

FOLDING FAN



ACEX15
Kandidatarbete i
Arkitektur och teknik VT18

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AT3

UPPGIFT

Detta arbete gick ut på att designa ett komplex innehållande funktionerna "Courtroom and Community hall" i en amerikansk förstad. Fokus var på att genom byggnades utformning få fram goda akustiska miljöer som möjliggör en klar och stark ljudbild utan elektronisk förstärkning.

PROCESS

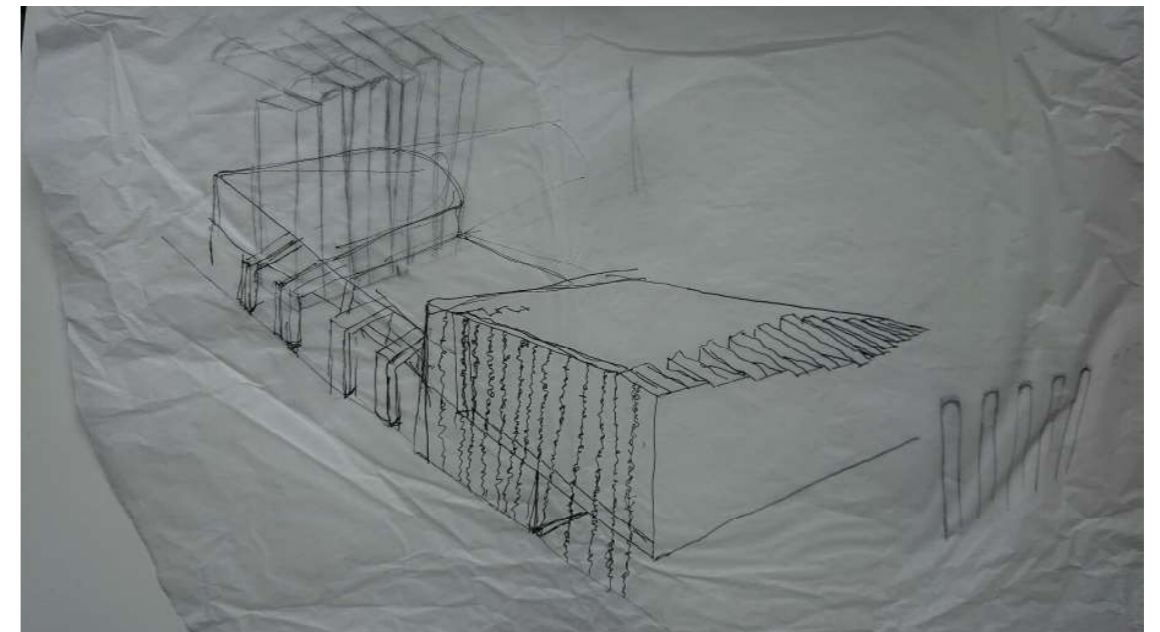
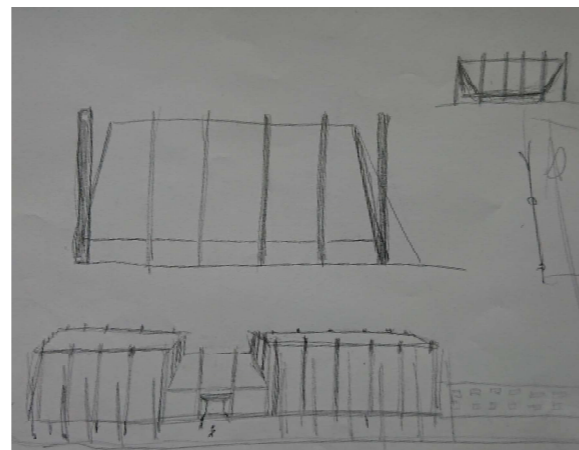
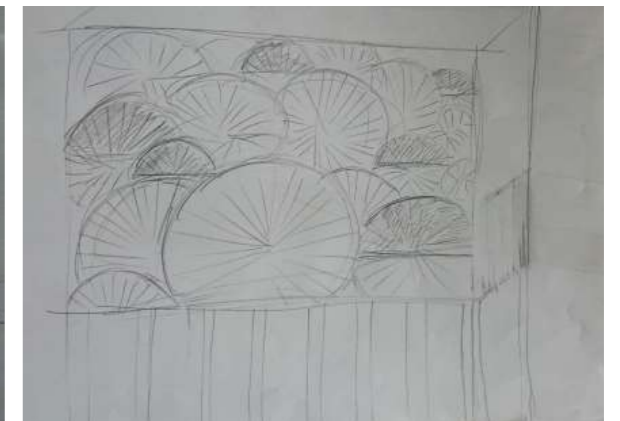
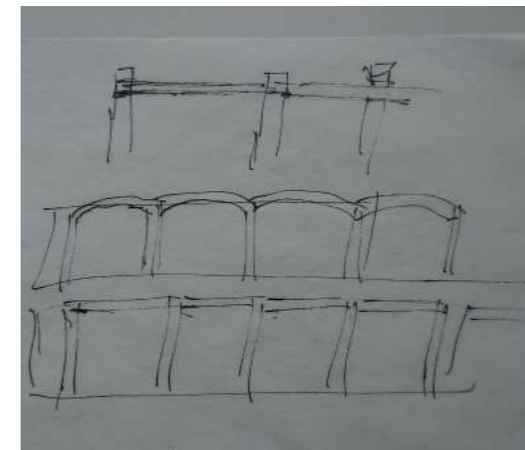
Innan tävlingsprogrammet blev känt arbetade vi i grupper om fyra med olika delar av byggnaden, vindfång, entré och ytterfasad, alla isolerade från varandra i den mån det gick. Detta gjordes med modeller och skisser.

