The Creation of Variable Space by Means of Metamorphic Boundaries

THE CREATION OF VARIABLE SPACE BY MEANS OF METAMORPHIC BOUNDARIES

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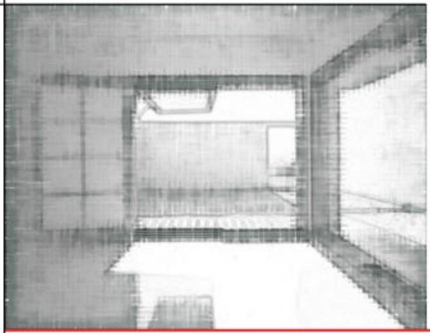
(Abstract)

For a long time, I have struggled with my origins, with my Korean-ness, with who I am. Whenever I finish a project, I often feel that there is still something that needs to be explained. In this thesis I attempt to explain precisely my ideas of design as these reflect my Korean-ness. Defining the city and its architecture as existing boundaries, I translate my Korean-ness and origins into an idea I call, metaphorically, "metamorphosis." This "metamorphosis" has to do with the way space is transformed from one thing into something else, as is the case when one walks from an airy Korean courtyard, in a traditional Korean house, into the house's shadowy interior. It is ambiguous, this metamorphic transformation, and for each individual visitor always a somewhat different experience, and sometimes a vastly different experience from that of anyone else, a familiarity with the unfamiliar nevertheless shaped by the uniquely personal prior life each visitor brings to the architectural space.



Sketch1. Soobak Dang House,
Interior View, Korea

The Creation of Variable Space by Means of Metamorphic Boundaries

Contents

1. House Project in Roanoke

A. Design Process

B. Final Design with the ideas of Metamorphic boundaries
a. Metamorphic Boundaries with Reflection to the Environment
b. Metamorphic Boundaries with employing the lawn?
c. Metamorphic Boundaries with Functional Use?
d. Metamorphic Boundaries with the Roof

2. The Thought about Metamorphic Boundaries

A. Basic Thought of Metamorphic Boundaries.
a. Korean Conservatism

B. Thought in Traditional Architecture in Korea
a. Spatial Separation by Function
b. Korean Court Yard
c. Court Yard in Modern Building

C. Urban Architecture As Seen Through Korean Eyes

D. Ideas of People and Architecture with Various Space of Metamorphic Boundaries

3. Conclusion

Appendix

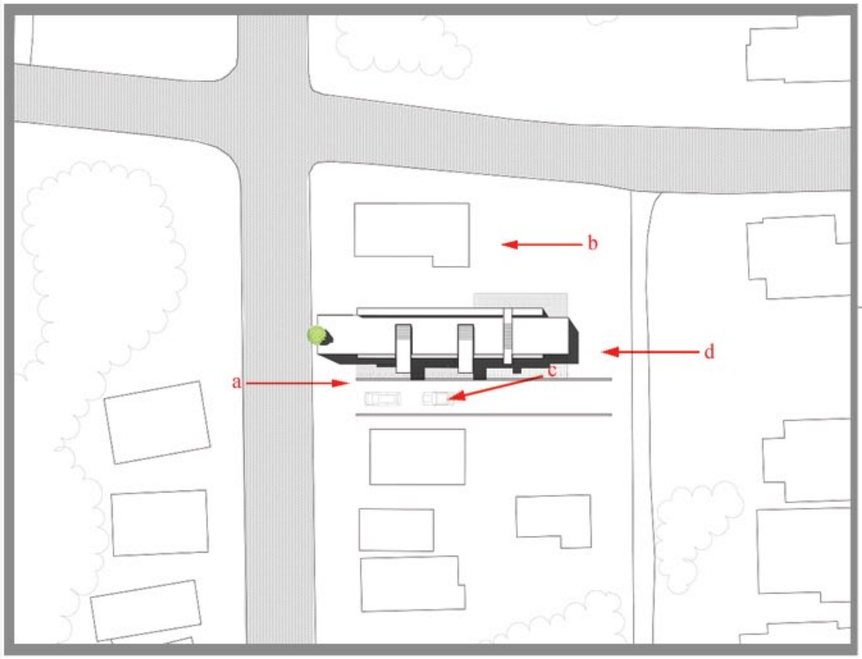
A. Student Union Building Design Process

B. Final Design by means of Metamorphic Boundaries
a. Metamorphic Boundaries with Reflection to the Drill-field
b. Metamorphic Boundaries with Entrance and Use of theater

Vita

1. House Project
In Roanoke

A. Preliminary Design



a

b

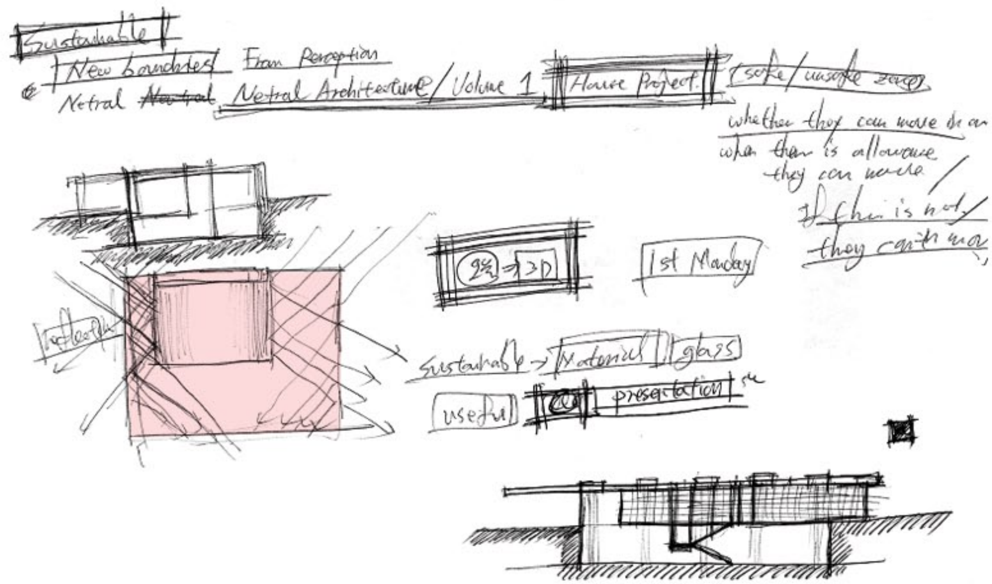
c

d

a. Site : This house is planned for a single family. The site is located in the residential area adjacent to Roanoke Downtown. Based on the conditions of the competition program for a sustainable house, I developed a series of metamorphic boundaries with respect to light, ventilation and space.

