MISSION CONTROL CENTER/
BUILDING 30

HISTORICAL DOCUMENTATION

Prepared for:
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Prepared by:
Archaeological Consultants, Inc.
Sarasota, Florida

October 2010

PREFACE

In response to President George W. Bush's announcement in January 2004 that the Space Shuttle program (SSP) would end in 2010, the National Aeronautics and Space Administration (NASA) completed a nation-wide historical survey and evaluation of NASA-owned facilities and properties (real property assets) at all its Centers and component facilities. The buildings and structures which supported the SSP were inventoried and assessed as per the criteria of eligibility for listing in the National Register of Historic Places (NRHP) in the context of this program. This study was performed in compliance with Section 110 of the National Historic Preservation Act (NHPA) of 1966 (Public Law 89-665), as amended; the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190); Executive Order (EO) 11593: Protection and Enhancement of the Cultural Environment; EO 13287, Preserve America, and other relevant legislation.

As part of this nation-wide study, in September 2006, historical survey and evaluation of NASA-owned and managed facilities was conducted by NASA's Lyndon B. Johnson Space Center (JSC) in Houston, Texas. The results of this study are presented in a report entitled, "Survey and Evaluation of NASA-owned Historic Facilities and Properties in the Context of the U.S. Space Shuttle Program, Lyndon B. Johnson Space Center, Houston, Texas," prepared in November 2007 by NASA JSC's contractor, Archaeological Consultants, Inc. As a result of this survey, the Mission Control Center (Building 30) was determined eligible for listing in the NRHP, with concurrence by the Texas State Historic Preservation Officer (SHPO). The survey concluded that Building 30 is eligible for the NRHP under Criteria A and C in the context of the U.S. Space Shuttle Program (1969-2010). Because it has achieved significance within the past 50 years, Criteria Consideration G applies. It should be noted that the Mission Control Center was designated a National Historic Landmark in 1985 for its role in the Apollo 11 Lunar Landing.

At the time of this documentation, Building 30 was still used to support the SSP as an engineering research facility, which is also sometimes used for astronaut training. This documentation package precedes any undertaking as defined by Section 106 of the NHPA, as amended, and implemented in 36 CFR Part 800, as NASA JSC has decided to proactively pursue efforts to mitigate the potential adverse affects of any future modifications to the facility. It includes a historical summary of the Space Shuttle program; the history of JSC in relation to the SSP; a narrative of the history of Building 30 and how it supported the SSP; and a physical description of the structure. In addition, photographs documenting the construction and historical use of Building 30 in support of the SSP, as well as photographs of the facility documenting the existing conditions, special technological features, and engineering details, are included. A contact sheet printed on archival paper, and an electronic copy of the work product on CD, are also provided.

ACKNOWLEDGEMENTS

Archaeological Consultants, Inc. (ACI) of Sarasota, Florida extends their gratitude to Perri E. Fox, NASA JSC's Shuttle Transition Manager, and Sandra J. Tetley, NASA JSC's Real Property Officer and Historic Preservation Officer (HPO), for making all arrangements for access and information gathering in support of this documentation. We also thank the staff of the JSC Imagery Repository for their cooperation in providing historical photographs; and the staff of the Engineering Drawing Control Center for their cooperation in providing architectural drawings of the facility. We deeply appreciate the efforts of Rebecca Marsh, Building 30 Facility Manager, for serving as ACI's point of contact at the facility and for providing valuable information, along with Dennis Hehir, Mike Thomasson, and Joe Morris, on the functions of the MCC. Finally, we would like to thank Rebecca Wright and Jennifer Ross-Nazzal of Tessada & Associates, for conducting oral histories, which greatly enhanced our discussion of the building.

TABLE OF CONTENTS

MISSION CONTROL CENTER
BUILDING 30
JOHNSON SPACE CENTER,
HOUSTON, TEXAS

Basic Information

Location:	To the south of Avenue C, between 2nd Street and 4th Street Johnson Space Center Houston Harris County Texas U.S.G.S. 7.5. minute League City, Texas, quadrangle, Universal Transverse Mercator coordinates: 15.297643.3271663
Date of Construction:	1963-1964; ca. 1990-1992
Architect/Engineer:	Kaiser Engineers, Oakland, California (original); Haldeman Powell Johns, Dallas, Texas (addition)
Builder:	W.S. Bellows Construction/Peter Kiewit Sons, Company and Ets-Hokin and Galvan, Inc., Houston, Texas (original); J.W. Bateson Company, Inc. (addition)
Present Owner:	National Aeronautics and Space Administration Johnson Space Center, Houston, Texas
Present Use:	Building 30 has provided mission control for all manned space flights from Gemini IV (June 3-7, 1965) to the present.
Significance:	The Mission Control Center (Building 30) was designated a National Historic Landmark (NHL) in 1985 as part of the Man in Space theme study. It derived its significance from its “close association with the manned spacecraft program of the U.S.” and for its use “to monitor nine Gemini and all Apollo flights, Apollo-Soyuz, and all recent Space Shuttle flights.” Building 30 continues its historical functions as the control center for the Space Shuttle program. Building 30 is significant under Criterion A in the areas of Space Exploration and Communications and under Criterion C in the area of Engineering. Because it has achieved significance within the past 50 years, Criteria Consideration G applies. Under Criterion A, it is significant as the support center critical to full

control of Space Shuttle missions, from liftoff to touchdown. The mission operations wing is the hub for communications and electronic controls employed to maintain contact with spacecraft and crew during actual flight missions. In addition, since the beginning of the Space Shuttle program, the MCC has also supported the control of simulated flight missions, providing both training and experience to astronauts and flight controllers. Under Criterion C, the MCC reflects the historic missions of the Space Shuttle program in terms of its unique design features which provided all aspects of manned spaceflight mission control.

Report Prepared by: Patricia Slovinac, Architectural Historian and Joan Deming, Project Manager
Archaeological Consultants, Inc.
8110 Blaikie Court, Suite A
Sarasota, Florida 34240

Date: October 2010

The U.S. Space Shuttle Program

On January 5, 1972, President Nixon delivered a speech in which he outlined the end of the Apollo era and the future of a reusable space flight vehicle, the Space Shuttle, which would provide "routine access to space." By commencing work at this time, Nixon added, "we can have the Shuttle in manned flight by 1978, and operational a short time after that."[1] The Space Task Group (STG), previously established by President Nixon in February 1969, to recommend a future course for the U.S. Space Program, presented three choices of long-range plans. All included an Earth–orbiting space station, a space shuttle, and a manned Mars expedition.[2] Although none of the original programs presented was eventually selected, the National Aeronautics and Space Administration (NASA) implemented a program, shaped by the politics and economic realities of the time, which served as a first step toward any future plans for implementing a space station.[3]

On January 5, 1972, President Richard Nixon instructed NASA to proceed with the design and building of a partially reusable space shuttle consisting of a reusable orbiter, three reusable main engines, two reusable solid rocket boosters (SRBs), and one non-reusable external liquid fuel tank (ET). NASA's administrators vowed that the shuttle would fly at least fifty times a year, making space travel economical and safe. NASA gave responsibility for developing the shuttle orbiter vehicle and overall management of the Space Shuttle Program (SSP) to the Manned Space Center (MSC, now the Johnson Space Center [JSC]) in Houston, based on the Center's experience. The Marshall Space Flight Center (MSFC) in Huntsville, Alabama, was responsible for development of the Space Shuttle Main Engine (SSME), SRBs, the ET, and for all propulsion-related tasks. Engineering design support continued at MSC, MSFC and NASA's Langley Research Center (LaRC), in Virginia, and engine tests were to be performed at NASA's Mississippi National Space Technology Laboratories (NSTL, later named Stennis Space Center [SSC]) and at the Air Force's Rocket Propulsion Laboratory in California, which later became the Santa Susana Field Laboratory (SSFL).[4] NASA selected the Kennedy Space Center (KSC) in Florida, as the primary launch and landing site for the SSP. KSC, responsible for designing the launch and recovery facilities, was to develop methods for shuttle assembly, checkout, and launch operations.[5]

On September 17, 1976, the full-scale orbiter prototype, *Enterprise* (OV- 101), was completed. Designed for test purposes only and never intended for space flight, structural assembly of this

---

[1] Marcus Lindroos. "President Nixon's 1972 Announcement on the Space Shuttle." (NASA Office of Policy and Plans, NASA History Office, updated April 14, 2000).
[2] NASA, History Office, NASA Headquarters. "Report of the Space Task Group, 1969."
[3] Dennis R. Jenkins. *Space Shuttle, The History of the National Space Transportation System. The First 100 Missions*. (Cape Canaveral, Florida: Specialty Press, 2001), 99.
[4] Jenkins, 122.
[5] Linda Neuman Ezell. *NASA Historical Databook Volume III Programs and Projects 1969-1978.* The NASA History Series, NASA SP-4012, (Washington, D.C.: NASA History Office, 1988), Table 2-57; Ray A. Williamson. "Developing the Space Shuttle." *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume IV: Accessing Space*. (Edited by John M. Logsdon. Washington, D.C.: U.S. Printing Office, 1999), 172-174.

orbiter had started more than two years earlier in June 1974 at Air Force Plant (AFP) 42 in Palmdale, California. Although the *Enterprise* was an aluminum shell prototype incapable of space flight, it reflected the overall design of the orbiter. As such, it served successfully in 1977 as the test article during the Approach and Landing Tests (ALT) aimed at checking out both the mating with the shuttle carrier aircraft (SCA) for ferry operations, as well as the orbiter's unpowered landing capabilities.

The first orbiter intended for space flight, *Columbia* (OV-102), arrived at KSC from the shuttle assembly facility in Palmdale in March 1979. Originally scheduled to lift off in late 1979, the launch date was delayed by problems with both the SSME components, as well as the thermal protection system (TPS). *Columbia* spent 610 days in the Orbiter Processing Facility (OPF), another thirty-five days in the Vehicle Assembly Building (VAB), and 105 days on Pad 39A before finally lifting off on April 12, 1981. STS-1, the first orbital test flight and first Space Shuttle Program mission, ended with a landing on April 14 at Edwards Air Force Base (AFB) in California. This launch demonstrated *Columbia's* ability to fly into orbit, conduct on-orbit operations, and return safely.[6] *Columbia* flew three additional test flights in 1981 and 1982, all with a crew of two. The Orbital Flight Test Program ended in July 1982 with 95% of its objectives completed. After the end of the fourth mission, President Ronald Reagan declared that with the next flight the Shuttle would be "fully operational."

By the end of the Space Shuttle Program, a total of 134 missions will have been conducted. From April 1981 until the *Challenger* accident in January 1986, between two and nine missions were flown yearly, with an average of four to five per year. The milestone year was 1985, when nine flights were successfully completed. The years between 1992 and 1997 were the most productive, with seven or eight yearly missions. Since 1995, in addition to its unique responsibility as the shuttle launch site, KSC also became the preferred landing site.

Over the past two decades, the SSP has launched a number of planetary and astronomy missions including the Hubble Space Telescope (HST), the Galileo probe to Jupiter, Magellan to Venus, and the Upper Atmospheric Research Satellite. In addition to astronomy and military satellites, a series of Spacelab research missions were flown, which carried dozens of international experiments in disciplines ranging from materials science to plant biology. Spacelab was a manned, reusable, microgravity laboratory flown into space in the rear of the Space Shuttle cargo bay. It was developed on a modular basis allowing assembly in a dozen arrangements depending on the specific mission requirements.[7] The first Spacelab mission, carried aboard *Columbia* (STS-9), began on November 28, 1983. Four Spacelab missions were flown between 1983 and 1985. Following a hiatus in the aftermath of the *Challenger* disaster, the next Spacelab mission was not launched until 1990. In total, twenty-four Space Shuttle missions carried Spacelab hardware before the program was decommissioned in 1998.[8] In addition to astronomical,

---

[6] Jenkins, 268.
[7] NASA. *NASA Shuttle Reference Manual*. (1988).
[8] STS-90, which landed on May 3, 1998, was the final Spacelab mission. NASA. "Shuttle Payloads and Related Information." *KSC Factoids*. Revised November 18, 2002.

atmospheric, microgravity, and life sciences missions, Spacelab was also used as a supply carrier to the HST and the Soviet space station *Mir*.

In 1995, a joint U.S./Russian Shuttle-*Mir* Program was initiated as a precursor to construction of the International Space Station (ISS). *Mir* had been launched in February 1986 and remained in orbit until March 2001.[9] The first approach and flyaround of *Mir* took place on February 3, 1995 (STS-63); the first *Mir* docking was in June 1995 (STS-71). During the three-year Shuttle-*Mir* Program (June 27, 1995 to June 2, 1998) the Space Shuttle docked with *Mir* nine times. All but the last two of these docking missions used the Orbiter *Atlantis*. Many of the activities carried out were types they would perform on the ISS.[10]

On December 4, 1999, *Endeavour* (STS-88) launched the first component of the ISS into orbit. As noted by Williamson, this event marked, "at long last the start of the Shuttle's use for which it was primarily designed – transport to and from a permanently inhabited orbital space station."[11] STS-96, launched on May 27, 1999, marked the first mission to dock with the ISS. Since that time, most Space Shuttle missions have supported the continued assembly of the space station. As currently planned, ISS assembly missions will continue through the life of the Space Shuttle Program.

The SSP suffered two major setbacks with the tragic losses of the *Challenger* and *Columbia* on January 28, 1986, and February 1, 2003, respectively. Following the *Challenger* accident, the SSP was suspended, and President Ronald Reagan formed a thirteen-member commission to identify the cause of the disaster. The Rogers Commission report, issued on June 6, 1986, which also included a review of the SSP, concluded "that the drive to declare the Shuttle operational had put enormous pressures on the system and stretched its resources to the limit."[12] In addition to mechanical failure, the Commission noted a number of NASA management failures that contributed to the catastrophe. As a result, among the tangible actions taken were extensive redesign of the SRBs; an upgrade of the Space Shuttle tires, brakes, and nose wheel steering mechanisms; the addition of a drag chute to help reduce speed upon landing; the addition of a crew escape system; and the requirement for astronauts to wear pressurized flight safety suits during launch and landing operations. Other changes involved reorganization and decentralization of the SSP. NASA moved the management of the program from JSC to NASA Headquarters, with the aim of preventing communication deficiencies.[13] Experienced astronauts were placed in key NASA management positions, all documented waivers to existing flight safety criteria were revoked and forbidden, and a policy of open reviews was implemented.[14] In addition, NASA adopted a Space Shuttle flight schedule with a reduced average number of launches, and discontinued the long-term practice of launching commercial and military

[9] Tony Reichhardt (editor). *Space Shuttle, The First 20 Years*. (Washington, D.C.: Smithsonian Institution, 2002), 85.
[10] Judy A. Rumerman, with Stephen J. Garber. *Chronology of Space Shuttle Flights 1981-2000*. HHR-70. (Washington, D.C.: NASA History Division, Office of Policy and Plans, October 2000), 3.
[11] Williamson, 191.
[12] Columbia Accident Investigation Board (CAIB). *Report Volume I*. (August 2003), 25.
[13] CAIB, 101.
[14] Cliff Lethbridge. "History of the Space Shuttle Program." (2001), 4.

payloads.[15] The launch of *Discovery* (STS-26) from KSC Pad 39B on September 29, 1988, marked a Return to Flight after a 32-month hiatus in manned spaceflight following the *Challenger* accident.

In the aftermath of the 2003 *Columbia* accident, a seven month investigation ensued, concluding with the findings of the Columbia Accident Investigation Board (CAIB), which determined that both technical and management conditions accounted for the loss of the orbiter and crew. According to the CAIB Report, the physical cause of the accident was a breach in the TPS on the leading edge of the left wing, caused by a piece of insulating foam, which separated from the ET after launch and struck the wing.[16] NASA spent more than two years researching and implementing safety improvements for the orbiters, SRBs and ET. Following a two-year hiatus, the launch of STS-114 on July 26, 2005, marked the first Return to Flight since the loss of *Columbia*.

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

> *Today I announce a new plan to explore space and extend a human presence across our solar system . . . Our first goal is to complete the International Space Station by 2010 . . . The Shuttle's chief purpose over the next several years will be to help finish assembly of the International Space Station. In 2010, the Space Shuttle – after nearly 30 years of duty – will be retired from service...*[17]

Following the President's speech, NASA released The Vision for Space Exploration, which outlined the Agency's approach to this new direction in space exploration.[18] As part of this initiative, NASA will continue to use the Space Shuttle to complete assembly of the ISS. The Shuttle will not be upgraded to serve beyond 2010 and, after completing the ISS, the Space Shuttle Program will be retired.

---

[15] Lethbridge, 5.
[16] CAIB, 9.
[17] The White House. "A Renewed Spirit of Discovery – The President's Vision for Space Exploration." (January 2004).
[18] NASA Headquarters. "The Vision for Space Exploration." (February 2004).

Johnson Space Center

The Lyndon B. Johnson Space Center (JSC) officially opened on-site in June 1964 as the Manned Spacecraft Center (MSC).[19] This approximately 1,620-acre facility is located near Clear Lake, Texas, about 25 miles from downtown Houston, in Harris County. Many of the approximate 140 buildings are specialized facilities devoted to spacecraft systems, materials research and development, and/or astronaut training. JSC also includes the Sonny Carter Training Facility, located roughly 4.5 miles to the northwest of JSC, close to Ellington Field. Opened in 1997, this facility is situated on land acquired through a lease/purchase agreement with the McDonnell Douglas Corporation. In addition, NASA JSC owns some of the facilities at Ellington Field, which are generally where the aircraft used for astronaut training are stored and maintained.

The origins of JSC can be traced to the summer of 1958 when three executives of the National Advisory Committee for Aeronautics (NACA), Dr. Hugh L. Dryden, Dr. Robert R. Gilruth, and Dr. Abe Silverstein, began to formulate a space program.[20] Almost immediately, Gilruth began to focus on manned spaceflight, and subsequently convened a group of his LaRC associates, who compiled the basics of what would become Project Mercury, the first U.S. manned space program. Eight days following the activation of NASA, with the approval of NASA's first administrator, Dr. T. Keith Glennan, the Space Task Group (STG) was created to implement this program. The group was formally established on November 3, 1958, with Gilruth named as Project Manager. The initial staff of the STG came from LaRC, but was soon supplemented with engineers from the Lewis Flight Propulsion Laboratory (now Glenn Research Center) and AVRO Aircraft, Ltd. of Canada.[21]

At first, the STG offices were located at LaRC. With the establishment of the Goddard Space Flight Center in Greensbelt, Maryland, in May 1959, plans were made to incorporate the STG into it, creating a new "space projects center."[22] It was later decided to leave the STG at LaRC until the completion of Project Mercury; however, by January 1961, it was obvious that the STG would need to develop into an autonomous center, and on January 3, it was designated as such.[23] The May 25, 1961, announcement by President John F. Kennedy to send a man to the Moon by

[19] Following the death of former President Lyndon B. Johnson, the U.S. Senate passed a resolution to rename the Manned Spacecraft Center in his memory. "MSC Is Renamed 'JSC'." *Roundup* (12, 8), March 2, 1973, 1; "Capacity Crowd View Dedication Ceremonies." *Roundup* (12, 20), August 31, 1973, 1 and 3. For ease of reference, JSC will be used throughout the text, with the exception of direct quotations from sources.

[20] Dryden was the Director of NACA; Gilruth was the head of the flight research section of NACA's Langley Aeronautical Laboratory (now Langley Research Center) in Hampton, Virginia; and Silverstein was the Director of NACA's Lewis Flight Propulsion Laboratory (now Glenn Research Center) in Cleveland, Ohio. As part of NASA's establishment, NACA, was deactivated and all of its personnel and facilities were transferred to NASA. James M. Grimwood. *Project Mercury: A Chronology*. (Washington, D.C.: NASA, Office of Scientific and Technical Information, 1963); Roger D. Launius. *NASA: A History of the U.S. Civil Space Program.* (Malabar, Fla.: Krieger Publishing Company, 2001), 29.

[21] Grimwood; Loyd S. Swenson, Jr., James M. Grimwood and Charles C. Alexander. *This New Ocean: A History of Project Mercury*. (Washington, D.C.: NASA, Office of Technology Utilization, 1966), 153.

[22] Swenson, et al., 115.

[23] Swenson, et al., 251.

the end of the decade reinforced the idea that the STG needed its independence, and soon. Thus, in August 1961, John Parsons, Associate Director of the Ames Research Center (ARC), was charged with establishing a survey team to locate a site for the new center.[24]

On September 19, 1961, James Webb, NASA Administrator, announced that Houston, Texas, would be the site for NASA's new Center for manned spaceflight.[25] Numerous factors influenced the choice of Houston as the home of the new Center. First of all, Rice University was willing to donate 1000 acres of land for the Center. Additionally, Houston met all of the requirements set forth in the selection criteria. For example, Ellington Air Force Base was located nearby, as were Clear Lake and Galveston Bay; these facilities could support air and barge traffic, respectively. Houston also has a year-round moderate climate, and both Rice University and the University of Houston were in close proximity to the new site.[26]

On November 1, 1961, the STG officially became the "Manned Spacecraft Center," with Gilruth as its first Director.[27] The first JSC employees officially transferred to Houston from LaRC were Ed Campagna of the Facilities Division, John Powers, from Public Affairs, and Martin Byrnes, Site Manager; their first offices were two vacant dress shops in the Gulfgate Shopping Center, which were donated by its site manager, Marvin Kaplan.[28] The trio was assigned the responsibilities of procuring temporary office space, hiring new personnel, and meeting with local organizations to help facilitate the needs of those co-workers who would soon be joining them.[29] From November 1961 until April 1962, nearly 400 additional employees were transferred from LaRC to Houston; the new Center officially became operational in Houston on March 1, 1962, when Gilruth moved the JSC's headquarters there.[30]

To supplement the 1000 acres of land promised by Rice University, NASA purchased an additional 620 acres, mainly to provide highway access for the estimated 4000 employees.[31] In

---

[24] Swenson, et al., 363-364.
[25] Glennan resigned effective January 22, 1961 when President Eisenhower left office. Webb was sworn into office on February 15, 1961. Grimwood.
[26] From a political viewpoint, Houston was located within the district of U.S. House Representative, Albert Thomas, chairman of the House Appropriations Committee, and Texas was the home state of Vice President Lyndon B. Johnson. Dr. Robert Gilruth Oral History Interview, February 27, 1987, 273-275, *The Glennan-Webb-Seamans Project*, National Air and Space Museum.
[27] "STG Renamed; Will Move." *Space News Roundup* (1, 1), November 1, 1961, 1.
[28] Martin A. Byrnes, Jr., interview by Robert Merrifield, December 12, 1967, (Houston, TX, Archives Department, Lyndon B. Johnson Space Center), 6.
[29] Temporary offices were located in buildings throughout the Houston area, including the Phil Rich Building, the Farnsworth-Chambers Building, the Lane-Wells Building, the Canada Dry Bottling Building, and a Veterans Administration Building; and at Ellington Field. "Houston Site Offices Move to Rich Building." *Space News Roundup* (1, 3), November 29, 1961, 1; "Move To Houston Area Is On Schedule." *Space News Roundup* (1, 6), January 10, 1962, 1; "Photo Captions." *Space News Roundup* (1, 18), June 27, 1962, 2.
[30] Henry C. Dethloff. *Suddenly, Tomorrow Came…A History of the Johnson Space Center*. (Houston: Lyndon B. Johnson Space Center, 1993), 48.
[31] "Interview with I. Edward Campagna, Assistant Chief, Technical Services Division, Maintenance and Operations." August 24, 1967, Box MERR1, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake; Dethloff, 48.

September 1961, the Fort Worth Division of the U.S. Army Corps of Engineers (ACOE), under District Engineer, Colonel R. Paul West, was designated the construction agency for the new Center. Their first task was to hire an architecture/engineering (A/E) team to complete the initial design work for the new Center. Twenty teams were considered for the initial contract, and after three rounds of reviews and cuts, an A/E team headed by Brown & Root, Inc., of Houston, Texas, was selected. Partnered with them were master planners Charles Luckman Associates, Los Angeles, California; and the architectural firms of Brooks & Barr, Austin, Texas; Harvin C. Moore, Houston, Texas; MacKie & Kamrath, Houston, Texas; and Wirtz, Calhoun, Tungate, & Jackson, Houston, Texas.[32] The nearly $1.5 million contract was officially awarded in December 1961, and included general site development; master planning; design of the flight project facility, the engineering evaluation laboratory and the flight operations facility; and various site utilities.[33]

Charles Luckman Associates developed the master plan of the JSC, and "did an outstanding job of meeting the functional requirements that had been set forth in developing a campus-like atmosphere for the facility."[34] The central "quad" area, bounded by 2nd Street on the west, Avenue D on the south, 5th Street on the east, and Avenue C on the north, included three "lagoons" surrounded by small, man-made hills, as well as various walkways, trees, and shrubs.[35] Luckman Associates also advocated the use of a modular design system for the buildings with materials that could be manufactured off-site, which aided in the tight schedule for completion. Most of the buildings incorporated a poured concrete foundation, and skeletal steel walls faced with precast exposed aggregate facing (PEAF) panels. This allowed for the fabrication of the steel components while the foundation was being poured, and subsequently the manufacture of the PEAF panels while the steel skeleton was being erected.[36]

Initial construction of the JSC was completed in three main phases. The contract for the first phase, preliminary site development, was awarded on March 29, 1962, to a joint venture of Morrison-Knudsen Construction Company of Boise, Idaho, and Paul Hardeman of Stanton, California; it amounted to $3,673,000. They began the work in early April; it was completed on July 18, 1963.[37] The task included "overall site grading and drainage, utility installations including an electrical power system, a complete water supply and distribution system, sanitary and storm drainage systems, basic roads, security fence and street lighting."[38]

The invitations to bid for the Phase II contract of the construction, which was the first to include actual buildings, were distributed in early July 1962. At first, the task included an office

---

[32] "Photo Captions." *Space News Roundup* (1, 12), April 4, 1962, 2.
[33] "Design Work Contract Is Let For Clear Lake." *Space News Roundup* (1, 5), December 27, 1961, 8.
[34] "Interview with James L. Ballard, Jr." August 1, 1968, Box MERR1, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake.
[35] Campagna, August 24, 1967.
[36] Ballard, August 1, 1968; Campagna, August 24, 1967.
[37] "First Construction Contract Work Underway at Clear Lake." *Space News Roundup* (1, 13), April 18, 1962, 1; "Clear Lake Site Commitment Now Stands At $38,911,458." *Space News Roundup* (3, 4), December 11, 1963, 3.
[38] "Interview with Jack P. Shields." August 1, 1968, Box MERR4, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake; "First Construction Contract Work."

building, a shop building and warehouse, a garage, a central heating and cooling plant, a fire station, and a sewage disposal plant, as well as all necessary paving and utilities for these structures.[39] By the time bids were received and opened, the statement of work had been revised to exclude the office building, the shop building, and the warehouse, all of which were replaced by the Data Processing Center (Building 12). By the time the contract was let in October 1962, the task had changed a second time. In the end, the ACOE signed a contract with the joint venture of W.S. Bellows Construction Corporation and Peter Kiewit & Sons Corporation, both of Houston, in the amount of $4,145,044, for the construction of Building 12, the sewage disposal plant, the central heating and cooling plant, the fire station, and a water treatment plant and associated building.[40] Of these facilities, the fire station was the first to be completed in September 1963; the central heating and cooling plant was last, finished in December 1963.[41]

Phase III of JSC's construction incorporated the largest grouping of buildings under one contract. The invitations to bid on this phase were issued on September 25, 1962, and listed ten buildings with an approximate total area of 760,000 square feet.[42] Similar to Phase II, the statement of work was revised prior to the submittal of the bids to include eleven office and lab buildings, and the temperature and humidity control machinery for the entire site. Interested firms were also asked to submit alternate proposals that incorporated additional facilities, which NASA was hoping to add to the contract if funding became available.[43] On December 3, 1962, Colonel Francis P. Koish, the new ACOE District Engineer, signed the official contract, which amounted to roughly $19 million, with the joint venture of C.H. Leavell and Company of El Paso, Texas, Morrison-Knudsen Construction Company, and Paul Hardeman. Eleven major facilities were part of this contract, including the project management building, the cafeteria, the flight operations and astronaut training facility, the crew systems laboratory, the technical services office and shop buildings, the systems evaluation laboratory, a spacecraft research lab and office building, and a data acquisition building. Funding for the additional facilities had become available by this time, so additional support buildings, such as the shop building and warehouse, were also included. Per the contract, the buildings were to be ready for occupancy in 450 calendar days.[44]

In October 1963, the Logistics Division became the first to move into its complete facility, the Support Office (Building 419) and its shops and warehouse (Building 420). By the end of 1963,

[39] "Second Major Clear Lake Building Contract Awarded." *Space News Roundup* (1, 17), June 13, 1962, 8.
[40] "Bids Open On Phase Two Of Clear Lake Work." *Space News Roundup* (1, 23), September 5, 1962, 1; "Phase II Contract Goes to Bellows, Peter Kiewet, Sons." *Space News Roundup* (1, 25), October 3, 1962, 8; Shields, August 1, 1968.
[41] "Photo Captions." *Space News Roundup* (2, 23), September 4, 1963, 3; "Central Heating and Cooling Plant Completed." *Space News Roundup* (3, 5), December 25, 1963, 8.
[42] "First Building Contract To Be Let In November." *Space News Roundup* (1, 20), July 25, 1962, 8.
[43] "Bids Open On Phase 3 Of Center Construction." *Space News Roundup* (2, 2), November 11, 1962, 1-2.
[44] "19 Million Dollar Construction Contract Signed." *Space News Roundup* (2, 4), December 12, 1962, 1; "MSC 'Site' Three-Fourths Complete, First Move Scheduled Next Month." *Space News Roundup* (2, 24), September 18, 1963, 1; Shields, August 1, 1968.

twelve additional buildings were certified as operational.[45] The major relocation to the new Center occurred between February and April 1964, and included the occupation of facilities such as the Auditorium and Public Affairs Building (Building 1), the Flight Crew Operations Office (Building 4), the Flight Crew Operations Lab (Building 7), the Systems Evaluation Lab (Building 13), and the Spacecraft Technical Lab (Building 16). The Director's office officially moved on March 6, 1964. During May, the Instrument and Electronics Lab (Building 15) was occupied, followed by the Manned Spaceflight Control Center, Houston (Building 30) at the end of June, when all leases on the temporary facilities expired.[46]

Since its beginnings as the STG, JSC has had four main tasks with regard to manned spaceflight: spacecraft development; mission control; research and development; and astronaut selection and training.[47] The basic design guidelines for each space vehicle used during the Mercury, Gemini, Apollo, and Space Shuttle programs were developed by JSC engineers. JSC subsequently managed the contracts with private firms for spacecraft manufacture. It was also the responsibility of JSC engineers to develop the proper interfacing between the spacecraft and its respective launch vehicle, which was developed separately by NASA's MSFC (Mercury-Redstone, Apollo-Saturn, Shuttle SRBs, ET, and SSMEs) or the U.S. Air Force (Mercury-Atlas, Gemini-Titan).[48]

In addition to spacecraft development and astronaut training, JSC is also responsible for mission control. Mission control begins once the space vehicle has cleared the launch pad, and ends when the vehicle lands.[49] The key figure of mission control is the Flight Director, who makes all final decisions with regards to the proceedings. All communication between the ground and the spacecraft is coordinated through the Spacecraft Communicator. The mission control team also includes personnel who monitor all aspects of the space vehicle, such as flight dynamics, communications links, data processing, and instrumentation. Between missions, the controllers plan for the next flight, conduct various in-house training exercises, and aid with astronaut training.[50]

In conjunction with vehicle design, JSC has historically conducted related research and development, which generally falls into four categories: materials, electrical systems, life

---

[45] "MSC 'Site' Three-Fourths Complete;" "Major Move To Clear Lake Begins February 20." *Space News Roundup* (3, 6), January 8, 1964, 1.
[46] "Majority of MSC Personnel Relocated At New Site." *Space News Roundup* (3, 11), March 18, 1964, 2; "Final Relocation Of Center Employees Begins Today." *Space News Roundup* (3, 18), June 24, 1964, 1.
[47] "Gilruth Cites MSC Progress Despite Difficult Relocation." *Space News Roundup* (1, 19), July 11, 1962, 1.
[48] Archaeological Consultants, Inc. (ACI). *Survey and Evaluation of NASA-owned Historic Facilities and Properties in the Context of the U.S. Space Shuttle Program. Lyndon B. Johnson Space Center, Houston, Texas*. November 2007, Section 4.3.1.
[49] Likewise, those who designed the launch vehicle generally handled the actual launch process. It should be noted that the Kennedy Space Center, which has conducted all launches for Apollo and Space Shuttle, grew from MSFC's Launch Operations Directorate, which controlled the initial Mercury-Redstone launches.
[50] All Mercury missions and the first four Gemini missions were controlled from the old Mercury Control Center at Cape Canaveral, Florida. The Mission Control Center at Houston took over starting with Gemini IV. ACI, Section 4.3.3.

systems, and life sciences. The materials category includes development and testing of active thermal control systems as well as spacecraft structure testing. Electrical systems includes testing of the various interfaces with spacecraft hardware and software, ensuring there are no anomalies within the wiring and electronics systems, and confirming the ability of the spacecraft's communications systems to connect to relay satellites and ground stations. Life systems and life sciences are inherently connected to one another and include the astronauts' spacesuits and backpacks, as well as ensuring that their meals meet nutritional guidelines, taste good and store well.[51]

The last major task of JSC, and probably the most well-known besides mission control, is astronaut selection and training. From the original "Mercury 7," JSC has determined the criteria for astronaut selection and handled all interviews and examinations during the selection procedure. Additionally, the Center has established all training curricula, which provide astronauts with the basic knowledge needed to fly a mission and survive in emergency circumstances, as well as more specific training for tasks associated with a particular mission. Since Project Gemini, program-specific spacecraft simulators and trainers have been located within various buildings at JSC for astronaut training.[52]

[51] ACI, Section 4.3.4.
[52] ACI, Section 4.3.2.

Mission Control Center (Building 30)

Construction

Between 1962 and 1963, Kaiser Engineers of Oakland, California, completed the design for the Mission Control Center (MCC; Building 30). As originally conceived, the MCC had an Administrative Wing (Wing A) and a Mission Operations Wing (Wing M), which were connected by a Lobby Wing (Wing L). While the Administrative Wing contained three floors of office space for the mission operations staff, as well as a "Mission Briefing and Observation Auditorium" on the first floor, the Missions Operations Wing included two flight control rooms (FCRs), a recovery control room, simulation equipment rooms, and various data and communications processing areas.[53] In October 1962, IBM was selected to assemble the real-time computer complex for processing data from the spacecraft; in March 1963, the Philco-Ford Western Development Laboratories in Palo Alto, California, received a contract to provide all other electronics equipment, such as the communications center, the flight simulator facilities, and the flight operations displays.[54]

In late 1962, work on the MCC's foundation, structural steel frame, and roof frame was begun by the joint venture of W.S. Bellows Construction and Peter Kiewit Sons, Company, both of Houston, Texas. The bids for the remaining structural work were opened on March 15, 1963; the contract was awarded to Ets-Hokin and Galvan, Inc. of Houston, Texas.[55] The firm finished the construction of the facility between June 1963 and November 1964, under the direction of the ACOE, for a cost of just over $8 million.[56] In April 1964, IBM's real-time computer complex was installed on the first floor of the Mission Operations Wing, and for the Gemini II mission, January 19, 1965, enough of Philco's flight controller equipment had been installed to allow a team of controllers to practice with the equipment during the mission.[57] The MCC served as a back-up control center to the one at Cape Canaveral Air Force Station, Florida, for the third Gemini mission (March 23, 1965); it officially took over all manned flight control operations with the launch of Gemini IV (June 3, 1965).[58]

Following Gemini IV, the remaining nine Gemini missions were also controlled from the FCR on the third floor. During this time frame, the FCR on the second floor was configured to monitor the earliest test flights for the Apollo Program, the first of which was Saturn-Apollo 201

[53] Kaiser Engineers, Oakland. "Integrated Mission Control Center." January 31, 1963. On file, JSC Engineering Drawing Control Center.
[54] "NASA Names Philco For Contract Negotiations On Control Center." *Space News Roundup*. (2, 8), February 6, 1963, 1; "Philco IMCC Pact Signed For Total of $33.8 Million." *Space News Roundup*. (2, 12), April 3, 1963, 1.
[55] "Bids On Control Center Building Well Within Reach." *Space News Roundup*. (2, 11), March 20, 1963, 7.
[56] NASA JSC. "Real Property Record-Building 30." On file, JSC, JSC Real Property Office, Center Operations Directorate.
[57] "Real-Time Computers Moved Into MCC." *Space News Roundup.* (3, 14), April 29, 1964, 2; "Flight Controllers In Houston Control Center Monitor Data Relayed From Cape Kennedy." *Space News Roundup*. (4, 8), February 3, 1965, 2.
[58] "MCC-Houston Operational During GT-3 Mission." *Space News Roundup*. (4, 12), April 2, 1965, 2; "Future Gemini Flights To Be Controlled Here." *Space News Roundup*. (4, 13), April 16, 1965, 1.

on February 22, 1966. After Project Gemini was completed (November 1966), the third floor FCR underwent a major modification and reconfiguration, completed by November 1967, to help support the upcoming manned Apollo missions. Through the Apollo 10 mission, the two control rooms divided the work load. With the success of the Apollo 11 moon landing (July 20, 1969), controlled from the third floor FCR, the second floor FCR was deactivated and all remaining Apollo missions used the third floor FCR. Subsequently, the second floor control room was reactivated in October 1971, and reconfigured to control the Skylab and Apollo-Soyuz Test Project missions, while the third floor FCR was deactivated in May 1973.[59]

Preparations to modify the MCC for the Space Shuttle program began in the mid-1970s. In June 1976, the IBM Corporation office in Gaithersburg, Maryland, was awarded a roughly $24 million contract to provide the Space Shuttle Data Processing Complex (SSPDC), which would handle all of the communication and telemetry data from the shuttle vehicle. The work included "the design, fabrication, delivery, installation and checkout of the computer complex and associated software."[60] The following month, Aeronutronic-Ford (formerly Philco-Ford) was awarded a contract "for the design, development, implementation, test, and maintenance and operation of the Mission Control Center – Houston, covering the Shuttle Program, Design, Development, Test and Evaluation (DDT&E) period." This included such features as the Orbital Flight Test Data Systems (OFTDS), the Shuttle Operation Data Systems (SODS), the Approach and Landing Test Data System (ALTDS), and the Shuttle Program Information Management Systems (SPIMS).[61]

With the ALT program scheduled to start in February 1977, installation of the ALTDS began in August 1976; it was completed in December 1976. The system, whose main function was to allow flight control teams to monitor the ALT missions, was then integrated with the existing consoles in the third floor FCR, which came to be known as FCR-2.[62] In June and July 1977, the MCC successfully supported the ALT's three Captive-Active flights with the new software, followed by the ALT's five Free-Flights from August through October 1977.[63] On November 9, 1977, the ALTDS was deactivated, and by the end of June 1979, all of the old equipment had been removed from the FCR-2, so it could be prepared for the operational phase of the Space Shuttle program.[64]

While the FCR-2 was supporting the ALT program, the development and installation of the SSPDC continued. To support this complex, nearly the entire first floor of the Mission

---

[59] "Contractual History of Major Implementation and Operations Milestones." January 10, 1985. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009, F-2- F-8; Ray Loree. *MCC Development History*. August 1990. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009, 11-14.
[60] "Computer Contract Let." *Roundup*. (15, 12), June 18, 1976, 1.
[61] "Contractual History," F-9.
[62] The third floor FCR had been deactivated in May 1973, after the last of the Apollo lunar missions. Although the equipment left in the room was outdated, it was still capable of supporting the simple monitoring tasks required for the ALT flights. Loree, 15; James R. Brandenburg, interview by Jennifer Ross-Nazzal, May 7, 2009, Houston, TX, Manuscript on file, Tessada & Associates, Houston, TX, 9.
[63] "Contractual History," F-9; Jenkins, 211.
[64] "Contractual History," F-10.

Operations Wing was reconfigured. This work mainly consisted of the subdivision of larger rooms, or the enlargement of smaller rooms, into new spaces that were assigned to hold specific system components. Coinciding with this effort were the preparations of the second floor FCR, which came to be known as FCR-1, to support the Orbital Flight Test phase of the Space Shuttle program. This task included the removal of the existing consoles, whose frames were then refurbished and fitted with new computers. The updated equipment, as well as additional consoles needed for new flight control positions, were then returned to the room and arranged per the needs of the new program.[65] Once this work was complete, various interface tests between the SSPDC and the FCR equipment were conducted to ensure the system worked properly.

In March 1979, FCR-1 successfully supported the first integrated simulation of the STS-1 mission. Afterwards, in-house and integrated simulations continued on a weekly basis, allowing the control teams to become better acquainted with their equipment and the systems of the Space Shuttle.[66] In November 1979, the room supported the first launch pad pre-launch test, and in January 1980, it participated in the first full mock mission of STS-1, in conjunction with the astronauts in their training simulators, that lasted thirty hours; an even longer simulation, at fifty-four hours, occurred in April 1980.[67] While all of these events were occurring, FCR-2 was officially reactivated and began its conversion for use during the Space Shuttle program. Similar to FCR-1, the process included the refurbishment of existing console frames, installation of new computers, and the arrangement of the consoles per program needs. In addition, a secure operations system was installed in this FCR, since it was designated as the sole control room for all Department of Defense (DoD) missions.[68]

From April 12-14, 1981, FCR-1 successfully supported the first flight of the Space Shuttle program, STS-1. It also provided flight control for the remaining three Orbital Test Flights, STS-2 in November 1981, STS-3 in March 1982, and STS-4 in June and July 1982.[69] In September 1982, the first addition to the MCC, a visitor's lobby along the east side of the Mission Operations Wing, was formally accepted. This lobby was constructed to support the security requirements of DoD missions, by providing a completely separate entrance for JSC visitors. This lobby contained an elevator that led only to the second floor of the Mission Operations Wing, giving tourists access solely to the Viewing Area of FCR-1.[70] Two months later, FCR-2 was used to control the first operational flight of the Space Shuttle program, STS-5.[71] From that point through January 1986, FCR-1 controlled six flights, while FCR-2 controlled fourteen.

---

[65] Loree, 15; "There's no 'lull' from the inside looking out." *Roundup.* (17, 4), March 3, 1978, 4.
[66] Integrated simulations typically involve both astronauts and flight controllers, the former within one of the astronaut training simulators in JSC Buildings 5 or 9, and the latter at their control station. Loree, 18-19.
[67] Loree, 18-19; Lyn Cywanowicz. "30-Hour Simulation." NASA JSC News Release No. 80-003, January 21, 1980; Lyn Cywanowicz. "54-Hour Simulation." NASA JSC News Release No. 80-025, April 17, 1980.
[68] Loree, 15.
[69] "Contractual History," F-13, F-14; Loree, 19.
[70] NASA JSC, "Building 30;" Loree, 17; "Two buildings close public tour areas for security repairs." *Roundup.* (19, 23), November 14, 1980, 3.
[71] Loree, 19.

