

CAPE CANAVERAL AIR FORCE STATION, LAUNCH
COMPLEX 39, HEADQUARTERS BUILDING
(John F. Kennedy Space Center)
Cape Canaveral
Brevard County
Florida

HABS No. FL-581-A

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Buildings Survey
National Park Service
U.S. Department of the Interior
100 Alabama Street, SW
Atlanta, GA 30303

HISTORIC AMERICAN BUILDINGS SURVEY

CAPE CANAVERAL AIR FORCE STATION,
LAUNCH COMPLEX 39, HEADQUARTERS BUILDING
(John F. Kennedy Space Center)
HABS No. FL-581-A

Location: First Street SE (between C Avenue SE and D Avenue SE)
John F. Kennedy Space Center (KSC)
Cape Canaveral
Brevard County
Florida

The Headquarters Building is located within the Industrial Area of KSC, at latitude: 28.524319, longitude: -80.650777. These coordinates were obtained on January 17, 2012, through Google Earth™. The coordinates datum are North American Datum 1983.

Present Owner/
Occupant: National Aeronautics and Space Administration (NASA)
Kennedy Space Center, FL 32899-0001

Present Use: Administration facility

Significance: The Headquarters Building was listed in the National Register of Historic Places (NRHP) on January 21, 2000. It is considered eligible for the NRHP in the context of the Apollo Program, ca. 1961 through 1975. It is significant under Criterion A in the area of Space Exploration and under Criterion C in the area of Architecture. Because the resource has achieved significance within the past 50 years, Criteria Consideration G applies. The significance of the Headquarters Building derives from its association with space exploration due to its historic function as the administrative center of KSC. Because it housed the top Center officials, it was essential as the site where all major meetings were conducted and decisions made. In the area of Architecture, the Headquarters Building is representative of the Federal Government's use of the International Style. Although it has undergone interior renovations with the advent of new technology, it continues to maintain its integrity of design, materials, workmanship, feeling, setting, location, and association as an administrative center of the Apollo Program.

Historian: Patricia Slovinac, Architectural Historian
Archaeological Consultants, Inc. (ACI)
8110 Blaikie Court, Suite A
Sarasota, Florida 34240

November 2012

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Project Information: The documentation of the Cape Canaveral Air Force Station (CCAFS), Launch Complex 39, Headquarters Building was conducted in 2012 for KSC by ACI, under contract to InoMedic Health Applications (IHA; formerly Innovative Health Applications), and in accordance with KSC's Programmatic Agreement Regarding Management of Historic Properties, dated May 18, 2009. The field team consisted of architectural historian, Patricia Slovinac (ACI), and independent photographer, Penny Rogo Bailes. Assistance in the field was provided by Barbara Naylor, KSC Historic Preservation Officer, and Nancy English, KSC Cultural Resource Specialist. The written narrative was prepared by Patricia Slovinac; it was edited by Joan Deming, ACI Project Manager; Elaine Liston, KSC Archivist; Barbara Naylor; Nancy English; and Jane Provancha, Environmental Projects-Manager, IHA. The photographs and negatives were processed by Zebra Color, Inc., an independent photography/processing studio.

The Scope of Services for the project, which was compiled based on the Programmatic Agreement and a letter from the Florida State Historic Preservation Office dated April 13, 2012, specifies a documentation effort following HABS Level II Standards. Information for the written narrative was primarily gathered through informal interviews with current NASA and contractor personnel and research materials housed at the KSC Archives Department. A search for historic photographs was also conducted at the Kennedy Institutional Imaging Facility. Selected drawings were provided by KSC's Engineering Documentation Center, which serves as the repository for all facility drawings. For the Headquarters Building, this included the original as-built drawings, as well as drawings depicting major additions and modifications to the facility. It should also be noted that KSC does not periodically produce drawings of their facilities to show current existing conditions.

LIST OF ACRONYMS

ABMA	Army Ballistic Missile Agency
ACI	Archaeological Consultants, Inc.
ACOE	U.S. Army Corps of Engineers
AMR	Atlantic Missile Range
ARPA	Advanced Research Projects Agency
AS	Apollo-Saturn
CCAFS	Cape Canaveral Air Force Station
CSM	Command/Service Module
EST	Eastern Standard Time
ET	External Tank
EVA	Extravehicular Activity
IHA	InoMedic Health Applications
ISS	International Space Station
JSC	Johnson Space Center
KSC	Kennedy Space Center
LC	Launch Complex
LOC	Launch Operations Center
LOD	Launch Operations Directorate
MFL	Missile Firing Laboratory
MILA	Merritt Island Launch Area
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NRHP	National Register of Historic Places
O&C	Operations & Checkout (Building)
OV	Orbiter Vehicle
SA	Saturn-Apollo
SRB	Solid Rocket Booster
SSME	Space Shuttle Main Engine
SSP	Space Shuttle Program
STG	Space Task Group
STS	Space Transportation System
U.S.	United States
VAB	Vehicle Assembly Building

Part I. Historical Information

A. Physical History:

- 1. Date of erection:** The original portion of the Headquarters Building was constructed between February 1964 and May 1965. The east and west additions were constructed between March 1967 and August 1968.¹
- 2. Architect/Engineer:** Kemp, Bunch & Jackson, Architects, Jacksonville, Florida; U.S. Army Corps of Engineers (ACOE), Merritt Island, Florida. This team designed all phases of the building.²
- 3. Original and subsequent owners, occupants, uses:** The facility has been continuously owned by NASA KSC since its construction. It has always contained administrative offices, including those of the Center Director, and support facilities for personnel.
- 4. Builder:** Franchi Construction Company of Indian River City, Florida, constructed the original building; H.J. Construction Company of Orlando, Florida, built the east and west additions.³
- 5. Original plans and construction:** The original design of the Headquarters Building was completed in two phases, although the drawings for both are dated September 1963. The first phase, denoted on the plans as Phase One, included a U-shaped structure, which would form the central core of the completed building (Photo Nos. 47-53). The second phase, referred to on the plans as Phase Two, included two L-shaped wings, one each to the east and west of the Phase One central core (Photo Nos. 54-59). Both of these design phases were constructed at the same time.
- 6. Alterations and additions:** A third design phase, denoted as Phase III, was finished in January 1967 (Photo Nos. 63-65, 68-70). This phase consisted of two L-shaped wing additions, one each at the east and west ends of the original built structure. Throughout the history of the building, various alterations to the interior of the facility have been completed, such as the continual rearrangement of open office areas and the adaptation of rooms for different uses.

¹ NASA KSC, "Real Property Record, KSC Headquarters," on file, KSC Real Property Office; "Headquarters Pact," *Spaceport News*, March 2, 1967, 6.

² Kemp, Bunch & Jackson, "L.O.C. Headquarters Phase One," September 1963, on file, KSC Engineering Documentation Center; Kemp, Bunch & Jackson, "L.O.C. Headquarters Phase Two," September 1963, on file, KSC Engineering Documentation Center; Kemp, Bunch & Jackson, "K.S.C. Headquarters Phase III Additions," January 1967, on file, KSC Engineering Documentation Center.

³ NASA KSC, "KSC Headquarters;" "Headquarters Pact."

B. Historical Context:

Introduction

Following the launch of Sputnik I and Sputnik II, which placed Soviet satellites into Earth's orbit in 1957, the attention of the American public turned to space exploration. President Dwight D. Eisenhower initially assigned responsibility for the U.S. Space Program to the Department of Defense. The Development Operations Division of the Army Ballistic Missile Agency (ABMA), led by Dr. Wernher von Braun, began to focus on the use of missiles to propel payloads, or even a man, into space. The United States successfully entered the space race with the launch of the Army's scientific satellite Explorer I on January 31, 1958, using a modified Jupiter missile named Juno I.⁴

With the realization that the military's involvement in the space program could jeopardize the use of space for peaceful purposes, President Eisenhower formed NASA on October 1, 1958, as a civilian agency with the mission of carrying out scientific aeronautical and space exploration, both manned and unmanned. At this time, several Army facilities at CCAFS were given to NASA, including various offices and hangars, as well as launch complexes (LCs) 5, 6, and 26. Within one year of its establishment, NASA had formulated the basics for its first three Manned Space Programs: Project Mercury (ca. 1958-1963), Project Gemini (ca. 1959-1966), and the Apollo Program (ca. 1959-1975).

During NASA's formative years, the Agency worked with ABMA's Development Operations Division, as it provided the Redstone rockets for the early Project Mercury missions and was in the process of developing the Saturn rocket, which would be used in Apollo. The Development Operations Division had maintained its Missile Firing Laboratory (MFL), under the direction of Dr. Kurt H. Debus, at CCAFS since 1951 to supervise the experimental launches of the Redstone missile.⁵ On March 15, 1960, President Eisenhower officially transferred the Development Operations Division to NASA, naming the new installation the George C. Marshall Space Flight Center (MSFC) in Huntsville, Alabama. Two months later, the MFL oversaw the first test flight of a Redstone modified for Project Mercury, which launched from LC 5 at CCAFS.⁶

⁴ Charles D. Benson and William B. Faherty, *Gateway to the Moon. Building the Kennedy Space Center Launch Complex* (Gainesville, FL: University Press of Florida, 2001), 1-2.

⁵ Francis E. Jarrett, Jr. and Robert A. Lindemann, *Historical Origins of NASA's Launch Operations Center to July 1, 1962* (Cocoa Beach, FL: John F. Kennedy Space Center, 1964),

http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19670031213_1967031213.pdf. The Redstone missile, which holds "the distinction of being the first operational US ballistic missile," was developed by von Braun's group in the early 1950s as an adaptation of the Navaho cruise missile. The first test of the Redstone occurred at LC 4 at CCAFS on August 20, 1953; the missile was declared operational in June 1958. Cliff Lethbridge, "Redstone Fact Sheet," 2000, <http://www.spaceline.org/rocketsum/redstone.html>.

⁶ Kay Grinter, "Beach-Abort (7)," 2000, <http://www-pao.ksc.nasa.gov/kscpao/history/mercury/beach-abort/beach-abort.htm>.

On July 1, 1960, the MFL, along with the Atlantic Missile Range (AMR) Operations Office, became the Launch Operations Directorate (LOD) and was absorbed by MSFC.⁷ Over the next two years, the LOD assisted NASA in the launch of five additional Redstone rockets as part of Project Mercury. This included three test flights (MR-1, MR-1A, and MR-2), and two manned launches, MR-3 and MR-4, which carried Alan B. Shepard, Jr. and Virgil I. "Gus" Grissom to space, respectively. The LOD also launched one test flight for the Apollo Program, SA-1 from LC 34 on October 27, 1961, the first test flight of the Saturn I vehicle.⁸

NASA's John F. Kennedy Space Center

On May 25, 1961, sixteen days after the flight of Alan Shepard, President John F. Kennedy charged NASA with putting a man on the Moon by the end of the decade. With the Agency's decision to use the powerful Saturn V launch vehicle, it was apparent that a new launch complex was required, and CCAFS, already with twenty-two launch complexes, did not have the space for new rocket facilities. After an evaluation of nine potential launch sites throughout the U.S. and nearby islands, NASA chose to acquire land on Merritt Island, an undeveloped area west and north of the existing CCAFS missile launching area. By September 1961, the initial master plan for what would initially be referred to as NASA's Merritt Island Launch Area (MILA) was completed. In late 1962, NASA began to gain title to the land, with the ACOE acting as purchasing agent. Over 83,903.9 acres were taken by outright purchase, which included several small towns, such as Orsino, Wilson, Heath and Audubon, many farms, citrus groves, and several fish camps. Negotiations with the State of Florida provided submerged lands, resulting in the acquisition of property identified on the original Deed of Dedication. Much of the State-provided land was located south of the Old Haulover Canal and north of the Barge Canal.⁹

As work on the Apollo Program progressed, it became clear to NASA Headquarters that the LOD needed to be an independent center. On March 7, 1962, NASA announced the separation of the LOD from MSFC, and its establishment as an independent field installation, the Launch Operations Center (LOC), effective July 1, 1962; Dr. Debus was appointed the center's first director.¹⁰ The LOC "would serve all NASA projects at Cape Canaveral, and would consolidate under 'a single official all of NASA's operating relationships with the Air Force Commander of

⁷ Benson and Faherty, *Gateway*, 15, 136; Jarrett and Lindemann, *Launch Operations Center*, 68. The Atlantic Missile Range Operations Office was a NASA liaison group established in 1958 to coordinate the scheduling and use of CCAFS facilities with the Atlantic Missile Range/CCAFS.

⁸ E. Bell, II, "Saturn SA-1," 2012, <http://nssdc.gsfc.nasa.gov/nmc/masterCatalog.do?sc=SATURNSA1>. The LOD did not participate in Project Gemini, NASA's second Manned Space Program, because the rocket used for the Gemini launches was the Air Force's Titan.

⁹ Benson and Faherty, *Gateway*, 96-107; David Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities That Have Reached the Age of 45-50 Years, John F. Kennedy Space Center, Brevard County, Florida," survey report, New South Associates, Stone Mountain, GA, 2012.

¹⁰ Jarrett and Lindemann, *Launch Operations Center*, 79.

AMR.”¹¹ Because of the increase in responsibilities, the LOC acquired new personnel. While most offices, or directorates, remained at CCAFS, crammed in tiny spaces, some groups were forced to find space in buildings throughout the cities of Cape Canaveral and Cocoa Beach. The various directorates would remain in these facilities until the new buildings at MILA were completed.¹² Eventually, MILA incorporated the LOC as part of its jurisdiction; the entirety was renamed the John F. Kennedy Space Center in November 1963 following the death of the President.¹³

A Manned Lunar Landing Program Master Planning Board, which consisted of NASA and Air Force personnel, was established to oversee the development of the new center on Merritt Island. Pan American was hired to complete the master plan for the center; the ACOE served as the LOC's supervisory design and construction agent.¹⁴ The master plan, mostly developed between 1961 and 1965, divided MILA into four functional zones: launch, launch support, industrial, and general support; the zones were arranged to maximize the protection of people and facilities from the four common types of launch hazards: blast, acoustic, toxic, and nuclear.¹⁵

The launch zone consisted of the launch pads and their direct support structures, such as fuel storage facilities, arming towers, and cable terminal buildings; this area was constructed along the shoreline between CCAFS and Playalinda Beach. The launch support zone, or Vehicle Assembly Building (VAB) Area, located roughly 3 miles southwest of the launch zone, included the assembly building, Launch Control Center, and other facilities that directly support launch activities. The industrial zone, or Industrial Area, includes assembly and checkout facilities, engineering and administrative facilities, such as the Headquarters Building, and employee/center support services; this area sits roughly 4 miles south of the VAB Area and 6.5 miles southwest of the launch area. The general support zone contains support structures, such as instrumentation sites, security control buildings, and telemetry receiver areas; these are interspersed throughout the Center.¹⁶

Construction of KSC began in 1962, when the ACOE and hired contractors began to prepare the swampy land for the required facilities. Canals were dredged, and the sand was used to compact

¹¹ Jarrett and Lindemann, *Launch Operations Center*, 80.

