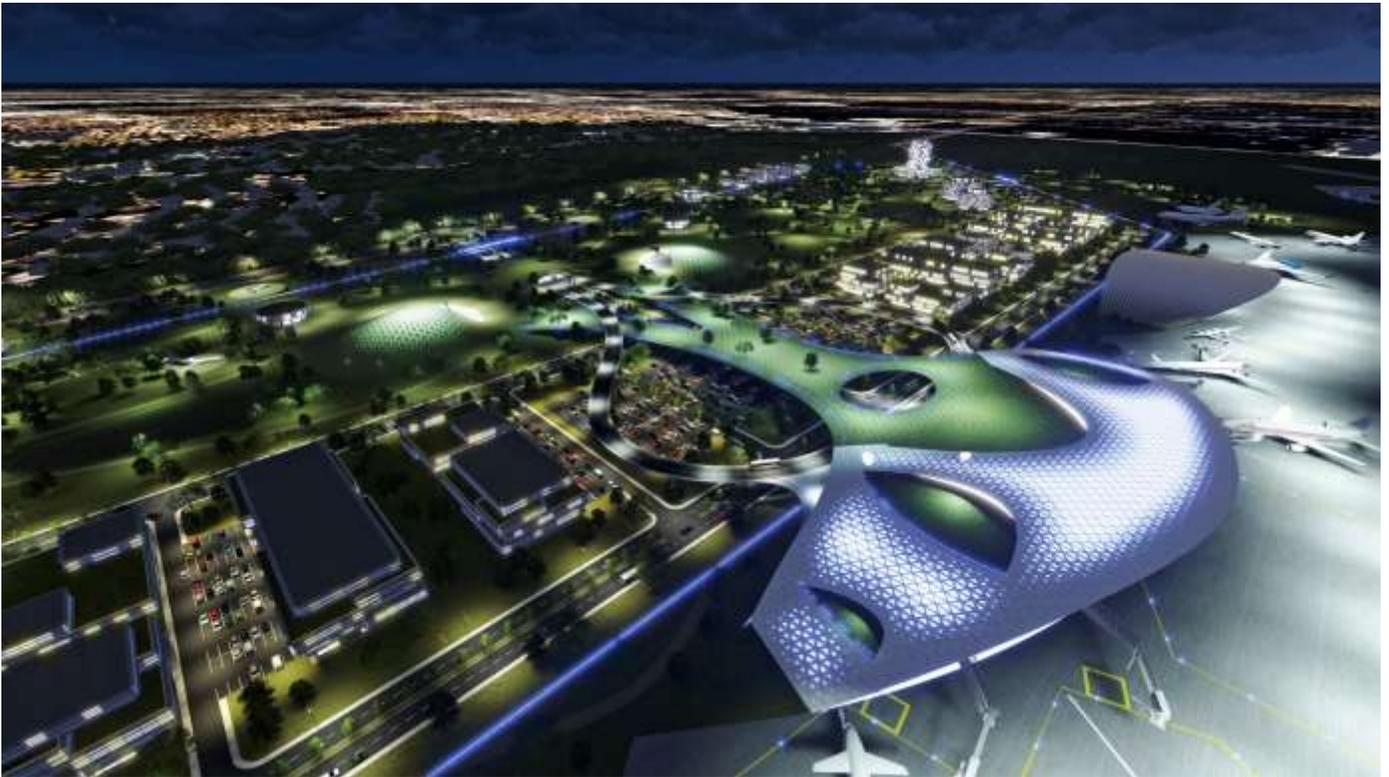


Houston Pushes to Stay at the Edge of Space Exploration 50 Years After the Moon Landing

Real Estate Projects Emerge at the Heart of a New Space Race



Construction is underway on Houston's Spaceport, which is about five miles from the Lyndon B. Johnson Space Center. Illustration: Houston Airport System

When Neil Armstrong and Buzz Aldrin took their historic first steps on the moon a half-century ago, few places back on Earth played a more central role than Houston.

The city was home to mission command as the race to the moon helped transform a Texas town dominated by the energy industry into a place known as Space City. Now as the world celebrates the 50th anniversary of the iconic feat this week, Houston finds itself in a new space race.

The rise of a commercial space industry, which investment bank Morgan Stanley projects could grow to \$1.4 trillion by 2040, has set off a development boom across the United States. Alabama, Florida and California all have major projects underway, seeking to serve ventures funded in part by billionaires.

