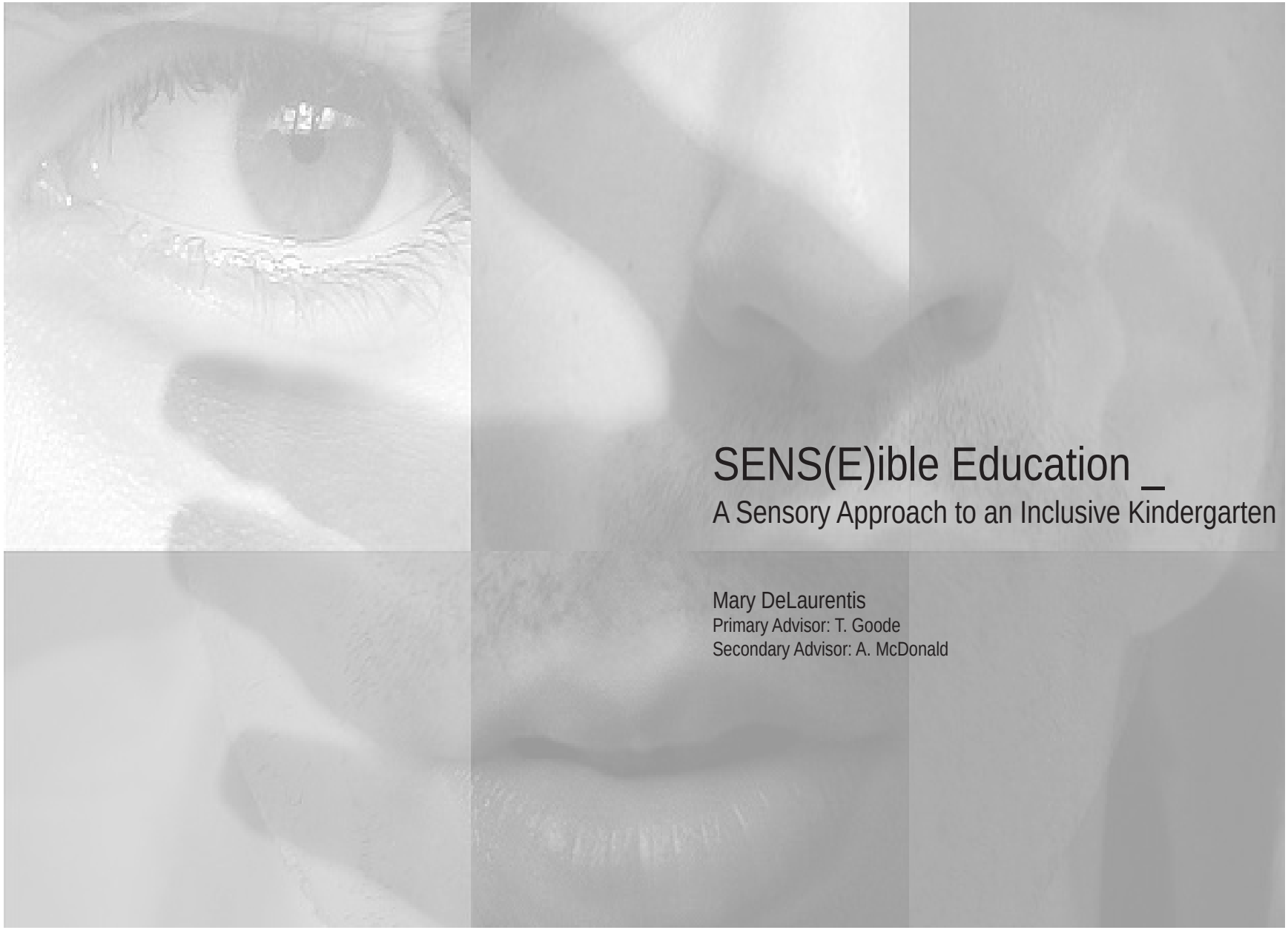
Spring 2012

SENS(E)ible Education: A Sensory Approach to an Inclusive Kindergarten

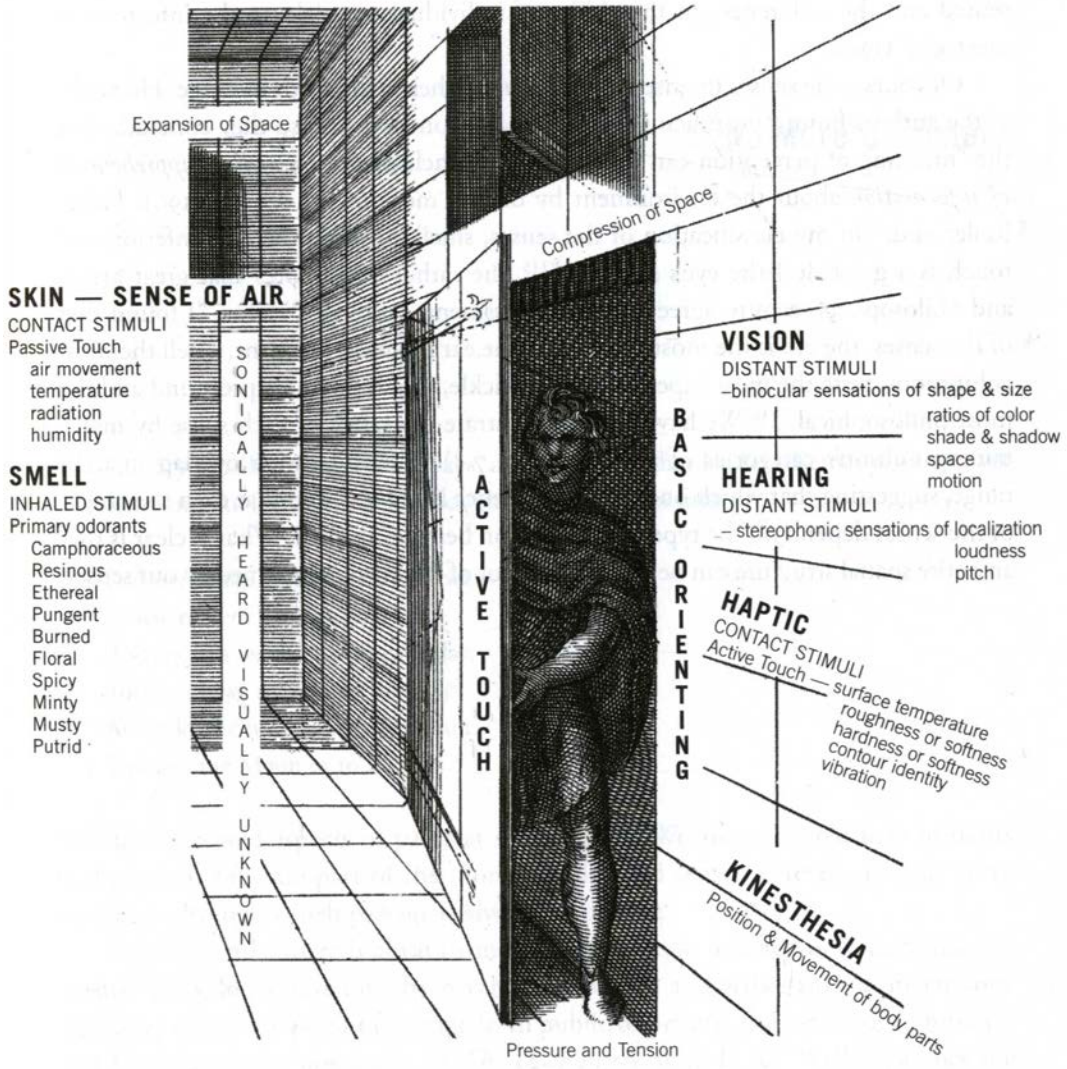
Mary DeLaurentis



SENS(E)ible Education _

A Sensory Approach to an Inclusive Kindergarten

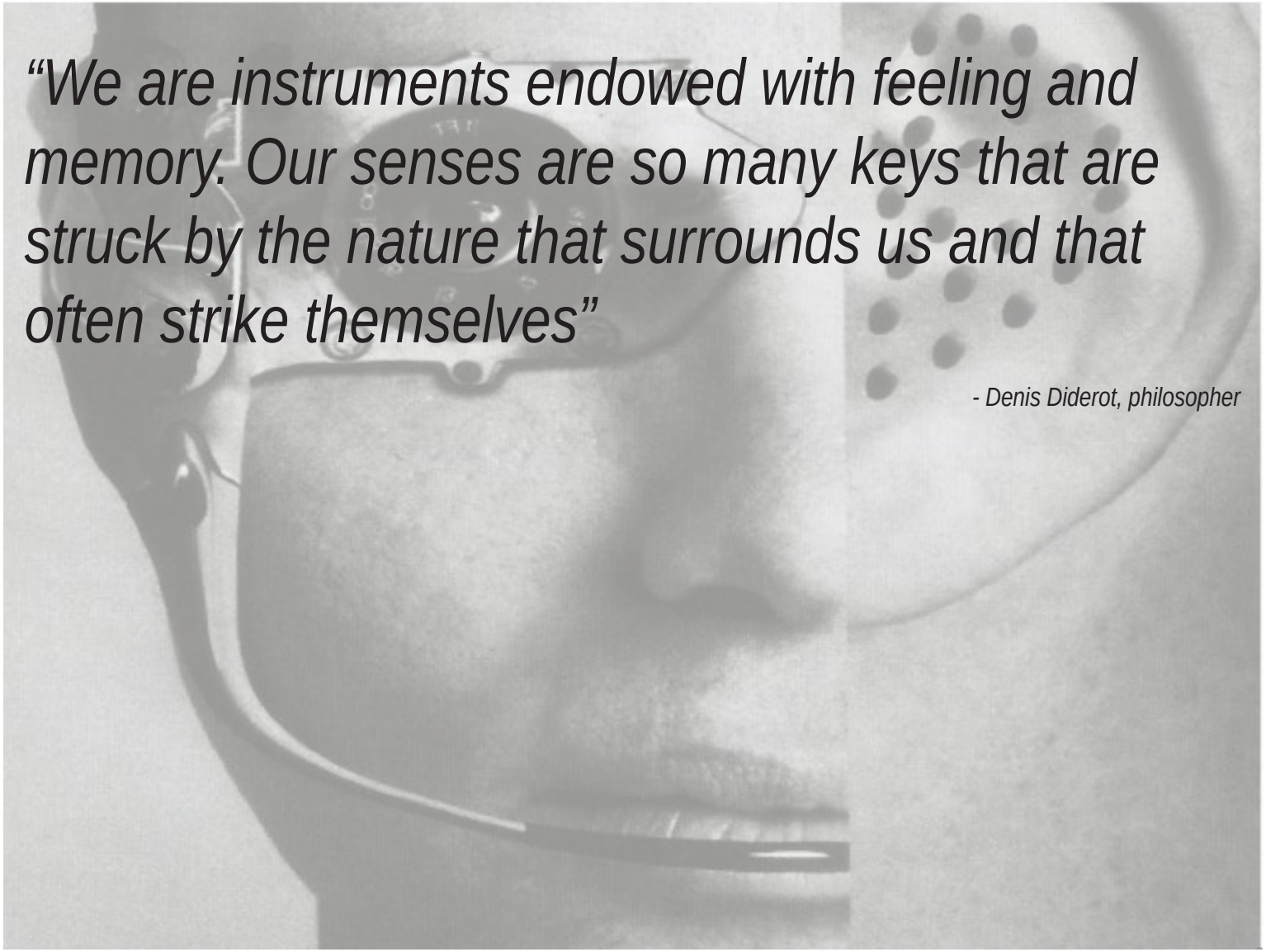
Mary DeLaurentis
Primary Advisor: T. Goode
Secondary Advisor: A. McDonald


Expansion of Space
Compression of Space
SKIN — SENSE OF AIR
CONTACT STIMULI
Passive Touch
air movement
temperature
radiation
humidity
SMELL
INHALED STIMULI
Primary odorants
Camphoraceous
Resinous
Ethereal
Pungent
Burned
Floral
Spicy
Minty
Musty
Putrid
SONICALLY HEARD VISUALLY UNKNOWN
ACTIVE TOUCH
BASIC ORIENTING
VISION
DISTANT STIMULI
–binocular sensations of shape & size
ratios of color
shade & shadow
space
motion
HEARING
DISTANT STIMULI
– stereophonic sensations of localization
loudness
pitch
HAPTIC
CONTACT STIMULI
Active Touch — surface temperature
roughness or softness
hardness or softness
contour identity
vibration
KINESTHESIA
Position & Movement of body parts
Pressure and Tension

“It is evident that “life enhancing” architecture has to address all the senses simultaneously and fuse our image of self with our experience of the world. The essential mental task of architecture is accommodation and integration. Architecture articulates the experiences of being in the world and strengthens our sense of reality and self; it does not make us inhabit worlds of mere fabrication and fantasy.”

- Juhani Pallasmaa

1



“We are instruments endowed with feeling and memory. Our senses are so many keys that are struck by the nature that surrounds us and that often strike themselves”

- Denis Diderot, philosopher

By and large we live in a visual world, which is due to our technological and consumerist culture. The visual world is instant and shared, which correlates with modern societal demands thus creating a sensory bias towards sight, while the tactile world is slow and intimate and often falls by the wayside in order to give priority to visual entities. The censorship of the other sensory realms has led to architecture that is solely focused on creating an image and form that society can easily value. This gives the public visually compelling buildings but sacrifices rich sensory experiences and leaves us with impoverished environments. Architecture should be for the entire body to exist, explore, and gain informative experiences. “The authenticity of architectural experience is grounded in the tectonic language of building and the comprehensibility of the act of construction to the senses. We behold, touch, listen and measure the world with our entire bodily existence, and the experiential world becomes organized and articulated around the centre of the body” (Pallasmaa). It seems as though many contemporary architects have created a bias towards the visual image of a sacrificed the sensory experience of architecture thus creating sterile environments that often alienate its users. Architecture has the capacity to be inspiring, engaging, and transfiguring if designed with respect to the complete sensory realm in relation to the occupant in mind.

Many “common” buildings that people occupy everyday lack concern for the impact architecture has on the sensorial realm of the human occupying and using the building. A person’s sensory perception of an architectural space has a strong effect on their physical and mental well-being. People experience space in both an unconscious and conscious manner. The sensory characteristics of spaces have the ability to engage a person’s emotions, memory, sense of self, and temporal awareness thus truly impacting the whole person. Today, many buildings are designed around cost effective programmatic requirements that do not relate to the user’s physical and/or emotional engagement with the space creating a dichotomy between the sensual and the spatial experience of a building. There is little to no attention to the use of the space in relation to the human experience of the architecture.

Due to our culture's reliance on technology and the visual realm, architects often design spaces based on a bias towards the single sensory realm of sight. Our ability to use all of our senses and fully engage in the world around us is minimized. I contend that in order to create a more meaningful and engaging architecture, architects need to design distinctive experiential spaces that take into consideration all of the sensory realms rather than the sensory generic architectural spaces we often occupy in the Western world. People interpret architectural spaces differently based on their own personal inclinations and thus the architecture should respond to the shifting needs of the users in both a spatially and sensory manner. Through an acute consciousness of perception, social understanding, and sensory awareness the architect is able to create a meaningful and informative relationship between the environment and the people who inhabit it; thus creating a space that people will identify with and give meaning to.

Architecture that is designed with the intended occupants full sensorial needs in mind ultimately enhances the occupants' experience. Architecture that engages all our senses will create spaces that transcend the purely visual. This higher order of perception will make occupants more self aware, conscious of their embodied experience of the world around them, and create informative experiences.

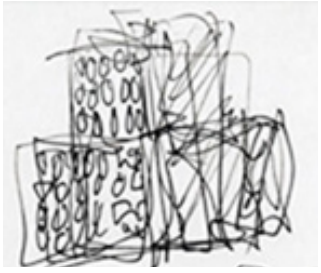
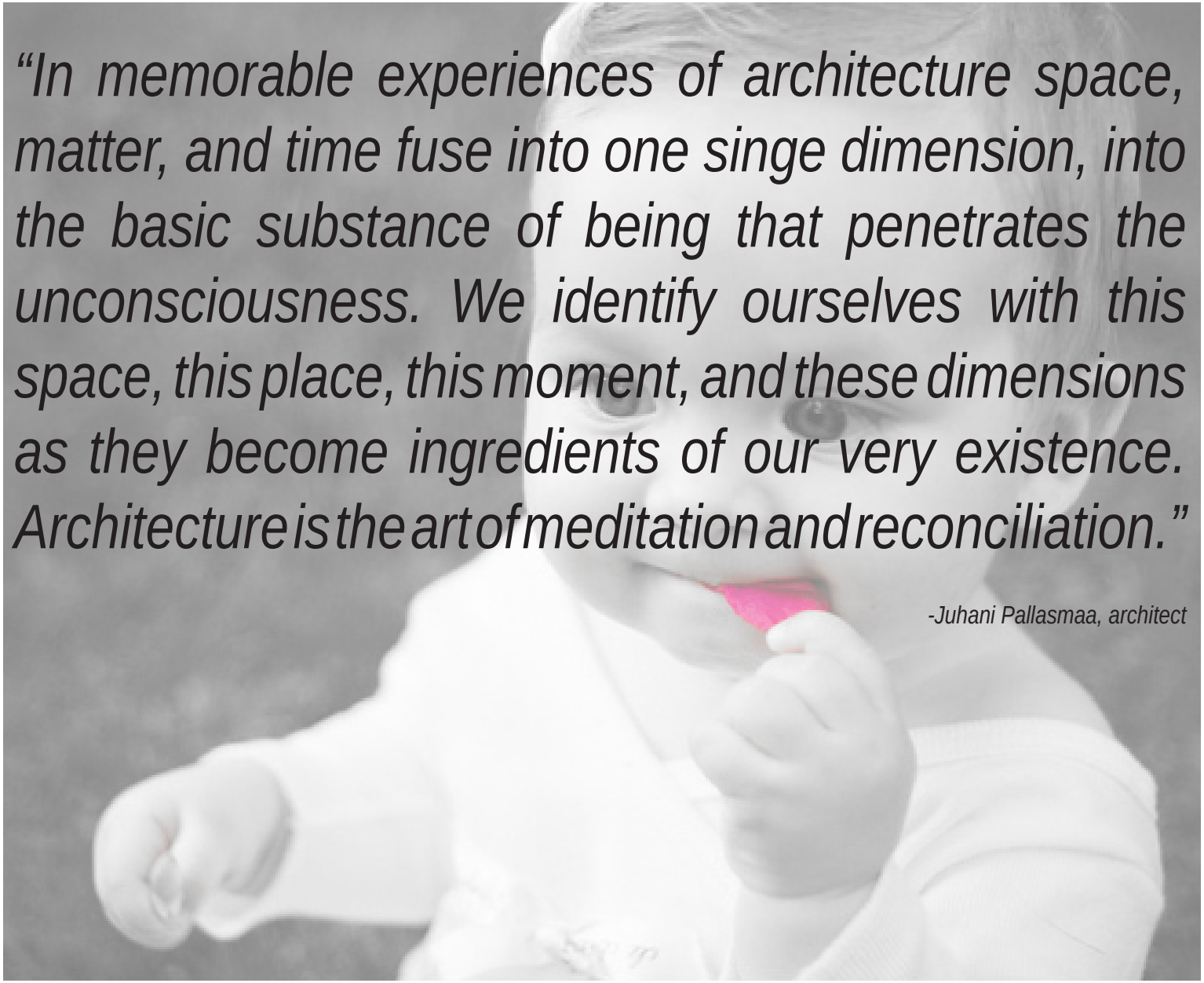


Fig 1_IAC Building_Frank Gehry

The architecture of this office building is seemingly designed not with the occupant's comfort in mind but instead is interested in creating a compelling form and image for the city.



"In memorable experiences of architecture space, matter, and time fuse into one singe dimension, into the basic substance of being that penetrates the unconsciousness. We identify ourselves with this space, this place, this moment, and these dimensions as they become ingredients of our very existence. Architecture is the art of meditation and reconciliation."

-Juhani Pallasmaa, architect

Why Kindergarten?_

The senses are the gateway to the mind, especially for children. From birth humans learn about themselves and the world around them through sensory experiences that are orchestrated by the environment. A child develops mentally, emotionally, and physically through interactions with other people and their environment (Siegler). According to Juhani Pallasmaa, "Educational change concerning the significance of the sensory realm is urgently needed to enable us to discover ourselves as complete physical and mental beings…an unbiased and full understanding of human existence is a prerequisite for dignified life" (OWP Architects 176). The sensory character of an educational space should be designed to respond to the way a child perceives the world, both in spatial and sensorial terms, and how he or she learns through discovering and interacting with their surroundings.

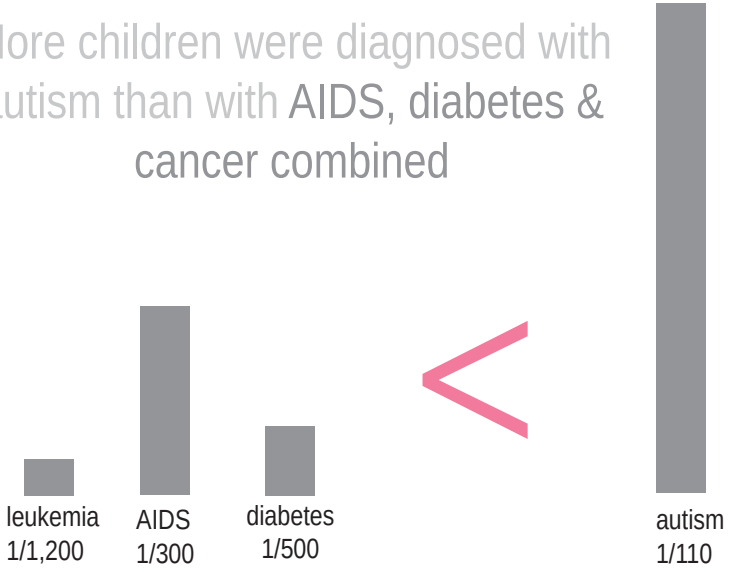
The architecture of elementary schools in the United States typically does not engage both the mind and body of the child creating a dichotomy between the school building and the innate process of learning through experiencing the world via the senses. A school has a very important role in society and the community yet the architecture is often based on cost effectiveness thus creating generic spaces that lack concern for the user's sensory stimulation needs. This generic learning environment does not capitalize on the ability for architecture to act as a catalyst to inform the students about themselves and their surroundings based on a child's perception and cognitive patterns.

The sensory characteristics of an educational facility should be designed to create stimulating and comfortable environments that promote meaningful educational experiences for every child. School buildings typically have flexible spaces, especially within the design of a classroom plan, but do not provide different sensory experiences. Since children learn in different ways, a variety of sensory experiences should be considered in the design of a kindergarten in order to construct various learning opportunities as well as provide each child with an educational environment that is suitable and adaptable to their individual cognitive, physical, and developmental needs. Designing early education architecture with the complete sensory realms and needs of a child in mind will construct meaningful and engaging architecture that does not purely act as a space in which learning happens in but also contributes to the educational experience.

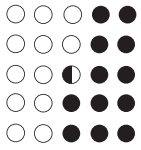
“ You have got to keep autistic children engaged with the world. You cannot let them tune out.....As you may know, some of the stereotyped behaviors exhibited by autistic children are also found in zoo animals who are raised in a barren environment.”

-Dr. Temple Grandin, noteworthy author who is autistic

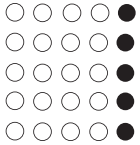
More children were diagnosed with autism than with AIDS, diabetes & cancer combined



ASD is 4 to 7 times more likely to occur in boys than girls



50% of parents of children with ASD notice their child’s unusual behaviors by age 18 months



4/5 notice by age 24 months

Autism is the fastest growing developmental disability at a 1,148% growth rate with 10-17% annual growth

Why Autism?_

As architects, we always design buildings with physically disabled people in mind but rarely for the developmental or cognitively disabled population. A person with a developmental disability is often more negatively affected by their surroundings than a neurotypical person; this is especially true of people with autism. Today, on average 1 in 110 children in the United States fall within the autism spectrum, regardless of economic and socio-cultural aspects ("Autism"). Autism is the fastest growing developmental disability with a growth rate of 1,148% and a 10-17% increase annually (Humphries). It is time that architects respond to the needs of this population.

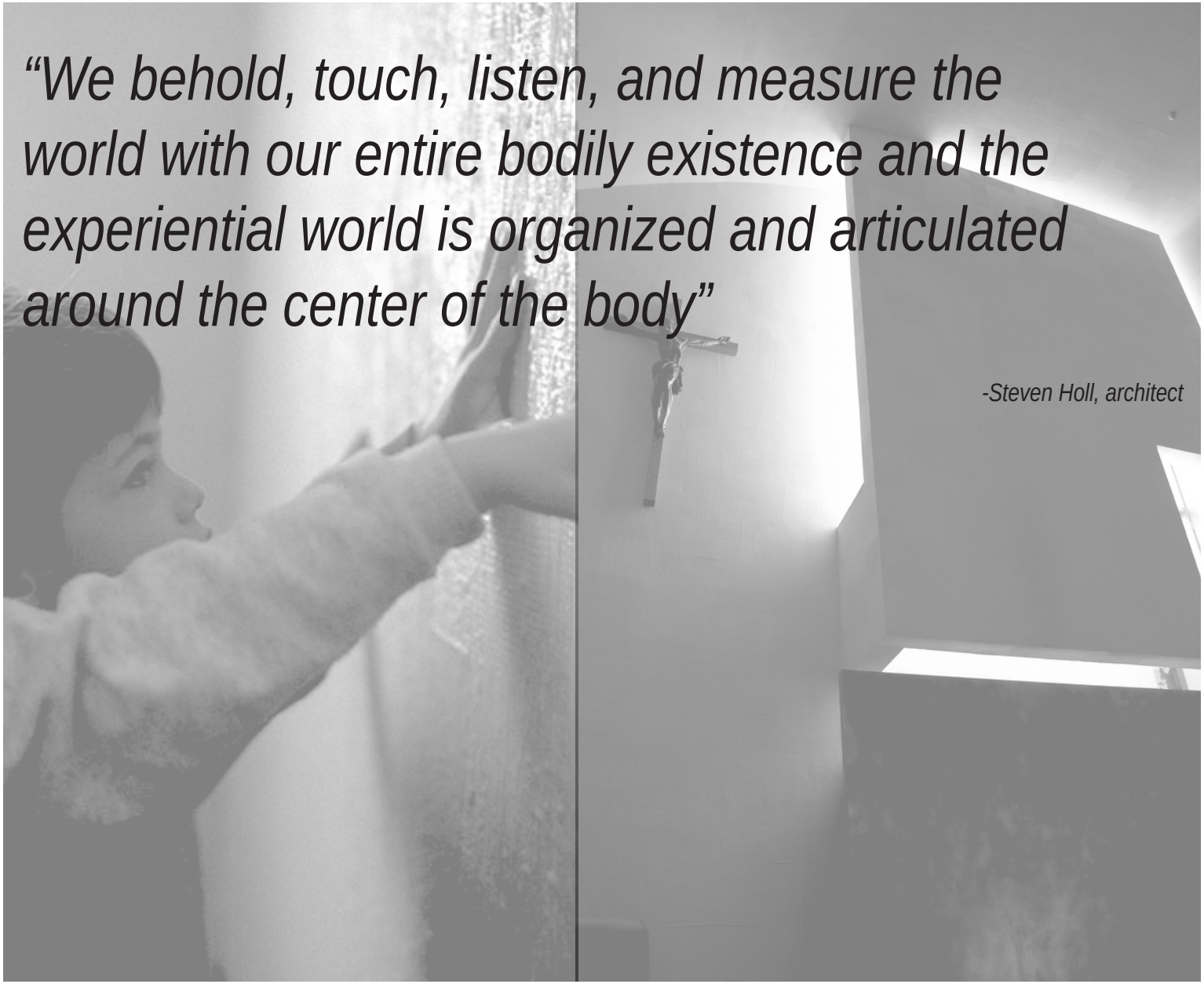
Autism is a neuropsychiatric disorder that is characterized by deficits in social interaction and communication skills ("Autism"). This developmental disorder is also often characterized by sensory integration dysfunction and repetitive behavior. People with autism often perceive the world around them much differently than those without a disability and architecture does not typically accommodate their mental and physical needs (Albano). A common term that refers to people diagnosed with autism is "a person on the spectrum". This term refers to the wide range of needs, symptoms, characteristics, and problems each individual with autism faces. Much like a person that is blind or deaf, people with autism may have certain senses that are overactive or under stimulated in certain environments leading them to have a distorted sense of space. Features of a space, such as indirect sounds, materiality, and lighting qualities, that a neurotypical person would not think twice about typically affects people with autism since frequently their senses are off kilter and their sensorial perception of the world is often skewed. People with autism often experience sensory aspects of the environment in an overly active manner, thus intensifying the sensory experience, or they have a muted sensorial experience and seek sensory stimulation from the environment. In both cases, this makes the many architectural spaces intolerable and difficult to negotiate thus denying those on the spectrum the opportunity to fully associate and integrate with those around them due to an alienating built environment (McAllister). Therefore societal buildings, especially kindergartens, should be designed in ways that are accessible and adaptable for every type of user.

Architects have been given the responsibility to create environments that support well-being and inclusiveness. Often architectural space does not accomplish this in the eyes of people with autism, further distancing them from feeling the "pleasure and protection when the body discovers its resonance in space" (Pallasmaa 67). It is time that architects respond to the growing needs of developmentally disabled just as ADA building codes that make every building accessible to the physically handicapped are required. People with autism will benefit from a variety of spaces contained in one building because it will allow each individual to choose how they inhabit the architecture. Creating a range of sensory environments in a kindergarten allows for both extremes of the spectrum to be addressed in an experiential and spatial manner.

“The task of architecture is to make visible how the world touches us”

- Merleau-Ponty

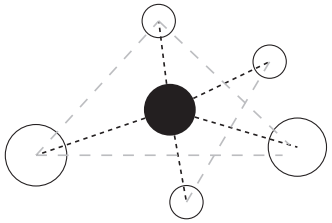
2



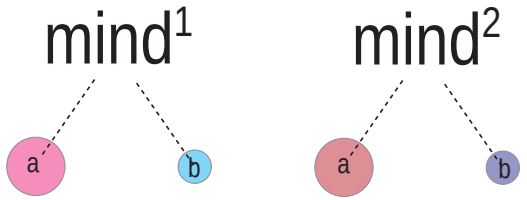
“We behold, touch, listen, and measure the world with our entire bodily existence and the experiential world is organized and articulated around the center of the body”

-Steven Holl, architect

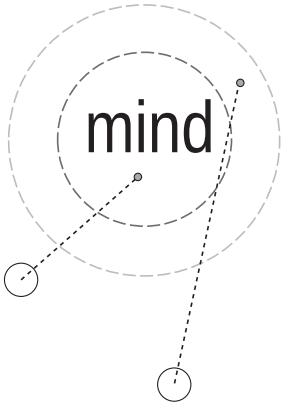
Phenomenology began as a philosophical movement that focuses on a person's conscious experiences. This theory has also be applied to the disciplines of science and psychology. Together in conjunction with the philosophical influenced ideas about phenomenology in architecture. Much of phenomenology in architecture is derived from both Merleau-Ponty's and Heidegger philosophical theories. For Merleau-Ponty, phenomenology describes an individual's perceptual contact with the world and provides a direct description of human experience (Smith) For Heidegger, "Phenomenology is not a descriptive, detached analysis of consciousness. It is a "method of access to being." ("Heidegger, Martin"). He stressed the importance of the individual's perception and experience is located within his or her own temporal-spatial circumstance. This context influences the meaning and perception of an event



scientific_
used in science to describe a body of knowledge that relates empirical observations of phenomena to each other



psychological_
used in psychology to refer to subjective experiences or their study

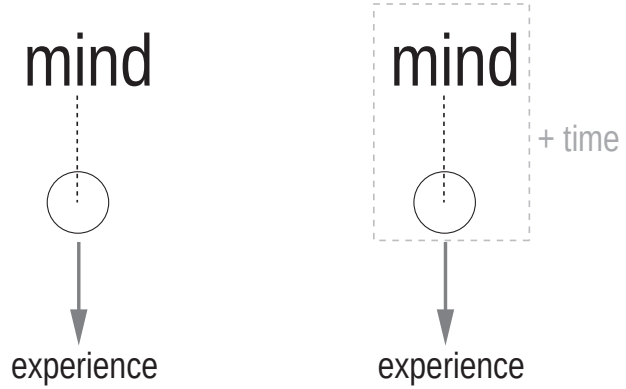


philosophical_
study of the systematic reflection on and analysis of the structures of consciousness, and the phenomena that appear in acts of consciousness

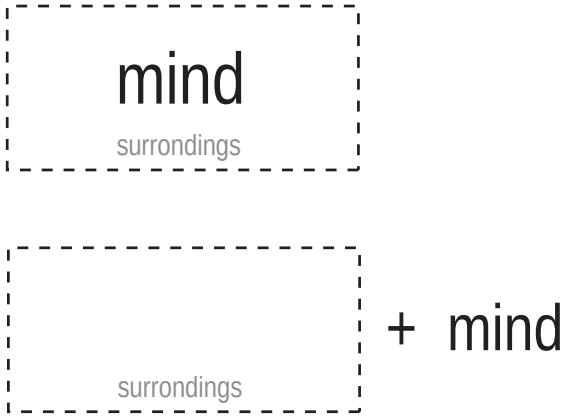
○ phenomena
- - perception

Heidegger's notion of dwelling, the idea that architecture "becomes a setting into work of 'truth', and a means of making the 'world' visible" was the basis for the development of phenomenology of architecture (Leach). Architects such as Holl, Pallasmaa, and Zumthor asks the same question of architecture that Merleau- Ponty and Heidegger asks of philosophy; how does a person's perceptual contact with the world create a meaningful conscious experience?

Architects who stress phenomenology in architectural design have explored the relationship between the built environment and the quality of human experience by creating buildings that engage all the sensory realms. The individual perception and thus experience of a space is held in high importance. According to Holl, "space is only perceived when a subject describes it.... It is precisely at the level of spatial perception that the most powerful architectural meaning come to the fore." (Parallax 13). By designing based on sensory stimuli the architect creates a journey through thresholds that is able to strengthen our sense of reality and direct our consciousness "towards our own sense of self and being" (Pallasmaa 11).



merleau-ponty's theory of phenomenology compared to heidegger's theory



2 ways a person can expereince an architectural space

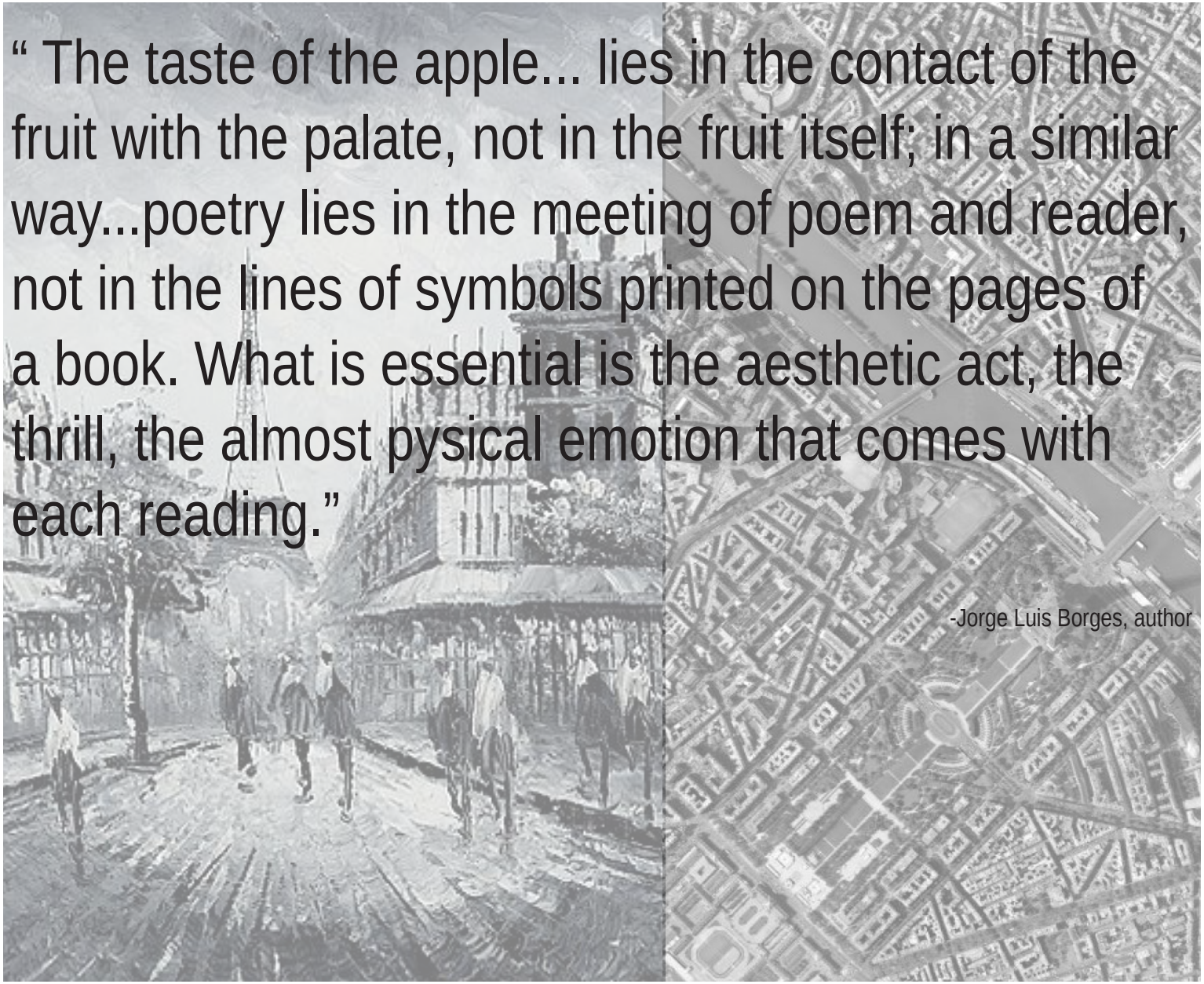
“There is double and crossed situating of the visible in the tangible and the tangible in the visible: the two maps are complete, and yet they do not merge into one. The two parts are total parts and yet are not superposable.”

-Merleau-Ponty, “The Intertwining-The Chiasm”

In Kiasmus “an interior mystery and the exterior horizon , which, like two hands clasping each other, form the architectonic equivalent of a public invitation. ”

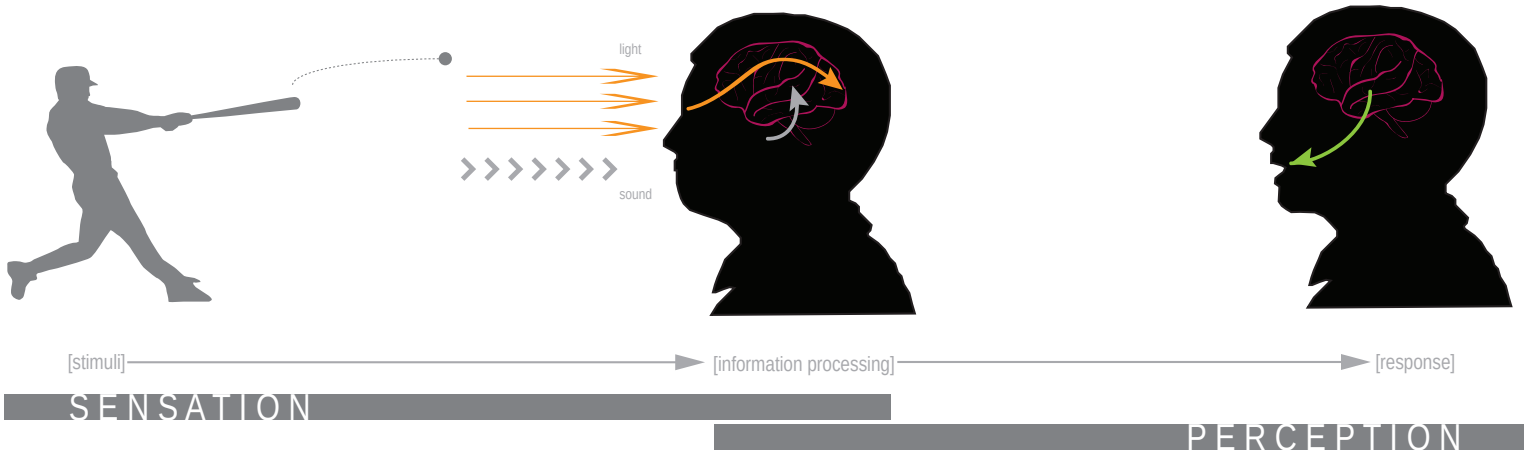
-Steven Holl, “Kiasma monograph”

Fig 2_Kiasma Museum by Steven Holl



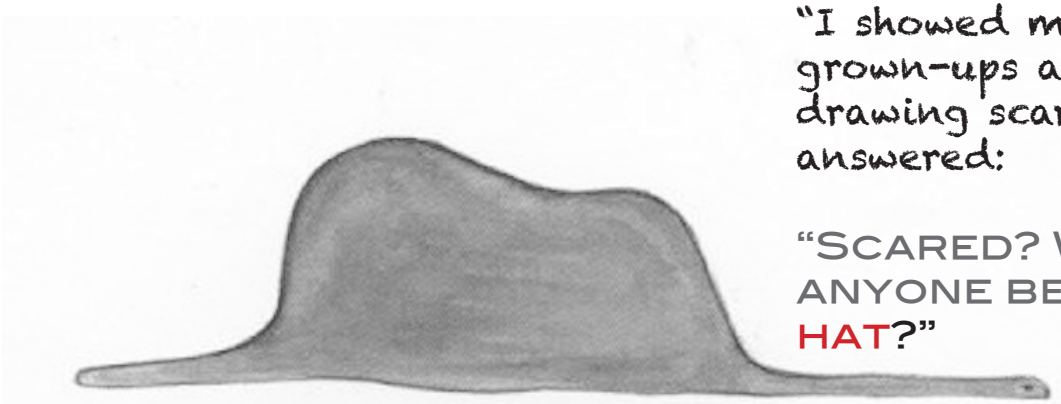
" The taste of the apple... lies in the contact of the fruit with the palate, not in the fruit itself; in a similar way...poetry lies in the meeting of poem and reader, not in the lines of symbols printed on the pages of a book. What is essential is the aesthetic act, the thrill, the almost pysical emotion that comes with each reading."

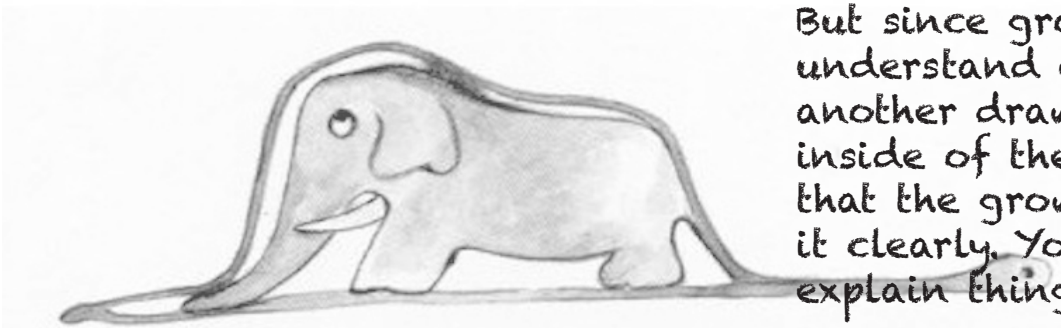
-Jorge Luis Borges, author



Sensation and Perception_

In the text, Fundamentals of Sensation and Peception, Levine and Shefner define perception as the way in which we interpret the information gathered and processed by the senses. In turn, sensation is the process of detecting a stimulus (or some aspect of it) in the environment. “In a word, we sense the presence of a stimulus, but we perceive what it is” (Levine and Shefner). Sensation is the way the body gathers information from the sensory receptors and is objective where as perception is how the mind interprets this data and thus is subjective. Therefore, every person has a variation on the perception of the sensory information gathered. Perception varies between individuals based on a person’s past experiences, beliefs, aesthetic preference, and cognitive development all contribute to the interaction of people and the built environment (Gibson). It is our perception of the world around us, which leads us to respond in many different ways, making perception a key factor in the way both children and adults behave.





