ADDENDUM TO: HAER No. FL-8-11-B
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39,
VEHICLE ASSEMBLY BUILDING
(John F. Kennedy Space Center)
VAB Road, East of Kennedy Parkway North
Cape Canaveral
Brevard County
Florida

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

HISTORIC AMERICAN ENGINEERING RECORD

CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39,
VEHICLE ASSEMBLY BUILDING
(John F. Kennedy Space Center)
HAER No. FL-8-11-B, ADDENDUM

This report is an addendum to a fifty-two page report previously transmitted to the Library of Congress in July 2009.

Location: VAB Road, east of Kennedy Parkway North
John F. Kennedy Space Center
Cape Canaveral
Brevard County
Florida

The VAB[1] Utility Annex is located to the west of the VAB at latitude: 28.585074, longitude: -80.652129. The Barge Terminal Facility is located to the southeast of the VAB at latitude: 28.583789, longitude: -80.646152, which represent the southeast corner of the Barge Terminal Facility's wharf. These coordinates were obtained on January 8, 2013 and February 12, 2013, respectively, through Google Earth™. The coordinates datum are North American Datum 1983.

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

Present Use: The VAB Utility Annex houses the primary utility equipment for the VAB, LCC, OPFs, and Thermal Protection System Facility, as well as support buildings within the LC 39/VAB Area. The Barge Terminal Facility is used as a dock and pier for boats.

Significance: Both the VAB Utility Annex and the Barge Terminal Facility are considered contributing resources to the VAB, which was listed in the NRHP on January 21, 2000, because of its exceptional importance at the national level in the context of the Apollo program. In addition, the VAB

[1] A list of acronyms, which includes those used in the original documentation package, is attached to this addendum as Appendix F.

was found to be exceptionally significant in the context of the Space Shuttle Program (see pages 1-2 of the original documentation package).

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Date: March 2014

Project Information: The documentation of the VAB Utility Annex and Barge Terminal Facility as an addendum to the Cape Canaveral Air Force Station, Launch Complex 39, Vehicle Assembly Building was completed in 2012-2014 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. 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; 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 also was 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 VAB Utility Annex included the "as-built" drawings, as well as those depicting major modifications to the facility. Those for the Barge Terminal Facility included the "as-built" drawings, which were part of the drawings for the overall barge canal system extending through CCAFS and KSC. KSC

does not periodically produce drawings of their facilities to show current existing conditions.

For ease of reference, this written narrative is arranged so that the basic historical information, physical description, and sources of information for the VAB Utility Annex are presented first (beginning on Page No. 56), followed by the same data for the Barge Terminal Facility (beginning on Page No. 68). Following the written section is Appendix B: Historic Photos of the VAB Utility Annex (Page No. 74); Appendix C: Architectural Drawings of the VAB Utility Annex (Page No. 80); Appendix D: Historic Photos of the Barge Terminal Facility (Page No. 91); Appendix E: Architectural Drawings of the Barge Terminal Facility (Page No. 104); and Appendix F: Legend of Acronyms (Page No. 111).

VAB UTILITY ANNEX

Part I. Historical Information

A. Physical History:

1. Date of construction: The VAB Utility Annex was constructed between 1964 and 1965.[2]

2. Architect/Engineer: URSAM (Max Urbahn [architectural]; Roberts and Schaefer [structural]; Seelye, Stevenson, Value and Knecht [civil, mechanical and electrical]; and Moran, Proctor, Mueser and Rutledge [foundations]), New York, New York.[3] The addition was designed by G.R.G. Vanderweil, Inc., of Maitland, Florida.[4]

3. Builder: The original facility was built by the joint venture of Morrison-Knudsen Company, Inc., Perini Corporation, and Paul Hardeman, Inc., of South Gate, California. RKT Constructors, Inc., of Titusville, Florida, constructed the northwest addition.[5]

4. Original plans and construction: The original plans for the VAB Utility Annex date to October 1963; construction occurred in 1964 and 1965. The original facility was rectangular in plan, and consisted of an open area within the west half of the building, an enclosed personnel support area along the south wall, an enclosed electrical equipment room at the northeast corner, and an enclosed fire suppression equipment room at the southeast corner. Situated around the exterior of the building were a concrete pad for an electrical substation near the west end of the north elevation and a concrete pad for fuel storage tanks to the southwest. A cooling tower was constructed to the west of the VAB Utility Annex, across Utility Road.[6]

5. Alterations and additions: In 1969-72, two small rooms were created to the east of the personnel support area.[7] Circa 1989-90, a new cooling tower was constructed to the

[2] NASA KSC, "Real Property Record, Utility Annex," on file, KSC Real Property Office. The Real Property Record provides a date of October 9, 1964, for the beginning of construction; however, a photo from the KSC Archives (Figure No. B-1) shows that most of the steel skeleton was in place by mid-July 1964.
[3] Urbahn Roberts Seelye Moran, New York, "Launch Complex 39, Vertical Assembly Building, Volume 31," October 1963, on file, KSC Engineering Documentation Center.
[4] G.R.G. Vanderweil Engineers, Inc., Maitland, "Replacement of MCC's and Upgrade LC-39 C.W. Pumping System at the Utility Annex," October 1993, on file, KSC Engineering Documentation Center.
[5] Ken Nail, Jr., "Chronology of KSC and KSC Related Events for 1994," January 1995, 60, on file KSC Archives.
[6] Urbahn Roberts Seelye Moran, "Volume 31."
[7] U.S. Army Corps of Engineers, Canaveral District, "Mods to VAB Utility Annex, LC 39, Sound Attenuation Rooms," August 1969, on file, KSC Engineering Documentation Center.

southwest of the VAB Utility Annex.[8] The facility received a small addition between 1994 and 1996, which consisted of a 1,500 square foot electrical equipment room located at the northwest corner. At the same time, the chilled water system piping, electrical lines, and motor control centers were replaced.[9] Additional equipment within the facility has also been upgraded since construction. For example, the electrical switch gear in the northeast corner of the building was replaced circa 2000.[10]

B. Historical Context:

The ACOE, NASA's supervisory design and construction agent, hired URSAM to complete the design for the VAB, LCC, and associated facilities within the LC 39/VAB Area of KSC.[11] On January 16, 1964, the ACOE awarded the construction contract for the VAB Utility Annex to the joint venture of Morrison-Knudsen Company, Inc., Perini Corporation, and Paul Hardeman, Inc.[12] Much of the structural steel skeleton of the VAB Utility Annex was in place by mid-July 1964 (Figure No. B-1), as was the concrete pad for the fuel oil storage tanks (located to the southwest of the building). The roof structure was in place and the fuel oil storage tanks had been installed by the end of October 1964 (Figure No. B-2). Less than two months later, the skylights, vents, and boiler stacks were in place, and the exterior walls begun to take shape.[13] By January 7, 1965, nearly all of the exterior wall panels had been installed (Figure No. B-3). The building was completed in June 1965; according to the Real Property Records, the utilities equipment was installed in 1967.[14]

In August 1969, the ACOE prepared drawings to add sound attenuation rooms to the VAB Utility Annex. These rooms were constructed between 1969 and 1972, to the east of the personnel support area.[15] In 1987, the two original air compressors were replaced with four smaller air compressors.[16] In the early 1990s, a new cooling tower, designed by Allen & Hoshell

[8] Allen & Hoshell, Memphis, "Replacement of V.A.B. U.A. [Utility Annex] Cooling Towers, Bldg. No. K6-947," November 1989, on file, KSC Engineering Documentation Center.
[9] G.R.G. Vanderweil Engineers, Inc., "Replacement of MCC's;" Nail, "Events for 1994," 60.
[10] NASA KSC, "Utility Annex;" Larry Kiel, personal communication (email) with Nancy English, February 25, 2014.
[11] An overall context of KSC and the VAB are provided in the original report, dated July 2009.
[12] Construction of the VAB Utility Annex was part of a roughly $63.36 million contract, which also included construction of the LCC, a sewage treatment plant, various roads and parking areas, and various other facilities and utility lines. NASA, *Astronautics & Aeronautics, 1964* (Washington, DC: NASA Scientific and Technical Information Division, 1965), 15; "$66 Million Expenditure to Finance 39 Area Work," *Spaceport News*, December 19, 1963, 8.
[13] Photo Number P-10560, Negative No. 100-KSC-64C-5673, on file, KSC Archives Department.
[14] NASA KSC, "Utility Annex."
[15] ACOE, "Mods to VAB Utility Annex."
[16] Ken Nail, Jr., "Chronology of KSC and KSC Related Events for 1987," March 1988, 62, on file KSC Archives.

in November 1989, was constructed to the southwest of the facility; at this time, the old tower was demolished.[17] In 1993, G.R.G. Vanderweil, Inc. designed a small addition for the northwest corner of the VAB Utility Annex to hold motor control centers for the chilled water system, which was updated at the same time.[18] In the mid-2000s, the roof of the facility was replaced.[19]

Historic/Current Function of the VAB Utility Annex

The VAB Utility Annex has provided the same service to the LC 39/VAB Area throughout its entire existence-the only difference has been the quantity of facilities it served.

As originally constructed, the VAB Utility Annex was designed to hold "the main heating, ventilating, air conditioning and fire protection primary equipment and supervisory control servicing" for the VAB, LCC, and other auxiliary facilities.[20] The piping from the equipment in the VAB Utility Annex to the VAB is located within the bridge between the two buildings; the pipes for the LCC also extend across this bridge and then through the VAB, and across the bridge between the VAB and the LCC.[21]

In the mid- to late-1970s, piping was installed between the VAB Utility Annex and the OPF, located to the northwest of the Annex, through an underground tunnel, so the same heating, ventilating, air conditioning, and fire protection services could be provided to that facility. The same was done in 1986 for OPF-3, situated to the north of the Annex, and the Thermal Protection System Facility, located to the north of the OPF.[22]

At the time of documentation, the VAB Utility Annex was providing chilled and hot water to the VAB, LCC, OPF, OPF-3, and the Thermal Protection System Facility. In addition, it was providing chilled water to itself, and the Processing Control Center, Operations Support Building No. 1, Operations Support Building No. 2, the Repeater Building, the Launch Equipment Shop, the Logistics Facility, the Component Refurbishment and Chemical Analysis Facility, the Multi-Function Facility, the Electrical Maintenance Facility, and a utility building.

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[17] Allen & Hoshell, "V.A.B. U.A. Cooling Towers;" Ken Nail, Jr., "Chronology of KSC and KSC Related Events for 1990," March 1991, 5-6, on file KSC Archives.
[18] G.R.G. Vanderweil Engineers, Inc., "Replacement of MCC's;" Nail, "Events for 1994," 60.
[19] NASA KSC, "Utility Annex."
[20] Urbahn Roberts Seelye Moran, New York, "Data Manual for Vertical Assembly Building Associated Facilities and Site Work," June 9, 1964, II.F.1, on file, KSC Documents Library.
[21] Urbahn Roberts Seelye Moran, "Volume 31;" Urbahn Roberts Seelye Moran, New York, "Launch Complex 39, Vertical Assembly Building, Volume 14," October 1963, on file, KSC Engineering Documentation Center; Urbahn Roberts Seelye Moran, New York, "Launch Complex 39, Vertical Assembly Building, Volume 29," October 1963, on file, KSC Engineering Documentation Center.
[22] Ken Nail, Jr., "Chronology of KSC and KSC Related Events for 1986," March 1987, 99, on file KSC Archives.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The VAB Utility Annex (Photo Nos. 194-198) is an Industrial Vernacular style building located directly west of the VAB Low Bay. It is one-story in height and contains roughly 28,560 square feet of interior space. The building features an irregular floor plan due to the circa 1993-96 addition at the northwest corner.

2. Condition of fabric: Due to periodic maintenance and continual use of the facility, the VAB Utility Annex is in good condition.

B. Description of Exterior:

1. Overall dimensions: The original portion of the VAB Utility Annex (see Photo No. 227 for a depiction of the original and new portions of the facility) has approximate overall dimensions of 253' in length (east-west), 103' in width (north-south), and 30' in height. The northwest addition roughly measures 61' in length (east-west), 41' in width (north-south), and 12' in height. At the north end of the east elevation is an elevated bridge that leads to the VAB.

2. Foundations: The foundation for the original portion of the VAB Utility Annex is comprised of a reinforced poured concrete slab that ranges in thickness from 4" to 14" and is supported by reinforced concrete footers. Additionally, the chillers, air compressors, boilers, and fire suppression system pumps sit on concrete housekeeping pads on top of the base floor slab. The foundation for the northwest addition consists of a 4"-thick, reinforced poured concrete slab supported by reinforced concrete footers.[23]

3. Walls: The walls of the original portion of the VAB Utility Annex are comprised of painted galvanized insulated metal wall panels. The walls for the northwest addition are painted galvanized uninsulated metal panels.

4. Structural system, framing: The structural system for the entire VAB Utility Annex is composed of steel columns, beams, and purlins.

5. Stoops: Each entrance into the VAB Utility Annex has a poured concrete stoop.

[23] Urbahn Roberts Seelye Moran, "Volume 31;" G.R.G. Vanderweil Engineers, Inc., "Replacement of MCC's;" Johnson, Levinson, Ragan, Davila, Inc., "Study to Upgrade Systems at the VAB Utility Annex at the Kennedy Space Center, Florida," (report, NASA KSC, 2012), 20.

6. Stacks: There are three boiler stacks near the west end of the roof, roughly 9' from the south edge of the building. Towards the east end of the roof are three fire suppression system exhaust pipes, about 11' from the south edge of the building. In addition, there are eight ventilator hoods spaced across the longitudinal centerline of the roof.

7. Openings:

a. Doorways and doors: The main entrance to the VAB Utility Annex is located on the south elevation of the original portion and consists of one set of double aluminum swing doors with one-light fixed windows in the upper half. The original section of the facility also contains one single one-light aluminum swing door and one aluminum overhead rolling door on the west elevation; and one set of double one-light aluminum swing doors, one single aluminum swing door fitted with a louver, and one solid aluminum swing door on the east elevation. The addition features one set of double louvered aluminum swing doors on the south elevation, one aluminum overhead rolling door on the west elevation, and one set of double solid aluminum swing doors on the east elevation. There are no doors on the north elevation.

b. Windows: None of the elevations for the annex or its addition contains window openings; however, the north elevation of the original section features two 10' x 4' translucent plastic panels. In addition, the roof of the original section features eight, 12' x 4' translucent plastic skylights.

