



Mobile Launcher 1



NASAfacts

In the early morning on Oct. 20, 2020, the mobile launcher for the Artemis I mission begins its rollout atop crawler-transporter 2 from the Vehicle Assembly Building at NASA's Kennedy Space Center in Florida. The nearly 400-foot-tall mobile launcher is being rolled to Launch Pad 39B for testing and a washdown to remove any debris remaining from construction and installation of the umbilical arms. Photo credit: NASA/Ben Smegelsky

The mobile launcher 1 (ML1) is the ground structure that will be used to assemble, process, and launch NASA's Space Launch System (SLS) rocket (Block 1) and Orion spacecraft from Launch Pad 39B at the agency's Kennedy Space Center in Florida for missions to deep space destinations such as the Moon, Mars, and beyond. ML1 will launch the first three missions of the agency's Artemis program, including the mission that will land the first woman and the next man on the Moon.

During preparations for launch, the crawler-transporter will pick up and move ML1 into High Bay 3 in the Vehicle Assembly Building (VAB). The launcher will be secured atop support posts, called mount mechanisms, and the crawler will move out. The Orion spacecraft will be stacked atop the SLS rocket and processed on the mobile launcher. The launcher is designed to support the assembly, testing, check-

out, and servicing of the rocket, as well as transfer it to the pad and serve as the structural platform from which it will launch.

ML1 consists of a two-story base that is the platform for the rocket and a tower that will be equipped with a number of connection lines, called umbilicals, and launch accessories that will provide SLS and Orion with power, communications, coolant, fuel, and stabilization prior to launch. The tower also contains a walkway for personnel, equipment, and astronauts entering the crew module during launch preparations.

The launcher will roll out to the pad for launch on top of the crawler-transporter, carrying SLS and Orion. After the crawler-transporter makes its eight-hour trek to the pad just over four miles away, engineers will lower the launcher onto the pad and remove the crawler-transporter. During launch, each umbilical and launch

accessory will release from its connection point, allowing the rocket and spacecraft to lift off safely from the launch pad.

By the Numbers

- Total height above ground: ~400 feet
- Two-story base: 25 feet high, 165 feet long, and 135 feet wide
- Sits 22 feet off the ground, “0” deck is 47 feet off the ground
- Height of six steel mount mechanisms: 22 feet (in VAB or on launch pad)
- Height above the ground of mobile launcher deck when positioned on six steel mounts: 47 feet (in VAB or on launch pad)
- The booster aft skirt sits on Vehicle Support Posts (VSPs): Eight to support the vehicle (four per booster) on mobile launcher platform during transfer to pad and at liftoff
- Tower: 40 feet square, about 345 feet tall
- Tower floor levels: every 20 feet for personnel access to vehicle and ground support equipment
- Approximate ML1 weight: ~11.3 million pounds

The ML1 structure is being modified by NASA’S Exploration Ground Systems (EGS) Program. Hensel Phelps constructed the structure and facility support systems during the first phase of development. The design and prototyping of the necessary ground support equipment subsystems was performed by Vencore and TOSC. JP Donovan Construction Inc. performed the work to widen the flame hole opening on the base of the launcher from approximately 22x22 feet to 34x64 feet to accommodate the SLS configuration of the core stage and its twin solid rocket boosters.

Right: During sunrise on Oct. 20, 2020, the nearly 400-foot-tall mobile launcher for the Artemis I mission, atop crawler-transporter 2, arrives at the ramp leading up to Launch Pad 39B at NASA’s Kennedy Space Center in Florida. While at the pad, engineers with Exploration Ground Systems and Jacobs will perform several tasks, including a timing test to validate the launch team’s countdown timeline, and a thorough, top-to-bottom washdown of the mobile launcher to remove any debris remaining from construction and installation of the umbilical arms. Photo credit: NASA/Ben Smegelsky

J.P Donovan Construction Inc. recently completed installing and integrating ground support equipment systems onto ML1, modifying the structure with the systems necessary to assemble, process, and launch NASA’s SLS rocket and Orion spacecraft. The scope of work included installing more than 800 mechanical, electrical, and fluid panels, 400,000-plus feet of cabling, and miles of tubing and piping that will support the SLS rocket. RS&H completed the structural design.



A wet flow test at Launch Pad 39B on September 13, 2019, tested the sound suppression system that will be used for launch of NASA’s Space Launch System for the Artemis I mission. During the test, about 450,000 gallons of water poured onto the Pad B flame deflector, the mobile launcher flame hole and onto the launcher’s blast deck. Photo credit: NASA/Kim Shifflett



Find out more about **Exploration Ground Systems** and NASA’s deep space exploration, including the Moon, Mars and beyond at <https://www.nasa.gov/exploration/systems/ground/index.html>

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

www.nasa.gov

FS-2020-10-964-KSC