



Launch Pad 39B

Significant enhancements are continuing at Launch Pad 39B at NASA's Kennedy Space Center in Florida, as the Exploration Ground Systems (EGS) Program prepares the pad to support the launch of the agency's Space Launch System (SLS) rocket for deep space missions and the Journey to Mars.

Pad subsystems used for Apollo and the Space Shuttle Program were replaced or upgraded to support the SLS and 21st century multi-user spaceport.

NASA awarded a contract to J.P. Donovan Construction of Rockledge, Florida, in June 2015 to upgrade the flame trench beneath the surface of the pad and provide a new flame deflector. The energy of the rocket's flame at liftoff will be diverted to the north side of the flame trench. The south side of the flame trench will not be covered in brick but, instead, will

be repaired and remain a concrete surface. The north side of the flame trench is about 571 feet long, 58 feet wide and 42 feet high.

Three 600-foot-tall masts with overhead wires used to transmit electrical energy were installed around the perimeter of the pad to provide lightning protection for launch vehicles as they are processed and launched from the pad. The tower that holds about 400,000 gallons of water to provide sound suppression during launch was sandblasted and repainted so it can continue to withstand the corrosive salt air from the nearby Atlantic Ocean.

Refurbishment at the pad includes installation of new bypass lines and valves, removal of the heritage liquid oxygen (LO₂) vaporizer, and removal and replacement of fire suppression piping around the entire pad



An aerial view of Launch Pad 39B at NASA's Kennedy Space Center in Florida. In view in the background at far left is the Vehicle Assembly Building and the mobile launcher. Photo credit: NASA/Bill White

complex. Other upgrades scheduled for completion prior to the first integrated launch of SLS with NASA's Orion spacecraft include completion of the flame trench and installation of a new flame deflector, completion of the structural reinforcement to the catacomb roof, installation of a liquid hydrogen (LH2) separator vaporizer, and partial demolition of the heritage Environmental Control System equipment and installation of new equipment.

The guiding principle behind the upgrades and modifications is to make the area a "clean pad," which will allow a variety of companies to launch their rockets from the pad. The basics that every rocket needs will remain in place, such as electrical power, a water system, flame trench and safe launch area. The other needs of individual rockets, including access for workers, can be met with the towers or other structures that deliver the rocket to the pad.

For SLS, engineers and technicians are planning to do almost all of their preparations inside the Vehicle Assembly Building (VAB) before the launcher goes to the pad. This reduces the amount of required time needed to be on the pad to 10 days or less ahead of liftoff.



A construction worker installs the final brick on the north side of the flame trench at Launch Complex 39B at NASA's Kennedy Space Center in Florida. The walls of the flame trench are being upgraded to withstand the intense heat and fire at launch of NASA's Space Launch System rocket with Orion atop. About 96,000 heat-resistant bricks, in three different sizes, were secured to the walls using bonding mortar in combination with adhesive anchors. Photo credit: NASA/Leif Heimbald

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Major History Facts

Apollo 10 was the first mission to begin at Launch Pad 39B when it lifted off May 18, 1969, to rehearse the first moon landing. Three crews of astronauts launched to the Skylab space station in 1973 from Pad B. Three Apollo astronauts who flew the historic Apollo-Soyuz mission to link up in space also launched from Pad B.

Fun Facts

- During refurbishment projects, 1.3 million feet of copper cables were removed and replaced with 300,000 feet of fiber cable.
- The water tower for the Ignition Overpressure and Sound Suppression System (IOP/SS) holds roughly 400,000 gallons of water, or enough to fill 27 average pools. This water is dumped on the mobile launcher and inside the flame trench in less than 30 seconds. The IOP/SS peak flow rate is 1.1 million gallons per minute, high enough to empty roughly two Olympic-size swimming pools in one minute.
- The three lightning towers are about 600 feet tall – taller than the Vehicle Assembly Building, which is 525 feet tall.
- The catacomb roof is being reinforced to be able to support 25.5 million pounds - the equivalent of 2,125 average-size African elephants.
- The refurbished flame trench and new flame deflector will be exposed to a peak temperature of 2,200 degrees Fahrenheit during launch.
- More than 96,000 bricks were installed on the walls of the flame trench during the refurbishment project.
- The flame trench is 450 feet long, equal to the length of one and a half football fields.
- The flame deflector will be made up of about 150 steel plates, each weighing up to 4,000 pounds.
- Liquid oxygen and liquid hydrogen tanks store super-cooled liquid gases (that are used for propellant) at minus 297 and minus 423 degrees Fahrenheit, respectively.