Ur bland annat dessa skisser föddes idén med arkader, fjäderform och pelare.

Efter en del skissande byggde vi en modell i Sktechup som vår akustiker använde för att ta fram bland annat clarity och soundstrength.

Resterande digitalt arbete skedde nästan uteslutande i Revit.

Mot slutet byggde vi en modell på frontfasaden i community hall av laserskuren plywood och plexiglas.



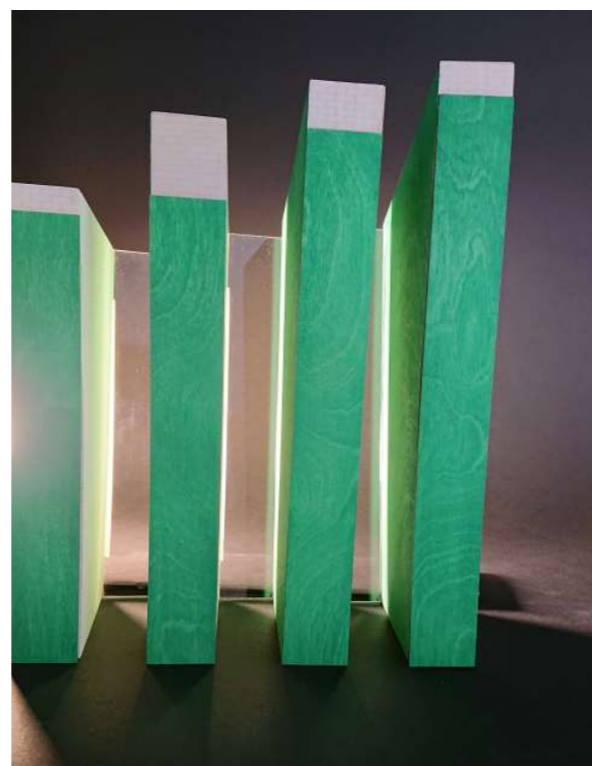
REFLEKTION

Det inledande arbetet med att ta fram olika delar av en byggnad var till stor hjälp senare i processen. Kravet att få fram en fungerande modell i sketchup gjorde att vi tidigt blev tvungna att bestämma husform och arbeta med den. Jag är nöjd över formen vi valde att jobba med och de utmärkta akustiska egenskaper den gav.

