

# TECHNIQUES IN AMBIGUITY

ALLY HUTCHISON



# Techniques in Ambiguity

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and State University in partial fulfillment of the requirements  
for the degree of:

## Master of Architecture

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The thesis investigates how ambiguity - created through a smooth, continuous building envelope- can be used to alter the perception and understanding of discrete typological or primitive forms with a focus on material expression.

The use of basic, primitive forms is tied to a contemporary discourse of discreteness. Contemporary practitioners are exhausted with the seductive, smooth, continuous envelopes from the 90s digital project. As a result, they have turned to generating form through loosely associated, blocky parts.

However, the thesis proves - through a vast series of investigations - that there is still room to explore smooth envelopes and gradients from the 90s project - as it relates to the creation of ambiguity - with the discrete, primitive forms of contemporary discourse in order to propose an alternative way of generating form through loosely associated, blocky parts.

Furthermore, by deploying basic, primitive forms, the task of analysis and interpretation is open to a larger audience.

The ambiguous techniques that the thesis explores serve to challenge the typical viewer's perception of the familiar, primitive forms. By challenging their perceptions, the thesis asks for their participation and reinterpretation of the basic volumes. As a result of this participation from multiple audiences, the discipline of architecture becomes open to more people and ideas.

# ABSTRACT

The thesis investigates how a continuous and ambiguous building envelope can be used to alter the perception and understanding of individual, familiar forms with a focus on material expression.

Contemporary practitioners are focusing on how to generate form through individual, basic geometric objects - cubes, cylinders, cones, etc.

However, the thesis proves - through a vast series of investigations - that there is room to explore continuous, smooth building envelopes with the contemporary discrete, basic objects in order to propose an alternative way of generating form through individual, basic parts.

Furthermore, by deploying basic objects, the task of analysis and interpretation is open to a larger audience.

The ambiguous techniques that the thesis explores serve to challenge the typical viewer's perception of the familiar objects. By challenging their perceptions, the thesis asks for their participation and reinterpretation of the volumes. As a result of this participation from multiple audiences, the discipline of architecture becomes open to more people and ideas.

# GENERAL ABSTRACT

To Joseph,  
for your insistence on theory.

To Miranda,  
for always challenging me to make my  
position clear.

To Clive,  
for your calm and steady guidance.

To my family & Steveo,  
iykyk <3

# ACKNOWLEDGMENTS

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# INTRODUCTION

## Contemporary moment...

Contemporary architectural discourse has seen a collective shift towards loosely arranged, discrete, blocky, toylike, primitive forms.

This formal strategy is a response to the exhaustion of the smooth digital project of the 90s. The discrete forms are seen as working against the seductive, continuous envelopes from the previous era.

These types of forms also spark a conversation around legibility because they are familiar to the non-expert due to their childish, toylike quality.

As Andrew Holder describes in his book, *Inscriptions: Architecture Before Speech*, legible or familiar forms allow a larger audience to take a stake in the project and offer their interpretation. They provide the audience something recognizable in which to investigate.

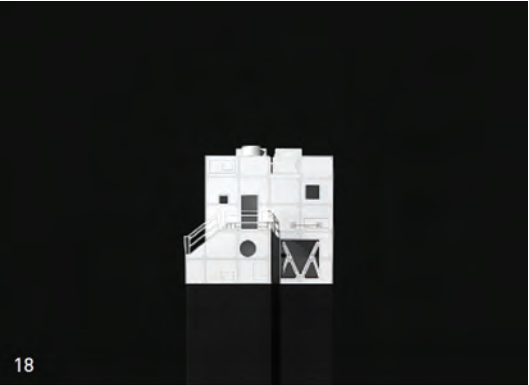
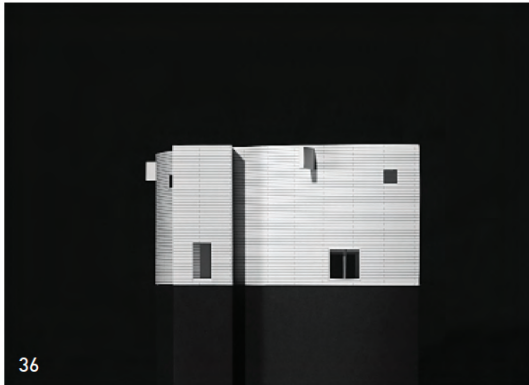
Stan Allen also argues that discrete formal arrangements are more apt for democracy because they fuse parts together, yet the parts retain their original identities.



HOUSE PARTS COLLECTED // MOS



CABINS // BESLER & SONS



44 LOW-RESOLUTION HOUSES // MOS

*44 Low-Resolution Houses* was an exhibition by MOS Architects in the fall of 2018 in which 44 contemporary practices, including MOS, designed a house that fits into at least one of the following categories:

“first, houses that vaguely resemble houses, using familiar house elements like pitched roofs, chimneys, windows, doors, etcetera; second, houses that appear to be constructed, in that one can see the construction, joints, and materials, and have a sort of cheap, unfinished quality; and third, houses that are composed of basic geometric primitives - squares, circles, triangles - arranged (primarily planimetrically) in a noncompositional or abstract manner.”

The low-res gains attention by being slightly strange, awkward, or crude as it focuses on technique, typologies, materiality and references; as opposed to the smooth and complex geometries from the 90s digital era.

The exhibition asks viewers to study the houses and enjoy the act of reading, comparing, and interpreting. Which is to say viewers are encouraged to analyze in order to conclude why the familiar elements, forms, or materials are slightly off or strange.

The categories that outline the houses prove a collective tendency towards discrete, familiar, primitive forms. Not only is MOS interested in this discourse, but they have identified 43 other practices that are engaged in this way of working as well.

Andrew Holder theorizes in his book *Inscriptions: Architecture Before Speech* that the seemingly disconnected contemporary work holds together through an “insistent flash of recognition.” He coins these flashes as “originals.”

Originals are engaged with the familiar and recognizable in two ways. The first being formally recognizable - for example pitched roofs, chimneys, porches, primitive forms. The second being recognizable as facts of the earth - for example rocks, or slumping due to gravity.

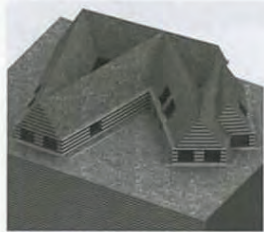
Holder continues to explain that “architects inscribe design onto the emptiness that we call an original such that the original persists as a regulating substrate even while it is overwritten by an accumulation of architectural activity reforming the surface.”

In the spread of *Inscriptions* to the right, the original in all the images is the pitched roof. The act of inscribing ranges from pulling apart - in the case of MOS’ House No. 10 - to conjoining - in the case of Sean Canty’s Janus House.

In essence, Holder is alluding to the fact that we are in an architectural moment of recognition. But it is not a stable moment that reassures us of our understanding of any given original - be it pitched roofs, primitive forms, or rocks - but a moment in which the recognizable is carefully deconstructed and transformed into something new and strange.

It is the analysis through comparison and interpretation that MOS called for in *44 Low-Resolution Houses* that allows multiple audiences to reconstruct their own understanding of the inscribed originals.

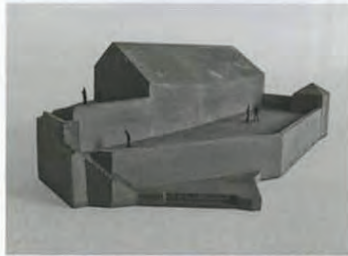
164 Category Eidetic Houses



Outpost Office, A Long House, 2020



Studio Sean Canty, Janus House, 2019



Karamuk Kuo, Chillon Castle Visitor Center, 2013



LAMAS, Townships Farmhouse, 2017



studioPM, Stowaway House, 2016



Karamuk Kuo, Chillon Castle Visitor Center, 2013

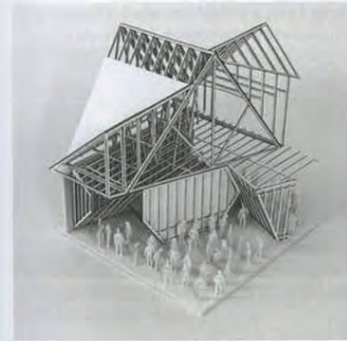
165 Category Eidetic Houses



The LADG, House in Los Angeles 1, 2016



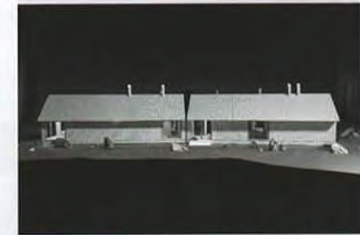
PARA Project, Stump House, 2019-



Besler & Sons, Roof Deck at MoMA PS1, 2015



studioPM, Stowaway House, 2016



MOS, House No. 10 (House with Courtyard), 2015-18



PEROT MUSEUM // MORPHOSIS ARCHITECTS



DALIAN INTERNATIONAL CONFERENCE CENTER // COOP HIMMELBLAU

## 90s moment...

However, the 90s marks the beginning of envelope discourse and it has remained a key component of contemporary practice.

The introduction of digital modeling software in the 90s provided a new way of thinking about the building envelope as a more 3-dimensional wrapper rather than 2-dimensional orthographic projections - or elevations.

Spherical envelopes, more specifically, enclose multiple, more pragmatic spaces while their exterior surface is free to evolve independently of the interior volumes. As a result, there was a focus on smoothness as the 3-dimensional wrapper morphs the individual programs into one continuous form.

The distortion of the exterior form is not driven by programmatic need, but instead by the pursuit of digital virtuosity that can have profound perceptual effects on the viewer.

The two buildings to the left speak to this idea of the envelope being capable of affecting the viewer. The Perot Museum gives an uneasy feeling as the glass form cuts through the continuous envelope and sits haphazardly on the facade. Similarly, the Conference Center gives the viewer chills as the fins on the side appear to be in a constant state of motion.

## Ambiguous envelopes...

The thesis is more specifically interested in a certain kind of envelope system that creates ambiguity and implies depth in order to create conflict and contradiction on the surface that challenges the legibility of the forms it contains.

The contemporary discussion tends to focus only on quick legibility of primitive forms that are slightly altered as opposed to challenging the legibility of the forms themselves.

The two buildings to the right speak to surface complexity and how the envelope is capable of implying depth and creating ambiguity in the perception of the form through material expression.

The implied depth in the surface destabilizes the viewer's understanding of the surface and the form. This allows the project to ask for reinterpretation from all viewers.

The viewer's depth perception is most prone to being tricked by ambiguity. According to Merleau-Ponty, perception is not only based on sensory information. The mind also projects knowledge from previous experiences onto that sensory information in order to form a complete understanding. The depth axis requires more of the mind's imagination and interpretation to formulate this complete understanding. Because of the involvement of the imagination, the viewer's perception is more easily tricked by opticality.



PHILHARMONIE // JEAN NOUVEL



TEXTILE INDUSTRY // BEHENT BONDZIO



MATTERS OF SENSATION // GEORGINA HULJICH & MARCELO SPINA



MATTERS OF SENSATION // GEORGINA HULJICH & MARCELO SPINA

## Affect theory...

The inclusion of perceptual effects in the thesis is related to another exploration in the early 2000s: affect and sensation in architecture.

The Matters of Sensation show - curated by Georgina Huljich and Marcelo Spina - was an exhibition in 2008 in which 13 practices designed and built atmospheric models that had a direct impact on the viewers.

The success of each exhibit was determined by its ability to affect the viewer's body and heighten their material awareness.

Some exhibits focused on inviting textures with lush anemone-like forms or sleek and smooth forms that tempt the viewer to touch; while others focused on uninviting textures with metal spikes extending from the form that tell the viewer to stay away.

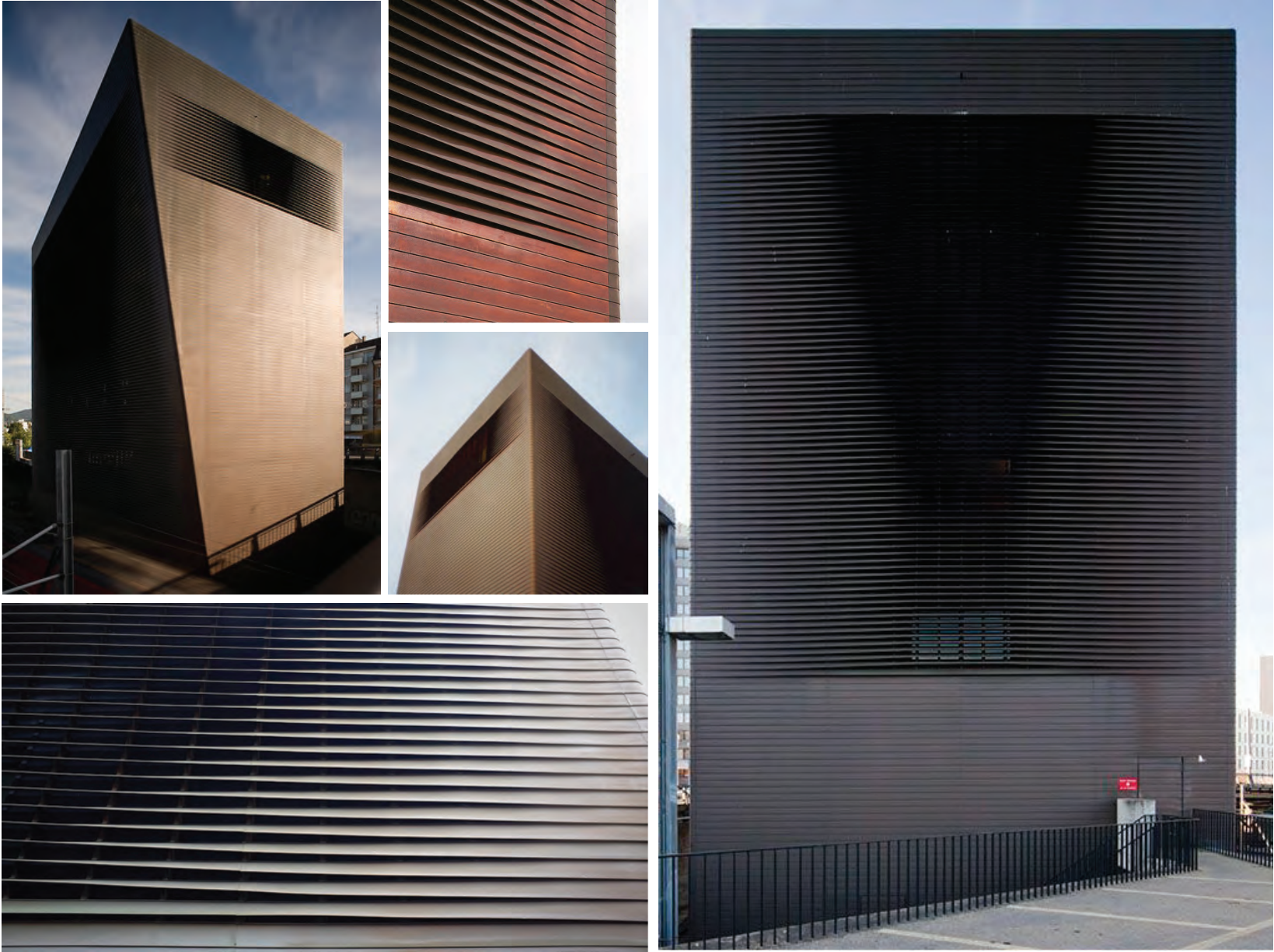
Because affect theory relies on perceptual awareness - rather than prior knowledge of certain forms or materials - it becomes legible to a larger audience. Interpretation is open to anyone willing to observe.

### Thesis statement...

With these discourses in mind, the thesis strives to combine the contemporary tendency towards loosely arranged, discrete, primitive forms with the 90s discourse of atmospheric envelopes and affect theory by deploying an ambiguous, wrapping envelope that connects discrete, primitive forms. In doing so, I aim to advance the contemporary discussion of legibility and propose an alternative way to generate form through loosely associated, blocky parts.

I also have an affinity to craft and make, so I am challenging myself to synthesize my perceptual argument with a material expression and tectonic system.





SIGNAL BOX // HERZOG & DE MEURON

## Material expression precedent...

An example of synthesizing optical effects with a material expression is Herzog & de Meuron's Signal Box. This project is a composition of numerous delicate copper strips that aggregate along the facade. Yet from a distance, it appears monolithic and solid.

The image of solidity is created through the repetition of closed strips against its primitive volume. Slight twists in the copper at certain moments along the facade reveal a breakage in this image of solidity as the fragile edge of the copper is exposed and the monolith disappears into its own shadow.



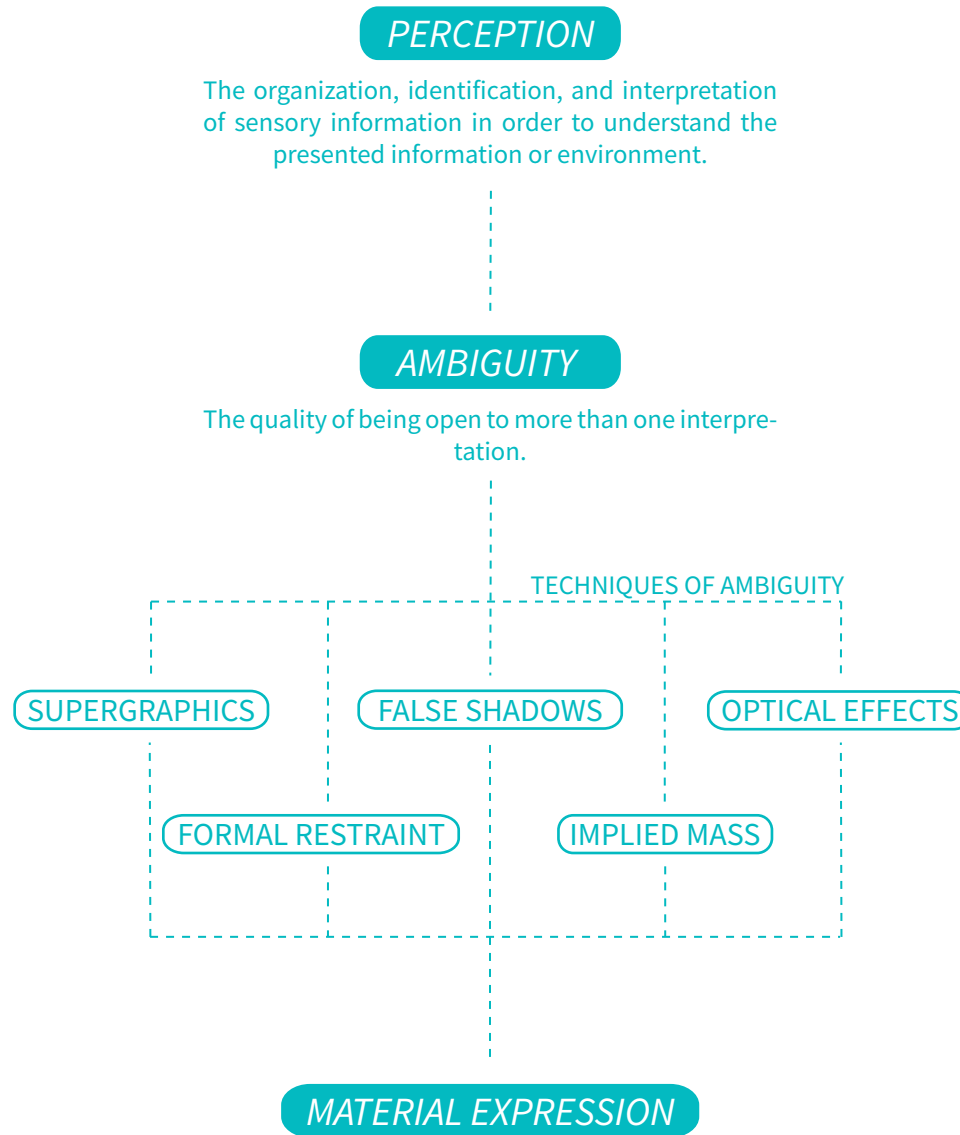
INVESTIGATIONS

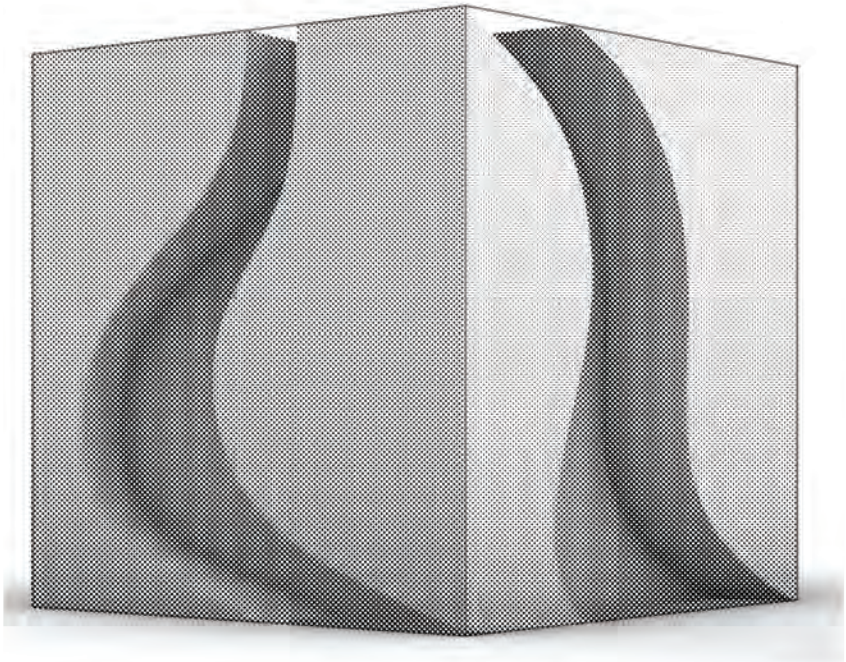
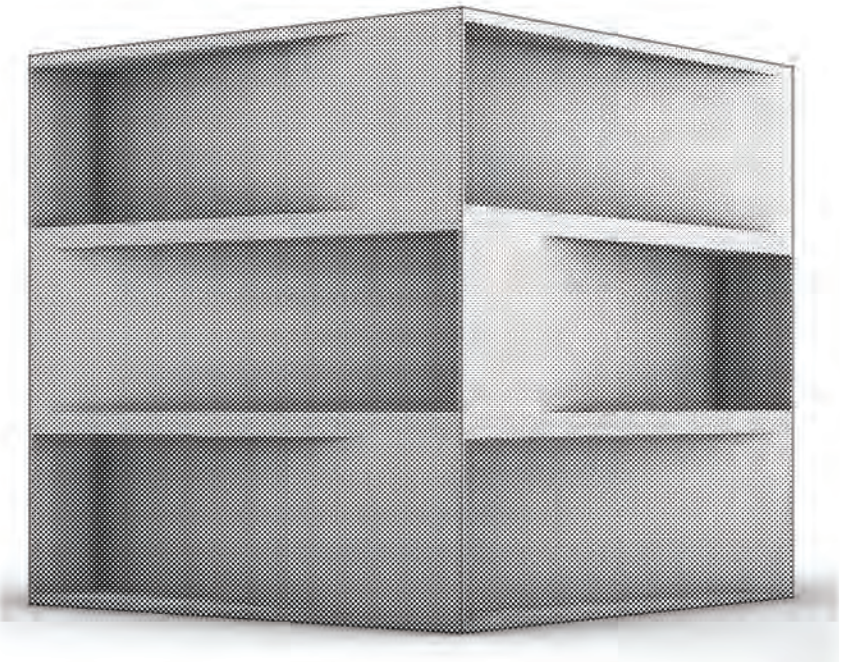
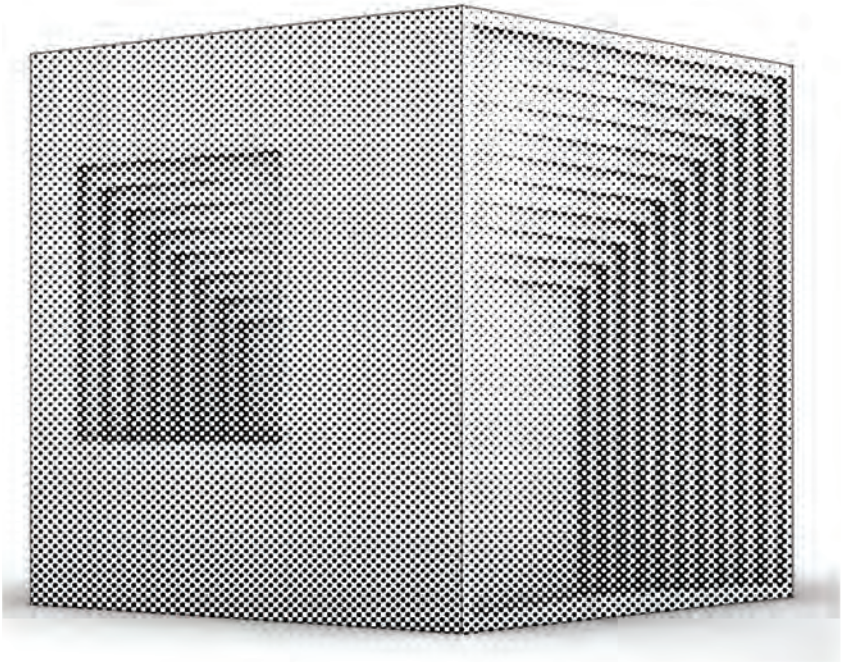
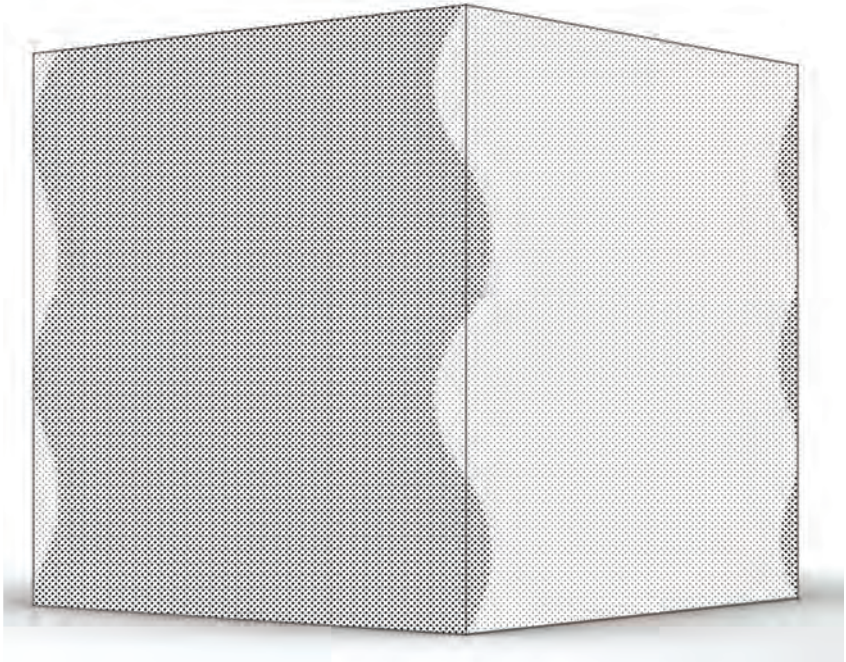
# HALFTONE STUDIES

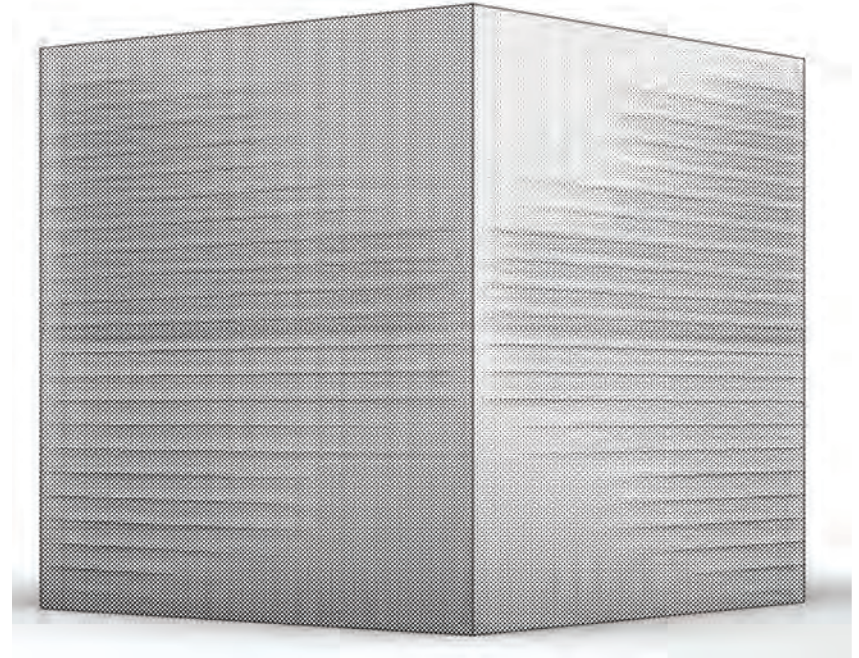
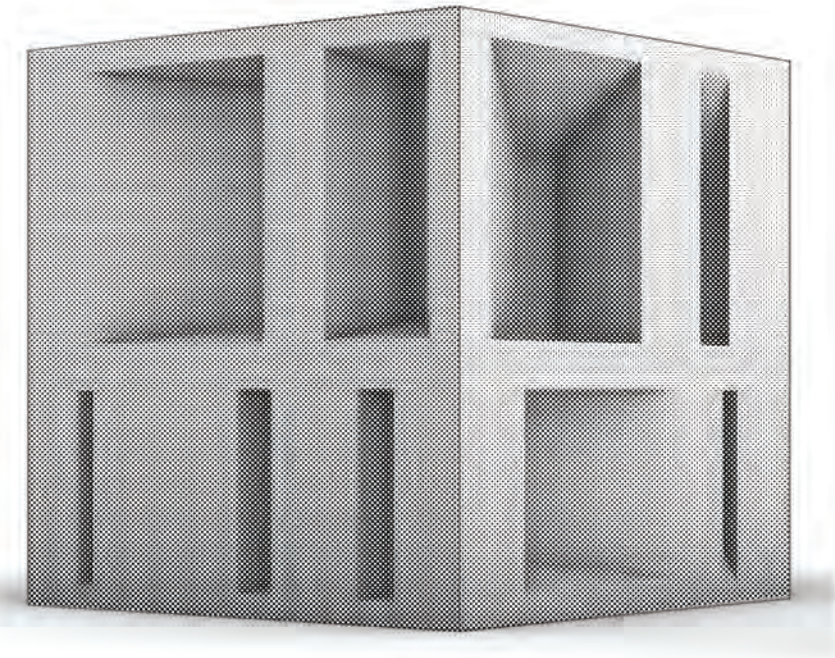
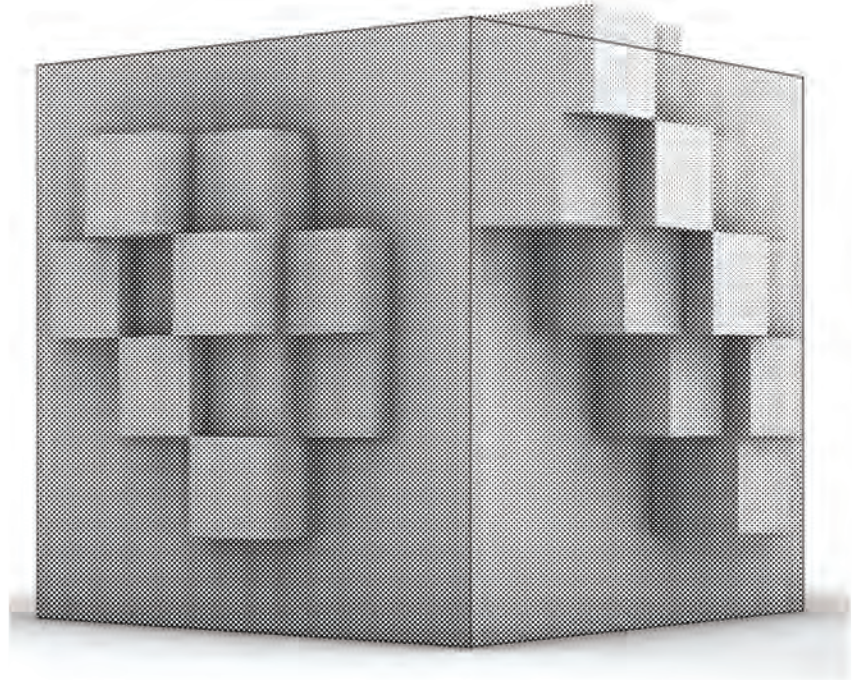
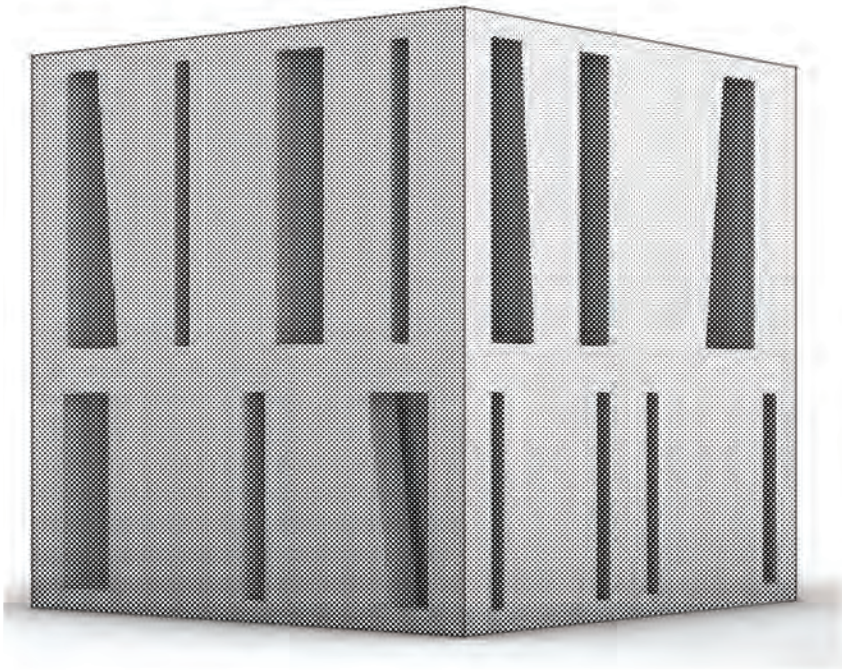
This series of studies investigates the manipulation of flat, planar surfaces to give the perception of formalism. Through the use of implied massiveness, the intention is to create an aesthetic of complexity with material and formal simplicity.

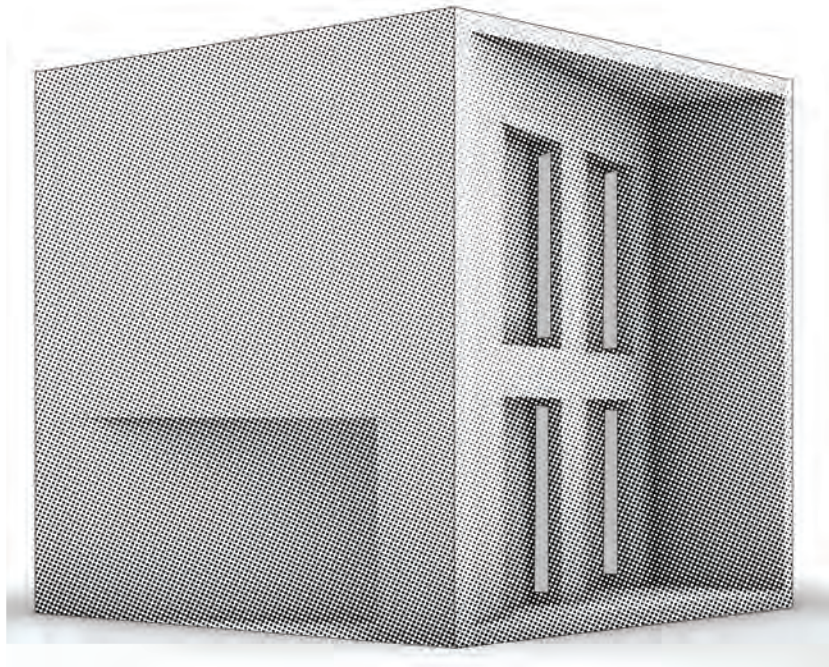
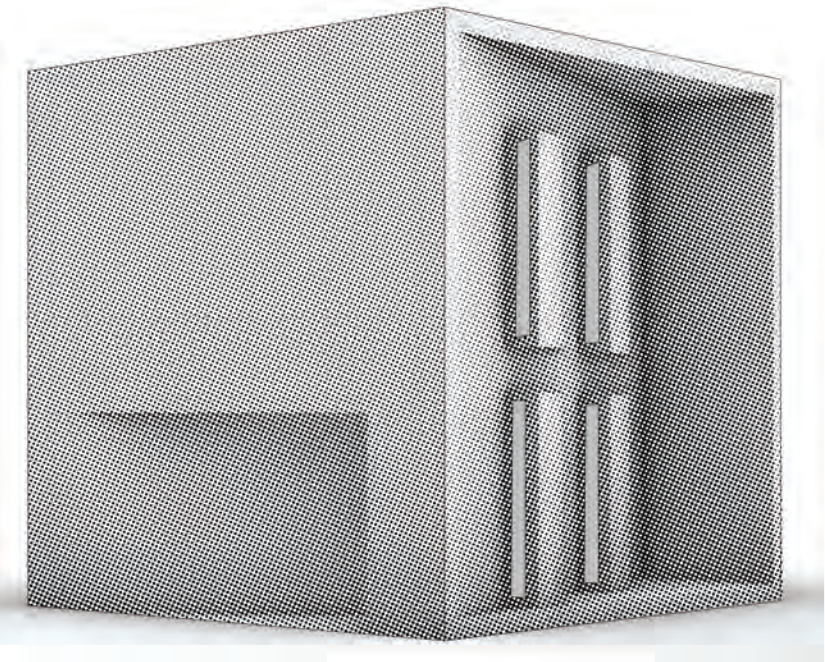
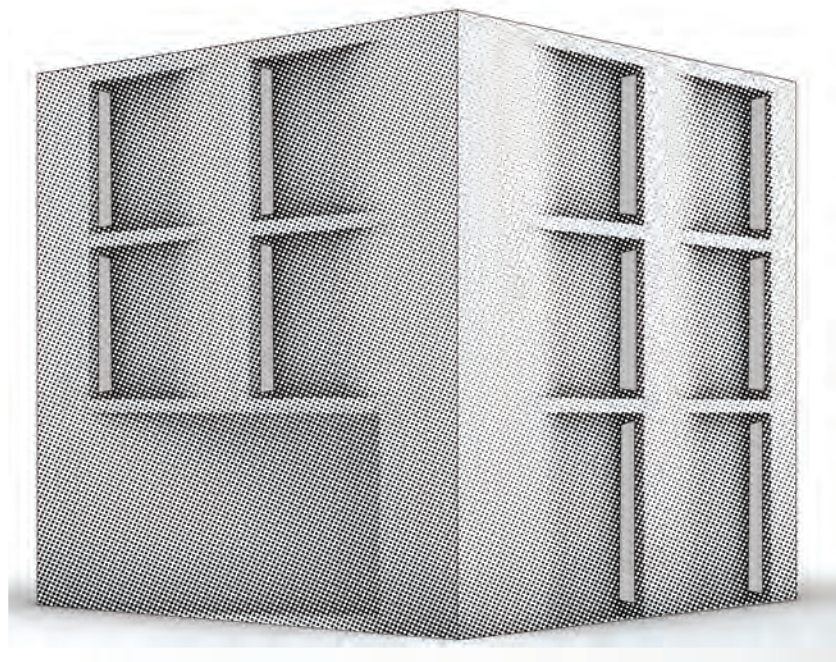
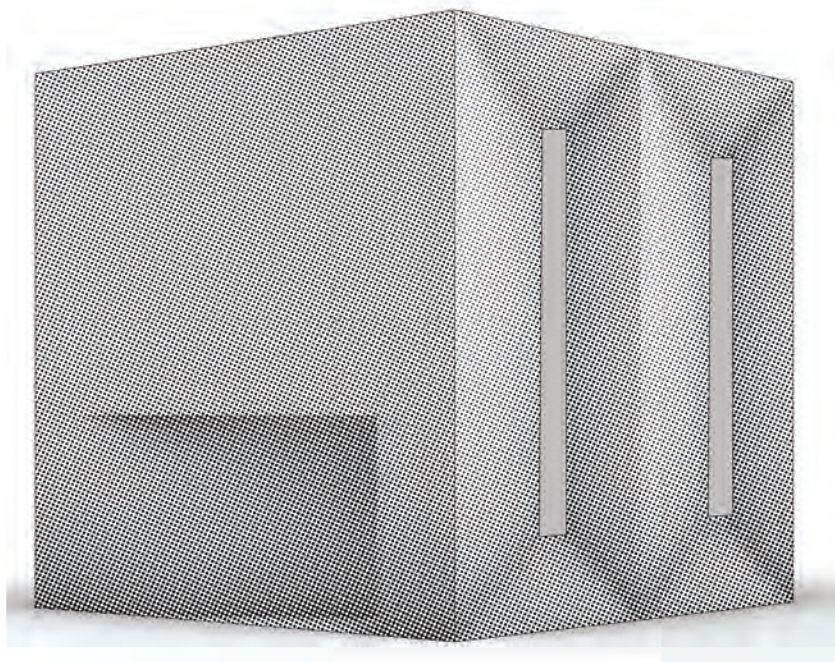
The studies utilize several techniques in order to create ambiguity on the surface that challenges the viewer's understanding of the form. Optical effects, like creating false shadows and edges, aid in giving the perception of formal gestures. The false gestures imply massiveness and are accessed through specific perspectives. These perspectives are known as supergraphics.

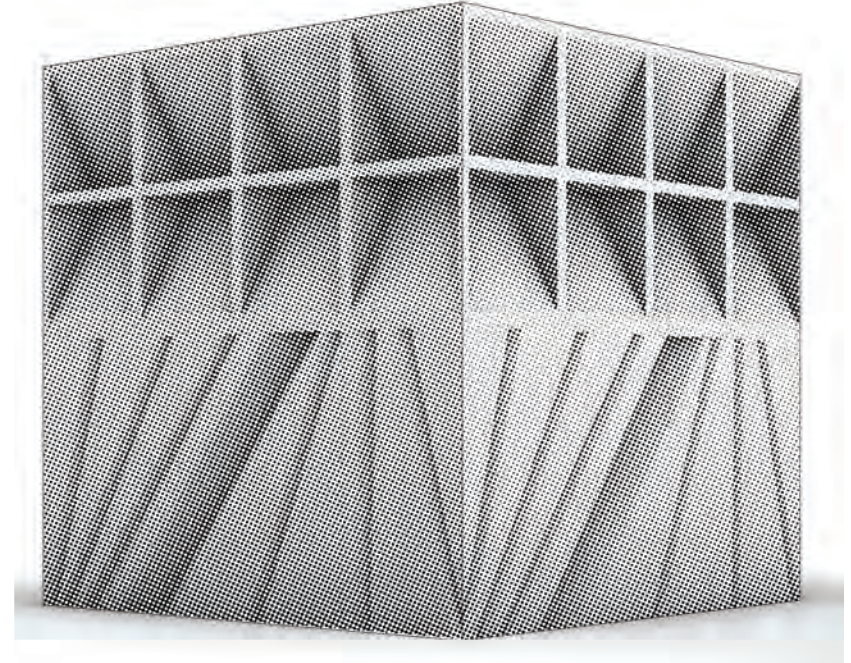
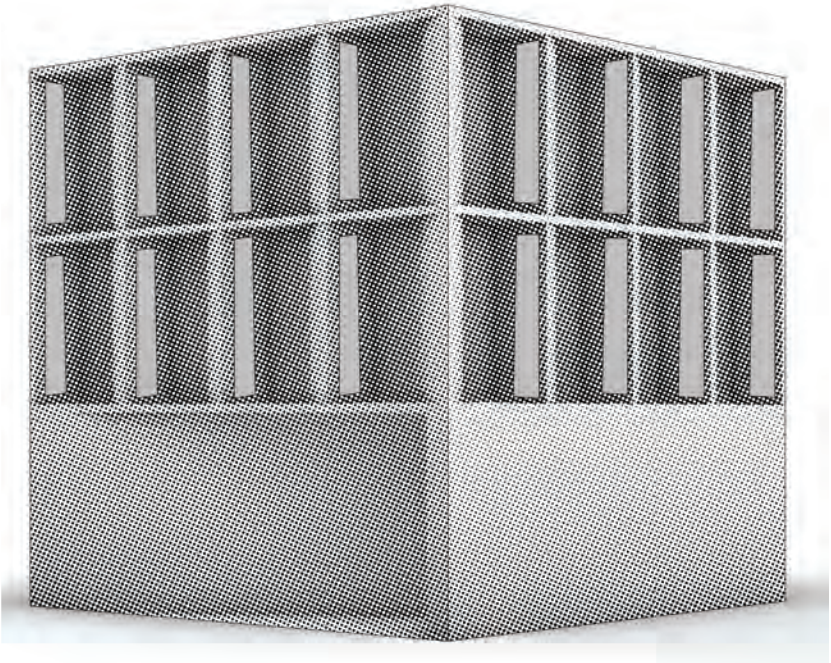
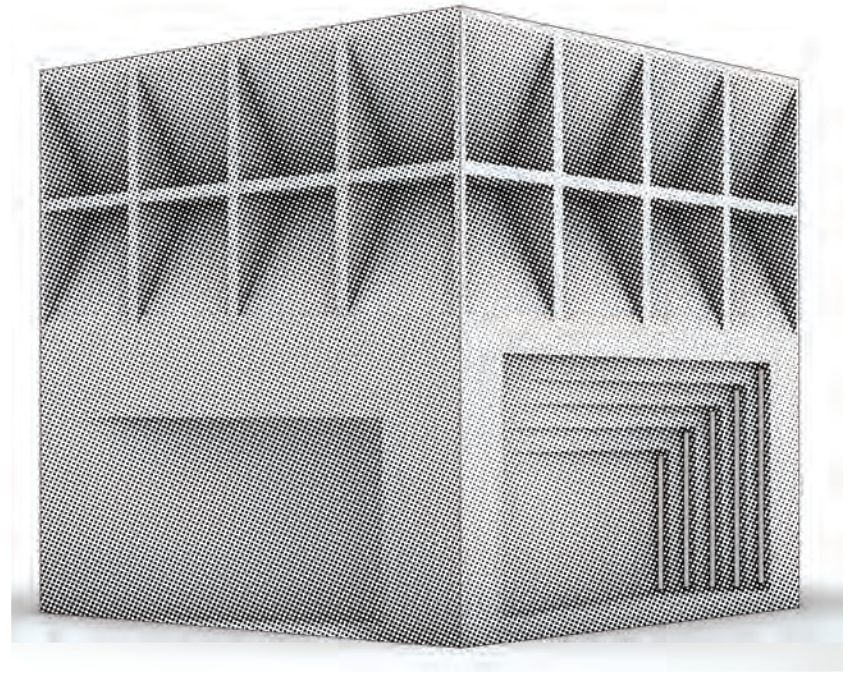
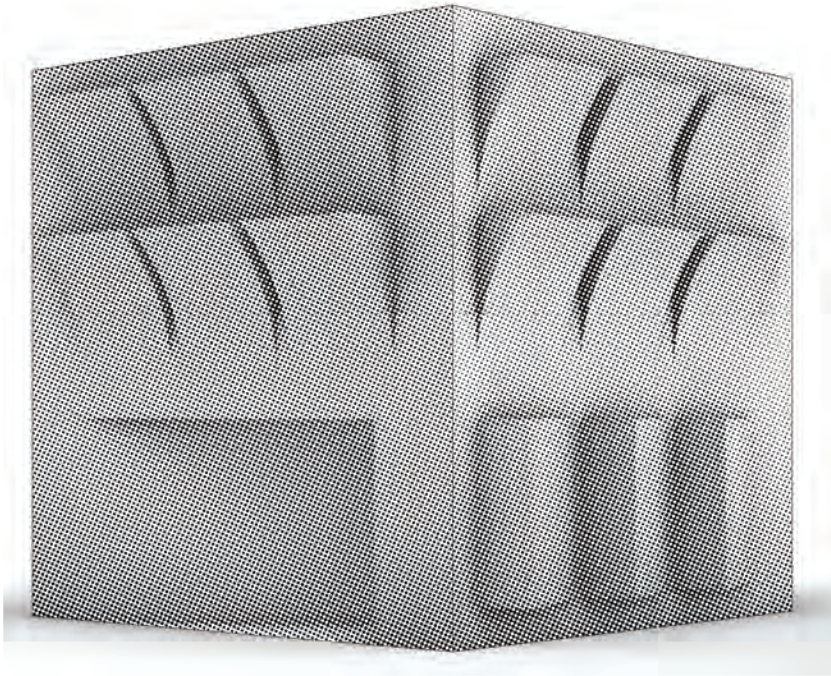
In an attempt to synthesize the perceptual aspect of the argument with a material expression, these studies explore exposing the aggregate within a concrete mixture to contrast the lighter, finished concrete in order to superimpose formalist gestures onto flat, planar surfaces.

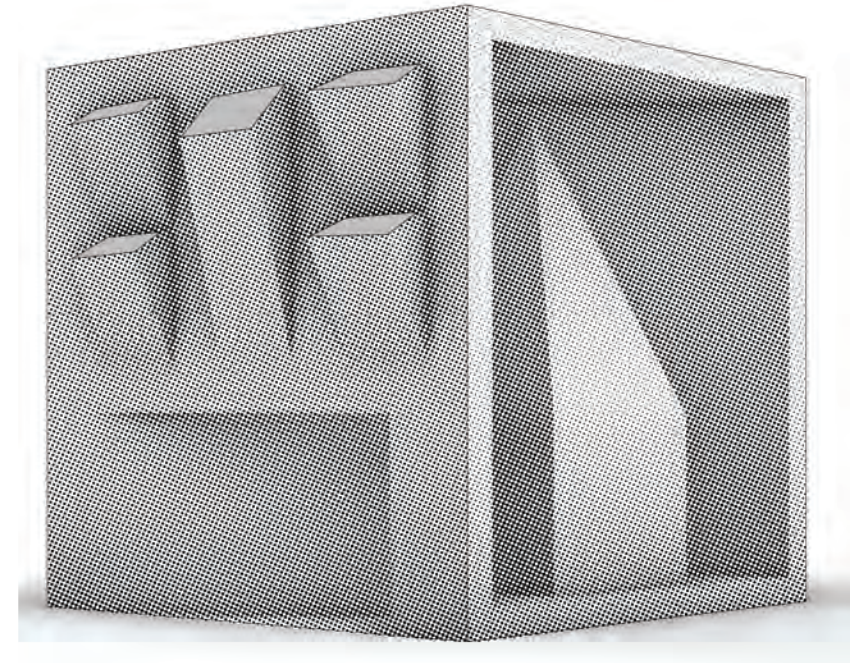
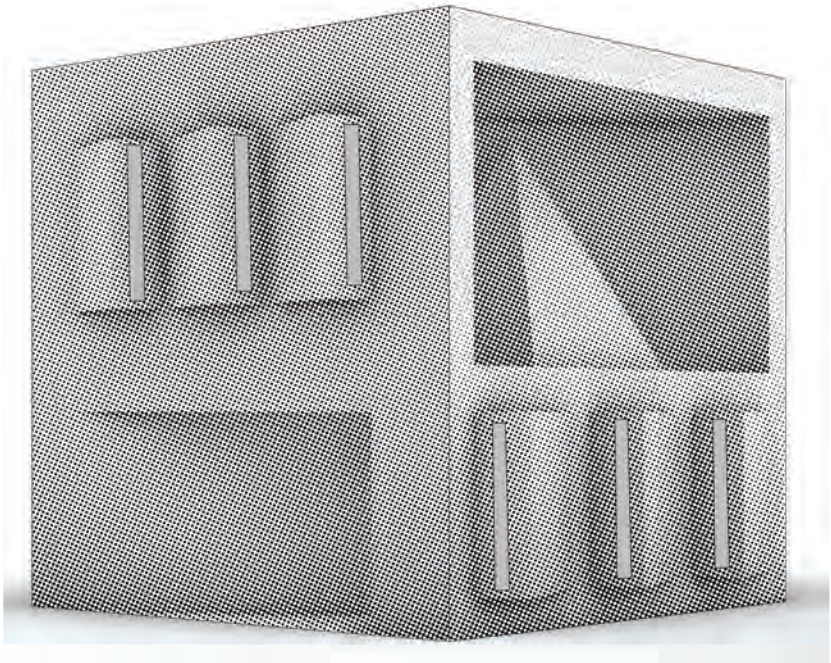
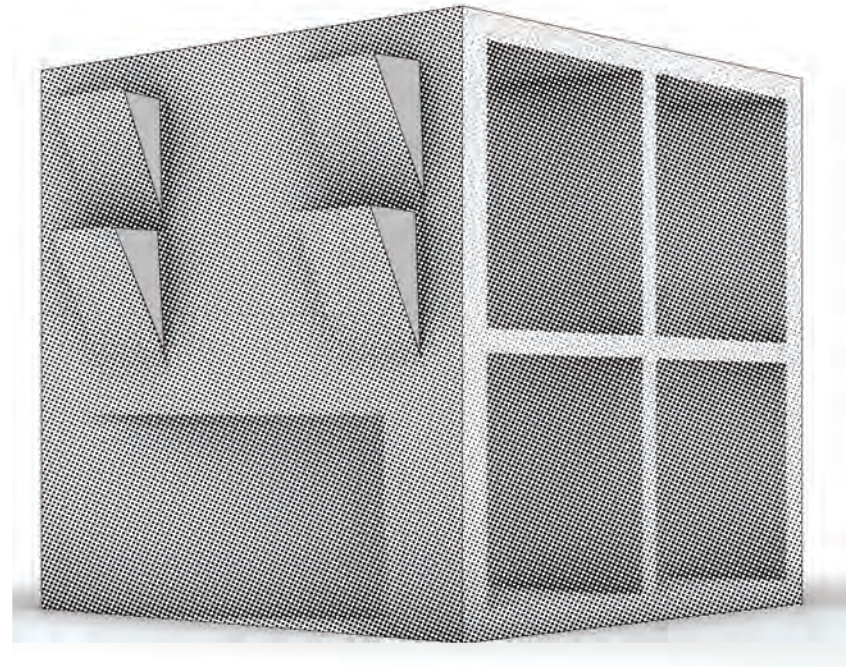
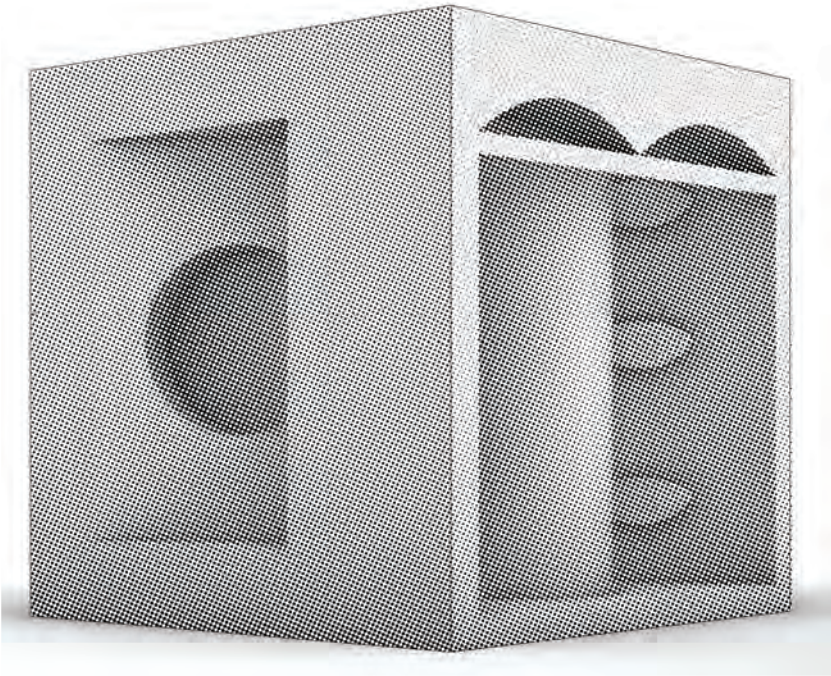


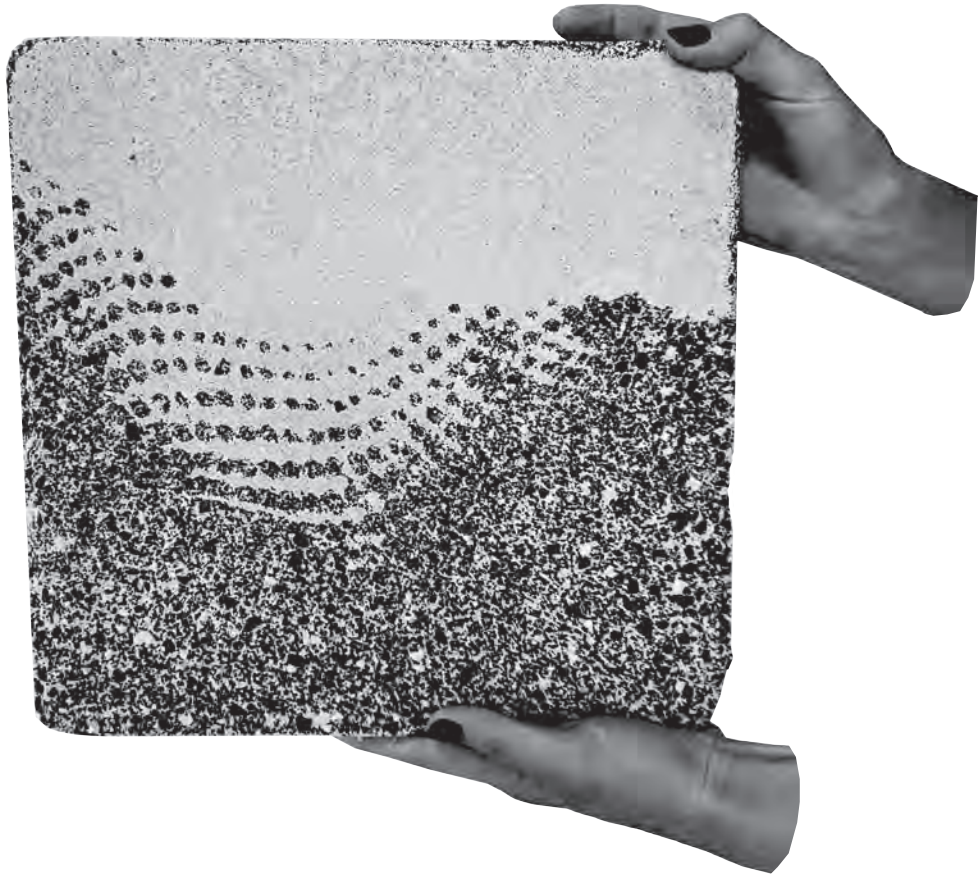
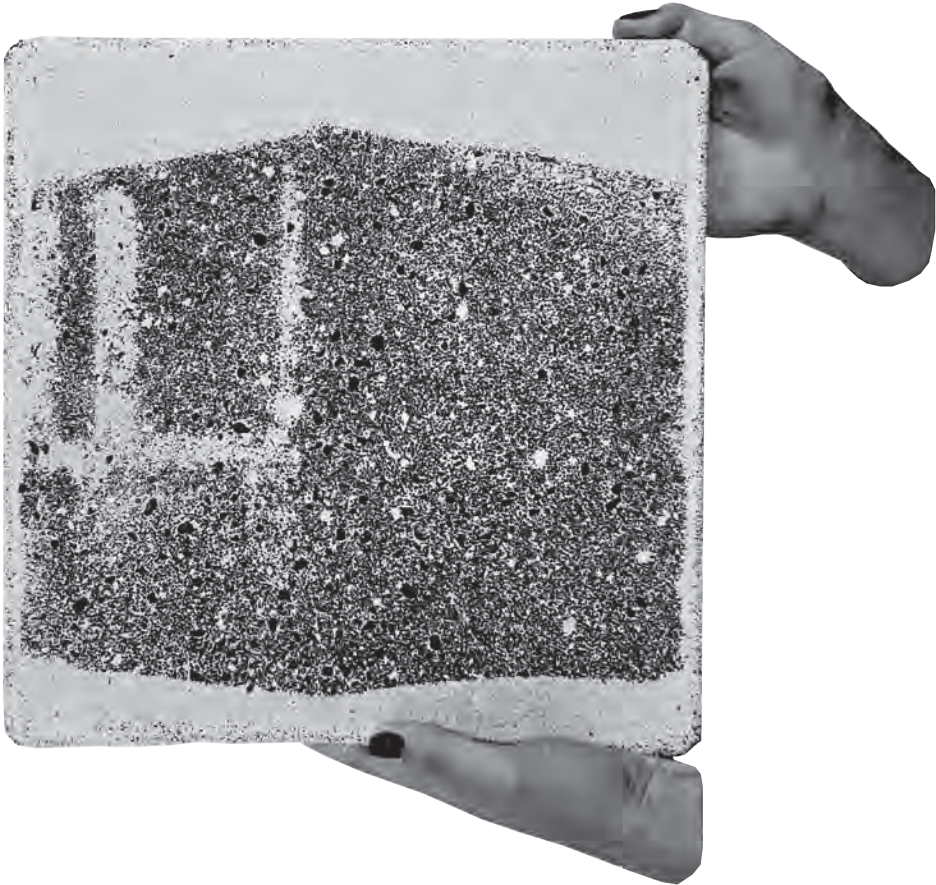










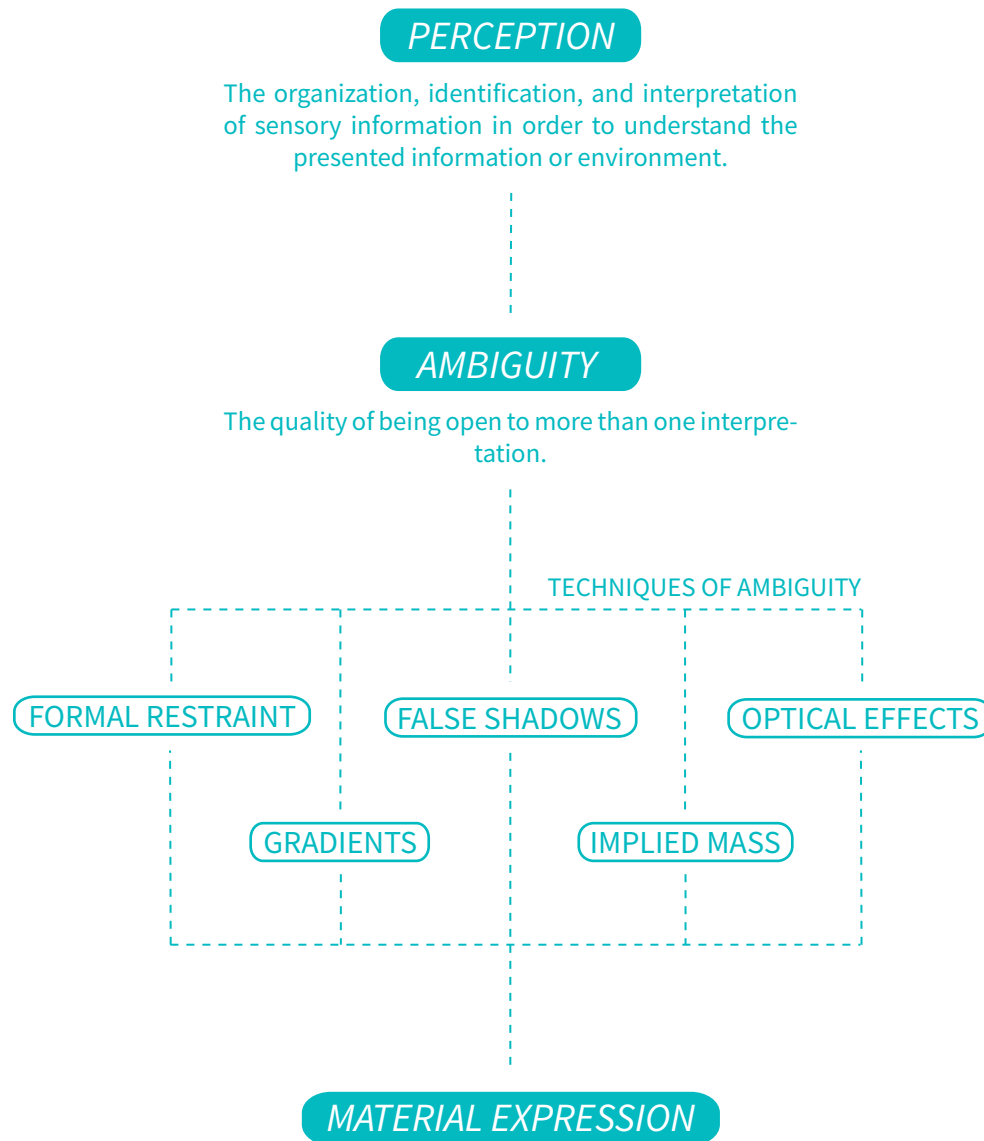


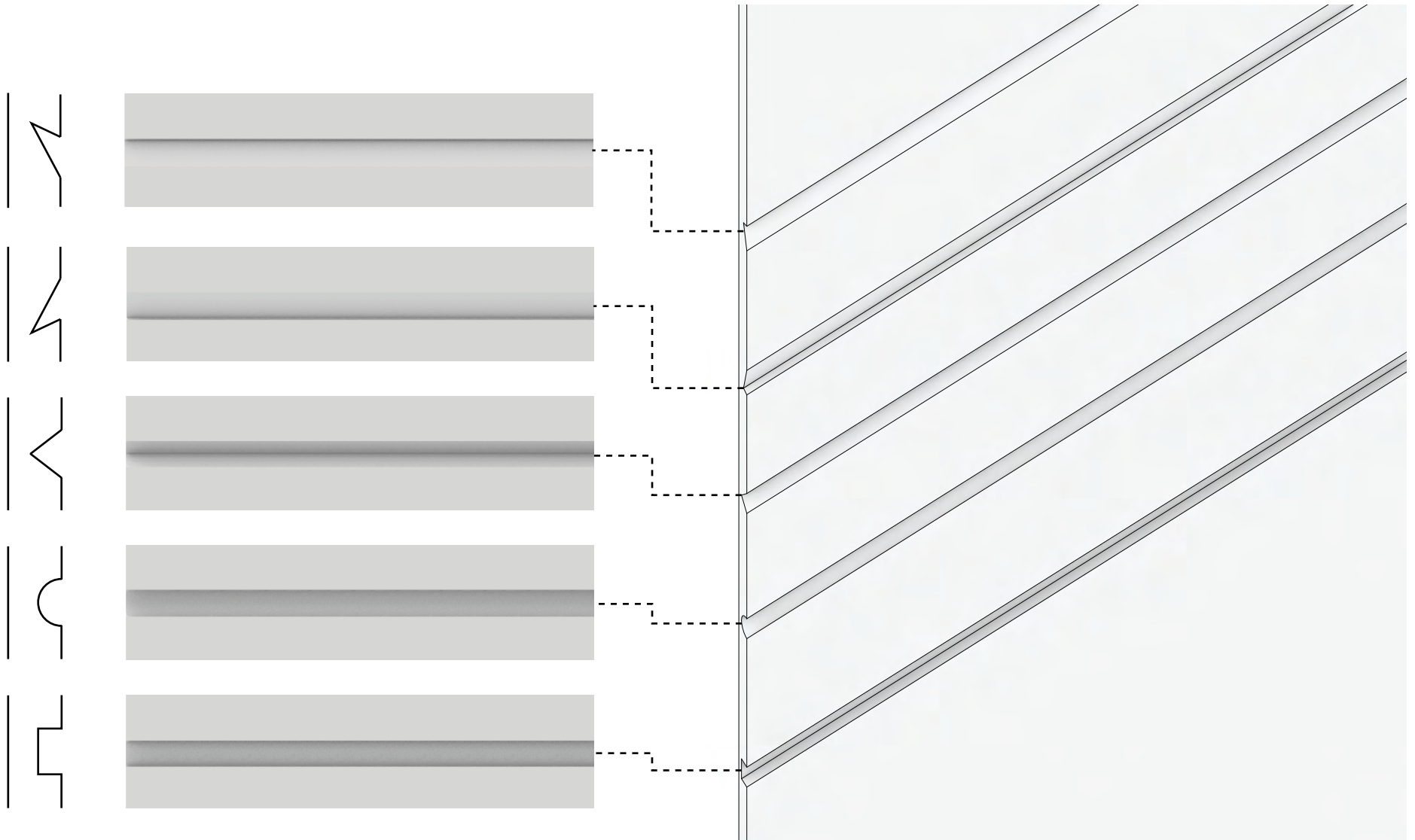
# REVEAL STUDIES

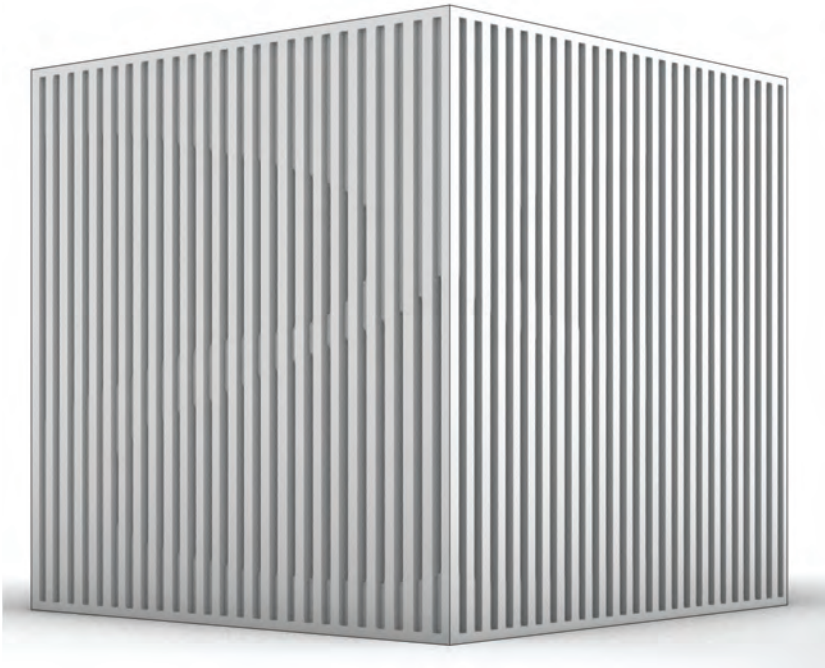
This series of studies investigates the manipulation of flat, planar surfaces to give the perception of formalism. Through the use of implied massiveness, the intention is to create an aesthetic of complexity with material and formal simplicity.