FCR-2 supported the first dedicated DoD mission in January 1985, and was also the control room in use during the *Challenger* accident.[72]

During the thirty-two month stand-down following the *Challenger* accident, the MCC underwent some significant changes. Between January and September 1986, all of the mainframe computers within the SSDPC were replaced with newer models, as were the voice integration systems. In addition, all of the SSDPC's data input and output devices were upgraded. Afterwards, all of the MCC's consoles and console interfacing equipment were replaced with workstations and local area networks, an effort which was not completed until 1989.[73] In 1987, the MCC received its second addition, a 3,472 square foot extension to the north end of the Mission Operations Wing, to provide additional mechanical rooms and storage spaces.[74] The same year, the Mission Evaluation Room (MER), which had been located in nearby Building 45 (Project Engineering Building), was upgraded and moved to the third floor of the MCC's Lobby Wing due to DoD requirements.[75]

From September 29 to October 3, 1988, FCR-1 supported STS-26, the Return to Flight mission following the *Challenger* accident. In December of 1988, FCR-2 supported STS-27, the first DoD mission following the *Challenger* accident.[76] In December 1989, the two control rooms received new front glass display screens and image projectors, after the coating on the old glass screens deteriorated. The new screens also featured enhanced optical qualities and had the capability of being washed.[77] From January 1989 through December 1992, FCR-2 served as the control room for six additional flights, all of which were DoD missions. Afterwards, all of the equipment was decommissioned, and the room was returned to its Apollo-era configuration and made accessible to visitors. FCR-1 continued to support the Space Shuttle program until 1996, providing complete flight control for an additional forty missions (the last being STS-71 in June 1995), and partial flight control for six missions, as detailed below.[78]

In 1989, the largest addition to the facility, the Station Operations Wing, was designed by the firm of Haldeman Powell Johns of Dallas, Texas. Intended to support the space station program then under development, this five-story addition included a new FCR, operations integration areas, systems support areas, and planning areas. The new wing was built around the southwest corner of the Mission Operations Wing by the contractor firm of J.W. Bateson Company, Inc, and was formally accepted for use in 1992. Due to budget cuts in both the shuttle and space station programs, and the fact that the new FCR, called the White FCR, featured "unprecedented flexibility in flight control operations," Space Shuttle mission control began a two year move

---

[72] Loree, 19-22.
[73] Loree, 23-24.
[74] Loree, 24; NASA JSC. "Building 30."
[75] Loree, 24; "New Mission Evaluation Room ready." *Space News Roundup.* (27, 8), April 8, 1988, 2.
[76] Loree, 27.
[77] Due to the historic status of the control rooms, the old screens were placed in storage for possible future use. Linda Copley. "Replacing the irreplaceable." *Space News Roundup.* (29, 1), January 5, 1990, 1.
[78] Loree, 27-28; Robert D. Legler. "Responses to Questions about Historical Mission Control." Memo to John Getter, April 7, 1977. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009.

from FCR-1 to the White FCR in 1994.[79] The White FCR ran its first shuttle simulations in December 1994, and in July 1995, controlled the on-orbit operations for STS-71, while FCR-1 monitored ascent and entry activities.[80]

The next six Space Shuttle missions (STS-69, STS-73, STS-74, STS-72, STS-75, and STS-76) were all controlled in the same fashion, with the ascent and entry phases of the flight being monitored from FCR-1, and the on-orbit activities controlled from the White FCR. With the STS-77 mission in May 1996, the White FCR completely took over Space Shuttle mission control operations. FCR-1 was transformed into the ISS control room in 2005, and is currently monitoring the events on the station twenty-four hours a day.[81]

In 1998, the MCC received a second, three-story mechanical room addition, located along the west elevation of the Mission Operations Wing. The last of the facility's mainframe computers in the SSPDC was decommissioned and replaced in 2002. In 2004, a new Mission Evaluation Room (MER) was created on the third floor of the Mission Operations Wing, and in 2005, a new Mission Management Team area was constructed on the first floor of the Mission Operations Wing.[82]

MCC Functions

The MCC, which falls under JSC's Mission Operations Directorate, is "responsible for providing operational support to the nation's manned space flight programs," with the goal of ensuring the safety and success of all missions.[83] The facility is typically staffed 'around-the-clock' in support of maintenance, development, testing, training, and flight operation activities.[84] All of these activities occur within one or more of the three mission phases: planning, training, or flight.[85] While the nature of these phases has not changed over the life of the shuttle program, there have been variances due to mission specific activities or software/equipment upgrades, as well as the technical experience of the flight controllers. However, in general, flight controllers spend roughly 10 percent of their time controlling missions, 15 percent of their time training for those missions, and 75 percent of their time planning for the missions.[86]

The planning phase of a mission typically begins two to three years prior to the actual flight, although during the early years of the program, it was generally started three to four years before the flight. During this phase, flight controllers, payload operations personnel, and other managers, develop a flight plan for the mission. The flight plan details all aspects of a mission, from large tasks, such as payload deployment, to the smallest of activities, such as when the crew

---

[79] James Hartsfield. "Old, new meet in Mission Control." *Space News Roundup.* (33, 48), December 30, 1994, 1.
[80] "Tools change, but 'Houston' still Mission Control call sign." *Space News Roundup.* (34, 22), June 2, 1995, 1.
[81] Legler; Rebecca Marsh, personal communication with Trish Slovinac of ACI, October 20, 2010, via e-mail.
[82] Brandenburg, 8; NASA JSC. "Building 30."
[83] "This *is* Mission Control, Houston." *Space News Roundup.* (32, 37), September 20, 1993, 3.
[84] "This *is* Mission Control."
[85] As defined by James R. Brandenburg, who worked in the MCC from 1967 until 2007. Brandenburg, 9-10.
[86] NASA. "Elements of a Space Mission." Last modified October 6, 2010.

members sleep. Also during the planning phase, the procedures for the different phases of the flight (i.e., ascent, orbit, entry) are developed, as are the specific mission rules. Also during this time, flight controllers take into account any software upgrades or reconfigurations for that particular flight, as well as any physical changes to the orbiter. Once the planning for a mission is completed, and all software upgrades and reconfigurations have been tested and verified, the flight controllers can begin to train for the flight.[87]

The training phase currently begins roughly three months before the flight, and typically encompasses about 300 to 400 total hours, as opposed to the over 2,000 training hours for STS-1. Training exercises allow flight control personnel to become familiar with the flight plan, the mission procedures, and any upgrades or reconfigurations to the shuttle software. Training activities can be done “in-house” with only flight controllers, or “integrated,” where the FCR is connected to an astronaut training simulator, the launch pad, the Payload Operations Control Center, the tracking network, or any combination of these. The training regimen consists of short-duration exercises that cover a specific phase of a flight, such as ascent, entry, and on-orbit operations, including payload deployment, and long-duration simulations, which typically involve all phases of the flight.[88] During any of these activities, various malfunctions can be introduced into the simulation, to allow the controllers and astronauts to practice emergency procedures.[89]

The flight phase of the MCC operations centers around the shuttle mission. Approximately two days before launch, the Ground Controller (see below) begins to man his station, and communicate with the now powered-up vehicle at the launch pad. At T-12 hours to launch, the remainder of the flight controllers arrive at the FCR, and begin their preparations for the flight. The flight control team operates over three shifts, to cover the entire twenty-four hour day. Each shift is eight hours long, plus a half-hour transition period at the beginning and end, and includes at least one flight controller for every pertinent system.[90] There are twenty-three designated flight controller positions, as follows (see Figure 2):[91]

1. The Flight Director (FLIGHT) is the designated leader of the team, who controls the overall mission and payload operations and makes decisions with regards to the crew’s safety.
2. The Mission Operations Directorate Manager (MOD) provides an interface between the FCR and top NASA officials and mission managers.

---

[87] Brandenburg, 9-15; “This *is* Mission Control.”
[88] Ascent and entry exercises typically last for about four hours each and on-orbit exercises generally take eight to ten hours each. The long-durations simulations typically extend for one to three days. Brandenburg, 13; “Sim report.” *Space News Roundup.* (20, 3), January 30, 1981, 1; “STS-2 Sim.” *Space News Roundup.* (20, 14), July 17, 1981, 1.
[89] Brandenburg, 9-15; Joe Morris, personal communication with Joan Deming of ACI, November 6, 2009, Houston, TX.
[90] Brandenburg, 13-14; Morris. Some flight controller positions are only needed during specific portions of a mission, such as the Booster Systems manager who is only required during launch.
[91] “This *is* Mission Control;” NASA. “Johnson Space Center: Mission Control Center.” NASA Facts, NP-2006-02-002-JSC, 2006.

3. The Spacecraft Communicator (CAPCOM) serves as the link between the FCR and the astronauts.
4. The Flight Activities Officer (FAO) plans and supports all crew checklists, procedures and schedules, and plans and manages the orientation of the orbiter in space.
5. The Payload Deployment and Retrieval Systems (PDRS) Manager supports the operations of the remote manipulator system, or robot arm, and coordinates the deployment, retrieval, and positioning of satellites and other cargo.
6. The Public Affairs Officer (PAO) provides mission commentary to the news media and the public.
7. The Instrumentation and Communications Officer (INCO) monitors the in-flight communications and instrument systems, as well as controls the orbiter's TV system.
8. The Data Processing Systems Engineer (DPS) Manager monitors the status of the data processing systems, including the five general purpose computers on the orbiter, the flight-critical and launch data lines, and the multifunction display systems. In addition, the manager watches the mass memories and systems level software.
9. The Payloads Officer (PAYLOADS) coordinates the interfaces between the flight crew and the payload users, and monitors the on-board experiments and satellites.
10. Recently, the PAYLOADS console has been shared with the Assembly and Checkout Officer (ACO), who is responsible for the development of ISS.
11. The Guidance, Navigation and Control Systems Engineer (GNC) monitors the vehicle's guidance, navigation and control systems and advises the crew of any guidance hardware malfunctions. He/she also notifies the flight director and crew of any impending aborts.
12. The Propulsion Officer (PROP) monitors and evaluates the orbiter's reaction control system and orbital maneuvering system jets and propellants.
13. The Flight Dynamics Officer (FDO) plans maneuvers and monitors trajectories.
14. The Trajectory Officer (TRAJECTORY) assists the FDO during the dynamic phases of flight, and is responsible for maintaining the trajectory processors in the MCC.
15. The Ground Controller (GC) monitors MCC hardware, software and support facilities. In addition, he/she maintains the links between the Ground Space Flight Tracking and Data Network (GSTDN) and the Tracking and Data Relay Satellite System (TDRSS), with Goddard.
16. The Maintenance, Mechanical, Arm and Crew Systems Officer (MMACS) monitors the orbiter's structural and mechanical systems, and on-board crew hardware and equipment.
17. The Electrical Generation and Illumination Engineer (EGIL) monitors the orbiter's electrical systems, fuel cells and their cryogenics, the AC and DC circuits, pyrotechnics, lighting, and the caution and warning systems.
18. The Emergency, Environment and Consumables Operations Manager (EECOM) monitors the passive and active thermal controls, the cabin atmosphere, the avionics cooling, the supply and waste water system, and the fire detection and suppression system.
19. The Surgeon (SURGEON) monitors the crew's health and coordinates any medical operations.

20. The Rendezvous Guidance and Procedures Officer (RENDEZVOUS) monitors a shuttle mission during deployment, rendezvous and proximity operations, and docking and undocking operations.
21. The Ascent/Entry Guidance and Procedures Officer (GUIDANCE), who monitors the guidance and navigation systems and execution of crew procedures in an ascent abort contingency, shares a console with RENDEZVOUS.
22. The Booster Systems Manager (BOOSTER) monitors and evaluates the SSMEs, SRBs, and ET during launch and ascent.
23. The Extravehicular Systems Activities Director (EVA) coordinates spacewalks from both the shuttle and the ISS and shares a console with BOOSTER.

During the mission, each of the flight controllers has three to five specialists supporting them from one of the Multi-Purpose Support Rooms (MPSRs), located throughout the MCC. The operators in this room aid the controllers by monitoring both ground and orbiter systems, which enables them to quickly respond to a contingency situation. Additionally, they can provide detailed analysis information to the controllers, if requested.[92]

Additional mission support is provided by the personnel located in the MER. Typically, there are 120 engineers staffing the room during pre-launch, launch, and entry, and between twenty and fifty people during on-orbit operations. The group's work begins roughly twenty-four hours prior to the launch, when they assist the launch control and mission control teams in evaluating any violations of the launch commit criteria. During the mission, the group assists the flight control team by providing detailed information on the various orbiter systems. In the case of a contingency situation, the engineers in this room will assist in evaluating the situation and recommending an appropriate course of action.[93]

[92] Brandenburg, 13; "This *is* Mission Control."
[93] "This *is* Mission Control;" "New Mission Evaluation Room ready."

Physical Description

As defined by the "Survey and Evaluation of NASA-owned Historic Facilities and Properties in the Context of the U.S. Space Shuttle Program, Lyndon B. Johnson Space Center, Houston, Texas," the significance of the MCC, with regards to the SSP, is derived from "the 'historic' FCR (Room 331) and its projection room (Room 330), viewing area (Room 332), the NASA Headquarters representative's office (Room 332A), and the JSC director's office (Room 332B); the Red FCR (Room 316); and the SSP MER (Room 313), all within Wing M, as well as the White FCR (Room 2306) and its projection room (Room 2300) and viewing area (Room 2M336) within Wing S."[94] However, it should be noted that during the field work for this documentation package, the function of Room 2300 was clarified as a "Multi-Purpose Support Room," rather than a projection room.[95]

The MCC has approximate overall dimensions of 560' in length (east-west) and 331' in width (north-south). The entire building has a reinforced concrete foundation and a flat, built-up roof. It is comprised of four distinct wings: the Administrative Wing (Wing A), the Lobby Wing (Wing L), the Mission Operations Wing (Wing M), and the Station Operations Wing (Wing S). These areas are arranged so that Wing A is at the east end of the facility, with Wing M parallel to it; in between is Wing L, which connects the two. Wing S is located at the southwest corner of Wing M.

Wing A (Photo Nos. 2-7) measures roughly 291' in length (north-south), 151' in width (east-west), and has a height of 45'; its walls are constructed of plate glass windows. The first floor walls are shaded by a 10'-deep PEAF panel canopy that is supported by free-standing pillars, which sit roughly 4' from the glass wall and are spaced at 28' on center. The upper two floors are shaded by a 5'-deep PEAF panel canopy. There are two entrances into Wing A from the exterior: a pair of metal swing doors on the east elevation, and a pair of sliding doors on the north elevation. Internally, this wing contains three floor levels, each with offices around the perimeter and support rooms in the center.

Wing L has rough dimensions of 84' in length (east-west), 56' in width (north-south), and 45' in height (Photo Nos. 1, 8). The central 58' of the north and south walls are constructed of plate glass window, while the remaining 13' at each end have PEAF panel walls; the east and west walls are internal partitions shared with Wing A and Wing M, respectively. The glass centers of the first floor walls have an approximate 5' set back, and each contains two pairs of glass swing doors. Above this recess, at both the second and third floor levels, are PEAF panel canopies, which have a depth of roughly 9'. Shading these canopies is a pierced pre-cast concrete screen that extends from the base of the second floor to the roof line (Photo No. 15). Internally, the first floor contains the formal lobby area for the MCC, and the second and third floors contain office and work areas.

---

[94] ACI, 6.2.5. The "historic" FCR was referred to as FCR-2 while it supported the Space Shuttle program, and prior to that as the third floor FCR.
[95] Rebecca Marsh, personal communication with Joan Deming and Trish Slovinac of ACI, November 5, 2009, Houston, TX.

Wing M measures approximately 255’ in length (north-south), 171’ in width (east-west), and 53’-6” in height (Photo Nos. 9-12, 14). It has walls constructed of a steel skeleton faced with PEAF panels, and features one pair of metal swing doors on the north elevation, and one pair of metal swing doors on the west elevation. The first floor contains flight operations and mission support facilities for the SSP and the ISS, as well as communications rooms, libraries, and storage areas. The second floor (Photo No. 117) contains FCR-1 (Room 231), which presently serves as the control room for the ISS, as well as mission development areas; the third floor (Photo No. 118) contains the “historic” FCR (Room 331), mission support areas, training and development rooms (such as the Red FCR, Room 316), office space, and storage rooms.

Wing S (Photo Nos. 11, 13, 14) wraps around the southwest corner of Wing M, and has rough dimensions of 202’ in length (east-west), 127’ in width (north-south), and 110’ in height. Like Wing M, it has walls constructed of a steel skeleton faced with PEAF panels. Wing S features one pair of metal swing doors and one single swing door on the north elevation, one pair of metal swing doors on the east elevation, and two pairs of metal swing doors on the south elevation. Internally, Wing S contains five floor levels. The first floor contains mission support areas for the ISS, and the second floor (Photo No. 105) holds the White FCR (Room 2306), and spaces for mission planning and support, flight operations, and training. The third floor consists of mission control areas, mission support rooms, and training facilities; the fourth floor contains mission planning and support areas, development rooms, and some training facilities. The fifth floor includes flight operations service areas, training rooms, and mission support facilities.

White Flight Control Room/Viewing Area

The White FCR (WFCR), located on the second floor level of Wing S, has approximate dimensions of 55’ in length (east-west), 48’ in width (north-south), and has a floor to ceiling height of 17’ (Photo Nos. 17-29). In general, the room has painted gypsum board walls, an acoustic tile ceiling, and a carpeted floor. It is oriented so that the west wall constitutes the front of the room and the east wall, which is shared with the Viewing Area, is the back of the room. The west wall features a large viewing screen that displays images from three ceiling-mounted projectors, located roughly 20’ away from the wall surface (Photo Nos. 17, 45). The north wall (Photo Nos. 24-26) contains one pair of metal swing doors near its west end. It also has two video cameras, one at the west end and the other near the center, that are mounted approximately 12’ above the finished floor.

At the top of the east end of the north wall is a 6’ x 8’ window that abuts a similar one on the east wall. These two windows correspond to the Center Director’s suite, which is situated on the second floor mezzanine level (Photo Nos. 24, 36). Underneath the window on the east wall is a video camera; the remainder of the east wall contains a 4’-high band of gypsum board at the bottom, above which is a 41’-long x 15’-high expanse of glass comprised of six sections that allow the people in the Viewing Area to see into the FCR (Photo No. 22). Below the northern five sections of glass is a narrow planter, with an approximate 1’ depth. At the top of the east end of the south wall are two windows where the media room is located on the mezzanine level. The only other features of the south wall are a metal swing door and a wall-mounted video camera near its west end (Photo Nos. 18-20).

The floor area of the WFCR contains five rows of consoles; each console is slightly curved and contains three built-in video monitors and two controller stations (see Figure 2 and Photo No. 28).[96] The front row of consoles is roughly in line with the doors on the north and south walls, and therefore contains only three consoles, while the other four rows each contain four consoles. Additionally, the front three rows are divided by a central aisle, while the back two rows are divided by two aisles. In the front row, there are two consoles (FDO/RENDEZVOUS) to the south of the aisle and one (GC) to the north. In the second and third rows, there are two consoles on either side of the aisle. On the south is the PROPULSION and GNC consoles (Photo No. 29) in the second row and the DPS and ACO/PAYLOADS consoles in the third row; to the north side of the aisle are the MMACS and EGIL consoles in the second row, and the FAO (Photo No. 30) and EECOM consoles in the third row. The fourth and fifth rows are arranged so that there is a pair of consoles in the center, flanked on either side by an aisle, and then a single console against the wall. The consoles in the fourth row are, from left to right, the INCO, FLIGHT (Photo No. 34), CAPCOM (Photo No. 33), and PDRS consoles. The fifth row contains the PAO, MOD, EVA/BOOSTER (Photo No. 32), and SURGEON consoles, from left to right.

As previously mentioned, the WFCR has a Viewing Area to its east that sits on the mezzanine level (Photo Nos. 37-41). The Viewing Area has approximate overall dimensions of 41’ in length (north-south), 26’ in width (east-west), and has a floor to ceiling height that ranges from 9’ at its east end (rear) to 15’ at its west end (front). Similar to the WFCR, it contains painted gypsum board walls, an acoustical tile ceiling, and a carpeted floor. At the northeast corner is a small foyer that connects the Viewing Area to the Center Director’s suite, and also serves as one of two entry points, with a metal swing door on its east wall. The second point of entry to the viewing area is a pair of metal swing doors at the east end of the south wall.

Internally, the Viewing Area is divided into two spaces: a front area with seating and a back area for standing. The front area contains five rows of stadium-style seating, which are divided roughly in half by a central aisle. To the south of the aisle are nine seats in each of the front four rows and seven in the back row; to the north of the aisle, there are seven seats in each row. The seating can also be accessed from an aisle along the north wall or an aisle along the south wall. Behind the last row of seats, on each side of the center aisle, is a line of desks for use by those who are standing in the back area. The back area has a width of about 6’-6”, and is on the same level as the last row of seating. Both the northwest and southwest corners have flat-screened monitors suspended from the ceiling.

Multi-Purpose Support Room

The Multi-Purpose Support Room (Photo Nos. 42 and 43) is an “L”-shaped area that wraps along the southwest corner of the WFCR. The room has rough overall dimensions of 89’ in length

[96] See pages 18-20 for the responsibilities of each position.

(north-south), 89’ in width (east-west), and 12’ in height. It has painted gypsum board walls, an acoustical tile ceiling, and a raised tile floor. The room can be entered directly from the south side of the WFCR through a metal swing door. It also has two entrances along its east wall (a pair of metal swing doors and a single metal swing door) and one entrance (a pair of metal swing doors) on its north wall. The room also features a metal rolling door on its west wall, which serves as an emergency exit directly to the exterior. Distributed throughout the Multi-Purpose Support Room are multiple groups of computer consoles.

SSP Mission Evaluation Room

The SSP MER (Photo Nos. 44-49) is located on the third floor of Wing M, and extends across the south exterior wall. This room, which measures approximately 124’ in length (east-west), 48’ in width, and 12’ in height, has painted gypsum board walls, an acoustical tile ceiling, and a carpeted floor. The MER is typically accessed from one of three entrances along the north wall, which includes two pairs of metal swing doors, one at each end, and a single metal swing door, just west of the centerline. Along the east wall are two single metal swing doors, each of which leads to a support area; an additional support/storage room is located in the southwest corner. Other features of the MER’s walls include two video screens and two white boards on the north wall, two white boards on the west wall, and four video screens and two white boards on the south wall.

Similar to the WFCR, the SSP MER contains pairs of computer consoles across the entire floor area, clustered in different arrangements (Figure 3). In the west third of the room, the pairs of consoles are arranged in four rows, which are divided into three sections by walkways. Only one, the third row from the west in the central cluster, contains only one console station. The engineers at these stations face eastward. The central area of the room has a similar layout of consoles with four rows, divided by walkways into three sections. The north three rows face south, while the south row faces north. The second row from the north at the east end contains only one console station. At the east end, there are two rows of consoles, divided into three sections by walkways, all of which face west.

“Historic” Flight Control Room/Viewing Area/Projection Room[97]

The “Historic” FCR measures approximately 65’ in length (east-west) and 52’ in width (north-south); its floor-to-ceiling height varies from 12’ to 15’. The room is comprised of painted gypsum board walls, an acoustical tile ceiling, and a carpeted floor. The front (west) wall contains large projection screens (Photo No. 53), which are fed from the projection room to its west. The back (east) wall (Photo No. 57) contains five large fixed windows, which provide visual access to the FCR from its viewing area. The FCR has a metal swing door on its left (south) wall (Photo No. 55), and a pair of metal swing doors on its right (north) wall (Photo No.

[97] JSC contracted with the National Park Service, HABS/HAER/HALS Program, in March 2010, to prepare a HAER Level I documentation of the Historic Flight Control Room and its supporting areas; therefore, only a brief description of these areas are included here.

59). Along the north wall is a small corridor that leads to another pair of metal swing doors on the east wall.

The floor of the FCR is comprised of four stepped levels. The lowest level corresponds to the front of the room, and has a width of 41'; the corridor along the north wall is a continuation of this base level. The other three steps each have a length of 35', a width of 8', and sit 1'-2" higher than the previous step. All four of these levels contain a row of consoles, which are presently arranged in their Apollo Program configuration. The front row is divided into two pairs of consoles, with the Booster Systems Engineer and Retrofire Officer consoles in the south half, and the Flight Dynamics Officer and Guidance Officer consoles in the north half. In the second row, there are three Vehicle Systems Engineer consoles to the north and the Flight Surgeon and CapCom consoles to the south. The third row is grouped so that the Flight Director's console is at the center, and is flanked on each side by a pair of consoles. The two consoles on the north side were manned by the Flight Activities Officer and the Network Controller; the two on the south side were for the Assistant Flight Director and the Communications Systems Engineer/Operations Procedures Officer. The fourth row is comprised of four individual consoles, which were used by the Public Affairs Officer, the Flight Operations Director, the Mission Director, and the DoD Representative.

The Viewing Area (Photo Nos. 61-64), which sits to the east of the FCR, has approximate dimensions of 65' in length (north-south), 26' in width (east-west), and has a ceiling height that ranges from 8' to 10'. The room has five tiers of seating, with access steps at either end. Behind the back row of seats is a standing desk area; each of the back corners of the Viewing Area has two telephone booths (Photo No. 65). The room has a set of double doors at each end of the back wall. To the north of the Viewing Area is the JSC Director's office, with rough dimension of 8' in length and 7' in width. It has windows on the south, west, and east walls, and is entered through a wood swing door on the east wall. An identical room sits to the south of the Viewing Area, and is referred to as the Headquarters Flight Operations Representative's office.

To the west of the FCR is its Projection Room (Photo Nos. 69-71), which has rough overall dimensions of 65' in length (north-south), 36' in width (east-west), and 15' in height. This area is entered through a pair of metal swing doors located in the northwest corner of the FCR. The Projection Room has gypsum board walls, an acoustical tile ceiling, and a floor, all of which are painted black. It is currently used as a storage area, but still contains some of the old metal-framed mirrors used to project images to the FCR screens (Photo Nos. 72, 73).

Red Flight Control Room

The Red FCR (RFCR) is located on the third floor of Wing M, to the west of the "historic" FCR (Photo Nos. 74-77). It has approximate overall dimensions of 65' in length (north-south), 49' in width (east-west), and 12' in height. It has painted gypsum board walls, a carpeted floor, and an acoustic tile ceiling. Access to this room is provided by a single metal swing door on the south wall, a pair of metal swing doors on the west wall, a single metal swing door on the north wall (connecting the RFCR to a maintenance and operations room), and a pair of metal swing doors on the east wall (leading to the projection room of the "Historic" FCR). On its front (west) wall are three projection screens, each of which displays the image from one of three ceiling-mounted projectors (Photo No. 78).

The consoles in the RFCR are arranged in three long rows, surrounded by walkways along the four walls. Like the working control rooms, each console is dedicated to a specific function, although they are not in the same location as they are in the real control center. For example, the Flight Director is located in the center of the second row of consoles, and the EECOM is located near the end of the first row. Another example is the GC console which is located at the back left corner of the RFCR, as opposed to the front right corner of the WFCR. Metal storage cabinets line the east wall of the RFCR.

Bibliography

"19 Million Dollar Construction Contract Signed." *Space News Roundup*. (2, 4), December 12, 1962, 1.

"After several postponements, CA1 was nearly perfect flight." *Roundup.* (16, 13), June 24, 1977, 1.

Archaeological Consultants, Inc. (ACI). *Survey and Evaluation of NASA-owned Historic Facilities and Properties in the Context of the U.S. Space Shuttle Program. Lyndon B. Johnson Space Center, Houston, Texas*. November 2007.

"Bids On Control Center Building Well Within Reach." *Space News Roundup*. (2, 11), March 20, 1963, 1 and 7.

"Bids Open On Phase 3 Of Center Construction." *Space News Roundup.* (2, 2), November 11, 1962, 1 and 2.

"Bids Open On Phase Two Of Clear Lake Work." *Space News Roundup.* (1, 23), September 5, 1962, 1 and 7.

Brandenburg, James R., interview by Jennifer Ross-Nazzal, May 7, 2009, Houston, TX, Manuscript on file, Tessada & Associates, Houston, TX.

Byrnes, Martin A., Jr., interview by Robert Merrifield, December 12, 1967. Houston, TX, Archives Department, Lyndon B. Johnson Space Center.

"Capacity Crowd View Dedication Ceremonies." *Roundup*. (12, 20), August 31, 1973, 1 and 3.

"Central Heating and Cooling Plant Completed." *Space News Roundup.* (3, 5), December 25, 1963, 6 and 8.

"Clear Lake Site Commitment Now Stands At $38,911,458." *Space News Roundup.* (3, 4), December 11, 1963, 1 and 3.

Columbia Accident Investigation Board. *Report Volumes I and II*, August 2003. http://spaceflight.nasa.gov/shuttle/archives/sts-107/investigation/CAIB_lowres_ full.pdf.

"Computer Contract Let." *Roundup*. (15, 12), June 18, 1976, 1.

"Contractual History of Major Implementation and Operations Milestones." January 10, 1985. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009.

Copley, Linda. "Replacing the irreplaceable." *Space News Roundup.* (29, 1), January 5, 1990, 1.

Cywanowicz, Lyn. “30-Hour Simulation.” NASA JSC News Release No. 80-003, January 21, 1980.

Cywanowicz, Lyn. “54-Hour Simulation.” NASA JSC News Release No. 80-025, April 17, 1980.

“Design Work Contract Is Let For Clear Lake.” *Space News Roundup.* (1, 5), December 27, 1961, 8.

Dethloff, Henry C. *Suddenly, Tomorrow Came…A History of the Johnson Space Center*. Houston: Lyndon B. Johnson Space Center, 1993.

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

“Final Relocation Of Center Employees Begins Today.” *Space News Roundup*. (3, 18), June 24, 1964, 1 and 3.

“First Building Contract To Be Let In November.” *Space News Roundup.* (1, 20), July 25, 1962, 8.

“First Construction Contract Work Underway at Clear Lake.” *Space News Roundup.* (1, 13), April 18, 1962, 1.

“Flight Control, Plans, Provides Training for MSC Missions.” *Space News Roundup*. (3, 7), January 22, 1964, 2.

“Flight Controllers In Houston Control Center Monitor Data Relayed From Cape Kennedy.” *Space News Roundup*. (4, 8), February 3, 1965, 2.

“Future Gemini Flights To Be Controlled Here.” *Space News Roundup*. (4, 13), April 16, 1965, 1 and 7.

“Gilruth Cites MSC Progress Despite Difficult Relocation.” *Space News Roundup*. (1, 19), July 11, 1962, 1 and 2.

Gilruth, Dr. Robert, Oral History Interview, February 27, 1987, 273-275, *The Glennan-Webb-Seamans Project,* National Air and Space Museum.

Grimwood, James M. *Project Mercury: A Chronology*. Washington, D.C.: NASA, Office of Scientific and Technical Information, 1963.

Haldeman Powell Johns, Dallas. "Building 30, Mission Control Center-Houston." December 22, 1989. On file, JSC Engineering Drawing Control Center.

Hartsfield, James. "New Mission Control Room portends increasing pace of human space flight, rapid space station expansion." *Space Center Roundup.* (39, 18), September 8, 2000, 1.

Hartsfield, James. "Old, new meet in Mission Control." *Space News Roundup.* (33, 48), December 30, 1994, 1 and 4.

"Houston Site Offices Move to Rich Building." *Space News Roundup.* (1, 3), November 29, 1961, 1.

"Interview with I. Edward Campagna, Assistant Chief, Technical Services Division, Maintenance and Operations." August 24, 1967, Box MERR1, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake.

"Interview with James L. Ballard, Jr." August 1, 1968, Box MERR1, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake.

"Interview with Jack P. Shields." August 1, 1968, Box MERR4, Oral History Series. Johnson Space Center History Collection, University of Houston-Clear Lake.

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

Kaiser Engineers, Oakland. "Integrated Mission Control Center." January 31, 1963. On file, JSC Engineering Drawing Control Center.

Launius, Roger D. *NASA: A History of the U.S. Civil Space Program.* Malabar, Fla.: Krieger Publishing Company, 2001.

Legler, Robert D. "Responses to Questions about Historical Mission Control." Memo to John Getter, April 7, 1977. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009.

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

Lindroos, Marcus. "President Nixon's 1972 Announcement on the Space Shuttle." NASA Office of Policy and Plans, NASA History Office, updated April 14, 2000. http://history.nasa.gov/stsnixon.htm.

Loree, Ray. *MCC Development History*. August 1990. Provided to Jennifer Ross-Nazzal by James R. Brandenburg, May 2009.

"Major Move To Clear Lake Begins February 20." *Space News Roundup*. (3, 6), January 8, 1964, 1 and 3.

"Majority of MSC Personnel Relocated At New Site." *Space News Roundup*. (3, 11), March 18, 1964, 1 and 2.

Marsh, Rebecca, personal communication with Joan Deming and Trish Slovinac of ACI, November 5, 2009, Houston, TX.

Marsh, Rebecca, personal communication with Trish Slovinac of ACI, October 20, 2010, via e-mail.

"MCC-Houston Operational During GT-3 Mission." *Space News Roundup*. (4, 12), April 2, 1965, 2.

Morris, Joe, personal communication with Joan Deming of ACI, November 6, 2009, Houston, TX.

"Move To Houston Area Is On Schedule." *Space News Roundup.* (1, 6), January 10, 1962, 1 and 7.

"MSC Is Renamed 'JSC'." *Roundup*. (12, 8), March 2, 1973, 1.

"MSC 'Site' Three-Fourths Complete, First Move Scheduled Next Month." *Space News Roundup*. (2, 24), September 18, 1963, 1.

"NASA Names Philco For Contract Negotiations On Control Center." *Space News Roundup*. (2, 8), February 6, 1963, 1 and 2.

National Aeronautics and Space Administration. "Elements of a Space Mission." Last modified October 6, 2010. http://aerospacescholars.jsc.nasa.gov/has/Modules/Shuttle-to-Station/1/4.cfm.

National Aeronautics and Space Administration. "Johnson Space Center: Mission Control Center." NASA Facts, NP-2006-02-002-JSC, 2006.

National Aeronautics and Space Administration. *NASA Shuttle Reference Manual*. 1988. http://spaceflight.nasa.gov/shuttle/reference/shutref/index.html.

National Aeronautics and Space Administration. "Shuttle Payloads and Related Information." KSC Factoids. Revised November 18, 2002. Accessed at http://www-pao.ksc.nasa.gov/kscpao/factoids/relinfo1.htm.

National Aeronautics and Space Administration, Headquarters. “The Vision for Space Exploration.” February 2004. http://history.nasa.gov/Vision_for_Space_Exploration.pdf.

National Aeronautics and Space Administration, History Office, NASA Headquarters. “Report of the Space Task Group, 1969.” http://www.hq.nasa.gov/office/pao/History/taskgrp.html.

National Aeronautics and Space Administration, Johnson Space Center. “Real Property Record-Building 30.” On file, JSC, JSC Real Property Office, Center Operations Directorate.

“New Mission Evaluation Room ready.” *Space News Roundup.* (27, 8), April 8, 1988, 2.

“Phase II Contract Goes to Bellows, Peter Kiewet, Sons.” *Space News Roundup.* (1, 25), October 3, 1962, 8.

“Philco IMCC Pact Signed For Total of $33.8 Million.” *Space News Roundup*. (2, 12), April 3, 1963, 1.

“Photo Captions.” *Space News Roundup.* (1, 12), April 4, 1962, 2.

“Photo Captions.” *Space News Roundup.* (1, 18), June 27, 1962, 2.

“Photo Captions.” *Space News Roundup.* (2, 23), September 4, 1963, 3.

“Real-Time Computers Moved Into MCC.” *Space News Roundup.* (3, 14), April 29, 1964, 2.

Reichhardt, Tony (editor). *Space Shuttle, The First 20 Years*. Washington, D.C.: Smithsonian Institution, 2002.

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

“Second Major Clear Lake Building Contract Awarded.” *Space News Roundup.* (1, 17), June 13, 1962, 8.

“Sim report.” *Space News Roundup*. (20, 3), January 30, 1981, 1.

“Software Production Facility now operational.” *Space News Roundup.* (21, 4), February 23, 1982, 3.

“STG Renamed; Will Move.” *Space News Roundup.* (1, 1), November 1, 1961, 1 and 3.

"STS-2 Sim." *Space News Roundup.* (20, 14), July 17, 1981, 1.

Swenson, Jr., Loyd S., James M. Grimwood and Charles C. Alexander. *This New Ocean: A History of Project Mercury*. Washington, D.C.: NASA, Office of Technology Utilization, 1966.

The White House. "A Renewed Spirit of Discovery – The President's Vision for Space Exploration." January 2004. http://www.whitehouse.gov/space/renewed_spirit.html.

"There's no 'lull' from the inside looking out." *Roundup.* (17, 4), March 3, 1978, 4.

"This *is* Mission Control, Houston." *Space News Roundup.* (32, 37), September 20, 1993, 3.

"Tools change, but 'Houston' still Mission Control call sign." *Space News Roundup.* (34, 22), June 2, 1995, 1.

"Two buildings close public tour areas for security repairs." *Roundup.* (19, 23), November 14, 1980, 3.

Williamson, Ray A. "Developing the Space Shuttle." *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume IV: Accessing Space*. Edited by John M. Logsdon. Washington, D.C.: U.S. Printing Office, 1999.

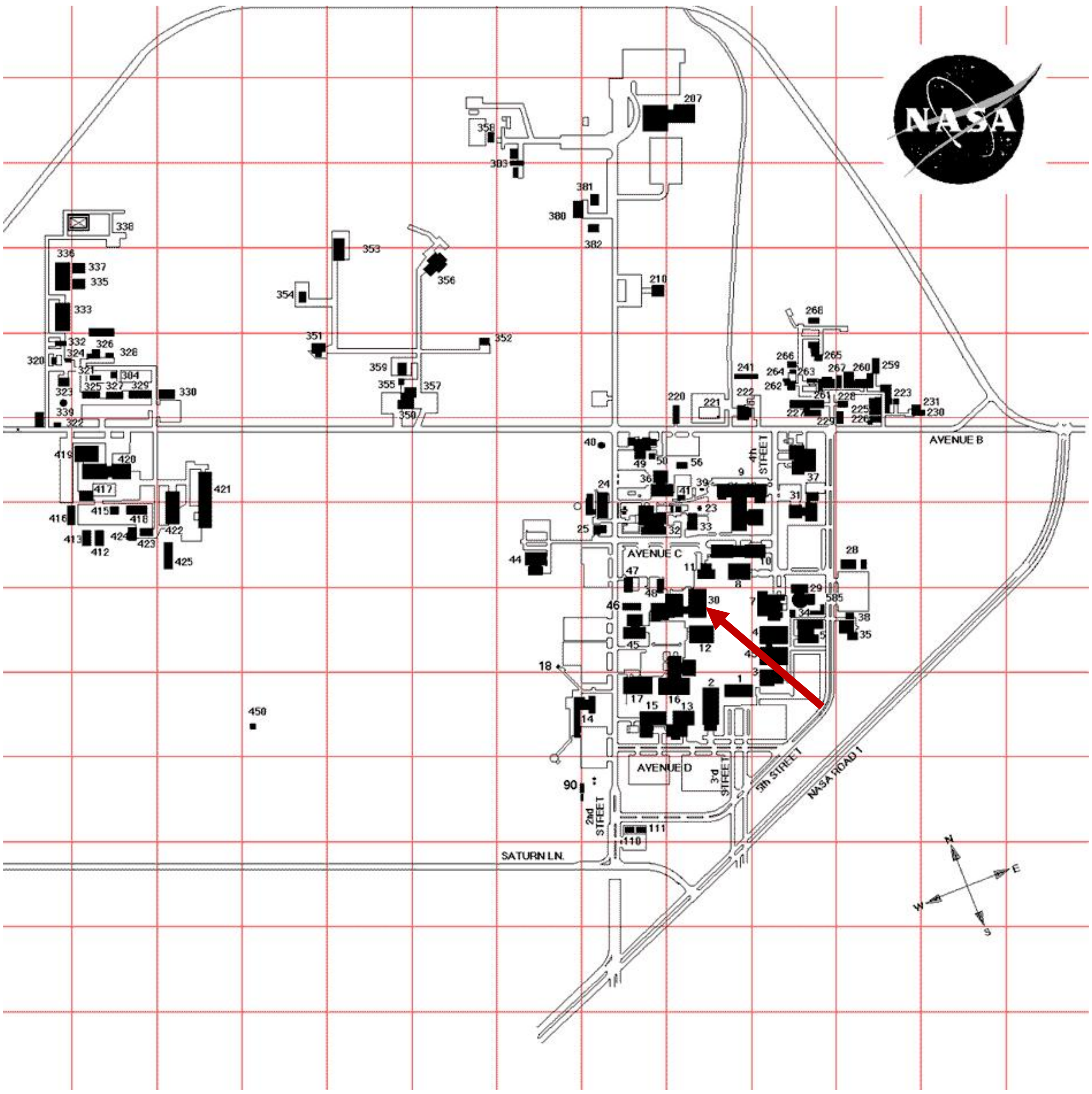


Figure 1. Location of the Mission Control Center.
Source: JSC, 2006.