8. Roof:

a. Shape, truss type, covering: All sections of the VAB Utility Annex feature a flat roof comprised of a 4"-thick, cast in place reinforced concrete deck supported by steel framing, which is topped with built-up roofing.[24]

C. Description of Interior:

1. Floor plans: The main entrance of the VAB Utility Annex opens into a 72' x 38' personnel support area that is roughly centered along the south wall (Photo Nos. 216, 220, 224). This area is divided into two halves by a 38'-long corridor; a door on the north wall opens into the main equipment area. Within the support area, on the east side of the corridor, are a break room, restrooms, and a circa 1969 laboratory and repair shop. On the west side of the corridor, there are two offices along the south wall and a control room to the north. At the time of documentation, the control room, which measures approximately 25' x 16', retained

[24] Urbahn Roberts Seelye Moran, "Volume 31;" G.R.G. Vanderweil Engineers, Inc., "Replacement of MCC's."

the original master control console (Photo No. 217) for all of the mechanical equipment within the VAB Utility Annex; the console was situated along the north wall. Windows in the west and north wall of the control room provide visual access to the main equipment area of the building.

The main equipment area of the VAB Utility Annex (Photo Nos. 200, 201) is mostly comprised of one open space, which is visibly divided in half by a longitudinal aisle, and functionally divided by equipment type. To the north of the aisle, at the west end of the building, is the 126' x 50' chiller area (Photo No. 202). This area contains five chillers, numbered 1 through 5 from east to west; a sixth chiller is comprised of a modification to Chiller No. 4.[25] To the south of each chiller is its individual control panel (Photo No. 203). Directly to the east of Chiller No. 1, within a 9'-wide space, are four secondary chilled water pumps, numbered 1 through 4 from north to south (Photo No. 204); the five primary chilled water pumps are along the north wall of the Annex. To the east of these pumps, is the roughly 28'-wide air compressor area. Here, there are four air compressors, numbered 1 through 4 from west to east (Photo No. 204). To the northeast of Air Compressor No. 4 is a 2,000 gallon compressed air tank. At the east end of the building, to the north of the aisle, is an enclosed electrical equipment room, roughly 75' x 50' (Photo No. 205). This room contains two motor control centers on the west wall, one row of electrical switchgear equipment parallel to the south wall and one parallel to the west wall, and two load break switches on the south wall. Above this room is a mezzanine that holds additional electrical equipment and storage racks (Photo No. 206). At the south edge of the mezzanine, suspended from a steel column, is a one-quarter ton crane (Photo No. 207).

To the south of the aisle, west of the personnel support area, is the roughly 75' x 38' hot water area (Photo No. 208). Here, there are three boilers, numbered 1 through 3 from east to west; to the north of each is its respective control panel (Photo No. 209). The four primary hot water pumps, numbered 1 through 4 from north to south, are situated to the east of Boiler No. 1 (Photo No. 210), and the four circulating pumps are along the south wall. To the west of Boiler No. 3, there is a 1,000-gallon hot water tank; a fuel oil heater and pump sit to the west of this tank (Photo No. 211).

Directly to the east of the personnel support area is an L-shaped tool crib/work area comprised of roughly 976 square feet of space. At the southeast corner of the VAB Utility Annex is another enclosed room with approximate dimensions of 55' x 37' (Photo No. 212). This room contains fire suppression equipment, in the form of three pumps (Photo No. 213) along the south wall and are numbered 2 through 4; along the north wall of this room are

[25] Johnson, Levinson, Ragan, Davila, Inc., "VAB Utility Annex," 39.

three domestic water pumps (Photo No. 214). At the southeast corner is a 10' x 8' chlorinator room with a small mezzanine above that holds additional fire suppression equipment.

The northwest addition to the VAB Utility Annex is also rectangular in plan. This area is mostly comprised of one open space that has a 480-volt substation to the north and two motor control centers to the south (Photo Nos. 218, 219). A small, 17' x 8' secondary pump control room is located in the northeast corner.

3. Stairways: There is one set of metal and concrete steps leading from the main floor level to the mezzanine level within the northeast corner of the building. A set of metal steps provides access to the small mezzanine located within the southeast corner room.

4. Flooring: The VAB Utility Annex features different flooring materials depending on the use of the space. The equipment areas, mezzanine, and restrooms have bare concrete floors; the control room has carpeting; and the office area has vinyl asbestos tile.

5. Wall and ceiling finish: The few interior walls within the VAB Utility Annex are comprised of concrete block. For the most part, the ceiling within the structure is exposed structural framing and the underside of the roof concrete slab. The control room and offices have acoustical tile ceilings; the restroom and shower have Keene's cement plaster ceilings.[26]

6. Openings:

a. Doorways and doors: There are nine interior doorways in the VAB Utility Annex. Eight of the doors are within the personnel support area and are single, hollow metal doors with pressed steel frames. The ninth door, which leads to the southeast corner room where the fire suppression equipment is located, is a 10'-4" x 8'-4" sliding fire door (Photo No. 215).[27]

b. Windows: The control room has two pairs of fixed glass windows on its north wall and one pair of fixed glass windows on its west wall (Photo No. 216). These windows provide visual access to the equipment within the facility.

[26] Keene's cement is a gypsum plaster finish that contains alum in the mixture. It has a high-strength ratio and sets quickly.
[27] Urbahn Roberts Seelye Moran, "Data Manual," II.F.4-1.

7. Mechanical equipment:

a. Heating, air conditioning, ventilation: The VAB Utility Annex contains a heating, and air conditioning system for the personnel support area only; ventilation is provided for the entire facility.

b. Lighting: The lighting system for the VAB Utility Annex includes surface-mounted and pendant fluorescent fixtures throughout the equipment areas and recessed fluorescent fixtures in the personnel support area.

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

d. Fire Protection: The VAB Utility Annex contains its own fire protection system, which is comprised of sprinklers, standpipe hose racks, and fire extinguishers.

D. Equipment:

1. Chillers: At the time of documentation, there were six chillers in the VAB Utility Annex. Four of the chillers, Nos. 1-4, are original to the building (Photo No. 203); Chiller No. 5 was installed in 1992. Each of these is a field erected, York, Model 0M2500 'Turbomaster'. Chiller Nos. 1-5 are 2,500-ton chillers rated at 4,300 gallons-per-minute for the chill water and 7,500 gallons-per-minute for the condenser water. Chiller Nos. 1-4 have a 0.87 kilowatt per ton net chiller efficiency rating, and Chiller No. 5 has a 0.75 kilowatt per ton efficiency rating. The sixth chiller is a modification to Chiller No. 4 in the form of an additional 1,100-ton compressor.[28]

2. Chilled water pumps: As originally constructed, the VAB Utility Annex had four chilled water pumps, arranged in a direct-pump, parallel configuration. Between 1993 and 1996, the pumping system within the VAB Utility Annex was changed to a primary-secondary configuration, and tertiary pumps were installed in the buildings supported by the Annex. At the time of documentation, there were five primary pumps and four secondary pumps. The primary pumps were Paco Pumps, Model No. 29-1015-3, with a capacity of 4,285 gallons per minute and a total dynamic head of 45'. The secondary pumps (Photo No.

[28] Johnson, Levinson, Ragan, Davila, Inc., "Study to Upgrade Systems," 39; NASA KSC, "Utility Annex;" Chiller No. 4 System Performance Data Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

204) were Goulds Pumps, Inc., Model No. 3410, with a capacity of 5,000 gallons-per-minute and a total dynamic head of 80'.[29]

3. Air compressors: There were four air compressors in the VAB Utility Annex at the time of documentation (Photo No. 204). These were Model No. VM750, manufactured by Kellogg. Each compressor had a speed of 750 revolutions per minute and a pressure of 10.5 bars.[30]

4. Boilers: At the time of documentation, the VAB Utility Annex contained three boilers (Photo No. 209). All were International Boiler Works, Model No. TJW-C-20. Each boiler could produce up to 20 million British thermal units per hour at a maximum release rate of 68,605 British thermal units per hour-feet squared. Each unit operated on a dual-fuel system of natural gas and No. 2 fuel oil.[31]

5. Hot water pumps: At the time of documentation, the VAB Annex contained four primary pumps and four circulating pumps associated with the hot water system. The primary pumps were Model R454 Horizontal Process Pumps, manufactured by the Dean Pump Division of Met-Pro Corporation (Photo No. 210). The circulating pumps also were manufactured by the Dean Pump Division of Met-Pro Corporation, and were Model No. R-430. Both pump models have a capacity of up to 6,500 gallons per minute and a maximum total dynamic head of 800'.[32]

6. Fuel oil heater/pump: The VAB Annex had one oil pump at the time of documentation that provided fuel oil to the boilers when natural gas was not being used (Photo No. 211). The pump was a Imo Pump Division Series 3D, with a maximum capacity of 400 gallons per minute at 500 pounds per square inch. It operated at a speed of 1,750 revolutions per minute.[33]

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[29] Johnson, Levinson, Ragan, Davila, Inc., "Study to Upgrade Systems," 51; NASA KSC, "Utility Annex;" Primary Chilled Water Pump Data Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert; Secondary Chilled Water Pump Data Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

[30] NASA KSC, "Utility Annex;" Air Compressor April 15, 1988 Field Test Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

[31] Johnson, Levinson, Ragan, Davila, Inc., "Study to Upgrade Systems," 51-2; NASA KSC, "Utility Annex;" Boiler Data Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

[32] NASA KSC, "Utility Annex;" Boiler Primary Pump Data Sheet, provided to author July 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert; Boiler Circulating Pump Data Sheet, provided to author July 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

[33] NASA KSC, "Utility Annex;" Oil Pump Data Sheet, provided to author July 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.

7. Fire suppression pumps: At the time of documentation, the VAB Annex contained three fire suppression pumps (Photo No. 213). All three were manufactured by Fairbanks Morse Pump Corporation and were of the Model No. 5900 series. The pumps had a maximum capacity of 2,800 gallons per minute and a maximum total dynamic head of 710'.[34]

8. Domestic water pumps: The VAB Utility Annex contained three domestic water pumps at the time of documentation (Photo No. 214). These pumps were manufactured by Fairbanks-Morse Pump Corporation and were Model No. UA-S01. These pumps had a capacity of 325 gallons per minute, with a total dynamic head of 510'.[35]

E. Site Layout: The VAB Utility Annex is situated to the west of the VAB; the two are connected by a second-story bridge structure at the north end of the Annex's east wall. To the south of the Annex, there is a concrete pad for three boiler oil tanks to the west (Photo No. 195) and a parking lot to the east. A driveway extends westward from the parking lot to Utility Road. South of the driveway is the circa 1989-90 cooling tower (Photo No. 199).

[34] NASA KSC, "Utility Annex;" Fire Pump Data Sheet, provided to author June 2013 by Larry Kiel, VAB Utility Annex Subject Matter Expert.
[35] NASA KSC, "Utility Annex;" Mike Denyer, personal communication (email) with Nancy English, KSC, (forwarded to author), July 9, 2013.

Part IV. Sources of Information

A. Primary Sources:

Allen & Hoshall, Memphis, Tennessee. "Replacement of V.A.B. U.A. Cooling Towers, Bldg. No. K6-947." Architectural drawings, NASA KSC, November 1989. On file, KSC Engineering Documentation Center, Florida.

G.R.G. Vanderweil Engineers, Inc., Maitland, Florida. "Replacement of MCC's and Upgrade LC-39 C.W. Pumping System at the Utility Annex." Architectural drawings, NASA KSC, October 1993. On file, KSC Engineering Documentation Center, Florida.

John F. Kennedy Space Center Archives Department, Florida.

NASA KSC. "Real Property Record, Utility Annex." On file, KSC Real Property Office.

Urbahn Roberts Seelye Moran, New York, New York. "Data Manual for Vertical Assembly Building Associated Facilities and Site Work." June 9, 1964. On file, KSC Documents Library.

_____. "Launch Complex 39, Vertical Assembly Building, Volume 14." Architectural drawings, NASA KSC, October 1963. On file, KSC Engineering Documentation Center.

_____. "Launch Complex 39, Vertical Assembly Building, Volume 29." Architectural drawings, NASA KSC, October 1963. On file, KSC Engineering Documentation Center.

_____. "LC 39 Vertical Assembly Building, Volume 31." Architectural drawings, NASA KSC, October 1963. On file, KSC Engineering Documentation Center, Florida.

U.S. Army Corps of Engineers, Jacksonville, Florida. "Modifications to VAB Utility Annex, LC-39: (Sound Attenuation Rooms)." Architectural drawings, NASA KSC, August 1969. On file, KSC Engineering Documentation Center, Florida.

B. Secondary Sources:

Johnson, Levinson, Ragan, Davila, Inc. "Study to Upgrade Systems at the VAB Utility Annex at the Kennedy Space Center, Florida." Analysis report, NASA KSC, 2012. On file, VAB Utility Annex.

Nail, Jr., Ken. "Chronology of KSC and KSC Related Events for 1987." March 1988. On file KSC Archives.

_____. "Chronology of KSC and KSC Related Events for 1990." March 1991. On file KSC Archives.

_____. "Chronology of KSC and KSC Related Events for 1994." January 1995. On file KSC Archives.

NASA. *Astronautics & Aeronautics, 1964.* Washington, DC: NASA Scientific and Technical Information Division, 1965.

BARGE TERMINAL FACILITY

Part I. Historical Information

A. Physical History:

1. Date of construction: The Barge Terminal Facility was dredged and constructed between June 6, 1963, and August 30, 1965.[36]

2. Architect/Engineer: The drawings for the dredging of the Barge Terminal Facility were completed by the ACOE.[37]

3. Builder: The Barge Terminal Facility was constructed by Gahagan Dredging Corporation of Tampa, Florida, and R. E. Clarson, Inc., of St. Petersburg, Florida.[38]

4. Original plans and construction: The earliest located drawings for the Barge Terminal Facility area date to November 1962, and detail areas of land to be dredged and used as fill for the VAB and Launch Pad 39C.[39] Drawings from November 1964, July 1965, and February 1969, provide information regarding the shape of the Barge Terminal Facility as well as the turning basin, wharf, pile dolphins, and bollards.[40]

5. Alterations and additions: According to the Real Property Record, the Barge Terminal Facility channel was widened and deepened in 1966. No other alterations or additions are indicated.[41]

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[36] NASA KSC, "Real Property Record, Barge Terminal Facility," on file, KSC Real Property Office.
[37] US Army Corps of Engineers, Canaveral District, "Access Channel & Hydraulic Fill for VAB and Pad 39C," November 1962, on file, KSC Engineering Documentation Center; US Army Corps of Engineers, Canaveral District, "LC-39 Vehicle Unloading Dock and Area," November 1964, on file, KSC Engineering Documentation Center; US Army Corps of Engineers, Canaveral District, "Dredging Saturn Barge Channel," July 1965, on file, KSC Engineering Documentation Center; US Army Corps of Engineers, Canaveral District, "Dredging Saturn Barge Channel," February 1969, on file, KSC Engineering Documentation Center.
[38] NASA KSC, "Barge Terminal Facility."
[39] ACOE, "Access Channel & Hydraulic Fill." The original master plans for KSC included three launch pads, labeled A, B, and C from north to south. By March 1963, the locations of Pads A and C were switched, so Pad A was then the southernmost pad for LC 39. In the end, NASA only constructed two of the pads, A and B. NASA, "Merritt Island Launch Area Master Plan," December 1962, on file, KSC Archives Department; NASA, "Merritt Island Launch Area Master Plan," March 1963, on file, KSC Archives Department.
[40] ACOE, "Unloading Dock and Area;" ACOE, "Dredging Saturn Barge Channel;" ACOE, "Dredging Saturn Barge Channel."
[41] NASA KSC, "Barge Terminal Facility."

