In Plain Sight: A Sensory Art Studio For the Blind and Sighted Communities of Atlanta

Justin Schwartzhoff

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Gundula Proksch
AnnMarie Borys
Rick Mohler

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Abstract

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Chair of the Supervisory Committee:
Assistant Professor, Gundula Proksch
Architecture

Architecture, inherently a multisensory art, is at risk of becoming visually biased in modern culture. Representation in the digital age primarily engages sight, fostering a preference for forms created solely to please the eye. This form of creation disregards the other senses, which distances the observer from the surrounding world, reducing their ability to internalize, and thus connect with, their surroundings. Conversely, an architecture that fosters a multisensory experience intimately links the built environment to ones sense of self, promoting connection between the observer, the space, the community, and the architecture as a whole. This thesis posits that the insertion of a sensory art school for blind and sighted individuals can have a transformative effect on the surrounding community. By shaping form through auditory, olfactory, and textural cues, the architecture educates its occupants in the pattern language of the senses, allowing for a deeper understanding of and connection to the built environment.

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The man in the course of his space travels, needs the body messages to ensure the stability of their visual world. Not having this body information, the human being loses the connection with the world

– Juhani Pallasmaa, The Eyes of the Skin

Chapter 1 - Introduction

Architecture, as an art, is inherently multisensory. Other mediums, such as painting and sculpture, offer stimulation to only specific sets of human senses, but when one occupies architecture, their entire body is engaged. Buildings are primarily accessible through visual means of form and color, but these creations also reflect and produce sound, emit odors, and provide tactile cues. As the structures age, these stimuli evolve with the space, maintaining a historical record within the experience. Memorable architecture encourages an internalization of form, including elements that have a sense of scale easily understood by the body. These details conform to the grasp of the hand or the placement of a foot, partitioning the work into a series of human scale moments. Memorable spaces direct their soundscapes, shaping resonance and silence for poetic means. Their materials emit specific odors, connecting the built work to scent-driven memories, creating links between the space and the occupant's past. Architecture is an art that is not meant simply to be observed, but to be actively inhabited.

Yet today, architecture risks becoming a creation developed solely for the delight of the eyes. The built environment is often designed digitally, removed from the physical realm. The works are then marketed through two-dimensional renderings and photography, which allows wide accessibility at the expense of simplifying the work. Architecture, observes theorist Juhani Pallasmaa, is fast becoming a medium of "advertising and instant persuasion," sacrificing depth and meaning to produce instant gratification and foster easy consumption.[1] The increasing demand for a visual product to accommodate the digital medium results in a lack of emphasis on a multisensory experience. This is a troubling development, as when sight is privileged as the sole means of perception, the occupant is pushed into the role

1 Juhani Pallasmaa. 2005. *The Eyes of the Skin: Architecture and the Senses.* Chichester: Wiley-Academy. 30

of an outside observer, a state described by Pallasmaa as one of "detachment, isolation, and exteriority."[2]

Worse, sight-biased architecture creates difficulties for those with limited or fully-impaired vision. Multisensory architecture produces a variety of cues for the user to position themselves in space regardless of sensory ability. Sight-dominant architecture places the impaired in bland, seemingly identical spaces, where they are unable to absorb the intricacies designed only for visual pleasure. The lack of stimulation to the remaining senses affects all occupants, reducing the experience to a single dimension.

This thesis is an exploration of the connection between the body and architecture, attempting to draw attention to the senses that are often completely neglected in architectural design. In order to fully consider the multisensory potential of this form of art, the thesis proposes the creation of a learning facility, dedicated to the education, production, and display of tactile, olfactory, and auditory art by both sighted and visually impaired artists and students. The creation of universal space, regardless of ability, will be achieved through design methods that shape space to produce specific sensory responses. These sensory cues allow for the potential to internalize the architecture for all occupants and result in a building whose form mirrors the educational program, providing subtle lessons through the experience of the space itself.

An internalized experience makes possible a play between architecture and the body. When all senses are engaged, a building has the potential to promote a connection with the surrounding world. The insertion of an innovative educational institution into a developing urban system has the potential to become a bridge for users between two vital public spaces, between visual and multisensory experience, between blind and sighted occupants, and ultimately between the architecture and a memorable urban experience.

2 Ibid., 19.

fig. 1 - child touching the textured walls of St. Ignatius Chapel by Stephen Holl

fig. 2 - the isolated observer. 21st Museum of Contemporary Art - SANAA

Chapter 2 - Theoretical Framework

The Detached Eye

To fully understand the surrounding world, one requires input from each of the human senses. External stimuli are internalized by the body at a variety of scales, with each sense describing different elements of the space. Allowing one sense to dominate degrades the total experience, depriving the occupant of a complete version of their surroundings. When sight alone is engaged, the bodily experience becomes detached from the world. Psychologist Miriam Helen Hill describes this condition as one of the observer, able to perceive vast distances, yet permanently separated from that which is being observed.[3]

The eye offers a focused, directed understanding of distant objects. This information is delivered instantaneously in two dimensions, yet the gaze can shift quickly, yielding three-dimensional order to the scene. Vision allows an idiosyncratic comprehension of space, requiring no specific sequence to be followed to gain an understanding of the surroundings. Sight, as discussed by neurologist Oliver Sacks, grants spatial hierarchy to human perception. Without sight, the observer is removed from a spatial existence, instead existing in a purely temporal one, defined by the slow intake of sequential stimuli.[4]

Sight exhibits another unique quality among the senses: the sight-perceived world is not internalized by the body. As described in Hill's research, vision's instantaneous reach decenters the observer, with the instantaneous gaze allowing the viewer to shift perspective without a shift in bodily perception.[5] Designers, too, describe this disconnect. Architect Steven Holl explains that the filter of the eyes holds the observer at a distance, removing them from the sequential understanding of space, and leav-

3 David Seamon and Robert Mugerauer. *Dwelling, Place, and Environment: Towards a Phenomenology of Person and World*. Dordrecht [Netherlands]: M. Nijhoff. 1985. 100.

4 Oliver W Sacks. *An Anthropologist on Mars: Seven Paradoxical Tales*. New York: Knopf, 1995. 124.

5 Seamon, David, and Robert Mugerauer *Dwelling, Place, and Environment* 103.

ing them potentially "frozen in time."[6] Equally troubling, urban theorist Botond Bognar proclaims that this detachment may expand beyond the individual, into the community they inhabit. The effect of visual dominance in the built environment has the potential foster alienation within communities, and a degradation of public and private realms which undermines the role of the city itself.[7] Hill's research provides an intriguing reversal of this idea. While studying the perceptive abilities of blind individuals, Hill found that with sight removed, the other senses draw in stimuli internally, creating an intimate connection with one's surrounding. [8]

6 Steven Holl, Juhani Pallasmaa, and Alberto Pérez Gómez. 2006. *Questions of perception: phenomenology of architecture*. San Francisco, CA: William Stout.
7 Seamon, David, and Robert Mugerauer *Dwelling, Place, and Environment* 184.
8 Ibid., 100.

fig. 3 - What remains of vision
Città Ideale - Piero Della Francesca

As architects, we're visual animals. The interesting riddle for me, then is: if you take sight out of the equation, what makes for good architecture?

– blind architect Chris Downey

Void Spaces

As sighted individuals, trained in visual representation, it may be difficult for architects to imagine what defines space without the aid of the eye. Indeed, architecture often focuses on framing views, capturing light, or producing a visual rhythm of architectural elements, all in order to produce a sense of beauty. Yet while pleasing to the eye, these creations rely on the primacy of sight. The effort put into creating a dramatic, glazed vista is lost without vision, losing its impact on those unable to gaze out over the space beyond. A building that relies on grand spaces such as open atria, courtyards, and galleries often becomes featureless to those without vision. The blind individuals that participated in Hill's studies of perception described their discomfort when in wide, open areas that contain few sensory cues. To the blind, these spaces are the equivalent of an unlit room.[9] The implication that these spaces lose their architectural interest when vision is removed reveals how they exist solely for visual pleasure.

As a trained architect who was blinded by an injury late in his career, Chris Downey provides particular insight into the necessity of multisensory experiences. While still practicing architecture, he has come to question the role of architectural design once sight is removed, criticizing the standards developed to help guide those without vision. Codes and guidelines such as the ones prescribed by the Americans with Disabilities Act, Downey argues, have gone a long way helping those with low vision get into the building. He continues that these guidelines, however, often stop at the door, providing no benefit or help with the experience within.[10] Examining the diagrams associated with these guidelines makes evident Downey's point. They reveal that codes are primarily intended to ensure only safety and accessibility. Building design, then, becomes an effort in preventing surprise collisions for the visually impaired. Moments of interest, such as textured surfaces, do exist, but are employed only

9 Ibid., 103.

10 Chris Slatin. "Q&A> Architect Chris Downey Finds Second Sight.": The Architect's Newspaper, LLC.

at dangerous transitions. The blind, then, are navigating a void. While these diagrams have been simplified in order to exhibit the guidelines, they hint at a misunderstanding of the potential of space beyond vision. Downy's critique of code comes from an understanding that architecture can provide multisensory engagement beyond simple protection. Hearing, smell, and touch can define space and create sensory interest. This multisensory experience extends to all occupants, affecting the impression of space regardless of visual acuity. Downey proclaims that since losing his vision, he understands that a well-designed place is not a space simply to be viewed, but a space for your entire body.[11]

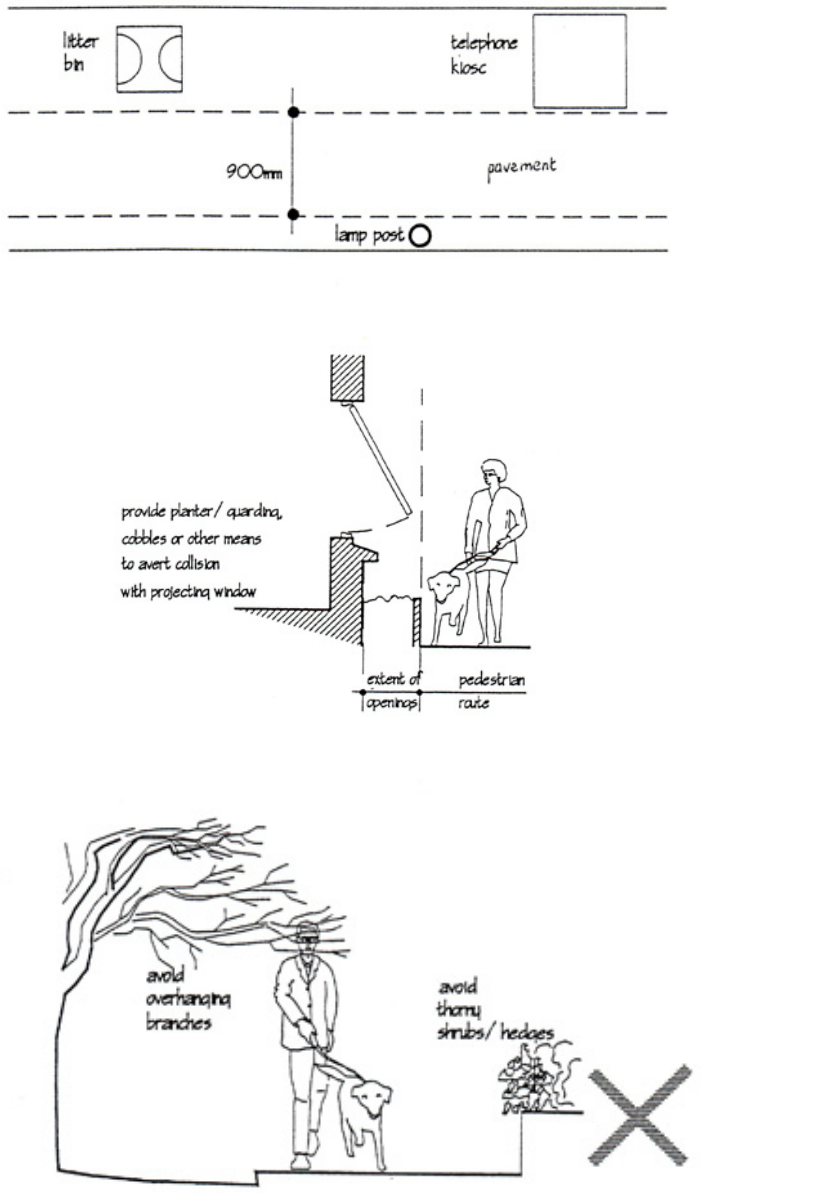


fig. 4 - creating "open" space for the blind

11 Chris Downey. "New Vision in Architecture." Lecture, TEDxBigApple from TED Conferences, LLC, New York City, February 4, 2012.

Pattern Language

> *"Doubtless he saw something – but what did he see? What did "seeing" for this previously not-seeing man mean? What sort of world had he been launched into?"*
>
> *- Oliver Sacks, An Anthropologist on Mars.*

To create architecture that fosters engagement and interest, even when sight is removed, the design must consider the entire multisensory experience. Yet, in a visually-biased culture, even when these experiences exist, their meaning may not be readily apparent. The responses produced by the senses, explains Oliver Sacks, gain meaning through exposure. When presented with a sensation, a person is essentially presented with an unfamiliar word. [12] Through repetition and context, the experience gains meaning and eventually becomes internalized. For this reason, Sacks describes the response of the senses as "pattern languages," with each sense contains its own vocabulary of spatial descriptions. [13] In order to foster these pattern languages in a visual culture, and to provide a universal space for both sighted and blind occupants, the spatial reasoning of those with low-vision must be defined. With each sense, methods for comprehending sensory response emerge, providing guidance for design that both engages the body and nurtures the creation of an individual's own pattern languages.

Patterns of Light and Shadow

When considering sight, in design for the blind, traditional sensory responses of spatial depth and perception are no longer viable. However, design for the blind still allows for vision to be engage. Tough not commonly realized, most blind individuals retain elements of vision, although these responses are often fragmentary and distort-

12 Sacks. *An anthropologist on Mars: seven paradoxical tales*. 111.

13 Ibid., 141.

ed, to the point that they provide only fragmentary meaning.[14] Sight for these individuals does not describe a coherent, volumetric form, but instead forms more random patterns of color and light. These patterns maintain the potential for visual delight, and the experience can result in vivid memories. Stephen Kuusisto, a blind poet, writes of these moments often, particularly the dappled patterns of shadow and light caused by the sun filtering through the trees.[15] His perceptions of the surrounding environment are understood through this differing pattern language, in which contrasting visual impressions provide meaning.

This differing approach to the nature of vision suggests that strong contrasts of light and shadow and bright, opposing colors can be used as a means of formal generation. The firm TALLER Mauricio Rocha + Gabriela Carrillo, in their design for the Hall for the Visually Impaired in Mexico City experiment with

fig. 5 - Hall for the Visually Impaired in Mexico City

14 Stephen Kuusisto. *Eavesdropping: A Life by Ear.* New York: W.W. Norton, 2006. Xii
15 Ibid., 130.

fig. 6 - Contrast employed at the entrance to the gallery creates a visual landmark

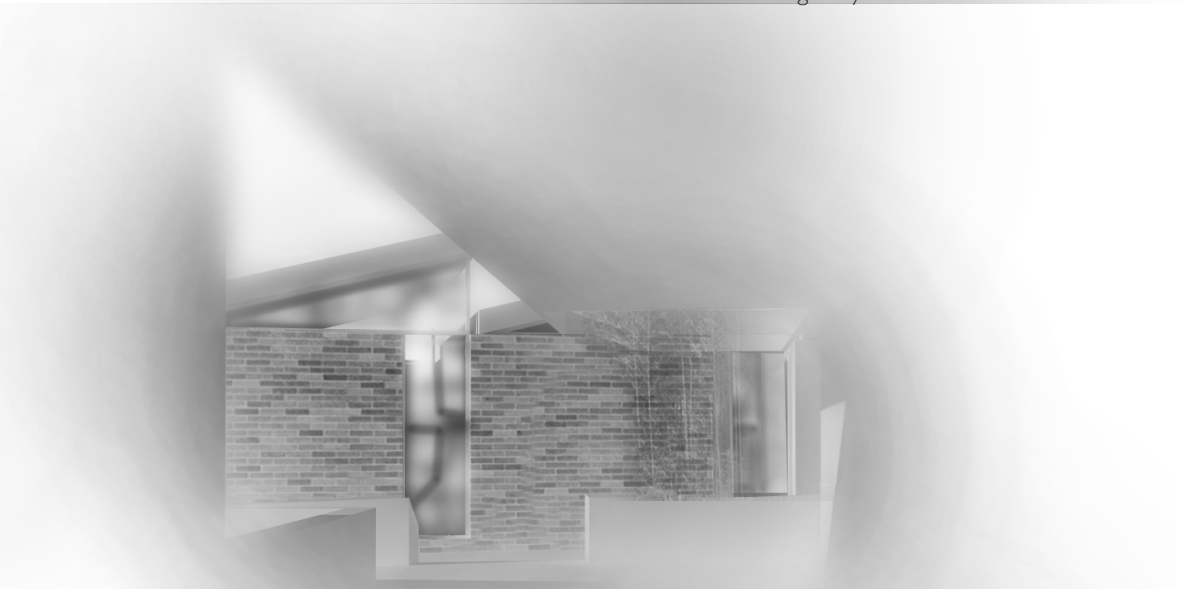


fig. 7 - Varied glazing patterns at the classrooms create dappled light for identification

this concept as both a source of visual interest and a way finding system. Within the project, they combine vibrant stripes of colored corian with an overall palette of darkened wood tones. The intense color of the stripes, a yellow bordering on florescent, was selected to maintain the strongest contrast. This ensures visibility for the widest range of visual acuity, as color intensity is typically the last element of vision to degrade.[16] In another project for the blind in Mexico City, the Centro de Invidentes y Débiles Visuales, the architects again employ contrast as a formal generating tool. Here, however, the project utilizes strong shadows and bright strips of light instead of varied colors. The center's spatial layout contains deep hallways to produce shade, which are split by shafts of light. The result is a two dimensional, contrasting pattern that maintains legibility for those with low-vision. The experience of contrast in both projects describes elements of the pattern language of sight that exist beyond spatial hierarchy, providing methods for its implementation beyond abled sight.

16 Priscila Vanneuville. "Hall for the Visually Impaired." (accessed July 29, 2014).

fig. 8 - The Forty Part Motet by Janet Cardiff, Installation in Tokyo

Patterns of Echo and Silence

"Can architecture be heard? Most people would probably say that as architecture does not produce sound, it cannot be heard. But neither does it radiate light and yet it can be seen"

– Steen Eiler Rasmussen, Experiencing Architecture

HEARING, LIKE SIGHT, ALLOWS for the perception of objects that are placed at a distance from the body. External noise sources can be located through hearing, providing the potential to define sonic locations, or soundmarks. Reflected sound is carries with it the aspects of solid forms and empty voids as it reverberates through space. Hearing is the sense that is most often credited for helping the blind navigate, providing a means to judge the closeness of a wall or describing the moment of passing beyond the edge of a building into open space.[17] Subtle shifts in ambient noise can act as a powerful way finding tool for the blind, as documented in Hill's studies.[18] However, while offering a way to perceive distant objects, unlike sight, hearing avoids creating a sense of detachment. Sound is received omnidirectionally, locating the listener at the center of auditory space. Because the ambient noise surrounds listener, it becomes internalized while simultaneously extending bodily perception to the edges of the auditory space.[19]

Sensory artists utilize both the place making and space making qualities of sound in their installations, in an effort to explore the pattern language of this sense. Each work serves as an experiment and an example of how sound can inform, transform, and be shaped by space.[20] Janet Cardiff, describing her work "The Forty Part Motet," explains that she attempts to

17 Downey. "New Vision in Architecture." Lecture

18 Seamon, David, and Robert Mugerauer *Dwelling, Place, and Environment* 102
19 Ibid., 94.
20 Apostolos Mitsios. "Zimoun // The Magician of Spatial Sound Installations." Yatzer.com. June 28, 2011. Accessed September 19, 2014.

Jim Dwyer. "Moved to Tears at the Cloisters by a Ghostly Tapestry of Music." The New York Times. September 19, 2013. Accessed September 19, 2014.

construct an auditory sculptural space, while allowing the original space to be explored by the listener. The Motet is a traveling installation, consisting of forty speakers that are arranged similarly in each venue. The interplay between the physical location and the virtual space defined by her recordings varies between iterations, allowing the work to evolve with each insertion.[21] Zimoun, another sound artist whose work fills galleries with white noise, creates soundscapes that can be explored as if they were enclosed space. The installations are deceptively simple, made up of individual sound producing devices that are scaled up to create "walls of sound." The resulting large, sonic spaces emerge from compositional altercations "between void, density, space, structure, interfacing, static and balance." [22]

Architecturally, sonic features are most often developed to neutralize ambient noise within the built environment, utilizing

21 Dwyer. "Moved to Tears at the Cloisters by a Ghostly Tapestry of Music."
22 Mark Wright. "Zimoun." EAR ROOM. January 1, 2011. Accessed September 19, 2014.

fig. 9 - Jewish Museum "Voids", Berlin

elements of white noise, such as moving water to obscure the sounds of the city. When sound is considered as a constructive element in architecture, it is often employed in an opposing way than the approach of the sound artists. Rather than creating soundscapes to simply fill the spatial volumes, the architects seek to punctuate silence with intermittent noises. This approach relies on the presence of sound within a larger void, as opposed to defining space through the sound itself. The "Voids" in Daniel Libeskind's Jewish Museum in Berlin utilize this method, amplifying the effect through the inclusion of a sound installation.[23] The voids, large occupiable volumes that have been removed from the larger building mass, stand as reminders of the loss caused within the Jewish community during World War 2. Within the space, an auditory installation results in the visitors producing harsh, metallic punctuations of sound as they walk. The resulting noise reflects off the walls, echoing in the cavernous space,

23 "Shalekhet - Fallen Leaves." Jewish Museum Berlin. Accessed September 18, 2014.

reminding the listener of the enormity of what is missing. The soundscape within the voids creates an atmosphere of reverence through silence, with each sound unable to form a space within such a large cavity.

The spatial qualities defined through hearing are part of the pattern language often underutilized by those who navigate by sight. However, when considered, this aspect of hearing creates great potential for formal generation within architecture. TALLER's Hall for the Visually Impaired provides an example of this as the space creates partitions for different programmatic functions. Although the main room lacks walls to denote space, a sectional shift occurs between the stalks and the reading spaces. Here, the double height ceiling drops to single height spaces, causing a shift in the reflected sound. The area is marked by its differing sonic characteristics, providing a clear differentiation of space.[24] Chris Downey, too, has worked extensively with sound in designs for the visually impaired. In one project, he describes the addition of a low, overhead bridge to provide sonic guidance across a large open atrium.[25] Without the bridge, the atrium would be impossible for the blind to navigate without help. With the overhead structure, a sonic zone exists, providing a corridor for travel through the open space.

The spatial qualities of hearing – as a locator, a generator of form, and a reflection of built form – expand its pattern language. The sense contains strong potential as a navigational aid for the blind, but offers opportunities beyond that, allowing for aural delight and expansion of the buildings poetics, if considered as a tool for formal generation.

24 Vanneuville. "Hall for the Visually Impaired"

25 Chris Downey. "Connecting Across the Visual Divide." Lecture, TEDxUChicago 2011 from TED Conferences, LLC, Chicago, April 17, 2011.

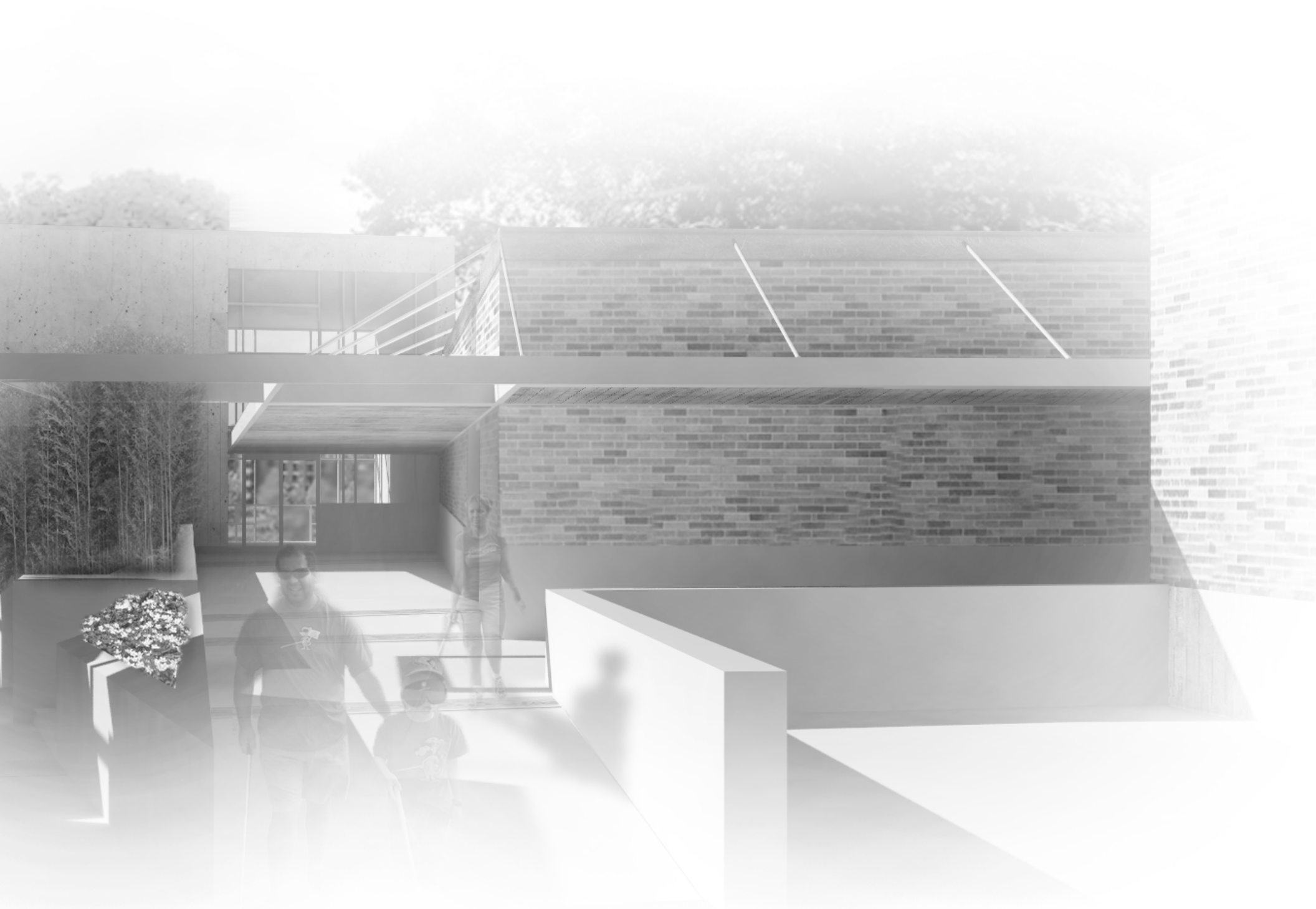


fig. 10 - The Entry Courtyard awning shapes space and works with the plantings to create a soundmark to provide a navigational center

fig. 11 - Textured surfaces of the Center for the Blind in Mexico City

Patterns of Texture and Temperature

Unlike sight and hearing, the sense of touch, typically allows only for perception of the immediate surroundings. Yet direct bodily contact with the built form conveys information that is largely imperceptible through other means. By experiencing the tactile properties of objects, the observer gains an understanding of their materiality, mass, and thermal qualities. Touch, argues Pallasmaa, maintains a strong connection to the body, as it provides an understanding of scale and proportion that is often obscured by the other senses. [26] This quality of tactile sensation offers the most intimate connection to space, ultimately partitioning space into human scale elements. This act forms a link between the body and the surroundings, allowing each to dwell within one another.[27]

The amount of information conveyed each tactile interaction has allowed touch to be used as a guidance tool between the built environment and the blind. As such, the sense is employed specifically within code, with ADA guidelines requiring textural applications that describe space, including braille signs and warning strips. In 2012, the American Institute of Architects attempted to advance the understanding of tactile space by conducting a study on the necessities of touch for visually-impaired guidance. Their report found that sensory cues are internalized primarily in two zones within the body – the hands and the feet. Each zone necessitates specific tactile engagement during times of movement and rest, with the hands preferring smooth surfaces, regardless of motion, and the feet able to comprehend meaning rougher textures during times directional guidance.[28]

These guidelines, while arguably beneficial, offer a sterile understanding of the function that touch provides in architecture. In contrast, the works of TALLER Mauricio Rocha + Gabriela Carrillo, provide a much stronger example of the potential for haptic design. Textural guidance is an integral part of both the

26 Pallasmaa. *The Eyes of the Skin* 40.
27 Ibid., 41.

28 Jasmien Herssens and Ann Heylighen. "Haptic design research" 376.

Centro de Invidentes y Débiles Visuales and the Hall for the Visually Impaired, acting as both a visual device and a practical transfer point for information. The Centro de Invidentes y Débiles Visuales utilizes cast-in-place concrete accents at hand height along the exterior of buildings within the complex. These continuous bands of concrete provide a sense of unity throughout the facility. At the same time subtle variations in the texture contain information about specific locations.[29] The graphic strips of yellow Corian employed within the Hall for the Visually Impaired are also used in this manner. The smooth, colored boards contrast with the wooden textures of the library, creating a guiding path for the hand as visitor navigates the space. The Corian surfaces contain descriptions in braille, resulting in a continuous band of information that would otherwise be handled with individual, detached signage.[30]

fig. 12 - Moments of textural and thermal engagement within the the Sensory Art Institute

29 Mauricio Rocha, Humberto Ricalde G., and Javier Barreiro. 2011. *Mauricio Rocha: Taller de Arquitectura.* México, D.F.: Arquine.
30 Vanneuville. "Hall for the Visually Impaired"

Beyond playing a practical role, touch has the potential to become part of the poetic nature of the architecture. Touch provides the first true interaction with the building form, an act personified by Pallasmaa who writes that "the door handle [acts as] the handshake of the building."[31] Conveyed through the haptic sense, the thermal characteristics of material can enhance architectural intent, allowing for a sensation of heat or coolness separate from the overall temperature of the space.[32] The skin's ability to transmit thermal understanding provides an opportunity for exploration of environmental elements, such as sun, shade, and wind, within design. The relationship between an occupant and these sensations changes as the occupant moves through a space, allowing touch to provide an increased awareness of ones surroundings.

