

# **Moon Village Association (MVA)**

## **Architecture Working Group (AWG)**

*Fostering Cooperation, Collaboration, and Competition*

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# Inception of the MVA AWG

- What is now known as the MVA Architecture Working Group began as the MVA Architectural Concepts & Issues Working Group 2020-2023
- The intention was to provide a forum for identifying and promoting an international discussion on various architectural concepts, including key environmental issues (such as dust mitigation, radiation exposure, etc. that might arise from the Moon Village concept and its implementation.
- Since its inception, the AWG has presented three webinars, held two global workshops, and produced three reports, all of which can be found on the MVA website [here](#)



# MVA AWG 2020-2023 Moon Base Concept



# Introduction to the MVA AWG 2.0

- The MVA AWG was rebooted in April 2024 with a new leadership team
- The MVA AWG is now Co-Chaired by:
  - Gary Barnhard, MVA Vice President, United States of America
  - Satoru Kurosu, MVA Moon Village Evolution Coordinator, Japan
- A Working Group membership refresh is underway
  - New members are welcome; please reach out to one of the AWG Co-Chairs
- The focus of the AWG is on:
  - broadening the engagement in AWG,
  - outreach to the broader space community, and
  - accomplishing tangible projects supporting MVA goals.
- The primary objective of the MVA AWG is to foster cooperation, collaboration, and competitive engagement in articulating and understanding the requirements for sustainable lunar operations and habitation

# MVA AWG Actions

- **MVA AWG 2024:**

- New project kickoff – Sustainable Lunar Settlement Design Charrette & Requirements Taxonomy
- ISDC 2024 Los Angeles – technical presentations in Lunar and Space Ambassadors Tracks
- Lunar Surface Innovation Consortium (LSIC) – Power & ISRU focus group participation
- Moon Station 2050 (MS 2050) International Competition – supported review of submitted proposals.
- International Moon Day – multiple events were facilitated (Kuwait, Cape Canaveral, USA)
- IAC 2024 Milan – multiple presentations on lunar-related papers were given (IAF Space Habitat Committee meeting and Systems Engineering Symposium)
- MVA Workshop AWG 2.0 Presentation to encourage participation and engagement bearing fruit

- **MVA AWG 2025:**

- Planned Outreach – ISDC 2025 Orlando, USA; MVA Workshop 2025, LSIC; IAC 2025 Sydney, LEAG
- Synthetic Moon Participation
  - Infusing MVA curated models of required lunar elements/systems into shared lunar modeling and simulation environments
- Sustainable Lunar Settlement Design Charrette & Requirements Taxonomy
  - A cooperative, collaborative, and competitive exploration and codification of how science, systems engineering, and architectural design drive the requirements for Offworld Anthropological Space Infrastructure Settlement (OASIS)
  - The goal is to bias initiatives across the community to achieve better outcomes



# Offworld Anthropological Space Infrastructure Settlement (OASIS) Lunar Skyvents (Pits) as a Resource



Image Credit: NASA GSFC/Arizona State University.

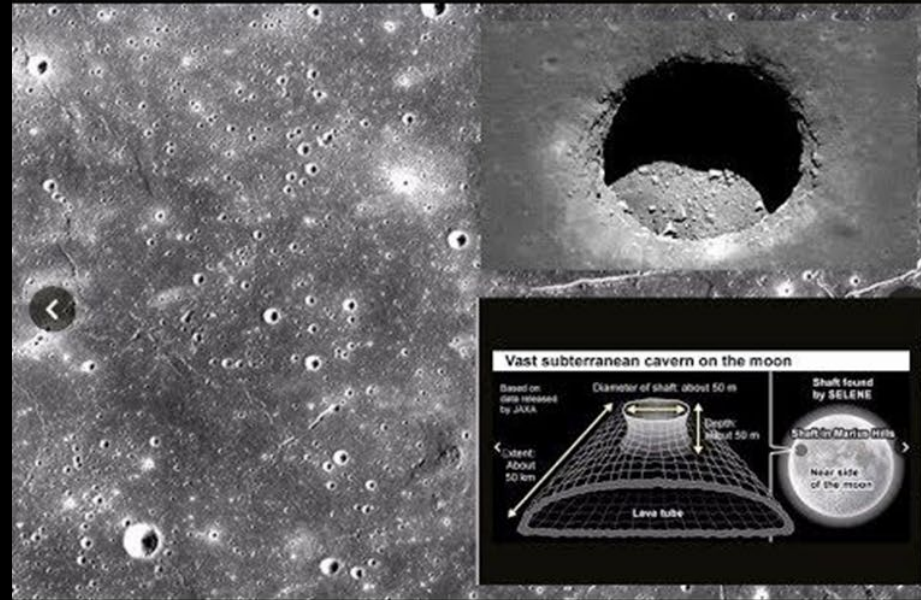
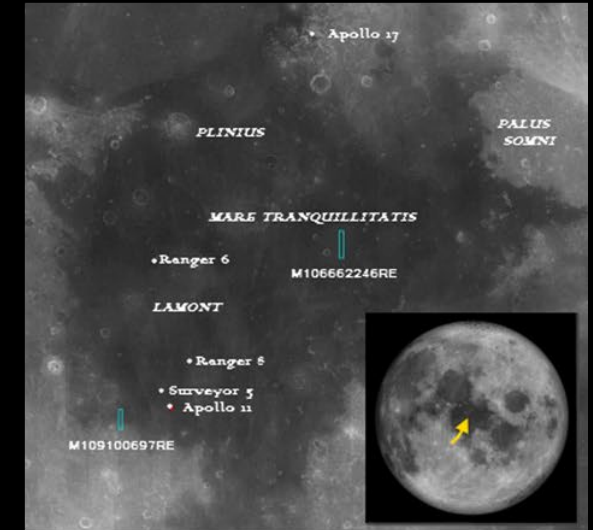


