LAVATOPIA

Lavatopia envisions a true utopian world embedded in the lava tube skylight in Philolaus Crater located near the North Pole. The global project, “Lunar Village” has launched to establish a permanent human civilization in space. Lavatopia addresses the third phase of this ambitious project and establishes a closed-loop habitat utilizing a lava tube skylight and water ice found within the lava tubes. After the implementation of the first one, multiple structures will be placed in other lava tube skylights and create a utopian city through the interconnected lava tubes underneath. Lavatopia will be the fundamental base for the construction of the permanent habitat in the space that can be implemented in Mars and other planets in the future.

Water is the key element to sustain any life, anywhere. Lavatopia creates a cyclical water filtration system to preserve one of the moon’s most precious resources. The structure, a porous dome constructed of regolith-mix concrete, encloses and sustains the habitat below. The “main trunk”, a vertical element extending from the dome through the center of the research center, will initially extract the water ice from deep inside the lava tubes. Once extracted, the water ice is transported and circulated through the exterior shell to protect the habitat and provide thermal stability. Heated water is brought down through “branches” to supply the aquaponics and the domestic living pods. The resulting gray water will be purified and re-frozen in the storage chambers at the bottom of the structure -- and the cycle will repeat.

At the moon surface, the lava tube skylight shelters the aquaponic agricultural system which houses experiments for food production in space. Glistening droplets of water trickle down through the branches to create a surreal experience that is only available within Lavatopia.

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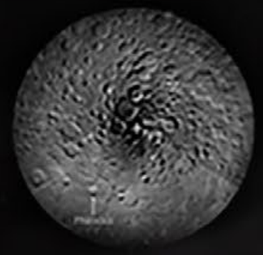
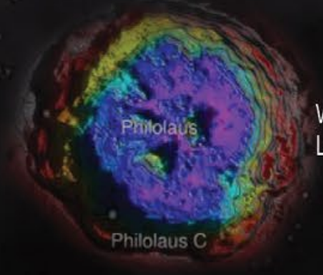


