House at Yellow Sulfur Springs

Thesis submitted to the faculty of the Virginia Polytechnic Institute & State University in partial fulfillment of the requirement for the degree of

MASTER OF ARCHITECTURE

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Abstract

Architecture is a structured relationship of physical elements in which use, experience and memory are integral to its sense of shelter. Beginning with the drawn and built conceptions of the House at Yellow Sulfur Springs, structural fragments of the project included cast concrete studies, a desired relationship between surface, physical structure and light, an indirect path of entry and pre-existing qualities of the site. These fragments coalesced as a house with varying degrees of enclosure, a structure defined by material distinctions and assembly details, and a sensual path between inside and outside.

Throughout the project, memory of the Japanese Tea Ceremony, thoughts about the nature of shelter and the ratifying logic of geometry served as additional guides.

In memory of my father

Contents

Shelter (or Stillness)

For more than five years prior to starting my thesis, I periodically helped care for my father, who was ill. These stints included times when he and I lived alone in a small apartment. They also included times in the house in which I grew up, with my mother, sister, and brother all taking part in his convalescence. In our collective efforts to make my father psychologically and physically comfortable, the nature of shelter increasingly preoccupied me.

During my father's last months, the Japanese tea ceremony, which I studied in college, took on particular significance. The tea ceremony takes place in a ritual tea room. Traditionally, the path to the tea room is indirect and offers, along its way, a series of outdoor rooms that gradually reveal the tea room. While in tea lore this sequence has been described as related to a non-linear path to enlightenment, I came to think of the path as a generous, protective connection between outside and inside.

The structure of the ritual is determined by the specific school of tea with which the host is associated. Within this formal organization, one of the prerogatives of the host is to infuse each tea meeting with a distinct sensibility. She does this, in part, by the way she integrates the ritual's prescribed elements with an assemblage of discretionary elements, collectively known as *toriawase*. In practice, these artifacts, edibles, flora, history and symbols start to seem like a structure of conceptual and sensory effects. By including a particular tea bowl or a certain flower at a particular time of year, the host might make connections to previous tea meetings and significant tea figures or might mine for seasonal allusions. Other elements of the ritual are more overtly sensual: the bubble of boiling water, the rough and smooth of a partially glazed ceramic bowl in hand and at one's lips, the froth of whisked green tea, the wafting smell of flowers, and the return of sensation to one's feet after sitting for too long, to name a few. Over time, the sensory effects and arcane references intertwine. Through experience and memory, the physical components of the ritual come to seem layered—inhabitable boundaries in their own right. During practice of the ritual, however, they take a background role defining a place in which host and guest meet through a shared cup of tea.

As my father's health deteriorated, he and I went out less often. Although our errands had not been extravagant for some time, we did continue going to the grocery store both as a necessity and because it was a reliable source of fresh experience. Operating intuitively from a life of eating well, my father selected fruits and vegetables as I

wheeled him in his chair around the produce aisle. When we finally suspended even these outings, we stayed inside our house most of the time. I felt confined; he seemed less alive.

It occurred to me that if I designed a house, I would make it a place where my father would not mind staying for a long time. It would be a place in which he could move from dark to light, look at day directly or reflected on the walls, be outside but not overly exposed. I was imagining a place with boundaries as multivalent as those I recalled from the tea ceremony.

The avowed aim of the tea ritual is to evoke a shared feeling between host and guest. But like the path to the tearoom itself, the meeting of host and guest is indirect. Entry to the tea room; preparation of the tea; and drinking and clean up all follow prescribed movements. Sometimes the choreography calls for direct interaction such as when the host invites the guest to comment on a particular item of tea ware. At other times, the host and guest are more solitary such as when the host whisks hot water and powdered tea and the guest sits still. The coordinated sequence of discrete gestures suggests a seamless series of movements on the part of both practitioners. Yet, for all of the predictability, there seems to be no precise moment of meeting between host and guest. If it happens at all, it occupies a time (or maybe a place) that derives from unprogrammed moments dispersed across the constellation of elements that define the ritual.

As the host and guest take their places in the tea room, the tangible artifacts of the ritual—walls, doors, floor, tea wares—appear to be rigidly defined physical boundaries. And as each practitioner moves and pauses with the ritual's choreography, these physical elements become integral to their vocabulary of inhabiting the ritual. What interests me about the tea ceremony is not the possibility of reinterpreting this esoteric Japanese tradition in contemporary terms. Rather, it is the way in which this designed environment relies on structure, artifacts, sensory effects, and history to allow for the most unpredictable and, therefore, human of responses. Architecture, too, is fundamentally about people and experience. And it too is made primarily through material, physical and sensual means. It has been with this understanding that I started to join thoughts about my father with recollections of the tea ceremony and conceptions about the relationship between structure; physical artifacts; and seeing, using and remembering a place—conceptions about the presence and quality of physical boundaries as integral to one's sense of shelter.

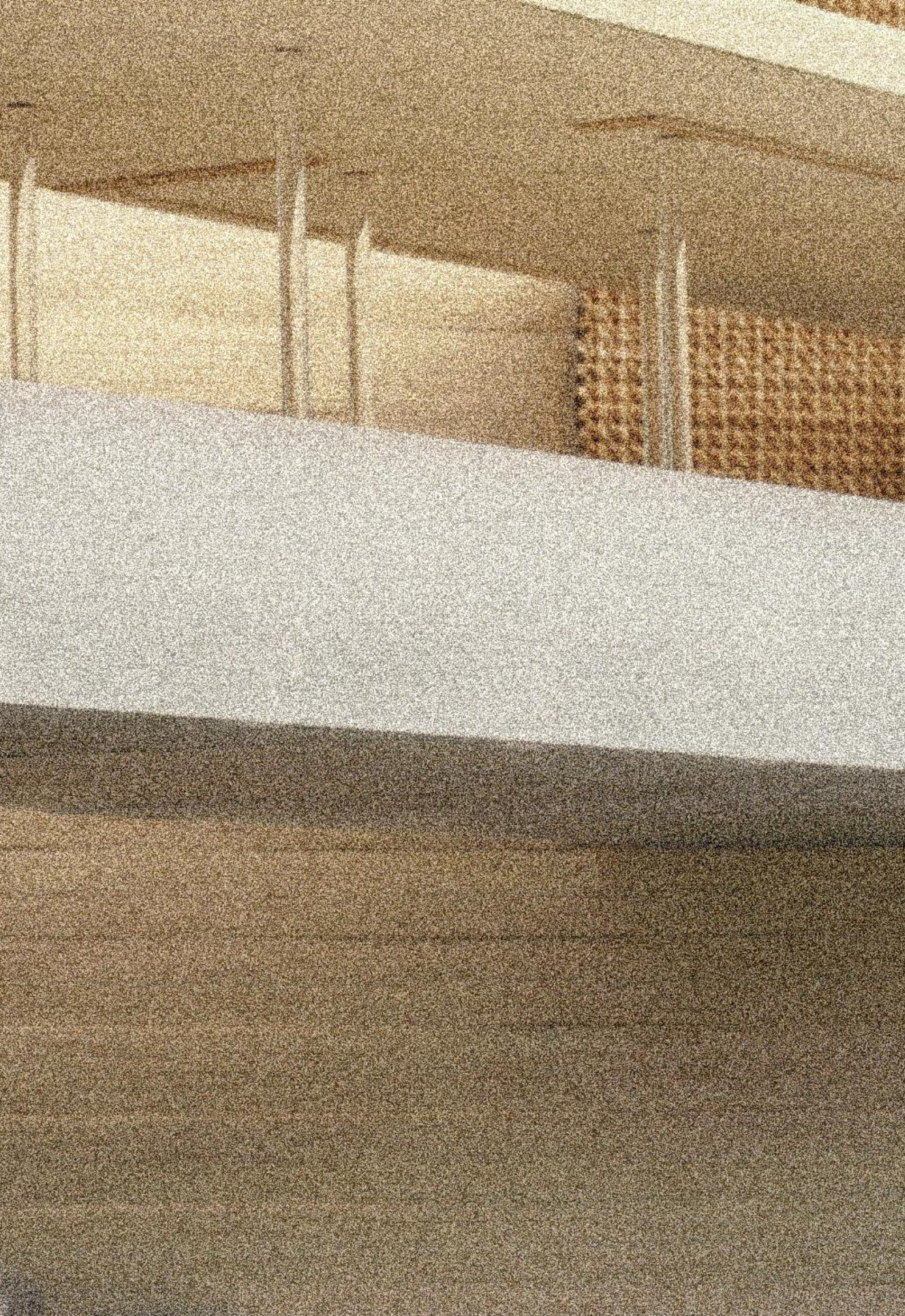
Abstract

Architecture is a structured relationship of physical elements in which use, experience and memory are integral to its sense of shelter. Beginning with the drawn and built conceptions of the House at Yellow Sulfur Springs, structural fragments of the project included cast concrete studies, a desired relationship between surface, physical structure and light, an indirect path of entry and pre-existing qualities of the site. These fragments coalesced as a house with varying degrees of enclosure, a structure defined by material distinctions and assembly details, and a sensual path between inside and outside.

Throughout the project, memory of the Japanese Tea Ceremony, thoughts about the nature of shelter and the ratifying logic of geometry served as additional guides.

Overview

The House at Yellow Sulfur Springs consists of a large beam supported by layers of walls that incrementally negotiate the site's steep terrain. The walls curve along the length of the beam to provide shade, privacy and protection from northwest winter winds. The surface texture of the walls and their location relative to the beam vary to demarcate rooms and cue circulation throughout the house. The polished concrete faces of the walls serve as partial visual boundaries for the central region of the house, containing and reflecting the parade of light and shadow, rain and snow that envelop the indoor-outdoor living space. In contrast to these visual boundaries, the physical boundaries in this region are the edges of the elevated beam and two glass box enclosures. Where the walls intersect the beam, the concrete boundaries reveal reverse faces of brick within which the contiguous living spaces of the house extend. In these more enclosed areas, the physical and visual boundaries are one and the same.



Inquiry 15

We shall not cease from exploration

And the end of all our exploring

Will be to arrive where we started

And know the place for the first time.

T.S. Eliot

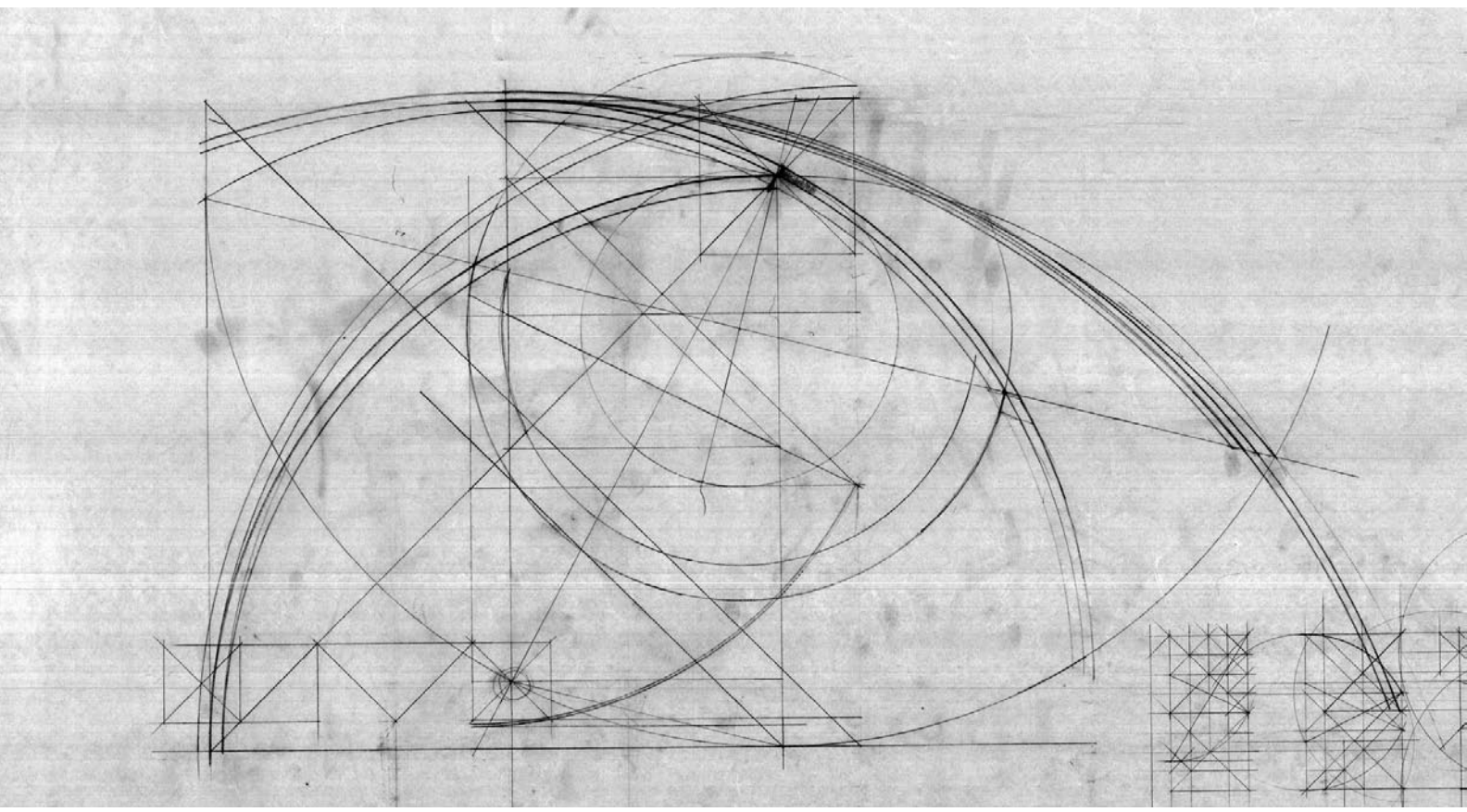


Diagram of the house drawn toward the end of the project.

Orientations

A house inspired by physical and material exploration and a sense of shelter recalled from the Japanese tea ceremony.

A relationship of physical elements developed through drawings, models, objects and writings.

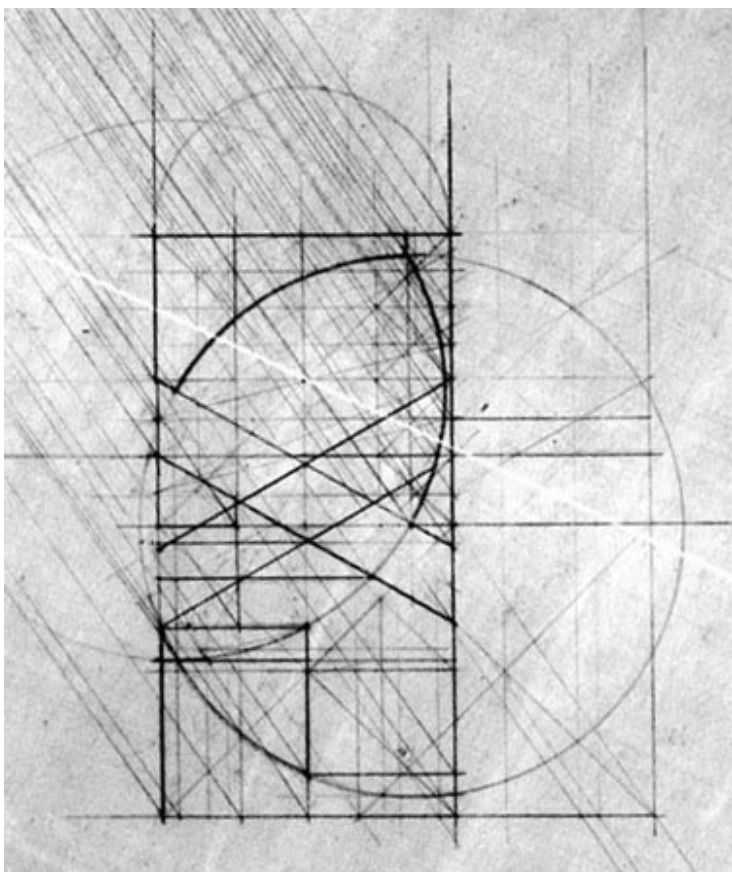
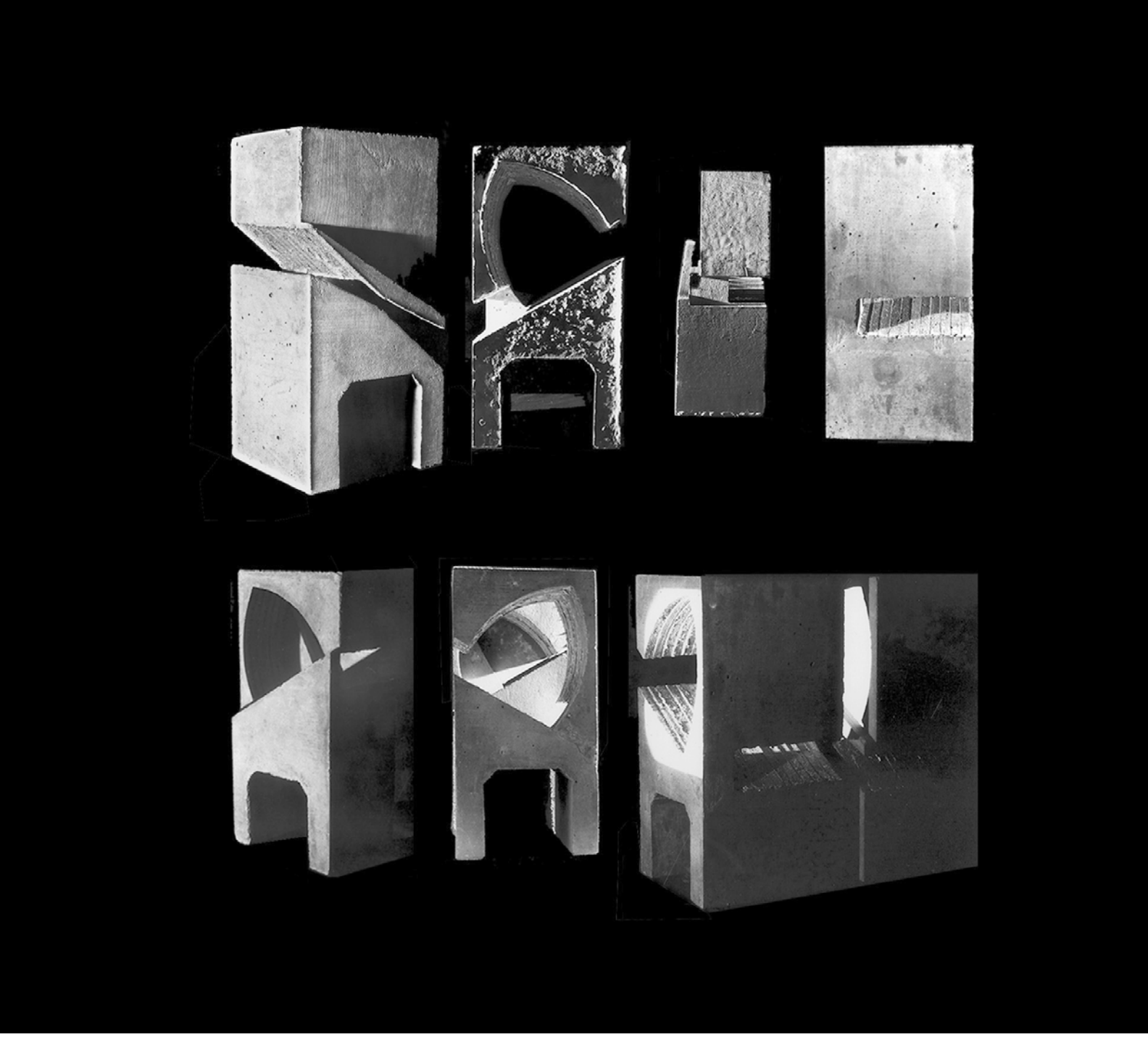


Diagram of a concrete cast.