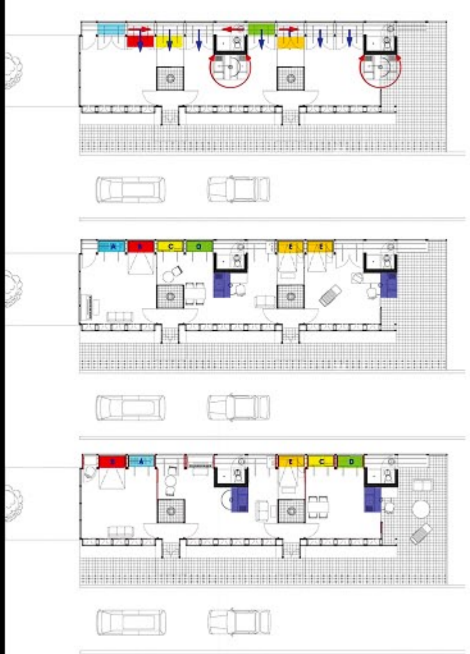
b. Ideas : The initial idea with the space below the roof of the house, which projects toward the street. The most metamorphic moments will happened in this space.

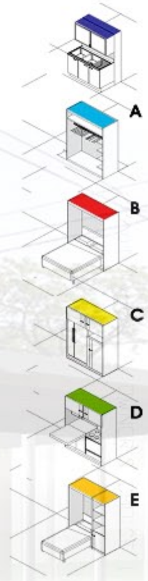
b-1. Sketches about how to use reflection and how to use the level of ground to create variable space.



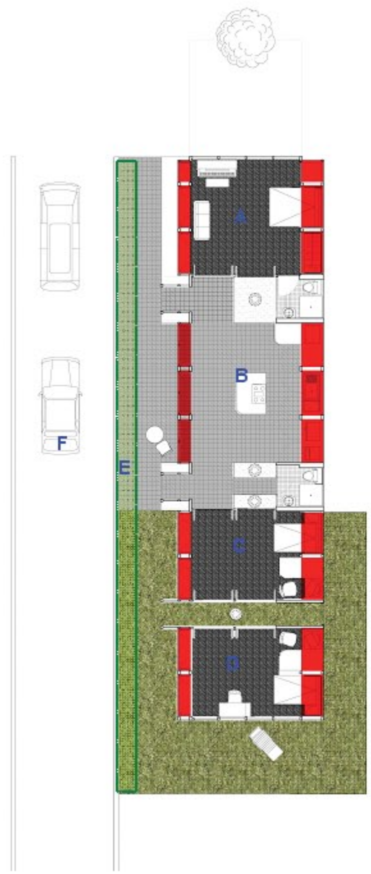
B. First Design Scheme

The initial plan with movable furniture and rotate-able sink to use interior space for multi-functions.



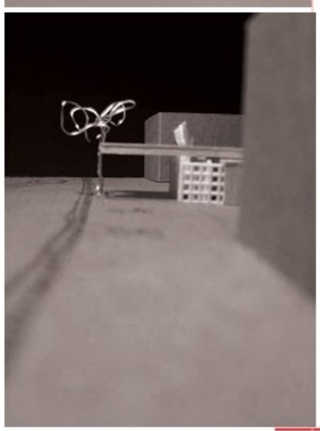


C. Final Design with the ideas of Metamorphic boundaries



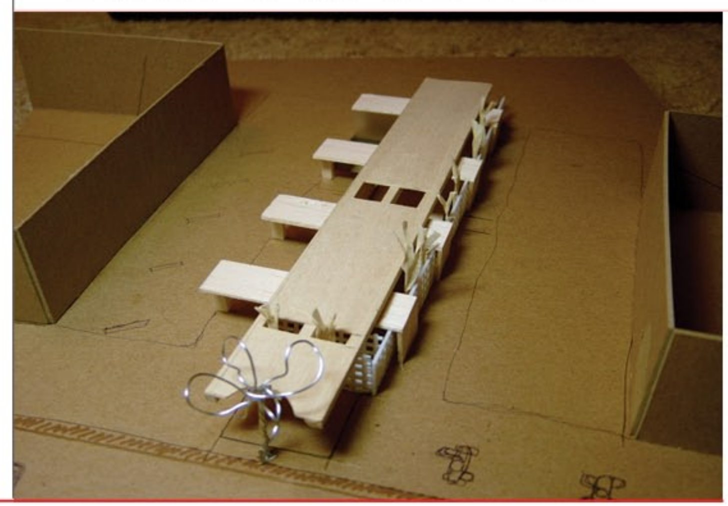
1st Floor Plan –

A : Master Bed Room
B : Living Room + Kitchen + Garden
C : Bed Room
D : Guest Room
E : Bamboo Garden
F : Driveway

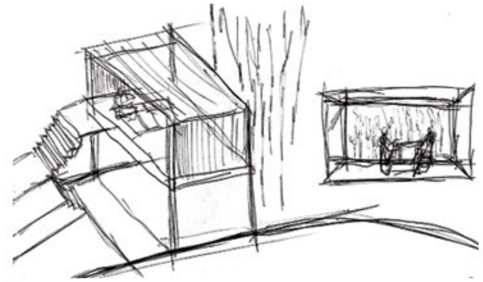


- Model study A -

c. Study model : This is about how to make variable space by using a natural material, bamboo, with the house.