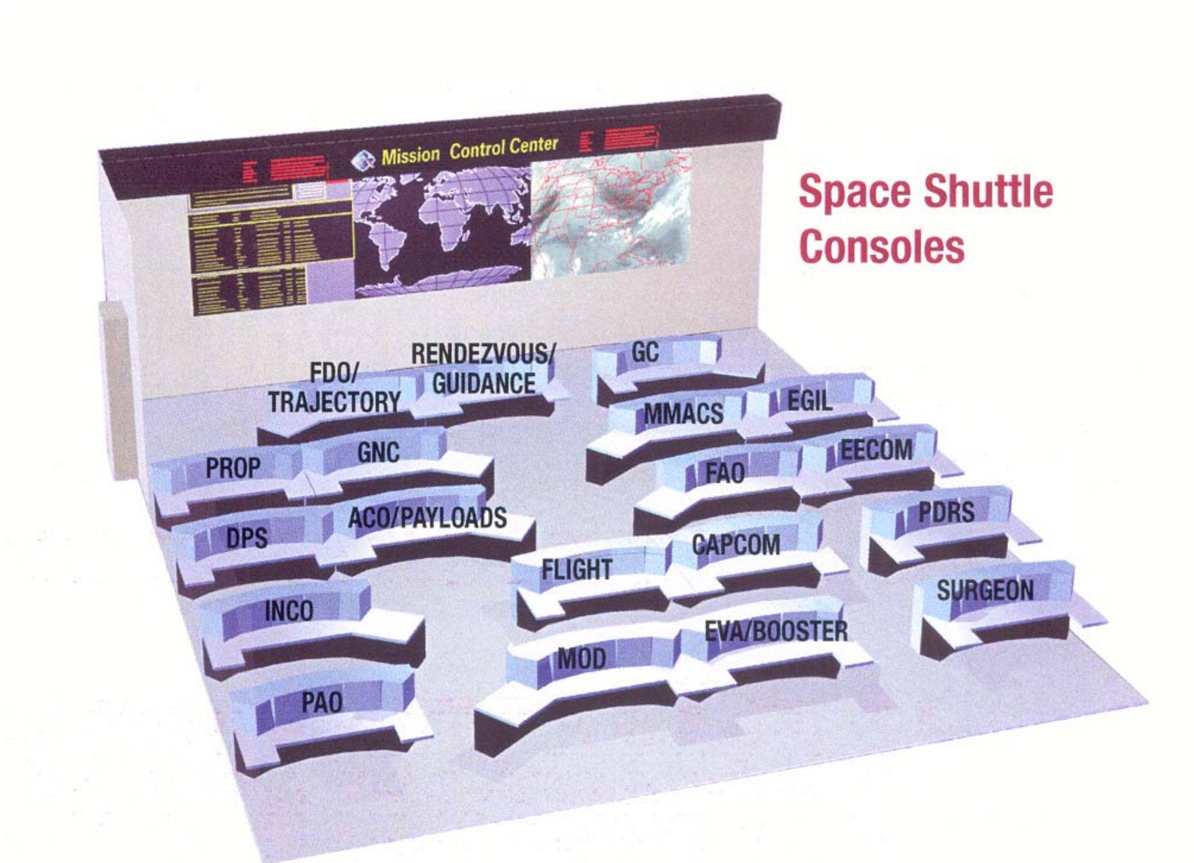


Figure 2. Flight Controller Console layout, White Flight Control Room.
Source: NASA. "Johnson Space Center: Mission Control Center." NP-2006-02-002-JSC, 2006.

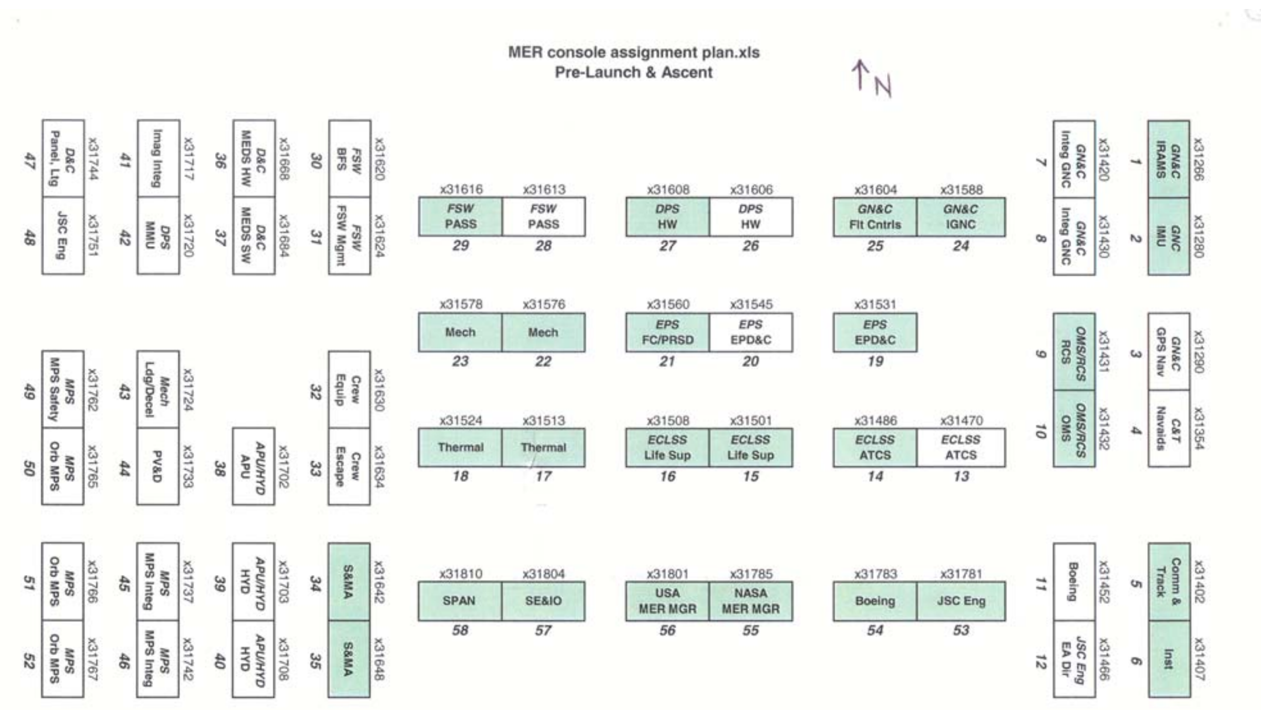


Figure 3. Console layout, Mission Evaluation Room.
Source: NASA JSC, 2009.

INDEX TO PHOTOGRAPHS

Photographs MCC-1 through MCC-78 were taken by Patricia Slovinac, ACI; September 2009. Historic photographs (MCC-79 through MCC-91) are courtesy of the NASA JSC Imaging Center (Building 424), Houston, Texas; the negative number is given in parentheses.

MCC-1 View of south elevation (Wing L), facing north.

MCC-2 View of south elevation (Wing A), facing north.

MCC-3 View of south and east elevations (Wing A), facing northwest.

MCC-4 View of east elevation (Wing A), facing west.

MCC-5 View of east and north elevations (Wing A), facing southwest.

MCC-6 View of north elevation (Wing A), facing south.

MCC-7 View of north and west elevations (Wing A), facing southeast.

MCC-8 View of north elevation (Wing L), facing south.

MCC-9 View of east and north elevations (Wing M), facing southwest.

MCC-10 View of north elevation (Wing M), facing south.

MCC-11 View of north and west elevations (Wings M and S), facing southeast.

MCC-12 View of west elevation (Wing M), facing east.

MCC-13 View of west elevation (Wing S), facing east.

MCC-14 View of south elevation (Wings S and M), facing north.

MCC-15 Detail view of decorative pattern on Wing L north elevation, facing south.

MCC-16 Detail view of NHL marker in north courtyard of MCC, facing west.

MCC-17 View of Room 2306/White Flight Control Room from center back, facing west.

MCC-18 View of Room 2306/White Flight Control Room from back right corner, facing southwest.

MCC-19 View of Room 2306/White Flight Control Room from center right, facing south.

MCC-20 View of Room 2306/White Flight Control Room from front right, facing southeast.

MCC-21 View of Room 2306/White Flight Control Room from center front, facing northeast.

MCC-22 View of Room 2306/White Flight Control Room from center front, facing east.

MCC-23 View of Room 2306/White Flight Control Room from center front, facing southeast.

MCC-24 View of Room 2306/White Flight Control Room from front left, facing northeast.

MCC-25 View of Room 2306/White Flight Control Room from center left, facing north.

MCC-26 View of Room 2306/White Flight Control Room from back left, facing northwest.

MCC-27 View of Room 2306/White Flight Control Room from Room 2M336/Viewing Room, facing southwest.

MCC-28 View of Room 2306/White Flight Control Room from Room 2M336/Viewing Room, facing west.

MCC-29 View of Room 2306/White Flight Control Room from Room 2M336/Viewing Room, facing northwest.

MCC-30 Detail view of Flight Activities Officer console in Room 2306, facing northwest.

MCC-31 Detail view of Propulsion (back) and Guidance, Navigation and Control Systems Engineer (front) consoles in Room 2306, facing southwest.

MCC-32 Detail view of Booster Systems Engineer console in Room 2306, facing northwest.

MCC-33 Detail view of Spacecraft Communicator’s console in Room 2306, facing northwest.

MCC-34 Detail view of Flight Director’s console in Room 2306, facing northwest.

MCC-35 Detail view of projection screen and camera, facing southwest.

MCC-36 Detail view of Center Director's Suite (Room 2M318) from Room 2306, facing northeast.

MCC-37 View of Room 2M336/Viewing Area for Room 2306 from back right, facing southwest.

MCC-38 View of Room 2M336/Viewing Area for Room 2306 from back center, facing northwest.

MCC-39 View of Room 2M336/Viewing Area for Room 2306 from center left, facing north.

MCC-40 View of Room 2M336/Viewing Area for Room 2306 from front left, facing northeast.

MCC-41 View of Room 2M336/Viewing Area for Room 2306 from center front, facing southeast.

MCC-42 View of Room 2300/Multi-Purpose Support Room for Room 2306, facing east.

MCC-43 View of Room 2300/Multi-Purpose Support Room for Room 2306, facing southeast.

MCC-44 View of Room 313/SSP Mission Evaluation Room from back left, facing southwest.

MCC-45 View of Room 313/SSP Mission Evaluation Room from center left, facing west.

MCC-46 View of Room 313/SSP Mission Evaluation Room from center front, facing northeast.

MCC-47 View of Room 313/SSP Mission Evaluation Room from center front, facing northwest.

MCC-48 View of Room 313/SSP Mission Evaluation Room from center right, facing east.

MCC-49 View of Room 313/SSP Mission Evaluation Room from center back, facing southeast.

MCC-50 Detail view of a row of support consoles in Room 313, facing southeast.

MCC-51 Detail view of a support console in Room 313, facing east.

MCC-52 Detail view of countdown and mission clocks in Room 313, facing south.

MCC-53	View of Room 331/'Historic' Flight Control Room, facing west.
MCC-54	View of Room 331/'Historic' Flight Control Room, facing southwest.
MCC-55	View of Room 331/'Historic' Flight Control Room, facing south.
MCC-56	View of Room 331/'Historic' Flight Control Room, facing southeast.
MCC-57	View of Room 331/'Historic' Flight Control Room, facing east.
MCC-58	View of Room 331/'Historic' Flight Control Room, facing northeast.
MCC-59	View of Room 331/'Historic' Flight Control Room, facing north.
MCC-60	View of Room 331/'Historic' Flight Control Room, facing northwest.
MCC-61	View of Room 332/Viewing Area for Room 331, facing northwest.
MCC-62	View of Room 332/Viewing Area for Room 331, facing northeast.
MCC-63	View of Room 332/Viewing Area for Room 331, facing southeast.
MCC-64	View of Room 332/Viewing Area for Room 331, facing southwest.
MCC-65	Detail view of a guest phone booth in Room 332, facing southwest.
MCC-66	View of Room 332A/NASA Headquarters' Representative's office, facing northwest.
MCC-67	View of entrance to Room 332B/JSC Director's office, facing southwest.
MCC-68	View of Room 332B/JSC Director's office, facing west.
MCC-69	View of Room 330/Projection Room, facing north.
MCC-70	View of Room 330/Projection Room, facing south.
MCC-71	View of Room 330/Projection Room, facing southwest.
MCC-72	View of Room 330 showing rear of projection screen, facing northeast.
MCC-73	View of Room 330 showing rear of projection screen, facing northeast.
MCC-74	View of Room 316/Red Flight Control Room, facing southeast.

MCC-75 View of Room 316/Red Flight Control Room, facing southwest.

MCC-76 View of Room 316/Red Flight Control Room, facing northwest.

MCC-77 View of Room 316/Red Flight Control Room, facing northeast.

MCC-78 Detail view of projection screen in Room 316, facing southeast.

MCC-79 Construction of the MCC, facing southwest (S63-22529).

MCC-80 Construction of the MCC, facing south (S63-23632).

MCC-81 Construction of the MCC, facing northeast (S64-24108).

MCC-82 Construction detail of the decorative pattern on the south elevation of the MCC, facing northeast (S64-24110).

MCC-83 Historic view of the MCC from 1964, facing northeast (S64-32287).

MCC-84 View of Wing S of the MCC during construction, facing northeast (S91-45291).

MCC-85 View of White Flight Control Room in Wing S during construction, facing northeast (S91-28693).

MCC-86 View of White Flight Control Room in Wing S during construction, facing southeast (S91-45251).

MCC-87 View of White Flight Control Room in Wing S during construction, facing southeast (S91-49717).

MCC-88 View of White Flight Control Room in Wing S prior to installation of consoles, facing southeast (S91-52148).

MCC-89 View of White Flight Control Room Viewing Area in Wing S during construction, facing northeast (S91-45236).

MCC-90 View of White Flight Control Room Viewing Area in Wing S during construction, facing northeast (S91-49712).

MCC-91 View of White Flight Control Room and Viewing Area in Wing S during construction, facing northwest (S91-52145).

Photograph Nos. MCC-92 through MCC-126 are photocopies of engineering drawings. Original drawings are located at the Engineering Drawing Control Center, JSC, Texas.

MCC-92 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-8, Kaiser Engineers, 1963
FIRST FLOOR PLAN
Sheet 9 of 79

MCC-93 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-9, Kaiser Engineers, 1963
SECOND FLOOR PLAN
Sheet 10 of 79

MCC-94 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-10, Kaiser Engineers, 1963
THIRD FLOOR PLAN
Sheet 11 of 79

MCC-95 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-11, Kaiser Engineers, 1963
EXTERIOR ELEVATIONS
Sheet 12 of 79

MCC-96 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-12, Kaiser Engineers, 1963
EXTERIOR ELEVATIONS
Sheet 13 of 79

MCC-97 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, MISSION OPERATIONS WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-13, Kaiser Engineers, 1963
CROSS SECTIONS
Sheet 14 of 79

MCC-98 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, LOBBY WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-36, Kaiser Engineers, 1963
FIRST, SECOND AND THIRD FLOOR PLANS
Sheet 44 of 79

MCC-99 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, LOBBY WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-39, Kaiser Engineers, 1963
EXTERIOR ELEVATIONS
Sheet 47 of 79

MCC-100 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, ADMINISTRATION WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-37, Kaiser Engineers, 1963
EXTERIOR ELEVATIONS
Sheet 45 of 79

MCC-101 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, ADMINISTRATION WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-38, Kaiser Engineers, 1963
EXTERIOR ELEVATIONS
Sheet 46 of 79

MCC-102 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, ADMINISTRATION WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-40, Kaiser Engineers, 1963
CROSS SECTIONS
Sheet 48 of 79

MCC-103 Photocopy of drawing
INTEGRATED MISSION CONTROL CENTER, ADMINISTRATION WING-BUILDING NO. 30
NASA, Manned Spacecraft Center, Texas
Drawing A-30-41, Kaiser Engineers, 1963
CROSS SECTIONS
Sheet 49 of 79

MCC-104 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1010, NASA, 1989
FIRST FLOOR PLAN

MCC-105 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1011, NASA, 1989
SECOND FLOOR PLAN

MCC-106 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1012, NASA, 1989
MEZZANINE LEVEL PLAN

MCC-107 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1013, NASA, 1989
THIRD FLOOR PLAN

MCC-108 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1014, NASA, 1989
FOURTH FLOOR/LOW ROOF PLAN

MCC-109 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1015, NASA, 1989
FIFTH FLOOR PLAN

MCC-110 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1030, NASA, 1989
NORTH ELEVATION

MCC-111 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1031, NASA, 1989
SOUTH ELEVATION

MCC-112 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1032, NASA, 1989
EAST ELEVATION

MCC-113 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1033, NASA, 1989
WEST ELEVATION

MCC-114 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1040, NASA, 1989
NORTH/SOUTH BUILDING SECTION

MCC-115 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-1041, NASA, 1989
EAST/WEST BUILDING SECTION

MCC-116 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, MISSION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-8, NASA, 2007
FIRST FLOOR PLAN

MCC-117 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, MISSION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-9, NASA, 2008
SECOND FLOOR PLAN

MCC-118 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, MISSION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-10, NASA, 2007
THIRD FLOOR PLAN (MOW)

MCC-119 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, LOBBY WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-36, NASA, 2004
FIRST, SECOND AND THIRD FLOOR PLANS

MCC-120 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, ADMINISTRATION WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-33, NASA, 2009
FIRST FLOOR PLAN (AW)

MCC-121 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, ADMINISTRATION WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-34, NASA, 2009
SECOND FLOOR PLAN (AW)

MCC-122 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, ADMINISTRATION WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-35, NASA, 2009
THIRD FLOOR PLAN (AW)

MCC-123 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, ADMINISTRATION WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30-35A, NASA, 2006
PARTIAL THIRD FLOOR PLAN

MCC-124 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30S-1010, NASA, 2005
FIRST FLOOR PLAN

MCC-125 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30S-1013, NASA, 2004
THIRD FLOOR PLAN

MCC-126 Photocopy of drawing
BUILDING 30, MISSION CONTROL CENTER-HOUSTON, STATION OPERATIONS WING
NASA, Lyndon B. Johnson Space Center, Texas
Drawing A-30S-1014, NASA, 2004
FOURTH FLOOR/LOW ROOF PLAN

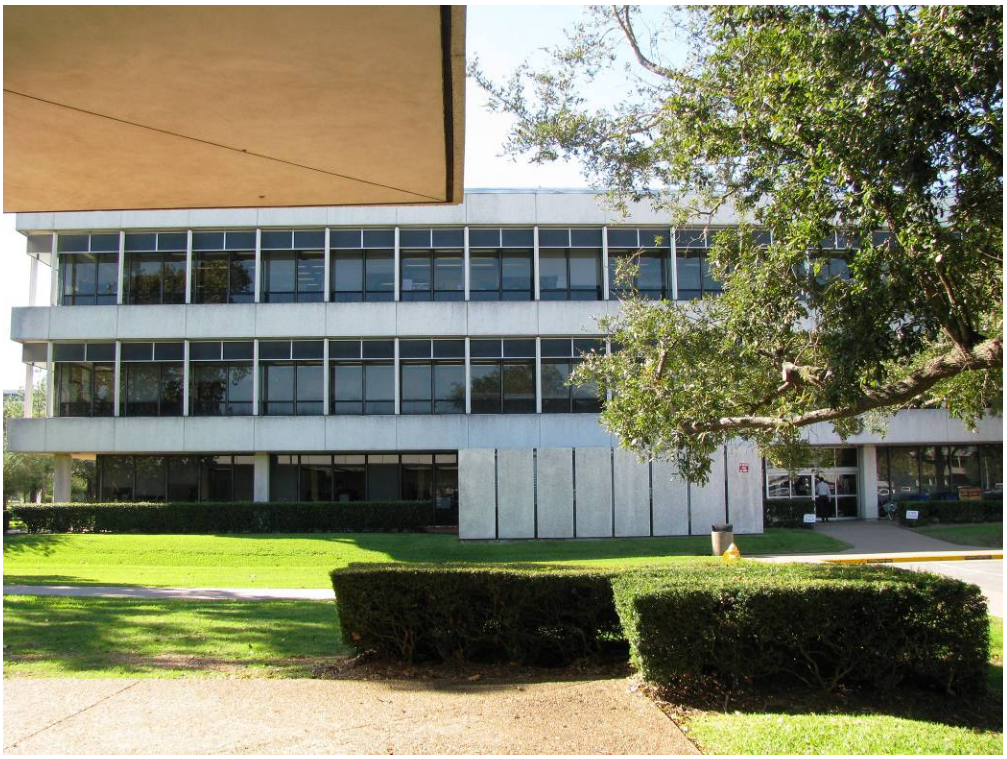
MCC-1

MCC-2

MCC-3

MCC-4

MCC-5



MCC-6

MCC-7

MCC-8

MCC-9

MCC-10

MCC-11

MCC-12

MCC-13

MCC-14

MCC-15

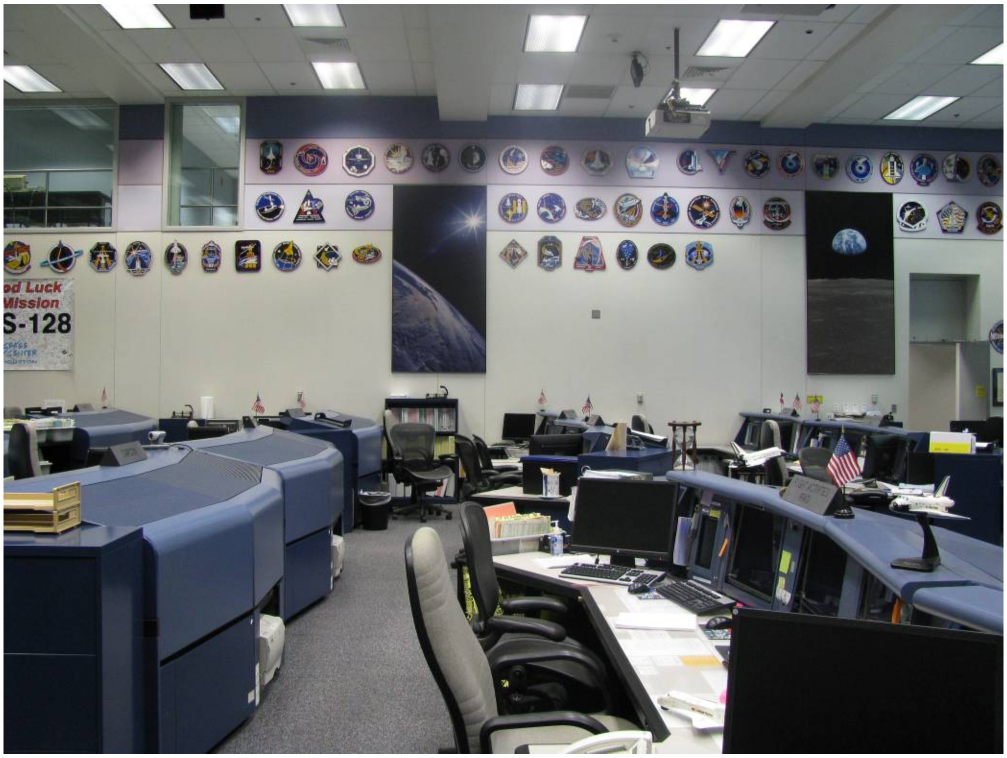
MCC-16


MISSION CONTROL CENTER
CAPCOM
BOOSTER

MCC-17


MISSION CONTROL CENT
BME

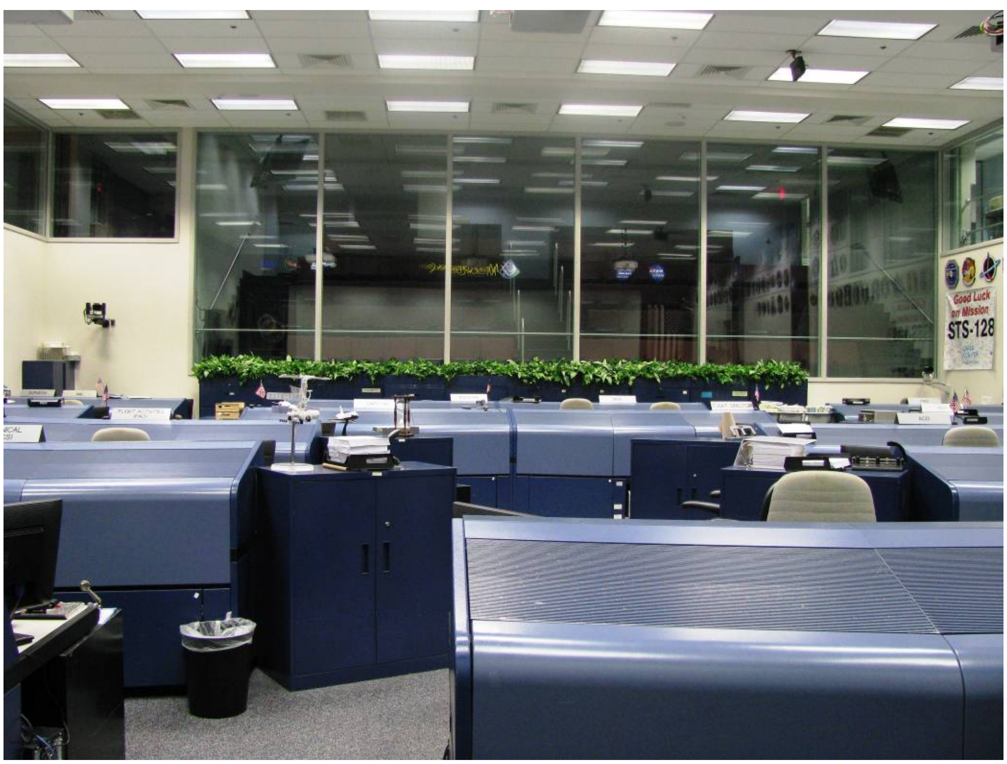
MCC-18



MCC-19

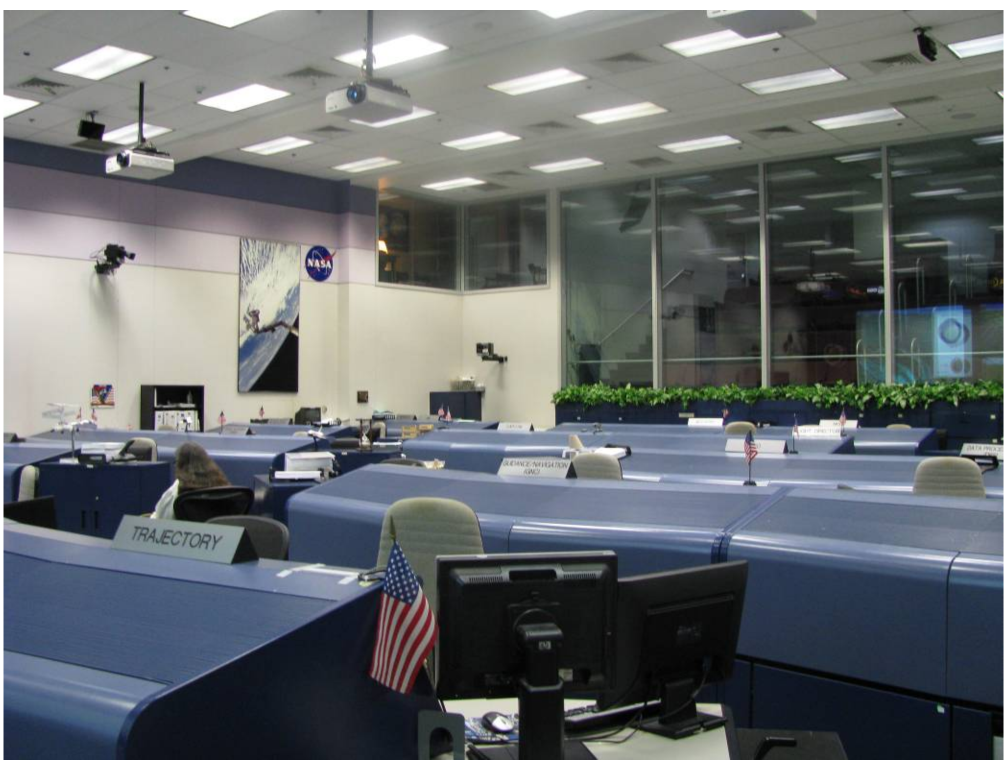
MCC-20

MCC-21

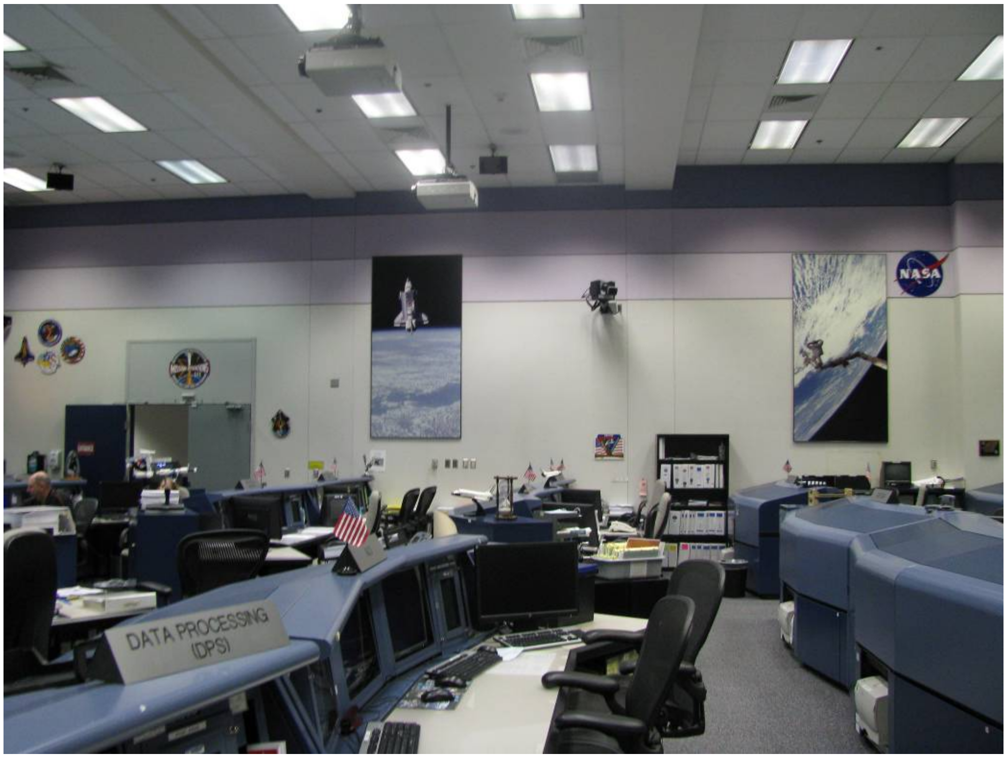


MCC-22

MCC-23



MCC-24

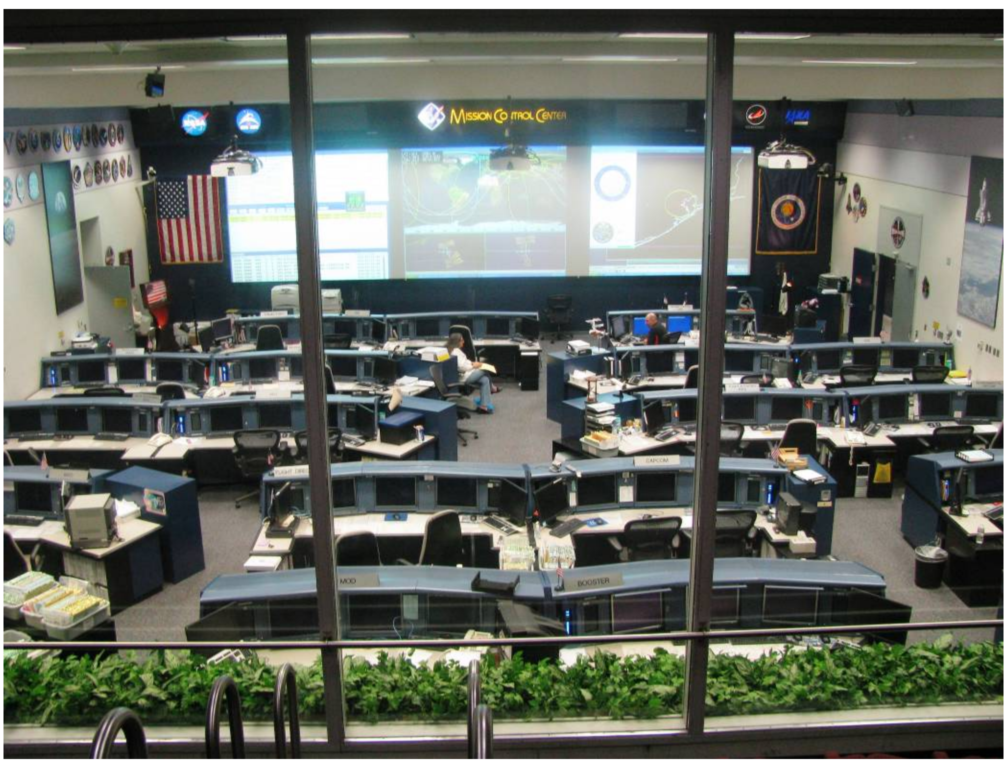

NASA
DATA PROCESSING
(DPS)

