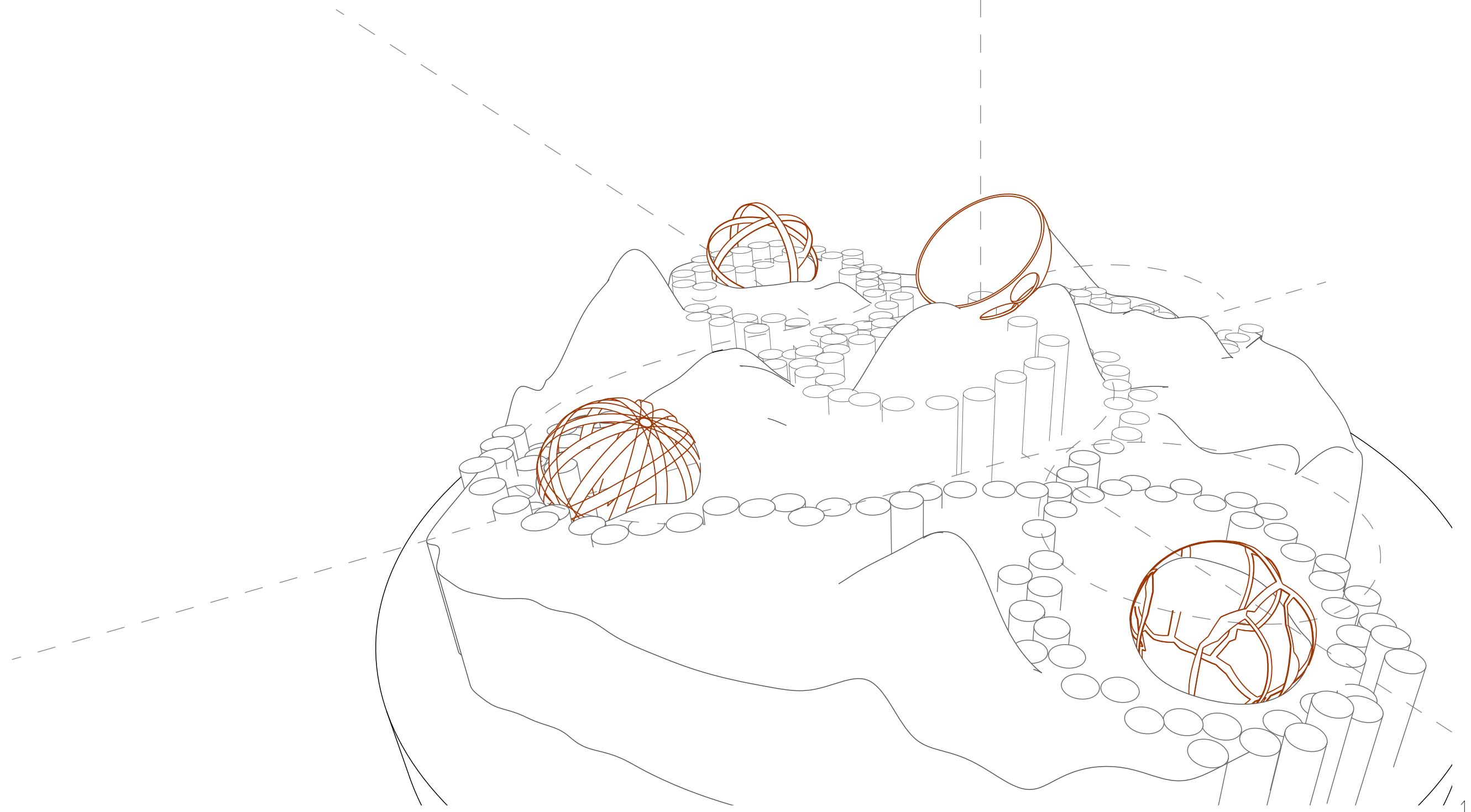


Shwetanc Bothra
5th Year Bachelors of Architecture
Bachelors of Art History
The Pennsylvania State University

Hunter Keene
5th Year Bachelors of Architecture
The Pennsylvania State University

ASCEND

the critical monument





SHWETANC BOTHRA

MUMBAI, INDIA

CAN'T HELP FALLING IN LOVE, ELVIS

#815f9b

HOME TOWN

FAVORITE SONG

FAVORITE COLOR

HUNTER KEENE

WEEHAWKEN, NJ

LA VIE EN ROSE, EDITH PIAF

#4abef0



Ever since a child, my imagination ran wild. There was an unending fascination to know more, see more, and learn more. Being the youngest of three, I have always been competitive.

It meant knowing that if I want something, I need to really earn it - and if I want to prove something, I better be right. But this also made me very social. Our family would often have 10+ people staying in an apartment with three rooms, sometimes for months - and it was delightful.

It made me realize that even 750 sq ft. of space for an Indian family, can be a home for 12 collective individuals - when designed right. In fact, it can make it even more fun. Then I started to travel, and having lived in India, then Italy and finally America, I learned that different cultures have different ways of making this work. Guess there is more to it, I thought.

Then I got to learn about science, and my world opened up to a whole new realm of fascination. I found that my love of the arts was matched by my intrigue for the sciences - and what better way to combine the two, than architecture. I made it my focus, to understand the phenomenology of space and get a grasp on what makes any room feel a certain way. I took this a little too far, and decided I want my life's goal to be reimagining Space Architecture.

A field intended for efficiency, a space meant to be a machine - how can I make it feel like home? Thus began my time studying architecture and art history, understanding how people have, throughout time, envisioned what comfort means to them. One day, I will help envision, in space, what comfort means for our future.

Growing up outside of one of the greatest cities on earth gave me a unique perspective on design. The constant flux and diversity of the area opened my eyes to the incredible potential of architecture. I went into university a young excited student and I'm leaving it slightly older and even more excited. My favorite nights to look back on from school are the late ones I spent in the studio surrounded by my peers. The environment cultivated in studio is one like no other. A sense of open communication and freedom of exploration can be addicting over the 5 years. These are qualities I seek out in my future career. Just like the city I so admire, studio provides a hub of diversity and stimulation that perpetuates creativity and expression.