¹² Benson and Faherty, *Gateway*, 138-39.

¹³ Benson and Faherty, *Gateway*, 65-68, 96-98, 105, 133-137, 146-48.

¹⁴ Benson and Faherty, *Gateway*, 252-253; E.R. Bramlitt, *History of Canaveral District 1950-1971* (Cape Canaveral, FL: South Atlantic Division, U.S. Army Corps of Engineers, 1971).

¹⁵ Pan American World Airways, Guided Missiles Range Division, *Analytical Report for NASA Merritt Island Launch Area Master Plan, Volume III* (Cape Canaveral, FL: Pan American World Airways, 1962), Sweetsir Collection, File No. ARCH00017252, Kennedy Space Center Archives Department, Florida; Pan American World Airways, Guided Missiles Range Division, *Analytical Report for NASA Merritt Island Launch Area Master Plan, Volume III* (Cape Canaveral, FL: Pan American World Airways, 1965), Sweetsir Collection, File No. ARCH00017254, Kennedy Space Center Archives Department, Florida.

¹⁶ Pan American World Airways, *Merritt Island Launch Area Master Plan, Volume III*, 1965.

and flatten the ground where the launch pads would be built; surface water was then drained into the canals. Over the next four years, the majority of the Center's key facilities, such as the VAB, the Launch Control Center, Launch Pad A, the barge canal and terminal facility, ordnance storage and laboratory areas, the Crawlerway, the Operations & Checkout (O&C) Building, the Central Instrumentation Facility, and the Headquarters Building, were completed.¹⁷

Development of KSC's Industrial Area

The approximately 1,070-acre Industrial Area sits roughly 4 miles south of the VAB Area at the former town of Orsino. Its site plan was largely developed by the Master Planning Board, with help from smaller committees that had been established to focus on facilities, instrumentation, and communications. The streets within the Industrial Area were arranged in a grid pattern. Those that run north to south were given alphabetic designations; those that extend west to east were given numeric designations. The Headquarters Building was positioned in a highly visible central location along First Street. To its east was the O&C Building, and to its west were the Central Instrumentation Facility and the Base Operations Building; all four buildings used similar exterior wall materials. Additional spacecraft support facilities were placed within the east portion of the Industrial Area, and support, storage and maintenance facilities to the south. The hazardous operations facilities were placed at the southeast corner, to isolate them from the remainder of the Industrial Area.¹⁸

The earliest work in the Industrial Area was the preliminary groundwork for the O&C Building, which was completed by the Azzarelli Construction Company of Tampa, Florida, in November 1962. In January 1963, groundbreaking ceremonies for the O&C Building marked the start of facilities construction within the Industrial Area (see Figure Nos. A-1 through A-5 for representative images from this period). Shortly afterwards, "the Corps of Engineers awarded a contract for the construction of primary utilities to provide for a water distribution system, sewer lines, an electrical system, a central heating plant, streets, and hydraulic fill for the Indian River causeway to connect the Industrial Area on Merritt Island with the Florida mainland."¹⁹ This was followed by the awarding of numerous contracts to various construction firms such as the joint venture of Paul Hardeman of Stanton, California, and Morrison-Knudsen Construction Company of Boise, Idaho; Franchi Construction Company of Indian River City, Florida; and Blount Brothers Construction Company of Shreveport, Louisiana, for other buildings within the Industrial Area.²⁰

The O&C Building was the first facility at KSC to be occupied; the Florida Operations team of the Lyndon B. Johnson Space Center (JSC; then the Manned Spacecraft Center) moved into the

¹⁷ Benson and Faherty, *Gateway*, 247-270; Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities."

¹⁸ Benson and Faherty, *Gateway*, 238-241; Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities."

¹⁹ Benson and Faherty, *Gateway*, 252, 266.

²⁰ Benson and Faherty, *Gateway*, 252-268.

building in September and October 1964. Formal opening ceremonies for the Headquarters Building occurred in May 1965.²¹ Other major facilities within the area completed by 1966 included the Central Instrumentation Facility, the Central Supply Facility, the Engineering Development Laboratory, two Spacecraft Assembly/Encapsulation facilities, the High Pressure Gas Storage Facility, the Fluid Test Complex, and the Parachute Refurbishment Facility. Additional support buildings, such as a cafeteria, an auditorium and training building, a medical services dispensary, a fire station, a security building, and maintenance facilities, also were constructed within the Industrial Area.²²

Currently, the Industrial Area is comprised of roughly 178 buildings and structures. By the end of the 1960s, roughly 38 percent of these facilities was completed, which included the key structures listed above, as well as numerous support buildings, such as storage sheds, maintenance shops, site utility structures, fuel storage areas, and equipment shelters.²³ During the Apollo Program, these facilities supported the inspection, check-out, and integration of the spacecraft modules; ordnance storage; telemetry data analysis and transmission; testing of hazardous fluids; and testing the Lunar Module's rendezvous radar. The O&C Building also provided pre-flight living quarters for the astronauts.²⁴ The Industrial Area facilities provided similar support for the Skylab missions and the Apollo-Soyuz Test Project of the mid-1970s. Only a few additional support structures (roughly 3 percent of the current total) were constructed during this period.²⁵ Likewise, roughly 95 percent of the facilities constructed from the mid-1970s to the present, are small support structures, such as maintenance shops, storage sheds, and utility buildings (see Figure No. A-6 for a 1970s aerial image of the Industrial Area).

The Space Shuttle Program (SSP) brought the first major changes to the Industrial Area of KSC. Although many of the existing facilities were modified to meet the needs of this program, new structures were required to accommodate payload processing and launch procedure testing, as well as to provide storage and maintenance for new ground support equipment.²⁶ The first major facility designed for the SSP, the Launch Equipment Test Facility, was completed in 1975. This was followed in the 1980s by the construction of a Proof Load Test Structure, a Cryogenics Test Laboratory, and a Multi-Mission Support Equipment Building within the spacecraft support area, and a Payload Hazardous Servicing Facility, a Multi-Operation Support Building, and an Operations Support Building within the hazardous operations area.²⁷ In 1992, the last major

²¹ Benson and Faherty, *Gateway*, 268-269.

²² Kenneth Lipartito and Orville R. Butler, *A History of the Kennedy Space Center* (Gainesville, FL: University Press of Florida, 2007), 222-223; Space Gateway Support, *CCAFS/KSC Basic Information Guide*, January 2006, 3-28 to 3-31, on file, Kennedy Space Center; Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities."

²³ Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.

²⁴ Benson and Faherty, *Gateway*, 240-242; Lipartito and Butler, 105.

²⁵ Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.

²⁶ Lipartito and Butler, 186, 201, 222-223; Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.

²⁷ Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.

facility to be added to the Industrial Area for the Space Shuttle Program, the Canister Rotation Facility, was completed. The introduction of the Space Station *Freedom*, which later became the International Space Station (ISS), spurred the construction of the last two major facilities of the Industrial Area: the Space Station Processing Facility, completed in 1992, and the Multi-Payload Processing Facility, finished in 1995 (see Figure Nos. A-7, A-8 for a 1980s and 1990s aerial image of the Industrial Area, respectively).²⁸

KSC Headquarters Building

The Headquarters Building was designated as the administrative facility that would house the Center Director's offices, as well as "people engaged in scientific, engineering and administrative work relating to the Saturn C-1 and Advanced Saturn programs."²⁹ The ACOE hired Kemp, Bunch & Jackson, Architects, of Jacksonville, Florida, to serve as the design architect for the Headquarters Building. Subsequently, on February 7, 1963, a predesign conference was held between representatives of NASA, ACOE, Kemp, Bunch & Jackson, and the Air Force to discuss the general design and architectural treatment of the building.³⁰ Some items discussed at the meeting included the use of precast exterior granular quartz surfaced panels to match the O&C Building; the use of insulated interior partitions to prevent sound transmission; lighting, power, and air conditioning requirements; and design concepts for the Center Director's offices. Also during the conference, a schedule of deliverables was developed, based on the goal of awarding the contract for the construction of the building around September 10, 1963.³¹

Over the next several months, the team completed the design of the building in two phases, although the drawings for both are dated September 1963. Phase I included a U-shaped structure, which would form the central core of the completed building. The center portion of the north part of the core, the 'bottom' of the U, contained a fourth floor for the Center Director's offices; the south wings, the upright portions of the U, were only three stories in height. Phase II of the design included two L-shaped additions, one to the east and one to the west, oriented so that the 'bottom' of the L aligned with the bottom of the central U (see 'Key Plan' on Photo No. 54).³² Although NASA had hoped to award the construction contract by September 1963, the proposals for the project were not opened until January 14, 1964. By this time, the LOC had formally been

²⁸ Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.

²⁹ Saturn C-1 was the original designation for the Saturn I vehicle, and Advanced Saturn was the designation for what became the Saturn V. Pan American World Airways, Guided Missiles Range Division, "Analytical Report for NASA Merritt Island Launch Area Master Plan," 1962; Roger E. Bilstein, *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles* (Gainesville, FL: University Press of Florida, 2003).

³⁰ ACOE, "Minutes of Pre-design Conference for LOC Headquarters Building," February 7, 1963, Sweetsir Collection, File No. ARCH00012990, Kennedy Space Center Archives Department, Florida.

³¹ ACOE, "Minutes of Pre-design Conference."

³² Kemp, Bunch & Jackson, "L.O.C. Headquarters Phase One;" Kemp, Bunch & Jackson, "L.O.C. Headquarters Phase Two."

designated KSC, in honor of the recently assassinated President.³³ Near the end of January, ACOE officially awarded the construction contract to Franchi Construction Company of Indian River City, Florida, who had submitted a low bid of \$7,112,912.³⁴ Franchi began construction of the Headquarters Building, both Phase I and Phase II, on February 3, 1964; the company had the site cleared and ready for construction in early March (Figure A-9). By the end of May, the structural skeleton for the first two floors of the central core had been erected.³⁵ A photograph from the beginning of August shows that the entire structural skeleton had been completed, and Franchi had started installing the exterior wall panels (Figure No. A-10); nearly all of the panels were in place by mid-October (Figure No. A-11).

Before construction of the Headquarters Building was finished, employees began to move into the facility. The first group, fifty personnel from the Base Communications and Transportation offices, completed their move on April 26, 1965. One week later, on May 3, 1965, 150 employees from the Program Control, Saturn V Systems, Saturn I and IB Systems, Reliability and Quality Assurance, Operations Support, and Spacecraft Systems offices moved into the building. The general procedure was for employees to pack their belongings on Friday and for contractors to move the equipment and files to their Headquarters offices over the weekend, allowing personnel to unpack and continue working on Monday with minimal disruptions.³⁶

The Headquarters Building was completed on May 14, 1965; the formal opening of the facility occurred on May 26, 1965, the day Dr. Kurt Debus, then Center Director, first occupied his office. The ceremony began with music by the forty-member 536th Air Force Band and Color Guard and an invocation. Afterwards, Dr. Debus, Major General Vincent G. Houston (Commanding General of the Air Force Eastern Test Range), Major General A.C. Welling (head of ACOE's South Atlantic Division), and Colonel W.L. Starnes (Canaveral District Engineer for ACOE), spoke to the crowd. Dr. Debus then presented the American and NASA flags to KSC Security Patrol, who subsequently raised them (Figure No. A-12).³⁷ Over the next several months, employees continued to move into the Headquarters Building (Figure No. A-13). By the end of the summer, more than 1,700 personnel had been relocated into the facility; more would

³³ ACOE, "Minutes of Predesign Conference;" "Pad A, VAB Contracts Scheduled," *Spaceport News*, September 13, 1963, 1; "Construction Jobs to Boom in January," *Spaceport News*, January 2, 1964, 1; "MILA Area Construction Projects Progress Rapidly," *Spaceport News*, January 2, 1964, 2; "Headquarters Building to Open in March 1965," *Spaceport News*, March 12, 1964, 2.

³⁴ "Headquarters Building Bid Announced," *Spaceport News*, January 16, 1964, 1; "Franchi Awarded Pact," *Spaceport News*, February 6, 1964, 8; "\$251 Million Set for Merritt Island," *Spaceport News*, March 12, 1964, 2.

³⁵ "Photo Caption," *Spaceport News*, May 28, 1964, 7; NASA KSC, "KSC Headquarters."

³⁶ "Merritt Island Migration Begins Saturday," *Spaceport News*, April 22, 1965, 1; "Employees Getting Settled in Headquarters Building," *Spaceport News*, April 29, 1965, 1 and 4.

³⁷ "Flag Raising Ceremony, Headquarters Building," Box 4D.5, Sweetsir Collection, Kennedy Space Center Archives Department, Florida; "Flag Raising Ceremonies at Island," *Spaceport News*, May 27, 1965, 3.

move in sporadically over the next few years.³⁸ In December 1966, a dedication ceremony was held for the bronze bust of President Kennedy, which adorns the main elevator lobby (Figure No. A-14).

In January 1967, Kemp, Bunch & Jackson and the ACOE completed plans for Phase III of the Headquarters Building. This phase of the facility consisted of two L-shaped additions, one to be built at the east end and one at the west end of the original building. Like those from Phase II, these additions were arranged so that the 'bottom' of the L aligned with the bottom of the earlier L-shaped wings (see Photo No. 62). ACOE awarded the construction contract, worth approximately \$2,390,750, to H.J. Construction Company of Orlando, Florida, in late February 1967.³⁹ Work began later that month, and by the end of the year, the additions were roughly 70 percent complete (Figure No. A-15).⁴⁰ The first move into the new east wing, by Installation Support personnel, occurred during the weekend of March 30-31, 1968. The new west wing was ready for occupancy three months later, although it would not be fully completed until August (Figure No. A-17).⁴¹

Since the 1967-68 additions, the Headquarters Building has not received any additions; however, various internal spaces have been remodeled based on functional needs and new technologies. In addition, modifications, such as the installation of automatic doors, were made to the building to improve access for those employees and visitors with physical disabilities. In 1977, KSC's Design Engineering Office worked with the Energy Research and Development Administration to install a 4,000-square foot solar flat plate collector array to the south of the Headquarters Building in an effort to conserve energy. This array was designed to provide 70 percent of the hot water needs for the central four wings of the facility.⁴²

Throughout its existence, the Headquarters Building has continuously housed the Center Director and served as an administrative and personnel service facility. Directorates that made the building their home included the Chief Counsel, Logistics Planning Branch, Ground Processing, Procurement, Design Engineering, Labor Relations/Human Resources, Weather Office/Hurricane Control Center, Quality Engineering and Control, Information Technology and Communications Services, Photography/Film, Printing/Duplication, News Operations, and Community Relations.⁴³ Various personnel services that have been located in the Headquarters

³⁸ "Island Move Dates Listed," *Spaceport News*, June 17, 1965, 4; "KSC 'Operation Big Move' More than Half Completed," *Spaceport News*, September 16, 1965, 1; "Gramer 'Evacuates' Trailer Office," *Spaceport News*, October 13, 1965, 6.