"I showed my masterpiece to the grown-ups and asked them if the drawing scared them. But they answered:

"SCARED? WHY WOULD ANYONE BE SCARED OF A HAT?"

My drawing wasn't a picture of a hat. It was a picture of a boa constrictor eating an elephant. But since grown-ups didn't understand what it was, I made another drawing: I drew the inside of the boa constrictor, so that the grown-ups could see it clearly. You always have to explain things to them."

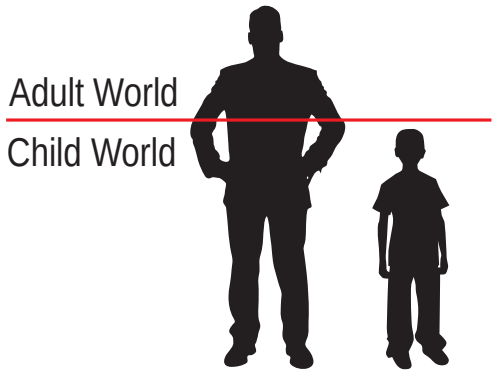
-Antoine de Saint-Exupery; The Little Prince

Sensory Perception and Children_

According to Merleau-Ponty, “It is true both that adult functions are already represented in the child, and that they don’t have the same meaning as they do in adults. [It is like] a game of chess: All the pieces are there from the beginning, and yet the game changes their arrangement.” (Kennedy 1991). Children perceive built space much differently than adults due to their physical and cognitive dissimilarities. However, often architects design child-centered buildings based not on the perception of a child but on the presumptions of adults; creating buildings that are not suited to the needs of the kids.

Young children have a natural mode of perception that is holistic and they “approach experiences with their senses and bodies wide open, exquisitely receptive to all the qualitative aspects of the environment” in contrast to adults who are more narrow minded and goal oriented (Olds 21). Kids live in the present and “feast upon the nuances of color, light, sound, odor, touch, texture, volume, movement, form, and rhythm around them.” (Olds 21). Children use the environment as a process to discover new things about themselves and their world where as adults view the environment as an entity that they need to improve in order to achieve an end goal (Olds). In other words, children give value to the way they experience and use a space where as adults see a space based on it’s form and aesthetic qualities.

Research proves that children remember sensation and places more than they remember people. Sensorial qualities of a space affect children much more than adults because they convey messages about their well being that leaves long-lasting impressions as well as immediate emotional and behavior responses (Olds). Architecture for children should be designed based on their social, cognitive, physical and developmental needs. Physically kids experience space at a different scale than adults and gain knowledge through movement and sensation and experience space in a much more subjective manner. Therefore, they perceive information and objects in a much more fanciful way than adults. Elements of the built space, such as the floor, impact children more so than adults since many kids are naturally curious and love to explore their surroundings.



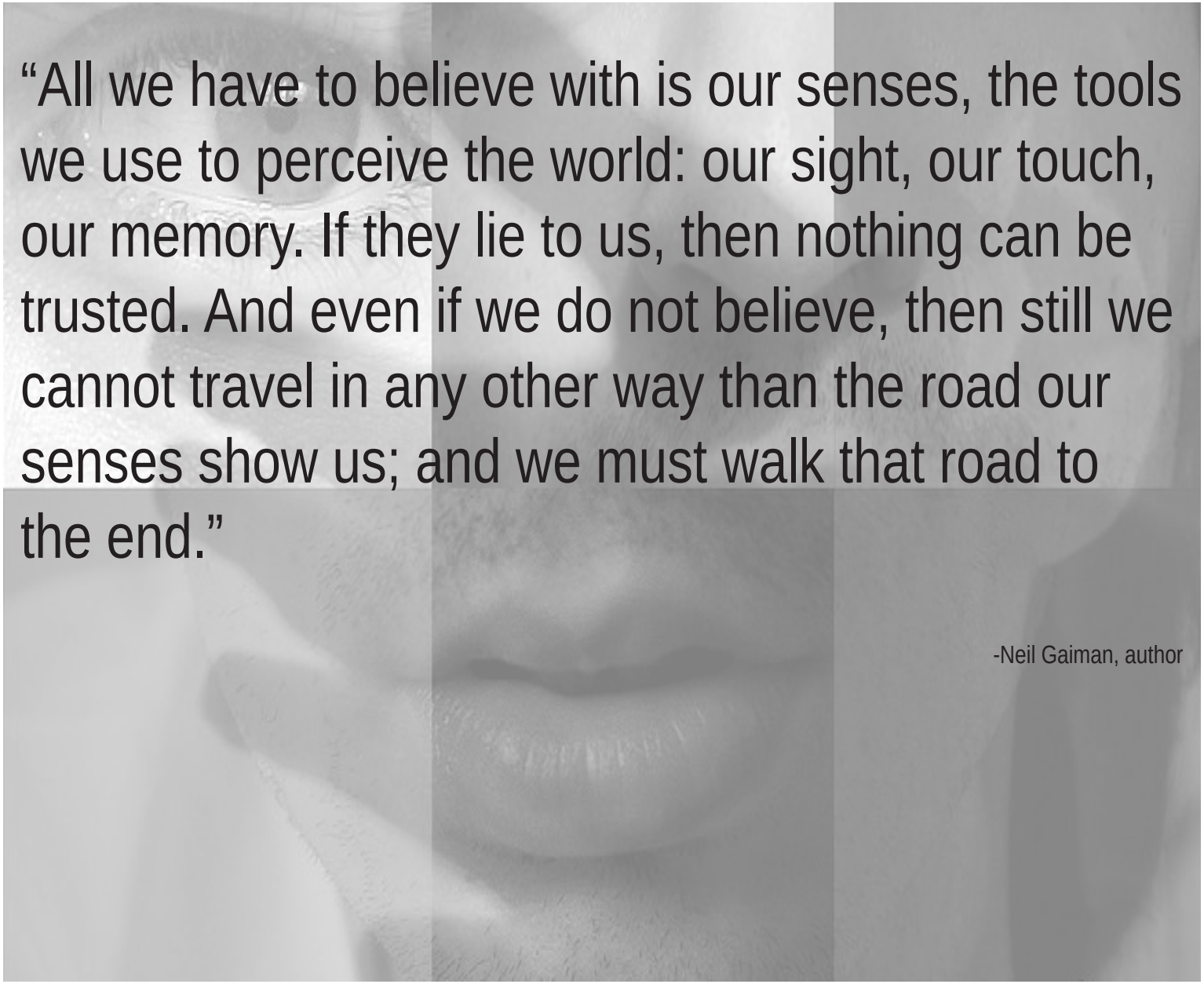
Sensory Perception + Autism_

A child with autism often perceives an architectural space much differently from a neuro-typical child. “Their specific ‘distinct’ way of perceiving and information processing causes people with autism to make sense of their surrounding world in a unique way, molding the way they view, and engage with, reality” (Baumers Heylighen 2). “For autistic people, autism is a way of being. It is pervasive, it colours every experience, every sensation, perception, thought, emotion, in sort, every aspect of existence (Sinclair, 1993). They do not respond in a way we expect them to, because they have different systems of perception and communication”(Bogdashina).

Both a person’s unique perception and the characteristic behaviors of autism influence their spatial interpretation, interaction, and experience of the built environment. Children with autism and neuro-typical kids have very similar perceptions of space in many ways. However, the difference between the perceptions of people with autism and those not on the spectrum is frequently found within the sensory characteristics of an environment. People that fall within the autism spectrum often have various sensory impairments. The two extremes concerning the sensory impairment range are hyposensitivity, sensation seeking, and hypersensitivity, overactive sensation. These sensory impairments can often make the built environment difficult to tolerate and negotiate thus alienating them from society (Mostafa). For example, the bright colors typically found in a kindergarten classroom may be perceived as extremely intense and overwhelming to one child with autism. A different student on the spectrum may perceive the same room as dull and washout. All kids react to these types of experiential characteristics in the example above but it is the child’s perception of a space that constructs the reality of the space they are in. In this way architecture affects a person’s vulnerability, responses, feelings, and reactions; which is especially true of those with autism.

Spatial Interpretation of a Person with Autism

Possible Perception of Space



"All we have to believe with is our senses, the tools we use to perceive the world: our sight, our touch, our memory. If they lie to us, then nothing can be trusted. And even if we do not believe, then still we cannot travel in any other way than the road our senses show us; and we must walk that road to the end."

-Neil Gaiman, author

Senses_

By having an understanding how those with autism are “wired” both physiologically and mentally as well as the needs of the autistic user, architects can design an environment that is conducive to learning and can possibly begin to favorable alter sensory input and typical autistic behavior that is disengaging. Carl Delacato was the first researcher to recognize sensory dysfunction in individuals on the autism spectrum. He classified that each sensory system could be hypo (stimulus seeking), hyper (overactive), or interference (white noise). A person with autism can have one or more of their senses acting through one of these classifications; ie, hypo-visual and simultaneously hyper-auditory. To complicate our understanding of the sensory dysfunction of those on the spectrum, each sense could have a different “type” of categorization therefore a person’s could be hypo-visual and hyper-auditory (Bogdashina Vision). When a person with autism experiences hyper-sensitivity their nervous system is painfully overwhelmed with information received from the senses. The opposite experience is the hypo-sensitive which happens when the nervous system receives so little sensory input that the individual “can not sense a connection with his own body” (Albano).

These sensory conditions cause the individual to have what is deemed stereotypical “autistic behavior” such as flapping hands, repetitive behavior, and withdrawal. These actions emerge because the person is overwhelmed by lack or abundance of sensory information and the abnormal behaviors are an attempt to “know where their “boundaries” exist in their environment, since they cannot see the world the same way we do” (Albano). Sensory dysfunction can affect a person with autism in various patterns and at various intensities. In my opinion, this complex idea that no two people with autism are alike is a contributing factor to why architects have not responded to the sensory and environmental needs of people with autism.

Sound_

Human beings have an innate ability to sense and perceive space by listening which is a design aspect that is not often considered in its architectural manifestation. When designed and experienced by the occupant of a building sound can transform and create spatial perceptions. Objects in a space that do not directly produce sound affect the aural quality of architecture. People translate these physical attributes into perceptual signals that then are transformed into an experience of the external world (Blesser).

People react to aural architecture, even though they may not be consciously aware of the sensory stimuli. The aural qualities of an architectural space direct our social behavior and overall experiential quality. According to Bloomer, “Auditory spatial awareness is more than just the ability to detect that space has changed sounds; it includes as well the emotional and behavioral experience of space.” (26). Auditory spatial awareness not only allows the user to detect spatiality but also affects a person’s emotional, behavioral, and symbolic experience of a space (Blesser).

Performance_

Sound has different spatiality effects that each contributes a unique quality to the atmosphere of architecture. These five major components are: social, navigational, musical, aesthetic, and symbolic. To a degree, all spaces manifest all of these components but one or two usually dominate the design. People can perceive both active and passive sound; both types contribute to the aural spatiality of a building. Sound has the ability to perform in a space in five different ways: reflection, dispersion, refraction, absorption, and diffraction. Spatial objects, surfaces, geometries, and form all contribute to how the aural environment is constructed (Bloomer).

Autism_

Acoustics of a space are the architectural factor that has the greatest impact on people with autism. “Auditory processing problems may also be linked to several autistic characteristics. Autism is sometimes described as a social-communication problem. Processing auditory information is a critical component of social-communication. Other characteristics that may be associated with auditory processing problems include: anxiety or confusion in social situations, inattentiveness, and poor speech comprehension” (Edelson). Some people with autism have a hyper-auditory system and can hear a siren that is blocks away from them or can hear the buzzing from fluorescent lights. Others potentially seek noise and have a hard time hearing typical sounds (“The Seven Senses | The Autism Life”).

Representations of Sound in Space_

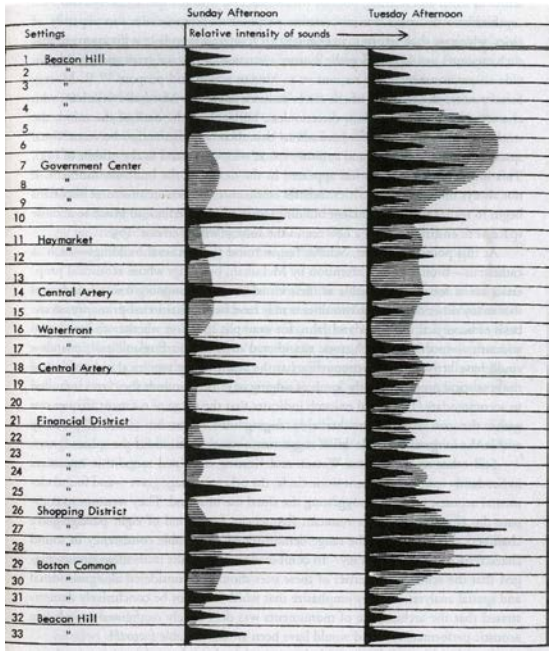


Fig 3_ "Temporal Change in Sounds"

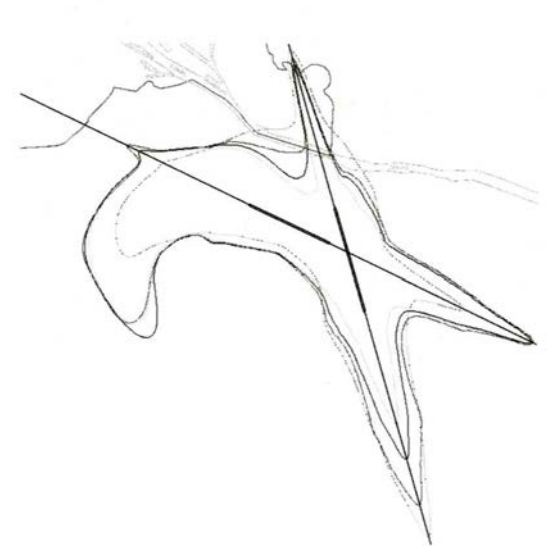
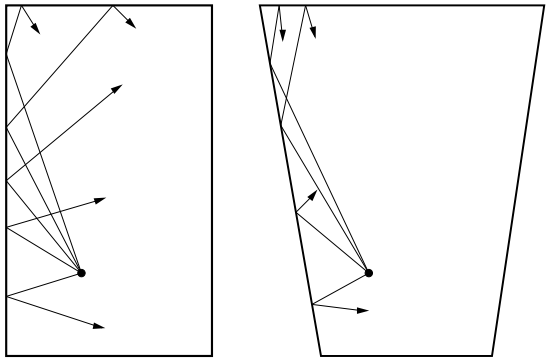
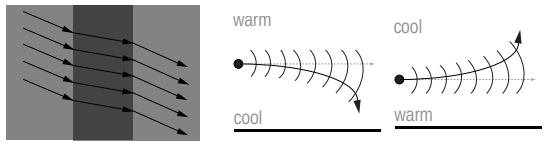


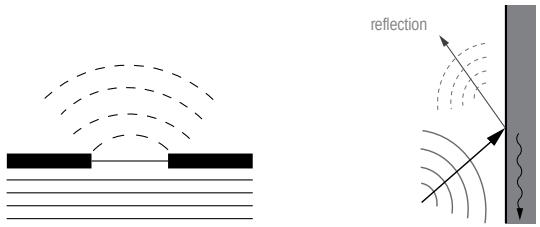
Fig 4_ Sound Control Map of Moving Traffic



Reflection_
Dependent on room geometries and surface shape. Irregularly shaped space can permit better design control but are more complex to predict.

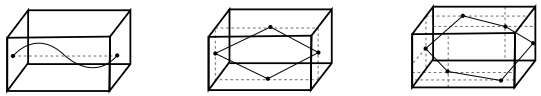


Refraction_ Sound waves change abruptly when they meet a solid object and more gradually when they change over time due to varying air temperatures. Refraction can also guide our attention in different directions and thus define destinations.

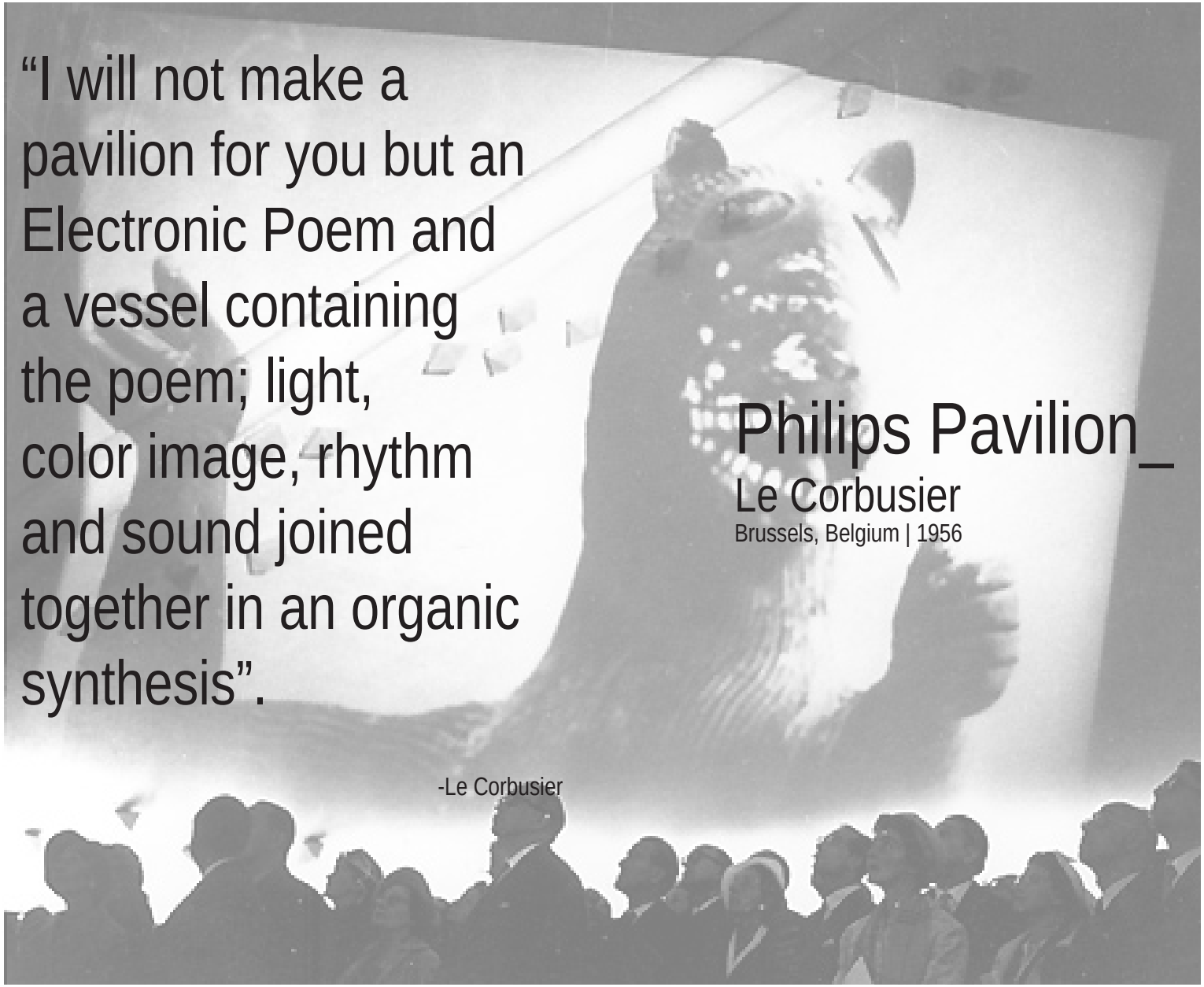


Diffraction_ When sound waves meet an object in space they can change their direction or travel around them. The degree of diffraction depends on the size of the object or opening in relation to the wavelength of the sound.

Absorption_ Surfaces can absorb sound waves to mute or decrease the level of sound in a room. This attribute of sound can hide or disclose the identity of a space or change the space's identity entirely.



Dispersion_ Sound is not unidirectional; it can change directions and can create volumes of sound. .



"I will not make a pavilion for you but an Electronic Poem and a vessel containing the poem; light, color image, rhythm and sound joined together in an organic synthesis".

-Le Corbusier

Philips Pavilion_

Le Corbusier

Brussels, Belgium | 1956

The Philips Pavilion was built for the 1958 World's Fair in Brussels. This World Fair is most famous for the advances made in the relationship between music and architecture, "creating a gestalt through an experiential encounter where body meets sound and space" (Lopez 1). The pavilion was commissioned by Philips Electronics Company who wanted to create an experience for the people attending the Fair while demonstrating the technology of their electronic products.

Both the form and the interior quality of the pavilion spark the imagination. In contrast to the "teacher-like presentations" that were favored in most of the displays the Philips Pavilion was completely dark and void of any objects. An 8-minute show, titled Poeme Electronique which was envisioned by Le Corbusier himself, turned the interior cavern like space into a pulsing vibrant exhibition of sound and light (Fondation Le Corbusier).

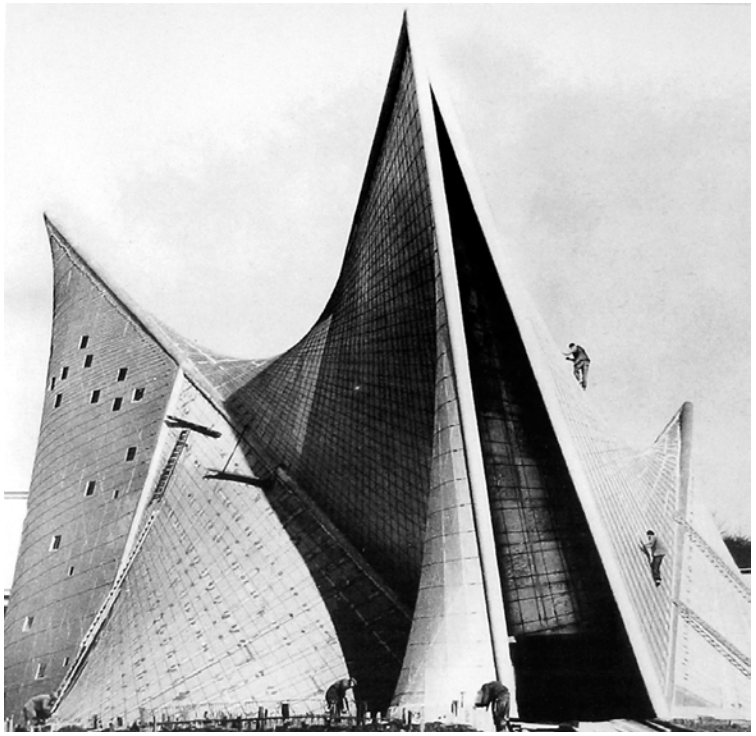


Fig 6_Exterior of Philips Pavilion

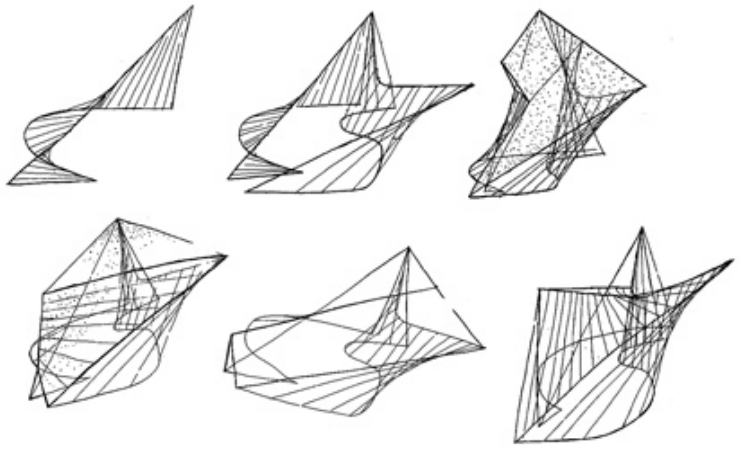


Fig 5_ Geometries

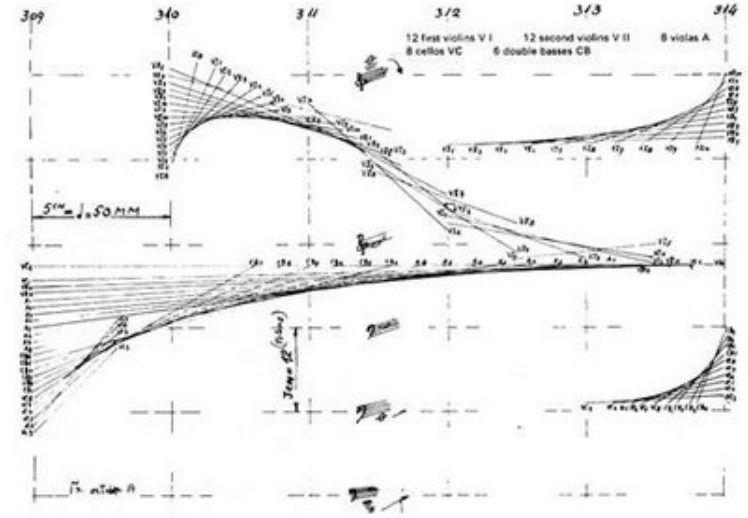


Fig 7_ Xenakis' composition, Metastasis in which the form of the pavilion was inspired by.

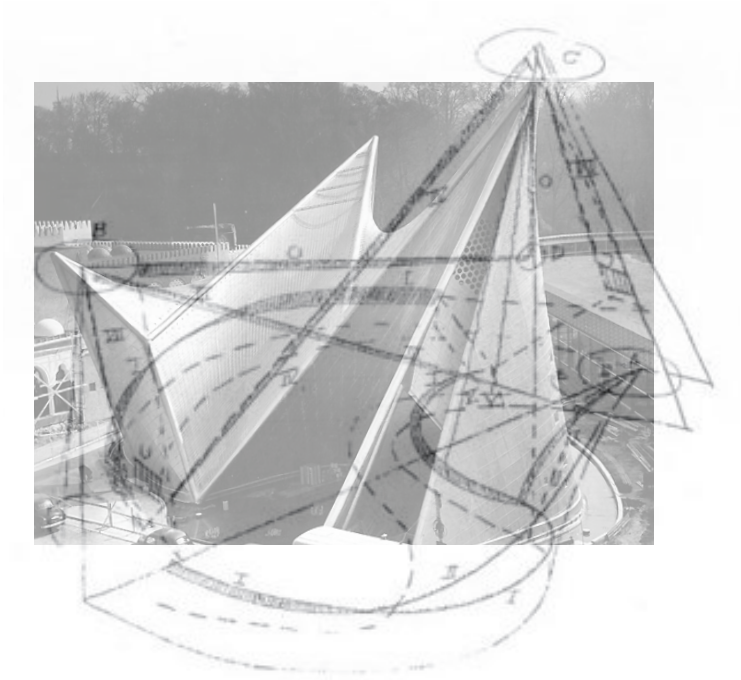
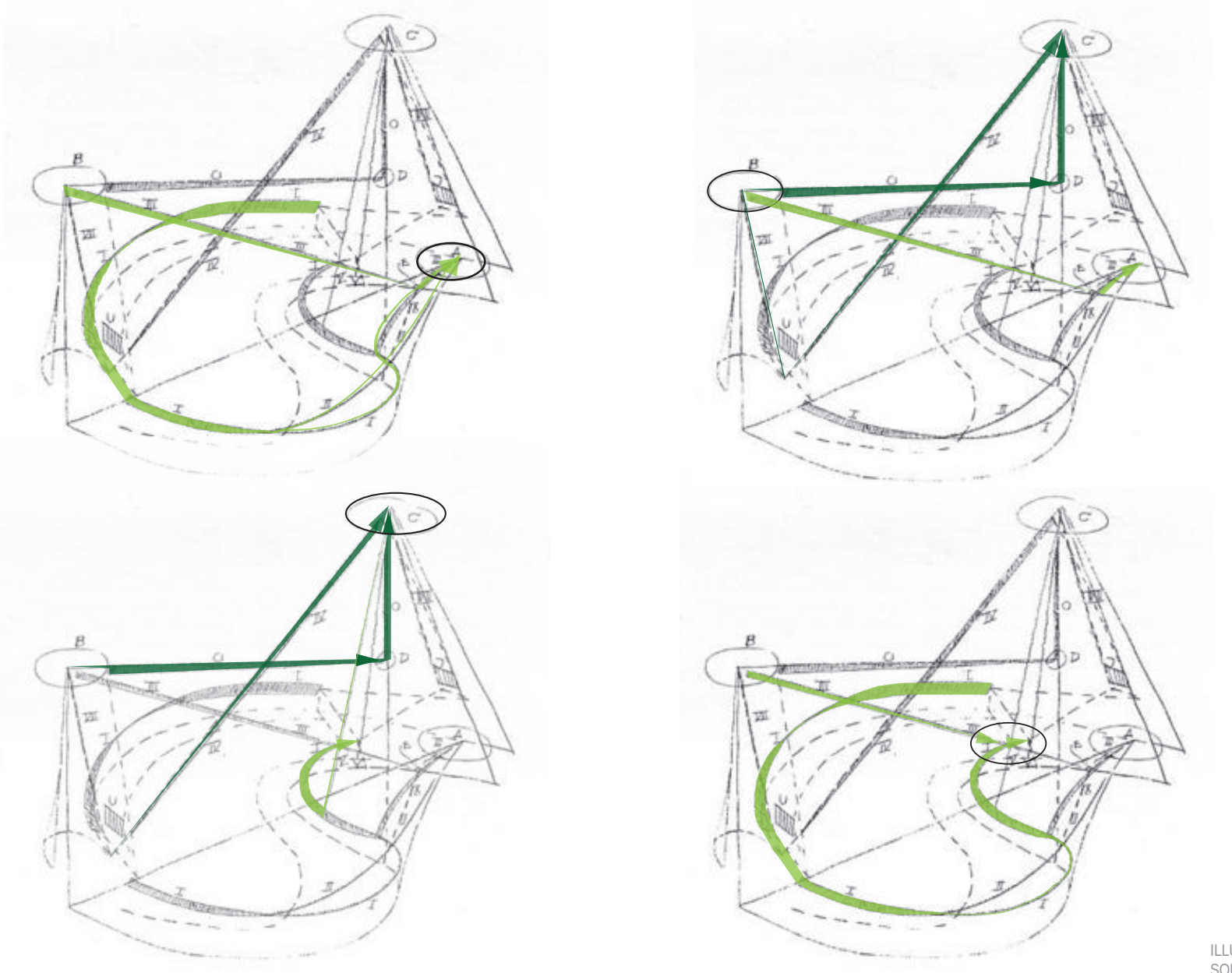


Fig 8_ Exterior Photo matched to the illusory sound paths in the building

Fig 9_ 350 speakers were installed to create the desired aural atmosphere.

Unfolding in seven sequences, Poeme Electonique was intended to unfold like an essay to the inhabitants of the space. 350 small speakers are strategically located around the pavilion in order to allow the sound to move and change in order to create different aural experiences throughout the show. The sound becomes spatialized within the building's interior through groups of speakers that support the three different tracks of music. Some sounds were emitted through multiple speakers while other traveled around a specific route in the space. The technology and architectural forms of the building work in unison to create the desired aural environment to express the narrative of the sensorial rich presentation. The convex and concave concrete forms that were designed as a single continuous cured surface which allows both sound and image to oscillate throughout the space and in various ways. Since the images were projected onto the walls of the pavilion the images were subjected to a changing deformation, just like the sound waves, based on perspective further strengthening the relationship between the architecture, the occupant, light, and sound (Fondation Le Corbusier).

The concrete hyperbolic geometry of the exterior also reflects notions of sound. Xenakis, a composer himself, wrote his music not on staves but in a graphic representation. The form of the pavilion began to portray the qualities found in his composition, Metastasis (Fondation Le Corbusier).



ILLUSORY PATHS OF SOUND

Touch_

Our sense of touch is the one sense that has the most immediate and direct contact with architecture. The skin can read “the texture, weight, density, and temperature of matter” (Palassmaa 56). We are able to give meaning and interpret information through the sense of touch. The tactile qualities of an architectural environment effect a person’s social behavior, self-perception, and comfort (Henry). Touch is the one sense that affects all the other sensory realms, thus we touch what we perceive and perceive what we touch.

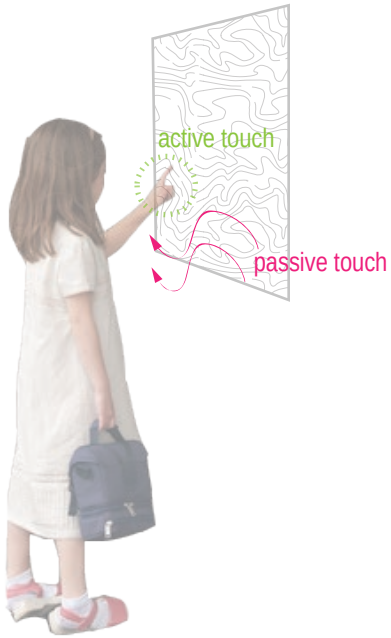
Performance_

Tactile qualities of a space can create meaningful architectural intentions in spatial experience. People have two sensory mechanisms that allow us to perceive the tactile environment. The eyes, ears, and nose are part of the sensory system that allows us to measure distances where as the skin and muscles are immediate receptors that allow us to experience sensations first hand. The perception of touch falls under two categories: active, touching, and passive, being touched. Active touch is understood through the qualities of the materials such as texture, hardness, thermal conductivity, and contour identity. Passive touch refers to how an environment touches the body. Therefore, temperature, humidity, air flow, and air pressure all are elements of passive touch (Malnar).

Elements of tactility can act as a navigational tool as well as create a desired architectural effect, condition, or intention. Lack of contrast of the tactile environment can be confusing and/or disorienting to the occupants. The conditions of both active and passive touch can be utilized to create visual effects as well as informative environments while simultaneously allow new sensual, spatial, and social understandings of a space to emerge (“Hapticity And Time”).

Autism_

From birth we crave the sense of touch. However for a person diagnosed with autism, this could potentially be the opposite or very exaggerated. Some people on the spectrum seek pressure and stimulating tactile sensation while others experience pain with the slightest brush against the shoulder. Therefore, materiality has to be considered when designing for people with autism since the texture and temperature can greatly affect the user (“The Seven Senses | The Autism Life”).



ACTIVE VS. PASSIVE TOUCH

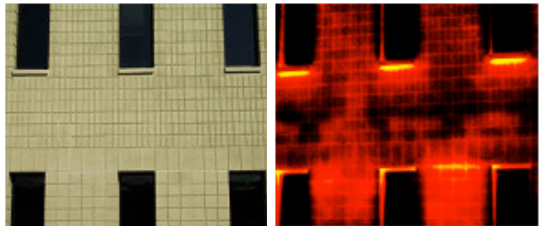


Fig 10_ The image on the left shows the active tactile characteristics and contrastingly the infrared photo illustrates the passive tactile qualities of the brick wall..

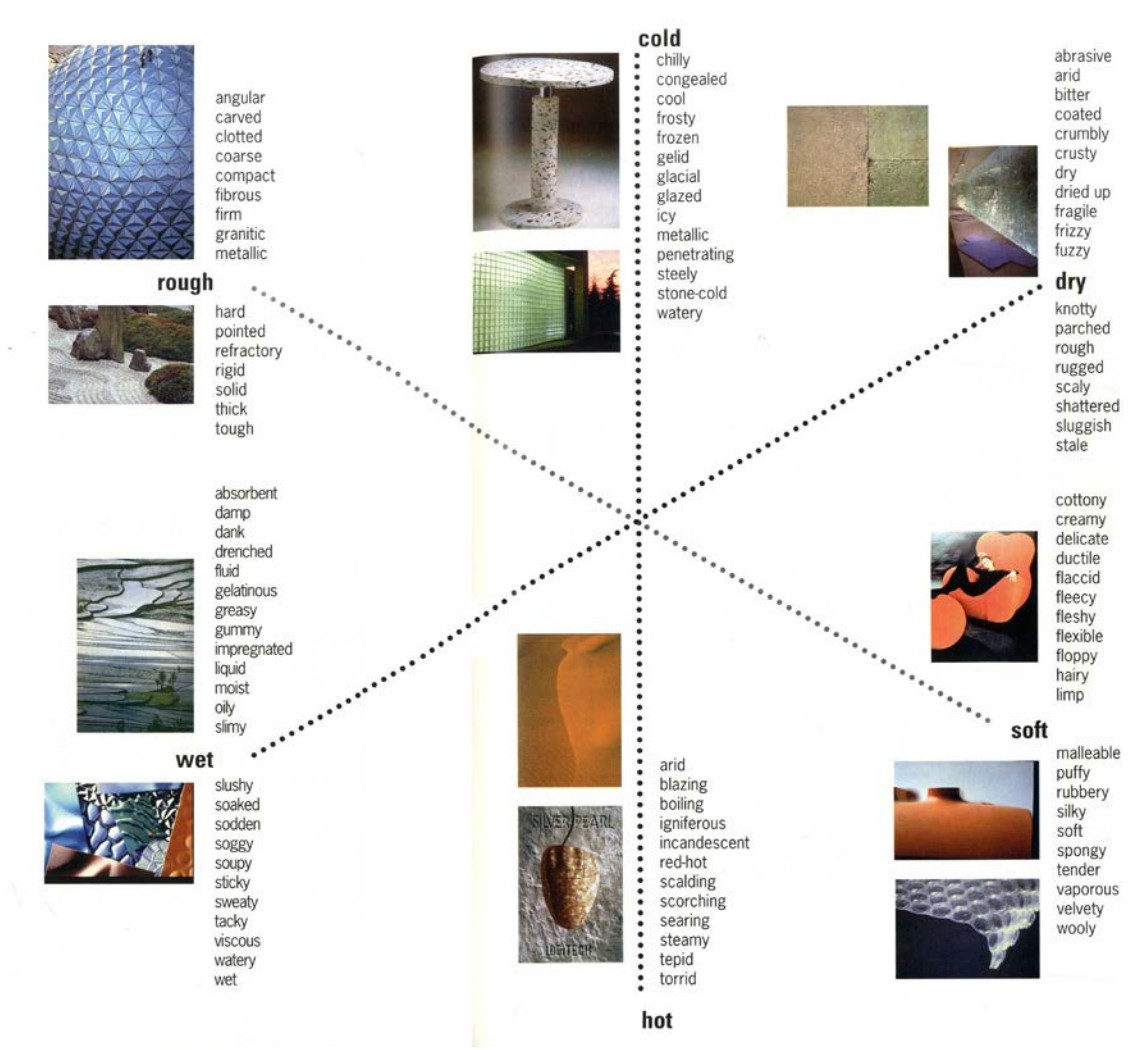
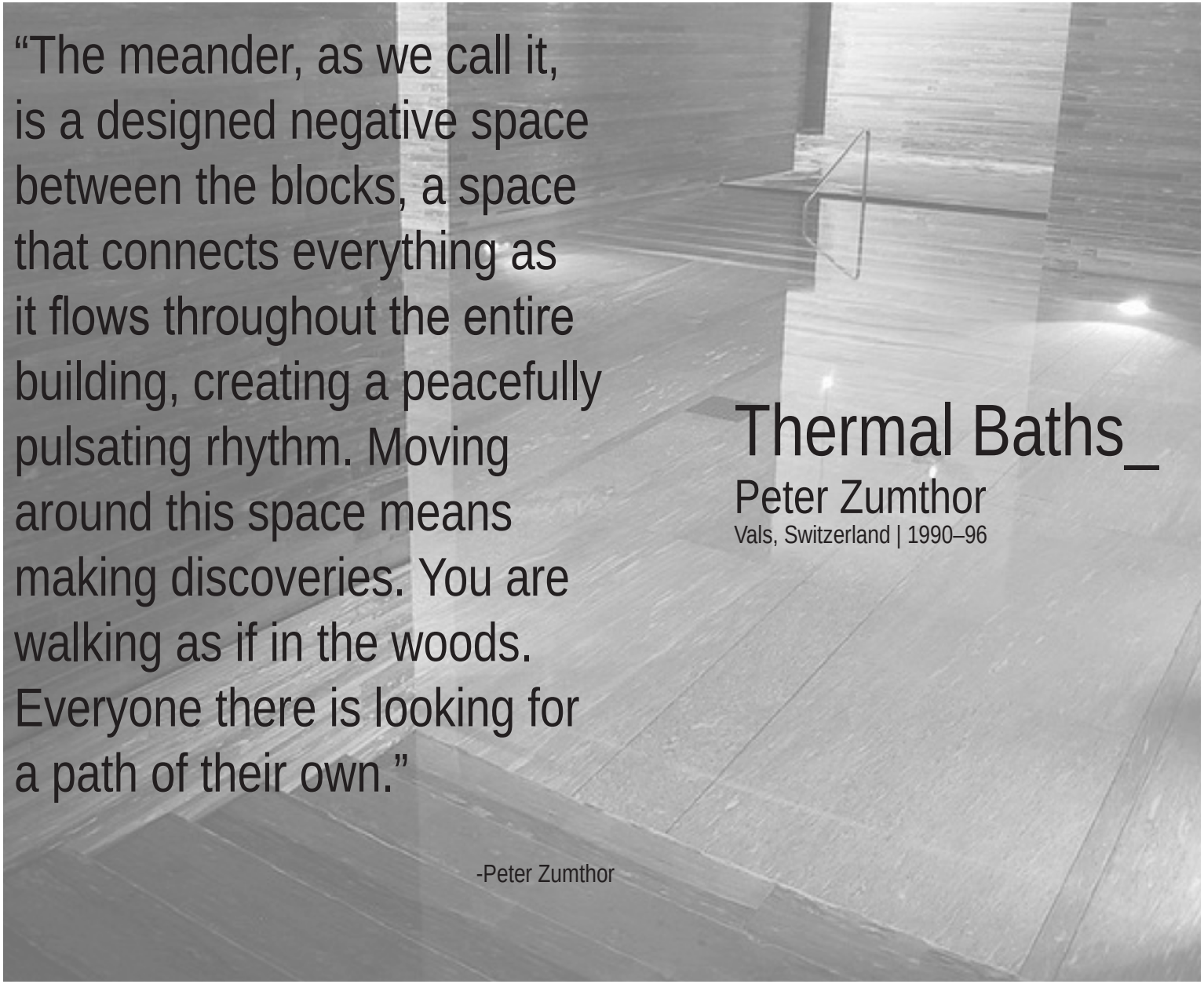


Fig 11_ Tactile qualities of materials commonly used in a kindergarten.



"The meander, as we call it, is a designed negative space between the blocks, a space that connects everything as it flows throughout the entire building, creating a peacefully pulsating rhythm. Moving around this space means making discoveries. You are walking as if in the woods. Everyone there is looking for a path of their own."