MCC-25


MISSION CONTROL CENTER
INCO
FLIGHT DIRECTOR
PAO
STS-126
CAP COM
WFCR

MCC-26

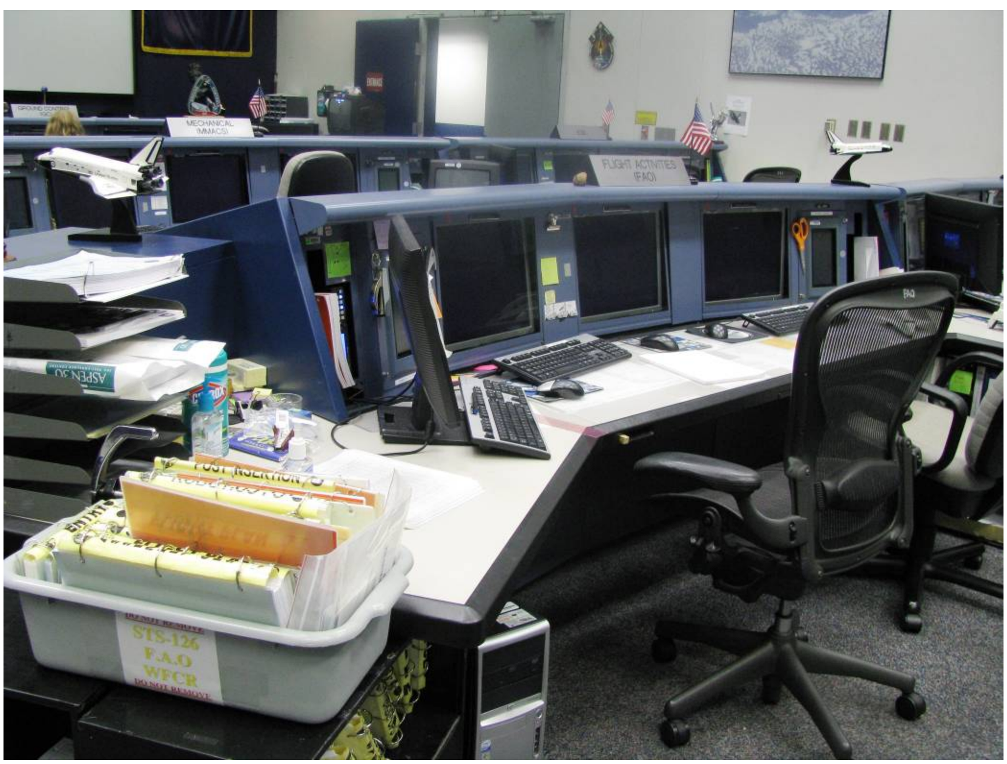
MCC-27



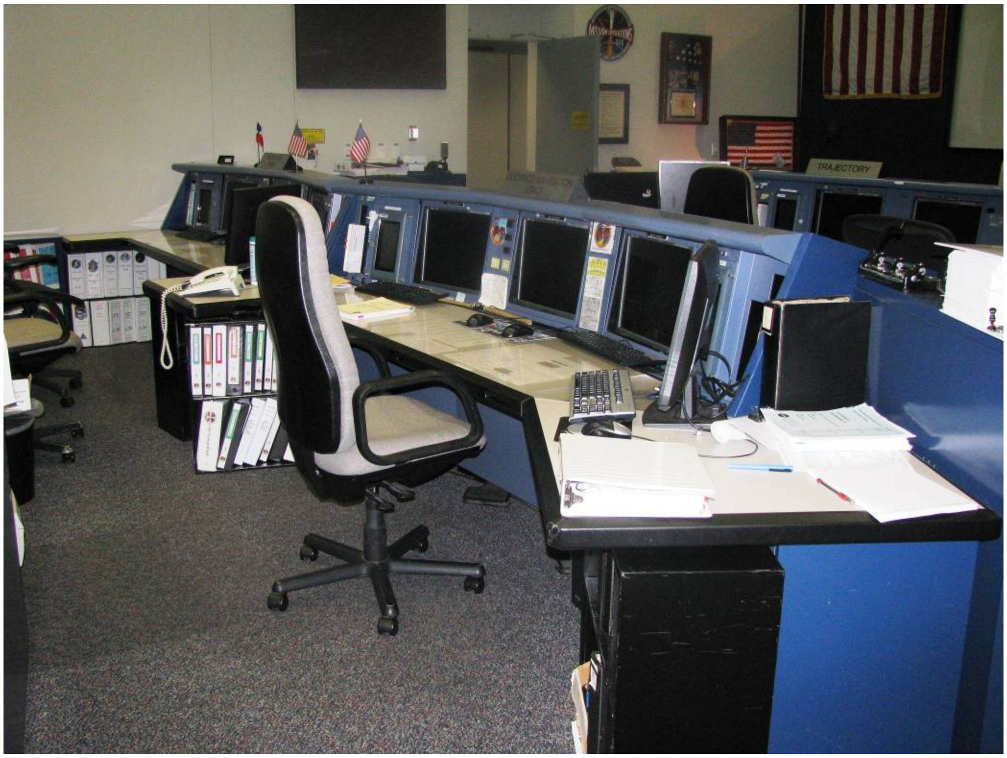
MCC-28


MISSION CONTROL CENTER
NASA
CAPCOM
BOOSTER
NASA

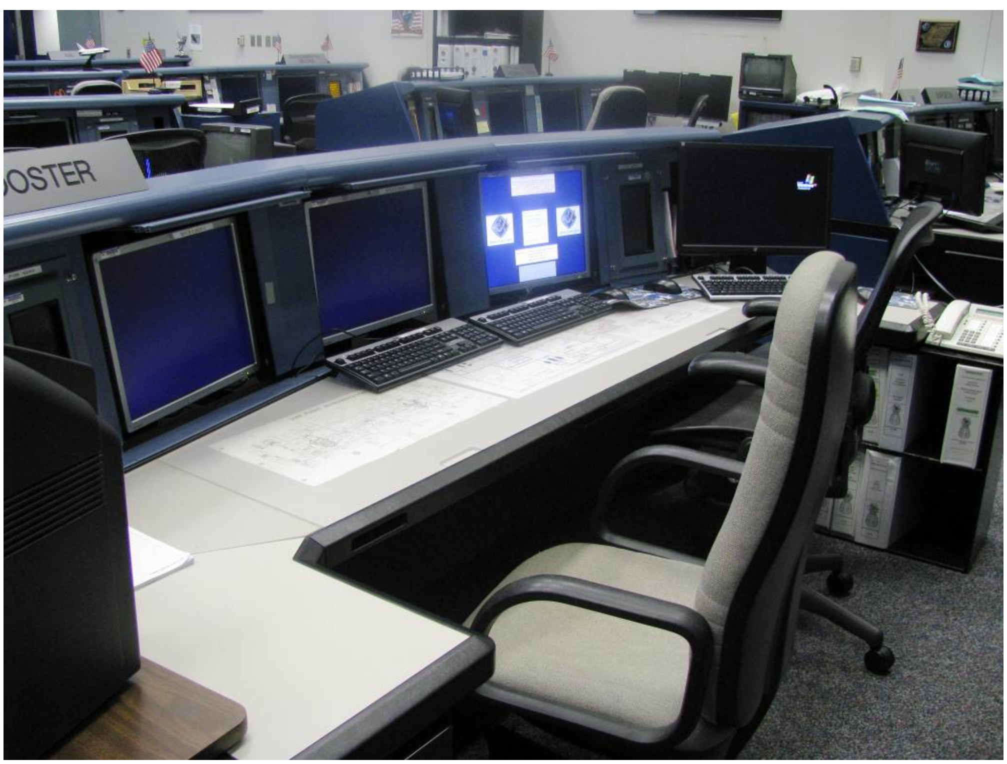
MCC-29


MECHANICAL (MMACS)
FLIGHT ACTIVITIES (FAO)
ASPEN
POST INSERTION
DO NOT REMOVE
STS-126
F.A.O
WFCR
DO NOT REMOVE

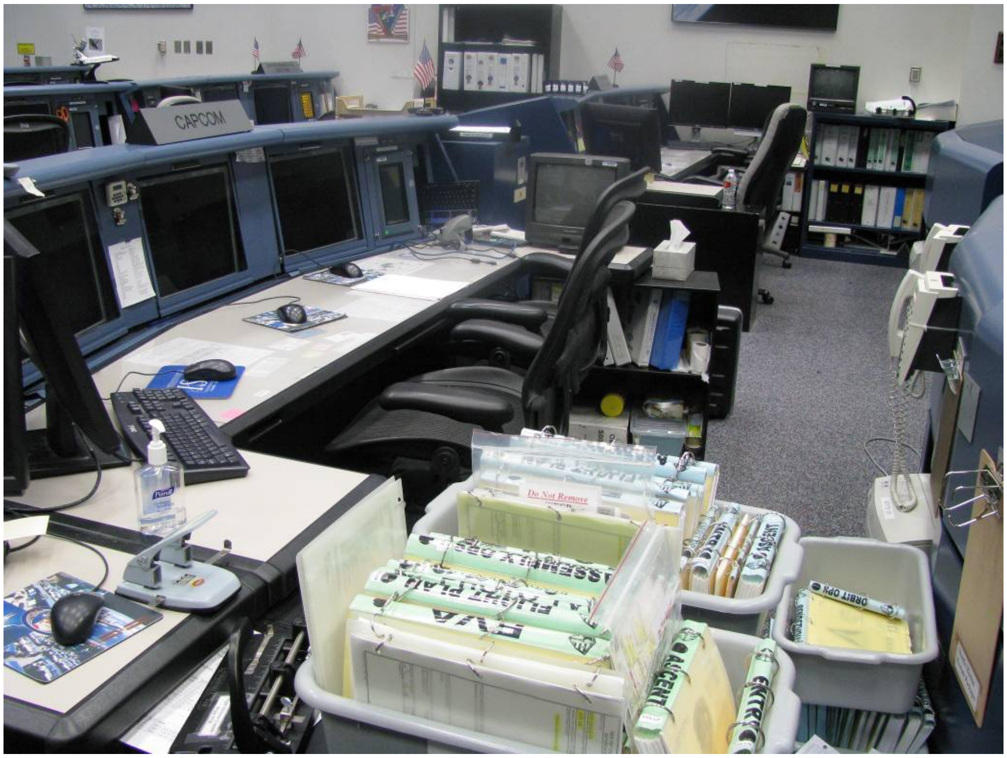
MCC-30



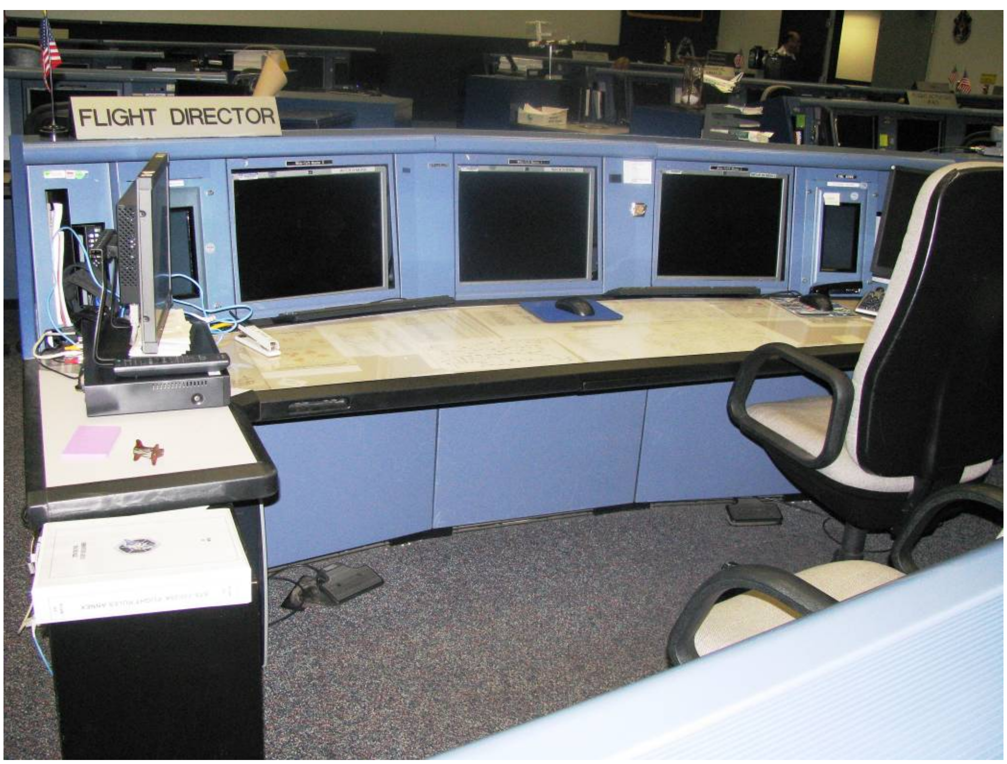
MCC-31



MCC-32



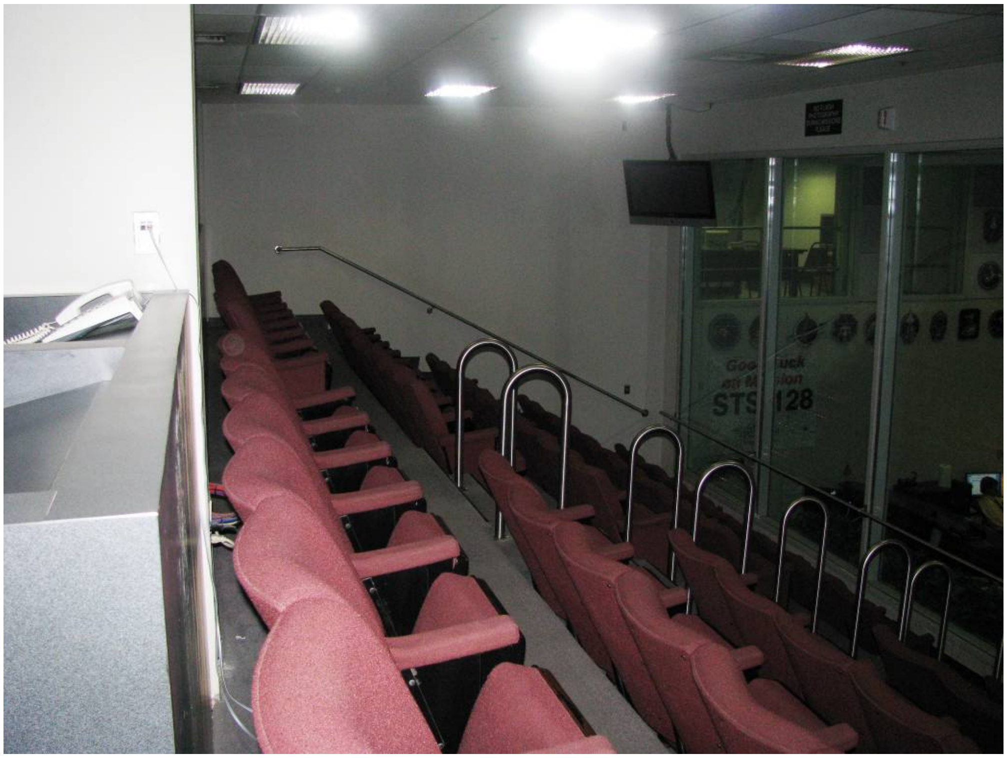
MCC-33



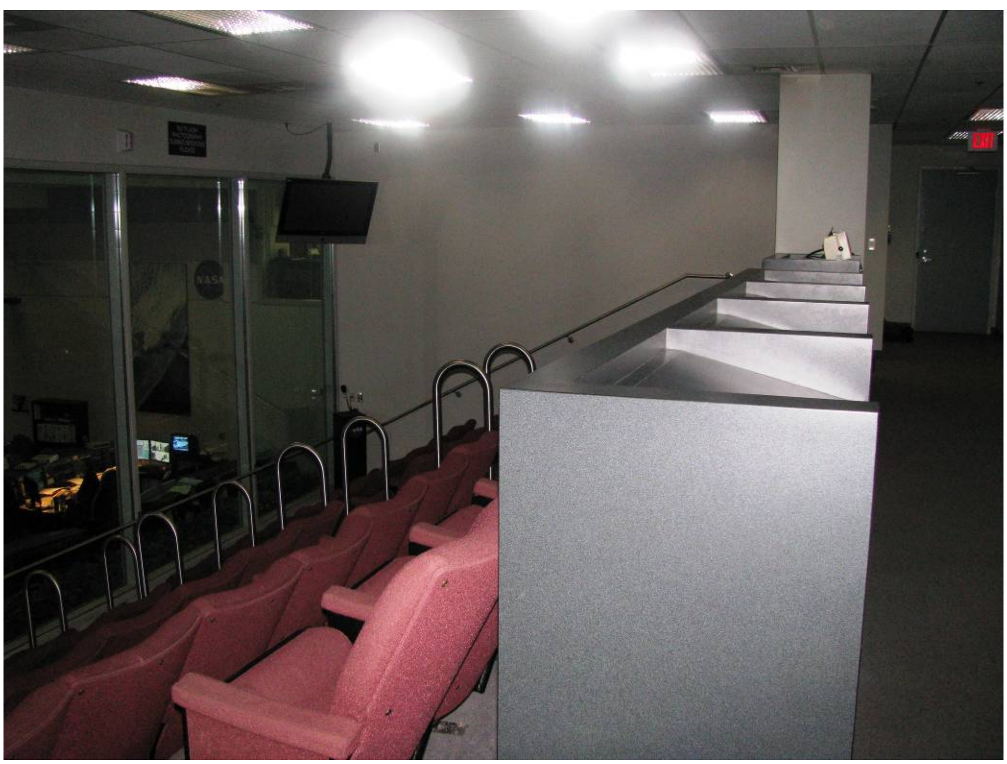
MCC-34

MCC-35

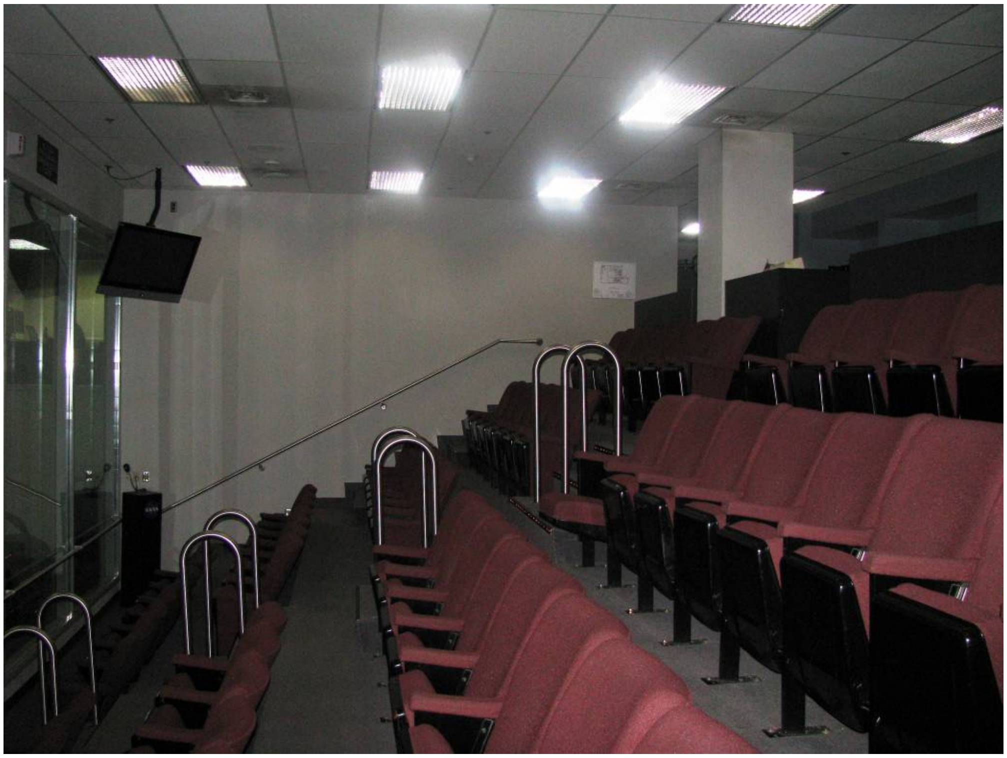
MCC-36



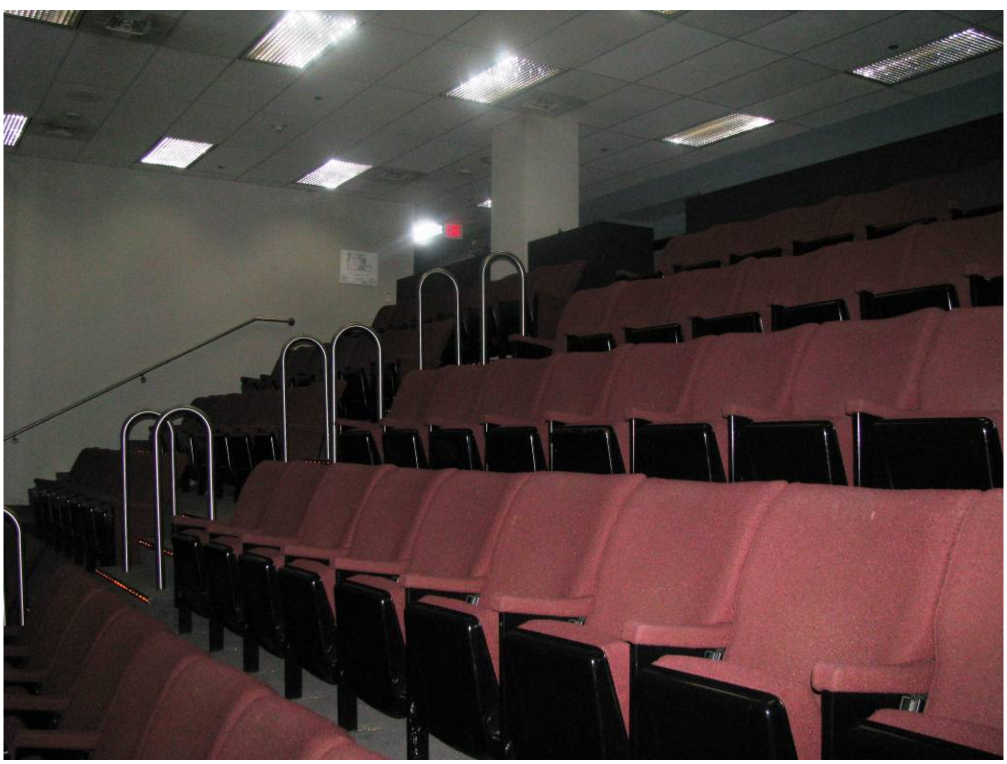
MCC-37



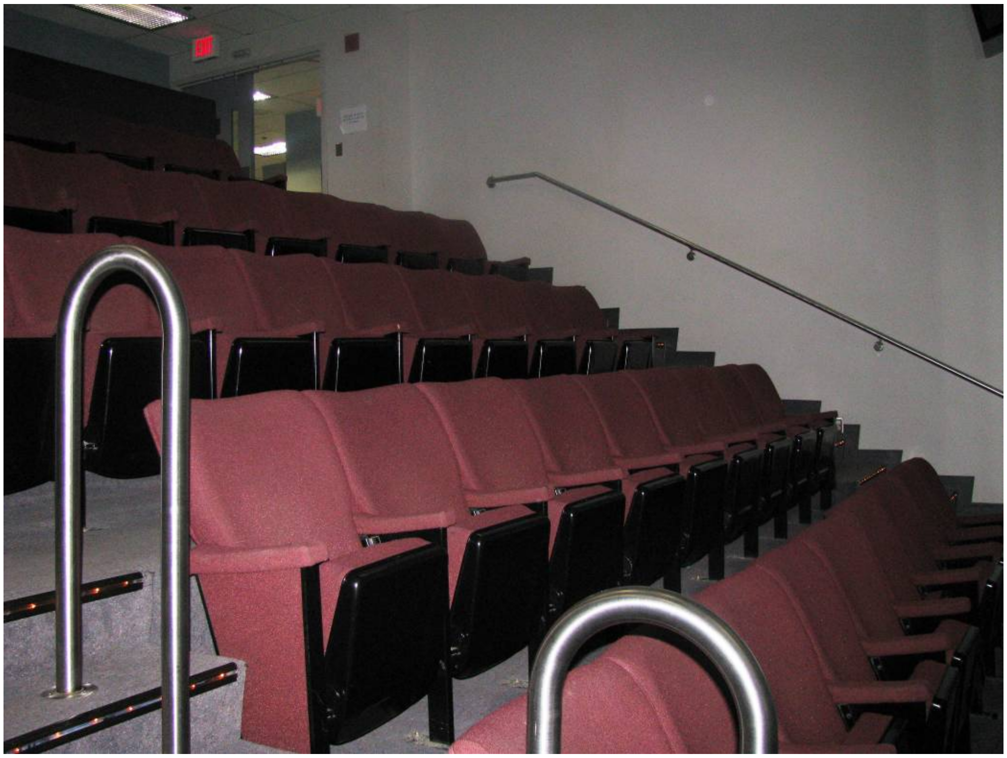
MCC-38



MCC-39



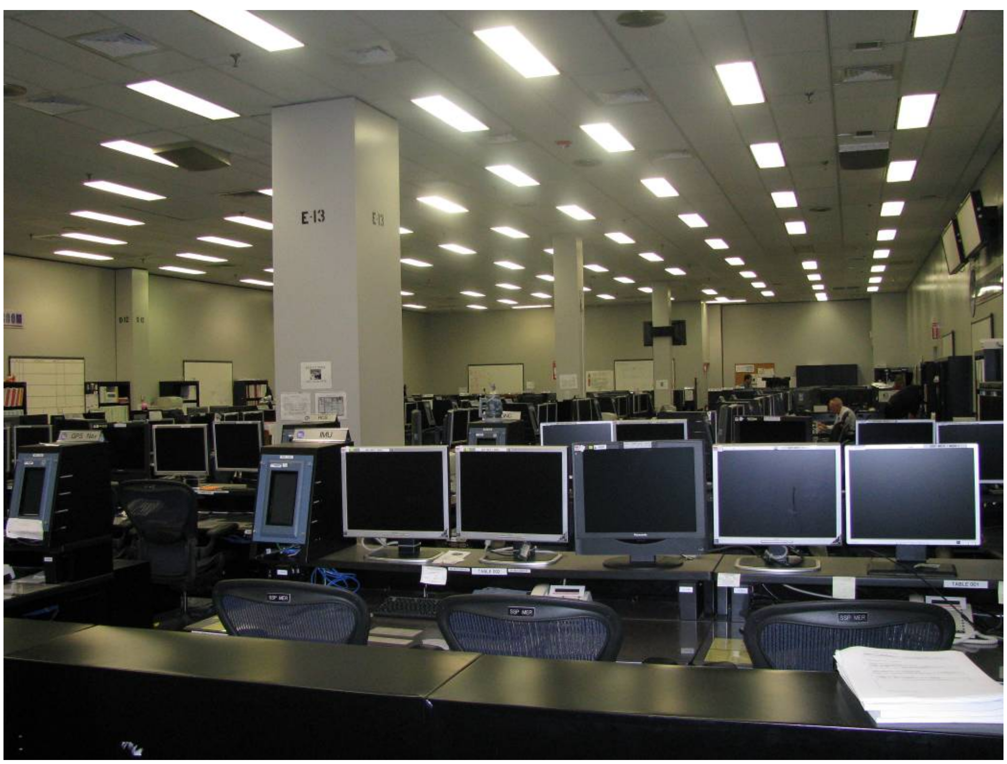
MCC-40



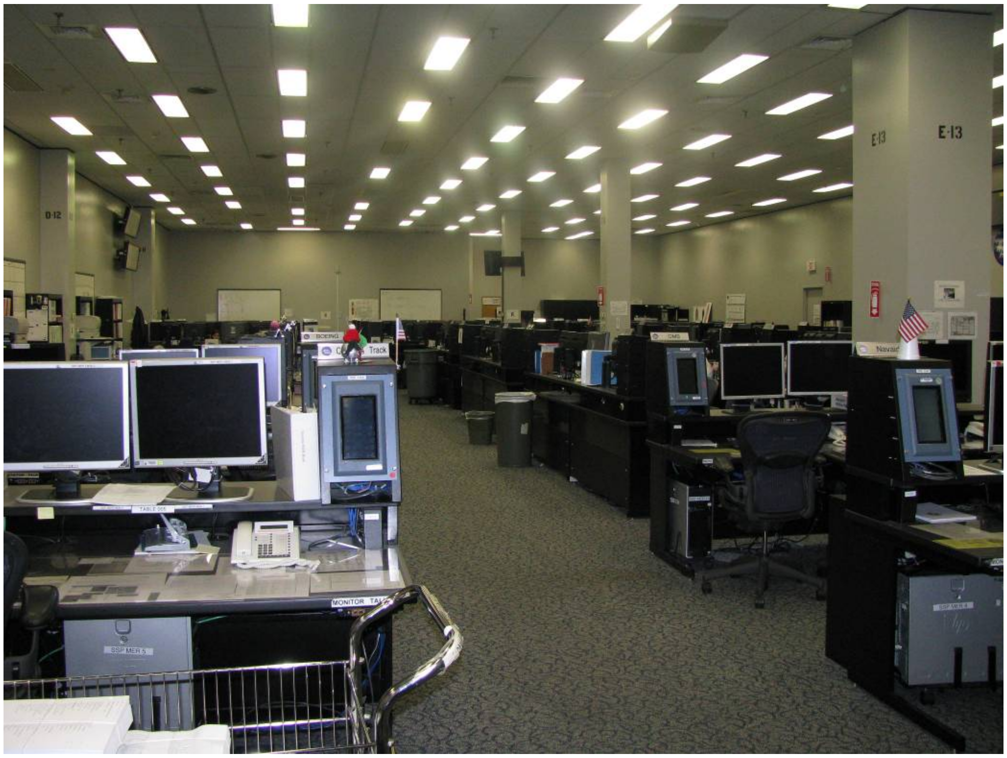
MCC-41

MCC-42

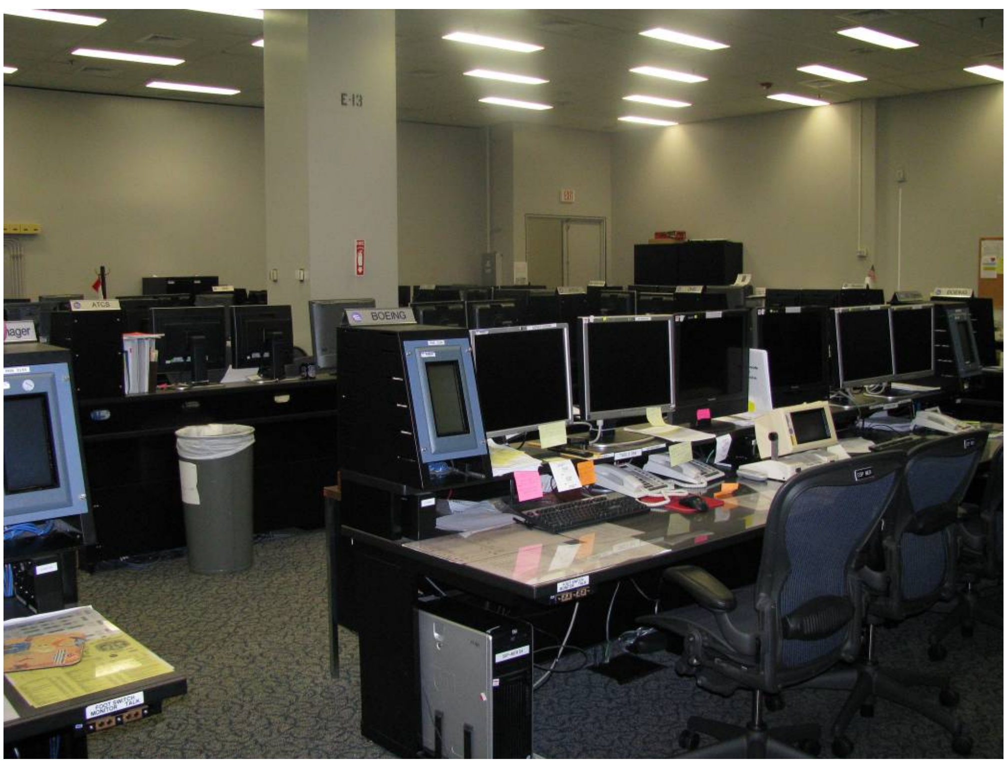
MCC-43



MCC-44

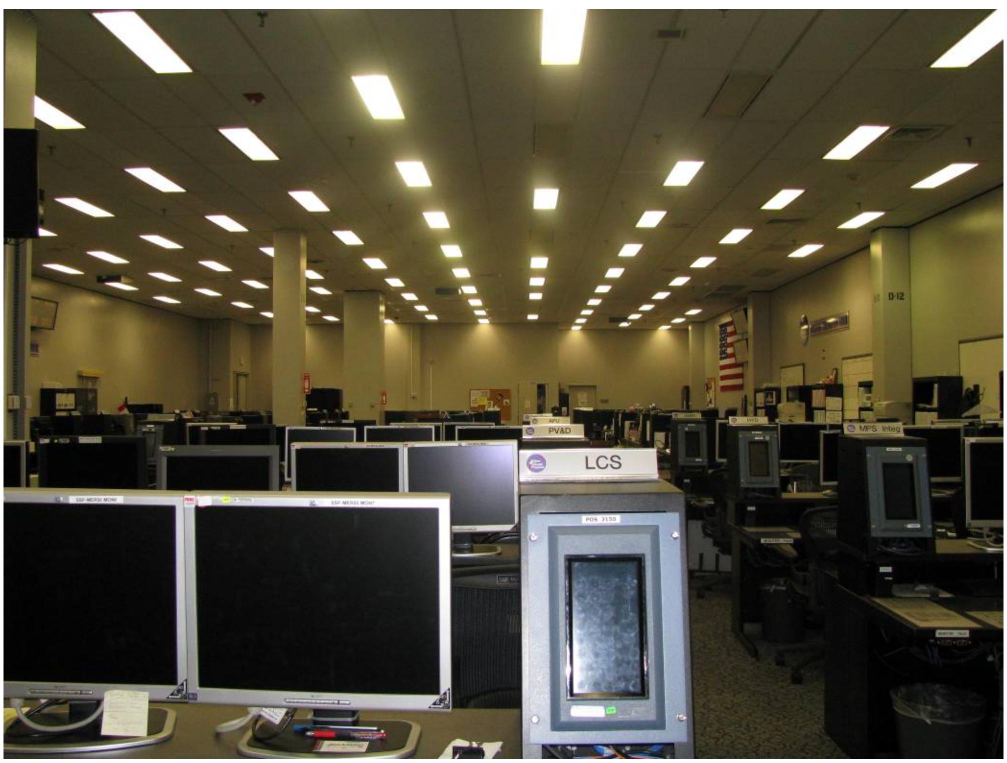


MCC-45



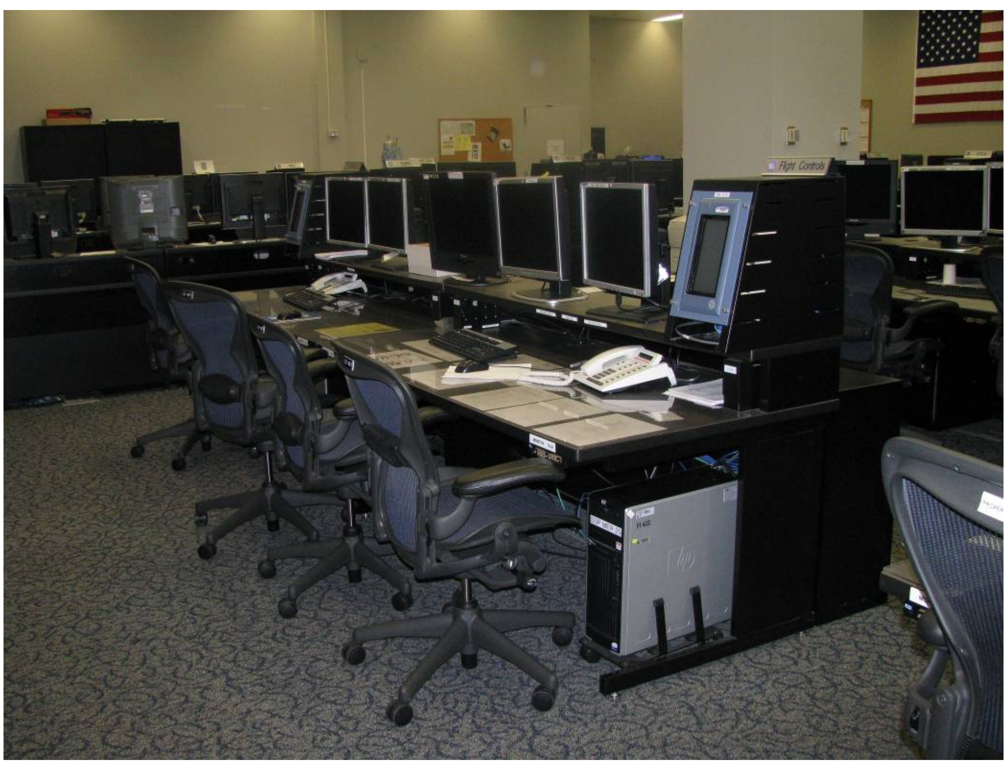
MCC-46

MCC-47

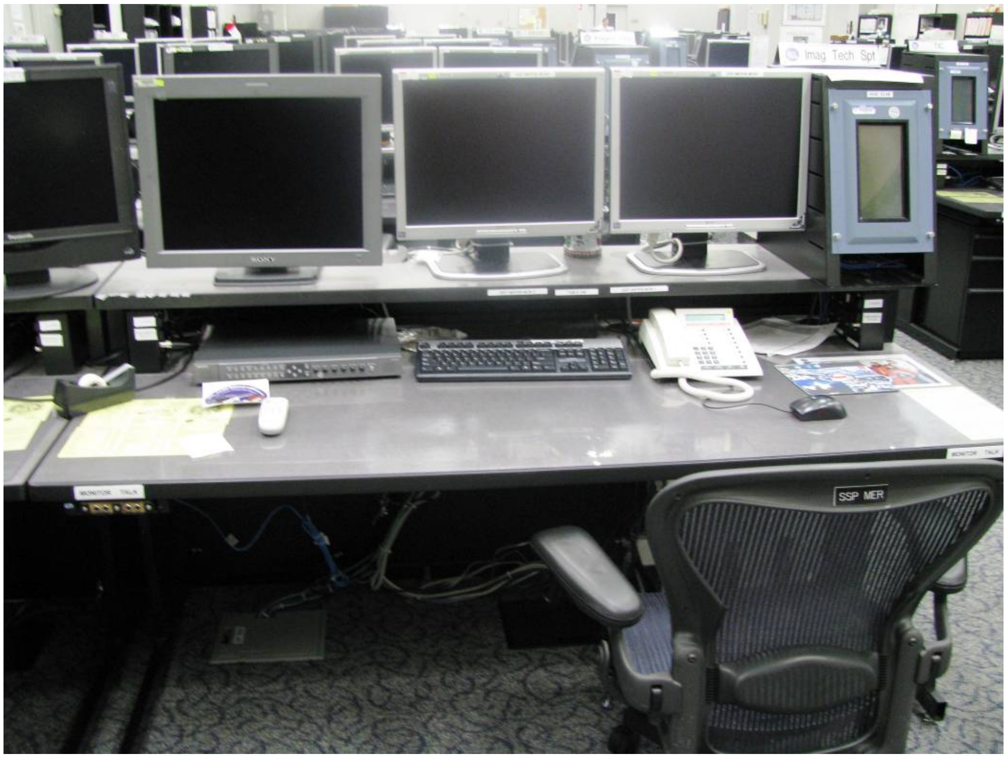


MCC-48

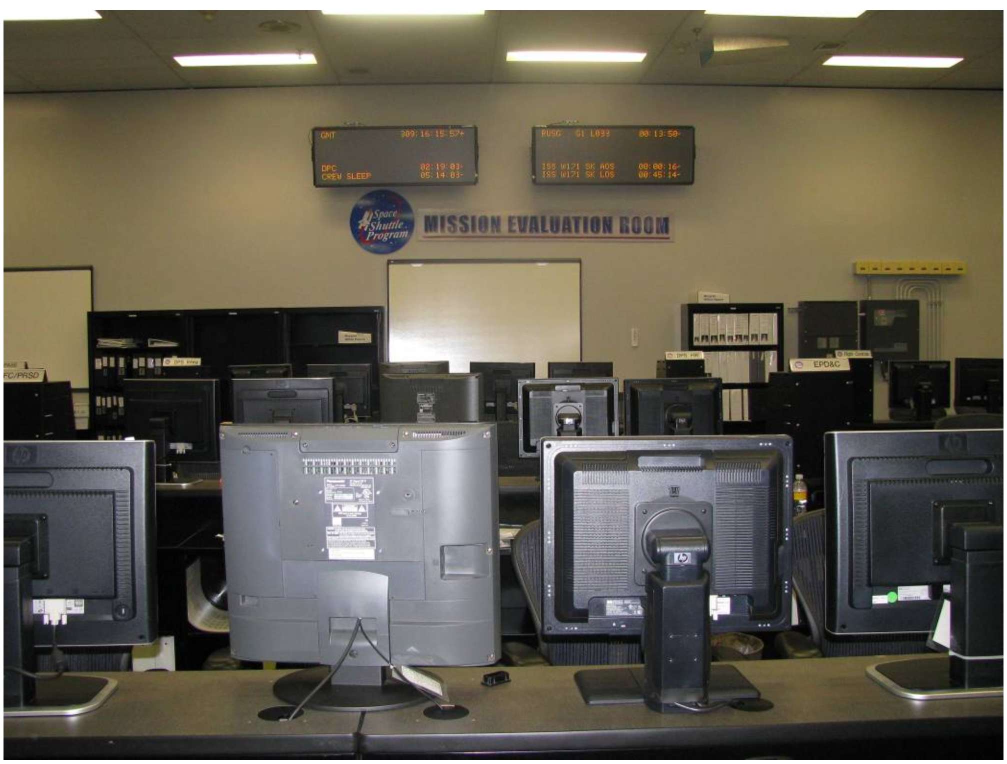
MCC-49



MCC-50


Imag Tech Spt
SSP MER

MCC-51


Space Shuttle Program
MISSION EVALUATION ROOM
EPD&C

MCC-52

MCC-53

MCC-54

MCC-55

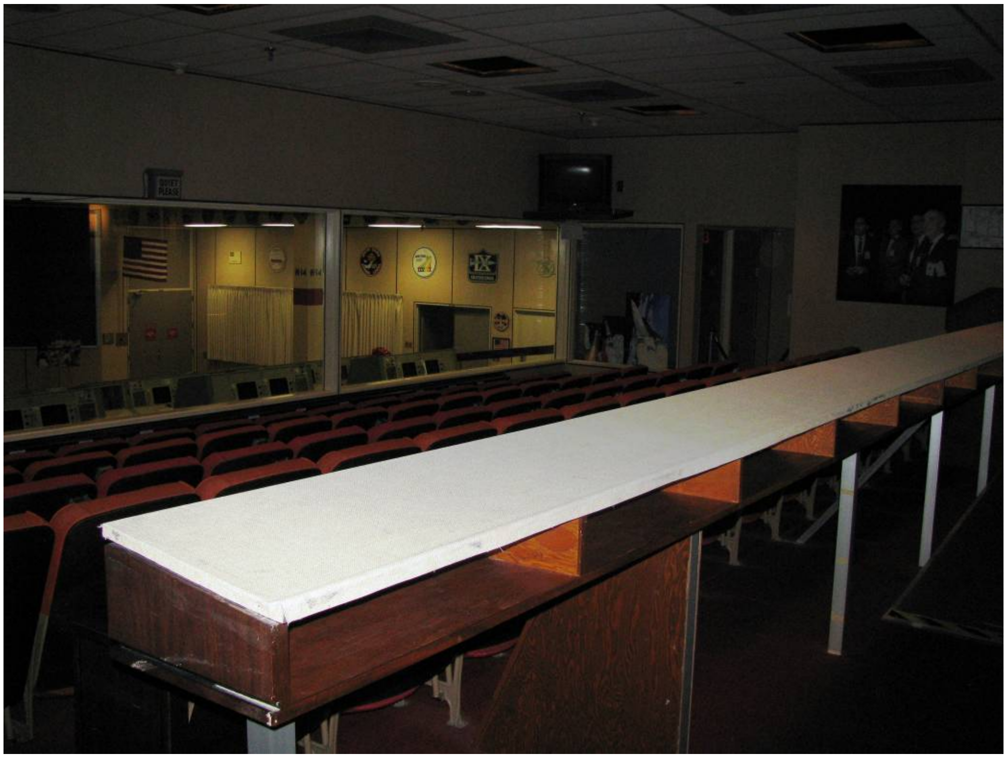
MCC-56

MCC-57

MCC-58

MCC-59

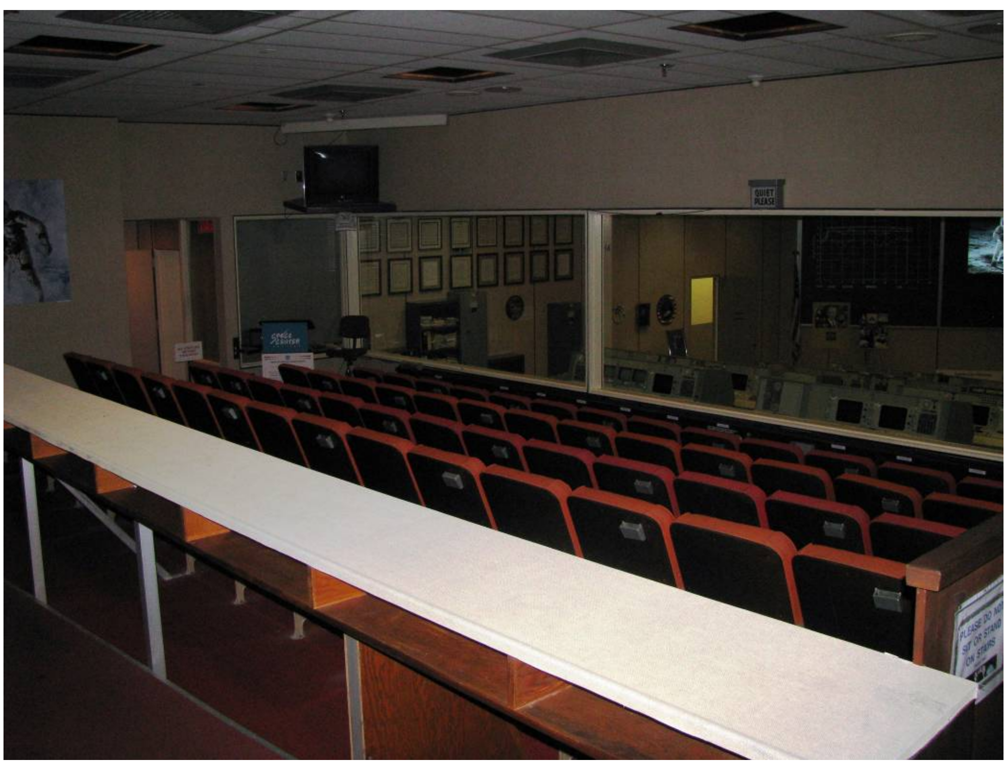
MCC-60



MCC-61

MCC-62

MCC-63



MCC-64


3TB4
MAXIMUM
OCCUPANCY
87 PERSONS
PLEASE DO NOT
SIT OR STAND
ON STAIRS
PLEASE DO NOT
SIT OR STAND
ON STAIRS

MCC-65


3328

MCC-66

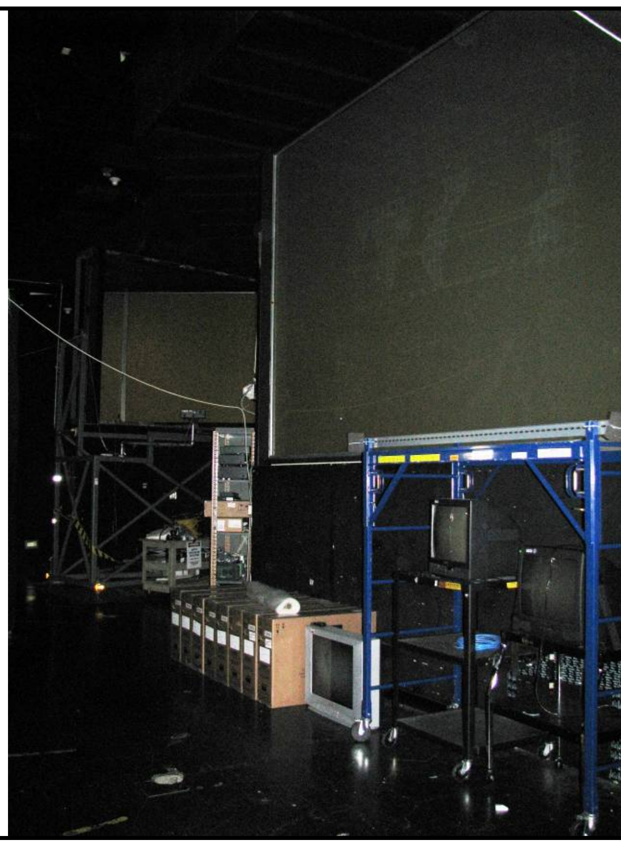
MCC-67

MCC-68

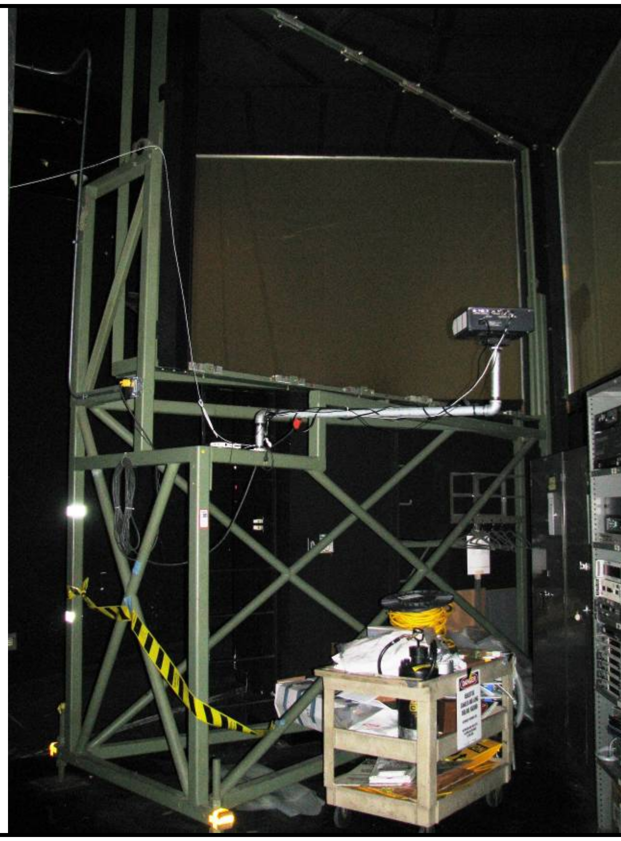
MCC-69

MCC-70

MCC-71



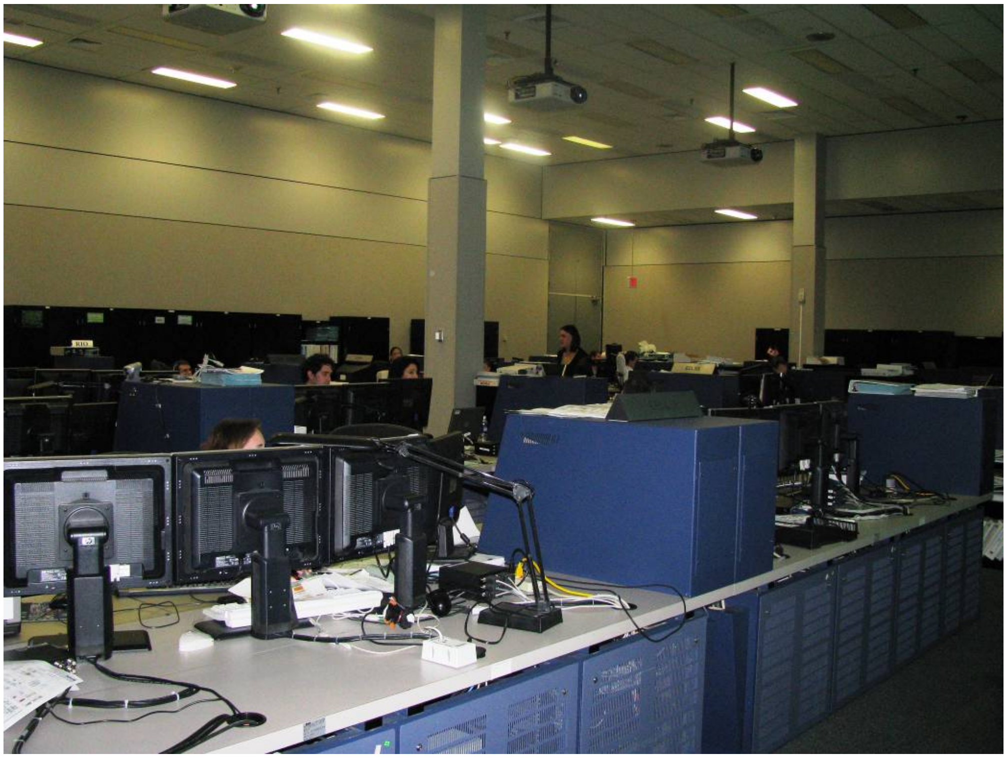
MCC-72



MCC-73

MCC-74

MCC-75



MCC-76

MCC-77

MCC-78

MCC-79

MCC-80

MCC-81

MCC-82

MCC-83

MCC-84

MCC-85

MCC-86

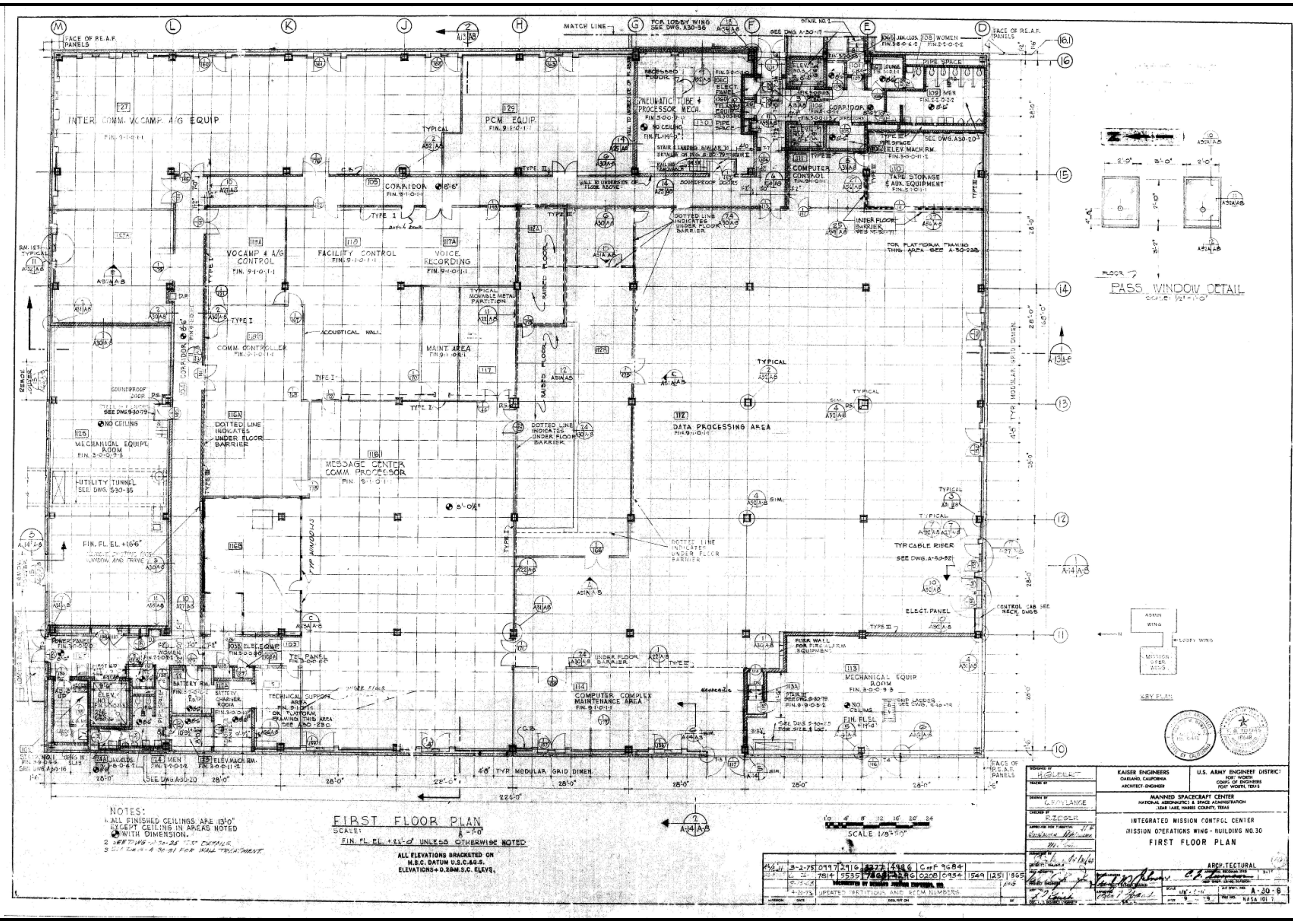
MCC-87

MCC-88

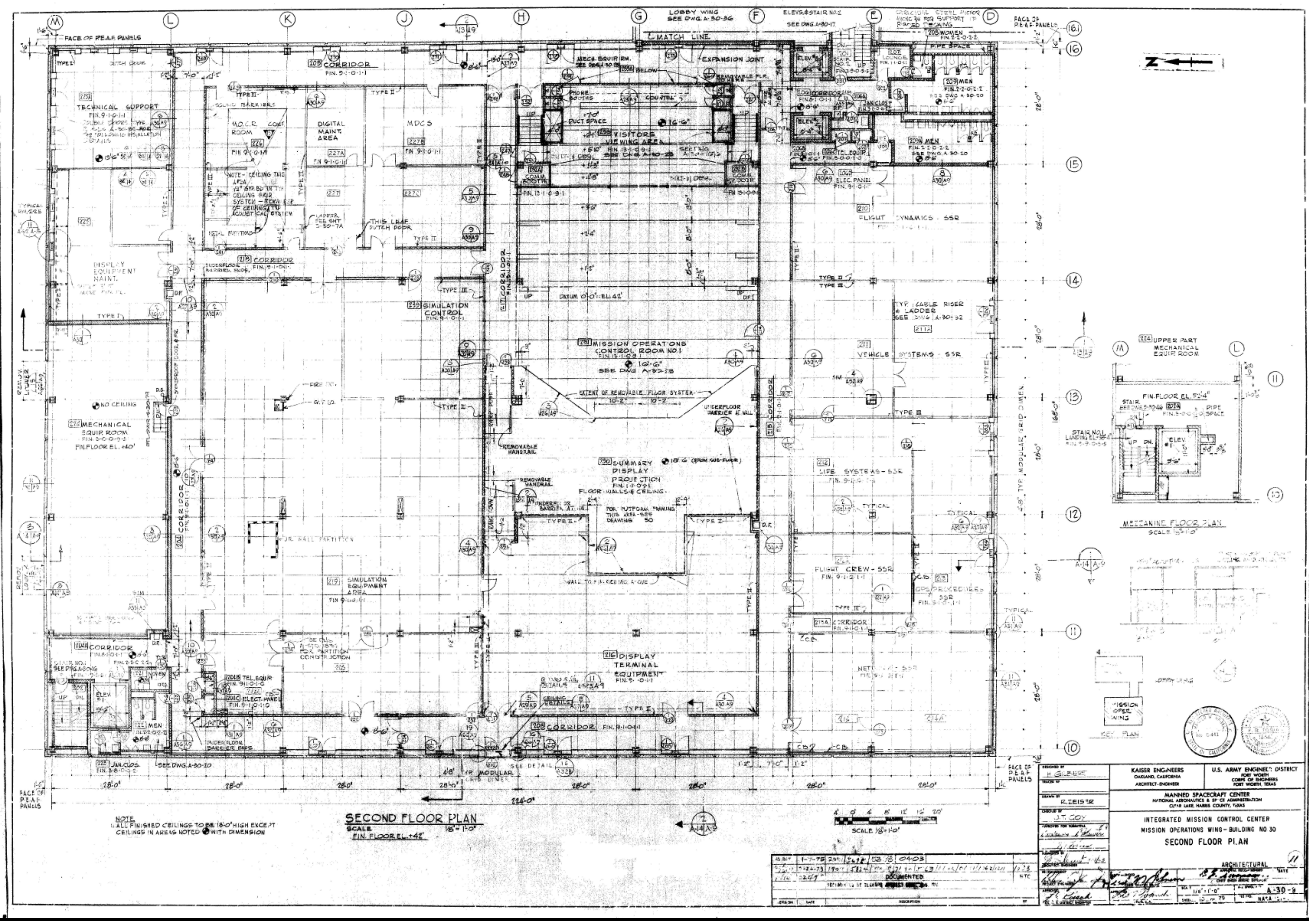
MCC-89

MCC-90

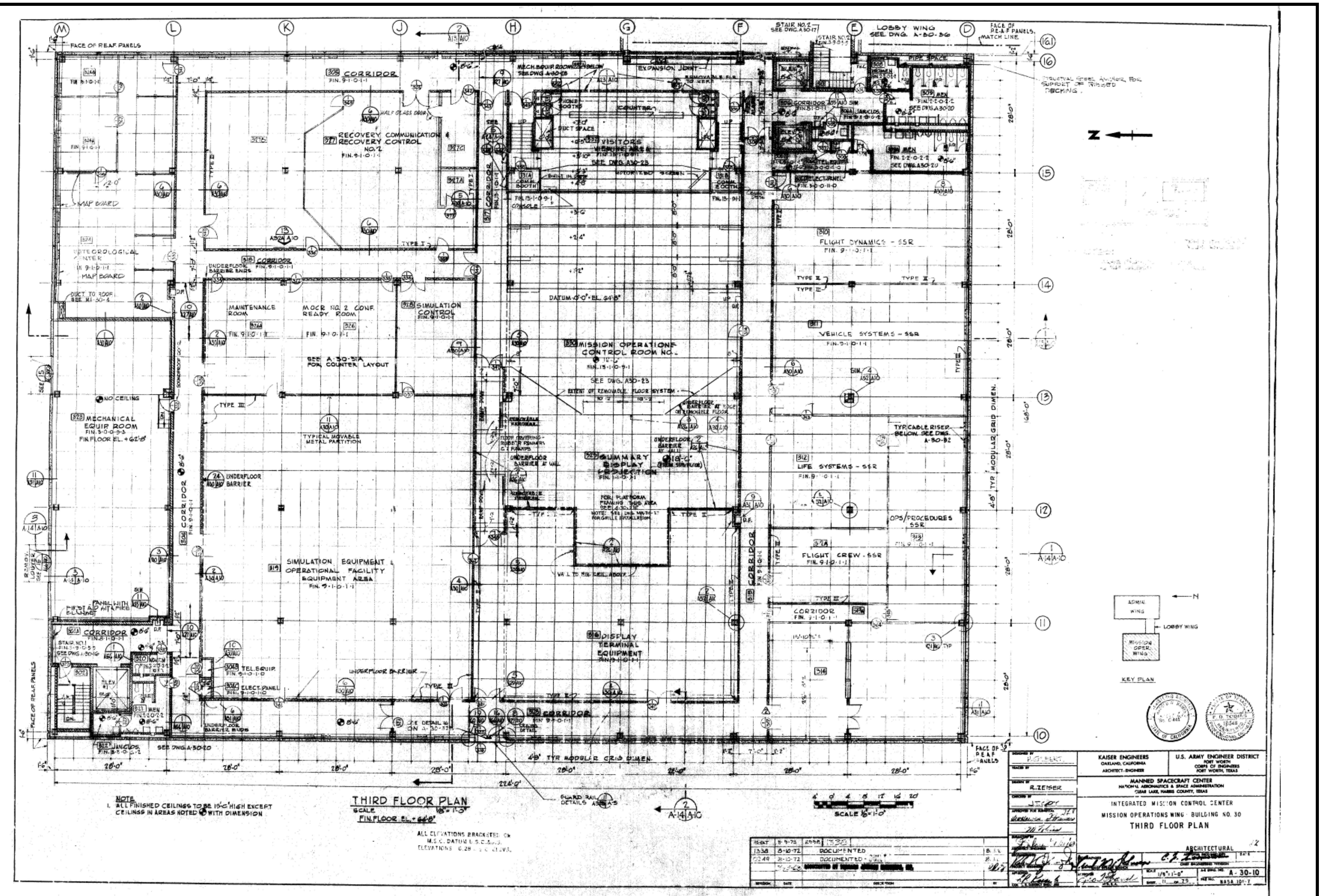
MCC-91


FIRST FLOOR PLAN
NOTES:
1. ALL FINISHED CEILINGS ARE 13'-0" EXCEPT CEILING IN AREAS NOTED WITH DIMENSION.
ALL ELEVATIONS BRACKETED ON M.S.C. DATUM U.S.C.&G.S. ELEVATIONS + D.28M.S.C. ELEVS.
DATA PROCESSING AREA
MESSAGE CENTER COMM PROCESSOR
COMPUTER COMPLEX MAINTENANCE AREA
MECHANICAL EQUIP ROOM
PASS WINDOW DETAIL
KAISER ENGINEERS
U.S. ARMY ENGINEER DISTRICT
MANNED SPACECRAFT CENTER
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO. 30
FIRST FLOOR PLAN

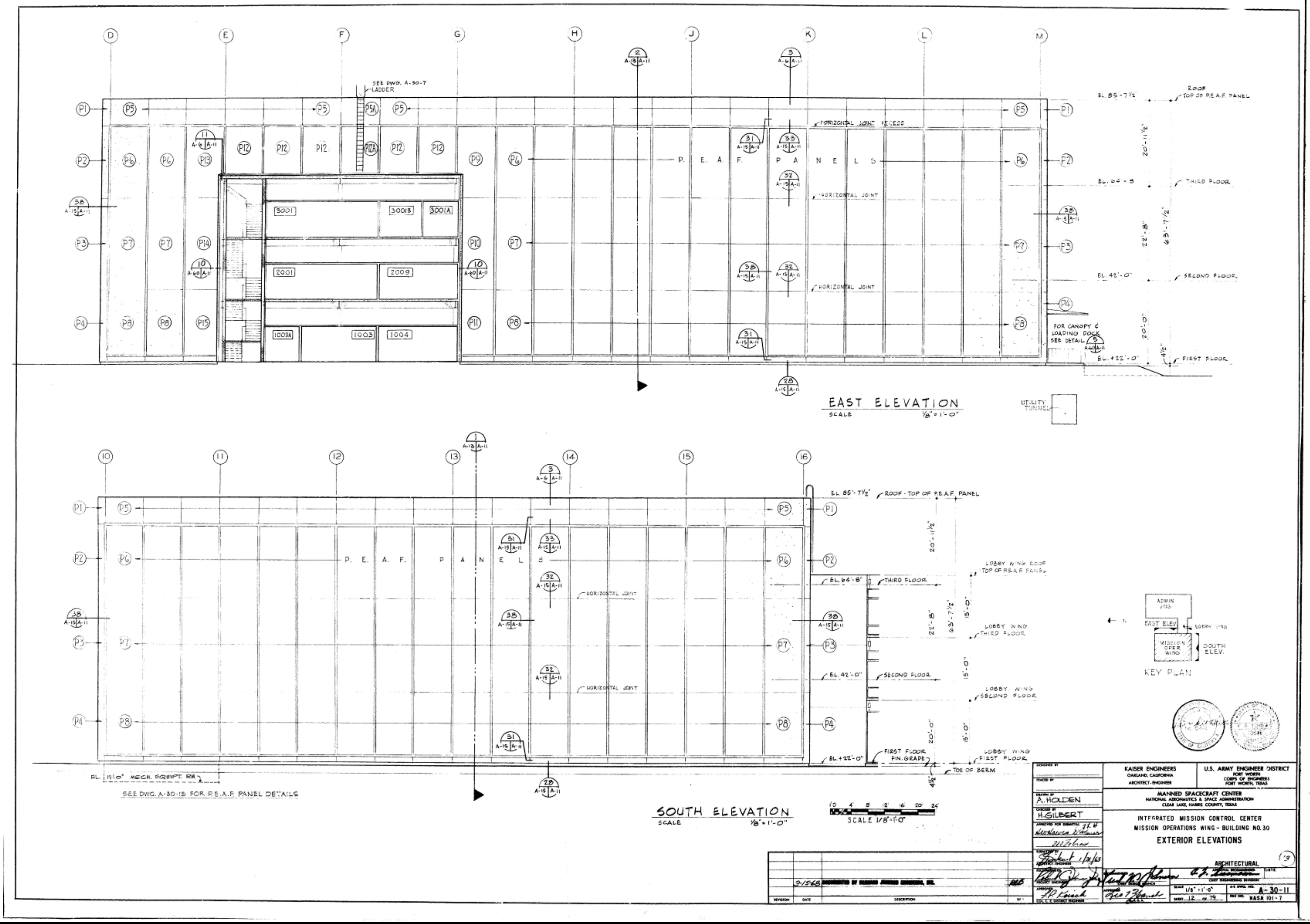
MCC-92

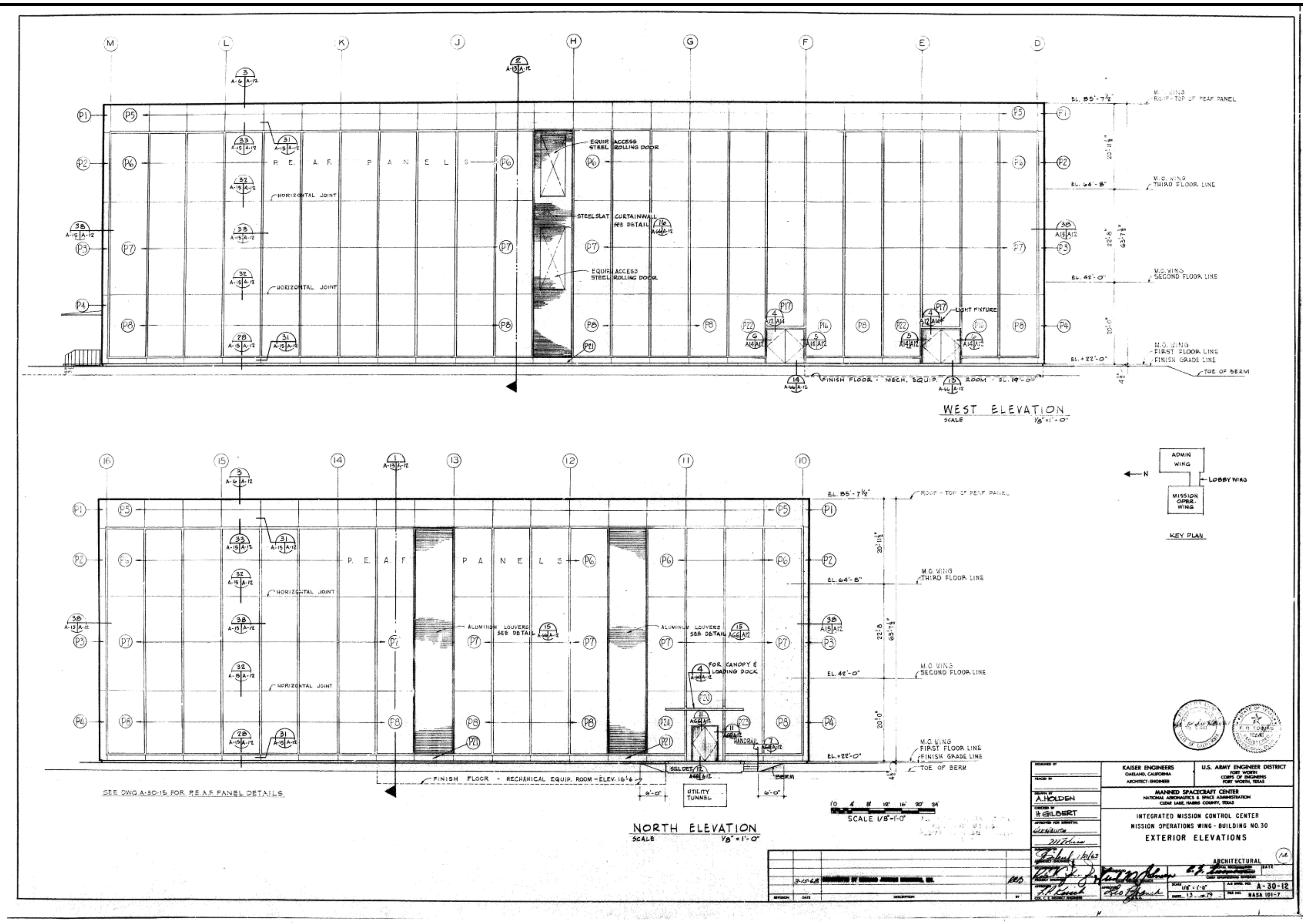

SECOND FLOOR PLAN
SCALE 1/8" = 1'-0"
FIN FLOOR EL. +42'
MEZZANINE FLOOR PLAN
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO 30
SECOND FLOOR PLAN
ARCHITECTURAL
A-30-9
MISSION OPERATIONS CONTROL ROOM NO.1
SIMULATION CONTROL
DISPLAY TERMINAL EQUIPMENT
MECHANICAL EQUIP ROOM
VISITORS VIEWING AREA
SUMMARY DISPLAY PROJECTION
NOTE
1. ALL FINISHED CEILINGS TO BE 18'-0" HIGH EXCEPT CEILINGS IN AREAS NOTED WITH DIMENSION

MCC-93

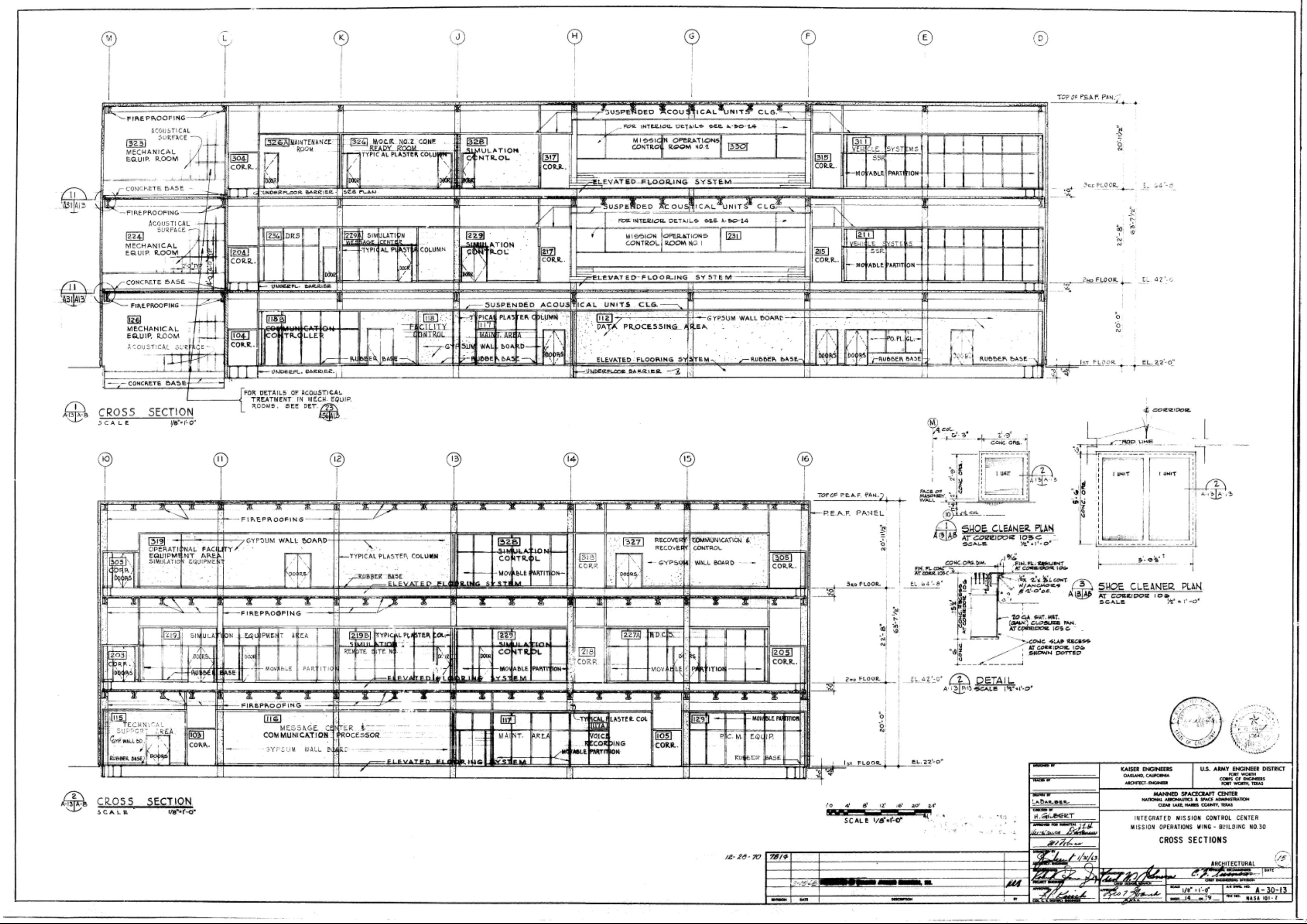

THIRD FLOOR PLAN
FIN. FLOOR EL. + 64'-8"
CORRIDOR
RECOVERY COMMUNICATION RECOVERY CONTROL NO. 2
VISITORS VIEWING AREA
COUNTER
EXPANSION JOINT
LOBBY WING SEE DWG. A-30-36
FLIGHT DYNAMICS - SSR
VEHICLE SYSTEMS - SSR
LIFE SYSTEMS - SSR
OPS/PROCEDURES SSR
FLIGHT CREW - SSR
MISSION OPERATIONS CONTROL ROOM NO. 2
SEE DWG. A30-23
