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National Aeronautics and  
Space Administration

# **Budget Estimates**

## **Fiscal Year 1995**

### **Volume II**

### **Mission Support**

### **Inspector General**

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Mission Support

I

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MISSION SUPPORT

FISCAL YEAR 1995 ESTIMATES

GENERAL STATEMENT

The Mission Support appropriation provides funding for NASA's civil service workforce, space communication services, safety and quality assurance activities, and for maintenance activities for the NASA institution. These objectives are accomplished through the following elements:

Safety, Reliability and Quality Assurance: This includes funding for programs to assure the safety and quality of NASA missions, through the development, implementation and oversight of Agencywide safety, reliability, maintainability and quality assurance policies and procedures.

Space Communication Services: This includes funding for the operation of the tracking, telemetry, command, data acquisition, and communications and data processing activities that are required by all NASA projects. This includes the Tracking and Data Relay Satellite System (TDRSS), and the telecommunications system which provides for real time transmission of data, video and voice information between and among NASA installations.

Research and Program Management: This includes funding for the salaries, benefits, travel requirements and other support of the civil service workforce, and the necessary funding for all of NASA's administrative functions in support of research in NASA's field centers.

Construction of Facilities: This includes funding for the modification, rehabilitation, repair and construction of the administrative facilities, the environmental compliance and restoration program, and the advanced planning of facilities and design of future facilities.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MISSION SUPPORT

FISCAL YEAR 1995 BUDGET ESTIMATES

(IN MILLIONS OF REAL YEAR DOLLARS)

	BUDGET PLAN		
	<u>1993</u>	<u>1994</u>	<u>1995</u>
<u>MISSION SUPPORT</u>	<u>2,727.2</u>	<u>2,619.0</u>	<u>2,662.9</u>
SAFETY, RELIABILITY AND QUALITY ASSURANCE	32.7	34.3	38.7
SPACE COMMUNICATION SERVICES	333.7	214.4	268.9
RESEARCH AND PROGRAM MANAGEMENT	2,171.4	2,148.2	2,220.3
CONSTRUCTION OF FACILITIES	189.4	222.1	135.0

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

**MISSION SUPPORT**

*For necessary expenses, not otherwise provided for, in carrying out mission support for human space flight programs and science, aeronautical, and technology programs, including research operations and support; space communications activities including operations, productions, and services; construction of facilities expenses including repair, rehabilitation, and modification of facilities. minor construction of new facilities and additions to existing facilities; facility planning and design; environmental compliance and restoration; acquisition or condemnation of real property, as authorized by law; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901-5902); travel expenses; purchase, lease, charter, maintenance, and operation of mission and administrative aircraft; nor to exceed \$35,000 for official reception and representation expenses; and purchase (not to exceed thirty-three for replacement only) and hire of passenger motor vehicles; \$2,662,900,000, to remain available until September 30, 1996.*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MISSION SUPPORT

REIMBURSABLE SUMMARY

(IN MILLIONS OF REAL YEAR DOLLARS)

	BUDGET PLAN		
	<u>1993</u>	<u>1994</u>	<u>1995</u>
<u>MISSION SUPPORT</u>	<u>83.0</u>	<u>138.8</u>	<u>117.2</u>
SAFETY, RELIABILITY AND QUALITY ASSURANCE	0.9	1.5	1.2
SPACE COMMUNICATION SERVICES	58.3	92.0	72.0
RESEARCH AND PROGRAM MANAGEMENT	22.1	44.0	43.0
CONSTRUCTION OF FACILITIES	1.7	1.3	1.0

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 FISCAL YEAR 1995 ESTIMATES  
 DISTRIBUTION OF MISSION SUPPORT BUDGET PLAN BY INSTALLATION AND FISCAL YEAR

(Thousands of Dollars)

Program	Total	Proposed Supplemental	Johnson Space Center	Space Sta Program Office	Kennedy Space Center	Marshall Space Flight Center	Stennis Space Center	Goddard Space Flt Center	Jet Propulsion Lab	Ames Research Center	Langley Research Center	Lewis Research Center	NASA HQ	
Safety, Reliability & QA	1993	32,707	0	3,105	0	2,208	1,820	476	5,059	3,753	302	2,372	4,237	9,375
	1994	34,289	0	3,354	0	1,296	1,879	730	4,185	3,110	800	2,196	4,380	12,359
	1995	38,700	0	3,625	0	1,300	2,275	750	6,320	5,500	950	2,325	4,500	11,155
Space Comm Services	1993	333,715	0	209	0	0	58,287	0	253,956	12,804	0	0	250	8,209
	1994	214,400	0	0	0	0	59,600	0	145,395	6,000	0	0	0	3,405
	1995	268,900	0	0	0	0	50,100	0	210,300	7,500	0	0	0	1,000
Res & Pgm Mgmt	1993	2,171,388	0	332,639	0	258,122	289,172	28,563	311,804	0	203,730	212,742	218,917	315,699
	1994	2,148,219	-60,000	339,777	25,346	255,288	295,592	32,100	314,422	0	203,558	216,516	223,719	301,901
	1995	2,220,300	0	342,730	26,707	249,248	301,444	31,696	329,692	0	207,839	222,494	221,666	266,784
Const of Facilities	1993	151,289	0	14,481	0	16,700	25,853	6,335	19,834	10,595	13,641	12,771	26,225	4,854
	1994	175,815	0	12,585	0	24,430	37,310	11,890	33,880	11,920	13,050	13,930	15,010	1,810
	1995	116,045	0	10,150	0	11,150	23,675	4,280	14,430	10,910	21,010	9,020	9,650	1,770
Const of Facilities Various Locations	1993	14,811												
	1994	14,285												
	1995	8,955												
Const of Facilities Facil Planning & Design	1993	23,300												
	1994	32,000												
	1995	10,000												
<b>TOTAL BUDGET PLAN</b>	1993	2,727,210	0	350,434	0	277,030	375,132	35,374	590,653	27,152	217,673	227,885	249,629	338,137
	1994	2,619,008	-60,000	355,716	25,346	281,014	394,381	44,720	497,882	21,030	217,408	232,642	243,109	319,475
	1995	2,662,900	0	356,505	26,707	261,698	377,494	36,726	560,742	23,910	229,799	233,839	235,816	300,709

**Safety, Reliability and  
Quality Assurance**

MISSION SUPPORT  
FISCAL YEAR 1995 ESTIMATES

BUDGET SUMMARY

OFFICE OF SAFETY AND MISSION ASSURANCE

SAFETY, RELIABILITY, MAINTAINABILITY  
AND QUALITY ASSURANCE

SUMMARY OF RESOURCES REQUIREMENTS

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>	<u>Page Number</u>
	(Thousands of dollars)			
Policy, oversight, and standards.....	24,807	27,134	24,200	MS 1-2
Technology qualification and integration.....	7,600	3,545	8,700	MS 1-2
Software independent verification and validation .....	<u>300</u>	<u>3,610</u>	<u>5,800</u>	MS 1-2
Total.....	<u>32,707</u>	<u>34,289</u>	<u>38,700</u>	
<u>Distribution of Program Amount by Installation</u>				
Johnson Space Center.....	3,105	3,354	3,625	
Kennedy Space Center.....	2,208	1,296	1,300	
Marshall Space Flight Center.....	1,820	1,879	2,275	
Stennis Space Center.....	476	730	750	
Langley Research Center.....	2,372	2,196	2,325	
Lewis Research Center.....	4,237	4,380	4,500	
Ames Research Center.....	302	800	950	
Goddard Space Flight Center.....	5,059	4,185	6,320	
Jet Propulsion Laboratory.....	3,753	3,110	5,500	
Headquarters.....	<u>9,375</u>	<u>12,359</u>	<u>11,155</u>	
Total.....	<u>32,707</u>	<u>34,289</u>	<u>38,700</u>	

## OBJECTIVES AND JUSTIFICATION

The goal of the Office of Safety and Mission Assurance (OSMA) is to provide innovative, NASA-wide leadership in promulgating and ensuring safety and mission quality. The OSMA will continue the key roles of program and project oversight: develop program-level safety, reliability, maintainability, and quality assurance (SRMCQA) policy and standards; and develop project-specific plans and procedures. In addition, OSMA conducts independent technical assessments of all major flight and nonflight projects to determine compliance to SRMCQA requirements. The SRMCQA functions include program assurance: development of technical standards and demonstration of key technologies for improving program assurance: safety: systems assessments and trend analyses: risk identification and resolution: reliability, maintainability, and quality assurance: and quality management initiatives.

The OSMA's FY 1995 strategic planning includes the following goals:

- Maintain oversight of the activities of NASA's SRMCQA offices, providing advice to the Administrator on key safety and mission assurance issues.
- Develop and implement NASA-wide risk management practices.
- Ensure that OSMA is an effective, contributing partner in planning, developing, and implementing NASA programs.
- Support development of innovative methods and techniques to achieve safety, mission success, and technology advancement.
- Improve and update the SRMCQA program to anticipate evolving technologies and requirements.
- Promote a work force and environment that cultivates technical excellence.
- Continue the effectiveness of OSMA products and services as value-added functions.

Beginning in FY 1995, funds to support NASA's SRMCQA program will be requested under the Mission Support appropriation. The SRMCQA funded activities represent functions performed for the benefit of all of the Agency's programs: Headquarters SRMCQA staff conduct oversight and provide technical support across all of the Agency's programs: and OSMA performs as an advocate of the SRMCQA offices and activities in all NASA Centers and facilities. The OSMA also performs as monitor of services provided by the Defense Contract Management Command in the oversight of contractor and supplier quality assurance programs.

Though increasing in absolute value from FY 1994 to FY 1995, because funding responsibility for NASA's Electrical, Electronic, and Electromechanical (EEE) and Mechanical Parts will be transferred to OSMA beginning in FY 1995, other activities are reduced. This reduction will result in a decrease in contractor support for NASA's SRMCQA program.

The office is involved across all levels of NASA programs to provide SRMCQA leadership. A key function is to provide independent judgments of program decisions and issues based on SRMCQA analyses, particularly

where there is divergent engineering opinion on critical points or a high degree of uncertainty that could impact program safety and mission success. The Office of Safety and Mission Quality (OSMQ) ensures that SRM&QA requirements are integrated into the earliest phases of development for space and aeronautics programs. Conformance with SRM&QA policies and procedures is monitored through each program phase to assure proper attention to risk. Through SRM&QA surveys and Functional Management Reviews (FMR's) of the NASA Centers. SRMLQA program implementation is assessed.

Beginning in FY 1994. the Safety, Reliability and Quality Assurance (SR&QA) program will be managed under three new program elements. These are the Policy, Oversight, and Standards (POS) program: the Technology Qualification and Integration (TQI) program: and the Software Independent Verification and Validation (SIV&V) program. In addition, programs previously performed under an Agency operating account EEE Parts will be funded directly under the SRM&QA program beginning in FY 1995. These funds will be allocated along with other ongoing SRMLQA activities under the TQI program.

The POS program supports SRM&QA activities in the areas of Safety and Risk Management. Program Assurance, Technical Standards, and Quality Assurance. In the area of Safety and Risk Management, OSMA develops top-level safety policies, defines program-specific safety requirements, and develops risk assessment methodologies. A primary means of supporting the NASA risk management process is to conduct hazard analyses and quantitative risk assessments to identify and resolve safety threats to NASA flight programs and facilities. The OSMA also performs trend analyses using mission performance and problem data to identify/predict areas that require preventive measures, or corrective actions to assure reliable and maintainable spacecraft. NASA operational safety considerations also include crew safety, range safety, mishap investigations. emergency preparedness, and implementation of federal safety requirements.

In the area of Program Assurance, OSMA serves as both an overseer and as a source of senior technical guidance to NASA flight programs. Programs funded under these activities serve to establish program-level SRM&QA requirements to address the unique mission, design, and operational characteristics of NASA flight programs: ensure flight program compliance with NASA's SRM&QA policies: and provide guidance and direction to NASA flight program offices regarding system design, test program management, and risk management. The OSMA maintains rigorous oversight of the Space Shuttle: the Space Station: and NASA's robotics spacecraft. aeronautics, and launch vehicle programs. Ongoing technical support, such as last year's continuous monitoring of the final stages of preparation for the repair of the Hubble Space Telescope. is also provided.

In the Technical Standards area. funds are provided for the development of NASA engineering standards and capabilities required to enhance the safety, reliability, and performance of NASA missions. The OSMA supports the establishment of NASA-wide standards and practices for design. manufacture, and test of flight systems. Finally, funds provided for Quality Assurance support the development of standards for parts quality. product assurance, materials and processes. handling, and test procedures.

The TQI program supports a large number of projects required to document and to verify the flight quality of parts used in NASA flight systems: to examine new methods in areas such as spacecraft wiring, microcircuit design and manufacture, and spacecraft battery production and operation: and to evaluate new methods of systems evaluation. such as nondestructive evaluation. Results from these program activities support the , development of future space projects and will lead to improvements in overall mission capability.

Finally. NASA's SIV&V program provides for a new comprehensive Agency focus on software assurance practices related to NASA flight, ground control, and science data processing systems. The OSMA funding provides for the operation and maintenance of NASA's IV&V facility located at Fairmont. West Virginia, and for research initiatives in this emerging area of systems evaluation. Other programs in support of NASA-wide information systems for the archiving and distribution of flight system assurance information are also funded under this program element.

#### **BASIS OF FY 1995 ESTIMATE**

In FY 1995, OSMA will continue to perform NASA assurance assessments and conduct ongoing activities in policy and standards formulation: safety and risk management: spaceflight, robotics, and aeronautics systems assurance: systems engineering: quality assurance: technology qualification and standardization: and software IV&V. Through careful use of the funds provided under the SRM&QA program, NASA will continue to develop its systems engineering and concurrent engineering concepts and programs: its software IV&V program: and its assurance metrics program.

In FY 1995, OSMA also will emphasize its use of risk management methods in support of space launch decisions, spaceflight systems development, and NASA program planning: will establish an Independent Safety and Mission Assurance (S&MA) program for the Space Station program: will increase support to NASA program offices in systems planning and program execution: and will extend the development of NASA's Lessons Learned program, using data derived from the earliest developmental phases to enable program management to build on Agency and industry experiences.

Space Communication  
Services

MISSION SUPPORT

FISCAL YEAR 1995 ESTIMATES

BUDGET SUMMARY

OFFICE OF SPACE COMMUNICATIONS

SPACE COMMUNICATION SERVICES

SUMMARY OF RESOURCES REQUIREMENTS

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>	<u>Page</u>
		(Thousands of dollars)		<u>Number</u>
Space network.....	199.106	83,500	154.000	MS 2-4
Telecommunications .....	<u>134,609</u>	<u>130,900</u>	<u>114,900</u>	MS 2-8
Total.....	<u>333,715</u>	<u>214,400</u>	<u>268,900</u>	
<u>Distribution of Proaram Amount by Installation</u>				
Johnson Space Center.....	209	--	--	
Marshall Space Flight Center.....	58,287	59.600	50,100	
Lewis Research Center.....	250	--	--	
Goddard Space Flight Center.....	253,956	145.395	210.300	
Jet Propulsion Laboratory.....	12,804	6.000	7,500	
Headquarters.....	<u>8,209</u>	<u>3,405</u>	<u>1,000</u>	
Total.....	<u>333,715</u>	<u>214,400</u>	<u>268,900</u>	

## MISSION SUPPORT

### FISCAL YEAR 1995 ESTIMATES

#### OFFICE OF SPACE COMMUNICATIONS

#### SPACE COMMUNICATION SERVICES

##### OBJECTIVES AND JUSTIFICATION

The Space Communication Services program provides user satellite-to-ground and point-to-point terrestrial communication among all elements of the NASA and associated activities. This program funds the development of Tracking and Data Relay Satellites (TDRS) required to sustain operational support to those NASA and other domestic and international users who depend on NASA's Space Network for their space communication requirements. Ground terminals at White Sands, New Mexico which provide tracking and communication access for the TDRS System (TDRSS) are also provided under this program element. Finally, NASA Communications (NASCOM) and the Program Support Communications Network (PSCN) which serve to interconnect all of NASA's worldwide tracking network facilities with NASA and other spacecraft control centers and data processing facilities located throughout the Nation.

Beginning in FY 1995, funding for these activities is requested under the NASA appropriation for Mission Support. NASA Space Network capabilities other than those required solely to provide user access to the network and other user support services, are contained in this appropriation. The NASCOM and PSCN services and capabilities, which are not easily allocable to individual end users, are also included in NASA's Mission Support appropriation.

The Office of Space Communications provides vital tracking, telemetry, command, data acquisition services and communications required by all NASA flight projects. These capabilities are also made available to other domestic and international users on a reimbursable basis. The Space Network portion of NASA's communications programs is the primary tracking, telemetry, command and data acquisition system for low-Earth-orbiting spacecraft including the Space Transportation System (STS) and its payloads, observatory class missions, and other TDRS compatible missions. As such, the Space Network provides the flight communications for the Hubble Space Telescope, NASA's premier astronomical observatory; the Compton Gamma Ray Observatory; the Upper Atmospheric Research Satellite; and other Earth science and astronomical satellites. The Space Network and TDRS also will provide operational communication with NASA's Earth Observing System.

The Space Network is the principal means of communication with the STS, providing primary support for all on-orbit procedures. Voice communication and televideo communication services are provided through the Space Network for all STS operations. Remote operation of all Spacelab payloads is also provided through the TDRSS. In the future, TDRSS will also play a fundamental role in NASA's human spaceflight program

through the communication access it will provide to the Space Station and in STS rendezvous with the Russian Mir station.

In addition to the replacement of TDRS spacecraft, ongoing maintenance, refurbishment and improvement of the ground elements of the Space Network is also needed. Initial operation of the Danzante ground terminal complex, the new title for the Second TDRSS Ground Terminal (STGT) is scheduled for March 1994. This facility, in addition to the existing Cacique ground terminal complex, the new title for the White Sands Ground Terminal (WSGT), will provide new, more reliable access by users to their orbiting spaceflight systems.

Finally, through its NASCOM and PSCN services, NASA provides point-to-point communication services among its own facilities and remote activities using leased land lines and other satellite telecommunications facilities: provides access by scientists, laboratories, industry researchers, and other U.S. agencies and departments to NASA spaceflight and aeronautics facilities in order to participate in NASA flight programs or to conduct mission operations for their own flight programs supported on a reimbursable basis by NASA's Space and Ground Networks; and provides nationwide access by educational facilities and the general public to information on NASA programs. The NASCOM network provides three classes of service for the conduct of spaceflight programs: a relatively low data rate system for the launch and landing facilities at the Kennedy Space Center (KSC) and the Dryden Flight Research Facility (DFRF); a medium rate system for the Deep Space Network (DSN); and a high rate system for the Space Network. The PSCN provides computer networking, voice and video conferencing, facsimile and electronic mail services among its many users. Together, these capabilities serve to support a wide ranging network of participants towards the advancement of the Nation's future in science and technology.

BASIS OF FY 1995 FUNDING REQUIREMENT

SPACE NETWORK

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
		(Thousands of dollars)	
Tracking and data relay satellite system (TDRSS) .....	25,817	10.100	7,200
Space network services.....	93,889	46,100	6,000
TDRS replacement spacecraft.....	6,300	5.700	22,200
TDRS replenishment spacecraft .....	-	2.600	100.000
Second TDRSS ground terminal.....	<u>73,100</u>	<u>19,000</u>	<u>18,600</u>
Total.....	<u>199,106</u>	<u>83.500</u>	<u>154,000</u>

OBJECTIVES AND JUSTIFICATION

The Space Network consists of the Tracking and Data Relay Satellites (TDRS) and the associated ground elements necessary to meet the communications requirements of low-Earth orbital spacecraft missions. The current TDRS constellation consists of three fully functional satellites, and two partially functional satellites. The last satellite, launched in January 1993, serves as a backup spacecraft. One partially functional satellite is being operated to reduce schedule overloads during Shuttle missions: the other will be repositioned to increase data return from the Compton Gamma Ray Observatory (CGRO). The CGRO, which has experienced problems with its tape recorder subsystem, required a remote ground terminal in order to complete its scientific mission.

Although some reduction of the current level of services is planned in FY 1995 from that performed in FY 1994 by the Space Network program, decreases in the amount requested for Space Network Services is primarily due to a change of financial management assumptions in the recording of planned offsetting reimbursements. Beginning in FY 1995, 100% of the anticipated reimbursement from external users for Space Network support, or \$38 million in FY 1995, will be recorded by NASA as an offset to our budget request for the Space Network Services program. Additional reduction of services provided by the TDRSS to NASA users will be required to meet the FY 1995 funding targets.

The TDRSS is the core of the Space Network, providing inflight communication with spacecraft operating in low-Earth orbit. The network provides ground uplink and downlink communication facilities at White Sands, New Mexico. In FY 1994, two ground terminal complexes, the Second TDRSS Ground Terminal (STGT) and the

White Sands Ground Terminal (WSGT). will both be operating for the first time. The STGT and the WSGT are co-located at NASA's White Sands communications complex.

Once returned to the ground, user's data is transferred via the NASA Communications (NASCOM) system to Payload Operations Control Centers at various locations. Command and control of robotics systems and voice and televideo communications with the Space Transportation System (STS) are provided via the TDRS and Space Network to various spaceflight systems on orbit. Currently, the Space Network system provides communication and services to the Hubble Space Telescope (HST), the CGRO, the Upper Atmosphere Research Satellite (UARS), the Earth Radiation Budget Satellite (ERBS), the Extreme Ultraviolet Explorer (EUVE), the Ocean Topography Experiment (TOPEX), the Cosmic Background Explorer (COBE), the STS and its attached payloads, and other domestic users. All of these will require support in FY 1995, except for COBE whose operations will be terminated in FY 1994.

Beginning in FY 1995, responsibility for funding of the operation of the Space Network ground facilities will begin to be transferred to the Space Network Services program. The Space Network Services program is a new funding element for NASA's communication program beginning in FY 1995. It combines activities that support multiple customers previously performed under the Space Network Operations and the Systems Engineering and Support programs, in addition to the White Sands Ground Terminal operations currently performed under the TDRSS contract. Also beginning in FY 1995, funds to support the operation and improvement of the ground elements of the Space Network will be provided under two separate NASA appropriations. The Space Network Customer Services program contained in the Science, Aeronautics and Technology appropriation will provide funds for the control of the network user interface and to provide customer-oriented services to Space Network users, including funds for the Network Control Center at GSFC.

The TDRSS program has been very successful over its ten year history. While increasing NASA's global coverage from 15% to 85% and the available data rates by a factor of six, fifteen ground stations have been closed and operating costs reduced. A continuing spacecraft replenishment program is considered essential by NASA to ensure reliable continuation of this service into the next century. The TDRS-4 and TDRS-5 are fully functional, with one positioned in the west and the other in the east. The TDRS-4 is operating on redundant systems. The TDRS-6 was successfully launched in January 1993 to ensure uninterrupted essential services. The two partially degraded spacecraft, TDRS-1 and TDRS-3 will be utilized to increase data return from the CGRO and to reduce schedule overloads during Shuttle missions, respectively.

The TDRS-7 spacecraft, funded under the TDRS Replacement Spacecraft program, is functionally identical to the previously produced satellites. Its development program is scheduled for completion in June 1995. The TDRS-7 provides a simple replacement capability for the current constellation of satellites while incorporating design changes to improve reliability. Final hardware deliveries have been made, and critical integration and test activities are scheduled to be completed in FY 1994.

Late in this decade many of the initial TDRS satellites will have exceeded their expected lifetime. Analyses indicate that without additional spacecraft, a substantial part of NASA's communications requirements for operating current and approved new missions cannot be met. Present programs such as the STS, the HST, the CGRO, TOPEX and future missions such as the Space Station and the Earth Observing System (EOS) cannot accomplish their objectives without a reliable Space Network. The investment in these programs must be balanced by a continuing capital investment in replenishment spacecraft.

Funding is requested to conduct a viable replenishment strategy for the space-based assets of the Space Network. Prior investments in the ground terminals and spacecraft of this network have established a benchmark for reliable and secure space communications services that represent a national asset. NASA will initiate development of TDRS-8 through TDRS-10 under the TDRS Replenishment Spacecraft program beginning in FY 1995 to assure continuity of network service. A minimal amount of funding has been set aside by NASA in FY 1994 for the initiation of procurement activities leading up to contract award early in FY 1995. Prospective offerors will be required to make contractual commitments to deliver on-orbit TDRS capability under a fixed price agreement.

The Second TDRSS Ground Terminal (STGT) program is nearing completion. This program will eliminate a critical single point of failure of the existing White Sands Ground Terminal (WSGT) and lower operations expense. The STGT is scheduled to transition to initial operational capability in March 1994. Following a trial period of operation, the WSGT will be closed in order to modernize its equipment to provide more cost-effective and reliable communications.

System level testing of the STGT complex has been completed. The Pennsylvania test berth has been closed, and all systems have been shipped to New Mexico. Network level testing is now underway which, upon completion, will allow the STGT complex to begin operations. Parallel operations with the WSGT will begin shortly thereafter. By the end of FY 1994, the STGT is scheduled to assume the day-to-day operational workload of the TDRSS, allowing the modernization of the WSGT to commence.

#### **BASIS OF FY 1995 ESTIMATE**

During FY 1995, operations and maintenance of the WSGT will cease when the STGT becomes fully operational. At that time, the original terminal will undergo modification. The TDRSS program will support the removal of existing equipment and preparation of the WSGT for modernization. Remaining TDRSS funding will provide for the operations and maintenance staff who will remove and install equipment and conduct testing and calibration of the new equipment suite. Future funding requirements for the operation of the White Sands complex will be funded from the Space Network Services program.

Funds requested for the TDRS Replacement Spacecraft program will allow for completion of the satellite's assembly and test program and final preparation for the scheduled launch in July 1995 aboard the STS. Funds

are also requested for the TDRS Replenishment Spacecraft program which will allow NASA to enter into a contract for the spacecraft in early **FY 1995**. This level of funding will support the procurement of three TDRS spacecraft. Current plans are to issue a fixed-price contract with limitations upon the Government's liability pending successful on-orbit performance of the satellite system. The first replenishment spacecraft is planned to be available for launch four years after contract award.

Funding requested for the Second TDRSS Ground Terminal program in **FY 1995** will provide for the modernization of the WSGT. When the STGT becomes operational, the WSGT will be remodeled and new equipment identical to the STGT will be installed. The WSGT antennas will be modified and refurbished. When testing has been completed, the WSGT will be returned to operations. A third Space-Ground Link Terminal (SGLT) will be retained at the STGT for use as a diagnostic tool and will be installed at WSGT later in the year.

BASIS OF FY 1994 FUNDING REQUIREMENT

TELECOMMUNICATIONS

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
		(Thousands of dollars)	
Communications systems implementation.....	8.694	11.800	9,800
Communications operations.....	<u>125,915</u>	<u>119,100</u>	<u>105,100</u>
Total.....	<u>134,609</u>	<u>130,900</u>	<u>114,900</u>

OBJECTIVES AND STATUS

NASA's Telecommunications program supports the operation, maintenance, and improvement of the NASA Communications (NASCOM) network and the Program Support Communications Network (PSCN). The NASCOM network provides for the transmission of data, video, and voice information among NASA installations and between NASA mission operations control centers and the NASA Networks. The NASCOM also provides linkages to mobile tracking stations. The PSCN provides administrative and data handling services to international space agencies, other domestic users, scientists, laboratories, aerospace contractors, and educational institutions. The transmission and sharing of information is critical to the success of NASA's flight missions and other user's missions supported by NASA communications, and to the management and execution of NASA's development programs and other activities. Included in NASA's Telecommunications program are computer networking services, voice and video conferencing, broadcast television service, and high-speed data transfer between Space and Ground Network ground stations, the spacecraft mission control centers, and distributed data processing facilities.

Due to fiscal constraints upon the entire NASA program in FY 1994, the Telecommunications program will be required to reduce the cost, scope and quality of current services. Information regarding specific reductions will be available as further assessments are conducted.

The NASCOM network interconnects the tracking and data acquisition facilities for all NASA and other user's flight projects via leased voice, data, video, and wideband circuits. The NASCOM control center is located at the Goddard Space Flight Center (GSFC). The overseas elements of NASCOM employ a sub-switching center at the Jet Propulsion Laboratory (JPL) to improve diversity of communications services, to ensure connectivity to multiple overseas destinations, and to achieve optimum utilization of circuit bandwidth. Direct services from Madrid and Australia to the JPL were established in FY 1992 to economically provide the increased bandwidth required by new missions under development.

NASA's PSCN provides communication links among NASA Field Centers and NASA Headquarters, and between remote NASA facilities and NASA contractors and university facilities for the transfer of program management information and scientific data. The PSCN services include computer networking, electronic mail, and voice and video teleconferencing. Control facilities for the PSCN are located at the Marshall Space Flight Center (MSFC).

Many domestic PSCN circuits within the U.S. are provided by the Federal Telecommunications System (FTS) 2000 program. Because of the critical nature of the real-time communications, special arrangements are being made with the General Services Administration (GSA) to modify the FTS 2000 contract to permit the provision of increased reliability and flexibility for the FTS services required for NASA applications. International PSCN circuits are outside of the scope of the current FTS 2000 program and are managed by NASA under separate arrangements.

The Communications Systems Implementation program provides necessary augmentation of the capability of the NASCOM system to meet new NASA flight program requirements, to increase the efficiency of NASCOM services, and to maintain reliable and secure data transmission among U.S. spacecraft and their control centers.

Significant upgrades to the NASCOM system scheduled to be completed in FY 1994 include the upgrade of the data handling capability of the Deep Space Network (DSN) to 768 K b/s; the implementation of a new multiplexer/demultiplexer (MDM) system between the White Sands complex, the GSFC, and the Johnson Space Center (JSC); and the replacement of the Digital Matrix Switch with the Digital Communications Switch.

The Communications Operations program performs management, operation, and sustainment of the NASCOM and PSCN systems.

#### **BASIS OF FY 1995 ESTIMATE**

FY 1995 funding for the Communications Systems Implementation program will provide the necessary equipment acquisitions and sustaining engineering modifications necessary to continue support of operational requirements established by users of spaceflight systems' science data. The budget request reflects services and equipment required to provide communication access to spacecraft, launch sites, NASA's Ground and Space Networks, and remote tracking and data acquisition stations. FY 1995 funds will support delivery of science data to various locations that require access to NASA control centers to access their flight systems.

The requested FY 1995 funding for the Communications Operations program supports NASA's capability to provide the level of NASCOM services required for mission operations, and to support planning for new missions and the interconnect that will begin with the newly completed Second TDRSS Ground Terminal ground

terminal at the White Sands, New Mexico complex. The PSCN will continue to provide circuits, facilities, and systems integration support to various users of the network.

Research and Program  
Management

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1995 ESTIMATES

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Summary Information

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

GENERAL STATEMENT

Funding for Research and Program Management (R&PM) provides the salaries, personnel and related costs, travel and the necessary support for all of NASA's administrative functions and other basic services in support of research and development activities at NASA field installations. Consistent with the new budget structure, Research Operations Support funding previously included in the Research and Development and Space Flight, Control, and Data Communications appropriations has been consolidated in Research and Program Management.

The NASA civil service workforce is the underpinning for the successful accomplishment of the Nation's civil aeronautics and space programs. These are the people who plan the programs, conduct and oversee the research; select and monitor the contractors; manage the various research, development, and test activities; and oversee all of NASA's operations. The salaries and benefits of this workforce comprise approximately 76 percent of the requested appropriation. Administrative and other support is 22 percent of the request. The remaining 2 percent of the requested appropriation is required to fund travel necessary to manage NASA and its programs, and provide the training and other supporting costs for NASA personnel.

The FY 1995 budget signals a new way of doing business across the board and the NASA workforce has aggressively examined every activity which supports the institutional operations at NASA. The NASA management team is committed to making sure all of its activities are conducted in the most efficient and effective manner. Funding for the institutional support of NASA is reduced significantly from the FY 1994 level, and plans are being implemented to achieve that savings. The FY 1994 budget request incorporated significant savings in the institutional support for NASA, the Congress directed a further reduction of \$25 million in the FY 1994 appropriation (P.L. 103-124) for Research Operations Support, and the proposed \$95 million rescission includes another reduction of \$10 million.

The FY 1995 request supports a total FTE ceiling level of 22,700 (plus 728 FTE for previously ceiling-exempt positions exclusive of the Inspector General). This is a reduction of 837 FTE from the FY 1994 level and a reduction of 1,284 FTE from the FY 1993 level. In P.L. 103-124, the Congress directed NASA to reach an end-of-year employment level of 22,900, a reduction of 1,000 FTE from the FY 1993 level, and reduced funding for

Research and Program Management consistent with that reduction. This reduction was based on the restructure of the Space Station program. To enable NASA to achieve this reduction through attrition, the agency was granted the authority by the Office of Personnel Management (OPM) to offer early retirement incentives, and authority was requested from Congress to offer separation incentives (buyouts). The House and senate have , passed slightly different versions of the National Aeronautics and Space Administration Management Reorganization Act of 1993 (H.R. 2876), and final action has not been taken. As a result of this delayed action, attrition has slowed because employees have delayed making retirement decisions until the buyout authority is granted. Unless buyout authority is granted, the ability to achieve the employment ceiling will be severely jeopardized.

The FY 1994 funding level for Research and Program Management has been further strained by implementation of locality pay in January 1994. In order to meet the increased costs of locality pay implementation, and the increased salaries and expenses requirements due to the delay in reducing employment levels, the President is proposing legislation for a supplemental appropriation in FY 1994 of \$60 million in Research and Program Management. These funds are obtained through the rescission of \$95 million of Research and Development and Space Flight, Control, and Data Communications, so the entire transaction remains outlay neutral. This rescission/supplemental legislation is required to avoid a highly disruptive furlough of the entire NASA workforce. The funding plan proposed for FY 1995 assumes positive action on the rescission/supplemental legislation and H.R. 2876, and assumes that FTE levels in FY 1994 are achieved.

NASA Field Centers report to the various Program Associate Administrators responsible for the major portion of their technical programs. The principal roles assigned to each Installation, based on demonstrated capabilities and capacities to meet NASA's overall program goals, are described below:

**OFFICE OF SPACE FLIGHT:**

Johnson Space Center (JSC) - Management, selection, and training of astronauts and mission specialists, Space Station and Shuttle Flight operations, including mission planning, operational procedures, and flight control.

Kennedy Space Center (KSC) - Management of Shuttle Launch Operations, including orbiter processing, final payload checkout and integration with the Shuttle, Shuttle launch and post landing processing, and Space Station launch processing.

Marshall Space Flight Center (MSFC) - Management of the Space Shuttle Main Engine, Redesigned Solid Rocket

Motor, Solid Rocket Booster, and External Tank projects; management of NASA's activities on the Spacelab project, management of Advanced X-Ray Astrophysics Facility development; development and conducting of experiments in materials processing in space; and payload integration activities for the Space Station.

- Stennis Space Center (SSC) - Space Shuttle engine testing, and Earth resources research and technology transfer.

Space Station Program Office (JSC) - Management of the design, development, integration, test, qualification and production of the flight hardware and software associated with the redesign of the Space Station.

**OFFICE OF MISSION TO PLANET EARTH:**

Goddard Space Flight Center (GSFC) - Development and operation of Earth orbital flight experiments and automated spacecraft to conduct scientific investigations and to demonstrate practical applications; management of tracking and data acquisition activities; management and launch of sounding rockets and balloons; operation of an instrumented flight range for aeronautical and space research and procurement of expendable launch services for small and medium payloads. The Goddard Space Flight Center has also begun development of the Earth Observing System (EOS) and its associated data system. The Wallops Flight Facility is an operational element and component installation of the Goddard Space Flight Center.

**OFFICE OF AERONAUTICAL RESEARCH AND TECHNOLOGY:**

Ames Research Center (ARC) - Conduct of activities involving computational aerodynamics and flight testing, computational/numerical simulation rotorcraft technology; short and vertical takeoff and landing technology; life sciences dealing with gravitational biology, and exobiology; human factors; autonomous systems; guidance and control; and operation of an alternate landing site for the Space Shuttle missions. The Dryden Flight Research Facility (DFRF) is an operational element and component installation of the Ames Research Center. Effective March 1, 1994, the DFRF will be established as a separate entity and will no longer be a part of the Ames Research Center.

Langley Research Center (LaRC) - conduct of airframe aerodynamics and structures research and technology; hypersonic propulsion; experimental and theoretical aerodynamics; environmental quality monitoring by remote sensing; advanced conceptual space system design independent assessments; research in the areas of structures

and materials, guidance and controls; and airframe/propulsion integration of the transatmospheric research and technology program.

Lewis Research Center (LeRC) - Conduct of aeronautical propulsion, electric space propulsion, and space power research and technology; space communications research and technology; development of microgravity sciences for fluid physics and combustion science; and procurement of expendable launch services on intermediate and large payload vehicles.

NASA HEADQUARTERS (HQ) - Overall executive direction of **NASA's** programs and activities, including functional management of such areas as personnel policies and development, Equal Employment Opportunity, procurement, financial management, information resource management, logistics, etc.

#### SUMMARY OF FUNDING REQUIREMENTS

The FY 1995 Budget provides the necessary resources to apply in-house capabilities to program activities. Detailed data on funding requirements are provided in the section on each Installation. A summary description of, and the funding required by the functional category includes:

I. Personnel and Related Costs (\$1,684,500,000)(assuming reappropriation approval): Includes salaries and benefits, the Government's contribution to personnel benefits for **NASA** civil service employees, and for personnel of other Government agencies detailed to **NASA**. In FY 1995, the budget provides for 23,428 FTE workyears (22,700 and 728 formerly categorized as ceiling exempt employees), exclusive of the Inspector General. This category also includes other personnel and related costs such as, moving expenses (excluding the associated travel of people); recruiting and personnel investigation services provided by the Office of Personnel Management; and the training of **NASA** civil service employees.

11. Travel (\$48,700,000): Includes the cost of transportation, per diem, and related travel expenses--domestic and foreign--of civil service employees who travel for coordination and management of **NASA** program activities including contract management; flight mission support; meetings and technical seminars and symposia; and for permanent and temporary relocations.

III. Research Operations Support (\$487,100,000): Includes all required support to **NASA's** administrative staff as well as providing significant support service to the entire civil service staff. It also provides for maintenance of roads and grounds and other institutional facilities.

SUMMARY OF THE BUDGET PLAN BY FUNCTION

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
I. Personnel and Related Costs.....	1,569,359	1,649,508	1,684,500
II. Travel.....	45,477	46,000	48,700
III. FY 1993 Supplemental Appropriation (P.L. 103-50) ...	20,000*	0	0
IV. Reduction if reappropriation not approved.....	0	-60,000	0
V. Research Operations Support.....	<u>536,552</u>	<u>512,711</u>	<u>487.100</u>
Total, NASA.....	2,171,388	2,148,219	2,220,300

\*Funds appropriated in FY 1993 to accommodate Space Station related activities

BASIS OF THE FY 1995 ESTIMATE

The FY 1995 Estimate of \$2,220.3 million represents an increase of \$35.0 million for Personnel and Related Costs, \$2.7 million for Travel, and a decrease of \$25.6 million for Research Operations Support over the FY 1994 Estimate assuming reappropriation approval. This increase provides for a civil service ceiling of 23,428 FTE workyears (22,700 plus 700 formerly categorized as ceiling exempt employees), the cost of the FY 1994 pay raise, anticipated pay increases in 1995, travel consistent with increased transportation and related costs and program requirements, and the transfer of the Research Operations Support budget of \$487.1 million into Research and Program Management.

The appropriation request for FY 1995, by functional category, is summarized below:

I. Personnel and Related Costs (\$1,684,500,000): The FY 1995 estimate for Personnel and Related Costs is \$35.0 million higher than FY 1994. The basis for the increase is the January 1994 locality based pay raise , and an OMB anticipated pay increase in January of 1995.

11. Travel (\$48,700,000): NASA relies very heavily on contracts with the private sector for the actual accomplishment of its programs and providing responsible oversight of these contractors requires considerable travel to the contractor locations. Additionally, the launch of a major payload on the Space Transportation System involves the integration and coordination of a very large number of people and activities. This can only be effectively accomplished by holding multiple pre-launch meetings in multiple locations. In total, program travel is approximately two-thirds of NASA's travel expenditures. The remaining travel funds are required to coordinate Agency management and administration, for professional development and training, and for the transportation of new and transferred employees to new duty stations. The FY 1995 increase of \$2.7 million in travel is consistent with increased transportation and related costs and program requirements.

III. Research Operations Support (\$487,100,000): This account provides vital support to the civil service workforce and to the physical plant at the Centers and at NASA Headquarters. This funding supports the basic core administrative Centerwide services for civil service staff, such as mail, telephones, janitorial services, transportation, medical (other than astronaut), security, and fire protection as well as maintenance of roads, grounds, and all requirements of administrative buildings.

In summary, the FY 1995 budget requirement of \$2,220,300,000 is to provide for 23,428 FTE workyears (22,700 plus 728 formerly categorized as ceiling exempt employees) to support the activities at eight NASA Installations and Headquarters.

DETAIL OF CONTENTS BY FUNCTION

I. Personnel and Related Costs

A. Compensation and Benefits:

1. Compensation:

- a. Permanent Positions: This part of Personnel and Related Costs covers the salaries of the full-time permanent civil service workforce and is the largest portion of this functional category.
- b. Other Than Full-Time Permanent Positions: This category includes the salaries of NASA's non-permanent workforce. Programs such as Presidential Management Interns, students participating in cooperative training, summer employment, youth opportunity, and temporary clerical support are covered in this category.
- c. Reimbursable Detailees: In accordance with existing agreements, NASA reimburses the parent Federal organization for the salaries and related costs of persons detailed to NASA.
- d. Overtime and Other Compensation: Overtime, holiday, post and night differential, and hazardous duty pay are included in this category. Also included are incentive awards for outstanding achievement and superior performance.

2. Benefits: In addition to compensation, NASA, as authorized and required by law, makes the employer's contribution to personnel benefits. These benefits include contributions to the Civil Service Retirement Fund, the Federal Employees Retirement System, employees' life and health insurance, payments to the Medicare fund for permanent employees, and social security contributions. Payments to the civil service retirement fund for re-employed annuitants and severance pay to former employees involuntarily separated through no fault of their own are also included.

B. Supporting Costs:

- 1. Transfer of Personnel: Provided under this category are relocation costs required by law, such as the expenses of selling and buying a home, subsistence expenses, and the movement and storage of household goods.
- 2. Investigative Services: The Office of Personnel Management is reimbursed for activities such as security investigations of new hires and revalidation of sensitive position clearances, recruitment advertising, and Federal wage system surveys.
- 3. Personnel Training: Training is provided within the framework of the Government Employees Training Act of 1958. Part of the training costs are for courses offered by other Government agencies, and the remainder is for training through nongovernment sources.

11. Travel

- A. Program Travel: The largest part of travel is for direction, coordination, and management of program activities including international programs and activities. The complexity of the programs and the geographical distribution of NASA Installations and contractors necessitate this category of travel. As projects reach the flight stage, support is required for prelaunch activities including overseas travel to launch and tracking sites. The amount of travel required for flight projects is significant as it is directly related to the number of systems and subsystems, the number of design reviews, and the number and complexity of the launches and associated ground operations.
- B. Scientific and Technical Development Travel: Travel to scientific and technical meetings and seminars permits employees engaged in research and development to participate in both Government sponsored and nongovernment sponsored activities. This participation allows personnel to benefit from exposure to technological advances which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates and provides for the dissemination of technical results to the United States community.

- C. Management and Operations Travel: Management and operations travel provides for the direction and coordination of general management matters and travel by officials to review the status of programs. It also includes travel by functional managers in such areas as personnel, financial management, and procurement. This category also includes the cost of travel of unpaid members of research advisory committees; and initial duty station, permanent change of assignment, and related travel expenses.

111. Research Operations Support

- A. Facilities Services: Facilities Services provides basic security, fire protection, and other custodial services. It also provides maintenance of roads and grounds and of all administrative buildings and facilities. Finally, it provides rental of administrative buildings and all utility costs of administrative buildings.
- B. Technical Services: Technical Services provides the Administrative Automatic Data Processing capability that supports Accounting, Payroll, Budgeting, Procurement, Personnel as well as all the other Administrative functions. It also funds the Graphics and Photographic support to these functions. Finally, it funds the Centerwide safety and public information programs.
- C. Management and Operations: Management and Operations funds the telephone, mail, and logistics systems, the administrative equipment and supplies, and the transportation system including the general purpose motor pools and the program support aircraft. It also funds the basic medical and environmental health programs. Finally, it funds printing and reproduction and all other support, such as small contract and purchases for the Center Directors staff and the Administrative functions.

### CENTER LOCATIONS AND CAPITAL INVESTMENT

JOHNSON SPACE CENTER - The Lyndon B. Johnson Space Center is located 20 miles southeast of Houston, Texas. NASA owns 1,618 acres of land at the Houston site and uses another 60,552 at the White Sands Test Facility, Las Cruces, New Mexico. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets was \$1,202,176,000 as of September 30, 1993.

KENNEDY SPACE CENTER - The Kennedy Space Center is located 50 miles east of Orlando, Florida. NASA owns 82,943 acres and uses launch facilities at Cape Canaveral Air Station and Vandenberg Air Force Base. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets was \$2,278,377,000 as of September 30, 1993.

MARSHALL SPACE FLIGHT CENTER - The Marshall Space Flight Center is located within the U.S. Army's Redstone Arsenal at Huntsville, Alabama. MSFC also manages operation at the Michoud Assembly 15 miles east of New Orleans, Louisiana and the Slidell Computer Complex in Slidell, Louisiana. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets was \$1,387,316,000 as of September 30, 1993.

STENNIS SPACE CENTER - The Stennis Space Center is located approximately 50 miles northeast of New Orleans, Louisiana. NASA owns 20,588 acres and has easements covering an additional 118,284 acres. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets was \$462,884,000 as of September 30, 1993.

GODDARD SPACE FLIGHT CENTER - The Goddard Space Flight Center is located 15 miles northeast of Washington, D.C. at Greenbelt, Maryland. NASA owns 1,106 acres at this location and an additional 6,176 acres at the Wallops Flight Facility in Wallops Island, Virginia. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets at both locations was \$1,120,634,000 as of September 30, 1993.

AMES RESEARCH CENTER - The Ames Research Center is located south of San Francisco on Moffett Field, California. The Dryden Flight Research Facility is located 65 miles northeast of Los Angeles at Edwards Air Force Base. The Dryden facility was under the operation of Ames until a decision was made in early 1994 that each facility will operate under separate management. NASA owns 429.9 acres at the Moffett Field location.

• The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets at both locations was \$1,289,430,000 as of September 30, 1993.

LANGLEY RESEARCH CENTER - The Langley Research Center is adjacent to Langley Air Force Base which is located between Williamsburg and Norfolk at Hampton, Virginia. NASA owns 807 acres and has access to 3,276 acres. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets was \$1,060,215,000 as of September 30, 1993.

LEWIS RESEARCH CENTER - The Lewis Research Center occupies two sites; the main site is in Cleveland, Ohio, adjacent to Cleveland-Hopkins Airport; the second site is the Plum Brook Station located south of Sandusky, Ohio, and 50 miles west of Cleveland. NASA owns 6,820 acres and leases an additional 14 acres at the Cleveland location. The total capital investment including land, buildings, structures and facilities, equipment, and other fixed assets at both locations was \$766,241,000 as September 30, 1993.

NASA HEADQUARTERS - NASA Headquarters is located at Two Independence Square, 300 E St. SW, Washington, DC and occupies other buildings in the District of Columbia, Maryland, and Virginia.