-Peter Zumthor

Thermal Baths_

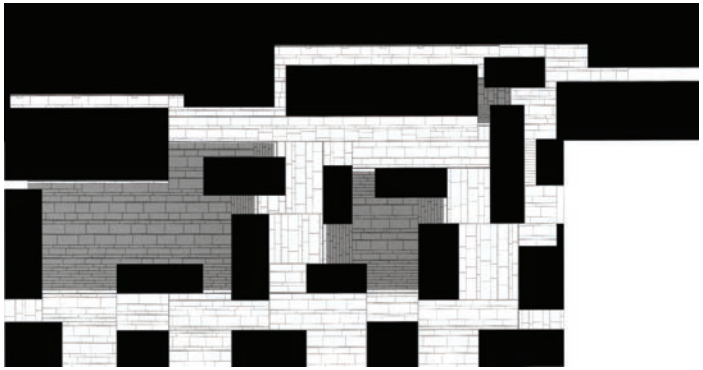
Peter Zumthor

Vals, Switzerland | 1990–96

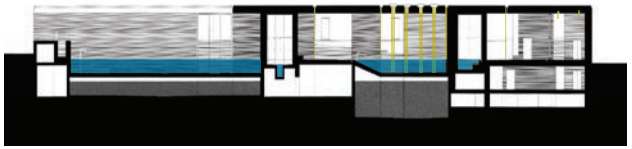
The thermal bath in Vals, designed by Peter Zumthor, is designed with a complete sensory experience in mind. The concept of this project is to seamlessly integrate the building with the natural landscape and create a cavernous space that allows the occupants to experience the sensual ritual of bathing through following their own natural curiosity and exploration. Zumthor is interesting in creating an atmosphere that is based on the perception of the form, materials, and detail rather than the characteristic and symbolic qualities of these elements themselves. “The “poetic quality” comes from the ability of the architect to create a “meaningful situation for (the materials)… since materials in themselves are not poetic.” (Therme Vals).

Concrete monolith cores are positioned in pinwheel arrangements and create interlocking spaces that define the spatial sequencing of the building. Each core contains a space that acts as a unique micro-world within the whole of the thermal bath. These shafts of space all appear as a monolithic stone structure on the outside but the interior of each reveals a distinct spatial experience based on the type of bath. Materiality, light, temperature, sound, and form all create a rich sensory environment at both an intimate and open scale and indoor and outdoor spaces that work harmoniously together within the act of bathing.

baths



concrete cores



light_water relationship

Sequence

1_Reception
The reception area is contained within the hotel and is a cave like environment mimicking the cavernous concept of the anticipated space of the bath.

2_ Hall of Fountains
The visitors leave the cave like space and walk down a corridor under the volume of the mountain. They arrive in a misty narrow space that contains fountains that draw hot water from the natural springs located on the site.

3_Changing Rooms
The changing rooms are dramatic and theatrical spaces. The atmosphere lets the occupant know they are about to embark on an architectural journey rich with sensory experiences. They diverge from the stone and concrete materiality that is present through out the rest of the building and are instead “panelled in highly polished red mahogany, exquisite cabins waiting to be touched by the bathers’ naked skin.” (Ryan).

4_Access to Main Level
A slow, ceremonial stair lets visitors descend from the changing areas and allows the people to orient themselves within the ritualistic journey of bathing. A strip of natural light washes over the steps and acknowledges the descent into the “sacred” space of the building; the pools. The space is warm and welcoming but still contextual in the use of materiality. The material and formal quality of the stair portrays the cave-like space that changes and varies as the bather’s journey progresses.

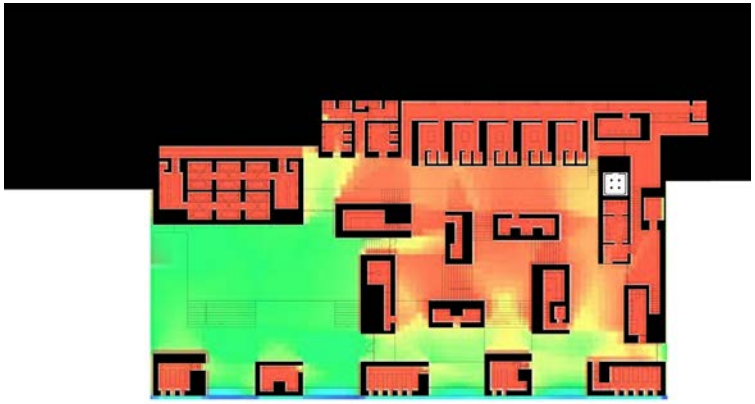


Fig 12_thermal heat

temperature of baths

5_Bathing Level

_ Circulation

The circulation space allows the visitor to explore and wander around the various pools and relaxation spaces in order to create their own experiences and find personal serenity within the architecture of project. “The underlying informal layout of the internal space is a carefully modeled path of circulation which leads bathers to certain predetermined points but lets them explore other areas for themselves. The perspective is always controlled. It either ensures or denies a view.” (O’Grady). This void space acts as a threshold between the public and private spaces as well as the exterior and interior through light, materiality, and sound.

_ Main Baths

The indoor pool is shaped based on the geometries of the concrete cores. This is the space that people always return to in order to orient themselves within the project. The exterior pool connects the visitors with the natural surroundings. There is a threshold created only of light and shadows between the indoor and outdoor pool. The interior and exterior use of the same material as well as the same temperature of water in each pool furthers the connection between interior and exterior space (Ryan).

natural light_
Slots of light enter the building from the roof. They provide directionality and reveal the circulation system.

Materiality_

Material qualities of both passive and active touch work together to create moments and sequences that engage all the senses. It is through the materiality of the project in which all other design opportunities branch from, such as light.

Stone: Gneiss
Water
Concrete
Wood: Red Mahogany
Corton Steel

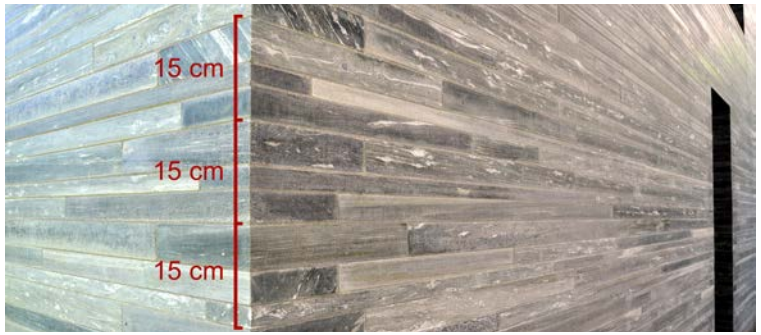


Fig 13_Gneiss, “a rock formed through metamorphic processes, where high pressure and temperature under the earth’s crust force surrounding rocks together to create a layered effect”, mirrors the way the water of the baths is heated.

hall of fountains

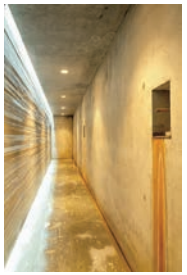
changing room

stair to main bath

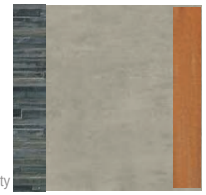
circulation

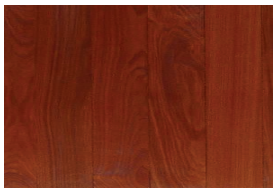
ou

SENSORY EXPERIENCE_space

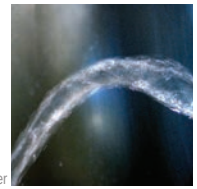


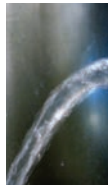
TACTILE_materiality



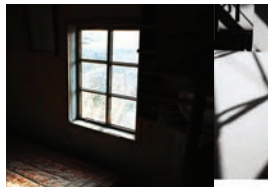


TACTILE VISION_water

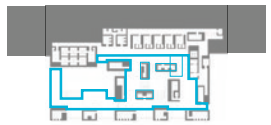




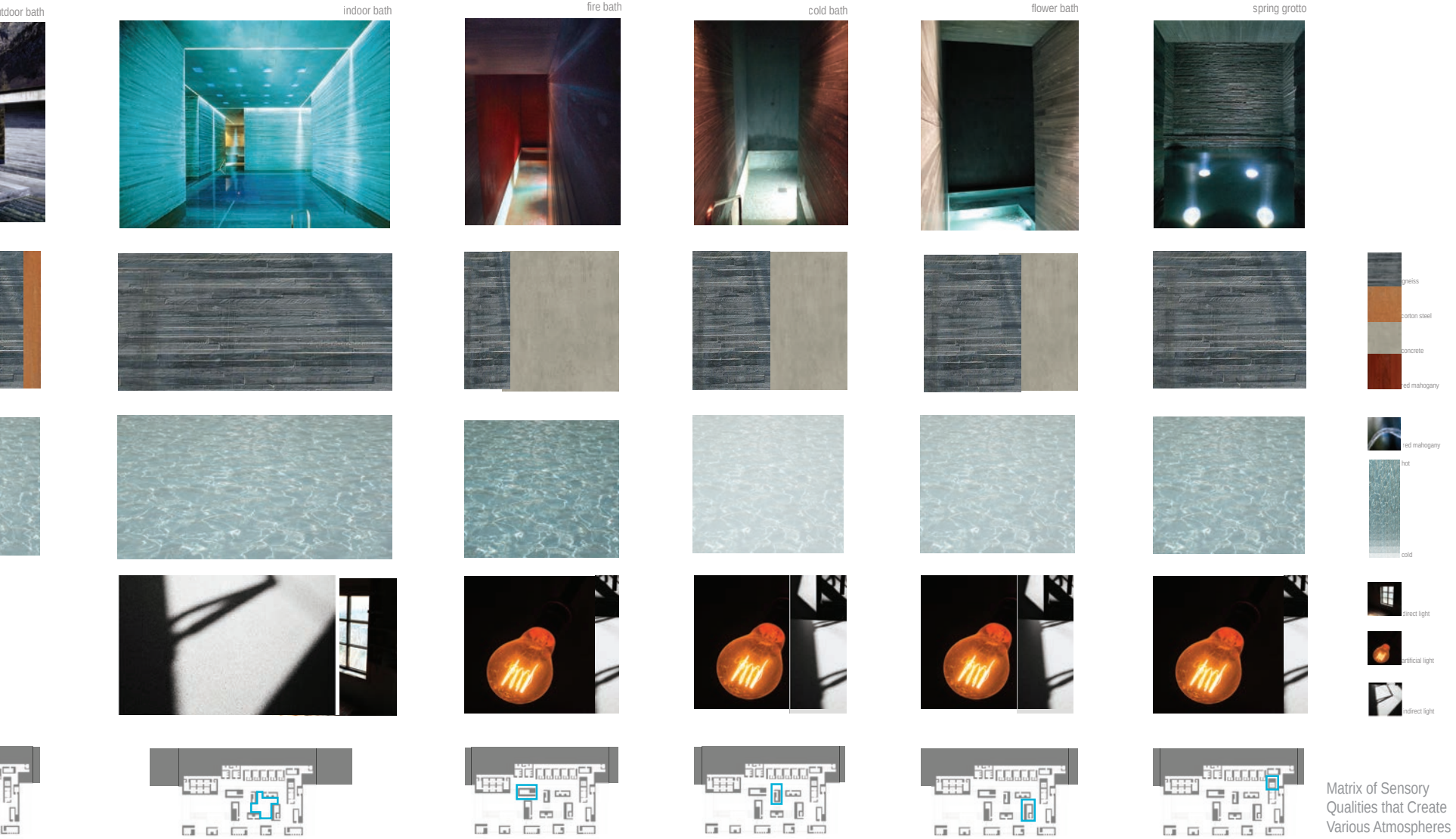
VISION_light



_plan



PROMENADE | BATHS



Matrix of Sensory Qualities that Create Various Atmospheres

Sight_

In Western culture, sight has been regarded as the noblest of the senses. Light and color play integral roles in a person's perception of the environment. In fact, the human eye first perceives motion, followed by brightness, then color, and finally form (Jules, Fredrick Form Space and the Language of Achitecture 15). Light and color can elicit emotions, behavior, and memories from the occupant which all play a major role in the creation of an architectural environment.

Performance_

Light can enter a space through a multitude of ways, each contributing a different atmospheric quality to the space. Color is a function of light and therefore one cannot exist without the other (CITE). People sense and experience color based on many dimensions that include biological reactions, subconsciousness, conscious symbolism association, cultural influence, trends, and personal relations. All of these categories of color reactions interact with each other and one cannot perform in isolation (Mahnke, Meerwein 18-21 "Human Color Space").

Autism_

People with autism are most affect by color and light when considering the realm of sight. The hypersensitive experiences overly vibrant colors and light and sees everything all at once. Contrastingly, the hyposensitive person will have a hard time seeing the big picture and tends to focus on a single detail. Both sensory profiles may have a hard time navigating a building independently or focusing on the task at hand due to the environment.

LIGHT

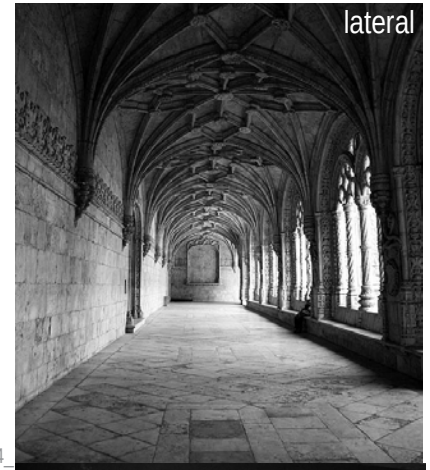


Fig 14_

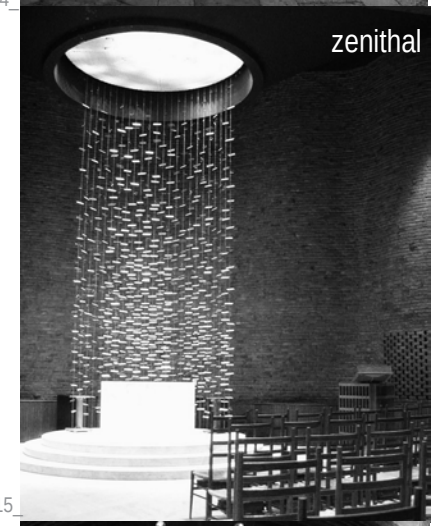
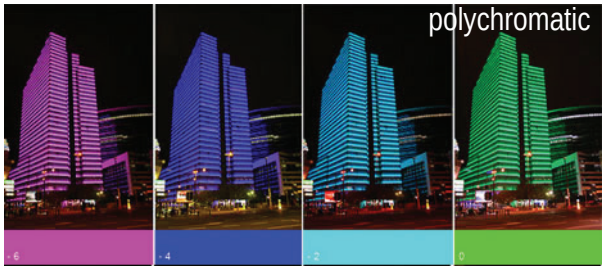
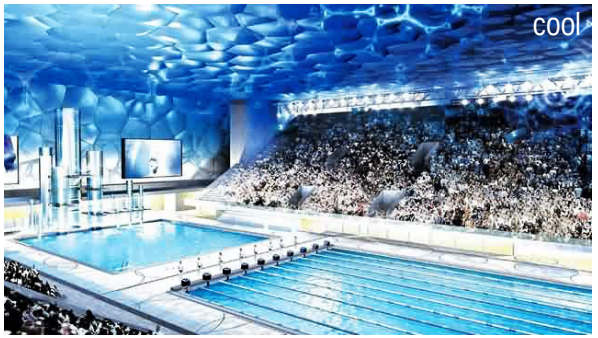


Fig 15_

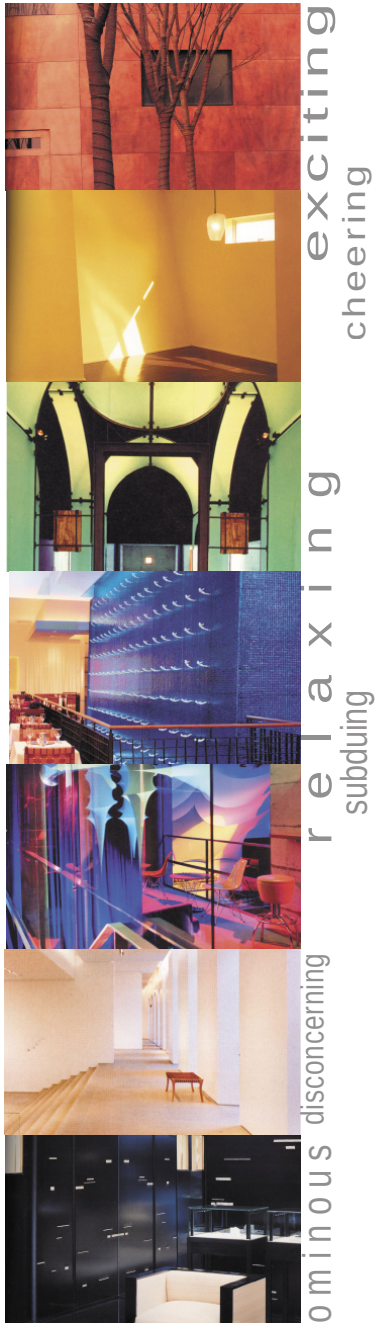
Fig 16_

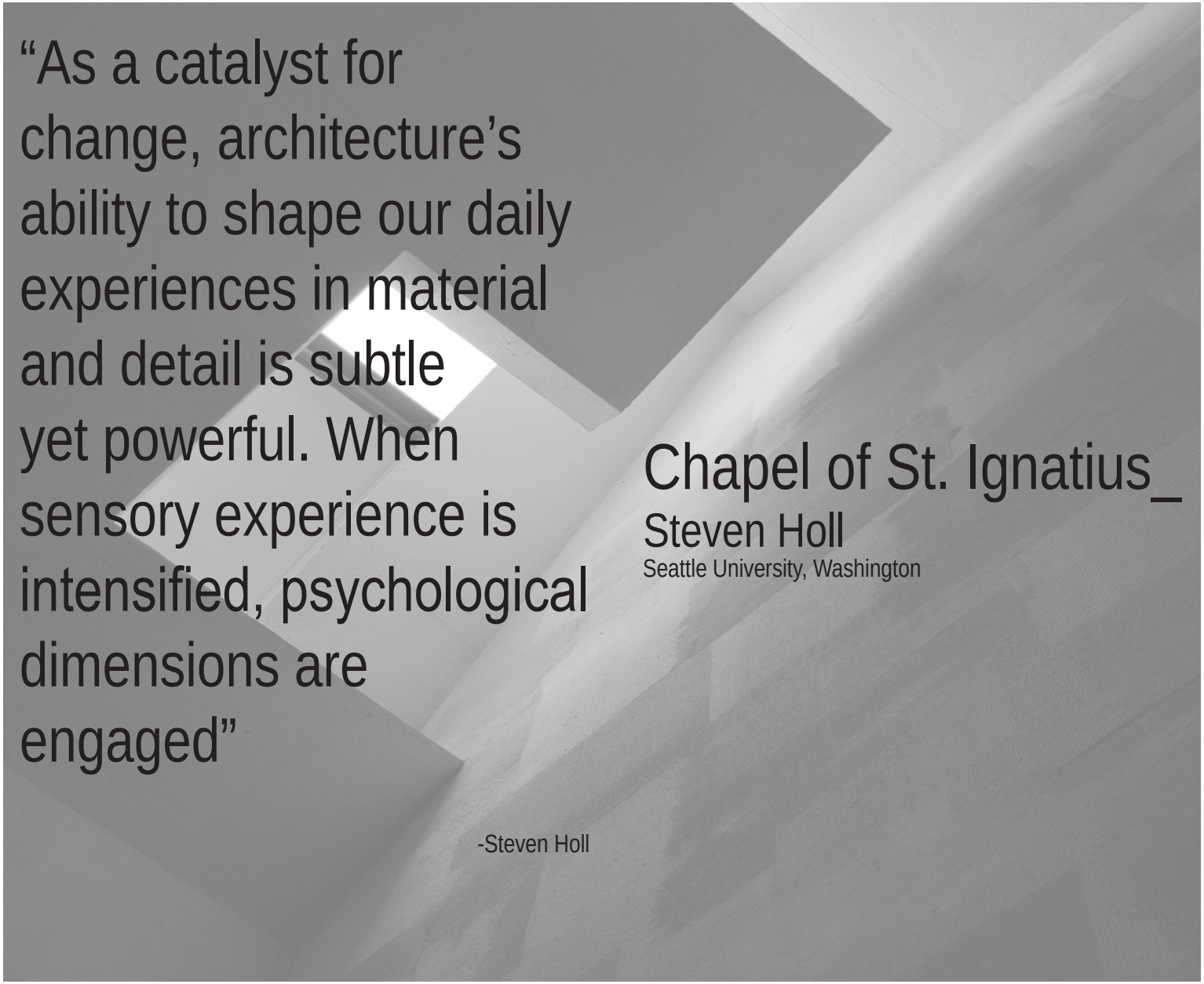
COLOR + LIGHT





COLOR AND EMOTION





"As a catalyst for change, architecture's ability to shape our daily experiences in material and detail is subtle yet powerful. When sensory experience is intensified, psychological dimensions are engaged"

-Steven Holl

Chapel of St. Ignatius_

Steven Holl

Seattle University, Washington

Chapel of St. Ignatius is designed around the idea of seven bottles of light contained within a stone box. Each “bottle of light” corresponds to a different stage of mass in the Jesuit services. Therefore, each main program of the building has a different sensorial quality due to the nature of the light and materiality. Holl’s ideas about light were inspired by the writing of St. Ignatius who pictured spiritual life as “a light from above” which would help one “perceive what can best be decided upon” (Smith 1).

Holl envisioned the chapel as a building containing what he deems “Different Lights”. This concept is conveyed in the architecture by combining a field of reflected color with a lens of the complementary color within each bottle of light. Opposite the windows of the volumes are baffles, each of which the back is painted a bright color. Since it is the back of the construct the bright shade is invisible to the occupant and therefore only the reflected color can be seen from within the chapel. The light in the various spaces changes and pulses as the characteristics of the natural light shift throughout the day and year (Minner).

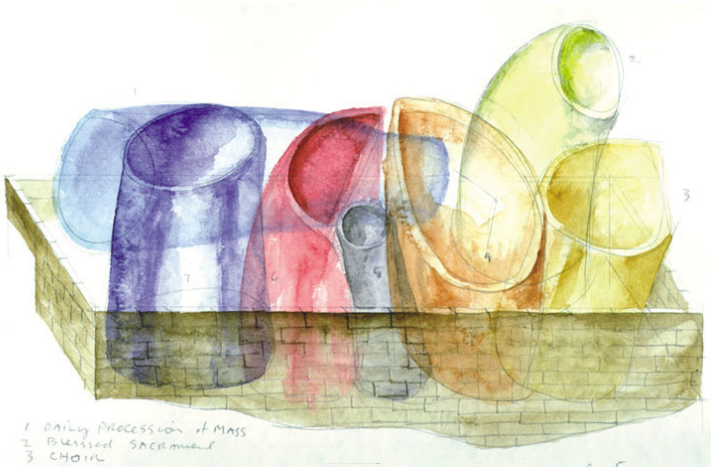
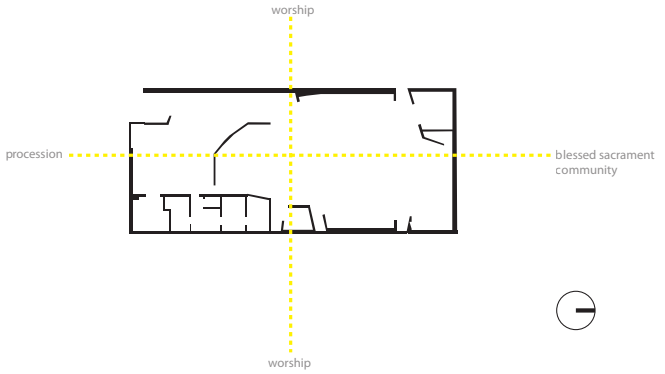


FIG 17_CONCEPT_ “stone box with seven bottles of light”



ORIENTATION + LIGHT_

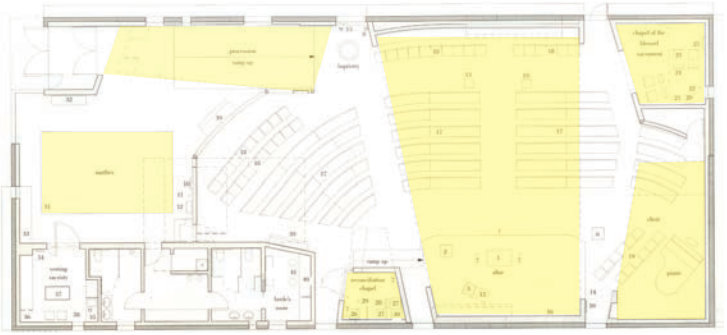
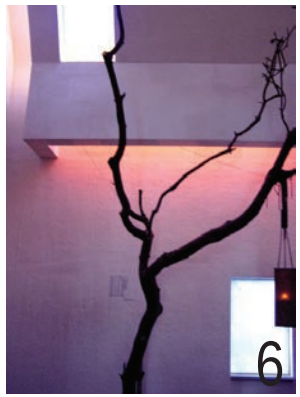
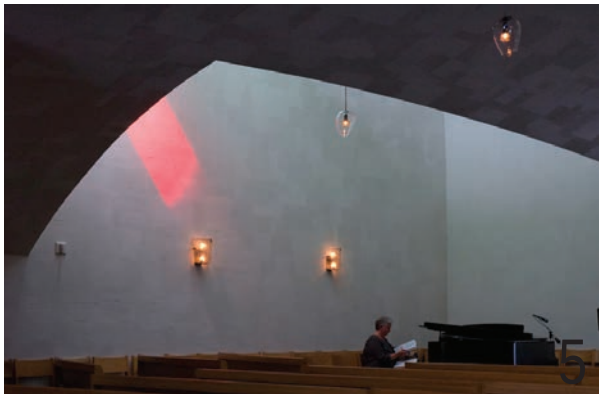
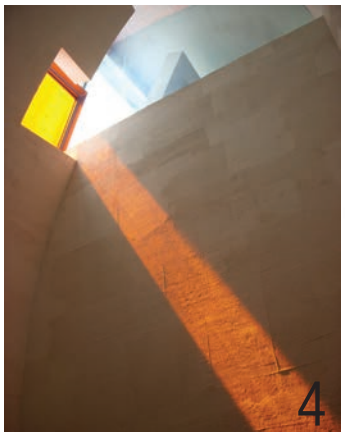


FIG 18_BOTTLES OF LIGHT_







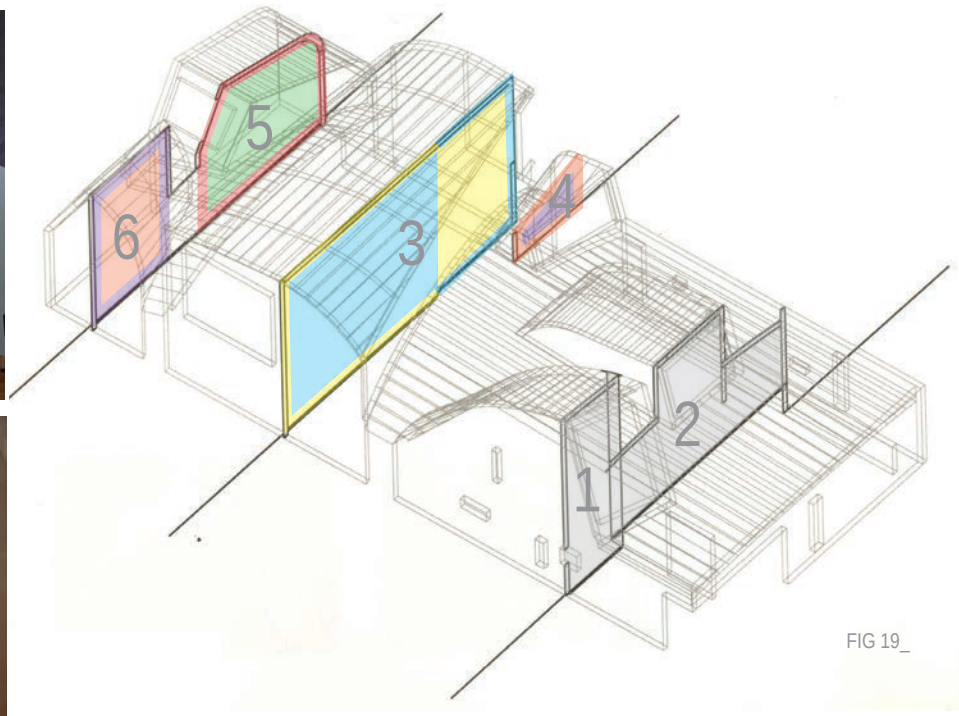
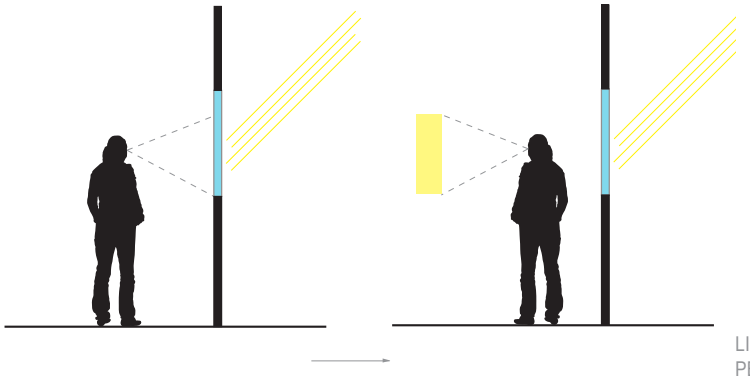


FIG 19_

1_Procession – natural sunlight
2_ Narthex – natural sunlight
3_ Nave – yellow field with blue lens (east)
– blue field with yellow lens (west)
4_ Blessed Sacrament – orange field with purple lens
5_ Choir – green field with red lens
6_ Reconciliation Chapel – purple field with orange lens
7_ Bell Tower and pond – projecting

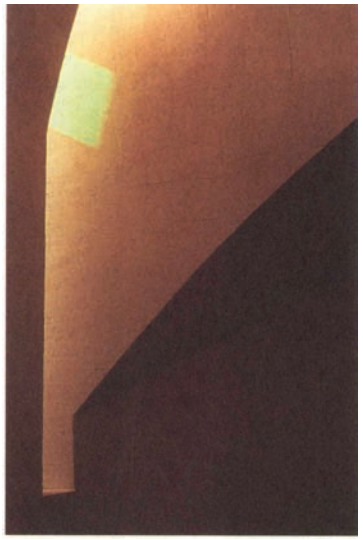
Light_

Each space brings in light from skylights except for the main worship space, which draws light in from a more horizontal manner. The variety of openings creates new experiential effects as the sun moves throughout the sky during the day and year (Smith). This provides the occupants with a sense of time while inside the chapel. Time, light, color, and materiality fuse into a single dimension that in combination with space creates architecture that provides the users with a multitude of rich sensory experience.



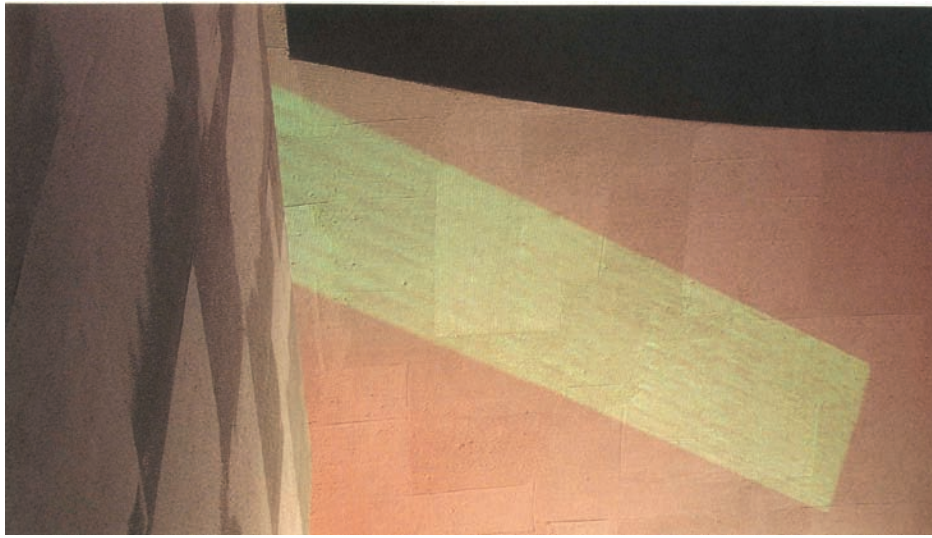
LIGHT+COLOR LENSE=
PERCEPTION_

7:00



10:00

13:00



15:00

FIG 20_

Proprioception_

Proprioception means “sense of self” and refers to the way your body perceives input from the skin, muscles, tendons, and vestibular system. The proprioception system is an internal sensation that calculates where the body is oriented in space and where our limbs are in relation to our bodies. “The way we can ‘feel’ where all our body parts are in relation to each other (and also ‘see’ them in our mind’s eye), without actually having to touch them with a hand or look at them with our eyes, is an ability that we get from our proprioceptive sense.” (“The Forgotten Sense – Proprioception” 20). This sense is responsible for constantly communicating with the brain about where the various body parts are in space, if they are moving, and how fast and which direction they are traveling. This sense provides body position awareness and aids in motor control and motor planning. When a person is sitting in a chair, it is the proprioceptive sense that allows them to remain upright, cross their legs, or shift positions. The information is processed unconsciously but is constant and abundant (“The Forgotten Sense – Proprioception”).

Performance_

The ground plane is a very important element that affects the proprioception sense. A slight sectional change repositions the body in three-dimensional space and can be read by the proprioception system in terms of balance and body position. The materiality of the ground is another way this sense reacts to built space. The firmness and yielding of pressure of a material surface in relation to a person’s body weight have similar affects of a sectional modification. This characteristic of the ground plane can act as an informed navigational tool and signal an upcoming threshold or sectional change. These ideas of materiality can also be applied to all surfaces in a building in which the occupant has direct bodily contact such as walls they may lean on or surfaces they may sit on.

Compression of space also affects the proprioception sense. The tightness of the space acts similarly to a weighted blanket because it stimulates strong pressure and sensing inputs. Also, incorporating weighted objects that can be pushed throughout the space also stimulates the proprioception sense. The proprioception sense is unique because unlike the other sensory systems this one can be learned through experience and improved with practice (“The Forgotten Sense – Proprioception”). This creates a unique opportunity for the architecture of a school to aid to creating spaces that challenge the proprioception sense at times in order to help children develop this sense.

Autism_

A person with a hypersensitive proprioceptive system is not able to comprehend where they are in space and may bump into furniture or have other “clumsy” tendencies. Someone with a hypo-sensitive proprioceptive system tends to create a lot of “input” into their joints and muscles by lots of aggressive movements. Many children with autism often seek deep pressure sensations to provide proprioceptive input which “calms and modulates the central nervous system which aids the processing of sensory information (Grandin). Many children attain this desired pressure by wearing weighted blankets or enter compressed spaces (Remus).

Vestibular_

The vestibular system is a person's sense of balance and movement. Our other sensory systems inform us about either ourselves or the world around us. The vestibular sense is unique because it mediates and informs us about the constant relationship happening between these two systems. This sense allows a person to know if they are falling, upright, upside down, or on their side. The vestibular sense indicates to our brains when we are moving and with that, how fast and what direction we are moving in. It also informs us of the motion, or lack, of objects around us. It allows for our instant and unconscious understanding of our bodies in relation to the things in our environments ("The Vestibular Sense").

Performance_

Movement is a vital aspect of how a person experiences architectural space and therefore the ground plane is influential on one's vestibular sense. Design elements can modify the way a person moves through a space thus changing their perception. A historical example of architecture altering the vestibular sense and changing the architectural experience is traditional Japanese gardens. The way the ground surface and features of the gardens are conceived is derived from a movement perspective. Edward Hall has studied the cultural and spatial aspects of historic Japanese gardens and states "[...] stretching visual space by exaggerating kinesthetic involvement [...] to watch his step as he picks his way along irregularly step stones [...] At each rock he must pause and look down to see where to step next. Even the neck muscles are deliberately brought into play." (Hall 52). The Japanese architects take into consideration the perception of space based on the vestibular sense of a person by creating an uneven ground condition that causes a person to innately react to this change.

Autism_

A person with a hypersensitive vestibular sense has poor balance and may not prefer to walk on uneven surfaces or move in a non-linear way. On the other hand, a person with a hyposensitive vestibular system seeks movement that intensifies their feeling of gravity. This child may spin in circles and is always on the move ("The Seven Senses | The Autism Life").

Castelvecchio_Carlo Scarpa_Verona, Italy_

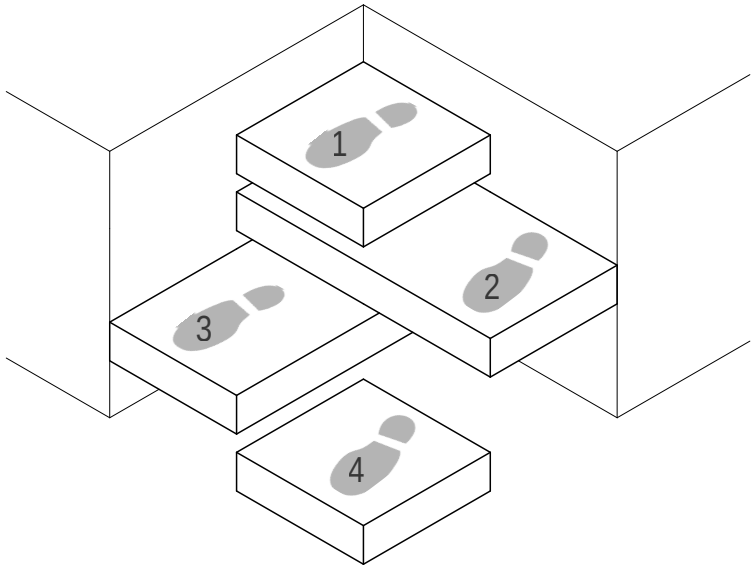
Scarpa frequently designs stairs that stimulate a person's vestibular sense. He carves space from each step and creates a tread with a surface that can only be occupied by one foot. Although the movement of ascending or descending the stair does not change, it forces the user to increase their awareness and rethink how our body needs to move to utilize this element in space.

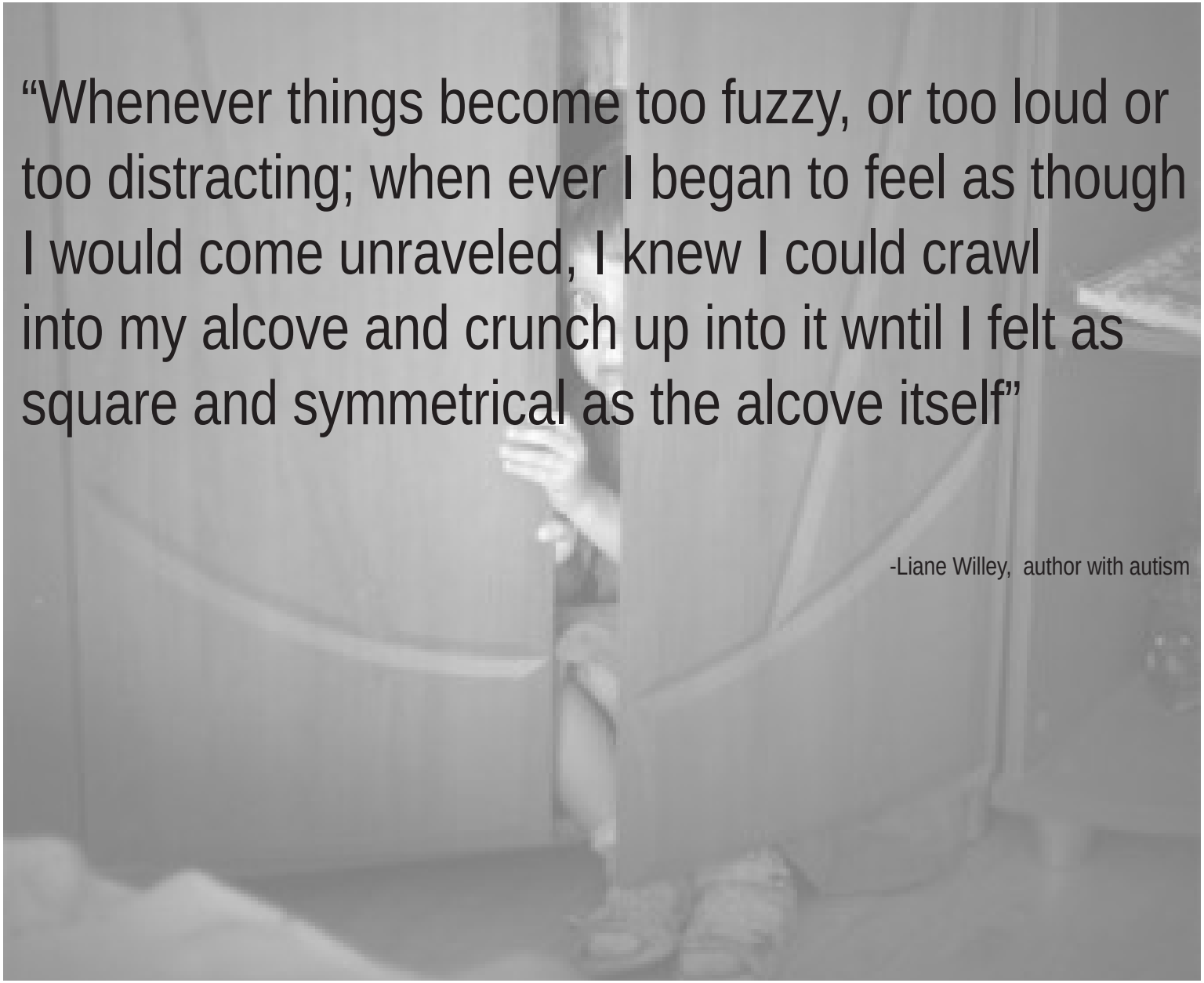
Sectional changes in Castelvecchio create tight spaces that when occupied speak to our proprioception sense. A person's proprioception receptors sense this compression of space and interpret the relationship between the user and the environment.

Brion Cemetery_Carlo Scarpa_Treviso, Italy_

The same design premise of the stairs of Castelvecchio is also utilized in Brion Cemetery. However, Scarpa increase the sensory experience by giving each step a different tone when a person steps down. This creates a rich sensorial experience that can aid in the understanding and navigation of the space.

The materiality of the ground plane changes as you approach the more sacred space of the cemetery. Once inside the grounds of the cemetery the pathway shifts from smooth pavement to a surface created from narrow pieces of stone oriented in one direction. The stones shift ever so slightly from one member to another signaling the direction in which a visitor must go to continue to the main space of the cemetery.




“Whenever things become too fuzzy, or too loud or too distracting; when ever I began to feel as though I would come unraveled, I knew I could crawl into my alcove and crunch up into it wntil I felt as square and symmetrical as the alcove itself”
-Liane Willey, author with autism

Autism and Spatial Experience_

Authors, Baumers Heylighen, analyzed the written accounts of people with autism and examined how they experience space. They examined “three particularities of an autistic world of experience that were noted in the written stories of people with autism: the confidence offered by physical space, the hidden logic associated with space, and a direct and conscious way of experiencing the world” (3). Their findings conclude that the physical characteristics of a space create confidence and act as a “tangible source of peace and safety rather than seeking comfort with other human beings”(4). The authors also found that the built environment is often unpredictable to those with autism and many spaces are uncomfortable or confusing to inhabit.

A study conducted by Rachna Khare and Abir Mullick shows a strong correlation between educational environment and performance of students with autism. A school that is not designed with the needs of an autistic student in mind can distant them from learning the curriculum, social skills, and about the world they will grow up to live in.

The majority of schools are zoned based on the program of spaces. A school that is designed for a student with autism should be organized based on the sensory stimuli of the space. This would allow the students the option to learn and play in various sensory environments. Transition spaces between sensory zones are necessary to prepare the child for the next sensory environment. This flexibility would benefit the students because they could learn the curriculum in the most comfortable environment based on their individual needs and they could learn life skills, such as social skills and how to adapt to the “real world” where the sensory stimuli of an environment is often uncontrollable. There should also be intimate spaces where an individual can go to escape over stimulating environments and situations. A school should also have a straightforward spatial sequence that allows children to navigate the building independently.