As a young child my sister and I had high aspirations; We were determined to join the circus. This helped me to discover one of my favorite hobbies, juggling. Little did I know this skill would help to prepare me for my collegiate education. Like juggling, life throws a lot of things at you all at once and you are expected to keep them all in the air. My junior year I was challenged by taking on an internship in the midst of my most challenging studio semester yet. This was a constant battle of time allocation. In the moment it was overwhelming and I felt unprepared to take on my responsibilities. I came out the other side of this stronger and more confident in my abilities. Everything in life takes practice, you have to drop a few balls...many, many balls... in order to learn how to juggle them. Every failure is an opportunity for growth.

EDUCATION

- PENN STATE UNIVERSITY** May 2022
Schreyer Honors College
Double degree of Bachelor of Architecture
Bachelor of Arts in Art History
GPA: 3.69 / 4.00 - Dean's List
- ROTARY YOUTH EXCHANGE PROGRAM**
Liceo Classico, Cagliari, Italy | Aug 2014 - May '15
Year long Cultural Exchange Program in Italy. As an ambassador, spoke for India's cultural and economic values, while studying the Italian culture and architecture.
Awarded the best Exchange Student of the District.
- JAMNABAI NARSEE SCHOOL**
High School, Mumbai, India | Graduated 2017

SKILLS

Software		Fabrication
Rhino	Illustrator	Laser Cutter
AutoCAD 2D	Photoshop	Casting
Revit	Indesign	CNC
V-Ray	RunwayML	3D Printing
Sketchup	TestFit	Woodwork
Language		
English	Italian	Hindi
QPR Certified from Jan 2020 - Jan 2023		

RECOGNITION

- Finalist for the Corbettelli Design Challenge 2019, with the entire school participating
- Nominated for the First Year Design Excellence Award (2018) & the First Year Academic Achievement Award (2018) from amongst 70 students from the class of 2022 (Architecture).
- Awarded the Rampant Lion Award, for excellence in service, teamwork, dedication and creativity by Alpha Rho Chi (awarded to the best elected member for the year 2018-2019)

SOFT SKILLS

- Strengths: Connectedness, Achiever, Ideation, Communication, Input
- Myers Briggs: ENXP

EXPERIENCE & INVOLVEMENT

- RLPS ARCHITECTS | MAY 2021 -** Lancaster PA, USA
Intern
Aided in research on generative design, developing tools for the firm to transition to using machine learning and automated software for the initial phases of design. Worked with software engineers to develop such software. Aided in research on biophilic design, particularly for schools and memory care for senior living facilities. Developed graphic and construction documents, and learned marketing/administrative aspects of architecture.
- ARCHOHN CONSULTS | JUNE-JULY 2019** New Delhi, India
Intern
Focused research on 2 UNESCO world heritage sites (Taj Mahal & Red Fort), to design ways to apprise tourist footfall. Designed improvements to a historic village to help it gain a UNESCO Heritage City status. Designed a house under my supervising architect's guidance, currently under construction in Shimla, India. Gained exp in working drawings, cost estimations and design details for both residential and commercial spaces.
- BOTTLE BRICKS PROJECT | MAY 2019** Mumbai, India
Intern
Supervised the design and construction of a cabin, using sustainable products such as eco bottle-bricks, bamboo, mud and reused cartons.
- TEACHING ASSISTANT**
Arch 121/122: Visual Communication | FA '19 - FA '20
Helped teach and assist 1st year architecture students learn better ways to communicate their design and studies, improve their drawing skills & presentation techniques.
- RESIDENT ASSISTANT | FALL 2019 - FALL 2020** Penn State University
Mentor and resource for first year ROTC students of Penn State, facilitating adjustment, course load management, psychological support and general assistance.
- LAB CONSULTANT**
Information Tech Services | 2018-2019
Work as a part time tech consultant on campus, to teach software use, printing systems, and digital usage.
- ALPHA RHO CHI**
Professional Fraternity for Architecture & The Allied Arts | 2018-
Member of the Fraternity, currently serving as the Chair of Recruitment.
- HAPPY VALLEY RESTAURANTS**
Bar Management and Supervision | June - July 2020



JOB EXPERIENCE

- WALKTHISHOUSE: INTERNSHIP 2020-2021**
LOCATED IN HOBOKEN NJ
2D AND 3D DRAFTING OF PROJECTS FOR CLIENT PRESENTATION
GAINED ON-SITE EXPERIENCE, WORKING WITH SURVEYING AND PROJECT EXECUTION
EXTENDED TO **PART-TIME POSITION** THROUGH 2021 SCHOOL YEAR
- MARK GOULD ARCHITECTURE: INTERNSHIP 2018**
LOCATED ON 22 AND 5TH IN NEW YORK, NY.
WORKED ON SURVEYING AND DRAFTING ISSUED PROJECTS.
DRAFTING AND ANNOTATING PLANS, DOB PLAN SET CREATION.
- NEW YORK CITY STAGEHAND: 2018**
EXPERIENCE WITH BROADWAY LOAD OUTS AND RESTORES.
INCLUDING THEATRICAL RIGGING.
WORKING FOR LOCAL ONE IATSE AND UNDER PRIVATE CONTRACTING COMPANY.

- EASTERN MILLWORKS, INC: INTERNSHIP 2016**
ARCHITECTURAL WOODWORKING COMPANY IN JERSEY CITY, NJ.
MULTIPLE LARGE SCALE PROJECTS
MODELED ASPECTS OF ARCHITECTURAL DRAWINGS IN ORDER TO
CREATE WORKING 3D MODELS

SCHOLARSHIPS AND AWARDS

- 2021 SCHOLASTIC ACHIEVEMENT AWARD**
AIA ARCHITECTS LEAGUE OF NORTHERN NEW JERSEY
SCHOLARSHIP AWARDED
- 2018 PROVOST AWARD**
SCHOLARSHIP AWARDED FROM THE PENN STATE UNIVERSITY
- 2019 ALBERT O. HALSE AWARD**
AIA ARCHITECTS LEAGUE OF NORTHERN NEW JERSEY
SCHOLARSHIP AWARDED

EDUCATION

- THE PENNSYLVANIA STATE UNIVERSITY**
STATE COLLEGE, PA
BACHELOR OF ARCHITECTURE
MINOR IN ARCHITECTURAL HISTORY
EXPECTED GRADUATION 2022
- HIGH TECH HIGH SCHOOL**
HUDSON COUNTY SCHOOL OF TECHNOLOGY
NORTH BERGEN
GRADUATED 2017

PROGRAMS

- AUTOCAD
- PHOTOSHOP
- ILLUSTRATOR
- RHINO
- INVENTOR
- V RAY
- SKETCHUP
- 3DS MAX
- INDESIGN
- VECTORWORKS
- GRASSHOPPER

SKILLS

- LASER CUTTER
- CNC
- LOOM KNITTING

NOTABLE COURSES

- ARCH 480**
TECHNICAL SYSTEMS INTEGRATION

ASCEND

From the hills of ferrous recede
A monument hidden in dust
A memory of life that precede
This world of scars and rust.

