

Project 1 // Daylight analysis of San Francisco Public Utility building facade

Location//San Francisco Public Utility Building

Project type// Indoor daylight analysis (Case Study)

Purpose//

Main purpose of this experiment was to

1. Inform daylight efficiency solutions in on-going facade design projects in the firm
2. Standardizing workflow for daylight efficiency evaluation modeling in Rhino, Ecotect and Radiance.

Team//

Project leader - Dr. Ran Xu (Architect)

Team - Lars Oliver Grobe (Architect), Christian Roeske (Architect), Andreas Nobak (Architect), Carsten Bauer (Physicist),



South Facade of SFPUC building showing fixed fins that serve as light shelves to bounce daylight into the interior spaces

Source// KMD Architects **Image credit**// Bruce Damonte

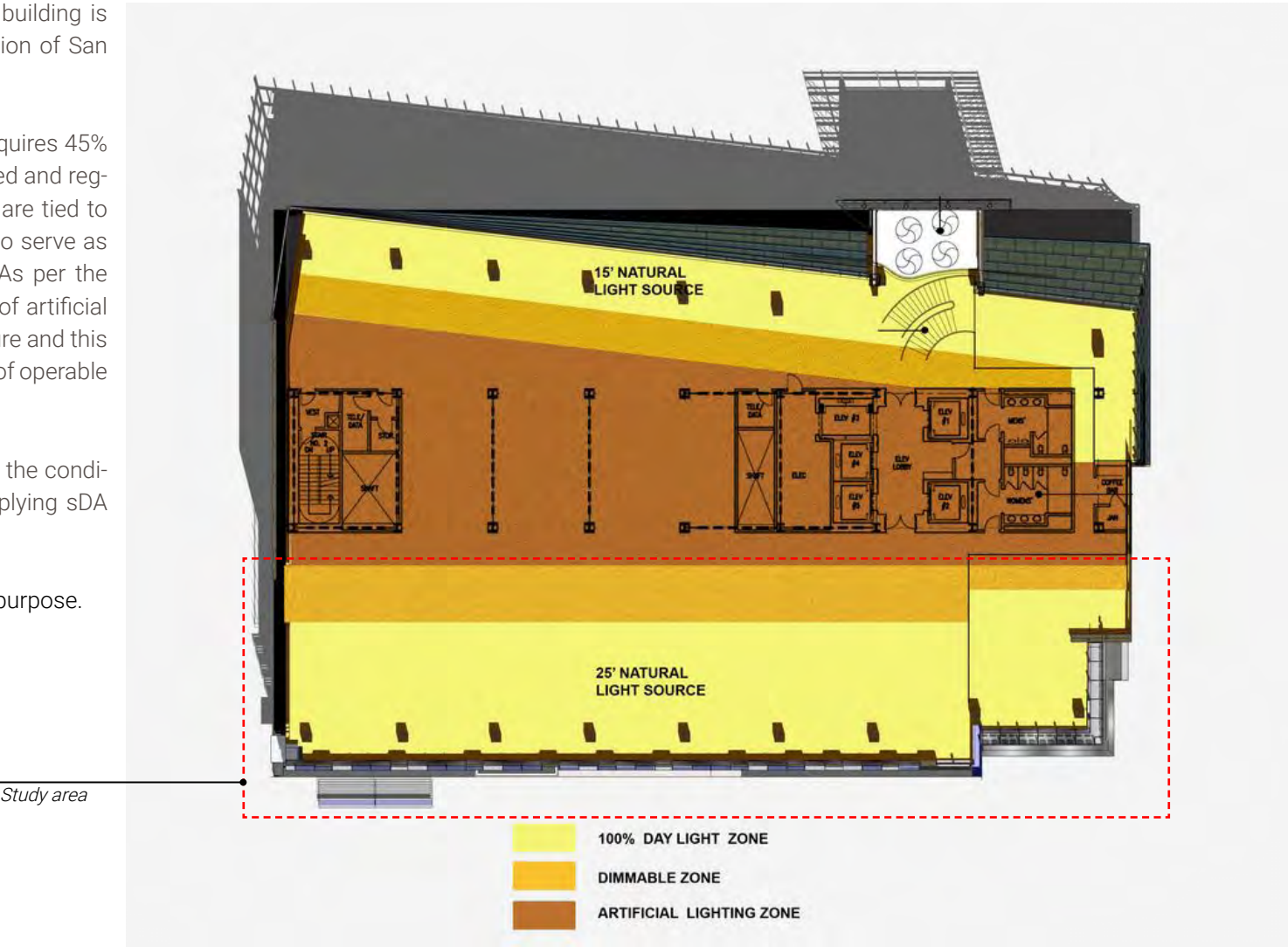
Note // Image used for education and research purpose only

