



a transcribed language of architectural elements

ENVIRO - BRAILLE



ENVIRO - BRAILLE

the Transcribed Language of Architecture

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

Laura Cragoe

In Partial Fulfillment of the Requirements
for the Degree of
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Primary Thesis Advisor

Thesis Committee Chair

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thesis prop

proposal



Image of eye
Figure 0.00



abstract

Architecture has an immense effect on our perception of reality. The way one gains understanding of their surroundings depends heavily on stimulation of senses. The pitfall of designers is the consciousness paid to occupants who have an impaired sense of sight or blindness. It is the architect's responsibility to make design decisions that cultivate environments that everyone can thrive in. Information for this research will be gathered by analyzing perception as it relates to the visually impaired and comparing the principles of language and semiotics to gain an understanding of how architecture is used as a tool of communication. From this information, an indication of architectural elements that should be used to communicate to the visually impaired will be made. The goal of this research to produce a framework of elements that can be applied to any typology.

narrative of the unifying idea of thesis

Architecture has an immense effect on our perception of reality. It has the ability to shape people's understanding of the world and impacts the way people feel, work, move, and play. The way in which one gains an understanding of their surroundings depends heavily on the stimulation of senses that are constantly gathering information. The pitfall in design is the consciousness paid to the occupants who have an impaired sense of sight or are blind. This lack of attention, in turn, creates barriers in the built environment that become frustrating, stressful, painful, and even embarrassing for those who can not get around them. It is the architect's responsibility to make design decisions that consider all occupants and mitigate these barriers to cultivate environments for everyone to thrive in. To do this, designers need to develop a strong understanding of all people. Raymond Lifchez and Cheryl Davis (1987) asks the question, "How ethical is it to practice architecture - to be a professional licensed to design buildings and places of assembly - without having first developed an intellectual and emotional understanding of people?" (p. 35) in the book *Rethinking Architecture*.

My interest in defining an architectural standard that enhances and cultivates a more inclusive environment for those impaired visually stemmed from interaction and testimony. This past year, I participated in a program called *Dialog in the Dark*. I was guid-

I was guided through an exhibition without the ability to see - feeling my way around space and listening to the sounds of my environment. I gained an awareness of how blind perceive and understand beauty from a different, non-visual, perspective. Since this experience, I have continued to be enamored by how visually impaired people perceive the world around them.

By investigating how senses detect certain signs and landmarks and applying these discoveries to architectural elements in different typologies, I hope to achieve an enhanced, inclusive environment of architecture. This research considers what architectural elements can be used, and are used, in order to translate the environment to those who have impaired visually abilities, including blindness. Abductive reasoning is guiding the research results; with an aspired value of meaning in mind, what architectural environments should communicate, and how it is communicated is unknown. This analysis is directed by the philosophical framework of Constructivism because the aspired value is created by constructing elements that cultivate a common meaning for the visually impaired. The research takes a stance that reality is a contextual field of information and a social construction where blind and visually impaired are information processors. It is important to recognize that reality is inter-subjective, where there are multiple diverse viewpoints regarding socio-cultural realities, but it is nevertheless possible to achieve shared understanding. The perspective foregrounds the interpretation of meaning in the environments that are constructed. The knowledge gained in this research will be gathered through analysis in order to understand how the visually impaired understand environments and how architecture can communicate through senses other than sight.

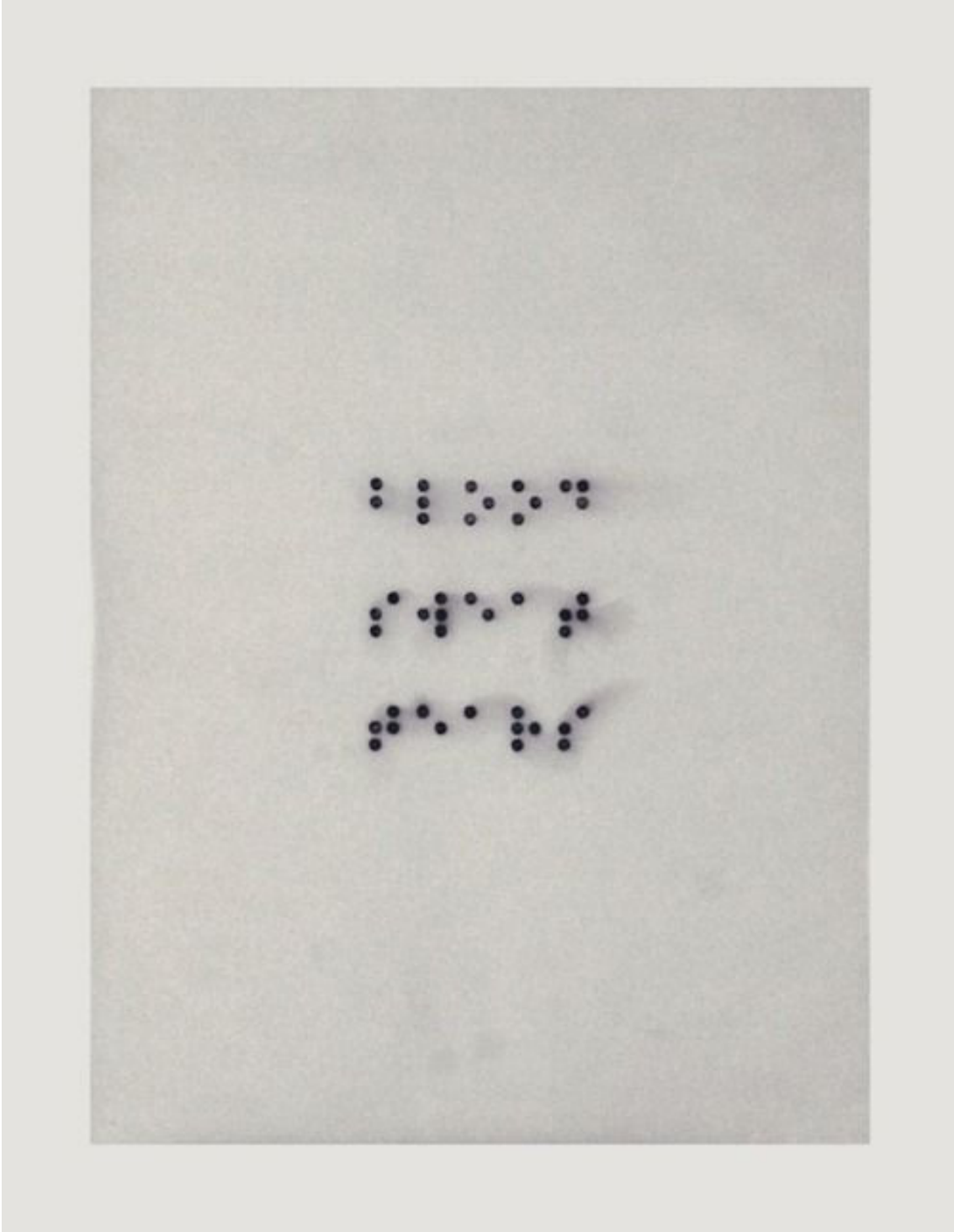
The knowledge of linguistics, semiotics, and cognitive sciences confirms that the language of architecture is constructed and translated with the use of elements that are able to convey meaning through signs. The implementation of sensory-rich elements in our built environment provides visually impaired persons with a mental perception, or cognitive map, of their environment. By analyzing language, semiotics, and understanding the impact of architectural elements to the senses of the visually impaired, it is the goal of this research to produce a framework of elements that can be applied to any typology. Designing with these elements will improve the way that architecture is read and cultivate a more inclusive environment. This research will not only bring awareness of the importance of universal design to architects but also set up a framework that can be built upon and utilized in the field.

project typology

This thesis project isn't looking at a specific building type, but should be applied to all building types for all ages. The project looks at architecture as an interactive piece in our daily environments; an architectural system of signs. These signs can be used to convey specific meaning, they can be used to create space for growth and learning, and it can be used to guide people through the environment.

Because the visually impaired need to learn every new environment that they are introduced to, the project studies learning environments along with architecture that evokes discovery and understanding simultaneously. The typology for the thesis design solution will applying specific architectural elements that enhance the experience of the everyday spaces we use and create environments where those with disabilities or impairments can feel like they can be successful and independent.

The model of architectural elements that will be implemented in this project will focus on sound, touch, and smell. It will have the ability to be applied to any building type with the goal of creating more inclusive environments to those with visual disabilities. The interactive environments will provide users with a more enjoyable and informative experience.



Braille
Figure 0.02

Sense Cafe

Beijing, China

Refurbishment in
Architecture

530.0 m²

typological research

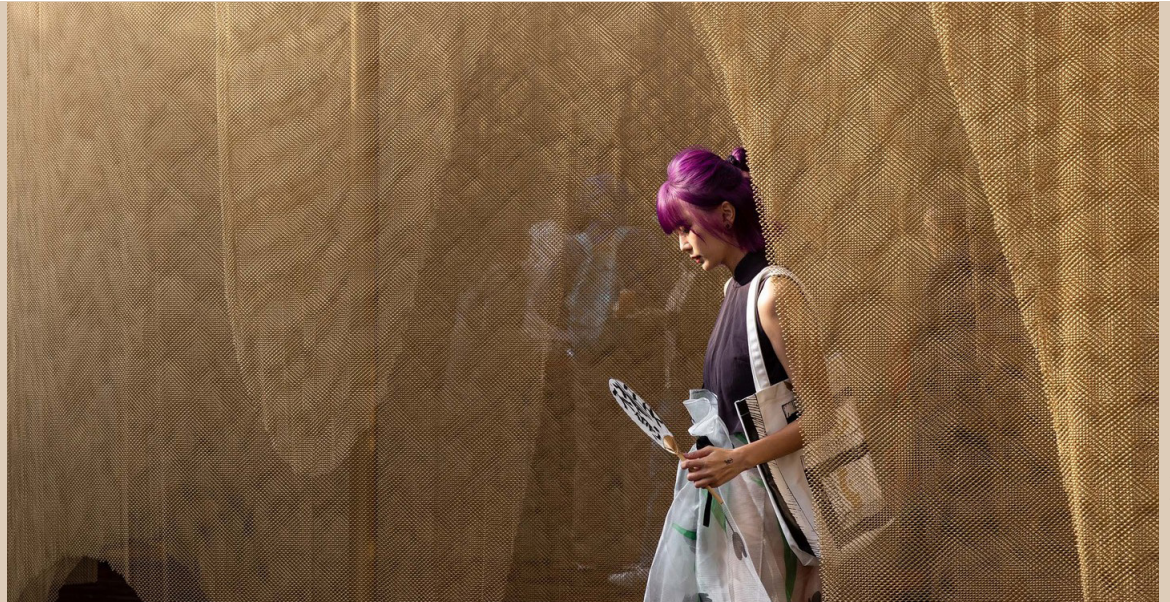


Image of plaza space
Figure 1.01



Image of courtyard structure
Figure 1.02



Image of interactive cafe space
Figure 1.03

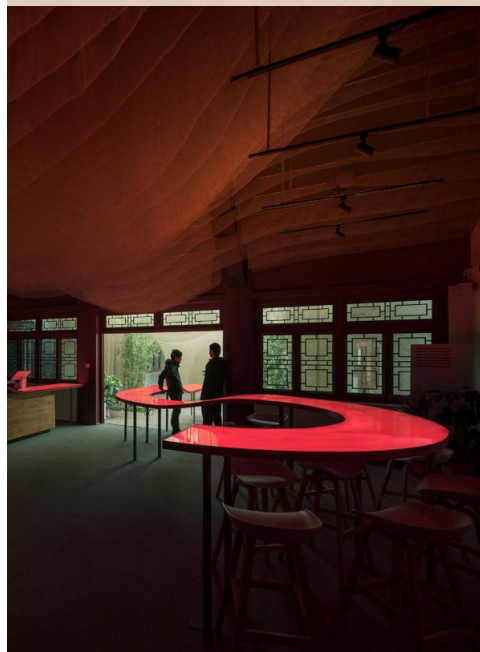


Image from main cafe into courtyard
Figure 1.04

Sense Cafe

This design is inspired by ancient Chinese cities with a new interpretation of traditional courtyards, called siheyuan, and the coffee experience. The distinguishing characteristic of this case is the poetic story that each element of the design possess

Existing program elements

Courtyard
Main cafe and seating area
Interactive listening experience
Four additional indoor seating areas
Plaza

research findings

The commonality of this design to the other case studies is the push for a more immerse sensory experience. The designers chose to tell a story through interaction of architectural elements that we interact with as we discover the space.

This case is different from the others because it isn't specifically designed for people who are visually impaired. This design is a retail space that strives to portray a spatial metaphor that enhances the user's experience and gives visitors a constant connection with the city.

The design invites people to gather in a traditional space and to participate in the story of the city with coffee.

What I find unique about this design is the integral skeleton arching over the courtyard that creates these soft spaces. It almost suggests that cities function similarly to our bodies.



Section
Figure 1.06

Shows progression of spaces along with the breaking of boundaries between courtyard and building.



Section
Figure 1.07

Shows the interactive aspects of the design elements.



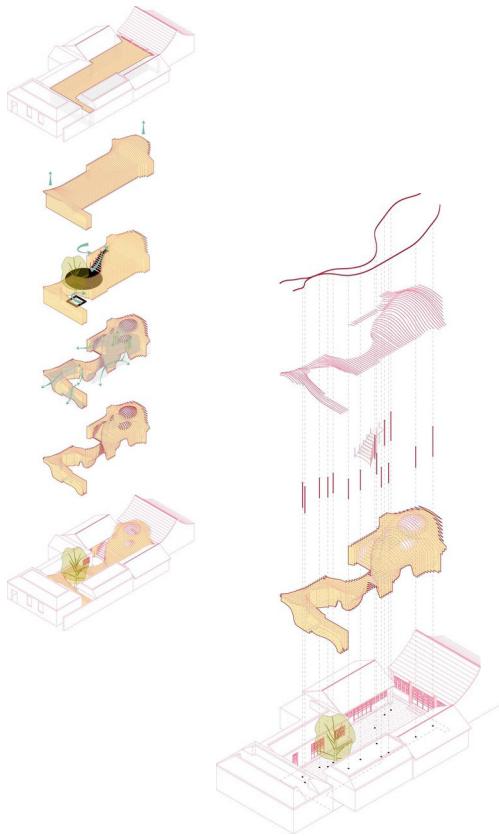
Floor Plan
Figure 1.08



analysis

The design attempts to break boundaries of “the ancient city” and takes a stance that just like the phenomena of getting and drinking a cup of coffee, architectural elements have the ability to impact the way you move through a space. The combination of the soft spaces with the chain drapery creates a unique juxtaposition.

Formation Time-line of Intervention
Figure 1.09



Hierarchy of Materials and Construction
Figure 1.10

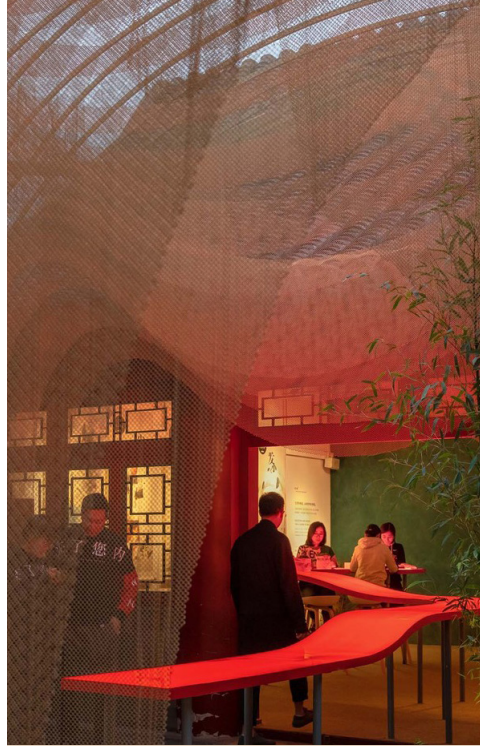


Image from courtyard into main cafe
Figure 1.11

conclusion

This case shows how architectural elements can be implemented to convey an underlying meaning or tell a story. The continuous tables could be interpreted as a sentence with a start and an end. They are playful and as you read the sentence, you take in the text around you. This design leads users through the space and impacts the perception of the context of the city. Each sensory element is purposeful and conveys a rich historical meaning.



Image of school building
Figure 2.01

Redemptorist School for the Blind

Payata, Thailand

Renovation

48.0 m²



Image of classroom
Figure 2.02



Image of student interacting with wall
Figure 2.03

Redemptorist School for the Blind

This design is of a single, flexible classroom and was curated specifically for the school so that visually impaired students, who don't have an understanding of braille, could have the opportunity to experience a space that would equip them with fundamental skills for their future. What sets this project apart from the others is the intentional design decisions to have every surface and element be a point of interaction and learning.

Existing program elements

Interactive sensory classroom

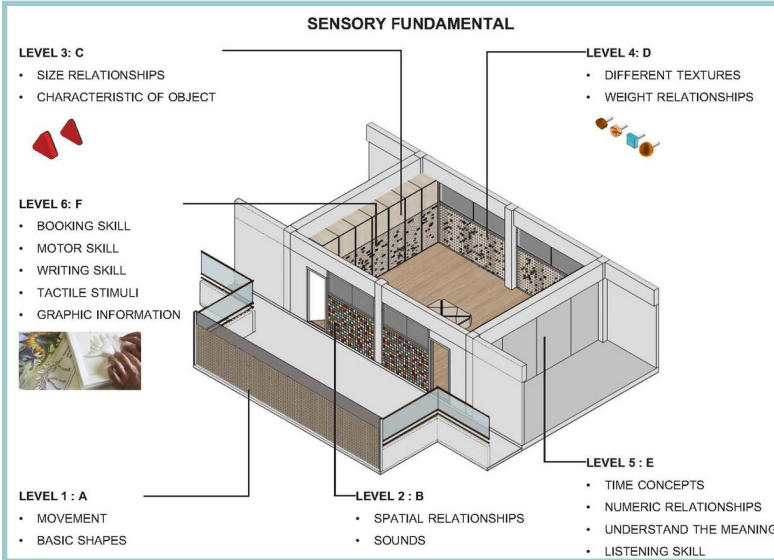
research findings

The use of interactive elements in this design is common to the cases that are investigated in the research. Like the other cases, the elements are informative and communicates to the user. The difference between this design and the other designs is that in this project, the elements are used specifically for educational purposes outside of the typical perception of space; these elements are used to teach and equip.

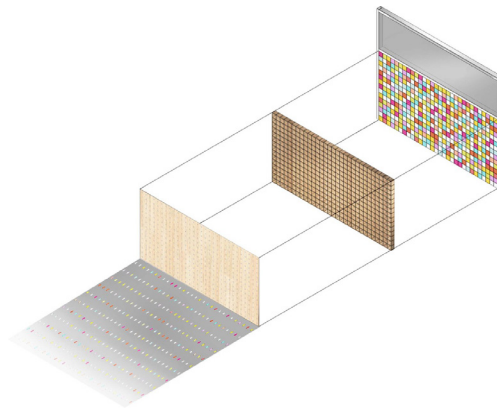
The conceptual underpinnings for this design has a strong emphasis on communication through senses. It can be assumed that research went into how feeling, along with sound and smell, influence reality.



Image of student interacting with wall
Figure 2.04



Sensory Elements
Figure 2.05



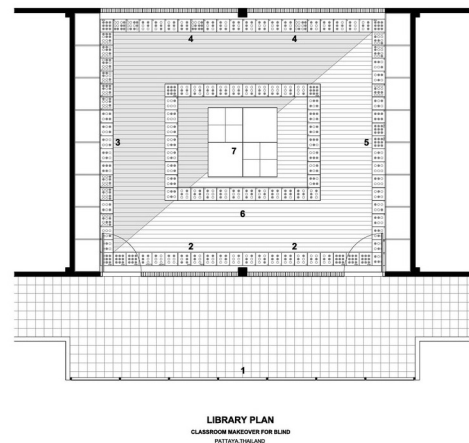
Wall Configuration
Figure 2.06

analysis

The room starts with simple shapes and size relationships, and then grows to more complex shapes, such as animals. As children progress, other senses are introduced to stimulate students' perception of the environment. Figure 2.05 outlines the elements that are implemented in this design.