Remember, if you must proceed
The time old adage - dust to dust





We celebrate a feat that our ancestors could never dream of - a moment in time when the world no longer seems 'too big', or our presence too miniscule. We celebrate our outreach, we celebrate our progress; and in this celebration we reexamine, what allowed (or will allow) us this achievement.

What gave us this chance.. to **ascend**.

SITE SELECTION & DESIGN CONSIDERATIONS

This 'monument' is a journey through time. It covers each phase of life traversed and what was learned from it. Our time on Earth has taught us an important lesson - cognizance. The only way forward is to be cognizant of what we have and grow from it, rather than take away.

This journey was therefore embedded into the hilly terrains of Mars. Each pause is **concealed** within the topography when seen from afar, **but colossal** when up close. The journey also traverses different altitudes, **symbolic** of the efforts (or ease) of transitioning between **phases of life** as we know it.

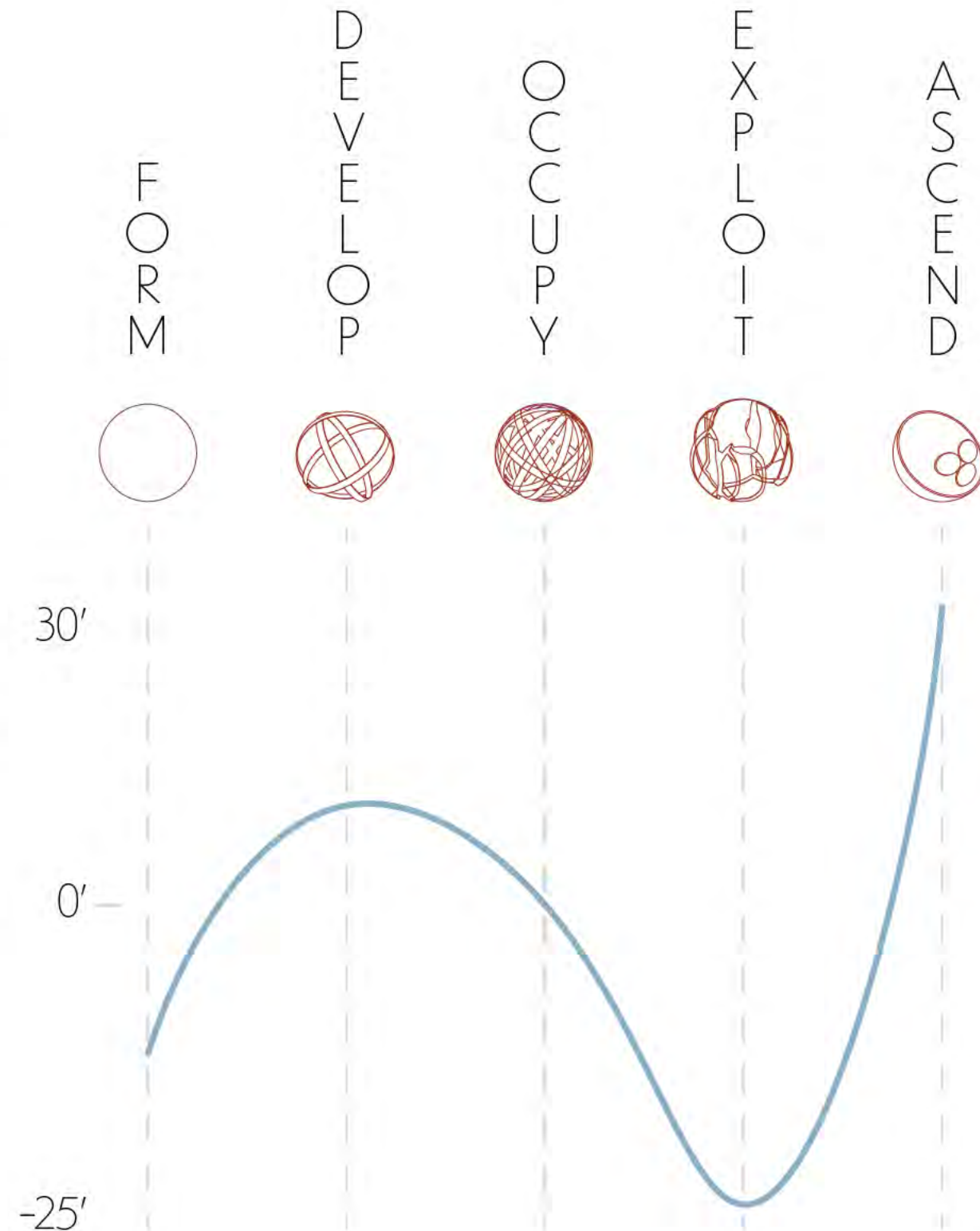
The number **5 is a pivotal number** throughout the design. This number is spiritually important (5 elements, 5 senses and a pentagram is often symbolic to the power of making your own choices. Therefore this journey has 5 phases and the ratio of each elevation change is multiplicable by 5.

As we reminisce how we scarred the Earth, **permanence is questioned** in this monument. As generations progress, this monument too will change over time. This is designed as **a canvas for Mars to fill in, and** - after centuries, when it no longer serves a purpose - **reclaim**. A protest against brute monumentality. A time, to ascend.

CONCEPT

This monument aims to point a **critical lens** at the need for a transition to mars. While it's an event to be celebrated, the condition our earth is currently in is nothing to forget about. This journey documents the process in which our culture **Formed, Developed, Occupied, and Exploited** our resources. This frames the ascension to a new planet as a regrettable but necessary venture.

