



Human Landing System Program

The Human Landing System (HLS) Program is leveraging decades of human spaceflight experience and the speed of the commercial sector by managing the development of commercially-owned human landing systems. These systems will safely carry Artemis astronauts from lunar orbit to the Moon's surface and back, culminating in demonstration missions of those systems, through the use of NASA's NextSTEP-2 BAA.

Why ▶

With NASA's Artemis campaign, NASA is exploring the Moon for scientific discovery, technology advancement, and to learn how to live and work on another world in preparation for human missions to Mars. NASA is collaborating with commercial and international partners and establishing the first long-term presence on the Moon, using innovative technologies to explore more of the lunar surface than ever before. Private sector innovation is key to NASA's goal of sustainable lunar exploration under Artemis, and the agency's many public-private partnerships are advancing capabilities for human spaceflight in deep space while stimulating commercial activities.

THE HLS PROGRAM WAS ESTABLISHED WITH THE FOLLOWING PRIMARY OBJECTIVES:

- 1** To invest with industry providers to buy lander services to test systems
- 2** To use innovative acquisition approaches that enable U.S. commercial capabilities to be leveraged toward human exploration
- 3** To achieve sustainable, long-term lunar lander capability leading to more permanent human access to the surface of the Moon

The NextSTEP-2 Omnibus BAA was created to continue NASA's development of space exploration technologies, capabilities, and concepts. Under the Omnibus BAA, the HLS Program created appendices that evolved over time from technology development and requirement maturation to developmental missions of actual hardware.

Current and future lunar contract opportunities will spur technological innovation and leverage the knowledge of NASA experts to assist industry.



When ▶

FALL 2019

NASA announces that Marshall Space Flight Center will lead the Human Landing System (HLS) Program.

APRIL 2020

The final Appendix H solicitation is released and the base period award is made.

APRIL 2021

The Appendix H Option A contract is awarded to SpaceX a year later, followed by two, ultimately dismissed, protests.

MARCH 2022

The HLS Program announces its plans for Option B and Appendix P.

NOVEMBER 2022

The HLS Program awards Option B to SpaceX.

MAY 2023

The HLS Program awards Appendix P to Blue Origin.

2026

Artemis III mission currently planned.

2028

Artemis IV mission currently planned.

2030

Artemis V mission currently planned.



◀ The Starship HLS from SpaceX will also serve as the habitat for the crew of the Artemis III during their moon surface stay.

SPACEX

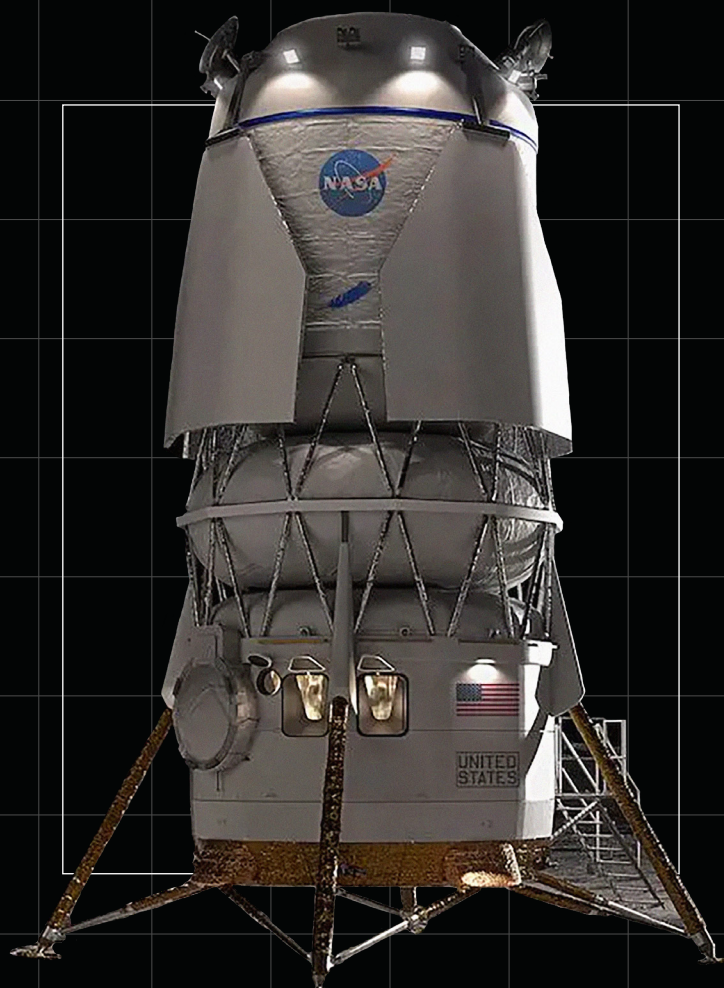
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BLUE ORIGIN