In Figure 2.06, one can see the transition from the exterior wall to the interior. The exterior wall is made of colored panels. As the light comes into the space, one can see the variation in color on the wall and shadowed onto the floor. This is shown in figure 1.06

In figure 2.06, the floor plan shows braille on the ground, acting both as a tool for education, and also a transition strip.

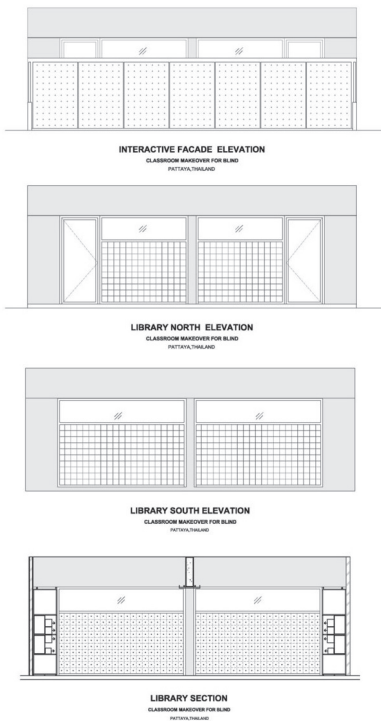


Floor Plan
Figure 2.07



Image of classroom
Figure 2.08

Interior elevations
of classroom
Figure 2.09



conclusion

This case study exhibits how different senses such as touch, sound, and smell can influence our understanding of the world. The design implements specific architectural elements to achieve a desired understanding. The classroom design showcases how one can play with the different aspects of our environments to convey meaning or thought.

Hazelwood School

Glasgow, Scotland

Educational - Elementary
School

typological research





Image of gathering place
Figure 3.01

typological research

Student walking through hallway
Figure 3.02



Hazelwood School

Hazelwood School is for a range of students from two to eight-teen who are blind and deaf. It was the goal of this design solution to support the needs of the children and inspire them despite the level of handicap they face.

Existing program elements

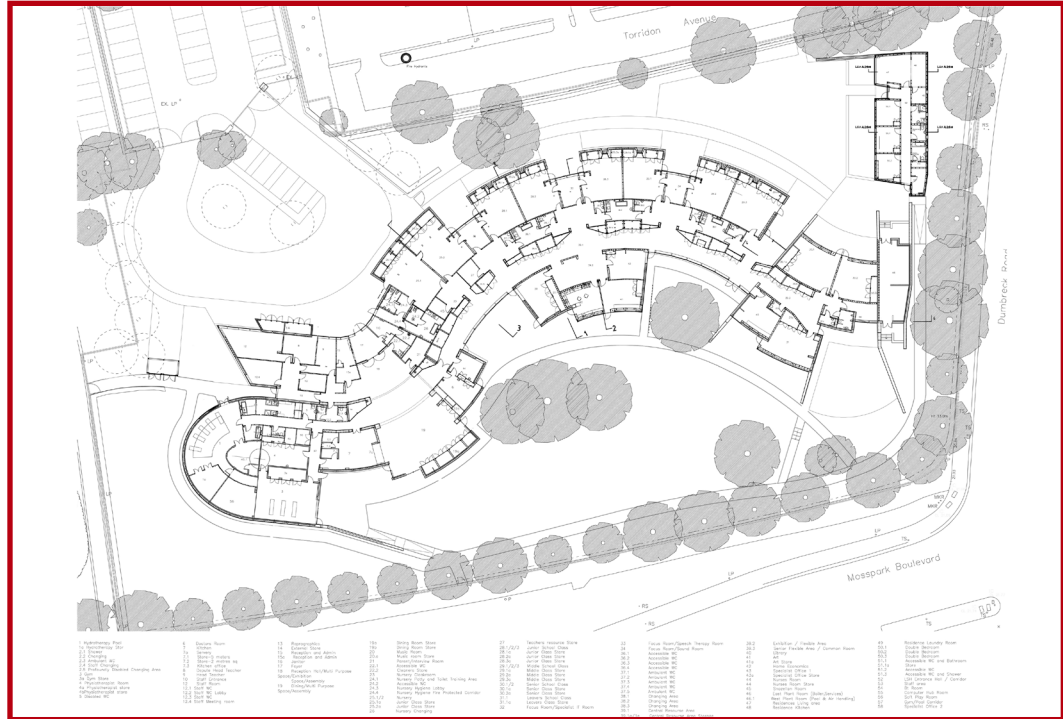
- Classrooms
- Cafeteria
- Hydrotherapy pool
- Gym
- Changing/Shower
- Physiotherapist room
- Water Closets
- Doctors Room
- Kitchen
- Nursery
- Multipurpose Space
- Music and Art Rooms

research findings

Common to the cases outlined previously, this design uses different elements to create a better experience for those who have visual disabilities. Unlike the other cases, the user of this building is not only one who is blind or deaf, but also those who are handicapped physically and cognitively.

The school is located in a suburban area. Surrounded by residences and major roads, serving the immediate community and neighboring cities.





Floor Plan and Site Plan
Figure 3.04

analysis

The concept of the building is a linear movement, as one can see by looking at Figure 3.04, making it easier for the users to understand and navigate the school. It shows a simple configuration of spaces that is efficient and creates harmony.

The line of trees along the busy road creates a barrier, making the school yard a safe environment for exploration and learning experiences. This can be observed in both Figure 3.04 and 3.05

In figure 3.05 the hierarchy of space is evident. Starting with the main entrance and then shifting to the avenue of travel within the building.

conclusion

This case focuses strongly on the order in which people perceive spaces. The design shows an organization of spaces that follows rules, such as shape grammar, giving users an idea of what logically comes next.

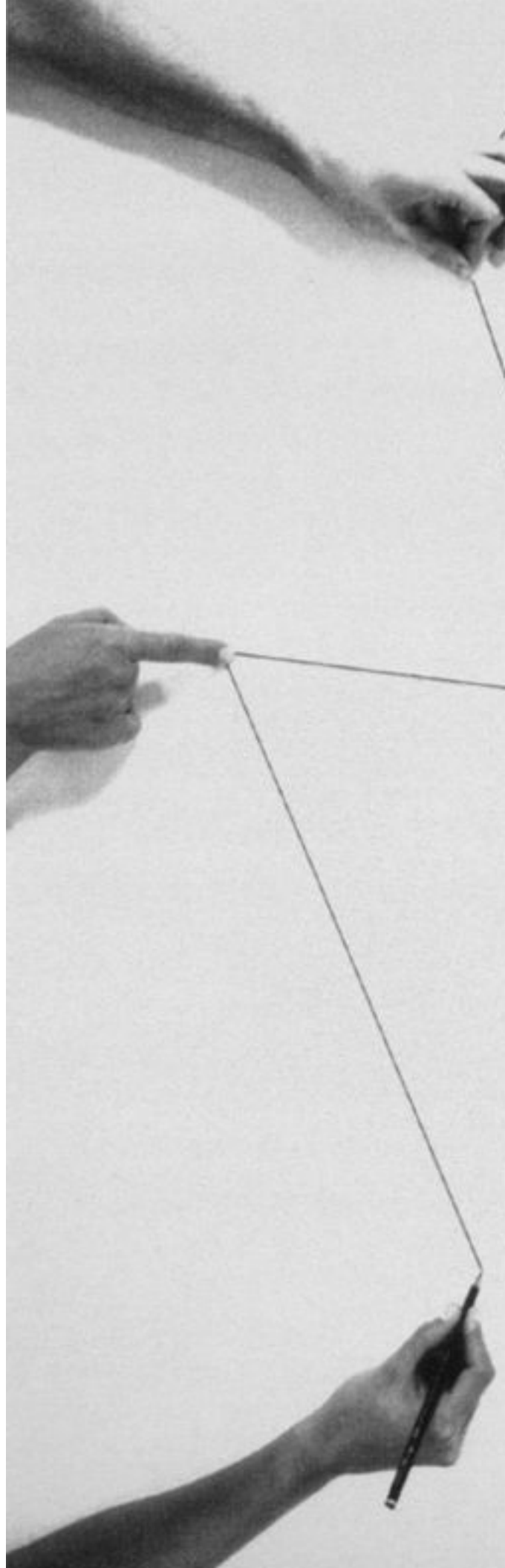
The design showcases unique elements that make it easier for those who are visually impaired to find their way around independently.

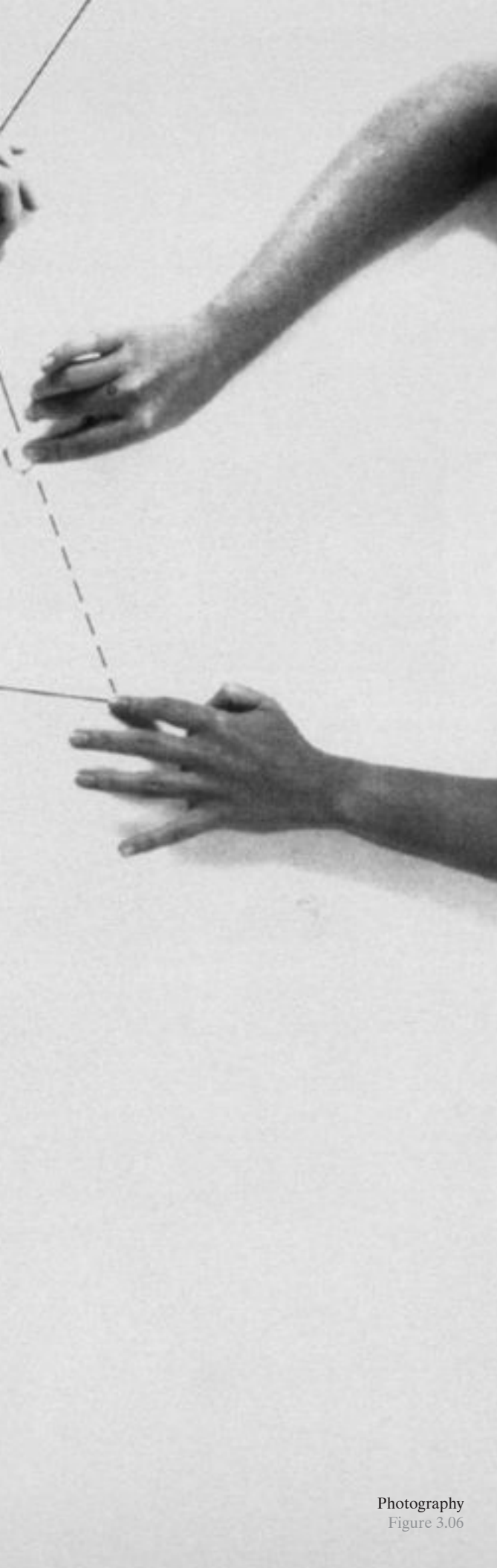


Bird's eye view of school
Figure 3.05

typological summary

The typological case studies give three examples of inclusive design for those who are visually impaired and blind. Each example implemented different interactive tools that communicated information that enhanced their environment. These case studies gave insight to how architectural elements are able to communicate and tell a story. Whether that story is about the ancient Chinese city or the vast world around us.





Photography
Figure 3.06

conclusion

While the types of projects didn't always serve the same grouping of users, one can conclude that there were multiple features of the designs that were a commonality in each design. These common features are:

An Empathetic Approach:

For each case the design focuses on enhancing visually impaired persons ability to function independently, even if the design wasn't specifically for blind people.

Lighting and color:

While light is processed visually, there are people with visual disabilities that are still sensitive to light and color. In each project the colors of red, orange, and yellow were used. These colors are the most visible to those who are visually impaired.

Tactility:

In each design there was a point, or multiple points of interaction. This interaction comes mostly in the form touching the objects around them to gain understanding of what it is. It could be a railing, a toy, or even a counter-top.



user/client description

The design is intended to be used by anyone, but additional attention will be paid to designing for those with visual disabilities. The learning/discovery center will be owned by either private or public stakeholders. It will be accessible to anyone of any age and of any ability. All reading material should be legible to all of its users. Both braille and written versions of text should be provided to accommodate the users.

While there is not a specific user that will be the sole benefactor of the architecture, the users will heavily depend on the community that it is implemented.

Owners/Managers (4):

It is the managers responsibility to ensure that people are treated fairly and that employees are following business standards. They will be in charge of supplying the learning/discovery center with material.

Employees (16):

The employees of learning/discovery center are necessary for the function and transactions of this typology.

Customers:

The users will be encouraged to come to building based on their own motivation to experience and learn more about the world around them.

Security agents will ensure the safety and well-being of the users.

major project elements

Sensory Rich Architectural Elements:

This element of the design will be the major focus of the project and will be carefully analyzed for the specific purposes of space to enhance it.

Retail Spaces:

Spaces for shopping that is inclusive to those who are visually impaired.

Spaces of transition:

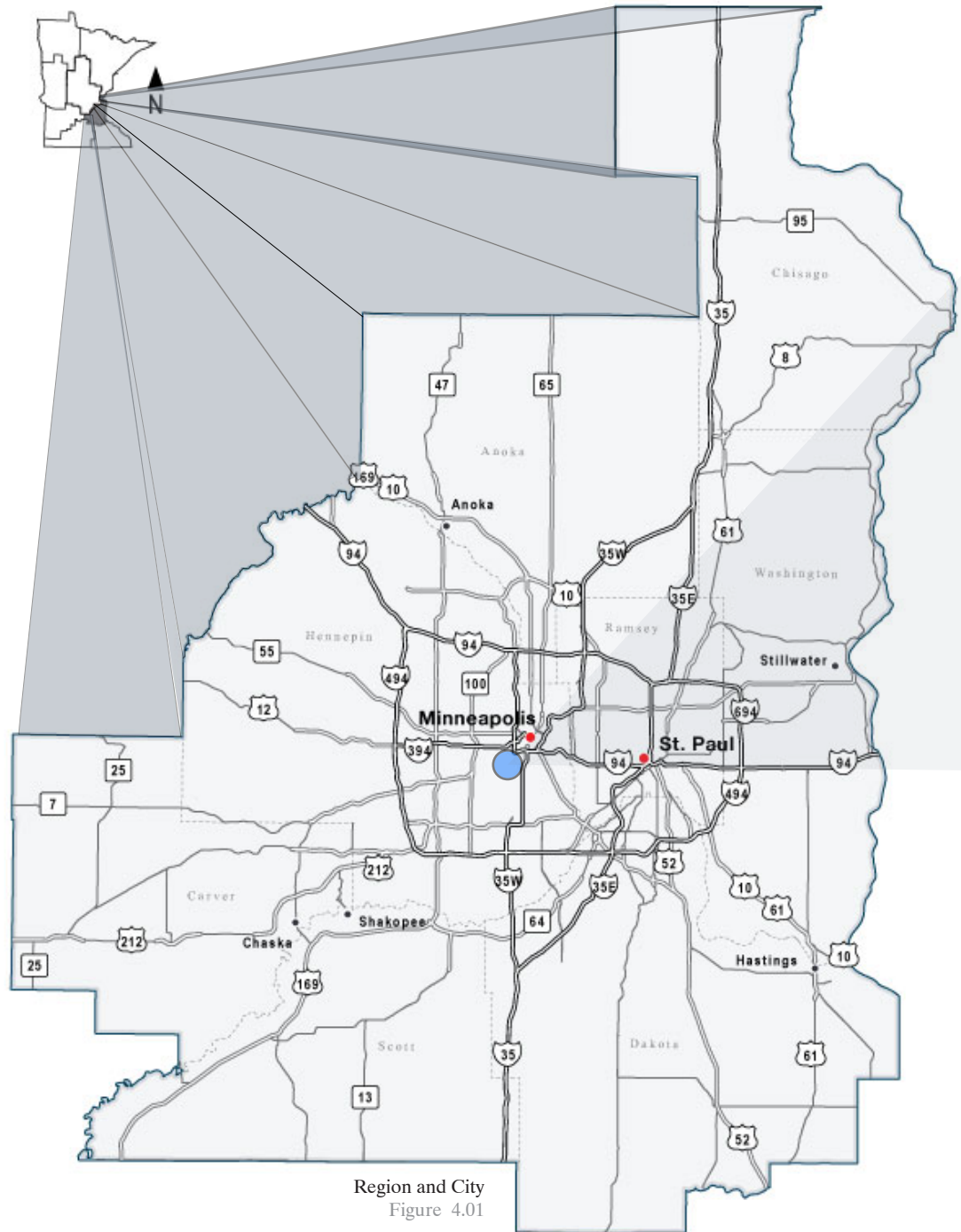
Between each retail space is transition, or a highway that people travel to get from one destination to the next.

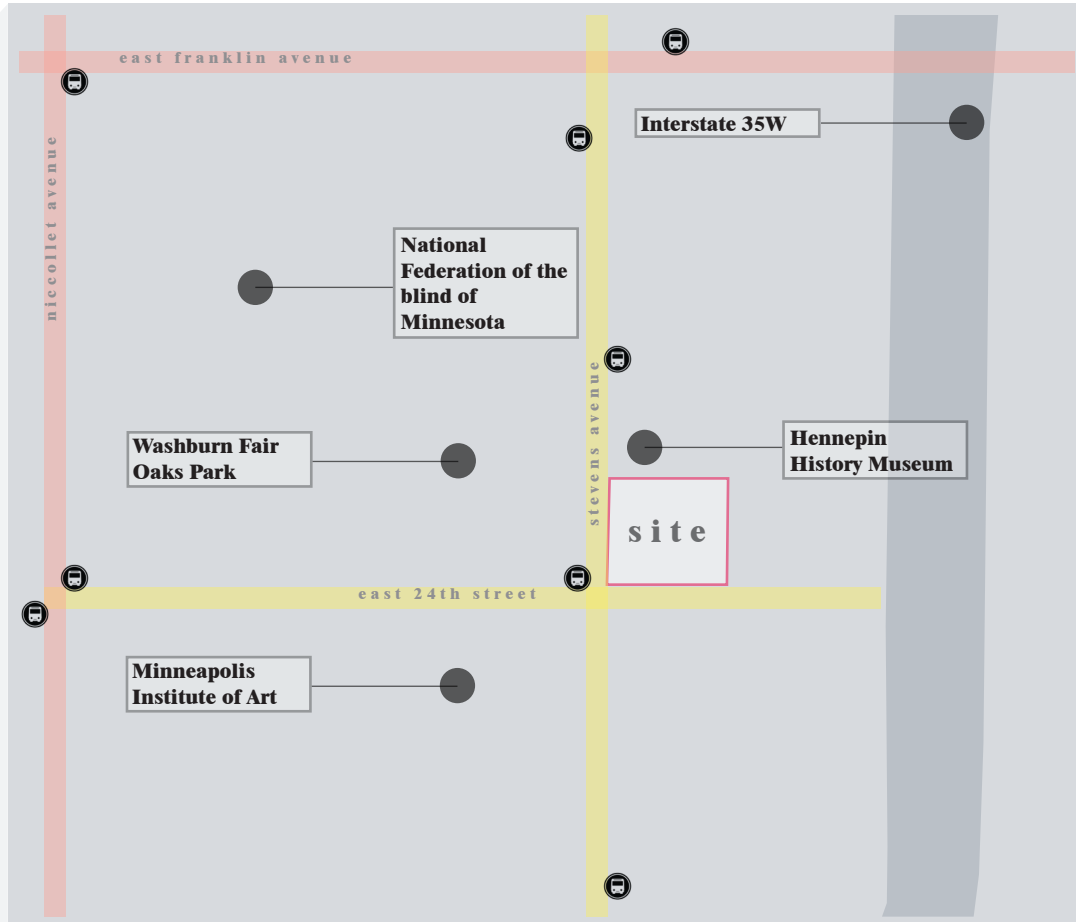
Lounge:

An area to rest and recharge.

Educational/Play area:

An area for kids to let out energy.





Site
Figure 4.02

importance of site

I have chosen this site, located on East 24th Street south of downtown Minneapolis, Minnesota, because it is in a urban center with multiple housing complexes nearby and it is easily accessible by highway and public transportation. With being in busy urban area, the site is met with interesting design challenges as it relates to what the thesis project focuses on.

Attention to detail in the design and the site around it will play a major role in safety of people who are visually impaired. Some examples would include safe crossing at intersections, easy access to entrance of building, and clear transitions of the site.

project emphasis

Senses:

There are five, some might argue 6, ways that we gather information about our surroundings. Through sight, hearing, touch, smell, and taste. Architecture is an art in which we construct the structural environment around us. Typically we admire architecture visually, but it is the architect's responsibility to ensure that all user needs are met and not everyone has the ability to see with their eyes. The way architectural elements interact with all of the senses of the visually impaired will be important to understand.

