CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39, CENTRAL INSTRUMENTATION FACILITY HABS No. FL-581-B
(John F. Kennedy Space Center)
First Street, between Avenue B and Avenue C
Cape Canaveral
Brevard County
Florida

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,
CENTRAL INSTRUMENTATION FACILITY, (John F. Kennedy Space Center)
HABS No. FL-581-B

Location: First Street, between Avenue B and Avenue C
Cape Canaveral
Brevard County
Florida

The Central Instrumentation Facility (CIF) is located within the Industrial Area of the Kennedy Space Center (KSC), at latitude: 28.524220, longitude: -80.656009. These coordinates were obtained on August 10, 2012, through Google Earth™. The coordinates datum are North American Datum 1983.

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

Present Use: Laboratory, central computer complex

Significance: The CIF was listed in the National Register of Historic Places (NRHP) in 2000, in recognition of its exceptional importance at the national level in the context of the Apollo Program (ca. 1961-1975). It is significant under NRHP Criterion A in the areas of space exploration and communications, and under Criterion C in the area of architecture. Because the building has achieved significance within the past 50 years, Criteria Consideration G applies. The CIF is exceptionally important in its association with space exploration, communications, and architecture due to its historic function as the communications center of KSC and Launch Complex 39. As the building specially designed to house and control the computer and communications networks of the Apollo Program, it was essential to the continuing mission and success of the program and KSC. In addition, the CIF was innovative in its use of modern building technologies as a means to house this equipment.

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

Date: December 2012

Project Information: The documentation of the Cape Canaveral Air Force Station (CCAFS), Launch Complex 39, CIF was conducted in 2012 for KSC by ACI, under contract to InoMedic Health Applications (IHA), 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 Ms. Slovinac; it was edited by Joan Deming, ACI Project Manager; Elaine Liston, KSC Archivist; Ms. Naylor; Ms. 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, 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. The available drawings for the CIF include the "as-built" drawings, as well as those depicting minor modifications that required a set of drawings (such as changes to the electrical or mechanical systems). KSC does not periodically produce drawings of their facilities to show current existing conditions.

LEGEND OF ACRONYMS

ACI	Archaeological Consultants, Inc.
ACOE	Army Corps of Engineers
AMR	Atlantic Missile Range
AS	Apollo-Saturn
CCAFS	Cape Canaveral Air Force Station
CIF	Central Instrumentation Facility
CSM	Command/Service Module
EST	Eastern Standard Time
EVA	Extravehicular Activity
JSC	Johnson Space Center
IHA	InoMedic Health Applications
ISC	Institutional Services Contract
ISS	International Space Station
KSC	Kennedy Space Center
LC	Launch Complex
LCC	Launch Control Center
LOC	Launch Operations Center
LOD	Launch Operations Directorate
MILA	Merritt Island Launch Area
MR	Mercury-Redstone
MSC	Manned Spacecraft Center
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NRHP	National Register of Historic Places
O&C	Operations and Checkout (Building)
SA	Saturn-Apollo
SSP	Space Shuttle Program
STS	Space Transportation System
U.S.	United States
USA	United Space Alliance
VAB	Vehicle Assembly Building

Part I. Historical Information

A. Physical History:

1. Date of construction: The CIF was constructed between January 27, 1964, and June 11, 1965.[1]

2. Engineers: Black & Veatch Consulting Engineers, Kansas City, Missouri; United States (U.S.) Army Corps of Engineers (ACOE), Merritt Island, Florida.[2]

3. Original and subsequent uses: Originally, the CIF contained equipment for handling telemetry measurements from spacecraft and launch vehicles, monitoring countdowns, calibrating handheld equipment and devices, and providing general computation support for KSC. The latter three functions were still performed by the facility at the time of documentation.

4. Builder: Blount Brothers Construction Company, Montgomery, Alabama.[3]

5. Original plans and construction: The original plans for the CIF were completed in 1963. The facility, which is rectangular in plan, was constructed between January 1964 and June 1965. As originally constructed, the CIF contained roughly 33,586 square feet of office areas, 56,543 square feet of laboratories and shops, 7,216 square feet of equipment rooms, and 10,784 square feet of control rooms.[4] The office areas were scattered throughout all three floors of the facility. On the first floor of the building were the calibration and standards laboratories, most of which were situated within the Class 100 clean area at the west end. Also on the first floor were half of the Central Computation Complex, environmental and acoustic laboratories, and tracking laboratories. The second floor of the CIF held the Telemetry Station, the other half of the Central Computation Complex, the Timing Distribution Laboratories, and various data laboratories. On the third floor were the Data Display System and the Data Presentation & Evaluation Room.

6. Alterations and additions: In 1967, a small, 430 square foot electrical/mechanical room was constructed at the south end of the east elevation. Circa 1983, much of the original

---

[1] NASA KSC, "Real Property Record, Central Instrumentation Facility," on file, KSC Real Property Office.
[2] Black & Veatch Consulting Engineers, "Central Instrumentation Facility, Industrial Area Building," October 1963, on file, KSC Engineering Documentation Center.
[3] NASA KSC, "Central Instrumentation Facility;" "$6 Million Bid Offered for Building," *Spaceport News*, January 23, 1964, 8.
[4] "Description of Facility – CIF Building," Sweetsir Collection, Box 29F.3, Facilities Descriptions, Kennedy Space Center Archives Department, Florida. According to this document, the building also had 2,897 square feet of storage, 20,000 square feet of public areas, and 5,433 square feet of service areas.

computer and telemetry equipment was removed and the areas subdivided to provide additional offices. These spaces include the first floor portion of the Central Computation Complex, the Telemetry Station, the second floor data laboratories, the Data Display Room, and the Data Presentation and Evaluation Room. The calibration and standards laboratories and the Timing Distribution Laboratories are extant, but their original incandescent light fixtures have been replaced by fluorescent fixtures. Additionally, the original roof antennas were removed at an unknown date. The current antennas were installed circa 1989.[5]

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, 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.[6]

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 the Army Ballistic Missile Agency'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, under the direction of Dr. Kurt H. Debus, at CCAFS since 1951 to supervise the experimental launches of the Redstone missile.[7] On March 15, 1960, President Eisenhower officially

---

[5] NASA KSC, "Central Instrumentation Facility."
[6] 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.
[7] 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),

transferred the Development Operations Division to NASA, naming the new installation the George C. Marshall Space Flight Center (MSFC). Two months later, the Missile Firing Laboratory oversaw the first test flight of a Redstone modified for Project Mercury, which launched from LC 5 at CCAFS.[8]

On July 1, 1960, the Missile Firing Laboratory, along with the Atlantic Missile Range (AMR) Operations Office, became the Launch Operations Directorate (LOD) and was absorbed by MSFC.[9] 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 (Mercury-Redstone (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, Saturn-Apollo (SA)-1 from LC 34 on October 27, 1961, the first test flight of the Saturn I vehicle.[10]

NASA's John F. Kennedy Space Center (KSC)

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

---

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.

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

[9] 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 (AMR)/CCAFS.

[10] E. Bell, II, "Saturn SA-1," 2012, http://nssdc.gsfc.nasa.gov/nmc/masterCatalog.do?sc=SATURNSA1. Because the rocket used to launch the Gemini spacecraft was the Air Force's Titan missile, the LOD's support of Project Gemini, NASA's second Manned Space Program, was limited to acting as NASA's point of contact with CCAFS and gathering/processing telemetry measurements.

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/terminal facility.[11]

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.[12] 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 AMR."[13] 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.[14] 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.[15]

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.[16] The master plan, mostly developed between 1961 and 1965, divided MILA into four functional zones: the launch zone, the launch support zone, the industrial zone, and the general support zone; 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.[17]

---

[11] 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.
[12] Jarrett and Lindemann, *Launch Operations Center,* 79.
[13] Jarrett and Lindemann, *Launch Operations Center,* 80.
[14] Benson and Faherty, *Gateway*, 138-39.
[15] Benson and Faherty, *Gateway*, 65-68, 96-98, 105, 133-137, 146-48.
[16] 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).
[17] 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.

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 (LCC), and other facilities that directly supported launch activities. The industrial zone, or Industrial Area, included assembly and checkout facilities, engineering and administrative facilities, such as the Headquarters Building, and employee/center support services. The general support zone contained support structures, such as instrumentation sites, security control buildings, and telemetry receiver areas; these are interspersed throughout the Center.[18]

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, with the sand used to compact 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 LCC, Launch Complex 39, Pad A, the barge canal and terminal facility, ordnance storage and laboratory areas, the Crawlerway, the Operations & Checkout (O&C) Building, the CIF, and the Headquarters Building, were completed.[19]

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 CIF 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.[20]

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. Shortly afterwards, "the Corps of Engineers

---

[18] Pan American World Airways, *Merritt Island Launch Area Master Plan*, *Volume III*, 1965.
[19] Benson and Faherty, *Gateway*, 247-270; Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities."
[20] Benson and Faherty, *Gateway*, 238-241; Price, "DRAFT: Architectural Survey and Evaluation of 45 Facilities."