SUMMARY DISPLAY PROJECTION
DISPLAY TERMINAL EQUIPMENT
SIMULATION EQUIPMENT OPERATIONAL FACILITY EQUIPMENT AREA
MAINTENANCE ROOM
MOCR NO. 2 CONF. READY ROOM
SIMULATION CONTROL
SEE A-30-51A FOR COUNTER LAYOUT
MECHANICAL EQUIP ROOM
METEOROLOGICAL CENTER
MAP BOARD
TYPICAL MOVABLE METAL PARTITION
UNDERFLOOR BARRIER
TEL EQUIP.
ELECT. PANEL
MEN
WOMEN
JAN. CLOS.
DATUM -0'-0" EL. 64'-8"
4'-8" TYP. MODULAR GRID DIMEN.
224'-0"
KEY PLAN
ADMIN WING
LOBBY WING
MISSION OPER. WING
NOTE
1. ALL FINISHED CEILINGS TO BE 10'-0" HIGH EXCEPT CEILINGS IN AREAS NOTED WITH DIMENSION
ALL ELEVATIONS BRACKETED ON M.S.C. DATUM
KAISER ENGINEERS OAKLAND, CALIFORNIA
U.S. ARMY ENGINEER DISTRICT FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO. 30
THIRD FLOOR PLAN
ARCHITECTURAL
R. ZEISER
A-30-10
DOCUMENTED

MCC-94

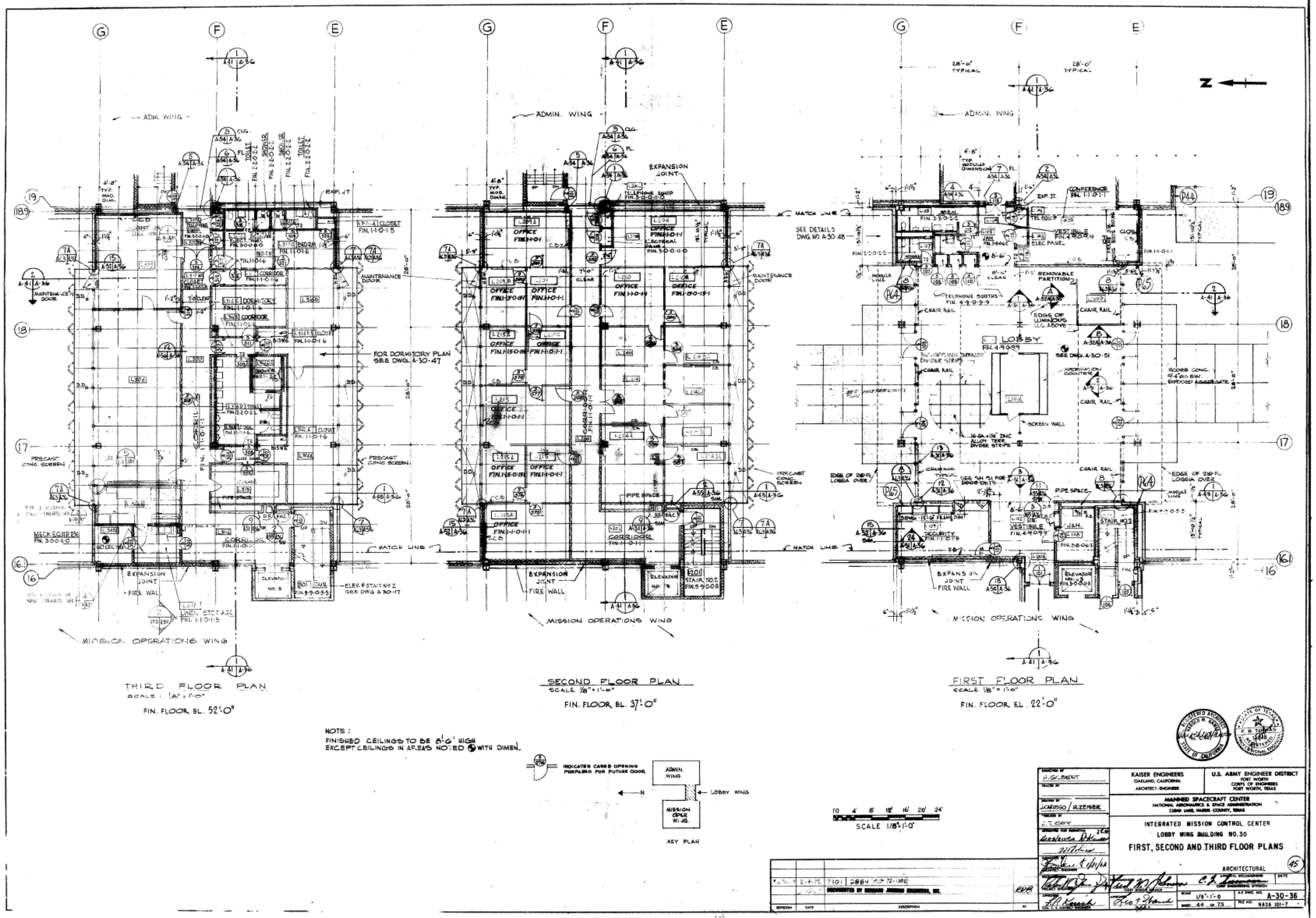

EAST ELEVATION
SCALE 1/8" = 1'-0"
P. E. A. F. PANELS
HORIZONTAL JOINT RECESS
HORIZONTAL JOINT
SEE DWG. A-30-7 LADDER
EL. 85'-7 1/2"
ROOF - TOP OF P.E.A.F. PANEL
EL. 64'-8"
THIRD FLOOR
EL. 43'-0"
SECOND FLOOR
EL. +22'-0"
FIRST FLOOR
FOR CANOPY & LOADING DOCK SEE DETAIL
UTILITY TUNNEL
SOUTH ELEVATION
SCALE 1/8" = 1'-0"
LOBBY WING ROOF TOP OF P.E.A.F. PANEL
LOBBY WING THIRD FLOOR
LOBBY WING SECOND FLOOR
LOBBY WING FIRST FLOOR
FIRST FLOOR FIN. GRADE
TOE OF BERM
SEE DWG. A-30-13 FOR P.E.A.F. PANEL DETAILS
SCALE 1/8"=1'-0"
KEY PLAN
ADMIN WING
EAST ELEV.
LOBBY WING
MISSION OPER WING
SOUTH ELEV.
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
DRAWN BY A. HOLDEN
CHECKED BY H. GILBERT
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO. 30
EXTERIOR ELEVATIONS
ARCHITECTURAL
SCALE 1/8" = 1'-0"
A-E DWG. NO. A-30-11
SHEET 12 OF 79
FILE NO. NASA 101-7


WEST ELEVATION
SCALE 1/8" = 1'-0"
NORTH ELEVATION
SCALE 1/8" = 1'-0"
R.E.A.F. PANELS
EQUIP. ACCESS STEEL ROLLING DOOR
STEELSLAT CURTAINWALL SEE DETAIL
HORIZONTAL JOINT
ALUMINUM LOUVERS SEE DETAIL
FOR CANOPY & LOADING DOCK
FINISH FLOOR - MECHANICAL EQUIP. ROOM - ELEV. 16'-6
UTILITY TUNNEL
SEE DWG A-30-15 FOR R.E.A.F. PANEL DETAILS
KEY PLAN
ADMIN WING
LOBBY WING
MISSION OPER. WING
KAISER ENGINEERS
OAKLAND, CALIFORNIA
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO. 30
EXTERIOR ELEVATIONS
ARCHITECTURAL
A-30-12
NASA 101-7
A. HOLDEN
R. GILBERT

MCC-96

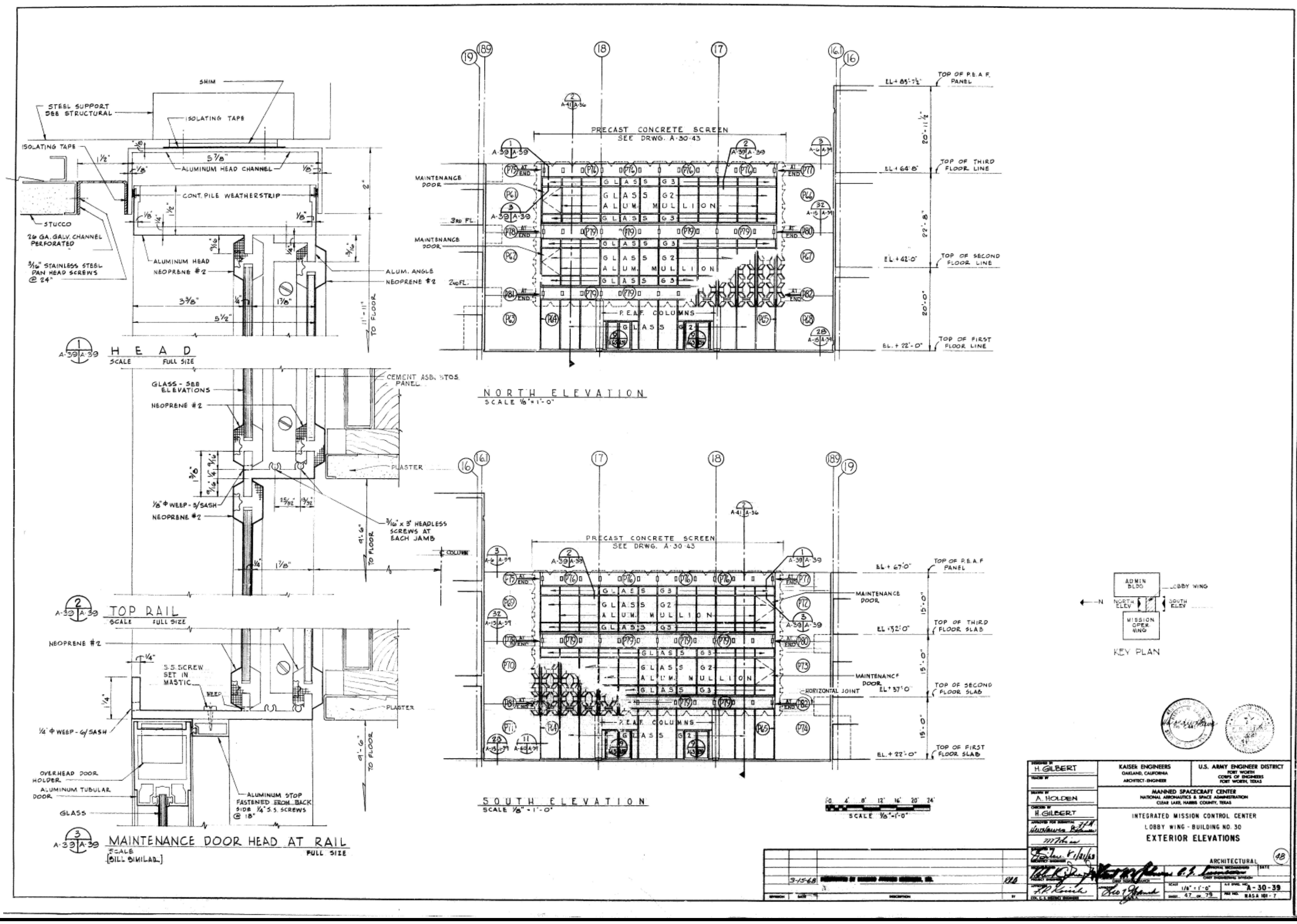

CROSS SECTION
SCALE 1/8"=1'-0"
SHOE CLEANER PLAN
AT CORRIDOR 103C
SHOE CLEANER PLAN
AT CORRIDOR 106
DETAIL
MISSION OPERATIONS CONTROL ROOM NO. 2
MISSION OPERATIONS CONTROL ROOM NO. 1
DATA PROCESSING AREA
SIMULATION CONTROL
MECHANICAL EQUIP. ROOM
MESSAGE CENTER & COMMUNICATION PROCESSOR
KAISER ENGINEERS
U.S. ARMY ENGINEER DISTRICT
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
INTEGRATED MISSION CONTROL CENTER
MISSION OPERATIONS WING - BUILDING NO.30
CROSS SECTIONS
ARCHITECTURAL
A-30-13

MCC-97



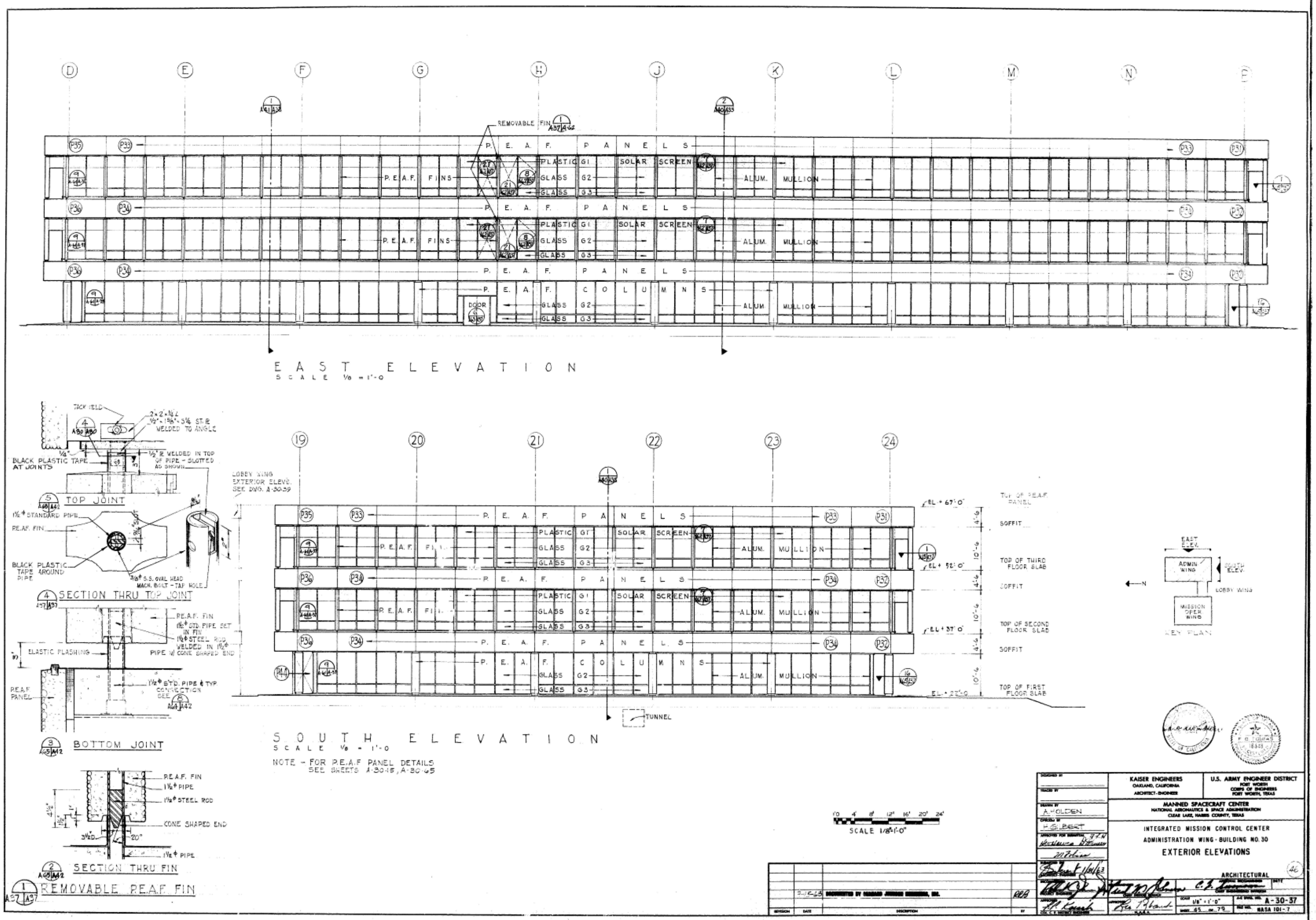
THIRD FLOOR PLAN
FIN. FLOOR EL. 52'-0"
SECOND FLOOR PLAN
SCALE 1/8" = 1'-0"
FIN. FLOOR EL. 37'-0"
FIRST FLOOR PLAN
SCALE 1/8" = 1'-0"
FIN. FLOOR EL. 22'-0"
ADM. WING
MISSION OPERATIONS WING
LOBBY
NOTES:
FINISHED CEILINGS TO BE 8'-6" HIGH EXCEPT CEILINGS IN AREAS NOTED WITH DIMEN.
KEY PLAN
ADMIN. WING
LOBBY WING
MISSION OPER. WING
SCALE 1/8"=1'-0"
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
LOBBY WING BUILDING NO.30
FIRST, SECOND AND THIRD FLOOR PLANS
ARCHITECTURAL
1/8"=1'-0
A-30-36
SHEET 44 OF 73
NASA 101-7