San Francisco Public Utility Commission Headquarter building is 13-story office built to in house Public Utility Commission of San Francisco.

By using daylight-harvesting throughout, the building requires 45% less energy to illuminate the interior. Daylight is optimized and regulated through light selves and automatic shades that are tied to trajectory of the sun. Fixed fins at the south facade also serve as light shelves to bounce daylight even further interior. As per the data provided by project team, this building avoid 60% of artificial light during day time due to natural light harvesting feature and this design doesn't obstruct view to outdoors (within 15 feet of operable windows) up to 91%.

Purpose of this experiment is to verify whether it fulfills the condition throughout year during different season hence applying sDA and ASE concept on existing building.

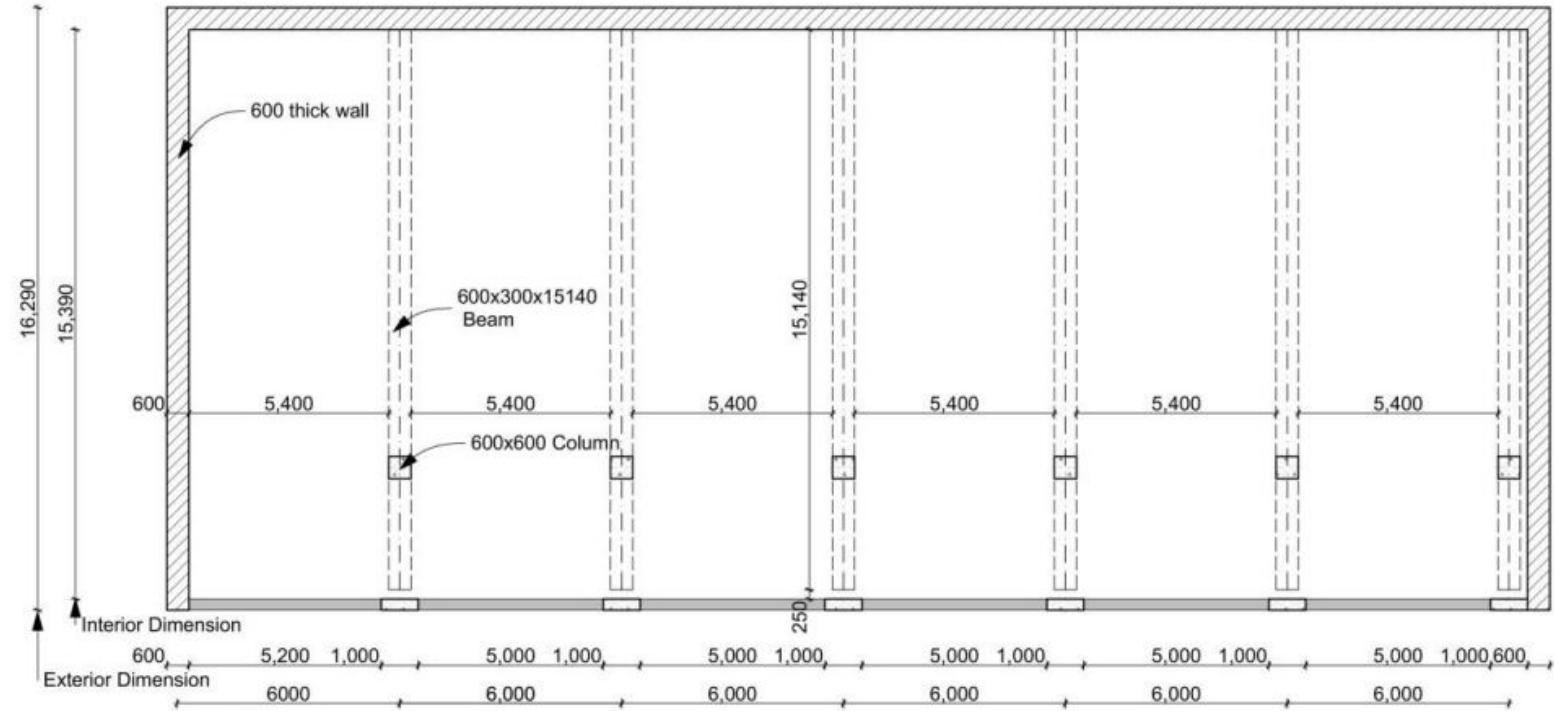
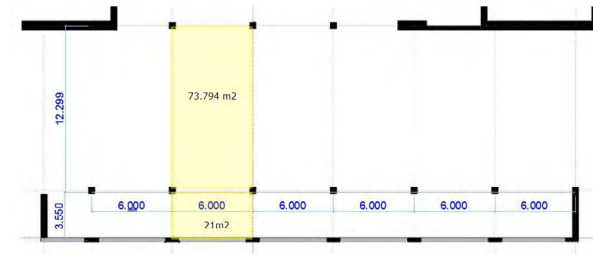
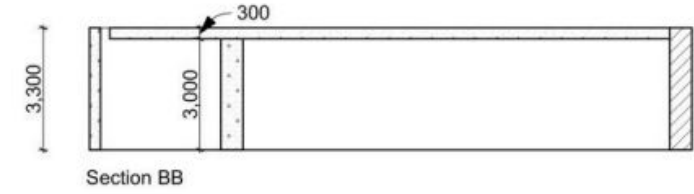
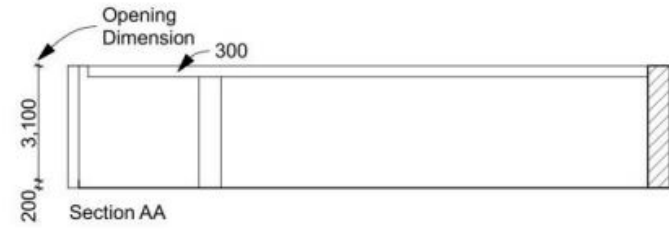
The image shows area selected for daylight simulation purpose.



