LUNARHOME

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Of primary concern in this design scenario was the creation of a habitable human environment. In order to develop a sensitivity in the design to human factors a conceptual analogy to biological growth was employed. Like a seed, the hard outer shell of the base would provide protection from the environment. Like a seed, the base could also grow or multiply while still remaining self-sufficient.

The pressurized enclosures would be protected from the environment by their placement six meters beneath the lunar surface. Limited surface contact would be achieved through the use of ingress and egress modules as well as vertical observation modules. The observation modules would allow the inhabitants limited opportunities for sight contact with the lunar surface and earth while remaining in a pressurized environment.

Prefabricated, modular interior systems of lightweight materials, like fabric, would define various areas. All environmental controls and utilities would be supplied by a detached plant. Base sections would also contain emergency back-up systems. The use of elementary geometric shapes throughout the interior would allow familiarity and easier adaption to the surroundings by the astronauts. Other factors of consideration in the design were the use of colors, variation in room volumes and human interface with systems and equipment. Again, the primary concern was with the environmental needs of the inhabitants.

The first phase habitation modules would be earth constructed using aluminum balloon technology. Later phases would utilize lunar resources in the construction of tensioned concrete domes. These large lunar material domes would be initially supported with inflatable form-giving membranes. These membranes would then serve as hermetic seals under the porous lunar concrete. The larger interior spaces would also serve varying purposes, including processing plants, non-pressurized storage areas and recreation centers.
Lunar Base 1 Plan
Surface Plan

Site showing placement of cross-over point concrete dome structure.

Prototypical module volume

Site Isometric showing vertical modules
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Base master plan

Conceptual diagram of Base2's construction sequence:

1. Place two rigid, monolithic gusset plates on the intersection between the base and the space frame to distribute the load.
2. Make concrete to pour in the space frame structure and reinforce with steel in order to make it rigid and strong enough to withstand the pressure inside.
3. The space frame structure is reinforced with rigid triangular plates placed on the floor to prevent the floor from being compressed and deformed by the pressure inside. Ensure the floor is secured on underneath the reinforced plate.
4. Processed reinforced steel unreinforced concrete or reinforced concrete is applied to lower surface of the roof.