National Aeronautics and
Space Administration

# Budget Estimates

## Fiscal Year
## 1994

### Volume II
### Construction of Facilities

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

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Summary
Information

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 1994 BUDGET ESTIMATES
CONSTRUCTION OF FACILITIES
GENERAL STATEMENT

The Construction of Facilities (CoF) appropriation provides contractual services for the repair, rehabilitation, and modification of existing facilities; the construction of new facilities and the acquisition of related collateral equipment; the acquisition or condemnation of real property; environmental compliance and restoration activities; the design of facilities projects; and advanced planning related to future facilities needs.

The funds requested for FY 1994 provide for continuing prior year endeavors to meet facilities requirements for the Advanced Solid Rocket Motor Program, and the modernization of the Ames Unitary Plan Wind Tunnel Complex; construction of additional facilities for the Earth Observing System (EOS) Program at Goddard Space Flight Center and Langley Research Center; construction of a 34-meter antenna at Goldstone, California, to start the second 34-meter beam waveguide subnet needed to support the mission set in the late 1990's; repair, rehabilitation, and modification of other facilities to restore, upgrade, and improve the usefulness of the NASA physical plant; minor construction of new facilities, facility planning and design activities; and environmental compliance and restoration. Also included is funding to continue the National Aeronautics Facilities Upgrade Program to improve the United States' aeronautics facilities capability so that we can enhance our competitive advantage in world aeronautics markets. This effort was initiated with $25 million provided by the Congress in FY 1993 for the high speed civil transport initiative and augmented by the new technology investment package.

The projects and amounts in the budget estimates reflect EOS, Space Communications, and Space Flight facilities requirements that are time-sensitive to meet specific program objectives. Other program requirements for FY 1994 include projects to restore, upgrade, and modernize existing facilities which have reached or exceeded the end of their normal design life. These facilities are critical to the development and operation of space transportation systems, payloads, and launches as well as our aeronautical and aerospace testing capabilities to support military and private industry users. In addition to the National Aeronautics Facilities Upgrade Program, projects to restore and/or upgrade heating, cooling, communication, control, and electrical distribution systems at Ames, Goddard, Jet Propulsion Laboratory, Johnson Space Center, Kennedy Space Center, Marshall Space Flight Center, Michoud Assembly Facility, and Stennis Space Center are included. Also included are

projects at Kennedy to upgrade the Firex systems at Launch Complexes 39A and 39B to provide the proper pressure classifications and to rehabilitate the fire alarm system in the Industrial Area. Projects at Marshall and Stennis restore high pressure air and gas capacity and high pressure industrial water systems to critical testing facilities. The National Full-scale Aerodynamic Complex at Ames will be upgraded to increase testing capabilities and the deteriorated Rocket Engine Test Facility at Lewis Research Center will be rehabilitated and modernized to improve reliability and productivity in space propulsion technology programs testing through decreased downtime for breakdowns and maintenance. The airfield at Wallops will be restored and Kennedy's Class III landfill capacity will be restored to accommodate the disposal of non-hazardous debris.

The FY 1994 program continues to meet the objectives of preserving and enhancing the capabilities and usefulness of existing facilities and ensuring 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 repair program restores facilities to a condition substantially equivalent to their originally designed capability. The minor construction program continues to provide a means to accomplish smaller facility projects which accommodate changes in technical and institutional requirements. The environmental compliance and restoration program ensures that statutory environmental requirements are met and any 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 1994 is $545,300,000, with estimated outlays of $540,197,000.

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

## PROPOSED APPROPRIATION LANGUAGE

### CONSTRUCTION OF FACILITIES

For construction, repair, rehabilitation and modification of facilities, minor construction of new facilities and additionu to existing facilities, and for facility planning and design not otherwise provided. for the National Aeronautics and Space Administration. and for the acquisition or condemnation of real property, as authorized by law, [$525,000,000] *$545,900,000* to remain available until September 30, [1995] *1996*: *Provided*, That, notwithstanding the limitation on the availability of funds appropriated under this heading by this appropriations Act, when any activity has been initiated by the incurrence of obligations therefor, the amount available for such activity shall remain available until expended, except that this provision shall not apply to the amounts appropriated pursuant to the authorization for repair. rehabilitation and modification of facilities, minor construction of new facilities and additions to existing facilities, and facility planning and design: ***Provided further,*** That no amount appropriated pursuant to this or any other Act may be used for the lease or construction of a new contractor-funded facility for exclusive use in support of a contract or contracts with the National Aeronautics and Space Administration under which the Administration would be required to substantially amortize through payment or reimbursement such contractor investment, unless an appropriations Act specifies the lease or contract pursuant to which such facilities are to be constructed or leased or such facility is otherwise identified in such Act: ***Provided further,*** That the Administrator may authorize such facility lease or construction. if he determines. in consultation with the Committees on Appropriations, that deferral of such action until the enactment of the next appropriations Act would be inconsistent with the interest of the Nation in aeronautical and space activities. *(Departments of Veterans Affairs and Housing and Urban Development. and Independent Agencies Appropriations Act. 1993.1*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY OF THE BUDGET PLAN BY LOCATION
(Thousands of Dollars)

| LOCATION | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request |
|---|---|---|---|
| Space Station Freedom Facilities | 35,000 | 13,800 | --- |
| Space Flight Facilities | 168,120 | 193,400 | 88,000 |
| Lyndon B. Johnson Space Center | 7,000 | 4,000 | 2,200 |
| John F. Kennedy Space Center | 6,700 | --- | 1,900 |
| George C. Marshall Space Flight Center | 5,200 | --- | 2,600 |
| John C. Stennis Space Center | --- | 2,200 | 3,800 |
| Goddard Space Flight Center | 23,500 | 19,800 | 25,600 |
| Jet Propulsion Laboratory | 5,500 | --- | 2,900 |
| Wallops Flight Facility | 3,500 | --- | 5,200 |
| Aeronautical Facilities at Various Facilities | 48,300 | 64,800 | 212,000 |
| Langley Research Center. | --- | --- | 8,000 |
| Lewis Research center.. | --- | --- | 12,500 |
| various Locati | 10,600 | 33,800 | 17,600 |
| Repair. | 31.700 | 31,900 | 36,000 |
| Rehabilitation and Modification | 34m | 34,000 | 36,000 |
| Minor Construction | 12,900 | 14,000 | 14,000 |
| Facility Planning and Design | 27,880 | 23,300 | 27,000 |
| Delta College | --- | 8,000 | --- |
| Deferred Rehabilitation and Major Maintenance | 11,800 | --- | --- |
| Classroom of the Future | 6,000 | --- | --- |
| Consortium for International Earth Science Information Network (CIESIN). | 3,400 | 42,000 | --- |
| National Technology Transfer Center | 13,500 | --- | --- |
| Christopher Columbus center of Marine Research and Exploration | 20,000 | --- | --- |
| Independent Software Validation and Verification Facility. | 10,000 | --- | --- |
| Space Dynamics Laboratory | 10,000 | --- | --- |
| Environmental Compliance and Restoration | 36,000 | 40,000 | 50,000 |
| Total Plan | 531,400 | 525,000 | 545,300 |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY OF THE BUDGET PLAN BY COGNIZANT OFFICE
(Thousands of Dollars)

| OFFICE | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request |
|---|---|---|---|
| Space Systems Development | 45,000 | 13,800 | --- |
| Space Flight | 181,820 | 199,600 | 98,500 |
| Space Science | 22,200 | 2,000 | 2,900 |
| Mission To Planet Earth | 33,800 | 61,800 | 38,800 |
| ti | 48,300 | 64,800 | 212,000 |
| Mvanced Concepts and Technology | 13,500 | --- | 12,500 |
| Human Resources and Education | 6,000 | 8,000 | --- |
| Space Communications | 5,700 | 31,800 | 17,600 |
| Management systems and Facilities | 175,080 | 143,200 | 163,000 |
| Total Plan | 531,400 | 525,000 | 545,300 |

SUMMARY OF THE BUDGET PLAN BY SUBFUNCTION
(Thousands of Dollars)

| Code | | | | |
|---|---|---|---|---|
| 252 | Space Flight, Research, and Supporting Activites | 483,100 | 460,200 | 333,300 |
| 402 | Air Transportation | 48,300 | 64,800 | 212,000 |
| | Total Plan | 531,400 | 525,000 | 545,300 |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES
BUDGET PLAN BY LOCATION AND PROJECT

(Thousands of Dollars)

| CO | BA | SF | INSTALLATION AND PROJECT | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request | Page No. |
|---|---|---|---|---|---|---|---|
| | | | SPACE STATION FREEDOM FACILITIES AT VARIOUS LOCATIONS: | 35,000 | 13,800 | --- | |
| SSD | 1252 | | Construction of Space Station Processing Facility (E.) | 35,000 | 12,000 | --- | |
| SSD | 1252 | | Modifications for Payload operations Integration Center (MSFC) | --- | 1,800 | --- | |
| | | | SPACE FLIGHT FACILITIES AT VARIOUS LOCATIONS: | 168,120 | 193,400 | 88,000 | |
| SF | 1252 | | Replace Mission Control Center Air Handlers (JSC) | --- | --- | 8,000 | CF 1-1 |
| SF | 1252 | | Replace Thermal Vacuum Helium Refrigeration Systems (JSC) | --- | --- | 7,400 | CF 1-5 |
| SF | 1252 | | Modify Launch Complex 39 Exterior Utility Piping (KSC) | --- | --- | 1,200 | CF 1-10 |
| SF | 1252 | | Refurbish Launch Complex 39 Cooling system (KSC) | --- | --- | 4,000 | CF 1-13 |
| SF | 1252 | | Refurbish Launch complex 39 Secondary Circuit Breakers (KSC) | --- | --- | 3,300 | CF 1-16 |
| SF | 1252 | | Refurbish Vehicle Assembly Building/Pad Water Storage Tanks (KSC) | --- | --- | 3,000 | CF 1-19 |
| SF | 1252 | | Rehabilitate Industrial Area Fire Alarm Reporting System (KSC) | --- | --- | 4,900 | CF 1-22 |
| SF | 1252 | | Restore C-5 Substation, Launch Complex 39 Area (KSC) | --- | --- | 5,000 | CF 1-25 |
| SF | 1252 | | Restoration of High Pressure Air Compressor System (MSFC) | --- | --- | 8,500 | CF 1-28 |
| SF | 1252 | | Repair Decking and Roof, X-Ray and Staging Facility (MAF) | --- | --- | 1,500 | CF 1-31 |
| SF | 1252 | | Replace Cooling Tower and Boiler (MAF) | --- | --- | 4,000 | CF 1-34 |
| SF | 1252 | | Restore SSME Test Complex High Pressure Industrial Water System (SSC) | --- | --- | 2,300 | CF 1-38 |
| SF | 1252 | | Replace Aircraft Operations support Facilities (JSC) | --- | 1,600 | --- | |
| SF | 1252 | | Modify Electrical and Mechanical Systems, Utility Annex (KSC) | --- | 4,400 | --- | |
| SF | 1252 | | Rehabilitate Explosive Safe Area-60 High Bays support Systems (KSC) | --- | 2,000 | --- | |
| SF | 1252 | | Rehabilitate LC-39 Area Fire Alarm Reporting System (KSC) | --- | 4,300 | --- | |
| SF | 1252 | | Replace Boiler House Components (MAF) | --- | 2,300 | --- | |
| SF | 1252 | | Restoration of Information and Electronic Systems Laboratory (MSFC) | --- | 5,000 | --- | |
| SF | 1252 | | Restore High Pressure Gas storage Capacity (SSC) | --- | 6,800 | 2,300 | CF 1-41 |
| SF | 1252 | | Construction of Addition for Flight Training and Operations (JSC) | 8,000 | --- | --- | |
| SF | 1252 | | Modification for Earthquake Protection, Downey, CA (JSC) | 4,400 | --- | --- | |
| SF | 1252 | | Rehabilitation of Crawlerway (KSC) | 3,000 | 2,000 | --- | |
| SF | 1252 | | Restoration of Shuttle Landing Facility Shoulders (KSC) | 2,720 | --- | --- | |
| SF | 1252 | | Construction of Advanced Solid Rocket Motor Program Facilities (Various Locations) | 150,000 | 165,000 | 32,600 | CF 1-44 |

SUM 6

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES
BUDGET PLAN BY LOCATION AND PROJECT

(Thousands of Dollars)

| CO | BA | SF | INSTALLATION AND PROJECT | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request | Page No. |
|---|---|---|---|---|---|---|---|
| | | | LYNDON B. JOE " SPACE CENTER | 7,000 | 4,000 | 2,200 | |
| SF | 7 | 252 | Rehabilitate Electrical Distribution System, Project Management Building | --- | --- | 2,200 | CF 2-1 |
| SF | 7 | 252 | Repair Site Water System, White sands Test Facility | 1,300 | --- | --- | |
| SF | 7 | 252 | Replace Central Plant Chilled Water Equipment | 5,700 | 4,000 | --- | |
| | | | JOHN F. KENNEDY SPACE CENTER | 6,700 | --- | 1,900 | |
| SF | 7 | 252 | Restore Class 111 Landfill. | --- | --- | 1,900 | CF 3-1 |
| SF | 7 | 252 | Rehabilitation and Expansion of Communications Duct Banks | 1,400 | --- | --- | |
| SF | 7 | 252 | Modernization of Industrial Area Chilled Water System | 4,000 | --- | --- | |
| SF | 7 | 252 | Replace 15 KV Load Break Switches. | 1,300 | --- | --- | |
| | | | MARSHALL SPACE FLIGHT CENTER | 5,200 | --- | 2,600 | |
| SF | 7 | 252 | Restoration of Electrical Power System | --- | --- | 2,600 | CF 4-1 |
| SS | 2 | 252 | Modifications to X-Ray Calibration Facility (XRCF). | 5,200 | --- | --- | |
| | | | JOHN C. STENNIS SPACE CENTER | --- | 2,200 | 3,800 | |
| SF | 7 | 252 | Restoration of Underground Communication Distribution %stem | --- | 2,200 | 3,800 | CF 5-1 |
| | | | GODDARD SPACE FLIGHT CENTER | 23,500 | 19,800 | 25,600 | |
| MTPE | 3 | 252 | Construction of Earth systems Science Building | --- | --- | 12,000 | CF 6-1 |
| MTPE | 7 | 252 | Replacement of Central Plant Steam and Electrical Generation Equipment.. | --- | --- | 8,600 | CF 6-5 |
| MTPE | 7 | 252 | Restoration and Modernization of Chilled Water System | --- | --- | 5,000 | CF 6-11 |
| MTPE | 7 | 252 | Restoration/Modernization of Electrical Distribution system | --- | 4,500 | --- | |
| MTPE | 7 | 252 | Restoration and Modernization of High Voltage Distribution System | 5,000 | --- | --- | |
| MTPE | 3 | 252 | Construction of Earth Observing System Data Information System (EOSDIS) Facility | 17,000 | 15,300 | --- | |
| SS | 2 | 252 | Construct Additional Support Facilities in Spacecraft Systems Development/Integration Facility.. | 1,500 | --- | --- | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES
BUDGET PLAN BY LOCATION AND PROJECT

(Thousands of Dollars)

| CO | BA | SF | INSTALLATION AND PROJECT | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request | Page No. |
|---|---|---|---|---|---|---|---|
| | | | JET PROPULSION LABORATORY | 5,500 | --- | 2,900 | |
| SS | 7 | 252 | Modifications to Cooling Systems, Various Buildings | --- | --- | 2,900 | CF 7-1 |
| SS | 7 | 252 | Modernization of Main Electrical Substation | 5,500 | --- | --- | |
| | | | VALLOPS FLIGHT FACILITY | 3,500 | --- | 5,200 | |
| MTPE | 7 | 252 | Restoration of Airfield | --- | --- | 5,200 | CF 8-1 |
| MTPE | 7 | 252 | Restoration of Utilities | 3,500 | --- | --- | |
| | | | AERONAUTICAL FACILITIES AT VARIOUS LOCATIONS: | 48,300 | 64,800 | 212,000 | |
| A | 5 | 402 | National Aeronautics Facilities Upgrade Program (Various Locations) | --- | 25,000 | 181,000 | CF 9A-1 |
| | | | Aeronautical Facilities Revitalization | 48,300 | 39,800 | 31,000 | |
| A | | 5402 | Rehabilitation of Control Systems, National Full-scale Aerodynamics Complex (ARC) | --- | --- | (2,100) | CF 9B-1 |
| A | | 5402 | Upgrade of Outdoor Aerodynamic Research Facility (ARC) | --- | --- | (3,900) | CF 9B-6 |
| A | | 5402 | Modernization of the unitary Plan Wind Tunnel Complex (ARC) | --- | (8,000) | (25,000) | CF 9B-11 |
| A | | 5402 | Modernization of 16-Foot Transonic Tunnel (LaRC) | (3,400) | --- | --- | |
| A | | 5402 | Modifications to 14 by 22-Foot Subsonic Wind Tunnel (LaRC) | --- | (2,200) | --- | |
| A | | 5402 | Rehabilitation of Icing Research Tunnel (LeRC) | (2,600) | --- | --- | |
| A | | 5402 | Repair and Modernization of the 12-Foot Pressure Vind Tunnel (ARC) | (25,000) | (17,400) | --- | |
| A | 5 | 402 | Modifications to the High Pressure Air System (LaRC) | (11,700) | --- | --- | |
| A | | 5402 | Rehabilitatim of Central Air System (LeRC) | (5,600) | (12,200) | --- | |
| | | | LANGLEY RESEARCH CENTER | --- | --- | 8,000 | |
| MTPE | 3 | 252 | Construction of EOSDIS Distributed Active Archive Center (DAAC) | --- | --- | 8,000 | CF 10-1 |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES
BUDGET PLAN BY LOCATION AND PROJECT

(Thousands of Dollars)

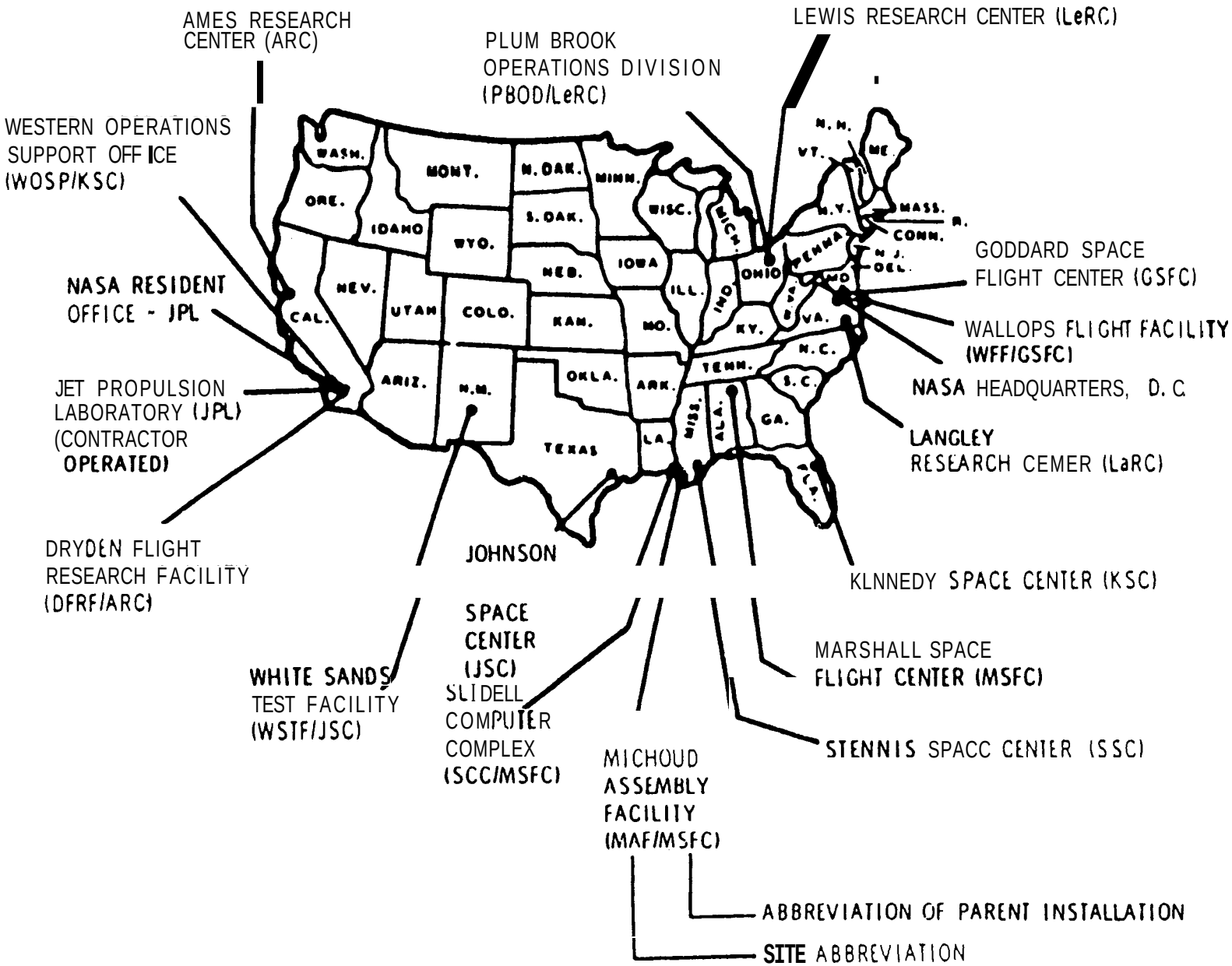
| CO | BA | SF | INSTALLATION AND PROJECT | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request | Page No. |
|---|---|---|---|---|---|---|---|
| | | | LEWIS RESEARCH CENTER | --- | --- | 12,500 | |
| ACT | 4 | 252 | Rehabilitation of Rocket Engine Test Facility | --- | --- | 12,500 | CF 11-1 |
| | | | VARIOUS LOCATIONS | 10,600 | 33,800 | 17,600 | |
| SC | 7 | 252 | Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) | --- | --- | 17,600 | CF 12-1 |
| SC | 7 | 252 | Construction of 34-Meter Miltifrequency Antenna, Canberra, Australia (JPL) | --- | 15,600 | --- | |
| SC | 7 | 252 | Construction of 34-Meter Multifrequency Antenna, Madrid, Spain (JPL) | --- | 16,200 | --- | |
| SS | 2 | 252 | Restoration and Modernization of Infrared Telescope Facility Mauna Kea | --- | 2,000 | --- | |
| SC | 7 | 252 | Rehabilitation of Tracking and Rata Relay Satellite System (TDRSS) Ground Terminal, White sands Test Facility, NM | 5,700 | --- | --- | |
| MTPE | 3 | 252 | Construct Rata Interface Facility, WSTF | 4,900 | --- | --- | |
| MSF | | 7252 | REPAIR OF FACILITIES AT VARIOUS LOCATIONS, NOT IN EXCESS OF $1,000,000 PER PROJECT | 31,700 | 31,900 | 36,000 | CF 13-1 |
| MSF | | 7252 | REHABILITATION AND MODIFICATION OF FACILITIES AT VARIOUS LOCATIONS NOT IN EXCESS OF $1,000,000 PER PROJECT | 34,800 | 34,000 | 36,000 | CF 14-1 |
| MSF | | 7252 | MINOR CONSTRUCTION OF NEW FACILITIES AND ADDITIONS TO EXISTING FACILITIES AT VARIOUS LOCATIONS, NOT IN EXCESS OF $750,000 PER PROJECT | 12,900 | 14,000 | 14,000 | CF 15-1 |
| MSF | 7 | 252 | FACILITY PLANNING AND DESIGN | 27,880 | 23,300 | 27,000 | CF 16-1 |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES
BUDGET PLAN BY LOCATION AND PROJECT

