Joining Man and Cosmos

A Pinnacle Observatory in South Fork, Colorado

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

by

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

Primary Thesis Advisor

Thesis Committee Chair

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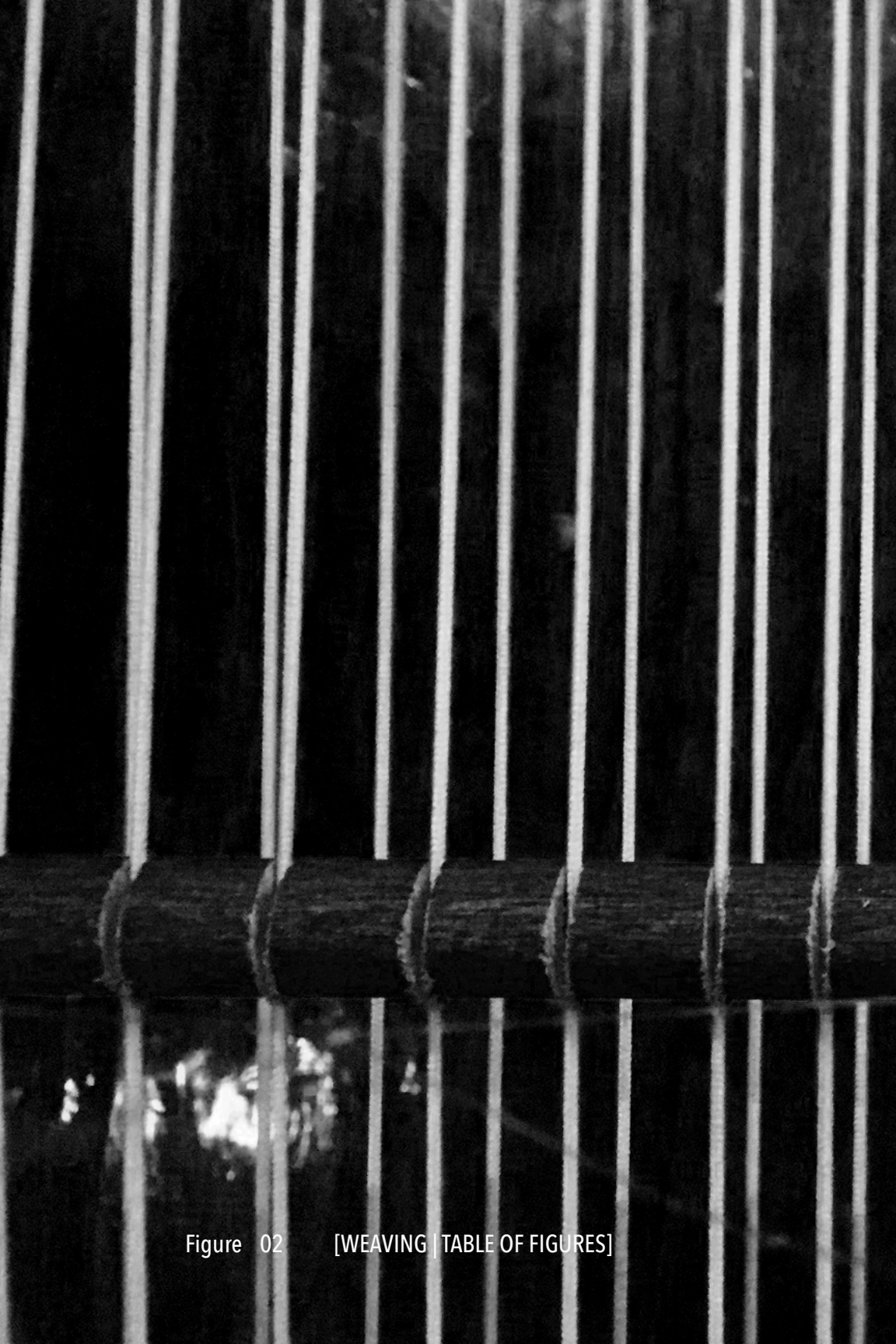

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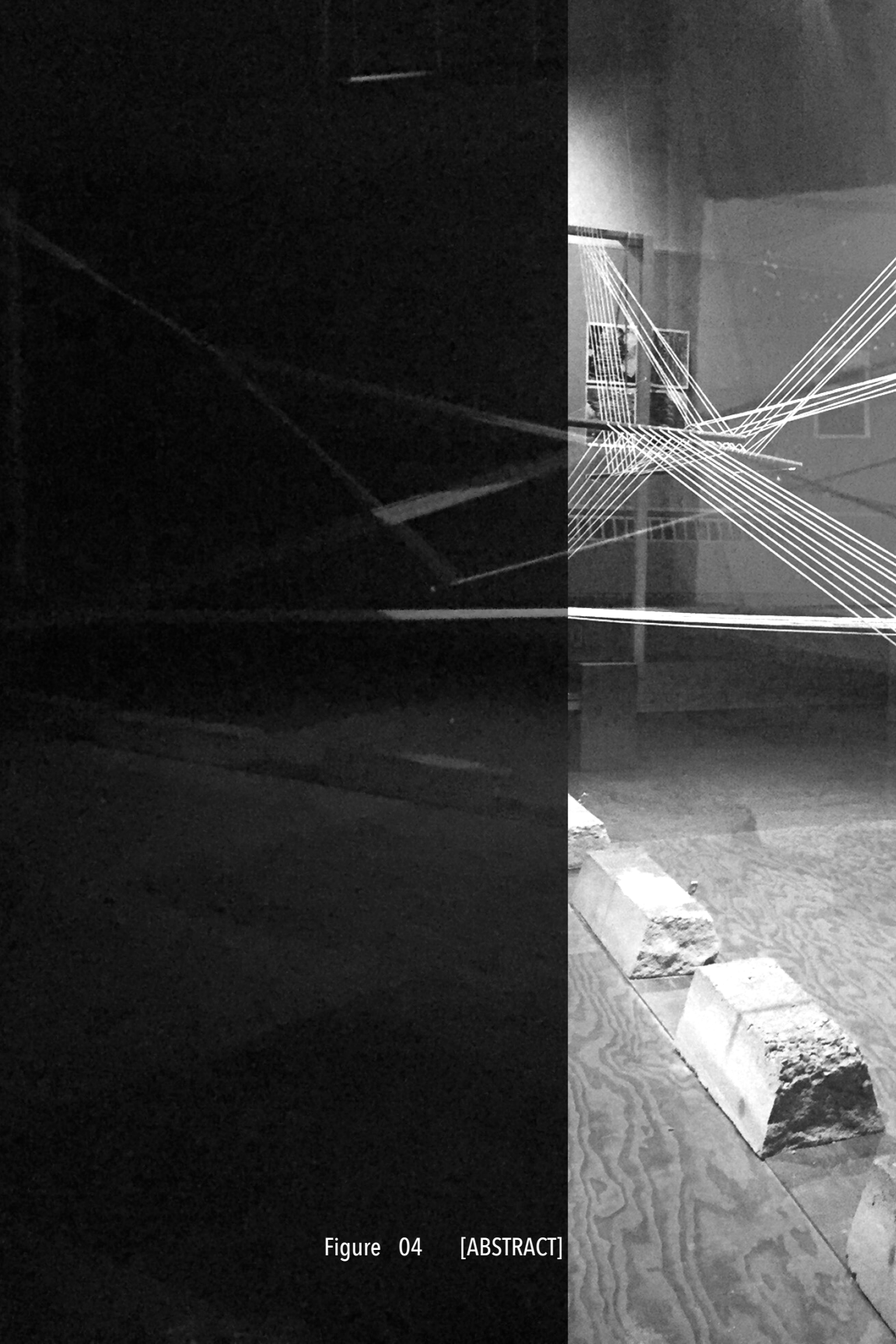

Figure 04 [ABSTRACT]

Thesis Abstract

A fascination in the Cosmos can be traced to time immemorial and has inspired wonder over the ages. This thesis would like to discover a way for architecture to join the space between science and art. Weaving above and below, microcosm and macrocosm, vertical and horizontal, mountain and sky, to locate ones place in the world.

Ancient man weaved self and Cosmos through everything that they thought and did. The native Ute people of South Fork, Colorado spend most of their time in the mountains and believe it was the closest one can get to the Cosmos;[1] where the earth and sky meet. It is the in-between that gathers the fourfold of the earth, sky, divinities and mortals.

Today, technology such as the orbiting Hubble Space Telescope helps man view the farthest reaches of the universe up close. This helps astronomers better understand the science of the universe, but it also distances man from the Cosmos by turning it into a mathematical formula and depriving it of its wonder.[2] Removing the telescope from the Earth and placing it in space displaces man's position. This disconnect creates a lost connection to both the Cosmos and to our ancestors. The masking of the stars from light pollution is another way in which they become an afterthought for modern man.

By placing an observatory in the Mountains of South Fork, Colorado, I propose to rediscover this connection in a new way. It is found through observing planets and stars within a tranquil environment that motivates both artistic and scientific thought.

Highlighting connections between the microcosm and macrocosm will bring man and Cosmos together. Joining the two will also unite the space between art and science for a greater sense of wholeness. Each one of us is made up of elements created from the exploded remnants of stars,[3] making apparent the relationship between humans on earth and the universe, including the spiritual realm of the divine.

The artefact symbolizes the path of walking the line[4] between the Earth and the Cosmos. Through this journey one needs to maintain a fragile balance between one extreme and another. Placing one foot in front of the other creates a rhythm through movement. Breaks in the path create moments where a leap of faith must be taken. A trace of the past, present and future are formed in the stars. The destination is in view, but somehow the discovery along the path becomes just as important.

Together the looms create a wholeness, weaving above and below and closing the space between. Similarly, the observatory will weave man and the Cosmos.

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1 The Utes most sacred site is at Pike's Peak because its high terrain

2 Didier Ottinger, Contemporary Cosmologies, from Cosmos (The Montreal Museum of Fine Arts) p. 286

3 According to Americal Physical Society, 93% of the mass in our body is stardust.

4 Walking the line defined by the Urban Dictionary is described as a balance between two extremes

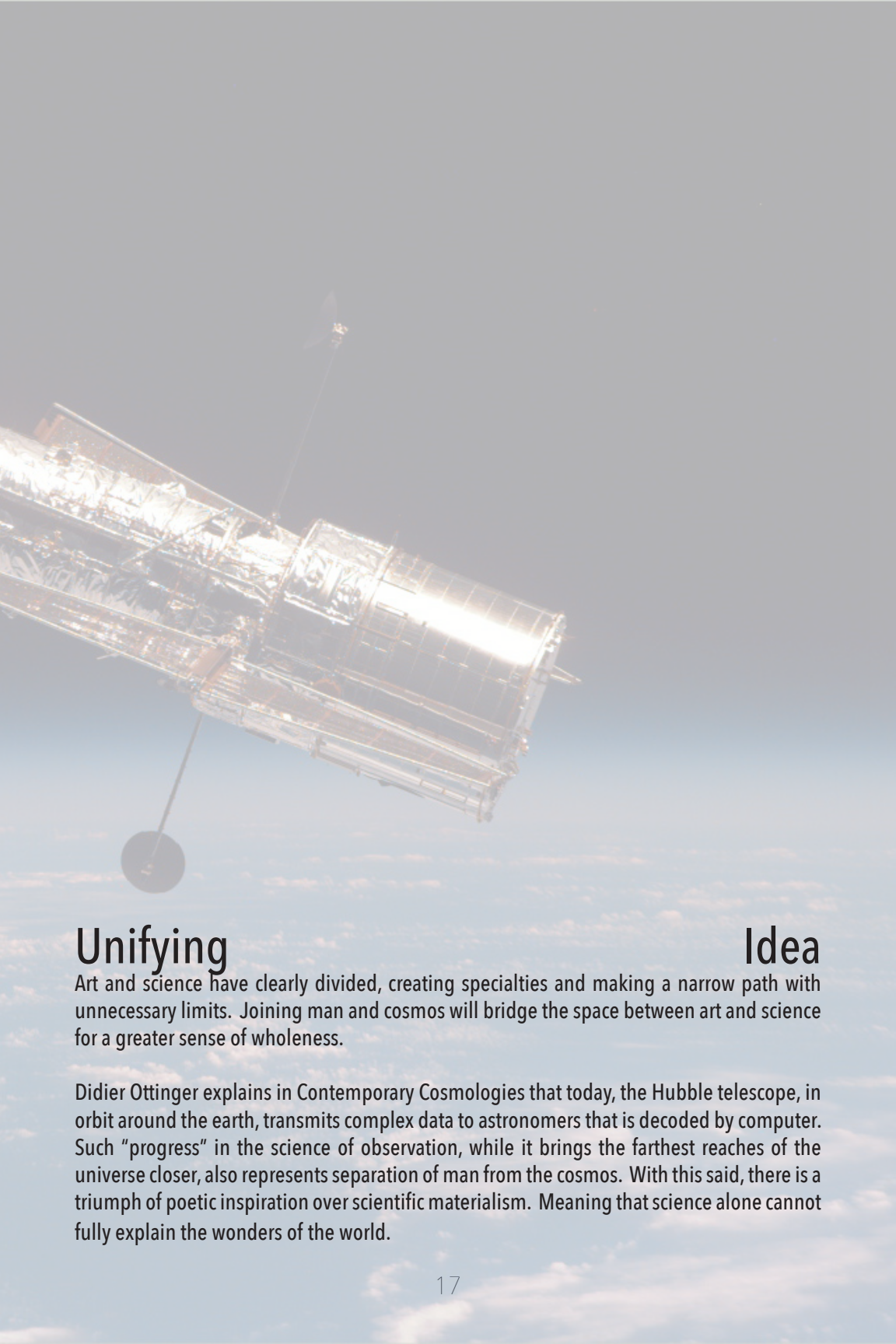
Narrative

Figure 05 [NARRATIVE | VIJA CLEMINS]

Unifying Idea

This thesis discovers how architecture may join the space between science and art. An observatory is a lookout; a building that can be used to see natural phenomena, a study center, it holds powerful equipment for observing planets and stars. To me it is just as much a place for art as it is for science. As an observatory the architecture will become the micro and macrocosm in relation to the world today and how the participant can reflect beyond self. This idea is not new, and can be traced back to the beginning of man.

Figure 06 [HUBBLE TELESCOPE | DIVISION]



Unifying Idea

Art and science have clearly divided, creating specialties and making a narrow path with unnecessary limits. Joining man and cosmos will bridge the space between art and science for a greater sense of wholeness.

Didier Ottinger explains in Contemporary Cosmologies that today, the Hubble telescope, in orbit around the earth, transmits complex data to astronomers that is decoded by computer. Such "progress" in the science of observation, while it brings the farthest reaches of the universe closer, also represents separation of man from the cosmos. With this said, there is a triumph of poetic inspiration over scientific materialism. Meaning that science alone cannot fully explain the wonders of the world.

I n t r o

Figure 07 [JACOBS LADDER | AS ABOVE SO BELOW]

Historical Context

Retracing an historical account of relationships between man and cosmos, Hermes Trismegistus considered the father of the "hermetic" arts, proposed the visual relationship and invisible connection between the microcosm and the macrocosm in the statement, "As above, so below."[1]

This relationship referenced is in many religions all over the world and is a part of many different traditions, such as metaphysics, alchemy and ceremonial magic. The main concept being that God(s) is reflected in the self and man is in the middle uniting both sides. For example, Jacob's dream is a biblical story that is found in the book of Genesis. As Jacob lays down to rest, he dreams of a ladder or stairway between earth and heaven. God's angels were on it ascending and descending. God speaks to him in this dream. And when Jacob awoke, he believed that this place was the gateway to heaven and made a commitment to believe in Lord as his God.

1 Hermes Trismegistus was a greek God who was known for his mystical visions, cosmogony and the secret sciences

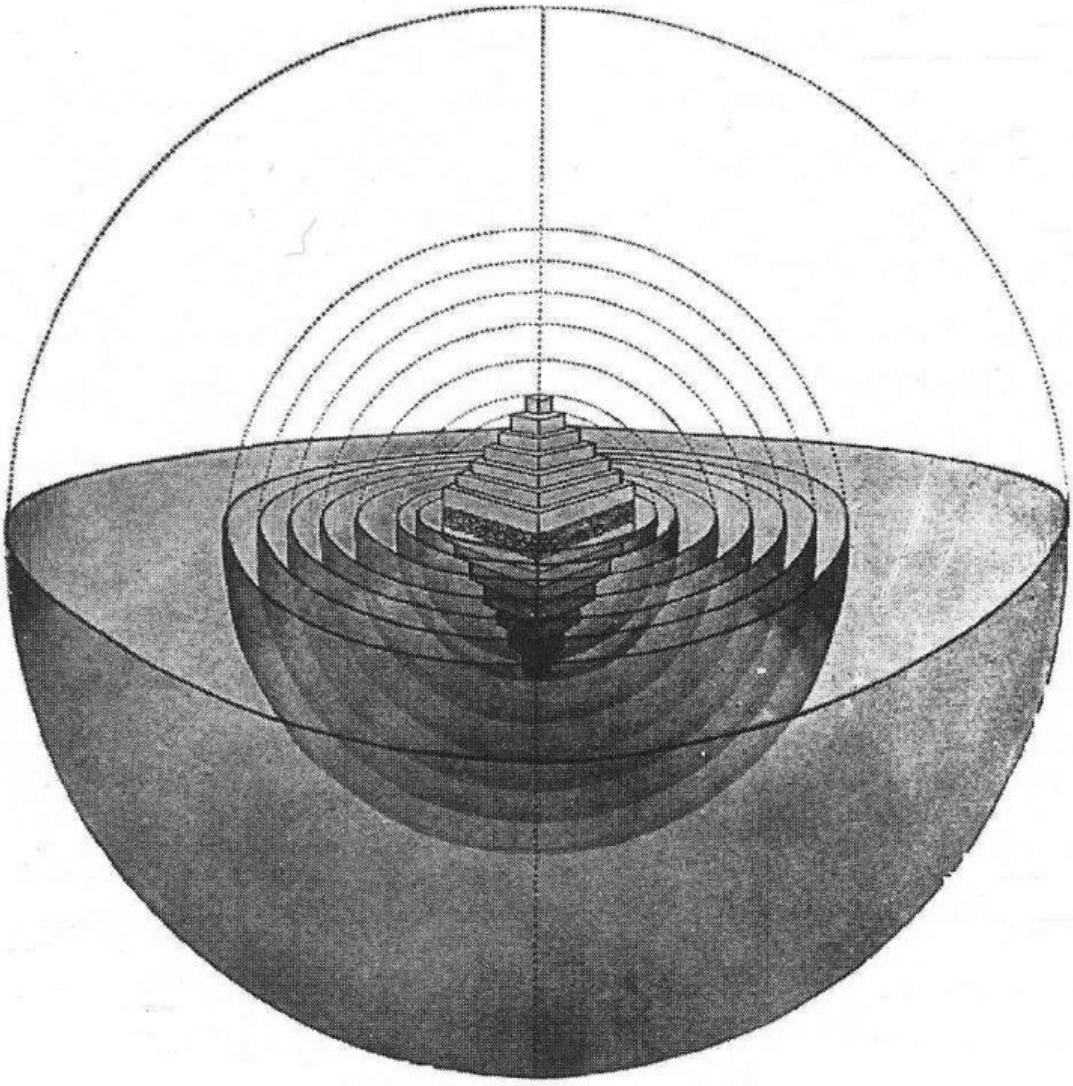


Figure 08 [STEINER'S RELATION OF HUMAN TO COSMOS | MODEL]

As Above So Below

Dalibor Vesely writes about the foundations of modern architecture and compares man's relationship with the world through time, stating, "As a result of the eighteenth century, the vertical articulation of the world subordinated to a horizontal articulation."[1] Form and formalization dominates modern architecture. An oscillation is occurring between the real and the imaginary. A paradox occurred between architecture and other visual arts as well as art and science. Vesely argues that architectural elements should be assembled to create a whole, both horizontally and vertically. This articulation composes an entire building; the microcosm makes up the macrocosm.

In a lecture by Rudolf Steiner, he talks about man and Cosmos in relation to a horizontal and vertical experience. The horizontal experience is one of perception that runs parallel with the Earth. Steiner uses the example of when we study human beings. The ways human beings are studied follow the direction of outside to the inside. When we study a corpse, it is no longer the whole living being. He describes it more a residue of what was once whole. The living being is no longer corresponding to the personal existence to its bones, muscles and nerve structure. Steiner then relates it to how man digs a hole into the Earth to try to study it. He states, "The closed Earth influences the human being standing upon it, differently from the things which exist in such a way that when the human being stands upon earth, he beholds them through his sense, as the Earth's environment." The Earth and Cosmos' influence upon man is in a vertical relationship. The Earth contains many metals that rise up from its insides. The connection with the Cosmos is able to show the divisions of time descending from above. Man is able to gazes upon the chronological order of time.

1 Vesely, Dalibor Architecture in the Age of Divided Representation, (MIT-press, 2004) p.175

Figure 09 [EARTH AND UNIVERSE | MODEL]

Relating Science and Art

Didier Ottiner writes about "Harmonious Spheres" and is comparing art and science through time. During the 17th century, humanistic culture alone could harmonize art and science to all created things. Leonardo da Vinci defines harmony as seeing man composed of Earth, water, air and fire. The same composition of man is found in the Earth. The 'music of spheres,' mentioned by Pythagoras, also proves "harmony between musical intervals and the positions of the celestial bodies, with the planets in their orbits like notes on a staff."

It is through these historical understandings that I may base my research and further extend mans relationship to the earth and sky. Through time one has wondered and studied the relationships between all the halves that make us whole. Separation that has occured should be taken into consideration but also understood that there is never complete separation in how humans begin to understand the microcosm and macrocosm.[1]

1 Ottinger, Contemporary Cosmologies, from Cosmos (The Montreal Museum of Fine Arts) p. 286

I n t r o

Figure 10 [COLOGNE CATHEDRAL | SKYLINE]

The Cologne Cathedral

According to Barbara Schock-Werner (and many others) Cologne Cathedral took over seven centuries to build, which shows the dedication and inspiration by the original plans and strength in the communities Christianity. By some, it is believed that it can only be completed by God. The Cologne Cathedral brings the cosmos to earth using light and expressing outstanding universal value i. When inside, the horizontal space seems more confined and dark, but the light from the clerestory feels infinite when looking up. It is a symbol in the city and can be seen from a great distance with the spires immersed in the sky.

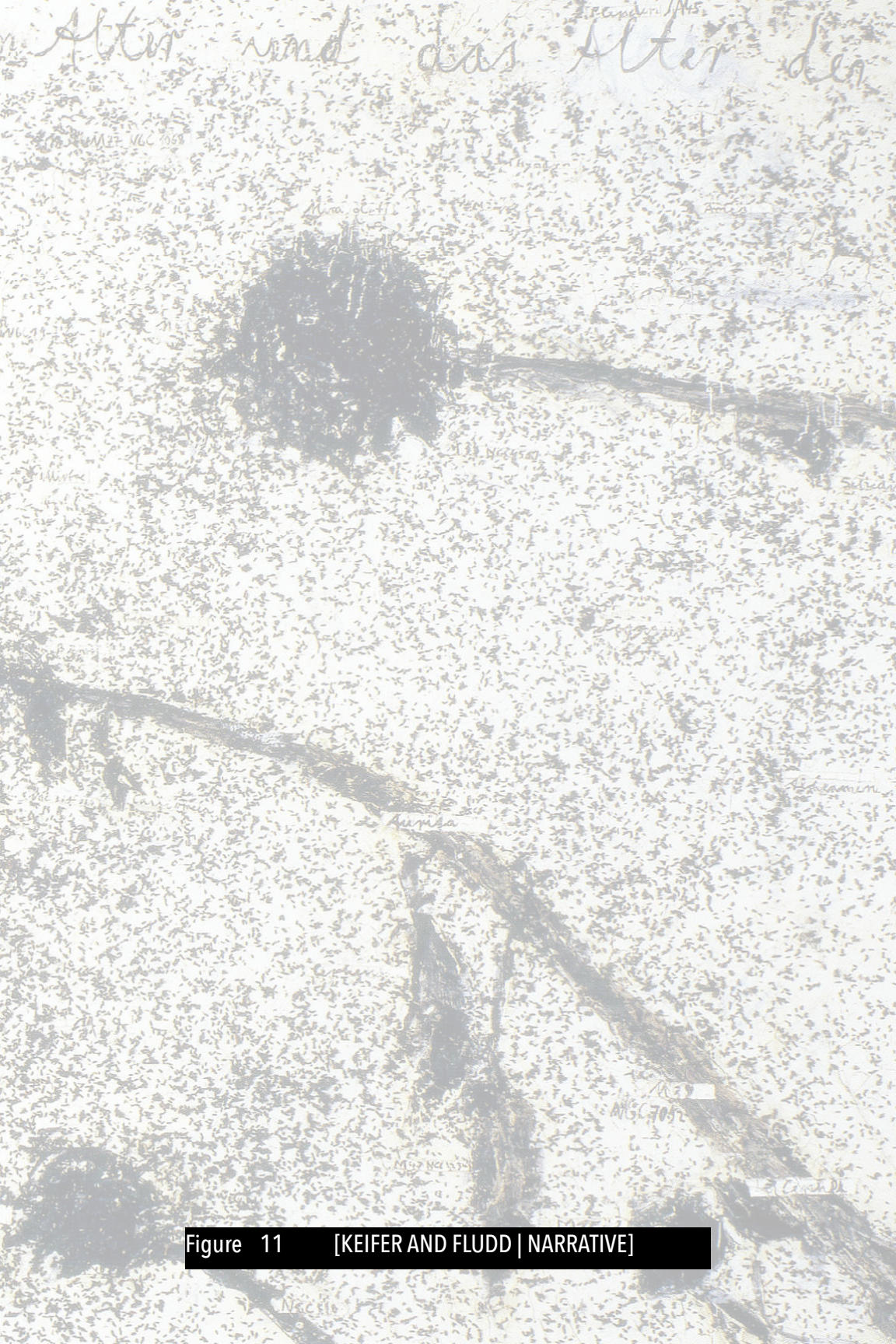


Figure 11 [KEIFER AND FLUDD | NARRATIVE]

Another prominent example ventured by Ottinger is Robert Fludd, a respected English physician, mystical philosopher and Rosicrucian, who wrote under the influence of Paracelsus' Hermetic and Neoplatonic ideas which discussed a universal range of topics from magical practices such as alchemy, astrology and fortune telling to radical theological thinking concerning the inter-relation of God with the natural and human worlds.