B. Historical Context:

The construction of the Barge Terminal Facility (Figure No. C-1) was completed in conjunction with the site preparation (land clearing and dredging) for the construction of the VAB.[42] Dredging operations (Figure Nos. C-2, C-3) for a barge canal began early in November 1962. The approximately 10'-deep, 124'-wide, 12.5-mile long channel extended from the original barge channel in the Banana River to a turning basin at the southeast of the VAB. At the northwest corner of the basin was the Barge Terminal Facility.[43] Construction of the Barge Terminal Facility, including the headwall, wharf, and pad area, began on June 6, 1963 (Figure Nos. C-4 through C-8). The headwall was the first portion to be built, followed by the wharf and the pad area. Work was completed on August 30, 1965.[44]

The first Apollo Program component to arrive at the Barge Terminal Facility, on November 2, 1965, was the inner stage component for the second stage of the Saturn V rocket for the AS-500F test vehicle onboard the barge *KSC 1* (Figure No. C-9). Although it never flew in space, AS-500F provided technicians the opportunity to test the procedures for vehicle assembly, transport from the VAB to the launch pad, mobile launcher and launch pad connections, and propellant loading operations. On September 12, 1966, the first component of an actual flight vehicle, the first stage for Apollo 4, arrived at the Barge Terminal Facility.[45] For the remainder of the Apollo Program, the Barge Terminal Facility served as the arrival point for all first, second, and third stages of the Saturn V rockets (for the lunar missions and Skylab 1) and the Saturn IB rockets (for Skylab 2-4 and the ASTP) (Figure No. C-10). The final component, the first stage for the ASTP rocket, arrived on April 24, 1974.[46]

The Barge Terminal Facility provided its first support of the SSP on April 3, 1978, when the Orbiter Weight Simulator arrived at KSC from MSFC. Similar to AS-500F, this simulator allowed KSC technicians to fit-check platforms in the OPF and VAB and fit-check the Mate-Demate Device at the SLF. It also provided ground crew training for post-landing procedures.[47] On March 28, 1979, the barge *Poseidon* delivered the first Space Shuttle external tank, ET-1 to be used for STS-1, to the Barge Terminal Facility. Over the next thirty-one years, 136 external tanks were delivered to the facility (Figure Nos. C-11, C-12); the last (ET-122) arrived on

[42] See pages 12-13 of the original submission.
[43] Benson and Flaherty, *Gateway*, 247-248.
[44] NASA KSC, "Barge Terminal Facility."
[45] Benson and Flaherty, *Gateway*, 324-325; Alan Lawrie, *Saturn* (Burlington, ON: Apogee Space Books, 2005), 152, 163.
[46] "Saturn 1B Due Here," *Spaceport News*, April 18, 1974, 7; Edward Clinton Ezell and Linda Neuman Ezell, *The Partnership: A NASA History of the Apollo-Soyuz Test Project* (Mineola, NY: Dover Publications, Inc., 2010), Appendix F.
[47] Jenkins, *Space Shuttle*, 215.

September 27, 2010, onboard the barge *Pegasus*. This tank was used during STS-134, the final mission of the Space Shuttle *Endeavour*.[48]

Aside from direct support for the Apollo and Space Shuttle Programs, NASA has used the Barge Terminal Facility for other tasks. On April 5, 1978, Apollo hardware that had been on display at the KSC Visitor Information Center, including the first and second stages of a Saturn IB, aft interface, and spacecraft capsule, were loaded onto a barge at the facility to be transported to Savannah, Georgia, where the artifacts would then continue to Tokyo, Japan, for a Space Science Exhibition.[49] Similarly, following the SSP, the Barge Terminal Facility was the send-off point for various Shuttle-era artifacts. On May 24, 2012, a high-fidelity replica orbiter named "Explorer" that had been on display at the KSC Visitor Complex for eighteen years, was placed on a barge for delivery to JSC to be exhibited atop an SCA.[50] Less than a year later, on April 24, 2013, the external tank from a SSP structural test article, a SRB nose cone, a SRB aft skirt, and a crew transportation vehicle, set sail from the Barge Terminal Facility; their destination was the Wings of Dreams Aviation Museum at the Keystone Heights Airport in Starke, Florida.[51]

[48] ET-122 was fabricated and signed over to NASA on November 21, 2002, but was never delivered to KSC for use; instead, it remained in storage at the Michoud Assembly Facility in New Orleans. The tank received post-Columbia accident modifications in 2003-2004, and was eventually delivered to KSC on September 27, 2010, for use as the "launch-on-need" tank for STS-134. The first tank slated for the STS-134 mission, ET-138, arrived at KSC on July 13, 2010, but it was later decided to use this tank for Space Shuttle *Atlantis'* last flight, STS-135. Research did not indicate why the switch was made. "Shuttle External Tank for STS-134 Mission Arrives at NASA's Kennedy Space Center," audio release, July 15, 2010, http://www.nasa.gov/news/media/audiofile/et138_arrives_ksc_07-15-2010.html; "Photo Caption," KSC Photo No. KSC-2011-1143, http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=50070; Lockheed Martin, "Space Shuttle Flight Info," 100-103, accessed August 2011, http://www.lockheedmartin.com/data/assets/ssc/michoud/.

[49] "Saturn 1B Goes to Japanese Expo," *Spaceport News*, April 14, 1978, 1 and 4.

[50] Robert Z. Pearlman, "Space Shuttle Replica Docks in Houston Lake, Launches 'Shuttlebration'," *Space.com*, June 1, 2012, http://www.space.com/15975-space-shuttle-replica-houston-delivery.html.

[51] "Space Shuttle External Tank, Astronaut Mover on Barge for Museum," Collectspace.com, April 24, 2013, http://www.collectspace.com/news/news-042413a.html.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The Barge Terminal Facility (Photo Nos. 220, 221) is located to the southeast of the VAB. The resource is defined as the concrete headwall along much of the northern edge of the turn basin, the concrete wharf at the west end of the turn basin, and the concrete pad to the west of the wharf.

2. Condition of fabric: Due to periodic maintenance, the Barge Terminal Facility is in good condition.

B. Description: The Barge Terminal Facility is comprised of three components: a wharf, a headwall, and a pad area.

The wharf (Photo Nos. 222, 223) is located at the northwest corner of the Barge Terminal Facility. It has approximate overall dimensions of 75’ in length (north-south) and 37’-6” in width (west-east). Its surface, a 3”-thick bituminous pavement cladding, is about 8’ above mean sea level. The structure is comprised of precast concrete deck units, precast concrete girders, prestressed concrete piling, timber bumpers and piles, and is enclosed with a chain fence.[52] There are thirty deck units, each of which measures roughly 13’ in length and 5’-6” in width, arranged so that there are five units end-to-end along the length of the wharf and six units side-to-side within the width. The deck units are supported by six girders oriented along a west-east axis. Each girder is 33’ in length, 3’ in width, and 2’ in height, and sits on five evenly-spaced pilings, which are roughly 1’-2” square and range in height from 38’ to 50’. Six additional batter piles are situated along the east edge of the wharf where the boats dock. Likewise, the 8” x 8” timber bumpers and 12”-diameter timber piles are only on the east edge of the wharf. There are also two 35-ton bollards anchored into the wharf (Photo No. 224). One is located roughly 7’ north and 13’-6” west of the southeast corner of the wharf and the other is about 7’ south and 13’-6” west of the northeast corner of the wharf.

The 11.5”-wide concrete headwall (Photo Nos. 225, 226) extends along most of the north edge of the turning basin. The wall begins at the west end of the wharf and extends eastward for approximately 311’. It then extends for 480’ along a northeasterly axis before it turns eastward again and extends another 510’.

The pad area is located to the west of the wharf (Photo No. 227). It has approximate overall dimensions of 350’ in length and 39’ in width. It is comprised of, from surface to base, two 1.5”

[52] NASA KSC, “Barge Terminal Facility.”

bituminous concrete layers separated by a tack coat, a 6”-thick limerock base course, a 6”-thick layer of loose measure limerock, and a 15”-thick layer of compacted earth.

D. Site Information: The Barge Terminal Facility is situated at the northeast corner of a turning basin, located to the southeast of the VAB. The facility is reached by a curving roadway off of Saturn Causeway that also provides access to the parking area for the Press Site, which sits to the southwest of the turning basin. The turning basin is roughly 10’ deep and ranges between 130’ and 1,200’ in width (or 1,995’ if the borrow pit area to the south is included). Along its west shore, approximately 185’ from the south edge of the wharf, is one of two timber mooring dolphins (Photo No. 228). A second timber dolphin is located roughly 185’ south and 293’ east of the southeast corner of the wharf.

Part IV. Sources of Information

A. Primary Sources:

NASA. "Merritt Island Launch Area Master Plan." December 1962. On file, KSC Archives Department.

_____. "Merritt Island Launch Area Master Plan." March 1963. On file, KSC Archives Department.

NASA KSC. "Real Property Record, Barge Terminal Facility." On file, KSC Real Property Office.

US Army Corps of Engineers, Canaveral District. "Access Channel & Hydraulic Fill for VAB and Pad 39C." November 1962. On file, KSC Engineering Documentation Center.

_____. "LC-39 Vehicle Unloading Dock and Area." November 1964. On file, KSC Engineering Documentation Center.

_____. "Dredging Saturn Barge Channel." July 1965. On file, KSC Engineering Documentation Center.

_____. "Dredging Saturn Barge Channel." February 1969. On file, KSC Engineering Documentation Center.

B. Secondary Sources:

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

Ezell, Edward Clinton, and Linda Neuman Ezell. *The Partnership: A NASA History of the Apollo-Soyuz Test Project.* Mineola, NY: Dover Publications, Inc., 2010.

Lawrie, Alan. *Saturn.* Burlington, ON: Apogee Space Books, 2005.

APPENDIX B: Historic Photos of the VAB Utility Annex

Figure B-1. Construction of the VAB Utility Annex, facing northeast, July 14, 1964.
Source: John F. Kennedy Space Center Archives, 100-KSC-64-15109.

Figure B-2. Construction of the VAB and VAB Utility Annex (denoted by arrow), facing east, October 13, 1964.
Source: John F. Kennedy Space Center Archives, KSC-64C-4000.

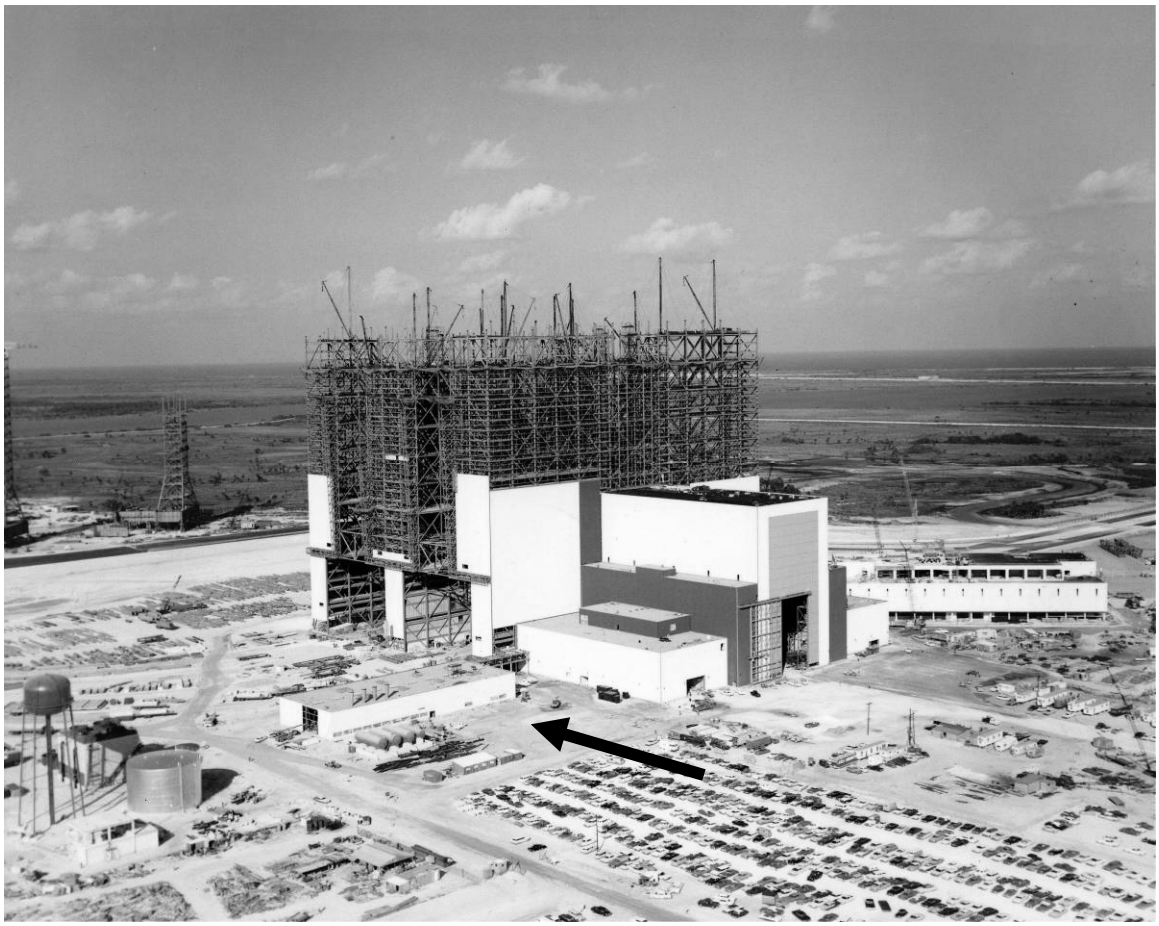

Figure B-3. Construction of the VAB and VAB Utility Annex (denoted by arrow), facing northeast, January 7, 1965.
Source: John F. Kennedy Space Center Archives, 100-KSC-65C-72.

Figure B-4. View of VAB and VAB Utility Annex (denoted by arrow), facing northeast, January 7, 1966.
Source: John F. Kennedy Space Center Archives, 100-KSC-66C-252.

Figure B-5. View of VAB Utility Annex showing northwest addition (denoted by arrow), facing northeast, January 29, 1996.
Source: John F. Kennedy Space Center Archives, KSC-96PC-212.