MCC-98

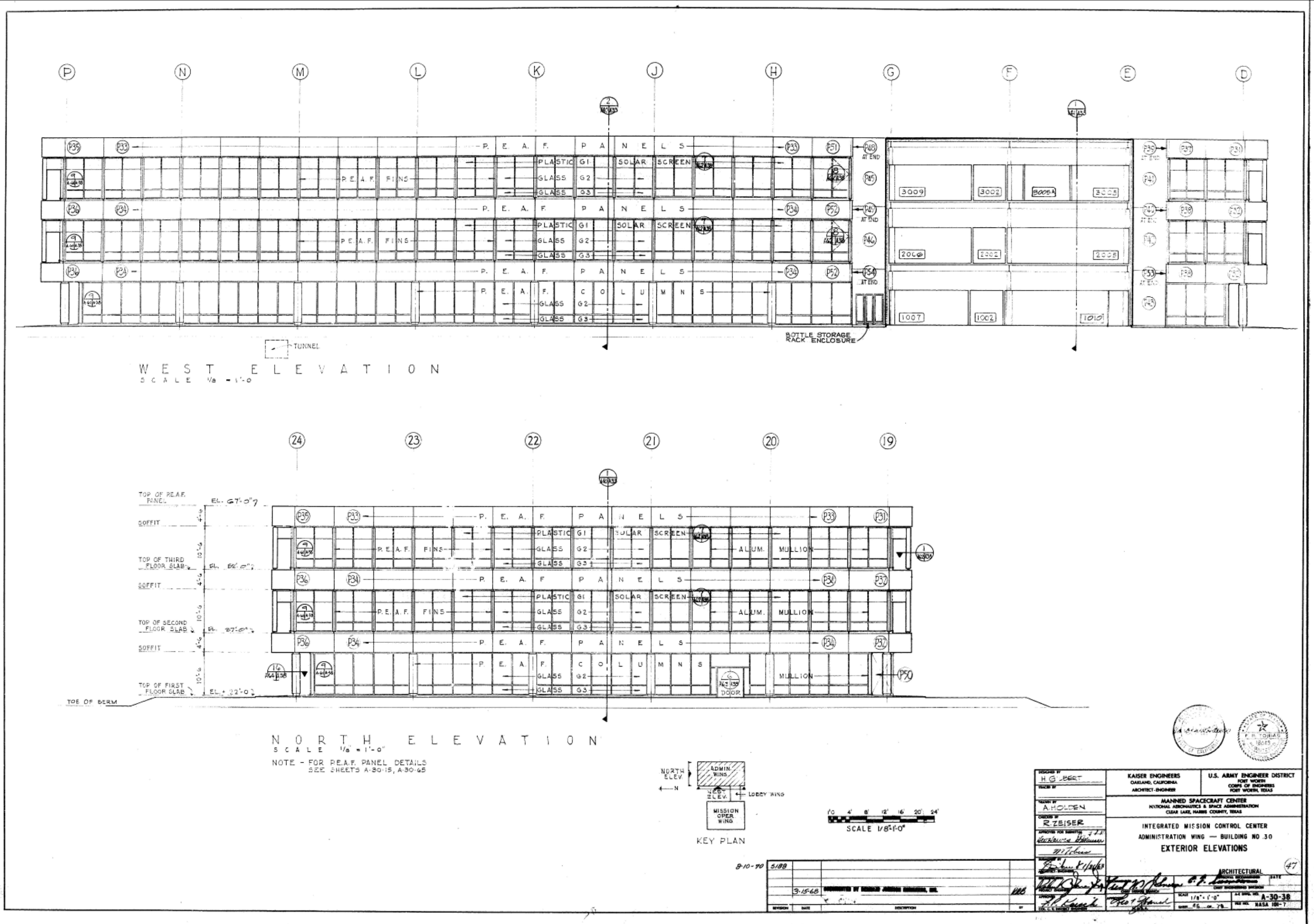


NORTH ELEVATION
SCALE 1/8" = 1'-0"
SOUTH ELEVATION
SCALE 1/8" = 1'-0"
PRECAST CONCRETE SCREEN
SEE DRWG. A-30-43
HEAD
SCALE FULL SIZE
TOP RAIL
SCALE FULL SIZE
MAINTENANCE DOOR HEAD AT RAIL
SCALE FULL SIZE
[BILL SIMILAR]
KEY PLAN
KAISER ENGINEERS
U.S. ARMY ENGINEER DISTRICT
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
INTEGRATED MISSION CONTROL CENTER
LOBBY WING - BUILDING NO. 30
EXTERIOR ELEVATIONS
ARCHITECTURAL
A-30-39

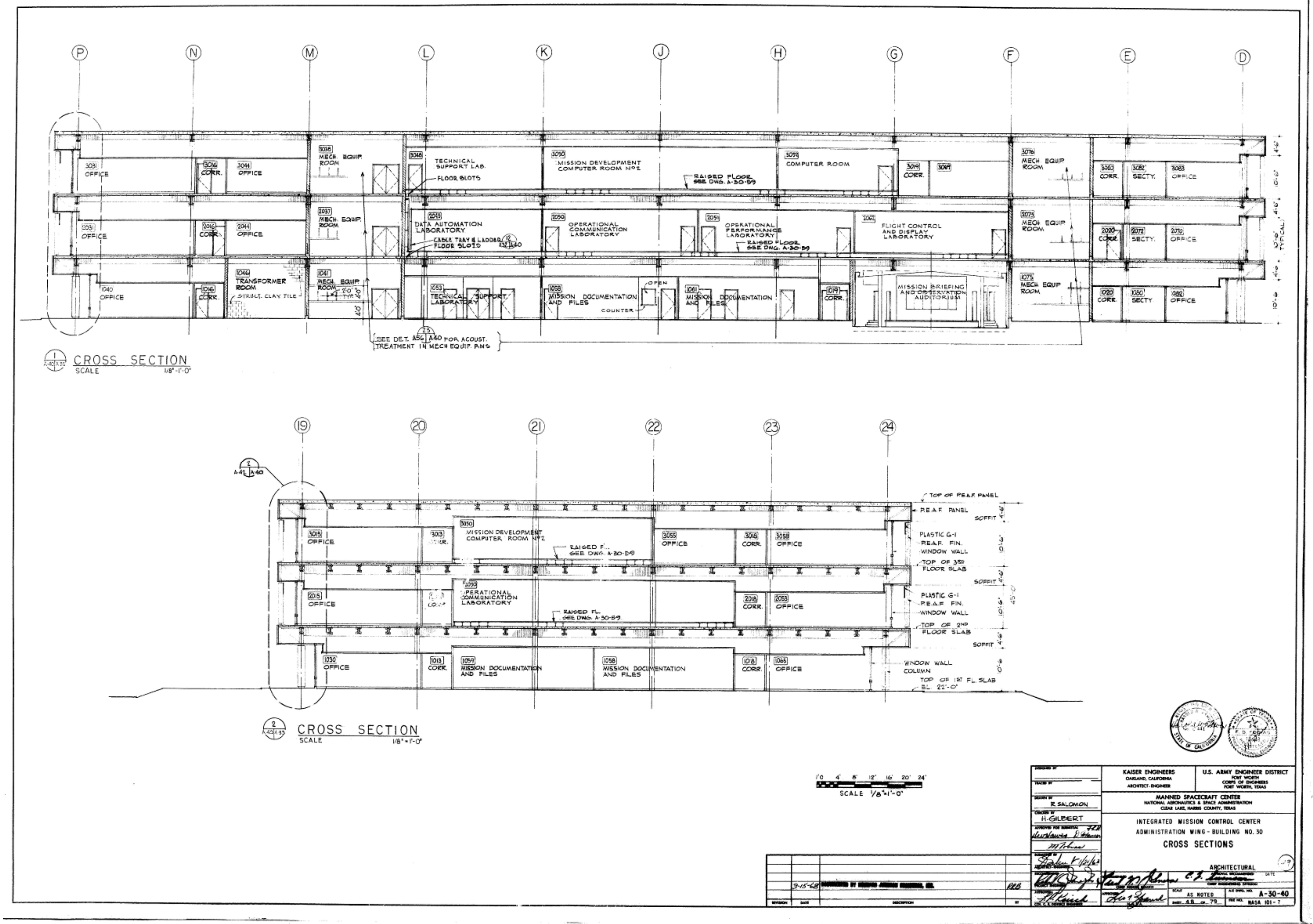
MCC-99


EAST ELEVATION
SCALE 1/8" = 1'-0"
SOUTH ELEVATION
SCALE 1/8" = 1'-0"
NOTE - FOR P.E.A.F. PANEL DETAILS SEE SHEETS A-30-45, A-30-45
P.E.A.F. PANELS
P.E.A.F. FINS
P.E.A.F. COLUMNS
PLASTIC G1
SOLAR SCREEN
GLASS G2
GLASS G3
ALUM. MULLION
REMOVABLE FIN
DOOR
TUNNEL
TOP JOINT
SECTION THRU TOP JOINT
BOTTOM JOINT
SECTION THRU FIN
REMOVABLE P.E.A.F. FIN
TACK WELD
BLACK PLASTIC TAPE AT JOINTS
1 1/2" STANDARD PIPE
P.E.A.F. FIN
ELASTIC FLASHING
P.E.A.F. PANEL
CONE SHAPED END
LOBBY WING EXTERIOR ELEVS. SEE DWG. A-30-39
TOP OF P.E.A.F. PANEL
SOFFIT
TOP OF THIRD FLOOR SLAB
TOP OF SECOND FLOOR SLAB
TOP OF FIRST FLOOR SLAB
EAST ELEV.
SOUTH ELEV.
ADMIN WING
MISSION OPER WING
LOBBY WING
KEY PLAN
SCALE 1/8"=1'-0"
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
ADMINISTRATION WING - BUILDING NO. 30
EXTERIOR ELEVATIONS
ARCHITECTURAL
A-30-37
NASA 101-7

MCC-100

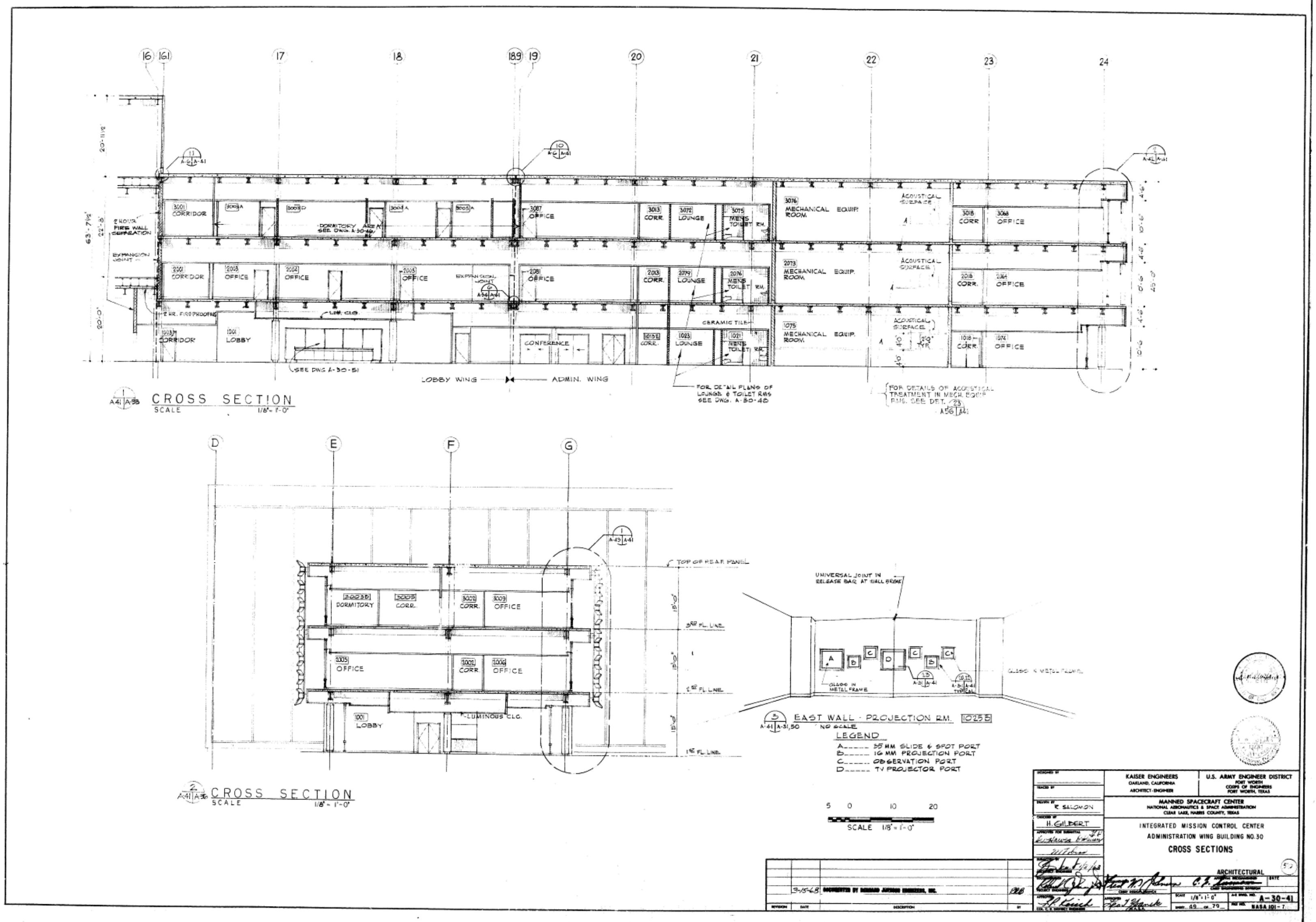

WEST ELEVATION
SCALE 1/8" = 1'-0"
NORTH ELEVATION
SCALE 1/8" = 1'-0"
NOTE - FOR P.E.A.F. PANEL DETAILS SEE SHEETS A-30-15, A-30-65
KEY PLAN
SCALE 1/8"=1'-0"
BOTTLE STORAGE RACK ENCLOSURE
KAISER ENGINEERS
OAKLAND, CALIFORNIA
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
INTEGRATED MISSION CONTROL CENTER
ADMINISTRATION WING — BUILDING NO. 30
EXTERIOR ELEVATIONS
ARCHITECTURAL
A-30-38

MCC-101

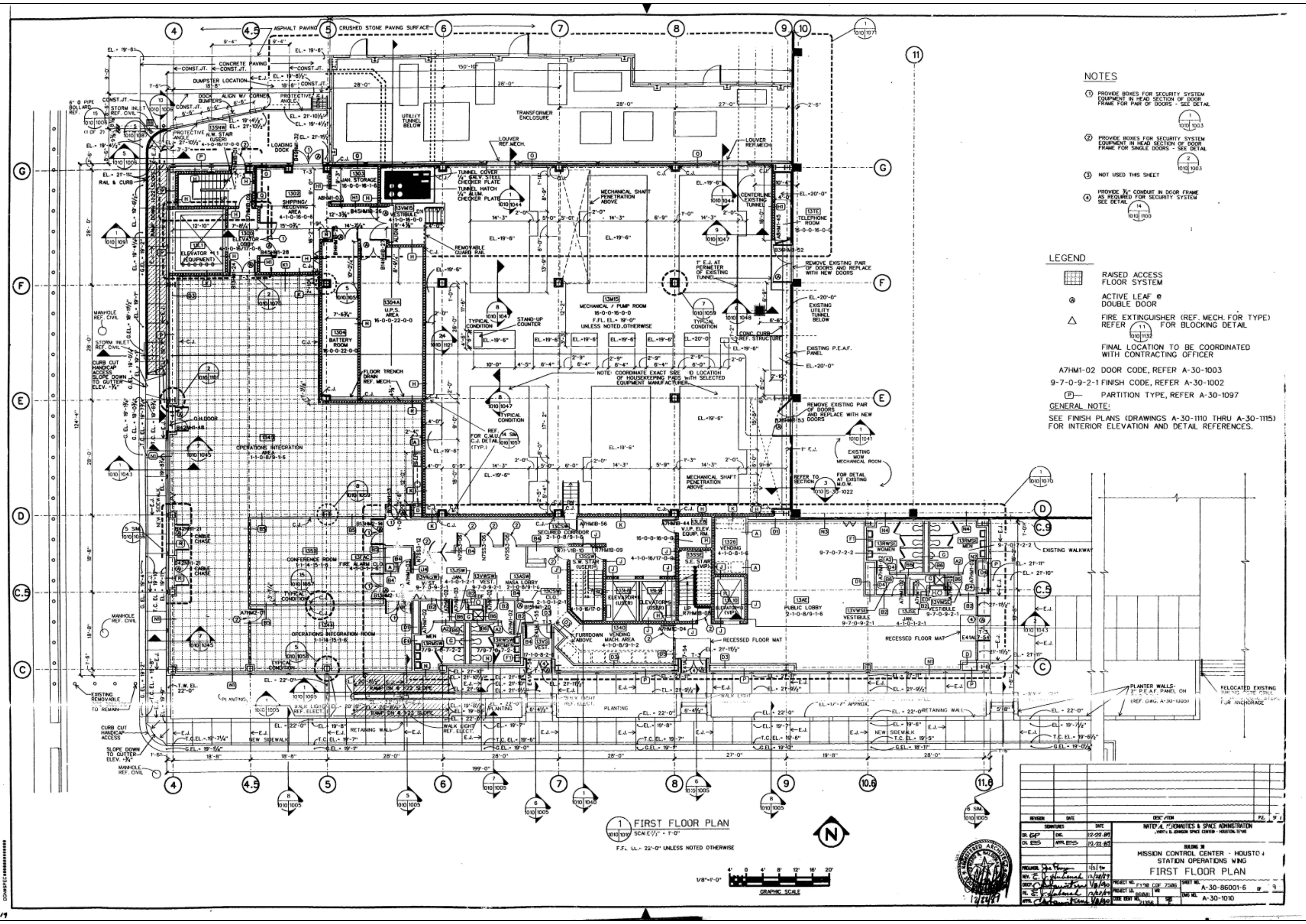


CROSS SECTION
SCALE 1/8" = 1'-0"
3031 OFFICE
3016 CORR.
3044 OFFICE
3036 MECH. EQUIP. ROOM
3048 TECHNICAL SUPPORT LAB.
FLOOR SLOTS
3090 MISSION DEVELOPMENT COMPUTER ROOM No 2
RAISED FLOOR SEE DWG. A-30-59
3092 COMPUTER ROOM
3019 CORR.
3076 MECH. EQUIP. ROOM
3083 CORR.
3082 SECTY.
3063 OFFICE
2037 MECH. EQUIP. ROOM
DATA AUTOMATION LABORATORY
CABLE TRAY & LADDER FLOOR SLOTS
2090 OPERATIONAL COMMUNICATION LABORATORY
2051 OPERATIONAL PERFORMANCE LABORATORY
FLIGHT CONTROL AND DISPLAY LABORATORY
2075 MECH. EQUIP. ROOM
1046 TRANSFORMER ROOM
STRUCT. CLAY TILE
1041 MECH. EQUIP. ROOM
1053 TECHNICAL SUPPORT LABORATORY
1058 MISSION DOCUMENTATION AND FILES
COUNTER
1061 MISSION DOCUMENTATION AND FILES
1019 CORR.
MISSION BRIEFING AND OBSERVATION AUDITORIUM
1075 MECH. EQUIP. ROOM
SEE DET. A56 A40 FOR ACOUST. TREATMENT IN MECH EQUIP. RMS
CROSS SECTION
SCALE 1/8" = 1'-0"
3015 OFFICE
3050 MISSION DEVELOPMENT COMPUTER ROOM No 2
RAISED FL. SEE DWG. A-30-59
3055 OFFICE
3018 CORR.
3058 OFFICE
TOP OF R.E.A.F. PANEL
R.E.A.F. PANEL
SOFFIT
PLASTIC G-1 R.E.A.F. FIN. WINDOW WALL
TOP OF 3RD FLOOR SLAB
2015 OFFICE
2090 OPERATIONAL COMMUNICATION LABORATORY
2018 CORR.
2053 OFFICE
TOP OF 2ND FLOOR SLAB
1030 OFFICE
1013 CORR.
1059 MISSION DOCUMENTATION AND FILES
1058 MISSION DOCUMENTATION AND FILES
1018 CORR.
1065 OFFICE
WINDOW WALL COLUMN
TOP OF 1ST FL. SLAB EL. 22'-0"
SCALE 1/8" = 1'-0"
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
R. SALOMON
H. GILBERT
INTEGRATED MISSION CONTROL CENTER
ADMINISTRATION WING - BUILDING NO. 30
CROSS SECTIONS
ARCHITECTURAL
AS NOTED
A-30-40
SHEET 48 OF 79
NASA 101-7

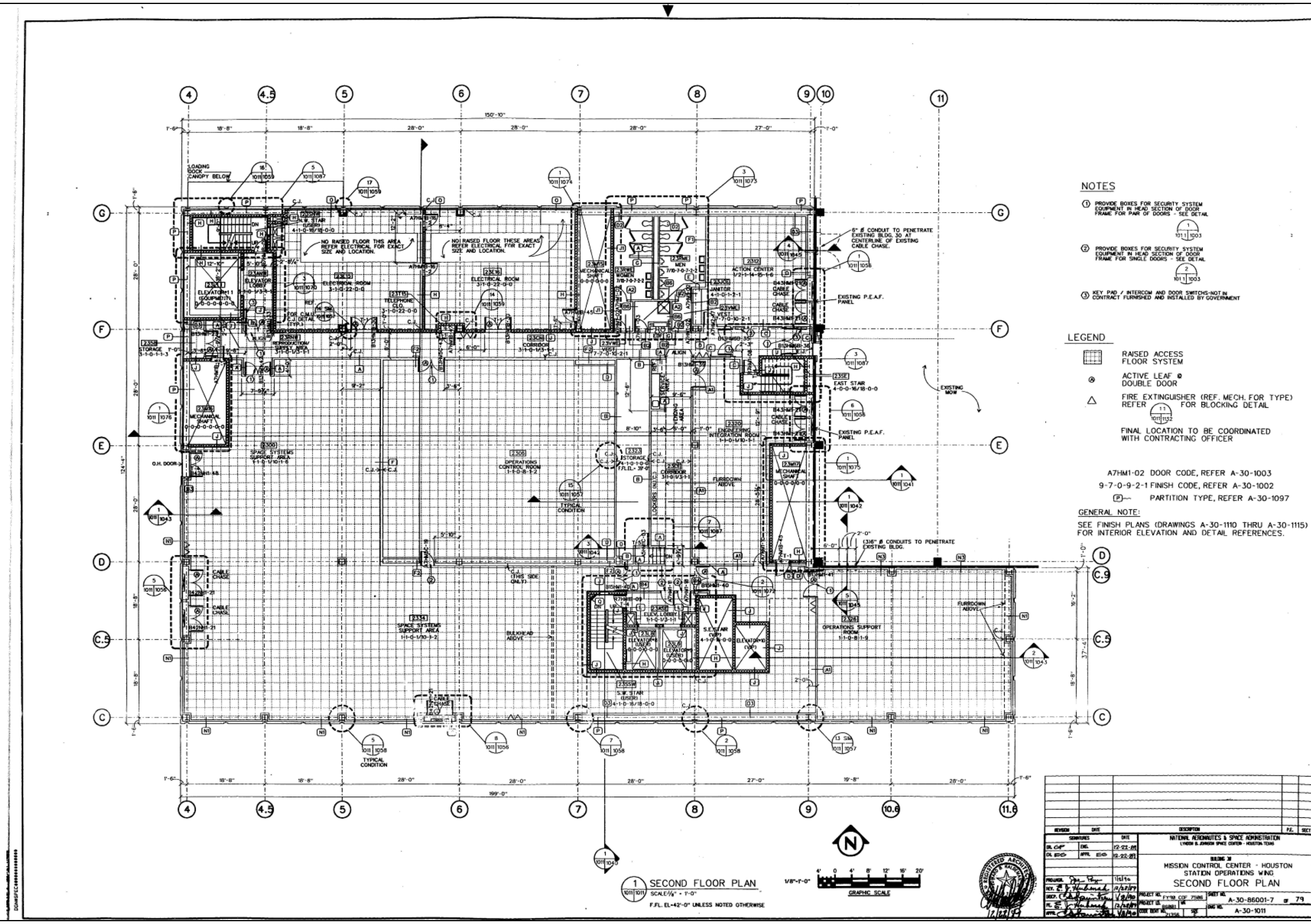
MCC-102


CROSS SECTION
SCALE 1/8" = 1'-0"
LOBBY WING
ADMIN. WING
CORRIDOR
OFFICE
CORR.
LOUNGE
MENS TOILET RM.
MECHANICAL EQUIP. ROOM
ACOUSTICAL SURFACE
LOBBY
CONFERENCE
CERAMIC TILE
FOR DETAIL PLANS OF LOUNGE & TOILET RMS SEE DWG. A-30-45
CROSS SECTION
SCALE 1/8" = 1'-0"
DORMITORY
LUMINOUS CLG.
TOP OF REAR PANEL
3RD FL. LINE
2ND FL. LINE
1ST FL. LINE
UNIVERSAL JOINT IN RELEASE BAR AT WALL BRKT
GLASS IN METAL FRAME
EAST WALL - PROJECTION RM. 1025S
NO SCALE
LEGEND
A..... 35 MM SLIDE & SPOT PORT
B..... 16 MM PROJECTION PORT
C..... OBSERVATION PORT
D..... TV PROJECTOR PORT
SCALE 1/8" = 1'-0"
KAISER ENGINEERS
OAKLAND, CALIFORNIA
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DISTRICT
FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
CLEAR LAKE, HARRIS COUNTY, TEXAS
INTEGRATED MISSION CONTROL CENTER
ADMINISTRATION WING BUILDING NO. 30
CROSS SECTIONS
ARCHITECTURAL
R. SALOMON
H. GILBERT
SCALE 1/8" = 1'-0"
A-30-41
SHEET 49 OF 79
NASA 101-7

MCC-103

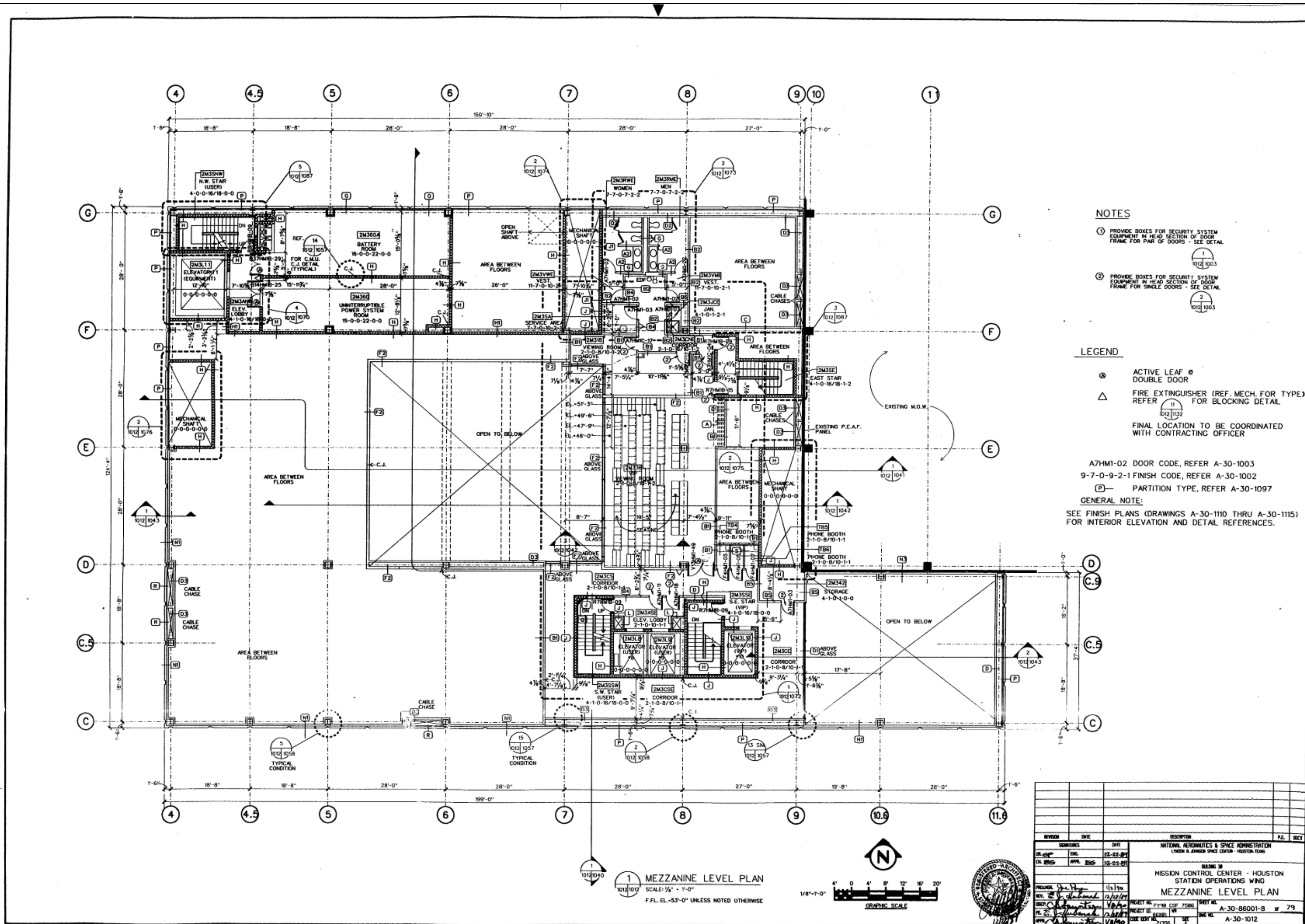

NOTES
1 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL 1 1010 1003
2 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL 2 1010 1003
3 NOT USED THIS SHEET
4 PROVIDE 3/4" CONDUIT IN DOOR FRAME AS REQUIRED FOR SECURITY SYSTEM SEE DETAIL 14 1010 1100
LEGEND
RAISED ACCESS FLOOR SYSTEM
ACTIVE LEAF @ DOUBLE DOOR
FIRE EXTINGUISHER (REF. MECH. FOR TYPE) REFER 11 1010 1132 FOR BLOCKING DETAIL
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
P PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
1 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"
F.F. EL.= 22'-0" UNLESS NOTED OTHERWISE
GRAPHIC SCALE
REVISION
DATE
DESCRIPTION
SIGNATURES
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
FIRST FLOOR PLAN
PROJECT NO. FY90 COF 7506
SHEET NO. A-30-86001-6
DWG NO. A-30-1010
PUBLIC LOBBY
OPERATIONS INTEGRATION AREA
CONFERENCE ROOM
OPERATIONS INTEGRATION ROOM
MECHANICAL / PUMP ROOM
TRANSFORMER ENCLOSURE
U.P.S. AREA
BATTERY ROOM
TELEPHONE ROOM

MCC-104

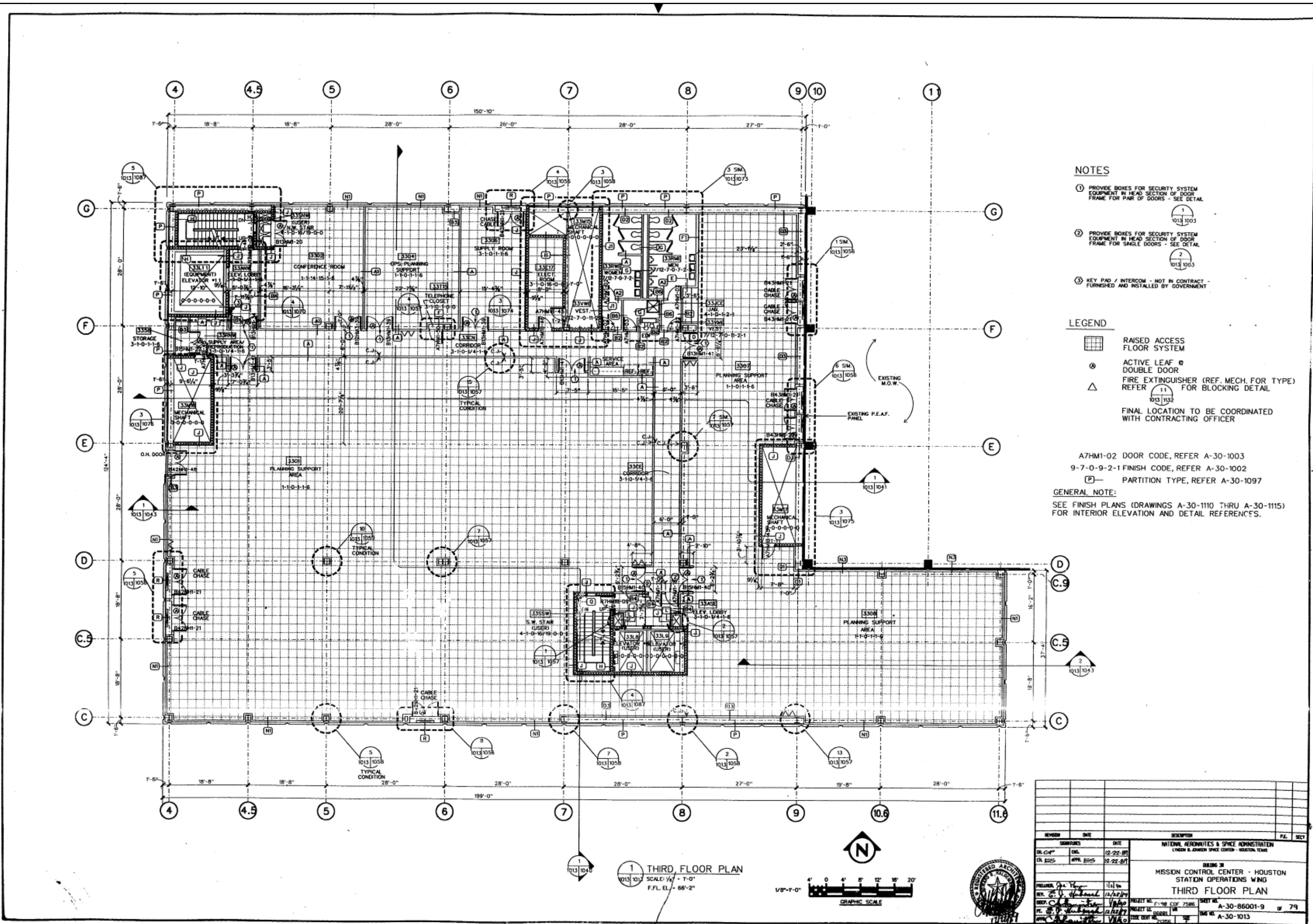


NOTES
1 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL 1 1011 1003
2 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL 2 1011 1003
3 KEY PAD / INTERCOM AND DOOR SWITCHS-NOT IN CONTRACT FURNISHED AND INSTALLED BY GOVERNMENT
LEGEND
RAISED ACCESS FLOOR SYSTEM
ACTIVE LEAF @ DOUBLE DOOR
FIRE EXTINGUISHER (REF. MECH. FOR TYPE) REFER 11 1011 1132 FOR BLOCKING DETAIL
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
P PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
1 SECOND FLOOR PLAN
1011 1011 SCALE 1/8" = 1'-0"
F.FL. EL=42'-0" UNLESS NOTED OTHERWISE
GRAPHIC SCALE
REVISION
DATE
DESCRIPTION
P.E.
SECT
SIGNATURES
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
SECOND FLOOR PLAN
PROJECT NO. FY90 COF 7586
SHEET NO. A-30-86001-7 OF 79
DWG NO. A-30-1011

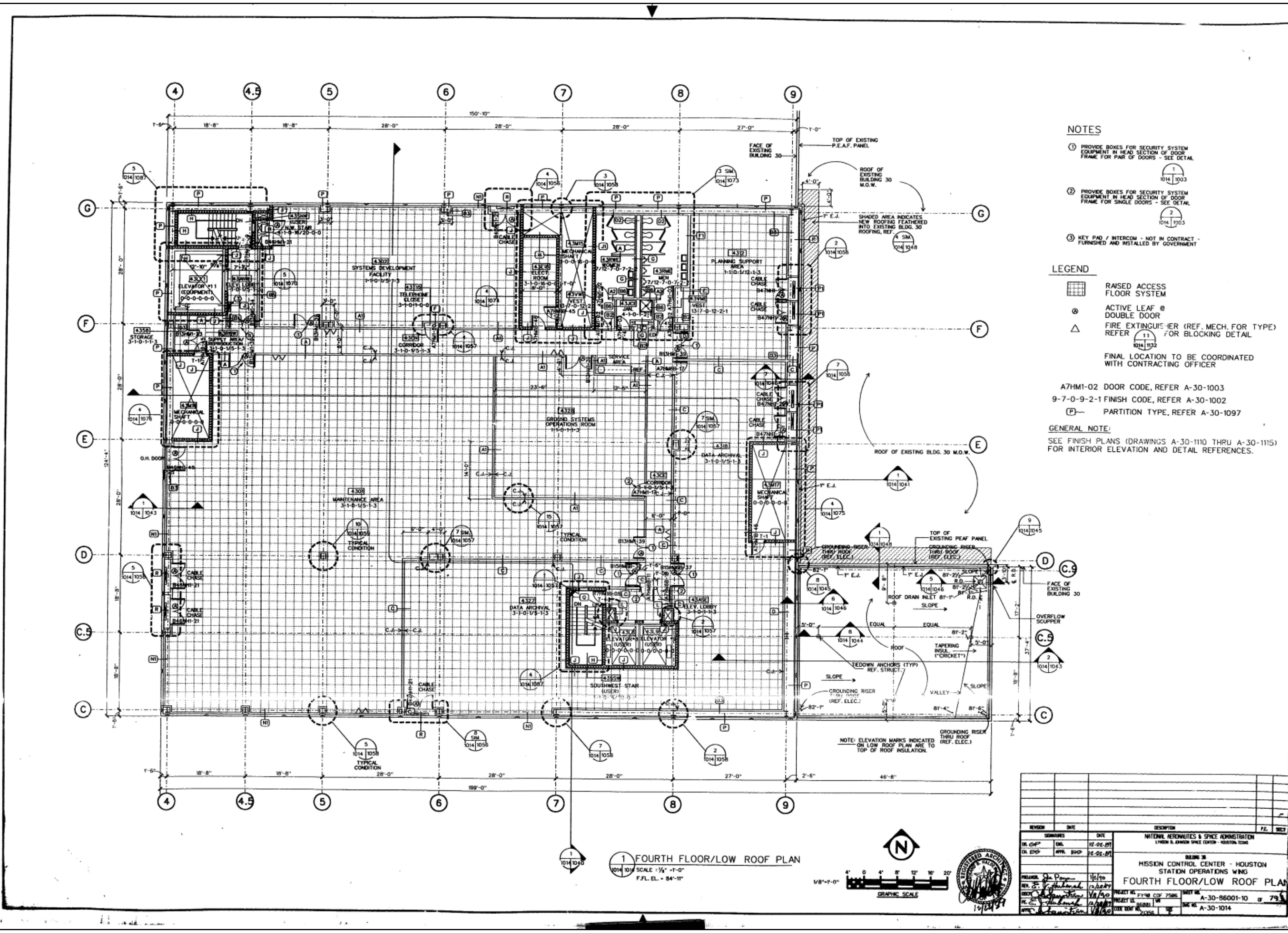
MCC-105


NOTES
① PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL 1 1012 1003
② PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL 2 1012 1003
LEGEND
ACTIVE LEAF @ DOUBLE DOOR
FIRE EXTINGUISHER (REF. MECH. FOR TYPE) REFER 11 1012 1132 FOR BLOCKING DETAIL
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
P PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
OPEN TO BELOW
AREA BETWEEN FLOORS
BATTERY ROOM
UNINTERRUPTIBLE POWER SYSTEM ROOM
MECHANICAL SHAFT
VIEWING ROOM
EAST STAIR
PHONE BOOTH
STORAGE
S.E. STAIR (VIP)
CORRIDOR
S.W. STAIR (USER)
N.W. STAIR (USER)
CABLE CHASE
EXISTING P.E.A.F. PANEL
EXISTING M.O.W.
TYPICAL CONDITION
1 1012 1012 MEZZANINE LEVEL PLAN
SCALE: 1/8" = 1'-0"
F.FL. EL.-53'-0" UNLESS NOTED OTHERWISE
GRAPHIC SCALE
REVISION DATE DESCRIPTION P.E. SECT
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
MEZZANINE LEVEL PLAN
PROJECT NO. FY90 COF 7586
SHEET NO. A-30-86001-8 OF 79
DWG NO. A-30-1012
CODE IDENT NO. 21356

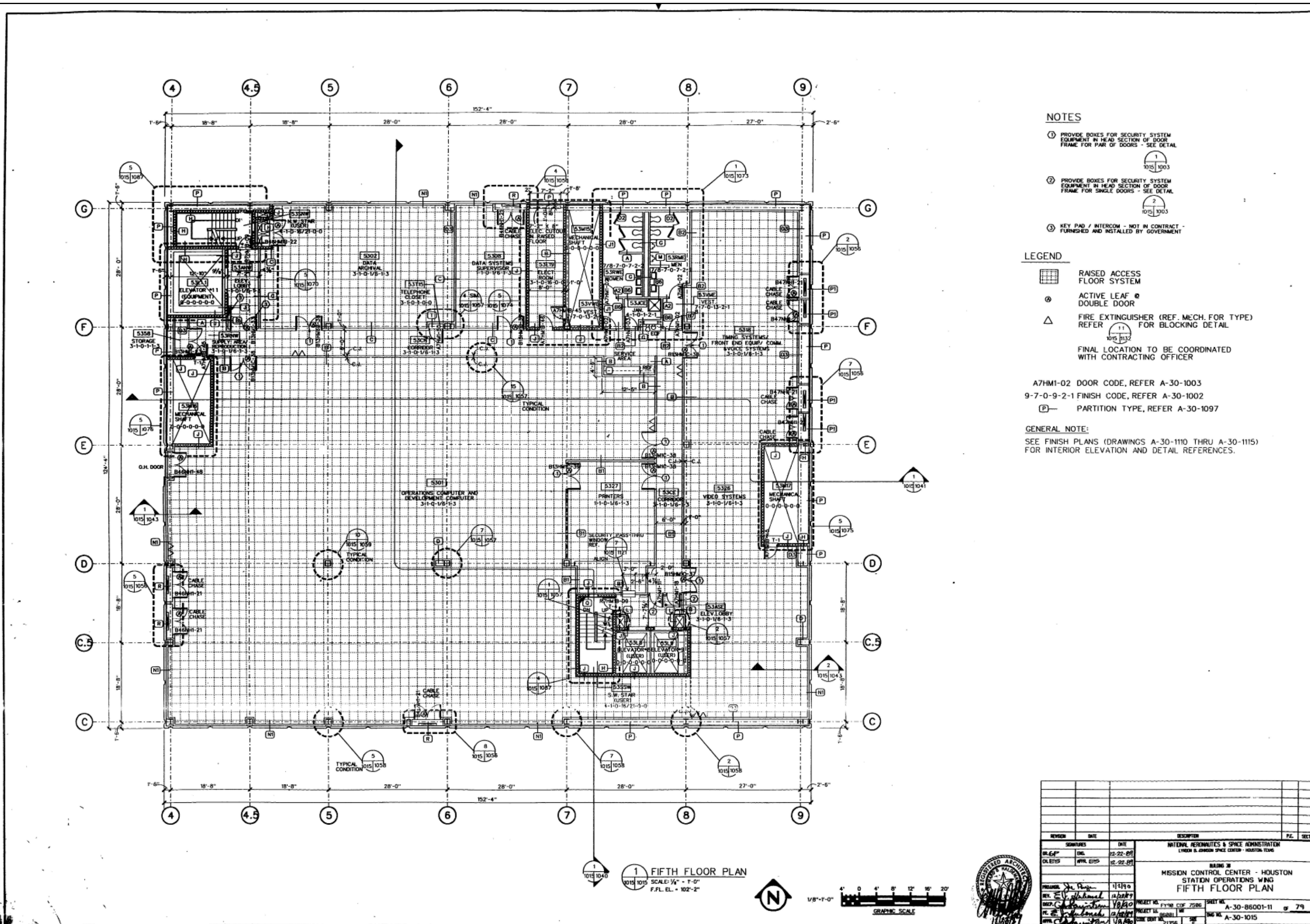
MCC-106


NOTES
1 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL 1 1013 1003
2 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL 2 1013 1003
3 KEY PAD / INTERCOM - NOT IN CONTRACT - FURNISHED AND INSTALLED BY GOVERNMENT
LEGEND
RAISED ACCESS FLOOR SYSTEM
ACTIVE LEAF @ DOUBLE DOOR
FIRE EXTINGUISHER (REF. MECH. FOR TYPE) REFER 11 1013 1132 FOR BLOCKING DETAIL
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
P PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
1 THIRD FLOOR PLAN
SCALE: 1/8" = 1'-0"
F.FL.EL. 66'-2"
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
THIRD FLOOR PLAN
PROJECT NO. FY90 COF 7506
SHEET NO. A-30-86001-9 OF 79
DWG NO. A-30-1013

