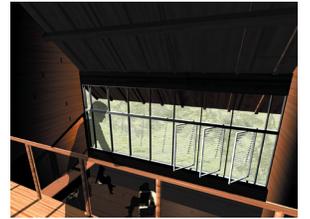
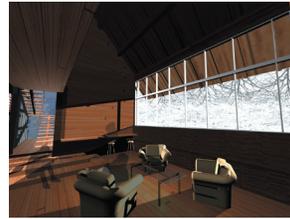


A Measure Of Time A Sense Of Place



Master Thesis in Architecture by Yvonne Chang, Virginia Polytechnic Institute And State University, Blacksburg Virginia, July 2005

A Measure Of Time A Sense Of Place

Yue-Feng Chang (Yvonne Chang)

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Yue-Feng Chang (Yvonne Chang)

Abstract

Sustainable design is often conceived of only in terms of applied technologies, without a concern for quality of life of residents. This thesis is an investigation of sustainable design that meets standards of quality of life for residents. The study focuses on balancing the needs for integration with the existing context and maintenance of privacy for the residents, and on heightening people's responsiveness to and awareness of daily and seasonal phenomena. The goal of this investigation is to create a residence that heightens the inhabitants' psychological connection with the outdoor environment, and thus enhances their quality of life.

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The way we build is a reflection of the way we live....

Introduction

A building is a man-made object intervening in the environment. How a building declares its domain in the existing context is a concern of architecture. Interventions between the building and the environment can create a framework for good living. Such a framework must always be both dynamic and balanced between the natural and man-made world. Architecture is the art and science of man's intervention in nature, whether in rural, urban, or suburban, with the purpose of such intervention being to launch an adventure of creation and recreation of the balance between our buildings and their environments. The way we build is our declaration of our domain.

The interventions necessary to achieve the goal of living well may entail various approaches to deal with different types of scenarios. Common approaches can be divided into *active* and *passive* techniques that transform a piece of land into a settlement. During the execution of these two approaches, *quantitative* and *qualitative* measurements are taken into consideration. Often, the combination of the approach and measurement technique leads to very different results. To understand the fundamental difference between *active* and *passive* techniques, it is necessary to make reference throughout to *quantitative* vs. *qualitative* measurements.

Active methods are physical transformations of landforms and techniques to actively control the indoor environment. For example, common active methods are to cut and fill sloping land, and generation of hot or cool air to stabilize indoor temperatures. This kind of approach requires great effort to realize. The comparison between what was before and what is achieved is obvious. Thus, effort and final products are more easily measured using quantitative techniques.

On the other hand, passive techniques usually do not involve physical changes to the existing environment, but they contribute tremendously to a good settlement. In fact, as architects, we have to admit that we cannot control everything in our environment, and therefore sometimes have to rely on the use of active techniques. We do not necessarily give in to things beyond our control—rather, appreciation of what is available and making the best use of it can sometimes even elevate the degree of harmony between our presence and the existing environment around us to a greater degree than would be possible through the use of active techniques. A house that has been oriented to obtain more sunshine is a typical example. Because we cannot change the sun's path, we adapt the design of the house and the site to capitalize on the qualities of the environment. Thus, passive techniques are not mere "compromises." They are a valid architectural alternative for the creation of a good living environment. The logic behind any passive technique varies from one site to another. Consequently, it is difficult to measure the success of passive techniques with rational, linear, quantitative measurements. Evaluation of passive techniques typically involves qualitative measurement. If the passive technique applied contributes to the goal of good living,

then this is the most critical measure.

In brief, although the desire to anchor ourselves and our properties to a piece of land is the driving force behind building, rational and linear assessments are not enough to judge whether a good living environment has been created. When we cannot or do not want to change the environment of a residence, we may need to embrace a different “logic” to support the goal of good living. From this point on, our fundamental attitude toward the environment will lead us in a different direction. This new attitude is based on the idea of appreciating our environment instead of controlling it. Our goal is still to achieve a state of living well. However, the techniques used to accomplish this goal no longer involve changing the surroundings using active techniques. The measurements taken do not involve comparison of alignable or commensurable inputs and outputs. Our concern, instead, is how we can interpret and enjoy what is available in the existing environment.

My thesis is a series of investigations into the design of a high-quality single-family residence based on the idea of accommodation to the existing environment. Many of the interpretations of scale and natural light I review constitute explorations into achieving a state of living well using the available resources on the chosen site.

Cradle to Cradle Architectural Design Competition

This thesis constitutes further development of an entry in the Cradle to Cradle, or C2C, competition. C2C was an architectural competition designed around a search for sustainable residential designs in Roanoke, Virginia. C2C was organized by a group of environmentally concerned architects and the City of Roanoke in 2004. Private and governmental sectors worked in collaboration to solicit substantial proposals from architects for four pieces of land provided by the City of Roanoke. The challenge was to design a single-family house with the vision of sustainable living for any of the given sites. (<http://www.c2c-home.org>)

Observation and Vision

Each of the four sites designated for the C2C competition is located in a low-rise residential area near downtown Roanoke. All of the sites share the geographical and meteorological features of the region, including the hilly landscape of the Blue Ridge Mountain Range, and strong and stable westerly winds.

The chosen site is located at the edge of the downtown district of Roanoke. It rests on a north-facing slope. The views to the north and west are toward neighboring single-family houses and woods on the hilly landscape. The existing trees to the south provide a buffer between the site and neighboring houses. The First Baptist Church to the east is the primary architectural landmark in the community.

The vitality of the South is revealed in downtown Roanoke and in the community within which the chosen site is located. Vernacular architecture with wooden structures and porches is still common in this area. Additionally, the landscape of the Blue Ridge Mountain Range is famous for its color changes throughout different seasons.



A typical house with porch in the community of the chosen site. (photo is taken by the author)

There are many man-made and natural features of interest to enjoy while living in the region. Any new intervention in this environment should be articulated in such a manner as to accommodate and capitalize on all of these features. Under the given circumstances, progressive methods of building the house may not be suitable. Such techniques might easily sacrifice the potential of contextual features to fulfill construction requirements and rational and linear standards of measurement. Passive methods, which are based on embracing the existing features of the environment, are the appropriate choice of technique here.



On the other hand, the guidelines for C2C, based on the book *Cradle To Cradle* by William McDonough and Michael Braungart, view building as an industrial process and give little attention to how we dwell in such buildings. Although the title, “*Cradle To Cradle*”, suggests that we should re-learn how to embrace our environment just like toddlers who are learning to walk, the book focuses on technology but not on attitudes toward our environment. It rarely discusses how we can re-examine architectural potential. Nor does it discuss how living that is both sustainable and supportive of a high quality of life can be simultaneously achieved. Therefore, the core issue of this thesis goes beyond the contents of *Cradle To Cradle*. In the development of the thesis, I would like to discuss more about a way of living well that is based on embracing the environment.

The way we build is a reflection of the way we live. To support a way of living should thus be the first step in building. Based on this notion, the goal of this thesis departs from that of designing a machine for living, and instead attempts to discover a way of living that will support the appreciation of the beauty of the environment, and the enjoyment of being part of it. The task is aimed at creating a high-quality way of living, not a mediocre house, the value of which is measured only by, say, how much energy it saves compared to similar houses. The sustainable building is not just a humble shelter, nor is it a self-sustaining machine. It should be an instrument that supports our ability to live well on this earth. This thesis is an exploration of how to enhance the spatial quality of a house based on its surroundings. The design is carried out in such a way as to call attention to the beauty of nature, and to help us embrace it as part of our lives. The main theme that emerged is how to incorporate geographical features that make the building’s site a special space through which we can enjoy the environment.

Main Themes that Emerged

A sustainable house should be a home with spirit. It should not only sustain itself on a mechanical level; it should not only provide us with a shelter against natural hazards. It should also support our ability to live well. Based on this notion, the present design has derived only the basic guidelines for a residential house from the C2C specifications. The main goal of the thesis is to create a place for living well. The thesis is the exploration of heightening inhabitants' awareness of the beauty of nature. The design principles are based on creating diverse connections between the inhabitants and the environment through the house in which they dwell. The project demonstrates how the various compositions of architectural elements can be used to achieve harmony between residents and their environment.

The main themes that emerged suggest the adoption of a holistic view of appreciation of nature. Appropriate declaration of domain is a goal of architecture, and a building is the concrete statement of a bounded domain. A building declares its domain in the environment both by the scale it defines and the way it responds to changes in time. But the way the domain is formed reflects the way we live. Thus, I propose design principles based on the aspects of scale and time. The first theme of the thesis is the interpretations of scale between the environment and the building. The second theme is how these interpretations can be used to address the phenomenon of the passage of time.

Theme One : Perception of Scale

A building is an intervention into the existing environment, whether rural, urban, or suburban. The existing features of the environment and the architectural elements of a building interact to form a living space. To create a high-quality space for living supports the goal of good living. However, the existing features of the environment may not "fit" a human scale. Similarly, the requirements for the building may not fit the conditions of the environment. Building requires artfully adapting the scale of the environment to the building and vice versa.

The scale in the environment relate to the region, community, and site. These three fields of view are shown in the three photos on the facing page. In addition, a residential building usually requires space for interaction with the neighborhood, space for family gatherings, and personal space. Proper attention to each of these three levels of privacy and the transitions among them are the key to good residential design.

The first design challenge for this house is how to integrate the existing three levels of scale in the environment with the three levels of privacy in the interior of the building. Articulations between these two scales should be designed so as to amplify the qualities of the environment and the key features of the spaces in the building.



The region - The neighborhood and landscape to the north



The community - The landmark, the First Baptist Church



The sloping site

(photos are taken by the author)

Theme Two: Responses to Phenomenon of the Passage of Time

How we understand the world involves more than just seeing or touching—it also involves thought. The way we perceive is usually determined by our first impressions. Take the two photos shown at the bottom of the page as examples. In different seasons, the house may be either revealed or hidden to outsiders, depending on the foliage. Conversely, people who live in the house may perceive their surroundings differently during each of the four seasons.

Changes in our surroundings reveal the passage of time. As modern buildings have become more functionally complicated, we have become more isolated from nature. Now we are as likely to be reminded of seasonal changes by television or radio commercials as by directly feeling temperature changes or observing leaves changing color. This leads to a uniform way of living in which we are untouched by the phenomenon of time changing, including activities such as watching the sun rise and set. Thus, an important design challenge is for the building to help us regain the pleasure of sensing the passing of time.

To establish a holistic approach toward living well, perception of different scales should be used to help residents regain the pleasure of sensing the passing of time. The design of the building articulates the relationship between each of the interior spaces of the building and the environment. The structural details of the building translate the passage of time into different moods within the interior. Thus, the building serves as more than a “container” for living. It is an instrument that refines our state of merely living into a state of living well. In short, the second theme of the thesis is how to use design principles to respond to the phenomenon of the passage of time.

The house is revealed when the leaves fall in winter



The house is hidden by the trees in summer



(photos are taken by the author)

Developments of the Main Themes and Case Studies

A Way of Living Well

The goal of discovering the essence of the two themes “perception of different scales” and “responses to phenomenon of the passage of time” is enhancing the enjoyment of living. Just as the word “living” is a gerund, part of the idea of “living” is to have a positive attitude toward dynamic features of our surroundings. Therefore, developing a “way of living well” involves integrating these two themes. As discussed above, the issue of scale is often related to the issue of privacy; and the issue of responding to time is often related to the celebration of the natural cycle of life. The theme of perception of different scales is embodied in the design by defining the degree of privacy of each room according to that room’s designated use. The theme of responding to time is embodied by the celebration of daily and seasonal changes in daylight and vegetation. In combination, all of our efforts are oriented toward supporting the most joyful manner of living.

In the next two sections, some cases that are relevant to these two themes are examined. These cases are successful examples of integrating the given site conditions with the idea of living well.

Theme One : Perception of Different Scales in the Context of the Degrees of Privacy

The domain defined by the building is the intervention of the building into the environment. But the contextual declaration should not just include the way that the building’s shape separates public from private domains, or the interior from the outside world of the building. Declaration of domain is more about how we can distinguish ourselves and our property from other people and theirs. It is about the way we define such a boundary, both physically and emotionally. We build up a physical wall to defend ourselves against natural hazards. We can also control interior conditions by adjusting openings in the wall. On the other hand, the landscapes we see from indoors inspire us. How we use the semi-private or semi-public space, such as the balcony or the entrance, also reflects our willingness to establish connections with the neighborhood. The building supports our self-image in the existing context, through all kinds of concrete or abstract details.

In brief, a proper declaration of domain always requires solid transitions between the public and private domains. Changes of scales between these two domains are involved in such transitions. The thesis project demonstrates the articulation between the three scales in the given conditions, the region, the community, the site; and the three levels of privacy of the house, the transitional space, the family gathering space, the personal space. The geometry and composition of the architectural elements are the primary indicators of each combination of scales. These indicators are designed according to the existing features in the environment. They hint at the degree of privacy of a room.

The ways in which the three scales in the environment for the present project are addressed include:

- The regional: Respond to the hilly landscape, the strong westerly winds, and the patterns of sunlight in the region.
- The community: Acknowledge the primary landmark, the neighborhood church.
- The site: Take advantage of the characteristics of the site, such as its topography and vegetation. The trees serve as a buffer to the neighbors to the south.

In addition, the building in which we live reflects our attitude toward the place we dwell. This desire of living well is addressed through acknowledgment of the three levels of privacy. These methods of acknowledgment are:

- The transitional space: The space between the public and private domains should be clearly defined, while at the same time being extendable into the other domain from both sides. Visual connections between the public and private sides should be carefully arranged.

- The family gathering space: The private family gathering space is orientated toward the sunny southern side. The visual connection to the neighborhood is important. It can be achieved by the spatial arrangement of the residence, which takes advantage of the hilly landscape.

- The personal space: A personal retreat for an individual is the most private area in a house. This space is located in the tranquil corner of the house, with only a visual connection to the private yard.

Theme Two : A Heightened Awareness of Our Response to Time

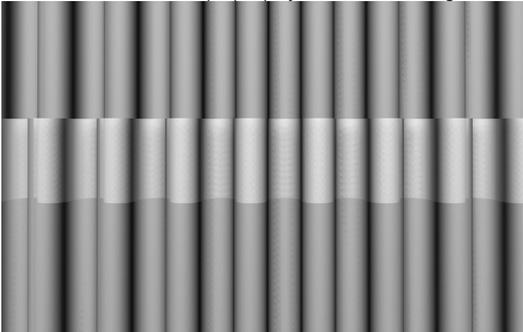
Usually, once a building is built, it will remain on its site for many decades. Very often, we perceive the presence of the building not only from its physical form or mass, but also from the way in which it responds to time. We may be able to tell how old the building is from the weathering of the wood. The orientation of the building can heighten our awareness of sunrise and sunset and encourage an awareness of the time of day. Similarly, the orientation of living spaces and the geometry of the architectural elements, such as shading devices, can heighten a seasonal awareness of time.