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BLUE ORIGIN



What/How ▶

Under NextSTEP-2 BAA Appendix H, the HLS Program successfully competed and awarded base period contracts to a Blue Origin-led team, Dynetics, and SpaceX for initial design and development of their respective human landing systems. Following the base period of performance, NASA awarded and performed a limited source competition amongst providers for a demonstration of landers during the Artemis III mission. This competition was won by SpaceX, whose Starship HLS will also serve as the crew habitat during the surface stay and carry them back to lunar orbit for their trip home in Orion. SpaceX will perform an uncrewed landing demonstration mission to the lunar surface prior to the crewed mission. NASA subsequently awarded SpaceX with Option B of the Appendix H contract to further develop the Starship HLS for use during the Artemis IV mission, meeting an extended set of requirements such as docking with Gateway for crew transfer and landing more mass on the lunar surface.

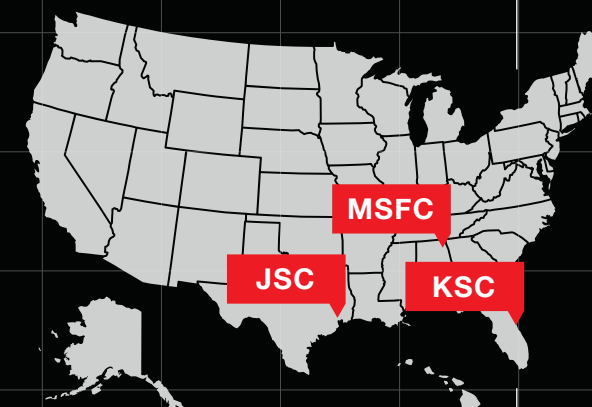
In order to bring a second entrant to market for the development of a lunar lander in parallel with SpaceX, MSFC Procurement issued the NextSTEP-2 BAA Appendix P solicitation for a new lander that meets the same set of extended requirements as SpaceX under Option B. The HLS Program awarded Appendix P to Blue Origin and its partners to develop the company's Blue Moon MK2 Lander for use on Artemis V. Blue Origin will also perform an uncrewed landing demonstration mission to the lunar surface prior to the crewed mission.

Both the Appendix H Option B and Appendix P contracts include initial design and development work for cargo versions of their human lunar landers to deliver large payloads, such as a pressurized rover, to the lunar surface. NASA plans to leverage the human lunar lander development work to procure and certify the design of landers capable of human-class cargo delivery.

The Appendix P award, combined with Option B under Appendix H, paves the way to a future recurring lunar transportation services procurement for landing astronauts on the Moon through NASA's Artemis campaign.

Who/Where ▶

The HLS Program is a multi-center program managed by Marshall Space Flight Center (MSFC) in Huntsville, Alabama, with offices also at Johnson Space Center (JSC) in Houston, Texas, and Kennedy Space Center (KSC) in Merritt Island, Florida. MSFC procurement awarded and administered the firm-fixed price, milestone-based contracts with SpaceX and Blue Origin for the development and demonstration of human lunar landers under the NextSTEP-2 Omnibus Broad Agency Announcement (BAA).



▲ As of 2024, NASA intends to use Starship HLS for Artemis III, an enhanced Starship HLS for Artemis IV, and a Blue Origin HLS for the Artemis V mission.

LEARN MORE ABOUT THE HUMAN LANDING SYSTEM AT

www.nasa.gov/humans-in-space/human-landing-system

ARTEMIS III CONCEPT OF OPERATIONS