Semiotics:

This concept is a cousin, or maybe second cousin to linguistics. Semiotics suggest that our world is made up of signs that we are constantly interpreting.

Cognitive mapping:

To understand how people map out spaces in their mind will be determined by both senses and the signs that are created in our minds from the senses. This will be the basis of understanding how we make maps in our minds.

Architectural as a Language:

Finally, it is important to think of architecture as a language; architecture having something important to communicate to its users.



Art
Figure 4.03

goals of the thesis project

the academic

1. Investigate the need and demand for spaces that are more inclusive to the visually impaired
2. Gain awareness of today's design solutions and how they are being enhanced by technology.
3. Gain more understanding and empathy for people.

the professional

1. Gain understanding of how research is used in the profession and how I can continue to research in my career.
2. Bring more awareness to design professional and encourage designers to design for multi-sensory experiences.

the personal

1. To become a well rounded architect, and expand my knowledge of how architecture impacts the world.
2. To develop skills that will be useful in the future.



Art
Figure 4.04

definition of research direction

Theoretical Premise and Unifying Idea

To research the theoretical premise, it will be important to gain an understanding of the philosophy and theories behind perception. This includes semiotics, linguistics, language elements, spatial grammar, and human cognition/how the visually impaired map out their environments. The most significant information will be taken from D. Chandler, F. Saussure, and S. Pinker.

Project Typology

Case studies will play a major role in understanding the design decisions made by other professionals and see how similar ideas can be employed.

Historical Context

Through case studies, an understanding of historical solutions will be gained. From that one can learn from the mistakes and triumphs of other projects. The research can then consider how new technologies and ways of thinking can be implemented now.

Site Analysis

Analysis of site will include documentation of elements such as weather, lighting, sound, and traffic to understand what challenges the design solution will be faced with. The placement of the solution along with the form will be heavily based on the analysis of the site context.

Programmatic Requirements

The program requirements will be influenced by the desired activities of the typology, which will be derived from case studies.





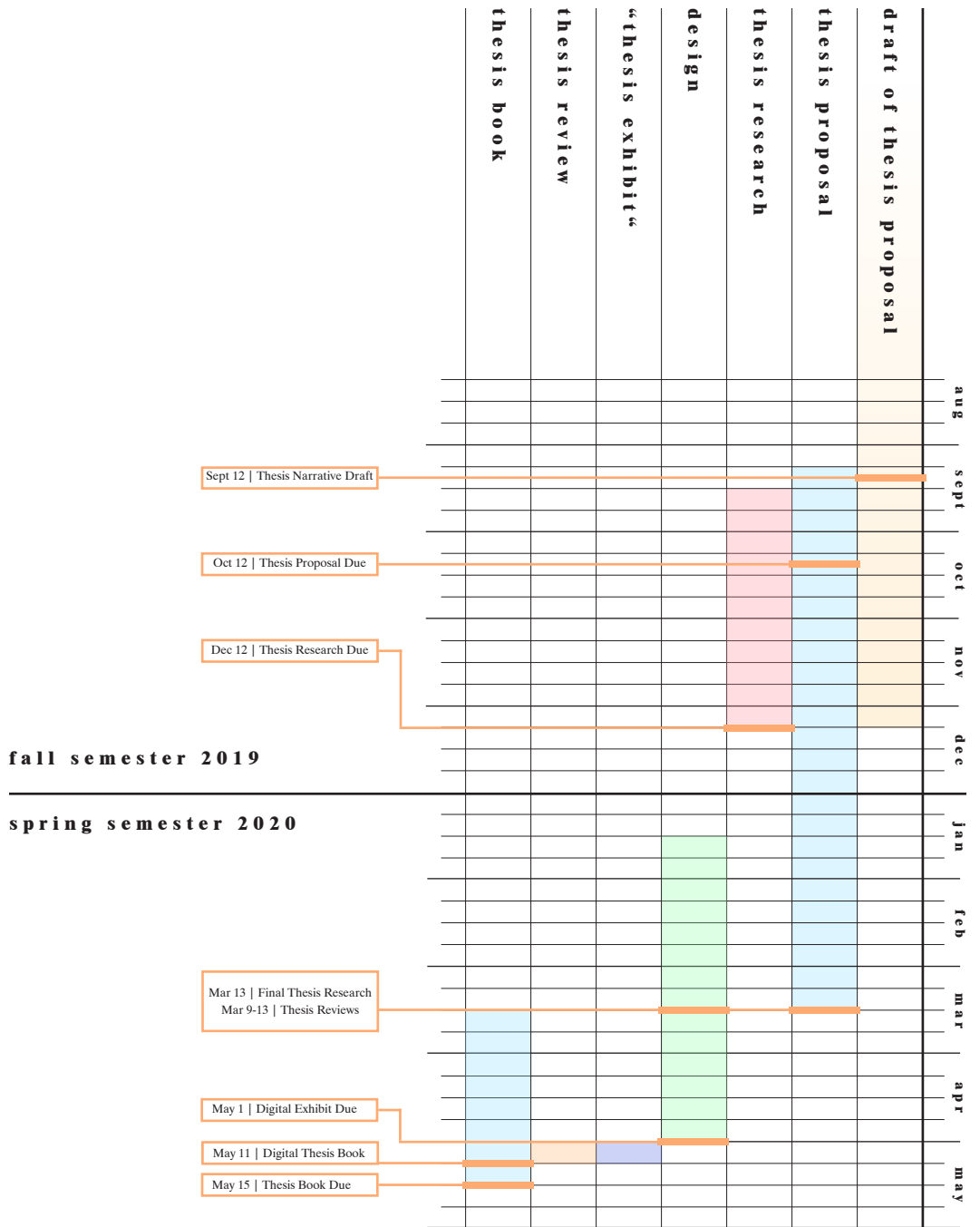
Photography
Figure 4.05

design methodology

Information for this research will be gathered by analyzing perception as it relates to the visually impaired and comparing the principles of language and semiotics to gain an understanding of how architecture is used as a tool of communication. From this information, an indication of architectural elements that should be used to communicate to the visually impaired will be made and discussion of how they can be implemented and why it is important will follow. With an understanding of what the impact of these constructed architectural elements are, they will then be applied to a retail design problem. Only elements that directly relate to the specific typology and site will be integrated into the solution.

The strategies employed are guided by the theoretical premise/unifying idea. Quantitative and qualitative data will be gathered concurrently. The archival statistical data pertaining to visually disabilities will be gathered to show justification of the theoretical premise. This information, along with single person interviews, will be analyzed to give readers a base understanding of the problems that visually impaired are faced with. Existing scientific data concerning perception, cognitive sciences, behavioral sciences, semiotics, linguistics, and language will be analyzed to provide information that will guide the construction of architectural elements that will be implemented in the design solution. Analyzing, interpreting, and reporting of the results will occur throughout the research process through text and graphics.

work plan



Work Plan
Figure 5.01

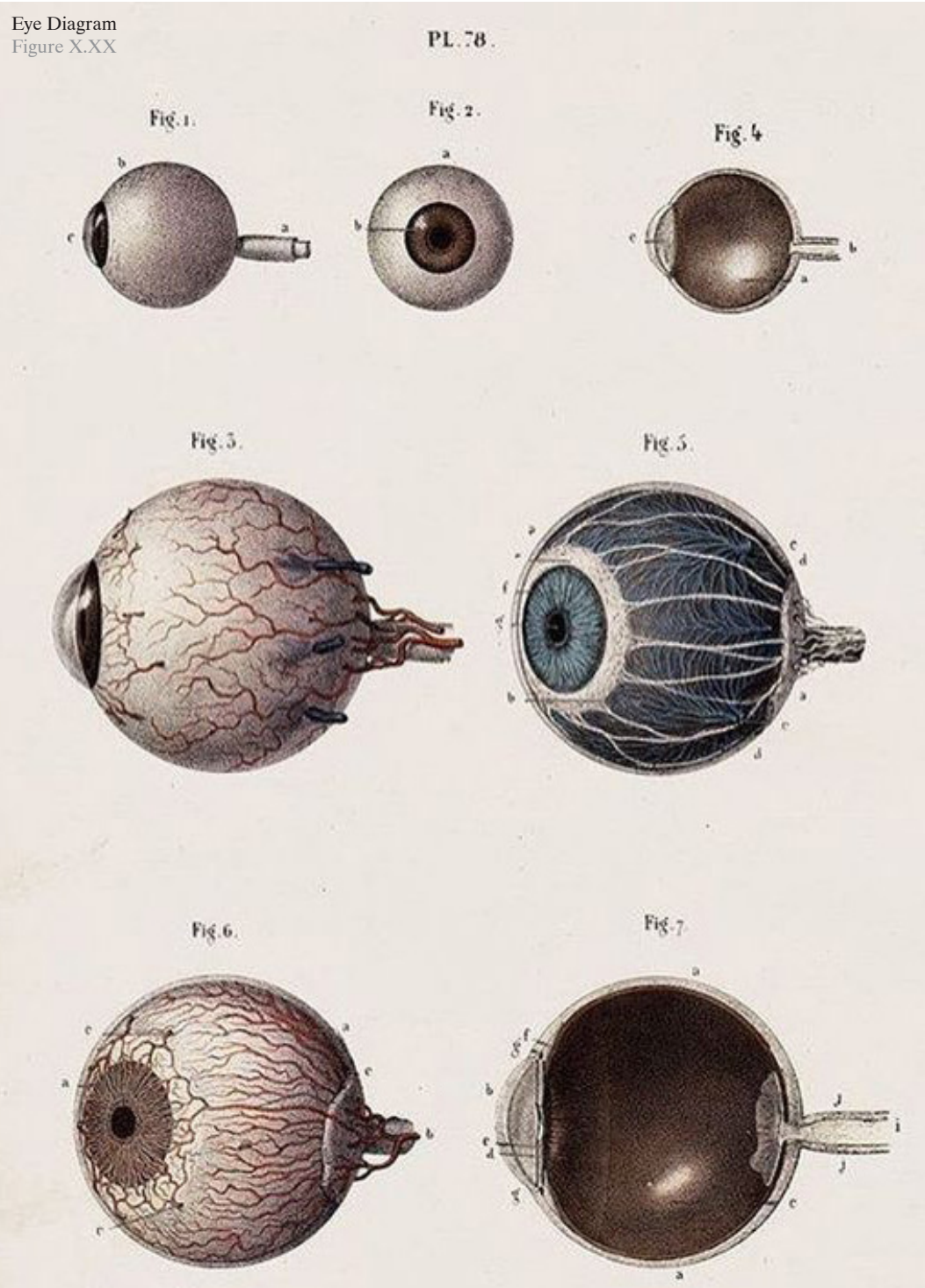
documentation of the design process

All information gathered in the design process will be compiled into a single document. The final thesis book will reference information that has significant roles in the design solution. This document and any other supporting graphics or literature is to be backed up on an external hard drive or Online weekly.

It is the intention of this project to present the findings in book form and through the use of graphic boards and models. The information will be presented verbally to faculty, peers, and guest through the use of these graphic boards and a sideshow. The findings and design solution will be available in the North Dakota State University Institutional Repository for the general public.

thesis rese

a r c h



Eye Diagram
Figure 6.01

introduction of research

Our society caters to the visual experience of life because it is the fastest way that we gather and process information. But it can be extremely stressful and frustrating for someone who isn't able to fully understand the visual to do tasks without aid. In order to enhance the experience of those who do not have a strong understanding of the visual aspects of architecture, this research asks what architectural environments can, and should, communicate to those who are blind or visually impaired.

Information for this research will be gathered by analyzing perception as it relates to the visually impaired and comparing the principles of language and semiotics to gain an understanding of how architecture is used as a tool of communication. From this information, an indication of architectural elements that should be used to communicate to the visually impaired will be made. The goal of this research to produce a framework of elements that can be applied to any typology.

In order to indicate and construct elements of architecture that can be used to communicate with occupants who are unable to understand their environment visually, there are a few topics that need to be thoroughly analyzed. The topics that will be analyzed stem from cognition. Cognition is a term that covers a broad array of subcategories. The subcategories that will be important in this discussion are perception, semiotics, and linguistics. All three of these subcategories tie together in one way or another, but they each tell a different story of how we understand our environments. Perception focuses on the stimulation, organization, interpretation, memory, and recall of our senses, the way we form complex thoughts into words and sentences is based on principles of linguistics, and semiotics is the study of how we interpret signs. Through this analysis, we gain an understanding of how our brain processes information, and from that, we can understand how someone who is visually impaired can form cognitive maps and realizations of their environment.

Architecture is a language that communicates with signs that speak to individual senses. To reach this conclusion, one must take a closer look into the communication of language, the concepts of semiotics, and the basic aspects of architecture. This understanding can be achieved by reading the following texts, “**Introduction to Language**” by Boundless Psychology, *Semiotics for Beginners* by Daniel Chandler, and *Form, Space, and Order* by Francis Ching, that are reviewed.

units of language

Language is something that people start learning quickly after they are born. Although it starts as jumbled sounds, or phonemes, that do not mean much to adults, it blossoms into an amazing ability to communicate the concepts of your thoughts. The article, "Introduction to Language" by Boundless Psychology, provides a foundation for the understanding of language units, as it describes the rudimentary properties and features of the language. While the article outlines the areas of study in linguistics and the structure of language, this review will focus primarily on the overarching concepts of language and how it shapes the way we think of and describe the happenings in the world around us. It is important to gain this understanding, as one attempts to understand how architecture can be informative and have the ability to communicate to someone, in ways other than spoken word and written word.

There are a number of internalized rules used in order to communicate concepts in a given language. This could include word-formation, phrase-formation, or sentence-formation rules, and is described as grammar. For example, in the English language, a word's tense can be changed by adding an -ed or -ing. This word-formation rule makes it possible to differentiate an action that is currently happening versus an action that previously happened. Another example from the English

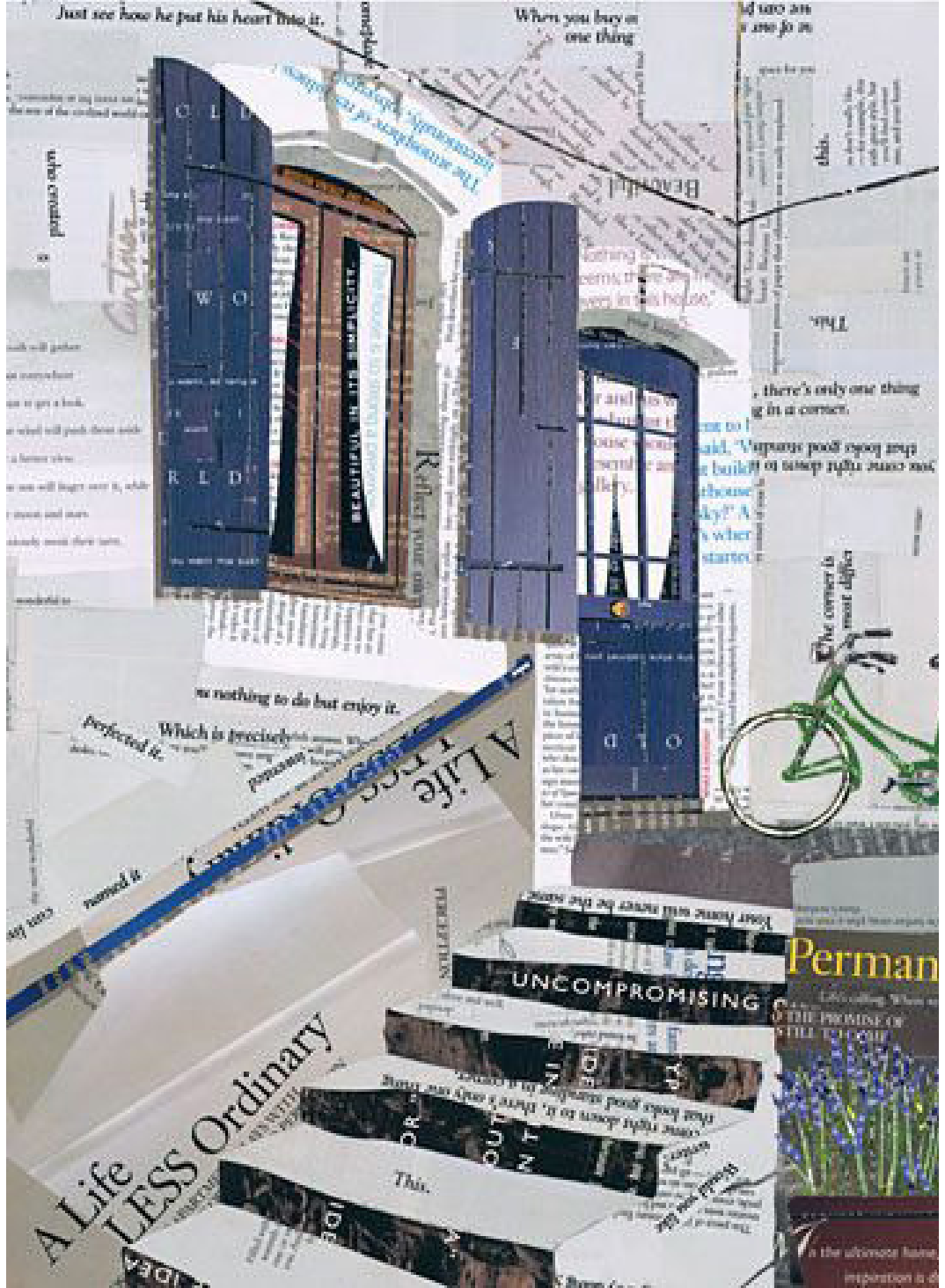


Word Art
Figure 7.01

language includes the formation of phrases. When one is presented with an action, or verb, a subject, and the object must accompany it. This gives meaning to a verb by indicating who is doing what. In other words, grammar gives context and meaning to words, by applying rules to sentences that clarify meaning. Speakers of a language create sentences to convey a limitless number of thoughts and concepts by using grammatical rules to combine words from a lexicon - the sum total of all the words in a language.

Before getting further into the explanation of how phrases and sentences are formed, it is important to understand how sounds are constructed into words. The studies of Phonetics and Phonology focus on individual speech sounds of a given language. From the article, one learns, "A phoneme is the smallest unit of sound that may cause a change in meaning within a language, but does not have any meaning by itself." While phonemes correspond to the sounds of an alphabet, there is not always a one-to-one relationship between them. The English language is comprised of twenty-six letters and approximately forty-five phonemes. Take the word "knee," for example. The word can be divided phonetically, like so: /kn/ /ee/. These individual sounds have no meaning by themselves. If you were to add the phoneme /l/ to the end of /kn/ /ee/, the series of phonemes would have a completely different meaning.

literature review - "introduction to language"



Word Art
Figure 7.02

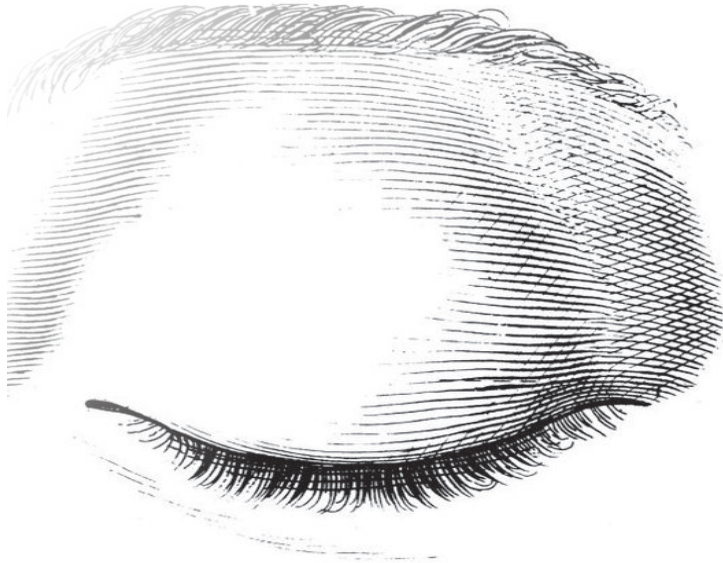
This brings us to the next level of linguistics - morphology. Morphology is described as the study of words and other meaningful units of languages like suffixes and prefixes. The basic unit of morphology is a morpheme, which is described as the smallest meaningful unit of language and is made up of a series of phonemes. In morphology, there are free morphemes and bound morphemes. Free morphemes are able to exist on their own. Bound morphemes are linguistic pieces that affect the meaning of a word and are not able to stand on their own. Prefixes and Suffixes would fall into this category. The word "knee" is a free morpheme. You could add the bound morpheme, "-s" to the same word and indicate multiple knees.

