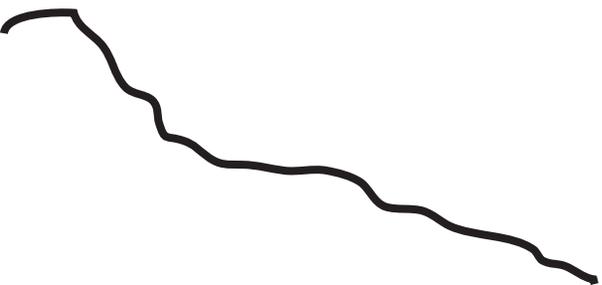
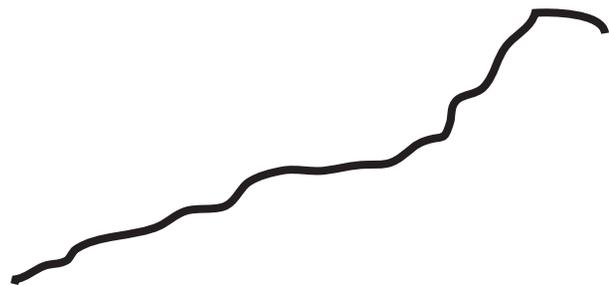


DESERT

LEARNING CONSERVATION
THROUGH SELF REVELATION

ELIZABETH A. MEDD





DESERT SOUL
THE ARCHITECTURE OF CONSERVATION
THROUGH SELF REVELATION

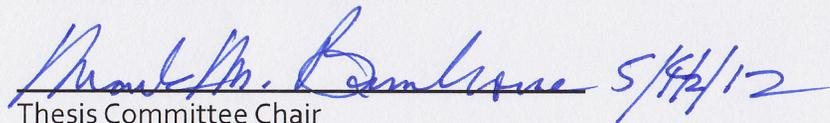
A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By
Elizabeth A. Medd

In Partial Fulfillment of the Requirements
for the Degree of
Master of Architecture

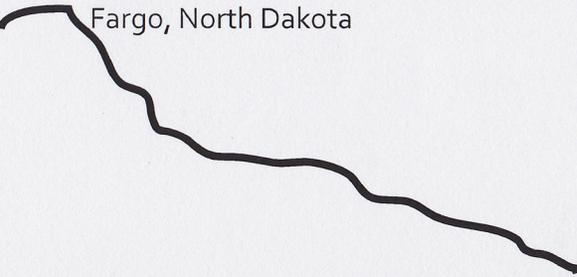


Primary Thesis Advisor



Thesis Committee Chair

May 2012
Fargo, North Dakota



DESERT SOUL

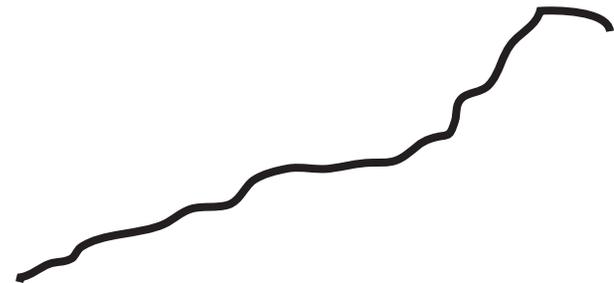


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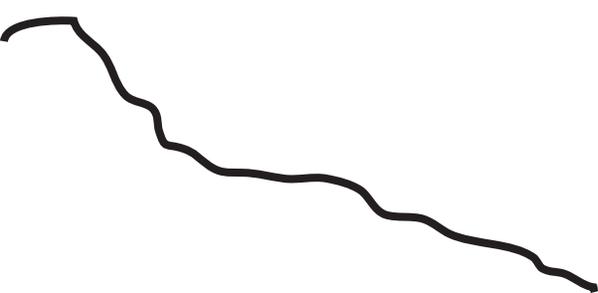
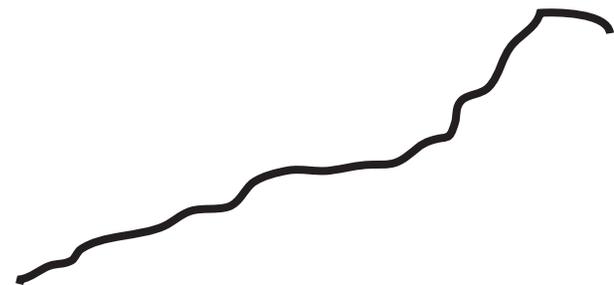
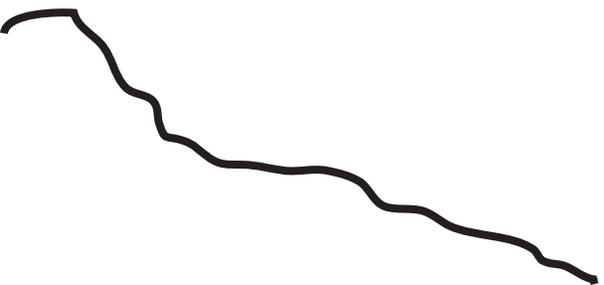


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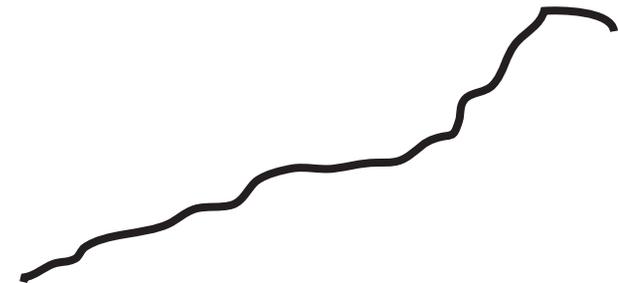


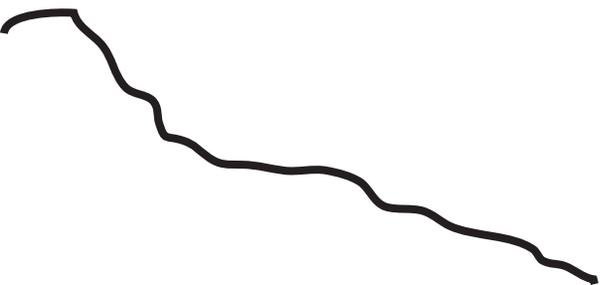


ABSTRACT

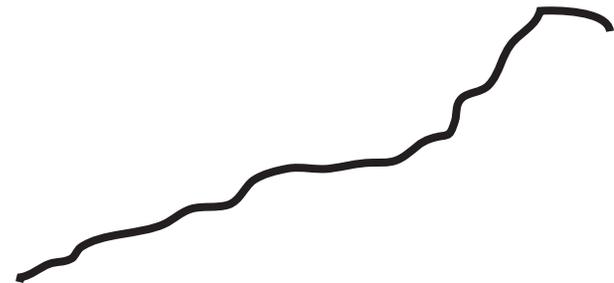
This thesis, *Desert Soul: Learning Conservation Through Self Revelation*, will focus on an investigation of the question, how can insight from past cultures of the Sonoran Desert inform and direct conservation and sustainability for the future of the desert? The typology for this examination will be a mixture between hospitality and a museum building combined into a 20,840 square foot facility with a site located in Marana, Arizona. The guiding idea behind this investigation is, "man cannot fully enact change in himself and society for the good of a sustainable future of the Sonoran Desert until the individual has had the opportunity to relate to and learn from the past cultures from that region and from the ecology in which the individual is participating." The justification behind this project is that "man cannot save the desert through conservation and sustainable practices if he does not also understand the ecology and learn better ways to inhabit the Sonoran Desert. An architecture that supports and provides for this kind of knowledge is essential to the future of the Sonoran Desert." The theoretical premise, unifying idea, and problem statement will be researched in this project through a Mixed Method, Quantitative Qualitative Approach while following a Concurrent Transformative Strategy.

Keywords: Sonoran Desert, past cultures, conservation, sustainability



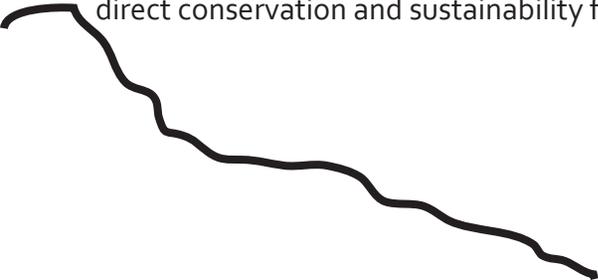


STATEMENT OF INTENT



PROBLEM STATEMENT

How can insight from past cultures of the Sonoran Desert inform and direct conservation and sustainability for the future of the desert?



STATEMENT OF INTENT

TYPOLOGY

A combination of hospitality and museum

CLAIM

By relating to psychological and practical premises from past cultures of the Sonoran Desert it is possible to learn how to create and practice conservation and sustainability in desert architecture.

The Actor(s): People of the Sonoran Desert Region

The Action: Conservation

The Object: Sonoran Desert

PREMISES

Premise 1: The Actor:

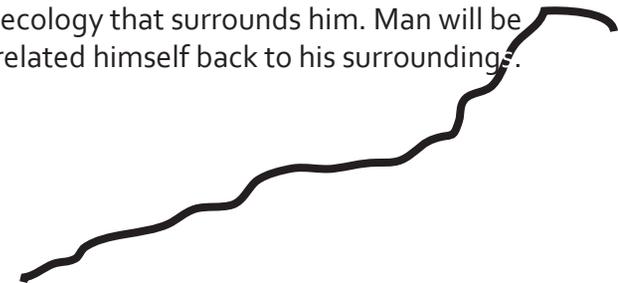
People affect and react to their environment based on a set of principles taught to them by those who possess some knowledge about how to live and interact with their surroundings.

Premise 2: The Action:

The knowledge people ascertain from their cultural and ecological surroundings in the Sonoran Desert can be used to better guide how they inhabit the region.

Premise 3: The Object:

In order to enact a conservationist mind toward the Sonoran Desert, man must first reconnect with the desert ecology that surrounds him. Man will be ready to learn once he has related himself back to his surroundings.



STATEMENT OF INTENT

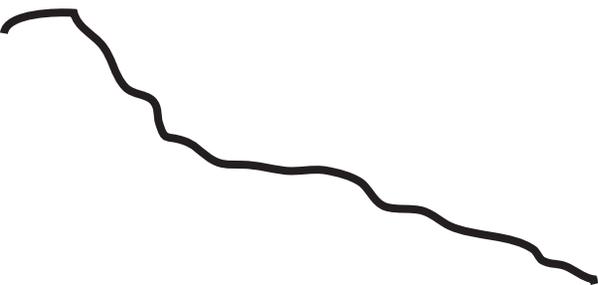
THEORETICAL PREMISE/UNIFYING IDEA

Architecture has the ability to significantly influence how a person sees and relates to his or her environment. The human connection to nature is one of the most important aspects and vehicles of architecture. Real design comes from an innate "knowledge", the senses, and the ability to feel the Nature (Wright, 1939, p. 12).

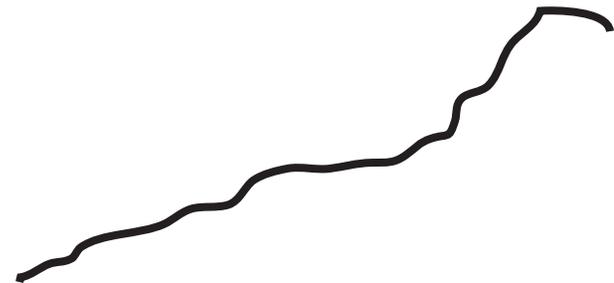
Man cannot fully enact change in himself and society for the good of a sustainable future of the Sonoran Desert until the individual has had the opportunity to relate to and learn from the past cultures from that region and from the ecology in which the individual is participating.

PROJECT JUSTIFICATION

It is necessary for the future of the Sonoran Desert that the individual has a natural relationship with the desert ecology in which one lives. Man cannot save the desert through conservation and sustainable practices if he does not also understand the ecology and learn better ways to inhabit the Sonoran Desert. An architecture that supports and provides for this kind of knowledge is essential to the future of the Sonoran Desert.



THE PROPOSAL

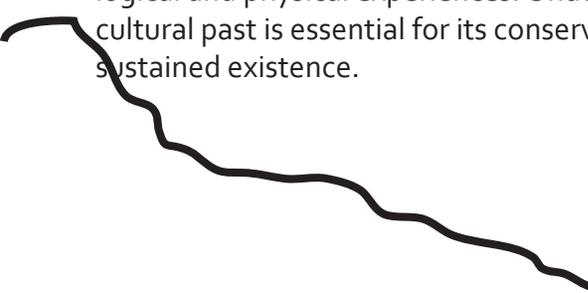


NARRATIVE

The human connection to nature is one of the most important aspects and vehicles of architecture. A Person without nature is someone without a true sense of place. A person who inhabits the Sonoran Desert without connecting to it is one who unknowingly destroys his or her home. It is essential to one's existence in the Sonoran Desert that one interacts, not just with exterior surroundings, but with the natural ecological setting. This connection enables a person to be aware of the delicacy of the surrounding desert and to make responsible decisions concerning this desert. When an individual has this connection he or she will innately understand and care for the fragility of the ecosystem. The opportunity for this connection can be far-reaching and impactful on everyday lives when it comes through architecture.

It is possible that through architecture one can experience and reflect upon the surrounding ecology from which one can grasp a better understanding of the way in which to live. Architecture can be described as an intellectual and artistic study and mastery of spaces. These spaces can and I believe should orient one's sense of place in such a way as to enhance one's connection to his or her exterior environment. Architecture that provides these connections is extremely important in the Sonoran Desert. The environment will benefit from a connection to the ecology and to the cultures that once thrived there. The loss of this relationship has inflicted very costly and perhaps irreversible damages to the Sonoran Desert. Architectural knowledge grouped with the knowledge of past cultures and the local ecology can reorient and reconnect one to the Sonoran Desert. Through understanding in conjunction with cultural knowledge from past inhabitants of the Sonoran Desert, each individual has the ability to conserve and sustain the Sonoran Desert.

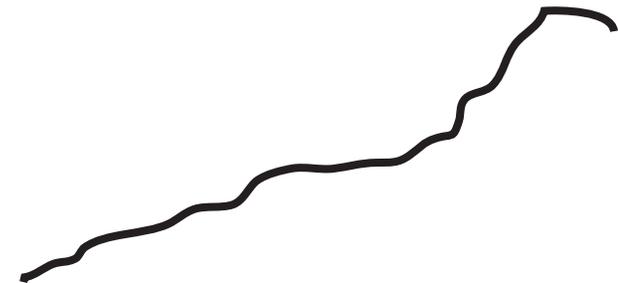
Architecture has the ability to teach people through sociological, psychological and physical experiences. Understanding the Sonoran Desert and its cultural past is essential for its conservation and for the Sonoran Desert's sustained existence.



USER/CLIENT DESCRIPTION

OWNER

The site and the buildings that are developed on it will be owned by the owner that will also oversee all operations. A private owner will lease the restaurant/cafe space from the project owner. The restaurant owner will oversee the operations necessary to keep the restaurant open and successful while maintaining pace and perspective with the project. A biologist and a master gardener will run and oversee the site elements including the indoor landscaping. A meditation expert will run the gardens in conjunction with the biologist and master gardener to ensure the upkeep of the landscaped spaces is in the best interest of reflection and meditation practices for the Sonoran Desert. There will be a museum curator to run the educational/museum portion of the building. The public will be able to use all the spaces available to them such as the restaurant , conservation gardens, and the education center/museum and its facilities.



USER/CLIENT DESCRIPTION

USER GROUPS

Restaurant/Cafe:

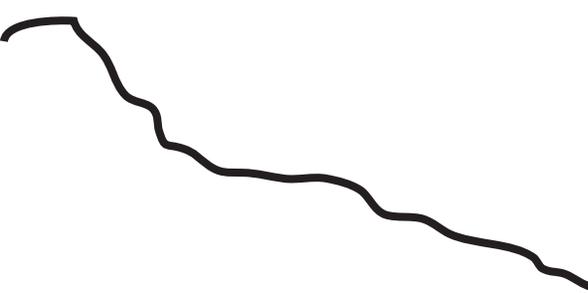
- Owner
- Manager
- Chef
- Sous-chef
- Kitchen Staff
- Wait Staff
- Custodial

Landscaping:

- Botanist
- Biologist
- Master Gardener
- Grounds Keeper
- Grounds Crew
- Wildlife Expert
- Docents

Educational Center/Museum:

- Museum Curator
- Facilities Director
- Museum Employees
- Docents
- IT Staff



MAJOR PROJECT ELEMENTS

RESTAURANT/CAFE

The restaurant/cafe will focus on regional foods and will have a garden on site to grow plants needed for ingredients. Spaces within the restaurant are as follows:

- Kitchen
- Dining Space
- Restrooms
- Casual Social Spaces
- Mechanical

REFLECTION

The reflection/meditation areas are spaces with quiet places to sit and relax. These spaces will be interior and exterior spaces that focus on the local ecology and the human connection with that ecology.

EDUCATION CENTER/MUSEUM

The education center/museum will be a center for learning about the Sonoran Desert and past cultures that resided in the Sonoran Desert as well as best practices for conserving and sustaining the region. Spaces within the education center/museum are as follows:

- Reception
- Restrooms
- Exhibition Space
- Presentation Rooms
- Storage
- Mechanical
- Small Classroom
- Laboratory
- Water Collection/Storage Room



SITE INFORMATION

REGION

The site is located in the Arizona Upland Region of the Sonoran Desert which encompasses south-central Arizona and northern Sonora. This portion of the Sonoran Desert is the highest in elevation and the coldest. It has 5 seasons, is rich in plant and wildlife species, due in part to two equal rainy seasons, and the terrain is highly with several mountain ranges, 4 of which surround the city of Tucson, Arizona (Phillips and Comus (Ed.), 2000).

CITY

The site sits at a southern border of Marana, Arizona and Tucson Arizona. The Town of Marana is north of Tucson and is home to 26,725 people. It is the border between the Middle and Lower Santa Cruz River (Town of Marana, 2011). The City of Tucson is a small metropolis located to the south east of Phoenix, the capitol of Arizona. Tucson is the county seat of Pima County and supports 750,000 residents. It is currently growing by 2000 residents a month. It is one of the oldest towns in the United States with continuous settlement for over 12,000 years (About Tucson, 2011).

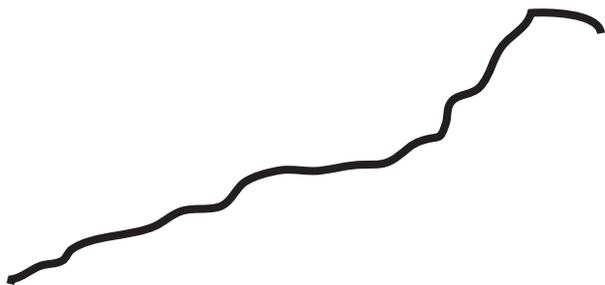
SITE

This site is located to the west of the Interstate 10 corridor and to the west of the Saguaro National Monument. It is directly off Silverbell Road and Ina Road with the Santa Cruz River Riparian Zone forming its eastern border.

This site is important because it is off a documented riparian zone. This zone provides a good base of integration with the reestablishment of the landscape to its natural ecosystem. The site has a prominent connection to the city via Ina Road and the surrounding context. It is in a high profile locale but has the ability to be a peaceful center of socializing, meditating, and learning.



Google Earth 2011

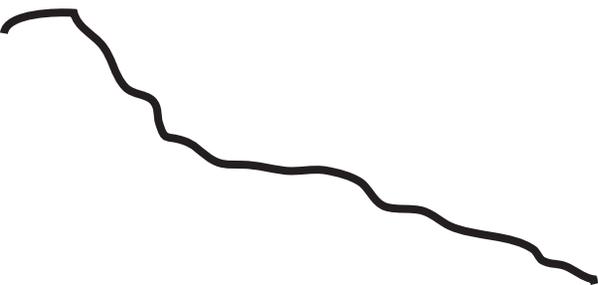




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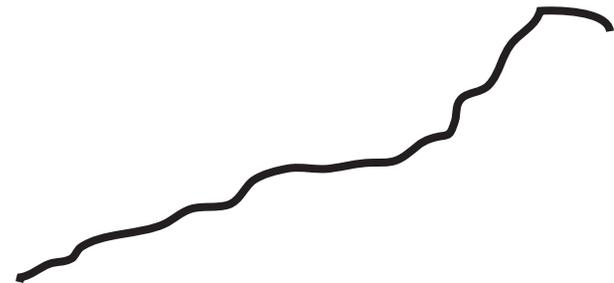


EA Medd



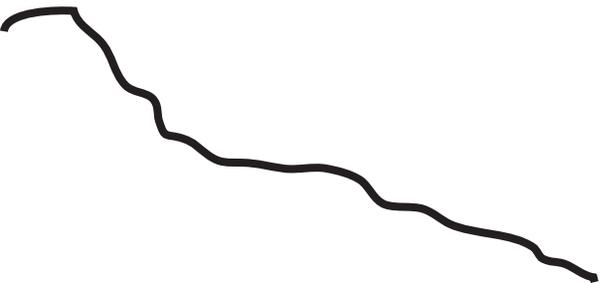


EA Medd



PROJECT EMPHASIS

This thesis will examine how to learn conservation through connection with the Sonoran Desert and how to apply that connection through knowledge.



A PLAN FOR PROCEEDING

RESEARCH DIRECTION

Research will be conducted throughout the thesis process. The theoretical premise/unifying idea, project typology, historical context, site analysis and programmatic requirements will be investigated in this process.

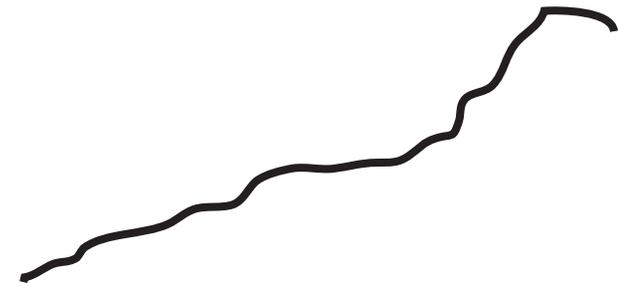
DESIGN METHODOLOGY

The design methodology will follow a mixed method quantitative qualitative approach. Quantitative and qualitative research will be conducted using a concurrent transformative strategy to better aid design. It will include graphic analysis, digital analysis, and interviews.

Quantitative data will include statistics and scientific data , gathered and analyzed.

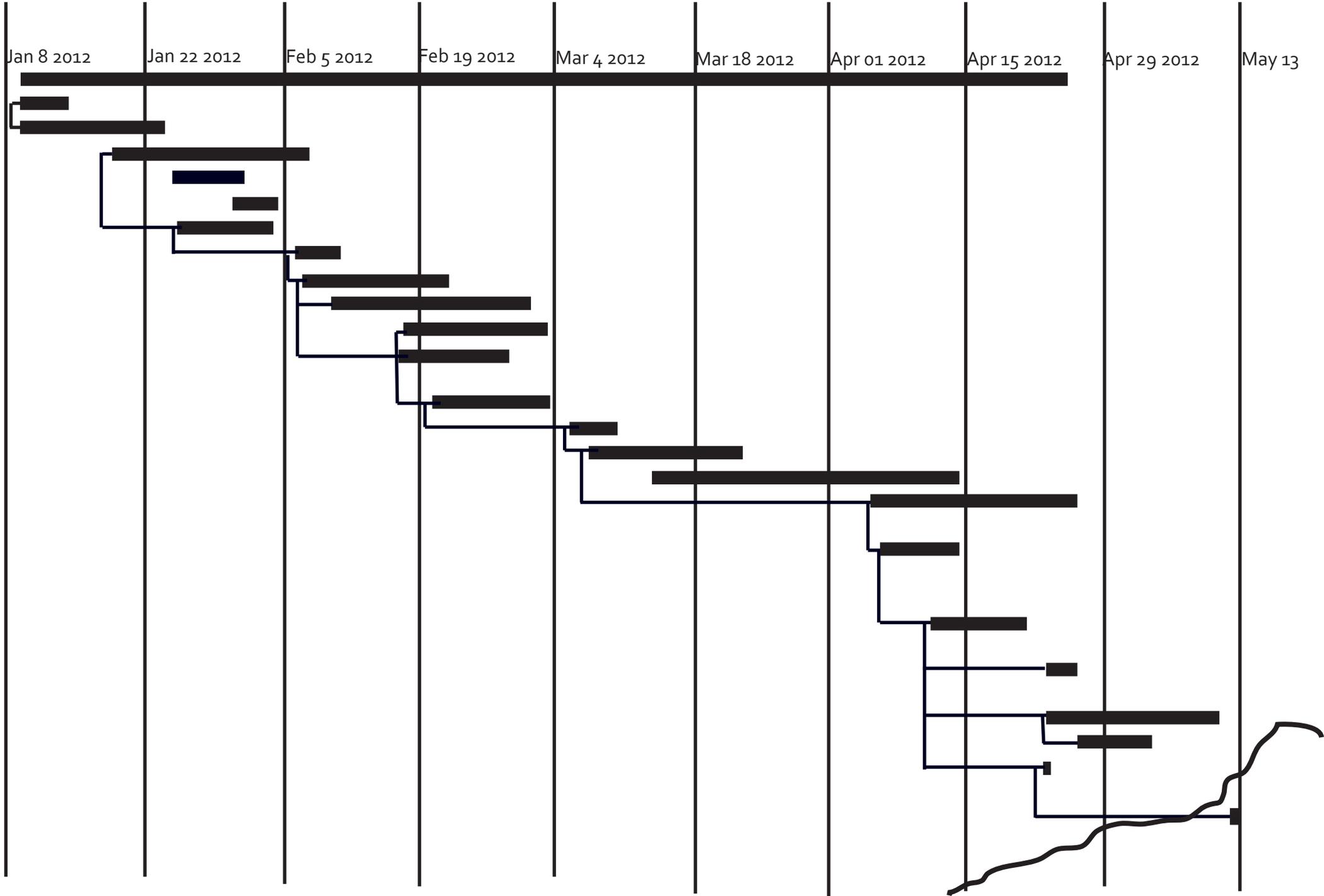
Qualitative data will be gathered through direct interviews, archival research, and observations.

This thesis project will be documented continuously throughout the process of design. Biweekly papers will be created showing any work conducted during that time span including but not limited to interviews, drawings, modeling, research and analysis.



SPRING SEMESTER WORK PLAN/SCHEDULE

Project Documentation	77 days	01.09.12 - 05.11.12	
Context Analysis	5 days	01.09.12 - 01.13.12	
Conceptual Analysis	11 days	01.09.12 - 01.23.12	2SS
ECS Passive Analysis	5 days	01.25.12 - 01.31.12	3SS+7 days
ECS Active Analysis	4 days	01.31.12 - 02.03.12	4SS+5 days
Structural Development	8 days	01.25.12 - 02.3.12	5SS+4 days
Context Redevelopment	5 days	02.06.12 - 02.10.12	4SS+5days
Floor Plan Development	11 days	02.07.12 - 02.21.12	7SS+8days
Envelope Development	14 days	02.10.12 - 02.29.12	8SS+1day
Materials Development	11 days	02.17.12 - 03.02.12	9SS+7days
Structural Redevelopment	7 days	02.17.12 - 02.27.12	9SS+8days
Section Development	10 days	02.20.12 - 03.02.12	11SS+1day
Midterm Reviews	5 days	03.05.12 - 03.09.12	13SS+10days
Project Revisions	12 days	03.07.12 - 03.22.12	14SS+2days
Rendering/Artistic	24 days	03.13.12 - 04.13.12	15SS+4days
Preparation for Presentations	15 days	04.05.12 - 04.25.12	15SS+21days
Presentation Layout	6 days	04.06.12 - 04.13.12	17SS+1day
CD of Boards to Thesis Advisor	0 days	04.16.12 - 04.16.12	18SS+6days
Plotting and Model Building	8 days	04.11.12 - 04.20.12	18SS+3days
Exhibits Installed on 5th Floor	3 days	04.23.12 - 04.25.12	20SS+8days
Thesis Exhibit	14 days	04.23.12 - 05.10.12	20SS+8days
Final Thesis Reviews	6 days	04.26.12 - 05.03.12	22SS+3days
Final Thesis Document Due	0 days	04.23.12 - 04.23.12	20SS+8days
Commencement	0 days	05.11.12 - 05.11.12	24SS+1day



PREVIOUS STUDIO EXPERIENCE

FALL 1999

Patrick Magness

Three Platforms

Three Walls

Nine Campsites

Adaptive Use

SPRING 2000

Russ Combs

Form Z Studio

Donald Judd Marfa

Three Rooms

Light Panels

FALL 2000

Brad Gildea

Three Rooms

Reading Rooms

SPRING 2001

Paolo Sanza

Party Wall/Hybrid Stair

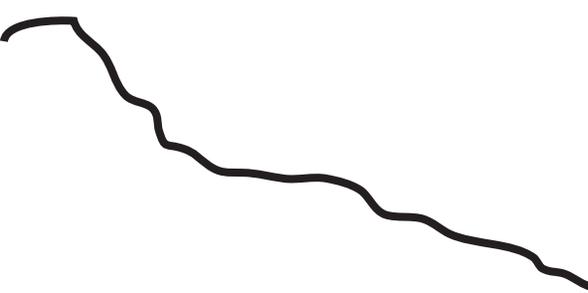
Mill Avenue Library

FALL 2001

Paolo Sanza

A Writer's Studio

A Ranger Station



PREVIOUS STUDIO EXPERIENCE

SPRING 2002

Tom Hahn
A Community Center
A Civic Center

FALL 2002

Charlie Lazor
Integral Studio: Redesign/Renovation: North Architecture Building, Arizona
State University

SPRING 2003

Paolo Sanza
Automotive Museum

FALL 2010

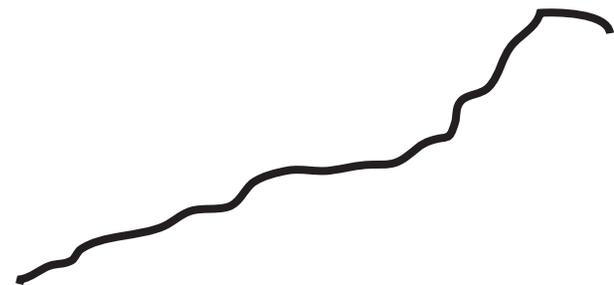
David Crutchfield
KKE
HighRise

SPRING 2011

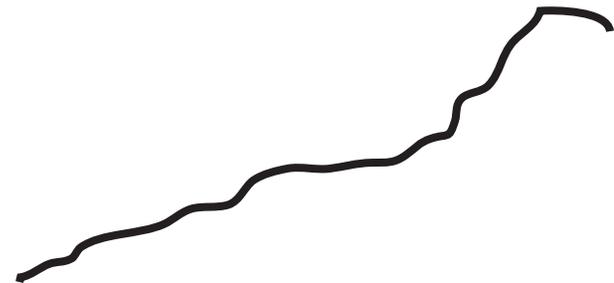
Don Faulkner and Frank Kratky
Marvin Windows
Boom /Bust Stanley North Dakota

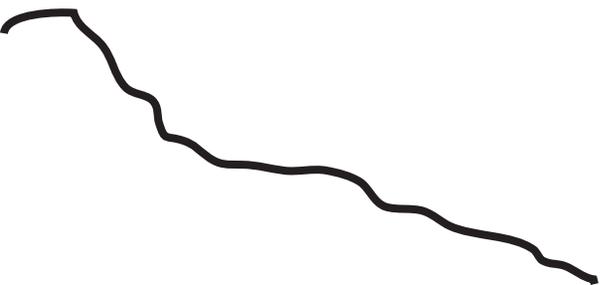
FALL 2011

Mark Barnhouse
Water Resource Experimentation Station



THE PROGRAM DOCUMENT

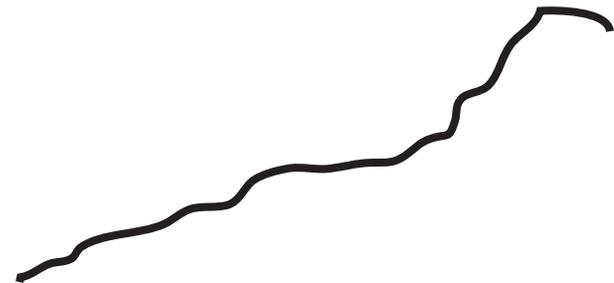




THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

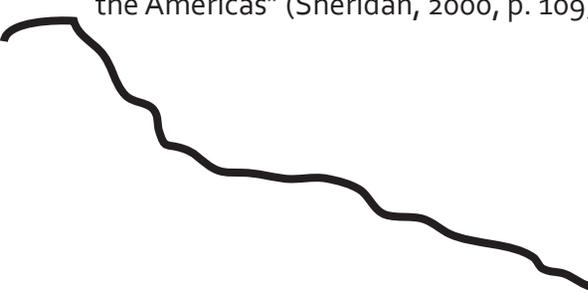
Men and women affect and react to their environment based on a set of principles taught to them by those who possess knowledge about how to live and interact with their surroundings. We must look to the past as a point of departure for reference on how we may better inhabit the desert.

Humans have populated the Sonoran Desert region for over 12,000 years (Sheridan, 2000, p. 106). And, while the cultures before the late 19th century triggered damage to the landscape, it has been within the last century that the most harmful damage has occurred. Prior to this time the Hohokam inhabited this region until sometime around 1450 A.D. (Doyel, 1979). There is still conflicting information about the descendents of the Hohokam, but the general tribe referred to are the present day Tohono O'odham tribes. Regardless, there are some facts archeologists do know about the Hohokam and the Tohono O'odham tribes. Archeologists have documented the social organization of the Hohokam. It is recorded that the Hohokam people within the Sonoran Desert lived in and interacted with their surroundings on different micro scales depending on their location. I will be using the information gathered about those who resided along the Santa Cruz River Basin due to the location of this thesis site. I will briefly discuss other Hohokam ways of life documented in the region because the existence of these different life ways practised within the Tucson Basin is an important fact of the first premise of this investigation. It is essential to note, even in the deficiencies of the Hohokam ways of life that will be discussed, the people who lived in this Sonoran Desert region the longest acknowledged how different life in the Sonoran Desert was based on site. As Doyel touched upon, Hohokams living 25 miles apart from each other would have utilized the land very differently (Doyel, 1979).



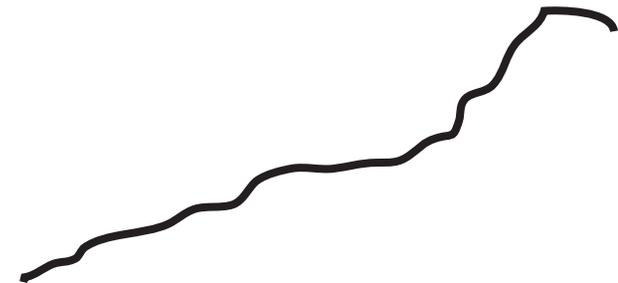
THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

One of the cultural characteristics the Hohokam are most known for is their extensive canal system. While not all canals were in use at the same time, the Hohokam just in the Phoenix Basin irrigated between 30,000 and 60,000 acres of land (Sheridan, 2000, p. 107). There were several other methods employed to use any water the Hohokam could harvest for farming. In some locations, such as Snaketown which is near present day Sacaton, Arizona, populations were larger and more sedentary. This is because of the amount of land the people there could irrigate using the canal system (Doyel, 1979). North of Tucson in the Santa Cruz River Valley, where this thesis site is located, canal irrigation was not a viable means of water harvesting (Doyel, 1979). Here the Hohokam depended on the rainfall in the floodplains to support the small local population. Ten miles north of the site in the Tortolita Mountains, the Hohokam terraced the landscaped and built checkdams with rock piles. It is documented that the Hohokam here were growing and harvesting agave plants, possibly as many as 100,000 simultaneously (Sheridan, 2000, p. 107). All of these farming and agriculture methods did considerable damage to the desert, mainly where the land had to be scraped to plant the crops and in cases of the canal systems, where the canals were dug. Despite the documentation of these sites, whether the sites be canals, check dams and terracing or other types of construction such as living quarters or ball courts or mounds, it is important to note that the Sonoran Desert at these locations, while changed some, was still largely intact until the Europeans arrived in the region. The most ecologically significant changes occurred when Europeans arrived bringing with them "genes, microbes, plants, and animals between the 'old world' of Eurasia and Africa and the 'new world' of the Americas" (Sheridan, 2000, p. 109).



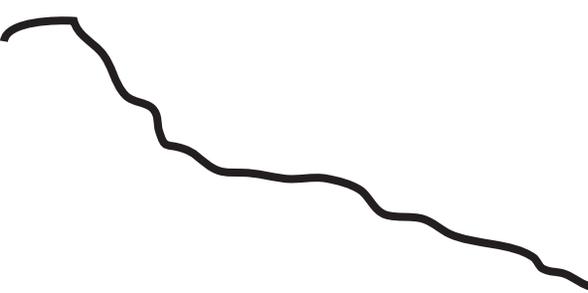
THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

After years of perishing from disease and enduring cultural evolution, the Hokokam and their descendents banded together with other Indian tribes to protect against Hispanic colonists. Soon Arizona Indians of the Sonoran Desert gave way. The frontier that was Arizona was infiltrated in the late 1880's. This began the era of the "three c's, cattle, copper, and cotton" (Sheridan, 2000, p. 109-111). It is noted that the introduction of these three 'c's' dramatically changed the desert. Cattle are a huge threat to riparian zones, by, as Williams (2001) states, "trampling, grazing, and fouling" (Williams, et. al., 2001). There is not a natural grass occurring that feeds the cattle to fulfill the extent of their necessary intake. Therefore buffle grass was introduced as a means for cattle grazing and is very harmful to the desert. The grass not only replaces native species but it "accumulates, forming combustible litter that causes the complete burning of ironwood and other plants" (Williams, et. al., 2001). Ironwoods are essential along riparian zones for species protection, both plant and animal. The saguaro cactus, as an example, is dependent on ironwoods, along with boulders and other protective elements of the desert, to survive its first years. The trees found along riparian zones protect the extremely fragile seedling. If these trees are successful, a saguaro seedling that survives its first decade will be only one inch tall (Dimmitt, 1985. p.72). The reduction of trees such as the ironwood at the edge of riparian zones greatly affects the survival of other plant and animal species. It is clear that cattle are a species not suited to the conservation of the desert as the species has been inhabiting the desert since the time of its introduction to the region. As Sheridan (2000) states, "Stock raising was the most land-extensive Euro-American transformation of the Sonoran Desert" (Sheridan, 2000, p. 111).



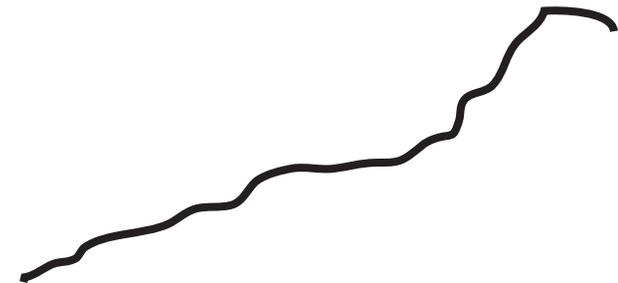
THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

Cattle, as noted above, were not and are not the only European introduction to the region that has caused damage. The most transformative of the three "c's" was cotton and the agriculture that developed from it. For centuries desert peoples relied on the surface flow of water and the little rainfall that came to water their crops. But with the damming of the Roosevelt River in 1903 that all changed. Cotton crops spread across the valley from Phoenix to Tucson. Present day, "dams have domesticated all major rivers in the region while pumps have mined ground water aquifers far beyond recharge" (Sheridan, 2000, p. 115). People of the Sonoran Desert have long since lived by means of working with the water in their region and have been manipulating and exhausting all sources possible to feed an unsustainable means of inhabiting the Sonoran Desert. While we will have to find ways to adapt to present day circumstances, men and women can learn from past inhabitants of the Sonoran Desert how to better use the resources the desert has to offer. The knowledge people ascertain from their cultural and ecological surroundings in the Sonoran Desert can be used to better guide how men and women inhabit the region. In order to encourage a conservationist mind toward the Sonoran Desert, men and women must first reconnect with the desert ecology that surrounds them. People will be ready to learn once they have related themselves back to their surroundings. In *Our Land, Ourselves: Readings on People and Place*, one editor, Peter Forbes (1999), quoted the conservationist Aldo Leopold as stating, "conservation... is defined by a state of harmony between man and nature" (p. 3). To get to that state of harmony people must make a personal effort to connect with nature. In order to do so, people must "know" nature.



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

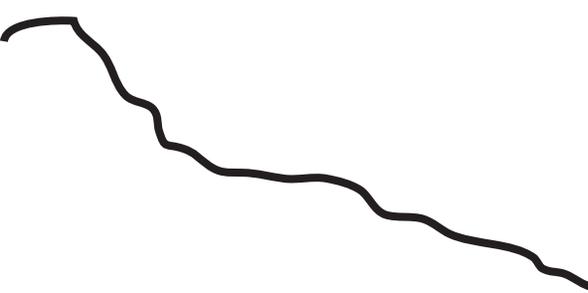
But not in the conventional sense, instead people must know nature in an intrinsic way that allows the brain to attribute positive associations of experiences and the ecology. Winifred Gallagher (1993) quoted Weiss as cited in *The Power of Place: How Our Surroundings Shape our Thoughts, Emotions, and Actions*, as saying “our brains are so adapted to make associations with the environment that whether we want to or not, we link our experiences and their settings, and those two things together produce behavior” (p. 136). This requires us to invest in the Sonoran Desert, not with money or capital of any means but through an investment of ourselves. By dedicating our emotion, skills, time and thought to the ecology we invest a part of ourselves that we can recognize and associate with (P. Forbes, A.A. Forbes and Whybrow, 1999, p. 11). This association will reinforce the sense of place and a claim to the land, even land we do not own, that will lead us to change our behavior towards the land, in this case the Sonoran Desert. The investment of self will be a part of the motivation that is necessary for a person to stay committed to a task. A personal connection to the landscape is a relationship and will take work, at the very least a constant reminder, to maintain its vigor. For those who are already passionate about the Sonoran Desert and those who have already established and developed ways to maintain their relationship with the desert the task of motivation is simple. It is to get up and start the day. For others who are not as familiar with the landscape, even those who have lived here all their lives who have not been properly introduced to all its splendor, it will not be so easy. As the design for this project unfolds this will be a key aspect that this designer will have to continuously investigate. How do people become and stay motivated about this topic?