Above: collage of images of the concrete casts with different light conditions in the voids of the casts.
Right: model of the House at Yellow Sulfur Springs shares the casts' curved shape.

Ideas of the house's form, materials, and construction emerged from a study involving concrete castings. Initially intended as an exploration of casings for a segmented bond beam, the castings contained two voids: one designed to carry a portion of the bond beam, the other designed to let light pass through the body of the block. Photographs of the completed casts suggested an inhabited void alternately sheltered and exposed by the surrounding structure - a place in which the physical boundaries offer a sense, rather than the fact, of enclosure. This mediated relationship between inside and outside brought to mind qualities of shelter in the Japanese tea ceremony and underlies the spatial character of the house.

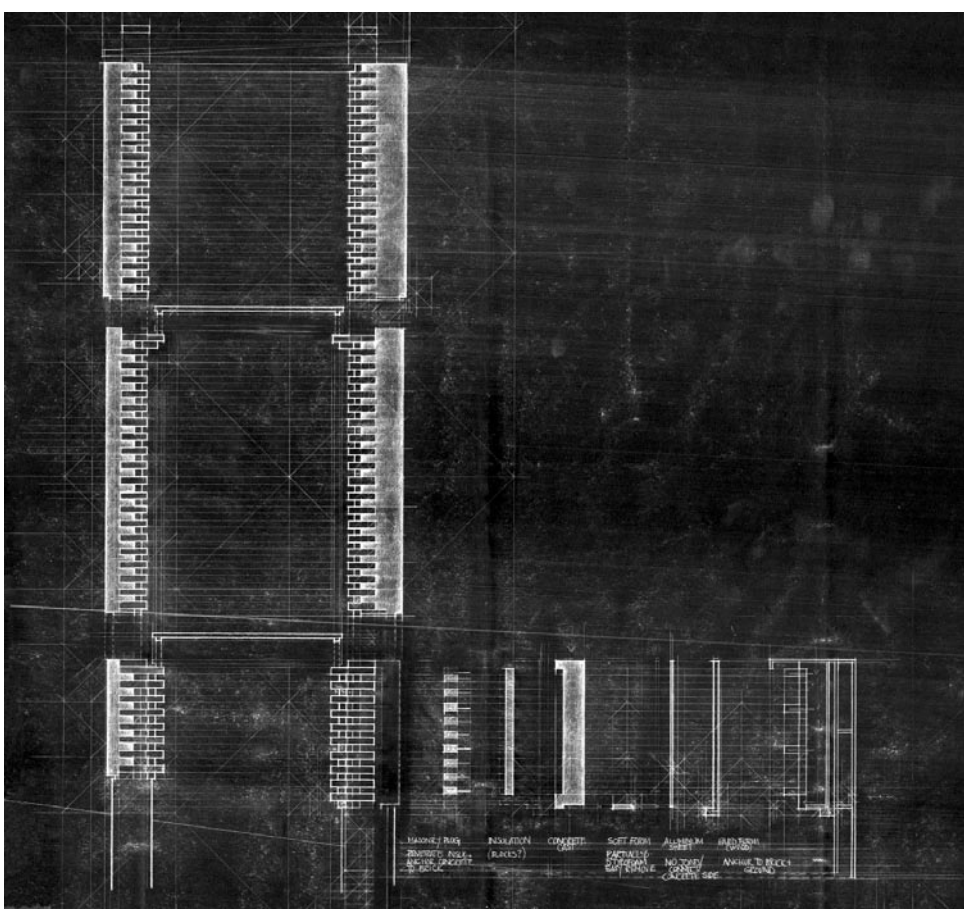
Inhabitable Boundaries

In one entrance, for example, tall walls with no roof make up the physical boundaries of the space. Descending from this entrance to a patio one story down, one is between the planes of the beam, but outside the enclosed living space of the house. Here, the horizontal floor and ceiling constitute the immediate physical boundaries. The visual boundaries of curving walls, to the north, and site, to the south at a greater distance, limit the space in a more ambiguous way.

The concrete casts involved two types of form work: reusable plywood forms for the smooth, rectilinear exterior and disposable layers of foam board for the irregular, interior passages. The casting exercises gave way to the composite brick and concrete walls of the house. In the house walls, the brick functions as both form work and one face of the walls' permanent surface. Form work for the other face of the walls is temporary and removed after construction.

Material Effects

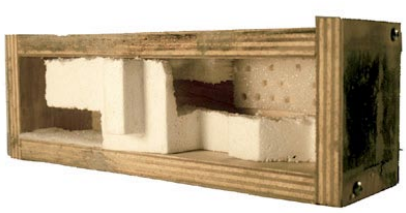
Schematic details for the house's brick and concrete walls include brick coursing patterns, construction sequencing and assembly strategies. These details developed reciprocally with the structure of the house. As details such as perpendicular brick coursing were adapted to locations around the house, an assembly logic developed for all of the walls. On paper, geometry ratified this logic, including the specific location and orientation of each wall and each brick. In physical and experiential terms, material presence and surface details reveal the structure of the house.

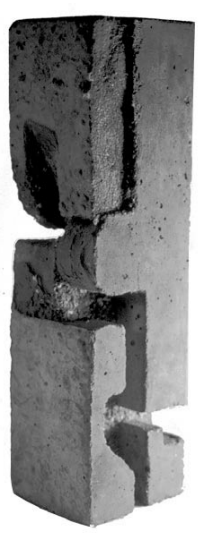


Above: close-up of concrete cast. (Reusable plywood box form used for exterior of the cast; layers of 1/2" foam board used for interior void).

Below: early casting exercises - plywood box form with irregular foam in-fill (right) and subsequent cast (left).

Left: preliminary wall section of the house with permanent brick form work on one side of the cast concrete wall and temporary form work for the other face of the wall.





Object Lessons

The concrete casts gave rise to a preliminary conceptualization of boundaries for the house and were central to the material and spatial development of the house. However, the casts did not serve as models for the house; scaling the casts would have destroyed their essential character.

The play of light — particularly the duality of direct and diffuse light — in the void of the casts suggested that understanding the structure of space was as important as material and shape to realizing the house. Looking at the negative space of one cast revealed possibilities for a transition from monolithic object to multiple building elements.

A hand-sized model diagram was developed to explore the possibility of inhabiting these elements. Imagining the diagram at different scales and in different orientations suggested several forms of use: a seat, a small shelter, elements of structure in the house.

Ultimately, the curved vertical planes became the walls and the straight horizontal planes became the "beam" of the house.

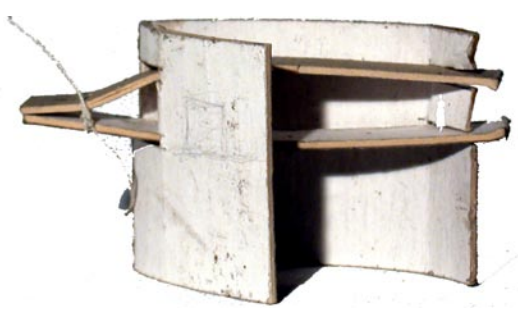
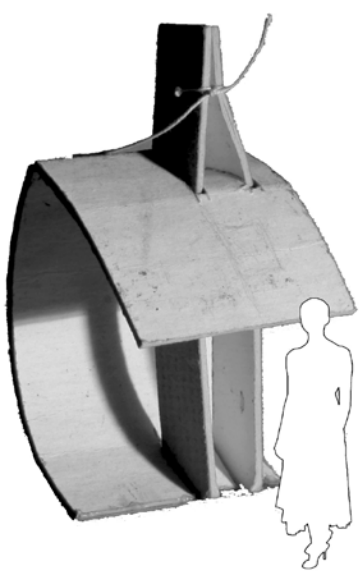
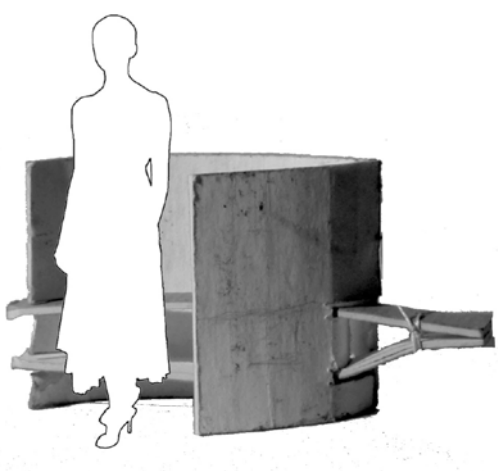


Diagram for the house

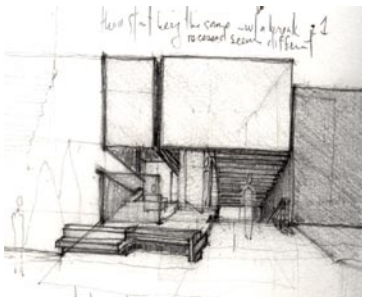
Above: drawings of two sections of different concrete casts with superimposed model diagrams.

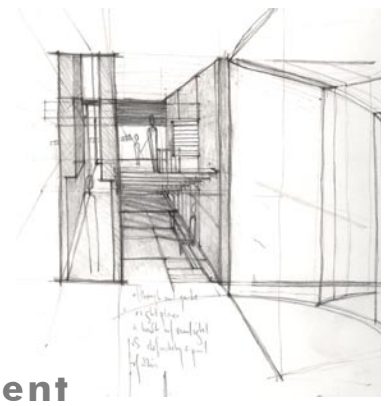
Below: two-inch high model diagram in different orientations and shown with figures of different scales.





Path and rooms in and around the house developed through model studies of the relationship of wall and beam elements. At the scale of the pedestrian, the choreographed interplay between host and guest in the Japanese tea ceremony inspired a sensual strategy for entry and circulation through the house.





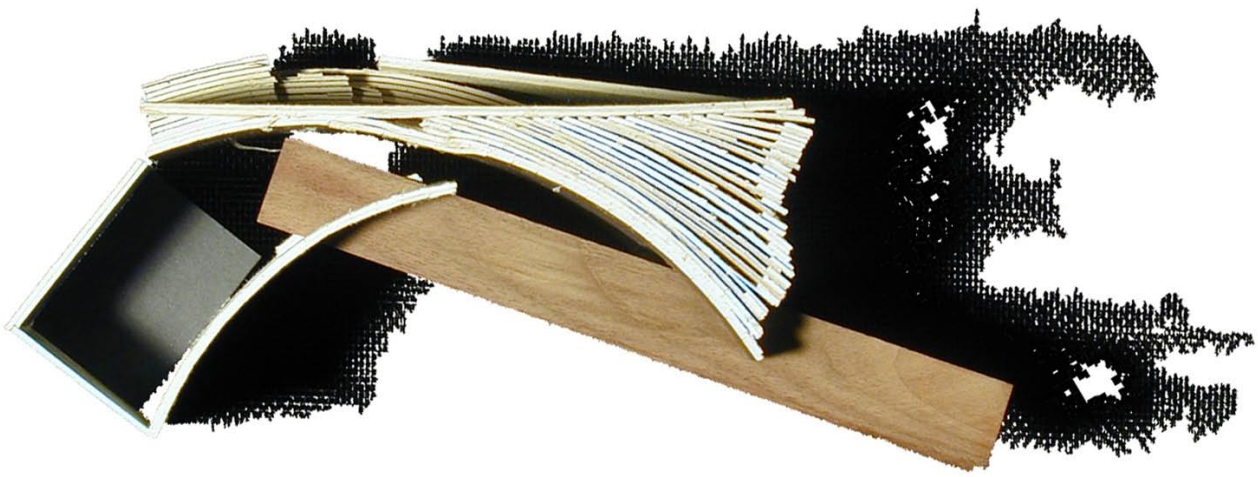
Structured Movement

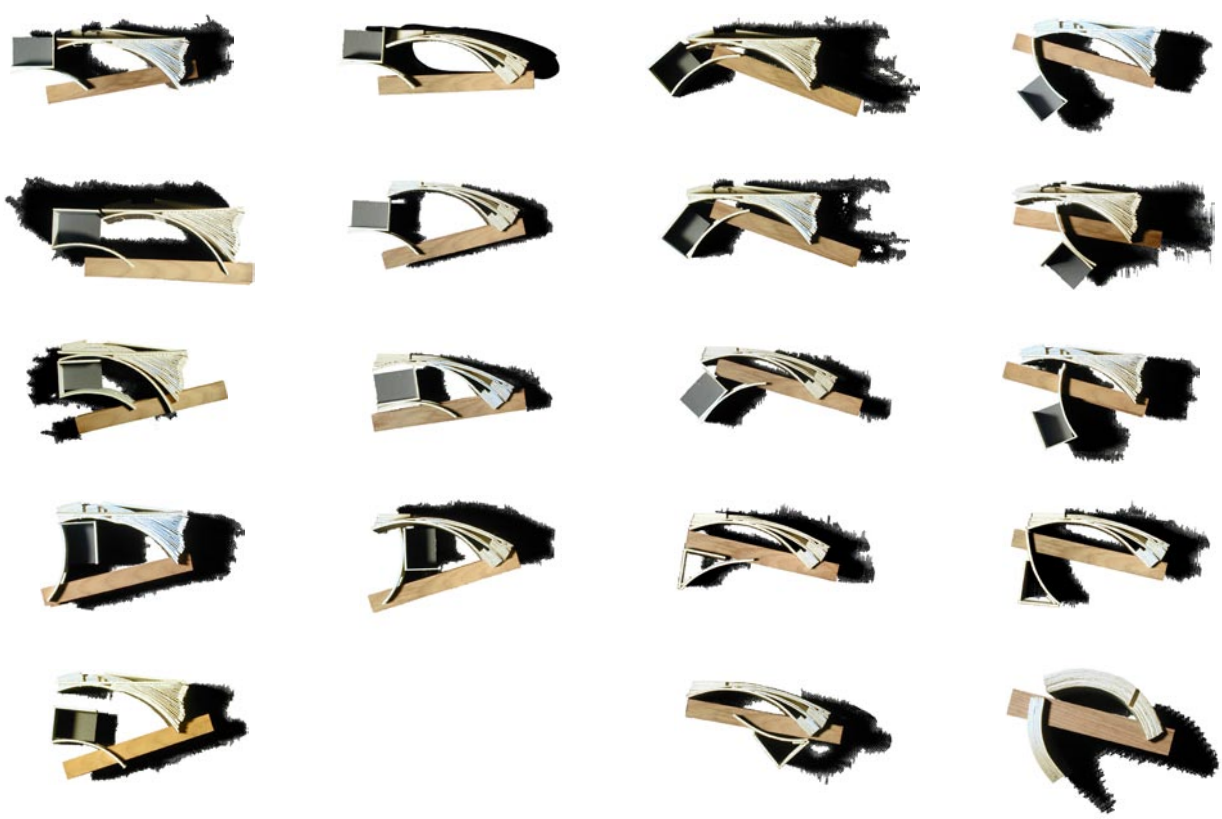
In the tea ritual, the guest enters via the *soto roji*, or outer path, and passes through several waiting areas before meeting the host. This sequence of outdoor rooms allows the guest to drop off cumbersome baggage, take refreshments, and arrange for the meeting to come. A middle gate, the *chumon*, separates the revealing outer path from the introspective *uchi roji*, or inner path, of the tearoom. The *chumon* functions like the front door of a contemporary house, physically marking threshold in the transition from exterior to interior. A second path of entry, a side entrance to the tearoom, enables the host to move unseen between preparation areas and the tea room.