The studies utilize several techniques in order to create ambiguity on the surface that challenges the viewer's understanding of the form. Optical effects, like creating false shadows and edges, aid in giving the perception of formal gestures. The false gestures imply massiveness and are not accessed through specific perspectives, but can be accessed through all perspectives.

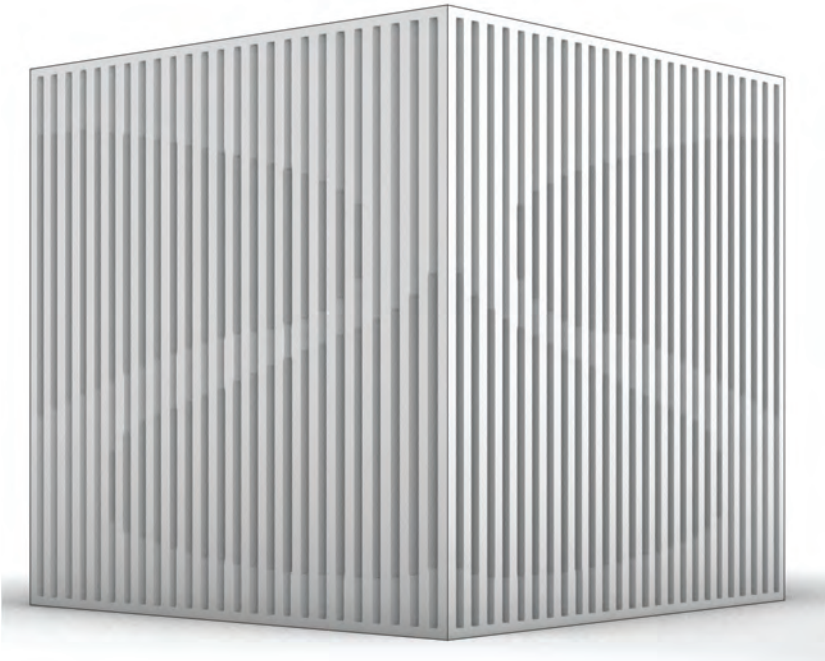
To synthesize the perceptual aspect of the argument with a material expression, these studies explore different reveal profiles and depths in concrete construction in order to superimpose formalist gestures onto flat, planar surfaces. Another possible material expression is a series of articulated form ties that follow a certain pattern within a cast-in-place concrete construction system to give the perception of depth within the surface.



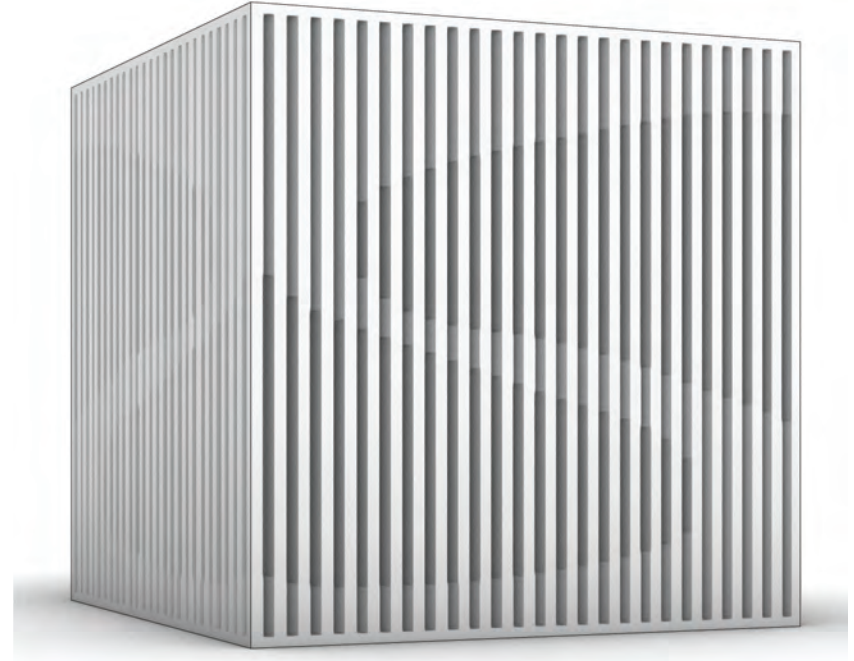


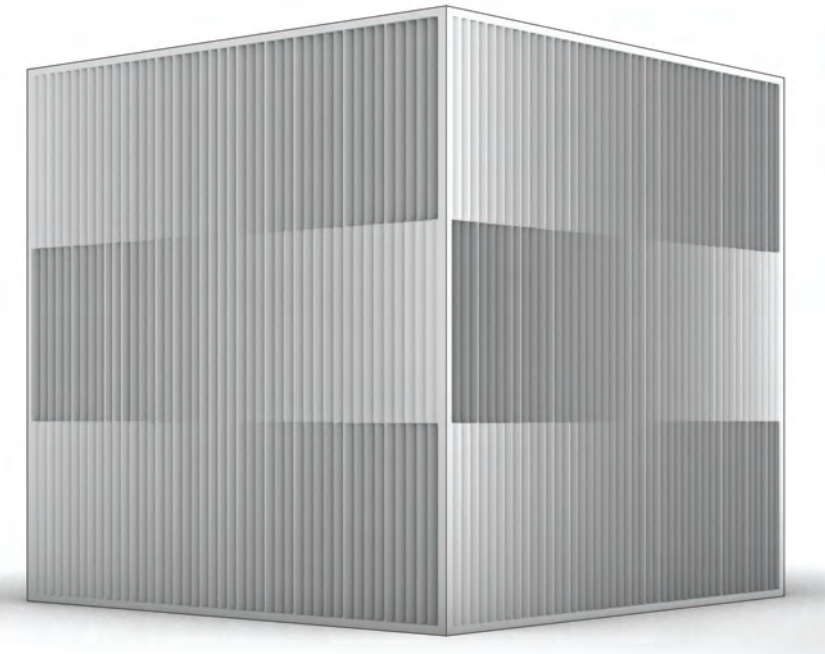


Rectangular Profile

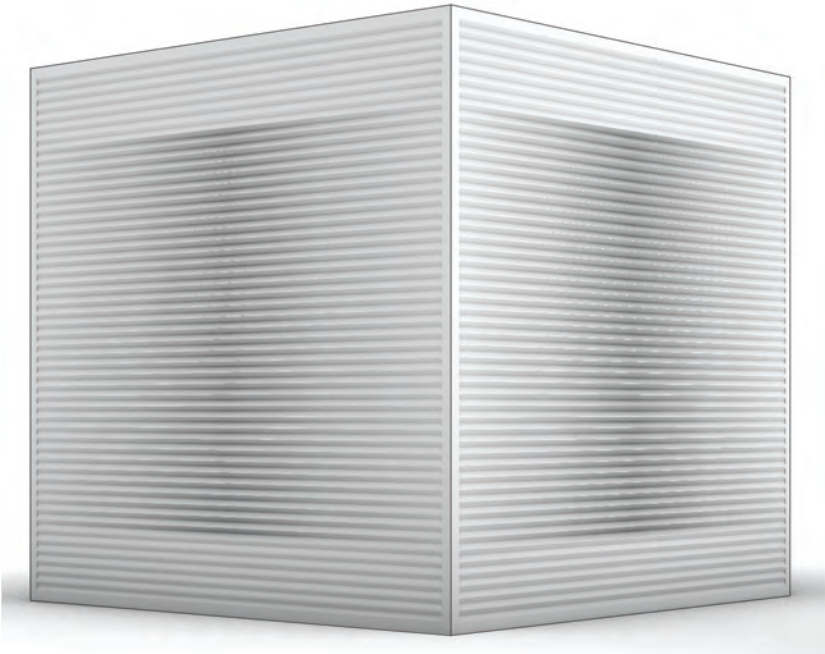


Symmetrical V Profile

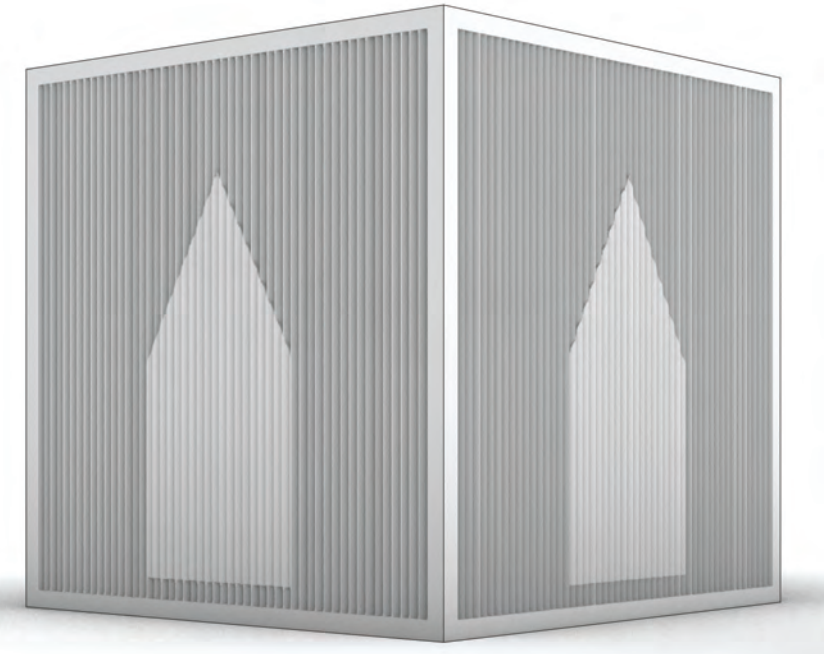




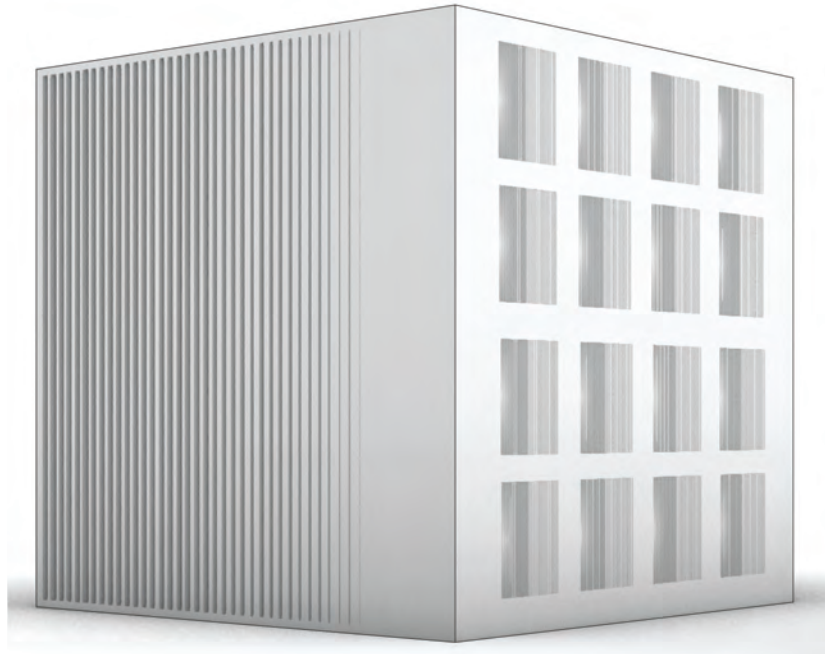
Varying Depths of Symmetrical V Profile



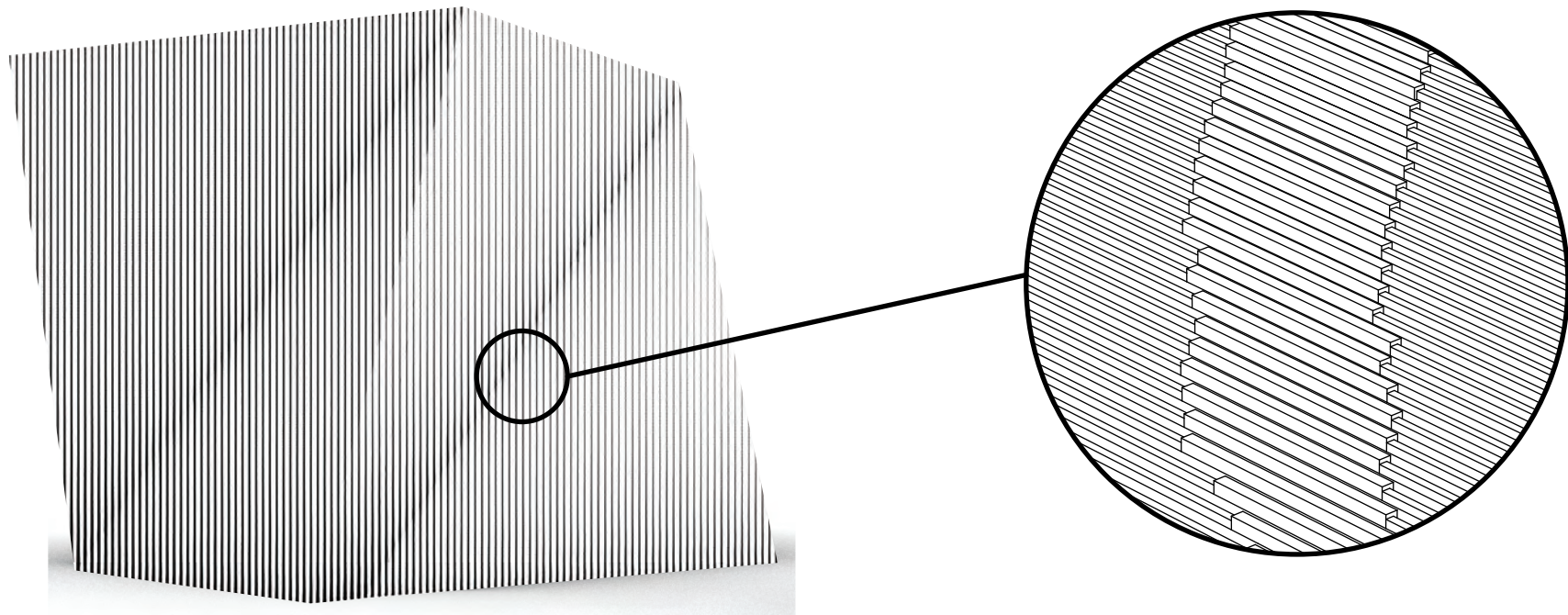
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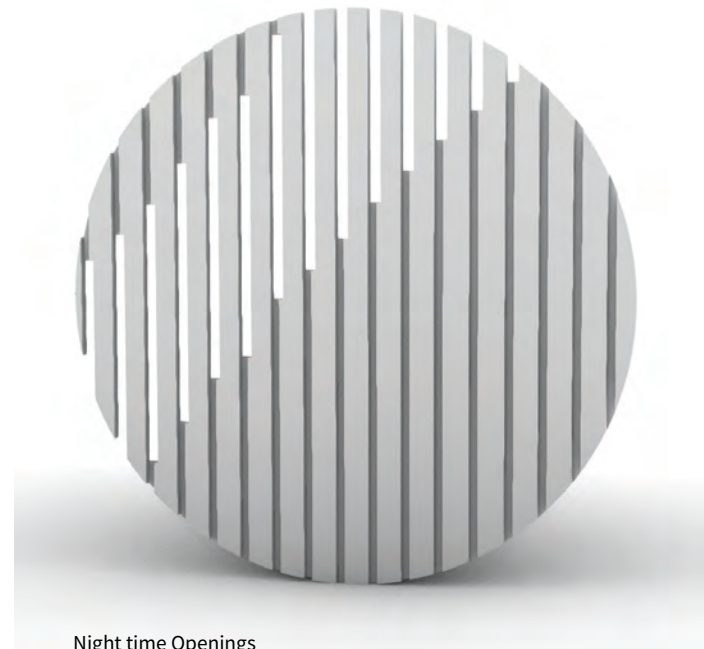
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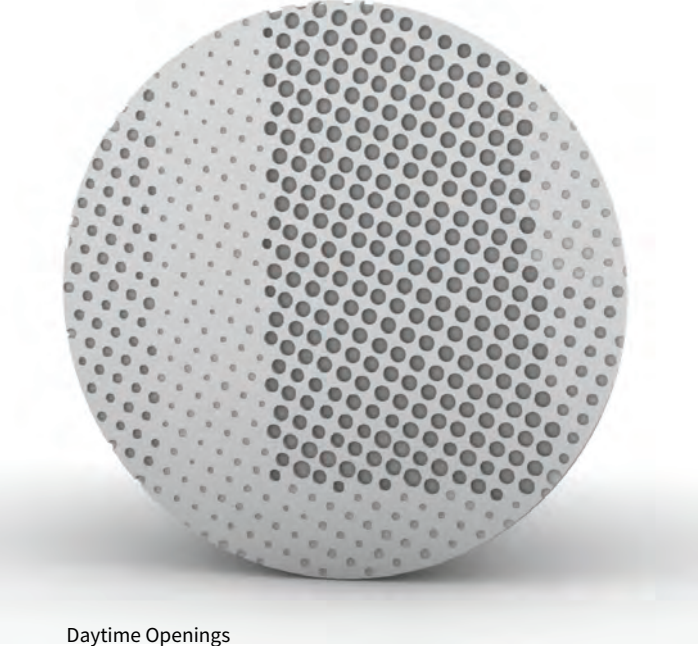
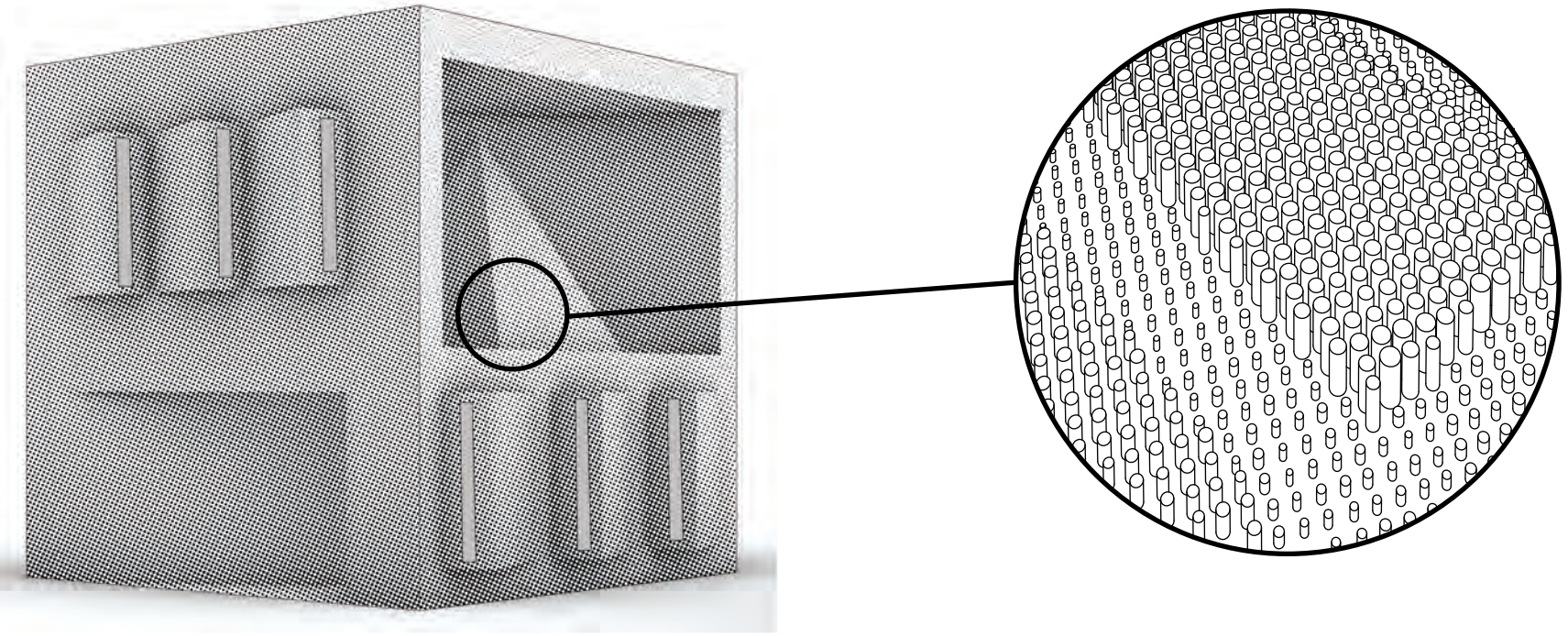
Varying Depths of Symmetrical V Profile



Daytime Openings



Night time Openings



Daytime Openings



Night time Openings

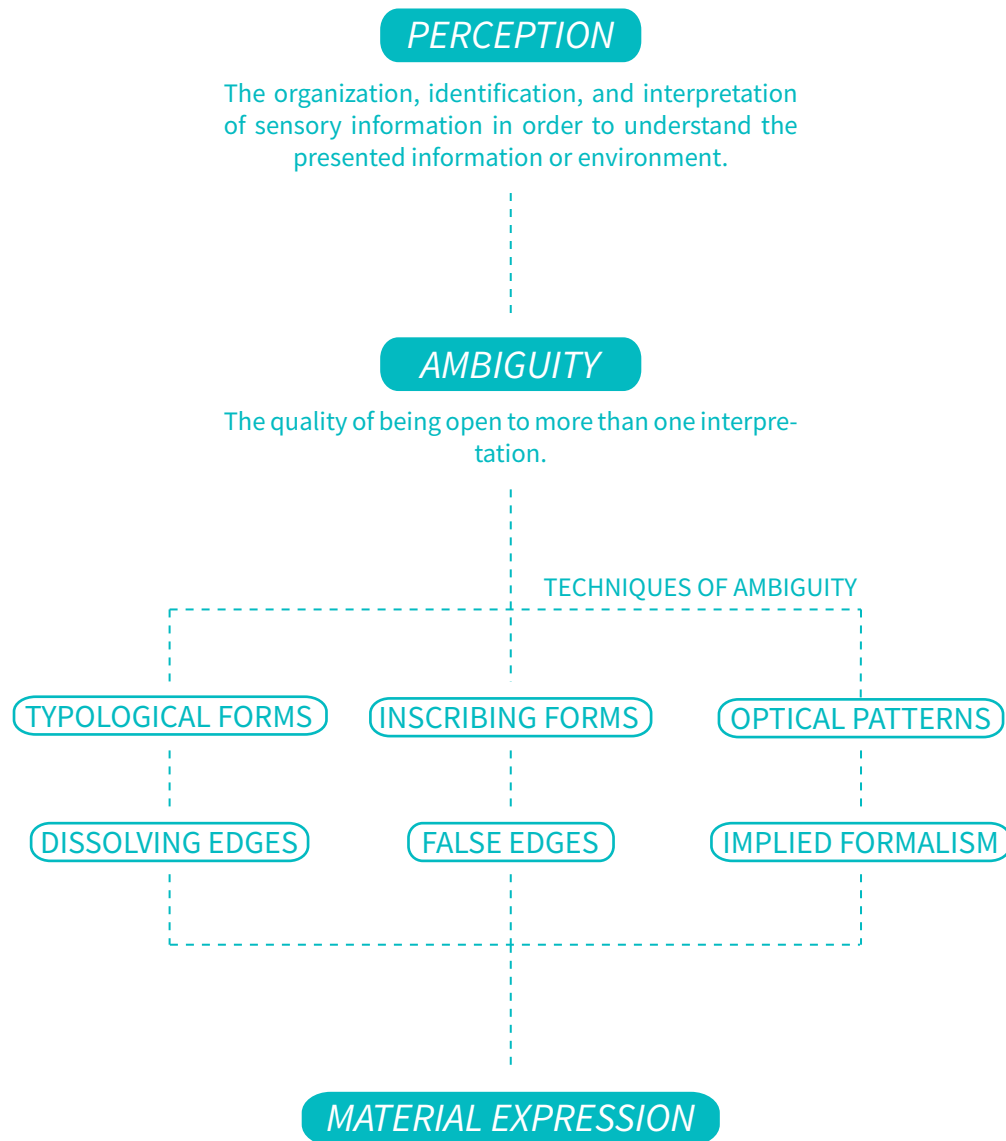


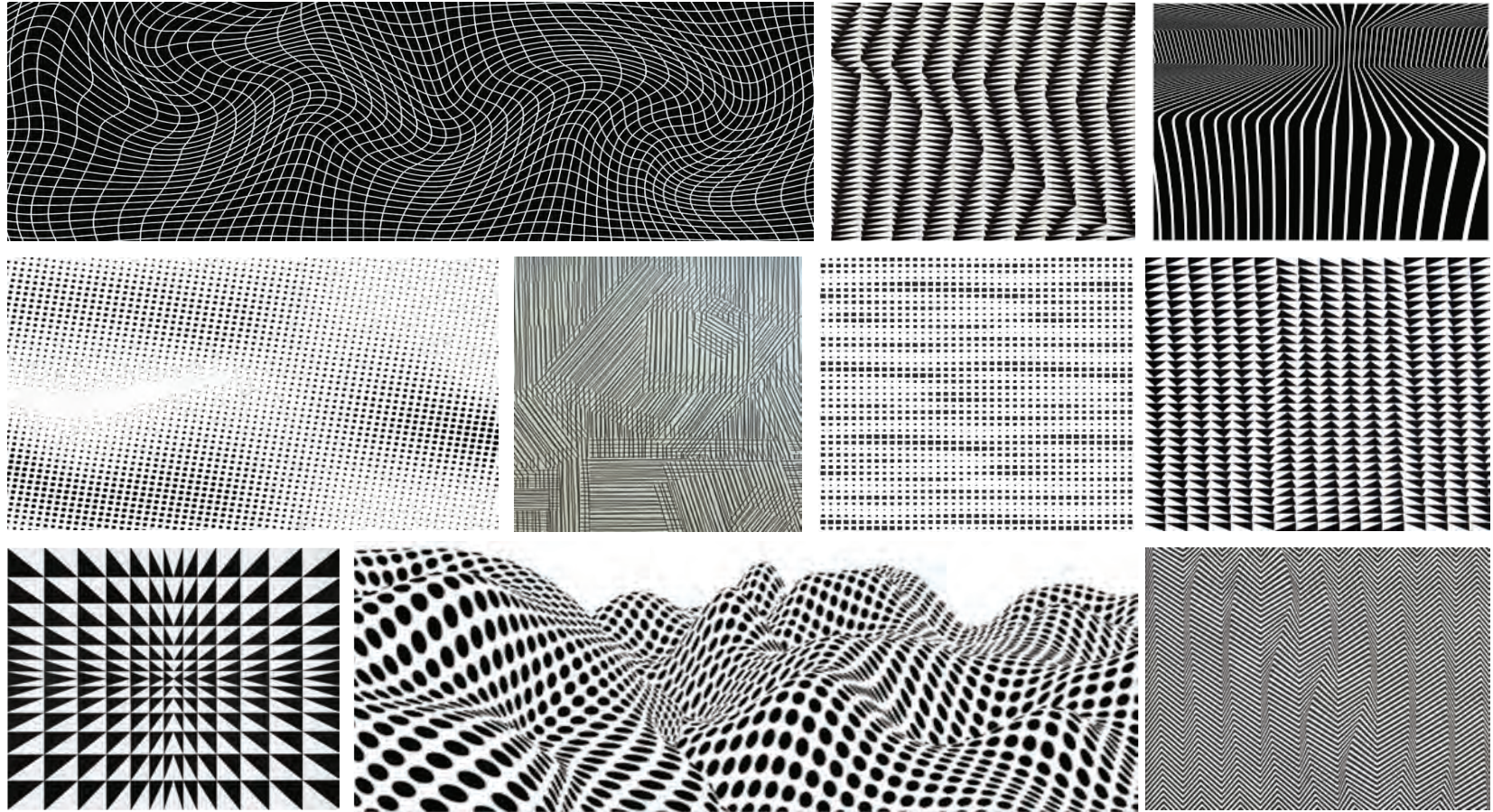
# PATTERN STUDIES

This series of studies suggests a renewed investigation of box-like structures with shed-like roofs with an ambiguous and optical surface pattern. The typological forms grant familiarity to the non-expert while the patterns challenge the viewer's understanding of the forms. The studies strive to create complexity in how the architecture is perceived rather than formed.

The optical patterns utilized in this series implies depth or movement within the surface. The pattern can enhance or dissolve edges, making it hard for the viewer to distinguish the relationship between adjacent surfaces. This results in experts and non-experts negotiating their relationship to, and interpretation of the surface and overall form.

To synthesize the perceptual aspect of the argument with a material expression, the following studies utilize the same halftoning, reveal profile, and form tie articulation techniques outlined in the previous studies.





The complexity and ambiguity of the surface is derived from an optical patterning that makes the viewer question the overall form. The optical pattern implies a depth or movement within the surface which is not actually there.

The pattern can enhance or dissolve corners and edges, making it hard for the viewer to distinguish the true form of the surface and its relationship to other adjacent surfaces. This results in experts and non-experts negotiating their relationship to, and interpretation of the surface and the overall form.

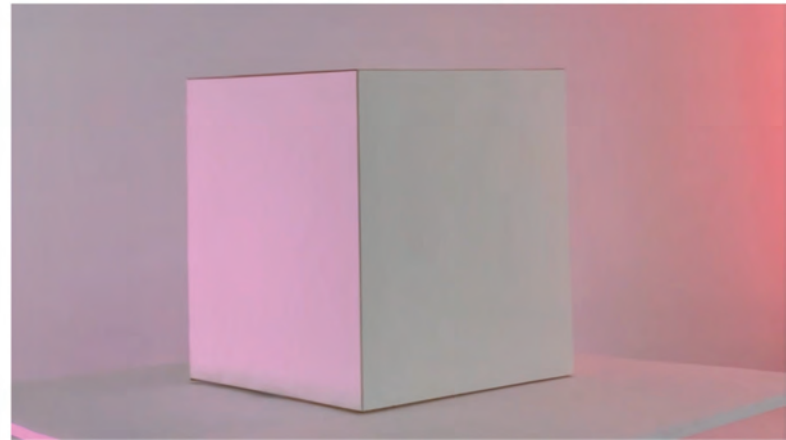
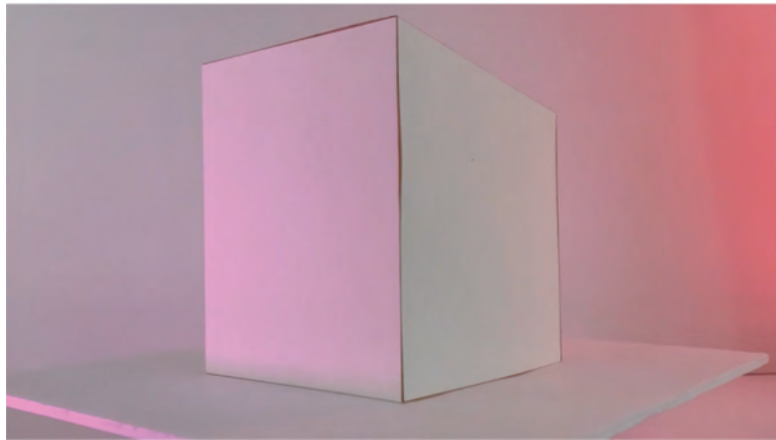
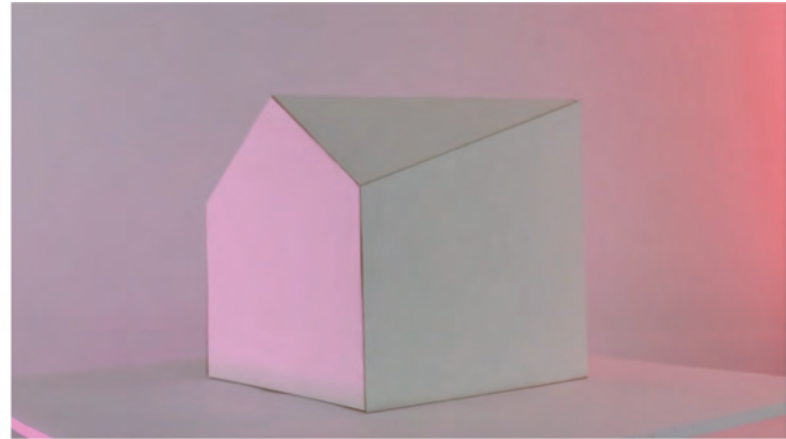
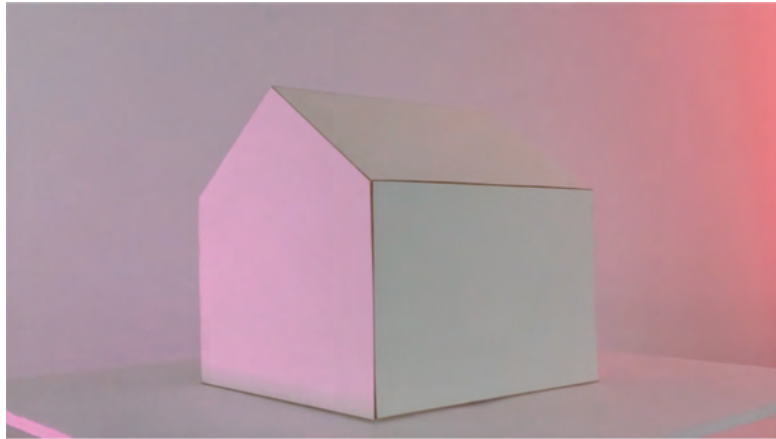
The viewer's depth perception is most prone to be tricked by ambiguity. According to Merleau-Ponty, perception is not only based on sensory information. The mind also projects knowledge from previous experiences onto that sensory information in order to form a complete understanding. The depth axis requires more of the mind's imagination and interpretation to formulate this complete understanding. Because of the involvement of the imagination, the viewer's perception is more easily tricked by opticality. This makes depth perception a perfect subject matter to focus on while developing a more ambiguous form of architecture.

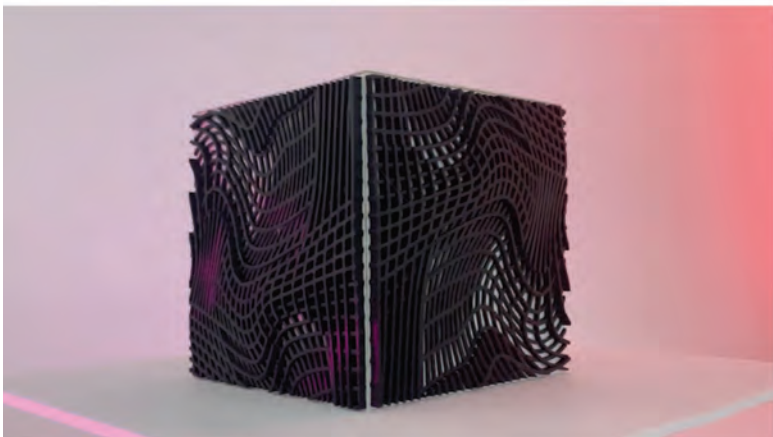
The study explores typologically primitive forms in addition to an ambiguous surfaces. Typological primitives are defined as box-like forms with shed-like roofs. Repetition across a regular volume is vital for the ambiguous pattern to register its depth manipulations in both the pattern itself and in the dissolving or creation of edges. The studies seeks to transfer some of the perceptual effects usually achieved through sculpturally complex forms onto the surface of more box-like volumes.

The roofs grant familiarity to the non-expert which provides something recognizable in which to investigate.

They allow the non-expert a brief understanding and relationship to the form before it is whisked away by the surface pattern.

The forms presents themselves as a different typological shape- gable, shed roof, or cube - from each facade. This creates ambiguity in the understanding of the whole as the viewer's perception is challenged by each new facade. No facade serves to reinforce the viewer's understanding of the previous one. Instead, it challenges the viewer to decipher and consolidate the sensory information into one cohesive understanding of the whole.





After defining the scope and forms of the study, different patterns and techniques were explored on the most primitive of volumes: the cube. During these initial studies, different densities and types of optical patterns were investigated. They are categorized by their “optical unit” - meaning dots, lines, triangles, grids, and squares.

Success is determined by how well the pattern dissolves the edges between adjacent surfaces and how well it implies a depth within the surface itself.

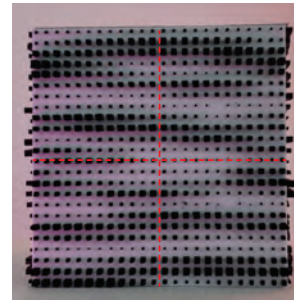
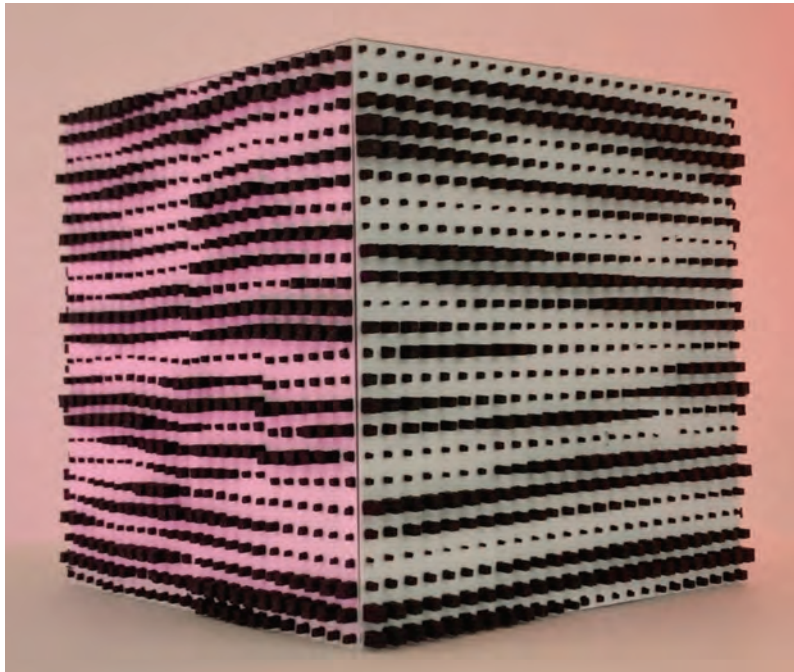
Although the typologically primitive form is partially recognizable and familiar, by deploying an ambiguous pattern on the surface, the architecture enters into the realm of controlled doubt. This doubt encourages the viewer to challenge their previous perceptions of the whole as they investigate it further. The ambiguity does not allow the viewer to easily decipher a complete understanding of the primitive volume at first glance. For instance, the surface pattern can dissolve an edge between the facade and roof on one facade. As the viewer moves around the building, the dissolved edges will determine the shape of the adjacent facade. The viewer must then negotiate which facade is the “true” form and which is their mind’s projection of the form.

Further experimentation with viewer interaction was explored by inscribing forms within the optical pattern. The emergence of purposeful forms challenges the viewer's understanding of the randomness of the pattern.

In the study to the right, individual optical units are altered within specific boundaries on each facade. Units are altered within quadrants, linear strips, and in a more grand sweep across the facade by rotating each optical unit by 5 degrees within the boundary of the inscribed form. The red lines in each elevation to the right describe the different boundaries in which the units are altered. This slight rotation of units allows the viewer to read the inscribed forms against the typical orientation of the pattern.

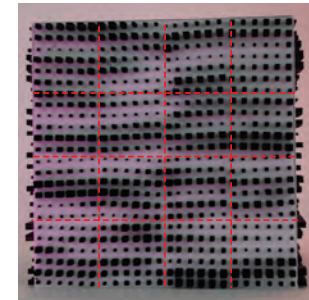
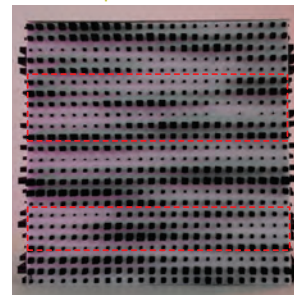
Superimposing multiple identities - from the typological form, to the implied depth of the pattern, to the forms residing within the pattern - allows multiple interpretations from the viewer to be accepted simultaneously. The goal is to compel the viewer to interpret these multiple identities and challenge previous perceptions in order to formulate their own understanding of the whole.

These studies make it evident that the essence of the thesis resides in the relationship between the surface and the subjective viewer. The surface pattern forces the viewer's perception to contemplate the sensory information as the pattern dissolves edges or emphasizes false edges. Without the ambiguity of the surface, the mind is left to decipher nothing, only know. But without the viewer, the surface is just a pattern. The object requires a subjective viewer to operate.



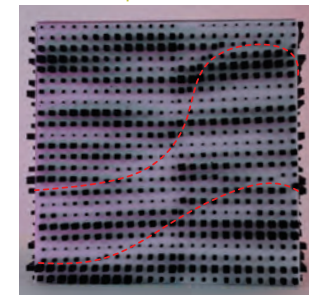
Quadrants

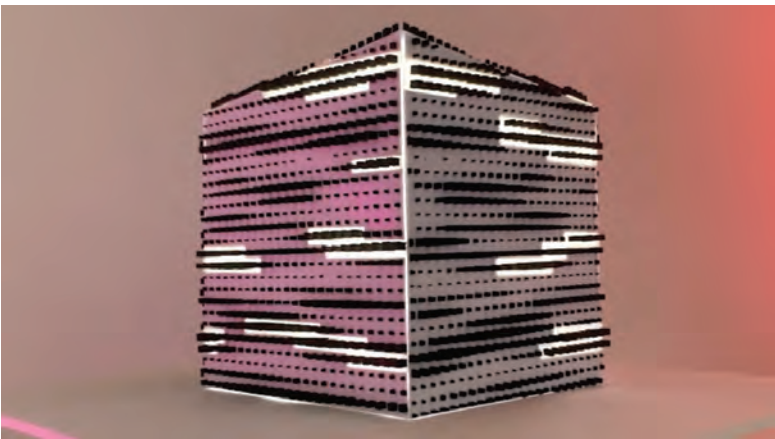
Linear Strips



Grid

Grand Sweep





Following the cubic studies, the most successful optical patterns were mapped across the typologically primitive forms. Again, the goal was to map the pattern in a way that deliberately dissolves seams between faces. These studies were also an opportunity to explore how to create openings within the pattern for windows and doors.

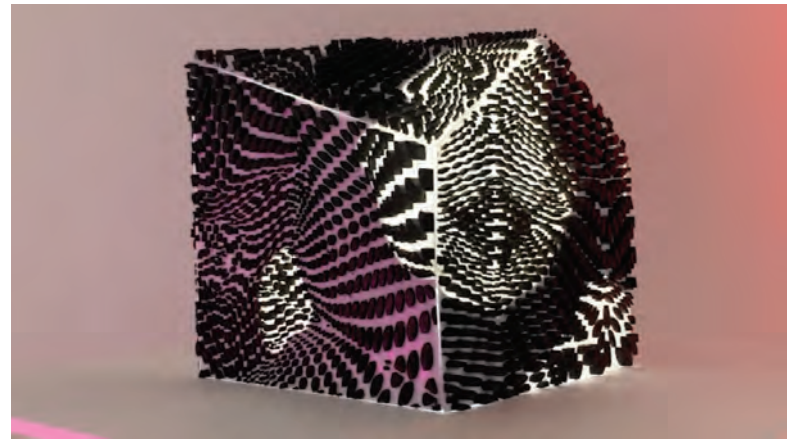
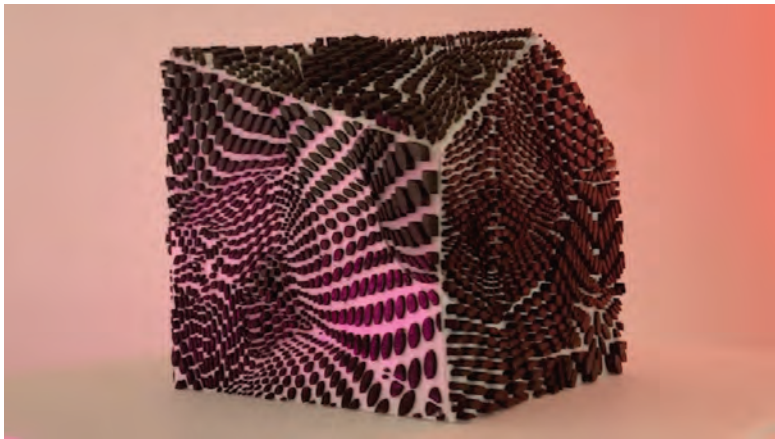
In this example, openings are located at the most dense or darkest moments within the pattern. This decision was informed by the previous reveal profile/form tie experiments. During the day, when there is more light outside than inside the building, the windows will appear dark and blend in to the depth of the pattern. During the night time, the windows will be illuminated from within and the most dense or darkest parts of the pattern will reveal light. This provides an added layer of ambiguity as it challenges the viewer's perception of those portions being the darkest or deepest moments in the facade.

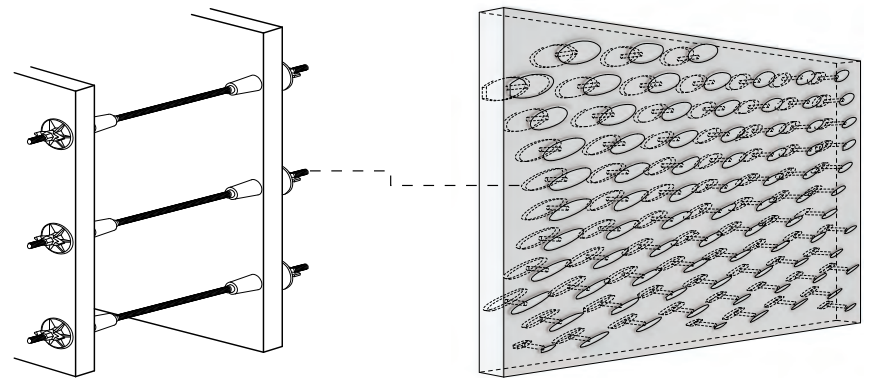
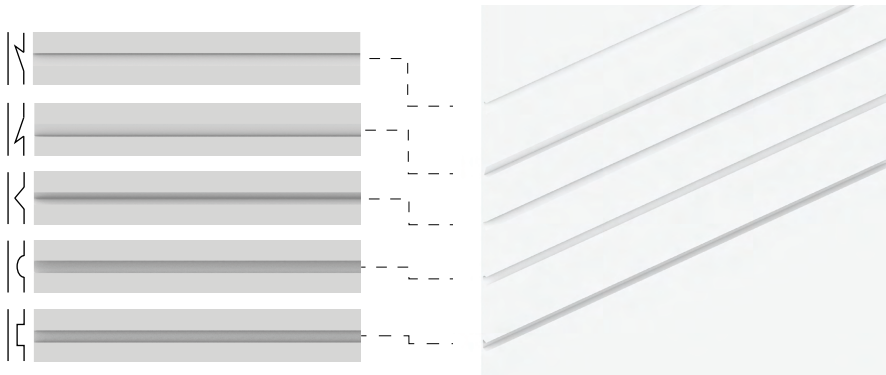
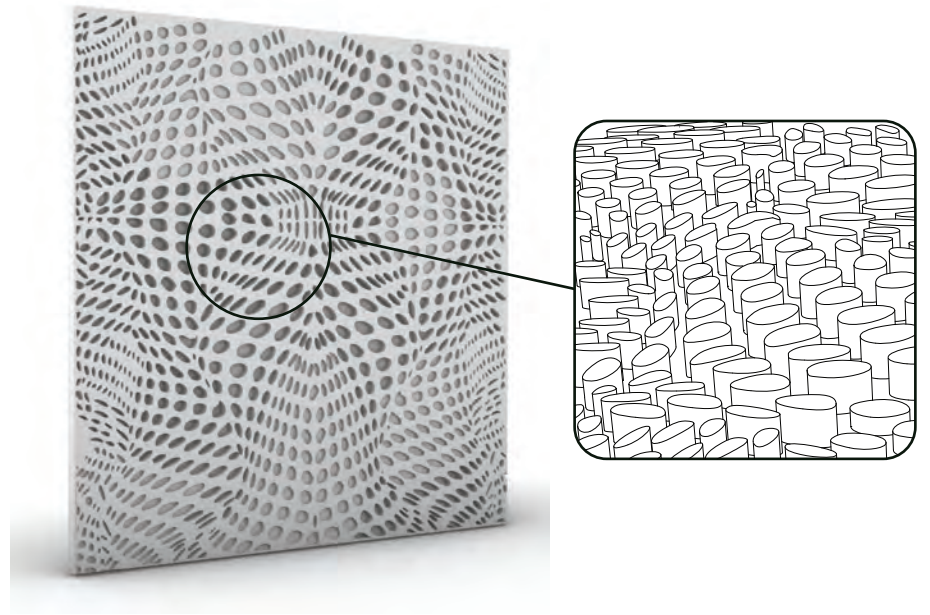
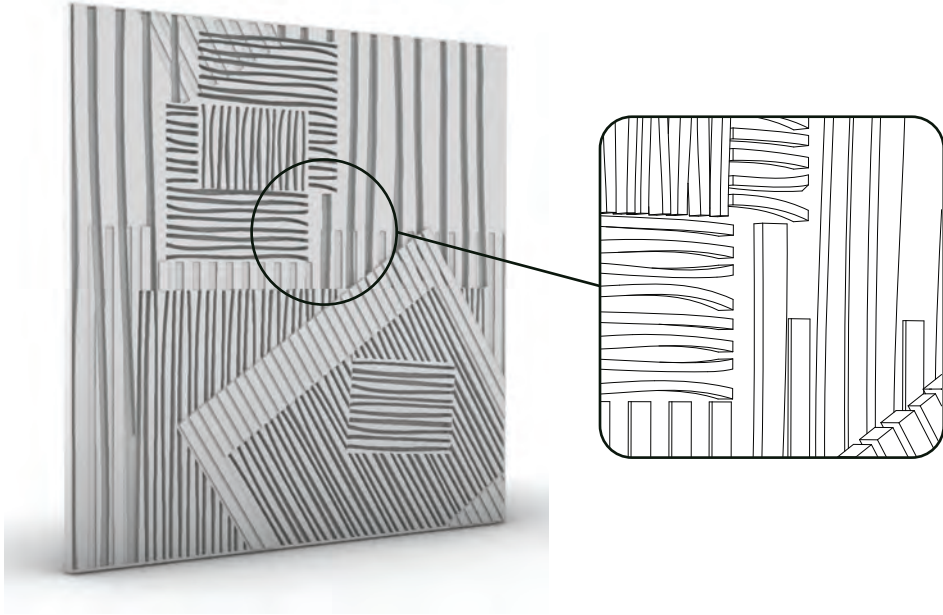
In the example to the right, openings are randomly located along the general flow of the pattern to reinforce its implied depth. Openings also span multiple faces in order to further dissolve edges to give the perception of one continuous opening.

The complex surface composition requires acute attention from the viewer to perceive how the subtle changes in patterning either reinscribe or change their interpretation and relationship to the building.

This shifts the thesis away from a prescribed narrative towards a perception based narrative and provides contemporary architecture with a new trajectory that involves larger cultural issues.

By making the architecture deliberately ambiguous, architects can engage the public through their subjective perceptions and ask for their participation and interpretations. This participation allows the discipline of architecture to become open to more people and ideas.





The studies to the left include material expression techniques explored in the previous studies.

The reveal profile construction logic can be applied to the linear optical patterns - including lines and grids. Depth in the surface can be implied through the varying depths of several different reveal profiles.

As shown in previous iterations, the optical patterns - including dots, squares, and triangles - can begin to speak to a material expression in terms of exposing the aggregate in a concrete mixture; or they can be expressed through a series of articulated form ties that begin to imply shadows and depth within the surface.

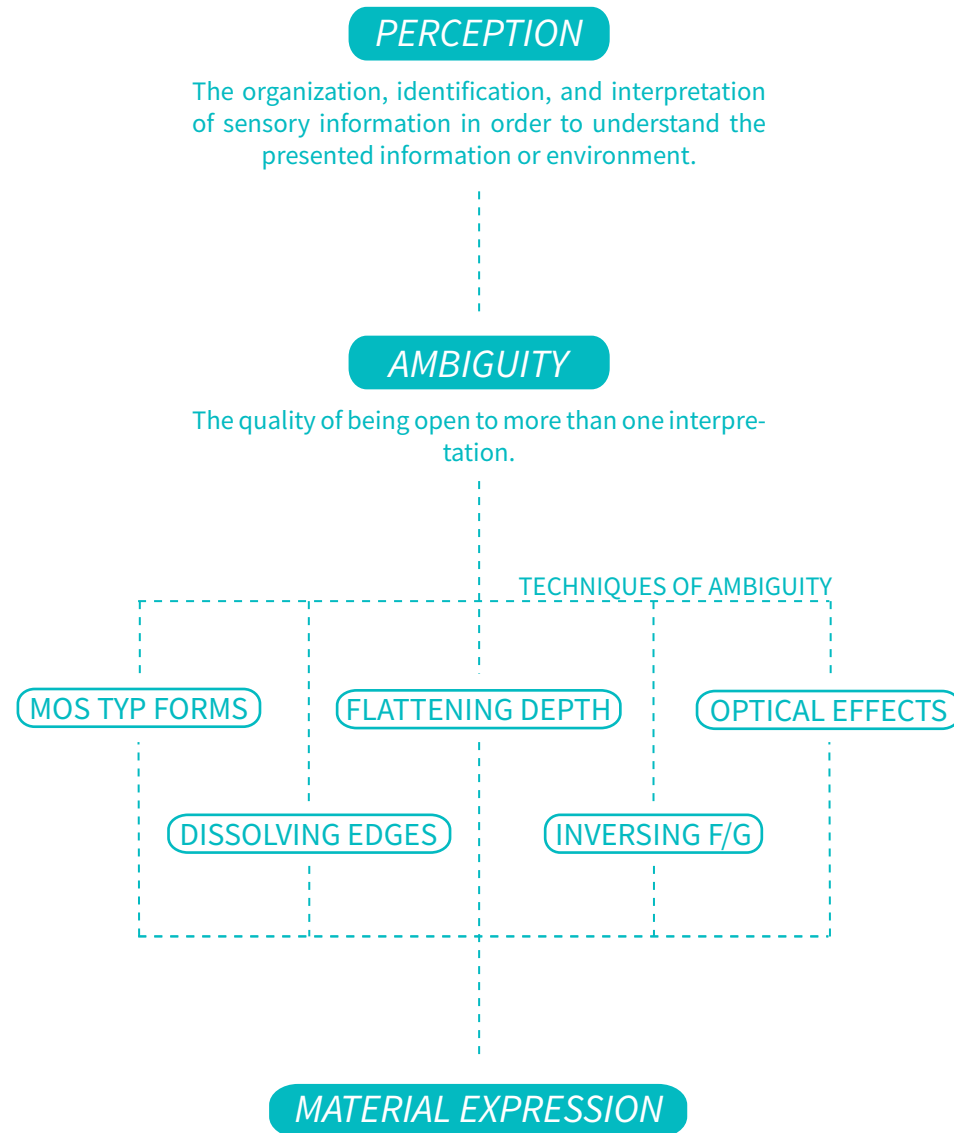
# MOS + HdeM STUDIES

The following studies combine forms by MOS Architects with the continuous wrapping technique of the HdeM Signal Box. Similar to the previous studies, the techniques of this study serve to alter the perception of legible forms and challenge why & when the forms become legible.

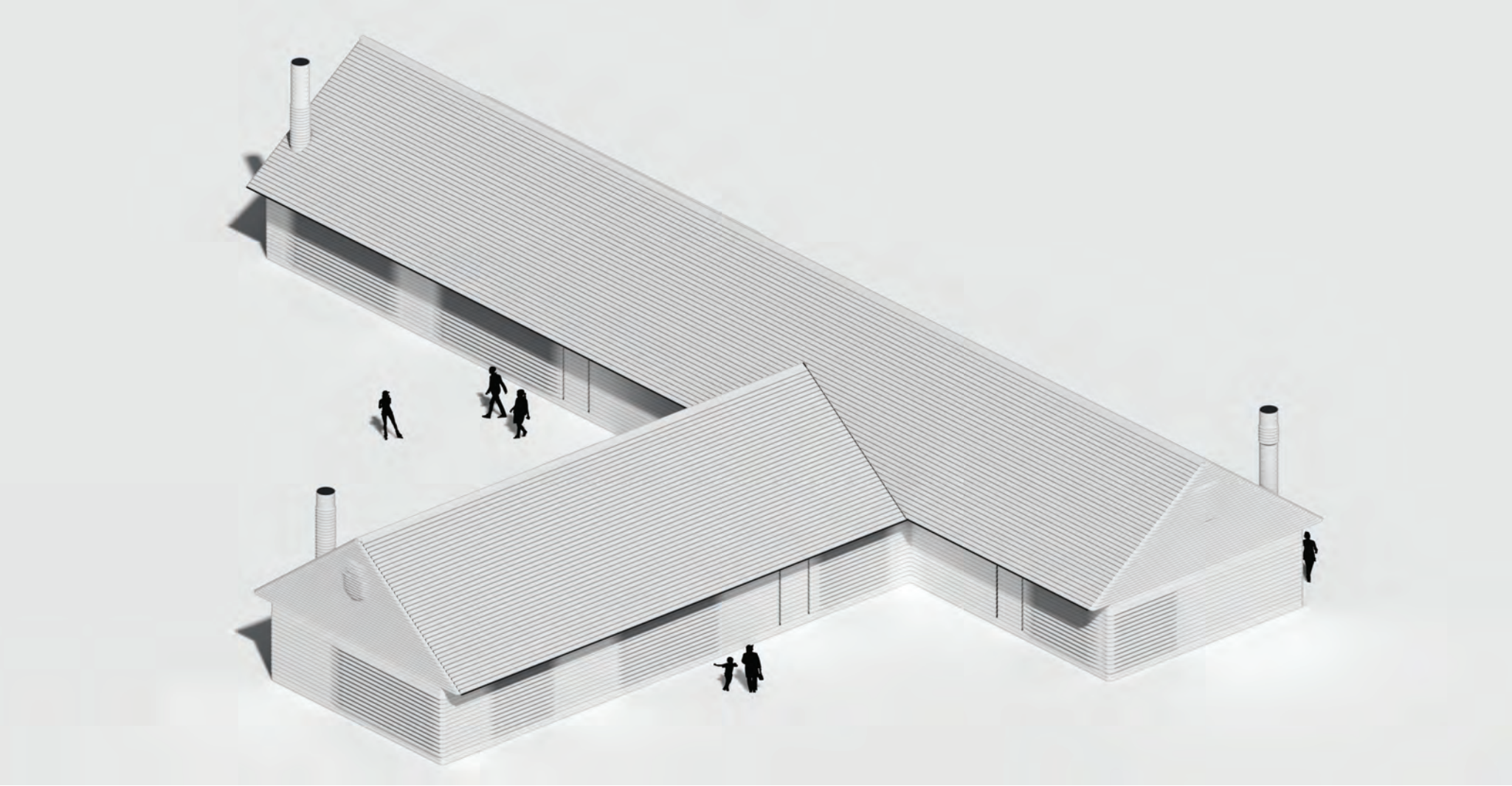
The Signal Box wrapping technique also begins to fuse 90s envelope discourse with the discrete MOS forms.

The wrapping technique utilized in this investigation dissolves edges between forms, and flattens the viewer's depth perception. The optical effects make it difficult for the viewer to distinguish the true form of the surface, and it's relationship to adjacent surfaces. The shadows created as the bands twist to reveal openings serve to inverse the figure/ground relationship and imply a false depth.

In the HdeM Signal Box, metal bands twist open to reveal openings beyond the deep shadows. The bands twist closed to wrap the edges of the primitive form. The metal is cut into a bowed profile and then stretched to create the twisting motion. The careful material expression of the Signal Box allows the perceptual effects to take place and creates the essence of the project.



