

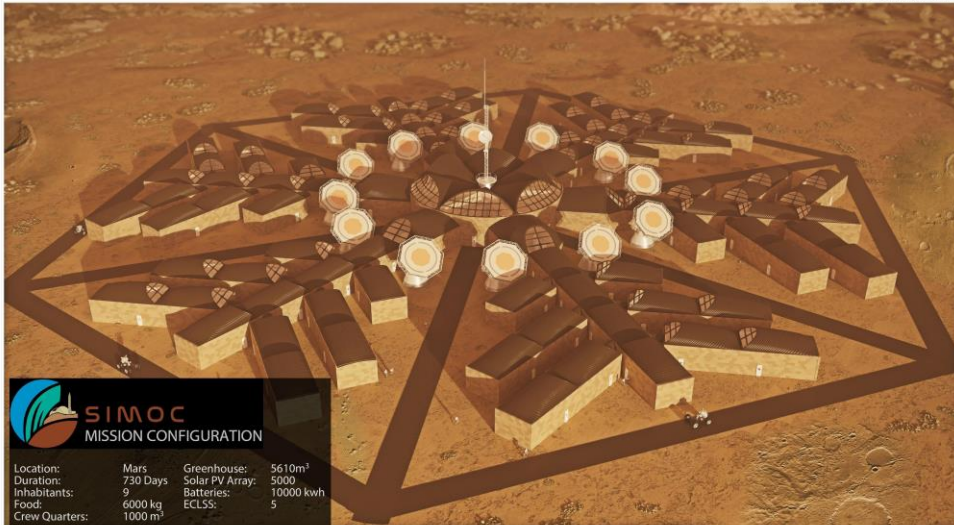
March 27th 2021

The 3rd AIAA LA-LV Space Architecture Gathering

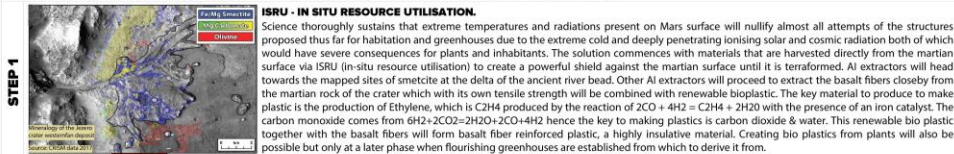
Arch Giuseppe Calabrese

URBAN FARMING FOR EXTREME ENVIRONMENTS ON MARS

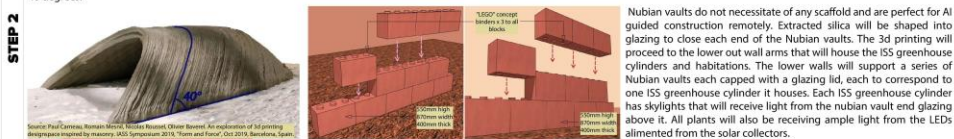




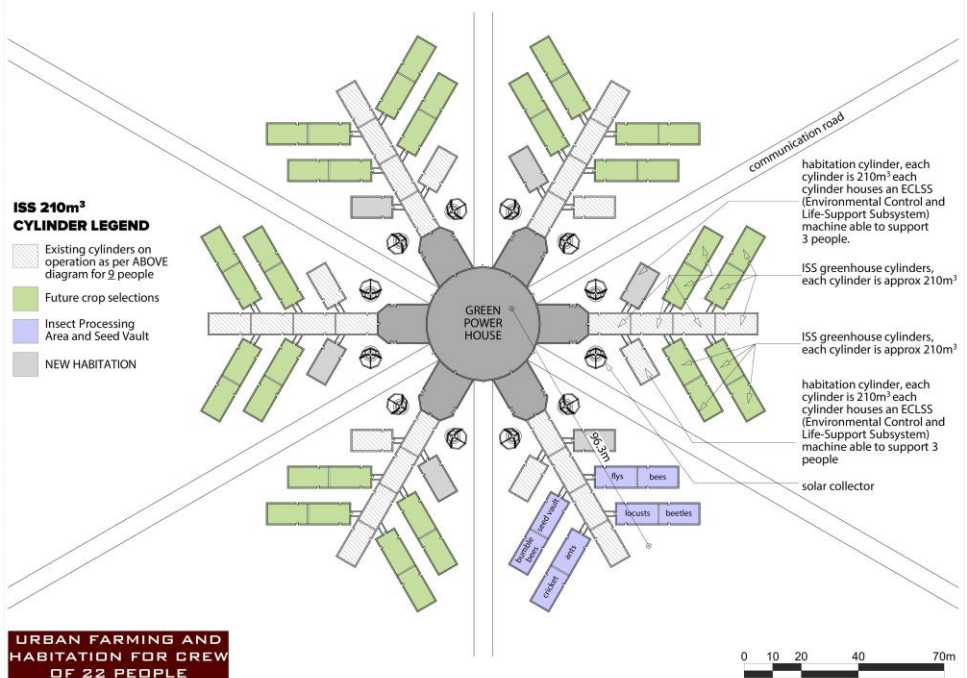
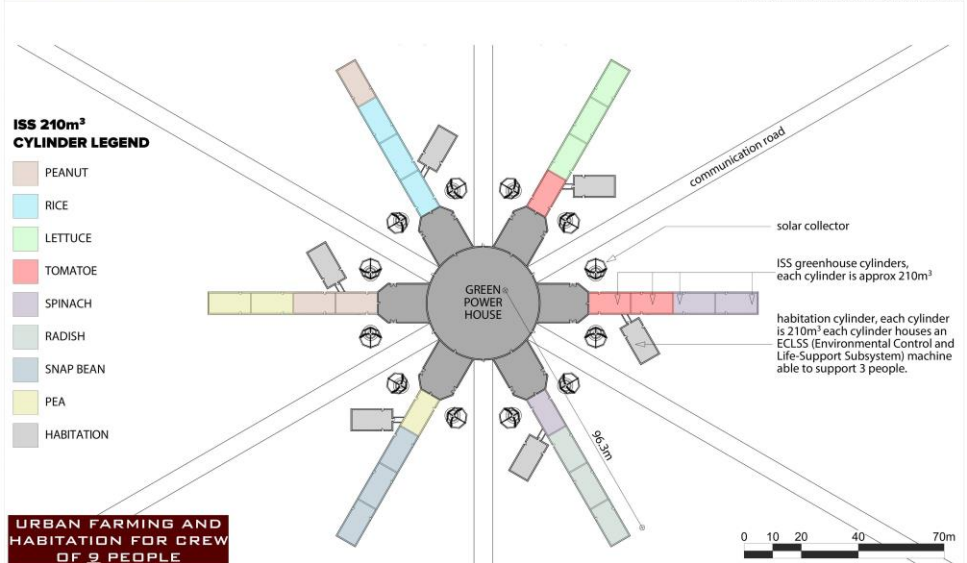
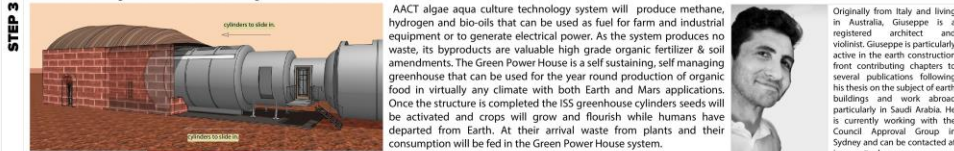
Agriculture is the most destructive human activity on the planet. Planet Earth has only 60 years of farmable land left due to unsustainable agriculture and extreme weather conditions. In USA alone the soil rate is at a loss of 10x it takes to generate it. The AACT algae aqua culture technology in conjunction with the pyrolysis process machines will heat bio waste at 1000 degrees Fahrenheit and in absence of oxygen will produce biochar a product that locks in carbon and creates an environment for soil microbes to breed in. As a waste bioproduct of this, we will have huge excess energy to be stored in batteries and methane sent back to process more waste in a perfect closed circle. Biodiversity is necessary, the unbalance as seen by all calls for fertilisers and pesticides to combat super weeds and super insects, health issues for consumers, destruction. The green power house is the solution moving forward as it will be able to absorb all the carbon in the terrestrial atmosphere and resolve global warming while accelerating soil generation from decades to days and turning waste into energy. Why is this not implemented everywhere already?