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 from the Indian River causeway to connect the Industrial Area on Merritt Island with the Florida mainland."[21] 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.[22]

The O&C Building was the first facility at KSC to be occupied; the Florida Operations team of the Manned Spacecraft Center (MSC)[23] moved into the building in September and October 1964. Formal opening ceremonies for the Headquarters Building occurred in May 1965.[24] Other major facilities within the area completed by 1966 included the CIF, 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.[25]

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.[26] 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.[27] 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

---

[21] Benson and Faherty, *Gateway*, 252, 266.
[22] Benson and Faherty, *Gateway*, 252-268.
[23] The MSC grew from the Space Task Group, the initial office created by NASA upon its establishment 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 Space Task Group became the autonomous MSC and moved to Houston, Texas. Following the death of President Lyndon B. Johnson in 1973, it received its current name: the Lyndon B. Johnson Space Center (JSC).
[24] Benson and Faherty, *Gateway*, 268-269.
[25] 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."
[26] Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.
[27] Benson and Faherty, *Gateway*, 240-242; Lipartito and Butler, 105.

during this period.[28] 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.

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.[29] 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.[30] In 1992, the last major facility to be added to the Industrial Area for the SSP, the Canister Rotation Facility, was completed. The introduction of the Space Station *Freedom*, which later became the International Space Station (ISS) Program, 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.[31]

The Central Instrumentation Facility

The ACOE hired Black & Veatch Consulting Engineers of Kansas City, Missouri, to design the CIF and its ancillary operations building (Photo No. 56), located roughly 1 mile to the north; the work was completed between July 1, 1962, and October 5, 1963.[32] The CIF was designed to serve as the headquarters of KSC's Instrumentation Group and the Timing and Countdown Systems Branch; house computers for receiving, evaluating, and recording telemetry data; and house calibration and standards laboratories. The operations building was designed to house antennas, from which equipment within the facility would pull signals, amplify those signals, and transmit them to the CIF.[33] On January 10, 1964, the ACOE opened bids for the construction of the two buildings.[34] The construction contract, totaling $6,261,600, was awarded to Blount Brothers Construction Company of Montgomery, Alabama; the portion allotted to the CIF was approximately $5,139,807.

[28] Space Gateway Support, *Basic Information Guide*, 3-28 to 3-31.
[29] Lipartito and Butler, 186, 201, 222-223; Space Gateway Support, *Basic Information Guide,* 3-28 to 3-31.
[30] Space Gateway Support, *Basic Information Guide,* 3-28 to 3-31.
[31] Space Gateway Support, *Basic Information Guide,* 3-28 to 3-31.
[32] "Description of Facility – CIF Building."
[33] "$6 Million Bid Offered for Building;" "Alabama Contractor Named to Construct MILA Data Facility," *Spaceport News*, February 6, 1964, 6. The operations building was located to avoid radio frequency interference from the equipment in the CIF. "Launch Operations Center, Fiscal Year 1964 Estimates, Central Instrumentation Facility," Sweetsir Collection, Box 29F.2, Kennedy Space Center Archives Department, Florida.
[34] "Construction Jobs to Boom in January," *Spaceport News*, January 2, 1964, 1.

Construction of the facility began on January 27, 1964, and the building was completed on June 11, 1965 (Figure Nos. A-1 through A-4).[35] By early July, a large number of employees had moved into the new facility. Special vans, with built-in shock absorbing systems, were required to move some of the instrumentation equipment.[36] Although the telemetry and computer equipment within the CIF was designed specifically for the Apollo Program, technicians learned that it was flexible enough to use for monitoring Gemini launch vehicles and spacecraft, as well as the Atlas-Agena target vehicles.[37] During this flight, the antennas atop the CIF gathered data from the spacecraft as it passed over the area; some of the data was reduced and computerized before being forwarded to MSC.[38] This experience with the simpler, smaller-scale Gemini vehicles helped the engineers and technicians practice for the more complicated Apollo missions.[39]

Throughout the remainder of Project Gemini, and during the Apollo and Skylab Programs and the Apollo-Soyuz Test Project, the CIF provided four key functions for KSC: handling telemetry measurements from spacecraft and launch vehicles, monitoring countdowns, calibrating handheld equipment and devices, and providing general computation support for the entire Center.[40]

With the advent of the SSP and the new Launch Processing System, many of the original telemetry functions of the CIF became obsolete. The Launch Processing System, developed in the mid-1970s, was a single automated computer system designed to replace the multiple systems used in previous programs. It had three major subsystems: the Checkout, Control and Monitor Subsystem, which included the operator-manned consoles in the firing rooms; the Central Data Subsystem; and the Record and Playback Subsystem that recorded unprocessed Shuttle instrumentation data during tests and launch countdowns, which could be played back for post-test analysis.[41]

---

[35] "$6 Million Bid Offered for Building"; "Alabama Contractor Named to Construct MILA Data Facility"; NASA KSC, "Central Instrumentation Facility"; "Description – Central Instrumentation Facility."
[36] "New Information Systems Building Keeps up with State-of-the-Art," *Spaceport News*, July 8, 1965, 2-3; "KSC 'Operation Big Move' More than Half Completed" *Spaceport News*, September 16, 1965, 1, 4.
[37] "Data Systems Provided 'Meaningful Information'," *Spaceport News*, December 8, 1965, 4.
[38] "Gemini Telemetry Gathered at KSG [sic]," *Spaceport News*, September 2, 1965, 3.
[39] "Data Systems Provided 'Meaningful Information'."
[40] "New Information Systems Building."
[41] Patricia Slovinac, "Cape Canaveral Air Force Station, Launch Complex 39, Launch Control Center (John F. Kennedy Space Center)," HAER No. FL-8-11-A. Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, January 2009.

Historic and Current Functions of the CIF

Telemetry Measurements: CIF support of telemetry measurement operations generally included receiving telemetry measurements from the spacecraft and launch vehicle; reducing, or "translating," the measurements into charts and statistics usable by technicians and engineers; and distributing the data to MSC, the Air Force, or any other NASA installation or affiliated agency/contractor who required the data.[42]

Facility support for a mission began roughly four weeks before the actual launch, and continued through all major vehicle tests, checkouts, launch, and orbital activities.[43] During these activities, transducers on the spacecraft and launch vehicle sent pressure, temperature, vibration, acceleration, voltage, current flow, fuel level, switch and valve position, guidance command, and biomedical data measurements to the equipment housed within the CIF. The number of telemetry measurements gathered from manned flights was generally greater than unmanned flights.[44] Some of the measurements were relayed continuously, whereas others were sampled at different rates, such as two or three times per second. The measurements were received by antennas at the ancillary operations building and on the roof of the CIF (Figure Nos. A-5, A-6).[45]

The antennas directed the measurements to four telemetry stations located in Room No. 291 (Figure No. A-7), which completed the initial processing and reduction of the data before sending them to two GE-635 computers in Room No. 205. The computers took the measurements, and further reduced/translated the measurements into usable data through either "quick-look reduction" or "real time reduction." The former was data provided a few hours after the measurements were recorded; the latter was instantly processed information. All of the data received were recorded onto magnetic tapes, strip charts, microfilm, or other storage means. Two dark rooms were located within the CIF to develop the paper. These tapes allowed technicians to clear the finite memory of the computer and were used to transmit the data to other locations.[46]

Once the measurements were reduced, the computers generated images or documents that were displayed on a television screen, a strip chart, or other type of visual aid. These visuals were

[42] "Data Systems Provided 'Meaningful Information'."
[43] "Data Systems Provided 'Meaningful Information'."
[44] The Saturn V vehicle had roughly 3,200 measurements itself. For reference, this compares to only 116 measurements from the earliest Redstone rockets. "2 Giant Computers Have Awesome Test Role Here," *Spaceport News*, January 27, 1972, 2.
[45] "Apollo 7 Telemetry Busy," *Spaceport News*, August 29, 1968, 5.
[46] "Data Systems Provided 'Meaningful Information'"; "2 Giant Computers;" Dan Hill, personal communication with Patricia Slovinac, April 26, 2012, notes on file at ACI, Sarasota, FL. In order to transmit the data, the tapes were played on a small computer that transmitted the contents over telephone lines; computers at the receiving end copied the data.

relayed to the Data Presentation and Evaluation Room, Room No. 307, the Data Display Room, Room No. 327, the LCC, MSC, MSFC, and other NASA/contractor installations.[47]

The Data Presentation and Evaluation Room (Figure Nos. A-8, A-9) served as an area where technicians and engineers could view data and images of a launch. During the testing periods and launches, more than 150 engineers and technicians from NASA and vehicle/spacecraft contractors occupied the room. These personnel could monitor such activities as fueling operations, power distribution control, propulsion system operation, and vehicle guidance and control. Regardless of when the data was displayed (immediately or later), all measurements were recorded for closer study, as required. The room contained large television screens to project the images and data from rear screen projectors, strip chart recorders, timing and countdown indicators, consoles for engineers to request specific data from the GE-635s, and tables where the engineers and technicians could set up workstations.[48] Adjacent to the Data Presentation and Evaluation Room was the Data Display Room, which contained command consoles and monitors that allowed engineers to select the particular parameter to be monitored and the format in which to monitor the parameter.[49]

In tandem with the telemetry measurements, the CIF also contained the computer tape data exchange equipment for the Launch Information Exchange Facility, a communications system that allowed for rapid information exchange between KSC and MSFC. Prior to the launch, the system would relay weather data gathered from Air Force weather balloons and quickly process the data so launch and flight controllers could determine whether the launch could occur based on weather conditions.[50] The equipment for this system was located on the first floor of the CIF. Also on the first floor, in Room No. 177, was the equipment for the Apollo Launch Data Systems, which contained high-speed serial outputs to transmit data to MSC (Figure No. A-10).[51]

---

[47] During spacecraft testing, the data was also relayed to the Apollo Checkout Equipment display rooms at the O&C Building at KSC. "Apollo 7 Telemetry Busy."