The language of touch contains a wealth of potential interactions with the user. These qualities are perhaps why the sense sees continued exploration, even within an increasingly visual culture. Stephen Holl proclaims that, "when the materiality of the details forming an architectural space become evident, the haptic realm is opened up." This tactile understanding, then, amplifies the understanding of space, allowing it to "become more real."[33]

31 Pallasmaa. *The Eyes of the Skin* 56.
32 Rasmussen, Steen. *Experiencing Architecture* 182.
33 Holl, Pallasmaa, and Pérez Gómez. 2006. *Questions of Perception* 91.

fig. 13 - Smoke Room, Olfactory Installation by Peter De Cupere

Patterns of Material and Memory

The use of smell within architectural design is often ignored, as the sense lacks obvious connections to spatial definition. Odors drift, linger, and float aimlessly with the air, flowing fluidly to fill the volume of space. Yet of all the senses, smell creates a deep connection with space through memory. As such, certain scents have the power to recall striking impressions_of the spaces in which they were originally experienced.[34] These memories are highly personal, which hinders the use of smell as a universal guide. However, the intimacy of the experience creates deep bonds within the observer. Olfactory artists, like Peter De Cupere, draw from these abilities of smell to foster personal connections between viewers and their work. De Cupere's pieces, such as his "paintings" made of the burnt ends of cigarette butts, combine visual imagery and strong odors to invoke memories that are highly specific to the individual observer. This creates fosters a familiarity with the work, while prompting the viewer to move beyond their own habituation as new meaning is layered onto to the olfactory stimulation.[35]

Spatially, smell has the potential for use as a guiding tool within the built environment. Hill's research on perception describes visually impaired individuals who employ scents that remain consistent every day as olfactory landmarks, or scentmarks.[36] Chris Downey, too, describes his use of olfactory cues to navigate the city, stating that each place has a particular fragrance, allowing the visually impaired to distinguish between different streets and alleys.[37]

The language of small, then, within in the experience architecture has poetic and practical implications, serving as both a guide and a tie to memory. The potential of smell is a venue of experimentation in TALLER's Centro de Invidentes y Débiles Visuales. The large complex includes scent gardens, spaces con-

34 Pallasmaa. *The Eyes of the Skin*, 54.

35 Peter De Cupere. "The Art of Smelling, Olfactory Art Research." Peter De Cupere. December 1, 2013. Accessed September 18, 2014.
36 Seamon, David, and Robert Mugerauer *Dwelling, Place, and Environment* 104
37 Chris Downey. "Design with the Blind in Mind."

taining specific palettes of plants whose aroma provide anchorage to the outdoor spaces. In order to contain their effect and maintain their power, these gardens are employed minimally and with specific intent. Through careful selection and placement, the odors remain distinct, without being overpowering. [38] TALLER's founder, Mauricio Rocha has also presented the idea that the use of scents is not limited to landscaping. In interior spaces, the materials present within the room often contain distinct odors, a feature amplified by the quantity of a material within in the work. In particular, Rocha describes his love of wood as a construction material, for its sonic qualities, its apparent warmth, but particularly for the powerful memories of evoked by its smell.[39] The use of smell within architecture is still in the early stages of exploration. However, there is potential in the sense's ability to invoking scentmarks both spatially and temporally.

fig. 14 - Planters create a column of scent, linking three distinct vertical spaces within the Sensory Art Institute

38 Vanneuville. "Hall for the Visually Impaired"
39 Mauricio Rocha-Iturbide. "CAPD Lecture: Mauricio Rocha-Iturbide." Lecture, from Kansas State CAPD, Manhattan, Kansas, November 10, 2010.

The Multisensory Experience

My perception is [therefore] not a sum of visual, tactile and audible givens: I perceive in a total way with my whole being: I grasp unique structures of the thing… which speaks to all my senses at once

- Merleau-Ponty

ARCHITECTURE, WHEN CRAFTED AS a unified multisensory experience, has the potential to create intimate connections with the viewer, while simultaneously expanding their world. Each sensory experience adds complexity to the work. When focused on sight alone, built work provides only a detached spatial existence. With hearing, the space envelops the observer, reflecting the enclosure and gaining further complexity through the creation of sonic form. Similarly, touch can translate the built form into bodily knowledge that conveys proportion, mass, texture, and temperature. Finally, smell can be invoked to tie built work into the occupant's memory, creating a link across time.

Good architecture, argues Steen Eiler Rasmussen, provides education for all of these senses, nurturing an understanding of the space on a phenomenological level.[40] For the blind, a multisensory space is critical to allow for full accessibility and appreciation of the work. However, for both the sighted and the blind, the multisensory experience fosters an education into the pattern languages of the senses. Development of these languages is especially important for sighted individuals. While the blind have lost the sense of sight, the sighted have often let their other senses become underdeveloped, resulting in, what is described by Miriam Helen Hill as, their own form of "disability."[41]

Therefore, an architecture designed to incorporate the pattern language of the senses represents an opportunity to improve the experience of all uses. The built work, then, can encourage an understanding of the bodily senses, fostering internalized connections between the work and the observer. Through these connections, the work reduces the potential for isolation and detachment that, Pallasmaa argues, results from visually biased works, and as the occupant becomes acclimated to the langue of the senses, their experiential understanding is extended into the surrounding community.

40 Rasmussen, Steen. *Experiencing Architecture* 14
41 Seamon, David, and Robert Mugerauer *Dwelling, Place, and Environment* 109


SHAKY KNEES
MUSIC FESTIVAL
ATL
GA
MAY 9 – 11 2014
AT
ATLANTIC STATION
ATLANTA, GEORGIA
DOS EQUIS
DOS EQUIS

Chapter 3 - Design Objectives

fig. 15 - North Avenue, Atlanta, Georgia View From the Eastside Trail

fig. 16 - Beltline Map

Sensory Art Institute - Atlanta, Georgia

To explore the potential of multisensory architecture within a community, this thesis proposes a site in Atlanta, Georgia. Atlanta is a city whose history is dominated by transportation, beginning life as a major rail hub in southern region of the United States. As the town grew, automobile technology allowed development sprawl outward from the core. This spread was further fueled by racial tensions, as wealthy, and predominately white, citizens moved out of the poorer, racially diverse city center. As a result of these tensions, the growth of mass transit was severely stunted, creating an infrastructure that is dominated by the automobile. This car culture, thanks to the high speeds and isolation within the vehicles, strongly promotes a visual culture within the city.

However, Atlanta's infrastructure is changing dramatically with the introduction of the Beltline transit corridor. The Beltline is an attempt to reuse Atlanta's historic rail corridors, which, up to this point, were seen as abandoned spaces. The

unused and underused right of ways are being replaced with a multimodal system, consisting of a light-rail/trolley bordered by walking and bike trails. The new construction attempts to fix the issues of the previous mass transit system, MARTA, by providing pedestrian access to several unconnected neighborhoods that were previously accessible only by car. Upon completion, the Beltline will create a 33-mile loop around the city core, promoting a walking culture that Atlanta has lacked up to this point.

The effects of the new walking culture are already evident in the section of the Beltline that the site is located within. This portion, known as the Eastside Trail, is a two-and-a-quarter mile path of completed bike and walking trails that connects Atlanta's Inman Park neighborhood to Piedmont Park, to the north. Along the stretch, users can access other neighborhoods, including Virginia Highlands and the Old Fourth Ward. Although the light-rail/trolley system is still years from construction, the trail sees heavy use from city residents for both leisure and sport, and the area has become a hub for local business, markets, as well as for artists' studios that now populate its edges.

The urban fabric that borders the trail is a mixture of new, mid-to-large scale residential development and repurposed utilitarian structures that once served the rail corridor. As a result, most of the commercial spaces are now reclaiming what was once considered back-of-house space, reusing warehouses characterized by patinaed, corrugated steel awnings, brick facades, and elevated porches created from platforms used to serve the railways. Other utilitarian spaces, such as street overpasses, have been converted into outside galleries, playing host to extensive street art murals that serve as a reminder of the graffiti that once covered these spaces. To the city's credit, the new murals are commissioned works created by the same street artists who once had to produce their art in secret.

The underpasses are one part of an attempt by the city

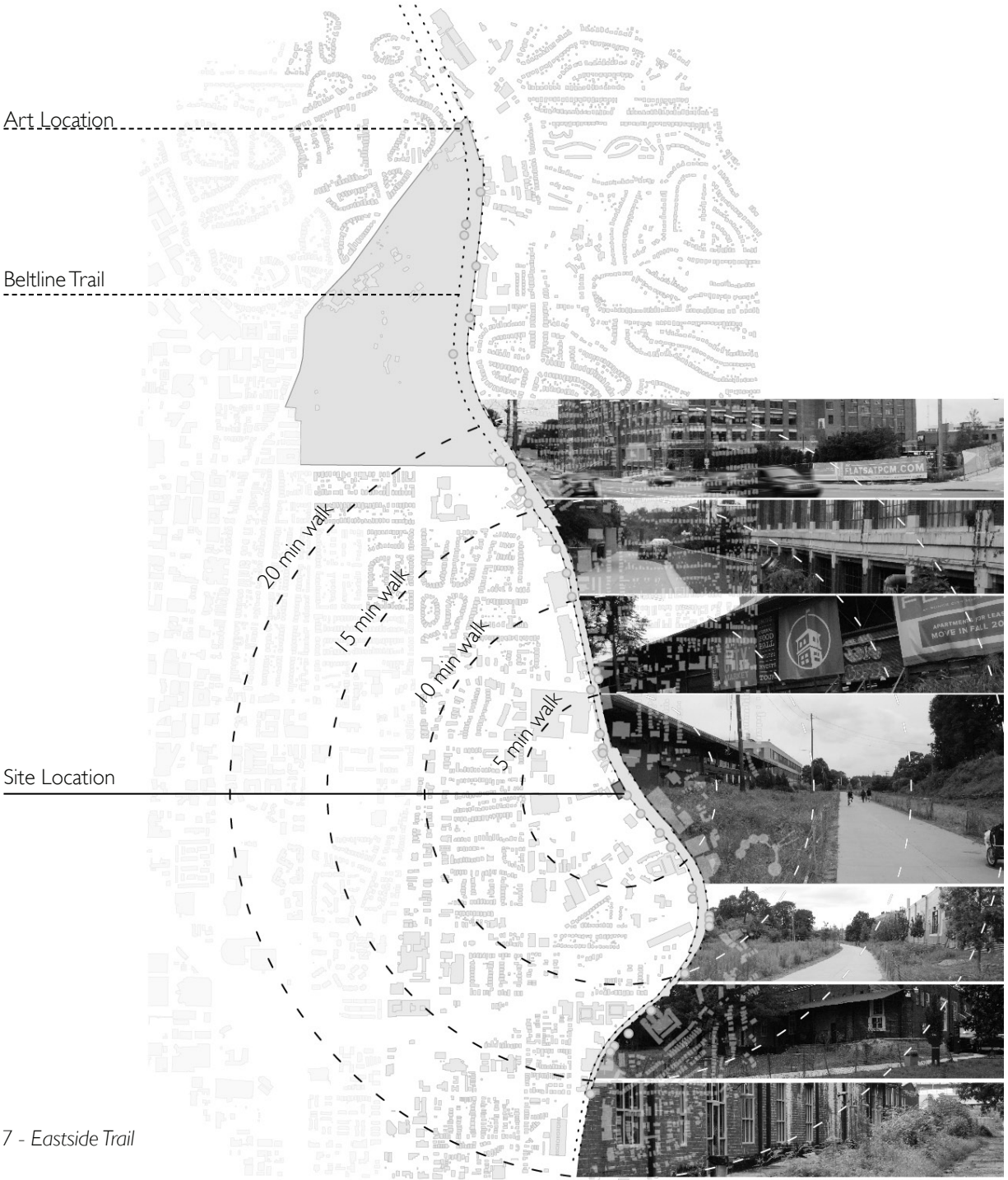


fig. 17 - Eastside Trail

to use the Beltline as an outdoor gallery for public art. Beyond the graffiti, several other styles of work have been commissioned along the lengths of the path. However, the majority of these pieces are intended solely for visual consumption. Sculptural work is generally inaccessible, placed either behind construction fences or within planted settings, forcing the pieces to exist as objects for sight alone. Art that engages hearing, smell, and touch is present within Atlanta's creative community, but currently, multisensory works are only displayed on the Beltline during temporary events. As the Beltline helps Atlanta transition from car/visual culture to a culture of the pedestrian/multisensory, there is potential for a permanent setting for sensory works within the multimodal system.

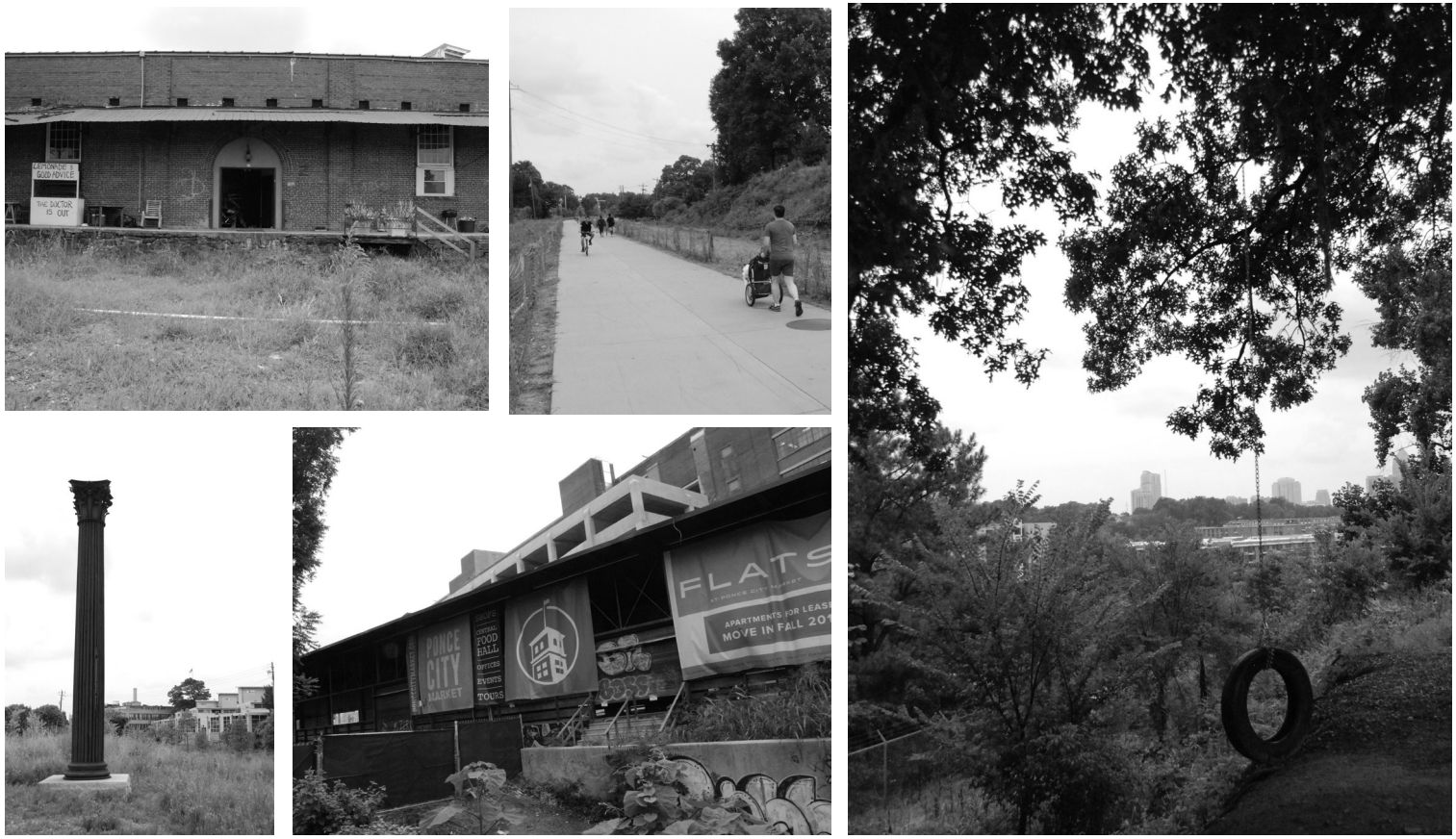


fig. 18 - Collection of moments along the Eastside Trail

fig. 19 - Site aerial and sensory diagram

Sensory Art Institute - The Site

To encourage a community connection to the newly housed works, the Sensory Art Institute is positioned at a specific topographical condition between the Historic Fourth Ward Park and the Eastside Trail. Here, the site slopes steeply from the Beltline, prohibiting access from the trail to the park and neighborhoods beyond. This creates the potential for the Institute to provide a connection between the two public amenities, directing the flow of traffic through the school's public space. By providing a common path of travel, the institute gains the opportunity to expose pedestrians to a multi-sensory experience, encouraging further inquiry into the school.

Pedestrian traffic is assumed to flow east and west through the site, with people moving from the park situated on the low, western edge of the site to the trail on the high, eastern edge. The park, Historic Fourth Ward Park, contains several walking paths and a large, well designed retention pond at the low point between two hills. Because the park occupies the majority of low lying space between the institute and the surrounding city fabric, there is potential for direct solar gain and access to westerly winds that is protected to development. The retention pond features several fountains and waterfalls, which act as soundmarks, useful for orientation in the surrounding area. The noise from these fountains is low, but constant.

The Masquerade music venue borders the site to the north. The venue maintains an outdoor festival area which sees use during the warmer months. These events must be included in the design considerations for the institute's soundscape. Beyond the Masquerade, North Avenue, a high traffic, five lane road, is a reminder of Atlanta's car-centric past. The sounds of traffic are occasionally audible from the site, especially when a direct, open path exists between a visitor and the street. The sites southern edge is bordered by a Georgia Power facility that is expected to be removed and replaced with mid-rise residential comparable to the new developments across from the park.

The Beltline trail, bordering the site to the east, is assumed to have the strongest impact on the design. The majority of pedestrian traffic to the site will arrive from this direction, as the Beltline serves as the connector between the area and the city as a whole. The soundscape of the trail primarily consists of the sounds of runners and cyclists, as well as the conversations of Atlanta's new breed of "flauners," who have taken to strolling along the path. When construction completes on the light-rail/trolley, the systems mechanical sounds will become a regular addition, creating an orienting soundmark.

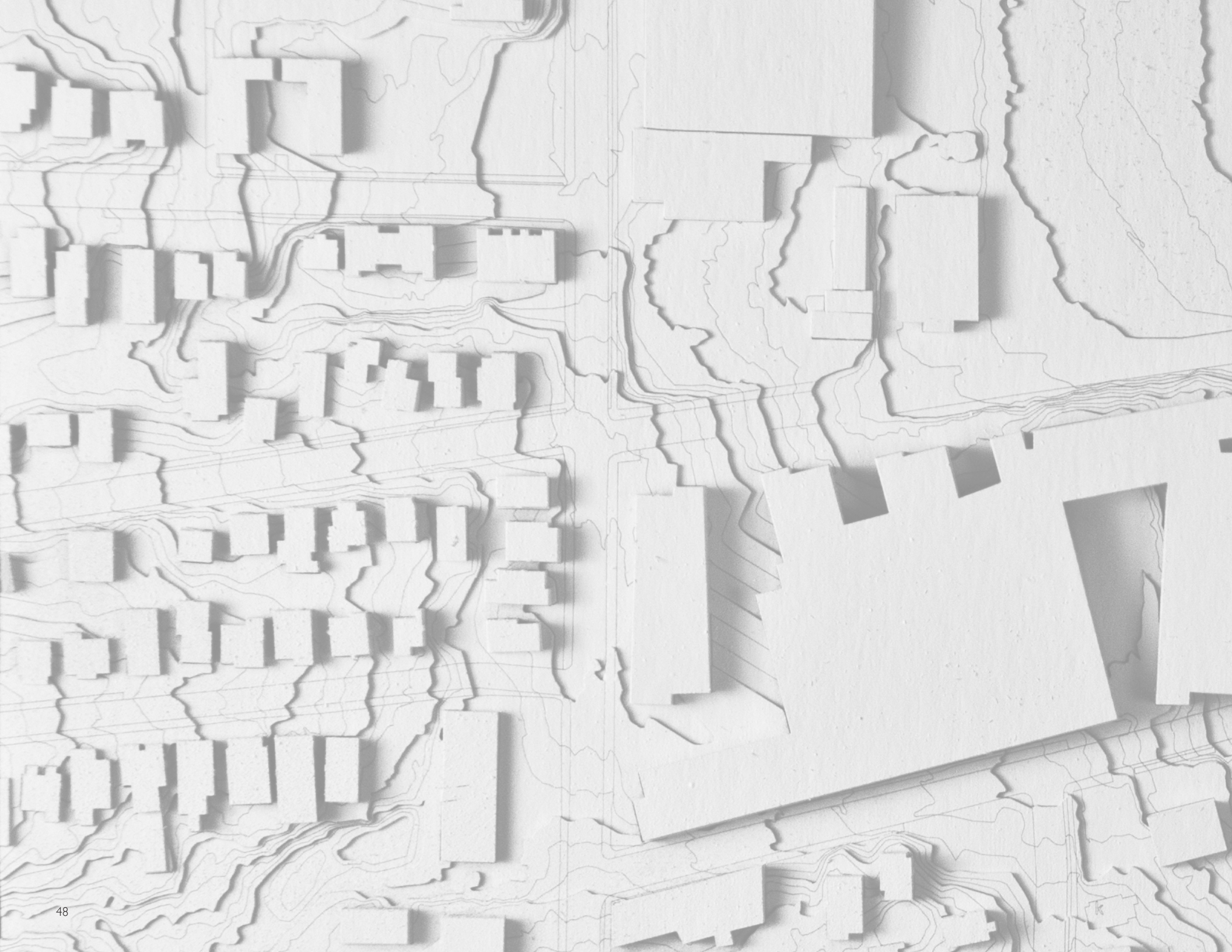
With regards to the sense of smell, the sites borders become more transparent. Scents that surround the site change with the seasons, as the park and the beltline are heavily landscaped. During the summer, the smell of rain evaporating off of hot pavement dominates due to summer storms. During the spring, Atlanta is blanketed, often literally, with the scents of flowering plants spreading their pollen. The fall and winter exhibit the earthy smell of the red Georgia clay. As these experiences are temporary and highly situational, their effect on the institute design is minimal. However, scent descriptions are included to help expand the understanding of the site.