Thus, the second theme of this thesis is that the building is an instrument that heightens our daily and seasonal awareness of and responsiveness to time. The critical task is to raise awareness of minute daily or seasonal changes in the environment. To address the issue of time, parts of the building should be transformative according to daily or seasonal daylight conditions. The brightness outdoors and the hint of outdoor scenery filtering the light coming into the house can produce various moods in residents of the building. The transformation of mood generates vitality in the building. The goal is that even if we live in the house for a long time, we should not be bored; the house should transform itself according to changes in time of day and of the seasons.

Designing the building to respond to daily and seasonal changes is accomplished through the selection of materials for the exterior wall, as well as the size and placement of the openings in these walls. The orientation of the building is determined by the level of permeability toward open or obstructed views on different sides of the building. Choice of materials, such as polycarbonate sheeting, offers the potential to create an attention-grabbing atmosphere in response to changes in climate and daylight conditions.

The three renderings shown below simulate how natural light penetrates polycarbonate sheeting with different levels of transparency. The filtering of daylight into the room requires the use of material that possesses this translucent quality.

opaque polycarbonate sheeting



regular light penetrates through



strong light penetrates through and outdoor scenery can be partially seen



The Project

A Way of Living Well to Be Supported by the Use of Scaled and Permeable Spaces

The project is the result of an investigation into a way of living well that addresses the issues of scale and time. The diverse connections of the building with the environment yield various moods for outdoor and indoor aspects of living in different times of the day and seasons of the year. These connections enrich our life by changing scales through transition from the public to the private domain, and by introducing the different qualities of natural light into the interior space.

The project addresses the issue of scalable living through composition and orientation of the building. To enhance the perception of scale within the regional and neighborhood context, the first strategy is to orient the building on the basis of strong geographical features. Orientation of the building is like a filter: it can allow for permeability toward desirable views and sunlight, while obstructing undesirable views and providing a barrier against harsh climate conditions.

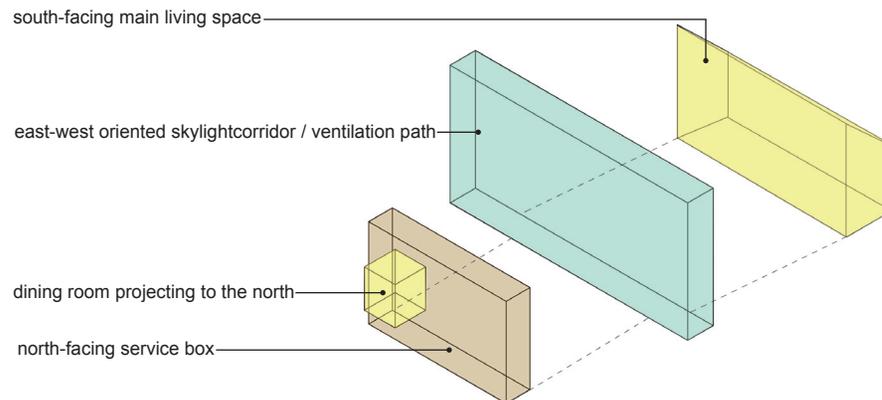
The site plan and the diagram at the bottom, and photos of the model at the right, show the chosen orientation and composition of the building. The north-facing service box acts as a barrier against the strong westerly and northerly winds. The south-facing main living space is well shaded by the existing trees in summer. In winter, the living space is warmed by the southern sunlight. Between these two zones is the skylight corridor/ventilation path. This space introduces sunlight mainly from the north and south, diffusing it through the tall volume of the interior space. During the summer, it also introduces stable breezes into the house. It is the connector between the servant and served space.



View from the church toward the neighborhood (view A)



View from the hill toward the neighborhood (view B)





Seeing the church in morninglight from the dining room

The projected dining room is an extension of the living space to the outdoors. It is cantilevered to bring a view of the northern side to the interior of the house. The site rests on a slope. By amplifying this geographical feature from the projected dining room, it is easy to perceive the regional features, the beautiful landscape to the north and west, and the community landmark—the church—to the east.

This project addresses the issue of transforming appearance with time changes, through the use of translucent materials and operable shutters. These features introduce various qualities of natural light to the indoor space and give the building different appearances in different seasons. The building is itself a time-telling instrument. Parts of it are adjustable according to thermal comfort requirements. It also reveals the daily and seasonal atmosphere from the perspective of both the interior and the exterior of the house.

Spring : Wood shutters are half close, tilt and turn windows still can be open.
Good ventilation is still provided.



Summer : Wood shutters are fully open. The dining room can be transformed to a balcony.
Porous paving for parking space allows rain water to penetrate through.

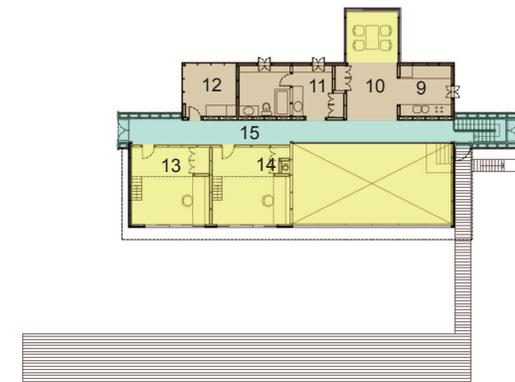
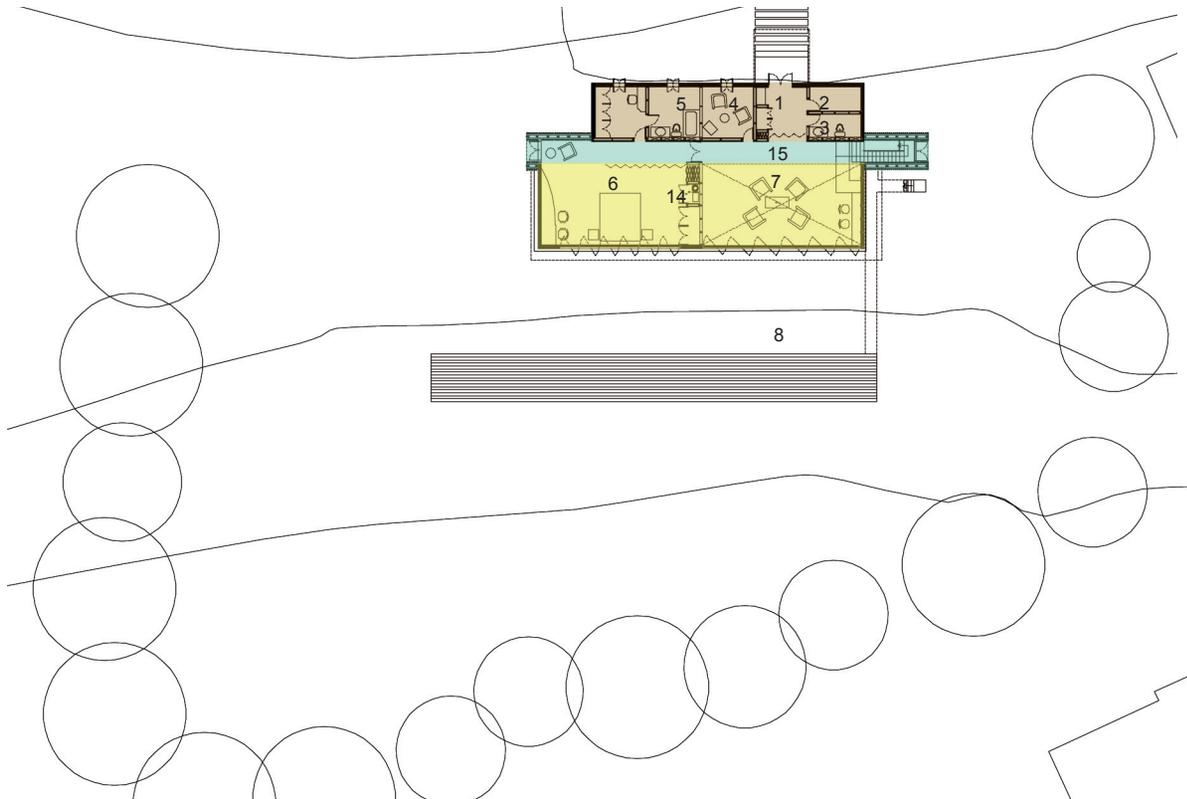


Winter : Wood shutters are fully close. The windows of the dining room also fully close.
The service box itself is the buffer zone against the strong west and north wind.





Walk-Through of the Building



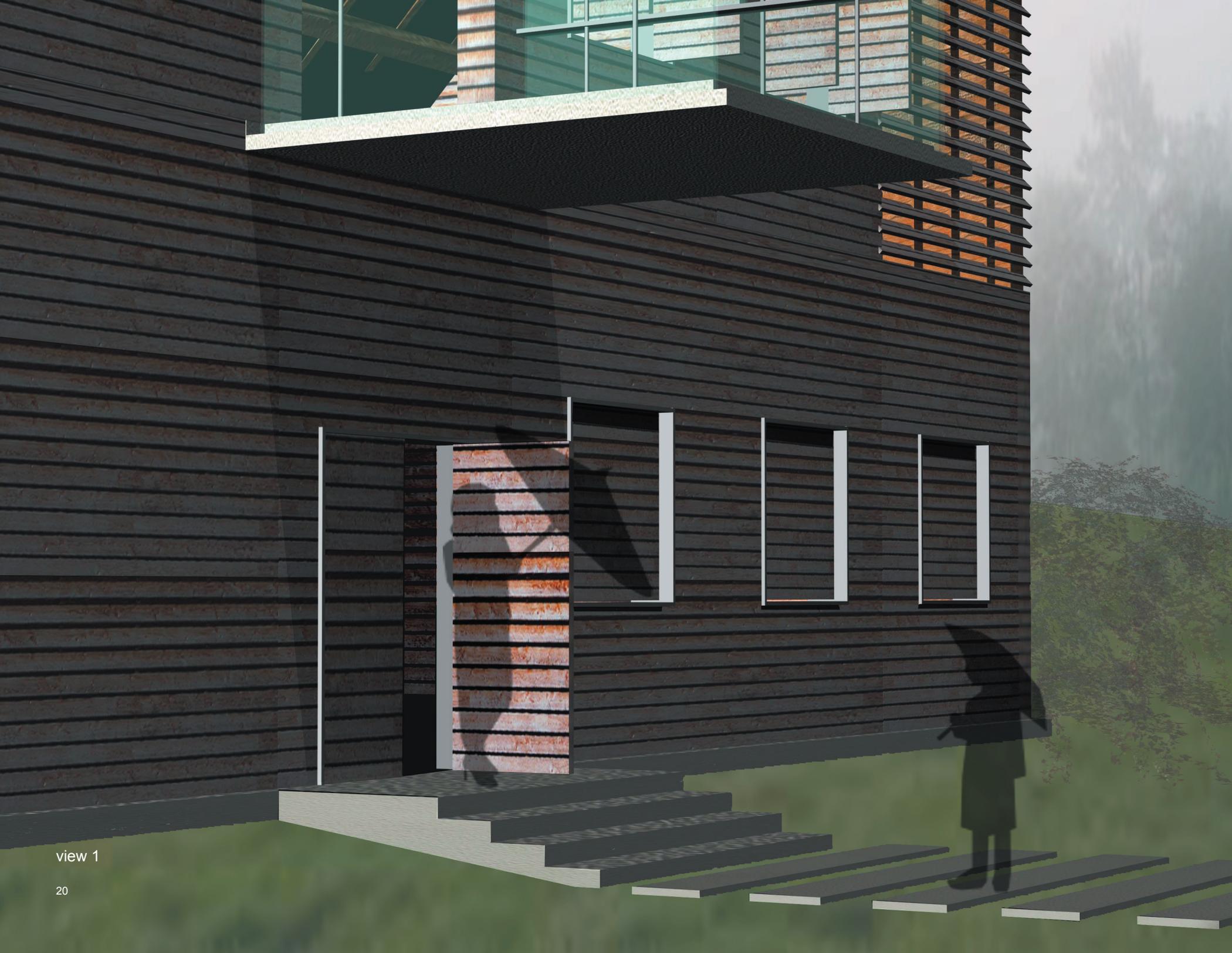
Left: First floor
Right: Second floor



The rendering on the left page shows the exterior of the building. It highlights the three most important architectural elements—the north-facing service box, the skylight corridor/ventilation path, and the south-facing living space. The backyard, located on the sloping part of the site, is visually connected to the neighborhood. However, it is invisible from the street due to the topography. Connection with the community is provided, while at the same time privacy is ensured.

Variations on the appearance of the façade, shown on the following pages, are produced by seasonal changes in the environment. Transformations of the building generate vitality for the interior and exterior spaces. Translations of the existing features in the surroundings into different moods in the interior are accomplished through the choice of architectural elements. Such transformations and translations support scalable living and remind us of the passage of time. Ultimately, the building refines our way of living well. The following are a series of renderings that show how each space of the house reflects the notion of living well by addressing the issues of scale and time.

- | | |
|---------------------|--|
| 1 foyer | 9 kitchen |
| 2 storage room | 10 dining room |
| 3 toilet | 11 bath |
| 4 TV room | 12 laundry room |
| 5 bath and dressing | 13 bedroom |
| 6 master bedroom | 14 OM Solar roof mechanical room |
| 7 livingroom | 15 skylight corridor/ ventilation path |
| 8 backyard | |



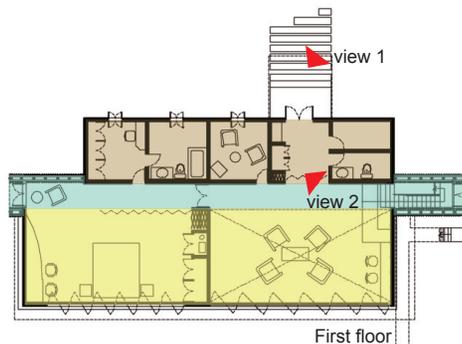
view 1

The entrance is the transition from the public domain to the private domain

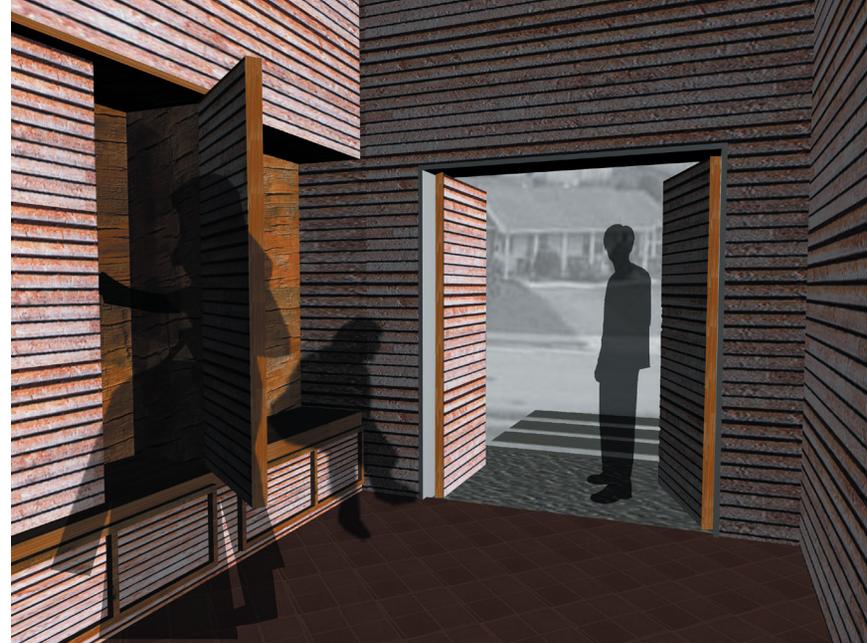
The entrance is the link between the region and the site. In passing through the entrance space, the experience of transitioning from a public domain to a private domain is heightened. The sequence is articulated from an open view of the region (photos of the site model and site plan on page 14), to the steppingstones in the front yard, to the steps and raised platform in front of the house (first floor plan on page 19), and to the foyer (view 2 at the right). This articulation provides a gradual change of scale from large to small.