In this entry sequence, the guest is granted the luxury of space and time to enter and to move toward her place in the tea room insulated from the expectant eye of the host. The generosity is reciprocal: space and time for the guest is also space and time for the host to make last minute adjustments. The structured path and out-of-view private areas permit movement that is unencumbered yet controlled.

Above: early sketches of possible entry sequence.

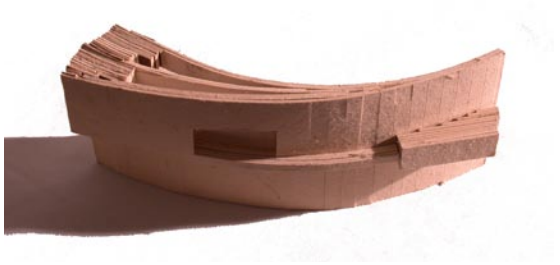
Right: model diagrams of walls and beam photographed in different relationships.

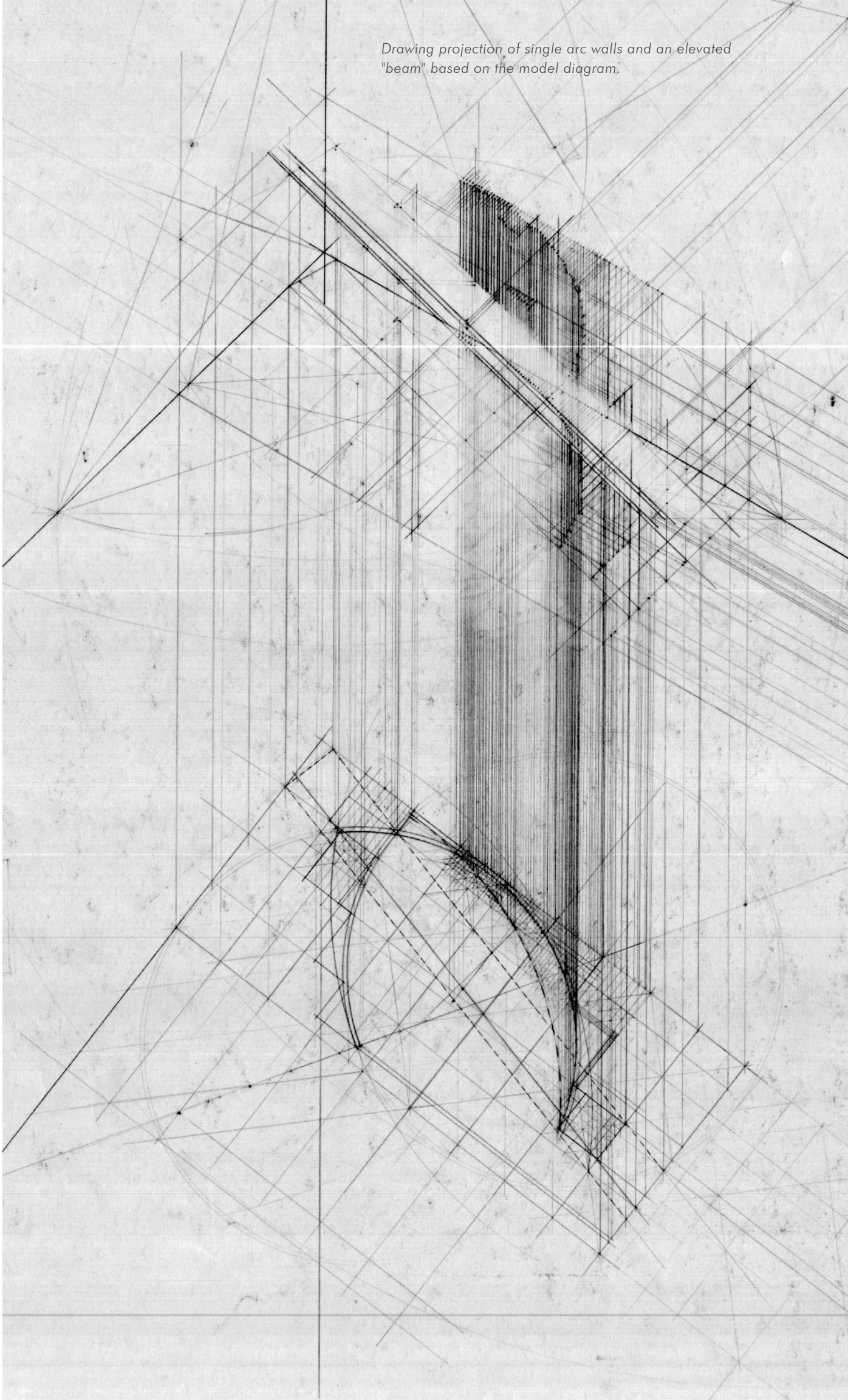




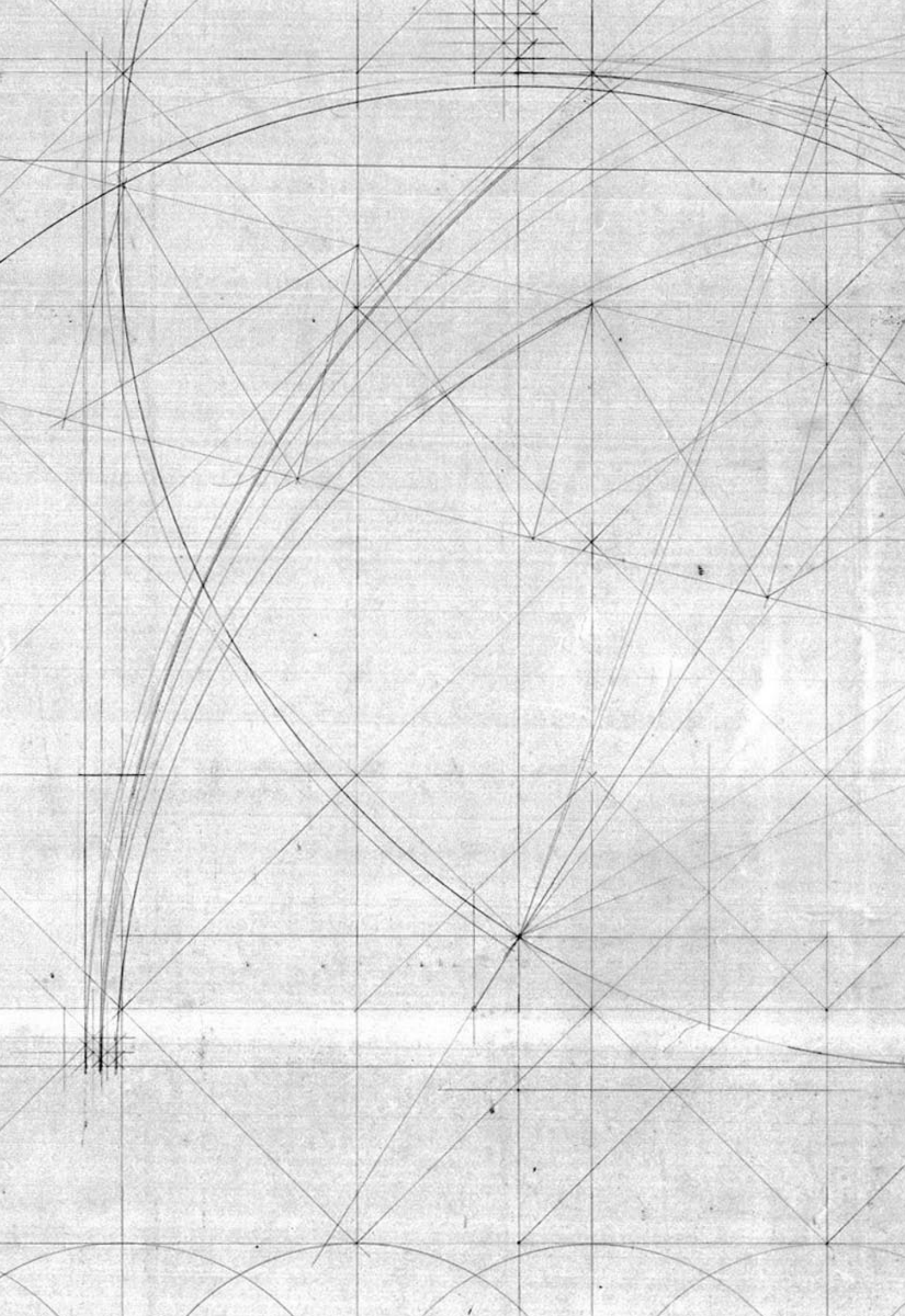
Plan diagram of layered arcs based on the model diagram.

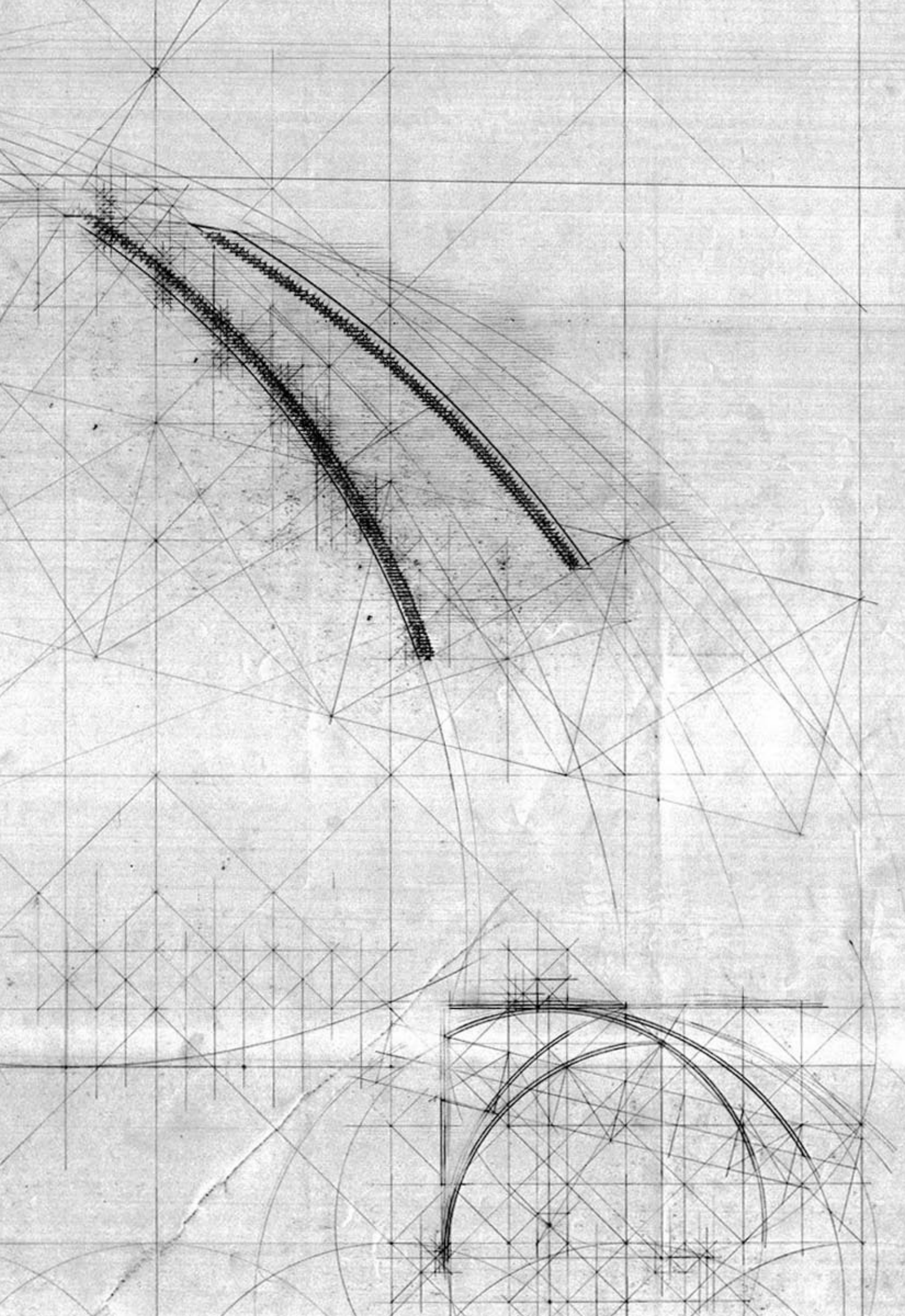
In drawings and diagrams on this and the following five pages, the form and structure of the house evolved as the project developed from concrete casts to models and drawings for the house.

