

ADDENDUM TO:
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39,
OPERATIONS AND CHECKOUT BUILDING
(John F. Kennedy Space Center)
First Street, between Avenue D and Avenue E
Cape Canaveral
Brevard County
Florida

HAER No. FL-8-11-E

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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

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HISTORIC AMERICAN ENGINEERING RECORD

CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39,
OPERATIONS & CHECKOUT BUILDING
(John F. Kennedy Space Center)
HAER No. FL-8-11-E, ADDENDUM

This report is an addendum to a thirty-nine page report previously transmitted to the Library of Congress.

Location: First Street, between Avenue D and Avenue E
Cape Canaveral
Brevard County
Florida

The O&C Building¹ is located within the Industrial Area of KSC at latitude: 28.524370, longitude: -80.645989. These coordinates were obtained on September 7, 2012, through Google Earth™. The coordinates datum are North American Datum 1983.

Present Owner: NASA
Kennedy Space Center, FL 32899-0001

Present Use: Spacecraft assembly, laboratories, astronaut crew quarters

Significance: The O&C Building was listed in the NRHP in 2000 in recognition of its exceptional importance at the national level in the context of the Apollo program, for which it was used to assemble and test the Apollo spacecraft before launching. It is significant at the national level under NRHP Criterion A in the area of space exploration and under Criterion C in the areas of engineering and architecture. Because the structure has achieved significance within the past fifty years and is of exceptional importance in the areas of space exploration, engineering, and architecture, Criteria Consideration G applies. The O&C Building derives its significance from its historic function as the site where the Apollo spacecraft were processed and tested and where the astronaut crews were housed.

¹ A list of acronyms, which includes those used in the original documentation package, is in Appendix C.

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Historian: Patricia Slovinac, Architectural Historian
Archaeological Consultants, Inc. (ACI)
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Sarasota, Florida 34240

Date: March 2013

Project Information: The documentation of the Cape Canaveral Air Force Station, Launch Complex 39, O&C Building 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. It is an expansion of the documentation for the Apollo-era Altitude Chambers within the O&C Building, completed in December 2009. The field team consisted of architectural historian, Patricia Slovinac (ACI), and independent photographer, Penny Rogo Bailes. Assistance in the field was provided by Nancy English, KSC Cultural Resource Specialist, and Barbara Naylor, KSC Historic Preservation Officer. The written narrative was prepared by Ms. Slovinac. It was edited by Joan Deming, ACI Project Manager; Ms. Naylor and Ms. English; Elaine Liston, KSC Archivist; 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 HAER 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 O&C Building include the "as-built" drawings, as well as those depicting major modifications to the facility, or any small 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.

Part I. Historical Information

A. Physical History:

1. Date of construction: The original portion of the O&C Building was constructed between January 16, 1963, and November 15, 1964. Major additions were completed between 1964 and 1967.²

2. Architect/Engineer: Burns and Roe, Inc., of New York, New York, served as the design architecture and engineering firm for all major phases of the facility; assistance was provided by the ACOE, Jacksonville District.³

3. Builder: The original facility was built by the joint venture of Paul Hardeman, Inc., of Stanton, California, and Morrison-Knudsen Company, Inc., of Los Angeles, California. The third floor addition to the north wing was constructed by H.J. High Construction Company of Orlando, Florida. The joint venture of Donovan Construction Company, St. Paul, Minnesota; Power Engineering Company, Inc., of Sioux City, Iowa; and Leslie Miller, Inc., of Fort Worth, Texas, constructed the east and west additions.⁴

4. Original plans and construction: The original plans for the O&C Building date to November 1962; construction occurred between January 1963, and November 1964. The original facility included north and south wings with a connector in between. In the north wing were administrative and engineering offices; the auditorium and cafeteria formed a connector between the north and south wings. The south wing included the laboratory and control room section to the north; a High Bay and Low Bay assembly and test area in the center; and the utility and service area along the south (Figure B-29).

5. Alterations and additions: The O&C Building underwent major additions between 1964 and 1967.⁵ In 1964-1965, a third story was constructed on the original north wing. Between 1964 and 1967, three-story east and west extensions were added to the north wing and a west addition to the south wing. The north wing extensions were designed to hold additional

² NASA KSC, "Real Property Record, Operations and Checkout Building," on file, KSC Real Property Office.

³ Burns and Roe, Inc., "MSC Operations and Checkout Building," November 1962, on file, KSC Engineering Documentation Center; Burns and Roe, Inc., "Third Floor Addition to Administrative & Engineering Office Area, MSC Operations and Checkout Building," April 1964, on file, KSC Engineering Documentation Center; Burns and Roe, Inc., "MSC Operations and Checkout Building Additions," July 1964, on file, KSC Engineering Documentation Center.

⁴ "Firms Announced for NASA Construction," *Spaceport News*, January 10, 1963, 2; "Construction at M.I. Set," *Spaceport News*, May 14, 1964, 6; "Operations Building Contract Announced," *Spaceport News*, November 25, 1964, 2.

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

administrative and engineering offices; the south wing extension included additional laboratories and control rooms (north), an airlock (center), and additional service rooms (south). At the same time, two connecting corridors between the north and south wings were constructed, one each to the east and west of the original main connector.

Throughout its existence, various areas of the O&C Building have undergone modifications as technology changed and/or new space programs brought different requirements. For example, in the early 1970s, the Low Bay was fitted with equipment to process the Apollo Telescope Mount for the Skylab Program; later in the 1970s, the Low Bay and equipment were retrofitted for horizontal processing of Space Shuttle payloads.

B. Historical Context:

The ACOE, NASA's supervisory design and construction agent, hired Burns and Roe, Inc. to complete the design for the O&C Building, which at one time was referred to as the Manned Spacecraft Operations Building.⁶ Preliminary groundwork for the facility was completed by the Azzarelli Construction Company, of Tampa, Florida, in November 1962. Part of this work included piling 200,000 cubic feet of soil on the site to compact the shale, fine sand, and clay silt earth in order to form a stable foundation for the building (Figure B-1).⁷

On January 16, 1963, the joint venture of Paul Hardeman and Morrison-Knudsen was awarded a \$7,691,624 contract to construct the original portion of the building; the official groundbreaking occurred twelve days later.⁸ By May of that year, most of the reinforcing steel for the poured concrete pilasters was in place.⁹ Construction proceeded rapidly, with nearly the entire structural skeleton in place by October 1963, and by January 1964, KSC's *Spaceport News* reported the structure was nearly three-fourths complete (Figure Nos. B-2 through B-7).¹⁰ The first employees moved into the building on August 28, although construction was not officially completed until November 16, 1964.¹¹

In April 1964, before construction of the original facility was finished, Burns and Roe completed the design for a third floor addition to the original north wing; the \$1,102,800 construction

⁶ 'Manned Spacecraft Operations Building' became the designated name in late 1964/early 1965; it is unclear when this name was dropped. "Spaceport Buildings Renamed," *Spaceport News*, January 14, 1965, 2.

⁷ "Planning is Key to Big Jobs Here," *Spaceport News*, January 10, 1963, 5.

⁸ "Officials Have Busy Week Here," *Spaceport News*, January 31, 1963, 1.

⁹ "Photo Caption," *Spaceport News*, May 1, 1963, 3.

¹⁰ "Photo Caption," *Spaceport News*, October 3, 1963, 4; "MILA Area Construction Projects Progress Rapidly," *Spaceport News*, January 2, 1964, 2.

¹¹ This first group was comprised of roughly 250 NASA Manned Spacecraft Center (MSC)-Florida operations, McDonnell Aircraft, and North American Aviation personnel. "MSC Begins Migration to New Spaceport Home," *Spaceport News*, August 27, 1964, 1; NASA KSC, "Operations and Checkout Building."

contract for this floor was awarded in May to H.J. High Construction Co. (Figure B-8). The addition was completed on October 11, 1965.¹² In the meantime, in November 1964, a \$9,412,626 contract for the construction of the east and west additions to the north wing, as well as the west addition to the south wing and the two corridor connectors, was awarded to the joint venture of Donovan Construction Company, Power Engineering Company, Inc., and Leslie Miller, Inc.¹³ These additions were completed in November 1967 (Figure Nos. B-9, B-10).

Since 1967, the O&C Building has received no major additions. However, various areas have been modified throughout the years based on the needs of different programs. The major modifications will be discussed within the Historic and Current Functions of the O&C Building section. In addition, various building systems have been upgraded with technological advances.

Historic and Current Functions of the O&C Building

As originally constructed, the O&C Building was designed to house the Florida operations of the MSC, located in Houston, Texas.¹⁴ These operations included the mating, modification, and testing of manned spacecraft modules and assemblies; training, housing, and prelaunch medical examination of astronaut crews; laboratory testing of electronic, mechanical, and structural spacecraft components; laboratory testing of biomedical components; and receiving, evaluating, and recording data from the spacecraft during simulated flights, launches, and missions.¹⁵

Spacecraft Operations

Spacecraft assembly, mating, modification, and testing historically occurred within the High and Low Bay areas of the O&C Building. In 1964, the first major piece of equipment was installed in this area: the original Project Mercury altitude simulator from Hangar S at CCAFS. The chamber was modified and used for preflight acceptance tests of the Gemini spacecraft in its flight configuration, with and without fully suited astronauts; the chamber could simulate altitudes up to 120,000'.¹⁶ The first spacecraft scheduled for testing was the Gemini Spacecraft 3, used for the first manned Gemini mission (Gemini III).¹⁷ In 1965, the two large altitude chambers for the Apollo spacecraft were installed near the northeast corner of the High Bay.¹⁸

¹² "Construction at M.I. Set;" NASA KSC, "Operations and Checkout Building."