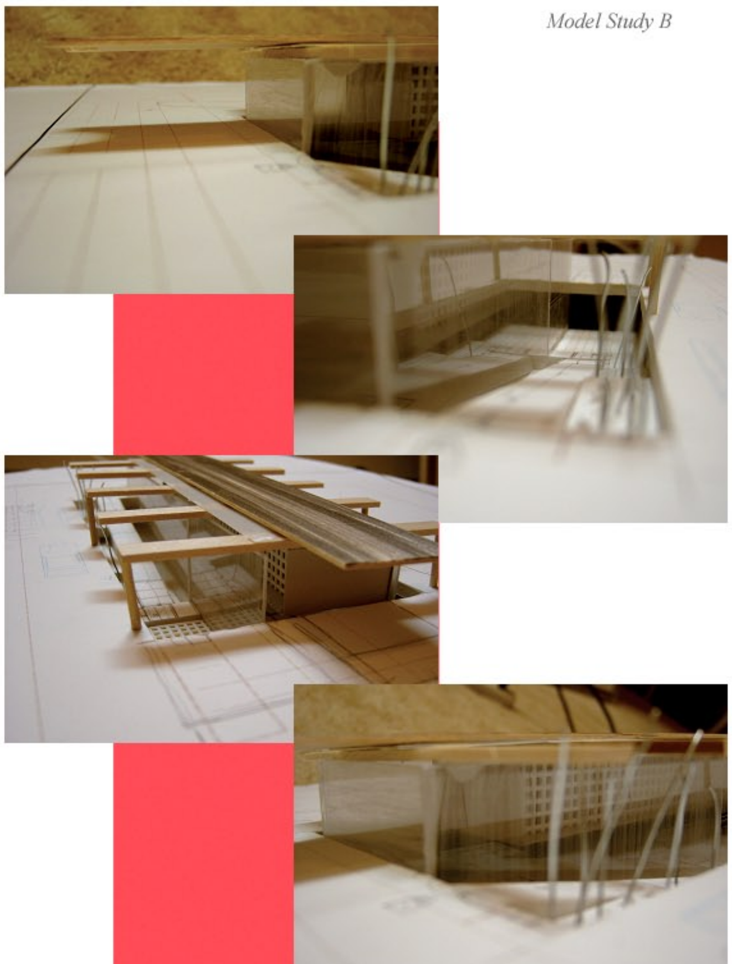


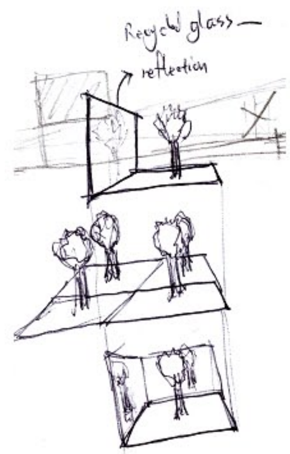
c-1. Study model : How to use the entrance to provide variable space by using reflection of bamboo.



- Relationship with nature and people through the use of bamboo in front of windows -

Model Study B





Reflection to nature

: Reflection and Transmittance

When light is incident to a material, some portion of the light is reflected and other portions of light are transmitted. For example, if the cylinder shaped shaft of the light as shown at right is incident to the material, some of it is transmitted and some is reflected.

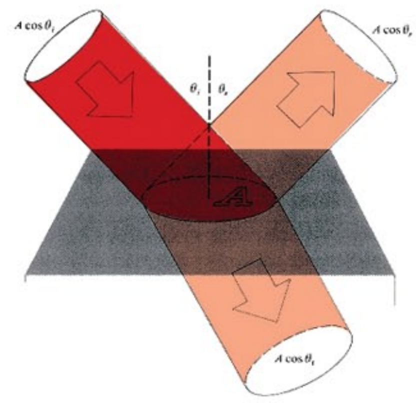


Figure 1. Reflection

: The graph of the reflection and transmittance

When the light from 60 degrees of inclination is incident to the material, reflection is 0.17(low), and transmittance is 0.82(high).

- 80 degrees : R=0.6 (high), T=0.4 (low)

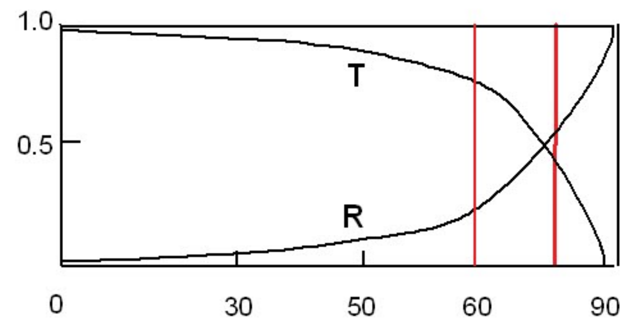


Figure 2. Reflection Graph

: The ratio of reflection and transmittance

The quantity of light is Intensity or Irradiance. Irradiance has the following formula;

The formula of the quantity of light is $I = \langle S \rangle_T = \frac{c\varepsilon_0}{2} E_o^2$

The quantity of reflection is $T = \frac{I_t \cos\theta_t}{I_i \cos\theta_i}$

The quantity of Transmittance is $R = \frac{I_r A \cos\theta_r}{I_i A \cos\theta_i} = \frac{I_r}{I_i}$

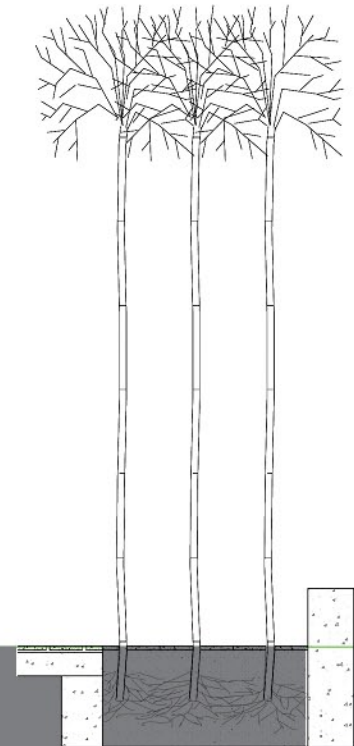
Plate glass is very flat and produces precise reflections.