APPENDIX C: Architectural Drawings of the VAB Utility Annex
(PDF Scans of each Drawing at the original size are located within the Field Notes)

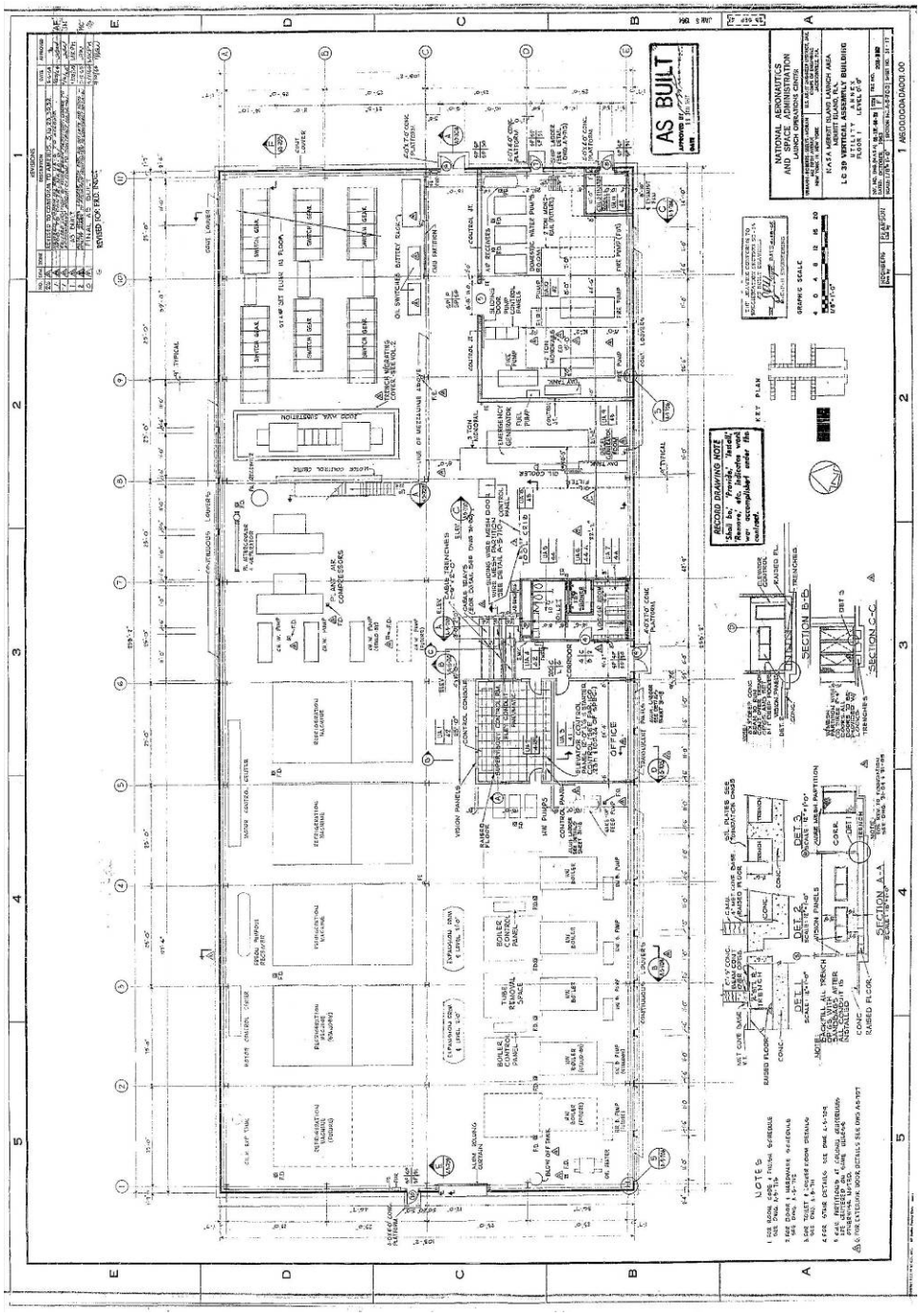

Figure C-1. Urbahn-Roberts-Seelye-Moran, "Launch Complex 39, Vertical Assembly Building, Volume 31," Utility Annex, Floor 1, Level 0'-0", October 1963, Sheet 31-17.

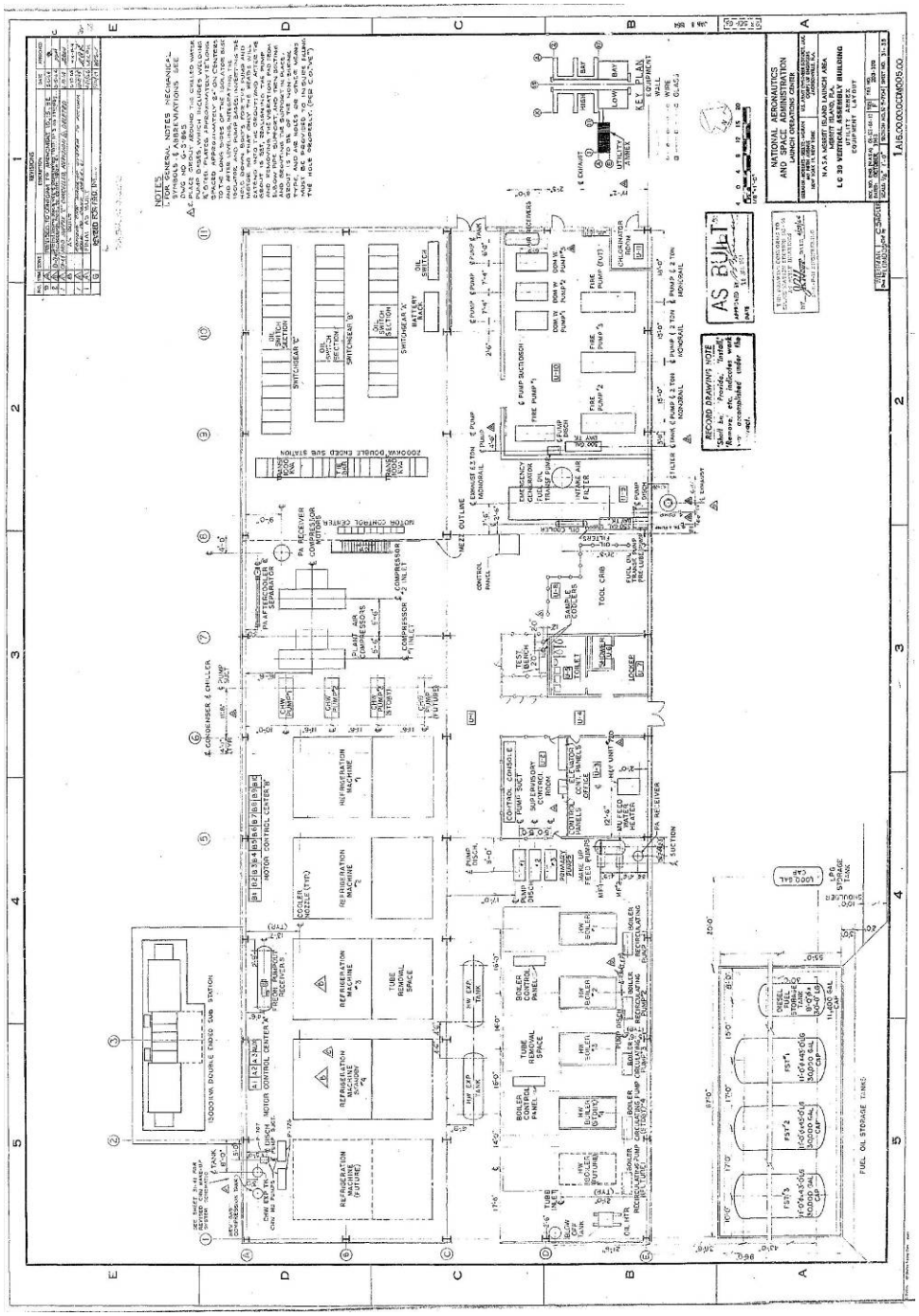

Figure C-2. Urbahn-Roberts-Seelye-Moran, "Launch Complex 39, Vertical Assembly Building, Volume 31," Utility Annex, Equipment Layout, October 1963, Sheet 31-35.

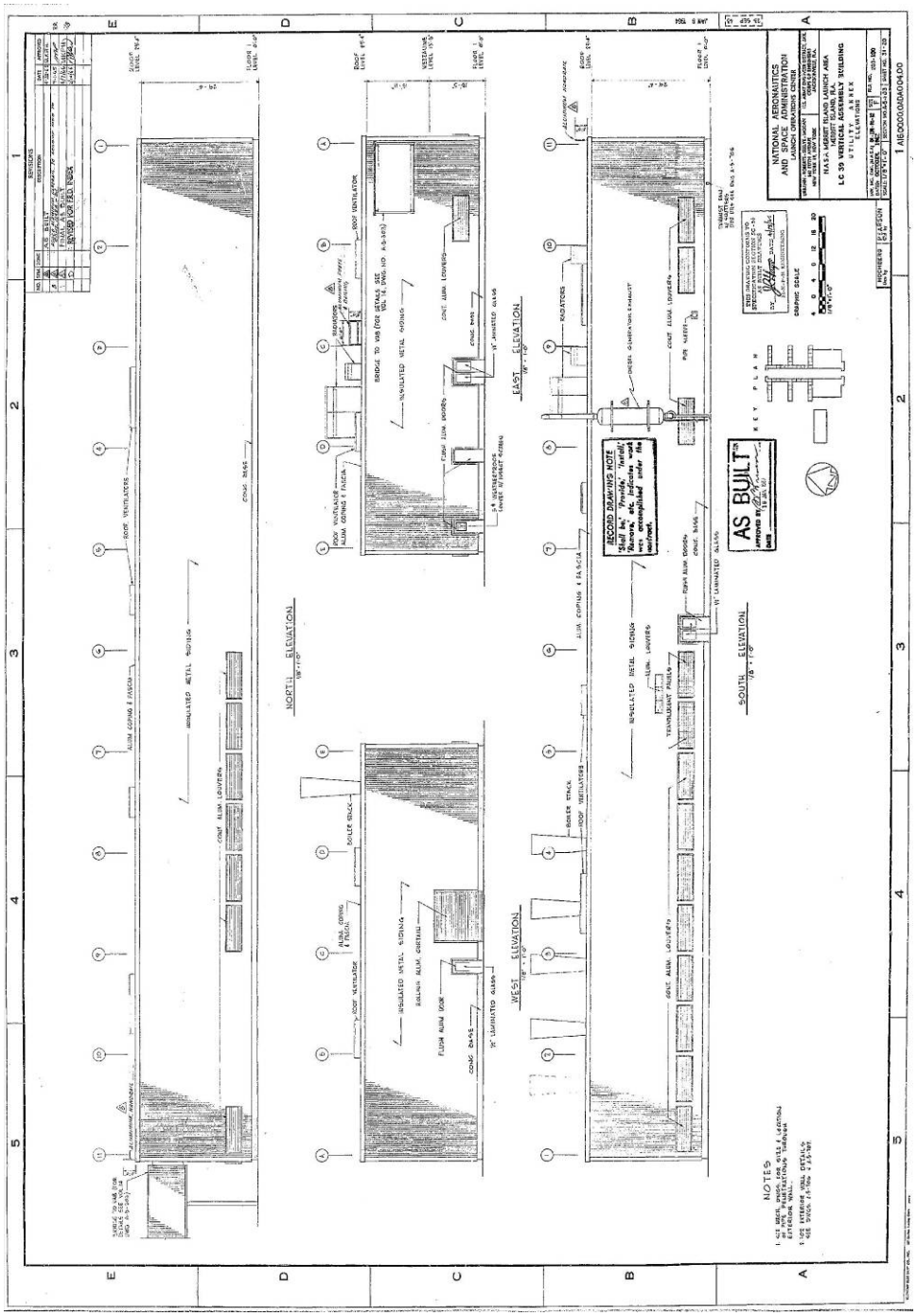

Figure C-3. Urbahn-Roberts-Seelye-Moran, "Launch Complex 39, Vertical Assembly Building, Volume 31," Utility Annex, Elevations, October 1963, Sheet 31-20.

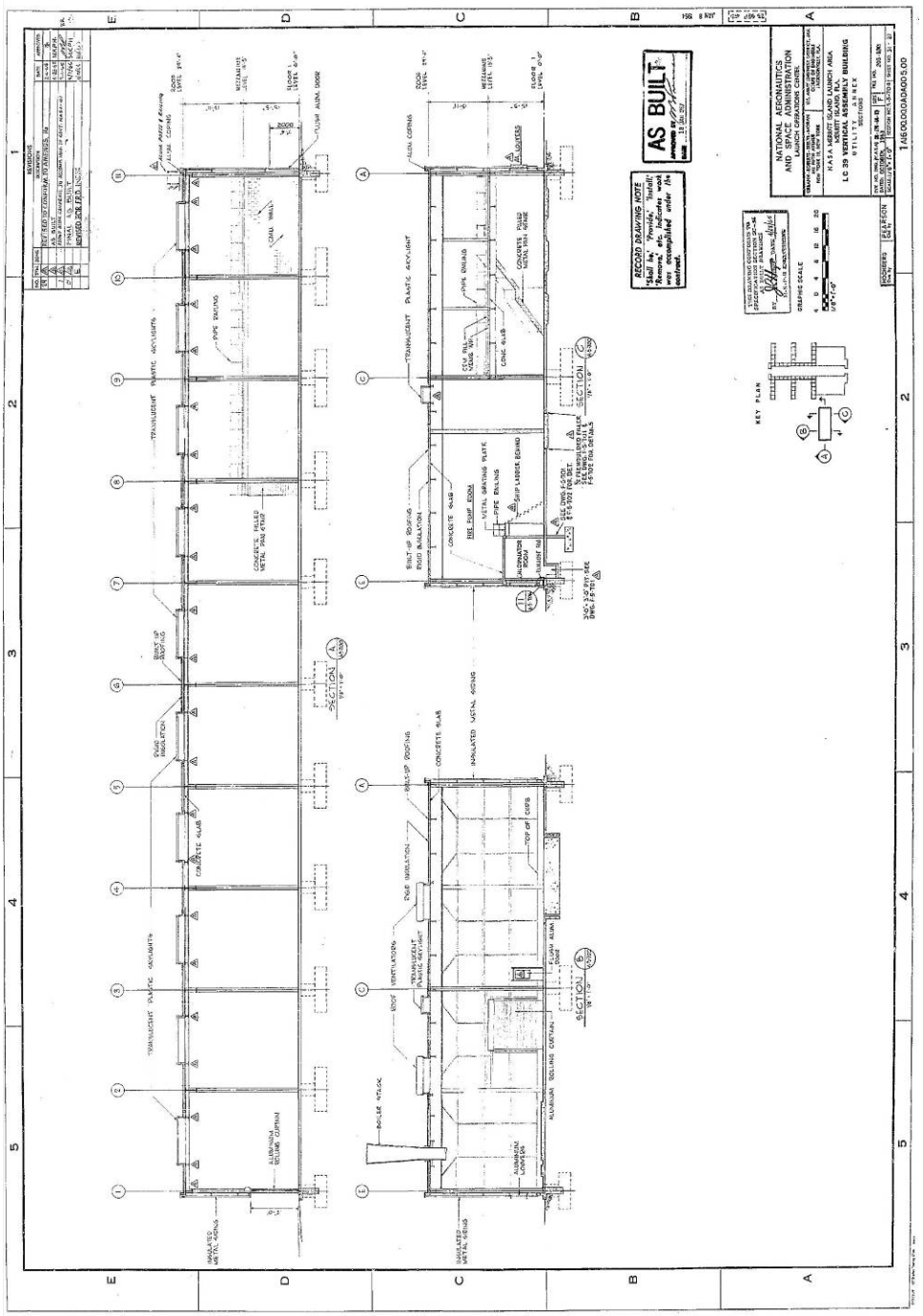

Figure C-4. Urbahn-Roberts-Seelye-Moran, "Launch Complex 39, Vertical Assembly Building, Volume 31," Utility Annex, Sections, October 1963, Sheet 31-21.