(Thousands of Dollars)

| CO | BA | SF | INSTALLATION AND PROJECT | Fiscal Year 1992 | Fiscal Year 1993 | Fiscal Year 1994 Agency Request | Page No. |
|---|---|---|---|---|---|---|---|
| HRE | 3 | 252 | DELTA COLLEGE | --- | 8,000 | --- | |
| MSF | 7 | 252 | DEFERRED REHABILITATION AND MAJOR MAINTENANCE | 11,800 | --- | --- | |
| HRE | 3 | 252 | CLASSROOM OF THE FUTURE | 6,000 | --- | --- | |
| MTPE | 3 | 252 | CONSORTIUM FOR INTERNATIONAL EARTH SCIENCE INFORMATION NETWORK (CIESIN) | 3,400 | 42,000 | --- | |
| ACT | 3 | 252 | NATIONAL TECHNOLOGY TRANSFER CENTER | 13,500 | --- | --- | |
| MSF | 7 | 252 | CHRISTOPHER COLUMBUS CENTER OF MARINE RESEARCH AND EXPLORATION | 20,000 | --- | --- | |
| SSD | 1 | 252 | INDEPENDENT SOFTWARE VALIDATION AND VERIFICATION FACILITY | 10,000 | --- | --- | |
| SS | 2 | 252 | SPACE DYNAMICS LABORATORY | 10,000 | --- | --- | |
| | | | S U B T O T A L , CONSTRUCTION | 495,400 | 485,000 | 495,300 | |
| MSF | 7 | 252 | ENVIRONMENTAL COMPLIANCE AND RESTORATION PROGRAM | 36,000 | 40,000 | 50,000 | CF 17-1 |
| | | | T O T A L , CONSTRUCTION OF FACILITIES | 531,400 | 525,000 | 545,300 | |

# LOCATION OF MAJOR AND COMPONENT INSTALLATIONS



**RECORDED VALUE OF CAPITAL TYPE PROPERTY**
**IN-HOUSE AND CONTRACTOR-HELD**
**AS OF SEPTEMBER 30, 1992**
**(DOLLARS IN THOUSANDS)**

| REPORTING INSTALLATION | LAND | BUILDING | OTHER STRUCTURES AND FACILITIES | LEASEHOLD IMPROVEMENTS | TOTAL | EQUIPMENT | FIXED ASSETS IN PROGRESS | GRAND TOTAL |
|---|---|---|---|---|---|---|---|---|
| **AMES RESEARCH CENTER** | 2,929 | 574,152 | 39,700 | 0 | 616,781 | 417,041 | 231,434 | 1,265,256 |
| ARC MOFFETT FIELD, CA | 2,928 | 517,404 | 18,601 | 0 | 538,933 | 318,304 | 221,979 | 1,079,216 |
| DRYDEN FLIGHT FACILITY EDWARDS, CA | 0 | 56,052 | 20,752 | 0 | 76,804 | 94,050 | 9,455 | 180,309 |
| VARIOUS LOCATIONS | 1 | 696 | 347 | 0 | 1,044 | 4,687 | 0 | 5,731 |
| **GODDARD SPACE FLIGHT CENTER** | 3,096 | 267,094 | 128,470 | 11 | 398,671 | 570,252 | 73,987 | 1,042,910 |
| [illegible], MD | 1,577 | 174,298 | 25,185 | 0 | 201,050 | 282,437 | 39,392 | 522,879 |
| TRACKING STATIONS NETWORK | 5 | 38,683 | 23,153 | 0 | 61,841 | 102,865 | 19,323 | 184,049 |
| WFF-WALLOPS ISLAND, VA | 1,514 | 53,172 | 75,923 | 0 | 130,609 | 71,025 | 15,272 | 216,906 |
| VARIOUS LOCATIONS | 0 | 951 | 4,209 | 11 | 5,171 | 113,905 | 0 | 119,076 |
| **JET PROPULSION LABORATORY** | 1,168 | 180,630 | 114,333 | 1,096 | 297,247 | 373,403 | 56,186 | 728,836 |
| JPL PASADENA, CA | 1,168 | 180,630 | 114,333 | 1,096 | 297247 | 373,403 | 56,186 | 728,836 |
| **JOHNSON SPACE CENTER** | 11,238 | 297,914 | 105,789 | 105 | 415,026 | 670,681 | 26,223 | 1,112,140 |
| JSC-HOUSTON, TX | 7,291 | 248,781 | 8.575 | 0 | 325,647 | 423,542 | 26,223 | 775,412 |
| WHITE SANDS TEST FACILITY LOS CRUCES, NM | 377 | 14,909 | 30,331 | 105 | 45,722 | 26,901 | 0 | 72,623 |
| VARIOUS LOCATIONS | 3,510 | 34224 | 5,863 | 0 | 43,657 | 220,448 | 0 | 264,105 |
| **KENNEDY SPACE CENTER** | 71,345 | 601,650 | 535,505 | 0 | 1,208,500 | 4,596,904 | 103,818 | 5,909,222 |
| KSC-CAPE CANAVERAL, FL | 71,345 | 601,650 | 535,505 | 0 | 1,208,500 | 3,837,832 | 103.618 | 5,149,950 |
| WESTERN TEST RANGE, LOMPAC, CA | 0 | 0 | 0 | 0 | 0 | 2,729 | 0 | 2,729 |
| VARIOUS LOCATIONS | 0 | 0 | 0 | 0 | 0 | 756,543 | 0 | 756,543 |
| **LANGLEY RESEARCH CENTER** | 156 | 226,670 | 438,879 | 0 | 665,705 | 305,673 | 42,661 | 1,014,039 |
| LARC-HAMPTON, VA | 156 | 226,670 | 438,879 | 0 | 665,705 | 290,441 | 42,661 | 998,807 |
| VARIOUS LOCATIONS | 0 | 0 | 0 | 0 | 0 | 15,232 | 0 | 15,232 |
| **LEWIS RESEARCH CENTER** | 2,821 | 291,966 | 110,702 | 136 | 405,445 | 246,020 | 58,549 | 710,014 |
| LERC-CLEVELAND, OH | 316 | 214,836 | 91,493 | 136 | 306,781 | 153,642 | 58,549 | 518.972 |
| PLUMBROOK, SANDUSKY, OH | 2,505 | 77.150 | 19,082 | 0 | 96,517 | 79,693 | 0 | 176210 |
| VARIOUS LOCATIONS | 0 | 0 | 147 | 0 | 147 | 12,685 | 0 | 12,832 |
| **MARSHALL SPACE FLIGHT CENTER** | 11,060 | 342,013 | 198,821 | 0 | 551,727 | 783,945 | 10,216 | 1,345,890 |
| MSFC-HUNTSVILLE, AL | 0 | 168,562 | 98,205 | 0 | 266,767 | 41.797 | 10,218 | 698,782 |
| MICHOUD ASSEMBLY FACILITY, LA | 7,162 | 161,909 | 86,654 | 0 | 255,725 | 73.791 | 0 | 329,516 |
| SLIDELL COMPUTER COMPLEX, LA | 69 | 5,253 | 3,155 | 0 | 8.477 | 15,204 | 0 | 23,661 |
| VARIOUS LOCATIONS | 3,862 | 6,289 | 10.607 | 0 | 20,758 | 273.153 | 0 | 293,911 |
| **STENNIS SPACE CENTER** | 18,061 | 117,922 | 233,018 | 0 | 368,999 | 40,376 | 29,715 | 439,092 |
| STENNIS SPACE CENTER | 18.061 | 117,922 | 233,018 | 0 | 368,999 | 40,376 | 29,715 | 439,092 |
| VARIOUS LOCATIONS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **NASA HEADQUARTERS** | 0 | 0 | 0 | 0 | 0 | 65,301 | 0 | 65,301 |
| NASA-HQS, WASH, DC | 0 | 0 | 0 | 0 | 0 | 42,195 | 0 | 42,195 |
| VARIOUS LOCATIONS | 0 | 0 | 0 | 0 | 0 | 23,106 | 0 | 23,106 |
| **AGENCY TOTAL** | 121,727 | 2,999,831 | 1,994,995 | 1,349 | 4,928,101 | 8,669,888 | 634,791 | 13,832,780 |

Project
Justification by
Location

Space Flight
Facilities

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

SPACE FLIGHT FACILITIES

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Space Flight:** | | |
| Replace Mission Control Center Air Handlers, Johnson Space Center | 8,000,000 | CF 1-1 |
| Replace Thermal Vacuum Helium Refrigeration Systems, Johnson Space Center.. | 7,400,000 | CF 1-5 |
| Modidify Launch Complex 39 Exterior Utility Piping, Kennedy Space Center | 1,200,000 | CF 1-10 |
| Refurbish Launch Complex 39 Cooling System, Kennedy Space Center.. | 4,000,000 | CF 1-13 |
| Refurbish Launch Complex 39 Secondary Circuit Breakers, Kennedy Space Center | 3,300,000 | CF 1-16 |
| Refurbish Vehicle Assembly Building/Pad Water Storage Tanks, Kennedy Space Center | 3,000,000 | CF 1-19 |
| Rehabilitate Industrial Area Fire Alarm Reporting System, Kennedy Space Center | 4,900,000 | CF 1-22 |
| Restore C-5 Substation, Launch Complex 39 Area, Kennedy Space Center | 5,000,000 | CF 1-25 |
| Restoration of High Pressure Air Compressor System, Marshall space Flight Center | 8,500,000 | CF 1-28 |
| Repair Decking and Roof, X-Ray and Staging Facility, Michoud Assembly Facility | 1,500,000 | CF 1-31 |
| Replace Cooling Tower and Boiler, Michoud Assembly Facility | 4,000,000 | CF 1-34 |
| Restore SSME Test Complex High Pressure Industrial Water System, Stennis Space Center | 2,300,000 | CF 1-38 |
| Restore High Pressure Gas Storage Capacity, Stermis Space Center | 2,300,000 | CF 1-41 |
| Construction of Advanced Solid Rocket Motor Program Facilities, Various Locations | 32,600,000 | CF 1-44 |
| Total... | 88,000,000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Replace Mission Control Center Air Handlers

INSTALLATION: Lyndon B. Johnson Space Center

FY 1994 CoF ESTIMATE: $8,000,000

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:

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $720,000 | --- | $ 720,000 |
| Capitalized Investment . . . . . | --- | $34,237.572 | 34,237,572 |
| Total . . . . . | $720,000 | $34,237,572 | $34,957,572 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the conversion to an energy saving variable air volume system by replacing six large built-up air handlers and associated components in the Mission Control Center, Building 30. Also included will be a 140-foot by 28-foot extension on the north end of the building to house the new air handlers.

## PROJECT:

The air handling system is approaching the end of its original design life and deteriorated to a condition that likely could adversely impact on Space Shuttle mission support. There are already internal leaks in the chilled water coil bundles and repairs cannot be made due to time and work

space constraints. The structural integrity of the units is failing due to constant exposure to moisture and must be replaced.

**IMPACT OF DELAY:**

The capability to provide continued cooling to the Mission Control Center may be impaired if this project is delayed. The worst case failure would be loss of cooling to the computer systems, effectively shutting down the Mission Control Center.

## PROJECT:

This project provides for the replacement of six large built-up air-handlers supplying overhead air to all three floors of the Mission Control Center, a 140- by 28-foot three-story mechanical equipment addition to the north of the building, and replacement of approximately 150 mixing boxes with variable air volume boxes. The mechanical room addition is required to keep the present air handling units operational until the new units become operational. The existing air handling units will then be removed. Air ductwork revisions and installation of associated electrical and mechanical systems and controls needed to effect these replacements are included. The constant volume mixing boxes will be replaced with variable air volume boxes to redistribute the air flow and effect energy conservation. The project also includes the removal of asbestos spray-applied insulation and piping insulation as required. The main chilled water piping within the building mechanical rooms also will be revised as required.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $8,000,000 |
| Demolition/Asbestos Abatement . . . | LS | --- | --- | 197,000 |
| Architectural/Structural Addition . | SF | 11,760 | 125 | 1,470,100 |
| Mechanical Air Handlers . . . . . | EA | 9 | 338,467 | 3,046,200 |
| Mechanical VAV Boxes . . . . . | EA | 150 | 8,494 | 1,274,100 |
| Mechanical Piping and Valves . . . . | LF | 600 | 327 | 196,000 |
| Mechanical Ductwork . . . . . | LS | --- | --- | 654,000 |
| Mechanical Air Devices . . . . . | EA | 590 | 197 | 116,300 |
| Electrical Modifications . . . . . | LS | --- | --- | 1,046,300 |
| Total . . . . . | | | | $8,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# LYNDON B. JOHNSON SPACE CENTER
# FISCAL YEAR 1994 ESTIMATES
# REPLACE MISSION CONTROL CENTER AIR HANDLERS

## SITE LOCATION PLAN

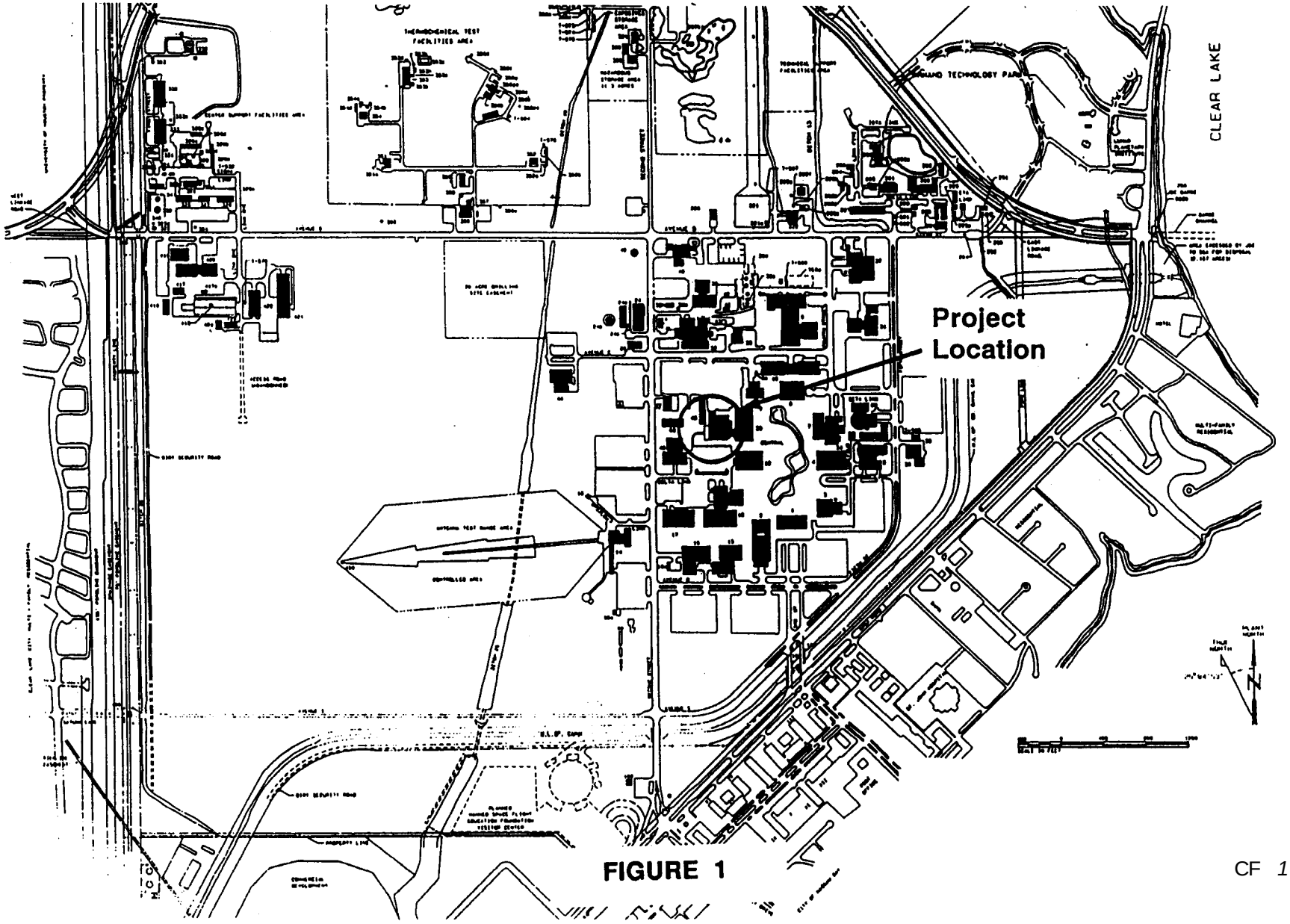



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Replace Thermal Vacuum Helium Refrigeration Systems

INSTALLATION: Lyndon B. Johnson Space Center

FY 1994 CoF ESTIMATE: $7,400,000

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

FY 1993 AND PRIOR YEARS FUNDING: The following prior ye-rs funding is rela ed to this project:

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $457,000 | --- | $ 457,000 |
| Capitalized Investment . . . . . | --- | $42,206,810 | 42,206,810 |
| Total . . . . . | $457,000 | $42,206,810 | $42,663,810 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the replacement of five obsolete helium refrigerators with three new larger helium refrigerators in the Space Environment Simulation Laboratory, Building 32. This helium refrigeration system is essential for attaining and maintaining high-vacuum conditions for thermal vacuum testing of program-related test articles, devices, and systems.

**PROJECT JUSTIFICATION:**

This project is required to maintain and ensure reliable operations for vacuum Chambers A and B in the Space Environment Simulation Laboratory to support a number of satellite retrieval/repair and other thermal vacuum test projects. The existing helium refrigerators are at the end of their 30 year design life and unreliable, increasing the risk of failure and possible impact on program schedules. Replacement parts for the system are expensive and not readily available since many components have to be custom made. Significant operation and maintenance costs can be avoided once these new helium refrigerators are operational.

**IMPACT OF DELAY:**

The potential of major test compromises and delays will be significantly increased.

## PROJECT:

Modifications include replacement of five obsolete 1.75-kW helium refrigerators with three new 3.5-kW helium refrigerators in the Space Environment Simulation Laboratory, Building 32. Two of the refrigerators will be located in a new 3,000 square foot cryogenics room adjecent to the existing Chamber A cryogenics room. The other refrigerator will be located in the existing cryogenics room near Chamber B. Necessary modifications to the facility's ventilation, electrical, chilled water, liquid nitrogen, and gaseous helium systems will be accomplished.

The project also provides for rehabilitation and automation of chamber support control systems including Chambers A and B vacuum roughing pump system, Chamber A liquid nitrogen shrouds, Chamber A lunar plain heater, and Chamber A helium cryogenics pumping shrouds. Automated monitoring and control of chamber systems will be installed and connected to an existing distributed process control system. Existing control systems are over 30 years old and have deteriorated to an undesirable and efficient level.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $7,400,000 |
| Sitework and Demolition . . . . . | LS | --- | --- | 45,700 |
| Architectural/Structural . . . . . | SF | 3,000 | 102.57 | 307,700 |
| Refrigerator Installation . . . . | EA | 3 | 2,064,700 | 6,194,100 |
| Piping Modifications . . . . . | LS | --- | --- | 215,600 |
| Electrical Modifications . . . . . | LS | --- | --- | 136,900 |
| Controls . . . . . | LS | --- | --- | 500,000 |
| Total . . . . . | | | | $7,400,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Isometric View Figure 2 - Systems Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE COST ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

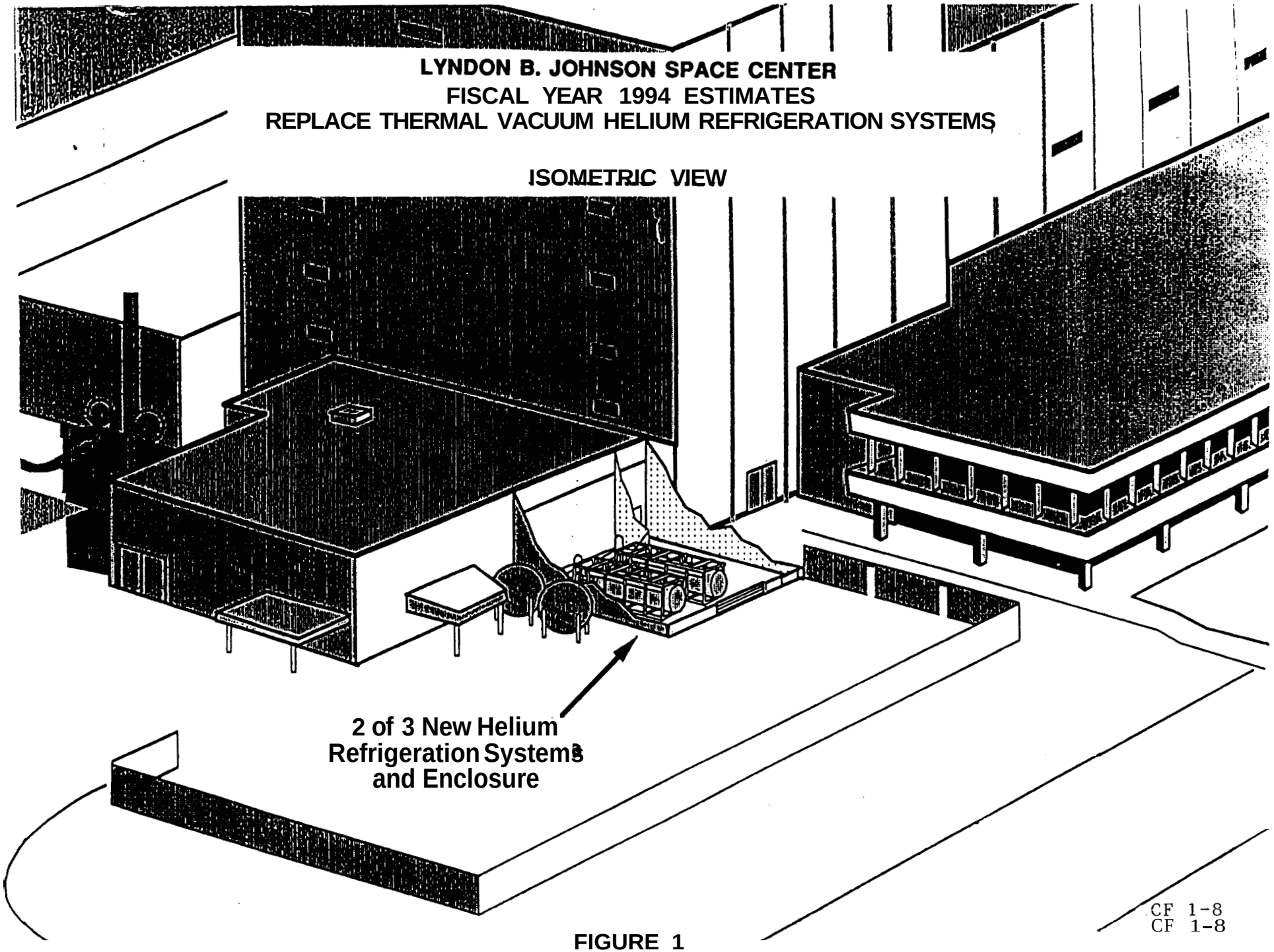



FIGURE 1

CF 1-8
CF 1-8

LYNDON B. JOHNSON SPACE CENTER
FISCAL YEAR 1994 ESTIMATES
REPLACE THERMAL VACUUM HELIUM REFRIGERATION SYSTEMS

SYSTEMS PLAN

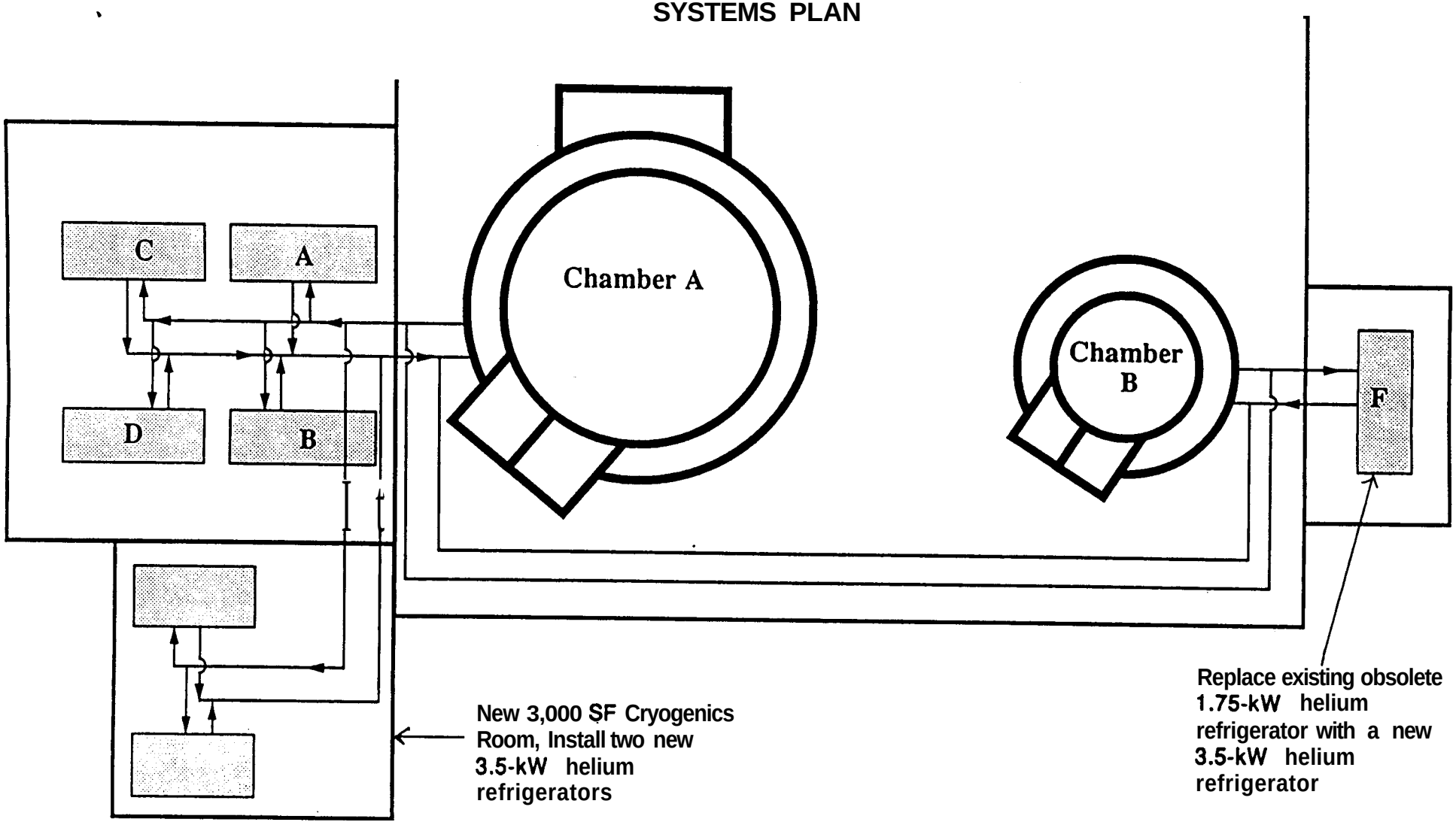



FIGURE 2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Modify Launch Complex 39 Exterior Utility Piping