HOUSE NO. 7





FRONT ELEVATION



RIGHT ELEVATION

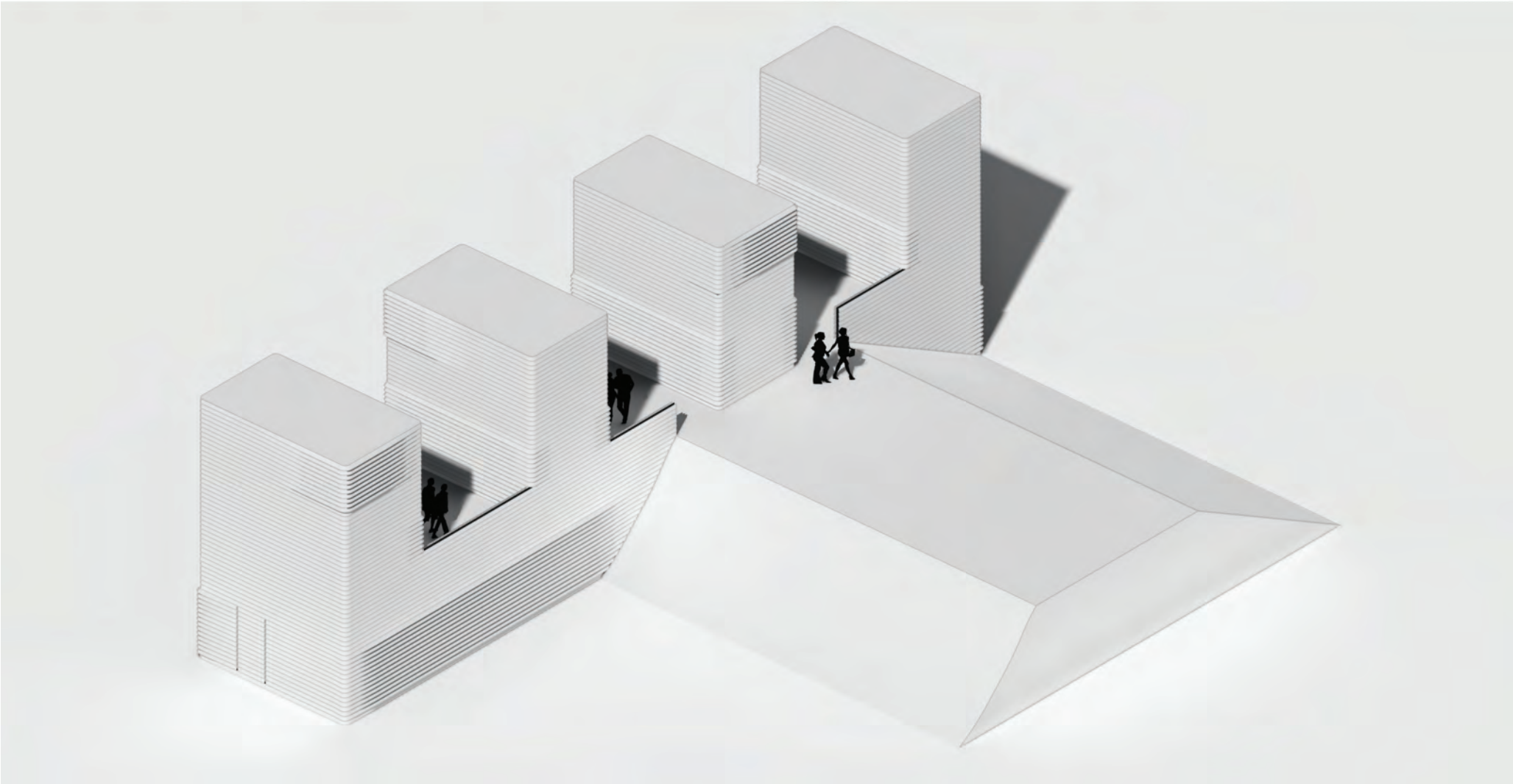


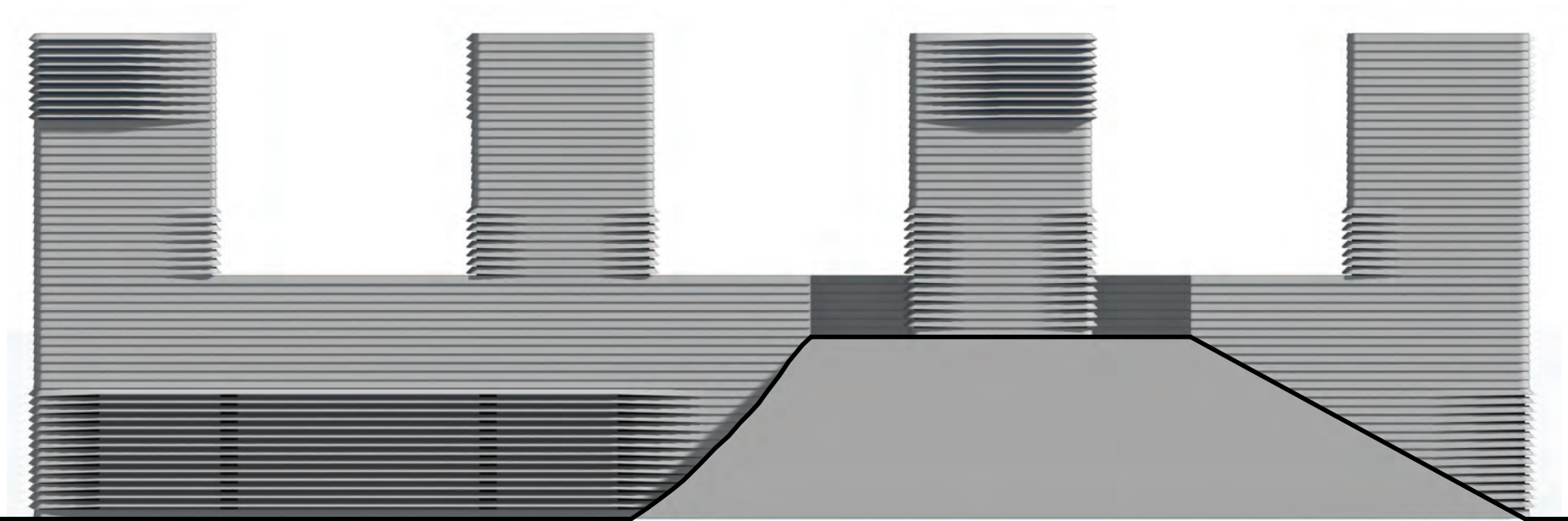
BACK ELEVATION



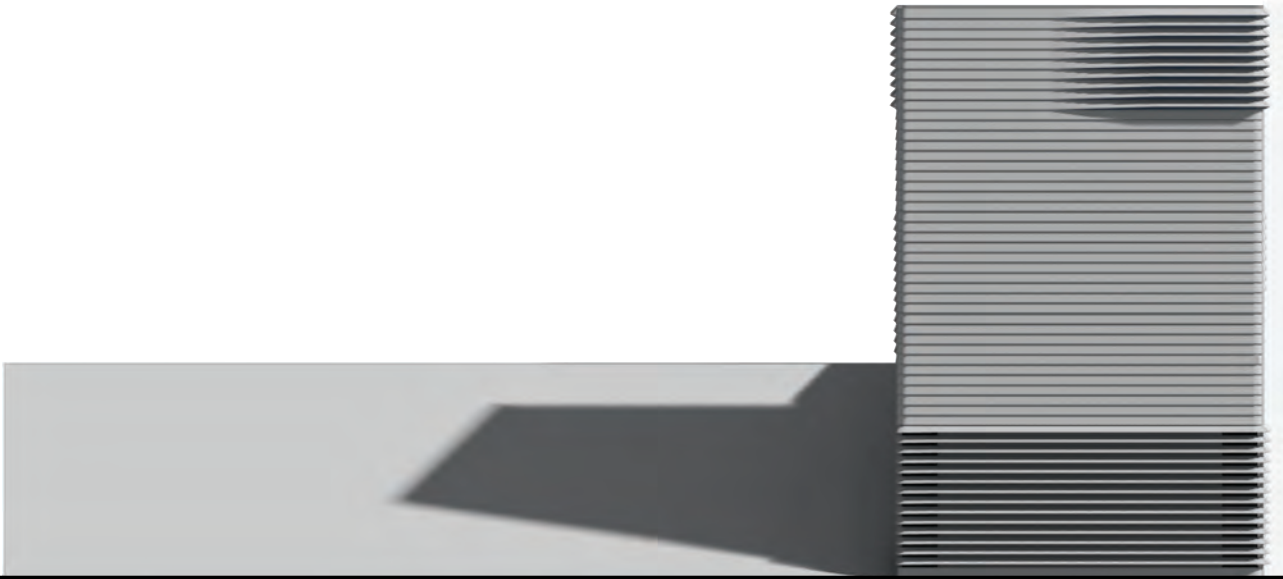
LEFT ELEVATION

HOUSE NO. 8





FRONT ELEVATION



RIGHT ELEVATION



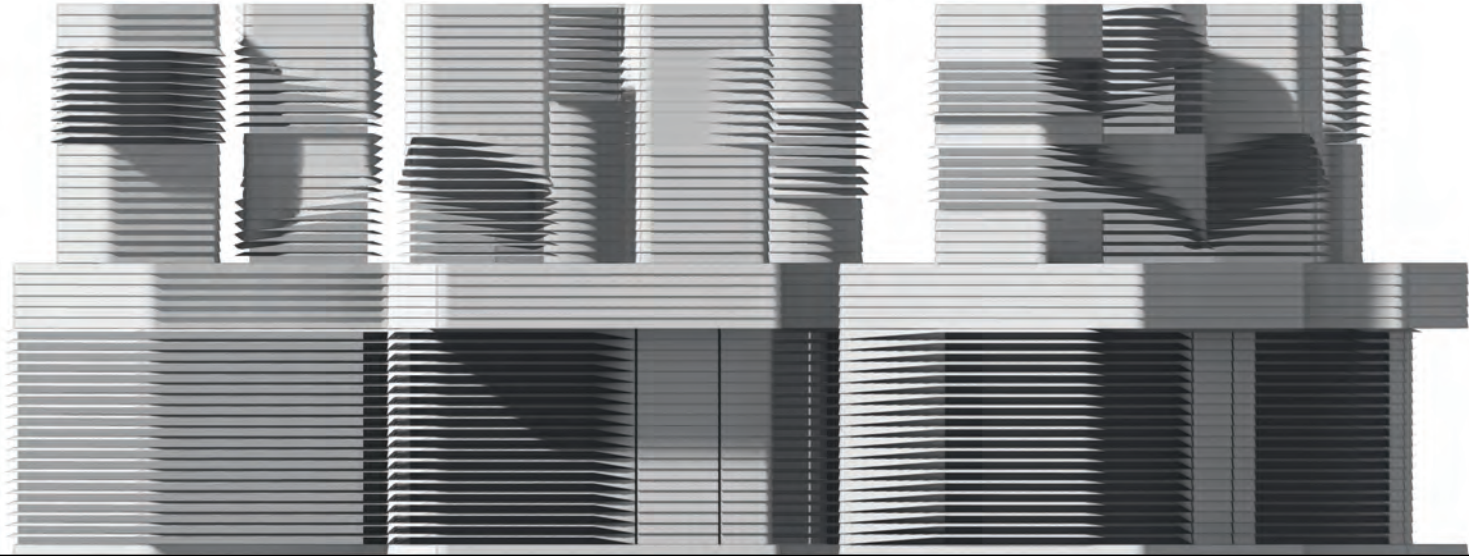
BACK ELEVATION



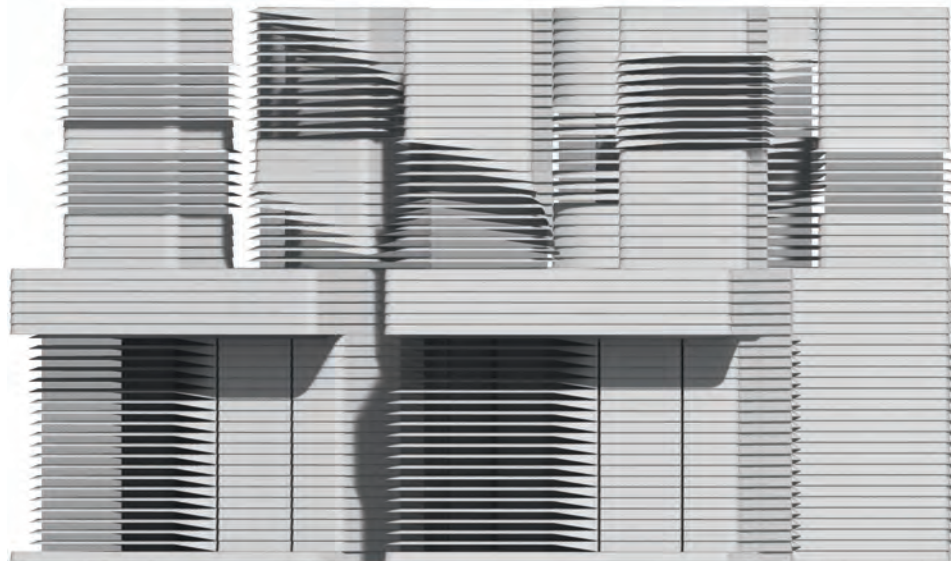
LEFT ELEVATION

HOUSE NO. 9





FRONT ELEVATION



RIGHT ELEVATION

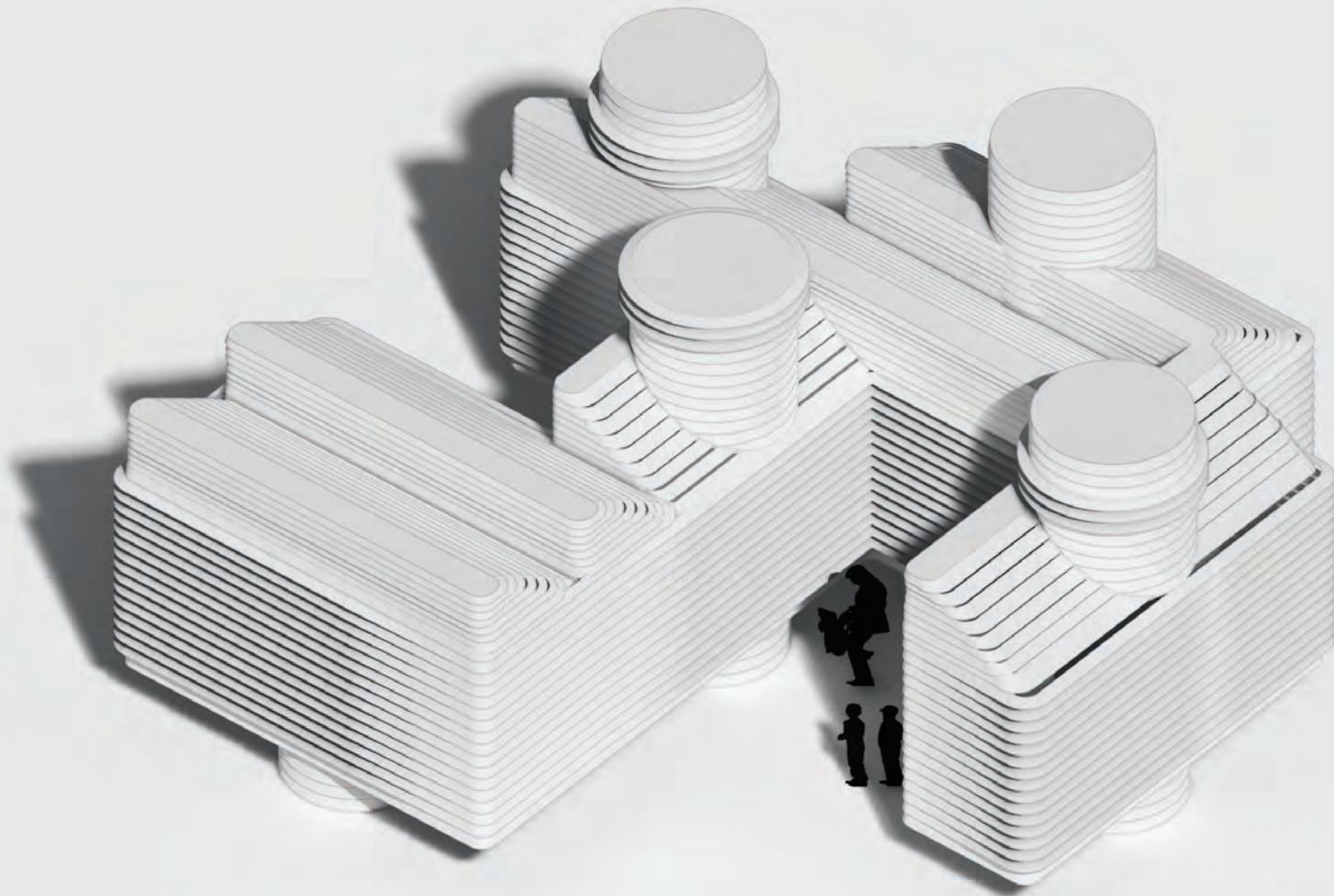


BACK ELEVATION



LEFT ELEVATION

HOUSE NO. 11





FRONT ELEVATION



RIGHT ELEVATION

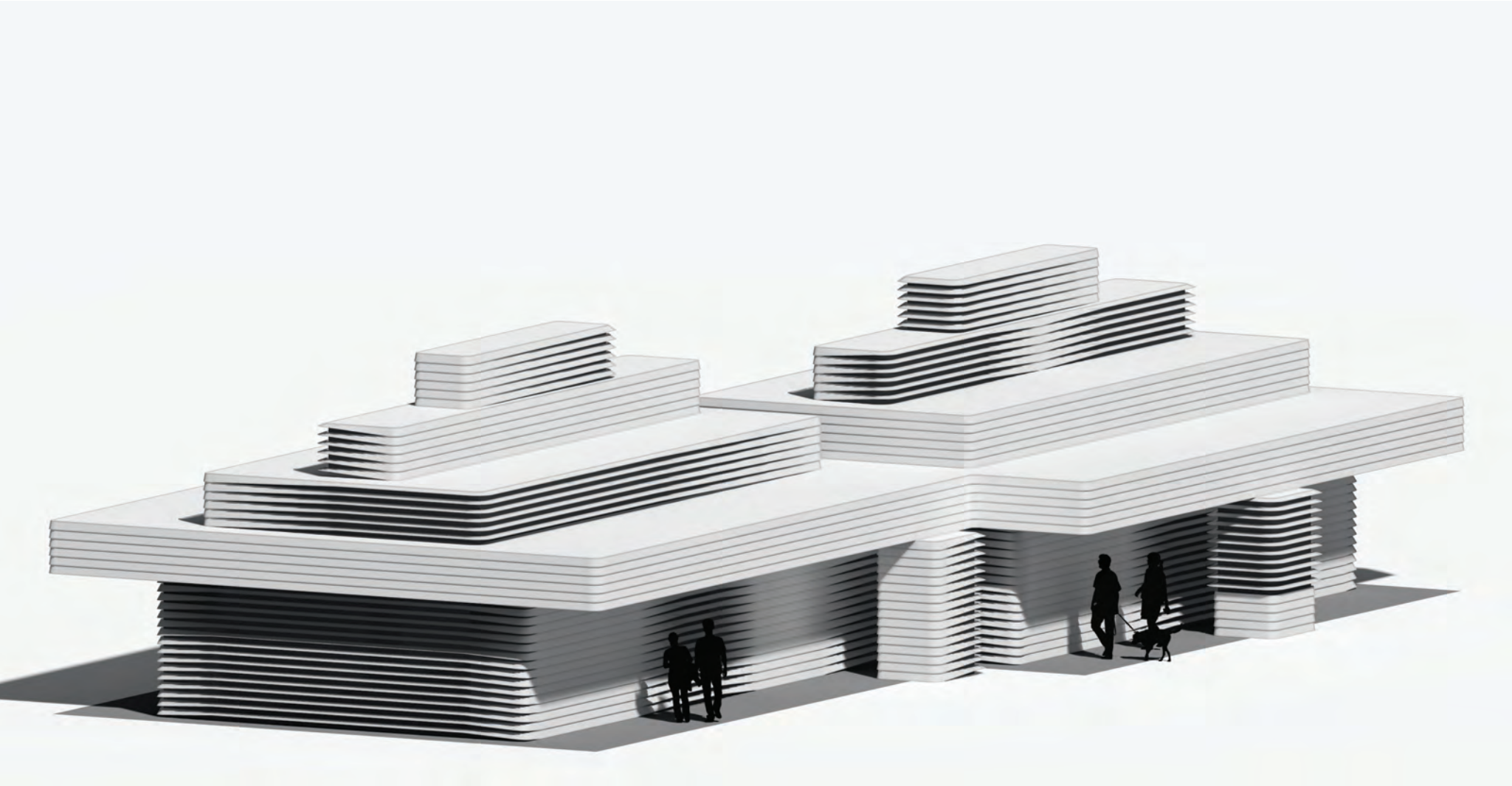


BACK ELEVATION



LEFT ELEVATION

HOUSE NO. 12

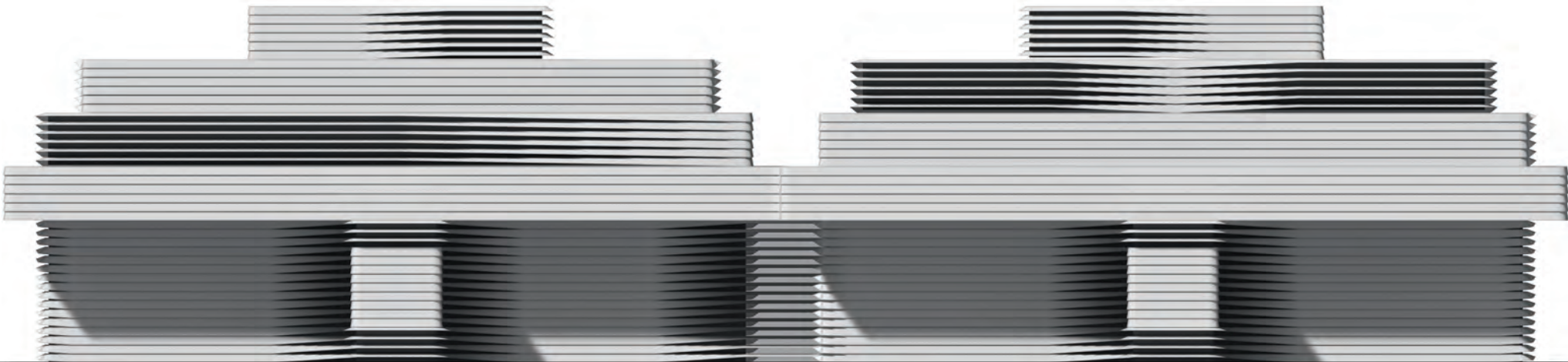




FRONT ELEVATION



RIGHT ELEVATION

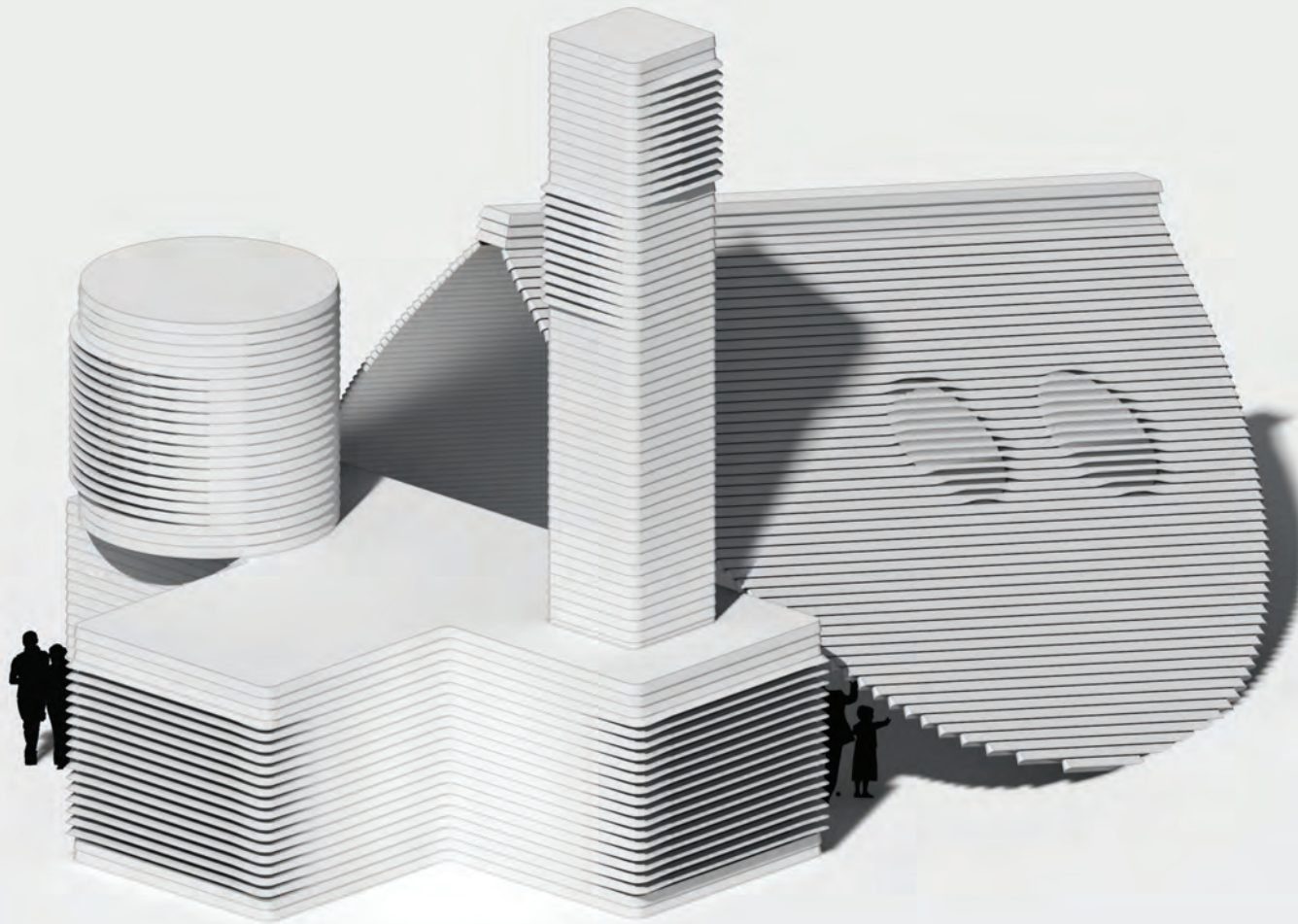


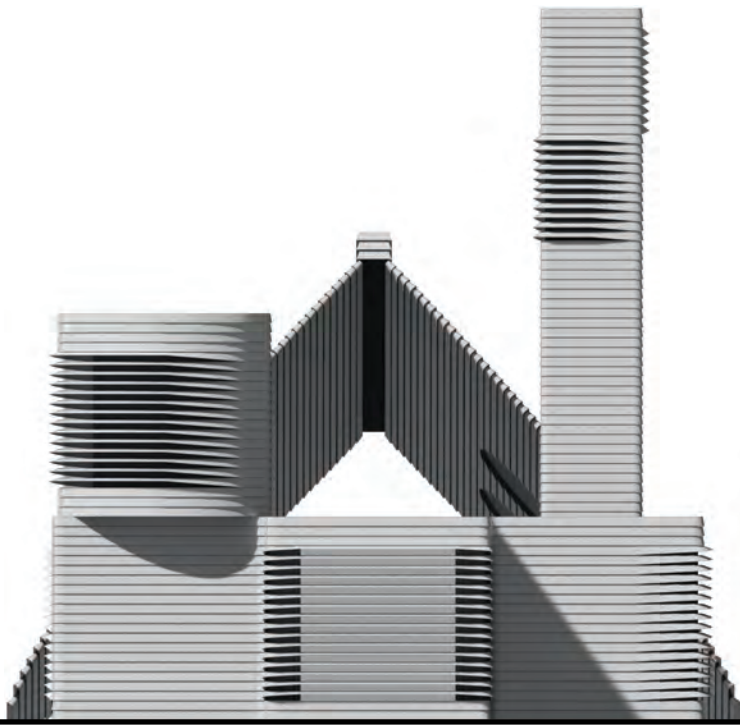
BACK ELEVATION



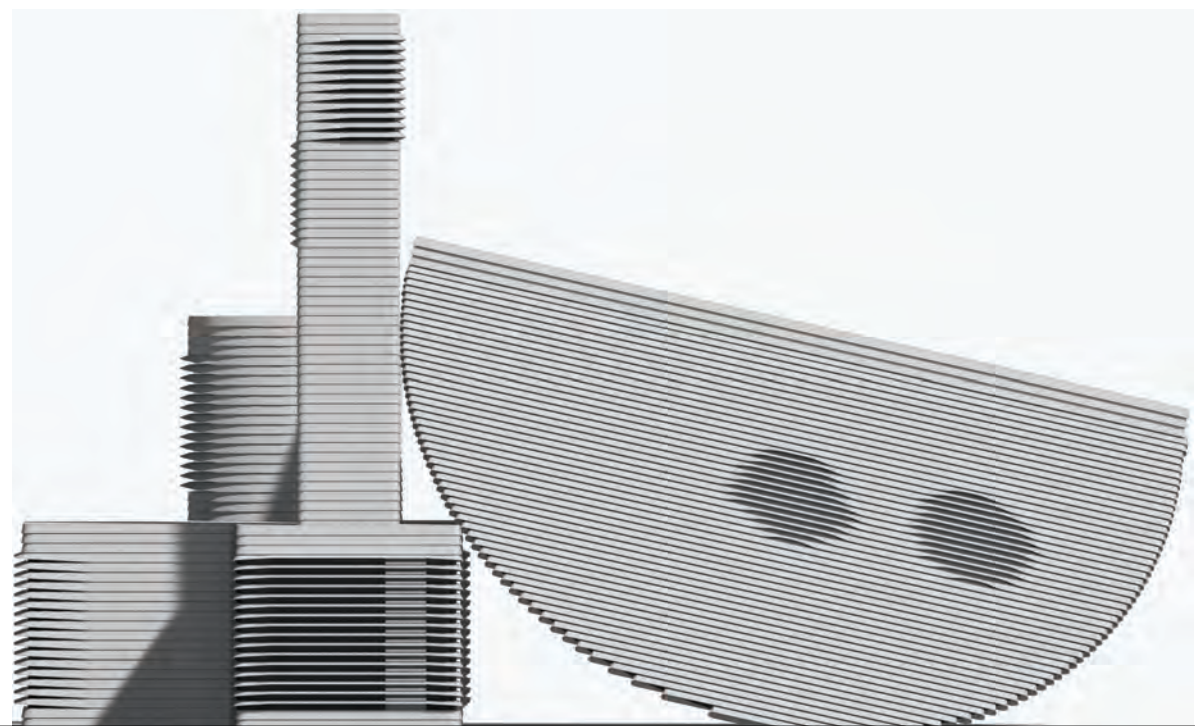
LEFT ELEVATION

HOUSE NO. 14

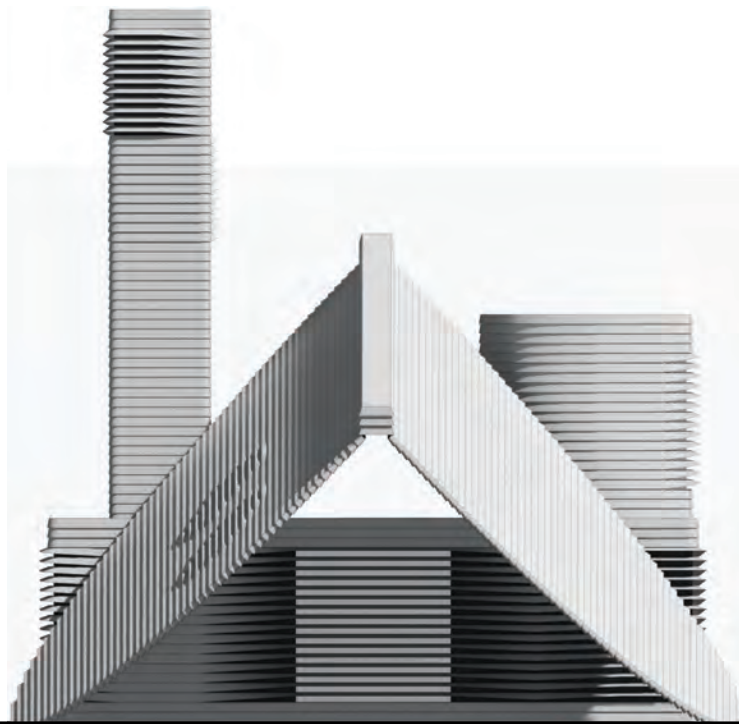




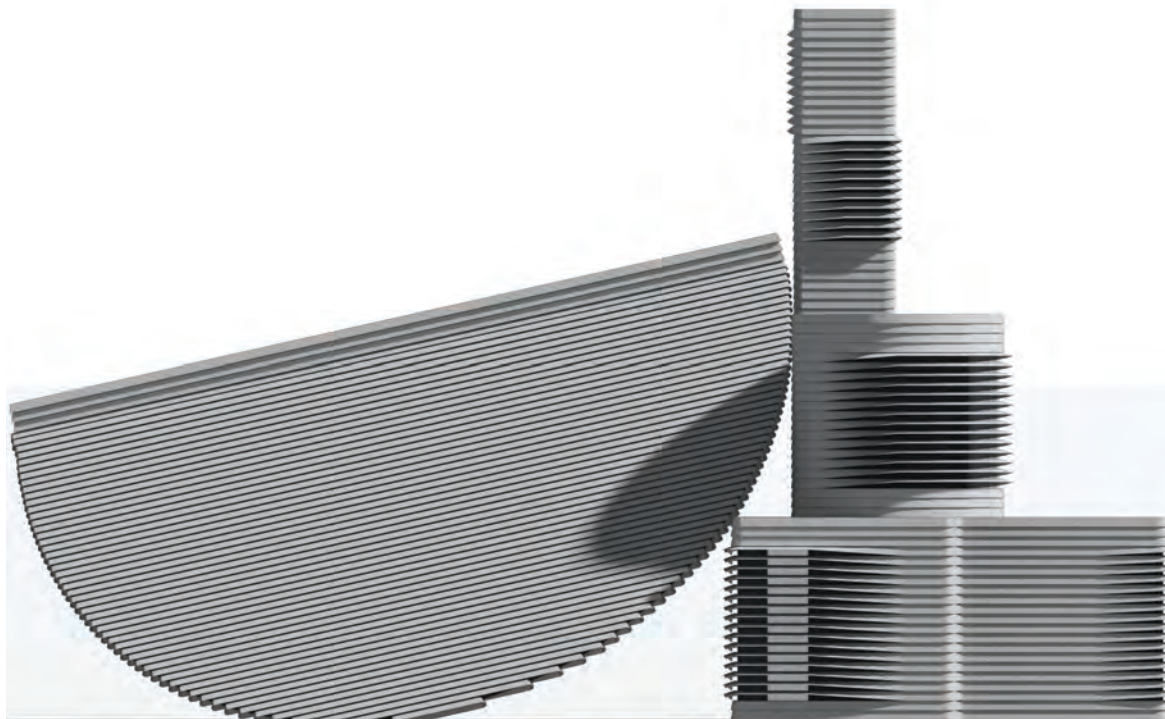
FRONT ELEVATION



RIGHT ELEVATION

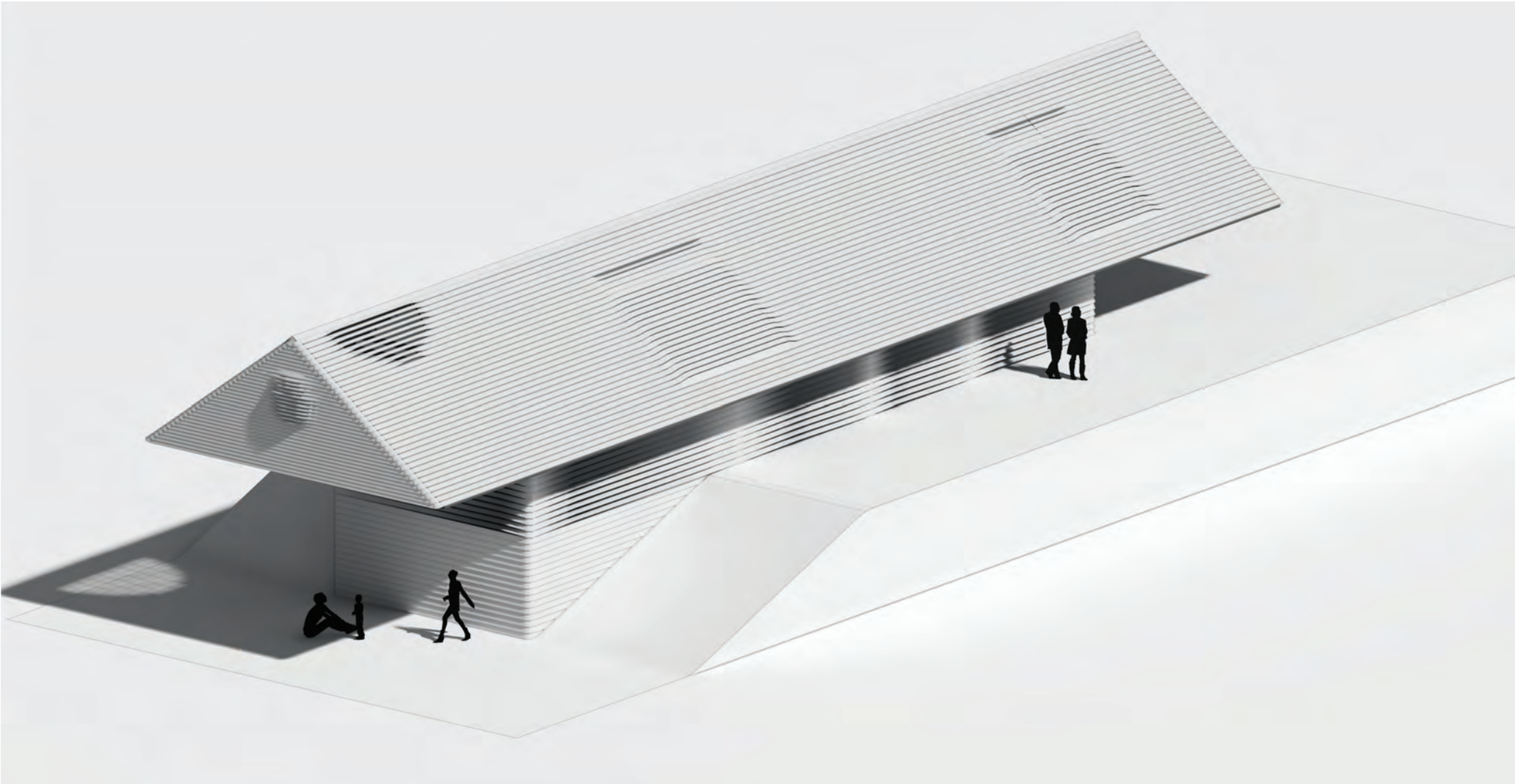


BACK ELEVATION



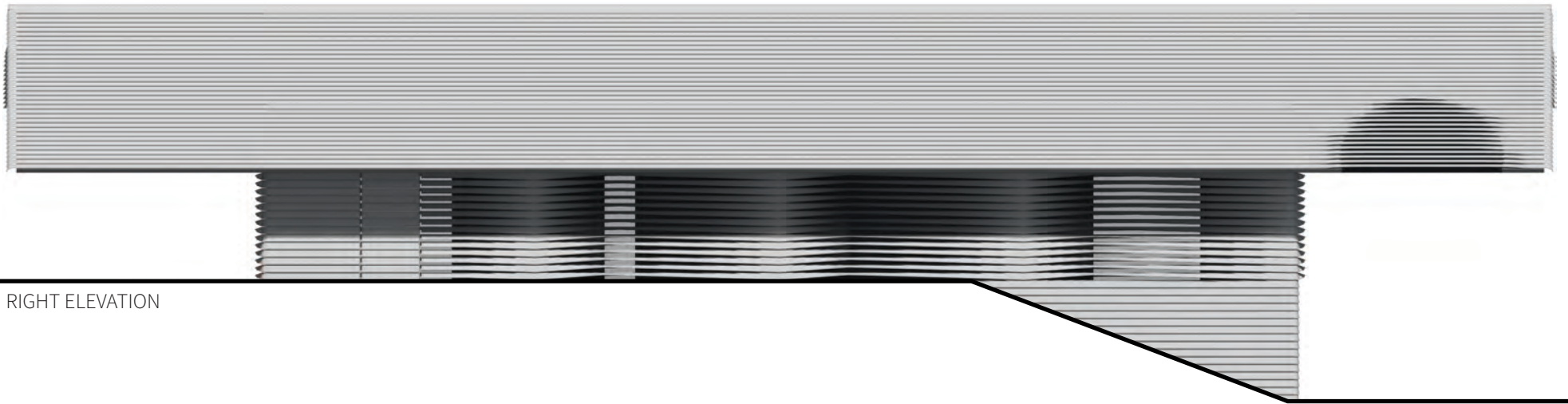
LEFT ELEVATION

HOUSE NO. 16

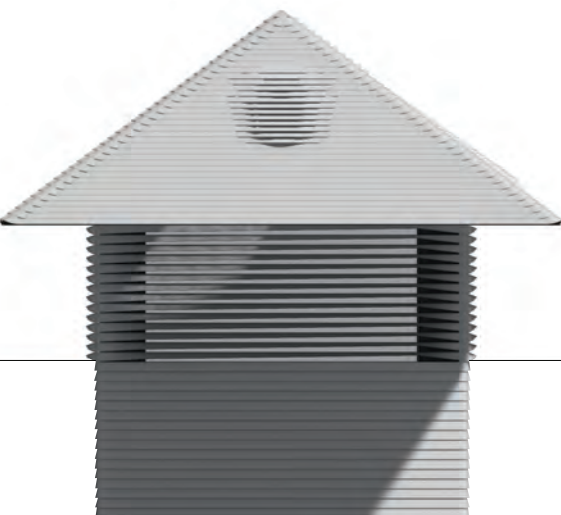




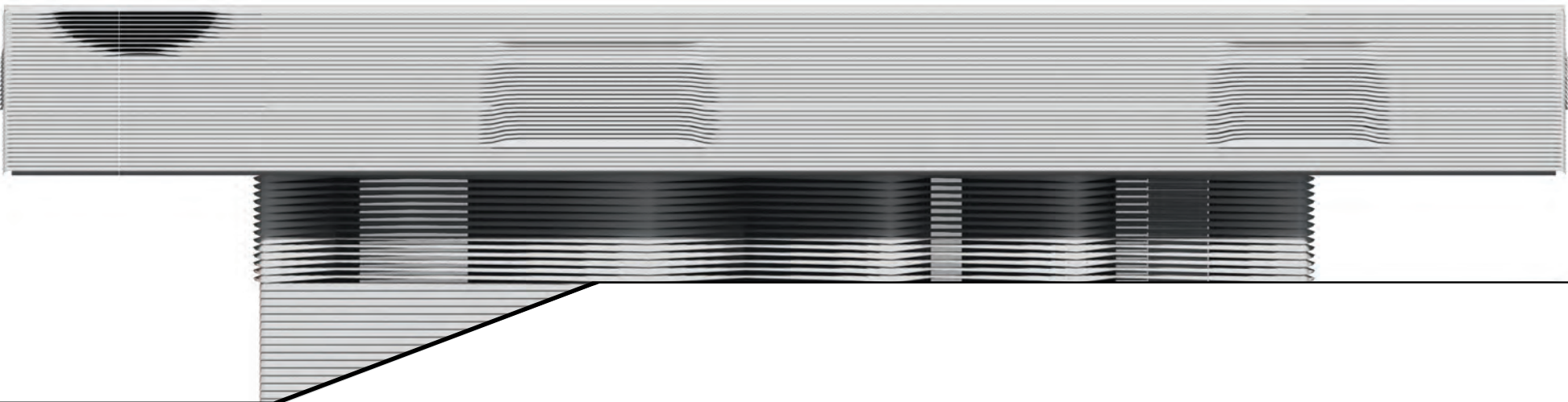
FRONT ELEVATION



RIGHT ELEVATION

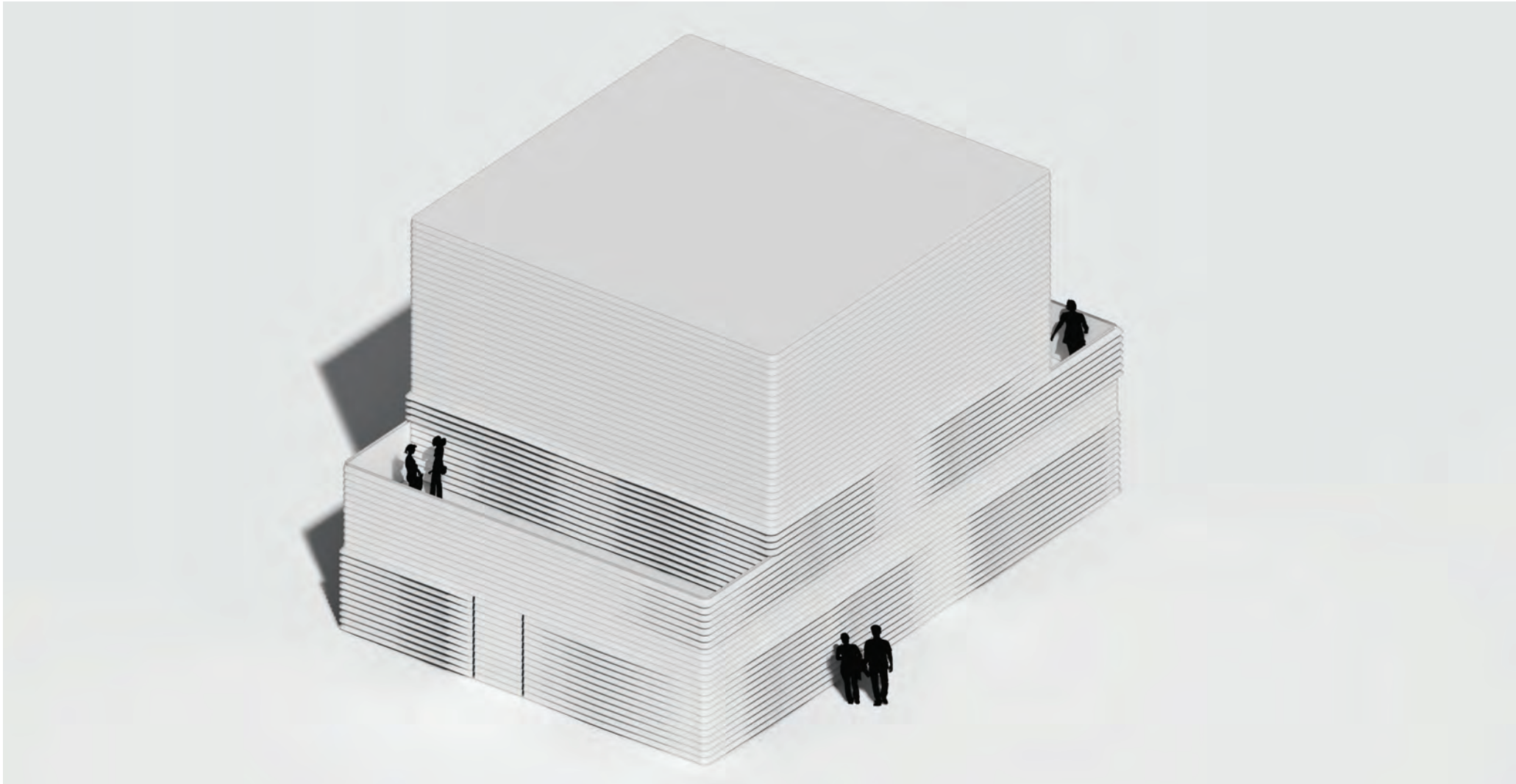


BACK ELEVATION



LEFT ELEVATION

HOUSE NO. 17

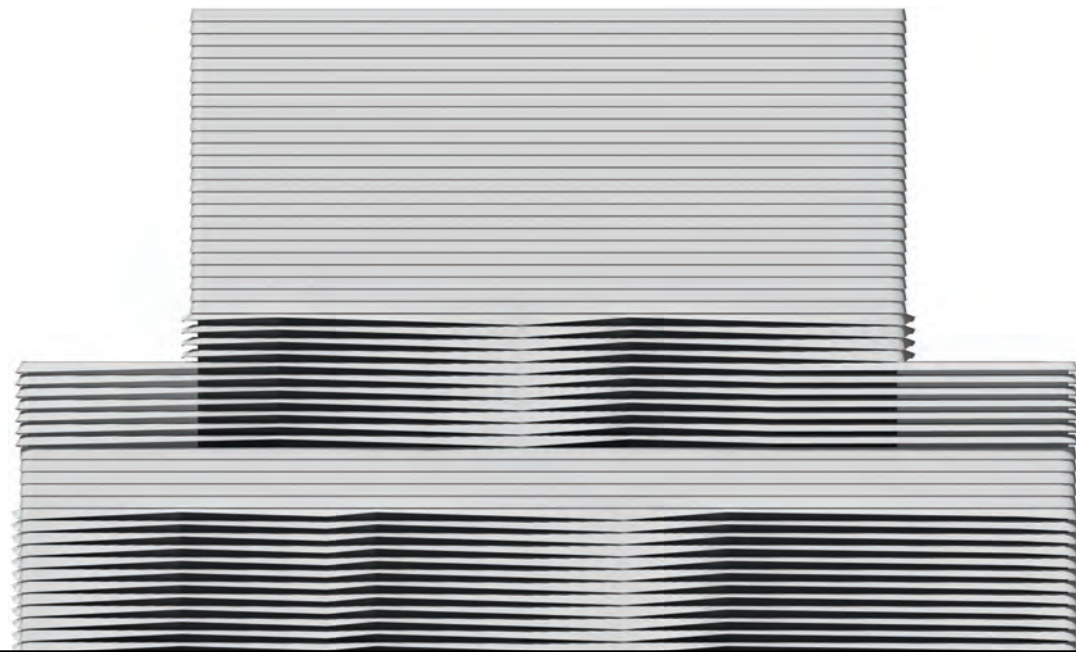




FRONT ELEVATION



RIGHT ELEVATION



BACK ELEVATION



LEFT ELEVATION

# BAND STUDIES

The following studies combine the contemporary tendency towards discrete, legible forms with a continuous wrapping envelope system that begins to evolve independently. The continuous envelope proposes a new way to generate form through loosely associated, blocky parts. As explored in the previous studies, the bands also serve to challenge the viewer's understanding of the forms by implying depth and dissolving edges between forms. This allows for participation from multiple audiences.

The continuous envelope utilized in the following investigations dissolves edges between forms. The shadows created as the bands twist to reveal openings serve to inverse the figure/ground relationship and imply depth in the surface. The envelope extends out to enclose void space and passes through itself as it weaves around the discrete forms. False forms emerge from the bands passing through each other.

These studies explore two possible materialities. The first being a tensile fabric structure in which a clip mechanism slots overtop of a thin aluminum rod and holds the cross sectional position of the bands while the fabric is stretched tight.

The second materiality is heavy timber that is CNC milled to follow the cross sectional movement of the bands.

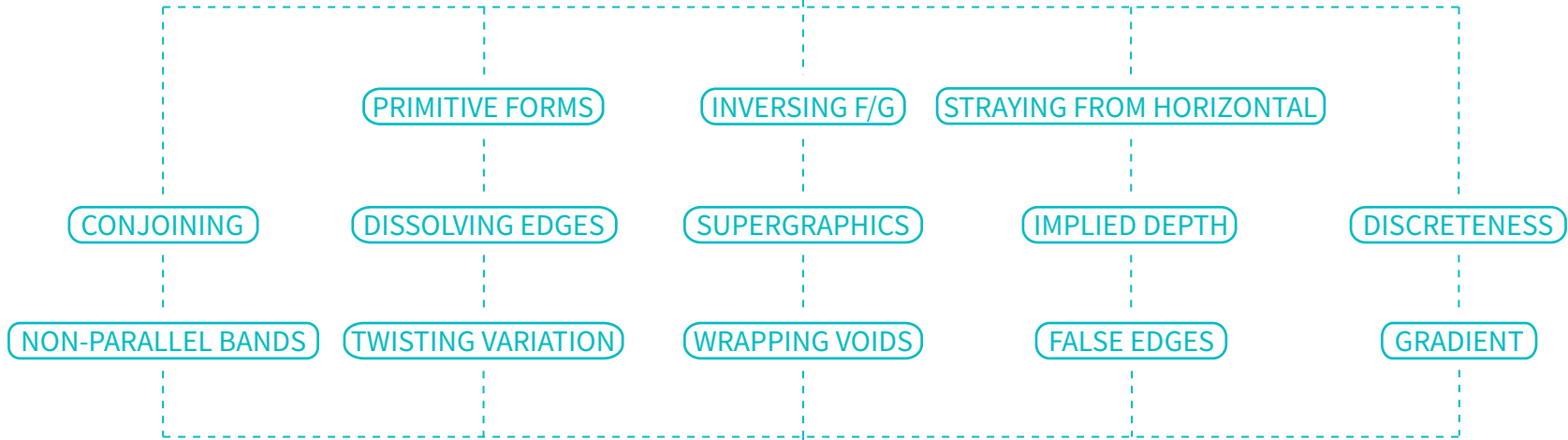
**PERCEPTION**

The organization, identification, and interpretation of sensory information in order to understand the presented information or environment.

**AMBIGUITY**

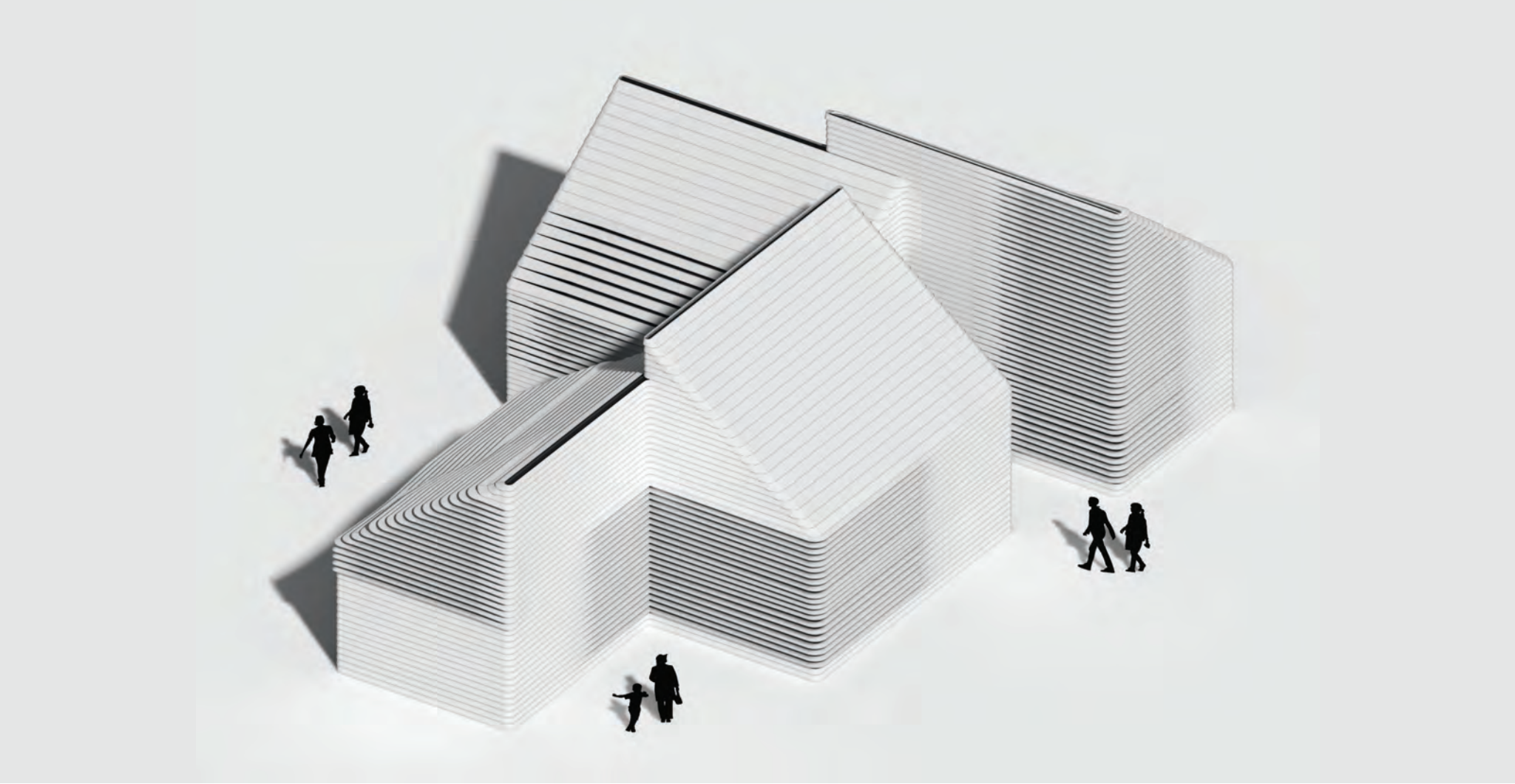
The quality of being open to more than one interpretation.

