



CanSpace Design Competition: Master Reference Document

1. Project Overview & Mission Statement

The Mission: Engineering for Inhabitant Flourishing.

Crews face intense isolation and confinement during extended lunar missions. Habitats must transition from pure survival to being sustainable and harmonious.

Guiding Quote:

"Architecture involves forging harmony around the human system, balancing culture, biology, planetary knowledge, and technology..." - The Millennium Charter.

The Goal:

To challenge high school and university students across Canada to design the interior architecture of a permanent, 4-person lunar surface habitat, bridging rigorous systems engineering with human-centric space architecture.

2. The 5 Figures of Merit (FOMS)

To evaluate designs objectively, submissions will be scored on the following five architectural themes applied to human activities:

1. **Usability:** Task efficiency, workspace clearance, and ergonomic reach.
2. **Flexibility:** Configuration range, reconfiguration efficiency, and multifunctionality.
3. **Livability:** Personal space, privacy, and environmental comfort.
4. **Sustainability:** Resource efficiency, repairability, and system durability.
5. **Communication:** Clarity with which the team communicates its design intent, system relationships, assumptions, evidence, and architectural reasoning.

Note: all the following FOMs are weighted equally to one another.

3. The Sandbox

Space Architects must prioritise crew safety and operational sustainability. Teams must address both the **structural requirements of operating on the lunar surface** and the **physiological challenges associated with long-duration exposure to lunar gravity**.

Core Rules

- **Rule #1 (Geometry is Truth):** Designs must respect physical dimensions, spatial relationships, structural plausibility, human scale, and the laws of physics. Visual representations must accurately



reflect the geometry and scale of the proposed habitat.

- **Rule #2 (Technology Constraint):** Teams may propose emerging or speculative technologies, but must clearly distinguish established technology from technology requiring future development. Critical habitat functions may not depend on unexplained or physically unsupported technologies.
- **Rule #3 (Crew Capacity):** The habitat must be designed for four crew members simultaneously, with no more than four crew members accommodated at any time.
- **Rule #4 (Volume Constraint):** The total pressurized, crew-accessible volume of the proposed habitat shall not exceed 100m³. Structural voids, unpressurized service spaces, external equipment, and permanently inaccessible volumes are excluded. The airlock space counts towards the 100m³.
- **Rule #5 (Required Specifications):** All submissions must explicitly specify the following:
 - Each proposal must identify the anticipated medical risks associated with long-duration exposure to lunar gravity and incorporate at least one architectural, mechanical, operational, or physiological countermeasure. Teams must explain the expected benefit, limitations, and operational requirements of their proposed countermeasure.
 - Approximate Location on the Moon (Example: at the pole, edge of a crater, flatlands, lunar lava tubes)
 - Primary Power Source (Example: Solar power, nuclear)
 - Primary Materials Used (Example: Earth material transferred over, like iron, aluminium, and etc. or lunar material like lunar regolith or ice)

The "3 of 5" Subsystem Rule

Each submission must select and focus on exactly 3 of the following 5 domains:

1. **Primary Structure:** Protection, viewports, docking, etc.
2. **ECLSS/Life Support:** Air, water, temperature, pressure, food prep/storage, waste management, etc.
3. **Nervous & Circulatory System:** Power generation/storage, data, illumination, command/control systems, etc.
4. **Workspace:** Operations, experiments, communication, education, EV storage, stowage, etc.
5. **Leisure:** Sleeping quarters, workout areas, relaxation, etc.

Assumptions

Teams must explicitly state their major assumptions, including where applicable:

- Construction method
- Material availability
- Technology readiness
- Communications
- Environmental conditions

4. Competition Pipeline & Deliverables

Phase 1: Preliminary Proposal

- **Due date:** 16 October, 2026.



- Each team must submit:
 1. Team name
 2. Team members
 3. Preliminary habitat concept
 4. *Proposed lunar location*
 5. *Primary power source*
 6. *Primary materials*
 7. Proposed three subsystem domains
 8. *Preliminary gravity countermeasure*
 9. 1–2 page technical/architectural proposal (11-point font, double-spaced)

Phase 2: Final Submission

- **Part A - The Abstract:** Must include a cover section stating the **team's name, school, and the full names of all team members**. The main body must detail the purpose, design philosophy, methodology, and how everything complements each other. Teams must demonstrate a deep understanding of their approach, the ideology behind it, factors considered, the number of flights needed to make the plan happen (if applicable), well-defined assumptions, and room for margin.
- **Part B - The Visuals (4 Total Renders):**
 - One (1) "Hero" macro-image showing how everything fits together holistically and how it feels to live here.
 - Three (3) small renders highlighting the 3 specific subsystems the team chose to focus on, visualizing how the system works.
- **Optional (For People's Choice Award Only):** People's Choice is determined by conference attendees based on the exhibited submission, including renders, drawings, models, and supporting materials.

5. Official Schedule

- **Phase 1 (Team Roster & Intent to Participate):** Submitted via online submission site by **October 16, 2026, 23:59 EDT**.
- **Phase 2 (Proposal/Final Submission):** Submitted via online submission site by **January 3, 2027, 23:59 EST**.
- **Private Announcement of Winner:** Via Email on **January 8, 2027**.
- **Public Announcement & Exhibition:** At the Canadian Space Conference, **January 29–31, 2027**.

6. Eligibility & Competition Rules

- **Who Can Enter:** All post-secondary students across Canada are welcome to participate.
- **Team Size:** Submissions can be made by an individual (1) or a group of up to ten (10) students.
- **Originality:** Designs submitted must be the work of the students. Inspiration from external sources is welcome, but students must credit the original source if applicable.
- **Exclusivity:** No more than 1 design from 1 student or team. If you are part of a team, you cannot participate as an individual or be part of 2 teams at the same time.



7. Copyright & Intellectual Property

Participants must guarantee that all competition entries are exclusively their own original creations. Teams maintain full intellectual property rights and copyright ownership over their submitted work. However, by entering the competition, participants grant CanSpace Design ongoing, non-exclusive permission to publish, reproduce, and distribute their submissions across any physical or digital platforms. CanSpace Design guarantees that full and appropriate credit will be given to the original authors whenever their materials are showcased.

8. Awards & The Showcase

- **The Exhibition:** Finalist renders and optional physical/CAD models will be showcased live at the 2027 Canadian Space Conference.
- **Technical Award:** Judged by the expert advisory panel using the 5 FOMs.
- **People's Choice Award:** Voted on live by conference attendees based on the complete exhibited submission, including renders, drawings, physical models, and supporting materials.
- **Prizes:** The Winner will be awarded a custom-made trophy at the Canadian Space Conference for their efforts. A monetary cash prize may be available depending on the funding provided.

9. Artificial Intelligence (AI) Policy

We recognize that AI tools are becoming a valuable part of the modern design and engineering workflow. Students are permitted to use generative AI tools (such as ChatGPT, Midjourney, Claude, etc.) to assist with brainstorming, drafting, editing, and conceptualizing their designs.

However, teams must strictly adhere to the following guidelines:

- **Accountability for Mistakes:** AI models frequently make errors, hallucinate facts, and generate physically impossible geometries. Remember Rule #1 ("Geometry is Truth"). The team is entirely responsible for verifying the scientific, mathematical, and architectural accuracy of their submission.
- **Transparency and Disclosure:** Teams must explicitly declare their use of AI. You must specify which tools were used and exactly *how* they were applied.
- **Originality:** AI should be used as a *tool* to enhance your own ideas, not as a replacement for original student design, rigorous engineering, and critical thinking.