Sensory Art Institute – The Institute

THE INSTITUTE PROVIDES SENSORY ART EDUCATION for students aged seven and up. Open to all levels of ability, students' visual acuity ranges from the fully sighted to the completely blind. Classes are held on a typical 9am to 5pm schedule, and courses range from art appreciation in a lecture format to the creation of sensory arts in a studio setting. The courses are taught by institute teachers in conjunction with four resident, live-in artists. In order to foster a deeper understanding of multisensory artwork, the institute selects only blind artists. The artists are provided their own housing on site, and are expected to spend time teaching the classes in conjunction

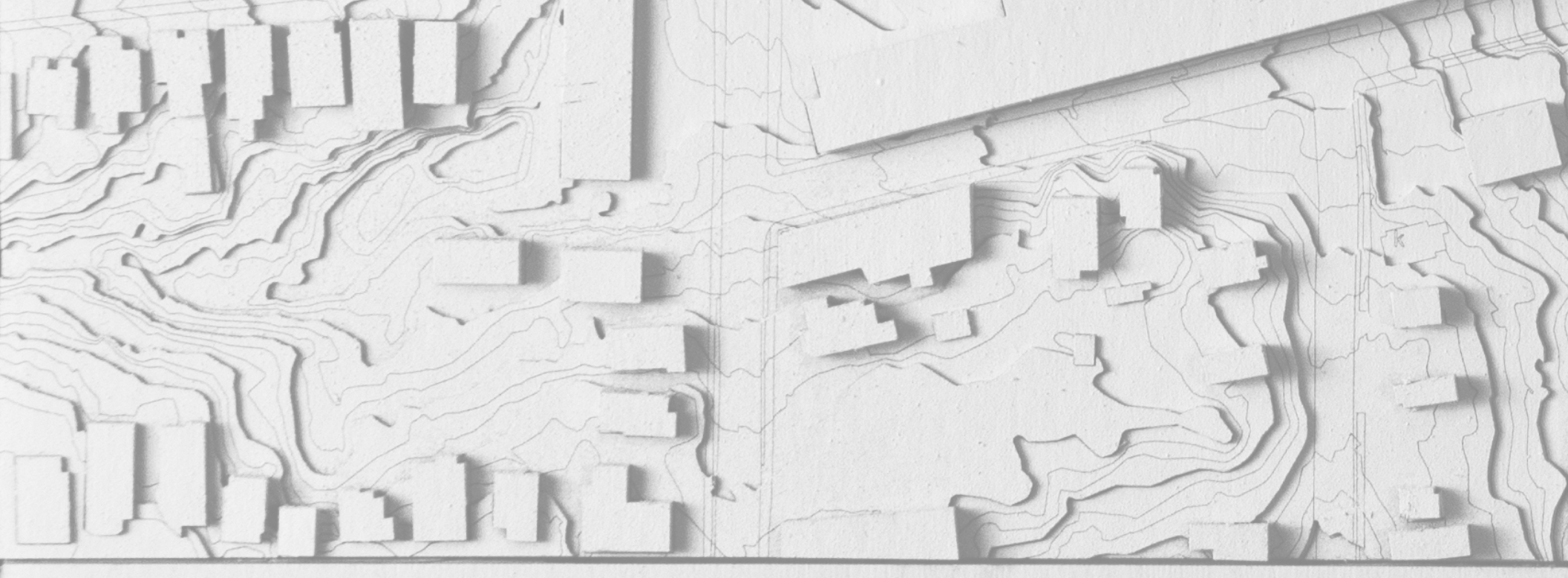
with creating and curating works for display in the main gallery. The Institute contains gallery space for both the resident artists' works and student creations, which are housed in a smaller, student gallery. The school also provides workshop facilities for the blind artists, consisting of a large shop space, as well as three isolation rooms that can function as independent sensory spaces. These isolation rooms, when not in use by the artists, are available as studio space, allowing instructors and students to play with space geometry and isolation in order to further the educational experience.

The institute's formal design is intended to extend the school's multisensory education to all occupants. Locations within the school are developed to function as experiential examples, encouraging wandering and exploration by visitors, regardless of sensory ability or user group. These experiences are available to each of the four perceived user groups – the blind artists, the blind and sighted students, gallery visitors, and the pedestrians using the building as a transitional space. Through this spatial education, the institute hopes to foster a connection between blind and sighted communities, as well as return an element of multisensory experience to a city that, until now, is sight-dominant.



Chapter 4 - Design Response

fig. 20 - Boards detail



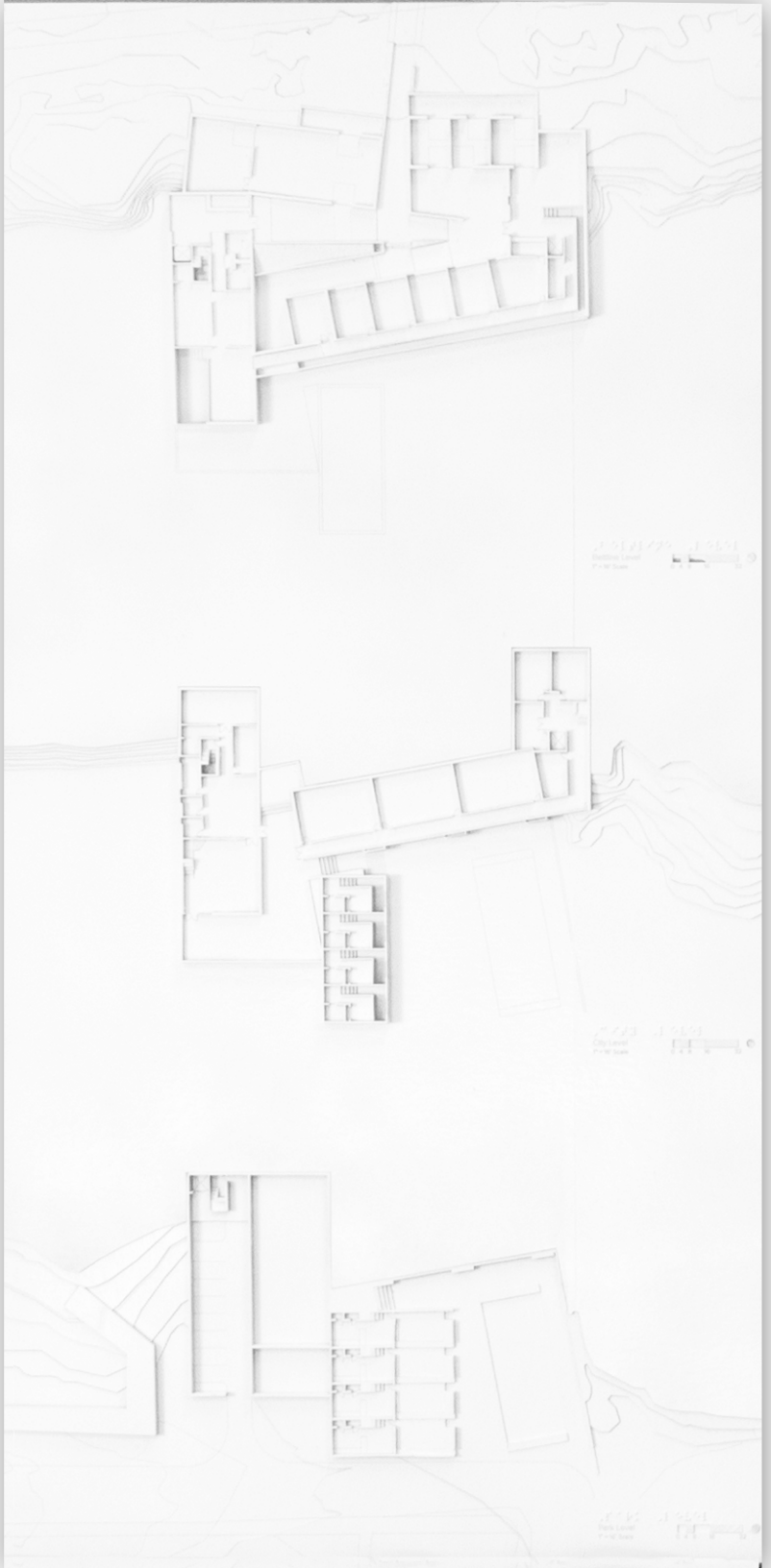
In Plain Sigh

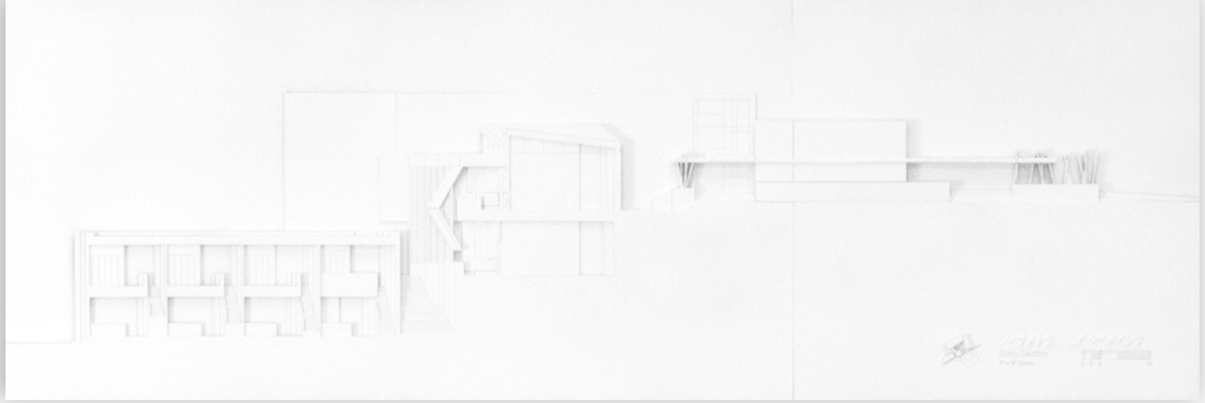
A Sensory Art School for the Blind and S

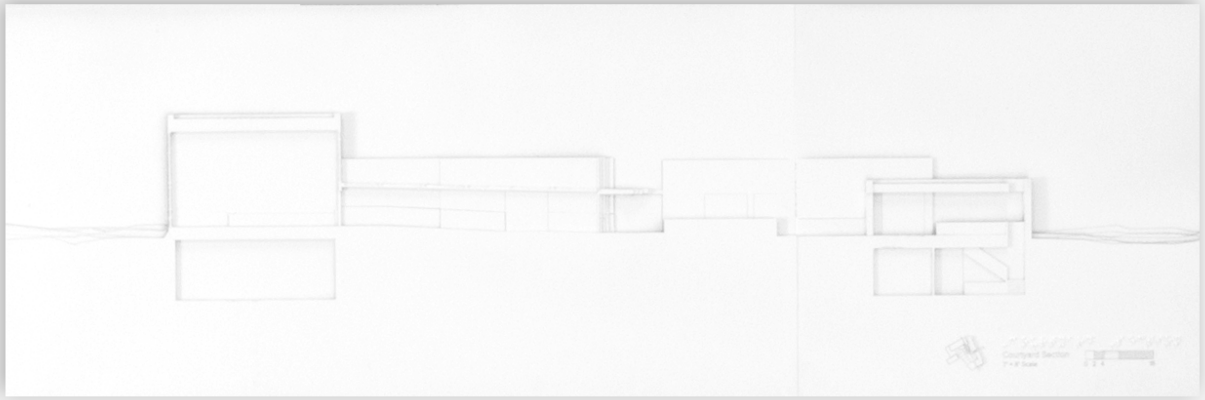
ighted Communities of Atlanta

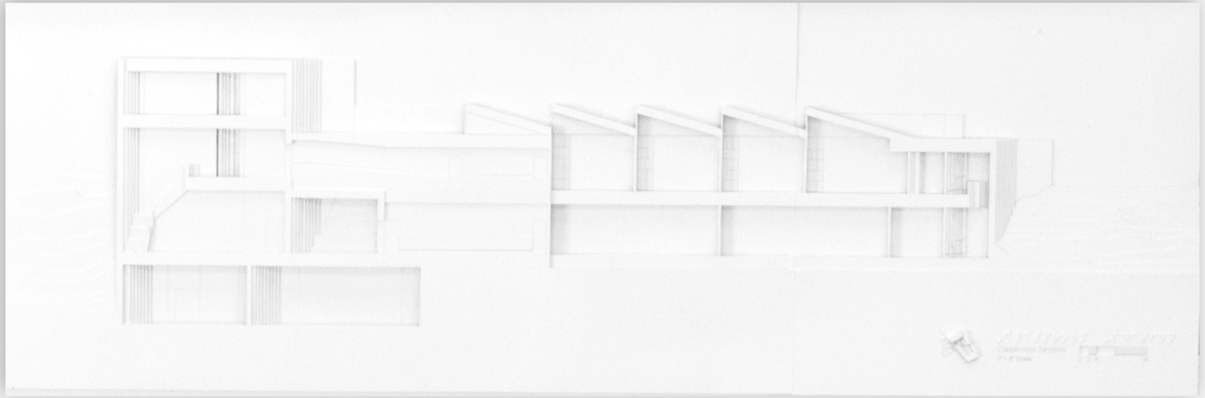
fig. 21 - Boards detail

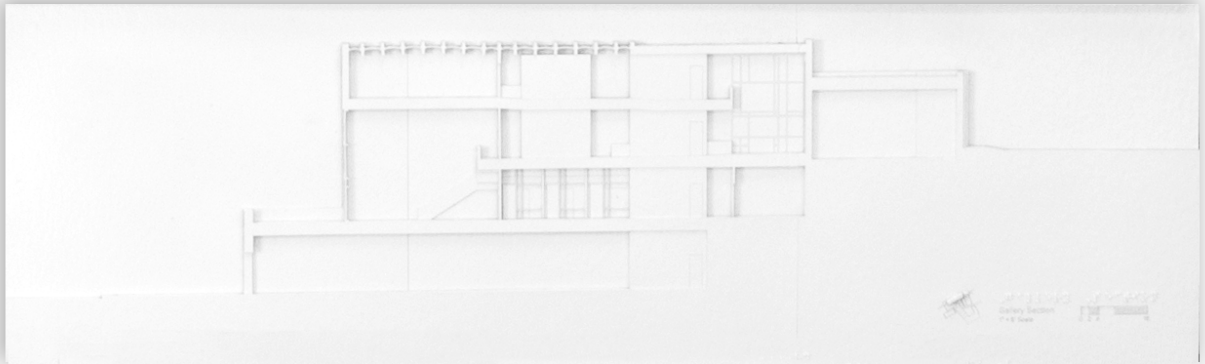

In Plain Sight
A Sensory Art School for the Blind and Sighted Communities of Atlanta











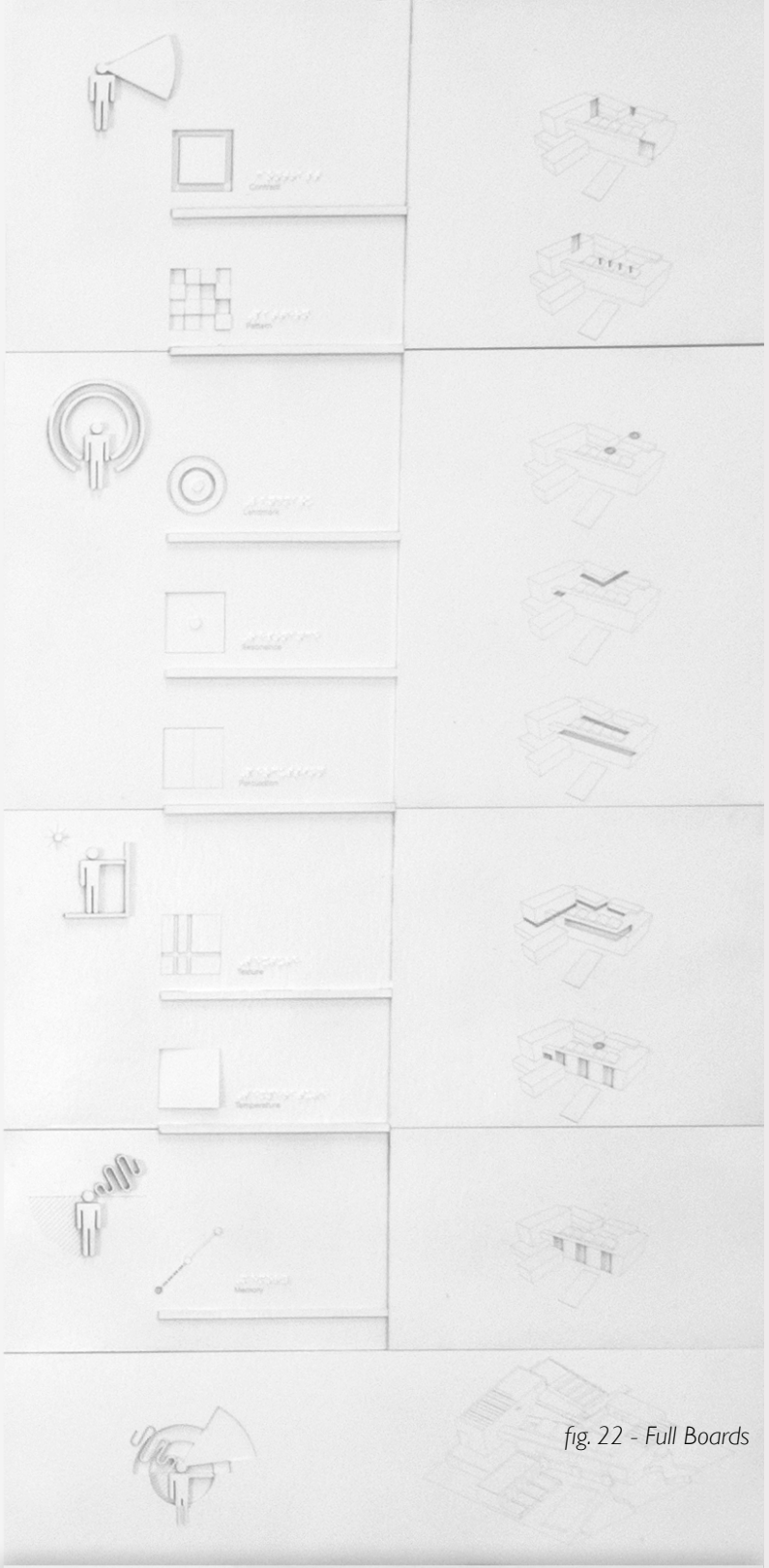


fig. 22 - Full Boards

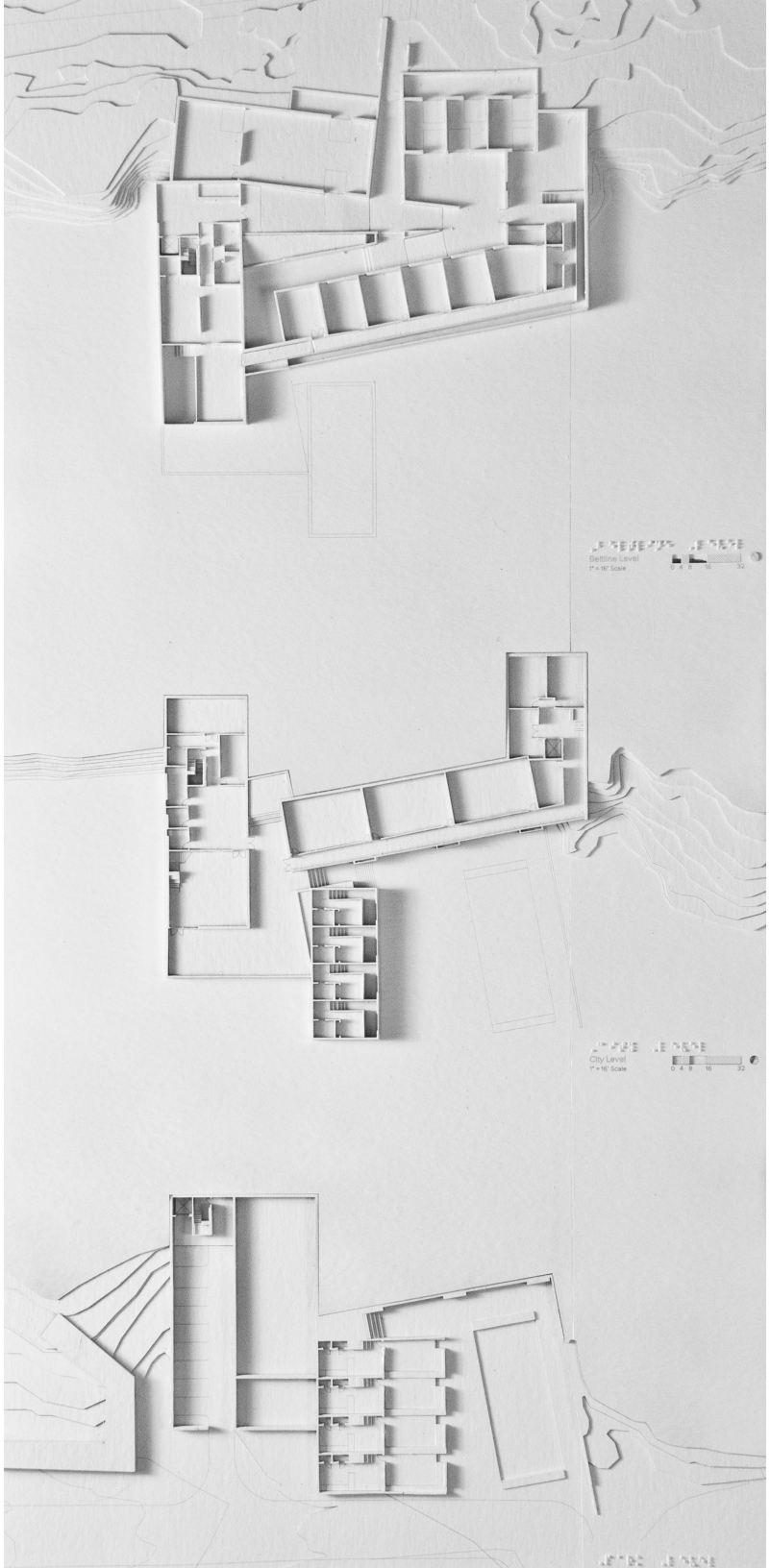
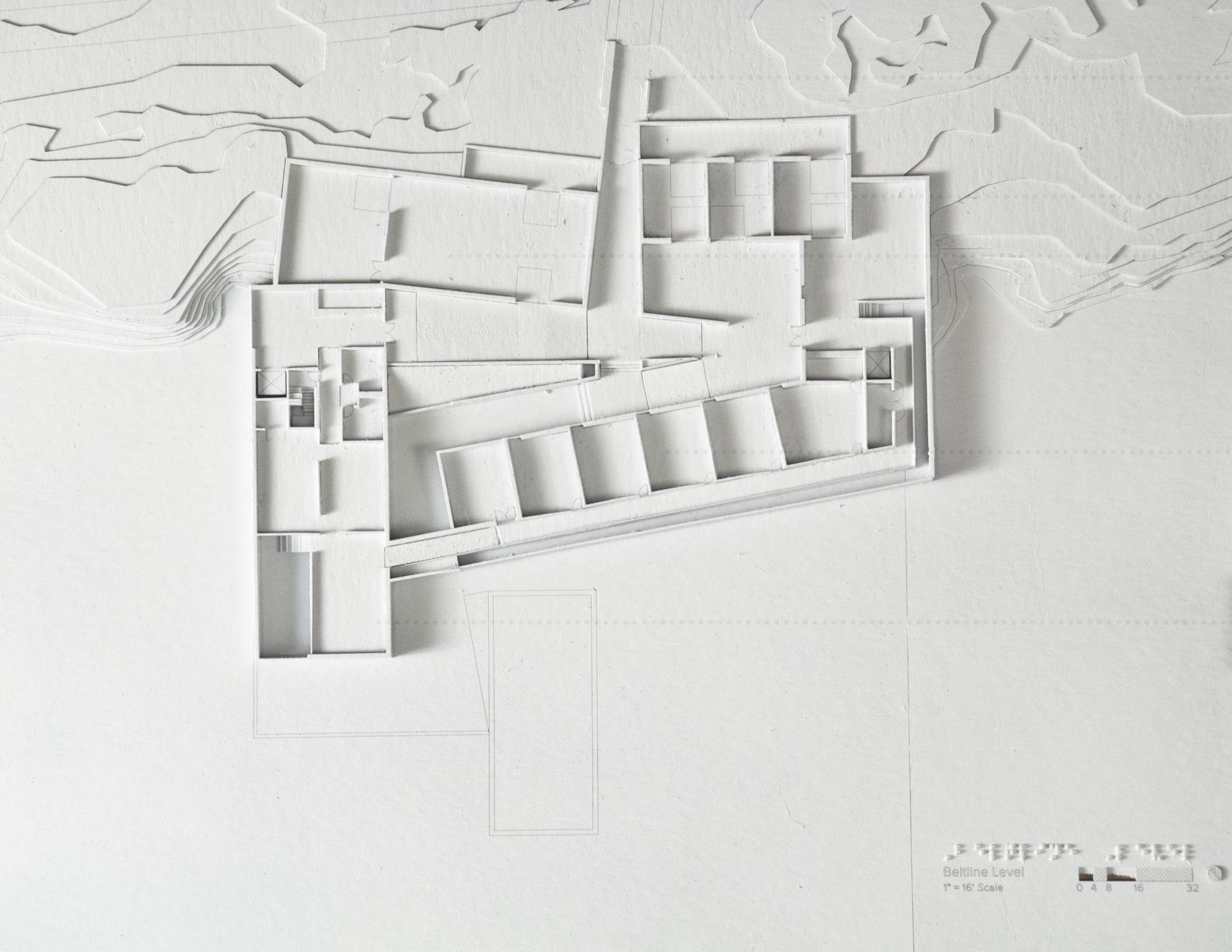


fig. 23 - Stacked Plans

Layout and Paths

Design of the Sensory Arts Institute is centered on the idea of creating engaging multi-sensory spaces in order to promote a freedom of movement and the joy of discovery regardless of ability. The design assumes that there are four main user groups – students, resident artists, gallery visitors, and pass-through pedestrians – and contains a central, exterior path to allow access to each of these users at all times. Wrapping this central path, the facility's program is zoned by type, with the Gallery and Administration space positioned to the northwest of the site, bordering the music venue's exterior space. The Gallery's mass is used as a barrier for the school against the occasional sound leak from the venue. Workshops are located to the east, bordering the Eastside Trail. The Workshops are placed here to provide a sonic buffer from the future sounds of the light-rail/trolley. This buffer is intended to reduce the sounds of rail line, though not to fully remove these noises as the rail acts as a soundmark for navigation within the site. The Classrooms and Student Gallery are positioned to the south and west of the building center, linked at the ends to the Gallery and Isolation Workspaces. Together, the Workshops, Galleries, and Classroom enclose the Entry Courtyard on the Beltline Level. A second courtyard, the City Plaza, exists at the exit to the gallery on the building's Central Level. Finally, at the base of the facility, bordering the Historic Fourth Ward Park, exists the Artist Housing and Sensory Garden. This level is referred to as the Park Level and serves as the entry to the school from park and surrounding neighborhood.