¹³ "Operations Building Contract Announced."

¹⁴ The MSC became the Lyndon B. Johnson Space Center in 1973, following the death of the president.

¹⁵ NASA MSC, "Criteria for Design, Operations & Checkout Building," March 9, 1962, Sweetsir Collection, File No. ARCH00017322, Kennedy Space Center Archives Department, Florida, 3.

¹⁶ "Counting Down with the Editor," *Spaceport News*, June 25, 1964, 4; "Altitude Chamber Modified, Moved," *Spaceport News*, July 30, 1964, 4; "Photo Caption," *Spaceport News*, September 3, 1964, 4.

¹⁷ "Mercury Attitude [sic] Chamber Modified," *Spaceport News*, August 27, 1964, 3.

¹⁸ See original documentation package for HAER No. FL-8-11-E.

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The Apollo spacecraft consisted of three components: the command module, the service module, and the lunar module, all of which were processed and tested in the O&C Building. The command and service modules arrived separately; the lunar module arrived in two sections, the ascent stage and the descent stage. Each of these four components was then thoroughly checked by technicians for damages, who then completed any required assembly tasks. Then, the command module was mated to the service module, and the lunar module's ascent and descent stages were mated. The command/service module and the lunar module were subjected to tests in the altitude chambers, after which any modifications were made to the components. The command/service module was then mated to the lunar module (Figure No. B-11), and the entire spacecraft was carried to the Vehicle Assembly Building for stacking with the Saturn rocket.¹⁹

During the Skylab Program, the High and Low Bays provided similar spacecraft assembly support. In addition, circa 1972, a Class 100,000 Clean Room was constructed at the west end of the Low Bay to provide a controlled environment in which to process the Apollo Telescope Mount for the Skylab Program.²⁰ Other facilities were installed in the Low Bay to assist in the checkout and processing of the Apollo Telescope Mount, as well as the airlock module, and multiple docking adapter for the Skylab Program. After processing, these items were taken to the Vehicle Assembly Building for stacking with the spacecraft.²¹ The vehicle for the Apollo-Soyuz Test Project was the last spacecraft processed in the O&C Building for roughly forty years (Figure No. B-15).

In August 1977, NASA contracted with W&J Construction Corporation of Cocoa, Florida, to convert the Low Bay area of the O&C Building into the Horizontal Processing Facility in support of Spacelab and other horizontal payloads that would fly on the Space Shuttle. Installation and modification of new integration and equipment stands took 300 days (Figure No. B-16). Installed equipment included a cargo integration test equipment stand for horizontal interface testing; an experiment integration stand that supported installation of experiments into Spacelab pallets; a rack, floor, and pallet stand, which accommodated electrical rack buildups; and two workstands for buildup of Spacelab elements.²² The first Shuttle equipment, the Orbiter Flight Test pallet, arrived at the O&C Building in December 1978; the first payloads to be

¹⁹ "KSC Team Checks Apollo 15," *Spaceport News*, July 29, 1971, 2.

²⁰ The Apollo Telescope Mount served as a housing for the first manned scientific telescope in space. It consisted of a 14'-diameter sunshield, an instrument canister, a spar assembly, which held the instruments within the canister, and four solar cell arrays. Its main purpose was to observe the Sun and collect data to help scientists on Earth determine the origin of the Sun and how it affects life on Earth. "Skylab Pedestal Work Completion set in August," *Spaceport News*, July 1, 1971, 7; ACI, "Operations & Checkout Building Low Bay" (state-level documentation package, NASA KSC, 2006).

²¹ ACI, "Operations & Checkout Building."

²² NASA KSC, "Apollo Spacecraft Building to be Modified for Shuttle Operations," news release no. KSC 143-77, August 18, 1977, Sweetsir Collection, File No. ARCH00009023, Kennedy Space Center Archives Department, Florida; ACI, "Operations & Checkout Building."

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processed in the O&C Building arrived in September 1979.²³ The first Spacelab component was delivered to KSC on December 5, 1980.²⁴ Spacelab components flew on twenty-eight Space Shuttle missions before the program was decommissioned in 1998. Afterwards, the equipment in the Low Bay was used for processing, assembly, acceptance testing, and integration testing of some of the truss segments for the ISS; one of the altitude chambers was also reactivated for testing station components.²⁵ From 2007-2009, the equipment within the Low Bay was removed in preparation for processing the Orion spacecraft.²⁶ During the \$55 million renovation, Hansel Phelps Construction Company of Orlando, Florida, replaced nearly everything in the area, including walls, ceilings, flooring, paint, air conditioning, and the heavy lifting crane; the base structure was left intact.²⁷

During the Apollo Program, testing support was provided by Acceptance Checkout Equipment stations (Figure No. B-17), located on the third floor of the laboratory and control section of the O&C Building. The first station was declared operational in May 1965; a total of four were operational by 1966. The stations allowed engineers and technicians to monitor 1,500 spacecraft operational parameters through more than 25,000 test samples per second. Equipment within the stations included high-speed computers, display consoles, and recording equipment, all of which gathered, processed, and displayed the data instantaneously. The data was also stored for future analysis. In addition, the engineers and technicians could control the spacecraft from the stations. Fifteen to twenty test runs were completed on each spacecraft, including tests of individual systems, integrated systems checks, and final prelaunch checkout.²⁸ In the 1980s, the Acceptance Checkout Equipment stations were removed, and the rooms were renovated into user rooms in support of Shuttle payloads (Figure No. B-18).²⁹

²³ "Two of First Shuttle Payload Experiments Arrive at KSC," *Spaceport News*, September 28, 1979, 1 and 2.

²⁴ "Shuttle Tempo Continues to Increase," *Spaceport News*, January 9, 1978, 1, 3 and 4; "Spacelab Model Arrives at KSC," *Spaceport News*, December 19, 1980, 3 and 6; "Mobile Cargo Home Tested," *Spaceport News*, January 2, 1981, 3. Horizontal payloads were those that could be processed in a horizontal position; vertical payloads were processed at the Vertical Processing Facility.

²⁵ "Stationary Object Arrives," *Spaceport News*, November 26, 1999, 6; "International Space Station Starboard Truss Segment at KSC," *Spaceport News*, October 15, 1999, 6; "International Space Station Center Truss Segment at KSC," *Spaceport News*, June 25, 1999, 7; "SSPF and O&C Building Multiflow Planning," slide presentation, September 22, 1997, Sweetsir Collection, File No. ARCH00012049, Kennedy Space Center Archives Department, Florida.

²⁶ Orion was the name given to the crew module for the Constellation Program, which was set to send man back to the moon. The Constellation Program was cancelled by President Barack Obama in 2010; however, the replacement program, designated Space Launch System, will use the Orion crew module to carry astronauts into space.

²⁷ Linda Herridge, "O&C High Bay Ready for Orion Processing," *Spaceport News*, February 6, 2009, 2.

²⁸ "First ACE Test Station Declared Operational," *Spaceport News*, May 20, 1965, 2; "KSC's ACE Checks Out Spacecraft," *Spaceport News*, February 18, 1966, 4; "ACE Checks Apollo Performance," *Spaceport News*, August 17, 1967, 7.

²⁹ NASA KSC, "Operations and Checkout Building."

Astronaut Support

In March 1965, the primary and backup crews of Gemini III were the first to reside in the new astronaut crew quarters within the O&C Building. The quarters were located at the west end of the third floor of the laboratory and control section in the south wing, and consisted of three apartments (each with a lounge area [Figure No. B-19], three bedrooms, and a lavatory), a conference room (Figure No. B-20), a gym, a sauna, a kitchen, and a dining room (Figure No. B-21). With the 1964-67 addition to the O&C Building, the astronaut quarters were expanded, to include four additional bedrooms, two additional lavatories, a pantry, six private offices, a suit room, and a general office area.

During the Apollo Program, the primary and backup astronaut crews arrived at KSC roughly three months before the mission.³⁰ During this time, they would train for the mission on simulators within the O&C Building, and at the Flight Crew Training Building, located to the southeast of the O&C Building (it is currently called the Engineering Development Laboratory). The lounge areas provided the astronauts with a place to relax in the evenings and between training periods; a fully equipped gym allowed them to stay in top physical condition. The conference room and office areas gave them a place to study and discuss mission operations, and a kitchen and dining room provided them with meals.³¹

For the first two months, the astronauts could stay where they wished. Beginning twenty-one days before launch, however, they were required to stay in the crew quarters, and their movements were limited to designated areas within the Flight Crew Training Building and the launch pad. This was to reduce the risk of the astronauts becoming sick prior to launch, which could potentially delay a mission. As the launch date neared, the primary and backup crews underwent a series of preflight medical exams in the medical laboratories within the Biomedical Laboratory at the east end of the third floor in the laboratory and control section of the O&C Building.³² The facilities included an X-ray machine; a neurology room; an ears, nose, and throat exam area; a blood pressure test area with a tilt-table; a food processing area; and a reception and lounge area. The first preflight physical occurred ten days before liftoff, and a second was performed two days before liftoff. In general, these physicals included temperature, blood

³⁰ "Cooperation Good in Crew Health Stabilization Program," *Spaceport News*, January 14, 1971, 1 and 5.