The next level of linguistics starts to put the morphemes together to create meaningful phrases and sentences. The set of rules that are used to construct full sentences out of words and phrases is known as the study of syntax. These rules are extremely important because the way words are ordered is not arbitrary. Words must be ordered in a certain way to convey an intended meaning. In English, sentences typically contain, at least, a noun phrase and a verb phrase. To attach additional meaning, adjectives and adverbs can be added. The underlying rules of syntax along with morphological rules make up all language's grammar.

The final few levels of linguistics are semantics and pragmatics. Semantics is about the meaning of sentences. In other words, semantics is the meaning of the words that one says and how it applies to the context of their reality. Pragmatics is similar in the sense that it deals with a word's meaning in its context, but it has more to do with how the context of reality applies to certain words that are said. An example that Boundless Psychology gives, in the article "Introduction to Language", is the word "fire." The meaning of this word changes in the context of a movie theater versus the context of combat.

Through understanding these basic concepts of linguistics, one can take a step further to study a subcategory of linguistics known as semiotics, or semiology. Daniel Chandler takes the principles of semantics, syntax, and pragmatics, to understand how language applies to reality and indicate meaning through signs.

Artist Eye Drawing
Figure 8.01



h o w m e a n i n g s a r e m a d e

Semiotics is, in short, the study of signs. Not written, visual signs, but words, sound, or even body language. There are multiple different takes as to what semiology means. Roland Barthes stated that “semiology aims to take in any system of signs, whatever their substance and limits; images, gestures, musical sounds, objects, and the complex associations of all these, which form the content of ritual, convention or public entertainment: these constitute, if not languages, at least systems of signification” (Barthes 1967, 9) Peirce thought of a sign as being something, anything that stood for something for somebody in one way or another.

Today, signs are studied in groups as a part of semiotic ‘sign systems’. They study how meanings are made. Branching off of linguistics, Daniel Chandler defines the relationship between semiotics and language units. Similar to semiotics, semantics focuses on what words mean. The difference is that semiotics is concerned more with “how signs mean” (Chandler 2017). Charles W. Morris redefines some of the units of language. Semantics is about the meaning of sentences to reality. Morris describes the semantics of signs similarly as the relationship of signs to what they stand for. The syntax is understood as a set of rules that are used to construct full sentences out of words and phrases. Morris describes syntax as the formal or structural relations between signs. Both descriptions suggest that there are connections between different signs or words and phrases. The last unit of language that is compared to semiotics is pragmatics and is described as the relation of signs to interpreters. In language,

pragmatics is known as the relationship between the context of reality to certain words. Both involving an interpretation of a sign to an interpreter's context or a word used in a certain context. As one may be able to infer, language and semiotics are interwoven with each other. Each concept having a similar meaning with different applications. "Language is a semiotic into which all other semiotics may be translated" (Genosko 1994, 62). While language represents meaning through words, semiotics illustrates meaning through the use of signs.

In our everyday experiences, there are multiple different "channels" of media that we process information with, such as, visual, auditory, or haptic. Chandler states that the human experience is "inherently multisensory, and every representation of experience is subject to the constraints and affordances of the medium involved." (Chandler 2017). A constraint that the medium of language runs into is when one tries to describe an experience in which words fail to do justice in representing it. Whether one can see visual signs or use other sensory aspects, signs can be used to become familiar with one's environment. We use certain mediums every day, and once one knows how to use it, the more transparent or invisible the signs are to its users. This is true for so many tasks that are done daily like driving, going to the grocery store, and within the buildings that we walk through every single day. One can become so anesthetized to a sign that they do not recognize the mediation that is involved. Inevitably these systems we use become 'ends in themselves.' When a medium is used for a purpose, it becomes part of that purpose. This can be true for language as well. Not often do people recognize how the concepts that are communicated acquire meaning. It is second nature, and this is what Daniel Chandler is describing when speaking about how signs become invisible. Chandler argues that semiotics is important because it brings consciousness to physical existence and suggests that reality is not something to be taken for granted, as something having a purely objective existence which is independent of human interpretation. (Chandler 2017) Semiotics shows that reality is a system of signs, a construction. Semiotics helps one understand that meaning is not 'contained' in books or 'transmitted' to us. According to Chandler, we are actively creating meaning according to a complex interplay of codes or conventions of which we are normally unaware. Daniel Chandler's ideas are confirmed by Francis Ching in the text *Form, Space, and Order*.

an architectural vocabulary

The term “architectural vocabulary” was coined by the designer Francis Ching. In Ching’s findings, He lays out the rudimentary aspects of architecture and develops a vocabulary that can be organized within the seven categories of primary elements, form, form and space, organization, circulation, proportion and scale, and principles. The following paragraphs will describe these elements and how they form an architectural vocabulary.

Primary Elements

These elements are the most basic form of an idea. Everything that we see begins with a dimensionless point on a paper. These points can remain on their own, or can be connected to other in one dimension points making lines. With multiple connecting lines a two dimensional planes emerge. If one were to extrude a plane along a third axis they would discover the last primary element of architecture - volume. All of these elements are interconnected and inform the next in order to form an object in space.

Points indicate a position in space

Lines have the properties of length, and position

Planes have the properties of length/width, shape, surface, orientation, and position

A Volume has the properties of length/width/depth, form/space, surface, orientation, and position

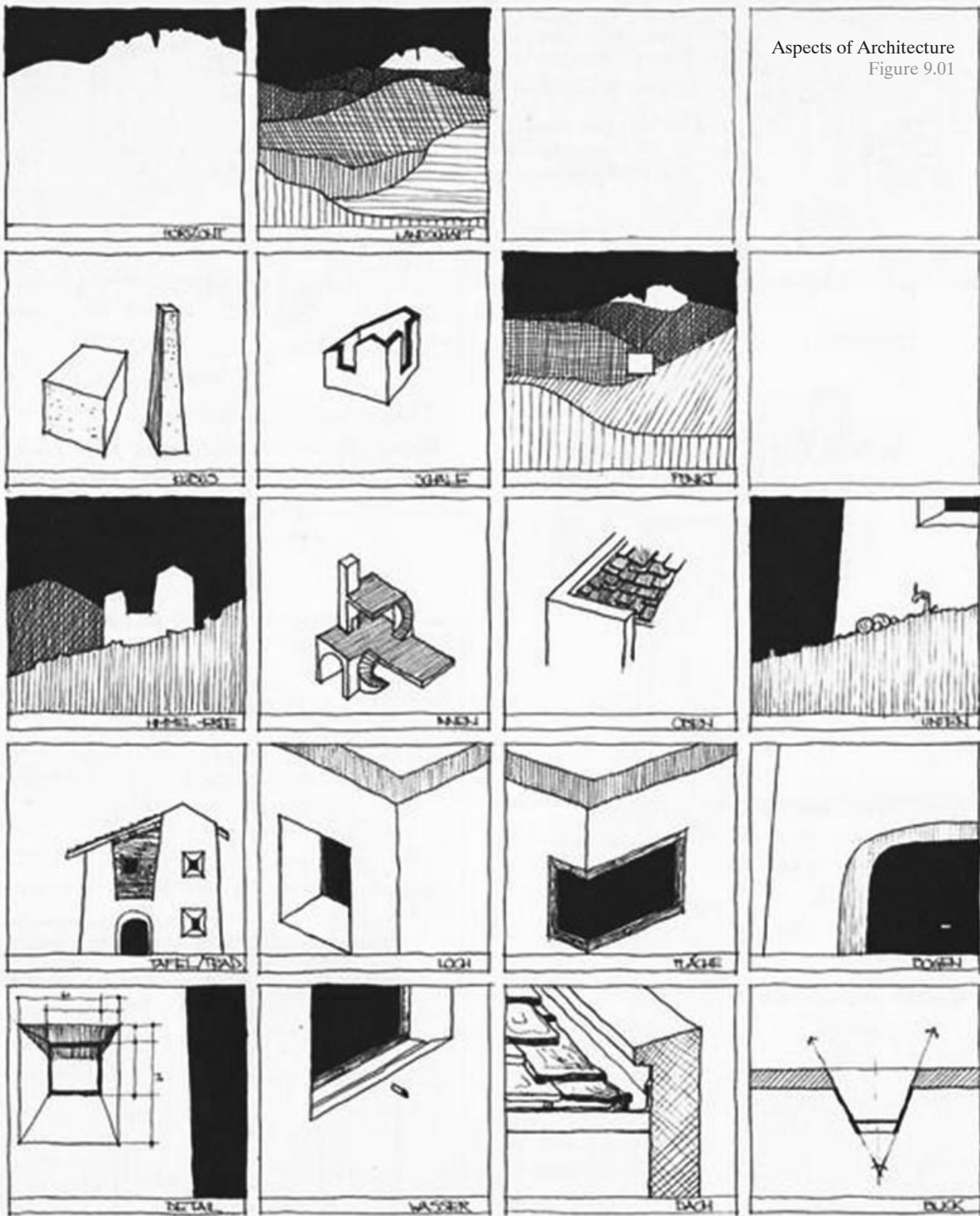
Form

“Architectural form is the point of contact between mass and space... Architectural forms, textures, materials, modulation of light and shade, color, all combine to inject a quality or spirit that articulates space (Bacon 1974).

Shape, size, color, and texture are all external forms that can be recognized and interacted with.

The properties of form include position (the location of a form relative to its environment or the visual field within which it is seen), Orientation (the direction of a form relative to the ground plane, the compass points, other forms, or to the person viewing the form), and visual inertia (the degree of concentration and stability of form).

Aspects of Architecture
Figure 9.01



Literature review - form, space, and order

The way we experience forms is subjectively affected by the conditions under which we view them. Forms can be changed by the perspective or angle that we view them, our distance away from the object, the lighting conditions, and the visual field surrounding it. Form is an arrangement and coordination of the primary elements that create a composition and produce a coherent image. As space begins to be captured, enclosed, molded, and organized by the elements of mass, architecture comes into being.

Form and Space

Forms have the ability to inform space. For example, a plane that is laying as a figure on another differing plane defines a simple field of space. This is also known as a base plane in architecture. One can reinforce the separation of spaces that the different planes established by elevating or depressing a plane. It can also be done by creating an overhead plane to define a volume between planes.

Separating fields of space can also be done with the use of vertical elements. These elements define the perpendicular edges of a volume of space (Ching 125). These elements include single vertical planes, l-shaped planes, parallel planes, u-shaped planes, and four planes creating closure.

Organization

Organization is the way in which one can order solitary forms and space to compose a number of spaces that relate to one another by function, proximity, or path; to create coherent patterns of form and space. There are four ways that spaces can relate to each other. This includes a space within a space, interlocking spaces, adjacent spaces, and spaces linked by a common space (Ching 185).

Spaces are arranged and organized within the layout of a building. These spatial organizations include, Centralized Organization (a central dominant space about which a number of secondary spaces are grouped), Linear Organization (a linear sequence of repetitive spaces), radial organization (a central space from which linear organizations of space extend in a radial manner), clustered organization (spaces grouped by proximity or the sharing of common visual trait or relationships), and grid organization (spaces organized within the field of a structural grid or other three-dimensional framework).

Circulation

The path of movement through a space can be conceived as the perceptual thread that links spaces of a building, or any series of indoor or exterior spaces. Since we move in time through a sequence of spaces, we experience a space in relation to where we've been before and where we anticipate going. There are five principal components of a building's circulation. We start with the approach, which can be seen as a distant view. After approaching, the entrance brings one from the outside to the inside. The movement between spaces is determined by the sequence of spaces. This is how a path is configured. Path-space relationships are developed with the use of edges, nodes, and terminations of the path. These paths that we can take can come in many different forms.

Principles

“... Nothing but confusion can result when order is considered a quality that can equally well be accepted or abandoned, something that can be forgone and replaced by something else. Order must be understood as indispensable to the functioning of any organized system...” (Ching 337). Order is extremely important because without it, there is chaos. The following ordering principles are seen as visual devices that allow the varied and diverse forms and spaces of a building to coexist perceptually and conceptually within an ordered, unified, and harmonious whole (Ching 339).

Axis is a line about which forms and spaces can be arranged in a symmetrical balanced manner.

Symmetry is the balanced distribution and arrangement of equivalent forms and spaces on opposite sides of a dividing line or plane, or about a center or axis.

Hierarchy is the articulation of the importance or significance of a form or space by its size, shape, or placement relative to the other forms and spaces of the organization.

Rhythm is a unifying movement characterized by a patterned repetition or alternation of formal elements or motifs in the same or modified form.

Datum is a line, plane, or volume that, by its continuity and regularity, serves to gather, measure, and organize a pattern of forms and spaces.

Transformation is the principle that an architectural concept, structure, or organization can be altered through a series of discrete manipulations and permutations in response to a specific context or set of conditions without a loss of identity or concept.

connecting language to architecture

language units	architectural sign-language
Lexicon: The summ total of all words in a language	Primary elements point, line, plane, volume
Phonology: Individual units of sound in languages - Speech Sounds	Form The point of contact between mass and space forms - Material used on a plane
Morphology: The study of words and other meaningful units of language	Form and Space Defining space and Surface articulation - Changing the base plane to articulate the special environment
Syntax: Phrases and sentences - the study of words and other meaningful units of language	Organization Spatial relationships and Spatial Organization - Similar to the construction of sentences - The construction of laying out spaces in a particular environment.
Semantics: literal meaning of phrases and sentences - the study of sentence meaning	Circulation The means of navigating through related spaces (semantics) in terms of organization (syntax)
Grammar: a set of combinatory rules that a language obeys for creating words and sentences - set of rules for generating logical communication	Principles Order: a condition in which each part of a whole is properly disposed with reference to other parts and purpose to produce a harmonious arrangement - Rules for expressing architectural ideas
Language: the ability to produce and comprehend both spoken and written words	Combination of elements to provide a meaning in architecture.

From reviewing the texts, “**Introduction to Language**” by Boundless Psychology, *Semiotics for Beginners* by Daniel Chandler, and *Form, Space, and Order* by Francis Ching, a path can be drawn from the different language elements described in “Introduction to Language” to the elements of architecture that Francis Ching describes in *Form, Space and Order*. This is shown in Figure 10.01. This table begins to articulate an architectural language using the vocabulary laid out by Francis Ching. All of these elements is what Daniel Chandler refers to as a ‘sign system.’

The text that are outlined and summarized help shape the foundation of knowledge for this research. While the goal of the research is to find out how architecture can communicate to the visually impaired, one must first understand what gives meaning to architecture. Because we grow so accustomed to our environments we forget about these basic elements or signs that inform users of their context. The following analysis attempts to take this knowledge a step further and develop definitions for fifteen signs that are communicated in architecture. After defining these aspired values, analysis of what elements and how they are implemented to achieve the aspired value will be defined.

definitions of aspired values

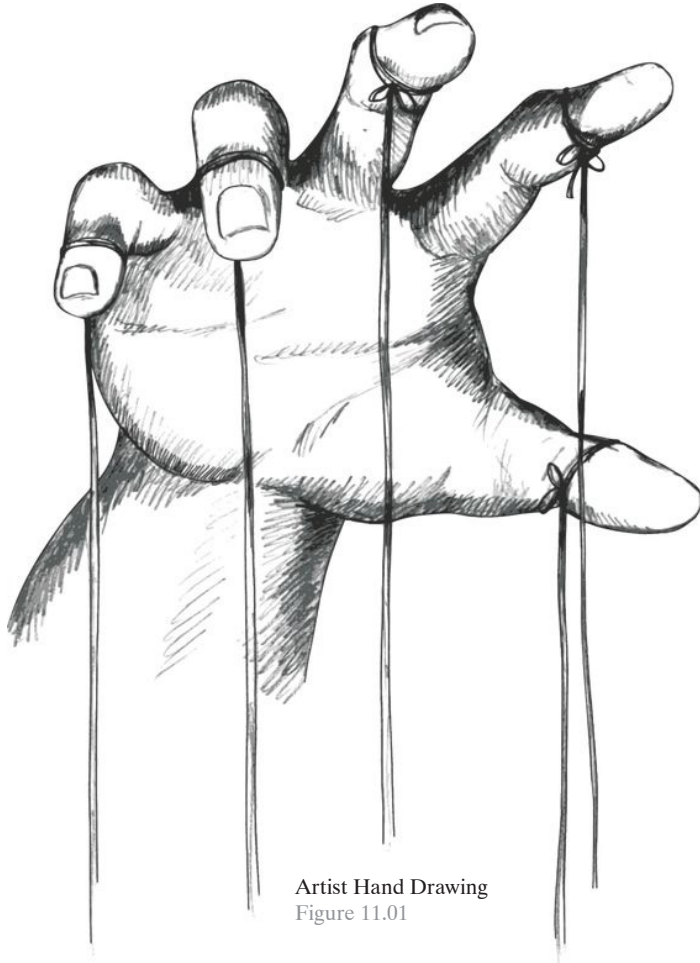
Beauty: From this dictionary definition, beauty in architecture, for the visually impaired, could be described as a combination of pleasing or attractive architectural elements, with different qualities, that pleases one's senses. Through interviews conducted by As/Is and Cut you-tube channels, people with visual impairments describe what they see as beautiful. Beauty was described as simple things: birds outside the window, the smell of cookies, a soft breeze, the sound of the ocean, grass underneath their feet, tenderness, smoothness, shape, and essence. In a social context, they describe beauty in people as character, a sense of calmness and peace, or people that exert joy. What can be concluded from this is beauty as an experience, an interaction of euphoric elements, and a beauty that is felt.

Circulation: The description of circulation in architecture would be the parts of the body that people move throughout and the major lane of traffic, or circulation - how people move through the building and through spaces. In many cases, this would also be an indicator of the liveliness of a building. The flow of people through a space is what brings life to a building; a fracture through a building's function where people transition from one place to another. For someone who is visually impaired, it can be helpful for them to have indicators and cues to know where these spaces are.

Breath: Breath can have multiple definitions in architecture. (1) It is an action, a movement of people providing life to a building. (2) You could say a space has breath. Whether it is a long breath or a short one. (3) It can be something subtle that speaks volumes. Because those who are visually impaired can pick up non-visual cues like sound, smell, and touch, they are able to get subtle hints that communicate different things about their environment.

Stillness: Stillness in architecture indicates focus. A place where there is an absence of sound, cultivating room for our minds to make noise. This could indicate to someone who is visually impaired, or blind, that they are in a workspace. It can be applied to libraries, study rooms, or offices.

Balance: Balance is a condition of architecture where each element works together to bring character to the environment. Not having elements that are overused, but complementary to the architectural purpose. For those who are visually impaired, it is important to have balance in the elements that they can comprehend.



Artist Hand Drawing
Figure 11.01

Interaction: Interaction in architecture is the ability for a space to communicate to its users through direct and indirect involvement. Architecture always is interacting with its users and the users with the architecture. Someone speaks, screams, or makes a sound and the architecture reacts. Architectural elements can give people a sensory response as well. This interaction between beings and architecture is key in communicating with those who are visually impaired. If we can not interact with our environment, we can not experience it.

Edges: An architectural edge can be many things. The end of a platform, or floor-plate, the transition between rooms or materials. Edges are important in architecture because it creates boundaries that are either meant to be knowingly crossed or are purposeful barriers to separate functions and private spaces from the public. It is extremely important for people to recognize these edges and for people who don't have the ability to see these edges, it is important to give indicators and cues.

Orientation: Orientation in architecture is a purposeful direction of elements that inform or work to create efficiency and sustainability for the comfort of its users. It is important for people who have visual impairments to have a sense of direction or orientation to help them find their way throughout a building or environment.

Change: Change in architecture is an indication of something new, or different about a space that was previously known. Because people who are visually impaired rely heavily on the memorization of landmarks within a space to find their way, it is extremely important for these elements to have strong cues to hint at changes.

Time: Time in architecture can be an indicator of the life lived by architecture. The period that was created can be significant in the future because the way we use elements and create elements changes how architecture is developed. Architecture should also be able to express the time of day and year.