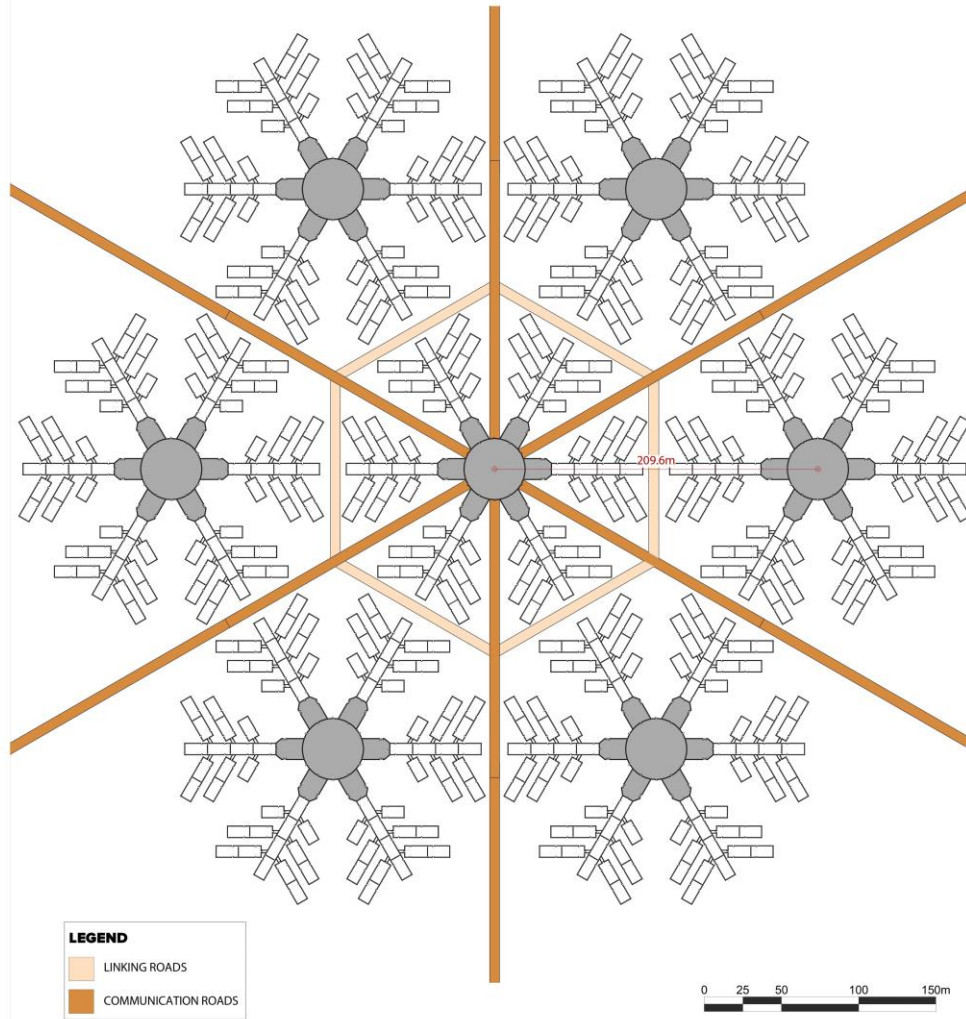


STRUCTURES - CMR (COMPRESSED MARS BLOCKS) AND 3D PRINTING.
AI will dig site trenches for foundations and commence the 3d printing in basalt fibre reinforced plastic of the Green Power House geothermal foundation and pools to include 6 algal raceways for algae aquaculture technology and house the bioprocessors with the photosynthetic collector cells. Compressed Mars bricks will be microwaved and locked together without mortar to form walls for the central core green power house building. After completion of the central core walls and six armed walled structure, the walls will be covered with six 3d printed basalt nubian vaults at an angle of 40 degrees.



STEP 3: GREEN POWER HOUSE AND GREEN HOUSE CYLINDERS.
The ISS cylinders will work together with a revolutionary system already applied with great success on planet Earth by Michael Smith which is referenced called the Green Power House, this system mimics natural biological processes that have been around for a very long time. The GPH Green Power House is an integration of three sub components: ABR: Anaerobic Bioreactors /PBR: Photo Bioreactors/OCE: Organic Carbon Engine that work together to convert waste by products from other agricultural, municipal, industrial and silvicultural processes into energy and soil amendments. ABR Anaerobic Bioreactors convert algal biomass into methane, hydrogen and organic fertilizer. PBR Photo Bio Reactors are designed for growing algae in large algal raceways. When ready, the PBR Photo Bioreactors move the algae to the reactor core where it is concentrated and prepared for transfer into an anaerobic bioreactor where it gets converted to organic fertilizer and fuel. Finally the OCE the Organic Carbon Engine, a biomass powered device that generated syngas, bio oil and biocarbon also called biochar, any residual heat is converted back into the Green Power House system for the cultivation of algae and its conversion into organic fertilizer and fuel.