The overhang provides protection to those approaching the entrance under different weather conditions. The open but covered entrance provides shelter on rainy or snowy days (view 1 at the left). In good weather, such as in summertime, the entrance still offers a welcoming gesture to visitors that gives it the role of a traditional porch (building overview on page 18).

On a functional level, the foyer provides sufficient storage space for outdoor wear (view 2 at the right).

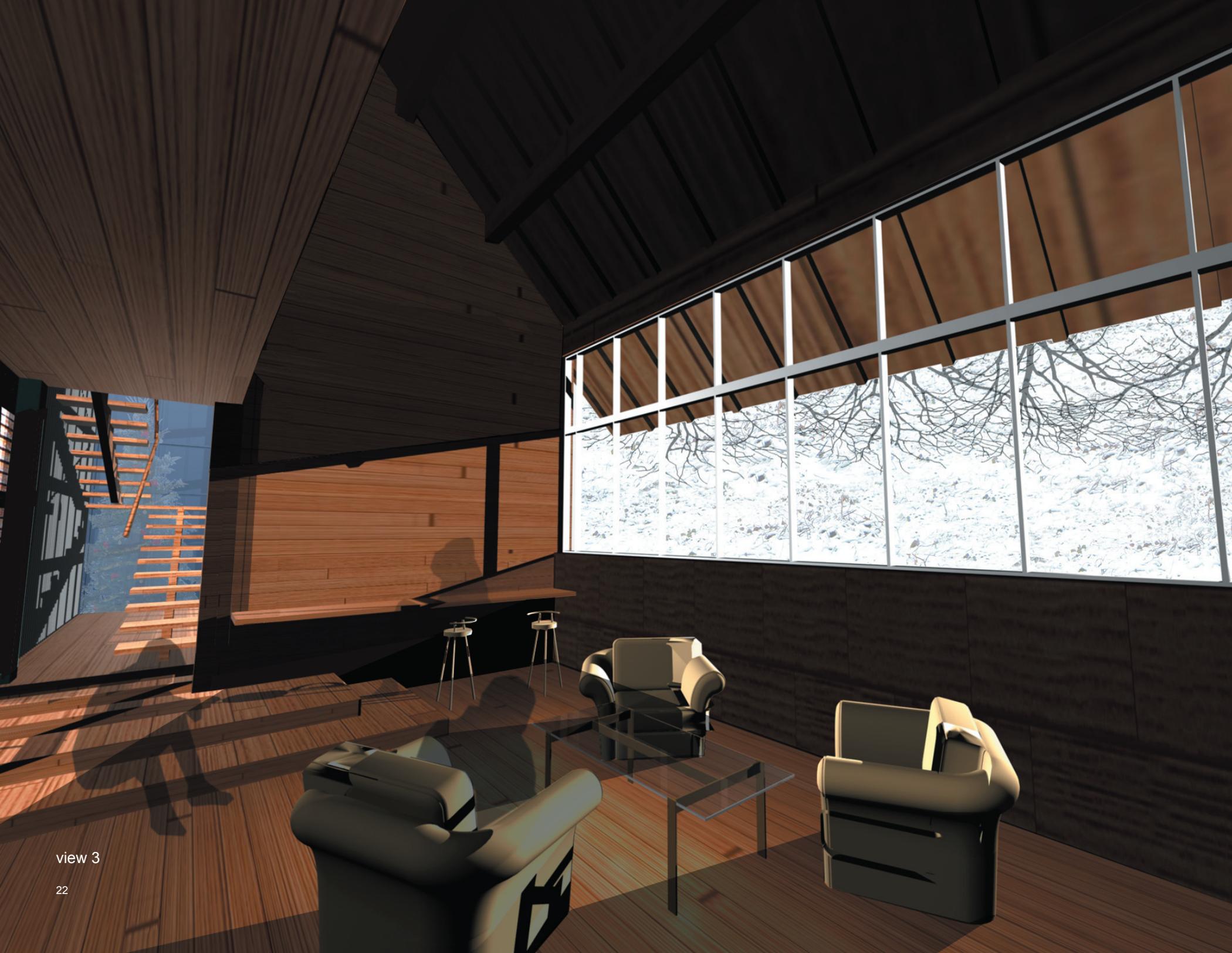


The foyer is part of the sequence into the house. It also provides sufficient storage space for the family.
- view 2



The typical houses in the neighborhood which have porch entrances. (photo is taken by the author)





view 3

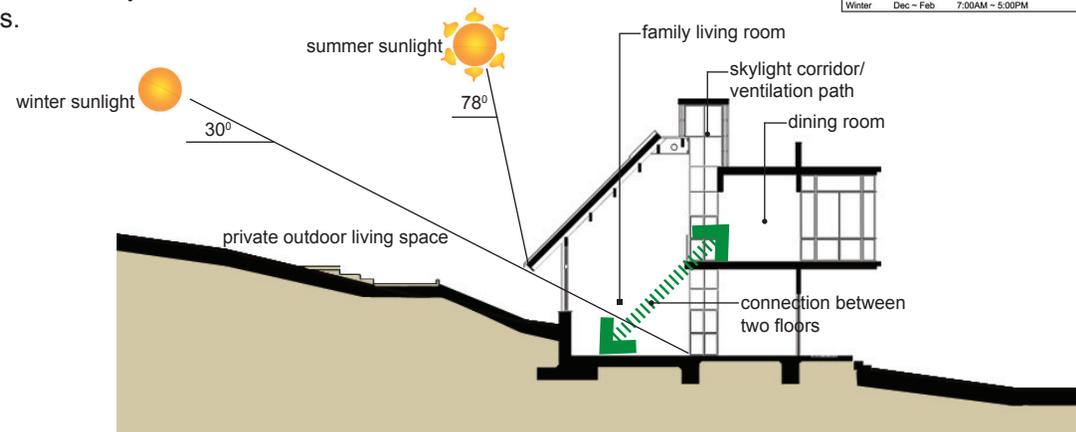
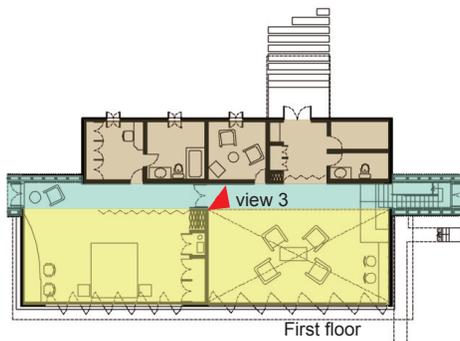
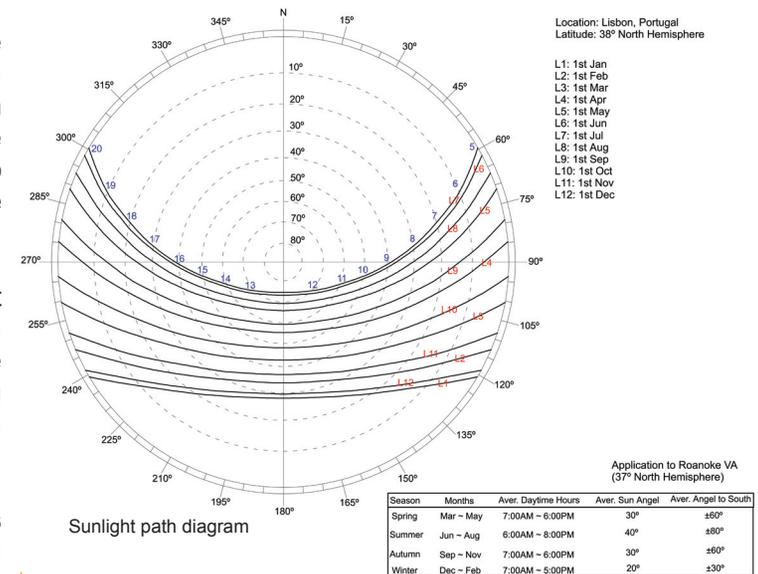
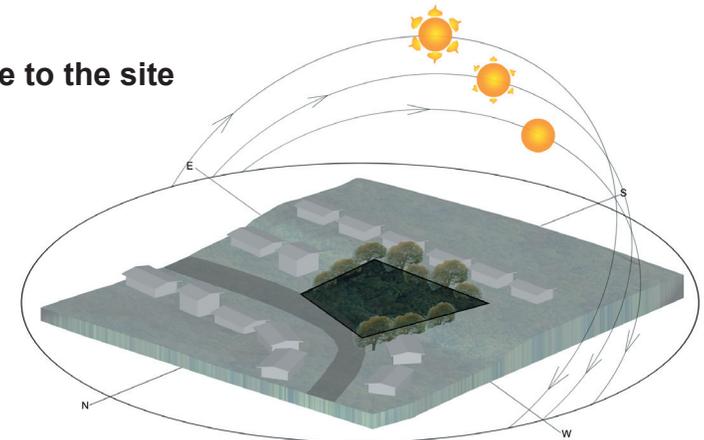
The living room is the family gathering space that anchors the house to the site

Based on the sunlight path diagram (shown at the right) in the region, and in an attempt to respond to the features of the landscape of the site, the living room has been designed as a south-facing space with tall windows (view 3 at the left). On the site, the volume of the room is pushed to the north in order to avoid being shaded by the trees on the OM Solar Roof⁷. This orientation is a win-win strategy that helps the building gain heat in winter but minimize heat gain in summer. South-facing windows help the house gain sunlight from the south in winter. However, the overhang of the roof shades the windows in summer. The trees in the backyard to the south of the building are also located in such a way as to create a well-shaded, open, but private space for personal retreat (view 4 on page 24).

On the other hand, the overhang of the roof and the height of the retaining wall combine to form a framed view of the backyard for the family space. The backyard is visible on an upward viewing angle. Usually, we view the landscape on a level angle. To heighten the awareness of living in the hilly region, the framed backyard view introduces the color of vegetation in summer and accumulation of snow in winter at our eye-level, to produce a beautiful tableau visible to all residents sitting in or even just passing by the family room (view 3 and 4).

The family gathering space does not itself extend to the backyard directly. Instead, it extends upward to the second floor (see view 6 on page 28). The connection between the two floors provides a strong sense of unity between the different living spaces in the house. Conversely, the separation of the outdoors from the living room by the retaining wall also creates a private outdoor living space (see view 4). This arrangement is an example of using the landscape of the site to create a unique living space.

The rendering on the left page shows how the low winter sun penetrates and enlivens the family gathering space. The framed views of the backyard to the south, west, and east provide a visual connection to the outdoors.



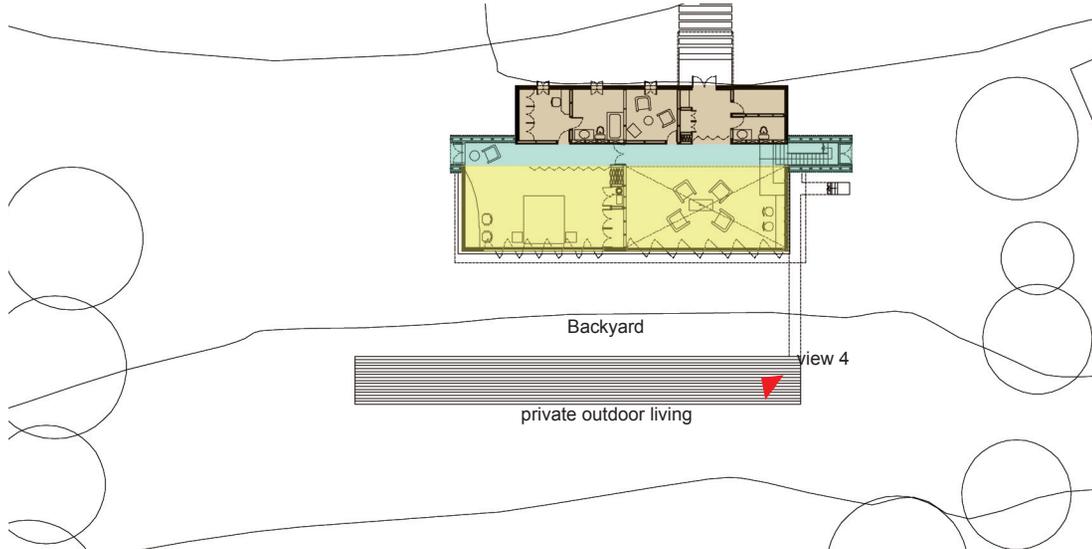


view 4



The backyard is the outdoor personal retreat

The backyard is characterized by the natural landscape of the site. Yet it perfectly fits into the role of a personal space in the entire composition of the site.