INSTALLATION: John F. Kennedy Space Center

FY 1994 CoF Estimate: $1,200,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $122,000 | --- | $ 122,000 |
| Capitalized Investment . . . . . | --- | $216,362,462 | 216,362,462 |
| Total . . . . . | $122,000 | $216,362,462 | $216,484,462 |

SUMMARY PURPOSE AND SCOPE

This project provides for reconfiguring the High Temperature Hot Water (HTHW) expansion system, control valve replacement, generator pumping, and distribution piping in the LC-39 area to overcome an outdated heating system and permit an energy-efficient operation.

PROJECT JUSTIFICATION:

The existing HTHW system is 27 years old, inefficient, and does not provide control of the water temperature leaving the Utility Annex. The present system causes variations in temperature that could damage equipment which must be maintained at close tolerance. In addition, modifications of the control system included in this project will allow for balancing HTHW water flow with system loads optimizing energy efficiency.

**IMPACT OF DELAY:**

Failure to implement this project will result in continued inefficient operation of the HTHW distribution system in the launch control area, which risks equipment damage and/or disruption to launch processing activities.

**PROJECT DESCRIPTION:**

This project provides for replacement of compression tanks and piping between heat source and the heat load. A new stand-by pump and interconnecting piping will be provided along with replacement of all existing 3-way control valves with 2-way control valves at the heat exchangers. Additionally, asbestos abatement and reinsulation of some piping is required.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $1,200,000 |
| Asbestos Abatement . . . . . | LS | --- | --- | 400,000 |
| New Tanks & Valves . . . . . | LS | --- | --- | 500,000 |
| Generator Pump . . . . . | LS | --- | --- | 75,000 |
| Piping . . . . . | LS | --- | --- | 225,000 |
| Total . . . . . | | | | $1,200,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**JOHN F. KENNEDY SPACE CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**MODIFY LAUNCH COMPLEX 39 EXTERIOR UTILITY PIPING**

**SITE PLAN**

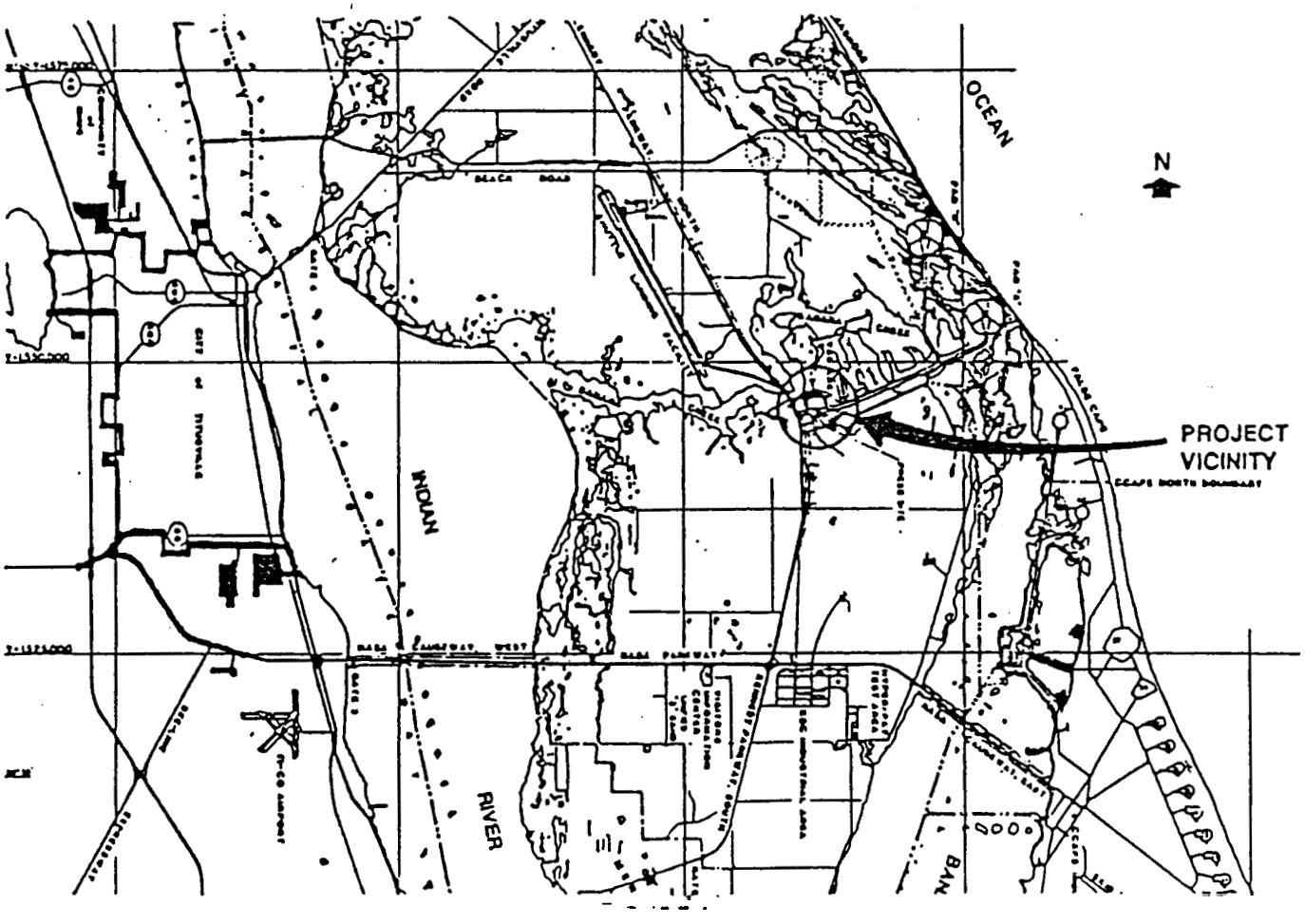



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Refurbish Launch Complex 39 Cooling System

INSTALLATION: John F. Kennedy Space Center

FY 1994 CoF Estimate: $4,000,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $378,000 | --- | $378,000 |
| Capitalized Investment . . . . . | --- | $358,272,990 | 358,272,990 |
| Total . . . . . | $378,000 | $358,272,990 | $358,650,990 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the refurbishment of four air handlers and the replacement of reheat coils throughout the Launch Control Center (LCC) and in the lowbay of the Vehicle Assembly Building (VAB). These modifications will be accomplished by installing new energy saving variable air volume (VAV) boxes and new VAV compatible heating, ventilating, and air conditioning equipment.

PROJECT JUSTIFICATION:

The associated air handling units and the reheat coils in both facilities are 25-30 years old and at the end of their original design life. The equipment is deteriorated, performance is diminished, and repair parts are difficult to obtain causing lengthy down times that delay shuttle processing and disrupt launch support operations. The constant volume configuration and poor condition of the air handling units coupled with the obsolete reheat coils result in an energy inefficient and unreliable system.

Conversion of this equipment to a variable air volume configuration would increase the reliability of the system and would be an energy efficient means of controlling the tight temperature and humidity requirements within the LCC and VAB.

**IMPACT OF DELAY:**

Failure to implement this project will result in continued inefficient operation of air handling units in the LCC and the lowbay of the VAB with possibility of system failures which could impact Shuttle launch activities.

## PROJECT:

This project provides for the replacement of four air handlers and the replacement of reheat coils throughout the LCC and in the lowbay of the VAB. This project will include asbestos abatement and removal of reheat coils, cooling coils, supply and return fans, filter sections, miscellaneous piping, valves, ducts, dampers, insulation, and electrical power feeders. These items will be replaced with new energy efficient equipment including new controls, humidification systems, and variable air volume boxes.

| PROJRCT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $4,000,000 |
| Asbestos Abatement . . . . . | LS | --- | --- | 570,000 |
| Mechanical . . . . . | LS | --- | --- | 2,250,000 |
| Electrical . . . . . | LS | --- | --- | 1,180,000 |
| Total . . . . . | | | | $4,000,000 |

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

**OTHER EQUIPMENT SUMMARY:** None.

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** None.

**JOHN F. KENNEDY SPACE CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**REFURBISH LAUNCH COMPLEX 39 COOLING SYSTEM**

**SITE PLAN**

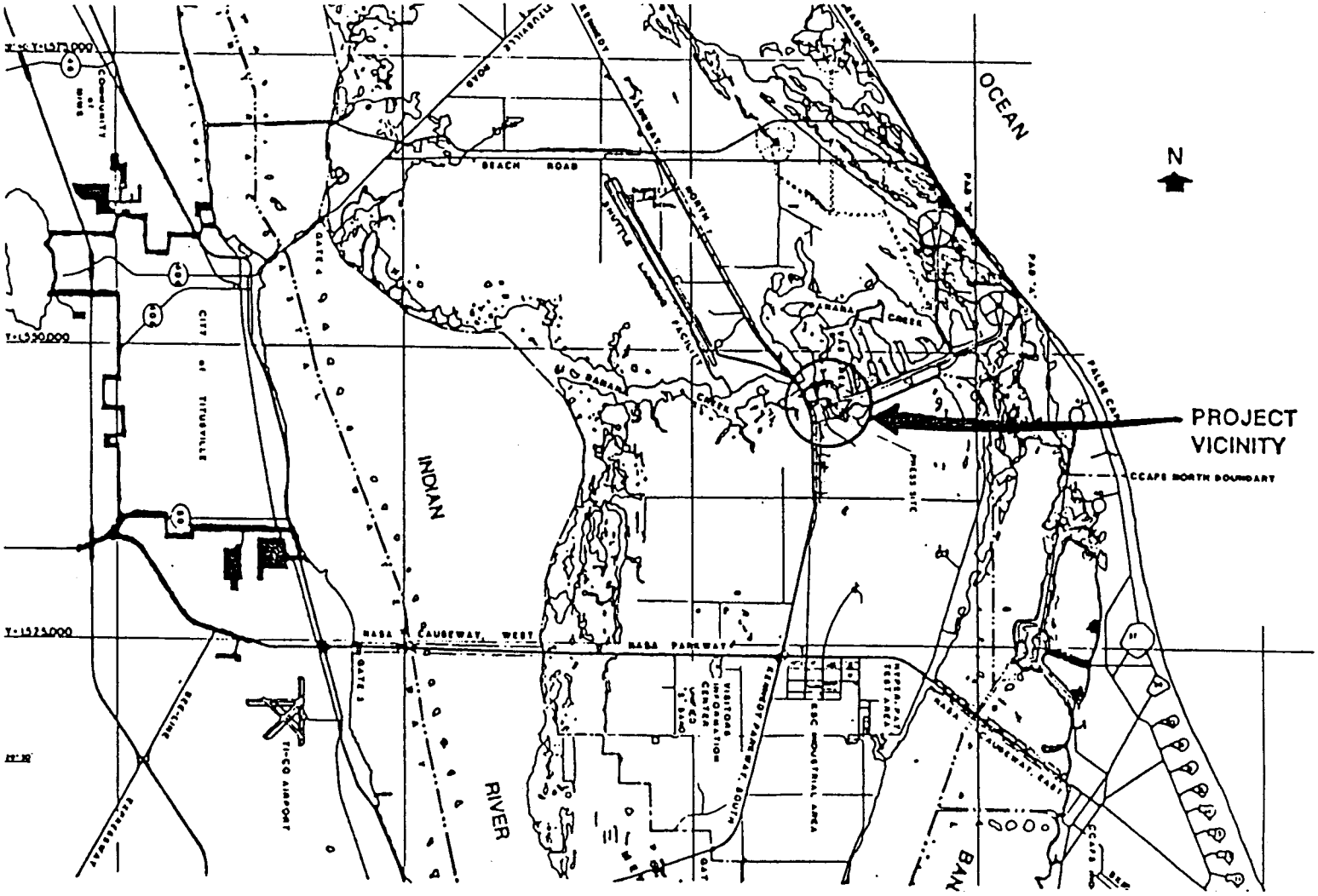



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Refurbish Launch Complex 39 Secondary Circuit Breakers

INSTALLATION: John F. Kennedy Space Center.

FY 1994 CoF Estimate: **$3,300,000**

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $266,000 | --- | $266,000 |
| Capitalized Investment . . . . . | --- | $478,844,110 | 478,844,110 |
| Total . . . . . | $266,000 | $478,844,110 | $479,110,110 |

SUMMARY PURPOSE AND SCOPE

This project provides for the refurbishment and service life extension of 480 Volt secondary circuit breakers and installation of state-of-the-art static trip overcurrent devices on the circuit breakers in the Launch Complex 39 (LC 39) area.

PROJECT JUSTIFICATION:

The existing circuit breaker overcurrent devices are 25 years old, difficult to maintain and spare parts are no longer made. The units do not have static overcurrent protection devices. The breaker settings cannot be verified because of the inaccuracy of the control devices. As a result, premature trips and unscheduled outages may occur. The new overcurrent protection will eliminate premature trips and/or failure to trip, thereby eliminating unscheduled outages and adverse impacts to shuttle processing.

IMPACT OF DELAY:

Premature tripping or failure to trip may occur, which would cause unscheduled outages or possible damage to critical equipment.

## PROJECT:

This project will refurbish the existing 480 Volt sensitive secondary circuit breakers installed on LC-39 facilities and includes the installation of state-of-the-art static trip overcurrent devices on the circuit breakers.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $3,300,000 |
| LCC Breakers . . . . . | LS | --- | --- | 570,000 |
| Mobile Launch Platforms 1,2,3 & Vehicle Assembly Building Repeater (VABR) Breakers . . . | LS | --- | --- | 1,130,000 |
| Vehicle Assembly Building Breakers . . . . . | LS | --- | --- | 710,000 |
| Pads A & B Breakers . . . . . | LS | --- | --- | 890,000 |
| Total . . . . . | | | | $3,300,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

## JOHN F. KENNEDY SPACE CENTER
## FISCAL YEAR 1994 ESTIMATES
## REFURBISH LAUNCH COMPLEX 39 SECONDARY CIRCUIT BREAKERS

### LOCATION PLAN

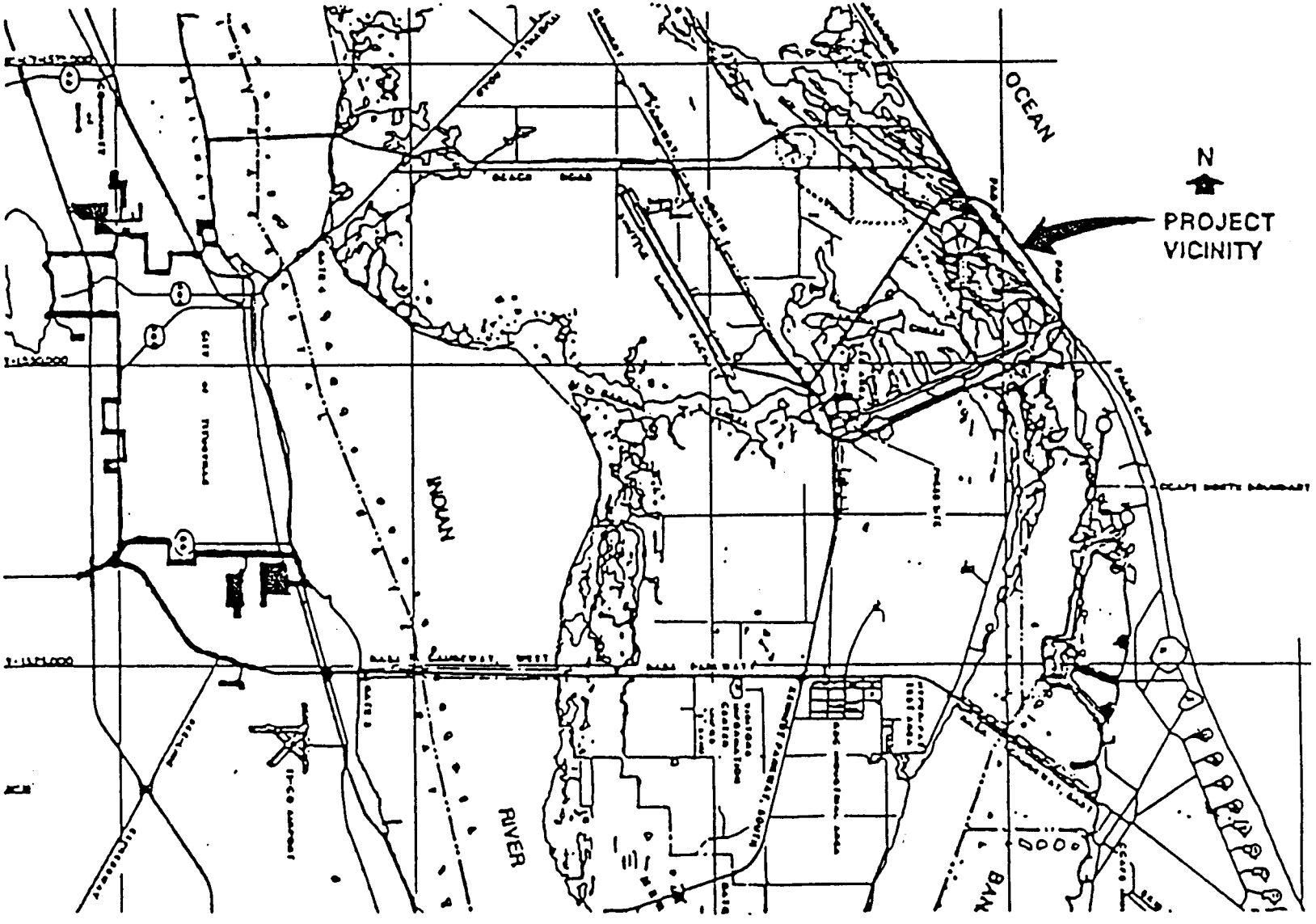



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Refurbish Vehicle Assembly Building/Pad Water Storage Tanks

INSTALLATION: John F. Kennedy Space Center

FY 1994 CoF Estimate: $3,000,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $253,000 | --- | $ 253,000 |
| Capitalized Investment . . . . . | --- | $5,879,292 | 5,879,292 |
| Total . . . . . | $253,000 | $5,879,292 | $6,132,292 |

SUMMARY PURPOSE AND SCOPE:

This project provides for refurbishment of the two 1,000,000 gallon ground storage water tanks and constructing two additional 1,000,000 gallon tanks near the Vehicle Assembly Building (VAB) and launch pads 39A and B.

PROJECT JUSTIFICATION:

Two new water tanks are required to provide redundancy and preclude a two-month shutdown to refurbish the existing 27-year-old tanks. Safety and launch operations personnel require the existing Shuttle fire protection systems to remain operational at all times. Therefore, new tanks will be constructed and become operational before the existing tanks are allowed to be taken out of service and refurbished. Existing tank refurbishment is required to repair existing corrosion damage.

**IMPACT OF DELAY:**

Failure to approve this project will delay repair of both tanks and could cause delay in Shuttle processing schedules due to inevitable corrosive failure of the tank walls.

