall is to be a complete hall. The volume of the building is very clear and strict and after entering the auditorium you walk through a passage which is essentially closed, the empty space where you can have the busy day outside. Like a shop window and from there you are going into the auditorium. With consideration from the opera theater in the Technical school the hall has been to create a hall that will satisfy the wall as well as the eye when entering.

The auditorium is covered with a heavy double shell to be acoustically insulated from the rest of the building and its surroundings. The double shell and an wall of thick, heavy stone make sure that the auditorium has STC 50. Heavy stone makes sure that the auditorium has STC 50. Heavy stone makes sure that the auditorium has STC 50.

In order to create an outstanding sound system, one needs to create the sound from the stage and the walls are made of transparent acoustic panels. The panels, together with the glass facade, help to create a more diffuse sound field in the opera hall. The transparent surface impregnation of up to 120% helps to create a more diffuse sound field in the opera hall.

The auditorium is covered with a heavy double shell to be acoustically insulated from the rest of the building and its surroundings. The double shell and an wall of thick, heavy stone make sure that the auditorium has STC 50. Heavy stone makes sure that the auditorium has STC 50.



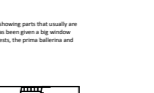
ORCHESTRA PIT

The size of the orchestra pit is dependent on suit different performances. By raising the floor, which is divided into two parts, the stage floor can be raised further out into the auditorium or be used for extra seating in the auditorium pit area with a reflection and diffusion while the other three are absorbed. This is to keep the sound pressure level down but still make it possible for the musicians to communicate with each other.



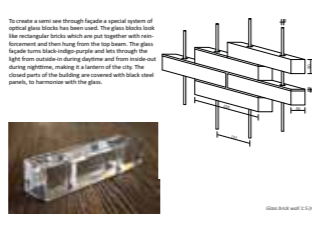
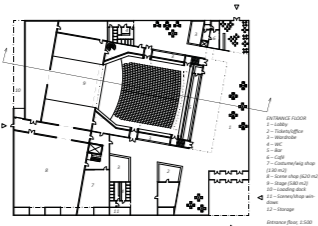
GREEN ROOM

Our concept of displaying rather than being hidden in changing parts that usually are closed to the public, for example the green room which has been given a big window towards the lobby. The curtain will be able to see the VIP guests, the press balcony and actors circulating after the performance.

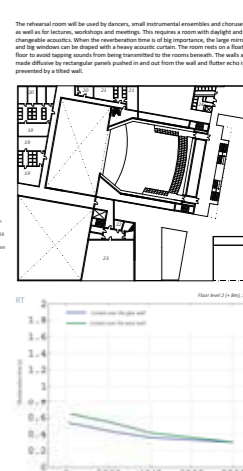
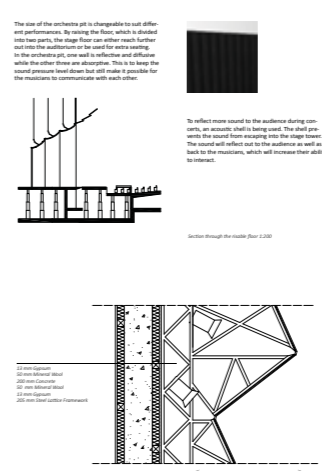
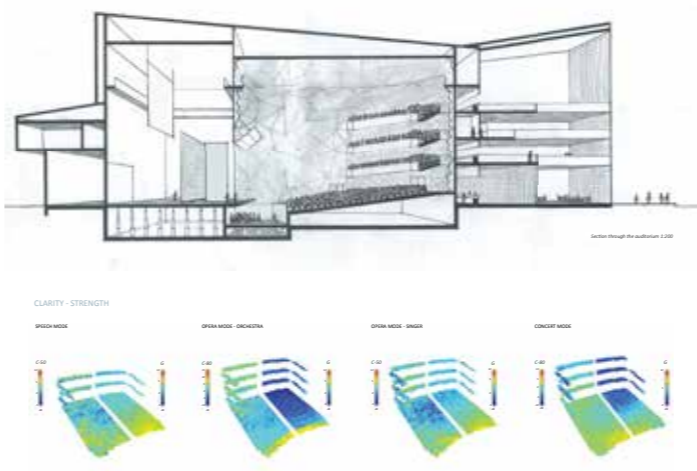
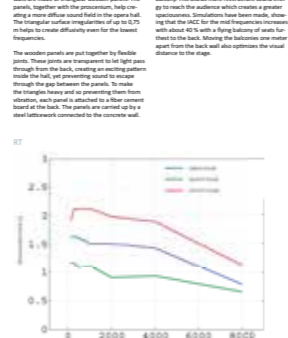
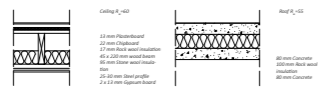