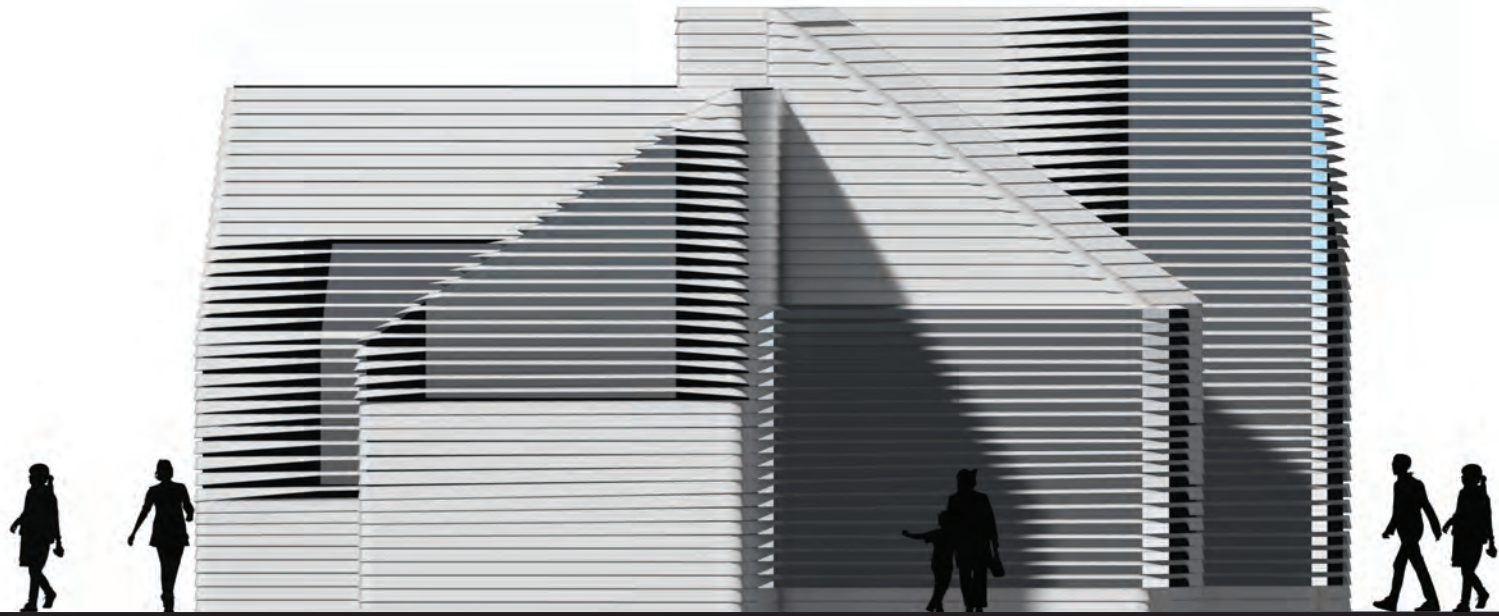
TECHNIQUES OF AMBIGUITY



**MATERIAL EXPRESSION**

ITERATION NO. 1





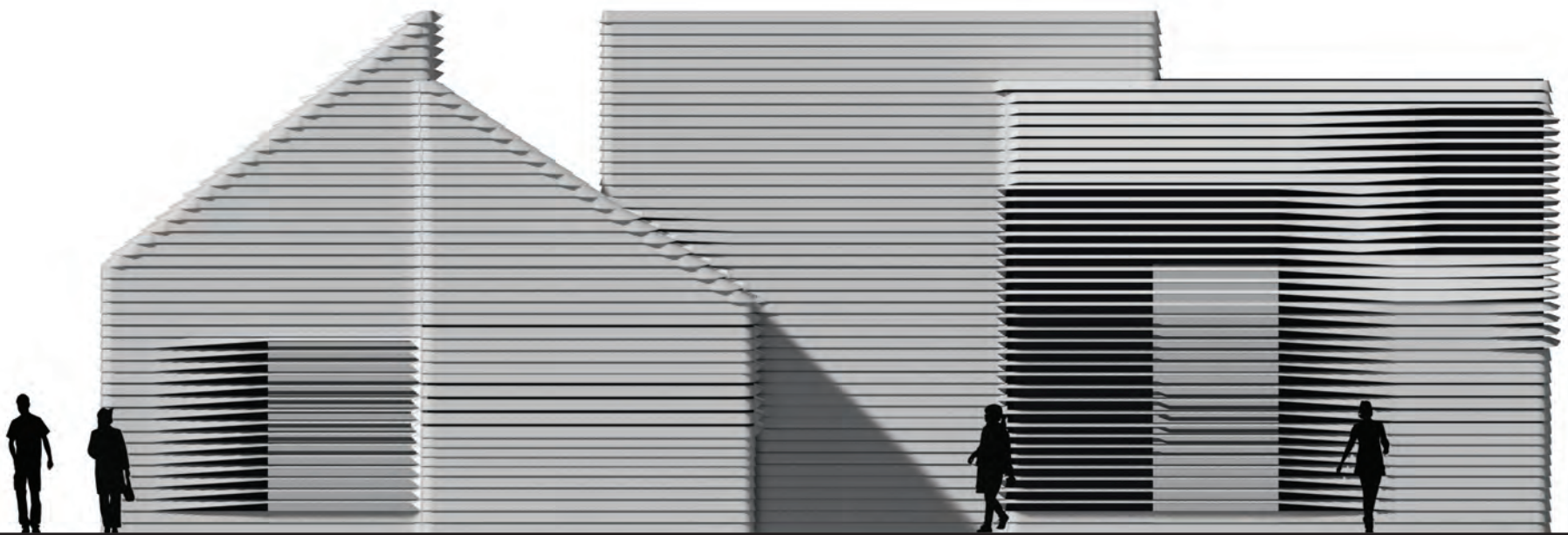
FRONT ELEVATION



RIGHT ELEVATION

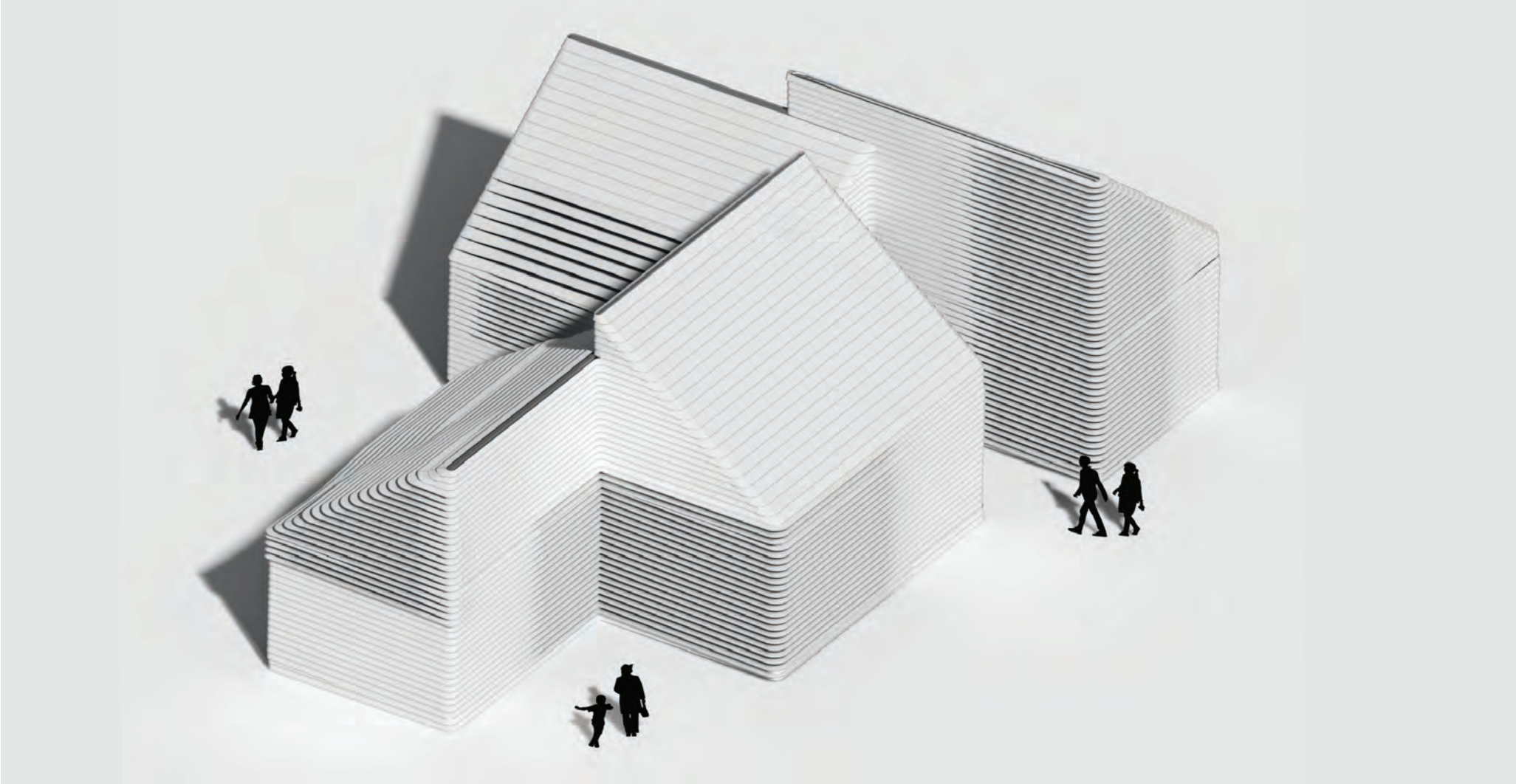


BACK ELEVATION



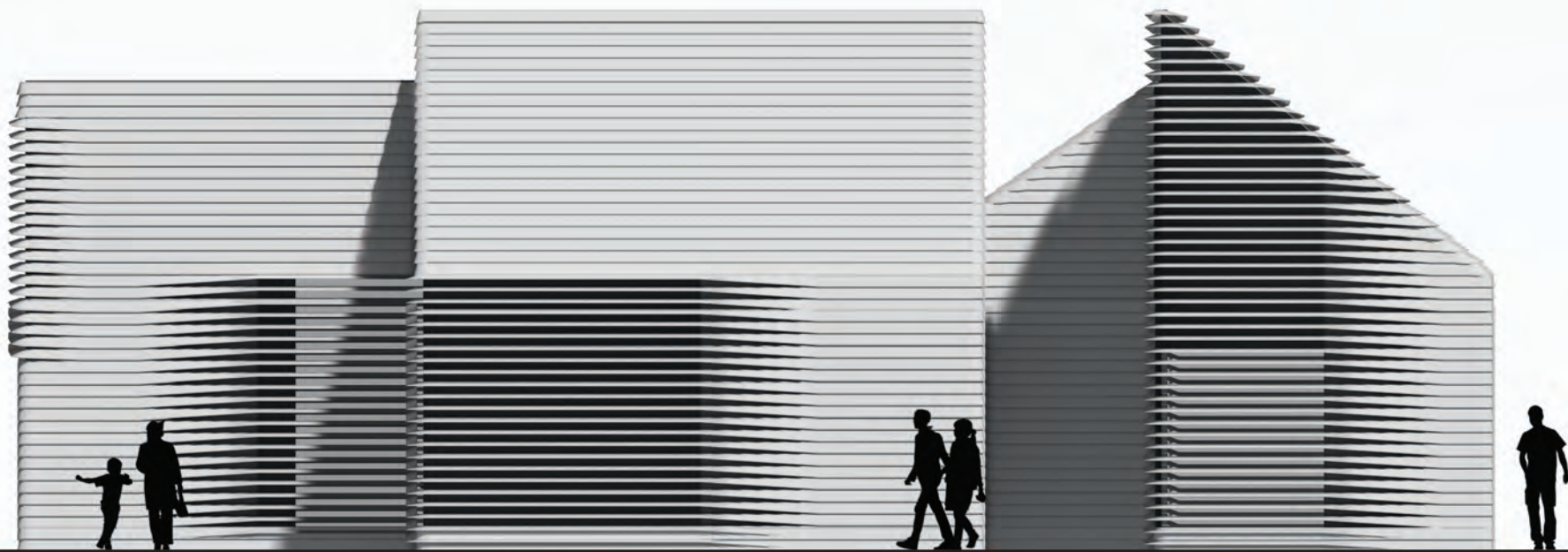
LEFT ELEVATION

ITERATION NO. 2





FRONT ELEVATION



RIGHT ELEVATION

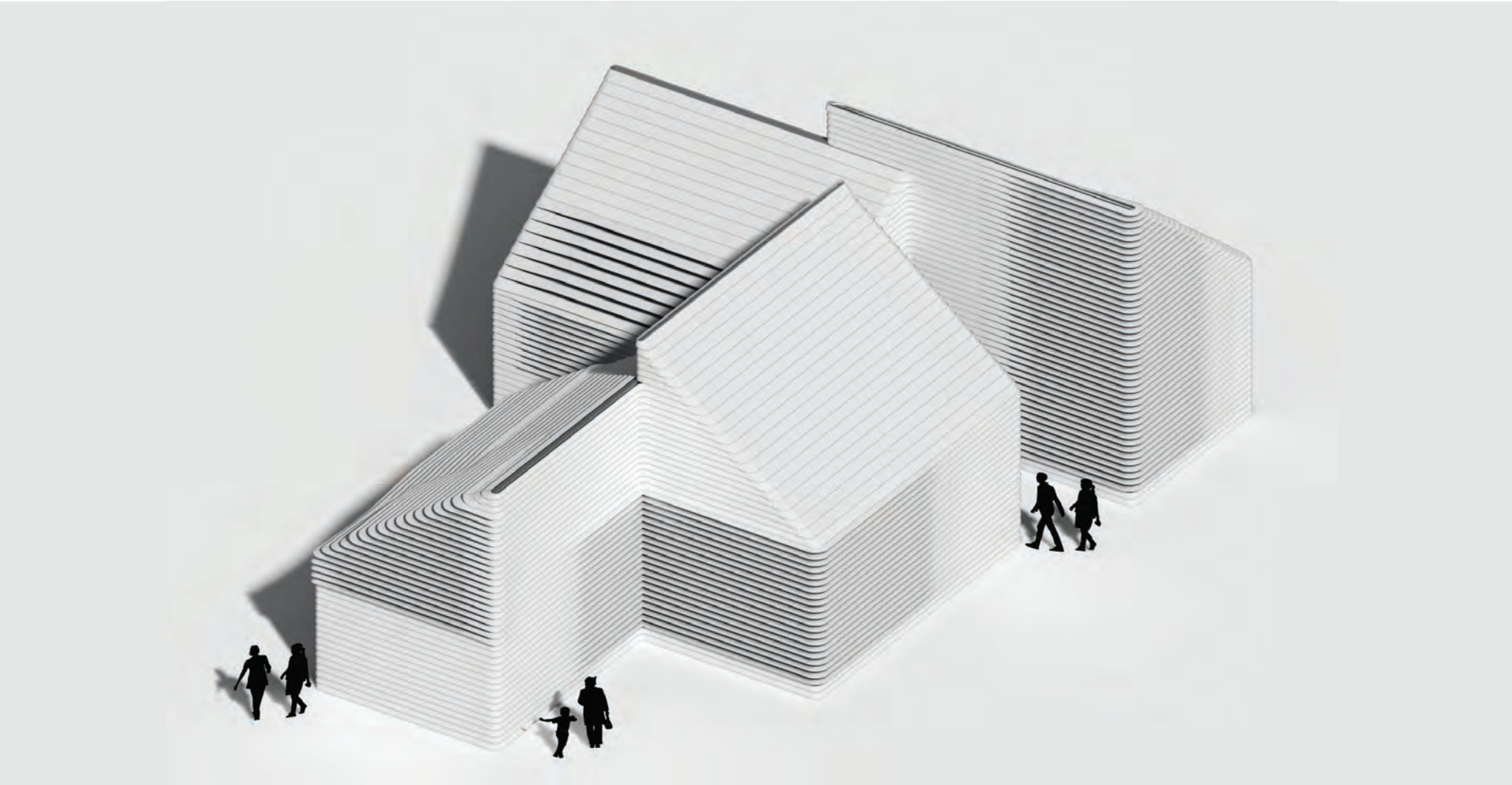


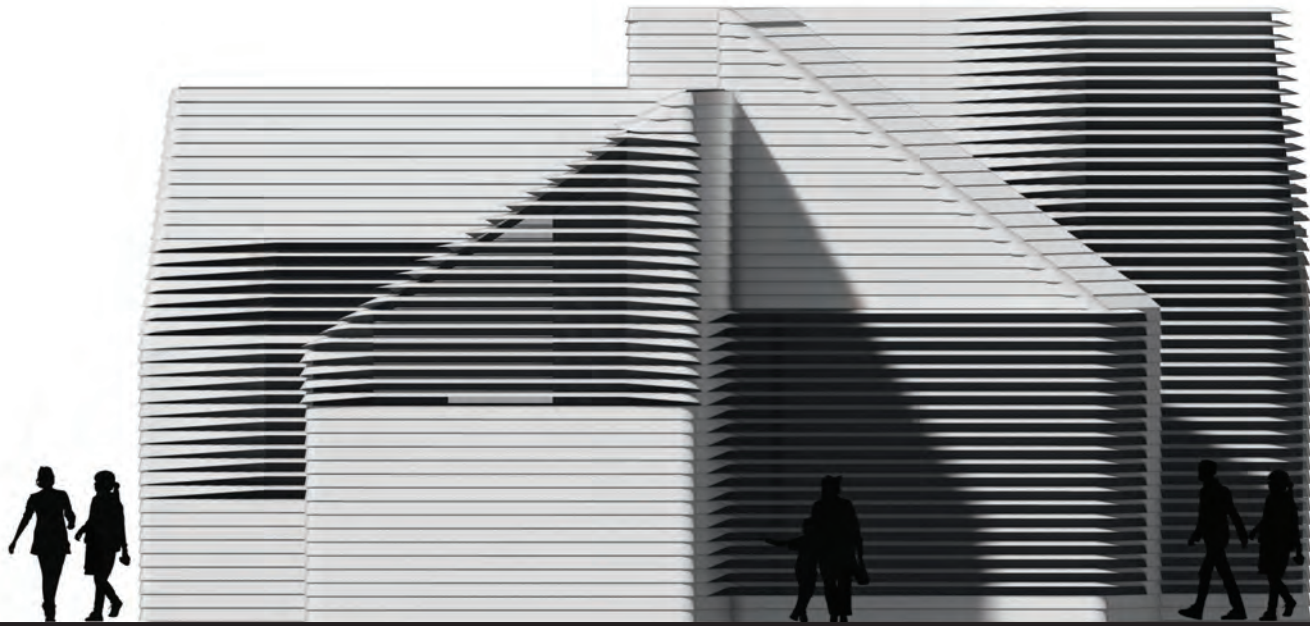
BACK ELEVATION



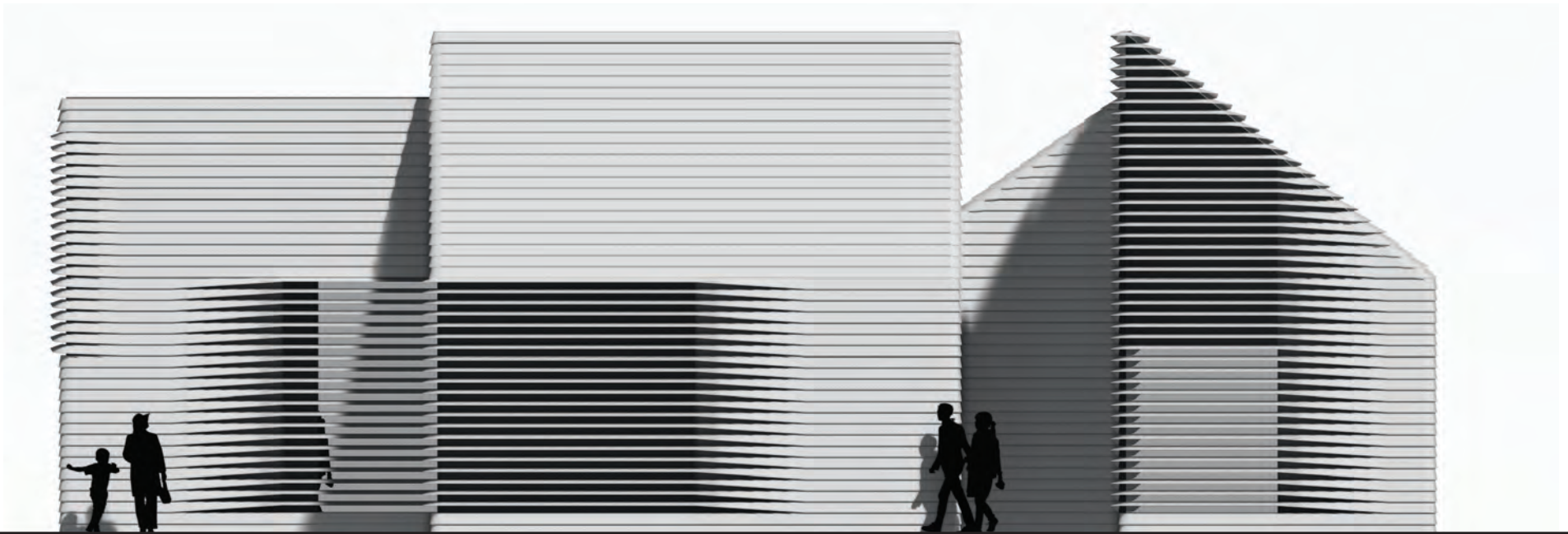
LEFT ELEVATION

ITERATION NO. 3





FRONT ELEVATION



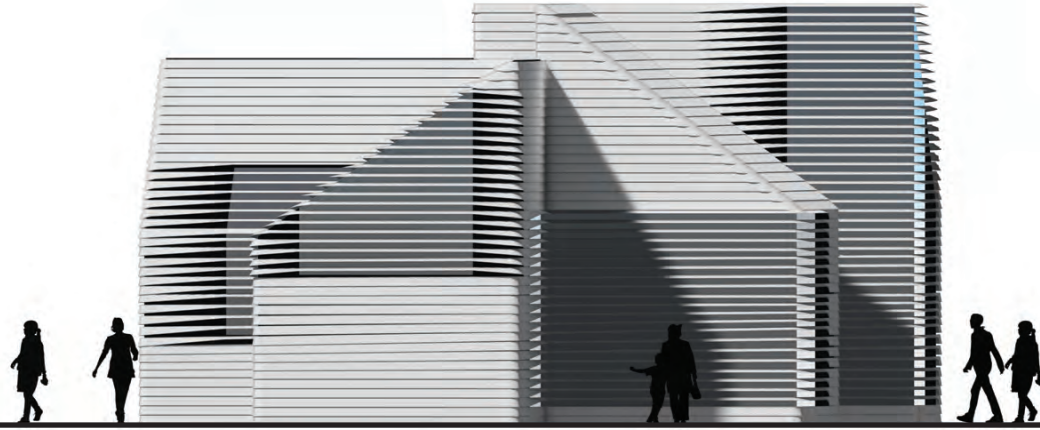
RIGHT ELEVATION



BACK ELEVATION



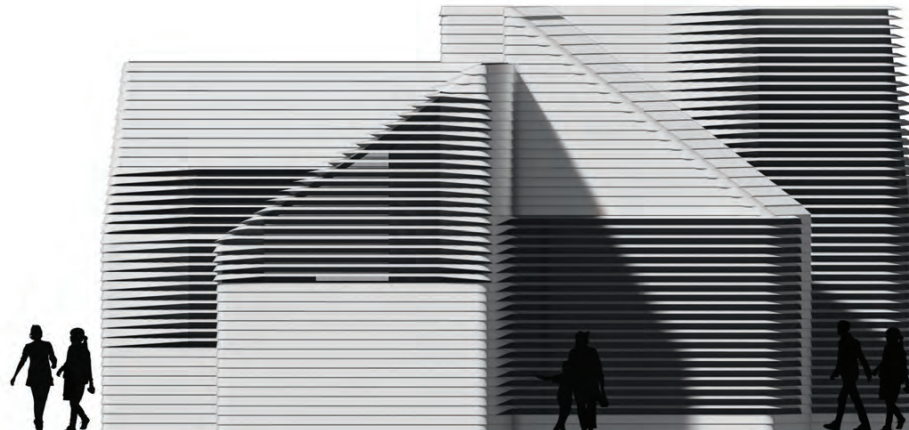
LEFT ELEVATION



0.25 OSCILLATING LOUVER ROTATION



1.5 DEGREE LOUVER ROTATION



0 DEGREE LOUVER ROTATION

ITERATION NO. 4

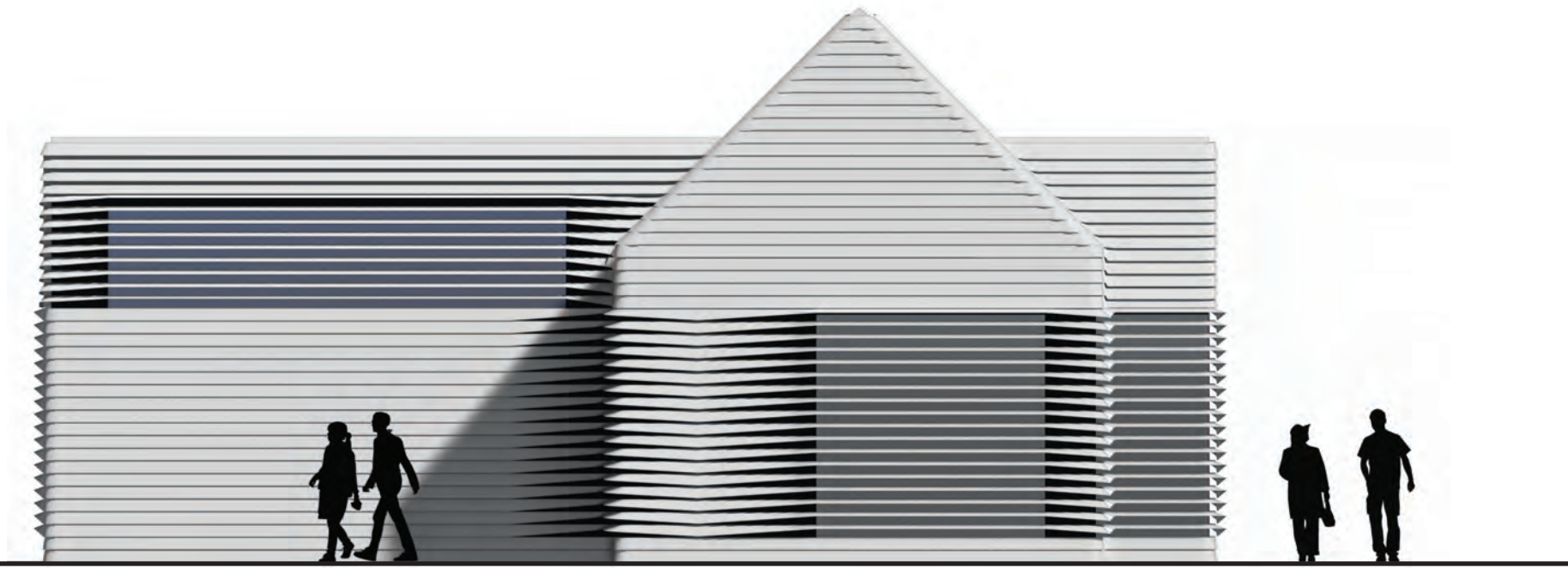




FRONT ELEVATION



RIGHT ELEVATION

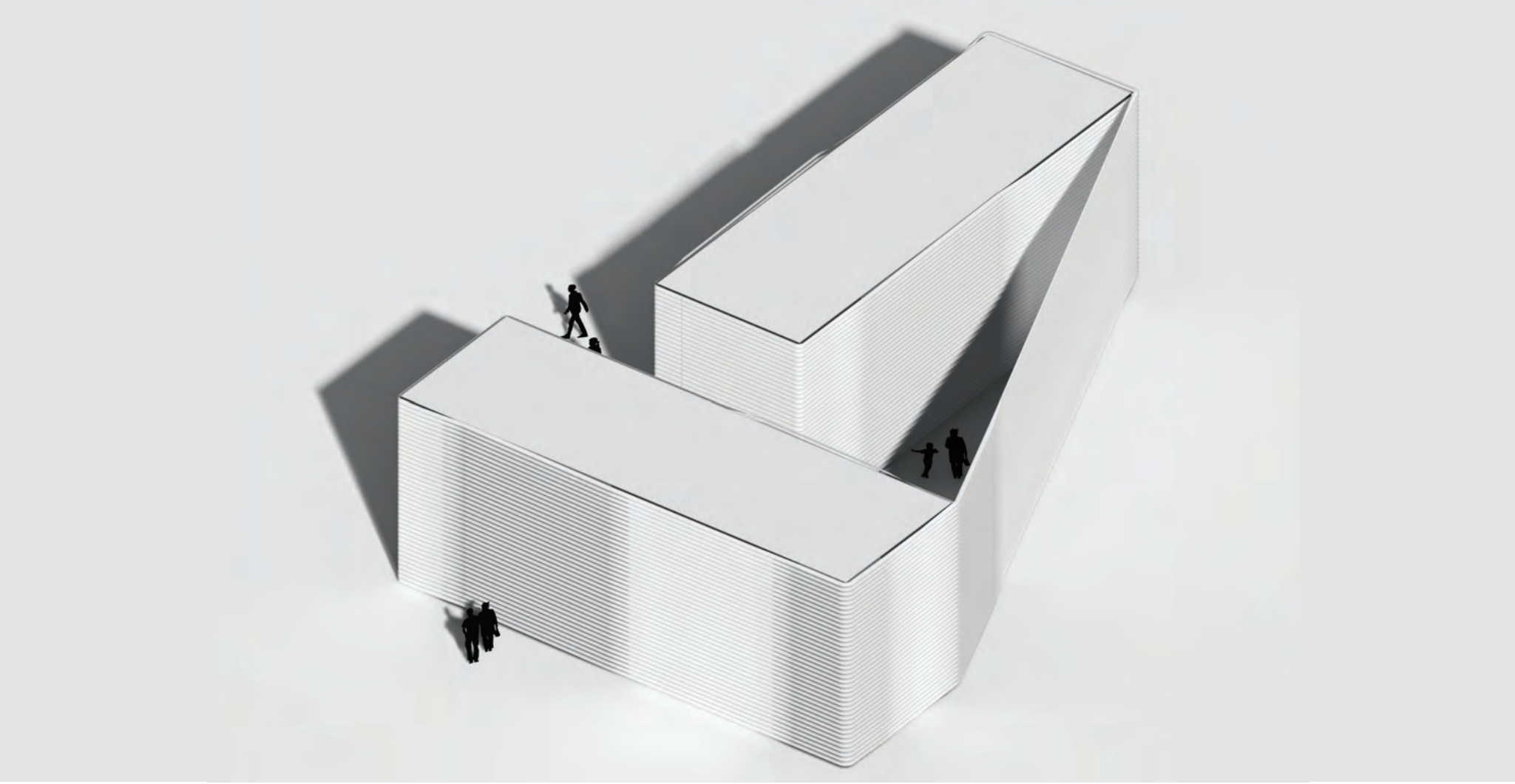


BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 5





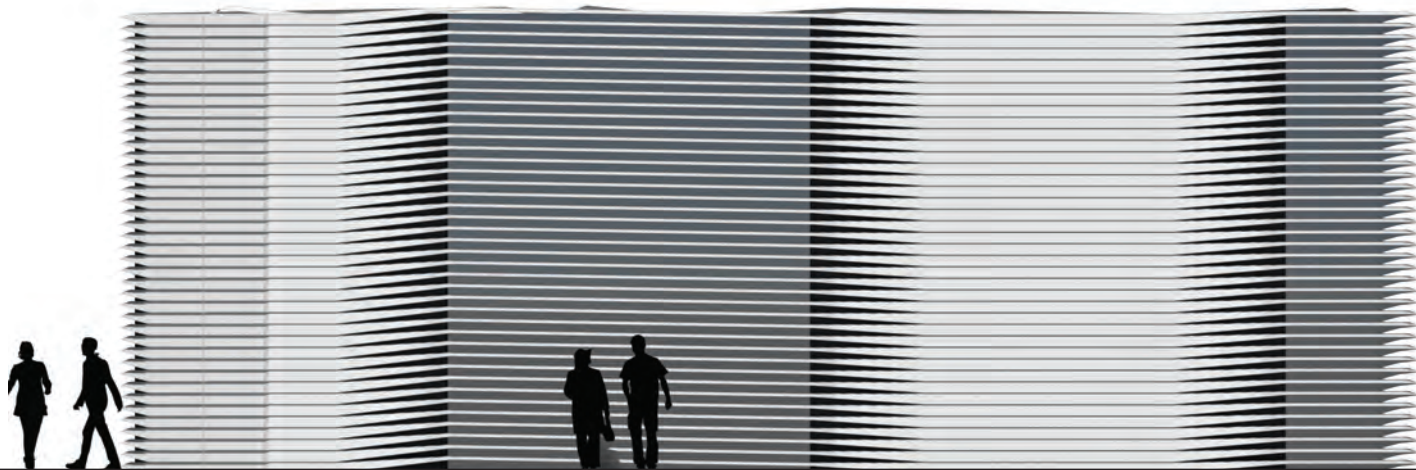
FRONT ELEVATION



RIGHT ELEVATION

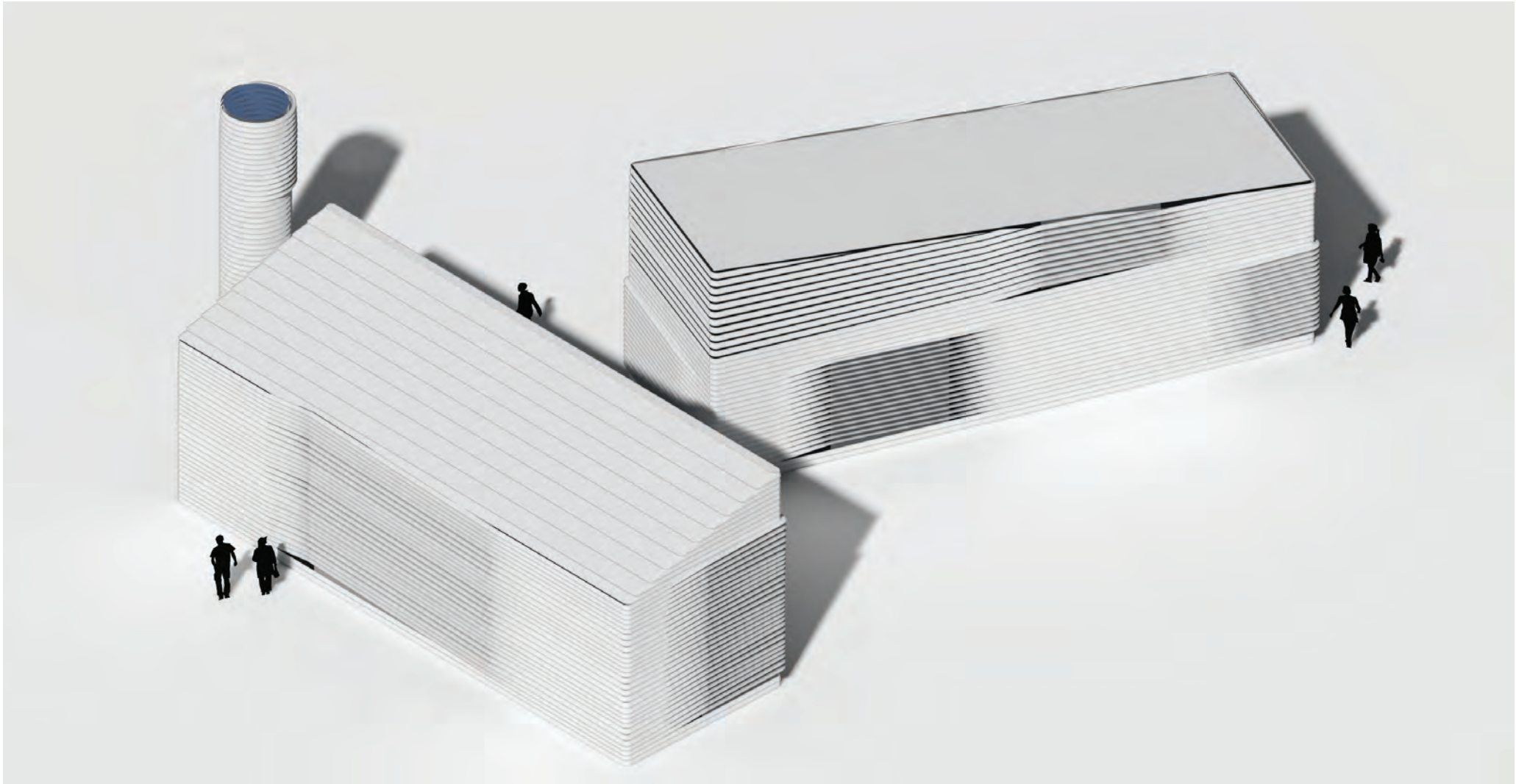


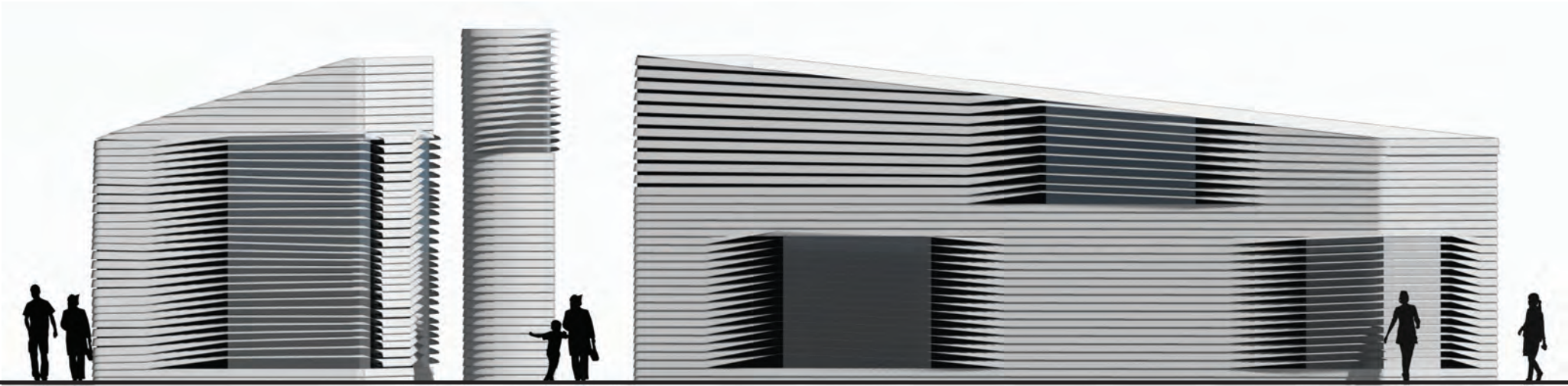
BACK ELEVATION



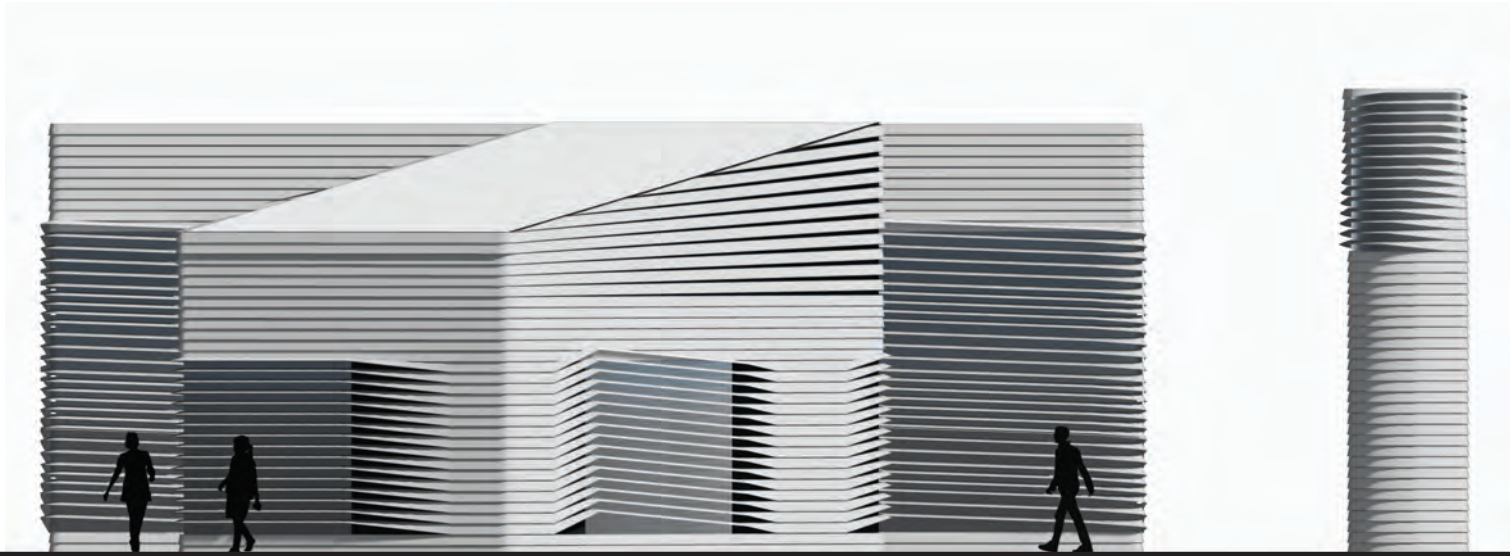
LEFT ELEVATION

ITERATION NO. 6

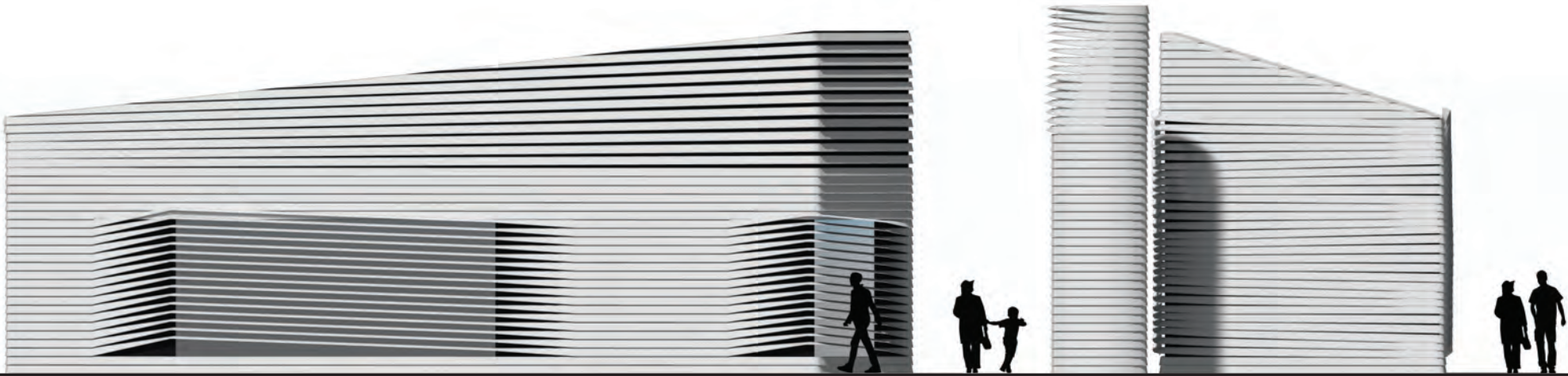




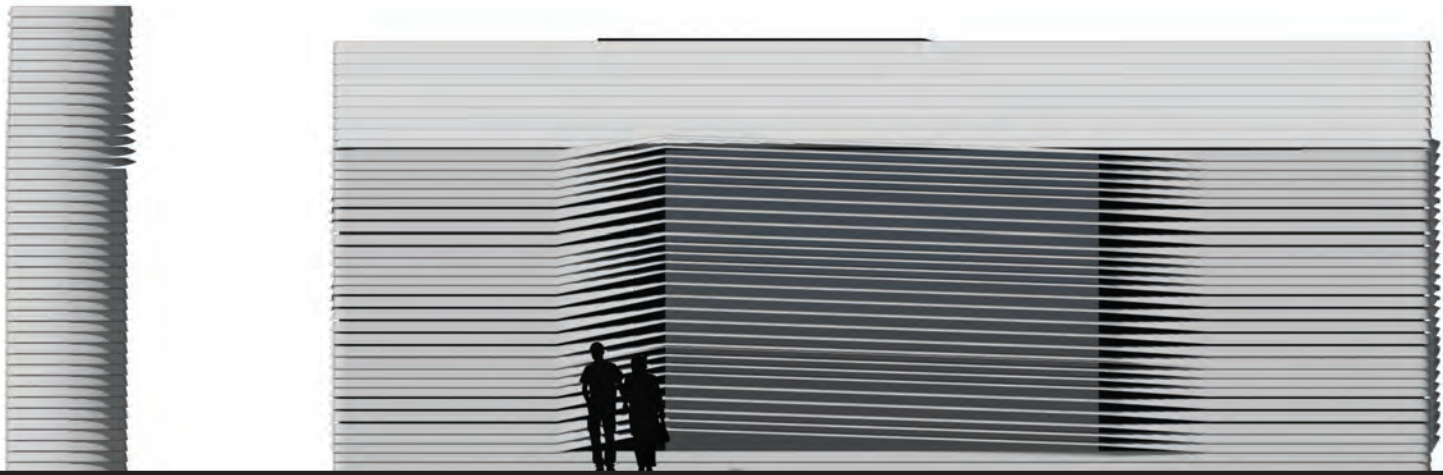
FRONT ELEVATION



RIGHT ELEVATION

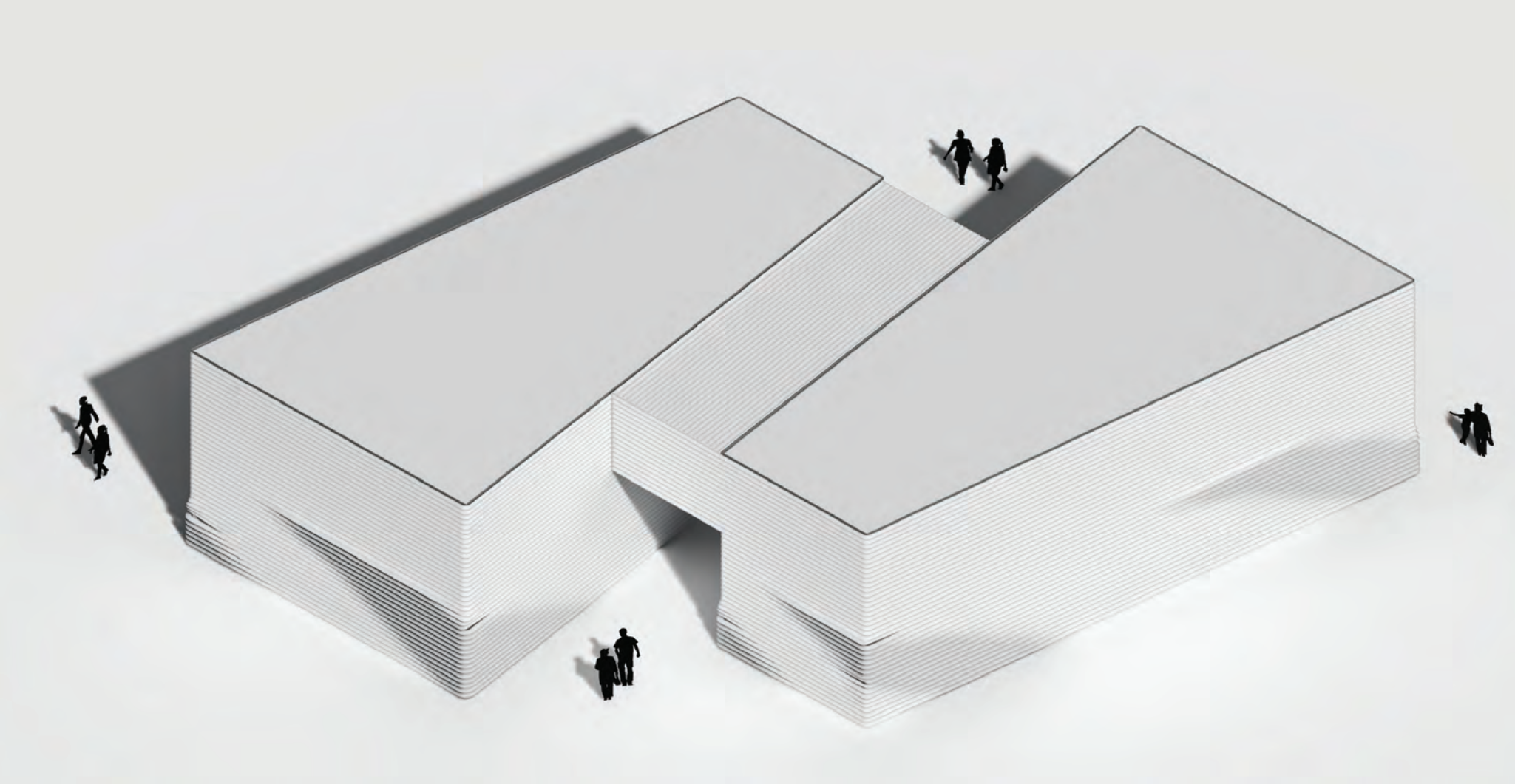


BACK ELEVATION



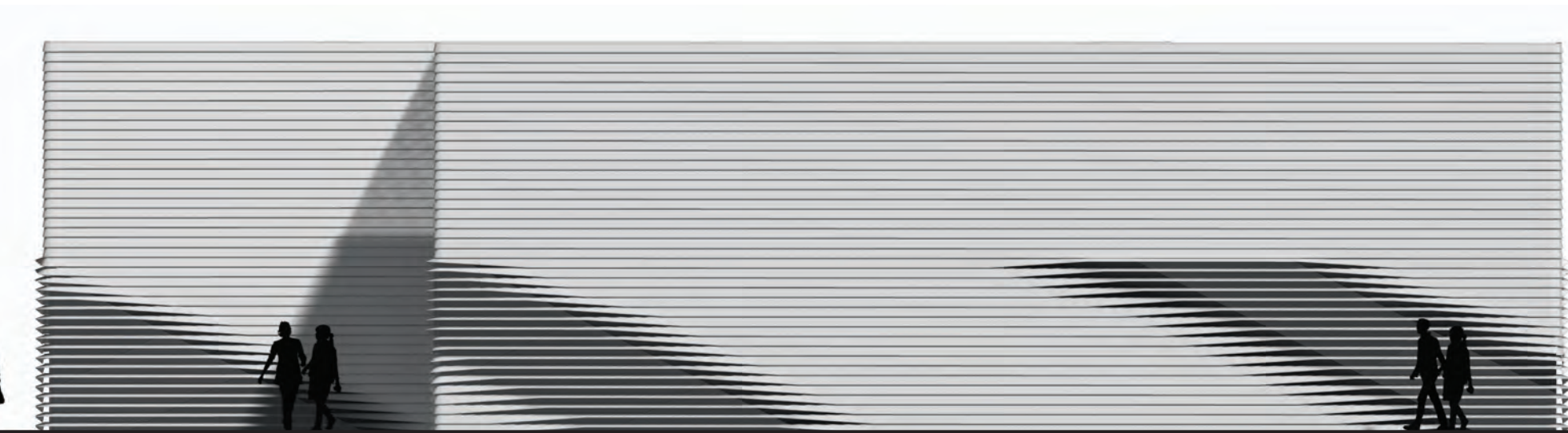
LEFT ELEVATION

ITERATION NO. 7

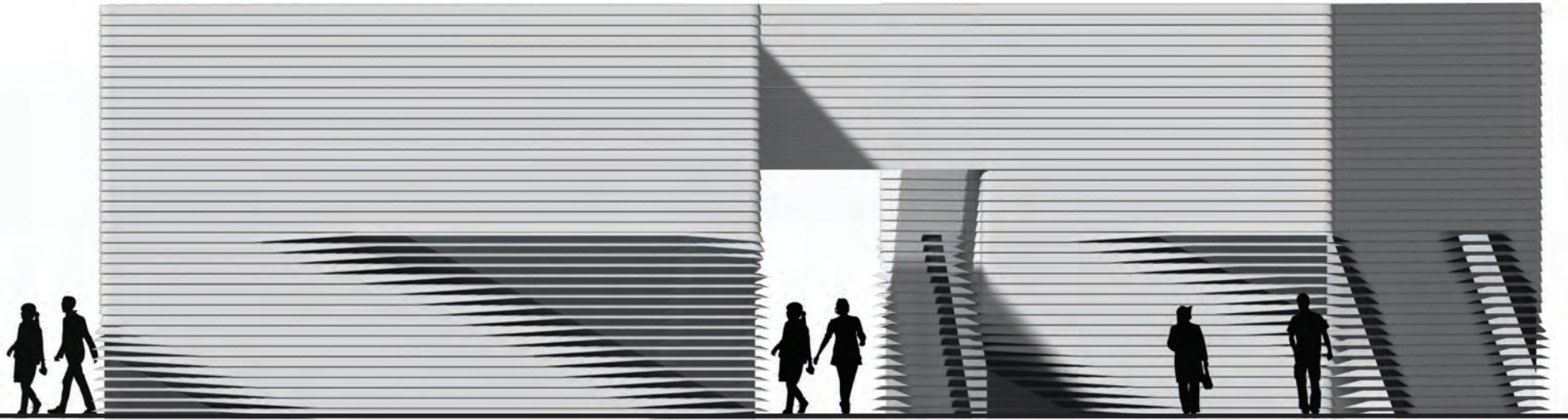




FRONT ELEVATION



RIGHT ELEVATION

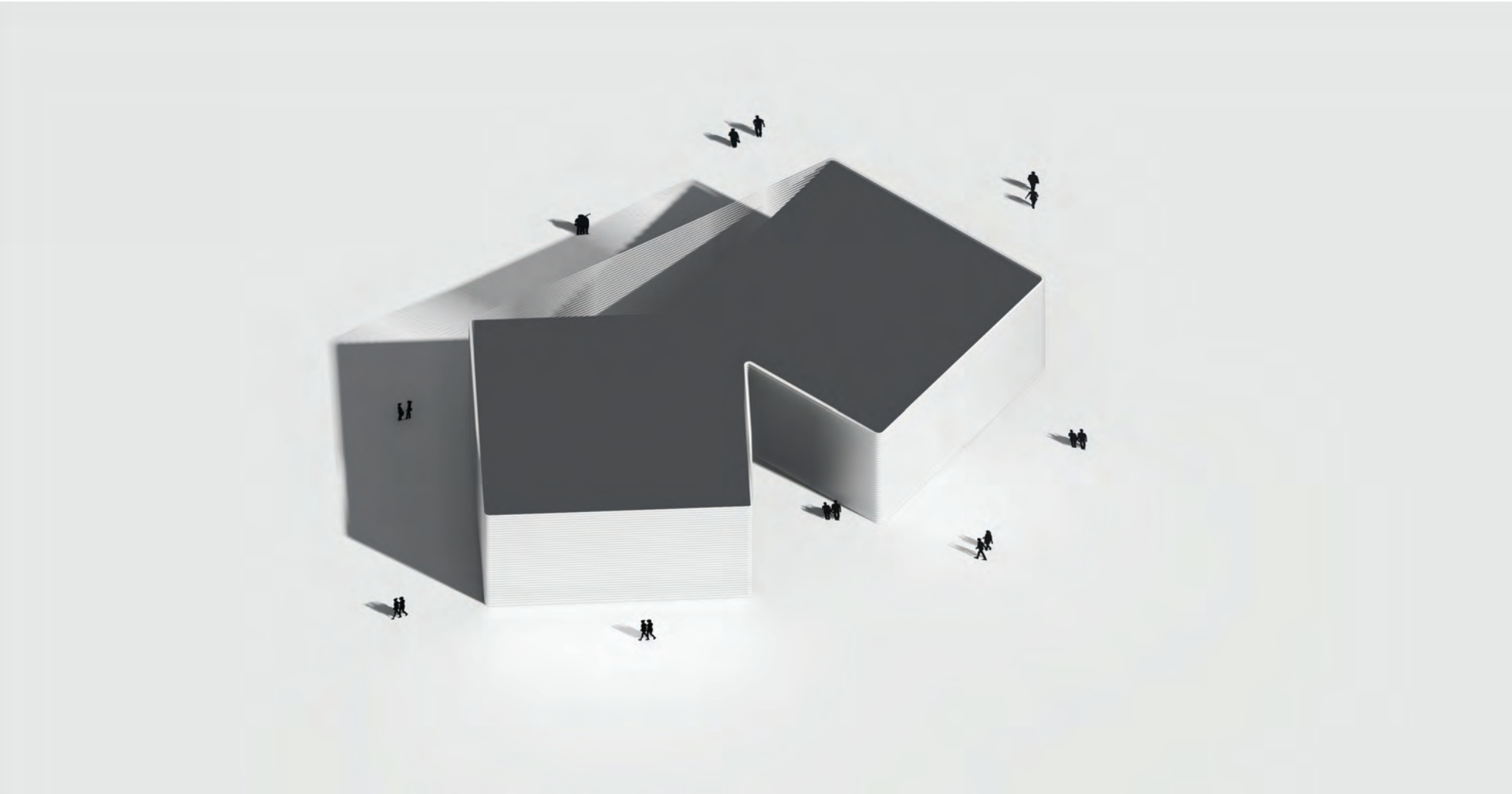


BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 8

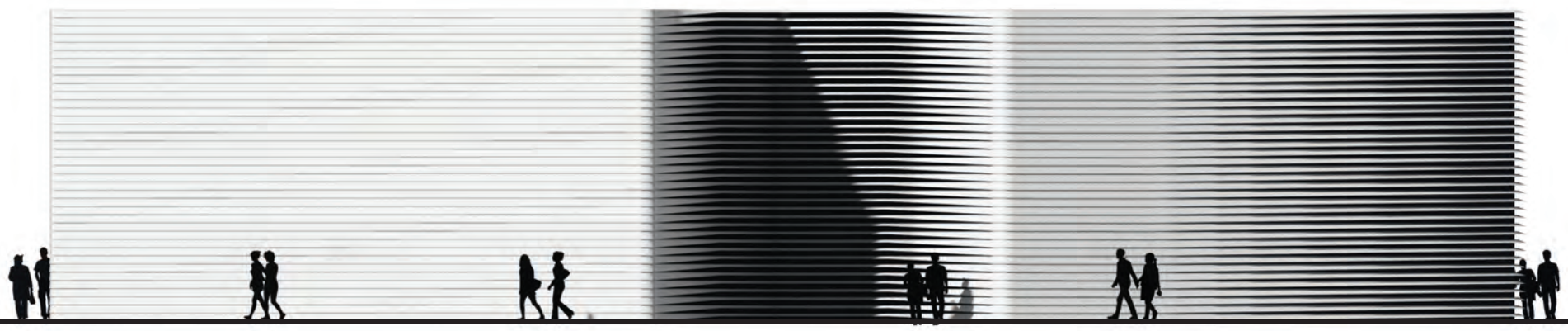




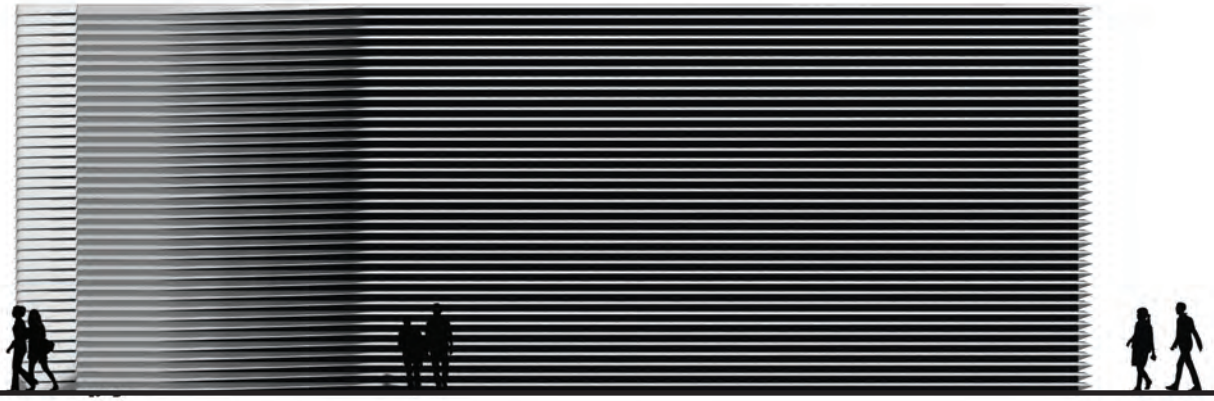
FRONT ELEVATION



RIGHT ELEVATION

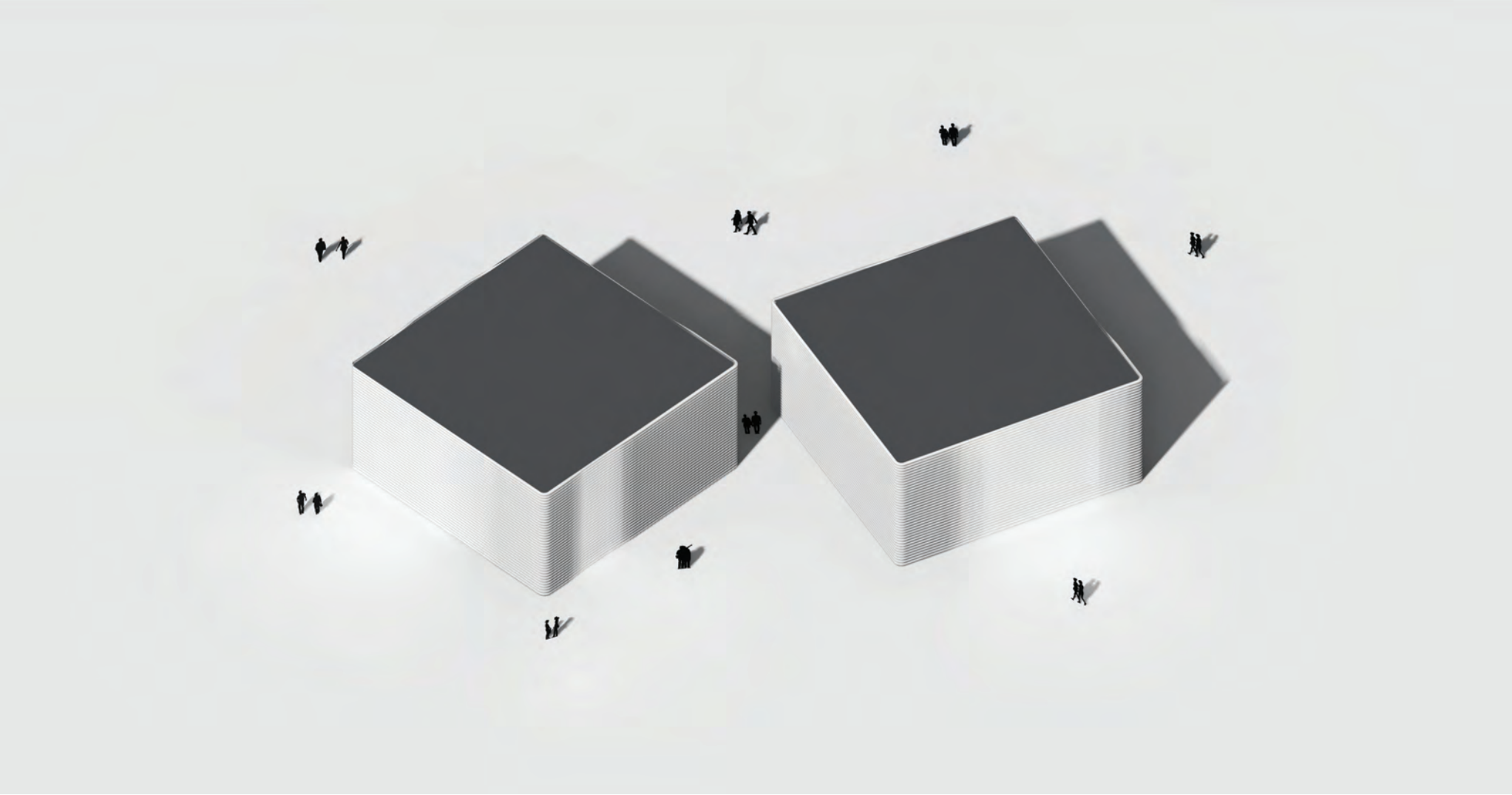


BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 9





FRONT ELEVATION



RIGHT ELEVATION

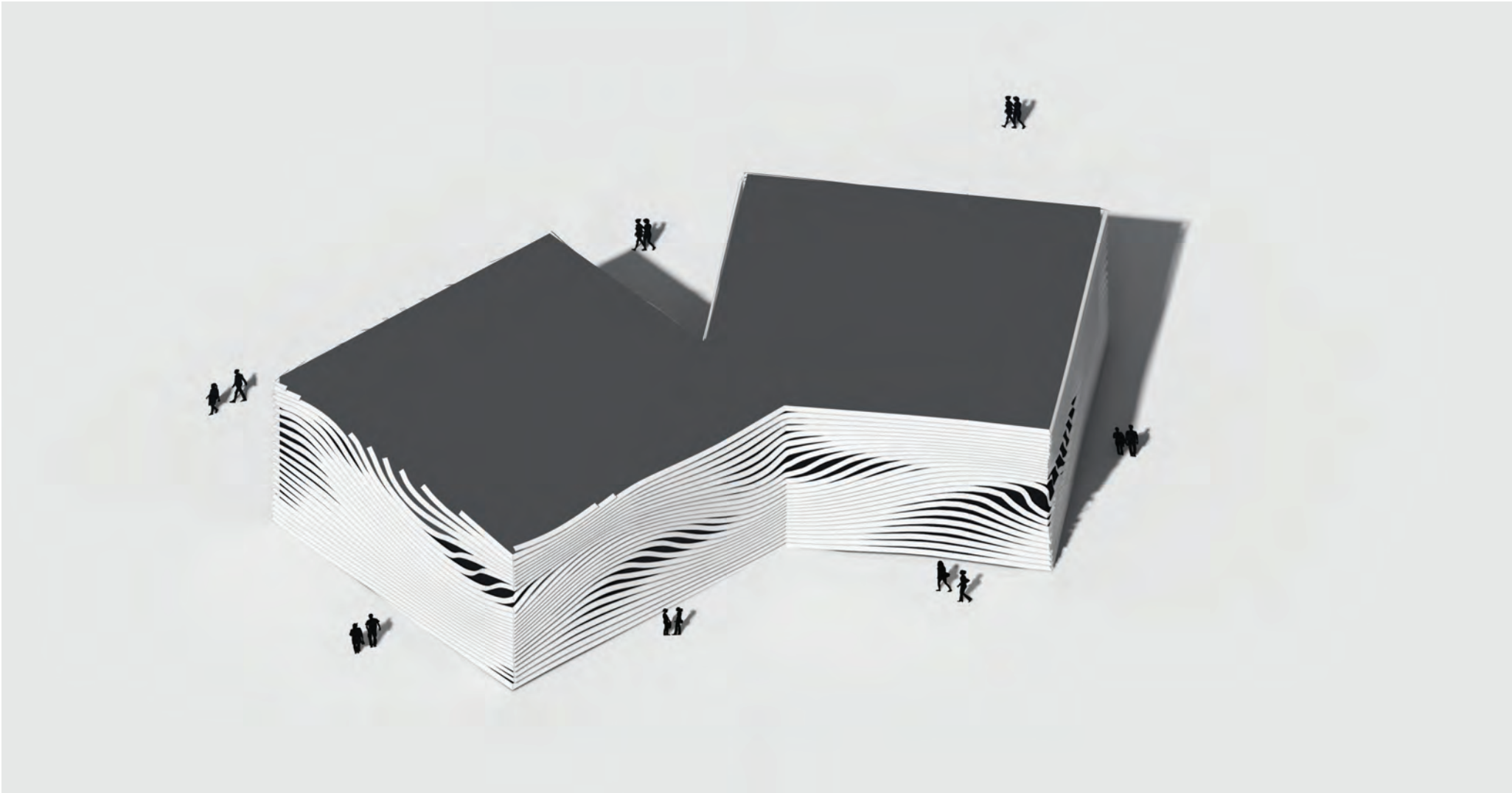


BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 10





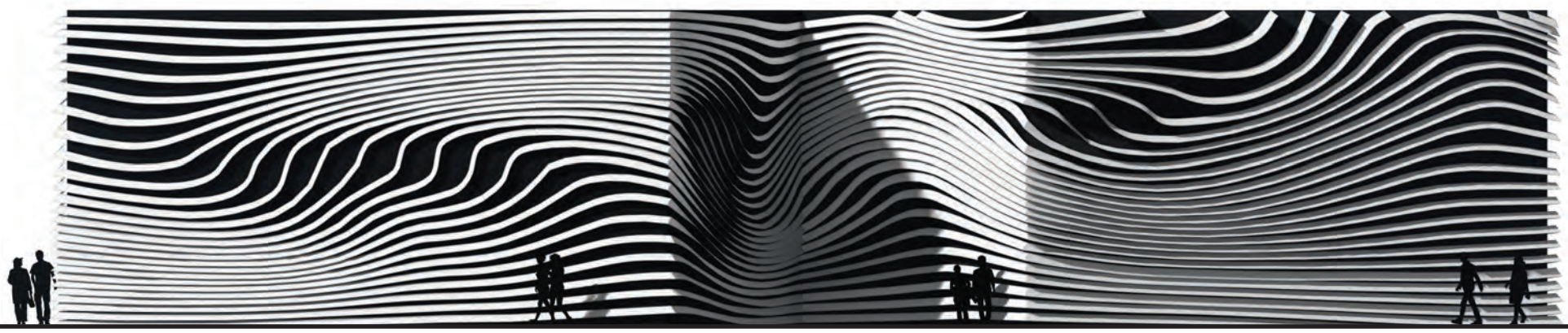
FRONT ELEVATION



RIGHT ELEVATION

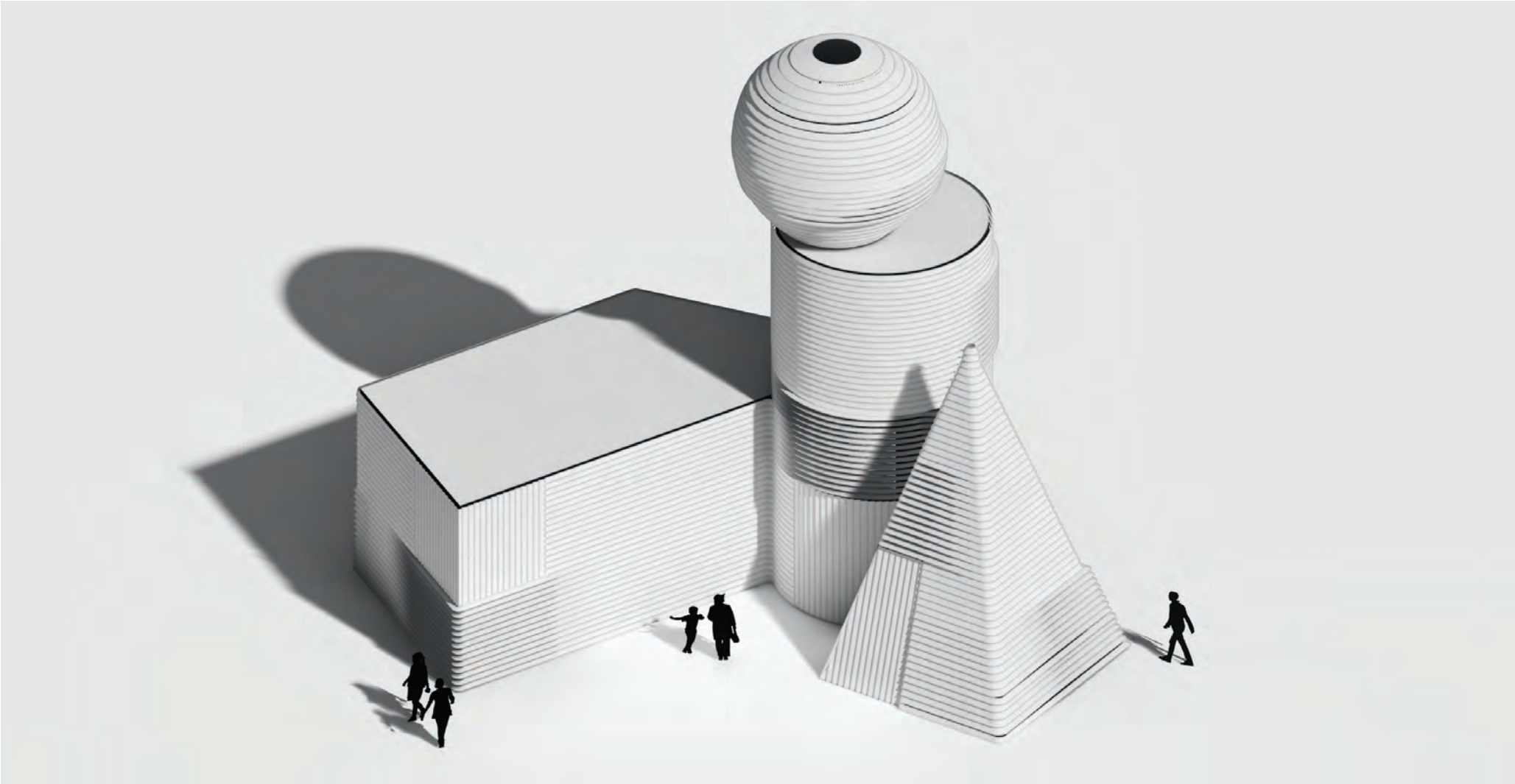


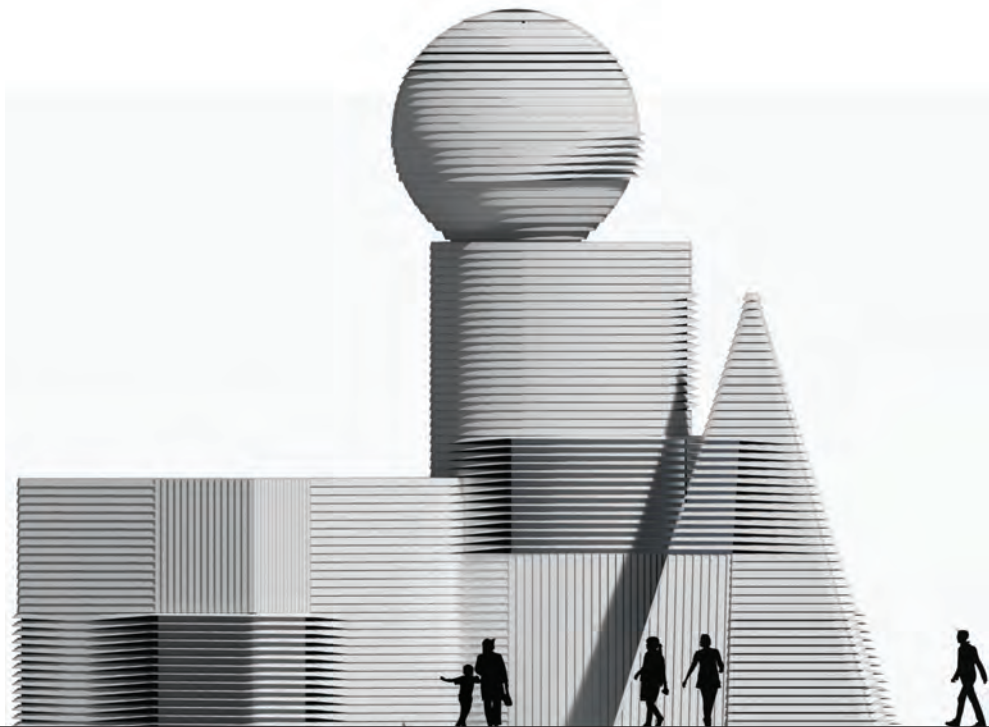
BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 11