**PROJECT DESCRIPTION:**

This project provides for two new 1,000,000 gallon tanks to be installed near the VAB and launch pads and tied into the existing water system. The two existing 1,000,000 gallon tanks will then be taken out of service for sand blasting, painting, and miscellaneous repairs. New cathodic protection systems will be provided for the four tanks.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $3,000,000 |
| Tank Refurbishment . . . . . | EA | 2 | 403,000 | 806,000 |
| New Tank Installation . . . . . | EA | 2 | 1,097,000 | 2,194,000 |
| Total . . . . . | | | | $3,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER
FISCAL YEAR 1994 ESTIMATES
REFURBISH VEHICLE ASSEMBLY BUILDING/PAD WATER STORAGE TANKS

SITE PLAN

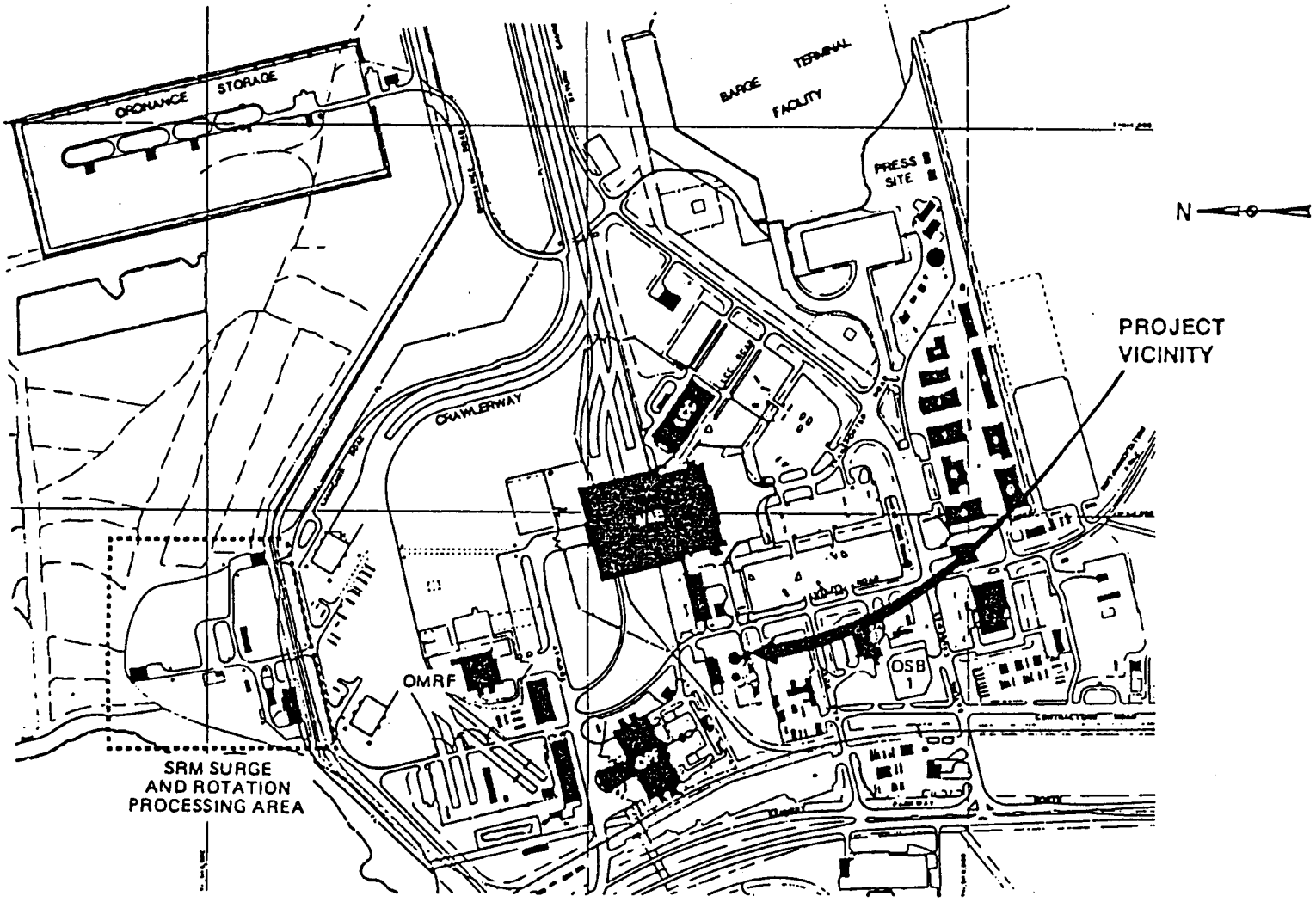



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Rehabilitate Industrial Area Fire Alarm Reporting System

INSTALLATION: John F. Kennedy Space Center

FY 1994 CoF Estimate: $4,900,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $476,000 | --- | $ 476,000 |
| Capitalized Investment . . . . . | --- | $2,402,000 | 2,402,000 |
| Total . . . . . | $476,000 | $2,402,000 | $2,878,000 |

SUMMARY PURPOSE AND SCOPE:

This project will replace existing unreliable and outdated fire alarm control and monitoring systems in the Industrial Area with microprocessor-based panels to be monitored and controlled through the existing central supervising station, located in the Launch Control Center.

PROJECT JUSTIFICATION:

The existing nonrecording, annunciator type fire alarm reporting and monitoring systems are unreliable, new facilities or zones cannot be added, and do not meet the updated recommendations of the National Fire Code. The existing monitoring systems are highly dependent on operator vigilance, proficiency, interpretation, and recording, and are incapable of monitoring individual fire alarm zones in large buildings. Repair parts are very difficult and costly to obtain for these obsolete systems. The increased frequency of hazardous operations within the industrial area makes the need for better control and monitoring of fire alarm and suppression systems essential.

**IMPACT OF DELAY:**

Deferral of this project will result in a continued inefficiency in the evaluation of fire signals received by the central fire alarm monitoring system. Without this project, there would be an increase in the risk of misdirecting the fire department, which adds delays to the critical response time.

## PROJECT:

This project will replace existing critical safety system fire alarm control and monitoring systems with microprocessor-based panels. Each facility's heat/smoke detection/signaling zones will be modified to be compatible with the new fire alarm panel, which will be compatible with the central station equipment, graphics, archiving and control functions. After the fire alarm systems are integrated with the central station, including graphics and base central processing unit, the system will provide reporting and control of individual alarm points.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $4,900,000 |
| Demolition . . . . . | LS | --- | --- | 70,000 |
| Fire Alarm Panels . . . . . | EA | 41 | 13,902.44 | 570,000 |
| Modem Packages . . . . . | EA | 27 | 6,888.89 | 186,000 |
| Detectors . . . . . | EA | 1,450 | 105.52 | 153,000 |
| Bell Units . . . . . | EA | 1,430 | 130.07 | 186,000 |
| Wire and Conduit. . . . . | LF | 125,600 | 22.85 | 2,870,000 |
| Asbestos Abatement . . . . . | LS | --- | --- | 620,000 |
| Head End Equipment . . . . . | LS | --- | --- | 245,000 |
| Total . . . . . | | | | $4,900,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

**OTHER EQUIPMENT SUMMARY:** None

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** None

# JOHN F. KENNEDY SPACE CENTER
# FISCAL YEAR 1994 ESTIMATES
# REHABILITATE INDUSTRIAL AREA FIRE ALARM REPORTING SYSTEM

## LOCATION PLAN

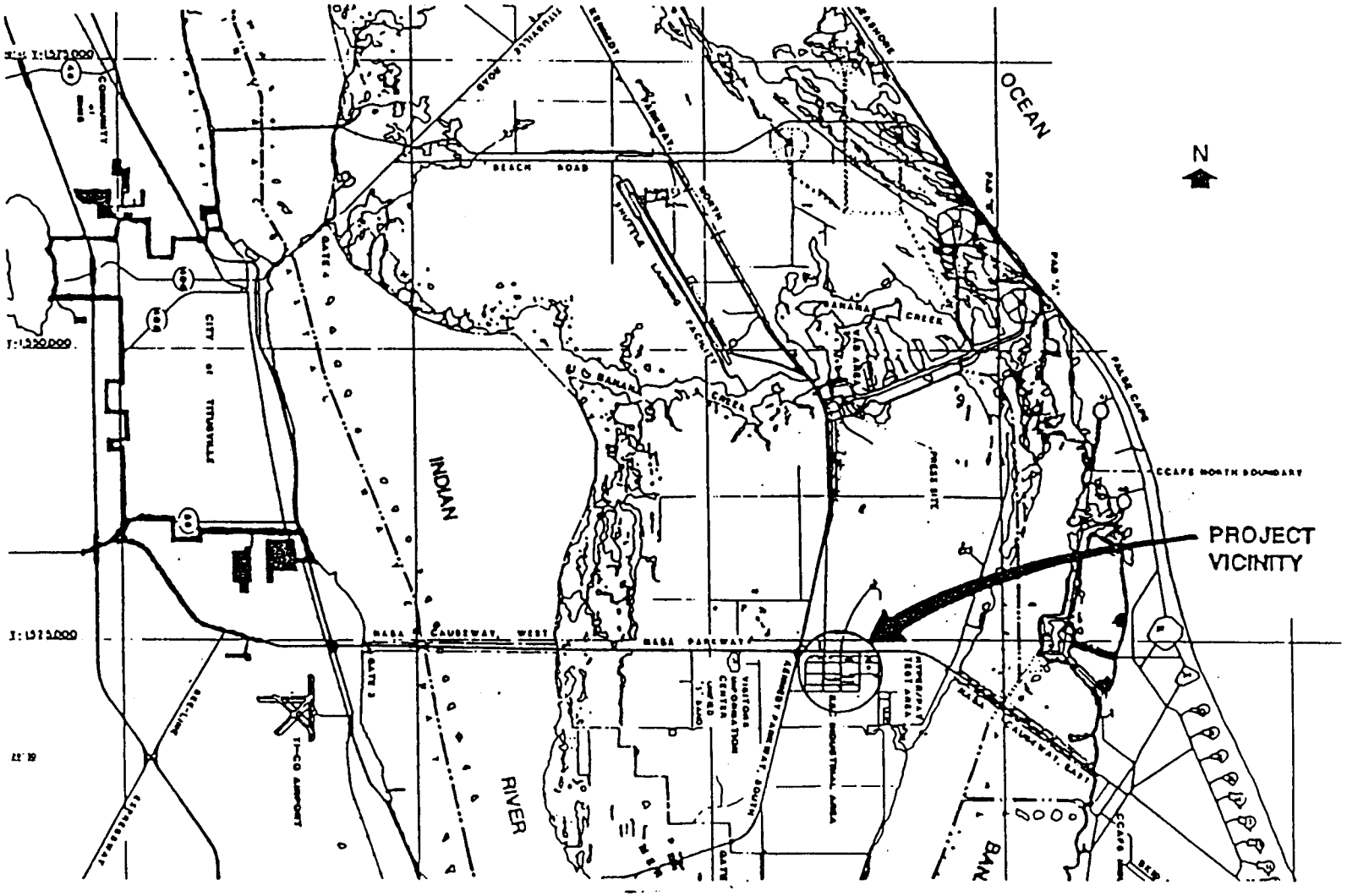



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restore C-5 Substation, Launch Complex 39 Area

INSTALLATION: John F. Kennedy Space Center

FY 1994 CoF Estimate: $5,000,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $300,000 | --- | $ 300,000 |
| Capitalized Investment . . . . . | --- | $4,705,523 | 4,705,573 |
| Total . . . . . | $300,000 | $4,705,523 | $5,005,523 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the expansion of the C-5 electrical distribution substation to provide necessary load relief to the existing C-5 substation and to support planned load increases in the Launch Complex 39 (LC-39) area.

PROJECT JUSTIFICATION:

This restoration project is required to correct the overload condition of the existing C-5 substation design capacity of 30 megaVolt Amperes (mva). Actual peak demand in FY 1990 and 1991 was 29.8 mva and load growth in the LC-39 area exceeded the design capacity in FY 1992. The peak substation capacity utilizing cooling fans will be exceeded by the end of FY 1994. Exceeding the substation design capacity is not recommended for extended periods of time as this reduces transformer service life. Once this upgrade becomes operational, it will provide the needed capacity to alleviate the overloaded condition and provide for planned growth in the LC-39 area.

IMPACT OF DELAY:

Failure to provide the expansion will result in the C-5 substation peak capacity being exceeded and eventual transformer failures. It will also force undesirable load shedding during critical launch operations beginning in FY 1994.

## PROJECT:

This project provides for increasing the capacity a minimum of 20 mva, which includes 13,800 volt feeders, feeder breakers, manholes, duct banks, feeder bays, control building, protective devices, public utility interface and a fenced enclosure. The protective devices, substation structure, feeder bays, and yard will be designed to allow for growth of the substation to reduce the cost impact of modifications and retrofitting at the time of future expansion.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $5,000,000 |
| Civil/Site . . . . . | LS | --- | --- | 180,000 |
| General . . . . . | LS | --- | --- | 60,000 |
| Mechanical . . . . . | LS | --- | --- | 275,000 |
| Electrical . . . . . | LS | --- | --- | 4,485,000 |
| Total . . . . . | | | | $5,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: Approximately $150,000 of Non-CoF equipment will be provided.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER
FISCAL YEAR 1994 ESTIMATES
RESTORE C-5 SUBSTATION, LAUNCH COMPLEX 39 AREA

LOCATION PLAN

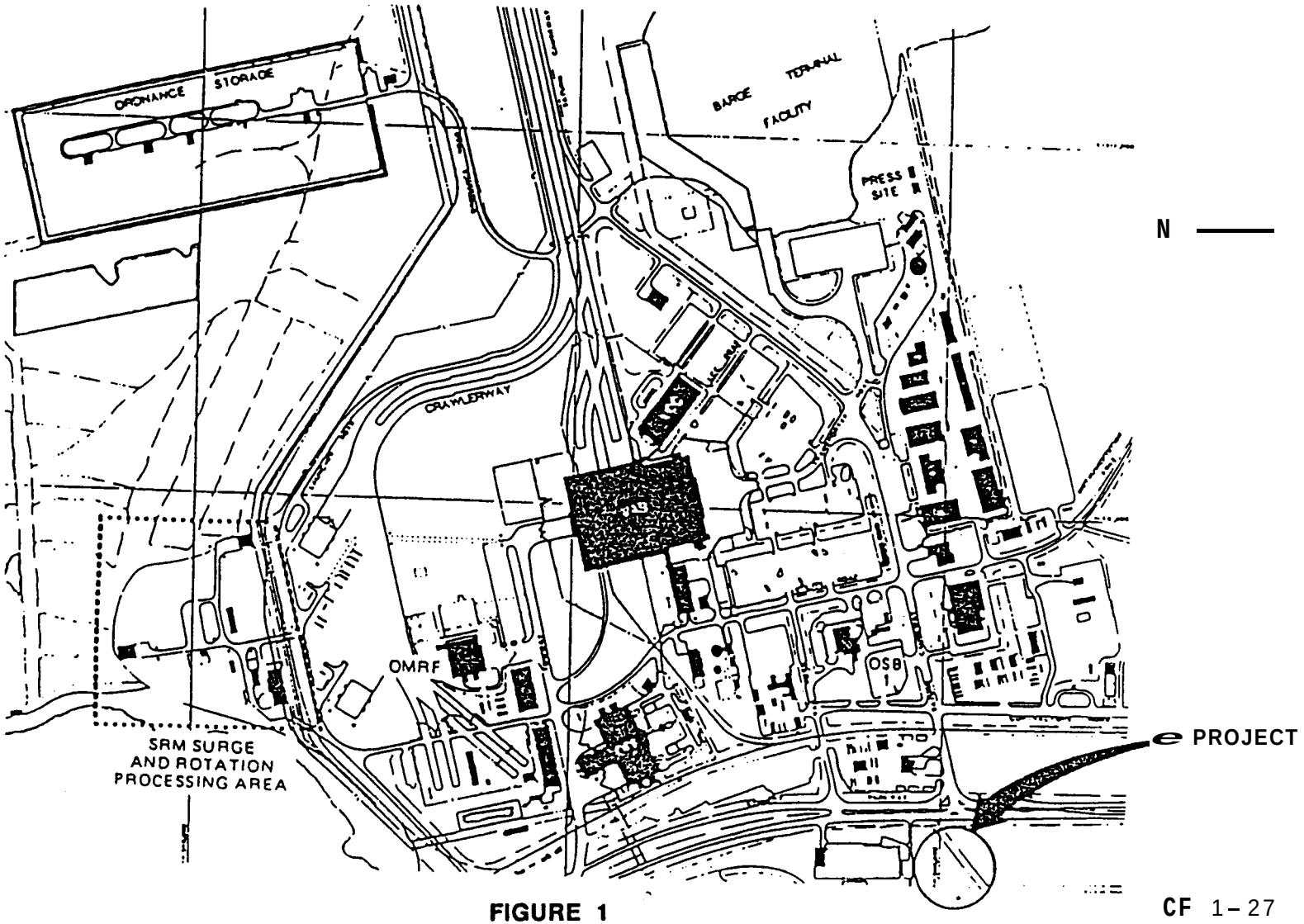



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Restoration of High Pressure Air Compressor System

INSTALLATION: George C. Marshall Space Flight Center

FY **1994** CoF Estimate: $8,500,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $664,000 | --- | $ 664,000 |
| Capitalized Investment . . . . . | --- | $3,447,111 | 3,447,111 |
| Total . . . . . | $664,000 | $3.44 7.111 | $4.111.111 |

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to replace the existing High Pressure Air Compressor System, which services the Center's laboratories and test areas. This project provides for the construction of a new air compressor facility with three compressors and space for three more. High pressure air is essential to operate all of the Center's major testing facilities.

PROJECT JUSTIFICATION:

This system provides high pressure air for purging operations, test area operations, wind tunnel operations, contamination control, critical pneumatic systems, scientific experiments, and neutral buoyancy activities. The existing compressors are **26** to **40** years old and very deteriorated. During the past two years, compressor downtime has resulted in a **23** percent reduction in rated compressor output. Compressor downtime can commonly run into months because of the unavailability of parts. With the High Pressure Air Compressor System already operating

at capacity, the loss of one compressor results in program testing delays. The existing facilities are not suitable for refurbishment and will be deactivated and demolished after this facility is fully operational.

IMPACT OF DELAY:

Delay of this project will impact all ongoing programs at the Center. Support of test programs will become increasingly unreliable and costly due to continued equipment failure and difficulty of maintenance.

## PROJECT:

This project provides an approximately 13,000 square foot air compressor building, including foundations, trenches, and utility systems. Also included is the installation of three electric motor driven air compressors with associated switchgear, and a new 10 MVA electrical unit substation. Space will be provided for three additional compressor units. An air purification system will be installed. The facility will have a fully equipped sound-proof control room and a bridge crane. Approximately 7,700 linear feet of pipe will be used to connect into and refurbish the existing air distribution system.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $8,500,000 |
| Site Work . . . . . | LS | --- | --- | 600,000 |
| Architectural/Structural . . | LS | --- | --- | 2,700,000 |
| Mechanical . . . . . | LS | --- | --- | 3,200,000 |
| Electrical . . . . . | LS | --- | --- | 2,000,000 |
| Total . . . . . | | | | $8,500,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: Future funding required to complete the replacement of the entire High Pressure Air Compressor System is estimated to cost approximately $6,000,000 FY 1995-FY 1996.

# MARSHALL SPACE FLIGHT CENTER
# FISCAL YEAR 1994 ESTIMATES
# RESTORATION OF HIGH PRESSURE AIR COMPRESSOR SYSTEM

## LOCATION PLAN

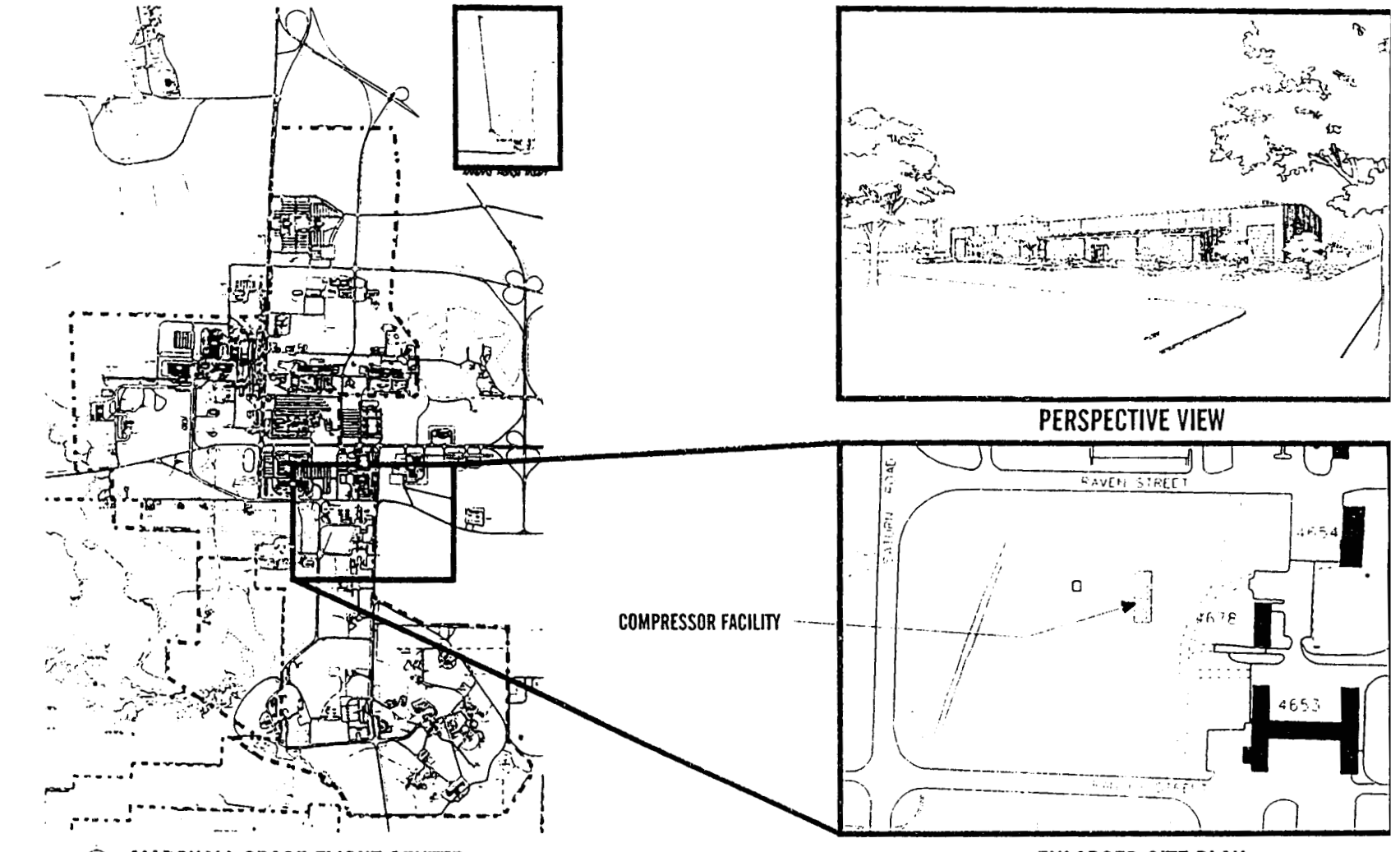





FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Repair Decking and Roof, X-Ray and Staging Facility

INSTALLATION: Michoud Assembly Facility

FY 1994 CoF Estimate: $1,500,000

LOCATION OF PROJECT: New Orleans, Orleans Parish, Louisiana

: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $105,000 | --- | $ 105,000 |
| Capitalized Investment . . . . . | --- | $9,611,664 | 9,611,664 |
| Total . . . . . | $105,000 | $9,611,664 | $9,716,664 |

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to repair the decking and roof system of the X-Ray and Staging Facility to ensure its structural integrity and to protect completed External Tanks stored in the facility for future Space Shuttle missions. Work to be performed includes removal of the existing roofing system and concrete decking, installation of corrugated metal decking, and the installation of a new roofing system.

PROJECT JUSTIFICATION:

The X-Ray and Staging Facility is used to modify and store completed External Tanks. Inspection of the decking revealed cracking and spalling of several concrete ceiling panels. This condition developed because the building had no ventilation, and moisture accumulated within the facility. In addition, the roof leaked, exposing the steel reinforcement bars to moisture. The resulting

oxidation of the rebar caused expansion, which in turn caused the concrete around the panel flange area to crack and spall. Temporary repairs will no longer rectify the problem. A recent study by an independent roofing consultant recommended complete replacement of the concrete decking with a metal decking, and installation of a new built-up roof.

IMPACT OF DELAY:

Delay of this project will allow continued spalling of the concrete, increasing the risk of damage to the stored External Tanks and support equipment from falling concrete.

