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Four decades after humans left their last footprints on the lunar surface, [Nasa](#) has drawn up proposals for sending astronauts one step beyond — a staging post for Mars hovering on the far side of the Moon.

The “gateway spacecraft” would be stationed at Lagrange Point 2 - located 277,000 miles from Earth and 38,000 miles beyond the Moon - where the two celestial bodies’ gravitational fields cancel out each other, providing a stable parking spot in deep space.

Nasa has told the White House that the station could be constructed using leftover parts from the \$100 billion International Space Station, which orbits 220 miles above the Earth. It would serve as a testing ground for Nasa’s ultimate missions of exploration — a crewed voyage to an asteroid and a manned Mars odyssey targeted for the 2030s.

In the nearer-term, however, it would provide a platform for robotic missions to the Moon’s far side, a previously unexplored area believed to be rich in minerals.

As the far side of the Moon never faces Earth, robotic probes have never been sent there because ground controllers could not communicate with them. A gateway spacecraft could act as a command centre able to provide a direct communications link.

Nasa has worked with partners including the [Lunar University Network for Astrophysics Research](#) (LUNAR), in Colorado, to assess the feasibility of sending unmanned rovers to pluck rocks from the surface and shuttle them back to the L2 way-station, focusing on a region called the South Pole Aitken Basin. Measuring 2,500kms across (1,600 miles) and 13kms (8.1 miles) deep, it is the largest impact crater in the Solar System.

Speaking to *The Times*, Jack Burns, a professor of astrophysics at the University of Colorado, Boulder, and director of the LUNAR Centre, said: “The Moon is our history book . . . It’s just sitting up there waiting for us to turn the pages.

“We’ve never been to the far side, either robots or humans, yet it is dramatically different to the near-side . . . It’d be a huge game-changer in terms of exploration.”

Though the idea for a gateway spacecraft is one of several that have been floated previously for establishing “stepping stones” to Mars, Nasa — which has conducted an appraisal in tandem with international space partners and drawn up planning papers — presented its vision to the White House earlier this month, affirming its selection as the space agency’s preferred course.

But getting the job done would require a significant “culture change” within Nasa and the federal government. Internal planning documents are said to note that establishing such an outpost would carry a “significantly different” level of risk to that inherent in Nasa’s recently closed space shuttle programme, during which 14 astronauts were lost in two disasters.

Flying to, and staying at, L2 would raise physical and logistical challenges never before faced by humans, including the potential risk to the astronauts posed by the increased radiation levels beyond the protective shield of the Earth's magnetic field.

Other major hurdles are the cost, and winning political will. The US is already spending \$18 billion on construction of its new Orion space capsule and accompanying rocket to take astronauts beyond low Earth orbit. "It'd be a poor show if it then stood up and said 'Well hey, we've built this stuff, but now we can't afford to send it anywhere,'" said Dan Lester, an astronomer at the University of Texas.

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