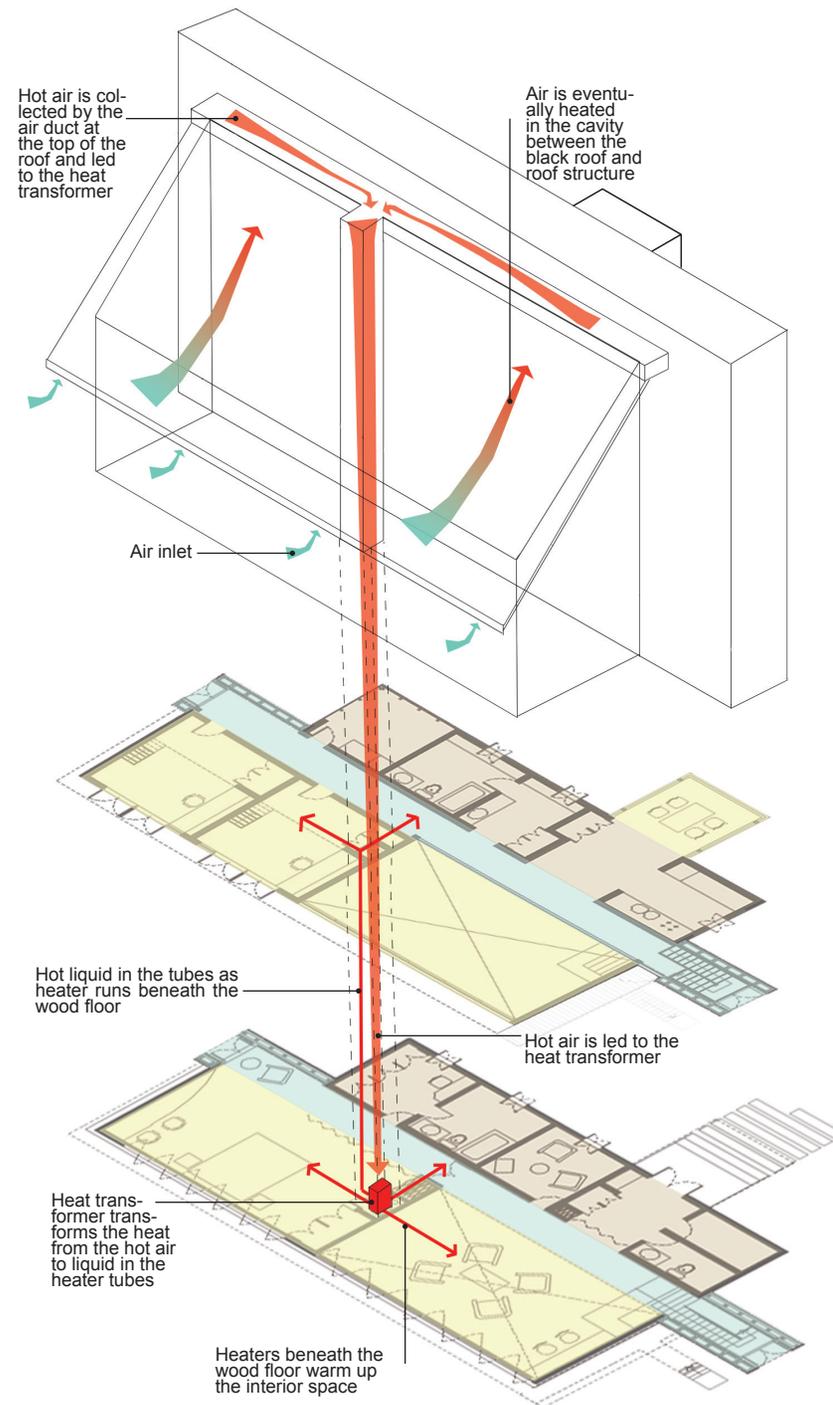


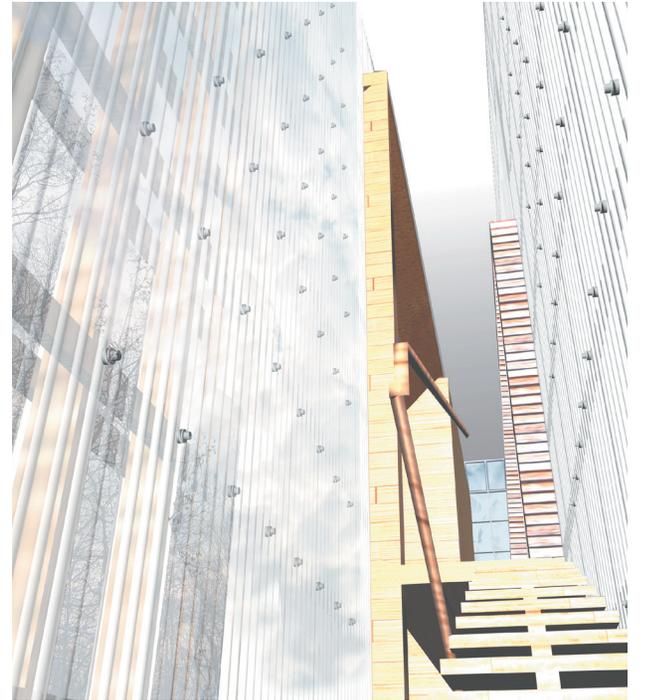
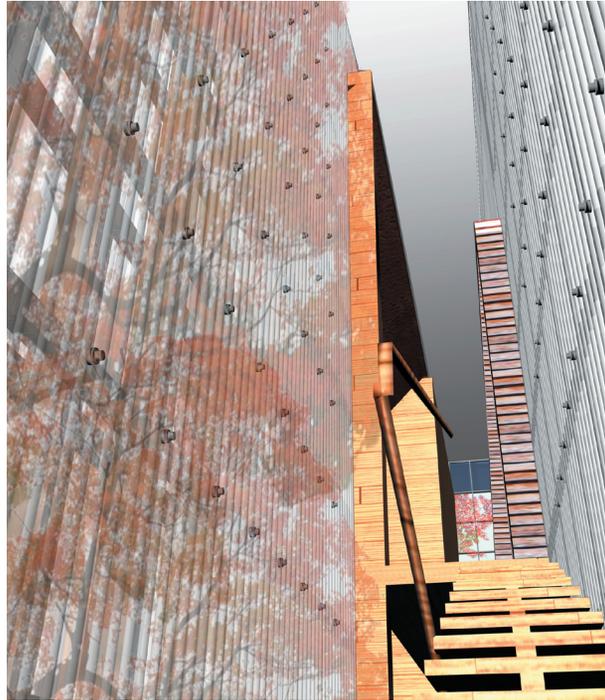
The notion of appreciating the existing landscape leads to the choice to not simply excavate the sloping backyard in order to transform it into flat land. In order to accommodate the slope, the linear wooden deck is the only intervention that connects the indoor living space in the house with the outdoor living space in the yard. Although this flat surface is small, it creates a personal space separate from the family room. It is an example of defining a different degree of privacy in a residence by embracing the character of the landscape.

The connection between this outdoor living space and the natural environment is the strongest among all the spaces in the house. The rendering at the left shows how this personal space is well shaded by the trees in the enjoyable late afternoon sun in summer.

From a technical perspective, the proposed OM Solar⁷ roof is an active solar heat system, with details shown in the appendix. The whole building has been pushed toward the northern boundary in order to avoid over-shading from the trees.

The proposed heating system is a modification of the OM Solar roof. The air gains heat that is collected by the roof; this heat then runs through the cavity between the two layers of the roof. Heat in this air system is transformed into heat in the liquid system by the heat transformer. The piping for the liquid system runs beneath the wood floors.





view 5

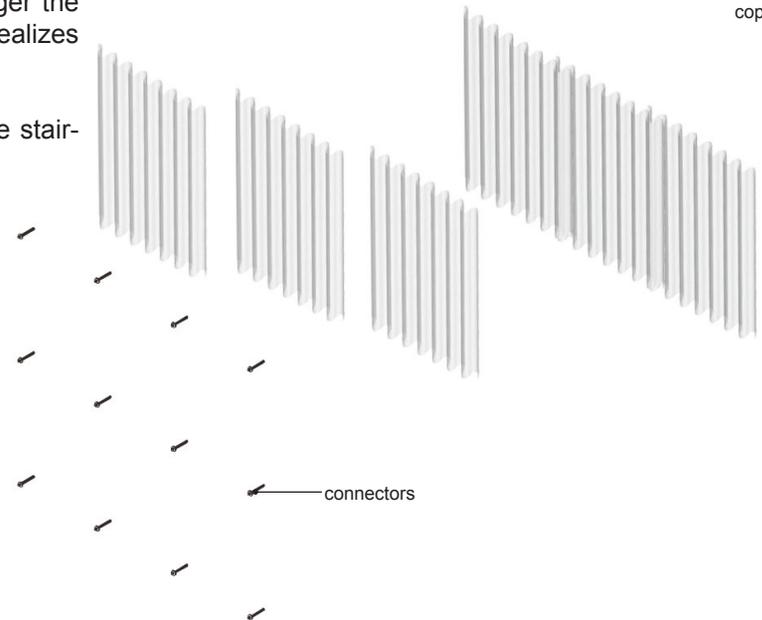
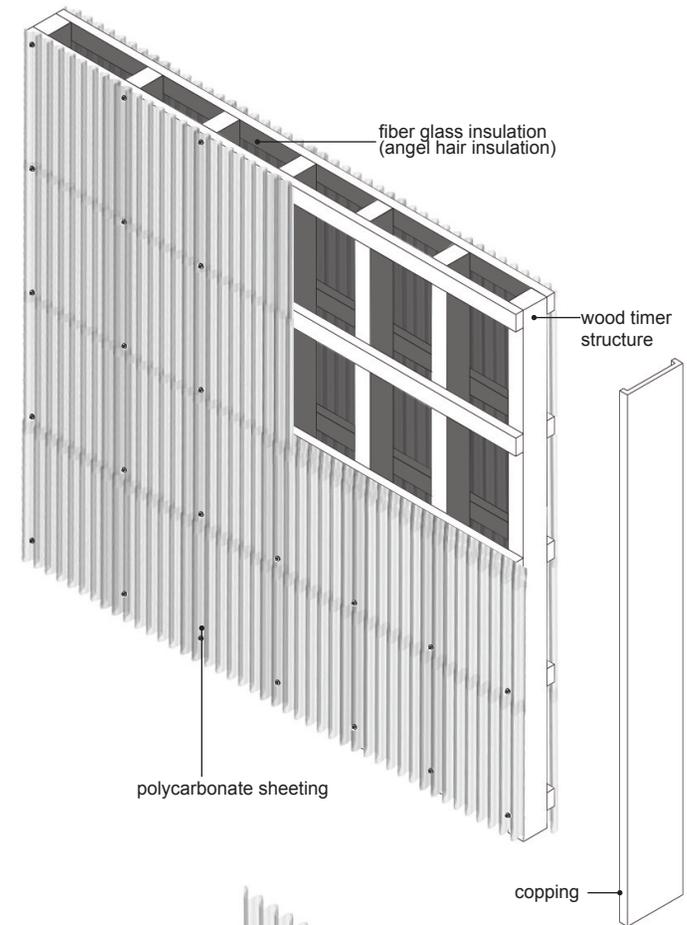
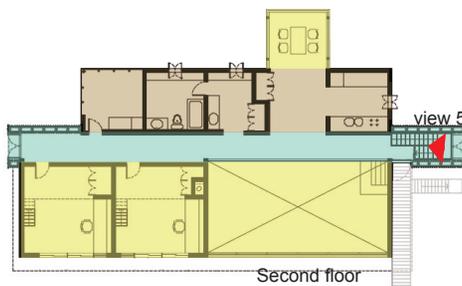
The staircase is a season-telling instrument

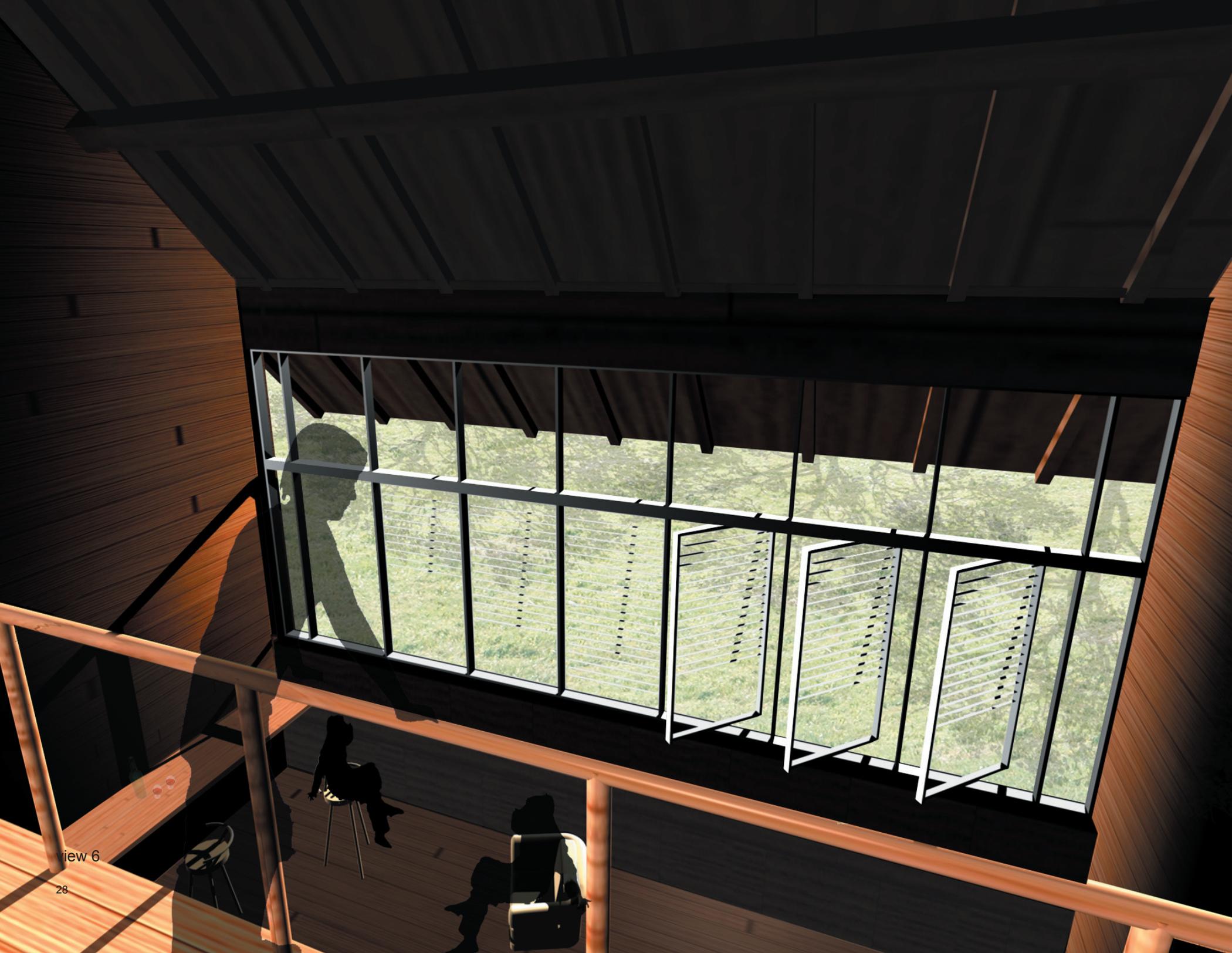
In most houses, the staircase serves as a mere passageway between floors. In the present building, the staircase transforms this routine path into a spectacular journey.

