

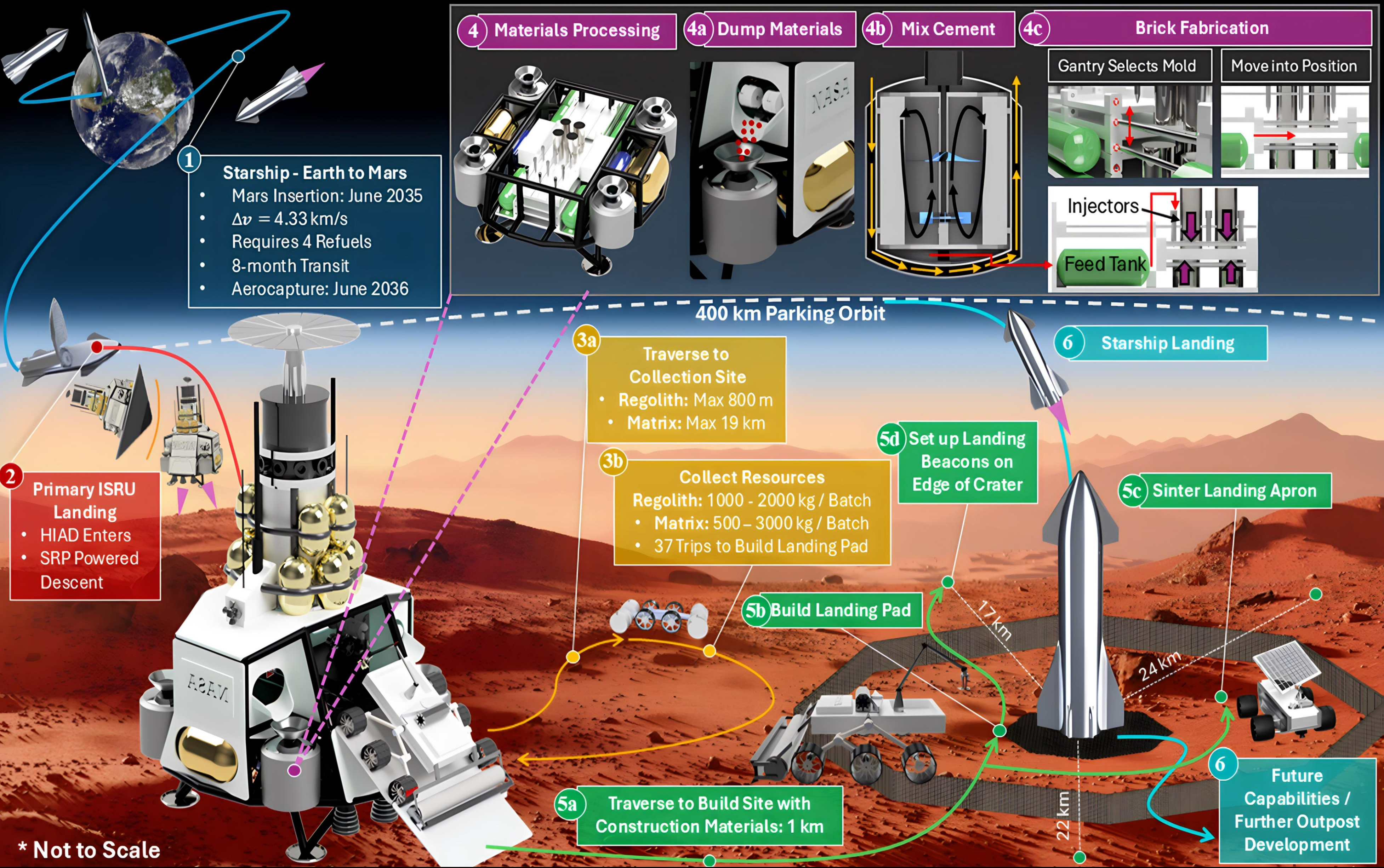
Problem Definition

Project VESTA is a proposal for a Martian precursor mission which serves to construct critical infrastructure utilizing in-situ resources available on mars.