³⁹ Kemp, Bunch & Jackson, "Phase III Additions;" "Headquarters Pact."

⁴⁰ "Major KSC Facilities Completed During 1967," *Spaceport News*, January 4, 1968, 5.

⁴¹ "First Move into New Wing Set," *Spaceport News*, March 28, 1968, 6; NASA KSC, "KSC Headquarters."

⁴² "Sun to Heat KSC's Water," *Spaceport News*, February 18, 1977, 1 and 3.

⁴³ The News Operations moved out of the Headquarters Building in 1995 with the construction of the NASA News Center at the Press Site near the VAB. See Patricia Slovinac, "Cape Canaveral Air Force Station, Launch Complex

Building include an exchange store, a barbershop, a Post Office,⁴⁴ a library, an archives department, a branch of the NASA-MILA Federal Credit Union, and a cafeteria and snack bar.

U.S. Manned Space Programs Supported by the Headquarters Building

Project Gemini

Project Gemini unofficially got its start in May 1959, when NASA Headquarters' Research Steering Committee for Manned Space Flight, commonly known as the Goett Committee after its leader Harry Goett, met for the first time to examine follow-up programs for Project Mercury.⁴⁵ Initial ideas included a two-man capsule, extended duration flights (up to two weeks), a manned lunar expedition, and a manned orbiting laboratory. Although lunar exploration became the major focus, the Goett Committee noted that there should be an intermediate step between Project Mercury and a lunar mission.⁴⁶

In January 1961, the focus of Apollo shifted from a lunar reconnaissance to a manned lunar landing. Over the next several months, NASA conducted studies on the concepts of Earth orbit rendezvous, lunar orbit rendezvous, and direct ascent to determine the best approach for reaching the Moon's surface. In the meantime, the leaders of the Space Task Group (STG; this group eventually became the Manned Spacecraft Center, and then Johnson Space Center) saw both rendezvous and extended time in orbit as possible focal points for a follow-on to Project Mercury.⁴⁷

These initial ideas culminated in a "Preliminary Project Development Plan for an Advanced Manned Space Program Utilizing the Mark II Two Man Spacecraft," issued on August 14, 1961. This plan outlined six objectives, which were to be achieved in ten flights between March 1963 and September 1964. The six goals included long-duration flights, a study of the Van Allen radiation belts, controlled landing, rendezvous and docking, astronaut training, and extensive use of vehicles and equipment already on hand.⁴⁸ On October 27, 1961, a revised plan was issued,

39, Press Site: Clock and Flag Pole (John F. Kennedy Space Center)," HAER No. FL-8-11-N. Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, January 2012.

⁴⁴ The KSC Post Office is considered a contract branch of the Orlando, Florida, Post Office; however, it was given its own zip code and an official stamp cancellation of "Kennedy Space Center, Florida." "Post Office set to Open," *Spaceport News*, April 22, 1965, 1 and 4.

⁴⁵ James M. Grimwood and Barton C. Hacker, *Project Gemini: A Chronology* (Washington, DC: NASA, Office of Scientific and Technical Information, 1969), <http://history.nasa.gov/SP-4002/contents.htm>; Courtney G. Brooks, James M. Grimwood, and Loyd S. Swenson, Jr., *Chariots for Apollo: The NASA History of Manned Lunar Spacecraft to 1969* (Mineola, NY: Dover Publications, Inc., 2009).

⁴⁶ Barton C. Hacker and James M. Grimwood, *On the Shoulders of Titans: A History of Project Gemini* (Washington, DC: NASA, Office of Scientific and Technical Information, 1977).

⁴⁷ Hacker and Grimwood, *On the Shoulders of Titans*.

⁴⁸ Hacker and Grimwood, *On the Shoulders of Titans*.

which retained all the original goals except for the Van Allen Study and the focus on using existing hardware; the program also was extended to twelve flights. Further revisions and negotiations with the Department of Defense delayed the project, and finally, on December 8, 1961, NASA approved the final "Project Development Plan for an Advanced Manned Space Program Utilizing the Mark II Two Man Spacecraft." On January 3, 1962, the new program was officially redesignated Project Gemini.⁴⁹

As the intermediate step between Project Mercury and the Apollo Program, the primary objective of Project Gemini was to prepare for a lunar landing. Its established goals were to keep a two-man crew in space for up to fourteen days; rendezvous and dock with orbiting vehicles, and maneuver the combination; and to perfect methods of entering the atmosphere and landing.⁵⁰ In addition, NASA desired to gain additional information on the effects of weightlessness on humans; and the Flight Operations Division planned on honing new skills in mission planning and control.

Altogether, Project Gemini flew twelve missions, all of which launched from LC 19 at CCAFS. The first two missions were unmanned development flights. The focus of Gemini I, April 8, 1964, was to prove that the Titan II could successfully launch the Gemini spacecraft and put it in orbit.⁵¹ Gemini II, which occurred on January 19, 1965, had as its major objectives demonstrating the adequacy of the spacecraft reentry module's heat protection, the structural integrity of the spacecraft from liftoff through reentry, and the satisfactory performance of spacecraft systems.⁵²

The first manned mission, Gemini III, occurred on March 23, 1965, with astronauts Virgil I. "Gus" Grissom as command pilot and John W. Young as pilot. This three-orbit mission focused on testing the maneuverability of the spacecraft, as Grissom and Young changed the shape of their orbit, shifted from their orbital plane, and dropped to a lower altitude by firing the vehicle's thrusters.⁵³ The launch of Gemini IV on June 3, 1965, marked the beginning of the first four-day flight of the U.S. Manned Space Program. Initially, the astronauts, James A. McDivitt and Edward H. White II, were to fly in formation with the second stage of the Titan II booster after separation. The attempt was unsuccessful, as the astronauts proved that the intended method, aiming the thrusters towards the target, would not work. However, during the mission, White successfully completed the first extravehicular activity (EVA), or spacewalk, by an American.

Gemini V, launched August 21, 1965, was an eight-day mission conducted by L. Gordon Cooper, Jr. and Charles "Pete" Conrad, Jr. Scheduled to perform a practice rendezvous with a

⁴⁹ Grimwood and Hacker, *Project Gemini*.

⁵⁰ NASA KSC, "Gemini Goals," 2000, <http://www-pao.ksc.nasa.gov/kscpao/history/gemini/gemini-goals.htm>.

⁵¹ Hacker and Grimwood, *On the Shoulders of Titans*.

⁵² Grimwood and Hacker, *Project Gemini*.

⁵³ Grimwood and Hacker, *Project Gemini*.

“pod,” electrical problems forced a cancellation of the experiment. Instead, Cooper and Conrad maneuvered the vehicle to a predetermined position, in effect completing a “phantom rendezvous.”⁵⁴ The goal of Gemini VI, scheduled to launch in October 1965, was to be the first rendezvous and docking mission of the program. The mission plan called for the launch of an unmanned Agena target vehicle by an Atlas rocket, followed by the launch of the manned Gemini vehicle. The astronauts, Walter M. Schirra, Jr. and Thomas P. Stafford, Jr., would catch up to the Agena target from a lower orbit, and then manipulate their vehicle for rendezvous. On October 25, 1965, the Agena/Atlas combination was launched from LC 14 at CCAFS; however, shortly afterwards, mission control lost all telemetry signals from Agena and cancelled the launch of Gemini VI. Although the mission was considered a failure, three days later with the approval of the White House, NASA announced that the mission would be redesignated Gemini VI-A, and would rendezvous with another manned vehicle, Gemini VII.⁵⁵

On December 4, 1965, Gemini VII launched with astronauts Frank F. Borman, II, and James A. Lovell, Jr. for a fourteen-day mission, meant to solve problems of long-duration spaceflight. For eleven days, Borman and Lovell performed various in-flight experiments, including the evaluation of a new, lightweight spacesuit. On December 15, Gemini VI-A launched from CCAFS and proceeded to track down the orbiting Gemini VII vehicle. Rendezvous was completed that afternoon, when Schirra piloted his capsule to within 1’ of the other, and the two flew in formation around each other for five hours. Gemini VI-A landed on December 16, followed two days later by Gemini VII.⁵⁶

Gemini VIII, with astronauts Neil A. Armstrong and David R. Scott, launched on March 16, 1966; less than six hours after launch, it became the first vehicle to rendezvous and dock to a prelaunched Agena target vehicle. Unfortunately, one of Gemini’s thrusters became stuck, causing the docked vehicles to roll continuously. Armstrong undocked his vehicle from the Agena, but could only fix the thruster by using the reentry control thrusters; thus, Gemini VIII was forced to make an emergency return to Earth just ten hours after launch. Gemini IX, which launched with Thomas P. Stafford, Jr. and Eugene A. Cernan on June 3, 1965, was supposed to have docked with a modified Agena, but the failed release of its protective shroud caused a cancellation of the objective.⁵⁷

Gemini X launched on July 18, 1966, carrying astronauts John W. Young and Michael Collins. During their four-day mission, Young and Collins rendezvoused and docked with their Agena target in low orbit, and then maneuvered their spacecraft to a higher orbit to rendezvous with the Agena target from Gemini VIII. Gemini XI, with Charles “Pete” Conrad, Jr. and Richard F. Gordon, Jr., launched on September 12, 1966. The astronauts rendezvoused and docked with

⁵⁴ Grimwood and Hacker, *Project Gemini*.

⁵⁵ Grimwood and Hacker, *Project Gemini*; Hacker and Grimwood, *On the Shoulders of Titans*.

⁵⁶ Grimwood and Hacker, *Project Gemini*.

⁵⁷ Grimwood and Hacker, *Project Gemini*.

their target vehicle eighty-five minutes after launch. Gemini XII, the last mission of the program, launched on November 11, 1966, with astronauts James A. Lovell, Jr. and Edwin E. "Buzz" Aldrin, Jr. The four-day mission incorporated a rendezvous and docking task with an Agena and three EVAs.⁵⁸

The Apollo Program

The Apollo Program had unofficially begun on February 5, 1959, when NASA established the Working Group on Lunar Exploration to formulate a lunar exploration program. Subsequently, a Research Steering Committee was created, which included personnel from the various NASA centers. At its first meeting in May 1959, the committee prioritized various aspects of a space program, which included a manned lunar landing and return to Earth. The concept was further discussed at the committee's second meeting (June 1959) and at its third meeting (December 1959). By the following January (1960), enough progress had been made to bring about the suggestion of a formal name, "Apollo," for the new program, with the goal of landing astronauts on the moon and returning them safely to Earth. T. Keith Glennan, NASA Administrator, approved the name on July 25, 1960, and it was subsequently announced at the first NASA-Industry Program Plans Conference three days later. On September 1, 1960, the STG officially created the "Apollo Project Office."⁵⁹

Altogether, the Apollo Program flew thirty-two missions, including the initial research/development, and qualification flights, the lunar flights, the Skylab application, and the Apollo-Soyuz Test Project. Three different launch complexes were used: LC 34 (seven launches) and LC 37 (eight launches) at CCAFS, and LC 39 (seventeen launches; twelve from Pad A and four from Pad B) at KSC. Of the total thirty-two flights, fifteen were manned, and of the seven attempted lunar landing missions, six were successful. No major launch vehicle failures of either the Saturn IB or Saturn V occurred; however, there were two major CSM failures, one on the ground (Apollo 1) and one on the way to the Moon (Apollo 13).⁶⁰

The first four test flights of the Apollo Program were launched from LC 34 and flew suborbital trajectories utilizing the Saturn I Block I vehicle. These flights verified the aerodynamics and structure of the launch vehicle, performed scientific experiments known as Project High Water I

⁵⁸ Grimwood and Hacker, *Project Gemini*.

⁵⁹ Ivan D. Ertel and Mary Louise Morse, *The Apollo Spacecraft: A Chronology, Volume 1* (Washington, DC: NASA, Scientific and Technical Information Office, 1969), <http://www.hq.nasa.gov/office/pao/History/SP-4009/contents.htm#Volume%20I>. The STG was the initial office created by NASA to operate its manned spaceflight program; it was stationed at the Langley Aeronautical Laboratory (now Langley Research Center) in Hampton, Virginia. As the space program grew, the STG became an autonomous NASA center, named the Manned Spacecraft Center, and was moved to Houston, Texas. Following the death of President Johnson, it received its current name: the Lyndon B. Johnson Space Center (JSC).

⁶⁰ NASA, *Facts: John F. Kennedy Space Center*, 1994, 82.

and Project High Water II, and tested an “engine-out” contingency, in which the fuel was rerouted to the seven remaining engines.⁶¹

The next phase of testing utilized the Block II configuration of the Saturn I vehicle. All six of these flights were launched from LC 37, since LC 34 was being modified for the assembly, checkout, and launch of the larger, more powerful Saturn IB vehicle. The first flight, SA-5, launched on January 24, 1964, and was the first orbital flight of the Apollo Program, as well as the first to test a fully-fueled second stage. The next two flights, SA-6 (May 28, 1964) and SA-7 (September 18, 1964), carried boilerplate CSMs to test telemetry and various systems, as well as the Launch Escape System. Due to the success of these two flights, the next three were used to carry satellites into space.⁶²

The first test flight using the Saturn IB vehicle, designated Apollo/Saturn 201 (AS-201), launched from LC 34 on February 26, 1966, carrying the first true spacecraft on a suborbital flight to test its heat shield. Two more unmanned test flights followed to test the instrumentation unit and the behavior of the fuel in the vehicle’s second stage. AS-202 also subjected the Command Module to the full force of re-entry for the first time. The fourth scheduled flight, set to launch from LC 34 in February 1967, was to be the first manned mission of the Apollo Program. During a countdown simulation on January 27, 1967, the Command Module caught fire on the launch pad, killing astronauts Virgil “Gus” Grissom, Edward White, and Roger Chaffee. The event was later commemorated as Apollo 1.⁶³

Following the fire, and subsequent modifications to the spacecraft, NASA conducted three additional unmanned Earth orbital missions to continue verification testing of the Apollo-Saturn combination and to begin testing of the Lunar Module. Apollo 4 was launched on November 9, 1967. This flight was the first to use the Saturn V vehicle, and thus, the first to launch from the new LC 39, Pad A at KSC. Apollo 5 launched on January 22, 1968, from LC 37 carrying the first Lunar Module into space for verification tests. Apollo 6 was the final unmanned mission of the Apollo Program; it launched on April 4, 1968, from LC 39, Pad A.⁶⁴

⁶¹ These experiments created artificial clouds to provide data on atmospheric physics. Although the vehicle tests were successful, the experiments produced questionable results. Robert Godwin, *Project Apollo: The Test Program* (Burlington, Ontario: Apogee Books, 2006), 4; Ertel and Morse, *A Chronology, Volume 1*; Mary Louise Morse and Jean Kernahan Bays, *The Apollo Spacecraft: A Chronology, Volume 2* (Washington, DC: NASA, Scientific and Technical Information Office, 1973), <http://www.hq.nasa.gov/office/pao/History/SP-4009/contents.htm#Volume%20II>.