Då vi jobbade i Revit, som jag behövde lära mig igen, hamnade lite för mycket fokus på att hitta material som gick att rendera i programmet snarare än att använda oss av det material vi gillade bäst. Vi hade då kanske haft lättare att i datormodell designa en arkitektur som fungerar bättre rent praktiskt.

Det modellsegment vi byggde gav utöver fina bilder en bättre förståelse för de lösningar formen på väggarna i community hall krävde. Jag tror att lösningar för mötet mellan fönster och balkar i tak, eller mellan stängare och tegelvägg, hade varit bättre genomtänkta om vi hade byggt upp dem fullt ut i modell.

Samarbetet i gruppen tycker jag har fungerat bra och det har varit ett öppet samtalsklimat när vi diskuterat projektet. Vår akustiker var engagerad och en stor del av arbetet att finjustera formerna och ta fram beskrivande texter.





FOLDING FAN

The pillars appearing in the exterior façade, in the community hall, and in the courtroom are a part of the acoustic concept. Different blends of mortar make the construct absorbing, reflective, or a mix of both. Making pillars and walls diverse in finding good quality room acoustic.

TRANSPARENCY

All members of the community enter the new municipal building equally; judges, politicians, spectators and concerned citizens come through the same doors. Once inside the central lobby, everyone meets at the same level and are able to follow the movements of others. Stairs separate the two parts of the municipal building, keeping sightlines and the ability to oversee what happens across the open second floor.

EXTERIOR NOISE CONTROL

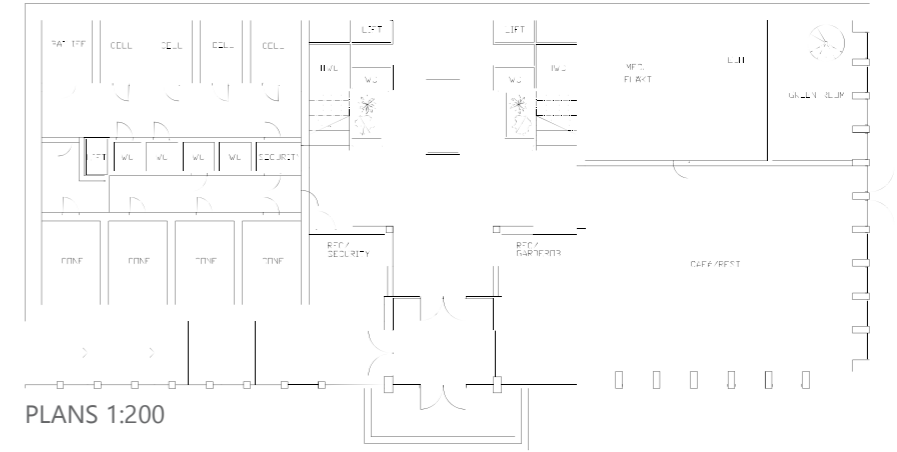
Going through the double doors leading into the lobby one leaves the city noises behind. Vibrations going through the ground are handled by decoupling the building with a permanently elastic foam rubber layer surrounding the buildings concrete foundation, decoupling at 15 Hz.

Heavy brick walls with batt insulation and resilient channel connecting the interior wall reflects the airborne exterior noises. All fitted windows are double glass where the two panes of different thickness are coated with a PVC foil. Between them a gas mixture further reduces exterior noise.