NORTH POLE

PHILOLAUS
CRATER



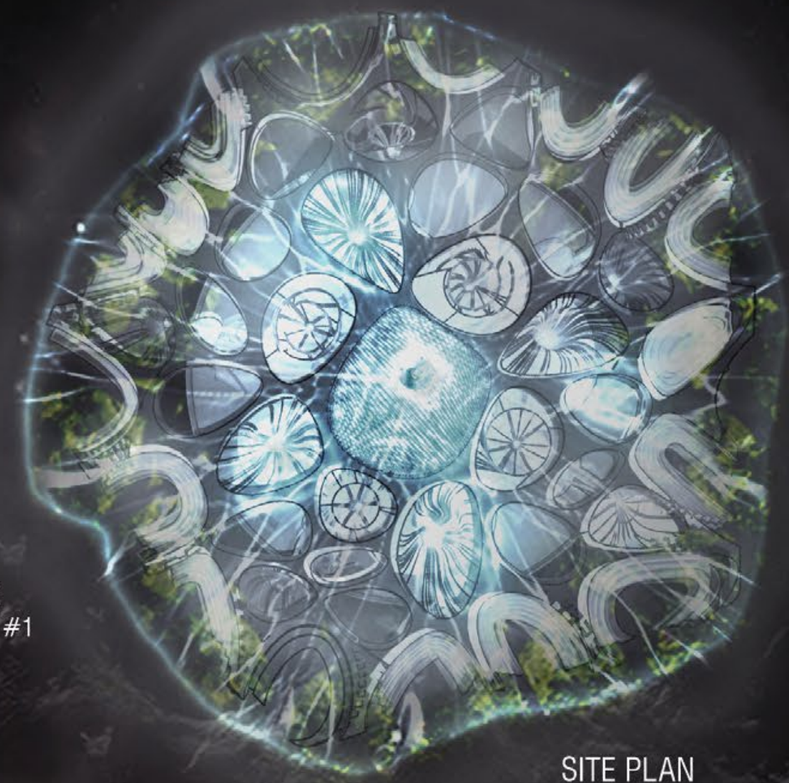
WATER ICE IN
LAVA TUBES

3 LAVA TUBE
SKYLIGHTS

LAVATUBE
SKYLIGHT #2

LAVATUBE
SKYLIGHT #3

LAVATUBE
SKYLIGHT #1



SITE PLAN

LUNAR VILLAGE PROJECT

PHASE 1: GATEWAY

YEAR: 2024

PHASE 2: WATER
EXTRACTION

YEAR: 2035

PHASE 3: FOOD PRODUCTION

YEAR: 2040

PHASE 4: LUNAR VILLAGE

YEAR: 2050

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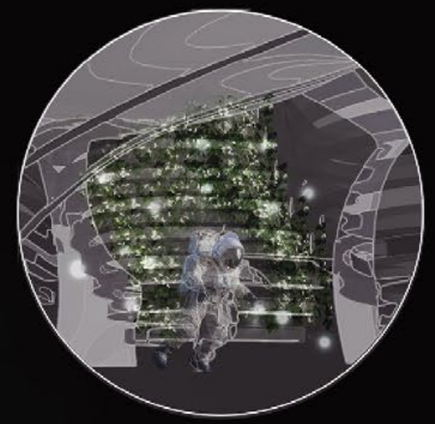
ENTRANCE

a.

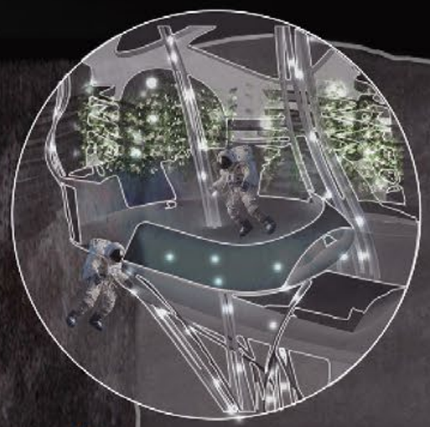
c.

b.