Daylight zones

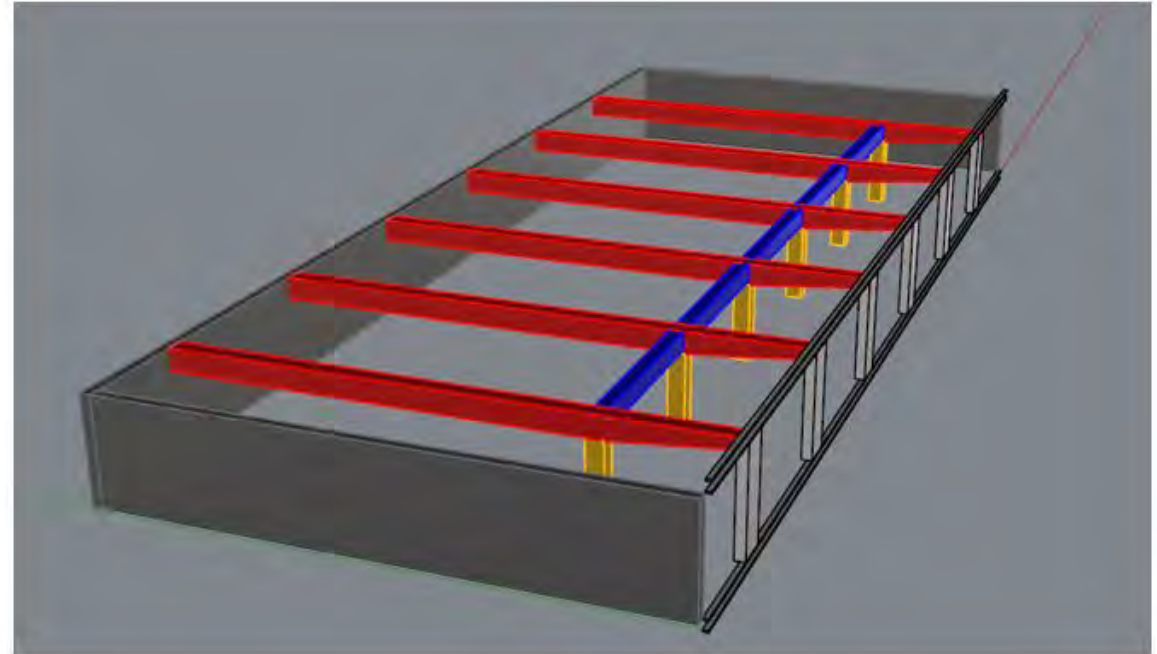
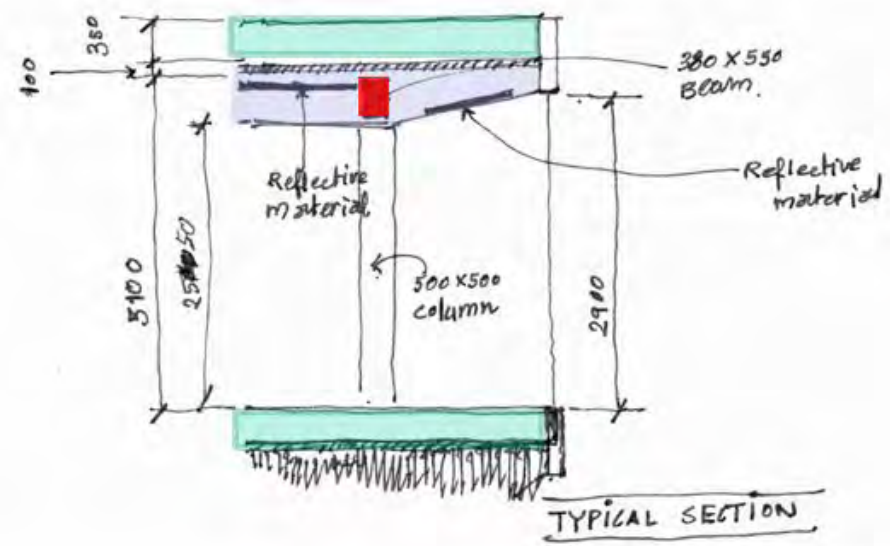
Source// Archdaily Image credit// KMD Architects

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SFPUC Headquarters : Plan

Analysis area



Simulation model set-up



Original office environment and setup



Simulation result in radiance



Luminance analysis

Project 2 // Punch metal mesh design and measuring PV panel efficiency behind glass and metal screens.

