

THE GLASS HOUSE

An Architectural and Structural Analysis and Reimagining of Ludwig Meis van der Rohe's 50x50 House

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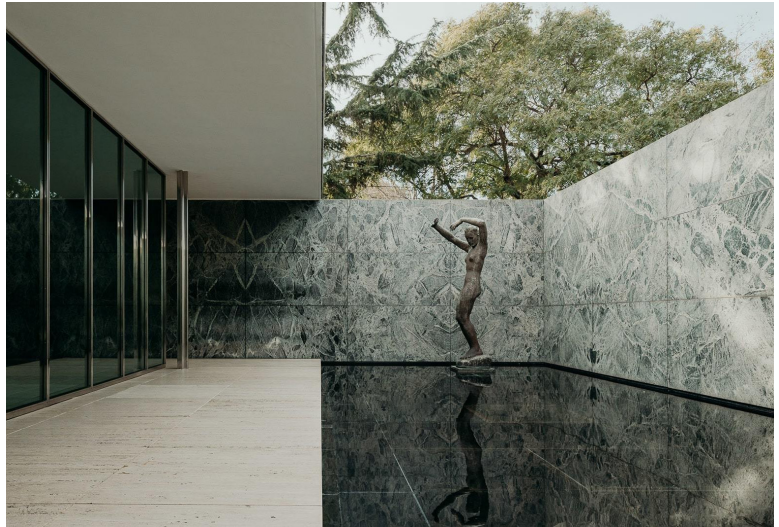
5_Studio Project: Artifacts

1_STUDIO PROJECT: INSPIRATION AND PRECEDENTS

1928 THE BARCELONA PAVILION

Ludwig Mies van der Rohe and Lilly Reich

This was the German Pavilion for the Barcelona International Exhibition, held on Montjuïc. Material expression and structural details are two primary factors that we loved about the Barcelona Pavilion. Our glass home was heavily inspired by the contrast of stone and glass.



1949 GLASS HOME

Phillip Johnson

Philip Johnson's Glass Home was the first fully realized execution of the original 50x50 Glass Home typology. We studied the structural details and became greatly concerned with thermal comfort going forward in our design process. We also acknowledge the use of a brick structural core. We found this to be against the conceptual goal of the 50x50 typology and decided that we would not be using a core in our structural design.



1950 IIT CROWN HALL

Ludwig Mies van der Rohe

Two large Vierendeel beams run the short direction of the roof and exaggerate the structure of Crown Hall. We worked on exaggerating this even further by detaching the Vierendeel members to overstate the exoskeletal quality of the structural system.



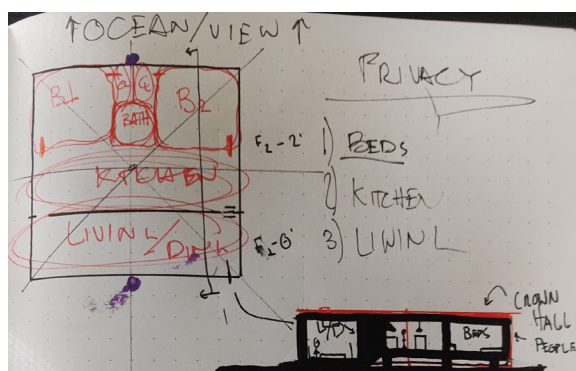
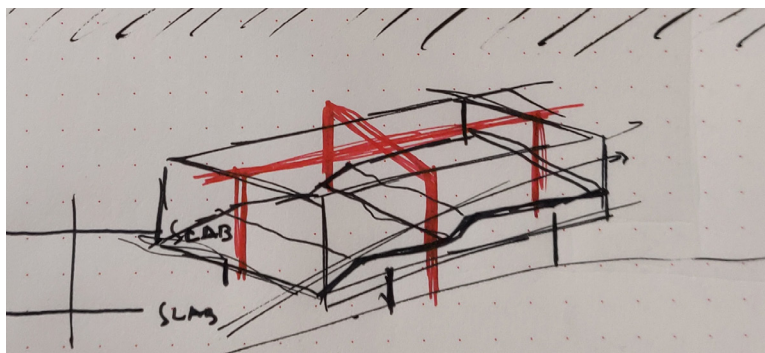
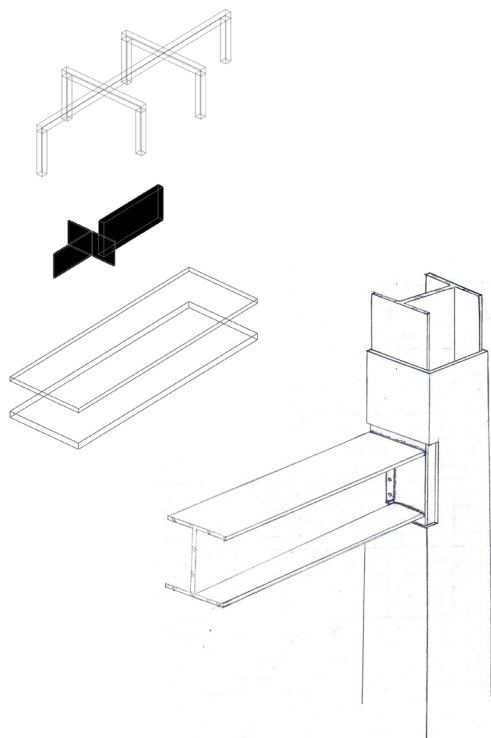
1951 FARNSWORTH HOUSE

Ludwig Mies van der Rohe

What many consider to be the gold standard for the glass house typology. The Farnsworth house contains many structural and glass details that we considered technologically outdated and needed improvement. While the details remain aesthetically important, we obviously wanted to improve on the sustainability and efficiency of the glass and steel connections.