## PROJECT:

This project provides for the removal of the existing four-ply roofing system and approximately 6,000 panels of concrete decking. The decking will be replaced with approximately 2,600 square feet of corrugated metal. A new built-up roofing system including insulation and flashing will be installed. Roof drains will be modified and/or replaced as required.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $1,500,000 |
| Replacement of Decking and Roof . . . . . | LS | --- | --- | 1,500,000 |
| Total . . . . . | | | | $1,500,000 |

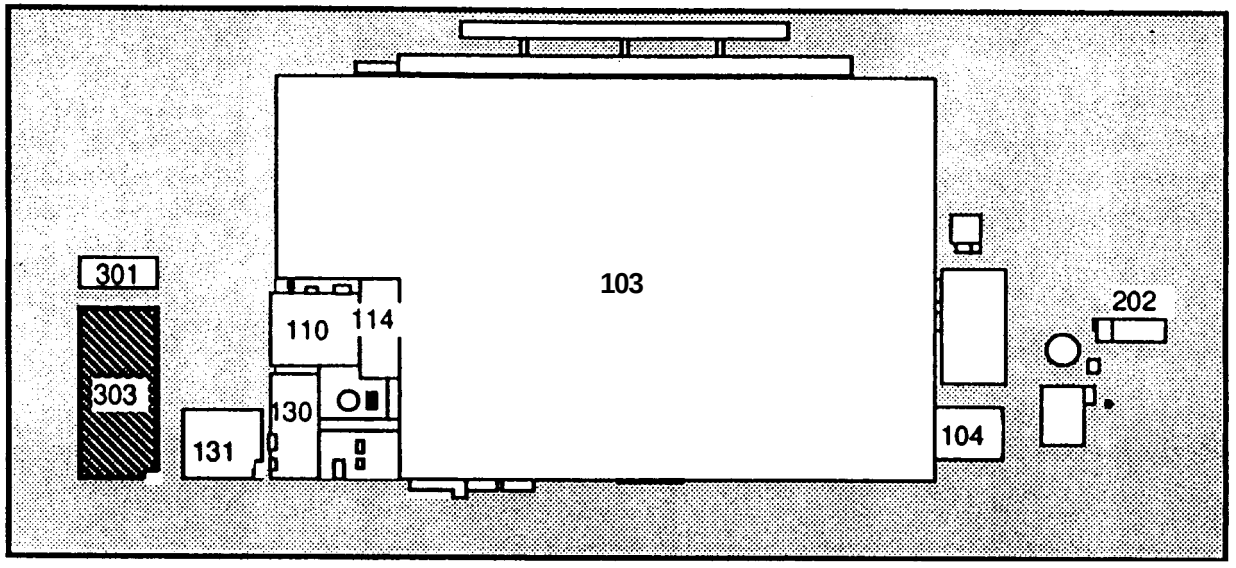
LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

MICHOUD ASSEMBLY FACILITY
FISCAL YEAR 1994 ESTIMATES
REPAIR DECKING AND ROOF, X-RAY AND STAGING FACILITY

SITE PLAN



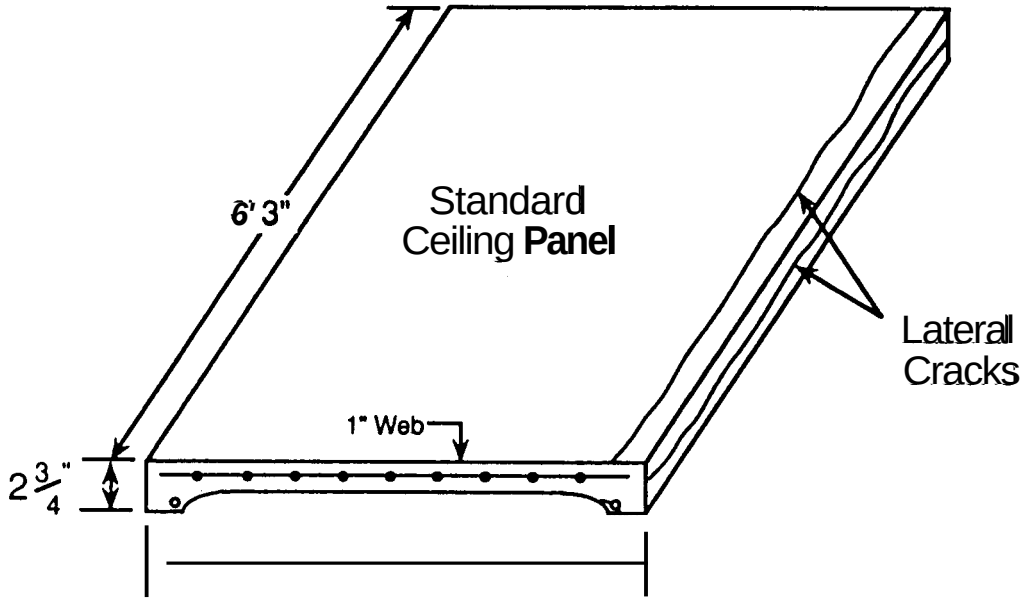




FIGURE 1

PROJECT TITLE: Replace Cooling Tower and Boiler

INSTALLATION: Michoud Assembly Facility

FY 1994 CoF Estimate: $4,000,000

**LOCATION OF PROJECT:** New Orleans, Orleans Parish, Louisiana

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $424,000 | $2,300,000 | $2,724,000 |
| Capitalized Investment . . . . . | --- | 5,201,098 | 5,201,098 |
| Total . . . . . | $424,000 | $7,501,098 | $7,925,098 |

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to continue the systematic replacement of major central heating and cooling plant components in the 202/207 complex. This phase provides for the replacement of a six-cell cooling tower and a 60,000 lb/hr steam boiler, which support production, engineering, storage, and administrative areas.

## PROJECT:

Cooling Tower 202 was constructed in 1953. A majority of the wooden members are rotting. The fan system is corroded, and fans, pumps, and other mechanical equipment have vibration problems as a result of deteriorated structural components. There are visible cracks around the entire perimeter of the foundation resulting in the leakage of treated cooling water. The upper deck, used by personnel to accomplish maintenance and repairs, is structurally unsafe. Steam Boiler No, 1 was also installed in 1953. It has extensive corrosion throughout, and replacement parts

are no longer available. Both the cooling tower and the steam boiler are reaching the point where corrective maintenance is no longer effective; complete replacement is needed.

IMPACT OF DELAY:

Continued deterioration of heating and cooling components will result in External Tank production disruptions and potential production rework. Critical production activities such as Spray-on Foam Insulation (SOFI) spray and curing, component cleaning, liquid hydrogen and oxygen tank cleaning, Liquid Oxygen Tank priming, and tank welding will be adversely impacted.

## PROJECT:

This project provides for the installation of a new ceramic six-cell cooling tower, with associated pumps, motors, piping, and valves, on a new pile-supported foundation. The sump and piping common to Cooling Towers 202 and 208 will also be replaced. The existing cooling tower and foundation will be demolished after the new cooling tower is activated. The project also provides for the demolition of an existing 60,000 lb/hr steam boiler, and its replacement with a high-efficiency boiler of equal capacity. An access door will be required to place the new boiler in the proper location; therefore, one section of the west wall will be removed and replaced with a roll-up door.

PROJECT COST ESTIMATE:

| | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $4,000,000 |
| Structural . . . . . | LS | --- | --- | 800,000 |
| Mechanical . . . . . | LS | --- | --- | 1,500,000 |
| Electrical . . . . . | LS | --- | --- | 350,000 |
| Asbestos Abatement . . . . . | LS | --- | --- | 200,000 |
| Cooling Tower Set in Place . . . | LS | --- | --- | 1,150,000 |
| Total . . . . . | | | | $4,000.000 |

LIST OF RELATED GRAPHICS: Figure 1 - Cooling Tower Site Plan
Figure 2 - Boiler House Site Plan1

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

Future funding to complete the replacement of all major heating and cooling equipment in the 202/207 complex is approximately $5,000,000 in FY 1996.

MICHOUD ASSEMBLY FACILITY
FISCAL YEAR 1994 ESTIMATES
REPLACE COOLING TOWER AND BOILER
COOLING TOWER 202 SITE PLAN

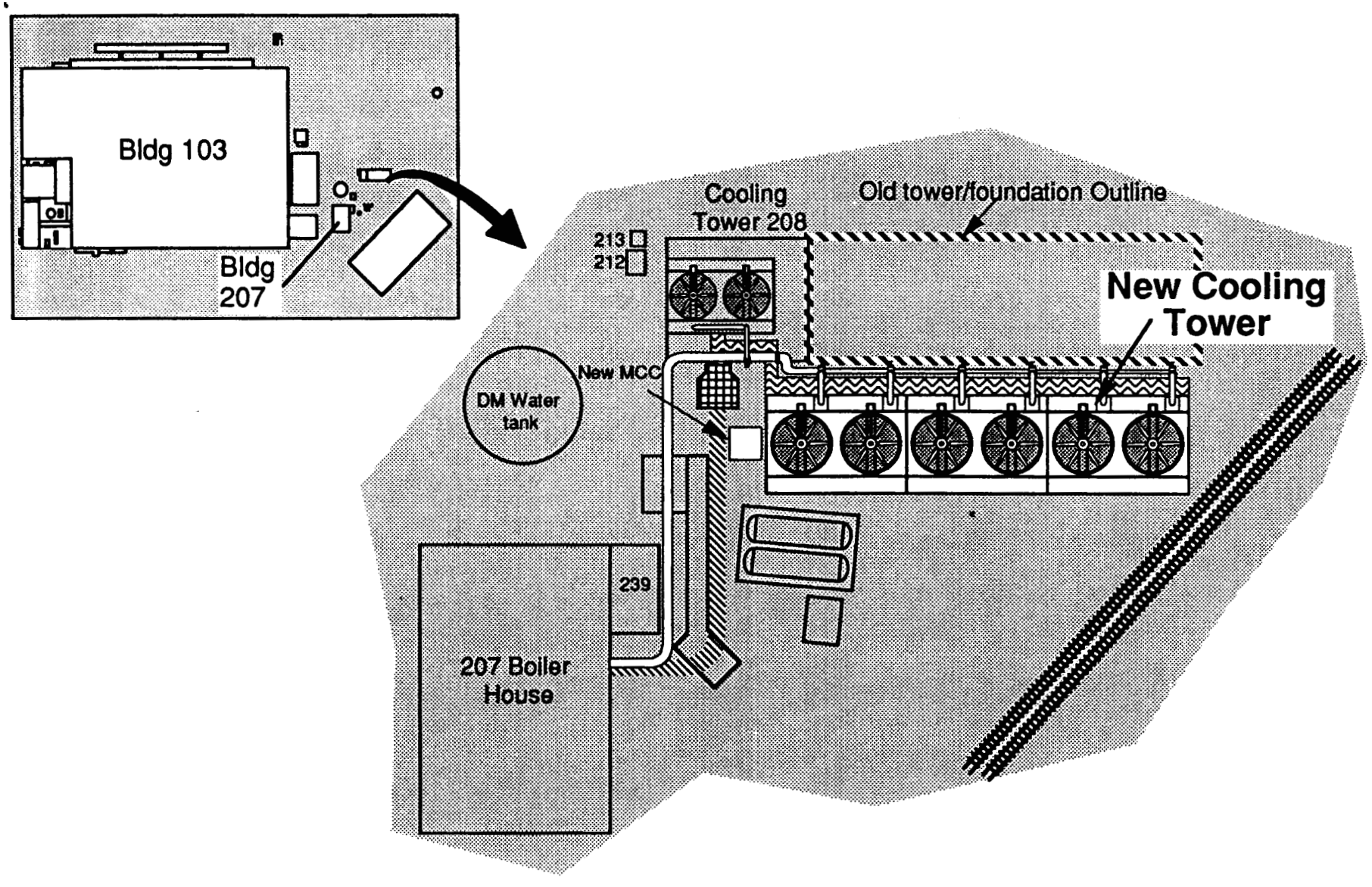
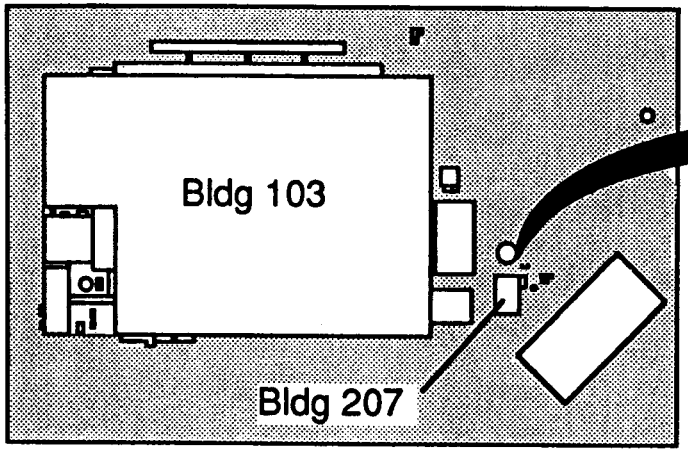
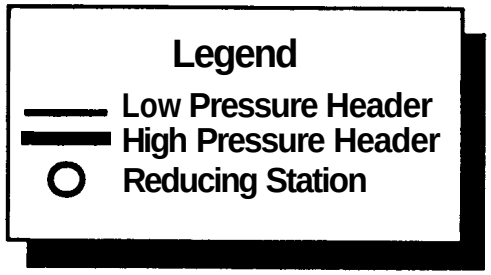


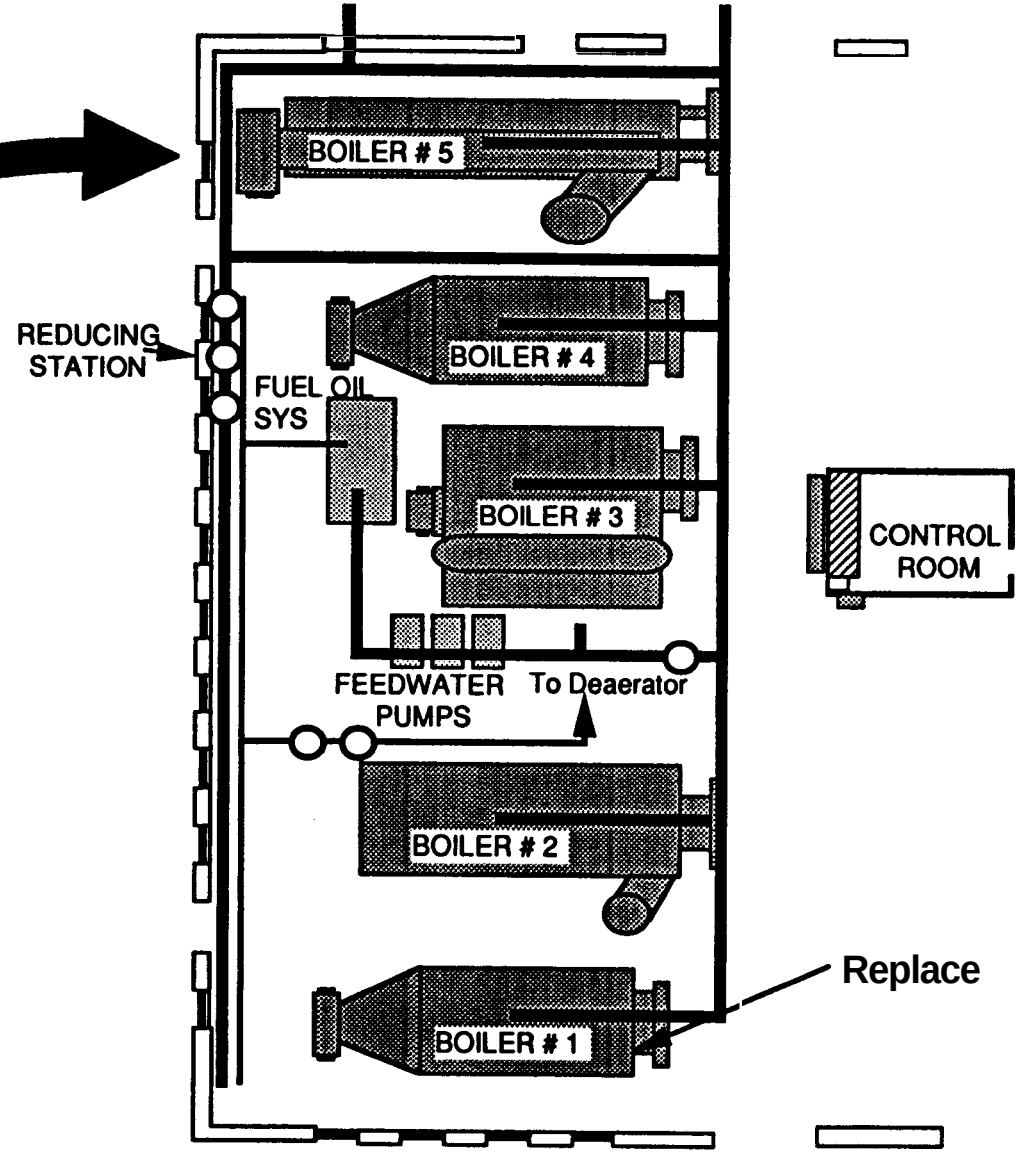

FIGURE 1

MICHOUD ASSEMBLY FACILITY
FISCAL YEAR 1994 ESTIMATES
REPLACE COOLING TOWER AND BOILER
BOILER HOUSE 207 SITE PLAN




| Boiler | Year Installed | Gross Capacity (lbs/hr) | Status |
|---|---|---|---|
| 1 | 1952 | 60,000 | Replace, FY94 |
| 2 | 1982 | 75,000 | Active |
| 3 | 1964 | 75,000 | Replace, FY93 |
| 4 | 1952 | 60,000 | Replace, N 9 3 |
| 5 | 1965 | 100,000 | Active |




Partial Floor Plan
Building 207

FIGURE 2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restore SSME Test Complex High Pressure Industrial Water System

INSTALLATION: John C. Stennis Space Center

FY 1994 CoF Estimate: $2,300,000

LOCATION OF PROJECT: Stennis Space Center, Hancock County, Mississippi

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $30,000 | --- | $ 30,000 |
| Capitalized Investment . . . . . | --- | $3,908,915 | 3,908,915 |
| Total . . . . . | $30,000 | $3,908,915 | $3,938,915 |

SUMMARY PURPOSE AND SCOPE

This project provides for the restoration of the High Pressure Industrial Water (HPIW) system at the Space Shuttle Main Engine (SSME) "A-1" and "A-2" Test Stands.

PROJECT JUSTIFICATION

The High Pressure Industrial Water piping systems are more than 25 years old and many of the lines are beginning to experience failures due to severe corrosion and erosion. Recent failures have required fabrication of large replacement sections instead of patching due to the loss of wall thickness from erosion and cavitation. Loss of any single major section of piping serving the deflector, diffuser, or deluge systems will result in loss of fire protection, a critical safety system on the test stands and at the barge docks. In addition, replacement of a large pipe would require long lead time procurement, causing a major SSME testing program interruption. Maintenance requirements are increasing as system reliability and availability are degrading on

this critical safety system. Repair is required to prevent system failure during critical operations and to control escalating maintenance costs.

**IMPACT OF DELAY:**

A delay in the implementation of this project will jeopardize system reliability and availability and could result in a major SSME Testing Program interruption.

## PROJECT:

This project provides for the restoration of the High Pressure Industrial Water system at the SSME "A-1" and "A-2" Test Stands. Work includes replacement of the large diameter corroded/eroded HPIW piping system, re-routing of the water line that supports the "A-2" Test Stand LH2 barge dock deluge system, replacement of two 24-inch riser valves, and replacement of the "Flex-Flo" deluge system control valves.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $2,300,000 |
| Excavation & Backfill . . . | LS | --- | --- | 173,000 |
| HPIW Pipe . . . . . | LF | 3,000 | 520.67 | 1,562,000 |
| Deluge Pipe . . . . . | LF | 750 | 236.00 | 177,000 |
| 24" Riser Valves . . . . . | EA | 2 | 68,500.00 | 137,000 |
| "Flex-Flo" Valves . . . . . | EA | 22 | 11,409.10 | 251,000 |
| Total . . . . . | | | | $2,300,000 |

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

**OTHER EQUIPMENT SUMMARY:** None

**FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:** None

**JOHN C. STENNIS SPACE CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**RESTORE SSME TEST COMPLEX HIGH PRESSURE INDUSTRIAL WATER SYSTEM**

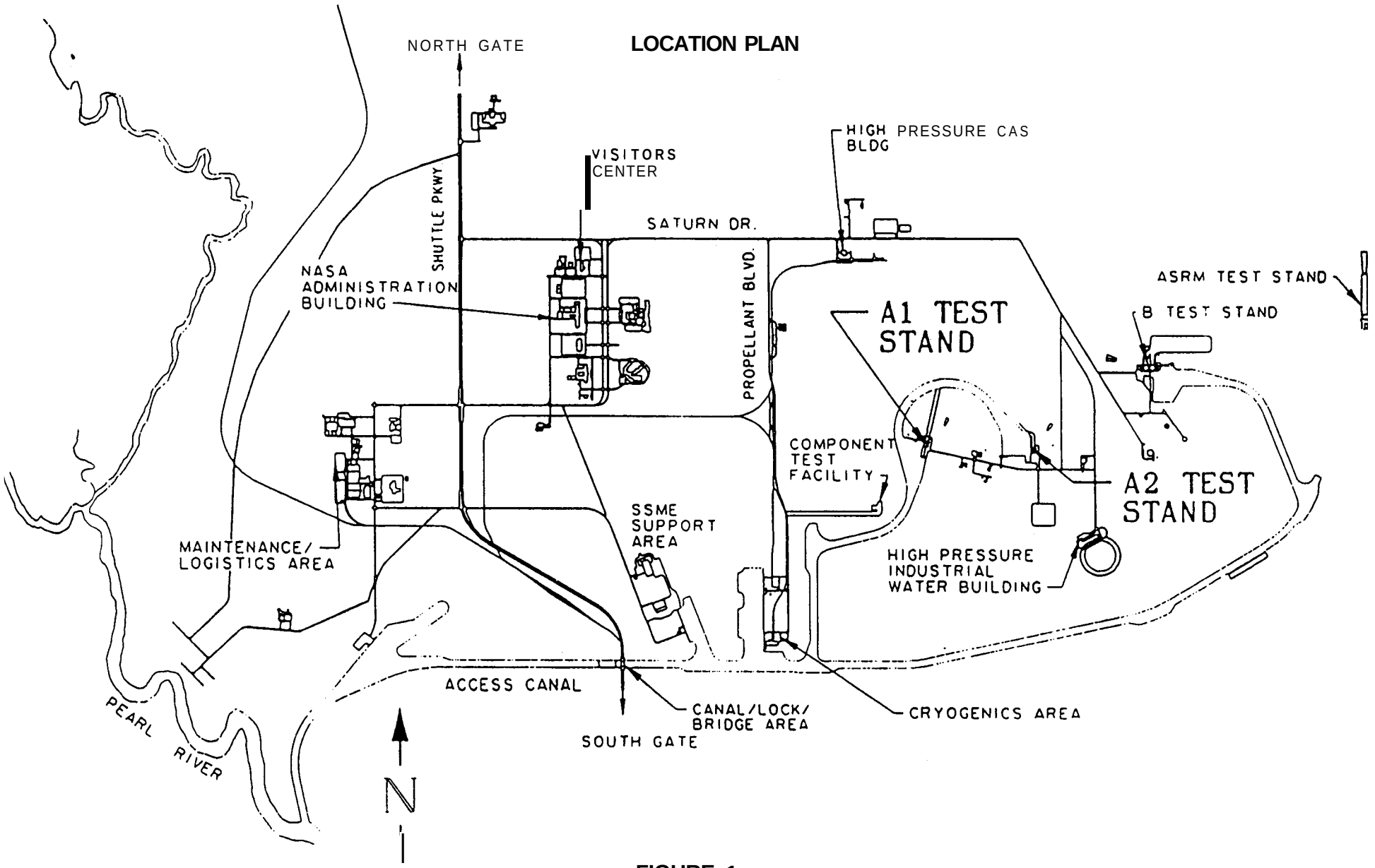



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restore High Pressure Gas Storage Capacity

INSTALLATION: John C. Stennis Space Center

FY 1994 CoF Estimate: $7,300,000

LOCATION OF PROJECT: Stennis Space Center, Hancock County, Mississippi

COGNIZANT HSADOUARTERS OFFICE: Office of Space Flight

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

| | Planning and Desian | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $135,000 | --- | $135,000 |
| Capitalized Investment . . . . . | --- | $100,000 | 100,000 |
| Total . . . . . | $135,000 | $100,000 | $235,000 |

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to restore high-pressure gas storage capacity in the Space Shuttle Main Engine (SSME) Test Complex at Stennis Space Center (SSC) to ensure the safety and reliability of the high-pressure system. Work includes the installation of approximately 1,250 cubic feet of storage capacity with supporting structure and the fabrication and cleaning of all associated piping and components necessary for connection to the existing gaseous hydrogen system.