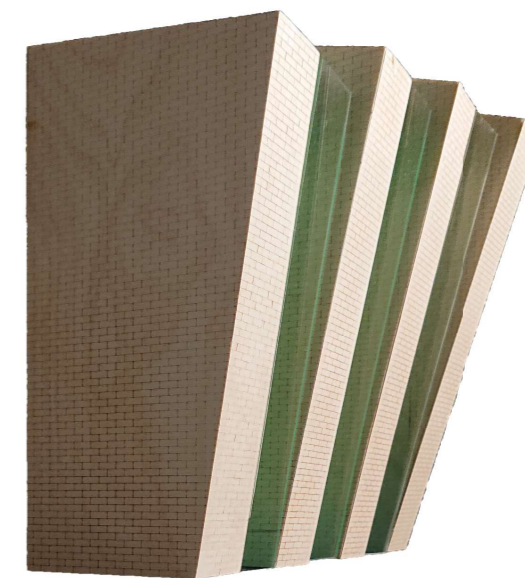
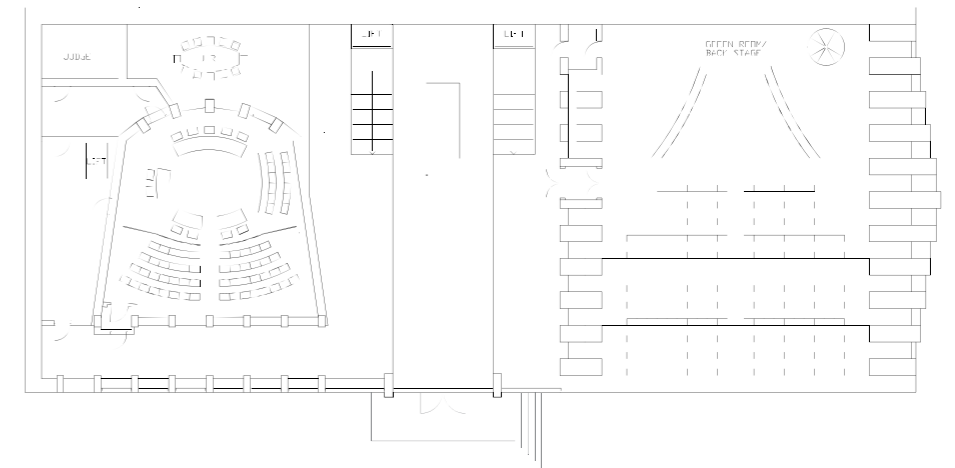
INTERIOR NOISE CONTROL