Location//Frick, Switzerland

Project type// PV panel solar facade research

Purpose//

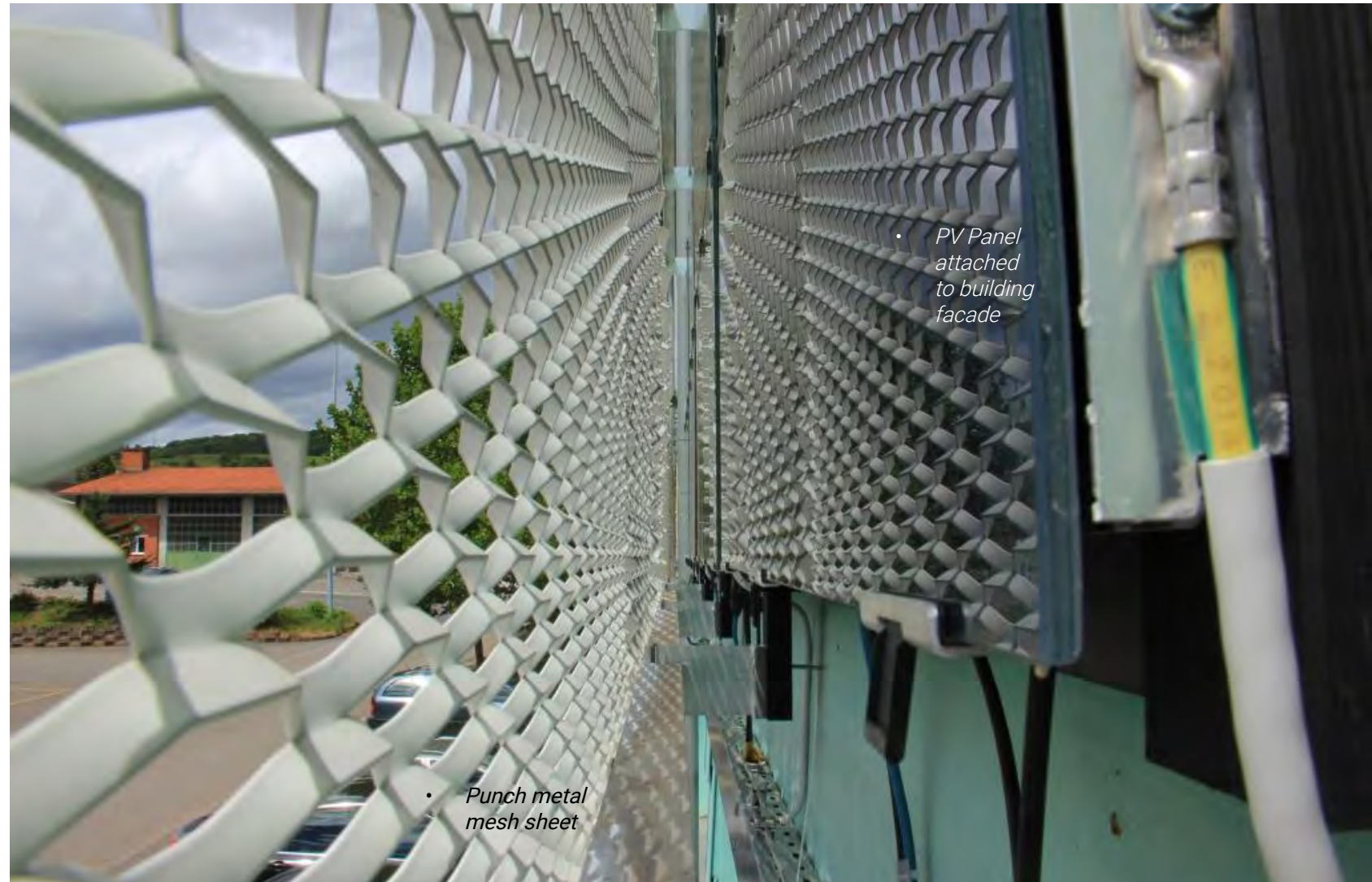
To measure and compare the efficiency of the photovoltaics behind different screens including colored glass screen, metal and wooden screens.

To adhere to the project report confidentiality, only few glimpse of the project and process are included here with the permission. These are some excerpts and images to provide a gist of project process.