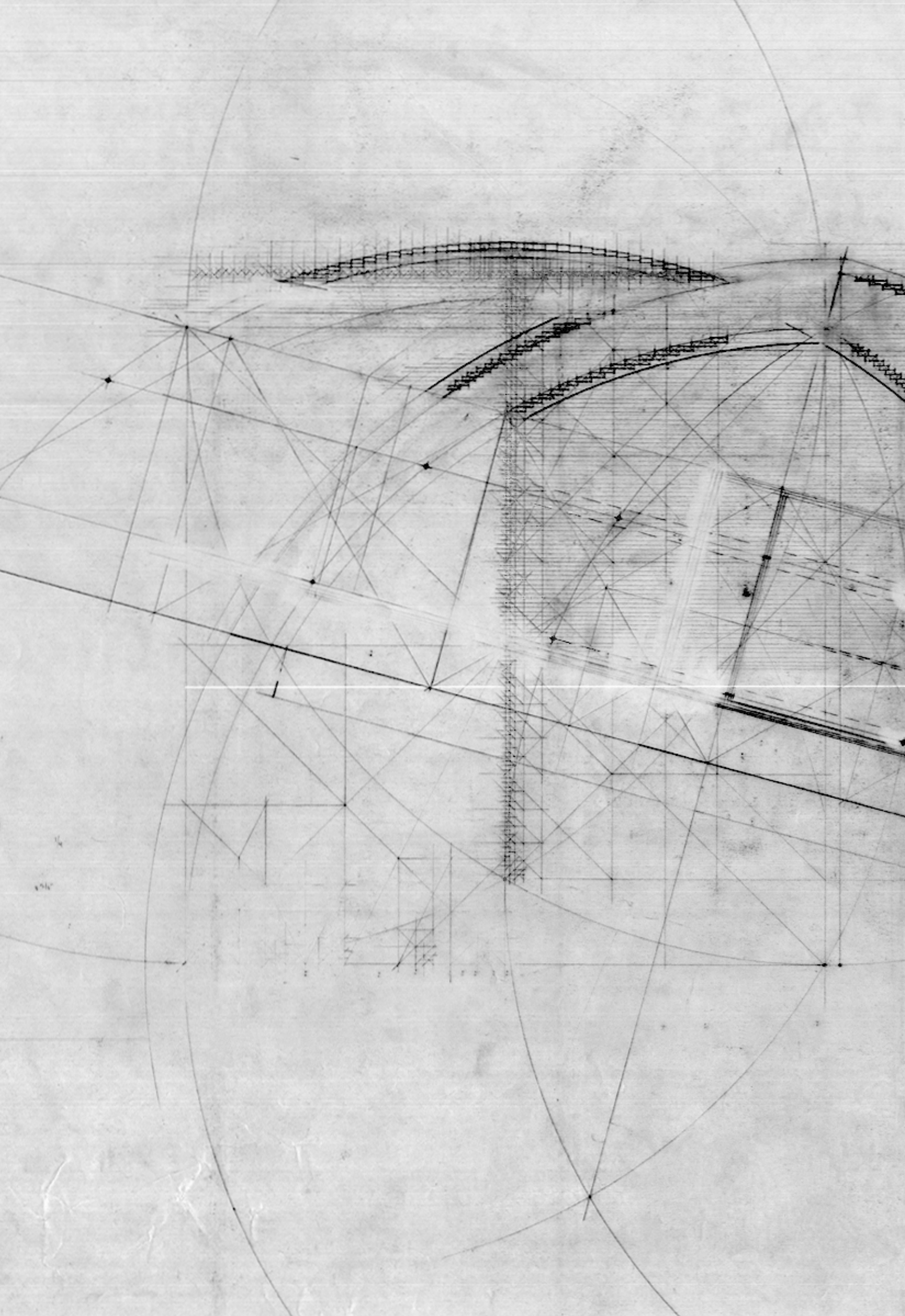


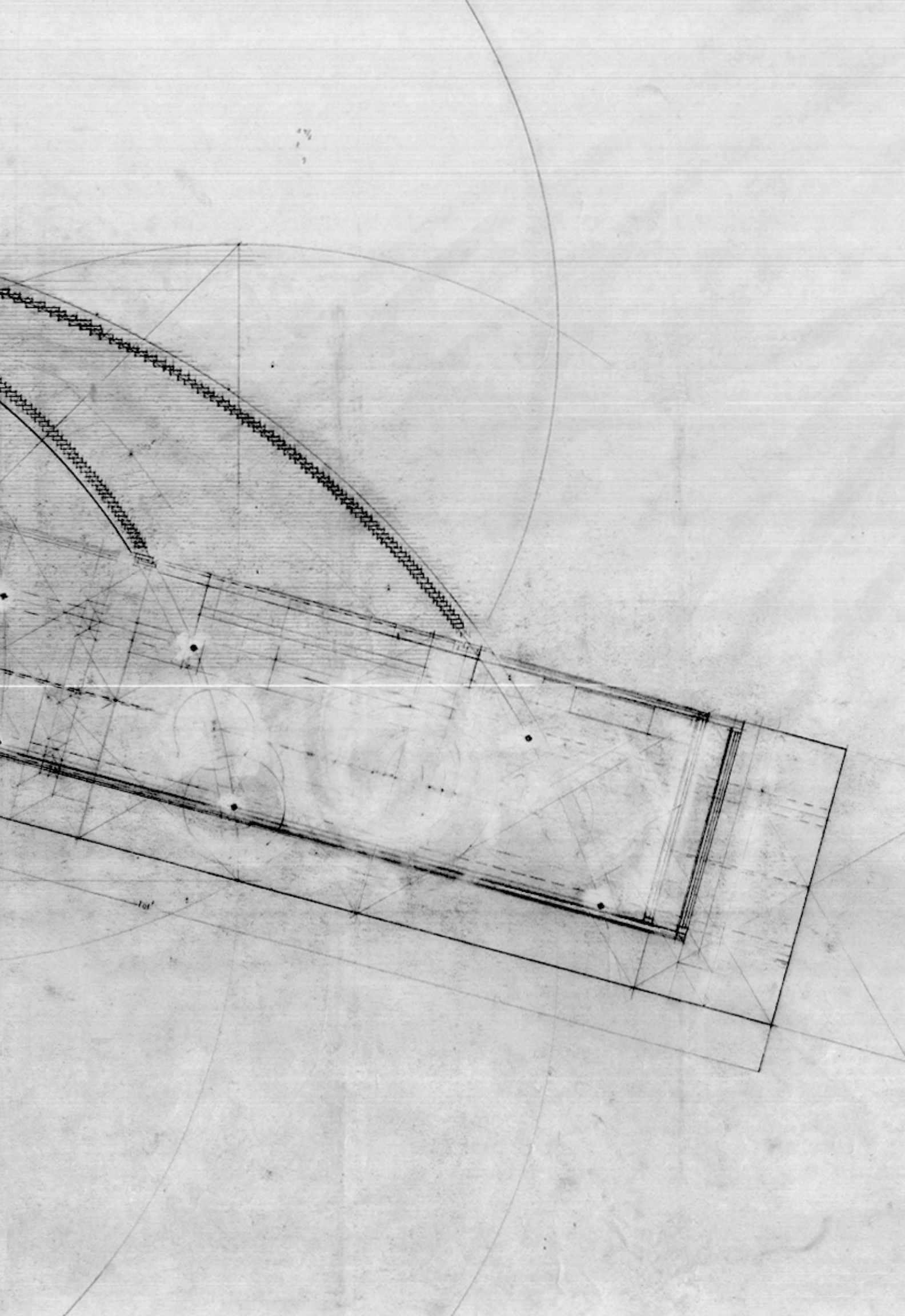


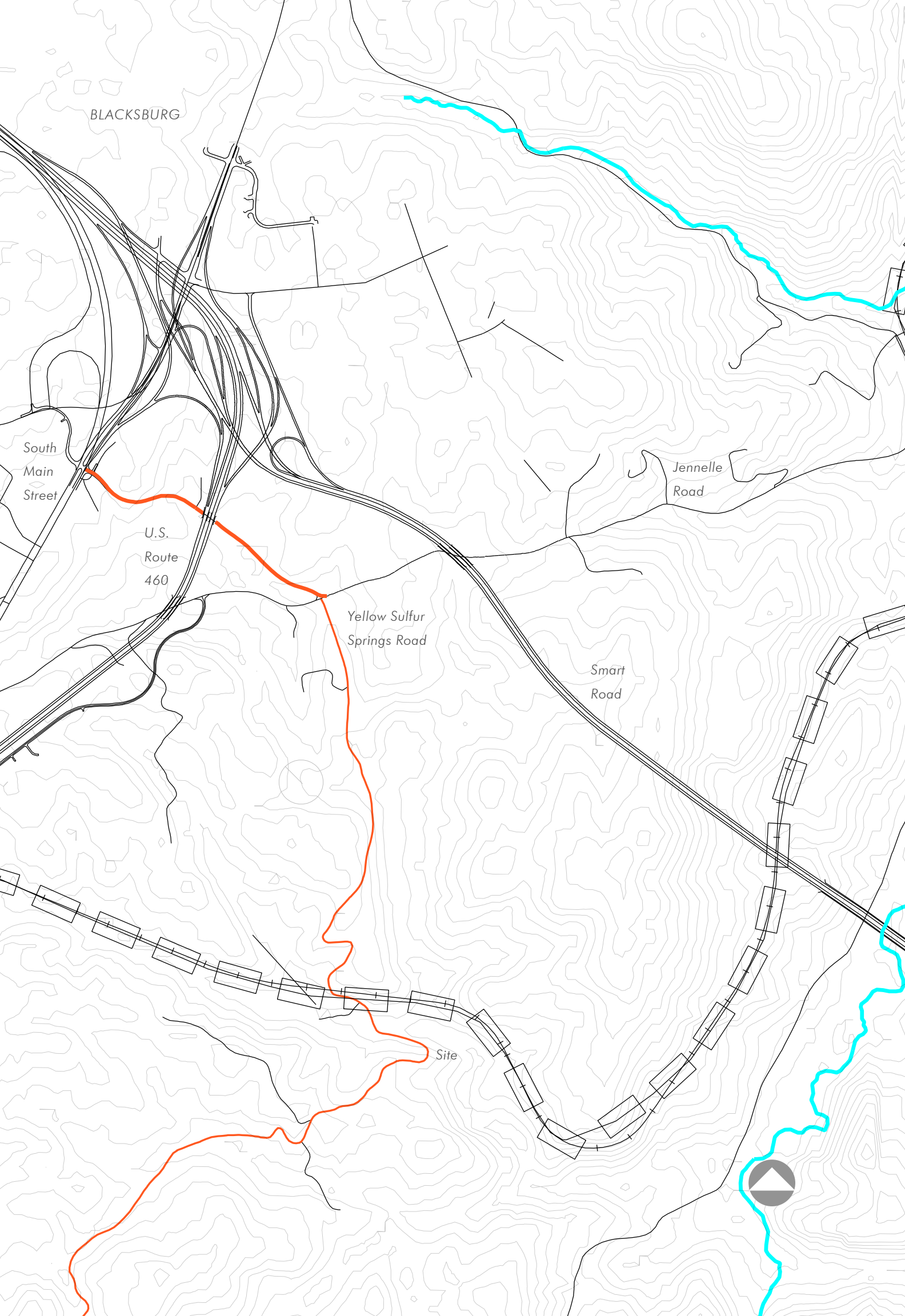
Drawing projection of single arc walls and an elevated "beam" based on the model diagram.







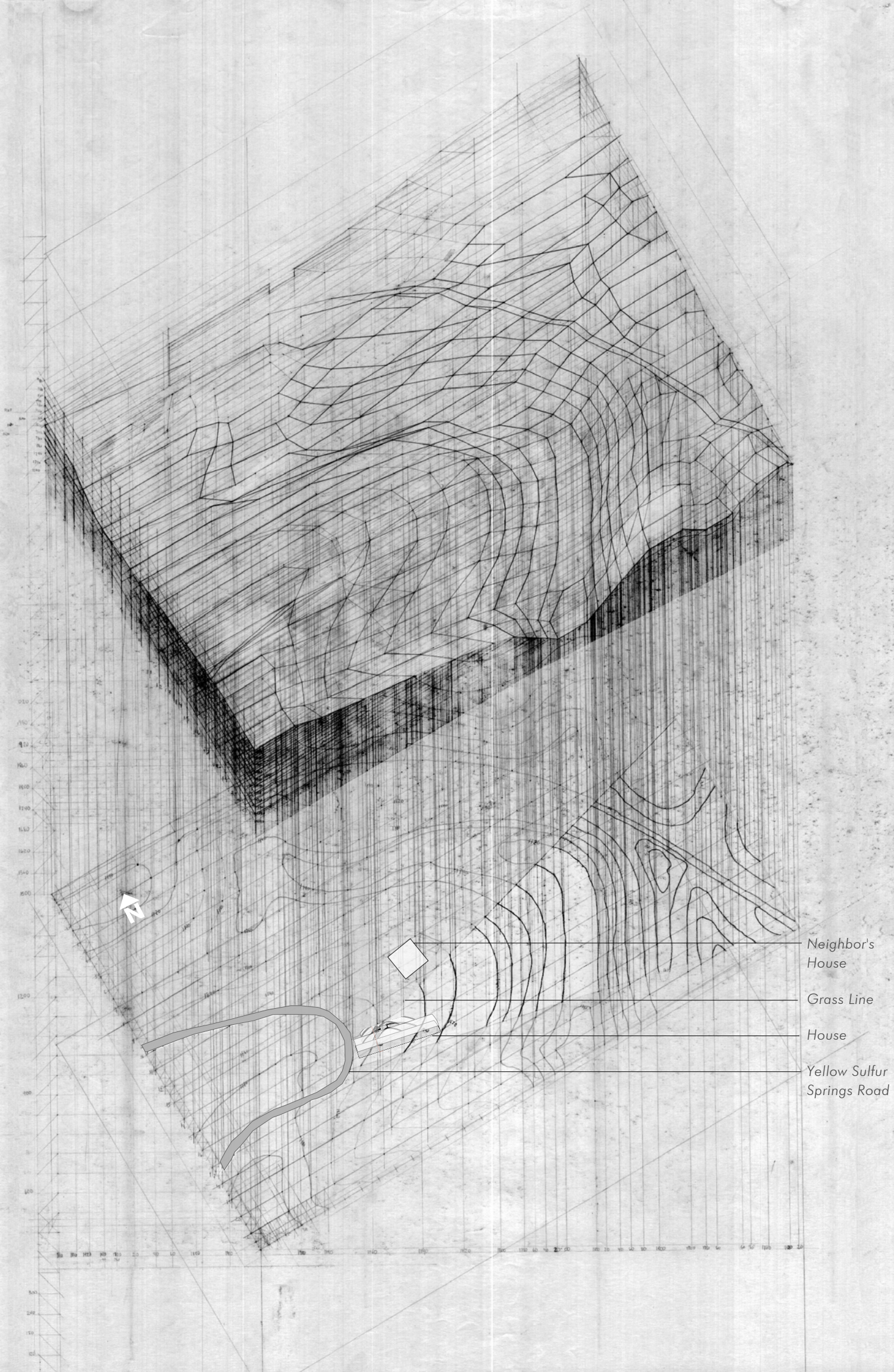



BLACKSBURG
South
Main
Street
U.S.
Route
460
Yellow Sulfur
Springs Road
Jennelle
Road
Smart
Road
Site

Approach

Located in the mountains of southwestern Virginia, the road to Yellow Sulfur Springs begins at a multi-lane highway, turns onto a two-lane road, and arrives at the House at Yellow Sulfur Springs on a rocky stretch that accommodates only one car comfortably.

All around Yellow Sulfur Springs, roads follow rolling hills into valleys, crest on high ridges and descend unpredictably again. Standing high on a ridge, one sees for long distances. Driving deep in a valley, visibility changes at every turn. Buildings or their parts sharply contrast with the land. Roofs and walls read as sculptural solids, windows as deep, black voids. Even the most mundane barns and houses appear as stark markers of singular settings and unforgiving ground.


N
Neighbor's House
Grass Line
House
Yellow Sulfur Springs Road

Site

As one approaches the site's narrow point of access, the road takes a hairpin turn from east to west. The direction of physical movement reverses as sight lines continue uninterrupted to the southeast. This phenomenon of diverging paths of sight and motion was physically palpable one day at Yellow Sulfur Springs and caused an otherwise unlikely pause. The surprising visual trajectory suggested a house set high over the steep terrain and defined by those lines of sight.

The boundary between the neighboring lot and the House at Yellow Sulfur Springs was suggested by a sharp border of mowed grass that gave way to unkempt growth. The site was not ideal in a traditional sense: only a narrow area fronted the road, and the site extended steeply down in a triangular shape. However, the place had strong vectors.

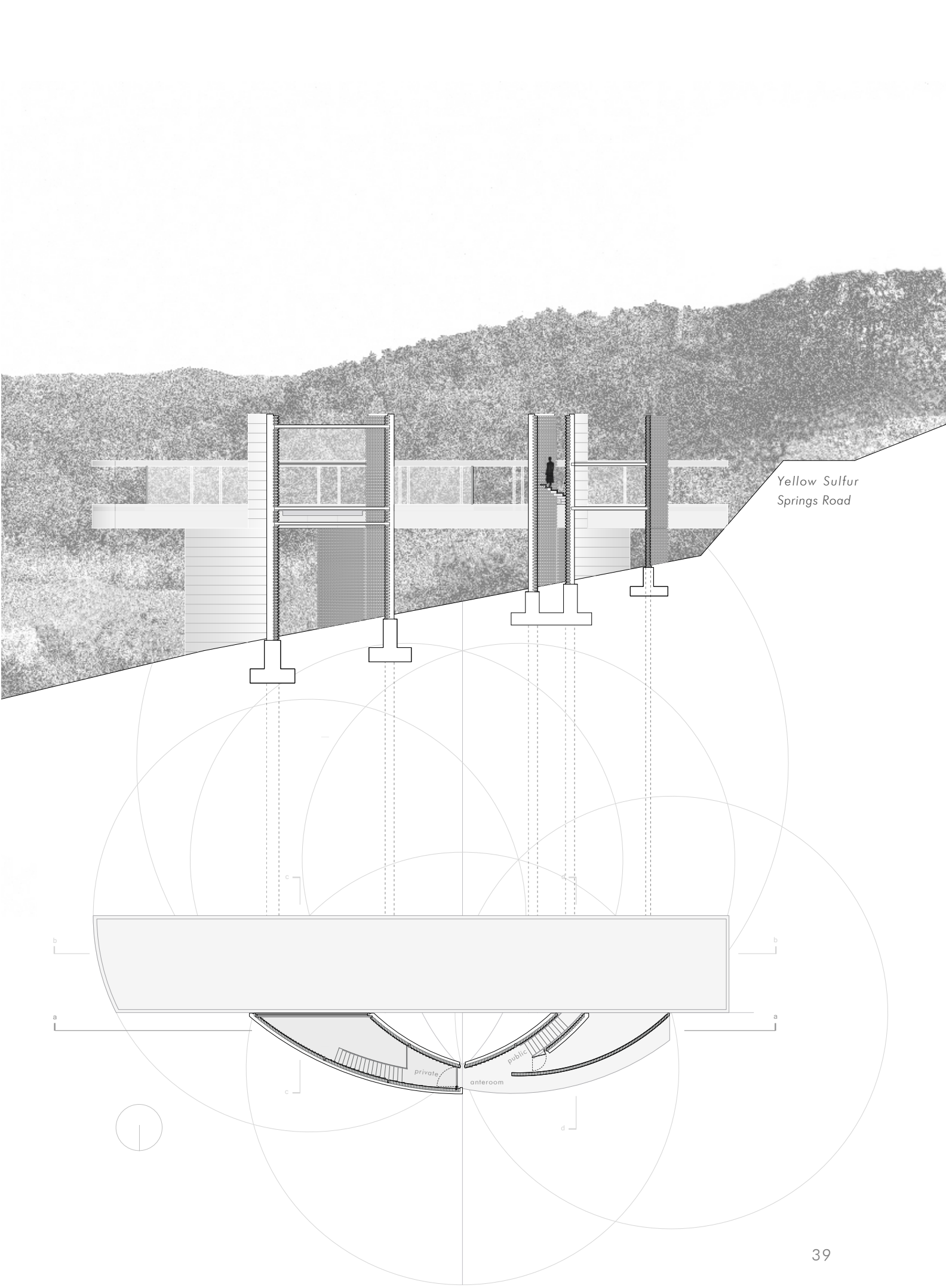
Beginning with the model diagram of the house, these vectors informed the design of the house.