2_STUDIO PROJECT: PRE-DESIGN SKETCHES



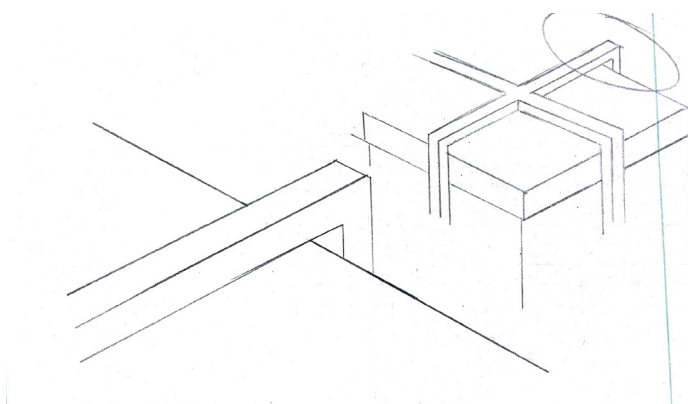
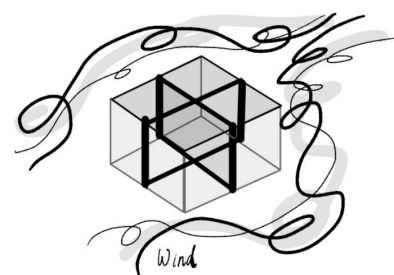
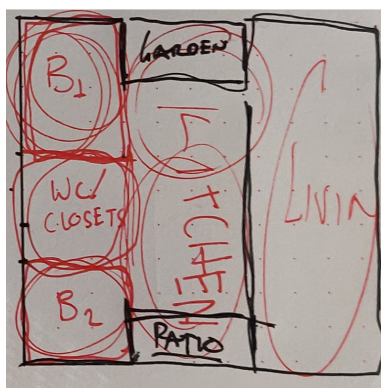
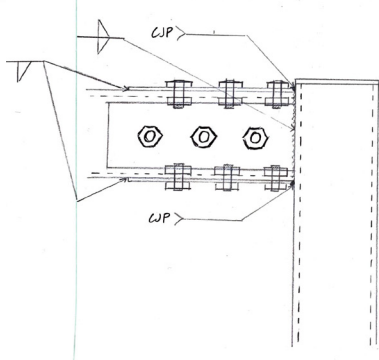
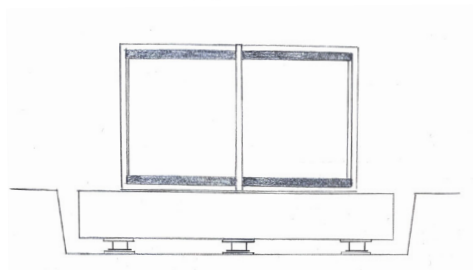
PHYSICAL SEPARATION OF INTERIOR/EXTERIOR SPACE ↔ VISUAL SEPARATION OF SPACE BEGINS TO DISAPPEAR

GLASS HOUSE

WALLS NOT REACHING CEILING

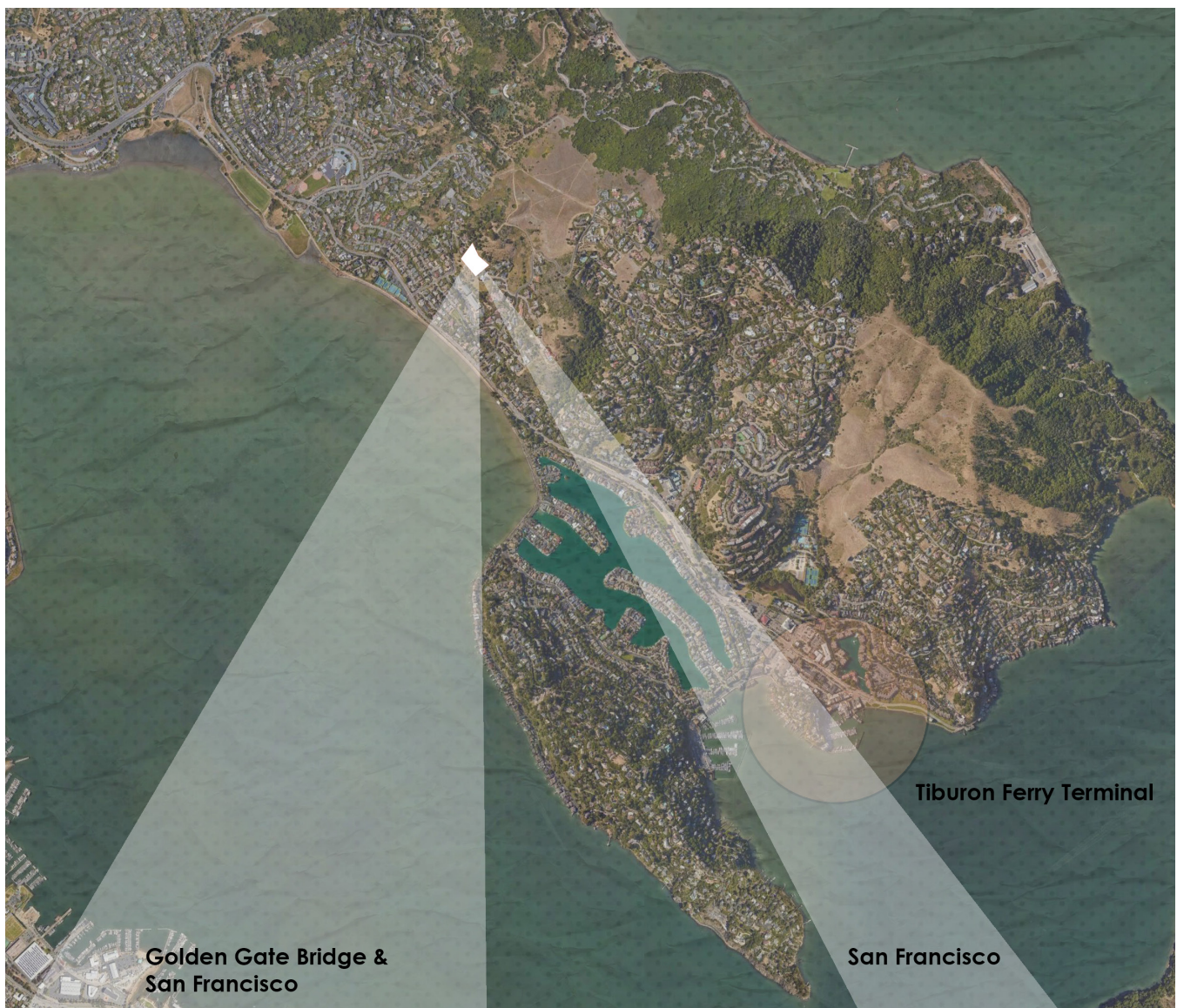
SEPARATION OF SPACE IS FURTHER ERASED

PRIVACY: EASIER FOR SINGLE PERSON DWELLING



3_STUDIO PROJECT: FINAL IMAGES

Our site is located in the north Bay Area in California. This is a great moderate climate with fantastic views of the Golden Gate Bridge, San Francisco Skyline, and the Pacific Ocean. Tiburon, CA is a small and quiet community with great views and privacy focused design. The perfect place to implement a glass home. We wanted to challenge and juxtapose the current design ideology of Tiburon with a housing typology that has historically tangled with the boldness and constraint of privacy.



STUDIO PROJECT: FINAL IMAGES

Our parcel is one of the few remaining undeveloped parts of Tiburon. This large site was pre-graded in late 2007 and has sat unused since the recession. The home is offset slightly allowing for all public spaces to have excellent views while ensuring that the home office always has great northern light during the day.