[48] "Apollo 7 Telemetry Busy;" "Stage's Tank on TV Shows Little Sloshing," *Spaceport News*, July 7, 1966, 6. "They Took the Pulse of Apollo 4," *Spaceport News*, December 7, 1967, 4; "Data Presentation & Evaluation Room-Central Instrumentation Facility," *Technical Facilities Resume*, September 1, 1973, Sweetsir Collection, Box 45B.7, Technical Facility Resume Sheets, Kennedy Space Center Archives Department, Florida.

[49] "Data Display System-Central Instrumentation Facility," *Technical Facilities Resume*, September 1, 1973, Sweetsir Collection, Box 45B.7, Technical Facility Resume Sheets, Kennedy Space Center Archives Department, Florida.

[50] "Data Systems Provided 'Meaningful Information';" "Sophisticated Communications Allows Information Exchange," *Spaceport News*, September 15, 1966, 4. Wind direction and velocity could critically affect the performance of a launch vehicle.

[51] Dan Hill, personal communication with Patricia Slovinac, April 27, 2012, notes on file at ACI, Sarasota, FL; Dave Vandongen, personal communication with Patricia Slovinac, April 26, 2012, notes on file at ACI, Sarasota, FL.

Telemetry measurement support by the CIF ceased with the advent of the SSP and the Launch Processing System. The telemetry and data processing equipment were removed from the building circa 1983.[52]

Countdown Monitoring: The CIF also housed the Timing and Countdown Branch, which by 1969 had become the Digital Systems Branch; these facilities are located in Room Nos. 248 and 250 (Figure No. A-11). The branch did not originate the countdown for the mission, but rather correlated the timing and countdown activities for Saturn V checkout, launch, astronaut training, altitude chamber tests, and activity at the launch pad. The Branch also kept track of any accumulated hold time and used these data to predict the actual launch time. In addition, it served as a central distribution point for transmitting the time to roughly 650 different countdown clocks around KSC, as well as any NASA installation that requested it. Originally, the time followed Greenwich Mean Time, but by 1969, the branch was using Coordinated Universal Time; all timing was accurate to one millionth of a second.[53]

The timing equipment within the CIF included two redundant time base generators that were continuously compared with readings from the Eastern Test Range, the National Bureau of Standards, and the Naval Observatory. Up to six networks allowed the branch to keep track of multiple activities simultaneously, such as a launch pad test, an altitude chamber test, an astronaut simulator test, and an Eastern Test Range count. An independent station at the LCC provided a backup system in the event of a breakdown at the CIF during a critical period. Prior to liftoff, the CIF provided countdown information to MSC. Once liftoff occurred, JSC kept its own time, but the CIF maintained a plus time count "so that local telemetry and tracking operations can follow in-flight events."[54]

Beginning in December 1989, the CIF received its timing signals from a global positioning system constellation controlled by the Air Force. An antenna on the roof of the facility (Photo No. 10) receives satellite signals, which equipment boxes build into codes that are distributed throughout KSC by distribution amplifiers.[55]

Calibration and Standards: The Calibration and Standards services were provided by a series of laboratories on the first floor of the CIF. These labs provided for the calibration, incidental

[52] Dave Vandongen, personal communication with Patricia Slovinac, April 26, 2012, notes on file at ACI, Sarasota, FL.
[53] Greenwich Mean Time did not accurately account for the Earth's rotation. Coordinated Universal Time, which was standardized in 1961, accounts for the rotation, and is calculated through a weighted average of signals from atomic clocks located in approximately seventy national laboratories around the world. It is currently the primary international standard. "Countdown Clocks Keep Launch Time," *Spaceport News*, April 14, 1966, 3; "One Millionth of Second Way of Life to KSC Timing Group," *Spaceport News*, May 8, 1969, 3; "Coordinated Universal Time," *wikipedia.org*, 2012, http://en.wikipedia.org/wiki/Coordinated_Universal_Time.
[54] "One Millionth of Second."
[55] Tim Wright, personal communication with Patricia Slovinac, April 26, 2012, notes on file at ACI, Sarasota, FL.

repair, and precision cleaning of testing and measurement equipment used by NASA and its contractors (Figure No. A-12).[56] These services were required periodically for all measurement and test equipment used on all flight hardware, flight components and systems acceptance tests, flight-related telecommunications and transmissions systems, and for measurements essential to the safety and protection of personnel, the public, and government property.[57]

As required, measuring equipment was delivered to Room No. 165 in the CIF for service.[58] From there, the items were taken to Room No. 177, where they were divided based on the specific type of service required. Deliveries were then made to the individual laboratories for completion of calibration, repair, or cleaning activities. A list of all the original Apollo calibration and standards laboratories, their Shuttle era function, and their function at the time of documentation follows.[59]

Room No.	Apollo Era Function	Shuttle Era Function	Function at Time of Documentation
104*	Temperature Calibration	Temperature Calibration (NASA)	Temperature Calibration (NASA)
105*	Instrument Repair	Pressure and Vacuum Calibration (NASA)	Pressure and Vacuum Calibration (NASA)
106*	Dimensional Measurement	General Standards and Calibration (NASA)	General Standards and Calibration (NASA)
107*	Electrical Calibration and Repair	Dimensional Calibration (NASA)	Dimensional Calibration (NASA)
111*	Mass Calibration	Mass Calibration (NASA)	Mass Calibration (NASA)
112*	Instrument Cleaning/Inspection	Pressure Calibration (NASA)	Pressure Calibration (NASA)
112A*	Cleaning, Assembly, and Repair	Cleaning, Assembly, and Repair (NASA)	Cleaning, Assembly, and Repair (NASA)
116/124*	Pressure Calibration	Pressure Calibration (USA)	Vacant
125*	Radio Frequency Calibration and Repair	Mass and Force Calibration (NASA)	Mass and Force Calibration (NASA)
126*	Electrical Standards	Temperature/Humidity Calibration (NASA)	Temperature/Humidity Calibration (NASA)
*denotes a laboratory within the clean room area			

[56] Calibration entails comparing a measuring instrument to a standard of known, traceable accuracy.
[57] "Institutional Services Contract, Kennedy Space Center Standards and Calibration Customer Guide," October 5, 2011, on file, KSC Technical Documents.
[58] Other drop-off locations were Building 981 at Patrick Air Force Base and Building 1724 at CCAFS. "Standards and Calibration Customer Guide."
[59] Beginning circa 1983, United Space Alliance (USA), NASA's contractor for Space Shuttle operations, established calibration and standards laboratories within the CIF, identical to NASA's in-house laboratories, to process USA's equipment. Following the close-out of the SSP, USA vacated the laboratories because they were no longer needed; NASA subsequently provided many of these spaces to the Institutional Services Contract (ISC). The table indicates in parentheses those rooms used by NASA, USA, and ISC during the Shuttle era and at the time of documentation; during Apollo, they were all used by NASA.

Room No.	Apollo Era Function	Shuttle Era Function	Function at Time of Documentation
127*	Standards Storage	Electrical Calibration (NASA)	Offices (ISC)
132	Acoustic Systems Laboratory	Mass and Force Calibration (USA)	Mass and Force Calibration (ISC)
136	Meteorological Equipment Laboratory	Temperature/Humidity/Dew Point Calibration (NASA)	Temperature/Humidity/Dew Point Calibration (NASA)
137	Acoustical Calibration (NASA)	Acoustical Calibration (NASA)	Break Room
138	Accelerometer Calibration and Testing	Temperature Calibration (USA)	Temperature Calibration (ISC)
139	Prototype Laboratory	Humidity/Dew Point Calibration (USA)	Humidity/Dew Point Calibration and Viscosity Calibration (ISC)
144	Environmental Laboratory	Pneumatic/Hydraulic Flow Calibration (USA)	Pneumatic/Hydraulic Flow Calibration (ISC)
148	Vibration Transducer Laboratory	Vibration Transducer Laboratory (NASA)	Calibration Lab/Vacuum Stand storage (ISC)
150	Signal Conditioning Equipment	Signal Conditioning Equipment (NASA)	Offices (ISC)
152	Shock Transducer Laboratory	Wire Stripper/Tool Calibration (USA)	Vacant
182	Dark Room	Viscosity Standards (USA)	Vacant
186	Office	Dimensional Calibration (USA)	Vacant
*denotes a laboratory within the clean room area			

Once the required work was completed, the items were returned to Room No. 177. Support personnel then informed the customer that their item was ready for pick-up.