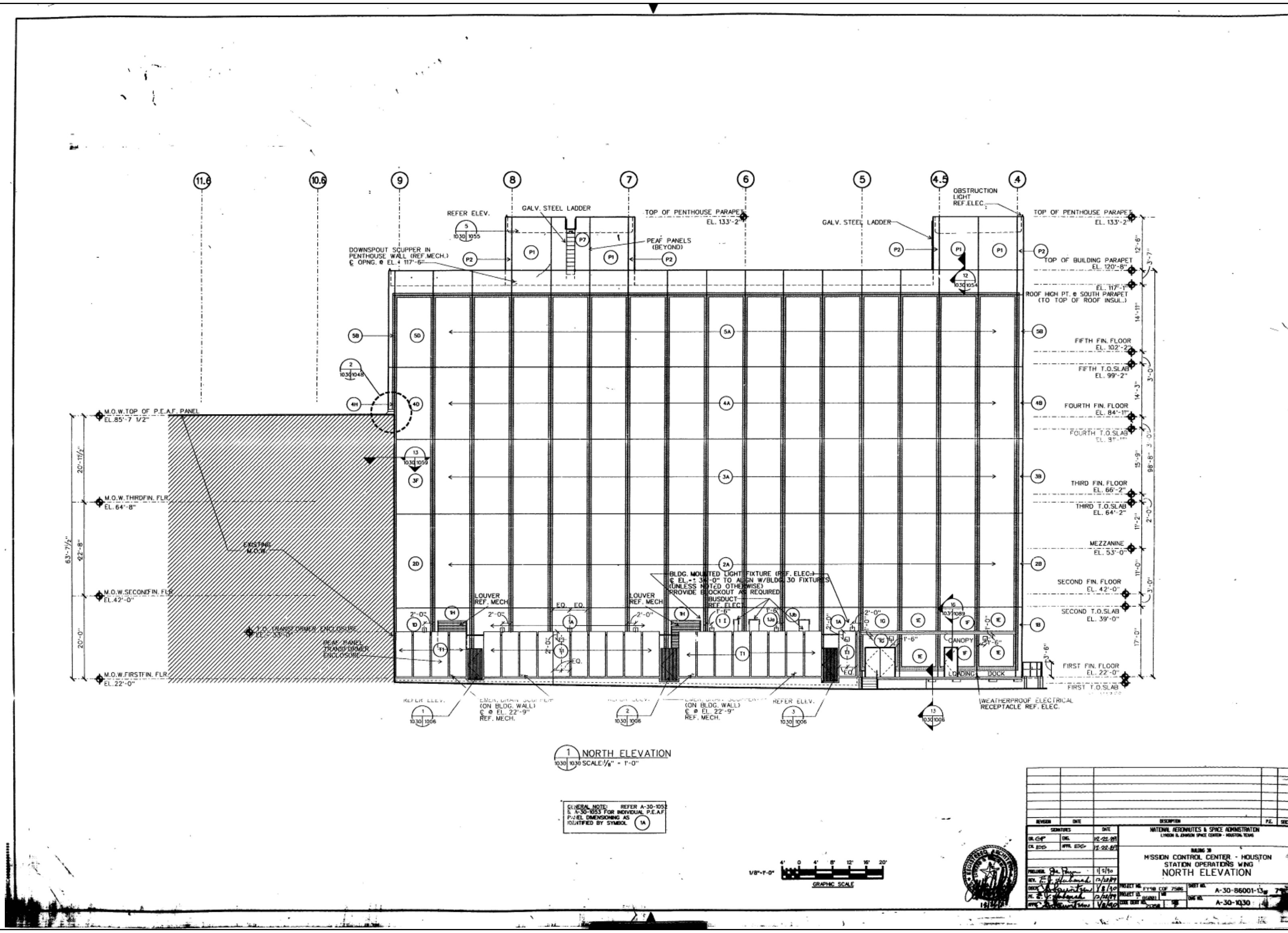
MCC-107


NOTES
① PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL
② PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL
③ KEY PAD / INTERCOM - NOT IN CONTRACT - FURNISHED AND INSTALLED BY GOVERNMENT
LEGEND
RAISED ACCESS FLOOR SYSTEM
ACTIVE LEAF @ DOUBLE DOOR
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
SYSTEMS DEVELOPMENT FACILITY
MAINTENANCE AREA
GROUND SYSTEMS OPERATIONS ROOM
DATA ARCHIVAL
PLANNING SUPPORT AREA
SOUTHWEST STAIR
ELEVATOR
MECHANICAL SHAFT
CABLE CHASE
CORRIDOR
STORAGE
TELEPHONE CLOSET
SHADED AREA INDICATES NEW ROOFING FEATHERED INTO EXISTING BLDG. 30 ROOFING, REF.
ROOF OF EXISTING BLDG. 30 M.O.W.
NOTE: ELEVATION MARKS INDICATED ON LOW ROOF PLAN ARE TO TOP OF ROOF INSULATION.
FOURTH FLOOR/LOW ROOF PLAN
SCALE : 1/8" = 1'-0"
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
FOURTH FLOOR/LOW ROOF PLAN
A-30-86001-10
A-30-1014

MCC-108

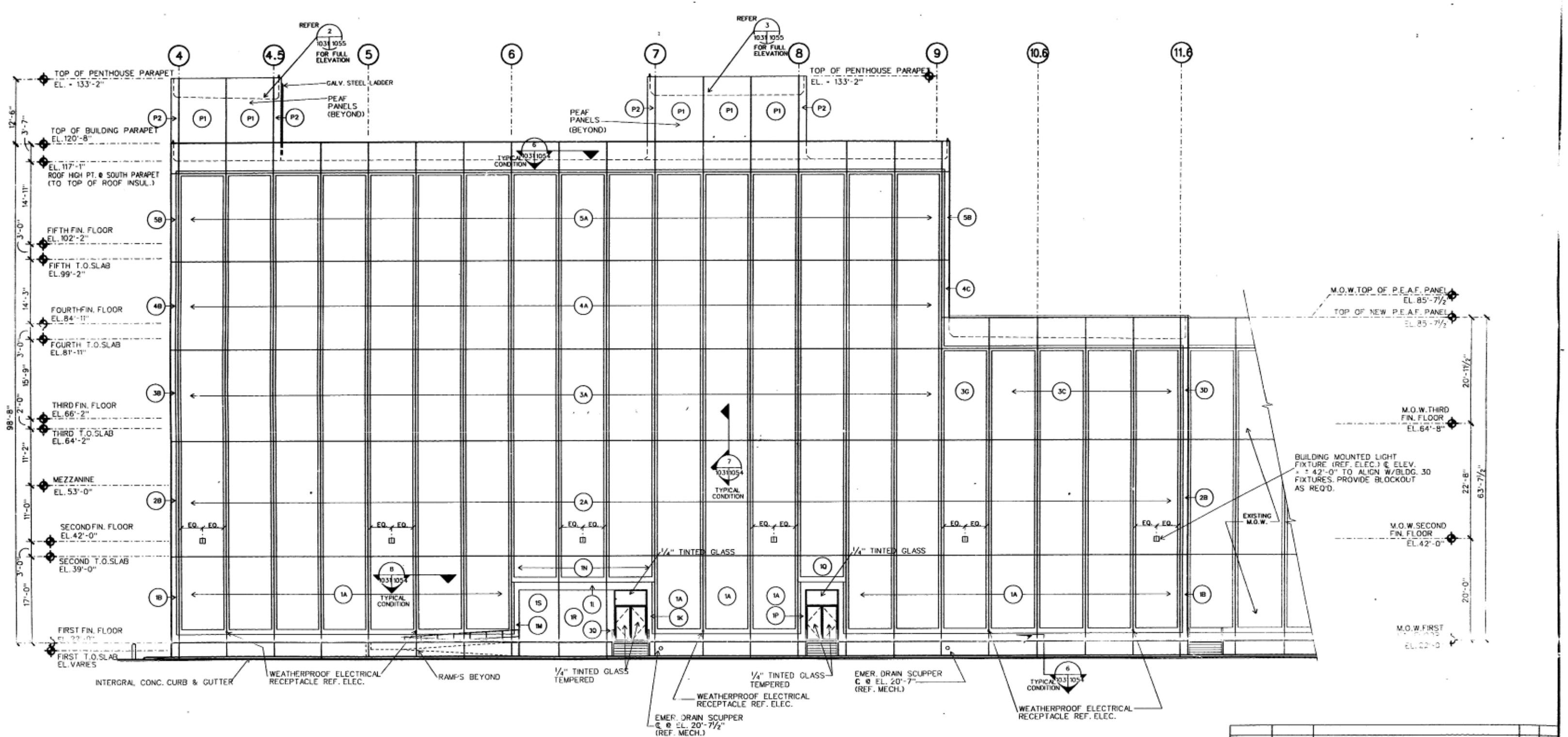

NOTES
1 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR PAIR OF DOORS - SEE DETAIL 1 1015 1003
2 PROVIDE BOXES FOR SECURITY SYSTEM EQUIPMENT IN HEAD SECTION OF DOOR FRAME FOR SINGLE DOORS - SEE DETAIL 2 1015 1003
3 KEY PAD / INTERCOM - NOT IN CONTRACT - FURNISHED AND INSTALLED BY GOVERNMENT
LEGEND
RAISED ACCESS FLOOR SYSTEM
ACTIVE LEAF @ DOUBLE DOOR
FIRE EXTINGUISHER (REF. MECH. FOR TYPE) REFER 11 1015 1132 FOR BLOCKING DETAIL
FINAL LOCATION TO BE COORDINATED WITH CONTRACTING OFFICER
A7HM1-02 DOOR CODE, REFER A-30-1003
9-7-0-9-2-1 FINISH CODE, REFER A-30-1002
P PARTITION TYPE, REFER A-30-1097
GENERAL NOTE:
SEE FINISH PLANS (DRAWINGS A-30-1110 THRU A-30-1115) FOR INTERIOR ELEVATION AND DETAIL REFERENCES.
1 FIFTH FLOOR PLAN
SCALE: 1/8" = 1'-0"
F.FL. EL. = 102'-2"
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
FIFTH FLOOR PLAN
PROJECT NO. FY90 COF 7586
SHEET NO. A-30-86001-11 OF 79
DWG NO. A-30-1015

MCC-109



NORTH ELEVATION
SCALE 1/8" = 1'-0"
TOP OF PENTHOUSE PARAPET EL. 133'-2"
TOP OF BUILDING PARAPET EL. 120'-8"
FIFTH FIN. FLOOR EL. 102'-2"
FOURTH FIN. FLOOR EL. 84'-11"
THIRD FIN. FLOOR EL. 66'-2"
MEZZANINE EL. 53'-0"
SECOND FIN. FLOOR EL. 42'-0"
FIRST FIN. FLOOR EL. 22'-0"
GALV. STEEL LADDER
OBSTRUCTION LIGHT REF. ELEC.
DOWNSPOUT SCUPPER IN PENTHOUSE WALL (REF. MECH.)
PEAF PANELS (BEYOND)
EXISTING M.O.W.
M.O.W. TOP OF P.E.A.F. PANEL EL. 85'-7 1/2"
M.O.W. THIRD FIN. FLR EL. 64'-8"
M.O.W. SECOND FIN. FLR EL. 42'-0"
M.O.W. FIRST FIN. FLR EL. 22'-0"
T.O. TRANSFORMER ENCLOSURE EL. 33'-0"
PEAF PANEL TRANSFORMER ENCLOSURE
LOUVER REF. MECH.
BLDG. MOUNTED LIGHT FIXTURE (REF. ELEC.)
BUSDUCT REF. ELEC.
CANOPY
LOADING DOCK
WEATHERPROOF ELECTRICAL RECEPTACLE REF. ELEC.
GENERAL NOTE: REFER A-30-1052 & A-30-1053 FOR INDIVIDUAL P.E.A.F. PANEL DIMENSIONING AS IDENTIFIED BY SYMBOL
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
NORTH ELEVATION
A-30-86001-13
A-30-1030

MCC-110



1 SOUTH ELEVATION
1031 1031 SCALE: 1/8" = 1'-0"

GENERAL NOTE: REFER A-30-1052 & A-30-1053 FOR INDIVIDUAL P.E.A.F. PANEL DIMENSIONING AS IDENTIFIED BY SYMBOL (1A)

1/8"=1'-0" GRAPHIC SCALE

REVISION	DATE	DESCRIPTION	P.E.	SECT

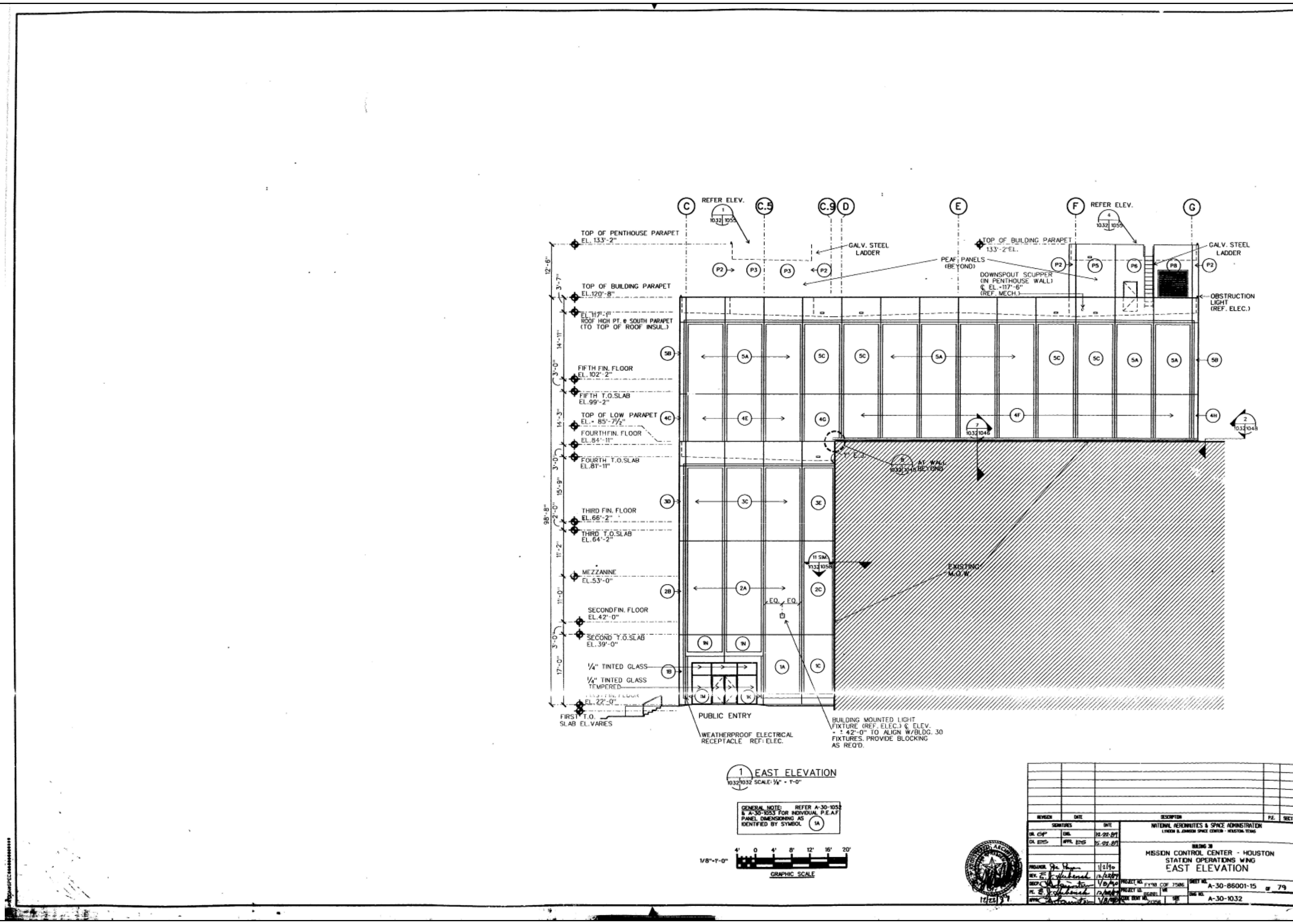
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS

BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
SOUTH ELEVATION

SIGNATURES		DATE
DR. GP	ENG.	12-22-89
CH.	APPR.	12-22-89
PROJ.MGR.		1/8/90
REV.		12/28/89
DISCP.		1/8/90
P.E.		12/28/89
APPR.		1/8/90

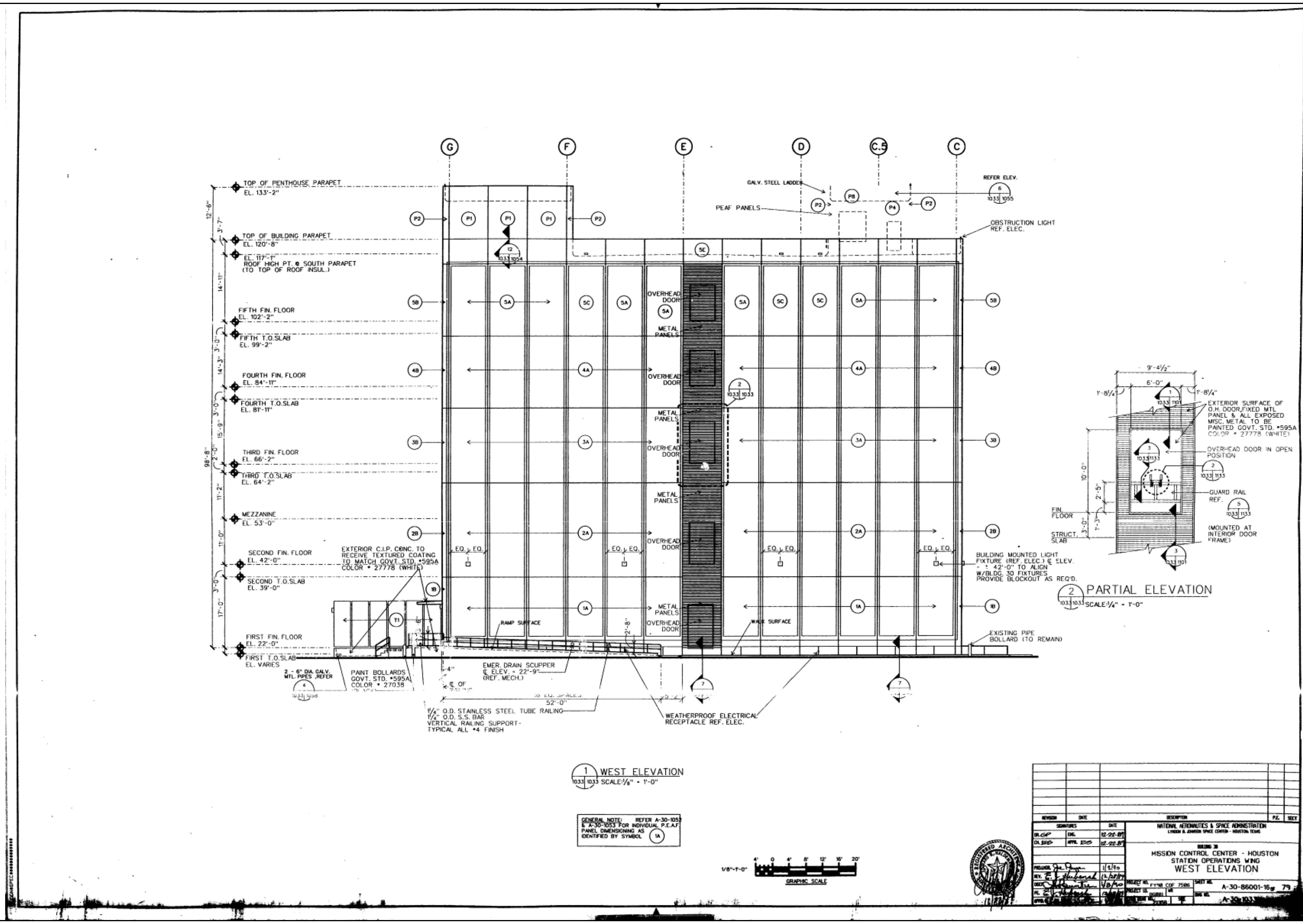
PROJECT NO. FY90 COF 7586
PROJECT I.D. 86001
CODE IDENT NO. 21356 SIZE F
SHEET NO. A-30-86001-14 OF 79
DWG NO. A-30-1031

MCC-111



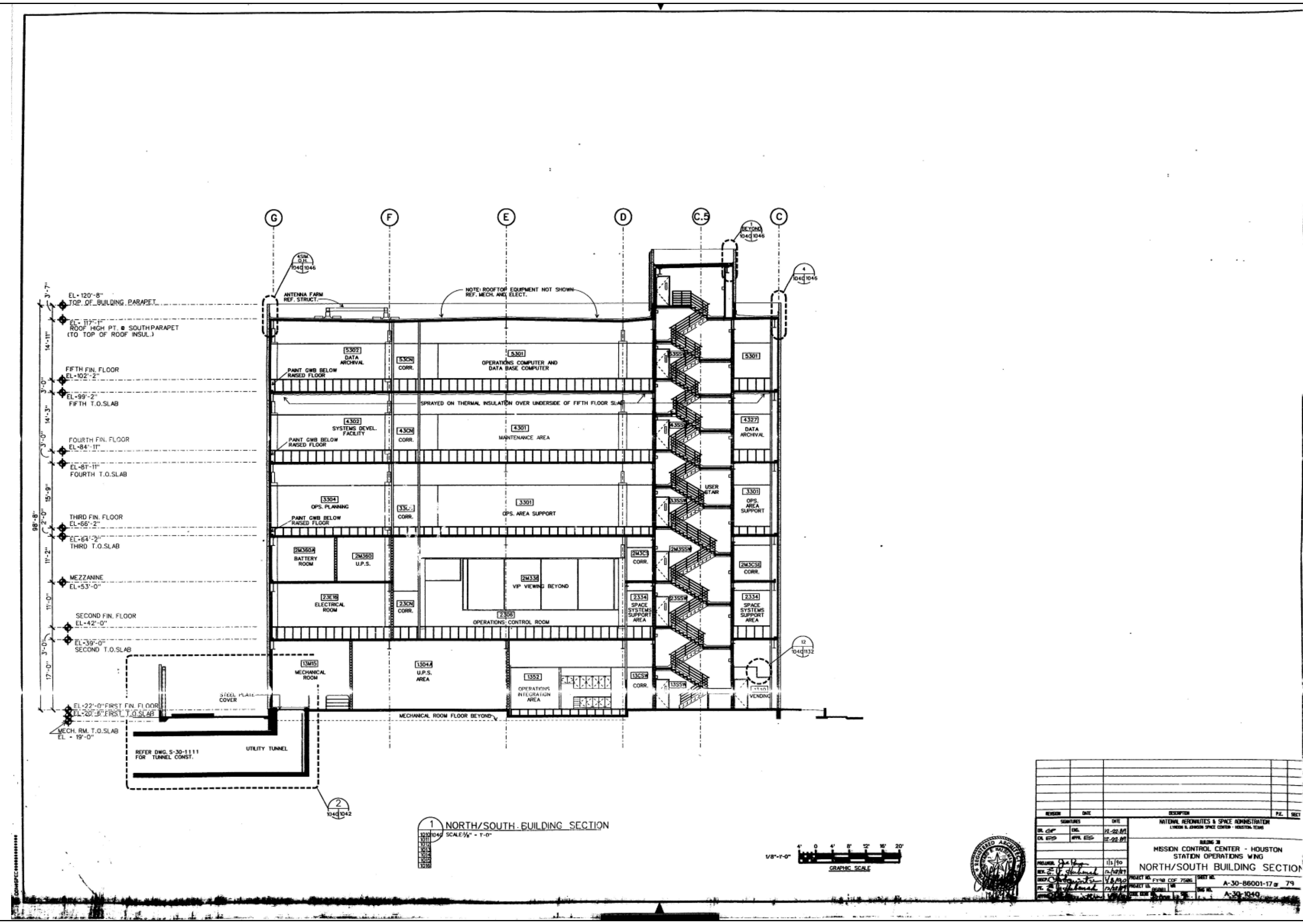
TOP OF PENTHOUSE PARAPET EL.133'-2"
TOP OF BUILDING PARAPET EL.120'-8"
FIFTH FIN. FLOOR EL.102'-2"
FIFTH T.O.SLAB EL.99'-2"
TOP OF LOW PARAPET
FOURTH FIN. FLOOR EL.84'-11"
FOURTH T.O.SLAB EL.81'-11"
THIRD FIN. FLOOR EL.66'-2"
THIRD T.O.SLAB EL.64'-2"
MEZZANINE EL.53'-0"
SECOND FIN. FLOOR EL.42'-0"
SECOND T.O.SLAB EL.39'-0"
1/4" TINTED GLASS
1/4" TINTED GLASS TEMPERED
FIRST T.O. SLAB EL.VARIES
GALV. STEEL LADDER
PEAF PANELS (BEYOND)
DOWNSPOUT SCUPPER (IN PENTHOUSE WALL)
OBSTRUCTION LIGHT (REF. ELEC.)
EXISTING M.O.W.
PUBLIC ENTRY
WEATHERPROOF ELECTRICAL RECEPTACLE REF: ELEC.
BUILDING MOUNTED LIGHT FIXTURE (REF. ELEC.)
FIXTURES. PROVIDE BLOCKING AS REQ'D.
1 EAST ELEVATION
SCALE: 1/8" = 1'-0"
GENERAL NOTE: REFER A-30-1052 & A-30-1053 FOR INDIVIDUAL P.E.A.F. PANEL DIMENSIONING AS IDENTIFIED BY SYMBOL 1A
1/8"=1'-0"
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
EAST ELEVATION
PROJECT NO. FY90 COF 7506
SHEET NO. A-30-86001-15 OF 79
DWG NO. A-30-1032

MCC-112

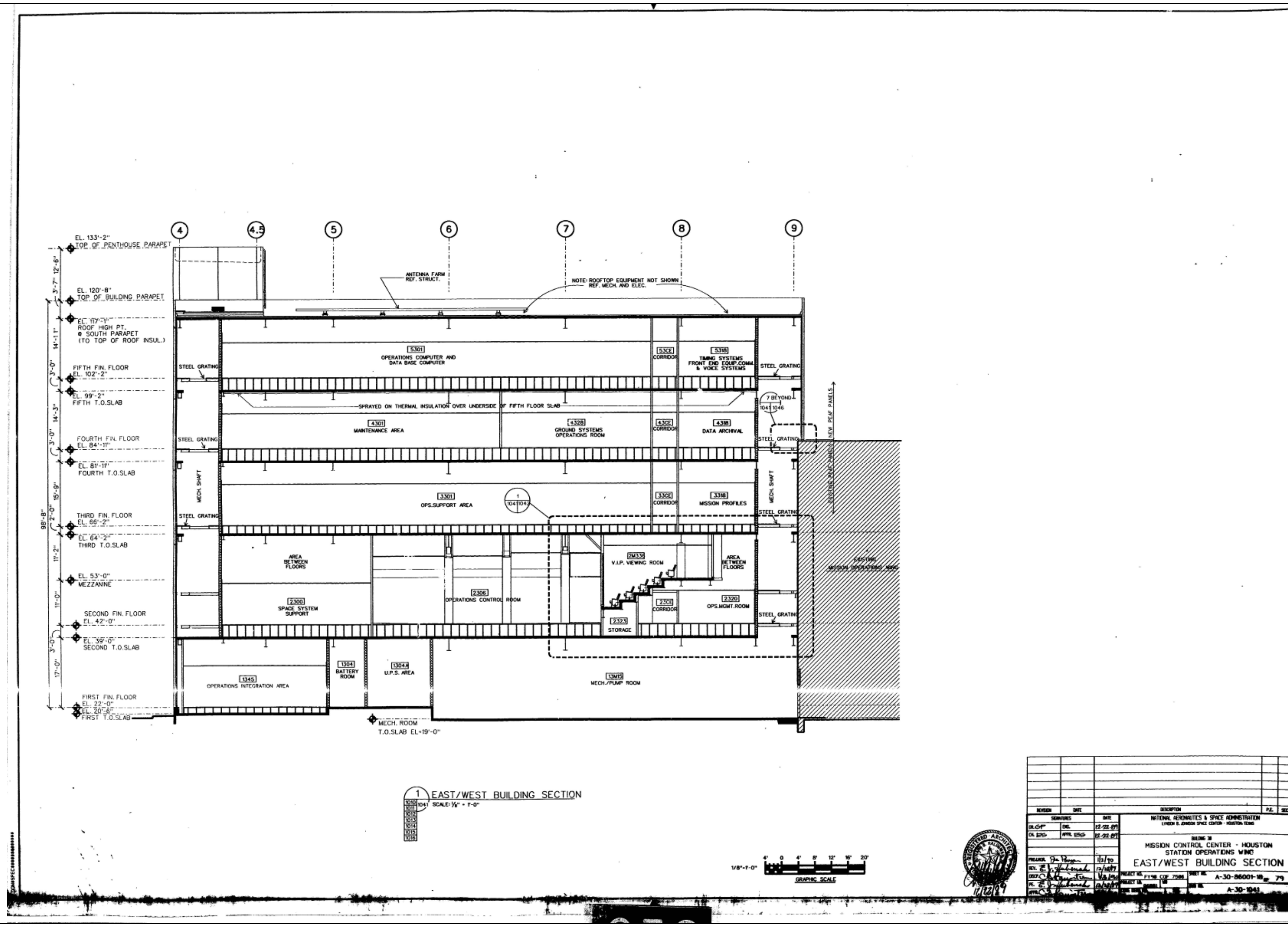


TOP OF PENTHOUSE PARAPET EL. 133'-2"
TOP OF BUILDING PARAPET EL. 120'-8"
EL. 117'-1" ROOF HIGH PT. @ SOUTH PARAPET (TO TOP OF ROOF INSUL.)
FIFTH FIN. FLOOR EL. 102'-2"
FIFTH T.O.SLAB EL. 99'-2"
FOURTH FIN. FLOOR EL. 84'-11"
FOURTH T.O.SLAB EL. 81'-11"
THIRD FIN. FLOOR EL. 66'-2"
THIRD T.O.SLAB EL. 64'-2"
MEZZANINE EL. 53'-0"
SECOND FIN. FLOOR EL. 42'-0"
SECOND T.O.SLAB EL. 39'-0"
FIRST FIN. FLOOR EL. 22'-0"
FIRST T.O.SLAB EL. VARIES
GALV. STEEL LADDER
PEAF PANELS
REFER ELEV.
OBSTRUCTION LIGHT REF. ELEC.
OVERHEAD DOOR
METAL PANELS
EXTERIOR C.I.P. CONC. TO RECEIVE TEXTURED COATING TO MATCH GOVT. STD. #595A COLOR # 27778 (WHITE)
BUILDING MOUNTED LIGHT FIXTURE (REF. ELEC.) ℄ ELEV. = ± 42'-0" TO ALIGN W/BLDG. 30 FIXTURES PROVIDE BLOCKOUT AS REQ'D.
RAMP SURFACE
WALK SURFACE
EXISTING PIPE BOLLARD (TO REMAIN)
2 - 6" DIA GALV. MTL. PIPES, REFER
PAINT BOLLARDS GOVT. STD. #595A COLOR # 27038
EMER. DRAIN SCUPPER ℄ ELEV. = 22'-9" (REF. MECH.)
52'-0"
1 5/8" O.D. STAINLESS STEEL TUBE RAILING
1 1/4" O.D. S.S. BAR VERTICAL RAILING SUPPORT- TYPICAL ALL #4 FINISH
WEATHERPROOF ELECTRICAL RECEPTACLE REF. ELEC.
1 WEST ELEVATION 1033 1033 SCALE: 1/8" = 1'-0"
EXTERIOR SURFACE OF O.H. DOOR, FIXED MTL PANEL & ALL EXPOSED MISC. METAL TO BE PAINTED GOVT. STD. #595A COLOR # 27778 (WHITE)
OVERHEAD DOOR IN OPEN POSITION
GUARD RAIL REF.
(MOUNTED AT INTERIOR DOOR FRAME)
FIN. FLOOR
STRUCT. SLAB
2 PARTIAL ELEVATION 1033 1033 SCALE: 3/4" = 1'-0"
GENERAL NOTE: REFER A-30-1053 & A-30-1053 FOR INDIVIDUAL P.E.A.F. PANEL DIMENSIONING AS IDENTIFIED BY SYMBOL (1A)
1/8" = 1'-0" GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER - HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
WEST ELEVATION
A-30-86001-16

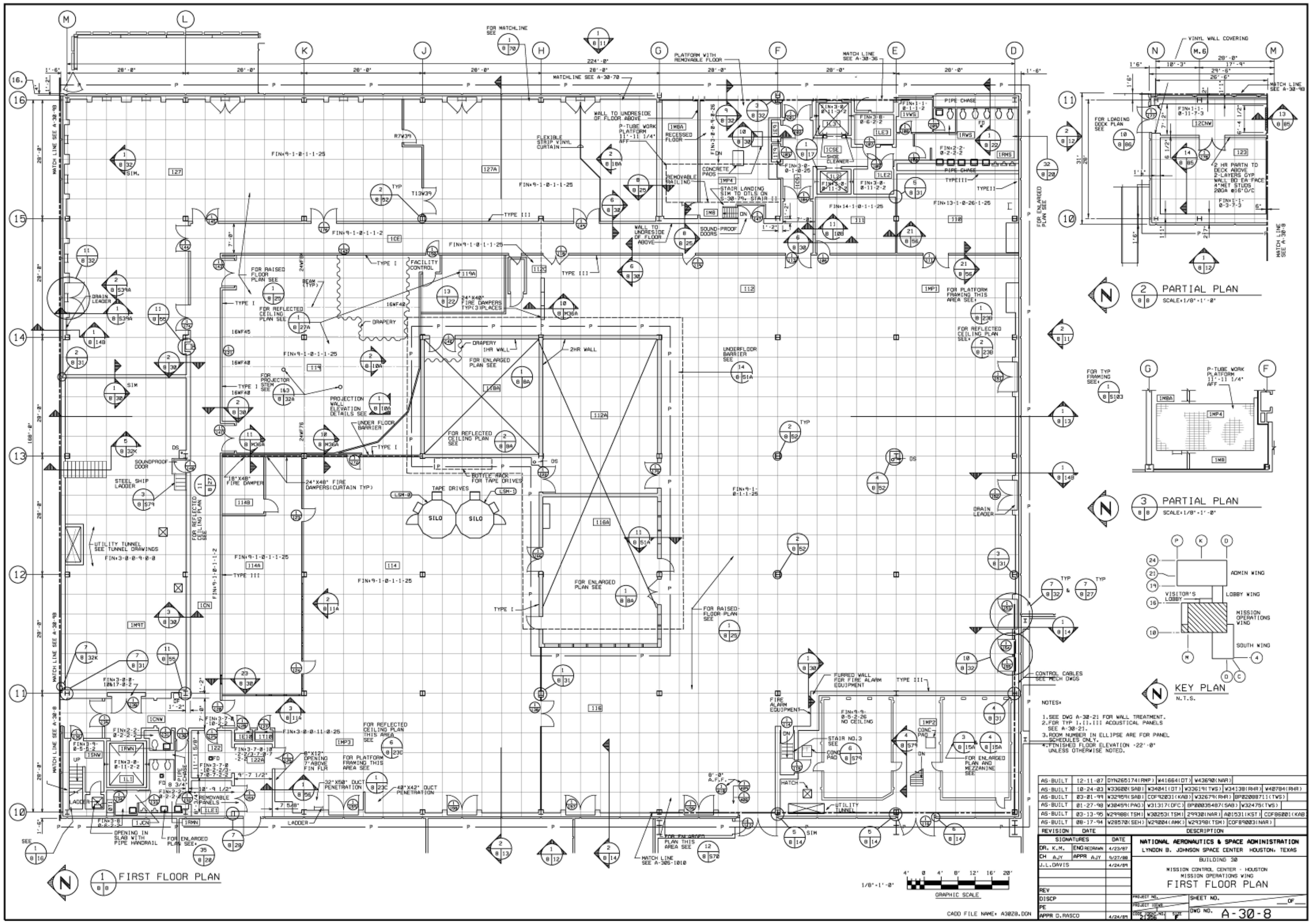
MCC-113


NORTH/SOUTH BUILDING SECTION
SCALE 1/8" = 1'-0"
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
NORTH/SOUTH BUILDING SECTION
A-30-86001-17
A-30-1040

MCC-114

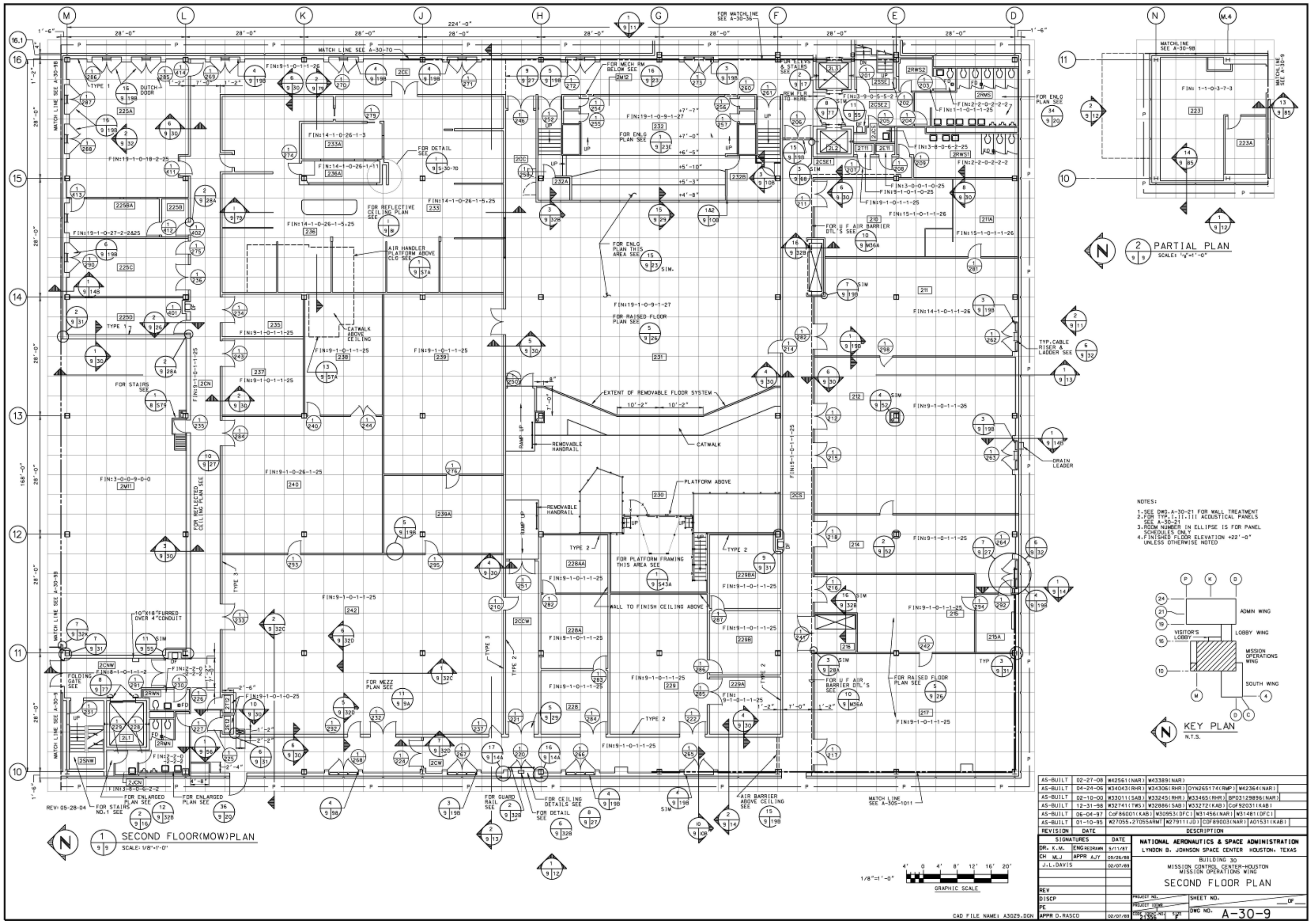

EAST/WEST BUILDING SECTION
SCALE: 1/8" = 1'-0"
OPERATIONS COMPUTER AND DATA BASE COMPUTER
MAINTENANCE AREA
GROUND SYSTEMS OPERATIONS ROOM
DATA ARCHIVAL
OPS.SUPPORT AREA
MISSION PROFILES
V.I.P. VIEWING ROOM
SPACE SYSTEM SUPPORT
OPERATIONS CONTROL ROOM
OPS.MGMT.ROOM
OPERATIONS INTEGRATION AREA
BATTERY ROOM
U.P.S. AREA
MECH./PUMP ROOM
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
EAST/WEST BUILDING SECTION
A-30-1041

MCC-115

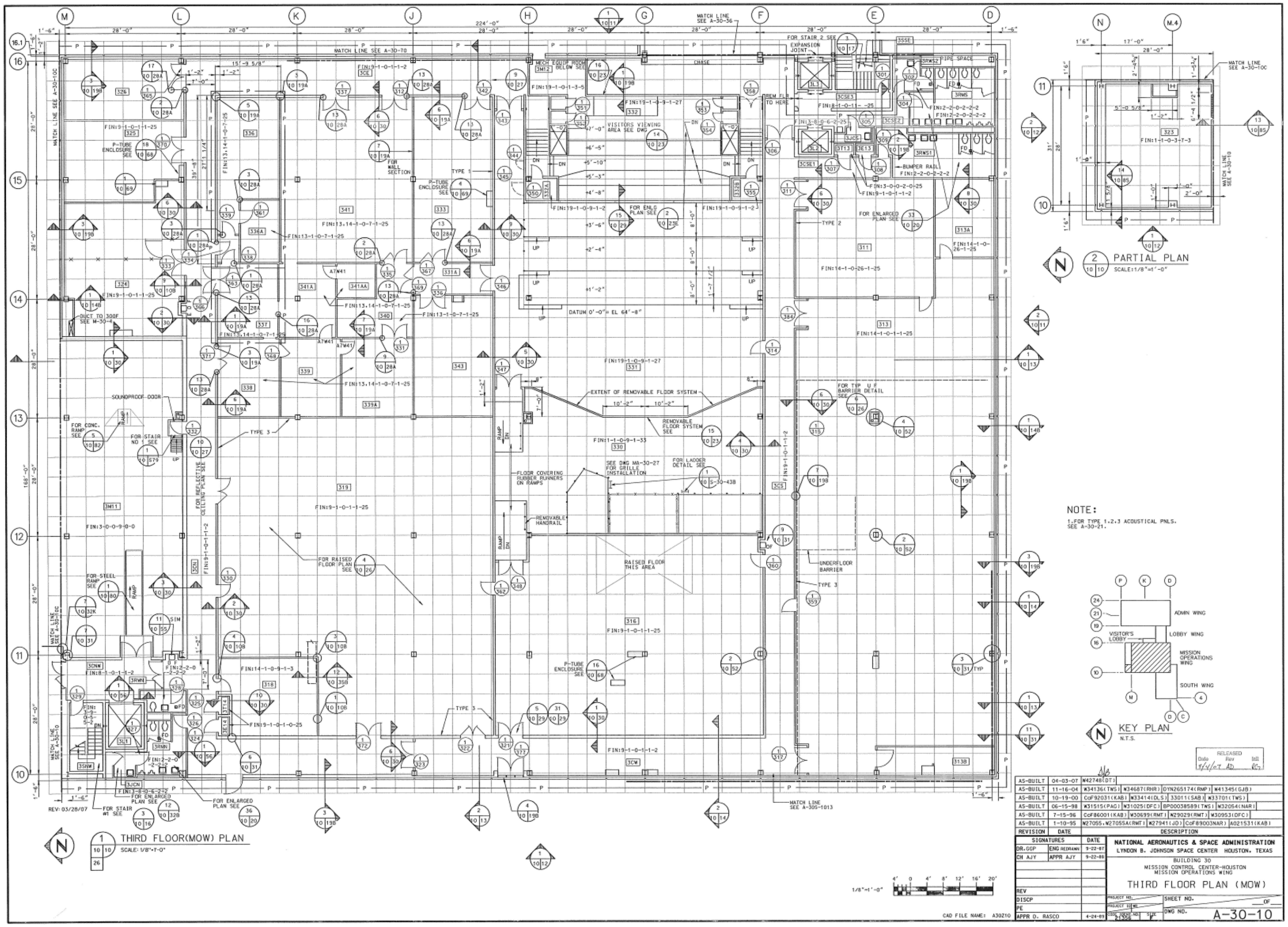


NOTES:
1. SEE DWG A-30-21 FOR WALL TREATMENT.
2. FOR TYP I,II,III ACOUSTICAL PANELS SEE A-30-21.
3. ROOM NUMBER IN ELLIPSE ARE FOR PANEL SCHEDULES ONLY.
4. FINISHED FLOOR ELEVATION -22'-0" UNLESS OTHERWISE NOTED.
FIRST FLOOR PLAN
PARTIAL PLAN
KEY PLAN
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
MISSION OPERATIONS WING
FIRST FLOOR PLAN
DWG NO. A-30-8
CADD FILE NAME: A3020.DGN