Fludd's most famous work is the History of the Two Worlds published in five volumes. The two worlds discussed are the microcosm of human life on earth and the macrocosm of the universe, which includes the spiritual realm of the divine. Fludd elaborated on Hermes Trismegistus's concept, "As above, so below," declaring that everything on earth has an equivalent star in heaven.

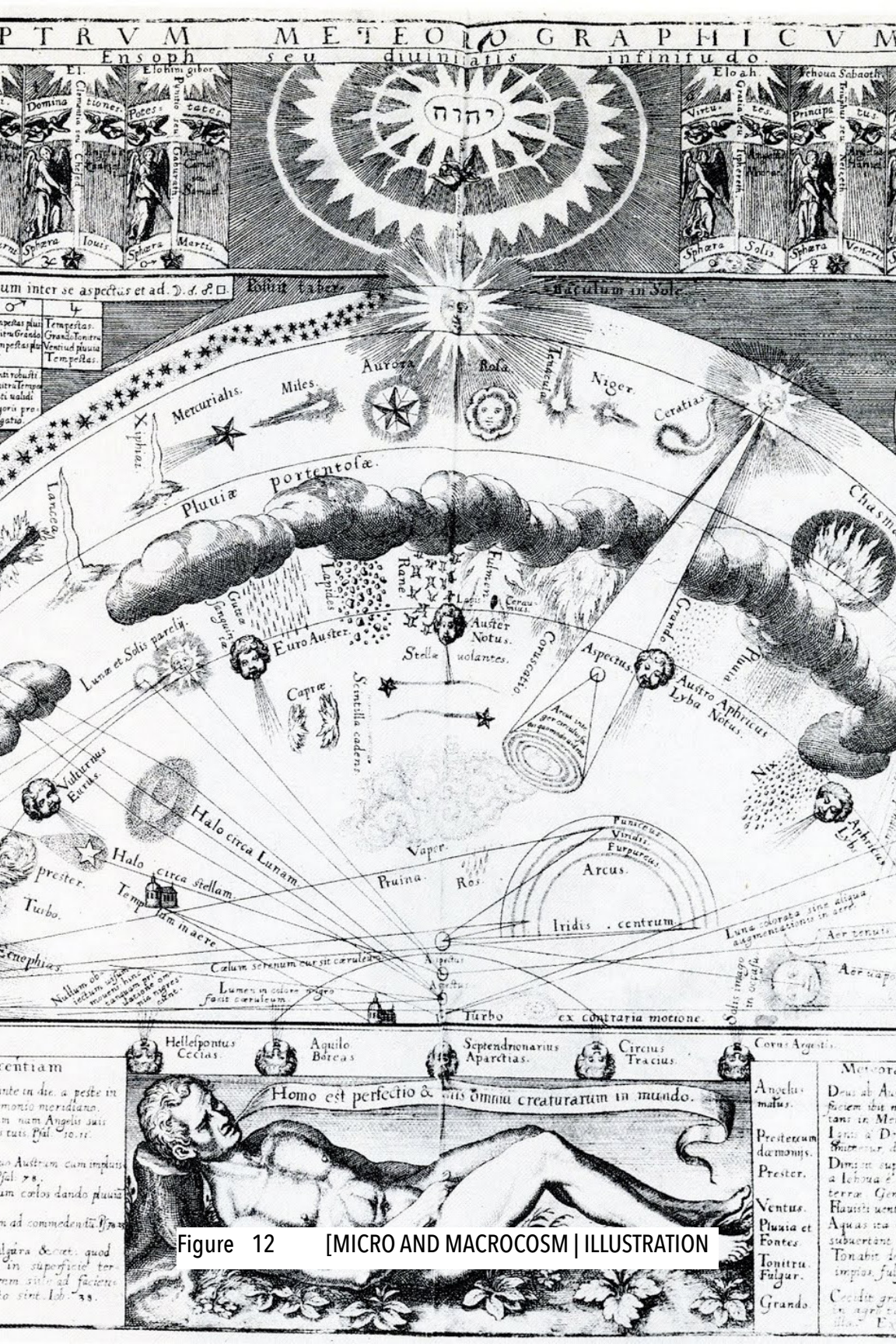


Figure 12 [MICRO AND MACROCOSM | ILLUSTRATION

Robert Fludd

Robert Fludd [1574-1637] held great interest in the origins of the cosmology. Fludd creates a concept of the microcosm and the macrocosm to better understand the world, depicting a non-linear approach, meaning everything is a microcosm and macrocosm. For example, man is a microcosm to the cosmos, but a macrocosm to the cells of the body. In all realms of creation there is a hierarchy and for Fludd, it is the Sun, which is placed at the center where balance is found. The beings of angels, stars, planets, man, plants and minerals are held within a structure that corresponds to light. In his illustration, "Historia," Fludd shows the macrocosm that God had manifested and the creation story that "from God all things did flow and spring," through his mind and was brought into existence.[1] Another important concept from his book is light, which is divided into parts from the highest purity in the heavens and lower existing among the stars, water, air and earth.

As Fludd continues to write on the concept of micro and macrocosm he includes the Pythagorean concept of the music of the spheres. The universe becomes one musical instrument that is created from the paths of planets, which stand as chords or stings. The illustration that matches this shows the Sun at the center with different circles representing different notes creating an order of the world. Through this order there is a harmony presented in the Holy Trinity.

Focusing more on the microcosm, Fludd proceeds to look at man and his position between the Holy Trinity. The pure soul can rise and be guided by the rays of wisdom to recognize the path. Heaven and Earth have their counterparts in the body as a circle, where the center is the organs of creation, bound man.

In my thesis project I will connect the microcosm and macrocosm in relation to my site, architecture, and mans experience. The native people of Colorado, known as the Utes also had a deeper connection to their surroundings than I feel people have today. When one begins to weave the microcosm and macrocosm, man will better understand placement of ones self. The idea of going on a voyage to learn more about the world, the particular place and ultimately ones self is something that I have always found interest in and is what I hope to achieve in my thesis project as an observatory.

1 Fludd, Robert. Utriusque Cosmi Historia.(Kessinger Publishing LLC, 2010)

Program Research

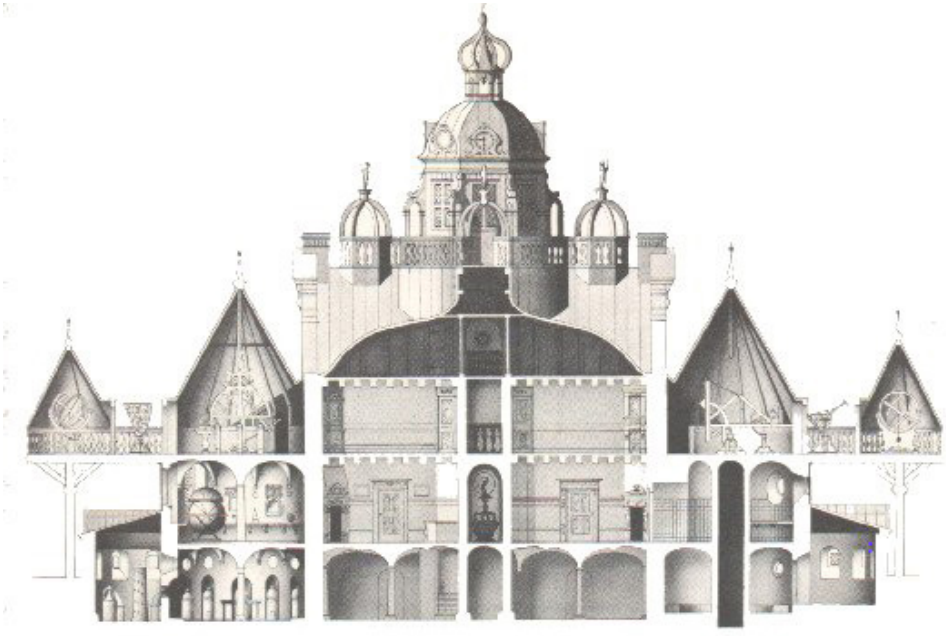


Figure 13 [URANIBORG | SECTION CUT]

History

Optical observatories have a long history and can be traced back to ancient man. These structures were used to track patterns of the sun and moon to distinguish time and are used as a calendar of the worlds cycles. The first observatory is believed to be built about 150 B.C.

Uraniborg was built in 1576 in Sweden by Tycho Brahe.[1] Brahe studied astronomy and is known for his discovery that the heavens extend beyond the moon. This observation was declared when he first saw a supernova and later was measured in relation to a comet in 1577. Uraniborg was the last observatory built without a telescope as its primary instrument.

Observatories in the 18th century included an observers' chair, a telescope ladder, writing desks, chart chest, library and a fine round table as the centerpiece of the observing room.

Relevance

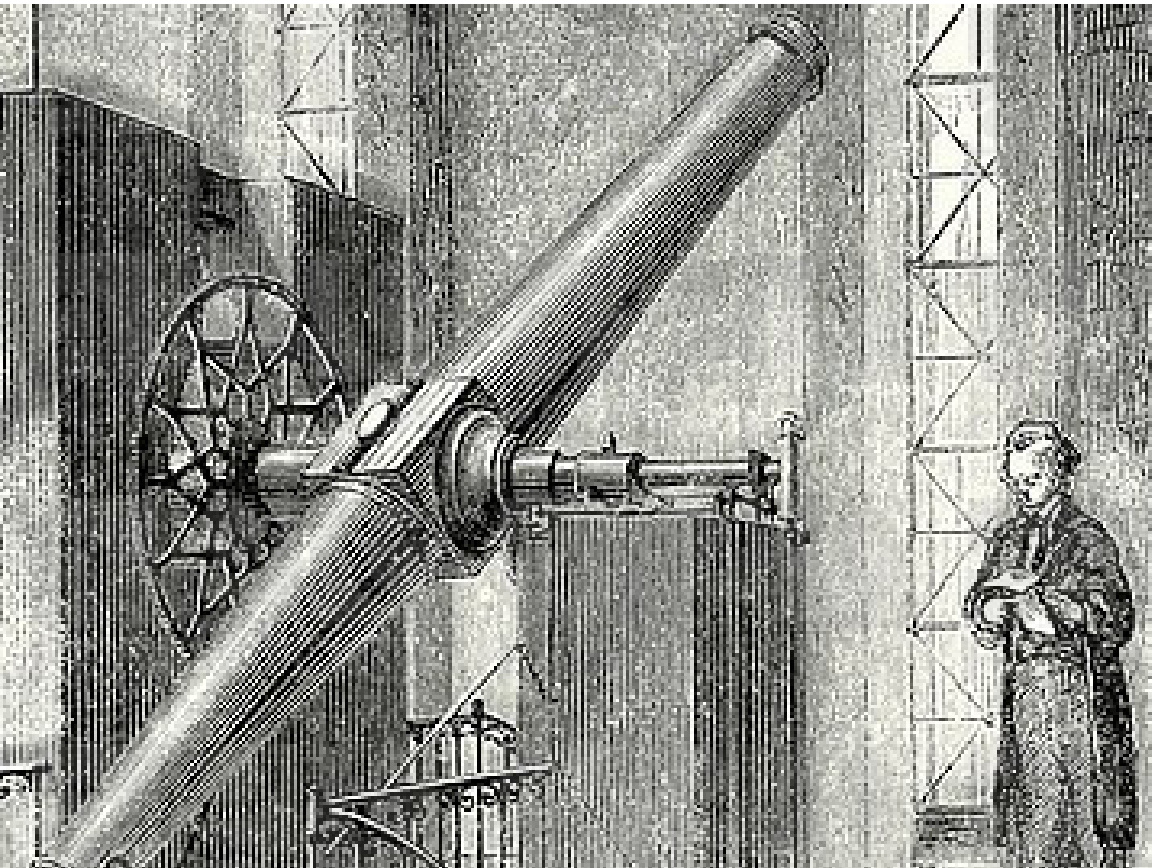
An observatory is something that has been with ancient man and is part of modern man today. It is a place where we can learn about the many layers to our world and relate to how man has come to be.

Purpose

Although we may have a calculated system for time and have a calendar observatories are still useful today because we can learn about the stars, planets and other natural phenomena in a way that merges art and science.

1 Ottinger, Contemporary Cosmologies from, Cosmos (The Montreal Museum of Fine Arts) p. 282

Figure 14 [PARIS OBSERVATORY | SECTION CUT]



The Paris Observatory is one of the largest astronomical centers in the world, designed by architect Claude Perrault who was one of the first to transform the history of interpretation into arbitrary taste and a system of calculations. From 1667 until now, the Paris Observatory is filled with scientific and technological heritage. Its history is that of its scientists, research, instruments, buildings and archives. The observatory has evolved as needed, adding many additions, but still being used to help further understand the cosmos. Today it is primarily used through the public university as a solar observatory and radio astronomy observatory.

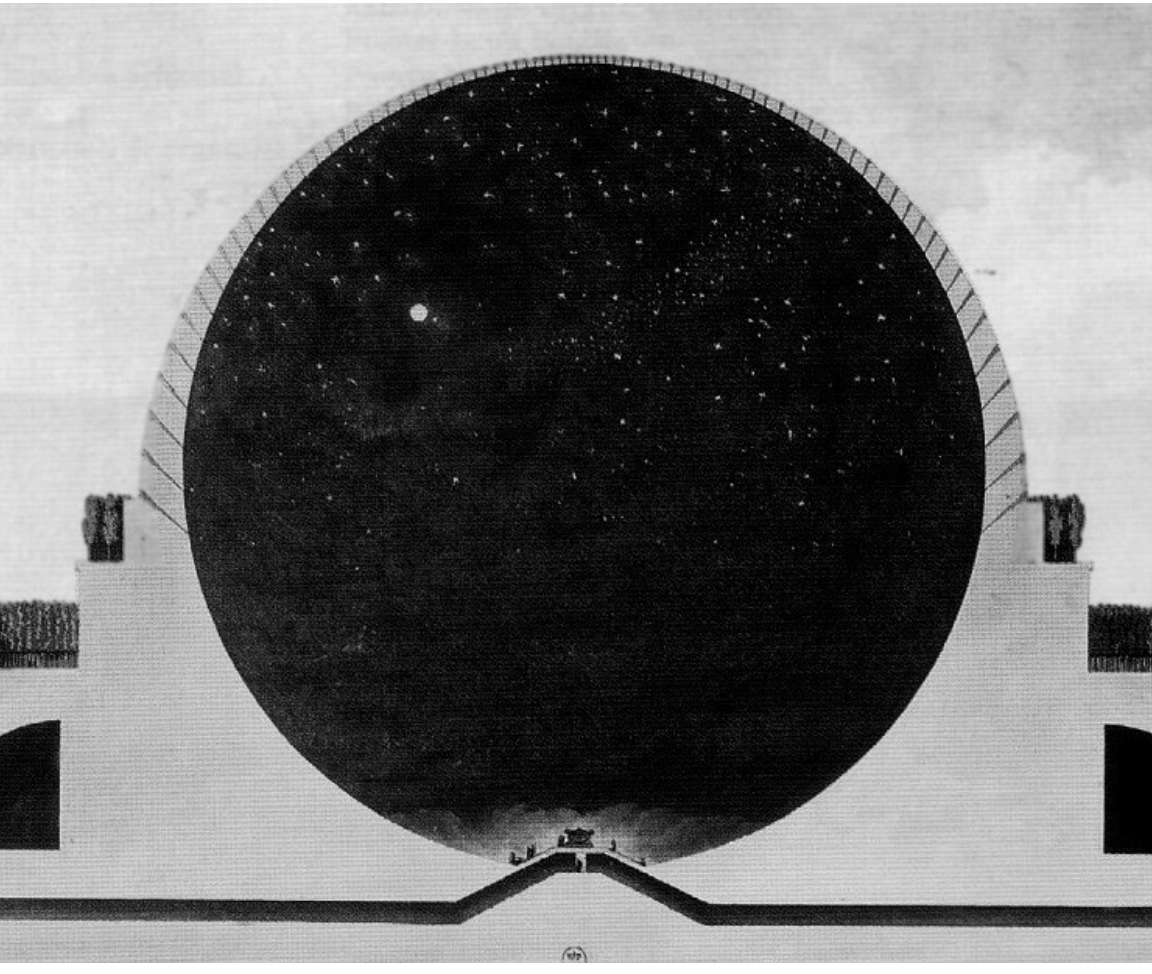


Figure 15 [BOULEE | SECTION CUT]

Unlike Perrault, Étienne-Louis Boullée grounds architectural theory with the simple order of nature. The platonic spherical spaces symbolizes the infinity of the universe and cosmos. Pure fundamental forms were explored in search of the truth and universal validity. Boullée designed architecture that expresses purpose; architecture parlante, which was essential in the polarity of his work.

Boullée proposed a cenotaph for English scientist, Isaac Newton, that was a 500 foot tall sphere with two teirs where hundreds of cypress trees cirlcled the building. The design of the memorial creates an effect of day and night, through the effect of illumination of sunlight coming through the holes in the vaulting.

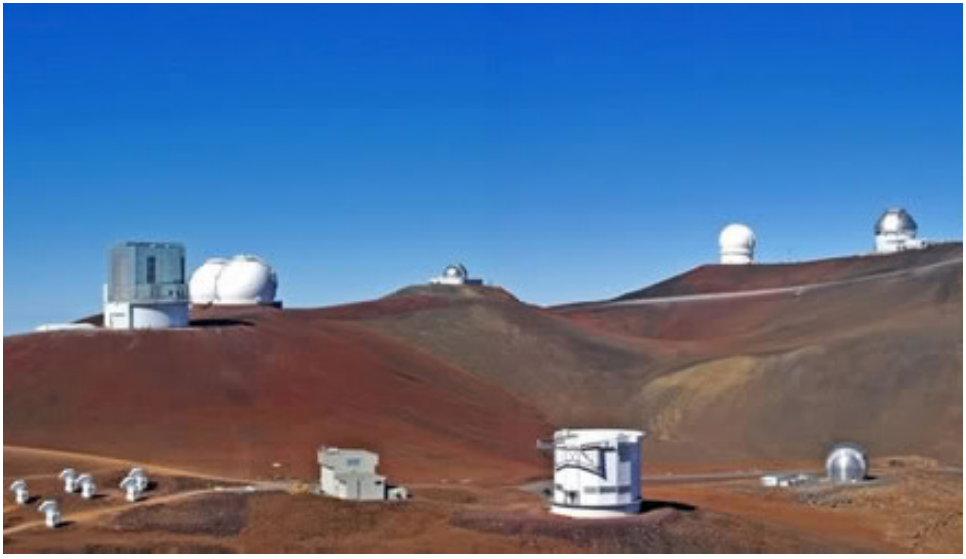


Figure 16 [MUANA KEA KEA | OBSERVATORY]

Figure 17 [TAO | OBSERVATORY]

Historical Context

An observatory is a place for observing terrestrial or celestial events. Historically, they were created to measure distances between stars and alignments with astronomical phenomena. Observatories are known to have telescope domes that have an opening in the roof and can be rotated to allow for different views of the night sky. The ideal locations for modern observatories are places that have dark skies, high elevations and a large percent of clear nights per year. The highest observatories are located near a summit of a volcano in Hawaii, Mauna Kea Observatory and University of Tokyo Atacama Observatory on the remote mountaintop in the Atacama Desert of Chile.

The Mauna Kea Observatories have thirteen working telescopes near the summit. Nine of them are for optical and infrared astronomy and the remaining are for radio astronomy.[1] Mauna Kea has one of the highest averages of clear nights per year, which makes it an ideal location. A tropical inversion cloud layer below the summit isolates the upper atmosphere from the moister in the lower atmosphere. The summit skies are dry and pure.

The Atacama Observatory in Chile observes the cosmos, galaxy formation and star formation. It also reveals evolution histories of galaxies and its clusters. There is one telescope that is designed to be similar to the Subaru (one of the telescopes in Hawaii). There were many tests done through a total of fourteen different sites to see which one would be best suited for an observatory for the university of Tokyo.[2]

More specifically to my site and its history and culture, there are plenty of historical and forms of recreation that is for the public. A sign labelled, "A Passport Through Time," greets you on the pathway to the visitor center. This sign had lots of information alone that instilled my research and helped me place an observatory in this town with a clear view. There are major events through time that marks the sign. Starting 10,500 years ago with the post ice-age hunters and gatherers spending most of their time high in the mountains. Next the Ute Indians are mentioned. They have been known to call the Rocky Mountains, "Shining Mountains."[3] Colorado becomes a land of opportunity for the Spanish explorers who followed the Utes hunting and trading routes. Later this ancient trail is widened to accommodate for recreation and transportation. An observatory will not only blend with the history and culture, but also provide a new and different means to discover as one voyages and finds self reflection in relation to a larger whole.

1 Mauna Kea Visitor Information Station (VIS)

2 Yoshii, Yuzuru; et al. "Atacama Observatory Operation". Press Release. School of Science, the University of Tokyo. (2009).