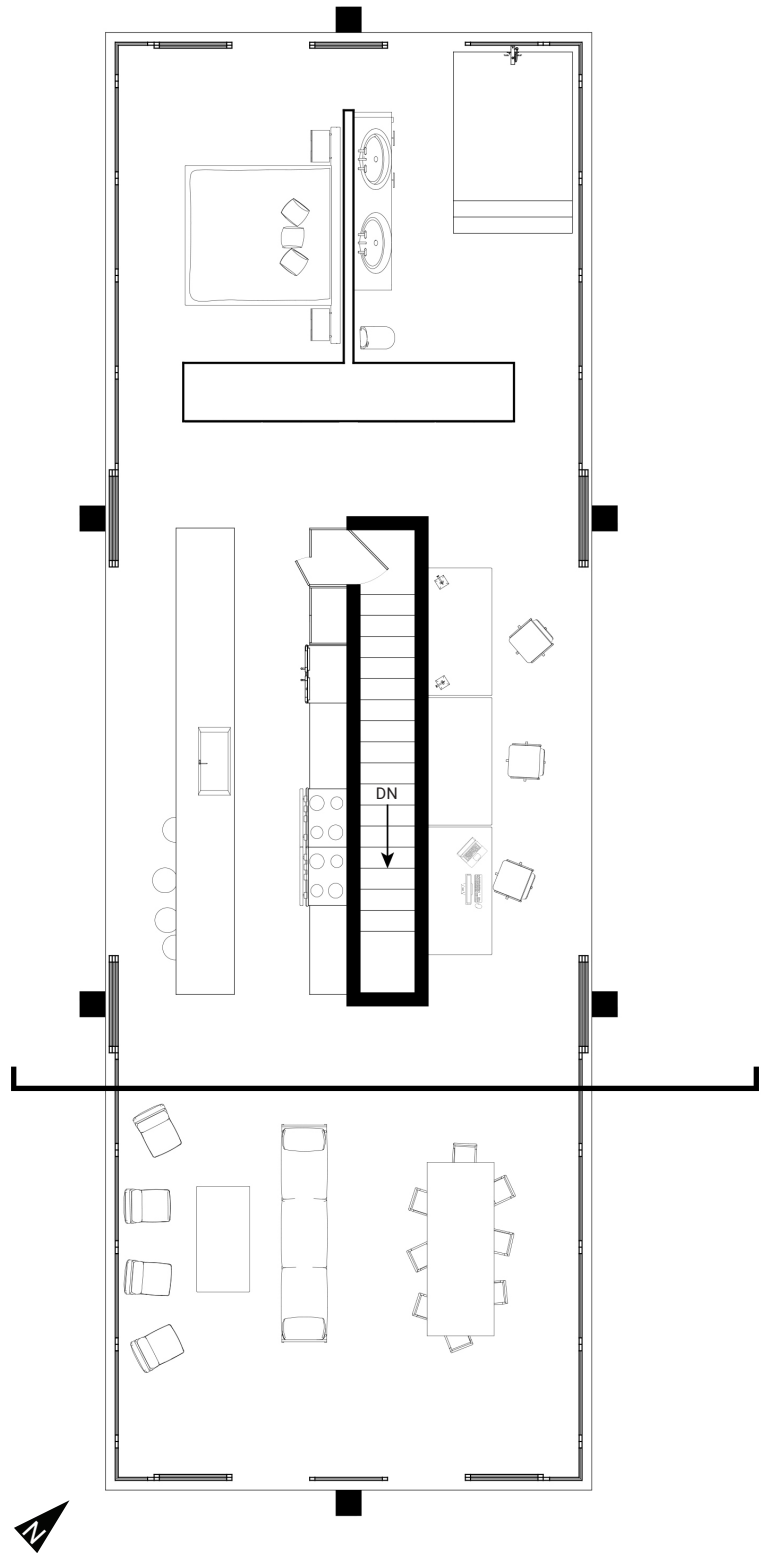
The topography drops quickly and we chose to implement a vineyard with a water-retention system to aid with the site runoff during the rainy season. This greywater collection system will be useful for all non-potable water on the site. The vineyard has a small crush pad for processing.



STUDIO PROJECT: FINAL IMAGES

The home is 25'x75'. A significant divergence from the original 50'x50' glass home. This choice allowed us to prioritize our views and better relate to the cinematic horizontality of our interior experience. The gradient of public to private spaces run vertically, starting with the living and dining space at the bottom and ending with the bathing and sleeping spaces. These long internal vistas reinforce the cinematic experience.

We experimented with truthfulness in the architecture. We chose to hide the structure entirely behind facade elements and inside the roof assembly. In doing so, we challenged the pure modernist ideology of truthfulness. This challenge is especially important in a glass home. These lies range from a completely concealed structural system, so half walls in the private space all the way to a false door in the pantry revealing a small wine cellar.



STUDIO PROJECT: FINAL IMAGES

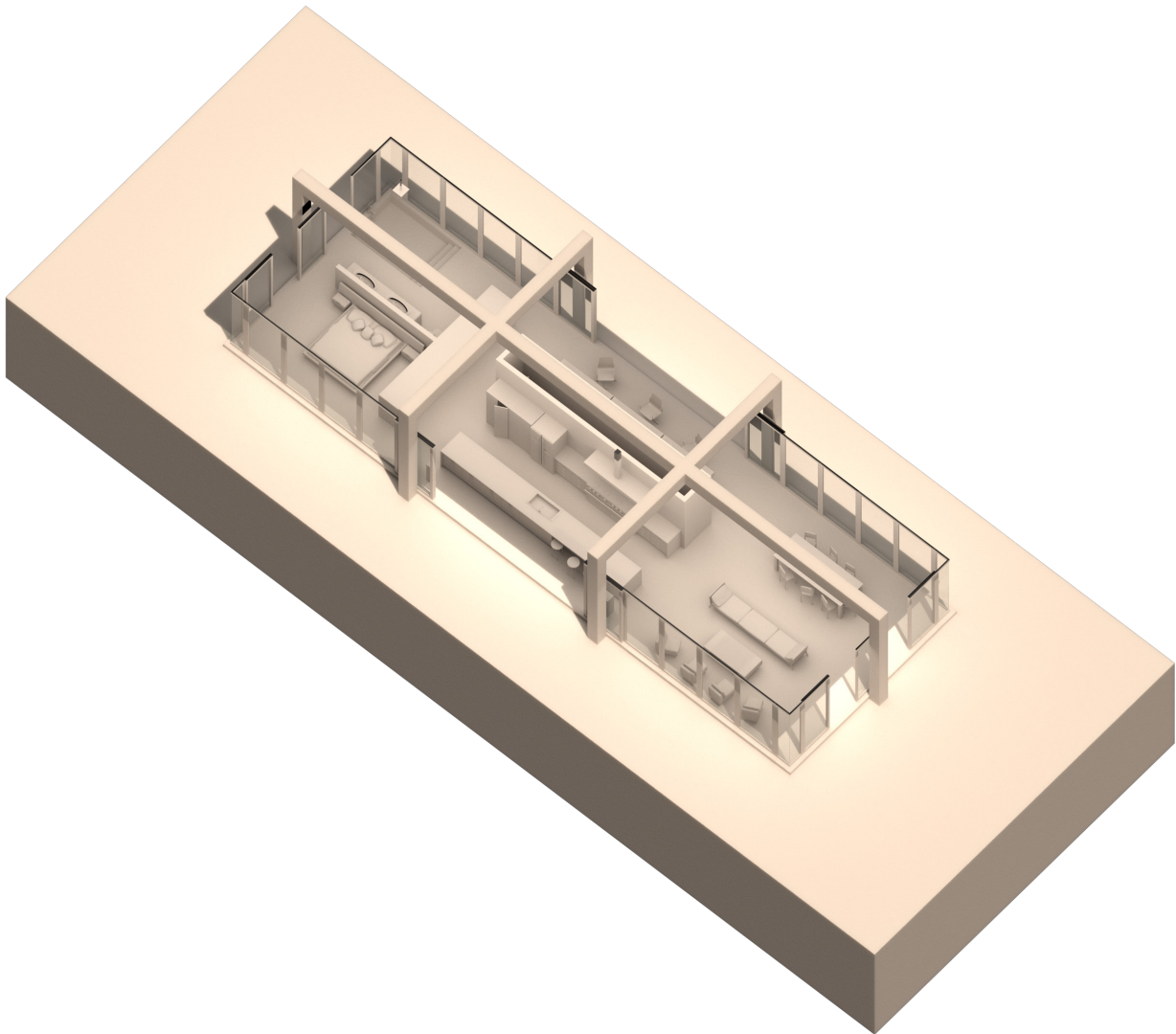
We better understand these vistas in section. We wanted people to be these focal points rather than the built environment. We chose half wall partitions for the bathing space to exaggerate the tenuous quality of privacy in the glass home.