The example of the reflection

Pic 1. Smithfield Building, Norfolk, VA

D. Metamorphic Boundaries with Reflection to the Environment

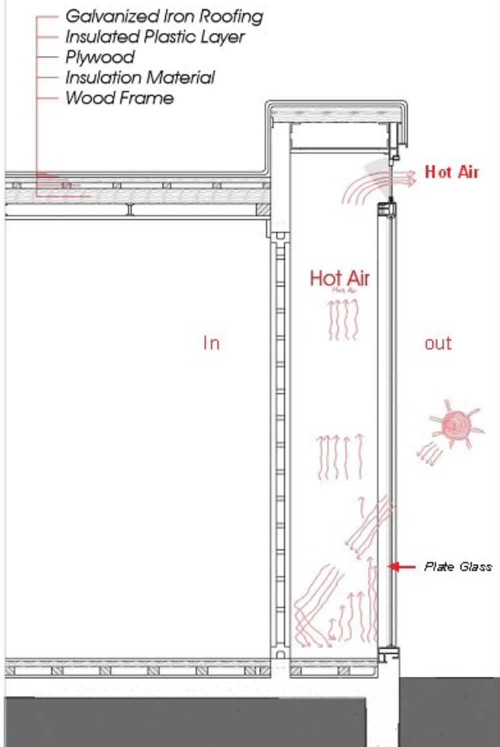
View A : The Reflection of the bamboo in the glass wall allows people to experience nature in this space.



Bamboo
Phyllostachys bambusoides
Common Names: Madake, Giant Timber Bamboo, Japanese Timber Bamboo
Maximum Height: 72 feet
Diameter: 6 inches
Hardiness: 5º F
USDA Zone recommended 7 through 10

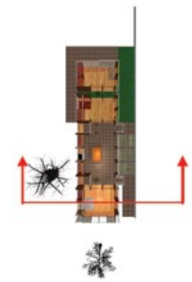
Of all the temperate timber bamboos, this is the strongest. Although not native to Japan, Madake is the bamboo most preferred for building in that country. It is a good bamboo for places that get snow, but do not get colder that 5º F, since it sheds snow better than most other large bamboos. It is also very upright not leaning to the sun as some others do.

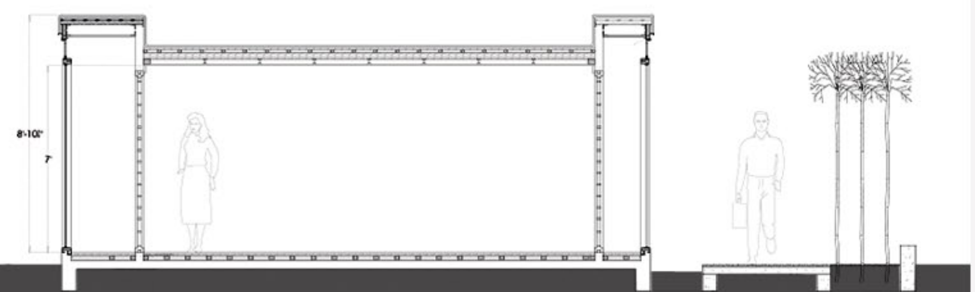
Pic 2. SanFrancisco Airport



a.Ventilation

The dual door system protects the privacy of the residents, and generates the high reflection of bamboo outside. When the inside window is closed, the residents, who pass in-between the bamboo and the glass wall, are surrounded by nature.