Adventure: Architecture that has something to be discovered, that makes one excited to know what is next. Adventure in architecture is the activity that happens within a space that is or is not predicted.

Complexity: Architecture is intricate; an integrated system of parts that provides shelter and fosters activities that are integral to human well-being. Like in nature the complexity of its structure is typically hidden or is not consciously thought about. As people, we tend to passively move through context without fully understanding the depth of thought that went into it.

Serenity: Architectural serenity can be defined as an experience that is harmonious with the function, elements, and meaning of the built environment. It is an architecture that is not overwhelming or nerve-racking, but an architecture that is peaceful and unified; true to itself.

Meaning: All architecture has meaning or purpose. Each element is selected and placed to carry out a function or cultivate a feeling. The meaning should be clear, and the elements used to carry out the function should be significant for each typology. With each space, the function of the whole should be evident.

Delight: Delight in architecture is a delight in the character of the building, its traits. For someone who is visually impaired, a grouping of elements that pleases the senses and gives insight to the building's character.

applying aspired values to element

architectural elements	aspired values	implementation
Shape / Size	1. Beauty 3. Breath	1. Shape of objects within space that can be interacted with to be understood 3. Ceiling height and shape
Air Flow	1. Beauty 4. Stillness 10. Time	1. Natural Ventilation 4. Even, gentle flow of air for ventilation 10. Cooling during warm months, or in spaces with high usage. Heating during cold months
Sound	1. Beauty 2. Circulation 4. Stillness 8. Orientation 9. Change 11. Adventure 15. Delight	1. Water Feature, wind chimes 2. The sound of people walking and talking, use of materials that steps and taps of the cane can be heard 4. Sound absorbing materials, soft seating 8. Higher sounds of traffic could indicate an entryway, whereas less sound indicates more private space 9. Different sound or use of equipment will indicate a change in use or the transition to a different function 11. Sounds of anticipation that is cause by one's step 15. Water in and around architecture
Material Textures	1. Beauty 6. Interaction 7. Edges 9. Change 14. Meaning 15. Delight	1. Materials used in furniture, flooring, and wall finishes (tenderness, smoothness, softness of a material) 6. Material sound reflectiveness and absorbance, texture, and color 7. Changes to indicate new uses of space that is meant to, or not meant to be explored 9. New textures indicates a change in function or layout of a space. 14. Space transitions with floor finishes and level changes. 15. Finishes on furniture, walls, flooring, and equipment
Smells	1. Beauty	1. Natural smells
Direction	2. Circulation	2. Tactile leading devices such as linear textures on a wall, or material usage along the main path of travel.
Function	3. Breath 5. Balance 13. Serenity 14. Meaning	3. Sound of machines, people gathering, paper's suffling 5. the typical sounds, smells, feelings, or taste you find for specific typologies 13. Serene unity that comes from a cohesive use of elements that cultivate a state of calmness 14. Casual environment - soft seating. Formal environments - hard seating
Walls	7. Edges 11. Adventure	7. Between functions and private vs. public spaces 11. An element that is ever-changing that is done by the physical interaction of the user
Space	8. Orientation 11. Adventure	8. informing spaces and indicating open ways of travel 11. The resonance of a room with a high ceiling that acts as an amplifier for those who briefly inhabit the space
Light	10. Time 15. Delight	10. Shadows and artificial light that change as the day goes on 15. Building orientation, material reflectiveness/absorbance
Color	14. Meaning	14. Use of different colors with different functions for those who have limited understanding of color

Application of Values
Figure 11.02

project justification

In our society, there is a wide range of people with differing abilities and characteristics. When designing any type of building there are a set of standards that an architect follows to ensure safety for users. What I find myself asking is, how do/can architects cultivate enjoyable spaces for people who aren't able to see the space they are in.

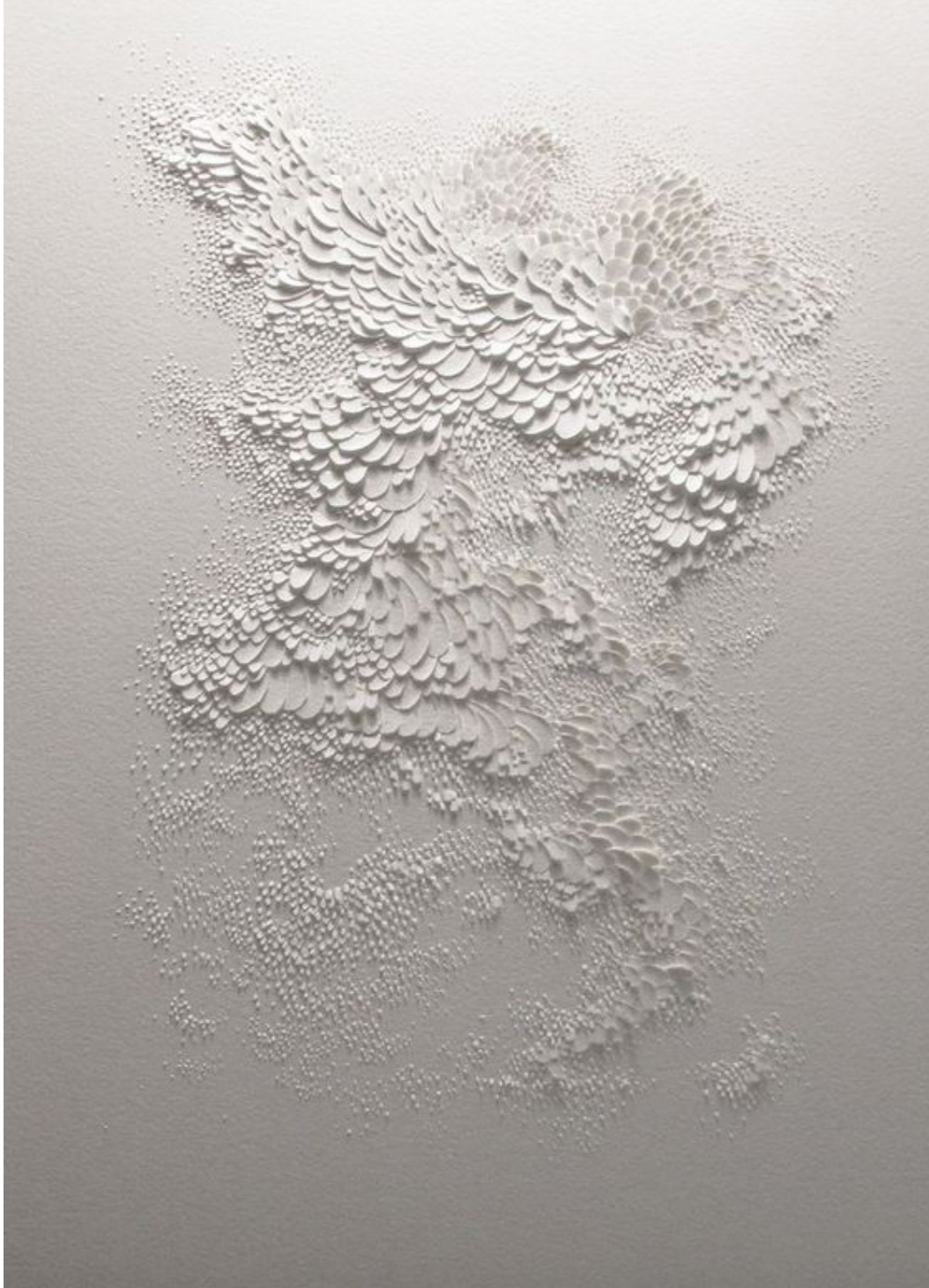
I became interested in this topic when participating in an activity called Dialogue in the dark. During this activity, I scratched the surface of how to perceive space without actually seeing it, and from the activity I gained empathy towards people who live in the environments that we construct. From doing this project, I will get to dive deeper into how people think and how sensory aspects of an environment can be used to inform, invite, and bring joy to people who are unable to see. From this project, I will also develop a better understanding on what elements can be used to reach an aspired value in architecture. A knowledge that can be built upon.

At the moment, most accessibility standards are geared towards physical body impairments, not visual impairments. This project pushes the boundaries of today's accepted standards and suggests that more needs to be taken into account for all people with any type of disability or impairment.

The project can be justified economically because it will make environments more inclusive to people with visual impairments, giving them a new outlet to contribute to society in and learn. Libraries serve as a significant channel for delivering educational serves for every age, from preschool through retirement. The proposed library will also employ a number of people, while also creating additional jobs in industries that support the library and their staff. The project is likely going to contribute to the economic prosperity of the community and quality of life. Funds for this project will likely be from public sources and donations.

In the construction and use of the design, there is the potential for some environmental impacts. This might include CO2 emissions and additional water usage (which could result in more wasted water). Because this project is not meant to be large and will not require waste from demolition of a building, the amount of CO2 emissions is likely to be minimal.

The project is important in its social context because it bridges the gap between the functions around it. It has the potential to bring people from nearby schools, the institute of art, the national federation of the blind of minnesota, and community members that reside near the site.



Texture Art
Figure 11.03

The Start of Accessible Design
Figure 12.01



historical context

Believe it or not, accessibility design is really only in its adolescence and people weren't concerned until the latter part of the twentieth century. In fact it wasn't until after post-World War II that people recognized the need for accessible design. It was at this time that veterans that came home from the war were in need of prosthetics and easier accessible technologies and ways to get around.

Once accessible design started to become necessary, it became evident that there was no standardization or designer input into the first elements that were implemented in society. They were merely made for function, but consideration of cohesion was not considered.

1950 - *Barrier-free Movement*

The movement was established in response to demands by disabled veterans and advocates for people with disabilities to create opportunities in education and employment rather than institutionalized health care and maintenance. Physical barriers in the environment were recognized as a significant hindrance to people with mobility impairments.

1960 - *Disability Civil Rights Act***1961 - *Publication from the American Standards Association***

Titled A 117.1 - Making Buildings Accessible to and Usable by the Physically Handicapped. These standards were not enforceable, however, until adopted by state or local legislative entities.

1968 - *Architectural Barriers Act*

The act mandated the removal of what was perceived to be the most significant obstacle to employment for people with disabilities: the physical design of the buildings and facilities they had to use on the job. The Act required all buildings designed, constructed, altered, or leased with federal funds to be made accessible.

1980 - *Universal Design terminology coined by Architect Ron Mace***1984 - *Uniform Federal Accessibility Standards (UFAS)***

ANSI specifications were incorporated

1988 - *the Rehabilitation Act of 1973*

The act was the first civil rights law for people with disabilities. This Act made it illegal to discriminate on the basis of disability and applied to federal agencies, public universities, federal contractors, and any other institution or activity receiving federal funds. The promulgation of regulations was initially stalled by the U.S. Department of Health, Education, and Welfare. In protest, disability rights advocates held numerous demonstrations.

1990 - *the Americans with Disabilities Act of 1990*

the act awakened widespread public awareness of the civil rights of people with disabilities. Discrimination in employment, access to places of public accommodation, services, programs, public transportation, and telecommunications is prohibited by this law. Physical barriers that impede access must be removed wherever they exist. The ADA has a uniform nationwide mandate that ensures accessibility regardless of local attitudes. The Architectural and Transportation Barriers Compliance Board (Access Board) issued Accessibility Guidelines for accessible design in 1991. These guidelines were adopted with modifications by the U.S. Department of Justice and became the enforceable ADA Standards for Accessible Design.



White Cane
Figure 12.02

social context

Throughout history, community attitudes and physical barriers in the built environment have prevented people with disabilities from fully participating in society. Access to education, employment, housing, recreation, cultural events, and transportation has been denied many people. Along with the growth in the disabled population, the quest for independence and equal rights has grown, as well.

Buyers of assistive technology now demand that products be designed with concern for their impact on the image, as well as the function, of the user. Devices are expected to be appropriate for use at the office or school, at home, in the community, and on vacation.

Similarly, aging members of the baby-boom generation (those born between the years 1946 and 1964) have begun to see the usefulness of products conceived for people with limitations. In a 1990 issue of *Capturing Customers*, Peter Francese noted, “As more Americans age, products that offer youthfulness without denigrating aging will do well. These consumers are not like their parents — they don’t feel that older is ugly” (American Association of Retired Persons, 1992).

A report published by the United Nations in 2011 estimated there were 1-1.3 billion people with disabilities in the world. That was the same number as the population of China in 2014 (1.39 billion) and about four times the population of the U.S. in 2014 (318.9 million). In fact, persons with disabilities are the largest minority in the world.

Impairment: In the context of health experience, an impairment is any loss or abnormality of psychological, physiological, or anatomical structure or function.

Disability: In the context of health experience, a disability is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.

Handicap: In the context of health experience, a handicap is a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfillment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual.” – World Health Organization (WHO), International Classification of Impairments, Disabilities, and Handicaps, 1980

Needless to say, these definitions are harsh and use keywords such as ‘abnormality’, ‘lack of ability’ and ‘disadvantage’ to describe a person. The Medical Model of Disability applies the medical world’s view that one needs cures or fixes to be a normal functioning person. And it places the onus on persons with disability.

The Social Model of Disability does not place the burden and responsibility on the person with a disability. Instead, this model describes disability as a consequence of environmental, social and attitudinal barriers. Instead of fixing or curing a person with disabilities, it is up to the society to remove barriers so as to improve his or her life. Hence, this model provides a deeper understanding and acceptance of people with disabilities.

Instead of trying to fix or cure a person with a disability, it is up to the society to drive social integration and acceptance. As UX designers, we should take environmental, social and attitudinal barriers into consideration.

cultural context

Cross-cultural differences and cultural sensitivities have not yet received much attention in the areas of accessibility, assistive technologies, and inclusive design and methods for working with disabled and older users. However, it is important to consider the challenges of developing accessible and usable technologies for people with disabilities and older people in different cultural contexts.

People with disabilities are kept out of sight and out of mind — a body with one arm, a person with autism, a wheelchair user. I'm tired of how little I come across people who are deaf in films and books, and when I do, the representation often leaves something to be desired — favoring novelty over characterization, reduced to stereotypes over subtlety.

Despite race and gender becoming hot commodities, disability has stayed invisible, pushed to the margins.

In that way, usability trumps guidelines. Accessibility and usability are similar, but not the same. Accessibility is adherence to the WCAG 2.0. These guidelines are a proverbial line in the sand on whether a website is accessible, but compliance to official practices may not result in the best user experience for your particular audience.

Accessible Design
Figure 12.03



qualitative aspects of site

The site is located south of Minneapolis' down-town district in Hennepin County. Some notable existing buildings around the site are the National Federation of the Blind of Minnesota, Washburn Oaks Park, Minneapolis Institute of Art, and the Hennepin County History Museum. All of which are shown in figure 13.03 along with their location. The closeness to the park brings the site stillness and a level of quietness, only to be interrupted by the rumble of vehicle engines and the occasional laughter from the young children enjoying the space to run free that the park offers.

The area surrounding the site is mostly of residential use, education, Park, and Recreation. The buildings surrounding the site are low rise and set back from the streets giving the site optimal daylighting from sunrise to sunset. This makes the site ideal for this thesis design typology.

The site is currently being used as two separate parking lots for the Minnesota Institute of Art. It has a unique grade change. While the parking lots remain level, the sidewalk slopes down to bring pedestrians to the next part of the block. This is why the parking lots are separated, as one is at an elevation that is fifteen to twenty feet lower than the other.



North South Section
Figure 13.01

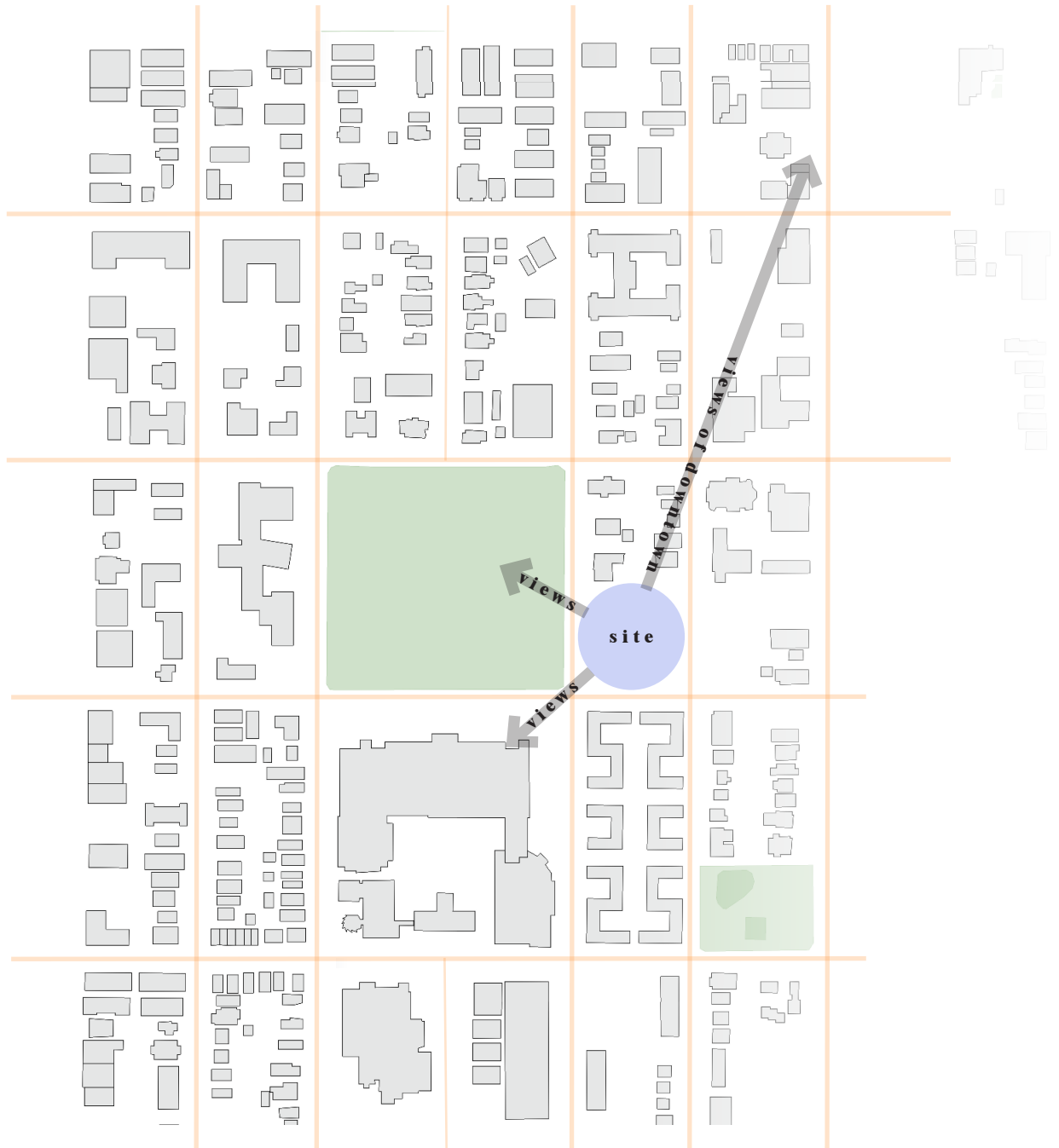


East West Section
Figure 13.02



Existing Textures, Material Textures, Topography, and Shade/Shadow Characteristics
Figure 13.03

views or vistas



Existing Grids, Geometric Relationships, and Views
Figure 13.04

From the site, one can see the park and the Minneapolis Institute of Art. Because the height of the surrounding buildings is relatively low, there is opportunity to see the high-rises of downtown Minneapolis from the site. It will be important to preserve these views for pedestrians and the surrounding buildings.

Along the roads and in the park, there are multiple different species of trees and plants. This brings an attraction of wildlife - mainly squirrels. The trees provide shade and protection from North West winds.