Not to be left behind, Houston has secured \$18.8 million in initial funding for the first phase of its Spaceport, which is licensed by the Federal Aviation Administration and will be used as a launch and landing site for suborbital, reusable launch vehicles as well as a proposed innovation center. The Spaceport is about five miles from the 1,620-acre Lyndon B. Johnson Space Center at 2101 E. NASA Parkway, home of the historic manned space program and one of the largest of NASA's U.S. facilities. It gets a quarter of the agency's budget, which is \$21.5 billion this year.

“Commercial space flight is the result of the work that was done 50 years ago by the experiment with spaceflight,” Arturo Machuca, general manager of the Houston Airport System's Ellington Airport and the Spaceport, said in an interview. “At the time, it was a government mission. We have now evolved into that segment of commercializing the industry.”

Houston was chosen to be home to the manned space program in 1961 largely because of the ties of key politicians to Texas at the time and a fast-paced timeline that hasn't been replicated since to beat the Soviet Union to the moon during the Cold War. The final manned moon mission took place in 1972, but President Donald Trump has set a goal to get astronauts back on the moon by 2024.

And in an increasingly competitive industry with billionaires such as Elon Musk and Jeffrey P. Bezos owning private space companies with [visions of habitable space colonies](#), Houston faces an uphill battle to stay relevant on the new frontier of space exploration.

“The center of gravity has moved away from Houston,” said George Abbey, who served as director of the Johnson Space Center between 1996 and 2001. “Alabama and Florida have taken on more responsibility, and there hasn't really been that effort to keep things in Houston, and that's unfortunate.”

Bezos' Blue Origin has manufacturing facilities in Huntsville, Alabama, as well as in [Florida](#) where it leases launchpads from NASA at Cape Canaveral in Brevard County in what is known as the Space Coast that includes the Kennedy Space Center. Blue Origin also plans to expand its footprint by 90 acres in [Florida](#) at the Kennedy Space Center that will double the amount of land the company leases from NASA. Blue Origin's plan to reach the moon could occur as early as 2021. Amazon's chief executive, Bezos, has hinted at visions of as many as a trillion people eventually living in space colonies on the surface of the moon.

And Musk's SpaceX also leases launchpads from NASA at Cape Canaveral and plans to fly around the moon by 2023.

Meanwhile, Florida got good news with Boeing's decision to [relocate a division headquarters](#) this year to Central Florida from Arlington, Virginia, in a move that will change the focus of the aerospace giant's space programs to the area east of Orlando.

Back in Houston, the Spaceport is currently under construction on 450 acres of unused land at Ellington Airport, a military facility where many of the country's first astronauts received their space training. The initial phase of development should wrap up in 2020 on 154 acres and

include water, electric and other utility lines and coworking spaces for aerospace technology companies. In the coming weeks, the Spaceport's anchor tenant will be announced.

“There are tremendous potential and economic benefits by making sure that Houston remains connected to aerospace and the aviation industry,” Machuca said.

The Spaceport’s sole tenant to-date is Intuitive Machines, a Houston-based company that was recently awarded a \$77 million NASA contract to build a lunar lander that plans to commence its mission to the moon in 2021, Machuca said. Houston's Spaceport is one of 12 commercial spaceports in the United States, eight of which can support the anticipated level of commercial spaceflight, space tourism and research.

“However, Houston is the only large metro area with a Spaceport right in the middle of the city,” said Machuca. “That’s a very important, very unique distinction that we have.”

A current view of the Johnson Space Center's 1,620-acre campus. Clear Lake is seen in the background. Photo: NASA



An aerial view at the 1,620-acre Johnson Space Center in the Houston area, 1960s. Photo: Photo by NASA/Interim Archives/Getty Image



A view from 1961 of a barn and windmill on the land where the Manned Spacecraft Center, later known as the Johnson Space Center, would be built. Image: NASA via Getty Images



President John F. Kennedy at the Manned Spacecraft Center in the Houston area on Feb. 23, 1962. Image: NASA

The Beginning

In 1961, NASA announced that the Houston area beat out more than 20 other cities including Jacksonville, Florida; Miami; Baton Rouge, Louisiana; Corpus Christi, Texas; San Diego; and San Francisco to host the government's \$60 million manned space flight laboratory.

Much like Amazon did when it was soliciting proposals for its second headquarters, NASA listed criteria for the city it would ultimately choose for the lab. NASA required transportation in ice-free water by barge, a mild climate, all-weather commercial jet service, a Department of Defense air base that could handle military aircraft, a university nearby and property that fell within certain cost parameters.