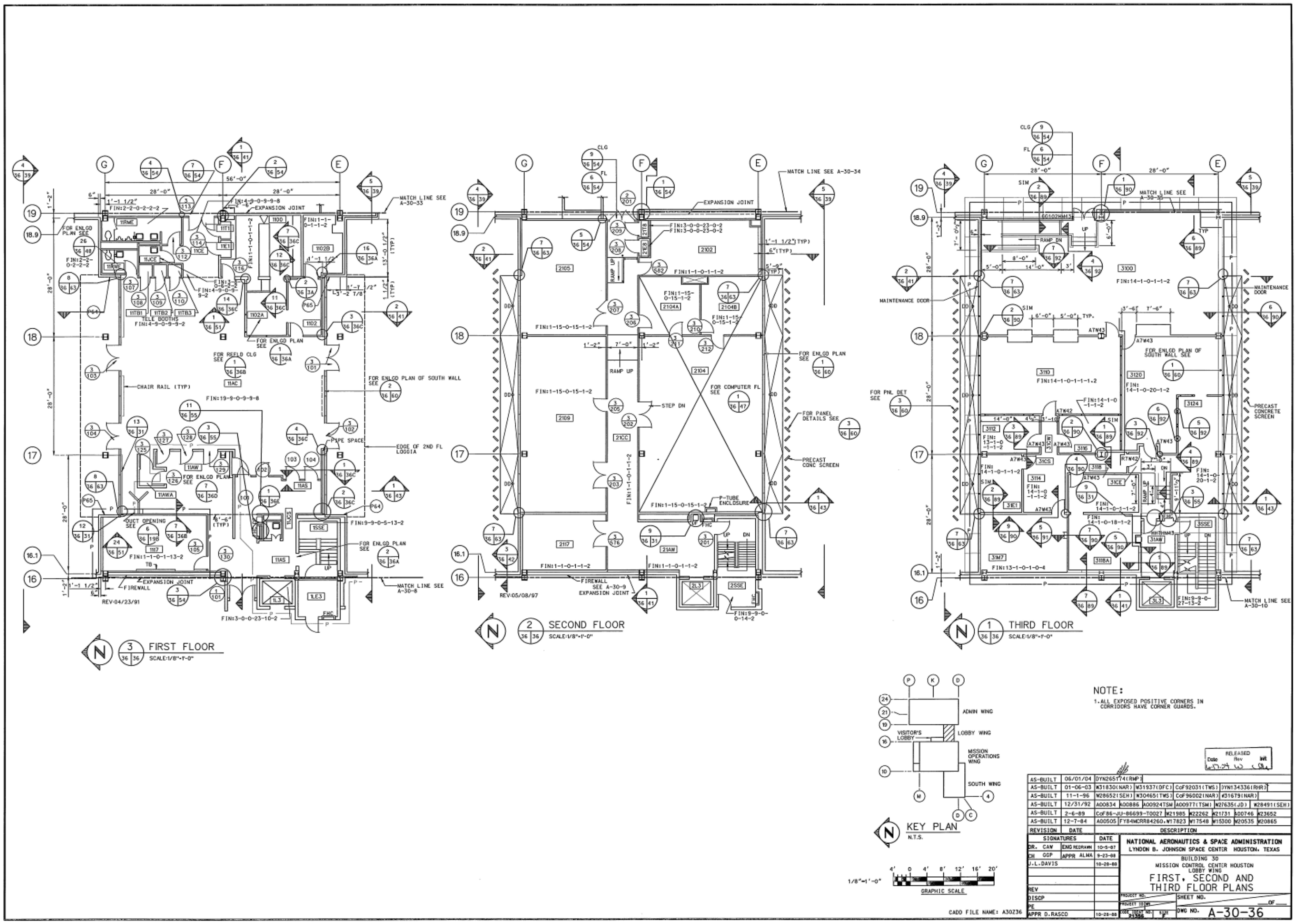
MCC-116


SECOND FLOOR(MOW)PLAN
PARTIAL PLAN
KEY PLAN
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER-HOUSTON
MISSION OPERATIONS WING
SECOND FLOOR PLAN
A-30-9

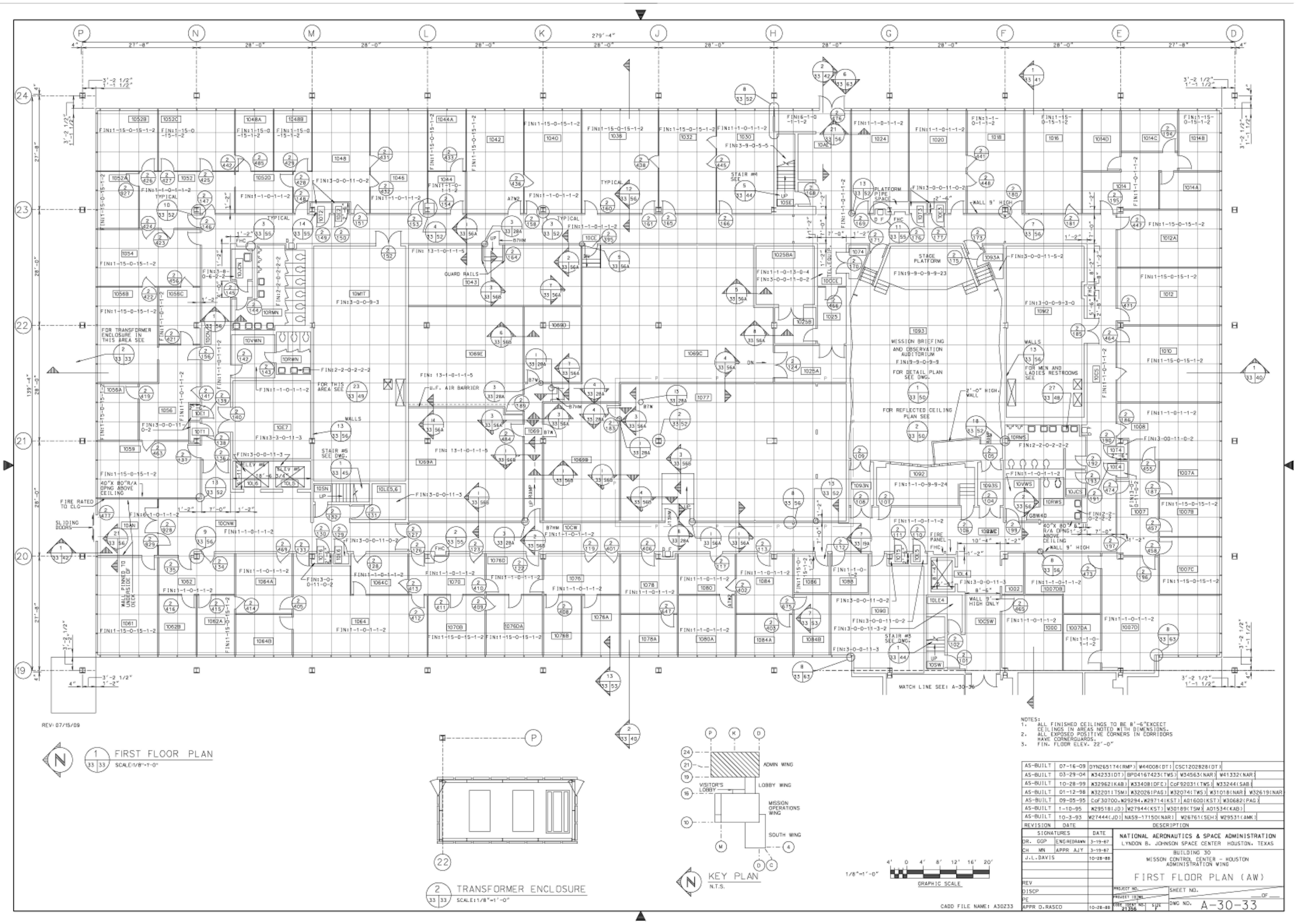
MCC-117


THIRD FLOOR(MOW) PLAN
SCALE: 1/8"=1'-0"
PARTIAL PLAN
SCALE:1/8"=1'-0"
KEY PLAN
N.T.S.
NOTE:
1.FOR TYPE 1,2,3 ACOUSTICAL PNLS. SEE A-30-21.
ADMIN WING
LOBBY WING
VISITOR'S LOBBY
MISSION OPERATIONS WING
SOUTH WING
AS-BUILT 04-03-07 W42748(DT)
AS-BUILT 11-16-04 W34136(TWS) W34687(RHR) DYN265174(RMP) W41345(GJB)
AS-BUILT 10-19-00 CoF92031(KAB) W33414(DLS) 33011(SAB) W33701(TWS)
AS-BUILT 06-15-98 W31515(PAG) W31025(DFC) BP00038589(TWS) W32054(NAR)
AS-BUILT 7-15-96 CoF86001(KAB) W30699(RMT) W29029(RMT) W30953(DFC)
AS-BUILT 1-10-95 W27055,W27055A(RMT) W27941(JD) CoF89003NAR) A021531(KAB)
REVISION DATE DESCRIPTION
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER-HOUSTON
MISSION OPERATIONS WING
THIRD FLOOR PLAN (MOW)
DWG NO. A-30-10
CAD FILE NAME: A30210
APPR D. RASCO 4-24-89

MCC-118

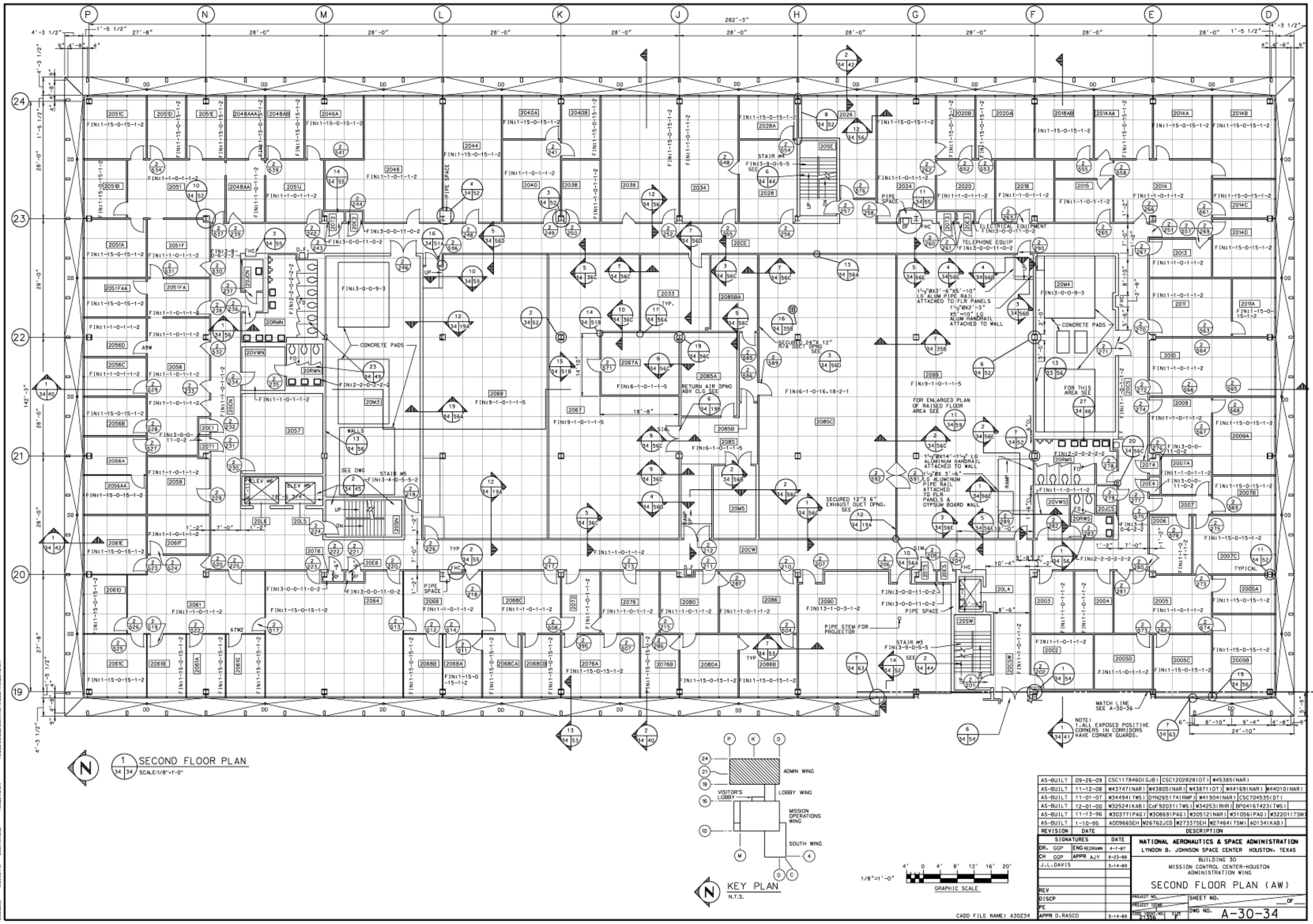

FIRST FLOOR
SCALE:1/8"=1'-0"
SECOND FLOOR
SCALE:1/8"=1'-0"
THIRD FLOOR
SCALE:1/8"=1'-0"
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
VISITOR'S LOBBY
MISSION OPERATIONS WING
SOUTH WING
NOTE:
1. ALL EXPOSED POSITIVE CORNERS IN CORRIDORS HAVE CORNER GUARDS.
GRAPHIC SCALE
CADD FILE NAME: A30Z36
AS-BUILT 06/01/04 DYN265174(RMP)
AS-BUILT 01-06-03 W31830(NAR) W31937(DFC) CoF92031(TWS) DYN134336(RHR)
AS-BUILT 11-1-96 W28652(SEH) W30465(TWS) CoF96002(NAR) W31679(NAR)
AS-BUILT 12/31/92 A00834 A00886 A00924TSM A00977(TSM) W27635(JD) W28491(SEH)
AS-BUILT 2-6-89 CoF86-JU-86699-T0027 W21985 W22262 W21731 A00746 W23652
AS-BUILT 12-7-84 A00505 FY84MCRR84260.W17823 W17548 W15300 W20535 W20865
REVISION DATE DESCRIPTION
SIGNATURES DATE
DR. CAW ENG REDRAWN 10-5-87
CH GGP APPR ALMA 9-23-88
J.L.DAVIS 10-28-88
REV
DISCP
PE
APPR D.RASCO 10-28-88
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER HOUSTON
LOBBY WING
FIRST, SECOND AND THIRD FLOOR PLANS
SHEET NO.
DWG NO. A-30-36

MCC-119

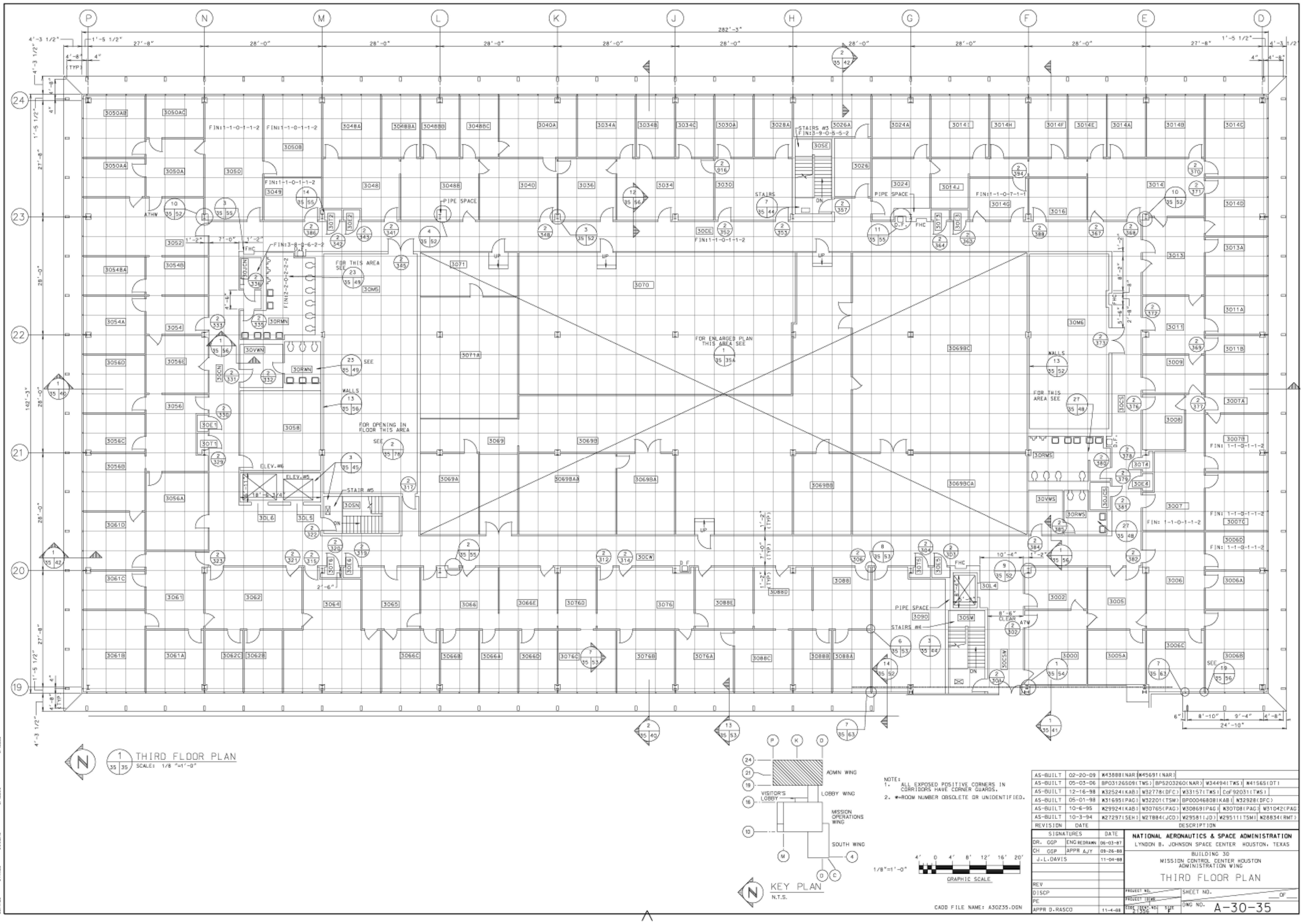


FIRST FLOOR PLAN
SCALE:1/8"=1'-0"
TRANSFORMER ENCLOSURE
SCALE:1/8"=1'-0"
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
VISITOR'S LOBBY
MISSION OPERATIONS WING
SOUTH WING
GRAPHIC SCALE
REV: 07/15/09
MATCH LINE SEE: A-30-34
NOTES:
1. ALL FINISHED CEILINGS TO BE 8'-6" EXCECT CEILINGS IN AREAS NOTED WITH DIMENSIONS.
2. ALL EXPOSED POSITIVE CORNERS IN CORRIDORS HAVE CORNERGUARDS.
3. FIN. FLOOR ELEV. 22'-0"
AS-BUILT 07-16-09 DYN265174(RMP) W44008(DT) CSC1202828(DT)
AS-BUILT 03-29-04 W34233(DT) BP04167423(TWS) W34563(NAR) W41332(NAR)
AS-BUILT 10-28-99 W32962(KAB) W33408(DFC) CoF92031(TWS) W33244(SAB)
AS-BUILT 01-12-98 W32201(TSM) W32026(PAG) W32074(TWS) W31018(NAR) W32619(NAR)
AS-BUILT 09-05-95 CoF30700,W29294,W29714(KST) A01600(KST) W30682(PAG)
AS-BUILT 1-10-95 W29518(JD) W27944(KST) W30189(TSM) A01534(KAB)
AS-BUILT 10-3-93 W27444(JD) NAS9-17150(NAR) W26761(SEH) W29531(AMK)
REVISION DATE DESCRIPTION
SIGNATURES DATE
DR. GGP ENG REDRAWN 3-19-87
CH MN APPR AJY 3-19-87
J.L.DAVIS 10-28-88
REV
DISCP
PE
APPR D.RASCO 10-28-88
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSON CONTROL CENTER - HOUSTON
ADMINISTRATION WING
FIRST FLOOR PLAN (AW)
CODE IDENT NO. 21356
SIZE F
DWG NO. A-30-33
CADD FILE NAME: A30233

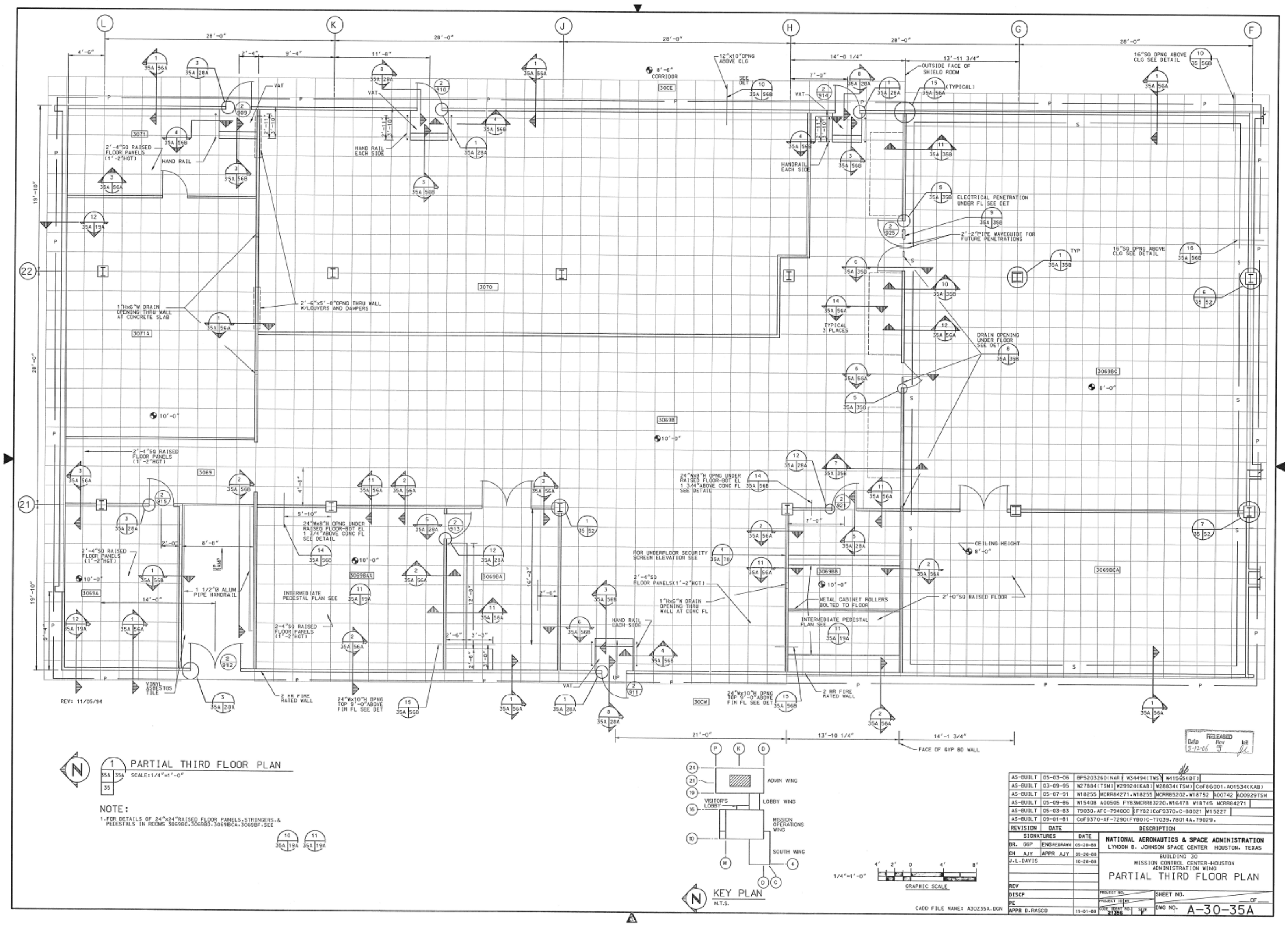
MCC-120


SECOND FLOOR PLAN
SCALE:1/8"=1'-0"
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
MISSION OPERATIONS WING
SOUTH WING
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER-HOUSTON
ADMINISTRATION WING
SECOND FLOOR PLAN (AW)
A-30-34
CADD FILE NAME: A30Z34

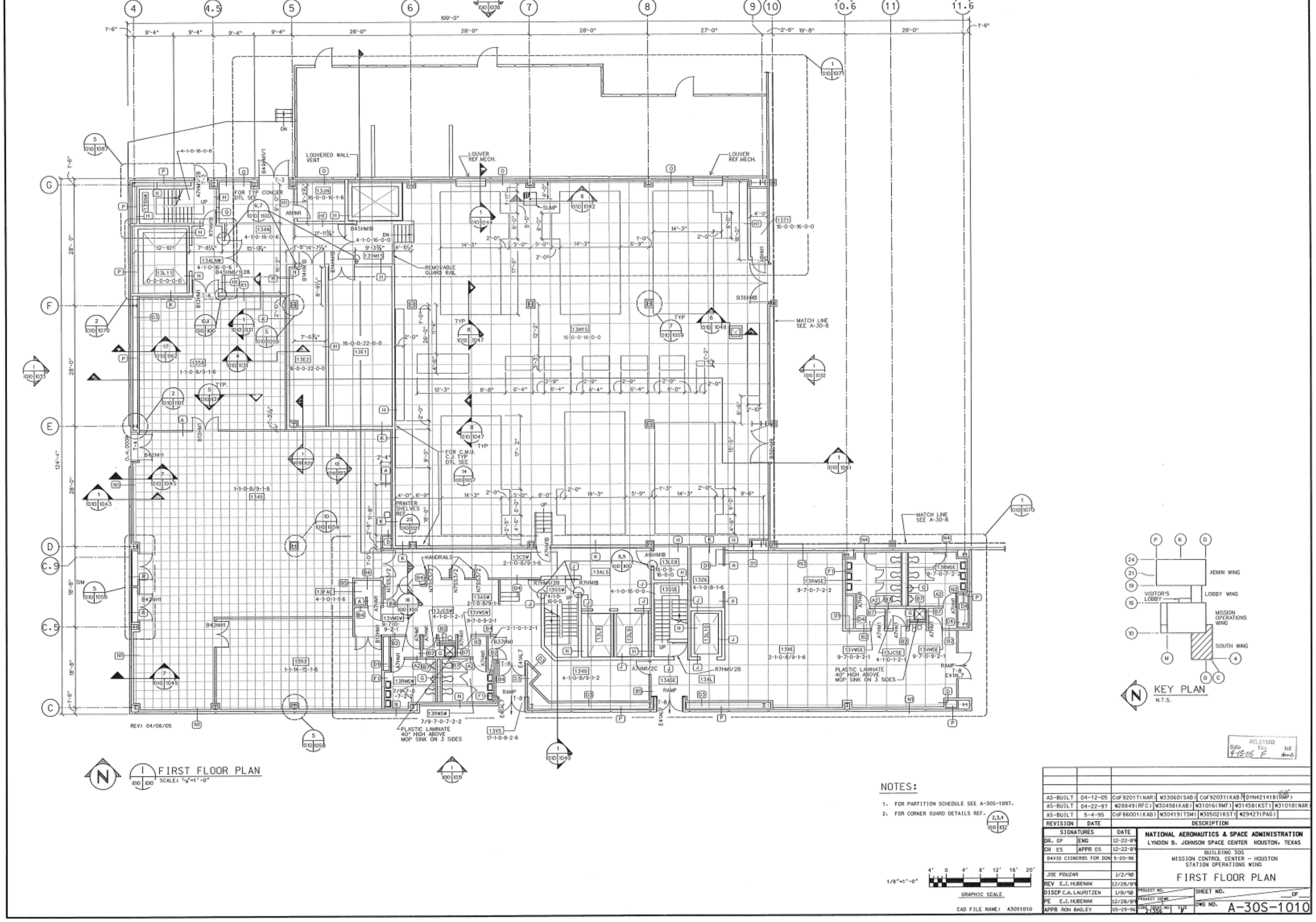
MCC-121


THIRD FLOOR PLAN
SCALE: 1/8 "=1'-0"
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
VISITOR'S LOBBY
MISSION OPERATIONS WING
SOUTH WING
NOTE:
1. ALL EXPOSED POSITIVE CORNERS IN CORRIDORS HAVE CORNER GUARDS.
2. *=ROOM NUMBER OBSOLETE OR UNIDENTIFIED.
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER HOUSTON
ADMINISTRATION WING
THIRD FLOOR PLAN
A-30-35
CADD FILE NAME: A30Z35.DGN

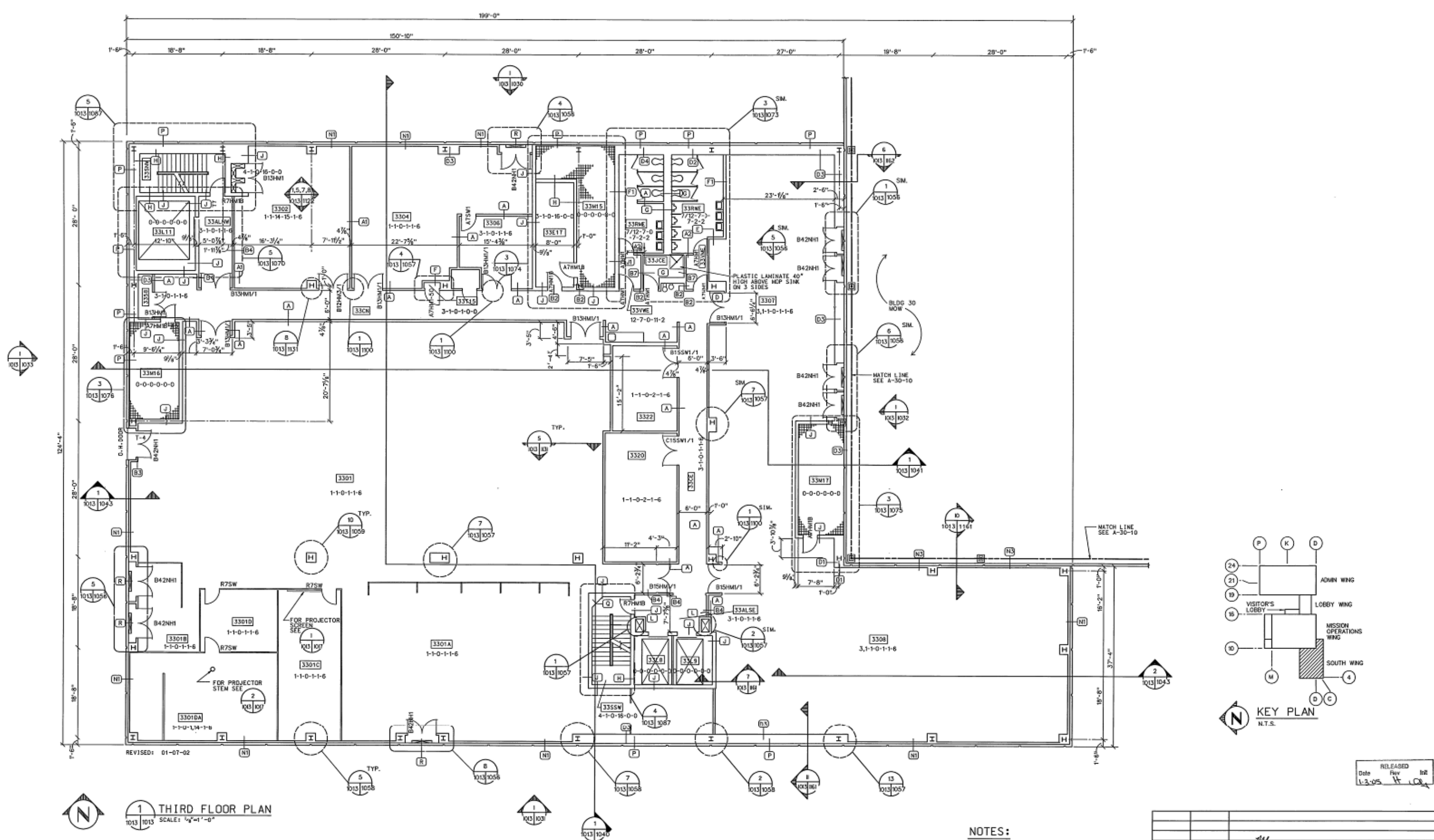
MCC-122


PARTIAL THIRD FLOOR PLAN
SCALE:1/4"=1'-0"
NOTE:
1.FOR DETAILS OF 24"x24"RAISED FLOOR PANELS,STRINGERS,& PEDESTALS IN ROOMS 3069BC,3069BD,3069BCA,3069BF,SEE
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
MISSION OPERATIONS WING
SOUTH WING
GRAPHIC SCALE
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER-HOUSTON
ADMINISTRATION WING
PARTIAL THIRD FLOOR PLAN
A-30-35A
RELEASED

MCC-123


FIRST FLOOR PLAN
SCALE: 1/8"=1'-0"
KEY PLAN
N.T.S.
ADMIN WING
LOBBY WING
VISITOR'S LOBBY
MISSION OPERATIONS WING
SOUTH WING
MATCH LINE SEE A-30-B
REV: 04/08/05
NOTES:
1. FOR PARTITION SCHEDULE SEE A-30S-1097.
2. FOR CORNER GUARD DETAILS REF.
GRAPHIC SCALE
1/8"=1'-0"
CAD FILE NAME: A30S1010
RELEASED Date 4-15-05 Rev F Init
AS-BUILT 04-12-05 CoF92017(NAR) W33060(SAB) CoF92031(KAB) DYN421418(RMP)
AS-BUILT 04-22-97 W28849(RFC) W30498(KAB) W31016(RMT) W31458(KST) W31018(NAR)
AS-BUILT 5-4-95 CoF86001(KAB) W30419(TSM) W30502(KST) W29427(PAG)
REVISION DATE DESCRIPTION
SIGNATURES DATE
DR. GP ENG 12-22-89
CH ES APPR ES 12-22-89
DAVID CISNEROS FOR DON 5-20-96
JOE POUZAR 1/2/90
REV E.J. HUBENAK 12/28/89
DISCP C.A. LAURITZEN 1/8/90
PE E.J. HUBENAK 12/28/89
APPR RON BAILEY 05-29-96
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30S
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
FIRST FLOOR PLAN
SHEET NO. OF
DWG NO. A-30S-1010

MCC-124



NOTES:

1. FOR PARTITION SCHEDULE SEE A-30S-1097.
2. FOR CORNER GUARD DETAILS REF. 2&3 1013 1132

1/8"=1'-0" 4' 0 4' 8' 12' 16' 20'
GRAPHIC SCALE

CAD FILE NAME: A30S1013.DGN

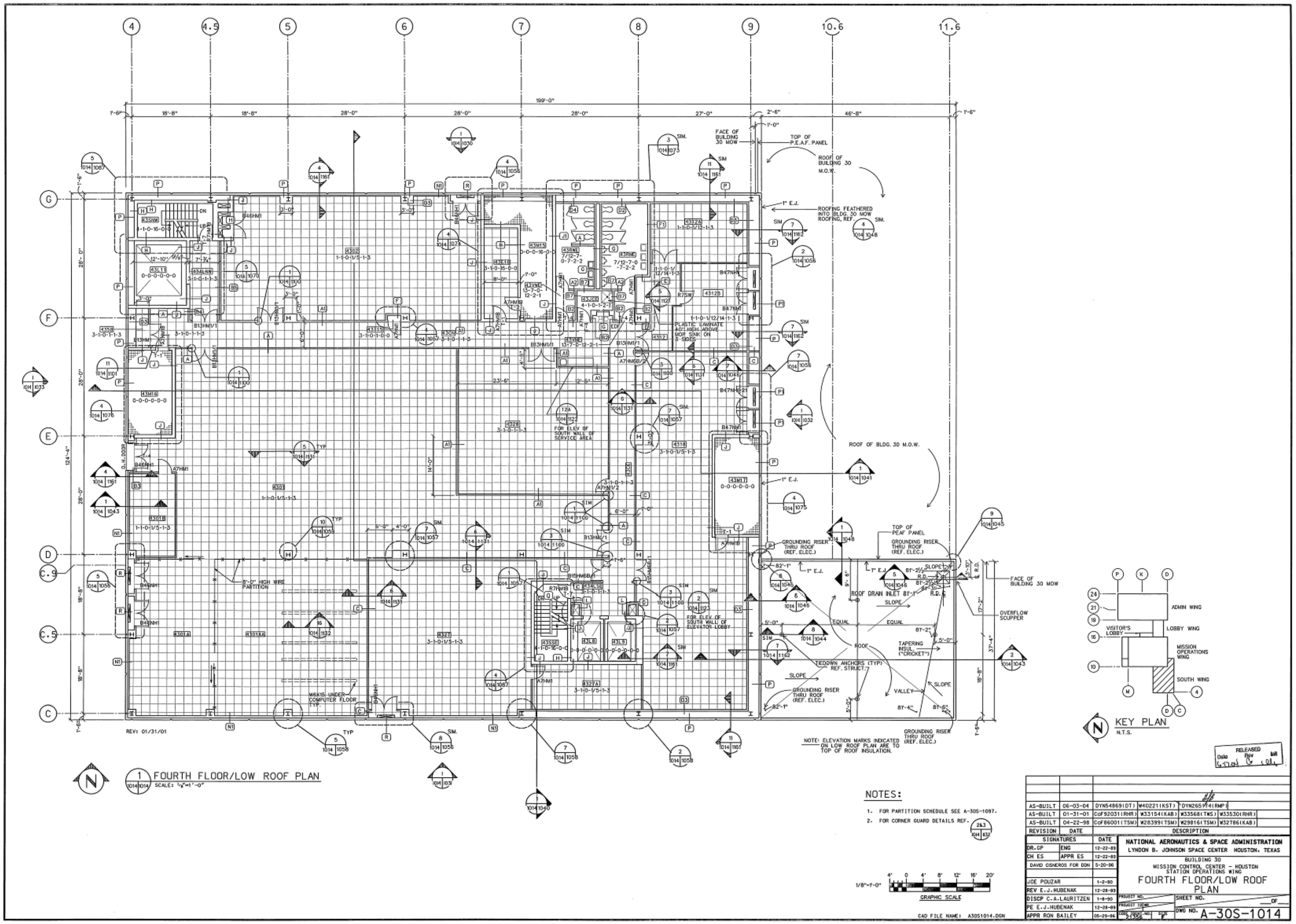
REVISION	DATE	DESCRIPTION
AS-BUILT	12-28-04	W41592(RMP)
AS-BUILT	07-14-03	W33568(TWS) W34447(RHR) DYN54869(DT) W40222(KST) W40998(RHR)
AS-BUILT	01-19-99	CoF86001(NAR) W31461(KST) W32011(GJB) CoF92031(RHR)

SIGNATURES		DATE
DR.NAR	ENG REDRAWN	02-15-95
CH ES	APPR ES	12-22-89
DAVID CISNEROS FOR DON		5-20-96
JOE POUZAR		01-02-90
REV E.J. HUBENAK		12-28-89
DISCP C.A.LAURITZEN		01-08-90
PE E.J.HUBENAK		12/28/89
APPR RON BAILEY		05-29-96

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

BUILDING 30S
MISSION CONTROL CENTER-HOUSTON
STATION OPERATIONS WING
THIRD FLOOR PLAN

PROJECT NO.
PROJECT IDENT.
CODE IDENT. NO. 21356 SIZE F
SHEET NO. ___ OF ___
DWG NO. A-30S-1013


FOURTH FLOOR/LOW ROOF PLAN
SCALE: 1/8"=1'-0"
KEY PLAN
N.T.S.
NOTES:
1. FOR PARTITION SCHEDULE SEE A-30S-1097.
2. FOR CORNER GUARD DETAILS REF.
NOTE: ELEVATION MARKS INDICATED ON LOW ROOF PLAN ARE TO TOP OF ROOF INSULATION.
REV: 01/31/01
GRAPHIC SCALE
CAD FILE NAME: A3051014.DGN
RELEASED
AS-BUILT 06-03-04 DYN54869(DT) W40221(KST) DYN265774(RMP)
AS-BUILT 01-31-01 CoF92031(RHR) W33154(KAB) W33568(TWS) W33530(RHR)
AS-BUILT 04-22-98 CoF86001(TSM) W28399(TSM) W29816(TSM) W32786(KAB)
REVISION DATE DESCRIPTION
SIGNATURES DATE
DR. GP ENG 12-22-89
CH ES APPR ES 12-22-89
DAVID CISNEROS FOR DDN 5-20-96
JOE POUZAR 1-2-90
REV E.J.HUBENAK 12-28-89
DISCP C.A.LAURITZEN 1-8-90
PE E.J.HUBENAK 12-28-89
APPR RON BAILEY 05-29-96
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
BUILDING 30
MISSION CONTROL CENTER - HOUSTON
STATION OPERATIONS WING
FOURTH FLOOR/LOW ROOF PLAN
SHEET NO. OF
21356
DWG NO. A-30S-1014

MCC-126