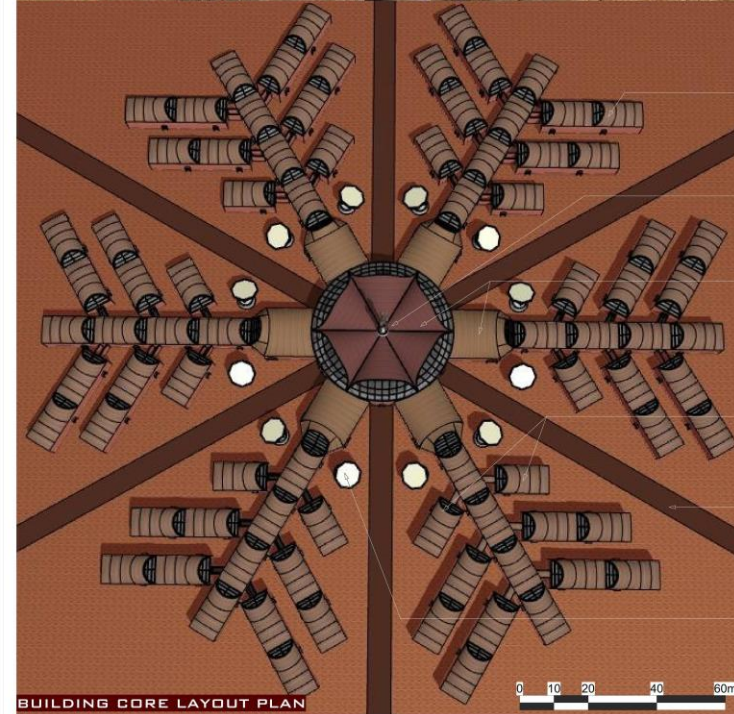
LEGEND

- LINKING ROADS
- COMMUNICATION ROADS

URBAN FARMING AND
HABITATION FOR CREW
OF 154 PEOPLE



JEZERO CRATER SITE LAYOUT PLAN



BUILDING CORE LAYOUT PLAN

NUBIAN VAULTS OVER CMB
BLOCK WALLS WILL SCREEN
ISS GREENHOUSE CYLINDERS
FROM IONIZING SOLAR,