DISTRIBUTION OF FULL TIME EQUIVALENT WORKYEARS BY INSTALLATION

	<u>PI 1993</u>	<u>PI 1994</u>	<u>FY 1995</u>
JOHNSON SPACE CENTER	3,606	3,415	3,189
KENNEDY SPACE CENTER	2,512	2,457	2,348
MARSHALL SPACE FLIGHT CENTER	3,659	3,595	3,298
STENNIS SPACE CENTER	209	200	209
SPACE STATION PROGRAM OFFICE	0	240	300
GODDARD SPACE FLIGHT CENTER	3,934	3,881	3,856
AMES RESEARCH CENTER	2,210	2,126	2,149
LANGLEY RESEARCH CENTER	2,902	2,821	2,810
LEWIS RESEARCH CENTER	2,753	2,698	2,524
HEADQUARTERS	<u>1,912</u>	<u>1,835</u>	<u>1,753</u>
SUBTOTAL, FULL-TIME PERMAMENT WORKYEARS	23,697	23,268	22,436
OTHER THAN FULL-TIME PERMAMENT WORKYEARS	<u>267</u>	<u>269</u>	<u>264</u>
SUBTOTAL, FTEs	23,964	23,537	22,700
FORMER NON-CEILING	<u>728</u>	<u>728</u>	<u>728</u>
GRAND TOTAL, FTEs	<u><u>24,692</u></u>	<u><u>24,265</u></u>	<u><u>23,428</u></u>

SUMMARY OF BUDGET PLAN BY INSTALLATION  
(THOUSANDS OF DOLLARS)

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
JOHNSON SPACE CENTER	252,539	261,377	264,130
KENNEDY SPACE CENTER	161,022	168,088	169,248
MARSHALL SPACE FLIGHT CENTER	236,872	242,292	246,144
STENNIS SPACE CENTER	14,563	15,300	15,796
SPACE STATION PROGRAM OFFICE	0	25,346	26,707
GODDARD SPACE FLIGHT CENTER	257,844	266,122	279,092
AMES RESEARCH CENTER	163,230	168,334	174,054
LANGLEY RESEARCH CENTER	179,242	186,013	194,049
LEWIS RESEARCH CENTER	178,325	186,035	186,796
HEADQUARTERS	<u>171,199</u>	<u>176,601</u>	<u>177,184</u>
 S/TOTAL, RESEARCH AND PROGRAM MANAGEMENT	 <u>1,614,836</u>	 <u>1,695,508</u>	 <u>1,733,200</u>
 FY 1993 SUPPLEMENTAL APPROPRIATION (P.L. 103-50)	 20,000	 0	 0
REDUCTION IF REAPPROPRIATION NOT APPROVED	0	(60,000)	0
RESEARCH OPERATIONS SUPPORT	<u>536,552</u>	<u>512,711</u>	<u>487,100</u>
 TOTAL, RESEARCH AND PROGRAM MANAGEMENT	 <u>2,171,388</u>	 <u>2,148,219</u>	 <u>2,220,300</u>

DI DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

NASA TOTAL	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	2,394	1,647	1,000
SHUTTLE PROGRAMS	5,479	5,490	5,328
SPACE SCIENCE	<u>2,225</u>	<u>2,085</u>	<u>2,041</u>
PHYSICS AND ASTRONOMY	2,017	1,842	1,802
PLANETARY EXPLORATION	208	243	239
LAUNCH SERVICES	232	228	248
LIFE AND MICROGRAVITY SCIENCES	1,050	1,534	1,533
MISSION TO PLANET EARTH	1,567	1,527	1,556
ADVANCED CONCEPTS AND TECHNOLOGY	1,522	1,455	1,428
AERONAUTICAL RESEARCH AND TECHNOLOGY	3,527	3,615	3,725
SAFETY RELIABILITY AND QUALITY ASSURANCE	142	142	144
ACADEMIC PROGRAMS	32	38	39
COMMUNICATIONS	<u>687</u>	<u>656</u>	<u>646</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	18,857	18,417	17,688
CENTER MANAGEMENT AND OPERATIONS	<u>4,840</u>	<u>4,851</u>	<u>4,748</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	23,697	23,268	22,436
OTHER CONTROLLED FTE's	<u>267</u>	<u>269</u>	<u>264</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	23,964	23,537	22,700
FORMER NON-CEILING	<u>728</u>	<u>728</u>	<u>728</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>24,692</u></u>	<u><u>24,265</u></u>	<u><u>23,428</u></u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
RESEARCH AND PROGRAM MANAGEMENT - FY 1995 ESTIMATES  
DISTRIBUTION OF BUDGET PLAN BY FUNCTION BY INSTALLATION

FUNCTION	TOTAL NASA	SPACE CENTER	KENNEDY SPACE CENTER	MARSHALL SPACE FLIGHT CENTER	STENNIS SPACE CENTER	SPACE STATION P.O.	GODDARD SPACE FLIGHT CENTER	AMES RESEARCH CENTER	LANGLEY RESEARCH CENTER	LEWIS RESEARCH CENTER	HEADQUARTERS
FY 1993	1,569,359	245,811	157,089	231,108	13,985	0	250,940	159,040	175,230	174,211	161,945
FY 1994	1,649,508	255,059	164,319	236,639	14,745	23,019	259,583	164,343	182,245	182,155	167,401
FY 1995	1,684,500	257,671	165,249	240,300	15,181	23,939	271,916	169,850	190,050	182,695	167,649
TRAVEL											
FY 1993	45,477	6,728	3,933	5,764	578	0	6,904	4,190	4,012	4,114	9,254
FY 1994	46,000	6,318	3,769	5,653	555	2,327	6,539	3,991	3,768	3,880	9,200
FY 1995	48,700	6,459	3,999	5,844	615	2,768	7,176	4,204	3,999	4,101	9,535
FY 1993 SUPPLEMENTAL APPROPRIATION (P.L. 103-50)											
FY 1993	20,000										
REDUCTION IF REAPPROPRIATION NOT APPROVED											
FY 1994	(60,000)										
RESEARCH OPERATIONS SUPPORT											
FY 1993	536,552										
FY 1994	512,711										
FY 1995	487,100	78,600	80,000	55,300	15,900	0	50,600	33,785	28,445	34,870	109,600
TOTAL											
FY 1993	2,171,388	252,539	161,022	236,872	14,563	0	257,844	163,230	179,242	178,325	171,199
FY 1994	2,148,219	261,377	168,088	242,292	15,300	25,346	266,122	168,334	186,013	186,035	176,601
FY 1995	2,220,300	342,730	249,248	301,444	31,696	26,707	329,692	207,839	222,494	221,666	286,784

**DETAIL OF PERMAMENT POSITIONS**

NASA TOTAL	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
Executive level II	1	1	1
Executive level III	0	1	1
Executive level V	<u>0</u>	<u>0</u>	<u>0</u>
	1	2	2
<b>ES-6</b>	51	54	54
<b>ES-5</b>	120	126	128
ES-4	290	305	306
<b>ES-3</b>	25	27	25
<b>ES-2</b>	39	40	39
<b>ES-1</b>	<u>23</u>	<u>23</u>	<u>23</u>
	548	575	575
<b>CA</b>	1	1	1
<b>SL/ST</b>	65	65	65
<b>GS/GM - 15</b>	2,581	2,594	2,531
<b>GS/GM - 14</b>	4,009	4,016	3,830
<b>GS/GM - 13</b>	5,972	5,714	5,652
<b>GS- 12</b>	3,553	3,410	3,377
<b>GS- 11</b>	2,102	1,995	1,978
<b>GS- 10</b>	307	306	302
<b>GS-09</b>	<b>748</b>	722	714
GS-08	339	337	333
<b>GS-07</b>	942	911	901
GS-06	718	691	686
<b>GS-05</b>	793	758	751
<b>GS-04</b>	104	98	97
<b>GS-03</b>	15	15	15
<b>GS-02</b>	<u>7</u>	<u>7</u>	<u>7</u>
	22,256	21,640	21,240
<b>SPECIAL UNGRADED POSITIONS</b>			
<b>ESTABLISHED BY NASA ADMINISTRATOR</b>	31	35	35
<b>UNGRADED POSITIONS</b>	<u>648</u>	<u>648</u>	<u>648</u>
<b>TOTAL PERMAMENT POSITIONS</b>	23,484	22,900	22,500
<b>UNFILLED POSITIONS, EOY</b>	<u>0</u>	<u>0</u>	<u>0</u>
<b>TOTAL PERM EMPLOYMENT, EOY</b>	<u><u>23,484</u></u>	<u><u>22,900</u></u>	<u><u>22,500</u></u>

PERSONNEL SUMMARY

	FY 1993	FY 1994	FY 1995
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AVERAGE GS/GM GRADE	12.0	12.0	12.0
AVERAGE ES SALARY	\$107,507	\$107,894	\$109,750
AVERAGE GS/GM SALARY	\$52,660	\$57,835	\$60,489
AVERAGE SALARY OF SPECIAL UNGRADED POSITIONS ESTABLISHED BY NASA ADMINISTRATOR	\$91,584	\$91,734	\$91,734
AVERAGE SALARY OF UNGRADED POSITIONS	\$37,831	\$38,398	\$38,974

Installation Justification

Johnson Space Center

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

LYNDON B. JOHNSON SPACE CENTER

ROLES AND MISSIONS

SPACE STATION - Institutional personnel provide engineering and testbed support to the program. This includes test capabilities, the provision of Government Furnished Equipment (GFE), and engineering analysis support for the work of the prime contractor, its major subcontractors, and NASA system engineering and integration efforts. The Johnson Space Center (JSC) is the host center for the Space Station program office. A detailed narrative describing these activities is included separately.

JSC shares the responsibility for operations capability and construction with Kennedy Space Center (KSC) and will develop a set of facilities and systems to conduct the operations of the Space Station. JSC will develop systems for on-orbit operations control of the Space Station.

SHUTTLE PROGRAMS - Provide support to Spacelab, the engineering technical base, payload operations and support equipment, and advanced programs. Conduct concept studies and development on flight systems and options for human transportation. Provide for Shuttle activities to support a schedule consistent with major program milestones. Provide development, integration, and operations support for the Mission Control Center (MCC), the Shuttle Mission Simulator (SMS), and other ground facilities needed for Space Shuttle operations. Provide for Shuttle operational flight program management including system integration, crew equipment modification and processing, crew training, flight mission planning and operations, and procurement of Orbiter hardware.

SPACE SCIENCE - Support the Agency's planetary science program in the area of geosciences required to support potential future programs, provide curatorial support for lunar materials, assist in information dissemination, and interact with outside scientists. The research focuses on the composition, structures, and evolutionary histories of the solid bodies of the universe.

**LIFE AND MICROGRAVITY SCIENCES** - Evaluate human physiological changes associated with the space flight environment and develop effective countermeasures to assure crew health and optimal performance during all phases of flight. Define and develop on-board health care systems and environmental monitoring systems; crew medical training; ground-based medical support of missions; develop a longitudinal crew health data base; and develop medical and psychological crew selection criteria. JSC has established a center for the support of biotechnology applications in microgravity in order to study growth factors, medical chemo/immunotherapeutic, and human tissue transplantation.

**ADVANCED CONCEPTS AND TECHNOLOGY** - Provide technology to support the evolution of the Space Shuttle, and the development of transportation systems. Promote and develop private sector investment in space-based technologies and promote industrial productivity through the transfer to the nation's commercial sector of technologies that derive from NASA's programs and activities. Works to establish innovative partnerships and innovative approaches leading to new commercial enterprises, products, and services.

**CENTER MANAGEMENT AND OPERATIONS** - Provide administrative and financial services in support of Center management and the Space Station Program Office, and provide for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

JOHNSON SPACE CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	865	506	380
SHUTTLE PROGRAMS	1,988	2,049	1,957
SPACE SCIENCE	<u>47</u>	<u>50</u>	<u>50</u>
PHYSICS AND ASTRONOMY	23	24	24
PLANETARY EXPLORATION	24	26	26
LAUNCH SERVICES	0	0	0
LIFE AND MICROGRAVITY SCIENCES	101	150	150
MISSION TO PLANET EARTH	3	4	4
ADVANCED CONCEPTS AND TECHNOLOGY	49	107	107
AERONAUTICAL RESEARCH AND TECHNOLOGY	0	0	0
SAFETY RELIABILITY AND QUALITY ASSURANCE	1	2	2
ACADEMIC PROGRAMS	0	4	4
COMMUNICATIONS	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	3,054	2,872	2,654
CENTER MANAGEMENT AND OPERATIONS	<u>552</u>	<u>543</u>	<u>535</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	3,606	3,415	3,189
OTHER CONTROLLED FTE's	<u>28</u>	<u>23</u>	<u>23</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	3,634	3,438	3,212
FORMER NON-CEILING	<u>114</u>	<u>114</u>	<u>114</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>3,748</u></u>	<u><u>3,552</u></u>	<u><u>3,326</u></u>

i

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>245,811</b>	<b>255,059</b>	<b>257,671</b>
A. COMPENSATION AND BENEFITS	242,871	252,246	254,600
1. COMPENSATION	203,643	209,484	212,051
2. BENEFITS	39,228	42,762	42,549
B. SUPPORTING COSTS	2,940	2,813	3,071
1. TRANSFER OF PERSONNEL	276	650	475
2. INVESTIGATIVE SERVICES	173	100	350
3. PERSONNEL TRAINING	2,491	2,063	2,246
<b>II. TRAVEL</b>	<b>6,728</b>	<b>6,318</b>	<b>6,459</b>
A. PROGRAM TRAVEL	5,587	5,559	5,490
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	324	188	256
C. MANAGEMENT AND OPERATIONS TRAVEL	817	571	713
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>80,100</b>	<b>78,400</b>	<b>78,600</b>
A. FACILITIES SERVICES	17,900	17,600	18,800
B. TECHNICAL SERVICES	30,700	24,800	23,200
C. MANAGEMENT AND OPERATIONS	31,500	36,000	36,600
<b>TOTAL, FUND REQUIREMENTS</b>	<b>332,639</b>	<b>339,777</b>	<b>342,730</b>

FY 1993    FY 1994    FY 1995  
 (Thousands of Dollars)

**I.            PERSONNEL AND RELATED COSTS**

1.            Compensation

2.            Benefits

3.            Supporting Costs

245,811    255,059    257,671

203,643    209,484    212,051

39,228     42,762     42,549

2,940      2,813      3,071

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II.           TRAVEL**

6,728      6,318      6,459

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate is the continuation of monitoring and managing cooperative ventures with foreign countries; mission support, and provide management overview of programs and functions.

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
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(Thousands of Dollars)

III. RESEARCH OPERATIONS SUPPORT

	80,100	78,400	78,600
A. FACILITIES SERVICES	17,900	17,600	18,800

Facilities Services provides basis security, fire protection and other custodial services for the Johnson Space Center. It also provides maintenance of all roads and grounds and of all administrative buildings and facilities. Finally, it provides all utility costs of administrative buildings.

Basis of FY 1995 Estimate

The FY 1995 estimate shows a minor increase over the FY 1994 estimate, though not enough to accommodate the anticipated escalation of costs. This increase is a result of anticipated increases in maintenance and utilities costs, offset by further reductions in maintenance related areas, fire protection and custodial services due to institutional reductions. The impact of these reductions will be reduced capability for facility services centerwide.

B. TECHNICAL SERVICES

	30,700	24,800	23,200
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Technical Services provides the Johnson Space Center administrative automated data processing (ADP) capability which supports accounting, payroll, budgeting, procurement, and personnel as well as all other administrative functions. It also funds the graphics and photographic support to these functions. Finally, it funds the centerwide safety and public information programs.

Basis of FY 1995 Estimate

The FY 1995 estimate shows a further reduction over the FY 1994 estimate, and does not accommodate anticipated escalation costs. There is a minor increase in the administrative ADP area which is offset by reductions in public affairs, scientific and technical information support and photographic support due to institutional reductions.

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		

C.           MANAGEMENT AND OPERATIONS

	31,500	36,000	36,600
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Management and Operations funds the Johnson Space Center telephone, mail and logistics systems, the administrative equipment and supplies, and the transportation system including the general purpose motor pool and the program support aircraft. It also funds the basic medical and environmental health programs. Finally, it funds printing and reproduction and all other support, such as small contracts and purchases for the Center Director's staff and the Administrative functions.

Basis of FY 1995 Estimate

The FY 1995 estimate shows a minor increase over the FY 1994 estimate, but does not accommodate anticipated escalation costs. There is an additional increase in administrative communications and a small increase in medical and environmental services which is partially offset by reductions in printing and reproduction services, transportation, and institutional support services.



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

JOHN F. KENNEDY SPACE CENTER

ROLES AND MISSIONS

SPACE STATION - The Kennedy Space Center (KSC) shares responsibility for operations capability and construction with the Johnson Space Center (JSC) to develop a set of facilities, systems, capabilities to conduct the operations of the Space Station. KSC will develop launch site operations capabilities for conducting prelaunch and post-landing ground operations including integrated testing, interface verification, servicing, launch activities, and experiment-to-rack physical integration.

SHUTTLE PROGRAMS - Provide Space Shuttle launch preparation, including Spacelab assembly and checkout and payload experiment integration; upper stages processing; orbiter, Spacelab, and Ground Support Equipment (GSE) logistics; and operation and maintenance of GSE.

LAUNCH SERVICES - Provide government oversight of all launch vehicle and payload processing and checkout activities for all NASA contracted expendable launch vehicle and upper stage launch services both at the KSC and the Vandenberg Air Force Base, and for NASA launch management responsibility.

CENTER MANAGEMENT AND OPERATIONS - Provide administrative and financial services in support of Center management and provides for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

KENNEDY SPACE CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	257	197	150
SHUTTLE PROGRAMS	1,691	1,690	1,629
SPACE SCIENCE	0	0	0
PHYSICS AND ASTRONOMY	0	0	0
PLANETARY EXPLORATION	0	0	0
LAUNCH SERVICES	43	53	53
LIFE AND MICROGRAVITY SCIENCES	115	117	117
MISSION TO PLANET EARTH	0	0	0
ADVANCED CONCEPTS AND TECHNOLOGY	9	10	10
AERONAUTICAL RESEARCH AND TECHNOLOGY	0	0	0
SAFETY RELIABILITY AND QUALITY ASSURANCE	0	0	0
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	0	0	0
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	<u>2,115</u>	<u>2,067</u>	<u>1,959</u>
CENTER MANAGEMENT AND OPERATIONS	397	390	389
SUBTOTAL - FULL-TIME PERMANENT FTEs	<u>2,512</u>	<u>2,457</u>	<u>2,348</u>
OTHER CONTROLLED FTE's	13	15	15
SUBTOTAL - FULL-TIME EQUIVALENTS	<u>2,525</u>	<u>2,472</u>	<u>2,363</u>
FORMER NON-CEILING	104	104	104
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>2,629</u></u>	<u><u>2,576</u></u>	<u><u>2,467</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>157,089</b>	<b>164,319</b>	<b>165,249</b>
A. COMPENSATION AND BENEFITS	153,986	161,530	162,260
1. COMPENSATION	128,193	134,532	135,205
2. BENEFITS	25,793	26,998	27,055
B. SUPPORTING COSTS	3,103	2,789	2,989
1. TRANSFER OF PERSONNEL	404	340	555
2. INVESTIGATIVE SERVICES	62	36	150
3. PERSONNEL TRAINING	2,637	2,413	2,284
<b>II. TRAVEL</b>	<b>3,933</b>	<b>3,769</b>	<b>3,999</b>
A. PROGRAM TRAVEL	2,367	2,900	3,076
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	83	80	87
C. MANAGEMENT AND OPERATIONS TRAVEL	1,483	789	836
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>97,100</b>	<b>87,200</b>	<b>80,000</b>
A. FACILITIES SERVICES	34,500	32,000	29,900
B. TECHNICAL SERVICES	22,900	21,800	19,000
C. MANAGEMENT AND OPERATIONS	39,700	33,400	31,100
<b>TOTAL, FUND REQUIREMENTS</b>	<b>258,122</b>	<b>255,288</b>	<b>249,248</b>

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**I            PERSONNEL AND RELATED COSTS**

	157,089	164,319	165,249
1.        Compensation	128,193	134,532	135,205
2        Benefits	24,793	26,998	27,045
3        Supporting Costs	3,103	2,789	2,989

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II            TRAVEL**

	3,933	3,769	3,999
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Basis of the FY 1994 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate provides the necessary support to monitor and manage the test, checkout and launch of space vehicles; mission support; and management overview of programs and functions.

FY 1993   FY 1994   FY 1995  
(Thousands of Dollars)

III.      RESEARCH OPERATIONS SUPPORT

97,100      87,200      80,000

A.          FACILITIES SERVICES

34,500      32,000      29,900

Facilities Services provide basic security, fire protection and other custodial services for the Kennedy Space Center. It also provides maintenance of all roads and grounds and of all administrative buildings and facilities. Finally, it provides all utility costs of administrative buildings.

Basis of FY 1995 Estimate

The FY 1995 estimate shows an additional decrease and does not accommodate the anticipated escalation of costs. This decrease is a result of further reductions in maintenance related support, security, fire protection, and custodial services which was partially offset by a minor increase in utilities due to anticipated rate and consumption increases.

B.          TECHNICAL SERVICES

22,900      21,800      19,000

Technical Services provides the Kennedy Space Center administrative automated data process (ADP) capability which supports accounting, payroll, budgeting, procurement, and personnel as well as all other administrative functions. It also funds the graphics and photographic support to the functions. Finally, it funds the centerwide safety and public information programs.

Basis of FY 1995 Estimate

The FY 1995 estimate shows an institutional reduction and does not accommodate escalation costs. All categories within this functional area were affected.



Marshall Space Flight  
Center

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

GEORGE C. MARSHALL SPACE FLIGHT CENTER

ROLES AND MISSIONS

SPACE STATION - Provide engineering and testbed support to the program including engineering analysis in support of the station system engineering and integration effort and the work of the prime and major subcontractors. Responsible for developing payload utilization capabilities and managing operations payload.

SHUTTLE PROGRAMS - Design, development, and procurement of propulsion elements of the Space Transportation System. Study and definition of future space programs including space transportation systems, space power and energy systems, space structures, space processing, and space science and applications facilities.

Design, development, integration, and testing of launch vehicles and space transportation systems and system definition for future manned and unmanned launch systems.

Spacecraft mission management including design, development and testing of payload carriers; payload definition; integration of science payloads into payload carriers; and operation of the payload integrated carrier systems.

LAUNCH SERVICES - Support of the Inertial Upper Stage (IUS) missions with readiness reviews, joint integrated flight simulations, launch and flight operations support, and post flight evaluation of the upper stage performance. Management of the development, production and launch support of the Small Expendable Deployer System (SEDS).

SPACE SCIENCE - Manage and plan Shuttle/Spacelab activities of the Atmospheric Laboratory for Applications and Science (ATLAS), Advanced X-Ray Astrophysics Facility (AXAF), International Microgravity Laboratory (IML), United States Microgravity Laboratory (USML), and other dedicated payload missions.

**LIFE AND MICROGRAVITY SCIENCES** - Provide the fundamental science and technology for processing materials under conditions that allow detailed examination of the constraints imposed by gravitational forces. Perform research in the areas of crystal growth, fluid physics, biophysics, solidification mechanics, chemistry and polymeric materials. Integrates microgravity flight experiments and science and applications flight experiments for Spacelab; operates integrated payload systems; and trains mission and payload specialists in the science aspects of their missions.

**ADVANCED CONCEPTS AND TECHNOLOGY** - Provide propulsion and vehicle technology to reduce schedule and cost risk in the development of next generation expendable and reusable space transportation vehicles. Perform technology development in hybrid and liquid propulsion systems, advanced manufacturing processes and transportation vehicle materials and structures. Conduct, under cooperative agreements with the U.S. launch vehicle industry, technology efforts to improve the competitiveness of current systems. In cooperation with the Shuttle Program Office, mature technologies that will reduce costs and avoid obsolescence of the Shuttle.

**MISSION TO PLANET EARTH** - Conduct theoretical, field, and laboratory experimental research in the global weather, severe storms, and local weather areas in order to improve the understanding of severe storms, local and global scale weather systems, and to establish criteria for Shuttle missions.

**COMMUNICATIONS** - Manage and maintain the Program Support Communications Network (PSCN) which provides communications hardware, software, and transmission medium that inter-connects NASA Headquarters, Field installations, and major contractor locations for the transfer of data, voice, and video.

**CENTER MANAGEMENT AND OPERATIONS** - Provide administrative and financial services in support of Center management and provides for the operation and maintenance of the institutional facilities, systems, and equipment. Lead center for the development and implementation of the NASA Financial Information System (NAFIS).

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

MARSHALL SPACE FLIGHT CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	580	412	150
SHUTTLE PROGRAMS	1,418	1,412	1,398
SPACE SCIENCE	<u>482</u>	<u>348</u>	<u>340</u>
PHYSICS AND ASTRONOMY	482	340	340
PLANETARY EXPLORATION	0	0	0
LAUNCH SERVICES	54	41	59
LIFE AND MICROGRAVITY SCIENCES	351	596	596
MISSION TO PLANET EARTH	129	137	137
ADVANCED CONCEPTS AND TECHNOLOGY	147	153	153
AERONAUTICAL RESEARCH AND TECHNOLOGY	2	0	0
SAFETY RELIABILITY AND QUALITY ASSURANCE	0	0	0
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>17</u>	<u>17</u>	<u>17</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	3,180	3,116	2,858
CENTER MANAGEMENT AND OPERATIONS	<u>479</u>	<u>479</u>	<u>440</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	3,659	3,595	3,298
OTHER CONTROLLED FTE's	<u>11</u>	<u>10</u>	<u>8</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	3,670	3,605	3,306
FORMER NON-CEILING	<u>124</u>	<u>124</u>	<u>124</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>3,794</u></u>	<u><u>3,729</u></u>	<u><u>3,430</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>231,108</b>	<b>236,639</b>	<b>240,300</b>
A. COMPENSATION AND BENEFITS	228,198	234,074	237,485
1. COMPENSATION	189,990	194,502	196,632
2. BENEFITS	38,208	39,572	40,853
B. SUPPORTING COSTS	2,910	2,565	2,815
1. TRANSFER OF PERSONNEL	405	365	315
2. INVESTIGATIVE SERVICES	46	50	200
3. PERSONNEL TRAINING	2,459	2,150	2,300
<b>II. TRAVEL</b>	<b>5,764</b>	<b>5,653</b>	<b>5,844</b>
A. PROGRAM TRAVEL	4,515	4,713	4,923
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	201	111	103
C. MANAGEMENT AND OPERATIONS TRAVEL	1,048	829	818
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>52,300</b>	<b>53,300</b>	<b>55,300</b>
A. FACILITIES SERVICES	14,800	15,700	15,600
B. TECHNICAL SERVICES	12,200	11,700	12,400
C. MANAGEMENT AND OPERATIONS	25,300	25,900	27,300
<b>TOTAL, FUND REQUIREMENTS</b>	<b>289,172</b>	<b>295,592</b>	<b>301,444</b>

FY 1993    FY 1994    FY 1995  
 (Thousands of Dollars)

		<u>231,108</u>	<u>236,639</u>	<u>240,300</u>
I.	<b>PERSONNEL AND RELATED COSTS</b>			
	1. Compensation	189,990	194,502	196,632
	2. Benefits	38,208	39,572	40,853
	3. Supporting Costs	2,910	2,565	2,815

Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

II.	<b>TRAVEL</b>	<u>5,764</u>	<u>5,653</u>	<u>5,844</u>
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Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate allows the Center to continue to monitor and manage the design, development and procurement of propulsion elements; the design, development, integration, and testing of launch vehicles and upper stages, and management overview of programs and functions.

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		

III. RESEARCH OPERATIONS SUPPORT

	52,300	53,300	55,300
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A. FACILITIES SERVICES

	14,800	15,700	15,600
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Facilities Services provides basic security, fire protection and other custodial services for the Marshall Space Flight Center. It also provides maintenance of all roads and grounds and of all administrative buildings and facilities. Finally, it provides all utility costs of administrative buildings.

Basis of FY 1995 Estimate

The FY 1995 estimate shows a minor decrease in maintenance related support and does not accommodate the anticipated escalation of costs.

B. TECHNICAL SERVICES

	12,200	11,700	12,400
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Technical Services provides the Marshall Space Flight Center administrative automated data processing (ADP) capability which supports accounting, payroll, budgeting, procurement, and personnel as well as all other administrative functions. It also funds the graphics and photographic support to the functions. Finally, it funds the centerwide safety and public information programs.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects an increase for ADP services and anticipated escalation of costs.

C. MANAGEMENT AND OPERATIONS

	25,300	25,900	27,300
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Management and Operations funds the Marshall Space Flight Center telephone, mail and logistics systems, administrative equipment and supplies, and the transportation system including the general purpose motor pool and the program support aircraft. It also funds the basic medical and environmental health programs as well as printing and reproduction and all other support, such as small contracts and purchases for the Center Director's staff and the Administrative functions.

Basis of FY 1995 Estimate

The FY 1995 budget estimate represents an increase based on projected inflation and increased services in the area of institutional support services

Stirn's Space Center

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

JOHN C. STENNIS SPACE CENTER

ROLES AND MISSIONS

SHUTTLE PROGRAMS - Provide, operate, maintain, and manage a propulsion test center and related capabilities for development, certification, and acceptance of rocket propulsion systems and components. Provides, maintains, and manages the facilities and the related capabilities required for the continued development and acceptance testing of the Space Shuttle Main Engines.

MISSION TO PLANET EARTH - Conduct technology utilization, applications, and commercialization programs to support the Agency goals in environmental systems sciences and observations, remote sensing, and image processing systems and applicable products.

ADVANCED CONCEPTS AND TECHNOLOGY - Conduct fundamental and applied research, develops advanced airborne sensors and data/information systems, and conducts test and evaluation activities of remote sensing technology. Also conducts research into applications for non-remote sensing, primarily in such areas as environmental system development and closed ecosystems development.

Commercial program activities emphasize promoting and developing private sector investment in space-based technologies and promoting industrial productivity through the transfer of technologies that derive from NASA's research and development programs and activities.

AERONAUTICAL RESEARCH AND TECHNOLOGY - Conduct challenging and quality research and development programs that will contribute and significantly advance propulsion test technologies for Government and commercial propulsion programs. Provides management oversight of National Aerospace Plane (NASP) Propulsion Test Facility design modifications and construction. Design, construction, and activation of the High Heat Flux Facility (HHFF) for high temperature material testing is underway. Stennis Space Center conducts technology development projects, including Hydrogen Leak Detection and Plume Diagnostics.

CENTER MANAGEMENT AND OPERATIONS - Provide operate, maintain, and manage the institutional base and laboratories required to accomplish and support assigned programs of NASA and other Federal and State organizations resident at SSC.

8

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

STENNIS SPACE CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	0	0	0
SHUTTLE PROGRAMS	85	77	80
SPACE SCIENCE	<u>0</u>	<u>0</u>	<u>0</u>
PHYSICS AND ASTRONOMY	0	0	0
PLANETARY EXPLORATION	0	0	0
LAUNCH SERVICES	0	0	0
LIFE AND MICROGRAVITY SCIENCES	1	1	1
MISSION TO PLANET EARTH	5	1	1
ADVANCED CONCEPTS AND TECHNOLOGY	11	11	16
AERONAUTICAL RESEARCH AND TECHNOLOGY	22	22	22
SAFETY RELIABILITY AND QUALITY ASSURANCE	1	1	1
ACADEMIC PROGRAMS	3	3	3
COMMUNICATIONS	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	128	116	124
CENTER MANAGEMENT AND OPERATIONS	<u>81</u>	<u>84</u>	<u>85</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	209	200	209
OTHER CONTROLLED FTE's	<u>          </u>	<u>5</u>	<u>5</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	214	205	214
FORMER NON-CEILING	<u>12</u>	<u>12</u>	<u>12</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>226</u></u>	<u><u>217</u></u>	<u><u>226</u></u>

	<u>FY 1993</u>	<u>FY 1984</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	13,985	14,745	15,181
A. COMPENSATION AND BENEFITS	13,586	14,394	14,726
1. COMPENSATION	11,079	11,622	11,977
2. BENEFITS	2,507	2,772	2,749
B. SUPPORTING COSTS	399	351	455
1. TRANSFER OF PERSONNEL	142	178	250
2. INVESTIGATIVE SERVICES	32	23	55
3. PERSONNEL TRAINING	225	150	150
II. TRAVEL	578	555	615
A. PROGRAM TRAVEL	265	294	326
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	130	100	111
C. MANAGEMENT AND OPERATIONS TRAVEL	183	161	178
III. RESEARCH OPERATIONS SUPPORT	14,000	16,800	15,900
A. FACILITIES SERVICES	5,600	8,800	8,200
B. TECHNICAL SERVICES	3,700	3,500	3,200
C. MANAGEMENT AND OPERATIONS	4,700	4,500	4,500
TOTAL, FUND REQUIREMENTS	28,563	32,100	31,696

FY 1993    FY 1984    FY 1995  
 (Thousands of Dollars)

I.	PERSONNEL AND RELATED COSTS	<u>13,985</u>	<u>14,745</u>	<u>15,181</u>
	1. Compensation	11,079	11,622	11,977
	2. Benefits	2,507	2,772	2,749
	3. Supporting Costs	399	351	455

Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

II.	TRAVEL	<u>578</u>	<u>555</u>	<u>615</u>
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Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate allows the Center to continue providing maintenance and management of facilities and related capability required for the development and acceptance testing of the Space Shuttle Main Engines, and provide increased management overview of programs and functions.

**III. RESEARCH OPERATIONS SUPPORT**

FY 1993    FY 1984    FY 1995  
 (Thousands of Dollars)

A. FACILITIES SERVICES	14,000	16,800	15,900
	5,600	8,800	8,200

Facilities Services provides basic security, fire protection and other custodial services for the Stennis Space Center. It also provides maintenance of all roads and grounds and of all administrative buildings and facilities. Finally, it provides all utility costs of administrative buildings.

Basis of FY 1995 Estimate

The FY 1995 estimate shows a decrease reflecting the Agency's decision to reduce institutional costs and does not accommodate the anticipated escalation of costs. Reductions were taken in maintenance related services and security which partially offset an increase to utilities.

B. TECHNICAL SERVICES	3,700	3,500	3,200
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Technical Services provides the Stennis Space Center administrative automated data processing (ADP) capability which supports accounting, payroll, budgeting, procurement, and personnel as well as all other administrative functions. It also funds the graphics and photographic support to the functions. Finally, it funds the centerwide safety and public information programs.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects a decrease based on reduced institutional costs not allowing for anticipated escalation costs. Reductions were taken in administrative ADP support and graphics support with a minor increase in public affairs support.

C. MANAGEMENT AND OPERATIONS	4,700	4,500	4,500
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Management and Operations funds the Stennis Space Center telephone, mail and logistics systems, the administrative equipment and supplies, and the transportation system including the general purpose motor pool

FY 1993    FY 1984    FY 1995  
(Thousands of Dollars)

and the program support aircraft. It also funds the basic medical and environmental health programs. Finally, it funds printing and reproduction and all other support, such as small contracts and purchases for the Center Director's staff and the Administrative functions.

Basis of FY 1995 Estimate

The FY 1995 estimate shows no net change and does not accommodate anticipated escalation costs. There is a minor decrease in administrative communications support, printing and reproduction and institutional support services which is offset by the increase in medical and environmental services.

Space Station Program  
Office

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

SPACE STATION

ROLES AND MISSIONS

Design and Development of Space Station Elements and Systems

In fiscal years 1994 and 1995, efforts are being concentrated on modifying the Space Station Freedom design to accommodate changes brought about by the fiscal year 1993 redesign activity. The new design, designated Alpha, will require the modification/deletion of hardware and include the incorporation of significant Russian participation. Contract negotiations are underway with the Space Station prime contractor, Boeing, and its subcontractors to implement management and design changes brought about by the redesign. Negotiations with the International Partners and Russia will be held to modify existing agreements where necessary.

The United States (U.S.) elements of the Space Station include two nodes, a laboratory module, truss segments, three photovoltaic arrays, a mini pressurized logistics module, a habitation module, a pressurized mating adapter, a cupola, and an unpressurized logistics carrier. Joint U.S./Russian components include the airlock, Salyut energy block, two Soyuz Assured Crew Return Vehicles (ACRV), batteries, solar dynamic modules, and additional photovoltaic arrays. Implementation of the design changes will culminate in a systems review during the second quarter of fiscal year 1994. Development will continue in FY 1995 with the production of design drawings, fabrication, and testing of hardware, software development/testing, and the outfitting of operations facilities.

Johnson Space Center

The Johnson Space Center (JSC) is the host location for the Space Station Program Office. The program office is responsible for contract and technical oversight of the prime contract with Boeing and its subcontractors. Integrated product teams are responsible for the systems and elements of the Space Station. These teams, consisting of NASA and contractor personnel, are responsible for the design, development, integration, test, qualification, and production of the flight hardware and software. These teams call on support from NASA

institutional personnel located at JSC and the other Field Centers where necessary. Personnel involved in the Space Station program located at Headquarters are included in the JSC Space Station FTE total. The level III project offices have been eliminated.

, JSC shares responsibility for Operations Capability and Construction with the Kennedy Space Center to develop a set of facilities, systems, and capabilities to conduct the operations of the Space Station. JSC will develop space systems operation capabilities for conducting training and on-orbit operations control for the Space Station.

#### **Marshall Space Flight Center**

The Marshall Space Flight Center (MSFC) provides engineering and testbed support to the program. This includes test capabilities, the provision of GFE, and engineering analysis support for the work of the prime contractor, its major subcontractors, and NASA system engineering and integration efforts. MSFC is also responsible for payload utilization and operations. The utilization of Space Station must be integrated across NASA Centers and the International Partners. Streamlined and responsive payload operations support to users will be provided through one research and science control facility.

#### **Lewis Research Center**

The Lewis Research Center (LeRC) provides engineering and testbed support to the program. This includes test capabilities, the provision of GFE, and engineering analysis support for the work of the prime contractor, its major subcontractors, and NASA system engineering and integration efforts.

#### **Kennedy Space Center**

The Kennedy Space Center (KSC) shares responsibility for Operations Capability and Construction with JSC to develop a set of facilities, systems, and capabilities to conduct the operations of the Space Station. KSC will develop launch site operations capabilities for conducting prelaunch and post-landing ground operations including integrated testing, interface verification, servicing, launch activities, and experiment-to-rack physical integration.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

SPACE STATION PROGRAM OFFICE	<u>FY 1993</u>	<u>PI 1994</u>	<u>FY 1995</u>
SPACE STATION	0	240	300
SHUTTLE PROGRAMS	0	0	0
SPACE SCIENCE	<u>0</u>	<u>0</u>	<u>0</u>
PHYSICS AND ASTRONOMY	0	0	0
PLANETARY EXPLORATION	0	0	0
LAUNCH SERVICES	0	0	0
LIFE AND MICROGRAVITY SCIENCES	0	0	0
MISSION TO PLANET EARTH	0	0	0
ADVANCED CONCEPTS AND TECHNOLOGY	0	0	0
AERONAUTICAL RESEARCH AND TECHNOLOGY	0	0	0
SAFETY RELIABILITY AND QUALITY ASSURANCE	0	0	0
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	0	240	300
CENTER MANAGEMENT AND OPERATIONS	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	0	240	300
OTHER CONTROLLED FTE's	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	0	240	300
FORMER NON-CEILING	<u>0</u>	<u>0</u>	<u>0</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>0</u></u>	<u><u>240</u></u>	<u><u>300</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	0	23,019	23,939
A. COMPENSATION AND BENEFITS	0	14,809	23,374
1. COMPENSATION	0	12,268	19,429
2. BENEFITS	0	2,541	3,945
B. SUPPORTING COSTS	0	8,210	565
1. TRANSFER OF PERSONNEL	0	8,000	325
2. INVESTIGATIVE SERVICES	0	15	15
3. PERSONNEL TRAINING	0	195	225
II. TRAVEL	0	2,327	2,768
A. PROGRAM TRAVEL	0	2,161	2,763
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	0	0	0
C. MANAGEMENT AND OPERATIONS TRAVEL	0	166	5
TOTAL, FUND REQUIREMENTS	0	25,346	26,707

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

I.            PERSONNEL AND RELATED COSTS

1.            Compensation

2.            Benefits

3.            Supporting Costs

0        23,019        23,939

0        12,268        19,429

0        2,541        3,945

0        8,210        565

Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

II.           TRAVEL

0        2,327        2,768

Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate provides continuation of support to the cooperative ventures with foreign countries, and increased management overview of programs and functions.

Goddard Space Flight  
Center



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

GODDARD SPACE FLIGHT CENTER

ROLES AND MISSIONS

SHUTTLE PROGRAMS - Manage development of the Hitchhiker, a reusable carrier system which provides increased flight opportunities with reduced leadtime while maximizing Shuttle load factors and minimizing spaceflight costs. Also manage and coordinate the Agency's Get Away Special (GAS) program.

LAUNCH SERVICES - Manages the small and medium class expendable launch vehicle services such as Pegasus and Delta used to put a wide variety of spacecraft into a broad spectrum of orbits.

PHYSICS AND ASTRONOMY - GSFC manages activities in the following discipline areas: gamma ray astronomy, X-ray astronomy, ultraviolet and optical astronomy, infrared and radio astronomy, particle astrophysics, solar physics, interplanetary physics, planetary magnetospheres, and astrochemistry. GSFC is also responsible for conducting the mission operations for a variety of operating spacecraft. Other activities include managing NASA's sounding rocket and scientific balloon program.

PLANETARY EXPLORATION - Conducts research into the physics of interplanetary and planetary space environments. Participates in planetary mission instrument development, operations, and data analysis.

MISSION TO PLANET EARTH - Development of the Earth Observing System (EOS). The primary objective of the Earth Observing System is to record global change and to observe regional-to-global processes. EOS will document global change over a fifteen year period to provide long-term, consistent data sets for use in modeling and understanding global processes. This process and modeling research effort will provide the basis for establishing predictive global change models for policy makers and scientists.

Manage flight projects (Earth Probes, Landsat) and develop and operate weather satellite missions for the National Oceanic and Atmospheric Administration (NOAA) and conduct correlation measurements from balloons, sounding rockets, aircraft, and ground installations.

**ADVANCED CONCEPTS AND TECHNOLOGY** - Develop technologies targeted at improved space borne instruments, on-board spacecraft systems and subsystems, and end-to-end systems. GSFC is involved in flight test and demonstration of the integration of new technology on Space Shuttle and Expendable Launch Vehicle (ELV) systems. Promote private sector investment in space-based technologies through the transfer of technologies that derive from NASA's programs and activities.

**AERONAUTICAL RESEARCH AND TECHNOLOGY** - Wallops Flight Facility conducts flight studies of new approach and landing procedures using the latest in guidance equipment and techniques, pilot information displays, human factors data, and terminal area navigation.

**COMMUNICATIONS** - Research and technology involves the investigation and development of advanced systems and techniques for spacecraft communications and tracking, command and control, and data acquisition and processing. The primary objectives are to apply technology and develop advanced capabilities to meet the tracking and data processing requirements of new missions and to improve the cost effectiveness and reliability of flight mission support.

Operates the Tracking and Data Relay Satellite System (TDRSS) manages the development of the replenishment TDRS spacecraft; provides mission control, data processing, and orbit/attitude computation support; operates the Space Tracking and Data Network (STDN), the NASA Communications (NASCOM) Network, and the Aeronautics, Balloons and Sounding Rocket Program.

The NASA Communications Network links the stations of the Deep Space Network (DSN), STDN, TDRSS, and other tracking and data acquisition elements with control centers and data processing and computation centers.

**CENTER MANAGEMENT AND OPERATIONS SUPPORT** - Provides administrative and financial services in support of Center management and provides for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

GODDARD SPACE FLIGHT CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	0	0	0
SHUTTLE PROGRAMS	61	44	46
SPACE SCIENCE	<u>1,440</u>	<u>1,404</u>	<u>1,361</u>
PHYSICS AND ASTRONOMY	1,325	1,283	1,243
PLANETARY EXPLORATION	115	121	118
LAUNCH SERVICES	50	52	54
LIFE AND MICROGRAVITY SCIENCES	0	0	0
MISSION TO PLANET EARTH	969	1,008	1,037
ADVANCED CONCEPTS AND TECHNOLOGY	71	59	61
AERONAUTICAL RESEARCH AND TECHNOLOGY	17	21	21
SAFETY RELIABILITY AND QUALITY ASSURANCE	13	12	12
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>587</u>	<u>556</u>	<u>546</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	3,208	3,156	3,138
CENTER MANAGEMENT AND OPERATIONS	<u>726</u>	<u>725</u>	<u>718</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	3,934	3,881	3,856
OTHER CONTROLLED FTE's	<u>30</u>	<u>30</u>	<u>30</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	3,964	3,911	3,886
FORMER NON-CEILING	<u>78</u>	<u>78</u>	<u>78</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>4,042</u></u>	<u><u>3,989</u></u>	<u><u>3,964</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	250,940	259,583	271,916
A. COMPENSATION AND BENEFITS	247,049	256,103	268,096
1. COMPENSATION	208,620	214,635	224,698
2. BENEFITS	38,429	41,468	43,398
B. SUPPORTING COSTS	3,891	3,480	3,820
1. TRANSFER OF PERSONNEL	262	230	500
2. INVESTIGATIVE SERVICES	90	50	120
3. PERSONNEL TRAINING	3,539	3,200	3,200
II. TRAVEL	6,904	6,539	7,176
A. PROGRAM TRAVEL	5,552	5,416	5,942
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	816	679	746
C. MANAGEMENT AND OPERATIONS TRAVEL	536	444	488
III. RESEARCH OPERATIONS SUPPORT	53,960	48,300	50,600
A. FACILITIES SERVICES	19,967	20,116	23,174
B. TECHNICAL SERVICES	12,487	11,274	10,970
C. MANAGEMENT AND OPERATIONS	21,506	16,910	16,456
TOTAL, FUND REQUIREMENTS	311,804	314,422	329,692

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

I.	PERSONNEL AND RELATED COSTS	250,940	259,583	271,916
	1. Compensation	208,620	214,635	224,698
	2. Benefits	38,429	41,468	43,398
	3. Supporting Costs	3,891	3,480	3,820

Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

II.	TRAVEL	6,904	6,539	7,176
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Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate allows the Center to continue to monitor and manage the EOS program, and management overview of programs and functions.

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

III.        RESEARCH OPERATIONS SUPPORT

53,960        48,300        50,600

A.         FACILITIES SERVICES

19,967        20,116        23,174

Facilities Services provides basic security, fire protection and other custodial services for the civil service workforce and to the physical plant at the Goddard Space Flight Center. It also provides maintenance of all roads and grounds and of all administrative buildings and facilities. Finally, it provides rental of administrative buildings and purchased utilities.

Basis of FY 1995 Estimate

The FY 1995 estimate provides for the following: funding of maintenance of facilities, equipment, roads, and grounds which have been deferred from prior years, anticipated rate changes in support service contracts, increased requirements for security, fire protection, custodial services, utility rate and consumption increases.

B.         TECHNICAL SERVICES

12,487        11,274        10,970

Technical services provides the Goddard Space Flight Center administrative automatic data processing capability that supports accounting, payroll, budgeting, procurement, personnel, as well as all the other administrative functions. It also funds the graphics and photographic support to these functions. Finally, it funds the centerwide safety and public information programs.

Basis of FY 1995 Estimate

The FY 1995 estimate represents reductions across the board in technical services in order to maintain the minimum level in facilities services to protect employee health and safety. It is the result of intensive cost cutting activities which respond to NASA's commitment to hold down costs in all areas.



Ames Research Center



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

AMES RESEARCH CENTER

ROLES AND MISSIONS

SHUTTLE PROGRAMS - Dryden Flight Research Facility (DFRF) is one of two primary recovery sites for the Space Shuttle missions. Upon landing, Dryden provides orbiter convoy operations and servicing support and support in mating the orbiter to the Shuttle Carrier Aircraft. Provide prime and contingency landing support to the Space Transportation System.

PHYSICS AND ASTRONOMY - Provide support for the airborne astronomy program with aircraft operated as flying astronomical observatories for research conducted by various NASA/university teams. Ames Research Center (ARC) manages and operates a variety of these operational aircraft which serve as facilities for research. Provides infrared technology research program utilizes the unique capabilities of infrared astronomy to investigate the nature and evolution of astronomical systems.

PLANETARY EXPLORATION - Provide a program of laboratory, computational, and theoretical studies to develop basic atmospheric planetary modeling concepts and obtain the necessary physical data to interpret spacecraft observations of planetary atmospheres and relate these data to the atmosphere of the Earth. Advanced studies of instrumentation and systems are carried out for potential deployment on future planetary missions.

LIFE AND MICROGRAVITY SCIENCES - Continue research on the effects of gravity on living systems using spaceflight experiments, ground simulation, and hypergravity facilities to understand the effects of gravity on the development of living systems, and to develop options for preventing health and psychophysiological problems during and following extended spaceflight. Develop the physical/chemical and regenerative life support technologies and extravehicular activity systems essential to exploration and extended presence in space. Continue biospherics research to enhance the understanding of the biological aspects of global conditions and biochemical processes on Earth.

MISSION TO PLANET EARTH - Develop instruments and computer models for the measurement and analysis of atmospheric constituents and properties from aircraft platforms. Continued applied research and development to enhance the use of remote and in-situ sensing technology for Earth resources applications. Conducting research, develop airborne and spaceborne instruments, and manage projects in the science of Earth's atmosphere and ecosystems.

ADVANCED CONCEPTS AND TECHNOLOGY - Conduct research on aerothermodynamics, entry technology materials research, intelligent systems technology, and advanced technology for space platforms. Continue the development of spaceborne processors and sensor technology and of technologies for humans in space, and the advancement in robotics and artificial intelligence.

AERONAUTICAL RESEARCH AND TECHNOLOGY - Conduct fundamental aeronautics research encompassing the entire range from computation to flight including computational analysis, wind tunnel research, flight simulation, and flight research. This research forms a coherent and interdependent program to provide a technology base for the development of subsonic and high speed transport aircraft, hypersonic aircraft, advanced rotorcraft and powered lift configurations, and the improvement of the performance and efficiency of high performance aircraft. Conducting aeronautical flight research and technology projects, including joint and/or cooperative activities with other NASA Centers, Government agencies, and industry.

Strengthen basic research and technology development for aerospace systems that transport humans, and instrumentation to and from space and within the atmospheres of other bodies within the solar system. Conducting transatmospheric research activities which focus on developing wind tunnel and flight analysis for use in evaluating the performance of a hypersonic/transatmospheric vehicle.

SAFETY, RELIABILITY AND QUALITY ASSURANCE - Provide institutional safety and health programs and develop and integrate SR&QA guidelines into program and project development.

CENTER MANAGEMENT AND OPERATIONS - Provide administrative and financial services in support of Center management and provides for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

AMES RESEARCH CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	7	6	0
SHUTTLE PROGRAMS	37	18	12
SPACE SCIENCE	<u>106</u>	<u>123</u>	<u>124</u>
PHYSICS AND ASTRONOMY	79	74	75
PLANETARY EXPLORATION	27	49	49
LAUNCH SERVICES	0	0	0
LIFE AND MICROGRAVITY SCIENCES	172	164	163
MISSION TO PLANET EARTH	91	86	86
ADVANCED CONCEPTS AND TECHNOLOGY	129	102	102
AERONAUTICAL RESEARCH AND TECHNOLOGY	1,062	1,024	1,055
SAFETY RELIABILITY AND QUALITY ASSURANCE	33	32	33
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>26</u>	<u>26</u>	<u>26</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	1,663	1,581	1,601
CENTER MANAGEMENT AND OPERATIONS	<u>547</u>	<u>545</u>	<u>548</u>
SUBTOTAL - FULL-TIME PERMANENT SFTEs	2,210	2,126	2,149
OTHER CONTROLLED FTE's	<u>24</u>	<u>30</u>	<u>35</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	2,234	2,156	2,184
FORMER NON-CEILING	<u>83</u>	<u>83</u>	<u>83</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>2,317</u></u>	<u><u>2,239</u></u>	<u><u>2,267</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>159,040</b>	<b>164,343</b>	<b>169,850</b>
A. COMPENSATION AND BENEFITS	156,240	161,903	167,184
1. COMPENSATION	131,447	134,340	139,804
2. BENEFITS	24,793	27,563	27,380
B. SUPPORTING COSTS	2,800	2,440	2,666
1. TRANSFER OF PERSONNEL	362	390	250
2. INVESTIGATIVE SERVICES	408	250	216
3. PERSONNEL TRAINING	2,030	1,800	2,200
<b>II. TRAVEL</b>	<b>4,190</b>	<b>3,991</b>	<b>4,204</b>
A. PROGRAM TRAVEL	2,649	2,573	2,710
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	583	539	568
C. MANAGEMENT AND OPERATIONS TRAVEL	958	879	926
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>40,500</b>	<b>35,224</b>	<b>33,785</b>
A. FACILITIES SERVICES	18,000	14,090	13,794
B. TECHNICAL SERVICES	11,700	9,678	9,208
C. MANAGEMENT AND OPERATIONS	10,800	11,456	10,783
<b>TOTAL, FUND REQUIREMENTS</b>	<b>203,730</b>	<b>203,558</b>	<b>207,839</b>

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**I            PERSONNEL AND RELATED COSTS**

		<u>159,040</u>	<u>174,343</u>	<u>179,850</u>
1	Compensation	131,447	134,340	139,804
2	Benefits	24,733	27,533	27,380
3	Supporting Costs	2,800	2,470	2,666

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes 1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II            TRAVEL**

	<u>4,190</u>	<u>3,991</u>	<u>4,204</u>
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Basis of the FY 1995 Estimate:

The increase from the FY 1994 estimate to the FY 1995 estimate allows the Center to provide support to monitor and manage major flight and aeronautical programs, and provides for increased management overview of programs and functions.