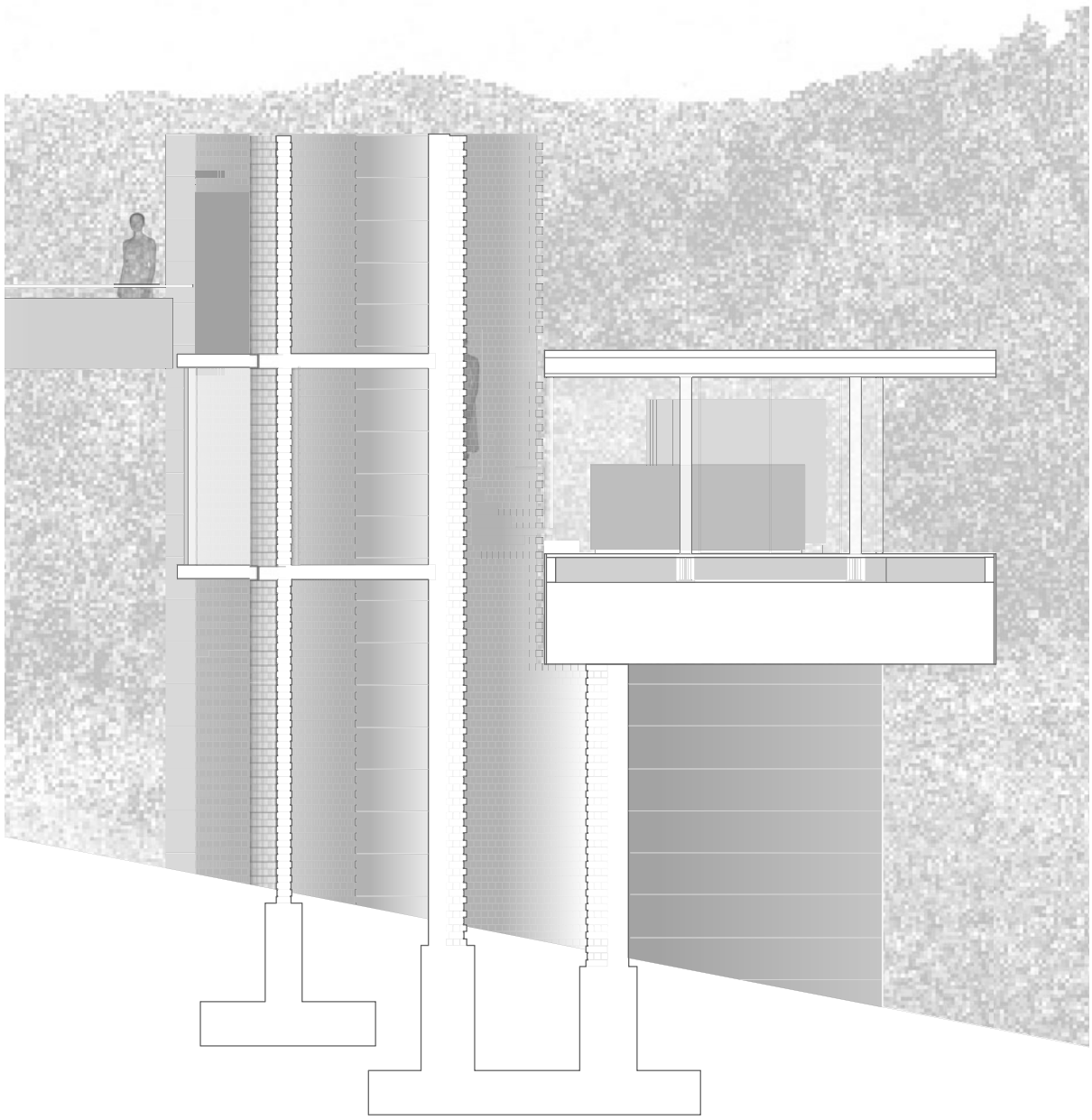
Road Level

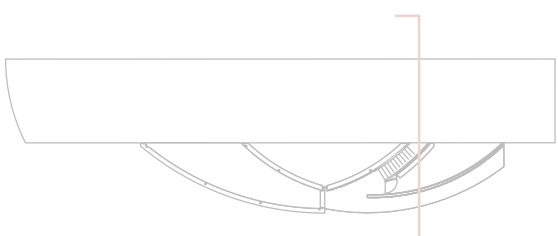
Entry to the house begins at the level of the road. The path of the more open public entry threads between the westward walls from an outdoor anteroom. Moving west, the distance between the walls gradually widens as a flight of stairs descends to the main living space of the house. Passing from the walls to a covered patio in the beam, one moves from a place defined by vertical walls and no roof to a place defined by the horizontal planes of the ceiling and floor. At that point, the vertical boundaries are either transparent, as in the glass enclosure of the beam, or distant, as in the site on one side and the concrete walls on the other.

The second, more private path proceeds from the outdoor anteroom directly into enclosed living space within the eastward walls. Beyond the closed door of this entry, interior stairs follow the curve of the brick wall to descend the double-height space to the main living area.

Right: entry level plan, section a-a


Yellow Sulfur
Springs Road
a
b
c
d
private
public
anteroom





Entry Section

The public entry follows a multi-level sequence of spaces that are both path and potential places for stopping. Although distinct in form and function from the tea ceremony, this sequence takes lessons from the tea ritual's outer path with its indirect approach, mediated exposure and provision of places for stopping and resting along the way.

The section through this public path of entry (left) shows passage from thick within the walls to the open space of the beam at the patio level. At the patio level, the view south is obscured by the kitchen at the far end of the beam.

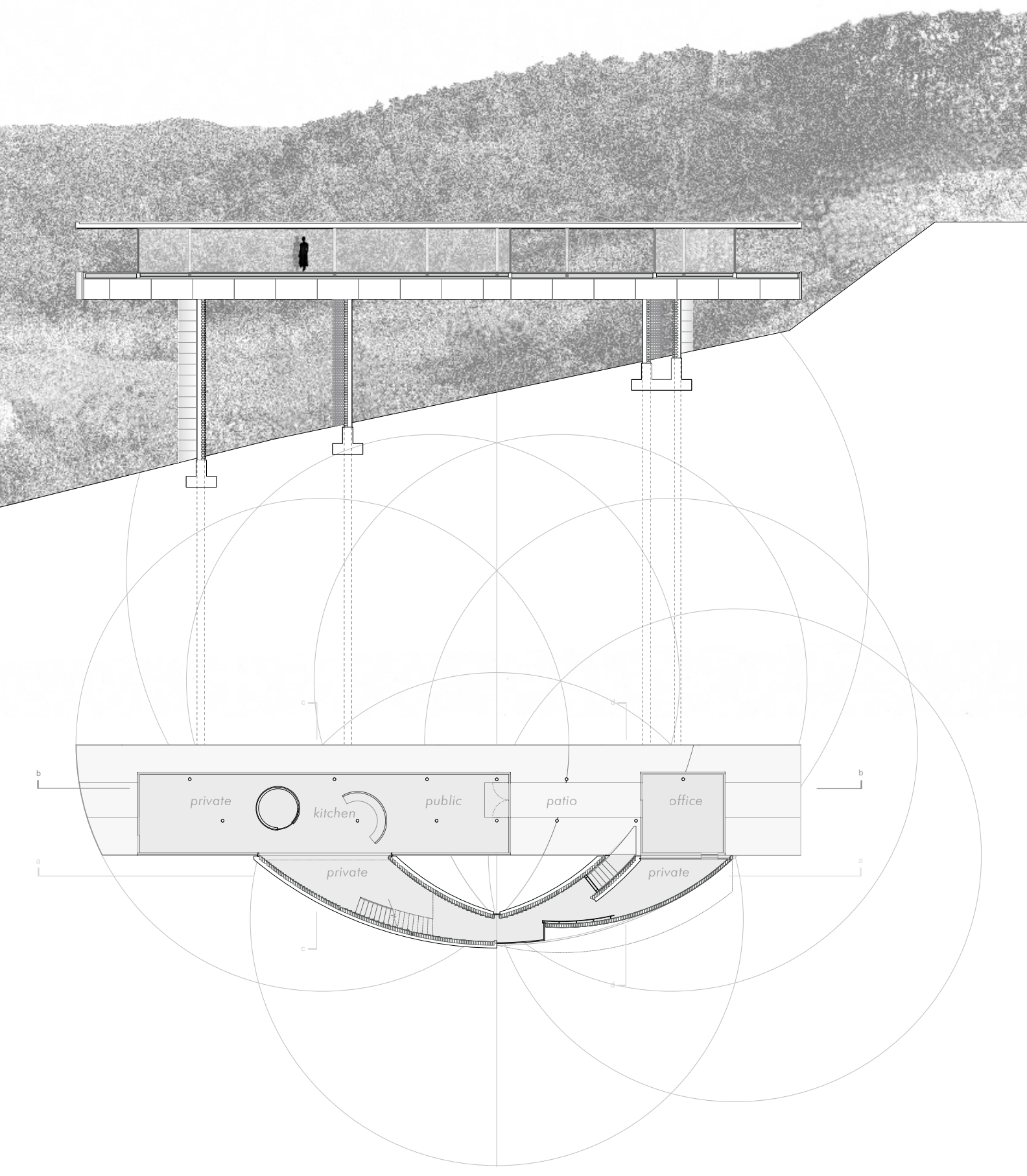
Although the path of entry passes through the walls, it is wholly separate from the enclosed interior living space of the house.

Left: section d-d

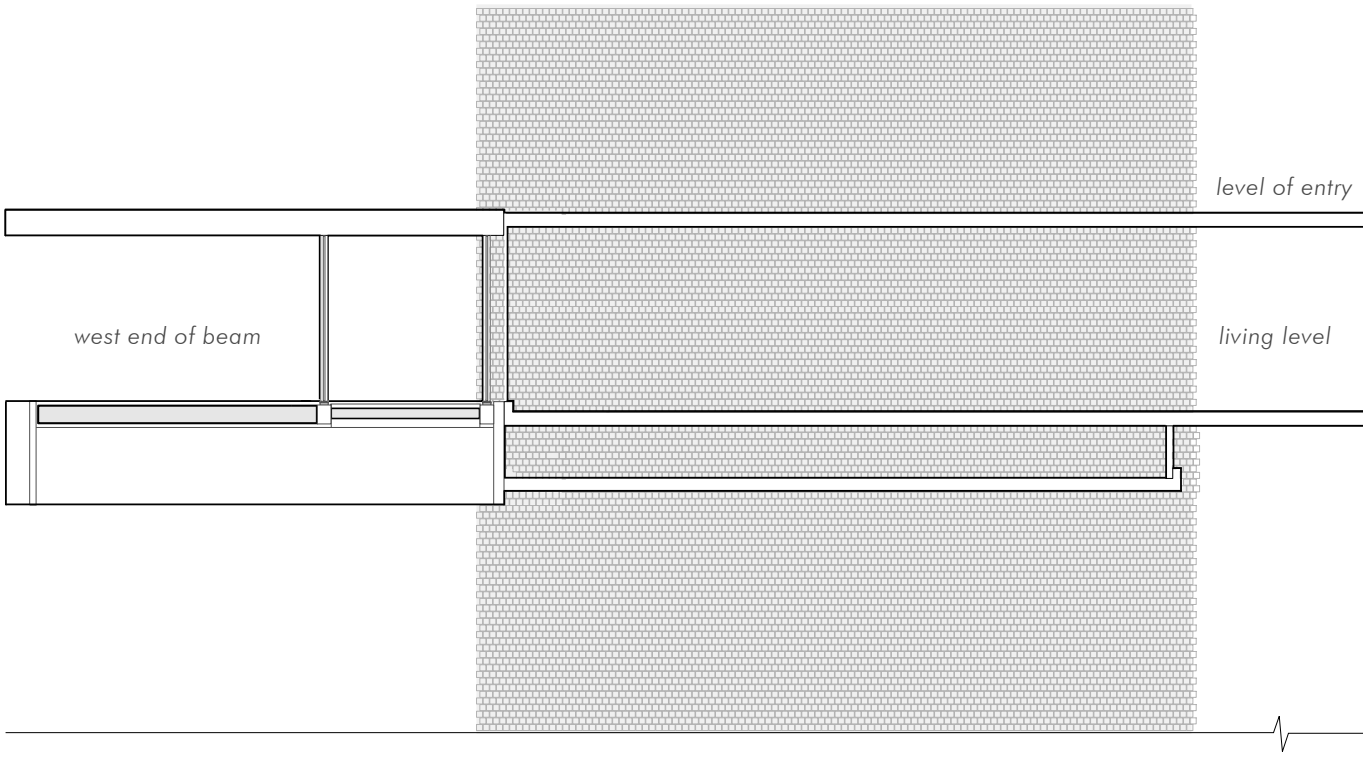
One Room

The open plan of the house is loosely oriented around a cylindrical bathroom and kitchen island. Public areas for meeting and living occur close to the center of the beam, with more private areas within the walls and at the ends of the beam. At the west end of the beam, a smaller glass enclosure is a separated office that connects to the rest of the house through sliding doors in the room's north walls.

Right: living level plan, section b-b



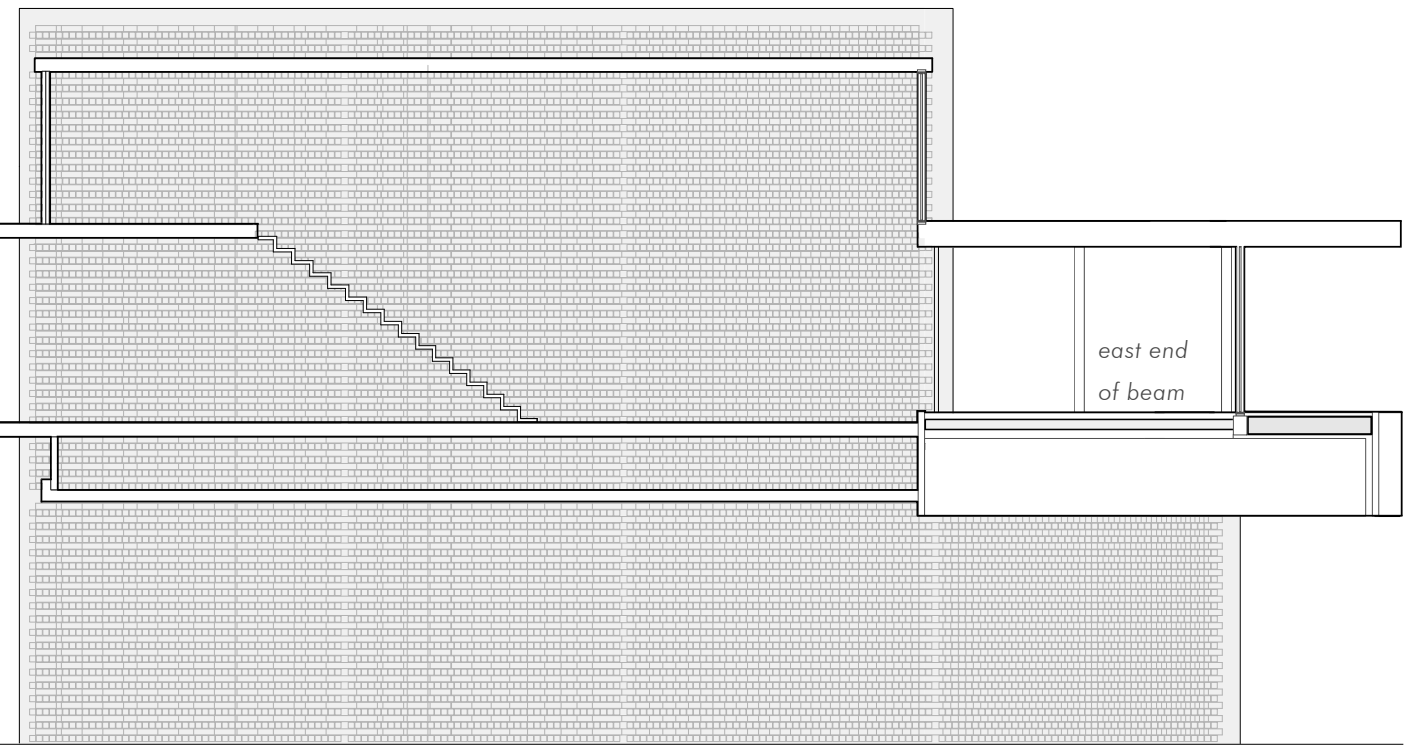
North

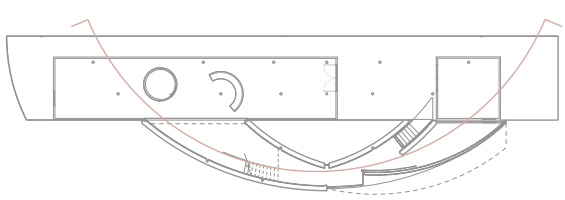


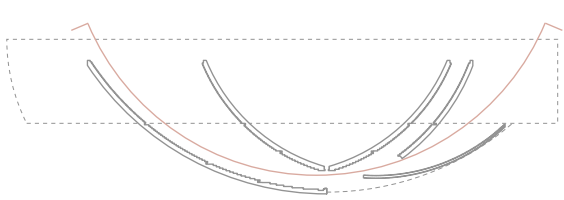
Above: diagrammatic section through curved walls