³¹ "KSC Readies Astronaut Quarters," *Spaceport News*, May 25, 1979, 6.

³² In August 1965, the primary and backup crews for Gemini V were the first to undergo their preflight medical exams in the new medical laboratories at the east end of the third floor in the laboratory and control section of the O&C Building. Previously, preflight medical examinations were given in Hangar S at CCAFS (Project Mercury) and the Bioastronautics Operational Support Unit facility at CCAFS (Project Gemini).

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pressure, and weight checks; blood and urine analyses; skin examinations; and eye, ear, nose, and throat examinations.³³

On the morning of launch, the astronauts would arise at the designated time and participate in the traditional crew breakfast in the dining room (Figure No. B-22). The crew would then go to the medical laboratories for their third preflight physical (Figure No. B-23). Once medically cleared, the astronauts returned to the crew quarters where they entered the "suit-up room," a super-clean area where they donned their spacesuits. Originally, the facility contained an airlock, a room where personnel put on surgical gowns and cleaned their shoes, a suit repair and maintenance room, and the main suiting room. The room was first used by the astronaut crew for Apollo 7, the first manned mission of the Apollo Program (Figure No. B-24).

The process started with each astronaut putting on a urine collection device, a biomedical sensor, and, if they were to perform an extravehicular activity, a liquid-cooled garment. Next, the astronauts donned the bottom part of the outer suit, followed by the upper half of the suit. The suit was then connected to a pressure garment assembly test stand, and oxygen was pumped into the suit. A communications carrier with earphones and microphones was placed on the astronaut's head, boots were placed on the feet, and a helmet was donned (Figure No. B-25). Afterwards, all fittings and communications equipment were checked, and the venting system was tested. Finally, pressure decay and leak checks were conducted.³⁴ Afterwards, the crew exited the suit-up room, walked down the hallway to an elevator that carried them to the first floor. They exited the O&C Building through a set of double doors, and climbed aboard a van that carried them to the launch pad (Figure No. B-26).

These functions continued through the Space Shuttle Program, although the crew tended to arrive closer to the launch date because nearly all of their training occurred at Houston. However, astronauts would use the quarters intermittently when they were at KSC to monitor tests on the spacecraft, flight hardware, or payloads.³⁵ The quarantine period for the Space Shuttle astronauts was shorter, at seven days prior to launch, and began at JSC, which also had crew quarters for the astronauts. The Shuttle crews would fly to KSC four or five days prior to launch. The suit-up process for Shuttle astronauts also was slightly different because the suits were one-piece (excluding helmet, boots, and gloves). In addition, a Shuttle astronaut may have spent the night following landing at KSC in the crew quarters upon the recommendation of the flight surgeon; an ISS Expedition Member returning from an extended stay was required to remain in the crew quarters that night. An astronaut also may have stayed at the crew quarters for multiple days

³³ "Astronauts Checked in New Med Lab," *Spaceport News*, September 16, 1965, 3. More extensive examinations were performed on the astronauts in Houston, prior to their travel to KSC.

³⁴ "Astronauts use Super-Clean Lab for Donning Spacesuits," *Spaceport News*, September 26, 1968, 5.

³⁵ "KSC Readies Astronaut Quarters," *Spaceport News*, May 25, 1979, 6.

following a mission, if he or she elected to participate in experiments or tests in support of the Baseline Data Collection Facility.³⁶

Circa 1989, medical examination rooms were installed within the astronaut crew quarters, directly west of the suit-up room. At this time, preflight examinations were conducted within the crew quarters, as opposed to the examination rooms in the Biomedical Laboratory at the east end. In 1994, the astronaut crew quarters were expanded to the west, when two office areas and a portion of the medical examination area were converted into eleven bedrooms and a conference room. This new area became the quarters for the primary crew and their medical staff, while the original area was devoted to support astronauts and management. These original bedroom areas were renovated at the same time so that each bedroom would have its own bathroom.³⁷

Component Testing

Component testing was completed within a series of materials analysis laboratories located throughout the laboratory and control section of the O & C Building. Within these labs was all the necessary apparatus required for the analysis of malfunctions to determine the basic failure of materials or equipment. These labs also provided testing support for ground support equipment. Different types of testing in these facilities included failure analysis and materials evaluation, materials analysis and corrosion testing, chemical analysis, cryogenics testing, and electrostatic analysis. Equipment within the various labs included mass spectrometers, an optical emission spectrograph, an X-ray image intensifier system, a scanning electron microscope, an electron microprobe, a thermal vacuum chamber, two spectrophotometers, a random vibration system, an X-ray diffraction/fluorescence unit, and a clean room.³⁸

Biomedical Testing

At the east end of the third floor of the laboratory and control section of the O&C Building is the Biomedical Laboratory, installed during original construction. Historically, this lab has supported manned spaceflight by testing astronauts' spacesuits, other protective equipment (such as respirators), biomedical sensors, and emergency equipment. The testing ensured that any

³⁶ Typically, the astronauts were taken to a nearby hotel to spend the night with their families before returning to JSC the following day. Lauren Lunde, personal communication (email) with Patricia Slovinac (ACI), October 25, 2012, on file, ACI, Sarasota, Florida.

³⁷ "Astronauts Crew Quarters are Part Office, Part Sanctuary," *Spaceport News*, June 15, 2007, 3; Lauren Lunde, personal communication (interview) with Patricia Slovinac (ACI), May 24, 2012, notes on file, ACI, Sarasota, Florida; Lauren Lunde, personal communication (email) with Patricia Slovinac (ACI), October 24, 2012, on file, ACI, Sarasota, Florida.

³⁸ NASA, "KSC Materials and Processes," pamphlet provided by Edrick Jackson, NASA KSC, 2011; NASA. *Technical Facilities Catalog Volume II*. (October 1974), 9-6 through 9-12.

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product used by an astronaut met the specifications issued by the manufacturer. This area has also provided medical equipment to emergency response teams. Much of the testing for human apparatus is completed with human test subjects, so a medical monitoring station was included in the area in the event of an emergency. If flaws were discovered in the equipment, and it was furnished by the government, in-house technicians would correct the problem; if the equipment came from an outside manufacturer, the lab would send representatives to the contractor with the defective equipment to monitor the corrections.³⁹ The original medical examination rooms described in the astronaut support section also were located in this area.

Spacecraft Data Monitoring

During the Apollo Program, the O&C Building contained equipment for receiving, recording, monitoring, and distributing radio frequency and video signals from the command and service modules. Special equipment was available to check airborne cameras, provide test signals for scan converters, record slow scan television (ten frames per sec), and convert slow scan to standard (thirty frames per sec). This equipment also provided voice communication to the altitude chambers via radio frequency and operational intercommunication systems, and data line interfaces with the Quick Look Data Station and the Acceptance Checkout Equipment stations. There were also rooftop antennas, as well as instrumentation and radio frequency checkout systems, which were used for open-loop tests of the command and service module's equipment when the spacecraft was located at the Vehicle Assembly Building and at Launch Complex 39.⁴⁰

Sometime after the Apollo-Soyuz Test Project, this equipment was removed from the facility. In 1988-1989, a closed circuit television monitoring station was installed in the O&C Building. This station was used to record processing and hazardous activities performed in the Vertical Processing Facility, the O&C Building High and Low Bays, Hangar AE, the Payload Hazardous Servicing Facility, and the Multi-Payload Processing Facility; it did not directly support testing of the Space Shuttle vehicle or payloads.⁴¹

³⁹ "They Test Flight Hardware," *Spaceport News*, August 31, 1967, 7; Robert Cummings, personal communication (interview) with Patricia Slovinac, May 23, 2012, notes on file at ACI.

⁴⁰ NASA KSC, *Facilities Catalog*, 9-18 through 9-21.

⁴¹ Barry Blitch, personal communication (interview) with Patricia Slovinac (ACI), May 25, 2012, notes on file, ACI, Sarasota, Florida.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The O&C Building (Photo Nos. 60-67) is a five-story, 601,505 square foot facility located directly east of the Headquarters Building in the Industrial Area of KSC. It features two prominent, rectilinear, east-west oriented components to the north and south, which are connected by three north-south components. The building 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 O&C Building displays the lack of ornament, effect of volume, flat roof, ribbon windows, skeleton construction, and horizontality, which are hallmarks of the International Style. It takes advantage of the utilitarian functional and economic nature of the style, providing efficiency in plan and in the use of materials.

2. Condition of fabric: Due to periodic maintenance and continual use of the facility, the O&C Building is in good condition.

B. Description of Exterior:

1. Overall dimensions: The O&C Building has overall dimensions of approximately 740' in length (east-west), 420' in width (north-south), and 105' in height.

The three-story north wing contains the administrative and engineering offices; it has rough dimensions of 740' in length (east-west), 117' in width (north-south), and 46'-6" in height.

The two-story auditorium and cafeteria area forms the original, north-south connector. This portion of the O&C Building has approximate dimensions of 109' in length (east-west), 74'-6" in width (north-south), and 37' in height. To either side of the auditorium and cafeteria area is a three-story corridor connector with rough dimensions of 74'-6" in length (north-south), 12' in width (east-west), and 46' in height. These two corridors were constructed as part of the circa 1964-67 additions to the facility.

