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## THE FIRST HUMAN SETTLEMENT ON THE MOON BY 2045: A CASE STUDY

**Abstract**

The vision of living and working in space has been the topic of speculative fiction and non-fiction for some 150 years. More recently and with the advent of rocketry in the 1950s, there have been numerous studies of potential camps and outposts to be located on Earth's moon during the past 60-plus years. However, most considerations of longer-term human settlements – i.e., locations with semi-permanent habitation have focused on orbital habitats such as the so-called “O'Neill Cylinders” of the 1970s. During 2020-2021, the Architecture Working Group of the Moon Village Association (MVA) conducted a design reference architecture case study focused on the first human settlement on the Moon – to be established by 2045. Key considerations include access to resources (such as lunar ices), access to energy (e.g., sunlight, nuclear, etc.) and access to and recycling of essential materials (e.g., air, water, Carbon, Nitrogen, etc.).

This paper will briefly summarize the history of space settlements, and recent MVA-sponsored studies. The paper will also describe in some detail the working results-to-date of the ‘2045 Settlement on the Moon Case Study’, including physical, biological and economic considerations. The paper concludes with a discussion of suggested directions for future studies and requirements for research needed to realizing the vision of a settlement on Earth's nearest neighboring world.