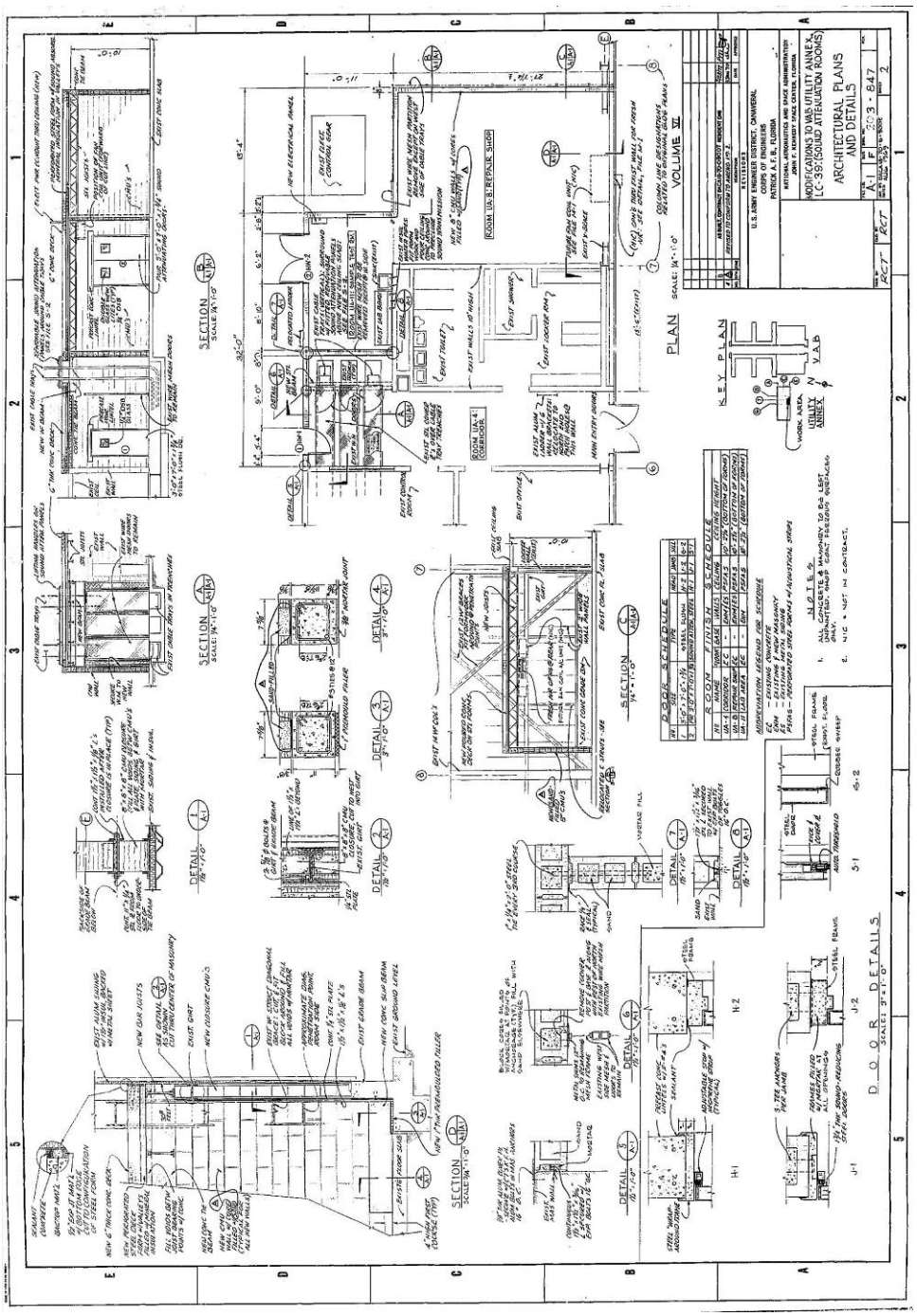

Figure C-5. U.S. ACOE, "Modifications to VAB Utility Annex, LC-39: (Sound Attenuation Rooms)," Architectural Plan and Details, August 1969, Sheet 2.

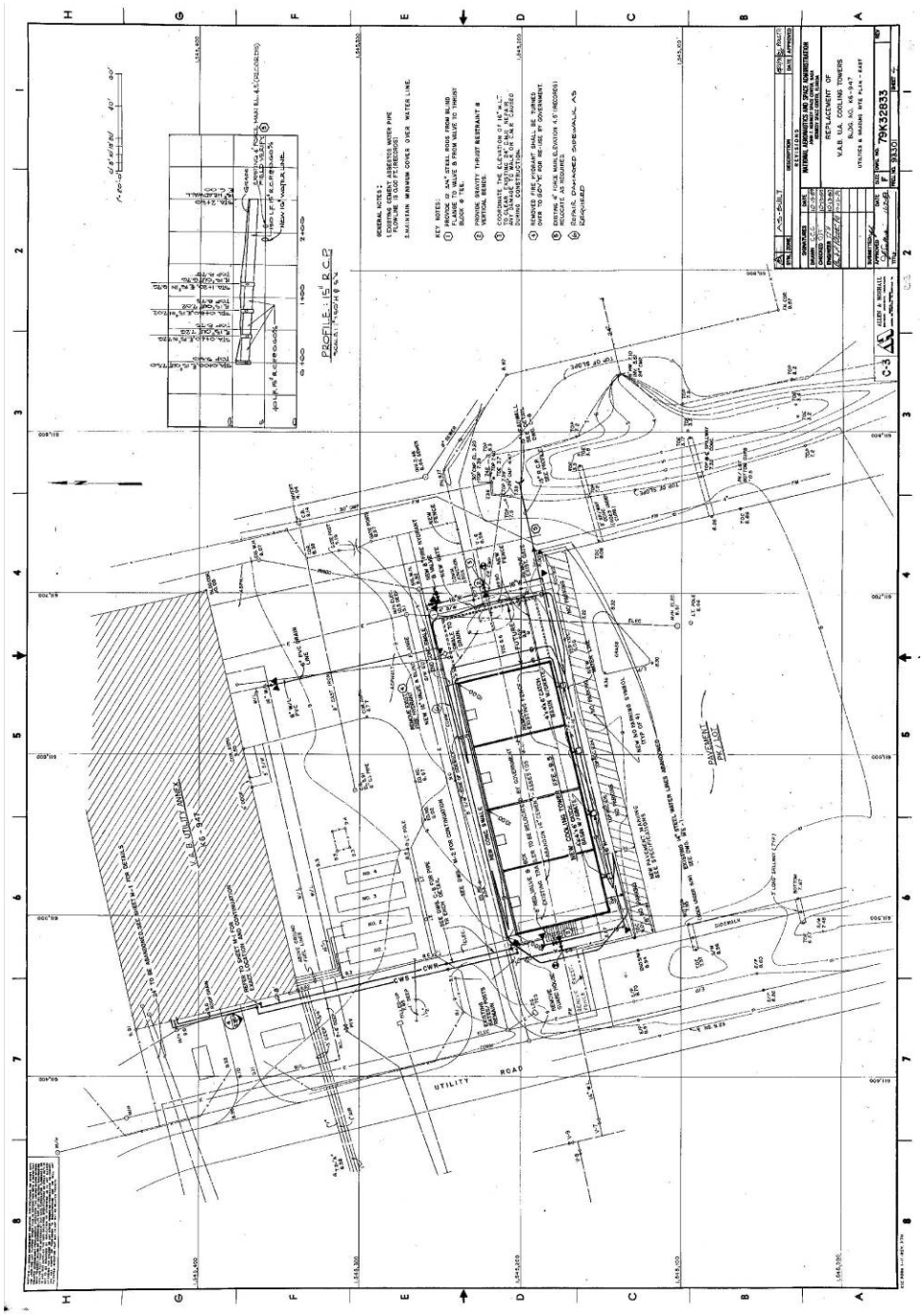

Figure C-6. Allen & Hoshall, "Replacement of V.A.B. U.A. Cooling Towers, Bldg. No. K6-947," Utilities & Grading Site Plan-East, November 1989, Sheet 4.

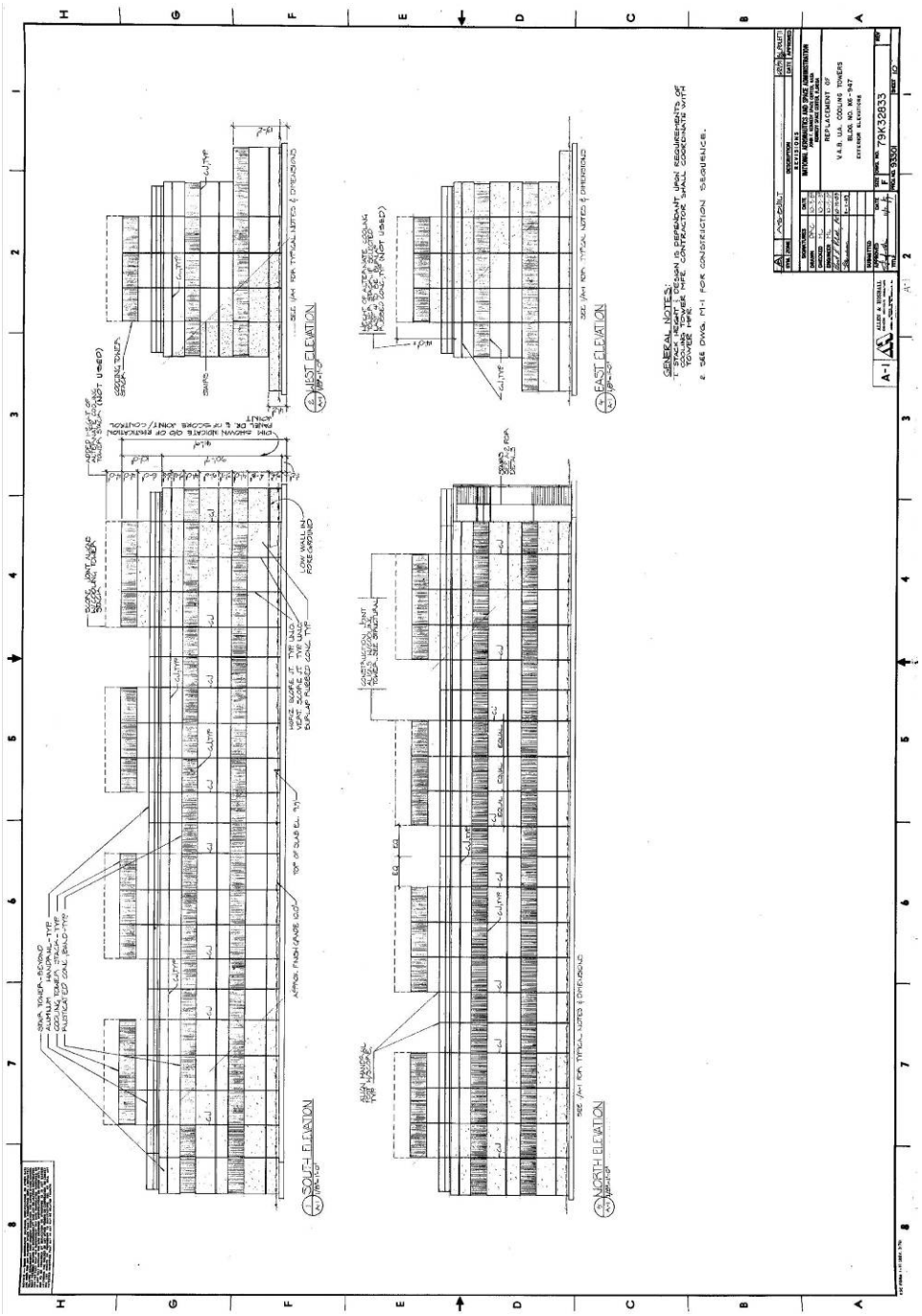

Figure C-7. Allen & Hoshall, "Replacement of V.A.B. U.A. Cooling Towers, Bldg. No. K6-947," Exterior Elevations, November 1989, Sheet 10.