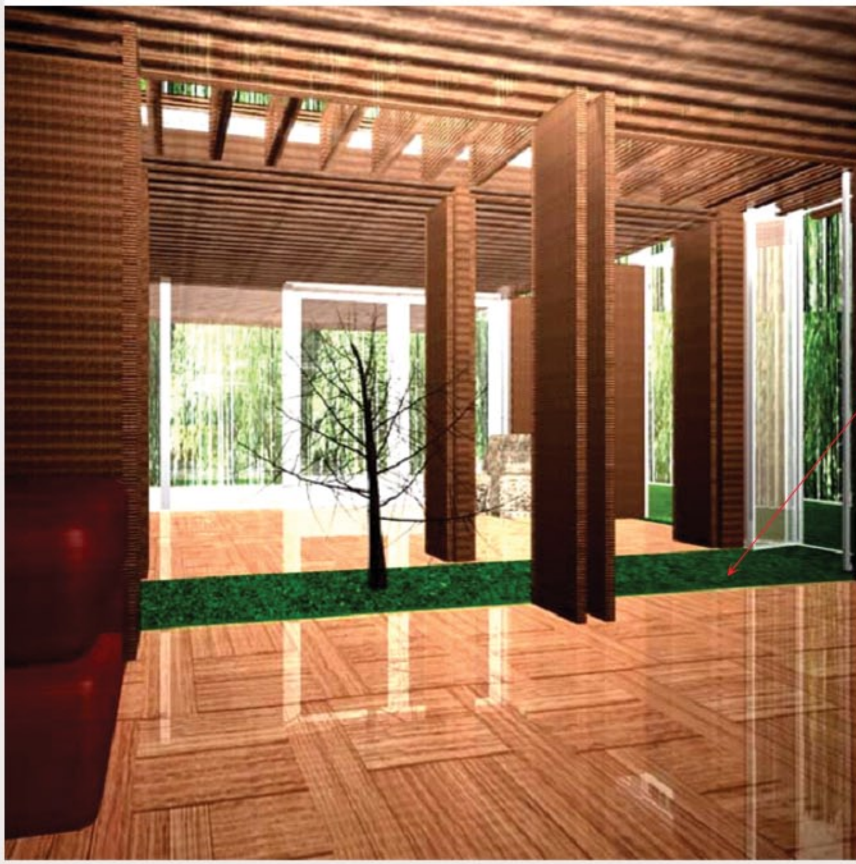
South Elevation

View Toward Entrance

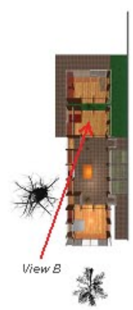
b. Metamorphic Boundaries: bringing the lawn into the house.

When the doors are open, this space provides fresh air, and views of a natural scene, so people can feel they are in nature. When the doors are closed, it becomes a private space for the residents.