Beltline Level
1" = 16' Scale
0 4 8 16 32

Entry from the Beltline

Breakout Workshop and Student Gallery

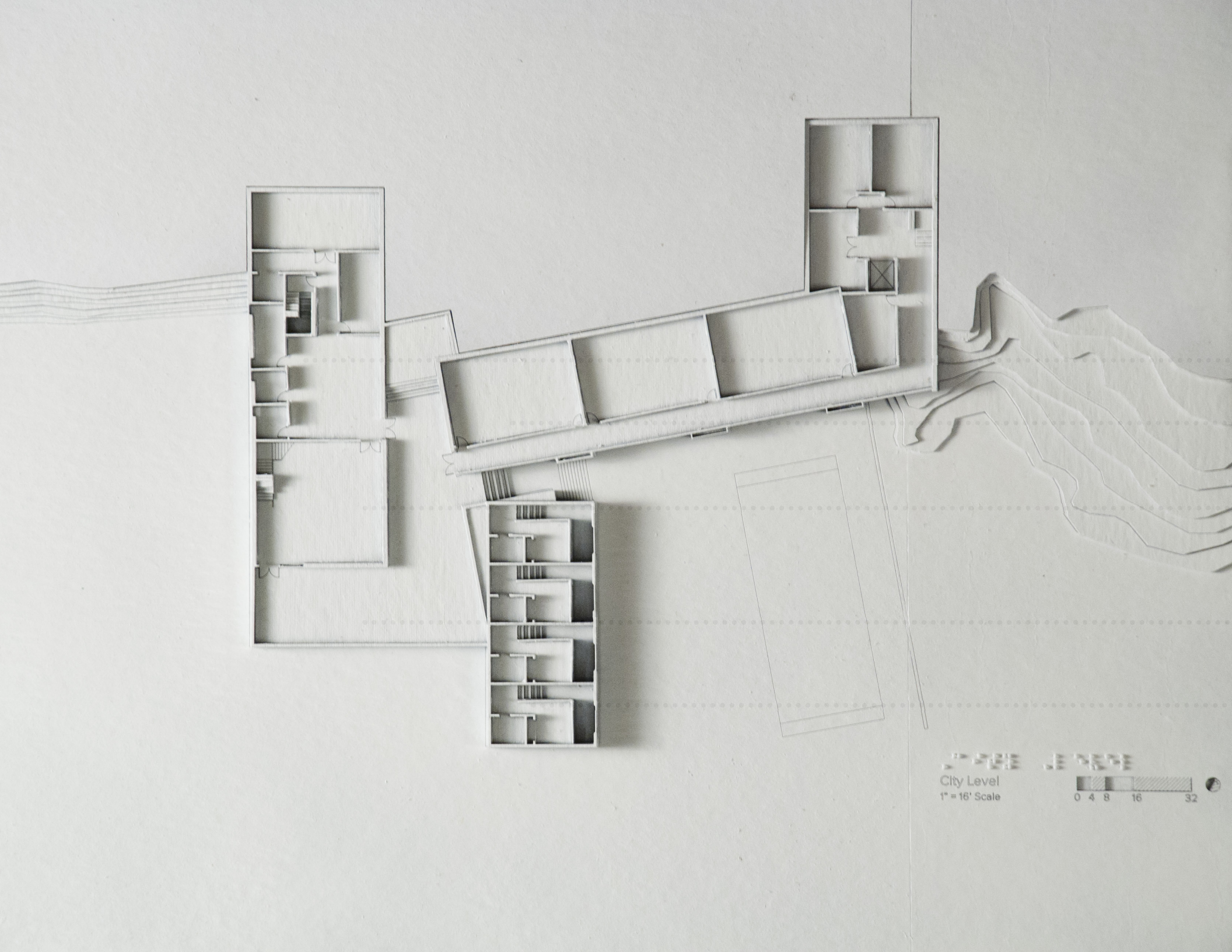
Artist Workshop

Classrooms

Gallery

Beltline Level

fig. 24 - Beltline Level Plan


City Level
1" = 16' Scale
0 4 8 16 32

Administration

Studio Classrooms

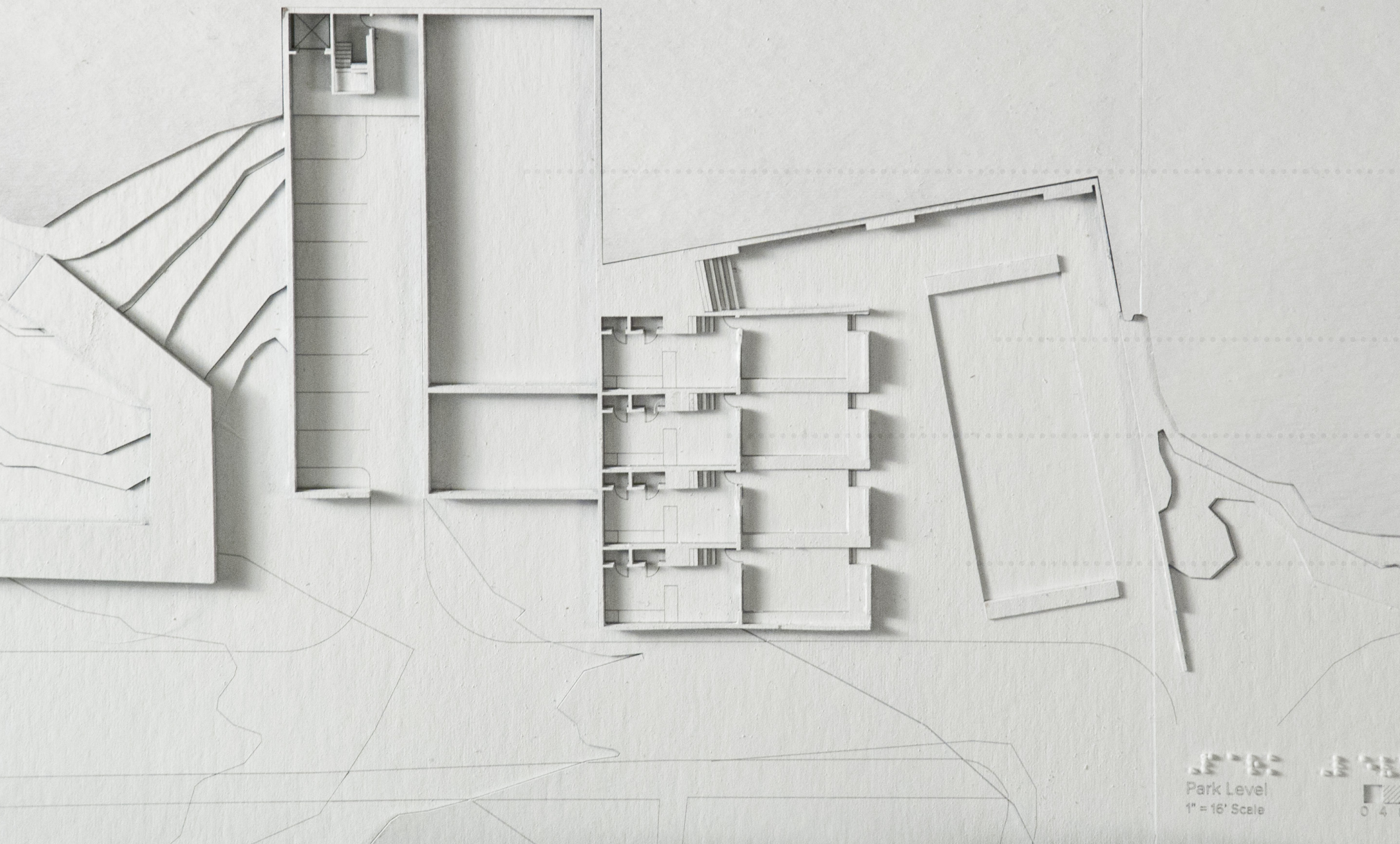
Gallery Exit

City Plaza

Artist Residences (upper floor)

Central Level

fig. 25 - Central Level Plan



Park Level
1" = 16' Scale

Mechanical

Sensory Garden

Artists Residence

Entry from park

Park Level

fig. 26 - Park Level Plan

Pattern Languages

In order to create an exploratory, sensory-engaging space, the institute is designed around the elements of pattern-language perception possessed by blind and low-sighted individuals. To engage hearing, the architecture utilizes soundmarks, spatial resonance, and the percussive qualities of materials. The qualities of vision that remain, even with impairment, allow the design to experiment with contrast and patterning of light, in order to provide guidance and visual delight. In regards to the tactile senses, the institute provides opportunities for awareness of texture, perceptions of gravity, and variations of temperature. Finally, to engage the sense of smell, the building makes use of areas defined by unique scent, scentmarks and scent columns, to provide order and link spaces through memory.

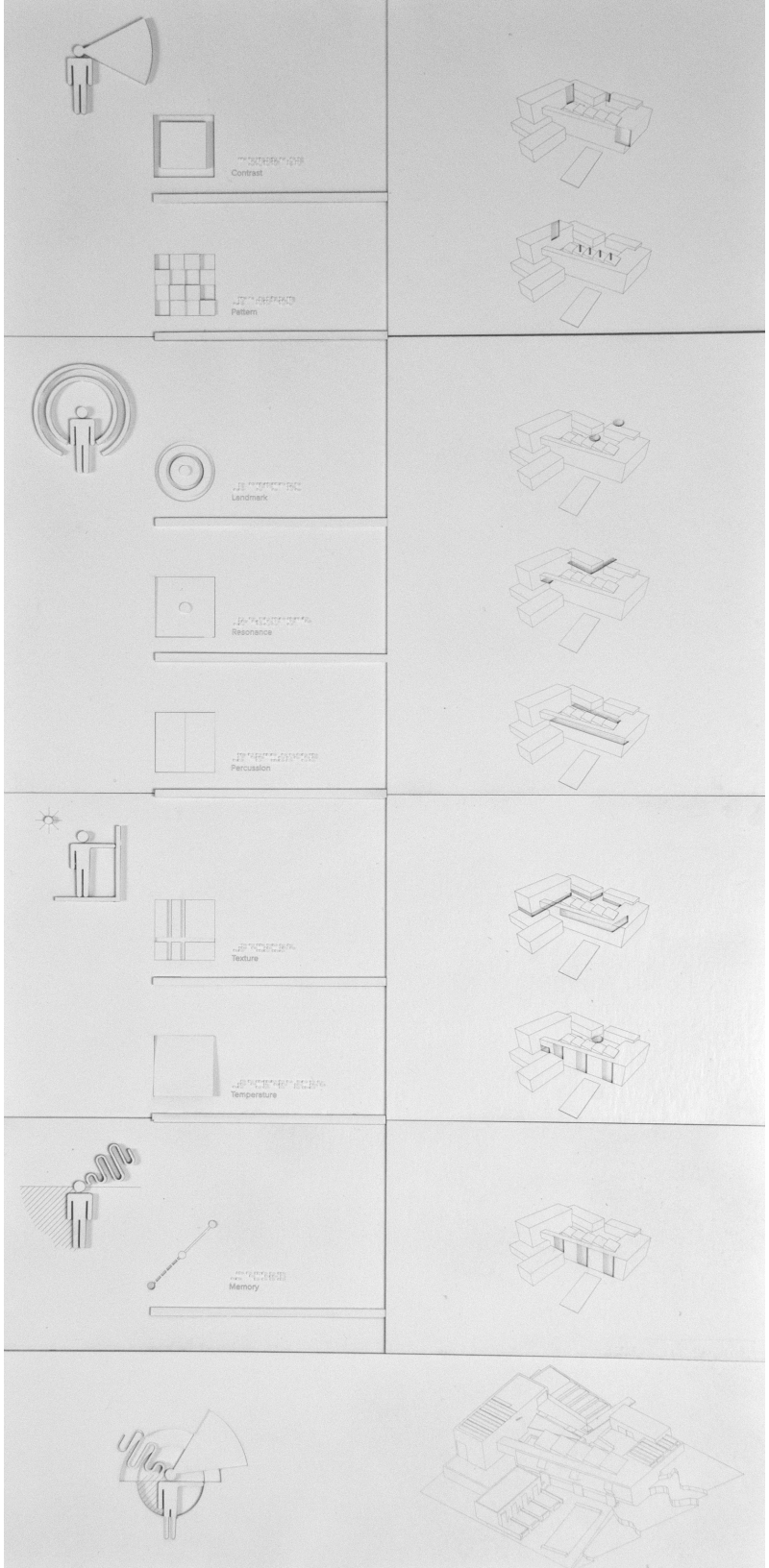
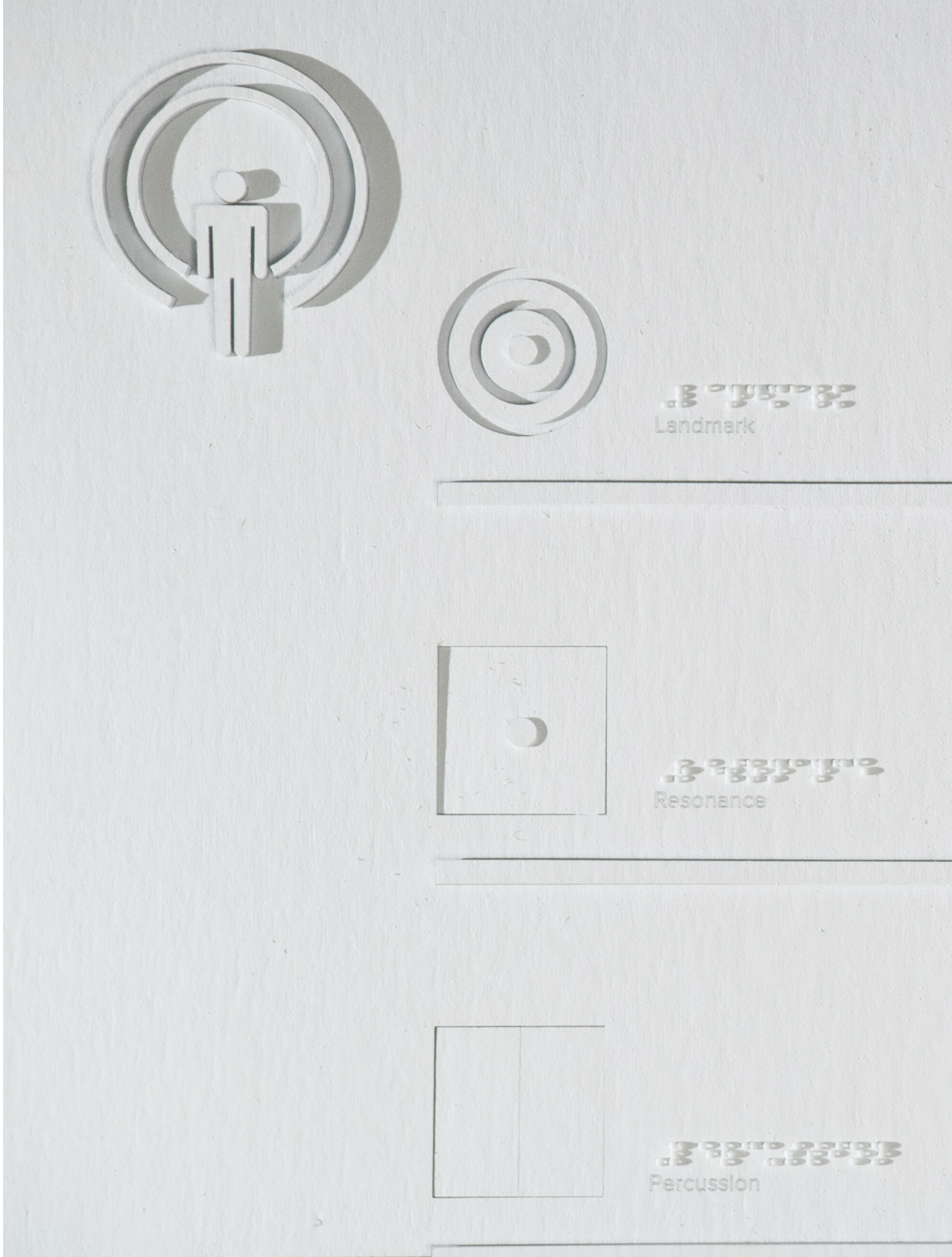


fig. 27 - Full Diagram Board

Pattern Languages - Hearing

With sight-derived spatiality removed as an orienting system, the institute must engage the other senses to announce its presence and locate itself within the Beltline system. Sound, which, of the remaining senses, allows for communication at the furthest distance, is often the first stimuli encountered by visitors to the school. The entry along the Beltline contains an awning that reaches outward towards the trail. The edge of the awning extends over a planter containing river cane, a native, bamboo-like plant, chosen specifically as the tall plant will quickly grow through an opening in the structure above. The river cane is flexible. With a slight wind or a breeze from the light rail's movement, the plant's stalks strike the metal support of the awning, acting as an architectural wind chime. In this situation, the awning becomes a soundmark, announcing itself as the entry for the studio.

From here, the soundscape is compressed by the awning above and by the walls of the Workshops as they guide the



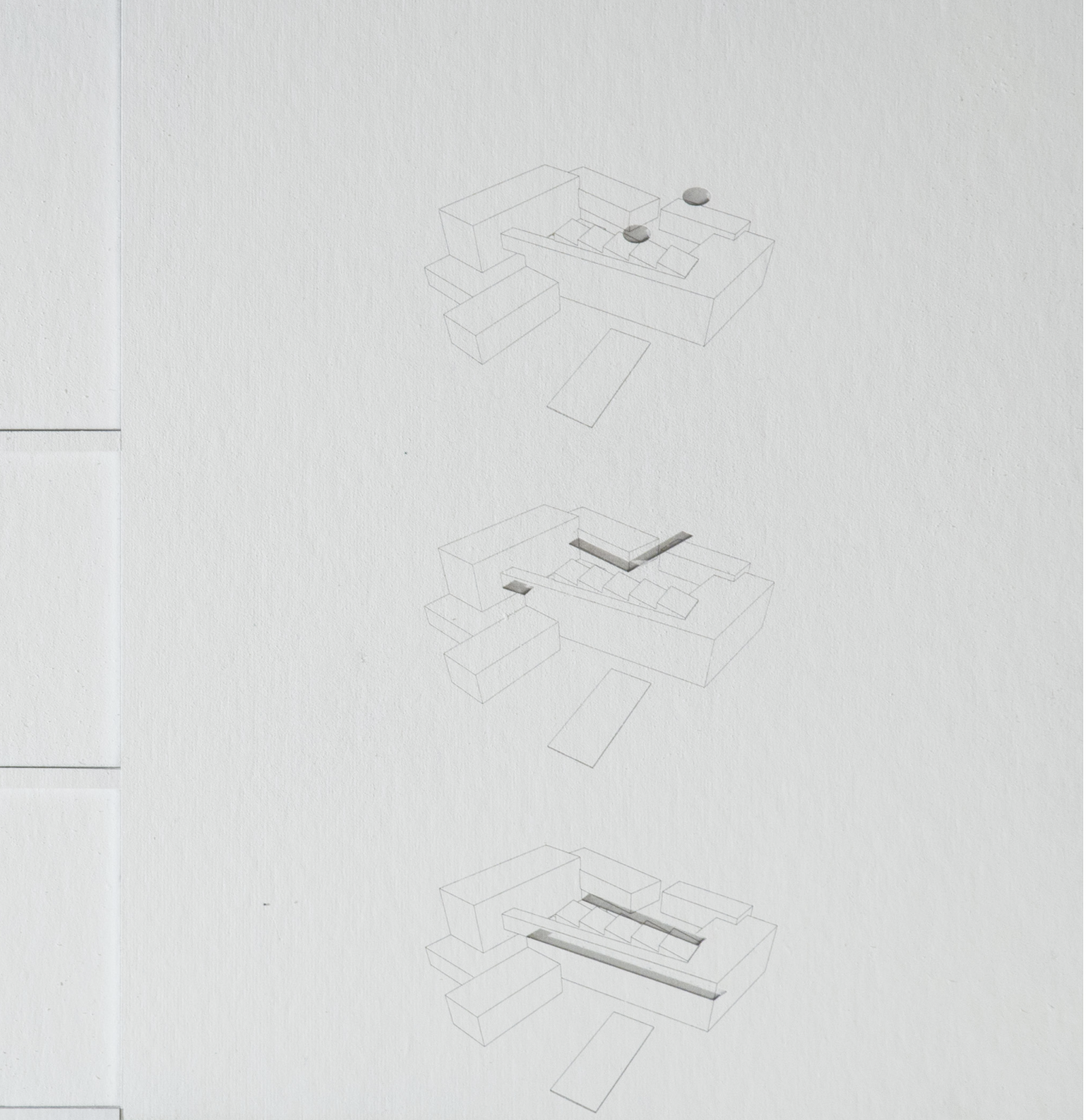
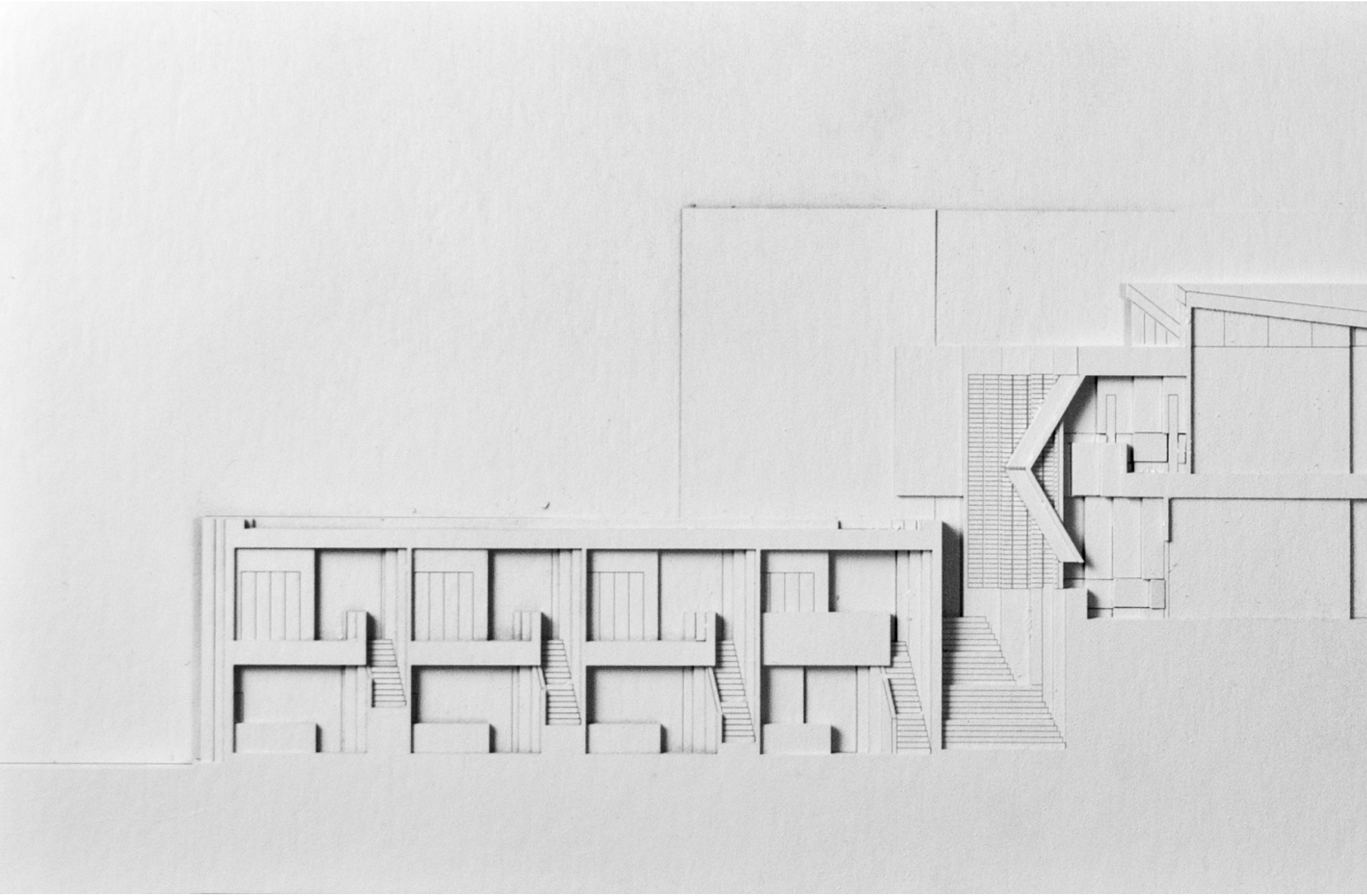