The user navigates through these stepping stools experiencing the **highs** and **lows** of cultural development. Along the way 5 sculptures identify 5 moments of pause. These are intended to be explored, traversed, touched and felt. The Corten steel construction provides a unique tactile quality that "reverse rusts" as the monument ages. This exemplifies the concept that the **aging** and **degradation** of the monument is an intentional and designed process.



THE HEIGHT OF THE PATH IS BASED ON THE FLUCTUATION OF HUMANITY'S INTERACTION WITH OUR PLANET. THE HIGHS AND LOWS OF OUR CULTURAL EVOLUTION ARE MIRRORED BY THE PEAKS AND VALLEYS OF THE PATH. THE APEX OF THE PATH REPRESENTS HUMANITY'S ASCENSION TO MARS.

FORM

THE FETAL PHASE OF DEVELOPMENT
A BARE INNOCENCE

DEVELOP

THE BEGINNING OF ORDER
HARMLESS INTERACTION

OCCUPY

THE USE OF NATURAL RESOURCES
ANALOG PRODUCTION

EXPLOIT

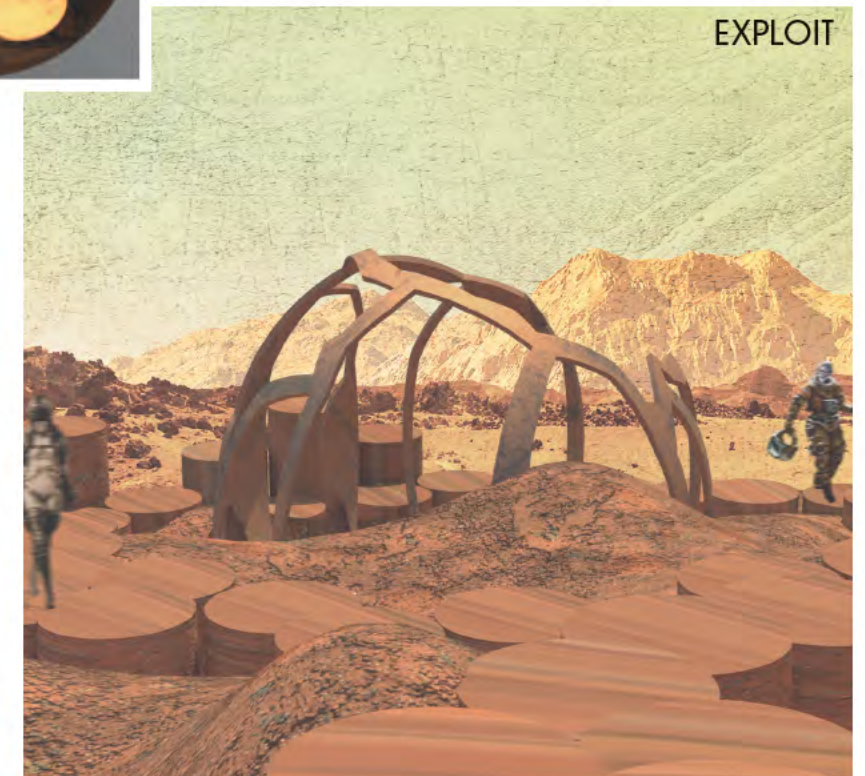
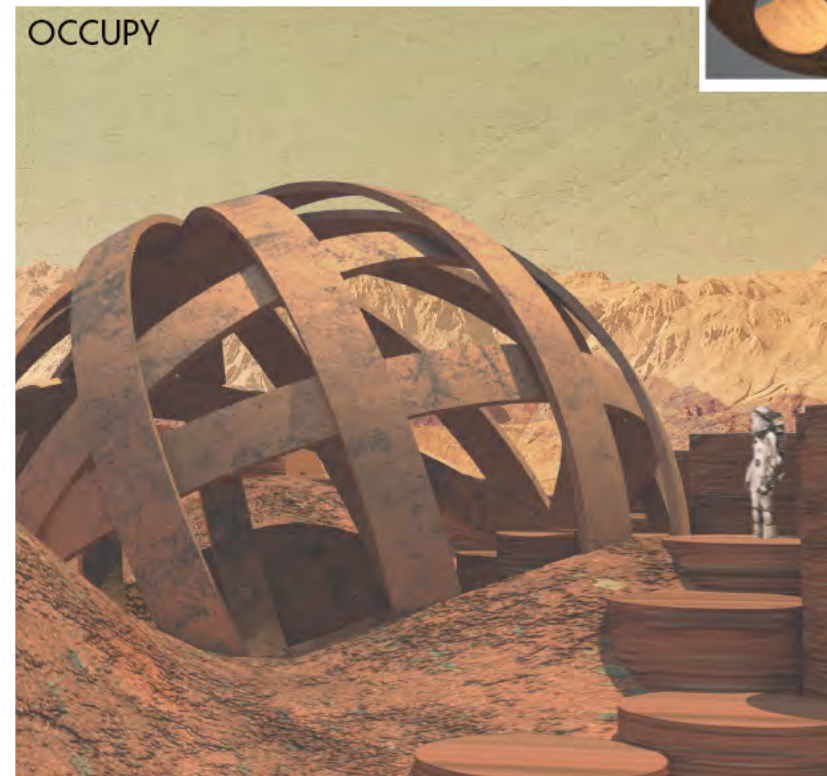
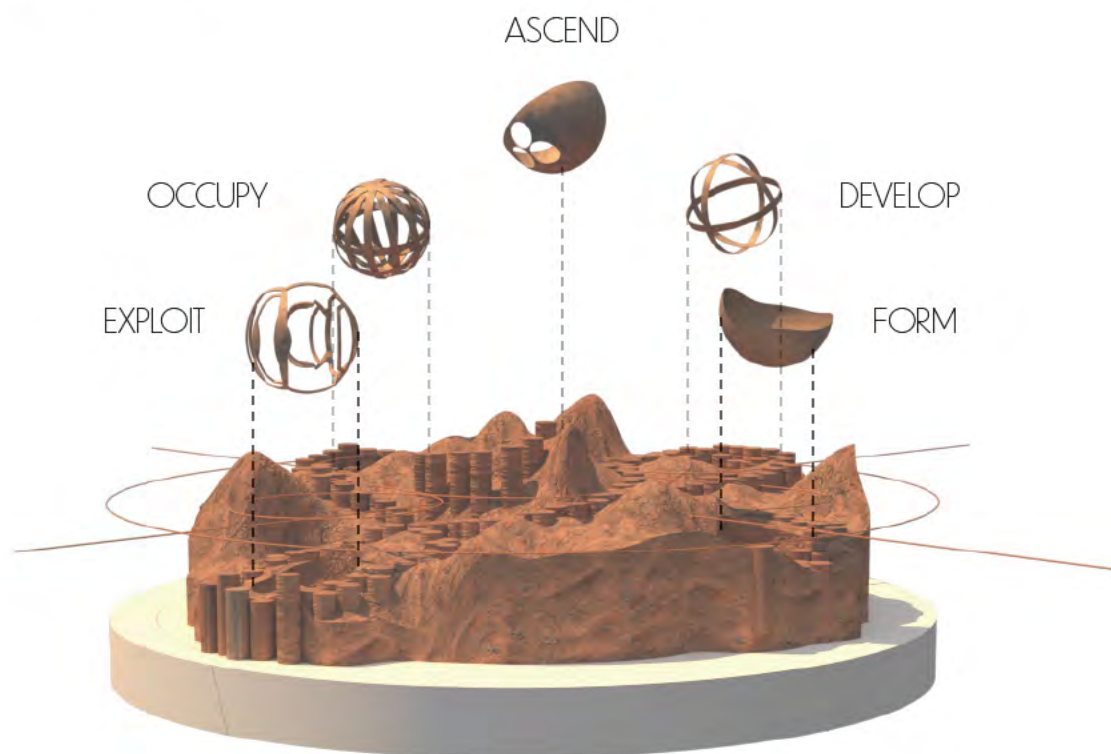
THE OVERUSE OF RESOURCES
BRUTE INDUSTRIALIZATION