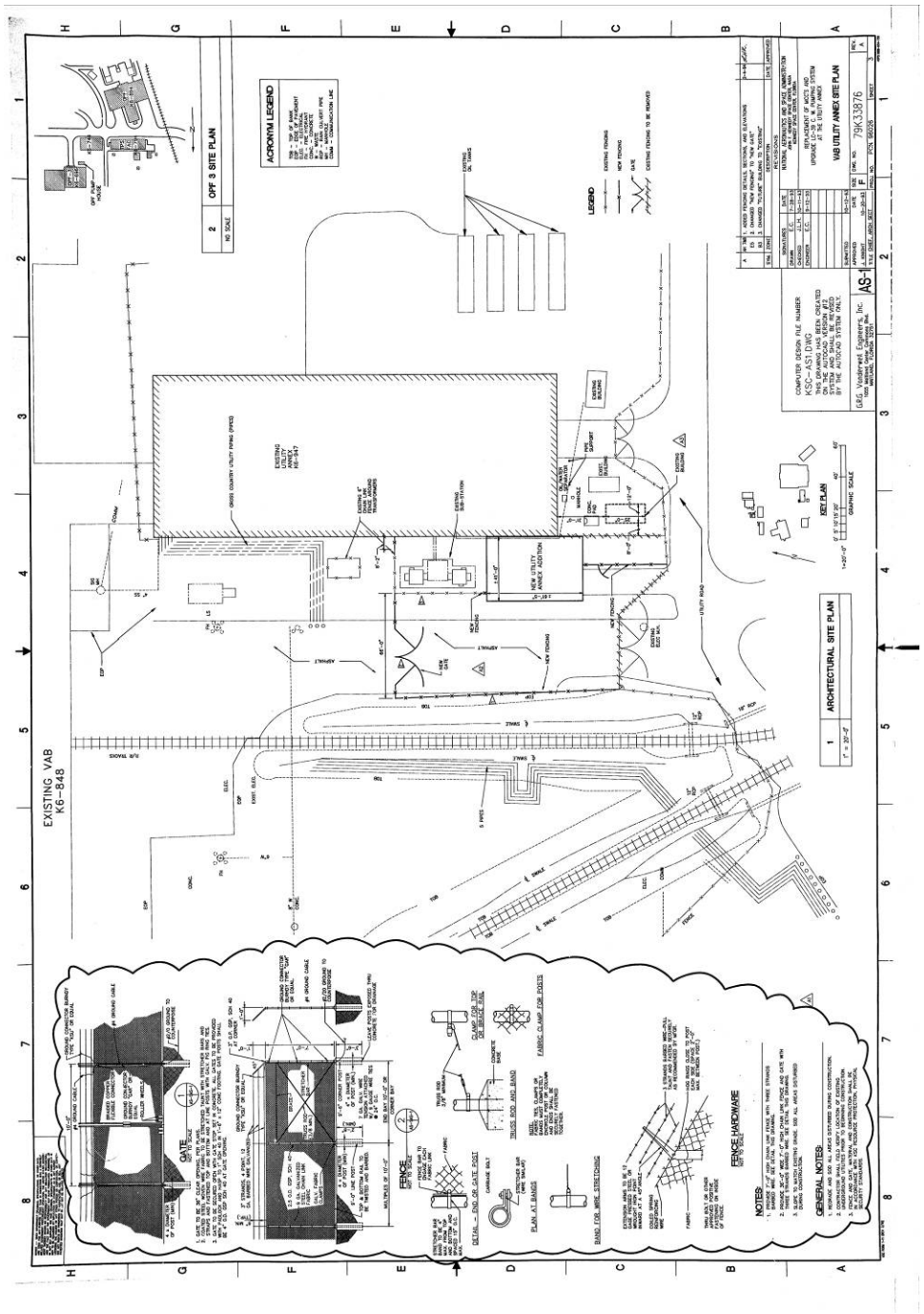

Figure C-8. G.R.G. Vanderweil Engineers, "Replacement of MCC's and Upgrade LC-39 C.W. Pumping System at the Utility Annex," VAB Utility Annex Site Plan, October 1993, Sheet 3.

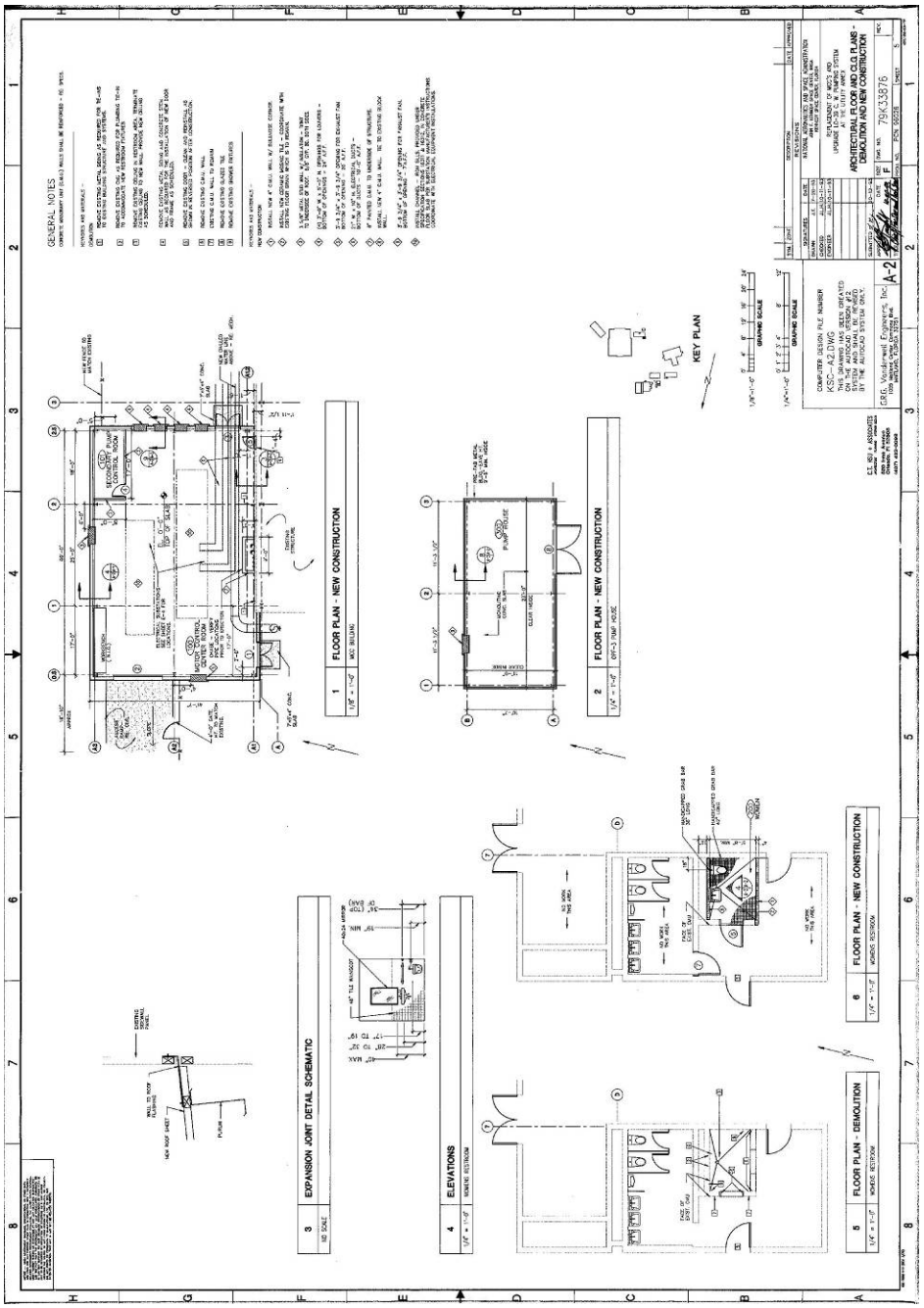

Figure C-9. G.R.G. Vanderweil Engineers, "Replacement of MCC's and Upgrade LC-39 C.W. Pumping System at the Utility Annex," Architectural Floor and Clg. [Ceiling] Plans-Demolition and New Construction, October 1993, Sheet 5.

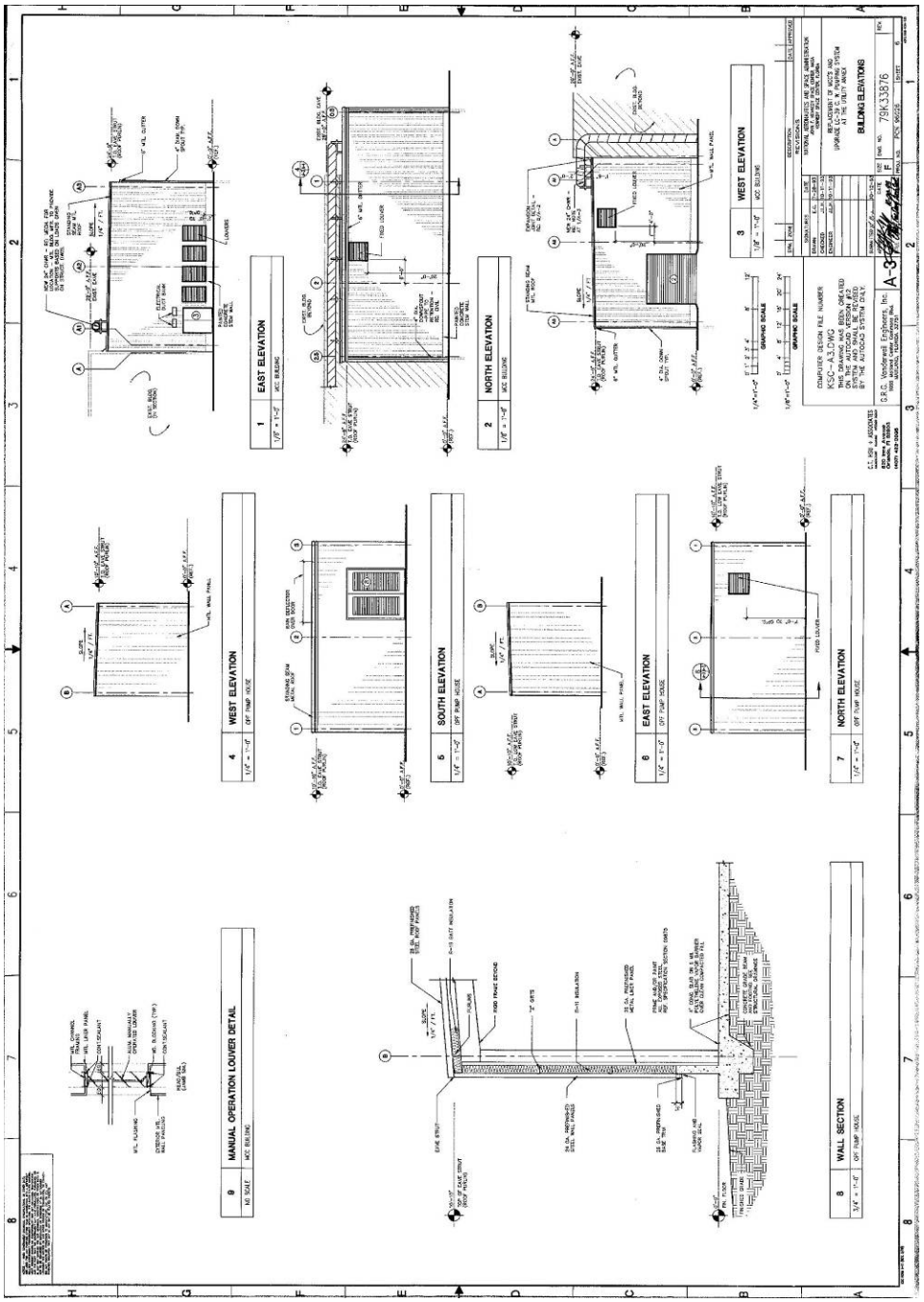

Figure C-10. G.R.G. Vanderweil Engineers, "Replacement of MCC's and Upgrade LC-39 C.W. Pumping System at the Utility Annex," Building Elevations, October 1993, Sheet 6.

APPENDIX D: Historic Photos of the Barge Terminal Facility

Figure D-1. Artist's concept of VAB Area and launch pads (Barge Terminal Facility to right of VAB, denoted by arrow), facing northeast, May 15, 1963.
Source: John F. Kennedy Institutional Imaging Facility, LOC-63C-1793.

Figure D-2. Dredging of the Barge Terminal Facility, direction unknown, May 16, 1963. Source: John F. Kennedy Space Center Archives, LOC-63-5287.

Figure D-3. Dredging of the Barge Terminal Facility, direction unknown, May 28, 1963. Source: John F. Kennedy Space Center Archives, LOC-63-5462.

Figure D-4. Construction of the headwall, direction unknown, July 17, 1963.
Source: John F. Kennedy Space Center Archives, LOC-63-7283.

Figure D-5. Construction of the Barge Terminal Facility headwall and dock, facing northeast, August 26, 1963.
Source: John F. Kennedy Space Center Archives, LOC-63-8501.

Figure D-6. Construction of the Barge Terminal Facility headwall and dock, facing southwest, September 5, 1963.
Source: John F. Kennedy Space Center Archives, LOC-63-8916.

Figure D-7. View of the Barge Terminal Facility (early construction work on the VAB in the background), facing northwest, September 10, 1965.
Source: John F. Kennedy Institutional Imaging Facility, LOC-63-9121.

Figure D-8. Construction of the wharf, direction unknown, May 14, 1965.
Source: John F. Kennedy Space Center Archives, 100-KSC-65-9380.

Figure D-9. A S-IV-B inner stage for a Saturn V launch vehicle on a barge docked at the Barge Terminal Facility, facing northwest, November 2, 1965.
Source: John F. Kennedy Space Center Archives, 100-KSC-65C-7464.

Figure D-10. Unloading of a S-1C at the Barge Terminal Facility, facing northwest, February 7, 1966.
Source: John F. Kennedy Institutional Imaging Facility, 100-KSC-66C-1250.

Figure D-11. The external tank for STS-2 arriving at the Barge Terminal Facility, facing northeast, April 22, 1981.
Source: John F. Kennedy Space Center Archives, 108-KSC-81P-212.

Figure D-12. The external tank for STS-135 being unloaded at the Barge Terminal Facility, facing northwest, July 14, 2010.
Source: John F. Kennedy Space Center Media Gallery, KSC-2010-4080, accessed at http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=48040.