⁶² SA-9, carrying Pegasus 1, was launched on February 16, 1965; SA-8 launched on May 25, 1965, with Pegasus 2; and SA-10 launched on July 30, 1965, with Pegasus 3. Godwin, *The Test Program*, 5-6, 16-24; Morse and Bays, *A Chronology, Volume 2*; Brooks and Ertel, *A Chronology, Volume 3*.

⁶³ Godwin, *The Test Program*, 7-8, 25-35; Ivan D. Ertel and Roland W. Newkirk (with Courtney G. Brooks), *The Apollo Spacecraft: A Chronology, Volume 4* (Washington, DC: NASA, Scientific and Technical Information Office, 1978), <http://www.hq.nasa.gov/office/pao/History/SP-4009/contents.htm#Volume%20IV>.

⁶⁴ Godwin, *The Test Program*, 9-10, 36-48; Ertel and Newkirk, *A Chronology, Volume 4*.

Although still considered part of the Apollo Program's testing phase, the October 11, 1968, Apollo 7 launch from LC 34 was the first manned mission, which placed astronauts into an Earth orbit for ten days using a Saturn IB vehicle. The crew, Walter Schirra, Donn Eisele, and Walter Cunningham, tested the CSM and their guidance and control systems, the Instrument Unit, the Spacecraft Lunar Adapter, the new spacesuit design, food supplies and work routines. During this flight, the astronauts separated the CSM from the second stage in order to practice rendezvous operations with the booster. The Command Module with the astronauts returned to Earth on October 22, after successfully completing all goals of the mission.⁶⁵

The next mission, designated Apollo 8, launched on December 21, 1968, from LC 39, Pad A, and became the first manned flight to use the Saturn V vehicle. It was the first mission to reach the Moon, which it orbited ten times before returning to Earth. Apollo 9, which launched on March 3, 1969, from LC 39, Pad A, remained in a low-Earth orbit, where its crew, James McDivitt, Russell Schweickart, and David Scott, performed the first spacewalk of the Apollo Program and the first docking of the Lunar and Command Modules. Apollo 10 was the "final dress rehearsal" for landing on the Moon. Launched on May 18, 1969, from LC 39, Pad B, it reached the Moon, which it orbited thirty-one times. While in orbit, the crew jettisoned the Lunar Module and allowed it to come within 50,000' of the Moon's surface, prior to initializing the ascent stage for its return to the Command Module (the descent stage was left to fall onto the Moon; the ascent stage would be jettisoned into a solar orbit).⁶⁶

On July 16, 1969, Apollo 11 launched from LC 39, Pad A, carrying its crew, Astronauts Neil Armstrong, Edwin "Buzz" Aldrin, and Michael Collins, into a lunar orbit just over three days later. On July 20, 1969, as Collins remained in the Command Module, Armstrong and Aldrin climbed into the Lunar Module and descended to the Moon's surface. Landing at 4:17 p.m., Eastern Standard Time (EST), Armstrong reported to Mission Control, "Houston, Tranquility Base here. The Eagle has landed."⁶⁷ Armstrong and Aldrin completed one EVA to collect lunar surface material for scientific analysis. Just over twenty-one hours after landing, the Lunar Module ascent stage lifted-off to successfully dock with the CSM in lunar orbit, and the two astronauts rejoined their colleague in the Command Module, prior to jettisoning the ascent stage. The three astronauts landed in the Pacific Ocean on July 24, 1969, at roughly 12:50 p.m. EST, officially accomplishing the goal set by President Kennedy on May 25, 1961.⁶⁸

⁶⁵ Godwin, *The Test Program*, 52-55; Ertel and Newkirk, *A Chronology, Volume 4*.

⁶⁶ Godwin, *The Test Program*, 12-13, 56-69; Ertel and Newkirk, *A Chronology, Volume 4*.

⁶⁷ Tranquility Base refers to their designated landing site; Eagle was the name given to the Lunar Module. NASA MSC [Manned Spacecraft Center, now JSC], *Apollo 11 Spacecraft Commentary*, July 16-24, 1969, http://www.jsc.nasa.gov/history/mission_trans/AS11_PAO.PDF.

⁶⁸ NASA KSC, "Apollo 11," *Apollo website*, 2003, <http://www-pao.ksc.nasa.gov/kscpao/history/apollo/apollo-11/apollo-11.htm>; Robert Godwin, *Project Apollo: Exploring the Moon* (Burlington, Ontario: Apogee Books, 2006), 3-5, 20-22; Ertel and Newkirk, *A Chronology, Volume 4*.

Four months later, Apollo 12 launched from LC 39, Pad A, for its rendezvous with the Moon. Essentially a repeat of Apollo 11, the crew remained in lunar orbit for one extra day to take photographs. On April 11, 1970, the ill-fated Apollo 13 lifted-off from LC 39, Pad A. Approximately fifty-six hours after launch, Oxygen Tank No. 2 ruptured, also causing a failure in Oxygen Tank No. 1. The three-man crew of James Lovell, Fred Haise, and John "Jack" Swigert, remained in limbo within the Lunar Module as the ground controllers in Mission Control at JSC frantically worked to bring them home safely. On April 17, they landed on Earth proving the ingenuity of the ground controllers. The event would have repercussions though, as two Apollo flights were removed from the program.⁶⁹

The next mission, Apollo 14, was launched on January 31, 1971. Astronauts Alan Shepard and Edgar Mitchell spent just over thirty-three hours on the Moon's surface and conducted two EVAs. Apollo 15, which launched on July 26, 1971, was the first mission to use the Lunar Rover, an electric-powered, four-wheel drive vehicle, to traverse around the lunar surface. The crew spent just under sixty-seven hours on the Moon collecting lunar samples, including one dubbed the "Genesis Rock." The next mission, Apollo 16, was essentially a repeat of Apollo 15, albeit with a different lunar landing site. Apollo 17, which launched on December 7, 1972, was the final lunar mission and the only one to carry a scientist-astronaut, Harrison "Jack" Schmitt, to the Moon.⁷⁰

Skylab, an application of the Apollo Program, served as an early type of space station. With 12,700 cubic feet of work and living space, it was the largest habitable structure ever placed in orbit, at the time. The station achieved several objectives: scientific investigations in Earth orbit (astronomical, space physics, and biological experiments); applications in Earth orbit (Earth resources surveys); and long-duration spaceflight. The Skylab 1 orbital workshop was inhabited in succession by three crews launched in modified Apollo CSMs (Skylab 2, 3 and 4). Actively used until February 1974, Skylab 1 remained in orbit until July 11, 1979, when it re-entered Earth's atmosphere over the Indian Ocean and Western Australia after completing 34,181 orbits.⁷¹

The Apollo-Soyuz Test Project of July 1975, the final application of the Apollo Program, marked the first international rendezvous and docking in space and was the first major cooperation between the only two nations engaged in manned spaceflight. As the first meeting of two manned spacecraft of different nations in space, first docking, and first visits by astronauts and cosmonauts into the others' spacecraft, the project was highly significant. The Apollo-Soyuz

⁶⁹ Godwin, *Exploring the Moon*, 5-10, 23-30; Ertel and Newkirk, *A Chronology, Volume 4*. One flight had already been cancelled following the return of Apollo 12.

⁷⁰ Godwin, *Exploring the Moon*, 10-18, 31-49; Ertel and Newkirk, *A Chronology, Volume 4*.

⁷¹ NASA, *Facts*, 91.

Test Project established workable joint docking mechanisms, taking the first steps toward mutual rescue capability of both Russian and American manned missions in space.⁷²

The Space Shuttle Program

On January 5, 1972, President Richard M. Nixon delivered a speech in which he outlined the end of the Apollo era and the future of a reusable space flight vehicle, the Space Shuttle, which would provide “routine access to space.” By commencing work at this time, Nixon added, “we can have the Shuttle in manned flight by 1978, and operational a short time after that.”⁷³ The Space Task Group, previously established by President Nixon in February 1969, recommended three choices of long-range space plans. All included an Earth-orbiting space station, a space shuttle, and a manned Mars expedition.⁷⁴ Although none of the original programs presented was eventually selected, NASA implemented a program, shaped by the politics and economic realities of its time that served as a first step toward any future plans for implementing a space station.⁷⁵

During this speech, President Nixon instructed NASA to proceed with the design and building of a partially reusable Space Transportation System (STS; commonly referred to as the Space Shuttle) consisting of a reusable orbiter, three reusable main engines, two reusable solid rocket boosters (SRBs), and one non-reusable external liquid fuel tank (ET). NASA’s administrators vowed that the Space Shuttle would fly at least fifty times a year, making space travel economical and safe. NASA gave responsibility for developing the Space Shuttle’s orbiter vehicle and overall management of the SSP to JSC in Houston, Texas, based on the Center’s experience. MSFC in Huntsville, Alabama, was responsible for development of the Space Shuttle Main Engine (SSME), the SRBs, the ET, and for all propulsion-related tasks. Engineering design support continued at JSC, MSFC, and NASA’s Langley Research Center, and engine tests were to be performed at NASA’s National Space Technology Laboratories (later named Stennis Space Center) in south Mississippi, and at the Air Force’s Rocket Propulsion Laboratory in California, which later became the Santa Susana Field Laboratory.⁷⁶ NASA selected KSC as the primary launch and landing site for the SSP. KSC, responsible for designing the launch and recovery facilities, was to develop methods for shuttle assembly, checkout, and launch operations.⁷⁷

⁷² NASA, *Facts*, 96.

⁷³ Marcus Lindroos, ed., “President Nixon’s 1972 Announcement on the Space Shuttle,” updated April 14, 2000, <http://history.nasa.gov/stsnixon.htm>.

⁷⁴ NASA, “Report of the Space Task Group, 1969,” (Washington, DC: NASA Headquarters, 1969), <http://www.hq.nasa.gov/office/pao/History/taskgrp.html>.

⁷⁵ Dennis R. Jenkins, *Space Shuttle, The History of the National Space Transportation System. The First 100 Missions* (Cape Canaveral, FL: Specialty Press, 2001), 99.

⁷⁶ Jenkins, *Space Shuttle*, 122.

⁷⁷ Linda Neuman Ezell, *NASA Historical Databook Volume III Programs and Projects 1969-1978*, The NASA History Series (Washington, DC: NASA History Office, 1988), 121-24, table 2-57; Ray A. Williamson,

On September 17, 1976, the full-scale Orbiter Vehicle (OV) prototype *Enterprise* (OV-101) was completed. Designed for test purposes only and never intended for space flight, structural assembly of OV-101 had started more than two years earlier in June 1974 at Air Force Plant 42 in Palmdale, California. Although the *Enterprise* was an aluminum shell prototype incapable of space flight, it reflected the overall design of the orbiter. As such, it served successfully in 1977 as the test article during the Approach and Landing Tests aimed at checking out both the mating with the Boeing 747 Shuttle Carrier Aircraft for ferry operations, as well as the orbiter's unpowered landing capabilities.

The first orbiter intended for spaceflight, *Columbia* (OV-102), arrived at KSC from Air Force Plant 42 in March 1979. Originally scheduled for liftoff in late 1979, the launch date was delayed by problems with both the SSME components as well as the thermal protection system. *Columbia* spent 610 days in the Orbiter Processing Facility, another thirty-five days in the VAB and 105 days on LC 39, Pad A before lifting off on April 12, 1981. STS-1, the first orbital test flight and first SSP mission, ended with a landing on April 14, 1981, at Edwards Air Force Base in California. This launch demonstrated *Columbia's* ability to fly into orbit, conduct on-orbit operations, and return safely.⁷⁸ *Columbia* flew three additional test flights in 1981 and 1982, all with a crew of two. The Orbital Test Flight Program ended in July 1982 with 95 percent of its objectives accomplished. After the end of the fourth mission, President Ronald W. Reagan declared that with the next flight the Shuttle would be "fully operational."

During the SSP, a total of 135 missions launched from KSC. From April 1981 until the *Challenger* accident in January 1986, between two and nine missions were flown yearly, with an average of four to five per year. The milestone year was 1985, when nine flights were successfully completed. The years between 1992 and 1997 were the most productive, with seven or eight yearly missions. Since 1995, in addition to its unique responsibility as the Shuttle launch site, KSC also became the preferred landing site.

Over the past three decades, the SSP has launched a number of planetary and astronomy missions, including the Hubble Space Telescope, the Galileo probe to Jupiter, Magellan to Venus, and the Upper Atmospheric Research Satellite. In addition to astronomy and military satellites, a series of Spacelab research missions were flown, which carried dozens of international experiments in disciplines ranging from materials science to plant biology. Spacelab was a manned, reusable, microgravity laboratory flown into space in the Space Shuttle cargo bay. It was developed on a modular basis allowing assembly in a dozen arrangements

"Developing the Space Shuttle," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume IV: Accessing Space*, ed. John M. Logsdon (Washington, DC: U.S. Printing Office, 1999), 172-174.

⁷⁸ Jenkins, *Space Shuttle*, 268.

depending on the specific mission requirements.⁷⁹ The first Spacelab mission, carried aboard *Columbia* (STS-9), began on November 28, 1983. Four Spacelab missions were flown between 1983 and 1985. Following a stand-down in the aftermath of the *Challenger* disaster, the next Spacelab mission was not launched until 1990. In total, twenty-four Space Shuttle missions carried Spacelab hardware before the program was decommissioned in 1998.⁸⁰

In 1995, a joint U.S./Russian Shuttle-*Mir* Program was initiated as a precursor to construction of the ISS. *Mir* was launched in February 1986, and remained in orbit until March 2001.⁸¹ The first approach and fly around of *Mir* (STS-63) took place on February 3, 1995, and the first *Mir* docking (STS-71) was in June 1995. During the three-year Shuttle-*Mir* Program (June 27, 1995 to June 2, 1998), the Space Shuttle docked with *Mir* nine times. The Orbiter *Atlantis* flew all but the last two of these docking missions. In 1995, Dr. Norman Thagard was the first American to live aboard the Russian space station. Over the next three years, six more U.S. astronauts served tours on *Mir*. The Shuttle served as a means of transporting supplies, equipment, and water to the space station in addition to performing a variety of other mission tasks, many of which involved Earth science experiments. It returned experiment results and unneeded equipment to Earth. The Shuttle-*Mir* Program served to acclimate the astronauts to living and working in space. Many of the activities carried out were types they would perform on the ISS.⁸²

On December 4, 1998, *Endeavour* (STS-88) launched the first U.S. component of the ISS into orbit. This event marked, “at long last the start of the Shuttle’s use for which it was primarily designed – transport to and from a permanently inhabited orbital space station.”⁸³ STS-96, *Discovery*, launched on May 27, 1999, marked the first mission to dock with the ISS. Afterwards, most Space Shuttle missions supported the assembly of the space station. The last major component of the ISS was delivered in May 2011, during the final flight of *Endeavour* (STS-134).