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

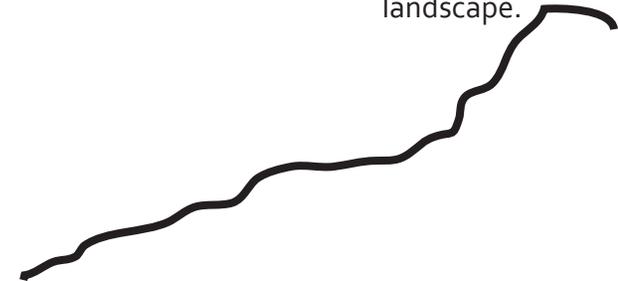
Can passion be taught or are respect and understanding enough to develop the relationship and connection needed to achieve a conservationist mindset? Education will definitely be at the forefront of practicing the goal, but it will have to be more than a standard type of teacher student education. It will be focused on philosophical, psychological, and emotional relationships, a way of educating that is more reflective and qualitative in nature. As displayed in the Living Planet Aquarium in Sandy, Utah, the environmentalist Baba Dioum is quoted as saying, "for in the end we will conserve only what we love, we will love only what we understand, we will understand only what we are taught." We can be taught only what we are personally invested in, through the personal connection with the Sonoran Desert people will start the education process while simultaneously connecting to the land. Space in the Sonoran Desert will begin to carve its place in people to inspire them to go further beyond the act of simply sitting on a bench in a landscape not recognizing the majesty that surrounds.

Through understanding in conjunction with cultural knowledge from past inhabitants of the Sonoran Desert, man has the ability to conserve and sustain the Sonoran Desert. The key is providing the motivation for the application of knowledge once it is learned and once the ecological connection is established. There was an interesting phenomenon that occurred in Tucson and is still undergoing evolution that may shed some light on how or what motivates people to change. E. Gregory McPherson and Renee A. Haip summed it up perfectly as a general set of framework to examine. In their paper *Emerging Desert Landscape in Tucson* they discussed a vegetation revolution and then evolution that started in the late nineteenth century.



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

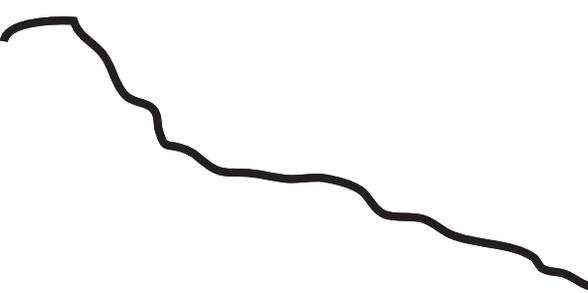
At the turn of the century the trees growing in Tucson were native species that voluntarily grew where the water, wind, and sun allowed. A decade later the city was essentially an exotic forest filled with trees that were invasive species. The drive behind the massive planting efforts was to alleviate the heat from the hot desert sun and for providing shade to get out of the sun's direct rays (McPherson & Haip, 1989, p. 435). There are still many neighborhoods in the greater Tucson area where this massive planting effort is visible. Large trees line the streets of neighborhoods in an environment where the tallest naturally occurring tree reaches at most thirty-five feet tall. "In Tucson vegetative patterns are linked to climate, water resources, cultural heritage, urban morphology, and the values of the population" (McPherson & Haip, 1989, p. 435). As McPherson and Haip noted, the Hispanic culture is a huge aspect of the city's culture and its heritage. The first nonnative settlers to the area were the Spanish, who in 1775 established themselves along the Santa Cruz River. The settlers developed the town as an adobe townscape with narrow streets lined directly with buildings. The buildings were placed around blocks with courtyards open for planting. A century later the beautification and afforestation of the region began. This went on for forty years. In that time the woodland riparian zone along the Santa Cruz was adversely impacted from the drastic reduction of the water tables due to pumping the aquifers. It wasn't until the advent of evaporative cooling that the afforestation campaign slowed down. By the 1950's most people had lost an interest in tree planting because the need for cooling dwellings and public buildings had been drastically reduced. By 1970, shift had begun to take place that would again change the landscape of Tucson. This shift was towards what was thought to be a more desert appropriate landscape.



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

It was the implementation of the xeriscape. With mainly gravel and other low or no water needed elements, the water used for landscaping was reduced (McPherson & Haip, 1989, p. 435-446). The shift is a very important social study. It shows how people respond to an environment and the values they associate to that local ecology. Without the proper connection to and education about a certain environment solutions to environmental normalities can produce damage to the ecological region. This loop of transformation in Tucson is a good example. The idea that the xeriscape is a desert friendly approach to landscaping is not far off at first glance. But there are problems with this way of thinking. The Sonoran Desert is not naturally just a gravel and dirt landscape with low grasses. To be truly appropriate and a sustainable means of developing landscape for the city, the landscape must follow the natural precedent. Plants and animals of the Sonoran Desert have evolved specifically to this climate and are aptly suited to withstand regional climate.

From the understanding of what is truly a desert appropriate way of life we must respect our local ecology and as a community take the proper steps to implementing the collective knowledge. This point leads us to environmental ethics and what motivates the understanding and respect necessary to continue the idea of conservation. In her essay *A Motivational Turn for Environmental Ethics*, Carol Booth (2009) provides a possible reason for why there is a disparity between knowledge and actions once the intrinsic knowledge needed for conservation is established. She states "in modern industrial societies, where many are affluent, well educated, sympathetic to conservation and have many ways to contribute, a primary diagnosis must be that people are insufficiently motivated by their beliefs and sympathies to act" (p. 54).



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

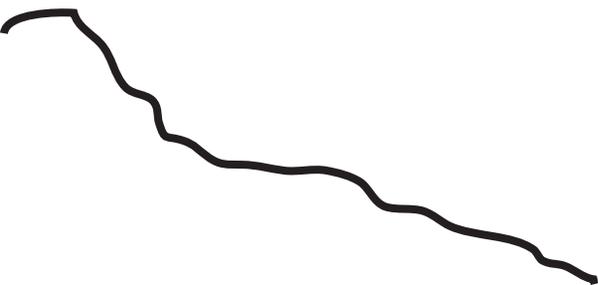
Once people have an understanding and an affinity for the ecological surroundings they must be motivated to go beyond the knowledge of place if they are to make changes to their ways of life for the benefit of the community and the ecological region. This is why the introduction to an intrinsic knowledge of the Sonoran desert is so vital. It lays the groundwork for motivation beyond a basic knowledge. People are easier to motivate if they have compassion towards the goal. That being said, compassion is not enough to create action. "Motivations are psychologically compelling demands of self, both conscious and non-conscious processes emerging from both individual and social sources" (Booth, 2009, p. 57). The transformation of the Tucson landscape took place because of both individual needs and social demands.

The fundamental cycle was the need for cooler situations in the city, and then when the drought hit in 1974 it was a need to reduce water use once the community realized it was pumping the aquifers beyond repair (McPherson & Haip, 1989, p. 445). According to Booth, "...the fundamental task of conservation is to motivate people to reduce the harm they do" (2009, p. 60). So how do we instill a sense of environmental ethics once a connection to the local ecology has been established? Booth quotes the biophilia hypothesis of EO Wilson as "[proposing] that humans have a deep, evolved inclination to affiliate with nature, an inclination that can provide an anthropocentric basis for environmental ethics" (as cited in Booth, 2009, p. 61). This means that when we center ourselves at the core of the environmental basis we may better promote conservation through communal needs. If we understand the ecology and then as a whole apply why that ecology is important to human survival we may have a more in-depth grasp and means for carrying out the motivation of conservation.



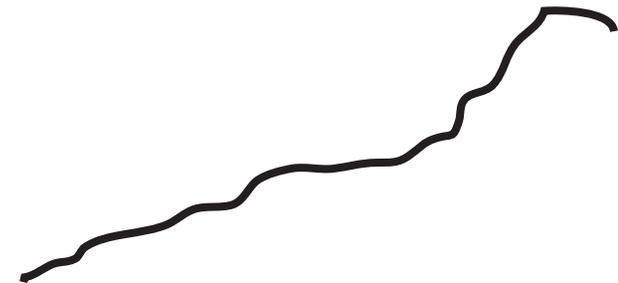
THEORETICAL PREMISE/UNIFYING IDEA RESEARCH

Man cannot save the desert through conservation and sustainable practices if he does not also understand the ecology and learn better ways to inhabit the Sonoran Desert. An architecture that supports and provides for this kind of knowledge is essential to the future of the Sonoran Desert. Motivation through community and self-based needs can that continue the means of conservation into the future.



THEORETICAL PREMISE/UNIFYING IDEA RESEARCH SUMMARY

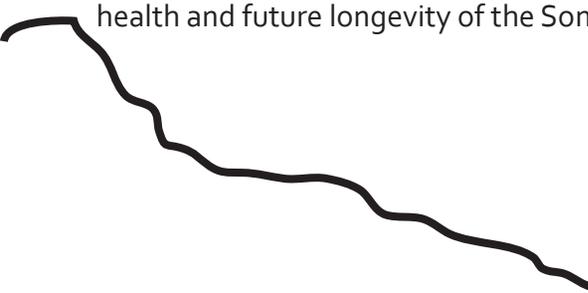
The Tucson Basin has been inhabited for over 14,000 years. In that time the Sonoran Desert has evolved naturally and has been affected and changed by the habits and practices of its inhabitants. The Hohokam Indians who previously lived in the region were a dual dwelling tribe in that they would relocate where they lived based on the time of year. They were farmers, manipulating the land raise yield. The Sonoran Desert, while it is one of the wettest deserts on the planet by definition, is still a desert and therefore an arid climate. At the time the Hohokam inhabited the region the major rivers that converge on the Tucson basin and those whose downstream flow used to reach the region through tributaries, were still running, uninhibited into the region provided more water than is currently available. While these rivers were a source of water their flow depended on rainfall. While then the desert could recuperate from dry years the Hohokam people had to struggle to survive. In dry years farming would have been nearly impossible. To take advantage of the landscape and the water that was abundant during wet years and especially after rainfalls, even in dry years, the Hohokam developed numerous ways of catching and retaining that water for their use. Because each family sub-clan lived apart from the main "city" but in regions with other families, the clans addressed water needs differently based on where their clan region was located. For instance, along the Santa Cruz River the people depending mainly on floodplain farming and surface flow water. Further away from the waters edge clans depended on canals. The Hohokam are most widely know for the extensive canals they built to collect and direct water to areas needing irrigation. At the base of mountains the Hohokam used yet another style of farming. They built check dams and terraced the landscape to control water collection and flow.

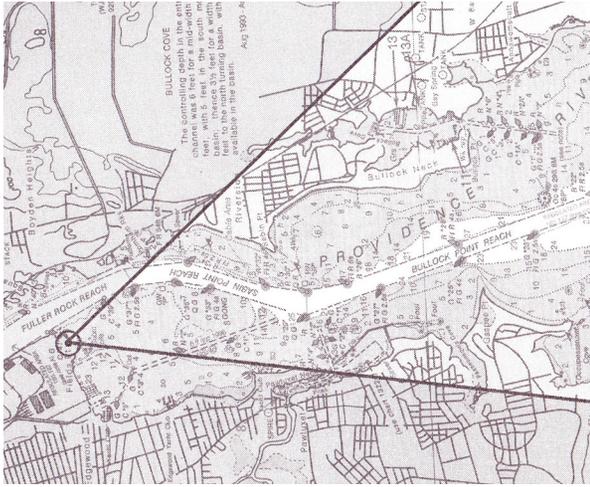


THEORETICAL PREMISE/UNIFYING IDEA RESEARCH SUMMARY

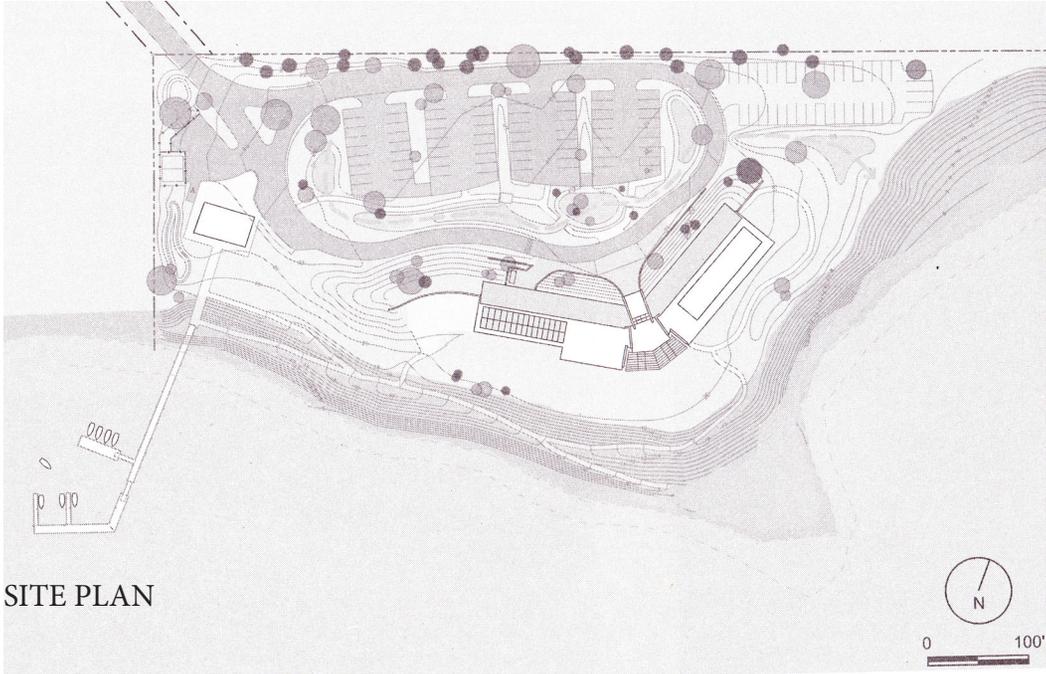
While the Hohokam changed the landscape through their farming techniques, introducing plants and animals based on trades with other Indian Nations, and through their development of dwelling, large communal and religious houses, and ball courts, they left the desert with most of the landscape intact. It wasn't until Spaniards came to the region and introduced a plethora of exotic plants, animals and diseases that the landscape was seriously damaged. The last century has seen the worst of the damage take place with habitat destruction for infrastructure, homes, and other built features that accommodate the rapid growth rate. The aquifers have been pumped beyond recharge and the loss of habitat, despite current conservation efforts, continues to happen at alarming rates.

To help combat the problems besieging the Sonoran Desert it is necessary for inhabitants of the community to renew, refresh and reestablish their individual connections to the ecology. Without education about the diverse and fragile ecosystem in which they live, people, even those who wish for conservation, will not conserve. To establish this education and connection to the Sonoran Desert ecology, this project looks to bring people together then allow them the time and space to reflect within a restored natural landscape. Once people have experienced the landscape they can learn about the areas they inhabit in the Sonoran Desert and through that awareness begin the process for conservation. The architecture on the site will be a means through which people can grow emotionally, rationally and possibly even spiritually over time, over repeated visits. It is necessary that there be a continual connection to the ecology to keep people motivated about where they live and the community they share. The intrinsic knowledge acquired over time will allow people to take personal steps of conservation to promote the health and future longevity of the Sonoran Desert.





NAUTICAL MAP OF NARRAGANSETT BAY

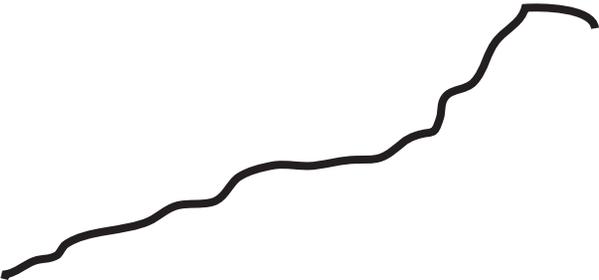


SITE PLAN

TYPOLOGICAL RESEARCH

BAY EDUCATION CENTER
BY CROXTON COLLABORATIVE ARCHITECTS

PROVIDENCE, RHODE ISLAND

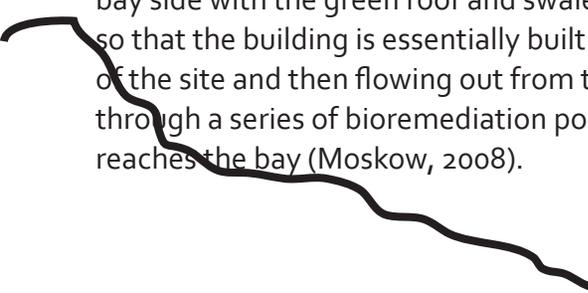


TYOPOLOGICAL RESEARCH

Bay Education Center
Croxtton Collaborative Architects
Providence, Rhode Island
Completed 2005
15,042 Square Feet

The Bay Education Center, owned by Save The Bay, Inc., is an education center aimed at allowing children access to the Narragansett Bay of Providence, Rhode Island, and to raise awareness of the importance of the coastal ecosystem that the site encompasses. The site itself is the main inspiration behind the project design and its ultimate function as an education center. The site is considered a brownfield site that was an abandoned landfill (Moskow, 2008). The main importance to the design, behind the necessity to create a center that would educate the occupants and visitors, is the drive not only to restore and conserve the local ecology through education but also through example.

The facility boasts numerous environmental accomplishments allowing the building to function as an innovative paradigm to the region, and to other locales looking to educate and promote ecological conservation and restoration through the built environment. One of the key issues addressed by the design is the rainwater runoff that flows into the bay from the site. The architects designed a 7000 square foot green roof and a series of swale that would hold up to 5000 gallons of water for a 24 hour period. The building form followed this lead by opening up towards the water, allowing all the views to be bay side with the green roof and swales to the entrance side of the building so that the building is essentially built into a berm running along the north of the site and then flowing out from there. The rainwater is also addressed through a series of bioremediation ponds that will clean the water before it reaches the bay (Moskow, 2008).



TYPOLOGICAL RESEARCH

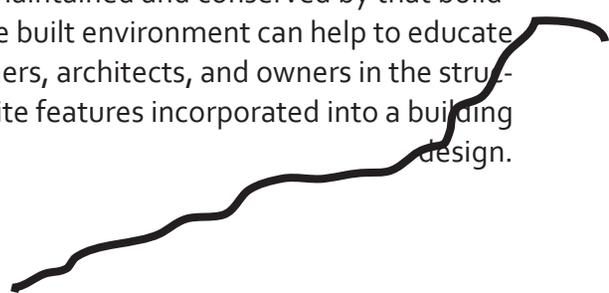
This allowed for a completely integrated building and building program that followed the design intent.

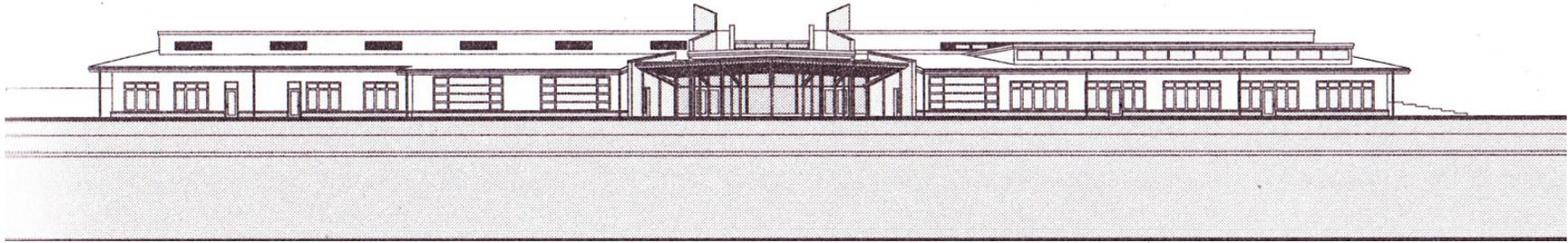
The building, at 15,042 square feet, has a symmetrical layout that supports yet separates its public and private functions. The north wing of the building is devoted to administrative functions as it hosts offices and open layout meeting rooms. The south wing is the public side of the program hosting classrooms and a large meeting room. It also supports the laboratory space.

The entrance is the tie between the two sides, as one enters he or she is greeted with dramatic views out to the bay through the observation lobby.

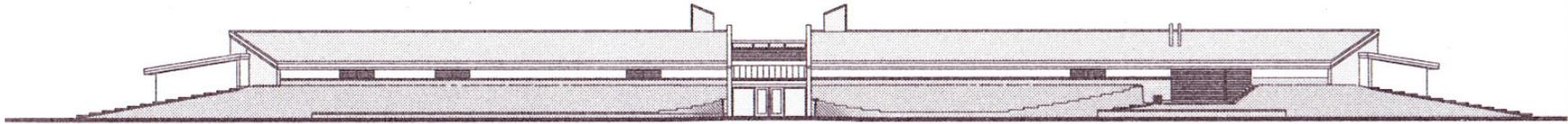
With the focus of the building on the site and not the structure itself, the program provides for 14 exits out onto the site. It also provides many views with the windows being on the bay side. The administrative wing is naturally lit with a three tiered daylight system using clerestories, main windows and dormer windows. The remainder of the building also addresses natural day lighting through shaded south facing glazing and clerestories (Moskow, 2008). The design of the building follows the approach of ecological importance through its daylighting, incorporation into the site, approach to storm water runoff and its use of materials from the site.

The importance of the Bay Education Center is the consistent approach to incorporating the facility into the site while addressing the needs of ecological preservation and restoration on the site. It helps to support and facilitate the awareness and education of ecological emphasis in the built environment. It is an example facility as to how the local environment can become a part of the building and yet still be maintained and conserved by that building. It is also a paradigm of how the built environment can help to educate through the choices made by designers, architects, and owners in the structure, materiality, placement and site features incorporated into a building design.

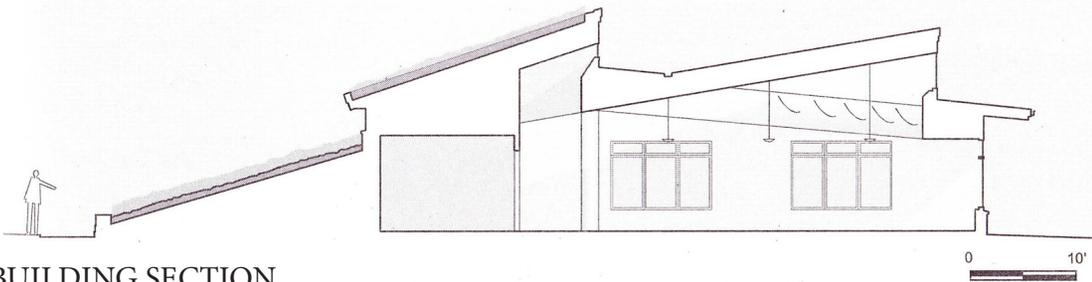




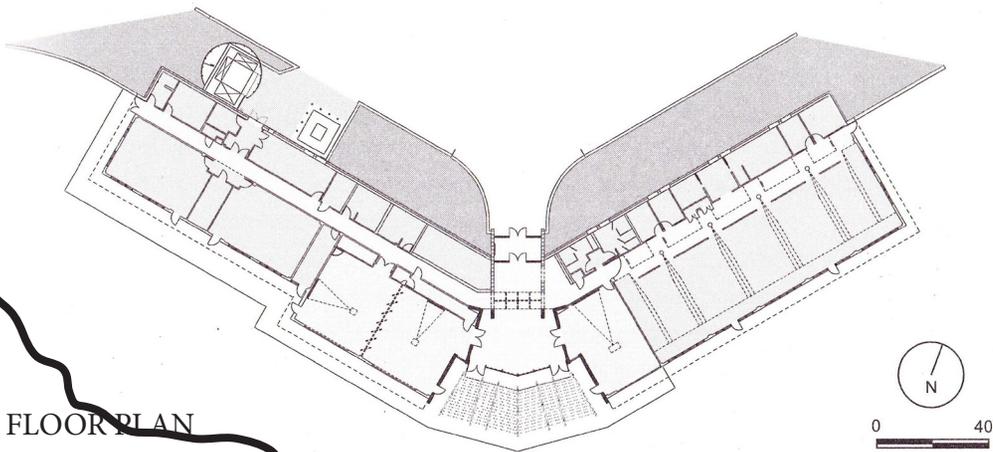
SOUTH EAST ELEVATION



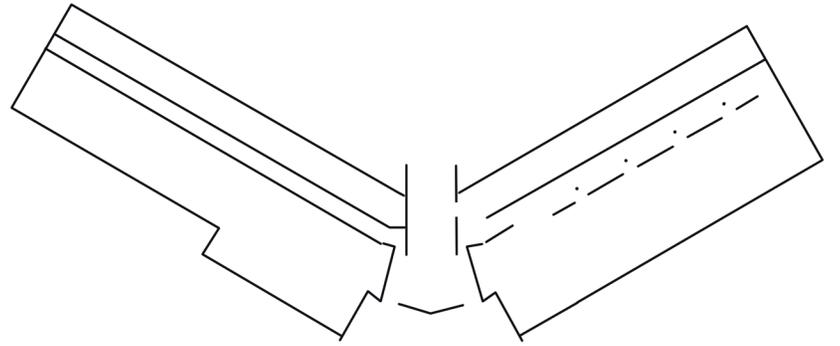
NORTH WEST ELEVATION



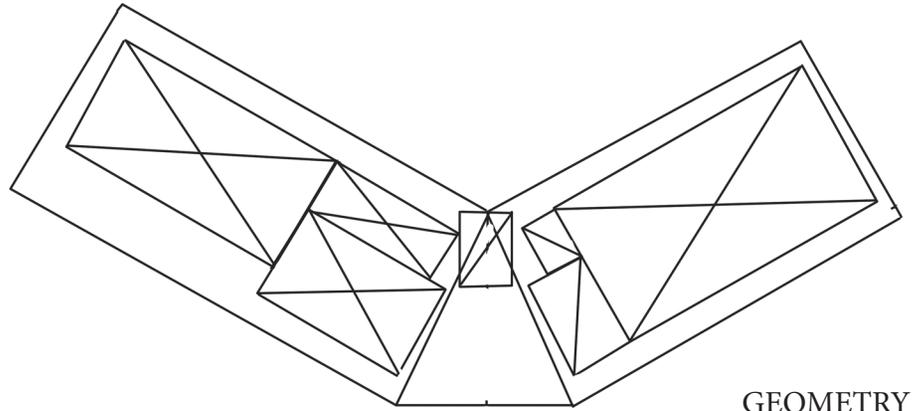
BUILDING SECTION



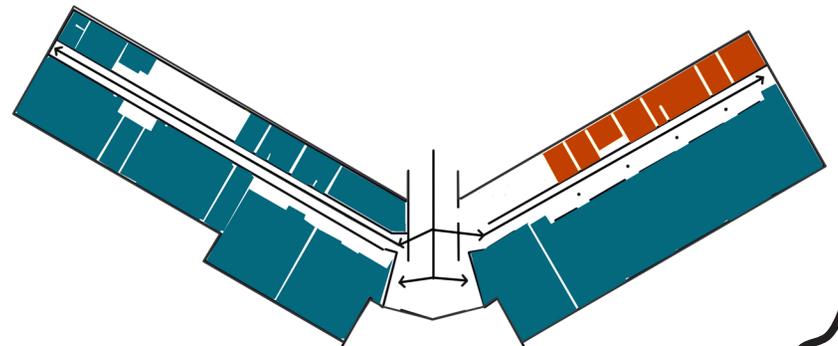
FLOOR PLAN



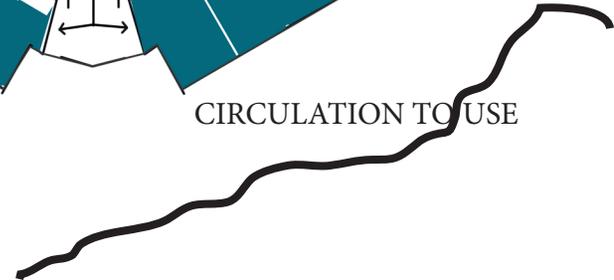
STRUCTURE



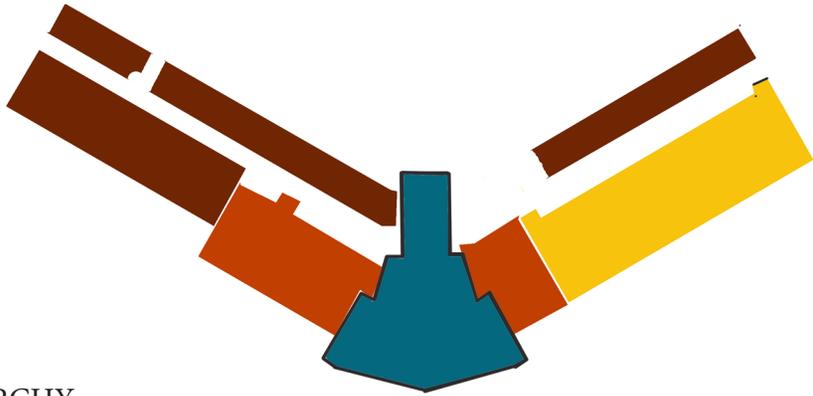
GEOMETRY



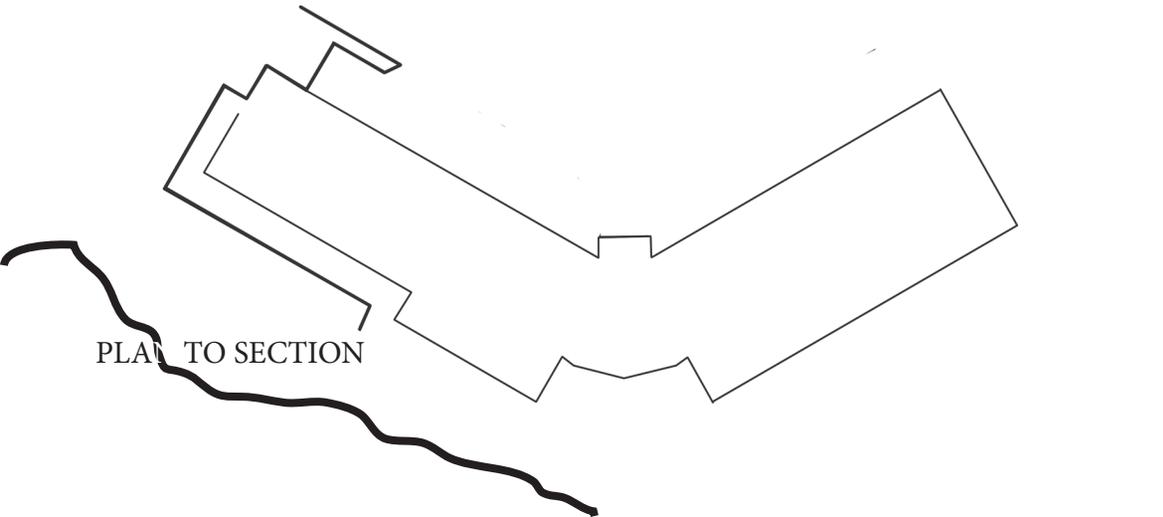
CIRCULATION TO USE

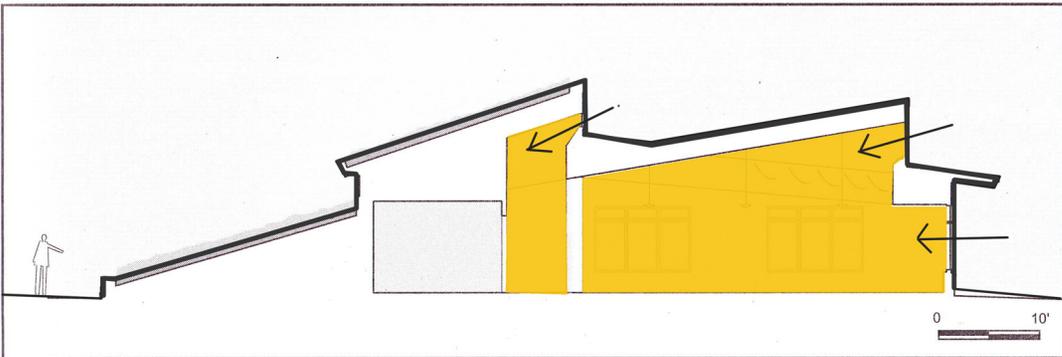


HIERARCHY



PLAN TO SECTION

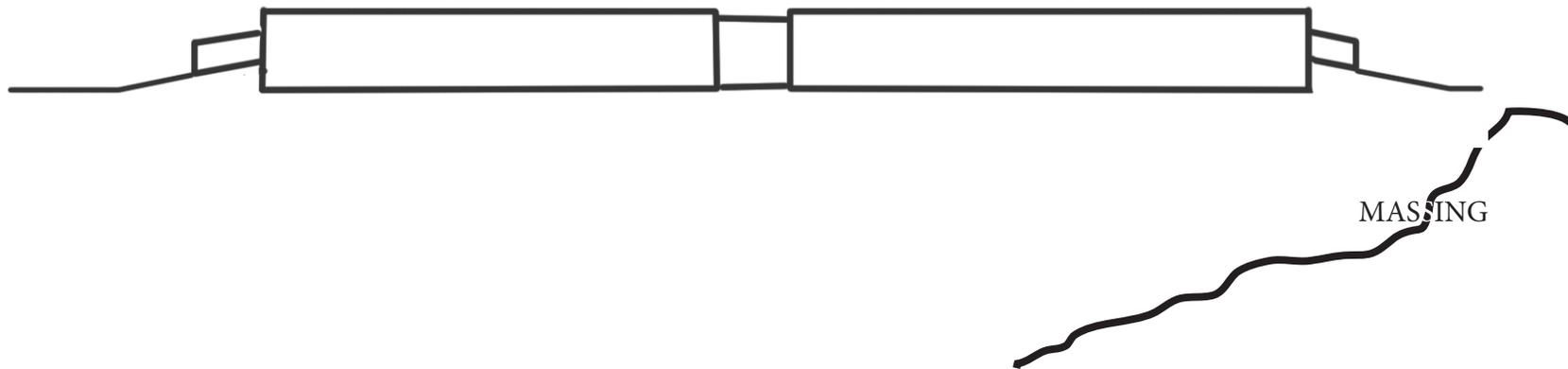




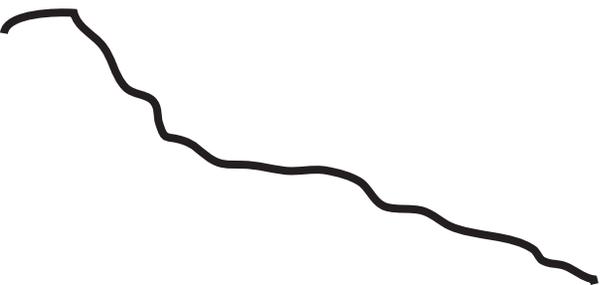
NATURAL LIGHT

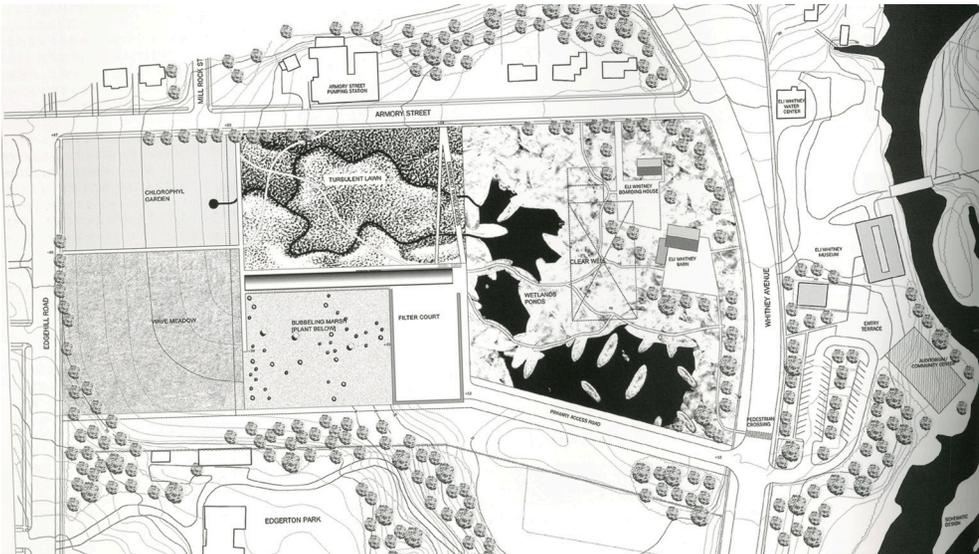


MASSING



MASSING

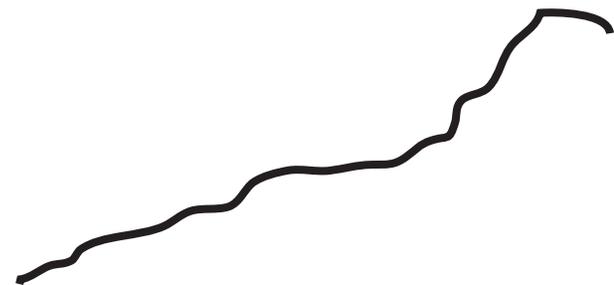




TYOLOGICAL RESEARCH

SOUTH CENTRAL CONNECTICUT WATER TREATMENT PLANT
BY STEVEN HOLL

NEW HAVEN, CONNECTICUT

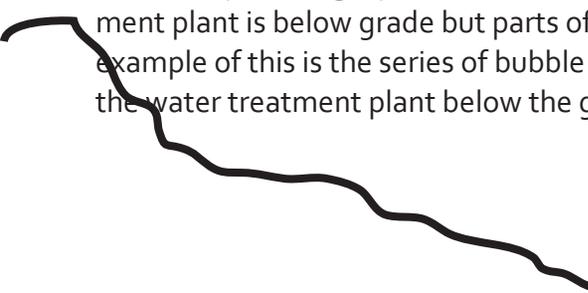


TYOPOLOGICAL RESEARCH

South Central Connecticut Water Treatment Plant
Steven Holl Architects
Connecticut, U.S.A.
Completed 2005
140,000 Square Feet

The South Central Connecticut Water Treatment Plant is a water treatment facility in the state of Connecticut. The architects looked at the literal reinterpretation of the processes of water treatment and the outcomes of that treatment when designing the facility (ed. Futagawa, 2005). The site provided some complicated design opportunities based on the surrounding fabric. Some of those opportunities include a residential neighborhood, in which the site is located, it is “adjacent to a historically significant museum, it [adjoins] a sensitive tributary to the Long Island Sound Estuary”, and the building is “highly visible from a cliff top park (ed. Futagawa, 2005).” This facility is an example of how services and processes that may be considered dirty, ugly, and threatening to the local ecology can continue the necessary work while still protecting and restoring the environment.

There are a myriad of green features to the project that stand out as eco-conscious design decisions. One of those decisions is the green roof that responds to the visibility of the project from the cliff above and while participating at the adjacent park. The green roof, which is a massive 28,000 square foot feature, is currently the largest green roof in Connecticut. It is “designed so that people can walk onto it from the park (ed. Futagawa, 2005).” The roof also helps to control storm water runoff, habitat protect and restoration as well as providing a place for education and recreation. The water treatment plant is below grade but parts of it rise up from below periodically. One example of this is the series of bubble skylights that allow natural light into the water treatment plant below the green roof.



TYPOLOGICAL RESEARCH

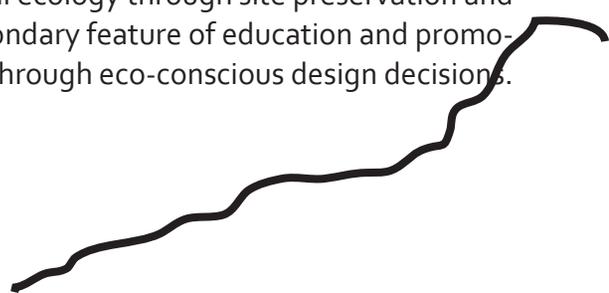
The roof as an example of habitat restoration continues into the intent of the site as a whole. Because certain wetland bird species use the adjacent wetlands as a stopping point during their migration, it was a necessity to incorporate and preserve the natural landscape and vegetation on site. The planting on site also provides shade to the site inhabitants. Other environmentally-oriented features include the use of renewable energy in the form of a heat pump system and energy credits, reduced light pollution by not lighting the grounds at night, and the use of recycled materials in the building of the project as well as for its finishes (ed. Futagawa, 2005). The green features support the processes going on within the plant and inform visitors of the importance of eco-conscious design.

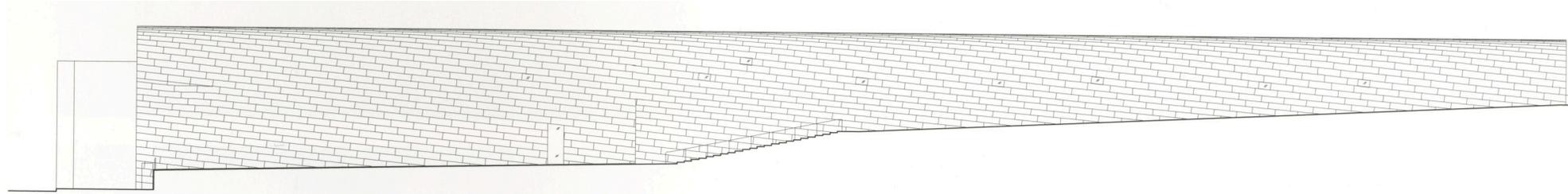
The facility supports very important processes in the steps to clean water.

While there are specific processes addressed in the program that are expected in such a facility there are some very important liberties included as well. Some of the more standard program needs include spaces to facilitate “six basic elements: Rapid Mix, Flocculation, Dissolved air flotation, Ozonation, Deep bed GAF Filtration, clear water storage” (ed. Futagawa, 2005). The other spaces within the plant include a “public education exhibition, offices, laboratories, [a] multi-purpose room and lobby” (ed. Futagawa, 2005).