COSMIC RADIATION AND
EXTREME COLD

COMMUNICATION ANTENNAS

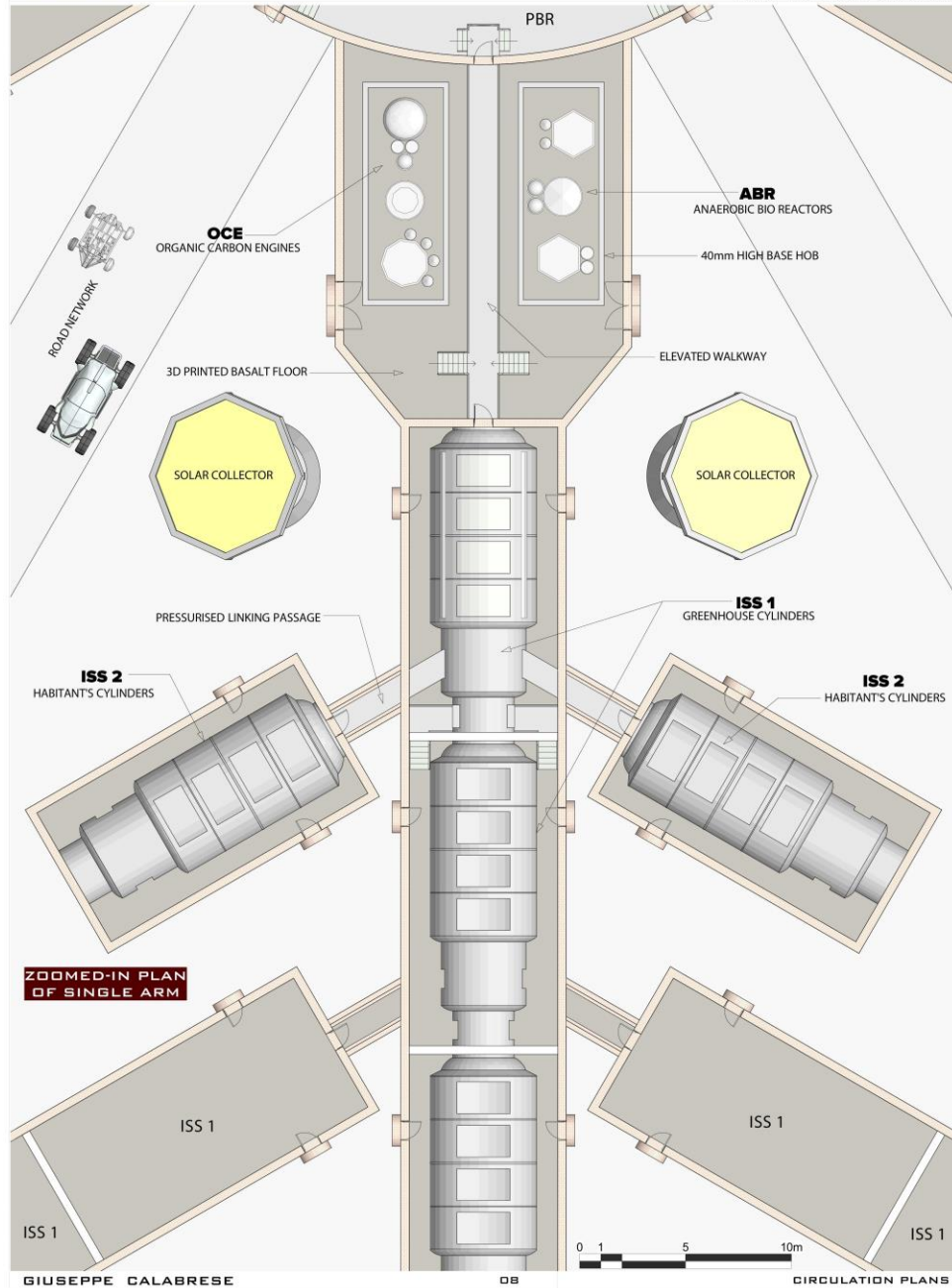
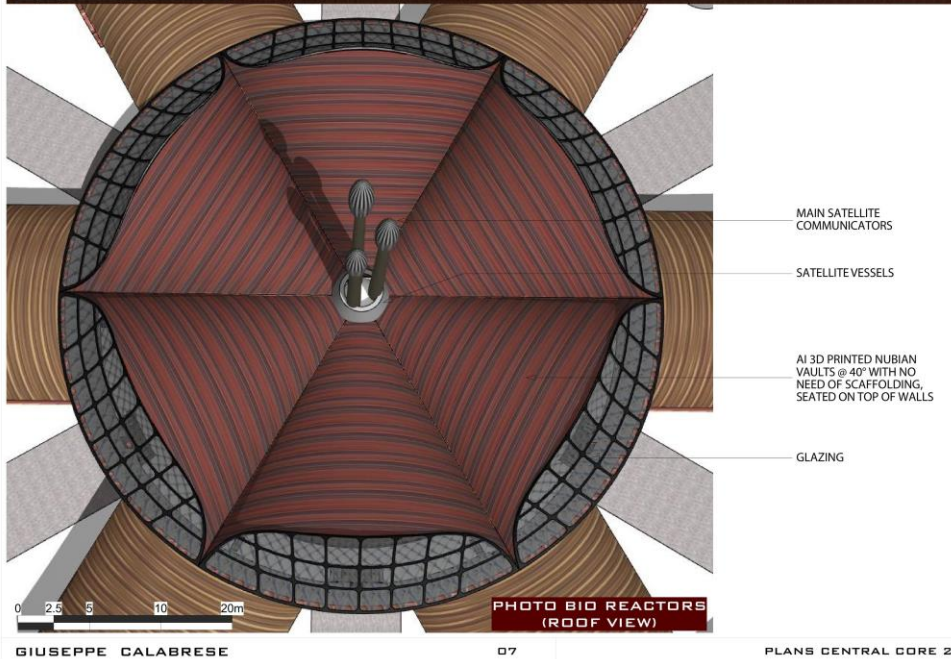
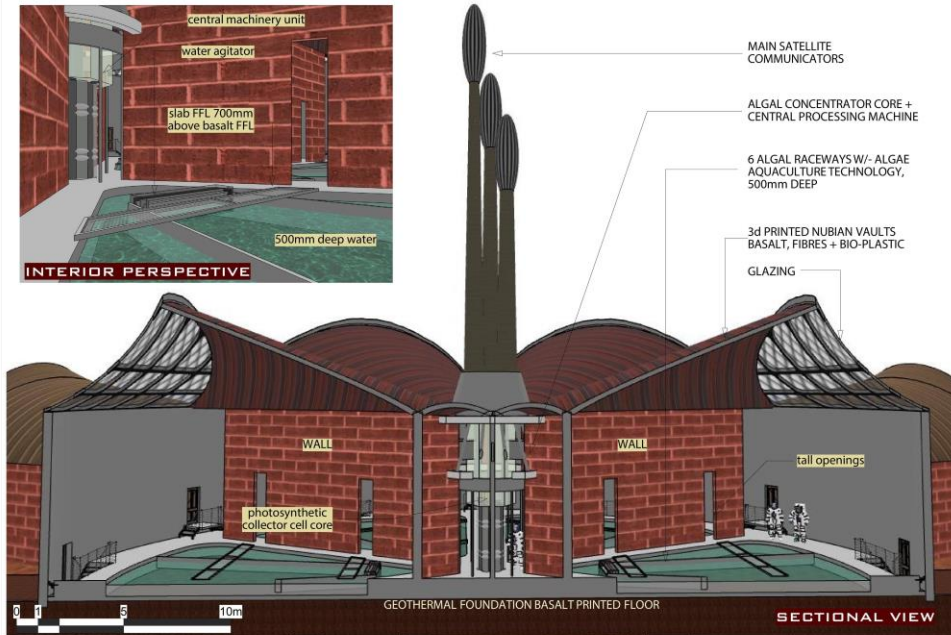
GREEN POWER HOUSE BUILDING
WITH SIX ALGAL RACEWAYS AND
BIOPROCESSORS WILL PRODUCE
BIOCHARCOAL AND ELIMINATE
WASTE.