The SSP suffered two major setbacks with the tragic losses of the *Challenger* and *Columbia* on January 28, 1986, and February 1, 2003, respectively. Following the *Challenger* accident, the program was suspended, and President Reagan formed a thirteen-member commission to identify the cause of the disaster. The Rogers Commission Report, issued on June 6, 1986, which also included a review of the SSP, concluded “that the drive to declare the Shuttle operational had put

⁷⁹ NASA, *NSTS 1988 News Reference Manual* (Florida: Kennedy Space Center, 1988), <http://science.ksc.nasa.gov/shuttle/technology/sts-newsref/>.

⁸⁰ STS-90, which landed on May 3, 1998, was the final Spacelab mission. NASA KSC, “Shuttle Payloads and Related Information,” *KSC Factoids* (Florida: Kennedy Space Center, 2002), <http://www-pao.ksc.nasa.gov/kscpao/factoids/reinfo2.htm>.

⁸¹ Tony Reichhardt, ed., *Space Shuttle, The First 20 Years* (Washington, DC: Smithsonian Institution, 2002), 85.

⁸² Judy A. Rumerman, with Stephen J. Garber, *Chronology of Space Shuttle Flights 1981-2000* (Washington, DC: NASA History Division, 2000), 3.

⁸³ Williamson, “Developing,” 191.

enormous pressures on the system and stretched its resources to the limit.”⁸⁴ In addition to mechanical failure, the Commission noted a number of NASA management failures that contributed to the catastrophe. As a result, among the tangible actions taken were extensive redesign of the SRBs; upgrading of the Space Shuttle tires, brakes, and nose wheel steering mechanisms; the addition of a drag chute to help reduce speed upon landing; the addition of a crew escape system; and the requirement for astronauts to wear pressurized flight safety suits during launch and landing operations. Other changes involved reorganization and decentralization of the SSP. NASA moved the management of the program from JSC to NASA Headquarters (Washington, DC), with the aim of preventing communication deficiencies.⁸⁵ Experienced astronauts were placed in key NASA management positions, all documented waivers to existing flight safety criteria were revoked and forbidden, and a policy of open reviews was implemented.⁸⁶ In addition, NASA adopted a Space Shuttle flight schedule with a reduced average number of launches and discontinued the long-term practice of launching commercial and military payloads.⁸⁷ The launch of *Discovery* (STS-26) from LC 39, Pad B, on September 29, 1988, marked a Return-to-Flight after a thirty-two-month stand-down in manned spaceflight following the *Challenger* accident.

In the aftermath of the 2003 *Columbia* accident, a seven-month investigation ensued, concluding with the findings of the Columbia Accident Investigation Board, which determined that both technical and management conditions accounted for the loss of the orbiter and crew. According to the Board’s Report, the physical cause of the accident was a breach in the thermal protection system on the leading edge of the left wing, caused by a piece of insulating foam, which separated from the ET after launch and struck the wing.⁸⁸ NASA spent more than two years researching and implementing safety improvements for the orbiters, SRBs and ET. Following a two-year stand-down, the launch of STS-114 on July 26, 2005, marked the first Return-to-Flight since the loss of *Columbia*.

On January 14, 2004, President George W. Bush outlined a new space exploration initiative in a speech given at NASA Headquarters.

Today I announce a new plan to explore space and extend a human presence across our solar system . . . Our first goal is to complete the International Space Station by 2010 . . . The Shuttle’s chief purpose over the next several years will be

⁸⁴ Columbia Accident Investigation Board (CAIB), *Report, Volume I*, (Washington, DC: U.S. Government Printing Office, 2003), 25, http://history.nasa.gov/columbia/CAIB_reportindex.html.

⁸⁵ CAIB, *Report, Volume I*, 101.

⁸⁶ Cliff Lethbridge, “History of the Space Shuttle Program,” 2001, <http://spaceline.org/rocketsum/shuttle-program.html>.

⁸⁷ Lethbridge, “History.”

⁸⁸ CAIB, *Report, Volume I*, 9.

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*to help finish assembly of the International Space Station. In 2010, the Space Shuttle – after nearly 30 years of duty – will be retired from service. . .*⁸⁹

Following the President's speech, NASA released *The Vision for Space Exploration*, which outlined the Agency's approach to the new direction in space exploration.⁹⁰ As part of this initiative, NASA decided that the Space Shuttle would not be upgraded to serve beyond 2010; after completing the ISS in 2011, the SSP was retired.

⁸⁹ Weekly Comp. Pres. Docs., Remarks at the National Aeronautics and Space Administration, Vol. 40, Issue 3 (January 19, 2004), <http://www.gpo.gov/fdsys/pkg/WCPD-2004-01-19/content-detail.html>.

⁹⁰ NASA, *The Vision for Space Exploration* (Washington, DC: NASA Headquarters, 2004), http://www.nasa.gov/pdf/55583main_vision_space_exploration2.pdf.

Part II. Structural/Design Information

A. General Statement:

1. Architectural character: The Headquarters Building at KSC is a three- and four-story structure with approximately 440,000 square feet of space. It features a continuous north section with six wings that extend to the south. It was designed following the principles of the International Style, which originated in Europe in the late 1920s with architects Walter Gropius, Ludwig Mies van der Rohe, and Le Corbusier. Although the style gained acceptance in the 1930s, its popularity tapered off in the late 1940s; it regained favor in the late 1960s through the 1970s. The Headquarters Building displays the lack of ornament, effect of volume, flat roof, ribbon windows, skeleton construction, and horizontality, which are hallmarks of the International Style. It takes advantage of the utilitarian functional and economic nature of the style, providing efficiency in plan and in the use of materials. The building was designed so that it could be enlarged incrementally.

2. Condition of fabric: The Headquarters Building is in good condition due to periodic maintenance.

B. Description of Exterior:

1. Overall dimensions: The Headquarters Building (Photo Nos. 1-9) has overall measurements of 861' in length (east-west), 236'-3" in width (north-south; excluding the canopy overhang), and 59'-8" in height. It is comprised of a rectangular north section that extends for the entire length of the building and ranges from 72'-8" to 122'-4" in width. From the south elevation of the north section extend six wings. For ease of reference, these wings will be referred to as Wing No. 1 through Wing No. 6, from west to east (Figure No. A-17). The central two wings, Wing Nos. 3 and 4, are 113'-11" in length (north-south) and 101'-4" in width, and those to their immediate west and east (Wing Nos. 2 and 5, respectively) are 144'-8" in length (north-south) and 101'-4" in width. The outer west and east wings (Wing Nos. 1 and 6, respectively) are 120'-8" in length (north-south) and 81'-4" in width. The north central portion of the facility is four stories in height, whereas the remainder of the building is three stories in height.

2. Foundation: The foundation of the Headquarters Building is constructed of reinforced concrete, and is comprised of a 4"-thick reinforced concrete slab on compacted fill and reinforced concrete footers.

3. Walls: The exterior walls of the Headquarters Building are constructed of a reinforced concrete frame with precast exterior granular quartz surfaced panels (Photo No. 16). In general, the north and south elevations of the building are divided into 20'-wide bays by

blue-painted concrete columns, whereas the east and west elevations are divided into 24'-wide bays by similar columns. Within each of these bays, there are five evenly spaced precast concrete fins, with the end fins abutting the blue columns (Photo No. 15). The only exceptions to this pattern are the east and west elevations of the fourth floor level and the north central projection, which have only four concrete fins, none of which abuts a bay-dividing column.

On the north elevation of the Headquarters Building, to either side of the lobby, are original surface-mounted letters that say "National Aeronautics & Space Administration, Kennedy Space Center, Headquarters" (Photo No. 12).

- 4. Structural system, framing:** The structural framing system of the Headquarters Building is comprised of precast reinforced concrete columns, beams, and joists.
- 5. Porches, patios, stoops:** The main entrance to the Headquarters Building (Photo No. 11) features an inset porch framed on the north by six precast concrete columns that extend through the central north elevation of the second, third, and fourth floors. The porch is further shielded by an approximately 49' x 19' concrete canopy. The floor of the porch originally featured a checkerboard-like pattern of precast smooth concrete panels and granular quartz surfaced concrete panels similar to the rear patio. However, this was removed ca. 2006 and replaced with concentric concrete and brick circles, with the NASA meatball logo made of mosaic tile in the center.

The central rear entrance to the building features a patio and walkway comprised of a checkerboard-like pattern of precast smooth concrete and granular quartz surfaced concrete panels (Photo No. 13). On both sides of the patio are concrete planters; abutting the planters on the east side of the patio are concrete benches. Between the planters on the west side of the patio and Wing No. 3 are round, concrete picnic tables.

All other entrances to the Headquarters Building feature a small concrete stoop and a concrete canopy (seen in Photo No. 4).

7. Openings:

- a. Doorways and doors:** The main entrance to the Headquarters Building, which opens into the visitor's lobby, is on the north elevation (Photo No. 11). It features three pairs of glass and aluminum swing doors, the central of which is automated. Above all three pairs of doors is a glass transom. This arrangement is mirrored in the rear entrance on the central south elevation of the north section, which leads to the elevator lobby. Aside from the main entrance, there are no other doorways on the north elevation. There are two additional doors on the south elevation. One is a single glass and

aluminum swing door on the south elevation of the north section, between Wing Nos. 5 and 6 (Photo No. 14). The other is a single glass and aluminum swing door, which provides access between the fourth floor elevator lobby and the roof. There is one set of double swing doors on the west and east elevations of the north section; the doors and frame are made of aluminum.

There are an additional seventeen sets of double swing doors across the east and west elevations of the six rear wings as well as one single swing door. On Wing No. 1, there is one set of double swing doors at the north end of the west elevation and one set of double swing doors at the south end of the east elevation. Wing No. 2 has one set of double swing doors at the south end of its west elevation and two sets of double swing doors towards the north end of its east elevation. On Wing No. 3, there are two sets of double swing doors on the west elevation, one towards the north end and one at the south end. The east elevation of this wing contains one set of double swing doors and one single swing door, both towards the south end. Wing No. 4 has one set of double swing doors at the south end of its west elevation, and two sets of double swing doors on its east elevation, one near the center and one towards the south end. The west elevation of Wing No. 5 features three sets of double swing doors; two sets are situated near the north end and one set is towards the south end. The east elevation of this wing contains one set of double swing doors near the south end. Wing No. 6 has two sets of double swing doors on its west elevation, one towards the north end and one towards the south end, and one set of double swing doors on the east elevation at the south end. All of the doors and frames are comprised of aluminum.⁹¹

- b. Windows:** The Headquarters Building features ribbons of windows at the second, third, and fourth floor levels; all have aluminum frames and are flush with the exterior surface of the wall (Photo No. 15). In general, these windows extend across the full length of the elevation except where there is an internal stairwell (Photo Nos. 60, 66, 67, 71, 72). At the second and third floor levels, there are four 4' x 4', one-light windows per vertical bay, each situated between two precast concrete fins; the two outer lights pivot open whereas the two center lights are fixed. The exceptions to this pattern are the east and west sides of the central north projection, which contain five windows per vertical bay. Here, the outer two windows and the central window all pivot.

The fourth floor level features 8' x 4', two-light windows. On the north and south elevations, there are four windows per bay; the outer two lights pivot open whereas the

⁹¹ Kemp, Bunch & Jackson, "Headquarters Phase One," Sheets 32 and 33; Kemp, Bunch & Jackson, "Headquarters Phase Two," Sheets 148 and 149; Kemp, Bunch & Jackson, "Headquarters Phase III," Sheet 27.

center ones are fixed. On the east and west elevation, there are five windows per bay; all are fixed except for the outer and central windows of the northernmost bays.

At the first floor level, there are window walls surrounding the visitor's lobby on the east, west, and north elevations; all are fixed lights. There is also a ribbon of eight fixed, 8'-8" x 4' windows located along the east elevation of Wing No. 3 and the south elevation of the north section between Wing Nos. 5 and 6 (Photo No. 14). Like those on the second, third, and fourth floor levels, these windows have aluminum frames.

8. Roof:

- a. **Shape, covering:** The Headquarters Building has a flat roof, comprised of a concrete deck topped with rigid insulation, and faced with built-up roofing.

C. Description of Interior:

- 1. **Floor plans:** The Headquarters Building is comprised of four floor levels. The first three floor levels extend through the entire footprint of the building, whereas the fourth floor level is located only at the north central portion of the facility.

- a. **First floor:** The first floor of the Headquarters Building features a combination single loaded and double loaded corridor layout (Photo Nos. 47, 48, 54, 57, 63, 68). Extending along the central north-south axis is the visitor's lobby (north) and the main elevator lobby (center and south). The visitor's lobby (Photo No. 17), which was renovated in 2003, maintains its original approximate dimensions of 58' in length (east-west) and 26.5' in width and also retains its original exterior glass walls. The area features a checkerboard-pattern carpeted floor and a 2' x 2' acoustic tile ceiling; the interior walls (south half) are painted gypsum board. There are display cases on the south portions of the west and east walls and on the west section of the south wall; a freestanding display case near the southeast corner of the lobby visually shields the restrooms. In addition, there is sofa-style seating on the north glass wall, to either side of the doors, and to the east and west of the two internal columns. The center of the south wall contains three sets of double metal and glass swing doors that provide access to the main elevator lobby.

The main elevator lobby (Photo No. 18) has rough dimensions of 58' in length (north-south) and 19' in width. The east wall of this lobby features three elevator openings and a single stainless steel swing door to a staircase. The remainder of the wall is faced with painted gypsum board panels. The south wall of the main elevator lobby is comprised of the rear entrance to the Headquarters Building. In the center of the west wall is a memorial to President Kennedy (Photo No. 19), which is approximately 22' wide and features two shades of granite panels arranged in a stepped layout. At the center is a

bronze bust of the president mounted on a marble pedestal that sits atop three granite steps.⁹² To each side of the bust is a quote engraved in the darker granite panels. That on the south says "Ask not what your country can do for you; Ask what you can do for your country," and the one on the north is "I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth."