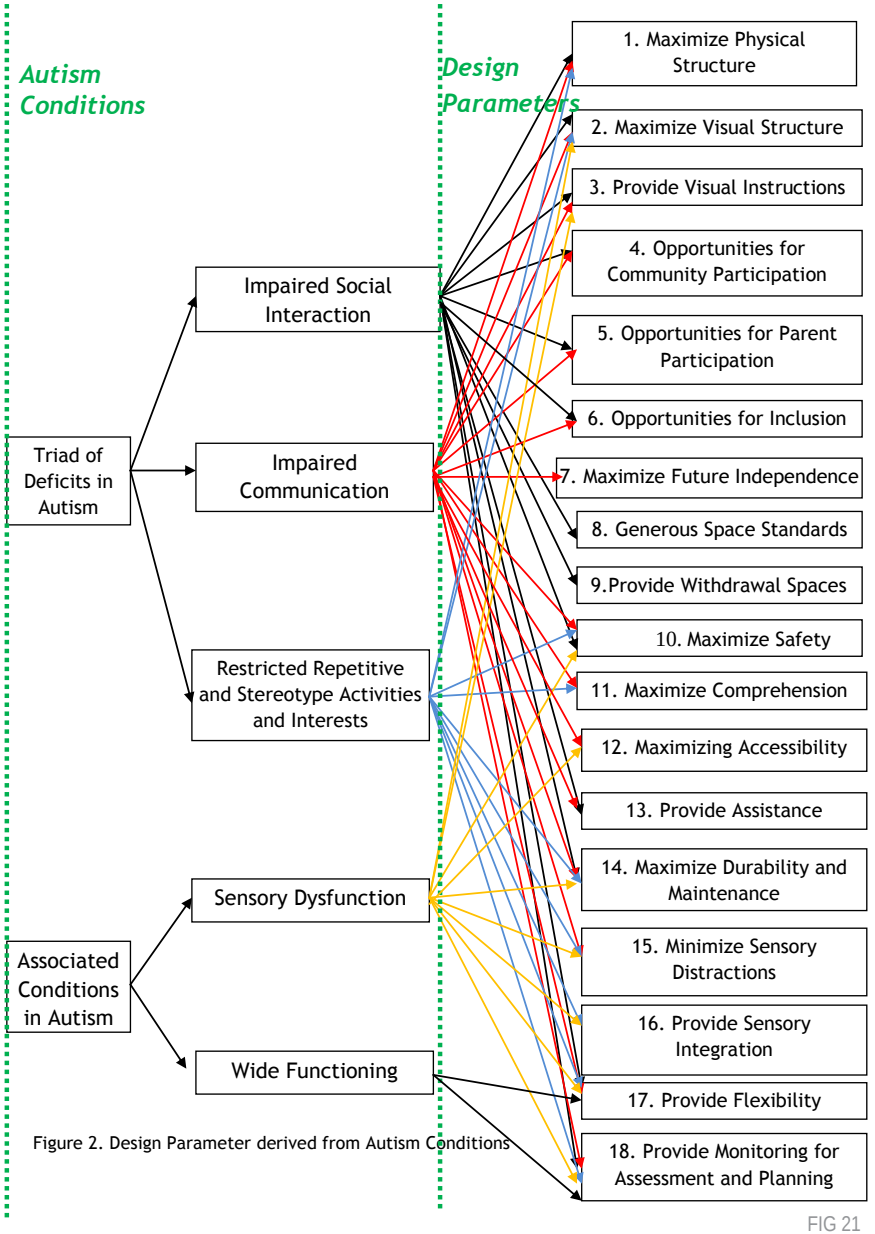
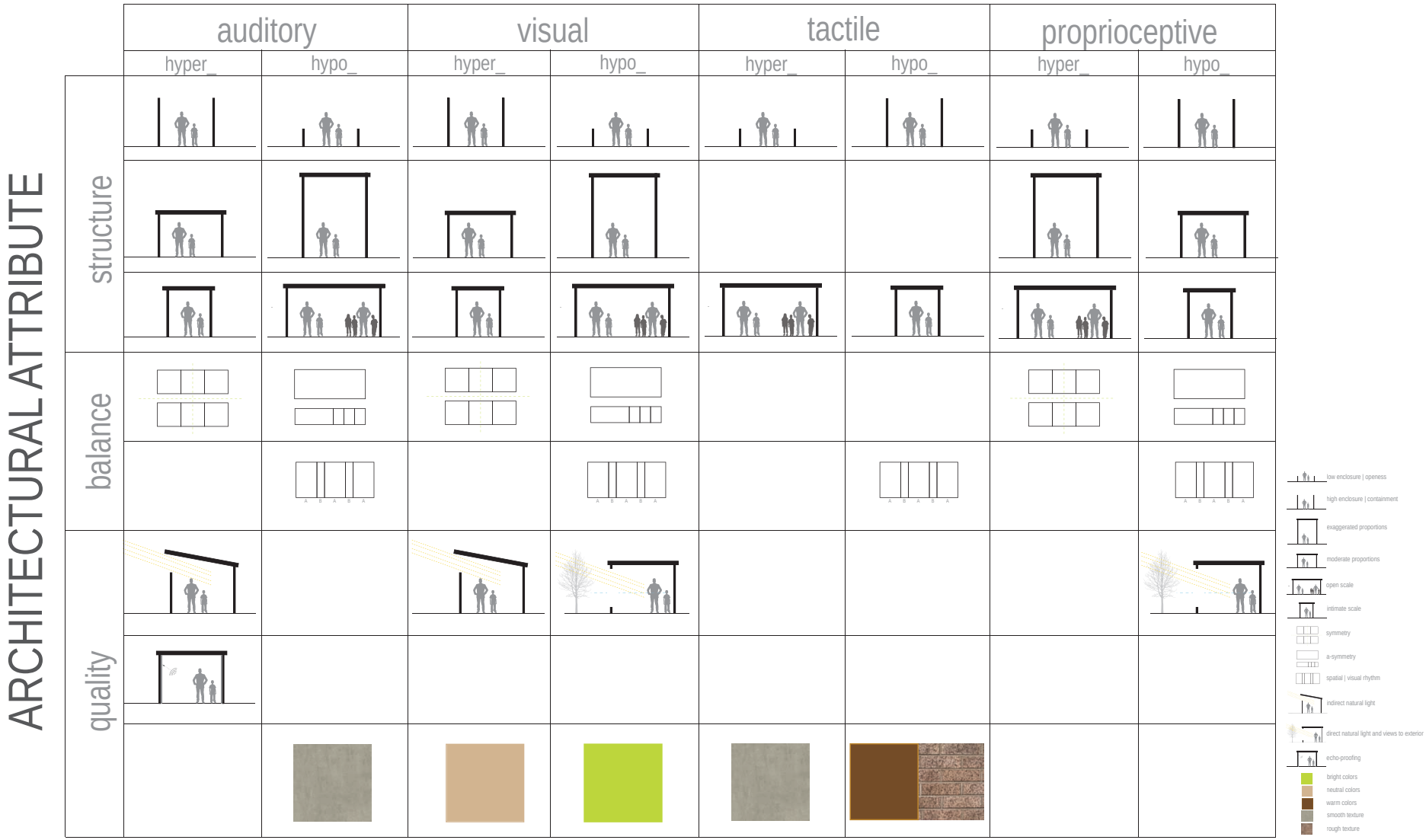


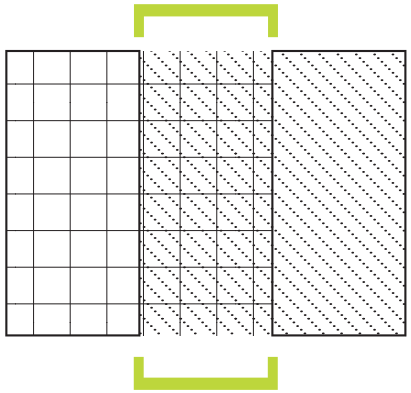
Figure 2. Design Parameter derived from Autism Conditions

FIG 21_

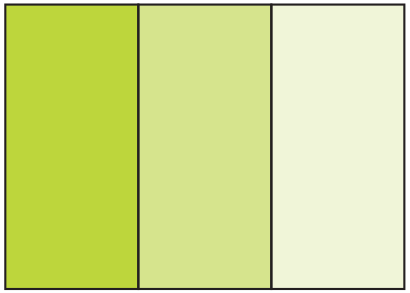
SENSORY ISSUES



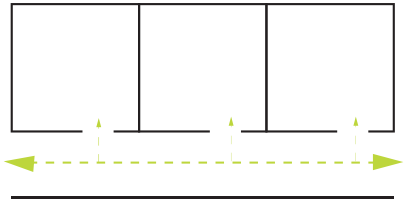
DESIGN ATTRIBUTES THAT ARE BENEFICIAL TO ALL SENSORY ISSUES_



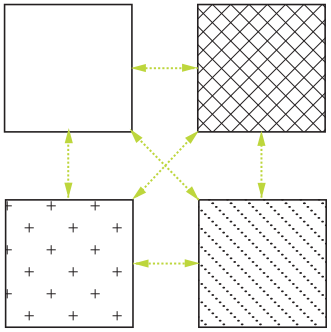
transition zone



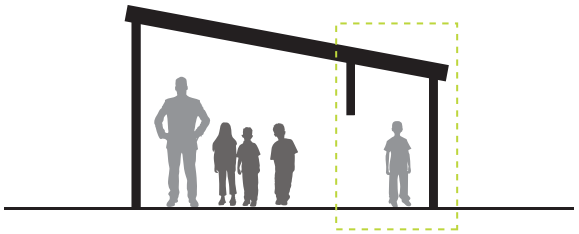
multiple sensory environments



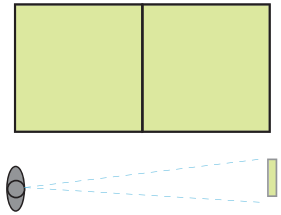
one way circulation



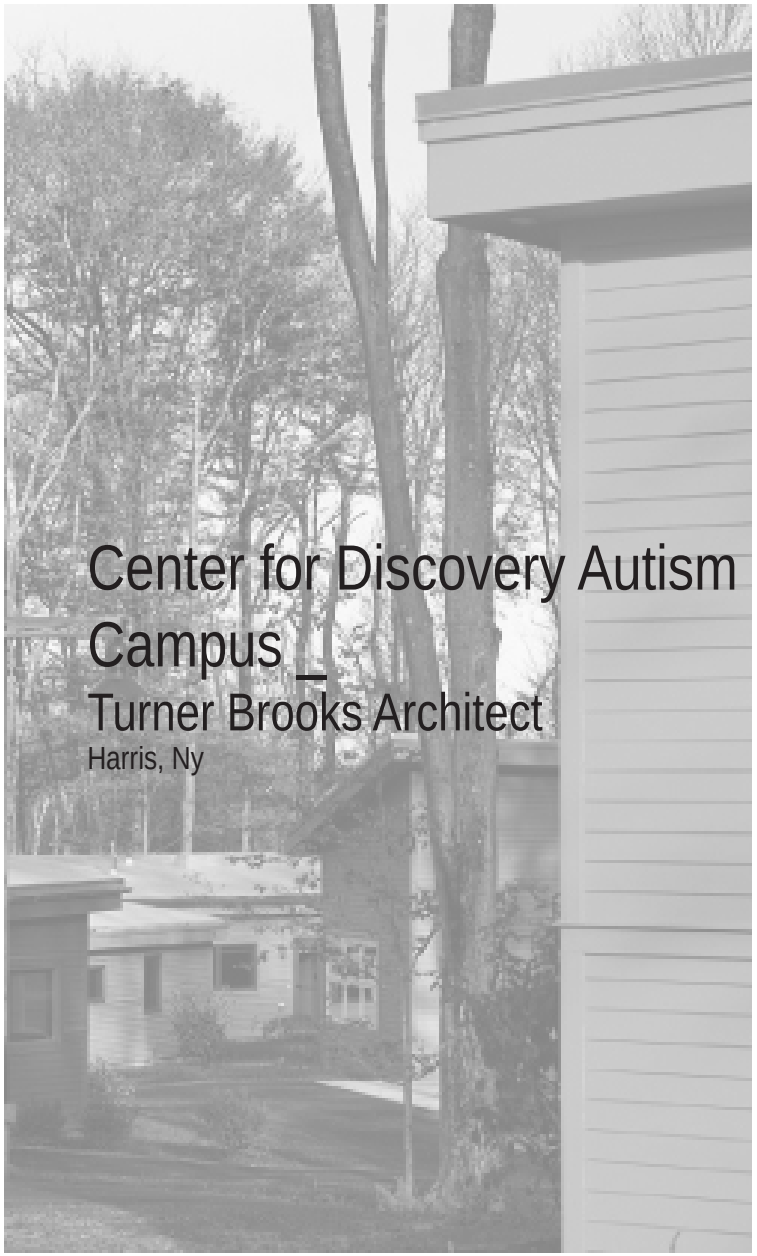
flexibility



withdrawl space



visual cues



Center for Discovery Autism Campus _

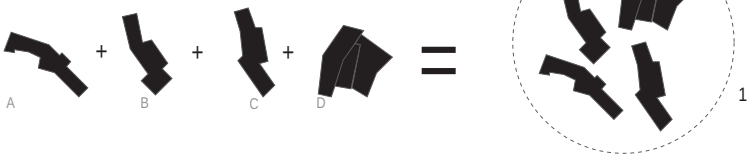
Turner Brooks Architect

Harris, Ny

This is an educational and residential project specifically for kids with autism. It is a series of buildings that are both individually and collectively highly attuned to the haptic experience of space. The architecture emphasizes the idea of transitional space since many people on the spectrum react negatively to sensory and spatial conditions that change abruptly. “The building plans in this project, therefore, unfold as continuous fluid arrangements of the program. Change in direction is signaled by gradual bends rather than abrupt turns.” (Turner Brooks). Right angles are avoided altogether except for the final turn into each individual bedroom.

Sensorial qualities, especially light, also follow this gradual change. Sunlit spaces gradually expand and contract into one another creating different sensory qualities throughout the building and campus. Intimate satellite “living areas” are nested along the corridor. This snug space allows residences to retreat from a possible overwhelming situation while still being able to observe the world around them.

This idea of an organic form continues through the design to the site because the buildings are naturally integrated into the landscape. Since walking is a common therapy for people with autism, pathways that wind through the natural landscape and gently guide the students to their destination connect the building clusters (Krichels).



INDIVIDUAL COMMUNITY

SYSTEM_ "NEIGHBORHOOD"

FIG 22-26_

Netley School Autistic Resource Base_ Vision

Haverstock Associates_ London

The Netley Resource Autistic Base draws in natural light in a variety of ways to create various sensory conditions throughout the building. Light is brought into the school via north facing skylights in the classrooms. Public spaces have floor to ceiling windows that are oriented to the south, creating a completely different quality of light. Circulation spaces have narrow windows that allow some natural light in while still allowing the students a view to the exterior. Color is also used in certain spaces to play off the lighting in each space (“Designing for Autism: Lighting”).

FIG 27_

The Pears National Centre for Autism Education_Propriception | Vestibular

Penoyre and Prasad_London

The Pears National Centre offers a range of teaching spaces and strives to make every space an opportunity for learning. Children are encouraged to interact with the environment and move from space to space in order to develop their sensory, social, and educational goals that will aid them in accomplishing “real world” tasks. The interior reflects a Hertzberger like “learning landscape” supporting movement. External spaces, such as the sloping green roof, provide many learning and play areas that require the children to use their proprioceptive and vestibular senses (“Our Building”).

FIG 28_

U.C. Davis M.I.N.D. Institute_Touch

HGA_Sacramento, CA

FIG 29_

The main material used in the interior of the U.C. Davis M.I.N.D. Institute is warm wood. The wood creates an inviting environment for the patients and their families without being overly stimulating. The architects carefully designed the detailing and construction of the millwork to create different textures and eliminate sharp corners, which allows children a safe yet stimulating tactile entity. The materiality of the ground changes based on the program of the space. This enhances the tactility of the environment and allows children a way to prepare themselves to transition to a potentially different sensory setting (http://hga.com).

Kennedy Leigh Centre_Sound

GA Architects_London

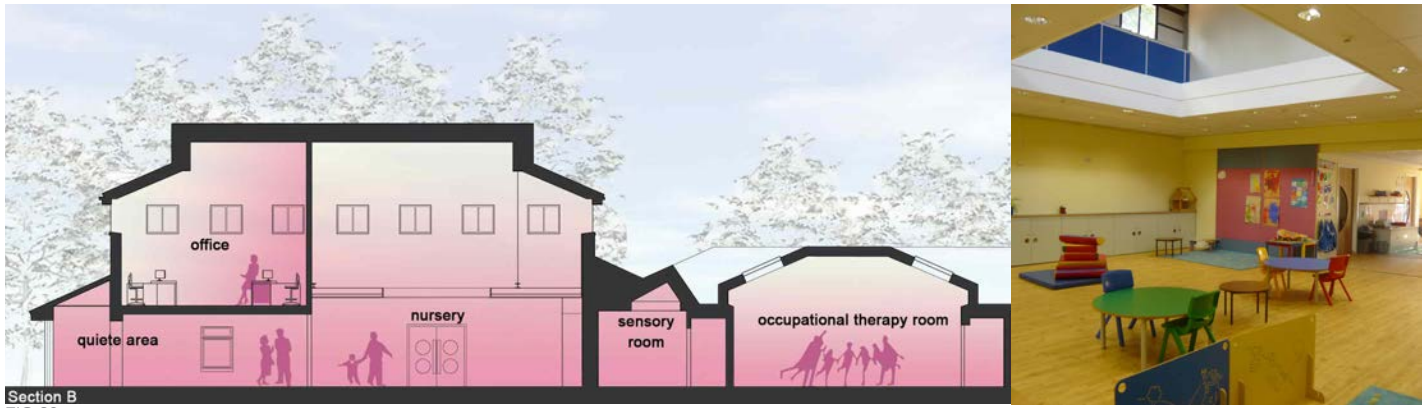


FIG 30_

Kennedy Leigh Centre is a nursery school for children with autism. Acoustics of space were important considerations in the design. Sound needed to be controlled and filtered in certain programs such as the quiet areas and occupational space but the architects wanted to create other situations that reflected real life situations. Materiality and form were the main ways the architects created and manipulated the aural quality of the architecture (“Designing for Autism: Spatial Considerations”).

“Learning is most effective when it is embedded in meaningful activities, when students are able to recognize the larger context of the topic they are studying, rather than doing something because it is ‘work…..Curiosity and hunger for novelty, discovery, and challenge are present in all students, and learning takes place constantly, sometimes despite our intentions.”

-William Powell, U.S. Department of State

3

"Universal design is not a fad or trend but an enduring approach that originates from the belief that the broad range of human ability is ordinary, not special"

-OWP Architects

ADA_

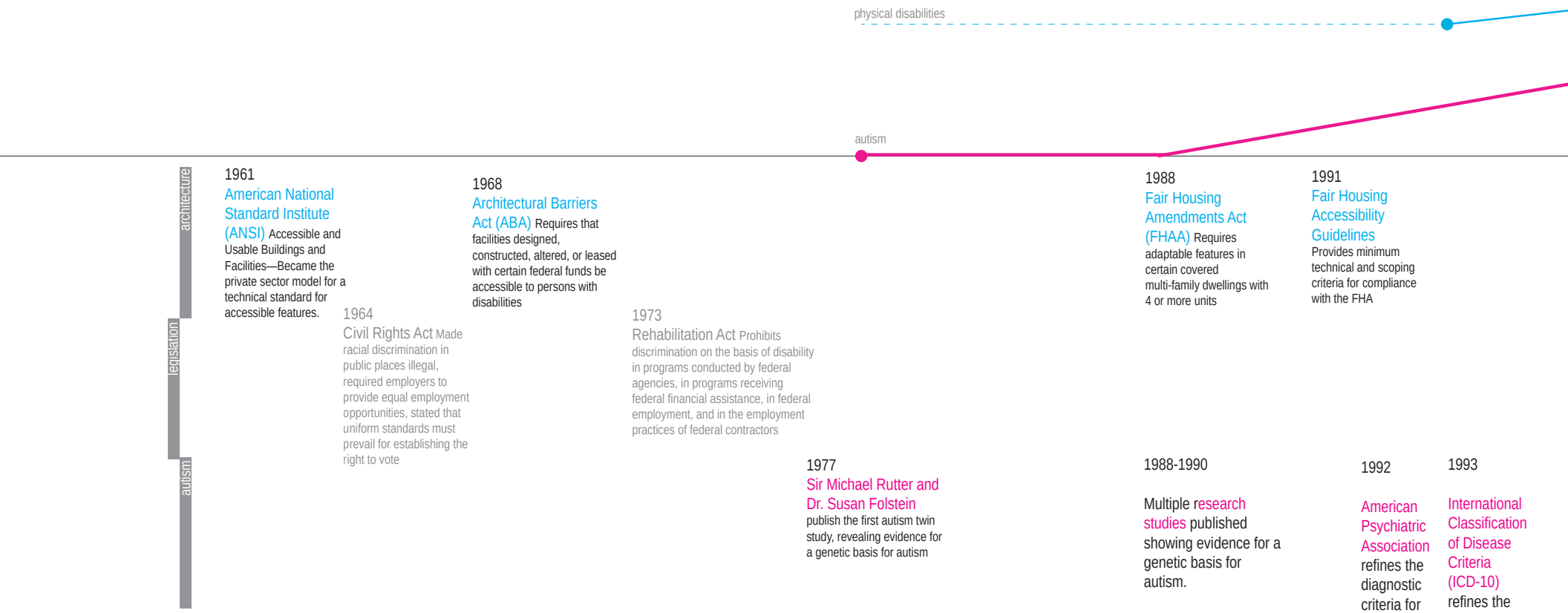
The Americans with Disabilities Act is the most comprehensive civil rights legislation that prohibits discrimination on the basis of disability in employment, State and local government, public accommodations, commercial facilities, transportation, and telecommunications (“A Guide to Disability Rights Laws”). This act prohibits employers, public and private businesses, state and local government agencies, private entities offering public accommodations and services, transportation and utilities from discriminating against people with a physical or mental disability. These standards allow all people to use, enjoy, and participate in many aspects of society. Contemporary building accessibility codes are derived from this act.

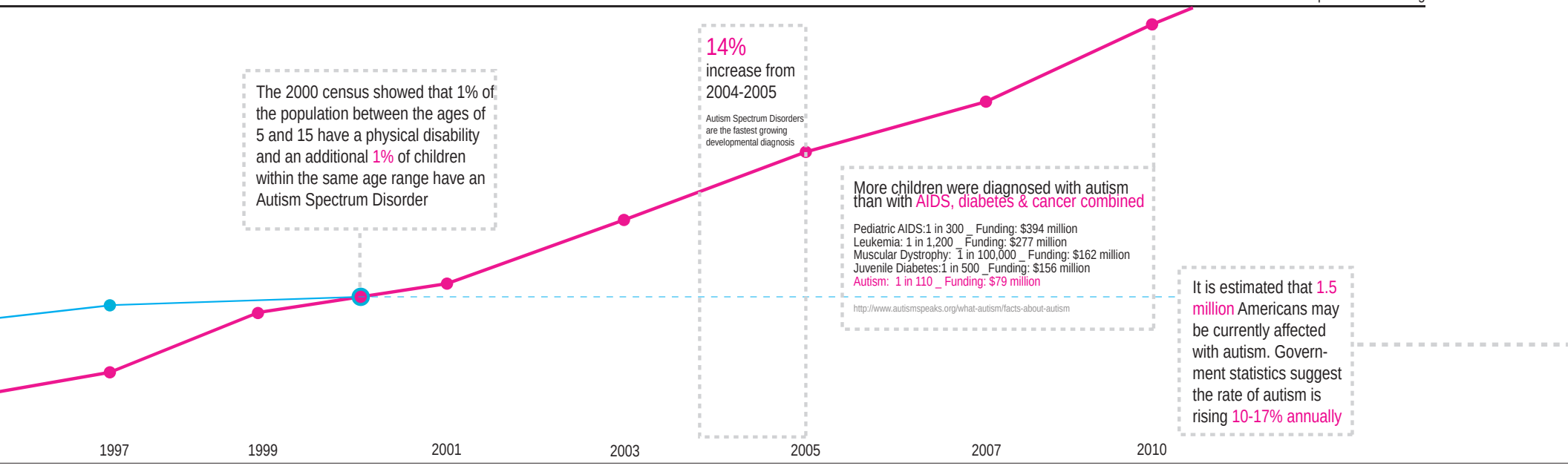
These building codes ensure that all buildings allow every person to gain access and easily maneuver through the built environment in an equal manner. “Providing equal access removes discrimination and protects human rights. An accessible built environment provides the opportunity for all people to fully participate in and contribute to their families, communities, and society.” (WBDG Accessible Committee). Accessibility guidelines are only in place for the physically disabled yet the mentally disabled are incorporated into the ADA.

Designing buildings to be accessible to those with certain cognitive and sensory disabilities, such as autism, should be considered just as the physically disabled are represented in building codes. People with autism have just as much difficulty with accessing the built environment as those with a physical handicap and should be given the same consideration with accessibility standards.

Universal design for learning is a curriculum approach that allows for every child to have similar opportunities to best learn the material. This concept infuses three principles of flexibility into the learning plans which are: multiple methods of presentation, multiple options for participation, and multiple means of expression This provides a “a wider range of options for students to choose from-meaning the curriculum adapts to the student rather than the other way around” (OWP Architects 200).

One in six U.S. children now has a developmental disability such as autism, learning disorders or attention-deficit/hyperactivity disorder (ADHD), according to new research from the U.S. Centers for Disease Control and Prevention. That number appears to be on the rise. In 1997-1999, about 12.8 percent of kids were diagnosed with a developmental disability. That number rose to 15 percent in 2006-2008 -- or an additional 1.8 million U.S. children (Goodwin). The 2000 census revealed that the number of children with a physical disability was equivalent to the number of children with autism (http://www.cdc.gov/ncbddd/autism/data.html).





1998
ADA Accessibility Guidelines Amended to include guidelines for state and local government facilities and building elements designed for children's use

2000
ADA Accessibility Guidelines Amended to include guidelines for play areas

2002
ADA Accessibility Guidelines Amended to include guidelines for recreation facilities

2004
ADA and ABA Accessibility Guidelines for Buildings and Facilities Updated and published in the Federal Register in July of 2004

2002
Help America Vote Act
Regulates equipment and voting booths for equal access voting areas

1997

First report of evidence for genetic linkage on chromosome 15q for Autistic disorder.

2001

The International Meeting for Autism Research was convened for the first time to provide ASD researchers with a focused opportunity to share the rapidly moving scientific investigation of ASD.

2006

The Combating Autism Act was signed into law

2007

Autism Speaks, through its Federal Legal Appeals Project (FLAP), has filed an amicus brief before the United States Supreme Court in the Tom F. case.

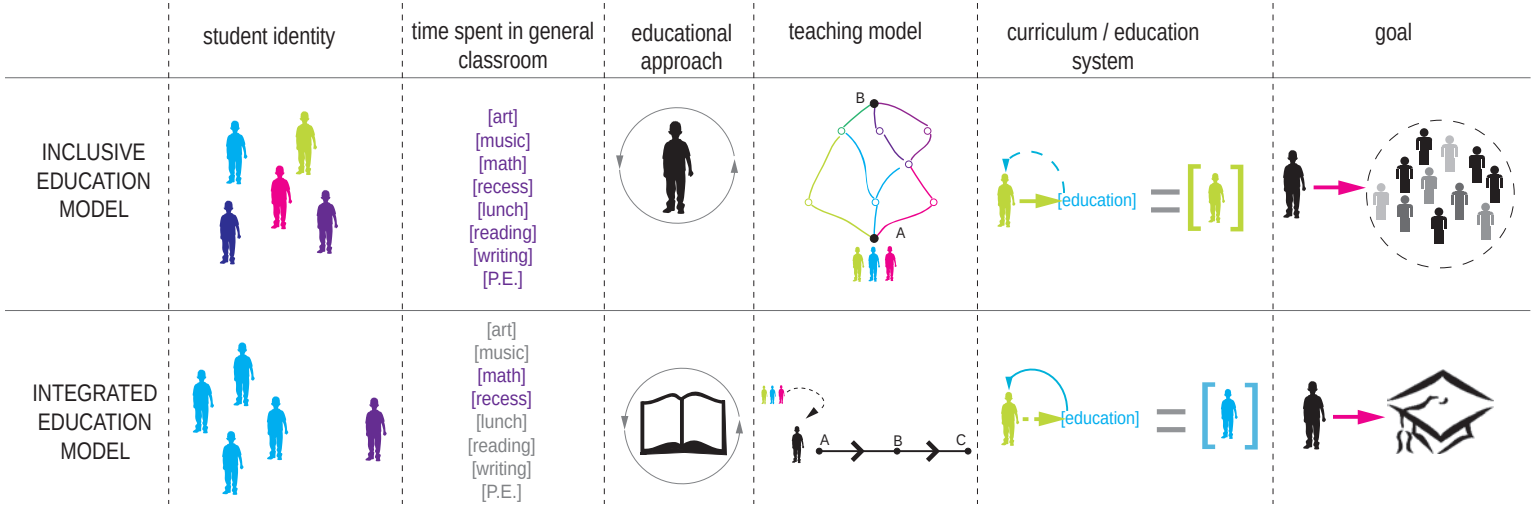
Inclusive Education_

The Individuals With Disabilities Education Act (IDEA), as amended in 2004, does not require inclusion. Instead, the law requires that children with disabilities be educated in the "least restrictive environment appropriate" to meet their "unique needs." And the IDEA contemplates that the "least restrictive environment" analysis will begin with placement the regular education classroom.

All children with a disability are at first the learners and second the disabled "and their education in the environment, should be based on what they can do and not on what they cannot, to make it a successful experience" (Mullik and Khare 8). A contemporary teaching method is inclusive education; an approach to teaching children with special needs where the child spends most or all of their time in a regular educational classroom with the rest of the student body. This greatly minimizes segregation from the general student body (Care 1). The Individuals With Disabilities Education Act (IDEA), as amended in 2004, does not require inclusion. Instead, the law requires that children with disabilities be educated in the "least restrictive environment appropriate" to meet their "unique needs." And the IDEA contemplates that the "least restrictive environment" analysis will begin with placement the regular education classroom.

75% of America's six million students with learning disabilities are being educated in general education classrooms (OWP Architects 193). Inclusive education is a child-centered approach to education in which the teaching method is expected to change rather than of the student's learning pattern. Teachers recognize that every child is an individual with specific needs and different ways to learn. This approach is considered active learning, which means it emphasizes "learning by doing" - learning through participating and experiences. Thus, the teaching model is not based on "teaching to the test" where each and every student is expected to meet certain milestones by a specific time. Instead education is seen as a dynamic and evolving process in which the student will become productive members of the community (Thomas). Inclusive education is different from the traditional model of mainstreaming special needs students because the students spend a majority, if not all of their time, in a regular education classroom. Those who advocate for "full inclusion" believe that the social interactions with regular education students are vitally important and that special services can be provided in the context of the regular classroom.

The idea of inclusion education is left up to the educators in the classroom to ignite. Teachers rely on different teaching techniques, lessons, props, and innovative pedagogical approaches to stimulate the learning of all students. Teachers are expected to adapt teaching styles, methods and the classroom atmosphere to make the learning environment more conducive to students of all capabilities and learning styles. Architects have designed schools exclusively for special needs students but very few schools have been specifically designed to support this inclusive model of education. Certain design features such as various types of sensory environments would especially enhance the learning environment for students with autism as well as be beneficial to neurotypical children. This would create a more favorable atmosphere for learning that is not completely dependant on the educator.



Architecture for Active Learning_

Currently there are schools specifically designed for special needs students and schools for “normal” children but there are only a few schools dedicated to this inclusive educational approach. Alvin Tofler, author of PowerShift, describes his vision of a school and expresses how important the concept of knowledge for all his. He believes that “knowledge is the most democratic source of power” and is the only type of power that can be grasped by all. His concept of the school of tomorrow revolves around the idea that a school is accessible and welcoming to all learners and a student’s education is tailored fit to them as an individual. This notion of what a school can and should become has a correlation with the current teaching methods many educators are practicing (OWP). The architecture of schools should be designed to better harbor the ideals of inclusive education in a way that enhances both the students and teachers learning experience.

Active Learning Requires:
- Variety of learning spaces
- Spaces that allow for multiple types of teaching
- Comfortable and engaging learning environment
- Opportunities for social interaction
- Outdoor spaces
- Transition spaces
- Sensory stimulating and sensory neutral spaces
- Way-finding circulation
- Safe spaces for exploration

Designing Around Needs of Autism = Beneficial to All_

If a kindergarten were to be designed around the needs of a child with autism, the environment would also benefit the rest of the student body. All children, especially those with autism, are affected and influenced by how they encounter the built environment. If architects are sensitive to this fact when designing spaces for early education, the learning environment can be both comfortable and engaging thus, acting as a catalyst for many different types of learning and experiences.

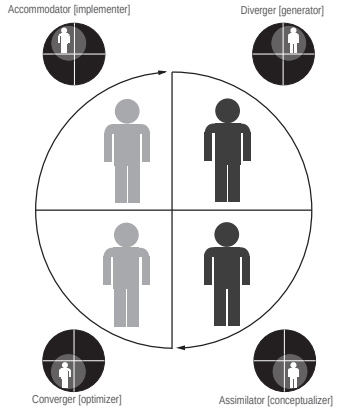
Learning and the Senses_

The senses are a vital way that children learn. As infants, humans begin to gain information abut the world and themselves through their environment. Besides knowledge about one's surrounding the senses also affect and shape our memories, imagination, and perception of the world. There are many theories about multiple learning intelligences but all in all there are four main learning styles; visual, auditory, kinesthetic, and tactile. Modern teachers have recognized that kids learn in different ways and the architecture of the school should reflect this viewpoint.

Universal design for learning is a curriculum approach that allows for every child to have similar opportunities to best learn the material. This concept infuses three principles of flexibility into the learning plans which are: multiple methods of presentation, multiple options for participation, and multiple means of expression This provides a "a wider range of options for students to choose from-meaning the curriculum adapts to the student rather than the other way around" (OWP Architects 200).

Gardner_ 8 different kinds of intelligence:

Visual: art and design
Linguistic: words
Logical: numbers and math
Bodily: action, movement
Musical:tone and rhythm
Interpersonal:communication
Intrapersonal:self-reflection
Naturalistic: appreciation of nature



Kolb_4 Models of Learning

1. Converger
2. Diverger
3. Assimilator
4. Accommodator

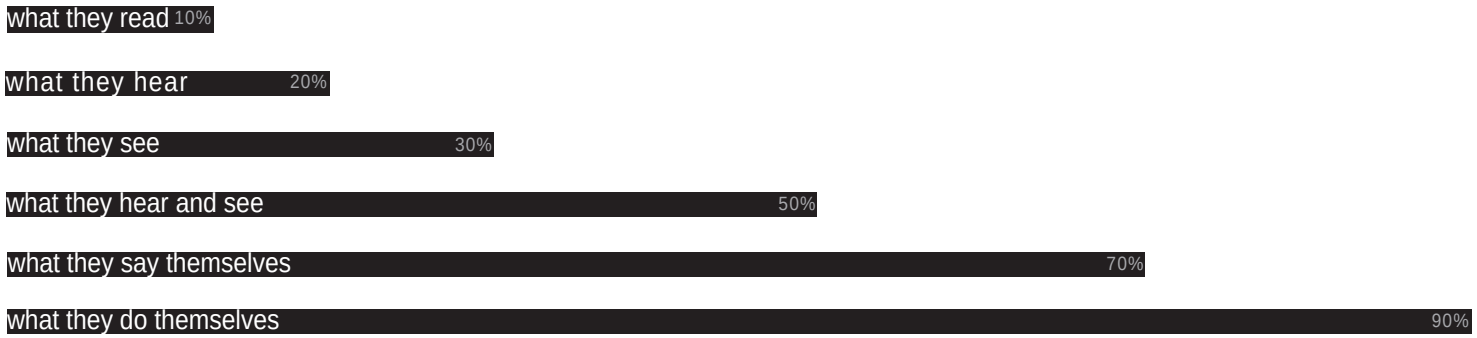
TYPES OF LEARNING STYLES

direct task mastering learning individualized cooperative inquire

teacher centered

RANGE OF TEACHING STYLES

student centered

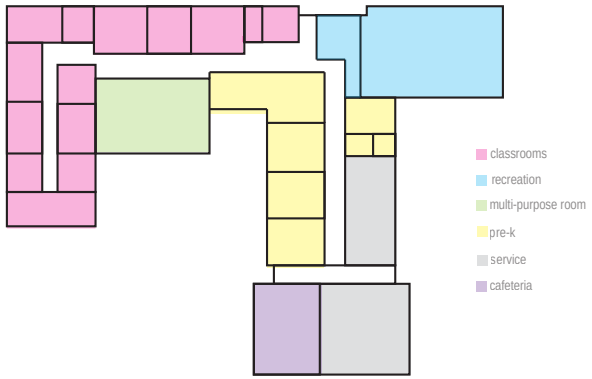


% of INFORMATION REATAINED PER LEARNING ACTIVITY

SENSES + LEARNING

Flexibility_

Flexibility is a crucial component in designing an inclusive kindergarten. This pedagogical approach focuses on the student as an individual with specific needs and the architecture of the school should reflect this idea. The architecture needs to be able to respond to the flux of the needs of the both the students and teachers as well as the needs of the community. Most schools are designed with a certain degree of adaptability. This flexibility is mostly found in the plan of the school. An inclusive school needs to be adaptable in both the spatial and sensory dimension.



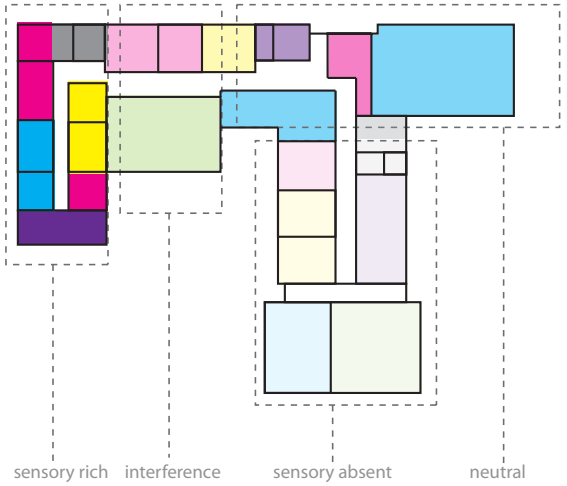
Program Zones

Zoning_

Today, most schools are organized based on programmatic characteristics. In many schools classrooms are grouped based on age/grade level or on the activity that happens in the space. An inclusive school should be organized not on the program of the space but instead based on spaces sensory characteristics.

Various Sensory Experiences_

By designing a school with multiple types of atmospheres allows the children to choose their comfort level but also provides them the opportunity to experience multiple environments. This is beneficial because if there was one type of atmosphere throughout the entire school children would become accustomed to this environment and would have a hard time functioning in spaces outside of the school that had an opposite spatial quality.



Sensory Zones

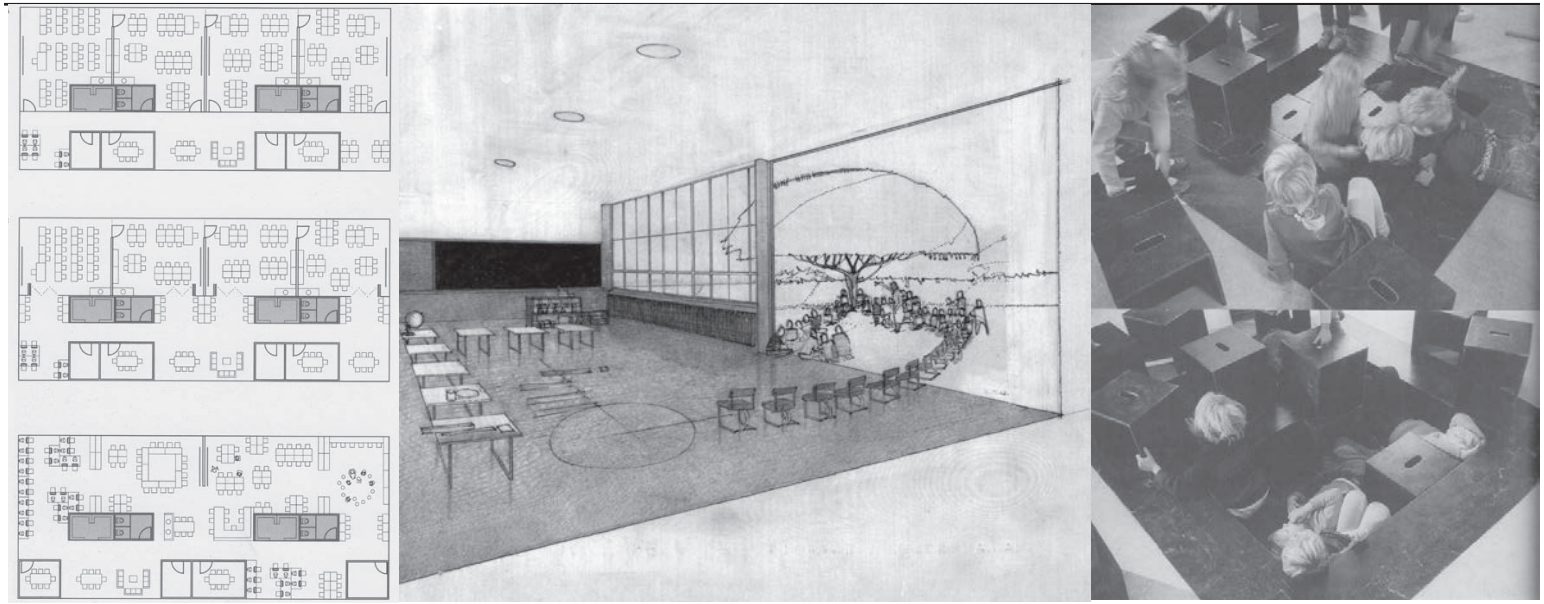


FIG 31-33_

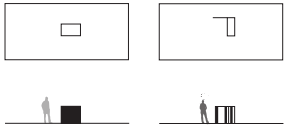
Hertzberger_
Plan transformation into the open plan starting as what he calls “regular” classrooms, meaning they are autonomous entities [top]. The open plan allows for greater flexibility and freedom within the school [bottom].

Corona School_Neutra
Neutra emphasized the necessity for both indoor and outdoor learning spaces. He created a seemingly seamless relationship to the exterior by designing classrooms with 12’ sliding glass door. The occupants of the school could control if they wanted the door open or closed as well as the view via blinds.

Montessori School at Delft_Hertzberger
Hertzberger creates a recessed space in the floor that cubes can be placed in. Children can control the use of their own space by rearranging and configuring the cubes to fit their individual needs.

Types of Flexibility_

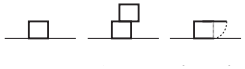
universal_
open plan, many spatial configurations



adaptable_
structures changeable per user/occupant

moveable_
repositionable structures capable of being torn down and reassembled in another location

responsive_
respond to a number of external stimuli



transformable_ characterized by modular design

“I am proud of the progress that we have made over the last two years but recognize that we have much further to go and must continue to focus on improving the educational outcomes and opportunities of all Philadelphians. If we continue to increase the number of people graduating from high school; if we continue to knock down real and perceived barriers to college; and if we continue to build an educated, skilled workforce in Philadelphia, we will at the same time address many of the other challenges that we face as a city.”

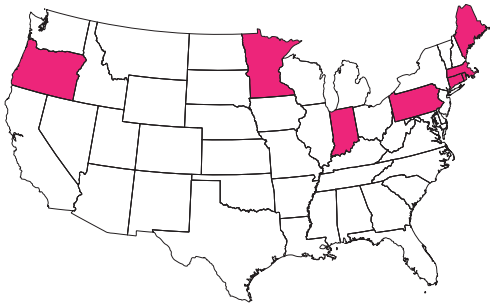
-Mayor Michael A. Nutter.

