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MACRO ENVIRONMENT AND INFRASTRUCTURE FOR MOON CAMP SITE AND HABITATS

Abstract

Building the elements of space travel missions involve various engineering fields such as aerospace, mechanical, industrial, systems, computer, material, and biomedical. With human space travel projects emerging, a boost in disciplines that were less active gained momentum such as space architecture, astrobiology, astropsychology, all the way to space food and beverage.

Luna Castra, a proposed semipermanent lunar base includes several habitats, labs, and service stations to be built in phases. On Earth, new buildings are part of an existing environment that provides macro services and infrastructure, in addition to the microenvironment created within the structure or habitat itself. In space architecture we have to factor-in all the macro and micro aspects. In other words, for humans extended space travel, design must include everything from the infrastructure and roads to the buildings, commodities, and breathable air.

What does an infrastructure plan on the Moon look like? Luna Castra is used as a case study to outline the steps needed to build such infrastructure, how it connects with the structures and habitats to make up for the micro/macro environment, and the technology that is available or needed to accomplish such project. With infrastructure and buildings come maintenance concerns. Maintenance in space needs special attention to quantify and assess resilience, longevity, maintainability, and maintenance procedures. A maintenance strategy is evaluated and incorporated in the timeline including the milestones of constructing the infrastructure and habitats, in addition to the parameters of the maintenance plan. Part of the maintenance strategy includes higher design resilient or durability to reduce future maintenance operations. Automation is a big part of maintenance in space, and it plays part in the maintenance strategy. In general, roads, buildings, food, and breathable air are addressed to a certain extent as part of this project.

The typical long time it takes space projects to work, in addition to the multidisciplinary aspects involved, conveyed a dynamic scheme incorporating variables to account for the fast development in IT, 3D printing, IoT, AI, and nanotechnology. This macro environment infrastructure case study was established utilizing design elements from the general design matrix. It could be used as a model for projects of similar nature or those that share the same design elements.