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Architecture for humans in space: design, engineering, concepts and mission planning (1)

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STRUCTURAL CONCEPTS FOR LUNAR HABITATS

Abstract

In this paper we assume that a large, airtight underground space has been created, desirably near the South lunar pole, and we ask what techniques could be best used for obtaining needed materials and using them to erect sustainable habitats for people, animals and plants. Criteria for human occupants include separable, sound-isolated quarters for work, social gatherings, hygiene and sleep, plus selectable surroundings appealing to all of the human senses. We refer to a wide background of Earth-based research and development proposing architectures suitable for application in lunar conditions including cost of Earth-Moon transport, low lunar gravity and composition of local natural resources. A fundamental assumption is economic availability of reasonable quantities of either native or imported water, without which the whole idea of a large, permanent lunar settlement seems impractical. With water, a lunar version of adobe can be an important building material, especially when used in combination with strong, light and stiff structural materials such as bamboo. Versions of this building concept can be seen in use today in China.