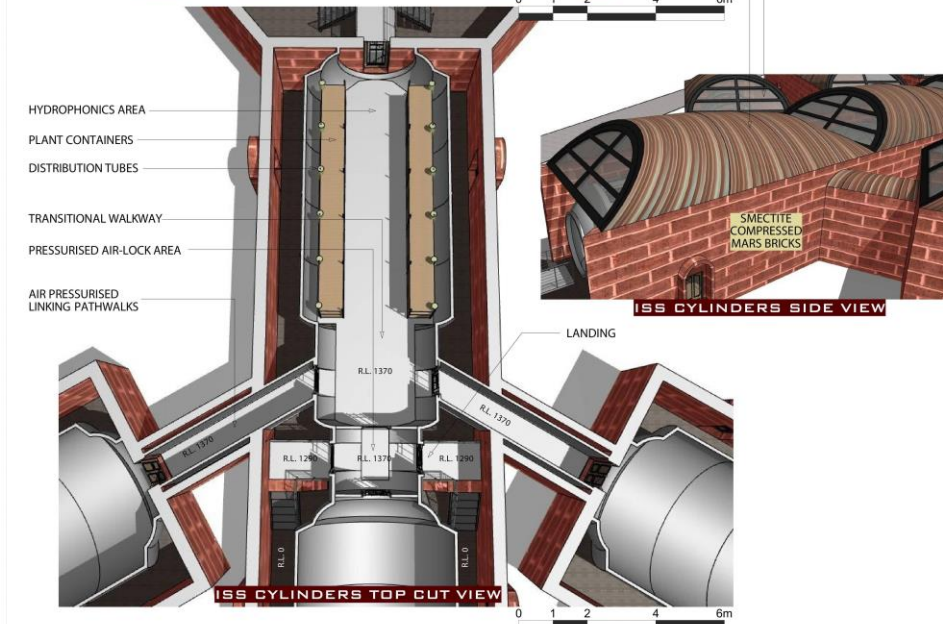
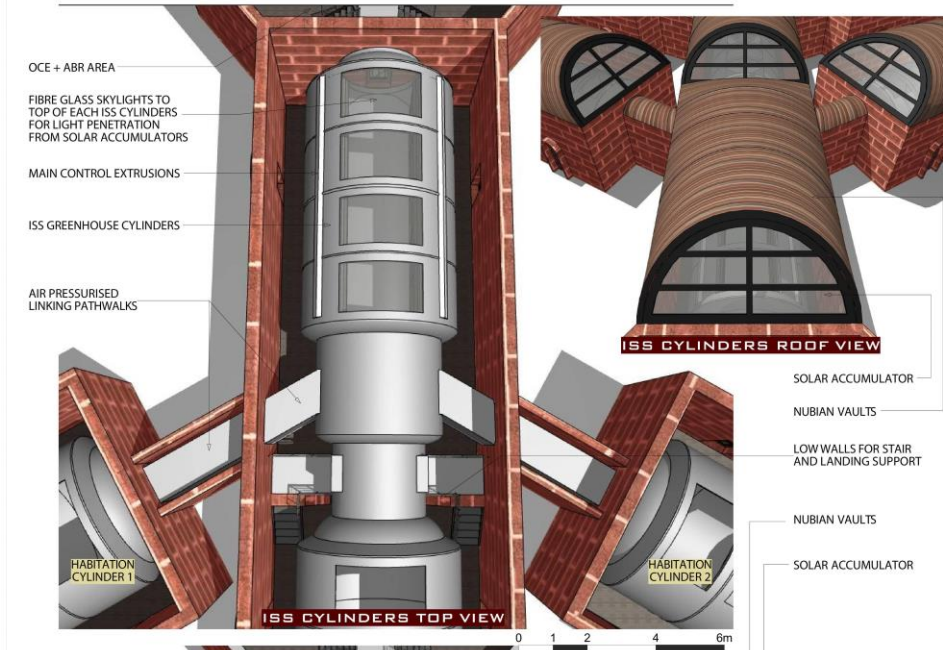
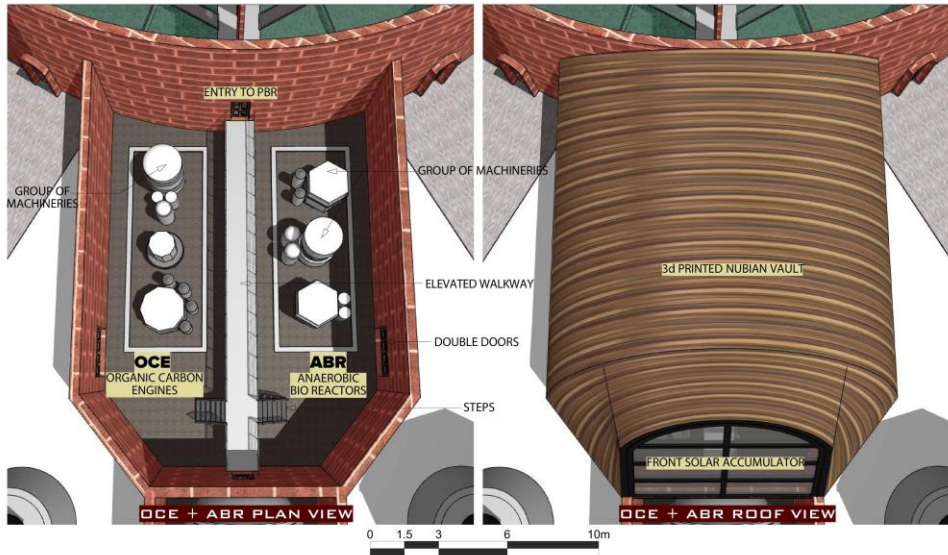
FIRST TWO CYLINDERS OF EACH
ARM WILL HOUSE HABITANTS.