fig. 28 - "Hearing" Diagram Board



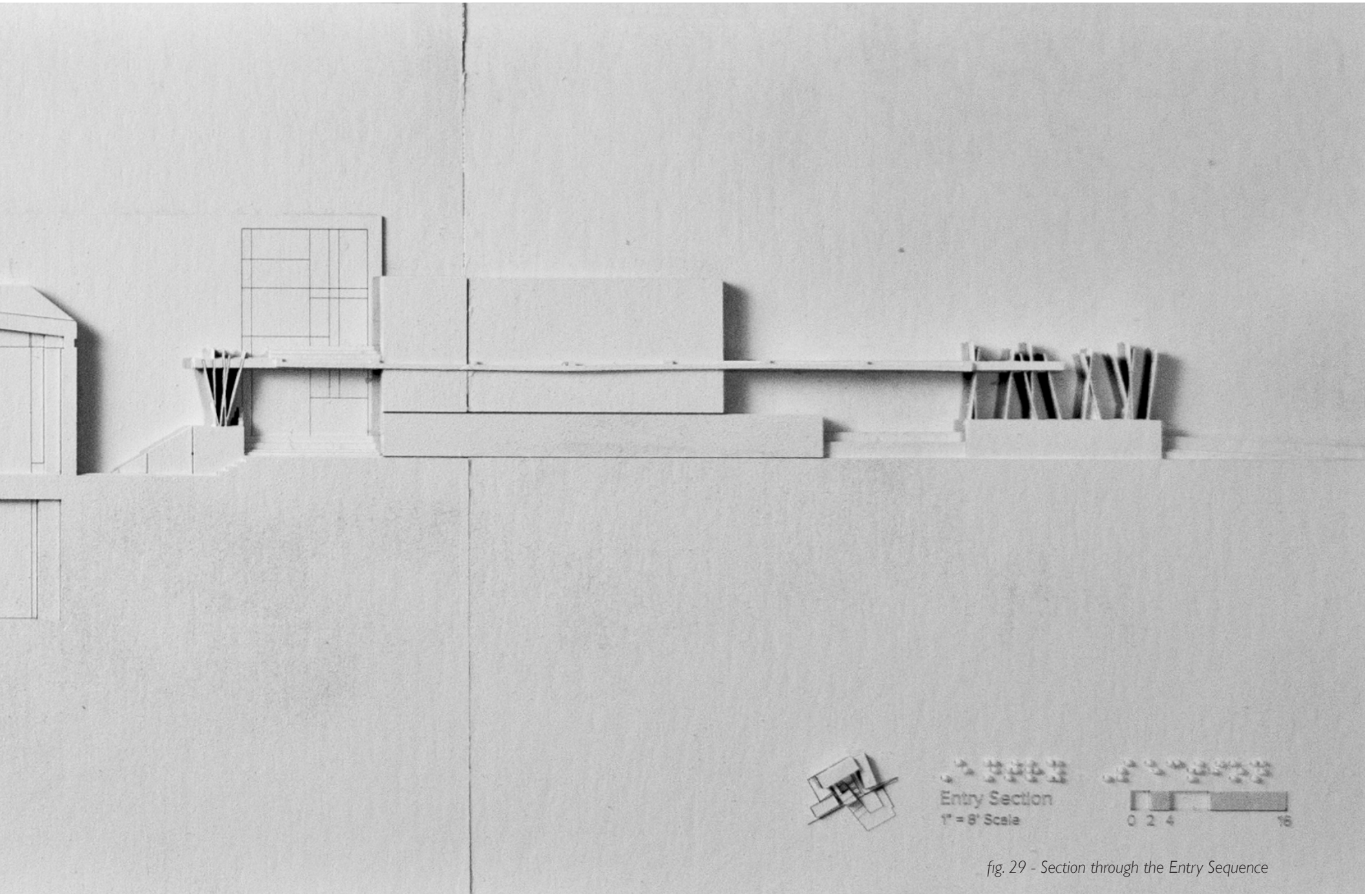


fig. 29 - Section through the Entry Sequence

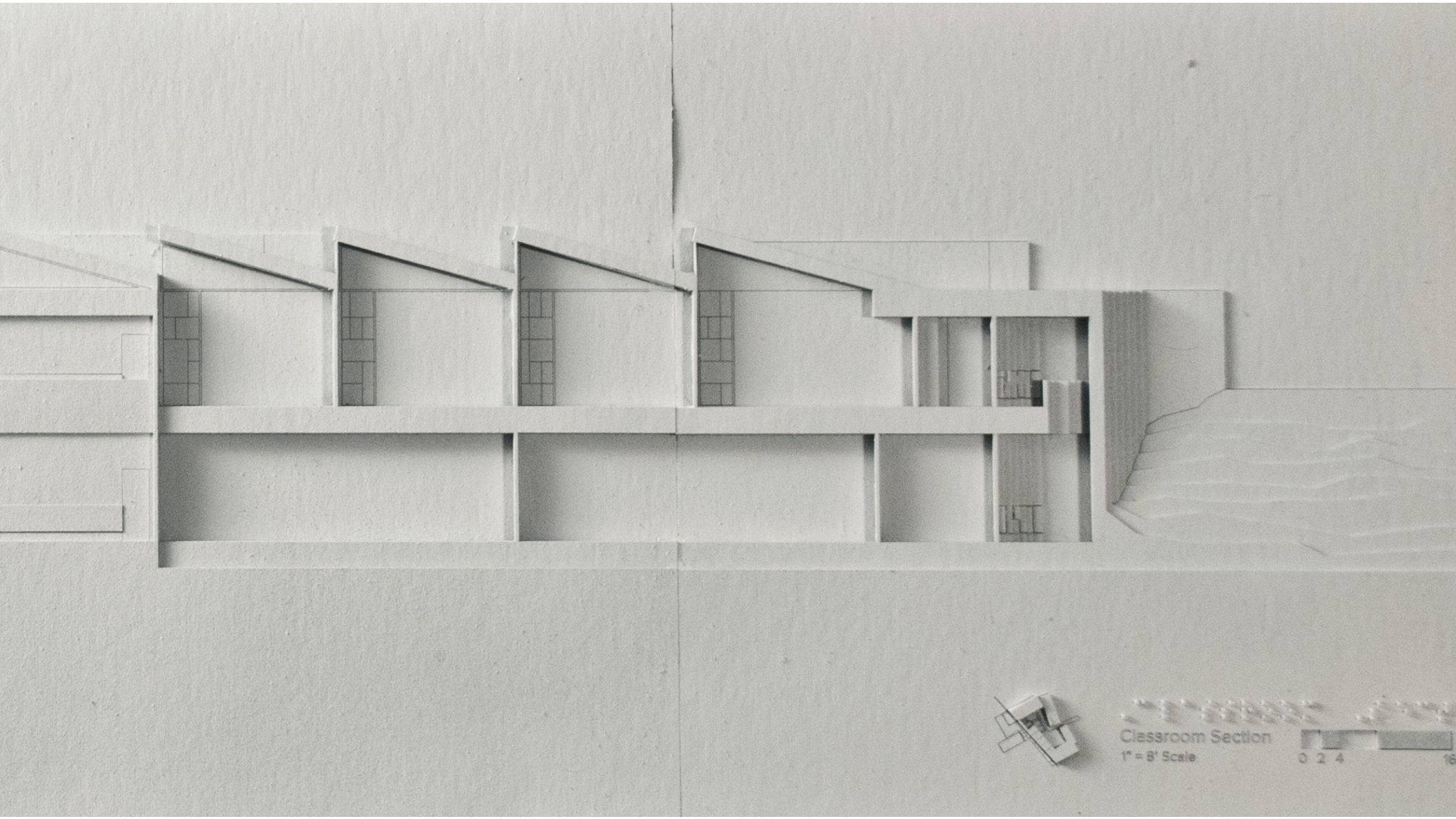


fig. 30 - Section through the Classrooms

visitor into the Entry Courtyard. As the guest moves between the Workshops, the corridor widens slightly, eventually opening to a large, exterior space with no immediate, architecturally-derived resonance for guidance. The courtyard's placement within the institute scheme is designed to remove most of the exterior soundscape, redefining the area's noise to fit the specific needs of the school. To reorient the visitor, a second planter containing river cane blocks the direct path of travel. This planter's position is a second soundmark, denoting a critical path point for the guest. From here, they can follow the compressed sound created by the awning as it continues towards the gallery. Alternatively, the visitor can travel south, where the courtyard contracts, towards the entry to the school. Finally, a path of travel through the building exists, as one can follow the stairs down, out of the controlled courtyard, to the City Plaza, where the sounds of the city are returned, amplified by the juxtaposition between the City Plaza's exposed terrace and the Entry Courtyard's controlled soundscape .

Within the building, sound is compressed and released mainly within the hallways between programed areas. The Classrooms and Workspaces, though left largely as open, modifiable spaces within this thesis, also employ sectional variations in order to shape sound and provide orientation within. Each classroom is identical in plan, shaped as a simple rectangle. This is intentional, as it removes the complexity of relearning each space as the blind artists move between rooms. The ceilings within these spaces, however, affect the reflections of sound, creating directionality within the simple shapes.

Within the Entry Courtyard, as well as within transitional space between Classrooms, several wood panels are set within the path of travel. These panels, though visually identical, contain differing thicknesses of wood inserts, with each insert causing a variation to the percussive response when struck by the foot or the cane. The depth of the wooden material is dependent on its proximity to the Gallery, with the heaviest, thickest inserts being placed close to the Gallery entry. The resulting sonic landscape becomes a gradient between hollow sounds at the entry to the Classrooms and solid, dense responses as one approaches the finished work of the Gallery.

Pattern Languages - Sight

Low-vision, though lacking the ability for a visual-spatial hierarchy, still offers opportunities for design within the school. Sight-based cues are used as landmarks, utilizing contrast and patterns of light, color, and shadow to describe location and create destinations. The Gallery's large entrance atrium is glazed on both ends, creating a bright void in what is otherwise a monolithic exterior wall. This allows the Gallery to announce itself from the courtyard, drawing visitors up the path to its entry. The school building also employs strong contrast as a guiding tool. Lighting shifts from overhead skylights to side-lit, western facing windows in the Classroom hallway. The shift provides a bright, orienting field of light for those entering into the school building, directing them to the path that will lead to their specific room. Large wooden shades within the Classroom hallway create areas of shadow at the entry point to several classrooms, adding to a secondary guiding tool during certain lighting conditions.

Within the Classrooms, lighting is delivered primarily through north-facing, saw-tooth skylights. However, each classroom contains a sidelight that opens to the Entry Courtyard. Each sidelight is unique, containing different patterns of brightly colored, translucent glass. These windows, then, are not intended to provide views out into the courtyard, but to provide a registration marks for each room. When backlit from the interior, the glowing patterns link the classroom spaces to Entry Courtyard, creating reference points for each classroom. These points describe spatial order without relying on a three-dimensional, visual hierarchy of space. Use of translucent patterning occurs within the entry atrium of the Gallery space. However, the intent here is to provide visual delight to both sighted and blind guests, and to serve as an abstract example of low-vision to those with full ability.

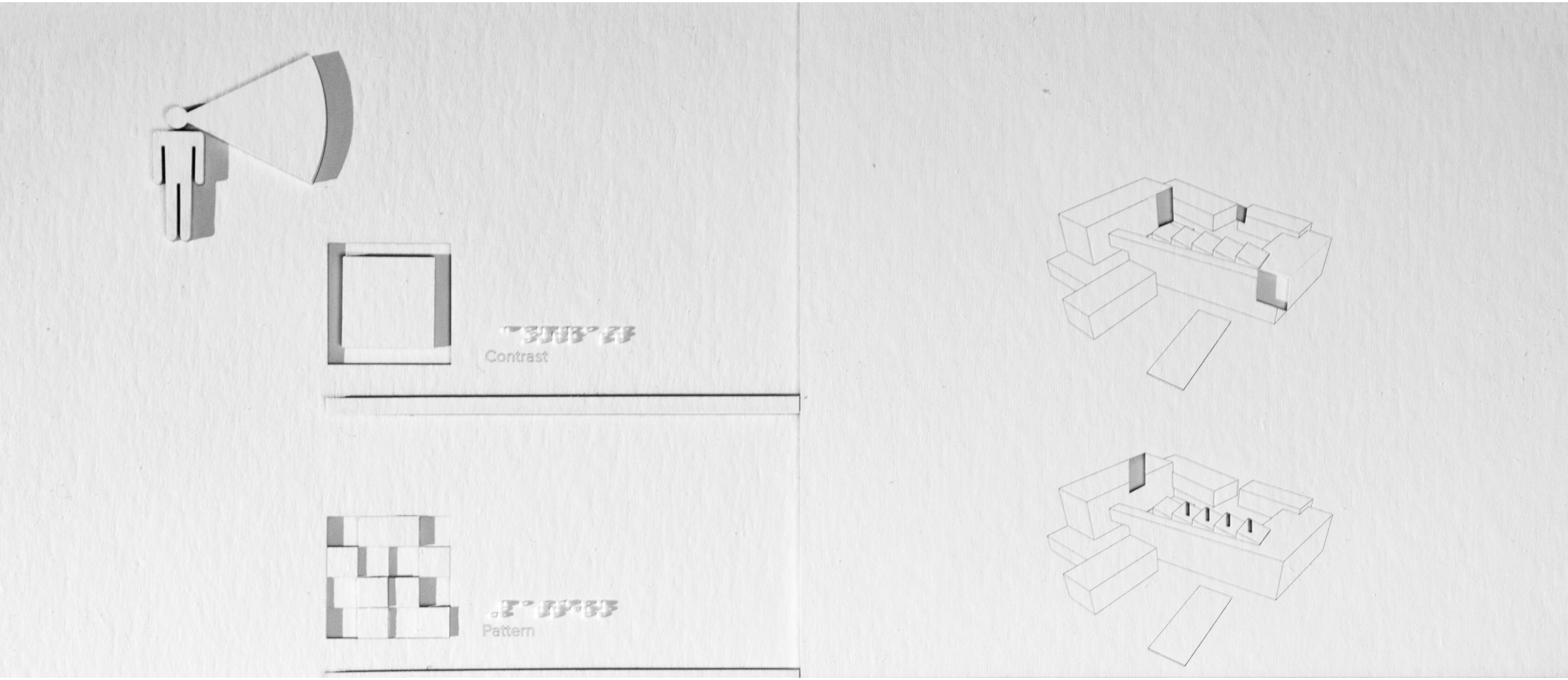
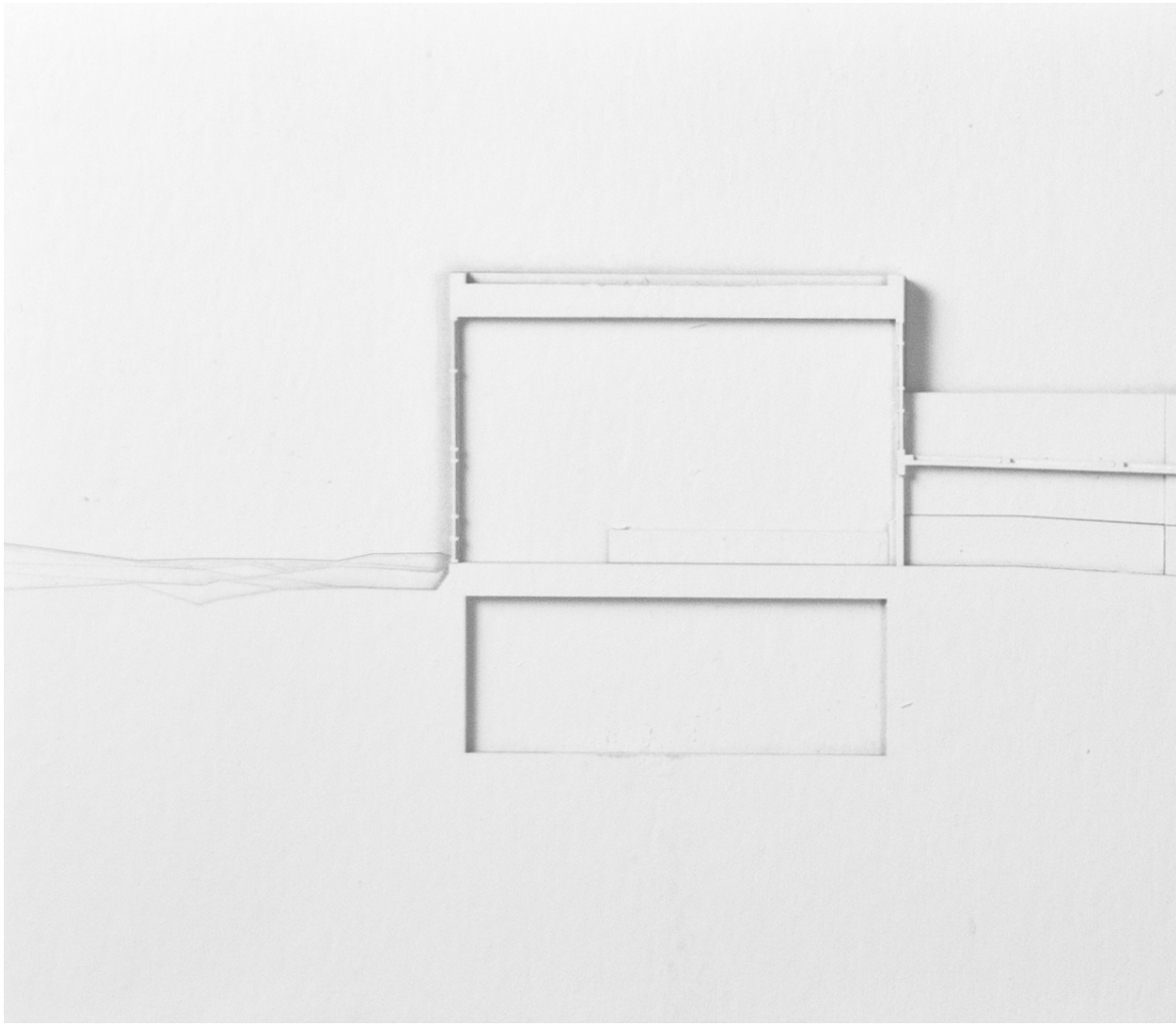


fig. 31 - "Sight" Diagram Board

Pattern Languages - Touch

The Sensory Art Institute, like most buildings designed for those with low vision, employs textured wall treatments to providing guidance for those who navigate by "trailing." While standardized in placement, variations in material provide landmarking potential for blind users. Within the Classroom hallway, registration panels of cork provide a soft, playful surface, with specific classrooms announced through patterns of reveals. On the exterior of the Classrooms and Workshop, registration panels of cast concrete are placed into the base of the brick walls. Each building's base utilizes specific casting treatments in order to create textures designed to mimic the artistic process taught by the school. Towards the Classrooms, the panels are board-formed, providing a rougher, unfinished texture. As students move towards the Gallery and the Workshops, the casting is smoothed out, becoming panel formed, as the creative process, becomes more refined. Finally, on the Gallery itself, the exterior of the building is made of cast-in-place concrete, and the



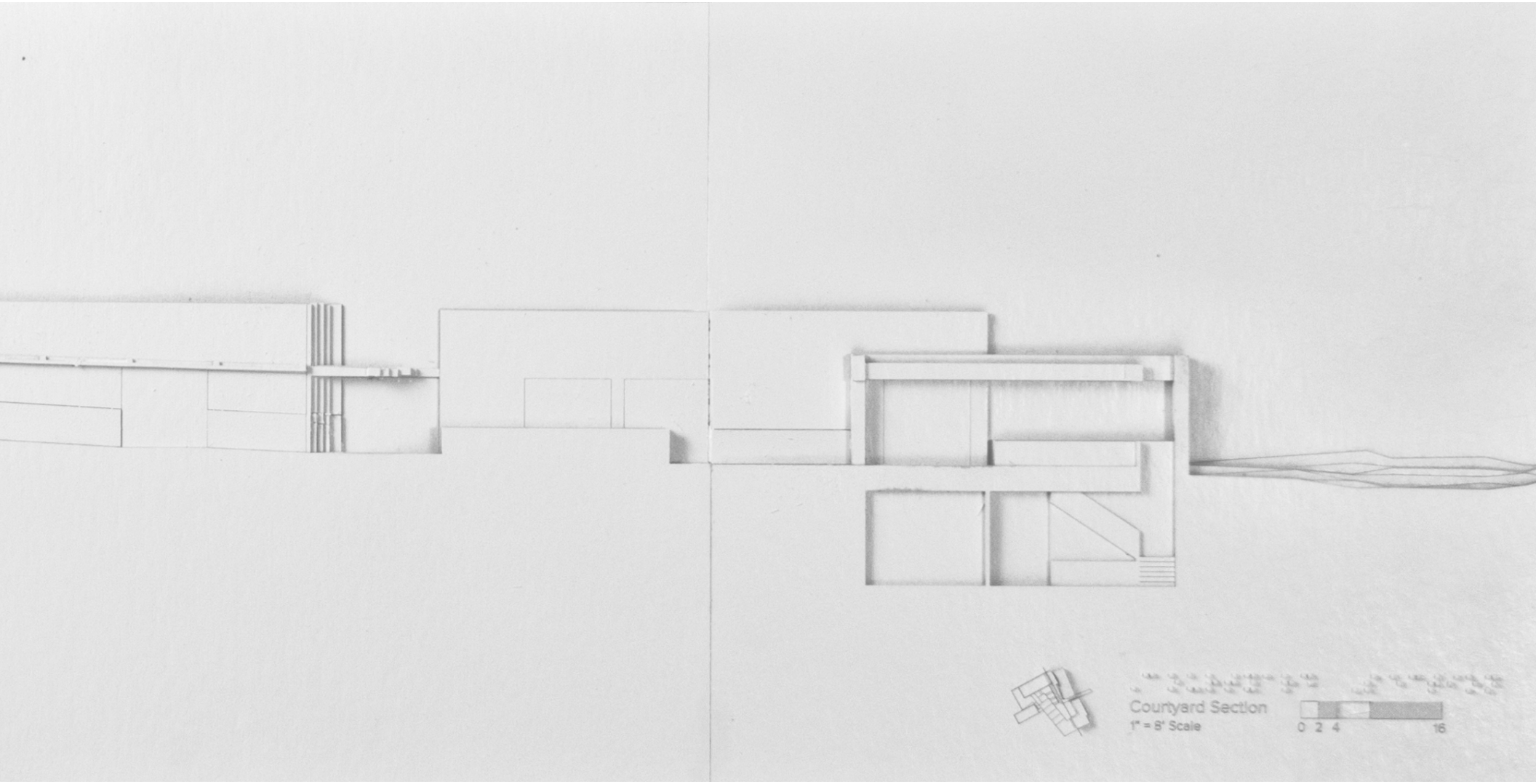
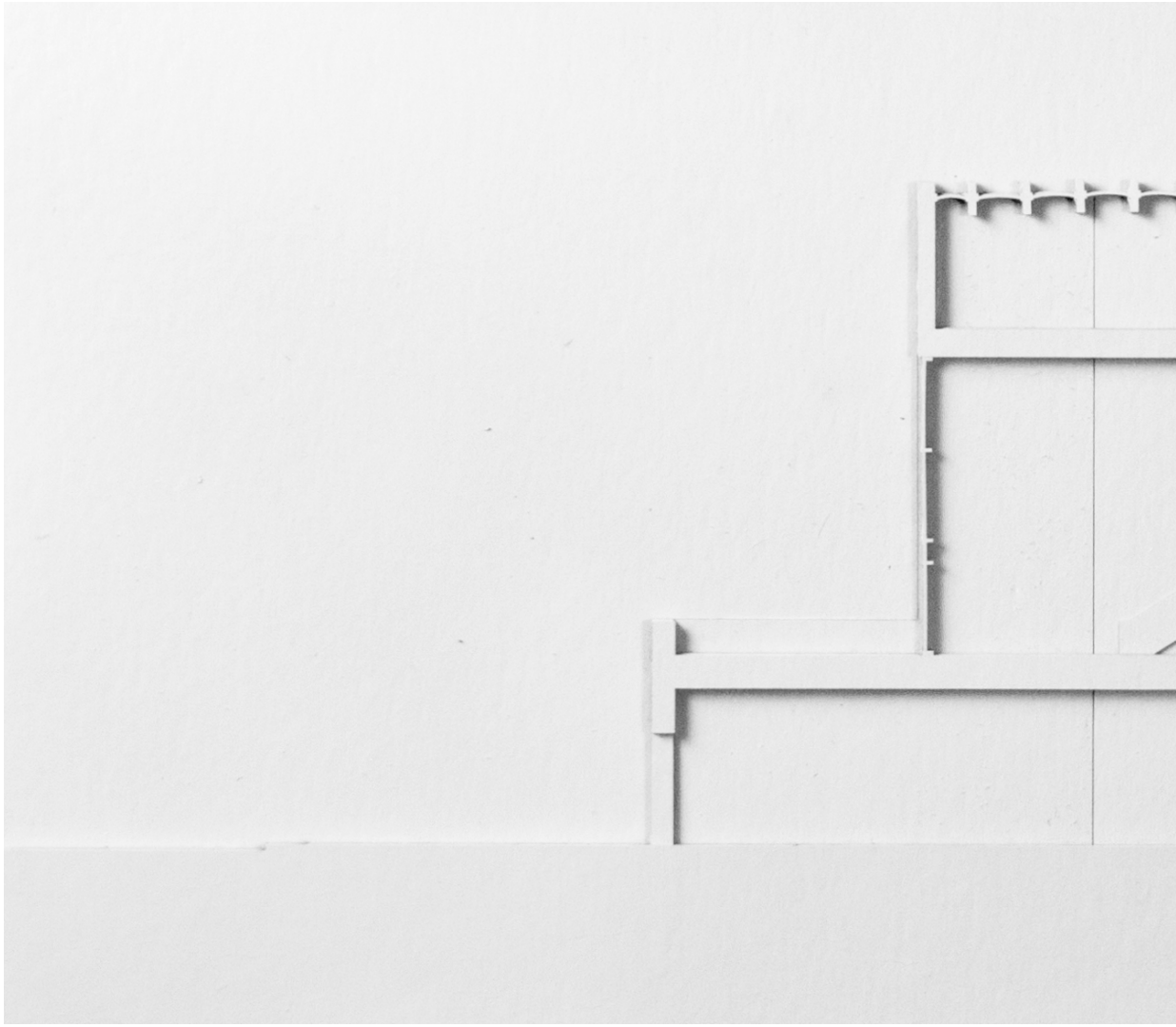


fig. 32 - Section through the Entry Courtyard

registration panels are now handled with wood slats, creating a narrative loop between the final work and the creative process it feeds into.

Beyond the textural guidance provided by the registration panels, subtle slopes are implemented throughout the Entry Courtyard and the Gallery. To travel towards the Gallery entrance, one must move up hill, an subtle, sectional act that invokes an interaction with gravity to provide a sense of direction. This method is employed within the Gallery itself, allowing the display spaces to remain unobstructed for various needs of the artists, while providing directionality to the path between rooms.

Shifts of temperature are incorporated into the sensory experience, primarily through interaction with sunlight and shade. Areas of shade and exposure are used to demark locations within the entry sequence and Classroom walkway. In both these locations, the visitor is quickly moved into and out of direct sunlight, indicating their arrival at intersections along the path, amplifying the other cues used to define these areas.