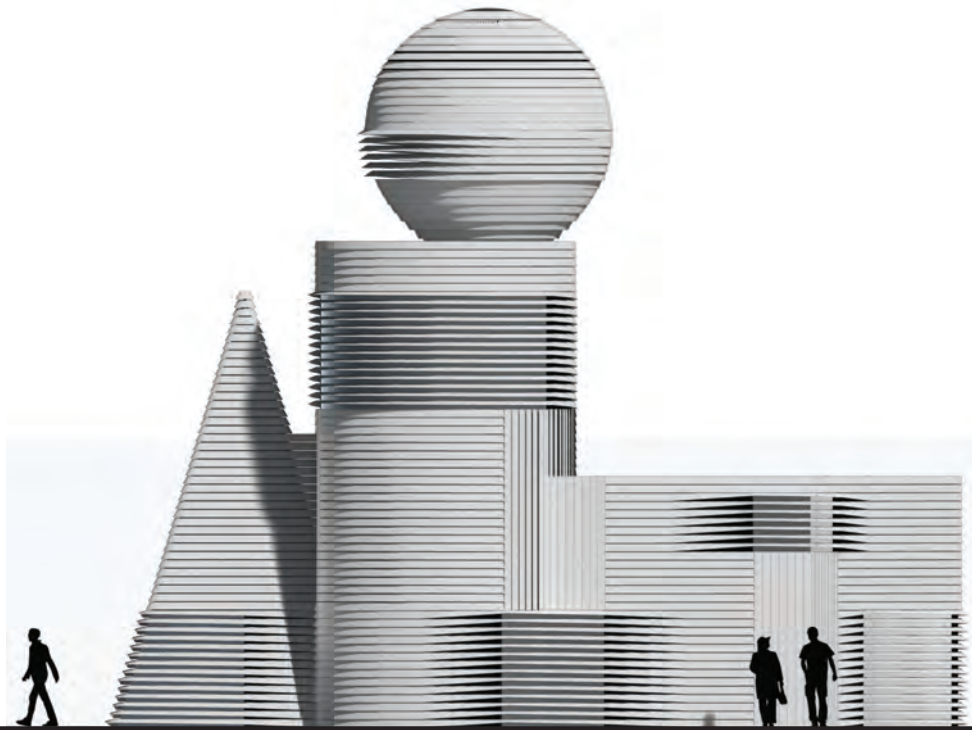




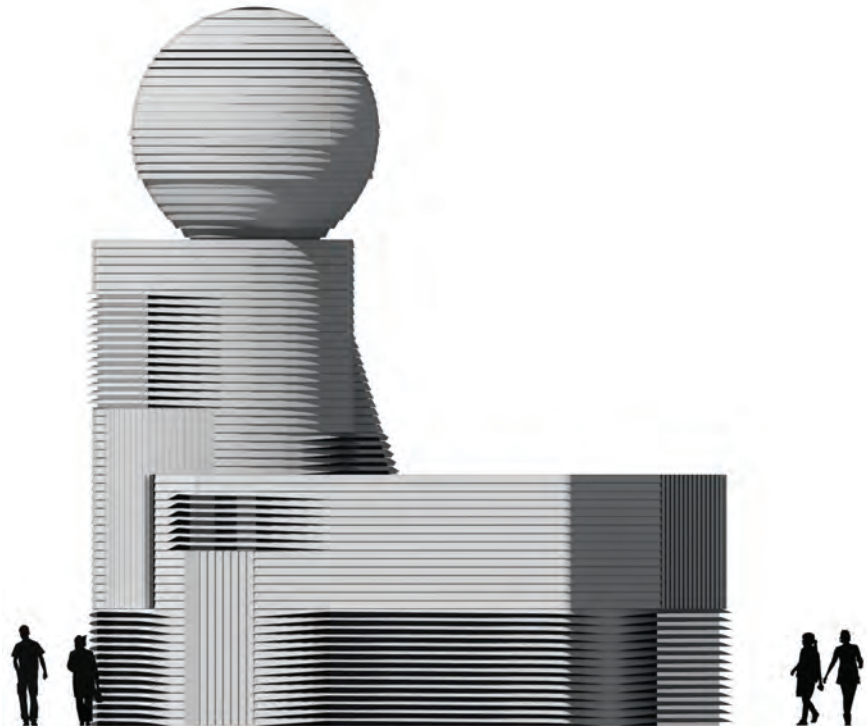
FRONT ELEVATION



RIGHT ELEVATION

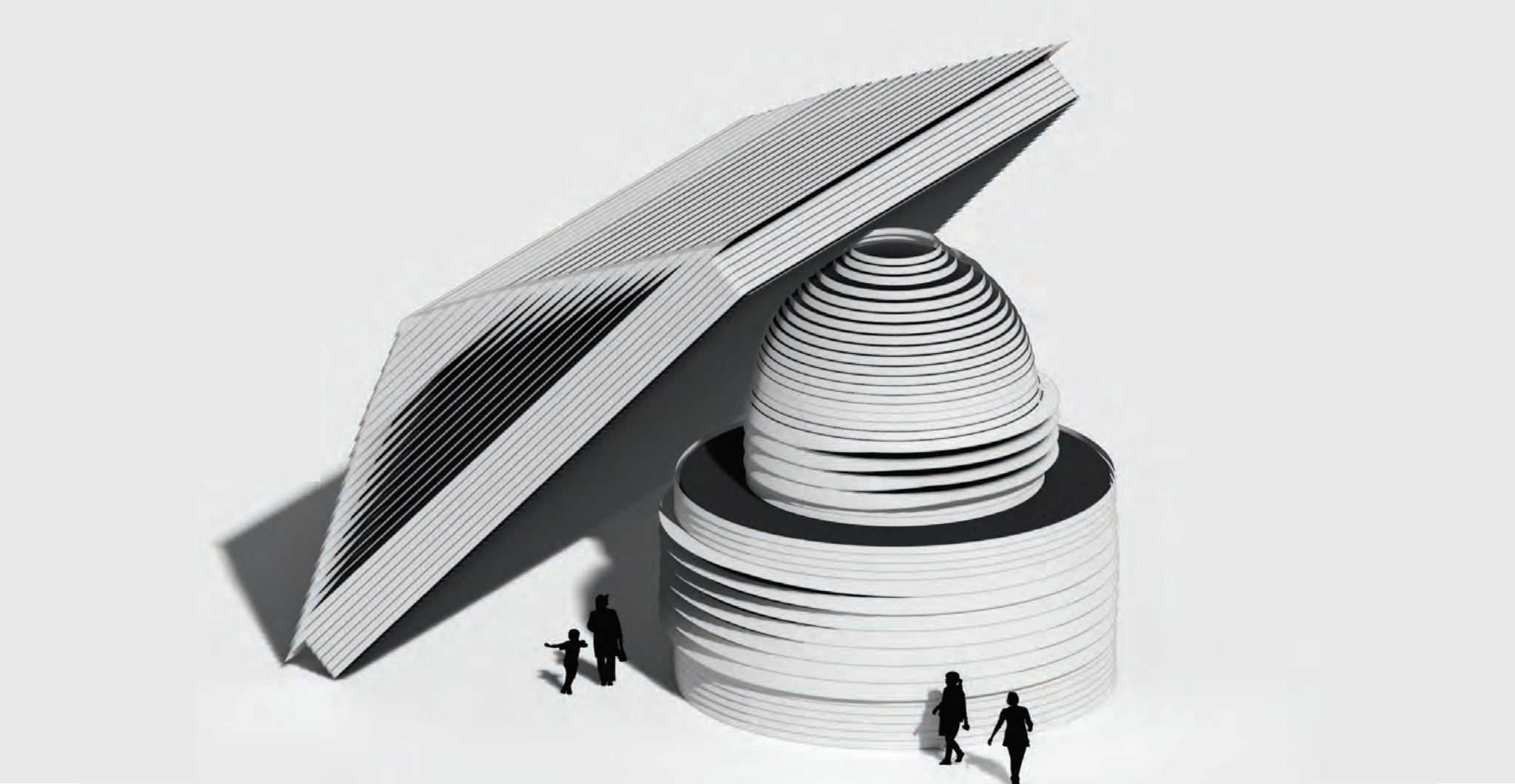


BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 12

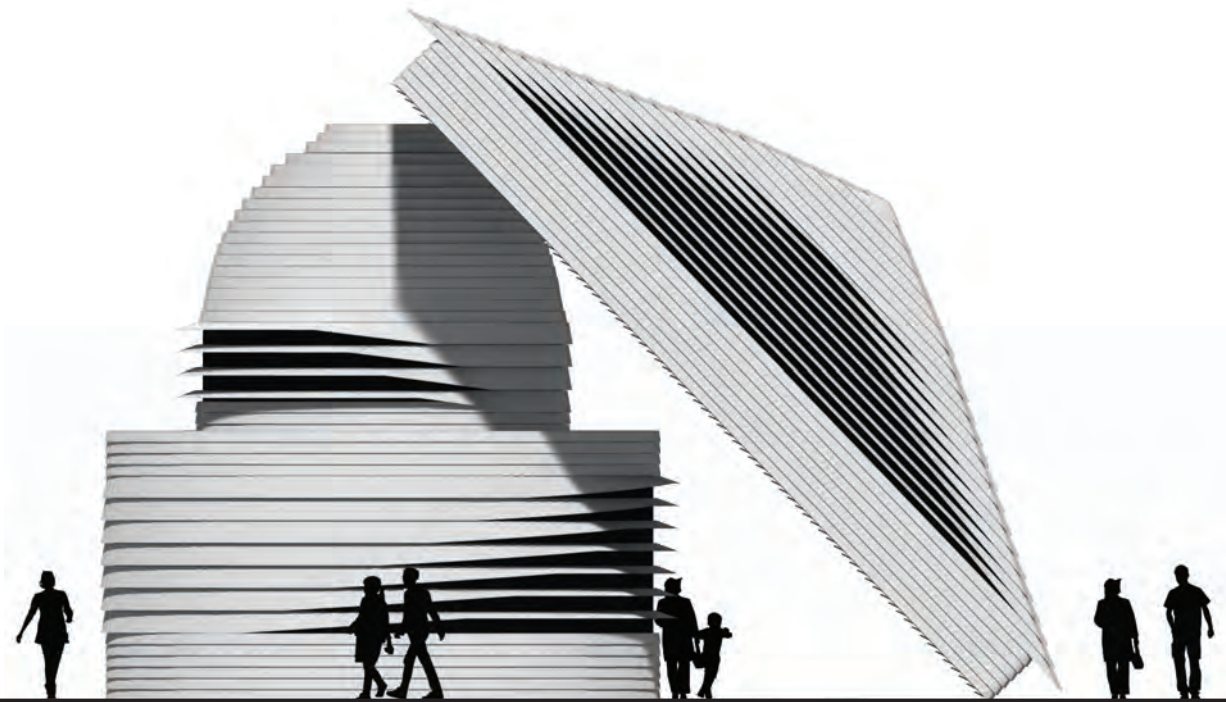




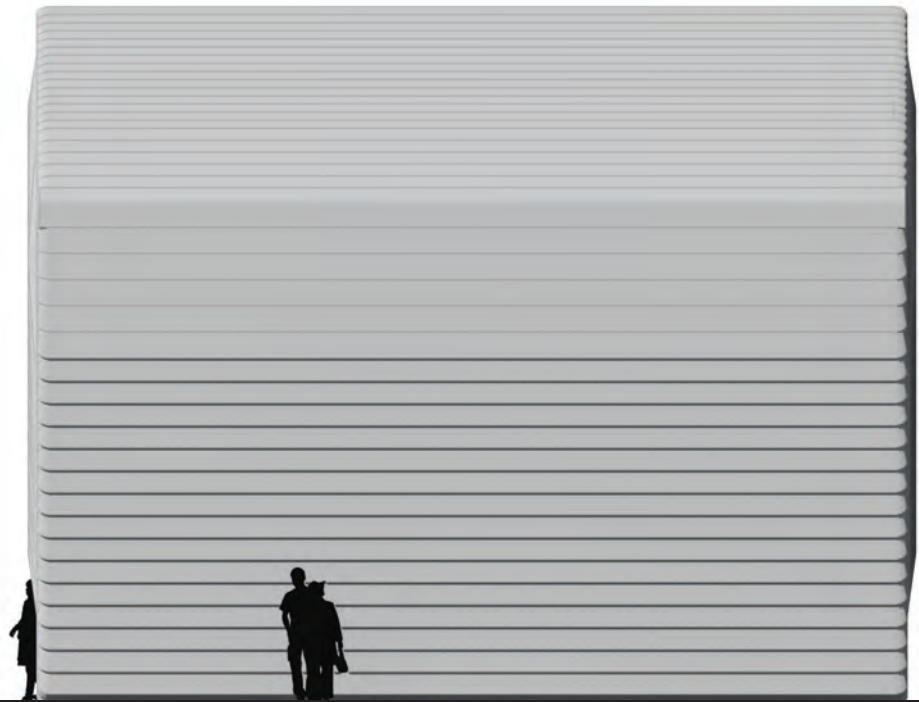
FRONT ELEVATION



RIGHT ELEVATION

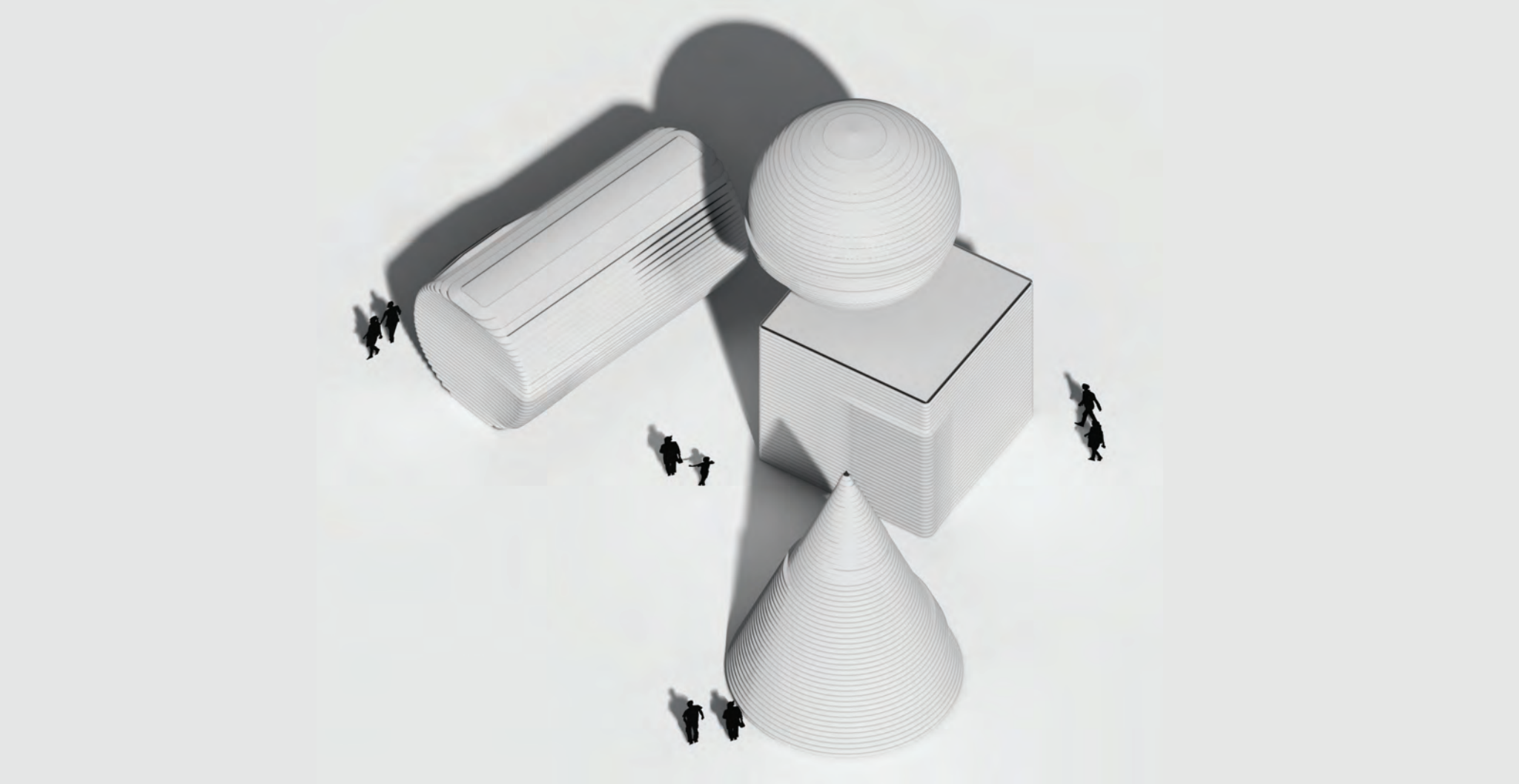


BACK ELEVATION



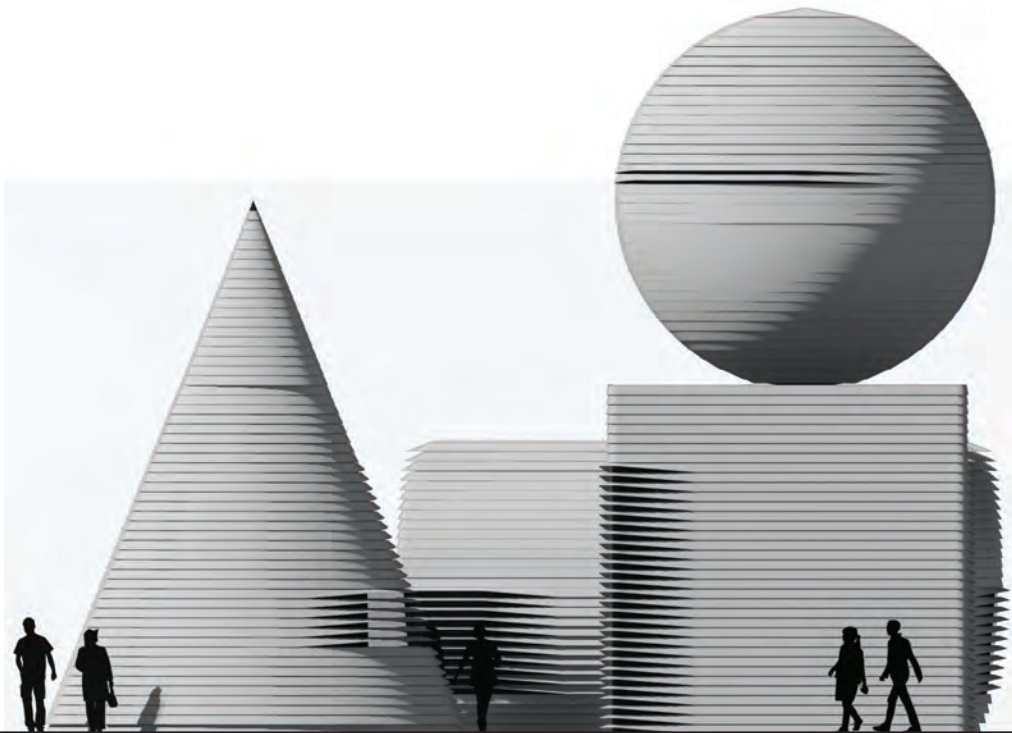
LEFT ELEVATION

ITERATION NO. 13

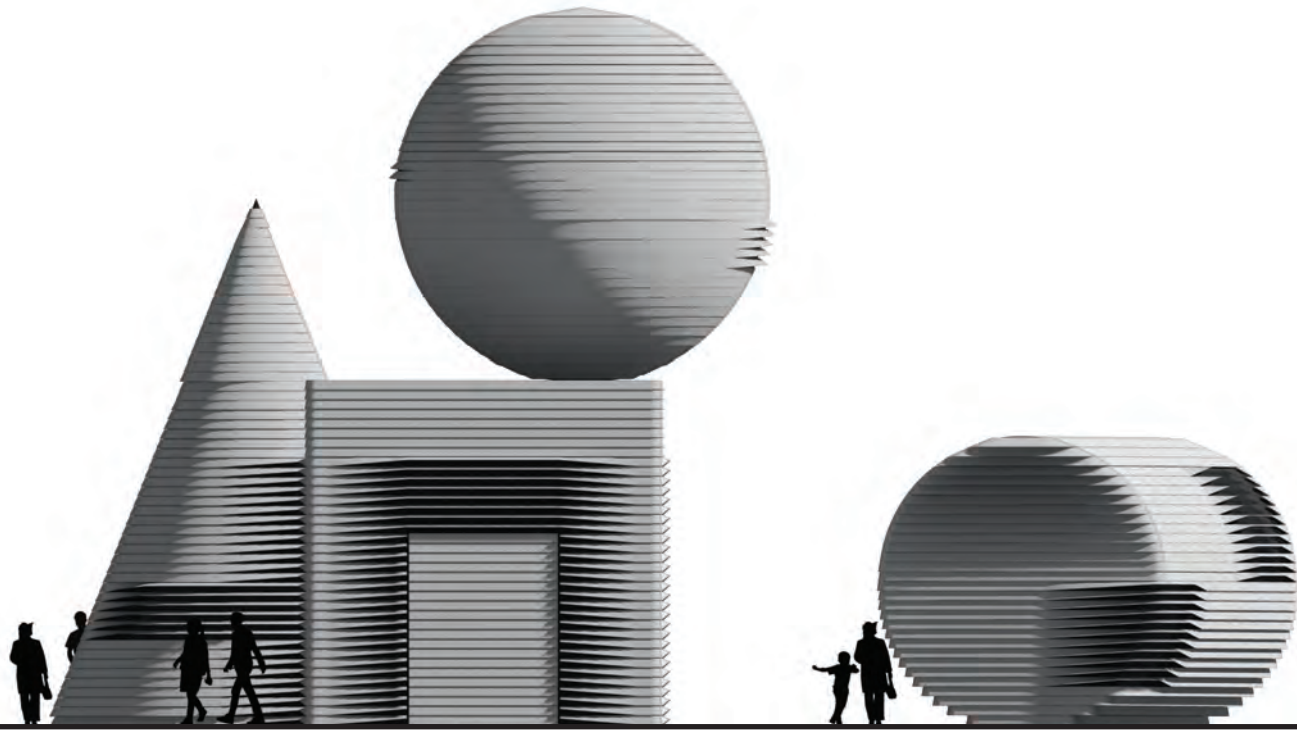




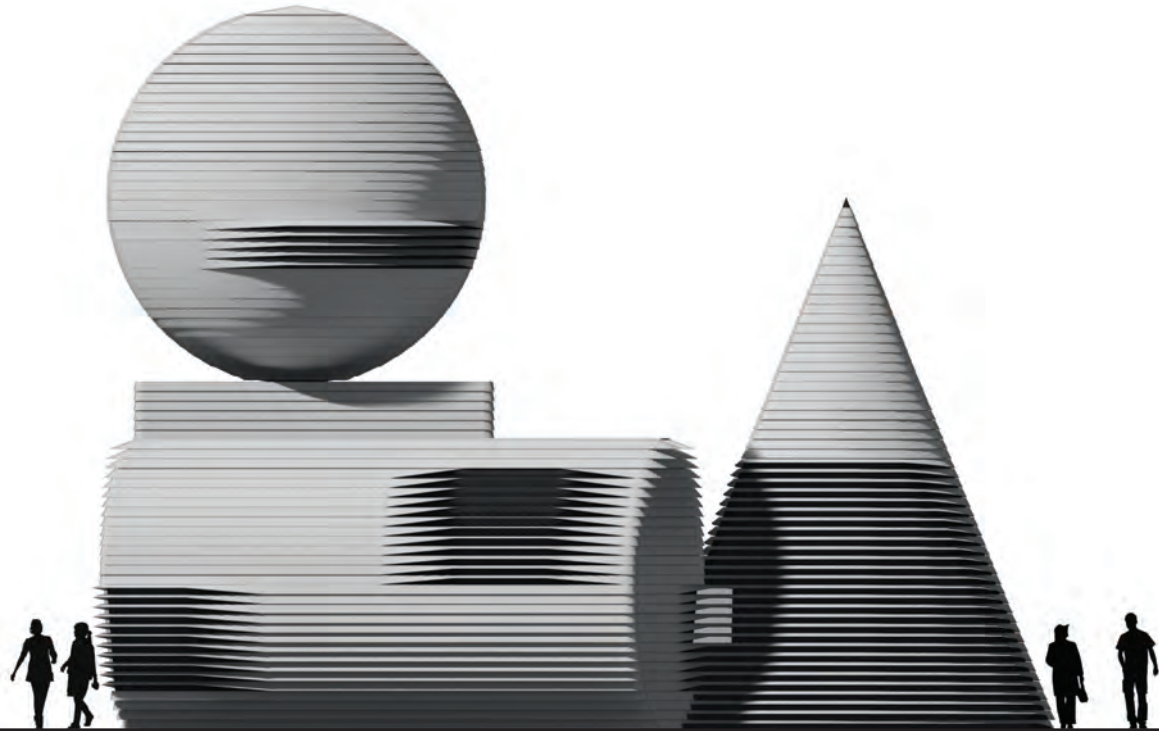
FRONT ELEVATION



RIGHT ELEVATION

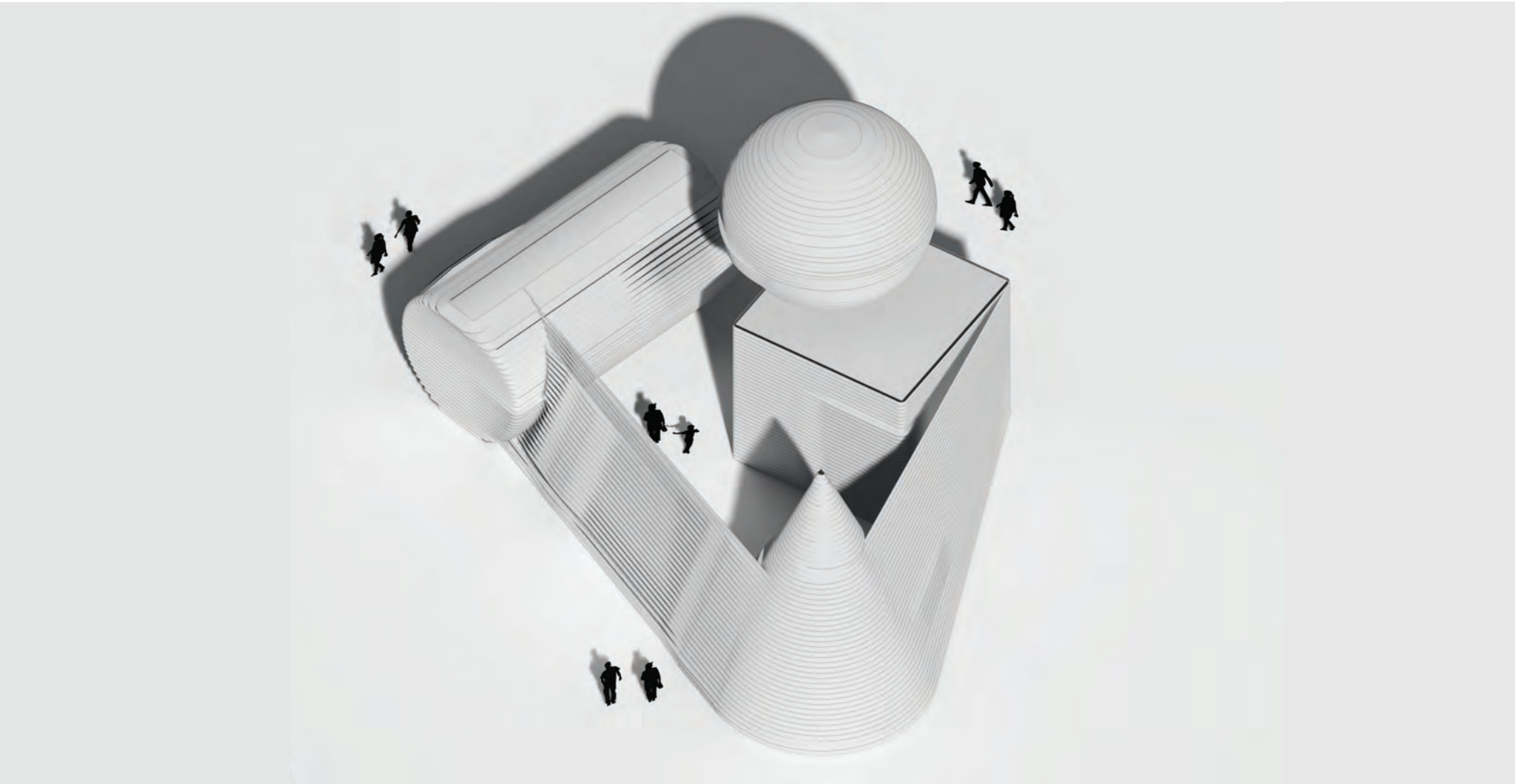


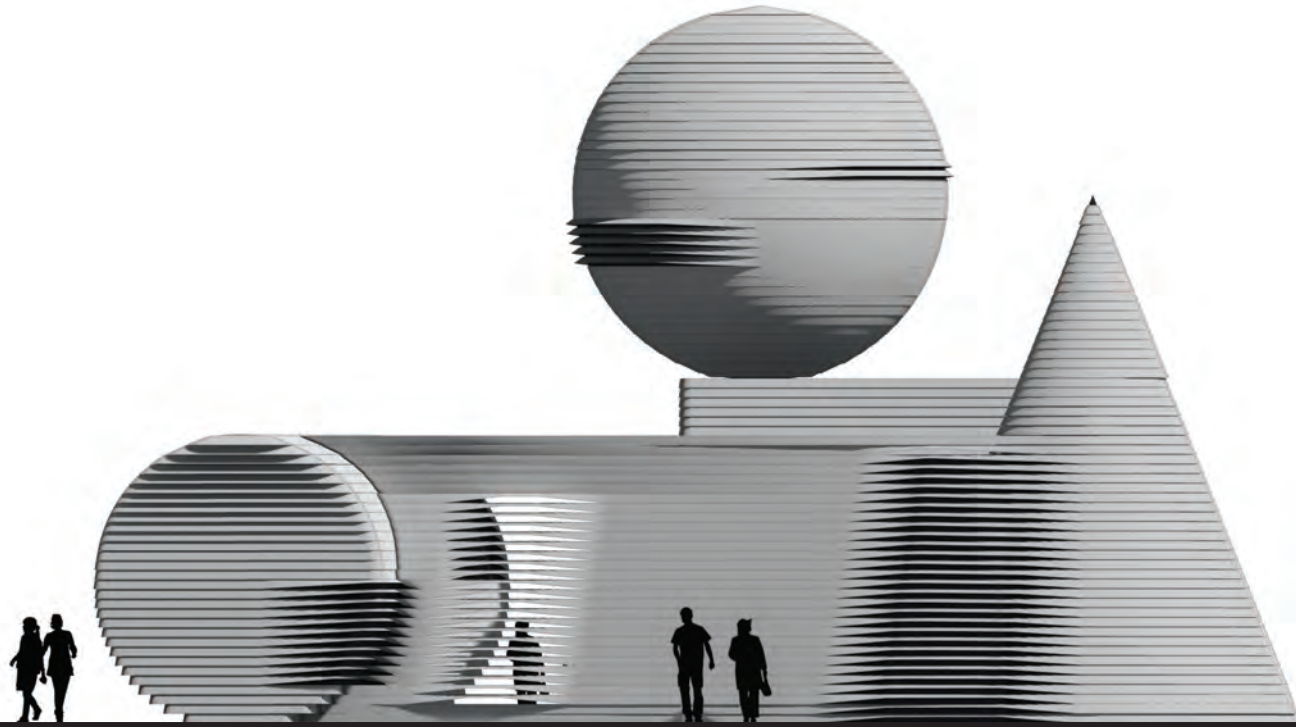
BACK ELEVATION



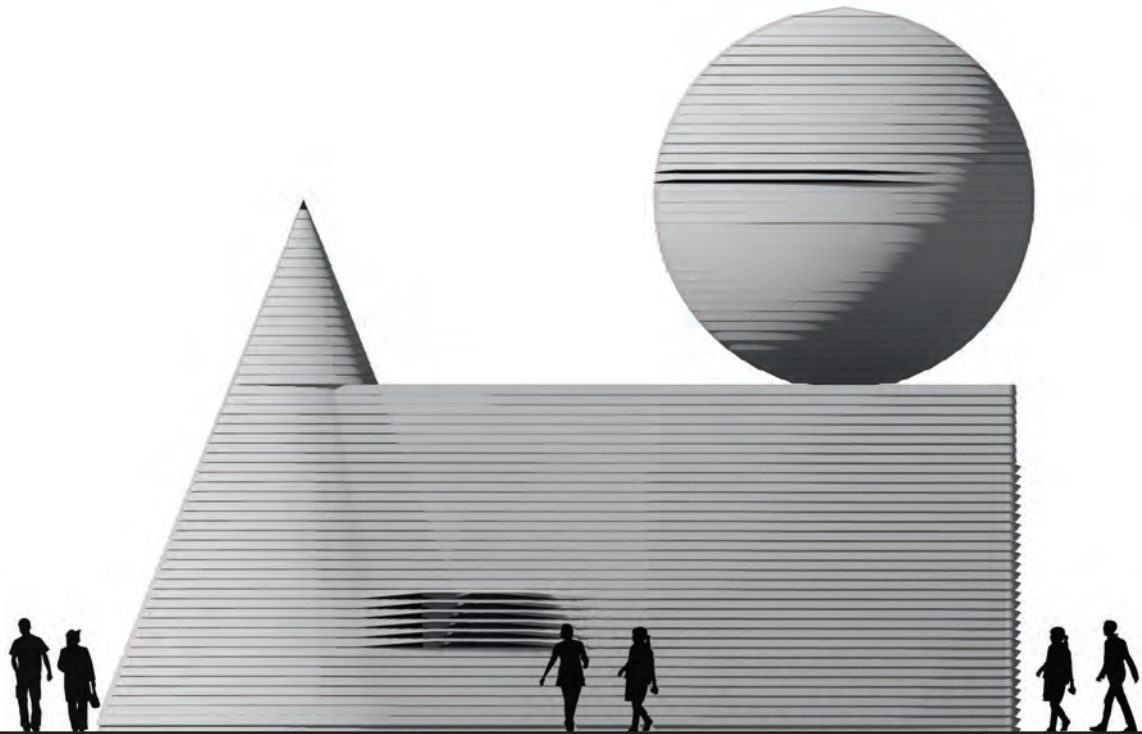
LEFT ELEVATION

ITERATION NO. 14

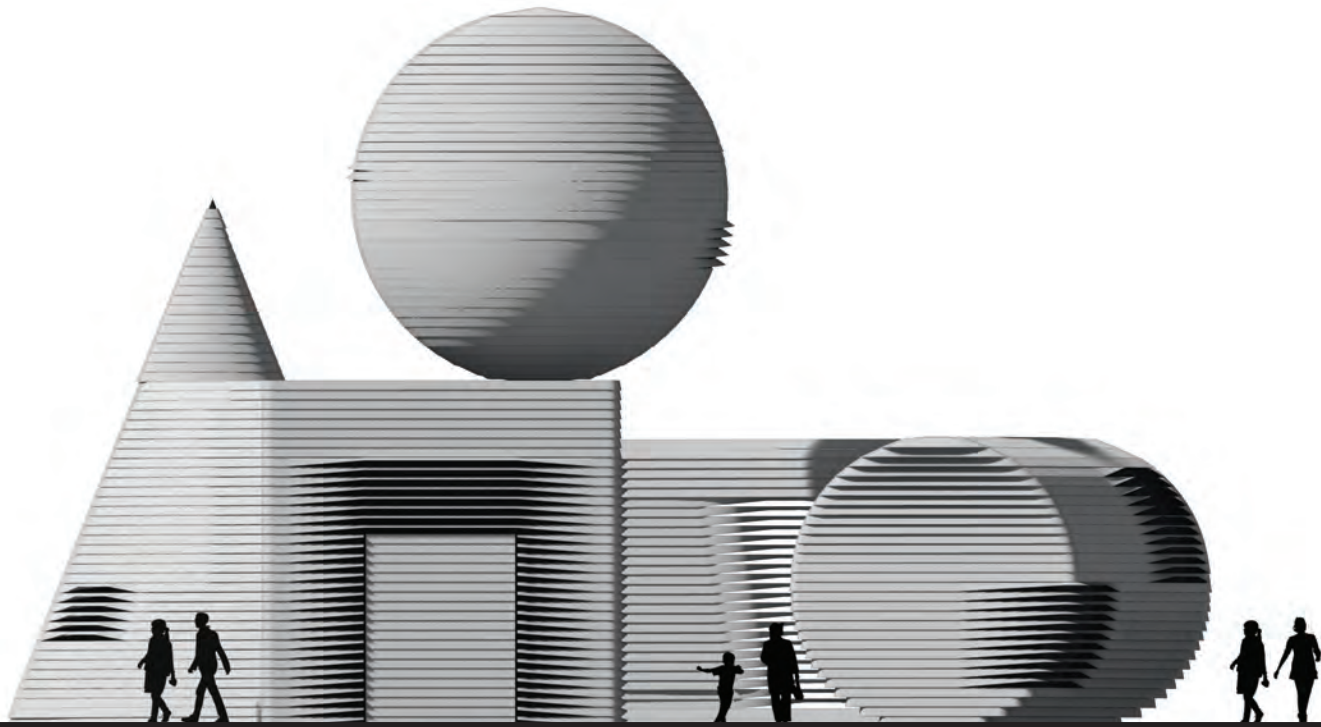




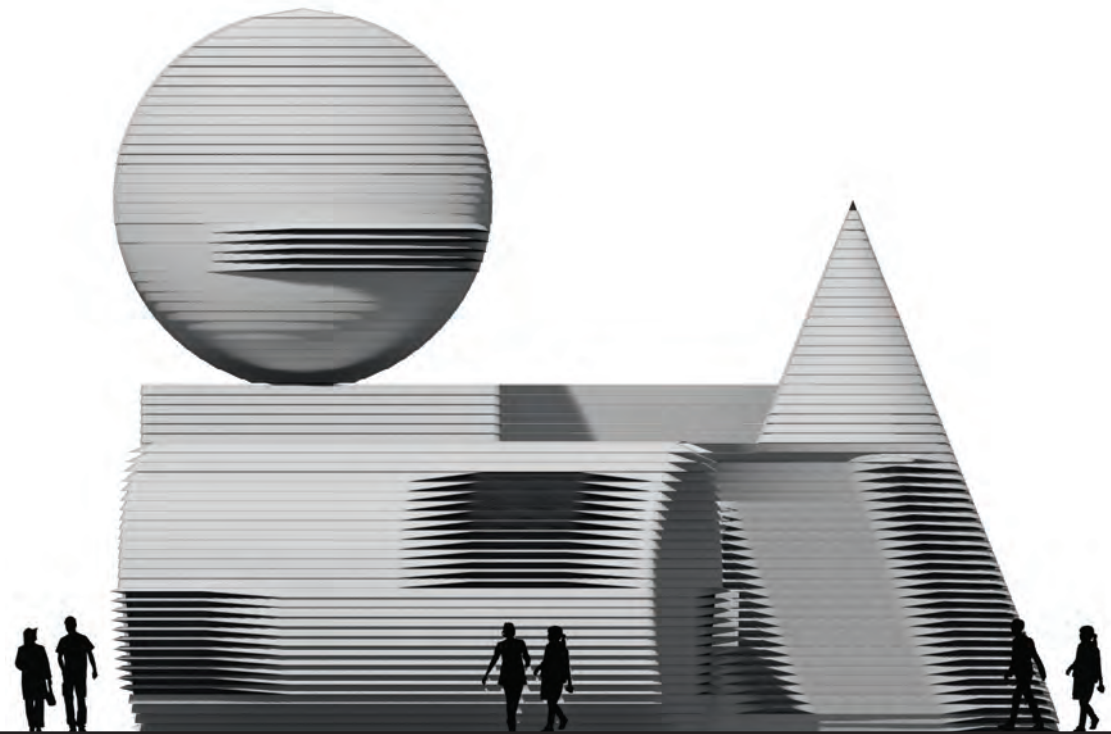
FRONT ELEVATION



RIGHT ELEVATION

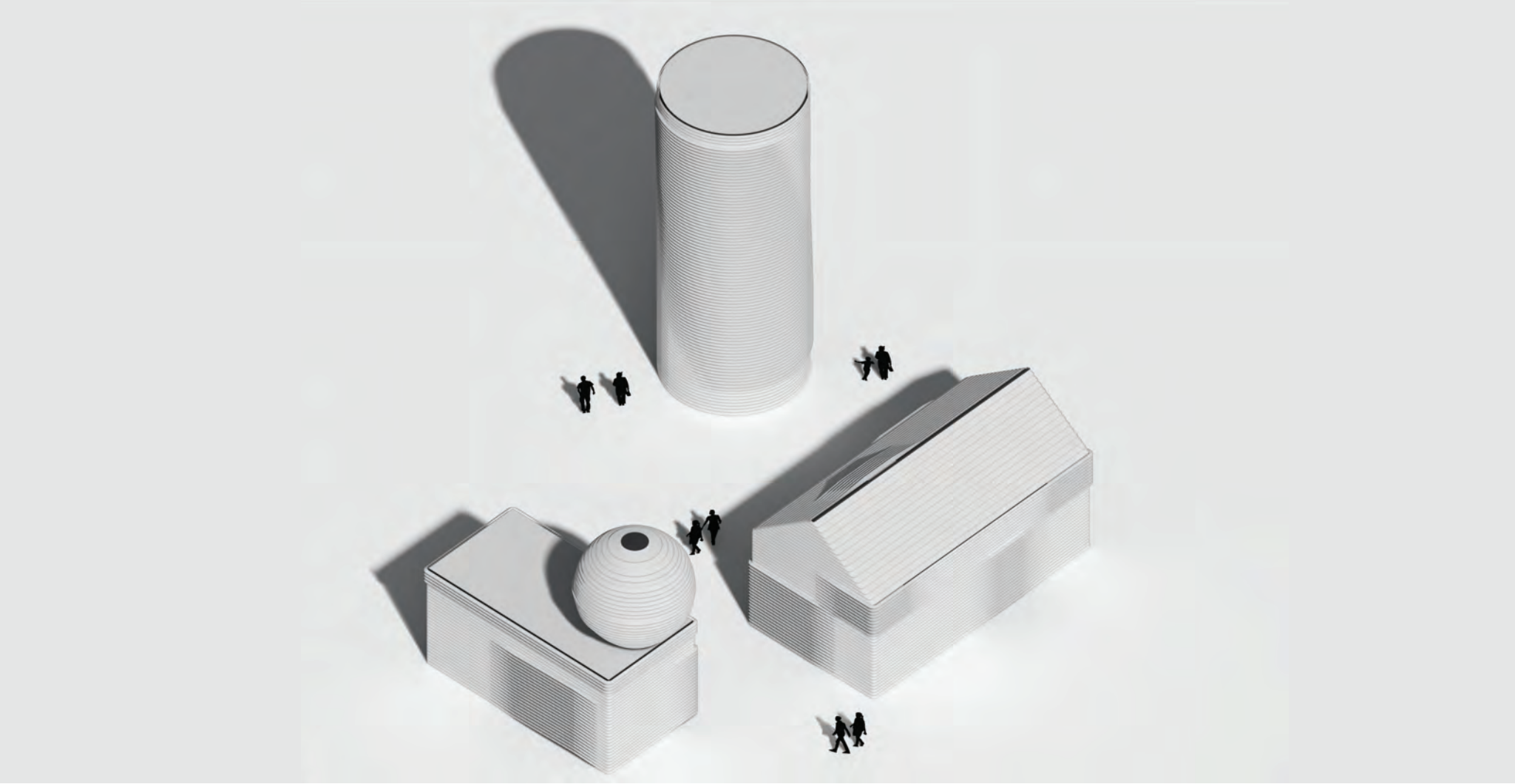


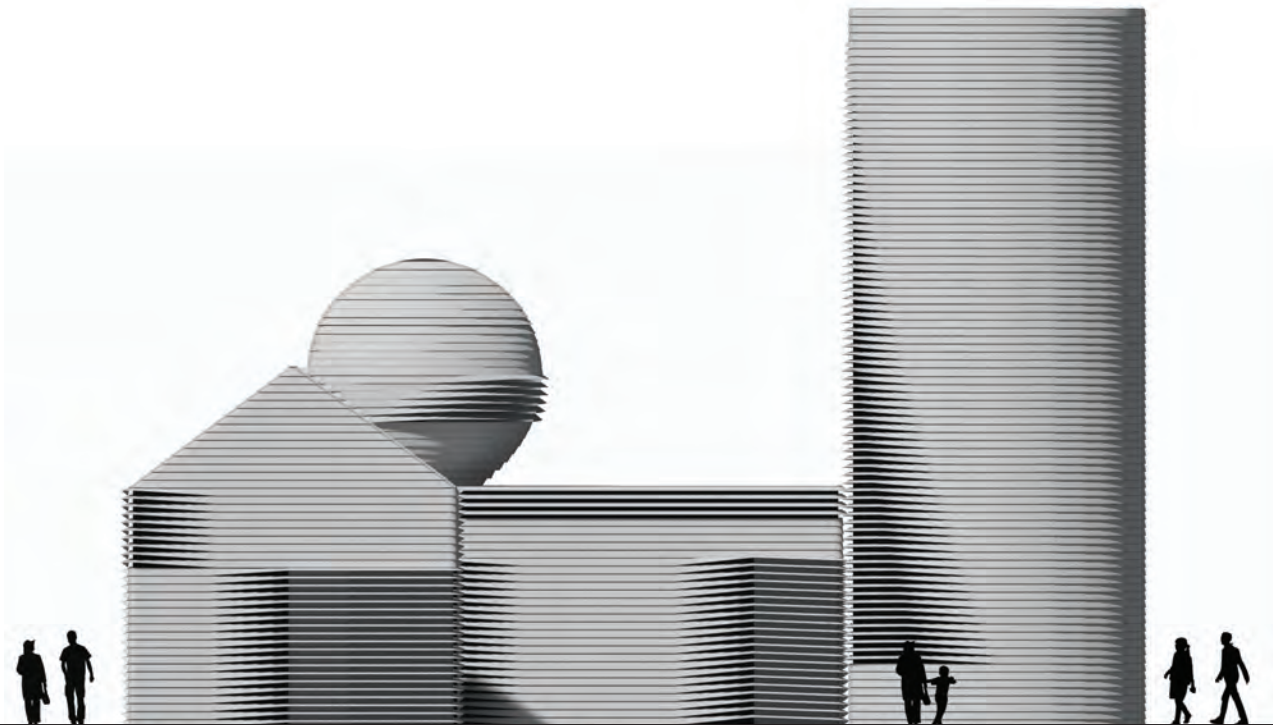
BACK ELEVATION



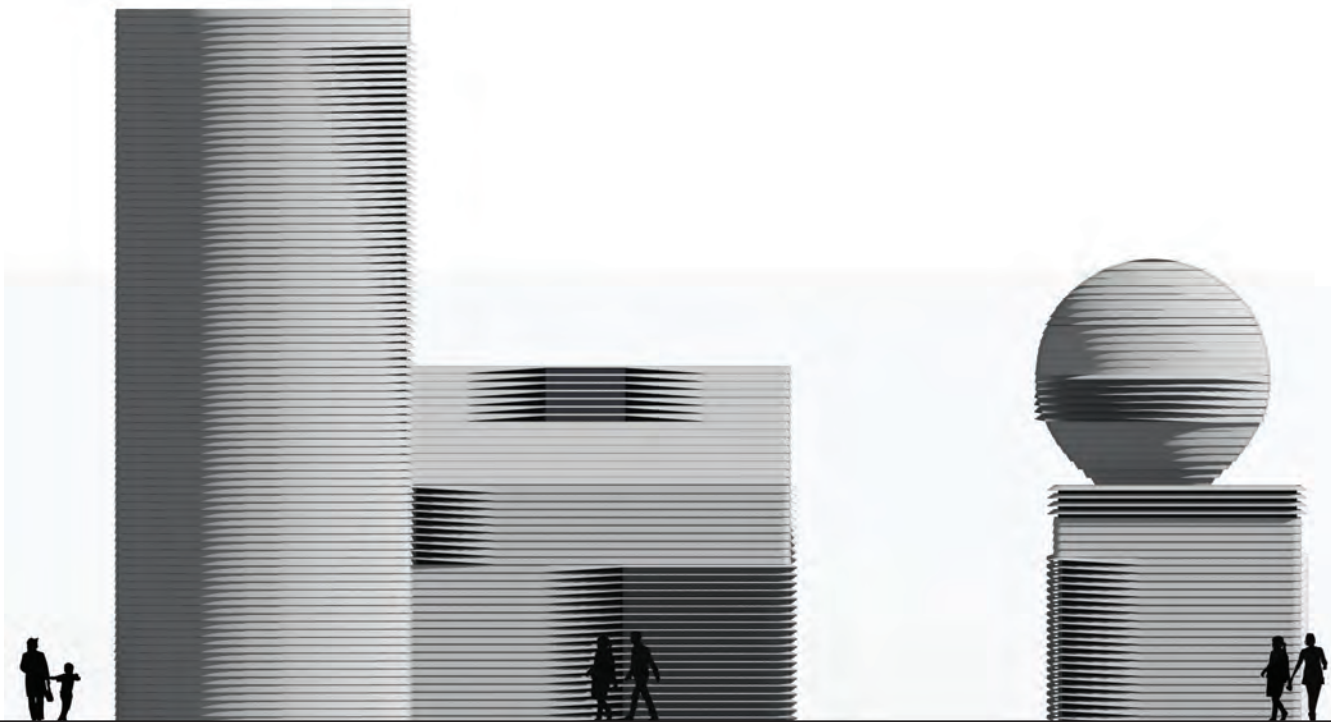
LEFT ELEVATION

ITERATION NO. 15

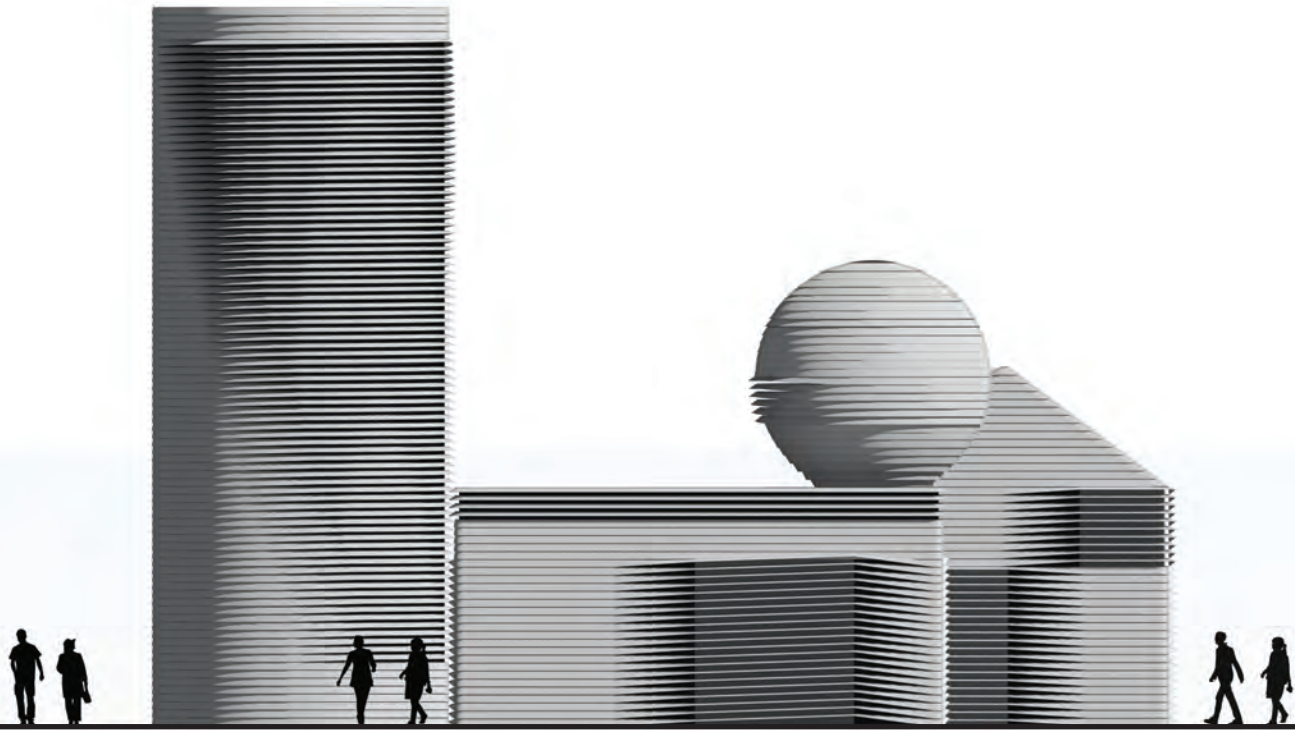




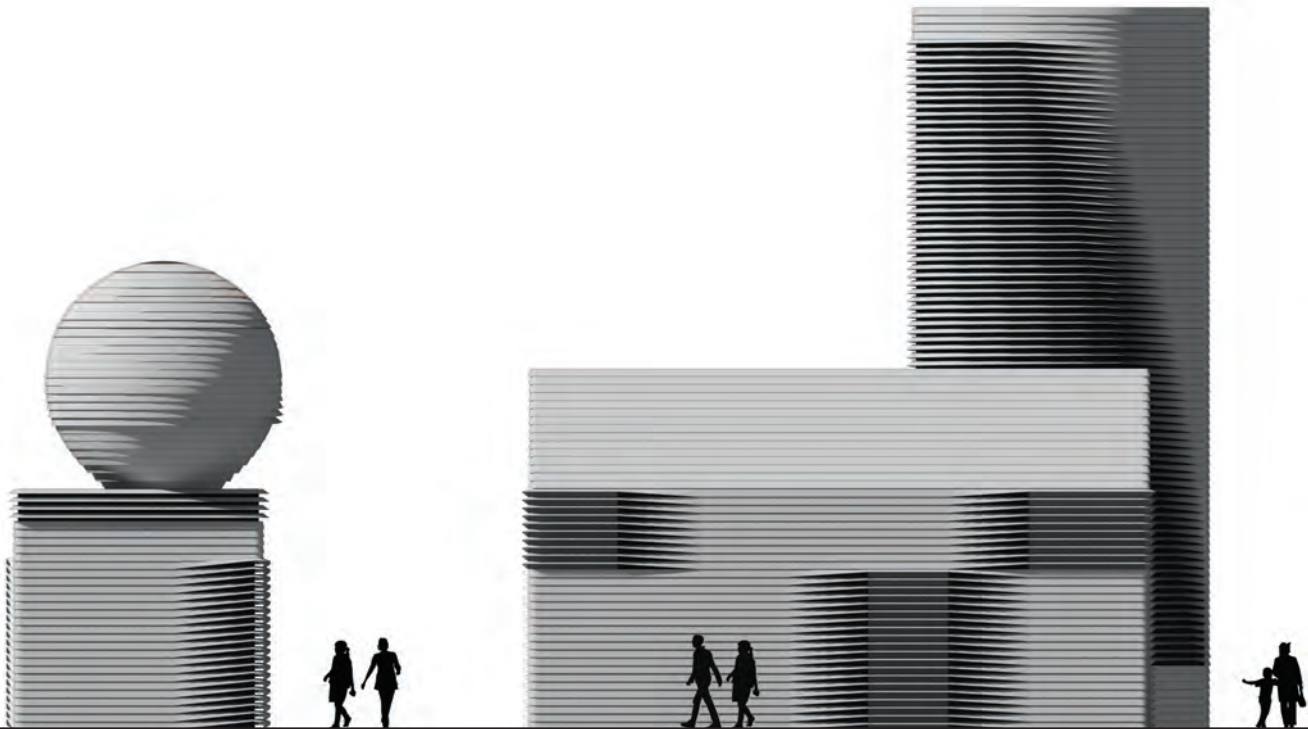
FRONT ELEVATION



RIGHT ELEVATION

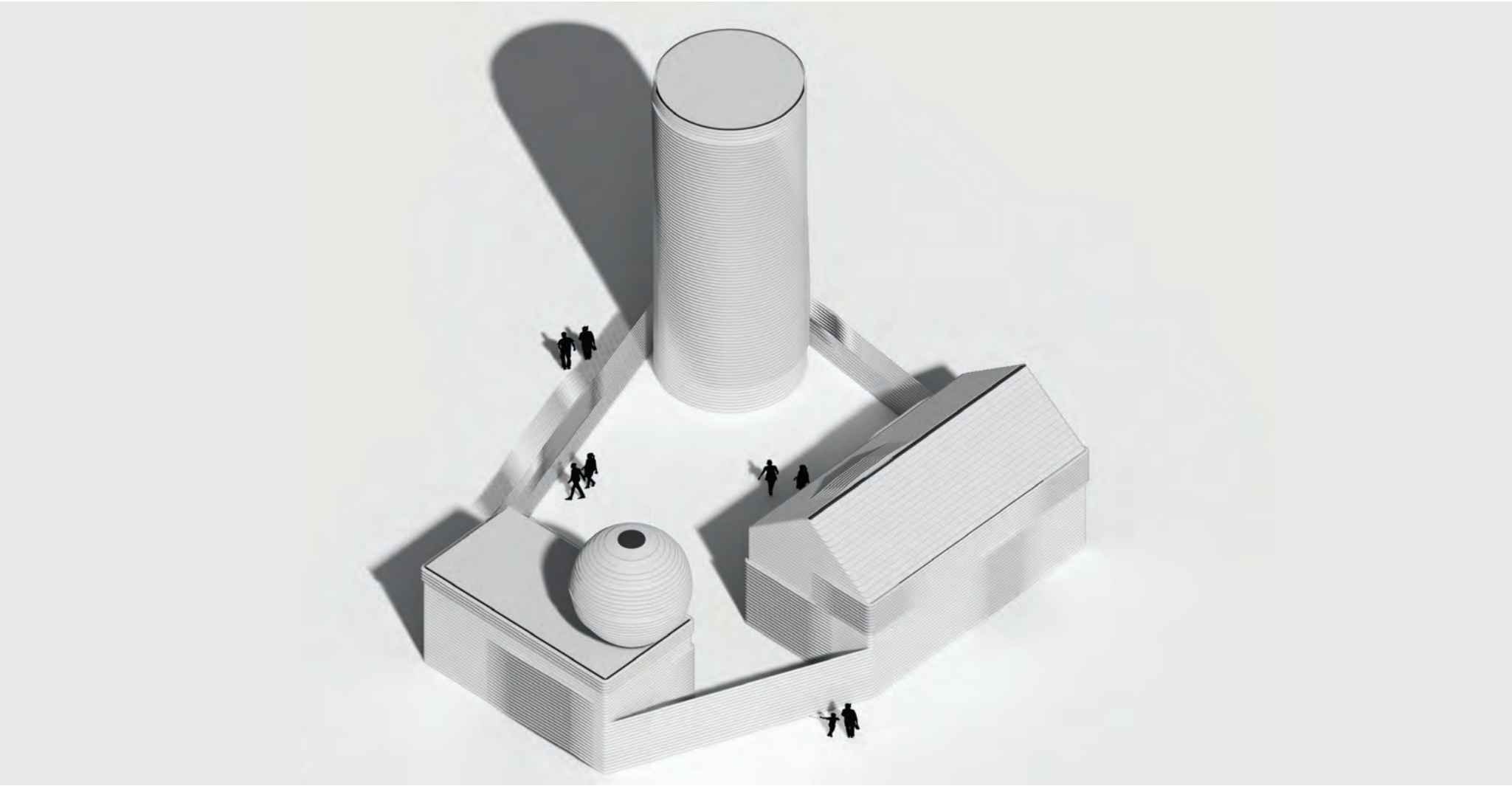


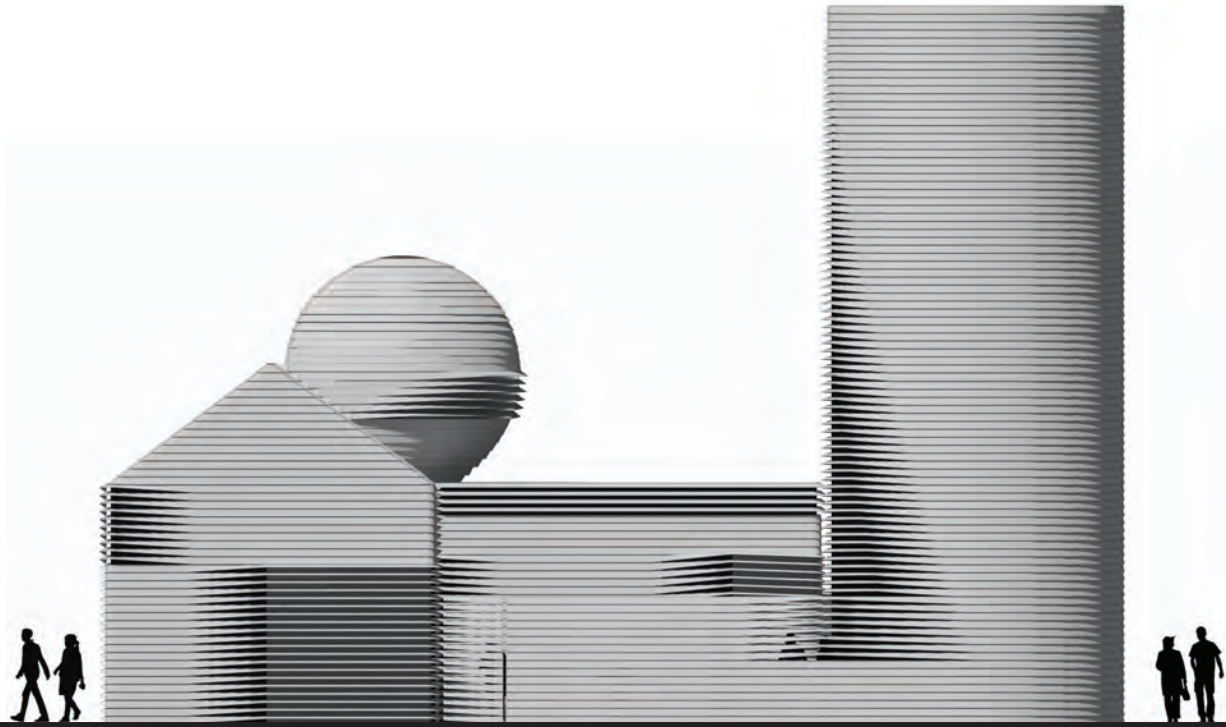
BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 16