General Computation Support: General functions supported by the computer equipment in the CIF (Room No. 205) include the processing of payrolls, personnel lists, supply inventories, and management documents (Figure No. A-13).[60] An example of a KSC general support function of the CIF was its role in the Center's real time supply distribution system. A NASA civil servant or contractor employee could go to one of five supply sub-stores around the Center to place an order for an item. The store clerk inputted the information into a computer station linked to the CIF's Central Computation Complex, which would relay instructions regarding the order. The Central Computer Complex kept track of the quantity of each item within the sub-stores and the central supply warehouse, and could automatically issue a purchase request for an item when the quantity in stock fell below the reorder point.[61]

Circa 1984, Room No. 205 was modified to incorporate two of the old data reduction rooms; the entirety became Room No. 243 and became known as the Data Center. Since then, the equipment

[60] "Pulse of Apollo 4."
[61] "'Real Time' Supply Operation in Swing," *Spaceport News*, March 30, 1967, 4.

in the room has been upgraded with advancements in computer technology. As of the time of documentation, it continued to serve as the central location for KSC's computer servers. A monitoring station is located in Room No. 295, where the Apollo era telemetry stations had been located.[62]

U.S. Manned Space Programs Supported by the CIF

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.[63] 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.[64]

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 (this group eventually became the MSC; see footnote no. 23) saw both rendezvous and extended time in orbit as possible focal points for a follow-on Mercury program.[65]

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.[66] On October 27, 1961, a revised plan was issued, 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

---

[62] NASA KSC, "Central Instrumentation Facility;" Clint Bartley, personal communication with Patricia Slovinac, April 17, 2012, notes on file at ACI, Sarasota, FL.
[63] 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).
[64] 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).
[65] Hacker and Grimwood, *On the Shoulders of Titans.*
[66] Hacker and Grimwood, *On the Shoulders of Titans.*

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.[67]

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.[68] 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.[69] 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.[70]

The first manned mission, Gemini III, occurred on March 23, 1965, with astronauts Virgil "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.[71] 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 "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

---

[67] Grimwood and Hacker, *Project Gemini.*
[68] NASA KSC, "Gemini Goals," 2000, http://www-pao.ksc.nasa.gov/kscpao/history/gemini/gemini-goals.htm.
[69] Hacker and Grimwood, *On the Shoulders of Titans.*
[70] Grimwood and Hacker, *Project Gemini.*
[71] Grimwood and Hacker, *Project Gemini.*

rendezvous."[72] 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.[73]

On December 4, 1965, Gemini VII launched with astronauts Frank Borman 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.[74]

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.[75]

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 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"

[72] Grimwood and Hacker, *Project Gemini.*
[73] Grimwood and Hacker, *Project Gemini;* Hacker and Grimwood, *On the Shoulders of Titans.*
[74] Grimwood and Hacker, *Project Gemini.*
[75] Grimwood and Hacker, *Project Gemini.*

Aldrin, Jr. The four-day mission incorporated a rendezvous and docking task with an Agena and three EVAs.[76]

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."[77]

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 five 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 Command/Service Module (CSM) failures, one on the ground (Apollo 1) and one on the way to the Moon (Apollo 13).[78]

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 and Project High Water II, and tested an "engine-out" contingency, in which the fuel was rerouted from the failed engine to the seven remaining engines.[79]

---

[76] Grimwood and Hacker, *Project Gemini*.
[77] 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.
[78] NASA, *Facts: John F. Kennedy Space Center*, 1994, 82.
[79] 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

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.[80]

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.[81]

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.[82]

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 M. Schirra, Jr., Donn F. Eisele, and Ronnie W. "Walt" 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

---

Technical Information Office, 1973), http://www.hq.nasa.gov/office/pao/History/SP-4009/contents.htm#Volume%20II.

[80] 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*.

[81] 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.

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

routines. During this flight, the astronauts separated the CSM from the second stage in order to practice rendezvous operations with the booster. The spacecraft and astronauts returned to Earth on October 22, after successfully completing all goals of the mission.[83]

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 M. McDivitt, Russell L. "Rusty" Schweickart, and David R. Scott, performed the first EVA 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).[84]

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."[85] 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.[86]

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 A. "Jim" Lovell, Jr., Fred W. Haise, Jr.,

---

[83] Godwin, *The Test Program*, 52-55; Ertel and Newkirk, *A Chronology, Volume 4*.
[84] Godwin, *The Test Program*, 12-13, 56-69; Ertel and Newkirk, *A Chronology, Volume 4*.
[85] 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.
[86] 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*.

and John L. "Jack" Swigert, Jr., 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.[87]

The next mission, Apollo 14, was launched on January 31, 1971. Astronauts Alan B. Shepard, Jr., and Edgar D. Mitchell, Sc.D., 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 H. "Jack" Schmitt, to the Moon.[88]

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.[89]

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 Test Project established workable joint docking mechanisms, taking the first steps toward mutual rescue capability of both Russian and American manned missions in space.[90]

---

[87] 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.
[88] Godwin, *Exploring the Moon*, 10-18, 31-49; Ertel and Newkirk, *A Chronology, Volume 4*.
[89] NASA, *Facts*, 91.
[90] NASA, *Facts*, 96.

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."[91] 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, and one expendable external liquid fuel tank. 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.[92]

The first orbiter intended for spaceflight, *Columbia*, arrived at KSC from Air Force Plant 42, Palmdale, California, in March 1979. Originally scheduled for liftoff in late 1979, the launch date was delayed by problems with both the main engine components as well as the thermal protection system. *Columbia* spent 610 days in the Orbiter Processing Facility, another 35 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.[93] *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 Reagan declared that with the next flight the Shuttle would be "fully operational."

During the SSP, 135 missions were launched from KSC. The Space Shuttle carried 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, a series of Spacelab research missions were flown, which carried dozens of international experiments in disciplines ranging from materials science to plant biology. Between 1995 and 1998, NASA conducted a joint U.S./Russian Shuttle-*Mir* Program as a precursor to construction of the ISS. The Shuttle-*Mir* program served to acclimate the astronauts to living and working in space.

---

[91] Marcus Lindroos, ed., "President Nixon's 1972 Announcement on the Space Shuttle," updated April 14, 2000, http://history.nasa.gov/stsnixon.htm.

[92] 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, "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.

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

Many of the activities carried out were types they would perform on the ISS.[94] Construction of the ISS began in 1998; it was completed in 2011.

The SSP suffered two major setbacks with the tragic losses of the *Challenger* and *Columbia* on January 28, 1986, and February 1, 2003, respectively. *Challenger* was destroyed 73 seconds after launch due to a faulty O-ring seal in the right solid rocket booster; the crew of seven astronauts all perished. *Columbia* was lost on February 1, 2003, following a sixteen-day mission. 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 external tank after launch and struck the wing.[95] Sixteen minutes prior to its scheduled touchdown at KSC, the spacecraft broke apart during reentry over eastern Texas and all seven members of the crew perished.

---

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

[95] 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.

Part II. Structural/Design Information

A. General Statement:

1. Architectural Character: The CIF (Photo Nos. 1-8) is a rectangular, three-story structure with approximately 137,000 square feet of space. 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 CIF 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.

2. Condition of fabric: Due to periodic maintenance and continual use of the facility, the building's structural skeleton and external envelope are in good condition.

B. Description of Exterior:

1. Overall dimensions: The CIF has a rectangular plan with approximate overall dimensions of 290' in length (east-west), 156' in width (north-south), and 48' in height (Photo No. 58). There is a screened enclosure within the south half of the roof, which roughly measures 240' in length, 55' in width, and 16' in height (Photo Nos. 9, 69).

2. Foundations: The foundation of the CIF is comprised of a roughly 5"-thick reinforced concrete slab supported by reinforced concrete footers.

3. Walls: The walls of the CIF are comprised of a reinforced concrete frame with precast exterior granular quartz surfaced panels (Photo No. 12). In general, the north and south elevations of the building are divided into 24'-wide bays by 2.5'-deep, white-painted concrete pilasters, whereas the east and west elevations are divided into 22'-wide bays by similar pilasters.

4. Structural system, framing: The structural system for the CIF is composed of reinforced concrete columns, beams, and rafters.

5. Porches, patios, stoops: The main entrance has a small, 31' x 14' porch area that features a poured concrete floor accessed by steps on the north edge and a handicapped ramp to the west; a curved precast concrete canopy provides a covering for the porch area (Photo No. 11). The additional doorway on the north elevation, the doorway on the east elevation, and the two easternmost doorways on the south elevation all feature a small concrete stoop accessed by steps. The other three doorways on the south elevation, as well as the first floor doorway on the west elevation, feature a poured concrete ramp.

7. Openings:

a. Doorways and doors: The main entrance to the CIF is on the north elevation of the building (Photo No. 11). This entrance features two sets of double glass and aluminum doors, each set with a transom and sidelights. The set of doors to the west automatically swing open and closed when a sensor detects a human presence; these doors were installed circa 1996. The set of doors to the east, which swing open and closed, is original to the building. Only the west door is fitted with an exterior door handle; each door has an interior push rod.

Aside from the main entrance, there are an additional ten sets of double aluminum swing doors across the four elevations. One set is on the north elevation, near the west end of the building; these doors are fitted with louvers and open from the environmental and contamination control equipment room. Three sets of doors are located near the south end of the west elevation. There is one set per floor level, and each corresponds with the interior south corridor/southwest stairway. Similarly, the single set of doors on the east elevation opens from the southeast stairway. The remaining five sets of doors are located on the center and east half of the south elevation. One opens from the central north-south corridor, one opens from a storage room, and three open from the main mechanical room at the southeast corner of the building.

b. Windows: The CIF features ribbons of windows at the second and third floor levels; all have aluminum frames and are flush with the exterior surface of the wall (Photo Nos. 1-8). In general, there are six, one-light windows with aluminum frames per vertical bay; four of the panes, the two center panes, and the two end panes, are fixed and the other two pivot.

8. Roof:

a. Shape, truss type, covering: The entire facility is covered by a flat roof comprised of a concrete deck faced with rigid insulation and built-up roofing. The roof is supported by precast concrete beams.

b. Cornice, eaves: The CIF has continuous reinforced concrete boxed eaves on all four elevations, that are roughly 2.5’ in depth and painted white. The eaves rest atop the pilasters that divide each elevation into vertical bays.

d. Antennas: At the time of documentation, there were three antennas on the roof of the CIF, each mounted atop its own platform (Photo No. 10).