The staircase is located in the skylight corridor. It of course constitutes the physical connection between the two floors. In addition, the materials used--as well as the composition of the service box, main living space, and corridor--draw one's attention when going up or downstairs. The staircase and the framed views at both ends of it adapt to the changing seasons. The translucent quality of the polycarbonate wall allows daylight to penetrate into the interior and give life to this space. It sustains the lively connection between the family space and the daylight conditions in the region. The skylight corridor is the most important time-telling instrument in the residence.

The reasons behind the choice of materials go beyond ordinary considerations for sustainability. Although polycarbonate is a product derived from petroleum, it contributes tremendously to the architectural worth of the house. Under some circumstances, it could be argued that enhancing our passion for living well is even more important for sustainability than using eco-friendly materials. If we enjoy living in a building, we take good care of it. As a consequence, we are less likely to treat the building in such a way that it leads to demolishing and reconstruction, with all of the concomitant damage such activity imposes on the environment. Thus, the longer the original building is maintained in its existing state, the more fully it realizes the ideal of sustainability.

The renderings on the left page show the lighting conditions of the staircase in summer, autumn, and winter, moving from left to right.





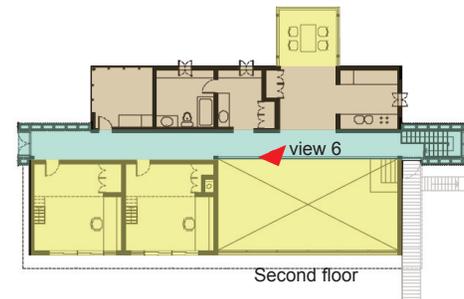
View 6

The visual connection between the first and second floor generates vitality for the house

The liveliness of the staircase continues with the corridor on the second floor. The corridor extends the living room upward toward the second floor. The living room declares its domain within the building by the eye contact between the two floors. Furthermore, the living space on the second floor establishes the relationship between the building and the region with the framed seasonal views of the backyard it provides (also see view 3 on page 22).

The rendering on the left page shows the connection between the two floors. While walking along the upstairs corridor, interaction with people on the first floor and in the backyard is encouraged. Seasonal views of the backyard are framed between the roof overhang and the retaining wall.

Application of a high-performance window, shown at the bottom, provides the occupants better control of thermal comfort, as well as a visual connection to the landscape of the backyard.



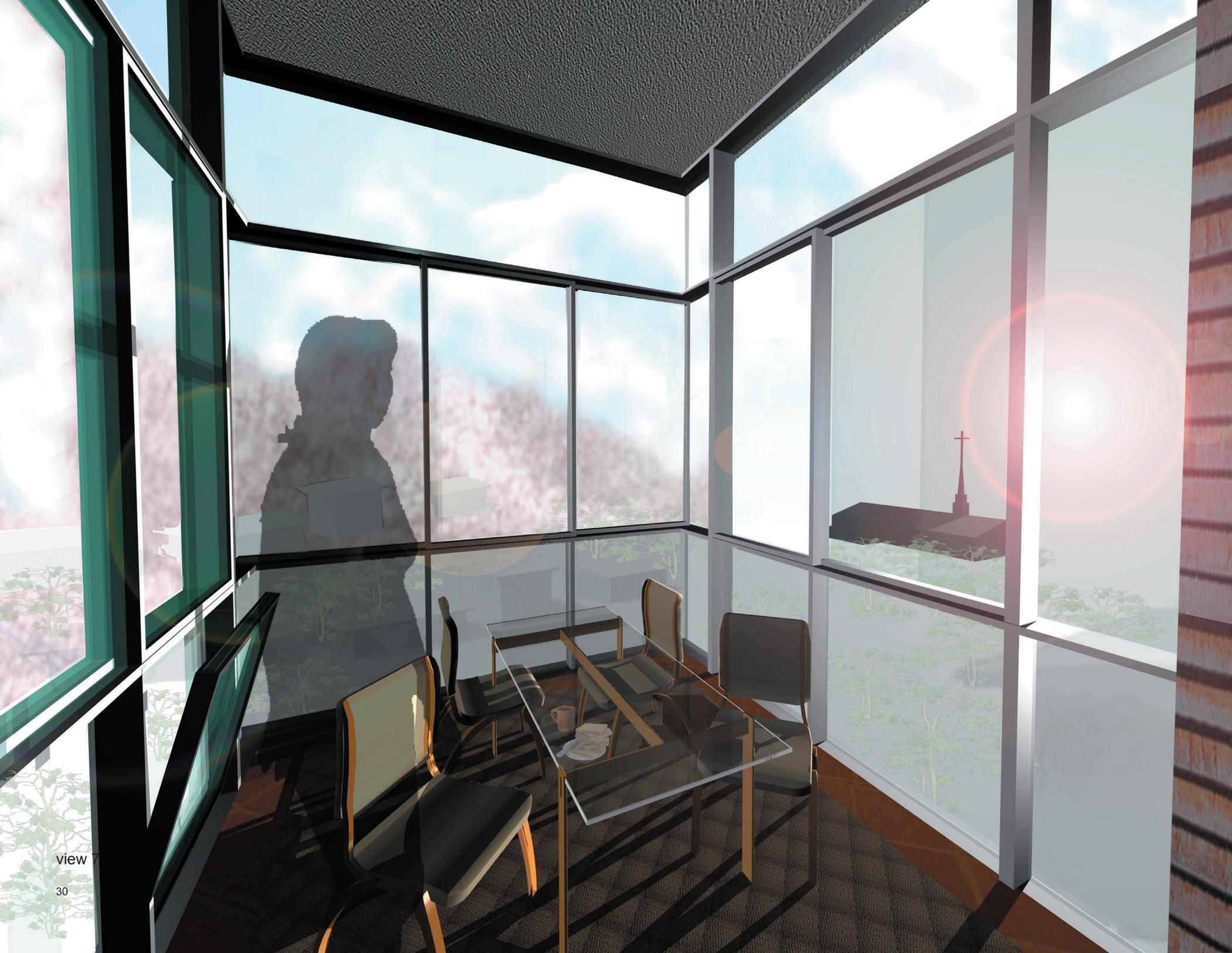
High Performance Window

Location: Mendrisio, Switzerland
Building: Accademia di Architettura Mendrisio

Notes:

1. pivot window
2. louvers are concealed within the glass and window frame
3. louvers are mechanically controlled

(photos are taken by the author)



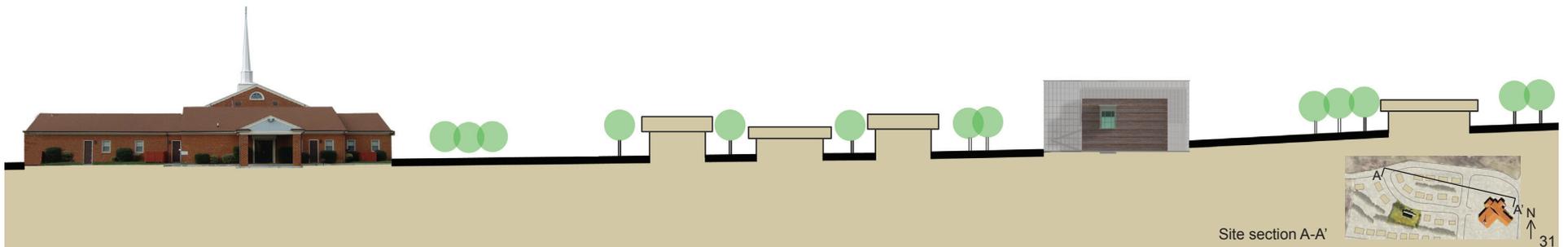
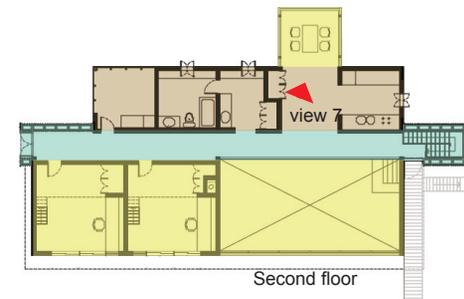
view

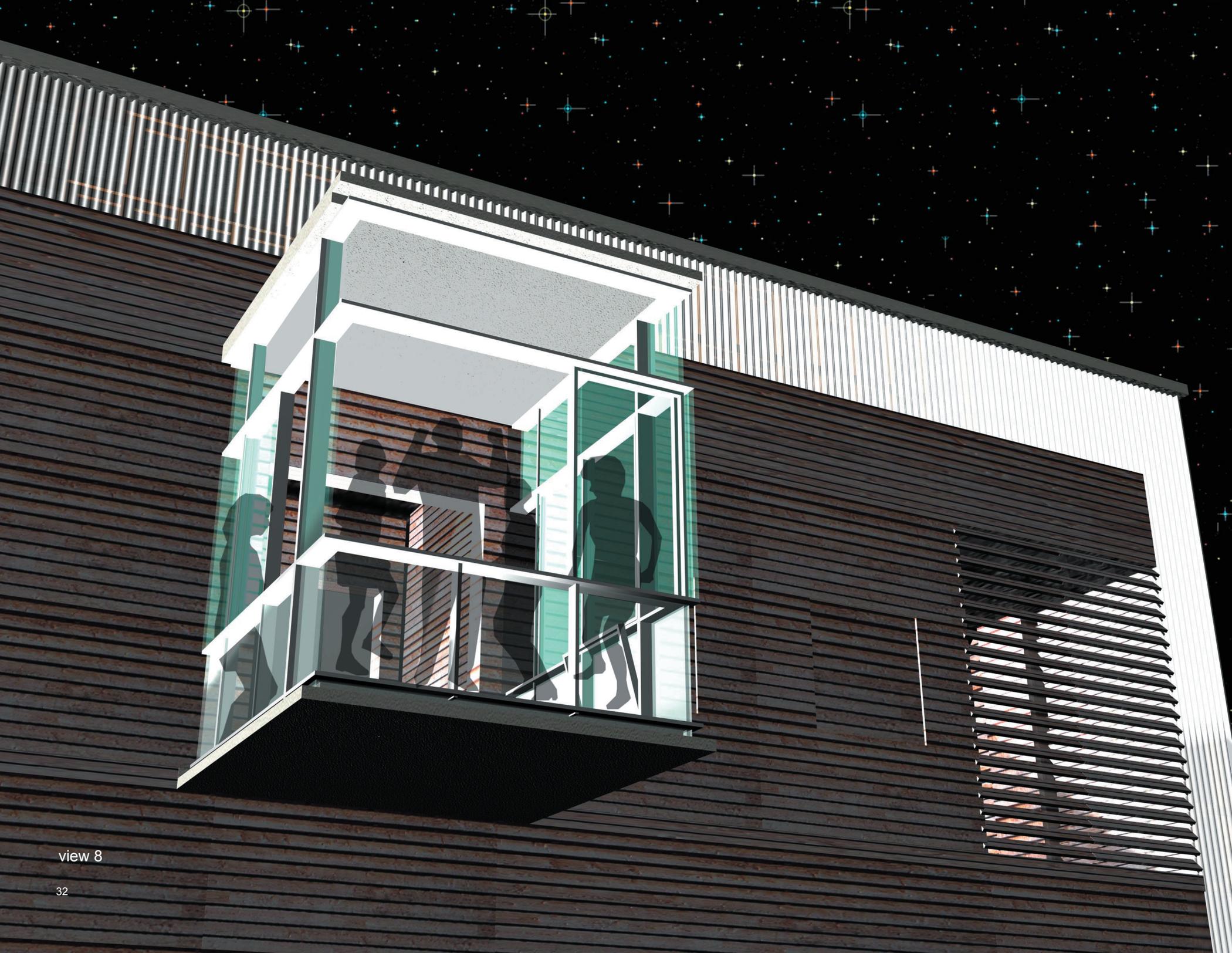
The projected dining room encourages a visual dialogue between the family and the community

From the upstairs corridor, one is able to see the backyard to the south, the neighborhood to the north, and the church to the east. How the family interacts with the community thus is not limited to the entrance space of the house. The dining room on the second floor provides a visual connection to the entire region and the primary landmark in the community, the church.

The dining room is another example of the desire to live well determining one's design approach. Although the glass room is a large opening into the environmental feature of the cold north wind, it provides a superb view of the landscape. Designing so as to intensify perception of the environment in which we live is the most critical architectural step for heightening awareness of the beauty of nature. Once we are aware of nature's beauty, we appreciate it more. Thus the desire to live well is fulfilled, not by controlling the environment, but by embracing it.

The rendering on the left page shows a summer morning during which the family can see the sunrise striking the cross of the church and the entire community as they enjoy breakfast.

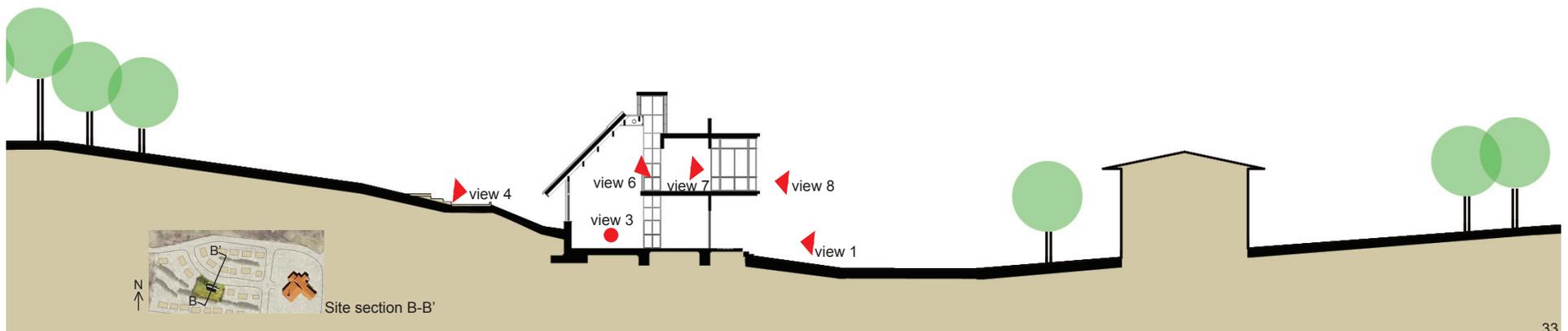
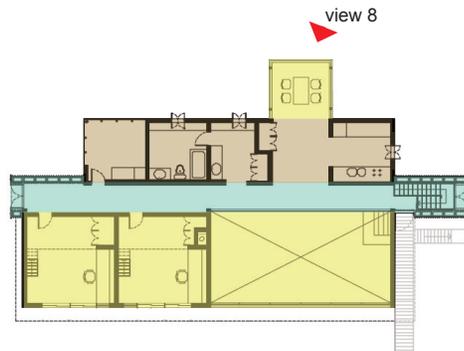