STUDIO PROJECT: FINAL IMAGES

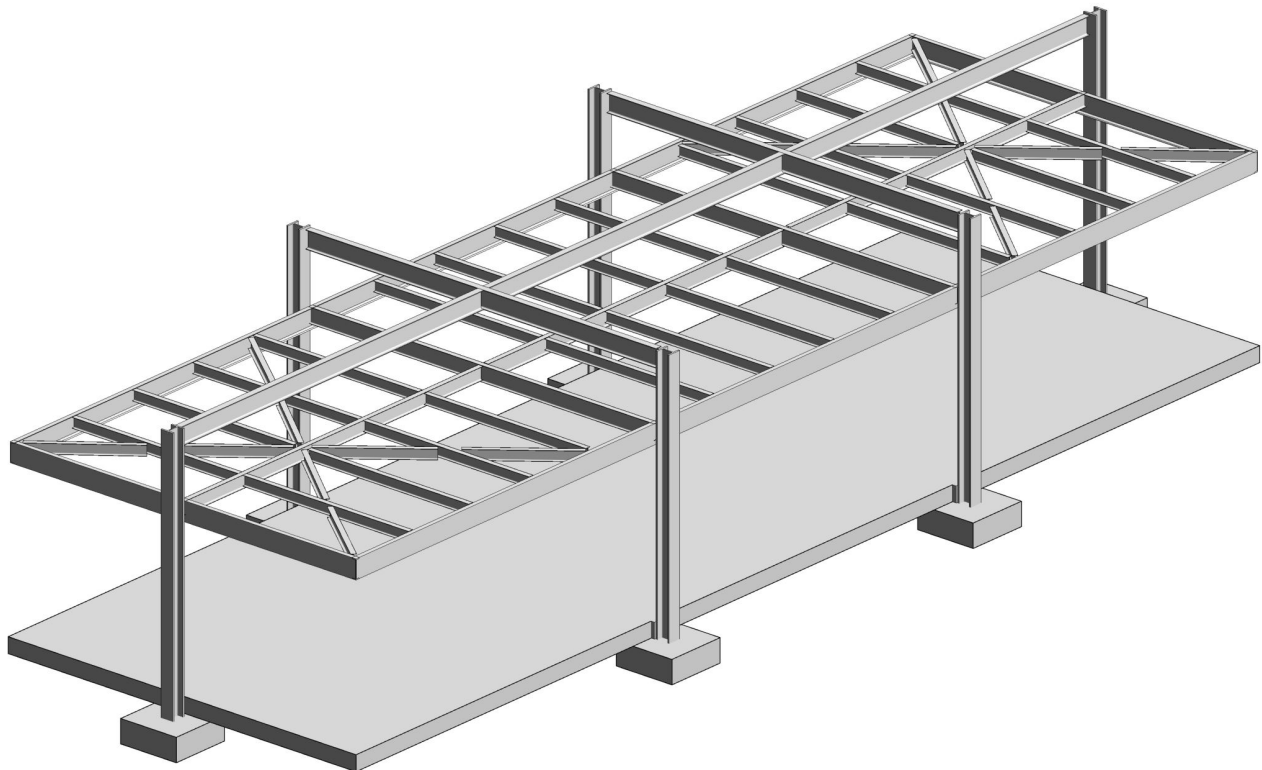
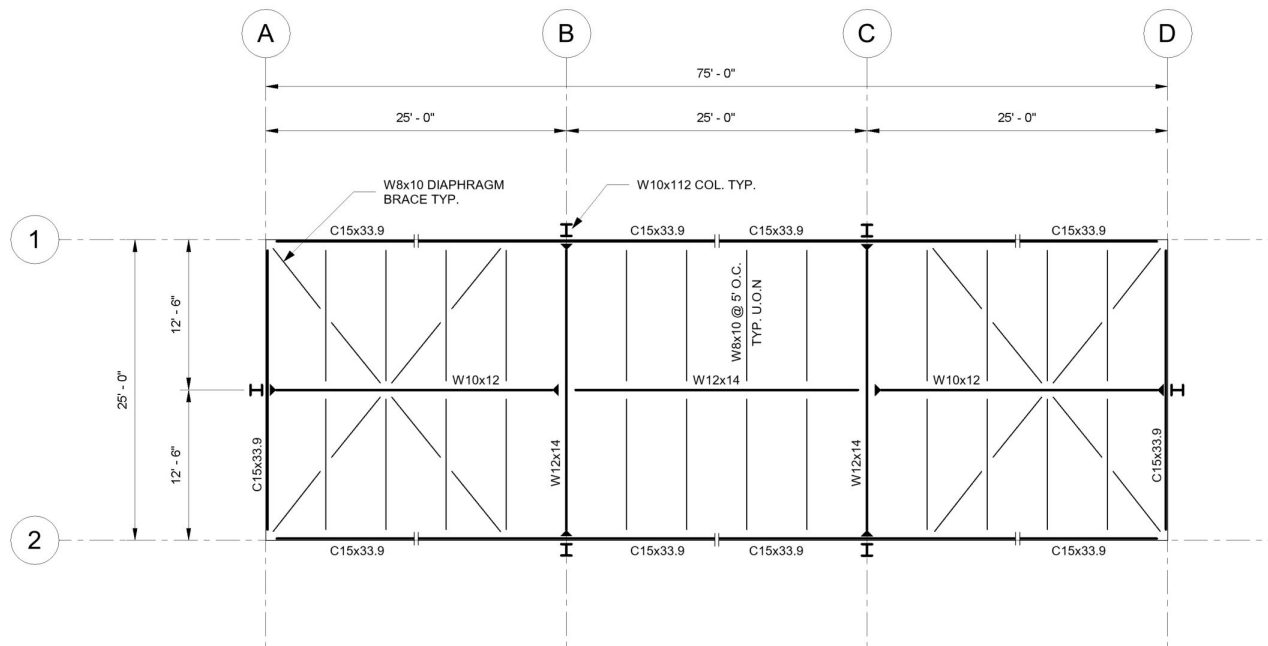
There is a romantic quality to sitting at the dining table in the foreground and watching your spouse showering in the background.