Team//

Project leader - Dr. Ran Xu (Architect)

Team - Lars Oliver Grobe (Architect), Christian Roeske (Architect), Andreas Nobak (Architect), Carsten Bauer (Physicist),



• *PV Panel attached to building facade*

• *Punch metal mesh sheet*

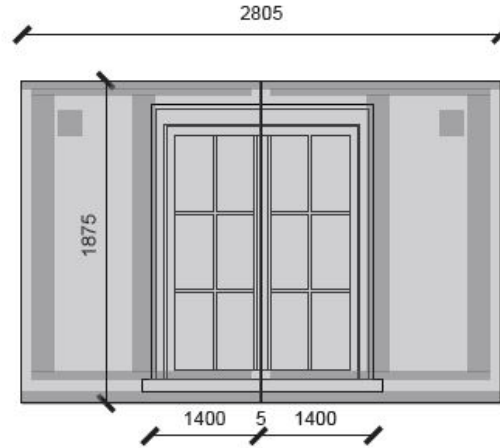
PV facade testing, Frick (Switzerland)

PV facade with metal mesh and glass color glass screen test Samples

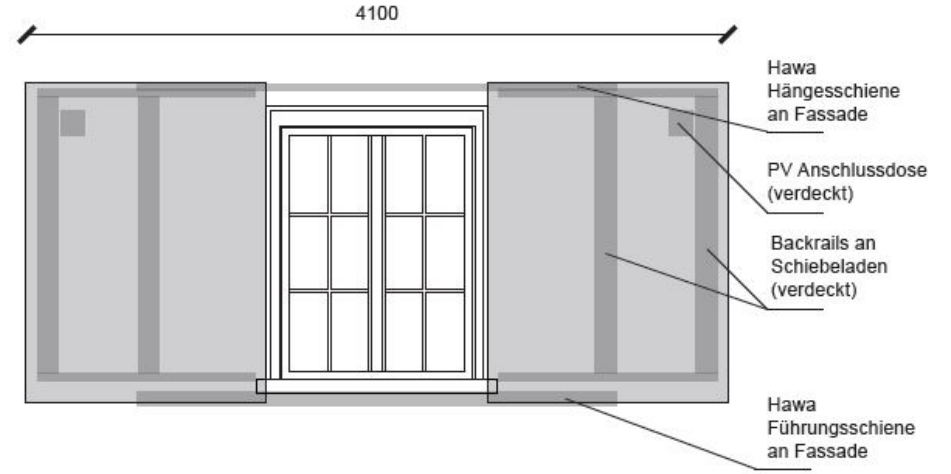


My Role //

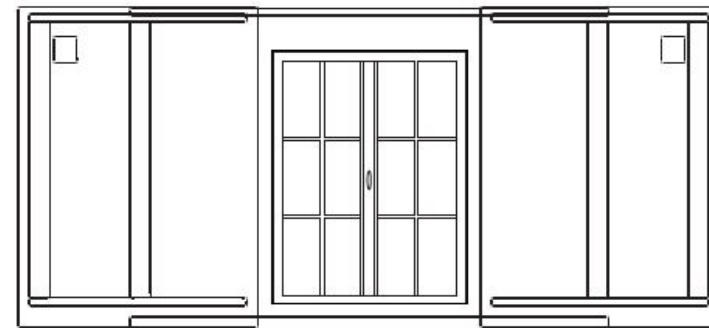
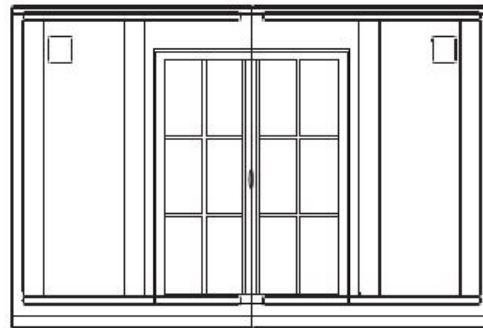
Site measurements and model preparation, Project documentation support