Another thing to note about the site is that the upper parking lot was fairly full, while the lower one remain

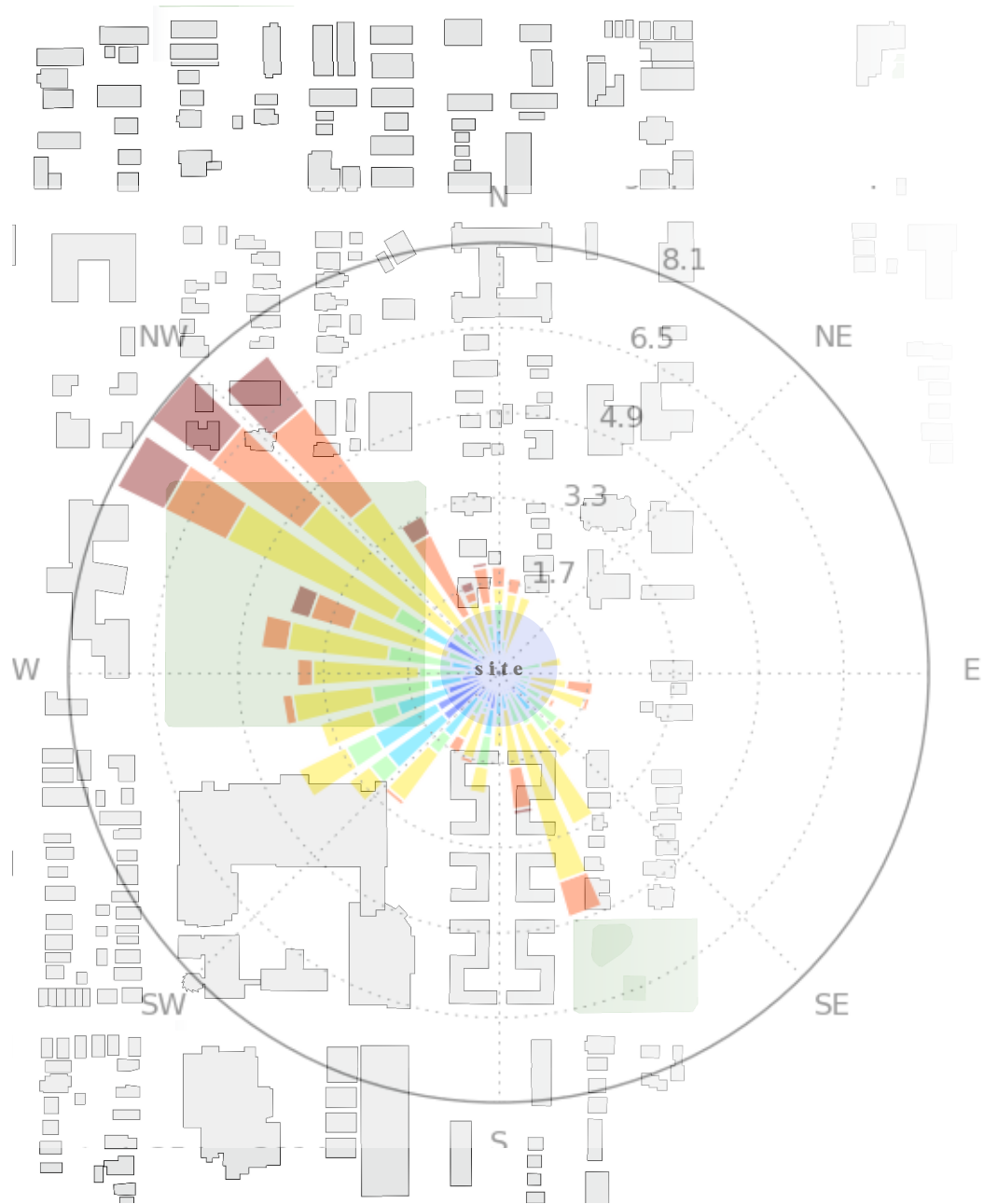
vacant, this will be important to consider when designing.

A unique aspect of the site is the embodiment of art and the community. When walking by the site, I recognized two murals on the retaining wall. It told me a story of brokenness in the community. But it also gave insight to the support and hope for those who come across this mural (Pictured in Figure 13.05). It told me a little more about who these people are, what they believe in, and what they struggle with. It would be interesting to try and use architectural elements to convey the same meanings to someone who are not able to enjoy this visually.

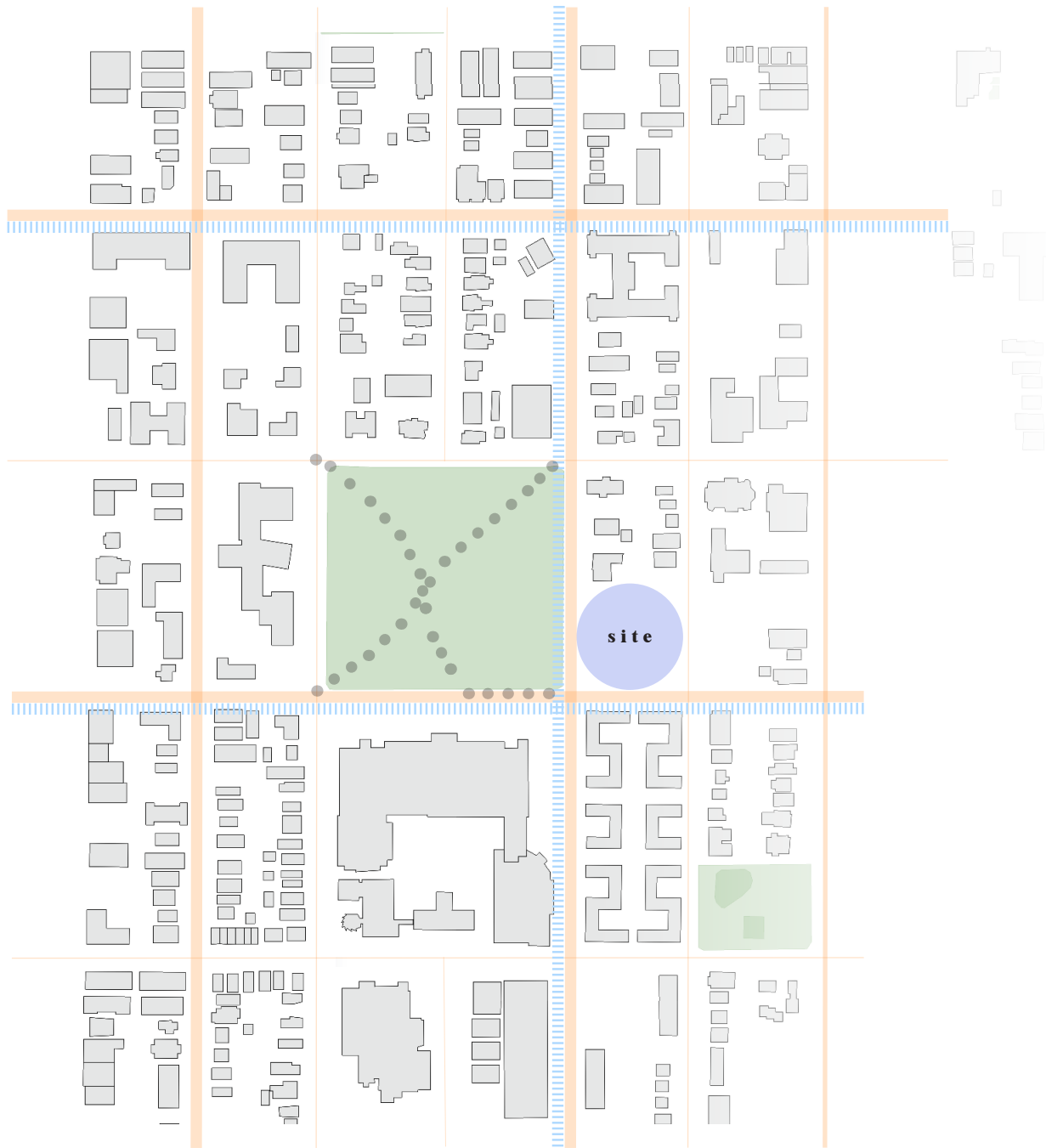


Site Character
Figure 13.05

wind patterns



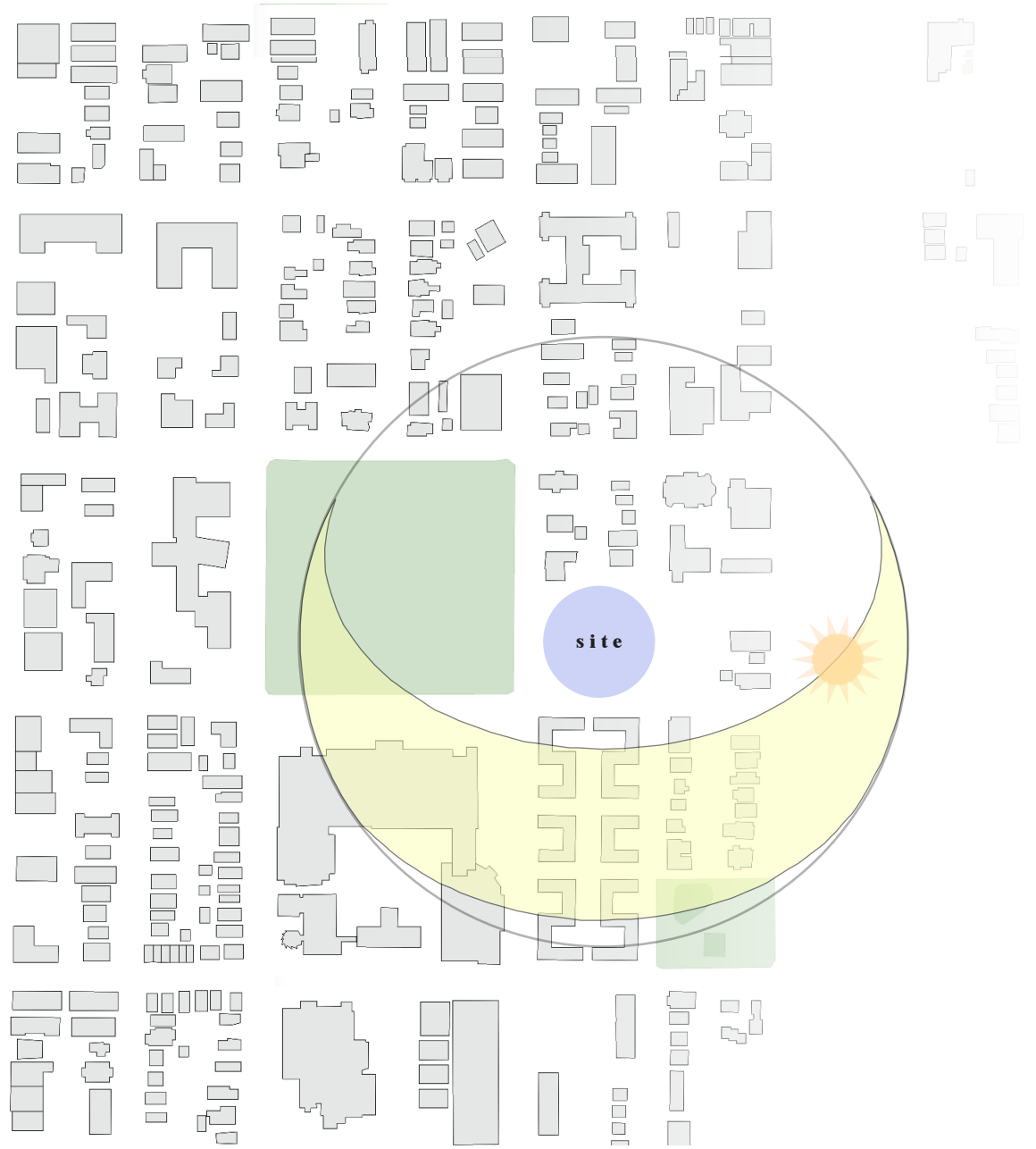
common paths of travel



Site Traffic
Figure 13.07

|||| pedestrian traffic — vehicle traffic ● ● informal paths

sun path



Sun Path
Figure 13.08

soil classification

Verndale, acid substratum, and similar soils

Extent: 75 to 100 percent of the unit

Geomorphic setting: Hills on out-wash plains; hills on stream terraces

Position on the land-form: Summits and back-slopes

Slope range: 2 to 6 percent

Texture of the surface layer: Sandy loam

Depth to restrictive feature: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Parent material: Out-wash

Flooding: None

Depth to wet soil moisture status: More than 6.7 feet all year

Ponding: None

Available water capacity to a depth of 60 inches: 4.8 inches

Content of organic matter in the upper 10 inches: 3 percent

Typical profile:

Ap—0 to 10 inches; sandy loam

Bt—10 to 19 inches; sandy loam

2Bw—19 to 28 inches; sand

2C—28 to 80 inches; sand

performance criteria

Space allocation:

The space allocation for this typology will be based upon the specific site conditions and typical standards for public libraries in Minnesota. These standards, found from the Minnesota Library Association, will shed light on the appropriate use of space within the building. The size of spaces within the building footprint is determined by these standards. While considering spaces for the building program, it will be important to recognize the immediate population that the library will be serving. This can be measured through site analysis and demographic studies of the immediate area.

Energy Consumption:

The energy consumption should be measured yearly and compared to the energy consumption of years past, to buildings with similar square footage and typology, and to established norms. While it is imperative to ensure that the design is meeting these established norms, it will be important to make design decisions that are made to go above and beyond to conserve energy in construction and use of the space. This measure will be analyzed by the efficiency of design decisions and how they contribute to the buildings energy consumption. To reduce the use of artificial light, the optimization of daylighting in the design will be necessary. This will be analyzed through Revit's software and add-ins, as well as using drawings and diagrams to analyze how the light affects a space throughout a day.

Environment Performance & Impact:

When implementing a design for the site, it will be important to note the current infrastructure and to make decisions of placement based on this knowledge. This is important to understand so that the building leaves a minimal impact on the site. The site is located near sites rich with history. It will be important to recognize this and be inspired by it to not take away the identity of the area.

The thermal performance of the library should, ideally, be around seventy degrees Fahrenheit, with the relative humidity between thirty and fifty percent to ensure that the materials and volumes will not ruin. To guarantee that the design supports this thermal environment, Revit's Energy Performance software will be utilized. Acoustical environmental performance will also be measured for comfort. The space's acoustics will be calculated by indicating potential distractors and determining the potential noise that would be generated. The "freedom from distraction" Articulation Index rating is 0.20 or less. This can be defined as the signal-to-noise ratio.

Behavioral Performance:

The design will be analyzed to verify that it causes little confusion between spaces and has a cohesive flow. Designing spaces that are logical and are informative is a major goal of this project. This will be analyzed through the use of elements outlined in research and circulation studies. Another behavior performance measure will be the interactions that people have with the specific elements in a space and how they decided to move through a space based on these elements. For example, one might stop and interact with an element, or one might simply walk in the direction of a sensory element. This can be analyzed through observation and the use of circulation software with specific parameters.

Psychological Impact:

The research for this design pays close attention to sensory elements of architecture. Whether they are tactile things that people feel or specific sounds that indicate what is going on around someone. The goal is for someone to walk into the building and experience it without necessarily having to see it. This measure will be analyzed similarly to the behavioral performance. Analysis will be possible by understanding what elements attract and inform the users.

Code Compliance:

The design should comply with the Minnesota Building Code along with the newest version of the Americans with Disabilities Act (ADA) Standards. Because the research for this design focuses on visual impairment, extra steps should be taken above the ADA Standards to ensure the safety of these users.

space allocation table

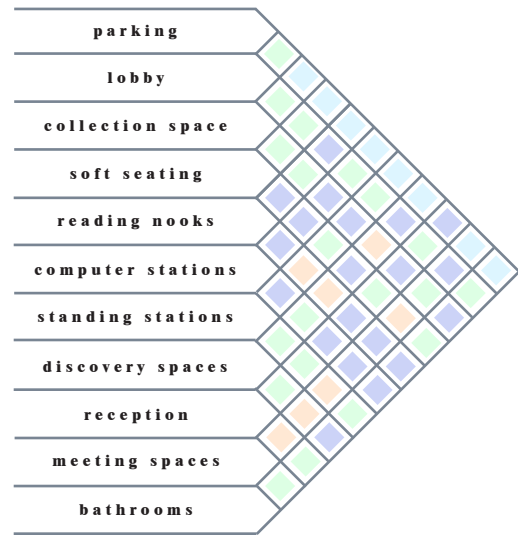
	small		average		large	
	sf	%	sf	%	sf	%
non-assignable space	1485	20%	2970	20%	4456	20%
collection space	3583	48%	7167	48%	10750	48%
electronic workstation space	1000	13%	2000	13%	3000	13%
user seating space	500	7%	1000	7%	1500	7%
meeting space	300	4%	600	4%	900	4%
special use space	107	1%	215	1%	322	1%
staff work space	450	6%	900	6%	1350	6%
total	7426	100%	14852	100%	22279	100%