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		

**III. RESEARCH OPERATIONS SUPPORT**

	40,500	35,224	33,785
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A. FACILITIES SERVICES

	18,000	14,090	13,794
--	--------	--------	--------

Facilities services provides the cost of maintaining and repairing institutional facilities and equipment; the cost of custodial services associated with approximately three million square feet of various types of space located in 231 buildings and structures; the cost of security services for buildings and property, fire protection; and utilities costs for administrative buildings and structures.

Basis of FY 1995 Estimate

The FY 1995 budget estimate reflects a decrease to accommodate the Agency's decision to reduce institutional costs.

B. TECHNICAL SERVICES

	11,700	9,678	9,208
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Technical services provides the cost of automatic data processing for management activities; the cost of public affairs, educational and public information programs; and the cost of technical shops supporting institutional activities, such as safety support, photo and graphics services, and audiovisual services.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support technical services at the Center and includes reduced funding in all areas. The impact will be scaled back programming support to the administrative computing system and a freeze on all hardware and software systems upgrades. These cuts will be accommodated in photo, graphics, and video services by further scaling back services to customers.

C. MANAGEMENT AND OPERATIONS

	10,800	11,456	10,783
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Management and Operations provides the cost of administrative communications, such as telephone and teletype services; the cost of transportation services, such as motor pool operation costs, government bills of lading and air freight costs; the cost of support to Center management and staff, such as personnel, procurement and

financial management; the cost of medical services, including the staffing of the health unit clinic supplies and equipment maintenance; and the cost of installation support services which provide supply and property management, mail pickup and delivery services, and postage.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support management and operations at the Center and includes reduced funding in most areas. The reduced services will result in decreased availability to telephone system users and a reduction in GSA-leased vehicles and equipment. This reduction was partially offset by a printing press upgrade which will reduce annual printing costs.

Langley Research Center

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATE

LANGLEY RESEARCH CENTER

ROLES AND MISSIONS

LIFE AND MICROGRAVITY SCIENCES - Conduct a space radiation exposure program to support current and future manned space efforts in order to more accurately assess astronaut radiation exposures and body shielding factors.

MISSION TO PLANET EARTH - Conduct research to understand the environment and to develop atmospheric sensing systems and techniques. Langley Research Center (LaRC) has been designated a Primary Data and Archival Center for Earth Radiation and Atmospheric Chemistry for the Earth Observing System (EOS). Study of the Earth's atmosphere to assess changes caused by man and to determine whether or not there is any associated change in the chemical composition of the stratosphere that would change the transmission of solar ultraviolet radiation to the Earth's surface.

ADVANCED CONCEPTS AND TECHNOLOGY - Application of multi-discipline research to current and future space technology requirements. Long range studies are directed at defining the technology requirements for future space systems and missions. Conduct research on advanced manned launch system studies which provide the Agency long-range planning for a second generation Space Shuttle anticipated after the year 2000. Develop advanced concepts and technology base for future space transportation systems and spacecraft. Conduct materials research to determine environmental effects on the mechanical and physical properties of materials using specialized facilities and laboratories. Conduct research in electronic component technology, spacecraft guidance and control, large space antenna systems, automation and robotics, sensor technology, and information systems technology. Promote and develop private sector investment in space-based technologies and promote industrial productivity through the transfer of technologies that derive from NASA's programs and activities.

**AERONAUTICAL RESEARCH AND TECHNOLOGY** - Conduct advanced research in fundamental aerodynamics; high-speed, highly maneuverable aircraft technology; hypersonic propulsion; guidance and controls; acoustics; and structures and materials. Develop a technology base for improving transport, general aviation, and commuter aircraft. Conduct an aeronautical research and technology program to study current and future technology requirements and to demonstrate technology applications. Conduct theoretical and experimental research in fluid and flight mechanics to determine aerodynamic flows and complex aircraft motions.

Study critical environmental compatibility issues in order to make decisions on future high speed civil transport technology and development programs.. Develop technology options for realization of practical hypersonic and transatmospheric flight.

Conduct control and guidance research programs to advance technology in aircraft guidance and navigation, aircraft control systems, cockpit systems integration and interfacing techniques, and performance validation and verification methods. Conduct research in aircraft noise prediction and abatement and wind shear avoidance.

Research activity also includes study of supersonic combustion of both ramjets and other advanced airbreathing propulsion systems; development of large reusable structures for aerospace vehicles; and studies to define and understand the integration of advanced technologies into a future class of horizontal takeoff and landing vehicles capable of operating to orbit and/or hypersonic cruise within the atmosphere.

**SAFETY, RELIABILITY, AND QUALITY ASSURANCE** - The Safety, Reliability, and Quality Assurance program provides independent assessment activities which reduce program risk.

**CENTER MANAGEMENT AND OPERATIONS** - Provides administrative and financial services in support of Center management and provides for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

LANGLEY RESEARCH CENTER	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	23	16	0
SHUTTLE PROGRAMS	32	21	16
SPACE SCIENCE	<u>2</u>	<u>2</u>	<u>0</u>
PHYSICS AND ASTRONOMY	1	1	0
PLANETARY EXPLORATION	1	1	0
LAUNCH SERVICES	2	0	0
LIFE AND MICROGRAVITY SCIENCES	11	22	22
MISSION TO PLANET EARTH	236	208	208
ADVANCED CONCEPTS AND TECHNOLOGY	485	399	371
AERONAUTICAL RESEARCH AND TECHNOLOGY	1,388	1,444	1,483
SAFETY RELIABILITY AND QUALITY ASSURANCE	16	9	10
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>0</u>		
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	2,195	2,121	2,110
CENTER MANAGEMENT AND OPERATIONS	<u>707</u>	<u>700</u>	<u>700</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	2,902	2,821	2,810
OTHER CONTROLLED FTE's	<u>15</u>	<u>17</u>	<u>17</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	2,917	2,838	2,827
FORMER NON-CEILING	<u>118</u>	<u>118</u>	<u>118</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>3,035</u></u>	<u><u>2,956</u></u>	<u><u>2,945</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>175,230</b>	<b>182,245</b>	<b>190,050</b>
A. COMPENSATION AND BENEFITS	172,482	179,738	187,315
1. COMPENSATION	145,797	149,728	156,727
2. BENEFITS	26,685	30,010	30,588
B. SUPPORTING COSTS	2,748	2,507	2,735
1. TRANSFER OF PERSONNEL	136	157	270
2. INVESTIGATIVE SERVICES	258	200	195
3. PERSONNEL TRAINING	2,354	2,150	2,270
<b>II. TRAVEL</b>	<b>4,012</b>	<b>3,768</b>	<b>3,999</b>
A. PROGRAM TRAVEL	2,681	2,518	2,673
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	849	797	846
C. MANAGEMENT AND OPERATIONS TRAVEL	482	453	480
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>33,500</b>	<b>30,503</b>	<b>28,445</b>
A. FACILITIES SERVICES	12,000	11,223	10,286
B. TECHNICAL SERVICES	8,500	8,066	7,945
C. MANAGEMENT AND OPERATIONS	13,000	11,214	10,214
<b>TOTAL, FUND REQUIREMENTS</b>	<b>212,742</b>	<b>216,516</b>	<b>222,494</b>

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**I            PERSONNEL AND RELATED COSTS**

175,230        182,245        190,050

1.        Compensation

145,797        149,728        158,727

2        Benefits

28,885        30,010        30,388

3        Supporting Costs

2,748        2,507        2,735

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II            TRAVEL**

4,012        3,788        3,999

Basis of the FY 1995 Estimate

The increase from the 1994 estimate to the FY 1995 estimate allows the Center to continue the provision of oversight of aeronautical program activity, and provide increased management overview of programs and functions.

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**III. RESEARCH OPERATIONS SUPPORT**

**33,500      30,503      28,445**

A. FACILITIES SERVICES

**12,000      11,223      10,286**

Facilities services provides the cost of maintaining and repairing institutional administrative facilities and equipment; the cost of janitorial, security and ambulance services and supplies; the cost of fire protection which is purchased from the City of Hampton; and the cost of utilities services, such as electricity, fuel oil, water and sewage charges; and operation of the cooperative refuse burner.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support facilities services at the Center and includes level funding for security and fire protection services and reduced repair and custodial services. This estimate also anticipates increased utilities costs. The impact will be cutting facility engineering services, reducing and rescheduling test shifts, further reductions of custodial service, and deleting purchase of non-collateral equipment.

B. TECHNICAL SERVICES

**8,500      8,066      7,945**

Technical services provides the costs of automatic data processing (equipment lease, purchase and maintenance, supplies, and programming and operations services) for management activities, such as accounting and management information; the cost of educational and informational programs, including library services and public affairs activities; and the cost of technical shops supporting institutional activities, such as technical documentation, safety support, and photo and graphics services.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support technical services at the Center. Anticipated increases in support service contractor rates will impact technical library operations, and photo, graphics and video services.

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

C.        MANAGEMENT AND OPERATIONS	13,000	11,214	10,214
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Management and Operations provides the cost of administrative communications, such as telephone and exchange costs, and datafax and telegraph service; printing and reproduction operating costs, as well as supplies and materials; transportation costs, such as operation, maintenance and purchase of motor vehicles, and shipping and freight charges; and the cost of installation common services, including medical services, mail delivery, and stock issue and warehousing.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects reduced institutional funding to support management and operations at the Center. The impact of the reduced funding will be suspended telephone and network upgrades, elimination of intracenter transportation, and reduced support service contractor administrative support in the areas of personnel, legal, procurement, and logistics services.



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

LEWIS RESEARCH CENTER

ROLES AND MISSIONS

SPACE STATION - The Lewis Research Center provides engineering and testbed support to the program. This includes test capabilities, the provision of Government Furnished Equipment (GFE), and engineering analysis support for the work of the prime contractor, its major subcontractors, and NASA system engineering and integration efforts.

LAUNCH SERVICES - LeRC is responsible for procurement and management of commercial launch services for the intermediate (Atlas/Centaur and Titan III) and large (Titan IV) class expendable launch vehicles in the NASA Mixed Fleet.

LIFE AND MICROGRAVITY SCIENCES - Conduct microgravity science and applications research; design and develop space flight experiments; and perform ground and space flight experiments in materials, combustion, fluid physics, and instrumentation. Perform research on advanced design and operation of microgravity experimental flight hardware. Conduct ground-based research and flight experiments in basic science and technology associated with materials, combustion, fluid physics phenomena, and power and propulsion technology.

ADVANCED CONCEPTS AND TECHNOLOGY - Conduct research to provide advancements in satellite, platform and planetary power systems; to create new propulsion options for high- and low- thrust systems; to enable new capabilities in space communications and electronics; and to provide effective means to manage cryogenic fluids in microgravity. Conduct research in propulsion to support the next generation of unmanned launch vehicles, satellites, microsatellites, and space platforms. Conduct research on enhanced micro- and full-size satellite power systems as well as power systems for deep space and planetary exploration.

Perform applied research and technology aimed at development of advanced concepts and technologies for communication systems. Emphasis is on developing high data return from NASA missions using less mass and

power and developing innovative and cost competitive commercial satellite communications services.

Conduct space materials and structures research and technology to develop improved materials, advance structural analysis and life prediction, and develop long-life, reliable space mechanisms.

Promote and develop private sector investment in space-based technologies and to promote industrial productivity through the transfer of technologies that derive from NASA's programs and activities.

Conduct studies to provide long-range planning for future launch systems and spacecraft. Provide technology assessments & technology definition studies for future space operations in the areas of telecommunications and information management networks.

**AERONAUTICAL RESEARCH AND TECHNOLOGY** - Conduct aerospace propulsion research and technology to enhance the technology base for developing advanced aeronautical propulsion systems in order to increase speed and range; improve fuel efficiency, operating cost, reliability and durability; and decrease environmental impact.

Conduct vehicle focused research and technology directed at developing the propulsion technology for specific engines and propulsion systems. Applications for these focused propulsion systems research efforts include subsonic transports, commuters, supersonic cruise (High Speed Research), hypersonic aircraft, rotorcraft, general aviation, and high performance aircraft.

**CENTER MANAGEMENT AND OPERATIONS** - Provides administrative and financial services in support of Center Management and provides for the operation and maintenance of the institutional facilities, systems, and equipment.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

LEWIS RESEARCH CENTER	<u>FY 1993</u>	<u>PI 1994</u>	<u>FY 1995</u>
SPACE STATION	384	190	20
SHUTTLE PROGRAMS	4	4	4
SPACE SCIENCE	<u>0</u>	<u>0</u>	<u>0</u>
PHYSICS AND ASTRONOMY	0	0	0
PLANETARY EXPLORATION	0	0	0
LAUNCH SERVICES	77	76	76
LIFE AND MICROGRAVITY SCIENCES	238	406	406
MISSION TO PLANET EARTH	62	0	0
ADVANCED CONCEPTS AND TECHNOLOGY	541	528	522
AERONAUTICAL RESEARCH AND TECHNOLOGY	945	989	1,029
SAFETY RELIABILITY AND QUALITY ASSURANCE	4	4	4
ACADEMIC PROGRAMS	0	0	0
COMMUNICATIONS	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	2,255	2,197	2,061
CENTER MANAGEMENT AND OPERATIONS	<u>498</u>	<u>501</u>	<u>463</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	2,753	2,698	2,524
OTHER CONTROLLED FTE's	<u>43</u>	<u>44</u>	<u>46</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	2,796	2,742	2,570
FORMER NON-CEILING	<u>27</u>	<u>27</u>	<u>27</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>2,823</u></u>	<u><u>2,769</u></u>	<u><u>2,597</u></u>

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
	(Thousands of Dollars)		
<b>I. PERSONNEL AND RELATED COSTS</b>	<b>174,211</b>	<b>182,155</b>	<b>182,695</b>
A. COMPENSATION AND BENEFITS	171,023	179,245	179,500
1. COMPENSATION	142,938	148,903	149,529
2. BENEFITS	28,085	30,342	29,971
B. SUPPORTING COSTS	3,188	2,910	3,195
1. TRANSFER OF PERSONNEL	94	78	550
2. INVESTIGATIVE SERVICES	171	150	90
3. PERSONNEL TRAINING	2,923	2,682	2,555
<b>II. TRAVEL</b>	<b>4,114</b>	<b>3,880</b>	<b>4,101</b>
A. PROGRAM TRAVEL	2,723	2,572	2,719
B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	731	687	726
C. MANAGEMENT AND OPERATIONS TRAVEL	660	621	656
<b>III. RESEARCH OPERATIONS SUPPORT</b>	<b>40,592</b>	<b>37,684</b>	<b>34,870</b>
A. FACILITIES SERVICES	14,700	14,779	13,455
B. TECHNICAL SERVICES	8,100	9,011	8,861
C. MANAGEMENT AND OPERATIONS	17,792	13,894	12,554
TOTAL, FUND REQUIREMENTS	218,917	223,719	221,666

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**I            PERSONNEL AND RELATED COSTS**

	<u>174,211</u>	<u>182,155</u>	<u>182,695</u>
1.        Compensation	142,938	148,903	149,529
2.        Benefits	28,085	30,342	29,971
3.        Supporting Costs	3,188	2,910	3,195

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II            TRAVEL**

	<u>4,114</u>	<u>3,880</u>	<u>4,101</u>
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Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate allows the Center to monitor and track the research experiments in conjunction with shuttle activities, and provide increased management overview of programs and functions.

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

III.        RESEARCH OPERATIONS SUPPORT

40,592        37,684        34,870

A.         FACILITIES SERVICES

14,700        14,779        13,455

Facilities services provides for the rental of office space for civil service employees; the cost of institutional facilities operation and maintenance; the cost of custodial services, including janitorial, security and fire protection; and the cost of institutional utilities services, such as electricity, natural gas, sewer, water and oil.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects reduced institutional funding that will support minimum facilities services at the Center. Significant impacts include reduction of facility modifications, reductions in facility engineering services related to configuration management, reduction in janitorial, security and ground services, and reductions in off-site office lease costs by moving off-site civil service employees to government-owned on-site offices.

B.         TECHNICAL SERVICES

8,100        9,011        8,861

Technical services provides the cost of all administrative automatic data processing functions (equipment lease, replacement and maintenance, and programming and operations contractor support) in support of institutional management, accounting and finance, procurement, personnel management and utility tracking; the cost of educational and informational programs, including library and public information services; the cost of graphics and photographic services, including supplies, materials and equipment; the cost of safety services and environmental compliance activities.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support technical services at the Center, reduced funding in administrative automatic data processing, and level funding plus inflation in all other areas.

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

C.            MANAGEMENT AND OPERATIONS

17,792            13,894            12,554

Management and Operations provides the cost of administrative communications, such as local and long distance telephone services and non-telephone communications; the cost of administrative printing, including the operating costs of the printing and reproduction facility as well as supplies, materials and equipment; the cost of transportation services, such as bus, package delivery, and administrative aircraft maintenance; and the cost of administrative services for Center management and staff, including medical services, mail delivery, postage, stock issue and warehousing, and environmental studies activities.

Basis of FY 1995 Estimate

The FY 1995 estimate reflects the minimum funding to support management and operations at the Center and includes substantial reductions in telecommunications by slowing phone system upgrades, and substantial reductions in installation support services (i.e., internal mail distribution and property management, warehousing). In addition, less substantial reductions will be required in transportation services, printing/reproduction services and medical services.



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1995 ESTIMATES

NASA HEADQUARTERS

CENTER ROLES AND MISSIONS

The mission of Headquarters is to plan and provide executive direction for the implementation of U.S. space and aeronautics programs consistent with the objectives stated in the National Aeronautics and Space Act of 1958, as amended. Responsibilities include providing a balanced Agency workforce capable of planning, formulating, and advocating executive direction to national programs to implement the above objectives. The following offices at Headquarters assist in carrying out the technical aspects of the mission:

Office of Space Flight - Plans, directs, executes, and evaluates the acquisition and operations of space flight programs including the Space Shuttle and other space flight related programs. The Office of Space improvements in safety, reliability, and effectiveness of Shuttle operational performance; and manages a variety of programs such as Spacelab, Payload Operations and Support Equipment. Manages the design, development, test, and evaluation of the Space Station program.

Office of Space Science (OSS) - Responsible for research and development efforts utilizing a variety of flight system and ground based observatories to increase knowledge of the universe. Office of Space Science research and development activities are carried out through the following program areas: Planetary Exploration, Astrophysics, and Space Physics. The Planetary Exploration program includes the scientific exploration of the solar system including the planets and their satellites, comets and asteroids, and the interplanetary medium. The Astrophysics program studies the distant galaxies and the interstellar medium in our galaxy. The Space Physics program studies our own sun providing answers to questions requiring comprehensive research into solar-terrestrial processes. Responsibilities also include the procurement of Expendable Launch Vehicle Services for NASA and other civil government programs.

Office of Mission to Planet Earth (OMTPE) - Responsible for research and development efforts utilizing a variety of flight system and ground based observatories to increase knowledge of the processes in the atmosphere, oceans, land surface and interior of the Earth, and to advance our knowledge of the interactions between these environments. The Mission to Planet Earth program provides space observations of parameters involved in these processes and extends the national capability to predict environmental phenomena, both short and long-term, and their interactions with human activities. The Mission to Planet Earth program also supports a broad interdisciplinary basic research program.

Office of Life and Microgravity Sciences and Applications (OLMSA) - Responsible for research and development efforts utilizing a variety of flight system and ground based observatories to increase knowledge in Life and Microgravity Sciences. The Life Sciences research program results are applied to maintaining astronaut health and productivity; understanding the response of biological mechanisms to weightlessness; study of basic cellular, development, and physiological processes; development of environmental health requirements and support systems for long-term piloted space flight. The Microgravity Research program is aimed at utilizing the low gravity environment to obtain new knowledge and understanding of those physical phenomena made obscure by the effects of gravity and to increase understanding of gravity-dependent phenomena. Responsibilities also include the Shuttle/Spacelab and attached payload mission management activities.

Office of Aeronautics - Plans, directs, executes, and evaluates the aeronautical and transatmospheric research and technology programs. The goal of the aeronautical programs is to conduct research and develop technology to strengthen U.S. leadership in civil and military aviation. The program is based on a strong commitment to develop a broad technology base in support of the aviation industry, to enhance safety and capacity of the national airspace system, and to assure U.S. aviation superiority for national security.

Office of Advanced Concepts and Technolow (OACT) - In 1993, the Office of Commercial Programs and the Space Technology Directorate of the former Office of Aeronautics and Space Technology were merged to create the Office of Advanced Concepts and Technology. Also, in FY 1994, the Advanced Space Transportation program combines space transportation technology, advanced programs, Solid Propulsion Integrity Program (SPIP), Advanced Launch Technology and Single Engine Centaur which were previously distributed in several programs. The new office will support the development and application of technologies critical to the economic, scientific, and technological competitiveness of the U.S. and will promote U.S. industrial preeminence through strengthened linkages between the private sector and NASA technology efforts.

Office of Space Communications - Provides the vital tracking, telemetry, command, data acquisition, communications, and data processing required by all NASA flight projects. Included in Earth orbital activities are the Space Transportation System (STS), Spacelab, and scientific and applications missions. The various capabilities provided include: (a) tracking to determine the position and trajectory of vehicles in space; (b) acquisition of science and space applications data from on-board experiments and sensors; (c) acquisition of engineering data on the performance of spacecraft and launch vehicle systems; (d) reception of television transmissions from space vehicles; (e) transmissions of commands from ground facilities to the spacecraft; (f) voice communications with astronauts; (g) transfer of information between the various ground facilities and control centers; and (h) processing of data acquired from the launch vehicles and spacecraft. These capabilities are essential for operating and maintaining U.S. space assets to achieve the scientific objectives of all flight missions and for executing the critical decisions necessary to the success of these missions.

Office of Safety and Mission Quality (OSMQ) - Assures NASA mission safety through the development, implementation, and oversight of uniform safety, reliability, maintainability, technical standards, improving program assurance, and quality assurance (SRM&QA) policies and procedures.

Center Management and Operations - This category is composed of two major groups of Headquarters employees. The first group includes all the functional and staff offices which provide Agencywide guidance and oversight in areas such as procurement, personnel, financial management, supply and logistics, equal opportunity, international relations, and management systems and facilities.

The second major group includes the employees whose primary task is to provide direct support to the Headquarters staff by providing day-to-day operations in procurement, personnel, financial, and other administrative functions.

DISTRIBUTION OF FULL-TIME EQUIVALENT (FTE) WORKYEARS BY PROGRAM

HEADQUARTERS	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
SPACE STATION	278	80	0
SHUTTLE PROGRAMS	163	175	186
SPACE SCIENCE	<u>148</u>	<u>158</u>	<u>158</u>
PHYSICS AND ASTRONOMY	107	112	112
PLANETARY EXPLORATION	41	46	46
LAUNCH SERVICES	6	6	6
LIFE AND MICROGRAVITY SCIENCES	61	78	78
MISSION TO PLANET EARTH	72	83	83
ADVANCED CONCEPTS AND TECHNOLOGY	80	86	86
AERONAUTICAL RESEARCH AND TECHNOLOGY	91	115	115
SAFETY RELIABILITY AND QUALITY ASSURANCE	74	82	82
ACADEMIC PROGRAMS	29	31	32
COMMUNICATIONS	<u>57</u>	<u>57</u>	<u>57</u>
SUBTOTAL - DIRECT FULL-TIME PERMANENT FTEs	1,059	951	883
CENTER MANAGEMENT AND OPERATIONS	<u>853</u>	<u>884</u>	<u>870</u>
SUBTOTAL - FULL-TIME PERMANENT FTEs	1,912	1,835	1,753
OTHER CONTROLLED FTE's	<u>98</u>	<u>95</u>	<u>85</u>
SUBTOTAL - FULL-TIME EQUIVALENTS	2,010	1,930	1,838
FORMER NON-CEILING	<u>68</u>	<u>68</u>	<u>68</u>
GRAND TOTAL - FULL-TIME EQUIVALENTS	<u><u>2,078</u></u>	<u><u>1,998</u></u>	<u><u>1,906</u></u>

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

I.	PERSONNEL AND RELATED COSTS	161,945	167,401	167,649
	A. COMPENSATION AND BENEFITS	151,738	157,951	157,861
	1. COMPENSATION	130,076	134,110	135,099
	2. BENEFITS	21,662	23,841	22,762
	B. SUPPORTING COSTS	10,207	9,450	9,788
	1. TRANSFER OF PERSONNEL	2,570	3,250	2,337
	2. INVESTIGATIVE SERVICES	1,362	900	1,436
	3. PERSONNEL TRAINING	6,275	5,300	6,015
II.	TRAVEL	9,254	9,200	9,535
	A. PROGRAM TRAVEL	3,930	3,929	4,056
	B. SCIENTIFIC AND TECHNICAL DEVELOPMENT TRAVEL	906	904	930
	C. MANAGEMENT AND OPERATIONS TRAVEL	4,418	4,367	4,549
III.	RESEARCH OPERATIONS SUPPORT	124,500	125,300	109,600
	A. FACILITIES SERVICES	38,400	34,500	30,200
	B. TECHNICAL SERVICES	58,100	63,100	56,300
	C. MANAGEMENT AND OPERATIONS	28,000	27,700	23,100
	TOTAL, FUND REQUIREMENTS	295,699	301,901	286,784

FY 1993    FY 1994    FY 1995  
(Thousands of Dollars)

**I            PERSONNEL AND RELATED COSTS**

**161 945    157 401    167 649**

---

1            Compensation

130,076    134 110    135 088

2            Benefits

21 662        23 841        22 762

3            Supporting Costs

10 207        9 450        8 788

Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate includes: (1) the impact of the January 1994 locality based pay raise; (2) the Office of Management and Budget (OMB) anticipated FY 1995 pay raise; and (3) increased health care costs.

**II            TRAVEL**

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Basis of the FY 1995 Estimate

The increase from the FY 1994 estimate to the FY 1995 estimate allows for increased management oversight of programs and functions.

<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
----------------	----------------	----------------

(Thousands of Dollars)

**III. RESEARCH OPERATIONS SUPPORT**

	<b>124,500</b>	<b>125,300</b>	<b>109,600</b>
	<hr/>	<hr/>	<hr/>
A. FACILITIES SERVICES	38,400	34,500	30,200

This function includes lease costs for NASA Headquarters offices and warehouse, and the Center for Aerospace Information. It also provides for facilities maintenance and repair, security and custodial services for NASA Headquarters. Funding is also included here for Agency costs for security investigations for contractor personnel, support of the Agency maintenance management project, and the automated security program.

Basis of FY 1995 Budget Estimate

The FY 1995 estimate identifies a decrease as a result of final negotiations on rates for leasing the Headquarters administrative buildings (Headquarters is the only installation within NASA that leases its facilities); and, the impact of the directed reduction to downsize institutional support.

B. TECHNICAL SERVICES

	58,100	63,100	56,300
--	--------	--------	--------

This function includes the costs of the Headquarters computer center operations, various ADP/T operations, and hardware and software acquisition in support of NASA Headquarters staff offices. Funding also supports the costs of: the Agency Automated Information Management (AIM) program, which manages the development of administrative computing systems including the NASA Accounting and Financial Information System (NAFIS); the Agency scientific and technical information program including Center for Aerospace Information (CASI) operations; the Agency Information Resources Management (IRM) program; and the Agency public information program.

Basis of FY 1995 Budget Estimate

The FY 1995 estimate reflects a substantial decrease from the FY 1994 estimate due to institutional reductions. These reductions reflect consolidation of Headquarters contractors and curtails initiatives that would bring new ADP/T technology to the aging administrative systems within NASA.



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Construction of Facilities /



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1995 ESTIMATES

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} **Summary Information** /

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 BUDGET ESTIMATES

GENERAL STATEMENT

Funding for Construction of Facilities has been restructured from a single appropriation to being distributed in the appropriations which require specific facilities to conduct their programs. Funds for discrete projects, including the acquisition of related collateral equipment, that are required to conduct specific Human Space Flight or Science, Aeronautics, and Technology programs or projects are provided in these two appropriations. The Construction of Facilities budget line item in the Mission Support appropriation provides for discrete projects including the acquisition of related collateral equipment required for components of the basic infrastructure and institutional facilities. The Mission Support appropriation also includes minor projects (repair, rehabilitation, and modification of existing facilities and minor construction projects), environmental compliance and restoration activities; the design of facilities projects; and advanced planning related to future facilities needs. However, the narratives for all construction projects are included in this portion of the budget submission to identify the total facilities required in FY 1995. The program budgets include the specific facility project as a program requirement and reference the narratives provided in Mission Support for detailed descriptions and justifications.

In Human Space Flight, the FY 1995 budget request provides for construction of a Neutral Buoyancy Laboratory at the Johnson Space Center in support of the Space Station. Funding is also included to modernize the Firex Systems at Launch Complexes 39A and 39B at the Kennedy Space Center (KSC) and to replace the inadequate Space Shuttle component assembly and cleaning facilities at KSC with an efficient facility that will meet environmental and safety standards.

The funds requested for FY 1995 in Science, Aeronautics and Technology provide for continuing multi-year funded projects begun in prior years to meet mission requirements. Included are the modernization of the Ames Unitary Plan Wind Tunnel Complex and the construction of the Goddard Earth Systems Science Building to support the Earth Observing System (EOS) Program.

In Mission Support, funding is requested in FY 1995 for discrete projects to repair and modernize utility systems and building systems which have reached or exceeded their normal design life, including heating, cooling, mechanical, and electrical distribution facilities at Goddard Space Flight Center, Jet Propulsion Laboratory, Johnson Space Center, Kennedy Space Center, and Marshall Space Flight Center. Also included are

structural modifications to the Research, Development and Test Building at the Dryden Flight Research Center for vital seismic protection requirements.

These facilities are critical to the development and operation of the space transportation system, and support of the payloads and launch facilities as well as our aeronautical and aerospace testing capabilities to support military and private industry users.

The FY 1995 construction program is required to help preserve and enhance the capabilities and usefulness of existing facilities and ensure safe, economical, and efficient use of the NASA physical plant. This request continues the necessary rehabilitation and modification program begun in prior years and continues a responsive repair program. The minor construction program provides a means to accomplish smaller facility projects which accommodate changes in technical and institutional requirements. The environmental compliance and restoration program is critical to ensuring that statutory environmental requirements are met and that necessary remedial actions are promptly taken.

Funds requested for facility planning and design cover advance planning and design requirements for potential future projects, master planning, facilities studies, engineering reports and studies, and the preparation of facility project design drawings and bid specifications.

The budget authority requested for FY 1995 for facilities budgeted in the Mission Support appropriation is **\$135,000,000.**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1995 ESTIMATES  
SUMMARY OF THE BUDGET PLAN BY LOCATION  
(Thousands of Dollars)

L O C A T I O N	Fiscal Year 1993	Fiscal Year 1994	Fiscal Year 1995 Agency Request
Ames Research Center.....	60,626	62,105	31,800
Dryden Flight Research Center...	3,415	1,945	11,210
Goddard Space Flight Center.....	27,716	32,750	27,110
Jet Propulsion Laboratory.....	10,595	11,920	10,910
Lyndon B. Johnson Space Center...	14,481	27,985	30,350
John F. Kennedy Space Center.....	35,000	37,930	23,450
Langley Research Center..	14,971	81,930	9,020
Lewis Research Center.....	26,225	54,510	9,650
George C. Marshall Space Center....	70,920	37,310	23,675
John C. Stennis Space Center.....	13,135	16,490	4,280
wallops Flight Facility.....	7,418	13,130	4,320
Various Locations.....	162,344	105,885	8,955
Headquarters.....	4,854	1,810	1,770
Facility Planning and Design.....	23,300	32,000	10,000
Delta College.....	8,000	---	---
Consortium For International Earth Science Information Network...	<u>37,000</u>	<u>---</u>	<u>---</u>
<b>Total Construction of Facilities.....</b>	<b><u>520,000</u></b>	<b><u>517,700</u></b>	<b><u>206,500</u></b>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY APPROPRIATION AND PROJECT  
 (NEW STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994	Fiscal Year 1995 Agency Request	Page No
<hr style="border-top: 1px dashed black;"/>				
<b><u>HUMAN SPACE FLIGHT</u></b>				
<b><u>SPACE STATION:</u></b>	<b><u>13,800</u></b>	<b><u>---</u></b>	<b><u>20,200</u></b>	
Construction of Neutral Buoyancy Laboratory (JSC) .....	---	---	20,200	CF 1-1
Construction of Space Station Processing Facility (KSC) .....	12,000	---	---	
Modifications for Payload Operations Integration Center (MSFC).....	1,800	---	---	
 <b><u>OTHER HUMAN B</u></b>	 <b><u>178,100</u></b>	 <b><u>33,500</u></b>	 <b><u>12,300</u></b>	
Modernize Firex System, Pads A and B (KSC) .....	---	---	4,800	CF 1-4
Replace Components Refurbishment Laboratory (KSC) .....	---	---	7,500	CF 1-7
Replace Mission Control Air Handlers (JSC) .....	---	8,000	---	
Replace Thermal Vacuum Helium Refrigeration Systems (JSC) .....	---	7,400	---	
Modify Launch Complex 39 Exterior Utility Piping (KSC) .....	---	1,200	---	
Refurbish Launch Complex 39 Cooling System (KSC) .....	---	4,000	---	
Refurbish Launch Complex 39 Secondary Circuit Breakers (KSC) .....	---	3,300	---	
Restore C-5 Substation, Launch Complex 39 Area (KSC) .....	---	5,000	---	
Restore SSME Test Complex High Pressure Industrial Water System (SSC) .....	---	2,300	---	
Rehabilitate LC-39 Area Fire Alarm Reporting System (KSC) .....	4,300	---	---	
Rehabilitation of Crawlerway (KSC) .....	2,000	---	---	
Restore High Pressure Gas Systems (SSC) .....	6,800	2,300	---	
Construction of Advanced Solid Rocket Motor Program Facilities (Various Locations) .....	165,000	---	---	
 <b>Total - Human space Flight .....</b>	 <b><u>191,900</u></b>	 <b><u>33,500</u></b>	 <b><u>32,500</u></b>	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY APPROPRIATION AND PROJECT  
 (NEW STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994	Fiscal Year 1995 Agency Request	Page No.
<b><u>SCIENCE, AERONAUTICS, AND TECHNOLOGY</u></b>				
<b>SCIENCE</b>	<b><u>86,100</u></b>	<b><u>37,600</u></b>	<b><u>17,000</u></b>	
Construction of Earth Systems Science Building (GSFC).....	---	12,000	17,000	CF 2-1
Construction of EOSDIS Distributed Active Archive Center (DAAC) (LARC) .....	---	8,000	---	
Construction of 34-Meter Multifrequency Antenna, Canberra, Australia (JPL) .....	---	17,600	---	
Consortium for International Earth Science Information Network (CIESIN).....	37,000	---	---	
Construction of Earth Observing System Data Information System (EOSDIS) Facility (GSFC).....	15,300	---	---	
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) ....	15,600	---	---	
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) ....	16,200	---	---	
Construction and Modernization of Infrared Telescope Facility, Mauna Kea, HI.....	2,000	---	---	
<b>AERONAUTICS</b>	<b><u>52,600</u></b>	<b><u>212,000</u></b>	<b><u>22,000</u></b>	
National Aeronautics Facilities Upgrade Program (Various Locations).	25,000	181,000	---	
Rehabilitation of Control Systems, National Full-Scale Aerodynamics Complex (ARC).....	---	2,100	---	
Upgrade of Outdoor Aerodynamic Research Facility (ARC).....	---	3,900	---	
Modernization of the Unitary Plan Wind Tunnel Complex (ARC).....	8,000	25,000	22,000	CF 2-5
Repair and Modernization of the 12-Foot Pressure Wind Tunnel (ARC)..	17,400	---	---	
Modifications to 14 by 22-Foot Subsonic Wind Tunnel (LaRC) .....	2,200	---	---	
<b>TECHNOLOGY</b>	<b><u>---</u></b>	<b><u>12,500</u></b>	<b><u>---</u></b>	
Rehabilitation of Rocket Engine Test Facility (LERC) .....	---	12,500	---	
<b>Total - Science, Aeronautics, and Technology.....</b>	<b><u>138,700</u></b>	<b><u>262,100</u></b>	<b><u>39,000</u></b>	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY APPROPRIATION AND PROJECT  
 (NEW STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994	Fiscal Year 1995 Agency Request	Page No
<b><u>MISSION SUPPORT</u></b>				
Seismic Upgrade of Research, Development, and Test Building (DFRC)..	---	---	8,000	CF 3.1-1
Restore Exterior/Interior Systems, Buildings 3, 13, and 14 GSFC)...	---	---	5,000	CF 3.1-4
Modernize Condenser Water Systems, Southern Sector (JPL) .....	---	---	4,300	CF 3.1-7
Rehabilitate Utility Tunnel Structure and Systems (JSC) .....	---	---	4,300	CF 3.1-11
Modernize Payloads Hazardous Servicing Facility HVAC System (KSC) ...	---	---	1,500	CF 3.1-14
Modernize Metrology and Calibration Facility (MSFC).....	---	---	4,900	CF 3.1-17
Replacement of Central Plant Steam and Electrical Generation Equipment (GSFC).....	---	8,600	---	
Restoration and Modernization of Chilled Water System (GSFC).....	---	5,000	---	
Replace Chillers, Various Buildings (JPL) .....	---	2,900	---	
Rehabilitate Electrical Distribution System, Project Management Building (JSC) .....	---	2,200	---	
Refurbish Vehicle Assembly Building/Pad Water Storage Tanks (KSC) ...	---	3,000	---	
Rehabilitate Industrial Area Fire Alarm Reporting System (KSC) .....	---	4,900	---	
Restore Class III Landfill (KSC) .....	---	1,900	---	
Restoration of Electrical Power System (MSFC).....	---	2,600	---	
Restoration of High Pressure Air Compressor System (MSFC).....	---	8,500	---	
Repair Decking and Roof, X-Ray and Staging Facility (MAF) .....	---	1,500	---	
Replace Cooling Tower and Boiler (MAF).. .....	---	4,000	---	
Restoration of Underground Communication Distribution System (SSC)..	2,200	3,800	---	
Restoration of Airfield (WFF) .....	---	5,200	---	
Modernize Secondary Electrical Systems, Various Buildings (GSFC)....	4,500	---	---	
Replace Aircraft Operations Support Facilities (JSC) .....	1,600	---	---	
Replace Central Plant Chilled Water Equipment (JSC) .....	4,000	---	---	
Modify Electrical and Mechanical Systems, Utility Annex (KSC) .....	4,400	---	---	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY APPROPRIATION AND PROJECT  
 (NEW STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994	Fiscal Year 1995 Agency Request	Page No
<hr style="border-top: 1px dashed black;"/>				
<b><u>MISSION SUPPORT (Continued)</u></b>				
Rehabilitate Explosive Safe Area-60 High Bays Support Systems (KSC).	2,000	---	---	
Rehabilitation of Central Air System (LeRC) .....	12,200	---	---	
Restoration of Information and Electronic Systems Laboratory (MSFC).	5,000	---	---	
Replace Boiler House Components (MAF) .....	2,300	---	---	
Repair of Facilities at Various Locations, Not in excess of \$1,000,000 per project.....	31,900	36,000	30,000	CF 3.2
Rehabilitation and Modification of Facilities at Various Locations, Not in excess of \$1,000,000 per project.....	34,000	36,000	30,000	CF 3.3
Minor Construction of New Facilities and Additions to Existing Facilities at Various Locations, Not in excess of \$750,000 per project .....	14,000	14,000	2,000	CF 3.4
Facility Planning and Design.....	23,300	32,000	10,000	CF 3.5
Delta College.....	a, 000	---	---	
Environmental Compliance and Restoration.....	40,000	50,000	35,000	CF 3.6
<b>Total - Mission Support.....</b>	<b><u>189,400</u></b>	<b><u>222,100</u></b>	<b><u>135,000</u></b>	
<b>Total - Construction of Facilities.....</b>	<b>520,000</b>	<b>517,700</b>	<b>206,500</b>	
(Total Construction of Facilities funding included in the three appropriations)				

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994
<b><u>SPACE STATION FACILITIES AT VARIOUS D</u></b>	<b><u>13,800</u></b>	<b><u>---</u></b>
Construction of Space Station Processing Facility (KSC) .....	12,000	---
Modifications for Payload Operations Integration Center (MSFC).....	1,800	---
<b><u>SPACE FLIGHT FACILITIES AT VARIOUS LOCATIONS:</u></b>	<b><u>193,400</u></b>	<b><u>55,400</u></b>
Replace Mission Control Air Handlers (JSC) .....	---	8,000
Replace Thermal Vacuum Helium Refrigeration Systems (JSC) .....	---	7,400
Modify Launch Complex 39 Exterior Utility Piping (KSC) .....	---	1,200
Refurbish Launch Complex 39 Cooling System (KSC) .....	---	4,000
Refurbish Launch Complex 39 Secondary Circuit Breakers (KSC) .....	---	3,300
Refurbish Vehicle Assembly Building/Pad Water Storage Tanks (KSC) .....	---	3,000
Rehabilitate Industrial Area Fire Alarm Reporting System (KSC) .....	---	4,900
Restore C-5 Substation, Launch Complex 39 Area (KSC) .....	---	5,000
Restoration of High Pressure Air Compressor System (MSFC).....	---	8,500
Repair Decking and Roof, X-Ray Staging Facility (MAF) .....	---	1,500
Replace Cooling Tower and Boiler (MAF) .....	---	4,000
Restore SSME Test Complex High Pressure Industrial Water System (SSC) .....	---	2,300
Replace Aircraft Operations Support Facilities (JSC) .....	1,600	---
Modify Electrical and Mechanical Systems, Utility Annex (KSC) .....	4,400	---
Rehabilitate Explosive Safe Area-60 High Bays Support Systems (KSC) .....	2,000	---
Rehabilitate LC-39 Area Fire Alarm Reporting System (KSC) .....	4,300	---
Rehabilitation of Crawlerway (KSC) .....	2,000	---
Replace Boiler House Components (MAF) .....	2,300	---
Restoration of Information and Electronic Systems Laboratory (MSFC).....	5,000	---
Restore High Pressure Gas Systems (SSC) .....	6,800	2,300
Construction of Advanced Solid Rocket Motor Program Facilities (Various Locations) .....	165,000	---

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994
-----	-----	-----
<b><u>LYNDON B. JOHNSON SPACE CENTER</u></b>	<b><u>4,000</u></b>	<b><u>2,200</u></b>
Rehabilitate Electrical Distribution System, Project Management Building.....	---	2,200
Replace Central Plant Chilled Water Equipment.....	4,000	---
<b><u>JOHN F. KENNEDY SPACE CENTER</u></b>	<b><u>---</u></b>	<b><u>1,900</u></b>
Restore Class III Landfill.....	---	1,900
<b><u>MARSHALL SPACE FLIGHT CENTER</u></b>	<b><u>---</u></b>	<b><u>2,600</u></b>
Restoration of Electrical Power System.....	---	2,600
<b><u>JOHN C. STENNIS SPACE CENTER</u></b>	<b><u>2,200</u></b>	<b><u>3,800</u></b>
Restoration of Underground Communication Distribution System.....	2,200	3,800
<b><u>GODDARD SPACE FLIGHT CENTER</u></b>	<b><u>19,800</u></b>	<b><u>25,600</u></b>
Construction of Earth Systems Science Building.....	---	12,000
Replacement of Central Plant Steam and Electrical Generation Equipment.....	---	8,600
Restoration and Modernization of Chilled Water System.....	---	5,000
Modernize Secondary Electrical Systems, Various Buildings.....	4,500	---
Construction of Earth Observing System Data Information System (EOSDIS) Facility.....	15,300	---
<b><u>JET PROPULSION LABORATORY</u></b>	<b><u>---</u></b>	<b><u>2,900</u></b>
Replace Chillers, Various Buildings.....	---	2,900
<b><u>WALLOPS FLIGHT FACILITY</u></b>	<b><u>---</u></b>	<b><u>5,200</u></b>
Restoration of Airfield.....	---	5,200

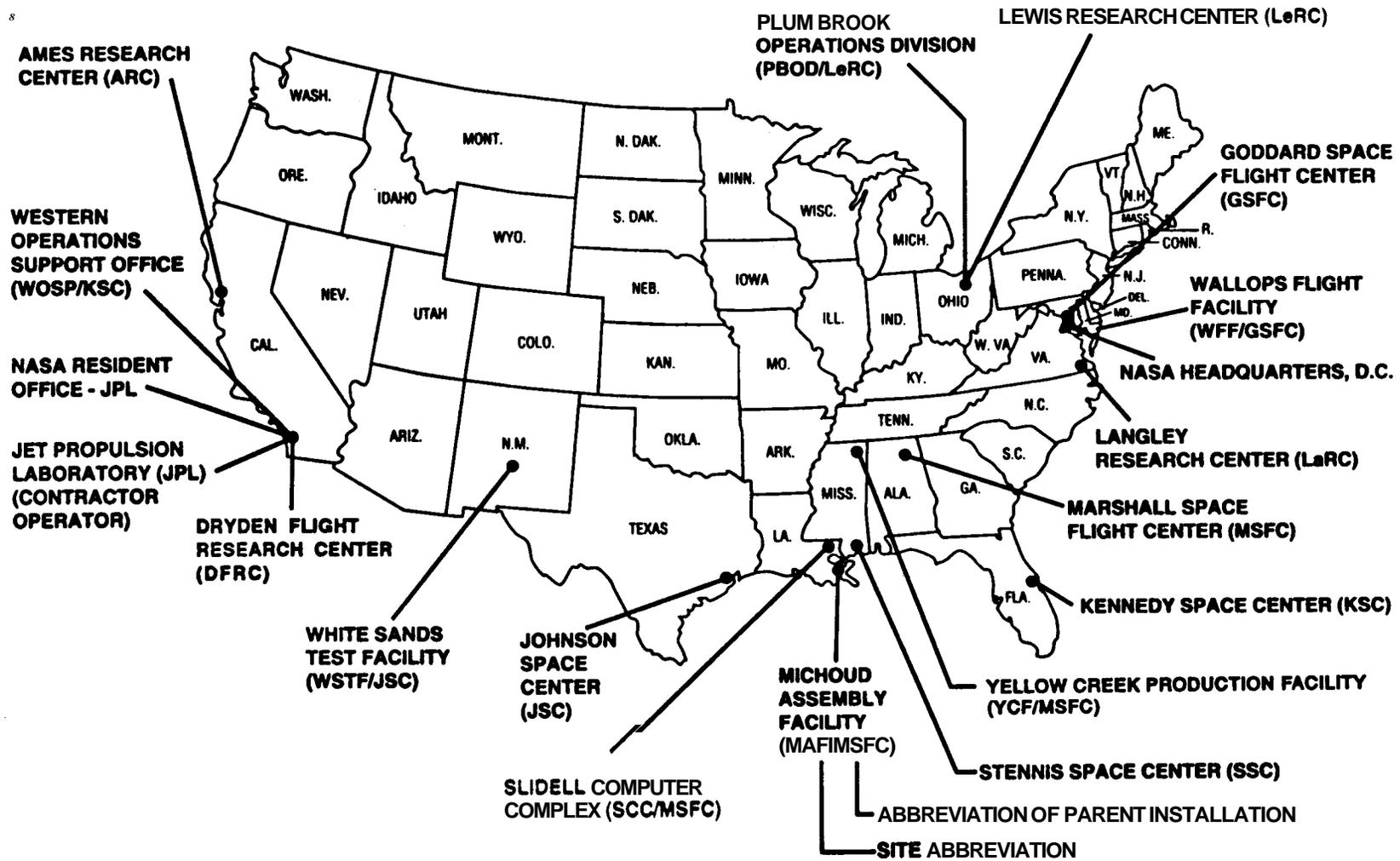
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993 -----	Fiscal Year 1994 -----
<hr/>		
<b><u>AERONAUTICAL FACILITIES AT VARIOUS LOCATIONS:</u></b>	<b><u>64,800</u></b>	<b><u>• 212,000</u></b>
National Aeronautics Facilities Upgrade Program (Various Locations) .....	25,000	181,000
Aeronautical Facilities Revitalization.....	39,800	31,000
Rehabilitation of Control Systems, National Full-scale Aerodynamics Complex (ARC).....	---	(2,100)
Upgrade of Outdoor Aerodynamic Research Facility (ARC).....	---	(3,900)
Modernization of the Unitary Plan Wind Tunnel Complex (ARC).....	(8,000)	(25,000)
Repair and Modernization of the 12-Foot Pressure Wind Tunnel (ARC).....	(17,400)	---
Modifications to 14 by 22-Foot Subsonic Wind Tunnel (LaRC) .....	(2,200)	---
Rehabilitation of Central Air System (LeRC) .....	(12,200)	---
 <b><u>LANGLEY RESEARCH CENTER</u></b>	 ---	 <b><u>8,000</u></b>
Construction of EOSDIS Distributed Active Archive Center (DAAC).....	---	8,000
 <b><u>LEWIS RESEARCH CENTER</u></b>	 ---	 <b><u>12,500</u></b>
Rehabilitation of Rocket Engine Test Facility .....	---	12,500
 <b><u>VARIOUS LOCATIONS</u></b>	 <b><u>33,800</u></b>	 <b><u>17,600</u></b>
Construction of 34-Meter Multifrequency Antennas, Canberra, Australia (JPL) ..	---	17,600
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) .....	15,600	---
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) .....	16,200	---
Construction and Modernization of Infrared Telescope Facility, Mauna Kea, HI..	2,000	---