C. Description of Interior:

1. Floor plans: The CIF is comprised of three floor levels, all of which feature a double loaded corridor layout. On all three levels, the corridors are arranged in the rough shape of a 'figure 8'. The south corridor on each floor extends to the east and west exterior walls; the central north-south corridor on the first floor extends from the main lobby to the south exterior wall.

a. First Floor: The first floor of the CIF (Photo Nos. 60-62) contains the calibration laboratories/clean room area, within the western half of the building (see table pages 15-16; Photo Nos. 14-46); a few laboratories are within the eastern half of the building. This area is virtually the same as it was when originally constructed; only three rooms have been physically modified to form office areas, including Room No. 197 (now Room No. 159), Room No. 173 (now Room Nos. 165 and 173), and Room No. 145. The east end of the first floor contains a cafeteria along the north wall, two laboratories along the east wall, mechanical and service areas on the south wall, and various office areas within the center. With the exception of Room No. 177, the central scheduling area for the calibration labs, the offices are either small spaces for a single individual or large spaces divided into cubicles.

b. Second Floor: The second floor of the CIF (Photo Nos. 63-65) is mostly comprised of large and small office areas divided into cubicles. The Central Data Center (the original Central Computation Complex; Photo Nos. 50, 51) is located within the center of the west end; the timing rooms (Photo Nos. 52, 53) are centrally located along the south wall; and the monitoring station (Photo No. 54) is within the east end.

c. Third Floor: Aside from a pair of large work areas, the third floor of the CIF (Photo No. 66-68) is comprised of large, medium, and small offices. The small offices typically hold one person, whereas the medium and large offices are divided into cubicles (Photo No. 55).

3. Stairways: There are four stairways within the CIF, all of which are U-shaped. Two of the stairways are located on the west side of the central north-south corridor; the one at the north end extends up to the third floor, whereas the one at the south end provides access to the building's roof. The other two stairways are located at the ends of the southern corridor, and extend up to the third floor.

3. Flooring: The flooring of the CIF varies by internal space. The calibration laboratories typically have sheet no wax, electro-static free vinyl flooring, and the offices have either carpeting or vinyl tile floors. The corridors have vinyl tile flooring, except for those within the clean room area, which are the same as those in the calibration laboratories. The stairways have terrazzo flooring, the restrooms have ceramic tile floors, and the equipment rooms have bare concrete floors.

4. Wall and ceiling finish: The walls and ceiling of the CIF also vary. Typically, the laboratories and office areas have painted gypsum walls; the first floor laboratories have suspended gypsum ceilings, whereas the remaining laboratories and office areas have suspended acoustical tile. The corridors and stairways generally have painted concrete masonry unit walls and suspended acoustical tile ceilings. The restrooms contain Keene's cement plaster[96] walls and ceilings; the equipment and other service rooms (e.g., janitorial closets) have bare concrete masonry unit walls and exposed concrete ceilings.

5. Openings:

a. Doorways and doors: There are approximately 324 internal doors within the CIF. Most of the doors are fabricated of hollow metal and are fitted with pressed steel frames. Some of the doors within the calibration laboratory area are made of laminated wood and have brass frames to provide shielding from radio frequencies.

b. Windows: The windows within the CIF are a combination of fixed and pivot lights, with aluminum trims. They all have 3" internal sills made of aluminum.

6. Decorative/special features and trim: The main lobby of the CIF features precast exterior granular quartz surfaced panels on portions of its east and west walls, and glazed concrete masonry units on portions of its west and south walls. In addition, there is a small, rectangular dropped ceiling along the east wall, denoting where the original reception desk was located. On the north face of this ceiling is a built-in clock with stainless steel hands and numbers.

Due to the functional nature of the CIF, the remainder of the building generally does not contain decorative features or trims in the traditional architectural sense. A few areas, however, incorporate special features to assist in their functions. The floors within the various calibration and standards laboratories are fitted with coves along the perimeter (Photo No. 14); this design feature allowed for easy cleanup of Mercury spills. Room Nos. 116, 112, 112A, and 116/124 have laminar flow walls fitted with HEPA filters to

[96] Keene's cement is a gypsum plaster finish that contains alum in the mixture. It has a high-strength ratio and sets quickly.

clean and stabilize the airflow through the rooms (Photo No. 25). Room No. 117 contains five granite tables that sit on pilings, which are not attached to the floor slab. These pilings extend down to bedrock, roughly 25’ below surface level, to isolate the tables from any movements on the part of the building that could compromise the weight measurements (Photo No. 15).

8. Mechanical equipment:

a. Heating, air conditioning, ventilation: The CIF contains its own centralized, heating, ventilating, and air conditioning system.

b. Lighting: The lighting system for the CIF is mostly comprised of recessed and surface mounted fluorescent fixtures. A few areas have pendant mounted fluorescent fixtures.

c. Plumbing: The CIF contains its own plumbing system, one for chilled water and one for heated water.

d. Other: The CIF is fitted with a fire suppression system.

D. Site:

1. **Historic landscape design:** The CIF has a semicircular driveway to the north (off First Street) that allowed motorized vehicles to drop off passengers at the main entrance; circa 2001, the driveway was blocked with bollards for security purposes. Parking lots are situated to the west and south of the building, and there is a sidewalk that begins at the east end of the driveway, extends across the north, west, and south elevations of the facility, ending at the door near the south end of the east elevation.

   Originally, the CIF also featured a simple landscaping plan, which consisted of trees planted along the four elevations, except for much of the eastern half of the south elevation. Additionally, lines of trees provided a visual buffer between the west parking lot and both First Street to the north and B Avenue to the west. The trees included queen and cabbage palms, as well as American sweetgum, Florida maple, weeping bottle brush, purple orchid, and cajeput. Most of this landscaping has since been removed; a few trees are still extant along the north and west elevations and along the north edge of the west parking lot.

2. **Outbuildings:** As originally constructed, the CIF had a cooling tower, electrical substation, and a toxic hazards lab to its south within the parking lot area. Circa 1986, a new cooling tower was constructed to the south, and a hazardous waste staging area was

built at the west end of the south elevation. The cooling tower was removed circa 1994, when the Industrial Area Chiller Plant was constructed. In 2009, a generator enclosure was built to the east of the CIF.

Part IV. Sources of Information

A. Primary Sources:

Black & Veatch Consulting Engineers. "Central Instrumentation Facility, Industrial Area Building." October 1963. On file, KSC Engineering Documentation Center.

Brooks, Courtney G. and Ivan D. Ertel. *The Apollo Spacecraft: A Chronology, Volume 3*. Washington, DC: NASA, Scientific and Technical Information Office, 1973. http://www.hq.nasa.gov/office/pao/History/SP-4009/contents.htm#Volume%20III.

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

Ertel, Ivan D. 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

Ertel, Ivan D. 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.

Grimwood, James M. 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.

"Institutional Services Contract, Kennedy Space Center Standards and Calibration Customer Guide," October 5, 2011, on file, KSC Technical Documents.

Jarrett, Jr., Francis E. 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.

Morse, Mary Louise 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.

National Aeronautics and Space Administration, Kennedy Space Center. *Countdown! NASA Launch Vehicles and Facilities*. Information Summaries PMS 018-A (KSC), October 1991. http://www-pao.ksc.nasa.gov/nasafact/counttoc.htm.

________. "Real Property Record, Central Instrumentation Facility." On file, KSC Real Property Office.

National Aeronautics and Space Administration, Manned Spacecraft Center. *Apollo 11 Spacecraft Commentary*. July 16-24, 1969. http://www.jsc.nasa.gov/history/mission_trans/AS11_PAO.PDF.

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. On file, Sweetsir Collection, Kennedy Space Center Archives Department, Florida.

________. *Analytical Report for NASA Merritt Island Launch Area Master Plan, Volume III.* Cape Canaveral, FL: Pan American World Airways, 1965. On file, Sweetsir Collection, Kennedy Space Center Archives Department, Florida.

Space Gateway Support. *CCAFS/KSC Basic Information Guide*. KSC-CCAFS-6747, Revision B, January 2006. On file, Kennedy Space Center, Master Planning Office.

Sweetsir Collection, Kennedy Space Center Archives Department, Florida.

Weekly Compilation of Presidential Documents. 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.

B. Secondary Sources:

Archaeological Consultants, Inc. "Survey and Evaluation of NASA-owned Historic Facilities and Properties in the Context of the U.S. Space Shuttle Program, John F. Kennedy Space Center (KSC), Brevard County, Florida." Survey report, NASA KSC, 2007.

Benson, Charles D. and William B. Faherty. *Gateway to the Moon. Building the Kennedy Space Center Launch Complex*. Gainesville: University Press of Florida, 2001 (first paperback printing).

________. *Moon Launch! A History of the Saturn-Apollo Launch Operations*. Gainesville: University Press of Florida, 2001 (first paperback printing).

Bilstein, Roger E. *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles*. Gainesville: University Press of Florida, 2003.

Boggs, Wallace H. and Samuel T. Beddingfield. “Moonport to Spaceport: The Changing Face at KSC.” *Astronautics & Aeronautics*. July/August 1982, 28-41.

Bramlitt, E. R. *History of Canaveral District*. Cape Canaveral, Florida: South Atlantic Division, U.S. Army Corps of Engineers, 1971.

