

23rd SYMPOSIUM ON SPACE ACTIVITY AND SOCIETY (E5)
Moon, Mars and Beyond: Analogues, Habitation and Spin-Offs (2)

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DESIGNING TOMORROW'S LUNAR HABITAT WITH TODAY'S TECHNOLOGY

Abstract

In the past many have designed lunar habitats, some that are small in stature and some monolithic, future feats of engineering. The paper begins with a historic overview of up-to-date proposed small and large scale lunar habitats and settlements. The small scale habitats are usually based on conventional ISS-type modules that are relatively simple to construct and can be outfitted on Earth with pre-integrated equipment and supplies needed for the crew to survive for a short period of time. The larger habitats and settlements tend to be more eye catching but lack a sense of feasibility and research into technical considerations, human requirements, and functionality.

The paper presents an on-going design project of a lunar habitat that provides for a growing community of 80 people, with limited amounts of external resources. The settlement incorporates aeroponic greenhouses and solar power generation systems to achieve maximum of sustainability and to provide inhabitants with all essential resources to survive on the Moon for an unlimited amount of time. The base is planned for the south pole of the Moon along the inside ridge of the Shackleton crater. This unique location allows the base to feed power from two solar farms, one placed along the rim of the crater and another placed on an elevation a few kilometers away. The combination of these two sites allow for the habitat to generate power over 98 percent of the year. The proposed habitat is a combination of five similar four and a half meter diameter modules and two typical torus inflatable modules that can be mass produced and delivered to the site ready to install. This design offers several benefits:

- The habitat uses existing technologies and does not rely on non-proven construction methods;
- The combination of these modules allows for the settlement to expand with the population growth;
- The design affords easy short-sleeve circulation between the habitats providing double egress from every structure;
- The design offers simple zoning and functions allocation.

The project is supported by the Houston Museum of Natural Science and is part of museum's Discovery Dome program.