4

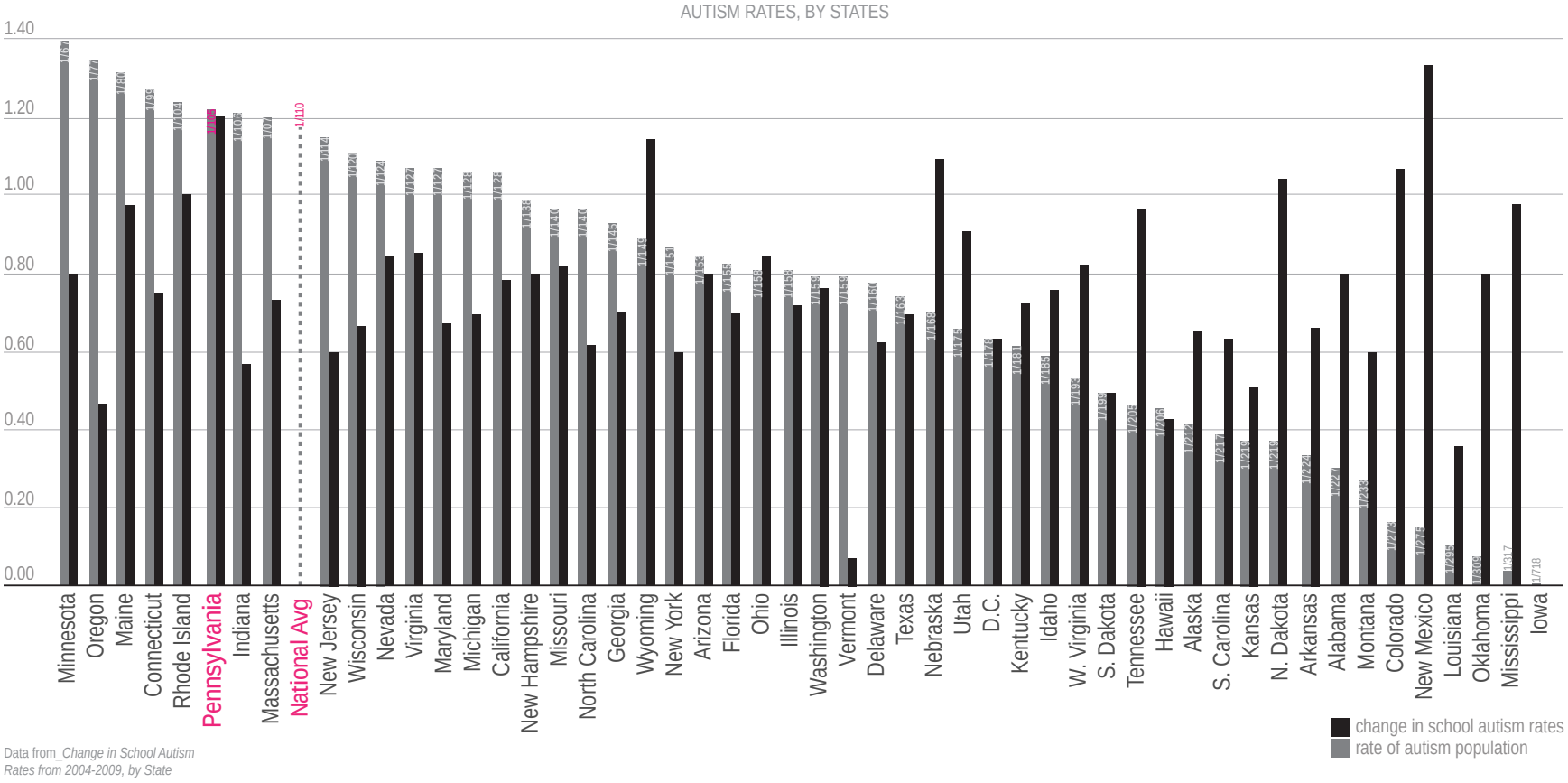

Philadelphia, Pennsylvania
West Fairmount Park
39.999463,-75.208905

Autism Prevalence_

Autism is becoming increasingly prevalent in the United States and it is estimated that on average, 1 in 110 children in the United States will be diagnosed with autism. Every state has reported an increase in the number of children diagnosed with autism annually since 1990. In the last decade the rate of children attending school with autism rose at a 1,700% increase, compared to the, a 30% increase of children with general disabilities (Yazbak). Pennsylvania has one of the highest population rates of autism, 1 in every 105 people, which is above the national average. It also has fifth highest rate of increase in rate of autism in school children (*Change in School Autism Rates*). This consistent increase in the prevalence of autism in school children in the U.S., especially in the state of Pennsylvania, needs to be addressed throughout the public school system, especially in the architecture of an early education school.



states with autism population greater than the national average



Data from_*Change in School Autism Rates from 2004-2009, by State*

Gaskin v. Pennsylvania Dept. of Education_

Another current issue concerning the public school system in the city was brought on by the court case Gaskin v. Pennsylvania Dept. of Education. In this case a child with special needs was given two options for kindergarten, attend a regular classroom with no support or a mixed assessment school that was two hours away from her home in Philadelphia. The child's parents believed that their daughter was not given the free and equal education in "the least restrictive environment" in which the Individuals With Disabilities Education Act gives all citizens the right to ("Gaskin Press Release"). This settlement is changing the quality of special needs education and service statewide. Designing a kindergarten that is attuned to the needs of students with autism, the developmental disorder that affects the largest number of Philadelphia residents will help accomplish the city's educational needs and goals.

FIG 34_

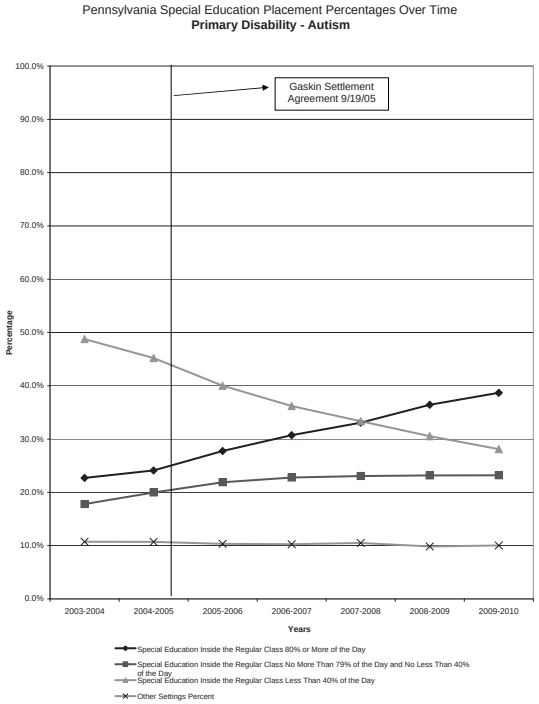


FIG 35_

Autism Facilities_

Philadelphia provides many resources in the surrounding area to individuals with autism and their families. However, there are only a few facilities dedicated to the needs of the population actually within the city limits. For some children with autism, traveling out of the city or paying a private school tuition to receive an education may not be feasible for them and their family. Public schools that address the needs of children with autism are greatly needed in Philadelphia.

NHS Autism School_

K-12 school that believes in combining behavioral expertise with a comprehensive educational program in order to create a stable, nurturing environment that can instill the confidence and skills that young people on the spectrum need in order to reach their fullest potential. www.nhsonline.org/

The Center for Autism (Satellite Office)_

"Mission: To improve the quality of life for individuals with Autism Spectrum Disorders and their families. We continually strive to be the premier resource for autism services in the Philadelphia region by providing programs that meet the specific needs of each individual affected by autism." www.thecenterforautism.org/

Drexel Autism Center_

This multidisciplinary center is focused on research and clinical care that uses resources from many medical departments.This collaboration is focused on making fundamental scientific discoveries that will improve the lives of people with autism and their families by developing technology that will lead to more precise diagnoses of children with autism. www.drexelmed.edu/Home/Research/AutismConsortium.aspx

The Center for Autism (Headquarters)_

The Center is a community-oriented facility that acts as both an educational and medical facility. The Center provides evaluations, support, therapy, and information to both the child and the family. The Center is home to an after school program for children ages 3-15 and also provides out patient services. The Center coordinates with the other agencies involved in the person's clinical, educational, and occupational program.http://www.thecenterforautism.org/

Center for Autism Research_

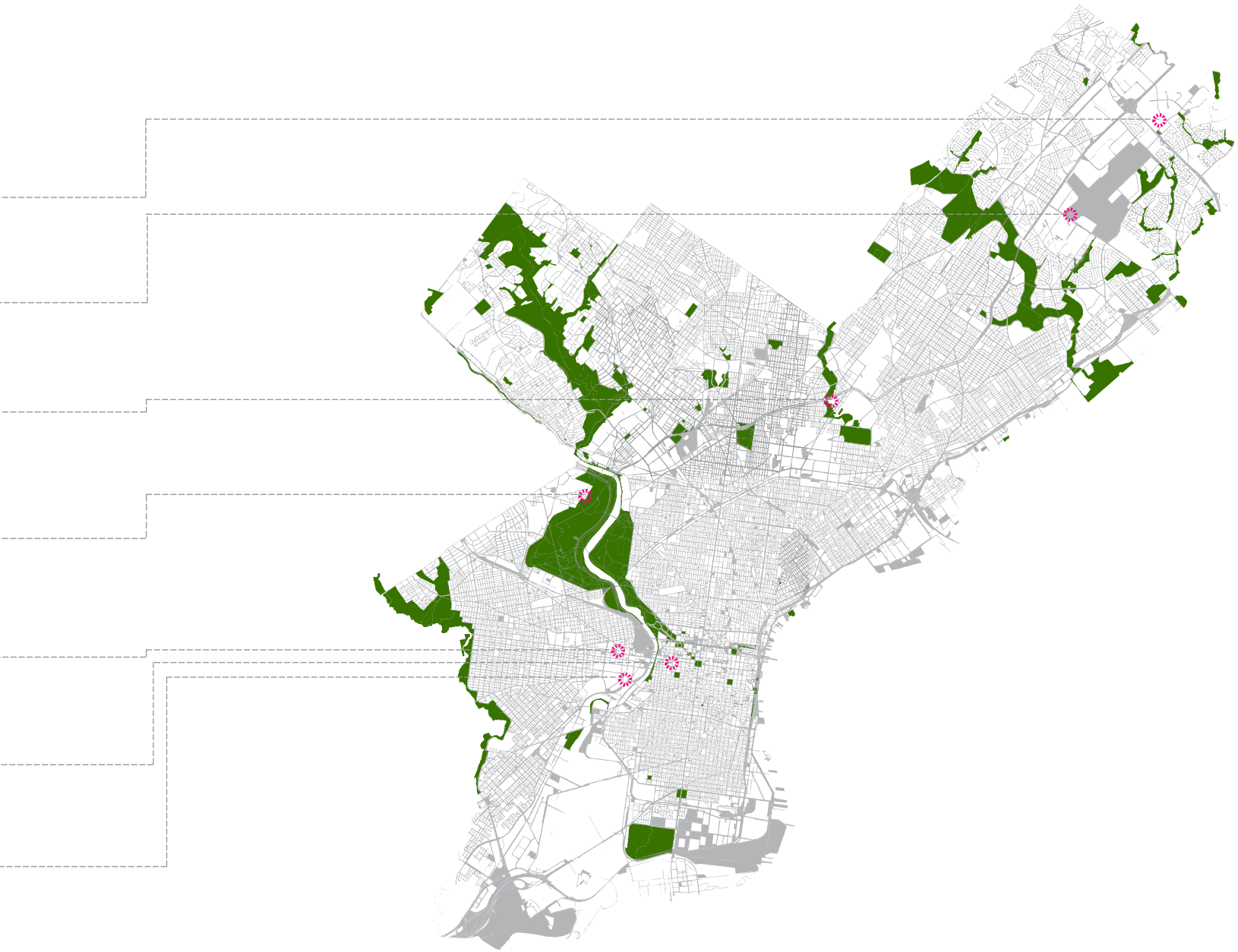
CAR, affiliated with the Children's Hospital of Philadelphia, is one of the most prominent autism research institutes in the nation. Researchers have already identified the first gene that puts a person at risk for ASD and have made major breakthroughs regarding brain-imaging studies.www.centerforautismresearch.com/

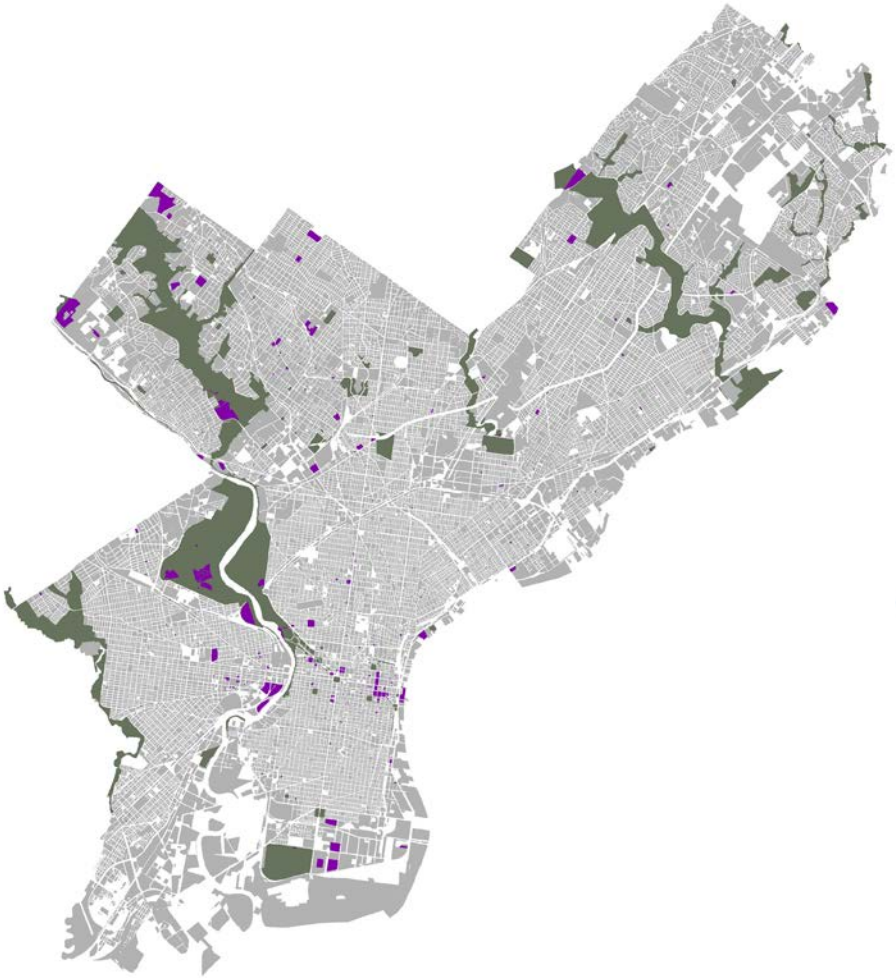
Autism Living and Working_

ALAW helps adults with autism form and sustain households, hold jobs, and contribute to community life, through individual supports and accomodations. This facilities helps people with autism and their families within the age range of 20-55. http://www.autismlivingworking.org

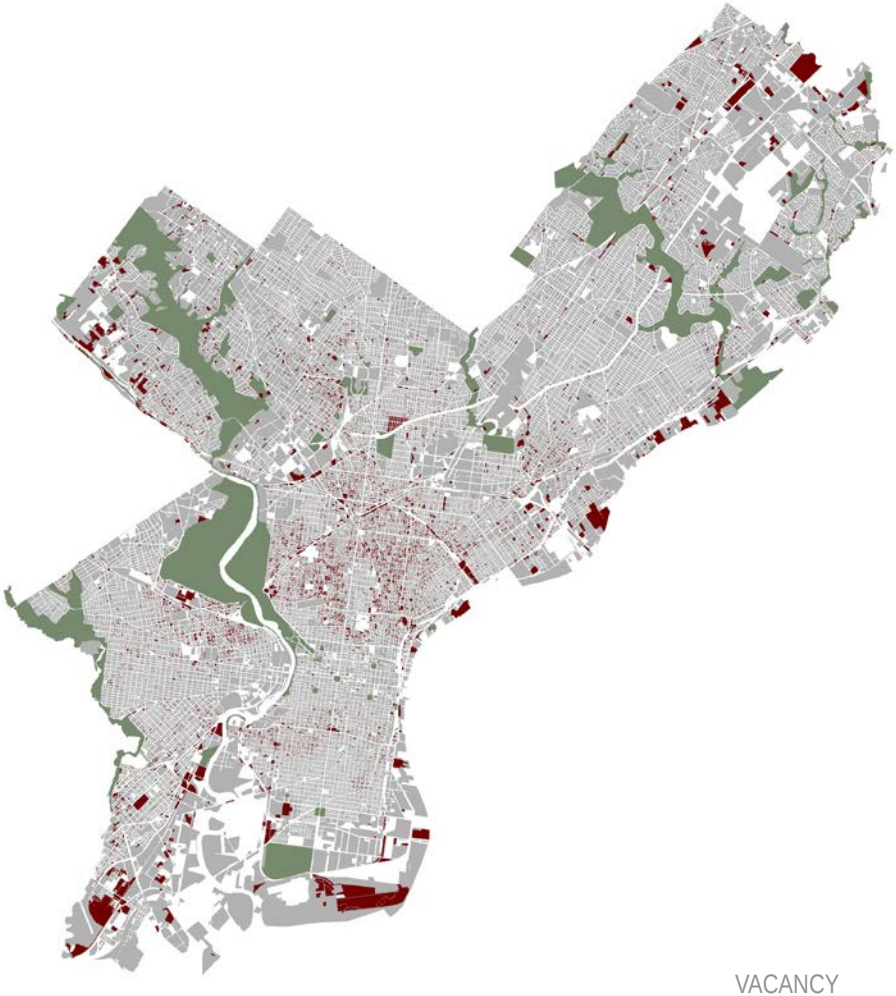
Children's Hospital of Philadelphia_

Provides comprehensive, coordinated, family-centered care ranging from accurate diagnosis to the most advanced treatments. CHOP diagnoses children on the spectrum and then recommends immediate and long-term treatment options to meet the needs of each child's educational and developmental needs.
http://www.chop.edu/service/autism-center/home.html

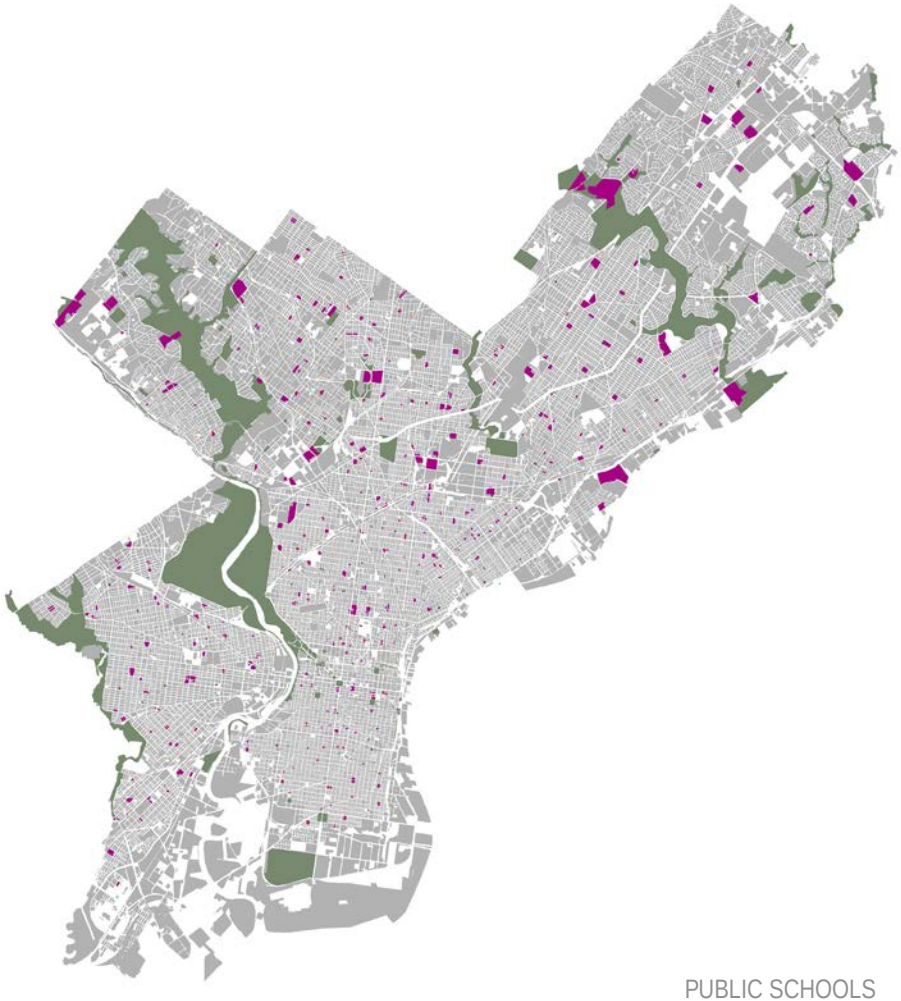




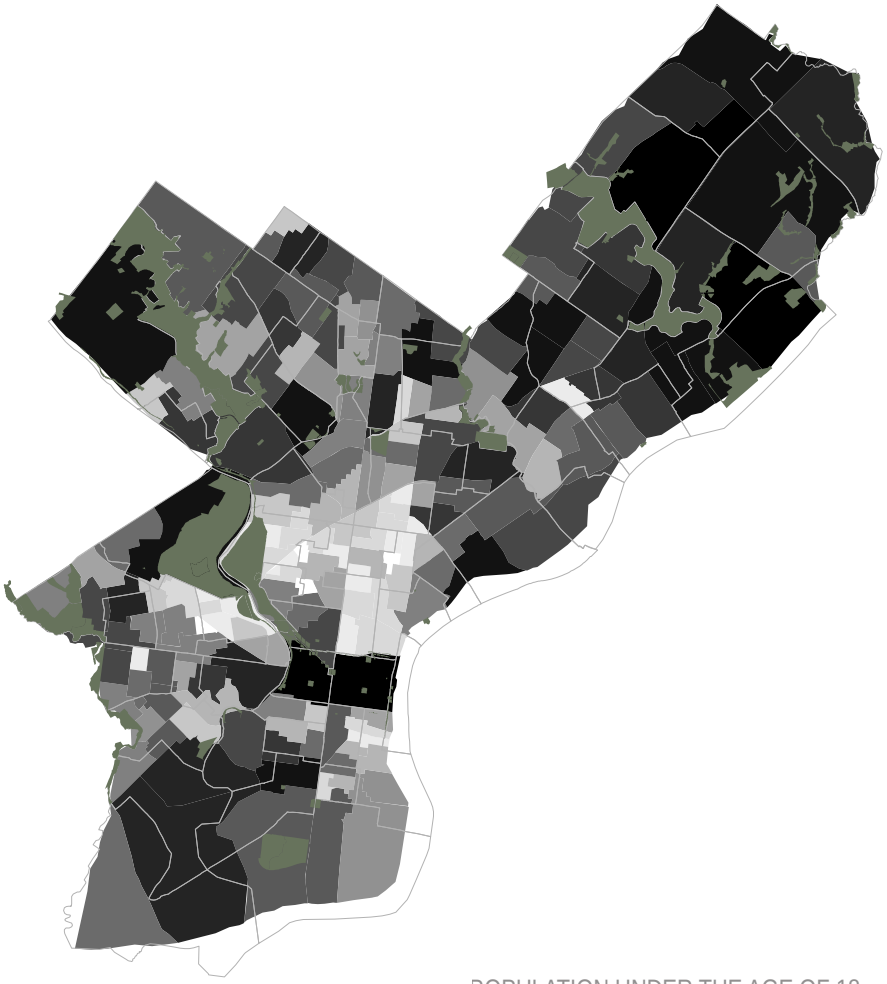
CULTURAL AMENITIES



VACANCY



PUBLIC SCHOOLS



POPULATION UNDER THE AGE OF 18

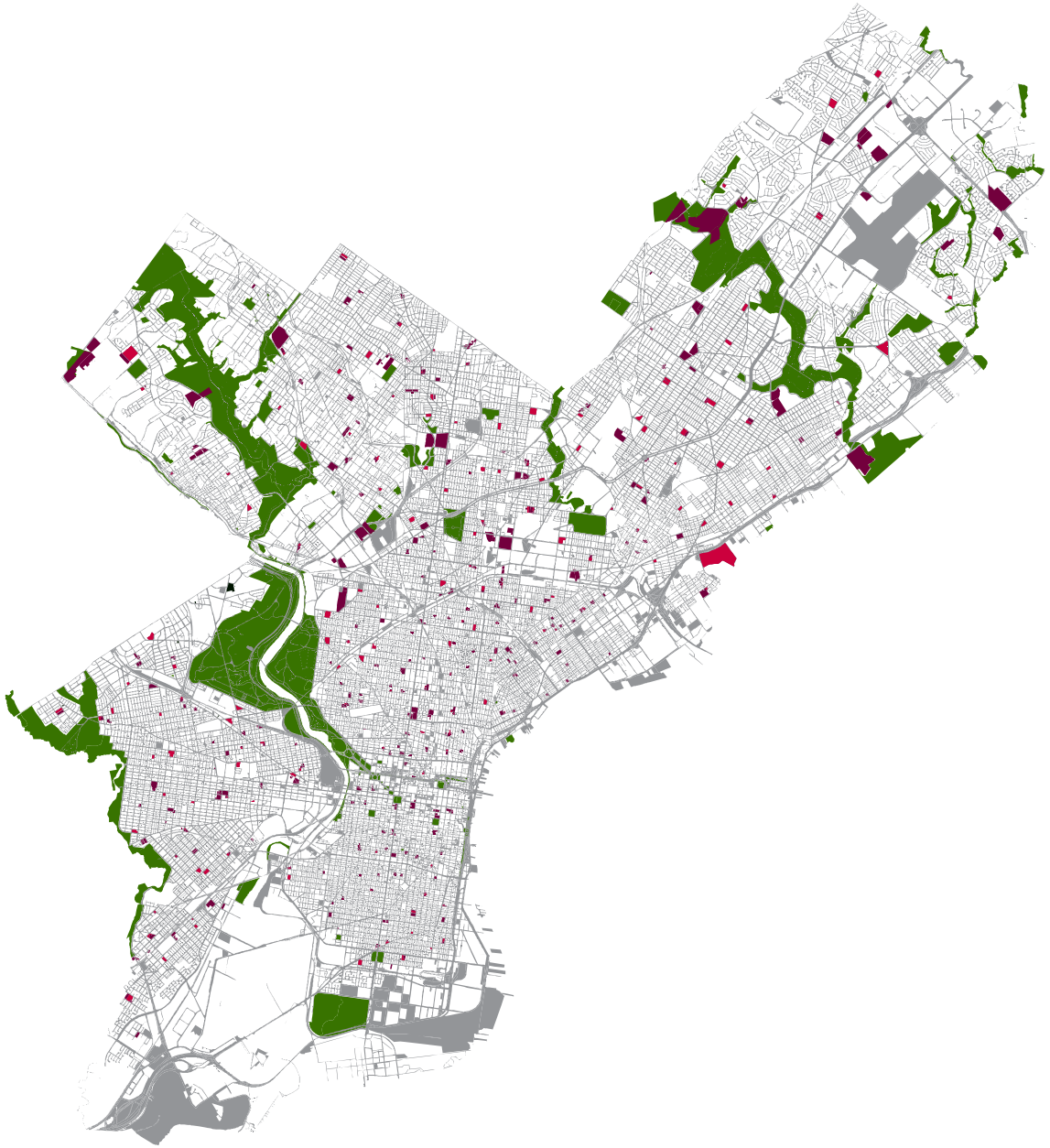
[+] [-]

Philadelphia Public Schools_

About Us
The School District of Philadelphia is the eighth largest school district in the nation, by enrollment. Located in a historic and culturally rich setting, we are a racially and ethnically diverse community committed to education. We are students, parents, teachers, staff, and community members; we are the School District of Philadelphia.

Our Mission
The mission of the School District of Philadelphia is to provide a high-quality education that prepares, ensures, and empowers all students to achieve their full intellectual and social potential in order to become lifelong learners and productive members of society.

The school district of Philadelphia is the eighth largest district in the nation; within the city there are 174 public elementary schools. In 2008 a strategic plan was created by the former superintendent, Arlene Ackerman, to improve the failing conditions of the public school system with the core goal being “to accelerate success for all of Philadelphia’s children” (Strategic Plan 3). This plan, titled “Imagine 2014”, sets out to ways to improve and accelerate the student’s overall academic performance. The plan wants to achieve “a great city system of schools in which teachers, principals, parents, staff, policymakers, and the entire community collectively focus all energy, efforts, planning and development, resources, and initiatives on building a 21st–century culture of achievement … where children come first, excellence is the norm, talent is nurtured, opportunities are made equal, and success is measured by the steady improvement of teaching and learning in classrooms system-wide … resulting in accelerated student progress … a school system in which all students succeed, families have many quality choices, the staff is great, adults are accountable, and world-class operations support the entire enterprise” (Strategic Plan). The need for schools that enhance the learning experience and opportunities for the children of Philadelphia is one that the city government is currently trying to provide to all residents.


PUBLIC SCHOOLS
elementary
high schools

Fairmount Park System_

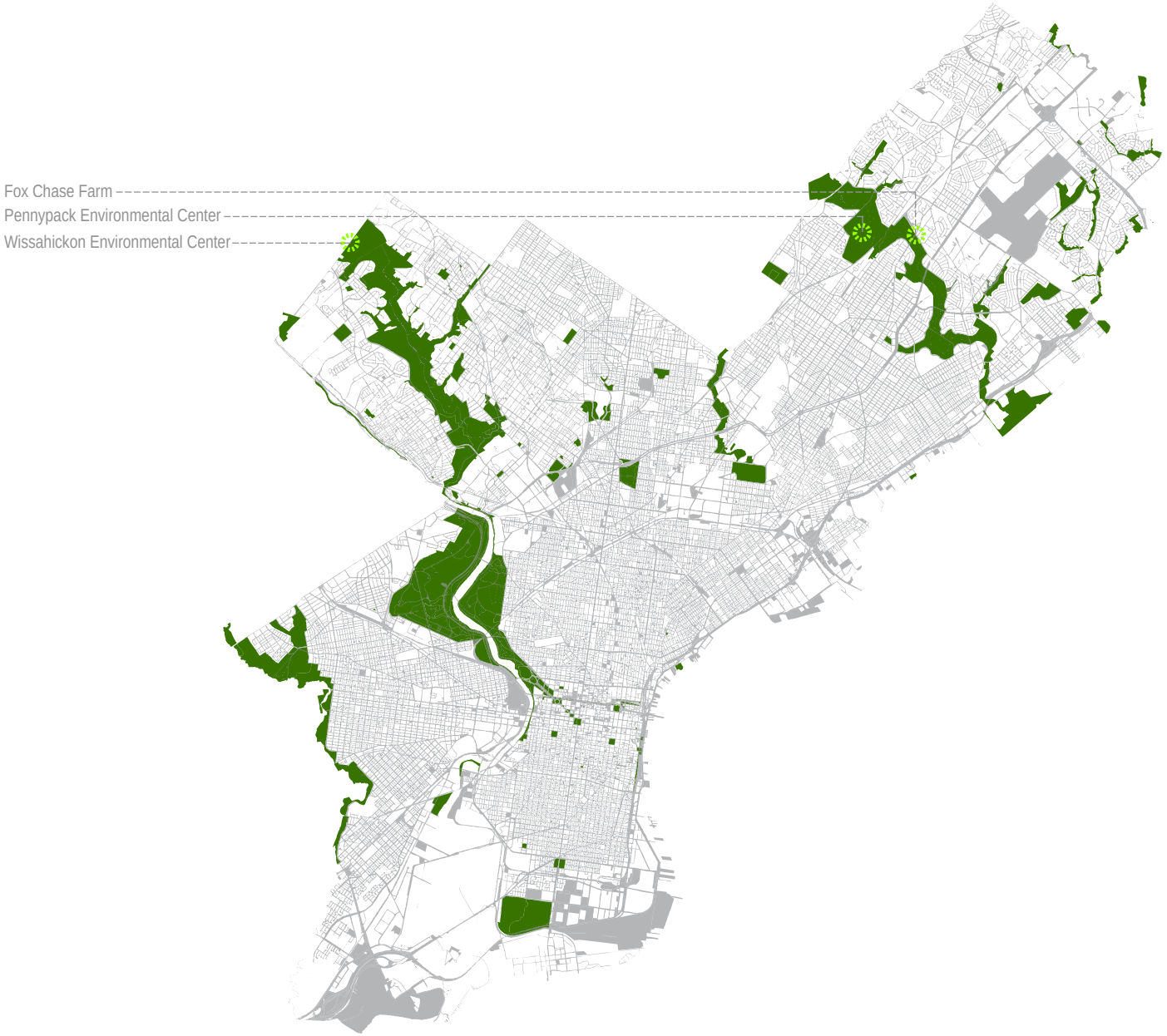
“Philadelphia is a city within a park” (Strategic plan 2). The history of the city is rooted in the important role of open space and public parks as envisioned by the city’s founder, William Penn. The Fairmount park system contains over 77 parks covering 9,200 acres of land citywide. Every resident in Philadelphia can walk to one of these parks. The park system has grown and transformed over time in order to meet the needs of the public. “Throughout its history, Fairmount Park has been lauded and criticized, examined and debated, and has strived to endure its role as a place to seek haven from the stress of urban living.” (Bridging 2). It is home to a large collection of public art, cultural spaces, recreation services, historic landmarks, community spaces, educational centers, a recycling center, and various species of trees and animals.

By designing an inclusive elementary school on a border of West Fairmount Park, the largest green space within the park system, students will find refuge from the sensory over load of the city. The school will interact with both the landscape and respond to the urban fabric acting as a space of refuge from the city. The school will provide spaces for the community and act as an extension of the park thus fulfilling the contemporary needs of Philadelphians as well as the educational reformers.

Fairmount Park Strategic Plan_

In 2003, the city of Philadelphia has created a plan, “Bridge to the Future”, for Fairmount Park that is intended to transform and revitalize the system. The mission of this plan is to “Preserve, protect, and maintain the open space, street trees, natural, and cultural resources of Philadelphia’s parks for the recreation and enjoyment of residents and visitors. Educate the public on the environment, history, and use of the Fairmount Park system. Promote, celebrate, and enhance the uniqueness and value of the Fairmount Park system and its economic impact to the City, region, and state.” “Bridge to the Future” is a community based planning approach that asks the people of Philadelphia what they want from the park in terms of resources, amenities, and facilities.

One of the main goals of this revitalization strategy is to educate the public on the environment, history, and use of the Fairmount Park system. A school located on the boarder of the park could not only educate children but also provide spaces that complete the educational goals of the strategic plan. Two major systems that have in the past structured society in Philadelphia are currently undergoing revitalization plans. How can these two systems come together to enhance and have a relationship with one another?



FAIRMOUNT PARK
EDUCATIONAL
CENTERS

History of Fairmount Park System_

In 1855, 2,400 Philadelphians signed a petition urging the city to purchase land for use as a public park. The city had an ongoing problem with providing people with clean drinking water so in an effort to protect the water supply a second piece of land was purchased and the city prohibited any development on it. “Unlike New York City’s Central Park with its man-made landscapes, Fairmount Park evolved through the absorption of older estates, their tree groves and open meadowland without significant alterations.” (“Park Origins”).

West Fairmount Park was designated as parkland in 1867 and is currently the largest park in Philadelphia. This park is most famous as being the site of the U.S. Centennial Exposition in 1876 when “the nation celebrated both its founding and its industrial prowess and prospects for the future” (“Fairmount Park”). Currently it is home to many cultural amenities including the Please Touch Museum, a Japanese garden and teahouse, and the Mann Performing Arts Center. Fairmount Park has always been a landscape in transition that has evolved over the years to absorb and meet the ever-changing needs of the residents of Philadelphia.

.

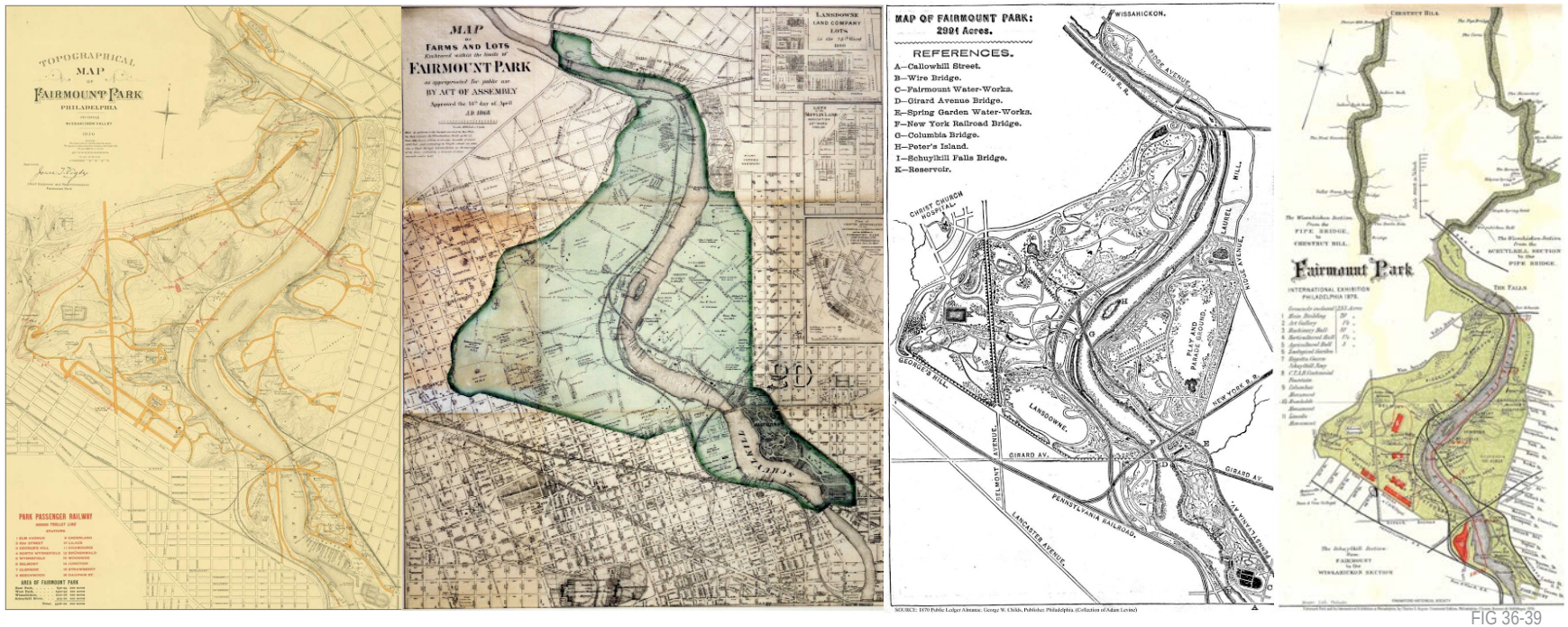


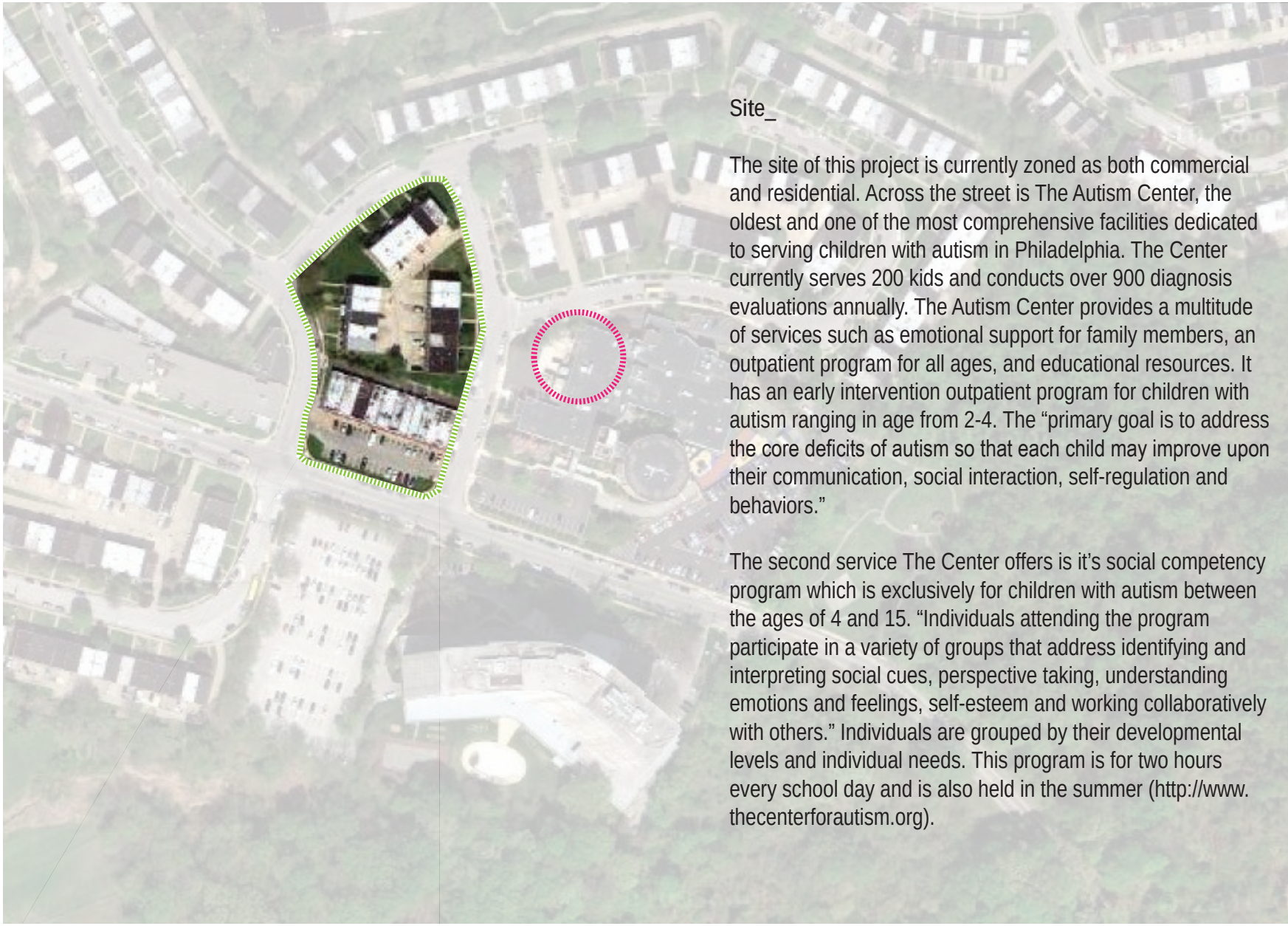
FIG 36-39_

West Fairmount Park_

West Fairmount Park is the largest green space in the park system. Currently it is home to many cultural amenities such as the Please Touch Museum, Japanese Gardens, and a Performing Arts Center. The northwest area of West Fairmount Park has one of the highest populations of children under the age of 18 but does not have many public elementary schools in close proximity. The Autism Center, which provides services to children from all over the city, is located on the border of this park.