3 South Fork Visitor Center Display

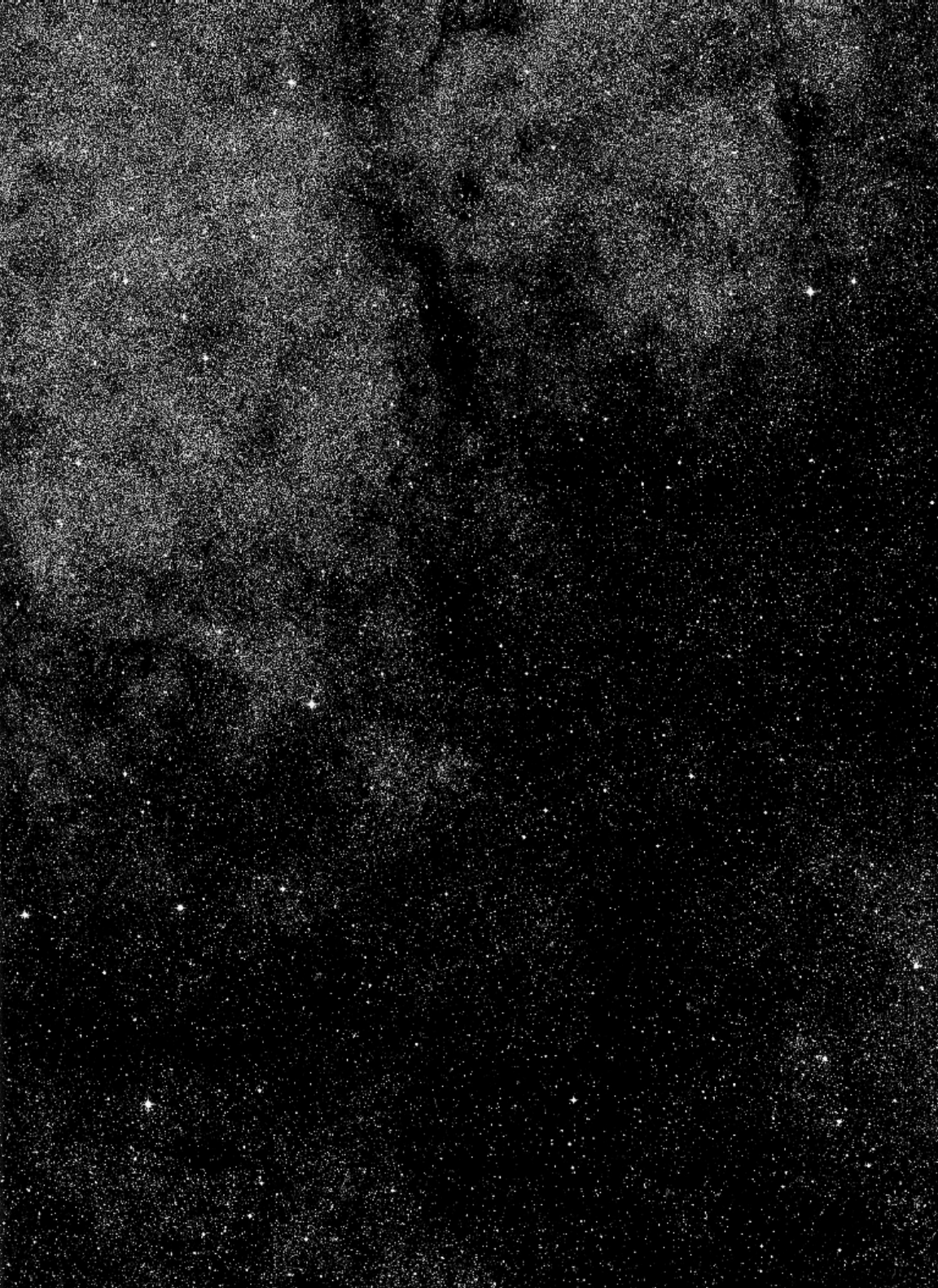


Figure 18 [VIJA CLEMINS | SCIENCE AND ART]

Science and Art Architecture

The dialogue shared between art and science has three distinct periods: Renaissance, Romanticism and modern times. During the Renaissance, Leonardo da Vinci was a very well known painter, and believed that art and science was one. This harmony with all things related the small and large between the Earth and heavens. Similarly it was believed by ancient man that man is in direct relation to the Earth. The elements water, air and fire are comprised of both man and Earth. The structure formed from bones for man is similar to the rocks of the Earth. Mans blood and the Earths oceans rise and fall, which lets one breathe. These qualities are a manifestation of the micro and macrocosm.[1]

The founder of modern astronomy, Johannes Kepler was interested in the arrangement of the universe and the heavens. Similarly to Plato and Pythagoras, Kepler believed that they could all be related to the five regular solid shapes. However, he was evoked by magic rather than scientific rationalism. Romanticism was an era where space was limitless. Artist Caspar David Friedrich's was able to paint landscapes, which framed the unframable, creating an oxymoron as well as a sublime quality. These images ranged from dark storms, clouds, hillsides, mountains, seas and infinite skies. Immanuel Kant also contributed to the sublime and created a view of the ultra sublime, meaning some thing that is triply sublime. His examples were the long durations and nature, which resulted in viewing a starry sky as triply sublime.

Modern times are taking the sublime further with artists like Thomas Ruff who ironically places moments of concealing and revealing in which one finds a more real quality of a cosmos through a dusty, bug-splattered windsheild. Ruff's time has been spent between both astronomy and art as a career, where he has used photographs from archives of an observatory and has forged them. The relationship linking his work to astronomy and art reveals a transformation of "sublime"[2] qualities that distances his work from its original scientific character and therefore claiming his passion, which lies in art. There are many other artists like Ruff who find irony in their work. By creating a wide variety of interpretations between art and science one must also contemplate the micro and macrocosm to fully understand their beliefs and where they would position man and cosmos.

1 Ottinger, Contemporary Cosmologies: Section 2 Harmonious Spheres from, Cosmos (The Montreal Museum of Fine Arts) p. 282

2 Ottinger, Contemporary Cosmologies: Section 3: The Sublime Today from, Cosmos (The Montreal Museum of Fine Arts) p. 283

I n t r o

Figure 19 [KIEFER | WOODCUT]

Anselm Kiefer, the German-born artist, begins an ambitious series, which he places man at the center of the world and positions around him allusions to the microcosm and the macrocosm, including sunflowers, seeds, and stars.[1] Robert Fludd uses examples that have a literal reference, where each element has a comparable status. Anselm Kiefer's examples have an ironic take, and are more interested in the mode of thought in the continuity of mankind and the cosmos, which was ruled out by the modern scientific approach to nature. For example, Anselm Kiefer's book, To Robert Fludd, he references the belief of an analogy between the microcosm and macrocosm, and free movement between the two. There are sequences of photographs, which follow a field full of sunflowers, whose circular centers ripen and turn into a star sky and through a kind of zoom effect, fill the whole picture field.[2] The flower became an image of cosmic flux and the possibility of regeneration. It follows the course of the sun, representing the daily influences of the heavens on the earth. In turning black when mature, it lends itself to metamorphosis into a starry sky. In the woodcut, Kiefer is upside down; his head is rooted in the soil, from which grow enormous sunflowers, ripened and black, and his stomach holds a circle of starry sky, identical to the starry centers of the sunflowers in the book. [3]

1 Text description extracted from James Hymann Fine Art Ltd. Gallery in London

2 Prodger, Michael. Inside Anselm Kiefer's Astonishing 200 acre art Studio. The Gardian, 2014..

3 Prodger, Woodcut description found in the Gardian, 2014.

Figure 20 [ANSELM KEIFER | SECRET LIFE OF PLANTS

Anselm Kiefer also created The Secret Life of Plants, which like Fludd, relates the microcosm to the macrocosm of the universe. Kiefer uses the plant as a symbol of earth's beginnings and proposes that all plants are connected to the cosmos as those of any person, may be able to provide answers to the mysteries of the world that science cannot.

Kiefer's work also consists of a six-foot-tall book made of lead that stands upright with pages fanning out, resembling the book: The Secret Life of Plants by Peter Tompkins and Christopher Bird. Kiefer's interpretation of the book contains stars and identification numbers from NASA in which the book becomes both seed and universe.[1]

1 Radford, Ron. description received for National Gallery of Austrailia, Canberra 2008. purchased in 2010.

Anselm Kiefer created Sternen-Lager IV in an architectural setting this painting is of the cellar where he stores materials from his past and future work. They are carefully ordered and classified by numbers on a shelf that reference the distance, color and mass of stars in modern astronomy. In the center of the picture, and in deep perspective, there is a ladder like the one in Jacob's Dream, suggesting the desire for spiritual ascent to which the work as a whole bears witness.

Figure 21 [STERNENFALLEN | NARRATIVE]

Another layer of interpretation is added to his work suggesting 'Star Camp,' a scar of the death camps, where the Nazis engineered the final solution. Numbers were no longer classifications of astronomers but a record that Jews bore on their arms before they disappeared into the gas chambers and crematoria. [1]

Kiefer's work has a thread of continuity in relation to his 'twenty years of solitude,' including his various versions of Sternenfall (starfall). The stars themselves are paradoxically both alight in the sky and blackened, burnt, and falling. Symbolizing the burning ashes floating up above and reappear as stars.

Anselm Kiefer uses Walter Benjamin to help him weave the ancient man's ability to experience the cosmic world and how modern astronomy places emphasis on how man sees the universe. Walter Benjamin says, "For it is the experience alone that we gain certain knowledge of what is nearest to us and what is remotest to us, and never of one without the other." The micro and macrocosm is what joins man and cosmos in both Fludd and Kiefer's work.

1 Anselm Kiefer often blatanly dealt with mourning Nazism in Germany through his work.

Figure 22 [ANSELM KEIFER | TO ROBERT FLUDD 2]

Results from Theoretical Premise + Unifying Idea
Anselm Kiefer

I think it is important that Anselm Kiefer took his life experiences and interpreted them in new ways and created other relationships. The connections that were made drew his life in a way that others may find a stronger presence within a more abstract understanding through his work. I enjoyed Anselm Kiefer's personal take on Robert Fludd's concept of the relationship between the microcosm and macrocosm. I think they both were successful in determining how they position themselves in the Cosmos and through my architecture I want people who experience my building to be able to better understand their position in life while looking at the larger whole down to the particulars.

Case Study Series

Dalibor Vesely writes about the foundations of modern architecture and compares man's relationship with the world through time, stating, "As a result, the vertical articulation of the world subordinated to a horizontal articulation." [1]This being said, he mentions that before mans daily view on the world consisted of god, the heavens and the cosmos in contrast to todays views of the world primarily in a horizontal relationship man is more introverted. There is a growing reliance on theoretical knowledge and a greater distance between self and the world. What was believed and passed down to man is now a detached background.

The following examples show both a vertical relationship with the cosmos as well as horizontal articulation with the placement of the building in its surrounding context.

1 Vesely, Architecture in the Age of Divided Representation, (MITpress, 2004) p.186

I n t r o

Figure 23 [BRUDER KLAUS | NARRATIVE]

From construction to today, the Bruder Klaus Field Chapel in Mechernich, Germany by Peter Zumthor, has been integrated with vertical and horizontal articulation. The 112 tree trunks are assembled vertically creating an oculus for the focal point towards the sky. While the 24 layers of concrete along with the landscape makes apparent the strong horizontal articulation. The hollowed blackened cavity and charred walls bring contrast to the many small circular openings, which appear as what could be stars as the light pours in and directs people's eyes. [1]

1 Sveiven, Megan. Bruder Klaus Field Chapel by Peter Zumthor. Archdaily. 2011.

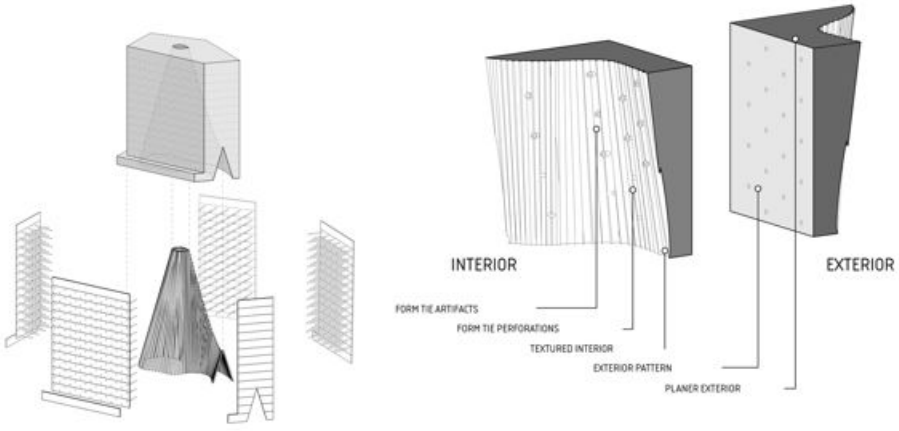


Figure 24 [BRUDER KLAUS | ASSEMBLY]

Bruder Klaus Field Chapel | 2007 | Peter Zumthor

Typology: Sanctuary
Location: Iversheimer Straße, 53894 Mechernich-Wachendorf, Germany
Size: 13,000 sqaure feet

Distinguishing Characteristics:

The Bruder Klaus Field Chapel has three steps of construction: building an intimate form out of the 112 timber logs, casting 24 layers of concrete over the timber structure creating a new external form and lastly burning the timber logs leaving a charred texture and impression of the logs that once held the concrete layers The unique roof opening lets in light and directs attention to above (Bruder Klaus Field Chapel, Megan Sveiven 2011).

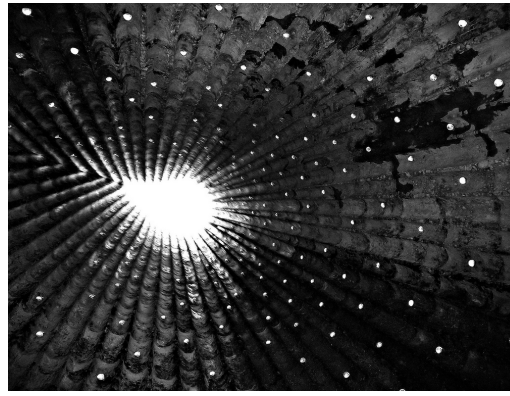
Program Elements:

The Bruder Klaus Field Chapel consists of one room but with a smaller entryway echoing the shape of the triangulated door. Although it is a chapel, it is somehow less about the religion and more about the journey getting there and the story the building shares with the occupant on a more personal level.

Case Study Take Aways:

The case study is not an observatory but it has elements that are important in the same way an observatory would. The focus above to the sky and light has a very strong presence in the building and it sets the mood. It is intimate and radiates a special encounter with architecture, nature and self. The simpicity of the program lends the space room for one to wonder.

The architecture itself was a ceremony that perfected religious symbolism in a pure form. It is a place that one seeks out and goes there to discover a special piece of an architects work. There seems to be many special elements of surprise that all link together to create a unifying experience (Bruder Klaus Chapel, Beatrice Galilee 2007).



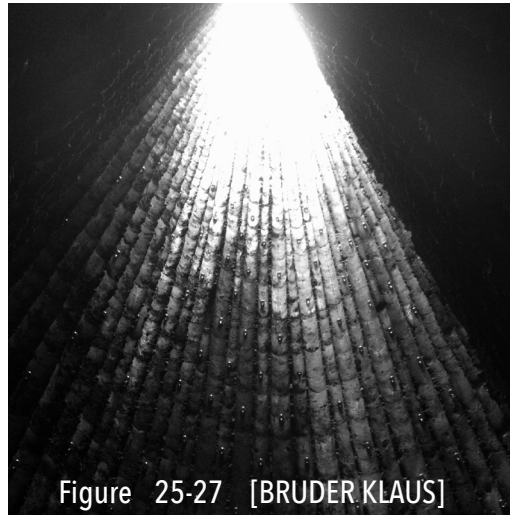


Figure 25-27 [BRUDER KLAUS]

Bruder Klaus Chapel

Analysis: Relation to Cosmos

As the intimidating door opens, a sliver of light is let in and once it is closed daylight seems to vanish. Light from the oculus cast shadows into the space that leave impressions of the trees that were burned. The light from above is so bright that it is hard to not look up.

There are 350 small holes that are about five centemeters in diameter that are disbursed through the building. This is where the smoke escaped during the burning process and now they are filled with glass, giving the impression of stars (Bruder Klaus Field Chapel, Megan Sveiven 2011).

Peter Zumthor is able to dramatize the light influencing how someone moves through the space. The concept of the environment becomes familiar to what is around us. The stars, the sun and moon above and the trees surrounding oneself in nature. The intimate space is able to showcase the details and bring the space to life with the harmony of natural light and materials.

The light in Bruder Klaus Field Chapel is important because it not only is a hidden element of the oculus that brings light into the space but it also tells a story about how the architecture was made and influenced by the openinngs. The pureness the light gives to the building that the top is open to exposure of natural air, light and other outside elements brings a focus to the heavens above.

I would like to have a connect similar to that in my project. I think it is important that light is thought about when designing and is part of the process through in through each decision. The way the viewers experience the space should be composed of a balance between enclosure and openness. The feeling of comfort and warmth can be controlled through natural lighting and how it is filtered through each space.

I n t r o

Figure 28 [RODEN CRATER | NARRATIVE]

Figure 29 [RODEN CRATER | NARRATIVE]

The Roden Crater Project near Flagstaff, AZ by James Turrell began in the 1970s and had its first public viewing in 2011; Turrell expects it to be complete in the next few years.[1] The 600 foot tall red and black cinder cone is being turned into a monumental work of art and naked eye observatory. This visual phenomenon has always interested man. The Roden Crater project will bring the light of the heavens down to earth, linking visitors with the celestial movements of planets, stars and distant galaxies. As the white circle surround by black fades, the black circle surrounded by the white comes into sharper focus, until it forms the precise figure of a keyhole. When reaching the end of the tunnel, something strange happens. What appeared to be a wall with a large round black circle turned into an elliptical room, which is actually an opening in the ceiling revealing the sky.

In this thesis, a new observatory in South Fork, Colorado will integrate the micro and macrocosm joining man with cosmos. Stargazing invites one to ponder and discover in the same way someone experiences architecture.

1 Turrell, James. Skystone Foundation. 2016.

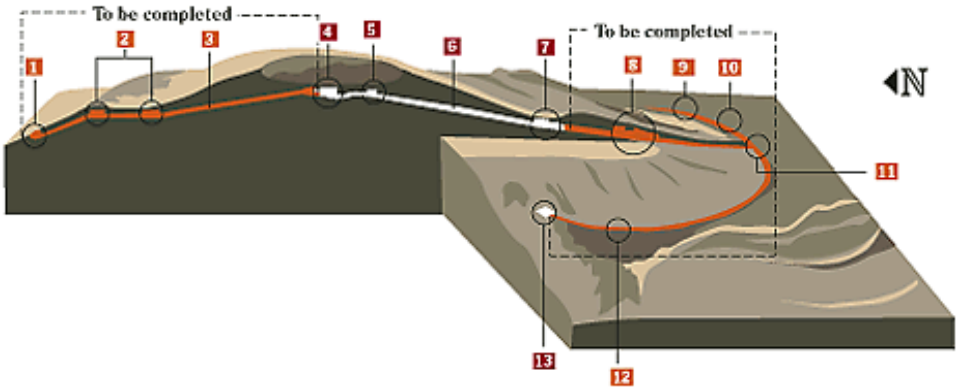


Figure 30 [RODEN CRATER | SECTION CUT]

Roden Crater | 1979- | James Turrell

Typology: Observatory
Location: Northeast of Flagstaff, Arizona, United States
Size: 92,000 square feet

Distinguishing Characteristics:

The Roden Crater observatory is placed into an extinct volcano that is about 400,000 years old. The 600 foot tall cinder cone brings light from the heavens down to earth. James Turrell encompasses this monumental work to express an unfolding of nature rather than altering it (James Turrell, Fundacion NMAC 2010).

Program Elements:
The project will have 20 spaces
Tunnels, Chambers, Pathways
Experiential Spaces of Light
Viewing Spaces
Meditation Room
Court Yard
Art Installations

Case Study Take Aways:

The path to Roden Crater brings a specialness to the typology and has impacted people through articles, blogs and film. It is evident that James Turrell is interested in pushing the boundaries and learning where science and art meet. The paths lead us through layers of discovery while linking the cosmos to architecture and self.

This observatories have architectural characteristics that restore the historic surrounds of the place and bring nature inside of architecture. Turrell also plays with the viewers mind and perception with what is claimed to be known as true is then challenged.

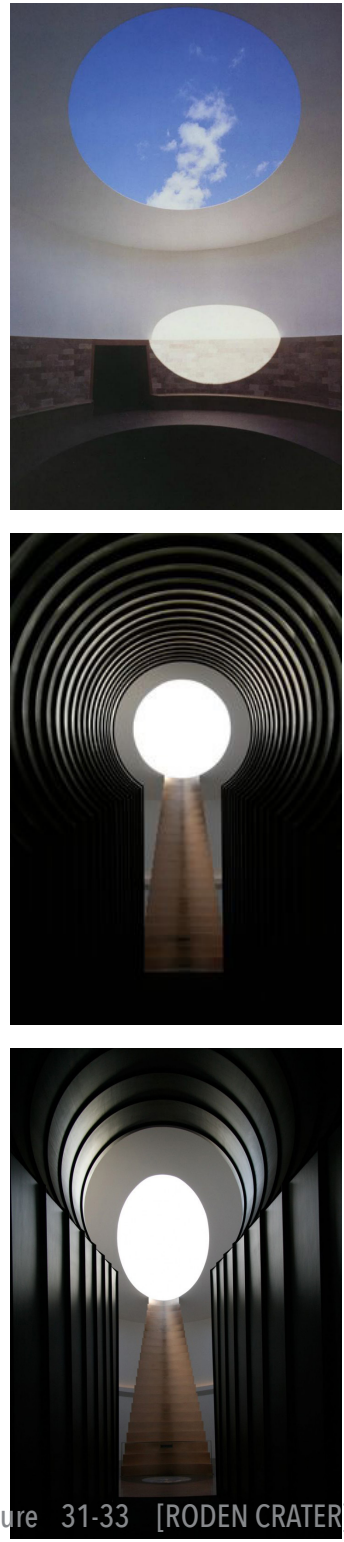


Figure 31-33 [RODEN CRATER]

Roden Crater

Analysis: Relation to Cosmos

James Turrell dedicates Roden Crater to the sky and celestial phenomena, primarily interested in space and light experienced. He states:

"... if you go to the Rocky Mountains, to a high altitude where it is cold, you see sky that is such a crisp blue you feel that you could cut it and put it in cubes! That is the kind of sky I want, and I have been able to get it by selecting the altitude. There are graduations near the horizon where the blue is lighter, and then gradually, toward the zenith, it gets deep... That is how you get that incredible color- by eliminating all of the white at the horizon (Light Matters, Thomas Schielke 2013)."

A camera obscura effect will cast a moon image on the back wall of the tunnel. Turrell uses light as a material and works with the architectural form to perform something beyond itself. As a person walks through the key hole passage way, what the mind perceives as a circle visually becomes an ellipse. Once in the main observatory room, it is clear that the opening is in fact an ellipse. The everyday wonders of light is discovered with refreshed eyes (A Visit to Roden Crater, David Barrie 2012).

The natural light in Roden Crater is important because it is able to take the natural light from the sky and be manipulated to cast down into the architectural space and make it aware to the viewer in a striking way. Turrell mentions that he wants his architecture to be able to bring light from thousands of years old into a space, making it present.

This is also important in my project to study because like light, I think the history of nature needs to be present in my architecture but then take it beyond the past and look at it in a new light.

Case Study Series: Summary

The case studies provided have distiguished characteristics such as a sense of place, natural materiality, strong connection to architecture and to the sky above. It is important that these studies use a variety of ways to capture ones experience in a personal way. There is a participation between the visitor and the architecture, one that is everlasting. When dealing with an observatory there is a remoteness about it, that is necessary for it to be sucessful as well as a strong presence.

Weaving self and cosmos was the focus for both the Bruder Klaus Field Chapel by Peter Zumthor and Roden Crater by James Turrell. Some studies had personal stories that related with the architecture while others were left for the participant to fill in their story with experience through the space. All have shown a connection to cosmos and a strong sense to the specific place and was able to use natural resources, bringing an overal comfort to the building. Both case studies were meant to have a limited amount of people in the space at a time for a level of intimacy. Each building left the participants to wonder with a steady sense of peace and the ability to linger. In my architectural solution I have designed for this building to have visitors of a smaller group and that one will voyage to this place, and have a longer duration of movements leading up to the building.

Before resulting to an observatory I looked into the relationships that both case studies seemed to have, along with my first idea of what the building should be. The Bruder Klaus Field Chapel by Peter Zumthor is very small in scale but can be preceived as more than just a chapel, or place of worship. Rather, the space brings participation and creates a path that is revealed through this journey of discovery. The process of how this building was constructed was just as important to me as the meaning behind the details and the underlying message. In my architectural design I was able to take the relationship of the earth and sky into another layer of balance through cutting away at the mountain and then rediscover parts of the slated rock that formed this mountains peak. Architecturally it holds a symbol of placement through which one is always aware of through the absent of the other, until reaching the top of the open sky observatory.

Roden Crater by James Turrell, is a building that was discussed among one of my presentations once I expressed interest in cosmos and how it relates to the surrounding world in a larger scale. The idea of cosmos has been tying together my project since then and has led me to this great case study to start with for an observatory. This project has been going on for over 40 years but will be used for thousands of year after completion. The fact that Roden Crater is in an extinct volcano is interesting to me because it shows that Turrell is willing to push the boundaries and unravel many stories within the buildings surrounding context (Roden Crater, James Turrell 2015).

The relationship between cosmos and architecture in both case studies have shown an immense amount of research that goes beyond the basic required drawings when designing a building. Like an observatory, one must detail out the material, volume, surrounding context, light sources and weather. But beyond that the details of how light plays a role in each individual space and how impactful it may be presented in one space compared to another. The different effects light may have coming from above versus below and how one uses light to make decisions. Architecture is often understood through light in a poetic and functional way. Through lighting I was able to express a heirarchy for the cosmos and relating the similarity among differences.