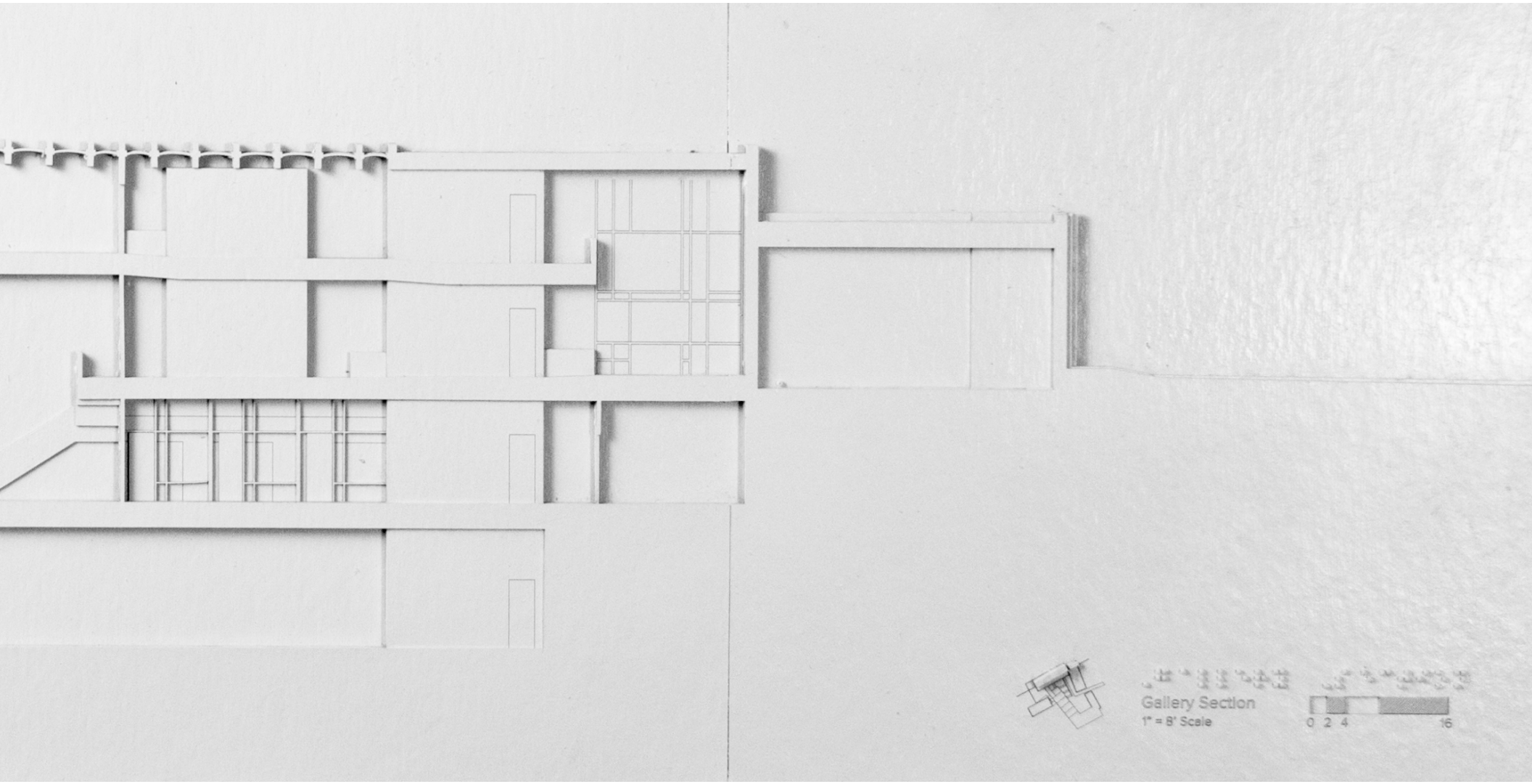
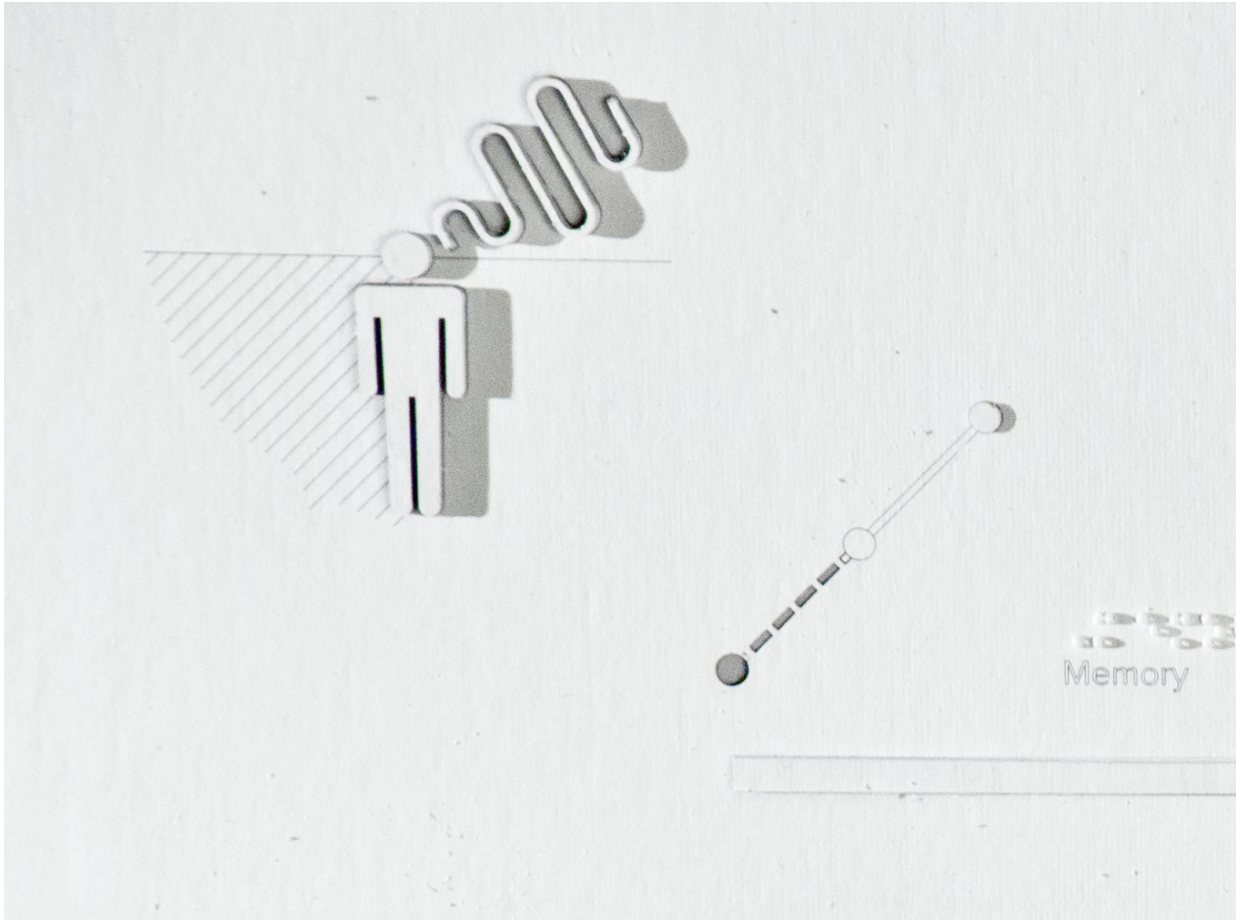


fig. 33 - Section through the Gallery

Pattern Languages - Smell

The sense of smell, though lacking spatial definition on its own, provides one of the strongest spatial orderings within the building. On the central path, landscaped planters act as scentmarks, each containing different combinations of local flora to produce distinct scentscapes. These spaces are removed from one another, in order to maintain a distinction between the aromas. The use of scentmarks, however, is not limited to external use. Within the double height Classroom corridor, planters are placed along the base of the large wooden blinds. During favorable weather, these blinds remain open, creating a column of scent that is perceptible along the path of travel on the Park Level, all the way up to the Classroom corridor on the Beltline Level. Tying into the body's connection between smell and memory, these planters offer a conceptual link between the three vertical spaces, something that may otherwise be impossible to comprehend without sight.



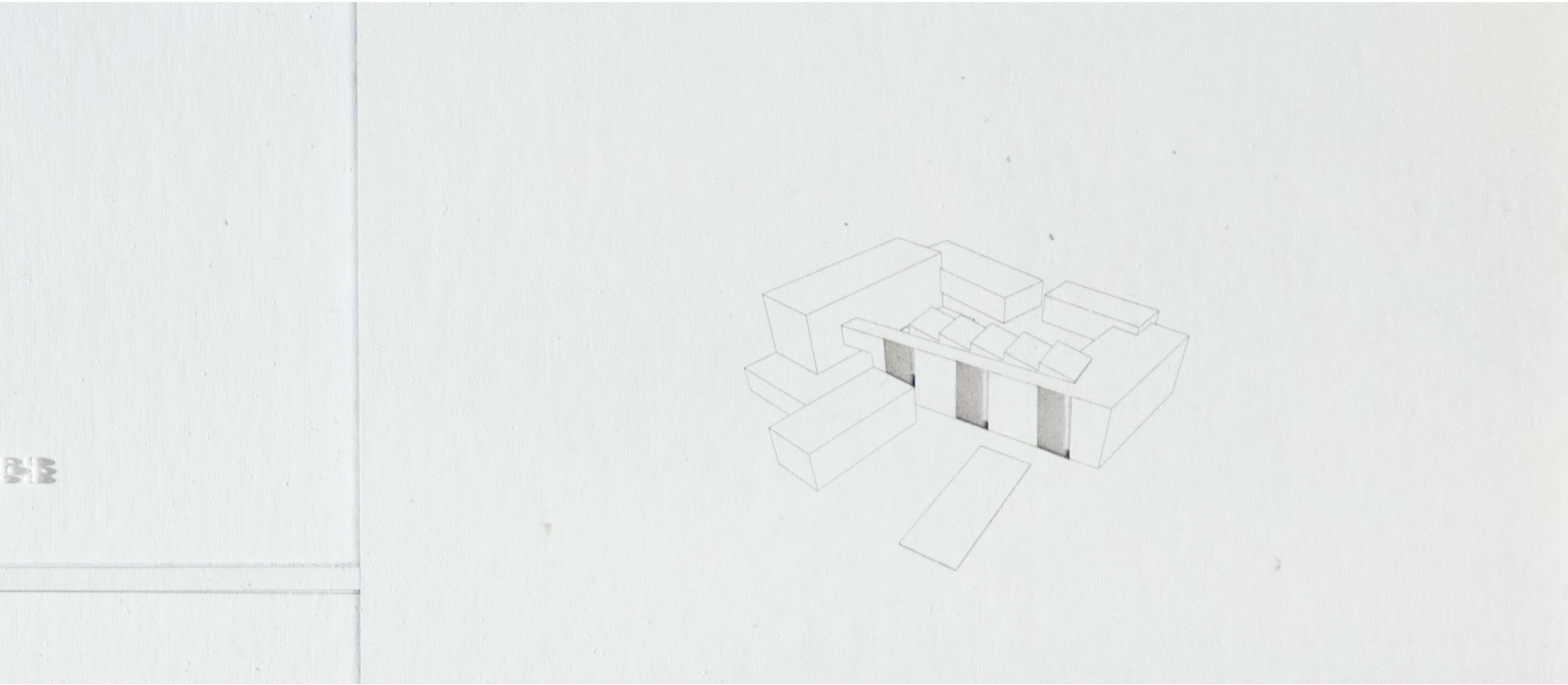
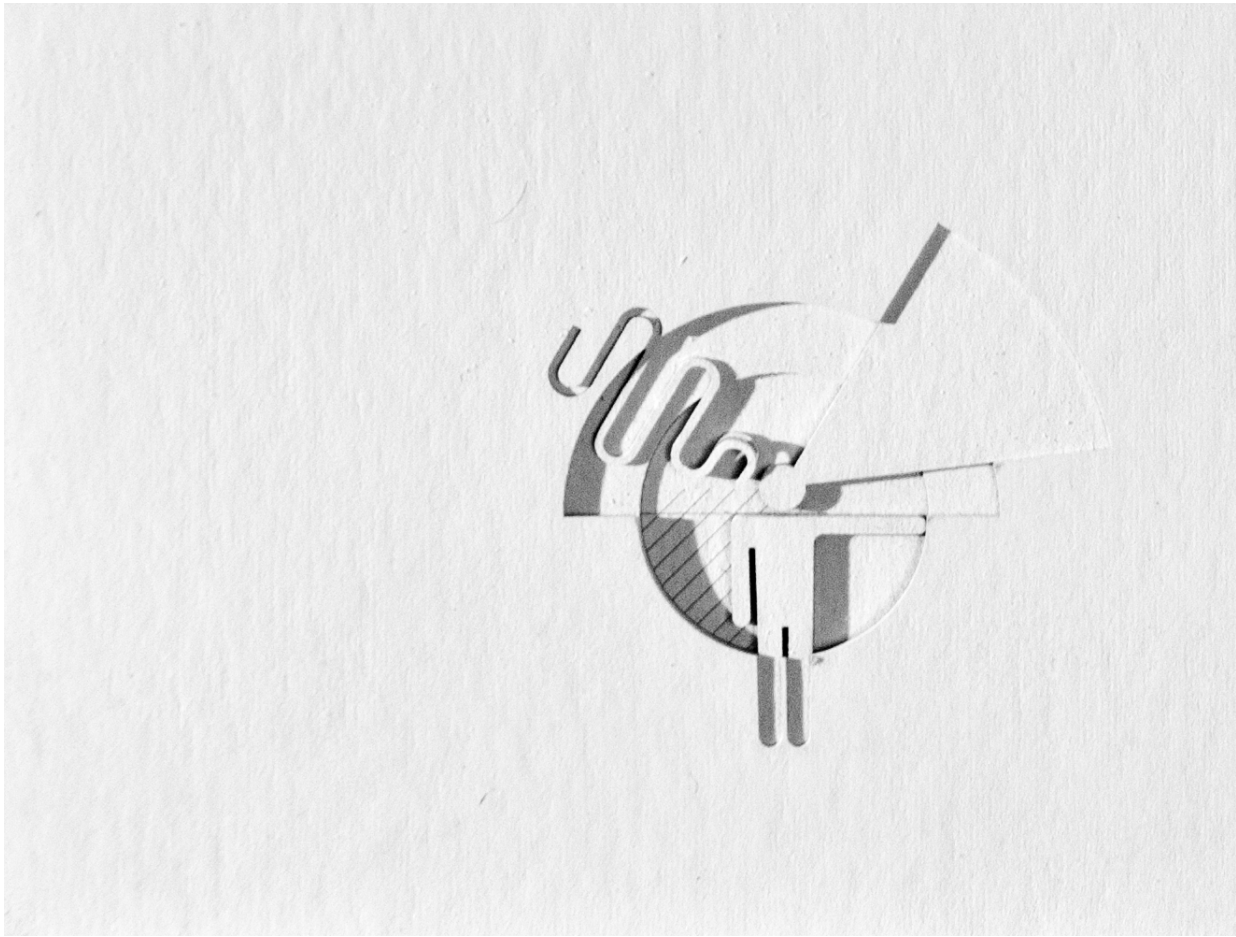


fig. 34 - "Smell" Diagram Board

Multisensory Experience

NO SINGLE SENSORY SYSTEM provides a full picture of the institute, as each aspect of perception provides a differing description of space. However, when taken together, the sensory experiences overlap each other, yielding an understanding of the building that is now deeply internalized. When a visitor enters into the Entry Courtyard, they are drawn, through sound, sight, or other senses, to the central, guiding landmark. From here, the institute begins to educate the occupant, offering clues for guidance and rewarding exploration with a multisensory understanding of spatial relations. The four user groups, the artist, student, visitor, and passerby, are all introduced into sensory systems. Regardless of destination, the building interacts with the occupants, encouraging them to broaden their perception of the experience. As the visitor leaves the building, they are now primed with the tools to understand the surrounding environment on a similarly intimate level.



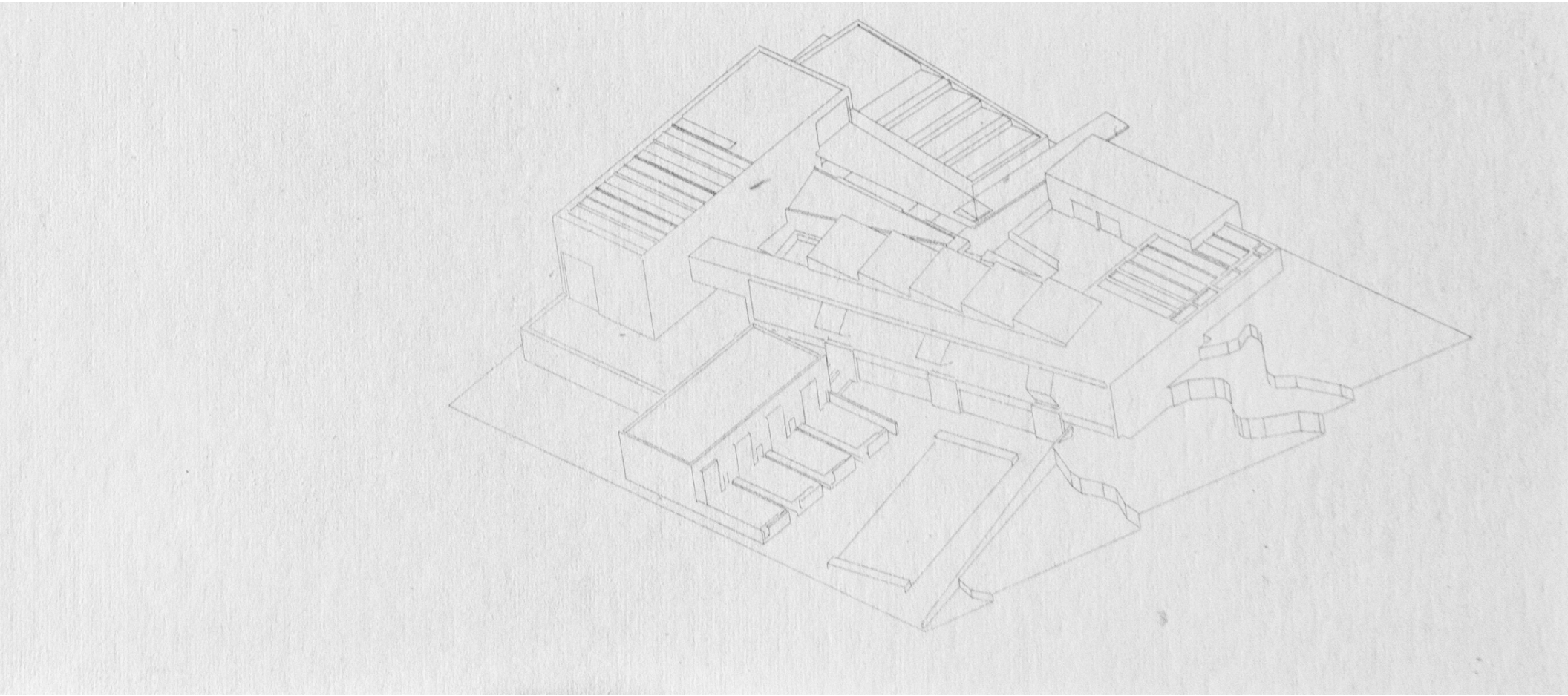


fig. 35 - Full Sensory Detail

fig. 36 - Title Board Detail

Chapter 5 - Conclusion

Beyond Plain Sight

THIS THESIS WAS BORN out of a desire to reintroduce elements of multisensory design that risk being forgotten in a digital, and thus visual, culture. By focusing on the perceptive abilities of those who lack visual acuity, a language of design options was crafted and proven to be effective in spatial generation. As such, the design favors blind users beyond all others, requiring the space to respond first to their needs.

Moving beyond this project, designers are encouraged to make use of these sensory methods, and to expand upon them, bringing other elements, such as a return of visual-spatiality, into the mix. Designers are also encouraged to explore sensory qualities that were not attempted in this thesis. Sensory concepts such as kinesthesia – one's understanding of the body in motion – and synesthesia – the mapping of one sense onto another – contain architectural potential, but are only now beginning to be explored. These represent only examples, not a full list of options, as the field of multisensory design is growing and its bounds and language continue to evolve.

Designing for the blind occupants does not require the architect to reduce the visual enjoyment within a space. Conversely, designing for those who are sighted should not diminish the sensory experience for those without this ability. Careful consideration of the multitude of perceptual methods results in a rich experience for all occupants. With the addition of each multisensory experience, the space gains added depth, internalizing the work within the guest, relating the architecture to the realm of the body, and thus expanding the occupant's connection with the surrounding world.

Chapter 6 - Appendix

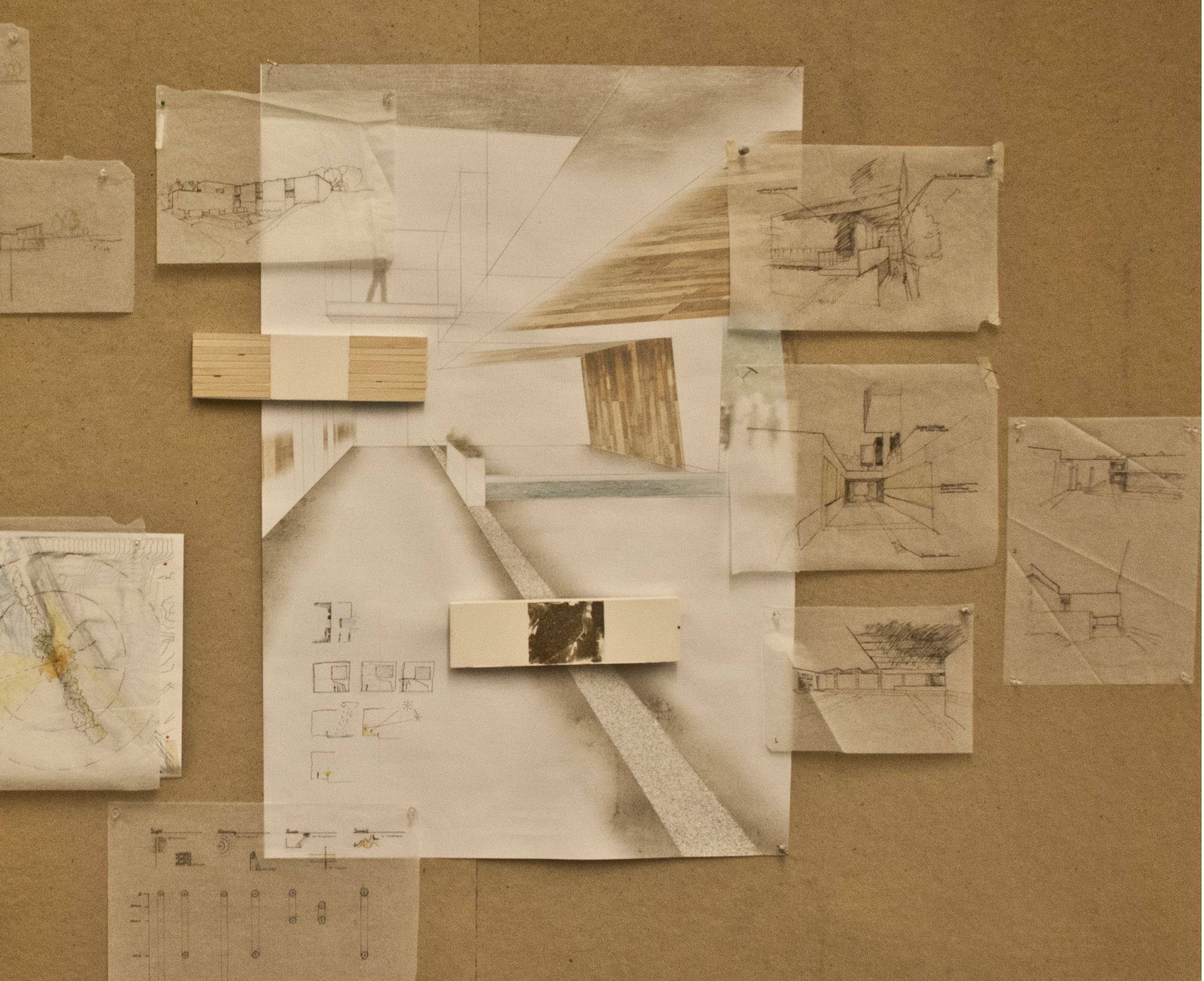
The following pages are a record of the design process that lead to the final look and presentation of "In Plain Sight." This thesis explored many display techniques to describe non-visual senses in a visual manner. Many of these were unsuccessful, but have been included here to help spur future attempts.

In addition, this thesis would not have been possible without the help of the following:

To Louisa Iarochi, for her guidance and faith in the change of topic.