1_The Autism Center
2_Shofuso Japanese House
3_Please Touch Museum
4_The Mann Center

LANDUSE
- residential
- commercial
- cultural
- vacant
- civic
- parks
- industrial
- K-6 schools



Site_

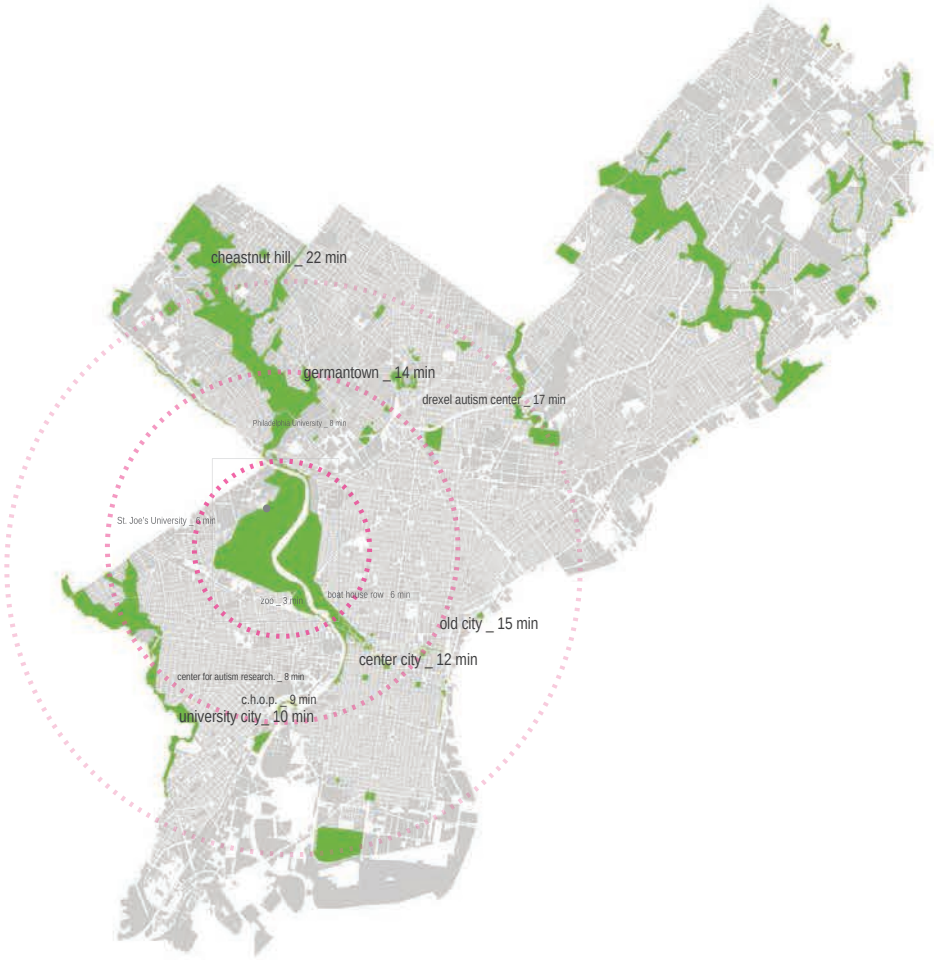
The site of this project is currently zoned as both commercial and residential. Across the street is The Autism Center, the oldest and one of the most comprehensive facilities dedicated to serving children with autism in Philadelphia. The Center currently serves 200 kids and conducts over 900 diagnosis evaluations annually. The Autism Center provides a multitude of services such as emotional support for family members, an outpatient program for all ages, and educational resources. It has an early intervention outpatient program for children with autism ranging in age from 2-4. The “primary goal is to address the core deficits of autism so that each child may improve upon their communication, social interaction, self-regulation and behaviors.”

The second service The Center offers is it’s social competency program which is exclusively for children with autism between the ages of 4 and 15. “Individuals attending the program participate in a variety of groups that address identifying and interpreting social cues, perspective taking, understanding emotions and feelings, self-esteem and working collaboratively with others.” Individuals are grouped by their developmental levels and individual needs. This program is for two hours every school day and is also held in the summer (http://www.thecenterforautism.org).

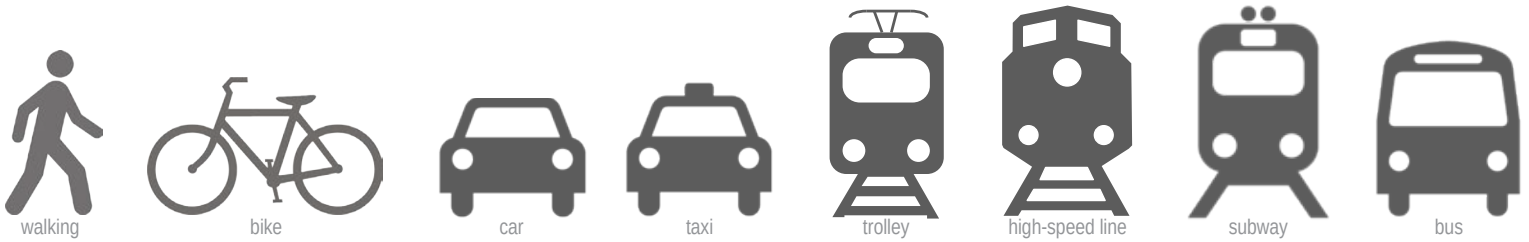

site
the autism center
LANDUSE
residential
commercial
cultural
vacant
civic
parks
industrial
K-6 schools

Centrality_

The central location of West Fairmount Park gives the park a unifying role within the city. It is a very accessible site and landmark within the urban fabric. Philadelphia has many methods of public transportation which is vital to an inclusive school. Different options of transportation allow both students and community members to easily get to the kindergarten, contributing to the inclusiveness of the building.



MODES OF TRANSPORTATION IN PHILADELPHIA




TRANSPORTATION
subway station
bus stop
bike network
highway
sidewalk

pedestrian_

residential_

PROPOSED SITE_

VESTIBULAR

PROPRIOCEPTION

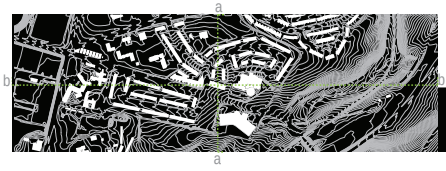
sound

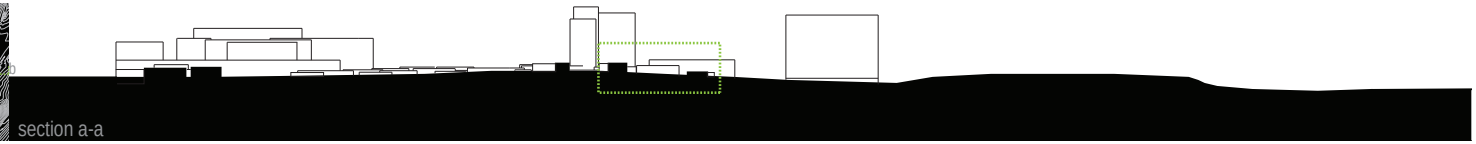
smell

SOUND

VESTIBU

TACT





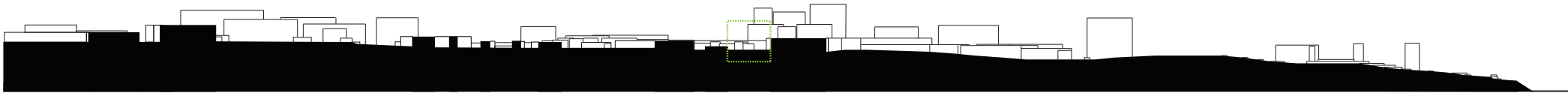
section a-a

medical complex_ park_ street_

LAR VISION sound TACTILE

I L E PROPRIOCEPTION tactile smell VISION SOUND

vestibular



section b-b

Auditory_Sound Map

SOUND NODES

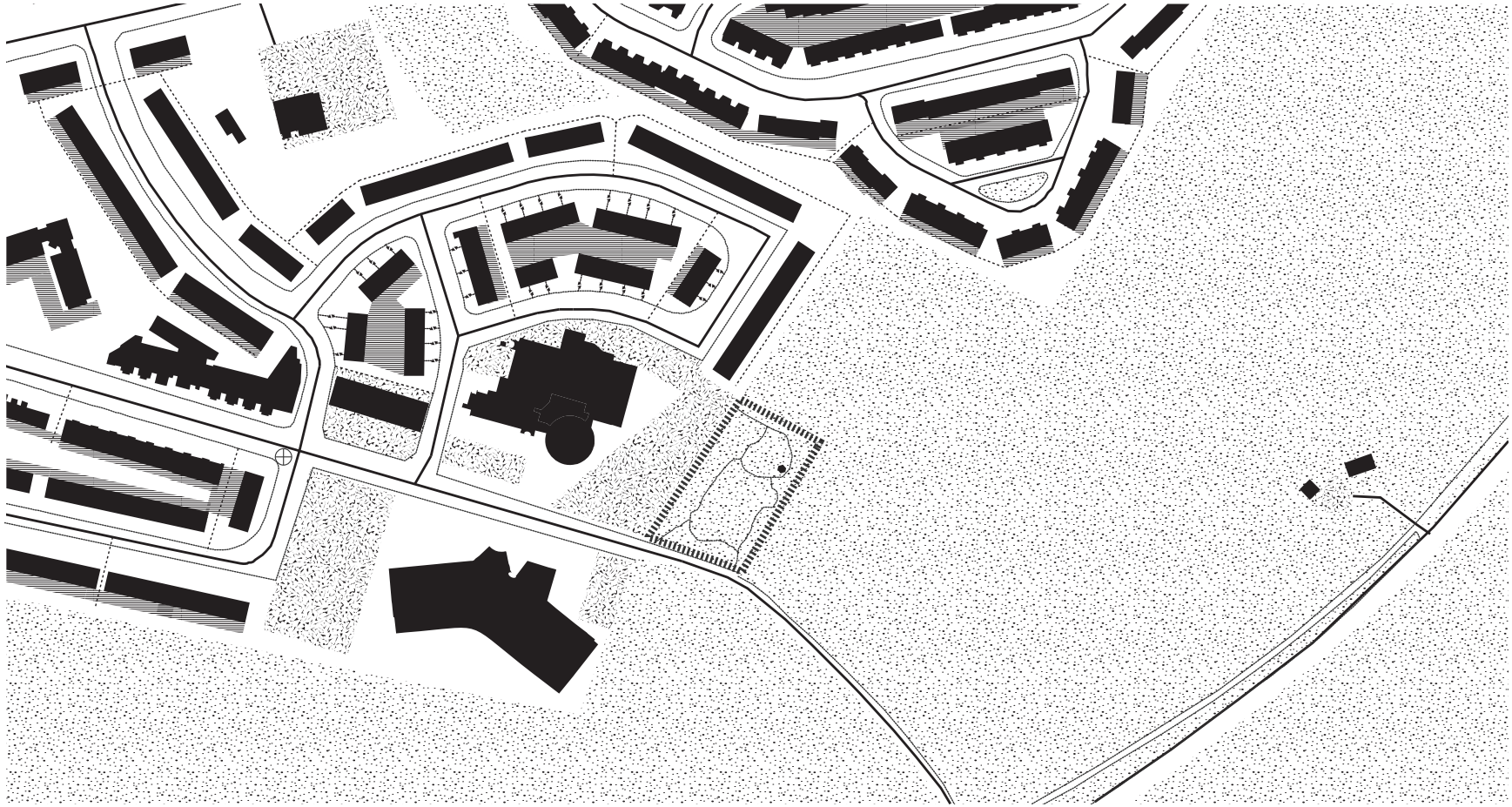
people

public transportation

nature

cars

Tactile_Surface Map



SURFACES
- green space
- asphalt lot
- concrete lot
- building
- asphalt street
- concrete sidewalk
- concrete access road
- chain-link fence
- concrete stairs

“An awareness of ones unique existence in space is essential in developing a consciousness of perception. Architecture holds the power to inspire and transform our day to day existence”

-Steven Holl

5

“Knowledge is the most democratic source of power”

-Alvin Toffler

Program_

Currently, there are plenty of schools exclusively for children with special needs or learning disabilities (which are almost always private) and there are schools for general education. However, there are minimal public schools specifically designed for an inclusive education approach. In order to support this idea of inclusiveness, the program needs to be flexible and adaptable to a certain level. The program needs to address the educational, social, developmental, physical, and cognitive needs for all the students of the building. This can be achieved creating various sensorial spaces that speak to the perceptions of the occupants. Possibly the program will be split into smaller spaces that each have their own identity and likewise unique sensory characteristics.

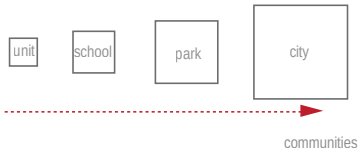
The program of the kindergarten will mediate and provide a relationship between the two main strategic plans happening in Philadelphia, which are the public education plan and the Fairmount Park strategic plan. The building will have private spaces specifically for the kindergarten and other areas for the environmental education center that can be accessed by the public. The school will also have spaces that are shared by both the school and park educational center. Therefore the idea of inclusiveness extends to all the users of the building, which include students, parents, teachers, and community members. All of these user groups will be able to use the building in a productive manner.

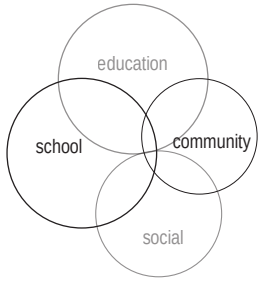
Figure 11 – Facility Needs Assessment Priority Ranking

Ranking	Facility/Amenity	High	Medium	Low
1	Restrooms			
2	Concessions (e.g. food/beverage/rentals, etc.)			
3	Hike/Bike Trails (1)			
4	Historic facilities			
5	Natural areas			
6	Playgrounds			
7	Signage			
8	River use/Water Sports (2)			
9	Basketball Courts			
10	Tennis Courts			
11	Environmental Education Centers			
12	Game Fields (3)			
13	Picnic Areas/Pavilions			
14	Drinking Fountains			
15	Golf Courses			
16	Skate Park			
17	Dog Parks			
18	Gardens			
19	Recreation Centers			
20	Visitor Center			
21	Chess Tables			
22	Bocce Courts			
23	Equestrian Trails			
24	Cricket			
25	Cross Country Running			
26	Disc Golf			
27	Equestrian Facilities			
28	Ice Rinks			
29	Outdoor Volleyball			
30	Track and Field			

Notes:
1. Combines Walking Trails and Bike Trails from Community Forum Questionaire
2. Includes boat concessions, etc.
3. Includes Baseball, Softball, Soccer, Football, Rugby, Cricket, La Crosse, etc.

FIG 40_Facilities members of the community reported were needed in the Fairmount Park System

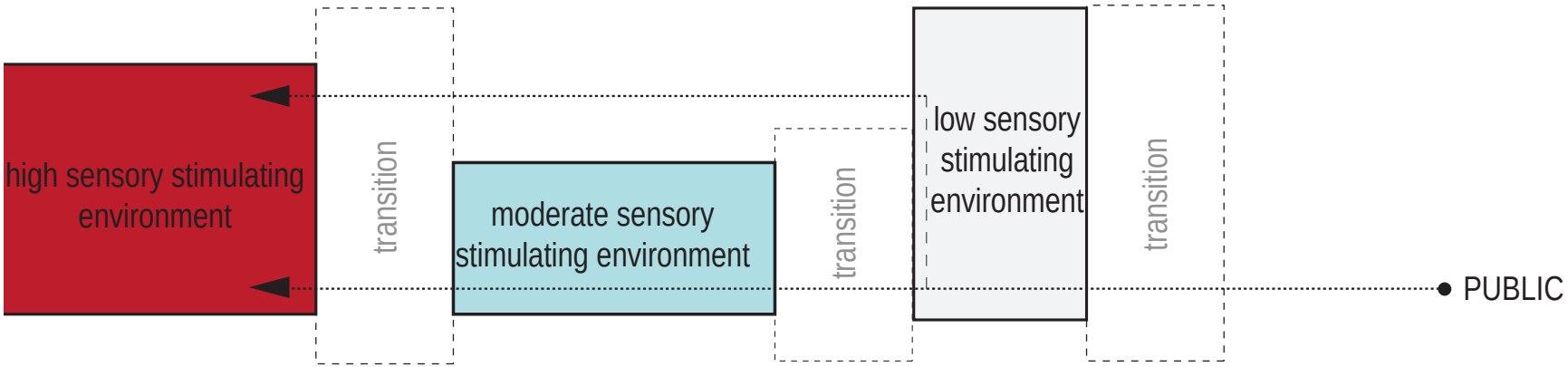




Sensory Perception and Autism_

Across from the site of the kindergarten is The Autism Center. The proximity of the two buildings lends itself to the idea of creating a dialogue between the two facilities. The kindergarten contains spaces that specifically support the development of children with autism that the Autism Center does not have at their facility, such as a sensory gym and physical therapy room. Children that attend the school can also enroll in the Center's after school program and likewise children that get support at the Center can use the kindergartens amenities. This relationship, along with the community-based programs, creates a school that can be used more than the typical school week and year. Children with autism tend to have a difficult time adjusting to becoming members of the community and this inclusive kindergarten could help them accomplish this task along with their educational and developmental goals.

Sensory transition spaces are an important feature of a kindergarten because they may help to prepare children to move to or from a different sensory level environment with minimal distraction. These transition zones can be in the form of a garden or sensory curriculum space. Possibly these spaces could help a child with autism form a sensory calibration that could potentially aid in the movement from different sensory zones and act as a navigational tool (Mostafa). Individual withdrawl zones are important aspects of design for children with autism. At times, the demands of socialization or the environment can overwhelm children with autism. Providing safe spaces that allow the child to escape from the stressor is important to calm them down.



kindergarten

Classroom (6)	2,000 sq. ft.
Cafeteria	2,000 sq. ft.
Kitchen	500 sq. ft.
Library	1,500 sq. ft.
Gym	2,500 sq. ft.
Art	1,000 sq. ft
Music	1,000 sq. ft.
Restrooms	100?
Storage	500 sq. ft.
Teacher room	300 sq. ft.
Offices	500 sq. ft.
nurse, principal, admin, community	
Withdrawl space	250 sq. ft.
Indoor play	2,000 sq. ft
OT room	500 sq. ft.
PT room	500 sq. ft.
Sensory gym	1,000 sq. ft.

community

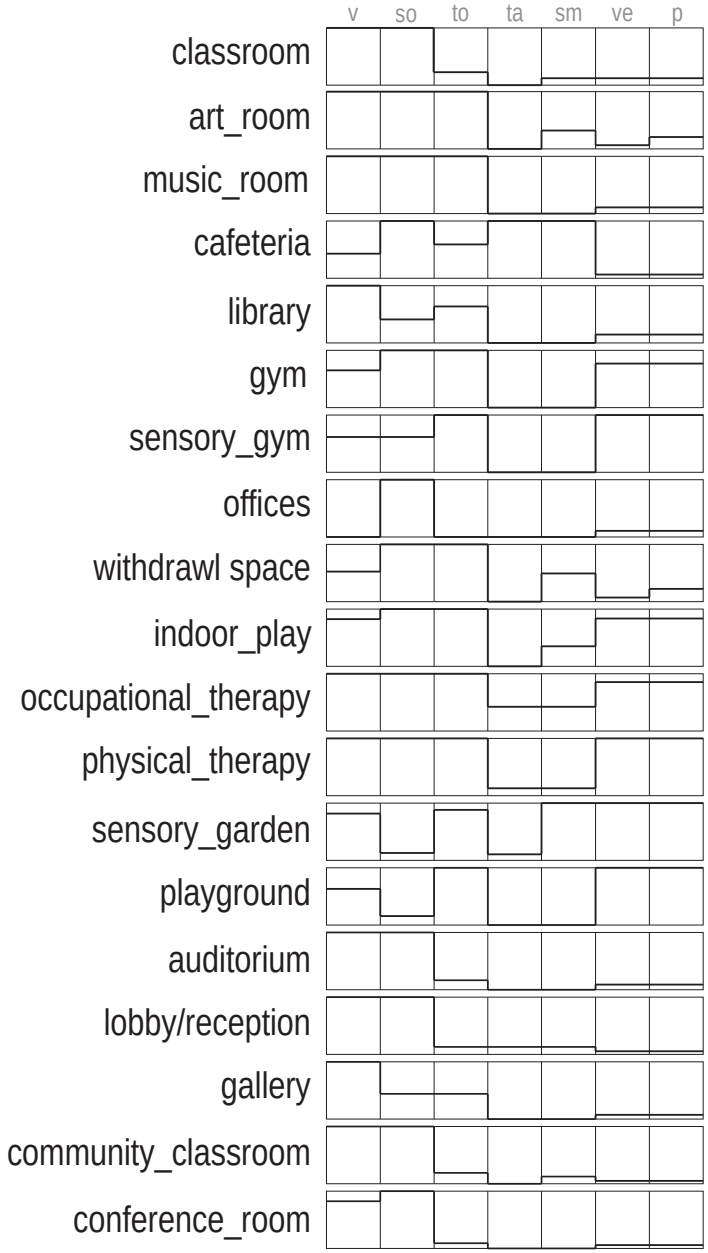
Parking	1500 sq. ft.
Lobby	500 sq. ft.
Reception	500 sq. ft.
Auditorium	3,000 sq. ft.
Sensory gardens	5,000 sq. ft
Playground	1,000 sq. ft.
Circulation	500 sq. ft.
Bus Shelter	200 sq. ft.

Gallery	1,500 sq. ft.
Community educational spaces	800 sq. ft.
Conference rooms	300 sq. ft.

TOTAL SQ. FT._ 30,000 sq. ft.

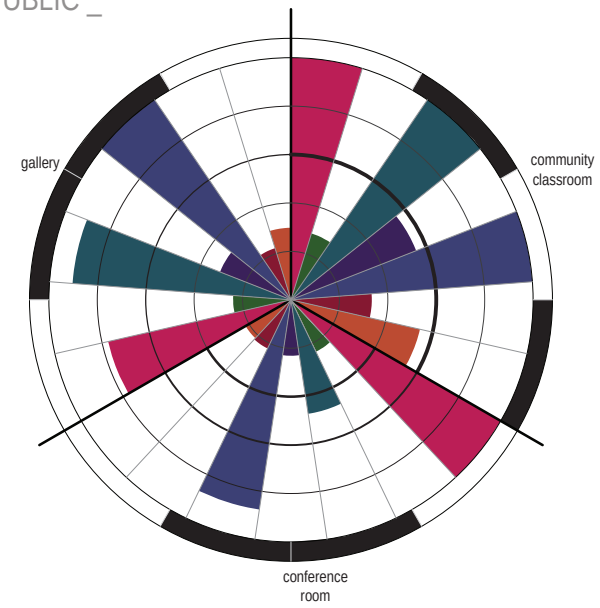
_ 8,000 sq. ft. outdoor space

_22,000 sq. ft. indoor space

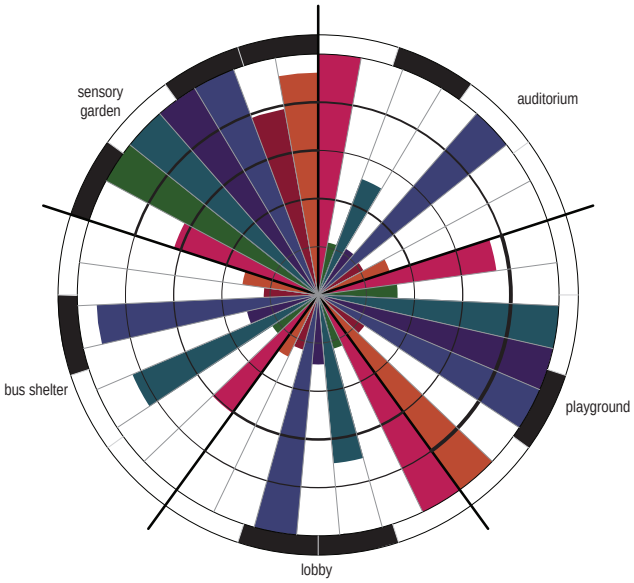

v
so
to
ta
sm
ve
p
classroom
art_room
music_room
cafeteria
library
gym
sensory_gym
offices
withdrawl space
indoor_play
occupational_therapy
physical_therapy
sensory_garden
playground
auditorium
lobby/reception
gallery
community_classroom
conference_room


high sensory program
low sensory program
classroom
art classroom
music classroom
cafeteria
library
gym
sensory gym
offices
withdrawl space
indoor play
P.T. therapy room
O.T. therapy room
sensory garden
playground
auditorium
lobby
gallery
community edu space
conference room
social space

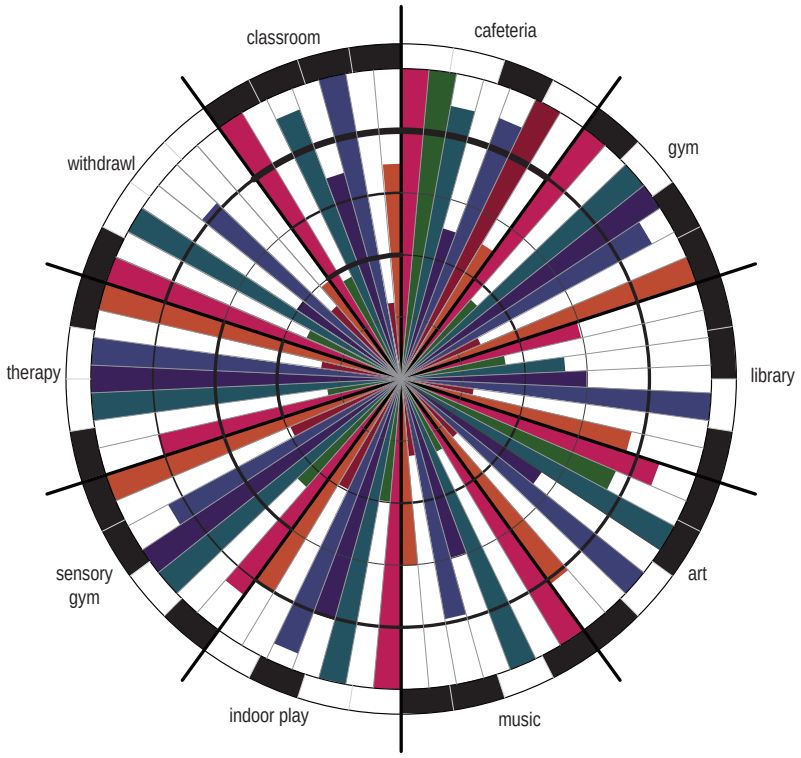
PUBLIC _

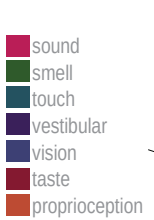


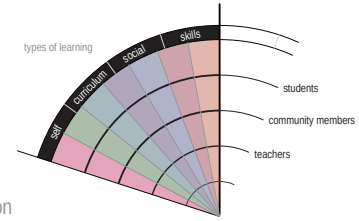
SHARED_



KINDERGARTEN_



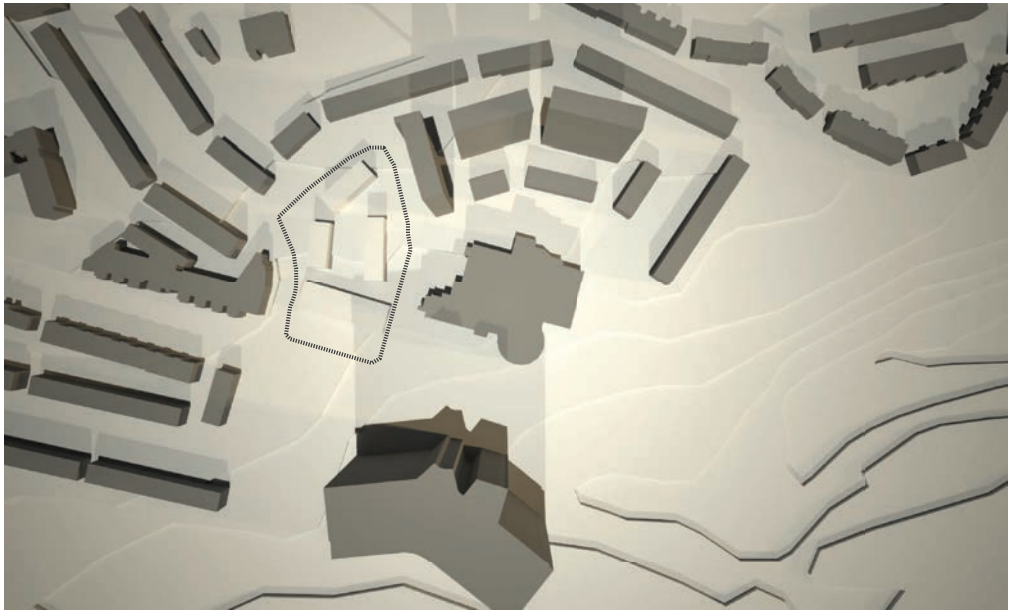




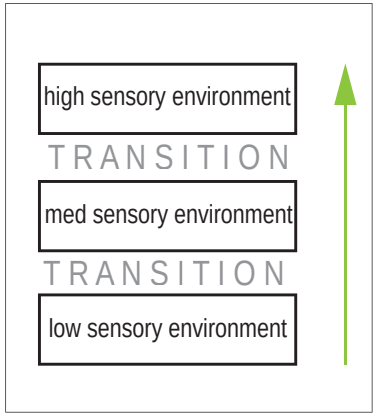
Site + Program_

ORIGINAL SITE

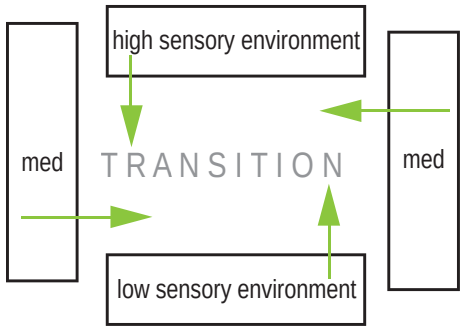
The site currently has a strip mall on the south end and three residential complexes to the north. The site is approximately 86,000 square feet in comparison to my program that is 30,000 square feet.



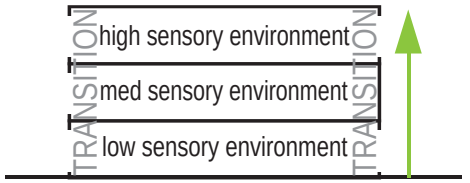
1_BARS OF PROGRAM

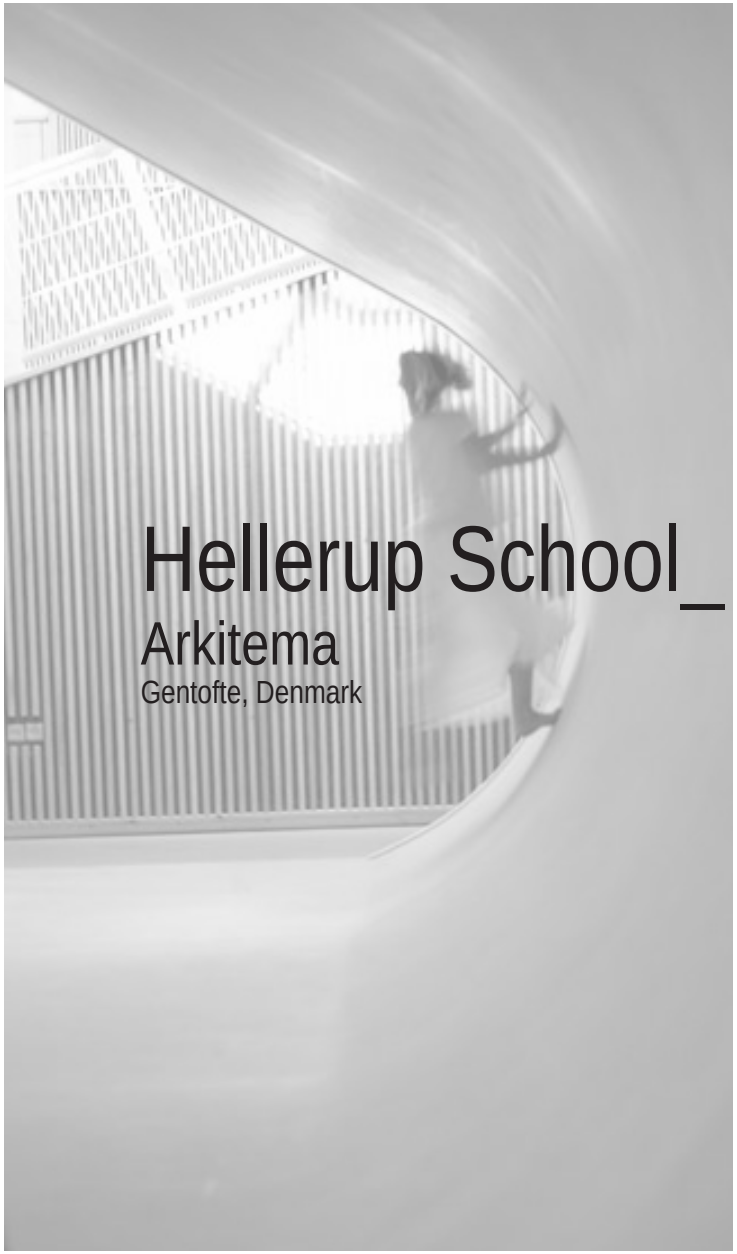


2_CENTRAL COURTYARD



3_ STACKED





Hellerup School_

Arkitema

Gentofte, Denmark

Hellerup School is rooted in the belief that all children have a unique learning profile and the architecture of the school responds to this pedagogical approach. The design reflects the idea that a child primarily learns through a combination of the visual, tactile, auditory, and kinesthetic senses by creating various learning spaces that engage multiple sensory receptors.

The sensory experience of Hellerup begins before the students enter the school. To reach the main entrance students have to walk through an educational landscape contrived of colorful paved mounds, aromatic vegetation, and a pool with stepping-stones. Once the children arrive in the main space of the school they take off their shoes. The removal of their shoes is intended to further trigger the senses by raising ones awareness of their body within the learning environment. “The floor areas are not merely flat surfaces, but a modeled landscape with staircases, plateaus, balconies and bridges, where the children can sit, jump about, stand, move around. Hellerup School is a network school, in which the physical and psychological distances have been minimized.” (Hetzberger 62). The architecture is able to engage the children’s senses and enhance their educational journeys.

The interior, including the grand staircase, balconies, and panels, is constructed of wood. Wood is a tactile material that connects the senses and creates a warm environment. The heart of the school is a large stair that is designed to engage all four of the main sensory apparatuses. Traditional teaching mainly takes place in the students’ home areas that are located in quiet corners of the building. These are flexible classroom like spaces that can be configured to match the students’ age and each class can create an identity for their home area (OWP Architects). The architecture of the Hellerup School is able to create various sensorial environments that engage the students’ innate learning processes. The architects were able to fuse together modern teaching approaches and physical space to create a seamless educational catalyst.

Atrium + Staircase _

The heart of the building is the large stairway area, which is much more than just a stairwell leading from one floor to another. Various activities take place on the stairs, such as socialization, teaching, movement, recreation, presentation, group work, etc, that are vital to the student's education. It activates the senses by "demanding action-do you go up or down, jump or stop, sit or stand- and in that way enables children to make choices and become more aware of their bodies." (OWP Architects 186). The atrium creates visual connections across the building. This in itself is a learning opportunity since children can easily observe their peers and older classmates at work. This central space is also the main circulation armature. It creates opportunities for socialization and self-learning which are important aspects of the development of children.

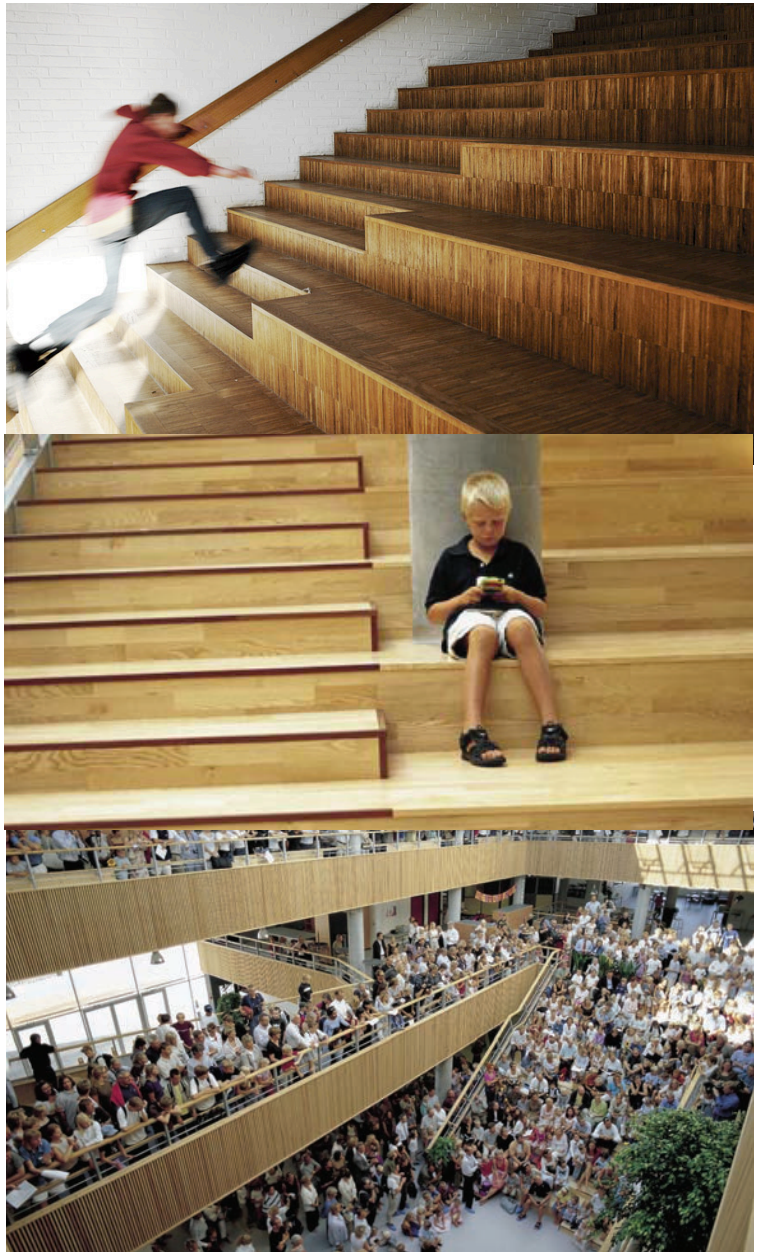
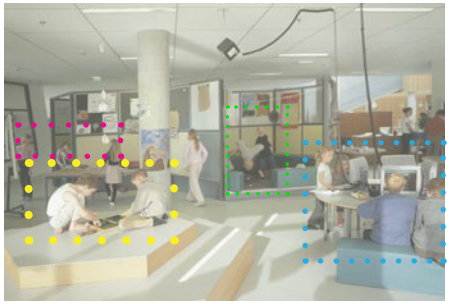


FIG 41-45_

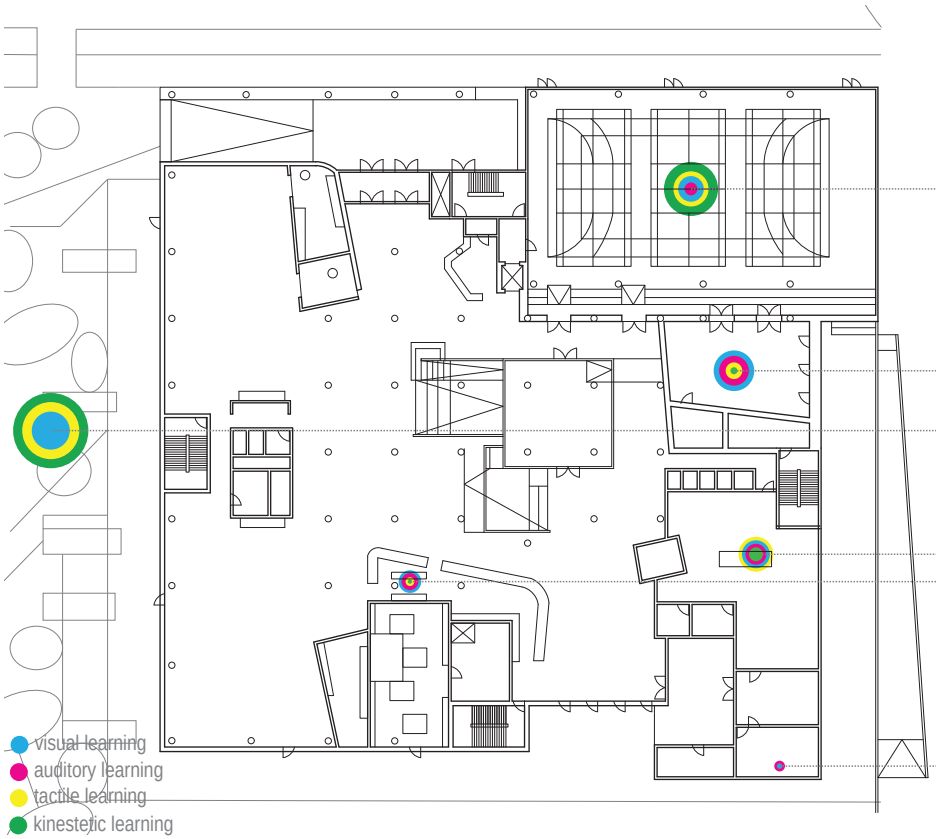
playground

seating

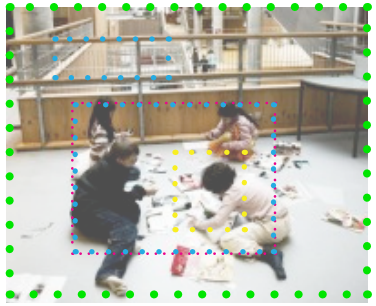
multi-purpose room



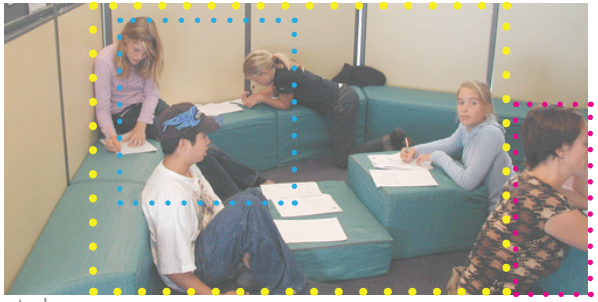
activity center



"home learning area"



circulation



study space

stairs

gym

individual study space

circulation center

multi-purpose room

staircase

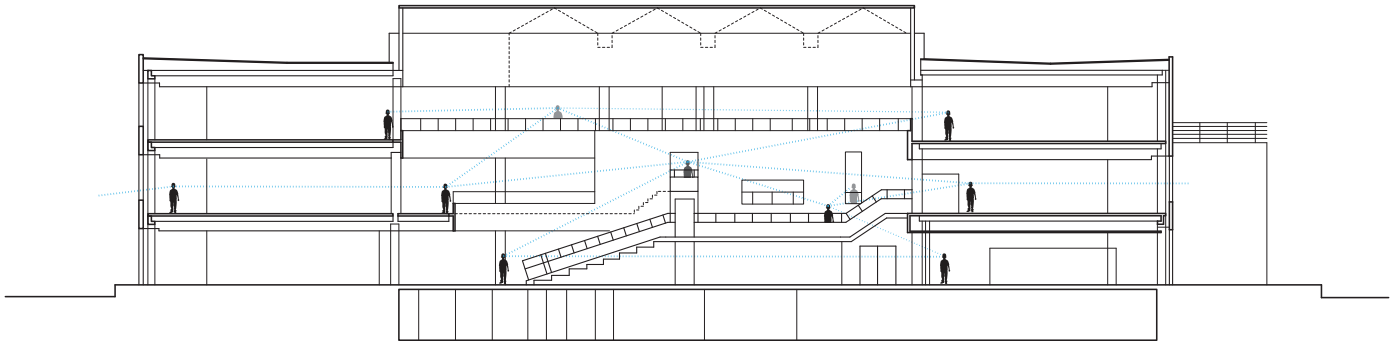
playground

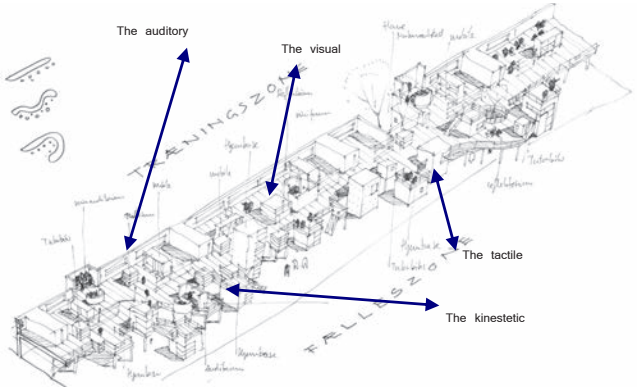
activity center

seating

"home learning area"

office





Circulation_

The main axis of circulation is the monumental staircase. From this central circulation sequence one can choose his/her own path. The open plan allows the students to create their own experience and utilize the space in the manner that best suits their needs.