- Deploys a semi-autonomous, self-sustainable network of collection, processing, and construction systems
- Demonstrates its capability by building a landing pad
- Sets up the foundation for an outpost in Jezero Crater

Primary Shortfalls Retired

NASA Technology Shortfall	ESDMD Rank
581: ISRU System Modeling	75
1584: Produce manufacturing and construction feedstock from extracted in-situ resources	116
622: Robotic Regolith Manipulation and Site Preparation	71
1400, 617, 666: On-surface, in-situ robotic assembly of horizontal and vertical structures	101, 110, 104
1569: High-Mass Entry and Descent Systems	16

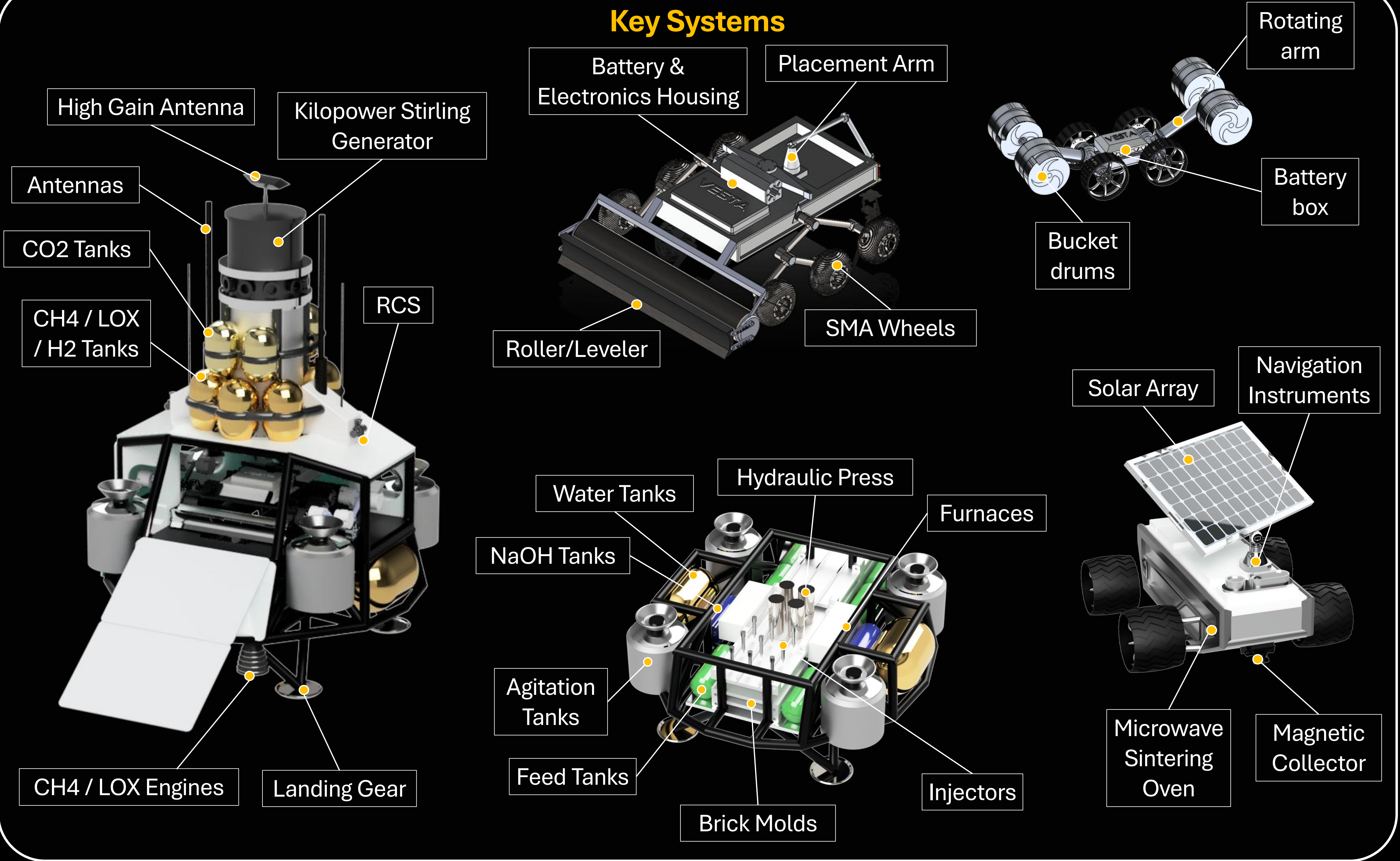


Outpost Site: Jezero Crater

- Scientific Regions of Interest: 8
- Size: 1600 km²
- Resource Diversity: 5 Varieties
- Subsurface Ice Detected
- Science Heritage: Perseverance
- Uniform crater structure allows precise beacon placement and safer landings



- ★ Expected landing site
- Landing zone. Rad: ~7 km
- Determined flattest region
- Regolith collection site
- Magnesite deposits
- Science ROI's
- Polyhydrated sulphate deposits
- Subsurface ice deposits
- Olivine deposits
- Landing pad construction site