Much of the remainder of the first floor contains employee service areas, although there are some office spaces of varying sizes. The north section of this floor level contains mostly offices to the west of the visitor's lobby; the only exception is the area adjacent to Wing No. 3, which contains a banking area and a barbershop. To the east of the visitor's lobby is the exchange store, to the north of Wing No. 4; the library rooms and 'vault,' to the north of Wing No. 5; the snack bar between Wing Nos. 5 and 6; and various office areas. The 'vault,' which is lined with soundproofing material, has historically been used to hold confidential meetings, mostly at the request of the Center Director. It is fitted with a special soundproof door comprised of steel (Photo No. 41).

The first floor of Wing No. 1 contains all office areas, as does Wing No. 2. At the south end of Wing No. 2 is a 71'-long by 48' wide room with window walls and a raised floor (Photo No. 34). This room, which features raised tile floors, originally housed the NASA-KSC Federal Credit Union, but was converted to an office area at an unknown date. The first floor of Wing No. 3 contains the building's cafeteria and its associated food preparation areas. Within Wing No. 4 is the main mechanical equipment room for the facility, which still houses the original control panel for the system (Photo No. 46). To the south of the mechanical room was the original mail room for the building; it currently contains a central supply store for KSC and contractor employees. Within Wing No. 5 is the document reproduction area of KSC. Although most rooms have been remodeled, some retain their original quarry tile floors (Photo No. 57). One room also maintains the original vault door that once sealed the film storage room (Photo No. 42). Wing No. 6 contains the KSC Archives Department, Post Office (Photo No. 35), and main mail room (Photo No. 36).

b. Second floor: The second floor of the Headquarters Building features a double loaded corridor layout, with the exception of the south corridor between Wing Nos. 3 and 4, which extends along the exterior wall. The majority of the second floor contains office areas for different departments with two exceptions. One exception is the conference room situated to the north of the elevator lobby (Photo No. 30). This room measures roughly 36' in length (east-west) and 24' in width, and features painted gypsum board walls with wood wainscoting, a carpeted floor, and a 2' x 4' acoustic tile ceiling. There

⁹² The bust was fabricated in 1966; it is unknown when it was moved to the elevator lobby.

are two projection screens on the west wall. The other exception is the Kennedy Institutional Imaging Facility area located within Wing No. 5, which has a special storage room for film and photographic negatives.

c. Third floor: The third floor layout of the Headquarters Building is a replica of that on the second floor. Also similar to the second floor, the third floor contains mostly office areas for NASA and contractor personnel. The one exception is the snack bar located in the north section of the building, between Wing Nos. 1 and 2. This snack bar, which has historically been operated by the Florida Council for the Blind, measures roughly 38' in length (east-west) and 31' in width. The room contains vinyl flooring, painted gypsum board walls, and an acoustic tile ceiling.

d. Fourth floor: The fourth floor of the Headquarters Building encompasses the Center Director's offices. It features a double loaded corridor layout, with the main conference room, service areas, and a few offices in the center of the floor, and the remainder of the offices around the perimeter (Photo Nos. 53, 73). The Center Director's office (Photo No. 24) is in the northeast corner and measures roughly 28.5' in length (east-west) and 18' in width. The room has walls faced with hand-rubbed walnut paneling,⁹³ a suspended plaster ceiling, and a carpeted floor featuring the NASA meatball logo. To the west of the Director's office is a "quiet room," which contains a personal closet, restroom, and shower; to the south of the office is the work area for the Director's personal administrative assistant.

The Deputy Center Director's office (Photo No. 25) is located in the northwest corner; it has approximate dimensions of 24.5' in length (east-west) and 18' in width. It features the same surface finishes as the Center Director's office, and also has an area to the south dedicated to a personal administrative assistant. The main conference room (Photo Nos. 26, 27) measures roughly 45' in length (east-west) and 24' in width. This room features a carpeted floor and a combination acoustical tile and suspended plaster ceiling. The walls have hardwood plywood panel wainscoting with vinyl wall covering above; the east wall features a decorative clock.

Other areas on the fourth floor include a small conference room to the south of the Center Director's area, a small kitchen area to the east of the Deputy Center Director's office, a visitor's lounge area to the west of the elevators (Photo No. 21), nine enclosed offices, two open work areas for additional administrative assistants, and restrooms.

⁹³ "Headquarters for KSC to be a 'Showplace'," *The Cocoa Tribune*, January 12, 1965, on file, KSC Real Property Office.

e. Typical office areas: The office areas throughout the Headquarters Building range in size from small, one person offices to large, multiple person offices (Photo Nos. 29, 31, 32, 33). They typically feature carpeted floors, gypsum board walls, and acoustic tile ceilings. Upper managers' offices generally hold one person and are large enough to accommodate a desk and a small conference table (Photo No. 29). Other office areas contain cubicles (Photo Nos. 31, 32, 33), and in some cases, small rooms enclosed by full-height moveable partitions (Photo Nos. 32, 33).

- 2. Stairways, elevators:** There are thirteen stairways within the Headquarters Building. Five of the stairways are located in the north section of the facility, three in the central area, one at the west end, and one at the east end. One of the stairways in the central area, located north of the three main elevators, is the only stairway that extends to the fourth floor. The other eight stairways are divided among the six wings, and all contain an external doorway. Wing Nos. 1, 3, 4, and 6 each contain one stairway; all are located toward the south end of their respective wing. Wing Nos. 2 and 5 both have two stairways, one near the north end and one at the south end. All of the stairways in the Headquarters Building are U-shaped, and feature vinyl tile landings, rubber risers and treads, and 1-1/2" diameter aluminum pipe railings (Photo No. 43).

The Headquarters Building also has five elevators. Three are located off the main elevator lobby; two are passenger elevators and provide access to all four floors, and the third is a passenger/freight elevator, which extends only to the third floor. In addition, there is one passenger/freight elevator in the north central area of Wing No. 2 and one passenger/freight elevator at the northwest corner of Wing No. 5.

- 3. Flooring:** The flooring throughout the Headquarters Building is a combination of different materials, which are applied to the concrete decks. Standard office areas, the cafeteria, the library, the visitor's lobby, the main elevator lobby, and the fourth floor have carpeting, whereas the corridors contain vinyl tile. Areas such as the archives, the snack bar, and the mail room also have vinyl tile. The various restrooms feature ceramic tile floors, as do a few areas in Wing No. 5 that are associated with the original printing laboratories. The equipment rooms, janitorial closets, and storage rooms have bare concrete floors.
- 4. Wall and ceiling finishes:** The interior of the Headquarters Building features a variety of wall finishes. In general, most areas have painted concrete block or painted gypsum board walls; the restrooms feature ceramic tile walls. Some of the conference rooms have wood wainscoting. The fourth floor features wood paneling in the Center Director's and Deputy Center Director's offices, as well as wood wainscoting in the conference room. In addition, there is wood paneling in the fourth floor visitor's lobby, the small hallway to the conference room, and on some of the executive administrative assistant areas.

The ceiling finishes throughout the Headquarters Building include 2' x 2' acoustical ceiling tile in the visitor's lobby, the main elevator lobby, and most of the fourth floor; 2' x 4' acoustical ceiling tile in the corridors and general office areas; and painted suspended plaster or exposed concrete in the service areas (e.g., restrooms, janitorial closets, stairways).

5. Openings:

- a. Doorways and doors:** The interior doors of the Headquarters Building are of various materials and styles. According to the as-built drawings, there are roughly 812 interior doors in the facility.⁹⁴ Of these, approximately 84 percent are wood doors with steel frames, 8 percent are steel doors with steel frames, and 6 percent are wood doors with wood frames. The remaining 2 percent include steel doors with wood frames, aluminum doors with aluminum frames, and aluminum doors with steel frames. Some of the doors are solid, whereas others contain a frosted-glass window in the top half (Photo No. 40). Others feature a louver in the bottom half.
- b. Windows:** The windows within the Headquarters Building are a combination of fixed and pivot lights with aluminum trims. They all have internal sills, which range in depth from 4" to 9".

8. Mechanical equipment:

- a. Heating, air conditioning, ventilation:** The Headquarters Building contains a central heating, ventilating, and air conditioning system, powered by eighteen dual duct air handling units and six draw through air handling units. There was one dual duct air handling unit for each floor level of each wing. The draw through units were used for specific rooms, including the second, third, and fourth floor conference rooms, the cafeteria, the recording and projection room, and the computer room.
- b. Lighting:** Most of the areas within the Headquarters Building feature recessed lensed and parabolic fluorescent light fixtures, either 2' x 2' or 2' x 4'. The Center Director's office, as well as many of the conference rooms, also contain recessed incandescent wall washers. The Deputy Center Director's office and visitor's lobby are fitted with recessed fixtures with incandescent parabolic lamps. The visitor's lobby and main elevator lobby also have incandescent accent lights for the various displays. Additionally, the lobby has surface-mounted sconces on the two columns. The service areas typically feature 2' x 4', surface-mounted fluorescent fixtures.

⁹⁴ Kemp, Bunch & Jackson, "Headquarters Phase One," Sheets 32 and 33; Kemp, Bunch & Jackson, "Headquarters Phase Two," Sheets 148 and 149; Kemp, Bunch & Jackson, "Headquarters Phase III," Sheet 27.

- c. **Plumbing:** The Headquarters Building features an indoor plumbing system with separate pumps for hot and cold water.
- d. **Electrical:** The Headquarters Building has an electrical system that powers all of the lighting, power outlets, communications systems, and plumbing/mechanical equipment. An array of solar panels was installed to the south of the building, which provides roughly 70 percent of the building's hot water.

D. Site:

1. **Historic landscape design:** The Headquarters Building originally featured a landscaping plan centered at the corners and entrances of the building. In these areas, special grasses such as big blue liriopse, wedelia, and coontie, provided the ground cover. Different shrubs, including azalea, common pomegranate, yobira pittosporum, sandankiva viburnum, aloe yucca, and compact pfitzer juniper, and trees, such as kumquat and queen palm, were planted within the grass. Broadleaf ladypalms were placed within the various planters, and Washingtonia robusta palms lined the sidewalk along First Street and the building's driveway. In addition, different trees, including Jerusalem thorn, purple orchid, southern magnolia, water and live oak, east Palatka holly, and cabbage palm, were scattered throughout the lawn areas around the building.⁹⁵ When the east and west wing additions were constructed, the plantings at the northeast and northwest corners of the Headquarters Building were removed; they were replaced in the early 1980s with transplants from local abandoned homesites.⁹⁶ Following the 1986 *Challenger* accident, seven trees were planted in a circle to the west of the facility, one for each of the fallen astronauts. In 2006, the palm trees along the sidewalk and First Street were removed.

When originally constructed, a semicircular driveway provided vehicular access to the main entrance area of the Headquarters Building. The island bounded by this driveway and First Street held the flagpole and a few palm trees; a small parking lot was situated to the north of First Street. In 2005, KSC began a renovation of this area, which included the removal of the driveway, the combination of the original entrance patio area with the driveway island, and the construction of two small parking lots on the south side of First Street, to the east and west of the main entrance area. Additionally, poured concrete planters were installed in the entrance patio (Photo Nos. 10, 11).⁹⁷

⁹⁵ "Native Plants, Imports Add Beauty," *Spaceport News*, March 27, 1969, 8.

⁹⁶ "Face of First Street is Changing," *Spaceport News*, April 26, 1985, 6.

⁹⁷ These parking lots provided the Headquarters Building with additional disabled parking spots, government vehicle spots, sites for recharging electrical vehicles, and visitors' spots. Linda Herridge, "Headquarters Building Entrance, Disabled Parking Provide Easier Access," *Spaceport News*, October 13, 2006, 3.

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- 2. Outbuildings:** Originally, the Headquarters Building had a cooling tower to its south, roughly in line with Wing No. 4; it was removed in the mid-1990s.

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Figure A-1. Aerial view showing early construction in the KSC Industrial Area, facing east, May 5, 1963. The Operations & Checkout Building can be seen in the upper center of the photograph.
Source: John F. Kennedy Space Center Archives, LOC-63-5291.

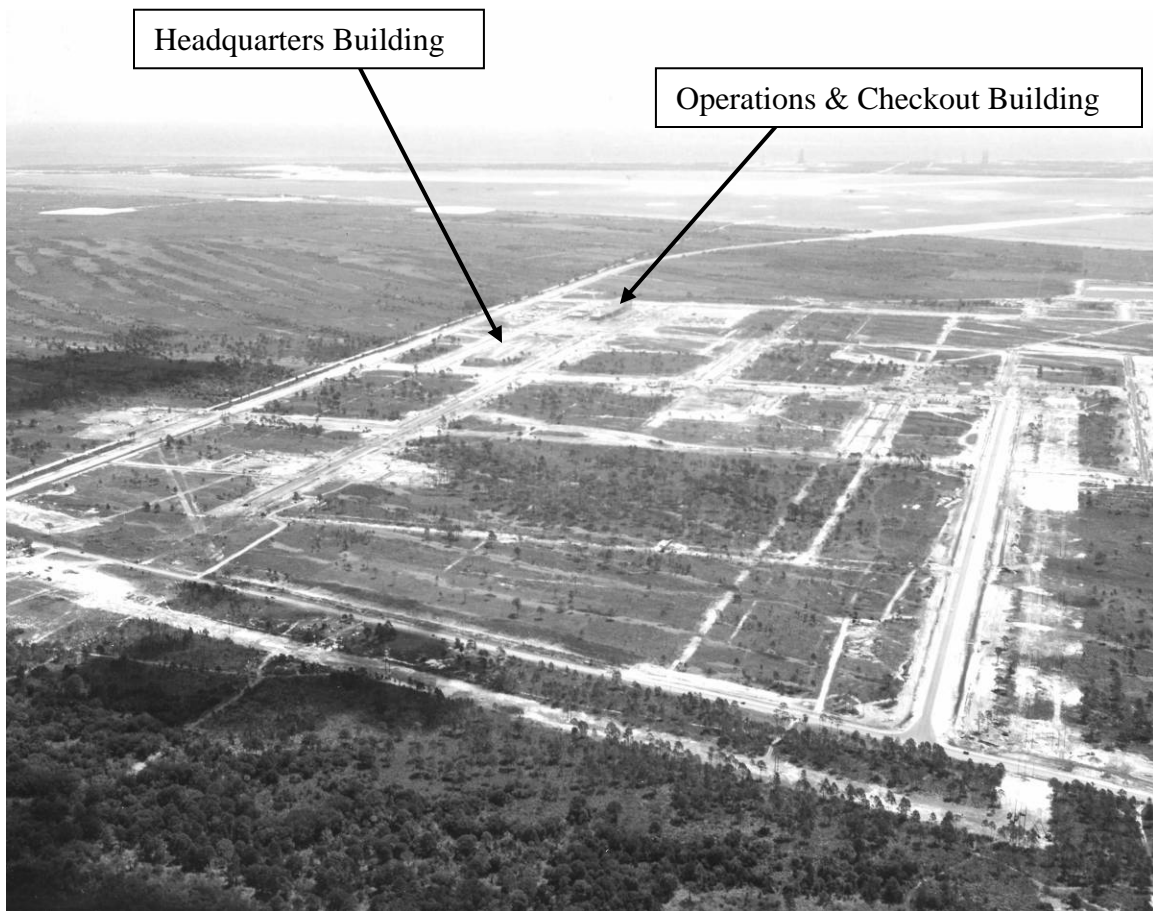


Figure A-2. Aerial view showing early construction in the KSC Industrial Area, facing northeast, August 6, 1963. The Operations & Checkout Building can be seen in the upper center of the photograph; site clearance for the Headquarters Building is to its lower left.