Views_

The central atrium space provides the users with a way to learn through observation. Students can watch other people from one side of the building to the other and potentially learn something from this direct view.

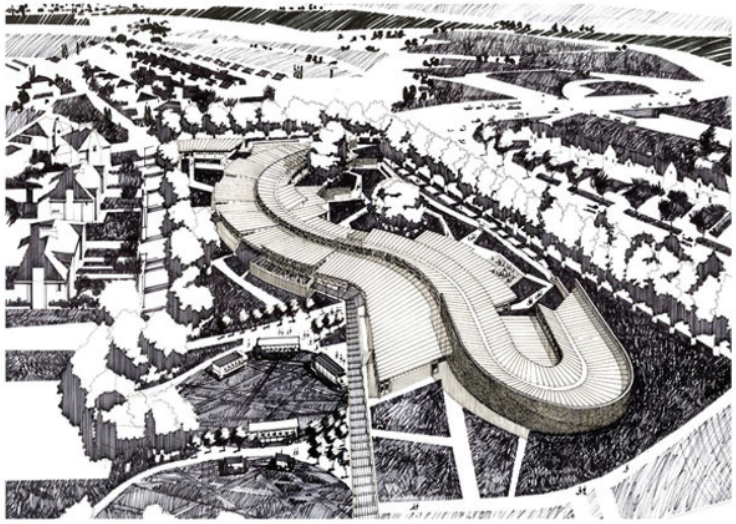
Hazelwood School for the Multi-Sensory Impaired

Gordon Murray + Alan Dunlop Architects

Glasgow, Scotland

Site_Sound

The school is located near Glasgow's Bellahouston Park and many people within the community had considered the site to be part of the park itself. Therefore, the architects wanted to preserve the natural landscape and integrate the school within the existing context. The school snakes around mature trees to create a series of intimate garden spaces that can double as outdoor classrooms (Sokol 1). These safe external spaces are an important educational opportunity for children with duel sensory impairments because it allows the children to experience the sensorial qualities of nature such as the rustling of leaves, heat of the sun, and feel of the grass. The organization of Hazelwood responds to the aural characteristics of the site by locating the classroom spaces away from the noisy roads that border the school on two sides ("Hazelwood School").



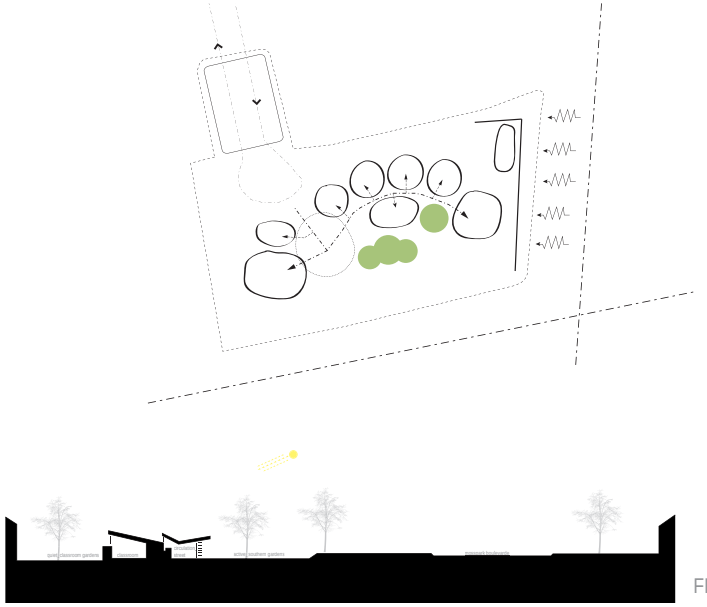
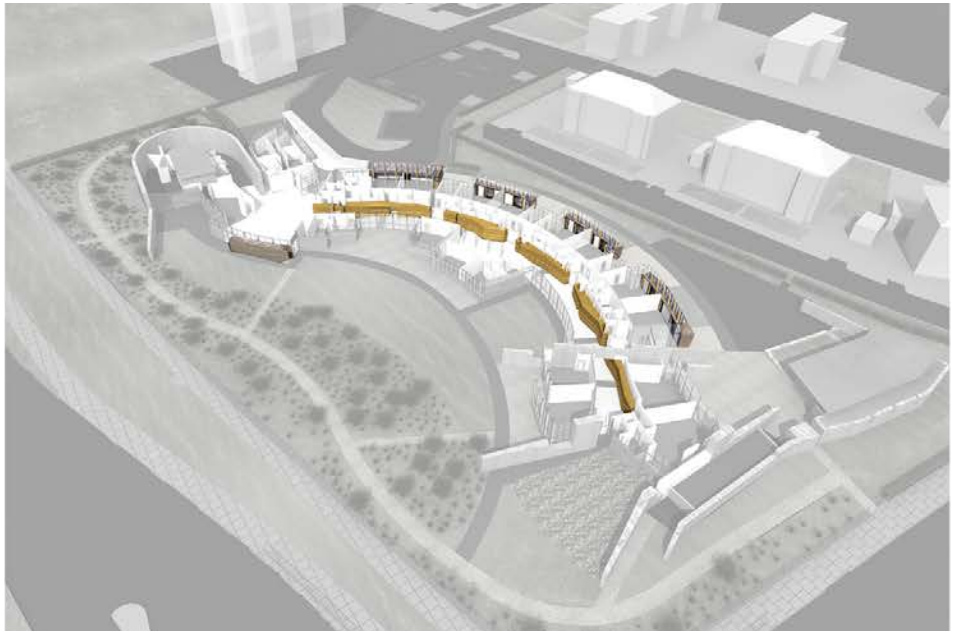
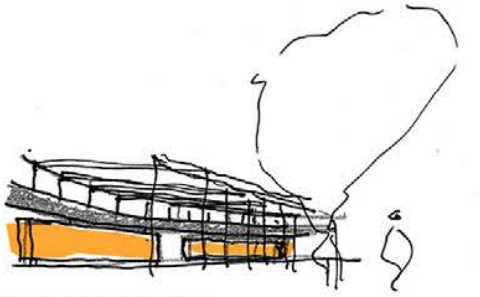


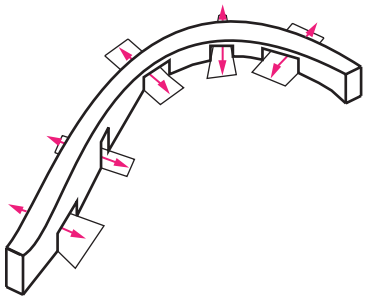
FIG 46-49_

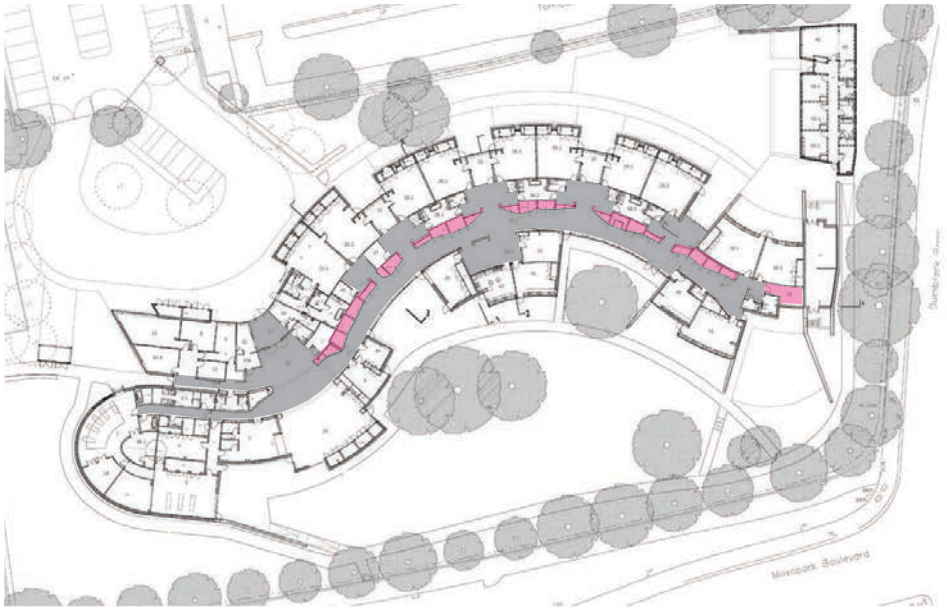
Sensory Wall_Touch

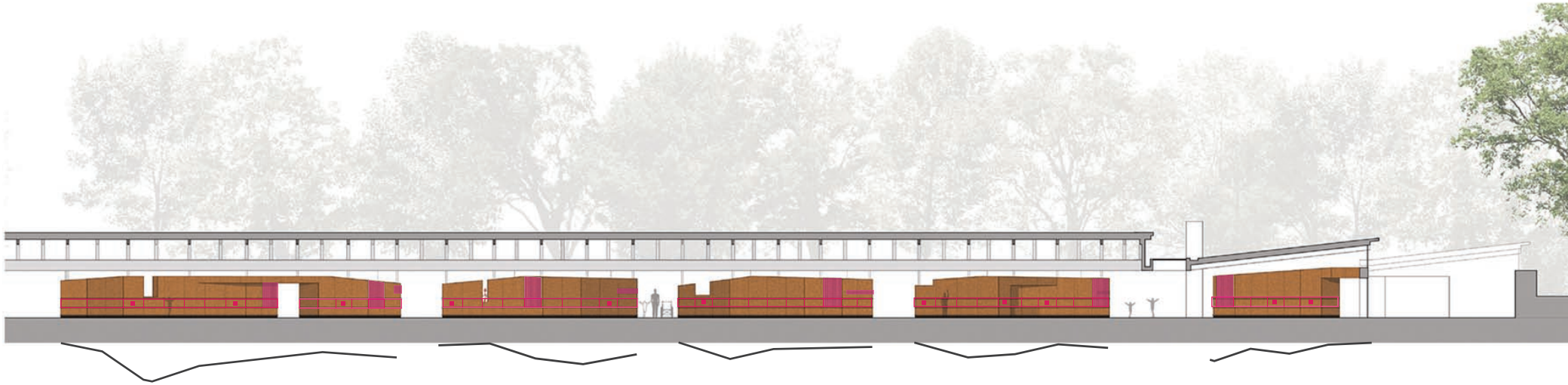
Ease of navigation and orientation were essential design elements that support each student's developing independence. In order to avoid an institutional feeling very few handrails are incorporated into the design. Instead, the circulation spine contains a sensory wall, a folding cork plane that provides sensory cues in order to allow the children to move throughout the school safely yet autonomously.





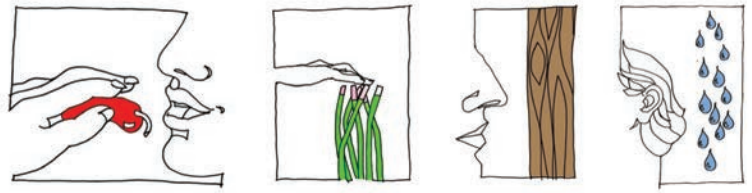






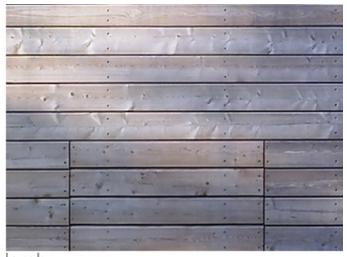
Materiality_Touch

The façade of the school utilizes materials that were chosen based on their sensory qualities of touch and smell. Natural larch weatherboarding develops a strong grain over time when exposed to the elements. This creates a rich tactile quality that students can use to navigate around the exterior of the building via the sense of touch. Roofing slate is also used on the exterior of the building to contrast the tactile qualities of the timber. The slate is noticeably harder to the touch and is used on the southern façade thus absorbing heat. The passive and active tactile characteristics of the slate act also act as a way-finding tool that defines exterior space (“Hazelwood School”).



senses maintained from site

slate

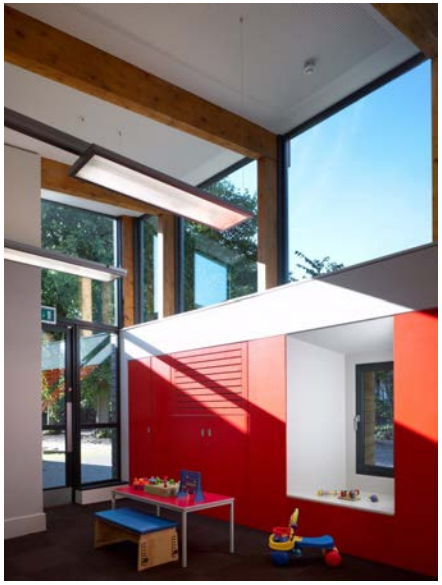


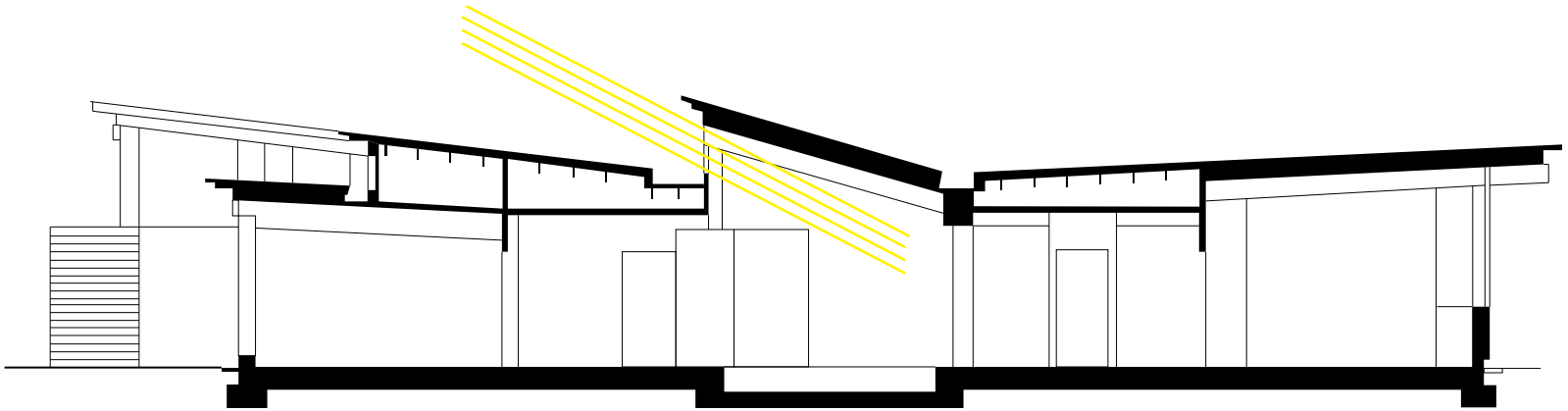
larch

materiality of the facade

Light and Color_Vision

Light was taken into careful consideration in the north-facing classrooms. High clerestory windows are the main source of natural light because it creates an even distribution of light and is able to penetrate deep into the spaces. In order to reduce external visual distraction (a design element that teachers say causes loss of concentration in some visually impaired children) storage boxes create a solid wall below these windows. At certain moments the wall is penetrated and a small void allows students views to the exterior. This was due to the fact that the architect wanted to “make students aware of the change of the seasons, the falling of rain, different smells,” (Sokol 1). These clerestory windows also surround the circulation spine (“Hazelwood School”).





“Equally, the task of art and architecture in general is to reconstruct the experience of an undifferentiated interior world, in which we are not mere spectators, but to which we inseparably belong.”

-Juhani Pallasmaa

6

Methodology_

Preliminary investigations demonstrate that architecture designed around the full range of sensory needs for the developmental of children, especially those with autism, is a complex task. The design approach will be focused on how the students perceive space at various scales and sensory profiles. In a way the design process will be from the inside out and will be constructed to design the parts of the whole based on the perceptual and sensorial processes of children with autism.

Conventional and nonconventional approaches to design will be incorporated in the design process. Tactile, visual, auditory, and kinesthetic systems will be the main sensory realms in which I design spaces around. This is due to the fact that these sensory systems are most affected by space and because they all correspond to a learning type. New visual techniques that are generated from issues involving the senses will be used to test the spatial implications of the design; even those sensory realms that are often rendered invisible such as sound.

The first task will be to design a classroom for each sensory profile. Examining the research of how children with autism with a specific sensory issue are affected by space. This idea of sensory perception in combination with how all children learn and experience space will be the driving force behind the design of the learning spaces. The classroom will support productive and flexible learning as well as developmental and social skills that are vital to all children, especially those with autism.

Creating the details of the spaces will be a very important design task. The more intimate the space the more intricate the details lend themselves to be. Also, spaces that are at one extreme of the sensory stimulation range will also typically have a highly designed detail because they will have a specific sensory identity. These considerations will heighten the sensory experience of spaces.

Glossary_

ac·cessi·bili·ty:
1. Easily approached or entered

at·mo·sphere:
1.An aesthetic quality or effect, especially a distinctive and pleasing one, associated with a particular place
2. a surrounding influence or environment

au·tism:
1.a developmental disability that is the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills

con·scious·ness:
1. The awareness or perception of something by a person

en·vi·ron·ment:
1. The circumstances or conditions that surround one

ex·pe·ri·ence:
1.direct observation of or participation in events as a basis of knowledge

in·clu·sive·ness:
1. creating a hospitable and welcoming environment; interacting with all members of the community without regard to individual characteristics
2. broad in orientation or scope

lear·ning:
1.The acquisition of knowledge or skills through experience, practice, or study, or by being taught

neur·o·typ·i·cal:
1. a label for people who are not on the autism spectrum

per·cep·tion:
1.The ability to see, hear, or become aware of something through the senses
2. awareness of the elements of environment through physical sensation

phe·nom·e·nol·o·gy:
1. the study of structures of experience, or consciousness. the study of “phenomena”
2.appearances of things, or things as they appear in our experience, or the ways we experience things, thus the meanings things have in our experience

sen·sa·tion
1.A physical feeling or perception resulting from something that happens to or comes into contact with the body

sen·ses
1.A faculty by which the body perceives an external stimulus

spec·trum
1.A range of values of a quantity

well-be·ing
1. The state of being comfortable, healthy, or happy

Works Cited _

Albano, Alanna. “Through Different Eyes: How People with Autism Experience the World.” Serendip. Serendip, 01 Sept. 2008. Web. 10 Sept. 2011.

“Autism.” PubMed Health. Ed. Neil K. Kaneshiro and David Zieve. A.D.A.M. Medical Encyclopedia., 26 Apr. 2010. Web. 14 Sept. 2011. <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002494/>.

Blesser, Barry, and Linda-Ruth Salter. Spaces Speak, Are You Listening?: Experiencing Aural Architecture. Cambridge, MA: MIT, 2007. Print.

Bogdashina, Olga. “Different Sensory Experiences - Different Sensory Experiences.” Autism Today. Web. 02 Sept. 2011. <http://www.autismtoday.com/articles/different_sensory_experiences.htm>.

“”Bridge to the Future” - Fairmount Park’ Strategic Plan.” Fairmount Park. Web. 08 Nov. 2011. <http://www.fairmountpark.org/StrategicPlan.asp>.

Brown, David. “The Forgotten Sense – Proprioception.” DBL Review (2006): 20-24. Web. 20 Oct. 2011. <files.cadbs.org/200000352.../1_proprioception_dbrown.pdf>.

Brown, David. “The Vestibular Sense.” DBL Review (2007): 17-22. Web. 6 Oct. 2011. <files.cadbs.org/200000353-9f7fca079e/2_vestibular_dbrown.pdf>.

Burke, Catherine, and Ian Grosvenor. School. London: Reaktion, 2008. Print.

Care, Leo. “SEN School Design; Inclusion, Integration and Inspiration.” Imagine: Ispirational School Design. Balfour Beatty Education. Web. 14 Sept. 2011. <http://www.imagineschooldesign.org/29.html?>.

Change in School Autism Rates from 2004-2009, by State. Digital image. 24/7 Wall St. The Individuals With Disabilities Education Act Data Accountability Center Read More: Can America Afford The Rising Cost Of Autism? - 24/7 Wall St. Http://247wallst.com/2011/03/10/can-america-afford-the-rising-cost-of-autism-education/#ixzz1fQtq2OLn, 2010. Web. 13 Nov. 2011. <http://247wallst.files.wordpress.com/2011/03/change-in-school-autism-rates-by-state.jpg>.

Cuito, Aurora. Kindergarten Architecture. Barcelona: Loft Publications., 2001. Print.

Dudek, Mark. Architecture of Schools: the New Learning Environments. Oxford: Architectural, 2000. Print.

Dudek, Mark. Children’s Spaces: [collection of Essays]. Amsterdam [u.a.: Elsevier/Architectural, 2005. Print.

Edelson, Stephen. “Auditory Processing Problems in Autism.” Autism Today. Center for the Study of Autism. Web. 02 Nov. 2011. <http://www.autismtoday.com/articles/Auditory_Processing_Problems.htm>.

“Fairmount Park.” WORKSHOP OF THE WORLD—PHILADELPHIA. 2007. Web. 02 Dec. 2011. <http://www.workshopoftheworld.com/fairmount_park/fairmount_park.html>.

Fondation Le Corbusier, comp. “Exposition Universelle, Pavillon Philips.” Print. Rpt. in Le Corbusier Plans. Vol. 15. Tokyo: Echelle-1, 2010. Print.

“Gaskin Press Release.” Kids Together Inc. (TM) Disability, Inclusion, Rights, Information & Resources. Kids Together Inc., 21 Dec. 2004. Web. 02 Nov. 2011. <http://www.kidstogether.org/Gaskin/gaskinpressrelease.htm>.

Goodwin, Jenifer. “U.S. Rates of Autism, ADHD Continue to Rise: Report - US News and World Report.” Health News Articles - US News Health. U.S.News & World Report LP, 23 May 2011. Web. 02 Nov. 2011. <http://health.usnews.com/health-news/family-health/brain-and-behavior/articles/2011/05/23/us-rates-of-autism-adhd-continue-to-rise-report>.

Grandin, Temple. “Calming Effects of Deep Touch Pressure in Patients with Autistic Disorder, College Students, and Animals.” Temple Grandin’s Web Page. JOURNAL OF CHILD AND ADOLESCENT PSYCHOPHARMACOLOGY. Web. 03 Nov. 2011. <http://www.grandin.com/inc/squeeze.html>.

“A Guide to Disability Rights Laws.” ADA Home Page - Information and Technical Assistance on the Americans with Disabilities Act. U.S. Department of Justice, 16 Feb. 2006. Web. 02 Nov. 2011. <http://www.ada.gov/cguide.htm>.

Hall, Edward T. The Hidden Dimension. Garden City, NY: Anchor, 1969. Print.

“Hazelwood School for the Multiple Sensory Impaired.” World Buildings Directory. World Building Directory. Web. 06 Nov. 2011. <http://www.worldbuildingsdirectory.com/project.cfm?id=264>.

“Heidegger, Martin.” Internet Encyclopedia of Philosophy. 23 Oct. 2001. Web. 02 Nov. 2011. <http://www.iep.utm.edu/heidegge/>.

Henry, Christopher N. “Designing for Autism: Lighting.” ArchDaily | Broadcasting Architecture Worldwide. ArchDaily, 19 Oct. 2011. Web. 06 Nov. 2011. <http://www.archdaily.com/177293/designing-for-autism-lighting/>.

Henry, Christopher N. “Designing for Autism: Spatial Considerations.” ArchDaily | Broadcasting Architecture Worldwide. ArchDaily, 26 Oct. 2011. Web. 01 Dec. 2011. <http://www.

archdaily.com/179359/designing-for-autism-spatial-considerations/>.
Henry, Christopher N. “Tactile Architecture: Does It Matter?” ArchDaily | Broadcasting Architecture Worldwide. FMLiving, 23 Nov. 2011. Web. 3 Dec. 2011. <http://www.archdaily.com/186499/tactile-architecture-does-it-matter/>.
Herzberger, Herman. Space and Learning. Rotterdam: 010, 2008. Print.
Hille, R. Thomas. Modern Schools: a Century of Design for Education. Hoboken, NJ: John Wiley and Sons, 2011. Print.
Holl, Steven, Juhani Pallasmaa, and Gómez Alberto Pérez. Questions of Perception: Phenomenology of Architecture. San Francisco, CA: William Stout, 2006. Print.
Holl, Steven. Parallax. Basel: Birkhäuser-Publishers for Architecture, 2000. Print.
Holl, Steven. The Chapel of St. Ignatius. New York: Princeton Architectural, 1999. Print.
Humphries, Jodie. “National Autism Awareness Day | GDS Publishing.” Healthcare Management Online | GDS Publishing. GDS Publishing, 01 Apr. 2010. Web. 02 Oct. 2011. <http://www.executivehm.com/news/national-autism-awareness-day/>.
Ivanič, Maja, and Špela Kuhar. Contemporary School Architecture in Slovenia, 1991-2007. New York: Springer, 2008. Print.
Johnson, Scott. “What a School Can Be.” Urban Land 63 (2004). Print.
Khare, Rachna, and Abir Mullick. “Universally Beneficial Educational Space Design for Children with Autism; the Research Progression.” Designing for Children. Web. 4 Sept. 2011.
Krichels, Jennifer. “Center for Discovery Autism Campus.” The Architect’s Newspaper. The Architect’s Newspaper, LLC, 23 Sept. 2009. Web. 1 Dec. 2011. <http://archpaper.com/news/articles.asp?id=3843>.
Lawer, Lindsay, and David S. Mandell. PENNSYLVANIA AUTISM CENSUS PROJECT: FINAL REPORT. Rep. Pennsylvania Department of Public Welfare, Bureau of Autism Services, Oct. 2009. Web. 1 Nov. 2011. <www.dpw.state.pa.us/ucmprd/groups/public/.../report/s_000920.pdf>.
Leach, Neil. Rethinking Architecture: a Reader in Cultural Theory. New York: Routledge, 1997. Print.
Levine, Michael W. Levine & Shefner’s Fundamentals of Sensation and Perception. Oxford: Oxford UP, 2000. Print.
Linn, Charles. “School of One.” Architectural Record 198.1 (2010). Factivia. DowJones, 2011. Web. 11 Sept. 2011.
Lopez, Oscar. “AD Classics: Expo ’58 Philips Pavilion / Le Corbusier and Iannis Xenakis | ArchDaily.” ArchDaily | Broadcasting Architecture Worldwide. ArchDaily, 25 Aug. 2011. Web. 07 Dec. 2011. <http://www.archdaily.com/157658/ad-classics-expo-58-philips-pavilion-le-corbusier-and-iannis-xenakis/>.
Malnar, Joy Monice., and Frank Vodvarka. Sensory Design. Minneapolis [u.a.: Univ. of Minnesota, 2004. Print.
McConnell-Henry, Tracy. “Unpacking Heideggerian Phenomenology.” Southern Online Journal of Nursing Research 9.1. JSTOR. Web. 22 Sept. 2011. <http://snrs.org/publications/SOJNR_articles2/Vol09Num01Art03.pdf>.
McConnell-Henry, Tracy. “Unpacking Heideggerian Phenomenology.” Southern Online Journal of Nursing Research 9.1. JSTOR. Web. 22 Sept. 2011. <http://snrs.org/publications/SOJNR_articles2/Vol09Num01Art03.pdf>.
Merleau-Ponty, Maurice. Phenomenology of Perception. New York: Humanities, 1962. Print.
Minner, Kelly. “AD Classics: Chapel of St. Ignatius / Steven Holl Architects | ArchDaily.” ArchDaily | Broadcasting Architecture Worldwide. ArchDaily, 1 Mar. 2011. Web. 04 Dec. 2011. <http://www.archdaily.com/115855/ad-classics-chapel-of-st-ignatius-steven-holl-architects/>.
Mostaedi, Arian. Preschool & Kindergarten Architecture. Barcelona: Carles Broto, 2006. Print.
Mostafa, Magda. “An Architecture for Autism: Concepts of Design Intervention for the Autistic User.” International Journal of Architectural Research 2.1 (2008): 189-211. Archnet-IJAR. Web. 9 Sept. 2011.
Müller, Thomas, and Romana Schneider. The Classroom from the Late 19th Century until the Present Day = Das Klassenzimmer Vom Ende Des 19. Jahrhunderts Bis Heute. Tübingen: Wasmuth, 2010. Print.
O’Grady, Elea. “The Therme Vals / Peter Zumthor.” ArchDaily | Broadcasting Architecture Worldwide. 11 Feb. 2009. Web. 02 Nov. 2011. <http://www.archdaily.com/13358/the-therme-vals/>.
Olds, Anita Rui. Child Care Design Guide. New York: McGraw-Hill, 2001. Print.

"Our Building: The Pears National Centre - Ambitious about Autism." Ambitious about Autism. Ambitious about Autism. Web. 1 Dec. 2011. <http://www.ambitiousaboutautism.org.uk/page/who_we_are/the_pears_national_centre/index.cfm>.

OWP/P Architects, VS Furniture, and Bruce Mau Design. The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning. New York: Abrams, 2010. Print.

Pallasmaa, Juhani. "Hapticity And Time." Business Library. CNN Interactive. Web. 20 Nov. 2011. <http://findarticles.com/p/articles/mi_m3575/is_1239_207/ai_64720968/pg_6/?tag=content;col1>.

Pallasmaa, Juhani. The Eyes of the Skin: Architecture and the Senses. Chichester: Wiley-Academy, 2008. Print.

Remus, Myrna. "Sensory Integration." TELUS Internet Services - Member Services. AUTISM AND SCHOOL BASED PROGRAMMING. Web. 03 Dec. 2011. <http://www.telusplanet.net/public/nremus/sensoryintegration.htm>.

Ryan, Raymund. "Primal Therapy." The Architectural Review. 5 July 2011. Web. 02 Nov. 2011. <http://www.architectural-review.com/home/innovators/primal-therapy/8616979.article>.

"The Seven Senses | The Autism Life." The Autism Life. The Autism Life, 9 July 2006. Web. 03 Oct. 2011. <http://www.theautismlife.com/the.senses.connected/the.seven.senses>.

Shelemay, Kay Kaufman. Soundscapes. New York: Norton, 2001. Print.

Siegler, Robert S., Judy S. DeLoache, Nancy Eisenberg, and Campbell Leaper. How Children Develop. New York: Worth, 2011. Print.

Smith, Carla. "Steven Holl - Chapel of St Ignatius." Scribd. Scribd Inc. Web. 24 Oct. 2011. <http://www.scribd.com/doc/22775665/Steven-Holl-Chapel-of-St-Ignatius>.

Smith, David. "Phenomenology." Stanford Encyclopedia of Philosophy. Stamford University, 28 July 2008. Web. 02 Oct. 2011. <http://plato.stanford.edu/entries/phenomenology/>.

Sokol, David. "Architectural Record | Schools of the 21st Century | Features | Hazelwood School." Architecture Design for Architects | Architectural Record. Architectural Record. Web. 16 Oct. 2011. <http://archrecord.construction.com/schools/08_Hazelwood.asp>.

Tanner, C. Kenneth. "The Influence of School Architecture on Academic Achievement." Journal of Educational Administration 38.4 (2000): 309-30. Print.

Thomas, Gary, and Andrew Loxley. Deconstructing Special Education and Constructing Inclusion. Philadelphia: Open UP, 2001. Print.

Verstegen, Ton, Dolf Broekhuizen, Like Bijlsma, and Jannes Linders. Contemporary Dutch School Architecture: a Tradition of Change. Rotterdam: NAi/Staro, 2008. Print.

Wallis, Claudia. "How to Bring Our Schools out of the 20th Century." Time Magazine. Time Inc., 10 Dec. 2006. Web. 8 Sept. 2011. <http://www.time.com/time/magazine/article/0,9171,1568480,00.html>.

WBDG Accessible Committee. "Provide Equal Access | Whole Building Design Guide." WBDG - The Whole Building Design Guide. National Institute of Building Sciences, 21 Apr. 2011. Web. 15 Oct. 2011. <http://www.wbdg.org/design/equal_access.php>.

Willey, Liane Holliday., and Tony Attwood. Pretending to Be Normal: Living with Asperger's Syndrome. London: Jessica Kingsley, 2001. Print.

Williams, E. "Who Really Needs a 'Theory' of Mind?: An Interpretative Phenomenological Analysis of the Autobiographical Writings of Ten High-Functioning Individuals with an Autism Spectrum Disorder." Theory & Psychology 14.5 (2004): 704-24. Print.

Yazbak, F. Edward. "Autism in the United States: a Perspective." Journal of American Physicians and Surgeons 8.4 (2003): 103-07. Journal of American Physicians and Surgeons. AAPS. Web. 14 Nov. 2011. <http://www.jpands.org/vol8no4/yazbak.pdf>.

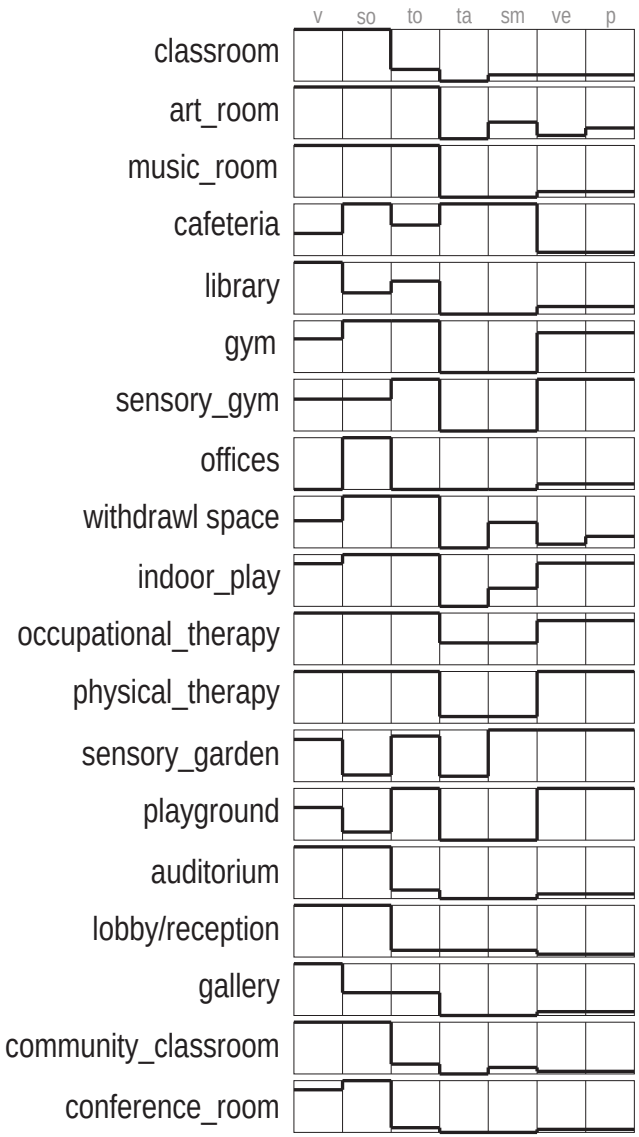
Zumthor, Peter. Atmospheres: Architectural Environments, Surrounding Objects. Basel: Birkhäuser, 2006. Print.

Zumthor, Peter, Maureen Oberli-Turner, and Catherine Schelbert. Thinking Architecture. Basel: Birkhäuser, 2006. Print.

Zumthor, Peter, Sigrid Hauser, Hélène Binet, Kimi Lum, and Catherine Schelbert. Therme Vals. Zurich: Scheidegger & Spiess, 2008. Print.

Figures_

1_http://www.flickr.com/photos/hgrosman/1471694695/sizes/l/in/photostream/
2_ http://www.flickr.com/photos/hgrosman/1471694695/sizes/l/in/photostream/
3_ Malnar, Joy Monice., and Frank Vodvarka. Sensory Design. Minneapolis [u.a.: Univ. of Minnesota, 2004. Print.
4_ Shelemay, Kay Kaufman. Soundscapes. New York: Norton, 2001. Print.
5-9_ Fondation Le Corbusier, comp. “Exposition Universelle, Pavillon Philips.” Print. Rpt. in Le Corbusier Plans. Vol. 15. Tokyo: Echelle-1, 2010. Print.
10_ http://www.irtest.com/infrared-wall-moisture-detection-survey-inspection-testing.html
11_ Malaguzzi, Loris, Giulio Ceppi, and Michele Zini. Children, Spaces, Relations: Metaproject for an Environment for Young Children. Reggio Emilia, Italy: Reggio Children, 1998. Print.
12_ http://jcf2cmsystems.files.wordpress.com/2011/11/1288298107-therme-vals-plan-01b.jpg
13_ http://jcf2cmsystems.wordpress.com/2011/11/08/assn-4-therme-vals/
14_ http://www.flickr.com/photos/ankursabz/3862573984/sizes/l/in/photostream/
15_ http://www.imahnahome.com/design-wall/the-harmonious-design-between-architecture-and-light.html
16_ http://www.flickr.com/photos/lincolnblues/2090797575/
17-20_ Holl, Steven. The Chapel of St. Ignatius. New York: Princeton Architectural, 1999. Print.
21_ Khare, Rachna, and Abir Mullick. “Universally Beneficial Educational Space Design for Children with Autism; the Research Progression.” Designing for Children. Web. 4 Sept. 2011.
22-26_ http://www.turnerbrooksarchitect.com
27-30_ Henry, Christopher N. “Designing for Autism: Lighting.” ArchDaily | Broadcasting Architecture Worldwide. ArchDaily, 19 Oct. 2011. Web. 06 Nov. 2011. <http://www.archdaily.com/177293/designing-for-autism-lighting/>.
31-33_ Herzberger, Herman. Space and Learning. Rotterdam: 010, 2008. Print.
34_ Lawer, Lindsay, and David S. Mandell. PENNSYLVANIA AUTISM CENSUS PROJECT: FINAL REPORT. Rep. Pennsylvania Department of Public Welfare, Bureau of Autism Services, Oct. 2009. Web. 1 Nov. 2011. <www.dpw.state.pa.us/ucmprd/groups/public/.../report/s_000920.pdf>.
35_ http://www.kidstogether.org/gaskin.htm
36-39_ “Fairmount Park.” WORKSHOP OF THE WORLD—PHILADELPHIA. 2007. Web. 02 Dec. 2011. <http://www.workshopoftheworld.com/fairmount_park/fairmount_park.html>.
40_ “Bridge to the Future” - Fairmount Park’ Strategic Plan.” Fairmount Park. Web. 08 Nov. 2011. <http://www.fairmountpark.org/StrategicPlan.asp>.
41-45_ http://www.arkitema.com/Laering+Learning/Projekter/Hellerup+Skole.aspx
46-49_ “Hazelwood School for the Multiple Sensory Impaired.” World Buildings Directory. World Building Directory. Web. 06 Nov. 2011. <http://www.worldbuildingsdirectory.com/project.cfm?id=264>.


v
so
to
ta
sm
ve
p
classroom
art_room
music_room
cafeteria
library
gym
sensory_gym
offices
withdrawl space
indoor_play
occupational_therapy
physical_therapy
sensory_garden
playground
auditorium
lobby/reception
gallery
community_classroom
conference_room

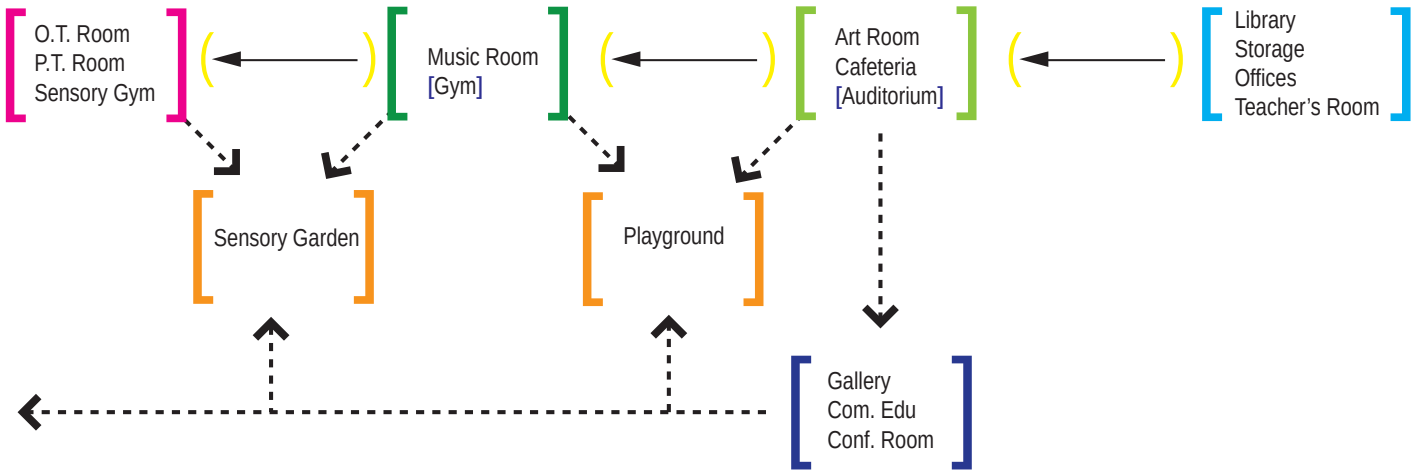

high sensory program
low sensory program
classroom
art classroom
music classroom
cafeteria
library
gym
sensory gym
offices
withdrawl space
indoor play
P.T. therapy room
O.T. therapy room
sensory garden
playground
auditorium
lobby
gallery
community edu space
conference room
social space

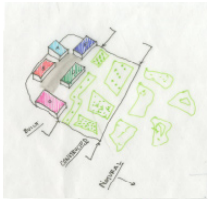
NUMBER OF SENSES USED

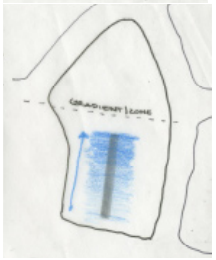
- classrooms
- withdrawl space
- sensory gym
- gym
- indoor play
- o.t. room
- p.t. room
- sensory garden
- playground
- art room
- music room
- lobby
- cafeteria
- auditorium
- gallery
- library