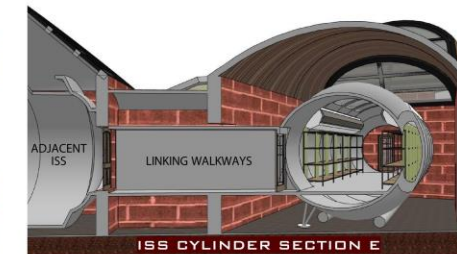
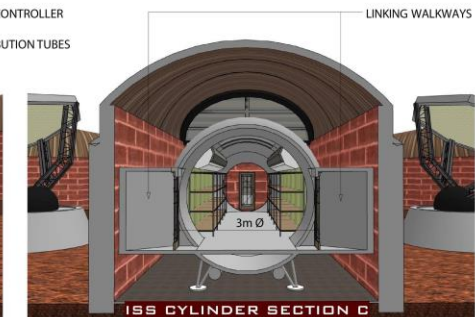
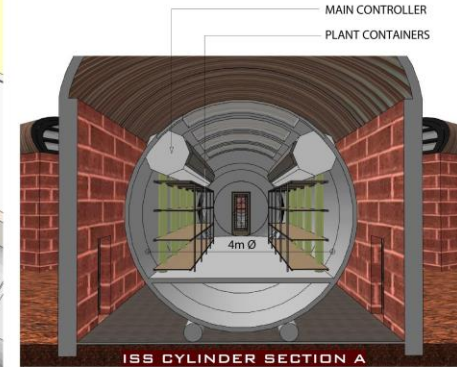
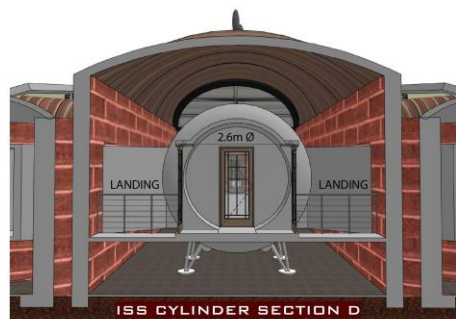
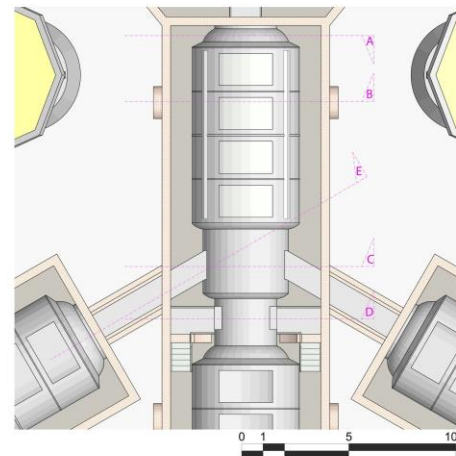
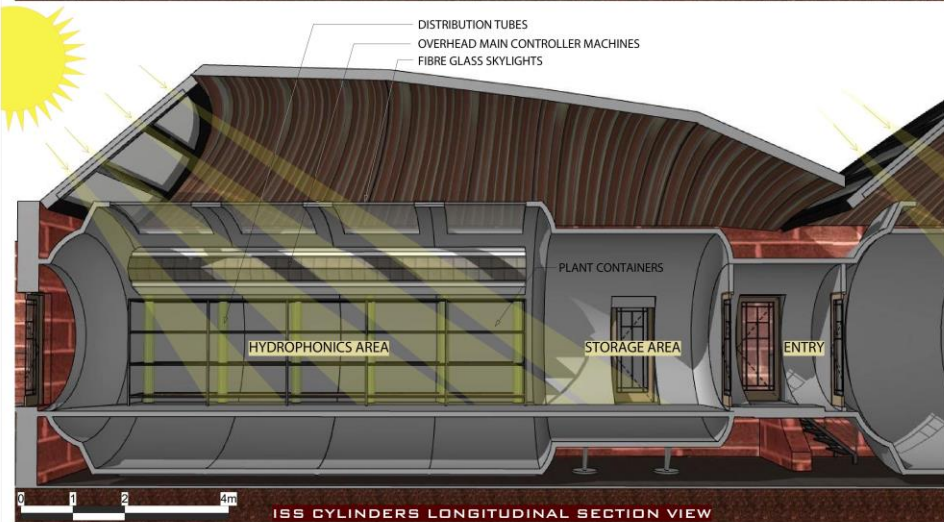
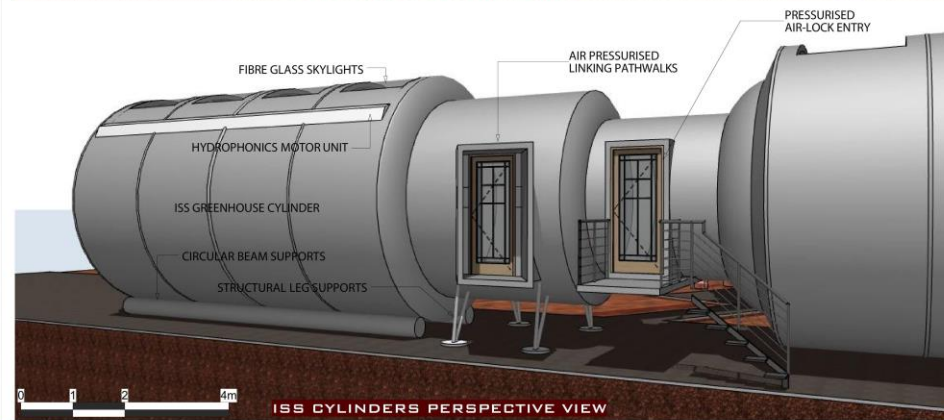
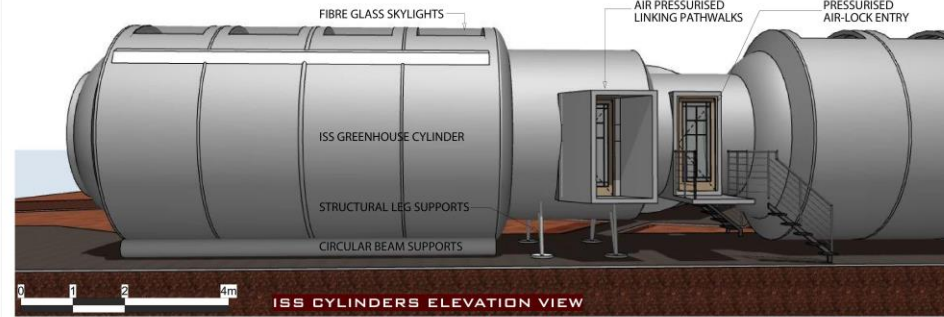
ROAD NETWORK