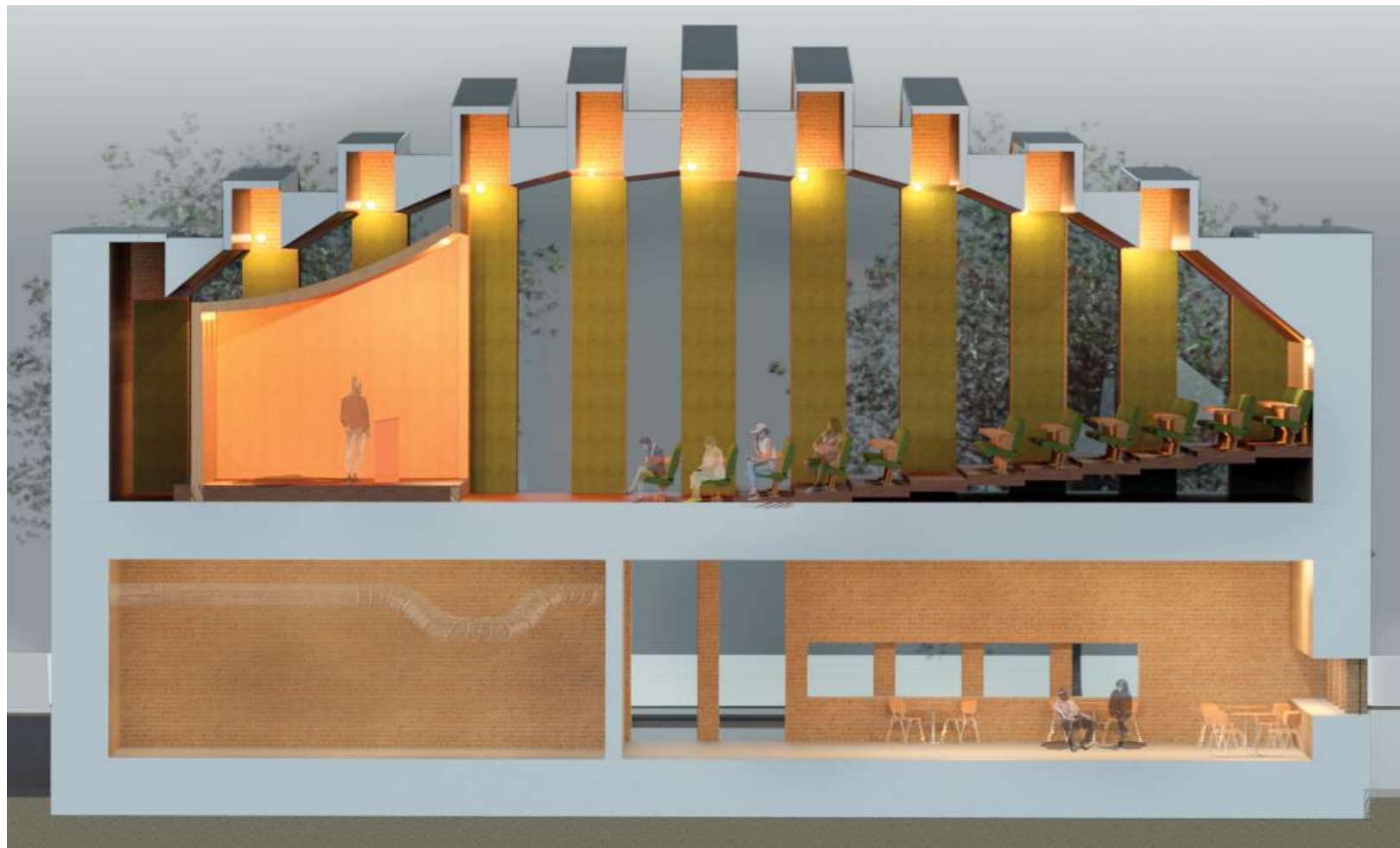
In the foyer, plants are placed in large boxes of dirt which in combination with the mortar in the brick walls dampens interior noise coming from people and the restaurant. The room housing airhandlers and electrical equipment are placed on the ground floor. Decoupling it from the rest of the house makes sure no vibrations are transferred from the mechanical and electrical equipment. Ample space for the HVAC system is allocated in the thick walls, floor and ceilings. Effective silencers make sure no sound is transferred between rooms by the airchannels.

1st FLOOR



2nd FLOOR





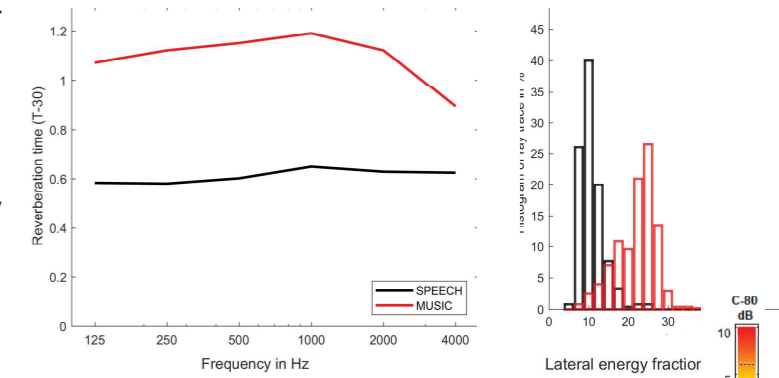
COMMUNITY HALL

Large windows open the city hall to the outside world, showing a glimpse of the ongoing political debate. Windows in the beams above add to the natural light entering the room.

An intimate seating arrangement with the furthest seat 15 m away from stage make sure that every word and facial expression is perceived by the audience. At 800 m³ or 4 m³/person the space is serving its main purpose of being a space where ideas meet and voices are heard.