The ultimate winner was Clear Lake, Texas, which is a 30-minute drive southeast of downtown Houston, about eight miles away from the Houston Ship Channel and Port Houston access, about five miles away from Ellington Airport, and near Rice University. But there was also probably political influence behind the decision with Texas native Lyndon B. Johnson serving at the time as head of the National Space Council and vice president of the United States, Houston native Sam Rayburn serving as the Speaker of the House of Representatives and longtime U.S. House member Albert Thomas, a close Johnson political ally, representing Houston.



Construction of the Manned Space Center's first 11 buildings in Houston began in 1962 on land that was formerly full of cows. Image: NASA



President Lyndon B. Johnson speaks at the Manned Spacecraft Center beside Building 1 during a visit on March 1, 1968. Image: NASA

Oil Co., which later became Exxon Mobil Corp., donated 1,000 acres to Rice University to give the government for the campus. The donation was as much a business investment as a contribution: Humble Oil's residential development subsidiary called Friendswood Development Co. owned surrounding property, which meant that any facility built on the 1,000 acres would likely hire employees who might

be enticed to buy houses built nearby.

So in some ways, the Houston space center owes its location to real estate development.

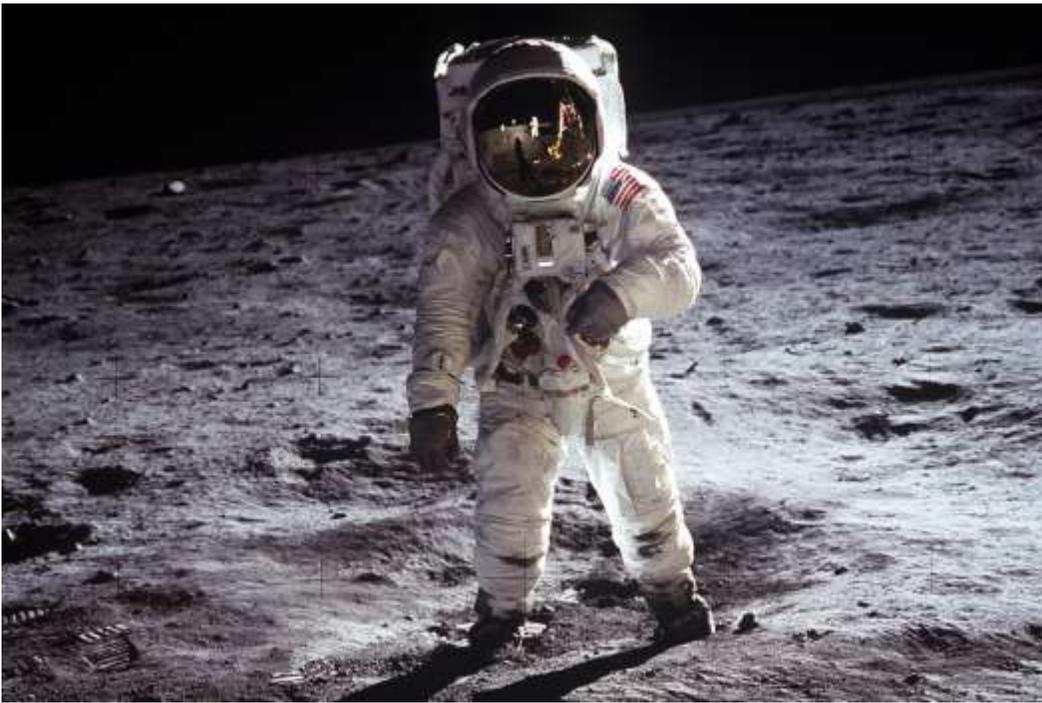
The federal government purchased an adjacent 600 acres and today what is known as the Lyndon B. Johnson Space Center is on 1,620 acres. An initial 751 NASA employees relocated from NASA's Langley Research Center in Virginia to Houston, which was the sixth-largest city in the country at the time, and an additional 689 workers were hired that first year.

When he first arrived in the Clear Lake area in the 1960s, "it was ranch grazing land for cattle. There were really no houses. There weren't stores," former Johnson Space Center Director Abbey said. Abbey joined NASA in 1964 as an Air Force captain assigned to the Apollo program.

Space fever swept Houston throughout the 1960s in support of the space program. The professional baseball team was renamed the Astros and the first multipurpose domed stadium in the world, the Astrodome, was built in 1965.