The sensitivity taken in all of these case studies will be implemented into my project to provide a unifying feeling of man, architecture and cosmos. Unification was met in ways that were shown through my process of the art and architectural examples. These have stood through time and have impacted many peoples experiences and I want that for my design. There is importance held within the site, the surrounding environment and its history as well as the symbol of the mountain and cosmos between man. Not only the symbols and history but also the future of technology has been placed in a critique that I believe will help this project to make a lasting impression on the people that particpate.

The outcomes from the case studies that I have researched have been successful in the approach for social, economic and cultural gains. I believe that the case studies that I have chosen are filled with excellence and strive for a long lasting life and impression on the people that participate.

History of Site

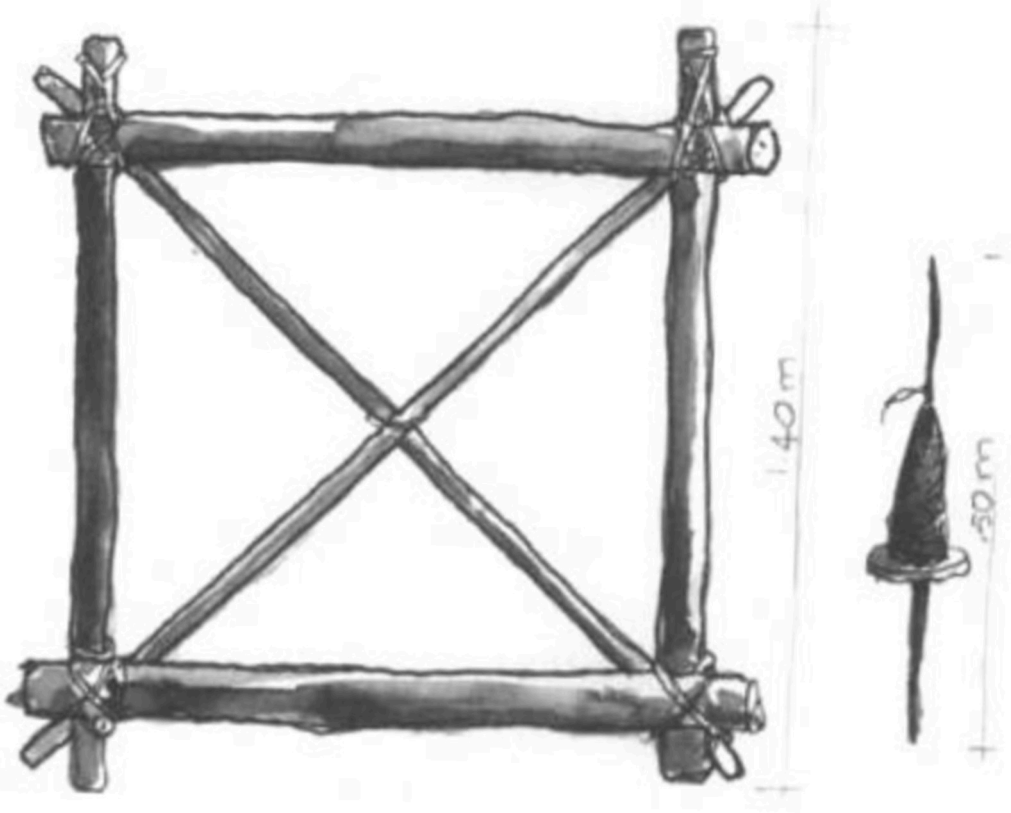


Figure 34 [SPINDLE AND LOOM | NARRATIVE]

From the first settlements in Colorado to the ancient man, mountains have been a part of dwelling. Alder Peak is a part of South Fork between the Rio Grande River and National Forest.

Like Jacob's Ladder, the mountain can also symbolize the same notion of above and below. The same irony is found in the name of the Ute people, Ute translates to "mountain people" and in their language, "land of the sun." It was believed that mountains were the closest one can get to the cosmos.

Ricardo L. Castro writes in Sounding the Path: Dwelling and Dreaming, about Buritica, which is one of the largest ancient cities found in the U.S. during this century. It is in Buritica where we learn about the Kogi people and culture. The Kogi's see temples, houses and mountains to be sacred because they believe the form to repeat above to the cosmos.

The Kogi people, like the Ute people native to Colorado find meaning in everyday activities and significance within the world intertwining them into the fabric of life.

Castro also relates the microcosm in the ancient man tools and comparing it in a larger sense, of what it meant to them stating, "At a microscopic level, the spindle is an analogue of the axis and the spindle-whorl is the earth…architecturally, the 'circular temple floor is the whorl, and the near vertical sunray that falls upon its center on the equinoxes at noon, is the spindle. The temples are a small scale of the cosmos, and Castro would speculate that the temple also served as an observatory during lunar cycles, which was an important event among the Kogi people."

The Ute people are the oldest residents of Colorado. The Ute people would inhabit the mountains for majority of the year. Mountains are believed to be sacred to them because it is where the earth and sky meet.

Stephen Wischer writes about the architecture of Anselm Kiefer and supports this view in relation to what Pérez Gómez suggests are questions of mortality and transcendence, "the desire to find one's place in the world, and the capacity to 'build' a cosmos."

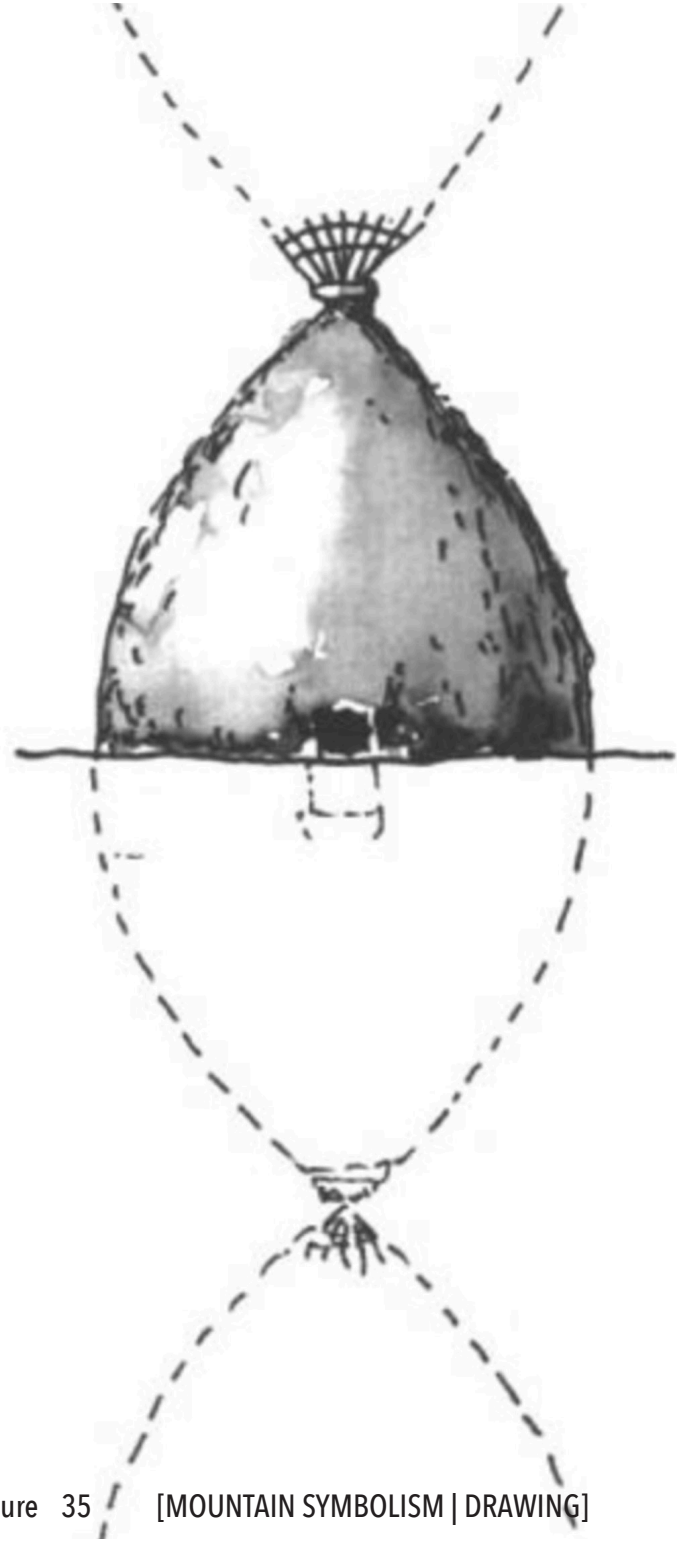


Figure 35 [MOUNTAIN SYMBOLISM | DRAWING]

The Journey

As mentioned in the previous section, Casto believes, one is able to understand the relationship between man and the world. A path is something that marks movement through space. Some cultures, such as the Aboriginals, the Kogi people and the Ute people hold strong relationships to the paths held within the land. This rooted connection symbolized the meaning of existence. 'Dream-tracks,' as Europeans would call them, are seen as footprints of a cultures ancestor. The land was not owned, like today, but instead chants about knowledge and identification among the lands surroundings helped to affiliate particular tribal areas. Among the Kogi people, footwear is forbidden because they believe only bare feet should touch so that we may be connected to mother Earth.

The structures that were made in particular areas held symbolic meaning and were in relation to the Cosmos. Ricardo mentions, "The doors were aligned east-west and during the solstices and equinoxes, the sun's movement along the virtual paths of the temples turns the buildings into an astronomical observatory." The sun weaves the floor of the temple to the Cosmos. Night walks for these cultures were also important, viewing the moon as the sun's companion. The visibility is claimed to be the best at night. Mountains are considered to be sacred because the paths are believed to continue and lead the soul towards heaven. Some also view mountains to be a symbol or fertility and resembling the female body.

The history of the Ute people, native to Colorado are rich with stories that relate to my site and the Cosmos. People in South Fork, Colorado today are there for reasons of tourism or vacation homes, with few permanent residences. I am not trying to turn my site back to how it may have been used before, but rather discover a path along the way. I do not want to make the town bigger, but I would like my thesis project to be a destination that people may make a special trip to go and experience.

My experience to my site held importance and became a personal journey. I can imagine people taking many modes of transportation such as planes, cars and automobiles and eventually by foot at different variations of time. My personal experience included a flight into Denver International Airport and a rental car driving 4.5 hours South-west to South Fork. It was great to see the contrast of the city and view of the mountains to being immersed in the mountains weaving through them. It was also interesting to travel between the mountains and on our way back to Denver; we drove on the edge between the mountain range to the West and the flat desert across the East making our way towards Colorado Springs.

The layers of transporation is able to be shed and then one is weaving the single-ness back to a whole. As one creates this bond that is old, it is somehow reinterpreted and understood in a more clearer sense. These movements that are both linear and cross reference moments that interlock the perpendicular realtionships among ones surroundings.

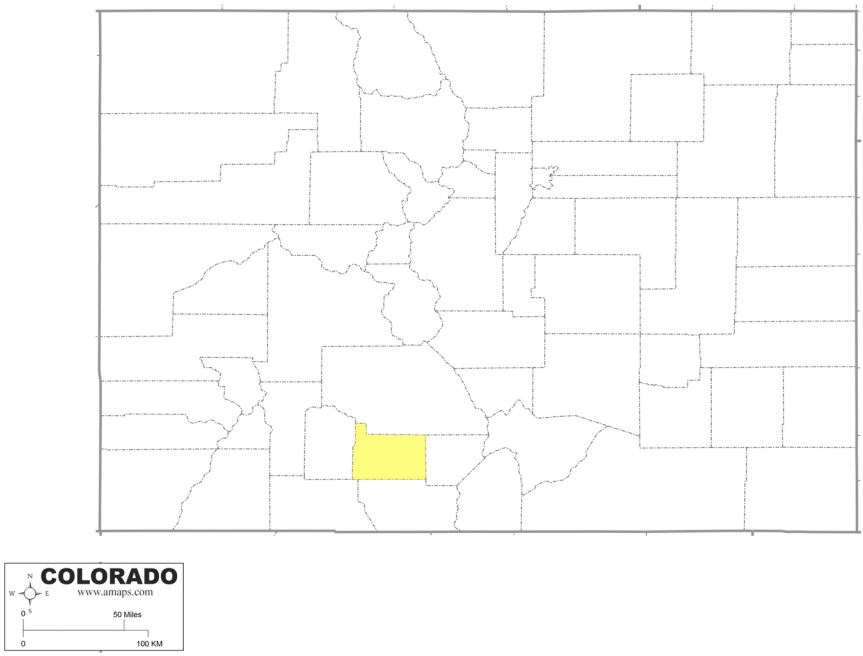


Figure 36 [COLORADO | COUNTY MAP]

Site Information

Site Selection:

South Fork, Colorado is a small town in a more remote area in Colorado that sits on the edge of many national forests, mountains and parks. Attracted to the outdoor activities the Rocky Mountains contain, there is this idea of getting away from the city to escape reality and go to nature to clear your head. The clear skies and high altitude away from city lights make this small town a great selection for an observatory. It is here where people are able to tie all of the culture, physical and social aspects of ones surroundings and how it relates to science and art today.

History and Culture:

The native people of colorado known as the Ute people, have lived in the mountains since they can remember and have refused to change to the mordern culture of today. Although I am not trying to reinvent the past, it is important that this is mentioned in my research and that it shapes the way that my project will be handled. South Fork today is a small town with only 200 permanent residents and up to 1,500 in the summer month filled with vacation homes and resort-style living that feeds off of the many outdoor adventures one can do in the many national forests.

The observatory is welcomed to all but I am catering it more towards people that are not from this town, and rather using this place as a path to get to the observatory which is their destination to find a greater understand of themselves in the world. There are other things to do nearby, but my hope is that the project will create a destination for people as less of a "vacation" and more of a discovery from wonders. This place will be special and get people thinking about their purpose in the world. Currently with the small amount of settlers within this specific town it is nice to know that there are no presumptions about the place and so people are able to wander through and have an open mind to what will happen on this journey.

Initially the site was discovered through the location within the Rocky Mountains. Specifically the larger forest fires that were happening in the past few years. I did not know exactly what to expect and if there would be any remains of the fires that would mark the site. With the history and experiencing the site first hand, it was clear to me that an observatory would be an ideal fit. The stars were pulsing in ways I have never seen before and I was able to see this only partially up the mountain and with my naked eye.

Not only is the mountain and earth celebrated in this moment with the cosmos, but it is an exhilerating moment that man is able to experiencing while placing self within this woven fabric on life that we always desire to be whole.

Figure 37 [SITE | BASE OF MOUNTAIN]

The Site

South Fork is a smaller town in a more remote area (covering only 2.4 square miles) compared to major cities Denver and Colorado Springs. This town, although established in 1882, the native Ute (mountain) people have lived in the mountains during the warm months and would migrate near the river and valleys during the colder months as long as they can remember. The Rio Grande River goes through the town and wraps around the mountain that reaches above 10,000 ft in elevation.

The Program

With the towns high elevation, remoteness and clear skies an observatory would nestle in very well. This architectural wonder brings a connection to the world through the investigation of cosmology. With specific events, people can gather or explore individually how archictecture joins man and Cosmos.

Site Analysis |Narrative

Figure 38 [MICROCOSM | SITE]

Getting There

We went to the Rocky Mountain Ski and Raft, where three guys in the store were able to tell us how to get to where we would like to go. Although there is no specific trail to the peak, they were able to direct us near some trail heads as an alternative as well as give us tips on our adventure. We go through some back roads to get to the Alder Peak and try to find the trail head and end up on the east side hiking the Bear Creek Trail right beside Alder Creek. We drove along this trail that is for both cross-country skiing and motorcycle friendly until we reached a fork in the road, where we started our hike.

The Hike

The hike started on a road and was initially very flat, but we knew not for long due to the view in front of us. The soil seemed very moist and spongy, feeling almost like quick sand in spots. Luckily, that wasn't for long and the ground started to feel more walkable and therefore buildable. We create switch back patterns as the mountain starts to get steep. Bush-whacking up, following the contours, moments of animal tracks and rocks that help guide us up one step at a time. Once we were an hour into our hike, we found the site that I am going to use for my thesis site to create an observatory. It is here where we stopped and took pictures, walked the site, listened, documented and ate lunch. During this time the weather was changing. The clouds were moving over the mountaintops across from us, where it looks as if there could be some snow. The sun was trying to pierce through the clouds and it did for 5 minutes at a time and this continually happened while at the site.

Site Analysis |Qualitative Aspects

Figure 39 [MACROCOSM | VIEW FROM SITE]

Nature and Wildlife

The base was more open and bare, and the trees grew thicker as we made our way up the mountain. The smell of pine was very apparent throughout the duration of the hike. Along the way we saw single dying trees that showed up through the entire hike as well as different small pokey cacti (pink, purple, green) and rocks/boulders. The rocks were positioned at a steeper incline, which may trace previous mudslides. We found deer tracks and heard two birds. Most of the hike was really quiet and the only sounds that distinctly stood out were from the birds. We found shotgun shells so we know that there are traces of humans, and of course we started on a marked trail and made our way off the path.

Existing Grids

South Fork, is a very small town, making a grid formation that lies in the valleys of the surrounding peaks. The major roads traveled on would be US-160 and 149. People would travel through stay in South Fork as a destination as well as a rest stop along the way through a longer journey. There are also vacation homes on higher land, built into the side of the mountain and often times on top of bluffs.

Textures

The texture found in South Fork and at my site varies. Majority of the mountains are full of trees that reach to the top while few nearby have snowcapped covered mountains and are very 'hard' and cold. The Mountain where my site is located is one that is covered in trees to the very top and gets denser near the peak. The soil appears to be less firm than that of the snow covered mountains. The colors from the mountains had two variations. The snow-covered mountains seemed to have more blues, blacks, whites and grays. The other mountains have a warmer tone with shades of greens, browns, oranges and purples.

Material Textures

The hard surfaces from the sheets of stone make up the mountains. The breaks in the rock are arranged in a way that look like scales but have a strong vertical presence. The grays quickly turn to blacks as the sun starts to set. The rocks and boulders of all shapes and sizes have a fragile-ness about them. They were once strong but not that it is separate, it is easily tarnished. However, I do know this peak is buildable due to some existing homes near the base. Most buildings here have a lodge and cabin feel made of timber construction with log details. Stone and masonry is also a popular base for homes, centers, and stores.

Site Analysis |Qualitative Aspects

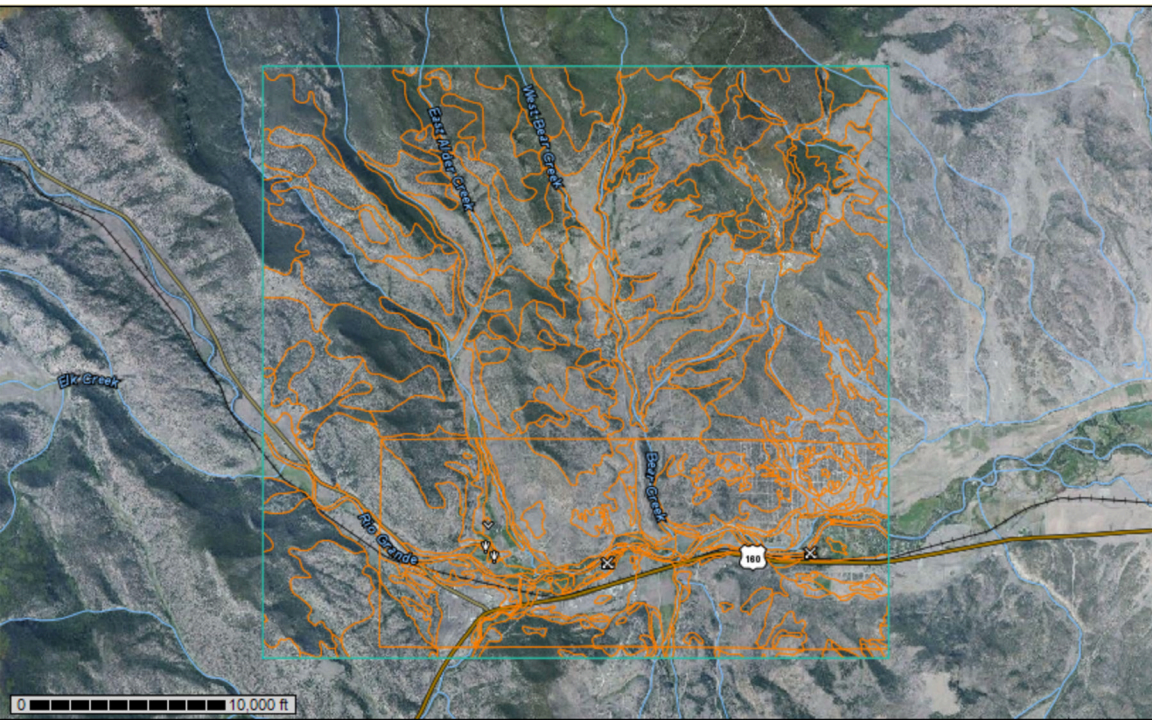


Figure 40 [VISUAL FORMS | MAP]

Geometric Relationships

The pinnacle observatory is built into the mountain and placed ¾ of the way towards the peak. There is a generally flat location where the mountain opens up to the city of South Fork and its neighboring mountains and picturesque horizon of the peaks into the sky. From the flattened area the building is built in and brings relation to the slope to follow. This slope is integrated with how I root the stair tower like a tree and approach designing the observatory with interlocking relationships between the horizontal and vertical spaces. The paths lent opportunity for people to observe as well as perform the act of weaving through the notion of walking the path towards both the sky and mountain that weaves in a similar movement. I would like this observatory to respect the landscape and also be visually interesting with layers of depth.

Shade and Shadow Characteristics

The building form in relation to the mountaintop is primarily positioned with exposure from north-south, so therefore it will have sun during all seasons. Even during the winter, sun is still able to be apparent on the site for (8 hours) of the day. Ventilation and breathability of the buildings skin will be important for my design as well as provide opportunity for opperable openings as a clearing to the sky.

Topography and Surrounding Landforms

The town of South Fork is 9,000 feet in elevation and the peak where my site is located is positioned at over 10,000 feet. There are only two major roads and the Rio Grande River that sits in the valley between the many mountaintops. There are points near the edge of town where it is very flat and wide range of fields. The roads are much like the "S" turns imagined as one weaves between mountains. There is also a train that follows the opposing side of the Rio Grande River.

Human Characteristics

There was sign of human intervention within the trails, which should be expected. There was little to no activity during the time that we were present (early December). I think that the site that I am proposing will be able to bring people here but in an appropriate way, as a destination and to not ruin the existing wildlife and activities that South Fork has implemented. One way in which I will implement little impact on the area will be through gondola lifts in which the way people get up to the base of the building will be suspended and therefore not disrupt wildlife. South Fork, although it has quite a bit of tourism during the summer months, the town is still able to function without expanding. This city is efficient and "turns off the lights" around 8-9pm. Not only is this an advantage for the observatory but it also keeps with the simplicity of the town and experience of the physical surroundings.

Site Analysis | Quantitative Aspects

Figure | 41 | GROUND AND SOIL | OBSERVATIONS |

Soils:

Located in the low mountain, mesa and foothills regions. Soils are comprised of Tolman, Bendire and rock outcroppings. 15-30 inches below lies lithic bedrock prime for building.

Water Table:

The drainage is natural with no signs of flooding. The water storage in profile is recorded as 0.9 inches, basically non-existent. The surface of the soils at the base of the mountain at the foot trail exists some sponge qualities, but will not directly affect building upon the site. No signs of floods have been marked or officially recorded.[1]

Vehicular and Pedestrian Traffic:

There are trails that are near the base of the mountain where people are able to hike. There are two parts that split but not directly to my site. There are signs of vehicles that go to the base of the mountain as well with a nearby golf club and ranch. Overall very minimal traffic seen in the winter with higher traffic shown in the summer months, when there are more tourists and outdoor activities.

Topographical survey:

Majority of the site seems to be at a 5-10% slope with 2/3 of the site reaching near 60% slope. The steeper slope will be where the building is built into the mountainside about ¾ of the way to the mountaintop. There will be stairs and an elevator for access along the site to make it suitable for movement through the space but not limited. Trails will be placed among all of the buildings edges for wandering the mountaintop as well as additional exits.

Visual Form:

From the site you will be able to see adjacent and far away mountains as well as the town of South Fork below about 10 miles away. There are two major roads that are alongside the Rio Grande River and a service road used to cross the train tracks and reach my site. South Fork is the closest town to my site and is in the valley between the mountains and surrounding foothills.