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994
-----	-----	-----
Repair of Facilities at Various Locations, Not in excess of \$1,000,000 per project .....	<u>31,900</u>	<u>36,000</u>
Rehabilitation and Modification of Facilities at Various Locations, Not in excess of \$1,000,000 per project .....	<u>34,000</u>	<u>36,000</u>
Minor Construction of New Facilities and Additions to Existing Facilities at Various Locations, Not in excess of \$750,000 per project .....	<u>14,000</u>	<u>14,000</u>
Facility Planning and Design .....	<u>23,300</u>	<u>32,000</u>
Delta College .....	2,000	---
Consortium for International Earth Science Information Network (CIESIN) .....	<u>37,000</u>	---
S U B T O T A L, Construction .....	480,000	467,700
Environmental Compliance and Restoration Program .....	<u>40,000</u>	<u>50,000</u>
T O T A L, Construction of Facilities .....	<u>520,000</u>	<u>517,700</u>

# LOCATION OF MAJOR AND COMPONENT INSTALLATIONS



**RECORDED VALUE OF CAPITAL TYPE PROPERTY  
IN-HOUSE AND CONTRACTOR-BUILT  
AS OF SEPTEMBER 30, 1993  
(DOLLARS IN THOUSANDS)**

REPORTING INSTALLATION	LAND	BUILDING	OTHER STRUCTURES AND FACILITIES	LEASEHOLD IMPROVEMENTS	TOTAL	EQUIPMENT	FIXED ASSETS IN PROGRESS	GRAND TOTAL
<b>AMES RESEARCH CENTER</b>	<b>2,929</b>	<b>589,056</b>	<b>46,484</b>	<b>0</b>	<b>638,469</b>	<b>401,475</b>	<b>249,486</b>	<b>1,289,430</b>
ARC MOFFETT FIELD, CA	2,928	527,848	20,700	0	551,476	304,094	240,667	1,096,237
DRYDEN FLIGHT FACILITY EDWARDS, CA	0	60,512	25,437	0	85,949	92,522	8,819	187,290
VARIOUS LOCATIONS	1	696	347	0	1,044	4,859	0	5,903
<b>GODDARD SPACE FLIGHT CENTER</b>	<b>3,311</b>	<b>281,447</b>	<b>131,944</b>	<b>0</b>	<b>416,702</b>	<b>645,274</b>	<b>58,658</b>	<b>1,120,634</b>
GSFC-GREENBELT, MD	1,577	186,401	27,701	0	215,679	349,377	39,539	604,595
TRACKING STATIONS NETWORK	5	39,209	23,153	0	62,367	102,498	2,698	167,563
WFF-WALLOPS ISLAND, VA	1,729	54,886	76,847	0	133,462	79,106	16,421	228,989
VARIOUS LOCATIONS	0	951	4,243	0	5,194	114,293	0	119,487
<b>JET PROPULSION LABORATORY</b>	<b>1,189</b>	<b>179,555</b>	<b>113,756</b>	<b>1,091</b>	<b>295,591</b>	<b>408,683</b>	<b>0</b>	<b>704,274</b>
JPL PASADENA, CA	1,189	179,555	113,756	1,091	295,591	408,683	0	704,274
<b>JOHNSON SPACE CENTER</b>	<b>11,238</b>	<b>312,943</b>	<b>113,189</b>	<b>105</b>	<b>437,475</b>	<b>724,493</b>	<b>40,208</b>	<b>1,202,176</b>
JSC-HOUSTON, TX	7,291	261,022	71,106	0	339,417	485,300	40,208	864,925
WHITE SANDS TEST FACILITY LOS CRUCES, NM	377	15,375	36,222	105	52,079	0	0	52,079
VARIOUS LOCATIONS	3570	36,546	5,863	0	45,979	239,193	0	285,172
<b>KENNEDY SPACE CENTER</b>	<b>73,672</b>	<b>623,719</b>	<b>550,494</b>	<b>0</b>	<b>1,247,885</b>	<b>893,976</b>	<b>136,516</b>	<b>2,278,377</b>
KSC-CAPE CANAVERAL FL	73,672	623,719	550,494	0	1,247,885	87,821	136,516	1,472,222
WESTERN TEST RANGE, LOMPAC, CA	0	0	0	0	0	2,928	0	2,928
VARIOUS LOCATIONS	0	0	0	0	0	803,227	0	803,227
<b>LANGLEY RESEARCH CENTER</b>	<b>156</b>	<b>231,727</b>	<b>436,112</b>	<b>0</b>	<b>667,995</b>	<b>327,435</b>	<b>64,705</b>	<b>1,060,215</b>
LARC-HAMPTON, VA	156	231,727	436,112	0	667,995	308,867	64,705	1,041,647
VARIOUS LOCATIONS	0	0	0	0	0	18,568	0	18,568
<b>LEWIS RESEARCH CENTER</b>	<b>2,621</b>	<b>305,940</b>	<b>112,579</b>	<b>136</b>	<b>421,276</b>	<b>263,969</b>	<b>80,996</b>	<b>766,241</b>
LEK-CLEVELAND, OH	316	228,790	93,517	136	322,759	171,442	80,996	575,197
PLUMBROOK, SANDUSKY, OH	2,305	77,150	19,062	0	98,517	79,693	0	178,210
VARIOUS LOCATIONS	0	0	0	0	0	12,834	0	12,834
<b>MARSHALL SPACE FLIGHT CENTER</b>	<b>11,093</b>	<b>369,289</b>	<b>202,848</b>	<b>0</b>	<b>583,230</b>	<b>788,983</b>	<b>15,103</b>	<b>1,387,316</b>
MSFC-HUNTSVILLE, AL	0	193,713	100,565	0	294,278	438,068	15,103	747,449
MICHOUD ASSEMBLY FACILITY, LA	7,162	164,007	88,500	0	259,669	72,609	0	332,278
SUDRELL COMPUTER COMPLEX, LA	69	5,253	3,176	0	8,498	14,557	0	23,055
VARIOUS LOCATIONS	3,862	6,316	10,607	0	20,705	263,749	0	284,534
<b>STENNIS SPACE CENTER</b>	<b>18,080</b>	<b>130,796</b>	<b>234,251</b>	<b>0</b>	<b>383,127</b>	<b>48,140</b>	<b>31,617</b>	<b>462,884</b>
STENNIS SPACE CENTER	18,080	130,796	234,251	0	383,127	48,140	31,617	462,884
VARIOUS LOCATIONS	0	0	0	0	0	0	0	0
<b>NASA HEADQUARTERS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>58,592</b>	<b>0</b>	<b>58,609</b>
NASA HQS, WASH. DC	0	0	0	17	17	58,592	0	58,609
VARIOUS LOCATIONS	0	0	0	0	0	0	0	0
<b>AGENCY TOTAL</b>	<b>124,289</b>	<b>3,024,472</b>	<b>1,941,657</b>	<b>1,349</b>	<b>5,091,767</b>	<b>4,561,020</b>	<b>477,369</b>	<b>10,330,166</b>

**Project Justification**

Human Space Flight



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1995 ESTIMATES

SUMMARY

HUMAN SPACE FLIGHT

	<u>Amount</u> -----	<u>Page</u> <u>No.</u> -----
	(Dollars)	
<u>Space Station:</u>		
Construction of Neutral Buoyancy Laboratory, Johnson Space Center.....	20,200,000	CF 1-1
<u>Other Human Space Flight:</u>		
Modernize Firex System, Pads A and B, Kennedy Space Center .....	4,800,000	CF 1-4
Replace Components Refurbishment Laboratory, Kennedy Space Center.....	7,500,000	CF 1-7
 Total Human Space Flight	 32,500,000 =====	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Construction of Neutral Buoyancy Laboratory

INSTALLATION: Lyndon B. Johnson Space Center

---

FY 1995 CoF Estimate: \$20,200,000

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LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$3,954,014	---	\$3,954,014
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$3,954,014</u>	<u>---</u>	<u>\$3,954,014</u>

SUMMARY PURPOSE AND SCOPE:

This project provides for the first of two increments for the construction of the Neutral Buoyancy Laboratory (NBL) to meet the requirements for extravehicular activity (EVA) simulations for astronaut training, EVA procedures development, and validation for the Space Station assembly and operations.

PROJECT JUSTIFICATION:

This project is required for EVA simulations for astronaut training and procedures development for the Space Station. A major critical requirement is the validation of EVA timelines to ensure that the EVA activities can be successfully carried out. Experience from several satellite retrieval/servicing EVA tasks, e.g., Solar Maximum, Westar/Palapa, Syncom, Intelsat-VI, and the recent Hubble Space Telescope, has clearly shown that the more realistic, complete simulations made possible by the larger pool size of the NBL will significantly increase assurance of successful and safe EVA mission operations.

Techniques developed and refined in neutral buoyancy facilities allow astronauts in space suits to perform space-related EVA operations on the ground in a way that correlates closely to actual on orbit task performance. Existing facilities were sized for existing program hardware. Larger facilities are required for the larger Space Station flight hardware assemblies. The NBL will accommodate the large space hardware portions and provide

realistic EVA development and operations planning activities during the Space Station buildup and follow-on operations. There are no acceptable neutral buoyancy facilities available for providing adequate Space Station EVA evaluations and astronaut training. The NBL also will be the primary EVA facility for Space Shuttle and other program requirements.

IMPACT OF DELAY:

The NBL is required to support Space Station assembly engineering and training and will be invaluable for the fourth and following assembly missions which have the highest EVA complexity. Delay in providing this facility will seriously impact Space Station assembly and operations.

PROJECT DESCRIPTION:

This project provides for the first of two increments for the construction of the NBL. This increment will include site preparation and construction of the tank and associated support systems, cranes, and the laboratory building which houses the pool. The laboratory building will be a steel framed structure with insulated metal panels comprising approximately 69,000 square feet. Approximately 12,000 square feet of this space will be test article mock up assembly and 12,000 square feet of this space will be used for locker room, scuba servicing rooms, electrical, mechanical rooms, hallways, and offices. Tank water circulation/treatment systems also will be installed. The pool will be 202 by 102 by 40 feet. The facility also will include breathing gas, support systems, out buildings to support the tank, and parking.

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
<u>Construction</u> . . . . .	---	---	---	<u>\$20,200,000</u>
Civil/Sitework . . . . .	LS	---	---	3,400,000
Mechanical/Plumbing, HVAC, Fire & Safety . . . . .	LS	---	---	200,000
Architectural . . . . .	LS	---	---	1,000,000
Structural . . . . .	LS	---	---	10,000,000
Electrical . . . . .	LS	---	---	1,600,000
Other Related Pool Equipment . . . . .	LS	---	---	1,000,000
Crane . . . . .	LS	---	---	1,100,000
Miscellaneous Equipment . . . . . (Outfitting)	LS	---	---	1,900,000
Total . . . . .				<u>\$20,200,000</u>

Total cost of this project is \$32.2M.

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: Approximately \$12,000,000 will be required in FY 1996 to complete the construction and provide a fully operational facility.

LYNDON B. JOHNSON SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
CONSTRUCTION OF NEUTRAL BUOYANCY LABORATORY  
LOCATION PLAN

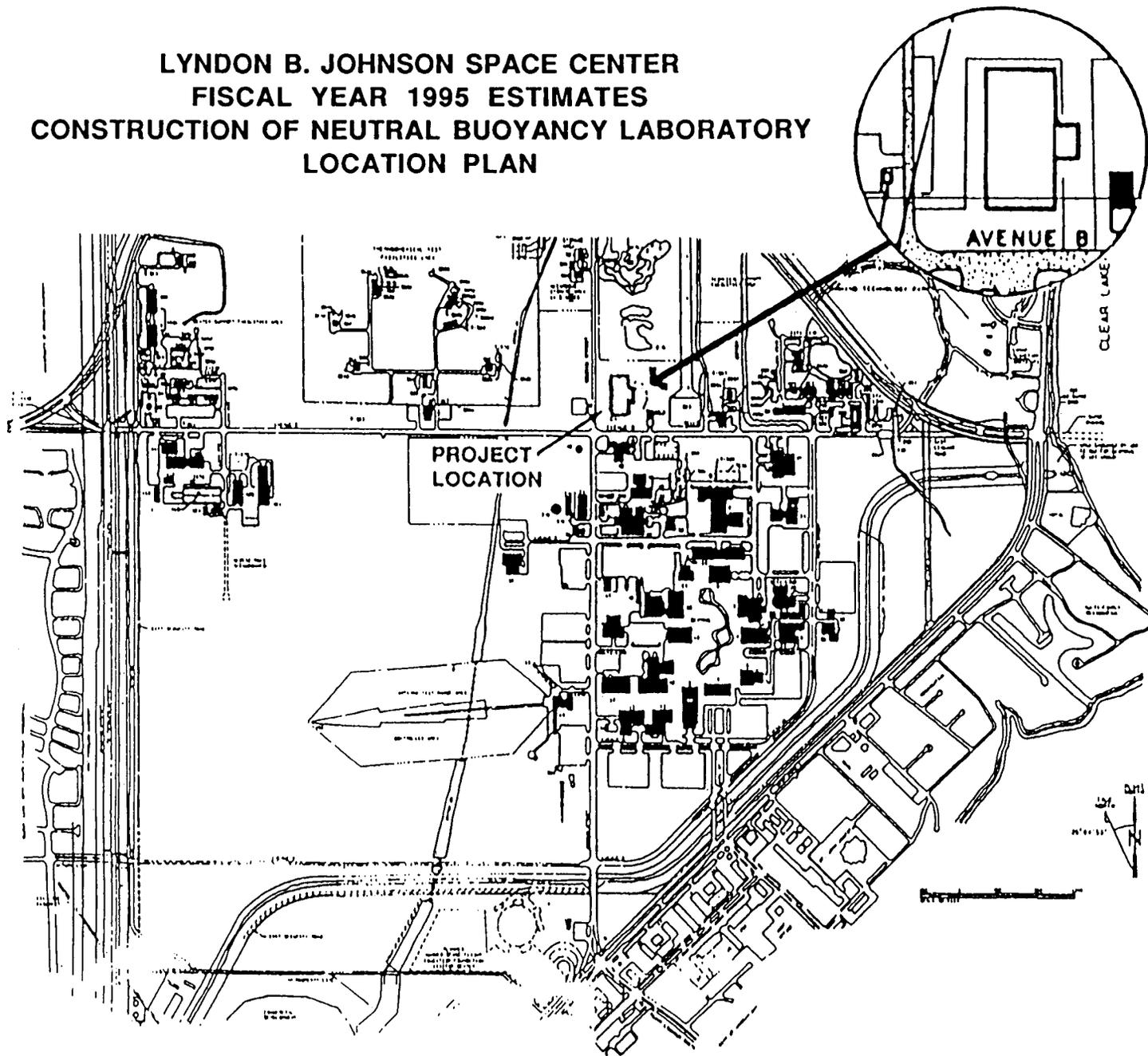


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Modernize Firex System, Pads A & B

INSTALLATION: John F. Kennedy Space Center

FY 1995 CoF Estimate: \$4,800,000

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LOCATION OF PROJECT: John F. Kennedy Space Center, Brevard County, Florida

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$440,000	---	\$440,000
Capitalized Investment . . . . .	---	\$216,362,462	\$216,362,462
Total . . . . .	<u>\$440,000</u>	<u>\$216,362,462</u>	<u>\$216,802,462</u>

SUMMARY PURPOSE AND SCOPE :

The purpose of this project is to replace the fire water perimeter loop piping and components to meet the required 300 psig operating pressure. The failure rate of this piping is increasing because it was not designed to withstand the required high operating pressures.

PROJECT JUSTIFICATION :

The Firex system is operated at 155 psig static pressure with occasional pressure surges up to 300 psig. The existing piping was installed in approximately 1966 and was designed to operate at 160 psig. There is concern in continuing to use the systems at high range pressures. In addition, most of the system components, particularly hydrants and hose reels, are not rated for the system pressure. Replacing Firex piping and making system modifications to connect water fog nozzles to the high pressure will improve overall system reliability. Spray

systems are required for emergency egress on the Orbiter Mid-Body Umbilical Unit and fuel handling areas to meet safety standards

IMPACT OF DELAY:

Increasing system failures and component failures could render the Pad A/B Firex protection system inadequate during an emergency. Personnel safety will be compromised.

PROJECT DESCRIPTION:

New Firex piping will be installed with the proper pressure classification with connections at the perimeter valve pit and facility valve pits. Existing Firex piping will be connected to the existing potable water system to create a new low-pressure system serving hydrants and hose reels. System connection details at several facilities will need to be revised to isolate water fog nozzles on the new Firex system and connect facility hydrants and hose reels to the new low pressure system. Nozzles will be added where hypergolic and cryogenic equipment is located. The Pad B surface requires only piping and nozzles; however, Pad A requires a complete Type I system.

PROJECT COST ESTIMATE:

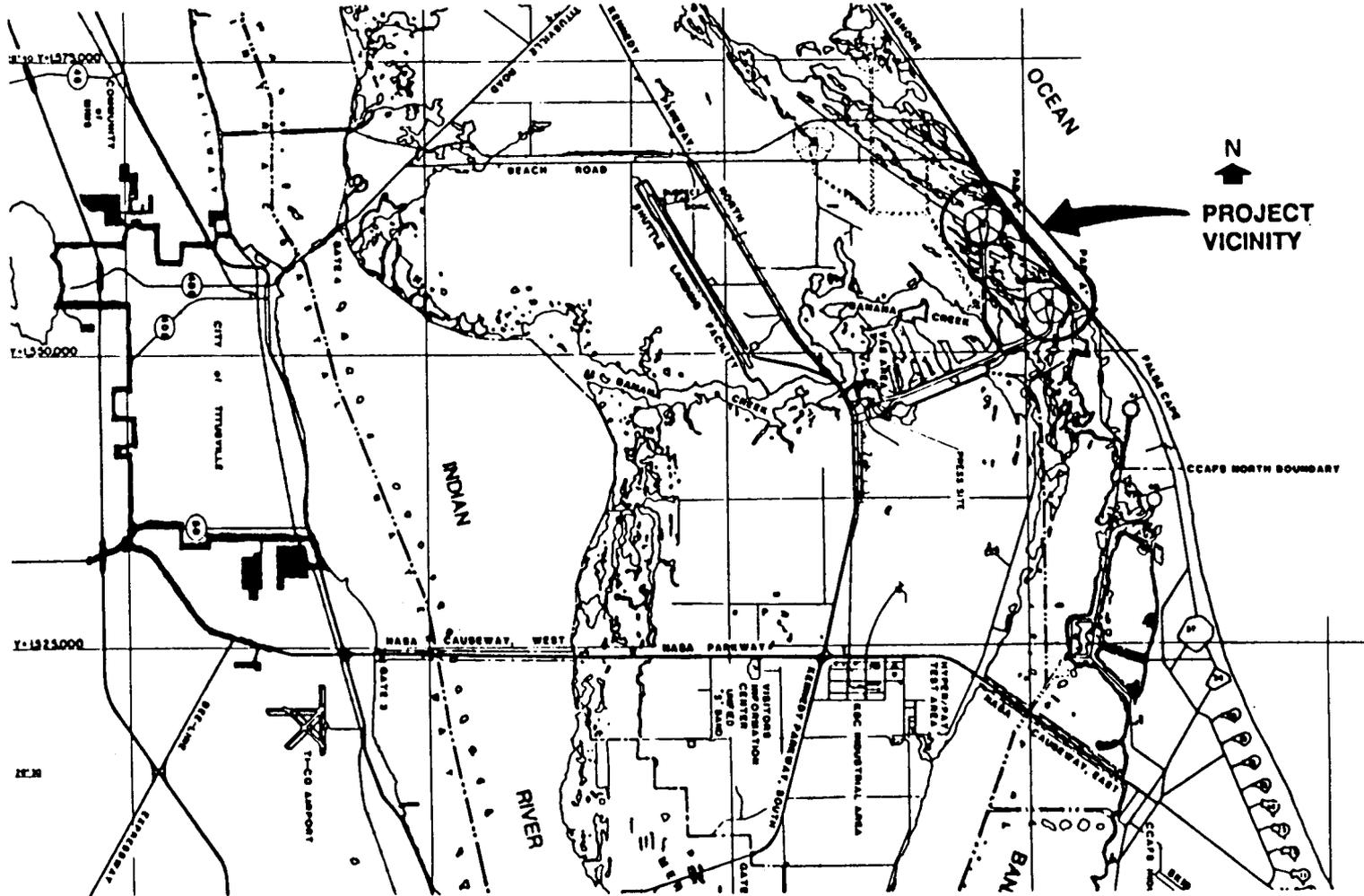
	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>\$K</u>
<u>Construction</u> . . . . .	---	---	---	<u>\$4,800,000</u>
Civil/Site Work . . . . .	LS	---	---	3,000,000
Mechanical Work . . . . .	LS	---	---	1,100,000
Electrical Work . . . . .	LS	---	---	700,000
Total . . . . .				<u>\$4,800,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**JOHN F. KENNEDY SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE FIREX SYSTEM, PADS A & B**

**LOCATION PLAN  
JOHN F. KENNEDY SPACE CENTER, FLORIDA**



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Replace Components Refurbishment Laboratory

INSTALLATION: John F. Kennedy Space Center

FY 1995 CoF Estimate: \$7,500,000

---

LOCATION OF PROJECT: John F. Kennedy Space Center, Brevard County, Florida

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	Planning <u>and Design</u>	<u>Construction</u>	Total
Specific CoF Funding . . . . .	\$645,000	---	\$645,000
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$645,000</u>	<u>---</u>	<u>\$645,000</u>

SUMMARY PURPOSE AND SCOPE,:

The purpose of this project is to upgrade the existing Space Shuttle Component Refurbishment Facilities by replacing approximately 30,000 square feet. The project also includes utilities to the site, site clearing, and support systems required for component assembly and cleaning.

PROJECT JUSTIFICATION:

The Components Refurbishment Laboratory is the only certified laboratory at Kennedy Space Center for cleaning flight hardware components and proof testing of tubing and flex hoses. The facilities are currently operated 7 days per week to support the number of Shuttle and Air Force components requiring refurbishment and cleaning. The existing primary facilities are overcrowded, do not comply with OSHA fire safety standards, have aging utility systems, and have friable asbestos in the roof deck and in the mechanical areas. Modifications to replace the

utility systems, install fire sprinklers, install non-chlorofluorocarbon (CFC) cleaning upgrades, and remove the asbestos have been canceled due to the requirement to keep this mission critical operation on-line. In addition, the existing facilities are located within the Shuttle launch impact zone requiring evacuation and subsequent work stoppage on launch days. Providing a replacement facility that meets present environmental and safety criteria will eventually permit the demolition of the existing facility and eliminate the present deficiencies.

IMPACT OF DELAY:

Continued use of the existing facilities would result in continued fire safety noncompliance, overcrowding, noncompliance with non-CFC cleaning upgrades, and increased breakdowns of out-dated utility systems.

PROJECT DESCRIPTION:

This project provides for replacing approximately 30,000 square feet for rough cleaning, pre-clean laboratories and shops, precision cleaning/verification clean rooms and test cells, hydraulics laboratories, shipping and receiving, logistics and other support space. A fire protection and detection system will be installed. Services provided will include communication, electricity, water, sewer, compressed air, and hazardous waste storage. Deionized water supply, wastewater holding tanks, and compressed gas tube banks will be relocated from the existing facilities.

<u>PROJECT COST ESTIMATE:</u>	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
<u>Construction</u> . . . . .	---	---	---	<u>\$7,500,000</u>
Civil . . . . .	LS	---	---	1,700,000
Structural/Architectural . . . . .	LS	---	---	2,500,000
Mechanical . . . . .	LS	---	---	1,200,000
Electrical . . . . .	LS	---	---	1,700,000
Cranes . . . . .	LS	---	---	400,000
Total . . . . .				<u>\$7,500,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: Approximately \$3,300,000 of other funds will be required for outfitting and facility support equipment.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: A future addition is planned so that all functions in the existing refurbishment facilities can be located in the same area.

JOHN F. KENNEDY SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
REPLACE COMPONENTS REFURBISHMENT LABORATORY

SITE PLAN  
KSC INDUSTRIAL AREA

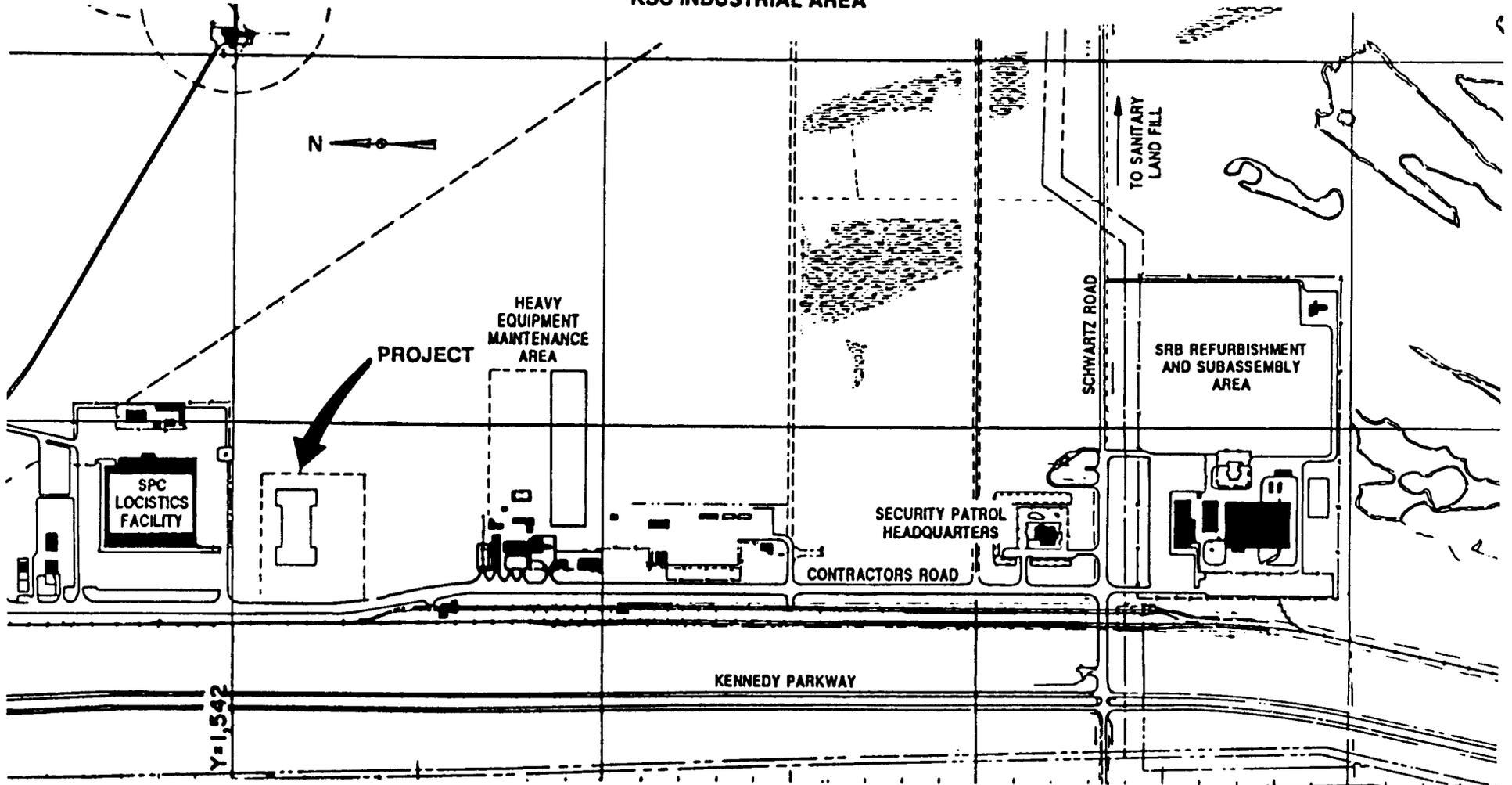


FIGURE 1

Science, Aeronautics  
and Technology 

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES



SCIENCE, AERONAUTICS, AND TECHNOLOGY

	Amount ----- (Dollars)	Page No. -----
<u>Science:</u>		
Construction of Earth Systems Science Building, Goddard Space Flight Center.....	17,000,000	CF Z-1
<u>Aeronautics:</u>		
Modernization of the Langley Plan Wind Tunnel Complex, Ames Research Center	22,000,000	CM Z-5
Total Science, Aeronautics, and Technology	39,000,000 =====	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

---

PROJECT TITLE: Construction of Earth Systems Science Building

INSTALLATION: Goddard Space Flight Center

FY 1995 CoF Estimate: \$17,000,000

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LOCATION OF PROJECT: Greenbelt, Prince George's County, Maryland

COGNIZANT HEADQUARTERS OFFICE: Office of Mission to Planet Earth

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$4,044,850	\$12,000,000	\$16,044,850
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$4,044,850</u>	<u>\$12,000,000</u>	<u>\$16,044,850</u>

SUMMARY PURPOSE AND SCOPE:

This project provides the second increment of the Earth Systems Science Building (ESSB) at the Goddard Space Flight Center (GSFC). The facility will provide approximately 290,000 square feet to house civil service, contractor, and visiting scientist personnel conducting interdisciplinary earth science and research into global change. This facility is located adjacent to the Earth Observing System Data Information System (EOSDIS) Facility and will support the Earth Observing System (EOS) program by data analysis, assimilation, and instrument and algorithm development. The third increment required to complete the facility is planned for FY 1996.

PROJECT JUSTIFICATION:

The United States has taken the leadership role in one of the largest Earth Science enterprises--Global Change research. The Earth Observing Systems (EOS) Program is a critical component of this effort. It will contribute

principal observational, data processing and archiving, and scientific research capabilities essential to conduct this research. Goddard Space Flight Center is NASA's lead Center for EOS, with responsibility for development of Earth Observing capabilities including the Earth Observing System Morning Crossing (EOSAM) and Earth Observing System Afternoon Crossing (EOSPM) spacecraft; GSFC-sponsored NASA facilities class instruments; Earth Science mission operations; principal or co-investigator for a number of EOS-related scientific investigations; Land Remote-Sensing Satellite (LANDSAT); and processing, archiving, and disseminating GSFC-related EOS data.

The Earth System Science Building (ESSB) brings together vital elements of GSFC's substantial Earth Sciences talent in specialized facilities dedicated to the conduct of EOS/Global Change research. This is essential to facilitate and promote the interdisciplinary scientific research required to achieve EOS/Global Change research goals. The ESSB will also provide a venue for collaboration between NASA and other scientists engaged in Global Change research. The proximity of the ESSB Facility to the EOSDIS Facility will provide ready access to the GSFC EOS Distributed Active Archive Center (DAAC), the central repository (located within the EOSDIS Facility) for all GSFC EOS-related data.

Goddard's Earth Science group is currently located in seven widely separated buildings, creating substantial obstacles to interdisciplinary scientific communication and collaboration, and inefficient EOS Project/EOSDIS programmatic support. The ESSB will provide a consolidated environment in which interdisciplinary interactions are fostered for the resident earth scientists and the visiting scientists. The ESSB will also accommodate new equipment such as computer, workstation, and graphics terminal technologies as they evolve over the life of the EOS/Global Change research effort. This facility will ensure an efficient and productive work environment for EOS/Global Change research.

IMPACT OF DELAY:

If the ESSB facility is delayed, it will adversely impact the analysis and understanding of EOS data, as well as delay the development of instrumentation and algorithms for future Earth Science missions.

PROJECT DESCRIPTION:

The 290,000 square foot facility will be located on the east site adjacent to the EOSDIS Facility at Greenbelt and Soil Conservation Service Roads. The first increment (FY 1994) provided for site development/utilities, and included extension of basic utilities infrastructure to the ESSB site, expansion of EOSDIS utility plant including provision for backup diesel electric power, and construction of ESSB footings and foundations. This second increment will provide for the ESSB shell and procurement of building architectural, mechanical and electrical long lead items. The third increment (FY 1996) will provide for installation of the architectural, mechanical, and electrical long lead items; construction of building interior, partitioning, and finishes; and completion of remaining work to provide a complete and usable facility.

The overall scope of work for this project provides for site development, including the extension of appropriate Center utility distribution systems (communication duct banks, electrical power, steam, chilled water, sanitary sewer and storm drainage systems), clearing and grubbing, construction of new access roads, necessary parking lots, area lighting, security fencing, and a gate house. Also included are foundations, structural steel, exterior wall, and interior support systems. Utility control systems, to be tied in with the Center-wide Utility Control System (UCS) monitored from the Central Power Plant, are also included.

<u>PROJECT COST ESTIMATE:</u>	Unit of Measure	Quantity	Unit Cost	Cost
<u>Construction:</u> . . . . .	---	---	---	<u>\$17,000,000</u>
Architectural . . . . .	LS	---	---	4,700,000
Structural . . . . .	LS	---	---	5,500,000
Mechanical . . . . .	LS	---	---	3,400,000
Electrical . . . . .	LS	---	---	3,400,000
Total . . . . .				<u>\$17,000,000</u>

Note: This cost estimate provides for the FY 1995 increment of the total facility. The total cost of the project is estimated to be \$46 million.

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY:

Noncollateral equipment such as systems furniture, other furnishings, and equipment for special purpose areas will be required at a cost of approximately \$20,000,000, which will be provided from other than CoF resources.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

The third increment required to complete this project will be included in the FY 1996 budget request for \$17,000,000.

GODDARD SPACE FLIGHT CENTER  
FISCAL YEAR 1995 ESTIMATES  
CONSTRUCTION OF EARTH SYSTEMS SCIENCE BUILDING (ESSB)

LOCATION PLAN

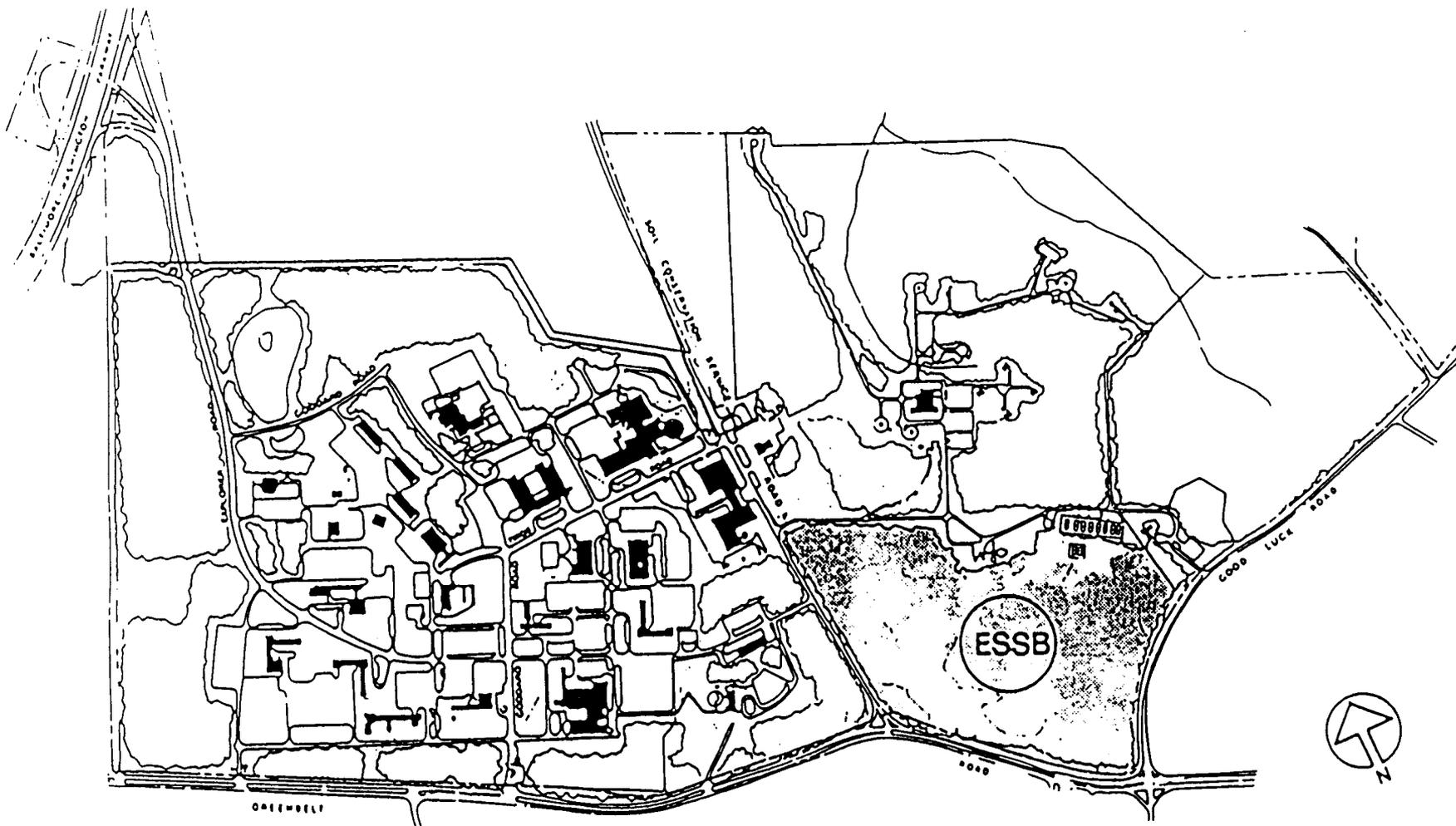


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

---

PROJECT TITLE: Modernization of the Unitary Plan Wind Tunnel Complex

INSTALLATION: Ames Research Center

---

FY 1995 CoF Estimate: \$22,000,000

---

LOCATION OF PROJECT: Moffett Field, Santa Clara County, California

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$4,600,000	\$33,000,000	\$37,600,000
Capitalized Investment . . . . .	<u>---</u>	<u>50,358,472</u>	<u>\$0,358,472</u>
Total . . . . .	<u>\$4,600,000</u>	<u>\$83,358,472</u>	<u>\$87,958,472</u>

SUMMARY PURPOSE AND SCOPE:

This project provides funding for modernization of the Unitary Plan Wind Tunnel Complex to improve productivity, reliability, and the quality of test results. The project will provide new automated tunnel and model support controls; automated controls for tunnel auxiliaries; flow quality improvements in the 11 by 11 foot Transonic Wind Tunnel (11-ft TWT); repair or replacement of aging facility systems; and repair of weld defects in the pressure shell to allow recertification. This increment of work continues the construction of this Aeronautical Facilities Revitalization project.

PROJECT JUSTIFICATION:

The Unitary Plan Wind Tunnel (UPWT) is a vital National high-speed tunnel facility consisting of one transonic and two supersonic test sections and supporting auxiliary equipment. This facility is the most heavily used wind

tunnel complex in NASA. However, the facility's productivity is limited by the 1950's era control systems and the increasing frequency of equipment breakdowns due to age and heavy use. Modernization is needed now to improve productivity, data quality, and reliability. This complex has been operated on three-shifts-per-day basis since 1956, with minimal improvements to the facility. Tunnel downtime resulting from equipment and control failures has caused major delays to important aircraft projects. Tunnel backlog of testing exceeds two years. Lack of modern data acquisition equipment results in over half of tunnel tests being concluded before all needed data is acquired. Comparable foreign facilities have shown two to three times the productivity achieved in this wind tunnel complex.

Since it was placed in service in 1956, the UPWT Complex has contributed to the development of almost every U.S. developed military and civil aircraft flying or nearing service in its speed regime of Mach 0.3 to 3.5, as well as every U.S. manned spacecraft. It has provided valuable experimental results for development of military aircraft such as F-100, F-106, F-111, F-14, F-15, F-16, F-18, F-22, B-58, B-70, B-1, A7, and EA-6; and for commercial transports, including McDonnell Douglas DC-8, 9, 10, 11, 87V/88V, and 90, as well as Boeing 727, 747, 757, 767, and 777.

Repair or replacement of tunnel components that have reached the end of their useful life is required. Also, the welds in the tunnel shell contain defects typical of 1950's technology and must be repaired and the pressure shell recertified.

#### IMPACT OF DELAY:

Failure to modernize this facility will increase the delay in acquiring critical test data. The existing (unmodified) facility will continue to fail more frequently, requiring the use of alternate testing resources in Europe and other countries. This in turn, will reduce or delay improvements to U.S. commercial and military aircraft, and will significantly increase the cost of testing. In addition, NASA's leadership role in aeronautical research and development will diminish resulting in further degradation of the United States' world leadership in aviation.

#### PROJECT DESCRIPTION:

This increment of work will continue construction of facility refurbishments; controls modernization, automation, and replacement; flow quality improvements; and pressure vessel shell repair. The total project includes refurbishing and providing automated controls for the tunnel systems, model support systems, make-up air system, and compressor lubrication system; enlarging and modernizing the control rooms; and installing flow quality improvements in the 11-ft TWT. The project also includes refurbishing, repairing, or replacing major components, including the cooling tower, large electrical switch-gear, and make-up air system; and repairing weld defects in the pressurized portions of the tunnel circuits and make-up air system and recertifying the pressurized systems for safe operation.

**PROJECT COST ESTIMATE:**

	Unit of Measure	Quantity	Unit Cost	Cost
<b><u>Construction:</u></b> . . . . .	---	---	---	<b><u>\$22,000,000</u></b>
Piping Refurbishments . . . . .	LS	---	---	4,300,000
Facility Refurbishments . . . . .	LS	---	---	2,000,000
Refurbish and Replace Tunnel Control System . . . . .	LS	---	---	8,200,000
Repair of Pressure Vessels . . . . .	LS	---	---	1,000,000
Flow Quality Improvements . . . . .	LS	---	---	4,100,000
Integration . . . . .	LS	---	---	700,000
Construction Management . . . . .	LS	---	---	1,700,000
Total . . . . .				<b><u>\$22,000,000</u></b>

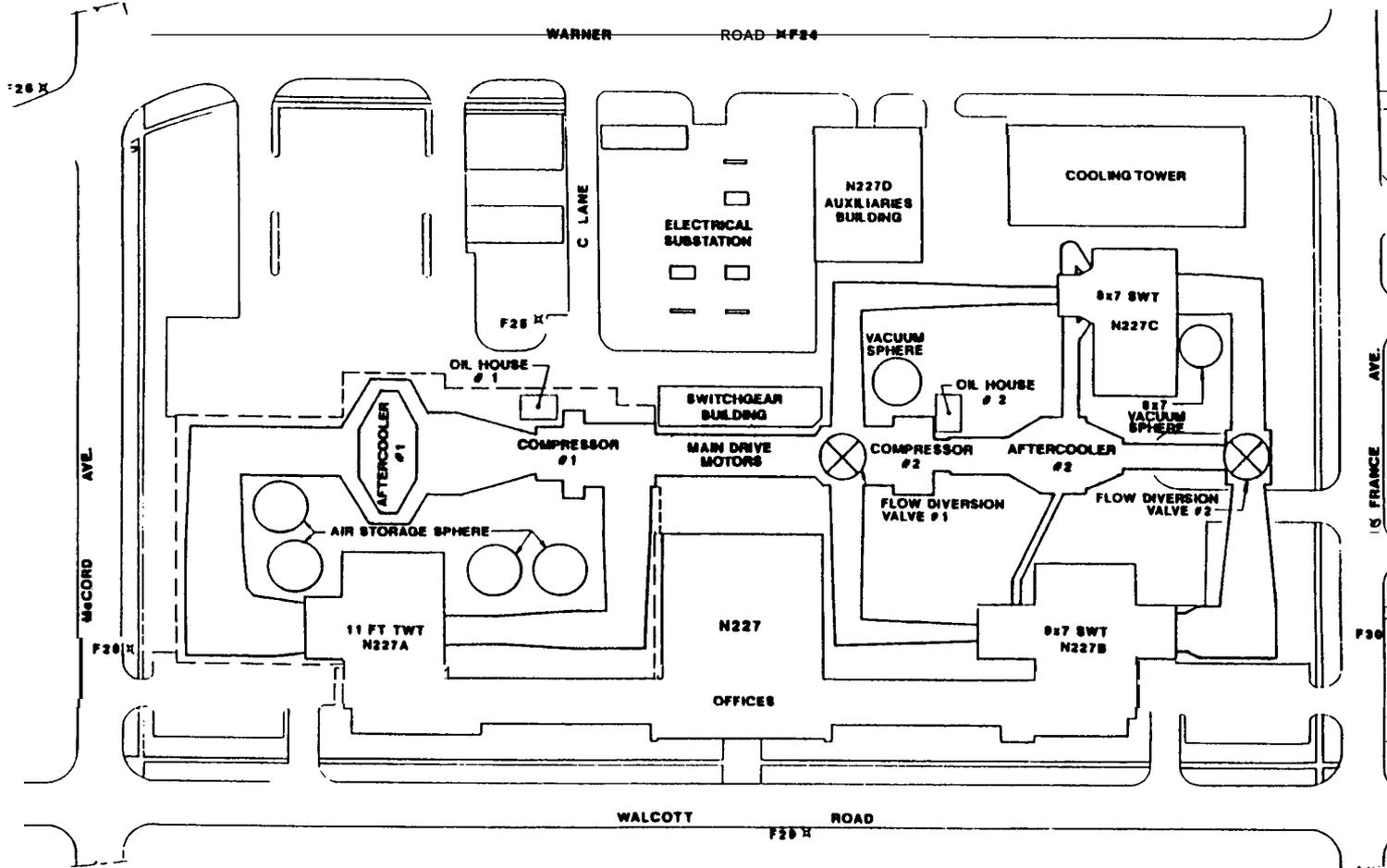
Note: This cost estimate provides for the FY 1995 increment of the project. The total cost of the project is estimated to be \$61 million. Previous funding has been provided as follows:  
FY 1993 - \$8.0M, and FY 1994 - \$25.0M.

**LIST OF RELATED GRAPHICS:** Figure 1 - Site Plan    Figure 2 - Perspective

**OTHER EQUIPMENT SUMMARY:** Data acquisition systems, model check-out equipment, and advanced instrumentation estimated to cost \$5.0 million will be located in this facility.

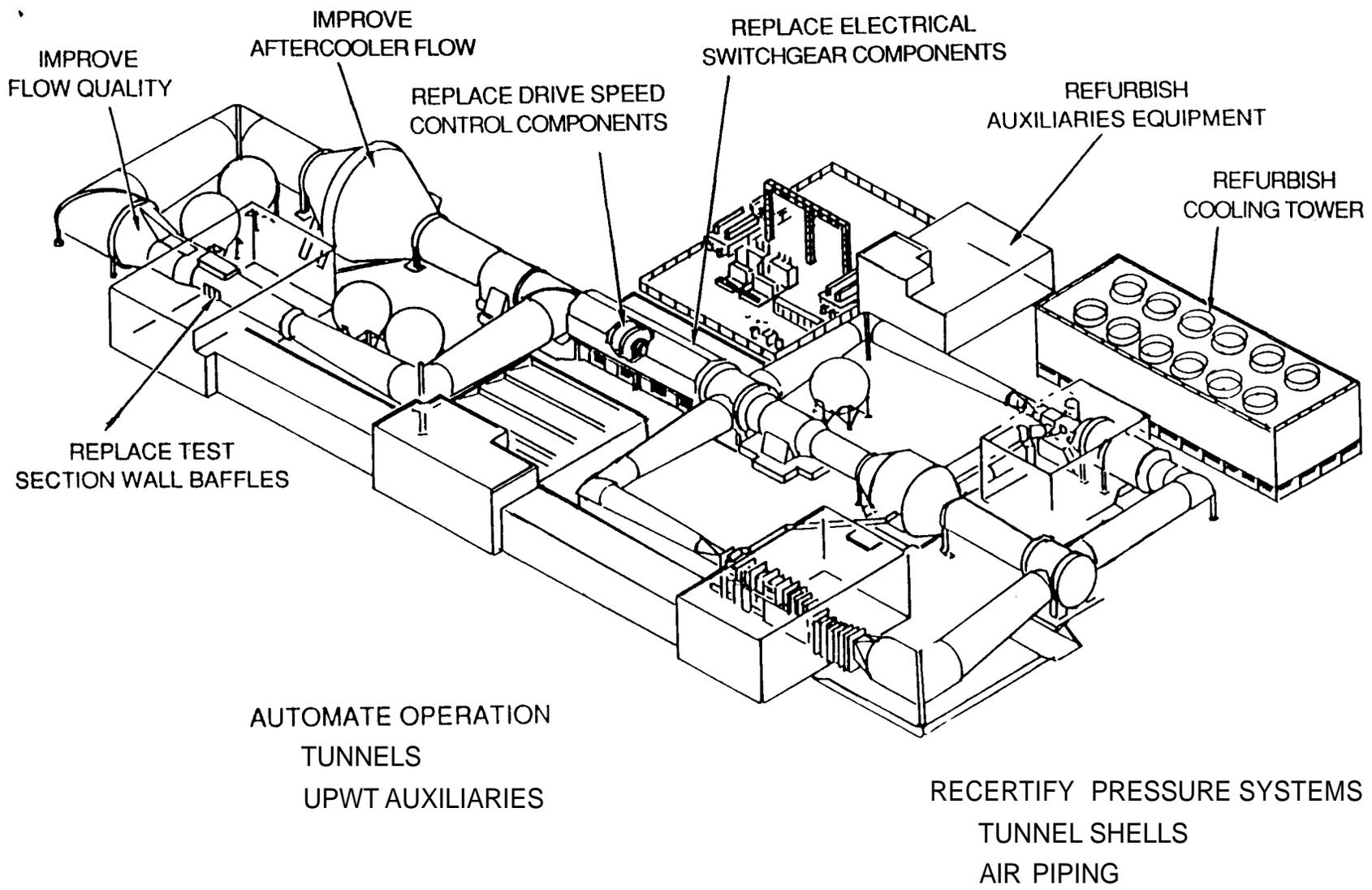
**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** To complete this project a fourth increment will be included in the FY 1996 budget at approximately \$6,000,000.