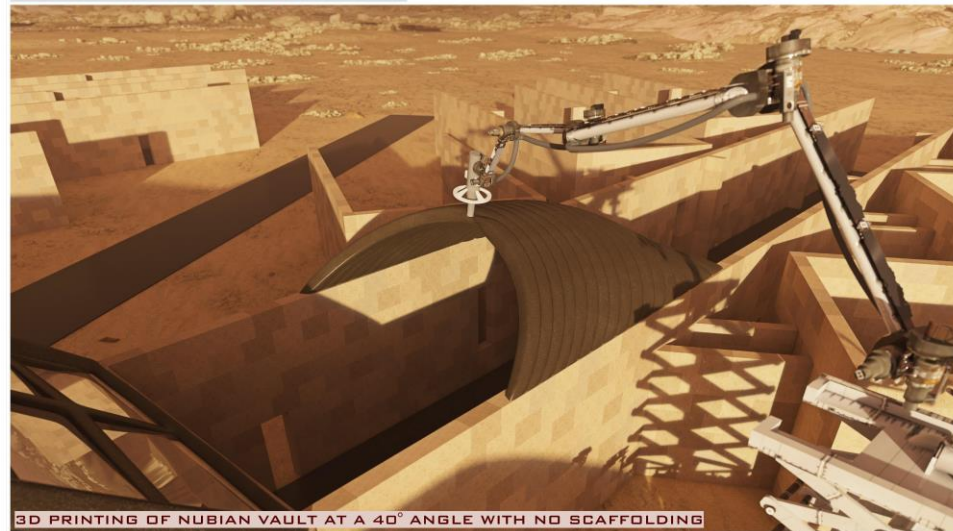
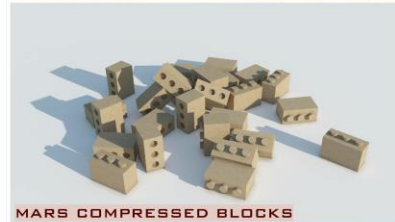
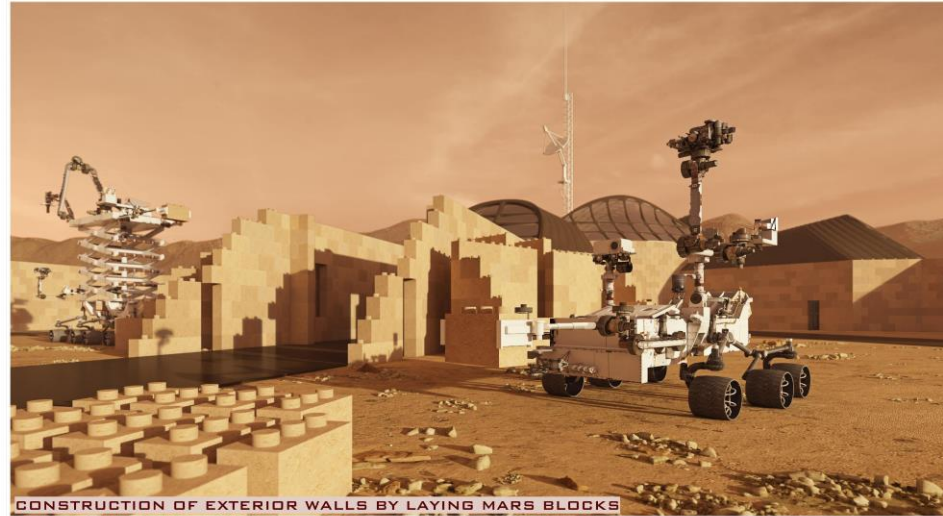
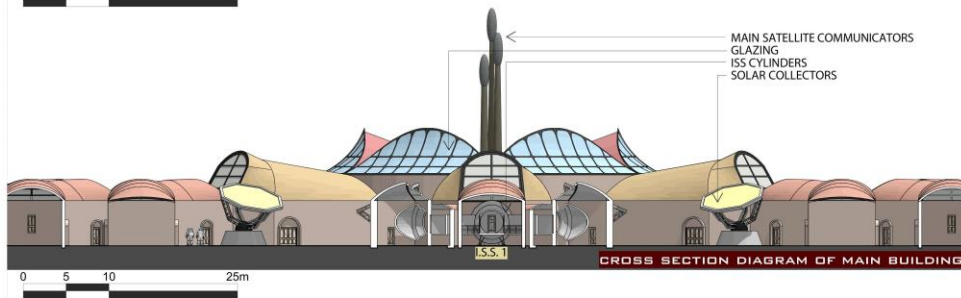
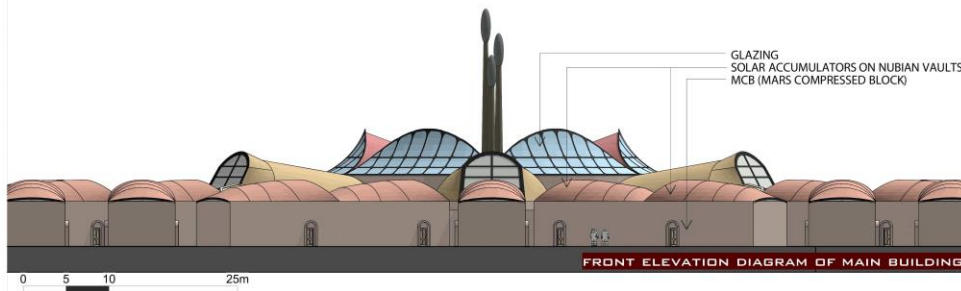
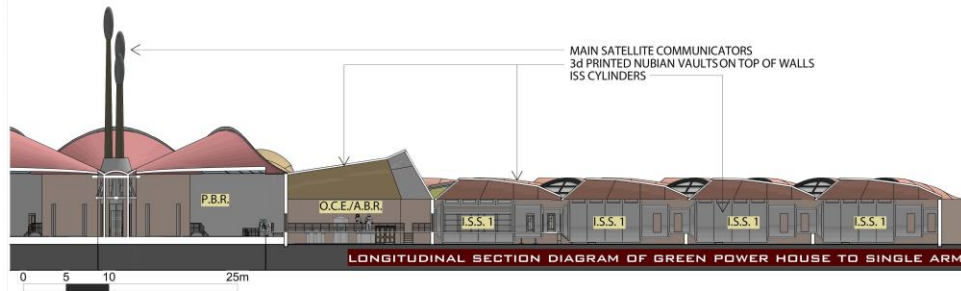
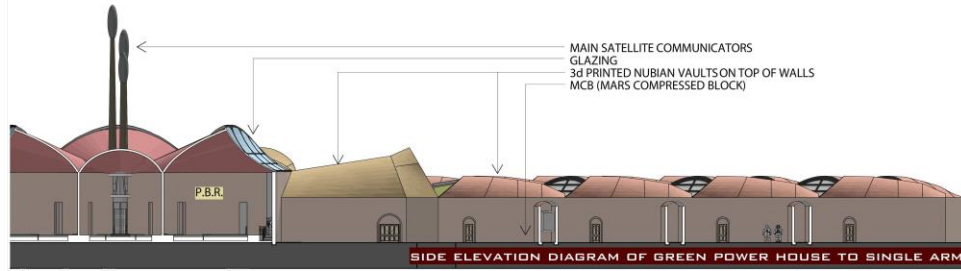
SOLAR COLLECTORS