1 This information was extracted from the United States Dept. of Agriculture on Natural Resources Conservation Service Soils

Climate

South Fork, Colorado:

Temperature: 70 F
Heat Index: 55-60 F
Windchill: 40 F (one tenth of region)
Fronts: northern part of region

Winters are moderately cold, with most of the annual rain of about 12 inches falling during that period. Winter sunshine, nevertheless, is plentiful. On average there are 284 sunny days per year. The July high is around 77 degrees and the January low is -9 degrees. Summers are hot and dry. The low humidity causes a large diurnal temperature range; consequently, summer nights are cool. Rain is rare during the summer months. [1]

Since spring and fall are very comfortable, and much of the rest of the year is not very uncomfortable, outdoor living is very popular in this region.
Because of the varying distances to the ocean, significant changes in microclimate exist. Neither winter nor summer dominates the climate of this region.

Climate Design Priorities:
1. Keep the heat in and cold temperatures out during the winter
2. Keep hot temperatures out during the summer
3. Let the winter sun in
4. Protect from the summer sun
5. Use thermal mass to reduce day-to-night temperature swings during the summer
6. Use natural ventilation for cooling in the spring and fall
7. Use evaporative cooling the in summer
8. Protect from the cold winter winds[2]

1 South Fork Visitor Info Website gives detail on the weather overall and days through the current week.

2 Lecchner, Norbert. Heating, Cooling, Lighting: Sustainable Design Methods of Architects. Climate infromation found in the index for the Region of South Central Colorado

Site Analysis |Quantitative Aspects

Figure 42 |PLANTS| OBSERVATIONS|

Plant Cover

The plants that cover my site include pine trees, cacti and pinyons. Pinyons are low bushy trees that are irregular and rounded spreading crowns. These trees are short and crooked. There were some areas of tall grass, but not too much at my site, more towards the base of the mountain. There were plenty of trees at the very peak of the mountain. Most of Colorado and the Southwestern region climate of the mountains have a high percentage of clear days, intense solar radiation, and windy conditions. Colorado pinyon are tolerant of cold and drought and grow in deep and shallow soils as well as materials including sandstone, limestone, shale, basalt, granite and mixed alluvium according to the fed US database.

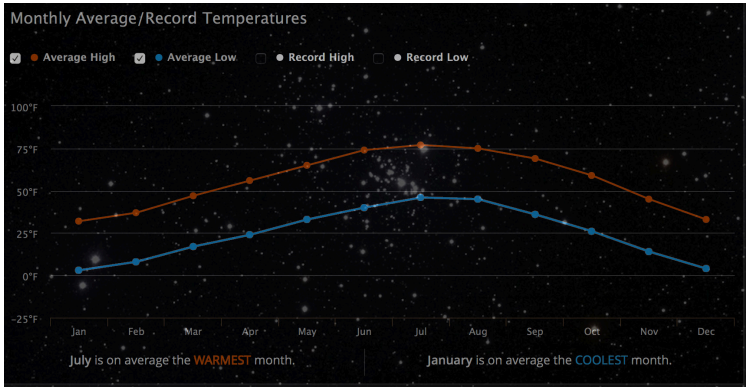


Figure 43 [TEMPERATURE | GRAPH]

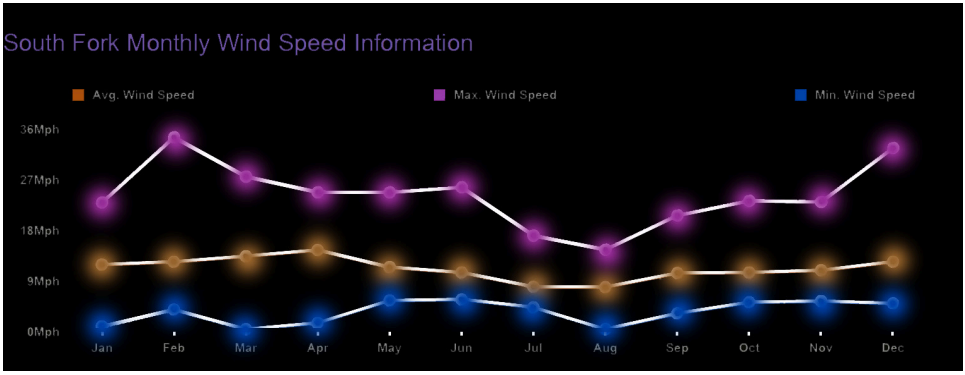


Figure 44 [WIND | GRAPH]

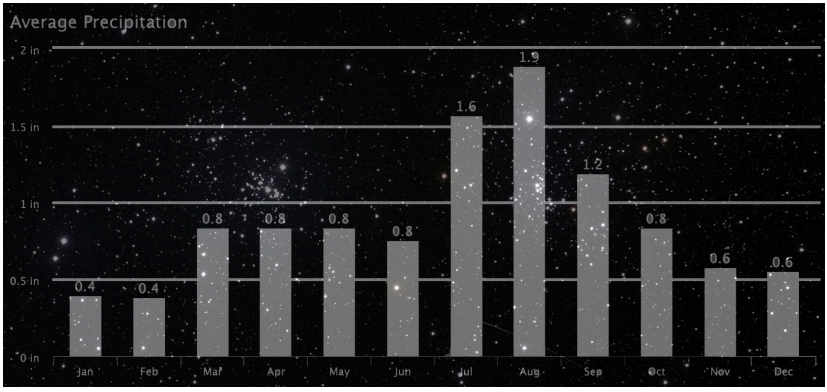


Figure 45 [PERCIPITATION | GRAPH]

Monthly Weather Averages

Temperature:

The maximum temperature reaching 80 degrees Fahrenheit and the minimum temperature near 0 degrees Fahenheit. The warmest month is in July, while the coolest month is in January.

Wind Speed:

The maximum speed reaches around 36 miles per hour on average. The maximum wind speeds are during the months of December and Febraury with the minimum wind speeds during the months of March and August.

Percipitation:

The maximum percipitation is during the month of August near 2 inches. The minimum percipitation is during the month of January and February near 0.5 inches.[1]

1 South Fork Visitor Info Website gives detail on the weather overall and days through the current week.

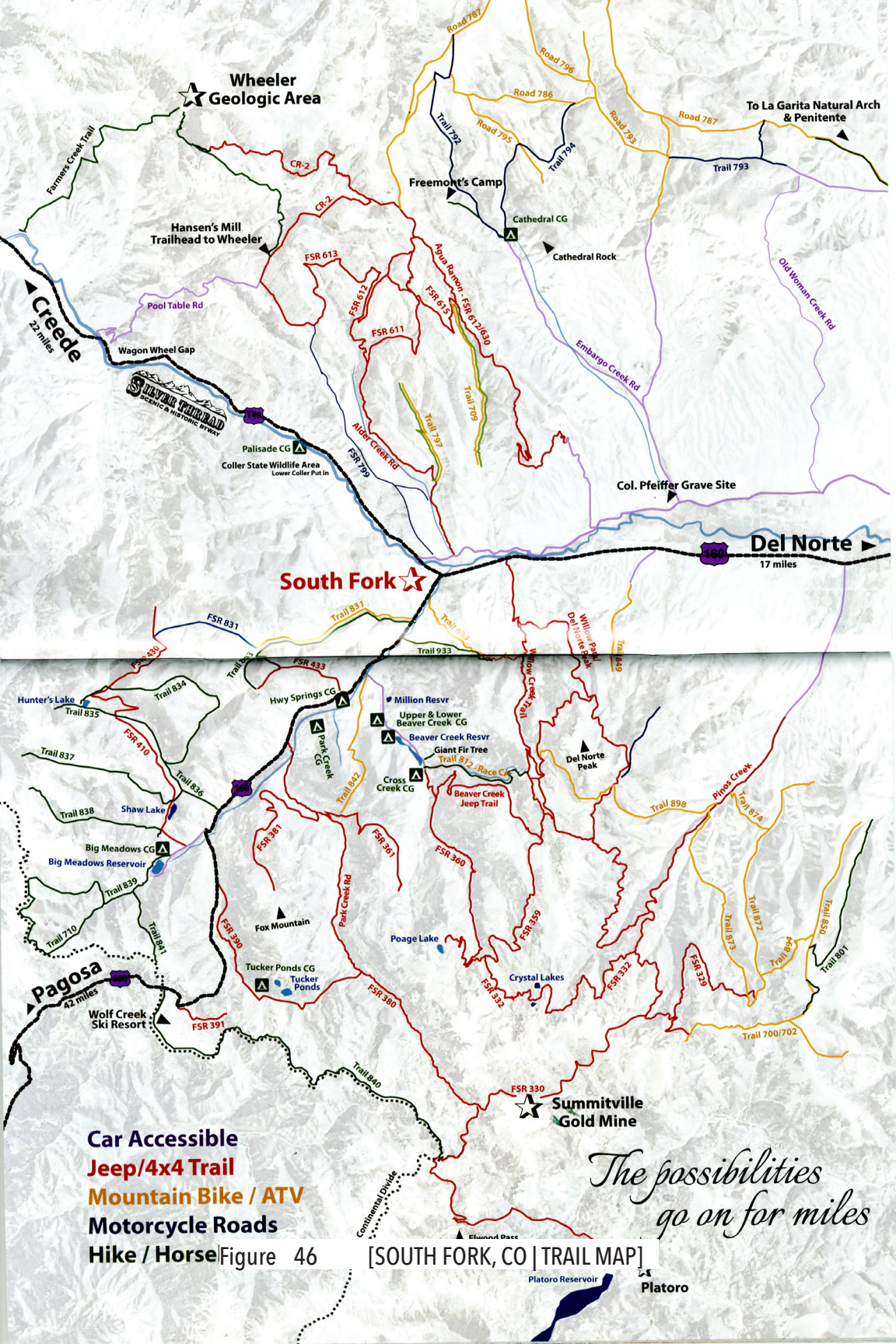


Figure 46 [SOUTH FORK, CO | TRAIL MAP]

Project Justification

As more and more time passes, technical advances are becoming a part of mans everyday life. Bringing some of the farthest reaches from the Earth to our very fingertips.[1] Placing a number of different devices between man and Cosmos through time, which has distanced our connection from above. The way in which we receive data are from buttons in which conceal the path that gets us from man to the Cosmos. This distancing makes it hard for one to grasp mans place with in the process of understanding the Cosmos.

Specialization of the arts and sciences divided a more holistic comprehension between man and Cosmos. Mythology was a large part of understanding how ancient man was personally connected to the sky above and held great meaning in existence. Modern man has very few people that have become specialists in the Cosmos, and perceives this information through eyes of a scientist. Art and science should be used together to bring both a gaze of wonder along with the sense of discovery.

Culture and lifestyles have evolved over time and has limited our connections to the Cosmos. Cities create light pollution, computers give infinite amounts of access to a more horizontal understanding of the world and cosmology is brushed over in our curriculum.[2] As cities grow dense streetlights, automobiles and buildings flood lights within an area making the stars faint or nonexistent. The way in which people learn today is primarily by schooling rather than by ones personal ancestors. There is still a community through the relationships of teachers, students and their family, but it is different then before. The computer is a device that is placed between man and their curiosities but almost instantly solved. The sense of wonder and discovery may seem less and less important or even satisfying.

An observatory in South Fork, Colorado will be a way to unite man and Cosmos through its remoteness, journey and integration of science and art. South Fork is a small town, with its main tourist attractions in the summers for outdoor adventures. There is not much else around besides being outdoors, which is great to have the Rocky Mountains as the towns backyard but it is lacking in the sense of a place that can be for when you need a physical break. The remoteness of the location would not only help with seeing a more clearer night sky but it also sets the observatory as a destination in which one will venture on a journey. From the views and vistas, the people that share the adventure, and the time for reflection, something will be discovered along the way. The integration of science and art will be apparent in the architecture but also in the way people weave self with the mountain and cosmos.

1 Ottinger, Contemporary Cosmologies, from Cosmos (The Montreal Museum of Fine Arts) p.286

2 Retrieved from government website: History of the Southern Ute


West Bear Creek
Bear Alder Creek
Alder Creek
Middle Alder Creek
West Alder Creek
Bear Alder Creek
Middle Alder Creek
Bear Creek
Bear Creek

Project Emphasis

My design solutions for an observatory located in South Fork, Coloardo places emphasis on balancing the many different dualisms. The tension within the building brings observation to how people perceive conflicting sides and where they stand is positioning them in a different way while moving through the space.

In my research I began find relationships that blur the boundary and would bring out the inbetween-ness of two contrasting sides. The building is able to express this by the particpant still experiencing science and art in separate parts of the building, but then later is given both. This wholeness is a rather luxurious instance in which we do not have the opportunity to find moments in our everyday life. Times like these will lend itself an experience for any person to have this resonate in our bodies and continue to feel a presence that is everlasting. The fact that this is such a special experience makes the journey worth it as well as brings an overall heirarchy that is shown through this duration in the personal path one took to get to this very moment.

The history of ancient man and the Utes of Colorado has brought to my attention a poetic expression that helped further my interpretation of what this building can hold. My exploration through a series of artefacts led to an ironic take on extremes and led me to this path that creates this notion of "walking the line". I wanted this building to, similarly to Kiefer and others bring out this idea that humans still want to have a feeling of ownership and find believability in the things that we can find familiar and can grasp with our hands, eyes and ears. The moments where things become completely desensitized of our senses is where we begin to lose the special feeling of placement, within the microcosm and macrocsom.

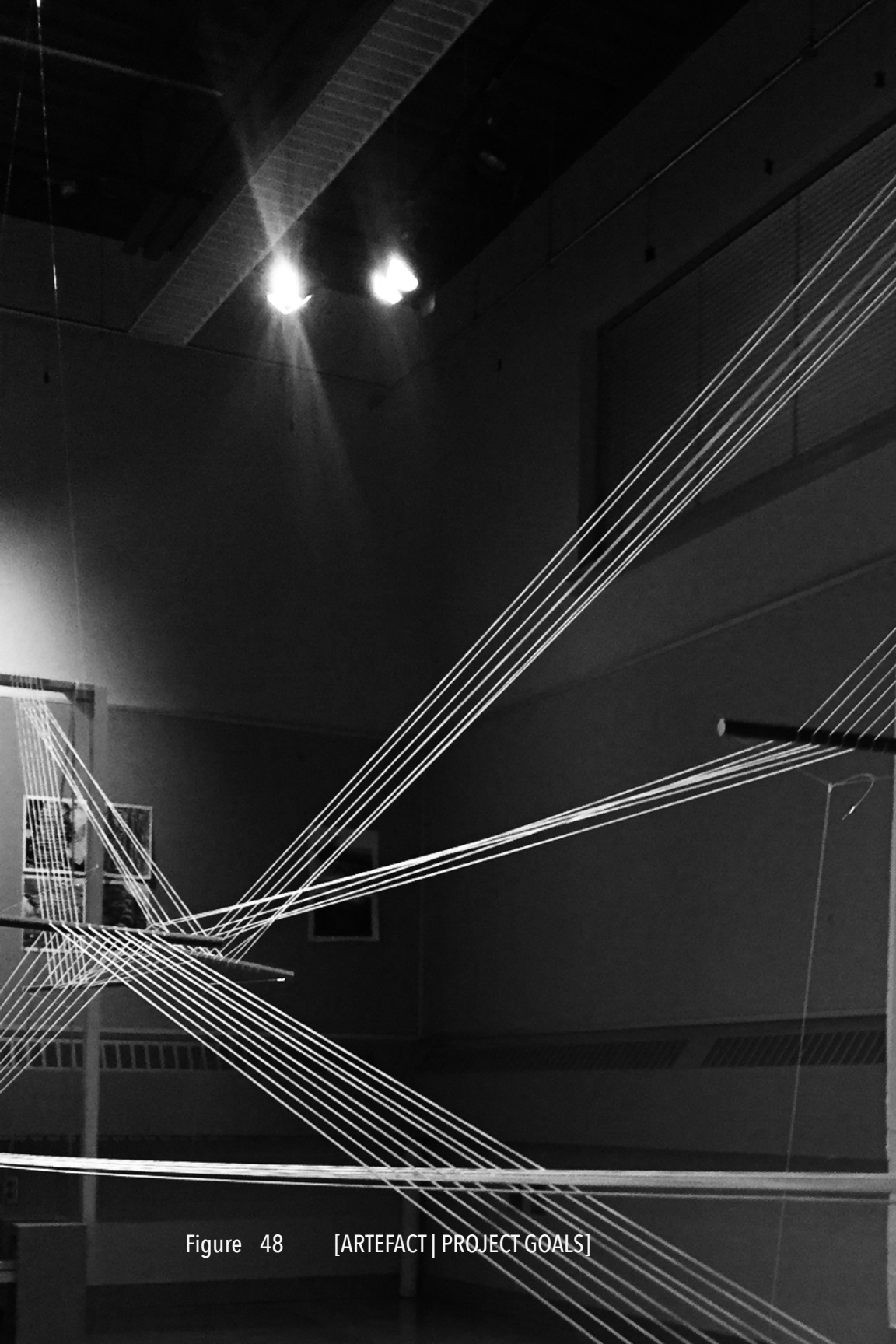


Figure 48 [ARTEFACT | PROJECT GOALS]

Goals of Thesis Project

The thesis project goals are based on the unifying idea of identity through space showcasing the interconnection between Cosmos, architecture and humans.

An observatory as architecture:

Observation has been a part of mans relation to the world since the beginning. It is hard to know exactly when observatories were being built for, but through this investigation I conclude that Brahe and Keppler had input on these moments. Buildings with other primary purposes started to have secondary notions and helped people understand time through creating special landmarks and building openings.

Multisensory experience:

The idea of being able to showcase architecture within an environment. This can bring an importance to how architecture is integrated in its surroundings and the affects it can have on both the environment and the occupants. Through my artefact, I had a continuous thread of the performer and the observer. In which, I would be interacting with the installation and others would be watching in the perpendicular view, to see a totality. Most of the time, the observers were never quite sure what I was doing or even what might be the end product, but that there was a time. There was a beginning and end with pauses inbetween.

Weaving self into the earth and stars:
Through this expression found in the artefact I investaged ways in which similar experiences could happen. The oscillation movement while ascending or descending the stair tower framed people to see the endless sky or the darkness of the mountain. Not only was there a contrast in which one was looking for a means of balance, but also, pauses throughout larger landings and walking paths to both the art exhibition section of the buliding where one can watch others weave.

Placing a critical view on science and art:

Note: art is standing in for architecture, that being said, science and art during ancient times were together and as time passed our minds changed and now we see art and science as two separate things. In my research and examples from my readings I would like my architecture to show that science and architecture can work in harmony and create a different understanding of the world through an observatory.

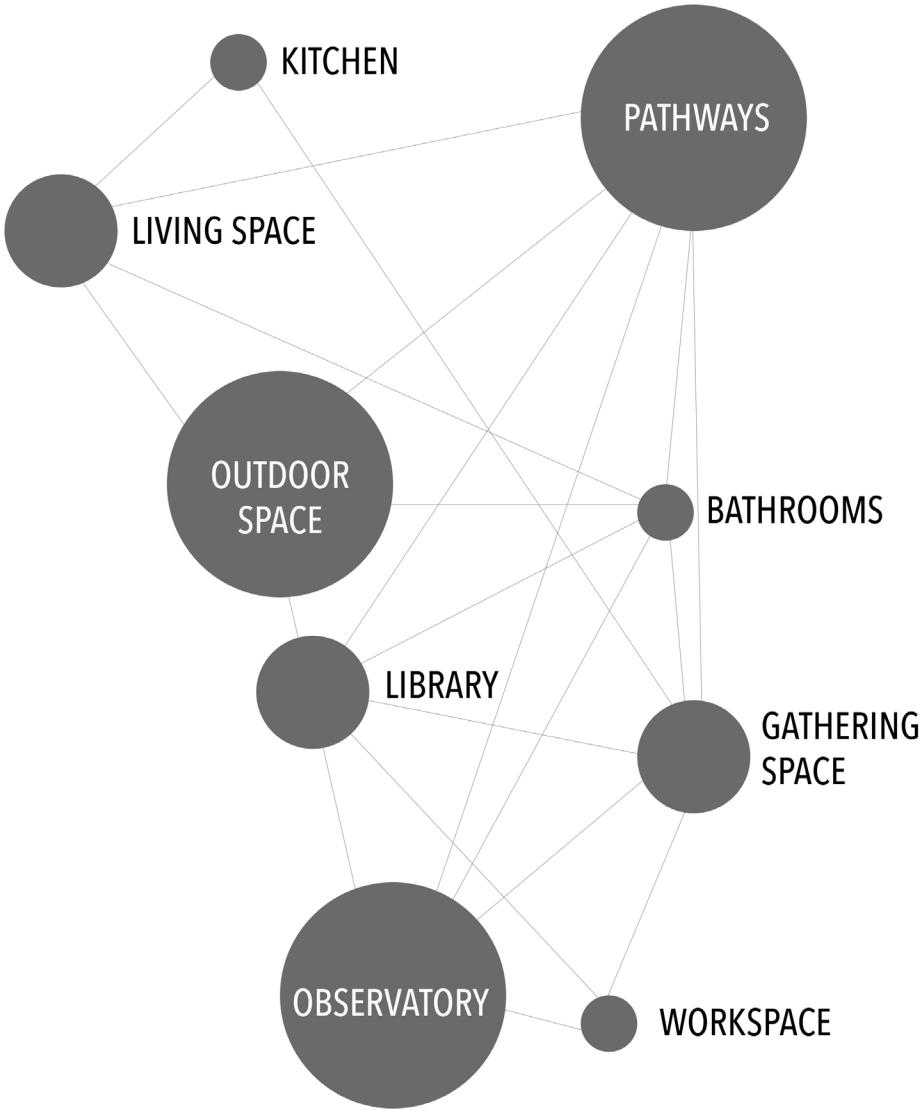


Figure 49 [MAJOR PROJECT ELEMENTS | DIAGRAM]

Major Project Elements

The size references the spatial importance and the lines connect the spatial relationships.

Primary Elements:
Observatory space
Tension between art/science
vertical/horizontal
Pathways

Secondary Elements:
Gathering space
Science Labs
Art Exhibition space

Tertiary Elements:
Archive
Restrooms
Storage

Other elements that may be included within these three subdivisions:
Outdoor spaces- gardens, trails, access to water, outdoor activities
Gathering spaces- event space, meditation, fire, lecture
Workspace- private space for viewing, studying, relaxing

The pathways hold a greater importance to my project because it is going to set the tone to how someone moves through the space. I would like there to be an overarching feeling of the ability to explore and feel free to linger within the certain spaces.

I found it to be important to breakdown experiences first public and private but then eventually led me to the three primary elements that I then took and broke down the overall connections between spaces and created a heirarchy to the specific use and importance of particpation within my project. The primary elements are for public use, the secondary elements are a mix of private and public use and the tertiary elements are private use.


RebuildBTree - InsertBTreeRecord failed with err 33 0x21
RebuildBTree numRecords = 78223
RebuildBTree - Record 11 in node 9477 is not recoverable
xxxxxxxx BTreeKey (length 48) xxxxxxxx
xxxxxxxx BTreeData (length 32) xxxxxxxx
RebuildBTree - numRecords = 78223
RebuildBTree record 12 in node 9477 is not recoverable
xxxxxxxx BTreeKey (length 48) xxxxxxxx
xxxxxxxx BTreeData (length 32) xxxxxxxx
RebuildBTree - InsertBTreeRecord failed with err 33 0x21
RebuildBTree - numRecords = 78223
RebuildBTree - Record 13 in node 9477 is not recoverable

User Client Description

Client 1: Artist

It will come with ease for the artist to be able to wander and be curious about how the architecture informs the art through scientific discovery. Although easy for the artist to see an experience art through science, the architecture will bring the artist through interpretations of observatories.

Client 2: Scientist

The enthused scientist will immediately find reasons why to go and experience an observatory. The architecture will have to open up the scientist to be able to think less and experience more. The pathways would be somewhat in control to slow the process and let the participant unwind. The building is unraveled through art and then science.

Client 3: Personal Journey

One is destined for a voyage in which many paths are taken. The divisions of how one gets there slowing begins to blur, similarily to how the horizon of the mountain and sky's edge blurs and finally how the art sculptures from the exhibition in the buliding blurs with the telescope from the astronomical observatory into one space, a place for unity and reflection.

This observatory is primarily for people to voyage to and find a better sense of placement in the world; looking beyond self. The adventure to get to the building is important and showcases importance of paths, due to the stairway and how it is both joining and separating the parts to this building. The tension is placed and brings awareness both the separation and joining between eaching section of the building. The people that particpate in the building will walk away with a better understanding of where they place themselves among this greater whole and learn or experience something that is both familiar and also different. The irony is what settles the duality in my architecture and only the relationship discovered through the revealing and concealing in paths and the duration of vertical understanding to the building with the horizontal understanding.