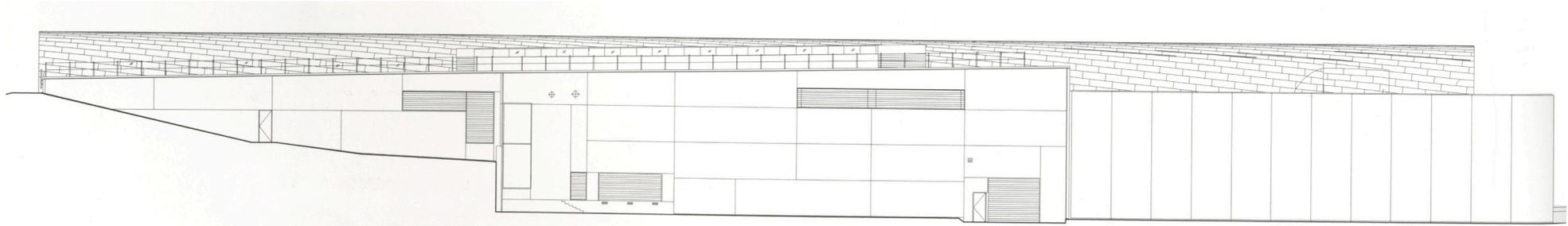
These spaces together comprise a total floor area of 140,000 square feet (ed. Futagawa, 2005). The facility is well incorporated into the site with the below grade plant and with the exterior spaces that tie the facility back into the environment.

The facility is a good example of how a more industrial process that is necessary can be a benefit to the local ecology through site preservation and restoration. It also supports the secondary feature of education and promotion of sustainable design through eco-conscious design decisions.

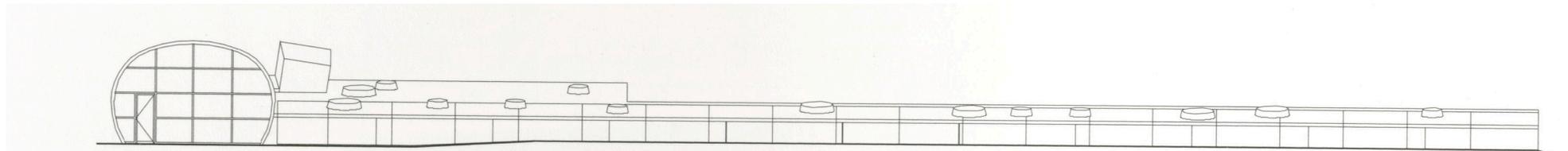




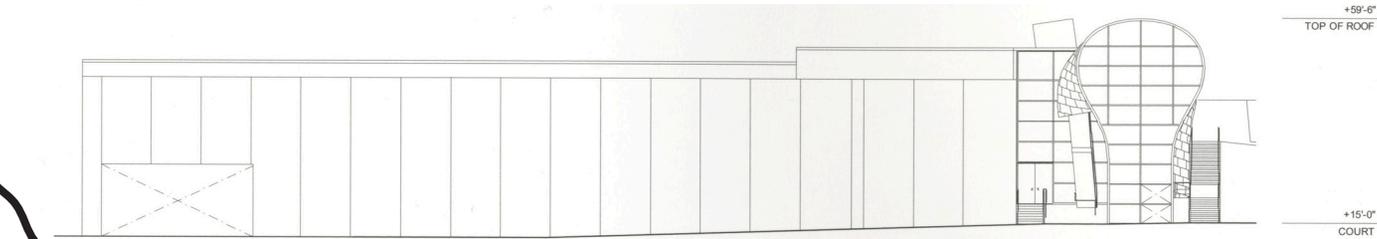
NORTH ELEVATION



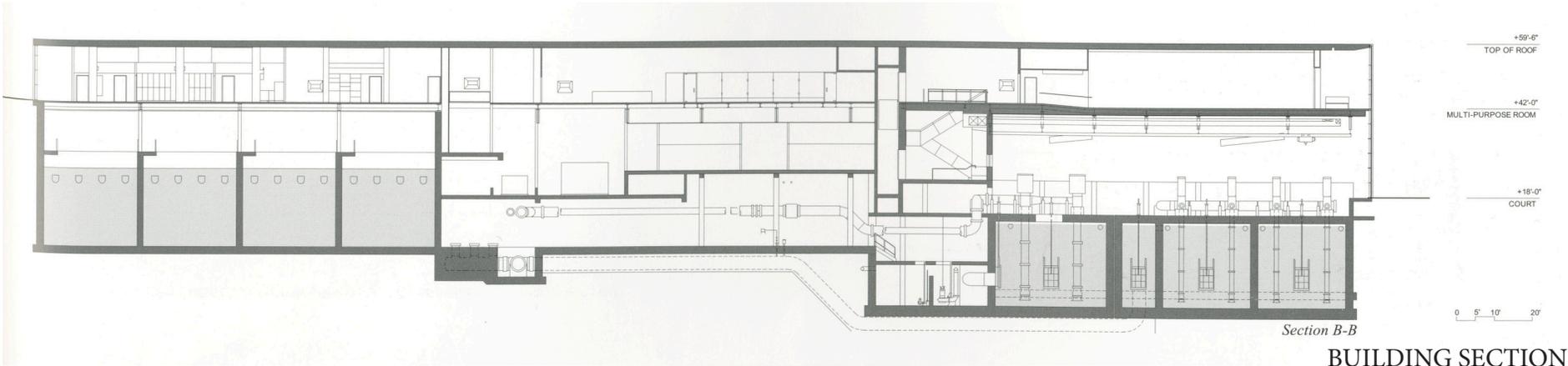
SOUTH ELEVATION



WEST ELEVATION

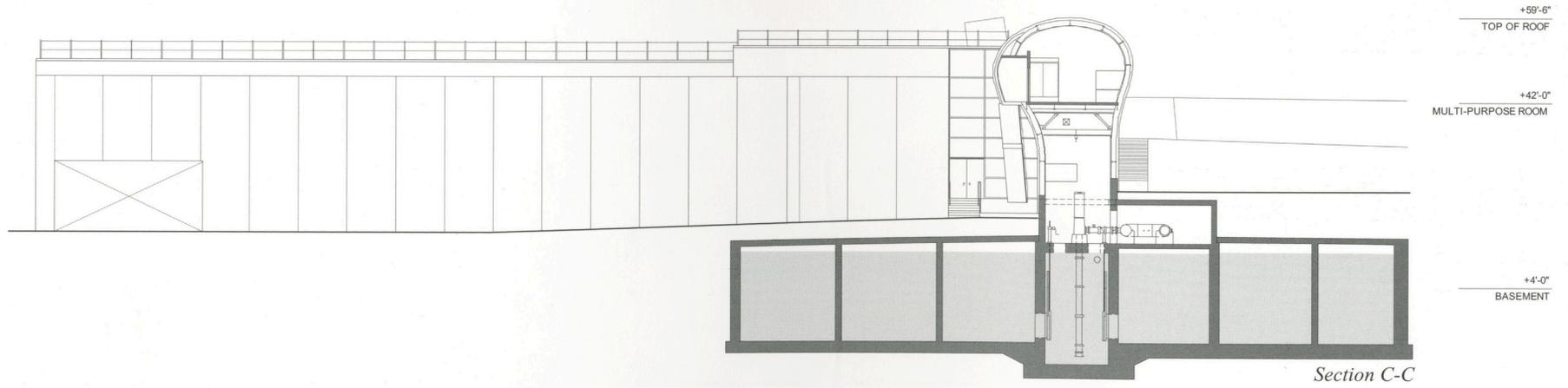


EAST ELEVATION



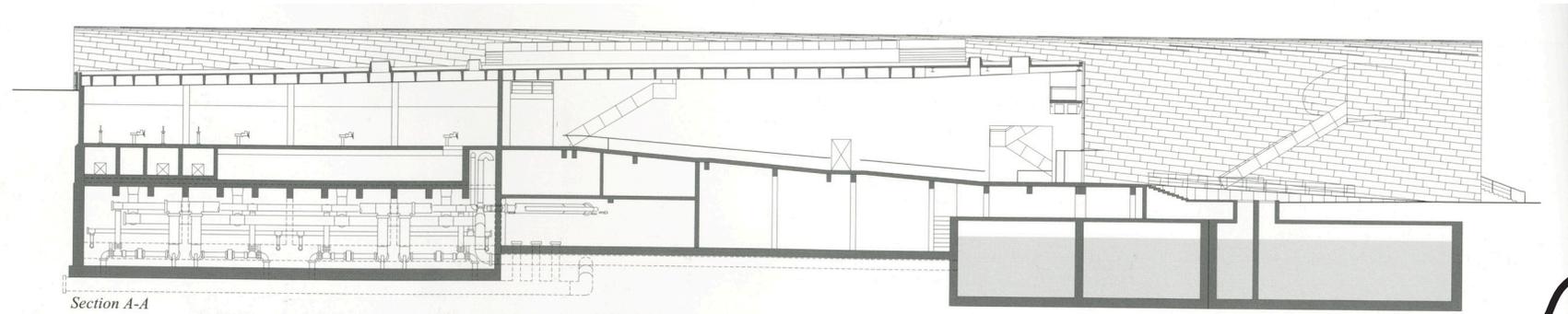
Section B-B

BUILDING SECTION



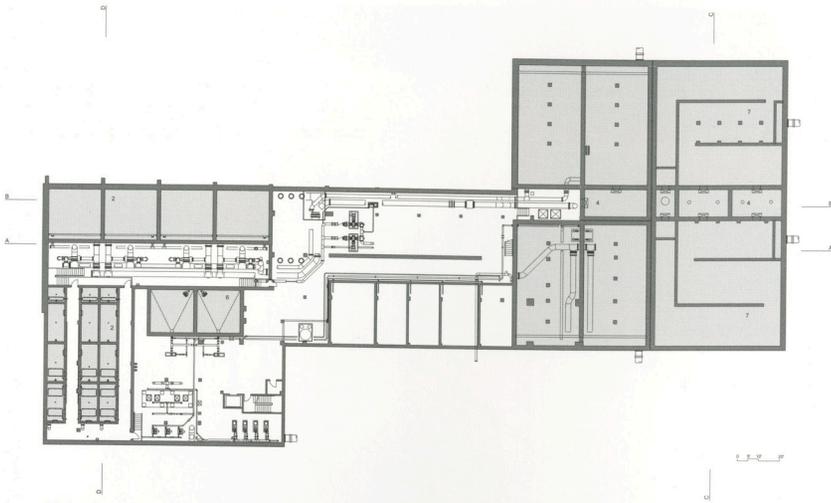
Section C-C

BUILDING SECTION



Section A-A

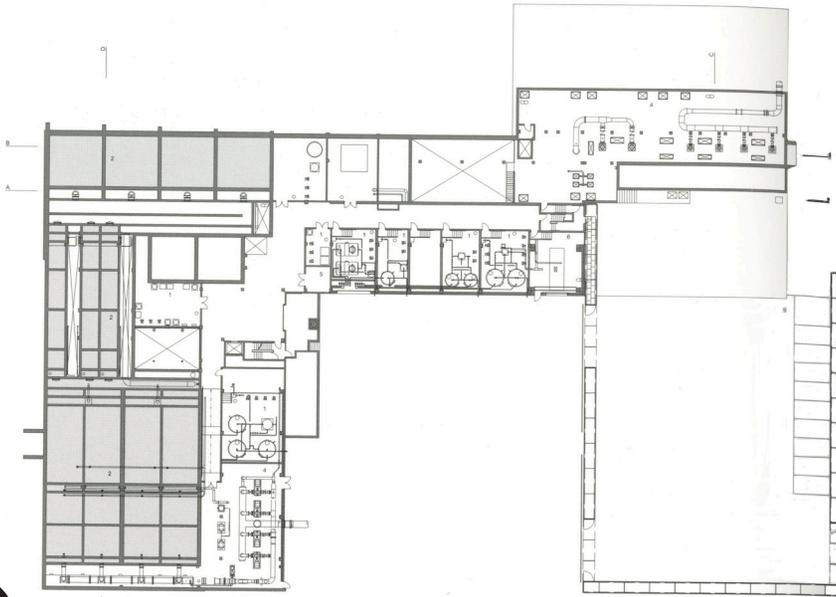
BUILDING SECTION



Plan +4

- 1 CHEMICAL STORAGE
- 2 WATER TANKS
- 3 FILTER GALLERY
- 4 PUMP ROOM
- 5 MECHANICAL/ELECTRICAL
- 6 RESIDUALS
- 7 WATER STORAGE

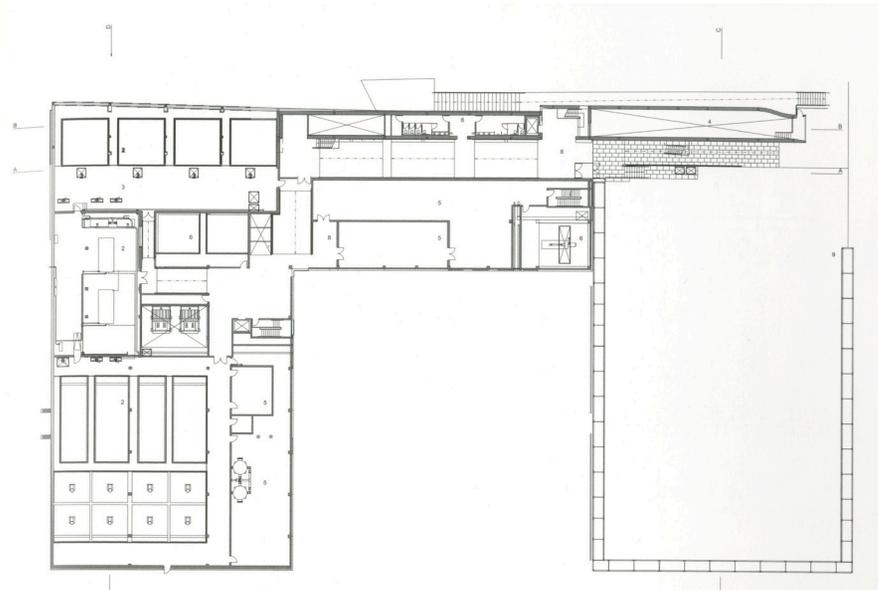
FLOOR PLAN +4



Plan +18

- 1 CHEMICAL STORAGE
- 2 WATER TANKS
- 3 FILTER GALLERY
- 4 PUMP ROOM
- 5 MECHANICAL/ELECTRICAL
- 6 RESIDUALS
- 7 WATER STORAGE
- 8 VESTIBULE
- 9 FILTER COURT

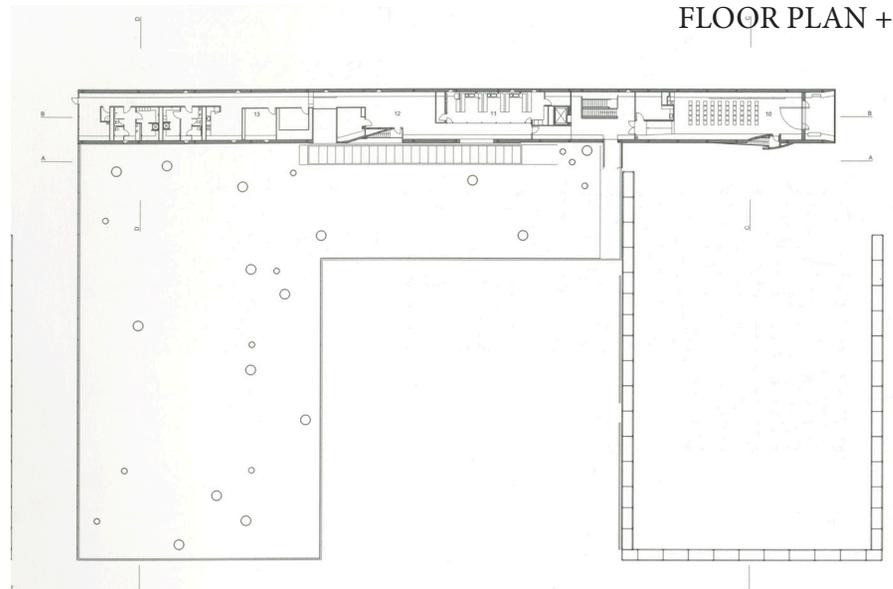
FLOOR PLAN +18



Plan +32

- 1 CHEMICAL STORAGE
- 2 PROCESS AREA
- 3 FILTER GALLERY
- 4 PUMP ROOM
- 5 MECHANICAL/ELECTRICAL
- 6 RESIDUALS
- 7 WATER STORAGE
- 8 VESTIBULE
- 9 FILTER COURT

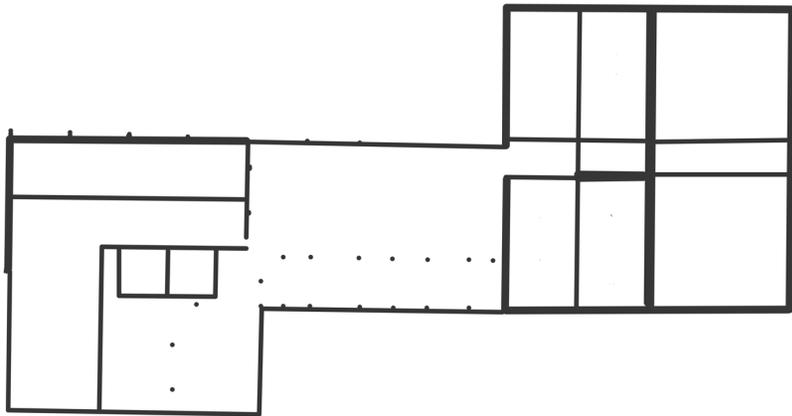
FLOOR PLAN +32



Plan +43

- 10 MULTI-PURPOSE ROOM
- 11 LABORATORY
- 12 CONTROL ROOM
- 13 ADMINISTRATION

FLOOR PLAN +43



STRUCTURE +4



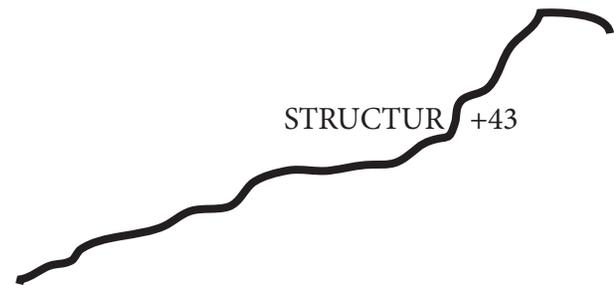
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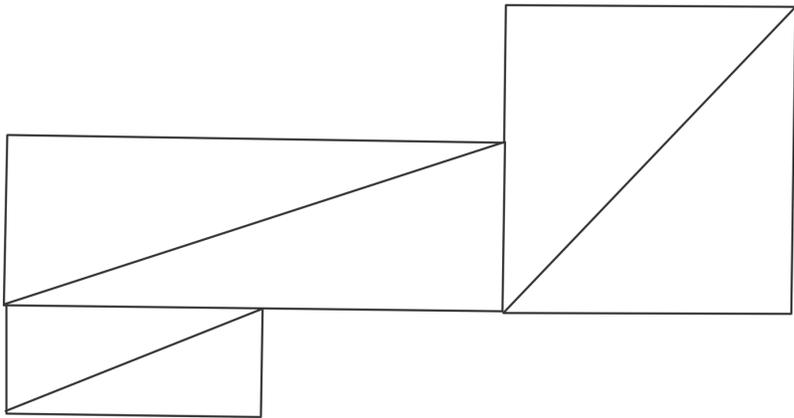


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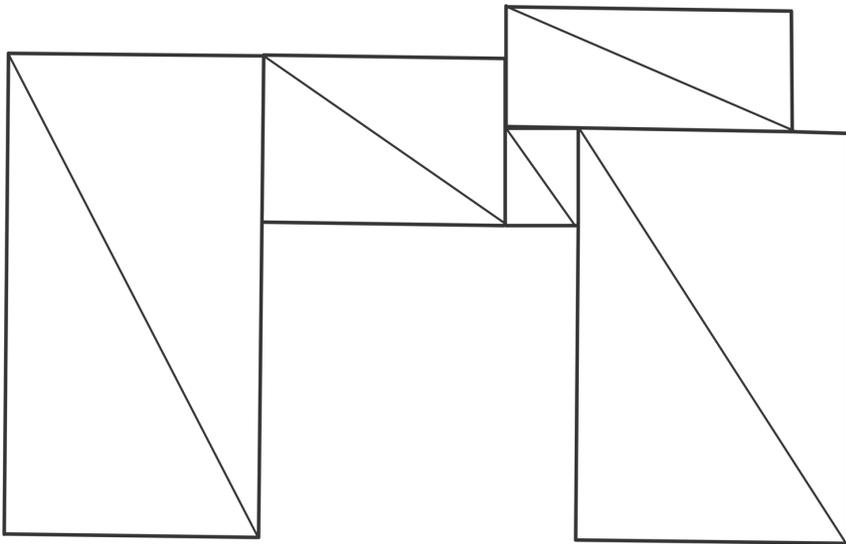


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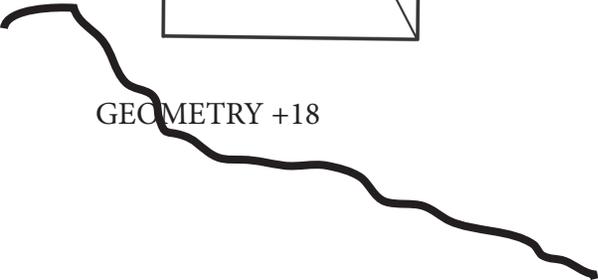


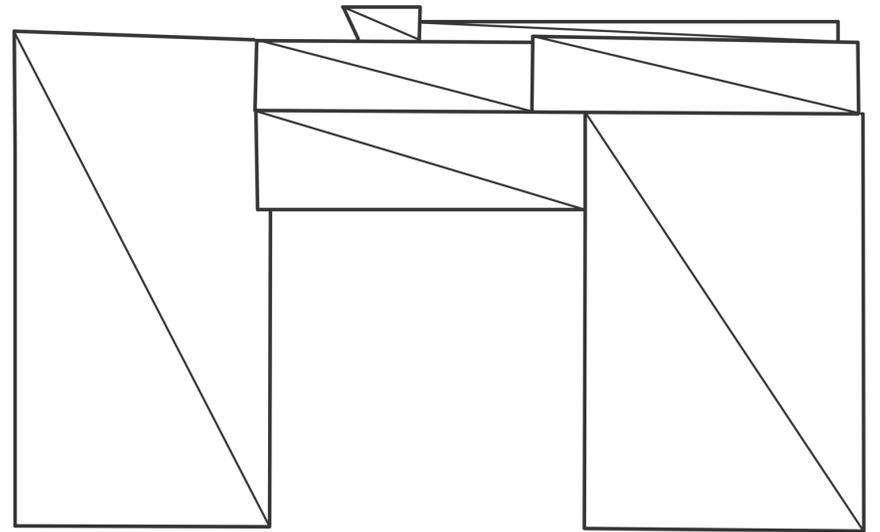


GEOMETRY +4

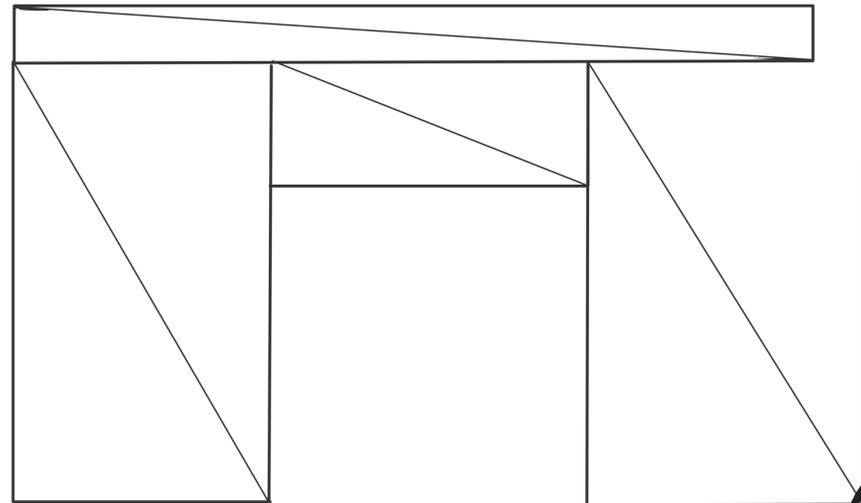


GEOMETRY +18





GEOMETRY +32



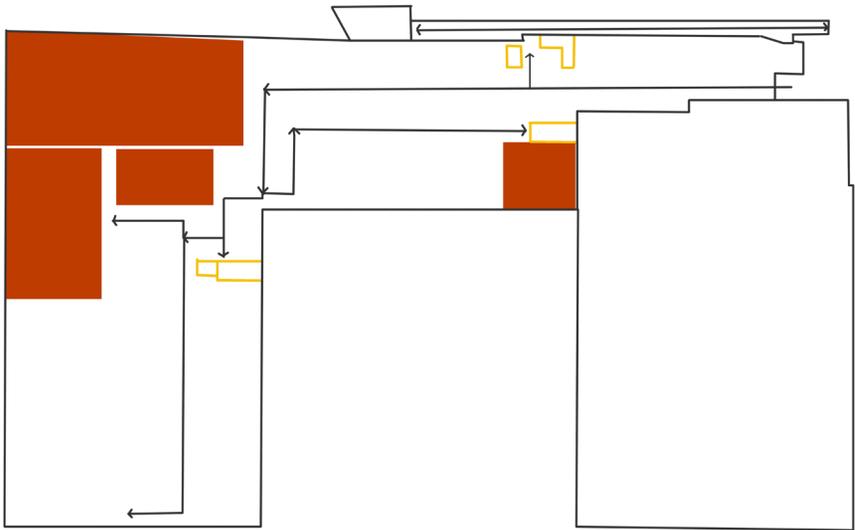
GEOMETRY +43



CIRCULATION TO USE +4



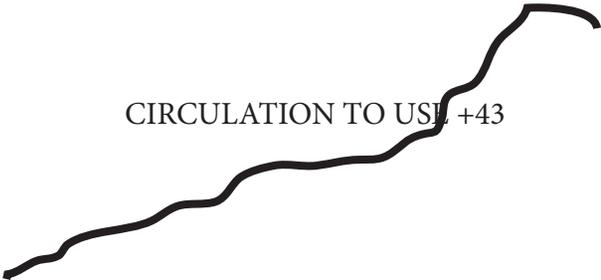
CIRCULATION TO USE +18

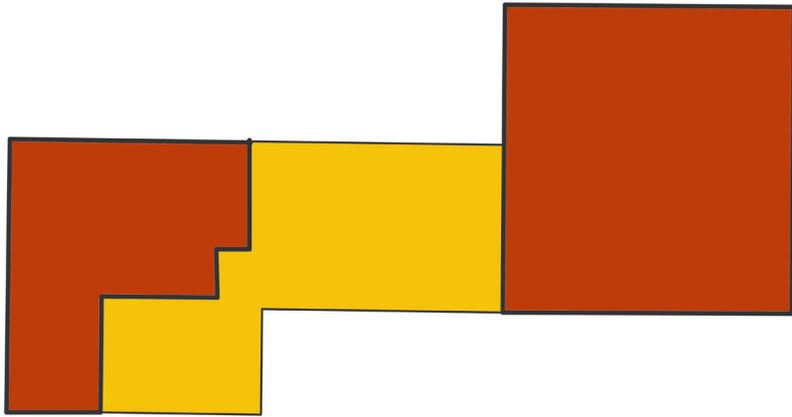


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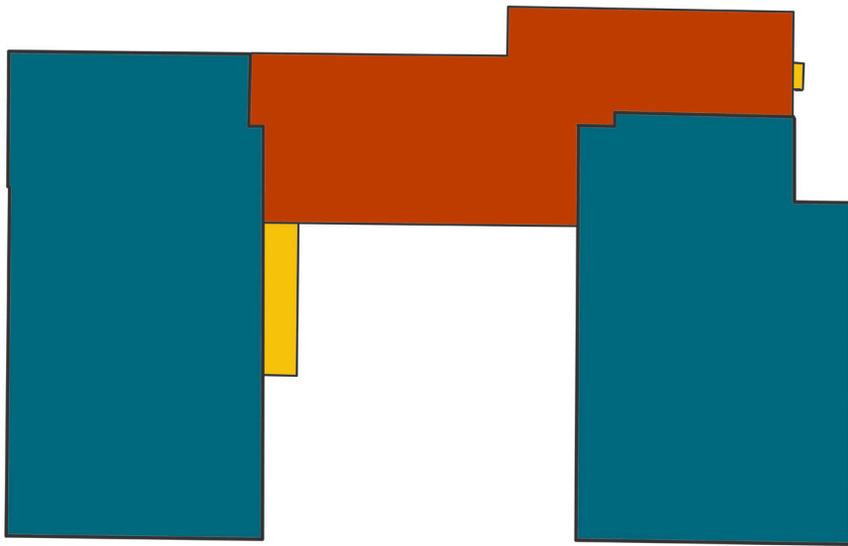


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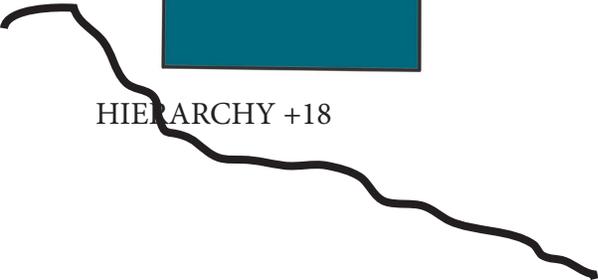


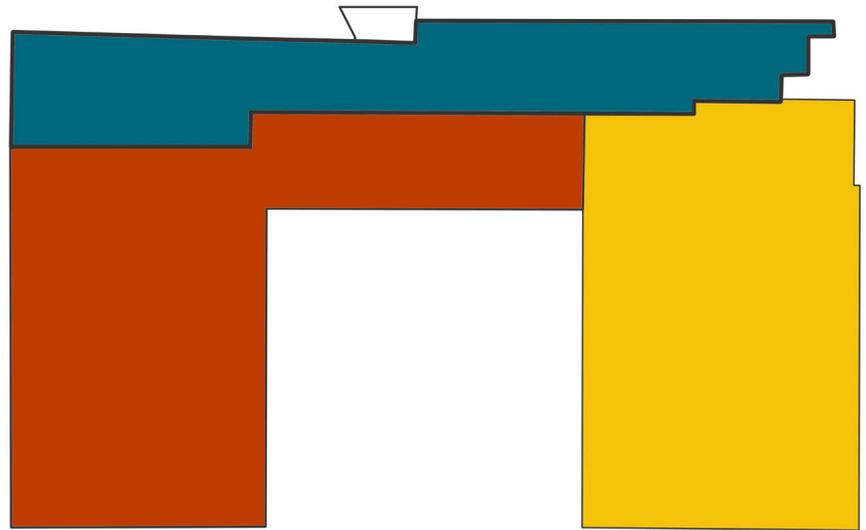


HIERARCHY +4

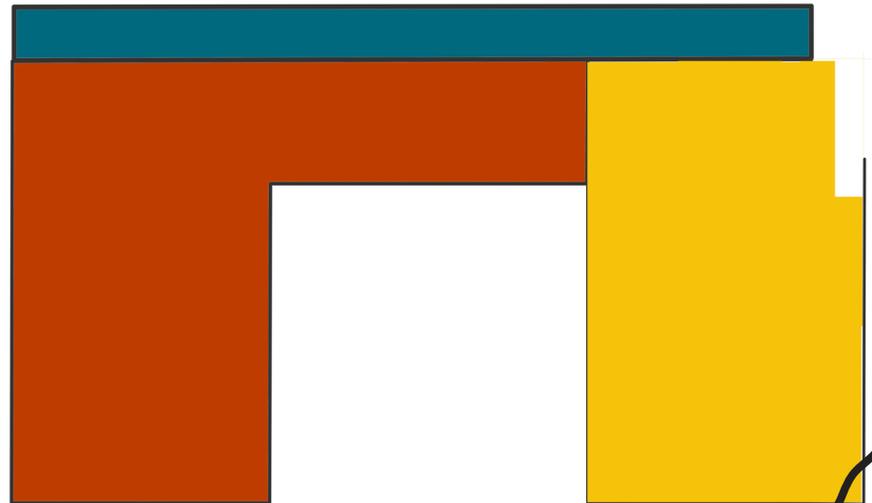


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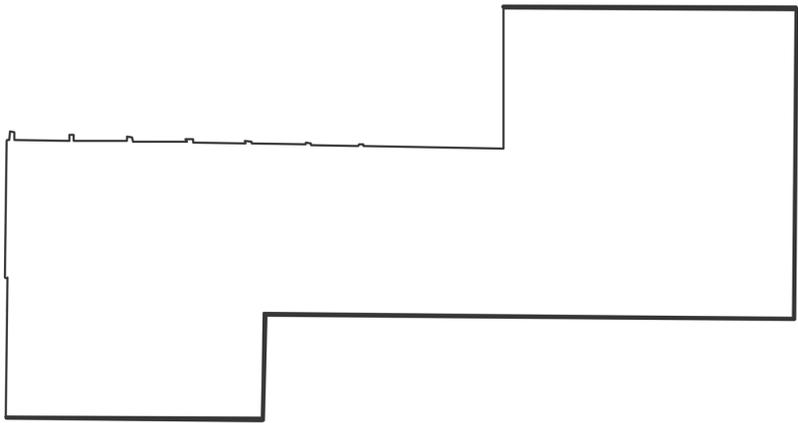
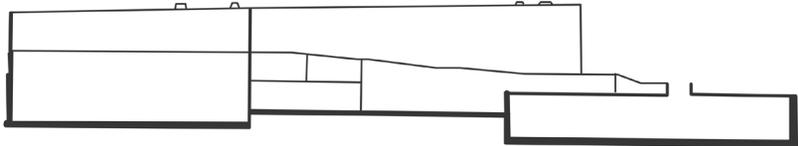




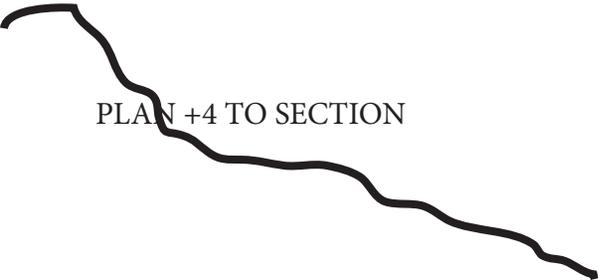
HIERARCHY +32

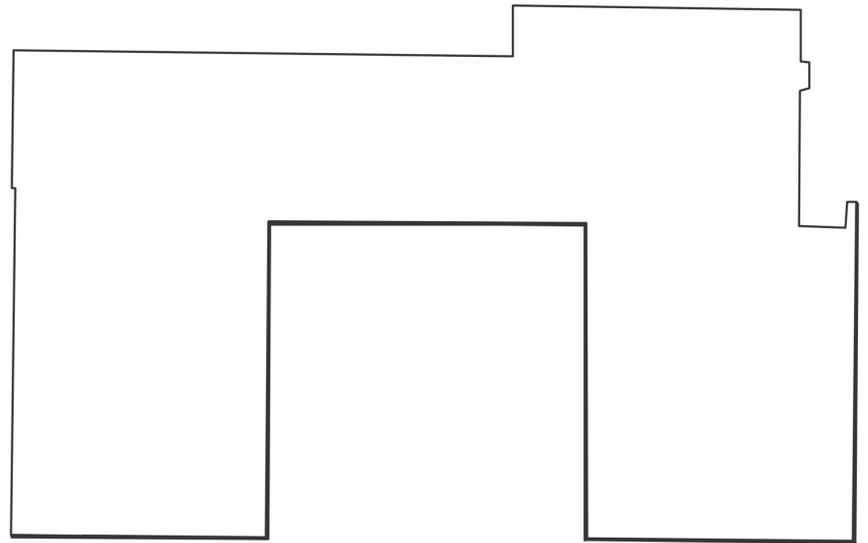
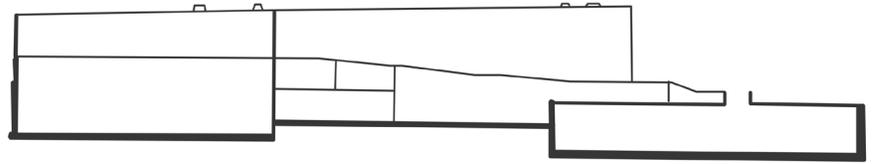


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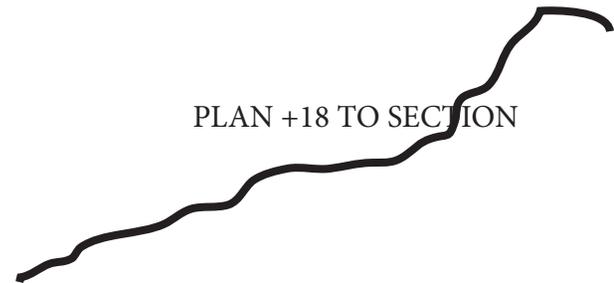


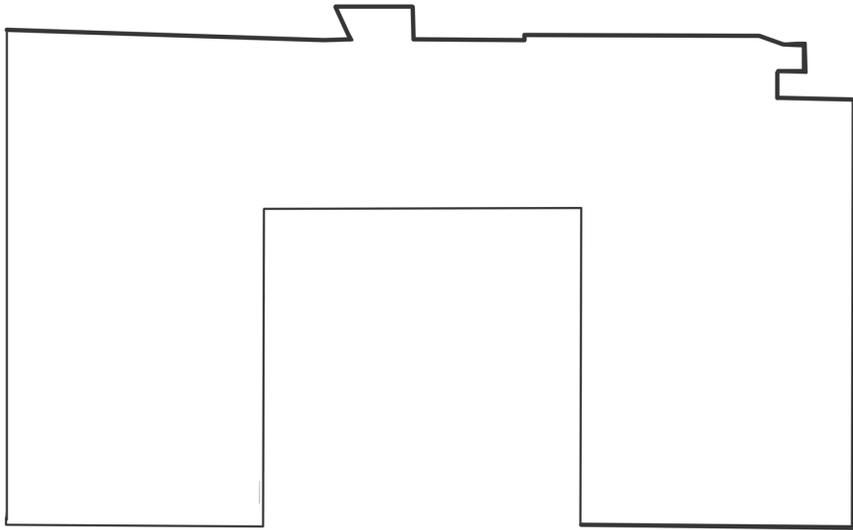
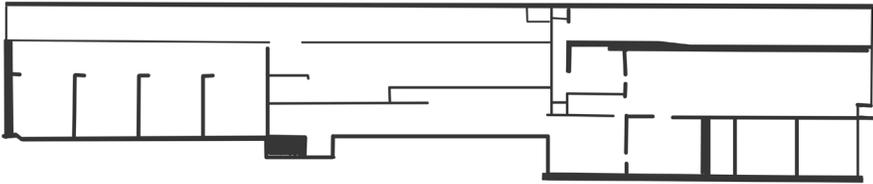
PLAN +4 TO SECTION



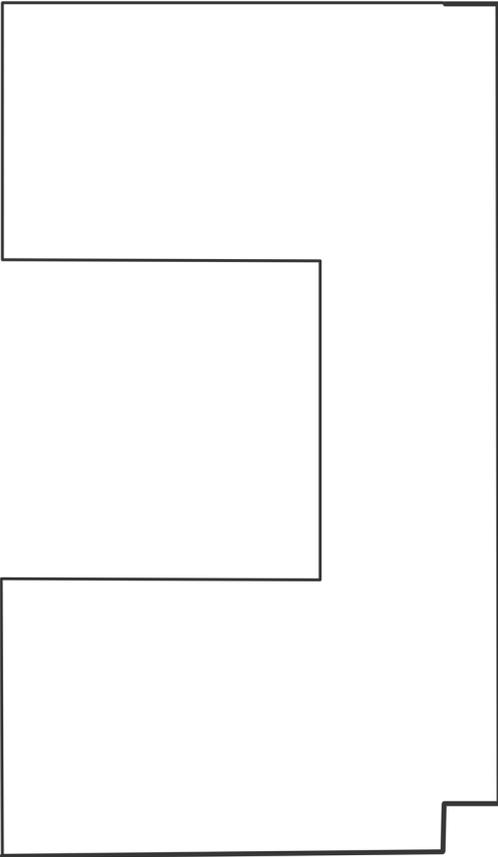
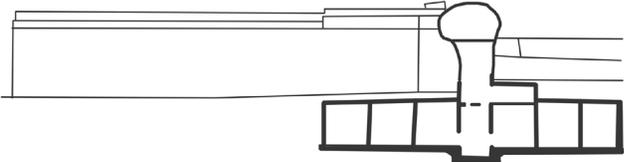