To Gabbi and Jena, for their help laying braille

To my family for their constant support



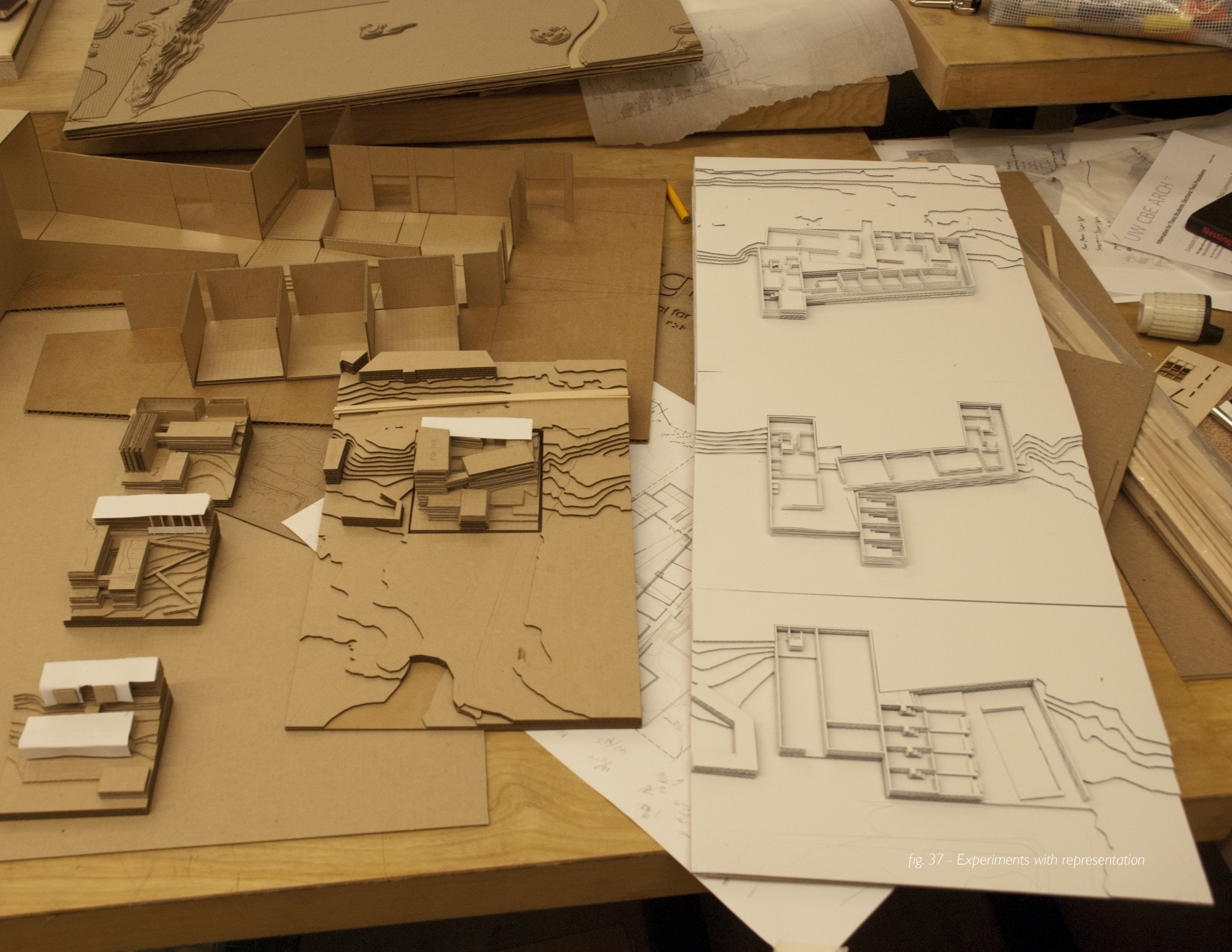


fig. 37 - Experiments with representation

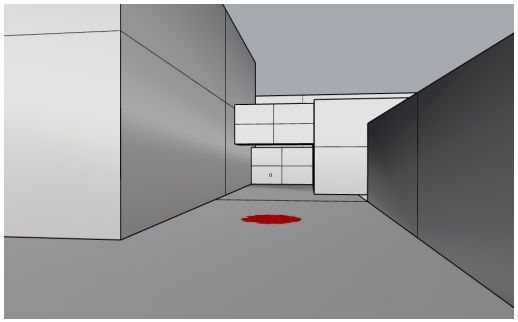
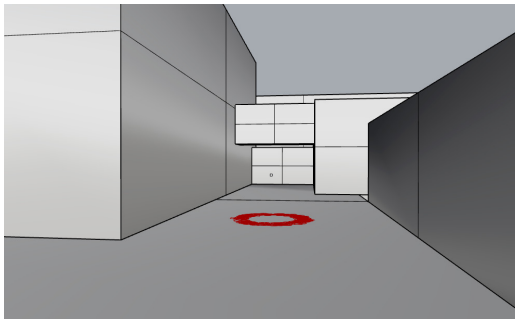
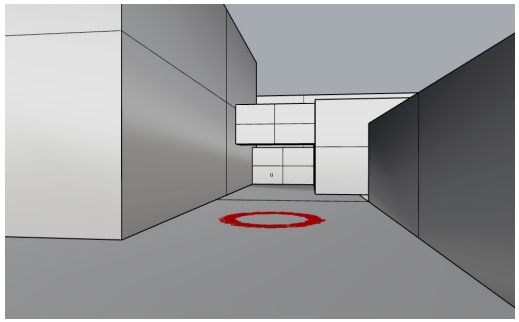
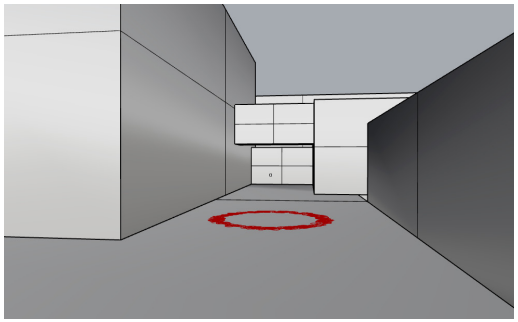
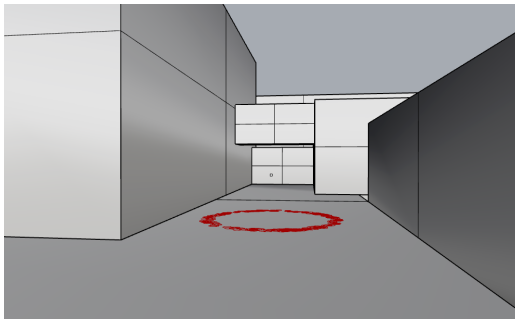
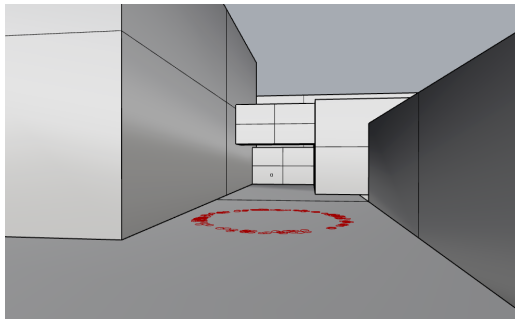
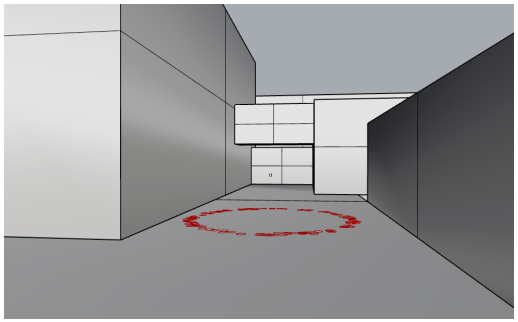
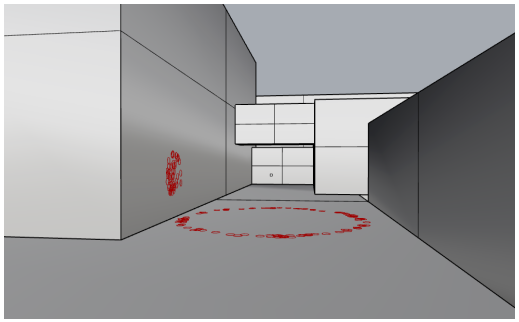
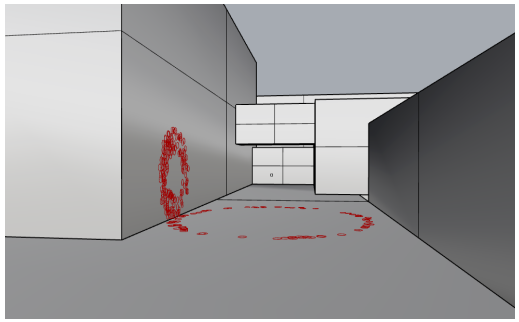
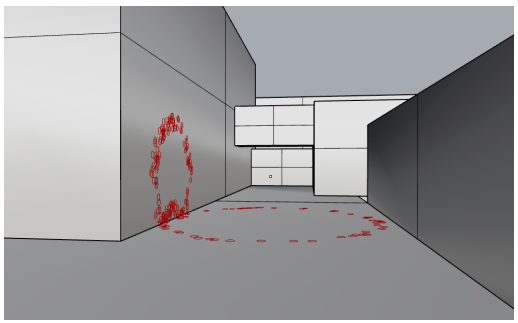
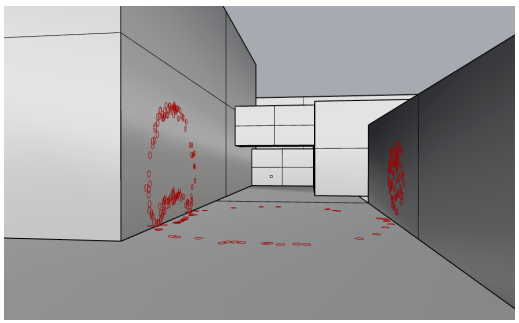
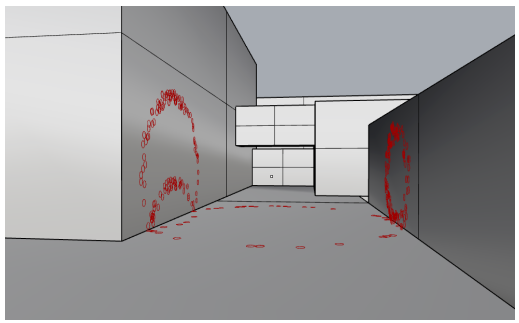
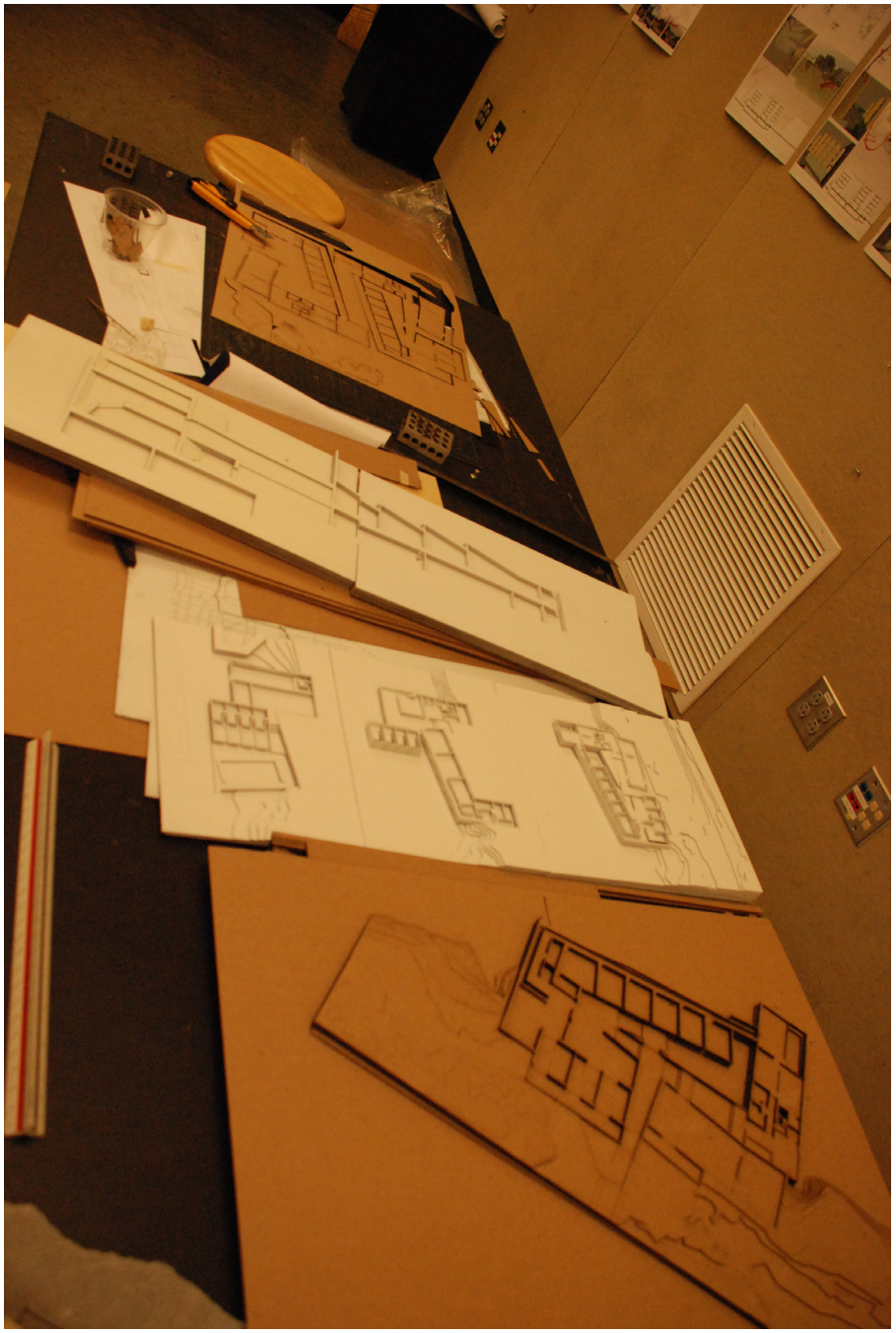
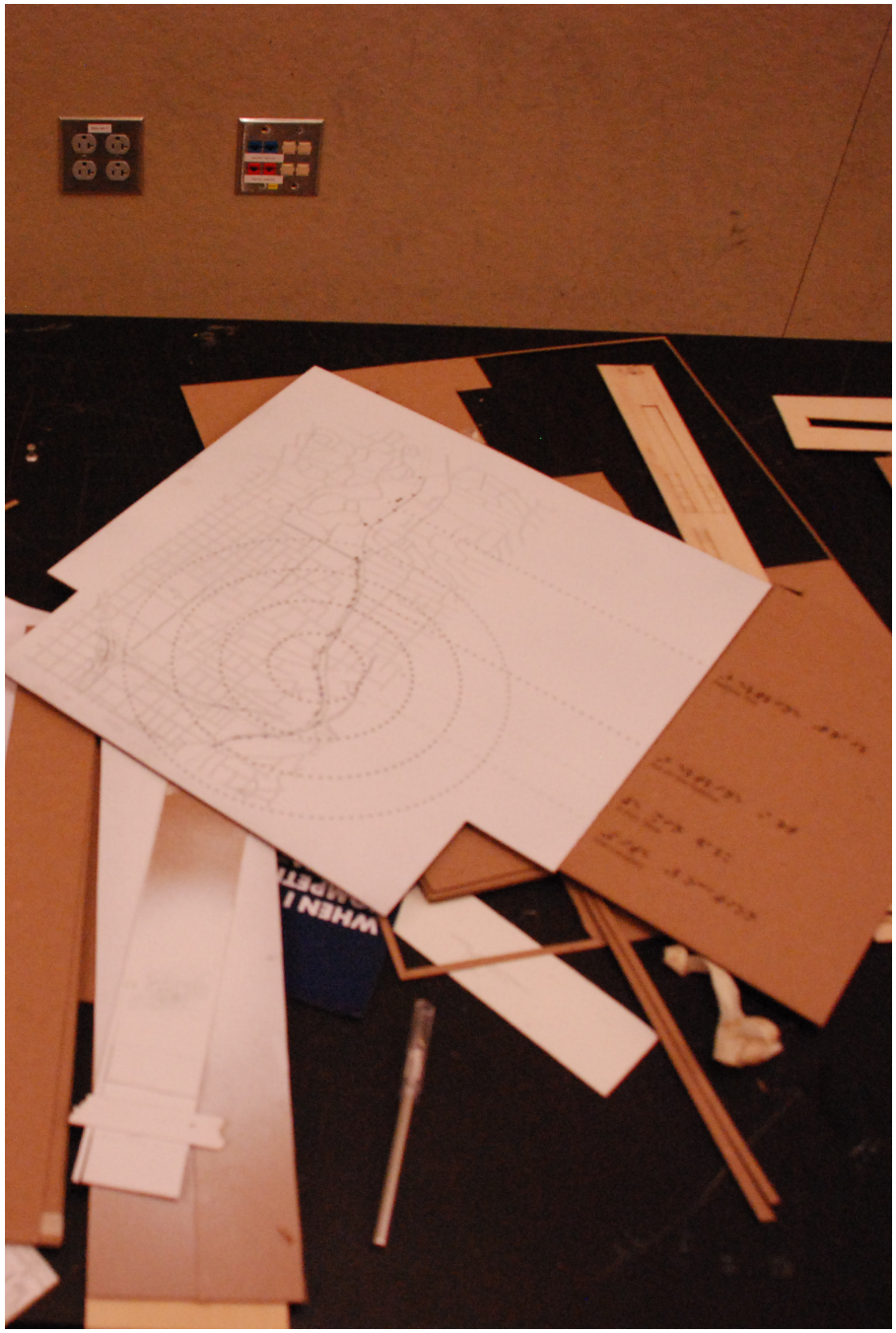













fig. 38 - Auditory Renderer and spatial renders

fig. 39 - Approach Experiments





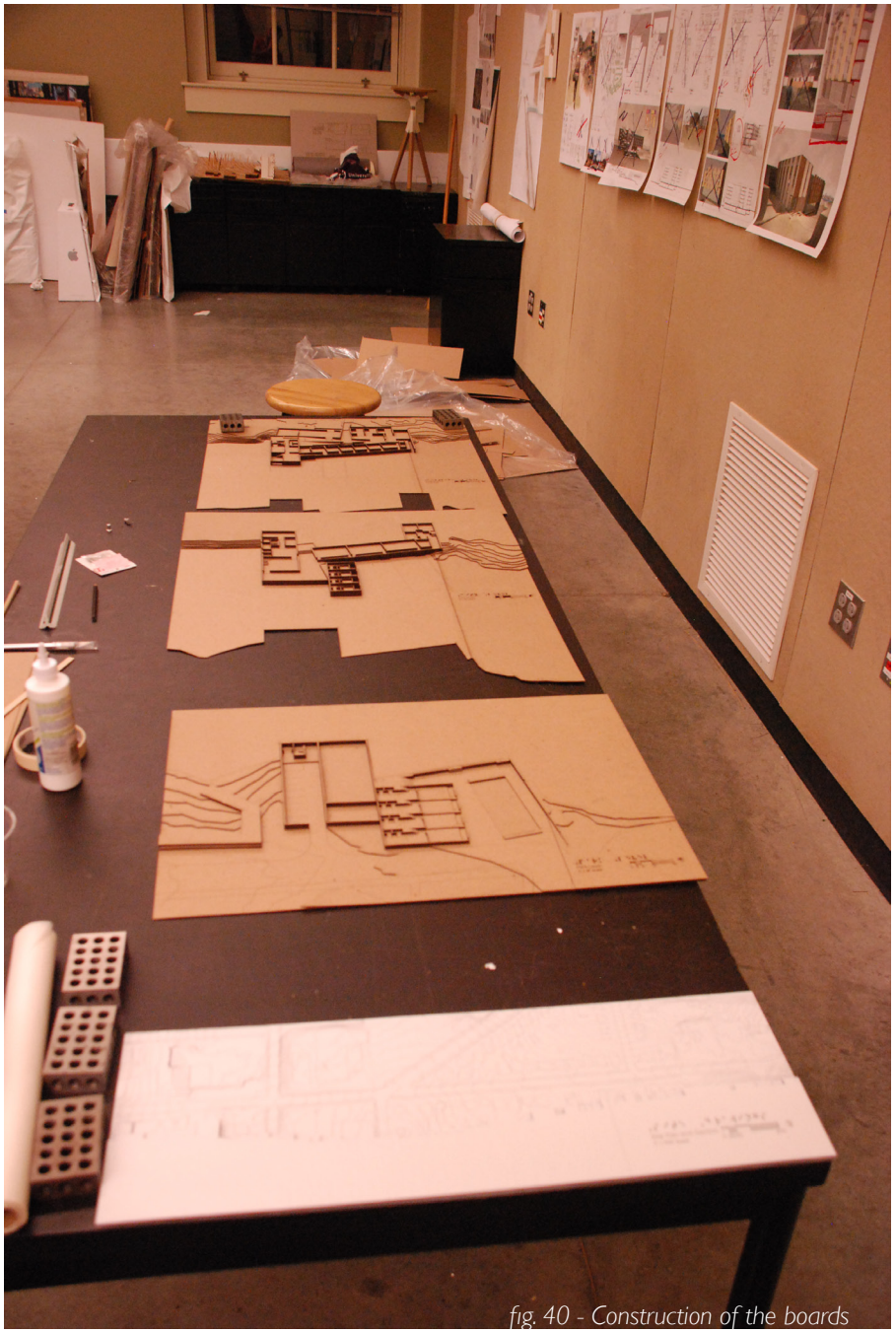
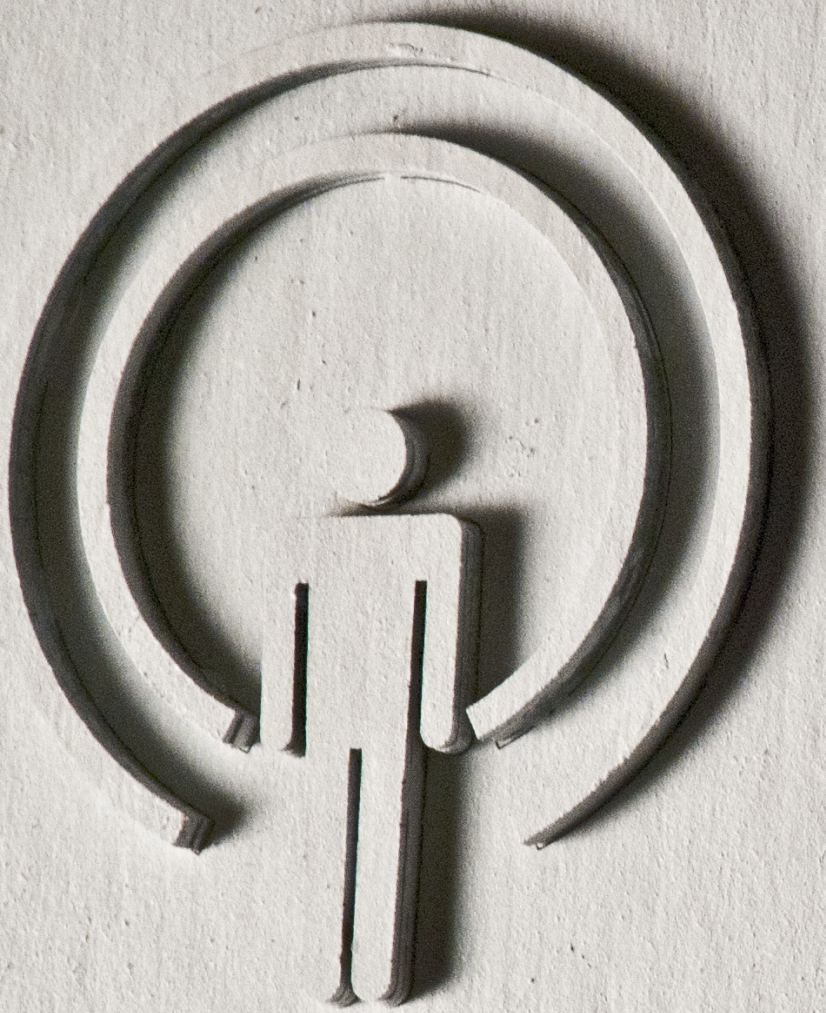
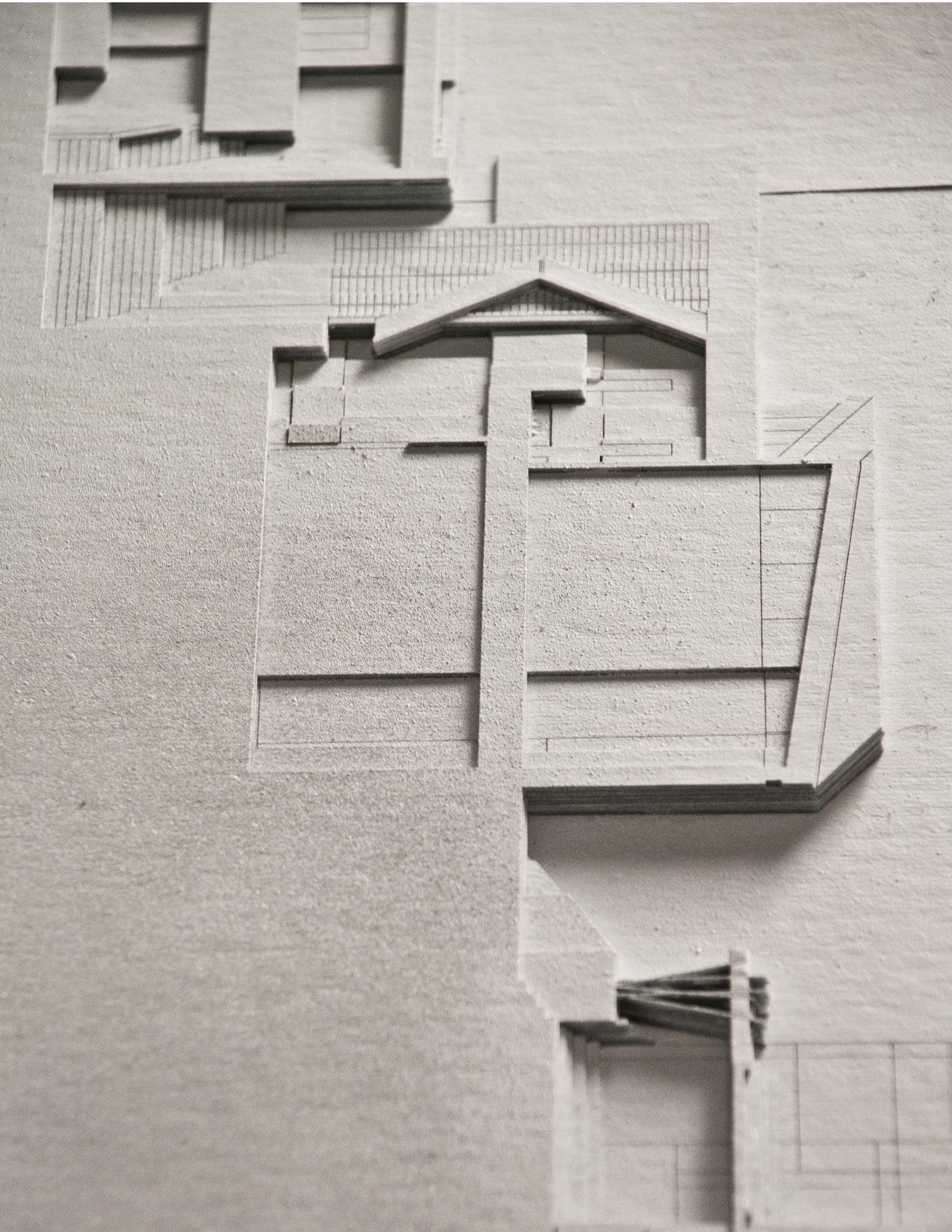