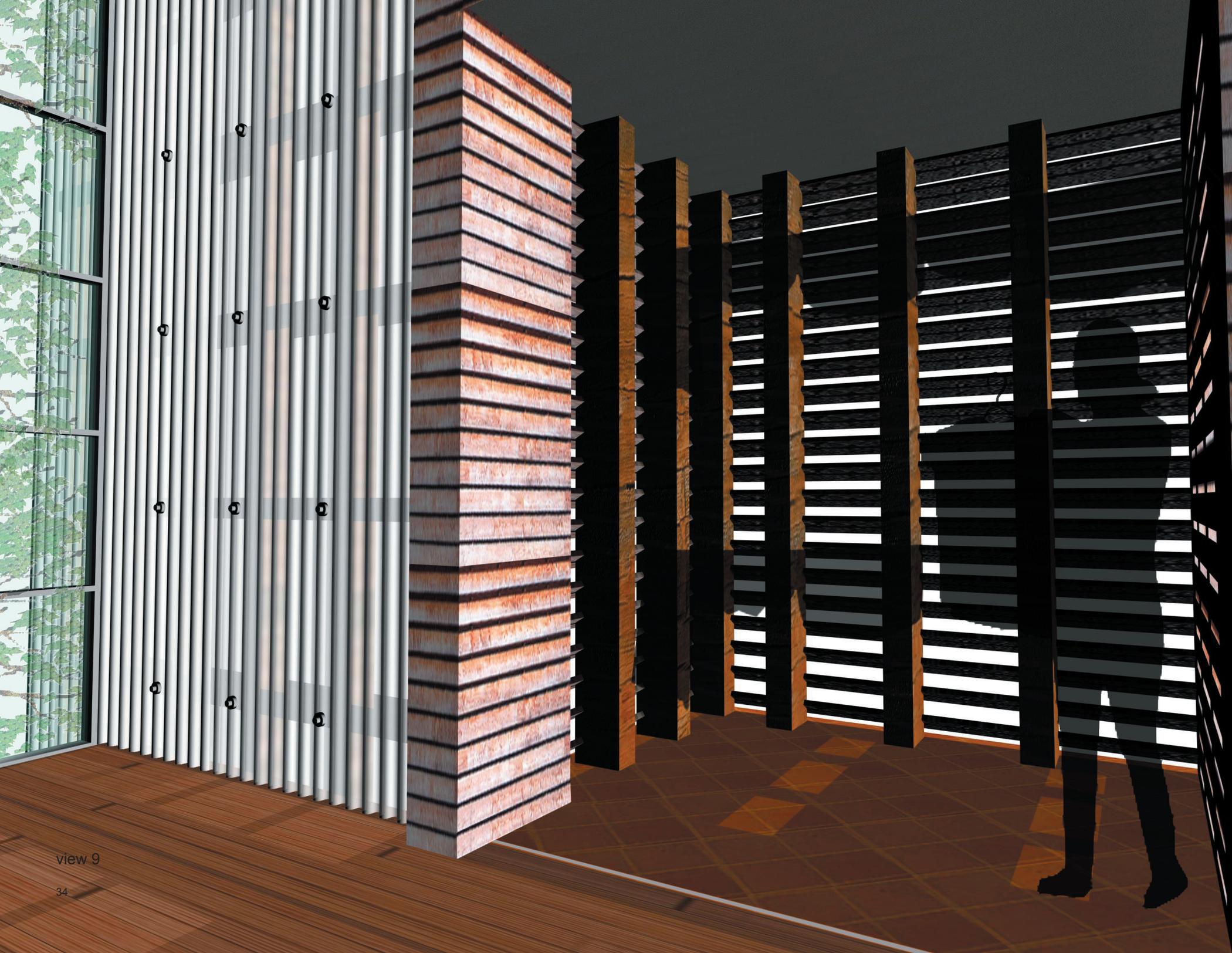


view 8

The projected dining room is an inside-out/ outside-in space

How we use semi-private spaces is the most important expression of how we interact with the neighborhood. In addition, a semi-open space reflects how we make the best use of existing natural resources. During daytime, the projected dining room is like a raised porch on the second floor. It adopts part of the welcoming character of a porch. During nighttime when the weather is nice—for example, during summer nights—the projected dining room is transformed into a balcony. The windows can be opened and used to ventilate the room. This dual quality of inside-out/outside-in makes the dining room the primary sentry of the building.



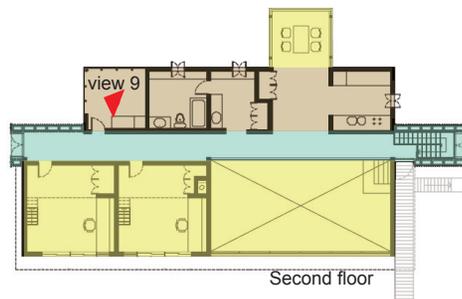
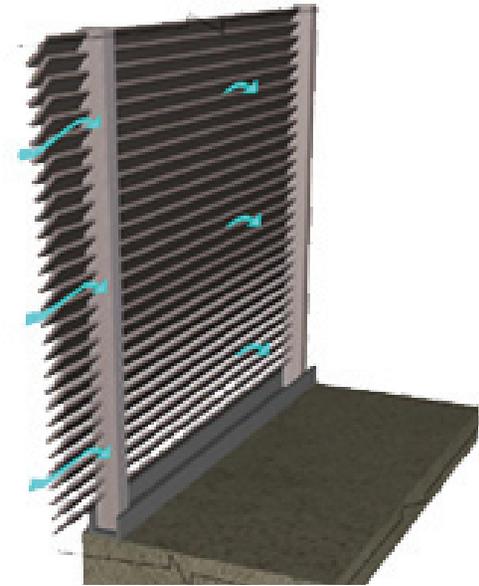


view 9

The laundry room is an example of taking advantage of the use of natural processes

The laundry room is in the northwest corner of the building. The design of this room demonstrates that, depending on how siding walls are used, good ventilation can still be achieved, even given the uniform look of the building. A space can thus be designed that both is fully functional and embraces the environment—specifically, the westerly wind of the region.

The renderings at the bottom show lighting conditions reflected by insulated vs. non-insulated wood siding walls. The rendering on the left shows how siding walls are used in the rest of the house, whereas the rendering on the right demonstrates how ventilation works in the laundry room using a siding wall with the same exterior appearance as the walls in the rest of the house.

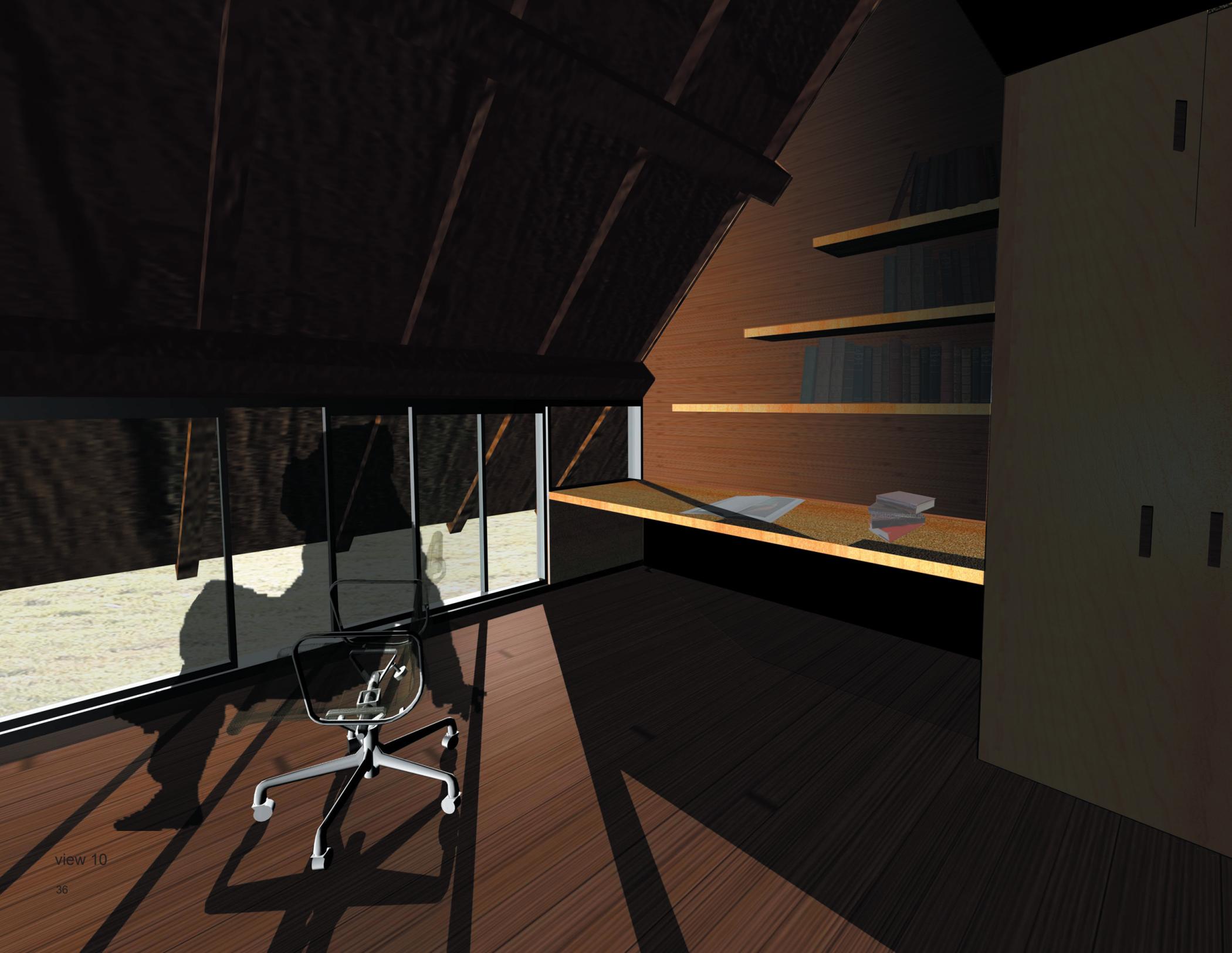


siding wall with insulation



siding wall without insulation

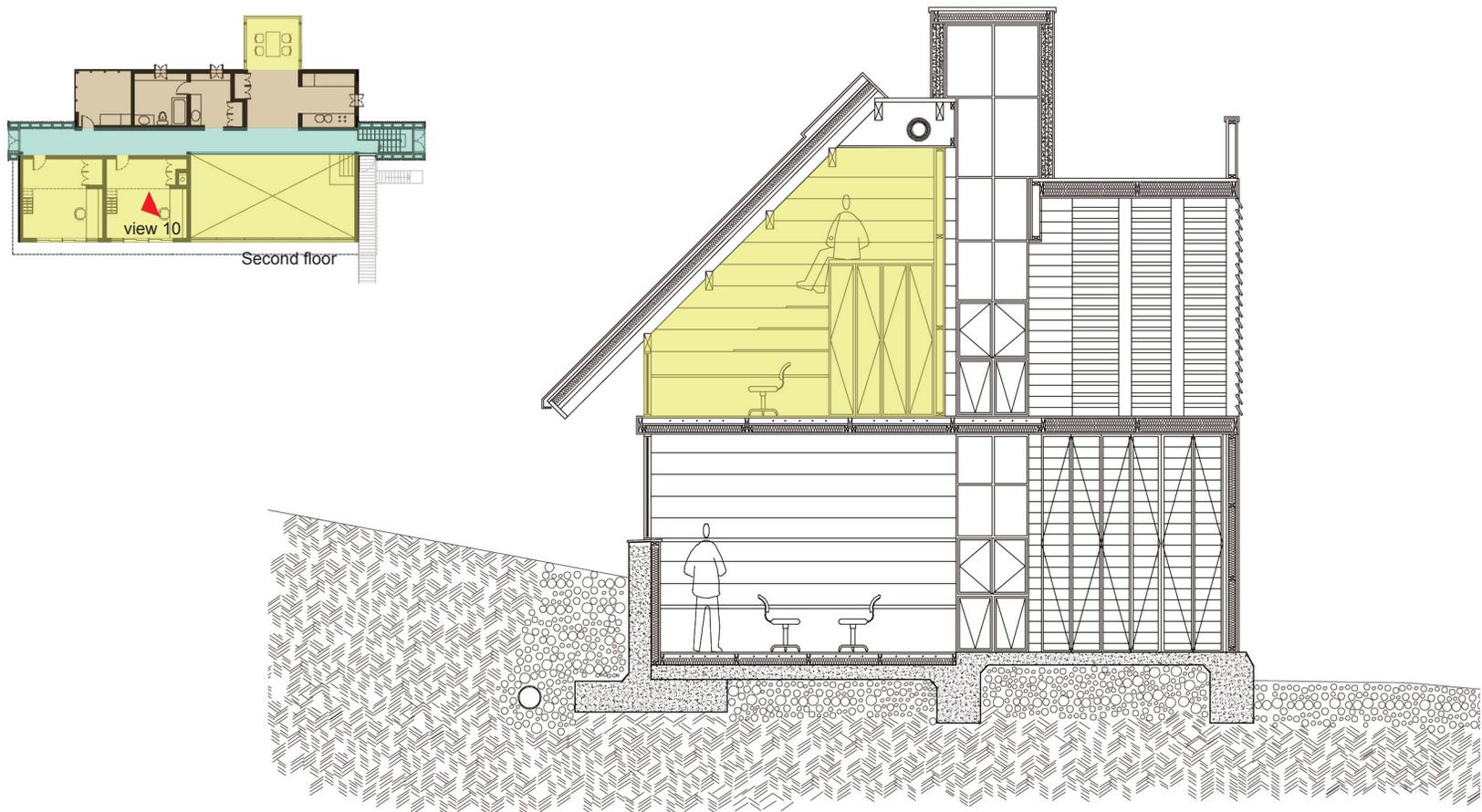




view 10

Bedroom on the second floor is the personal corner in the house

The section of the bedroom on the second floor is shaped like a triangle, with the bed on the upper level and the sloping roof leading down to a lower section that serves as a personal space. This room is strongly characterized by a relationship with the site—specifically, by the framed view of the backyard. In summer, the room is well shaded by the projecting roof canopy, but also provides good eye contact with the tranquil backyard. But in winter, it is able to maximize heat gain from the southern sunlight, through the south facing windows. The bedroom is the most personal space in the house.



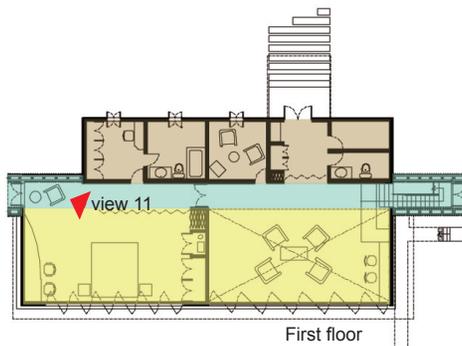


view 11

The master bedroom on the first floor admits various degrees of daylight

The master bedroom, located on the west side of the first floor, is another personal space. It provides the joy of being able to perceive variations in the qualities of regional features while being within the most personal space in the house. The rendering on the left shows the west end of the skylight corridor/ventilation path in the master bedroom. This spot frames the view of the landscape to the west. Due to the orientation of the building and the material used for the wall, this spot allows for two different types of lighting conditions in the morning (right) and the late afternoon (left).