APPENDIX E: Architectural Drawings of the Barge Terminal Facility
(PDF Scans of each Drawing at the original size are located within the Field Notes)

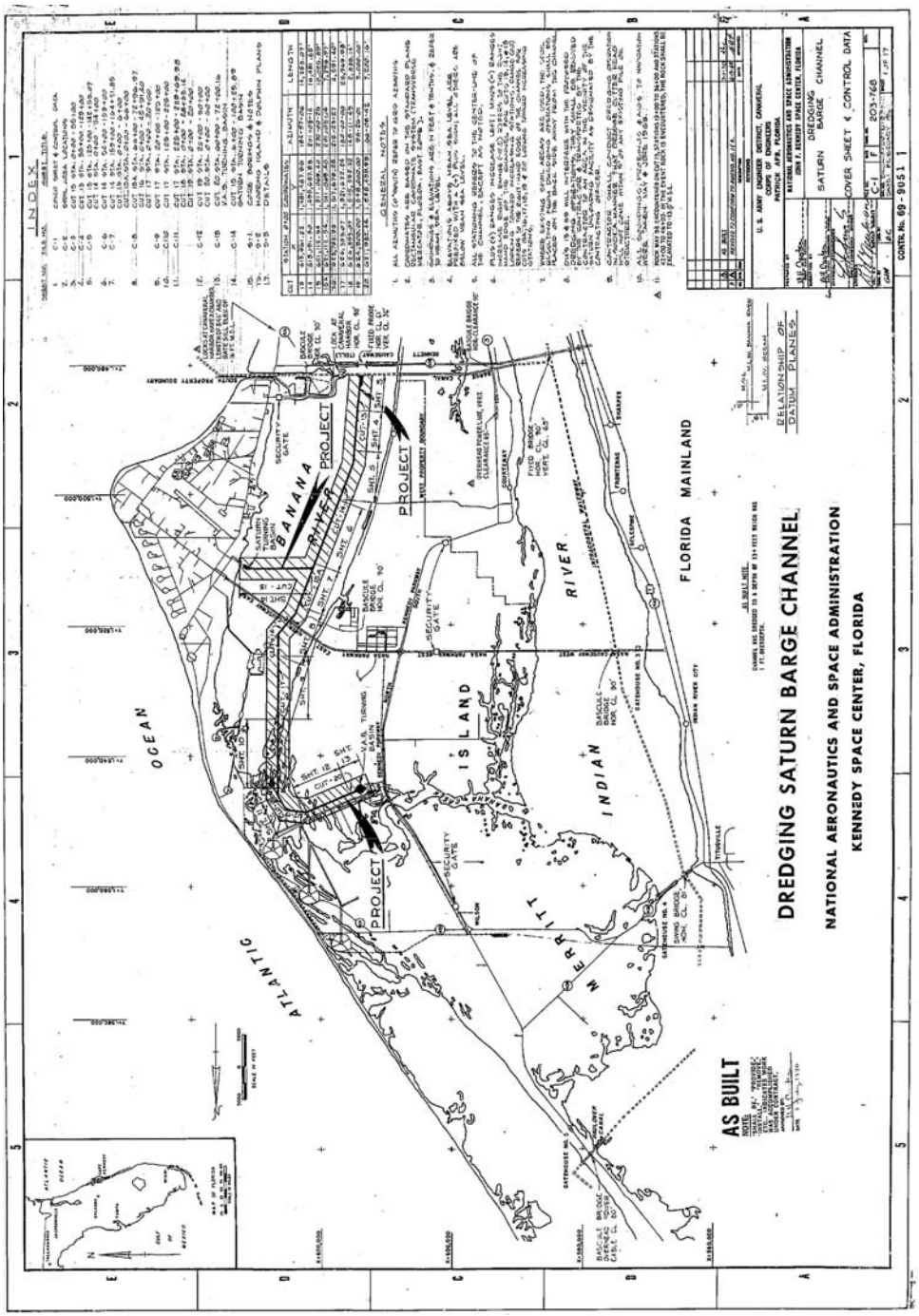

Figure E-1. U.S. ACOE, "Dredging Saturn Barge Channel," Cover Sheet & Control Data, February 1969, Sheet 1.

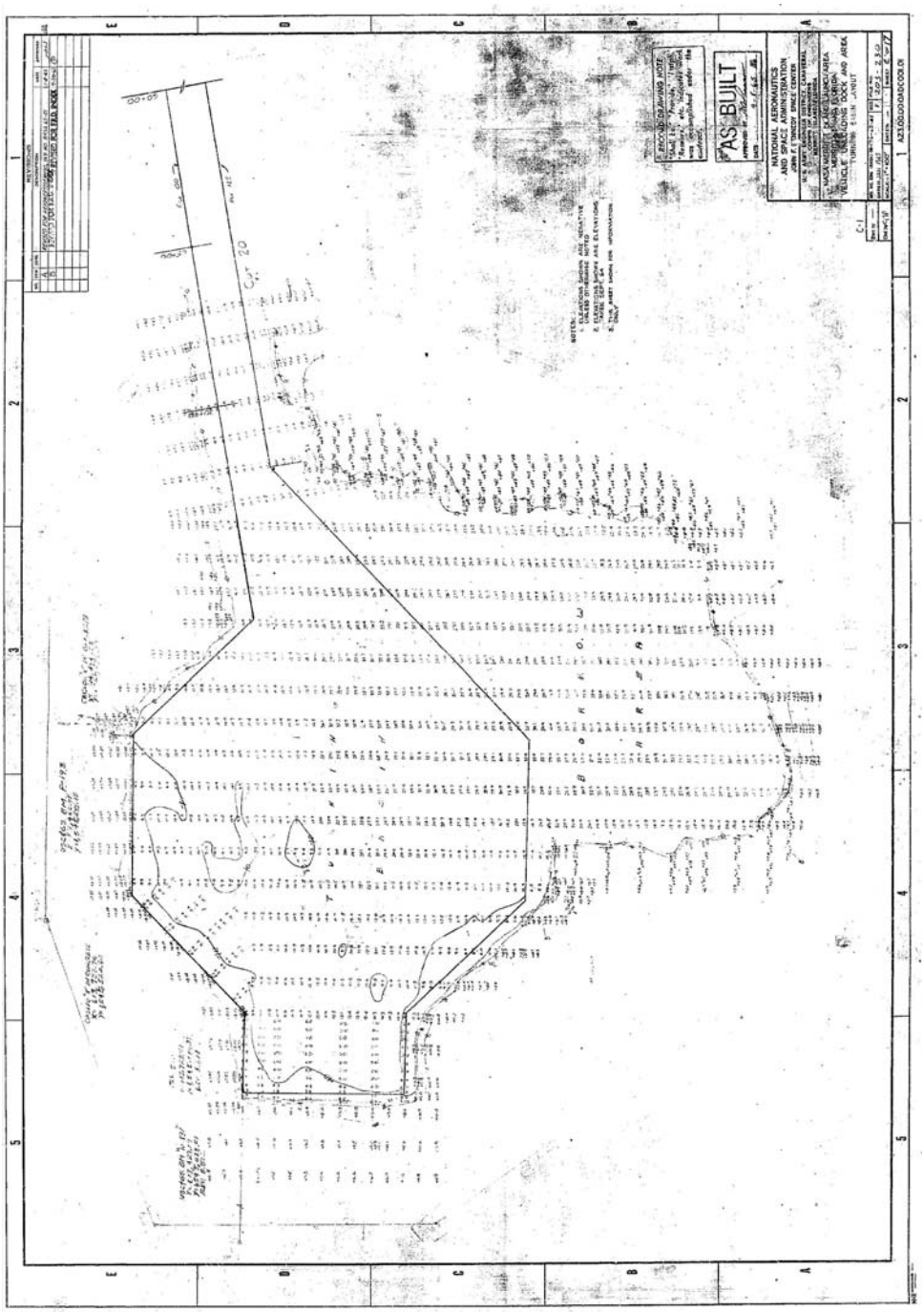

Figure E-2. U.S. ACOE, "Vehicle Unloading Dock and Area," Turning Basin Layout, January 1965, Sheet 2.

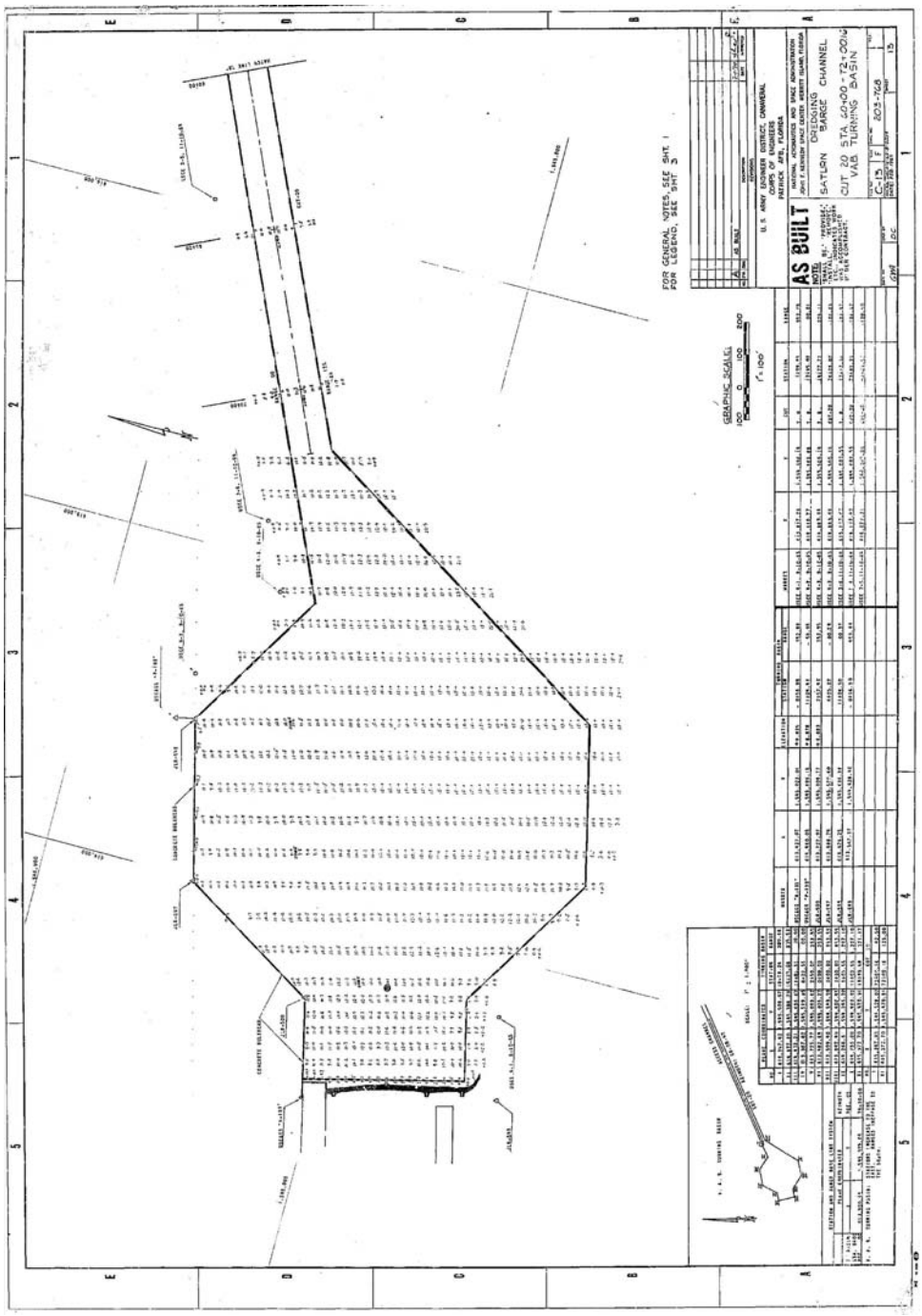

Figure E-3. U.S. ACOE, "Dredging Saturn Barge Channel," Cut 20, Sta. 60+00-72+00.16, V.A.B. Turning Basin, February 1969, Sheet 13.

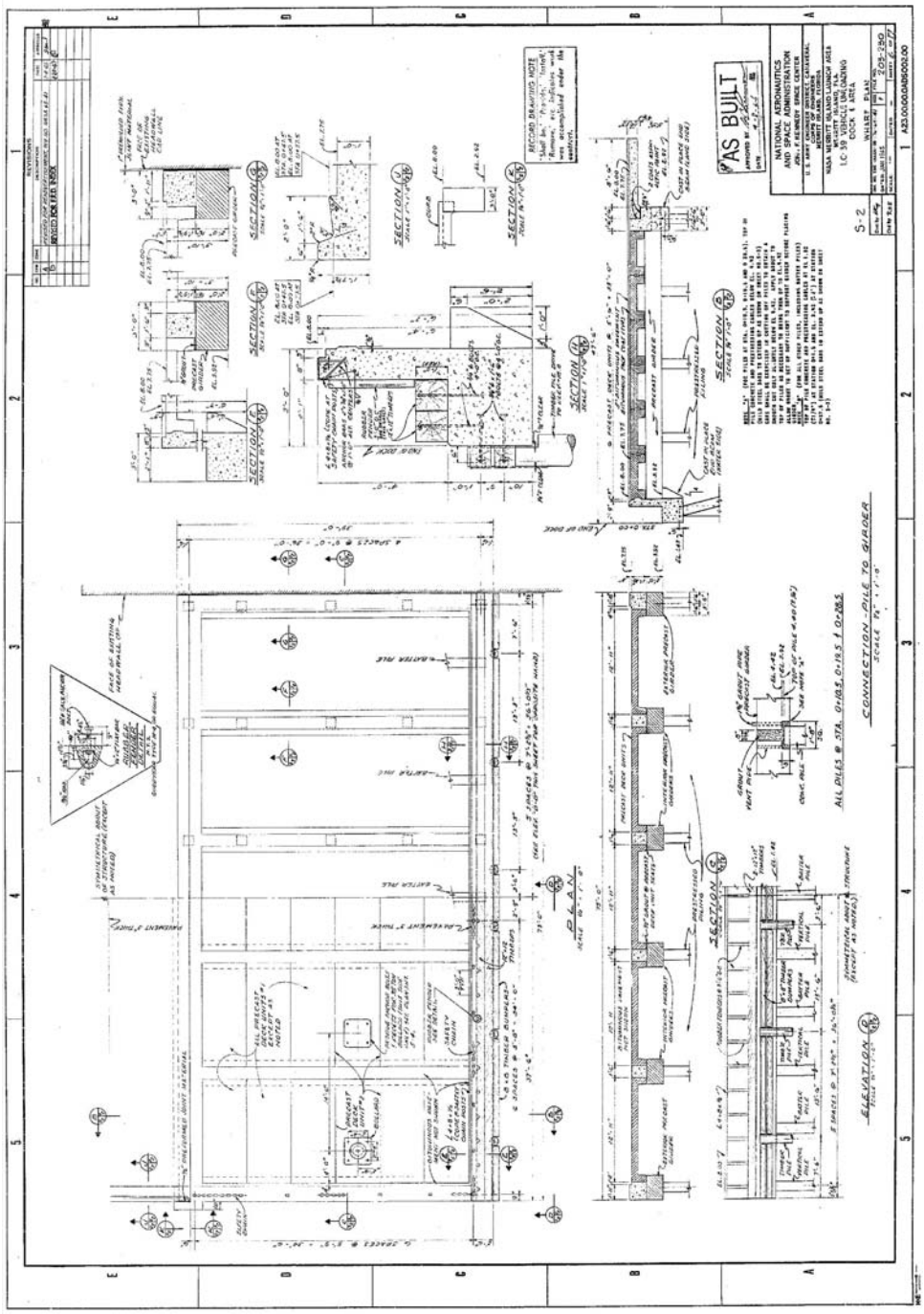

Figure E-4. U.S. ACOE, "LC-39 Vehicle Unloading Dock & Area," Wharf Plan, January 1965, Sheet 8.