fig. 40 - Construction of the boards



Landmark

fig. 4 | - Board details



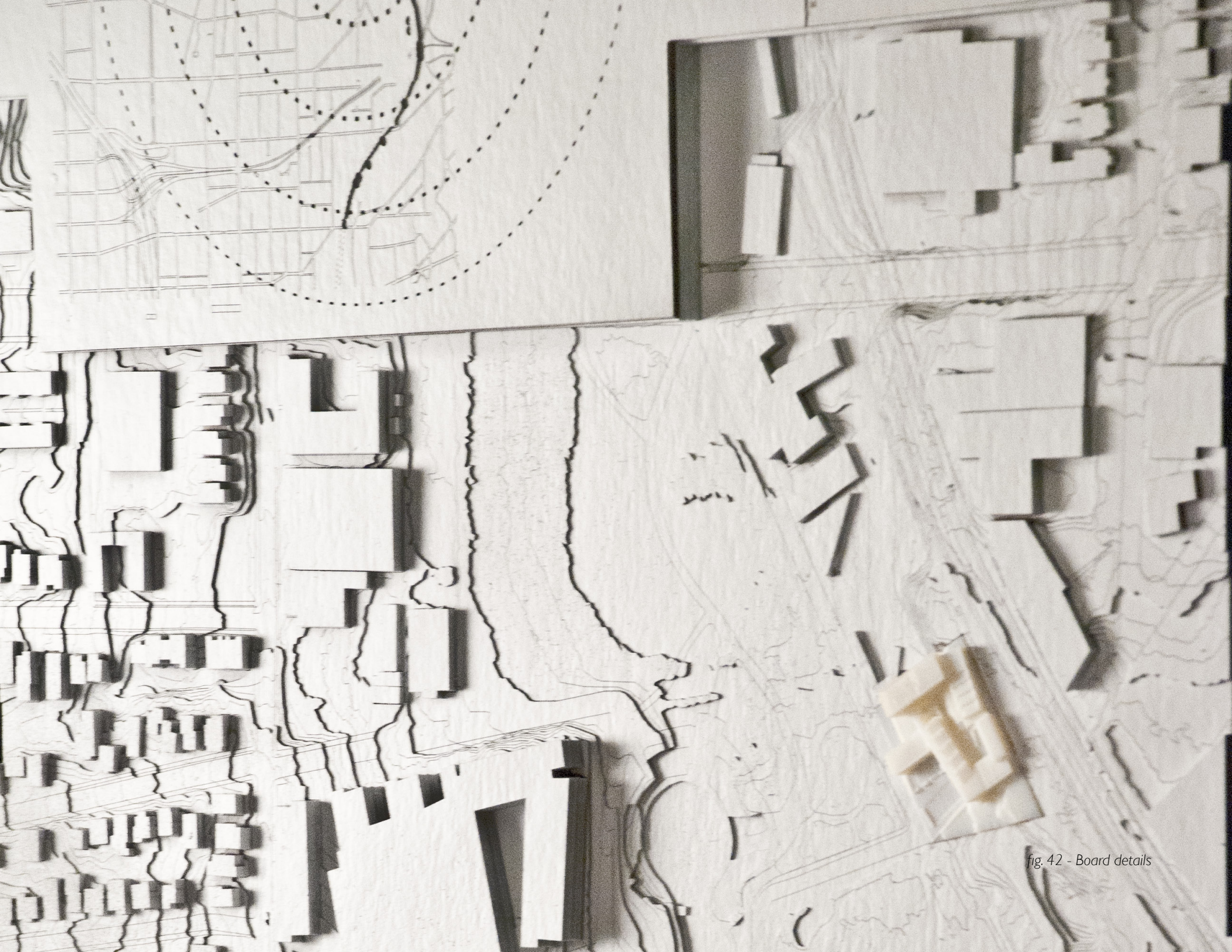


fig. 42 - Board details

In Plain Sight

A Sensory Art School for the Blind and Sighted Communities of

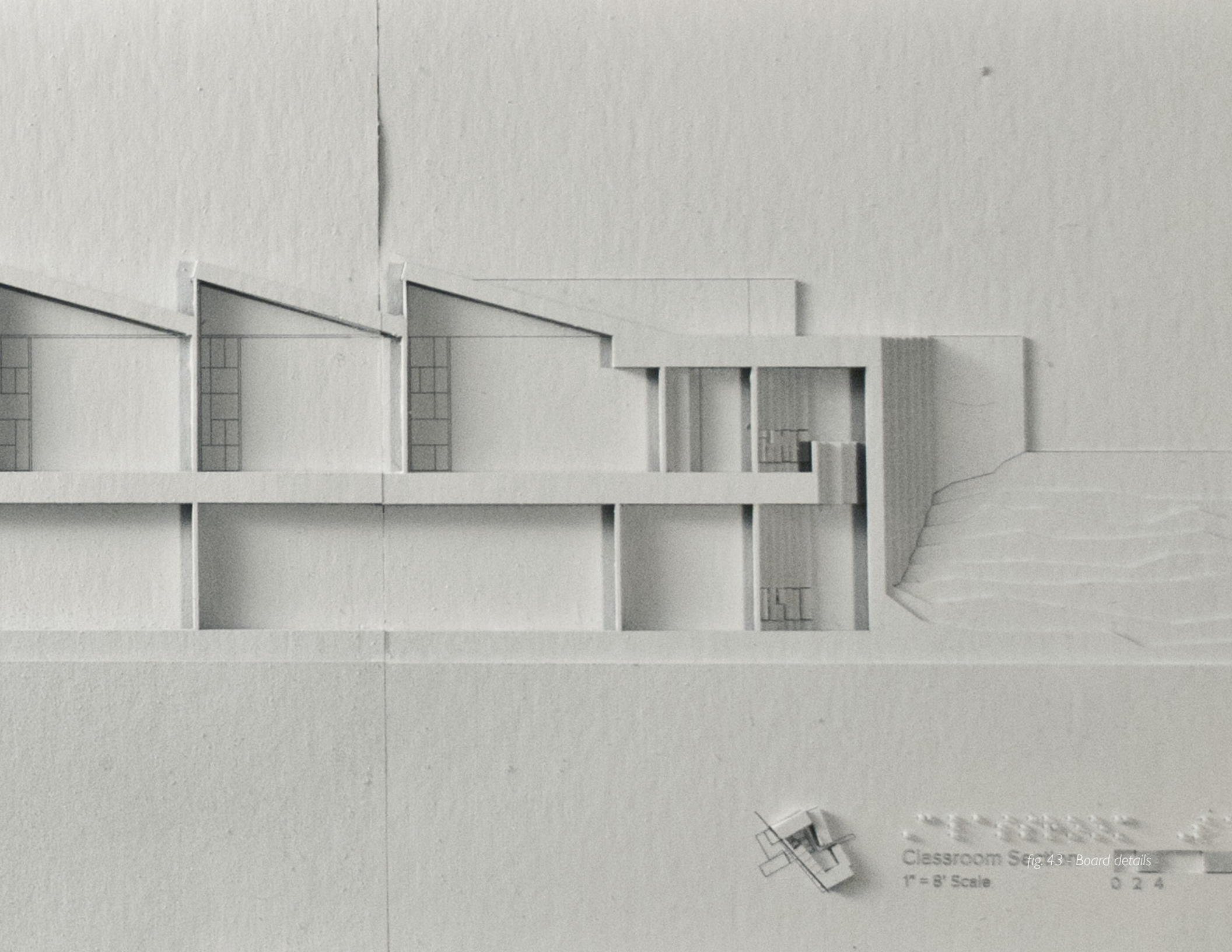
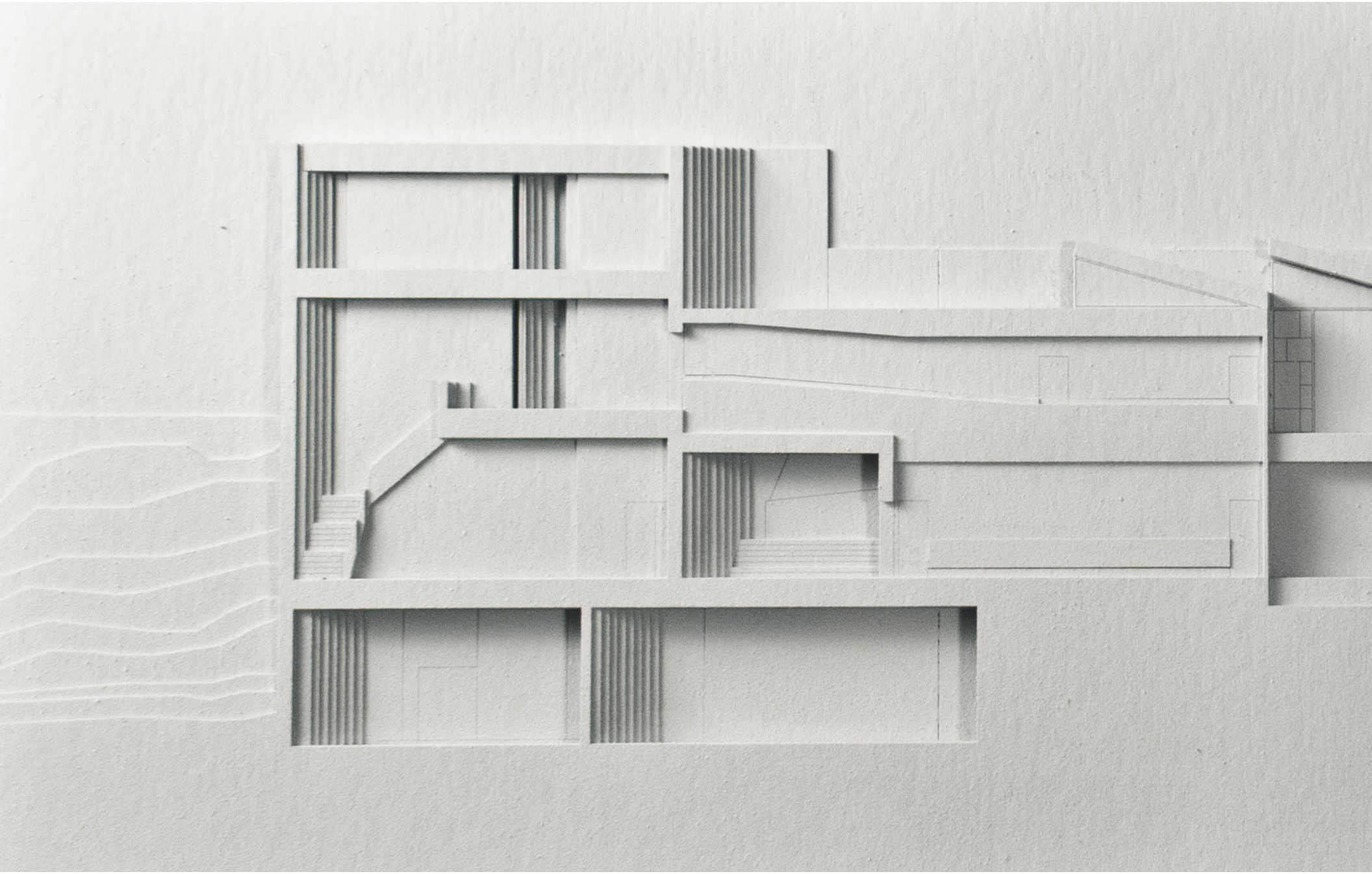


fig. 43 - Board details



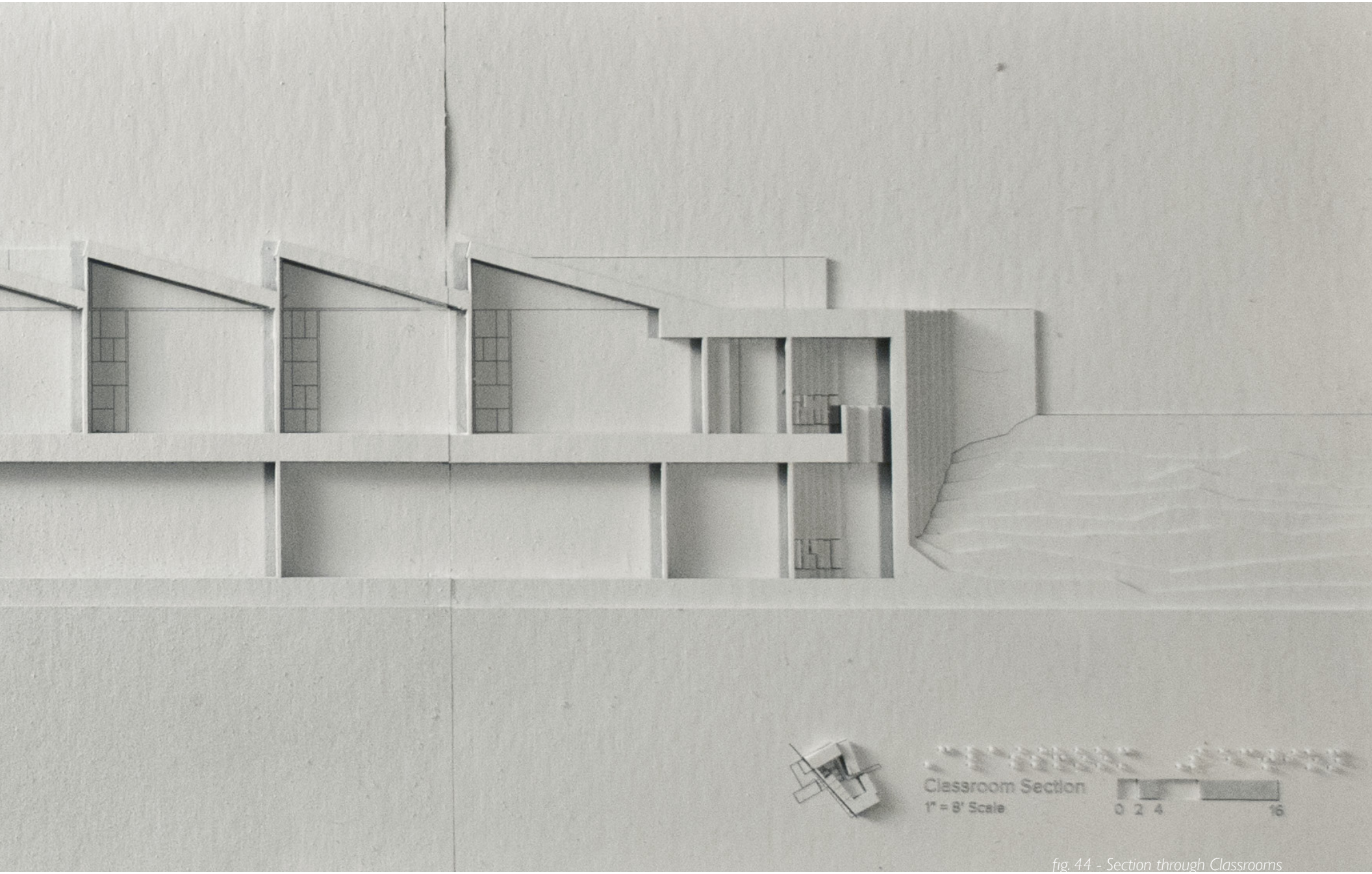
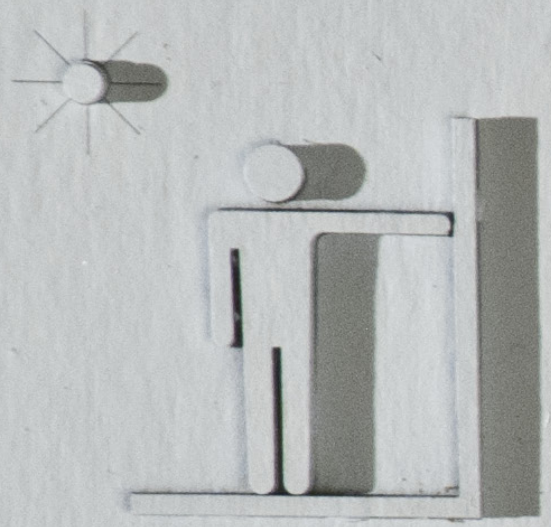
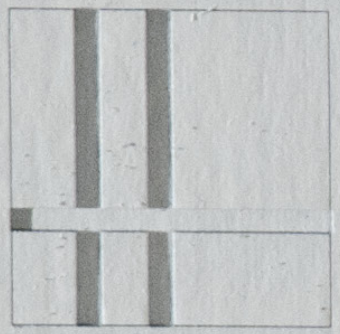


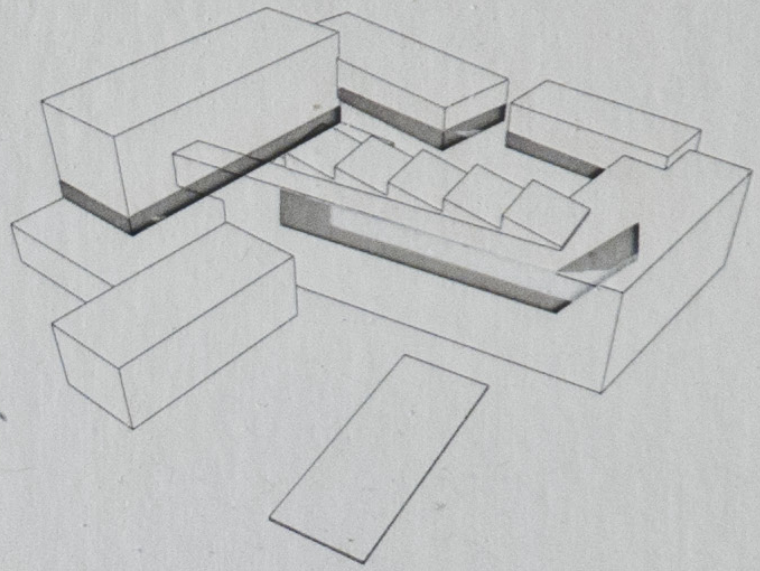
fig. 44 - Section through Classrooms





Texture

Temperature



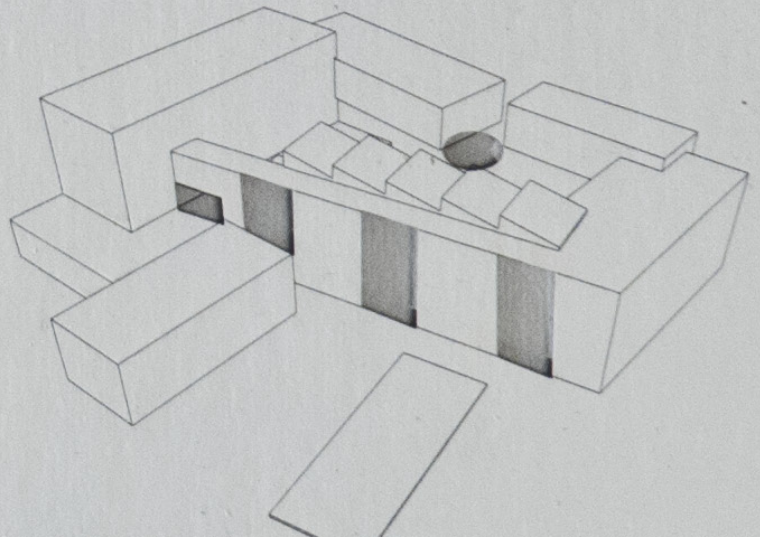
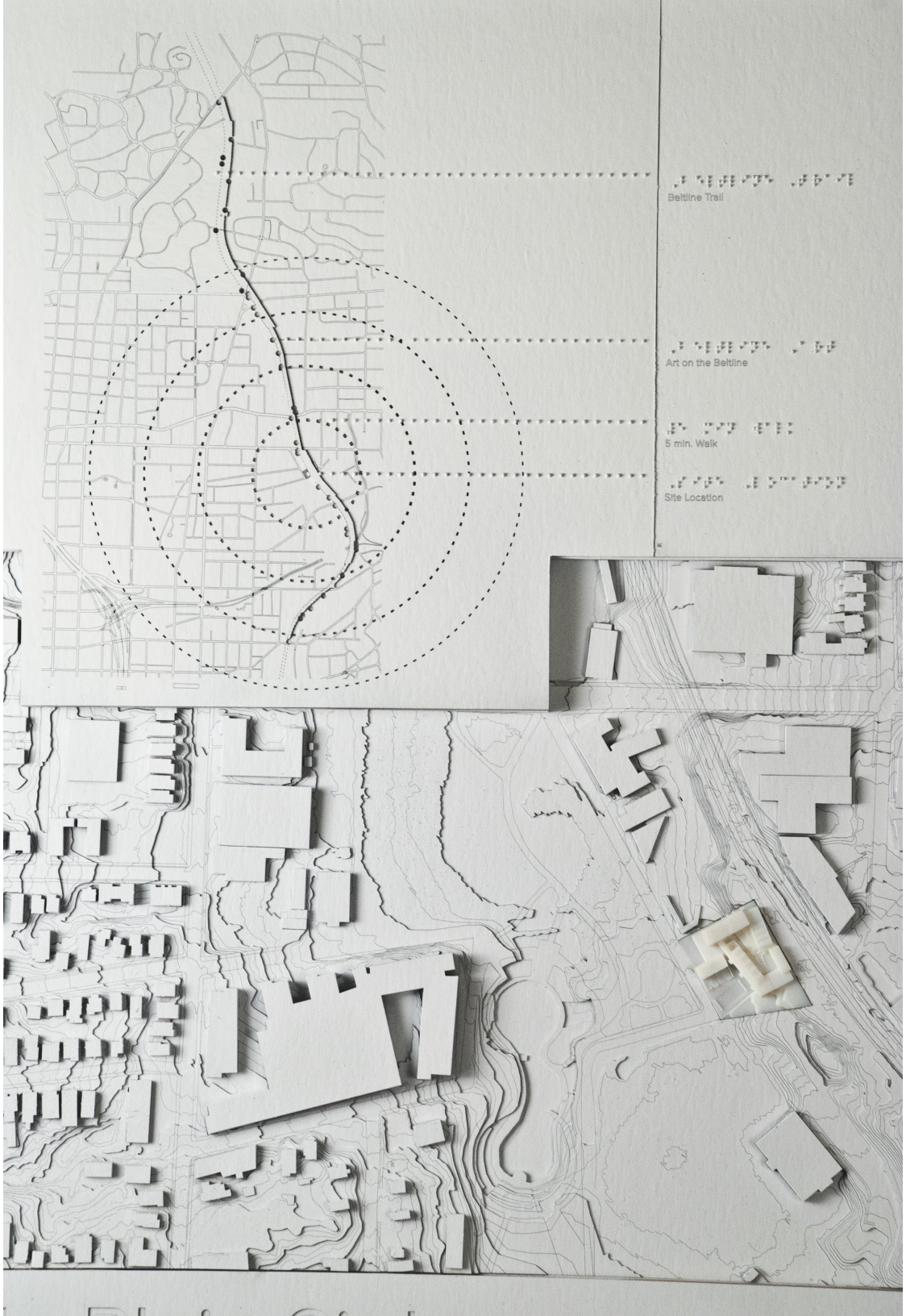


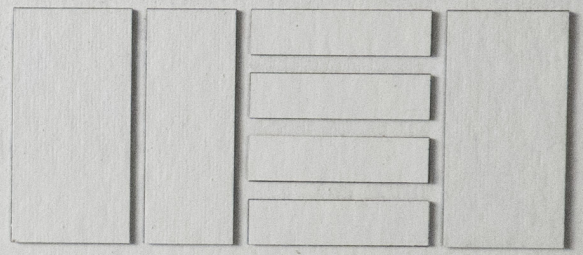
fig. 45 - "Touch" Diagram Board


Beltline Trail
Art on the Beltline
5 min. Walk
Site Location

In Plain Sight

A Sensory Art School for the Blind and Sighted Communities of Atlanta

Justin Schwartzhoff Committee: Ann Marie Borys, Gundula Proksch, Rick Mohler



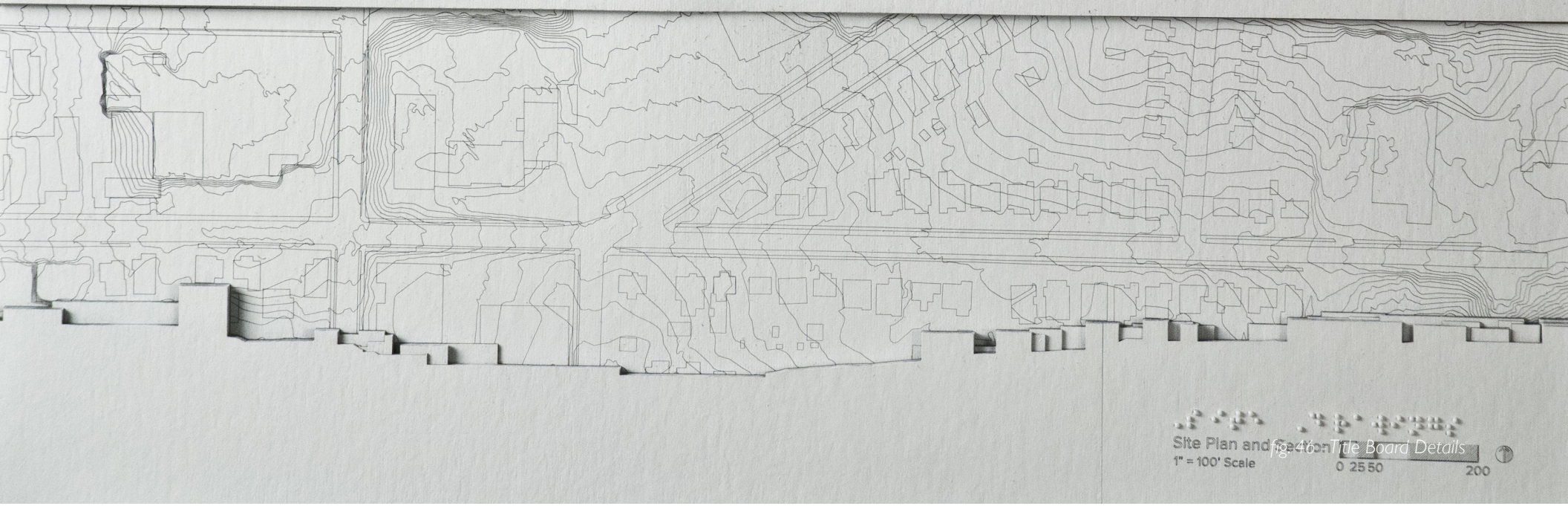


Fig. X: Title Board Details

List of figures - Unless noted, all images are by author

Works Cited:

De Cupere, Peter. "The Art of Smelling, Olfactory Art Research." Peter De Cupere. December 1, 2013. Accessed September 18, 2014.

Downey, Chris. "Connecting Across the Visual Divide." Lecture, TEDxUChicago 2011 from TED Conferences, LLC, Chicago, April 17, 2011.

Downey, Chris. "Design with the Blind in Mind." Lecture, TEDCity2.0 from TED Conferences LLC, Manhatten, September 20, 2013.

Downey, Chris. "New Vision in Architecture." Lecture, TEDxBigApple from TED Conferences, LLC, New York City, February 4, 2012.

Dwyer, Jim. "Moved to Tears at the Cloisters by a Ghostly Tapestry of Music." The New York Times. September 19, 2013. Accessed September 19, 2014.

Herssens, Jasmien, and Ann Heylighen. "Haptic design research: A blind sense of space." The Place of Research, the Research of Place (2012): 374-382.

Holl, Steven, Juhani Pallasmaa, and Alberto Pérez Gómez. 2006. *Questions of Perception: Phenomenology of Architecture.* San Francisco, CA: William Stout.

Kuusisto, Stephen. *Eavesdropping: A Life by Ear*. WNew York: W.W. Norton, 2006.

McGray, Douglas. "Design Within Reach." The Atlantic. http://www.theatlantic.com/magazine/archive/2010/10/design-within-reach/308220/ (accessed July 30, 2014).

Mitsios, Apostolos. "Zimoun // The Magician of Spatial Sound Installations." Yatzer.com. June 28, 2011. Accessed September 19, 2014.

Pallasmaa, Juhani. 2005. *The Eyes of the Skin: Architecture and the Senses*. Chichester: Wiley-Academy.

Rasmussen, Steen Eiler. 1962. *Experiencing Architecture*. Cambridge [Mass.]: M.I.T. Press, Massachusetts Institute of Technology.

Rocha, Mauricio, Humberto Ricalde G., and Javier Barreiro. 2011. *Mauricio Rocha: Taller de Arquitectura*. México, D.F.: Arquine.

Rocha-Iturbide, Mauricio. "CAPD Lecture: Mauricio Rocha-Iturbide." Lecture, from Kansas State CAPD, Manhattan, Kansas, November 10, 2010.

Sacks, Oliver W. *An Anthropologist on Mars: Seven Paradoxical Tales.* New York: Knopf, 1995.

Seamon, David, and Robert Mugerauer. 1985. *Dwelling, Place, and Environment: Towards a Phenomenology of Person and World*. Dordrecht [Netherlands]: M. Nijhoff.

"Shalekhet - Fallen Leaves." Jewish Museum Berlin. Accessed September 18, 2014.

Slatin, Chris. "Q&A> Architect Chris Downey Finds Second Sight." . : The Architect's Newspaper, LLC.

Vanneuville, Priscila. "Hall for the Visually Impaired." http://limulus.mx/sala-para-personas-con-discapacidad-visual-taller-de-arquitectura-mauricio-rocha/?lang=en (accessed July 29, 2014).

Wright, Mark. "Zimoun." EAR ROOM. January 1, 2011. Accessed September 19, 2014.

Bibliography:

Bayes, Kenneth, and Sandra Francklin. 1971. *Designing for the handicapped: the mentally retarded, the mentally ill, the maladjusted, the blind, the deaf, those with learning difficulties, the gifted or exceptional child*. London: George Godwin Limited.

"Center for the Blind and Visually Impaired / Taller de Arquitectura-Mauricio Rocha" 11 Aug 2011. ArchDaily. Accessed 30 Jul 2014. <http://www.archdaily.com/?p=158301>

Downey, Chris. "Chris Downey Provides Architectural Services for the Blind and Visually Impaired." http://www.arch4blind.com/profile.html (accessed July 30, 2014).

Gonzales, Vincent Ralph. 2000. *Lost Space: a Learning Center for the Blind*. Thesis (M. Arch.)--University of Washington, 2000.

Hall, Edward T. 1976. *Beyond Culture*. Garden City, N.Y.: Anchor Press.

Holl, Steven. *The Chapel of St. Ignatius*. New York: Princeton Architectural Press, 1999.

Howes, David. 1991. *The Varieties of Sensory Experience: a Sourcebook in the Anthropology of the Senses*. Toronto: University of Toronto Press.

Hunter, John A.. *Housing for the Visually Impaired: Research-Based Design*. Milwaukee: School of Architecture & Urban Planning, University of Wisconsin-Milwaukee, 1981.

Michel, Derek. *Architecture and the Blind: Finding Pleasure in the Non-Visual Realm*. Pullman: Washington State University, 2006.

Pearson, David. "Making Sense of Architecture: How Architecture Appeals to All Five Senses." *The Architectural Review* 189: 68-70.

Preiser, Wolfgang F. E., and Mark Brecht. 1981. *The Visually Handicapped and the Built Environment: Tactile Mapping and Building Directories : a selected bibliography*. Monticello, Ill: Vance Bibliographies.