Application of a high-performance window, shown at the bottom, provides occupants better control of thermal comfort at different times of the day.



High Performance Window

Location: Riva San Vitale, Switzerland
Building: Casa Maderni, Center of European Studies and Architecture, Virginia Tech
Room: bathroom

Notes:

1. multiple operation , closed, open, tilted controlled by two sets of hinges
2. two sets of hinges sealed in the frame, controlled by the handle
3. materials for the frame could be wood, metal, or hard plastic

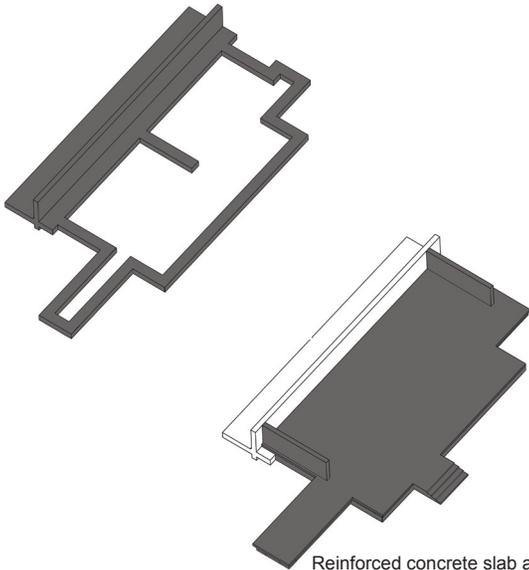
(photos are taken by the author)



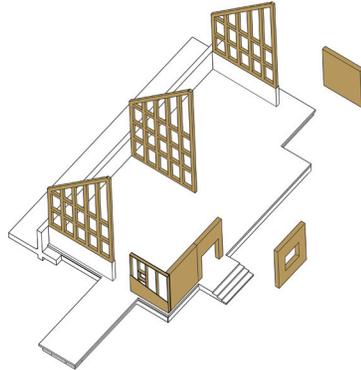
Construction Sequence

Integration of common materials, such as wood siding, construction techniques, and the solar roof combine to make the building more affordable.

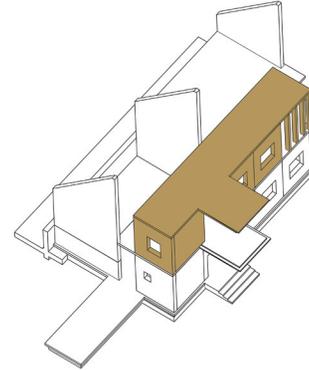
Reinforced concrete foundation and retaining wall



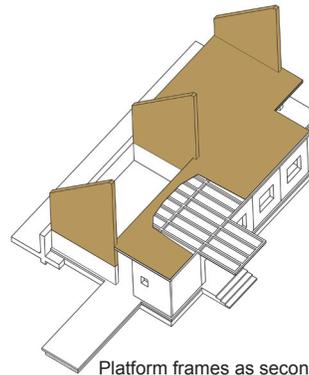
Prefabricated wall panels and balloon frames



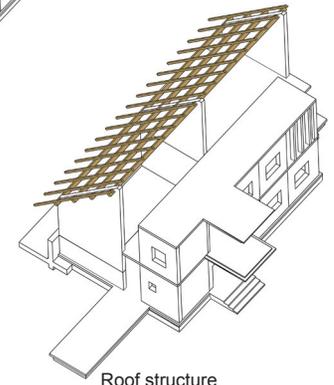
Prefabricated wall panels, platform frames and studded laundry room



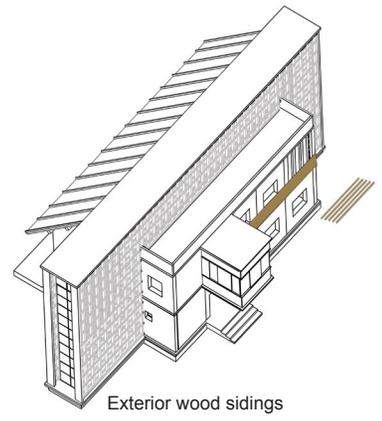
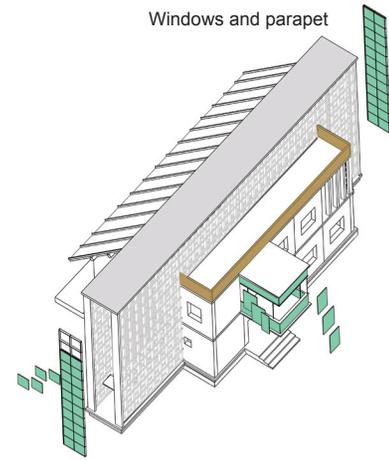
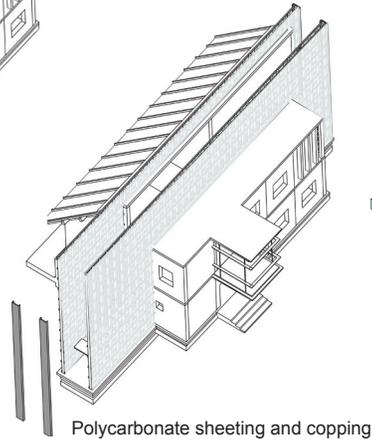
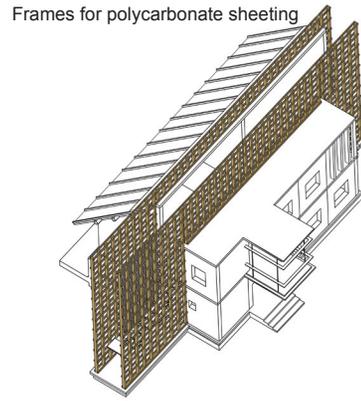
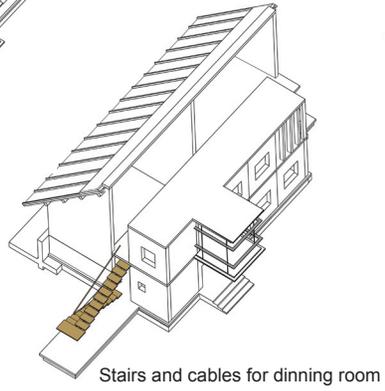
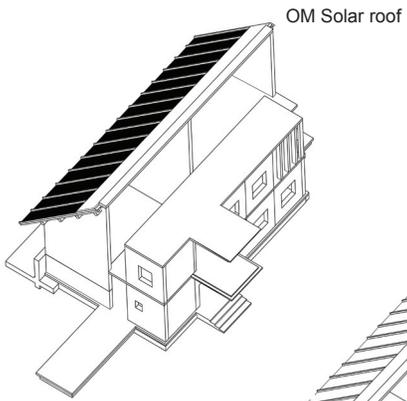
Reinforced concrete slab and side walls