PLAN +18 TO SECTION



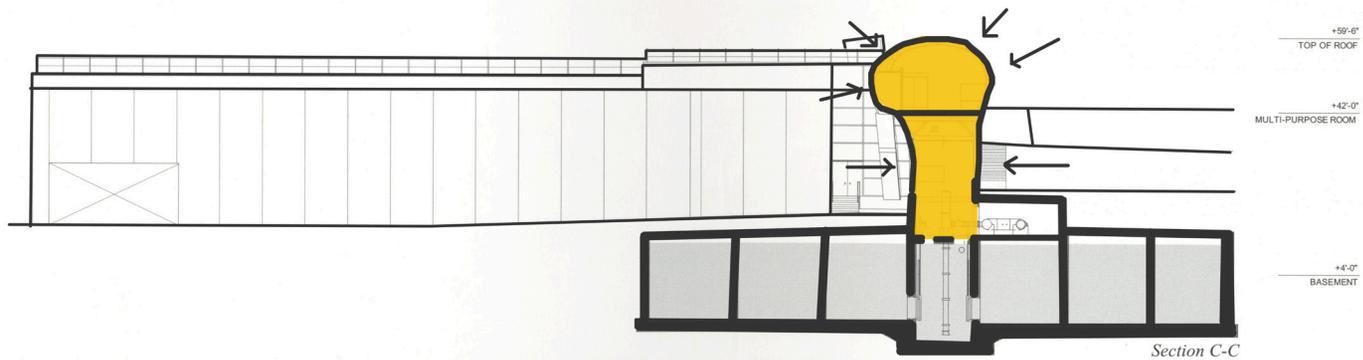


PLAN +32 TO SECTION

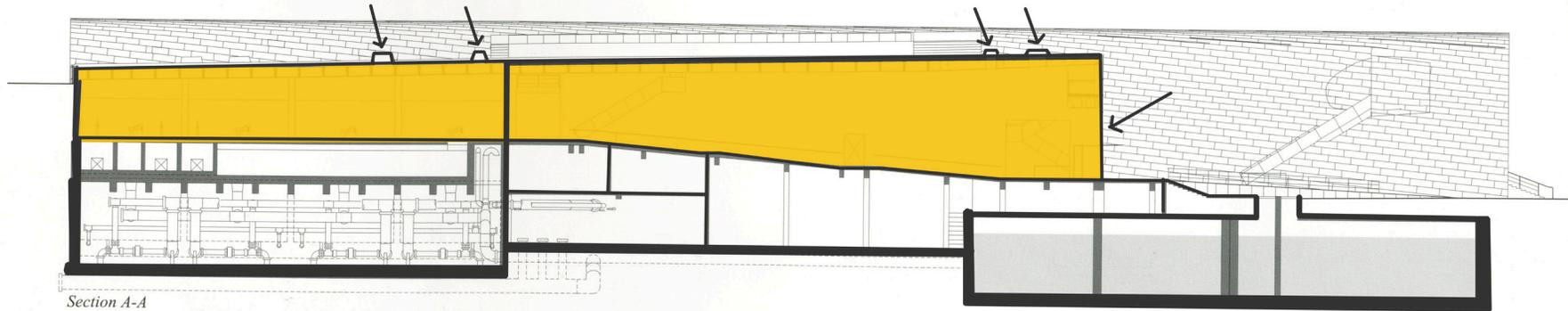


PLAN +43 TO SECTION

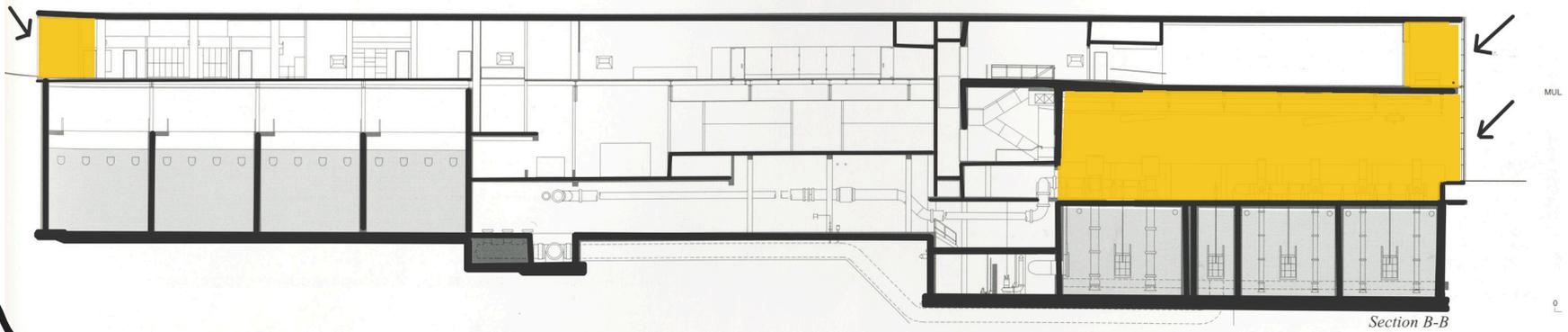




Section C-C

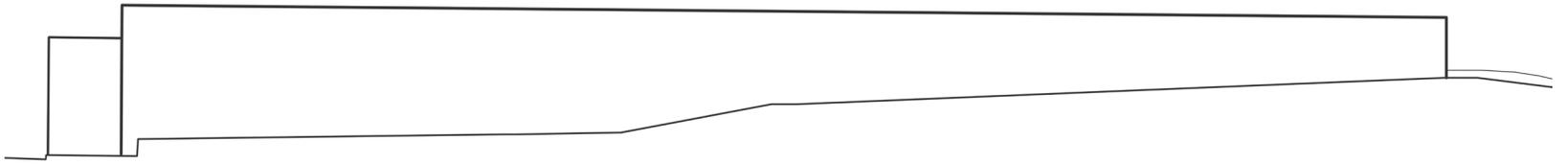


Section A-A

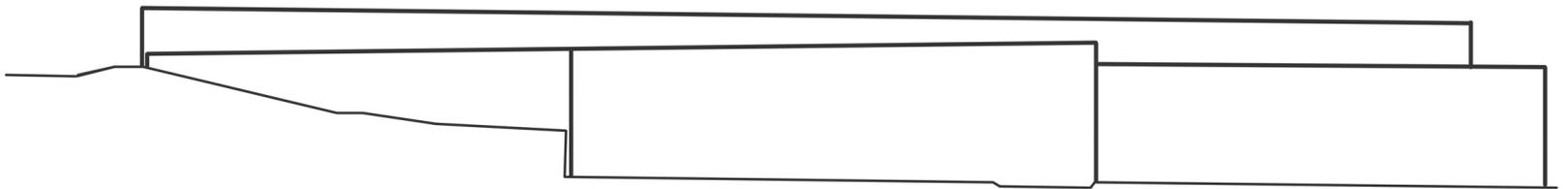


Section B-B

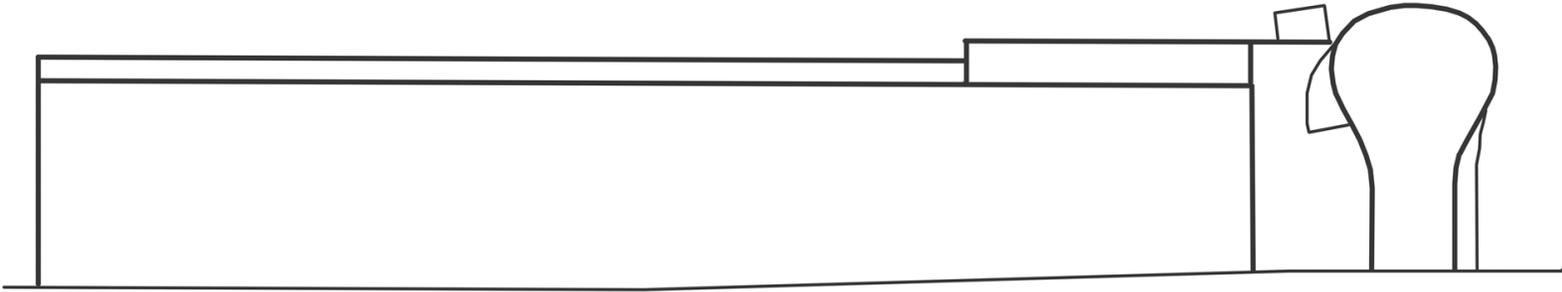
NATURAL LIGHT



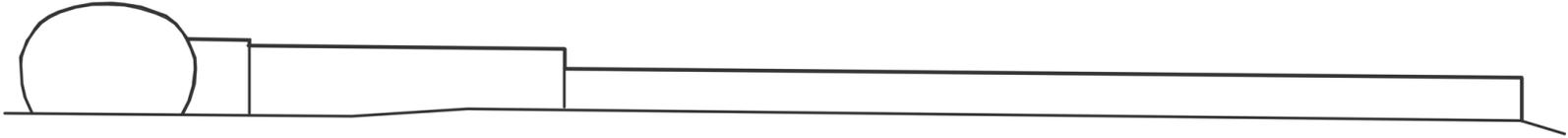
NORTH ELEVATION MASSING



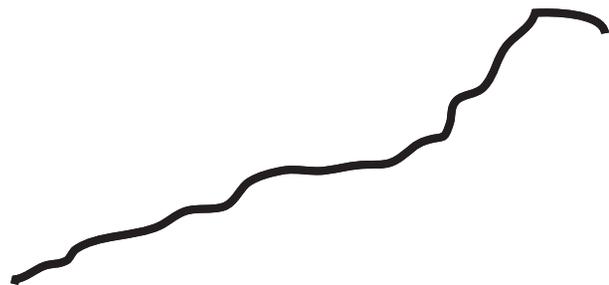
SOUTH ELEVATION MASSING

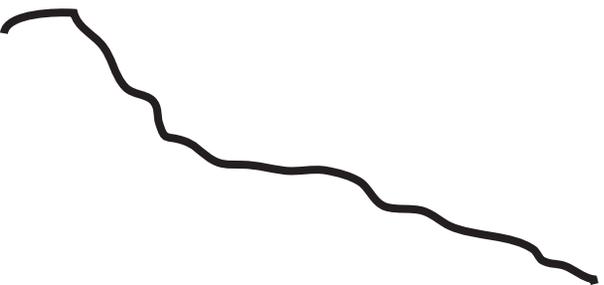


EAST ELEVATION MASSING



WEST ELEVATION MASSING



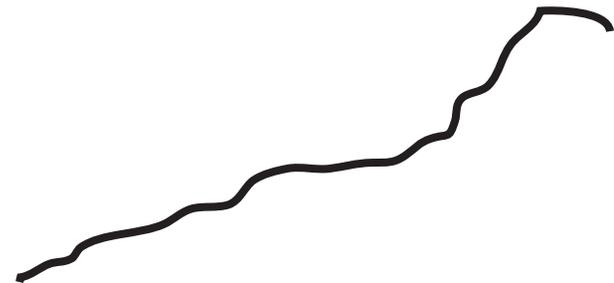




TYOLOGICAL RESEARCH

CLARK ART AND CONSERVATION CENTER (STONE HILL CENTER)
BY TADAO ANDO

WILLIAMSTOWN, MASSACHUSETTS



TYPOTOLOGICAL RESEARCH

Clark Art and Conservation Center (Stone Hill Center)

Tadao Ando

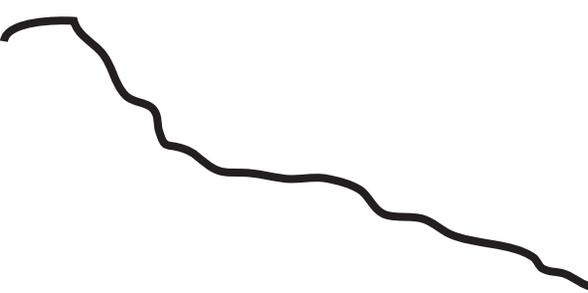
Williamstown, Massachusetts

Completed 2006

32,440 Square Feet

The Clark Art and Conservation Center Stone Hill Center is located on a hillside south of the main campus of the Sterling and Francine Clark Art Institute. The primary focus of the design was to provide a center well integrated into the site that met the appropriate needs of two programmatically divided functions. These functions of art museum and education center needed to coexist with the function of art preservation. The preservation area now houses the Williamstown Art Conservation Center (WACC) which is the "largest regional conservation center in the country" (The Clark Art Now, 2011). The main functions of the Stone Hill Center work together despite their divide of private and public.

The primary functions of the museum, public exhibition spaces and the private restoration facility, play together through a series of experiences in this 32,440 square foot building. The forms push and pull against each other to constantly remind visitors that there is a necessary and parallel function of restoration. In plan the geometry is easy to read, a triangular shape connects the main campus with Stone Hill Center. The long side of an obtuse triangle runs parallel to the rectangular form of the main campus. One of the three points appears to direct visitors from the path into the Stone Hill Center as it

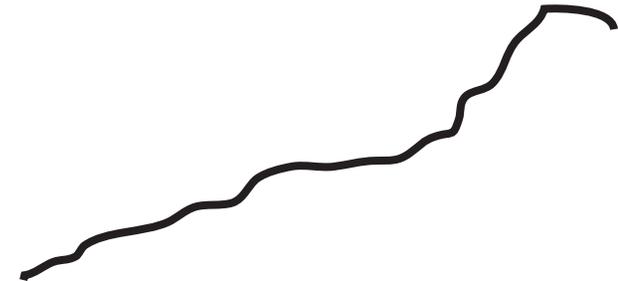


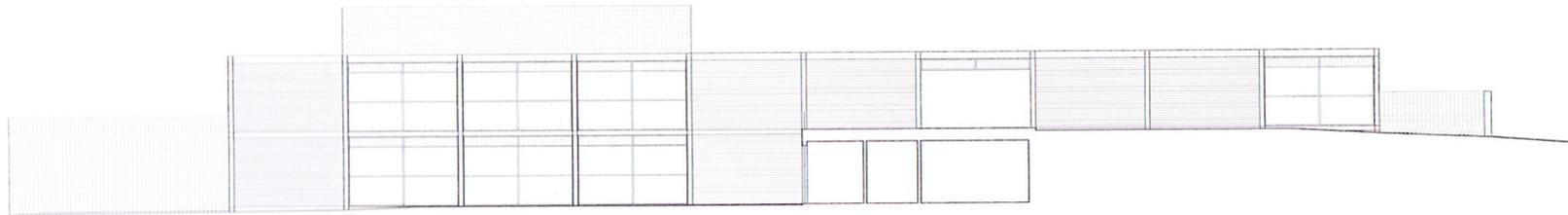
TYPOLOGICAL RESEARCH

extends out. The exhibition spaces and the conservation facility work together to promote and educate visitors about art and secondarily to promote the local ecology.

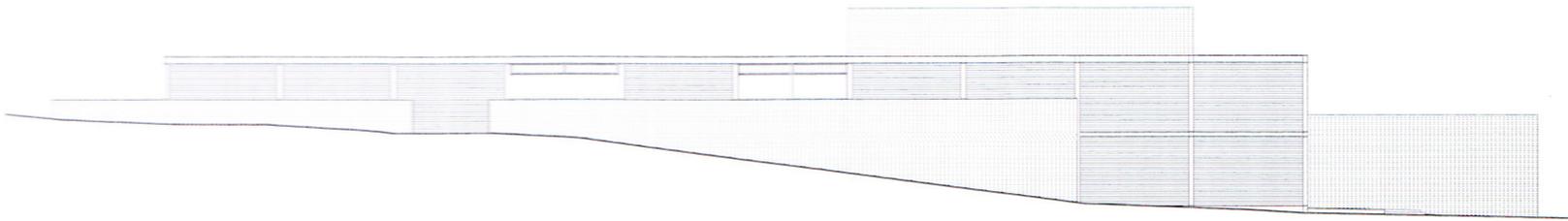
The secondary functions of the site compliment the program elements of the facility. The Stone Hill Center provides views to the surrounding mountains including the Green Mountains and the Taconic Range. It also boasts a number of walking paths and scenic trails that allow visitors to experience their surroundings parallel to the awe and curiosity that the visitors may employ when studying the works of art inside of the center (Sterling and Francine Clark Art Institute, 2011). The overall site area encompasses 6,100,000 square feet. The secondary functions tie together the main museum buildings and the Stone Hill Center with the local ecology placing significance not only on the works of our greatest masters in art but also on the surrounding ecology.

The ecology that envelops the facility on the outside of the building is also well respected inside the building. Ando set up views amidst the art framing the exterior ecology (Lacayo, 2008). It is simply a humble way of emphasizing the ever-important landscape and the role it plays in our personal serenity. Ando also brought the inside to the exterior building. There are a series of spaces and terraces that allow visitors to view the restoration process from the exterior of the facility (Futagawa, 2008). The importance of a relationship between the interior and the exterior environment are at major project elements that sit humbly next to great works of art nestled in a serene forest environment.

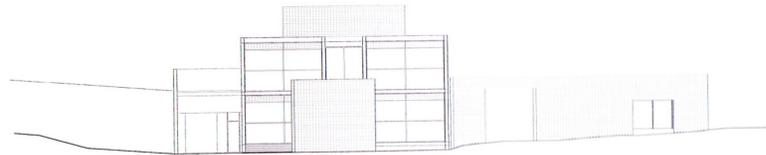




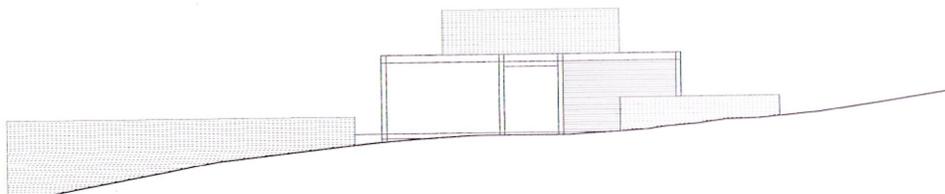
NORTH ELEVATION



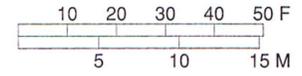
SOUTH ELEVATION

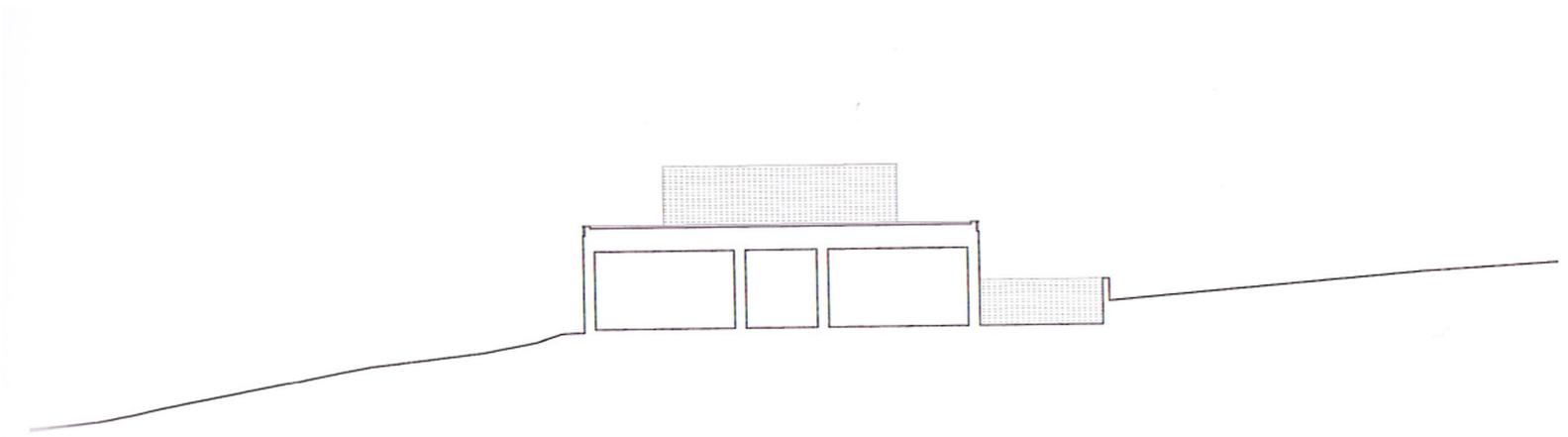


EAST ELEVATION

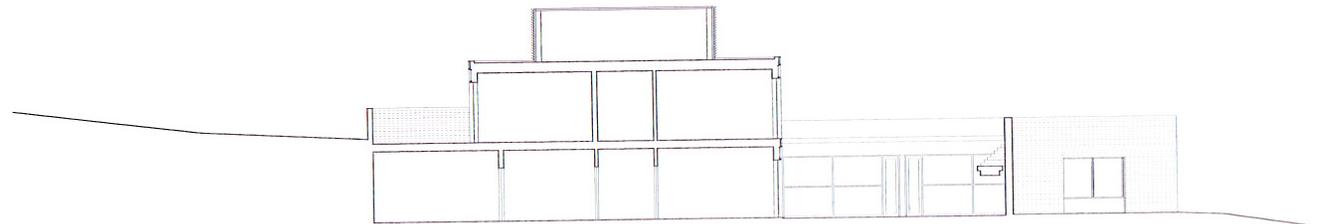


WEST ELEVATION

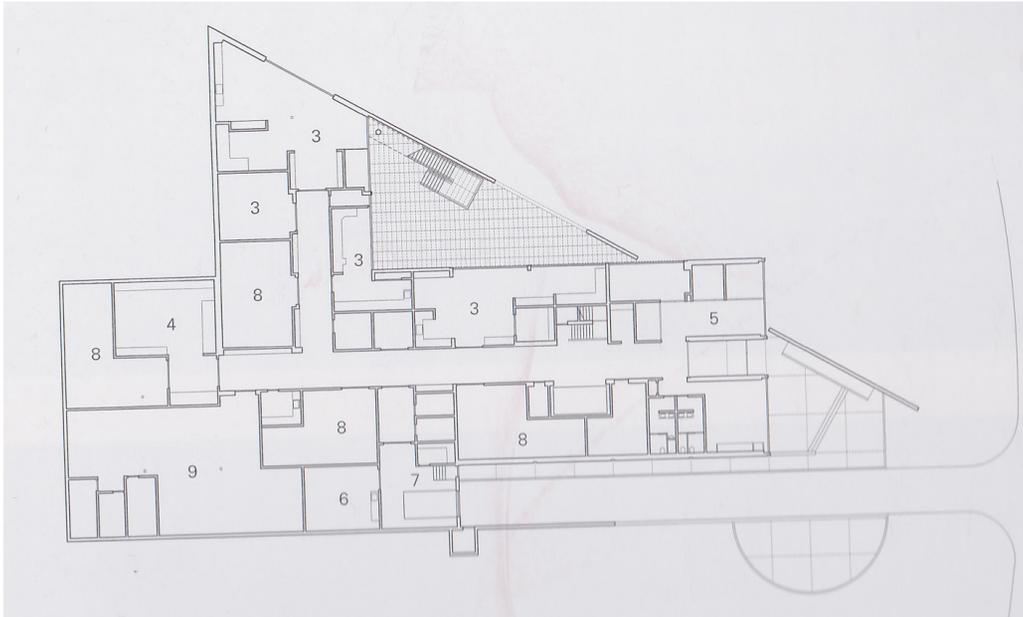




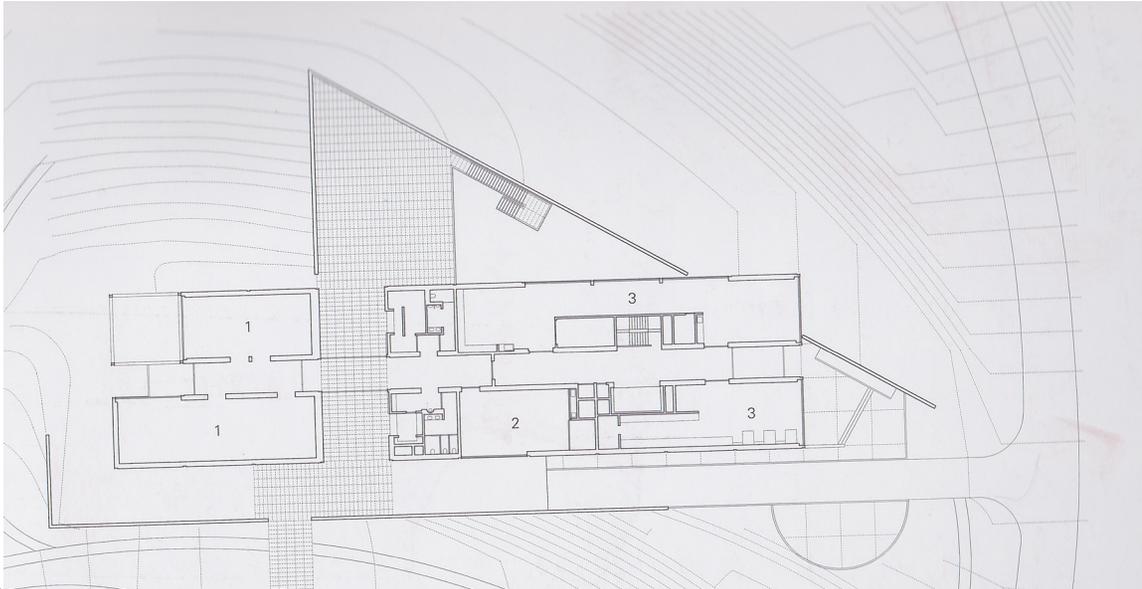
BUILDING SECTION



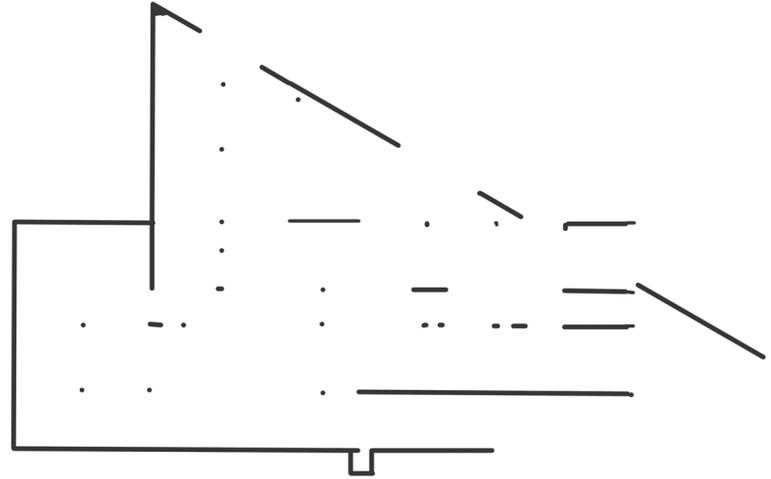
BUILDING SECTION



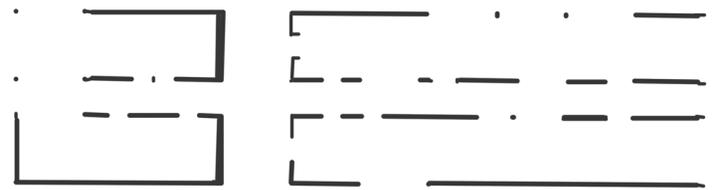
LOWER FLOOR PLAN



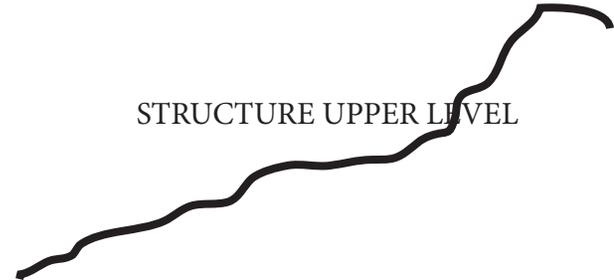
UPPER FLOOR PLAN

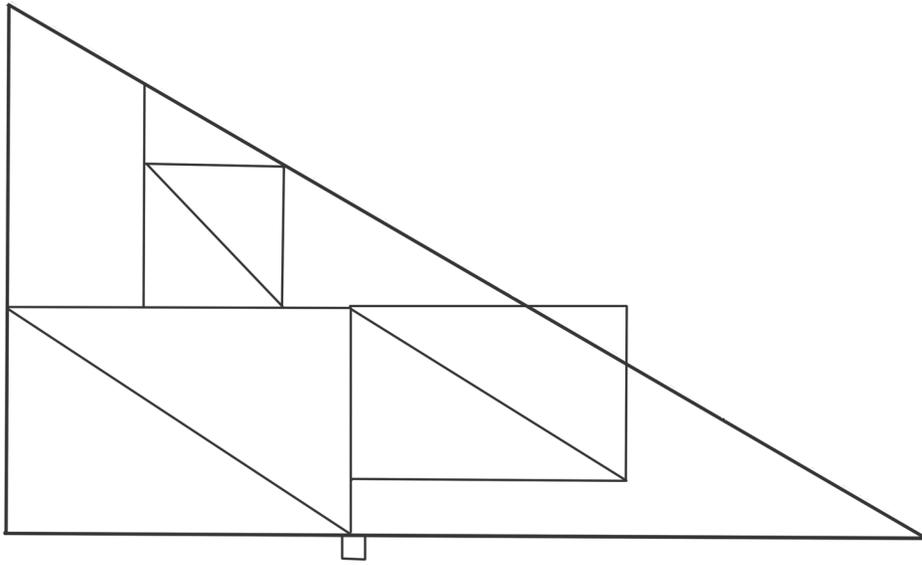


STRUCTURE LOWER LEVEL

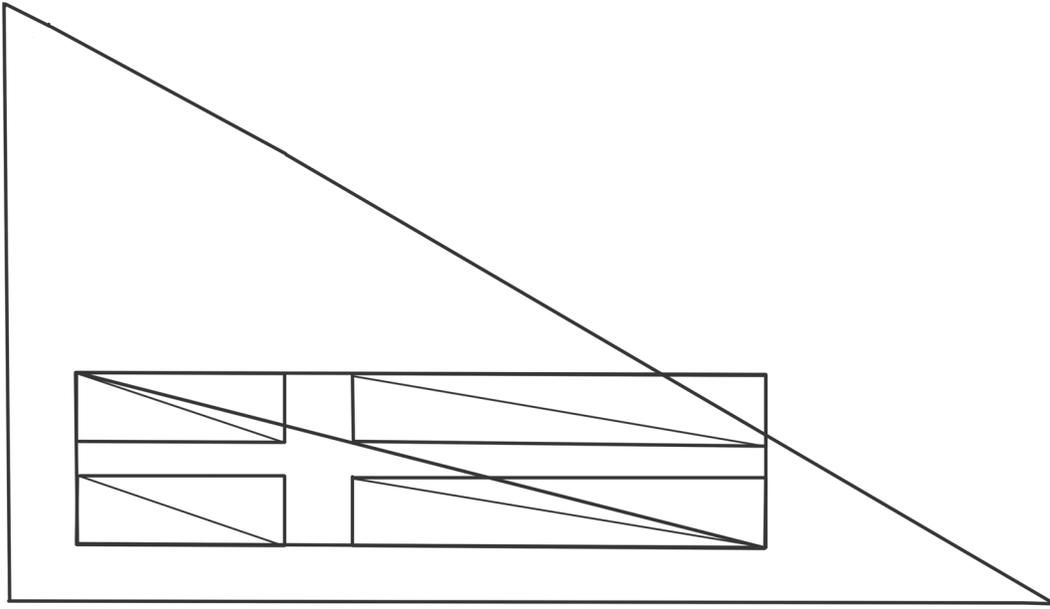


STRUCTURE UPPER LEVEL

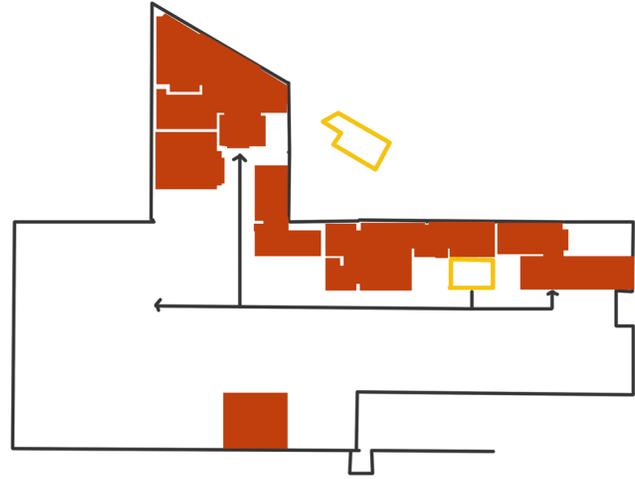




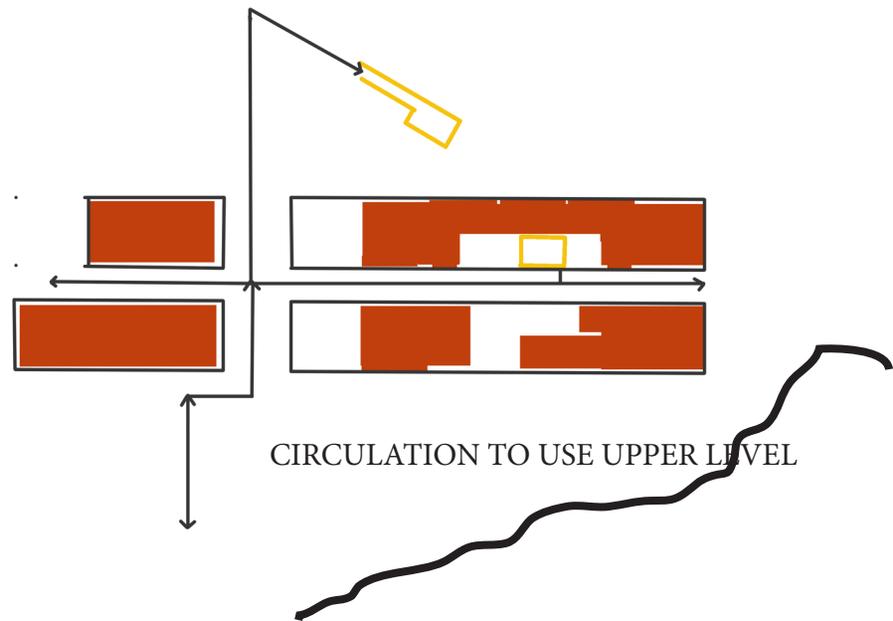
GEOMETRY LOWER FLOOR



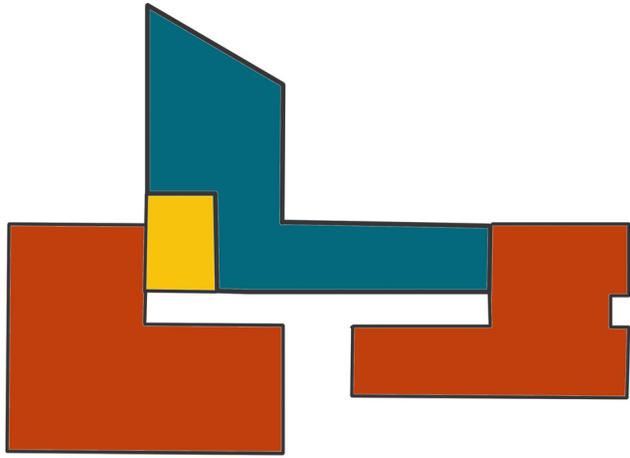
GEOMETRY UPPER FLOOR



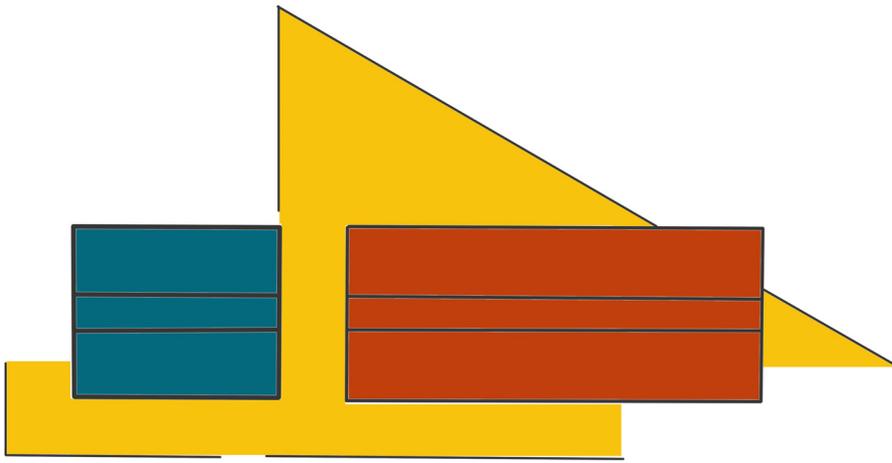
CIRCULATION TO USE LOWER LEVEL



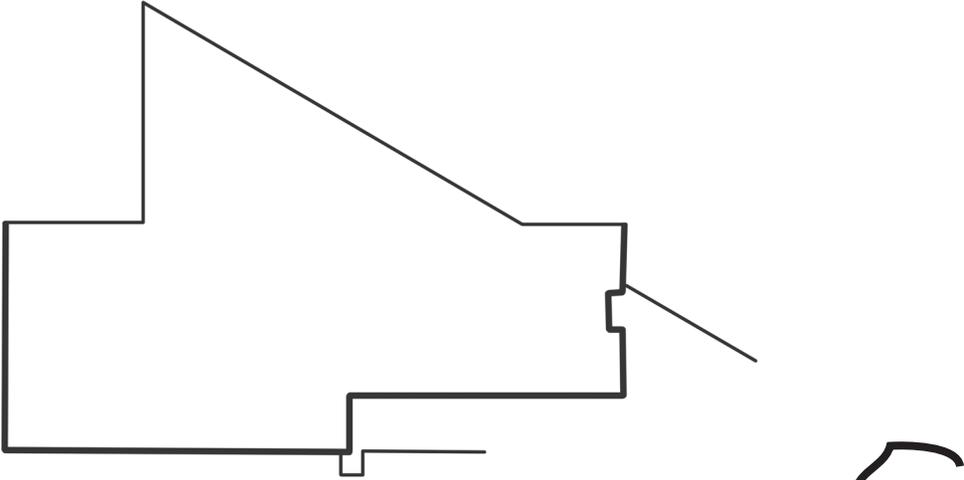
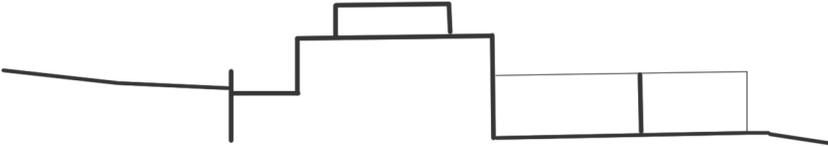
CIRCULATION TO USE UPPER LEVEL



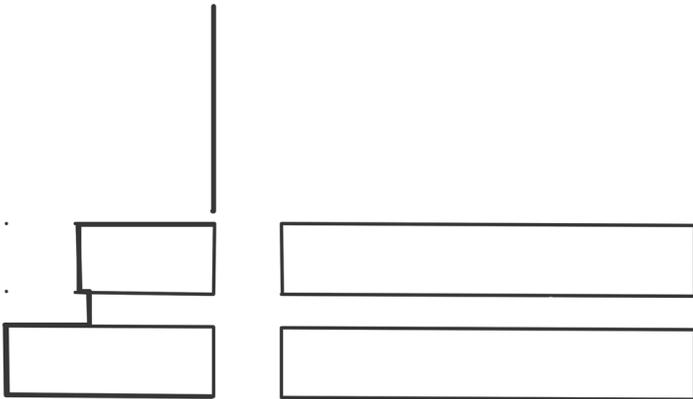
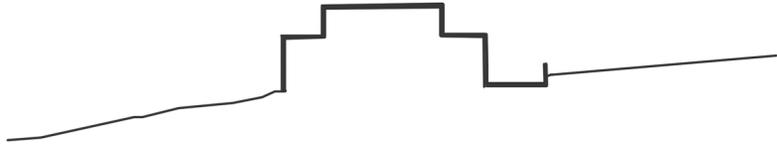
HIERARCHY LOWER FLOOR



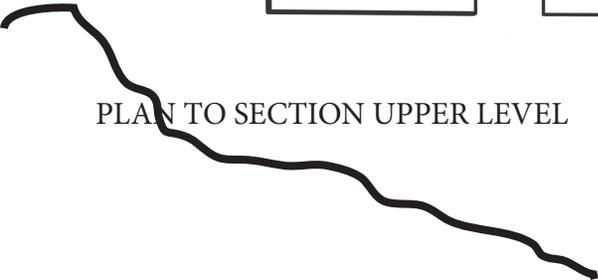
HIERARCHY UPPER FLOOR

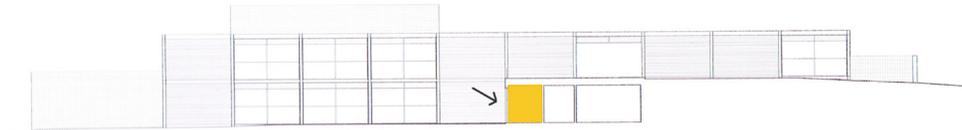
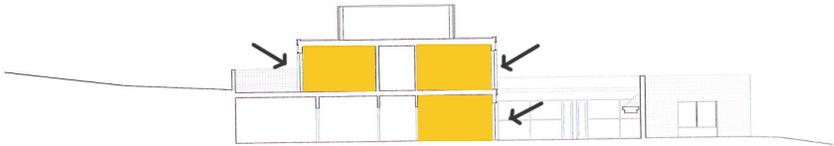


PLAN TO SECTION LOWER LEVEL

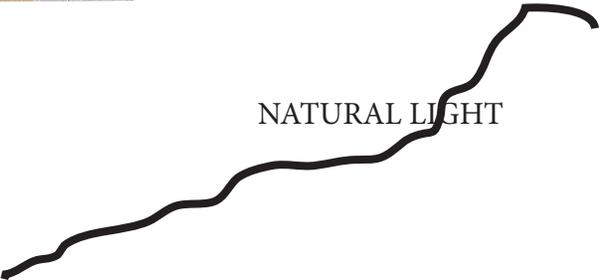


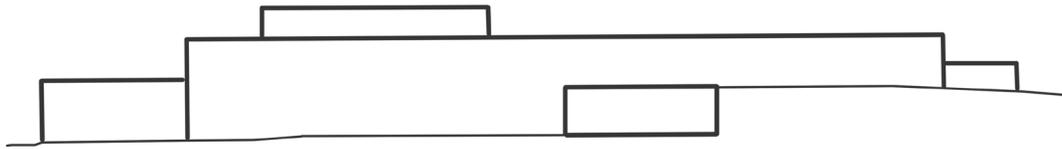
PLAN TO SECTION UPPER LEVEL



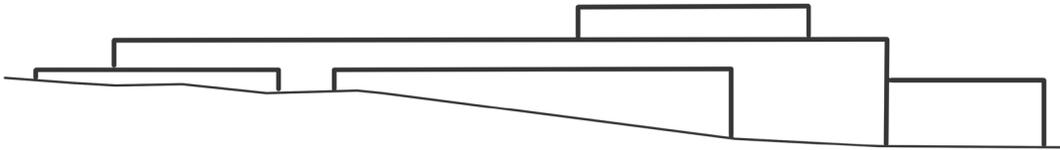


NATURAL LIGHT

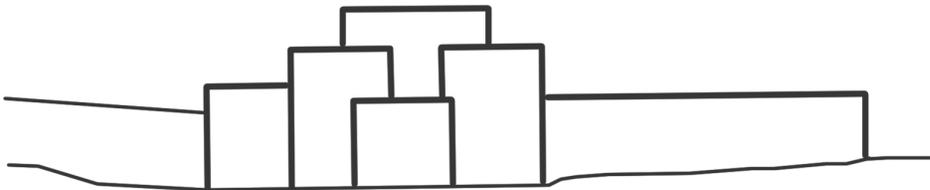




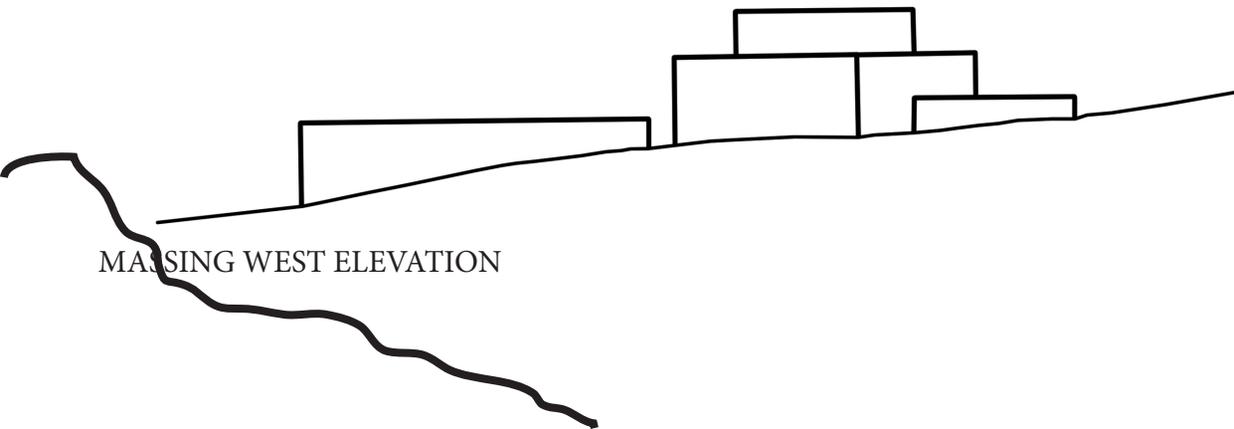
MASSING NORTH ELEVATION



MASSING SOUTH ELEVATION



MASSING EAST ELEVATION



MASSING WEST ELEVATION

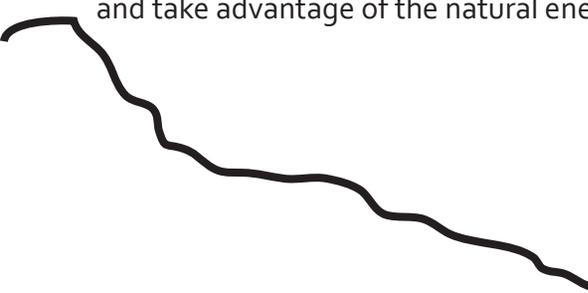
TYPOLOGICAL SUMMARY

TYPOLOGICAL SUMMARY

The three facilities studied for the typological research represent the diversity that defines the field of architecture. At first glance it would seem the three projects have nothing in common. They host three seemingly different primary programmatic functions, vary greatly in square footage, and are seemingly strikingly different visually. It is important to take a closer look into each of the buildings and the elements that define each because once the programs and defining characteristics are compared one will see that there are more similarities than initially thought.