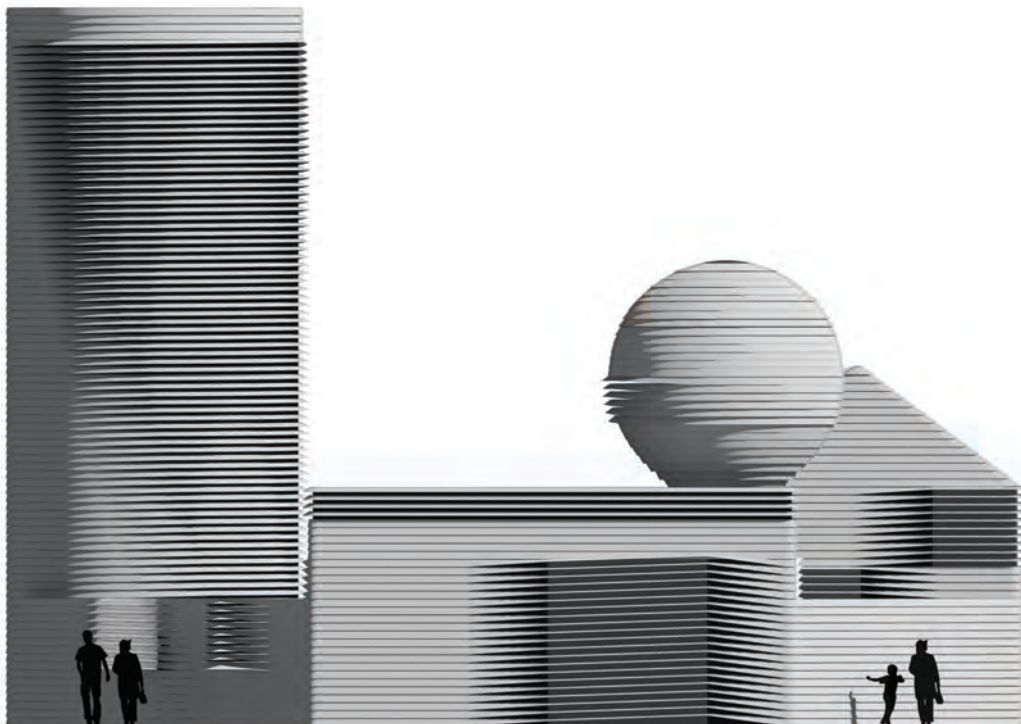




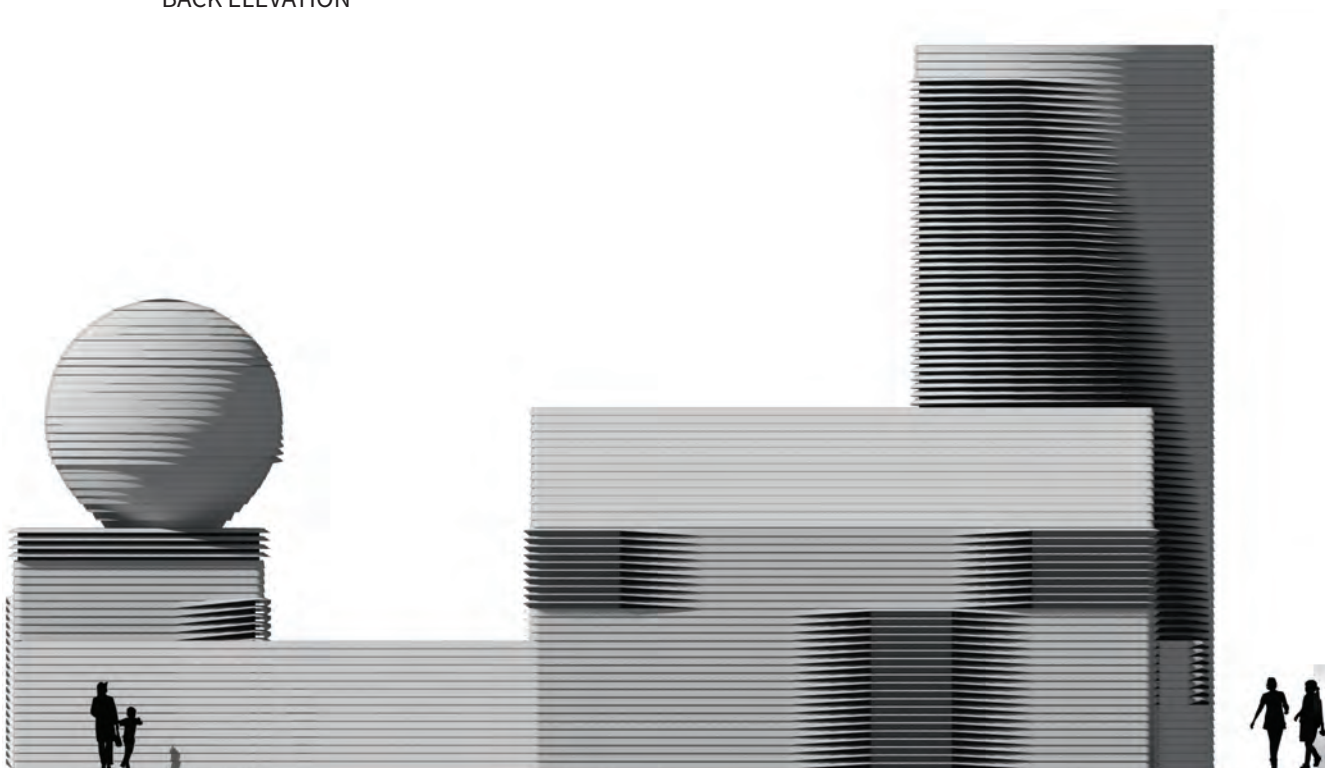
FRONT ELEVATION



RIGHT ELEVATION

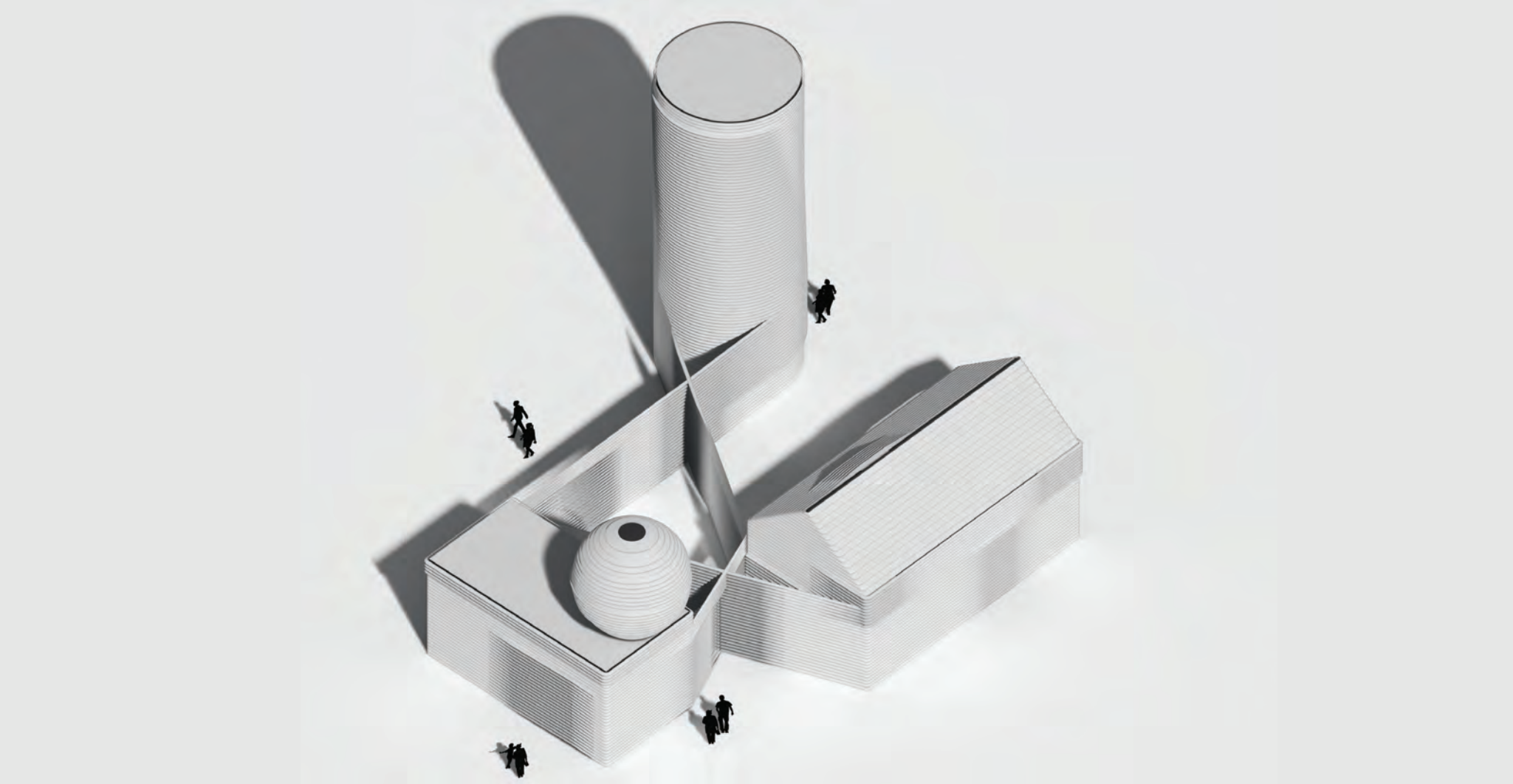


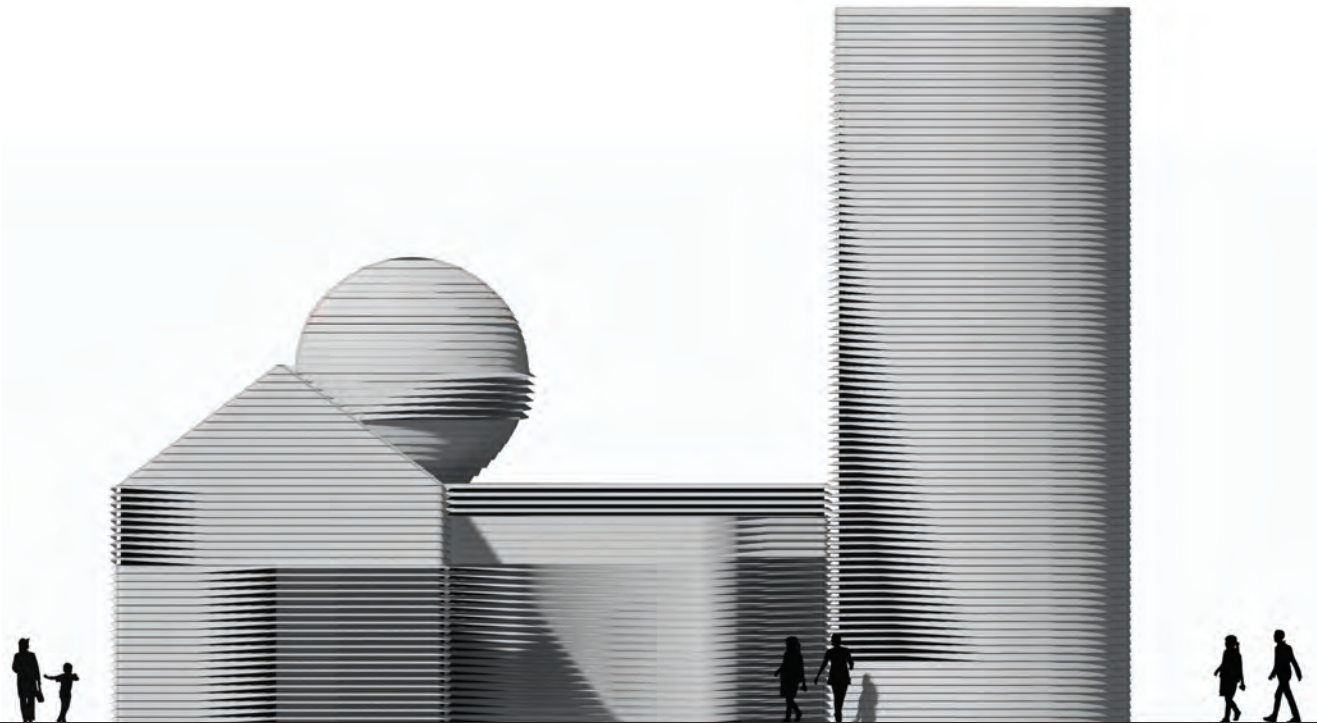
BACK ELEVATION



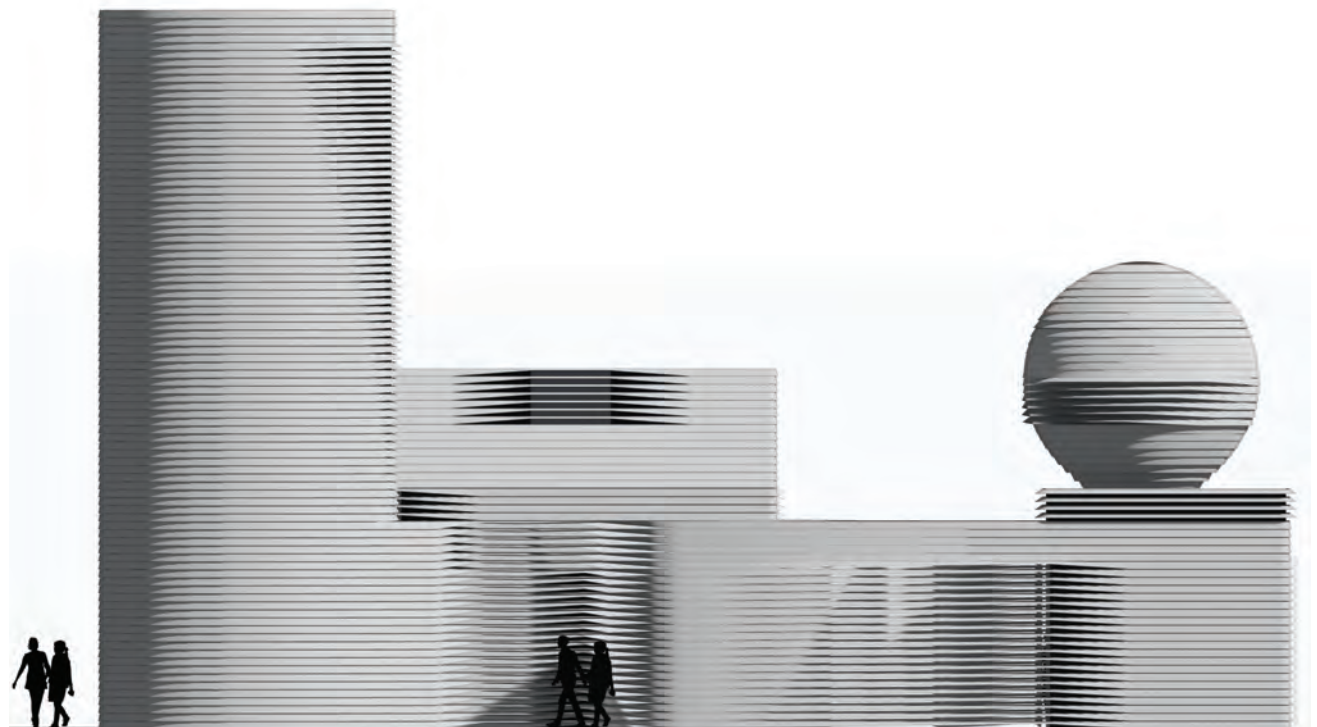
LEFT ELEVATION

ITERATION NO. 17

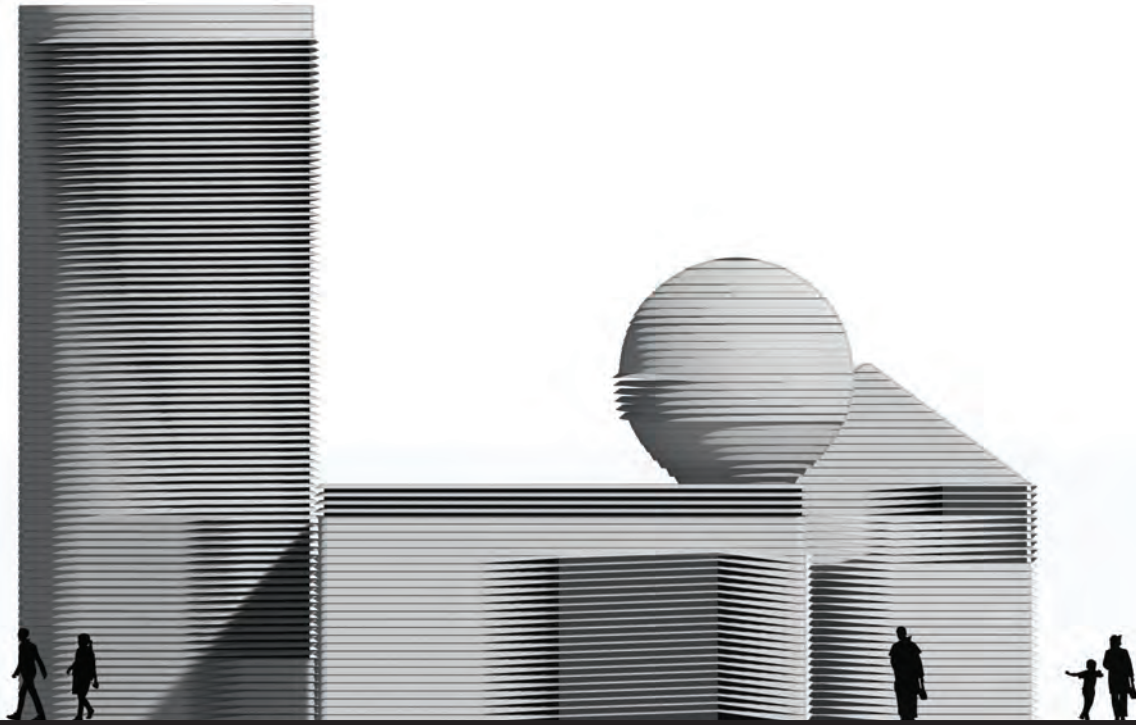




FRONT ELEVATION



RIGHT ELEVATION

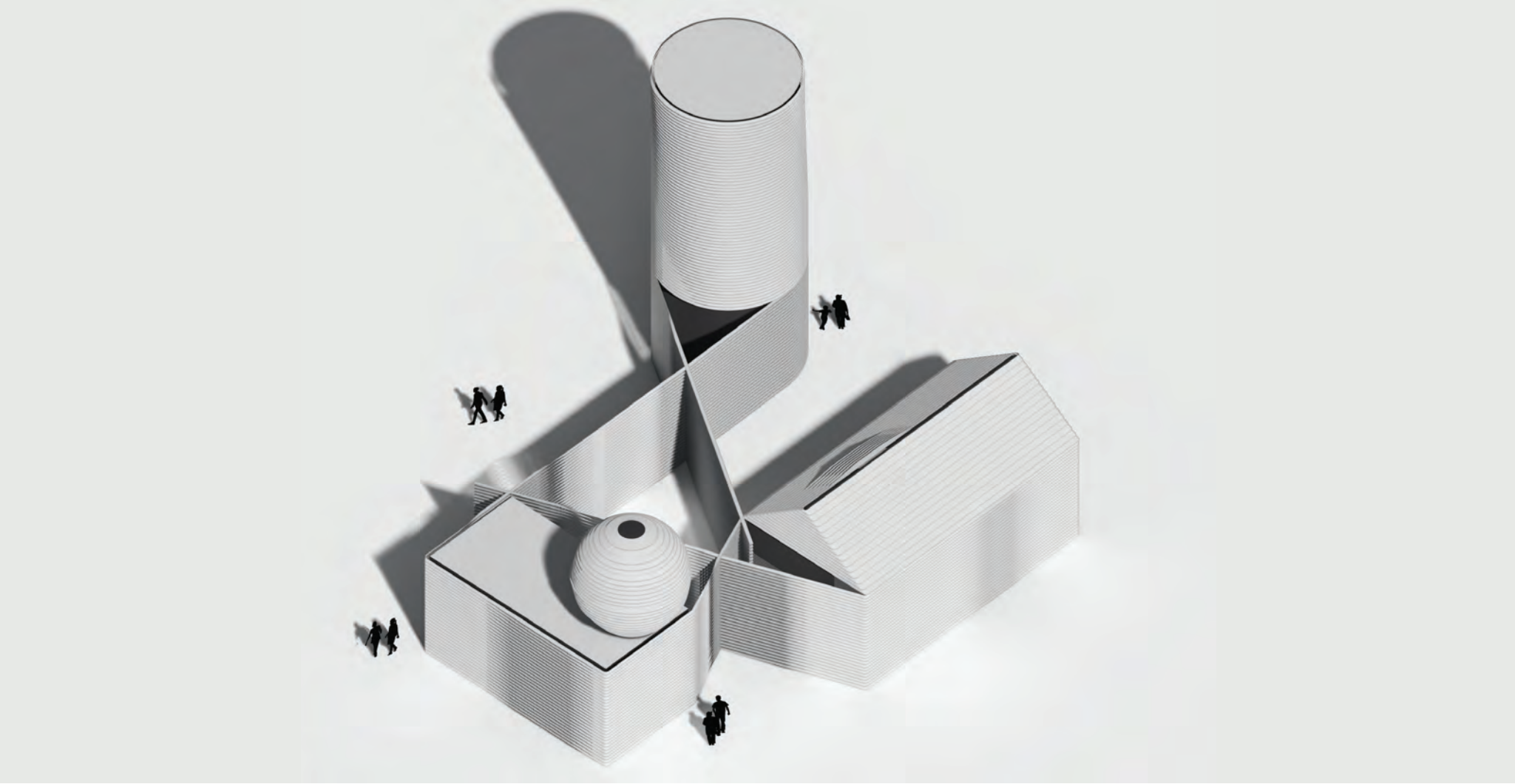


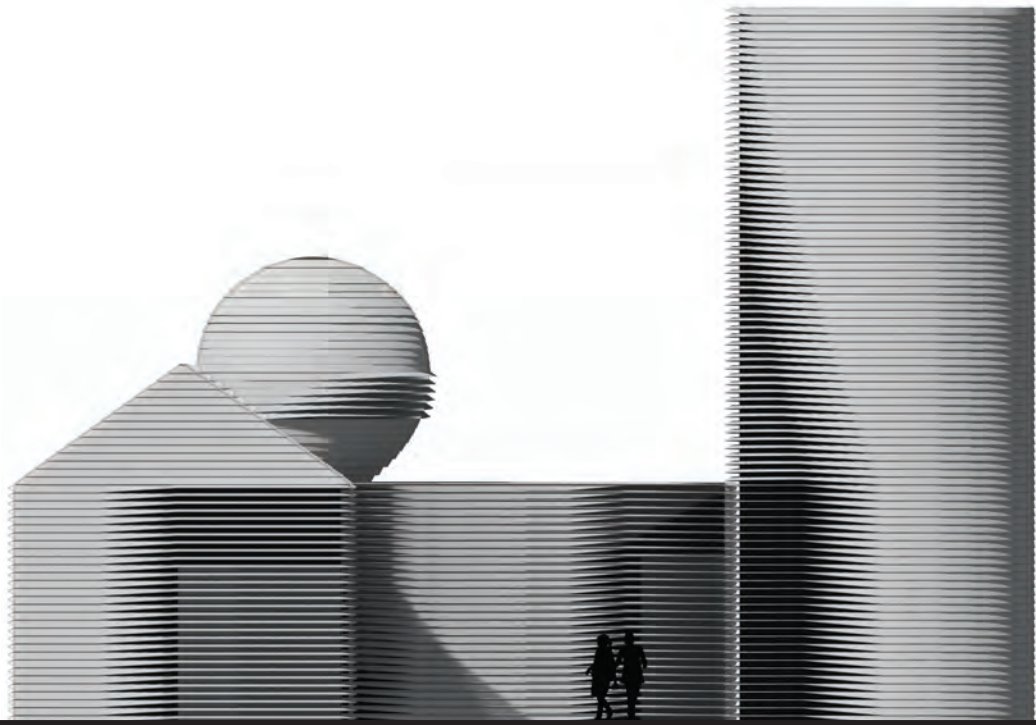
BACK ELEVATION



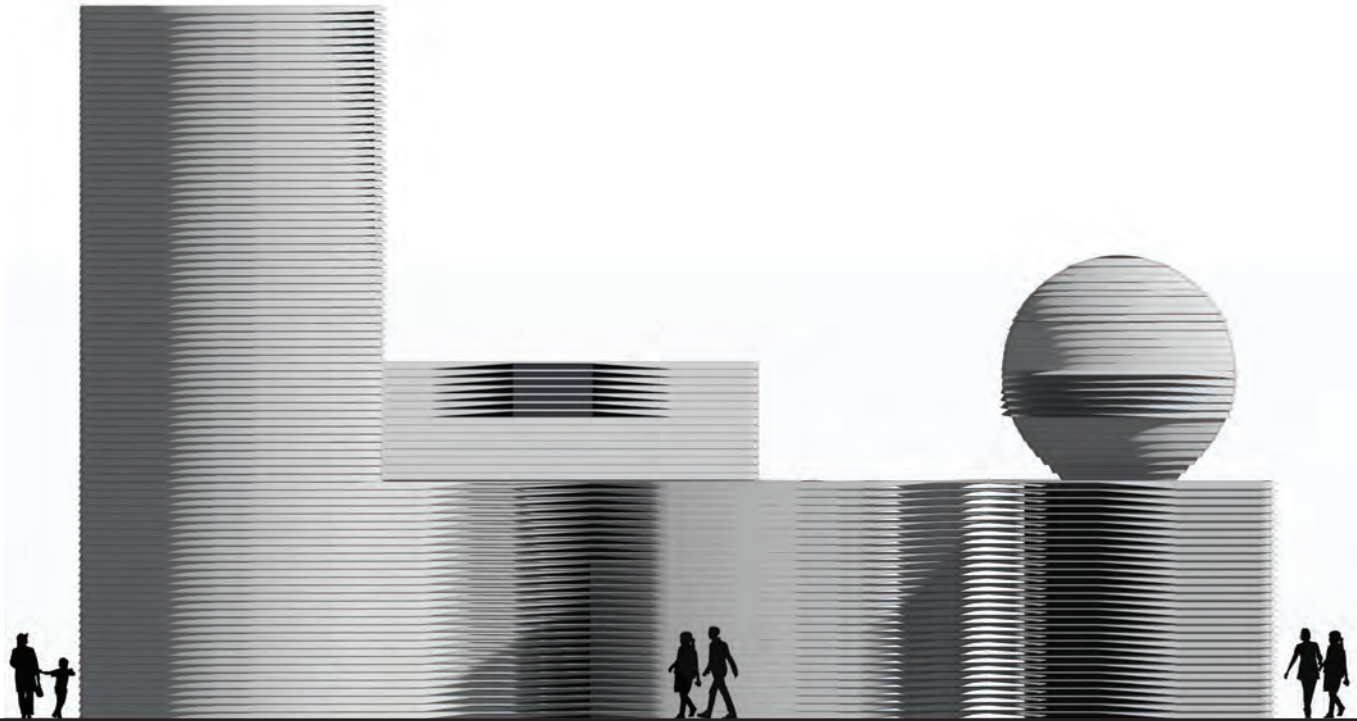
LEFT ELEVATION

ITERATION NO. 18

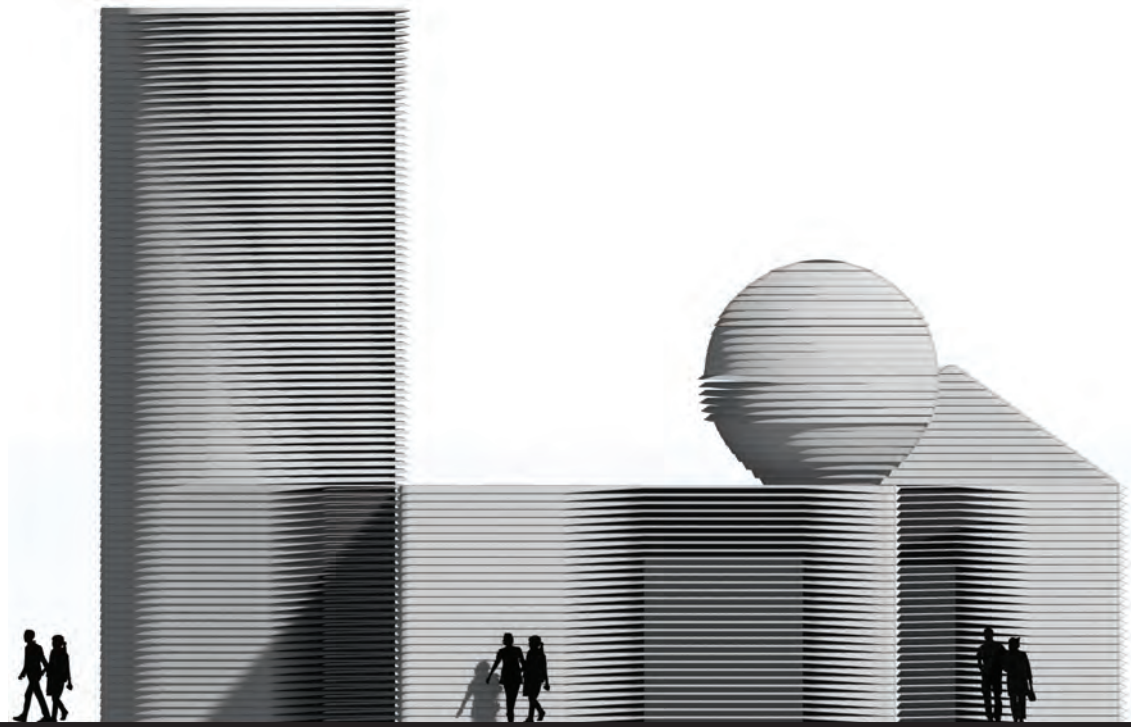




FRONT ELEVATION



RIGHT ELEVATION

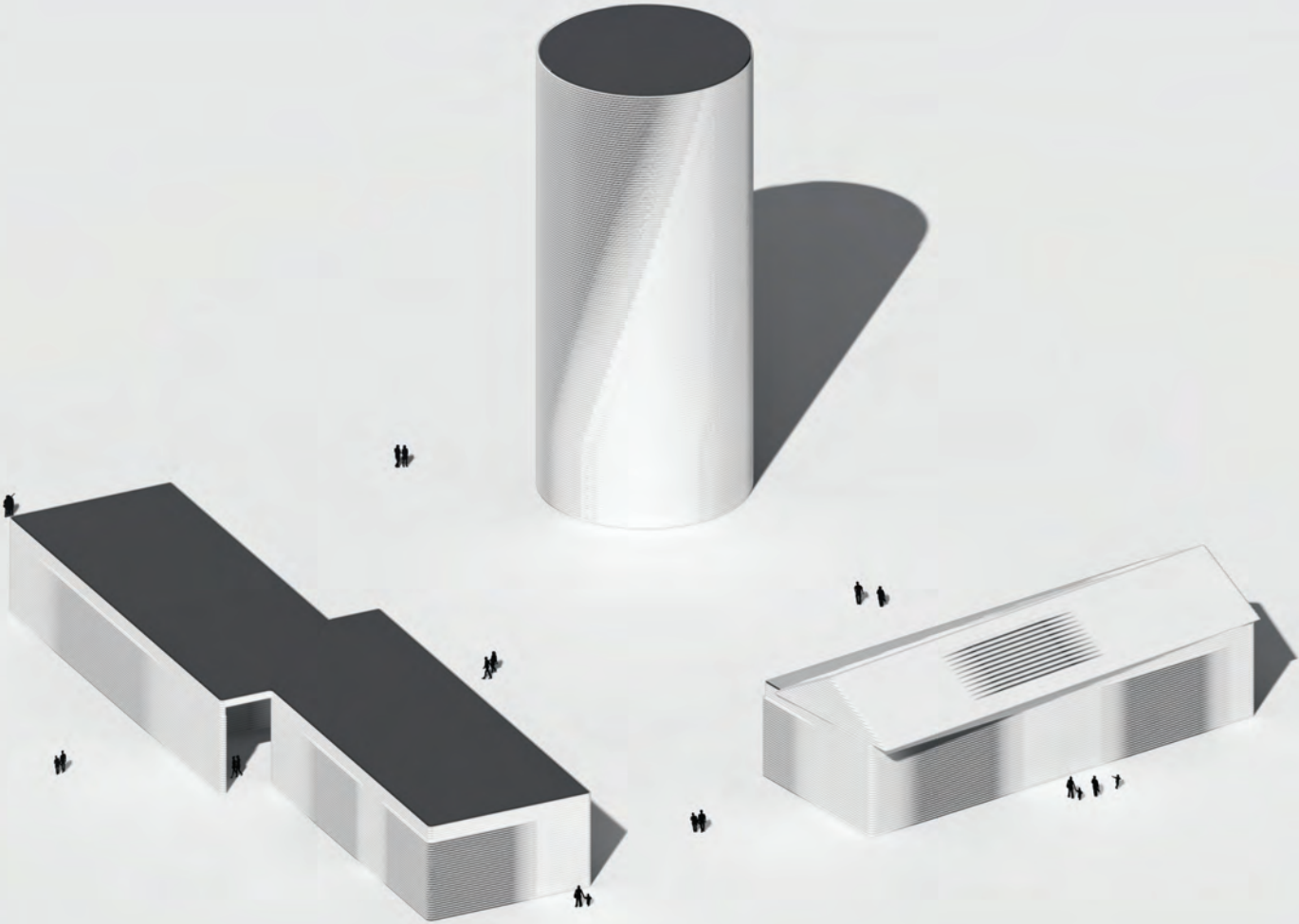


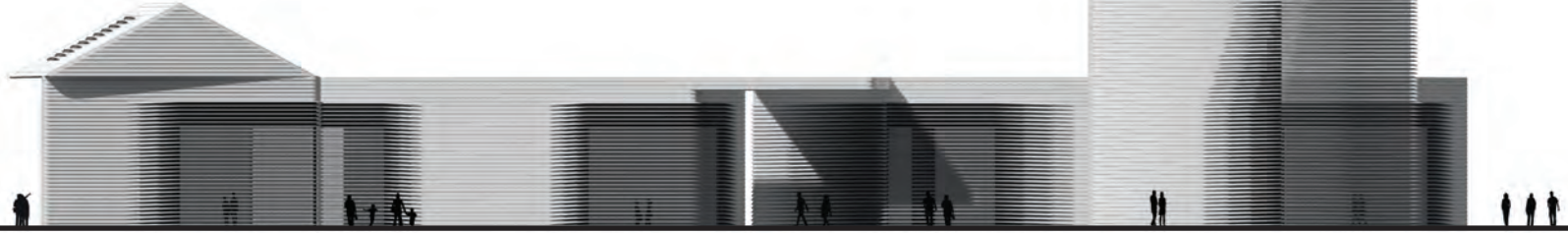
BACK ELEVATION



LEFT ELEVATION

ITERATION NO. 19





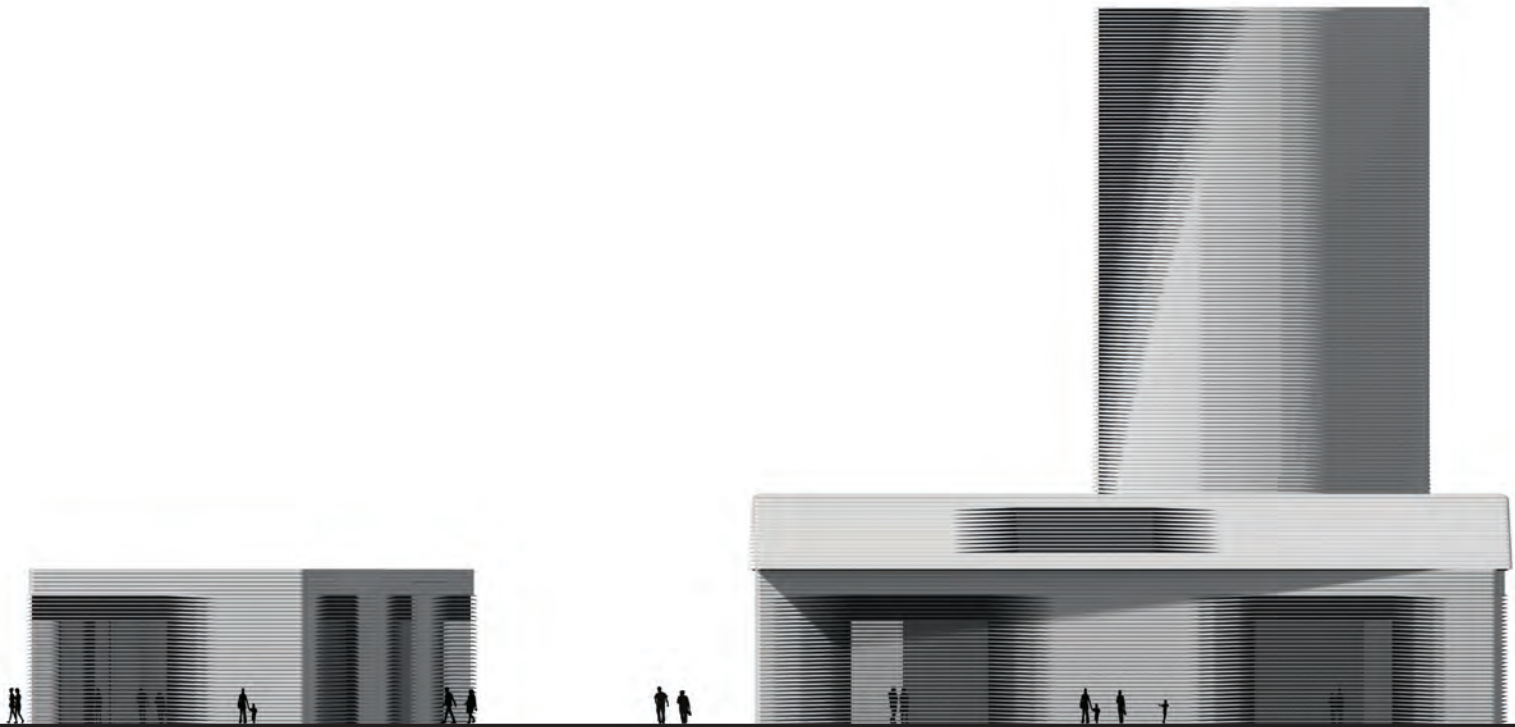
FRONT ELEVATION



RIGHT ELEVATION

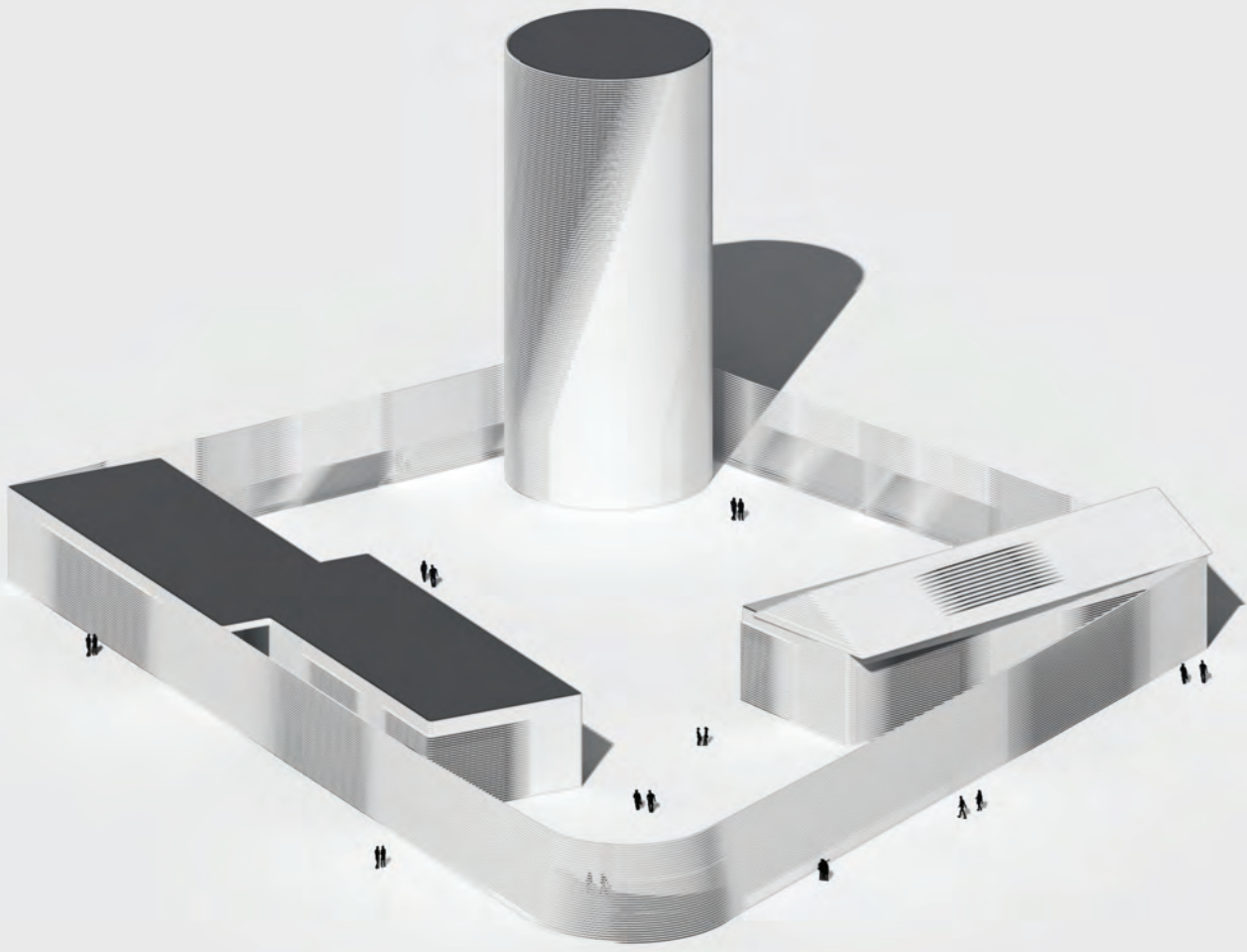


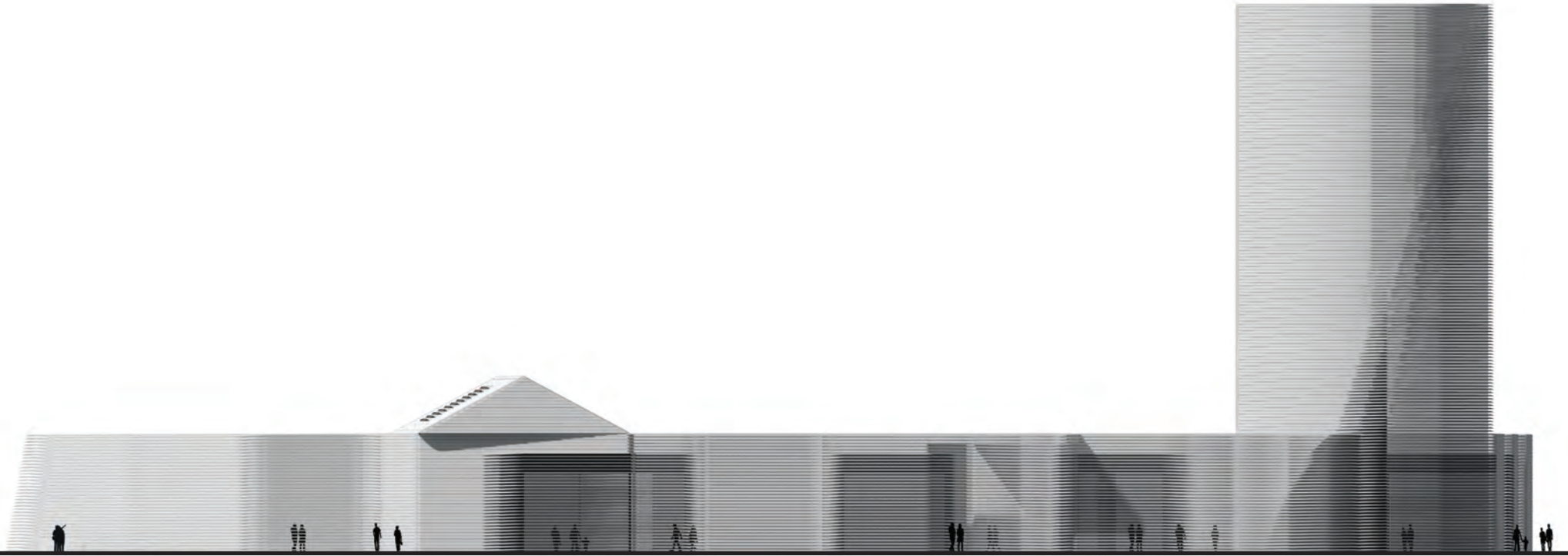
BACK ELEVATION



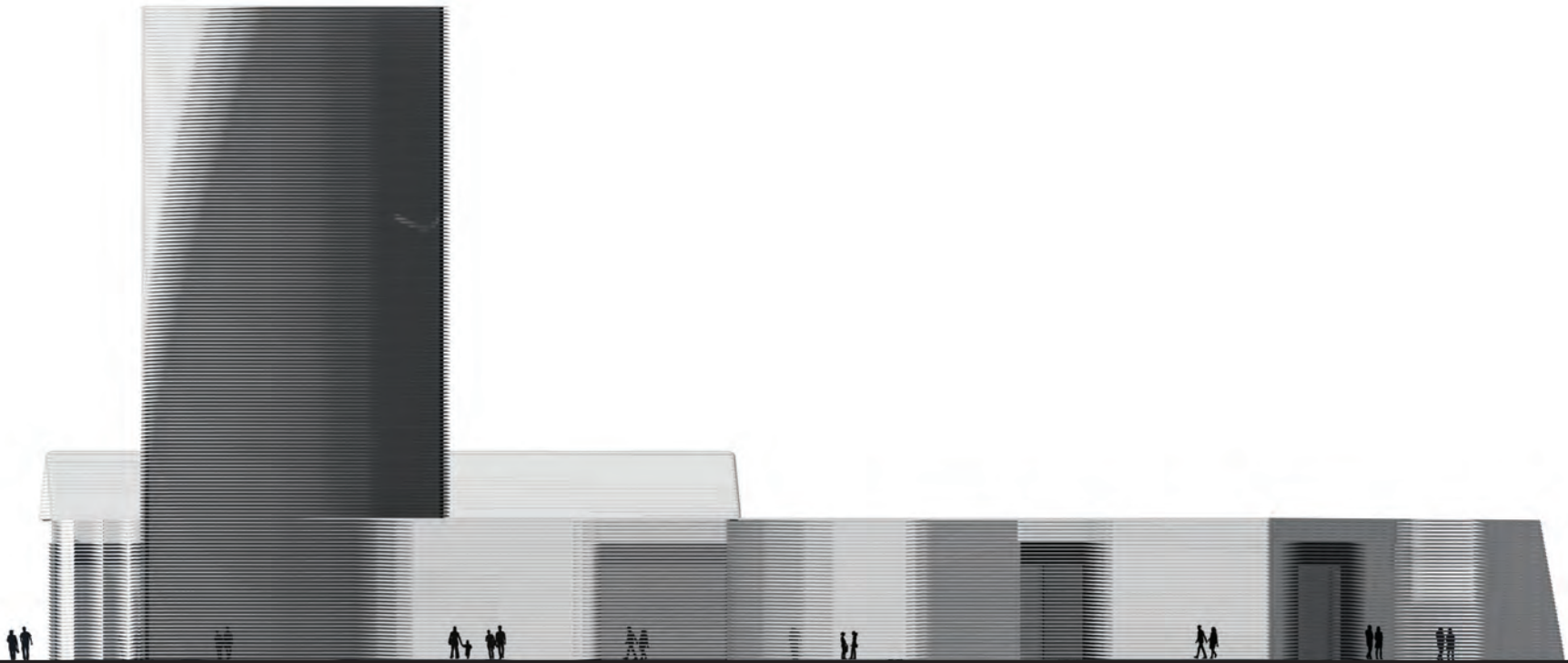
LEFT ELEVATION

ITERATION NO. 20





FRONT ELEVATION



RIGHT ELEVATION



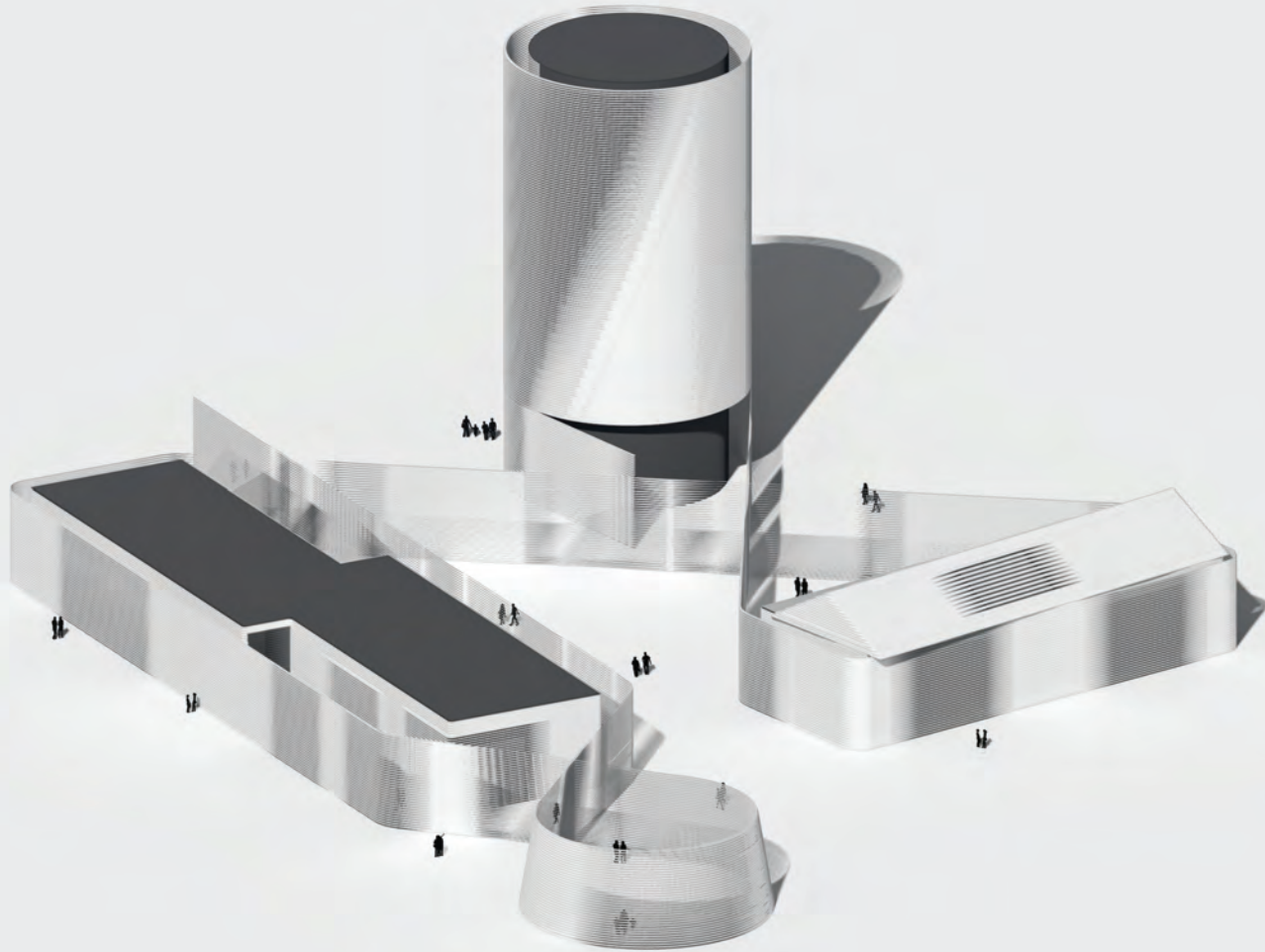
BACK ELEVATION

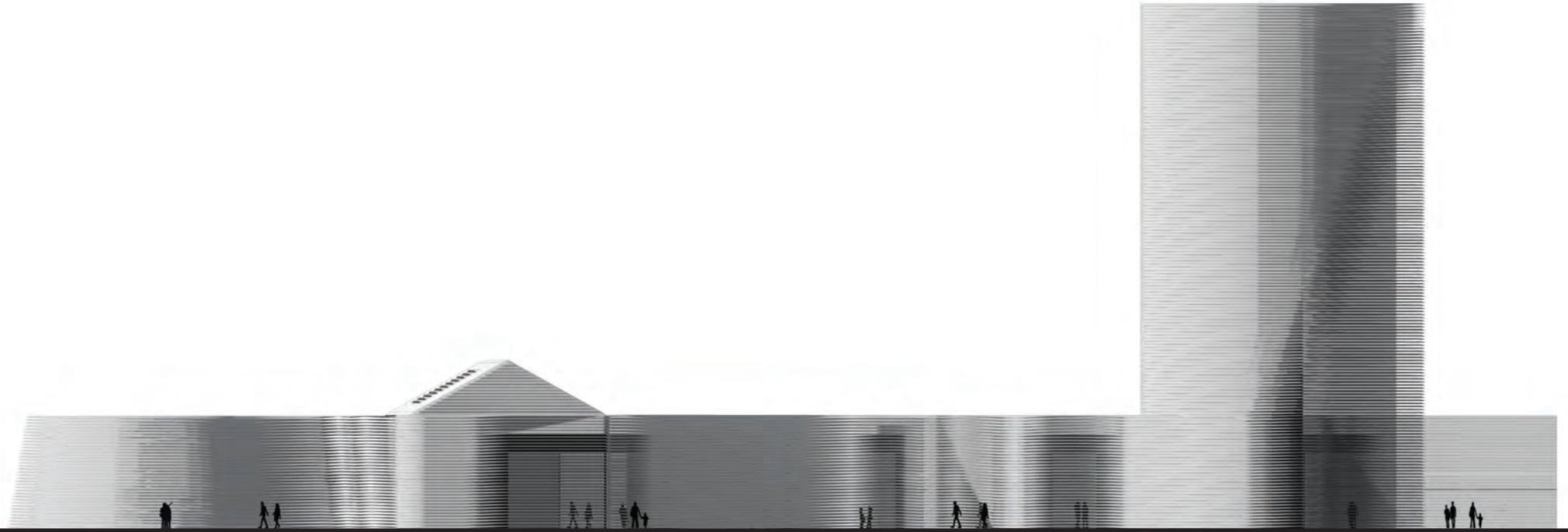


LEFT ELEVATION



ITERATION NO. 21

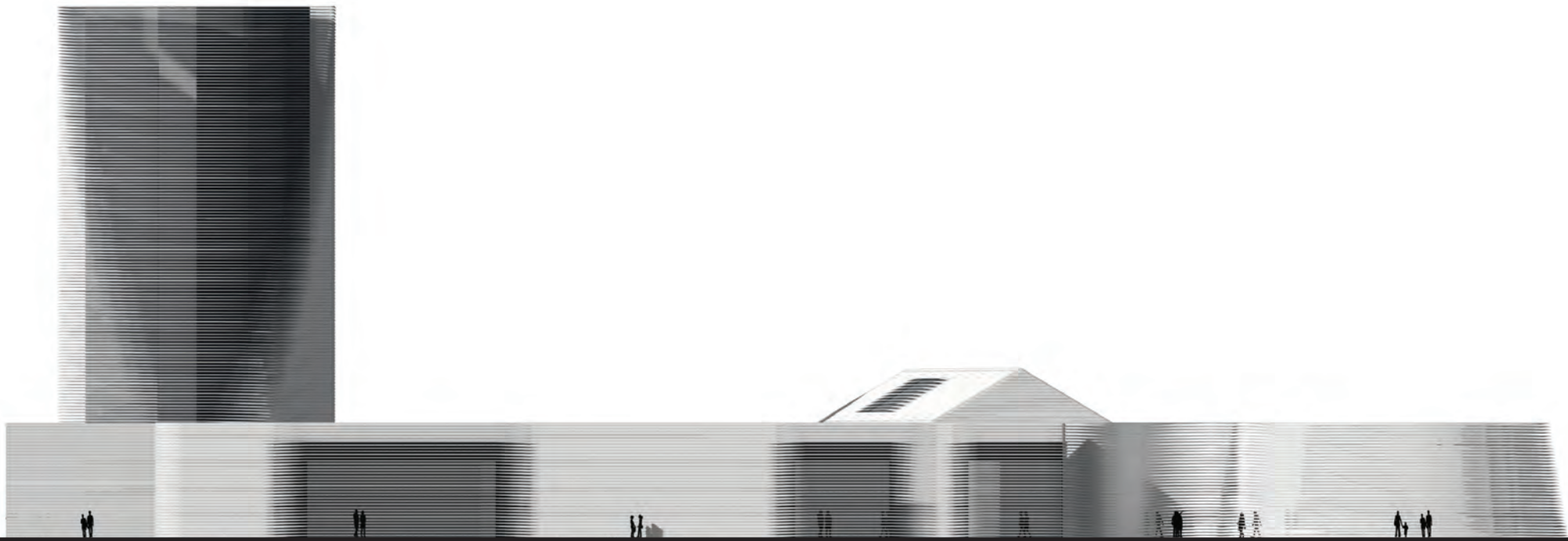




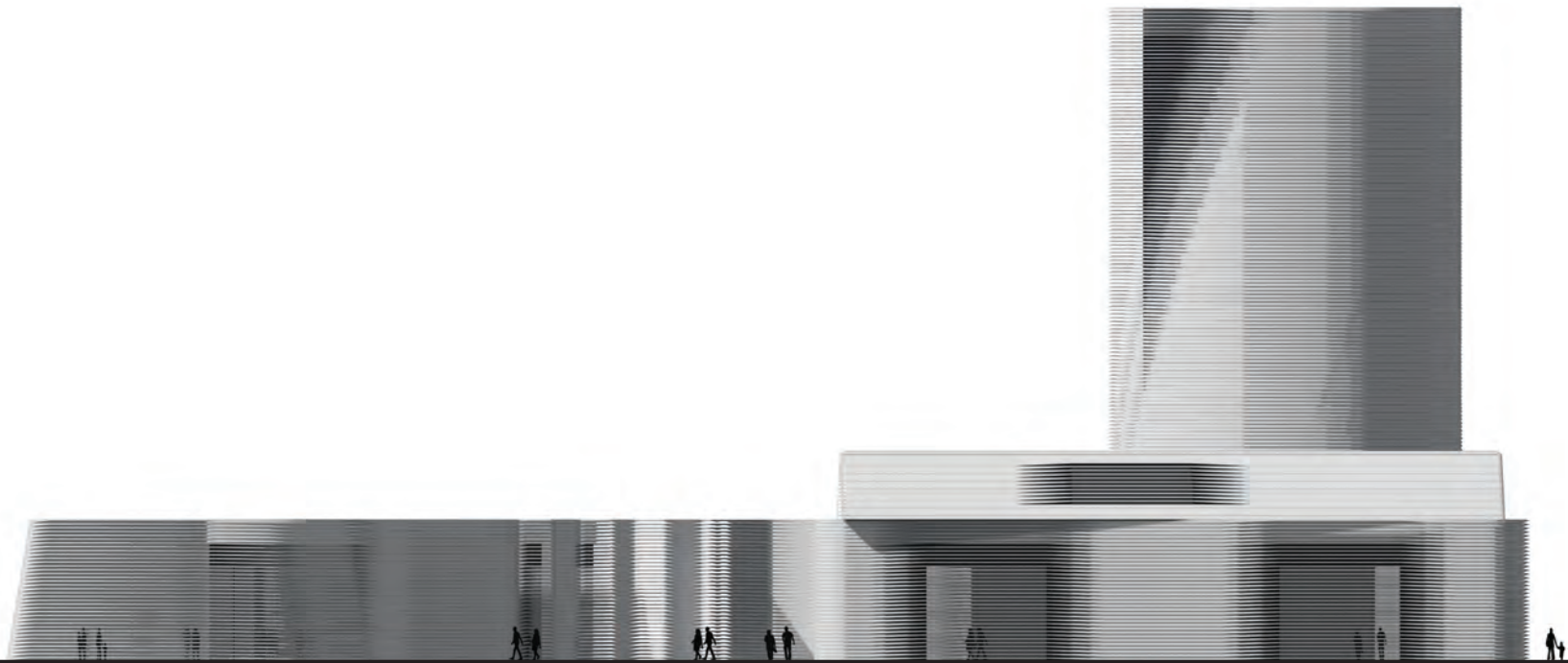
FRONT ELEVATION



RIGHT ELEVATION

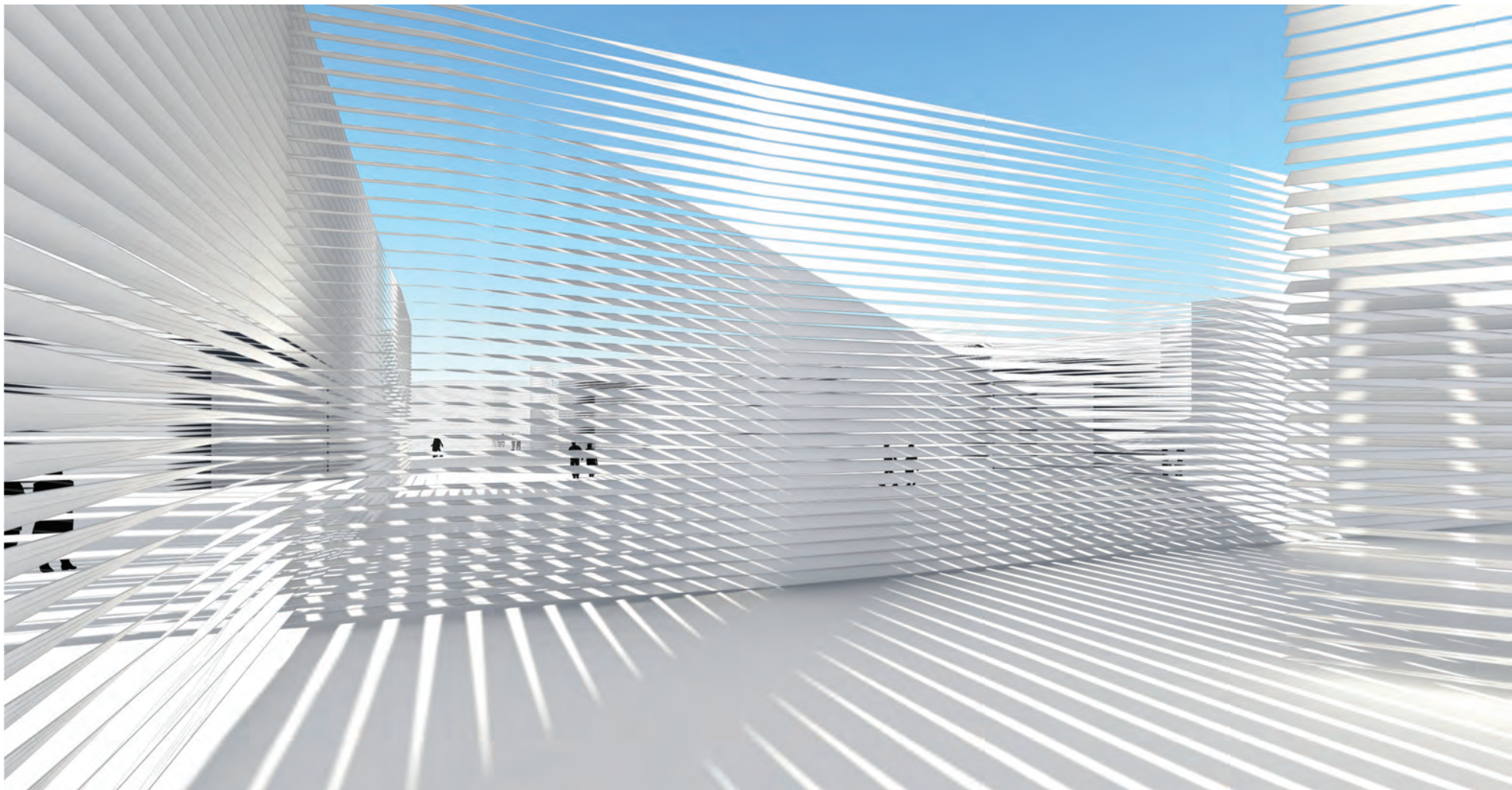


BACK ELEVATION

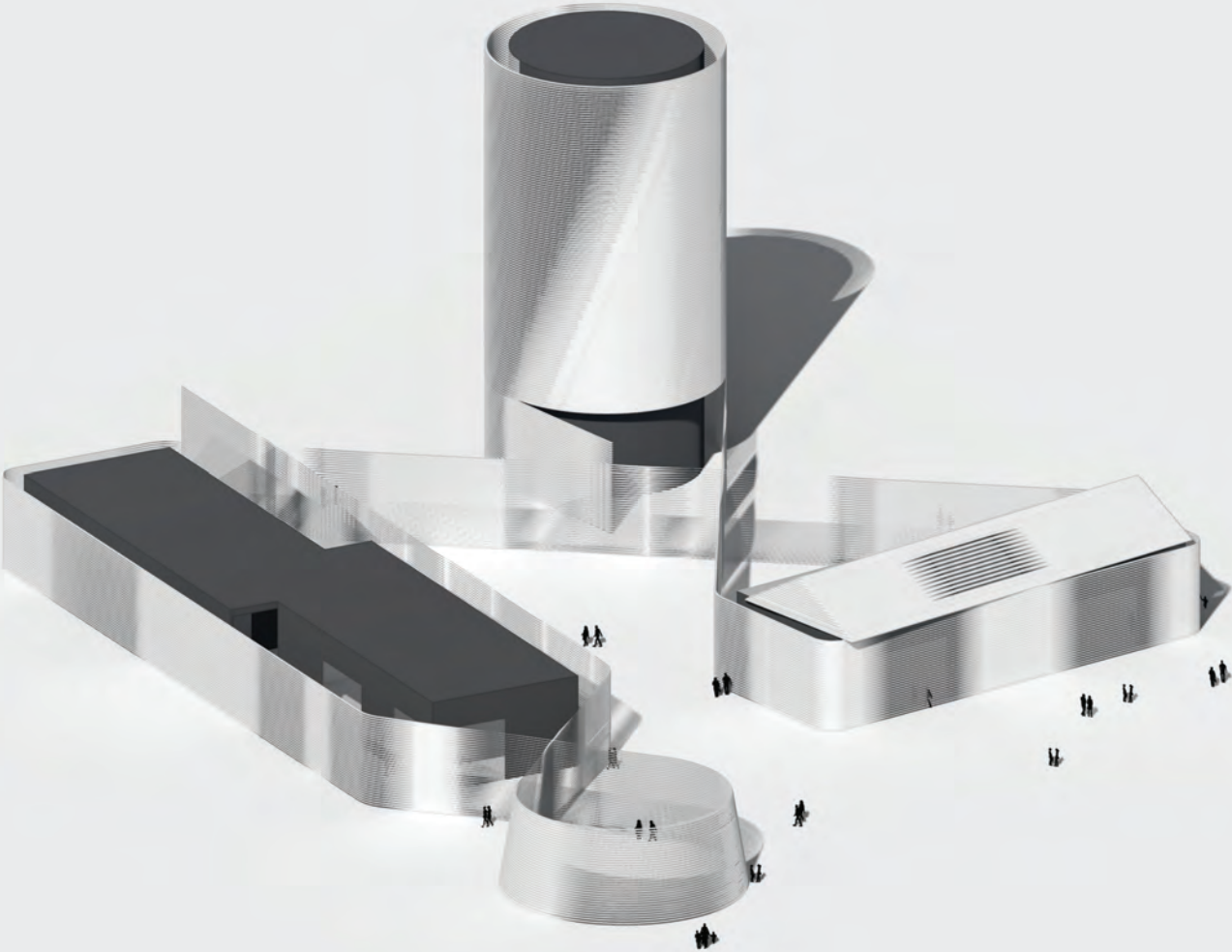


LEFT ELEVATION





ITERATION NO. 22

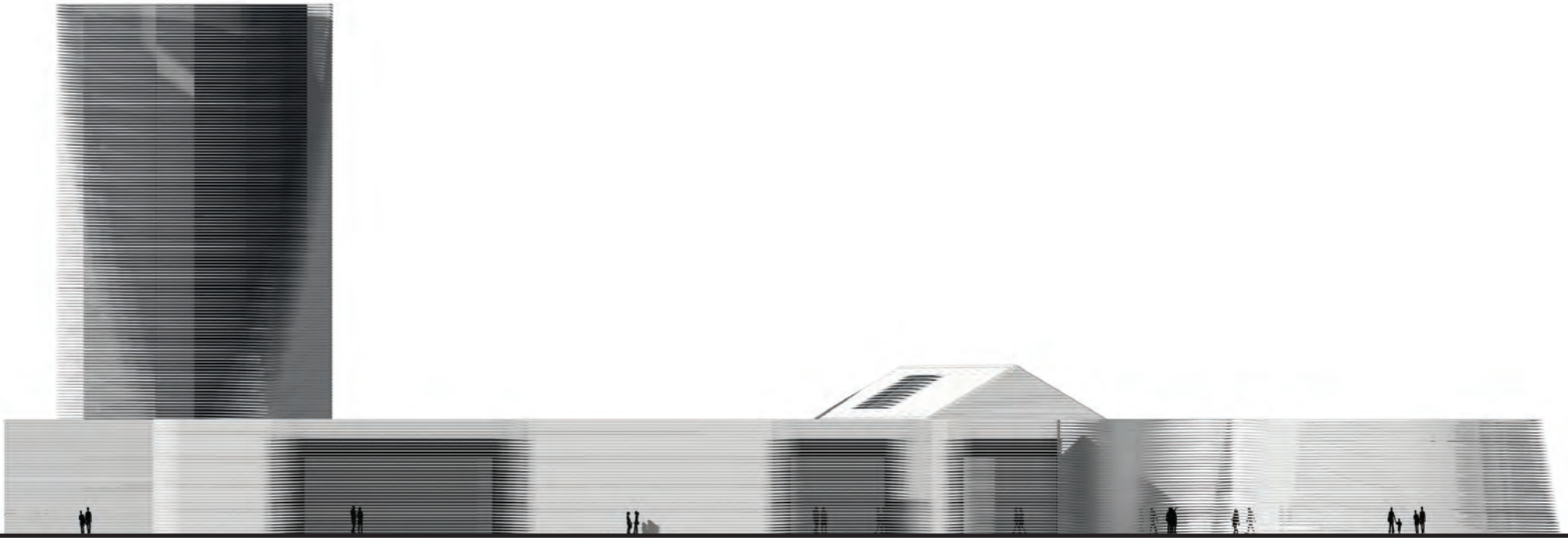




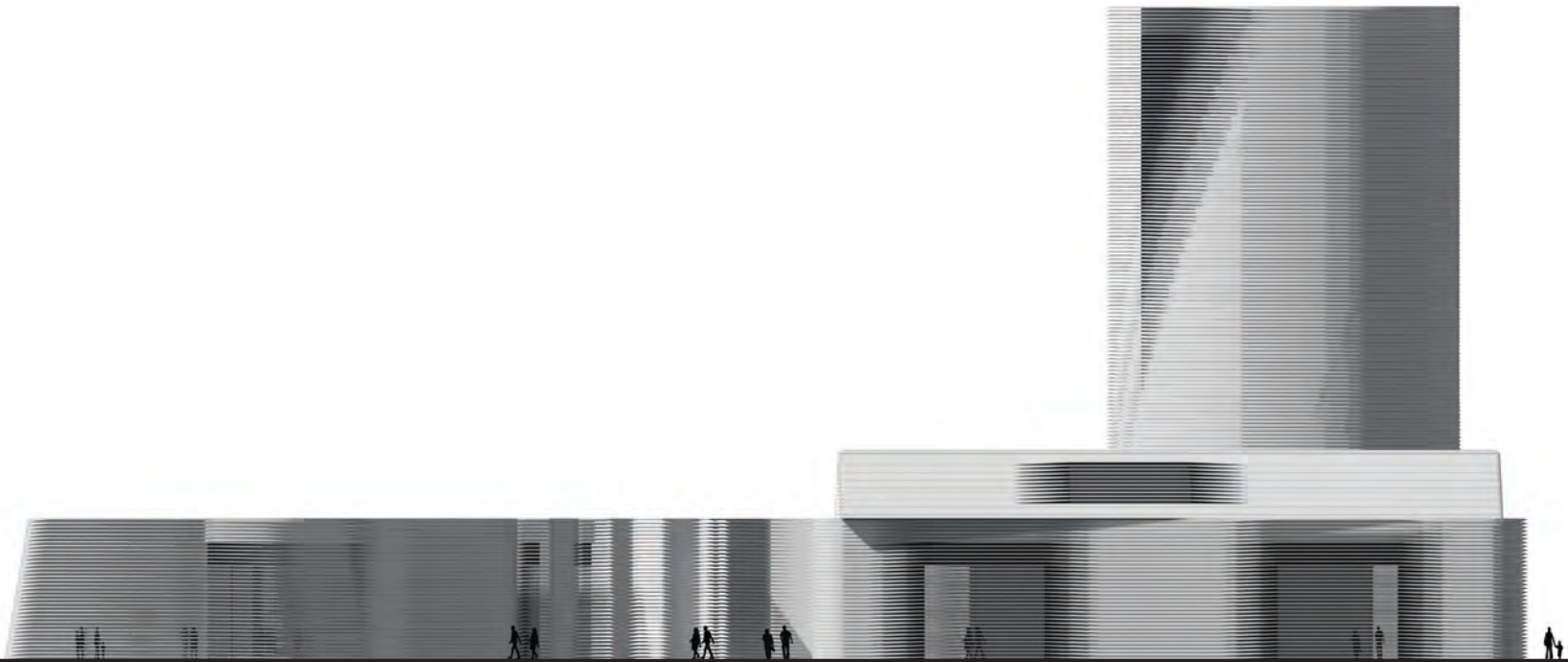
FRONT ELEVATION



RIGHT ELEVATION

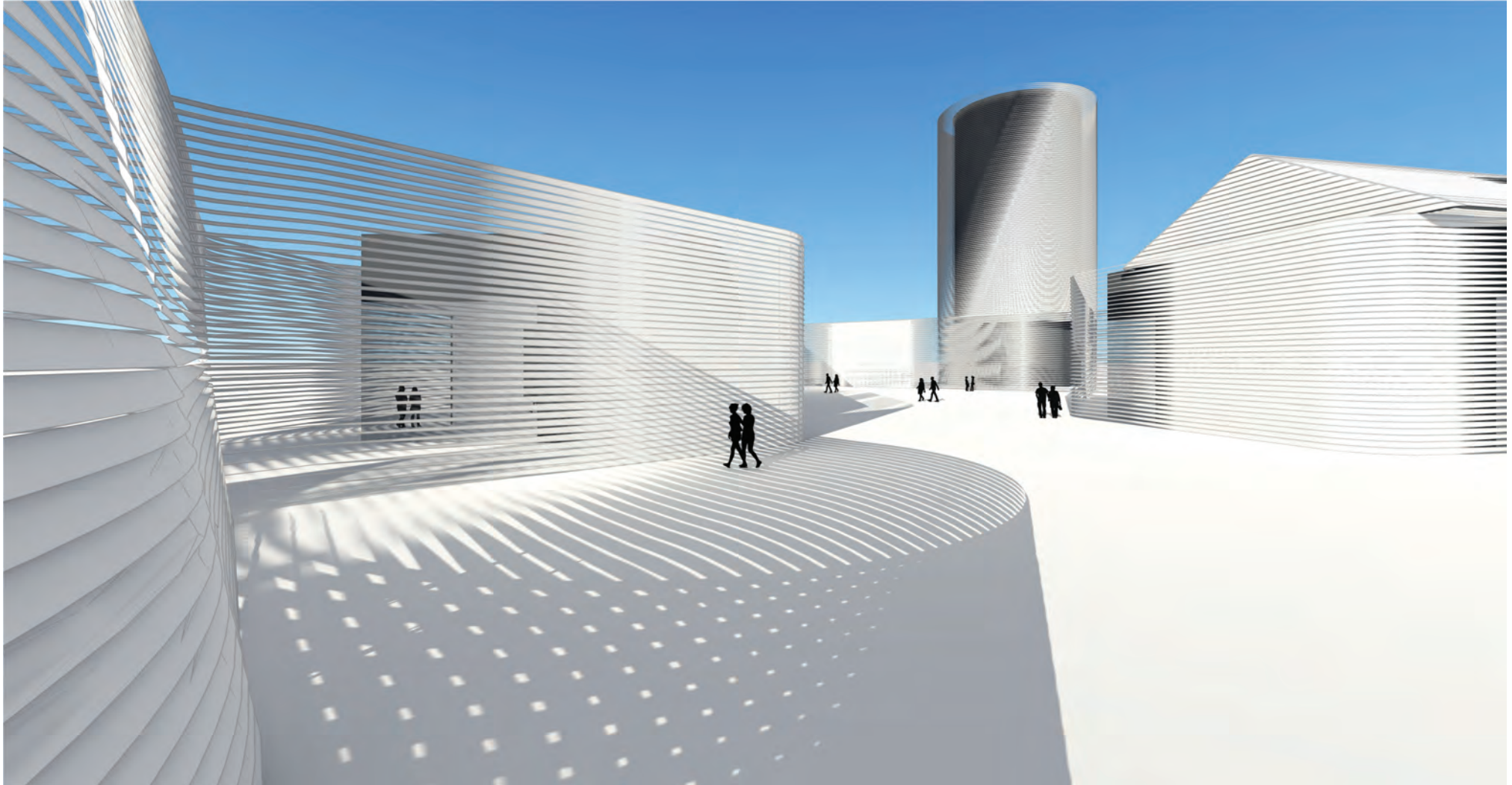


BACK ELEVATION

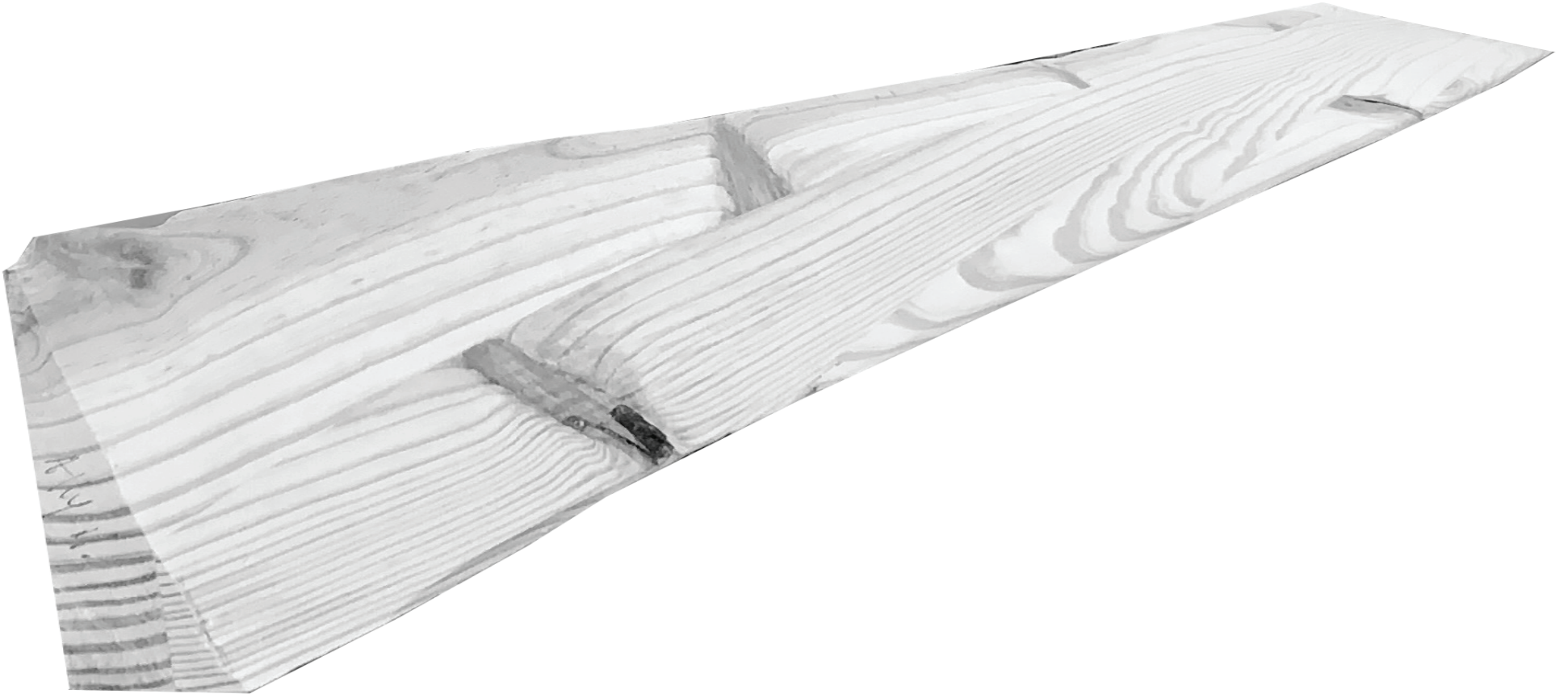


LEFT ELEVATION











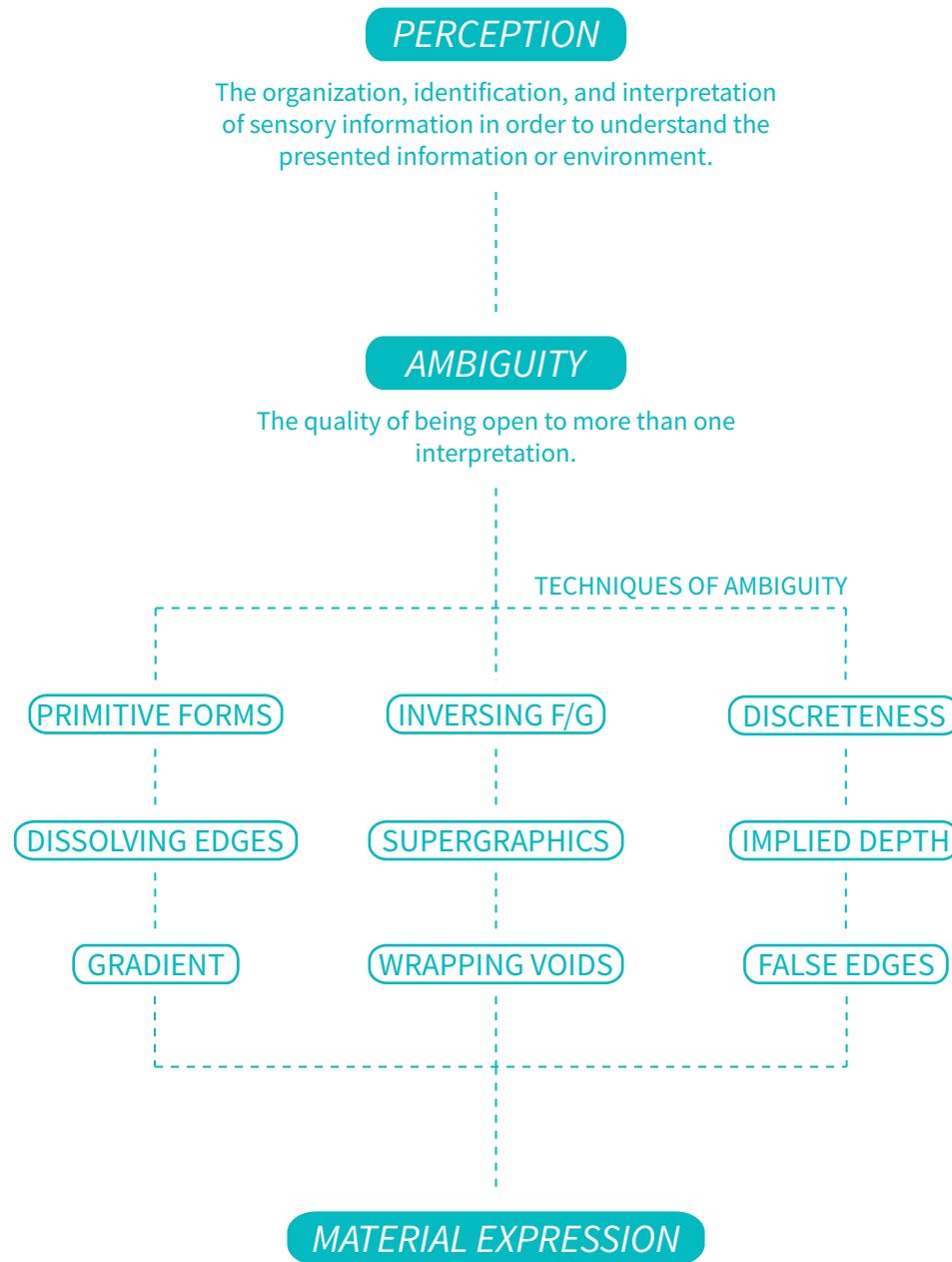
FINAL PROPOSAL

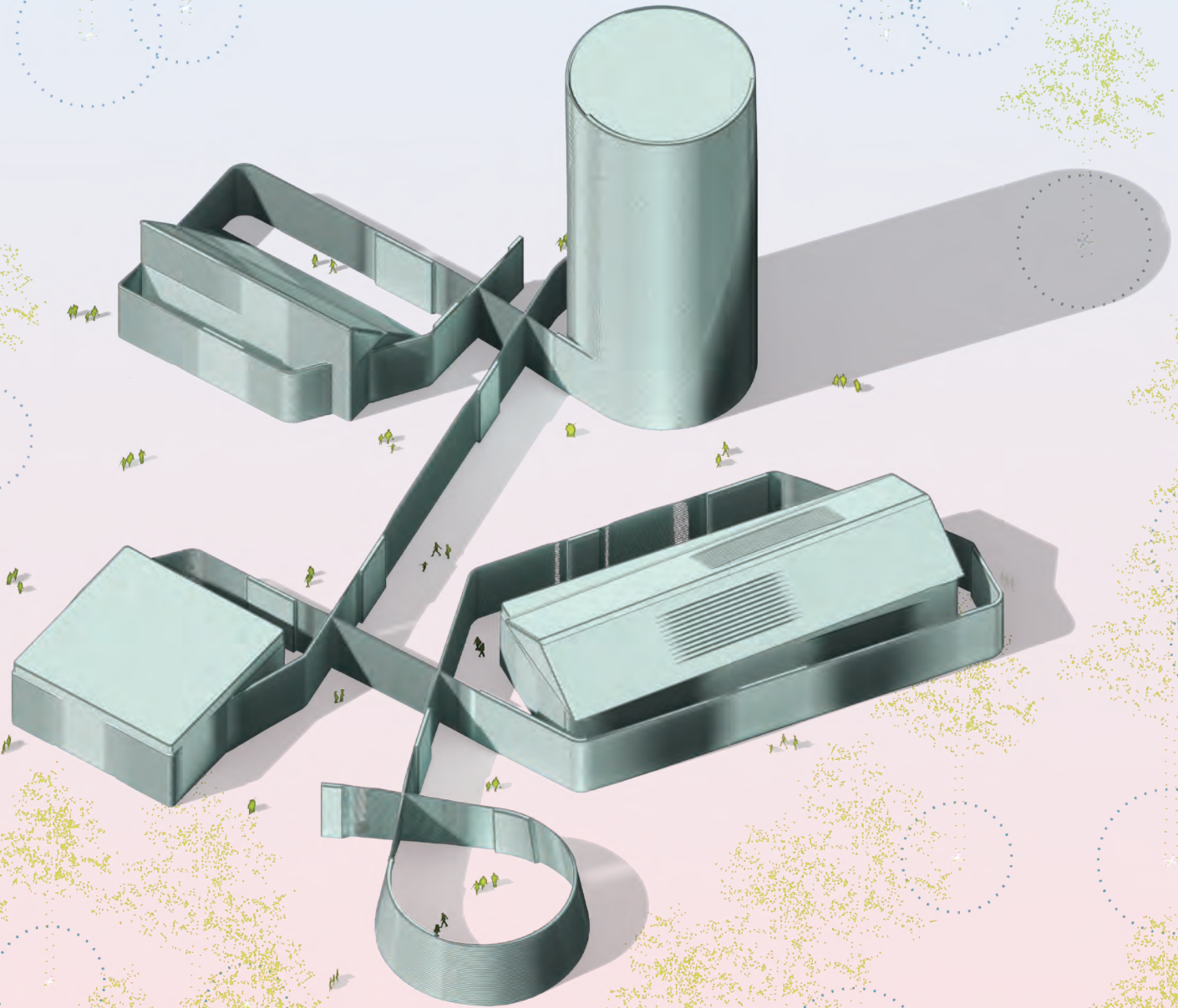
# MIDWEST GRAIN MILL

The final proposal combines the contemporary tendency towards legible, discrete forms with a continuous envelope system that begins to evolve independently of the forms it encloses. The envelope system builds upon contemporary discourse by proposing a new way to generate form through loosely associated, blocky parts. As explored in the previous studies, the bands also serve to challenge the viewer's understanding of the forms. This allows for participation from multiple audiences.

The continuous envelope utilized in the following proposal dissolves edges between forms. The shadows created as the bands twist to reveal openings serve to inverse the figure/ground relationship and imply depth within the surface. The envelope extends out to enclose void space and passes through itself as it weaves around the discrete forms. False forms emerge from the bands passing through each other. These techniques serves to challenge the viewer's perception of the form and ask for their participation in the understanding of the form.

The final proposal explores the heavy timber materiality from the previous study. The bands are CNC milled from heavy timber to follow the cross sectional movement of the bands. When they are fully closed, the material extends back 18" to carry structural load while the slimmer bands extend out from the walls. The bands stack vertically around hollow steel tubes that serve to tie the individual bands together in one continuous system and also provide locations to run MEP equipment.





The final proposal borrows techniques of ambiguity explored in the previous studies and uses only primitive forms to make up the composition. The forms are woven together with a continuous envelope system.

There are two band systems that serve to create ambiguity in the perception of the forms themselves and blur the boundaries between discrete forms. The individual primitives are wrapped in their own series of bands that define the iconic profiles. A second series of bands begins to evolve independently of the primitives and ties the objects together in one continuous line.

At certain moments, the outer set of bands must open to pass through themselves or the primitive bands. At other unique moments, the two systems merge together and occupy the same space.

As stated previously, the primitive forms invite a discussion of legibility because they are familiar to the non-expert due to their childish, toylike quality. Cones, cylinders, cubes, or triangles are identifiable because they are the first shapes we are taught as children. They become a basis of common knowledge.

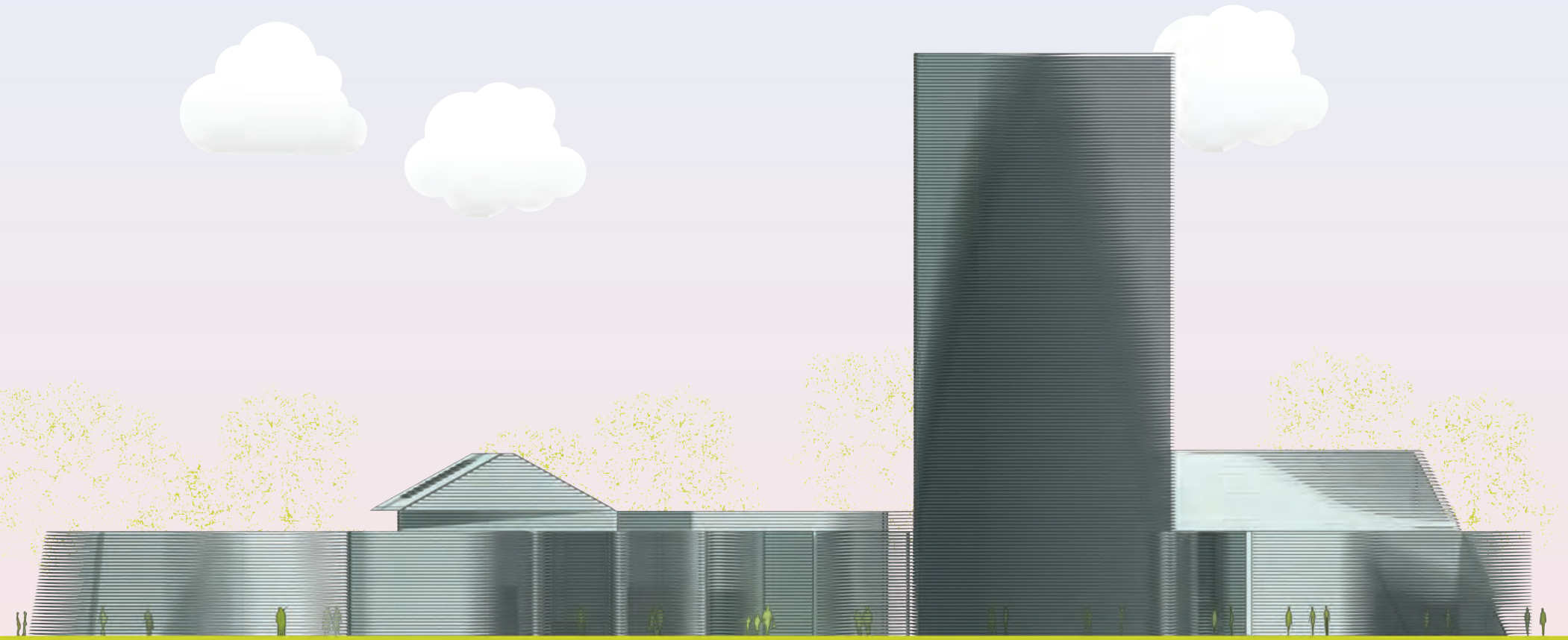
As Andrew Holder explains in his writings, by composing the forms in a haphazard composition - as shown in the final proposal - their stackable, toylike quality allows the viewer to perhaps imagine themselves arranging them in a different configuration; thus taking part in the architectural endeavor.

The continuous envelope serves to create ambiguity on the surface of the primitive forms. It intentionally dissolves edges and implies a false depth within the flat surfaces.