Image Credit: NASA/DOD/USGS

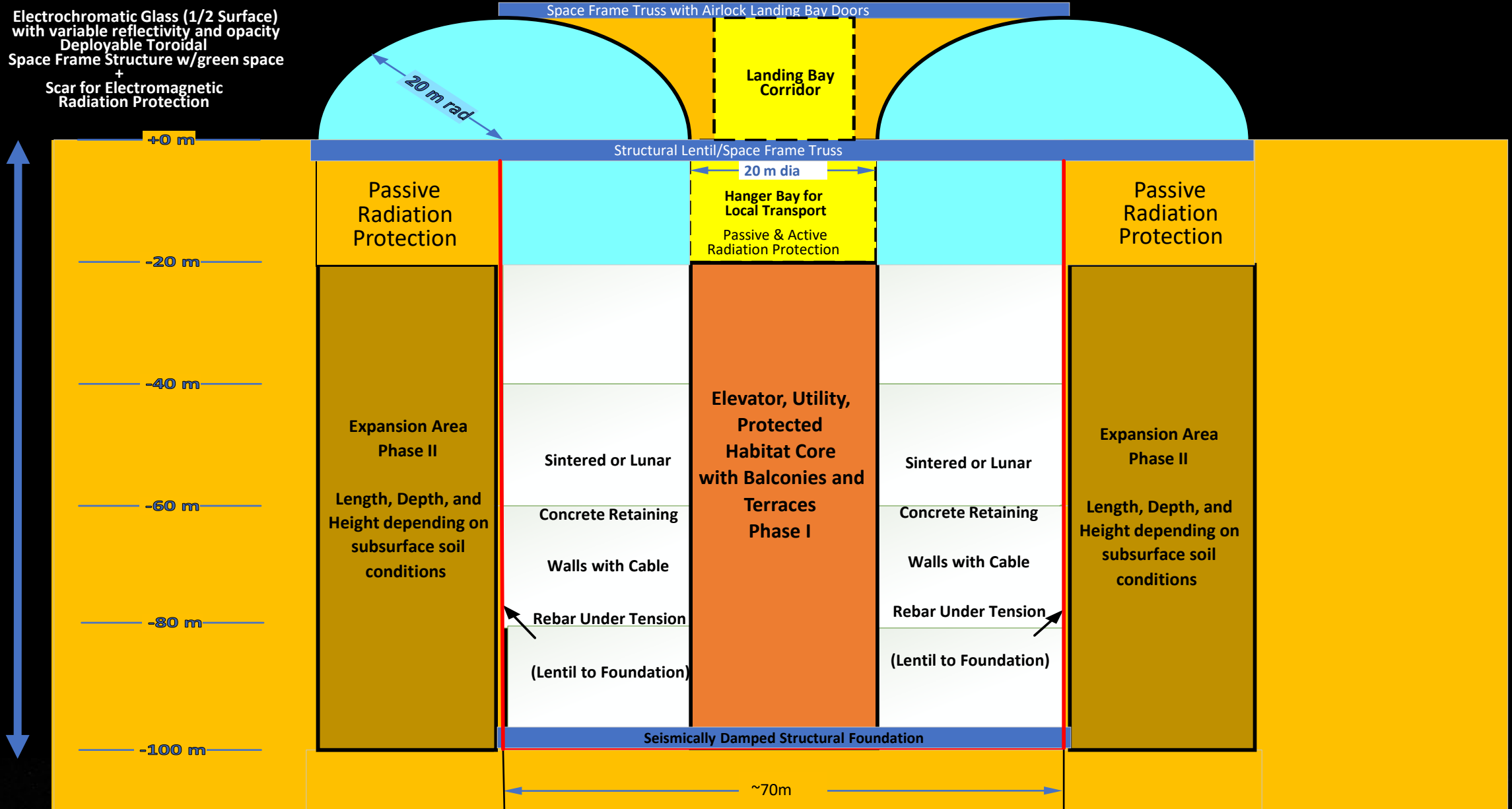


- Examples include Mare Tranquillitatis (shown) and Marius Hills.
- OASIS geometry assumes ~70m diameter, 100m depth, flat bottom, and bedrock sides
- The Lunar Reconnaissance Orbiter has imaged over 200 pits that show the signature of being skylights into subsurface voids or caverns, ranging in diameter from ~5 m to more than 900 m

**Science → Systems Engineering → Architectural Design → Realized Archology**  
Understanding