Brooks, Courtney G., 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.

Butowsky, Harry A. *Reconnaissance Survey: Man in Space*. Washington, DC: National Park Service, 1981.

Dethloff, Henry C. “The Space Shuttle’s First Flight: STS-1.” *From Engineering Science to Big Science: The NASA and NASA Collier Trophy Research Project Winners*. NASA SP-4219, Edited by Pamela E. Mack, Washington, DC: Government Printing Office, 1998.

Ezell, Linda Neuman. *NASA Historical Databook Volume III Programs and Projects 1969-1978.* The NASA History Series, NASA SP-4012, Washington, DC: NASA History Office, 1988.

Godwin, Robert. *Project Apollo: Exploring the Moon*. Burlington, Ontario: Apogee Books, 2006.

________. *Project Apollo: The Test Program*. Burlington, Ontario: Apogee Books, 2006.

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

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

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

________. “Redstone Fact Sheet.” 2000. http://www.spaceline.org/rocketsum/redstone.html.

________. “Saturn I Fact Sheet.” *Spaceline.org*. 1998. http://spaceline.org/rocketsum/saturn-I.html.

________. “Saturn IB Fact Sheet.” *Spaceline.org*. 1998. http://spaceline.org/rocketsum/saturn-Ib.html.

________. “Saturn V (Apollo) Fact Sheet.” *Spaceline.org*. 1998. http://spaceline.org/rocketsum/saturn-V-apollo.html.

Lipartito, Kenneth and Orville R. Butler. *A History of the Kennedy Space Center*. Gainesville: University Press of Florida, 2007.

National Aeronautics and Space Administration. *Facts: John F. Kennedy Space Center*. 1994.

Orloff, Richard W. *Apollo by the Numbers: A Statistical Reference*. Washington, DC: NASA History Division, Office of Policy and Procedures, 2000. http://history.nasa.gov/SP-4029/SP-4029.htm.

Price, David. “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.

Rumerman, Judy A. with Stephen J. Garber. *Chronology of Space Shuttle Flights 1981-2000*. HHR-70. Washington, DC: NASA History Division, Office of Policy and Plans, October 2000.

Slovinac, Patricia. “Cape Canaveral Air Force Station, Launch Complex 39, Launch Control Center (John F. Kennedy Space Center),” HAER No. FL-8-11-A. Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, January 2009.

Slovinac, Patricia and Joan Deming. National Register of Historic Places Multiple Property Documentation Form, *Historic Cultural Resources of the John F. Kennedy Space Center, Florida*. October 2007.

Williamson, Ray A. “Developing the Space Shuttle.” In *Exploring the Unknown: Selected Documents in the History of the US Civil Space Program, Volume IV: Accessing Space*, edited by John M. Logsdon, 161-93. Washington, DC: US Printing Office, 1999.

Figure A-1. Artist's Concept of the CIF, September 6, 1963.
Source: Kennedy Institutional Image Facility, KSC-63C-2640.

Figure A-2. Construction of the CIF, July 29, 1964.
Source: John F. Kennedy Space Center Archives, 100-KSC-64-5108.

Figure A-3. Construction of the CIF, January 8, 1965.
Source: John F. Kennedy Space Center Archives, 100-KSC-65-326.

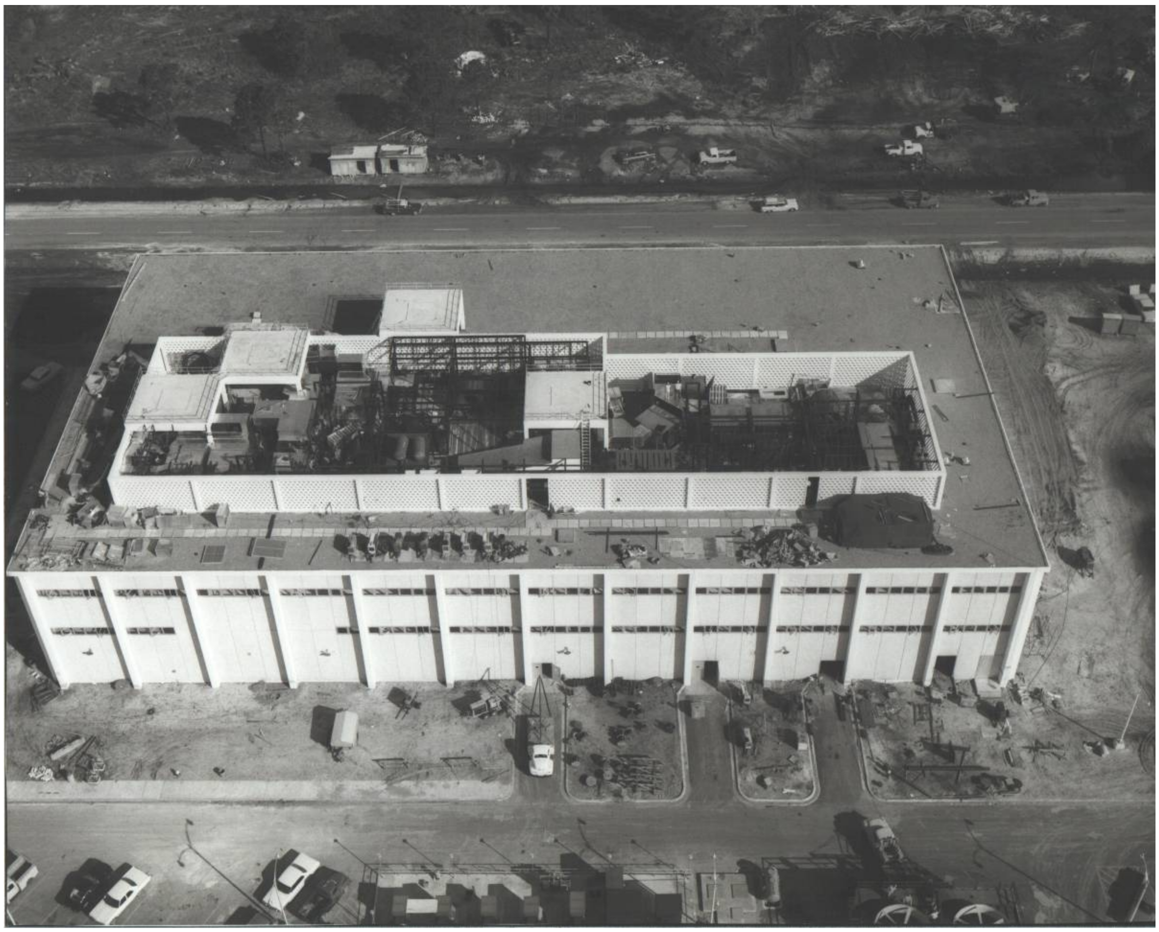

Figure A-4. Construction on roof of the CIF for electronics and tracking components, February 11, 1965.
Source: John F. Kennedy Space Center Archives, 100-KSC-65-2846.

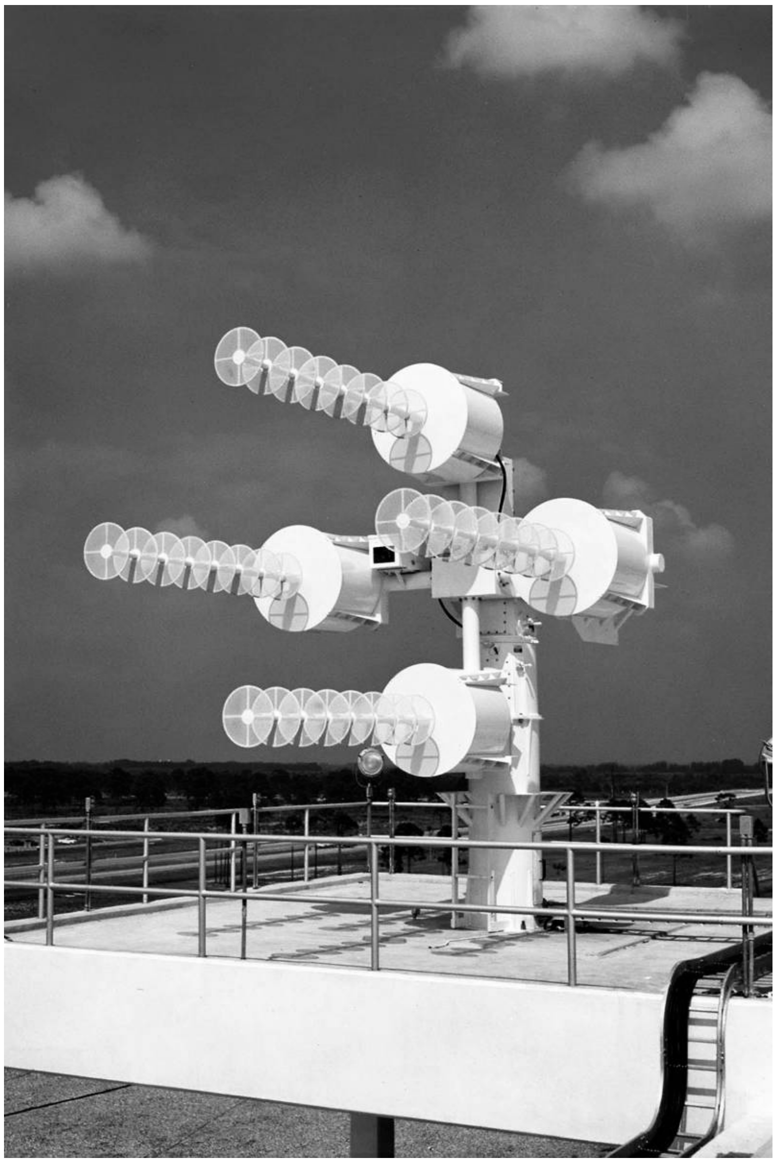

Figure A-5. Telemetry antenna on the roof of the CIF, October 5, 1966.
Source: Kennedy Institutional Image Facility, KSC-66C-8242.