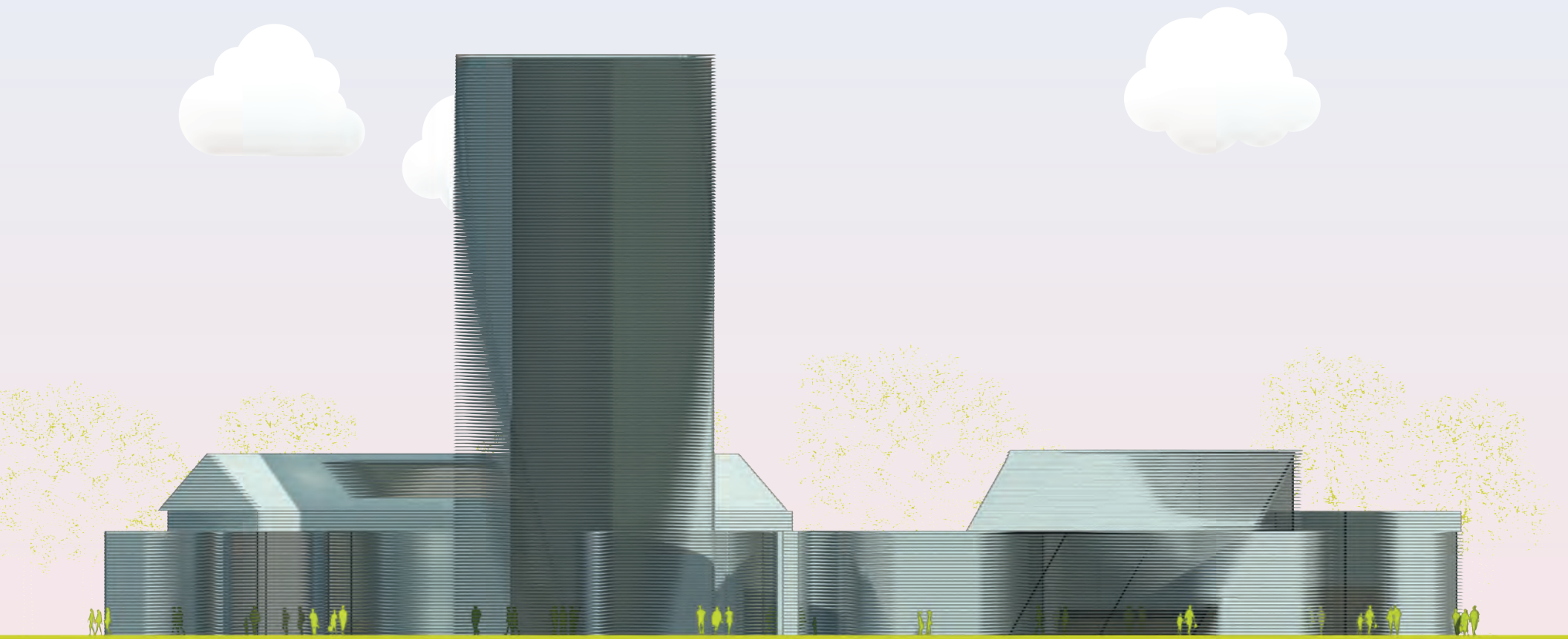
Forms that are separated on the x/y coordinate plane present themselves as one continuous surface. Window openings span multiple primitives in elevation. As the bands open at the edges, they create a seamless pattern across the boundaries of the forms.

At these moments, the viewer must contemplate the validity of both perceptions - one being two independent primitive forms; the second being one continuous surface.

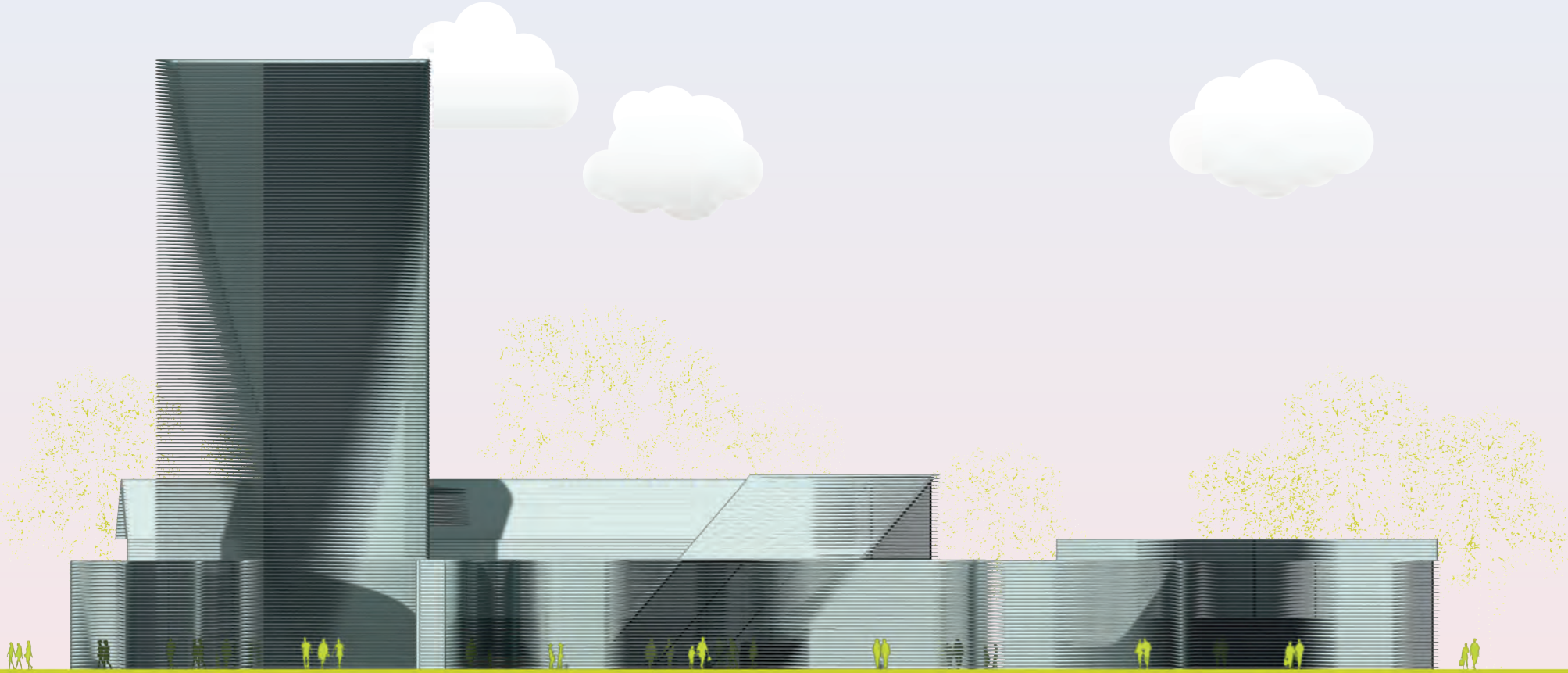
To put it in terms of Andrew Holder's theory: the primitive forms are the original while the bands are the inscribed architectural activity that is reforming the surface.



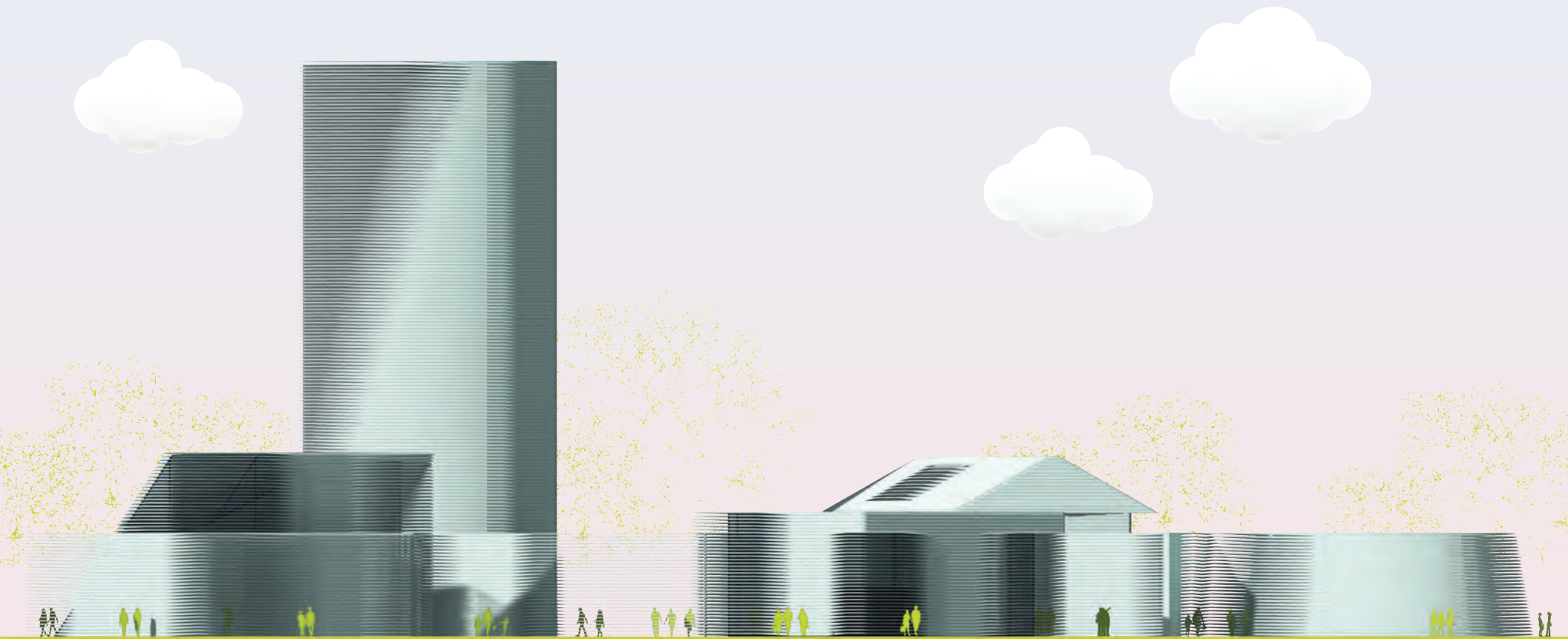
FRONT ELEVATION



ELEVATION



RIGHT ELEVATION



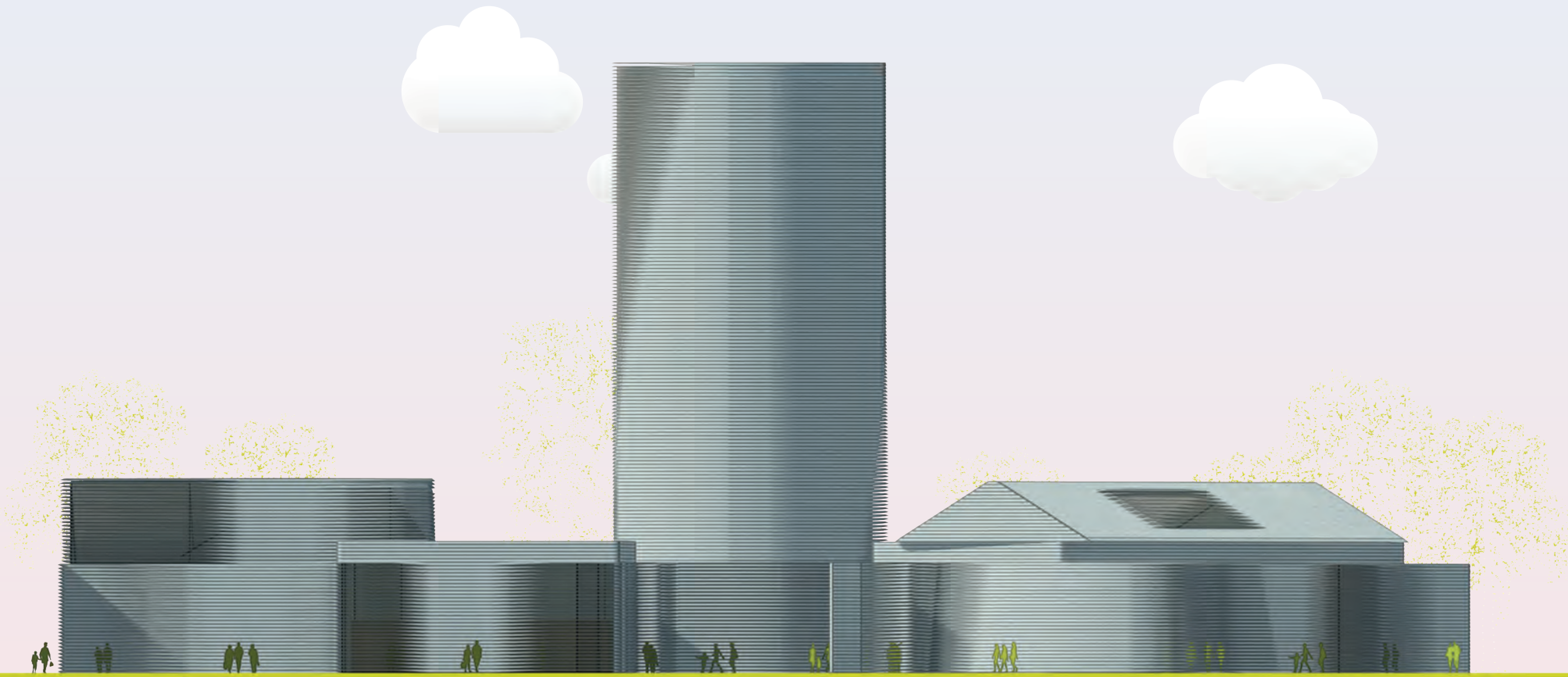
BACK ELEVATION

The thesis offers a tiered discussion of legibility. The childish, toylike forms aim to create a basis of shared knowledge between the expert and non-expert. If the viewer is familiar with cones, cylinders, triangles, and cubes, then a discussion can open about whether the primitive is still recognizable if some of the edges dissolve as it seems to merge with other forms, or if the boundaries seem to undulate.

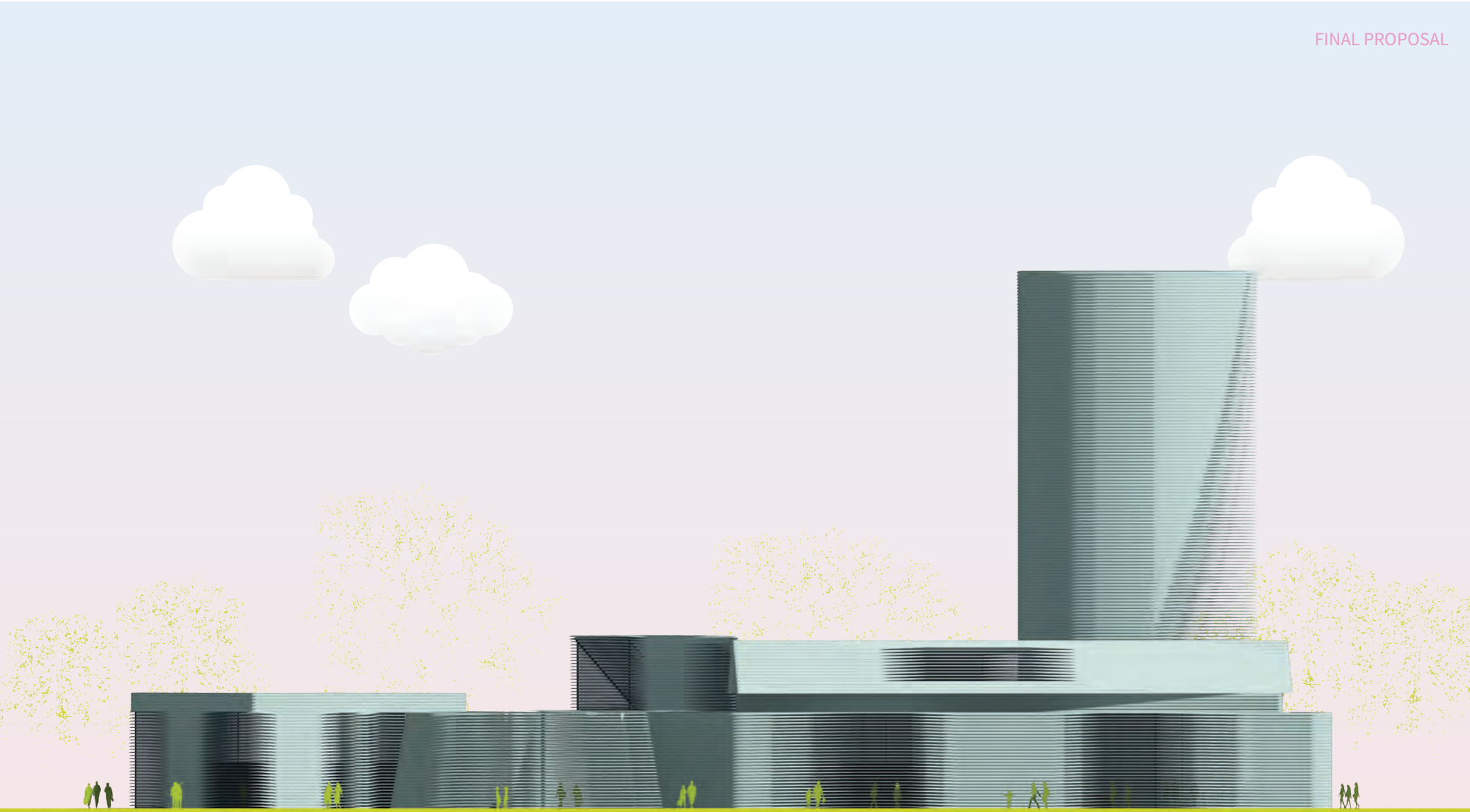
However, although primitives are some of the most basic forms, prior knowledge cannot be guaranteed.

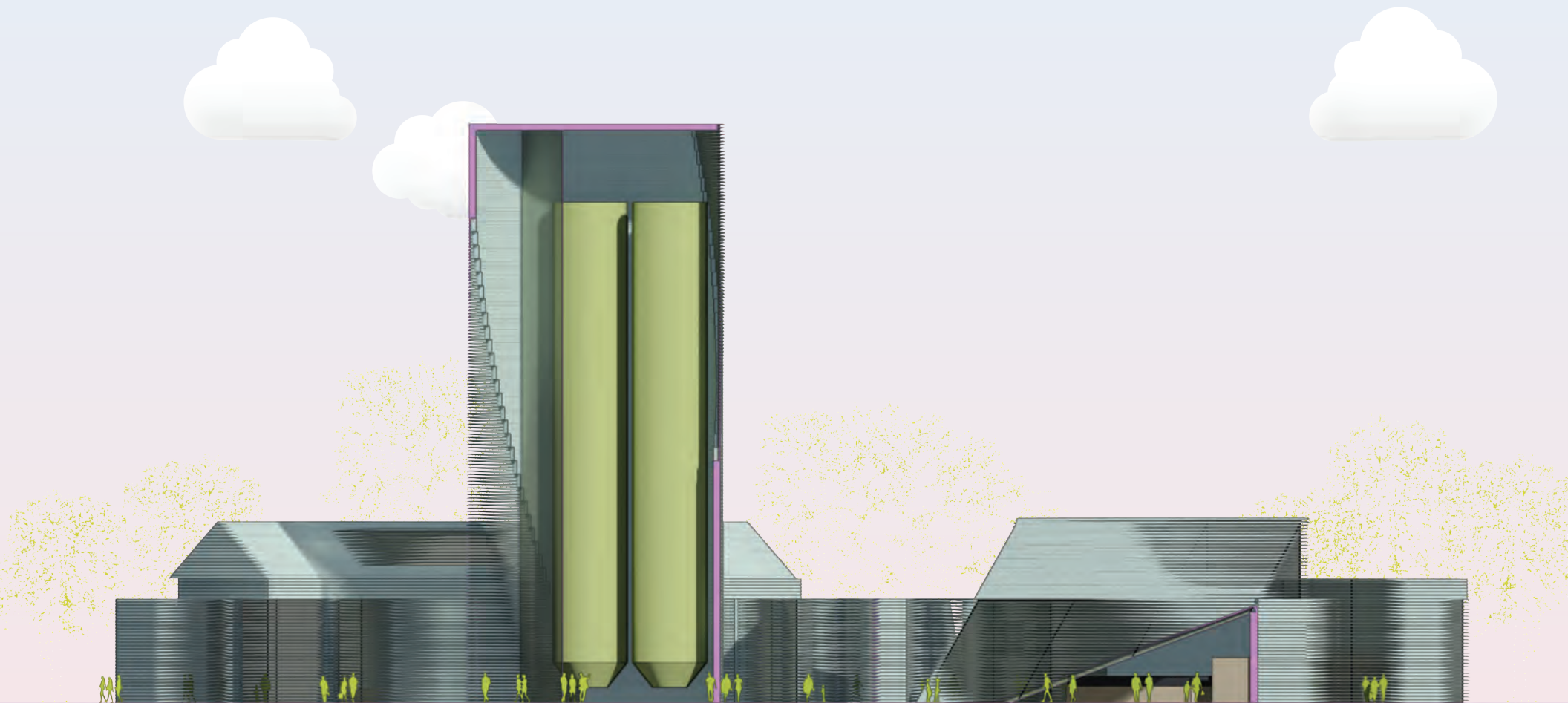
The incorporation of perception and affect theory in the thesis open a separate discussion for viewers that are not familiar with primitive forms. The ambiguous surface treatment essentially eliminates the need for prior knowledge because the viewer is left to contemplate two understandings presented simultaneously. The discussion then leans away from identifying forms and towards contemplating the validity of two opposing perceptions.

For example, when the bands pass through one another, it results in an optical effect of a false cylinder. As one moves through the space, they realize that it is in fact voids space. Even if the viewer is not familiar with cylinders, they can negotiate if they are perceiving a figure or a void; and if that perception is different from the orthogonal space they encounter on the interior.

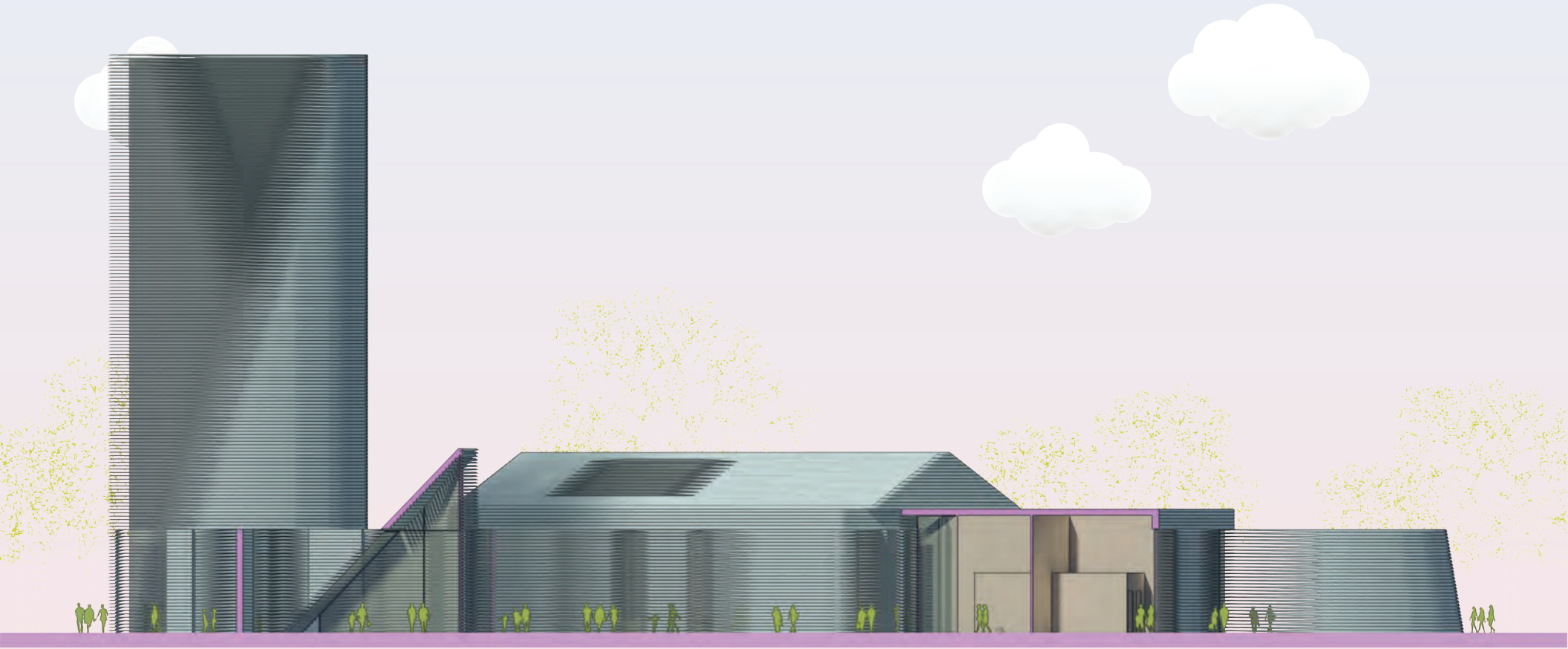


ELEVATION



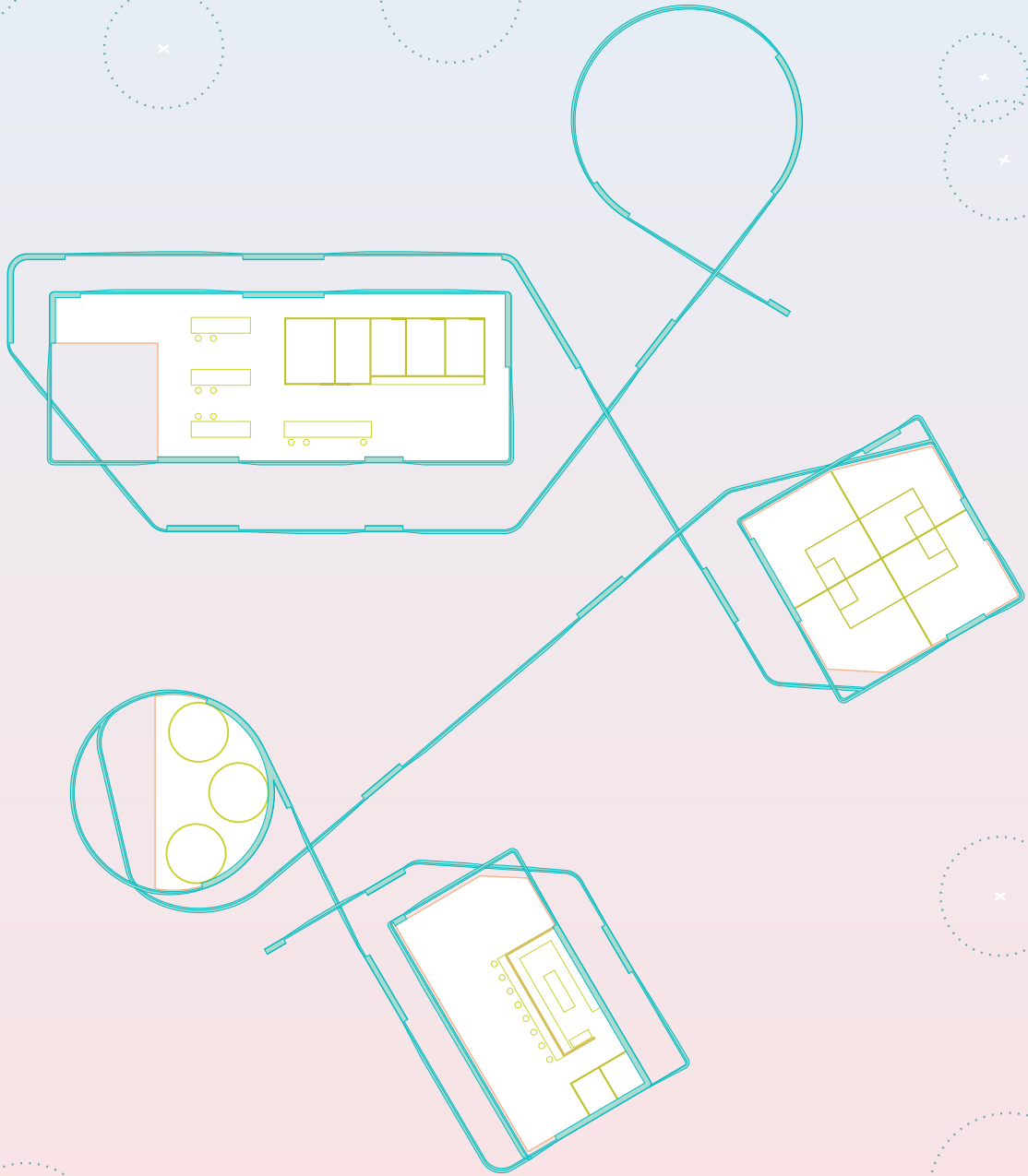


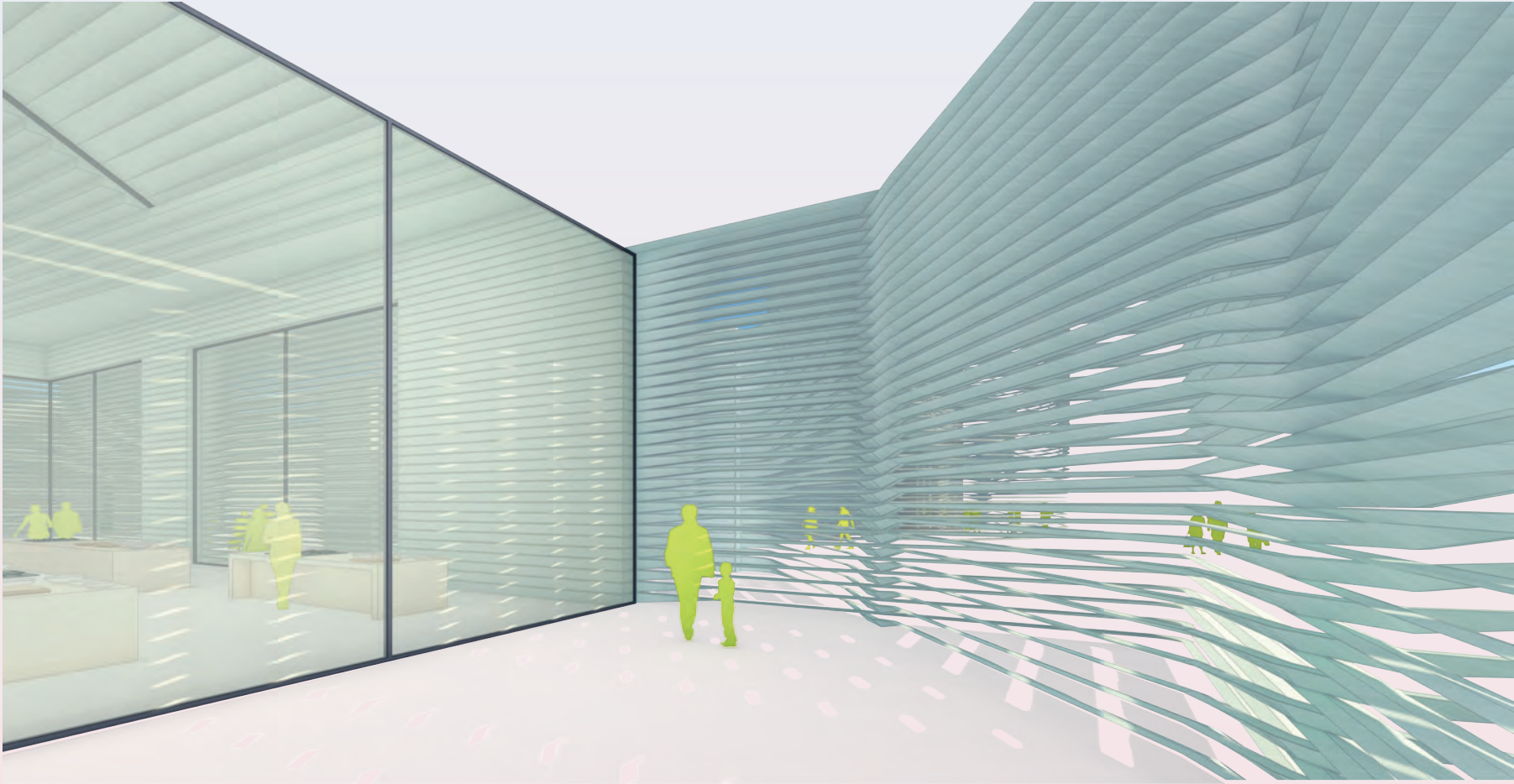
SECTION B



The plan purposefully lacks detail because the thesis is not driven by a site or program. The configuration shown here holds a grain mill kitchen, grain storage, cafe/shop, and 4 short term stay residential units. However, a number of different functions could be housed in any of the forms.

The thesis most comfortably resides in a field somewhere in the midwest because the construction method borrows logic from a vernacular fencing technique - that being snake rail fencing.



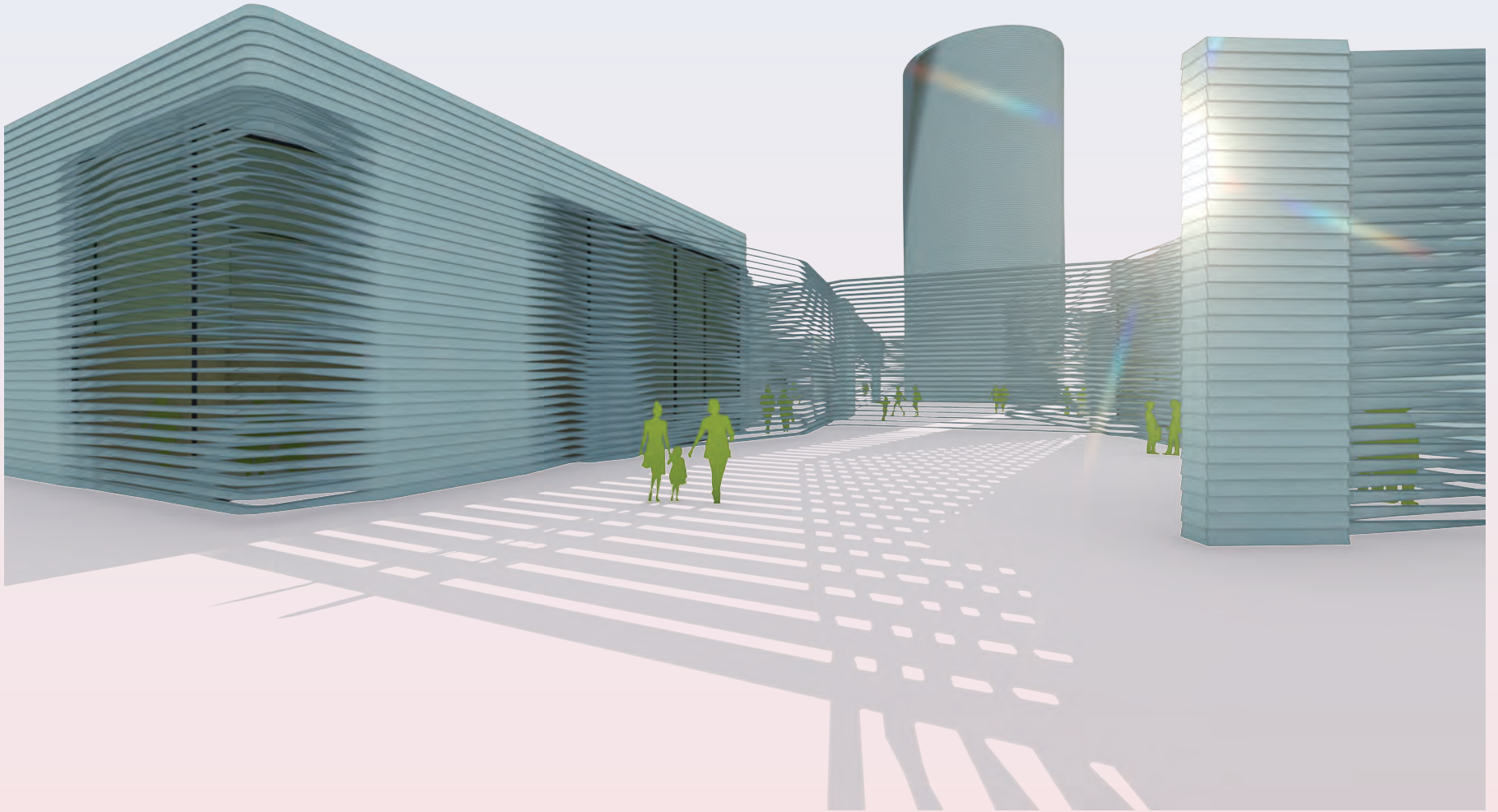


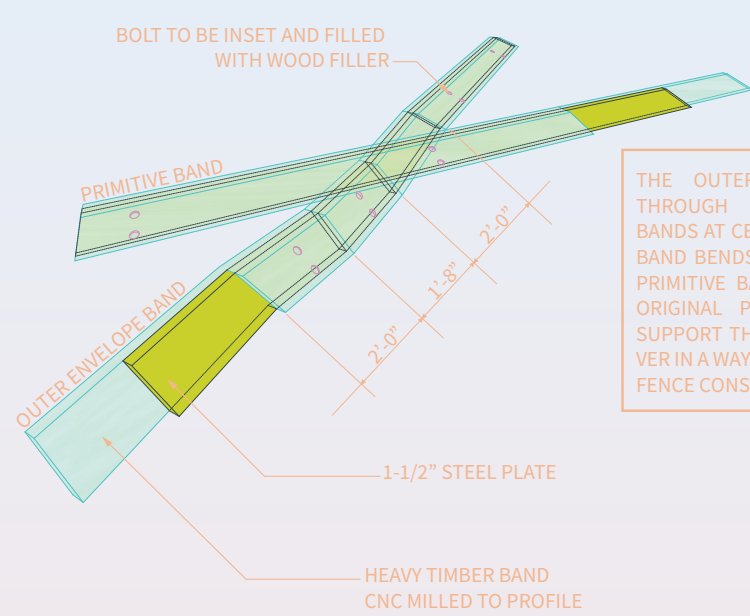
The interior perspective to the left describes how the outer bands must bend down to accommodate the bands that wrap each primitive as they pass through one another.

This accommodation also serves to support the subsequent bands as the stack vertically. This logic is borrowed from the vernacular snake rail fence construction.

The perspective to the right speaks to the construction method for the final proposal. The perceptual argument is synthesized into a material expression with heavy timber bands that are CNC milled to profile.

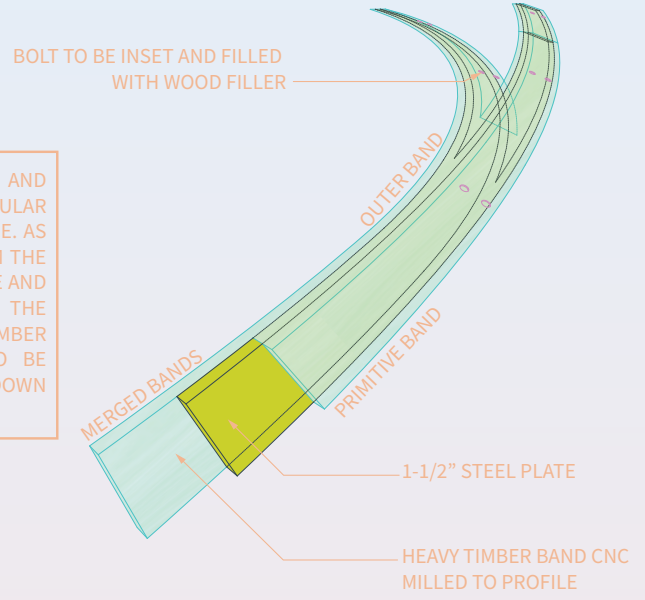
The bands become heavy timber walls or anchor points when their cross section is fully closed. The material extends back 18 inches to carry structural load and the bands extend out from these walls as they pivot open.





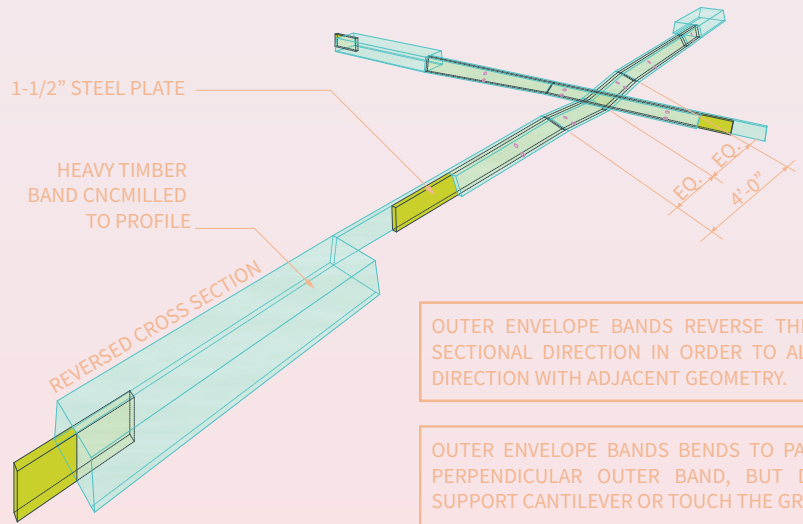
THE OUTER ENVELOPE BANDS PASS THROUGH THE INDIVIDUAL PRIMITIVE BANDS AT CERTAIN MOMENTS. THE OUTER BAND BENDS DOWN TO PASS UNDER THE PRIMITIVE BAND, THEN RETURNS TO ITS ORIGINAL POSITION. THIS SERVES TO SUPPORT THE PRIMITIVE BANDS CANTILEVER IN A WAY THAT RELATES TO SNAKE RAIL FENCE CONSTRUCTION.

THE OUTER ENVELOPE BAND AND PRIMITIVE BAND BEGIN AS A SINGULAR ITEM THAT OCCUPY THE SAME SPACE. AS THE OUTER BAND SEPARATES FROM THE PRIMITIVE, A SINGULAR STEEL PLATE AND HEAVY TIMBER PROFILE MEDIATE THE FORKING BANDS. HEAVY TIMBER PROFILES AND STEEL PLATES TO BE STITCHED TOGETHER FURTHER DOWN EACH PATH.



1 OUTER BAND ENGAGING PRIMITIVE BAND CONDITION

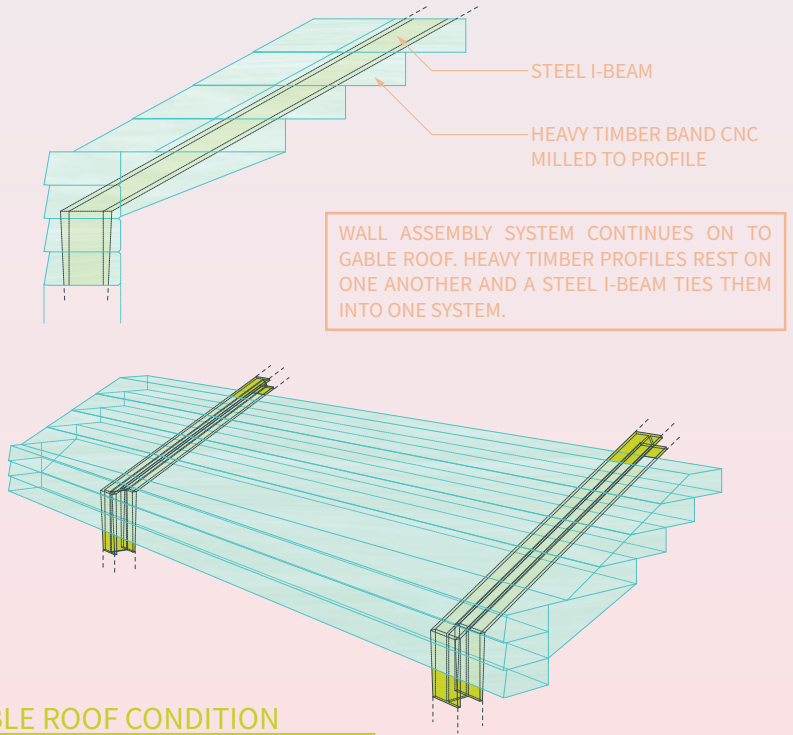
2 SEPARATION OF OUTER & PRIMITIVE BAND CONDITION



OUTER ENVELOPE BANDS REVERSE THEIR CROSS SECTIONAL DIRECTION IN ORDER TO ALIGN BAND DIRECTION WITH ADJACENT GEOMETRY.

OUTER ENVELOPE BANDS BENDS TO PASS UNDER PERPENDICULAR OUTER BAND, BUT DOES NOT SUPPORT CANTILEVER OR TOUCH THE GROUND.