ASCEND

THE COGNIZANT ADVANCEMENT
ADAPTIVE ENLIGHTENMENT

JOURNEY

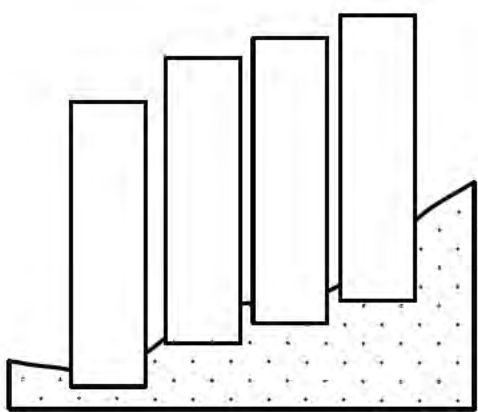
Stepping stools guide visitors through this monument. The journey begins at **FORM (-10')**. A **void** of reflection, with unlimited potential. The path then ascends to the second stop: **DEVELOP (5')**. An order begins, and a **semblance of space** can be seen. One can walk through this minimal structure, and start a slow descend into what appears as the first 'enclosure', at the third stop: **OCCUPY (0')**. A **harmonious enclosure** is offered here, rest if you must, under the shadowed comfort of the space provided. The idea of 'complexity' is first seen here symbolic of the development of society, trade cultivation and growth. The path continues to descend. A steady declines now turns into a sharper fall. A longer distance is traversed, to reach the fourth stop: **EXPLOIT (-25')**. The form observes a higher amount of complexity but appears to be **disintegrating**. While the descend was comforting, it led to chaos. That path, however, continues. This time, it ascends, the steps are farther apart, requiring more effort. It leads us to the peak, the final stop: **ASCEND (30')**. This form remains complex, but stays humble, allowing for growth. It lets you sit, but when you do, the **only way to look - is up**.



LIFE CYCLE

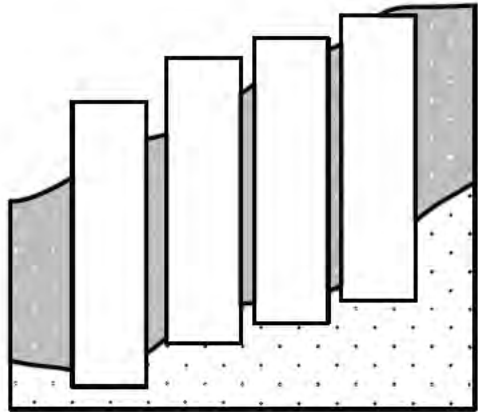
There are three indistinct stages to "ASCEND". The first is the virgin form of the monument. Placed on the landscape to blend in, revealing itself through large steel structures. The manifestation of small circular stools protruding from the surface. At first these stools seem in stark contrast to the consistent texture of the martian landscape. As the sands and wind of mars swirl and sweep, the spaces in between the stool will begin to fill. Mars will use this monument as a canvas on which it may express itself. This represents the intermingling of mans intervention and the unpredictable nature of a foreign planet. The final stage is the degradation of the monument. Over hundreds of years, as the course sands and harsh winds whip across the surface of this monument it will begin to degrade. The material that was harvested from the very soil it sits atop will once again return to its home.

STOOL PHASES



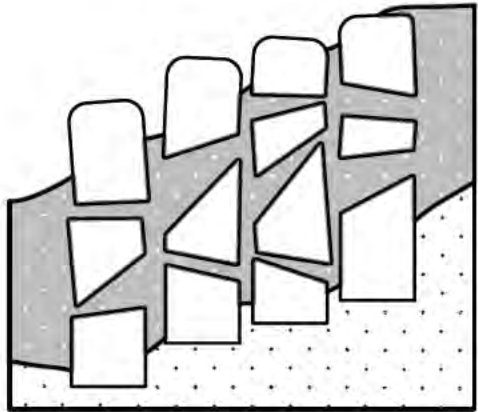
PHASE 1

THE INITIAL STATE OF THE MONUMENT. MAJORITY EXPOSED AND IN NEW CONDITION.