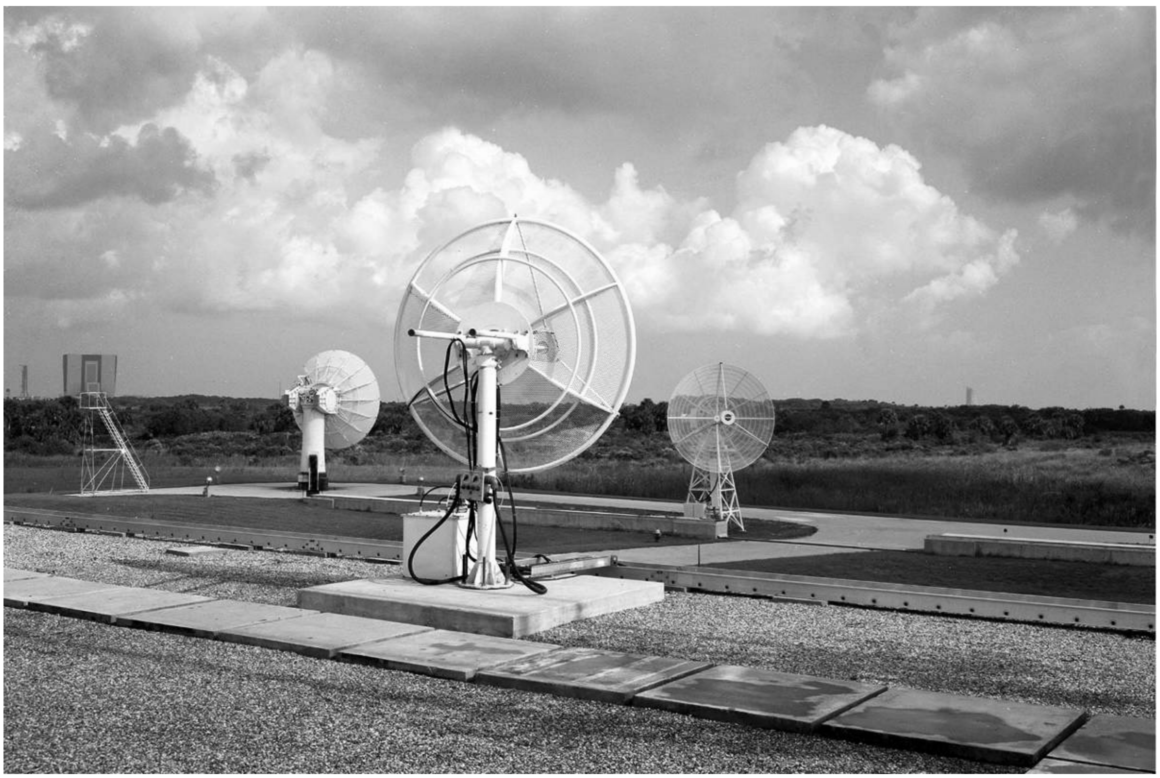

Figure A-6. View of radar dishes on the roof of the CIF, October 27, 1967.
Source: Kennedy Institutional Image Facility, KSC-67C-9051.

Figure A-7. Telemetry station within the CIF, Room No. 291, November 1, 1965.
Source: David Laprise, CIF Facility Manager, File No. Tel Station_110165(1).

Figure A-8. View of the Data Presentation and Evaluation Room, Room No. 307, 1967.
Source: Kennedy Institutional Image Facility, KSC-67C-1319.

Figure A-9. View of the Data Presentation and Evaluation Room, Room No. 307, September 27, 1967.
Source: David Laprise, CIF Facility Manager, File No. Tel Sys Eq_092767.

Figure A-10. View of a control room within the CIF, October 5, 1966.
Source: Kennedy Institutional Image Facility, KSC-66-8243.

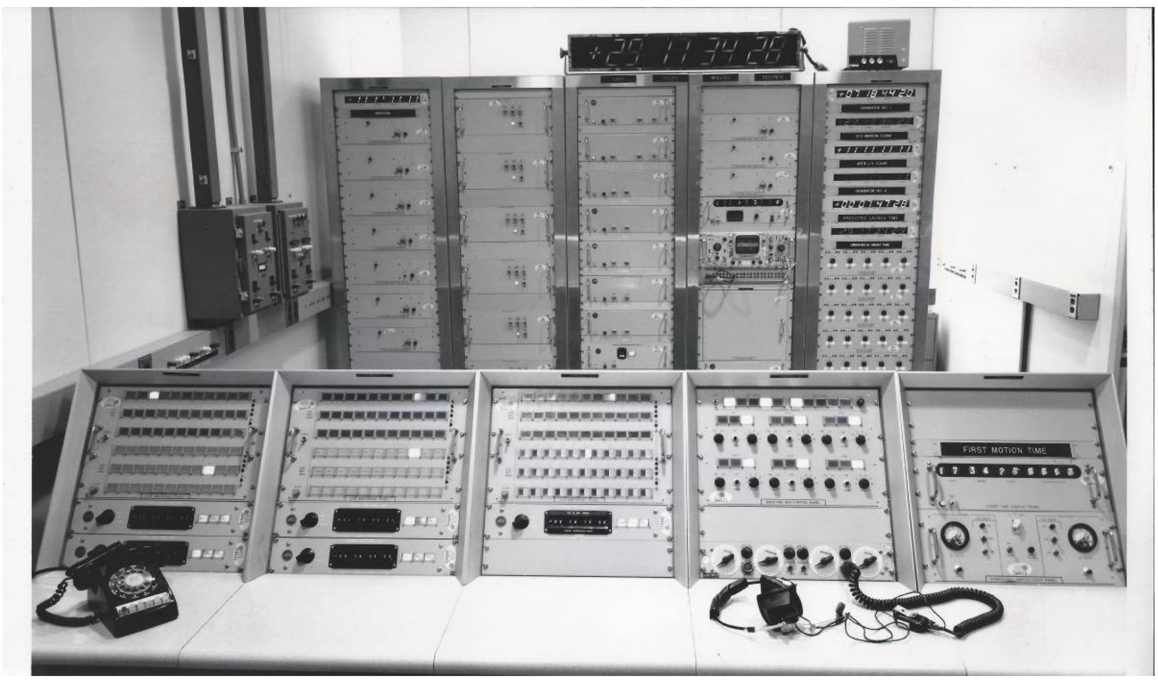

Figure A-11. View of the central countdown clock in the CIF, Room No. 250, September 29, 1971.
Source: David Laprise, CIF Facility Manager, File No. Central Countdown_092971.

Figure A-12. View of Room No. 112, Instrument Cleaning/Inspection Lab, 1967.
Source: Kennedy Institutional Image Facility, KSC-67C-0189.

Figure A-13. View of the CIF computer complex, Room No. 205, 1967.
Source: Kennedy Institutional Image Facility, KSC-67C-0344.

Figure A-14. View of sign within the CIF, no date.
Source: David Laprise, CIF Facility Manager, File No., Photo-14.

HISTORIC AMERICAN BUILDINGS SURVEY

INDEX TO PHOTOGRAPHS

CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39, CENTRAL INSTRUMENTATION FACILITY (John F. Kennedy Space Center) HABS No. FL-581-B
First Street, between Avenue B and Avenue C
Brevard County
Florida

Penny Rogo Bailes, Photographer; April 2012 (FL-581-B-1 through FL-581-B-77)

FL-581-B-1 OVERALL VIEW OF NORTH ELEVATION, FACING SOUTH.

FL-581-B-2 OVERALL VIEW OF NORTH AND EAST ELEVATIONS, FACING SOUTHWEST.

FL-581-B-3 OVERALL VIEW OF EAST ELEVATION, FACING WEST.

FL-581-B-4 OVERALL VIEW OF EAST AND SOUTH ELEVATIONS, FACING NORTHWEST.

FL-581-B-5 OVERALL VIEW OF SOUTH ELEVATION, FACING NORTH.

FL-581-B-6 OVERALL VIEW OF SOUTH AND WEST ELEVATIONS, FACING NORTHEAST.

FL-581-B-7 OVERALL VIEW OF WEST ELEVATION, FACING EAST.

FL-581-B-8 OVERALL VIEW OF NORTH AND WEST ELEVATIONS, FACING SOUTHEAST.

FL-581-B-9 OVERALL VIEW OF ANTENNA ENCLOSURE SCREEN, FACING SOUTHWEST.

FL-581-B-10 DETAIL VIEW OF MODERN ANTENNAE, FACING NORTHWEST.

FL-581-B-11 DETAIL VIEW OF MAIN ENTRANCE ON NORTH ELEVATION, FACING SOUTHWEST.

FL-581-B-12 DETAIL VIEW OF TYPICAL PRECAST EXTERIOR GRANULAR QUARTZ SURFACED PANEL, WEST ELEVATION, FACING EAST.