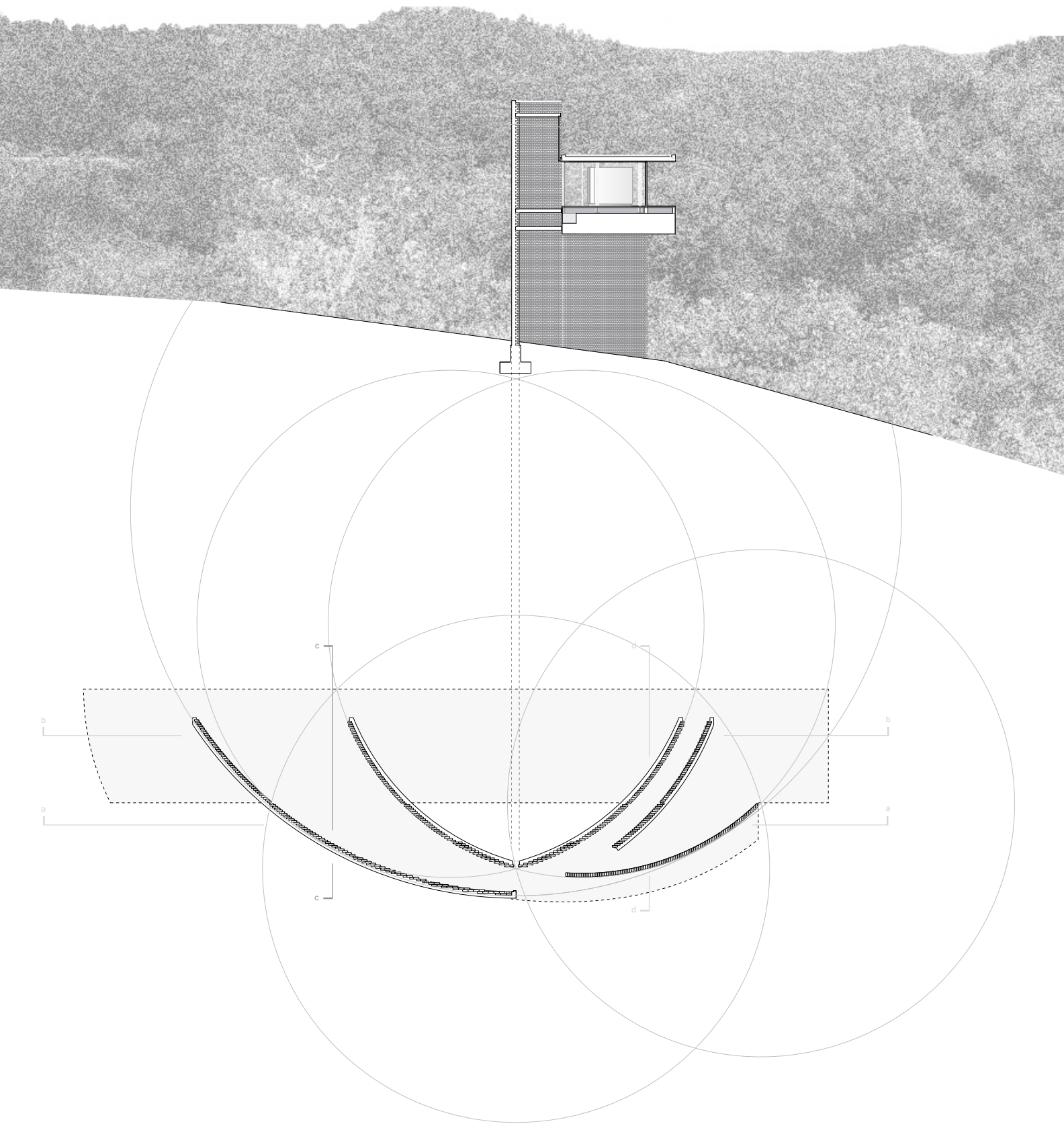
Inner Section

The private areas of the house span from the ends of the beams into the brick enclosed portions of the house. The diagrammatic section above shows the private path of entry, which descends from entry level into the private living space within the curving brick walls. Along the length of these walls, the texture of brick shifts subtly from one end of the house to the other with vertical control joints periodically breaking the continuity of the wall. Although in plan it is one continuous space, material distinctions in the walls in conjunction with the changing proximity of the walls, ceilings and natural light suggest a series of discrete, but connected rooms.


east end
of beam







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North

Ground Level

At ground level, the steep terrain anchors the brick and concrete walls. The living space of the house is high above one's head.

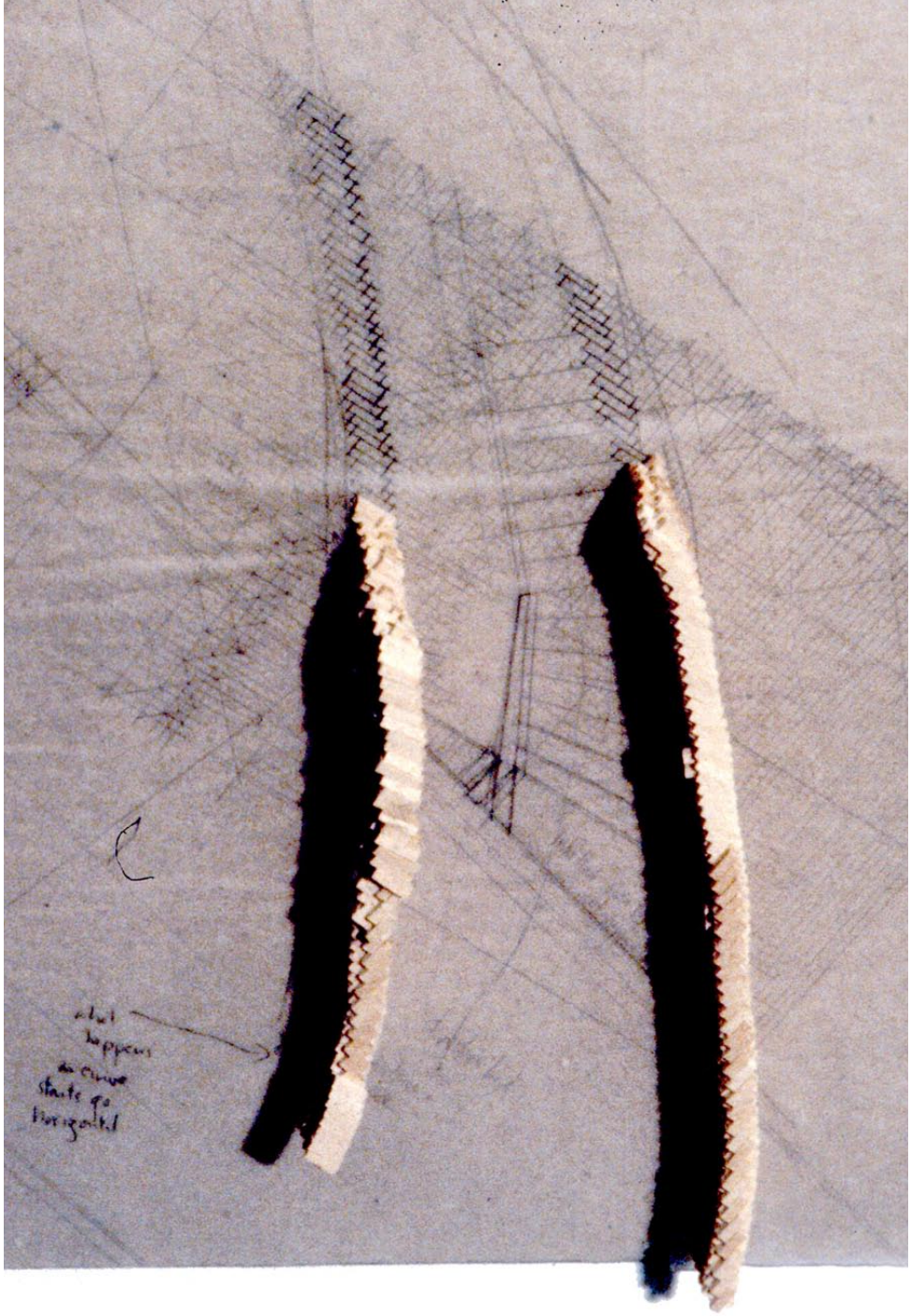
Left: ground plan, section c-c

Partial model view of central brick walls.

Details 51

Architecture starts when you carefully put two bricks together. There it begins.

Mies van der Rohe



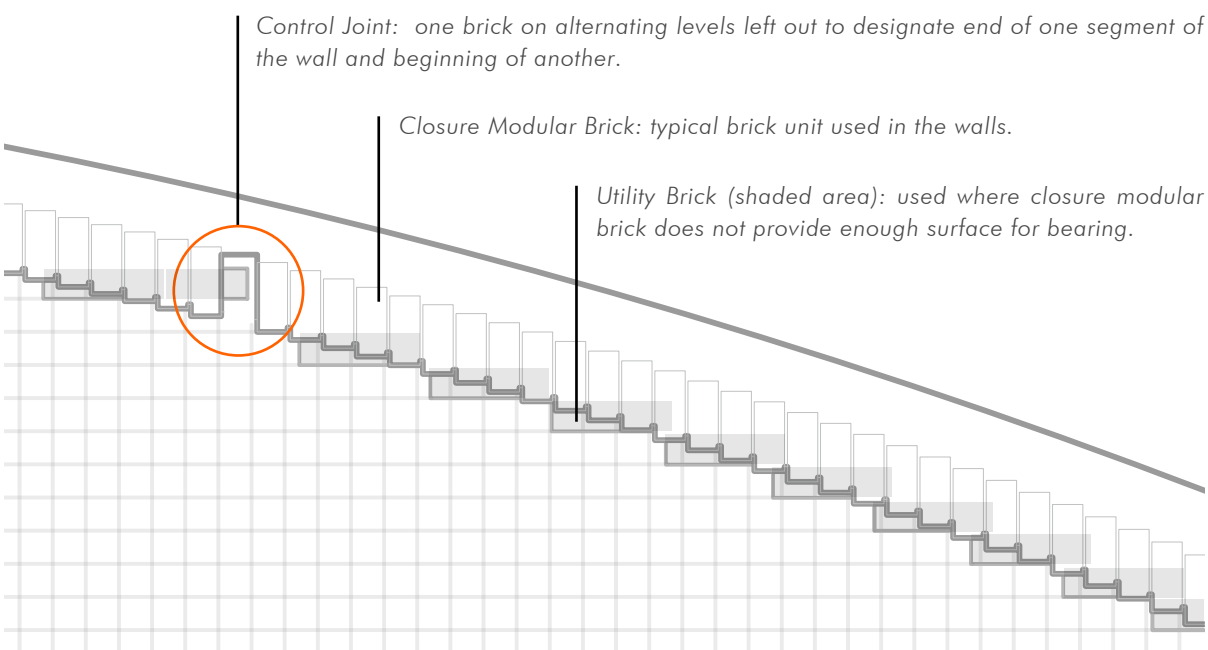
Bricks

Courses of brick form work in the house consist of two types of brick that share a height and a width of 3.5", but differ in length:

Closure modular brick: (3.5" x 3.5" x 8")

Utility brick: (3.5" x 3.5" x 11.5")

The coursing varies from segment to segment according to the changing orientation of the curved plan. The incremental assembly allows for periodic registration of the curve during construction using control joints. The control joints appear as vertical reveals on the interior faces of each wall.



Top and left: initial study model of perpendicular brick stack.

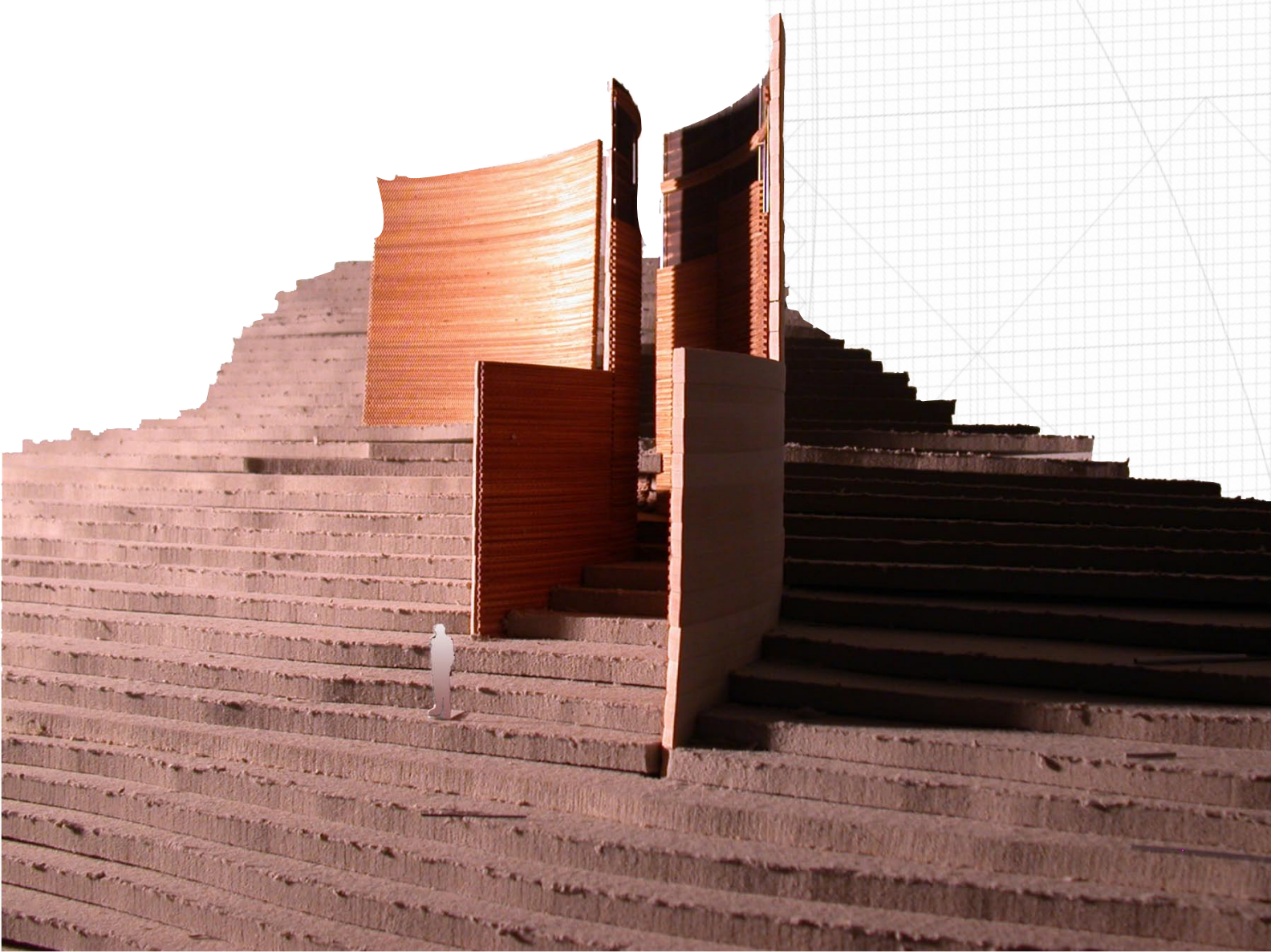
Above: typical plan detail of the walls.

Walls

The walls are composite constructions of brick and concrete in which the brick serves as permanent form work for the concrete.

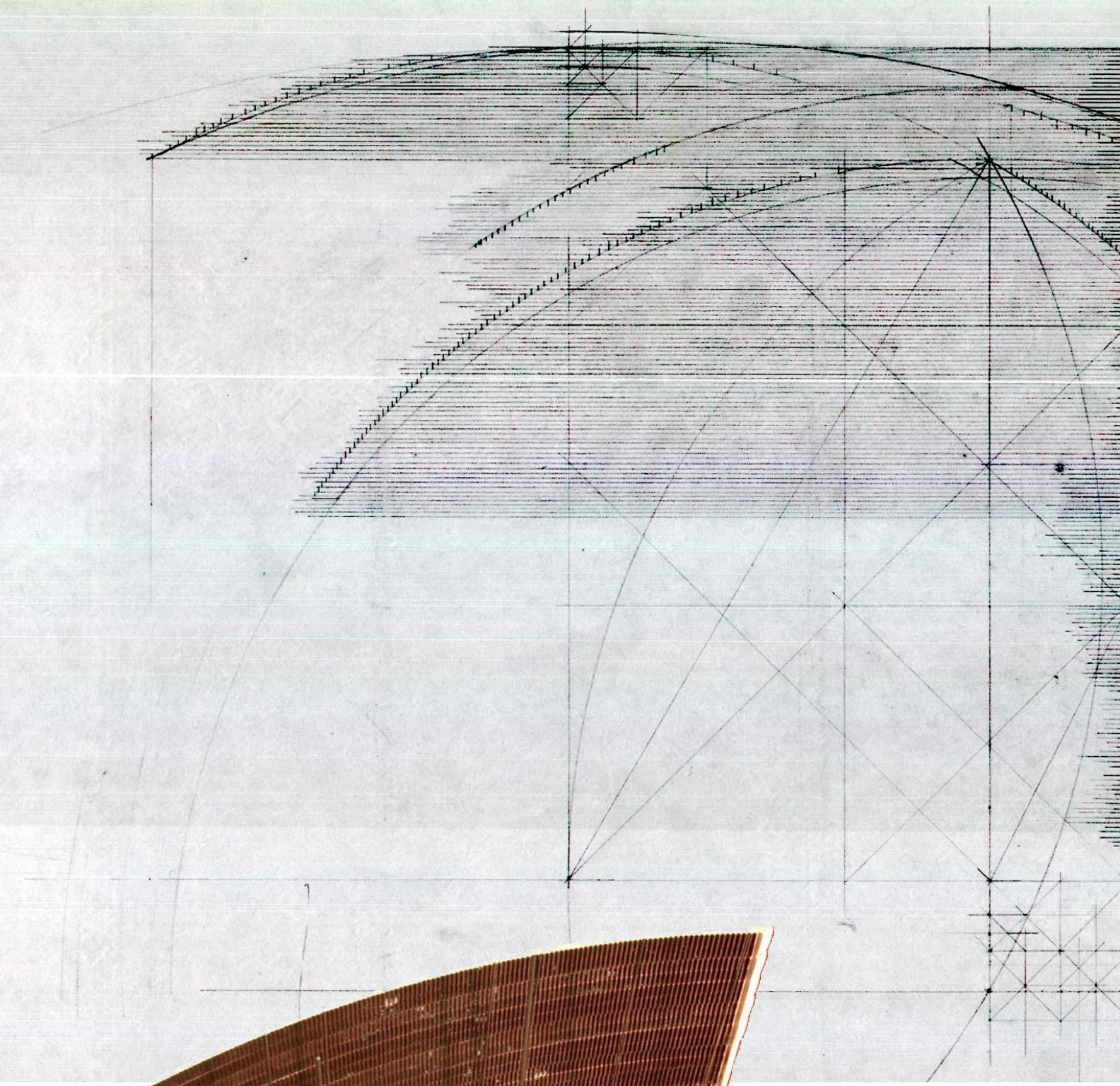
In the walls, each brick shifts in relation to the previous brick to follow the curved plan of the walls. Alternating rows of brick coursing lie perpendicular to one another. The continuous weave of brick changes texture along its length. In addition to varying within each wall, the texture changes from wall to wall as the brick stack adapts to the related but discrete arc segments.