The Bay Education Center is a series of spaces that cater to education of youth. The administrative wing is mirrored off the public side of the building and organized around an open plan layout. The Stone Hill Center is an art gallery that hosts a world renowned antiques restoration collaborative. The design is a series of volumes that play off of each other in a geometrical arrangement. The South Central Connecticut Water Treatment Plant is a water processing plant with some opportunistic spaces directed toward public education. The geometry is based on the functions of the water treatment process. The majority of the building is underground with the administrative space rising above the ground like water bubbling from the surface of the earth. The square footage of the three facilities respectively is 15,042 square feet, 32,440 square feet, and 140,000 square feet. While the South Central Connecticut Water Treatment Plant is considerably larger than the other two facilities it still embodies the same concept of intrinsic connection to the landscape that the other two projects discuss.

The Bay Education Center is very carefully designed to blend into the site and take advantage of the natural energy and materials that are abundant



TYPOLOGICAL SUMMARY

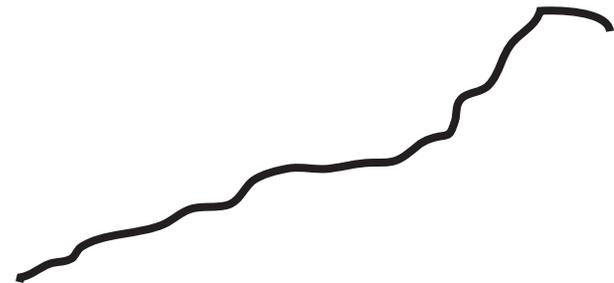
there. It uses a three-tiered window system, clerestories, dormer windows, and main view windows to provide natural daylighting within the building.

There is a photovoltaic array on the roof that absorbs and creates enough electricity to power the lighting system annually. There is also a 7,000 square foot green roof with swales that breaks at the entrance to allow visitors in.

While LEED certification was not sought after for this project the design intent followed was that of a LEED certified building.

The South Central Connecticut Water Treatment plant is on a very difficult site to work with. The facility had to remain focused on water treatment yet respond to its surroundings. The literal interpretation of the process of cleaning water was a very successful move for this project. The administrative spaces rising up out of the earth with the plants main functions below ground emphasize the physical relationship with water. The incidents of light that are like splashes of water allow natural light to penetrate through the facility and down into the main plant spaces directly below. Another feature that helps this facility link back to the site is the 28,000 square foot green roof that employees and park go-ers alike can experience.

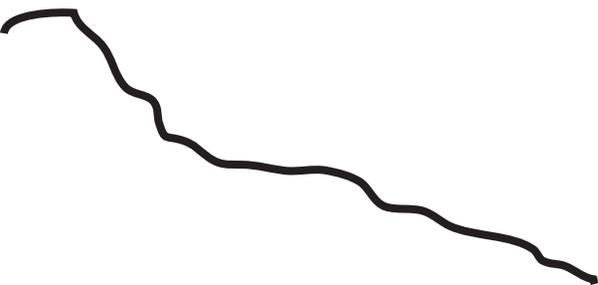
The Clark Art and Conservation Center Stone Hill facility is a meticulous and calm play of geometry, visual relationships and natural connections. Ando brings natural light into the building through large sections of glass on the north face of the building. With the building tucked perfectly into the hillside the south façade is protected by landscape and by the exterior skin, opening up in only two optimal locations. This project is unlike the other two in that it does not have a green roof. Regardless the building relates well and is



TYPOLOGICAL SUMMARY

wholly integrated into the surrounding forest and walking paths that connect it to the main campus facility.

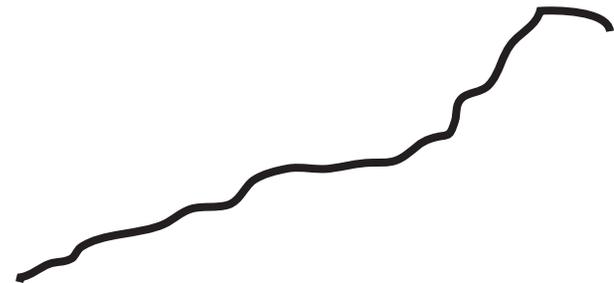
These three facilities have more in common than what appears at the surface. Further investigation into the spaces highlights the similarities in the numerous green building steps taken amongst them, the direct relation back to the site, and the geometric organization of space to emphasize the relationships within the buildings.



PROGRAM DOCUMENT:

HISTORICAL CONTEXT

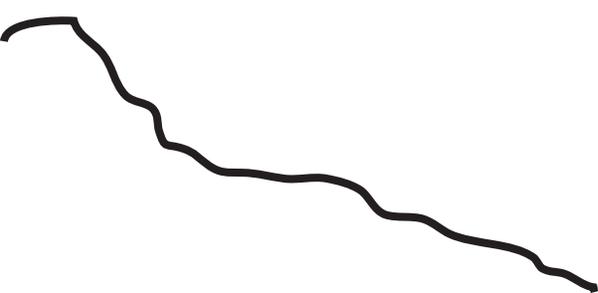
A History of Ecology and Conservation in the Sonoran Desert



HISTORICAL CONTEXT

There are four deserts that can be found in North America, the Mojave Desert, the Chihuahuan Desert, the Great Basin Desert and the Sonoran Desert. Of these four, three of the deserts can be found in Arizona. The desert studied here is the Sonoran Desert. It is comprised of thousands of species of plants, animals and insects, many of which are specific to the Sonoran Desert. This rich and comparatively lush desert has been the subject of many debates for conservation in the United States and Mexico. The level of conservation, what agencies participate and to what extent, and how local citizens are involved are all issues nested in conservation endeavors. Today these endeavors are more important than ever as populations of people continue to flock to the region. The arrival of more people puts increased stress on the local and regional habitat of all the abundant plant and animal life found here through resource depletion, habitat destruction and water depletion.

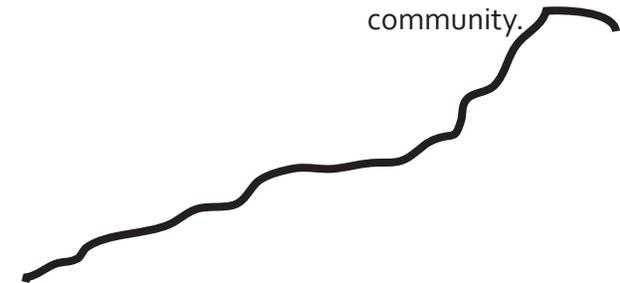
The steps toward conservation measures that take place in the Sonoran Desert are varied and often are slow to take root. When the measures do make that step forward and put conservation into action the result can be grand. One of the first of these measures was started in the mid twentieth century as an attempt to educate people about the region. William H. Carr a conservationist and educator was the visionary behind the Arizona Sonora Desert Museum. "He wanted to create a place where people would pause and reflect on this marvelous land called the Sonoran Desert and learn about its endlessly fascinating ecology (Daley, 2000)." The ecology of the Sonoran Desert is one of the most diverse of any of the world's deserts.



HISTORICAL CONTEXT

There are two causes for the existence of deserts on our planet. The Sonoran Desert comprised of a combination of those two causes. Part of the desert is in the Horse Latitude that occurs on the western edge of a continent between 30 degrees north and south latitude. The other part of the desert is considered a rain shadow or orthographic desert that occurs on the Lee-ward sides of mountain ranges (Dimmitt, 1985, p. 67). Covering over 100,000 square miles, the Sonoran Desert is located in Arizona, a small corner of California, and in Mexico. Because of the diversity of the desert it is divided into six subdivisions. Each of the six can be identified by its climate, topography and vegetation as these three terrestrial indicators of locale are distinct for each subdivision (Phillips and Comus (Ed.), 2000). Some of the defining characteristics of the Sonoran Desert include its "legume trees and columnar cacti, [its] amount and seasonality of rainfall" as much of the desert has a bi-seasonal precipitation cycle, and its mild winters with "biota that are partly tropical in nature" (Phillips and Comus (Ed.), 2000). The subdivisions are the Lower Colorado River Valley, the Arizona Upland, where this thesis is focusing, the Plains of Sonora, the central Gulf Coast, the Vizcaino and the Magdalena. When Forrest Shreve defined these subdivisions, he had a seventh division, the Foothills of Sonora, but that has been reclassified as a non-desert region (Phillips and Comus (Ed.), 2000, p. 14-18).

Conservation of the Sonoran Desert is imperative to its survival. Conservation efforts to this date have been as varied as the biomes within the spectacular and diverse ecological region. Cohesion to conservation is essential to the success of the region and this can be accomplished through parallel actions and communication among government officials and people of the community.

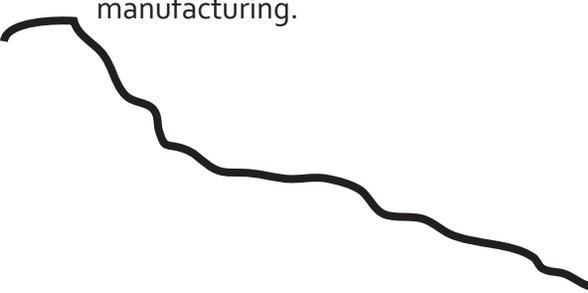


HISTORICAL CONTEXT

Part of the difficulty of establishing a consistent community level view of conservation is a factor of the ecology and the expanse to which it spreads. It spans across two states in the United States, three states in Mexico and the Tohono O'odham Indian Nation, which also spans into both the U.S. and Mexico. The International Sonoran Desert Alliance covers the desert and more specifically the Arizona Upland and the Lower Colorado River Valley subdivisions. Together these two subdivisions can be called the Western Sonoran Desert. "This portion of the Sonoran Desert is one of the largest primarily intact arid ecosystems in the world" (Rana, 2001, p. 3). Despite this fact the Western Sonoran Desert, as with all subdivisions of the Sonoran Desert, still is considerably lacking in habitat protection, conservation and reintroduction. According to the World Wildlife Fund:

about 60% of habitat in the U.S. alone [has] been altered by agriculture, grazing, excessive groundwater pumping, and urbanization. Riparian woodland habitats have suffered, by far, the worst and are now one of the rarest habitats in North America...Four protected areas have been established in the Mexican Sonoran Desert in the last two decades but they occupy less than 5% (9,540 km²) of the original desert area. In the United States approximately 17% of the Sonoran Desert is protected (Williams et. al., 2001, p. 4).

Unfortunately due to the favorable climate this ecosystem is in danger. While much of the natural resource extraction, such as copper, has ceased due to exhausted mines, people are still coming to the region on droves, to enjoy the newer economic resources of the region, tourism, leisure, and manufacturing.



HISTORICAL CONTEXT

Agriculture has long been a tradition in the desert, dating back at least 12,000 years, and continues to be a source of economy. Ranching is a newer way of life here relatively speaking, but has been around since approximately 1870 (Phillips and Comus (Ed.), 2000). These economic trends lead to one of the main concerns of the Sonoran Desert, the rapid rate of population growth. While there are planning measures in place, Pima County has worked very hard in the last few years to establish significant planning measures, to promote more eco-conscious expansion, the Sonoran Desert is still suffering. It is plagued with habitat destruction or alteration that is threatening species and their survival. From 1970 to 1990 the region's population doubled (Rana, 2001, p. 4). The population in Arizona increased 40% from 1990 to 2001 and shows no signs of slowing (Cohn, 2001, p. 607-608). This growth is not only unsustainable on the resources need to support people it is also unsustainable development. In Tucson alone, the construction needed to meet the growth rate destroys 6,400 acres of the Sonoran Desert a year (Cohn, 2001, p. 607-608). That does not include the damage inflicted on the ecology by having that many people and the factors attached to people, such as automobile emissions, water usage, electrical needs, etc. With the rapid rate of growth and habitat destruction for homes, infrastructure, resorts, golf courses, manufacturing and agriculture, it is necessary for conservation to take hold at the community level and act to protect the ecosystems that make up our communities within the Sonoran Desert.

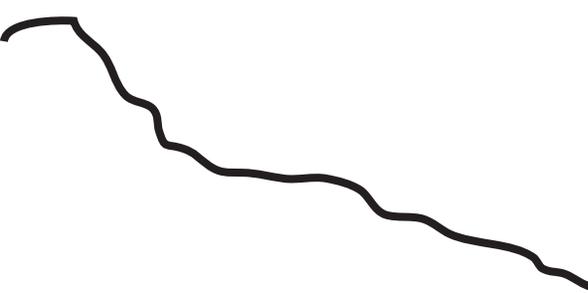
Many steps have been made toward conserving the Sonoran Desert. The Arizona Sonora Desert Museum as conceived by William H. Carr was one of those steps. In the mid-twentieth century he wished to create a place where people could go and experience the desert while learning about its richness.



HISTORICAL CONTEXT

In the 1960's Stewart and Morris Udall first proposed the establishment of a single national park protecting the Sonoran Desert of the United States (Rana, 2001, p. 5). This has not happened yet, but in 2000 Bill Broyels was at the forefront of a similar debate. He argued that the parks as they are currently setup are managed by different agencies and are therefore mismanaged. Donald Tiller, then the refuge manager at Cabeza Prieta, disagrees with Broyels. His main concern with establishing one large national park to be managed by the National Park Service means the land will have to be developed to some extent to accommodate the economics of the National Park Service. He says that while the parks now are more concern with ecology and its preservation the National Park Service is more concerned with recreation. To have a national park means "paved roads, campgrounds, and other facilities where none now exist" (Cohn, 2001, p. 610). While the National Park Service has done many great things for habitats across the United States and in Arizona, two of which are already protecting the Sonoran Desert, the fear is that too much of the land is already being used that certain areas need to be left as close to natural as possible without the addition of recreational services.

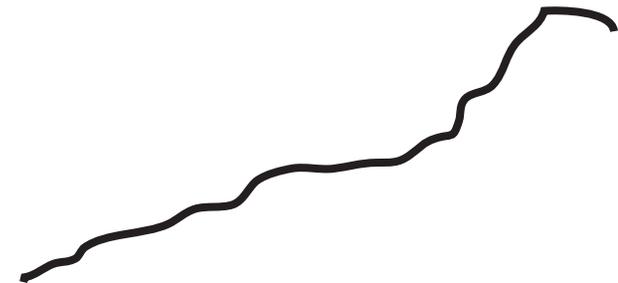
Conservation efforts do protect a large amount of desert between the United States and Mexico. There are approximately 6.5 million acres of desert currently protected by several different state and federal agencies. There is also a large amount of land on the Tohono O'odham Indian Reservation (Rana, 2001, p.4). This represents a current and important trend toward conservation. Currently the parks, monuments, and protected areas that exist in the Sonoran Desert include at least ten areas.



HISTORICAL CONTEXT

The Cabeza Prieta Wildlife Refuge which at 860,000 acres is the largest, protects desert thorn scrub west of Ajo, Arizona. The Organ Pipe Cactus National Monument along the U.S. and Mexican border is 330,000 acres. The Buenos Aires National Wildlife Refuge protects 116,000 acres. The Saguaro national Park is divided into two sections protecting 93,000 acres in total. The two divisions of land for the Saguaro National Park are the Saguaro Forest and the Palo Verde Forest. The Coronado National Forest includes most of the Santa Catalina Mountains to Tucson's north, the Rincon Mountains to the east and the Santa Rita Mountains to the south (Cohn, 2001, p. 607). In 1996 the Governors of Arizona and Sonora signed an agreement endorsing the creation of the network of binational Biosphere Reserves that exist throughout the Sonoran Desert today (Rana, 2001, p. 5). Under President Bill Clinton 486,000 acres were set aside as the Sonoran Desert National Monument protecting land between Phoenix and Tucson. In 2000, the 42,000 acre Las Cienegas National Conservation Area was established as a means to protect the transition between the Sonoran and Chihuahuan Deserts (Cohn, 2001, p. 610). There are also two state parks north of Tucson along the west slopes of the Santa Catalina Mountains and Picacho Peak that adds another 9,000 acres of protected land. The Tucson and Tortolita Mountain Parks protect another 28,000 acres (Cohn, 2001, p. 607). The above mentioned parks are regional accomplishments towards a protected Sonoran Desert ecological region.

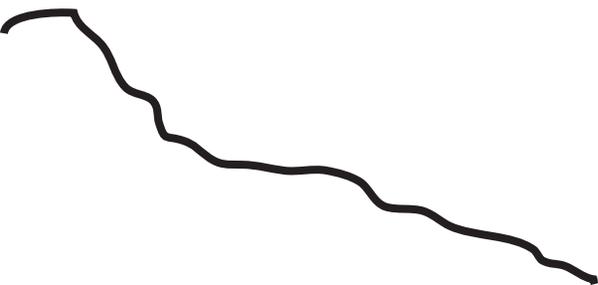
The next important step is to bring that mode of conservation to the community level, just as William H. Carr envisioned half a century ago.



HISTORICAL CONTEXT

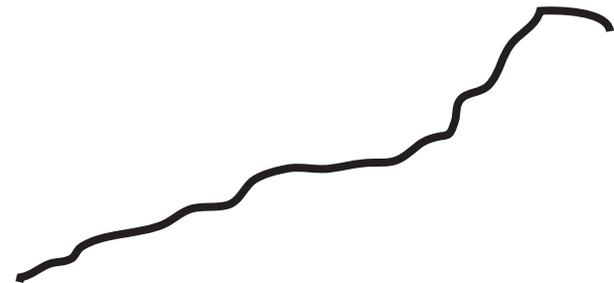
In 1988 the Pinacate Conference in Hermosillo brought to the forefront the idea that conservation is not just a regional environmental concern but that is also a local and regional social concern (Rana, 2001, p. 6). The aim of International Sonoran Desert Alliance is to have its most significant impact at the local level where the community will inevitably be the greatest vehicle of change. The ISDA is involved in the community at the local level, fostering awareness and hands on programs in area schools. It has also taken the stance that conservation can occur via economic growth and development. An example of this is the 'earth ship' demonstration project that takes an innovative design approach to regional issues such as water shortage. The "earth ship" is a "self-sufficient housing unit that is constructed from recycled bottles, can and tires and utilizes solar and wind energy and water catchment systems" (Rana, 2001, p. 11). Other economic opportunities promoted by ISDA are ecotourism and green business ventures (Rana, 2001, p. 11). Conservation brought down to the local level is imperative for community involvement. It is in turn this involvement that creates and sustains the motivation necessary to continue of the oath of conservation.

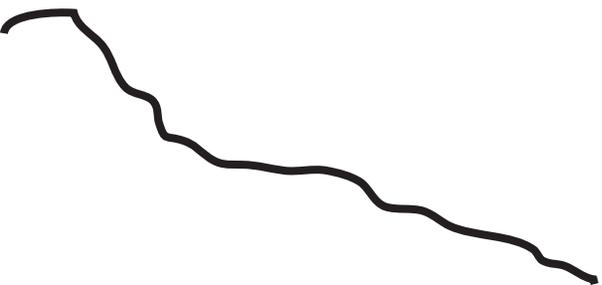
There are many regional and local conservation groups and efforts making the effort to contain the sprawl of people that is destroying the Sonoran Desert. These efforts are doing their part to establish the precedence for conservation. These areas allow people to observe the desert in as natural setting as possible. This thesis will focus on going further. Instead of conserving outside of city limits the intent is to restore a section of habitat in the Town of Marana along the endangered and damaged Santa Cruz River.



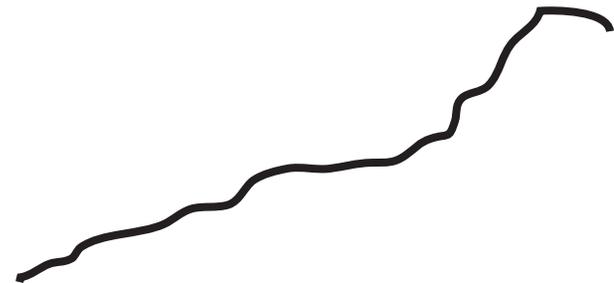
HISTORICAL CONTEXT

This area will include a series of spaces that will bring people out into the restored land in an effort to establish a connection that will promote an intrinsic understanding of the desert. It is through this knowledge that the motivation and means to promote conservation at the individual and communities levels will take place. The architecture then will be a vehicle for conservation, a means of getting to know the Sonoran Desert ecology to better understand the fragility of the Sonoran Desert.





PROGRAM DOCUMENT:
GOALS FOR THE THESIS PROJECT

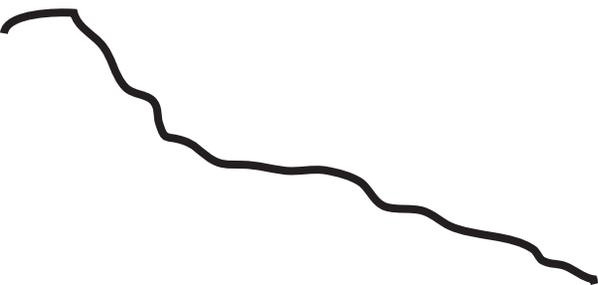


GOALS FOR THE THESIS PROJECT

Many ideas come to mind when one starts thinking about a design thesis. What avenues should one follow that will lead to an architectural solution beyond any personal work previously attempted? What will push the boundaries of an area within the field to open up new avenues of thought and research?

This particular project follows the statement of intent, "How can insight from past cultures of the Sonoran Desert inform and direct conservation and sustainability for the future of the desert?" The research that followed the intent focuses on the native tribes that once thrived in the Sonoran Desert as well as the current tribes that live within the desert. The research portion also spent a significant amount of time focusing on the human relationship to site, environment, history and the psychology behind these relationships. The history of the region is focused on the history of conservation in the region to support the idea that conservation can be taught and can be used as part of a daily routine in the lives of desert inhabitants. It is a goal of this project that people will be inspired to further research the ecological diverse and fragile ecosystem of the Sonoran Desert. It is then imagined that the information and knowledge discovered through personal and educational endeavours of all who begin the investigation will be used as motivation to join the ranks of those fighting to save the Sonoran Desert.

In the educational world of architecture this thesis project wishes to demonstrate that architecture is as much of a psychological experience as it a physiological one.

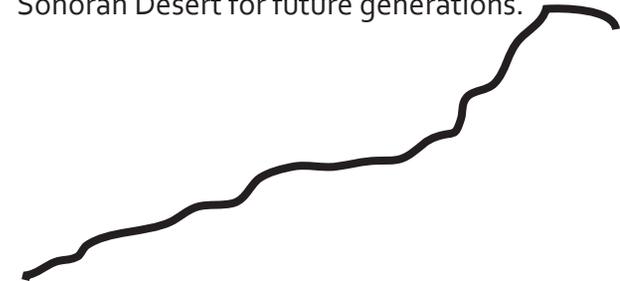


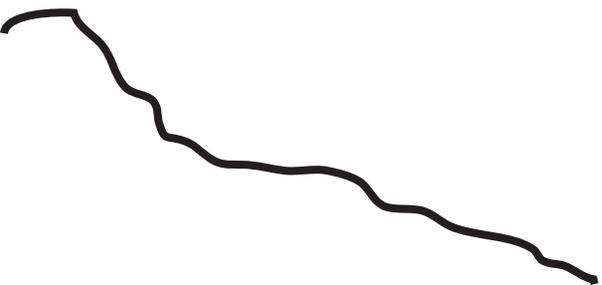
GOALS FOR THE THESIS PROJECT

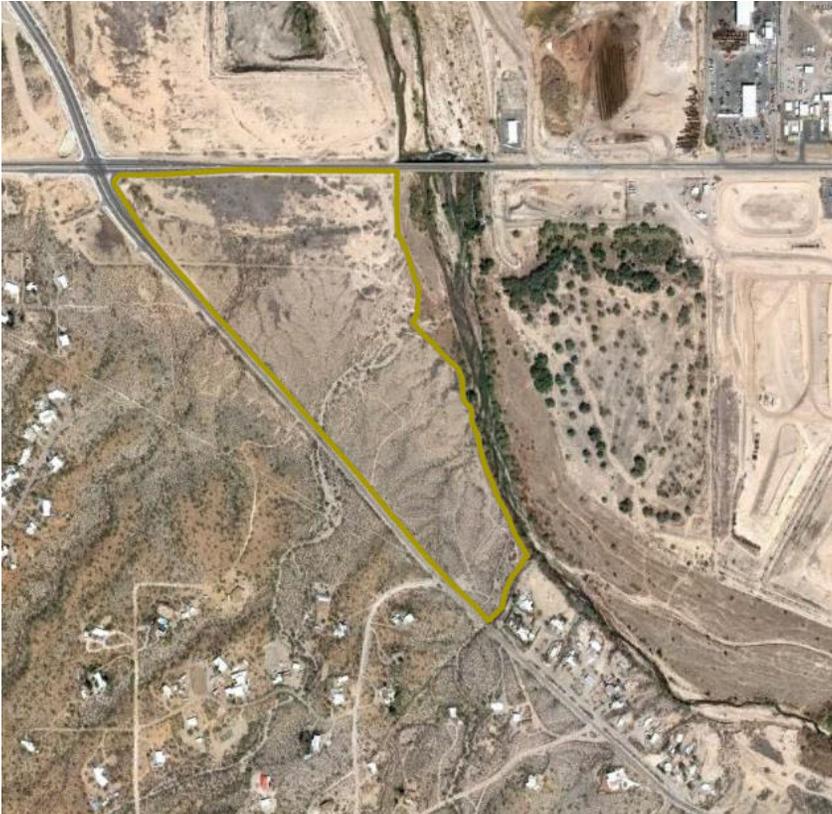
The duality of experience and relationship between men and women, their surrounding ecology and architecture can be exploited to create spaces that respond to human nature and that inform the human psyche. If change is to take place at the local community levels, people need the connection to the desert and the experience of it. This will in turn motivate people to take action to save the community in which they live. Environmental ethics are the shadows in which the hope of our deserts lies. Without the motivation and moral insight and connection to the Sonoran Desert people in the community will struggle with conservation efforts.

Professionally this project can serve as an example as how we, as designers and architects, may start to view the works that we endeavor to design and complete. It is imperative that, not only as citizens of the design community but as citizens of a local ecological community, we are responsive to our environments and respect them in our decisions. This thesis will examine environmental ethics of design and attempt to translate those into spaces that can provide for social and private experiences that will relate visitors back to the ecological environment. In this regard the built environment will be the means to which a project is experienced, not the solution.

Personally I have lived in the Sonoran Desert since I was an infant until recently. I have traveled the world and there is no place more special and closely related to my soul than the Sonoran Desert. I fear that my children will not be able to experience it the way I did even though our experiences are separated by a couple decades. I believe that changes in the way people inhabit the desert need to be made if we want to conserve and preserve the Sonoran Desert for future generations.

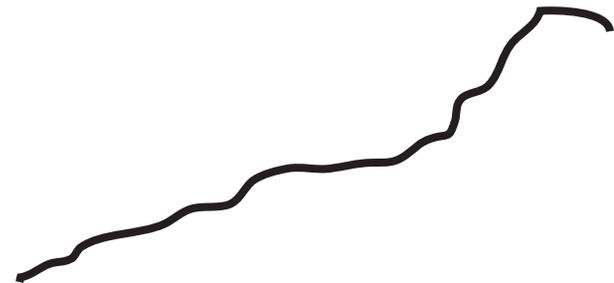






Google Earth 2011

PROGRAM DOCUMENT:
SITE ANALYSIS



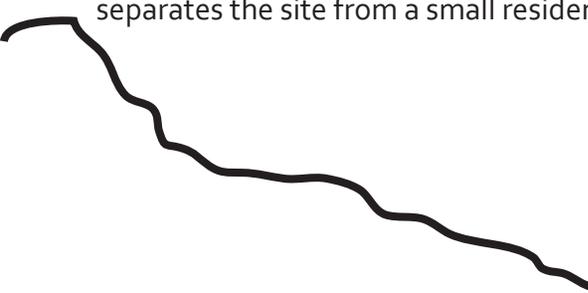
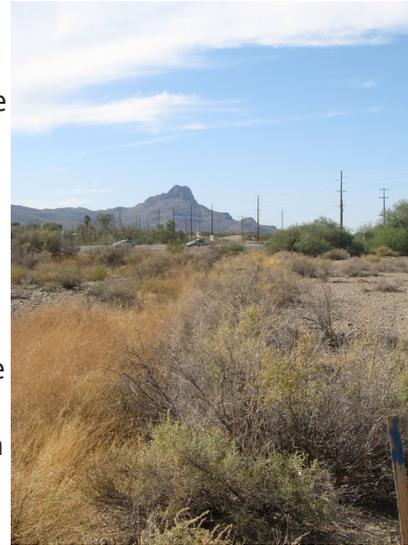
SITE ANALYSIS

VIEWS OR VISTAS:

The site location for this particular thesis project has several levels of views. At the macro scale there are views of the Tortolita Mountains to the north, the Santa Catalina Mountains to the west, and of the Tucson Mountains to the West/Southwest. At the micro scale there are views to the east of the site looking at the Santa Cruz River, to the south looking at the landscape as it slopes up with the topography of the site, and to the west at the desert as it exists within the framework of the existing residential development. The site is immediately striking as having lots of visual layers. Even with the obvious damage that has been done to the site there are still glimpses of the natural desert ecology, both plant life and animal life. The middle of the site and the south end of the site, while damaged, are in better condition than the north end of the site.

The Santa Cruz River is a very rich border at the east. It is very bright in color and felt much cooler despite an average 3:00pm October temperature at the time of the site visit. The sounds of the riparian ecology were very calming and surreal. The texture of the site is very diverse. The river zone felt smooth and peaceful while the north end felt burnt and brittle, it was the warmest part of the site during my visit. The south felt more natural with hard and soft textures mixed together due to the particular plant life. It is a site of duality. It has elements of the natural past yet appears damaged and used with disregard to the ecology.

The site itself is triangular in shape. It is bound to the north and west by Ina and Silverbell Roads, respectively, the Santa Cruz River to the East and an intermittent stream bed, or arroyo to the South. The southern arroyo also separates the site from a small residential development.



SITE ANALYSIS

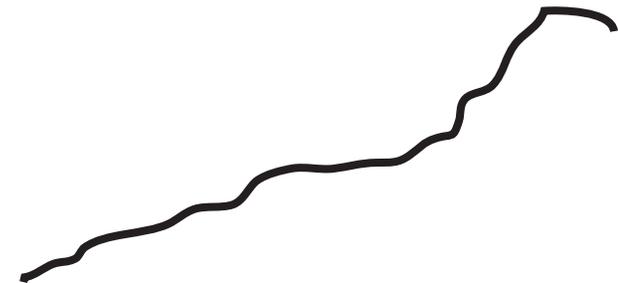
VIEWS OR VISTAS

The site is split in several places with smaller arroyos that follow the stream flow from the Tucson Mountains into the Santa Cruz.

In section the site slopes up to the south and to the west. The water flows down from the Tucson mountains through the site to the Santa Cruz River. There is a drop in topography at the eastern edge between the edge of the site and the river. Towards the northern end of the site there is a man-made berm built up to separate the site from the river. The northern end of the site is flat where it appears water would accumulate before being absorbed into the ground or flowing down to the river if there was a heavy storm such as a desert monsoon.

BUILT FEATURES

There are a number of built features surrounding the site. The Pima County Environmental Department and the Pima County Wastewater Management are to the east on the other side of the Santa Cruz River. There are houses to the south and to the west with a few small business mixed in mostly to the southwest. The closest house on the west side is approximately 290 feet straight west of the southern end of the site. This measurement does not account for the houses to the south of the southernmost arroyo.



SITE ANALYSIS

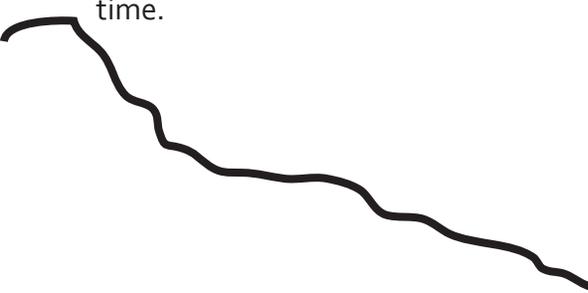
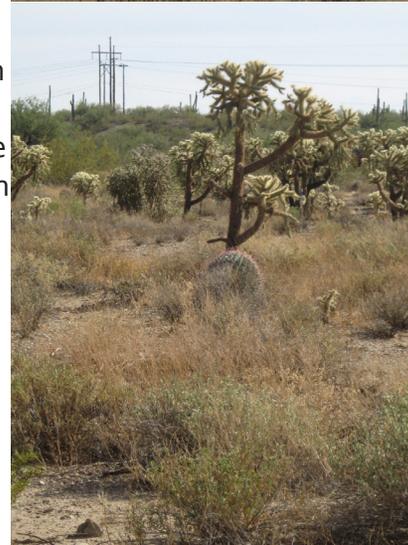
LIGHT QUALITIES

The site felt very bright and warm, especially at the north end of the site where there is much less vegetation. The middle of the site was still bright but felt more layered with light, direct, diffuse, shadows, all were apparent here and to the south because of the vegetation and the sloping topography. The earth was tan and was dotted with color rocks smaller at the north and larger towards the south. The flora was muted except for some squash and bright white flowers found on site. The river zone was bright with intense greens but the sunlight was more diffuse there highlighting the bigger trees creating shadows and layers of light and shade among the smaller foliage. The light was intense when the surrounding plants were smaller and was more diluted next to the larger trees. The light was still intense by the saguaros and chollas but the cacti did create a small amount of shade.

VEGETATION

This site is located in a riparian zone and therefore the vegetation may be broken into four categories. Starting with the vegetation at the river the zones are as follows: Obligate Wetland, Obligate Riparian, Facultative Riparian and Upland. The initial impression of color on the site was muted except for some greens, yellows, and shades of blue. The Santa Cruz was very green and lush.

The texture of the vegetation was spiny, smalls leaves, waxy, and brittle. The site seemed more naturally vegetated toward the road and toward the south end of the site. The north appeared to have been scraped at some point in time.





SITE ANALYSIS

WATER

The Santa Cruz did have water flowing in it when the site was visited for analysis. There was no other water visible on site at the time. The water that was in the river appeared cool, with some areas of brown and some areas were more blue. It appeared to be somewhat mucky and polluted in some areas and cleaner in others.

The water at the Santa Cruz is permanent. The arroyos only flow intermittently.

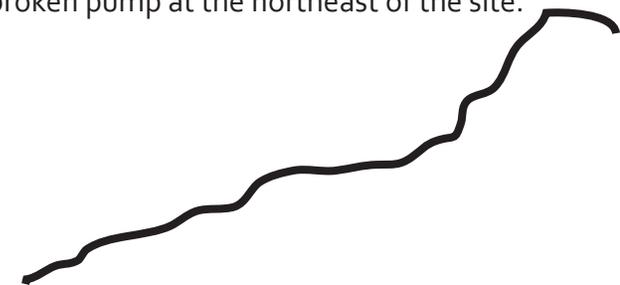
WIND

The flow of the wind at a macro scale is affected by the region's mountains. Mrill Ingram wrote in *A Natural History of the Sonoran Desert* that the winds actually originate from the west, but because of the mountains, the winds arrive in the valley from the southeast (2001, p. 43).

The site will seem windier to the north because the flow comes from the southeast. It is also the least dense area of the site so unless the vegetation slows the wind on a micro scale before it reaches the north end the wind will feel stronger at the north than at the south.

HUMAN CHARACTERISTICS

There is definitely human intervention at the site. It was disturbed to build the berm at the northeast edge, and to install the power lines that run along Ina and Silverbell Roads. There is also what appears to be an abandoned water trough and broken pump at the northeast of the site.



SITE ANALYSIS

HUMAN CHARACTERISTICS

The site also appears to be used for recreation. There were numerous tracks for what appeared to be off road vehicle such as trucks and dirt bikes. There were also horse tracks , bicycle tracks, and numerous footprints. There were not any paved paths or roads on the site.

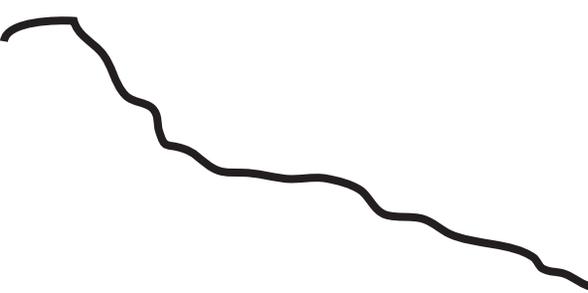
There are a few human residents on site that have littered the area with trash and debris.

DISTRESS

The site is distressed. It felt very neglected in a destructive way. There appeared to be non-native plants growing on site. Again, the north end of the site appeared to be scraped. The downstream flow of water through the site poses a very serious problem.

There is site erosion along the river and the arroyos as the natural process of water flow.

Some trees appeared dead but this can be typical in a dry year in the Sonoran Desert. There are currently several species of non-native plants growing on site. These are threatening the local habitat for the native plants and animals.





SITE ANALYSIS

SOILS

The soils on this site are varied due to the slope of the site. The north end was made of sand, silt and clay while the west and south end of the site had more rocks and gravel. According to the USDA soil series report, the taxonomic class of soil in Marana are fine-silty, mixed, superactive and hyperthermic Typic Haplocambids (1999)

UTILITIES

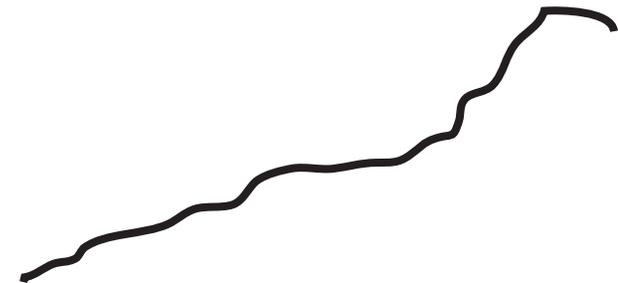
The north and west of the site are delineated with power lines. There are also water services to the site.

VEHICULAR TRAFFIC

Both Ina Road and Silverbell Road are major roads. There is middle level traffic during rush hour during the work week and very little traffic during other times. There is constant vehicular movement on the roads. There is a train track about a mile away that can cause some added noise to the site as well.

PEDESTRIAN TRAFFIC

There are no sidewalks along the site off either Ina or Silverbell Roads. There is however, pedestrian traffic through the site.



SITE ANALYSIS

TOPOGRAPHIC SURVEY

The slope to the north end of the site appears to be less than 1% in the middle of the scraped area. The far north slopes down slightly to this area, roughly at 4% slope as it does from the west. The land slopes back up to the east, but it may have sloped down into the river prior to the berm being built. The slope is greater moving further south and the topography of the site is always higher on the western edge unless of a man made intervention such as the berm. The land also slopes down before reaching the continuously eroded edge of the arroyos.

VISUAL FORM

The terrain seems nearly flat, except at the edges, when one stands at the north end of the site due to the flora that creates a separation line from the northern scraped lot to the rest of the site. From the west looking east the land appears completely different. Not only because of the vegetation but because the land slopes toward the river.

The land rises up then flows back down again in two directions. As a whole the land slopes from the west down to the east. It also rises up between arroyos, even if only slightly, then falls down below "grade".

PLANT COVER

The water drains toward the river and the plant cover does not seem to affect this flow. Larger desert trees line the Santa Cruz River and the arroyos while saguaros, cholla, barrel and other cacti along with creosote and other desert grasses live in the areas between the arroyos.



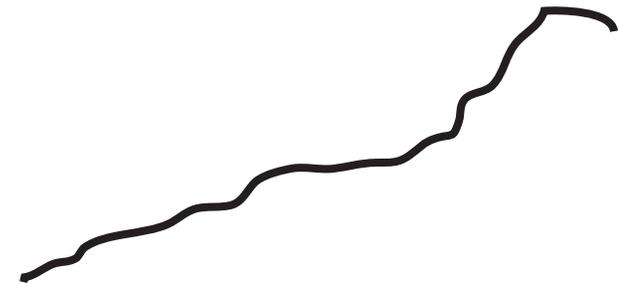
SITE ANALYSIS

PLANT COVER

The vegetation played a large role in the temperature on site. It was cooler near the arroyos, even though there was no water running through them at the time of investigation. The less vegetation areas felt much warmer and were much brighter. This also relates to the sunlight. It was not as piercing near the areas with trees yet dominated where the vegetation was mostly grasses and small succulents.

The site felt very moist near the river and more towards the southern end of the site. The north end felt very dry and crusty.