the relationships between humans, the natural environment, and the built environment

# OASIS Project Sky Vent Volumetrics, Light & Radiation V2.0 Cross Section

Electrochromatic Glass (1/2 Surface)  
with variable reflectivity and opacity  
Deployable Toroidal  
Space Frame Structure w/green space  
+  
Scar for Electromagnetic  
Radiation Protection



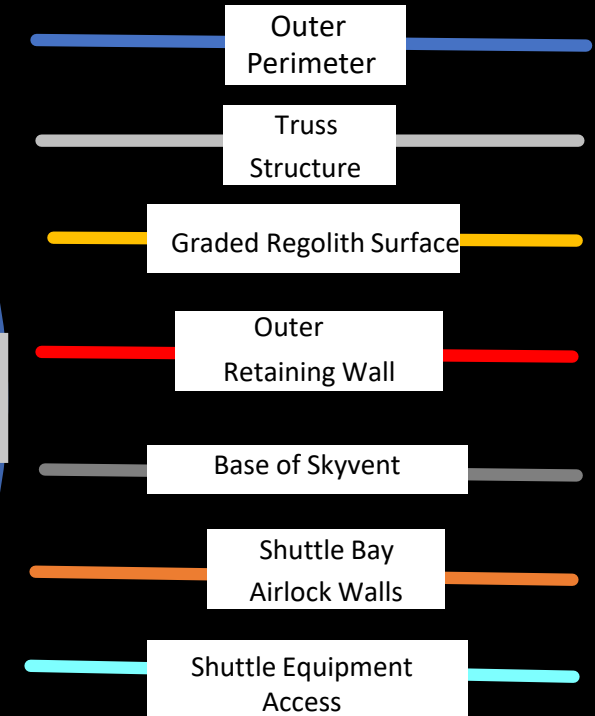
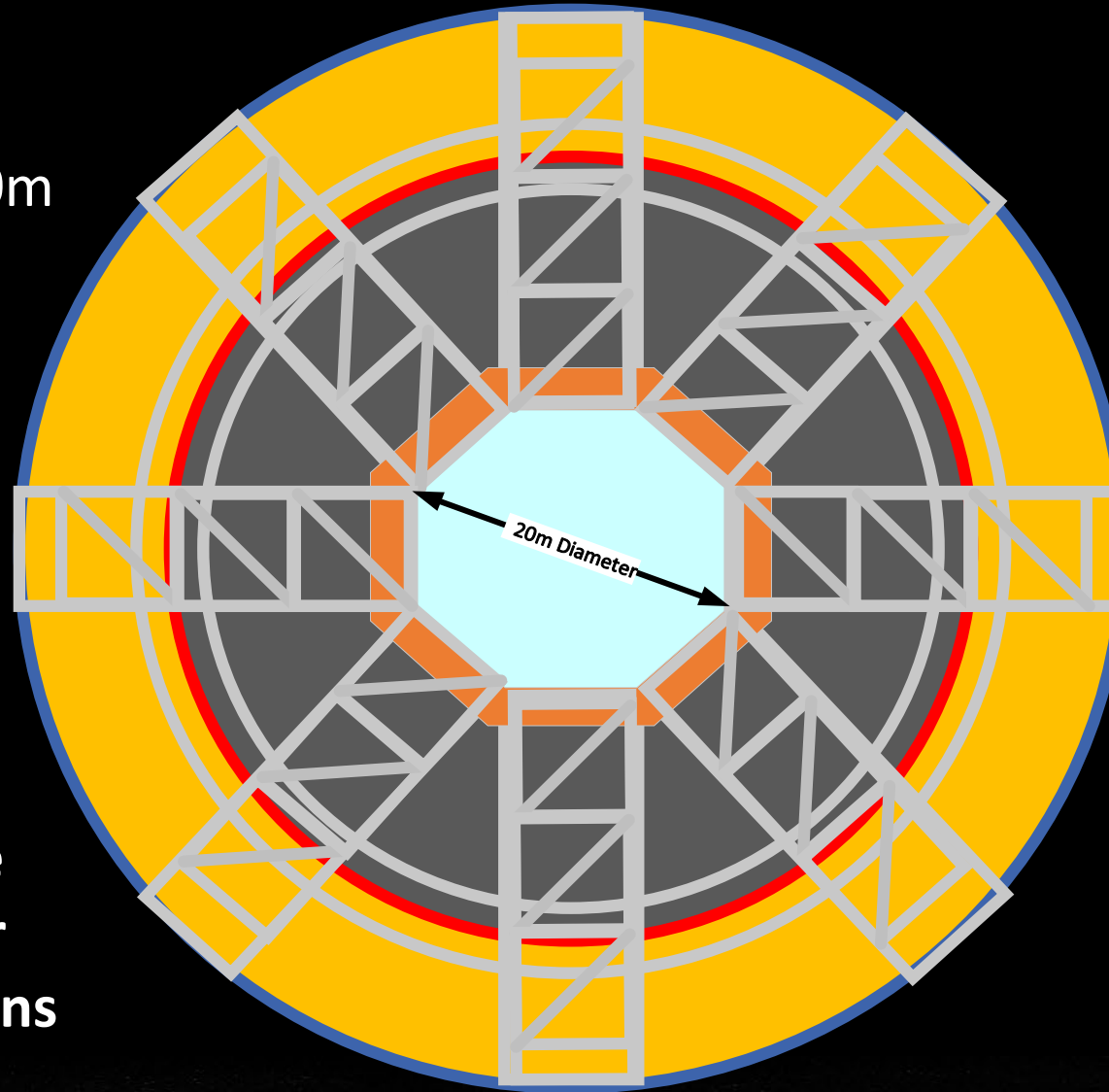
# OASIS Skyvent Structural Truss Platform Surface Level Plan View