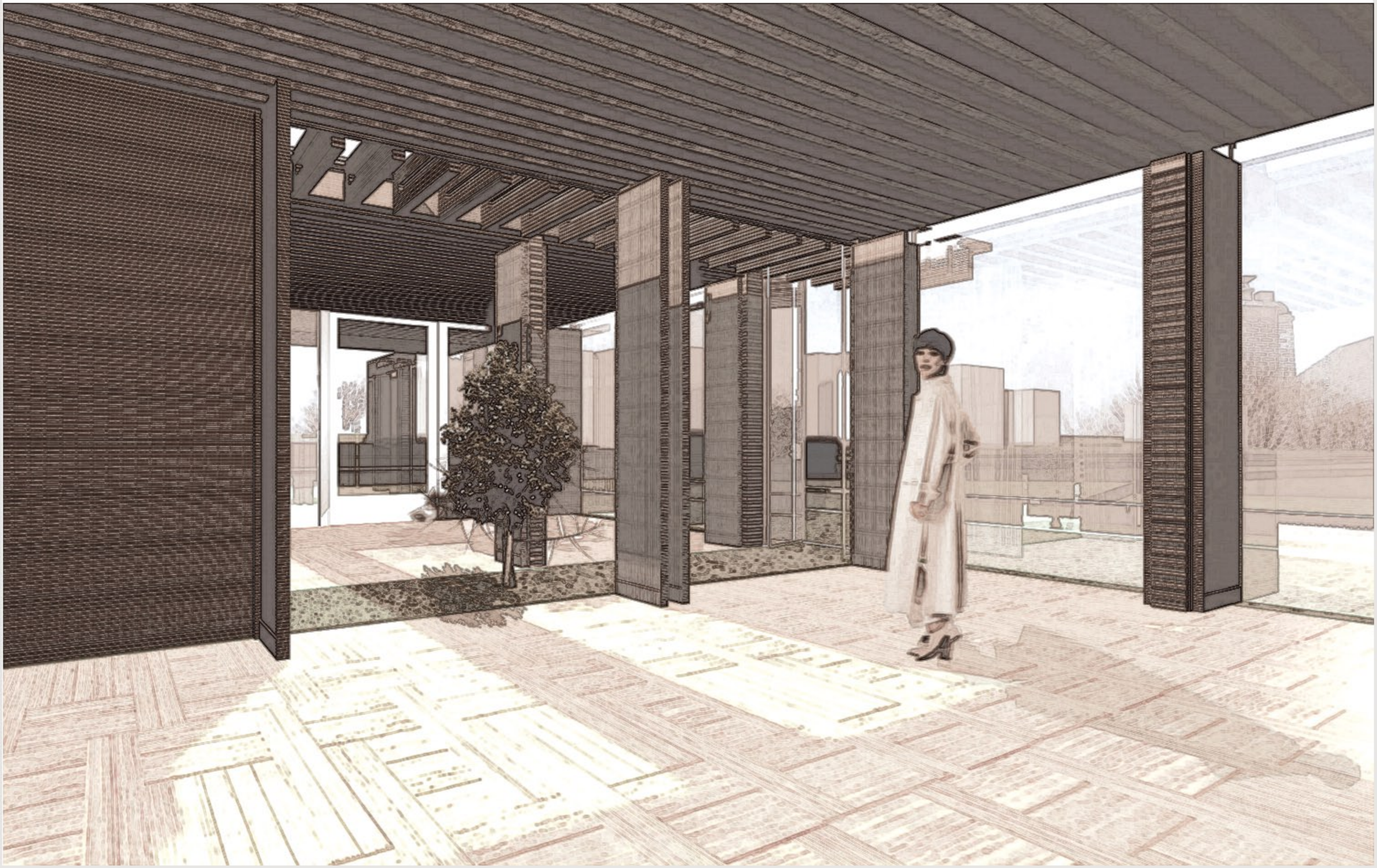
The interior view



Lawn from Outside Garden of the house



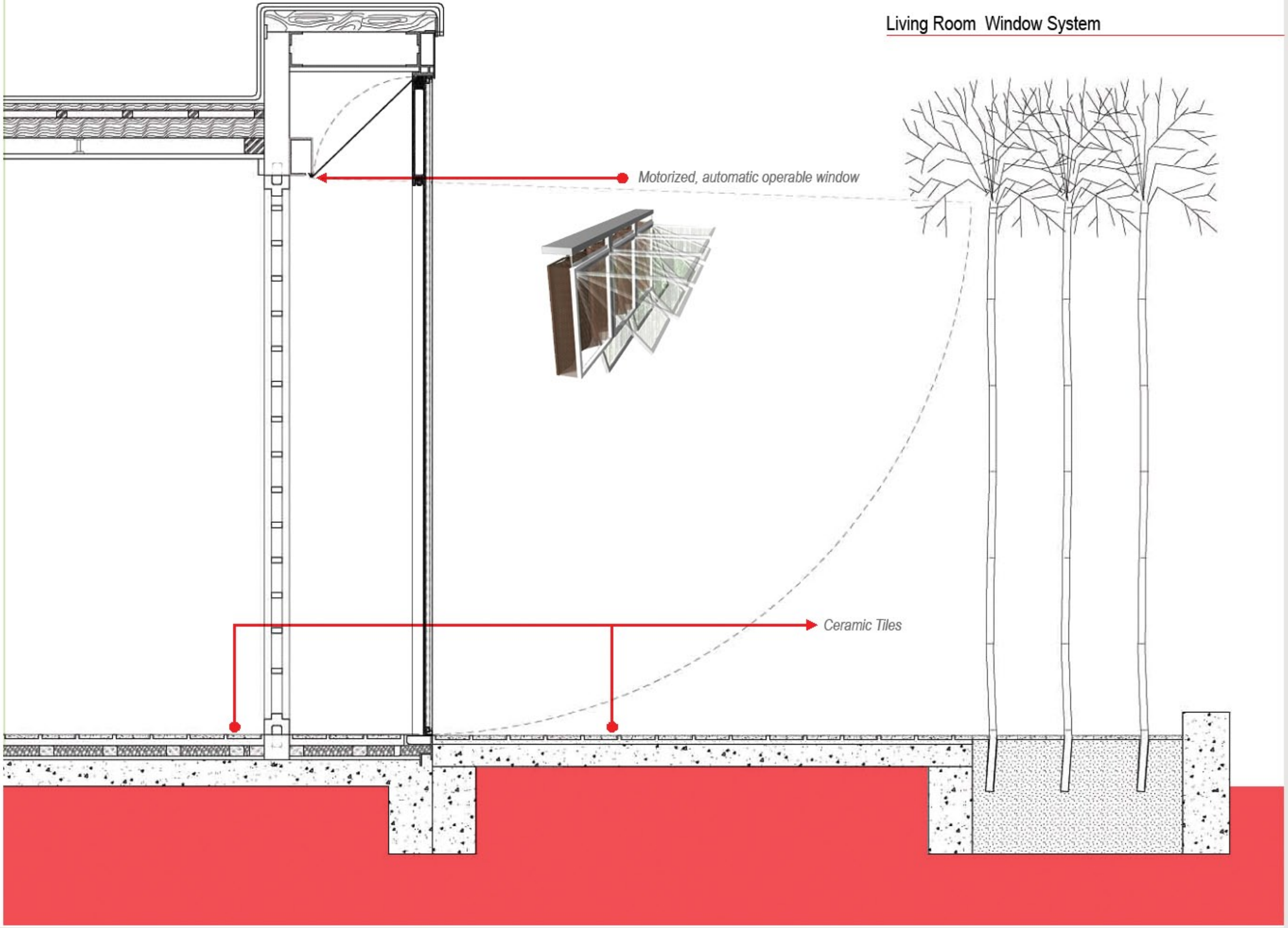
Bi-pivot Door for the house interior openings creating broad open space and totally closed space.



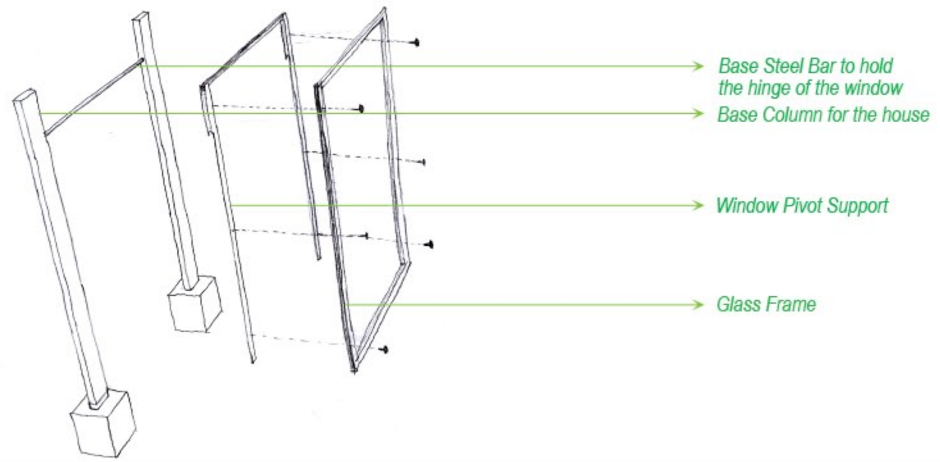
c. Metamorphic Boundaries for Functional Uses

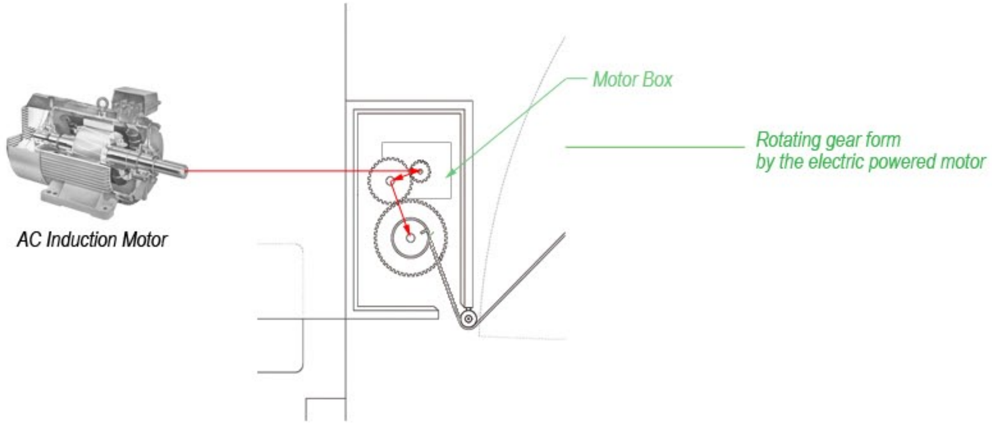
Operable windows of the living room.