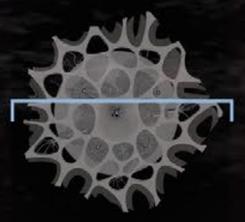
a. FOOD PRODUCTION

ADJACENT
SKYLIGHT



b. AQUAPONICS SYSTEM

c. RECREATIONAL AREAS



SECTION

LAVA TUBES BEYOND

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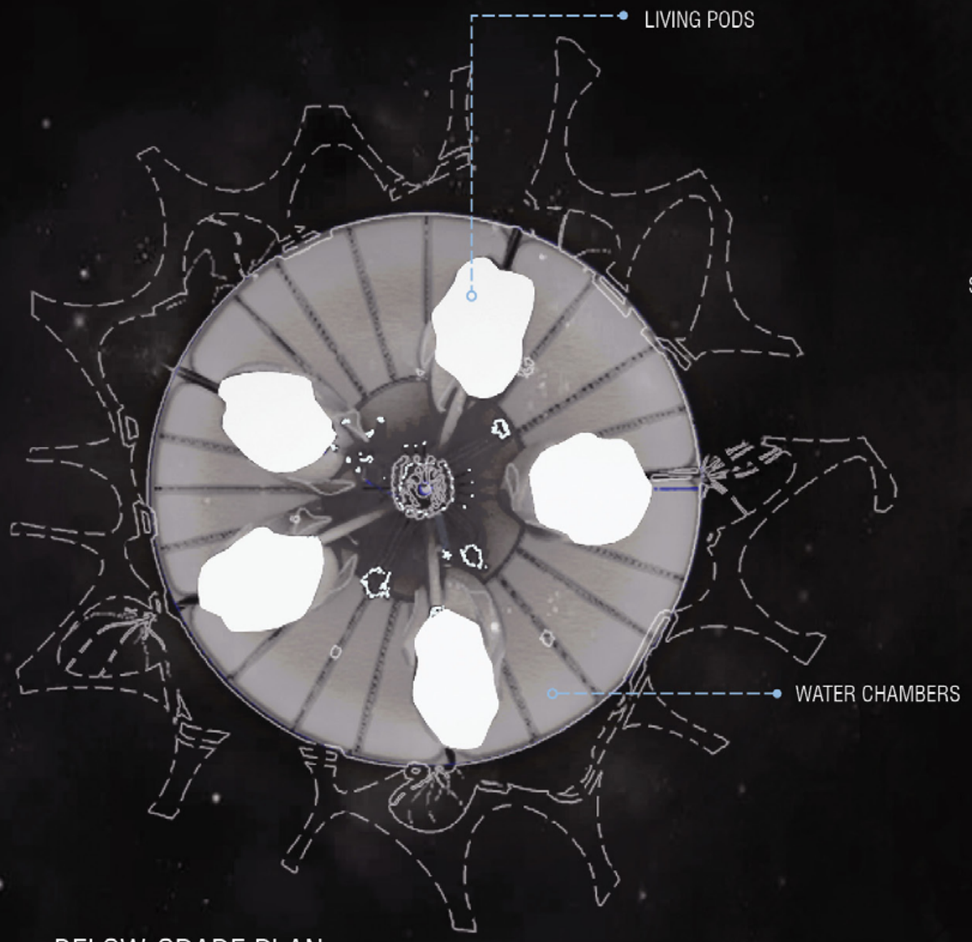
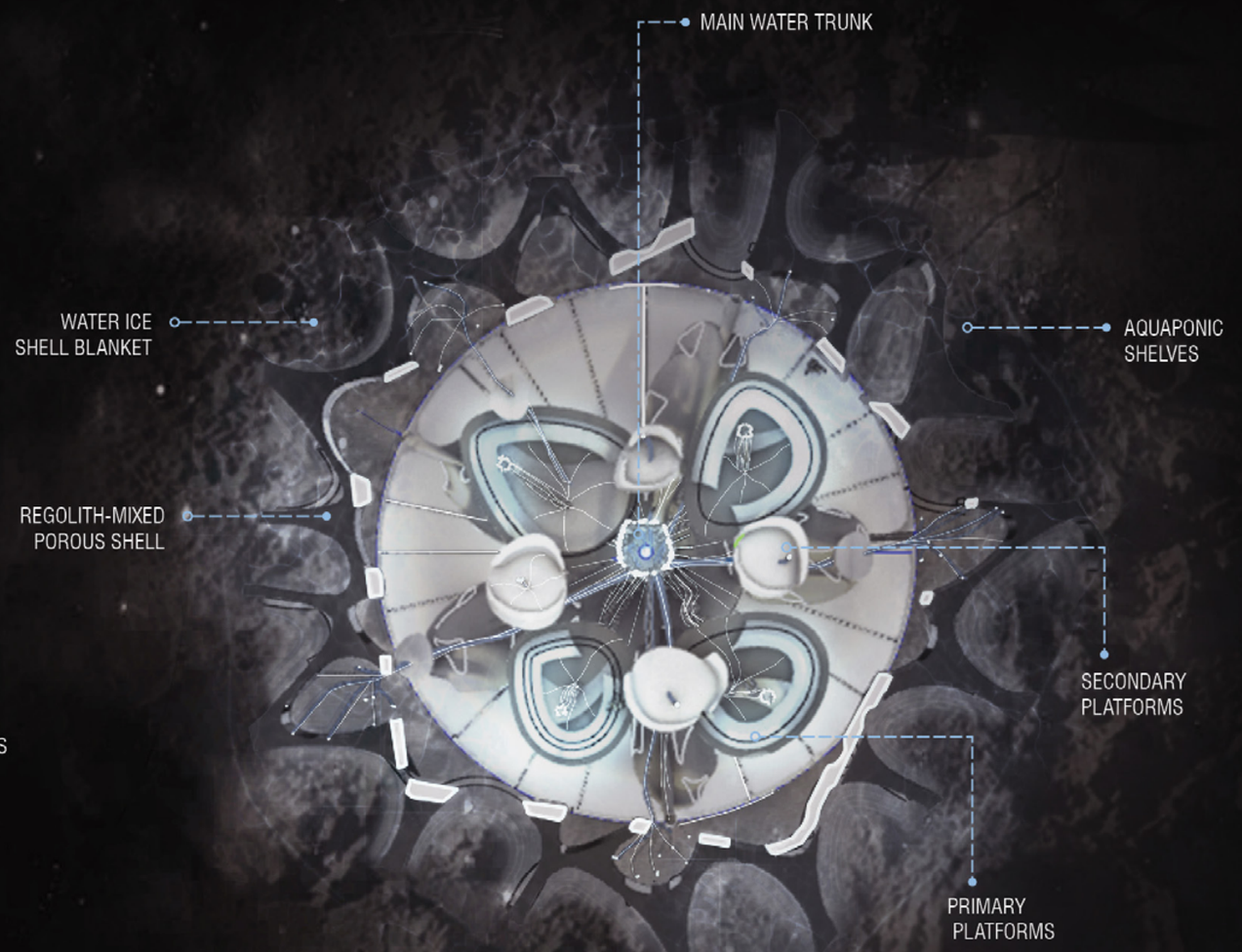
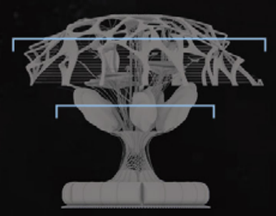