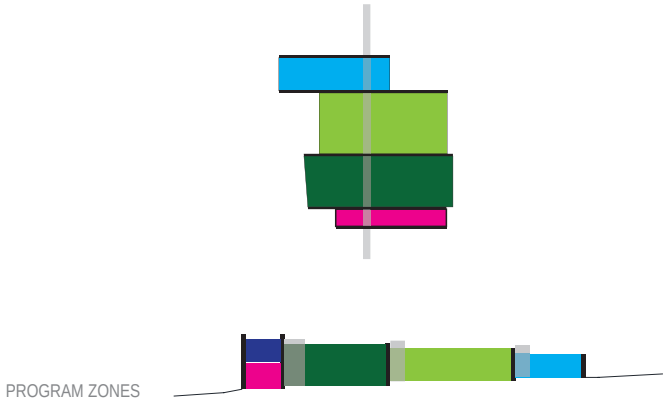
FREQUENCY OF USE

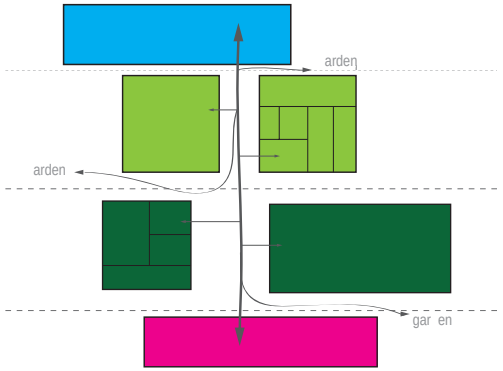
- classrooms
- withdrawl space
- sensory garden
- playground
- lobby
- cafeteria
- indoor play
- library
- gym
- music room
- art room
- sensory gym
- o.t. room
- p.t. room
- auditorium
- conference room
- gallery
- community classroom

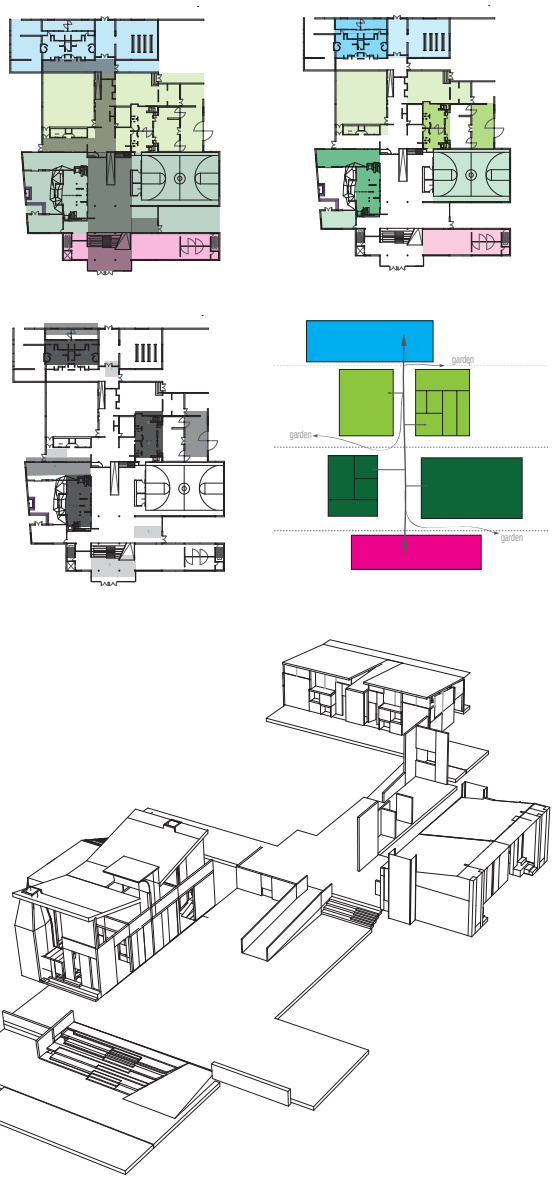

O.T. Room
P.T. Room
Sensory Gym
Music Room
[Gym]
Art Room
Cafeteria
[Auditorium]
Library
Storage
Offices
Teacher's Room
Sensory Garden
Playground
Gallery
Com. Edu
Conf. Room

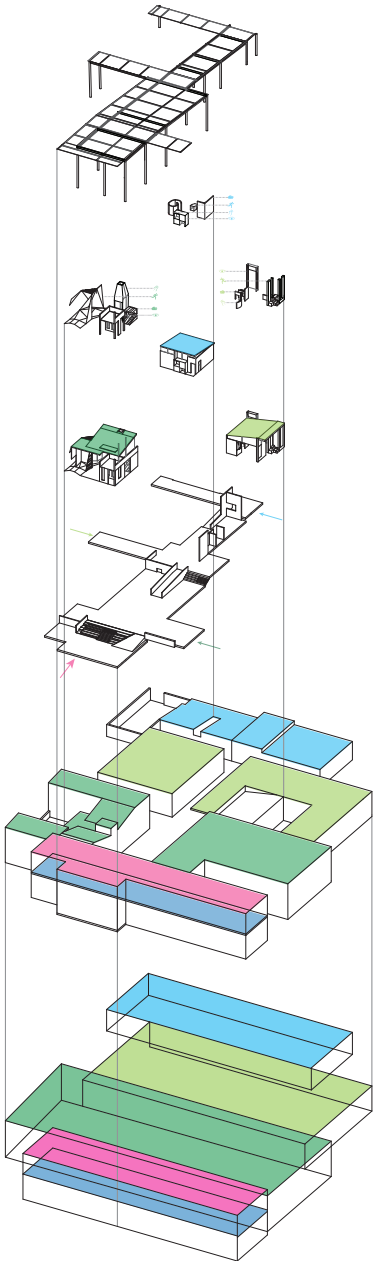





PROGRAM ZONES


arden
arden
gar en





GLASS ROOF SYSTEM

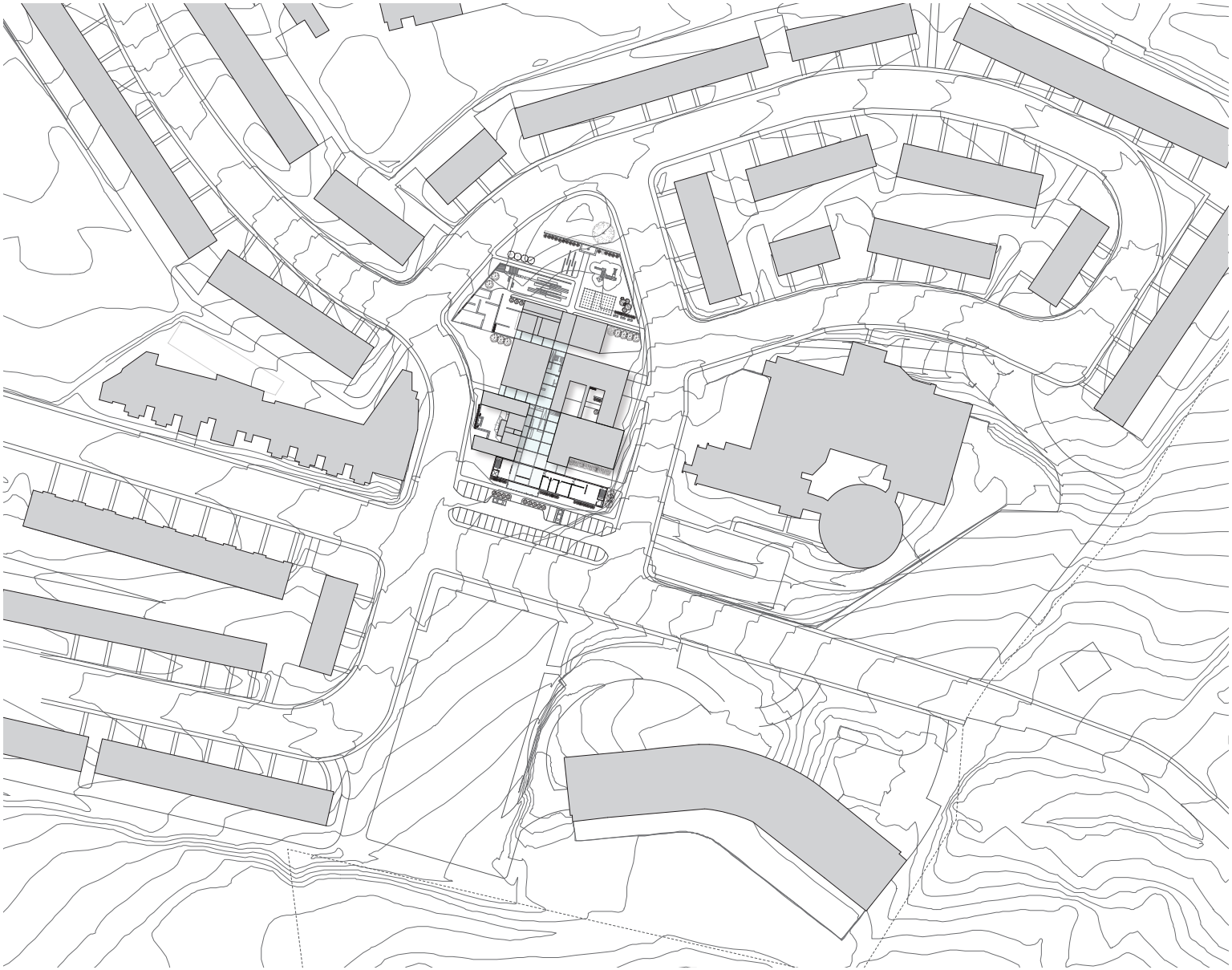
MICRO ENVIRONMENT

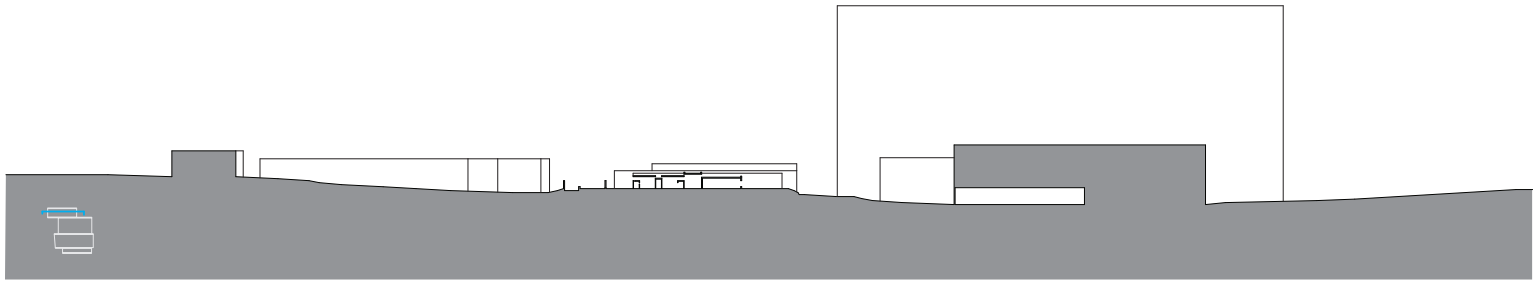
CLASSROOM

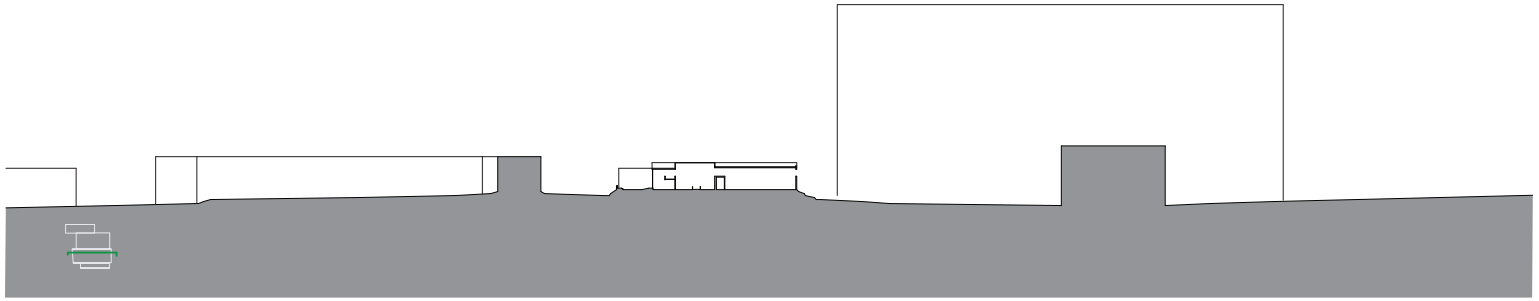
"STREET"

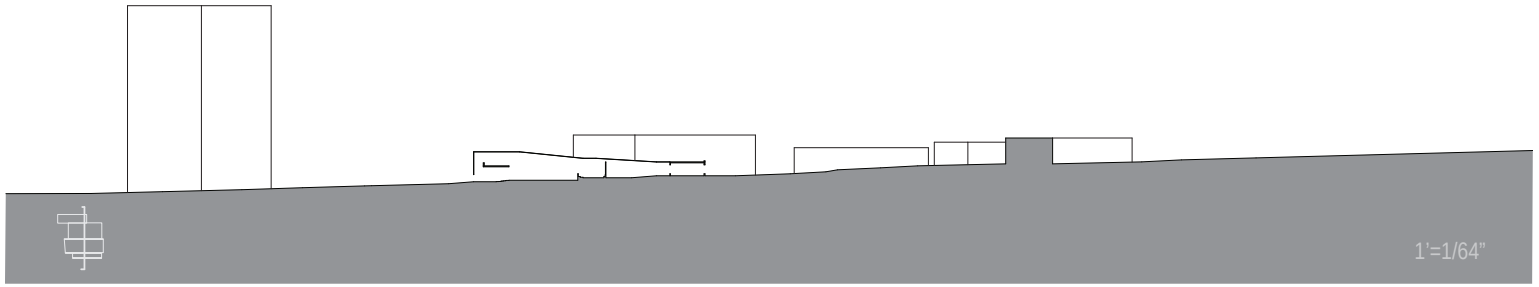
PROGRAM PIECES

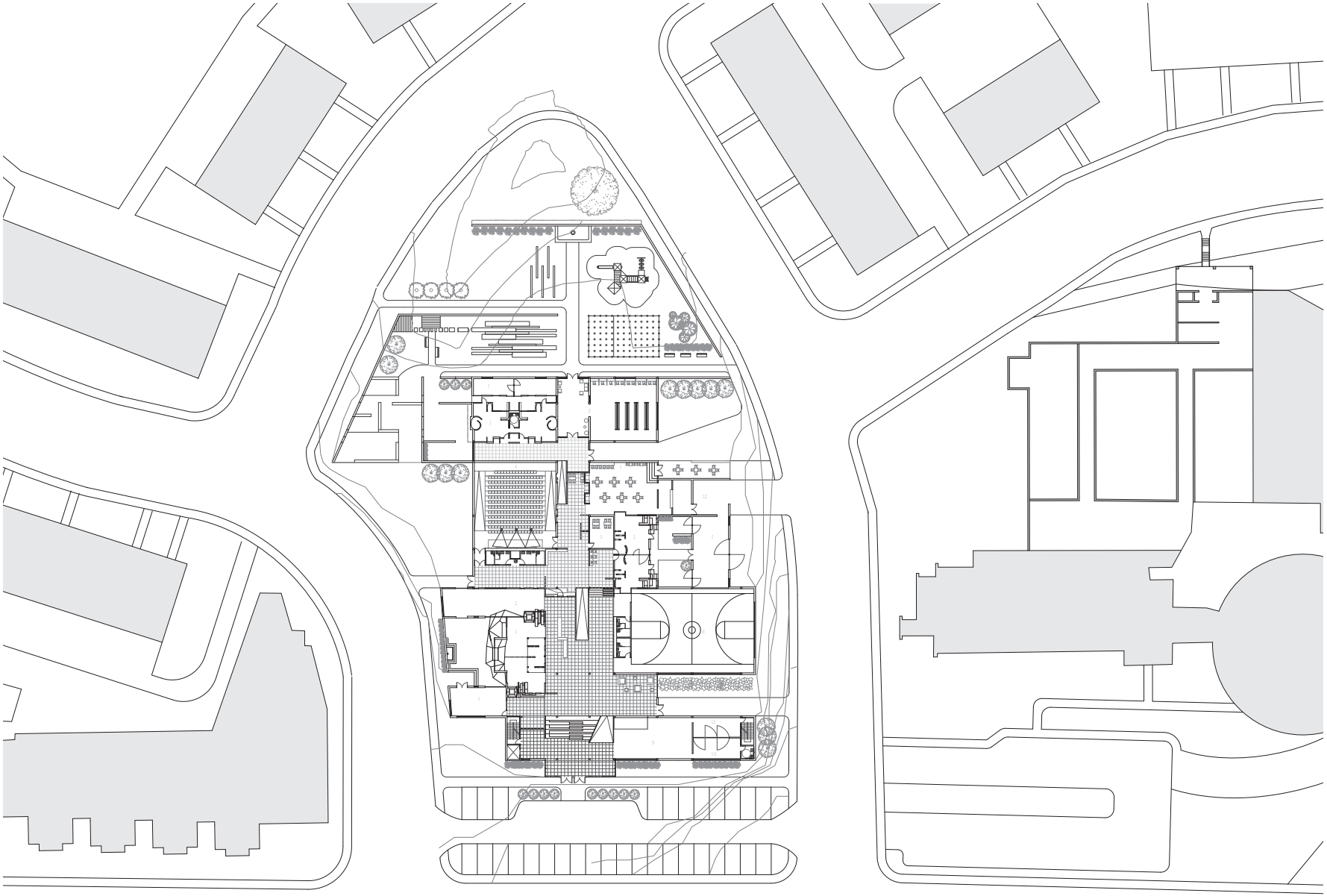
ZONES

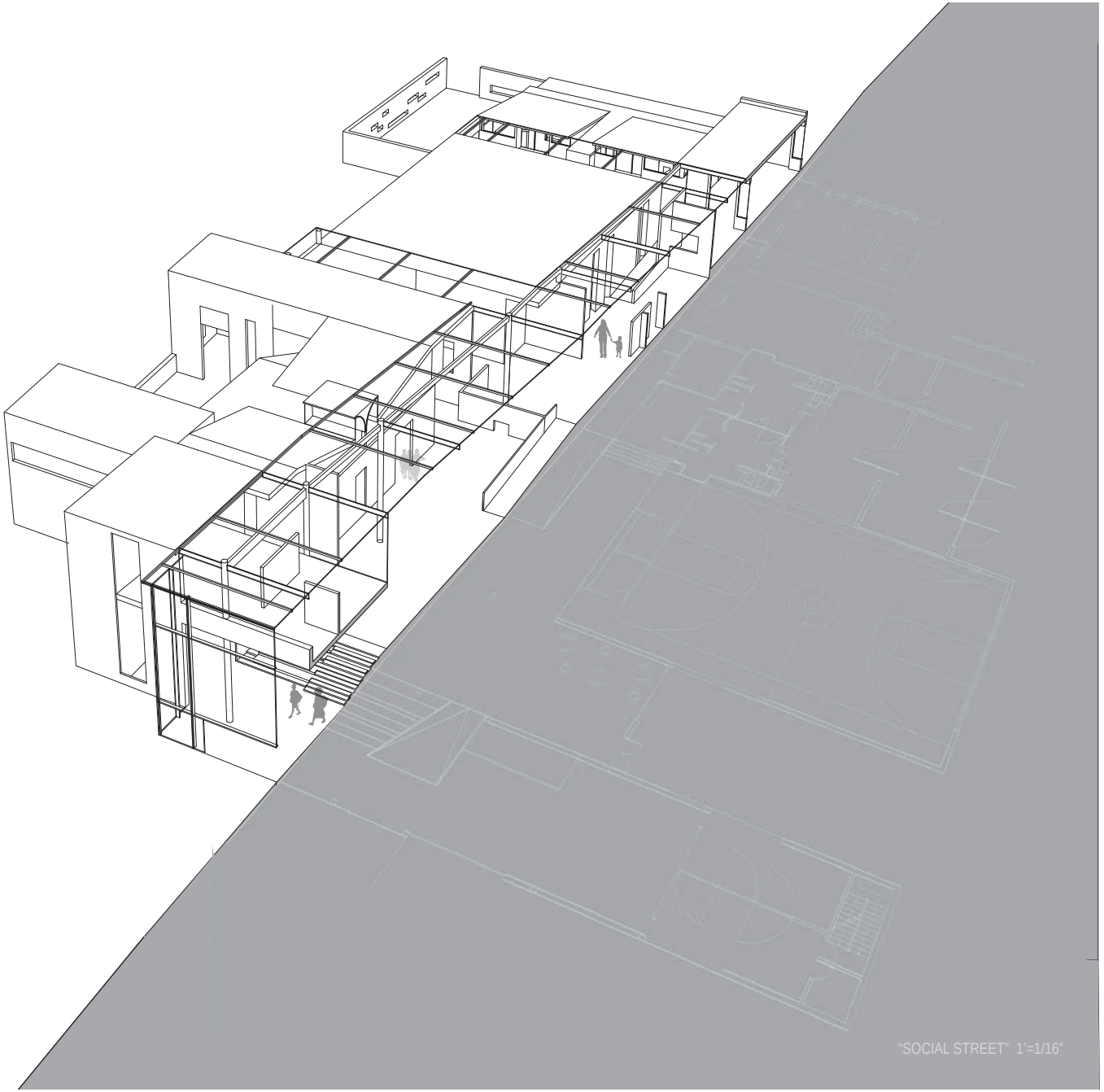


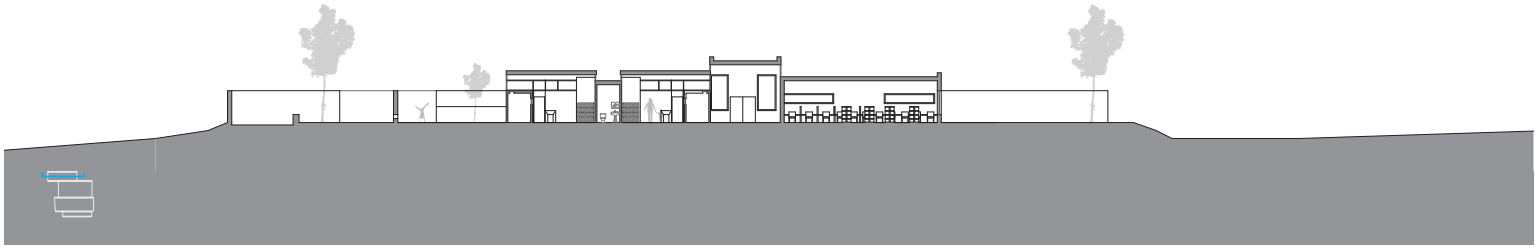


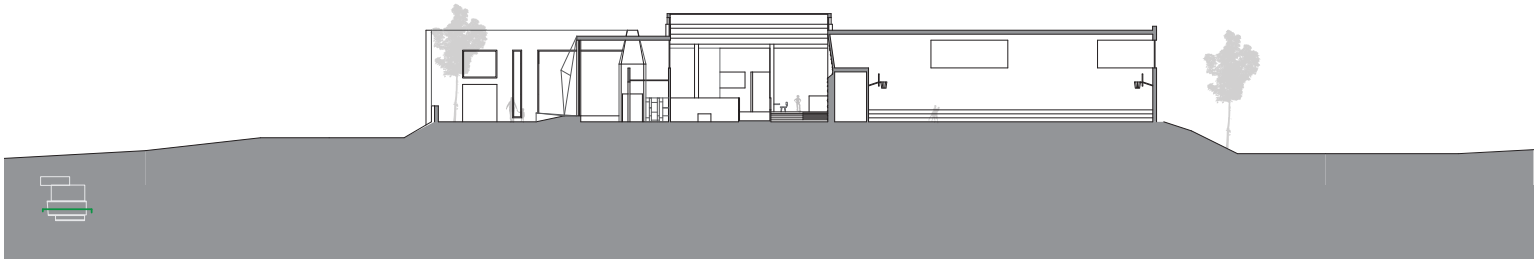


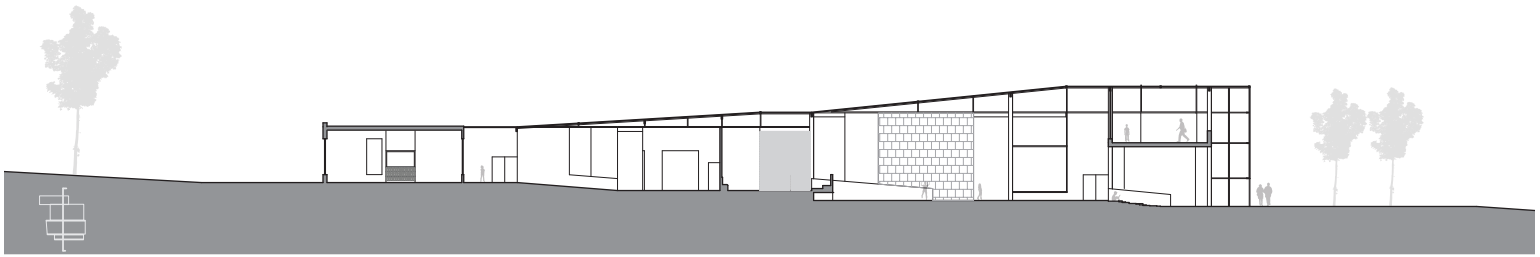

1'=1/64"

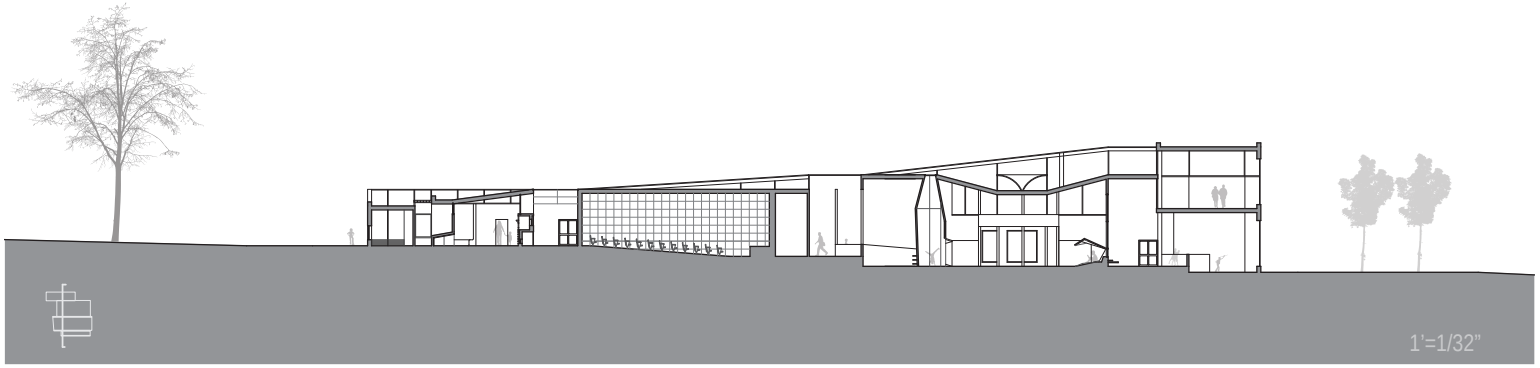

1_CLASSROOM
2_PLAY SPACE
3_LIBRARY
4_AUDITORIUM
5_CAFETERIA
6_ART ROOM
7_MUSIC ROOM
8_GYM
9_SENSORY GYM
10_ O.T. ROOM
11_P.T. ROOM
12_SERVICE
1'=1/16"

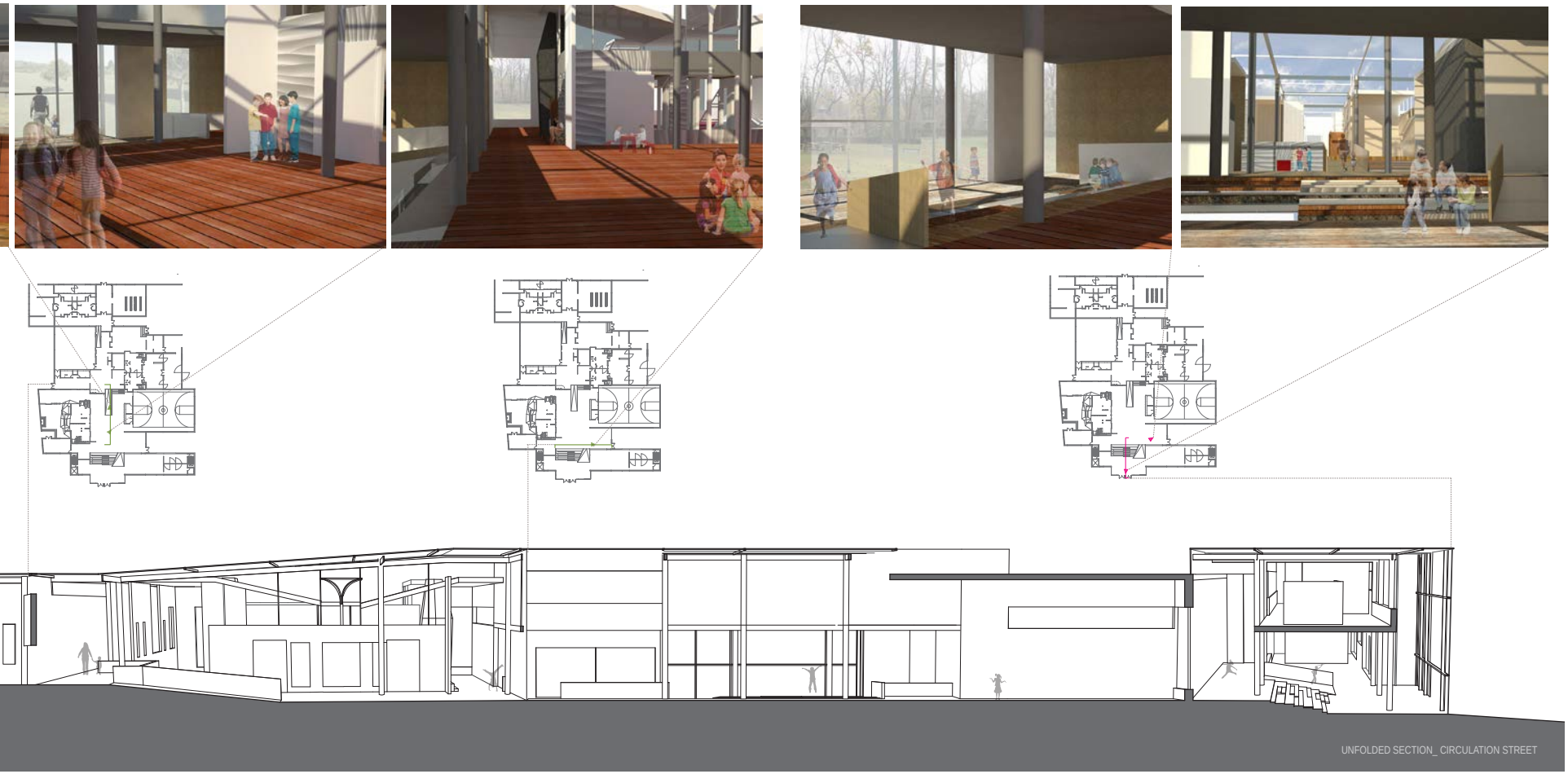

"SOCIAL STREET" 1'=1/16"





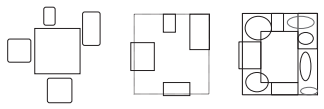



1'=1/32"

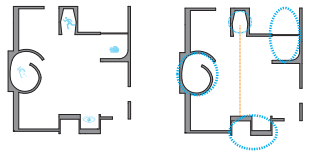


UNFOLDED SECTION_ CIRCULATION STREET

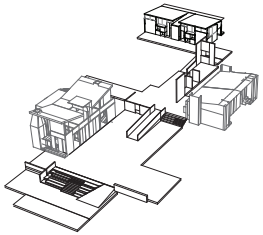
CLASSROOM 1

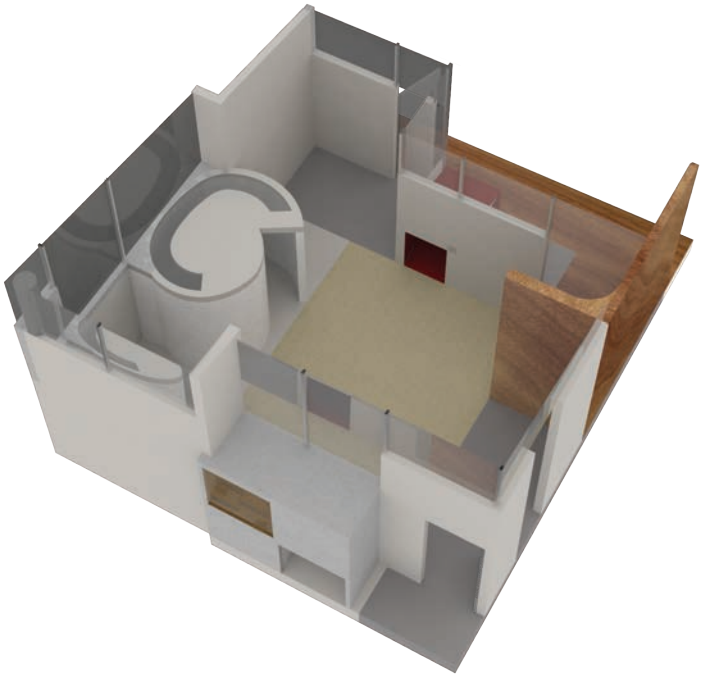


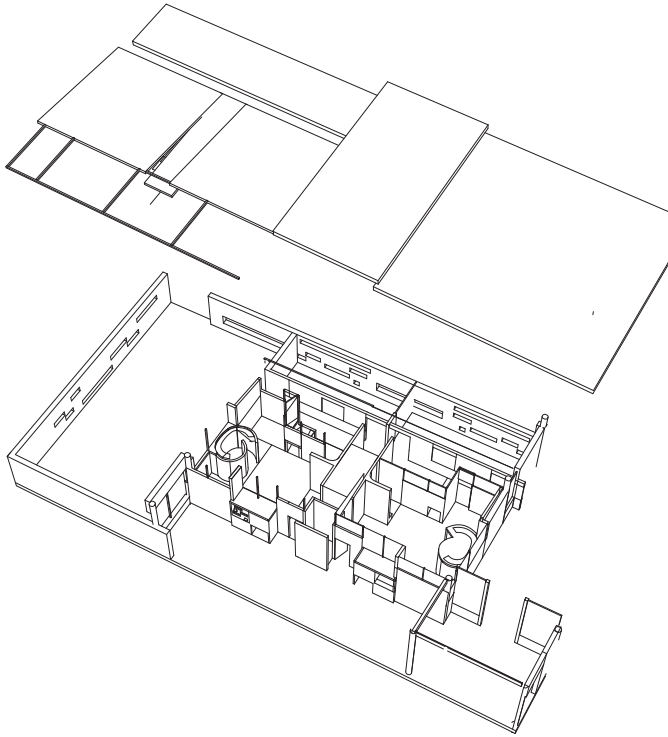
PRIMARY SPACES

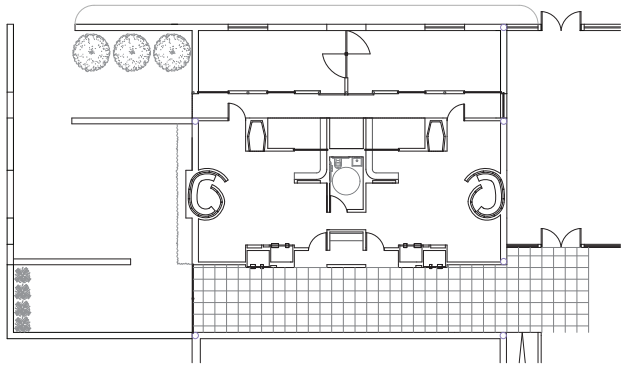


VISUAL AND PHYSICAL RELATIONSHIP



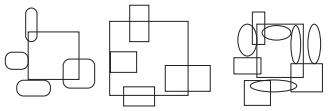


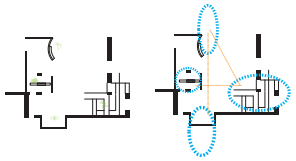


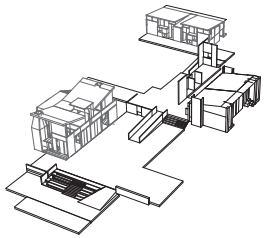


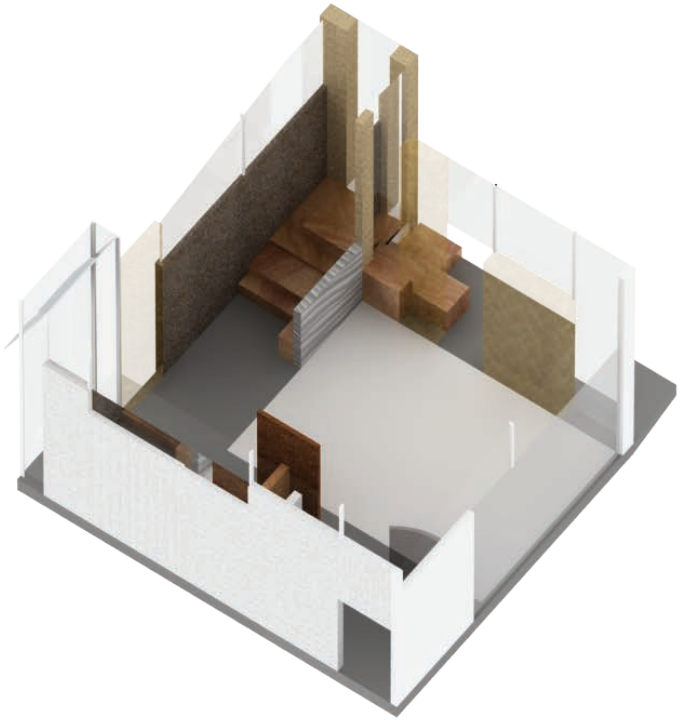
1'=1/8"

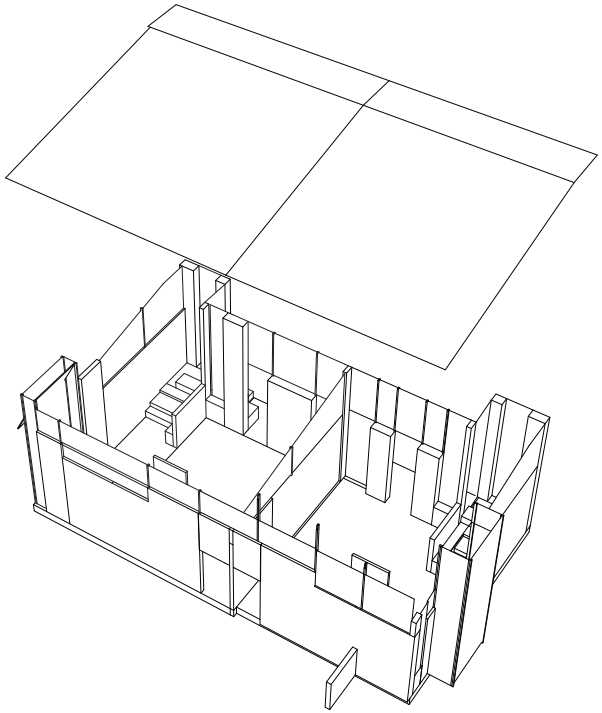
CLASSROOM 2

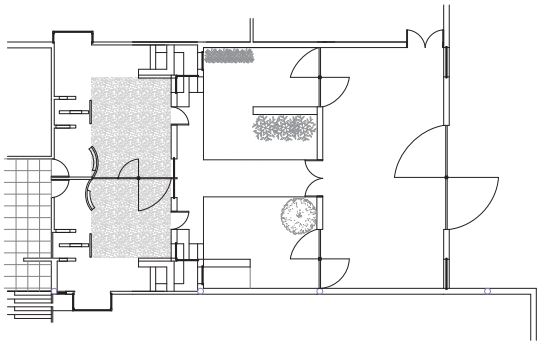


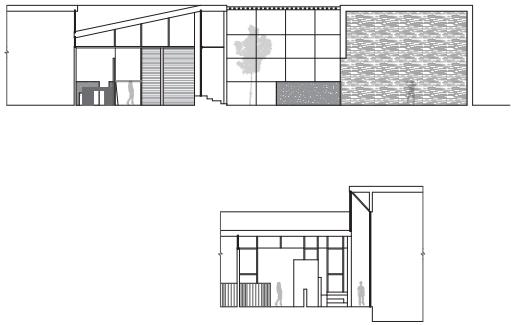






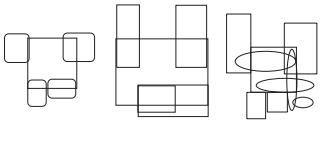


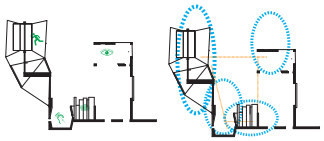


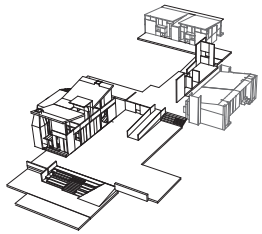


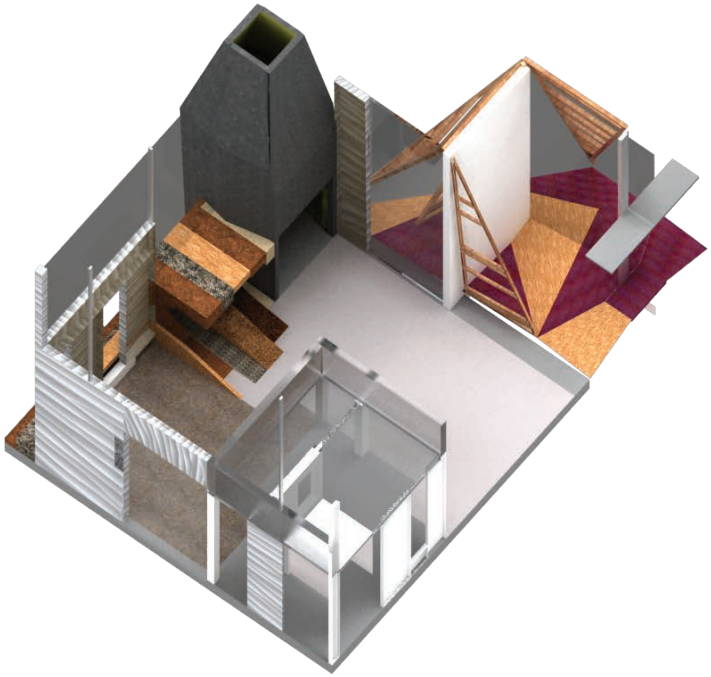
1'=1/8"

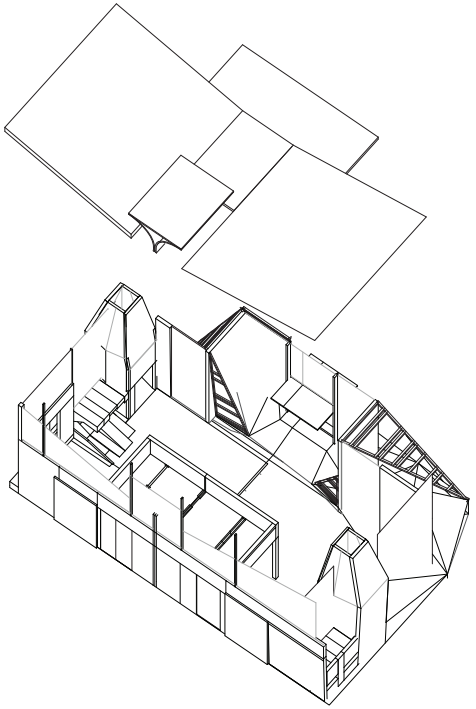
CLASSROOM 3

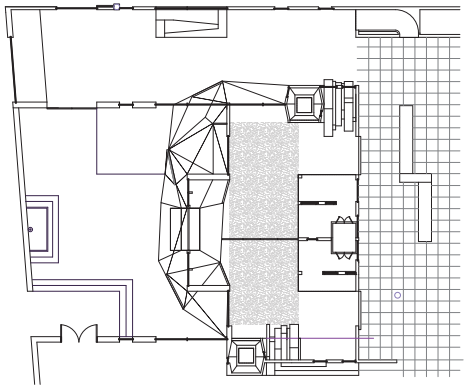












1'=1/8"