The south wing of the facility is comprised of the laboratory and control room section (to the north), the High Bay, Low Bay, and airlock (in the center), and the utility and service area (to the south). This wing has rough overall measurements of 728' in length (east-west), and 211' in width (north-south). The laboratory and control room is about 78' in height, the High Bay stands approximately 105' in height, the Low Bay is around 70' in height, and the utility and service area is roughly 21' in height.

2. Foundations: The foundation for the administrative and engineering office wing of the O&C Building is comprised of a 4"-thick, reinforced poured concrete slab supported by reinforced concrete footers. The auditorium and cafeteria area, laboratory and control room area, High Bay and Low Bay area, and service area have foundations composed of a 6"-thick, reinforced poured concrete slab supported by reinforced concrete footers.

3. Walls: The administrative and engineering office wing has walls comprised of a reinforced concrete frame with precast exterior granular quartz surfaced panels. In general, the north and south elevations are divided into 25'-wide bays by 2'-deep, white-painted concrete pilasters; the east and west elevations are divided into four vertical bays by similar pilasters, the outer bays are roughly 26' in width and the inner bays are about 32.5' in width.

The auditorium and cafeteria connector has exterior walls composed of the same materials as the administrative and engineering office wing. These walls are divided into four, 18.5'-wide vertical bays by white-painted pilasters. The two corridor connectors are not divided into vertical bays; rather, they feature concrete masonry unit walls faced with stucco.

The north elevation of the south wing has walls comprised of a reinforced concrete frame with precast exterior granular quartz surfaced panels. Like the administrative and engineering office wing, the elevation is divided into 25'-wide bays by white-painted concrete pilasters. The north portion of the east and west walls of this wing, which correspond to the laboratory and control area, also are constructed of a reinforced concrete frame with precast exterior granular quartz surfaced panels, but feature no vertical bay divisions. The remaining elevations on the south wing also are not divided into vertical bays, and are composed of concrete masonry units faced with stucco.

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

5. Porches, stoops, balconies, bulkheads: The main entrance on the north elevation of the north wing features an open porch, shielded by a 25' x 10' precast concrete canopy. All of the remaining exterior doors into the O&C Building have a poured concrete stoop.

6. Stacks: The south elevation of the south wing features utility pipes that extend across the entire length of the building (Photo Nos. 63-65).

7. Openings:

a. Doorways and doors: According to the architectural drawings, there are forty-eight exterior entrances along the various elevations of the O&C Building.⁴² The main entrance is located on the north elevation of the north wing; it features four glass and metal swing doors, the outer two of which are automatic.⁴³ Aside from the main entrance, there is one other entrance on the north elevation of the north wing. The east elevation of this wing contains one entrance, the south elevation has five entrances, and the west elevation has two entrances. One of the entrances is comprised of a single swing door; all others are comprised of one set of double swing doors. All of the doors are fabricated of aluminum and feature aluminum frames.

The auditorium and cafeteria connector contains four exterior entrances, two on the east elevation and two on the west elevation. All four are comprised one set of double swing doors. Three are fabricated of aluminum and have aluminum frames; the fourth is made of hollow metal and features a pressed steel frame.

The south wing of the O&C Building features thirty-four doors in a variety of styles. Both the east and west elevation feature a 40' x 50', seven section, aluminum raising door operated through the use of counterweights; these correspond to the High Bay/Low Bay/airlock section (Photo No. 68). There are eight horizontal sliding doors on the south elevation, all which are comprised of aluminum and feature steel frames. There is one vertical roll-up door, made of aluminum, on the south elevation, and one aluminum vertical bi-parting lift door on both the west and north elevations. The remaining twenty entrances are standard single swing doors and sets of double swing doors, with all doors fabricated of aluminum and featuring steel or aluminum frames. There are four sets of double swing doors and four single swing doors on the north elevation; the set of double swing doors underneath the west connector is where the astronauts exit the O&C Building on their way to the launch pad (Photo Nos. 70, 71). The south wing also contains one set of double swing doors on the east elevation; seven sets of double swing doors and two single swing doors on the south elevation; and two sets of double swing doors (one on the second floor level) and one single swing door on the west elevation.

⁴² Burns and Roe, Inc., "Operations and Checkout," Sheet Nos. 50-53; Burns and Roe, Inc., "Building Additions," Sheet Nos. 72, 73.

⁴³ This description is based on photograph KSC-04PD-0655, available at <http://mediaarchive.ksc.nasa.gov/search.cfm>. At the time of documentation, the main entrance was inaccessible due to lobby renovations; however, according to Todd Baker, O&C Building Facility Manager, the renovations do not include door replacement.

b. Windows: All four elevations of the north wing feature ribbons of 4' x 4' windows at all three floor levels; all have aluminum frames and are flush with the exterior surface of the wall (Photo Nos. 60, 61, 67). In general, there are six, one-light windows with aluminum frames per vertical bay. Four, the two center panes, and the two end panes, are fixed and the other two pivot. Similar ribbons of windows are on the north elevation of the south wing at four of the five floor levels, as well as the north portion of the west elevation of the south wing, at the third floor level only.

The second story of the auditorium and cafeteria connector contains a ribbon of fixed windows on both its east and west elevations. Similarly, the second and third floor levels of the two corridor connectors contain ribbons of windows on both the east and west elevations. At the second floor level, these windows consist of two 4' x 4' panes at the bottom, atop of which is a 8' x 4' pane, above which is a 8' x 2.5' pane. On the third floor level (corridor connectors only), the windows consist of two 4' x 4' panes with one 8' x 4' pane above. About half of the 4' x 4' windows pivot, whereas the rest are fixed.

8. Roof:

a. Shape, truss type, covering: All sections of the O&C Building feature a flat, built-up roof.

d. Antennae: At the west end of the roof over the laboratory and control area are two modern dish antennas. In addition, the support framework for the original antennas is situated in this area (Photo No. 68).

C. Description of Interior:

1. Floor plans: The two wings and main connector of the O&C Building contain five functional areas. In the north wing are the administrative and engineering offices; the auditorium and cafeteria form the main connector between the north and south wings. In the south wing are the laboratory and control room section; a High Bay and Low Bay assembly and test area; and the utility and service area (Figure No. B-29).

a. North Wing: The north wing of the O&C Building, which contains three floor levels, is comprised of the administrative and engineering office area. The layout of all three floors is based on a double loaded corridor plan, with offices along the perimeter and in the center. Interspersed among the offices are restrooms, electrical rooms, mechanical rooms, and storage rooms. In the center of the first floor, along the north wall, is the roughly 50' x 31' lobby area, which was inaccessible at the time of documentation. This wing also features a snack bar on the second floor level, near the west end of the building.

b. Auditorium and Cafeteria Connector/Secondary Connectors: The auditorium and cafeteria connector is comprised of two floor levels. On the first floor, there is a central corridor with the auditorium (Photo No. 103; originally called the Mission Briefing Room) to the east and the cafeteria to the west. The corridor extends into the north and south wings. On the second floor, there is an enclosed corridor directly above the first floor corridor to provide sheltered access between the north and south wings. Roughly halfway along the length of this corridor, there are two small air conditioning rooms, one to the east and one to the west; these two rooms are only accessible from the first floor roof.

To the east and west of the auditorium and cafeteria connector is a three-story corridor connector, providing access between the north and south wings. The first level is open, and the second and third levels are enclosed (Photo Nos. 62, 66).

c. South Wing: The south wing is longitudinally divided into three areas: the laboratory and control room section at the north; the High and Low Bay assembly and test area in the middle; and a utility and service area at the south.⁴⁴ For ease of discussion, these three sections will be discussed separately.

i. Laboratory and Control Room Section: The laboratory and control room section has four full floor levels and a partial fifth floor at the east end. The layouts of the first four floors are based on a double loaded corridor plan, with a main corridor that extends continuously from the east elevation to the west elevation. This corridor is slightly off center, so that the rooms along the north are 25' wide and those on the south are 42' wide.

On the first floor level, the rooms to the north of the corridor are mostly offices; mechanical, air conditioning, electrical, and communications equipment rooms; and restrooms. To the south of the corridor, there are various laboratory areas, including the Materials Failure Analysis Laboratory (Photo Nos. 104, 106), the Mechanical System/Metrology Laboratory (Photo Nos. 107-109), the Materials Science/Chemical Analysis Laboratory, the Physical Test Area, an Applied Chemistry Laboratory, the Environmental Laboratory, the Environmental and Vacuum Chamber Test Area (Photo No. 105), the Materials Test Section, and the Polymer Laboratory. There are also locker rooms for those who work in the High and Low Bay area and an office area.

The second floor of the laboratory and control room section is similar to the first floor, with offices and support areas to the north of the corridor. To the south of the corridor are mostly laboratory areas. These include the Corrosion Technology Laboratory, the Environmental Microbiology Laboratory, the Electronics Failure Analysis Laboratory

⁴⁴ NASA, *Facilities Catalog*, 9-3.

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(Photo No. 111), and two applied chemistry laboratories (Photo No. 110). Additionally, the control rooms for the two altitude chambers are near the east end.⁴⁵ At the west end of this floor level is the Baseline Data Collection Facility/Life Sciences Flight Experiments area (Photo Nos. 100-102).