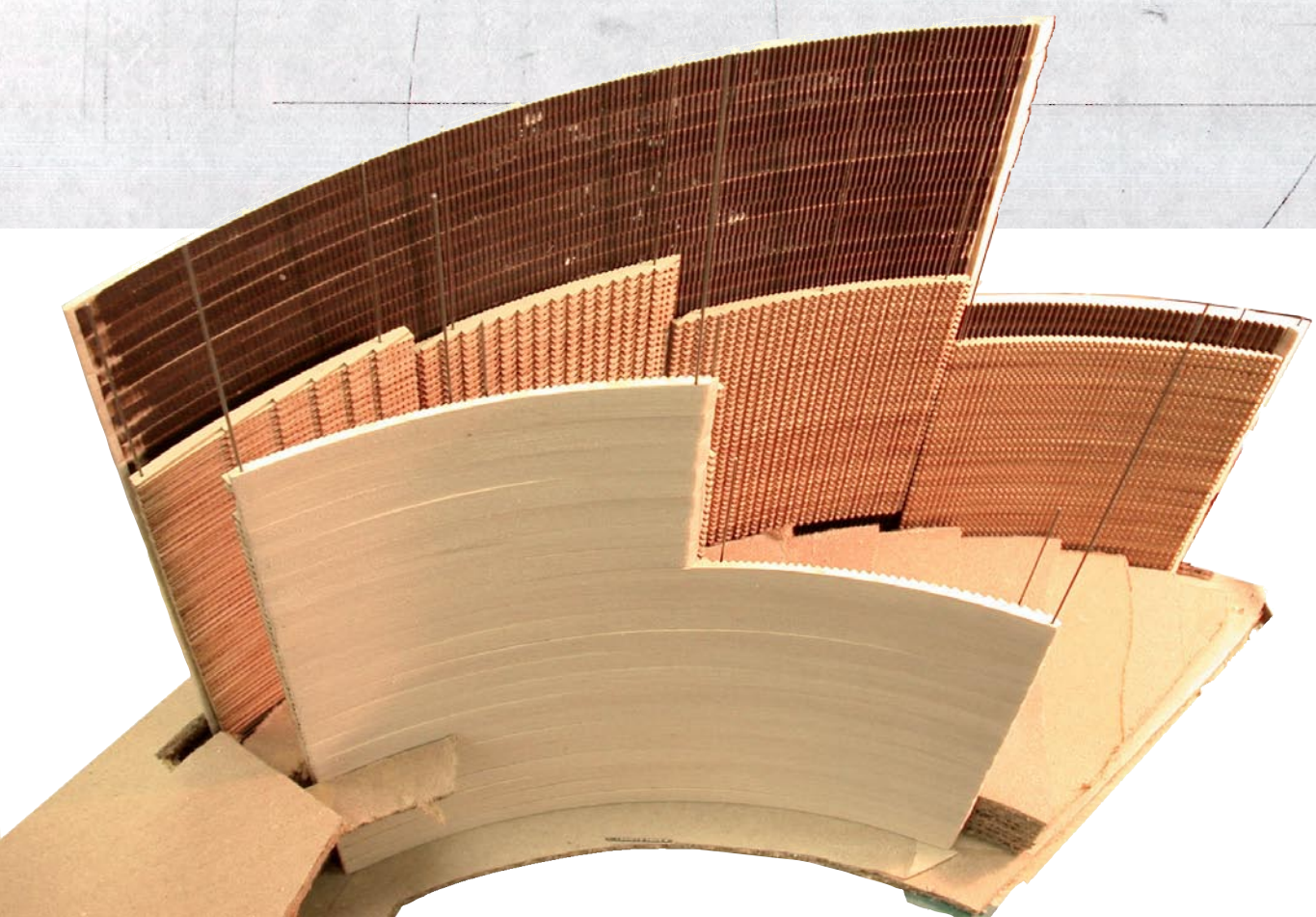
The reverse face of each wall is cast-in-place concrete formed against two-foot wide bands of smooth aluminum face material that is removed after construction.

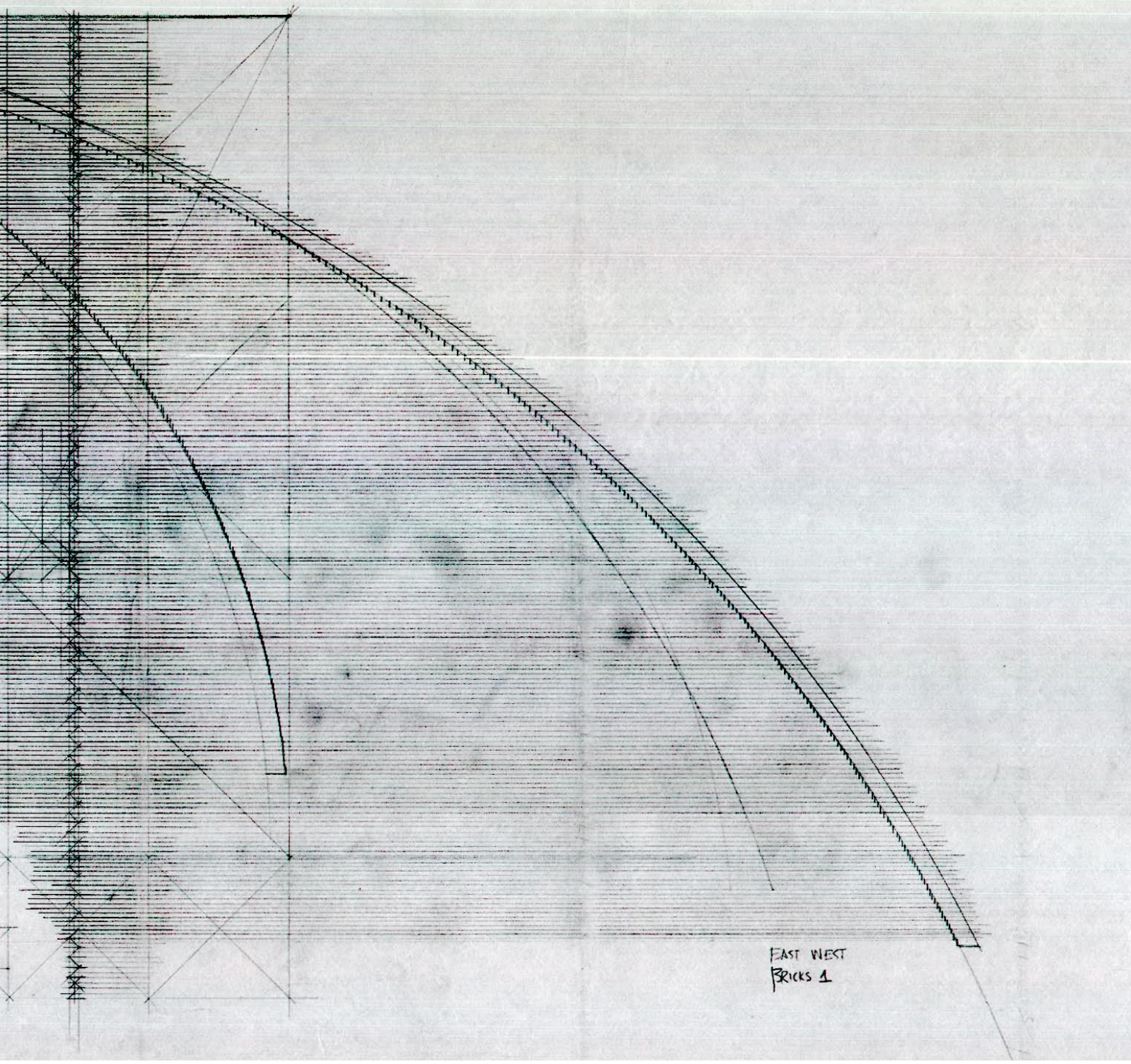


Left: partial model of the eastern walls.

Above: partial plan of the eastern walls.

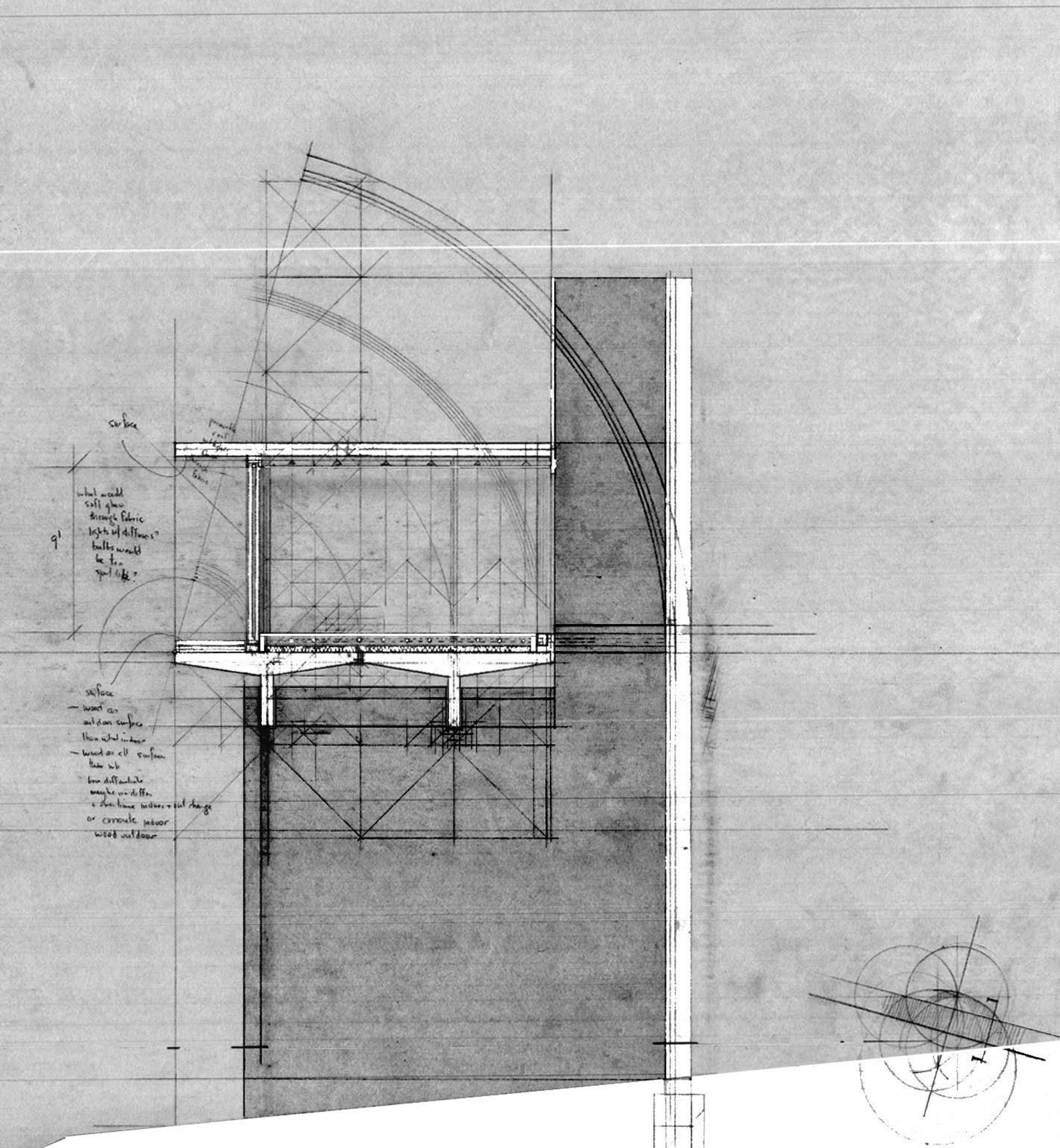






Construction Logic

As individual units, the bricks allow for stepped construction of the curved wall on steep terrain. As a method of construction, laying bricks introduces a matrix within which the geometry of the house is set. In the drawing above, a single set of lines extends horizontally across the page. The bricks are laid in the east-west direction along these lines. Each brick in the house has a specific relationship to every other brick and, by extension, to the geometry of the house. Textural distinctions on the surface of the built wall are a direct result of the meeting between the arcs and the straight lines that underlie the walls and beam of the house.


surface
what would
soft glow
through fabric
9'
surface
wood outdoor
or concrete indoor

Beam

Inside the house, the walls and site have a strong presence, but viewed from a distance, the beam is a strong datum in the landscape. At the beginning of the project, two planes defined the living space of the beam. As the project evolved, the beam developed into three parts:

Floor: post-tensioned box beam made of precast concrete segments. This portion of the beam is the primary visual and structural element of the house.

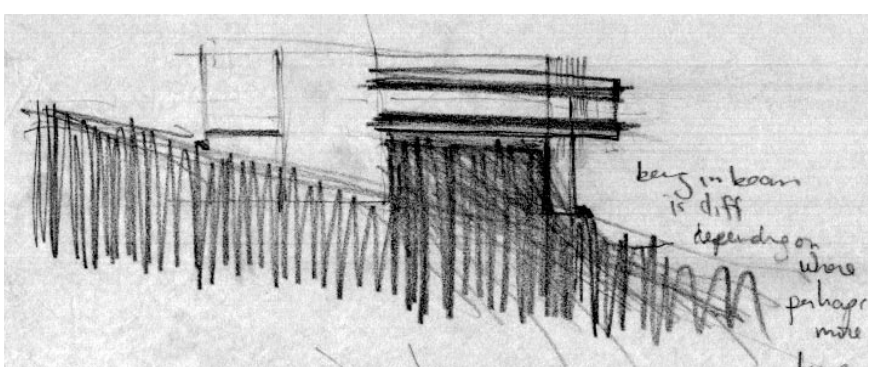
Roof: cast-in place concrete slab.

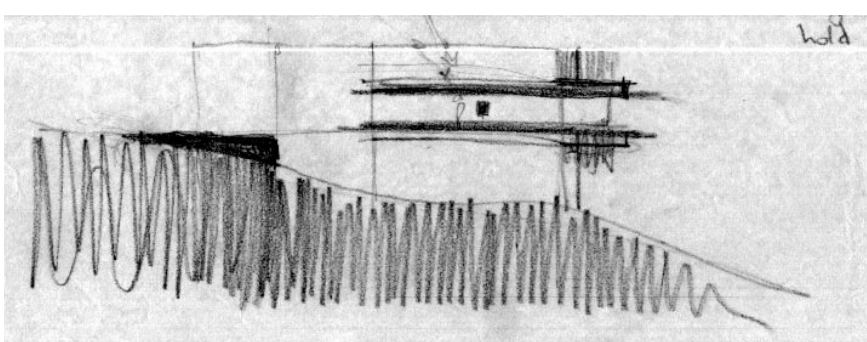
Columns: load bearing glass columns.