Ansicht von Aussen M 1:20
Schiebeläden geschlossen

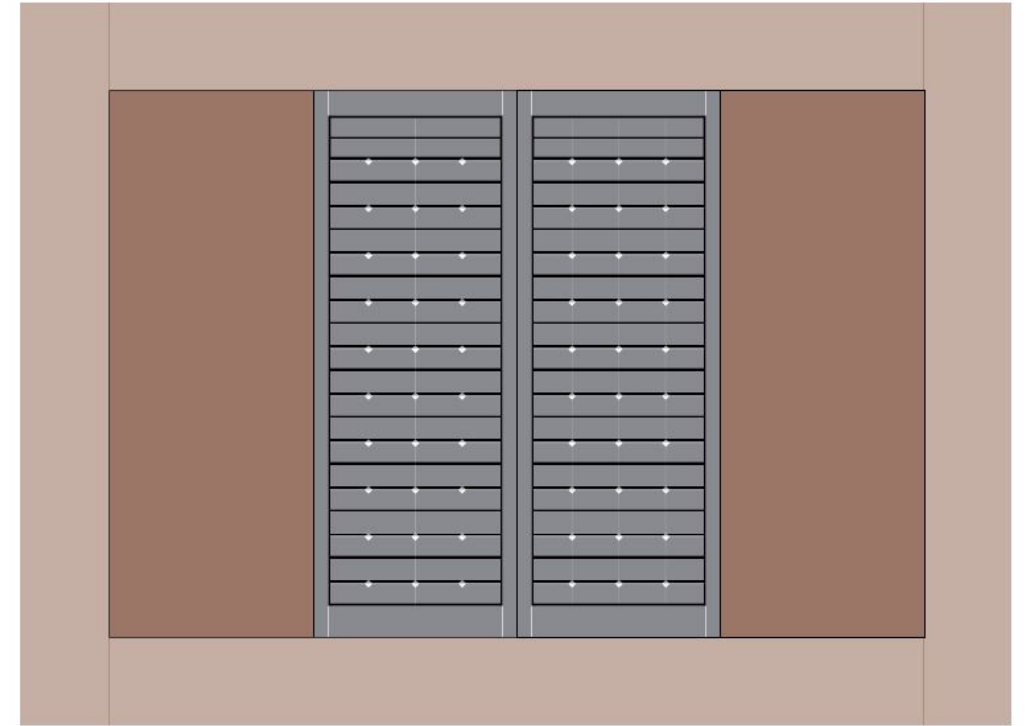
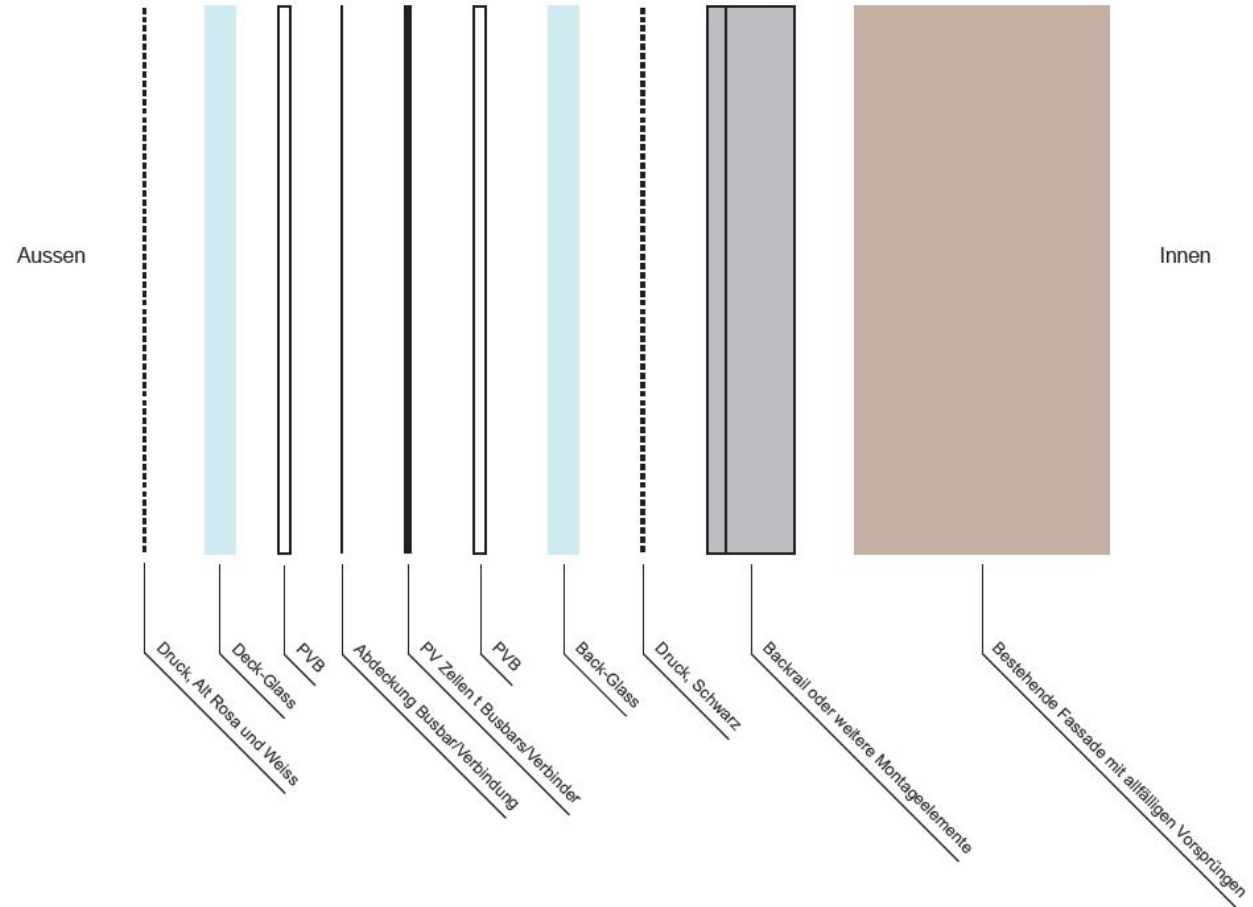