PROJECT JUSTIFICATION:

The high-pressure gas storage vessels provide direct support to the Space Shuttle Main Engine (SSME) Test Complex during propulsion testing activity. Many of these vessels were fabricated in the early 1960s from HS-1A (T-1) steel. A 1,250 cubic foot gaseous hydrogen ($GH_2$) storage vessel has been removed from service because of defects in the vessel wall detected during the Pressure Vessel Recertification Program. Internal inspection of $GH_2$ storage vessels are required to be performed in five-year intervals. This cannot be accomplished in the SSME "A" Test Complex,

however, because it requires the vessels to be put out of service for a period of four to six weeks each. There current1y is not enough reserve capacity available to support SSME testing activities during these periods because a vessel had to be removed from service.

IMPACT OF DELAY:

A delay in the implementation of this project will result in the continued operation of the critical high-pressure gas system at the marginal limits of the $GH_2$ storage capacity and will require a pressure vessel recertification waiver.

## PROJECT:

This project includes the procurement and installation of two high-pressure $GH_2$ vessels (approximately 1,250 cubic feet of storage capacity) with supporting structure, and the fabrication and cleaning of all associated piping and components necessary for connection to the existing gaseous hydrogen system.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $2,300,000 |
| Vessels . . . . . | EA | 2 | $934,500 | 1,869,000 |
| Installation . . . . . | EA | 2 | 43,000 | 86,000 |
| Foundations . . . . . | EA | 2 | 57,000 | 114,000 |
| Piping . . . . . | LS | --- | --- | 231,000 |
| Total . . . . . | | | | $2,300,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**JOHN C. STENNIS SPACE CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**RESTORE HIGH PRESSURE GAS STORAGE CAPACITY**

**LOCATION PLAN**

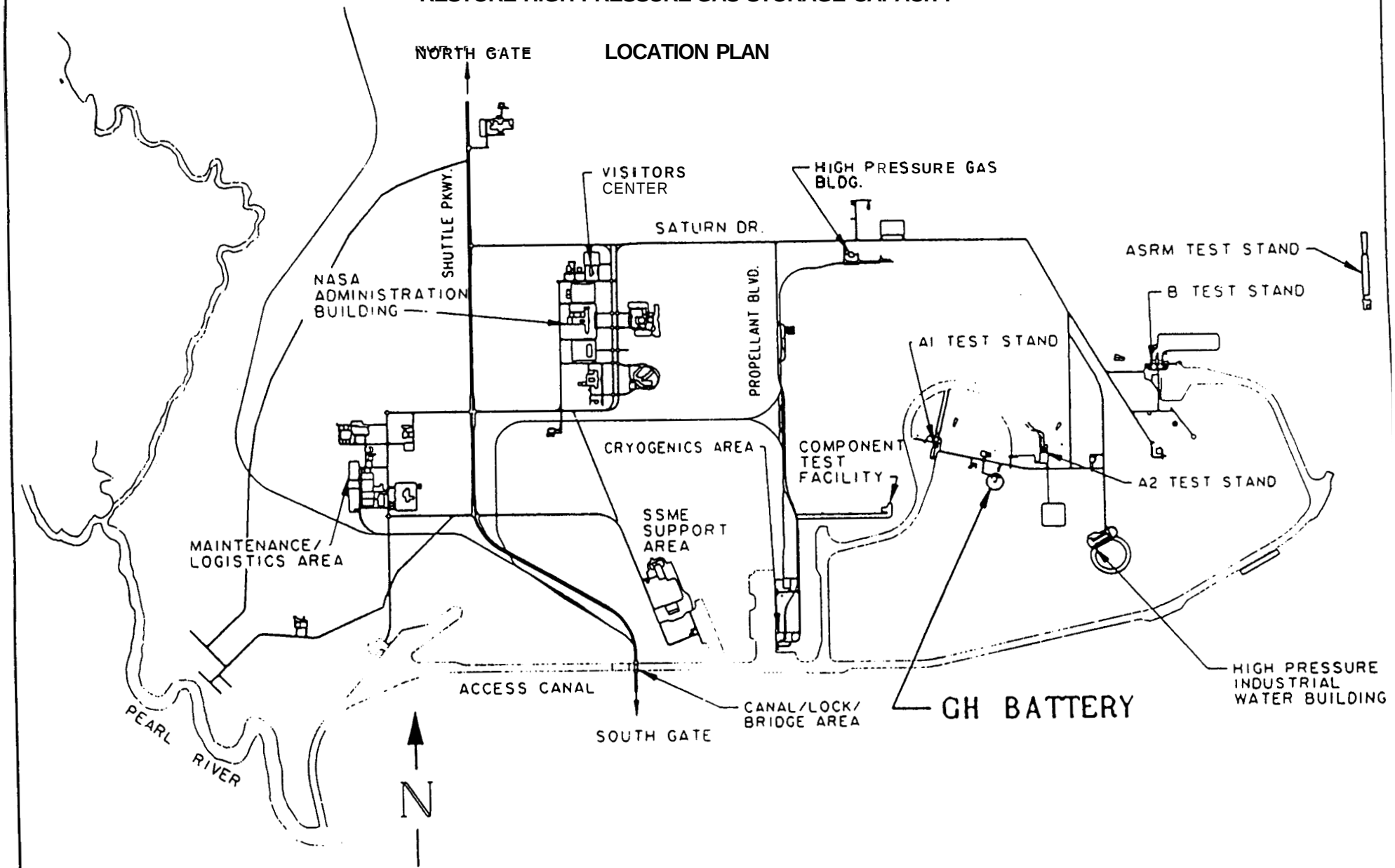



**FIGURE 1**

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Construction of Advanced Solid Rocket Motor Program Facilities

INSTALLATION: Various Locations

FY 1994 CoF Estimate: $32,600,000

LOCATION OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning, Design and Construction Management | Construction | Equipment Procurement | Total |
|---|---|---|---|---|
| Specific CoF Funding | $64,700,000 | $285,770,000 | $163,000,000 | $513,470,000 |
| Capitalized Investment | --- | --- | --- | --- |
| Total | $64,700,000 | $285,770,000 | $163,000,000 | $513,470,000 |

SUMMARY PURPOSE AND SCOPE:

This continues the construction of Advanced Solid Rocket Motor (ASRM) facility projects, technical support, design, and construction management. ASRM is needed to improve margins of safety and reliability, increase payload lift, and add mission capability to the Space Transportation System. The Yellow Creek site in Northeastern Mississippi is the primary site for the production facilities; Stennis Space Center is the primary site for testing facilities; Michoud Assembly Facility is the site for nozzle manufacturing facilities; and rocket motor handling and assembly facilities modifications are included at the Kennedy Space Center. Additional component manufacturing or test facilities of a minor nature may be located at other sites as required.

## PROJECT:

The ASRM will improve the safety and reliability margins of the Solid Rocket Motor (SRM) and Space Shuttle vehicle by reducing or eliminating more than 200 critical failure modes. It also will provide the Shuttle with a significant gain in performance by providing an additional 12,000 pounds of payload capability. Moreover, development of the ASRM will strengthen the technical foundation upon which the United States' leadership in solid fueled rockets can be maintained. Production of the ASRM will require modern and automated facilities with greatly improved manufacturing and quality control processes. The facilities will be designed at a size to support manufacturing of sufficient ASRM flight sets to meet currently planned Space Shuttle launch rates. The present manufacturing process is labor-intensive with many opportunities for human error and requires excessive inspection efforts to ensure achievement of required standards. The new facilities will incorporate state-of-the-art computer controlled manufacturing and assembly techniques to enhance the reliability and safety margins of the rocket motor, reduce human error, and provide more effective inspection techniques.

**IMPACT OF DELAY:**

Delay of this project will delay improvements in Space Shuttle reliability, safety margins and payload lift.

## PROJECT:

The total facility construction program is phased over several fiscal years and includes the following major elements of work: site preparation, utilities, manufacturing and production buildings, test facilities, motor handling and assembly facilities, other required support facilities, and special facilities-related equipment.

The FY 1994 phase of the overall ASRM facility construction program encompasses the following continuation of work: site preparation including fencing, railroad, and parking lots; expansion and extension of existing utilities including raw water, potable water, storm and sanitary-sewer, waste treatment, electrical substations and power distribution and communications systems; static test complex including test stand, control building, hydrotest stand, meteorological facility and barge dock; motor propellent mix/cast/cure complex; motor case refurbishment and preparation facility; motor finish facility; non-destructive test (NDT) facility; nozzle manufacturing complex; production support office; quality assurance test laboratory; security/medical facility; fire station; warehouse buildings and transient/pressure test facility; rotation/processing/storage facility and barge dock modifications.

## FY 1994 PROJECT COST ESTIMATE

The project cost estimate is based on relatively mature criteria and design documentation. As manufacturing concepts are finalized and facility requirements are validated, it is possible that priorities may change and revisions and/or additions to the facilities and estimated costs may be necessary.

| | FY 89 93 | FY 94 |
|---|---|---|
| Land Acquisition | $ 5,700,000 | --- |
| Technical Support, Studies, Design & Construction Management | $64,700,000 | --- |
| Construction | $280,070,000 | $32,600,000 |
| Site/Utilities | (62,000,000) | (2,000,000) |
| Motor Propellent Mix/Cast | (55,000,000) | (5,000,000) |
| Motor Case Prep/Refurb | (40,000,000) | --- |
| Motor Finish/NDE | (24,000,000) | --- |
| Nozzle Manufacture Complex (MAF) | (25,000,000) | (6,600,000) |
| Static Test Complex (SSC) | (33,600,000) | --- |
| Component Test Complex (MSFC) | (1,170,000) | --- |
| Handling & Assembly Facilities (KSC) | (21,300,000) | (18,500,000) |
| Support Facilities | (18,000,000) | (500,000) |
| Subtotal | $280,070,000 | $32,600,000 |
| Special Facilities Related Equipment | 163,000,000 | --- |
| Total | $513,470,000 | $32,600,000 |

LIST OF RELATED GRAPHICS: Figure 1: ASRM-Yellow Creek Site.
Figure 2: ASRM-Michoud Nozzle Manufacture Site.
Figure 3: ASRM-Stennis Test Site.

OTHER EQUIPMENT SUMMARY:

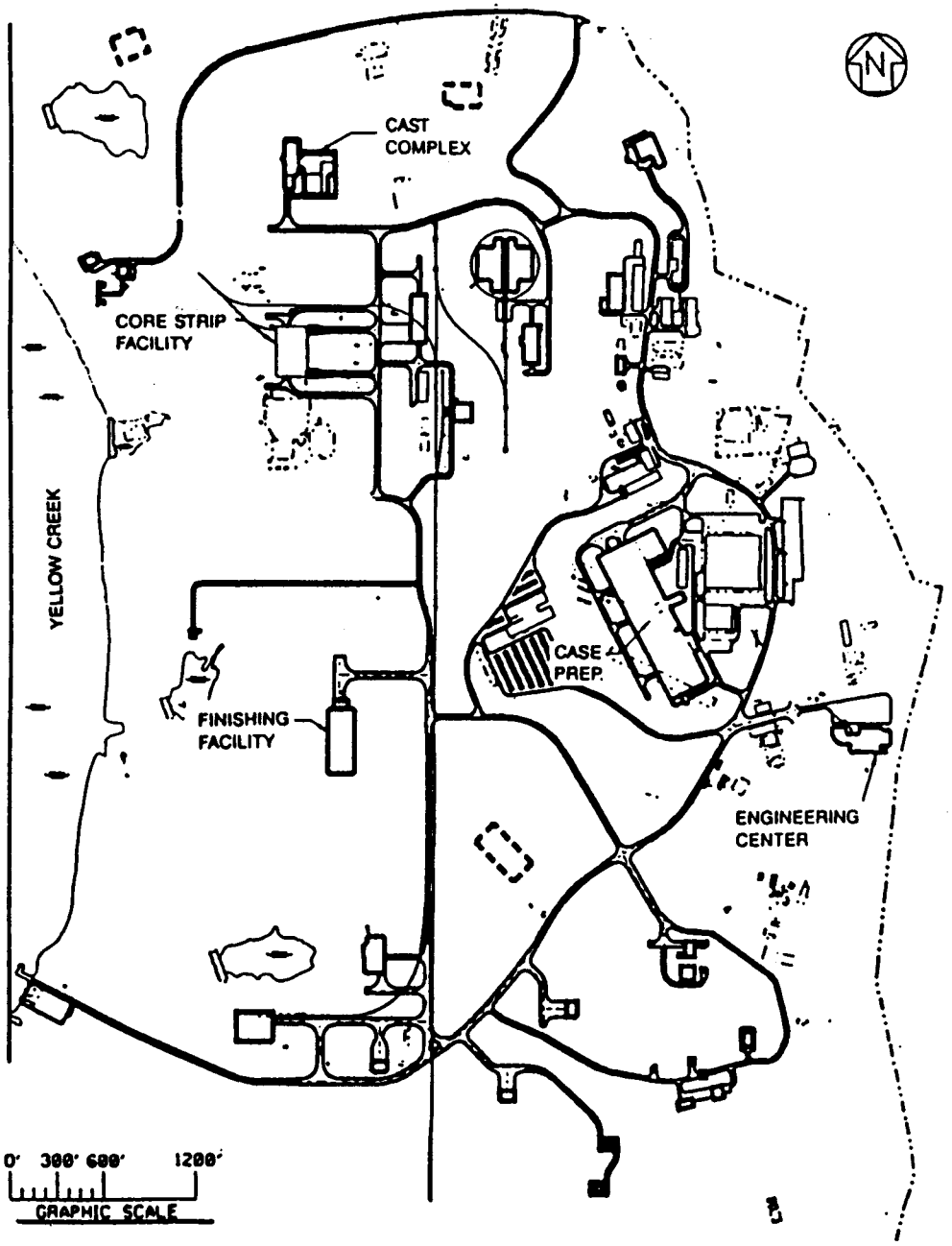
Other equipment to be funded from SFCDC resources is estimated to cost approximately $360 million through completion of development; however, this amount may change as the program matures.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

The total CoF cost for all ASRM facilities construction at various locations (including CoF-funded equipment procurement) is approximately $574 million. An additional funding increment of approximately $28.2 million is required in FY 1995.

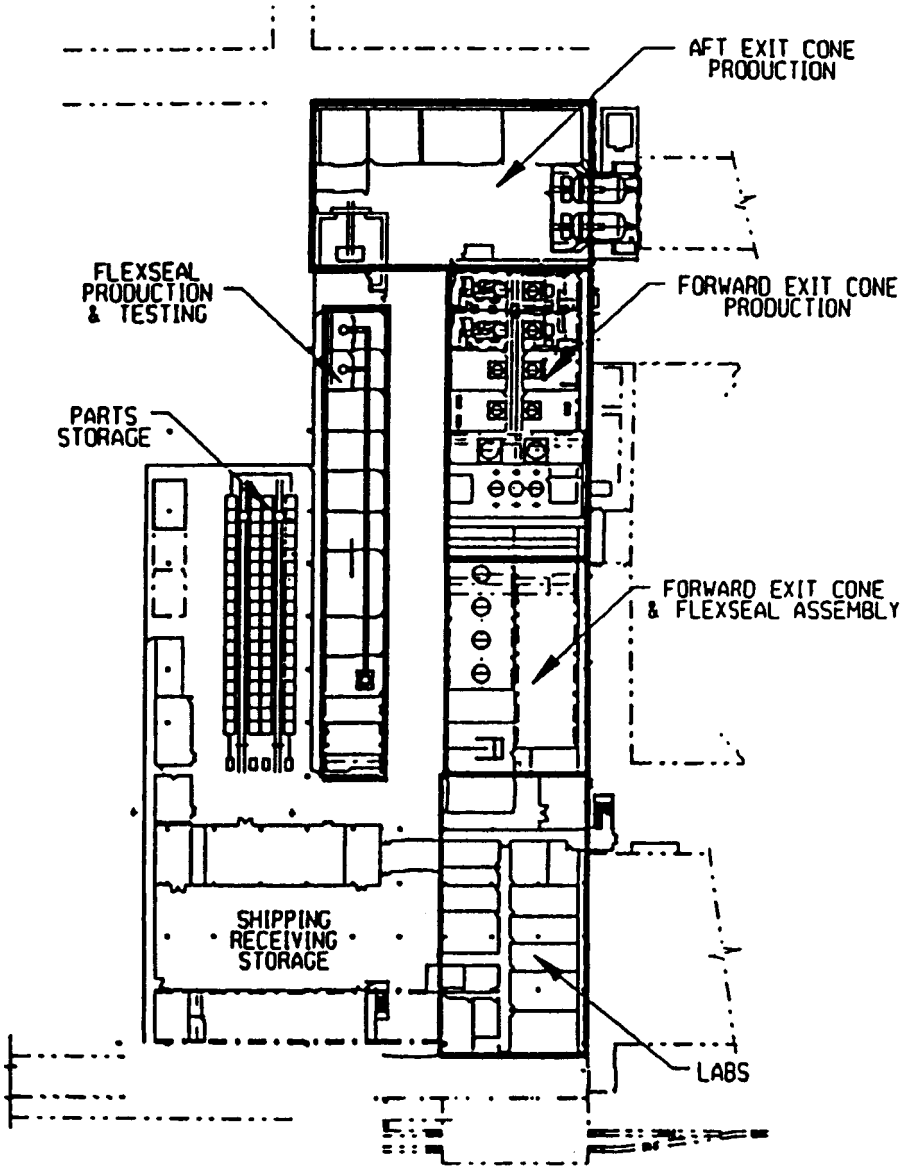
**CONSTRUCTION OF**
**ADVANCED SOLID ROCKET MOTOR FACILITIES**
**FISCAL YEAR 1994 ESTIMATES**
**YELLOW CREEK SITE**

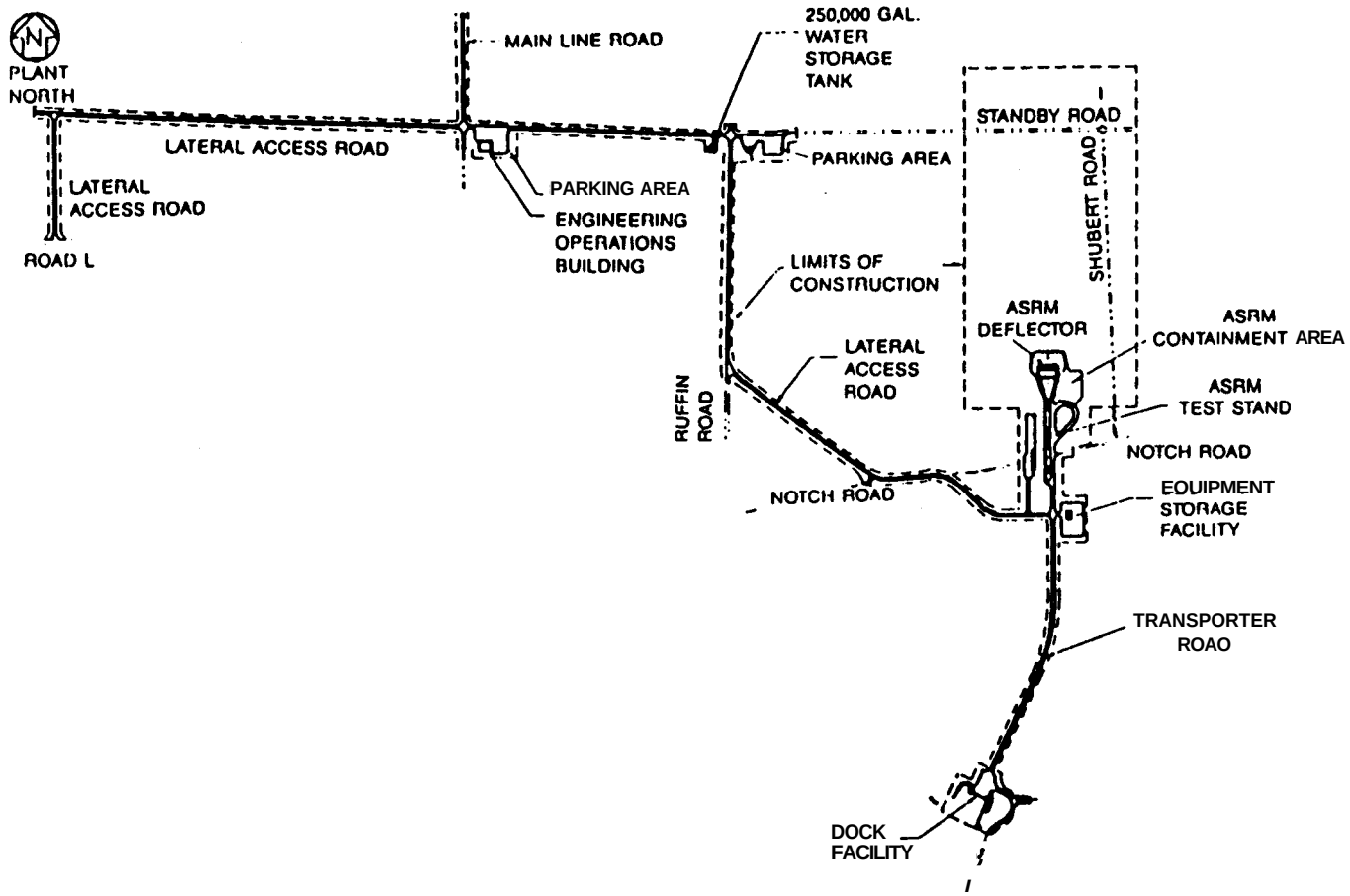
**FIGURE 1**



**CONSTRUCTION OF**
**ADVANCED SOLID ROCKET MOTOR FACILITIES**
**FISCAL YEAR 1994 ESTIMATES**
**MICHOUD NOZZLE MANUFACTURE SITE**

**FIGURE 2**






**CONSTRUCTION OF ADVANCED SOLID ROCKET MOTOR FACILITES**
**FISCAL YEAR 1994 ESTIMATES**
**STENNIS SPACE CENTER TEST SITE**

**FIGURE 3**

Johnson
Space Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

JOHNSON SPACE CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| Space Flight: | | |
| Rehabilitate Electrical Distribution System, Project Management Building.. ..... | 2,200,000 | CF 2-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Rehabilitate Electrical Distribution System, Project Management Building

INSTALLATION: Lyndon B. Johnson Space Center

FY 1994 CoF Estimate: $2,200,000

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:

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $155,855 | --- | $ 155,855 |
| Capitalized Investment . . . . . | --- | $6,572,314 | 6,572,314 |
| Total . . . . . | $155,855 | $6,572,314 | $6,728,169 |

SUMMARY PURPOSE AND SCOPE:

The purpose of this project is to replace the existing obsolete and overloaded electrical system that serves the Project Management Building (1). The work includes installing conductors from a new outdoor substation to both ground-floor mechanical rooms and bus ducts to the various floors of the building including the penthouse.

PROJECT JUSTIFICATION

The electrical substation equipment located in the Building 1 penthouse is 30 years old. Deterioration of the system's electrical insulation, particularly of the dry-type transformers, significantly degrades the reliability of the equipment. Switchgear components are obsolete and

only limited spare parts are available. The ground-level electrical substation to be provided will be equipped with oil-filled transformers that can be more easily accessed and maintained. With the establishment of a new substation for the building, activation and power cut-over can be accomplished without interrupting normal building operations. In addition, the new substation will provide needed additional electrical capacity to adequately service increased electrical loads in this major building.