PHASE 2

AS THE SANDS AND WIND SWEEP ACROSS THE MONUMENT THE GAPS INBETWEEN THE STOOLS IS FILLED



PHASE 3

THE FINAL STAGE OF THE MONUMENT LEAVES MOST OF THE STOOLS COVERED IN SAND. THE OBJECTS DEGRADE OVERTIME AND RETURN BACK TO THE GROUND FROM WHICH THEY CAME

CORTEN AGEING PROCESS

.5 MONTH

1.5 MONTH

6 MONTHS

2 YEARS

5 YEARS

22 YEARS

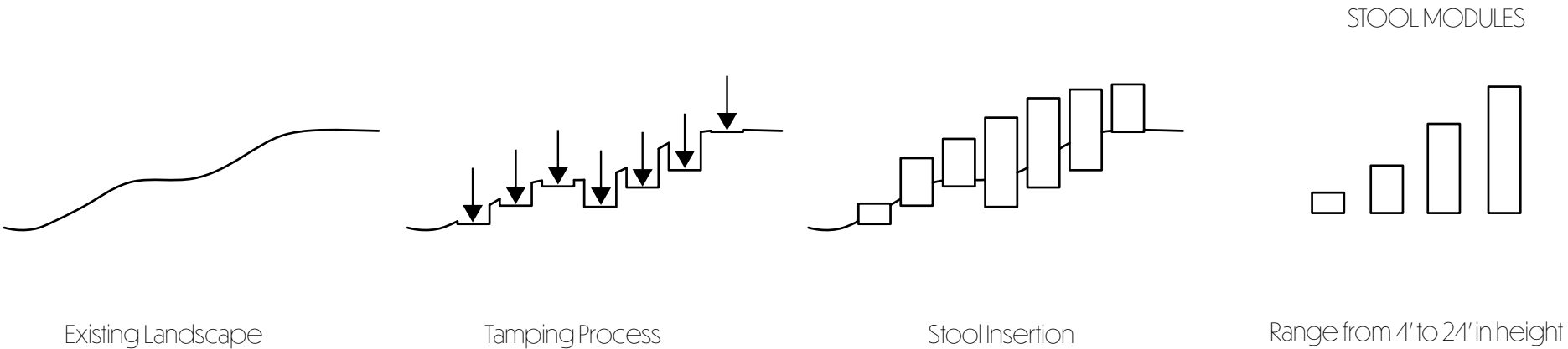
40 YEARS



MATERIALS AND CONSTRUCTION

PROCESS

The construction process of this monument begins with the identification of a basepoint. This will be used to grid out the acre of land and establish bearings for the computer-guided construction system. From this point a construction zone is needed for 3D printing and steel manipulation.



MATERIALS

CORTEN STEEL



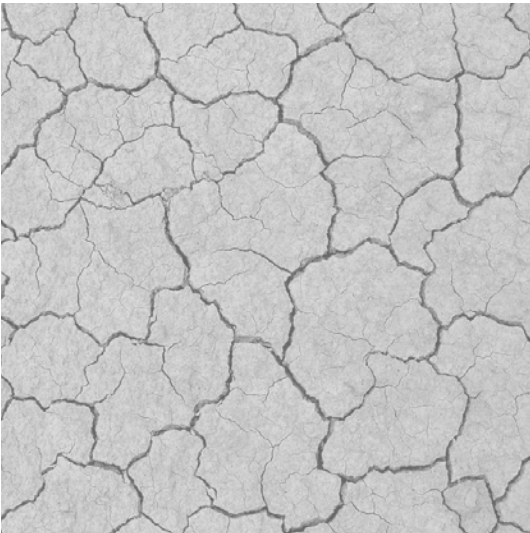
STEEL IS AN ABUNDANT MATERIAL THAT CAN BE TREATED TO ATTAIN CERTAIN SURFACE QUALITIES. THIS STEEL WOULD BE TRANSPORTED FROM EARTH DURING THE TRANSITION TO MARS

MARTIAN SOIL



USING LOCAL SOIL REDUCES THE ENVIRONMENTAL IMPACT OF THE MONUMENT. THIS IS ONE OF THE INGREDIENTS IN THE 3D PRINTING MIXTURE.

REGOLITH



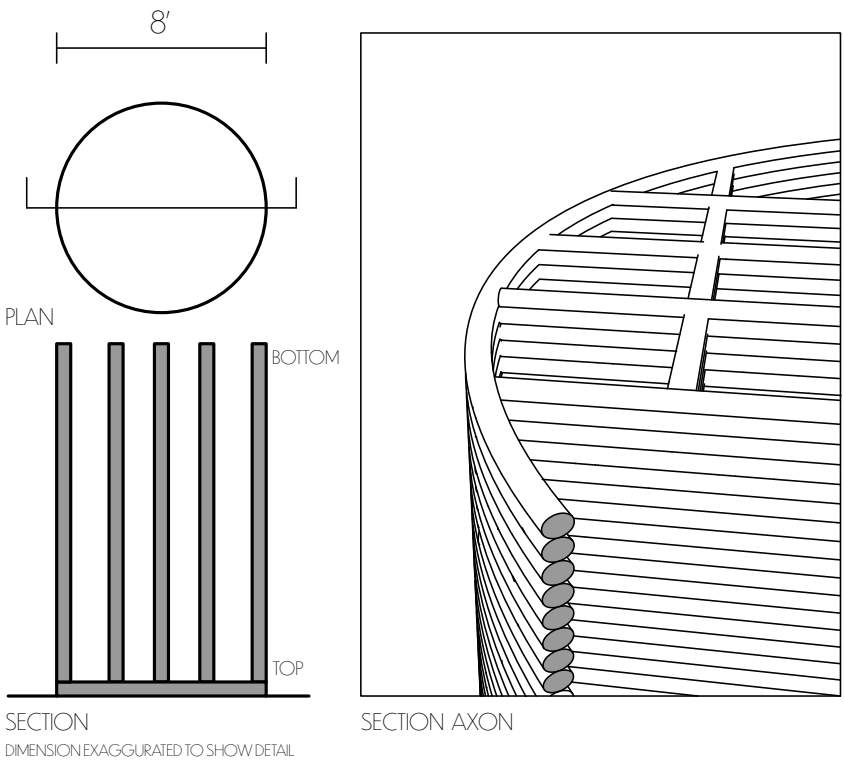
THIS IS A MATERIAL THAT IS ABUNDANT ON EARTH, THE MOON AND MARS. IT CAN BE YIELDED FROM THE SOIL AND USED AS AN AGGREGATE IN THE 3D PRINTING MIXTURE.