**AMES RESEARCH CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZATION OF UNITARY PLAN WIND TUNNEL COMPLEX**



**FIGURE 1  
SITE PLAN**

**AMES RESEARCH CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZATION OF UNITARY PLAN WIND TUNNEL COMPLEX**



**FIGURE 2  
PERSPECTIVE**

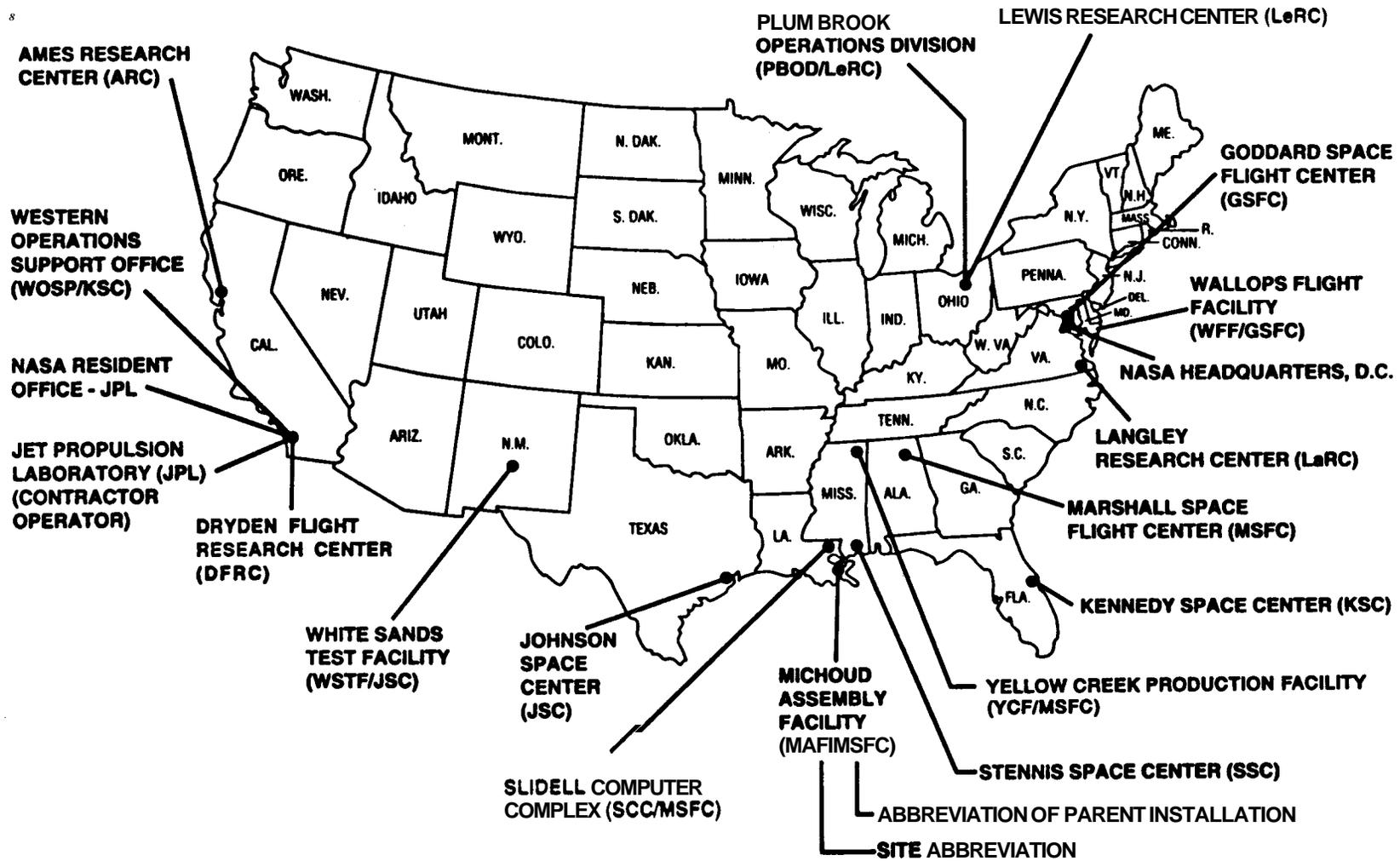
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993 -----	Fiscal Year 1994 -----
<hr/>		
<u>AERONAUTICAL FACILITIES AT VARIOUS LOCATIONS:</u>	<u>64,800</u>	<u>• 212,000</u>
National Aeronautics Facilities Upgrade Program (Various Locations) .....	25,000	181,000
Aeronautical Facilities Revitalization.....	39,800	31,000
Rehabilitation of Control Systems, National Full-scale Aerodynamics Complex (ARC).....	---	(2,100)
Upgrade of Outdoor Aerodynamic Research Facility (ARC).....	---	(3,900)
Modernization of the Unitary Plan Wind Tunnel Complex (ARC).....	(8,000)	(25,000)
Repair and Modernization of the 12-Foot Pressure Wind Tunnel (ARC).....	(17,400)	---
Modifications to 14 by 22-Foot Subsonic Wind Tunnel (LaRC) .....	(2,200)	---
Rehabilitation of Central Air System (LeRC) .....	(12,200)	---
 <u>LANGLEY RESEARCH CENTER</u>	 ---	 <u>8,000</u>
Construction of EOSDIS Distributed Active Archive Center (DAAC).....	---	8,000
 <u>LEWIS RESEARCH CENTER</u>	 ---	 <u>12,500</u>
Rehabilitation of Rocket Engine Test Facility .....	---	12,500
 <u>VARIOUS LOCATIONS</u>	 <u>33,800</u>	 <u>17,600</u>
Construction of 34-Meter Multifrequency Antennas, Canberra, Australia (JPL) ..	---	17,600
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) .....	15,600	---
Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) .....	16,200	---
Construction and Modernization of Infrared Telescope Facility, Mauna Kea, HI..	2,000	---

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES  
 BUDGET PLAN BY AUTHORIZATION LINE ITEM  
 (CURRENT STRUCTURE)  
 (Thousands of Dollars)

INSTALLATION AND PROJECT	Fiscal Year 1993	Fiscal Year 1994
Repair of Facilities at Various Locations, Not in excess of \$1,000,000 per project .....	<u>31,900</u>	<u>36,000</u>
Rehabilitation and Modification of Facilities at Various Locations, Not in excess of \$1,000,000 per project .....	<u>34,000</u>	<u>36,000</u>
Minor Construction of New Facilities and Additions to Existing Facilities at Various Locations, Not in excess of \$750,000 per project .....	<u>14,000</u>	<u>14,000</u>
Facility Planning and Design .....	<u>23,300</u>	<u>32,000</u>
Delta College .....	2,000	---
Consortium for International Earth Science Information Network (CIESIN) .....	<u>37,000</u>	<u>---</u>
S U B T O T A L, Construction .....	480,000	467,700
Environmental Compliance and Restoration Program .....	<u>40,000</u>	<u>50,000</u>
T O T A L, Construction of Facilities .....	<u>520,000</u>	<u>517,700</u>

# LOCATION OF MAJOR AND COMPONENT INSTALLATIONS



**RECORDED VALUE OF CAPITAL TYPE PROPERTY  
IN-HOUSE AND CONTRACTOR-BUILT  
AS OF SEPTEMBER 30, 1993  
(DOLLARS IN THOUSANDS)**

REPORTING INSTALLATION	LAND	BUILDING	OTHER STRUCTURES AND FACILITIES	LEASEHOLD IMPROVEMENTS	TOTAL	EQUIPMENT	FIXED ASSETS IN PROGRESS	GRAND TOTAL
<b>AMES RESEARCH CENTER</b>	<b>2,929</b>	<b>589,056</b>	<b>46,484</b>	<b>0</b>	<b>638,469</b>	<b>401,475</b>	<b>249,486</b>	<b>1,289,430</b>
ARC MOFFETT FIELD, CA	2,928	527,848	20,700	0	551,476	304,094	240,667	1,096,237
DRYDEN FLIGHT FACILITY WEDWARDS, CA	0	60,512	25,437	0	85,949	92,522	8,819	187,290
VARIOUS LOCATIONS	1	696	347	0	1,044	4,859	0	5,903
<b>GODDARD SPACE FLIGHT CENTER</b>	<b>3,311</b>	<b>281,447</b>	<b>131,944</b>	<b>0</b>	<b>416,702</b>	<b>645,274</b>	<b>58,658</b>	<b>1,120,634</b>
GSC GREENBELT, MD	1,577	186,401	27,701	0	215,679	349,377	39,539	604,595
TRACKING STATIONS NETWORK	5	39,209	23,153	0	62,367	102,498	2,698	167,563
WFF-WALLOPS ISLAND, VA	1,729	54,886	76,847	0	133,462	79,106	16,421	228,989
VARIOUS LOCATIONS	0	951	4,243	0	5,194	114,293	0	119,487
<b>JET PROPULSION LABORATORY</b>	<b>1,189</b>	<b>179,555</b>	<b>113,756</b>	<b>1,091</b>	<b>295,591</b>	<b>408,683</b>	<b>0</b>	<b>704,274</b>
JPL PASADENA, CA	1,189	179,555	113,756	1,091	295,591	408,683	0	704,274
<b>JOHNSON SPACE CENTER</b>	<b>11,238</b>	<b>312,943</b>	<b>113,189</b>	<b>105</b>	<b>437,475</b>	<b>724,493</b>	<b>40,208</b>	<b>1,202,176</b>
JSC-HOUSTON, TX	7,291	261,022	71,106	0	339,417	485,300	40,208	864,925
WHITE SANDS TEST FACILITY LOS CRUCES, NM	377	15,375	36,222	105	52,079	0	0	52,079
VARIOUS LOCATIONS	3570	36,546	5,863	0	45,979	239,193	0	285,172
<b>KENNEDY SPACE CENTER</b>	<b>73,672</b>	<b>623,719</b>	<b>550,494</b>	<b>0</b>	<b>1,247,885</b>	<b>893,976</b>	<b>136,516</b>	<b>2,278,377</b>
KSC-CAPE CANAVERAL FL	73,672	623,719	550,494	0	1,247,885	87,821	136,516	1,472,222
WESTERN TEST RANGE, LOMPAC, CA	0	0	0	0	0	2,928	0	2,928
VARIOUS LOCATIONS	0	0	0	0	0	803,227	0	803,227
<b>LANGLEY RESEARCH CENTER</b>	<b>156</b>	<b>231,727</b>	<b>436,112</b>	<b>0</b>	<b>667,995</b>	<b>327,435</b>	<b>64,705</b>	<b>1,060,215</b>
LARC-HAMPTON, VA	156	231,727	436,112	0	667,995	308,867	64,705	1,041,647
VARIOUS LOCATIONS	0	0	0	0	0	18,568	0	18,568
<b>LEWIS RESEARCH CENTER</b>	<b>2,621</b>	<b>305,940</b>	<b>112,579</b>	<b>136</b>	<b>421,276</b>	<b>263,969</b>	<b>80,996</b>	<b>766,241</b>
LEK-CLEVELAND, OH	316	228,790	93,517	136	322,759	171,442	80,996	575,197
PLUMBROOK, SANDUSKY, OH	2,305	77,150	19,062	0	98,517	79,693	0	178,210
VARIOUS LOCATIONS	0	0	0	0	0	12,834	0	12,834
<b>MARSHALL SPACE FLIGHT CENTER</b>	<b>11,093</b>	<b>369,289</b>	<b>202,848</b>	<b>0</b>	<b>583,230</b>	<b>788,983</b>	<b>15,103</b>	<b>1,387,316</b>
MSPC-HUNTSVILLE, AL	0	193,713	100,565	0	294,278	438,068	15,103	747,449
MICHOUD ASSEMBLY FACILITY, LA	7,162	164,007	88,500	0	259,669	72,609	0	332,278
SUDRELL COMPUTER COMPLEX, LA	69	5,253	3,176	0	8,498	14,557	0	23,055
VARIOUS LOCATIONS	3,862	6,316	10,607	0	20,705	263,749	0	284,534
<b>STENNIS SPACE CENTER</b>	<b>18,080</b>	<b>130,796</b>	<b>234,251</b>	<b>0</b>	<b>383,127</b>	<b>48,140</b>	<b>31,617</b>	<b>462,884</b>
STENNIS SPACE CENTER	18,080	130,796	234,251	0	383,127	48,140	31,617	462,884
VARIOUS LOCATIONS	0	0	0	0	0	0	0	0
<b>NASA HEADQUARTERS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>58,592</b>	<b>0</b>	<b>58,609</b>
NASA-HQS, WASH. DC	0	0	0	17	17	58,592	0	58,609
VARIOUS LOCATIONS	0	0	0	0	0	0	0	0
<b>AGENCY TOTAL</b>	<b>124,289</b>	<b>3,024,472</b>	<b>1,941,657</b>	<b>1,349</b>	<b>5,091,767</b>	<b>4,561,020</b>	<b>477,369</b>	<b>10,330,156</b>

**Project Justification**

Human Space Flight



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1995 ESTIMATES

SUMMARY

HUMAN SPACE FLIGHT

	<u>Amount</u> -----	<u>Page</u> <u>No.</u> -----
	(Dollars)	
<u>Space Station:</u>		
Construction of Neutral Buoyancy Laboratory, Johnson Space Center.....	20,200,000	CF 1-1
<u>Other Human Space Flight:</u>		
Modernize Firex System, Pads A and B, Kennedy Space Center .....	4,800,000	CF 1-4
Replace Components Refurbishment Laboratory, Kennedy Space Center.....	7,500,000	CF 1-7
 Total Human Space Flight	 32,500,000 =====	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

---

PROJECT TITLE: Construction of Neutral Buoyancy Laboratory

INSTALLATION: Lyndon B. Johnson Space Center

---

FY 1995 CoF Estimate: \$20,200,000

---

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$3,954,014	---	\$3,954,014
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$3,954,014</u>	<u>---</u>	<u>\$3,954,014</u>

SUMMARY PURPOSE AND SCOPE:

This project provides for the first of two increments for the construction of the Neutral Buoyancy Laboratory (NBL) to meet the requirements for extravehicular activity (EVA) simulations for astronaut training, EVA procedures development, and validation for the Space Station assembly and operations.

PROJECT JUSTIFICATION:

This project is required for EVA simulations for astronaut training and procedures development for the Space Station. A major critical requirement is the validation of EVA timelines to ensure that the EVA activities can be successfully carried out. Experience from several satellite retrieval/servicing EVA tasks, e.g., Solar Maximum, Westar/Palapa, Syncom, Intelsat-VI, and the recent Hubble Space Telescope, has clearly shown that the more realistic, complete simulations made possible by the larger pool size of the NBL will significantly increase assurance of successful and safe EVA mission operations.

Techniques developed and refined in neutral buoyancy facilities allow astronauts in space suits to perform space-related EVA operations on the ground in a way that correlates closely to actual on orbit task performance. Existing facilities were sized for existing program hardware. Larger facilities are required for the larger Space Station flight hardware assemblies. The NBL will accommodate the large space hardware portions and provide

realistic EVA development and operations planning activities during the Space Station buildup and follow-on operations. There are no acceptable neutral buoyancy facilities available for providing adequate Space Station EVA evaluations and astronaut training. The NBL also will be the primary EVA facility for Space Shuttle and other program requirements.

IMPACT OF DELAY:

The NBL is required to support Space Station assembly engineering and training and will be invaluable for the fourth and following assembly missions which have the highest EVA complexity. Delay in providing this facility will seriously impact Space Station assembly and operations.

PROJECT DESCRIPTION:

This project provides for the first of two increments for the construction of the NBL. This increment will include site preparation and construction of the tank and associated support systems, cranes, and the laboratory building which houses the pool. The laboratory building will be a steel framed structure with insulated metal panels comprising approximately 69,000 square feet. Approximately 12,000 square feet of this space will be test article mock up assembly and 12,000 square feet of this space will be used for locker room, scuba servicing rooms, electrical, mechanical rooms, hallways, and offices. Tank water circulation/treatment systems also will be installed. The pool will be 202 by 102 by 40 feet. The facility also will include breathing gas, support systems, out buildings to support the tank, and parking.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Cost
<u>Construction</u> . . . . .	---	---	---	<u>\$20,200,000</u>
Civil/Sitework . . . . .	LS	---	---	3,400,000
Mechanical/Plumbing, HVAC, Fire & Safety . . . . .	LS	---	---	200,000
Architectural . . . . .	LS	---	---	1,000,000
Structural . . . . .	LS	---	---	10,000,000
Electrical . . . . .	LS	---	---	1,600,000
Other Related Pool Equipment . . .	LS	---	---	1,000,000
Crane . . . . .	LS	---	---	1,100,000
Miscellaneous Equipment . . . . . (Outfitting)	LS	---	---	1,900,000
Total . . . . .				<u>\$20,200,000</u>

Total cost of this project is \$32.2M.

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: Approximately \$12,000,000 will be required in FY 1996 to complete the construction and provide a fully operational facility.

LYNDON B. JOHNSON SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
CONSTRUCTION OF NEUTRAL BUOYANCY LABORATORY  
LOCATION PLAN

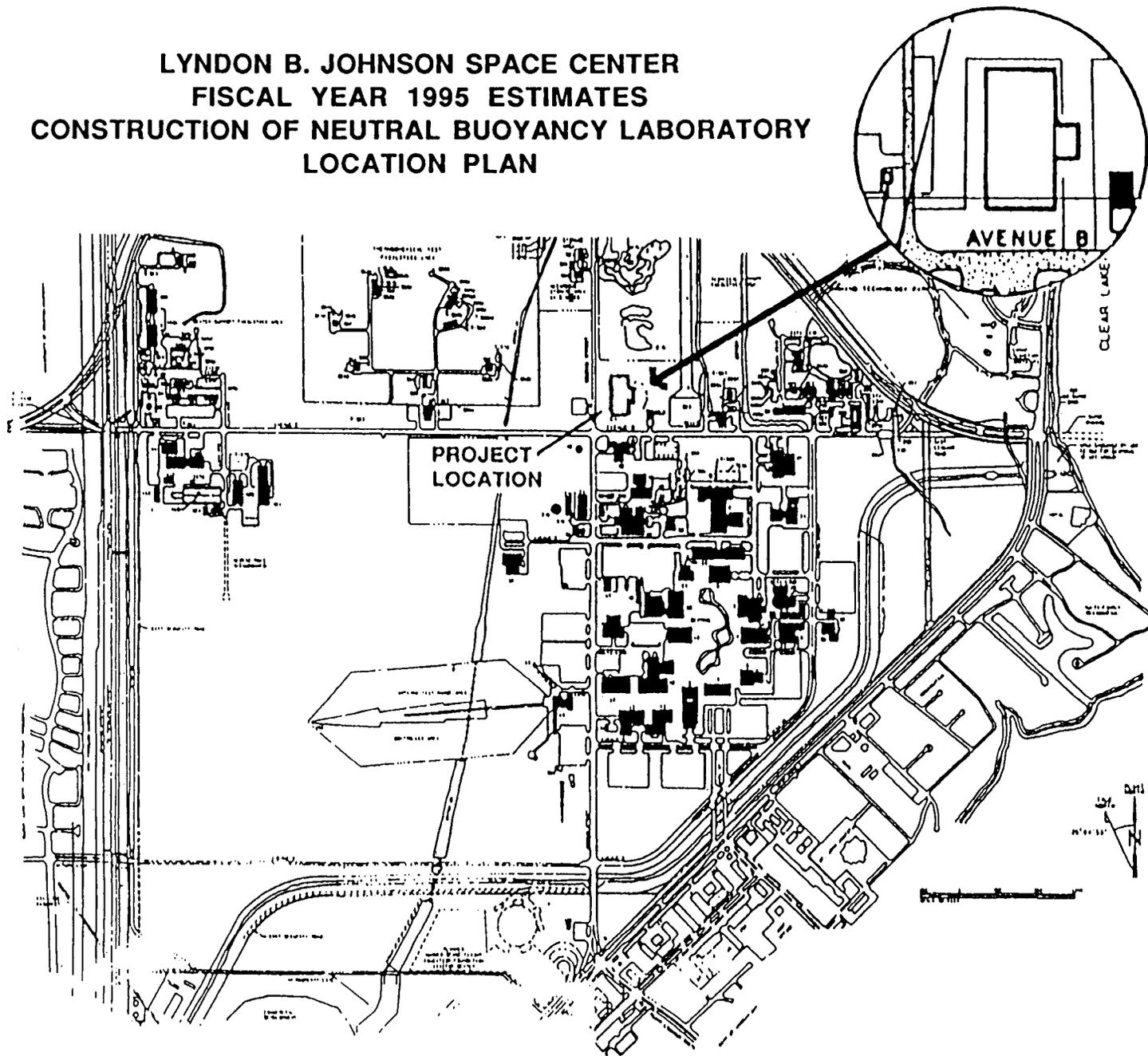


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Modernize Firex System, Pads A & B

INSTALLATION: John F. Kennedy Space Center

FY 1995 CoF Estimate: \$4,800,000

---

LOCATION OF PROJECT: John F. Kennedy Space Center, Brevard County, Florida

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$440,000	---	\$440,000
Capitalized Investment . . . . .	---	<u>\$216,362,462</u>	<u>\$216,362,462</u>
Total . . . . .	<u>\$440,000</u>	<u>\$216,362,462</u>	<u>\$216,802,462</u>

SUMMARY PURPOSE AND SCOPE :

The purpose of this project is to replace the fire water perimeter loop piping and components to meet the required 300 psig operating pressure. The failure rate of this piping is increasing because it was not designed to withstand the required high operating pressures.

PROJECT JUSTIFICATION :

The Firex system is operated at 155 psig static pressure with occasional pressure surges up to 300 psig. The existing piping was installed in approximately 1966 and was designed to operate at 160 psig. There is concern in continuing to use the systems at high range pressures. In addition, most of the system components, particularly hydrants and hose reels, are not rated for the system pressure. Replacing Firex piping and making system modifications to connect water fog nozzles to the high pressure will improve overall system reliability. Spray

systems are required for emergency egress on the Orbiter Mid-Body Umbilical Unit and fuel handling areas to meet safety standards

IMPACT OF DELAY:

Increasing system failures and component failures could render the Pad A/B Firex protection system inadequate during an emergency. Personnel safety will be compromised.

PROJECT DESCRIPTION:

New Firex piping will be installed with the proper pressure classification with connections at the perimeter valve pit and facility valve pits. Existing Firex piping will be connected to the existing potable water system to create a new low-pressure system serving hydrants and hose reels. System connection details at several facilities will need to be revised to isolate water fog nozzles on the new Firex system and connect facility hydrants and hose reels to the new low pressure system. Nozzles will be added where hypergolic and cryogenic equipment is located. The Pad B surface requires only piping and nozzles; however, Pad A requires a complete Type I system.

PROJECT COST ESTIMATE:

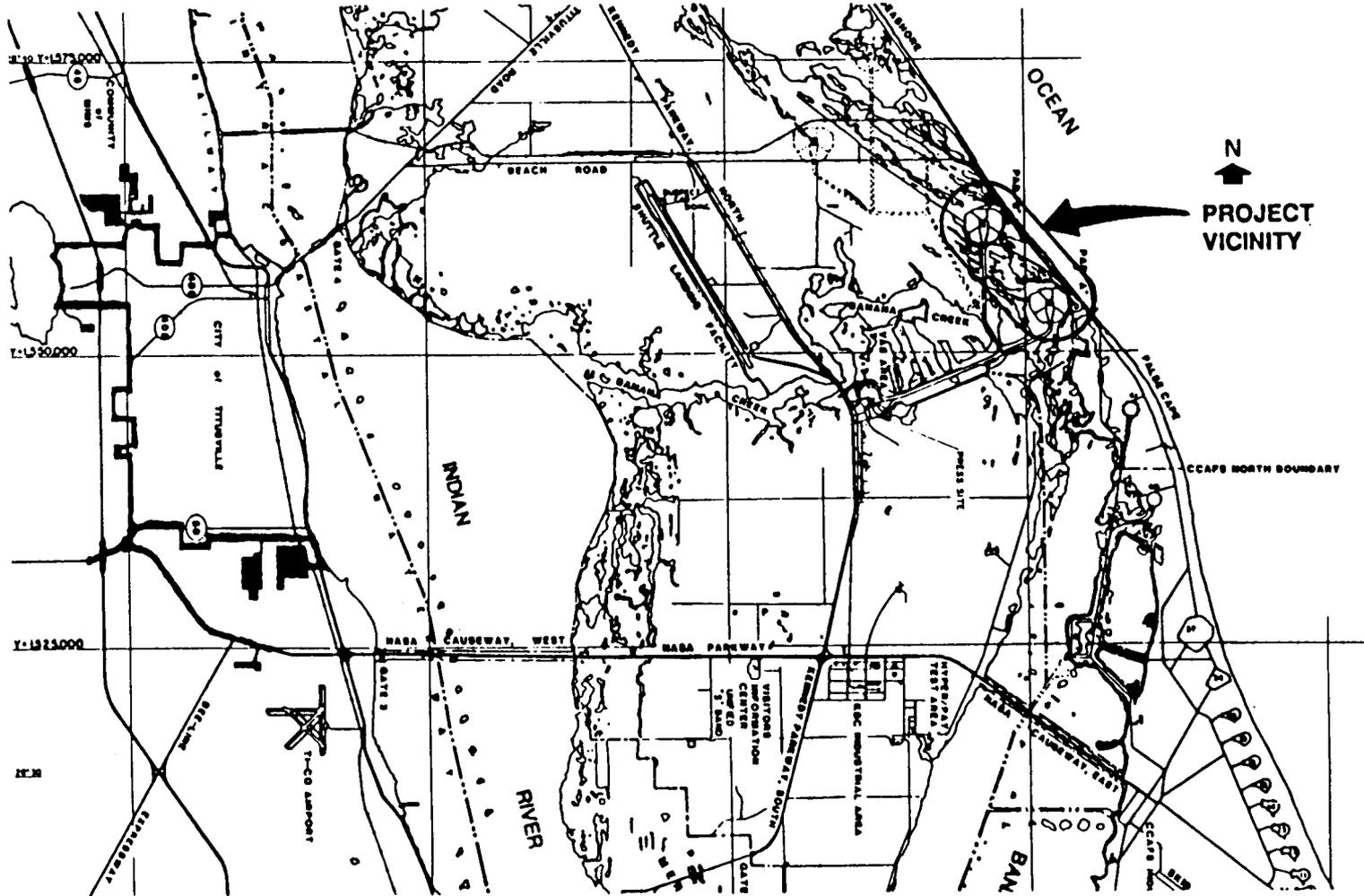
	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>\$K</u>
<u>Construction</u> . . . . .	---	---	---	<u>\$4,800,000</u>
Civil/Site Work . . . . .	LS	---	---	3,000,000
Mechanical Work . . . . .	LS	---	---	1,100,000
Electrical Work . . . . .	LS	---	---	700,000
Total . . . . .				<u>\$4,800,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**JOHN F. KENNEDY SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE FIREX SYSTEM, PADS A & B**

**LOCATION PLAN  
JOHN F. KENNEDY SPACE CENTER, FLORIDA**



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Replace Components Refurbishment Laboratory

INSTALLATION: John F. Kennedy Space Center

FY 1995 CoF Estimate: \$7,500,000

---

LOCATION OF PROJECT: John F. Kennedy Space Center, Brevard County, Florida

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$645,000	---	\$645,000
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$645,000</u>	<u>---</u>	<u>\$645,000</u>

SUMMARY PURPOSE AND SCOPE,:

The purpose of this project is to upgrade the existing Space Shuttle Component Refurbishment Facilities by replacing approximately 30,000 square feet. The project also includes utilities to the site, site clearing, and support systems required for component assembly and cleaning.

PROJECT JUSTIFICATION:

The Components Refurbishment Laboratory is the only certified laboratory at Kennedy Space Center for cleaning flight hardware components and proof testing of tubing and flex hoses. The facilities are currently operated 7 days per week to support the number of Shuttle and Air Force components requiring refurbishment and cleaning. The existing primary facilities are overcrowded, do not comply with OSHA fire safety standards, have aging utility systems, and have friable asbestos in the roof deck and in the mechanical areas. Modifications to replace the

utility systems, install fire sprinklers, install non-chlorofluorocarbon (CFC) cleaning upgrades, and remove the asbestos have been canceled due to the requirement to keep this mission critical operation on-line. In addition, the existing facilities are located within the Shuttle launch impact zone requiring evacuation and subsequent work stoppage on launch days. Providing a replacement facility that meets present environmental and safety criteria will eventually permit the demolition of the existing facility and eliminate the present deficiencies.

IMPACT OF DELAY:

Continued use of the existing facilities would result in continued fire safety noncompliance, overcrowding, noncompliance with non-CFC cleaning upgrades, and increased breakdowns of out-dated utility systems.

PROJECT DESCRIPTION:

This project provides for replacing approximately 30,000 square feet for rough cleaning, pre-clean laboratories and shops, precision cleaning/verification clean rooms and test cells, hydraulics laboratories, shipping and receiving, logistics and other support space. A fire protection and detection system will be installed. Services provided will include communication, electricity, water, sewer, compressed air, and hazardous waste storage. Deionized water supply, wastewater holding tanks, and compressed gas tube banks will be relocated from the existing facilities.

<u>PROJECT COST ESTIMATE:</u>	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
<u>Construction</u> . . . . .	---	---	---	<u>\$7,500,000</u>
Civil . . . . .	LS	---	---	1,700,000
Structural/Architectural . . . . .	LS	---	---	2,500,000
Mechanical . . . . .	LS	---	---	1,200,000
Electrical . . . . .	LS	---	---	1,700,000
Cranes . . . . .	LS	---	---	400,000
Total . . . . .				<u>\$7,500,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: Approximately \$3,300,000 of other funds will be required for outfitting and facility support equipment.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: A future addition is planned so that all functions in the existing refurbishment facilities can be located in the same area.

JOHN F. KENNEDY SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
REPLACE COMPONENTS REFURBISHMENT LABORATORY

SITE PLAN  
KSC INDUSTRIAL AREA

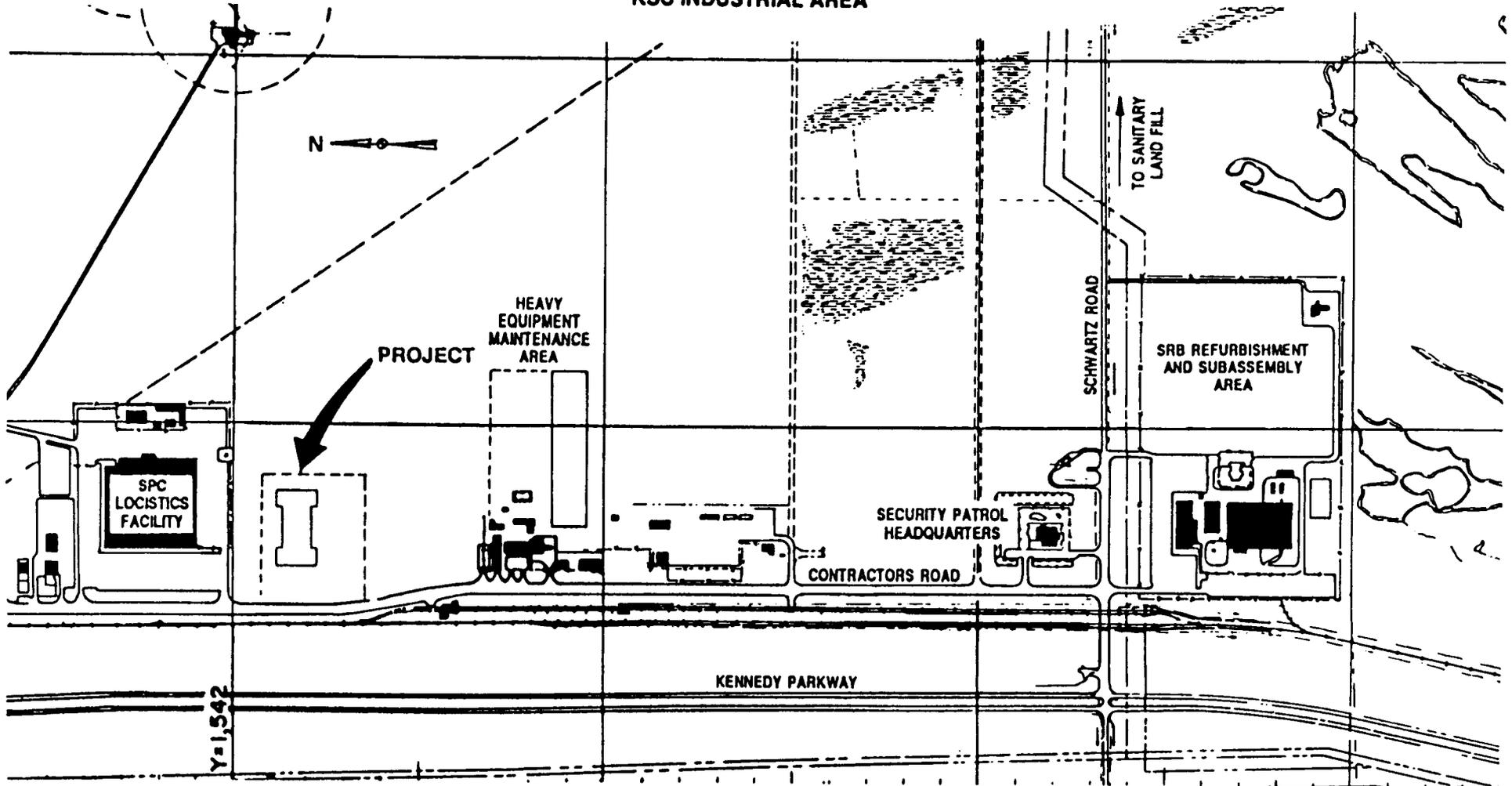


FIGURE 1

Science, Aeronautics  
and Technology 

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES

█

SCIENCE, AERONAUTICS, AND TECHNOLOGY

	Amount ----- (Dollars)	Page No. -----
<u>Science:</u>		
Construction of Earth Systems Science Building, Goddard Space Flight Center.....	17,000,000	CF Z-1
<u>Aeronautics:</u>		
Modernization of the Langley Plan Wind Tunnel Complex, Ames Research Center	22,000,000	CM Z-5
Total Science, Aeronautics, and Technology	39,000,000 =====	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

---

PROJECT TITLE: Construction of Earth Systems Science Building

INSTALLATION: Goddard Space Flight Center

FY 1995 CoF Estimate: \$17,000,000

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LOCATION OF PROJECT: Greenbelt, Prince George's County, Maryland

COGNIZANT HEADQUARTERS OFFICE: Office of Mission to Planet Earth

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$4,044,850	\$12,000,000	\$16,044,850
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$4,044,850</u>	<u>\$12,000,000</u>	<u>\$16,044,850</u>

SUMMARY PURPOSE AND SCOPE:

This project provides the second increment of the Earth Systems Science Building (ESSB) at the Goddard Space Flight Center (GSFC). The facility will provide approximately 290,000 square feet to house civil service, contractor, and visiting scientist personnel conducting interdisciplinary earth science and research into global change. This facility is located adjacent to the Earth Observing System Data Information System (EOSDIS) Facility and will support the Earth Observing System (EOS) program by data analysis, assimilation, and instrument and algorithm development. The third increment required to complete the facility is planned for FY 1996.

PROJECT JUSTIFICATION:

The United States has taken the leadership role in one of the largest Earth Science enterprises--Global Change research. The Earth Observing Systems (EOS) Program is a critical component of this effort. It will contribute

principal observational, data processing and archiving, and scientific research capabilities essential to conduct this research. Goddard Space Flight Center is NASA's lead Center for EOS, with responsibility for development of Earth Observing capabilities including the Earth Observing System Morning Crossing (EOSAM) and Earth Observing System Afternoon Crossing (EOSPM) spacecraft; GSFC-sponsored NASA facilities class instruments; Earth Science mission operations; principal or co-investigator for a number of EOS-related scientific investigations; Land Remote-Sensing Satellite (LANDSAT); and processing, archiving, and disseminating GSFC-related EOS data.

The Earth System Science Building (ESSB) brings together vital elements of GSFC's substantial Earth Sciences talent in specialized facilities dedicated to the conduct of EOS/Global Change research. This is essential to facilitate and promote the interdisciplinary scientific research required to achieve EOS/Global Change research goals. The ESSB will also provide a venue for collaboration between NASA and other scientists engaged in Global Change research. The proximity of the ESSB Facility to the EOSDIS Facility will provide ready access to the GSFC EOS Distributed Active Archive Center (DAAC), the central repository (located within the EOSDIS Facility) for all GSFC EOS-related data.

Goddard's Earth Science group is currently located in seven widely separated buildings, creating substantial obstacles to interdisciplinary scientific communication and collaboration, and inefficient EOS Project/EOSDIS programmatic support. The ESSB will provide a consolidated environment in which interdisciplinary interactions are fostered for the resident earth scientists and the visiting scientists. The ESSB will also accommodate new equipment such as computer, workstation, and graphics terminal technologies as they evolve over the life of the EOS/Global Change research effort. This facility will ensure an efficient and productive work environment for EOS/Global Change research.

IMPACT OF DELAY:

If the ESSB facility is delayed, it will adversely impact the analysis and understanding of EOS data, as well as delay the development of instrumentation and algorithms for future Earth Science missions.

PROJECT DESCRIPTION:

The 290,000 square foot facility will be located on the east site adjacent to the EOSDIS Facility at Greenbelt and Soil Conservation Service Roads. The first increment (FY 1994) provided for site development/utilities, and included extension of basic utilities infrastructure to the ESSB site, expansion of EOSDIS utility plant including provision for backup diesel electric power, and construction of ESSB footings and foundations. This second increment will provide for the ESSB shell and procurement of building architectural, mechanical and electrical long lead items. The third increment (FY 1996) will provide for installation of the architectural, mechanical, and electrical long lead items; construction of building interior, partitioning, and finishes; and completion of remaining work to provide a complete and usable facility.

The overall scope of work for this project provides for site development, including the extension of appropriate Center utility distribution systems (communication duct banks, electrical power, steam, chilled water, sanitary sewer and storm drainage systems), clearing and grubbing, construction of new access roads, necessary parking lots, area lighting, security fencing, and a gate house. Also included are foundations, structural steel, exterior wall, and interior support systems. Utility control systems, to be tied in with the Center-wide Utility Control System (UCS) monitored from the Central Power Plant, are also included.

<u>PROJECT COST ESTIMATE:</u>	Unit of Measure	Quantity	Unit Cost	Cost
<u>Construction:</u> . . . . .	---	---	---	<u>\$17,000,000</u>
Architectural . . . . .	LS	---	---	4,700,000
Structural . . . . .	LS	---	---	5,500,000
Mechanical . . . . .	LS	---	---	3,400,000
Electrical . . . . .	LS	---	---	3,400,000
Total . . . . .				<u>\$17,000,000</u>

Note: This cost estimate provides for the FY 1995 increment of the total facility. The total cost of the project is estimated to be \$46 million.

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY:

Noncollateral equipment such as systems furniture, other furnishings, and equipment for special purpose areas will be required at a cost of approximately \$20,000,000, which will be provided from other than CoF resources.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

The third increment required to complete this project will be included in the FY 1996 budget request for \$17,000,000.

GODDARD SPACE FLIGHT CENTER  
FISCAL YEAR 1995 ESTIMATES  
CONSTRUCTION OF EARTH SYSTEMS SCIENCE BUILDING (ESSB)

LOCATION PLAN

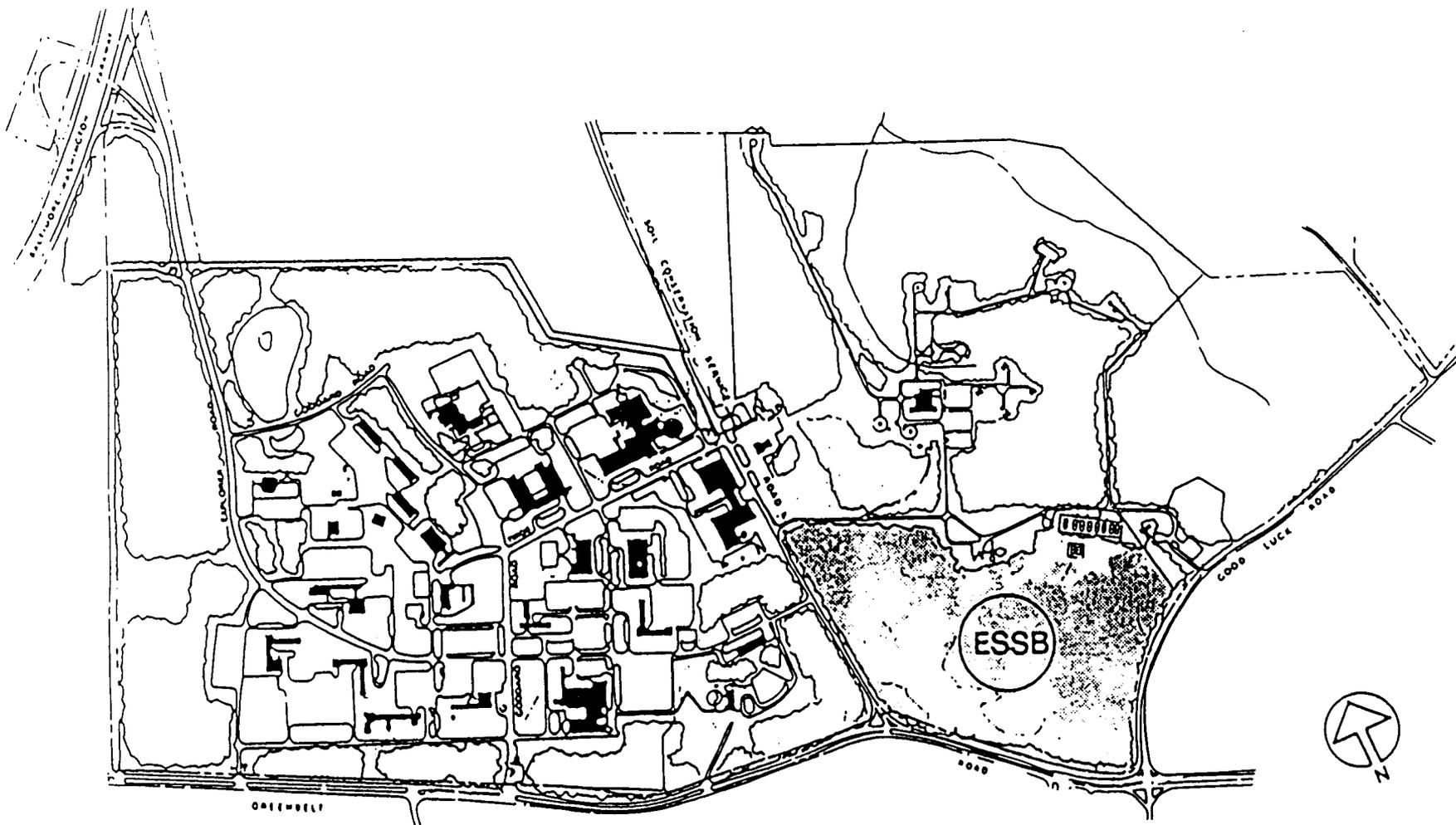


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Modernization of the Unitary Plan Wind Tunnel Complex

INSTALLATION: Ames Research Center

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FY 1995 CoF Estimate: \$22,000,000

---

LOCATION OF PROJECT: Moffett Field, Santa Clara County, California

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$4,600,000	\$33,000,000	\$37,600,000
Capitalized Investment . . . . .	<u>---</u>	<u>50,358,472</u>	<u>\$0,358,472</u>
Total . . . . .	<u>\$4,600,000</u>	<u>\$83,358,472</u>	<u>\$87,958,472</u>

SUMMARY PURPOSE AND SCOPE:

This project provides funding for modernization of the Unitary Plan Wind Tunnel Complex to improve productivity, reliability, and the quality of test results. The project will provide new automated tunnel and model support controls; automated controls for tunnel auxiliaries; flow quality improvements in the 11 by 11 foot Transonic Wind Tunnel (11-ft TWT); repair or replacement of aging facility systems; and repair of weld defects in the pressure shell to allow recertification. This increment of work continues the construction of this Aeronautical Facilities Revitalization project.

PROJECT JUSTIFICATION:

The Unitary Plan Wind Tunnel (UPWT) is a vital National high-speed tunnel facility consisting of one transonic and two supersonic test sections and supporting auxiliary equipment. This facility is the most heavily used wind

tunnel complex in NASA. However, the facility's productivity is limited by the 1950's era control systems and the increasing frequency of equipment breakdowns due to age and heavy use. Modernization is needed now to improve productivity, data quality, and reliability. This complex has been operated on three-shifts-per-day basis since 1956, with minimal improvements to the facility. Tunnel downtime resulting from equipment and control failures has caused major delays to important aircraft projects. Tunnel backlog of testing exceeds two years. Lack of modern data acquisition equipment results in over half of tunnel tests being concluded before all needed data is acquired. Comparable foreign facilities have shown two to three times the productivity achieved in this wind tunnel complex.

Since it was placed in service in 1956, the UPWT Complex has contributed to the development of almost every U.S. developed military and civil aircraft flying or nearing service in its speed regime of Mach 0.3 to 3.5, as well as every U.S. manned spacecraft. It has provided valuable experimental results for development of military aircraft such as F-100, F-106, F-111, F-14, F-15, F-16, F-18, F-22, B-58, B-70, B-1, A7, and EA-6; and for commercial transports, including McDonnell Douglas DC-8, 9, 10, 11, 87V/88V, and 90, as well as Boeing 727, 747, 757, 767, and 777.

Repair or replacement of tunnel components that have reached the end of their useful life is required. Also, the welds in the tunnel shell contain defects typical of 1950's technology and must be repaired and the pressure shell recertified.

#### IMPACT OF DELAY:

Failure to modernize this facility will increase the delay in acquiring critical test data. The existing (unmodified) facility will continue to fail more frequently, requiring the use of alternate testing resources in Europe and other countries. This in turn, will reduce or delay improvements to U.S. commercial and military aircraft, and will significantly increase the cost of testing. In addition, NASA's leadership role in aeronautical research and development will diminish resulting in further degradation of the United States' world leadership in aviation.

#### PROJECT DESCRIPTION:

This increment of work will continue construction of facility refurbishments; controls modernization, automation, and replacement; flow quality improvements; and pressure vessel shell repair. The total project includes refurbishing and providing automated controls for the tunnel systems, model support systems, make-up air system, and compressor lubrication system; enlarging and modernizing the control rooms; and installing flow quality improvements in the 11-ft TWT. The project also includes refurbishing, repairing, or replacing major components, including the cooling tower, large electrical switch-gear, and make-up air system; and repairing weld defects in the pressurized portions of the tunnel circuits and make-up air system and recertifying the pressurized systems for safe operation.

**PROJECT COST ESTIMATE:**

	Unit of Measure	Quantity	Unit Cost	Cost
<b><u>Construction:</u></b> . . . . .	---	---	---	<b><u>\$22,000,000</u></b>
Piping Refurbishments . . . . .	LS	---	---	4,300,000
Facility Refurbishments . . . . .	LS	---	---	2,000,000
Refurbish and Replace Tunnel Control System . . . . .	LS	---	---	8,200,000
Repair of Pressure Vessels . . . . .	LS	---	---	1,000,000
Flow Quality Improvements . . . . .	LS	---	---	4,100,000
Integration . . . . .	LS	---	---	700,000
Construction Management . . . . .	LS	---	---	1,700,000
Total . . . . .				<b><u>\$22,000,000</u></b>

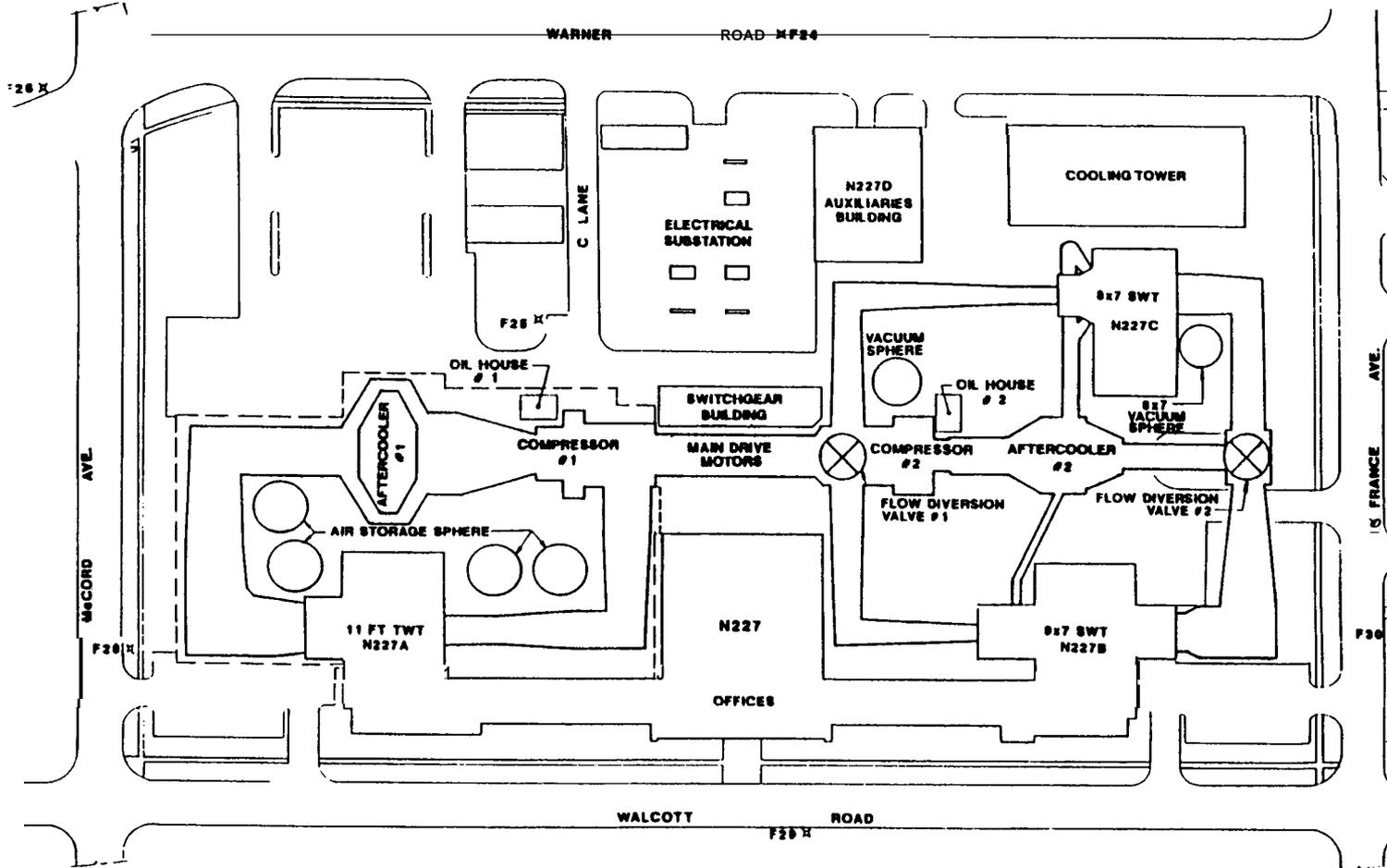
Note: This cost estimate provides for the FY 1995 increment of the project. The total cost of the project is estimated to be \$61 million. Previous funding has been provided as follows: FY 1993 - \$8.0M, and FY 1994 - \$25.0M.