IMPACT OF DELAY:

A delay in this project could result in an unscheduled loss of power to this building for several days or weeks, which could require costly emergency repairs and severe interruptions of critical JSC operations.

## PROJECT:

A new substation will be installed at ground-level adjacent to Building 1. Necessary electrical conductors, switchgear, and panels will be installed. Building electrical distribution and related air-conditioning will be upgraded as required.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $2,200,000 |
| Sitework . . . . . | LS | --- | --- | 87,300 |
| Demolition . . . . . | LS | --- | --- | 36,400 |
| Asbestos Removal . . . . . | LS | --- | --- | 119,700 |
| Mechanical Work . . . . . | LS | --- | --- | 237,000 |
| Electrical Work . . . . . | LS | --- | --- | 1,719,600 |
| Total . . . . . | | | | $2,200,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Perspective Drawing

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

LYNDON B. JOHNSON SPACE CENTER
FISCAL YEAR 1994 ESTIMATES
REHABILITATE ELECTRICAL DISTRIBUTION SYSTEM,
PROJECT MANAGEMENT BUILDING
PERSPECTIVE DRAWING

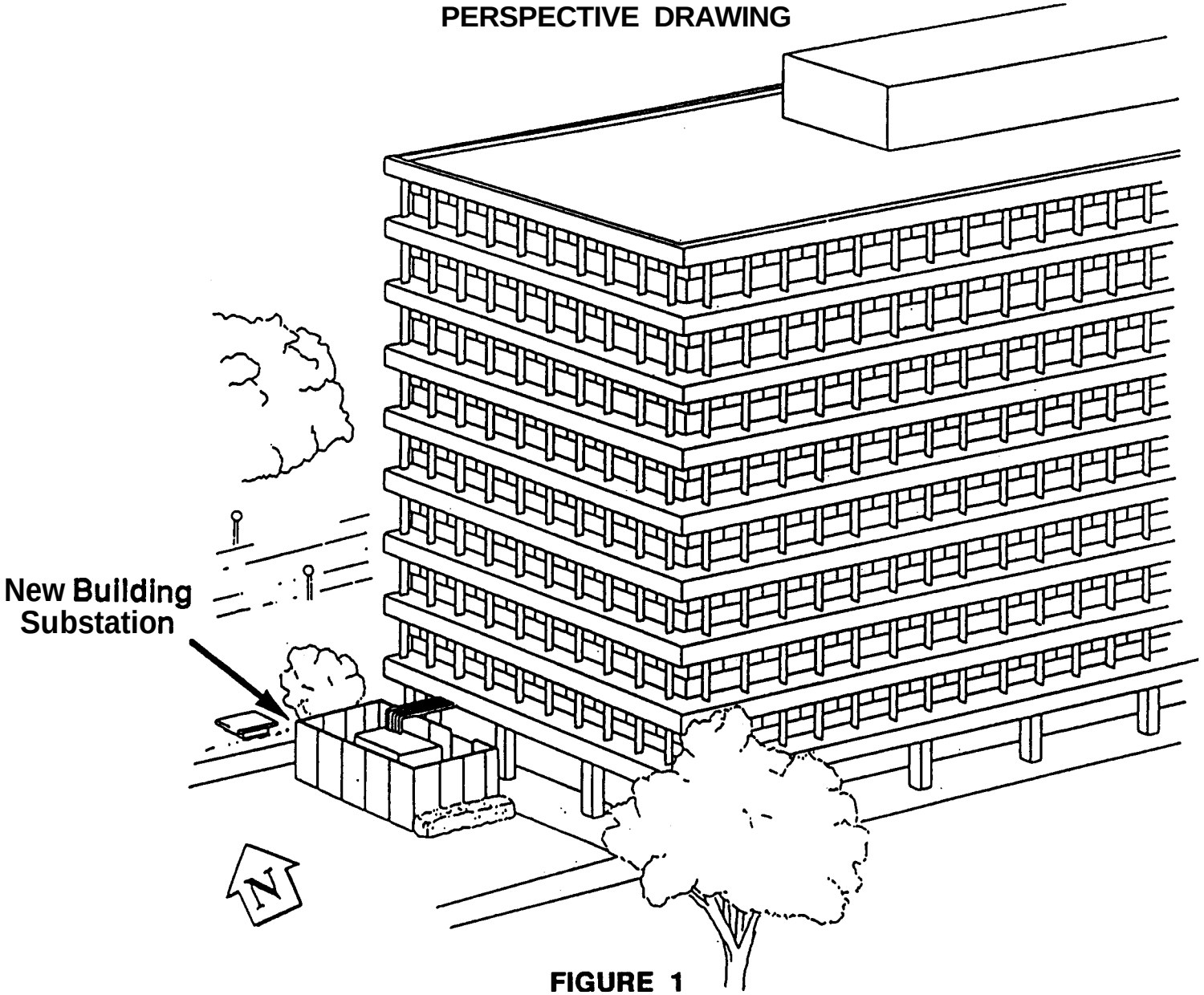



FIGURE 1

Kennedy
Space Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

KENNEDY SPACE CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Space Flight:** | | |
| Restore Class III Landfill | 1,900,000 | 3-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Restore Class III Landfill

INSTALLATION: John F. Kennedy Space Center

FY **1994** CoF Estimate: $1,900,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $210,000 | --- | $210,000 |
| Capitalized Investment . . . . . | --- | --- | --- |
| Total . . . . . | $210,000 | --- | $210,000 |

SUMMARY PURPOSE AND SCOPE:

This project provides for restoration of Class III landfill capability by developing a 67 acre site located due east of the Schwartz Road Landfill for this purpose. This landfill is required to accommodate the disposal of non-hazardous debris such as demolition materials, steel, glass, roofing materials, and masonry.

PROJECT JUSTIFICATION:

The present landfill at KSC located on Schwartz Road will soon reach its permitted capacity. On-Center capability is required for disposal of construction debris because off-site disposal would be very costly due to high transportation costs and fees charged by off-site agencies. In addition, off-site disposal could potentially expose NASA to some operational liability should off-site disposal areas become contaminated by other customers.

Cost benefit analyses support restoration of the Class III landfill capability versus off-site disposal. Payback analysis shows a break-even point late in the second year of operation versus hauling off-site. Also, should local off-site disposal sites be closed, KSC would be faced with more distant and more expensive disposal costs.

**IMPACT OF DELAY:**

The present facility only has capacity to support Center requirements for approximately two more years. This requires restoration of the Class III landfill capability by late calendar year 1993. If this project is not approved, the Center will have to incur additional expensive off-site disposal costs.

## PROJECT:

This project provides for the development of 67 acres that will be permitted as a Class III landfill. The area will be located at the east end of Schwartz Road due east of the existing Schwartz Road Landfill. Work includes clearing the site for construction of disposal cells, constructing a stabilized access roadway, hauling approximately 200,000 cubic yards of fill dirt to the site for coverage, installing monitoring wells, and constructing a stormwater management system.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $1,900,000 |
| Clearing . . . . . | AC | 67 | $2,402.99 | 161,000 |
| Grading . . . . . | SY | 326,000 | .35 | 114,000 |
| Road . . . . . | SY | 1,100 | 6.36 | 7,000 |
| Fill . . . . . | CY | 200,200 | 5.61 | 1,123,000 |
| Wells . . . . . | LF | 225 | 66.67 | 15,000 |
| Stormwater Management . | LS | --- | --- | 250,000 |
| Mitigation . . . . . | LS | --- | --- | 230,000 |
| Total . . . . . | | | | $1,900,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# JOHN F. KENNEDY SPACE CENTER
# FISCAL YEAR 1994 ESTIMATES
# RESTORE CLASS III LANDFILL

## LOCATION PLAN

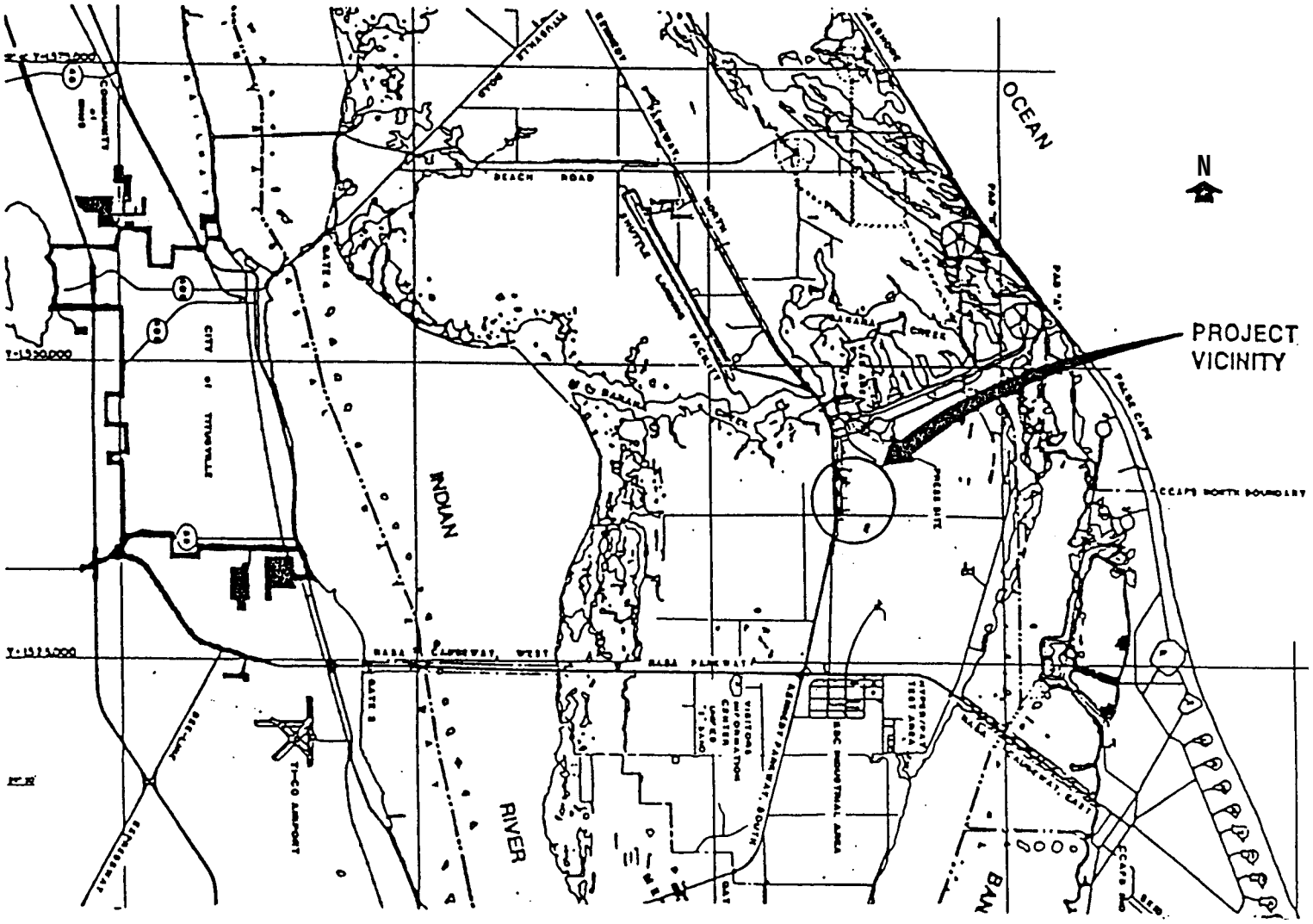



FIGURE 1

Marshall
Space Flight
Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OFFICE OF MANAGEMENT AND BUDGET
FISCAL YEAR 1994 ESTIMATES
CONSTRUCTION OF FACILITIES

SUMMARY

MARSHALL SPACE FLIGHT CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| Space Flight: | | |
| Restoration of Electrical Power System..... | 2,600,000 | CF 4-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restoration of Electrical Power System

INSTALLATION: George C. Marshall Space Flight Center

FY 1994 CoF Estimate: $2,600,000*

*NOTE: This is the NASA portion of a jointly funded NASA/DOD facility project.

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $75,000** | --- | $75,000 |
| Capitalized Investment . . . . . | --- | --- | --- |
| Total . . . . . | $75,000 | --- | $75,000 |

**NOTE: This is the NASA portion of planning and design.

SUMMARY PURPOSE AND SCOPE:

This is a joint project between the Department of the Army and NASA to replace a 45 megavolt amperes (mva) primary electrical power substation at Redstone Arsenal. The Army will fund the cost of replacing the existing substation with one of equal capacity. NASA will fund the cost of augmenting the capacity of the substation by an additional 15 mva. This project is required to support the increasing electrical power needs of NASA programs and to restore overall system reliability.

## PROJECT:

The electrical substation to be replaced is owned and maintained by the Army, but primarily serves NASA activities. The substation is over 40 years old and seriously overloaded. It operates continually with cooling fans running, which reduces transformer life and decreases reliability. This is a high risk situation because the substation carries 80 percent of MSFC's total electrical power load. The Army is cognizant of this situation and has budgeted a repair project to replace the substation with one of equal capacity. However, since the existing substation is undersized for the current loads, NASA needs to augment it to avoid a repeat of the current overload condition. This project is critical to ensure the Center has the capability to provide reliable power to support its ongoing test programs, payload mission operations, and research and development activities.

**IMPACT OF DELAY:**

Delay of this project will impact all programmatic activities at the Center. Failure to augment the substation places operational restrictions on Center programs that substantially increase program costs and cause schedule slips. Continued operation of the primary substation in an overload condition also places the Center at risk of a major electrical brownout or blackout.

## PROJECT:

This project provides for the purchase and installation of a 15 mva transformer with associated switchgear, circuit breakers, and site work. This equipment will be installed concurrent with the Army's replacement of Primary Substation No. 3. The project also provides for the installation of new 44 kV transmission lines, as required, between the primary substation and NASA secondary substations.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $7,600,000 |
| Army Share of Project: | | | | |
| Three 15 mva transformers with associated site work, switchgear, and 44kV transmission lines to Army secondary substations . . . | LS | --- | --- | 5,000,000 |
| NASA Share of Project: | | | | |
| One 15 mva transformer with associated site work, switchgear, and 44kV transmission lines to NASA secondary substations . . . | LS | --- | --- | $2,600,000 |
| Total . . . . . | | | | $7,600,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**MARSHALL SPACE FLIGHT CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**RESTORATION OF ELECTRICAL POWER SYSTEM**
**LOCATION PLAN**

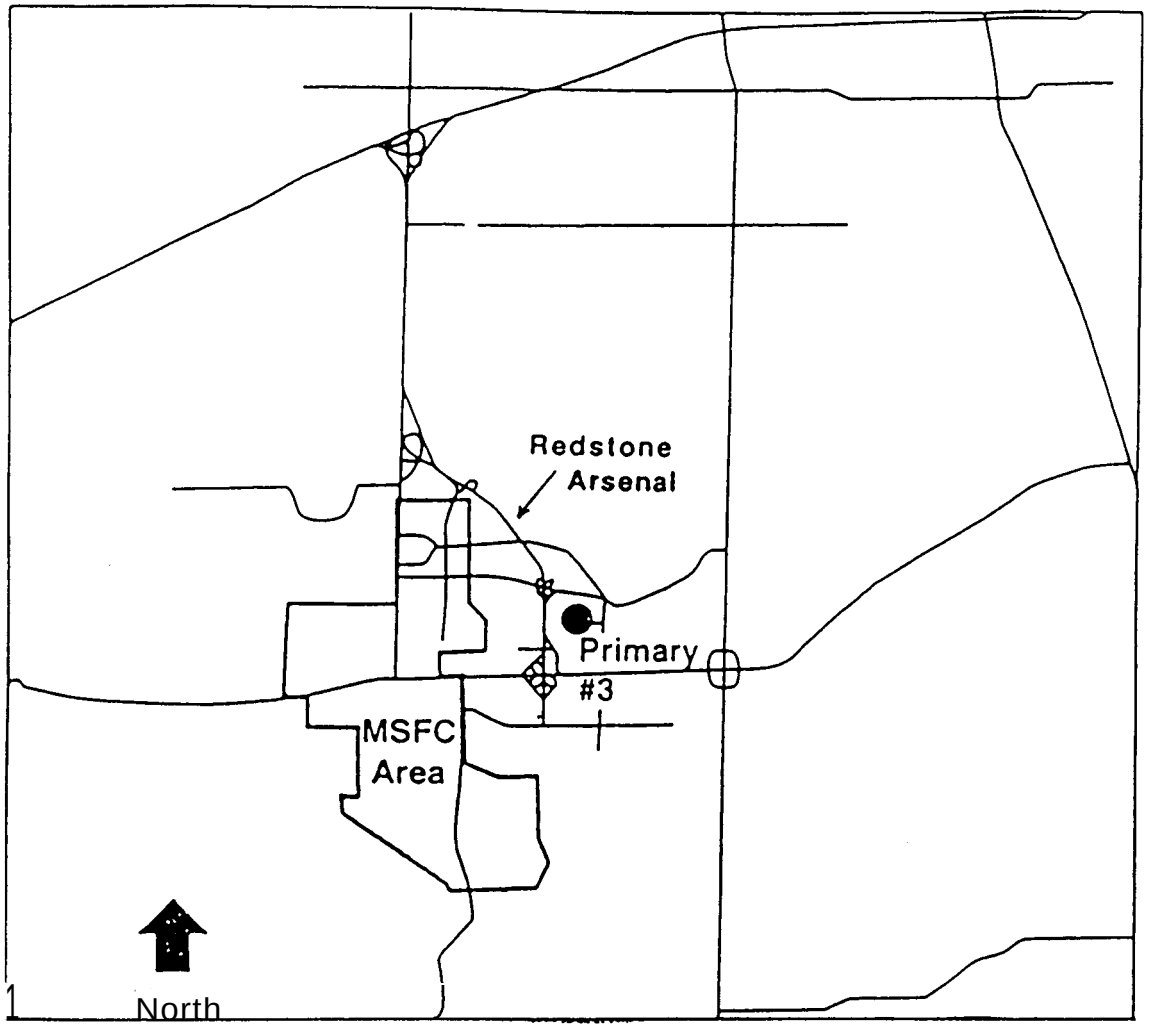



**FIGURE 1**

Stennis
Space Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

STENNIS SPACE CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Space Flight:** | | |
| Restoration of Underground Communication Distribution System..... | 200,000 | CF 5-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restoration of Underground Communication Distribution System

INSTALLATION: John C. Stennis Space Center

FY 1994 CoF Estimate: $3,800,000

LOCATION OF PROJECT: Stennis Space Center, Hancock County, Mississippi

COGNIZANT HEADQUARTERS OFFICE: Office of Space Flight

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $537,400 | $2,935,000 | $3,472,400 |
| Capitalized Investment . . . . . | --- | 4,444,060 | $4,444,060 |
| Total . . . . . | $237,400 | $7,379,060 | $7,916,460 |

SUMMARY PURPOSE AND SCOPE

This project provides for the restoration of approximately 10,700 linear feet of underground communication distribution system duct banks in the industrial area of Stennis Space Center (SSC) to restore the reliability of the existing system and to meet future communication requirements in the area.

PROJECT JUSTIFICATION:

The existing underground communication duct bank system along the industrial area route is at maximum capacity. The interior of the duct banks are blocked in many places because the "Orangeburg" (tar impregnated paper) ducts of this old system are swelled shut due to water penetration. Additional duct capacity is critical for providing communication services to the existing and proposed facilities along these routes. Due to the size of the communication cable

required, underground installation is the most cost-effective method. Direct burial of this cable would reduce system flexibility and subject the system to unnecessary risk.

**IMPACT OF DELAY:**

Delay in the implementation of this project will result in decreased reliability of the existing communication system and the inability to meet future communication requirements along this route.

## PROJECT:

This project provides for the restoration of 10,700 linear feet of existing underground communication distribution system duct banks in the industrial area of ssc. Also included is an extension to support Building 3202, an extension to support the expansion at the Administrative area, and a branch extending down Propellant Boulevard to the Component Test Facility (CTF). Work includes the construction of double bay manholes, eight feet deep by twelve feet long by six feet wide, placed a minimum of 600 feet apart.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $3,800,000 |
| Sitework . . . . . | LS | --- | --- | 240,000 |
| Duct Bank . . . . . | LF | 10,700 | 298.13 | 3,190,000 |
| Manholes . . . . . | EA | 54 | 6,851.85 | 370,000 |
| Total . . . . . | | | | $3,800,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

JOHN C. STENNIS SPACE CENTER
FISCAL YEAR 1994 ESTIMATES
RESTORATION OF UNDERGROUND COMMUNICATION DISTRIBUTION SYSTEM

**LOCATION PLAN**

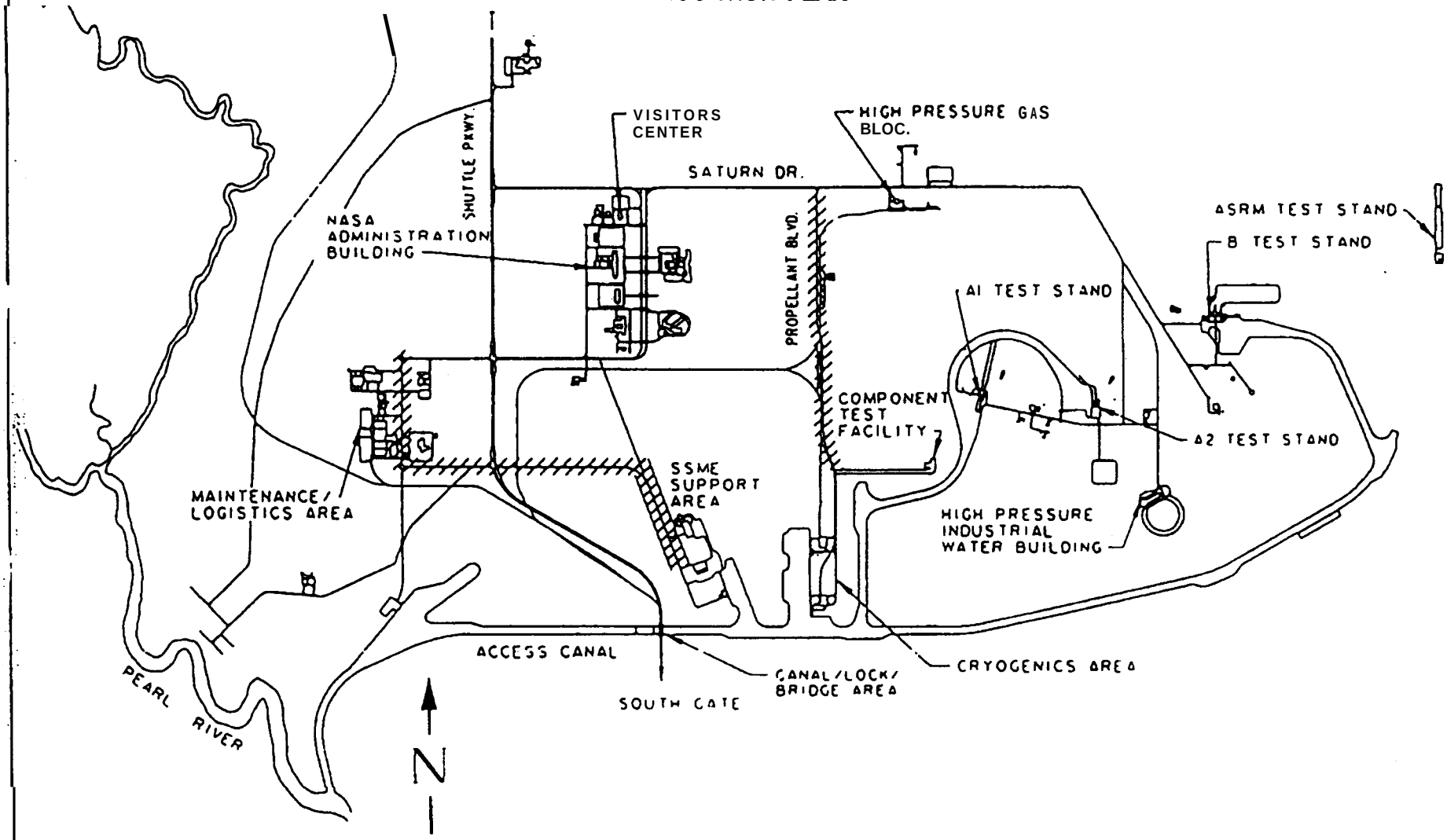



**FIGURE 1**

Goddard
Space Flight
Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

GODDARD SPACE FLIGHT CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| Mission To Planet Earth: | | |
| [redacted]uction of Earth Systems Science Building | 12,000,000 | CF 6-1 |
| Replacement of Central Plant Steam and Electrical Generation Equipment | 8,600,000 | CF 6-5 |
| Restoration and Modernization of Chilled Water System | 5,000,000 | CF 6-11 |
| Total | 25,600,000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Construction of Earth Systems Science Building

INSTALLATION: Goddard Space Flight Center

FY 1994 CoF ESTIMATE: $12.000.000

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

COGNIZANT HEADQUARTERS OFFICE: Mission to Planet Earth

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $4,849,000 | --- | $ 4,849,000 |
| Capitalized Investment . . . . . | --- | --- | --- |
| Total . . . . . | $4,849,000 | --- | $ 4,849,000 |

SUMMARY PURPOSE AND SCOPE

This project provides the first increment of an 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 second and third increments to complete the facility are planned for FY 1995 and 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 the responsibilities for development of Earth Observing

capabilities including responsibility for 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, and principal or co-investigator responsibilities for a number of EOS-related scientific investigations, as well as Land Remote-Sensing Satellite (LANDSAT), and responsibility for processing, archiving, and disseminating GSFC-related EOS data.