3D SECTIONAL VIEWS OF 2X LINKING ISS CYLINDERS



3D SECTIONAL VIEWS OF AN ENTIRE ROW OF ISS CYLINDERS IN 1 BUILDING ARM



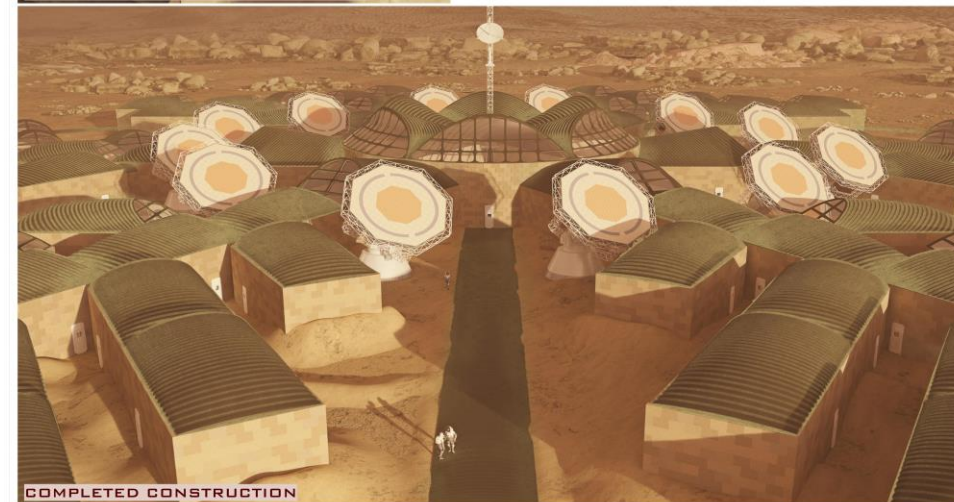
INTERIOR PERSPECTIVE OF GREENHOUSE ISS CYLINDER



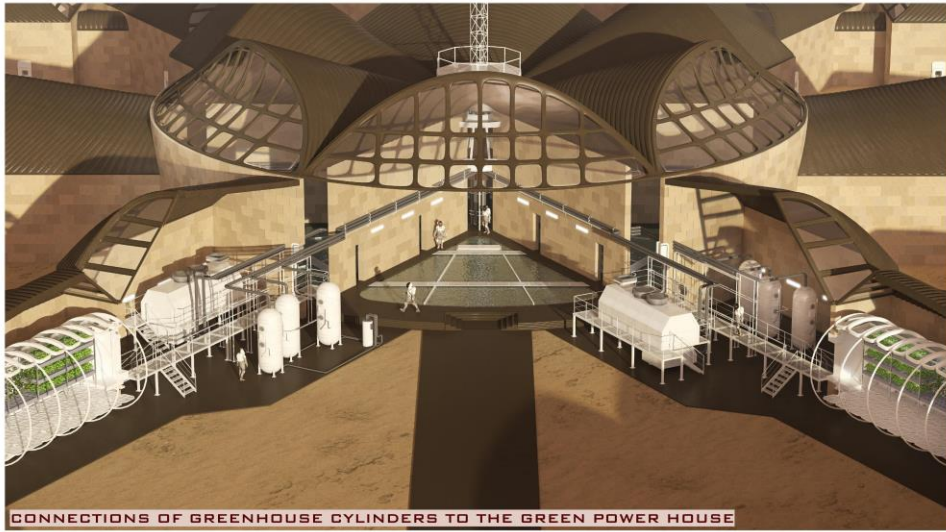
PROGRESSING SHIELDING STRUCTURE CONSTRUCTION



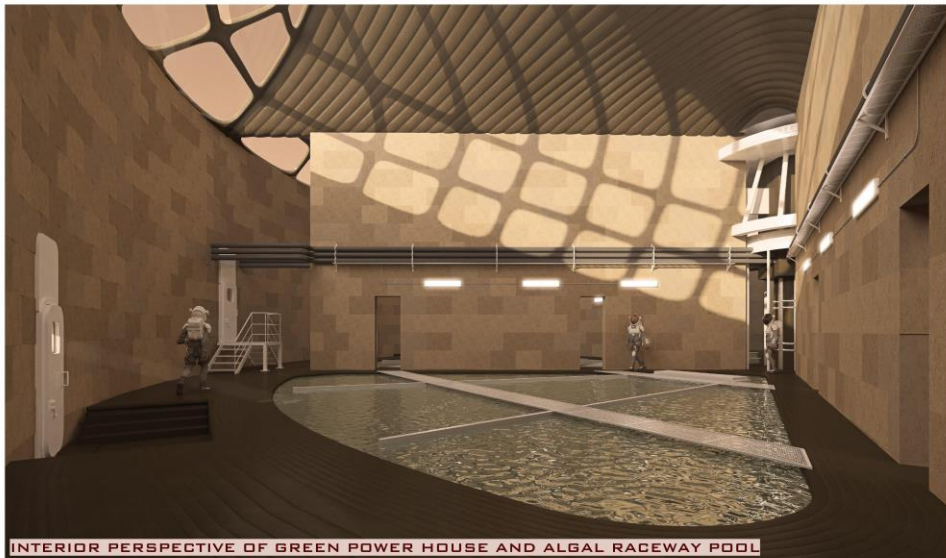
VIEW OF COMPLETED NUBIAN VAULT



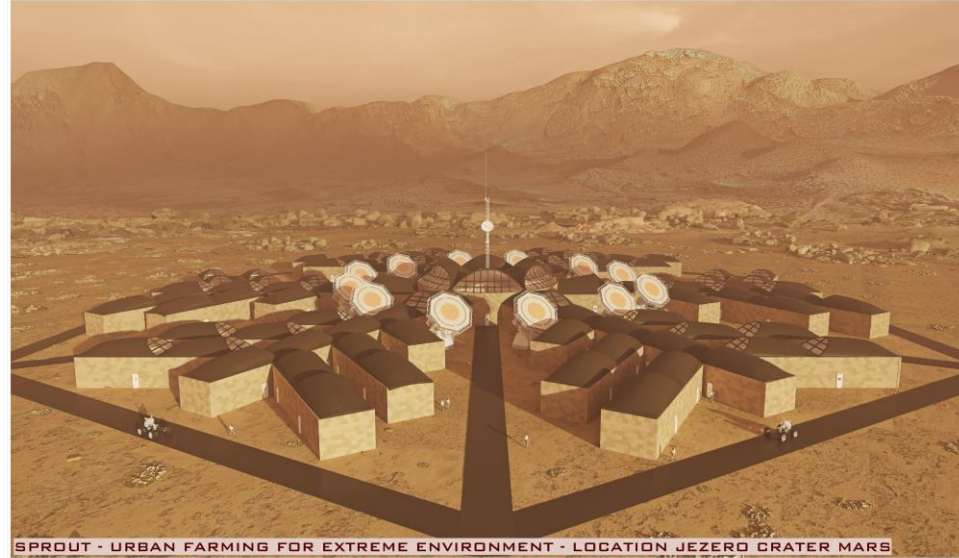
COMPLETED CONSTRUCTION



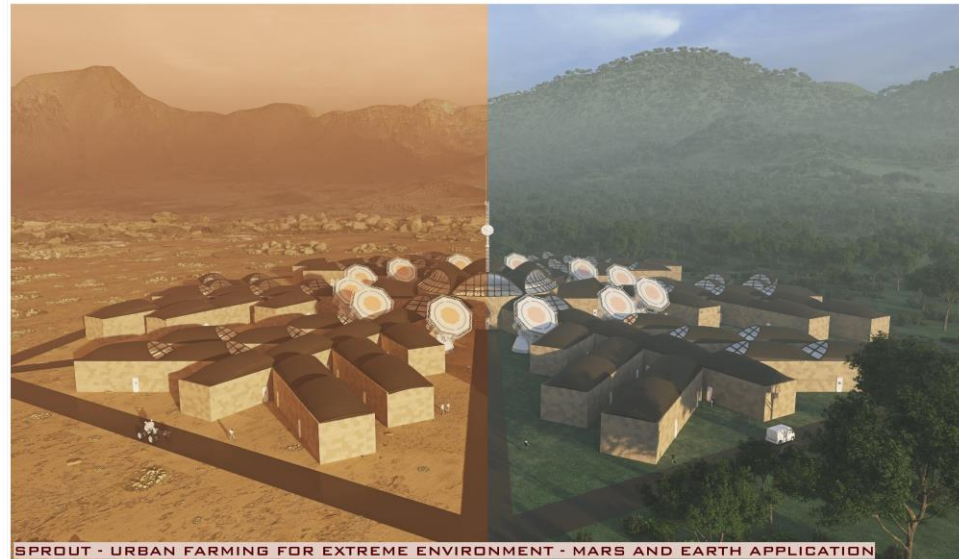
CONNECTIONS OF GREENHOUSE CYLINDERS TO THE GREEN POWER HOUSE



INTERIOR PERSPECTIVE OF GREEN POWER HOUSE AND ALGAL RACEWAY POOL



SPROUT - URBAN FARMING FOR EXTREME ENVIRONMENT - LOCATION JEZERO CRATER MARS



SPROUT - URBAN FARMING FOR EXTREME ENVIRONMENT - MARS AND EARTH APPLICATION