**LIST OF RELATED GRAPHICS:** Figure 1 - Site Plan    Figure 2 - Perspective

**OTHER EQUIPMENT SUMMARY:** Data acquisition systems, model check-out equipment, and advanced instrumentation estimated to cost \$5.0 million will be located in this facility.

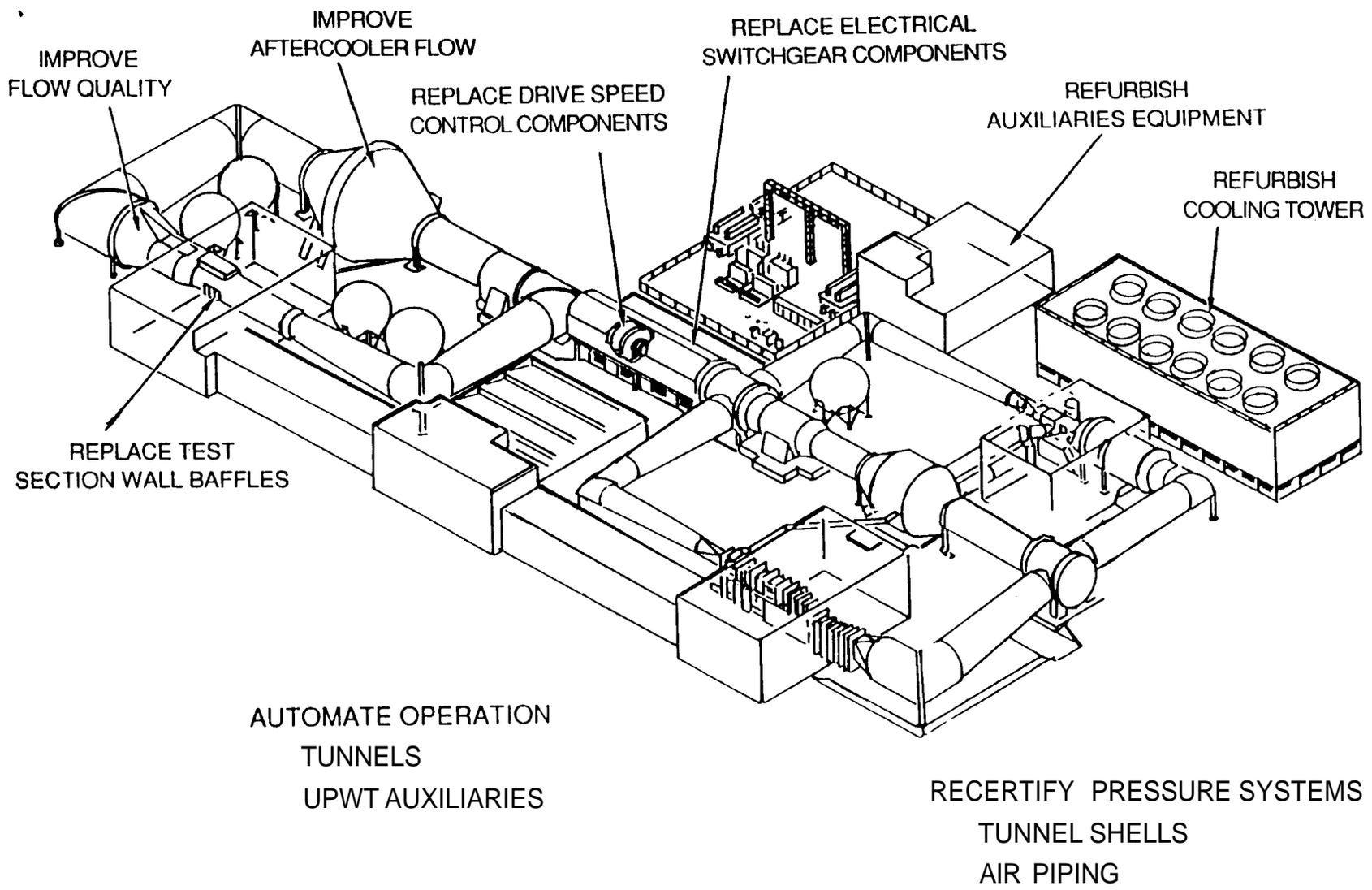
**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** To complete this project a fourth increment will be included in the FY 1996 budget at approximately \$6,000,000.

**AMES RESEARCH CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZATION OF UNITARY PLAN WIND TUNNEL COMPLEX**



**FIGURE 1  
SITE PLAN**

**AMES RESEARCH CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZATION OF UNITARY PLAN WIND TUNNEL COMPLEX**



**FIGURE 2  
PERSPECTIVE**

Mission Support

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
 CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1995 ESTIMATES

SUMMARY

MISSION SUPPORT	Amount ----- (Dollars)	Page No. -----
Seismic Upgrade of Research, Development, and Test Building, Dryden Flight Research Center .....	8,000,000	CF 3.1-1
Restore Exterior/Interior Systems, Buildings 3, 13, and 14, Goddard Space Flight Center.. .....	5,000,000	CF 3.1-4
Modernize Condenser Water Systems, Southern Sector, Jet Propulsion Laboratory.....	4,300,000	CF 3.1-7
Rehabilitate Utility Tunnel Structure and Systems, Johnson Space Center. ....	4,300,000	CF 3.1-11
Modernize Payloads Hazardous Servicing Facility HVAC System, Kennedy Space Center. ....	1,500,000	CF 3.1-14
Modernize Metrology and Calibration Facility, Marshall Space Flight Center... ..	4,900,000	CF 3.1-17
Repair .....	30,000,000	CF 3.2
Rehabilitation and Modification.. .....	30,000,000	CF 3.3
Minor Construction .....	2,000,000	CF 3.4
Facility Planning and Design.....	10,000,000	CF 3.5
Environmental Compliance and Restoration. ....	<u>35,000,000</u>	CF 3.6
 Total Mission Support	 <u>135,000,000</u> =====	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

PROJECT TITLE: Seismic Upgrade of Research, Development, and Test Building

INSTALLATION: Dryden Flight Research Center

FY 1995 CoF Estimate: \$8,000,000

LOCATION OF PROJECT: Edwards Air Force Base, Kern County, CA

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	Total
Specific CoF Funding . . . . .	\$900,000	---	\$ 900,000
Capitalized Investment . . . . .	<u>---</u>	<u>\$10,529,000</u>	<u>10,529,000</u>
Total . . . . .	<u>\$900,000</u>	<u>\$10,529,000</u>	<u>\$11,429,000</u>

SUMMARY PURPOSE AND SCOPE:

This project will provide for seismic repair of Building 4800 to protect building occupants from injury or death. This project will upgrade the structural systems of the building, provide collateral equipment with seismic resistance, and allow building occupants to survive if a major earthquake occurs near the Dryden Flight Research Center (DFRC).

**PROJECT:**

The probability of a major earthquake (magnitude 8+) occurring within the next 30 years in the San Andreas area adjacent to DFRC is over 60 percent. Building 4800 is the main administrative, research, development, and test building with over 300 persons. All missions are monitored, controlled, and recorded in this building. A major earthquake could severely damage Building 4800 and halt missions and cause death or injury to personnel.

Building 4800 and the adjoining hangars, 4801 and 4802, were designed in accordance with 1952 building codes. Major additions and walls were constructed of unreinforced masonry walls which are banned by current building codes. During previous minor earthquakes these walls absorbed energy; were stressed to brittle cracking; and have a high probability of future failures. Also, in the event of a major earthquake, total or partial collapse of the fire water piping is likely and must be remedied. In addition, asbestos used on mechanical piping and building fireproofing, has deteriorated, been damaged, and become friable and must be replaced.

IMPACT OF DELAY:

Delay of this project will continue to expose personnel to injury or death, maintain the risk of drastic mission interruption, and assure catastrophic failure of Building 4800 induced by a major earthquake. The section of the San Andreas fault adjacent to DFRC is a locked fault segment where major (magnitude 8+) earthquakes occur.

PROJECT DESCRIPTION:

The seismic upgrade will include the demolition of existing masonry walls and suspended ceilings, and removal of abandoned collateral equipment, including cables. Concrete foundations and concrete walls will be modified. Structural steel bracing will be installed. URM walls will be replaced with metal stud/gypsum board walls. Ceilings will be replaced and braced. Work will include reworking plumbing, ventilation ducts, electrical conduits, cable trays, and adequate bracing for each of these items. Lighting systems will be reinstalled. Fire alarm and communication systems will be reworked and certified. Asbestos materials and any other hazardous materials as necessary to complete the upgrade will be removed. The fire water piping will be braced and allowed the proper degrees of freedom to maintain automatic fire suppression during and after earthquakes.

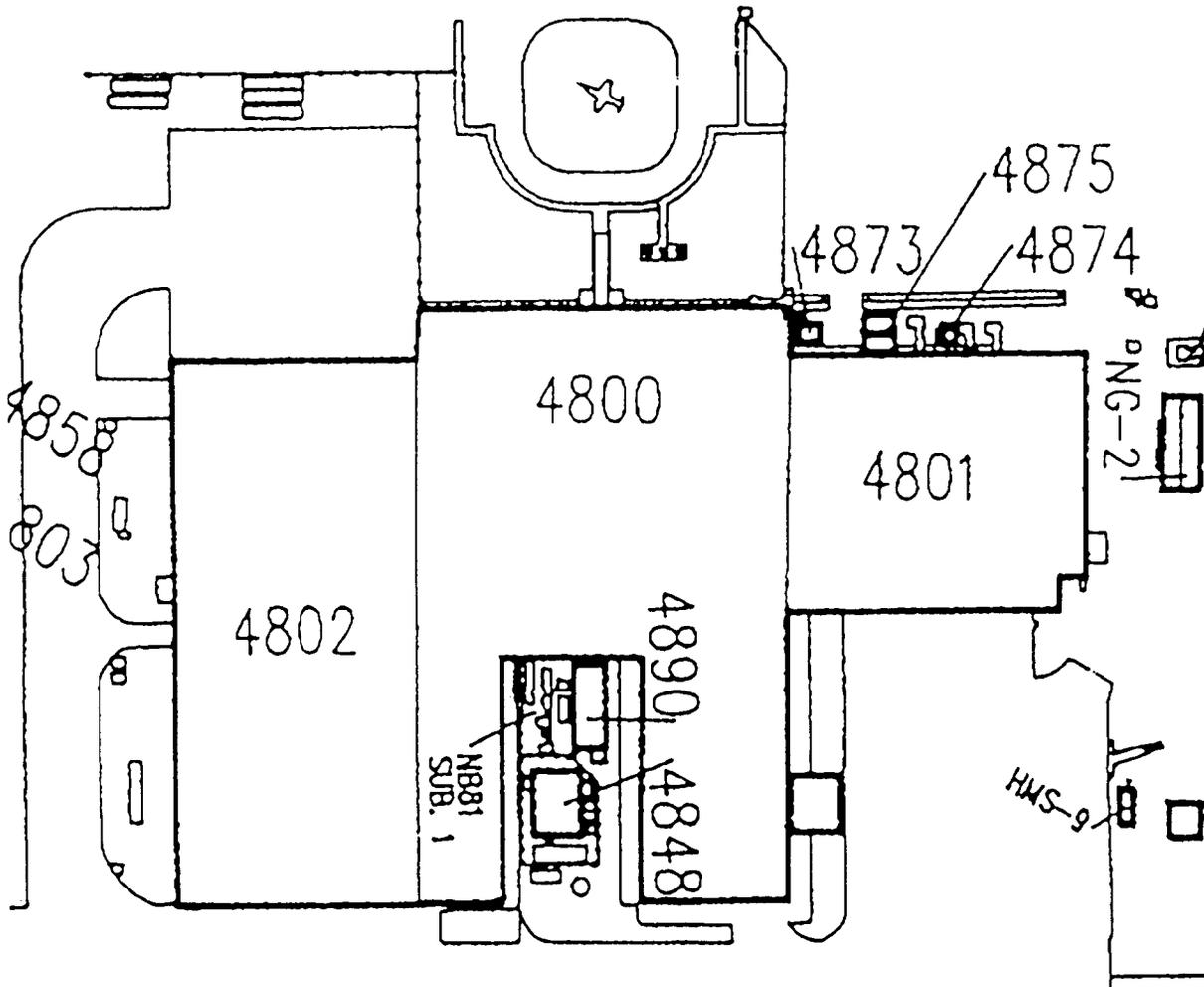
PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Cost
<u>Constructioq:</u> . . . . .	---	---	---	<u>\$8,000,000</u>
Demolition and Asbestos Removal . . . . .	LS	---	---	3,500,000
Structural . . . . .	LS	---	---	1,600,000
Architectural . . . . .	LS	---	---	1,200,000
Mechanical . . . . .	LS	---	---	800,000
Electrical . . . . .	LS	---	---	900,000
Total . . . . .				<u>\$8,000,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**DRYDEN FLIGHT RESEARCH CENTER  
FISCAL YEAR 1995 ESTIMATES  
SEISMIC UNDERPINNING OF RESEARCH, DEVELOPMENT, AND TEST BUILDING**



**FIGURE 1  
SITE PLAN**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

PROJECT TITLE: Restore Exterior/Interior Svstems. Buildings 3, 13, and 14

INSTALLATION: Goddard Space Flight Center

FY 1995 CoF ESTIMATE: \$5,000,000

LOCATION OF PROJECT: Greenbelt, Prince George's County, Maryland

COGNIZANT HEADOUARTERS OFFICE: Office of Mission to Planet Earth

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	Total
Specific CoF Funding . . . . .	\$500,000	---	\$ 500,000
Capitalized Investment . . . . .	<u>---</u>	<u>\$17,999,059</u>	<u>\$17,999,059</u>
Total . . . . .	<u>\$500,000</u>	<u>\$17,999,059</u>	<u>\$18,499,059</u>

SUMMARY PURPOSE AND SCOPE :

This project restores various building systems in the basement, plumbing, and loading dock at Building 3; all of Building 13; and the full basement of Building 14. The project will correct building deficiencies in order to effectively support spacecraft mission operations.

PROJECT JUSTIFICATION

The buildings in this project include the Central Flight Control and Range Operations, Building 3; Network Control Center Facility, Building 13; and Spacecraft Operations Facility, Building 14. These buildings are linked together to form the 3/13/14 complex, which provides critical support to GSFC spacecraft mission operations. The building systems in this complex are approximately 30 years old and have reached the end of their useful life. The mechanical, plumbing, and electrical systems are failing and costly to maintain. Replacement parts for these systems are difficult and costly to obtain. Opportunities exist for cost savings from energy efficient, state-of-the-art replacement systems. The loading dock at Building 3 is too small and narrow for the current volume of

traffic. One building entrance serves both goods and personnel creating a difficult and potentially unsafe situation.

**IMPACT OF DELAY:**

System breakdown could occur at any time, resulting in emergency repair/replacement. Buildings 3/13/14 are critical to mission operations. Any unanticipated outage in the facility seriously impacts on-going missions.

**PROJECT:**

This project restores the mechanical and plumbing systems, and modifies and upgrades the electrical systems. Also abandoned and superfluous ducting and wire/cable distribution systems above the ceiling and beneath the floors will be removed, and replaced. Interior ceiling, raised floor, and wall systems will be replaced and upgraded. Interior doors and hardware will be replaced and several life safety upgrades i.e., fire rated enclosures, emergency egress paths, and upgrades to the fire alarm system will be provided. The building loading docks will be modified. Accessibility for persons with disabilities will be provided in restrooms and egress paths. Removal of asbestos will also be included in this project.

**PROJECT COST ESTIMATE:**

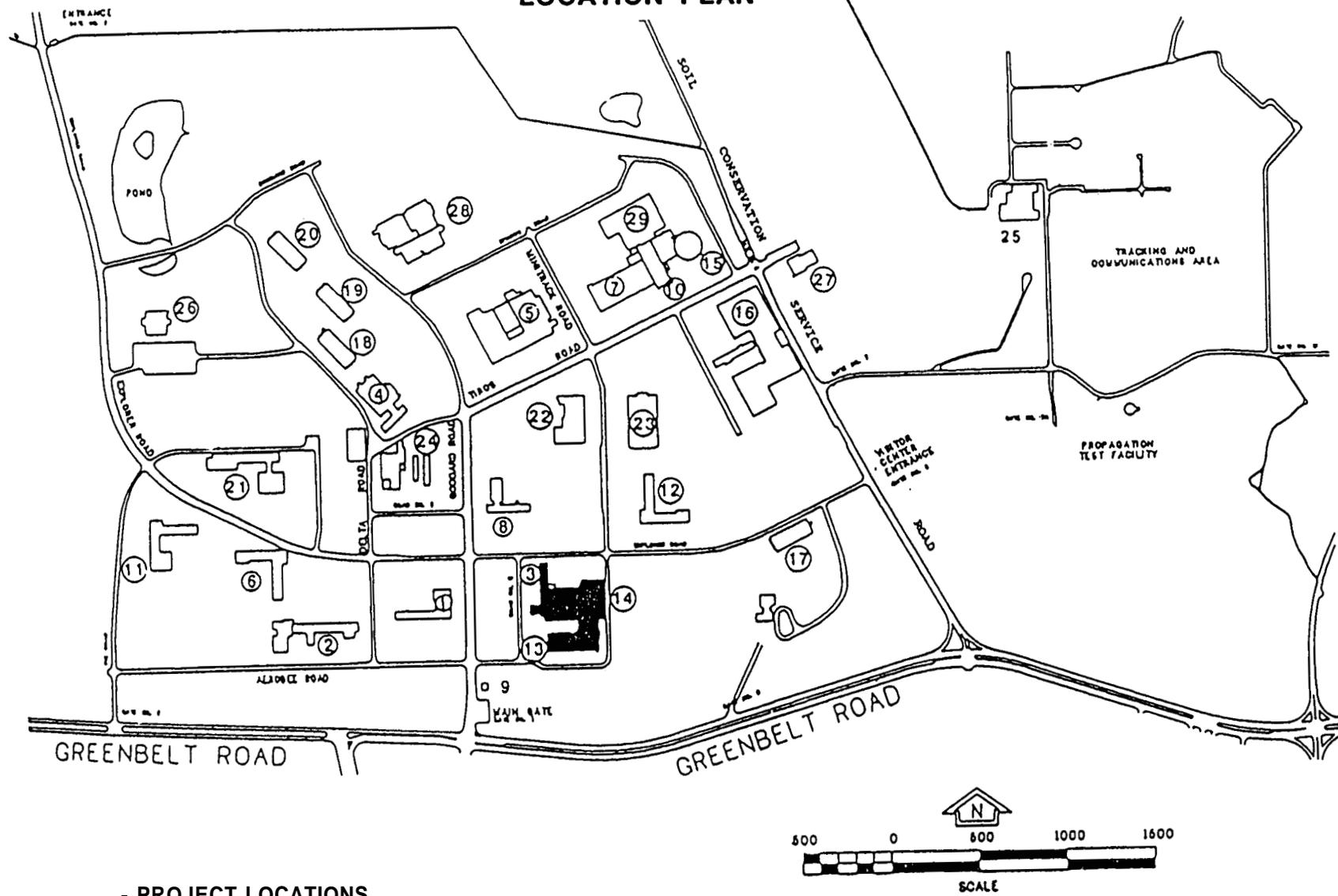
	Unit of Measure	<u>Quantity</u>	Unit <u>Cost</u>	<u>Cost</u>
<b><u>Construction</u></b> . . . . .	---	---	---	<b><u>\$5,000,000</u></b>
Architectural . . . . .	LS	---	---	1,200,000
Mechanical . . . . .	LS	---	---	2,500,000
Plumbing . . . . .	LS	---	---	300,000
Electrical . . . . .	LS	---	---	<b><u>1,000,000</u></b>
 Total . . . . .				 <b><u>\$5,000,000</u></b>

**LIST OF RELATED GRAPHICS:** Figure 1 - Location Plan

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** Future CoF funding will be requested to restore and modernize other areas in this building complex.

**GODDARD SPACE FLIGHT CENTER  
FISCAL YEAR 1995 ESTIMATES  
RESTORE EXTERIOR/INTERIOR SYSTEMS, BLDGS. 3, 13 AND 14**

**LOCATION PLAN**



- PROJECT LOCATIONS

FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

PROJECT TITLE: Modernize Condenser Water Systems, Southern Sector

INSTALLATION: Jet Propulsion Laboratory

FY 1995 CoF Estimate: \$4,300,000

LOCATION OF PROJECT: La Canada-Flintridge, Los Angeles County, California

COGNIZANT HEADQUARTERS OFFICE: Office of Space Science

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$400,000	---	\$400,000
Capitalized Investment . . . . .	---	---	---
Total . . . . .	<u>\$400,000</u>	<u>---</u>	<u>\$400,000</u>

SUMMARY PURPOSE AND SCOPE:

This project will install a new multi-celi, central cooling tower to serve the major buildings south of Mariner Road and west of Surveyor Road. The new cooling tower will replace 16 old individual cooling towers which will be incrementally removed.

PROJECT JUSTIFICATION:

The Jet Propulsion Laboratory relies on a decentralized cooling system in which almost every building in the southern sector of the site has its own refrigeration system and cooling tower. This consolidation project will replace 16 small cooling towers which serve 20 existing buildings. Twelve of these buildings contain critical operations. The existing towers are decades old, beyond their economic lives, unreliable, inefficient and very expensive to maintain. Repair parts are difficult to obtain. Many of the towers are in need of major repairs or

replacement and many of the roofs in the tower area are in need of maintenance. A centralized cooling tower will lower the total number of cooling towers and their requirements for energy, maintenance and monitoring. The installation of a ground level cooling tower would also remove the damage potential to the roofs of many buildings and eliminate an unsuitable siphon situation at two of the buildings.

IMPACT OF DELAY:

If this project is not approved, inefficient and costly operation, maintenance and repair of these obsolete cooling towers will continue. It will inhibit Jet Propulsion Laboratory's ability to provide necessary cooling for equipment and personnel. Repairs will be required with increasing frequency and cost.

PROJECT DESCRIPTION:

Construct a new south campus cooling tower and centralized condensing water distribution loop to serve Buildings 157, 158, 168, 169, 170, 171, 179, 183, 186, 190, 200, 201, 202, 218, 231, 233, 241, 291, 301, and 306. The new tower will have a minimum capacity of 4,000 tons and will be architecturally compatible with surrounding structures. The cooling tower system will incorporate a sump to retain condensing water within the loop when pumps are shut down and will include chemical water treatment, water bleed off, and replenishment water control. The pumping system will be sized to maintain basic loop circulation of approximately 12,000 GPM and pressure to accommodate a static head of approximately 16 feet. Additional head when required will be provided by localized circulation pumps. Underground piping will be added to existing pipes to establish a circulation loop. Runouts to and through buildings to chillers will be provided.

PROJECT COST ESTIMATE:

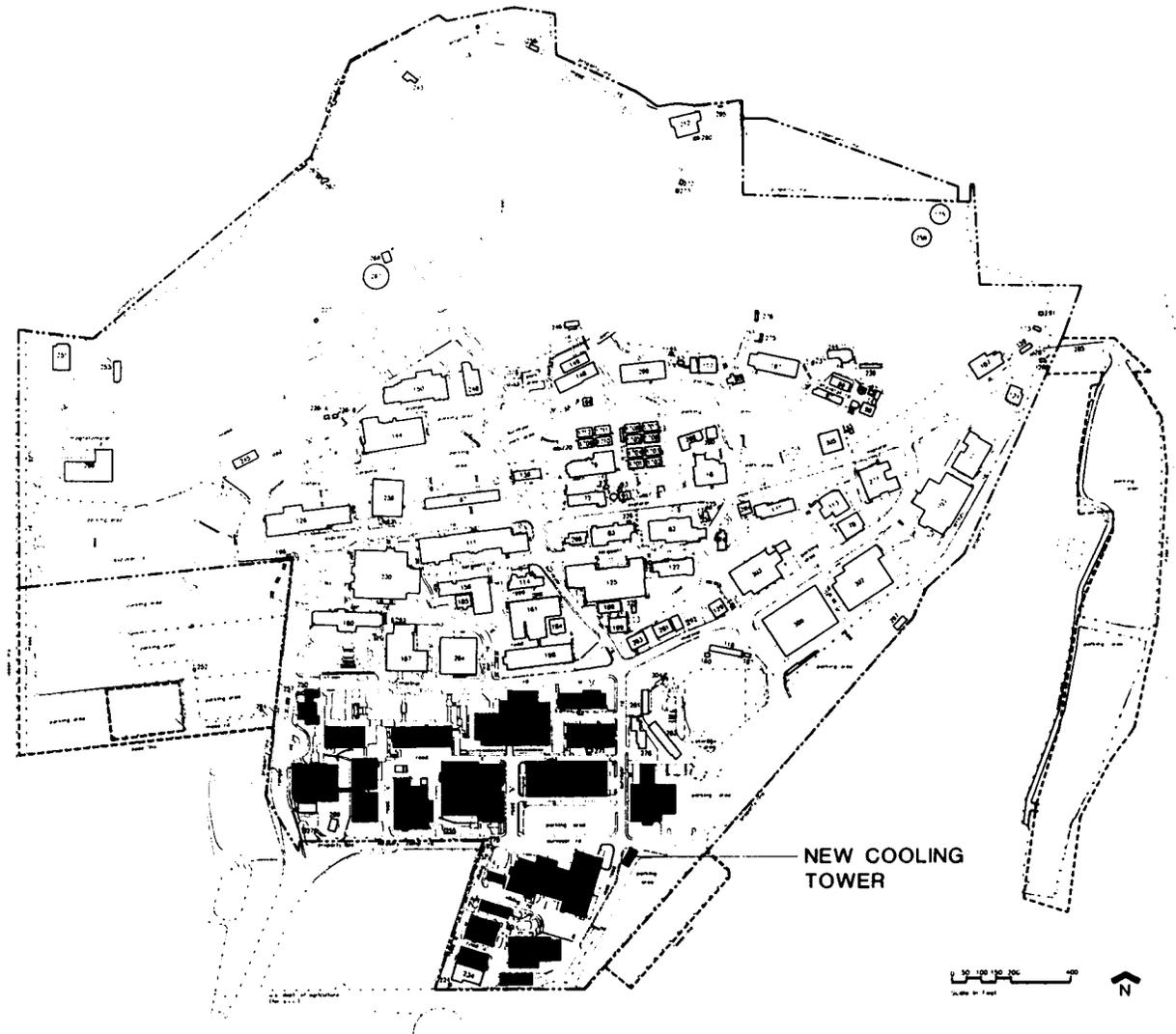
	Unit of Measure	Quantity	Unit Cost	Cost
Construction . . . . .	---	---	---	<u>\$4,300,000</u>
Sitework . . . . .	LS	---	---	330,000
Architectural/Structural . . . . .	LS	---	---	110,000
Mechanical . . . . .	LS	---	---	3,520,000
Electrical . . . . .	LS	---	---	340,000
Total . . . . .				<u>\$4,300,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan      Figure 2 - Perspective View

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

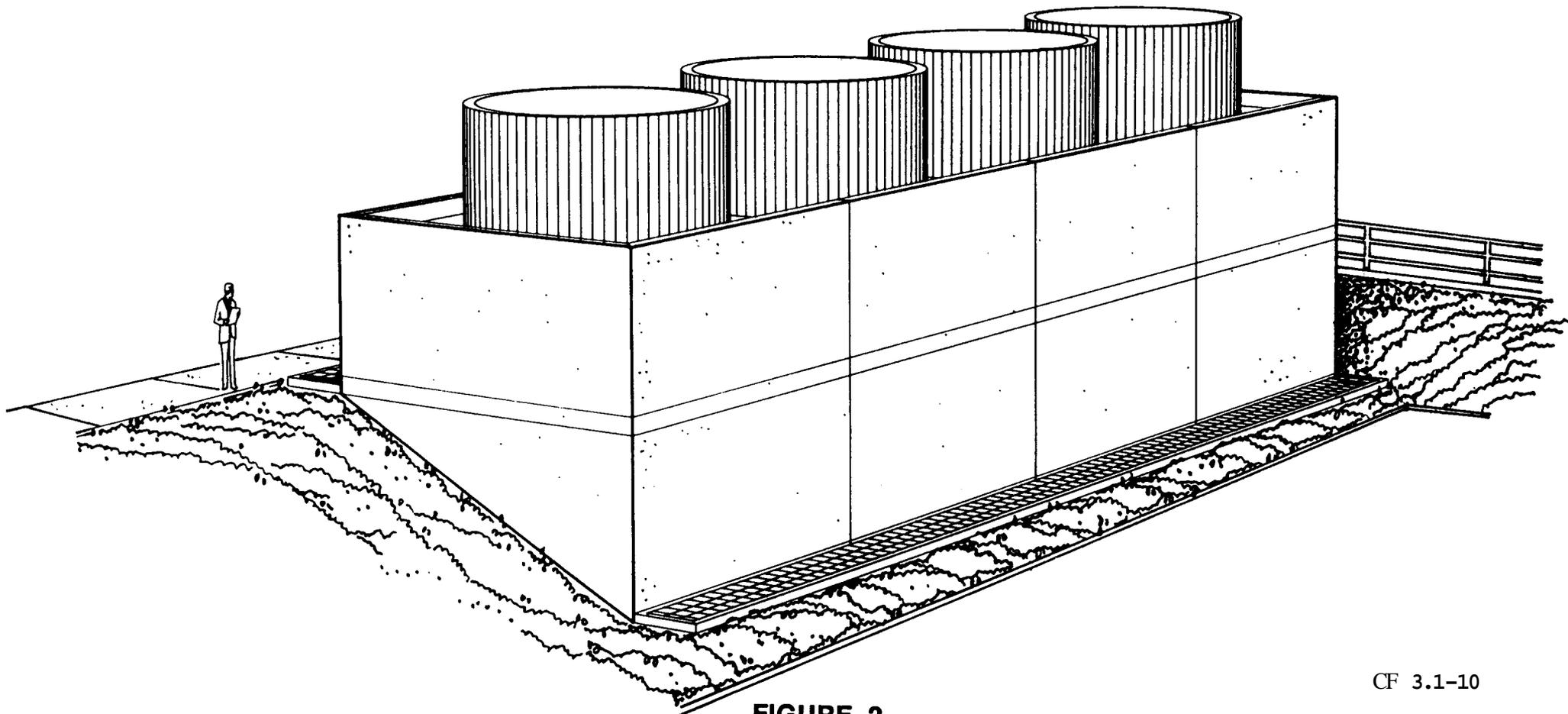
**JET PROPULSION LABORATORY  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE CONDENSER WATER SYSTEMS - SOUTHERN SECTOR**

**LOCATION PLAN**



**FIGURE 1**

**JET PROPULSION LABORATORY  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE CONDENSER WATER SYSTEMS - SOUTHERN SECTOR  
PERSPECTIVE VIEW OF COOLING TOWER**



**FIGURE 2**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Rehabilitate Utility Tunnel Structure and Systems

INSTALLATION: Lyndon B. Johnson Space Center

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FY 1995 CoF Estimate: \$4,300,000

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LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1993 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$ 540,000	---	\$ 540,000
Capitalized Investment . . . . .	---	\$ 5,382,635	<u>5,382,635</u>
Total . . . . .	\$ <u>540,000</u>	\$ <u>5,382,635</u>	\$ <u>5,922,635</u>

SUMMARY PURPOSE AND SCOPE :

This project rehabilitates the existing utility tunnel structure and systems. The work includes structural modifications, systems modifications, and provision of safety features to meet Occupational Safety and Health Administration (OSHA) requirements.

PROJECT JUSTIFICATION:

The utility tunnel system was originally constructed in 1962 to provide a protected passageway to carry utilities and services to Center buildings. The utility tunnel now requires restoration in many areas to preserve integrity and bring the tunnels into compliance with current safety regulations. The deteriorating conditions were confirmed as critical priorities during the JSC Facility Condition Assessment of 1992. Breaches of the tunnel

structure are increasing in number and severity; the steam return/condensate system as a whole is rapidly approaching catastrophic failure conditions; numerous cable tray failures and inadequacies exist and hamper communications upgrades; many valves in the chilled water system are beginning to exhibit wall failures from over extended usage; and tunnel accesses and ventilation are markedly inadequate for personnel safety. Major failures in the tunnel steam or chilled water systems are increasingly likely and would cause considerable disruption to buildings and potential hazard to operations personnel.

IMPACT OF DELAY:

If this project is not approved, the reliability and safety of the JSC utility tunnel and systems will continue to deteriorate and increase the risk of a catastrophic failure which would result in serious disruptions to mission operations.

PROJECT DESCRIPTION:

The work includes repair and sealing of areas of water infiltration; correction of wall-section displacements; replacement of concrete access sections; modification of substandard personnel access provisions; replacement of steam condensate piping, components and asbestos insulation; cable and cable tray modifications; replacement of selected chilled water system valves and components; upgrade of the ventilation system; structural modifications; and provision of safety features to meet OSHA requirements.

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
<u>Construction:</u> . . . . .	---	---	---	\$ <u>4,300,000</u>
Structural and Safety Modifications . . . . .	LS	1	---	2,900,000
Upgrade Ventilation . . . . .	LS	1	---	600,000
Replace Mechanical Systems and Asbestos Insulation . . . . .	LS	1	---	800,000
Total . . . . .				\$ <u>4,300,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Site Location

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: To complete the entire tunnel system, a second increment is planned for the FY 1997 budget request at \$8,000,000 and a third increment in the FY 1999 budget at \$6,000,000.

LYNDON B. JOHNSON SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
REHABILITATE UTILITY TUNNEL STRUCTURE AND SYSTEMS

SITE LOCATION

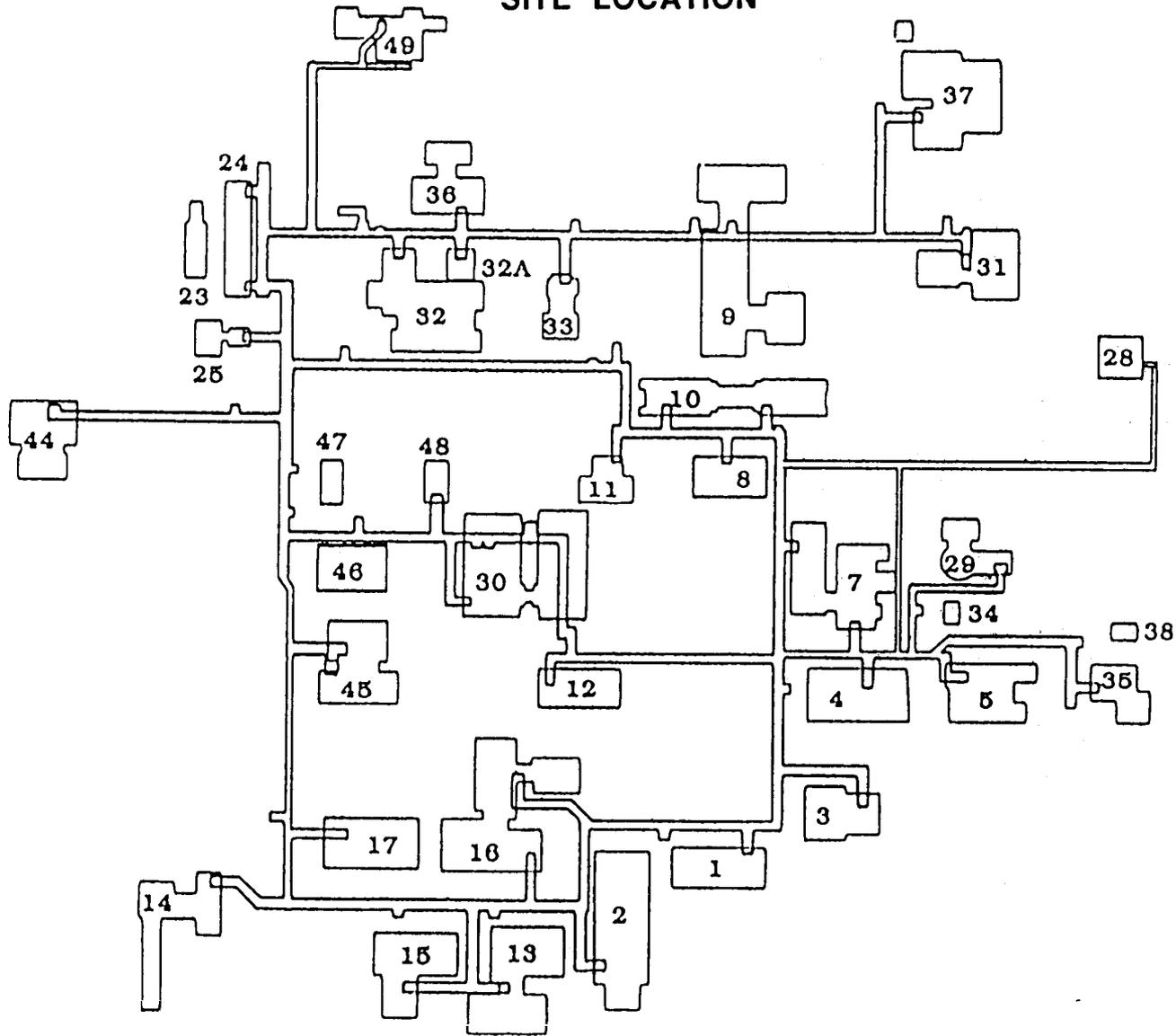


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Modernize Payloads Hazardous Servicing Facility HVAC System

INSTALLATION: John F. Kennedy Space Center

FY 1995 CoF Estimate: \$1,500,000

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LOCATION OF PROJECT: John F. Kennedy Space Center, Brevard County, Florida

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	<u>Total</u>
Specific CoF Funding . . . . .	\$105,000	---	\$105,000
Capitalized Investment . . . . .	---	<u>\$10,255,399</u>	<u>10,255,399</u>
Total . . . . .	<u>\$105,000</u>	<u>\$10,255,399</u>	<u>\$10,360,399</u>

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to increase reliability of the HVAC control system in the Payloads Hazardous Processing Facility (PHSF) and minimize the maintenance workload through replacing the existing deteriorated direct expansion auxiliary HVAC system with a chilled water HVAC system.

**PROJECT:**

Existing HVAC systems serving the PHSF consists of a main chilled water HVAC system and an auxiliary direct expansion HVAC serving the same building. This configuration requires multiple levels of controls that must work precisely with both systems to maintain control of the specified processing environment. In addition, the current system continues to deteriorate causing degradation in overall system performance and requiring increased

unscheduled maintenance and repairs. By replacing the direct expansion system and its controls, the facility will be able to maintain the specified conditions reliably and efficiently.

IMPACT OF DELAY:

Delay of this project will affect payload processing through the loss of ability to maintain processing environment requirements and will necessitate additional funding from other sources to perform repetitive maintenance and unscheduled repairs.

PROJECT DESCRIPTION:

This project will replace the existing auxiliary direct expansion system with a chilled water system eliminating the need for the direct expansion compressors and air cooled condenser unit. Equipment needed to replace the direct expansion system includes air handling units, duct work, associated piping, insulation, pumps, valves, controls and electrical work. Architectural/structural work will be included as necessary to provide weather protection for new equipment.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Cost
Construction . . . . .	---	---	---	<u>\$1,500,000</u>
Demolition . . . . .	LS	---	---	10,000
Architectural/Structural . . . . .	LS	---	---	100,000
Mechanical . . . . .	LS	---	---	1,170,000
Electrical . . . . .	LS	---	---	220,000
Total . . . . .				<u>\$1,500,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: Additional funding of \$70,000 is required.

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE PAYLOADS HAZARDOUS SERVICING  
FACILITY HVAC SYSTEM

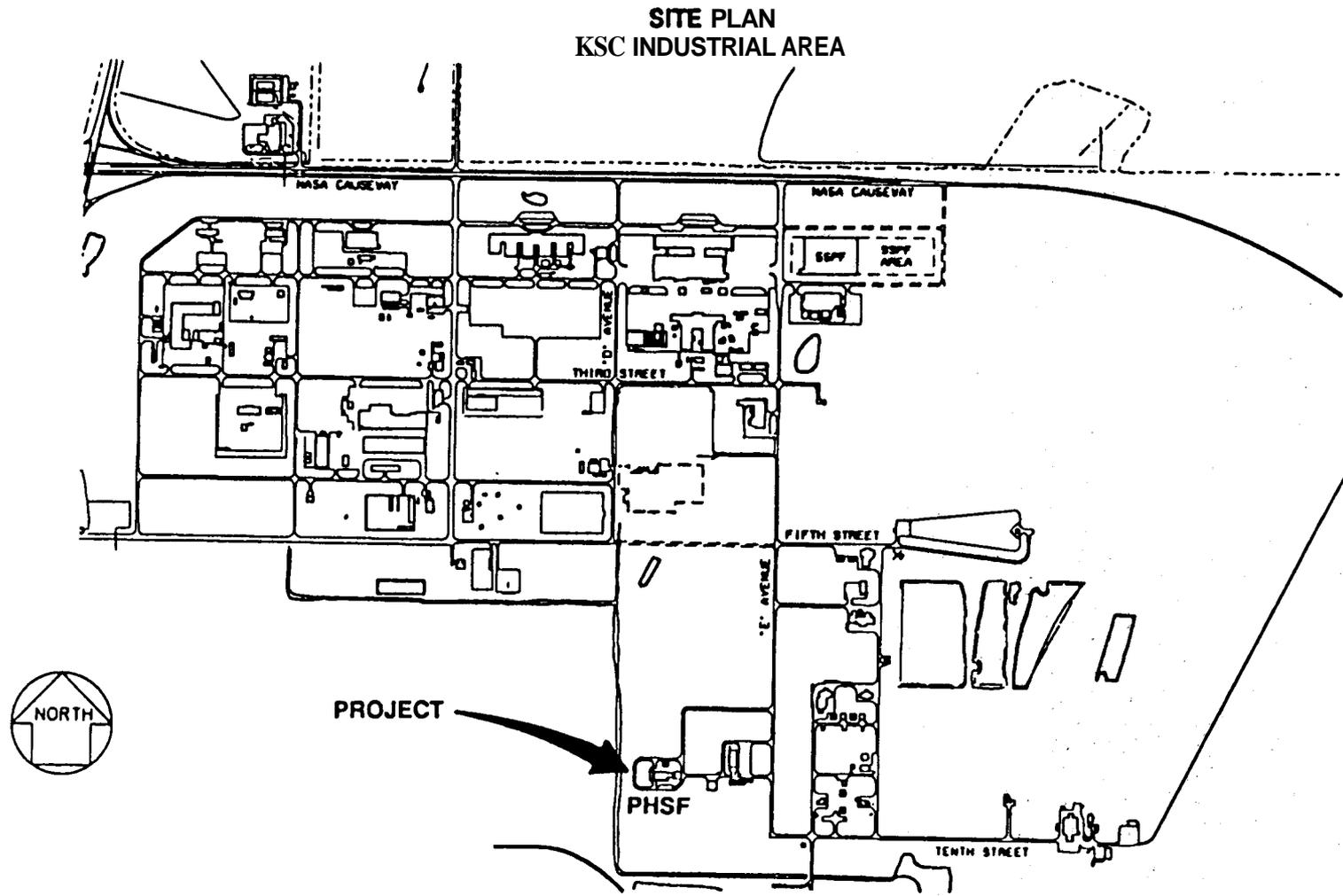


FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

PROJECT TITLE: Modernize Metrology and Calibration Facility

INSTALLATION: George C. Marshall Space Flight Center

FY 1995 CoF Estimate: \$4,900,000

LOCATION OF PROJECT: Marshall Space Flight Center, Madison County, Alabama

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1994 AND PRIOR YEARS FUNDING: The following prior years funding is related to this project:

	<u>Planning and Design</u>	<u>Construction</u>	Total
Specific CoF Funding . . . . .	\$390,000	---	\$ 390,000
Capitalized Investment . . . . .	---	<u>\$2,934,490</u>	<u>2,934,490</u>
Total . . . . .	<u>\$390,000</u>	<u>\$2,934,490</u>	<u>\$3,324,490</u>

SUMMARY PURPOSE AND SCOPE:

This project provides for the restoration and modernization of the section of Building 4650, which houses the Metrology and Calibration Laboratory and reconfigures adjacent space to permit relocation and consolidation of the remaining calibration activities from other substandard facilities.

PROJECT JUSTIFICATION:

The Metrology and Calibration Laboratory supports all projects and programs at the Center by testing, calibrating, and maintaining critical instrumentation devices. These devices are extremely sensitive to temperature, cleanliness, and humidity control. In the existing facility, humidity is routinely so high in the calibration area that rust forms on precision standards. Electrical calibration standards cannot be maintained without proper electrical screening and temperature control, so hundreds of instruments are only partially calibrated and returned to the customer. Pressure transducer calibration is continuously degraded by varying temperature and noisy electrical power. High resistance measurement in the direct current (DC) calibration area is compromised by

the lack of radio frequency shielding. Every kind of instrument used for critical testing at the Center is in some way being detrimentally affected by environmental inadequacies of the existing facilities. This project will correct this situation.

IMPACT OF DELAY:

Use of less than optimum calibrations can result in measurements which will propagate into direct compromises of test results. Significant additional cost and lost time is incurred in trying to reduce risk associated with low quality calibrations.

**PROJECT:**

This project restores and modernizes approximately 21,000 square feet of existing office and laboratory space within Building 4650. Interior work includes upgrading of the interior electro-mechanical systems, ceilings, lighting, and fire detection and suppression systems. Exterior work includes installation of a sloped standing-seam metal roof system over the existing flat roof, removal of existing windows, and installation of thermal protection and a new exterior facade. A 2,900 square foot addition with 12-foot ceilings and approximately 2,000 square feet of vibration free floor will be constructed. A new loading dock with a scissor lift will be constructed between the new and existing areas.