## Platform

- Box Truss ~10m x 10m
- On surface  $\pm$  10m
- ~100 m diameter
- Self-supporting
- Build-out & Build In

## Skyvent

- ~70m diameter
- ~100m depth
- Cylindrical entrance
- Rubble on a flat floor
- Significant indications of cave structure





# Offworld Anthropological Space Infrastructure Settlement (OASIS) Project

- The Moon Village Association (MVA) Architecture Working Group aims to foster interest in building an international and interdisciplinary understanding of the issues and stakes raised by future space settlements.
- This mission is of utmost importance as it drives the future of sustainable, scalable space settlements where the inhabitants would thrive, not just survive.
- To achieve these aims, the MVA needs to ask and begin to answer fundamental questions concerning how science, systems engineering, and architectural design need to drive such endeavors toward a realized archology.
- Creating a framework that draws out and codifies what we know and what we know that we do not know concerning space settlements can be an invaluable resource for evolving efforts to design sustainable lunar settlements in the coming decades.
- We need to develop the vocabulary and understanding that enables a confluence of interests to be articulated, building on statecraft initiatives such as the Artemis Accords, fostering cooperation, collaboration, and competition.
- The structuring/ordering of discipline knowledge we curate must address analog Earth/Flight testing, in-situ checkout/evaluation, final assembly, operations, and maintenance of habitable infrastructure.

*We must translate all we learn into a realized archology*

*We must become the best stewards we can of our Earth and life wherever we may be*

# MVA AWG 2.0 Status

- MVA Workshop AWG 2.0 Presentation to encourage participation and engagement is bearing fruit
- The first MVA AWG Working Group V2.0 virtual meeting was held on December 18<sup>th</sup>, 2024
- Seventeen (17) people from around the world representing all sectors of the space business have agreed to participate and engage at some level
- Nine (9) participants actively engaged in dialog at the first meeting
- Dialog resulted in an agreement in principle on a reasonable path forward expressed in multiple voices
- Specific project examples were identified and agreed to be relevant by the participants
- The AWG 2.0 Portfolio will both build on the AWG 2020-2023 MVA foundational work and extend consideration to the general problem and solution space for lunar development
- Detailed minutes of the meeting will be distributed later today
- Next full AWG meeting will be in January, date TBD

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