Ansicht von Aussen M 1:20
Schiebeläden offen



Window PV panel installation experiment

Drawings by Dr. Ran Xu.

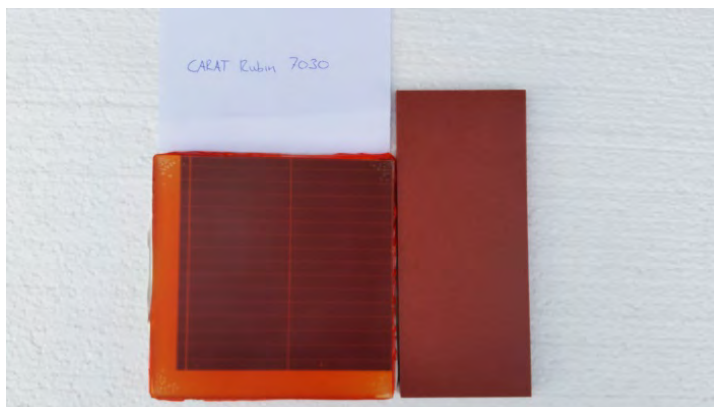
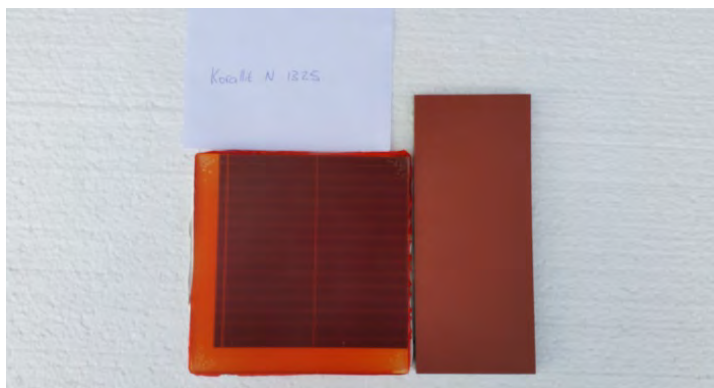


Gesamtansicht M 1:10



PV penal window installation





*BIPV panels with coloured glass,
Garage roof installation render
samples*



• BIPV panels with colored glass, garage roof installation render samples.