BELOW-GRADE PLAN

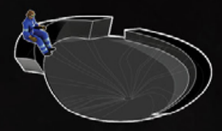


ABOVE-GRADE PLAN



PRIMARY PLATFORMS:

AQUAPONICS SYSTEM



SECONDARY PLATFORMS:

RECREATIONAL AREAS

The “main trunk”, a vertical element extending from the dome through the center of the research center, will initially extract the water ice from deep inside the lava tubes. Once extracted, the water ice is transported and circulated through the exterior shell to protect the habitat and provide thermal stability. Heated water is brought down through “branches” to supply the aquaponics and the domestic living pods. The resulting gray water will be purified and re-frozen in the storage chambers at the bottom of the structure -- and the cycle will repeat.

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WATER ICE SHELL

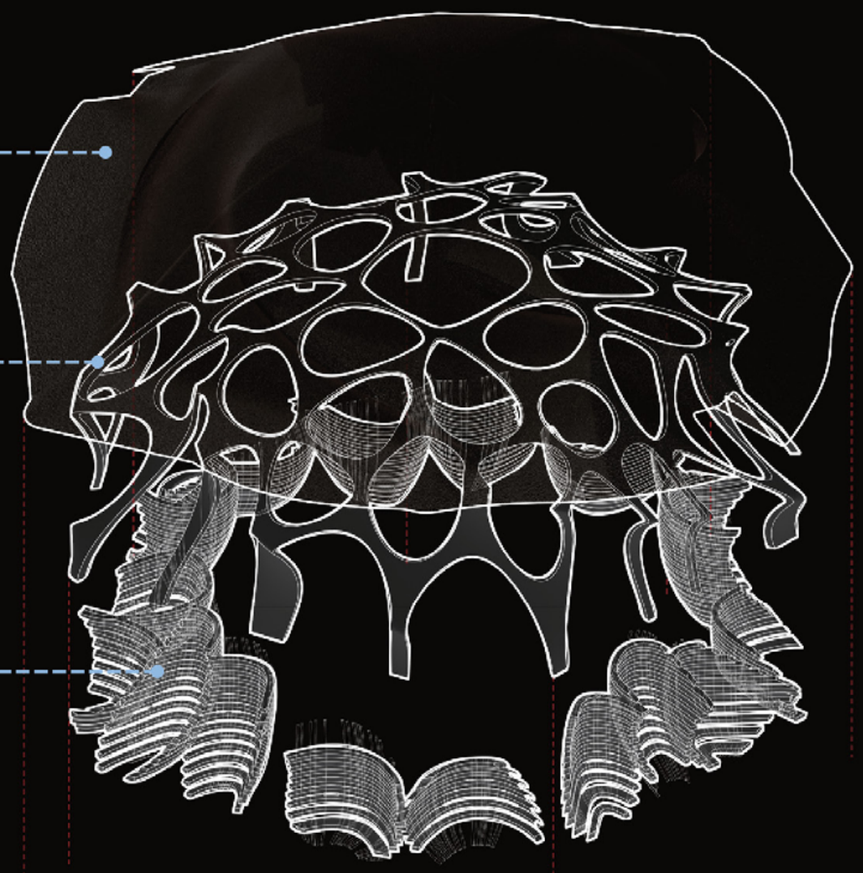
CONTINUOUSLY CIRCULATING WATER ICE TO PROVIDE THERMAL STABILITY

REGOLITH-MIXED CONCRETE SHELL

REGOLITH-MIXED AGGREGATE CAST-IN-PLACE CONCRETE SHELL TO PROTECT THE STRUCTURE FROM SOLAR RADIATION AND STRUCTURAL SUPPORT

AQUAPONIC SHELVES

SHELVES FOR THE FOOD PRODUCTION THAT ARE CONNECTED TO THE AQUAPONIC PLATFORMS



EXPLODED SHELL STRUCTURES

LIVING PODS

EACH POD TO HOUSE 6-8 PEOPLE; LIVING CAPSULES ENCLOSED

WATER BRANCHES

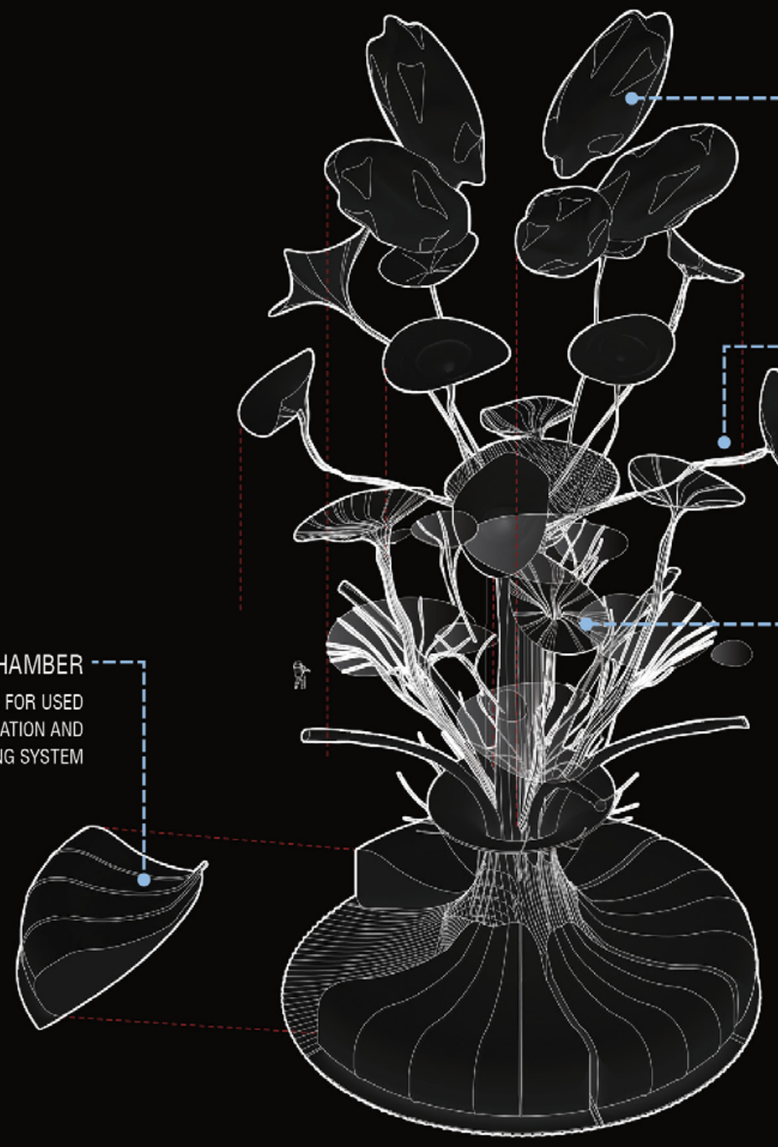
FIBER COMPOSITES WITH LIGHTING MODULES THAT TRANSPORT WATER TO PLATFORMS AND LIVING PODS