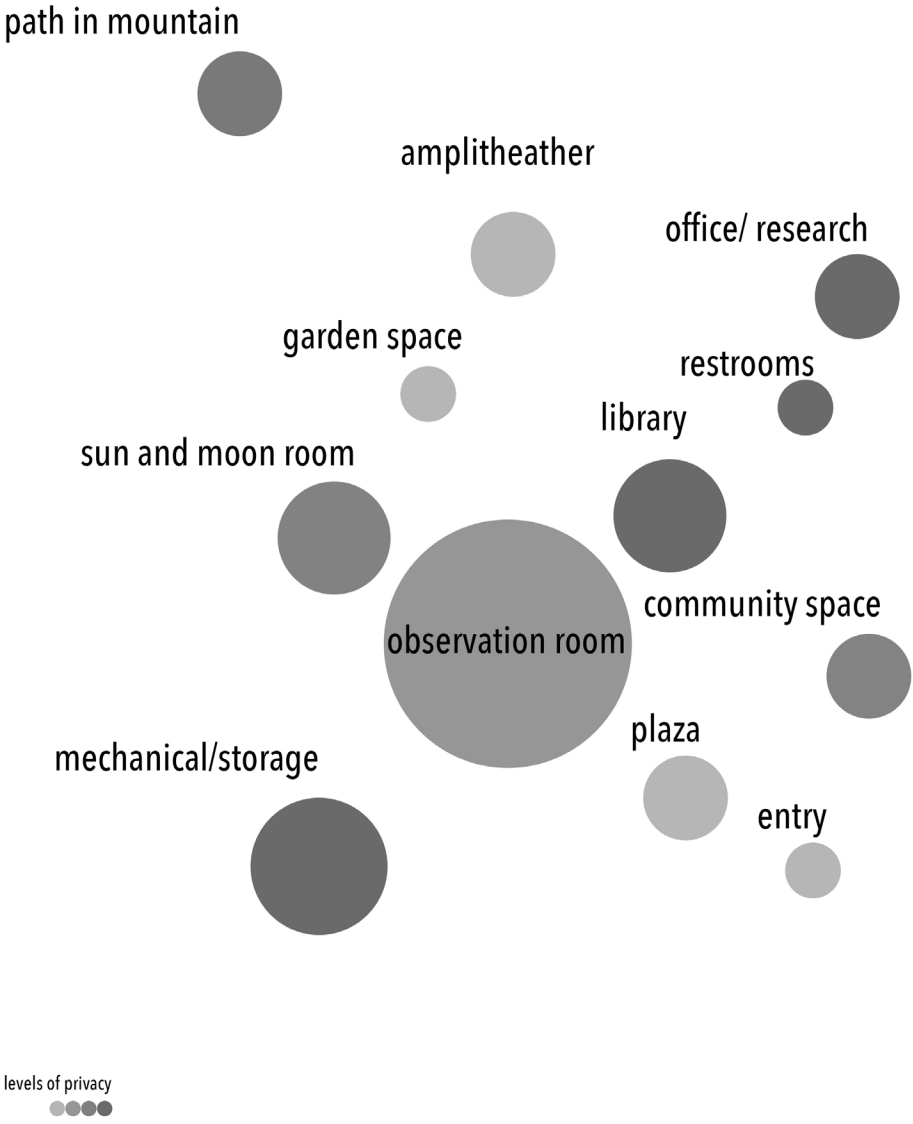


Figure 50 [SPACE ALLOCATION | DIAGRAM]

Space Allocation Qualitative

Openings to the sky

Most of the lighting can be used from natural daylight and will need to be developed in specific rooms to create a strong presence within the space and to be able for the space to live up to its full potential. Views of the nearby mountains and vistas as well as the natural light from the sun pour into the space for a more intimate feeling. The stairtower is framing both the infinite light sky as well as the darkness of the heavy mountain.

Impact

Relationships between the sequences of spaces will invite one to slowly open up to new discoveries. The stairs are designed in a way for the steepness of the mountain to be taken notice but also the irony of the heavy concrete planks suspended by strings in which orchestrate a unity. The final reveal, consumes our senses and places us in a way that lets us experience the cosmos in a personal setting.
Balance of both new and old joins man with the Cosmos. People that experience this are brought full circle through their time leading up to now and how they may place themselves in the universe for the future.

Duration of stay

The primary time for one to view and experience the observatory will be shortly before sunrise or after sunset. Another important consideration would be specific cosmic events such as moon phases, meteor showers, planets, equinoxes and solstices. Colorado is known for clear skies majority of the year, which increase the hours of operation annually compared to some.

Environment Needed

The atmosphere on a mountain is thinner, which is good to help see the stars and planets in the night sky. A remote area is necessary for all of the stars to be visible with little to no light pollution.

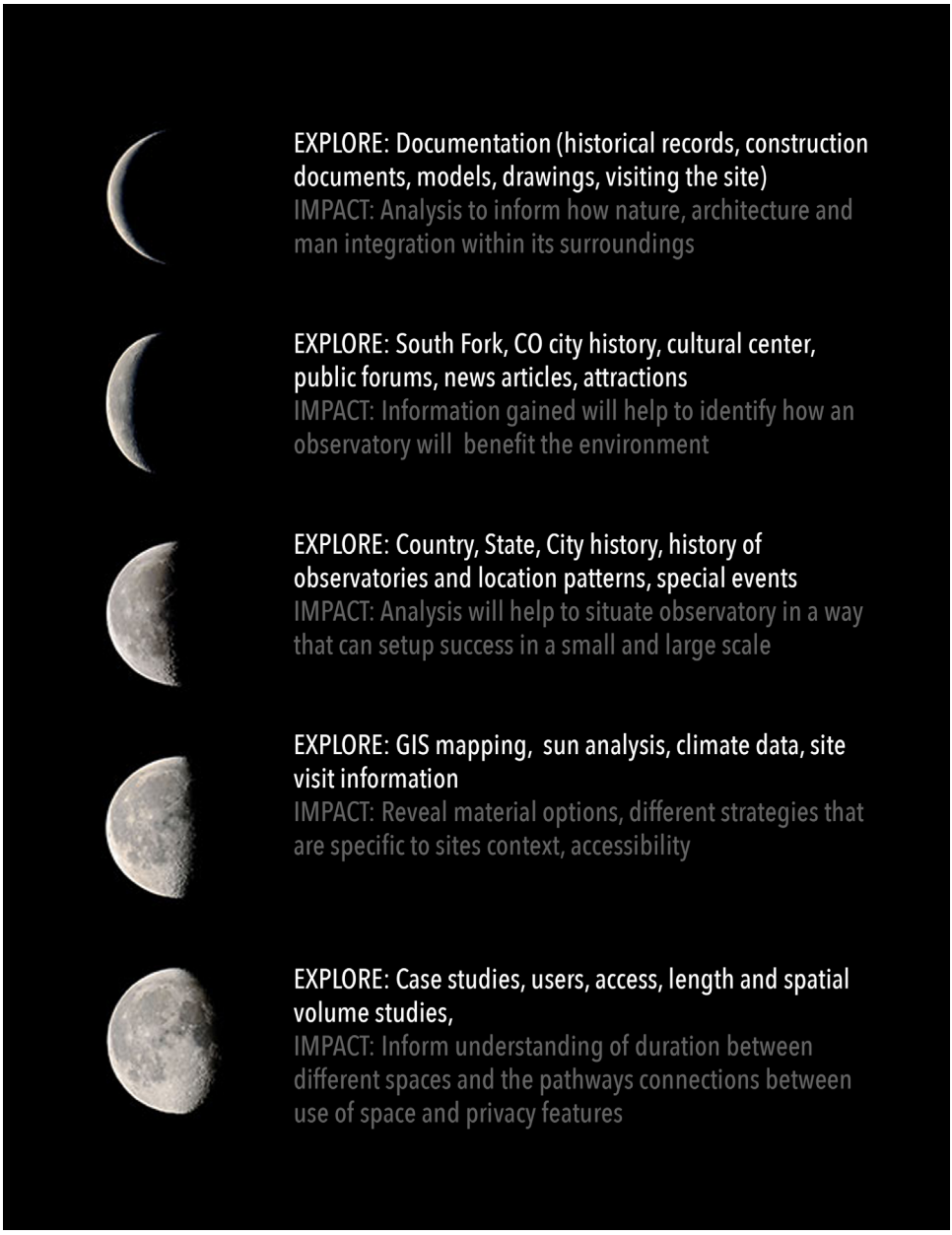


Figure 51 [MOON PHASES | PART 1]

Plan for Proceeding

Definition of Research Direction

Theoretical premise/ Unifying idea:

-Precendents of observatories in history and its evolvement
-Precedents of construction methods, integration to site, spatial organization and use of natural light
-Identify historical views of nature, architecture and man
-How does an observatory become a destination?
-What can an observatory tell us about the way we participate in the world?

Typology:

-Identify client/ community goals and values
-What can an observatory offer socially, economically and culturally?
-How is one able to establish a desire to go to an observatory?
-How does an observatory relate to something beyond itself?

Historical Context:

-How has an observatory participated with humans before?
-In what ways has an observatory evolve through art and science?
-What type of people go to an observatory?
-How can my project use history to inform today?
-Why was an observatory important then and how is it important now?

Site Analysis:

-What opportunities are formed with integration of the site?
-How can light be used in a space in a specific way?
-How is the site used in the past, currently and are there plans in the future?

Program Requirements:

-What spaces are used for wandering?
-How does one person experience the space compared to a group?
-How is the environment inside compared to outside?

Figure 52 [MOON PHASES | PART 2]

Plan for Proceeding

Design Methodology:

-Theoretical premise/ unifying idea
-Topic research leading to discovery of new ideas and tools to help answer questions
-Forming critical design opinions
-Test new ideas and tools
-Provide a solution that meets the goals and values to the participant

Quantitative Analysis:

-Interpret data/ information through investigations
-Interpret analysis to inform design decisions

Qualitative Analysis:

-How does the solution meet the goals and values?

Documentation of Design Process:
Tools and Medium for Documentation

-Hand Sketching
-Making an Artefact
-Hand Modeling

Softwares for Investigation and Representation:

-Autodesk AutoCad
-Autodesk Revit
-Sketchup
-Adobe Illistrator
-Adobe InDesign
-Adobe Photoshop

Publication of Material:

-NDSU Institutional Repository
-Hard cover book format

Documentation Organization:

-File labeling: Year-Schuman_Thesis_Name_Document Type
Example: 2015-Schuman_Thesis_Siteplan_HandDrawing

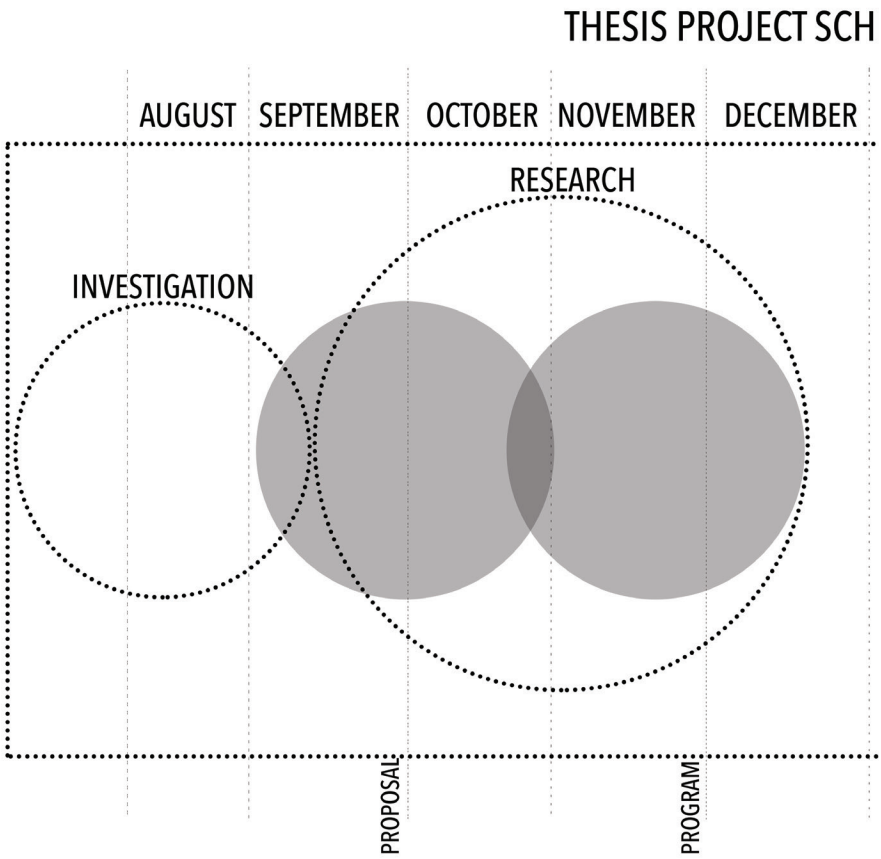
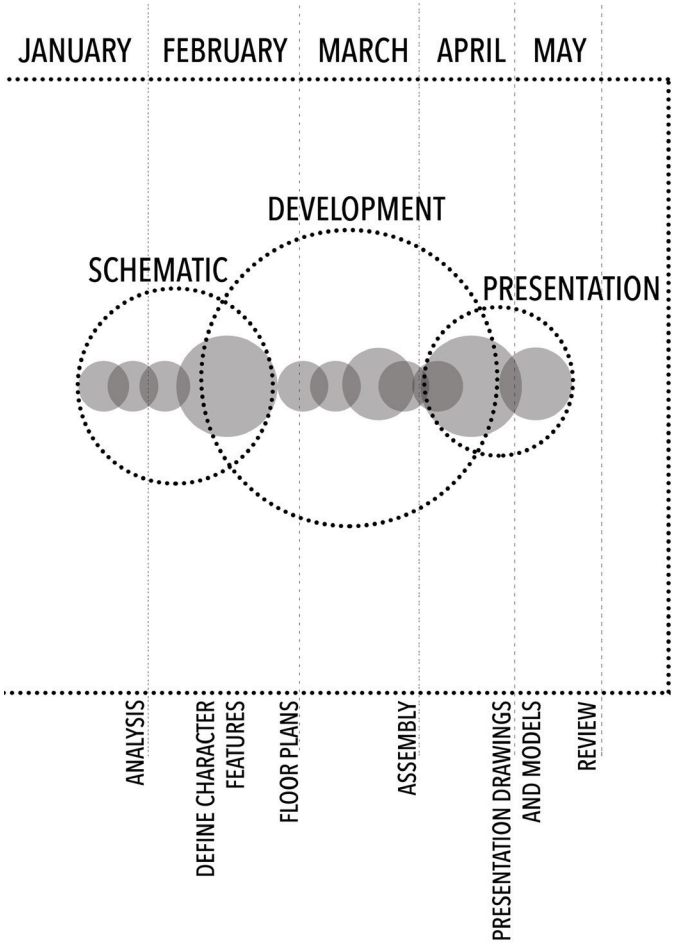
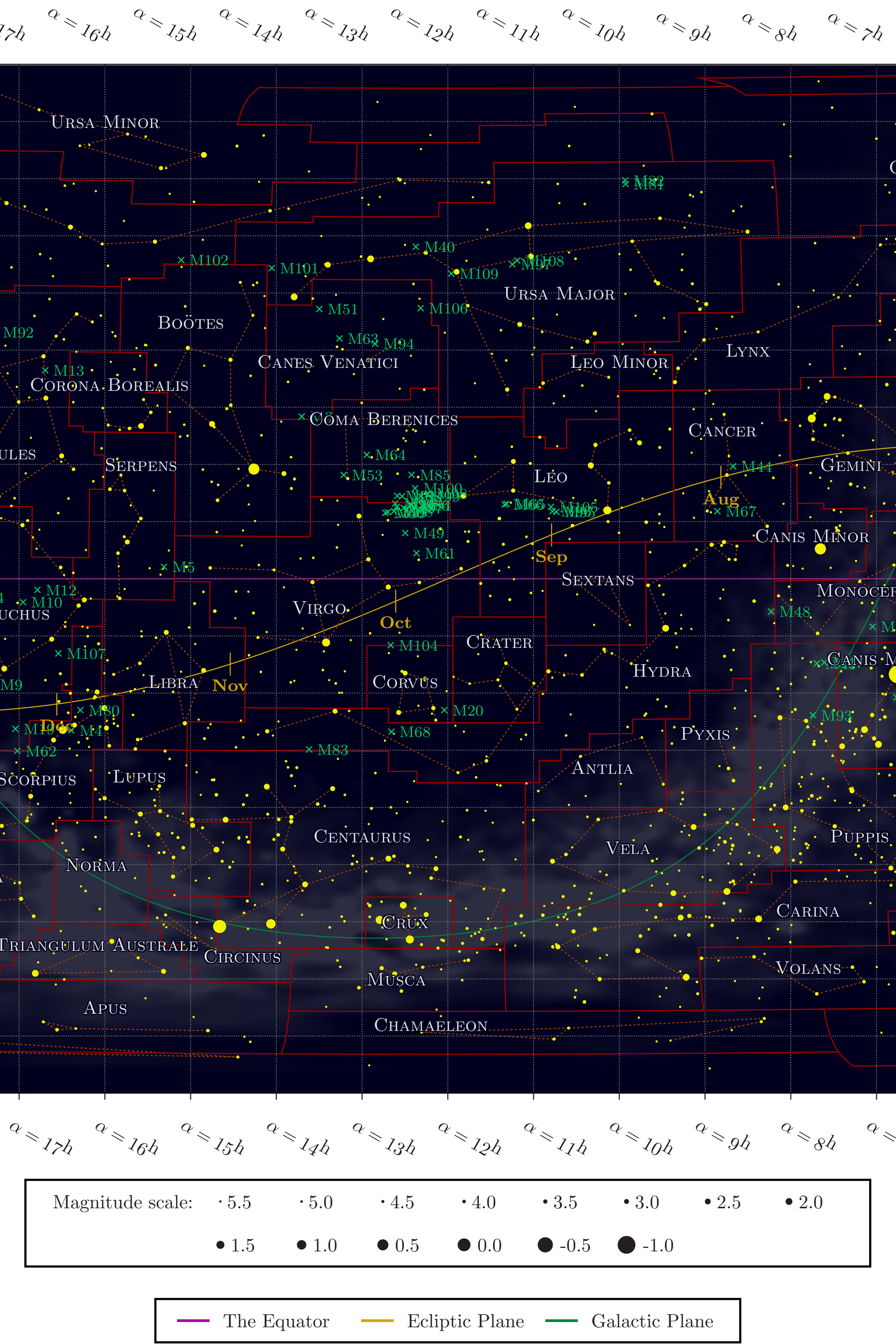


Figure 53 [THESIS PROJECT SCHEDULE | DIAGRAM}

EDULE


JANUARY
FEBRUARY
MARCH
APRIL
MAY
DEVELOPMENT
SCHEMATIC
PRESENTATION
ANALYSIS
DEFINE CHARACTER FEATURES
FLOOR PLANS
ASSEMBLY
PRESENTATION DRAWINGS AND MODELS
REVIEW


α = 16h
α = 15h
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α = 10h
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Ursa Minor
Ursa Major
Boötes
Canes Venatici
Corona Borealis
Leo Minor
Lynx
Coma Berenices
Cancer
Serpens
Leo
Gemini
Canis Minor
Sextans
Monoceros
Virgo
Crater
Hydra
Libra
Corvus
Pyxis
Scorpius
Lupus
Antlia
Centaurus
Vela
Puppis
Norma
Carina
Crux
Triangulum Australe
Circinus
Volans
Musca
Apus
Chamaeleon
M82
M81
M40
M108
M97
M102
M101
M109
M51
M106
M92
M63
M94
M13
M64
M53
M85
M44
M67
M49
M61
M5
M12
M10
M48
M104
M107
M9
M20
M80
M4
M19
M62
M68
M83
M93
M66
Aug
Sep
Oct
Nov
Dec
α = 17h
Magnitude scale:
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
The Equator
Ecliptic Plane
Galactic Plane

MANS UNDERSTANDING OF THE UNIVERSE

500-300 BC
Pythagoras believed Earth was in motion and had knowledge of the relationships between the planets, moon and sun.

Aristotle taught the planets, moon and sun were rotating spheres that moved around a stationary Earth.

200 AD
Claudius Ptolemaeus proposes the Earth to be at the center of the universe, with the sun and planets revolving around it.

1500
Nicolaus Copernicus viewed the sun as the center of the universe along with several other astronomers.

1600
Tycho Brahe realized a flaw within the idea the if Earth was moving around the sun, then the stars positions should change as viewed from different positions while in orbit. Brahe proposed a system in which the planets other than Earth orbit the sun while the sun orbits Earth.

1609
Johannes Kepler uses creates a heliocentric model that argues a finite universe. Kepler believes that the planets moved in ellipses and not perfect circles about the sun, known as the laws of planetary motion.

Galileo Galilei also supports the Heliocentrism theory, as he observes the moons of Jupiter.

1905-1915
Albert Einstein publishes the Theory of Relativity, stating that space and time are not on separate continuums. Einstein agreed with Mach's Principle, stating the mass of a body is finite, and is determined by all other matter therefore, the universe must be finite.

1929
American astronomer Hubble discovers a red shift in distance, meaning that the stars and galaxies were moving apart. This evidence would hold truth that the universe is expanding.

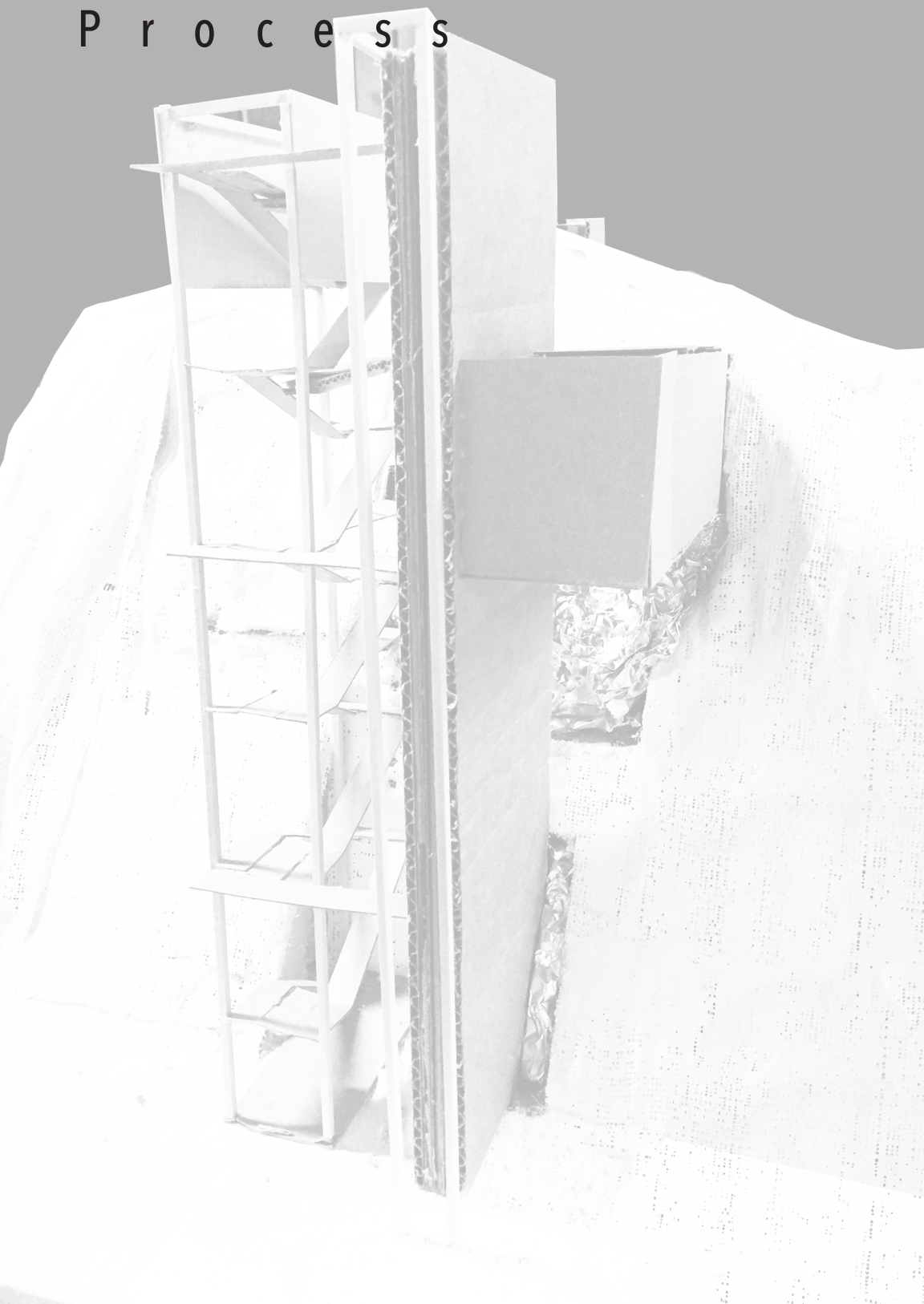
Einstein is swayed by this argument and changes his mind about the universe being finite.