Like the first two floor levels, the rooms to the north of the third floor corridor are mostly offices and equipment rooms; those to the south of the corridor are laboratories and user rooms. The user rooms (Photo Nos. 92, 93) vary in size and layout. Each typically has a raised floor, allowing computer and electrical wiring to be placed underneath. At the east end is the Biomedical Office area. Here, on the north side of the corridor, there is a mechanical shop and the original astronaut medical facilities (Photo No. 98), including examination rooms, and a hematology laboratory. On the south side of the corridor is an electronics shop (Photo No. 99), and a protective equipment test area, complete with a medical monitoring station (Photo Nos. 95-97).

At the west end of the third floor are the astronaut crew quarters. This roughly 18,800 square foot area was informally divided into two sections: one for the primary crew (west) and one for the support astronauts and management (east). The western section, which was installed circa 1995, contains eleven bedrooms, each with a closet and bathroom (Photo No. 83); a lounge/conference room (Photo No. 80); medical facilities (Photo Nos. 81, 82); and the suit-up room (Photo Nos. 85, 86). The eastern section, which dates to the original construction of the O&C Building, contains twelve bedrooms (Photo No. 84), a conference room (Photo No. 74), a dining room (Photo No. 76), a kitchen (Photo No. 77), a gym (Photo No. 78), staff offices, and laundry facilities. A sauna room was located next to the gym, but the sauna equipment has been disassembled and removed (Photo No. 79).

At the fourth floor level, offices and equipment rooms extend to the north of the corridor, whereas user rooms, closed-circuit television rooms, and laboratories are along the south of the corridor. Near the east end of this floor is a racquetball court for the astronauts (Photo No. 87). The small, fifth floor level at the east end of the O&C Building contains office areas.

ii. High Bay and Low Bay Assembly and Test Area: To the south of the laboratory and control section is the assembly and test area, which is comprised of the High Bay at the east end, the Low Bay in the middle, and an airlock at the west end (Photo Nos. 88-91). The High Bay roughly measures 157' in length (east-west), 85' in width (north-south), and 104' in height; the original 27.5-ton bridge crane, which moves east-west, is mounted roughly 100' above the floor (Photo No. 43). The High Bay is comprised of one large

⁴⁵ See page 21, and photo no. 44.

open space. In the east wall is a seven-section raising metal door. Along the north wall are the two altitude chambers embedded in a platform structure; to their east is the integrated test stand, a steel structure fitted with fixed and movable platforms (Photo Nos. 1, 5). The High Bay opens into the Low Bay, which sits directly to its west. The Low Bay is approximately 475' in length (east-west), 85' in width, and 70' in height, with a bridge crane mounted 48' above the floor. At the time of documentation, the Low Bay contained enclosed work areas for the Orion capsule; none are permanent fixtures. The airlock at the west end (Photo No. 91) measures roughly 75' in length (east-west), 85' in width, and 70' in height. It has seven-section raising metal doors on both its west wall (to the exterior) and east wall (into the Low Bay), and features large ducts along its walls, which are part of the vacuum system.

Below the north half of the assembly and test area (High and Low Bays) is a cable/utility tunnel, the floor of which rests 12' below grade (Figure Nos. A-27, A-28). From the east wall of the High Bay, the tunnel extends for 174' at a width of 40'-5"; within this section is the bottom of the two altitude chambers.⁴⁶ For its remaining length (493'), the tunnel is 30' in width. In addition, four small tunnels extend from the main tunnel to the utility and service section along the south wall of the O&C Building.

iii. Utility and Service Section: The utility and service section at the south is one story in height. This area contains electrical and mechanical equipment rooms, a vacuum pump room for the altitude chambers, a tool and supply area, a mechanical shop, and other workshops.

3. Stairways, elevators: There are seven stairways within the administrative and engineering office area (north wing) of the O&C Building. All of these stairways are U-shaped, and feature bare concrete or vinyl tile landings, rubber risers and treads, and 1-1/2" diameter aluminum pipe railings. In the south wing, there are four stairways of similar design and materials. There are also three elevators in the north wing and four elevators in the south wing.

4. Flooring: The O&C Building features a variety of flooring materials. In general, office, user rooms, and laboratory areas, as well as the astronaut quarters, have vinyl tile or carpeting; the corridors contain carpeting, vinyl tile, and terrazzo; the cafeteria and auditorium feature carpeting; the restrooms have ceramic tiles; and stairways, service areas, and equipment rooms feature bare concrete. The High Bay, Low Bay, and airlock contain poured concrete floors faced with an epoxy covering.

⁴⁶ See Photo No. 16 in the original submission.

5. Wall and ceiling finish: The O&C Building features a variety of wall finishes throughout the facility. Plaster applied to concrete masonry units is one of the more common wall finishes in the facility; it is found in offices, user rooms, and laboratories, and corridors. Metal partitions are also used throughout the facility, providing flexibility in layout (Photo No. 115). Another common wall finish is painted concrete masonry units, found in areas such as the High Bay, Low Bay, and airlock; equipment rooms; stairways; and corridors. The astronaut quarters feature painted gypsum wall panels. The restrooms and locker rooms generally have ceramic tile walls.

The most common ceiling finish throughout the facility is suspended acoustical tile, which is found in offices, laboratories, user rooms, corridors, and the astronaut quarters. Other ceiling finishes include suspended plaster, in areas such as restrooms, and exposed concrete, typically found in equipment rooms.

6. Openings:

a. Doorways and doors: There are approximately 660 interior doors throughout the O&C Building.⁴⁷ About 95 percent are fabricated of hollow metal; the remaining 5 percent are of aluminum, steel, or wood.

7. Mechanical equipment:

a. Heating, air conditioning, ventilation: The O&C Building contains its own centralized, heating, ventilating, and air conditioning system.

b. Lighting: The lighting system for the High Bay includes high pressure sodium pendant and wall-mounted fixtures, surface-mounted and pendant fluorescent fixtures, and fluorescent emergency lighting.

c. Plumbing: The O&C Building contains its own plumbing system, one for chilled water and one for heated water.

E. Site Layout: The O&C Building is situated within the Industrial Area of KSC. It is located along First Street, directly east of the Headquarters Building and west of the Space Station Processing Facility. Second Street lines the south of the building, and there are parking lots to the east and west. To the southeast of the O&C Building is its cooling tower and electrical substation.

⁴⁷ This number is based on counting those listed within the architectural drawings. An actual count was not conducted during the fieldwork.

Part IV. Sources of Information

A. Primary Sources:

Burns and Roe, Inc. "MSC Operations and Checkout Building." November 1962. On file, KSC Engineering Documentation Center.

_____. "MSC Operations and Checkout Building Additions." July 1964. On file, KSC Engineering Documentation Center.

_____. "Third Floor Addition to Administrative & Engineering Office Area, MSC Operations and Checkout Building." April 1964. On file, KSC Engineering Documentation Center.

NASA. *Technical Facilities Catalog Volume II*. October 1974.

NASA KSC. "Real Property Record, Operations and Checkout Building." On file, KSC Real Property Office.

NASA MSC. "Criteria for Design, Operations & Checkout Building." March 9, 1962. Sweetsir Collection, File No. ARCH00017322, Kennedy Space Center Archives Department, Florida.

B. Secondary Sources:

ACI. "Operations & Checkout Building Low Bay." State-level documentation package, NASA KSC, 2006.

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APPENDIX B: Historic Photos of O&C Building

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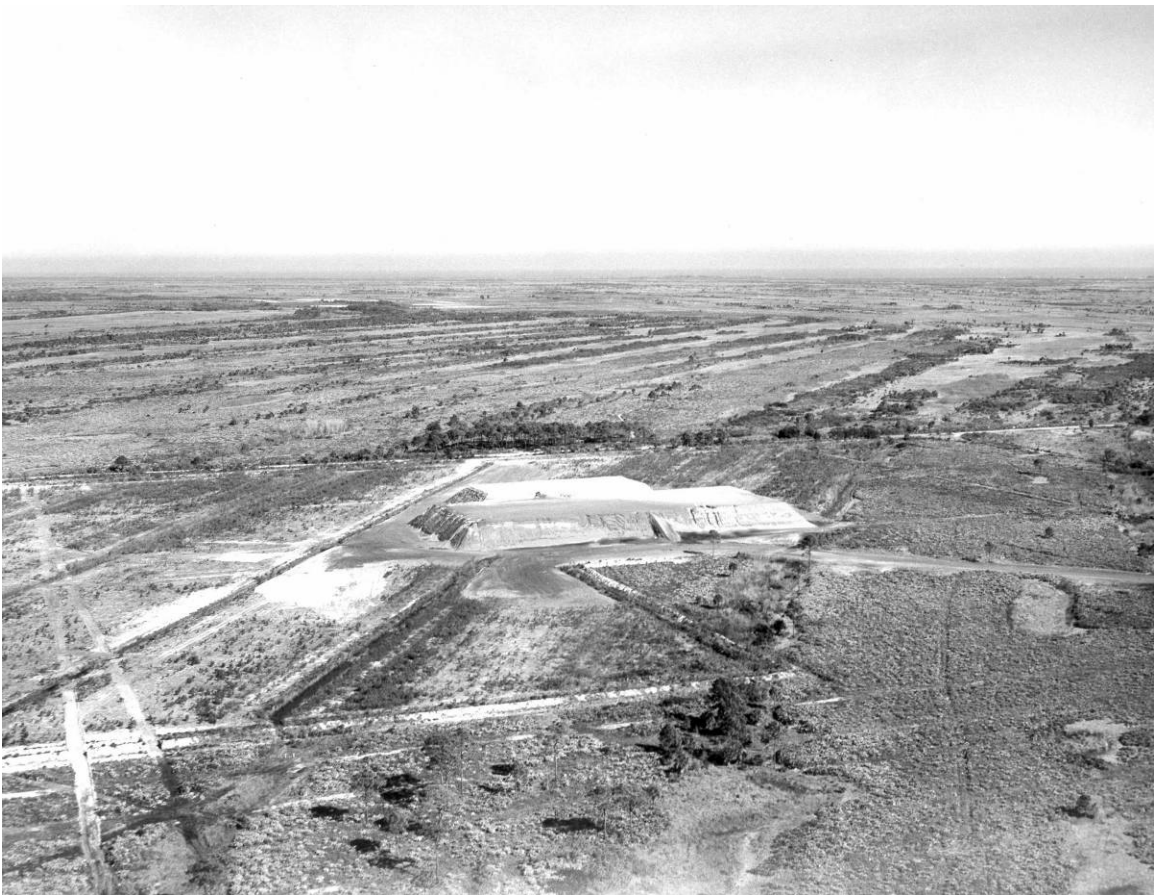


Figure B-1. View of surcharge used to compact soil underneath the O&C Building foundation, facing northeast, December 11, 1962.