PLATFORMS

CONNECTED TO THE WATER BRANCHES; PRIMARY PLATFORMS FOR AQUAPONICS SYSTEM AND SECONDARY PLATFORMS FOR RECREATIONAL AREAS

WATER CHAMBER

RESERVOIR FOR USED WATER; PURIFICATION AND RECYCLING SYSTEM



EXPLODED CORE STRUCTURES

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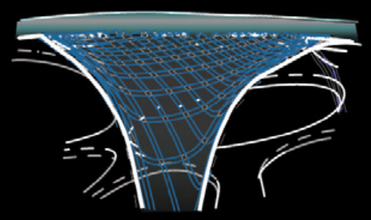
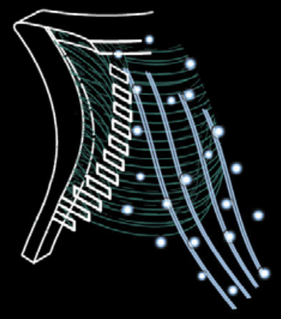
1. MAIN TRUNK

INITIALLY BRINGS OUT EXTRACTED WATER ICE TO THE SHELL AND CONTINUES TO BRING UP RE-FROZEN WATER TO THE EXTERIOR SHELL



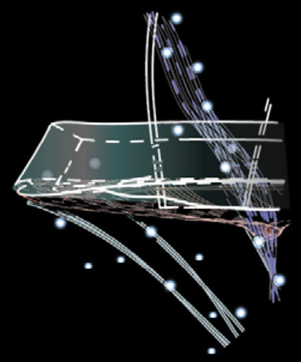
2. AQUAPONIC - SHELVES

VERTICALLY STACKED AQUAPONIC SHELVES FOR HARVESTING AGRICULTURAL PRODUCTS IN THE SPACE. STRINGS OF WATER WILL BE TRICKLING DOWN TO THE SHELVES FROM THE BRANCHES AND NUTRIENTS FROM THE FISH TANKS