Below, these internal vistas are obvious. These, for the most part, uninterrupted 75' views were pivotal to making the internal experience and views just as valuable as the external experience and views.



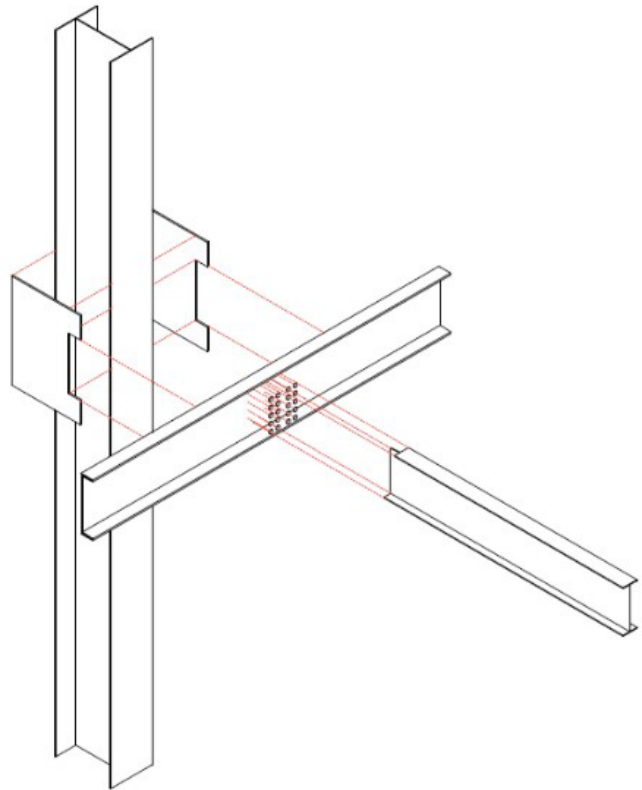
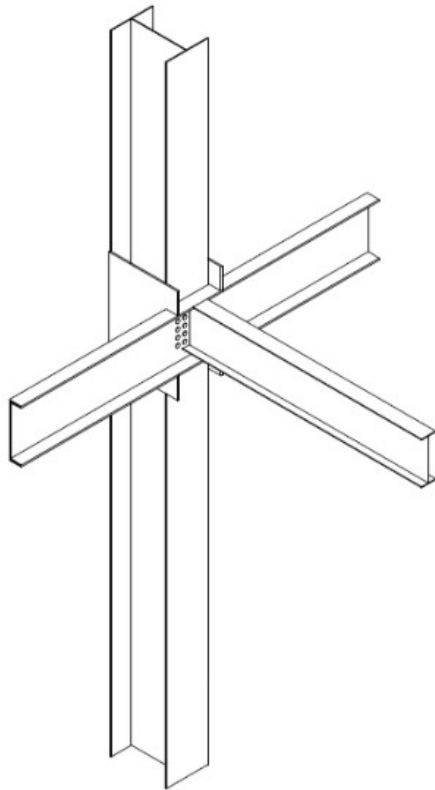
STUDIO PROJECT: FINAL IMAGES

The roof assembly is comprised of wide flange beams with in-plane diagonal braces, all surrounded by channel sections along the perimeter of the diaphragm. In both longitudinal and transverse axes, the lateral system consists of moment frames with double beams that provide increased stiffness.



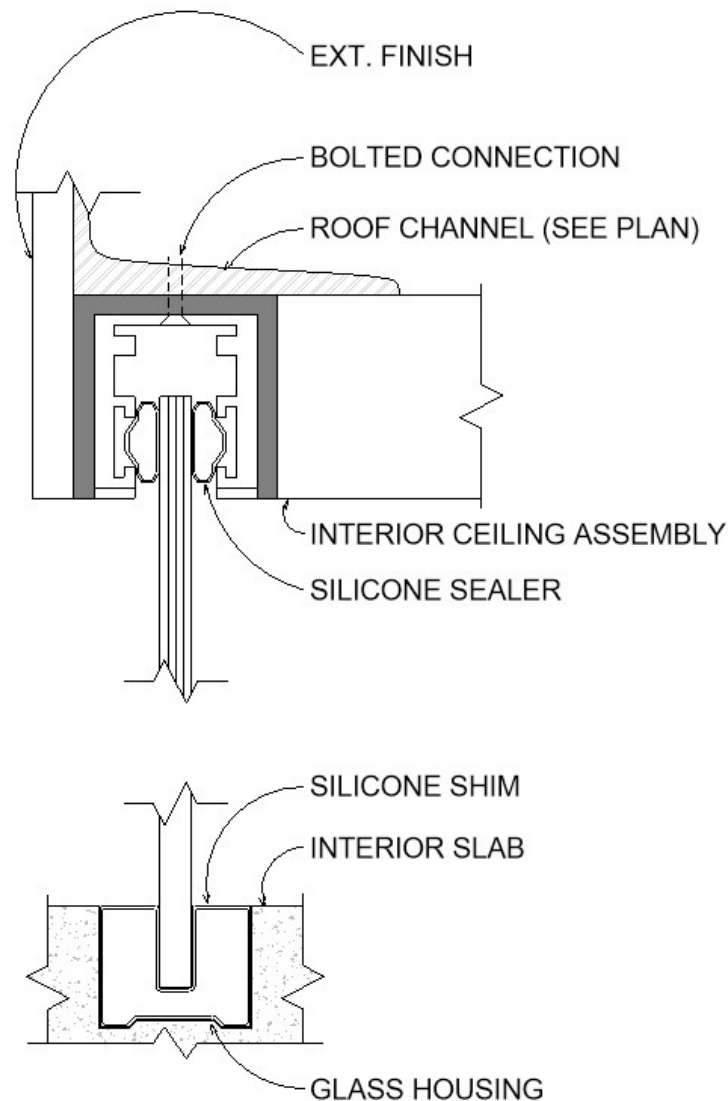
STUDIO PROJECT: FINAL IMAGES

At the beam to column connections, a unique design was necessary in order to maintain structural requirements while respecting Meis van der Rohe's original detail. After several iterations, we developed a solution; the channel members are continuous across the flange of the column and spliced elsewhere. The side plates on each column are welded in the shop and provide a space to seat and bolt the channels at the site. The perpendicular wide flange beam is coped and welded to the web of the channel in a typical field-welded moment connection.