Source: John F. Kennedy Space Center Archives, LOC-62-9782.

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Figure B-2. Early construction of the O&C Building, facing northeast, May 17, 1963.
Source: Kennedy Institutional Imaging Facility, KSC-63C-1682.

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Figure B-3. Aerial showing early construction of O&C Building, facing southwest, June 4, 1963.
Source: John F. Kennedy Space Center Archives, LOC-63-5667.

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Figure B-4. Construction of the O&C Building, facing east, July 29, 1963.
Source: Kennedy Institutional Imaging Facility, KSC-63C-2376.

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Figure B-5. Construction of the O&C Building, facing southwest, August 27, 1963.
Source: John F. Kennedy Space Center Archives, LOC-63-8557.

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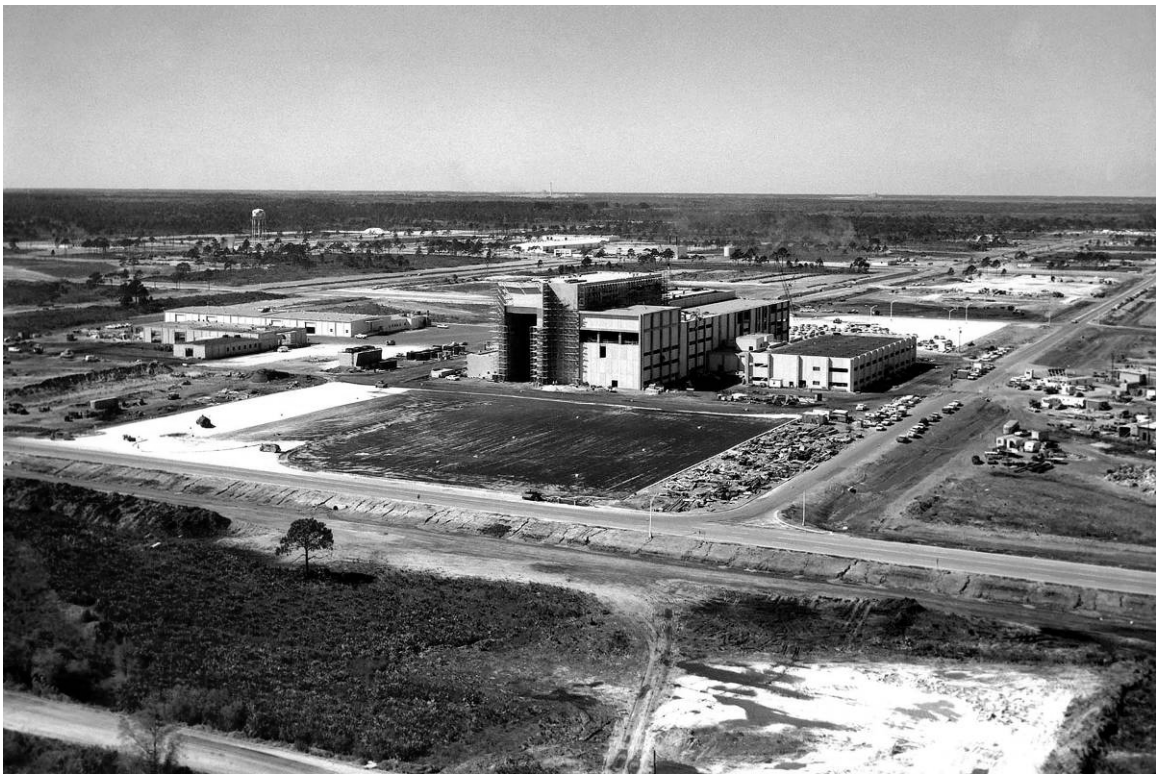


Figure B-6. Construction of the O&C Building, facing southwest, 1964.
Source: Kennedy Institutional Imaging Facility, KSC-64C-1712.

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Figure B-7. Construction of the original O&C Building nearing completion, facing southwest,
June 25, 1964.

Source: John F. Kennedy Space Center Archives, KSC-64-183-008.

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Figure B-8. Construction of the third floor of the O&C Building north wing, facing southwest, September 3, 1964.

Source: John F. Kennedy Space Center Archives, KSC-64C-3234.

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Figure B-9. Construction of the east and west additions to the O&C Building, facing west-northwest, August 5, 1965.

Source: John F. Kennedy Space Center Archives, 100-KSC-65C-5214.

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Figure B-10. Aerial of the O&C Building with the completed exterior shells of the additions, facing south, June 21, 1966.

Source: Kennedy Institutional Imaging Facility, KSC-66C-5748.

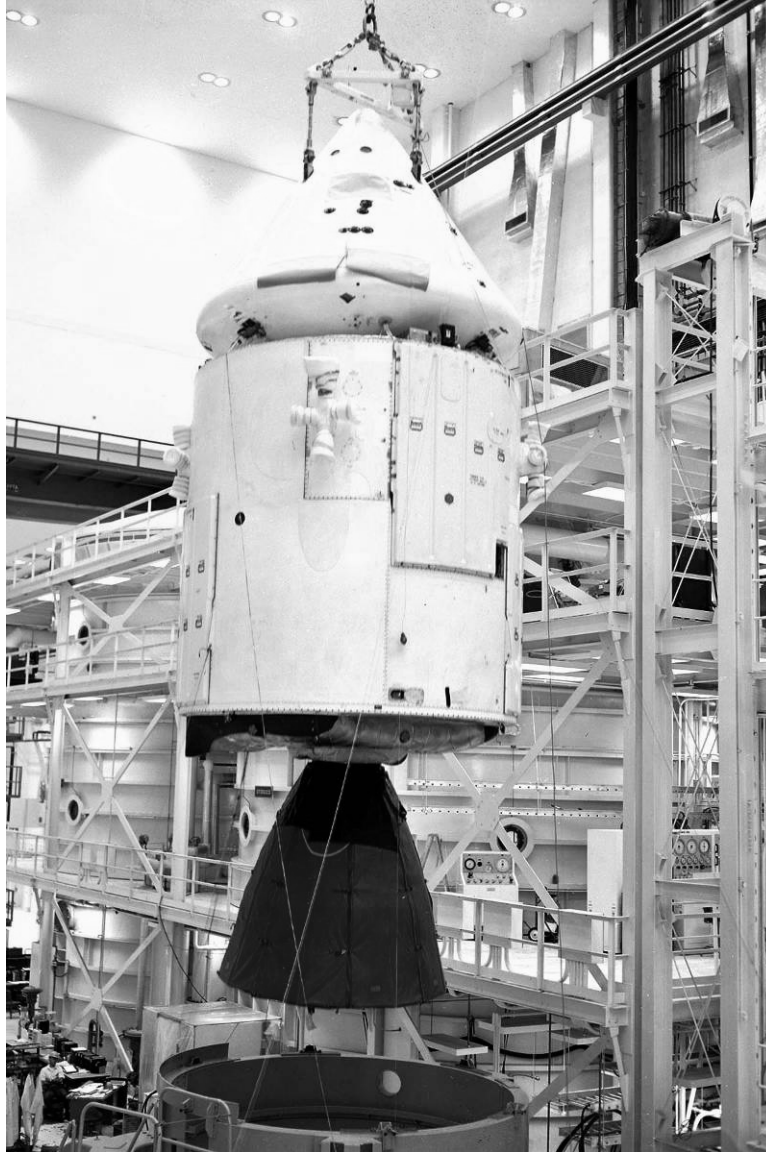


Figure B-11. Apollo command and service modules being hoisted for mating, facing northwest,
June 25, 1966.

Source: Kennedy Institutional Imaging Facility, KSC-66C-5810.



Figure B-12. Construction of the Lunar Module assembly and test area, facing northeast,
August 15, 1966.

Source: John F. Kennedy Space Center Archives, 100-KSC-66C-7156.



Figure B-13. Apollo spacecraft components within the Low Bay, facing west, March 1, 1968.
Source: John F. Kennedy Space Center Archives, 116-KSC-68-2629.



Figure B-14. Apollo 17 Lunar Rover Vehicle being readied for a test simulation in the Low Bay, direction unknown, August 4, 1972.

Source: John F. Kennedy Space Center Archives, 108-KSC-72P-358.