FL-581-B-13	OVERALL VIEW OF MAIN LOBBY, FACING SOUTHWEST.
FL-581-B-14	OVERALL VIEW OF CORRIDOR TO CALIBRATION LABORATORIES, FIRST FLOOR, FACING WEST. NOTE SUPPORT BRACKETS ON RIGHT WALL, USED FOR CALIBRATING MEASURING TAPES.
FL-581-B-15	OVERALL VIEW OF ROOM NO. 104, STANDARDS LABORATORY, FACING NORTHEAST.
FL-581-B-16	DETAIL VIEW OF HELIUM LEAK TEST CHAMBER WITHIN ROOM NO. 104, FACING NORTHEAST.
FL-581-B-17	OVERALL VIEW OF ROOM NO. 105, VACUUM STANDARDS LABORATORY, FACING EAST.
FL-581-B-18	DETAIL VIEW OF VACUUM TEST CHAMBER, ROOM NO. 105, FACING NORTHEAST.
FL-581-B-19	OVERALL VIEW OF ROOM NO. 106, MIXED USE LABORATORY, FACING NORTHWEST.
FL-581-B-20	OVERALL VIEW OF EAST SIDE OF ROOM NO. 107, MIXED USE LABORATORY, FACING SOUTHEAST.
FL-581-B-21	OVERALL VIEW OF SOUTH PORTION OF ROOM NO. 107, MIXED USE LABORATORY, FACING NORTHWEST.
FL-581-B-22	DETAIL VIEW OF CALIBRATION TABLE IN ROOM NO. 107, FACING SOUTHWEST.
FL-581-B-23	OVERALL VIEW OF ROOM NO. 111, MASS LABORATORY, FACING SOUTHWEST.
FL-581-B-24	DETAIL VIEW OF CALIBRATION EQUIPMENT/TABLE IN ROOM NO. 111, FACING NORTHWEST.
FL-581-B-25	OVERALL VIEW OF ROOM NO. 112, CALIBRATION/PRESSURE LABORATORY, FACING NORTHEAST.
FL-581-B-26	OVERALL VIEW OF ROOM NO. 112A, CLEAN ROOM, FACING SOUTHWEST.

FL-581-B-27 DETAIL OF PASS-THROUGH BETWEEN ROOM NO. 112A AND ROOM NO. 124, FACING SOUTH.

FL-581-B-28 DETAIL VIEW OF PNEUMATIC SAFETY TEST CHAMBER IN ROOM NO. 112A, FACING SOUTHWEST.

FL-581-B-29 OVERALL VIEW OF WEST SIDE OF ROOM NO. 124, CALIBRATION/PRESSURE LABORATORY, FACING NORTH.

FL-581-B-30 OVERALL VIEW OF EAST SIDE OF ROOM NO. 124, CALIBRATION/PRESSURE LABORATORY, FACING NORTH.

FL-581-B-31 OVERALL VIEW OF SOUTH AREA OF ROOM NO. 124, CALIBRATION/PRESSURE LABORATORY, FACING NORTH.

FL-581-B-32 OVERALL VIEW OF ROOM NO. 125, FORCE/MASS, CALIBRATION/TORQUE LABORATORY, FACING NORTHEAST.

FL-581-B-33 OVERALL VIEW OF ROOM NO. 125, FORCE/MASS, CALIBRATION/TORQUE LABORATORY, FACING SOUTHEAST.

FL-581-B-34 OVERALL VIEW OF WEST SIDE OF ROOM NO. 126, TOXIC GAS DETECTION LABORATORY, FACING NORTHWEST.

FL-581-B-35 OVERALL VIEW OF AIRLOCK INTO THE CALIBRATION LABORATORY AREA, FACING SOUTHWEST.

FL-581-B-36 DETAIL VIEW OF THE EXTERIOR OF A TYPICAL COPPER-LINED DOOR WITHIN THE CALIBRATION LABORATORY AREA, FACING NORTHEAST.

FL-581-B-37 DETAIL VIEW OF THE INTERIOR OF A TYPICAL COPPER-LINED DOOR WITHIN THE CALIBRATION LABORATORY AREA, FACING NORTHEAST.

FL-581-B-38 OVERALL VIEW OF ROOM NO. 132, FORCE/MASS, LABORATORY, FACING SOUTHWEST.

FL-581-B-39 DETAIL VIEW OF A CALIBRATION MACHINE WITHIN ROOM NO. 132, FACING SOUTH.

FL-581-B-40 OVERALL VIEW OF ROOM NO. 136, TEMPERATURE, HUMIDITY, AND DEW POINT CALIBRATION LABORATORY, FACING NORTHEAST.

FL-581-B-41 OVERALL VIEW OF ROOM NO. 138, TEMPERATURE CALIBRATION LABORATORY, FACING SOUTHWEST.

FL-581-B-42 OVERALL VIEW OF ROOM NO. 139, TEMPERATURE CALIBRATION LABORATORY, FACING NORTHWEST.

FL-581-B-43 OVERALL VIEW OF ROOM NO. 144, FLOW LABORATORY, FACING SOUTHEAST.

FL-581-B-44 OVERALL VIEW OF ROOM NO. 148, VIBRATION TESTING LABORATORY, FACING NORTHWEST.

FL-581-B-45 OVERALL VIEW OF ROOM NO. 182, CALIBRATION/GAS DETECTOR LABORATORY, FACING SOUTHEAST.

FL-581-B-46 DETAIL VIEW OF SHUTTLE LASER MEASUREMENT SYSTEM, ROOM NO. 186, FACING NORTHEAST.

FL-581-B-47 OVERALL VIEW OF NORTH CORRIDOR IN EAST WING SHOWING REMOVABLE FLOOR PANELS, FACING EAST.

FL-581-B-48 OVERALL VIEW OF ROOM NO. 236, TRAINING AREA, FACING EAST.

FL-581-B-49 OVERALL VIEW OF ROOM NO. 240, TEST FACILITY, FACING NORTHWEST.

FL-581-B-50 OVERALL VIEW OF ROOM NO. 243, KSC DATA CENTER, FACING SOUTHWEST.

FL-581-B-51 OVERALL VIEW OF ROOM NO. 243, KSC DATA CENTER, FACING NORTHWEST.

FL-581-B-52 OVERALL VIEW OF ROOM NO. 248, TIMING ROOM, FACING SOUTHEAST.

FL-581-B-53 OVERALL VIEW OF ROOM NO. 250, TIMING ROOM/COUNTDOWN CLOCK, FACING SOUTHEAST.

FL-581-B-54 OVERALL VIEW OF ROOM NO. 295, KSC NETWORK MONITORING ROOM, FACING SOUTHWEST.

FL-581-B-55 OVERALL VIEW OF ROOM NO. 307, ELECTRICAL LABORATORY, FACING NORTHEAST.

FL-581-B-56 OVERALL VIEW OF ORIGINAL CIF OPERATIONS BUILDING/ANTENNA SERVICE PAD (ENVIRONMENTAL HEALTH BUILDING), FACING NORTHWEST.

Photograph Nos. FL-581-B-57 through FL-581-B-77 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, KSC, Florida.

FL-581-B-57 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
INDEX TO VOLUME NO. 1
Sheet 1 of 214

FL-581-B-58 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
GENERAL LAYOUT & VICINITY MAP
Sheet 2 of 214

FL-581-B-59 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
LAYOUT PLAN
Sheet 3 of 214

FL-581-B-60 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
FIRST FLOOR PLAN
Sheet 24 of 214

FL-581-B-61 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL FIRST FLOOR PLAN-EAST
Sheet 25 of 214

FL-581-B-62 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL FIRST FLOOR PLAN-WEST
Sheet 26 of 214

FL-581-B-63 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
SECOND FLOOR PLAN
Sheet 27 of 214

FL-581-B-64 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL SECOND FLOOR PLAN-EAST
Sheet 28 of 214

FL-581-B-65 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL SECOND FLOOR PLAN-WEST
Sheet 29 of 214

FL-581-B-66 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
THIRD FLOOR PLAN
Sheet 30 of 214

FL-581-B-67 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL THIRD FLOOR PLAN-EAST
Sheet 31 of 214

FL-581-B-68 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
PARTIAL THIRD FLOOR PLAN-WEST
Sheet 32 of 214

FL-581-B-69 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
ROOF & SCREENED ENCLOSURE PLANS
Sheet 33 of 214

FL-581-B-70 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
ELEVATIONS
Sheet 34 of 214

FL-581-B-71 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
ELEVATIONS
Sheet 35 of 214

FL-581-B-72 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
SECTIONS
Sheet 36 of 214

FL-581-B-73 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
ENTRANCE & LOBBY DETAILS
Sheet 50 of 214

FL-581-B-74 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
AIR LOCK DETAILS
Sheet 49 of 214

FL-581-B-75 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
SPECIAL EQUIPMENT FOUNDATIONS, ROOMS 104, 117, & 126
Sheet 75 of 214

FL-581-B-76 Photocopy of drawing
CENTRAL INSTRUMENTATION FACILITY
NASA, John F. Kennedy Space Center, Florida
Drawing 203-106, Black & Veatch Consulting Engineers, October 1963
SPECIAL EQUIPMENT FOUNDATIONS, ROOMS 148 & 152
Sheet 76 of 214

FL-581-B-77 Photocopy of drawing
MASTER POWER SHUTOFF SWITCH
NASA, John F. Kennedy Space Center, Florida
Drawing 81K04511, NASA KSC, October 2002
POWER PLAN, RMS 205, 209, AND 231
Sheet 76 of 214