Space Allocation Table
Figure 14.01

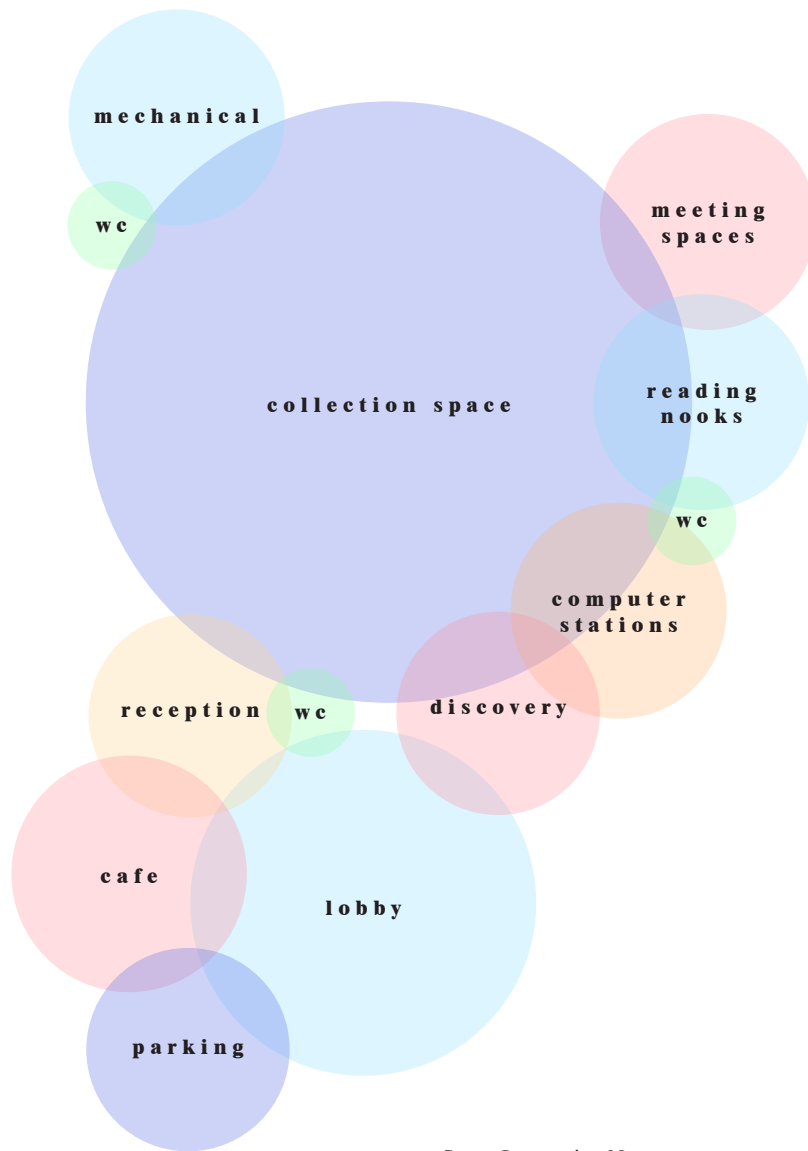
space interaction matrix

- adjacent
- nearby
- not adjacent
- not related

Space Interaction Matrix
Figure 14.02



**space interaction
net**

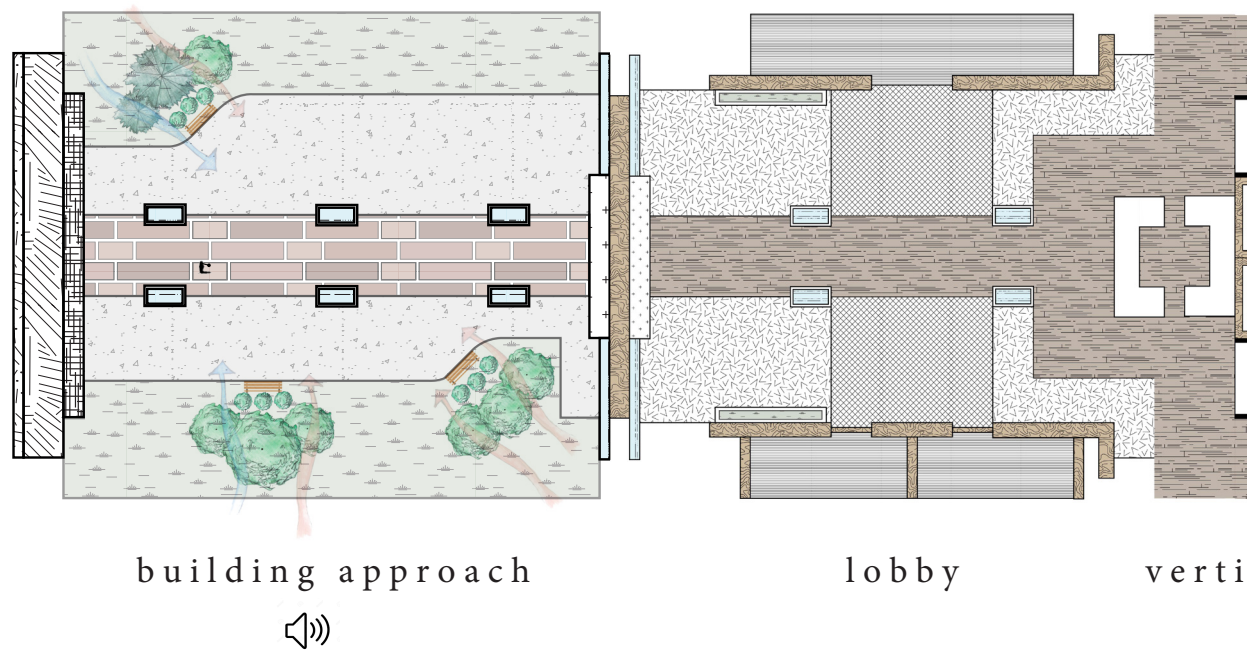


Space Interaction Net
Figure 14.03

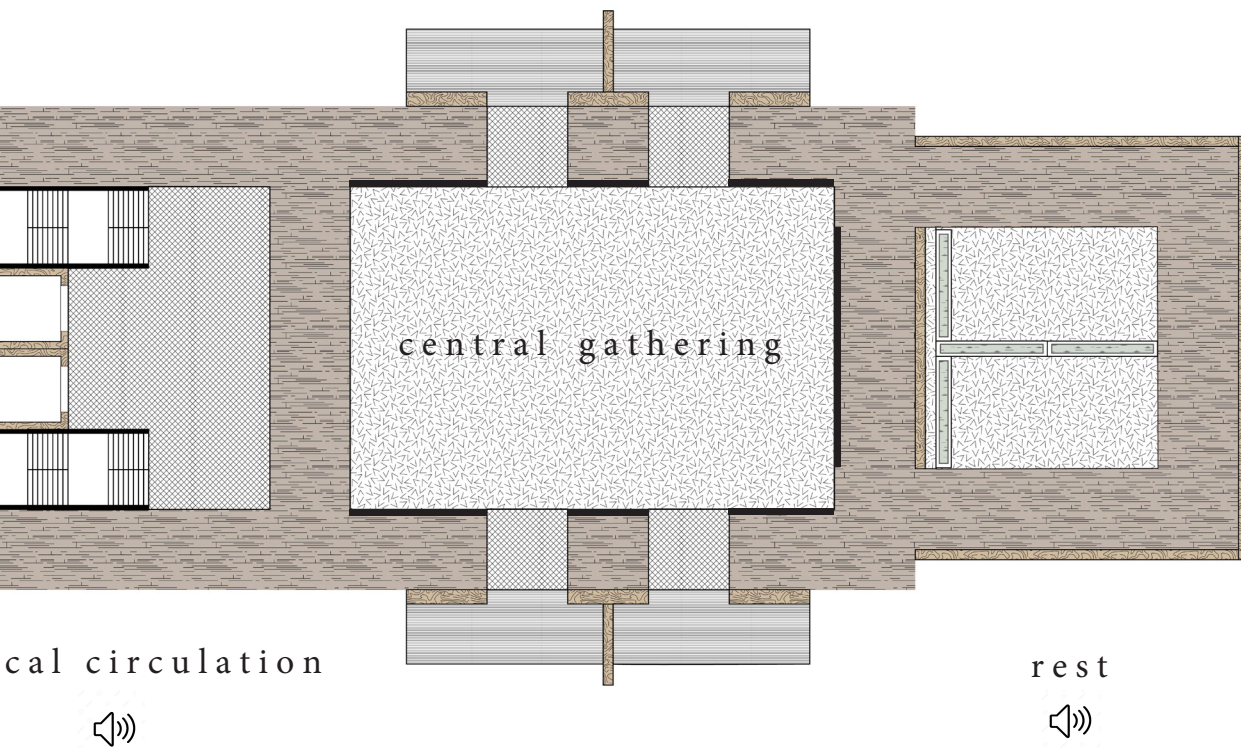
thesis solution

tion

**cognitive
explanation**



In order to understand semiotics in the form of sounds, I have created a cognitive explanation taking you through a series of spaces. In order to understand semiotics in the form of sounds, I have created a cognitive explanation taking you through a series of spaces. The first clip is the approach to the building. Pay attention to context and let yourself imagine where this person is in the environment. Think about the sounds that might be leading this person on their journey. The next clip is a different person's journey from the entrance, through the inner courtyard and into a place of refuge, or rest. Did you notice how the sound changed as they walked over the different surfaces, the ding of the elevator off in the distance, or even the water fountain



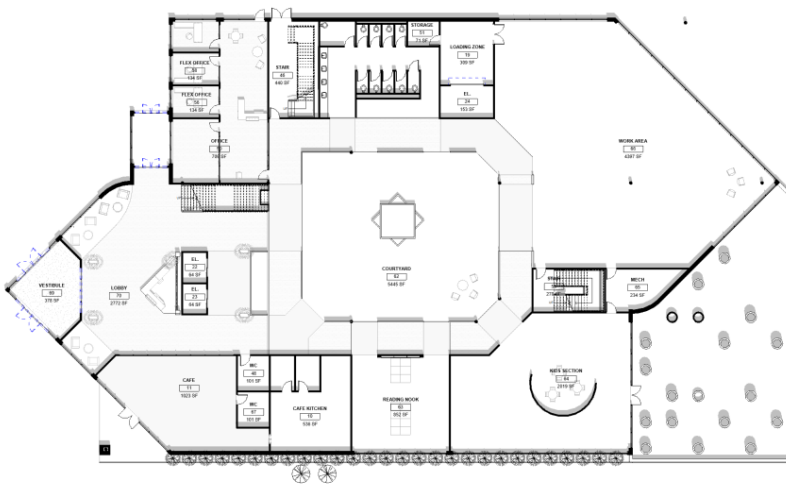
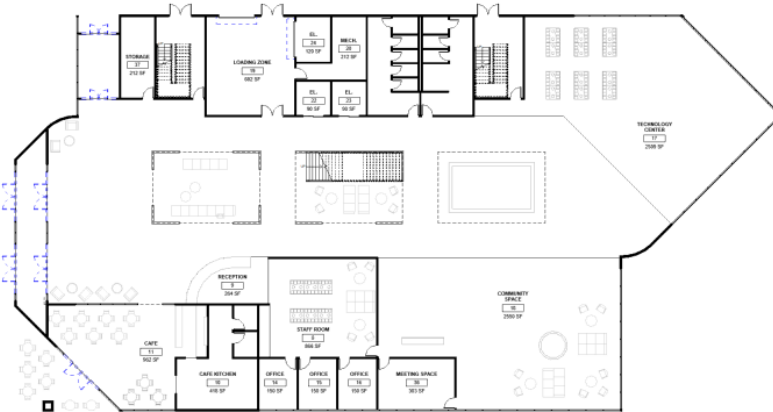
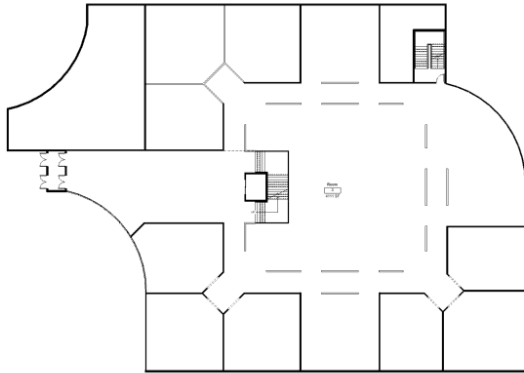
in the lobby?The final clip is not necessarily a journey through space, but more of an experience. This audio is meant to represent the sounds one might hear in a reading nook, or on the upper levels where the collection space would be. Think about what this sound makes you feel.I imagine that each of these sounds brought you back to a memory, or a familiar sound. These are sign systems that we encounter daily and they bring all the more meaning to your experience in the built environment. While these clips just scratch the surface of the depth of our perception. There are other ways that architecture is being communicated. I will discuss the different ways that architecture communicates to its users as I introduce my design solution.

floor plan evolution

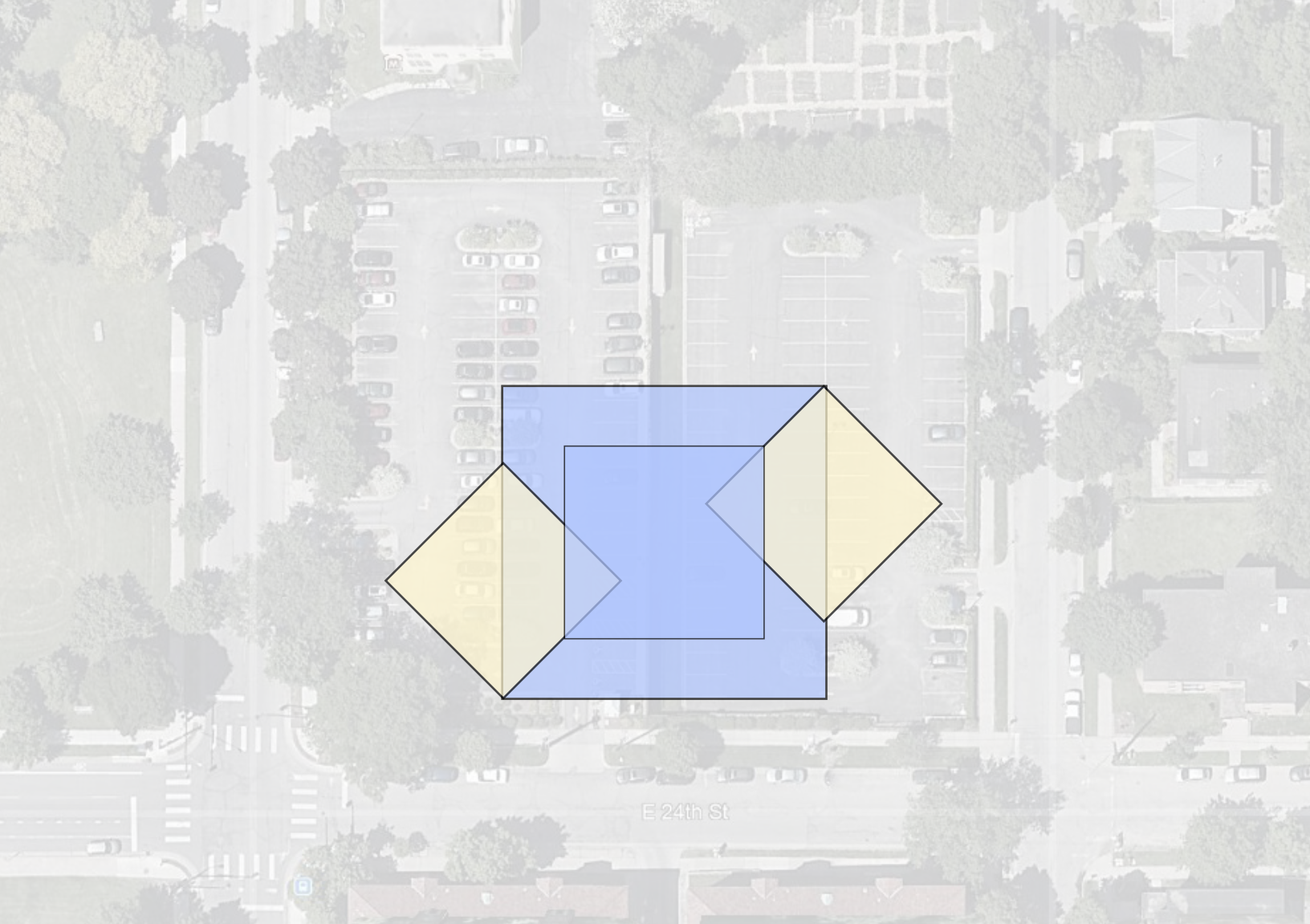
The form was heavily influenced by the floor plan. It was important for me to think about how people walked through the organization of the building before it really began to take shape.

I also wanted to capture the community around the site. The location is unique as it is directly adjacent to a park and kiddy corner to a museum. Downtown minneapolis is also visible from the site.

The first iteration seen on the next page focused mainly on circulation and program. The next iteration focused more heavily on site. In order to get to my solution I morphed the first two iterations into one.



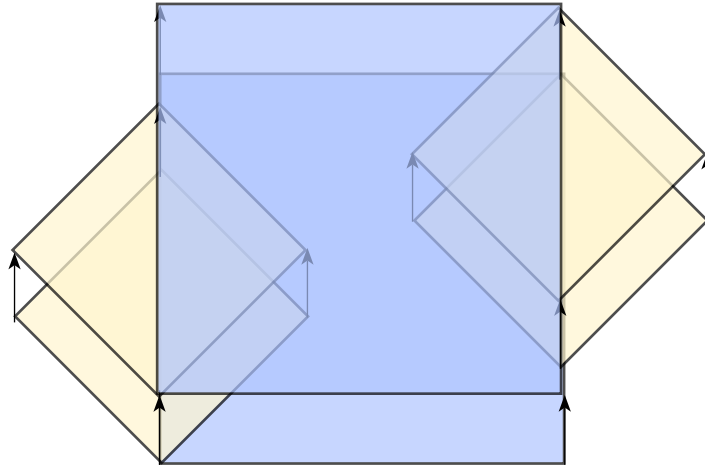
floor plan evolution



site influences

For my design solution, I chose a site in a suburb just south of downtown Minneapolis on a fairly busy intersection. It is currently being used as surface parking lots and there is a grade change of approximately 14 feet from the west to the east side of the site. This will be represented later.

When designing, I wanted to maximize the views along with the surface area on the East and West sides of the building. This creates a unique form that provides a unique movement of the wind coming from the northeast and south/southwest. The main views being captured include a direct line of sight to the Minneapolis Institute of Art, views of the neighboring park, and views of the skyscrapers in downtown Minneapolis.

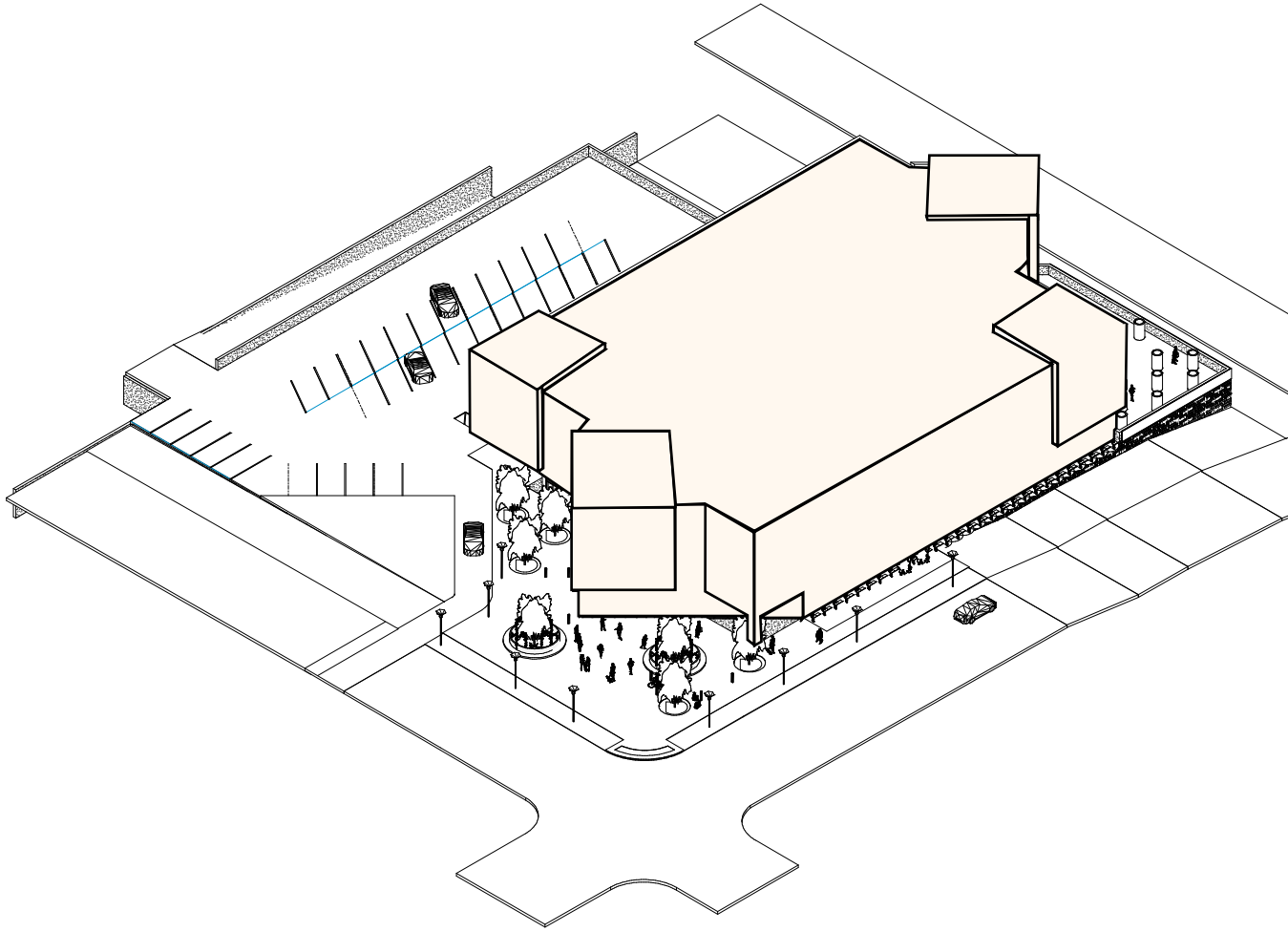


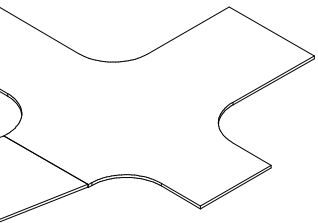
architectural phonemes

Points, lines, planes, and volumes are the start of any form. Everything that we see begins with a dimensionless point on a paper. These points can remain on their own or can be connected to another point on the same axis making a line. From multiple lines connecting along two axes, a plane emerges. If one were to extrude a plane along a third axis they would discover the last primary element of architecture - volume. All of these elements are interconnected and inform the next in order to form an object in space. Phonemes can be described similarly: when writing a word, you are putting different phonemes together to create a word in a language.

These volumes I have created are different accents of the same type of phoneme. As you can see, there are three interconnected cubes of two different shapes. In language you could see this as a short /a/ with a long /a/.

This layout of volumes provides visually impaired with a direct path to find from the intersection of Stevens Avenue and 24th Street.





architectural lexicon

“Architectural form is the point of contact between mass and space... Architectural forms, textures, materials, modulation of light and shade, color, all combine to inject a quality or spirit that articulates space (Bacon 1974). This line of thought can be seen as almost parallel to the concept of lexicon. Words are the basic form of language, and they combine to convey concepts and meaning to thought.

Form is an arrangement and coordination of the primary elements that create a composition and produce a coherent image. As space begins to be captured, enclosed, molded, and organized by the elements of mass, architecture comes into being.

In this graphic you see the different shapes of my solution come into being, along with the position, orientation, and visual inertia. This collection is like the words of language coming together to create meaning. Each word corresponding to a space.