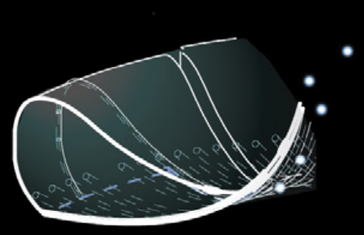
3. AQUAPONIC - FISH TANK

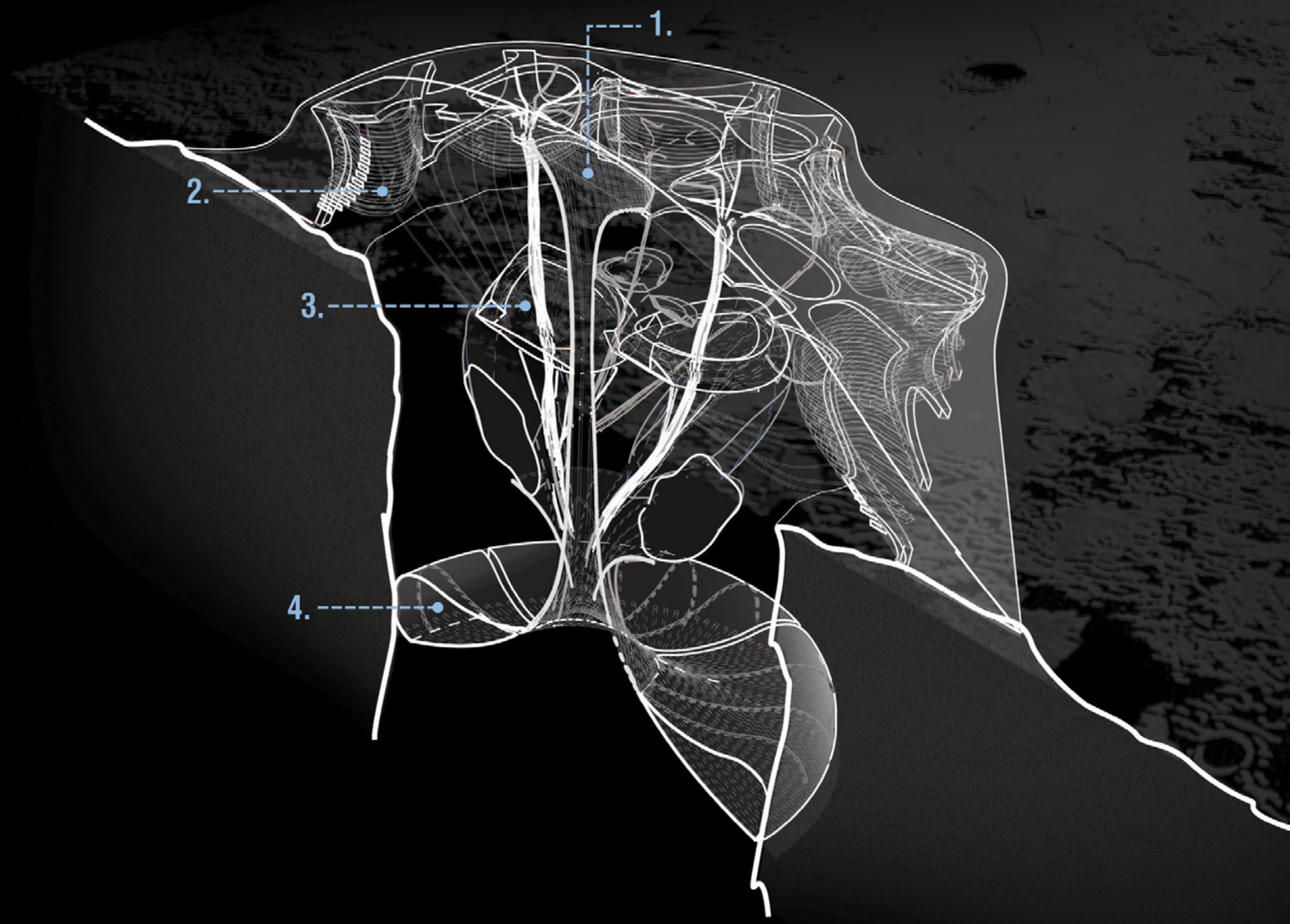
HEATED WATER FROM THE EXTERIOR SHELL COMES DOWN THROUGH THE BRANCH AND IS RE-CIRCULATED THROUGHOUT THE PLATFORMS TO BE USED FOR THE FISH TANKS EMBEDDED ON THE PLATFORMS