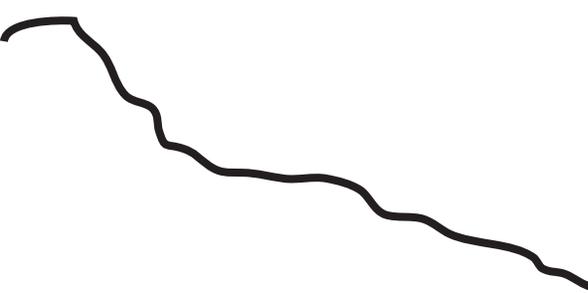
There was a wide variety of plant life from Saguaros, to cholla, creosotes to succulents . There were also a few mesquite trees on site and some palo verdes near the arroyos.



SITE ANALYSIS

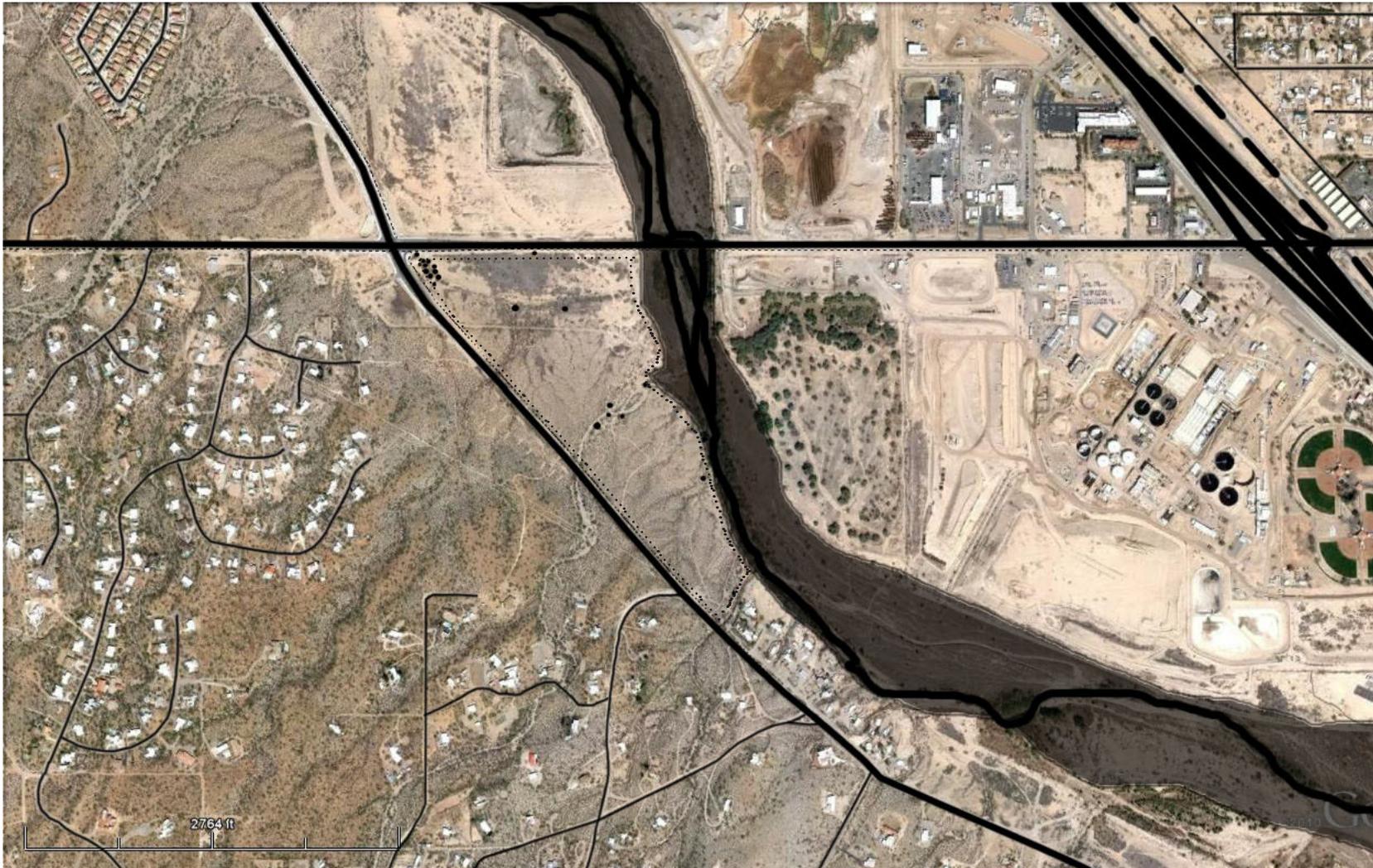
WILDLIFE

The wildlife on this site needs further investigation and inventory as does the current state of vegetation. The images below are examples of some of the life that can be found on site.



SITE ANALYSIS

MAPS



BASE MAP

LEGEND:

- MAIN SITE ROADS, INA AND SILVERBELL
- INTERSTATE -10
- RESIDENTIAL ROADS

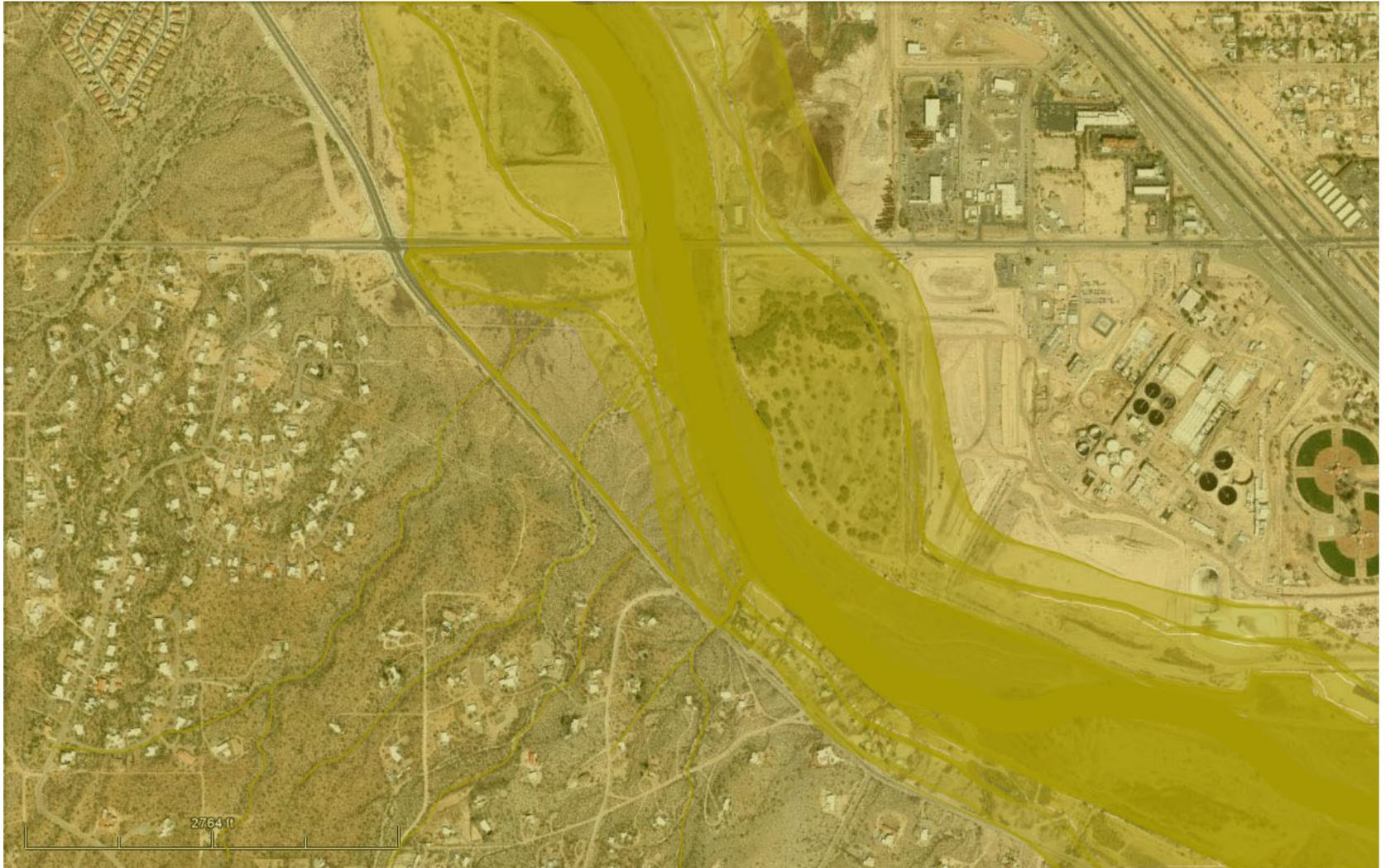
- RAILROAD
- SANTA CRUZ RIVER
- EASEMENTS

- Google Earth 2011
- - - UTILITIES
- LARGE TREES ON SITE
- FLOOD PLAIN

SITE ANALYSIS

MAPS

VEGETATION
REGION MAP



LEGEND:

-  OBLIGATE WETLAND
-  OBLIGATE RIPARIAN

-  FACULTATIVE RIPARIAN
-  UPLAND

Google Earth 2011

SITE ANALYSIS

MAPS

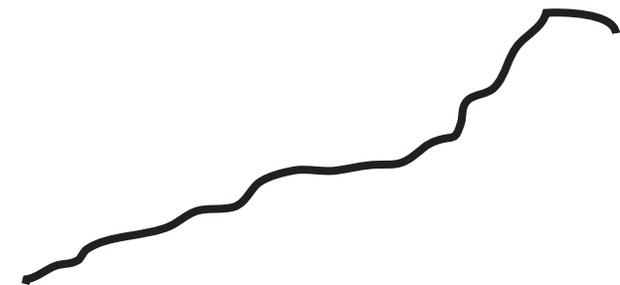


LEGEND:

- MAJOR TOPOGRAPHY LINE
- MINOR TOPOGRAPHY LINE

Google Earth 2011

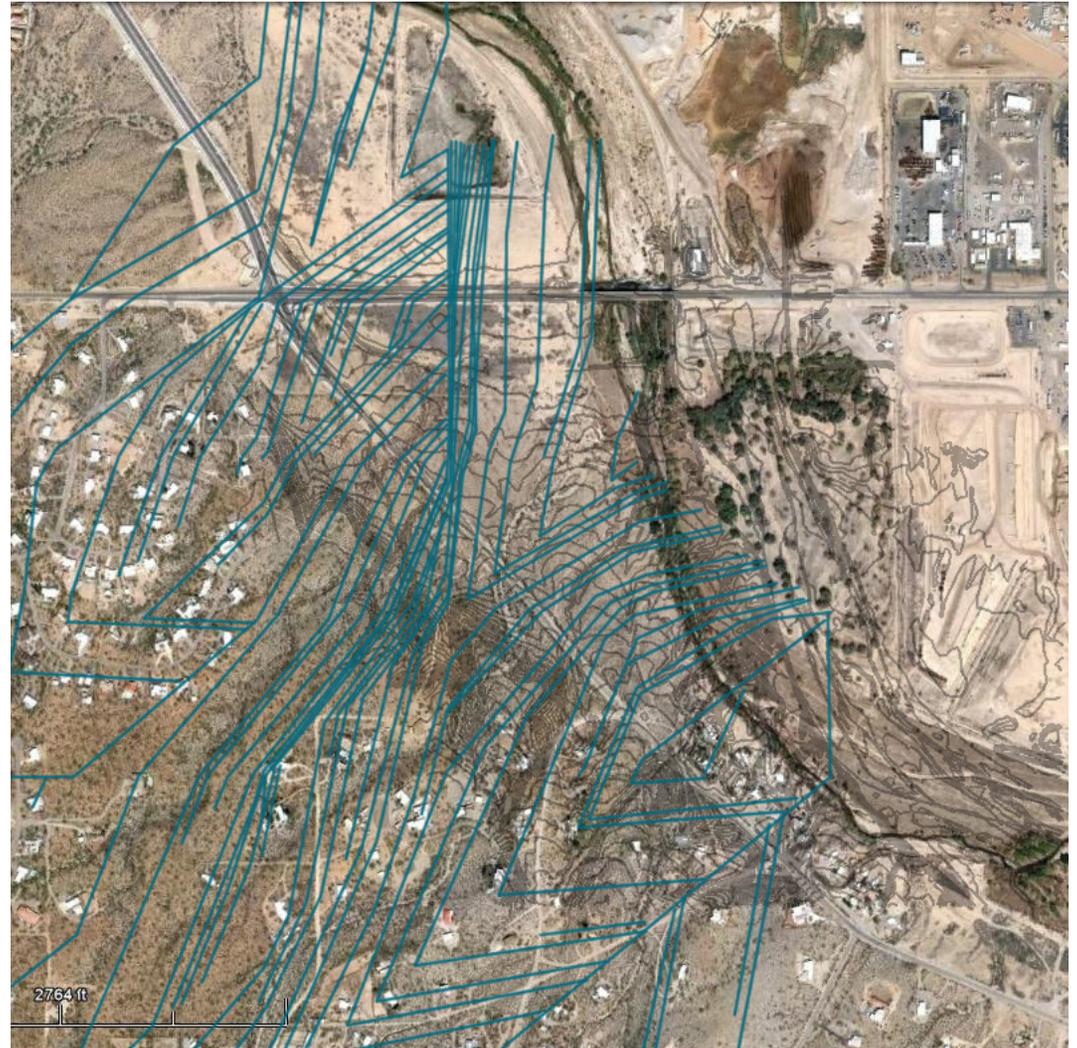
TOPOGRAPHY
MAP



SITE ANALYSIS

MAPS

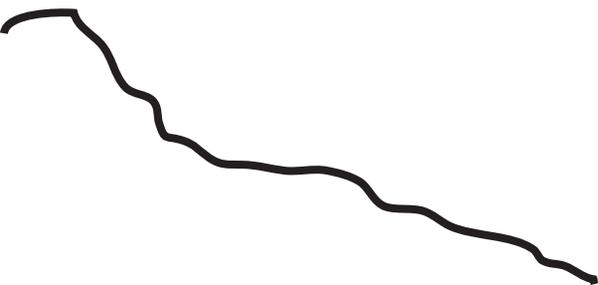
WATER RUNOFF MAP



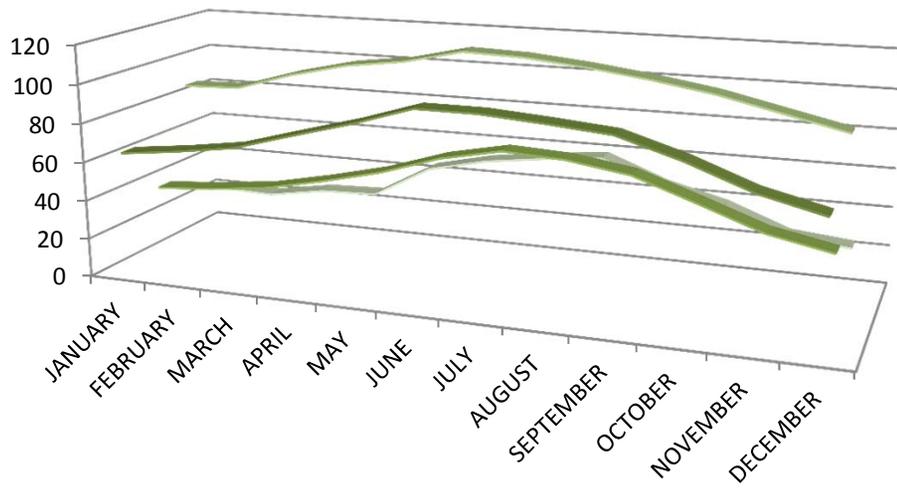
Google Earth 2011

LEGEND:

- MAJOR TOPOGRAPHY LINE
- MINOR TOPOGRAPHY LINE
- WATER RUNOFF

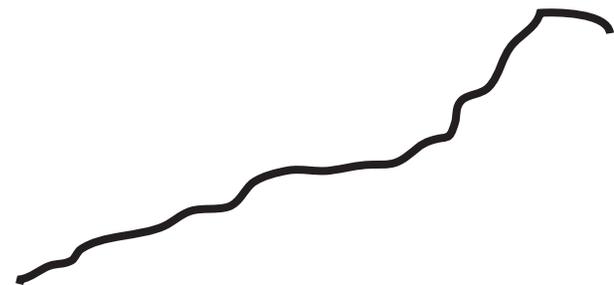


CLIMATE DATA



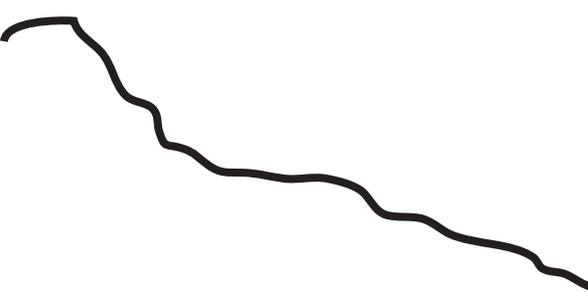
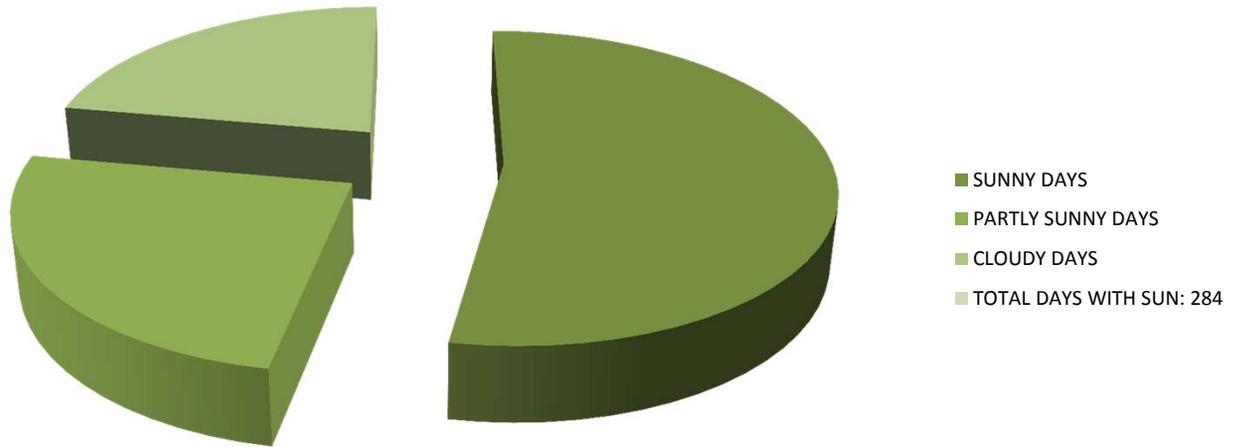
- AVERAGE HIGH TEMPERATURE
- AVERAGE LOW TEMPERATURE
- RECORD HIGH TEMPERATURE
- RECORD LOW TEMPERATURE

TEMPERATURE

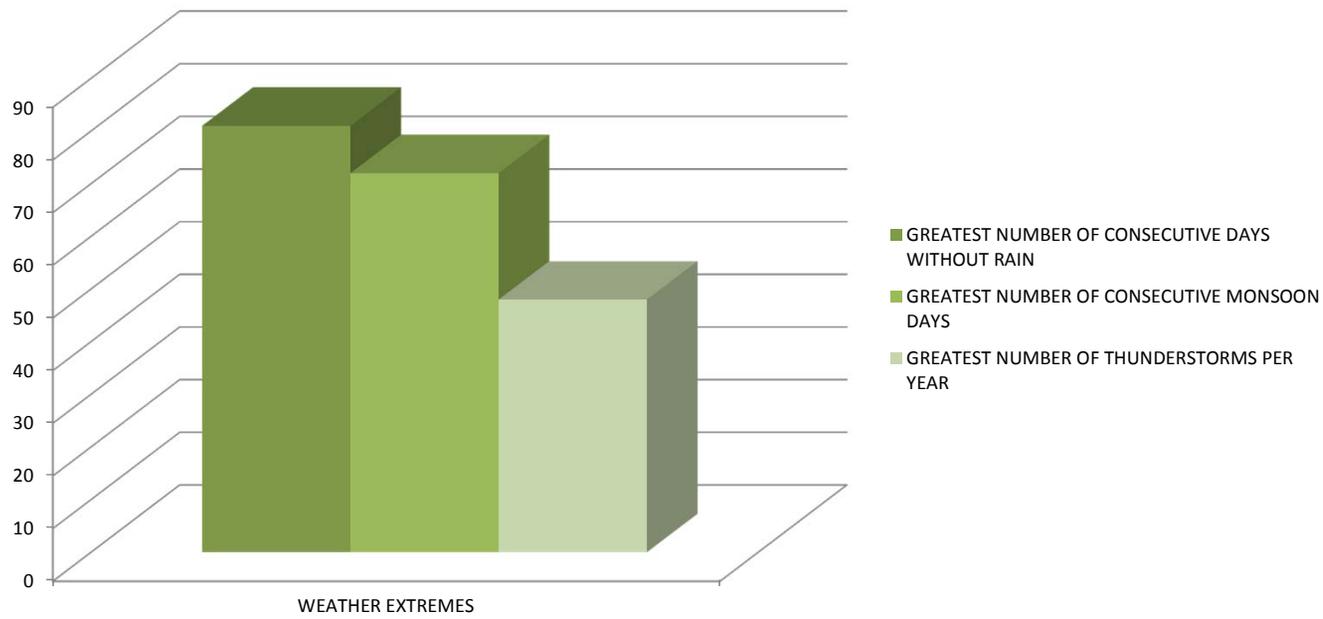


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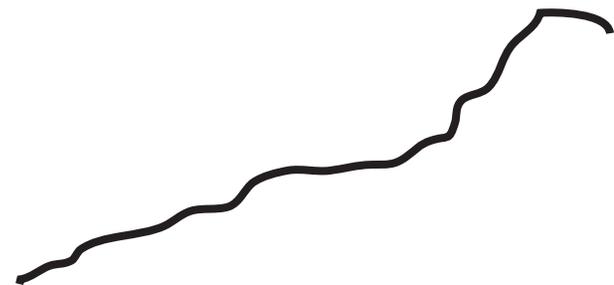
SUNSHINE



CLIMATE DATA

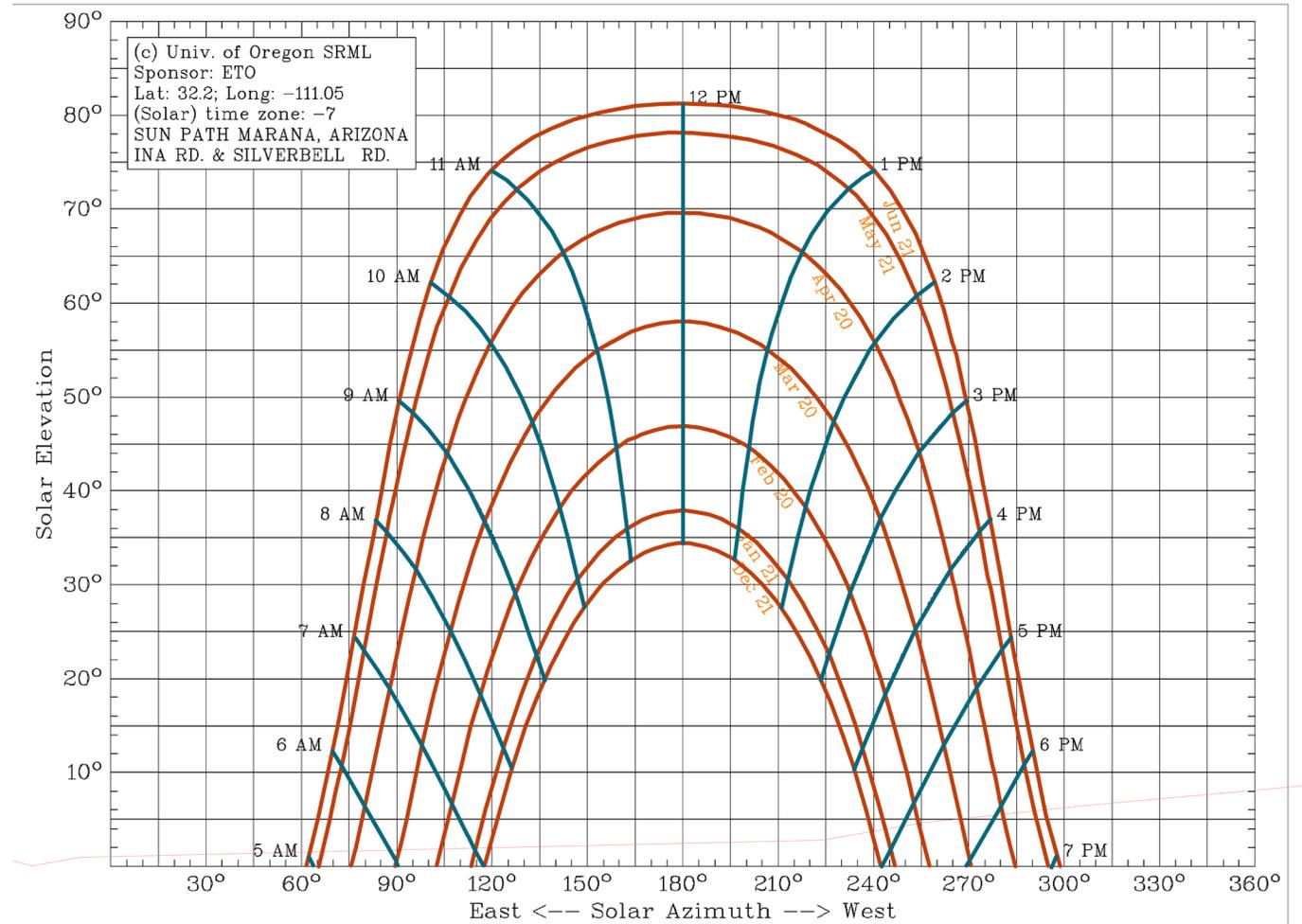


WEATHER EXTREMES



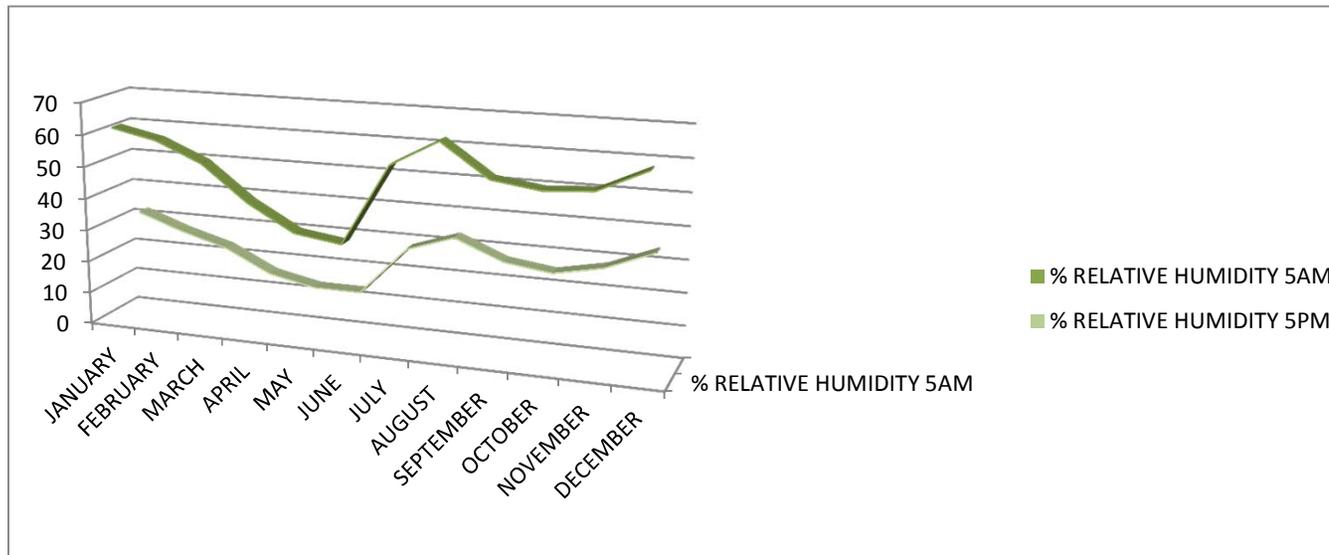
CLIMATE DATA

SUN PATH

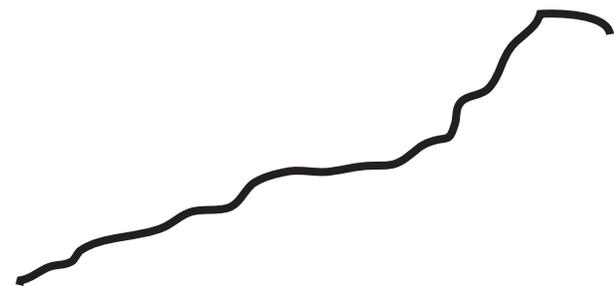


THIS SUN CHART WAS CREATED USING GARMIN GPS COORDINATES FROM THE NORTHWEST CORNER OF THE SITE JUST EAST OF THE INTERSECTION OF INA ROAD AND SILVERBELL ROAD. THE POLAR SUN PATH CHART PROGRAM IS FROM THE UNIVERSITY OF OREGON SOLAR RADIATION MONITORING LABORATORY.

CLIMATE DATA

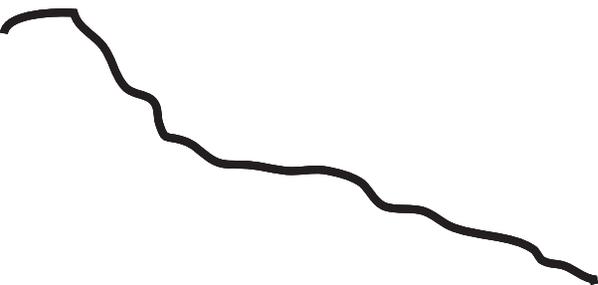
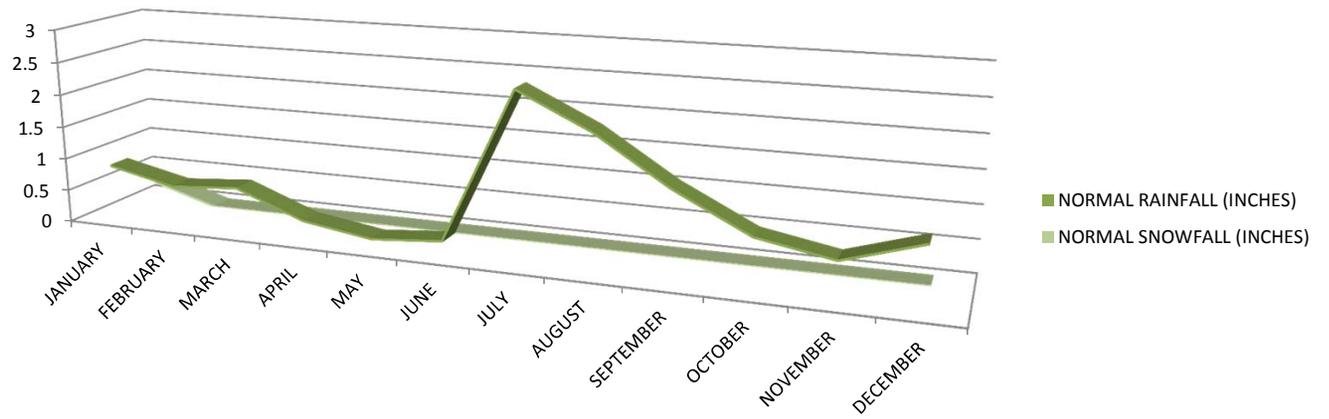


HUMIDITY



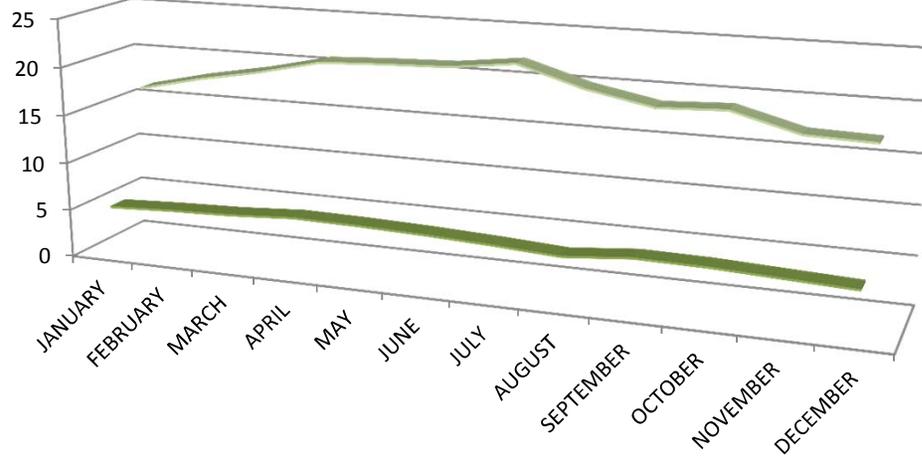
CLIMATE DATA

PRECIPITATION

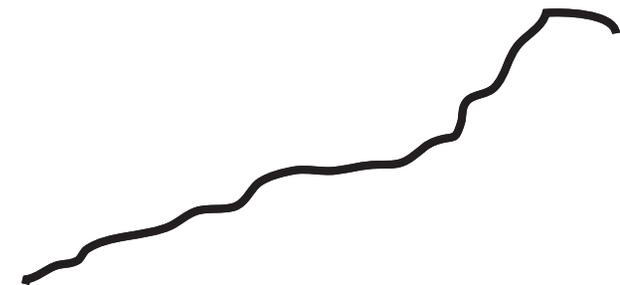


CLIMATE DATA

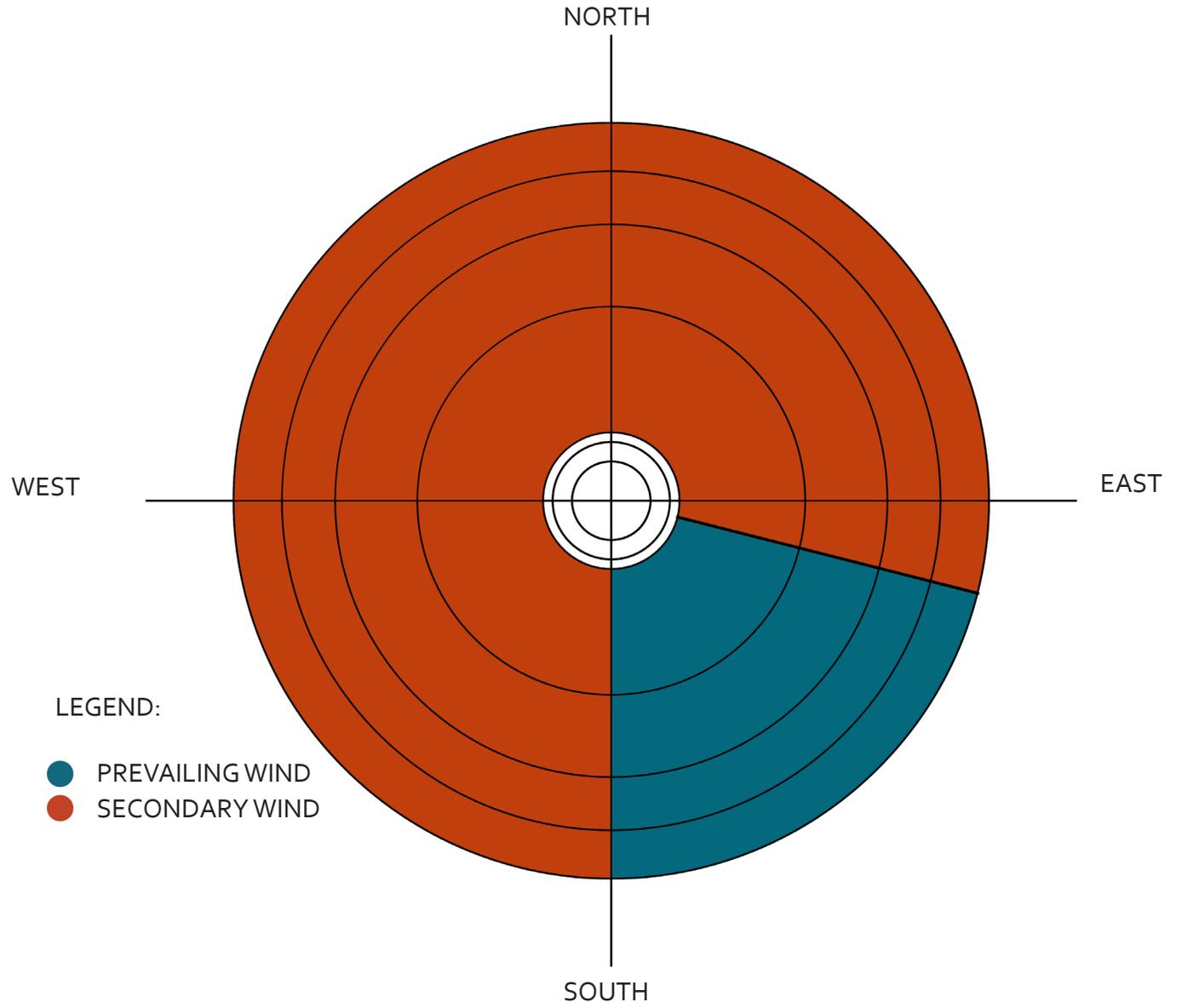
WIND SPEED



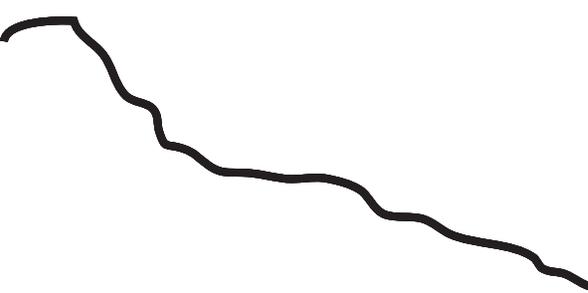
- AVERAGE WIND SPEED
- MAXIMUM WIND SPEED



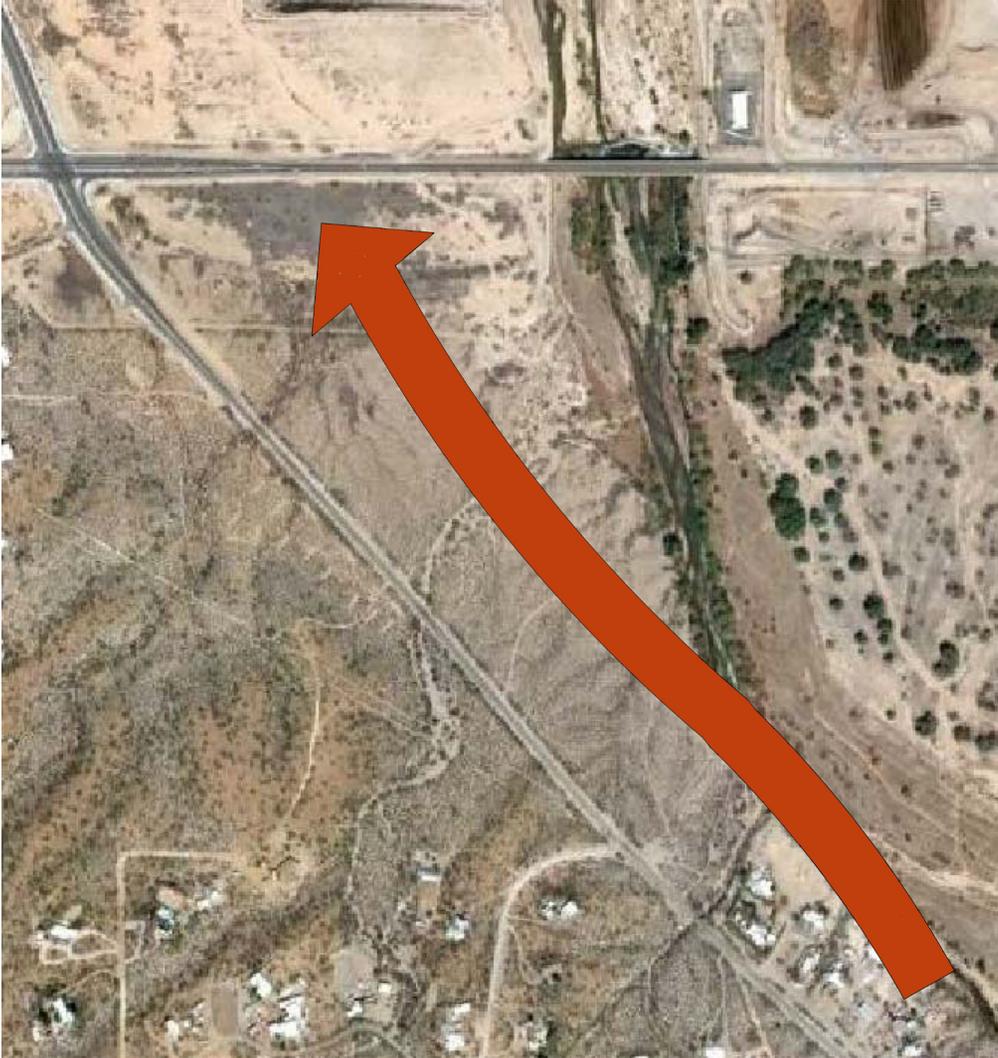
CLIMATE DATA



WIND DIRECTION

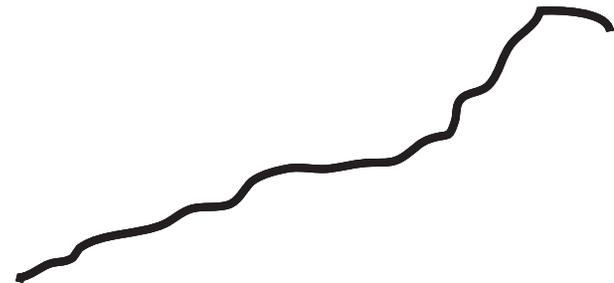


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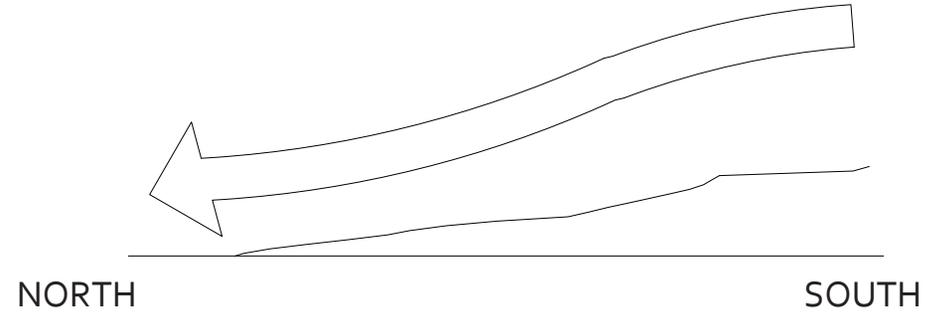
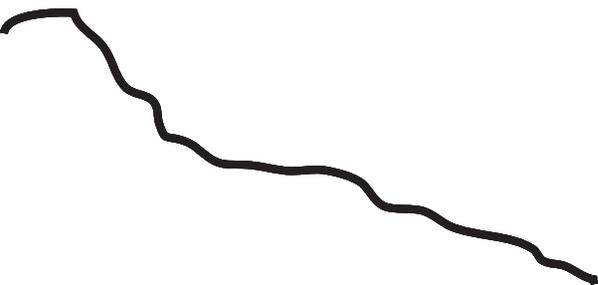
Google Earth 2011