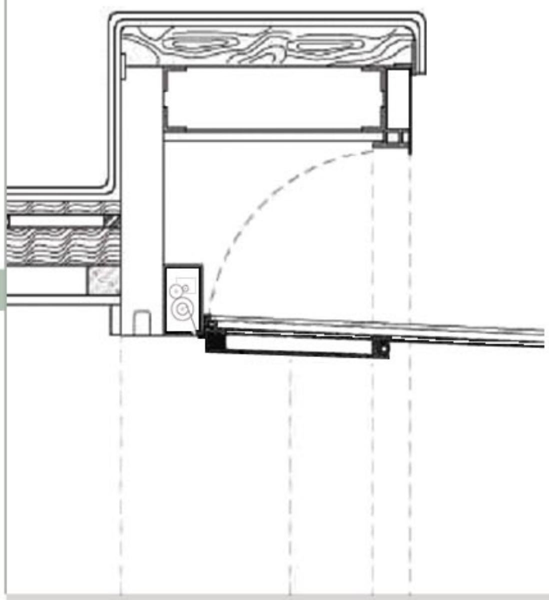
Living Room Window System

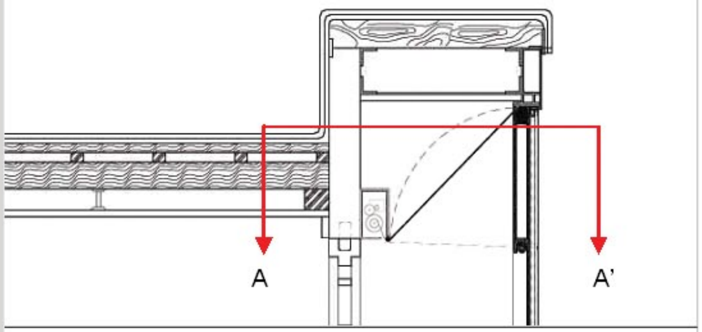


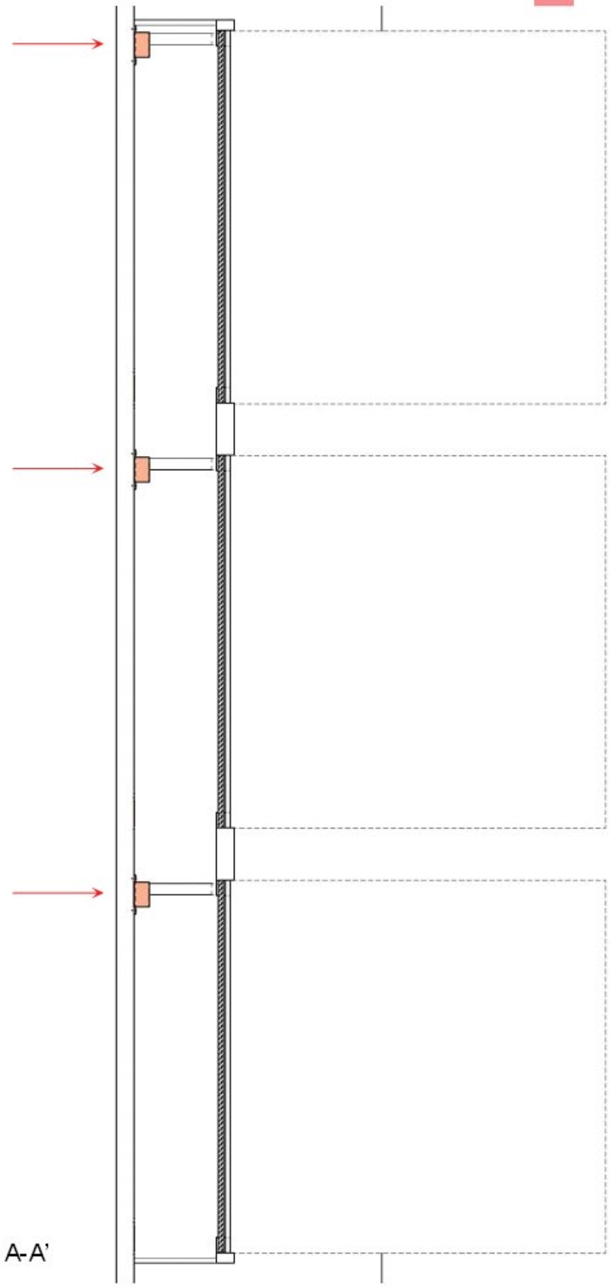
Window Assembly





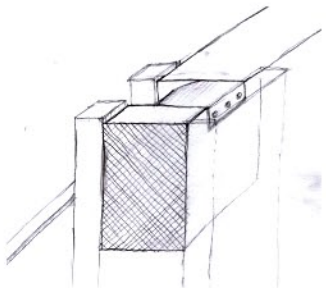


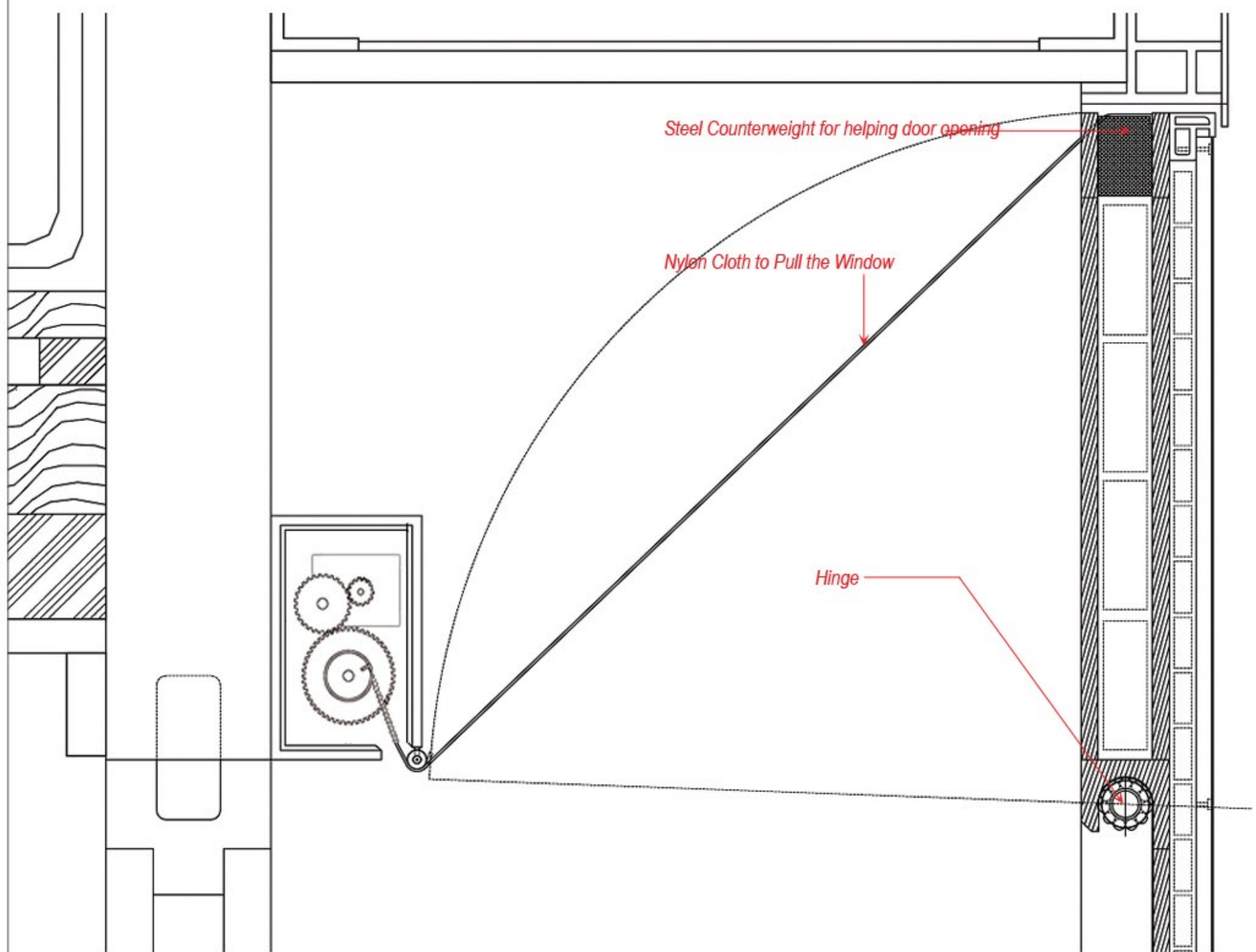




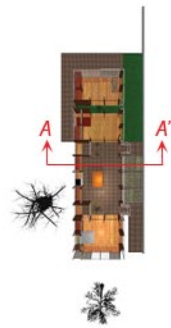
Section A-A'

Window Pivot Mechanism

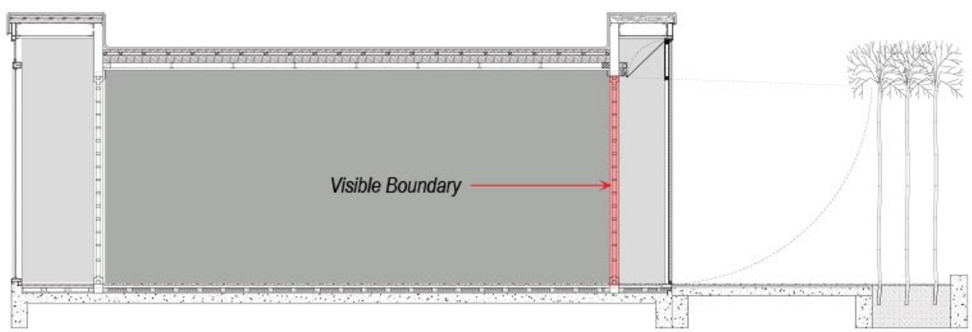




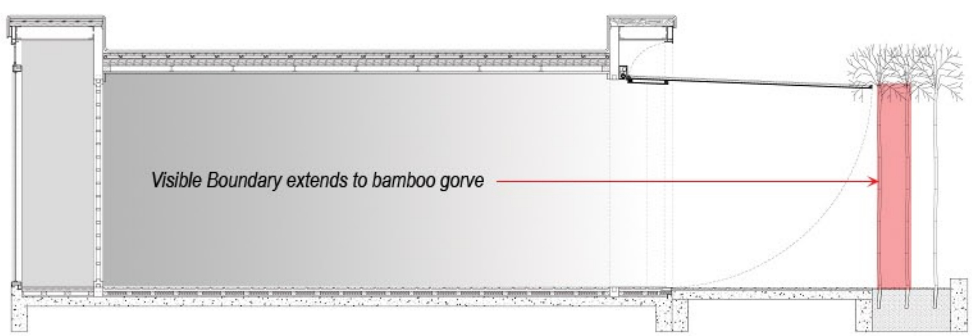
Metamorphic Boundaries Created by Opening Windows



Section A-A'



Movement of the Boundary by Opening window



d. Metamorphic Boundaries by the Roof

The space below the roof has its ceilings and lights for people who pass by –

This place will provide somewhat different feelings from the common street. It can be a rest area to talk with neighbors or to hide from the direct sunlight. Otherwise, it may look a part of the street.