The next step is the preparation of the land. The site contains a large variation in topography so a system of regulation is needed. This comes in the form of a tamping process. This takes the unpredictable martian solid and creates a surface that can be worked on. Each Individual stool location has a specific tamp height that is required to create the path that was designed. The stools can be buried or exposed more in order to achieve the needed height.

The stools are printed in 4 different heights. These four modules make up our 212 stool path. The modules are printed upside down in order to use the surface of mars as a form work for the caps. These volumes are then inverted prior to installation. These can be mass produced and stored until they are placed on the site. The 3d printing mixture takes around 48 hours to cure to a structurally sound point. At this point the stools are transported en masse to the site where a rover places them on the earth.

The next phase is the metalworking needed to create smaller monuments along the path. The spherical objects are formed in pieces and welded together. These small pieces require metal working equipment to form and bend them into shape. This process is completed in the construction zone that was set up in the first step.

STOOL CONSTRUCTION DETAIL



KEY ASSUMPTIONS

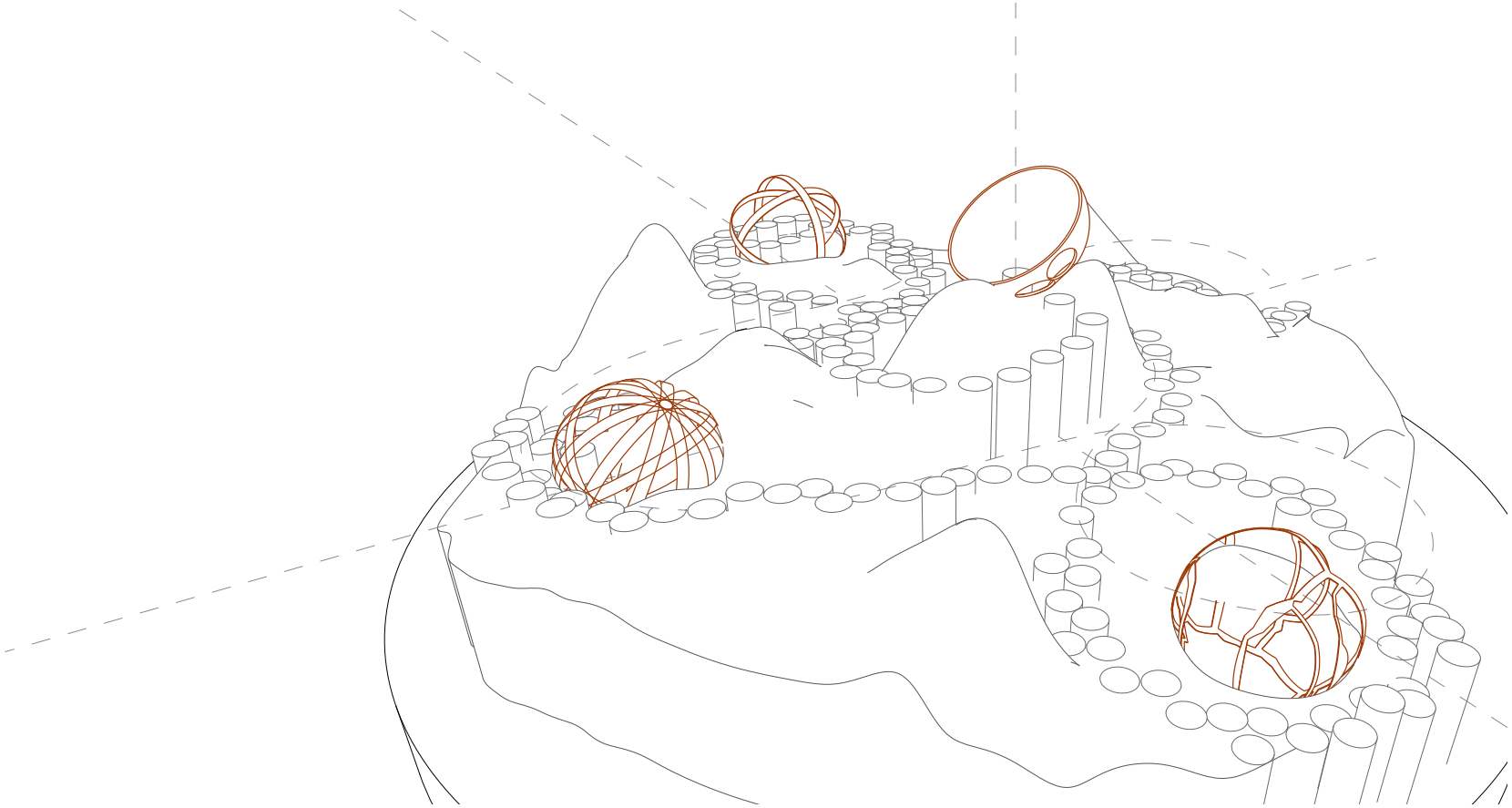
This Utopian project is designed with assumptions kept in mind:

- Colonization of Mars was a response to failure of Earth
- The chemical composition of Martian soil is as currently studied by Dr. Sarah Lorek
- The availability of industrial 3D Printers on Mars, without which rammed mars would be the alternative for building the step stools
- Corten Steel degradation is slower on Mars than on Earth, as has been studied
- Tectonic stability on the chosen site
- Wind stability

BUDGET

ITEM	MATERIAL	PRICE (\$)
EXCAVATION/ MATERIAL ACQUISITION	REGOLITH	25,000
3D PRINTING	LABOR & EQUIPMENT	150,000
FORM BUILDING	CORTEN STEEL	15,000
METAL WORK	LABOR & EQUIPMENT	20,000
TOTAL		210,000

The estimated cost of this monument is around \$200,000. A majority of this cost comes from the 3d printing as this is the main medium for the monument. The labor costs are offset by sourcing local materials and harvesting a large portion of the aggregate from the soil. The steel working and material requires infrastructure that has been built into the cost.