Figure B-15. Command module for the Apollo-Soyuz Test Project being received in the O&C Building, facing east, September 8, 1974.

Source: Lyndon B. Johnson Space Center, S74-32049, accessed at <http://nix.ksc.nasa.gov/search.jsp?N=0&Ntk=All&Ntt=S74-32049&Ntx=mode%20matchallpartial>.



Figure B-16. Construction of the Spacelab workstands in the Low Bay, direction unknown,
May 31, 1978.

Source: John F. Kennedy Space Center Archives, 108-KSC-378C-360_4.

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Figure B-17. View of Acceptance Checkout Equipment Station No. 1, direction unknown,
February 16, 1967.

Source: John F. Kennedy Space Center Archives, 107-KSC-67C-919.



Figure B-18. Renovation of an Acceptance Checkout Equipment Station into Payload User Room Nos. A and B, direction unknown, April 28, 1981.

Source: John F. Kennedy Space Center Archives, 108-KSC-381C-947_3.



Figure B-19. View of one of the lounge areas within the Astronaut Crew Quarters, direction unknown, October 29, 1965.

Source: Kennedy Institutional Imaging Facility, KSC-65C-7730.



Figure B-20. View of one of the conference room within the Astronaut Crew Quarters, facing southeast, October 29, 1965.

Source: Kennedy Institutional Imaging Facility, KSC-65C-7740.



Figure B-21. View of one of the dining room within the Astronaut Crew Quarters, facing northeast, October 29, 1965.

Source: Kennedy Institutional Imaging Facility, KSC-65C-7728.



Figure B-22. Apollo 9 crew having breakfast with mission officials and guests on the morning of launch, facing northeast, October 29, 1965.

Source: John F. Kennedy Space Center Online Multimedia Gallery, 108-KSC-69P-0037, accessed at <http://mediaarchive.ksc.nasa.gov/search.cfm>.



Figure B-23. Apollo 14 backup crew with Nurse Dee O'Hara in medical laboratories prior to preflight physicals, direction unknown, January 26, 1971.

Source: John F. Kennedy Space Center Online Multimedia Gallery, 108-KSC-71P-043, accessed at <http://mediaarchive.ksc.nasa.gov/search.cfm>.



Figure B-24. Apollo 7 crew in suit-up room, direction unknown, October 11, 1968.
Source: John F. Kennedy Space Center Online Multimedia Gallery, KSC-68P-417, accessed at
<http://mediaarchive.ksc.nasa.gov/search.cfm>.



Figure B-25. Michael Collins, Apollo 11 crewmember, in suit-up room, direction unknown,
July 16, 1969.

Source: John F. Kennedy Space Center Online Multimedia Gallery, KSC-69PC-373, accessed at
<http://mediaarchive.ksc.nasa.gov/search.cfm>.



Figure B-26. Apollo 11 crew exiting O&C Building for travel to the launch pad, facing southwest, July 16, 1969.

Source: John F. Kennedy Space Center Online Multimedia Gallery, KSC-69PC-412, accessed at <http://mediaarchive.ksc.nasa.gov/search.cfm>.



Figure B-27. View of the cable/utility tunnel, February 6, 1974.
Source: John F. Kennedy Space Center Archives, 108-KSC-74C-82.



Figure B-28. View of the cable/utility tunnel, circa 2010.
Source: Lockheed Martin.

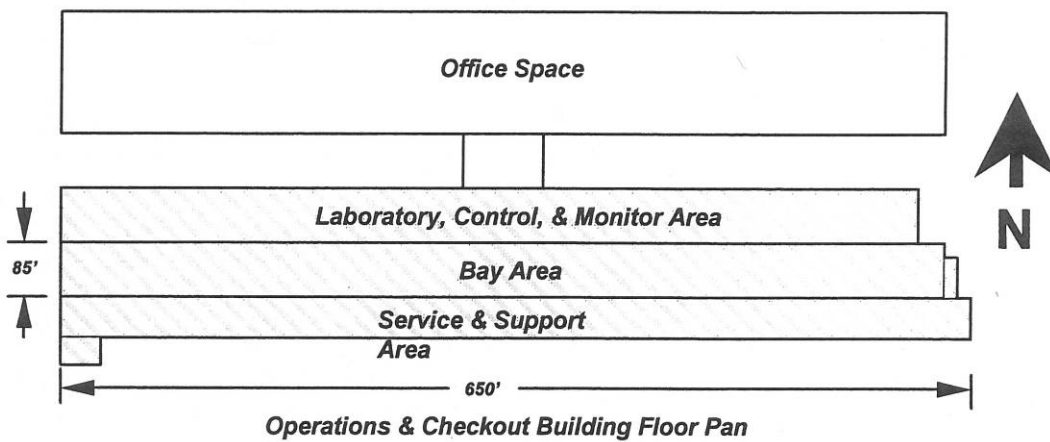


Figure B-29. General layout of the O&C Building, no date.
Source: John F. Kennedy Space Center Real Property Office, O&C Building.

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APPENDIX C: Legend of Acronyms

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ABMA	Army Ballistic Missile Agency
ACI	Archaeological Consultants, Inc.
ACOE	Army Corps of Engineers
ARPA	Advanced Research Projects Agency
AS	Apollo/Saturn
ASTP	Apollo-Soyuz Test Project
CCAFS	Cape Canaveral Air Force Station
CSM	Command/Service Module
DoD	Department of Defense
DOD	Development Operations Division
EST	Eastern Standard Time
EVA	Extravehicular Activity
GN2	Gaseous Nitrogen
IHA	InoMedic Health Applications
ISS	International Space Station
JSC	Johnson Space Center
KSC	Kennedy Space Center
LC	Launch Complex
LM	Lunar Module
LOC	Launch Operations Center
LOD	Launch Operations Directorate
MILA	Merritt Island Launch Area
MSC	Manned Spacecraft Center
MSFC	Marshall Space Flight Center
NAA	North American Aviation
NASA	National Aeronautics and Space Administration
NRHP	National Register of Historic Places
O&C	Operations and Checkout
SA	Saturn/Apollo
STG	Space Task Group
U.S.	United States
USSR	Union of Soviet Socialist Republics

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Brevard County
Florida

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Penny Rogo Bailes, Photographer; May 2012 (FL-8-11-E-60 through FL-8-11-E-140)

- FL-8-11-E-60 OVERALL VIEW OF NORTH ELEVATION, FACING SOUTH.
- FL-8-11-E-61 OVERALL VIEW OF NORTH AND EAST ELEVATIONS, FACING
SOUTHWEST.
- FL-8-11-E-62 OVERALL VIEW OF EAST ELEVATION, FACING WEST.
- FL-8-11-E-63 OVERALL VIEW OF EAST AND SOUTH ELEVATIONS, FACING
NORTHWEST.
- FL-8-11-E-64 OVERALL VIEW OF SOUTH ELEVATION, FACING NORTHEAST.
- FL-8-11-E-65 OVERALL VIEW OF SOUTH AND WEST ELEVATIONS, FACING
NORTHEAST.
- FL-8-11-E-66 OVERALL VIEW OF WEST ELEVATION, FACING EAST.
- FL-8-11-E-67 OVERALL VIEW OF WEST AND NORTH ELEVATIONS, FACING
SOUTHEAST.
- FL-8-11-E-68 DETAIL VIEW OF DOOR INTO AIRLOCK, FACING EAST.
- FL-8-11-E-69 DETAIL VIEW OF ANTENNA SUPPORT STRUCTURE ON ROOF,
FACING SOUTHWEST.

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- FL-8-11-E-70 OVERALL VIEW OF ASTRONAUT EXIT DOORS AND STOOP, FACING SOUTH.
- FL-8-11-E-71 DETAIL VIEW OF ASTRONAUT EXIT DOORS, FACING SOUTH.
- FL-8-11-E-72 DETAIL VIEW OF ASTRONAUT ELEVATOR LANDING, FACING SOUTHWEST.
- FL-8-11-E-73 DETAIL VIEW OF ASTRONAUT ELEVATOR, FACING EAST.
- FL-8-11-E-74 OVERALL VIEW OF ASTRONAUT CONFERENCE ROOM, FACING SOUTHEAST.
- FL-8-11-E-75 OVERALL VIEW OF ASTRONAUT LOUNGE, FACING SOUTH.
- FL-8-11-E-76 OVERALL VIEW OF ASTRONAUT DINING AREA, FACING NORTHWEST.
- FL-8-11-E-77 OVERALL VIEW OF ASTRONAUT QUARTERS KITCHEN, FACING NORTH.
- FL-8-11-E-78 OVERALL VIEW OF ASTRONAUT GYM, FACING SOUTHEAST.
- FL-8-11-E-79 OVERALL VIEW OF ASTRONAUT SAUNA, FACING SOUTH.
- FL-8-11-E-80 OVERALL VIEW OF ASTRONAUT LOUNGE-PRIMARY CREW AREA, FACING SOUTHWEST.
- FL-8-11-E-81 OVERALL VIEW OF MEDICAL EXAMINATION AREA, FACING SOUTHEAST.
- FL-8-11-E-82 DETAIL VIEW OF MEDICAL EXAM ROOM, FACING NORTHEAST.
- FL-8-11-E-83 DETAIL VIEW OF ASTRONAUT BEDROOM, PRIMARY CREW AREA, FACING SOUTHWEST.
- FL-8-11-E-84 DETAIL VIEW OF ASTRONAUT BEDROOM, GENERAL AREA, FACING NORTHWEST.