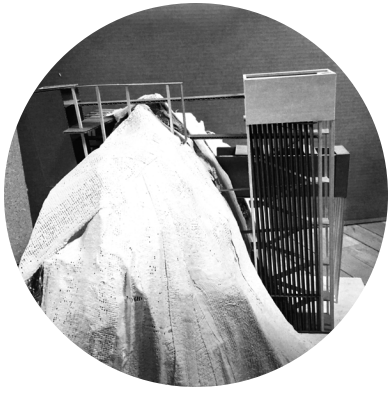
Intro

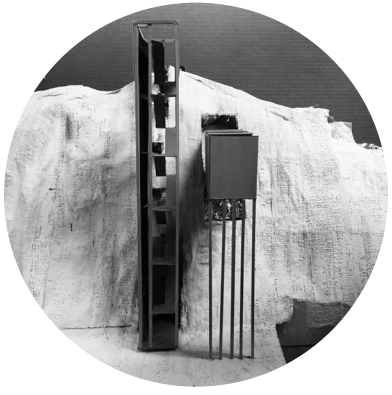
Artefact

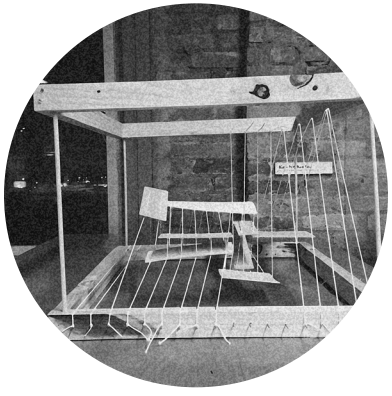
While walking the line there needs to be an overall balance, as these two looms set in notion the inbetween moments; such as science and art, above and below, earth and sky, seed and stars, microcsom and macrocsom, interlocking one another to create a whole. It is in the halves that make us whole, the extremes where we find balance, between the dualities. The edge of the mountain meets the edge of the starry sky and is faced with humans in the center as they weave together to form a constellation. tracing time in the path marked by the stars. The remains of the stars and earth make up the self to join the interconnectedness as we explore time.

Process





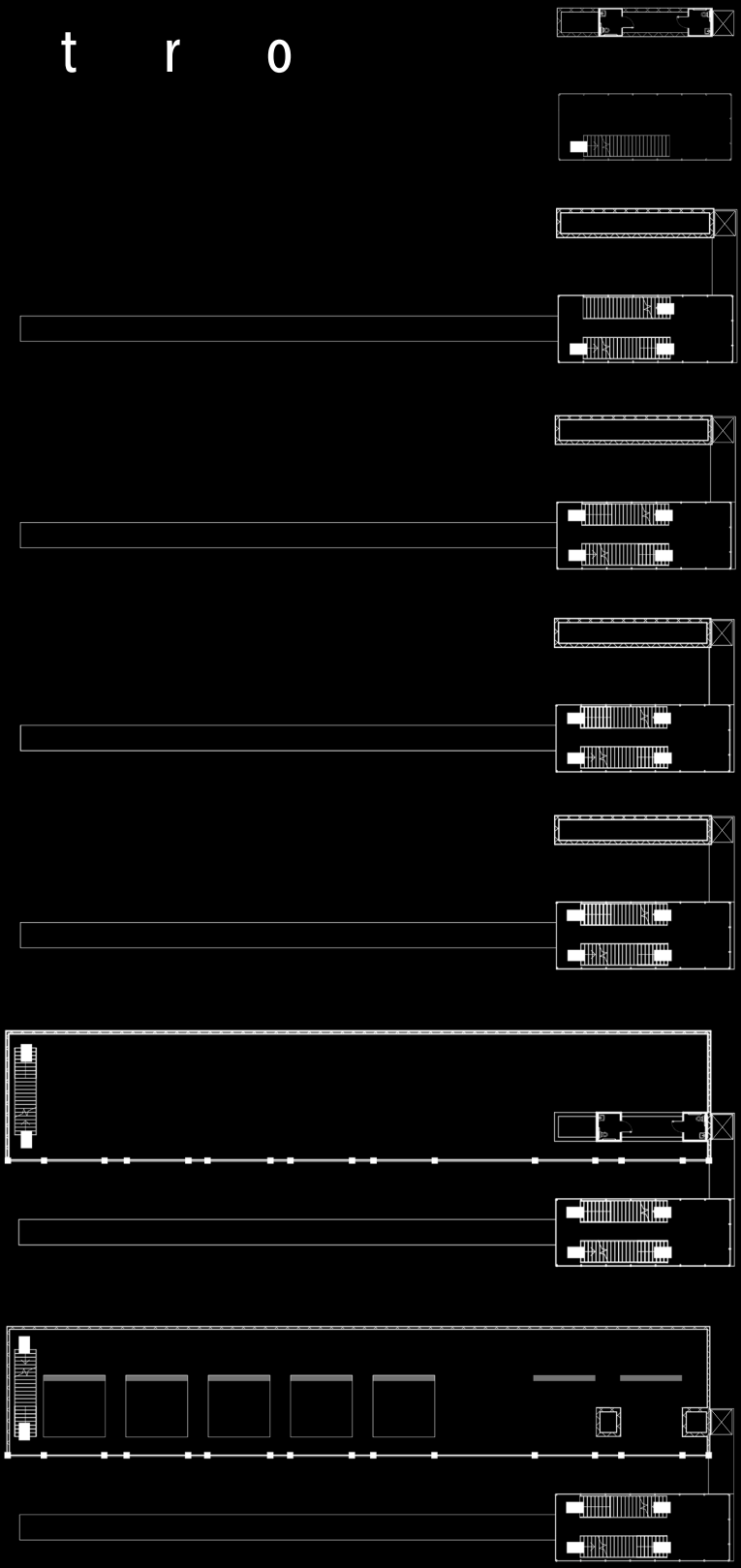


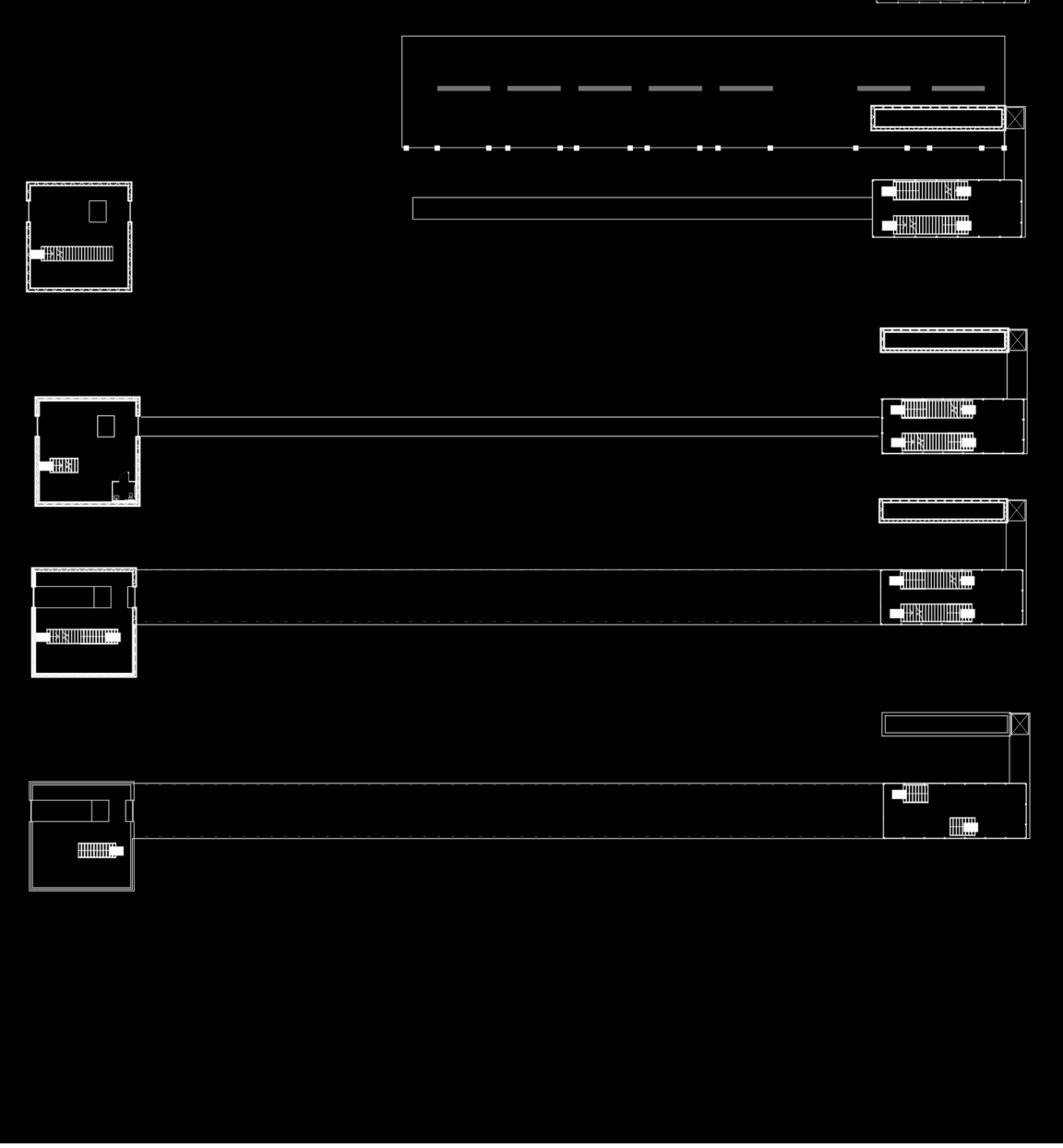


Translation

The bottom drawing marks one of my first attempt to create an archiectural solution. The mountain is strings in which hold up the building and brings everything together, similarily to that of the two looms. The other images are more closely related to my final architecture. The balance between the vertical and horizontal spaces also brings a means for separation and even moments that of tension.

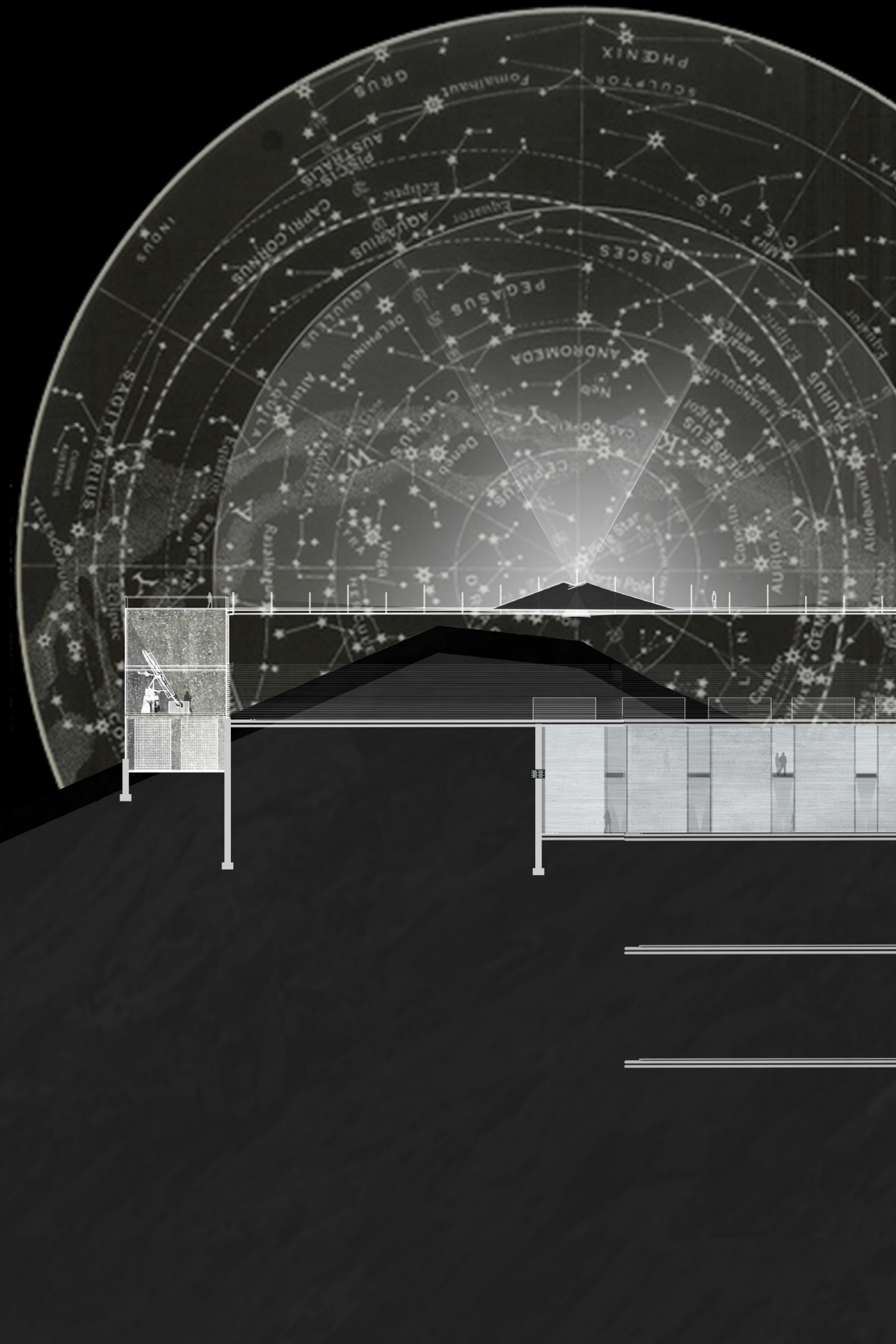
I n t r o

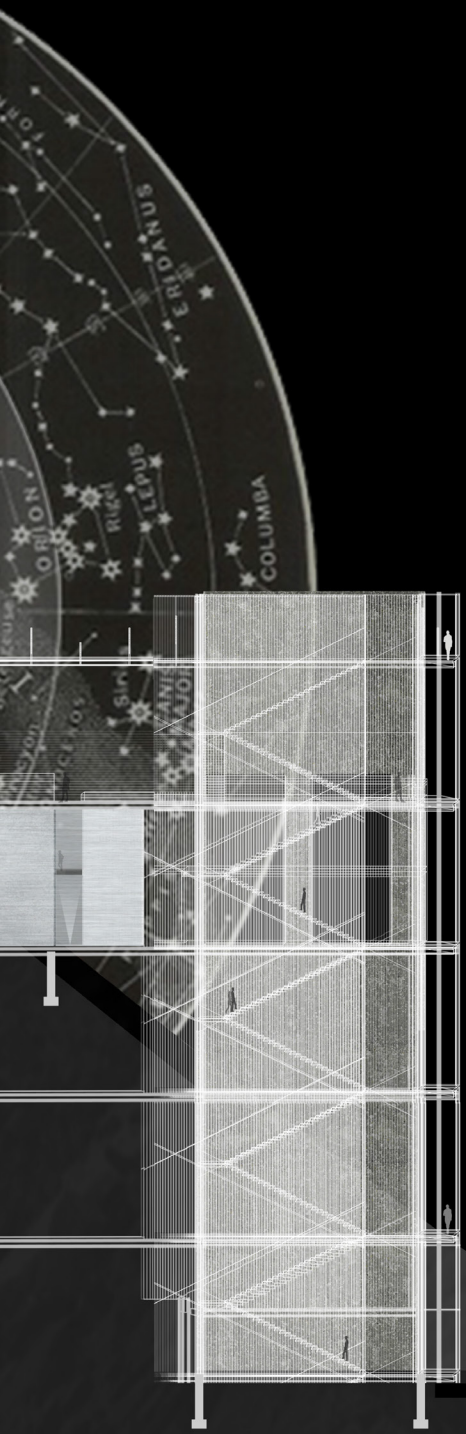


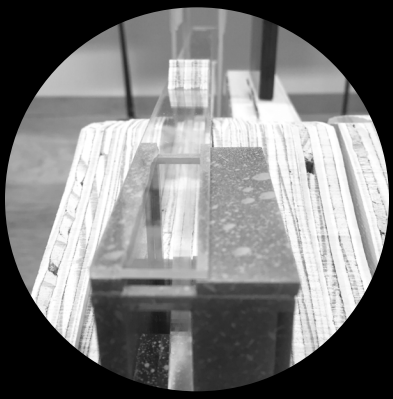


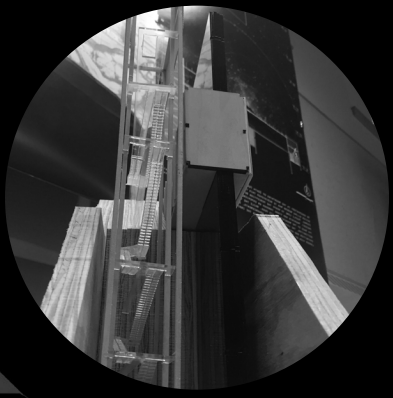
Architecture

As the translation to architecture formed, spaces were delineated for the participant to clearly understand the spaces within the building, but not until one expereiences the spaces, will they fully understand the relationship that is carried. The gondola lift is the first encounter of the site in which the people are engaged and begin to explore with a sense of arrival. The line of the gondola runs paralell with the overall form of the buildings linear circulation. Throughout the course of experiencing the spaces, one is able to look at it from a single thread to a woven fabric in which the path has lead to this very moment, and to this very place.


PHOENIX
SCULPTOR
GRUS
Fomalhaut
AUSTRALIS
PISCIS
CAPRICORNUS
Ecliptic
Equator
AQUARIUS
CETUS
PISCES
PEGASUS
EQUULEUS
DELPHINUS
ANDROMEDA
Nebula
CASSIOPEIA
CEPHEUS
Deneb
ALTAIR
AQUILA
SAGITTARIUS
Vega
Polaris
AURIGA
Capella
Aldebaran
TAURUS
Hyades
Pleiades
Rigel
Sirius
Procyon
Castor
Pollux
GEMINI
LYNX
Ecliptic