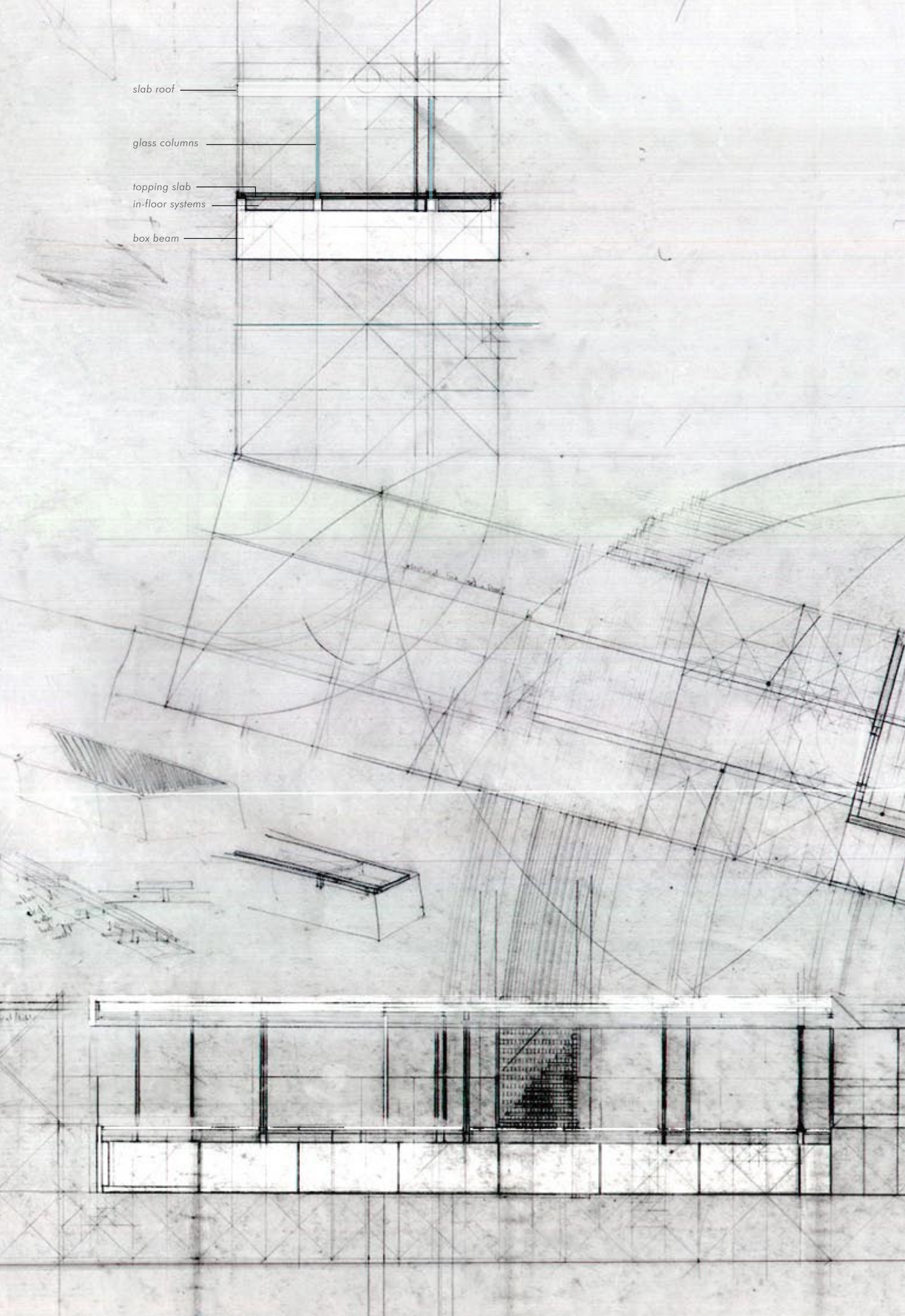
Above right: partial model view where the walls and beam meet below the main living space of the house.

Right: early sketches of the house.

Left: early section with the beam as two precast concrete single tees.






slab roof
glass columns
topping slab
in-floor systems
box beam

Box Beam

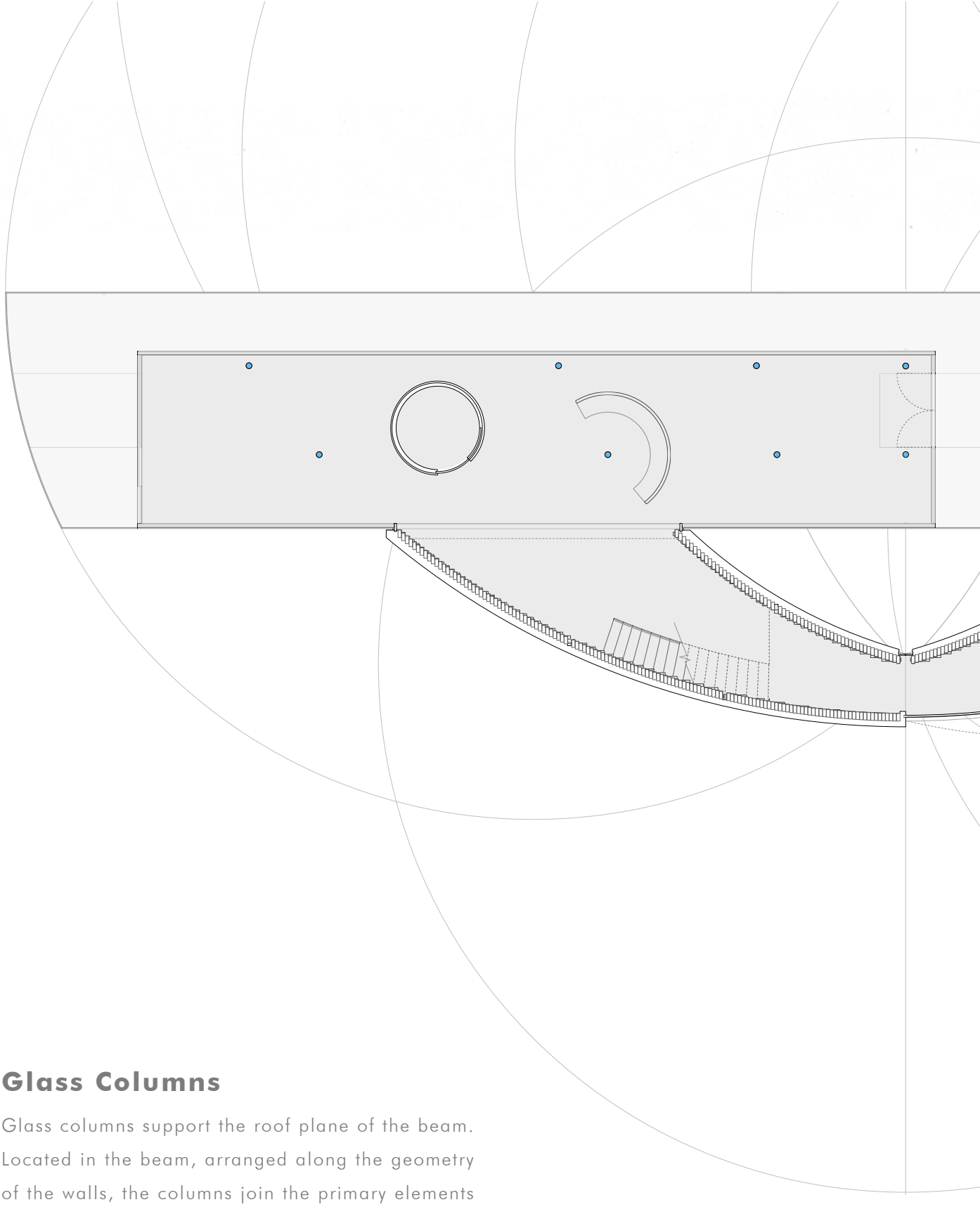
Distinct decisions about material and construction in the walls and beam arose, in part, because of their different relationships to the site. The walls meet the ground to negotiate uneven terrain. The beam, by contrast, rests on a level plane made by the walls.

This conceptualization is most apparent in the box beam that defines the floor of the house. Whereas the walls are made by hand, the assembly that includes the box beam is industrially produced. The post-tensioned box beam consists of factory-produced precast segments clad with translucent glass panels. Each precast segment is approximately 8′ x 20′ x 3.5′ and has a potential weight of between 25 and 30 tons. The segments are sized to make reasonable the use of a crane for placement while also remaining small enough for road transportation.

The transverse section (top left) shows the precast segments with a topping slab that separates space for mechanical systems (below the topping slab) from the living space of the house (above the topping slab). The plane of the roof, the flanking side walls and the field of glass columns give shape to the living space. Below the slab, insulation, radiant heat pipes, electrical wiring and plumbing run the length of the house.

Above: partial model view of the living space of the assembled beam.

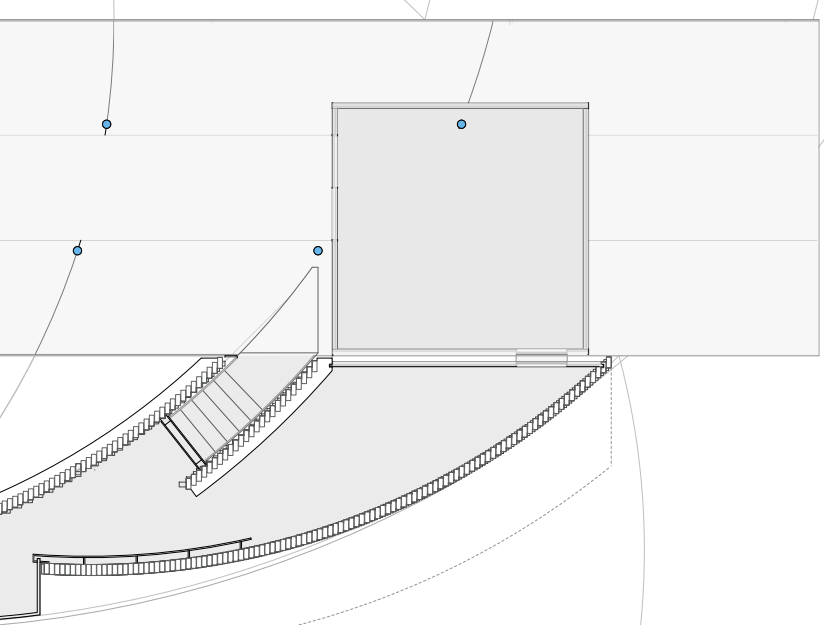
Left: longitudinal (bottom) and transverse (top) sections at the precast beam.

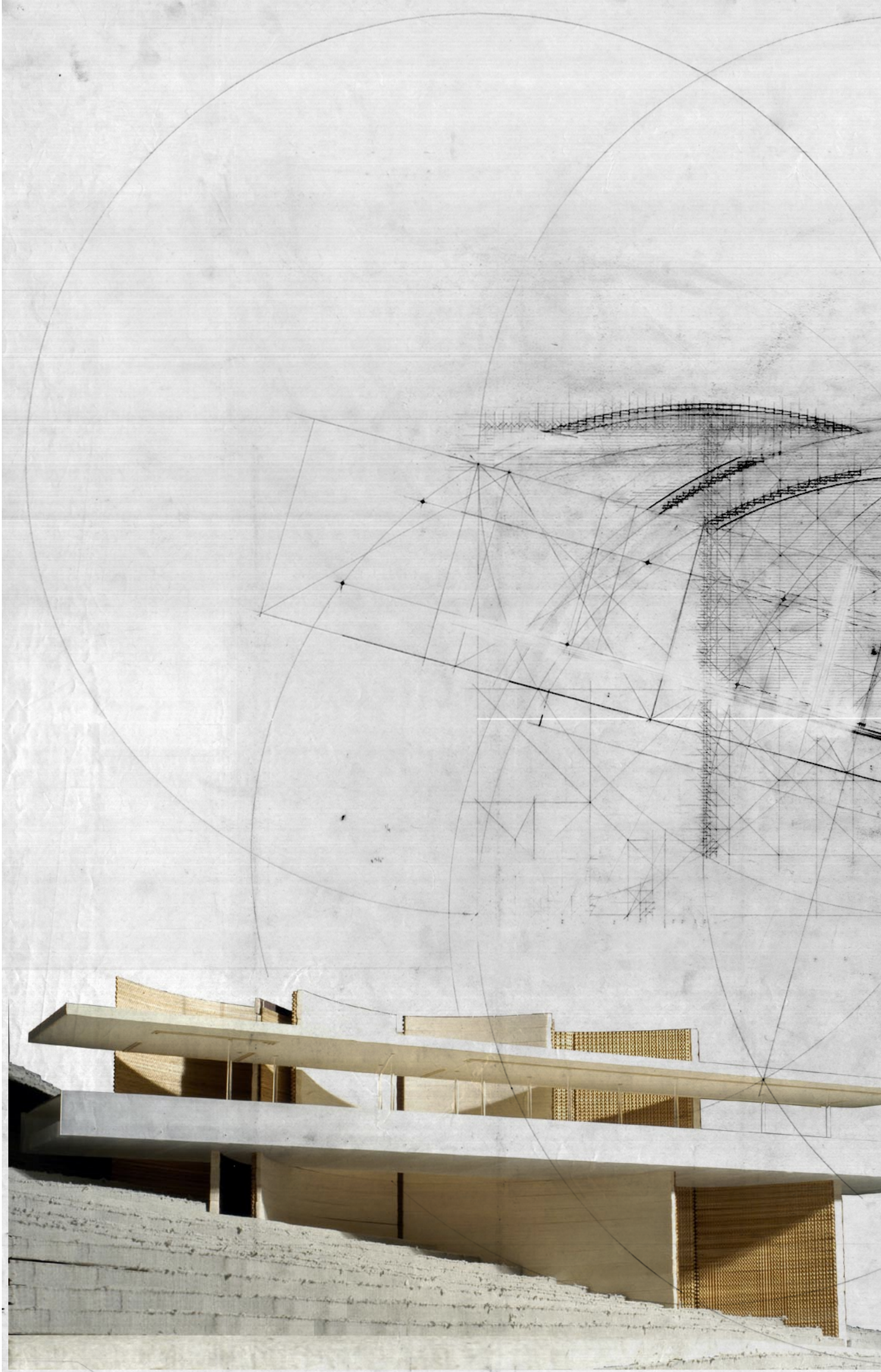


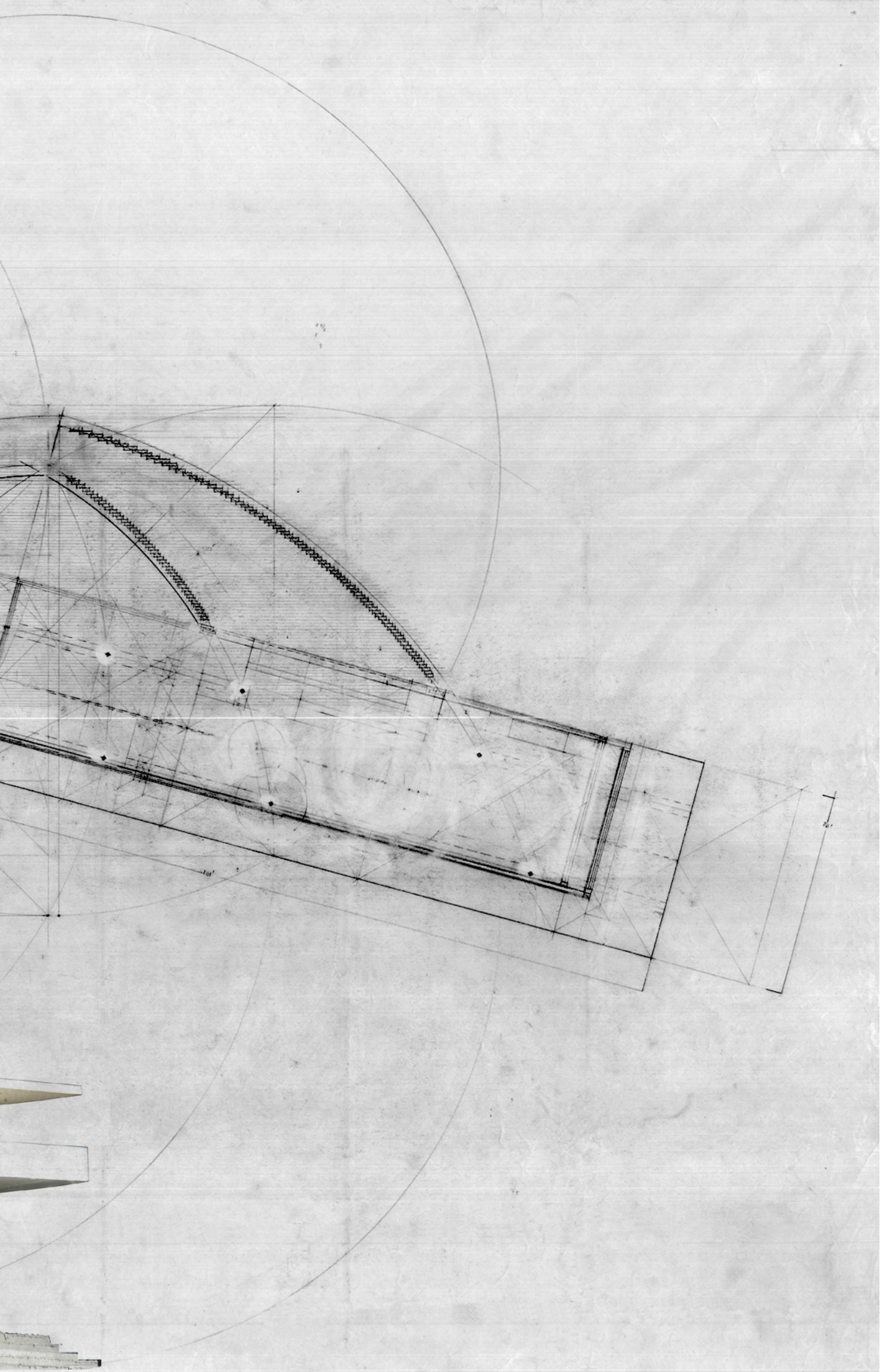
Glass Columns

Glass columns support the roof plane of the beam. Located in the beam, arranged along the geometry of the walls, the columns join the primary elements of the house and subtly extend the presence of the walls into the space of the beam.

Above and right: plan and study model with columns arranged in line with the geometry of the walls.







Reflections

A nebulous goal emerged as this thesis developed: to make a place that has richness. The bulk of this work has been about trying to understand the meaning of richness in terms of architecture.

At this point, I understand richness as a layered perception that happens over time and derives both from immediate, surface pleasures and the often less accessible pleasure of understanding. In terms of architecture, I associate this with a place defined by a structured relationship of physical elements that offers experiential pleasure to a first time visitor and reveals itself differently over time, through use and in one's memory.

References

Below is a partial list of sources that has, over time, been most relevant to the development of the House at Yellow Sulfur Springs.

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Of course, any errors are mine.

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