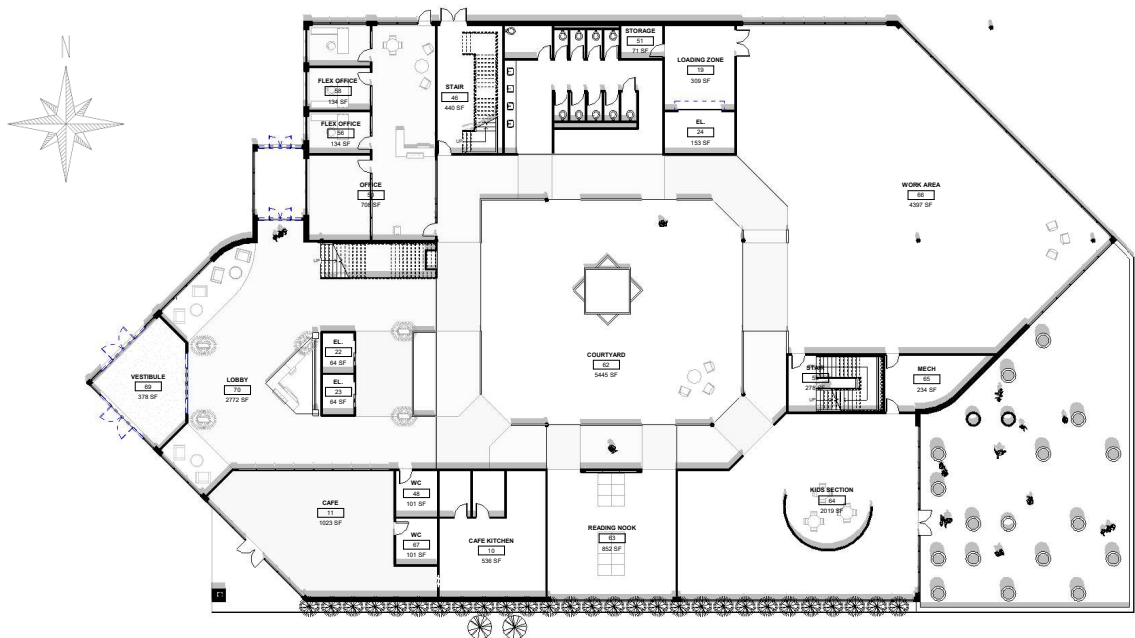
For example, the additive elements of the architectural form indicate spaces of warmth and rest. As we progress through the presentation and the form materializes, these additive forms will have large windows, bringing heat from the sun into the space.

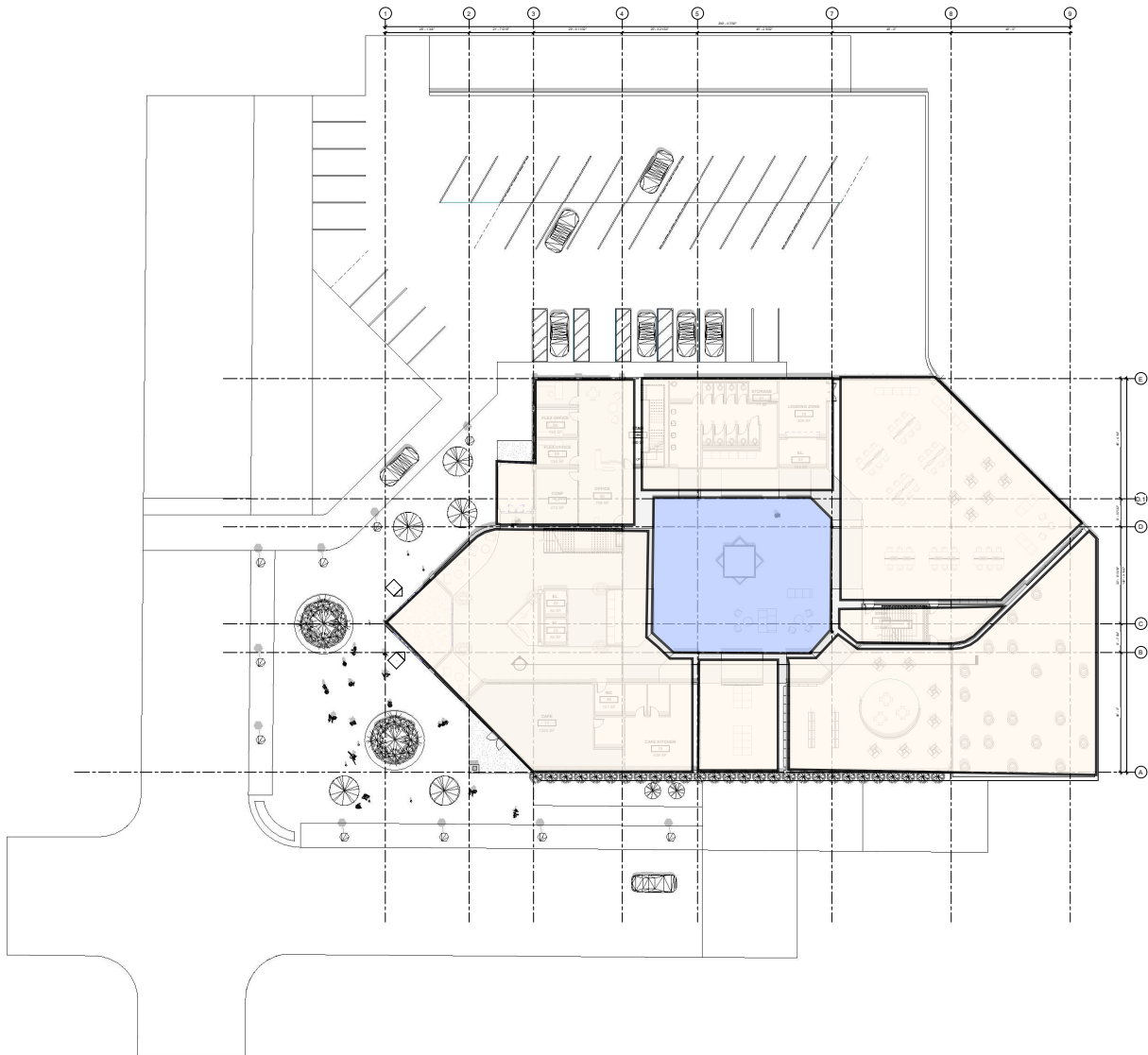
In the next few pages, I will start to show these connections as they relate to the building use.

architectural morphology

Forms have the ability to inform space. For example, a plane that is laying as a figure on another differing plane defines a simple field of space. What we know as a base plane.

For this example you see the base plane, or a free standing morpheme in relation to architecture. The prefixes and suffixes of this element can be considered as the change in material texture, or walls that are extruded, giving meaning to the volume. It creates edges, circulation, and balance in the architecture.





architectural syntax

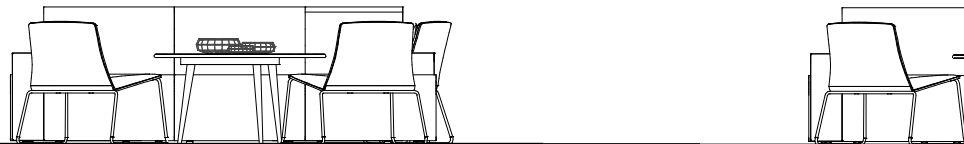
Organization is the way in which one can order solitary forms and space to compose a number of spaces that relate to one another by function, proximity, or path; to create coherent patterns of form and space.

The spaces around the inner courtyard are the phrases that relate and come together to form sentences, in which the story begins to be molded and structured into a whole.

syntactic relationship

This diagram shows the syntactic relationship between the phrase, the circulation space and the inner courtyard. This does several things for the visually impaired. In the circulation space you are separated from the different spaces on both sides, but the half wall on the interior side provides connection to the space through sound and feeling of warmth. which in turn gives the visually impaired the sense of position and orientation. These values are also implemented through the exterior space. The acoustics of these spaces will be more regulated and there will be a relatively cooler temperature that would emit into the circulation space.

syntactic relationship



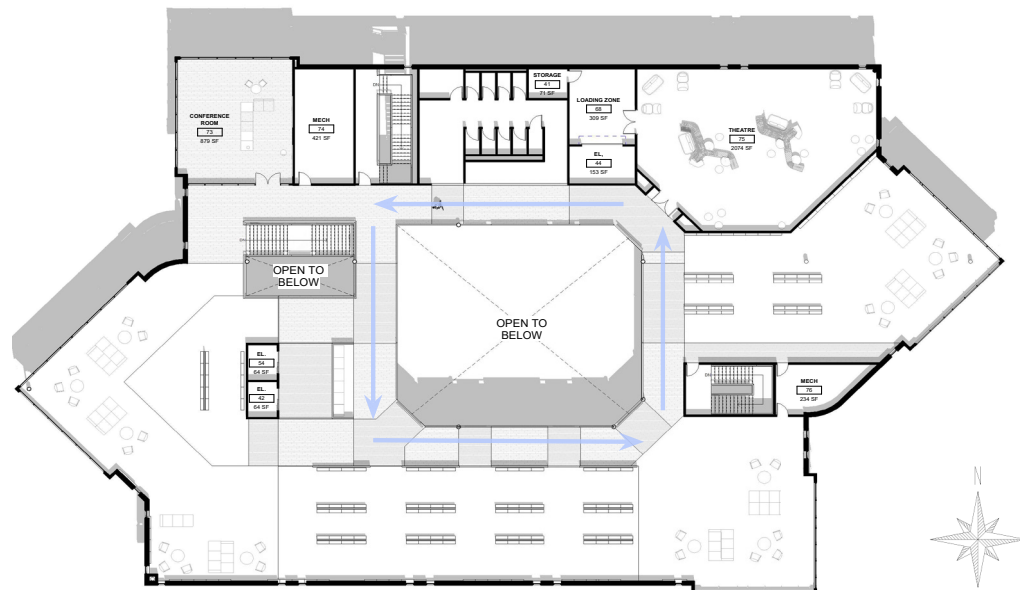
**form of the
circulation space**

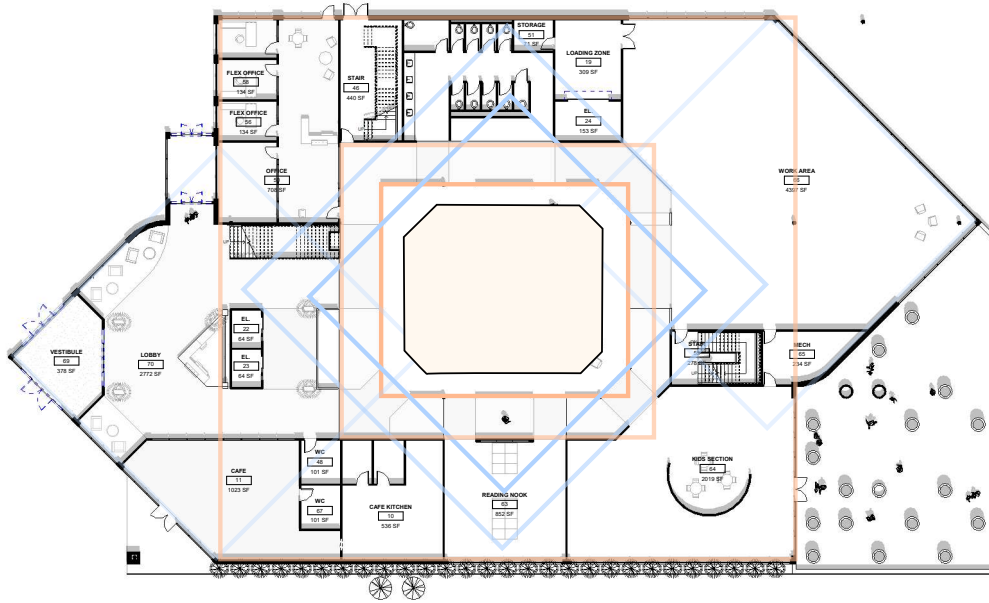


architectural semantics

Here is an example of semantics in architecture. The path of movement through space can be conceived as the perceptual thread that links spaces of a building, or any series of indoor or exterior spaces. Similar to how semantics connects phrases and words together to make meaningful sentences. Since we move in time through a sequence of spaces, we experience space in relation to where we've been before and where we anticipate going.

The changing of the base plane begins to form a path, and the meaning that derives from this spatial arrangement is circum-ambulation, or the concept of going around.

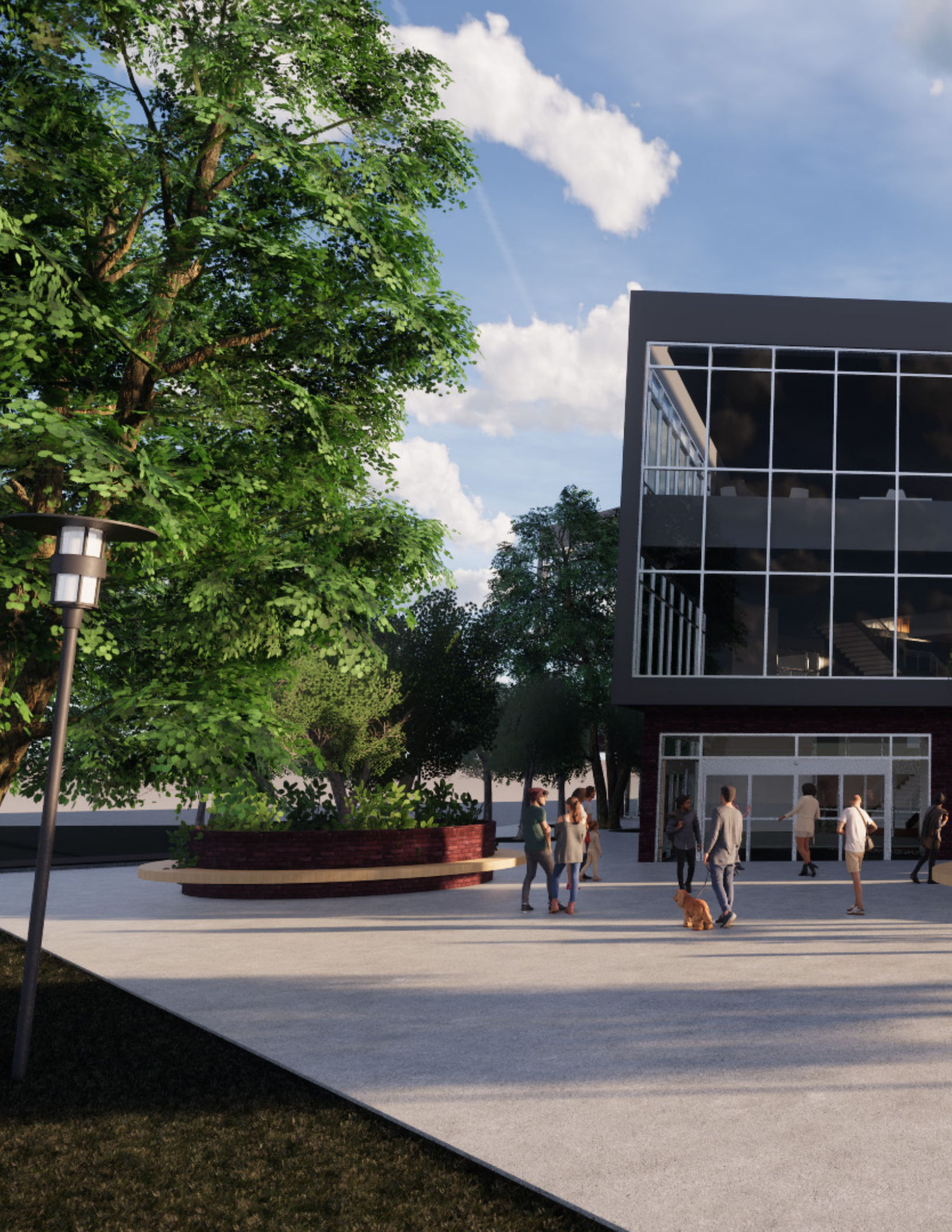




architectural syntax

This diagram relates to the phonetic volumes that I showed early in the presentation. The phoneme, or primary elements, were chosen in light of this space grammar shown.

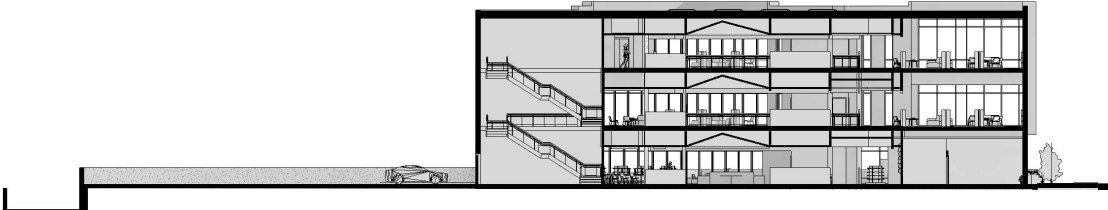
Like grammar, the order of architecture is a set of rules to generate a logical whole. Order is extremely important because, without it, there is chaos. It allows the varied and diverse forms of architecture to coexist perceptually and conceptually within an ordered, unified, and harmonious whole.







WEST ELEVATION



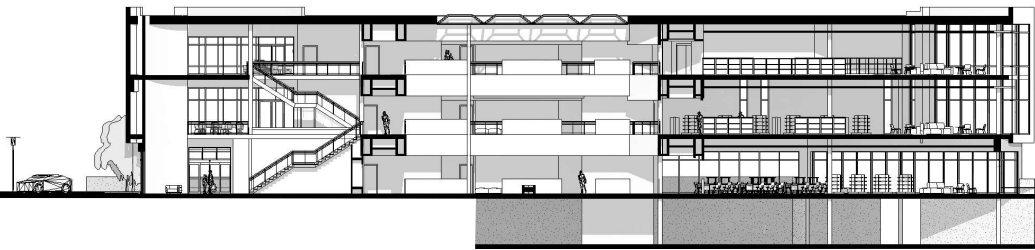
WEST SECTION



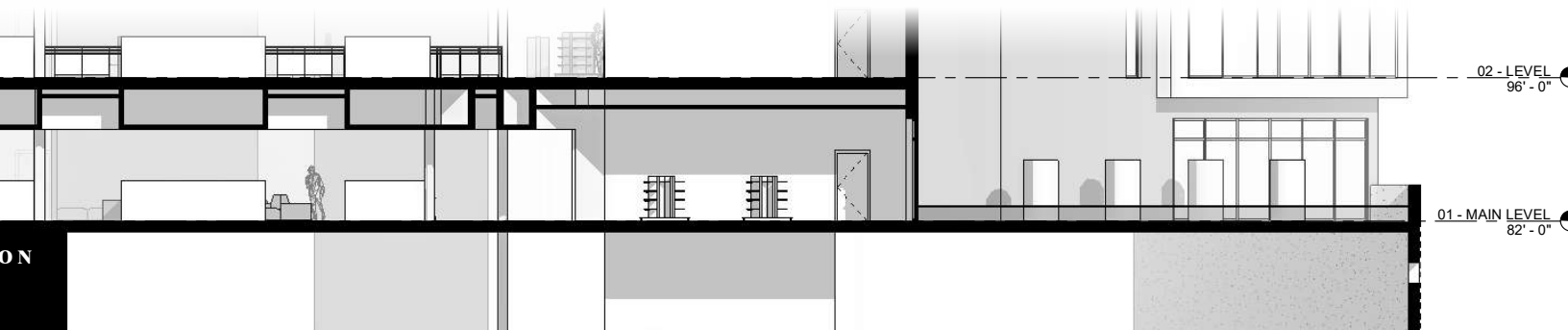
ENLARGED SOUTH SECTION



SOUTH ELEVATION



SOUTH SECTION





thesis app

e n d i x

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- Saussure, F. (1993). *Course in General Linguistics*. London: Duckworth.

**previous studio
experience**

second year

fall 2016 | Charlotte Grueb
Tea house - Moorhead, Minnesota
Montessori School - Fargo, North Dakota

spring 2017 | Cindy Urness
Dance Academy - Fargo, North Dakota
Dwelling - Marfa, Texas

third year

fall 2017 | Paul Gleye
Mixed-use Wellness Center - Fargo, North Dakota
Visitor Center - Fargo, North Dakota

spring 2018 | Mike Christenson
Educational Building - Chicago, Illinois

fourth year

fall 2018 | Bakr Aly Ahmed
High Rise Design - Miami, Florida

spring 2019 | Paul Gleye
Urban Developement - Brussels, Belgium

fifth year

fall 2016 | Ganapathy Mahalingam
Research Design Studio