Infrastructure

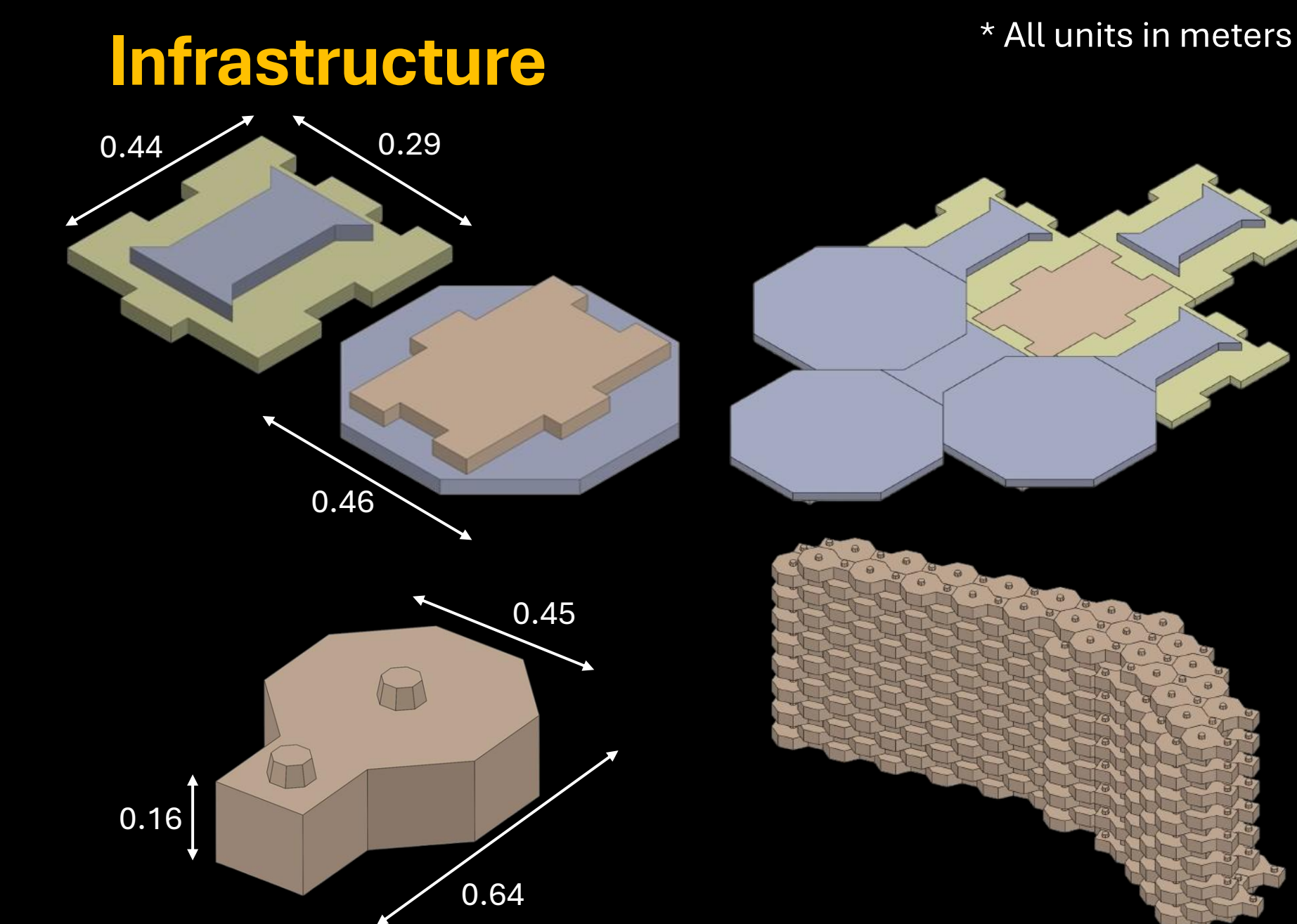
* All units in meters

Flat Infrastructure

- Two interlocking pavers, 3542 each
- Locks down to 6 DOF
- 30-meter Landing Pad

Vertical Infrastructure

- Interlocking Octo bricks
- Berm construction
- Extends to Habitat Walls



Processing Methods

Method	UCS (MPa)	Thermal Limit (K)	Applications
Sulfur	54	390	Temporary structures
Magnesium Silica	40	1300	Non-pressurized Structures
Polymer	41	580	Radiation Shielding
Star Crete	72	400	Foundations, interiors
Calcium Aluminate	85	1300	High/Low Temp applications
Low-Temp Sintering	45	1500	Foundations, interiors
High-Temp Sintering	26	1500	High temp applications