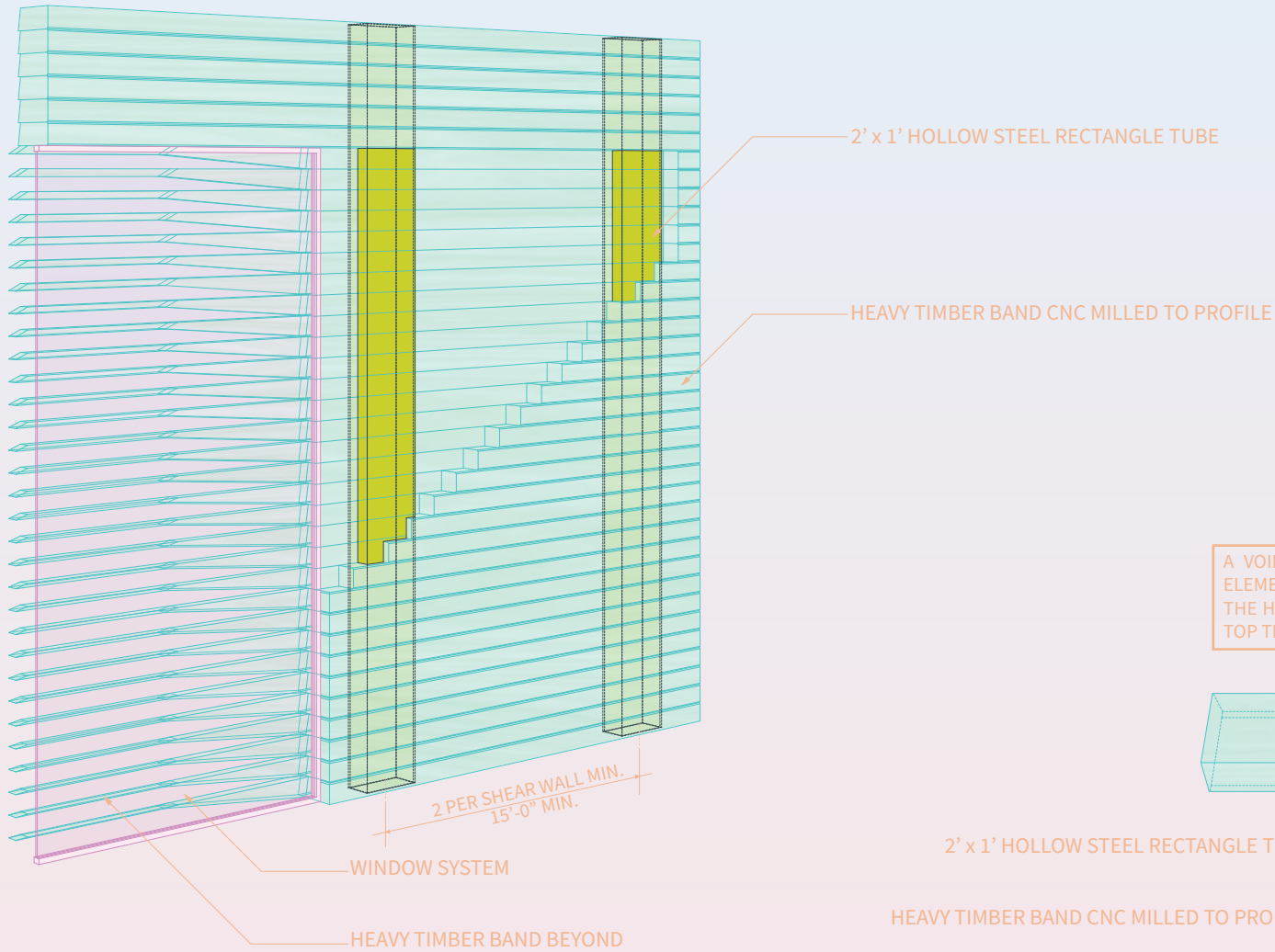
3 SWITCH BACK BAND CONDITION



4 GABLE ROOF CONDITION

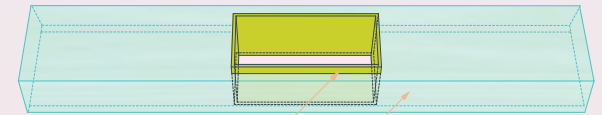
The thesis also investigates a series of speculative details that taxonomize the different band conditions.

Unique conditions include: bands passing through one another, the individual primitive bands merging with the outer bands and occupying the same space, and the bands having to mirror their cross sectional direction to accommodate the subsequent geometry.



HOLLOW STEEL TUBE TIE THE STACKED HEAVY TIMBER ELEMENTS TOGETHER IN A VERTICAL SYSTEM AND ALSO PROVIDE LOCATIONS TO RUN MECHANICAL/ELECTRICAL/PLUMBING EQUIPMENT.

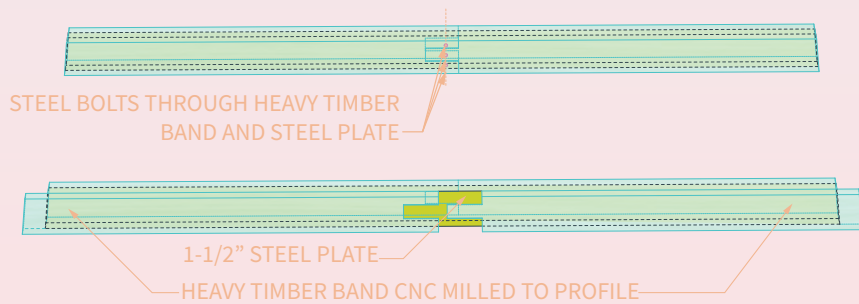
A VOID IS CUT OUT OF THE HEAVY TIMBER SHEAR WALL ELEMENTS IN ORDER TO ACCEPT THE HOLLOW STEEL TUBE. THE HEAVY TIMBER SHEAR WALLS SLOT SUBSEQUENTLY OVER THE HOLLOW STEEL TUBE.



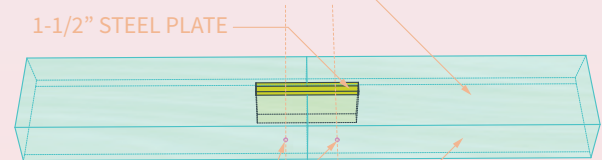
2' x 1' HOLLOW STEEL RECTANGLE TUBE

HEAVY TIMBER BAND CNC MILLED TO PROFILE

5 PRIMITIVE BAND WALL ASSEMBLY



HEAVY TIMBER BAND CNC MILLED TO PROFILE



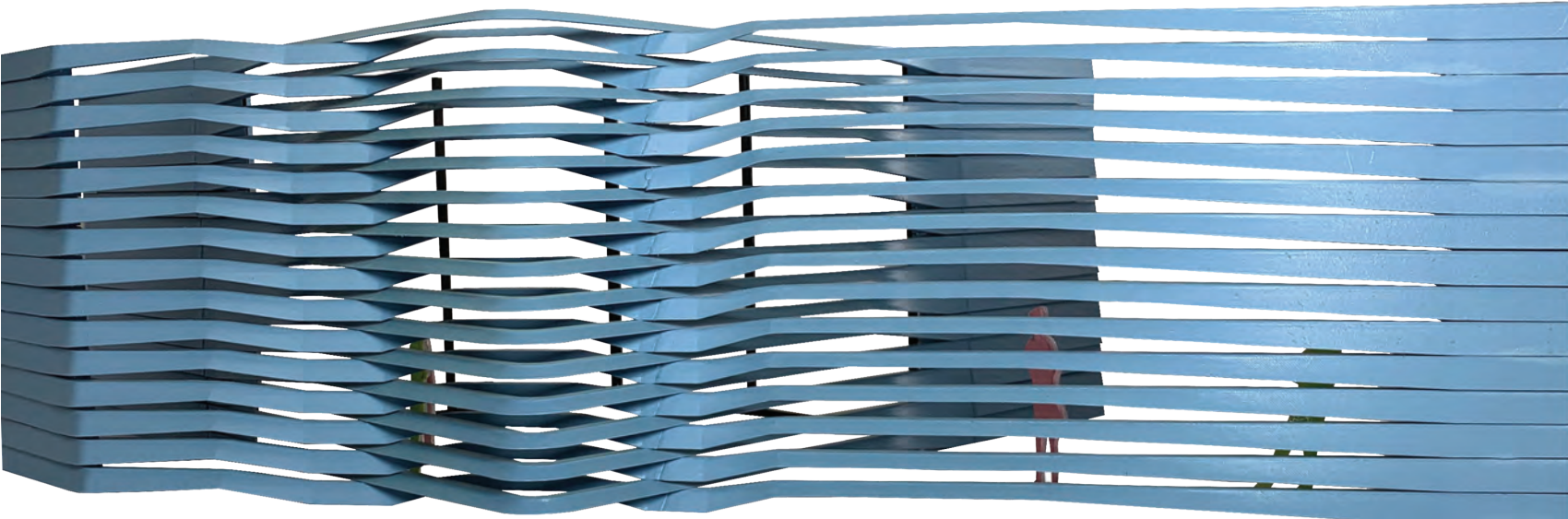
STEEL BOLTS THROUGH HEAVY TIMBER BAND AND STEEL PLATE

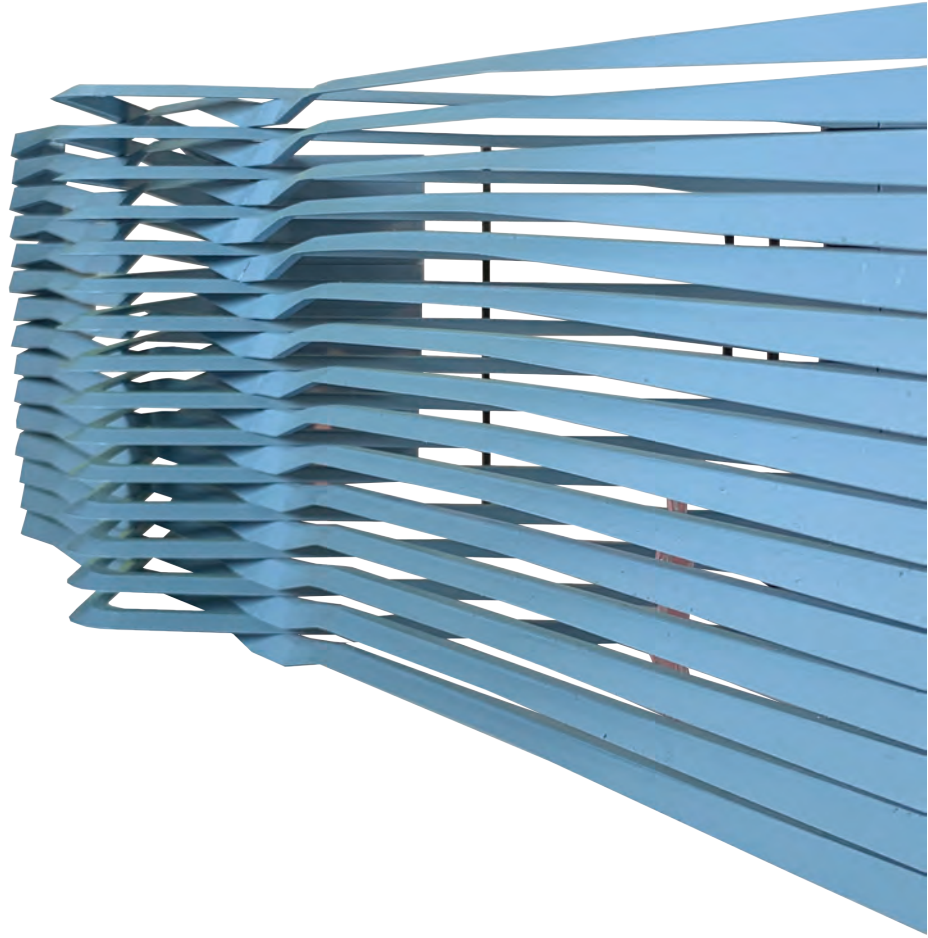
HEAVY TIMBER BAND CNC MILLED TO PROFILE

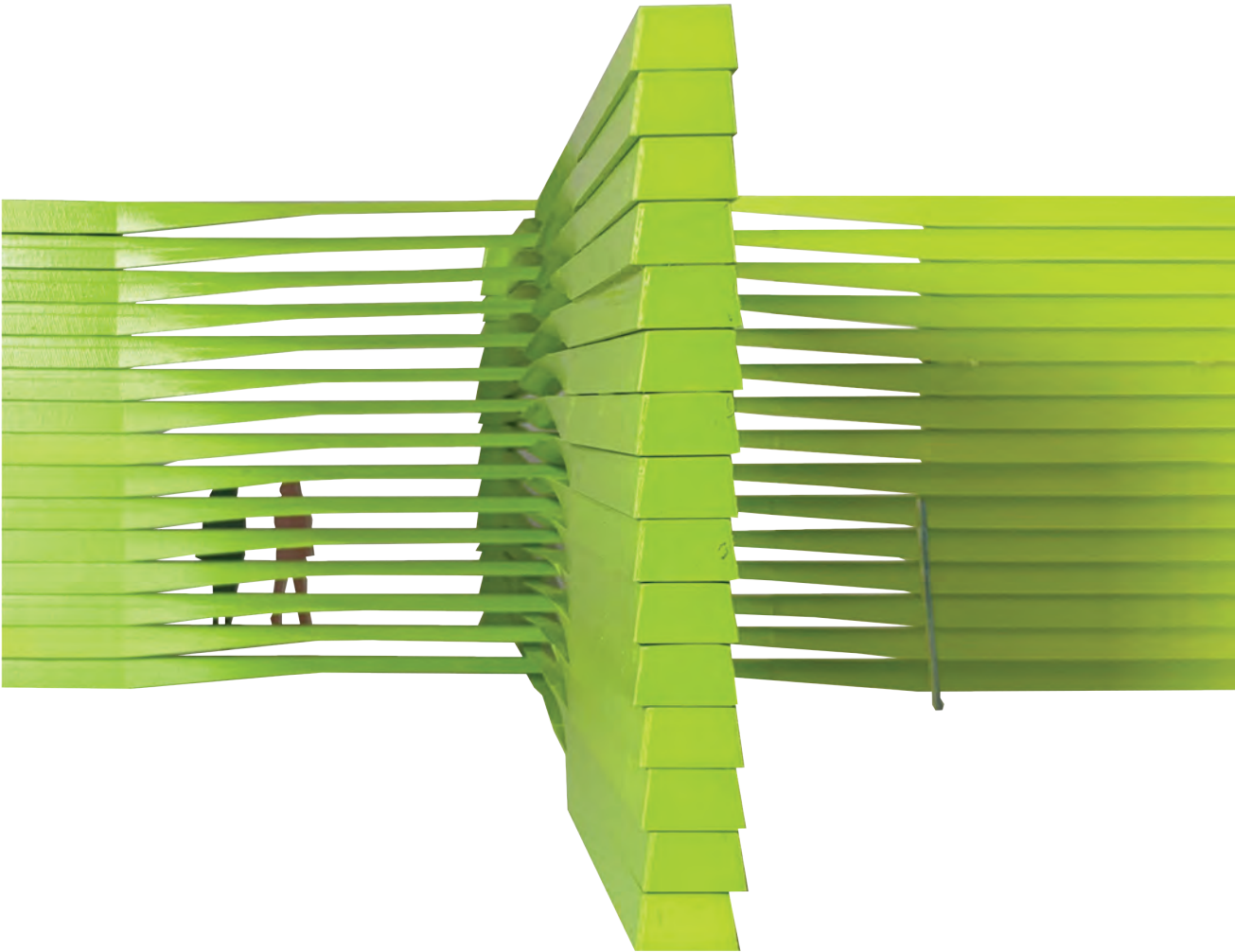
6 OPEN BAND SPLICE CONNECTION

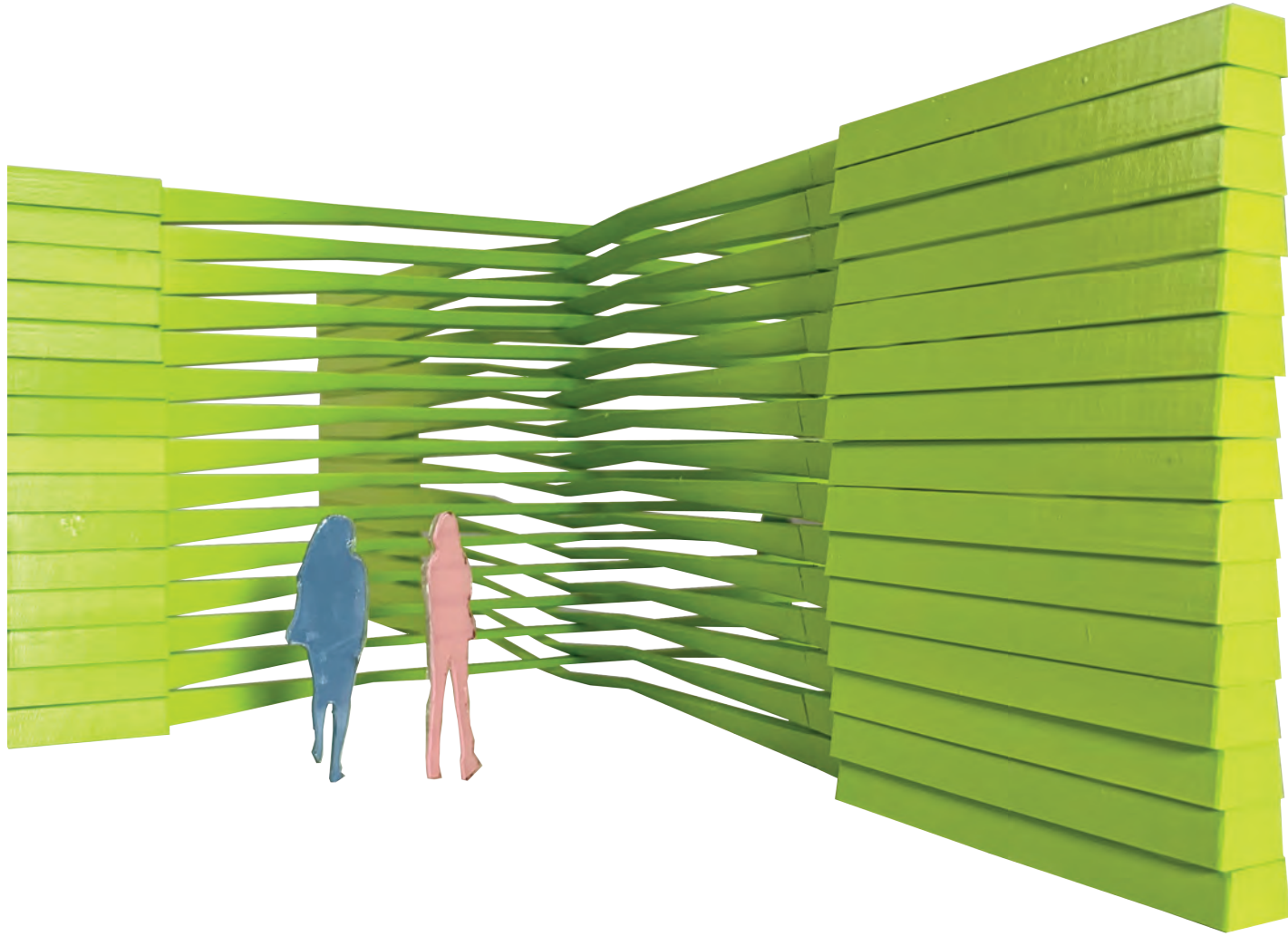
7 WALL SPLICE CONNECTION



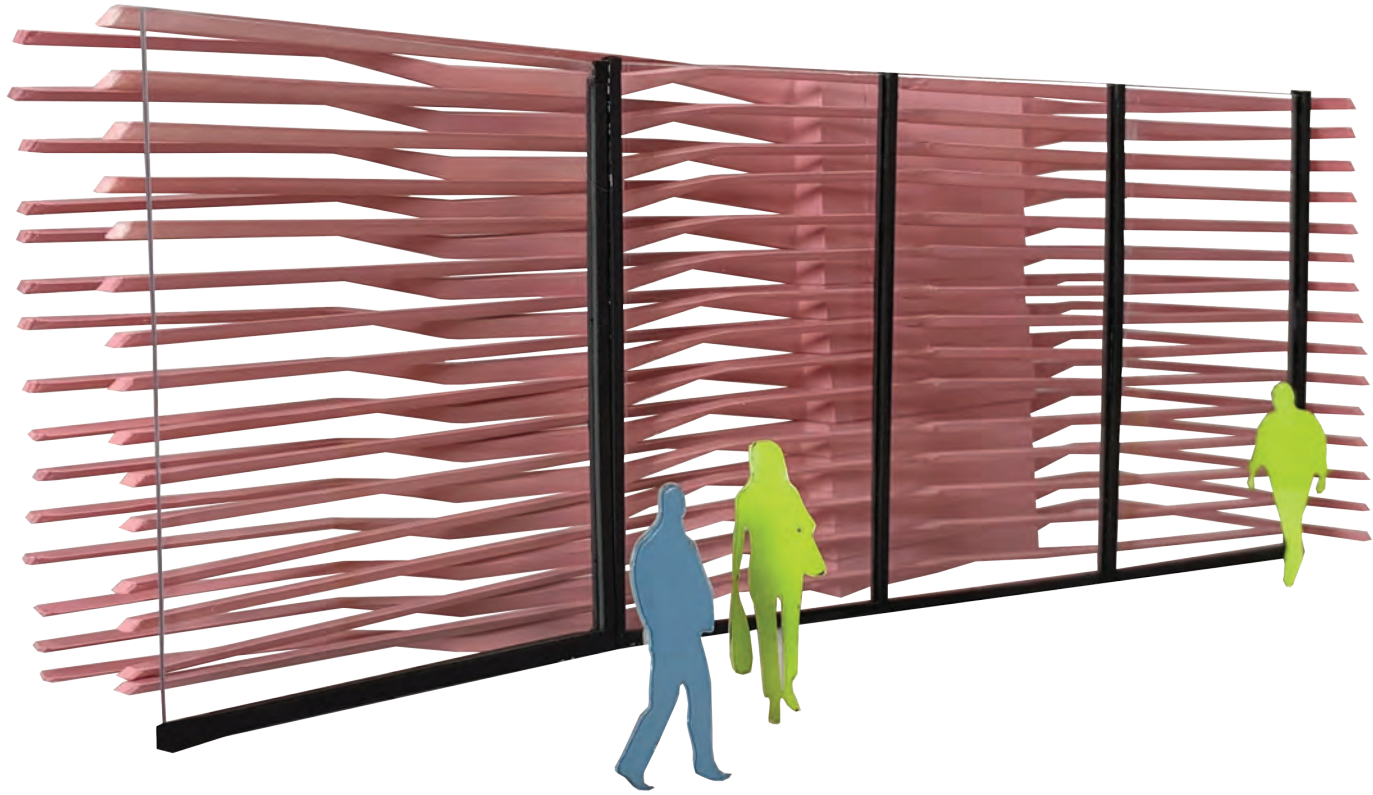






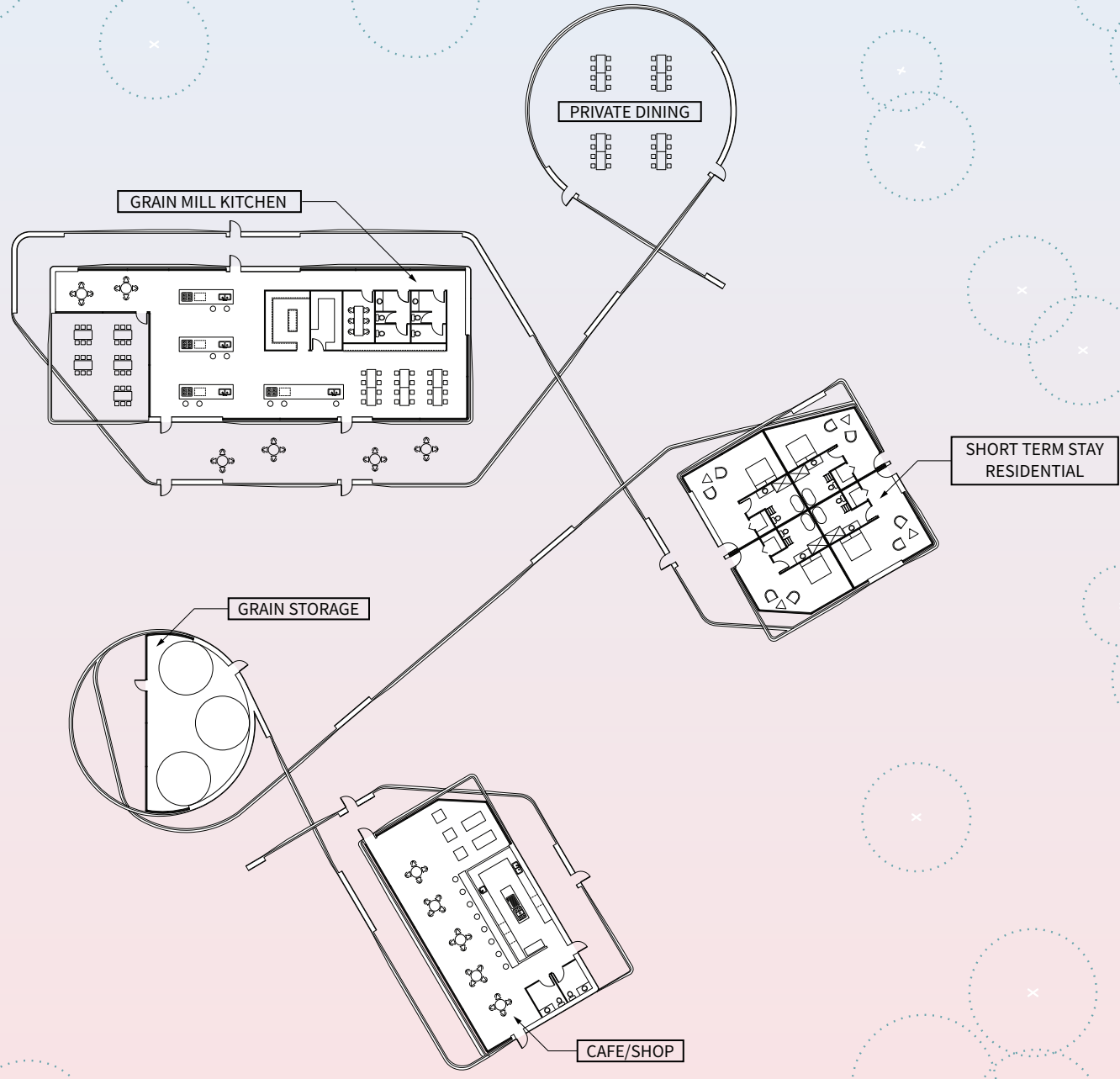


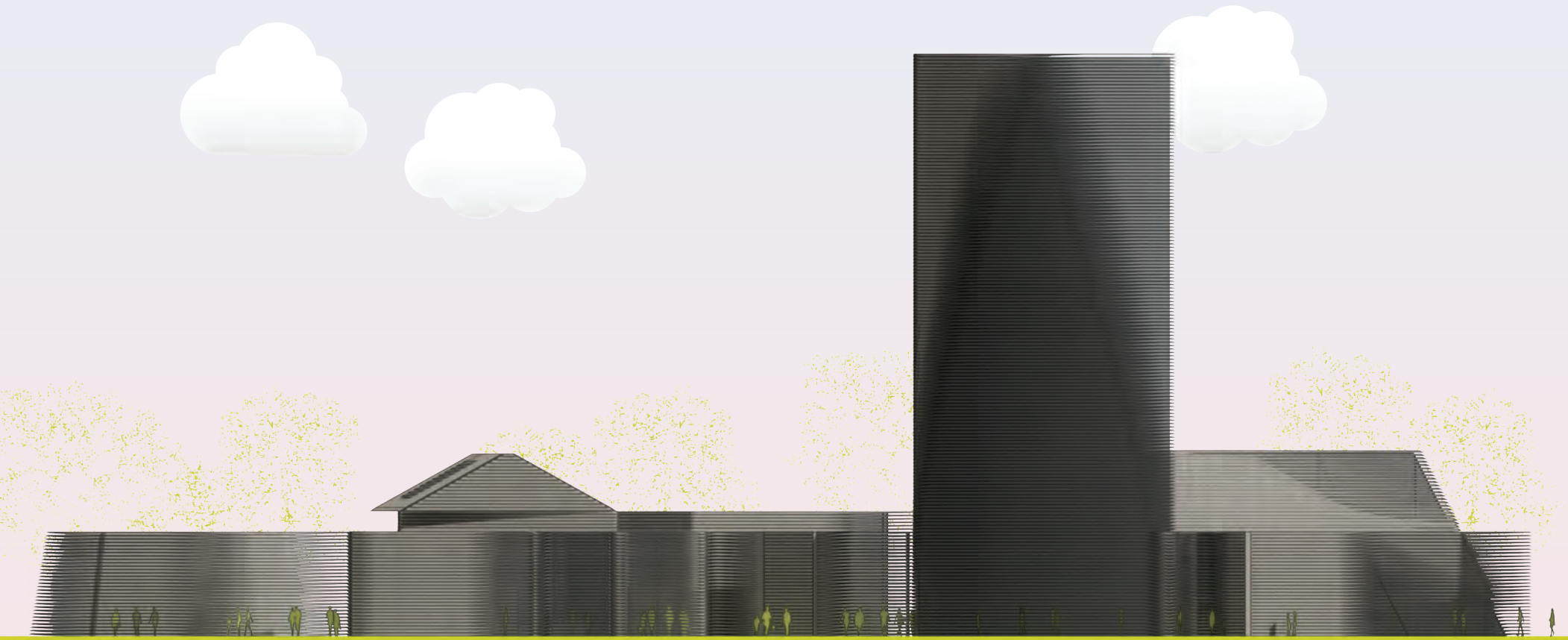




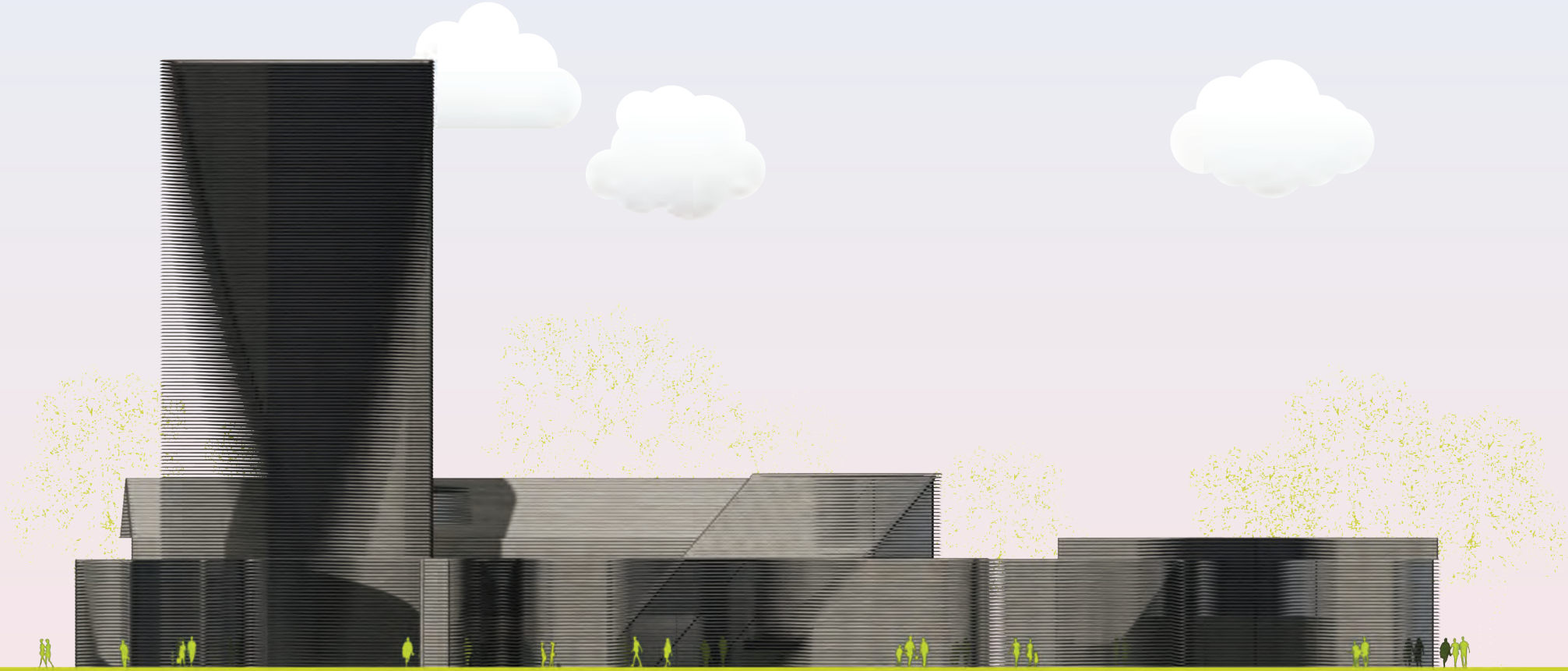
In addition to the representational drawings previously shown, the final proposal also investigates the physical materiality.

Building off the vernacular snake rail fence aesthetic, the final design suggests an aged, brownish grey stained timber material.

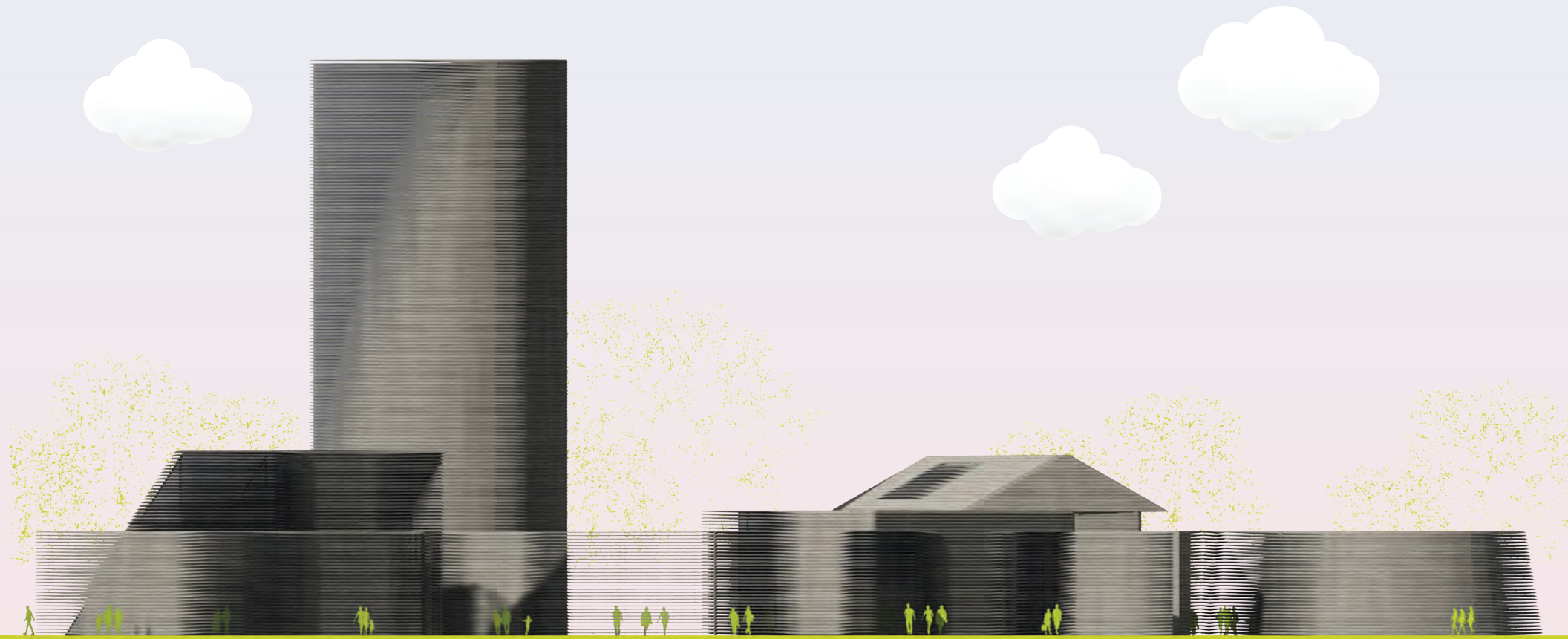




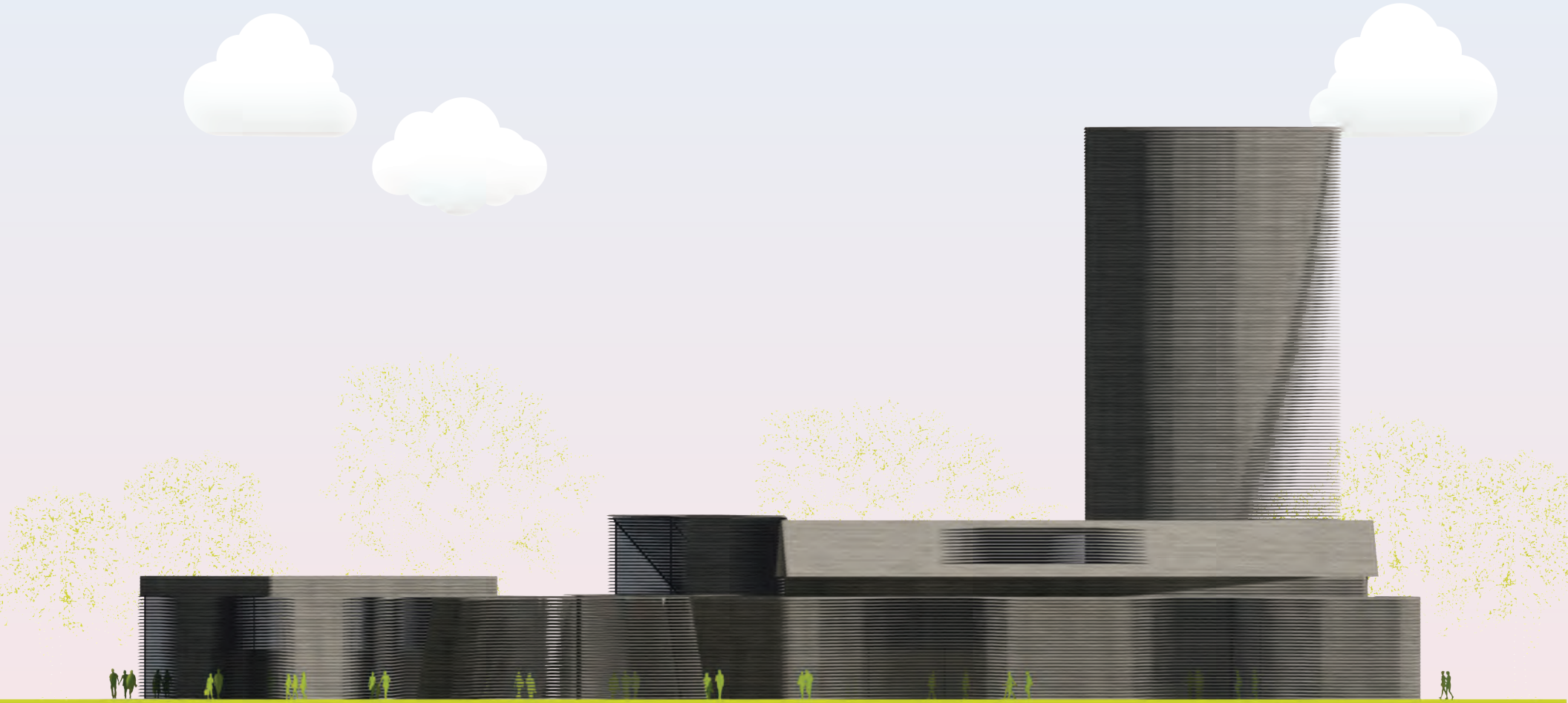
FRONT ELEVATION



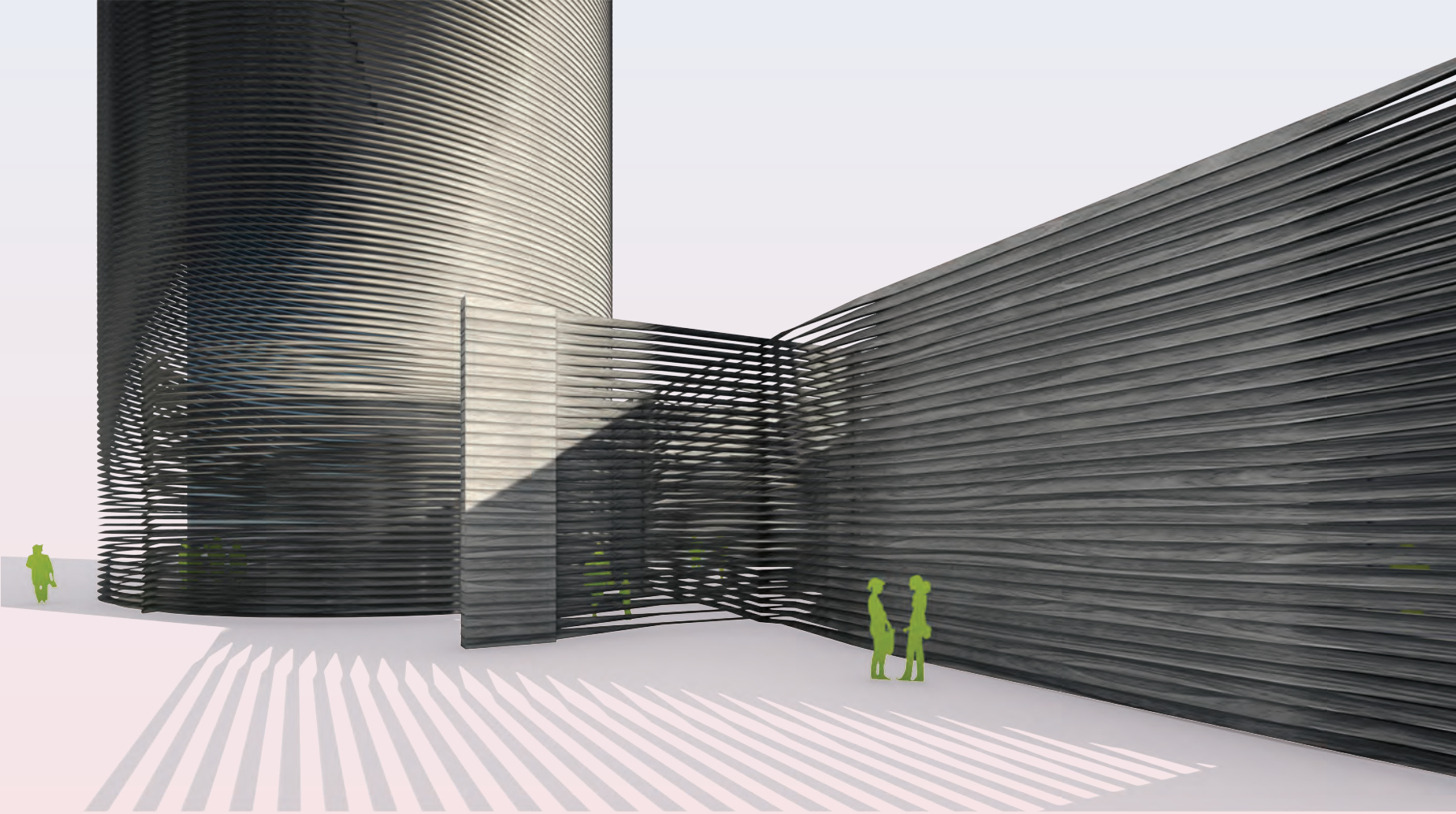
RIGHT ELEVATION

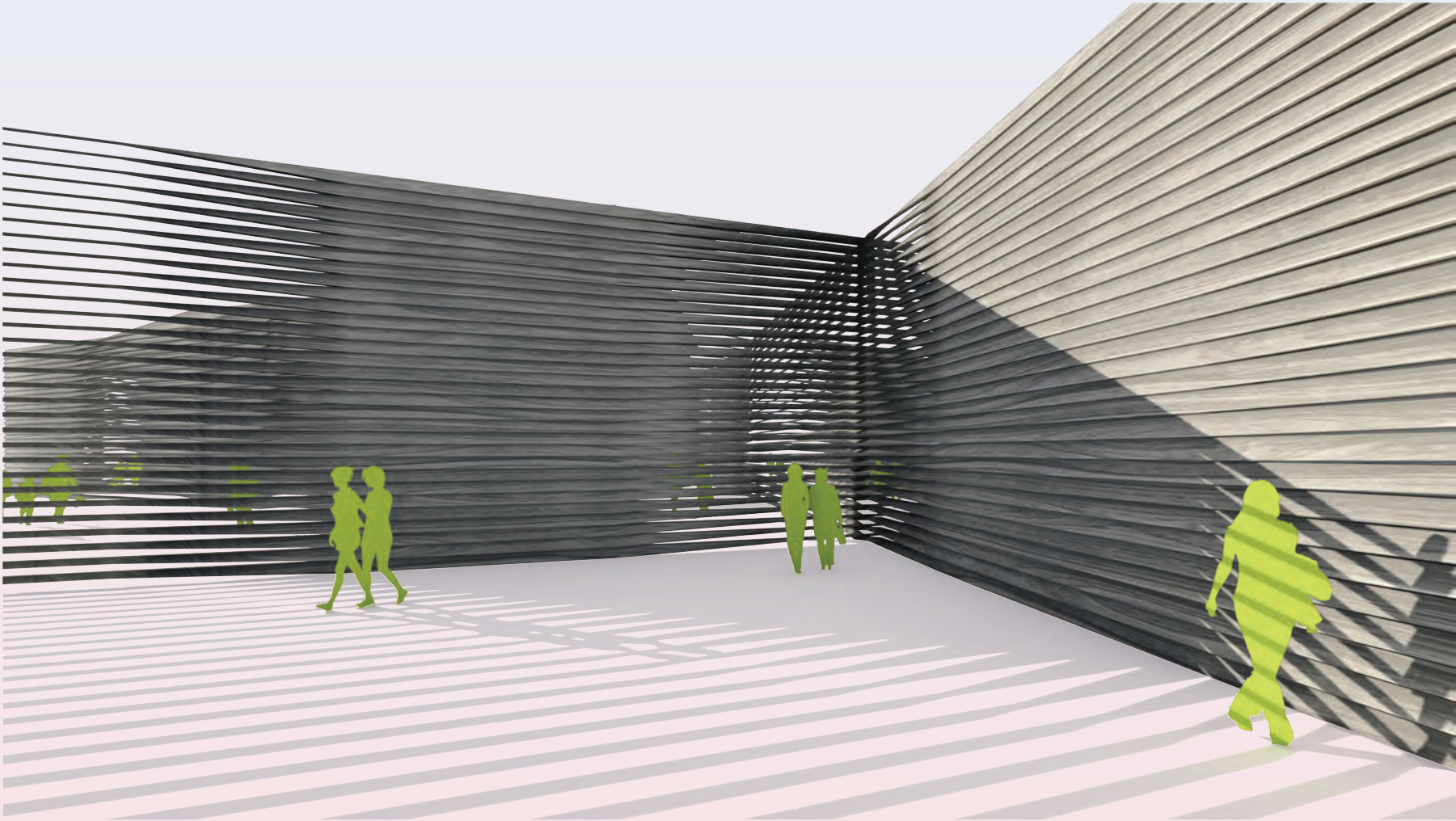


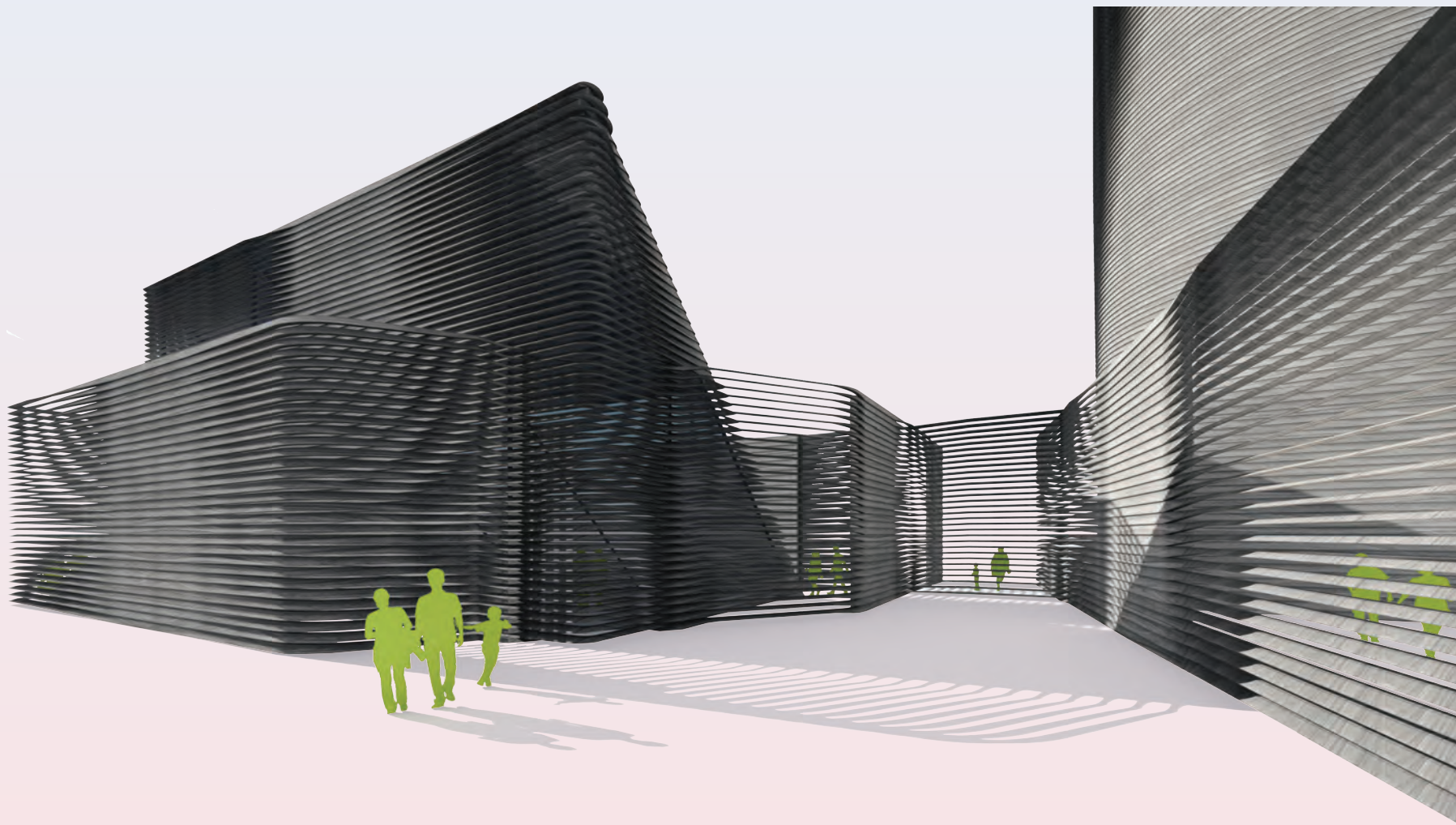
BACK ELEVATION

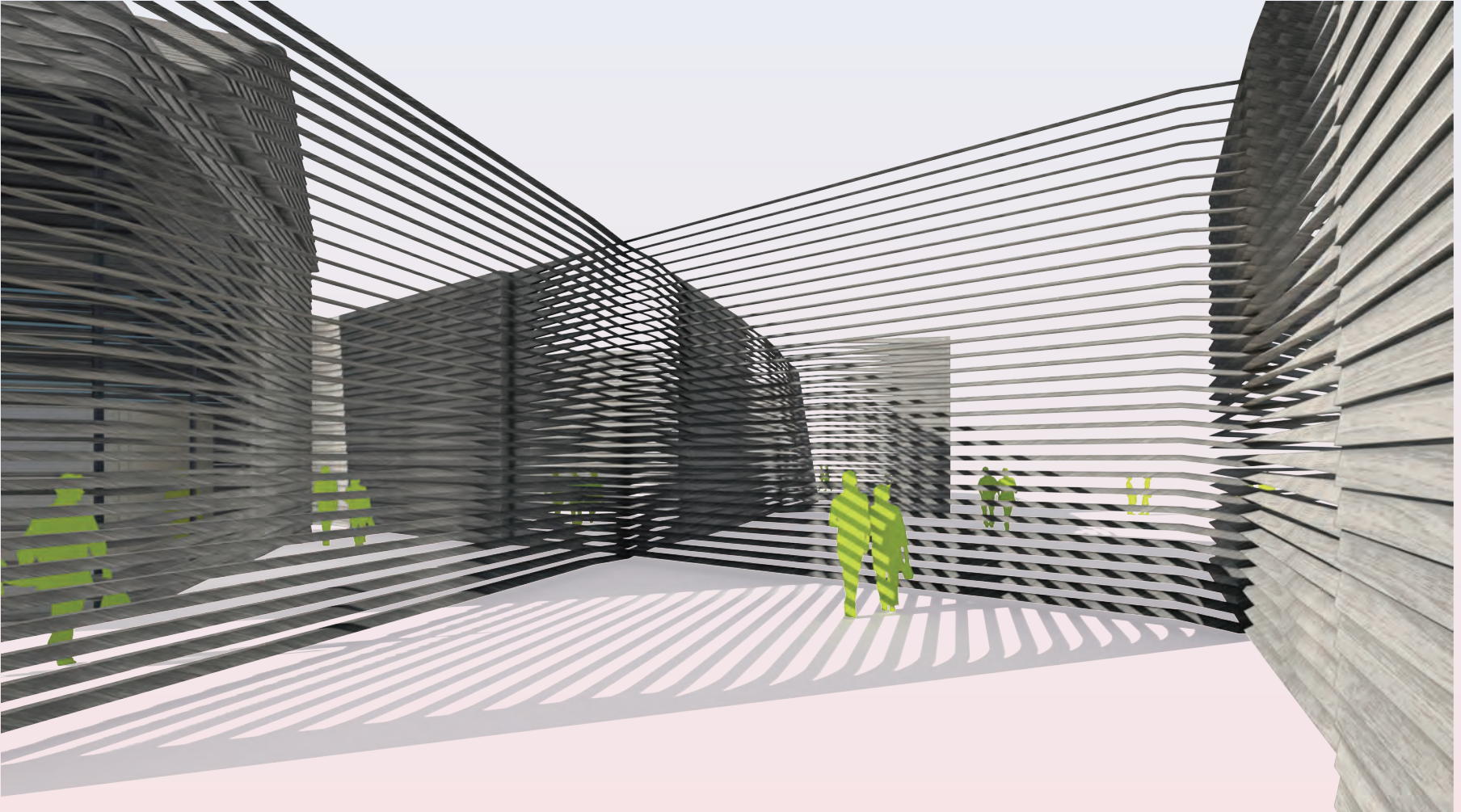


LEFT ELEVATION











CONCLUSION

To summarize, the contemporary discourse around chunky, discrete forms does not have to reject smoothness and gradients from the 90s digital project. The thesis takes advantage of smoothness and continuity through the use of a continuous envelope in order to blur the boundaries of the discrete objects and challenge the viewer's understanding. Yet, the geometry maintains a contemporary resistance to digital intricacy. The bands are derived from simply changing the cross sectional position of a line.

The inclusion of a continuous envelope provides the contemporary discourse with an alternative way to generate form with discrete, blocky parts.

In his *Indifference, Again* article, Michael Meredith characterizes this cohort of work as “describ[ing] itself in terms of qualities traditionally rejected in architecture like playfulness, failure, heaps, piles, ad hoc assemblages, collections, the ugly, the ironic, the awkward, the absurd, the cute, the humorous, the ambiguous, the banal, the non-design, the generic, the ready-made, the referential, crude material processes, the entropic, bad sketches, the cheap, the handmade, and so on.” He coins these strategies as “indifferent.”

Meredith concludes that “the artistic expression of no expression, of calculated indifference, is not necessarily the avoidance of or giving into extremist politics. Instead, when done well, architecture's calculated ambiguity - its indifference - is a social engine to produce discussion, reflection, thought, and even action, while allowing for the coexistence of an irresolvable diversity of ideas and identities.”

Although the social engine for discussion and reflection Meredith describes is a partial aim of the thesis, the contemporary discussion is too legible. Meaning it does not challenge the viewer or forms enough.

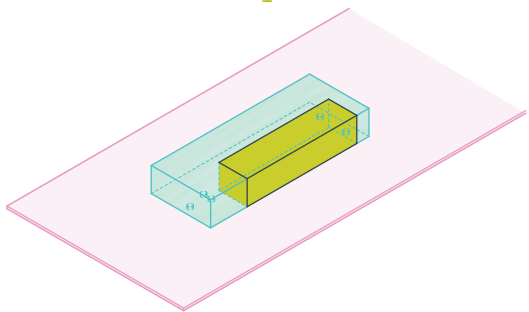
Many practitioners deploy familiar or indifferent forms within new contexts to reinterpret their meaning. However, it seems productive to first investigate why and when the iconic, familiar profiles - in this case: primitive profiles - are recognizable before deploying them throughout the entire discipline.

By choosing not to reject certain qualities of the previous 90s project, the thesis is able to challenge the legibility of primitive forms in a manner that promotes discussion and builds upon contemporary discrete formal strategies.

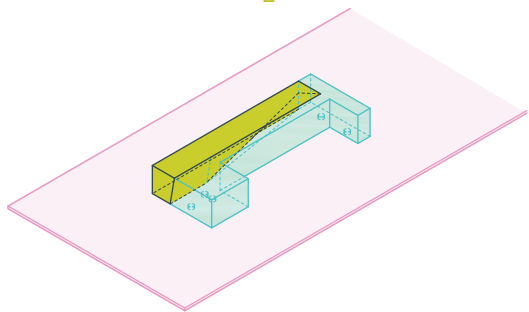


FABRICATION

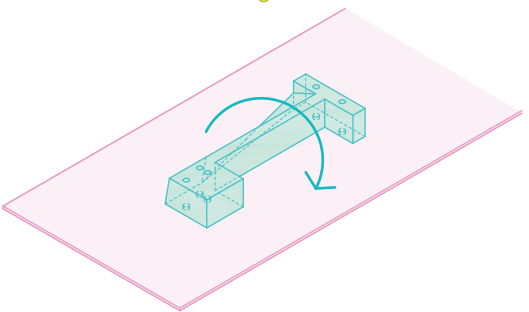
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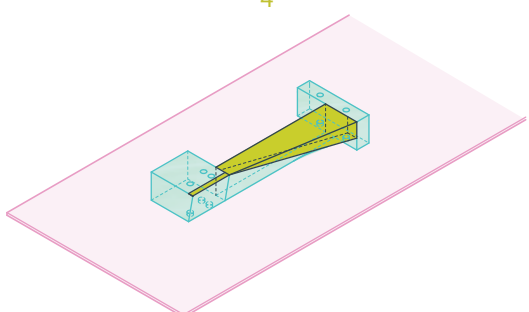
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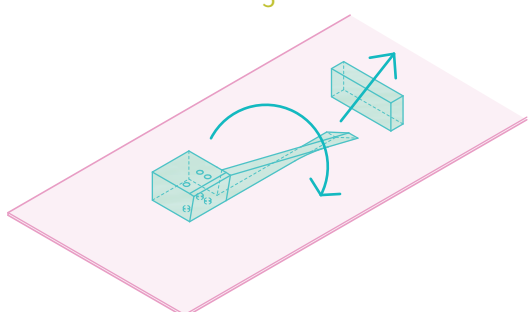
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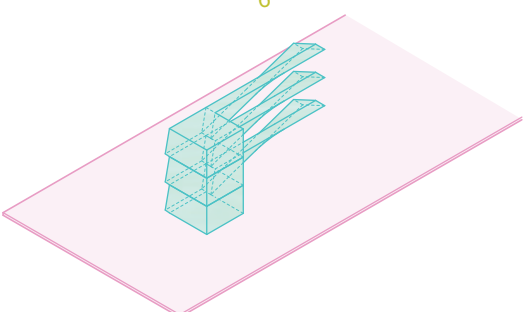
4



5



6



The bands are derived from simply changing the cross sectional position of a line along a constant rail. When the bands are fully closed, they are positioned at -80 degrees. When fully open, they reside at -20 degrees. A simple sweep command mediates the two positions.

The bands extend back 18” at certain points to create walls or anchor points and extend back only 4.5” as they pivot open.

The bands are CNC milled to profile in a series of operations.

The milling process begins with a stock piece of material that fulfills the cross sectional dimensions of both band positions (open & closed). The stock piece is held in place on the bed with 5 dowel rods that are inset into both the CNC bed and the stock material. 3 dowels on the anchor wall and 2 dowels on the opposite side.

Material is removed from the back side of the bands that are not anchor walls - figure 1. An addition 2” wide piece of stock is left at the extremity opposite of the anchor wall to support the cantilevering band and prevent machining errors due to vibration of the material.

The front side of the bands are then milled to cross sectional profile - figure 2.

The piece is then rotated 180 degrees on the bed while the dowel holes ensure the piece is placed in the exact same position - figure 3.

The bottom side of the bands is then milled to the correct thickness and profile - figure 4.

The piece is now done being milled and can be removed from the bed. The extra stock material opposite of the anchor wall can be cut off using a bandsaw - figure 5.

After machining, the band needs to be sanded to finish quality and then can be stacked to create a wall assembly system - figure 6.





The blue, yellow, and pink models are composed of 3D printed bands. These models required several test print iterations in order to arrive at the final product.

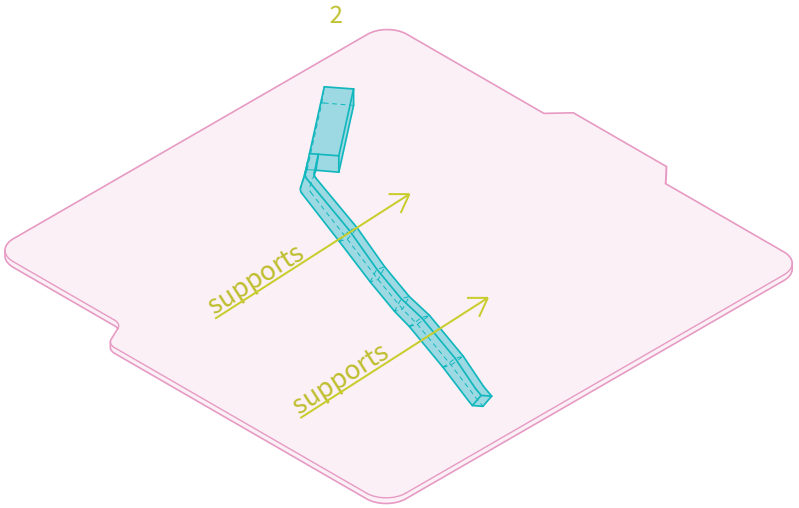
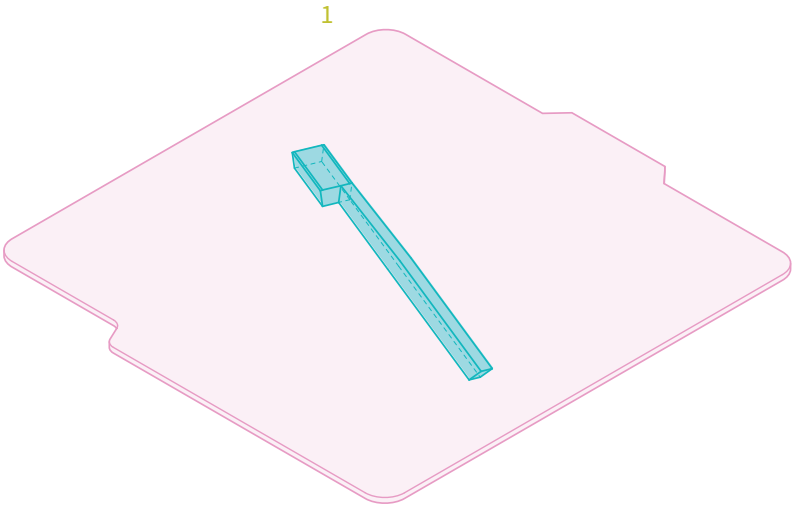
As shown in both diagrams to the right, each piece had to be placed on the print bed in a very particular position in order to reduce print imperfections. The assumption is that the retraction settings and tool path of this orientation reduces imperfections.

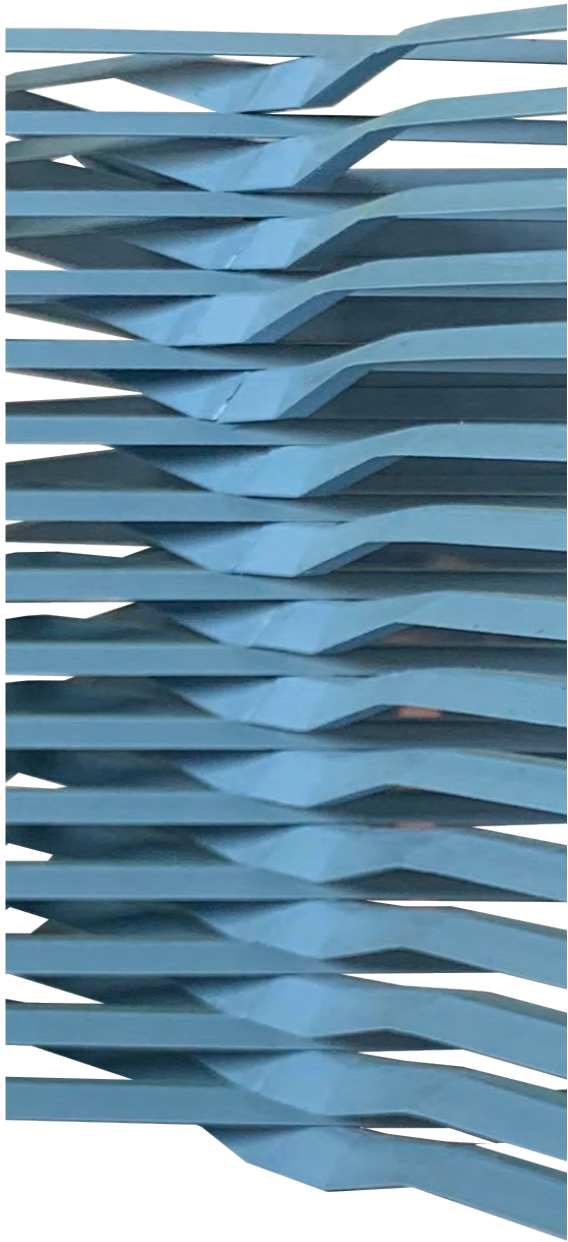
Bands that do not bend down to accommodate interaction with other bands are printed upside down on the bed. This orientation means the print does not need supports and ensures the best finish quality - figure 1.

Bands that do bend down to accommodate interaction are printed right side up because they require supports in either orientation and the finish quality is preferred on the top/front of the band - figure 2.

In either scenario, bands must be placed along the very particular angle on the bed and the cantilever must angle towards the back of the printer. This was found to be the best position for print quality. Each piece must also be printed individually - meaning the printer starts and finishes one whole object before starting another; as opposed to the typical settings where it prints one layer of each object at a time.

After each piece is printed, it is then sanded down and glued to adjacent bands.







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