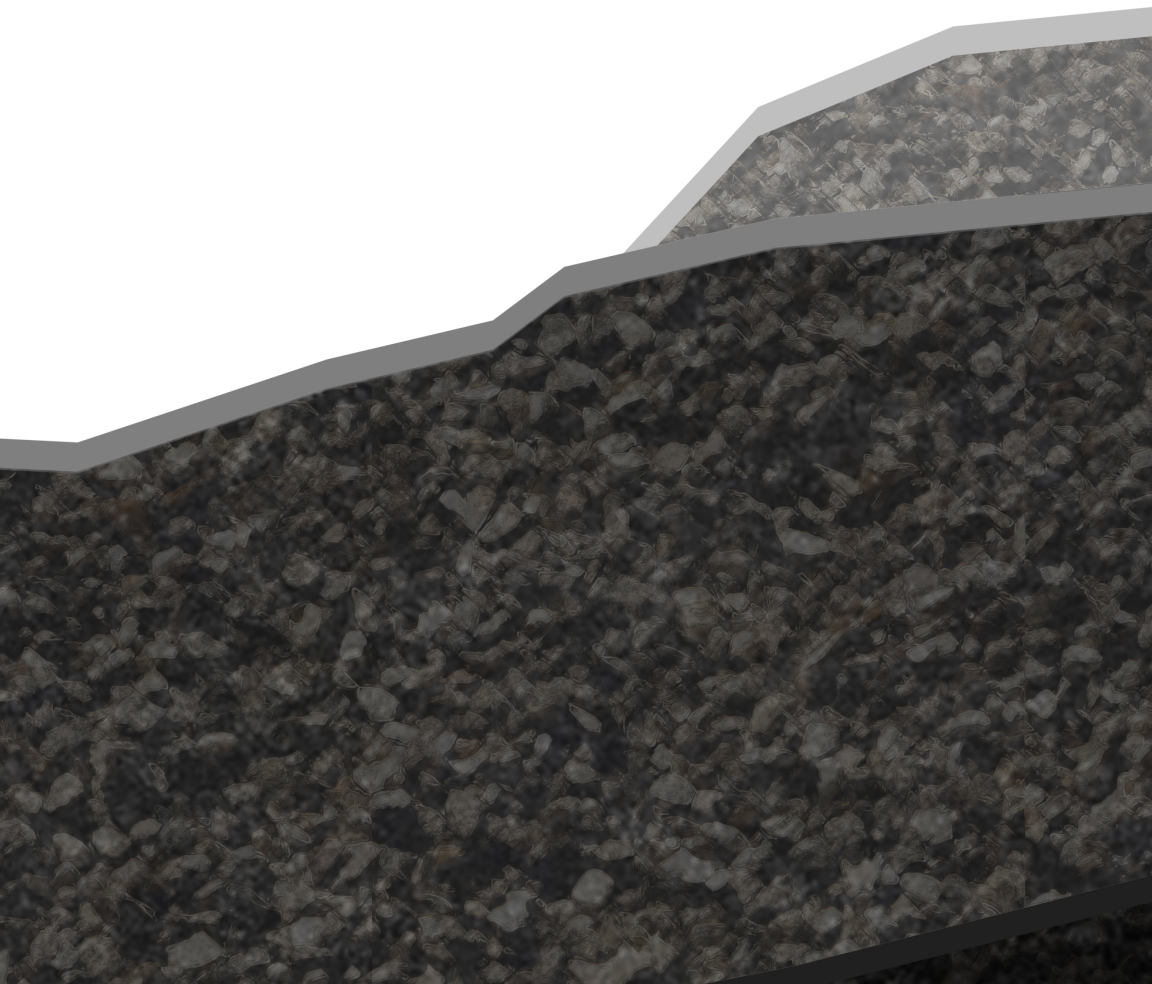

ERIDANUS
LEPUS
COLUMBA
ORION

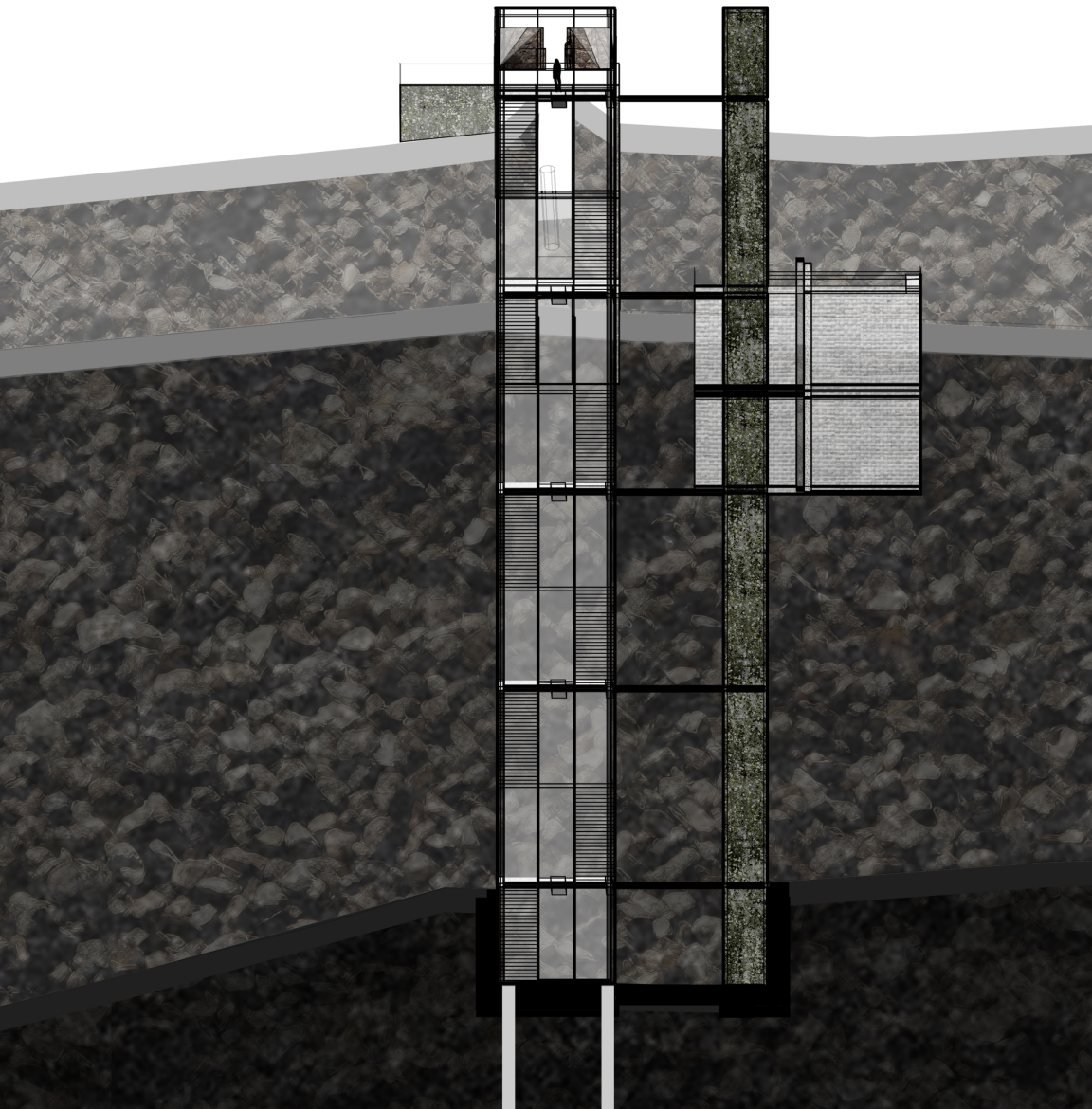


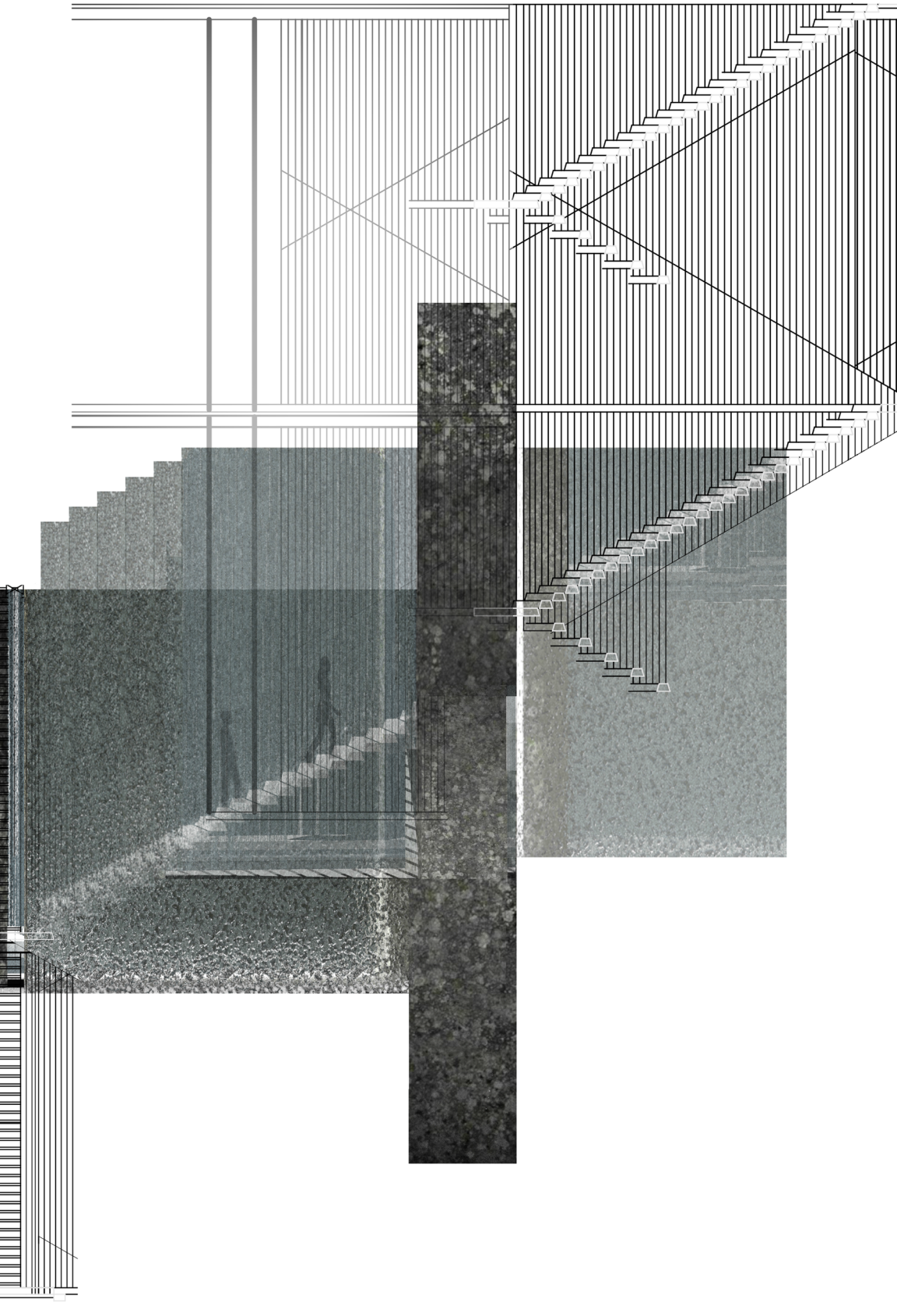


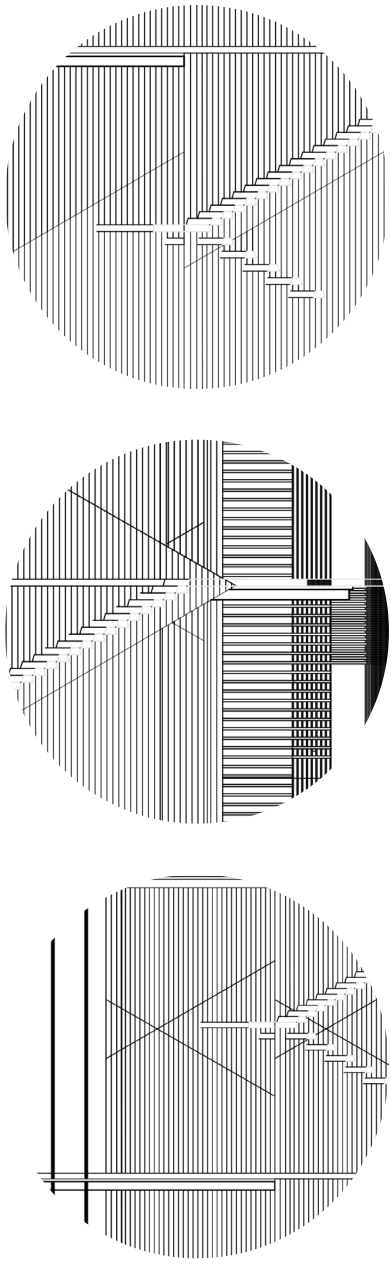
Architecture Analysis

This architectural design has been sucessful in what my project set out to achieve. A pinnacle observatory brings together the dichotomy of science and art, as well as many other polarities. The purpose is to join humans to the cosmos through the polarities and to create a stronger understanding of these contrasts through an irony. The irony has been displayed through inbetweens and tensions that interlock into a holistic design. The voyage to the site and the time it will take one to experience the space is quite a comitment and is celebrated at the top, where everything is repositioned into unity. The process of my research, exploration of artefact and architectural models have set forth a pace in which is similar to the cycles formed into the cosmos as it relates to time, showing traces of the past and leading one self to the future.



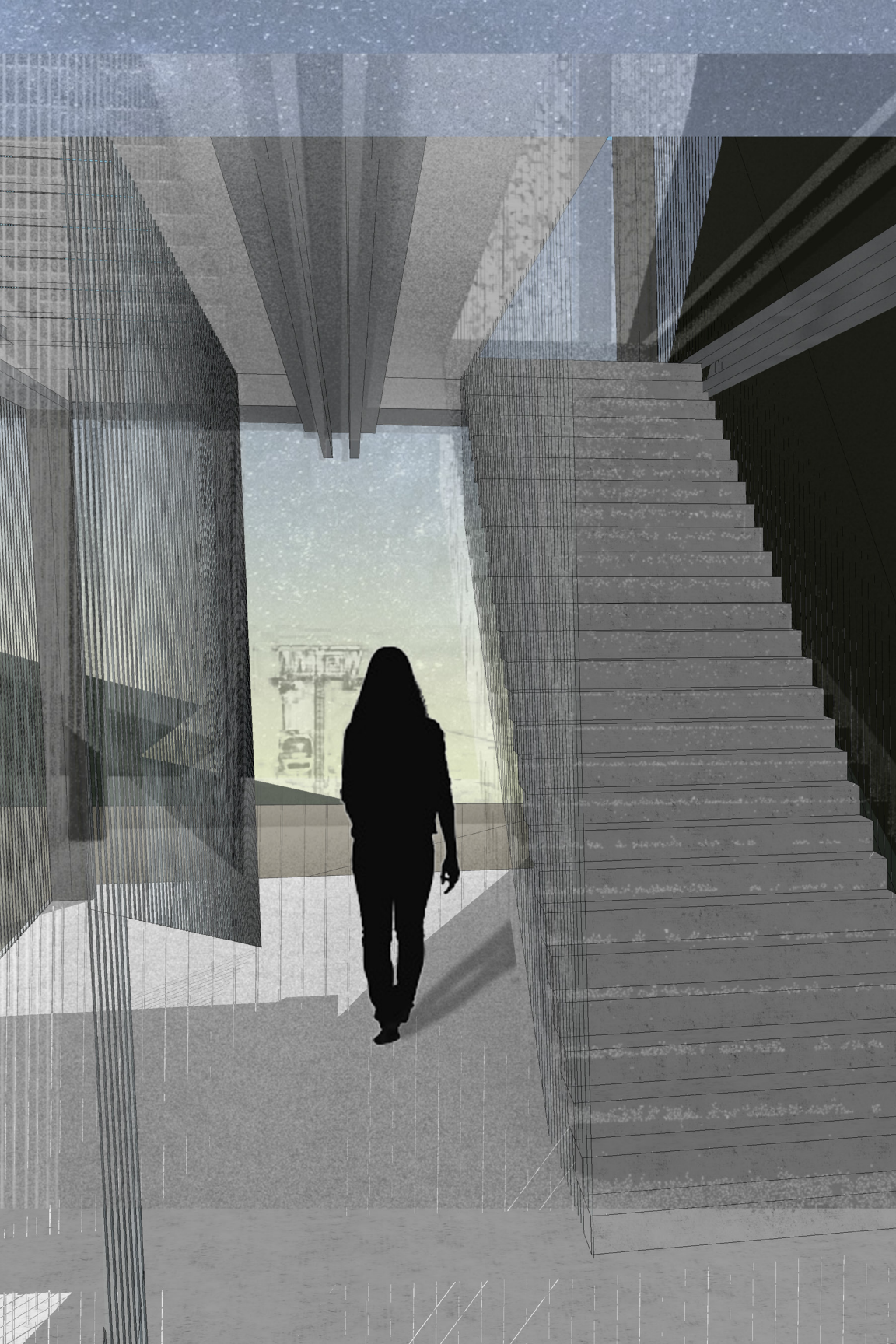


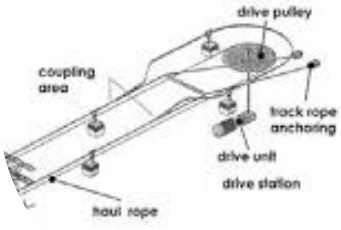


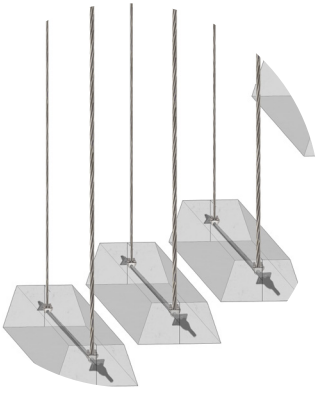


Stair as Plinth

The structural details above are highlighting moments of connections. The top group of stairs near the landing extend pass the others and are fastened to the internal wall, enclosing one self before reaching the landing and letting the opening from the landing as vertical space. The stairs are tied to the landings, with an angle that mimcs the slope of the mountain and telescope. The wire mesh is used as a skin, it is a breathable layer.

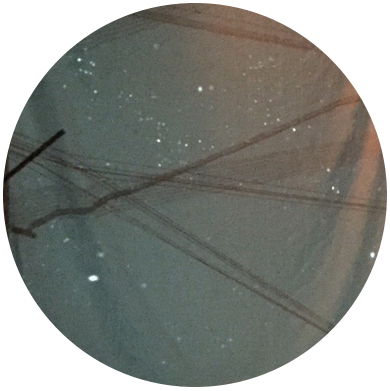


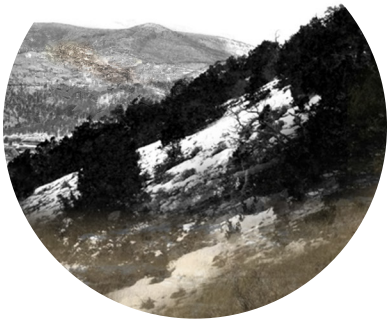




Into the Mountain

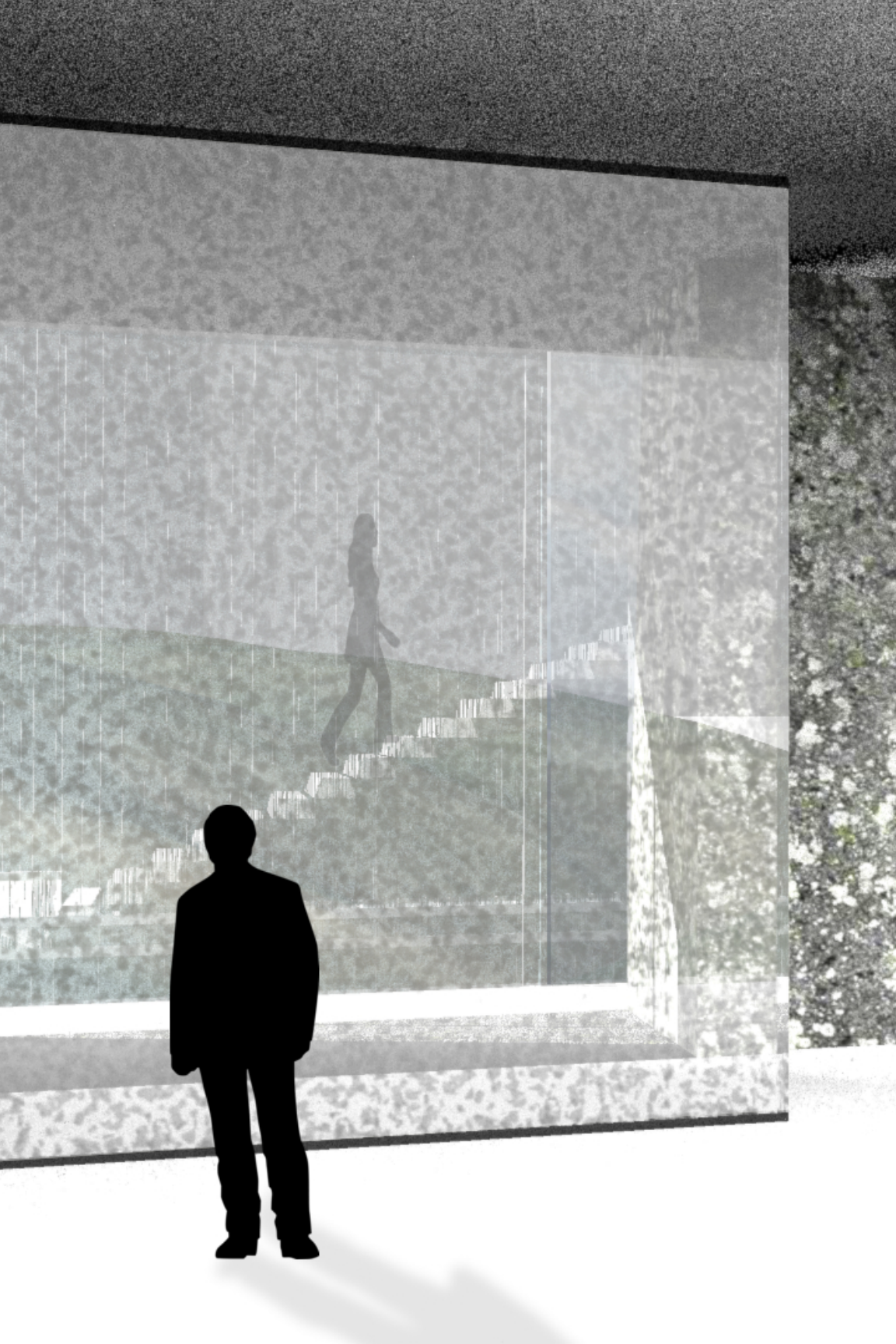
The strands of my artifact have woven together the gondola lift connections as well as the stairs. The movement from the gondola is very different to the entry in that of which gradually becomes darker. The light is mimal here, and the mountain becomes aparent in a more grander scale. The darkness is offset from the lightness previously experienced.





Framing the endless sky

The stairs oscillate views between the mountain and the sky. The sky appears to be endless with such great height. The singleness of the body is more and more apparent as one begins to lose sense of sclae of self, and through the long duration of the climb closer to the stars above. The embers recollected from the town is reappearing as a starry sky.

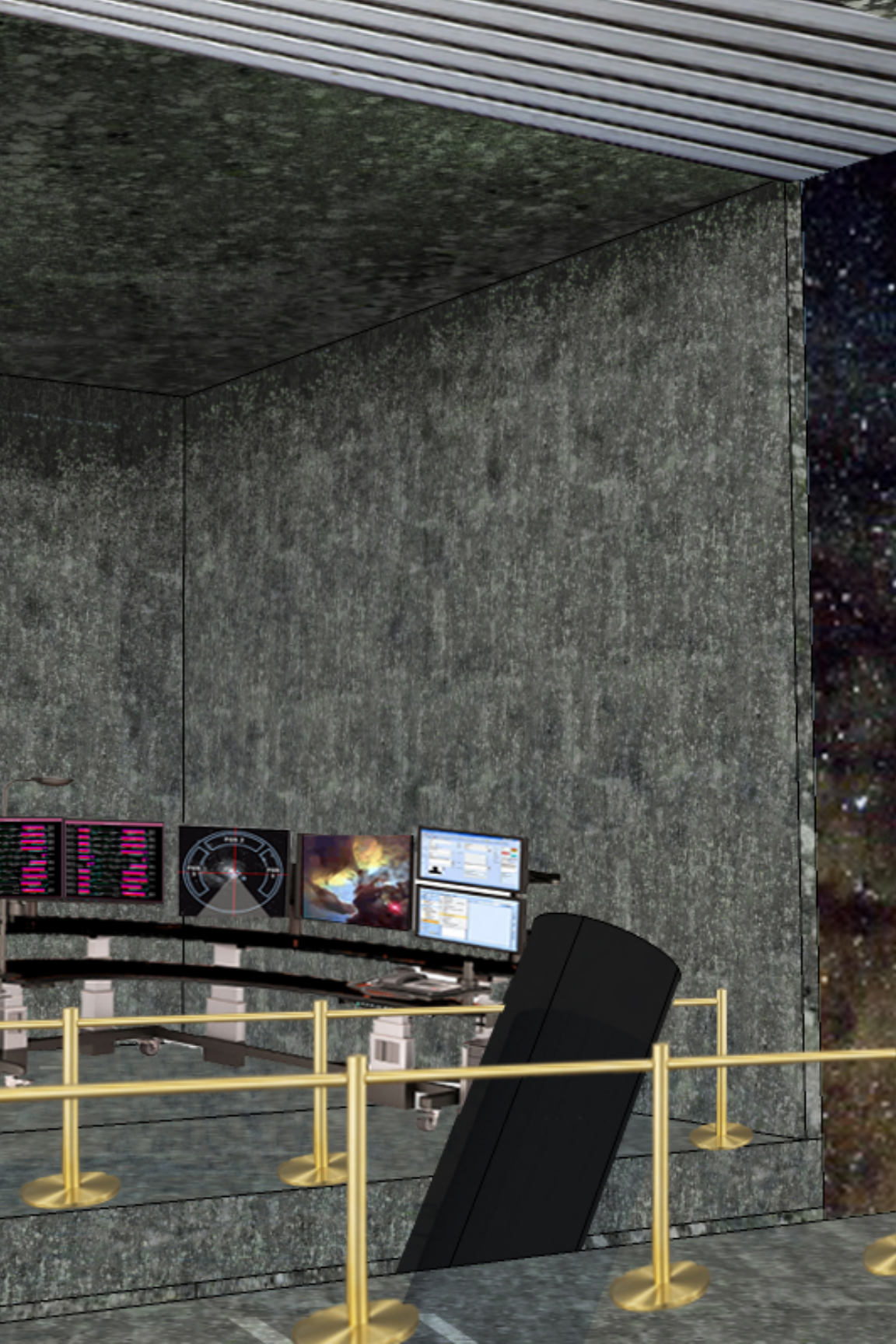


Watching People Weave

Moments of self reflectance is found through moments where people are watching others move in the same way that they moved. The people appear to be weaving self with the mountain and stars. The skywells are able to let in light and also bring another layer in which bring the light through a space and in turn can be perceived as stars with the resin texture bringing in forms of the stars, to the earth. The architecture is able to use qualities found in both the mountain and the cosmos and join with man through many layers.

Slit of the Mountain

The peak of the mountain is carved away. Structurally braced with steel cables, to show the removal of the mountains peak and to frame the views opening up to all the sections in the building. Bracing from the mountain, recalls the wire mesh skin that one becomes familiar with while stitching self into the web of stairs. An astronomical observatory is grounded within the mountain and uses the slit to form a opening so that the telescope move freely to see full range of the stars. This tension is provided by the mountain and technology and how we have overtaken parts of nature and history to help better understand what was there. The mountain is still being preserved and protects the equipment as well as brings an experience of closeness to the earth back into the realm of our tools in which we choose to see the cosmos.



Telescope + Technologies

The pulley system created for the delicate strings in my artefact threads the sticks to lift up the looms and create a constellation. The pulley system for the roof of the science building and the stair well wrap around the face of the building opening up to the stairs above. Unraveling the steel openings have a quality of intrigue in a similar way the sun falls and the moon rises.

The telescope is a tool in which we use to understand the cosmos. It raises and lowers so that one can adjust to meet the needs of creating a sucessful view. Telescopes have many advancements that we may never believed possible before. This careful procedure of calculations brings together a view. However, the beautiful scenery and experience in which it is held in, does not compare to what surrounds it. These fantastic images, feel sterile and so small compared to the experience one can feel right outside this room. Below an archive is stored and shares images of what we have been able to capture through the hubble telescope findings as well as discoveries scientists from all over the world have researched. Time is missing in these images, time and space feels immeasureable and therefore loses touch with humans. Today, there are artists in which are hired to take images from telescopes, like the Hubble, and add humanistic qualities. As one visits this space, they may first feel like this is the cosmos, but somehow after seeing so many, become unenthused.

The detailed moments highlighted above correlate to my artifact and bring oppotunity for one to find wonder and intrigue of the railing stringing moments in time to form a constellation.

Facade to the Sky

When the sky is revealed at the top of the building, another form of an observatory is expressed through the open sky. Part of the mountains peak is placed on the walking path and is meant for one to lay to meet the sky horizontally and in turn interlocking self with both the mountain and sky in a completeness that was found through the path of the building. One is humbled by the night sky and the mountain and has moments of feeling both very small and large in the woven fabric of dualities.

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Personal Identification

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Figure 30 [PERSONAL IDENTIFICATION | PHOTO]

Previous Studio Experience

Second Year:
Fall 2012 Joan Vorderbruggen
Tea House | Fargo, ND
Site response and integration into a conceptual building
Boat House | Minneapolis, MN
Spatial relationships and connections in design
Spring 2013 Rhett Fiskness
Jazz Dance Studio | Moorhead, MN
Incorporation of a parti as inspiration for design
Sensory Building: Temperature | Fargo, ND
Designing with a main focus, working with surrounding site

Third Year:
Fall 2013 Steve Martens
Wild Life Research Facility |
Designing for specific needs based on user
Wellness Spa | Chaska, MN
Using materiality and incorporating strong histoical context

Spring 2014 Frank Kratky
Steel Recycling Center | Fargo, ND
Focusing on sustainability and creating public awareness
Youth Center | Chicago, IL
Engaging the community and providing a healthy environment

Fourth Year:
Fall 2014 David Crutchfield
Highrise | San Francisco, CA
Extensive research and investigation under a strict schedule
Spring 2015 Paul Gleye
Concrete Plant and Urban Development | Brussels, Belgium
Providing a detailed analysis and setting up stages for construction of area on a larger scale over time.