TOPOGRAPHY AND AIR MOVEMENT



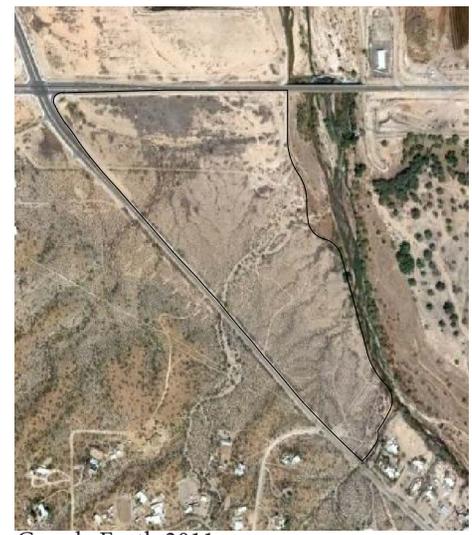
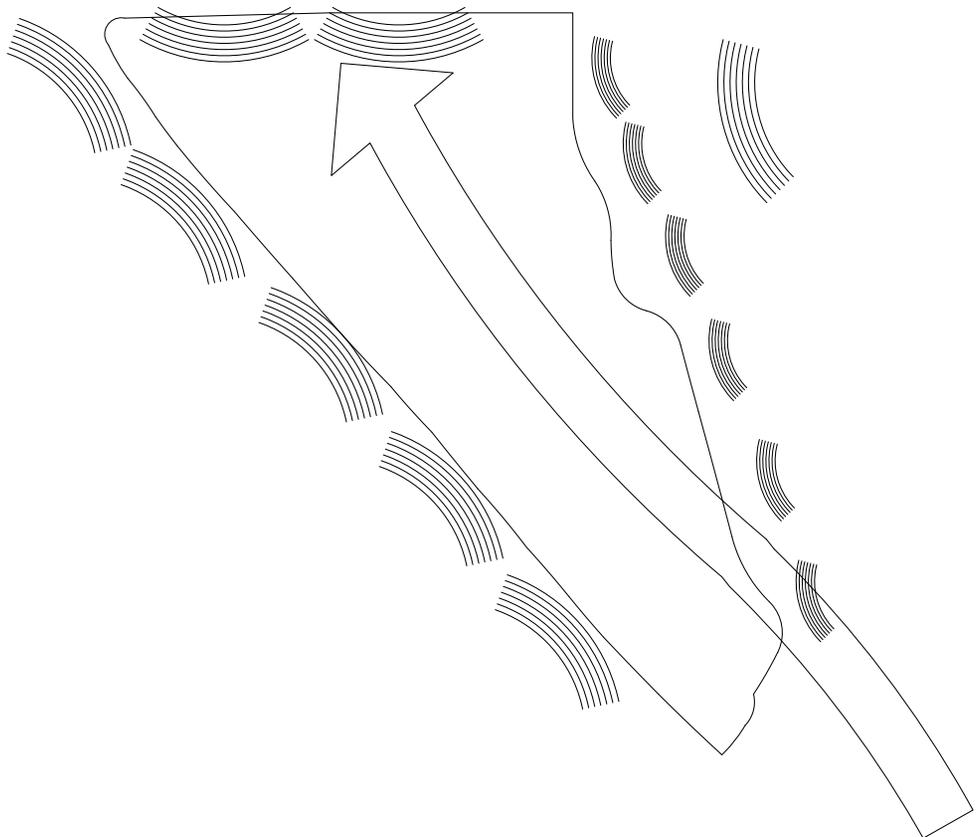
CLIMATE DATA

TOPOGRAPHY AND AIR MOVEMENT



LONGITUDINAL SECTION CUT EAST END OF SITE

CLIMATE DATA



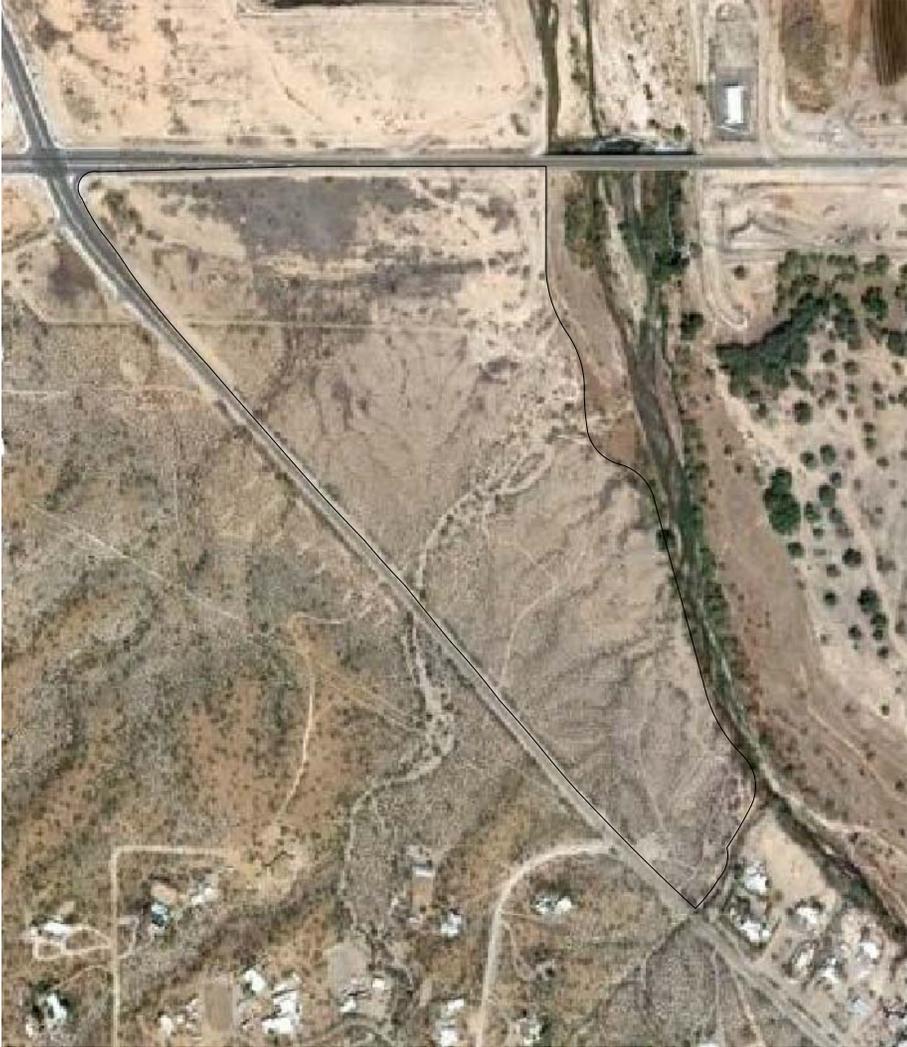
Google Earth 2011

LEGEND:

-  MAN MADE NOISE
-  NATURAL NOISE FROM SANTA CRUZ RIVER
-  NOISE POTENTIAL FROM PREVAILING WINDS
-  SITE BORDER

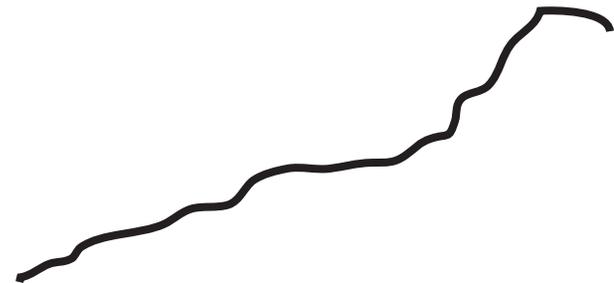
NOISE





Google Earth 2011

PROGRAM DOCUMENT:
SPACE ALLOCATION

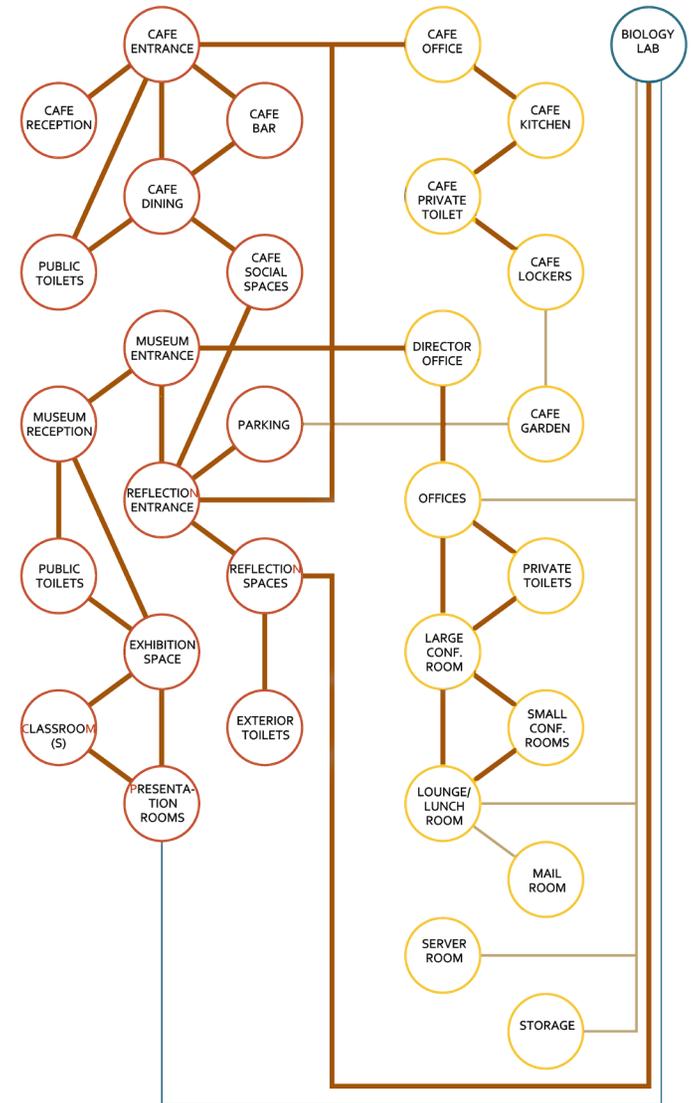


SPACE ALLOCATION

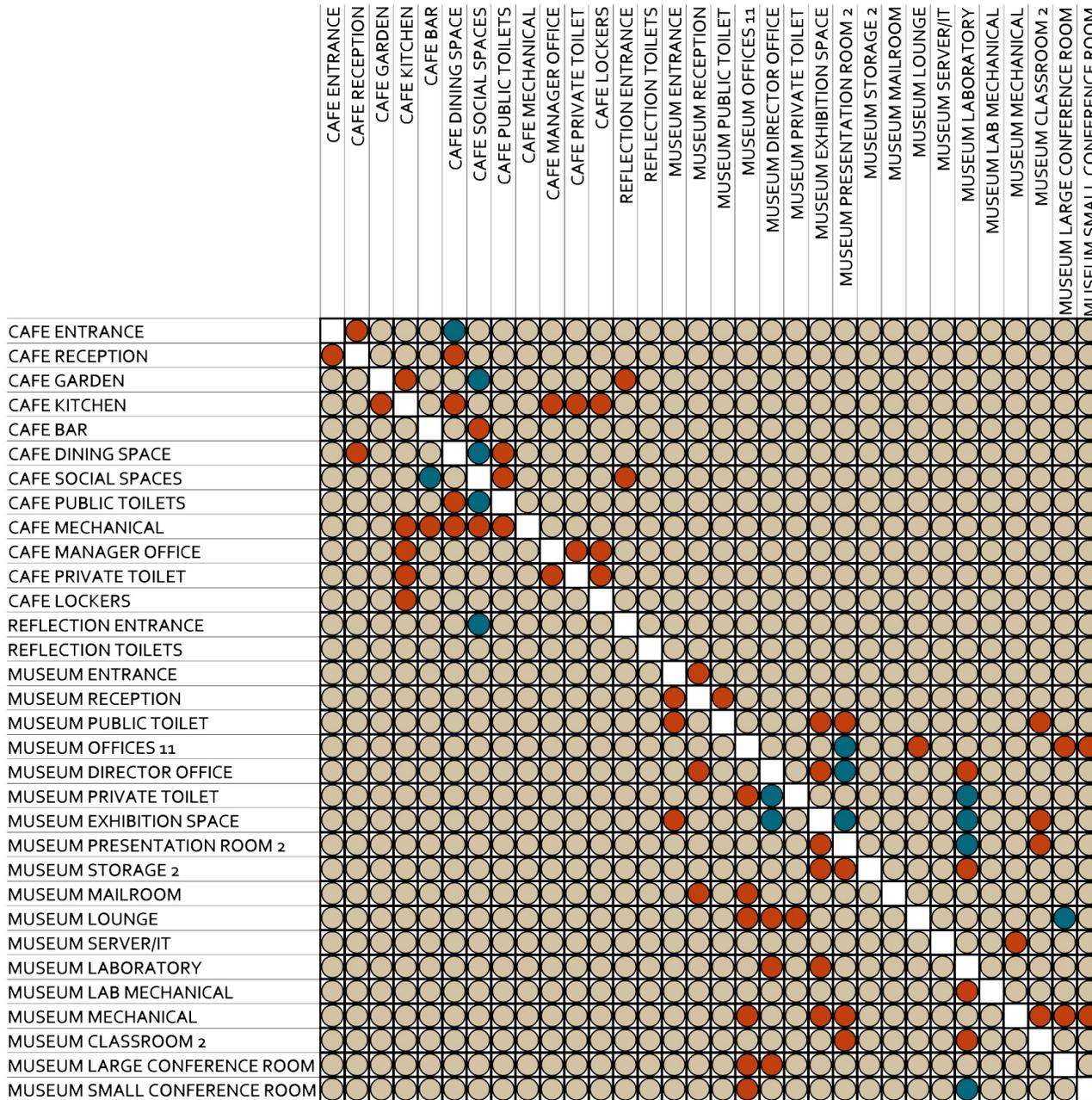
INTERACTION NET

LEGEND:

-  FORMAL CONNECTION
-  INFORMAL CONNECTION
-  CASUAL CONNECTION
-  PUBLIC SPACE
-  PRIVATE SPACE
-  WORK SPACE



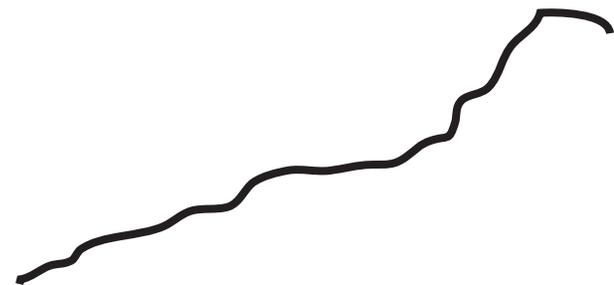
SPACE ALLOCATION



INTERACTION MATRIX

LEGEND:

- ESSENTIAL
- DESIRED
- NOT NECESSARY

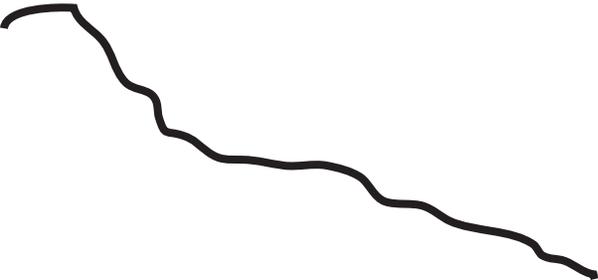


SPACE ALLOCATION

CAFE:	
Entrance:	200 sf
Reception:	200 sf
Garden:	1500 sf
Kitchen:	1500 sf
Bar:	750 sf
Dining:	1500 sf
Social Spaces:	500 sf
Public Toilets:	200 sf x 2 = 400 sf
Mechanical:	250 sf
Manager Office:	120 sf
Private Toilet:	150 sf
Lockers:	300 sf



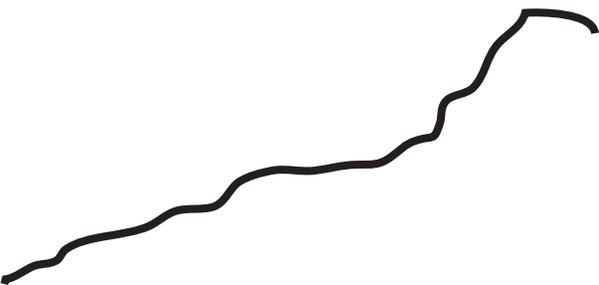
REFLECTION:	
Entrance:	200 sf
Public Toilet:	200 sf x 2 = 400 sf

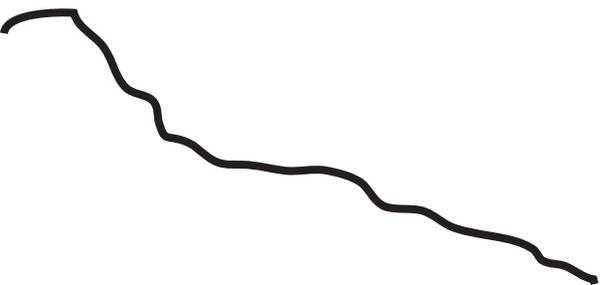


SPACE ALLOCATION

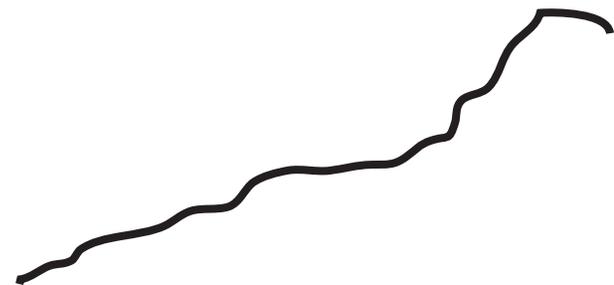
	MUSEUM:
Entrance:	300 sf
Reception:	200 sf
Public Toilet:	200 sf x 2 = 400 sf
Office (11):	150 sf x 11 = 1650 sf
Director Office:	200 sf
Private Toilet:	200 sf x 2 = 400 sf
Exhibition Space:	5000 sf
Presentation Room (2):	400 sf x 2 = 800 sf
Storage (2):	350 sf x 2 = 700 sf
Mail Room:	150 sf
Lounge:	250 sf
Server/IT:	120 sf
Laboratory:	1000 sf
Laboratory Mechanical:	150 sf
Mechanical:	200 sf
Classroom (2):	400 sf x 2 = 800 sf
Large Conference Room:	350 sf
Small Conference Room:	200 sf

20,840 sf total built area

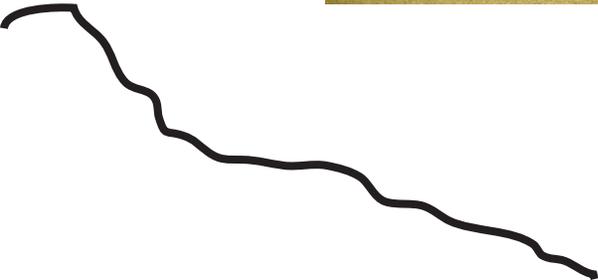




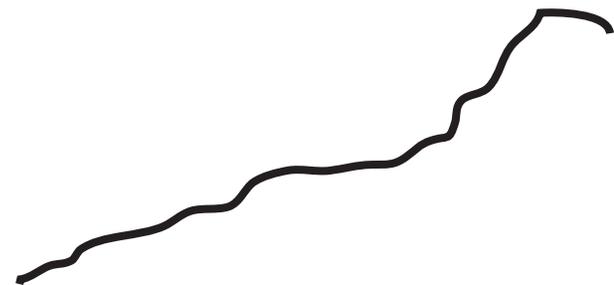
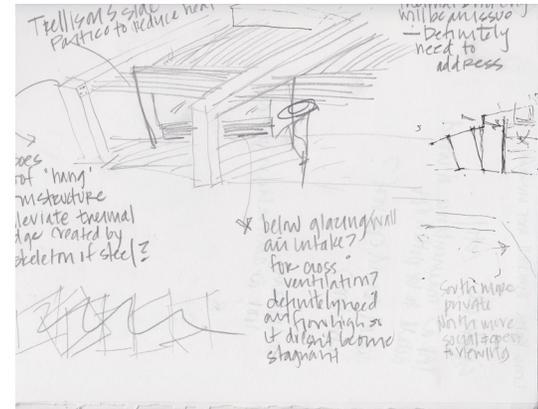
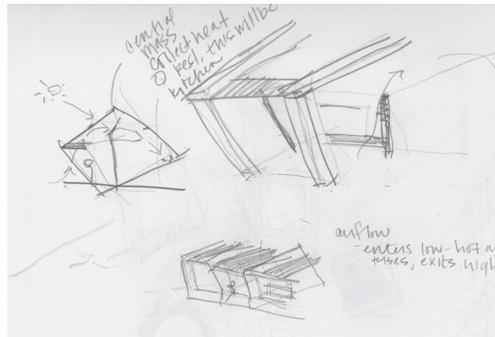
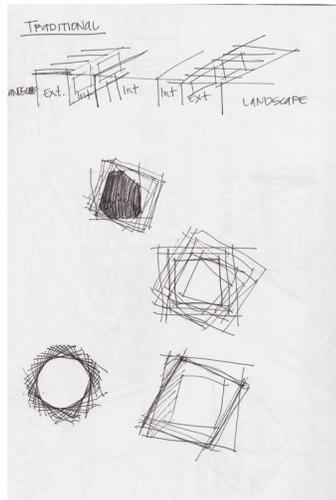
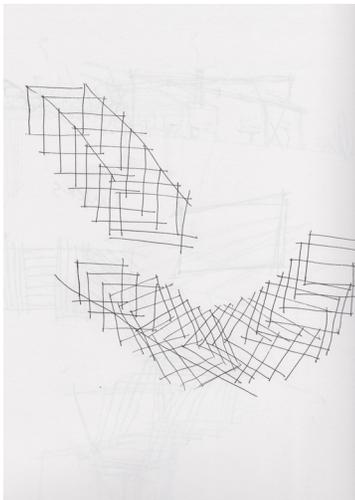
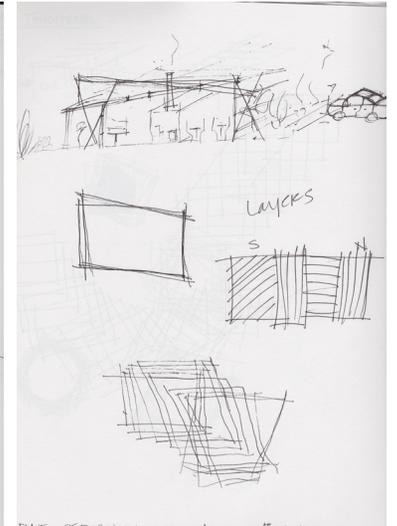
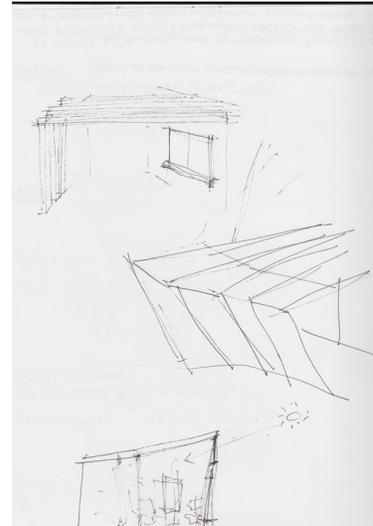
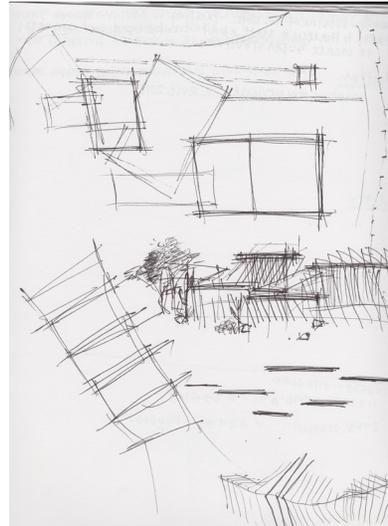
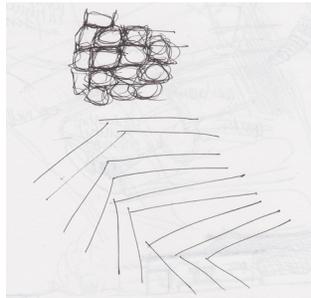
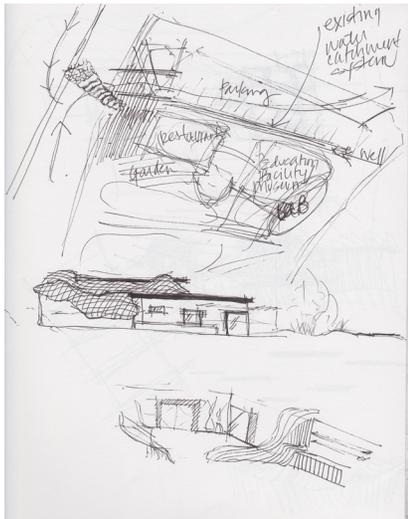
THE DESIGN:



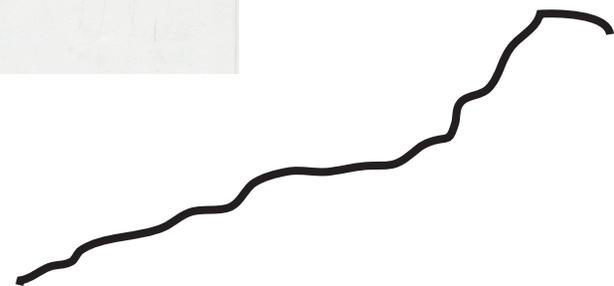
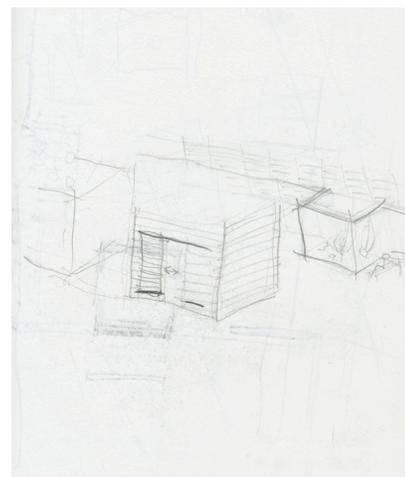
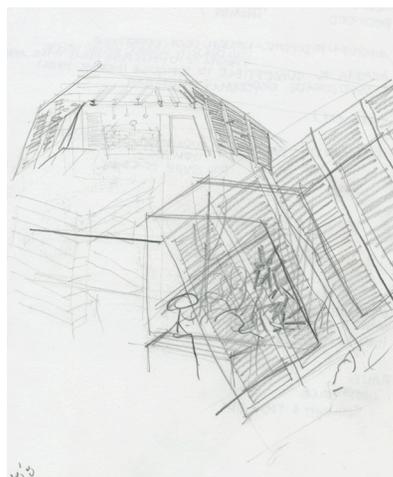
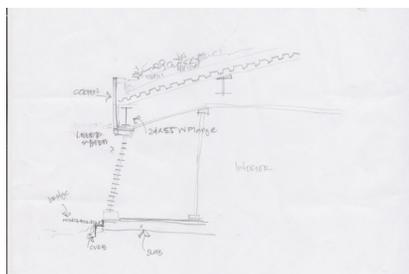
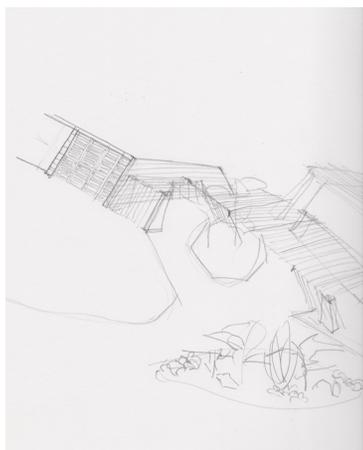
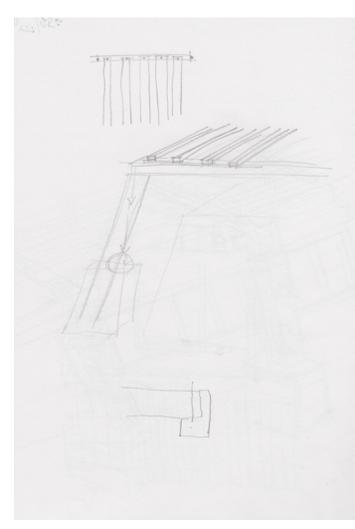
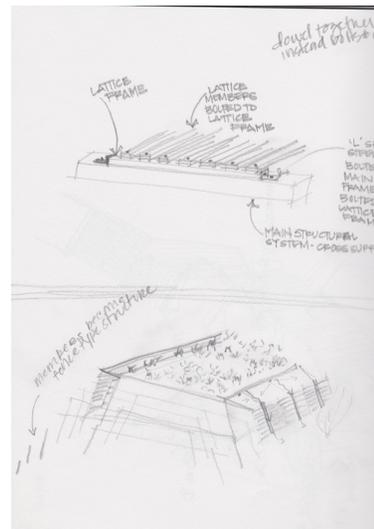
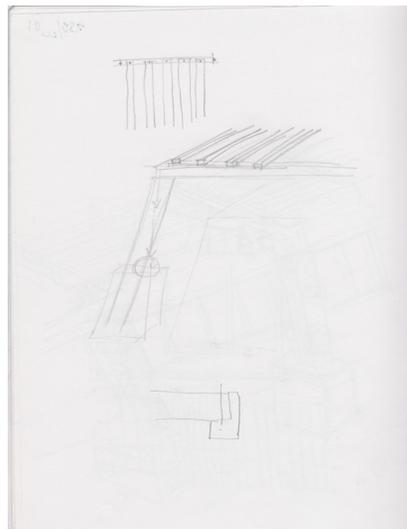
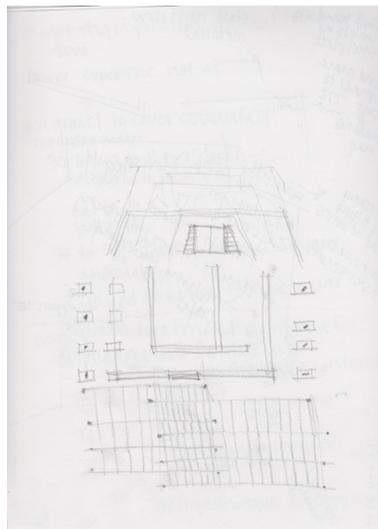
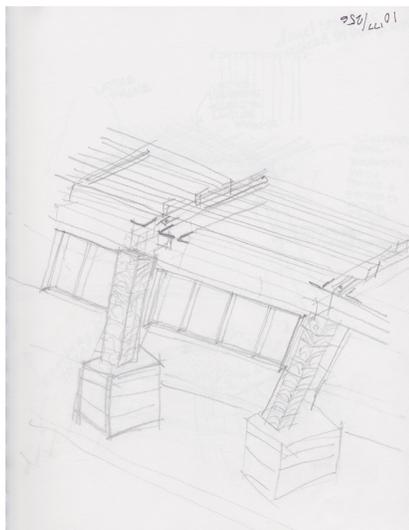
PROCESS



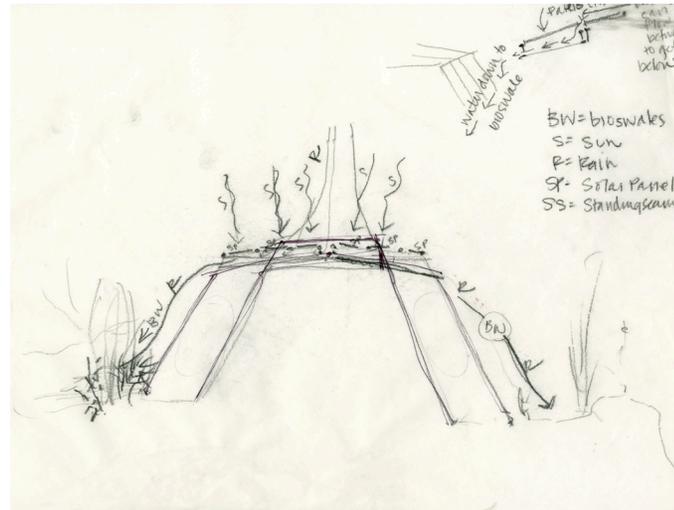
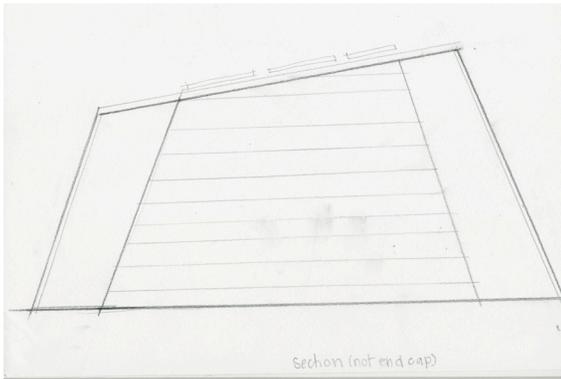
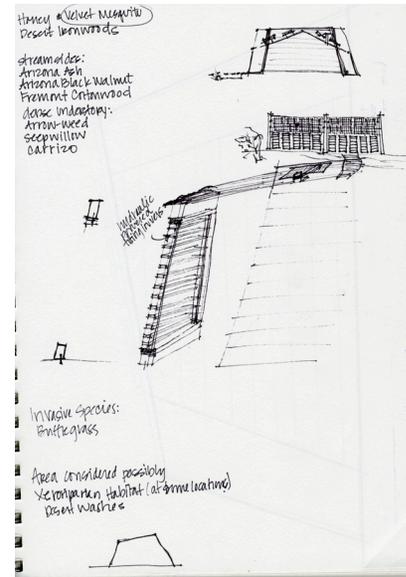
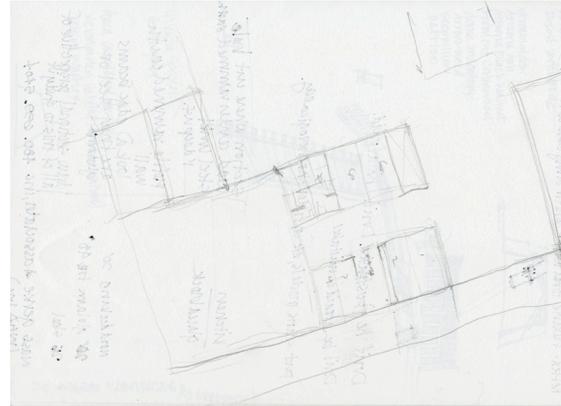
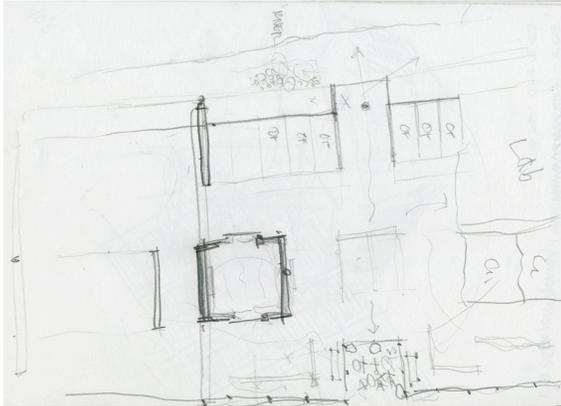
PROCESS



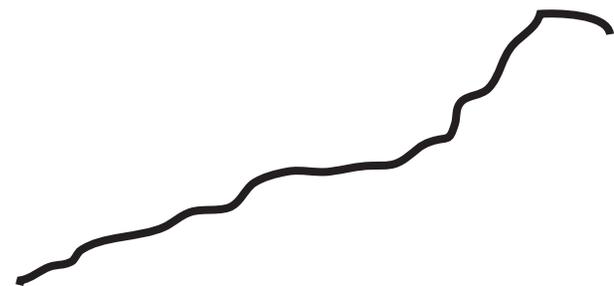
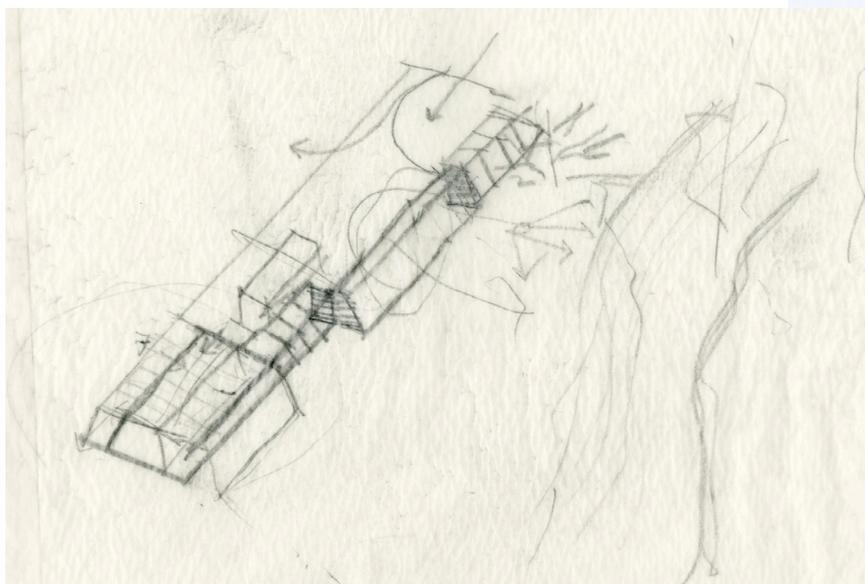
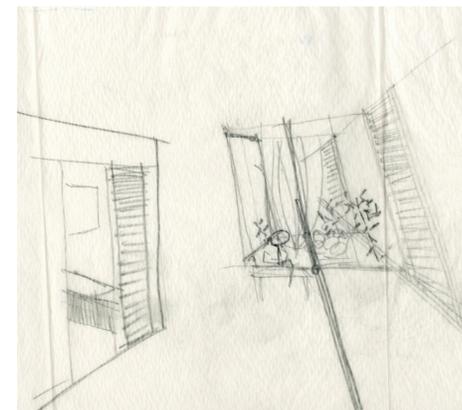
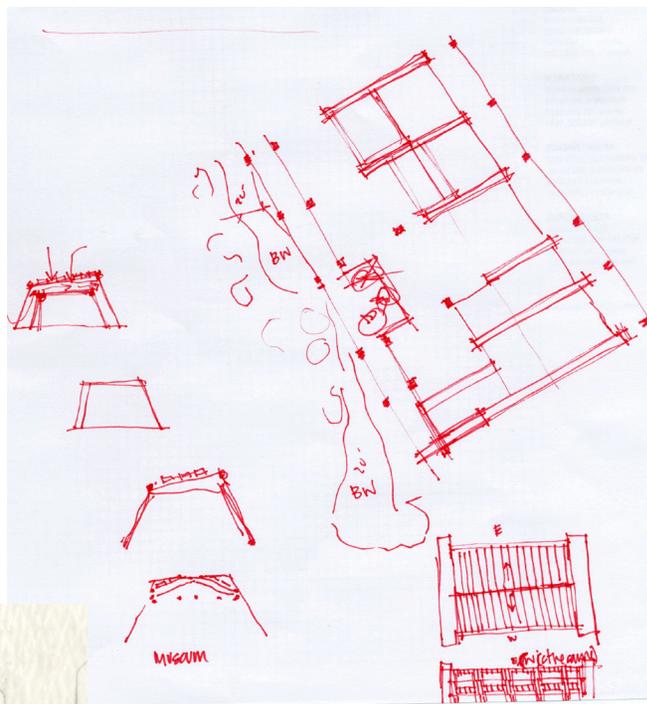
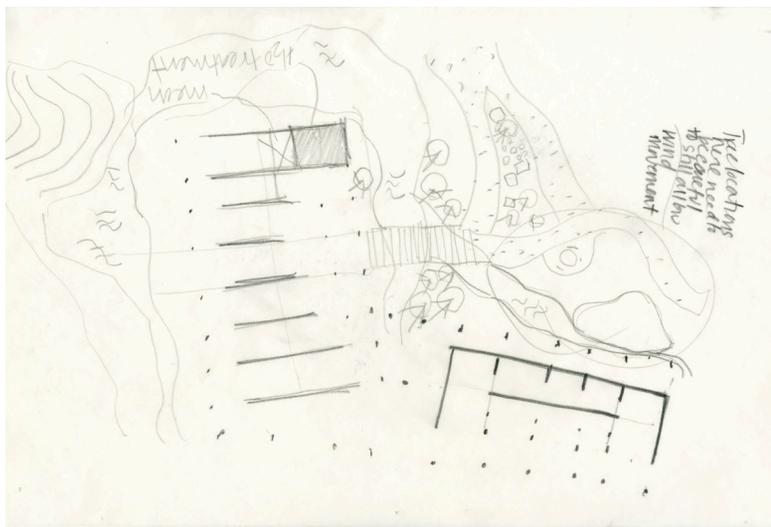
PROCESS



PROCESS



PROCESS



THE COMPONENTS

Site Features:

Bioswales

Revegetation/Vegetation

Paths follow previously established use patterns

Solar Panels

(4) 4600 gallon tanks in building to collect, clean and redistribute water throughout the building

(total storage capabilities: 18400 gallons)

Garden with edible indigenous plants used in the cafe

Pervious paving using recycled concrete pavers

Building Features:

Structural Rammed Earth Walls

Mesquite Wood

Dura-Frame Windows and Doors

Steel fabricated in Arizona

Glulams from Arizona

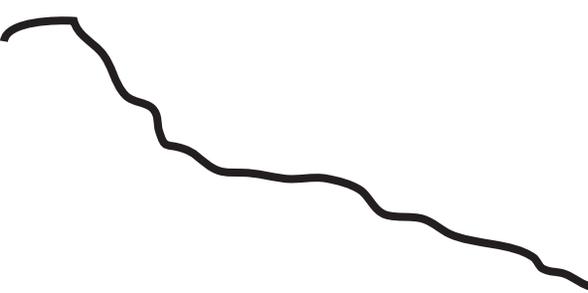
Portland Cement Plaster

Planted Roof on Museum

Shade structure over Cafe roof

Mechanically and Manually operated louver system to allow or deny sunlight based on time of day and time of year

Naturally Ventilated - Cross Ventilation



THE COMPONENTS



Trellis Connection Detail



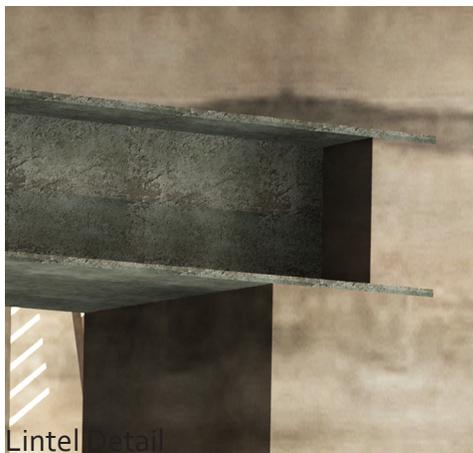
Trellis Detail



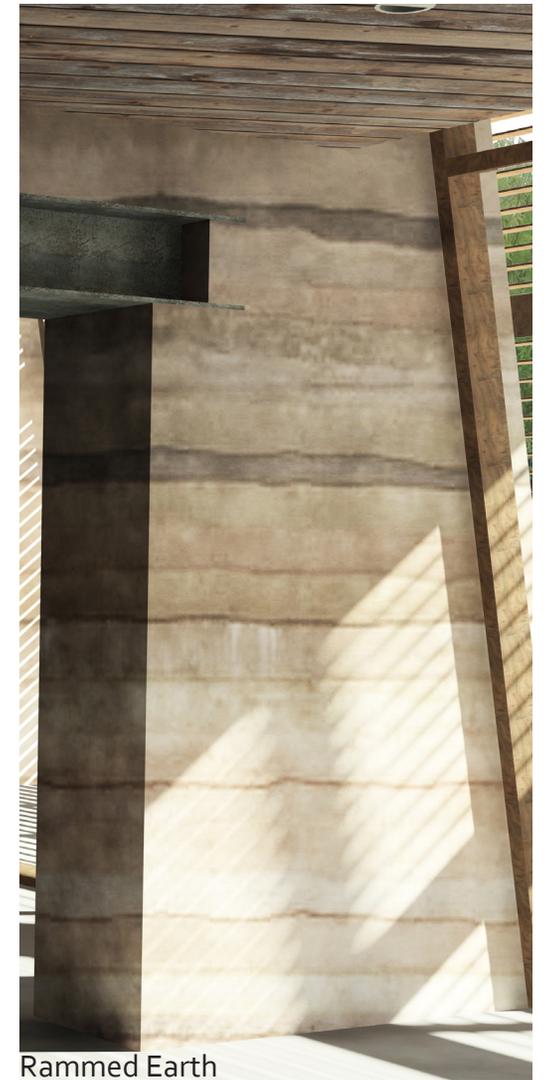
Museum West End Verandah Detail



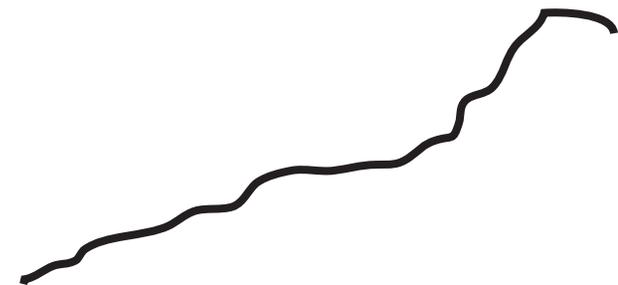
Louver Detail



Lintel Detail

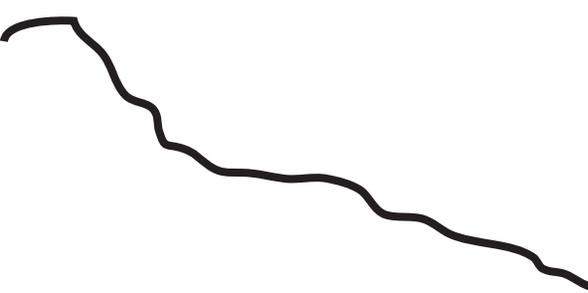


Rammed Earth



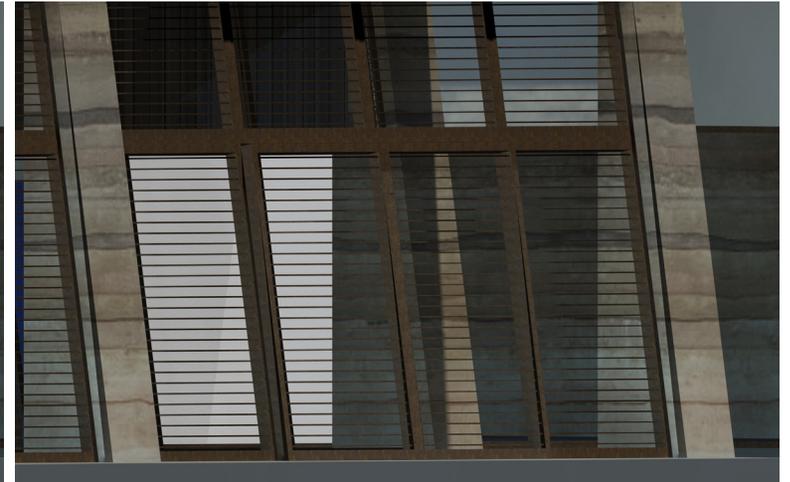
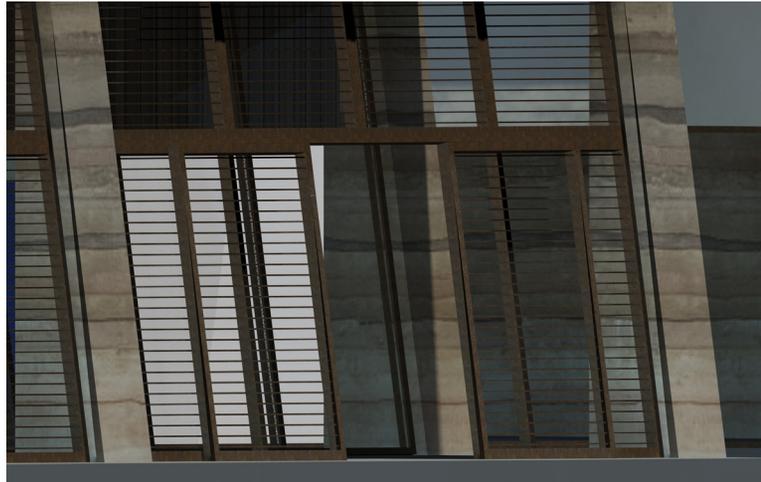
THE COMPONENTS

Planted Roof - Museum

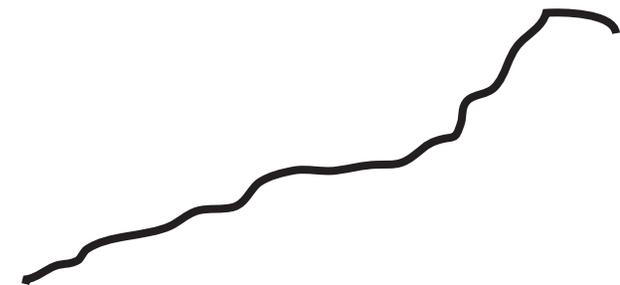
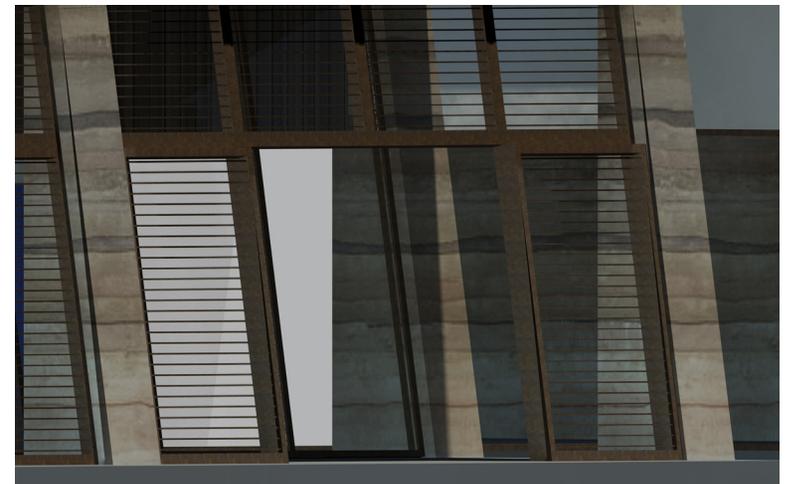


THE COMPONENTS

Museum Louver Panels - Sliding Panel



The louvers at the museum are set in sliding panels as the images here demonstrate. The louvers themselves rotate to fully open and fully closed. They are capable of being both mechanically and manually operated to allow for personal and situational control based on function and time of year.



THE COMPONENTS



Hohokom Round House
This type of structure was used for ceremonies and traditionally was built of saguaro ribs, creosote and mesquite.



Roasting Pit
Shown here with Agave



THE COMPONENTS

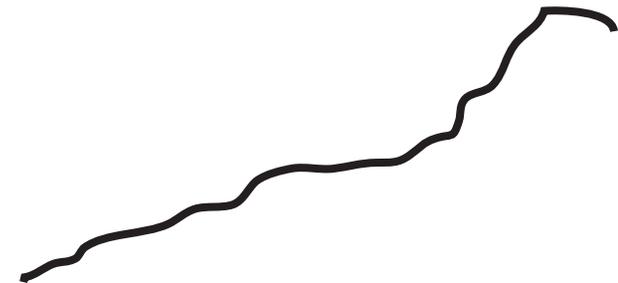


Hohokom Mesquite Tree House
This type of structure was used housing. It is made of mesquite and saguaro ribs.

This structure provided the inspiration behind the exterior reflection spaces that can be found from one end of the site to the other.



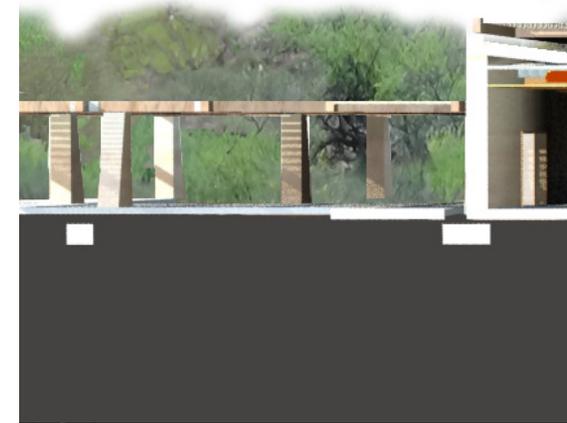
Hohokom Mesquite Tree House
Rib Detail



THE COMPONENTS



Bioswale

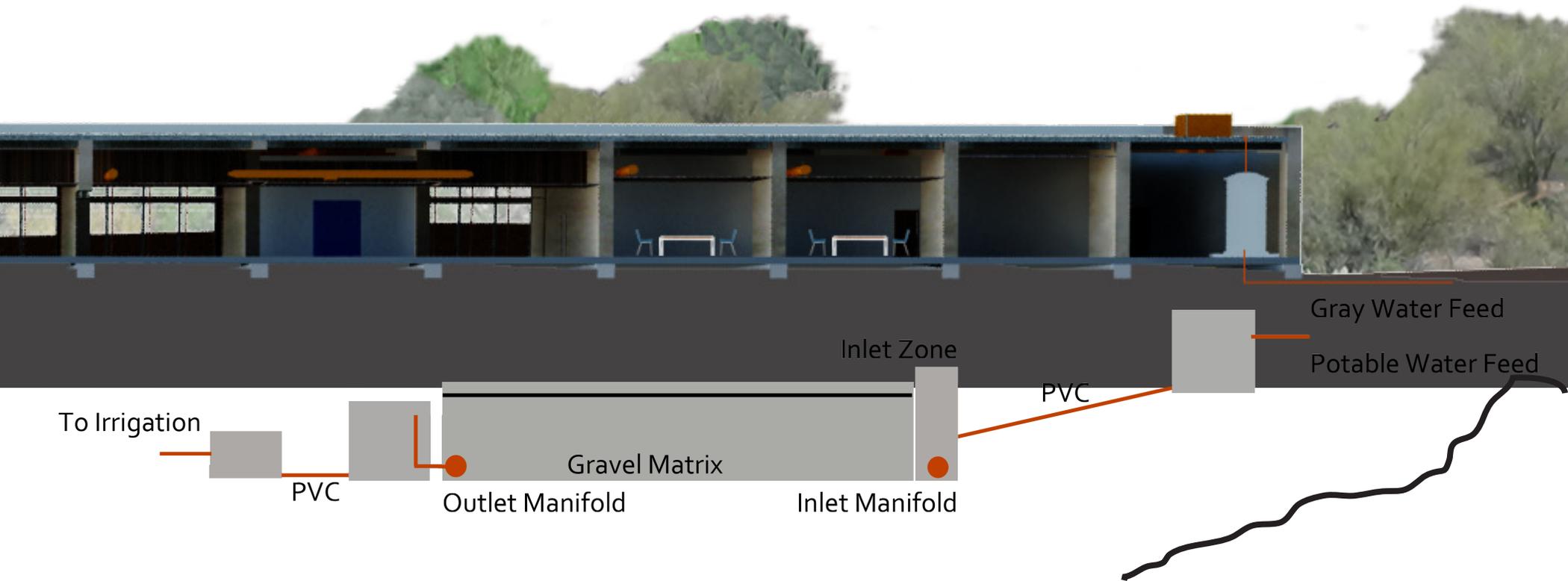


Cafe Section Perspective
Scale: N.T.S.



Museum Section Perspective
Scale: N.T.S.

THE COMPONENTS



THE DESIGN

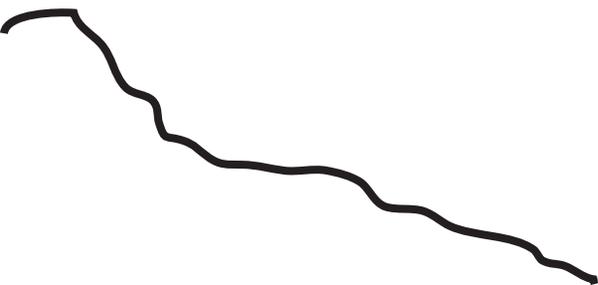
“At the gate of the garden some stand and look within, but do not care to enter. Others step inside, behold its beauty, but do not penetrate far. Still others encircle the garden inhaling the fragrances of the flowers, and having enjoyed their full beauty pass out the gate. But there are always some who enter and becoming intoxicated with the splendor of what they behold remain for life to tend to the garden.”

-Abdu'l-Baha

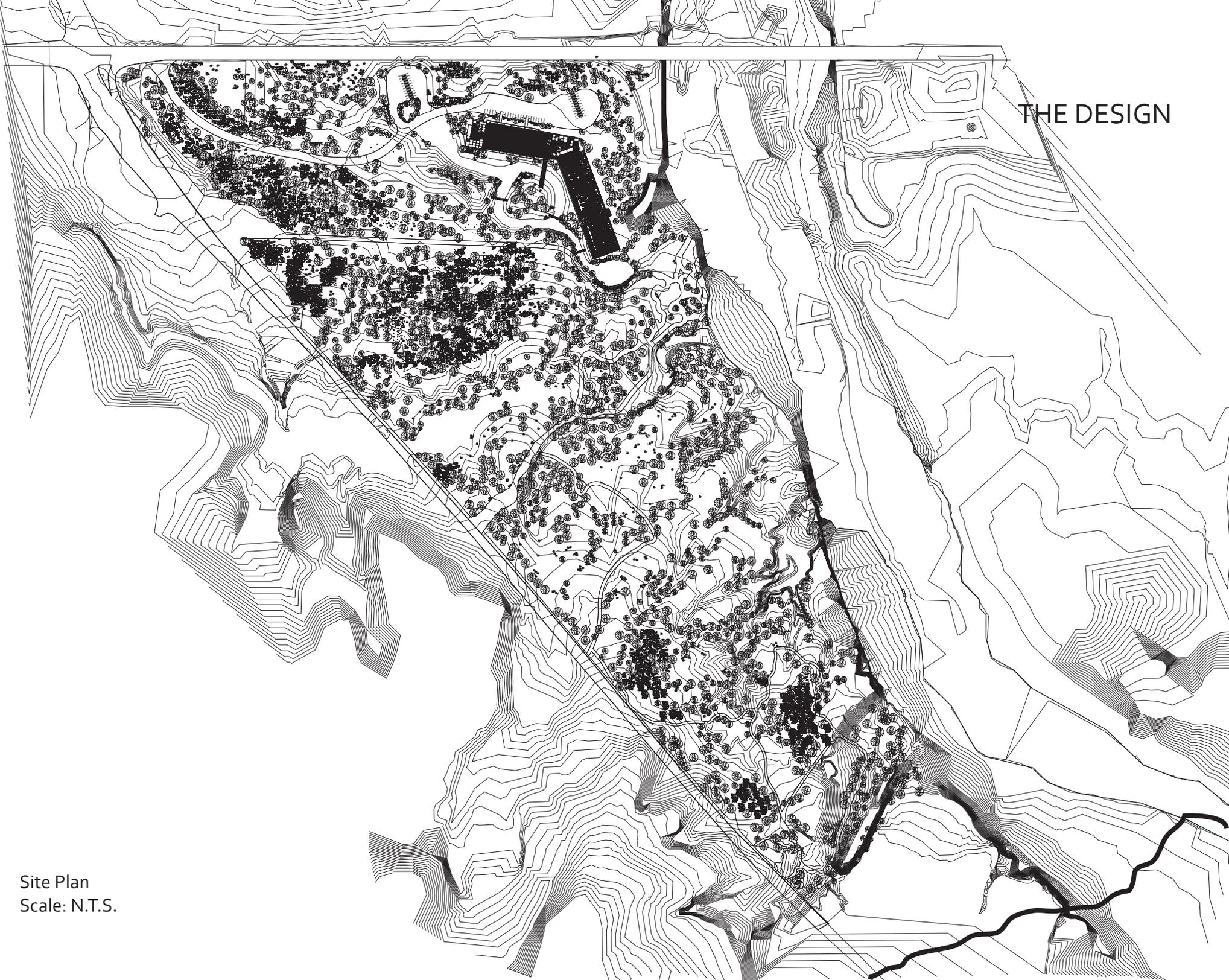
Sonoran Desert
Ecological Boundary



Geographic Location
Scale: N.T.S.

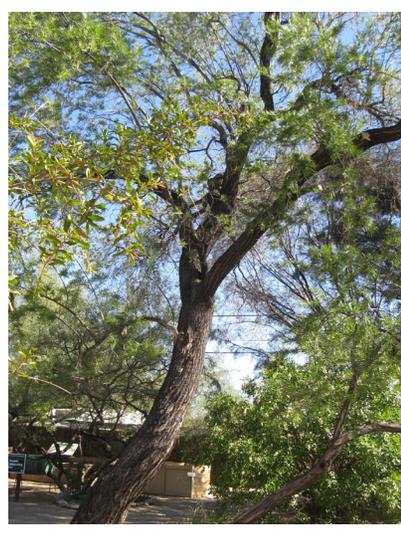


THE DESIGN



Site Plan
Scale: N.T.S.

THE DESIGN



THE DESIGN

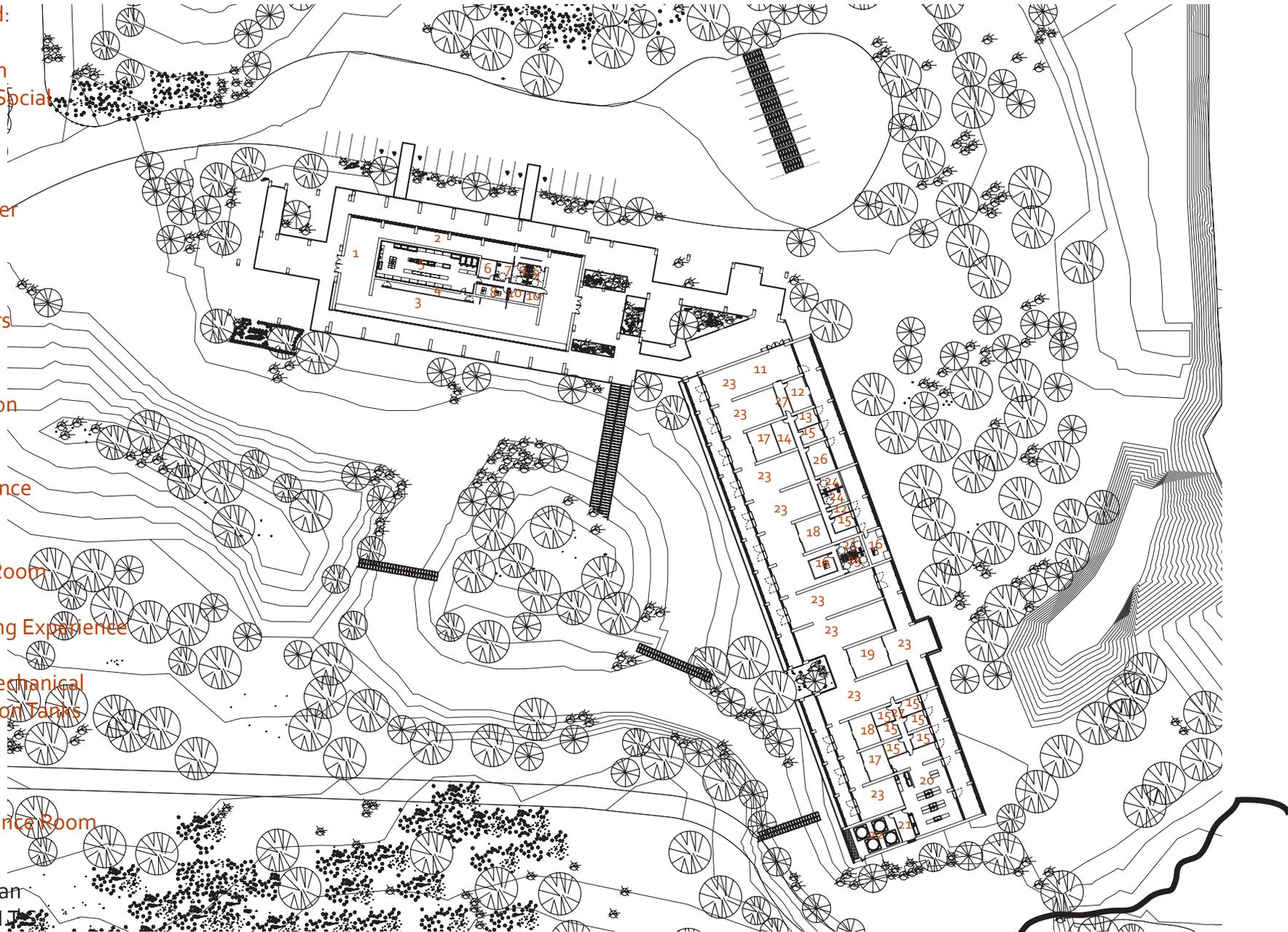
Floor Plan Legend:

Café:

- 1. Entry/Reception
- 2. Casual Dining/ Social
- 3. Dining
- 4. Server Walk
- 5. Kitchen
- 6. Kitchen Manager
- 7. Private Toilet
- 8. Mechanical
- 9. Public Toilets
- 10. Private Lockers

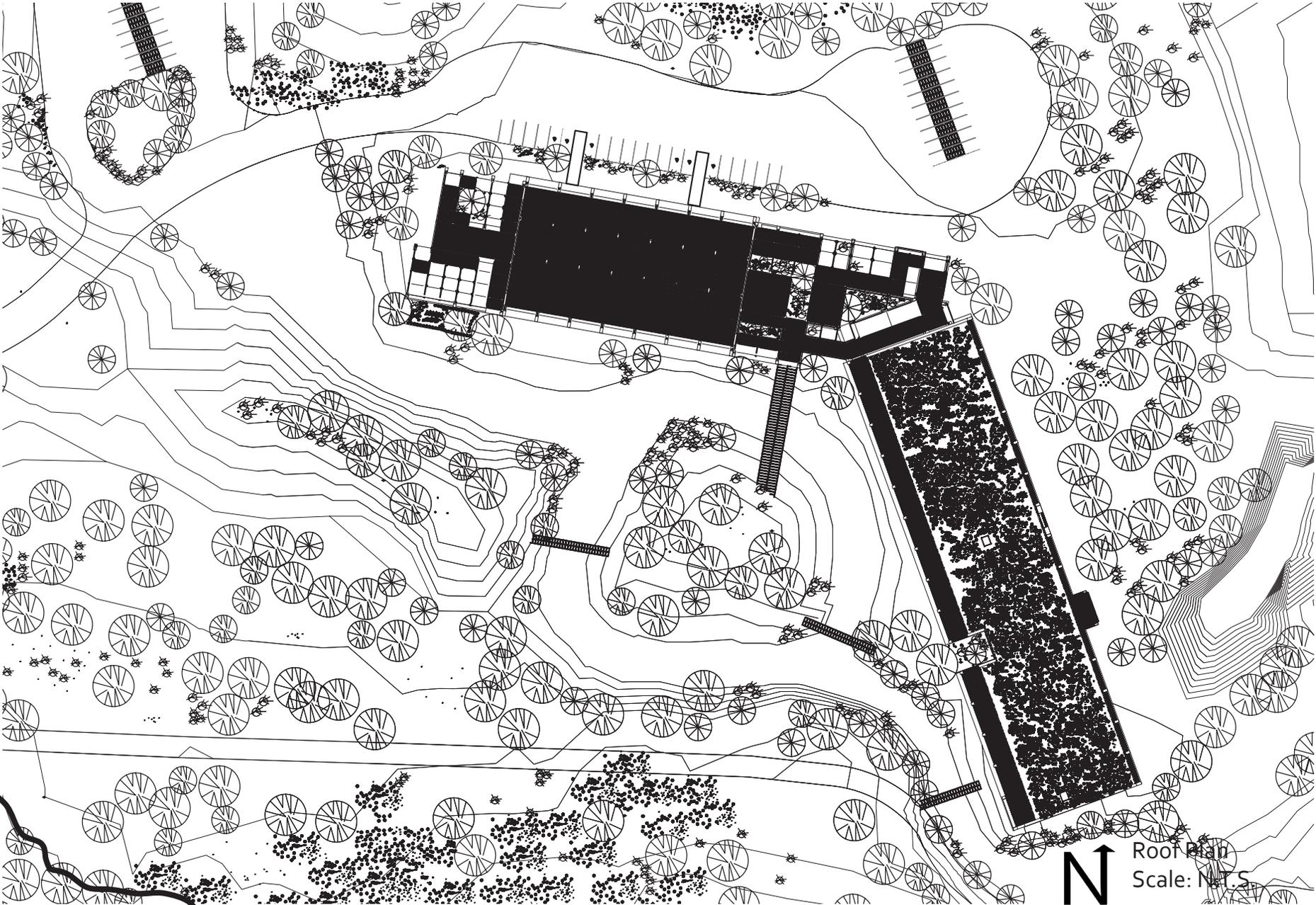
Museum:

- 11. Entry/Reception
- 12. Storage
- 13. Director
- 14. Small Conference
- 15. Office
- 16. Mechanical
- 17. Presentation Room
- 18. Classroom
- 19. Digital Learning Experience
- 20. Laboratory
- 21. Laboratory Mechanical
- 22. Water Collection Tanks
- 23. Display
- 24. Private Toilets
- 25. Public Toilets
- 26. Large Conference Room
- 27. Corridor



Floor Plan
Scale: N.T.S.

THE DESIGN

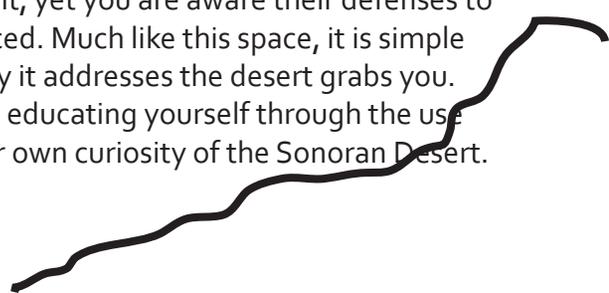


THE DESIGN

One arrives at the site along Ina Road, turning onto a narrow drive that meanders through a desert landscape, only a few feet away from community yet there is a sense of natural existence, another world along your daily routine. Parking is pleasant even in the brutal summer with the shaded protection provided by the solar panels that provide power to the buildings. Walking up you notice the cooling of the latticed wood above, and the introduction to beautiful desert flora. The entrance is inviting, cozy, it is not extravagant, it isn't another café yelling out to you, it whispers, right in front of your face, gently.

The café is an exciting place. There is chatter and laughter and all the dynamics of social exchange. You are interested so to the social side you go. The food is fresh and surprising, a combination of plants grown on site that are indigenous to the Sonoran Desert. It entices you, lush sweet food found here? You must learn more. The pleasant waitress points the way to the museum. As you walk outside you are again greeted with the latticed structure and native plants. You noticed the entrance to the museum framed just so by a blue palo verde and some cacti. You are drawn forward, again it is calm, welcoming, like an old friend.

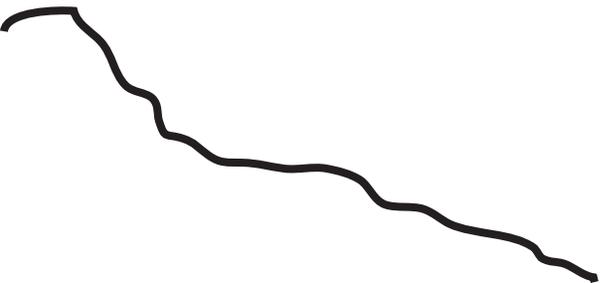
You are greeted with a smile, a guide and are motioned to head to your right. You notice the rhythm of the space, it was nudging at you in the café and now it speaks to you. It calls you through the museum, display by display. The rammed earth walls are warm to look at yet cool to the touch, so natural, so merciful. They embody depth yet you feel youthful and free in their presence. The light keeps you floating, the more time you spend in here the more you feel its life. Changing with every moment, drifting in changing its color with the time, even when the louvers are shut midafternoon in June you still feel the light, you know it is there, a reminder of the sun and the power it has on this place, its harsh hold that the region has accepted. The flora and fauna are almost complaisant, yet you are aware their defenses to the extremes are plentiful and advanced. Much like this space, it is simple and meek, yet the elegance in the way it addresses the desert grabs you. You spend some time in a cozy space, educating yourself through the use of an iPad, directing you through your own curiosity of the Sonoran Desert.



THE DESIGN

When you emerge you are greeted by the desert, you are still inside but here it is with you. You sit and rest, relax and wonder.

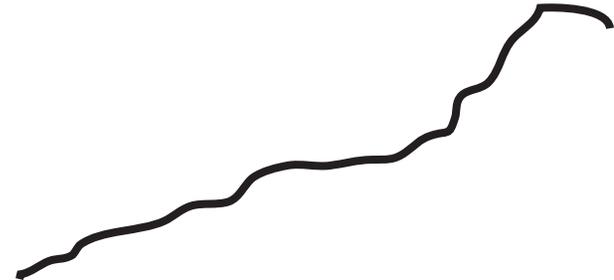
You eventually make your way outside, after having talked to a botanist about the site and the desert. At first it is simple you meander over and around the bioswales and the plant life that is supported here. Then you realize that you must go further you must wander beyond the controlled, out through the site. This is where the transformation happens, at any one of the reflection sites you encounter. It even happens along the path, made by years of abuse left as a reminder that every foot leaves its mark. A reminder that we are all connected, that we cannot survive here without this natural setting, that without conservation everything we love about this place will be lost....



THE DESIGN



Cafe North Verandah



THE DESIGN



Cafe Approach

THE DESIGN



Cafe Entry

THE DESIGN



This view is of the south side of the cafe. To the direct south of this view there is a garden used by the cafe chef. All the plants in the garden are indigenous to the Sonoran Desert and have a long history of being used as food. Some of the species planted in this garden include the barrel cactus, saguaro, velvet mesquite, the red flowered bird of paradise, screwbean mesquite, agave and the prockly pear cactus.

Cafe Social Space



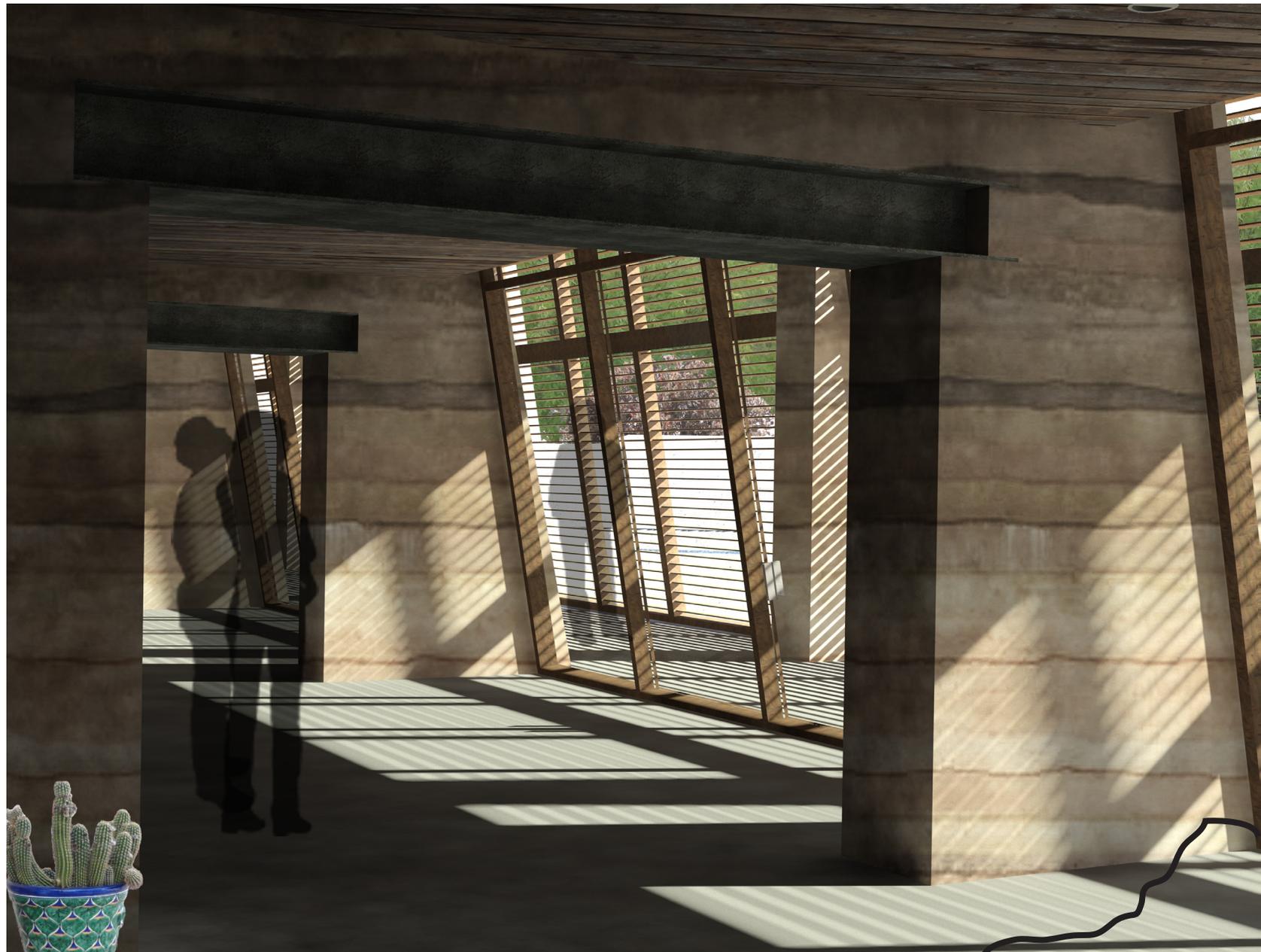
THE DESIGN



View of Museum
Entry from cafe

THE DESIGN

Museum Display



THE DESIGN

Museum Interior
Reflection



THE DESIGN

Museum West Verandah



THE DESIGN



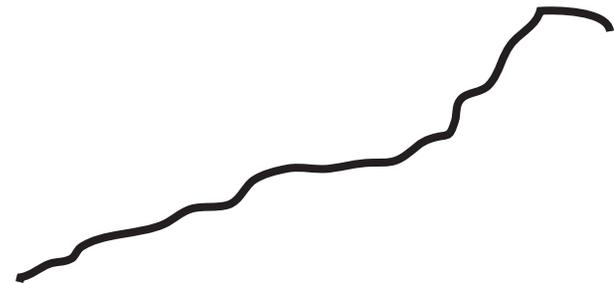
Exterior Refelction
Space



THE DESIGN

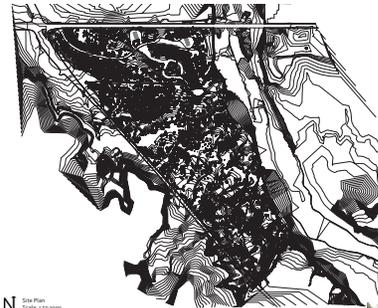


Bird's Eye View from South



The Sonoran Desert is one of the most ecologically diverse regions on the planet. While great measures have been made to conserve what is left of the desert, it is still facing the threat of a second wave of desertification. Its favorable weather, secure opportunities, lower economic, regulatory, and manufacturing costs.

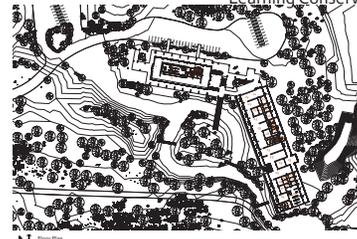
Instead of focusing on conserving outside city limits, this new generation of the Sonoran Desert focuses along the endangered and damaged Santa Cruz River. The new and modern will bring people and their lives to the desert land in an effort to establish a connection that generates a more sustainable way of life in the desert. It is through this knowledge that the architecture must be designed to promote conservation at the individual and community levels will take place. The architecture must be a vehicle for conservation, a means of getting to know the Sonoran Desert ecology to better understand the fragility of the Sonoran Desert.



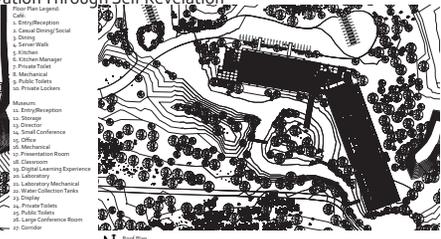
Site Plan Scale: 1/8" = 1'-0"

Geographic Location Scale: N.T.S.

Desert Soul Learning Conservation Through Self Revelation

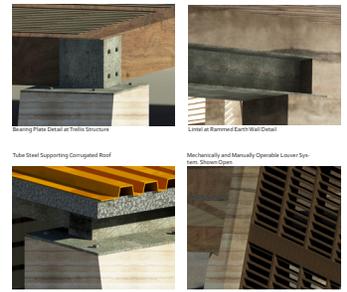


Site Plan Scale: 1/8" = 1'-0"



Site Plan Scale: 1/8" = 1'-0"

- Room Legend
- 1. Energy Reception
 - 2. Great Living Space
 - 3. Dining
 - 4. Kitchen
 - 5. Kitchen Manager
 - 6. Storage
 - 7. Mechanical
 - 8. Public Toilet
 - 9. Private Lockers
- Museum
- 10. Entry Reception
 - 11. Storage
 - 12. Conference
 - 13. Office
 - 14. Laboratory
 - 15. Presentation Room
 - 16. Laboratory
 - 17. Laboratory Mechanical
 - 18. Water Collection Tanks
 - 19. Chapel
 - 20. Private Toilet
 - 21. Public Toilet
 - 22. Large Conference Room
 - 23. Corridor



Living Floor Detail at Table Structure

View of Barred Exposed Steel



Tube Steel Supporting Corrugated Roof



Mechanically and Manually Operable Louvre System - Slotted Glass



Site Section Perspective Scale: N.T.S.

Museum Section Perspective Scale: N.T.S.

To Vegetate

Grand Malibu

Site Material



Site North Section



Architecture has the ability to significantly influence how a person sees and relates to his or her environment. The human connection to nature is one of the most important aspects and reflects an individual's character and the ability to feel nature through their senses.

It is necessary for the future of the Sonoran Desert that we introduce a new natural relationship with the desert ecology in which we live. People cannot save the desert through conventional and sustainable practices if they do not also understand the ecology and learn better ways to inhabit the Sonoran Desert. An architecture that respects and provides for this kind of knowledge is essential to the future of the Sonoran Desert.

Right Reflection Structure



How can people from past cultures of the Sonoran Desert inform and direct conservation and restoration in the future of this region? This examination through the typology of a wall and movement through the psychological and physical connection with the desert ecology.

People affect and react to their environment based on a set of different things to them. To those who possess some knowledge about how to live and connect with the environment. The knowledge people acquire from their cultural and ecological typology in the Sonoran Desert can be used to better guide how they inhabit the region. In order to create a conservation plan towards the Sonoran Desert, man must first reconnect with the desert ecology that surrounds him. Man will be ready to learn once he has related himself back to his surroundings.

Museum Display



Museum Display and Exterior Reflection



Museum Laboratory



North

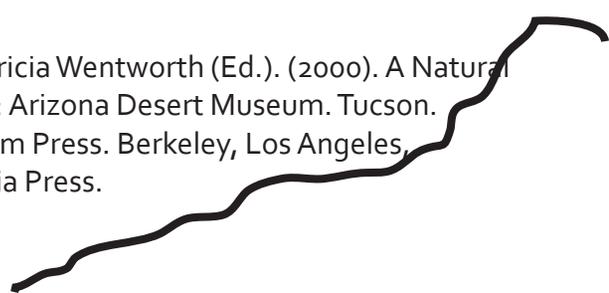
THE DESIGN



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North Dakota State University welcomes and embraces everyone
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