PROJECT COST ESTIMATE:

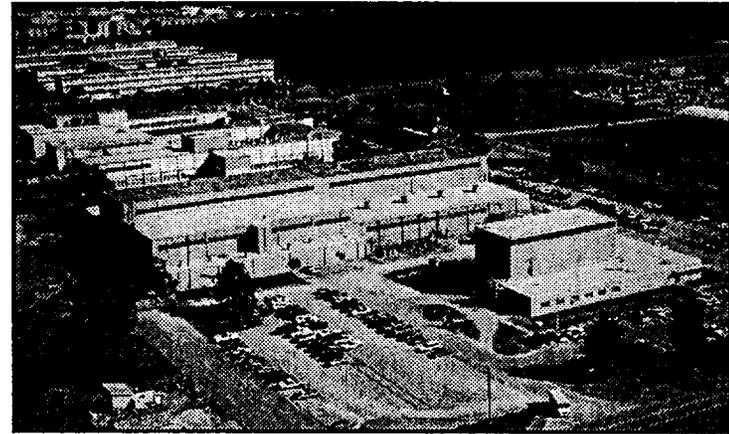
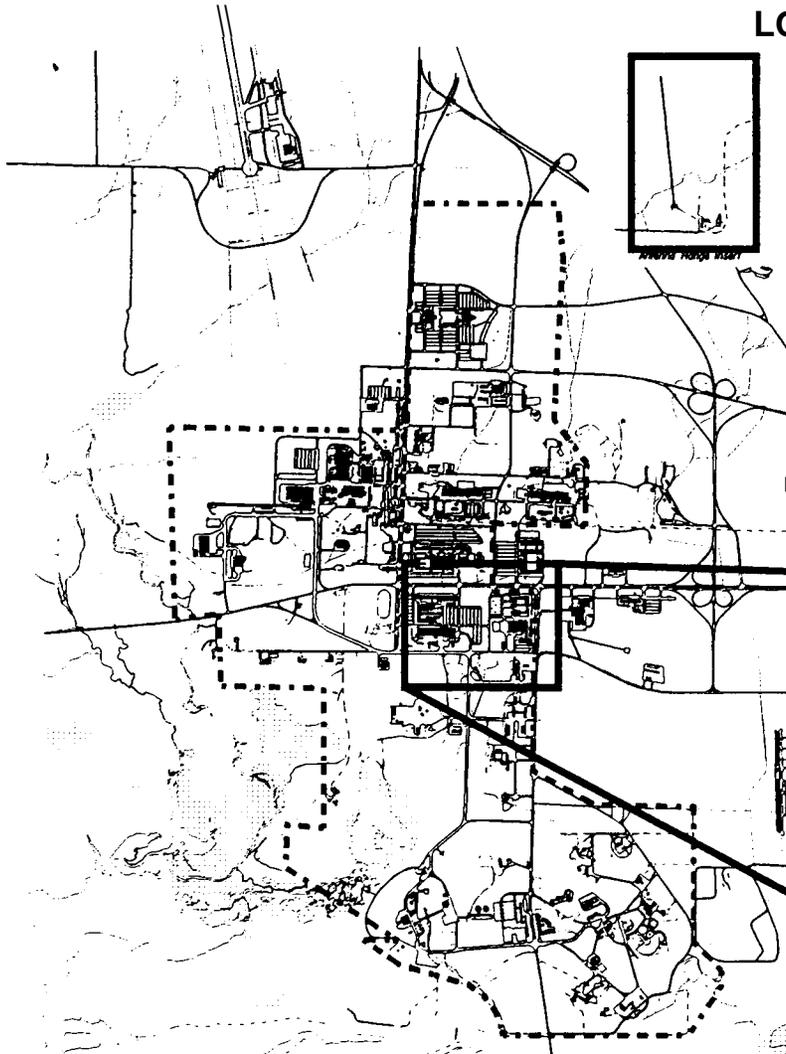
	Unit of Measure	Quantity	Unit Cost	Cost
<u>Construction</u>	---	---	---	<u>\$4,900,000</u>
Site .....	LS	---	---	145,000
Civil/Structural .....	LS	---	---	255,000
Architectural .....	LS	---	---	1,380,000
Mechanical .....	LS	---	---	1,770,000
Electrical .....	LS	---	---	1,350,000
Total .....				<u>\$4,900,000</u>

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

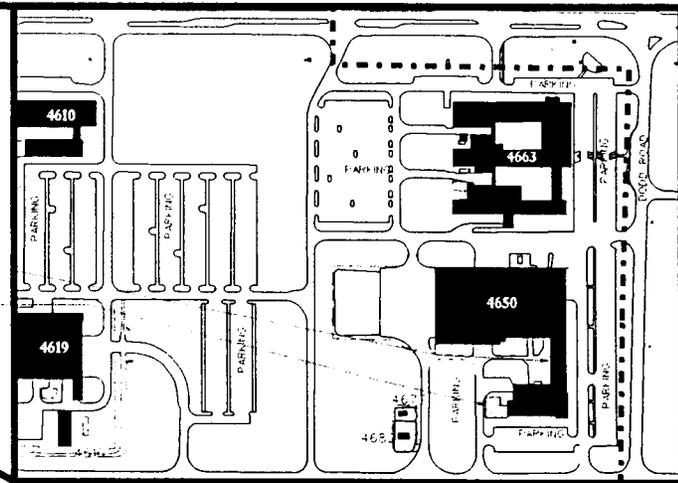
**MARSHALL SPACE FLIGHT CENTER  
FISCAL YEAR 1995 ESTIMATES  
MODERNIZE METROLOGY AND CALIBRATION FACILITY**

**LOCATION PLAN**



**VIEW FROM SOUTH**

L WING TO BE RESTORED  
NEW ADDITION



**ENLARGED SITE PLAN  
NOT TO SCALE**

**MARSHALL SPACE FLIGHT CENTER  
NOT TO SCALE**

**FIGURE 1**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

SUMMARY

REPAIR

<u>Summary of Project Amounts by Location:</u>	<u>Amount</u>	<u>Page No.</u>
Ames Research Center . . . . .	\$ 3,090,000	CF 3.2-3
Dryden Flight Research Center . . . . .	950,000	CF 3.2-4
Goddard Space Flight Center . . . . .	2,300,000	CF 3.2-4
Jet Propulsion Laboratory . . . . .	1,560,000	CF 3.2-5
Johnson Space Center . . . . .	1,850,000	CF 3.2-6
Kennedy Space Center . . . . .	3,035,000	CF 3.2-6
Langley Research Center . . . . .	3,415,000	CF 3.2-7
Lewis Research Center . . . . .	3,500,000	CF 3.2-8
Marshall Space Flight Center . . . . .	3,320,000	CF 3.2-9
Michoud Assembly Facility . . . . .	2,000,000	CF 3.2-10
Stennis Space Center . . . . .	1,125,000	CF 3.2-10
Wallops Flight Facility . . . . .	2,280,000	CF 3.2-11
Various Locations . . . . .	1,325,000	CF 3.2-12
Miscellaneous Projects Not in Excess of \$250,000 Each . . . . .	<u>250,000</u>	CF 3.2-12
Total . . . . .	<u>\$30,000,000</u>	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Repair of Facilities, Not in Excess of \$1,000,000 Per Project

INSTALLATION: Various Locations

FY 1995 CoF Estimate: \$30,000,000

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FY 1993: \$31,900,000

FY 1994: \$36,000,000

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COGNIZANT INSTALLATIONS/LOCATIONS OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Management Systems and Facilities

SUMMARY PURPOSE AND SCOPE:

These resources will provide for critical repairs to facilities at NASA field installations and Government-owned industrial plants supporting NASA activities. Included in the request are those facility repair needs for FY 1995 that can be identified at the time of the submission of these estimates and are not in excess of \$1 million per project. The thrust of this program is to restore facilities and components thereof, including collateral equipment, to a condition substantially equivalent to their originally intended and designed capability. The request includes the substantially equivalent replacement of utility systems and collateral equipment necessitated by incipient or actual breakdown. This work also includes major preventive measures that are normally accomplished on a cyclic schedule.

PROJECT JUSTIFICATION:

NASA is now experiencing "block obsolescence" where a substantial portion of the agency's facilities have been in use for over 25 to 30 years. Repair costs for mechanical and electrical systems in a typical building are almost three times higher after system operations exceed 15-20 years than they are during the initial years. Many electrical and mechanical components reach the end of their serviceable or economic life at the 20 year point and should be replaced in the interest of long-term economy. Continued piecemeal repair of these components is more

costly in the long run than replacement at the end of the economic life of the original components. Approximately 90 percent of NASA's physical plant has been in service for over 25 years.

A major thrust of this repair program is to help preserve the capabilities of the NASA physical plant, which has a capital investment of \$5.1 billion and a current replacement value of more than \$15 billion. This work must be addressed and progressively accomplished. Otherwise, risks are increased and future repair costs will be significantly greater. More importantly, there will be increased breakdowns, interruption of critical operations, and costly unscheduled repairs incurred.

This program includes only facility repair work having an estimated cost not in excess of \$1 million per project. The work is of such a nature and magnitude that it cannot be accomplished by routine day-to-day facility maintenance and repair activities. Repair projects estimated to cost more than \$1 million are included as separate discrete projects in the budget request.

PROJECT DESCRIPTION:

Proposed repair projects for FY 1995 totaling \$30 million are described under "PROJECT COST ESTIMATE." This repair program has been distilled from requests in excess of \$53 million, and thus represents a modest request in relation to the continuing backlog of this type of work. The projects that comprise this request are of the highest priority based on relative urgency and expected return on investment. Deferral of this mission-essential work would adversely impact the availability of critical facilities and program schedules. Projects estimated to cost not in excess of \$250,000 have not been individually described or identified by Center. The total request for this category is \$250,000.

During the course of the year, it is recognized that some rearrangement of priorities may be necessary. This may force a change in some of the items to be accomplished. Any such changes, however, will be accomplished within total available repair resources. The following broad categories of work are described further in the "PROJECT COST ESTIMATE":

a.	Utility Systems . . . . .	\$ 6,915,000
b.	General Purpose Buildings . . . . .	5,380,000
c.	Technical Buildings/Structures . . . . .	9,310,000
d.	Pavements and Drainage . . . . .	3,225,000
e.	Building Exteriors and Roofs . . . . .	5,170,000

PROJECT COST ESTIMATE:

**A. ~~Ames Research Center (ARC)~~ . . . . . \$3,090,000**

**1. Repair Switchgear, N221C . . . . . 900,000**

The original switchgear circuit breakers for main fan drive motors of the National Full Scale Aerodynamics Complex will be replaced in this project. Fan drive controls and breaker trucks will be reworked as necessary to install the breakers. The existing breakers were designed as substation circuit breakers. Their use as motor circuit protectors results in undue stress in the tripping mechanism. Over time, this has worn out the mechanism. Malfunctions and breakdowns are a frequent occurrence. The breakers must be replaced to reduce tunnel downtime and maintenance and repair costs.

**2. Repair Roofs, Buildings N223 and N245 . . . . . 630,000**

This project provides for replacement of roofs on the Visitor Center and the Space Science Research Laboratory, including replacement of insulation, roof membranes, flashings, and drains. Heavy traffic and inadequate support of mechanical equipment have accelerated the failure of the N223 roof. Plans to replace the N245 roof by 1996 have been accelerated because the insulation has become saturated due to extensive leakage. Moisture in the insulation causes bubbling of the roof membrane in hot weather, causing further leaks. Both roofs have reached the end of their useful lives.

**3. Replace Instrument Air Compressors, Building N229A . . . . . 400,000**

This project provides for replacement of two instrument air compressors in the Wind Tunnel Auxiliaries Building serving the Thermoprotection Lab, Arc Jets, Physical Science Research Lab, and Hypersonic Wind Tunnel. The existing piston compressors will be replaced by new rotary compressors with integrated drying/filtration and control systems. Associated piping and controls will be modified. The existing compressors were installed in 1959. Their performance has deteriorated over time, and researchers have been forced to obtain air from the 3,000 psi high pressure air system and use the instrument air compressors as a backup. This operation is highly inefficient and results in oil contamination and subsequent damage to equipment.

**4. Repair Pressure Systems . . . . . 350,000**

Pressure shells in High Reynolds Channels (HRC) I and 11, and the downstream vacuum piping in the Fluid Dynamics Laboratory will be repaired in this project. Work will include weld replacements, replacement of shell sections, and replacement of piping. Recently completed pressure shell recertification inspections have revealed that approximately 50 percent of inspected welds in HRC I and II contain defects. If weld failures were to occur, the pressure system, the facility, and personnel would be seriously impacted.

**5. Repair Heating, Ventilating, and Air Conditioning System;  
Building N239 . . . . . 810,000**

This project will include replacement of three chillers, chilled water pumps, piping, and controls in the Life Science Research Laboratory. The existing system is over 24 years old and is beyond its useful life. Equipment

is in poor condition and some replacement parts are not available. Research animals are housed in the building year-round. Temperature control is critical and cannot be maintained with the existing system.

**B. Dryden Flight Research Center (DERC) . . . . . \$950,000**

**1. Repair Taxiways, Tow-ways, and Aprons . . . . . 950,000**

This project provides for repair or replacement of various airfield pavements. Work includes patching spalled concrete, replacing approximately 6,500 square yards of failing apron, crack and joint sealing, and installing aircraft ground rods. Airfield pavements have developed severe structural cracks. Sealant has become brittle and failed after many years of exposure to desert conditions. Spalls have occurred due to failed sealants and aging of the pavement. If pavements are not repaired, Foreign Object Damage (FOD) could occur to aircraft, risking an aircraft accident and endangering personnel.

**C. Goddard Space Flight Center (GSFC) . . . . . \$2,300,000**

**1. Repair of Building Foundation and Exterior System in Buildings 1 and 2 . . . . . 700,000**

This project provides for the repair of building exterior and foundation components of the Space Projects Facility (Building 1) and Research Projects Laboratory (Building 2). This work includes replacement of the existing exterior metal panel system with a new enclosure system and masonry repairs to include replacement of damaged brick, repointing of mortar joints, and resetting of parapet walls. Also, included is repair of the footing drains, repair of cracks in foundation walls, waterproofing of the foundations, site work such as the removal and replacement of paved surfaces, regrading the landscaped areas to direct water away from the buildings, associated excavation, and replacement of sealant around windows and along the joints between the building and the adjacent pavement. These buildings show numerous signs of water damage. The proposed work will restore facility integrity and minimize potential loss of equipment due to water damage.

**2. Repair Site Steam Distribution System . . . . . 500,000**

This project will provide for the repair of various components of the Center's steam system and will include replacement of deteriorated condensate lines and high pressure drip lines between manholes MH4 to MH5, MH4 to Building 6, MH5 to MH7, and MH6-1 to MH9A, behind Building 1; replacement of 22 steam ejectors in steam manholes with high temperature sump pumps and provide electrical service in manholes; and replacement of all asbestos insulation with non-asbestos insulation. The central steam distribution system was installed in the early 1960's and has major condensate leaks. This project will minimize capacity loss, reduce maintenance cost, and restore reliability.

**3. Repair of Heating, Ventilating and,**

**Air Conditioning (HVAC) Systems; Various Buildings . . . . . 700,000**

This project provides for the replacement of the central HVAC system located in Building 302 that supplies conditioned air to the Magnetic Test Facility Complex 1, Buildings 302, 303, 304 and 305. The project work includes replacement of associated pumps, air compressors, exhaust fans, etc. New controls will be compatible with the Center's program for utilizing Direct Digital Control to establish a centralized utility control system. This project provides for the removal and disposal of all asbestos materials within the work area. The project also includes replacement of eight air handlers in Building 2 and the replacement of HVAC induction systems in various other buildings. The HVAC equipment, related piping and controls are original equipment installed 30 years ago and have outlived their service lives. Repairs are required to extend equipment life and to prevent potential breakdowns.

**4. Replace GN<sub>2</sub> Compressor System, Payload Testing Facility,**

**Building 7/10/15 . . . . . 400,000**

This project provides for the replacement of the GN<sub>2</sub> compressor system for the Payload Testing Facility (Building 7) complex. The project includes site preparation, replacement of the GN<sub>2</sub> cryogenic pump, replacement of the liquid nitrogen storage vessel, replacement of ambient air vaporizers, associated piping and valves, controls, safety devices, and an equipment enclosure. This project will replace and upgrade the 25 year old GN<sub>2</sub> compressor system which is used daily to produce high pressure GN<sub>2</sub> for payload processing in the 7/10/15 complex.

**D. Jet Propulsion Laboratory (JPL) . . . . . \$1,560,000**

**1. Replace Elevator Controls, Administration Building 180 . . . . . 780,000**

This project provides for the rehabilitation of three elevators in the Administration Building (180). New controls will employ solid state technology and improve operating economics, maintenance, and elevator scheduling and sequencing. The existing cabs will be retained and reused making alterations to conform with current standards. The elevators are thirty years old and service this nine story building. Many of the parts are no longer manufactured and the old parts are either being repaired or custom fabricated. This project will provide reliable service and reduce the maintenance cost and improve operating efficiency.

**2. Replace Ceiling and Lighting Systems,**

**Buildings 168 & 169 . . . . . 780,000**

This project will replace ceiling system and light fixtures in the laboratories and corridors on the second and fourth floors of Building 168 and the fourth floor of Building 169. The existing ceiling system will be replaced with acoustical lay-in panels in a seismically braced suspension system. The existing fixtures will be replaced with a modern energy-efficient lighting system. The heating ventilating and air conditioning system will be modified to meet current life safety codes. The lighting; ceiling; and heating, ventilating and air conditioning systems do not meet current life safety codes and, in certain instances, pose a danger to the occupants.

**E. Johnson Space Center (JSC) . . . . . \$1,850,000**

**1. Repair Aircraft Maintenance Hangar 135, Ellington Field . . . . . 950,000**

This project provides for selective repair and/or replacement of structural, mechanical, and electrical systems in Maintenance Hangar 135, Ellington Field. The work includes replacement of interior and exterior building components and systems. This includes roofing components, boilers, space heaters, air conditioning units and systems, condensing units, electrical panels, transformers, wiring, and lights. The hangar is approximately 50 years old and many of the building components and systems have exceeded their life expectancy. These repairs will bring the building up to current life safety standards.

**2. Repair Heating, Ventilating, Air Conditioning Systems;  
Building 16 . . . . . 900,000**

This project provides for repair of heating, ventilating, and air conditioning (HVAC) equipment in Avionics Systems Laboratory, Building 16. The work includes the repair and/or replacement of air-handler casings and structures, valves, fan/scroll assemblies and associated control systems. This equipment is over 30 years old and repair is required to provide for an efficient, reliable, and maintainable energy-conserving system.

**F. Kennedy Space Center (KSC) . . . . . \$3,035,000**

**1. Replace Heat Exchangers and Feeder Piping, Industrial Area . . . . . 870,000**

This project is required to replace 13 high temperature hot water heat exchangers and their associated valves/piping located in various buildings in the KSC industrial area. Replacement includes relocating the heat exchangers to more accessible/serviceable locations. Also included are replacement of the existing buried "RIC-WIL" supply and return feeder piping, and removal of asbestos. All of the subject heat exchangers and the underground building feeder line have exceeded their 25-year life expectancy.

**2. Replace CCAFS Administrative Building 1385 Roof . . . . . 750,000**

This project is required to replace the roof in the old mission control center (Building 1385) at Cape Canaveral Air Force Station (CCAFS). The roof is approximately 27,000 square feet. In addition to the roof replacement, new flashing and miscellaneous metals will be replaced as necessary. The roof can no longer be kept leak-free with regular maintenance procedures because of weathering and aging. Replacement is necessary to restore the integrity of the roof and protect the contents of the building.

**3. Repair Roads and Paving . . . . . 700,000**

This project is required to repair various KSC roads and paved areas including parking lots. Repairs will include asphaltic concrete surface courses, base course repairs as necessary, and/or repair of stabilized surface courses. Repairs may also include providing for treatment of surface water runoff, as required by environmental regulations.

**4. Replace Two 5-Ton Auxiliary Power Unit Hoists, Pads A & B . . . . . 715,000**

This project is required to replace two 5-ton monorail hoists on the 135 foot level on Pads A & B. Work includes installation of two hoists, electrical hookup, and GN2 purge for hoists motors and controls. These hoists will replace the present air-powered hoists and eliminate the need for the four existing auxiliary power units (APU) cart hoists. The 2-ton APU hoists at Pads A & B are exclusively used to raise and lower the APU service carts and to lift other payload Ground Support Equipment to and from the pad surface to the 170 foot level. There are recurring problems with the existing hoists becoming disabled during critical operations. The new hoists will correct these problems and increase reliability.

**G. Langley Research Center (LaRC) . . . . . \$3,415,000**

**1. Repairs to High Pressure Systems, Various Facilities . . . . . 485,000**

This project provides for the repairs to high pressure systems at various facilities. The work to be done includes the replacement of defective piping, valves, and fittings; radiographic inspection of welds; and repair of defective welds. The systems to be repaired include piping systems and pressure vessels at the West Area Steam Distribution System and a portion of the West Area Air Distribution System (1247). These systems are being analyzed and spot inspected under LaRC's ongoing Recertification Program. Completion of this project is essential to ensure the safe and efficient operation of the research facilities.

**2. Replace Chillers, Central Scientific Computer Facility (1268) . . . . . 580,000**

This project provides for the replacement of two existing chillers (Numbers 1 and 2) at the Central Scientific Computer Facility, Building 1268. The project will replace two existing nominal 400-ton centrifugal chillers, associated piping, controls, and electrical components that serve the facility environmental and computer cooling requirements. The existing 1967 vintage chillers, which are unreliable and costly to maintain, will be replaced with chillers using an acceptable substitute refrigerant.

**3. Repairs to Cafeteria, West Area (1213) . . . . . 650,000**

This project provides for the replacement of the 40 year old main air conditioning system, replacement of the 208 volt and 480 volt unit substations and associated panelboards, and removal of asbestos pipe and duct insulation at the Cafeteria building. This project will provide a system which is quieter, more efficient, and easy to maintain. The new installation will also bring the power system into conformance with the current requirements of the National Electric Code.

**4. Replace Model Cart Hydraulic Lift System,  
14 x 22 Subsonic Tunnel (1212C) . . . . . 900,000**

This project provides for replacement of the two existing 45 ton capacity hydraulic lift systems which are used to raise and lower the model support carts into the desired locations in the test section floor of the 14 by 22 Foot Subsonic Tunnel. The existing hydraulic cylinders are worn and assistance by riggers is required to properly

position the model carts. Much valuable time is lost during this procedure. Replacement of the lift systems with a system designed to handle the non-uniformly distributed loads of the model carts will allow for safer, more efficient, more reliable, and more productive operation of the system and the facility.

**. 5. Repairs to Hypersonic Technology Office, Building 1300 . . . . . 800,000**

This project will provide for replacement of the heating, ventilating, and air conditioning (HVAC) systems serving the second floor and repairs to the office areas on the second floor of Building 1300. The repairs will include painting, replacing ceiling tiles and lighting fixtures, and upgrading existing rest rooms on the second floor to meet handicap standards. The new HVAC system will include a variable volume air distribution system; packaged chiller; and associated pumps, piping, direct digital control system, and electrical service. The project will also include replacement of the existing oil-fired boiler which serves the entire building with a new gas-fired boiler. The repairs will provide a safe, comfortable working environment, reduce maintenance, and increase system reliability and efficiency.

**H. Lewis Research Center (LeRC) . . . . . \$3,500,000**

**1. Repair Capacitors, 10 x 10 Supersonic Wind Tunnel (SWT) . . . . . 900,000**

This project provides for the removal and replacement of approximately 3,000 capacitors for the 10 x 10 SWT Facilities at Lewis Research Center. The work includes replacement of capacitor cabinets, lighting panel, lighting, receptacles, and system modifications necessary to meet current National Electrical Code requirements. The units identified in this project are more than thirty years old, contain Polychlorinated Biphenyls (PCB's), and support the main and secondary drive motors for the 10 x 10. Rupture of one of these units would contaminate the facility with PCB's to the extent that the 10 x 10 SWT Facility would have to be shutdown for an indefinite period of time.

**2. Repair Central Water Distribution System . . . . . 800,000**

This project provides for the repair of the central water distribution system. The work includes the replacement or cleaning/relining of corroded and clogged water mains located on Ames, Moffett, and Westover Roads. Mineral deposits on the inside of the water mains have caused a general reduction in water flow throughout the Center. This project is an important part of a multi-year program to increase water pressure and improve water quality for the various buildings served.

**3. Repair Steam Trenches, Outlying Areas . . . . . 900,000**

This project provides for the repair and replacement of piping and valves at locations near Buildings 6, 38, 102, and 125 in the steam distribution system. The locations will also require road excavation, trench cover replacement, drainage and manhole repairs, piping and valve reinsulation, trench water level sensor installation, and roadway resurfacing. Existing conditions include collapsed sections of trench and roadway; severe concrete deterioration due to road salts and freeze-thaw cycling; advanced corrosion of condensate piping and pipe supports

due to the trench environment; and poor condition of steam line insulation, valves, and expansion joints. This project will provide safe, reliable steam service to critical research buildings and administrative functions.

**4. Repair Chilled Water Piping, Engine Research Building (5) . . . . . 900,000**  
This project provides for the repair of the chilled water piping in the Engine Research Building (5). The work includes removal of approximately 2,000 linear feet of old 6-inch through 12-inch diameter asbestos insulated steel chilled water piping in the basement, and replacement with new fiberglass insulated steel piping. Other work includes miscellaneous mechanical and structural modifications as necessary. The piping in this building was installed during original construction in 1950. Replacement will eliminate deterioration and erosion, reduce maintenance, and increase system reliability.

**I. Marshall Space Flight Center (MSFC) . . . . . \$3,320,000**

**1. Repair High Bay Roof of Structures and Dynamics Laboratory (4619). . . . . 850,000**  
This project provides for the replacement of portions of the high bay roof of Building 4619. Work includes installation of an R-30 roof insulation system; approximately 50,000 square feet of sloped standing-seam metal roof; new gutters, downspouts, and interior drains; replacement of flashing; and removal of unnecessary expansion joints and vents. The existing roof has already exceeded its life expectancy and is very deteriorated. Repair of this roof will preserve the integrity of the facility, reduce maintenance costs, and provide energy cost savings.

**2. Repairs to High Pressure Piping System . . . . . 610,000**  
This project provides for the replacement of approximately 8,000 linear feet of high pressure gas piping and associated components throughout the Center. This piping is part of the high pressure distribution system for hydrogen, helium, nitrogen, and high purity air. This system provides critical support to major test programs. It is very old and deteriorated. Continued piecemeal repairs are costly and disruptive to testing activities.

**3. Repair Low Bay Roof of Multipurpose Facility (4752) . . . . . 260,000**  
This project provides for the replacement of the low bay roof of Building 4752. Work includes installation of an R-30 roof insulation system; a 15,000 square foot sloped standing-seam metal roof; new gutters, downspouts, and interior drains; replacement of flashing; and removal of unnecessary expansion joints and vents. The existing roof has already exceeded its life expectancy and is very deteriorated. Repair of this roof will preserve the integrity of the facility, reduce maintenance costs, and provide energy cost savings.

**4. Repair Roof of Communications Facility (4207) . . . . . 700,000**  
This project provides for repairs to the roof on Building 4207. Work includes installation of an R-30 roof insulation system; a 40,000 square foot sloped standing-seam metal roof; new gutters, downspouts, and interior drains; replacement of flashing; and removal of unnecessary expansion joints and vents. The existing roof has already exceeded its life expectancy and is very deteriorated. Repair of this roof will preserve the integrity of the facility, reduce maintenance costs, and provide energy cost savings.

**5. Repair Exterior of Facilities Office Building (4250) . . . . . 900,000**

This project provides for repairs to Building 4250. Work includes providing thermal protection to exterior walls by installing insulation, face brick, and new insulated glass windows. Also included is the installation of a sloped standing-seam metal roof system over the existing flat roof, and modification of the building entrances. Building 4250 is 31 years old, poorly insulated, and has severe moisture penetration problems. The proposed repairs will preserve the integrity of the facility, provide an energy efficient and low maintenance building envelope, and upgrade handicapped accessibility to current standards.

**J. Michoud Assembly Facility (MAF) . . . . . \$2,000,000**

**1. Repair Sanitary Sewer Piping (103) . . . . . 500,000**

This project provides for the repair of the 50 year old sanitary sewer system in the External Tank Manufacturing Building. Repairs will be performed to both the gravity-fed and the forced main piping systems. Scope includes relining or replacing, as required, sections of below-grade piping, installation of sixteen manholes, and replacement of valves and associated components. The project will correct problems of deterioration, improper line sloping, ground water filtration, insufficient capacity, and improper discharge.

**2. Repair Storm Drainage Outfall Structure . . . . . 900,000**

This project provides for the repair of the storm drainage outfall structure between Michoud and the offsite intracoastal waterway. Scope includes replacement of the steel structure supporting the drainage piping in the waterway, cleaning and painting of the four 54-inch drainage pipes from the pumphouse to the outfall point, replacement of the drainage piping at the point of outfall, and replacement of the two wooden bridges over the canal and levee. This structure was installed in 1962 and has deteriorated to the point that it is collapsing in some areas. Failure of the structure would allow storm water to cause major erosion damage to the levee.

**3. Repair Roofs, Buildings 114 and 207 . . . . . 600,000**

This project provides for replacement of the roofs on High Bay Addition, Building 114 and Boiler House, Building 207. Scope includes removal of approximately 44,500 square feet of existing built-up roofing membranes, installation of new roofing with reflective coating, repair of the flashing, and upgrade of the lightning protection. Repair of these roofs will preserve the integrity of the facilities, reduce maintenance costs, and provide energy cost savings.

**K. Stennis Space Center (SSC) . . . . . \$1,125,000**

**1. Repair Canal and Waterway System . . . . . 450,000**

This project provides for the repair of approximately 6,500 feet of canal and waterway embankments. Work includes placement and compaction of select fill; placement of geotextile filter fabrics, erosion control mats, and

concrete riprap at the waterline; and sodding of the embankment above the waterline. Erosion of the canal banks has been accelerated by the barge traffic along the waterways and by run-off down the canal bank slopes. This project ensures the unobstructed flow of propellant barge traffic in support of the Space Shuttle Main Engine testing program.

**2. Replace Cryogenic and High Pressure System Components . . . . . 675,000**  
 This project provides for the replacement of various cryogenic and high pressure system components in the Space Shuttle Main Engine test complex. Existing components are over thirty years old and have become unreliable as a result of their extended service life. Replacement parts are difficult to obtain and frequent maintenance is required.

**L. Wallops Flight Facility (WFF) . . . . . \$2,280,000**

**1. Repair Seawall . . . . . 900,000**  
 This project provides for the repair of the Wallops Island seawall to complete protection of the South Launch Area and extend the protection in the V-area. The construction will be seaward of the existing seawall and include all necessary toe protection. This work is necessary to prevent or minimize storm damage, which is becoming increasingly common due to beach erosion and deterioration of the existing protection system.

**2. Repair Road Surfaces . . . . . 450,000**  
 This project provides for the repair of road surfaces on Wallops Main Base and Island. The work includes 15,000 linear feet of concrete joint repair; the filling and repair of surface cracks and surface treatment; the replacement of 1,200 square yards of concrete; and the placement of 35,000 square yards of new asphalt pavement. The paved areas requiring repair and asphalt overlay are 45 years old. They service the Magazine and Rocket Storage facilities. The roads requiring surface treatment repair and asphalt paving include the airfield safety road and the northern extension on Wallops Island.

**3. Repair Roofs, Various Buildings . . . . . 530,000**  
 This project provides for the repair of roofs on Buildings E-2, F-3, and F-19. The work involves the replacement of 30,000 square feet of roofing shingles at Building E-2 with a new roofing shingle system; the replacement of 8,800 square feet of built-up roofing at Building F-3, and 21,000 square feet at Building F-19 with an elastomeric membrane system, including insulation, flashing, and coating. Building E-2 houses the Optical Laboratory, Cafeteria, and the Management Education Dining Facility; F-3 houses the Conference and Morale Activities Center; and F-19 houses Receiving, Shipping, and Storage Facility. The roofs have a history of leaks and drainage problems. New roofing systems will remedy the defects and reduce maintenance costs.

**4. Repair Rocket Assembly Shop No. 5, Building W-40 . . . . . 400,000**  
 This project provides for the repair of the Rocket Assembly Shop No. 5 on Wallops Island. The work includes demolition of the exterior metal walls, roof panels, and insulation; repair of structural framing; replacement of

doors, windows, heating, ventilating, air conditioning, lighting, power panels, and interior finish systems; installation of metal siding, roofing, insulation, interior liner panels, fire protection, and an entrance drainage system. This facility serves as an assembly shop for multistage research vehicles. The building is 35 years old and has been compromised by age and storm damage. It is in need of repair to improve building integrity, reduce maintenance, and increase efficiency.

**M. Various Locations . . . . . \$1,325,000**

**1. Replace Air Cooled Condensers, Merritt Island, Florida . . . . . 350,000**

This project will replace six roof-mounted air cooled condensers and the associated chillers of the Operations Building at the Spaceflight Tracking and Data Network station located at Merritt Island, Florida. New condensers, two new 150-ton chillers, and new controls will be installed. The work includes repair of the roof area under the chillers and the interior space occupied by the old chillers. This work is essential to provide reliable air conditioning for the electronic equipment in this building, which is vital for Space Transportation System missions including pre-launch, launch, and landing phases at the Kennedy Space Center. The old systems are severely deteriorated and require continual maintenance due to the corrosive salt-air environment at this location.

**2. Repair Storage Magazines, Bermuda . . . . . 300,000**

This project will repair six deteriorated underground storage magazines at the Spaceflight Tracking and Data Network Station in Bermuda. The magazines require repairs to preserve their utility for the station's storage needs. The work includes repair of ceilings, floors, walls, headwalls, doors, electrical wiring, lighting, security hardware and fire protection systems. Inspection of the 50-year-old bunkers indicate that they are in urgent need of repair. Maintenance equipment, spare parts, and other materials are stored in these bunkers. The repair will save the cost of providing new aboveground storage facilities.

**3. Repair Aircraft Runway, Goldstone, California . . . . . 675,000**

This project will provide for the repair and resurfacing of the airport runway with 1-1/2 inch of asphaltic concrete paving. The runway will be restriped after paving. The runway condition is deteriorating and requires an overlay to preserve it in safe and usable condition. The repair will improve area drainage, strengthen the runway structure, and maintain and provide a smooth reliable surface for aircraft operations.

**N. Miscellaneous Projects Not In Excess of \$350,000 Each . . . . . \$250,000**

Total . . . . . \$30,000,000

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:**

Approximately \$40-50 million per year will be required for continuing repair needs.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

SUMMARY

REHABILITATION AND MODIFICATION

Summary of Project Amounts by Location:

	<u>Amount</u>	<u>Page No.</u>
Ames Research Center . . . . .	\$3.420. 000	CF 3.3-3
Dryden Flight Research Center . . . . .	650. 000	CF 3.3-4
Goddard Space Flight Center . . . . .	2.810. 000	CF 3.3-4
Jet Propulsion Laboratory . . . . .	1.850. 000	CF 3.3-6
Johnson Space Center . . . . .	2.450. 000	CF 3.3-6
Kennedy Space Center . . . . .	3.450. 000	CF 3.3-7
Langley Research Center . . . . .	2.940. 000	CF 3.3-9
Lewis Research Center . . . . .	2.700. 000	CF 3.3-10
Marshall Space Flight Center . . . . .	2.110. 000	CF 3.3-10
Michoud Assembly Facility . . . . .	1.750. 000	CF 3.3-11
Stennis Space Center . . . . .	2.155. 000	CF 3.3-11
Wallops Flight Facility . . . . .	2.040. 000	CF 3.3-12
Various Locations . . . . .	1.130. 000	CF 3.3-13
Miscellaneous Projects Not in Excess of \$250.000 Each . . . . .	<u>545,000</u>	CF 3.3-13
Total . . . . .	<u>\$30,000,000</u>	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Rehabilitation and Modification of Facilities,  
Not in Excess of \$1,000,000 Per Project

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INSTALLATION: Various Locations

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FY 1995 CoF Estimate: \$30,000,000

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FY 1993: \$34,000,000

FY 1994: \$36,000,000

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COGNIZANT INSTALLATIONS/LOCATIONS OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Management Systems and Facilities

SUMMARY PURPOSE AND SCOPE:

These resources will provide for the rehabilitation and modification of facilities at NASA field Installations and Government-owned industrial plants supporting NASA activities. Included in this request are those facility rehabilitation and modification needs for FY 1995 that have been fully identified at the time of the submission of these estimates and are estimated not to exceed \$1,000,000 per project. The purpose of this program may include some restoration of current functional capability but also includes enhancement of the condition of a facility **so** that it can more effectively accomplish its designated purpose or increase its functional capability.

PROJECT JUSTIFICATION:

The NASA physical plant has a capital investment of \$5.1 billion and has a current replacement value of more than \$15 billion. A continuing program of rehabilitation and modification of these facilities is required to accomplish the following:

- a. Protect the capital investment in these facilities by minimizing the cumulative effects of wear and deterioration.
- b. Ensure that these facilities are continuously available and that they operate at peak efficiency.

- C. Improve the capabilities and usefulness of these facilities and thereby mitigate the effects of obsolescence.
- d. Provide a better and safer environment for all personnel.

This program includes only facility rehabilitation and modification work having an estimated cost not in excess of \$1,000,000. The work is of such a nature and magnitude that it cannot be accomplished by routine day-to-day facility maintenance or by related routine facility work efforts that are provided for in other than CoF estimates.

PROJECT DESCRIPTION:

Proposed rehabilitation and modification projects for FY 1995 totaling \$30 million are described under "PROJECT COST ESTIMATE." The total program of \$30 million has been distilled from requests of more than \$64 million and represents only a modest request in relation to the backlog of this type of work. Based on relative urgency and expected return on investment, the projects that comprise this request are the highest priority requirements. Deferral of this mission-essential work would adversely affect the availability of critical facilities, program schedules, and energy-conservation objectives. Only those projects estimated to cost not in excess of \$250,000 have not been described individually or identified by center. The total cost of these miscellaneous projects is \$545,000.

During the course of the year, some rearrangement of priorities may be necessary. This may force a change in some of the items to be accomplished. Any such change will be accomplished within available resources. The following broad categories of work are described further in the "PROJECT COST ESTIMATE":

a.	Utility Systems . . . . .	\$11,880,000
b.	Fire Detection/Protection Systems . . . . .	1,905,000
c.	General Purpose Buildings . . . . .	3,040,000
d.	Technical Buildings/Structures . . . . .	13,175,000

PROJECT COST ESTIMATE:

A. Ames Research Center (ARC) . . . . . \$3,420,000

    , 1. Rehabilitation and Modification of Basement Facilities,  
        Building N-241. . . . . . 560,000

This project provides for upgrade of the basement of the Administrative Management Building by installation of a fire sprinkler system, renovation of graphics and training areas, and rehabilitation of bathrooms to provide handicapped access. The current configuration of the area proposed for upgrade is inefficient and means of egress do not meet fire codes. It is essential that the area be reconfigured to prevent injury to personnel in case of fire and to improve efficiency.

    2. Rehabilitate Steam Vacuum System Turning Vanes,  
        Building N234A . . . . . 370,000

This project provides for replacement of the turning vanes and plumbing hardware in the north and south plenums of the Steam Vacuum System (SVS). Heat exchangers and electrical controls will be installed, booster pumps will be added to increase flow rate, and piping will be modified. The existing SVS Turning Vanes are old and corroded. Hoses and pipe fittings frequently break, flooding the plenum. The entire Arc Jet facility must then be shut down to accomplish repairs, significantly increasing cost and down time.

    3. Rehabilitation and Modification of Secondary Electrical  
        Distribution System, Building N225B . . . . . 430,000

Modification of the secondary side of the North Electrical Substation power distribution transformers to provide power factor correction capacitor banks and controllers is included in this project. Modification of the Center's power system is needed to improve capability and to defray excessive costs of operating at power factors below 0.95. Currently, the Center cannot make use of the cheapest available power, provided by the Western Area Power Administration (WAPA). Often operation is at power factors as low as 0.50. WAPA has required the center to improve its power factor or face mandatory surcharges. Completion of this project will reduce operating cost and improve efficiency.

    4. Rehabilitation and Modification of 7 Ft X 10 Ft Wind Tunnel  
        Number 1, Building N215 . . . . . 400,000

This project improves flow quality in the tunnel by installation of wire mesh screens and a spoiler. The project will also modify the test section by installing a turntable, used to yaw the test models. The wind tunnel experiences heavy gusting and meandering of the air flow, causing instability in model rotors. This impairs the ability of researchers to obtain accurate data. The turntable will enhance test productivity.

    5. Rehabilitation of N239A, High Bay Area . . . . . 780,000

This project provides for rehabilitation of the high bay area of the Life Science Research Laboratory. Included are rehabilitation of bathrooms: heating, ventilating, and air conditioning (HVAC) systems; utilities, and

lighting. An elevator will be installed to provide access to the physically disadvantaged. Facility requirements for advanced life support research, development, and testing projects range from traditional wet chemistry labs to open high bay space suitable for large scale equipment, such as Crop Growth Research Chambers (CGRC) and New Technology Test Beds (NTTB). This project improves CGRC capability and allows for NTTB system level tests of physical/chemical life support technology.

**6. Rehabilitation and Modification of Switchgear, Building 104 . . . . . 880,000**  
 The electrical substation switchgear "C" in Building 104 will be upgraded in this project to provide 12.8 kilovolt (KV) power. Work will include switchgear, a tie-breaker, rework of feeders, installation of new interlock control systems, and approximately 1,650 feet of duct bank. The 2.4KV existing power supply on the west side of Moffett Field is not adequate to support the demand. The Navy had been upgrading to a 12.8KV system, but has terminated this work due to transfer of facilities to NASA.

**B. Pruden Flight Research Center (DFRC) . . . . . \$650,000**

**1. Rehabilitation and Modification of Foam Deluge and Suppression System, Building 4826 . . . . . 650,000**  
 This project provides for installation of a foam-water automatic fire suppression system in the Aircraft Maintenance Hangar, including a new deluge sprinkler system, foam system, detection and alarm systems, and drainage. The existing systems are in violation of NASA and National Fire Protection Association standards. They are closed-head systems, providing neither foam-water fire suppression nor sufficient water flow to control aircraft fuel fires. Until this project is completed, a fuel fire in the hangar could cause major damage to expensive research aircraft and property.

**C. Goddard Space Flight Center (GSFC) . . . . . \$2,810,000**

**1. Rehabilitation of Utility Control System . . . . . 900,000**  
 This project will replace obsolete portions of the existing Utility Control System (UCS) for Buildings 1, 9, and 3/13/14 with a state-of-the-art Direct Digital Control UCS System. Pneumatic automatic temperature controls and sensors will be replaced with new digital systems to provide reliable inputs and independent local control of air conditioning systems. This project is critical to providing effective energy conservation. The existing obsolete UCS is primarily a monitoring system and has incurred numerous operational problems such as software failures and inaccurate sensor inputs. The new digital system will provide for an efficient, reliable, and maintainable air conditioning control system.

**2. Modifications for Disabled Access, Various Buildings . . . . . 260,000**  
 This project provides for the upgrade of various buildings and facilities to meet the Uniform Federal Accessibility Standard. Included in this project is the installation of visual warning systems consisting of

visual alarm devices (strobe lights) in the corridors, restrooms, conference rooms, various assembly areas, and specific offices occupied by people with hearing impairments. The visual warning systems shall interface with and operate in conjunction with the building fire alarm system. Also included is upgrades of other building elements such as the bathroom facilities, elevator controls, handrails for stairs, drinking fountains, doors, parking spaces, curb ramps, ramps to building entrances, public telephones, and signage.

**3. Rehabilitation and Modification of Logistics Supply and**

**Warehouse Facilities, Buildings 16 and 16W . . . . . 450,000**

This project provides for the renovation of approximately 10,000 square feet in the Logistics Supply and Warehouse Facilities (Buildings 16 and 16W) which will be vacated by individuals moving to the Earth Observing System Data Information System Facility. Modifications include the relocation of wall partitions; heating, ventilating, and air conditioning systems; ceiling systems; floor tiles; and wall finishes as required. Rehabilitation of lighting, smoke detection, and sprinkler systems is also included. This project is an essential element in the Center's overall housing plan. This project will relieve overcrowding of existing facilities and will promote operational efficiency of like activities.

**4. Rehabilitation of Radio Frequency Interference (RFI) Clean Room,**

**Mechanical Integation Facility . . . . . 900,000**

This project provides for the rehabilitation to the RFI Cleanroom of the Spacecraft Assembly area. The area will be converted to an anechoic test chamber and upgrades to include extension of utilities and services to the RFI cleanroom through RFI shielded penetrations will be required. In order to maintain the cleanroom integrity, modifications to the High Efficiency Particulate Air (HEPA) filter wall will also be required to achieve the desired acoustical properties and to minimize particle infiltration. Upgrades to the RFI Cleanroom are required to prevent the creation of RF waves during electromagnetic interference testing which could damage sensitive flight hardware detectors/receivers. New technology applications in sensitive spacecraft detectors and receivers require a smaller reverberation area in acoustic enclosure materials than is currently present in this 25 year old facility.

**5. Modify NASA Communications Systems Facilities, Spacecraft Operations, . . . . . 300,000**

This project will modify the heating, ventilating and air conditioning systems (HVAC) and the uninterruptible power supply system (UPS) which serve the NASA Communications (NASCOM) systems. The old air conditioners will be replaced with four 8-ton units. The old UPS systems will be replaced with two 75 KVA systems, which will provide the necessary full power redundancy. These modifications are required to provide the increased capacity and operational redundancy necessary for critical support to NASA missions. The HVAC and electrical loads of NASCOM Voice Switching System and Voice Distribution System have expanded, adversely reducing the operational redundancy for contingencies.

D. ~~Jet Propulsion Laboratory (JPL)~~ . . . . . \$1,850,000

**1. Modify Utility Services, Environmental Test Laboratory (144) . . . . . 550,000**

This project will provide a new 200 Kilowatt, 250 Kilovolt diesel powered emergency generator and a surface fuel bank with a 10 hour fuel capacity. A new feeder cable and modern transfer switch will be installed with related circuiting and over current protection. Deteriorated liquid nitrogen pipe fittings will be replaced. Deteriorated insulation on the liquid nitrogen piping system will be repaired or replaced. The existing emergency generator has frequent problems and is underrated for the required load. Long duration power outages result.

**2. Modify Regional Planetary Image Facility (202) . . . . . 400,000**

This project will rearrange and upgrade approximately 4,800 square feet on the first floor of this building. Included is demolition of non-bearing partitions, removal of raised floor, rearrangement of exit doors, and the construction of an entrance vestibule. Modifications include new floor surfaces, ceiling system with new fluorescent light fixtures, and associated painting of the walls. The heating ventilating and air conditioning system will be upgraded to include a filtering and humidity control system. The project will improve access and environment for the work force and the public. Data housed in this facility requires temperature and humidity controls for long-term preservation.

**3. Upgrade Emergency Generator Capacity, Space Flight Operations Facility (230) . . . . . 900,000**

This project will procure and install an additional 1,350 Kilowatt, 1,750 Kilovolt emergency generator. The new generator will be installed in an existing space of the generator room on new foundations. New vibration isolation connections to the engine, space ventilation system, and exhaust system will be adapted to the existing rough-in. A new 2,400 ampere busway will be installed. The existing distribution switchboard will be remodeled to accommodate the additional power circuit. The existing 3,000 ampere draw-out circuit will be serviced, recalibrated, and reinstalled. The existing control system will be expanded to serve the new generator. The existing generators are over twenty years old and use antiquated technology. Major spare parts require long lead times and are fabricated on a costly individual basis.

E. ~~Johnson Space Center (JSC)~~ . . . . . \$2,450,000

**1. Rehabilitate Water Distribution System . . . . . 900,000**

This project provides for the rehabilitation of the Johnson Space Center's potable Water Treatment Plant, Building 322, and the repair of the potable water distribution system. The work includes modifications to the chlorine injection equipment; installation of injection equipment for ammonia, pH adjustment, corrosion inhibitors, distribution control valves, approximately 2,000 feet of 3-inch pipe to the Utility Maintenance Storage Facility, Building 207a; and an approximately 400 square foot addition to the Water Treatment Plant, Building 322, to house the chlorination system. The existing water supply system has deteriorated from age and the corrosive environment. The current system does not consistently supply the quality of potable water required by the Texas

Water Commission. The work is required to prevent further deterioration of the water quality and to bring the system into compliance.

**2. Rehabilitation of Laser Tracking Facility (14) . . . . . 300,000**  
This project provides for critical repairs to the laser tracking facility, Building 14. Included are repair of wall section displacements and cracks, roof replacement, waterproofing and recaulking of the below-grade portions of the structure, rehabilitation of water-damaged ceilings and walls, and readjustment of the air conditioning system. Also included are rehabilitation and modification to the facility storm drain and sanitary sewer systems to correct frequent backups and unsafe conditions. Major facility deterioration and deficiencies will be corrected providing basic laboratory environments for environmental control, stability, and safety for critical engineering development and testing.

**3. Upgrade Sanitary Sewer System . . . . . 550,000**  
This project provides for modifications to the sanitary sewer system. The work includes streamlining sewage flows, replacing pumps, and installing approximately 7,900 lineal feet of 8-inch force main piping. The project is required to meet additional demands on the system caused by the addition of several new facilities and increased flow from cooling tower waste streams.

**4. Rehabilitation of Antenna Test Range Facilities (18 and 450) . . . . . 700,000**  
This project provides for the rehabilitation of the Radar Boresight Range Control Building 18 and the Microwave Transmitting Antenna Tower, Facility 450. The structural members of the tower will be renovated and repainted. Electrical and mechanical systems for building 18 will be upgraded to accommodate current and future test support operations. In addition, a small enclosure will be added to the building to support Global Positioning System (GPS) hardware development. The new addition and existing exterior walls facing the test range will be covered with a new high-frequency absorbent material. These facilities have deteriorated over time and are in need of rehabilitation. This project is required to maintain the capability to support the Shuttle program and other programs.

**F. Kennedy Space Center (KSC) . . . . . \$3,450,000**

**1. Modify Gas Supply Line (GN2, GH3, Compressed Air) . . . . . 835,000**  
This project provides new stainless steel piping for gaseous nitrogen, gaseous helium (GN2, GH3) and compressed air lines from the Orbiter Processing Facility-3 to each Mobile Launch Platform refurbishment site. Also provided are new steel piping lines for compressed air from the Utility Annex to each Mobile Launch Platform refurbishment site. The existing tube banks at the refurbishment sites do not provide adequate pressure or capacity required for efficient operation.

**2. Install RSS Hoist Machine Room Air Handler, Pads A&B,  
Increase G02 Storage Capacity, LC-39A . . . . . 875,000**

This project is required to provide installation of new fan coil air handling units outside of the Rotating Service Structure (RSS) hoist machine rooms with air delivery through ductwork into machine rooms. Work also includes new chiller water lines, electrical power, a 200 cubic feet 6,000 psig pressure vessel rated for gaseous oxygen (G02) storage. The existing fan coil units are located above 460 volt electrical panels. Safety hazards exist due to the potential of water intrusion into high voltage equipment. Maintenance is hazardous because they are suspended above high voltage equipment. Additional G02 storage is needed due to increased fuel cell requirements to support launch scrub turnarounds.

**3. Replace Central Heat Plant Motor Control Center No. 1 . . . . . 290,000**

This project is required to replace the existing motor control center (MCC) with a fiberglass full direct spray rated motor. All existing underfloor conduit will be replaced with overhead watertight conduit. The 30-year old motor control center is an obsolete model and direct replacement parts are difficult to obtain. The underfloor conduit and wiring have been failing at an increasing rate. Installation of a new Motor Control Center is the most economical and safe approach to obtain satisfactory separation of water, oil and electricity at this facility.

**4. Upgrade Firex and Heating Systems in the Hypergolic  
Maintenance Facility . . . . . 900,000**

This project is required to replace the central hot water piping system for various buildings in the industrial area. Work includes replacement of piping, insulation, valves, and associated system supports. It will eliminate electrical single failure points by removing the firex deluge system from the electricity-driven potable water pump source. The new system will be tied to the Hypergolic Maintenance Facility's (HMF) diesel-driven firex supply loop. Additionally, the building's firex system will be upgraded to a 300 psig allowable working pressure. The central hot water system for these buildings was changed from high temperature hot water to low temperature hot water. The additional flow needed dictates larger pipe size throughout the existing system. The existing facility deluge system booster pump is approximately 25 years old and in deteriorated condition.

**5. Upgrade Operations and Control (O&C) Building  
to Accommodate the Functionally Disabled . . . . . 550,000**

This project is required to accommodate the functionally disabled in the O&C Building. Work includes modifying stalls; lavatories; toilets; visual, audible, and general signage; access to restroom accessories; and general access to restroom facilities. Three restrooms per floor, for male and female personnel, are included. Existing facilities are restrictive and are not adequate for those with functional disabilities.

**G. Langley Research Center (LaRC) . . . . . \$2,940,000**

**1. Rehabilitation of Office Area, 8-Foot High  
Temperature Tunnel Facility . . . . . 820,000**

This project provides for the rehabilitation of approximately 5,000 square feet of existing office area in the 8-Foot High Temperature Tunnel Facility, Building 1265; construction of a 2,300 square foot addition to the east end of the facility with a ramp for disabled access to the facility; and a parking lot. The rehabilitation will include installing new windows and exterior doors; replacing ceilings, lights, and interior walls; upgrading restrooms for disabled access; upgrading the electrical system; and upgrading the heating, ventilating, and air conditioning systems in two portions of the building. The project also includes asbestos removal. This area has not been upgraded since the original construction in 1959 and has deteriorated due to its age and continued use.