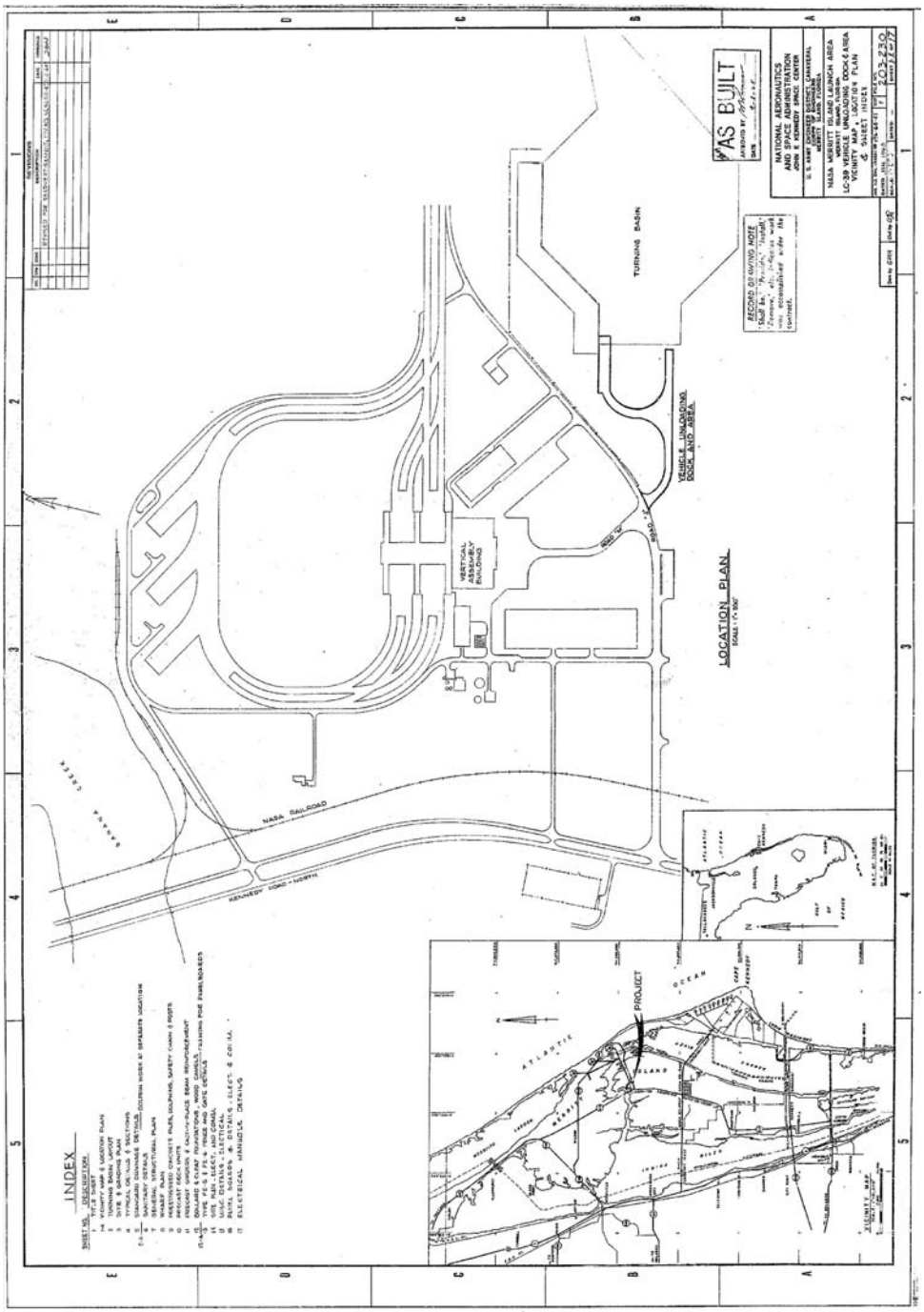

Figure E-5. U.S. ACOE, "LC-39 Vehicle Unloading Dock & Area," Vicinity Map, Location Plan & Sheet Index, January 1965, Sheet 1.

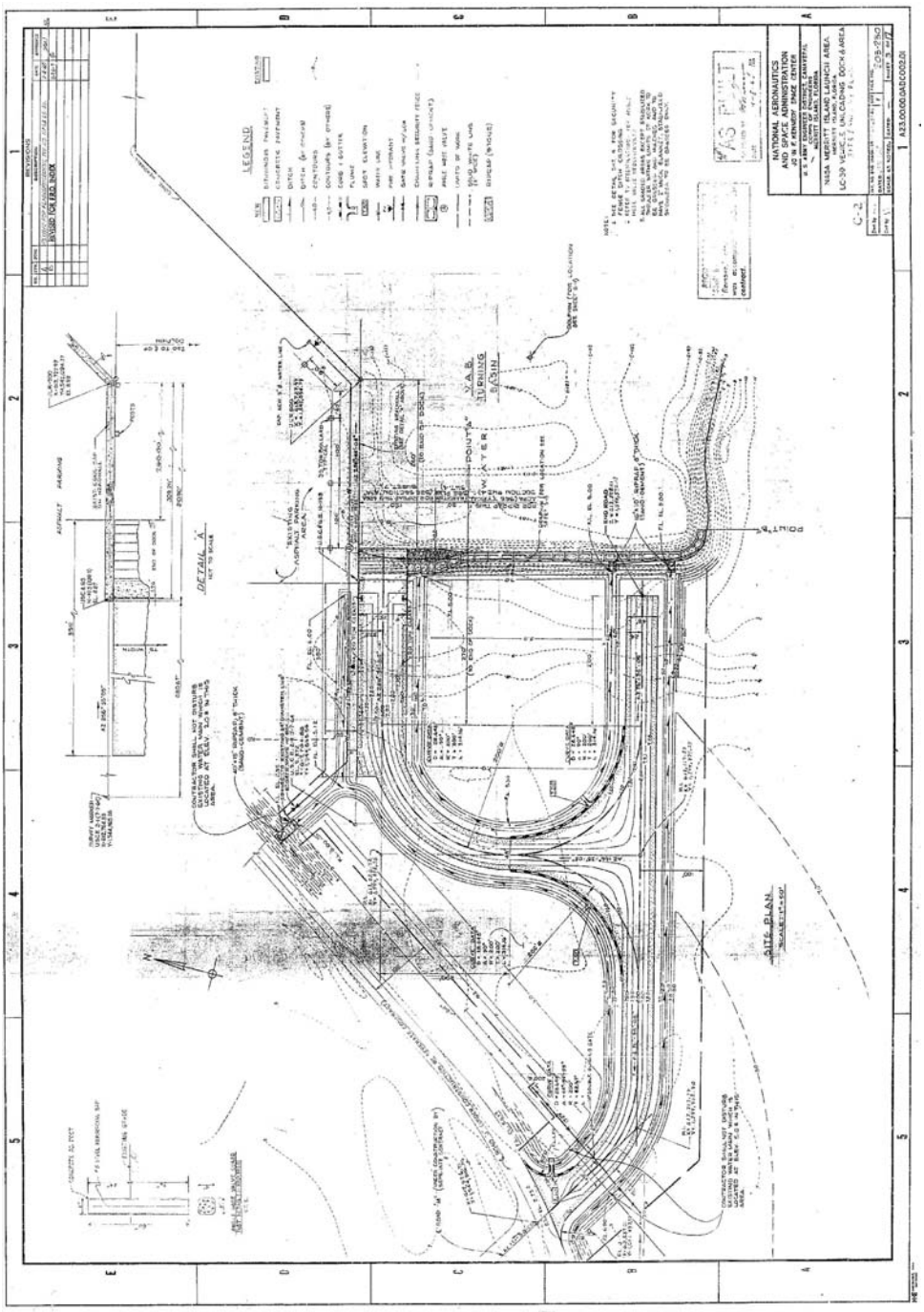

Figure E-6. U.S. ACOE, "LC-39 Vehicle Unloading Dock & Area," Site Plan, January 1965, Sheet 3.

APPENDIX F: Legend of Acronyms

ABMA	Army Ballistic Missile Agency
ACI	Archaeological Consultants, Inc.
ACOE	Army Corps of Engineers
AFB	Air Force Base
AFP	Air Force Plant
ALT	Approach and Landing Tests
AP	Access Platform
ARF	Assembly and Refurbishment Facility
ASTP	Apollo-Soyuz Test Project
CAIB	Columbia Accident Investigation Board
CCAFS	Cape Canaveral Air Force Station
CEV	Crew Exploration Vehicle
CSM	Command/Service Module
DoD	Department of Defense
ET	External Tank
FSS	Fixed Service Structure
GUCA	Ground Umbilical Carrier Assembly
HB	High Bay
HST	Hubble Space Telescope
IHA	InoMedic Health Applications
ISS	International Space Station
JSC	Johnson Space Center
KATS	Kennedy Avionics Test Set
KSC	Kennedy Space Center
LaRC	Langley Research Center
LC	Launch Complex
LCC	Launch Control Center
LOC	Launch Operations Center
LOD	Launch Operations Directorate
LPS	Launch Processing System
LUT	Launch Umbilical Tower
MILA	Merritt Island Launch Area
MLP	Mobile Launcher Platform
MSC	Manned Spacecraft Center
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NRHP	National Register of Historic Places
NSTL	National Space Technology Laboratories
O&C	Operations and Checkout
OPF	Orbiter Processing Facility

OV	Orbiter Vehicle
PCR	Payload Changeout Room
PGHM	Payload Ground Handling Mechanism
RMS	Remote Manipulator System
RPSF	Rotation, Processing and Surge Facility
RS&H	Reynolds, Smith & Hills
RSS	Rotating Service Structure
SCA	Shuttle Carrier Aircraft
SLF	Shuttle Landing Facility
SRB	Solid Rocket Booster
SSC	Stennis Space Center
SSFL	Santa Susana Field Laboratory
SSME	Space Shuttle Main Engine
SSP	Space Shuttle Program
STG	Space Task Group
STS	Space Transportation System
SWTS	Shuttle Wheel and Tire Shop
TPS	Thermal Protection System
TSM	Tail Service Mast
U.S.	United States
VAB	Vehicle Assembly Building

HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO PHOTOGRAPHS

ADDENDUM TO: HAER No. FL-8-11-B
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39
VEHICLE ASSEMBLY BUILDING
(John F. Kennedy Space Center)
VAB Road, East of Kennedy Parkway North
Cape Canaveral
Brevard County
Florida

Penny Rogo, Photographer; September 2012 (FL-8-11-B-194 through FL-8-11-B-219)
Penny Rogo, Photographer; January 2013 (FL-8-11-B-220 through FL-8-11-B-228)

FL-8-11-B-194 OVERALL VIEW OF THE VAB UTILITY ANNEX SOUTH ELEVATION, FACING NORTH-NORTHWEST.

FL-8-11-B-195 OVERALL VIEW OF THE VAB UTILITY ANNEX SOUTH AND WEST ELEVATIONS, FACING NORTHEAST (DIESEL FUEL TANKS FOR THE BOILERS TO RIGHT).

FL-8-11-B-196 OVERALL VIEW OF THE VAB UTILITY ANNEX WEST AND NORTH ELEVATIONS, FACING SOUTHEAST.

FL-8-11-B-197 OVERALL VIEW OF THE VAB UTILITY ANNEX NORTH AND EAST ELEVATIONS, FACING SOUTHWEST.

FL-8-11-B-198 OVERALL VIEW OF THE VAB UTILITY ANNEX SOUTH AND EAST ELEVATIONS, FACING NORTHWEST.

FL-8-11-B-199 OVERALL VIEW OF THE VAB UTILITY ANNEX COOLING TOWER, FACING SOUTHEAST.

FL-8-11-B-200 OVERALL VIEW OF THE VAB UTILITY ANNEX INTERIOR, FACING WEST.

FL-8-11-B-201 OVERALL VIEW OF THE VAB UTILITY ANNEX INTERIOR, FACING EAST.

ADDENDUM TO:
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39, VEHICLE ASSEMBLY BUILDING
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FL-8-11-B-203 DETAIL VIEW OF VAB UTILITY ANNEX CHILLER NO. 1, FACING NORTHEAST.

FL-8-11-B-204 OVERALL VIEW OF THE VAB UTILITY ANNEX AIR COMPRESSORS AND SECONDARY CHILLED WATER PUMPS (LEFT), FACING NORTHWEST.

FL-8-11-B-205 OVERALL VIEW OF THE VAB UTILITY ANNEX ELECTRICAL AREA, FACING SOUTHWEST.

FL-8-11-B-206 OVERALL VIEW OF THE VAB UTILITY ANNEX MEZZANINE AREA, FACING NORTHEAST.

FL-8-11-B-207 DETAIL VIEW OF THE VAB UTILITY ANNEX ¼-TON EQUIPMENT CRANE, FACING SOUTHEAST.

FL-8-11-B-208 OVERALL VIEW OF THE VAB UTILITY ANNEX BOILER AREA, FACING SOUTHWEST.

FL-8-11-B-209 DETAIL VIEW OF VAB UTILITY ANNEX BOILER NO. 1, FACING SOUTHWEST.

FL-8-11-B-210 DETAIL VIEW OF THE VAB UTILITY ANNEX PRIMARY HOT WATER PUMPS, FACING SOUTHEAST.

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FL-8-11-B-213 DETAIL VIEW OF VAB UTILITY ANNEX FIRE SUPPRESSION PUMP NO. 4, FACING SOUTHEAST.

FL-8-11-B-214 DETAIL VIEW OF THE VAB UTILITY ANNEX DOMESTIC WATER PUMPS, FACING NORTHWEST.

ADDENDUM TO:
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39, VEHICLE ASSEMBLY BUILDING
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FL-8-11-B-215 DETAIL VIEW OF THE FIRE DOOR FOR THE VAB UTILITY ANNEX DOMESTIC WATER PUMP/FIRE SUPPRESSION SYSTEM ROOM, FACING NORTHWEST.

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FL-8-11-B-217 OVERALL VIEW OF THE VAB UTILITY ANNEX CONTROL ROOM, FACING NORTHWEST.

FL-8-11-B-218 OVERALL VIEW OF THE VAB UTILITY ANNEX ELECTRICAL SUBSTATION ADDITION, FACING NORTHEAST.

FL-8-11-B-219 DETAIL VIEW OF VAB UTILITY ANNEX SUBSTATION PANELS IN THE ELECTRICAL SUBSTATION ADDITION, FACING WEST.

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FL-8-11-B-223 OVERALL VIEW OF THE BARGE TERMINAL FACILITY WHARF, FACING SOUTHWEST.

FL-8-11-B-224 DETAIL VIEW OF A TIE-DOWN BOLLARD ON THE BARGE TERMINAL FACILITY WHARF, FACING EAST.

FL-8-11-B-225 OVERALL VIEW OF THE BARGE TERMINAL FACILITY HEADWALL, FACING EAST.

FL-8-11-B-226 DETAIL VIEW OF THE BARGE TERMINAL FACILITY HEADWALL, FACING NORTHEAST.

FL-8-11-B-227 OVERALL VIEW OF THE BARGE TERMINAL FACILITY WHARF, PAD, AND ROADWAY, FACING EAST-NORTHEAST.

ADDENDUM TO:
CAPE CANAVERAL AIR FORCE STATION, LAUNCH COMPLEX 39, VEHICLE ASSEMBLY BUILDING
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