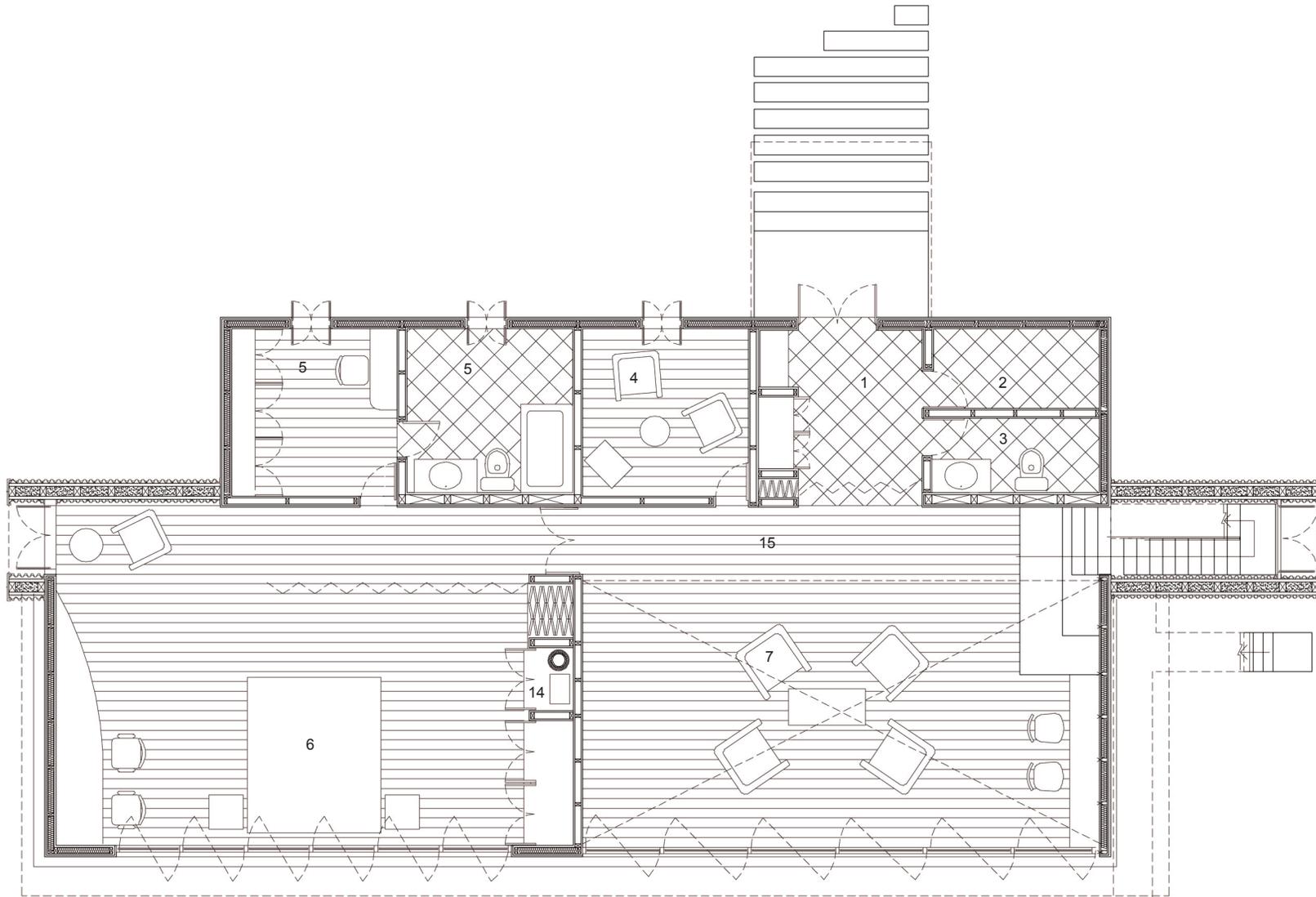


Platform frames as second floor structure



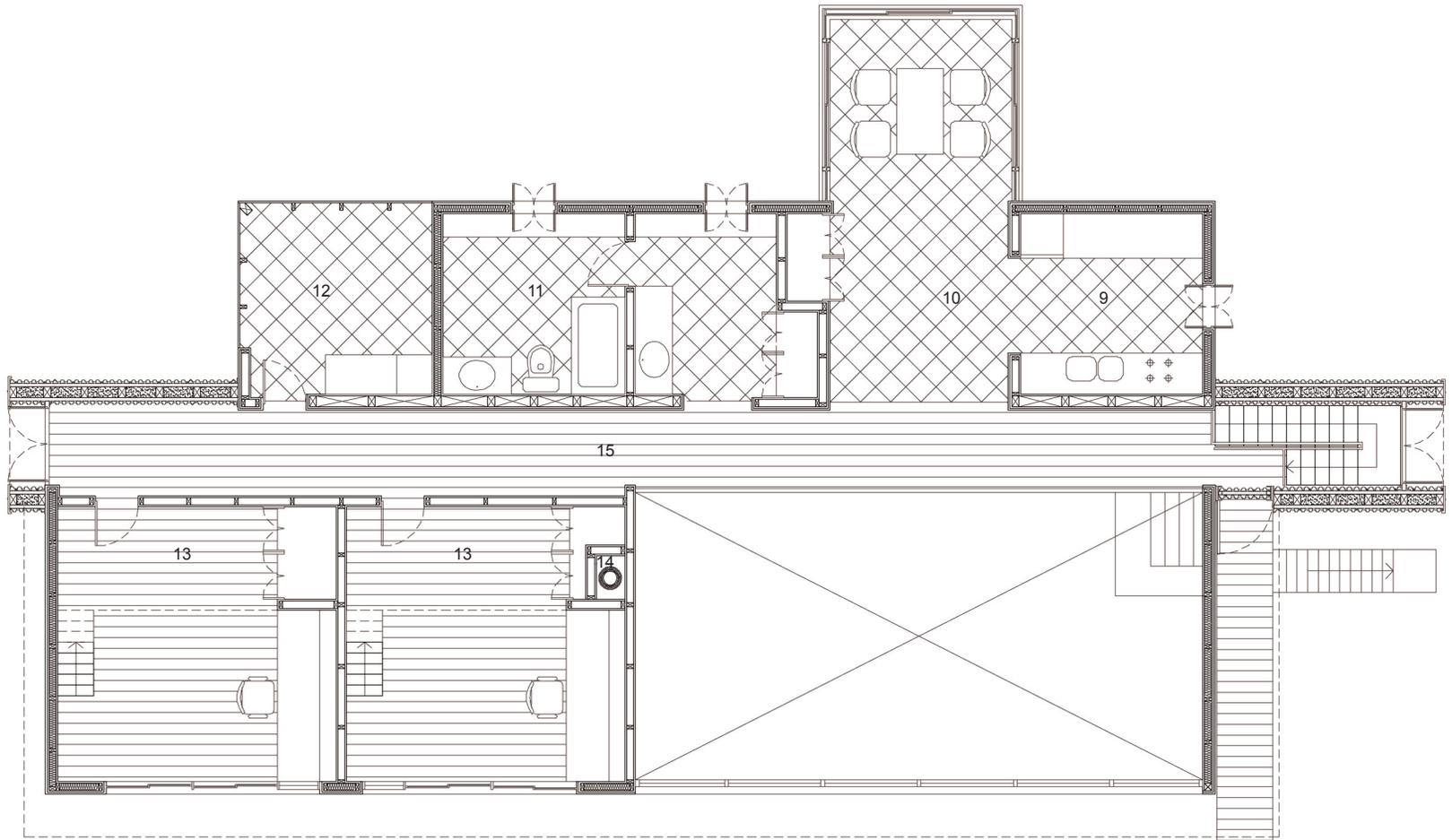
Roof structure



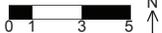


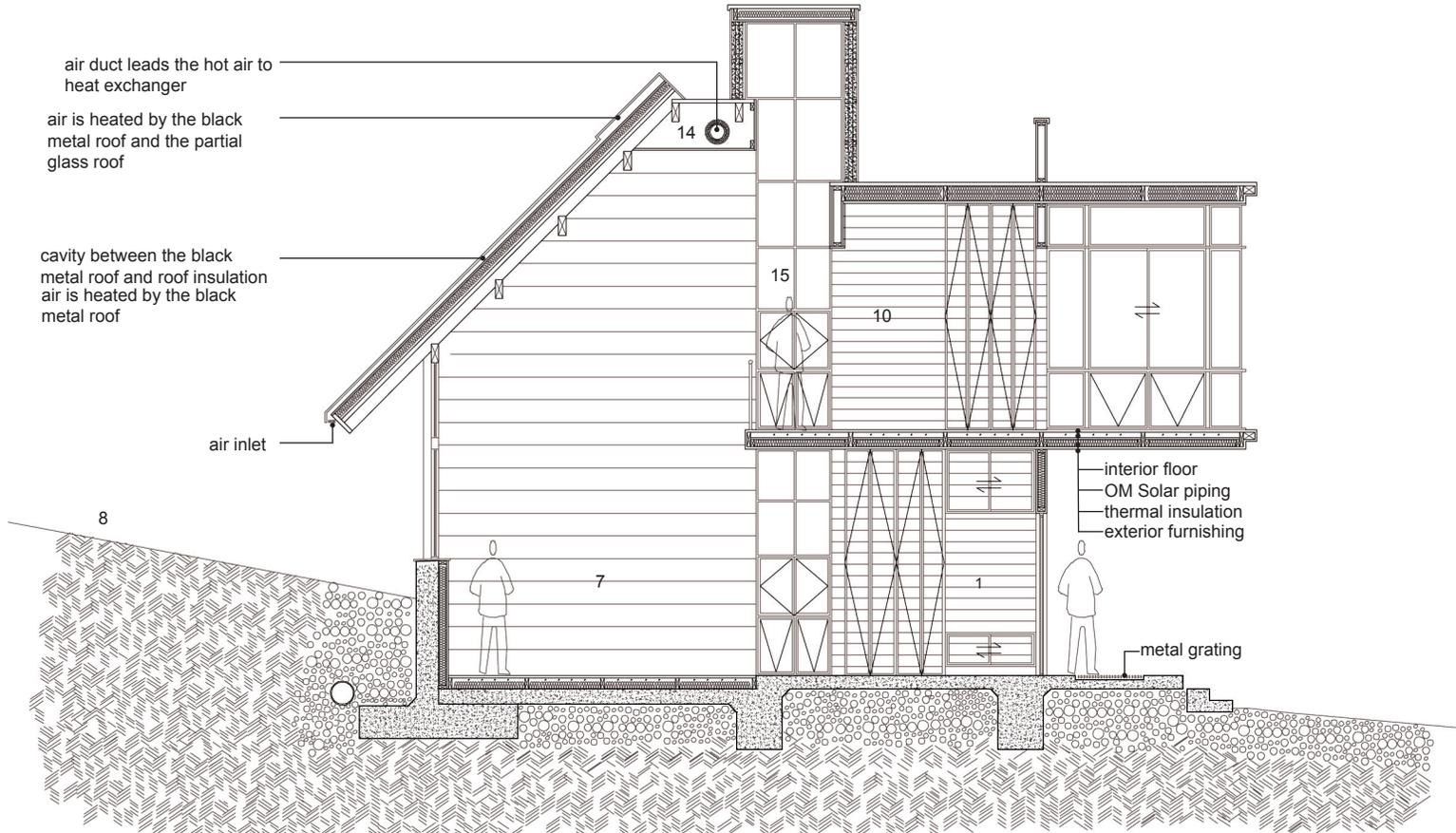
- | | |
|---------------------|--|
| 1 foyer | 9 kitchen |
| 2 storage room | 10 dining room |
| 3 toilet | 11 bath |
| 4 TV room | 12 laundry room |
| 5 bath and dressing | 13 bedroom |
| 6 master bedroom | 14 OM Solar roof mechanical room |
| 7 livingroom | 15 skylight corridor/ ventilation path |
| 8 backyard | |

First floor 0 1 3 5 N



- 1 foyer
- 2 storage room
- 3 toilet
- 4 TV room
- 5 bath and dressing
- 6 master bedroom
- 7 livingroom
- 8 backyard
- 9 kitchen
- 10 dining room
- 11 bath
- 12 laundry room
- 13 bedroom
- 14 OM Solar roof mechanical room
- 15 skylight corridor/ ventilation path

Second floor  



air duct leads the hot air to heat exchanger

air is heated by the black metal roof and the partial glass roof

cavity between the black metal roof and roof insulation air is heated by the black metal roof

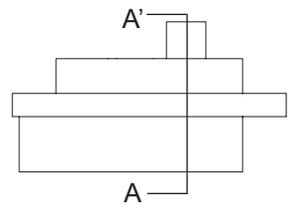
interior floor

OM Solar piping

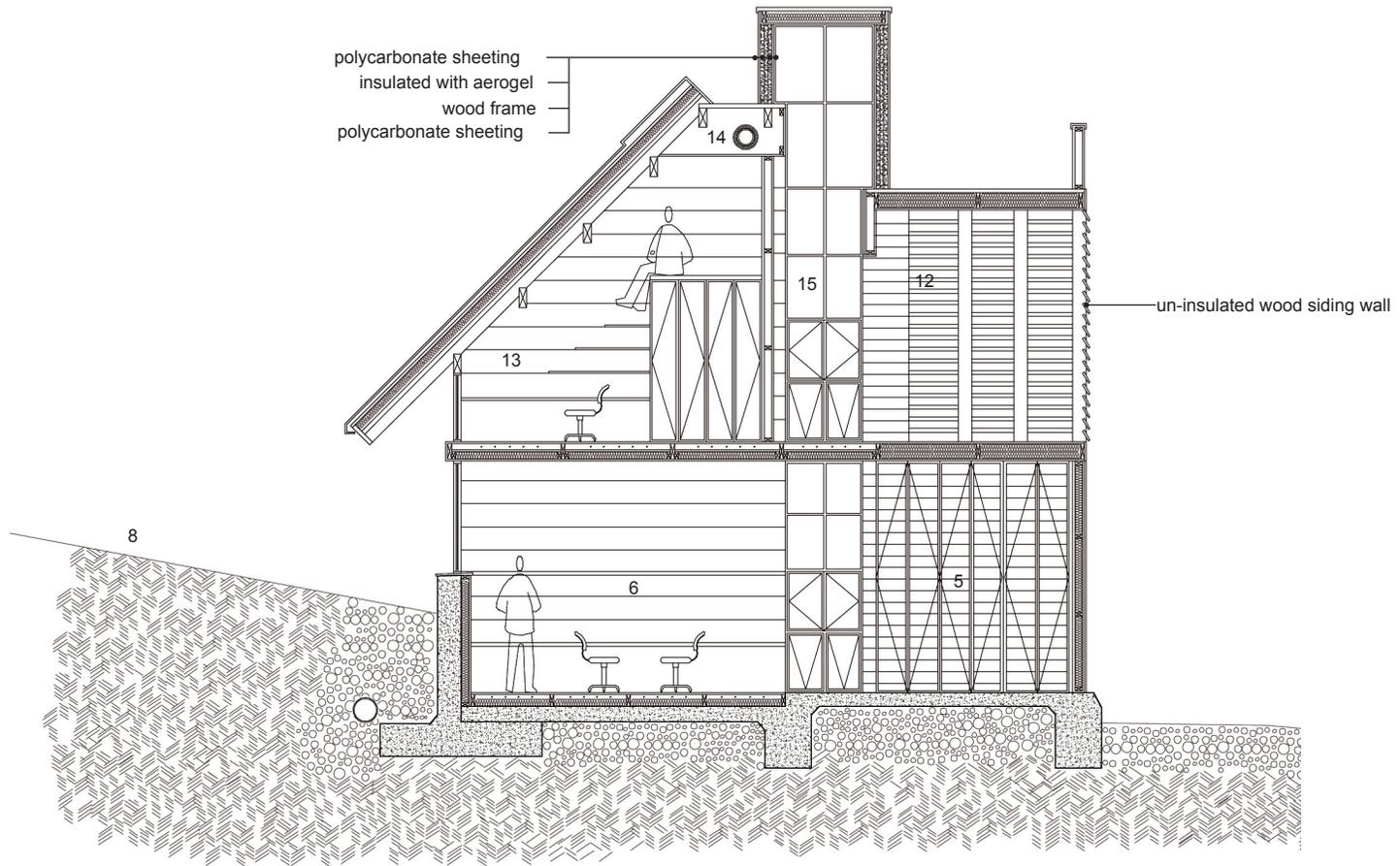
thermal insulation

exterior furnishing

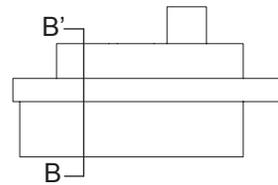
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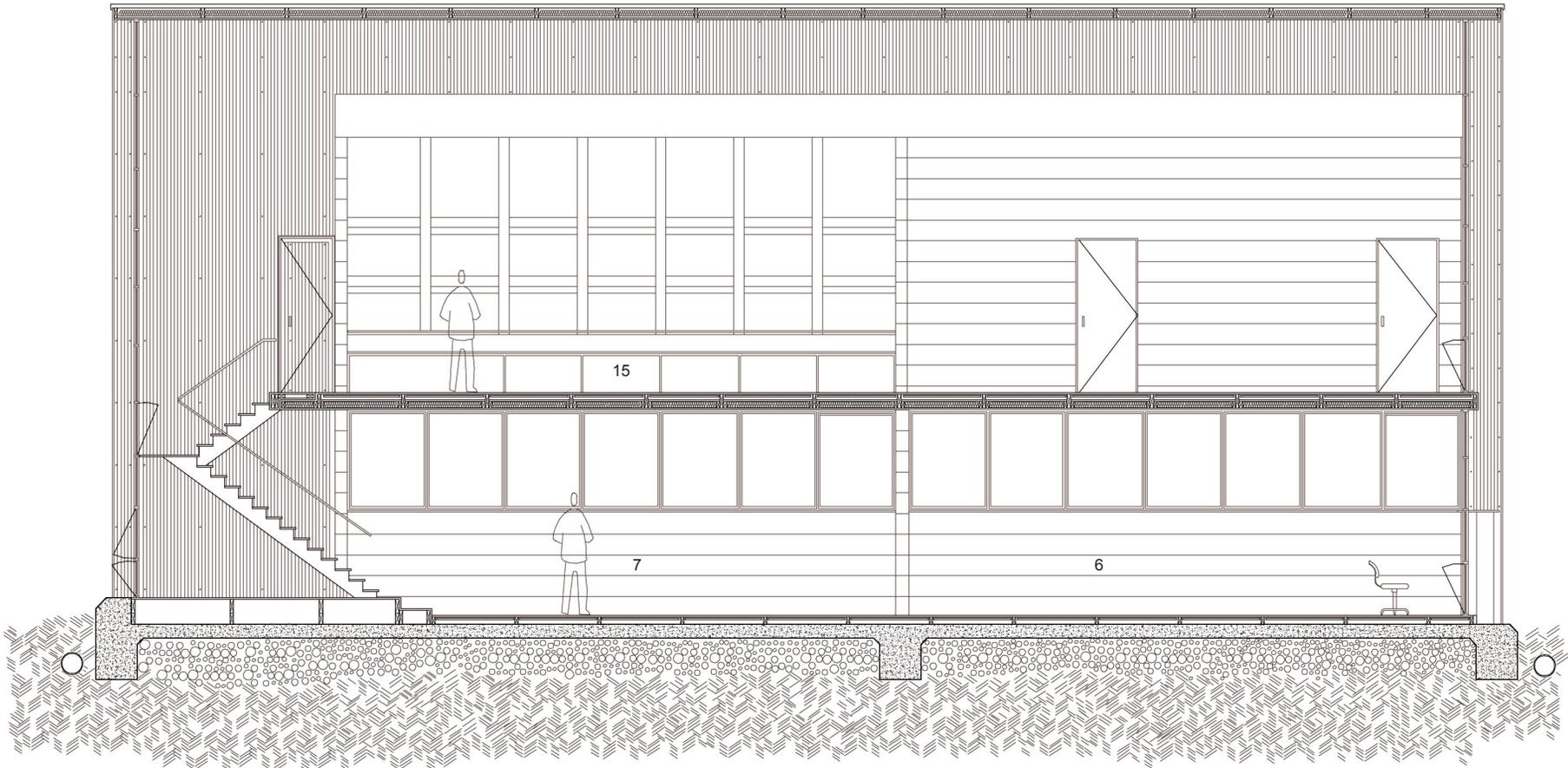
Section A-A' 0 1 3 5



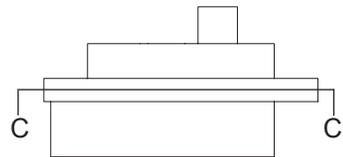
- | | |
|---------------------|--|
| 1 foyer | 9 kitchen |
| 2 storage room | 10 dining room |
| 3 toilet | 11 bath |
| 4 TV room | 12 laundry room |
| 5 bath and dressing | 13 bedroom |
| 6 master bedroom | 14 OM Solar roof mechanical room |
| 7 livingroom | 15 skylight corridor/ ventilation path |
| 8 backyard | |



Section B-B' 0 1 3 5



- | | |
|---------------------|--|
| 1 foyer | 9 kitchen |
| 2 storage room | 10 dining room |
| 3 toilet | 11 bath |
| 4 TV room | 12 laundry room |
| 5 bath and dressing | 13 bedroom |
| 6 master bedroom | 14 OM Solar roof mechanical room |
| 7 livingroom | 15 skylight corridor/ ventilation path |
| 8 backyard | |



Section C-C'



The way we build is a reflection of the way we live. The core issue in design is always how we can elevate our quality of life. Although quality of life may be purchased by other means, the pleasure obtained through experiencing the qualities of unique spaces is invaluable. The building itself is a substantial response to these issues. Thus, the formation of a building should not be the result of series of mathematical equations that generate one answer using only linear logic. Since no two pieces of land on earth are the same, quantitative measurements cannot address the existing conditions of all sites on a universal basis. The building, the man-made intervention, should be the critical balancing point in our dynamic world. It should artfully link the given site with the proposed arrangement of space, and should launch a proper appreciation of the passage of time by the design of its spaces. A building should capture the unique and enchanting qualities of life with its composition. A building is not just a container for living. It is an instrument by which residents can realize and value their own place in space and time.

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Also see [http:// www.omsolar.com](http://www.omsolar.com)

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