**2. Modification of Sanitary Sewers, East Area . . . . . 300,000**

This project provides for modifications to the sanitary sewer system in the East Area to allow separation of the NASA LaRC sewage collection from the Langley Air Force Base system prior to discharge into Air Force pumping station, Building 656. This project will require approximately 815 lineal feet of new sewer line and 10 new manholes to accomplish separation from the Air Force collection system. Separation of the two flows will facilitate sampling and allow identification to ensure that Hampton Roads Sanitation District permit requirements are being met.

**3. Modifications to Steam and Hot Water Distribution Systems,  
West Area . . . . . 920,000**

This project provides for the installation of a new 125 psi steam supply from Building 1154 to Building 1272 and extension of the existing hot water distribution system from Building 1154 to Buildings 1163 and 1164 in the West Area. The work at Building 1272 will also include the removal of the existing boiler, installation of a new steam to hot water heat exchanger, and connection into the existing hot water heating system which is currently supplied by the existing boiler. This project will increase the utilization of existing steam being generated and supplied to NASA by the Hampton Refuse-Fired Steam Generation Plant, decrease maintenance requirements, improve reliability, and result in a cost savings.

**4. Modifications to Nozzle Test Chamber (1247D) . . . . . 900,000**

This project provides for modifications to enlarge the chamber to 10-feet long by 10-feet wide by 8-feet high to accommodate larger models and to relocate the Nozzle Test Chamber from Room D108 to Room D114 in Building 1247D. The modifications also include replacing the existing test chamber with a new larger test chamber to permit room for calibration, as well as modifications to the existing vacuum and high pressure air systems to accommodate the new location. Currently the Nozzle Test Chamber is located in the same room with the 20-Inch Mach 6 Tunnel. Separating the two facilities will allow more room for model preparation, model changes, check-out, and enhance the productivity of both.

**H. Lewis Research Center (LeRC) . . . . . \$2,700,000**

**1. Modifications of Tank 5 for Cryopumping, Electric Power Laboratory . . . . . 900,000**

This project provides for modification of the existing cryosystem in Tank 5 located in the Electric Power Laboratory (EPL) (301). The work includes modification of the helium gas and liquid transfer and delivery lines, improving helium compressor controls, rehabilitation of the helium storage facilities, installation of government furnished cryopanel, and upgrade of the helium loop controls. The cryopanel will provide very high speed pumping essential for programs such as Space Electric Power and Nuclear Electric Power (Topaz and SP-100 class); advanced propulsion concepts; high capacity environmental and other interaction phenomena; and cooperative projects with DOD, industry, and other NASA Centers.

**2. Rehabilitation of Mechanical Systems, Basic Materials Laboratory . . . . . 900,000**

This project provides for rehabilitation of mechanical systems and central air handlers in the Basic Materials Laboratory (BML) (106). Work includes installation of new air handling units to serve the first floor, second floor, and rear basement labs, and a recirculation water system. Demolition and disposal of the existing air handlers, abandoned chillers, and associated asbestos insulated chilled water and steam piping is also included. The current 1962 vintage heating, ventilating, and air conditioning (HVAC) systems are inefficient and require constant maintenance and repair. The new HVAC system will provide efficient, reliable, and economical service for the BML labs.

**3. Rehabilitation of Mechanical System, Instrument Research Laboratory . . . . . 900,000**

This project provides for rehabilitation of the mechanical system in the original section of the Instrument Research Laboratory (IRL) (77). The work includes the installation of a new heating, ventilating, and air conditioning (HVAC) system including air handlers, piping, ductwork, controls, and demolition and removal of the existing HVAC system. The HVAC system, installed in 1951, has deteriorated beyond repair. The new HVAC system will provide efficient, reliable, and economical service to handle heating and cooling loads for the IRL.

**I. Marshall Space Flight Center . . . . . \$2,110,000**

**1. Modification of Structures Storage Building (Kennedy Space Center) . . . . . 950,000**

This project provides for modification of the Structures Storage Building at Kennedy Space Center. Work includes installation of heating, ventilation, and air conditioning (HVAC) equipment; walk-in coolers; and material handling and shelving systems. Work also includes addition of a mezzanine with associated stairways and restrooms. These modifications will improve the overall efficiency and reduce the operational cost of the Solid Rocket Booster refurbishment and assembly support activities.

**2. Rehabilitate Elevators in Office Building (4201) . . . . . 580,000**

This project provides for complete rehabilitation of the elevators in Office Building 4201. Work includes replacement of the electrical control systems with microprocessor controls and solid state drive systems. Work

also includes replacement of the car platform, cab, hoist cables, tracks, rollers, door panels, and operator mechanisms. The hoist equipment will be reconditioned for reuse. Building 4201 is a 29-year-old, six story facility. Its elevators are obsolete, unreliable, costly to maintain, and parts are difficult to obtain. This project will upgrade the elevator systems to current Life Safety and Handicapped Accessibility standards.

**3. Rehabilitate Elevator in Office Building (4202) . . . . . 580,000**  
 This project provides for complete rehabilitation of the elevators in Office Building 4202. Work includes replacement of the electrical control systems with microprocessor controls and solid state drive systems. Work also includes replacement of the car platform, cab, hoist cables, tracks, rollers, door panels, and operator mechanisms. The hoist equipment will be reconditioned for reuse. Building 4202 is a 29-years-old, six story facility. Its elevators are obsolete, unreliable, costly to maintain, and parts are difficult to obtain. This project will upgrade the elevator systems to current Life Safety and Handicapped Accessibility standards.

**J. Michoud Assembly Facility (MAF) . . . . . \$1,750,000**

**1. Rehabilitate West Chilled Water Return Piping . . . . . \$900,000**  
 This project provides for the restoration and upgrade of approximately 6,000 linear feet of overhead chilled water return piping in the External Tank Main Manufacturing Building. The new piping will be routed differently than the existing piping to improve accessibility and maintainability. Work to be done includes the replacement of existing valves, or the addition of new valves, as required. The chilled water return system was originally installed in the 1940's and is very deteriorated. Pipe wall thickness has decreased by 50 percent in some areas due to severe corrosion. Current configuration does not provide sufficient valves to adequately isolate problem areas during outages. Lack of easy access to piping makes piecemeal repairs difficult and costly.

**2. Rehabilitate and Modify Substation No. 10 . . . . . \$850,000**  
 This project provides for the upgrade of Substation No. 10. Work includes replacement of the existing equipment with two 2,000 KVA transformers with associated switchgear, and the replacement of power panels, breakers, starters, and other electrical components at Motor Control Centers 1 and 2. Substation No. 10 is 40 years old, difficult to maintain, and constantly overheating. The substation provides power for External Tank production processes, a chemical tank farm, and a cooling tower. It can no longer meet these requirements in its present configuration because of substantial load increases since its original installation.

**IC. Stennis Space Center (SSC) . . . . . \$2,155,000**

**1. Rehabilitate Fire and Hazardous Gas Detection System . . . . . 855,000**  
 This project provides for rehabilitation of the existing fire and hazardous gas detection systems on the Space Shuttle Main Engine test stands. Work includes the installation of state-of-the-art monitoring and gas detection devices. Rehabilitation of the existing fire and hazardous gas detection system is necessary to provide more

expedient protection for personnel and equipment located in the vicinity of these facilities during test operations.

**2. Modify 13.8KV Electrical Distribution System . . . . . 900,000**  
This project provides for modifications to the 13.8KV electrical distribution system. Work includes the replacement of approximately 1,600 feet of underground cable and 4,900 feet of overhead cable in the industrial complex. Work also includes the installation of two new 13.8KV feeders at the Main Substation feeder pole and approximately 33,000 feet of new overhead cable. This project will install the necessary power supply loop to ensure the reliability of the electrical distribution system for the base support of Space Shuttle Main Engine test operations.

**3. Dredge East Pearl River . . . . . 400,000**  
This project provides for the dredging of the East Pearl River access to the John C. Stennis Space Center canal system. Work includes the dredging of the waterway to the original design depth and the repair, augmentation, or construction of spoil areas as required. A cyclical dredging program maintains access to the canal system and ensures the critical supply of propellant for the Space Shuttle Main Engine testing program.

**L. Wallops Flight Facility (WFF) . . . . . \$2,040,000**

**1. Modifications to Range Control Center, Building E-106 . . . . . 430,000**  
This project provides for modifications of the first floor area and mechanical room of the Range Control Center entrance to provide a reception/conference room area and a connecting corridor for passage between Buildings E-107 and E-108. A reception/conference area in close proximity of the Control Center is essential for meetings, briefings and holding areas during long count down periods prior to launch. The connecting corridor will provide a less complicated and safer passage between buildings.

**2. Modification to Launch Area No. 2 . . . . . 750,000**  
This project provides for modification of Launch Area No. 2. It includes excavation and fill, reinforced concrete slab and foundation, structural steel, launch shelter with rails, electrical troughs and grounding system, cable tray relocation, and perimeter fencing. Launch Pad No. 2 which was built in 1950 is currently the oldest and most active launch complex on Wallops Island. It consists of three launchers mounted on a concrete pad at an elevation below the surrounding beach and adjacent to the dune line. During storms the pad is subject to overwash, leaving a layer of sand and mud. Pad relocation and placement at a higher elevation west of the seawall will reduce the overwash hazard and downtime on scheduled launches.

**3. Modification for Disabled Access, Various Buildings . . . . . 260,000**  
This project provides for modification to various buildings on the Main Base that are inaccessible to people with disabilities. The work includes the installation of elevators, modification of building exterior and interior entrances and thresholds, modification to restroom areas including fixtures, modifications to drinking fountains,

installation of interior and exterior access ramps, and display of signs. This project is required to meet the regulations established by the Uniform Federal Accessibility Standards.

**4. Rehabilitation of Range Control/Evaluation Facility West Wing, (N-159) . . . 600,000**  
 This project provides for rehabilitation of the first floor hangar and environmental lab areas in the west wing of Building N-159. The work includes the demolition of interior partitions and finishes, electric wiring, lighting and panels, installation of interior partitions, personnel doors, finishes, lighting, wiring, and panels; modifications to heating, ventilating, and air conditioning; installation of boiler, fire protection, plumbing, and restrooms. The west wing of Building N-159 houses observational science equipment, aeronautics hangar and support laboratories, and temporary partitioned offices. The modification updates the utilities in the hangar area, provides efficient use of space in the laboratories, and represents the first significant rehabilitation to the west wing since its construction over 35 years ago.

**M. Various Locations . . . . . \$1,130,000**

**1. Modify Fire Suppression Systems, Merritt Island, Florida . . . . . 400,000**  
 This project will provide for the extension of fire detection and water sprinkler, carbon dioxide, or other fire suppression systems to various buildings and structures at the Spaceflight Tracking and Data Network station located at Merritt Island, Florida. This project will correct the detection and suppression deficiencies, and replace existing halon fire suppression systems. This station provides key pre-launch, launch, and landing communications support to the Space Transportation System.

**2. Modify Uninterruptible Power Supply, Goldstone, California . . . . . 730,000**  
 This project will provide a 500 Kilowatt Uninterruptible Power Supply (UPS) with batteries to support all Signal Processing Center electronics at Building G86 of the Mars site at the Goldstone Deep Space Communications Complex. The modifications will protect electronic equipment against short transient power surges and allow orderly emergency shut-down during power outages. The electronic equipment is subject to power outages, which result in time consumption for extensive reconfiguration of the computers to restore operations for spacecraft support. The UPS will act as a power conditioner in the normal mode and provides battery power for a limited time, until diesel generated or commercial power is back on line.

**N. Miscellaneous Projects Not in Excess of \$250,000 . . . . . \$545,000**

Total . . . . . **\$30,000,000**

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:**

Approximately \$40-50 million per year will be required for continuing rehabilitation and modification needs.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

SUMMARY

MINOR CONSTRUCTION

Summary of Project Amounts by Location:

	<u>Amount</u>	<u>Page No.</u>
Kennedy Space Center . . . . .	665,000	CF 3.4-3
Langley Research Center . . . . .	665,000	CF 3.4-3
Marshall Space Flight Center . . . . .	670,000	CF 3.4-3
Total . . . . .	<u>\$2,000,000</u>	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Minor Construction of New Facilities and Additions to Existing Facilities,  
Not in Excess of \$750,000 Per Project

INSTALLATION: Various Locations

FY 1995 CoF Estimate: \$2,000,000

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FY 1993: \$14,000,000

FY 1994: \$14,000,000

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COGNIZANT INSTALLATIONS/LOCATIONS OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Management Systems and Facilities

SUMMARY PURPOSE AND SCOPE:

These resources will provide for minor facility construction at NASA field Installations and Government-owned industrial plants supporting NASA activities. Each project in this program is estimated to cost no more than \$750,000 and involves either the construction of new facilities or additions to existing facilities. The FY 1995 request of \$2 million will improve the usefulness of NASA's physical plant by changing the utilization of or augmenting the capabilities of various facilities. Included in this request are those programmatic and institutional projects that are essential to the accomplishment of mission objectives.

PROJECT JUSTIFICATION:

The configuration of NASA's physical plant necessarily must respond to changes in utilization and adaptations required by changes in technology or in mission needs. Demands are generated by research, development, testing, and similar activities. Specific justification for each minor construction project is provided under "PROJECT COST ESTIMATE."

PROJECT DESCRIPTION:

Included in the FY 1995 minor construction program are those facility projects for institutional or technical facility needs that could be fully identified at the time of submission of this budget estimate. Items of work totaling \$2 million are included in this resource request and have been distilled from a list totalling over \$26 million. Projects were selected on the basis of the relative urgency of each item and the expected return on the investment. During the course of the year, the revision of priorities may require changes in some of the items to be accomplished. Such changes will be accommodated within the total resources allocated.

These projects represent requirements that must be met in this time frame to support institutional needs and programmatic objectives. The following listing summarizes the cost distribution by category of work:

a. General Purpose Buildings . . . . .	665,000
b. Technical Buildings/Structures . . . . .	1,335,000

PROJECT COST ESTIMATE:

A. ~~Kennedy Space Center (KSC)~~ . . . . . \$665,000

1. Modernize LC-39 News Facility . . . . . 665,000  
This project will replace a deteriorating, costly to maintain, canvas covered geodesic dome with a permanent 7,000 square foot facility. During launch activities and press conferences it is essential that a safe place be provided for the press and international partners to follow the shuttle activities. The existing facility is not appropriate or safe and must be replaced.

B. ~~Langley Research Center (LaRC)~~ . . . . . \$665,000

1. Construction of Addition to Cockpit Motion Facility . . . . . 665,000  
This project provides for construction of a two-story addition of approximately 5,200 square feet. The addition will house computer laboratories, simulator spaces, a pilot briefing and debriefing conference room, a control room, and a technician work station/office. An access ramp will be provided between the second floors of the existing building and the new addition. The space provided by the addition will support research under the Terminal Area Productivity and High-speed Research programs, as well as on-going research efforts in Aviation Safety/Automation, Wind Shear, Advanced Transport Operating Systems, and Advanced Aircraft.

C. ~~Marshall Space Flight Center~~ . . . . . \$670,000

1. Construct Addition for Precision Optical Fabrication  
and Testing (4487-B) . . . . . 670,000  
This project provides for the construction of two additions to the Straylight Facility, which is attached to the B-wing of Building 4487. Total space to be provided will be approximately 3,500 square feet. The areas will be designed for class 100,000 clean room operations and finished with low particulate-generating and low out-gassing materials. Individual rooms will be designed to operate as class 10,000 laboratories with vibration isolated floors and thermal and acoustic isolation enclosures. The project also provides for necessary support equipment and utilities. Precision optical fabrication and testing facilities are critical for optical research and testing. The controlled environment provided by this facility is required to protect and fully utilize highly specialized and valuable equipment recently obtained by NASA for use in on-going and future research programs.

Total . . . . . \$2,000,000

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: Approximately \$6 million per year will be required for continuing minor construction needs.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

SUMMARY

FACILITY PLANNING AND DESIGN

	<u>Amount</u>	<u>Page No.</u>
Master Planning . . . . .	\$ 400,000	CF 3.5-1
Sustaining Engineering Support . . . . .	700,000	CF 3.5-2
Preliminary Engineering Reports and Related Special Engineering Support . . . . .	1,600,000	CF 3.5-3
Final Design . . . . .	<u>7,300,000</u>	CF 3.5-4
Total . . . . .	\$ <u>10,000,000</u>	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Facil' Pla ni

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FY 1995 CoF Estimate: \$10,000,000

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FY 1993: \$23,300,000

FY 1994: \$21,500,000

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The funds requested in this estimate are required to provide for the following advance planning and design activities related to facilities activities and projects where not otherwise provided for:

- a. The accomplishment of necessary studies, development and master planning for field installation and the provision of continuing engineering support and special engineering management and other services.
- b. The preparation of preliminary engineering reports, cost estimates, and design and construction schedules. Also includes the preliminary engineering efforts required to initiate design-build projects.
- c. The preparation of final designs which include construction plans, specifications, and associated cost estimates and schedules required to implement construction projects.
- d. The accomplishment of facilities siting and other investigations, studies and reports.

A. Master Planning . . . . . \$400,000

Provides for updating, developing and automating existing field installation master plans. This effort includes facility studies, site investigations, and analyses of utility systems. The existing utility and civil drawings will be converted into a highly detailed electronic database using a computer-aided-design (CADD) system. Topographical features from original drawings will be merged electronically to create individual area maps or an entire center map. The master plan documents will be updated to reflect as-built conditions and to graphically represent the 5-year facility plan baseline for future development.

The NASA field center master plans are periodically updated. The master plans are essential as reference documents for land use planning, identification of physical relationships of facilities, and proper orientation and arrangement of facilities. The updates reflect as-built condition of facilities and utility systems with emphasis on changes caused by recent facility construction and modifications.

**B. Sustaining Engineering Support . . . . . \$700,000**

Provisions for facility studies and specific engineering support continue in importance as evidenced in recent years. These efforts are important due to changing cost trends in construction materials and fuels; the operation and maintenance costs for the physical plant; and energy conservation and efficiency.

The following items are included in the FY 1995 requirements:

**1. Building Research Board**

Covers annual support to the Federal Construction Council's (FCC) operations and provides for special studies that the Council will perform throughout FY 1995 to help advance the science and technology of Federal Government building and construction. The FCC is subordinate to the Building Research Board, National Academy of Sciences, and its activities are supported by NASA and other Federal agencies with similar construction programs.

**2. Value Engineering, Cost Validations and Analyses**

Provides for engineering services to improve cost-effectiveness of facility projects by subjecting project design criteria, specifications and working drawings for specific material components and systems to detailed independent reviews by engineering specialists. Also provides services necessary to predict and validate facility costs to aid in resources planning.

**3. Facilities Utilization Analyses**

Provides for the analyses of agencywide facilities utilization data covering (1) office and other types of building space; (2) designate major technical facilities; and (3) special studies comparing the utilization of technical facilities which are similar in type or capability, such as wind tunnels. Such analyses provide for (1) insights into and development of better methods of identifying underutilized facilities; (2) improved techniques to quantify level of facilities use; and (3) actions to improve facilities utilization. Work provides for review of each installation's inventory data base in support of the facilities utilization program. Surveys are necessary to validate the reported data in relation to a specific problem or need, and to assist in providing a credible foundation for plans to improve the use of facilities.

**4. Facilities Management Systems**

Provides for continued engineering support for the technical updating of NASA's master text construction specifications to reflect the use of new materials, state-of-the-art construction techniques and current references to building codes and safety standards.

**5. Independent Analysis and Third Party Reviews**

Provides the technical and engineering support analyses, designs, and reviews required to verify, confirm and ensure suitability of construction designs within the project cost estimates.

**6. Facilities Engineering Metrication**

Required to support the transitioning of NASA facilities engineering designs and specifications from the English inch-pound system to metric, as required by Presidential Executive Order 12770 of July 25, 1991.

**C. Preliminary Engineering Reports and**

**Related Special Engineering Support** . . . . . **\$1,600,000**

**1. Preliminary Engineering Reports (PERs)** . . . . . **(1,300,000)**

This estimate provides for preparation of PERs, investigations, and project studies related to proposed facility projects in the FY 1997 and FY 1998 Construction of Facilities programs. These reports are required to permit the early and timely development of the most suitable project to meet the stated programmatic and functional needs. Reports provide basic data, cost estimates and schedules relating to future budgetary proposals. This request provides for PERs associated with proposed construction.

The estimated cost of PER support for FY 1997 construction projects is \$1,000,000, which will permit updating of PERs for \$20 to \$30 million in construction, and the development of new PERs for an additional \$90 to \$100 million in projects.

An additional \$300,000 has been included in this line for the completion of new PERs for approximately \$15 to \$20 million of construction projects which will be high priority candidates for inclusion in the FY 1998 Construction of Facilities program. The activity associated with FY 1998 will be confined to the highest priority candidates.

**2. Related Special Engineering Support** . . . . . **(300,000)**

This estimate provides for investigations and project studies related to proposed facility projects to be included in the subsequent Construction of Facilities programs. Such studies involve documentation and validation of "as-built" conditions, survey/study of present condition of such items as roofing and cooling towers, utility plant condition and operational modes, and other like studies. These studies are required to allow for the timely development of projects to meet the stated functional needs and to provide basic data, cost estimates and schedules for related future budgetary proposals.

**D. Final Design** . . . . . **\$7,300,000**

The amount requested will provide for the preparation of designs, plans, drawings, and specifications necessary for the accomplishment of projects. Projects involved are planned for inclusion in the FY 1996 and FY 1997 programs. The goal is to obtain better facilities on line earlier at a lower cost.

The request will provide for final design work associated with construction proposed for the FY 1996 program, estimated to cost \$140 to \$150 million, and for \$10 to \$20 million of high potential projects proposed for the FY 1997 program. The final design amount included for FY 1996 candidates and for residual requirements of this nature which have accumulated from prior years activities is \$6,100,000. For FY 1997 \$1,200,000 is included and design activity will be confined to the highest priority candidates.

Total . . . . . **\$10,000,000**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

SUMMARY

ENVIRONMENTAL COMPLIANCE AND RESTORATION

<u>Summary of Project Amounts by Location:</u>	<u>Amount</u>	<u>Page No.</u>
Ames Research Center . . . . .	\$3,290,000	CF 3.6-3
Dryden Flight Research Center . . . . .	1,610,000	CF 3.6-3
Jet Propulsion Laboratory . . . . .	3,200,000	CF 3.6-4
Johnson Space Center . . . . .	550,000	CF 3.6-4
Kennedy Space Center . . . . .	2,500,000	CF 3.6-5
Langley Research Center . . . . .	2,000,000	CF 3.6-5
Lewis Research Center . . . . .	3,450,000	CF 3.6-5
Marshall Space Flight Center . . . . .	5,700,000	CF 3.6-6
Michoud Assembly Facility . . . . .	3,000,000	CF 3.6-7
Stennis Space Center . . . . .	1,000,000	CF 3.6-7
White Sands Test Facility . . . . .	1,000,000	CF 3.6-7
Miscellaneous Projects Not in Excess of \$250,000 Each . . . . .	1,200,000	CF 3.6-8
Remedial Investigations, Feasibility Studies, Assessments, Studies, Design, and Related Engineering . . . . .	<u>6,500,000</u>	CF 3.6-8
Total . . . . .	<u>\$35,000,000</u>	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1995 ESTIMATES

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PROJECT TITLE: Environmental Compliance and Restoration Program

INSTALLATION: Various Locations

FY 1995 CoF Estimate: \$35,000,000

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FY 1993: \$40,000,000

FY 1994: \$50,000,000

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COGNIZANT INSTALLATIONS/LOCATIONS OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Management Systems and Facilities

SUMMARY PURPOSE AND SCOPE:

These resources will provide for studies, assessments, remedial investigations, feasibility studies, design, related engineering, and remedial action projects for environmental compliance and restoration measures at NASA field installations, Government-owned industrial plants supporting NASA activities, and other locations where NASA operations have contributed to environmental problems and NASA is obligated to contribute to cleanup costs. In addition, these resources will be used to acquire land if necessary to implement environmental compliance and restoration measures. The purpose of this program is to enable NASA to comply with mandatory environmental statutory requirements and standards. The resources authorized and appropriated pursuant to this program may not be applied to other activities. The program includes studies or assessments to determine compliance status and options for remedial action; conduct of prescribed remedial investigations and feasibility studies as required by Federal environmental laws; and performance of environmental restoration, hazardous waste removal and disposal, cleanups, and closures.

PROJECT JUSTIFICATION/DESCRIPTION:

Proposed environmental compliance and restoration projects and activities for Fiscal Year 1995 total \$35 million, which has been distilled from requests of approximately \$105 million. This program represents only a modest request in relation to the total requirements for environmental compliance and restoration that must be

implemented within the next several years. Based on relative urgency and potential health hazards, the following listed projects are the highest priority requirements currently planned for accomplishment in FY 1995. Deferral of these necessary remedial measures would preclude **NASA** from complying with environmental requirements and jeopardize critical **NASA** operations. The remedial investigations, feasibility studies, assessments, design, and related engineering costs are estimated to be approximately \$6,500,000. Projects estimated to cost less than \$250,000 have not been described or identified by specific location. The estimated cost of these projects is \$1,200,000. **As** studies, assessments, remedial investigations, feasibility studies, and designs progress and as new discoveries or regulatory requirements change, it is expected that priorities may change and revisions of the activities and projects may be necessary.

The following listing summarizes broad categories of effort to be undertaken with projects of an estimated cost of over \$250,000:

a.	Replacement of Underground Storage Tanks . . . . .	\$3,000,000
b.	Rehabilitation/Replacement of Polychlorinated Biphenyl (PCB) Transformers . . . . .	1,020,000
c.	Hazardous Waste Corrective Actions/Cleanups . . . . .	15,650,000
d.	Hazardous Waste Storage and Control . . . . .	690,000
e.	Air Pollution Control . . . . .	6,390,000
f.	Water Pollution Control . . . . .	550,000

**PROJECT COST ESTIMATE:**

**A. Ames Research Center (ARC) . . . . . \$3,290,000**

1. Fuel System Replacement and Remediation (N211) . . . . . 2,000,000

This project continues the effort to provide for removal, replacement and site remediation of the fuel storage and supply system used by Flight Operations at Building 211. Leak detection and monitoring, spill containment, and site cleanup are required to conform with the underground storage tank (UST) regulatory requirements. This project provides for removal/closure of a fuel supply line, installation of a new fuel system, and soil and groundwater remediation as needed. The project is required to comply with the Federal RCRA, state, and local environmental regulations.

2. Construct Toxic Gas Storage Facilities . . . . . 1,290,000

This project provides for the construction of facilities at various locations throughout the Center for the adequate use and storage of toxic gases and materials in conformance with environmental requirements. The work includes providing new facilities and control devices and retrofitting of existing facilities for the indoor and outdoor storage and/or use of the regulated gases and materials. The work is required to conform with the Santa Clara County Toxic Gas Ordinance requirements, regulating facilities which store, use, dispense or handle toxic gases or materials which may act as toxic gases when released into the atmosphere.

**B. Dryden Flight Research Center (DFRC) . . . . . \$1,610,000**

1. Replace Polychlorinated Biphenyl Transformers . . . . . 520,000

This project provides for the final phase of the replacement of existing polychlorinated biphenyl (PCB) and PCB contaminated transformers with non-PCB fluids and equipment. The work includes removal and disposal of PCB fluids and transformers in accordance with regulations and replacement of transformers with non-PCB equipment. The project will prevent potential contamination or hazards, and disruption of the Center's operations due to leaks, spills, or fires associated with these transformers. It will provide for compliance with environmental requirements and tenant agreements. PCBs are regulated by the Toxic Substances Control Act (TSCA).

2. Hazardous Waste Storage and Recycling Facilities . . . . . 690,000

This project provides for the repair and replacement of existing hazardous waste storage facilities and construction of new facilities for the storage and recycling of hazardous waste materials. The work involves repair and replacement of existing hazardous waste accumulation facilities with new enclosed facilities and the construction of a solvent recycling and a drum crushing facility with associated utilities. This project will upgrade and expand the Center's hazardous waste operations to ensure compliance with the Federal RCRA, state hazardous waste regulations, and tenant agreements.

**3. Construct Air Pollution Control Systems . . . . . 400,000**

This project provides for the installation, repair and replacement of air pollution control systems at air emissions sources within the Center. Preliminary study work in support of the project involved identification and testing of air emission sources and the performance of risk assessments from air toxic emissions. This project involves the installation of new, or repair and replacement of existing pollution control equipment in order to minimize emissions from the identified sources. The work is needed to conform with the Federal Clean Air Act (CAA) requirements, the state CAA regulations, and tenant agreements with the host facility environmental policies.

**C. Jet Propulsion Laboratory (JPL) . . . . . \$3,200,000**

**1. Cleanup of Arroyo Seco Groundwater Contamination . . . . . 2,500,000**

This project provides for continuation of the groundwater cleanup effort of the Arroyo Seco aquifer contamination. Sampling and testing of groundwater in the vicinity of JPL confirmed the presence of contaminants beneath the site and in nearby production wells, in excess of Federal and State of California standards. This phase of the project provides for continuation of remedial investigations and feasibility studies to identify the extent of the contamination and determine remedial alternatives, and for the payment of state oversight costs as required by the Federal Facilities Agreement (FFA). This site is listed in the EPA's "National Priorities List" and is subject to the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

**2. Construct Air Pollution Control Units . . . . . 700,000**

This project provides for the construction of air pollution control devices and installation of emission monitoring systems at JPL facilities. These control and monitoring devices are required to comply with the air emission reduction requirements being incorporated as part of the South Coast Air Quality Management District air pollution control regulations. The work involves the addition of emission control devices to equipment based on results of compliance surveys, in order to control and reduce air pollutant emission levels and comply with current and pending Federal, state and local air quality regulations.

**D. Johnson Space Center (JSC) . . . . . \$550,000**

**1. Modify Photo Waste Treatment Facilities . . . . . 550,000**

This project provides modifications to the photographic waste treatment facilities at the Johnson Space Center. This project is needed to provide safe operations of the waste treatment and collection system and to bring JSC into compliance with pretreatment standards required under the Clean Water Act and the waste handling requirements of the Resource Conservation and Recovery Act.

**E. Kennedy Space Center (KSC) . . . . . \$2,500,000**

**1. Construct Corrosion Abatement Facility . . . . . 2,000,000**

This project provides for the construction of an abrasive blast and painting facility needed to bring KSC into compliance with the Clean Air Act (CAA), the Clean Water Act (CWA) and State of Florida regulations. The project includes construction of concrete pads to increase the serviceable area of the blast facilities covered spray paint areas office and sanitary facilities and equipment storage and staging facilities. The project will provide adequate blasting and painting facilities and satisfy the deficiencies found during State of Florida inspections.

**2. Industrial/LC-39 Areas PCB Transformer Retrofill . . . . . 500,000**

This project will continue the polychlorinated biphenyl (PCB) transformer retrofill in the industrial and launch complex 39 (LC-39) areas. This project involves the retrofill of approximately 25 transformers. Upon removal of the PCB containing oil, the transformers will be cleaned, flushed, and refilled with insulating oil which is PCB free. Continued use of the PCB transformers represents a significant potential hazard to human health, the environment, and for disruption of the Center's operations and schedules from leaks and/or fires. PCBs are regulated by the Toxic Substance Control Act.

**F. Langley Research Center (LaRC) . . . . . \$2,000,000**

**1. Remediation of PCB/PCT at Tabbs Creek . . . . . 2,000,000**

This project continues the remediation efforts for Tabbs Creek, contaminated with polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs). The Center is required to assess, investigate and verify, and remediate identified contamination. Tabbs Creek is located behind the Center and joins the Northwest Branch of Back River about a mile from the Center property line. Tabbs Creek is a tidal wetland and Back River is used for oyster harvesting. Chemicals were released into the creek from the Langley storm drain system. A Federal Facilities Compliance Agreement was signed with the Environmental Protection Agency (EPA). PCBs are regulated under the Toxic Substances Control Act (TSCA) and cleanup is regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). LaRC is proposed for listing on the EPA's National Priorities List (NPL).

**G. Lewis Research Center (LeRC) . . . . . \$3,450,000**

**1. Cleanup/Disposal of PCB at 10X10 Supersonic Wind Tunnel (SWT) . . . . . 850,000**

This project provides for the cleanup of polychlorinated biphenyl (PCB) contamination from capacitors located at the 10X10 SWT Substation. The work includes removal and replacement of contaminated concrete from capacitor cabinets pad, removal and disposal of PCB capacitors, cleanup of contamination in a cable tunnel, and remediation of contaminated soil in the vicinity of the capacitors. PCB contamination is regulated under Federal TSCA regulations.

**2. Remedial Investigation/Feasibility Study (RI/FS) for**

**Priority Project Management Units, Plum Brook Station . . . . . 2,600,000**

This study project provides for continuation of environmental studies to verify, assess, and remediate site contamination at the LeRC Plum Brook Station (PBS) located in Sandusky, Ohio. The facility was required by the Environmental Protection Agency (EPA) to perform site investigations in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requirements. This work continues the effort for preparation of work plans and conduct of an RI/FS according to priorities established by previous studies. The RI/FS will further investigate and assess contamination at prioritized project management units to identify and evaluate treatment options for remediation of these areas. This study project will be conducted following CERCLA requirements.

**H. Marshall Space Flight Center (MSFC) . . . . . \$5,700,000**

**1. RCRA Facility Investigation (RFI) . . . . . 3,000,000**

This project provides for work required for assessment, investigation and cleanup of sites with potential contamination as identified in the Preliminary Assessment (PA) by the Environmental Protection Agency (EPA) and MSFC. This project will finalize the investigations and begin the initial phase of the Resource Conservation and Recovery Act (RCRA) Corrective Measures Study for the sites and areas of concern determined to require remediation.

**2. Cleanup of Groundwater Contamination,**

**Santa Susana Field Laboratory (SSFL) . . . . . 1,000,000**

This project continues the assessment/cleanup and characterization of the groundwater and hydrogeologic regime currently under way at SSFL. Current results indicate a high level of trichloroethylene in the groundwater, which has been associated with rocket engine testing performed at SSFL by both NASA and the Air Force. The assessment/cleanup consists of well installations, sampling and analysis, and removal actions. This project is required to be in compliance with the Resource Conservation and Recovery Act (RCRA) and the regulations of the State of California.

**3. Cleanup of Solid Waste Management Units (SWMUs), SSFL . . . . . 700,000**

This project is the final component of the investigation, characterization, and assessment of the SWMUs identified by SSFL, the Environmental Protection Agency (EPA) and the state of California. The SWMUs involved in this investigation include NASA's Area II SWMUs and sites associated with rocket engine testing on Rocketdyne's Areas I and 111. This project will include the initiation of the Corrective Measures Study and involve a wide array of methodologies including soil boring, well installations, sampling and analysis, and soil removal.

**4. Remove and Replace Underground Storage Tanks . . . . . 1,000,000**  
 This project completes the program to replace the underground storage tanks (UST) at MSFC. This project will remove four 20,000 gallon USTs and install four 20,000 gallon above-ground tanks and accompanying structures. The new construction will meet legal requirements and provide equivalent capabilities. This project also provides for soil sampling, analysis, disposal and backfill of excavated areas. The USTs must be replaced to comply with Federal and State of Alabama regulations.

**I. Michoud Assembly Facility (MAF) . . . . . \$3,000,000**

**1. Modify Facilities for Air Emission Regulations . . . . . 2,000,000**  
 This project provides for installation, modification, and/or upgrades of air emission controls and monitoring equipment to buildings 131, 318, 114, 130, and 103. The work includes thermal oxidizer upgrades, vapor recovery system installations, routing emissions to existing treatment systems, and installation of monitoring/control devices for the epoxy spray booth. The emission controls and monitoring devices are needed to comply with Federal and State of Louisiana air toxic regulations.

**2. Consolidated Investigations, MAF . . . . . 1,000,000**  
 This project continues the remediation activities associated with the Solid Waste Management Units (SWMUs) identified during the Resource Conservation and Recovery Act (RCRA) facility investigation. The work includes the Corrective Measures Study which will identify, develop, evaluate alternatives (bench scale testing), and recommend response actions. This project is required by MAF's RCRA permit.

**J. Stennis Space Center (SSC) . . . . . \$1,000,000**

**1. Cleanup of the Herbicides/Pesticides Handling Area . . . . . 1,000,000**  
 This project provides for the remediation of contaminated soil and groundwater associated with SSC herbicide/pesticide handling facility (SWMUs 7 and 10). Work will include well installation; groundwater treatment; contaminated material removal and disposal; and backfill of any excavated areas. The project is required to comply with Federal and State of Mississippi regulations.

**K. White Sands Test Facility (WSTF) . . . . . \$1,000,000**

**1. Groundwater Contamination Assessment and Remediation . . . . . 1,000,000**  
 This project continues the ongoing groundwater assessment at WSTF. The project provides for report preparation, additional investigation and assessment, and technical support in defense of the long term solution WSTF will propose as a result of the seven year assessment. The reports, investigations and the final proposed solution are required by WSTF's RCRA 3008(h) consent order.

L. <u>Miscellaneous Projects Not in Excess of \$250,000 Each</u> . . . . .	<u>\$1,200,000</u>
M. <u>Remedial Investigations, Feasibility Studies, Assessments,</u> <u>Studies, Design, and Related Engineering</u> . . . . .	<u>\$6,500,000</u>
Total . . . . .	<u>\$35,000,000</u>

FUTURE CoE ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

Approximately \$40-\$50 million per year for the next few years is the current estimate for meeting Environmental Compliance and Restoration requirements. This figure will become better defined as studies are completed and remediation projects are reviewed by Federal, state and local regulators.

Inspector General

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSPECTOR GENERAL

FISCAL YEAR 1995 ESTIMATES

The NASA Office of Inspector General (OIG) budget request of \$16 million for FY 1995 is based primarily on 210 Full Time Equivalents (FTEs), the same staffing level as authorized in FY 1994. The personnel and related cost of the 210 FTEs represents approximately 92% of the total OIG budget request. This is the minimal staffing level that allows the OIG to effectively perform its legislated mission. At the requested level the OIG will: provide assistance and work cooperatively with Agency management as it carries out NASA's programs and operations; maintain a balanced audit program which includes providing technical assistance in the audit of the Agency's financial statement as required by the Chief Financial Officers (CFO) Act; and concentrate investigative resources on procurement fraud matters including emphasis on prevention initiatives. This budget level recognizes the fiscal constraints facing the Agency and the need for the OIG to provide quality products and services to meet all of our customers' needs.

As NASA establishes new priorities and modifies others for its programs and operations within proposed budget constraints, efforts are underway to reinvent the OIG. Throughout this process the OIG is increasing its cooperation with NASA management while assuring that the OIG's statutory independence is maintained. The OIG will continue to selectively concentrate staff resources on those programs and operations identified as the most critical and vulnerable to fraud and abuse based on funding levels, program needs, Congressional/Administration concerns and results of OIG research and findings.

The OIG's mission is to conduct audits and investigations of NASA's programs and operations working cooperatively with NASA management and program managers. Audits will be prioritized and selected to evaluate programmatic, operational and financial management concerns, problems, and vulnerabilities. The investigations program will remain focused on complex procurement fraud matters, criminal and noncriminal: fraud against the Government by contractor and government employees, product substitution, procurement irregularities, unethical and improper conduct, and waste and mismanagement. Investigative matters will be approached on a programmatic, priority basis to identify preventive initiatives.

OBJECTIVES AND STATUS

This request represents the resources (FTEs) needed at NASA Headquarters and the Field Offices to fulfill the OIG mission. Recognizing that the identified audit and investigative workload significantly exceeds the available resources, continuous adjustments of priorities will be necessary to ensure balanced coverage of

NASA's programs and operations is maintained, that critical and sensitive matters are promptly investigated. and that all OIG customers receive timely. accurate. and complete responses.

The OIG audit program sets priorities for internal and external audits to maximize the return on available audit resources. These priorities are established and contained in each major program area plan - Space Flight, Space Station, Space Science. Aeronautics, Mission to Planet Earth, Space Communications, Financial Management. Management Systems and Facilities. and Procurement. The OIG uses a formal. comprehensive process to identify, review. prioritize and select the audits to be performed.

The OIG audit workload and assignments are derived: (1) by working closely with management and program managers to determine programmatic concerns and vulnerabilities: (2) selecting audits using a structured internal audit universe encompassing NASA's programs and operations and an external universe comprised of NASA's prime contractors, their subcontractors and grantees: and (3) addressing issues required by laws and internal regulations. The audits identified from these sources are prioritized and compared to available resources and published in the required annual audit plan. The OIG will continue its implementation of the program manager concept to obtain greater visibility and awareness of issues related to NASA's major programs which will be included in the audit plan.

The defined audit workload far exceeds available staff which will require continuous adjustment of priorities to provide balanced coverage of programs and operations most vulnerable to abuse and mismanagement. Further, program/project change, growth, delay, and termination increase the need for OIG oversight of contractor/subcontractor/grantee cost, schedule and performance effectiveness. NASA's continued reliance on contractors and grantees (about 90% of the Agency's total obligations are for procurement) requires direct OIG audit work and oversight of Defense Contract Audit Agency (DCAA) and the Health and Human Services (HHS) OIG audits of NASA contractors and grantees to ensure effective contract and grant execution and administration. NASA was billed approximately \$18 million during FY 1993 for contract audit services.

The OIG will continue its implementation of the program manager concept to ensure visibility and awareness of major issues related to NASA's major programs/projects. During FY 1995 the OIG will focus attention and provide support to program managers on issues relating to: Space Station. Earth Observing System, Shuttle. Spacelab. Cassini, etc. The functional areas to be evaluated will include procurement and contract administration, technology transfer, financial management, information resources management, facilities and equipment and space science.

The OIG will continue to monitor and assess NASA's high risk areas, material weaknesses and areas of significant concern to ensure that corrective actions are implemented timely. Areas of emphasis will include: financial systems-accounting: procurement and environmental programs: institutional contracting practices: contract management: printing management: contractor-held property: contractor cost reporting:

allotment and budgetary controls: and financial reporting/general ledger. Financial management's significance increased with the passage of the CFO Act requiring the OIG to audit the Agency's annual financial statement to render an opinion on the statement, its internal control structure and compliance with laws and regulations. Our financial audits will concentrate on accounting controls, information systems and required performance measurements.

Agency vulnerabilities are determined by taking into consideration the following: whether program/project objectives are accomplished in the most cost effective manner: if NASA's more than \$1 billion annual expenditure on information technology is providing expected programmatic and financial information needed to make sound decisions (NASA is the top ranked civilian agency in information technology spending): management's actions to correct internal control weaknesses reported under the Federal Manager's Financial Integrity Act: improvements in financial management systems, practices, controls and information: effectiveness of the audit follow-up system in enabling management to maintain the status of corrective actions: completeness of safety and mission quality activities: and the adequacy of agency-wide corrective actions addressing environmental concerns. These identified vulnerabilities are then evaluated, prioritized and included in our plans for further action.

The OIG investigative workload of both criminal and noncriminal cases continues to exceed the availability of investigative resources. Continued growth in the investigative program has caused the OIG to be primarily reactive with emphasis given to the more serious criminal allegations. (Historically, criminal allegations represent about 85% of our total investigative caseload.) The FY 1995 investigative staffing level will enable and require OIG management to effectively manage the increasing and complex workload of both criminal and civil matters. As the number of complex procurement fraud cases continues to increase. and with such cases taking longer to resolve, our flexibility to improve and expand the program is reduced. Also, the increasing quantity of investigative allegations received requires a preliminary evaluation to determine their potential impact and, if serious. opening an investigation: further adversely affecting the timely completion of ongoing cases. We continue to work with management by referring the more routine administrative matters to them for their resolution. keeping the OIG advised of the action taken. The investigations program managers, like audit, are assessing the allegations and cases on a programmatic basis to determine the seriousness and impact to the programs meeting its objectives and the adverse financial impact.

In summary. the OIG will work collaboratively with Agency management to address issues of joint concern and to improve the scope. timeliness and thoroughness of it's oversight of NASA programs and operations, identify preventive measures, and enhance its capability to assist NASA management to efficiently and effectively achieve program/project goals and objectives.

INSPECTOR GENERAL

FISCAL YEAR 1995 ESTIMATES

BUDGET SUMMARY

	<u>FY 1993</u>	<u>FY 1994</u> (Thousands of dollars)	<u>FY 1995</u>	<u>Page Number</u>
I. Personnel & related costs...	13,292	14,176	14,735	IG 1-5
II. Travel .....	644	700	700	IG 1-7
III. Operation of installation.....	655	515	565	IG 1-8
A. Facilities services.....	(--)	(--)	(--)	
B. Technical services.....	(566)	(335)	(355)	
C. Management & operations.....	<u>(89)</u>	<u>(180)</u>	<u>(210)</u>	
Total .....	<u>14,591</u>	<u>15,391</u>	<u>16,000</u>	

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
Full-time permanents .....	204	200	200
Other controlled FTE's.....	<u>10</u>	<u>10</u>	<u>10</u>
Total .....	214	210	210

BASIS OF FY 1995 FUNDING REQUIREMENT

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
		(Thousands of dollars)	
I. Personnel & related costs.....	<u>13,292</u>	<u>14,176</u>	<u>14,735</u>
A. <u>Compensation &amp; benefits</u>			
1. Compensation			
a. Full-time permanent.....	10,254	10,877	11,356
b. Other than full-time permanent...	308	325	340
c. Overtime & other compensation....	<u>218</u>	<u>250</u>	<u>250</u>
Subtotal compensation.....	10,780	11,452	11,946
2. Benefits			
Contributions by category:			
Retirement fund & thrift plan.....	1,270	1,358	1,382
Employee life insurance.....	20	21	22
Employee health insurance.....	462	495	505
Workmen's compensation.....	--	--	--
FICA.....	235	250	265
Medicare.....	<u>157</u>	<u>165</u>	<u>180</u>
Subtotal benefits.....	2,144	2,289	2,354
Subtotal compensation & benefits.....	12,924	13,741	14,300

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
		(Thousands of dollars)	
B. <u>Supporting costs</u>			
1. Transfer of personnel.....	238	275	275
2. Personnel training.....	130	150	150
3. OPM services.....	<u>--</u>	<u>10</u>	<u>10</u>
Subtotal supporting costs.....	368	435	435

**BASIS OF FY 1995 ESTIMATE**

In FY 1995 the compensation cost of permanent workyears is estimated to be **\$11,356,000**. The increase from FY 1994 results from the cost changes in FY 1995 for locality pay, within-grade and career advances of **\$479,000**.

The costs associated with transfer of personnel include movement of household goods, subsistence and temporary expenses, and real estate and miscellaneous moving expenses related to change of duty station.

The maintenance and expansion of skills through various training and educational activities is essential in carrying out the Inspector General's mission. Part of the training consists of courses offered by other Government agencies, usually for a fee. The remainder of the training is provided through non-government sources. The costs are for tuition, fees, and related costs for training at colleges, universities and technical institutions, and also to cover the costs associated with seminars and workshops. Training funds are necessary not only for routine training, but also to fund training mandated by the General Accounting Office (GAO) audit standards and training for Financial Management Audits.

The cost associated with the Office of Personnel Management's (OPM) investigation of new hires at for the Office of Inspector General are included here (NASA Headquarters only). In FY 1993 NASA OIG conducted investigations of new hires due to a backlog at OPM. however, OPM will conduct these investigations in FY 1994 and FY 1995.

BASIS OF FY 1995 FUNDING REQUIREMENT

		<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
			(Thousands of dollars)	
II	Travel	.....	<u>644</u>	<u>700</u>

BASIS OF FY 1995 ESTIMATE

Travel funding is required to carry out audit, investigation and management duties. Per diem, airline costs, and workloads have all increased, however, we are maintaining our travel request at the FY 1994 level.

BASIS OF FY 1995 FUNDING REQUIREMENT

	<u>FY 1993</u>	<u>FY 1994</u> (Thousands of dollars)	<u>FY 1995</u>
III. Operation of installation.....	<u>655</u>	<u>515</u>	<u>565</u>
A. Facilities services.....	--	--	--
B. Technical services.....	566	335	355
C. Management and operations			
1. Administravtive communications....	--	--	--
2. Printing and reproduction.....	--	--	--
3. Installation common services.....	<u>89</u>	<u>180</u>	<u>210</u>
Subtotal management and operations.....	89	180	210

BASIS OF FY 1995 ESTIMATE

Operation of Installation provides a broad range of services and equipment in support of the Inspector General's activities.

The technical services estimate provides for all OIG equipment, including the lease, purchase, maintenance, programming and operations services of electronic data processing (EDP) equipment. The NASA provides a common services item such as office space, communications, some supplies, and printing and reproduction at no charge to the Office of Inspector General. The funding for technical services will cover the cost of upgrading the EDP equipment, replacing equipment that has become outdated or unserviceable, and the initial costs of installing a new nationwide network.

Included in the installation common services estimate are the General Services Administration (GSA) cars, miscellaneous expenses, contracts, and supplies not provided by NASA. The increase will primarily allow for additional supply costs and miscellaneous small contracts.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

OFFICE OF INSPECTOR GENERAL

WORKLOAD

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>
<u>Office Staff Ceilings</u>			
Full-Time Permanents.....	2 14	210	2 10
<u>Investigations</u>			
Cases pending beginning of year.....	330	416	447
Opened during year.....	539	465	473
Closed during year.....	453	434	448
Cases pending end of year... ..	416	447	472
<u>Audits</u>			
Audits pending beginning of year.....	74	72	75
Opened during year.....	69	• 65	* 65
Closed during year.....	71	62	63
Audits pending end of year.....	72	75	77

\*Instituting emphasis on programmatic audits

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

OFFICE OF INSPECTOR GENERAL

For necessary expenses of the ~~Office~~ of the Inspector General in carrying out the provisions of the Inspector General Act of 1978, as amended, [~~\$15,391,000~~] *\$16,000,000*, to remain available until September 30, 1996. (*Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 1994.*)

**DATE DUE**

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United States. National  
Aeronautics and Space

Budget estimates