STUDIO PROJECT: FINAL IMAGES

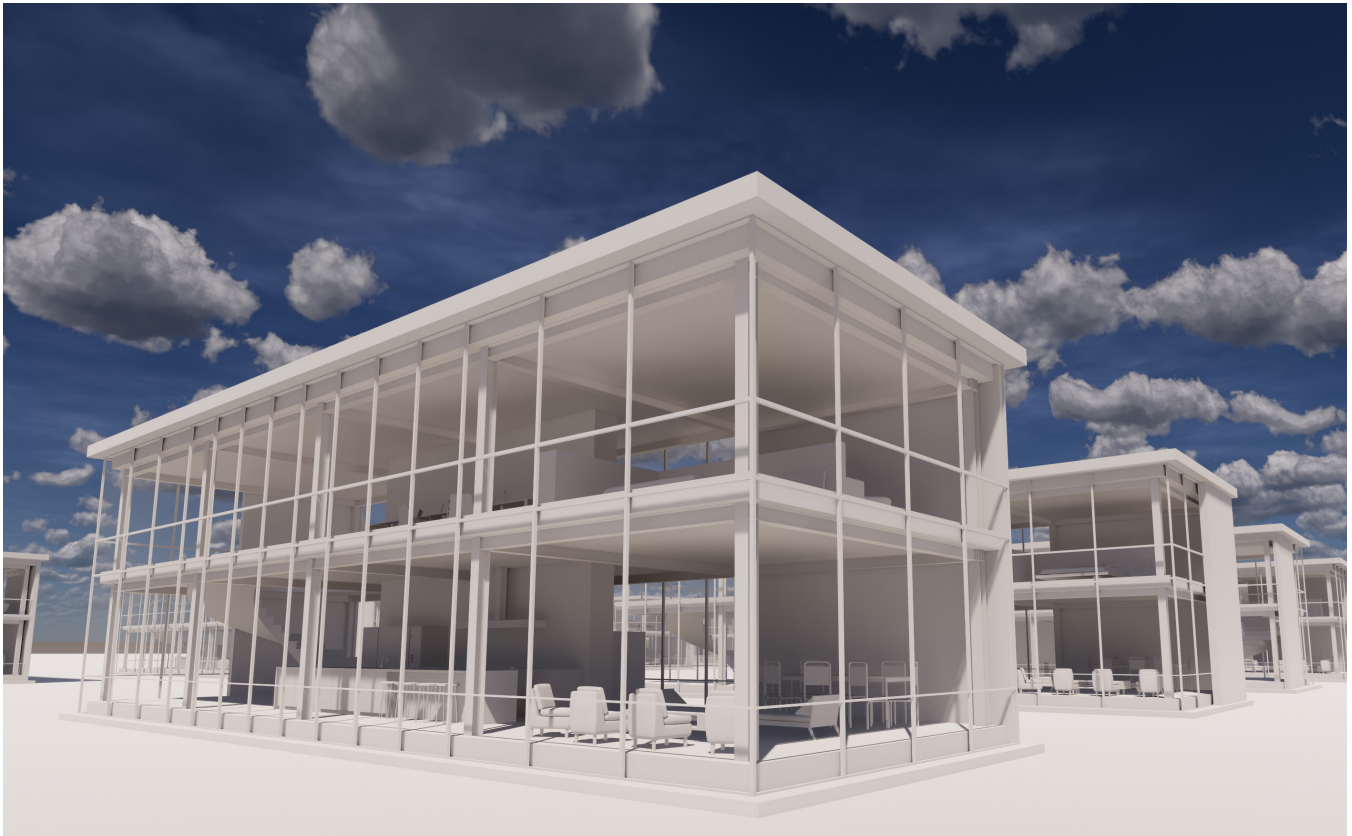
The following detail illustrates our solution for the connection of glass to steel structure. In order to protect the glass from the structure's inevitable small amounts of deflection, the glass panes are held in place using silicone sealers. This allows for some vertical movement of the glass, as well as out-of-plane pivoting to reduce bending stresses caused by lateral deflections in the roof.