REHEARSAL ROOM

The rehearsal rooms will be used by dancers, vocal instrumental ensembles and choruses as well as for lectures, workshops and meetings. This requires a room with daylight and changeable acoustics. When the construction level of the experience, the stage scenes and big windows can be changed with a heavy acoustic curtain. The room uses a floating floor to avoid tapping sounds from being transmitted by the room structure. The walls are made diffuse by rectangular panels pushed in and out from the wall and Rubber who is powered by a thin wall.



LE RIDEAU



Vad är jag nöjd med?

Formen. Vi utgick från två rätblock och lät sen formen följa volymen som krävdes för de olika utrymmena. Från början ville vi dölja scenhuset, men insåg att all den volymen inte skulle behövas i byggnaden och fick jobba vidare. Jag tycker att den slutliga volymen förhåller sig fint till omgivningen och tar ett steg ut i korsningen, precis som vi önskade. När vi analyserade operahuset i kursen Klimatsystem kom vi även fram till att det stora södersluttande taket är perfekt för solpaneler.

Planerna. Vi jobbade en hel del med den enkla rektangulära formen och lyckades, efter att ha roterat operasalen i förhållande till den övriga byggnaden, att minimera korridorer och få in rätt ytor. Jag tycker att det blir fina rum i entréplanet mellan operasalen och fasaden. De olika WC-utrymmena är placerade en bit ifrån auditoriet vilket motverkar att ljud därifrån transmitteras in till den ljudkänsliga lokalen.

Auditoriet. Genom modellbygge och sen eftermiddagssol upptäckte vi det vackra ljuset som föll in mellan de triangulära ytorna och jag fastnade direkt för det. Jag är nöjd att det gick att skapa rent visuellt, men att det även hjälper till att skapa god akustik i salen.

Renderingen som visar auditoriet från scenen. Jag är jättenöjd med den bilden och känner att jag får visat de speciella väggarna och spänningen som finns i salen.

Vad har jag lärt mig?

Jag har lärt mig mycket om akustik. Att det är viktigt att se en byggnad som en helhet där akustiken kan uppmuntra till arkitekturen och tvärtom, istället för att se det som två skilda saker. Det blir genast mer kraft i något och mer givande när det visuella även har en akustisk poäng.

Att ett starkt koncept är viktigt för att kunna kommunicera sitt projekt. Och att ett koncept som går att kommunicera i modellform är lättare att ta till sig än ett som kommunicerar i ord.

Genom att förklara sitt projekt för någon utomstående ser man genast vad som är otydligt och vad man behöver ha svar på/ha tänkt igenom.

Jag har utvecklat mina datorkunskaper, framför allt inom Adobe Photoshop.

Vad skulle jag göra annorlunda?

Jag skulle vilja jobba om renderingen som visar entrén, den gjordes precis på slutet och gör inte glasfasaden rättvisa. Träden skulle bytas ut till "vanliga" träd, ljussättningen skulle ändras lite och fasaden skulle få de glasblock som den faktiskt består av.

Vårt koncept var att jobba med att visa insidan utåt istället för att göra en ikonbyggnad utifrån en häftig form. I efterhand kan jag tänka att det kanske faktiskt är en ikonbyggnad man vill ha när det kommer till en opera, och att vi eventuellt skulle funderat mer kring det i början av projektet.

När vi analyserade operabyggnaden i kursen Klimatsystem kom vi fram till att flera av de större glasytorna kommer att behöva solavskärmning. Även om väderstreck och solinstrålning fanns med i tanken när vi valde vart vi placerade de olika lokalerna samt de stora glasytorna så var det inte tillräckligt. "Fel" sorts solavskärmning skulle kunna förstöra byggnadens rena formspråk. Det är något som jag hade funderat kring och jobbat med om vi gjort om eller vidareutvecklat förslaget.