Source: John F. Kennedy Space Center Archives, LOC-63C-2475.

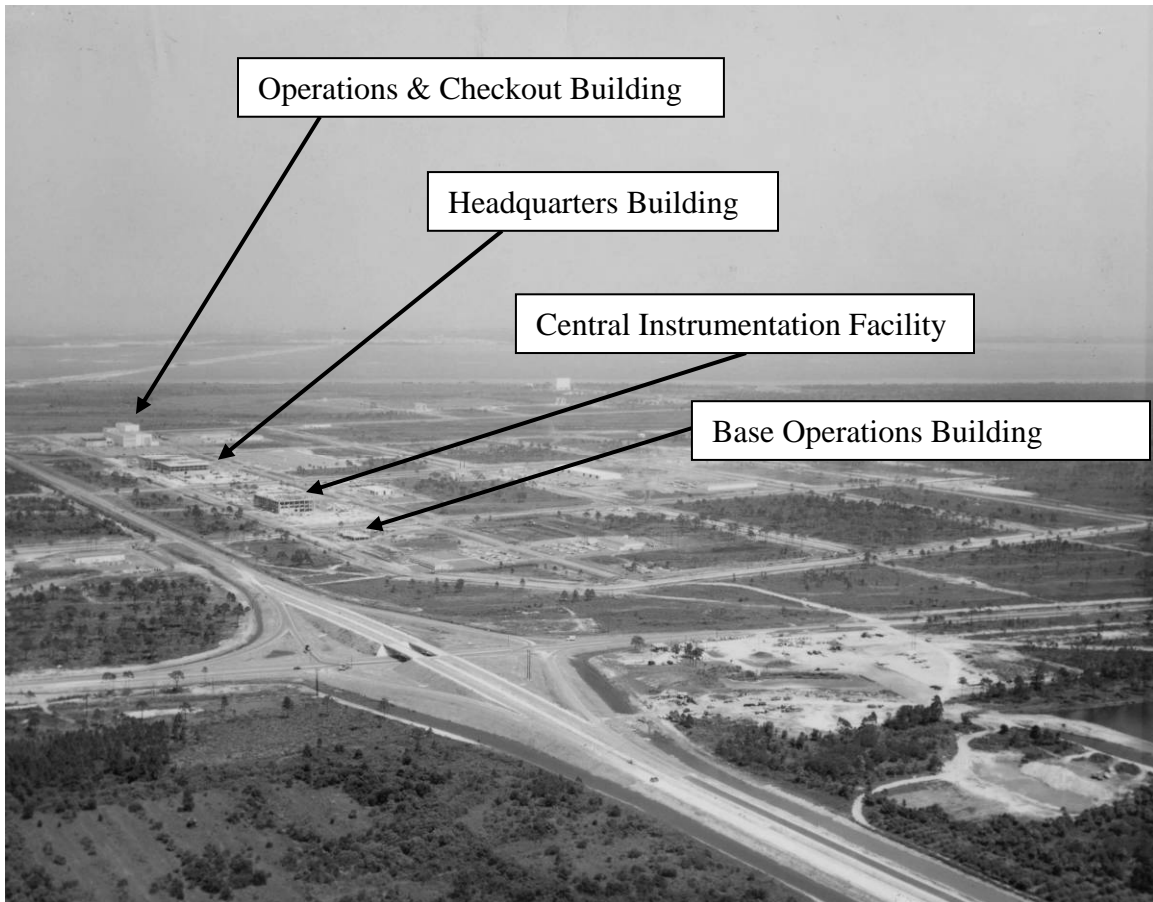


Figure A-3. Aerial showing construction along NASA Parkway East in the KSC Industrial Area, facing southeast, August 6, 1964. The Operations & Checkout Building can be seen at the far left of the photograph; to its lower right is the Headquarters Building, followed by the Central Instrumentation Facility and the Base Operations Building. The intersection of NASA Parkway East and Kennedy Parkway North is in the foreground.

Source: John F. Kennedy Space Center Archives, 100-KSC-64C-2966.

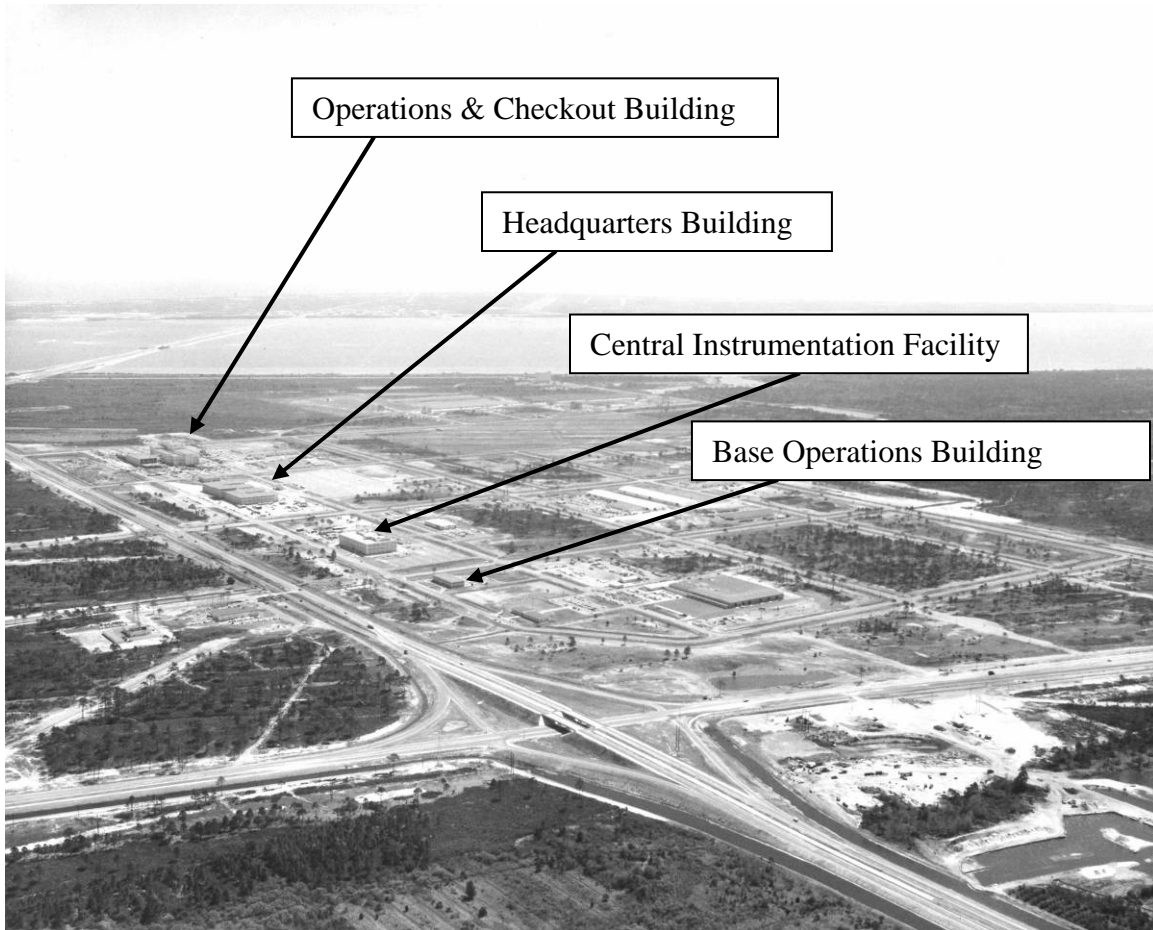


Figure A-4. Aerial showing construction within the KSC Industrial Area, facing southeast, March 11, 1965. The Operations & Checkout Building can be seen at the far left of the photograph; to its lower right is the Headquarters Building, followed by the Central Instrumentation Facility and the Base Operations Building. The intersection of NASA Parkway East and Kennedy Parkway North is in the foreground.

Source: John F. Kennedy Space Center Archives, 100-KSC-65C-1473.

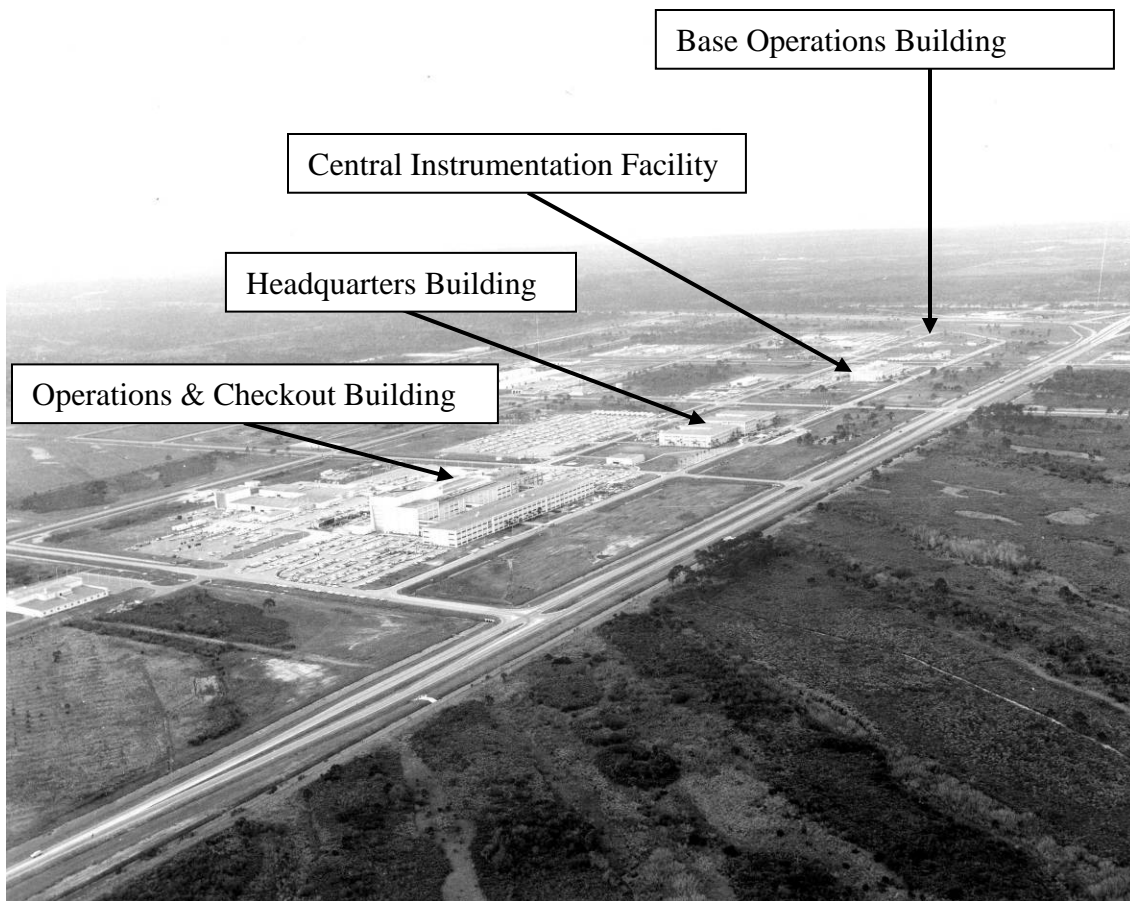


Figure A-5. Aerial showing facilities along NASA Parkway East in the KSC Industrial Area, facing southwest, January 7, 1966. The Operations & Checkout Building is just left of center; to its upper right is the Headquarters Building, followed by the Central Instrumentation Facility and the Base Operations Building.

Source: John F. Kennedy Space Center Archives, 100-KSC-66C-68.

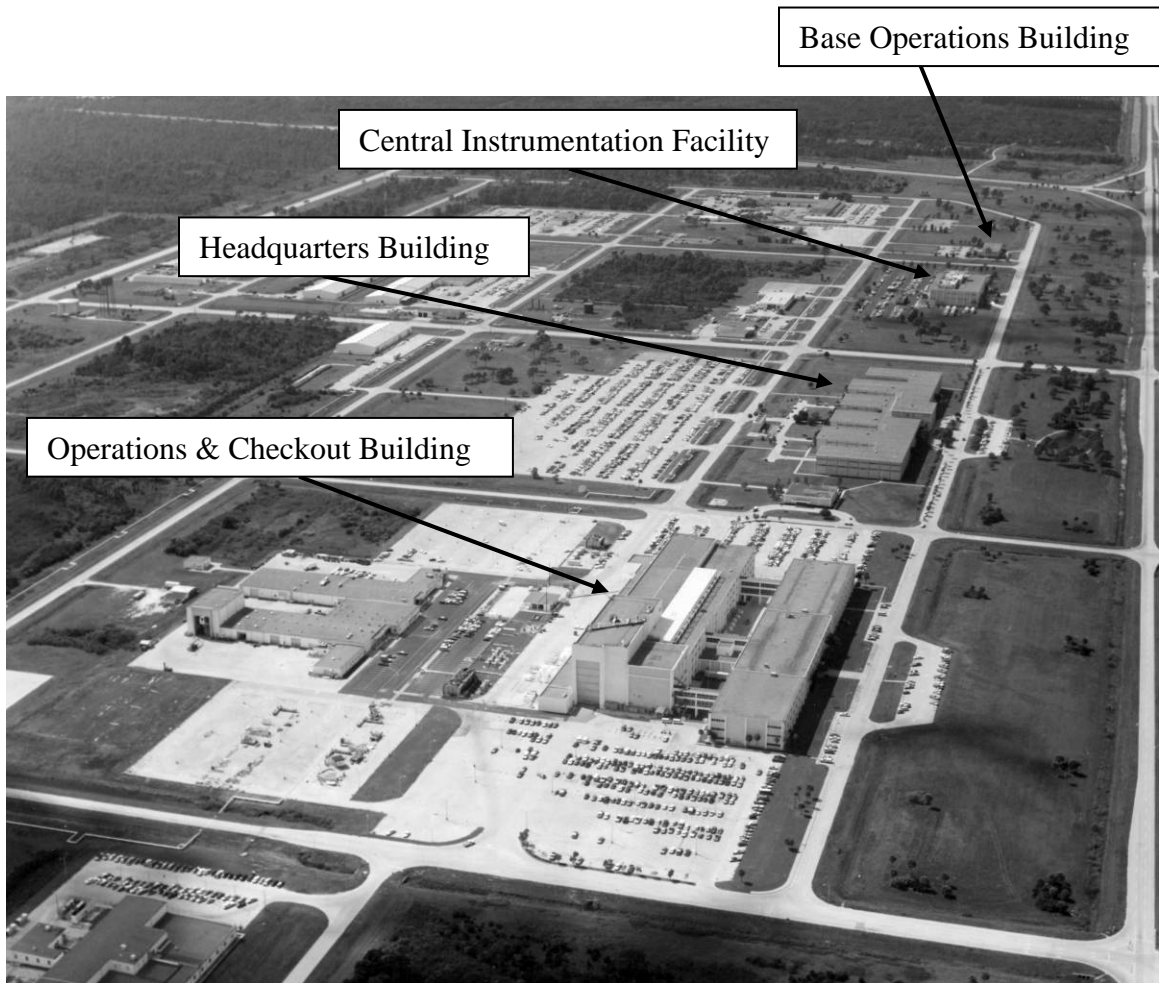


Figure A-6. Aerial view of the KSC Industrial Area, facing southwest, October 16, 1975. The Operations & Checkout Building is in the lower center of the photograph; to its upper right is the Headquarters Building, followed by the Central Instrumentation Facility and the Base Operations Building. To the left of the Operations & Checkout Building is the Payload Support Building. Source: John F. Kennedy Space Center Archives, 116-KSC-375C-604.19.