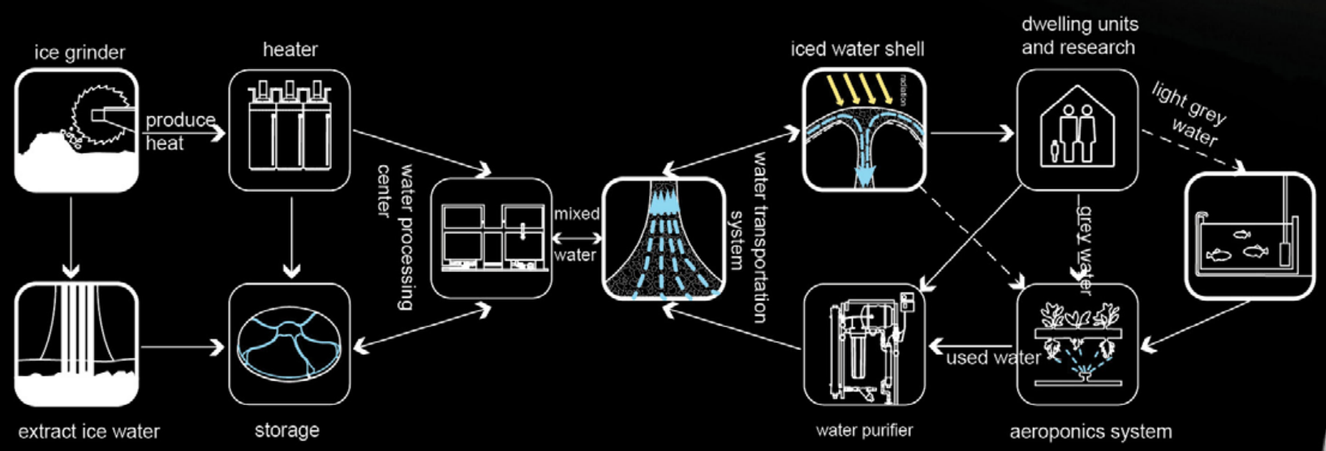


4. WATER CHAMBER

USED WATER FROM THE PODS AND PLATFORMS WILL COME DOWN TO THE WATER CHAMBER AT THE BOTTOM OF THE STRUCTURE AND WILL GO THROUGH THE PURIFICATION AND RE-FREEZING PROCESS FOR RECYCLING







CLOSED-LOOP HABITAT UTILIZING AQUAPONICS SYSTEM

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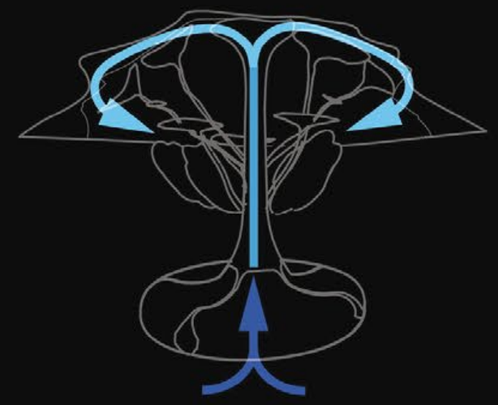
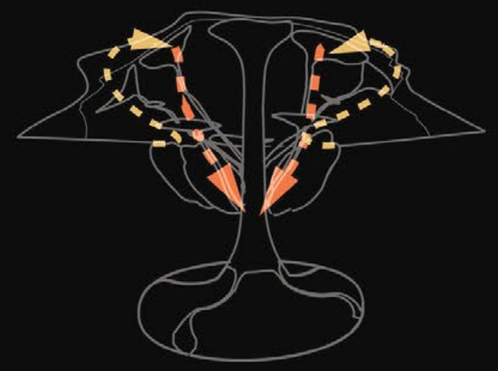
WATER RECYCLING SYSTEM DIAGRAM



PHASE 1: COLD WATER TO THE SHELL



PHASE 2: HEATED WATER TO AQUAPONICS SYSTEM AND LIVING PODS

PHASE 3: PURIFICATION AND RECYCLING

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At the moon surface, the lava tube skylight shelters the aquaponic agricultural system which houses experiments for food production in space.

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Glistening droplets of water trickle down through the branches to create a surreal experience that is only available within Lavatopia.

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WATER RECYCLING SYSTEM

CYCLICAL WATER FILTRATION SYSTEM IS DESIGNED TO PRESERVE THE MOON'S MOST PRECIOUS RESOURCE, WATER. EACH STRUCTURAL COMPONENT TRANSPORTS WATER AROUND THE PROGRAMS TO SUSTAIN THE HABITAT

GATEWAY TO UTOPIA CITY IN SPACE

LAVATOPIA MARKS THE BEGINNING OF THE ESTABLISHMENT OF UTOPIAN WORLD IN THE SPACE. THE CITY EMBEDDED IN THE LAVA TUBES WILL CONTINUE TO GROW TO FORM A CITY IN THE SPACE - LAVATOPIA WILL BE THE UTOPIAN MODEL THAT CAN BE IMPLEMENTED IN MARS AND OTHER PLANETS

SUSTAINABLE HABITAT

UTILIZING THE AQUAPONICS SYSTEM,

LAVATOPIA IS TRULY A CLOSED-LOOP SUSTAINABLE SYSTEM THAT WILL HAVE FOOD PRODUCTION SYSTEM IN THE SPACE HABITAT FOR THE FIRST TIME

CLOSED-LOOP HABITAT

LAVATOPIA ENVISIONS A HABITAT SYSTEM ON THE MOON THAT IS INDEPENDENT FROM THE EARTH BY UTILIZING IN-SITU RESOURCES SUCH AS REGOLITH-MIXED CONCRETE POROUS SHELL AND WATER ICE FOUND WITHIN THE LAVA TUBES.

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