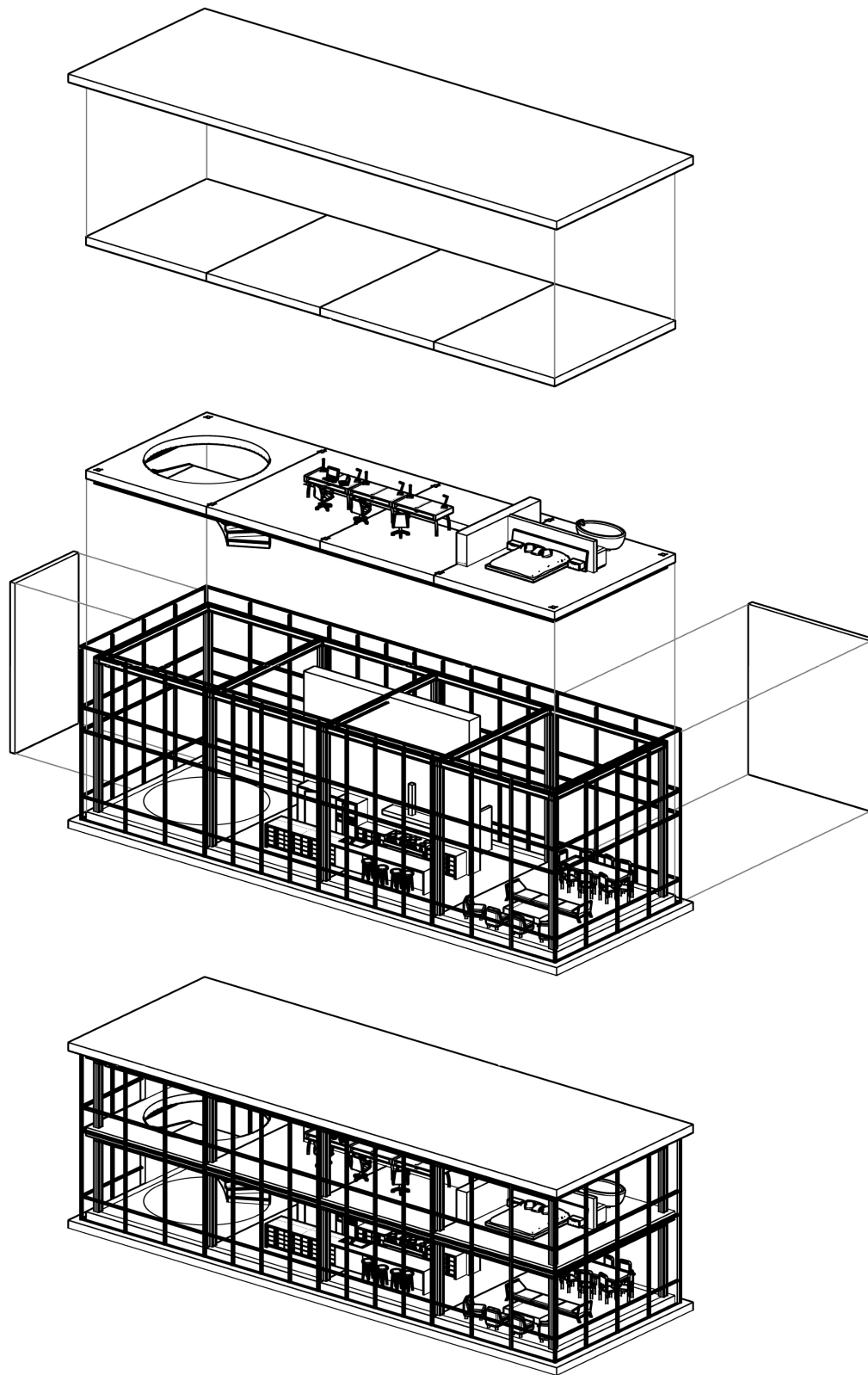
4_STUDIO PROJECT: FINAL FANTASY

Final Fantasy--as the name suggests-- is a fantastical conceptual design based on our experience and knowledge gained from the glass house we designed prior.

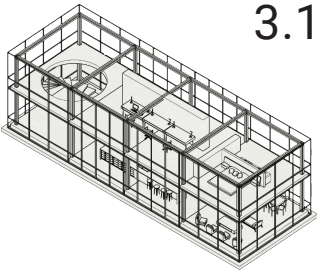
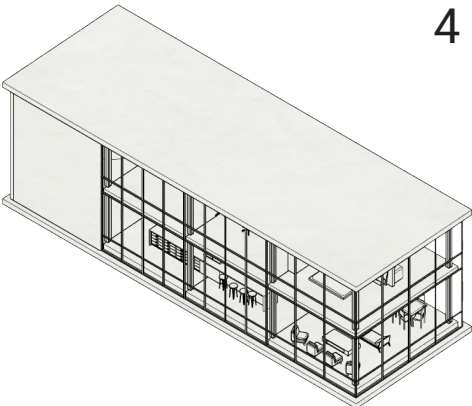
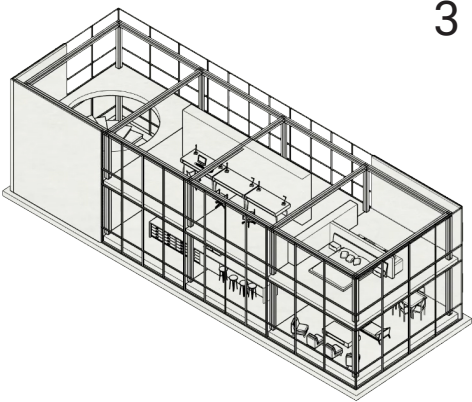
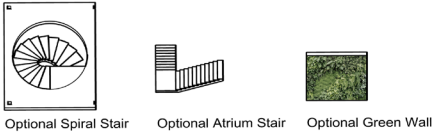
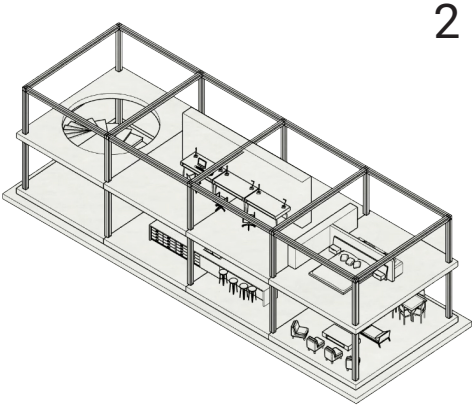
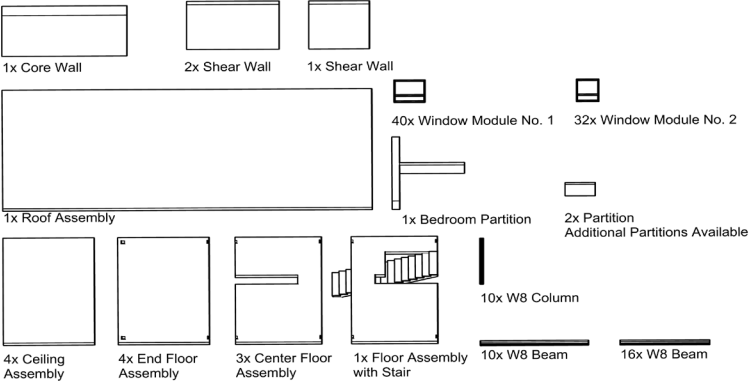
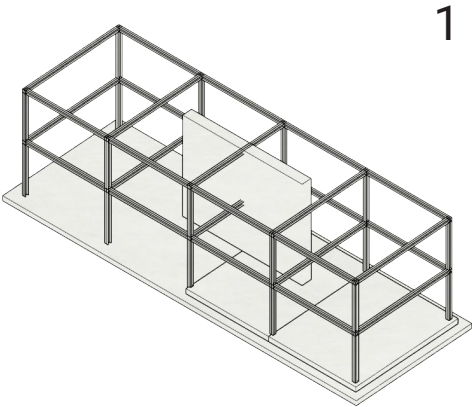
Our Final Fantasy is based on a dystopia inspired by the novel *WE* written by Yevgeny Zamyatin in 1920. In this dystopia, our profession as architects is extinct. The only available careers are poets and mathematicians. We were inspired and imagined a society where engineers and mathematicians attempted to perfect modularized and pre-fabricated homes to house the masses. These Nobel efforts were dashed by a tyrannical government who decided that they would use modularized upgrades to incentivize better behavior from citizens. These mass-produced, modularized, and site-less homes would be able to showcase the social status and credit individual citizens have in the government.