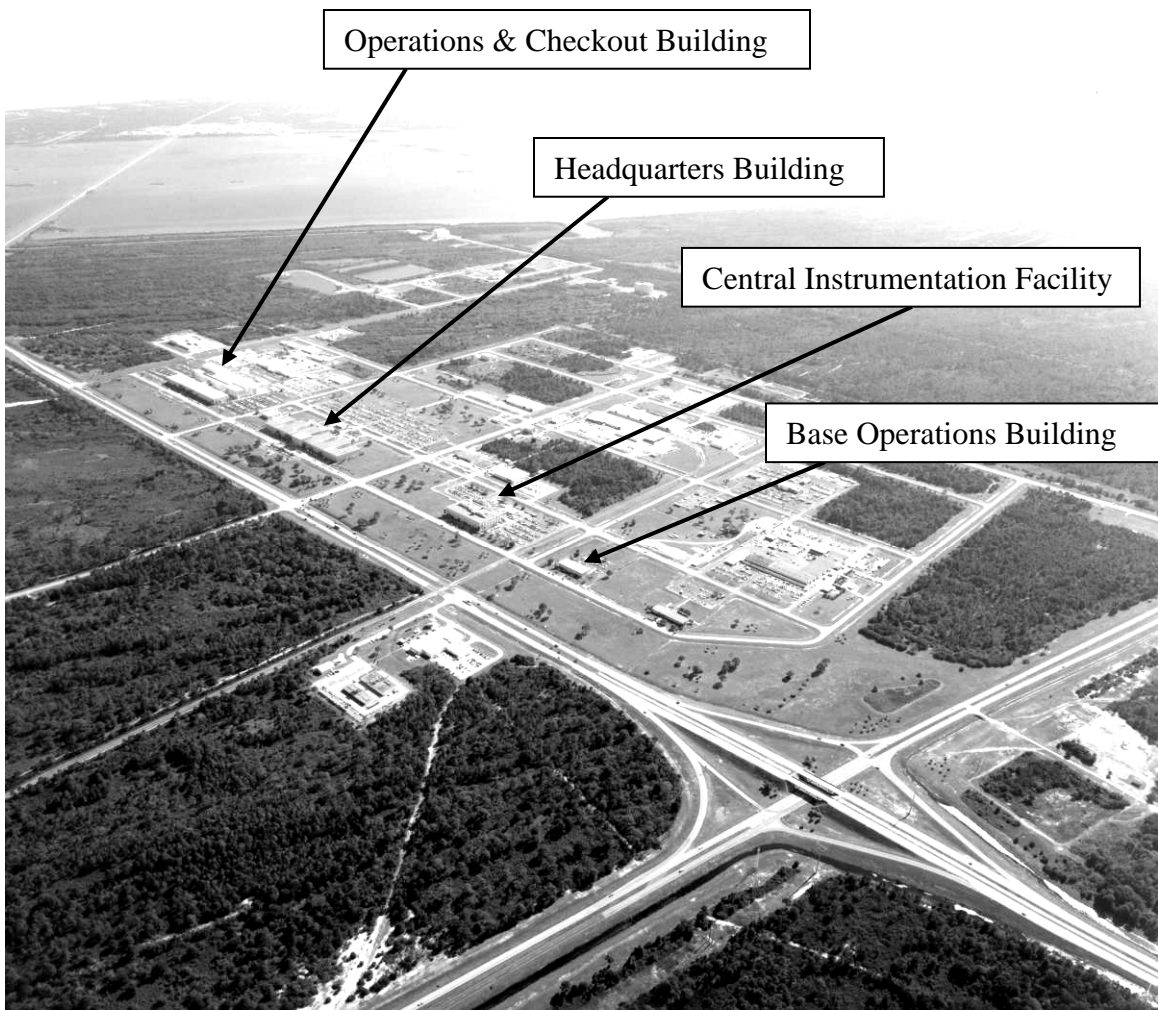


Figure A-7. Aerial view of the KSC Industrial Area, facing southeast, December 10, 1986.
Source: John F. Kennedy Space Center Archives, KSC-86C-1306.

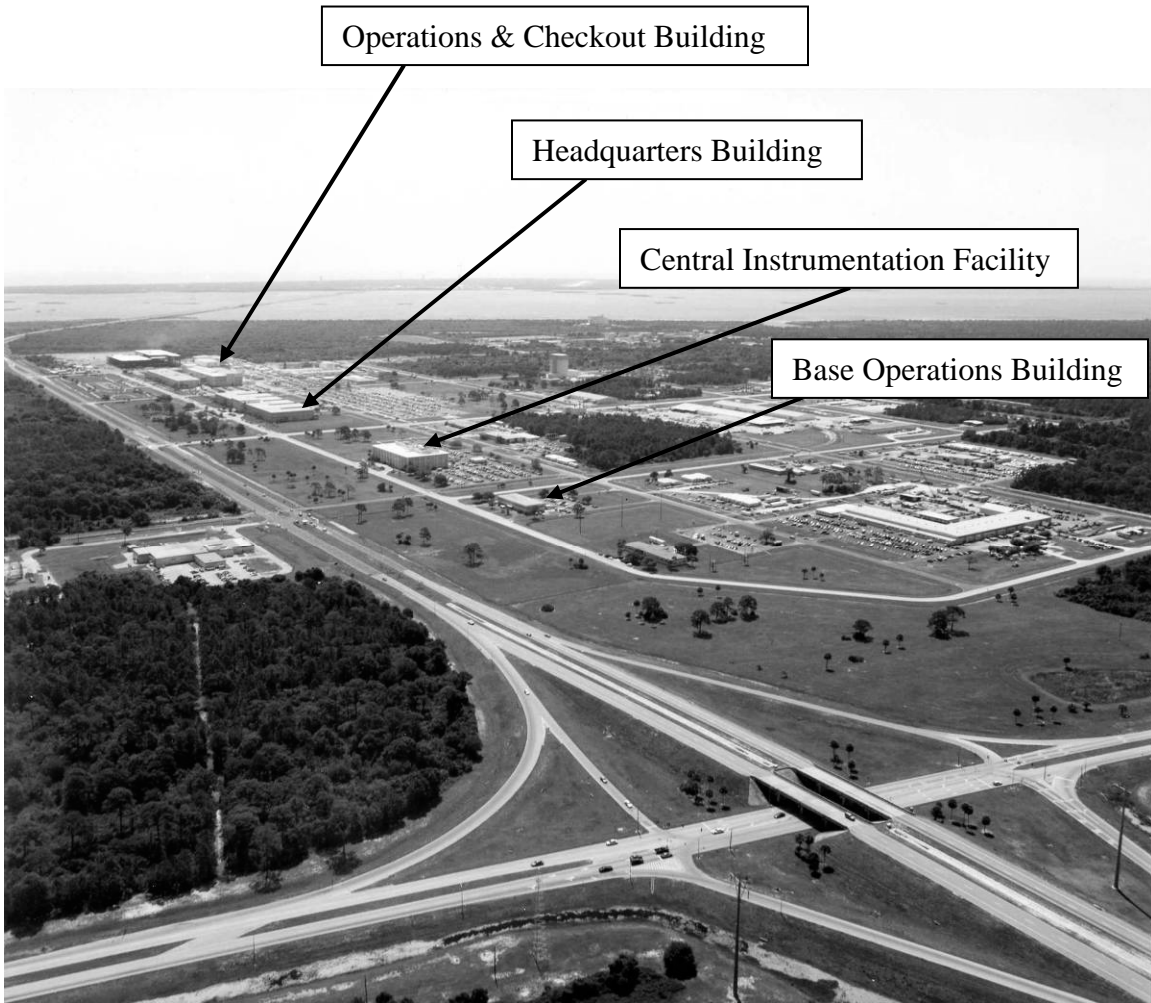


Figure A-8. Aerial view of the KSC Industrial Area, facing southeast, April 28, 1992.
Source: John F. Kennedy Space Center Archives, KSC-392C-2230-60.

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Figure A-9. View showing site preparations for the construction of the Headquarters Building, facing east, March 5, 1964.

Source: John F. Kennedy Space Center Archives, KSC-64-9729.

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Figure A-10. View showing Phase I construction of the Headquarters Building, facing northeast,
August 6, 1964.

Source: John F. Kennedy Space Center Archives, 100-KSC-64C-2962.

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Figure A-11. View showing Phase I construction of the Headquarters Building, facing southwest,
October 13, 1964.

Source: John F. Kennedy Space Center Archives, 100-KSC-64C-4010.



Figure A-12. Raising the American Flag at the opening ceremonies for the Headquarters Building, facing southeast, May 25, 1965.

Source: John F. Kennedy Space Center Archives, 100-KSC-65-10600.

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Figure A-13. Aerial view of the Headquarters Building following completion of Phase I construction, facing south, October 8, 1965.

Source: John F. Kennedy Space Center Archives, 107-KSC-65C-6859.



Figure A-14. Dedication of bronze bust of President Kennedy, now within the main elevator lobby, December 22, 1966.

Source: John F. Kennedy Space Center, Kennedy Institutional Imaging Facility, KSC-66C-9946.

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Figure A-15. Aerial view showing near completion of east and west wings, facing northwest,
January 10, 1968.

Source: John F. Kennedy Space Center, Kennedy Institutional Imaging Facility,
KSC-68C-0236.

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Figure A-16. Aerial view of the completed Headquarters Building, facing southwest,
April 16, 1973.

Source: John F. Kennedy Space Center Archives, 116-KSC-373C-0548.44.

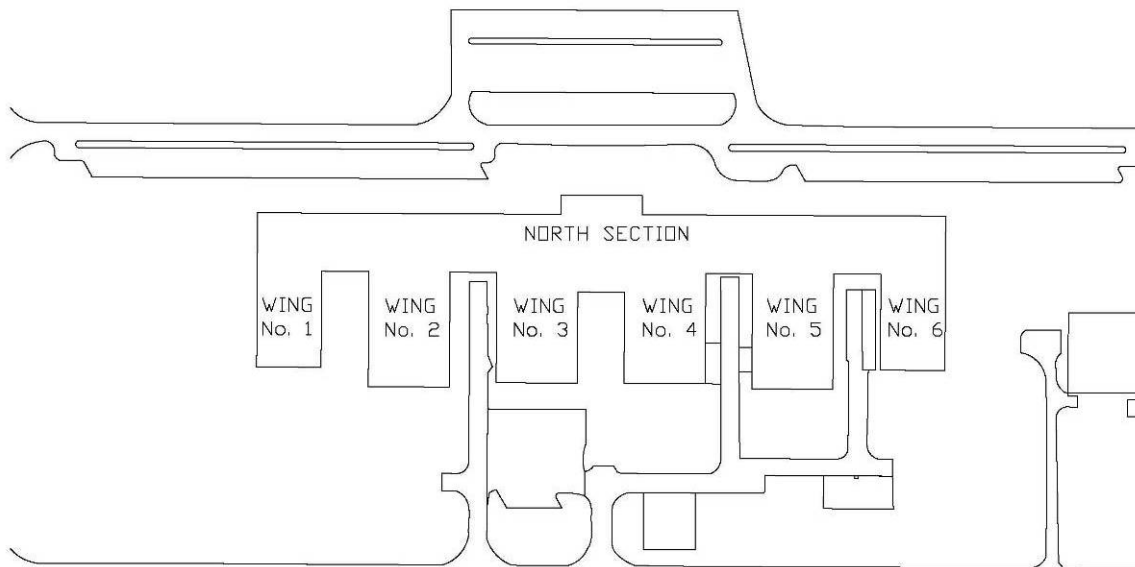


Figure A-17. Key to sections of Headquarters Building.

HISTORIC AMERICAN BUILDINGS SURVEY

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Cape Canaveral
Brevard County
Florida

HABS No. FL-581-A

Penny Rogo Bailes, Photographer; March 2012
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- FL-581-A-1 OVERALL VIEW OF NORTH ELEVATION, FACING SOUTH.
- FL-581-A-2 OVERALL VIEW OF NORTH ELEVATION, FACING SOUTHWEST.
- FL-581-A-3 OVERALL VIEW OF NORTH AND EAST ELEVATIONS, FACING
SOUTHWEST.
- FL-581-A-4 OVERALL VIEW OF EAST ELEVATION, FACING WEST.
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Photograph Nos. FL-581-A-47 through FL-581-A-72 are photocopies of engineering drawings, and are 8" x 10" enlargements from 4" x 5" negatives. Original drawings are located at the Engineering Documentation Center, NASA KSC, Florida.

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Sheet 19
- FL-581-A-69 Photocopy of drawing
K. S. C. HEADQUARTERS PHASE III ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-646, NASA KSC, January, 1967
THIRD FLOOR PLAN – WEST WING
Sheet 20
- FL-581-A-70 Photocopy of drawing
K. S. C. HEADQUARTERS PHASE III ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-646, NASA KSC, January, 1967
EXTERIOR ELEVATIONS – WEST WING
Sheet 24
- FL-581-A-71 Photocopy of drawing
K. S. C. HEADQUARTERS PHASE III ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-646, NASA KSC, January, 1967
EXTERIOR ELEVATIONS – WEST WING
Sheet 25
- FL-581-A-72 Photocopy of drawing
4TH FLOOR RENOVATIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 98K00312, NASA KSC, June, 2000
EXISTING FLOOR PLAN
Sheet 2