"It was extreme excitement and joy and terror, all mixed into one," said Beth Williams, chief executive of TechTrans International, who moved with her husband and NASA astronaut Clifton Curtis "C.C." Williams Jr. to Clear Lake in the mid-1960s so he could work at the Johnson Space Center.

Clifton never made it to space — he passed away in a plane crash in 1967, just two years before the July 20, 1969, historic moon landing and walk by Armstrong and Aldrin as part of Apollo 11.



Apollo 11 Astronaut Buzz Aldrin on the moon on July 20, 1969. Image: Universal Images Group va Getty

Beth stayed around the Clear Lake area, though. Her company, which provides translation services and employs over 280 people in the company's six global offices, used to receive 100% of its business from NASA. Today, NASA represents about 35% of TechTrans International's business.

"People were thrust into roles they never thought they'd have," she said of the early

participants in the space program. Her husband likely would have been the fourth man to walk on the moon, according to several reports from other astronauts at the time.

The Johnson Space Center led to an onslaught of homes sprouting up in the Clear Lake area, which became a hub for aerospace, engineering and research jobs and home to engineering giants like Boeing, which opened its Clear Lake office in the 1960s, and Lockheed Martin. At its peak, there were roughly 18,000 contractors for NASA working in the Clear Lake area, which is adjacent to a namesake lake that feeds into Galveston Bay and the Gulf of Mexico.

"During the initial phase, you found that a lot of the people who came into the community were working at the Johnson Space Center ... throughout the '60s and '70s," Abbey said. "Then, you had people from the Houston area moving into the community because they were attracted to the water."

Humble Oil's subsidiary Friendswood Development designed master-planned communities on land around the waterways in the Clear Lake area and some of the first home buyers were astronauts. Humble Oil, after it became Exxon, sold off the residential unit in the 1990s to Lennar Corp., which is now the nation's largest home builder.

In the 1970s and 1980s, neighborhoods in Clear Lake such as Friendswood, Nassau Bay and Seabrook were built and expanded to support NASA's growing workforce. Friendswood, for example, housed 1,675 people and 26 businesses in 1968. By 1980, Friendswood was home to nearly 14,000 residents and six times as many businesses, according to the Texas State Historical Association. And by 1990, Friendswood was home to more than 22,000 people.

“Everybody worked for NASA,” said Coy Davidson, senior vice president in Houston of Colliers International, of the Clear Lake area.



NASA's Saturn shuttle in the Johnson Space Center. Photo: NASA

NASA's Saturn shuttle in the Johnson Space Center. Photo: NASA

When the shuttle program ended in 2011, the Clear Lake area had roughly 17,000 employees with 3,500 working directly for NASA, according to Bob Mitchell, president of the Bay Area Houston Economic Partnership. After the end of the program, Boeing put nearly 1 million square feet of office space on the sublease market, Davidson said. Considering that Clear Lake's office market

encompassed a total of 5.5 million square feet at the time, Boeing's move had a mammoth impact on the area, Davidson said.

“The biggest setback I've seen the area have — from a real estate standpoint, particularly with the office market — was the end of the shuttle program,” Davidson said. “The office market still hasn't recovered.”

Clear Lake's inventory of 3.02 million square feet of Class B office space is 26.8% empty, according to Colliers data. The area has 1.7 million square feet of Class A office space, 9.6% of which is empty. Comparably, the average office building in Houston is 19.5% empty.

Today, the Clear Lake-area's aerospace workforce stands at roughly 11,000 workers, according to data from the Bay Area Houston Economic Partnership. About 8,000 of those workers are private contractors who support NASA's programs and operations, while just 3,000 work directly for NASA.

But NASA has been hiring as part of the Mars Exploration Program. In March, Trump signed an order directing NASA to send astronauts to Mars by 2033, confirming plans drawn up under Barack Obama in 2010.

NASA "is adding employees pretty much on a weekly basis," said Mitchell with the Bay Area Houston Economic Partnership. "Ten here, 20 there, 30 there."

CoStar News' Emily Wilkinson contributed to this story.



Houston's mayor Sylvester Turner and other officials and business leaders rang the closing bell of the NYSE July 16 to showcase the moon landing anniversary and Houston's involvement. Photo: NYSE



LEFT: The United Kingdom's Queen Elizabeth visits the now named Johnson Space Center in 1991. RIGHT: The Mission Control Center at the Manned Space Center during Apollo 13. A prototype of an impromptu device made to remove carbon dioxide from the spacecraft is pictured. Images: NASA