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- FL-8-11-E-85 OVERALL VIEW OF ASTRONAUT SUIT ROOM, FACING NORTHWEST.
- FL-8-11-E-86 DETAIL VIEW OF ASTRONAUT SUIT STATION, FACING WEST.
- FL-8-11-E-87 OVERALL VIEW OF RACQUETBALL COURT, FACING NORTHWEST.
- FL-8-11-E-88 OVERALL VIEW OF HIGH BAY, FACING NORTHEAST.
- FL-8-11-E-89 VIEW OF WEST HALF OF HIGH BAY, FACING WEST.
- FL-8-11-E-90 DETAIL VIEW OF OBSERVATION WINDOW PROVIDING VISUAL ACCESS TO HIGH BAY FROM THE THIRD FLOOR, FACING NORTHWEST.
- FL-8-11-E-91 OVERALL VIEW OF THE AIRLOCK, FACING SOUTHWEST.
- FL-8-11-E-92 OVERALL VIEW OF A TYPICAL SPACE SHUTTLE ERA USER ROOM (PREVIOUSLY AN APOLLO ERA ACCEPTANCE AND CHECKOUT EQUIPMENT ROOM), FACING NORTHWEST.
- FL-8-11-E-93 OVERALL VIEW OF A TYPICAL SPACE SHUTTLE ERA USER ROOM (PREVIOUSLY AN APOLLO ERA CONTROL ROOM), FACING SOUTHWEST.
- FL-8-11-E-94 DETAIL VIEW OF AN APOLLO ERA ACCEPTANCE AND CHECKOUT EQUIPMENT CONTROL CONSOLE, FACING SOUTHWEST.
- FL-8-11-E-95 OVERALL VIEW OF BIOMEDICAL TESTING LABORATORY, FACING SOUTH.
- FL-8-11-E-96 DETAIL VIEW OF APOLLO ERA DATA RECORDER FOR TESTING LABORATORY, FACING NORTHWEST.
- FL-8-11-E-97 OVERALL VIEW OF NURSE'S STATION ADJACENT TO AEROMEDICAL TESTING LABORATORY, FACING SOUTH.
- FL-8-11-E-98 OVERALL VIEW OF MEDICAL EXAMINATION ROOM IN AEROMEDICAL TESTING AREA, FACING NORTH.

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- FL-8-11-E-99 OVERALL VIEW OF ELECTRONICS TESTING LABORATORY, FACING NORTHEAST.
- FL-8-11-E-100 OVERALL VIEW OF ASTRONAUT POST-MISSION ENTRY WITHIN THE BASELINE DATA COLLECTION FACILITY, FACING NORTHWEST.
- FL-8-11-E-101 OVERALL VIEW OF ASTRONAUT POST-MISSION REST AREA WITHIN THE BASELINE DATA COLLECTION FACILITY, FACING NORTHEAST.
- FL-8-11-E-102 OVERALL VIEW OF TESTING AREA WITHIN THE BASELINE DATA COLLECTION FACILITY, FACING WEST.
- FL-8-11-E-103 OVERALL VIEW OF THE AUDITORIUM/MISSION BRIEFING ROOM, FACING SOUTH.
- FL-8-11-E-104 OVERALL VIEW OF THE FAILURE ANALYSIS VACUUM CHAMBER ROOM, FACING NORTHWEST.
- FL-8-11-E-105 OVERALL VIEW OF THE WALK-IN ENVIRONMENTAL TEST CHAMBER, FACING SOUTHWEST.
- FL-8-11-E-106 DETAIL VIEW OF THE ELECTRONICS FAILURE ANALYSIS TESTING AREA, FACING NORTHWEST.
- FL-8-11-E-107 OVERALL VIEW OF THE MECHANICAL FAILURE ANALYSIS LABORATORY, FACING SOUTH.
- FL-8-11-E-108 OVERALL VIEW OF MATERIALS TESTING-METROLOGY LABORATORY, FACING SOUTHEAST.
- FL-8-11-E-109 OVERALL VIEW OF X-RAY CHAMBER WITHIN THE MATERIALS TESTING-METROLOGY LABORATORY, FACING NORTHEAST.
- FL-8-11-E-110 OVERALL VIEW OF THE CHEMICAL ANALYSIS LABORATORY, FACING SOUTHWEST.
- FL-8-11-E-111 OVERALL VIEW OF THE FAILURE LABORATORY, FACING SOUTHEAST.

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- FL-8-11-E-112 OVERALL VIEW OF THE CLOSED CIRCUIT TELEVISION STATION,
FACING SOUTHWEST.
- FL-8-11-E-113 OVERALL VIEW OF THE CLOSED CIRCUIT TELEVISION VIDEO
SWITCHER STATION, FACING SOUTHWEST.
- FL-8-11-E-114 OVERALL VIEW OF A TYPICAL CORRIDOR, FACING WEST.
- FL-8-11-E-115 DETAIL VIEW OF A TYPICAL STEEL WALL PANEL, FACING SOUTH.

Photograph Nos. FL-8-11-E-116 through FL-8-11-E-140 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-8-11-E-116 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
1ST FLOOR PART. PLAN AND DETAILS, L&C, A&T, & SERVICE AREA
Sheet 16
- FL-8-11-E-117 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
2ND FLOOR PLAN AND DETAILS, LABORATORY & CONTROL, &
ASSEMBLY & TEST AREAS
Sheet 18
- FL-8-11-E-118 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
3RD FLOOR PLAN AND DETAILS, LABORATORY & CONTROL, &
ASSEMBLY & TEST AREAS
Sheet 19

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- FL-8-11-E-119 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
4TH & 5TH FLOOR PLANS & DETAILS, LABORATORY & CONTROL, &
ASSEMBLY & TEST AREAS
Sheet 20
- FL-8-11-E-120 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
1ST FLOOR PART. PLAN AND DETAILS, ADMINISTRATIVE &
ENGINEERING OFFICE AREA
Sheet 15
- FL-8-11-E-121 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
PARTIAL SECOND FLOOR PLAN, ADMINISTRATIVE &
ENGINEERING OFFICE AREA
Sheet 17
- FL-8-11-E-122 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
ELEVATIONS
Sheet 12
- FL-8-11-E-123 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
ELEVATIONS
Sheet 13

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- FL-8-11-E-124 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-28-034, Burns and Roe, Inc., November 1963
BUILDING SECTIONS
Sheet 26
- FL-8-11-E-125 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
1ST FLOOR PLAN, LAB & CONTROL, & ASSEMBLY & TEST &
SERVICE AREA
Sheet 42
- FL-8-11-E-126 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
2ND FL. PLAN, L&C, & A&T AREA
Sheet 43
- FL-8-11-E-127 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
3RD FL. PLAN, L&C, & A&T AREA
Sheet 44
- FL-8-11-E-128 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
4TH FL. PLAN, L&C, & A&T AREA
Sheet 45

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- FL-8-11-E-129 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
FIRST & SECOND FL. (EAST) A&E AREA
Sheet 37
- FL-8-11-E-130 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
FIRST FL. PLAN (WEST) A&E AREA
Sheet 39
- FL-8-11-E-131 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
SECOND FL. PLAN (WEST) A&E AREA
Sheet 40
- FL-8-11-E-132 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
THIRD FL. PLAN (EAST) A&E AREA
Sheet 38
- FL-8-11-E-133 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
THIRD FL. PLAN (WEST) A&E AREA
Sheet 41

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- FL-8-11-E-134 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
ELEVATIONS
Sheet 33
- FL-8-11-E-135 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BLDG.
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
ELEVATIONS
Sheet 34
- FL-8-11-E-136 Photocopy of drawing
MSC OPERATIONS AND CHECKOUT BUILDING ADDITIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 203-233, Burns and Roe, Inc., September 1964
ELEVATIONS
Sheet 35
- FL-8-11-E-137 Photocopy of drawing
OPERATIONS AND CHECKOUT BUILDING
NASA, John F. Kennedy Space Center, Florida
Drawing 203-309, PBR Engineers & Associates, March 1965
LEM CONTROL ROOM NO. 1 & 2, EQUIPMENT COOLING PLANS &
DETAILS AI 20 & 21
Sheet 6
- FL-8-11-E-138 Photocopy of drawing
OPERATIONS AND CHECKOUT BUILDING
NASA, John F. Kennedy Space Center, Florida
Drawing 203-309, PBR Engineers & Associates, March 1965
LEM CONTROL ROOM NO. 1 & 2, EQUIPMENT COOLING PLANS &
DETAILS AI 22 & 23
Sheet 7

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- FL-8-11-E-139 Photocopy of drawing
MANNED SPACECRAFT OPERATIONS BUILDING, AEROMEDICAL
SUPPORT LABORATORY, ROOMS 3402, 3403, 3407
NASA, John F. Kennedy Space Center, Florida
Drawing 203-369, U.S. Army Corps of Engineers, June 1965
EQUIP. LAYOUT & PLUMBING PLANS
Sheet 4
- FL-8-11-E-140 Photocopy of drawing
ASTRONAUT CREW QUARTERS MODIFICATIONS
NASA, John F. Kennedy Space Center, Florida
Drawing 79K33915, BRPH Architects-Engineers, Inc., July 1994
FLOOR PLAN-NEW CREW QUARTERS
Sheet 3