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Space Architecture: Habitats, Habitability, and Bases (1)

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STRATEGY FOR THE CONSTRUCTION OF SPACE HABITAT BASED ON KOREAN  
CONSTRUCTION TECHNOLOGY

**Abstract**

Moving forward, the global vision in space exploration focuses on establishing a sustainable presence on (and around) the Moon. Lunar exploration, therefore, has become a central item in the exploration strategy of most agencies and an increasing number of commercial organizations around the world. Developing a sustainable presence on the Moon is a long process expected to occur over at least the next two decades. To achieve this, it will be necessary to develop the necessary lunar infrastructure across technical areas (transportation, robotics, habitats, communications, space resources utilization, etc.). In this context, the Korea Institute of Civil Engineering and Building Technology (KICT), is considering potentially engaging in the development of lunar habitats given its expertise in civil engineering. The study aims at analyzing international trends and activities with respect to lunar habitats, developing a conceptual roadmap for the development of a lunar habitat, as well as identifying potential international partnership opportunities. First, future technology trends and domestic technology levels were identified to design a technology roadmap for space habitat. Using the derived technology level, the direction of the space habitat construction technology roadmap was established. The roadmap was established to build a permanently manned space base for more than 100 people by 2050 to achieve the space economy. The technologies required for space habitat construction, including site selection plan, landing system, building materials, construction technology, habitat system, onboard and offboard access plan, maintenance plan, and construction robot, are organized into eight technology classification systems. The derived

space habitat construction technology roadmap includes mission plans and technology development scenarios from 2032 (short-term) to 2050 (long-term). And then, the space habitat construction technology roadmap is used in manned space habitat design work. A manned space habitat was designed according to the step-by-step scenarios of the technology roadmap. A design document was derived by classifying basic construction elements, construction elements for survival, and elements necessary for physical and health maintenance and activity, and finally, design guidelines for a manned space base were derived.