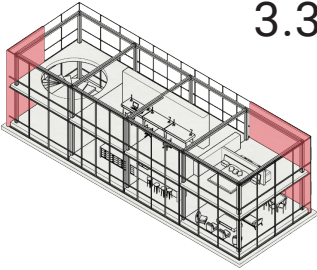
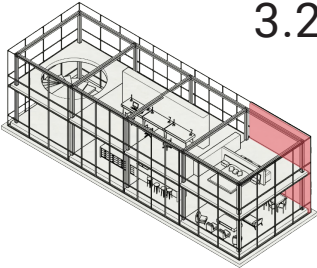
STUDIO PROJECT: FINAL FANTASY



STUDIO PROJECT: FINAL FANTASY



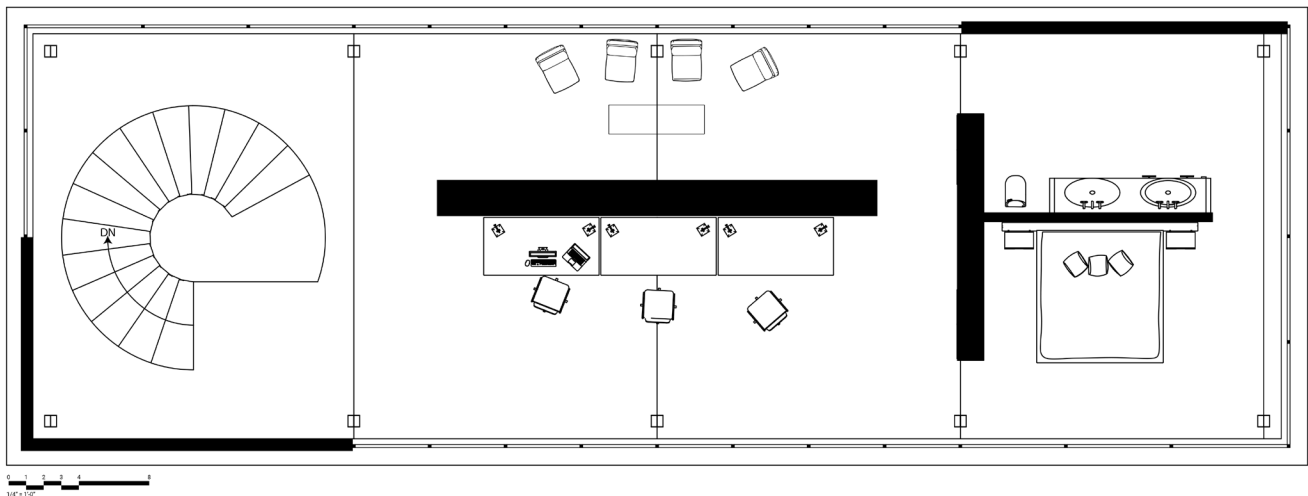
These upgrades would be used to display the favor your neighbor has with the government. This would ensure all citizens are on their best behavior for a shot at having a spiral staircase for instance.



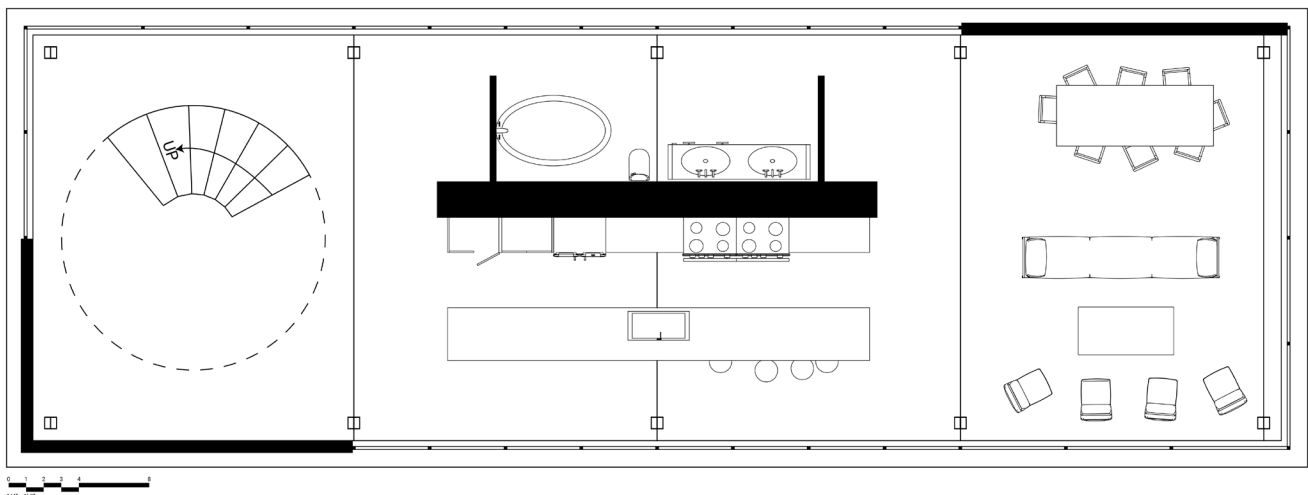
STUDIO PROJECT: FINAL FANTASY

The floor plans are based on the plans we developed for our first glass house. These have split floor plates every 12 feet making spans and assembly much easier. Shear walls and corner columns is glass home heresy. However, constructability and Cost became a large concern for us given our new goal and direction in final fantasy. This meant that shear walls and corner columns became a reasonable design solution for the sake of modularity, prefabrication, constructability, and affordability. We embraced the idea of industrialized production of this house as it related to our dystopia. We saw these design choices as very important steps in taking the glass house from primarily a work of architectural art to something that we saw as a potential housing solution for this WE inspired dystopia.

SECOND FLOOR

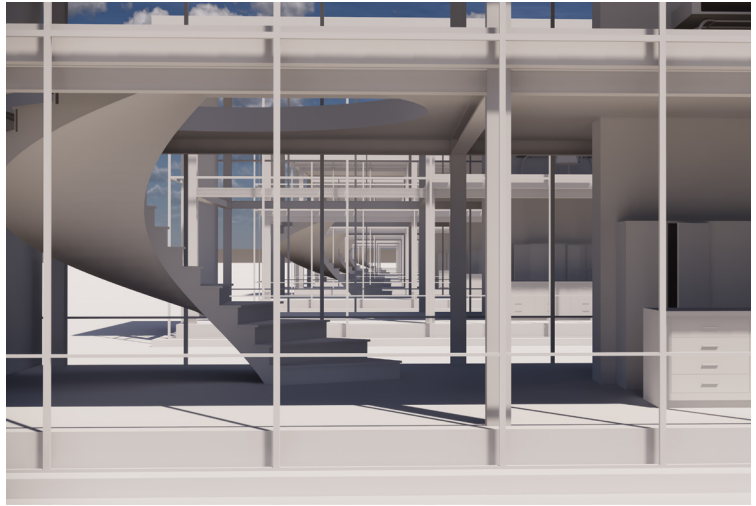


GROUND FLOOR



STUDIO PROJECT: FINAL FANTASY

Similar to our first glass home, the Final Fantasy glass home still values internal vistas and people as focal points. This was important for internal experience, but also when the homes align, these create massive compounding layers of people and experience.



5_STUDIO PROJECT: ARTIFACTS

Each member of our group produced a creative work. Through digital and/or physical media, these products are individual interpretations of the glass house concept and legacy.