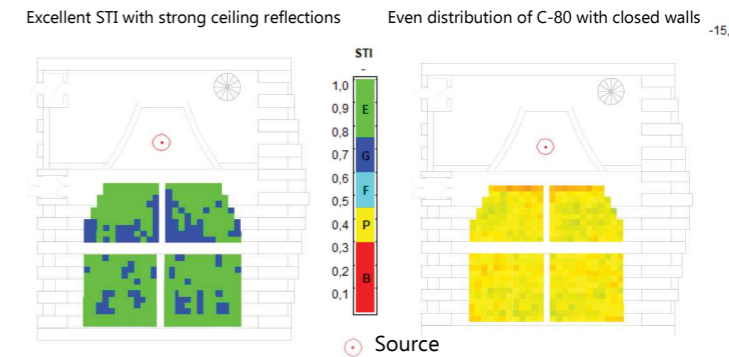
FROM CLARITY TO ENVELOPMENT

The reflections at 60-400 ms coming to the listener from the sides contribute most to a sense of envelopment. Early reflections from the ceiling contribute to a high speech intelligibility and localization. Our community hall is therefore easily adaptable to both scenarios.



SPEECH

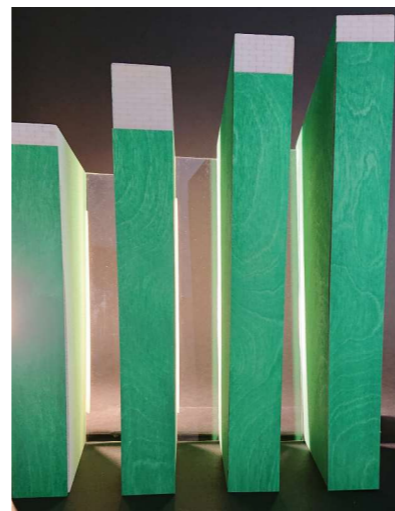
Folding windows closing the gap between beams create one big reflector optimized for even distribution of sound in the seating area. Absorbents on the doors covering the brick pillars, and on one side of each pillar removes reflections that are not from the ceiling. Thus making the room great for public speaking and theatre.



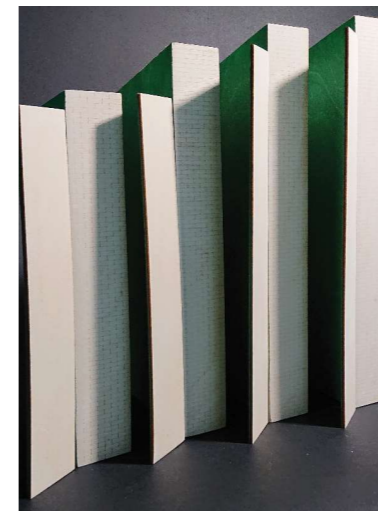
MUSIC

When the audience wants to be enveloped in live music, the doors on the sides close and folding ceiling windows are retracted. This moves the reflections to the side of the audience while still maintaining the same room volume, but with less absorption. The slotted helmholtz resonators in the beams take care of low frequency reverberation.