ACKNOWLEDGEMENTS

Lorek, Sarah. "SpaceX to Mars City: How to Build on Mars." Construction Industry Data, 16 Feb. 2020, <https://constructible.trimble.com/construction-industry/spacex-to-mars-city-how-to-build-on-mars>.

"Mars X-House V2." Space Exploration Architecture, <http://www.spacexarch.com/mars-xhouse-v2>.

Illustrations:
Godde, Benoitte, et al. "39 Concept Art and Illustrations of Astronauts." Concept Art World, conceptartworld.com/inspiration/39-concept-art-and-illustrations-of-astronauts/.

NARRATIVE

1. What materials and methods are used to build/install your structure/artwork/installation?

The monument is mostly made of regolith and mars soil. These materials can both be found native on the site. As the site is excavated and prepared for the installation the raw materials are collected and processed. This reduces the overall impact our monument has on the site. The secondary material used is Corten steel. This is a non native material but would degrade and weather along with the rest of the monument. This is a “permanent” monument, however the scale of permanence is questioned as the monument is estimated to last around 250 years. This promotes the idea of an anti-monument. The transition to this new and alien planet is celebrated but the integrity of the planet is respected in this process.

2. What is the estimated build/setup time?

The monument is estimated to take around 9-15 weeks to construct. This is based on the estimated time for a SpaceX 3d printed habitat to be formed. The specific times for 3d printing and layering was analyzed and applied to the scale of the monument. There is a preparation requirement as the corten steel needs to be processed and prepared prior to arrival on mars. The actual forming and shaping of the metal sculptures will take place on site. The stools can be printed en mass as they have been broken down into 4 repeating modules. This reduces the amount of time needed to print as there is no customization. The varying heights of the stools is achieved in combination with tamping and excavating.

3. How would collaboration be utilized in realizing the design?

This monument requires a team of different trades to be realized. A landscape team would be needed to survey and help navigate the undulating surface. Their consultation is also needed to begin the tamping and excavation process. A team of landscape engineers is needed to help plan and execute the regulation of the soil. This is an important step in the process as this creates the foundations on which the stools and sculptures are placed. An earth 3d printing team is needed to assist in the production and handling of the stools. This is a delicate process as the stools must be cured and structurally sound prior to the moving and installation. In addition, a team of metal working experts will be needed to form and install the sculptures. Due to the unpredictability of the terrain these trades will need to be in constant communication to ensure the execution of the monument.

4. How will your structure/installation be used by the public? Provide an example of how the public will interact with the space.

This monument is the embodiment of our journey to mars. It acknowledges the struggle and mistreatment that paved the way for this momentous journey. Each stop along the winding path presented represents a key stepping stone. The mountainous climax stands tall above all else promoting an optimistic view of the future. The public has the opportunity to explore this monument in a highly tangible and tactile way. Climbing through and around the wake of humanities occupation. The user experience of this monument was designed above all else. The drastically changing elevations represent the highs and lows of humanity. As people navigate the rolling terrain they are brought down into the earth and then propelled upwards towards the climax. The stools themselves are placed no more than 4' apart. This would be an issue on earth but due to the decrease in gravity on Mars this jump is effortless. The path begins large and inviting, with stools clustered close together. As the path progresses the stools begin to thin out and the journey becomes one of isolation.

5. How does the structure/artwork/installation address the climate in which it would reside?

This monument addresses not only the environment in which it's built, but why it's built there as well. By using the materials native to the land we blurred the line between what existed and what was built. The porous space between the stools

provides a blank canvas on which the sands and winds of mars may take control. The materials themselves are mostly locally sourced. This reduces the waste and pollution of the planet in the decomposition cycle.

The form of this monument aims to emulate the natural structures found on mars. The stools protrude from the earth and cradle a series of metal sculptures. The path is blended into the environment and almost disappears into the landscape from afar. This aims to leave the beautiful vistas of mars relatively untouched. With the intention of eventual degradation via harsh winds and abrasive sands, the monument will eventually be washed away leaving only the dunes of Mars remaining.

6. What type of technology is implemented in your design?

This monument uses a variety of technologies in its production. Initially a surveying process is required to fully understand the site. This would utilize 3d scanning technology as well as a CAD program to compute the information. In order to tamp the martian ground, a pilling system is needed. This would hammer the earth forming a brick like composite that acts as a foundation. A 3d printer is also required to produce the 212 stools that form the winding path. These stools would be designed in 3d using computer software. This software would communicate with the printing machine to manufacture the module. A team of rovers is needed to aid in the transportation of materials from the printing site to the project site. These need to be equipped with technology capable of lifting and transporting large 3d printed stools. A steelworker is needed to manipulate the metal into shape. This process also involves a series of welding machines to combine the steel pieces.

7. What makes the design environmentally friendly / sustainable?

By prioritizing locally sourced material, we created a monument that would, one day, dissolve back into the ground that it came from. We also utilized the natural topography of the land in order to minimize excavation. The color palette of the project is based on the naturally occurring materials and minerals on mars. Corten steel starts as a beautiful rusted red and slowly transitions to a dark brown. This acts as a time, wayfinding, device to age our entry to the martian landscape.

8. How does your project address a high quality and unique aesthetic?

By taking a minimal approach to the design, the monument utilizes the natural beauty of the surrounding terrain. As if they fell from the very space we came from, a series of spherical sculptures are the most discernible feature from afar. As the user approaches the monument the protruding stools become more apparent. This monument was designed with a series of experiences in mind. The sparse arrangement of stools creates voids that the sands of mars will navigate over time. This creates an evolving monument that reflects the environment of mars over time. The aesthetic of the monument is ever changing and embraces the fluid terrain in which it lays.

9. Open question: Is there anything else you would like to tell us about your proposal?

This proposal aims to point a critical lens at the need for a transition to mars. While it's an event to be celebrated, the conditions in which our earth is currently is nothing to forget about. By highlighting the process in which our culture Formed, Developed, Occupied, and then Exploited our resources. This frames the ascension to a new planet as a regrettable but necessary venture. The user navigates these rolling stools experiencing the highs and lows of cultural development. Along the way they are reminded of these steps with a series of imposing monuments. These are intended to be explored, touched and felt. The Corten steel construction provides a unique tactile quality that “reverse rusts” as the monument ages. This exemplifies the concept that the aging and degradation of the monument is an intentional and designed process.