Open/ Speech

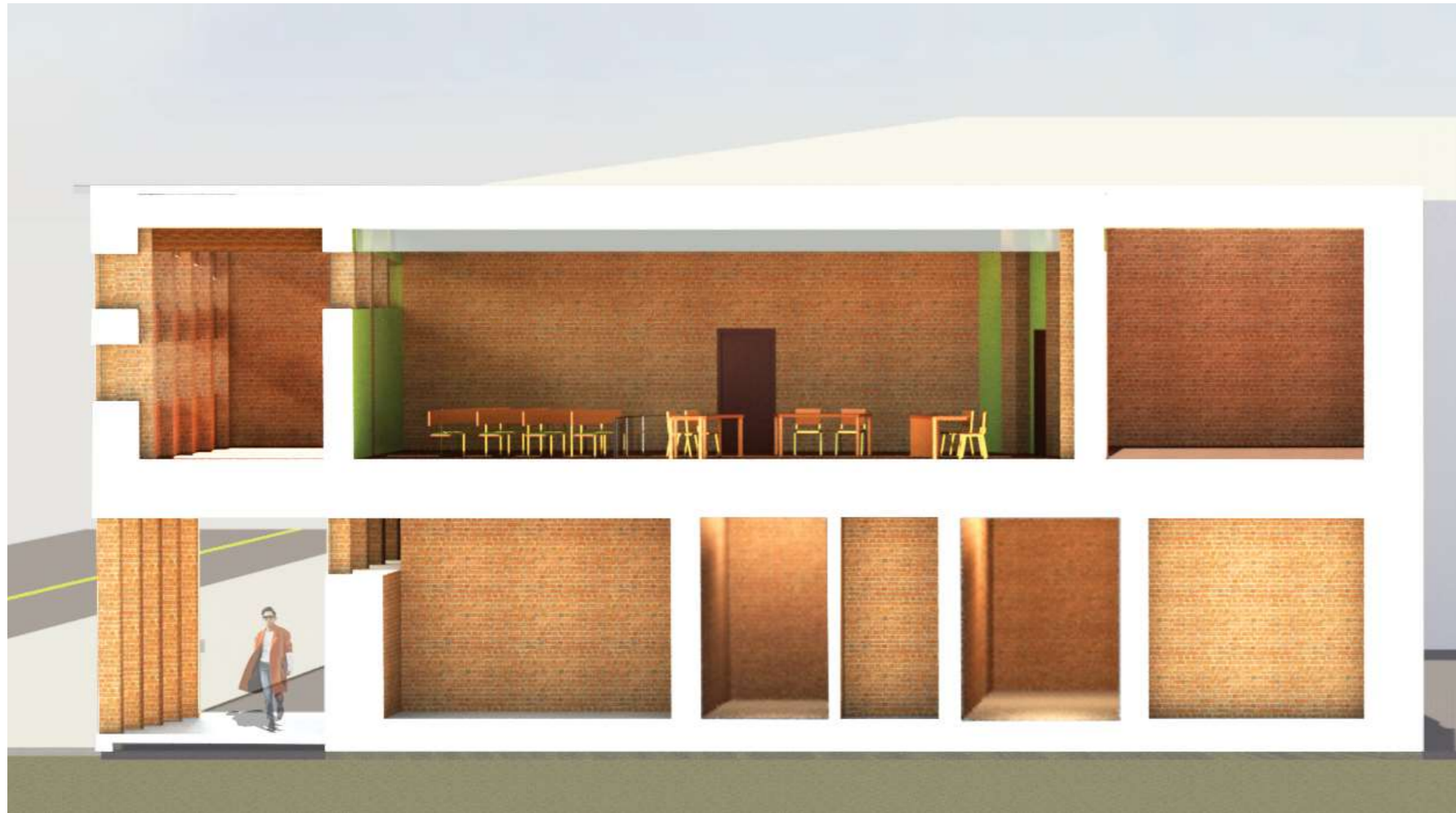


Closing



Closed/Music





COURTROOM

HEIGHTENED EQUALITY

The different functions of the courtroom are made apparent by a traditional and expected placement of furniture, leaving out hierarchy by levels. The overall layout of the room instead channels a natural focus at the oval litigation area. This arrangement has been chosen to enable clear sightlines for everyone attending.



INTIMATE SOUND CLIMATE

Spectators enter through double doors in the back corner of the courtroom, ensuring no sound exits the room unwittingly. The walls surrounding the courtroom with its connecting jury and judge rooms are built heavy like the exterior walls. Flanking transmission is handled by having insulation interlayer at the junction where the ceiling or floor of two rooms meet. The pillars and walls are fitted with sound absorbing mortar making speech direct and intelligible. At 480 m³ or 6.4 m³/person, the room is spacious yet intimate.