The Earth System Science Building (ESSB) is fundamental to the fulfillment of GSFC EOS/Global Change Science responsibilities. It brings together vital elements of GSFC's substantial Earth Sciences talent in specialized facilities dedicated to the conduct of EOS/Global Change research. Such an arrangement is essential to facilitate and promote the interdisciplinary approach to 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, availing them of the benefits of GSFC's considerable Remote Sensing expertise. 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 create a consolidated environment in which interdisciplinary interactions are fostered not only for the resident GSFC earth scientists but also for visiting scientists. The ESSB also anticipates the need to 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 in which to do 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:

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. This increment will provide for site development/utilities, and will include 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. The second increment (FY 1995) provides for the ESSB shell and procurement of building architectural, mechanical and electrical long lead items. The third increment (FY 1996) provides 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 all necessary 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, as well as construction of new access roads, necessary parking lots, area lighting, and security fencing and a gate house. Also included is construction of footings and foundations; erection of structural steel; construction of composite concrete and metal floor and roof slabs; construction of exterior walls, doors, windows, and weatherproofing systems; and installation of interior doors, partitions, and finishes. Installation of necessary mechanical and electrical equipment, sized for sufficient capacity to support immediate needs with a modest capacity for future growth, is also included. Appropriate internal building support areas will be provided, including laboratories, loading dock areas, storage spaces, stairs, elevators, restrooms, entrance lobby, fire protection and detection systems, and internal building security 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.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $12,000,000 |
| Site Development . . . . . | LS | --- | --- | 2,100,000 |
| Site Utilities . . . . . | LS | --- | --- | 2,000,000 |
| Utility Plant Expansion . . . . . | SF | 21,000 | 214.29 | 4,500,000 |
| Building Foundations . . . . . | SF | 290,000 | 11.72 | 3,400,000 |
| Total . . . . . | | | | $12,000,000 |

Note: This cost estimate provides for the FY 1994 increment of the total facility. The total cost of the project is estimated to be approximately $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:

To complete this project, a second increment will be included in the FY 1995 budget request at $17,000,000 and a third increment in the FY 1996 budget at $17,000,000.

# GODDARD SPACE FLIGHT CENTER
# FISCAL YEAR 1994 ESTIMATES
# CONSTRUCTION OF EARTH SYSTEMS SCIENCE BUILDING (ESSB)

## LOCATION PLAN

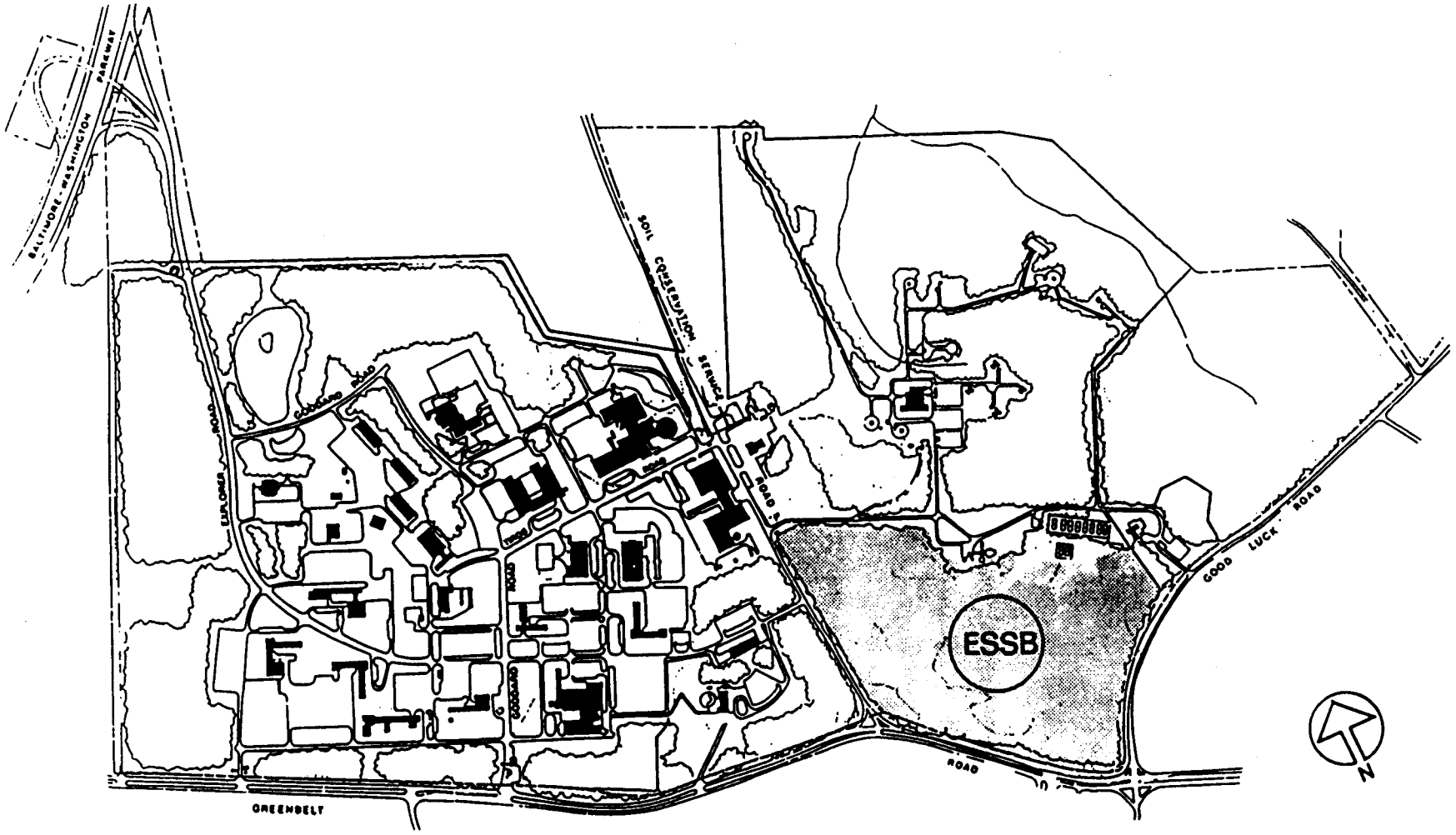



FIGURE 1

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Replacement of Central Plant Steam and Electrical Generation Equipment

INSTALLATION: Goddard Space Flight Center

FY 1994 CoF Estimate: $8,600,000

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

COGNIZANT HEADQUARTERS OFFICE: Mission to Planet Earth

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $776,000 | --- | $ 776,000 |
| Capitalized Investment . . . . . | --- | $5.597,946 | 5,597,946 |
| Total . . . . . | $776,000 | $5,597,946 | $6,373,946 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the replacement of 25- to 30-year-old steam generation equipment and emergency diesel generator sets located in the Central Heating and Cooling Plant, Building 24, with three new 40,000 lb/hr. dual fuel, water-tube boilers and five new 1,000 KW diesel-generator sets. The project will also provide for the construction of an addition to the existing generator building (24C) to house the new diesel generators and associated equipment.

PROJECT JUSTIFICATION:

This project will replace current steam and electrical generation capability in Building 24. Steam boilers and diesel generator sets are 25 to 30 years old, and are nearing the end of their service life. The central steam plant is required to provide steam to all major buildings for heating, hot water and humidification. Diesel generator sets are required to provide emergency backup power to mission critical facilities. Due to equipment age, replacement parts are not readily available. Currently, Building 24 houses five boilers with a combined capacity of 158,000 pounds per hour. The existing diesel generator capacity consists of four 500 KW generators in the basement of Building 24 and three 500 KW generators in Building 24C. The project is a key element of ongoing efforts to restore the Center's utilities infrastructure before serious and disruptive equipment breakdowns occur.

IMPACT OF DELAY:

Deferral will increase the probability of boiler and diesel generator failures and increase maintenance downtime, reducing plant reliability for meeting steam and back-up power requirements for mission support.

PROJECT:

This project provides for removal of four steam, water-tube boilers with combined capacity of 123,000 pounds per hour; removal of ancillary equipment associated with each boiler, as required; removal of all asbestos material within scope of construction and replacement with non-asbestos material, as required; and removal of existing diesel-generator sets, associated switchgear, controls and cabling from the basement of Building 24.

Replacement steam generation equipment will consist of three dual fuel (natural gas/#2 fuel oil) water-tube boilers with a capacity of 40,000 lb/hr, each. The new equipment will be designed to use #2 fuel oil as a back-up fuel source. Also included are upgrades and structural modifications to accommodate new equipment and to retain boiler No. 6 as a back-up unit. Conversion of burner and pneumatic controls on Boiler No. 6 and fuel system modifications to permit use of #2 fuel oil are also included. In addition, the project provides five 1,000 KW diesel-generator sets to replace existing diesel equipment in the basement of Building 24, and to accommodate current and known growth in emergency power requirements. The project also provides for an addition to the generator Building 24C to house the new generators and associated equipment. The project also includes conversion of the diesel equipment room in the basement of Building 24 to a storeroom.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $8,600,000 |
| Boiler Replacement . . . . . | LS | --- | --- | 4,600,000 |
| Diesel Replacement . . . . . | LS | --- | --- | $4,000,000 |
| Total . . . . . | | | | $8,600,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan
Figure 2 - Proposed Boiler Plant Layout
Figure 3 - Proposed Diesel Plant Layout

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# GODDARD SPACE FLIGHT CENTER
# FISCAL YEAR 1994 ESTIMATES
# REPLACEMENT OF CENTRAL PLANT STEAM AND ELECTRICAL GENERATION EQUIPMENT

## LOCATION PLAN

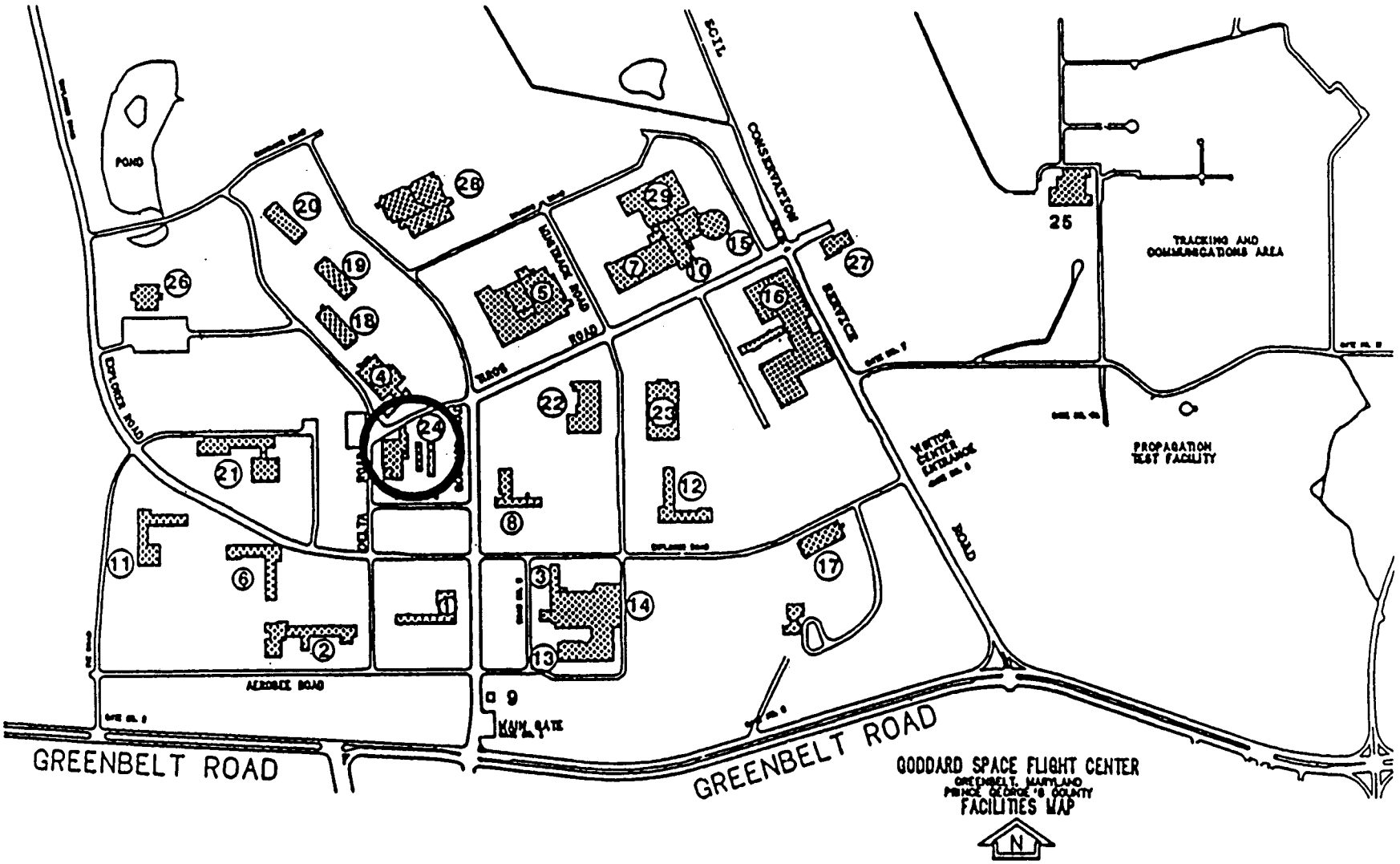
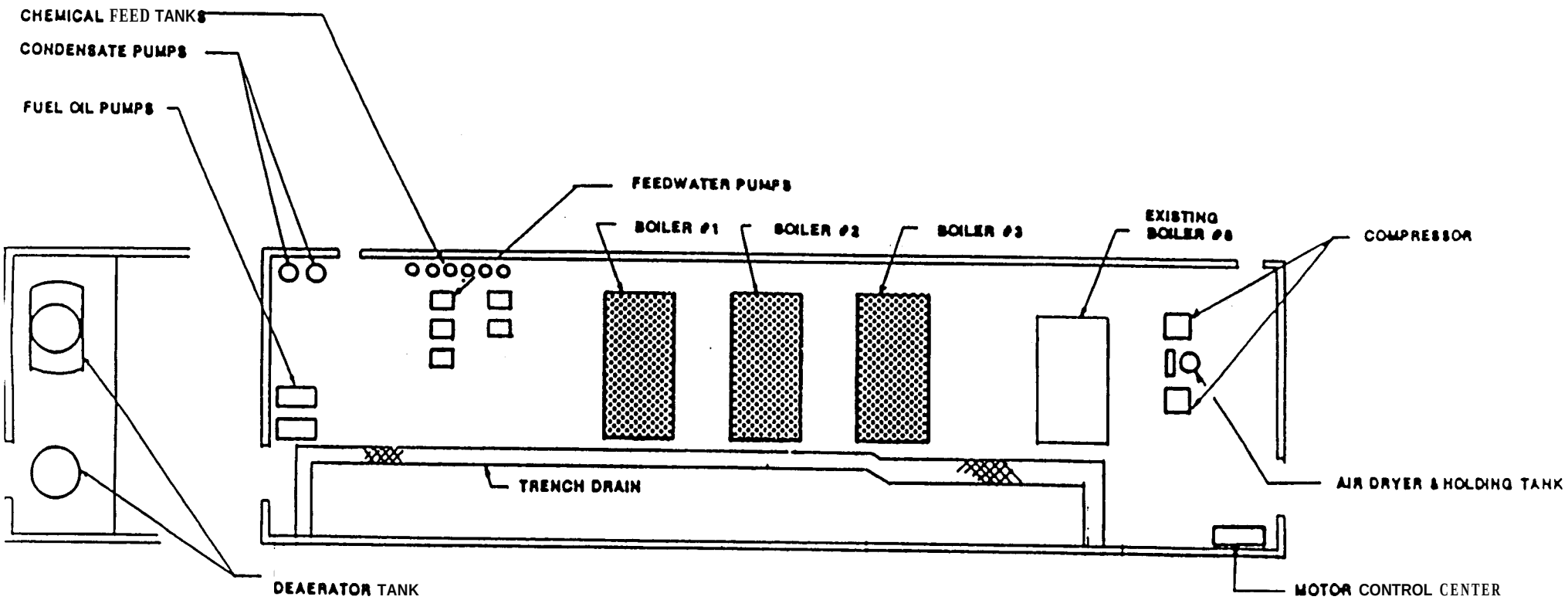



FIGURE 1

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1994 ESTIMATES
REPLACEMENT OF CENTRAL PLANT STEAM AND ELECTRICAL GENERATION EQUIPMENT

PROPOSED BOILER PLANT LAYOUT




NEW 40,000 LB/HR BOILERS

FIGURE 2

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1994 ESTIMATES
REPLACEMENT OF CENTRAL PLANT STEAM AND ELECTRICAL GENERATION EQUIPMENT

PROPOSED DIESEL PLANT LAYOUT

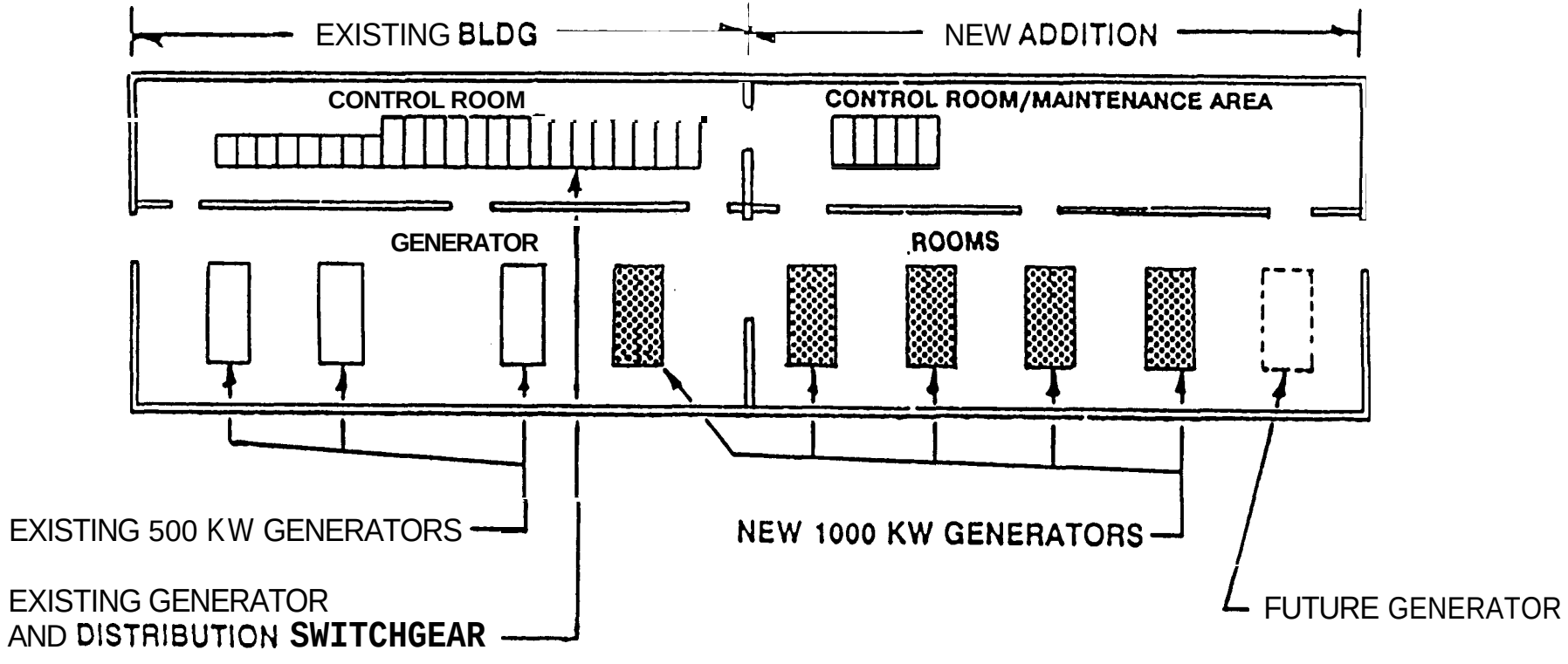



FIGURE 3

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restoration and Modernization of Chilled Water System

INSTALLATION: Goddard Space Flight Center

FY 1994 CoF ESTIMATE: $5.000.000

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

COGNIZANT HEADQUARTERS OFFICE: Mission to Planet Earth

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $475,000 | --- | $ 475,000 |
| Capitalized Investment . . . . . | --- | $3,874,500 | 3,874,500 |
| Total . . . . . | $475,000 | $3,874,500 | $ 4,349,500 |

SUMMARY PURPOSE AND SCOPE

This project provides for the restoration and modernization of the Center's central chilled water system. The project consists of the replacement of chiller #8 (3,000 ton unit) at the central plant, the upgrade of the central plant chilled water pumping system, and the replacement/upgrade of the site chilled water distribution piping system.

## PROJECT JUSTIFICATION

Chiller #8 is approximately 20 years old and is increasingly difficult to maintain because of a limited availability of replacement parts. The current chilled water pumping configuration reflects old design technology. The system is inefficient and difficult to control and operate. The central plant has a capacity of 10,500 tons. Activation of facilities currently under construction is expected to increase the load to 10,500 tons. The only backup will then be Chiller #8. The age and condition of Chiller #8 places it at high risk of failure with a prolonged down-time. Consequently, there is a high probability that loss of a second chiller due to failure or required maintenance would result in the inability of the plant to support a peak-load condition, thus requiring load sheading. Distribution system lines are old and at increased risk of failure, which could result in loss of cooling to critical operational areas. Systematic replacement and upgrade of the central chilled water distribution system is required to minimize the risk associated with distribution system failure. Modifications will also increase the energy efficiency and performance of the plant.

## IMPACT OF DELAY:

Delay of the project will increase the risk of equipment and line distribution system failure, leading to a requirement for load sheading, which will have a very negative impact on Goddard's programmatic/institutional operations.

## PROJECT:

This project provides for the replacement of Chiller #8 with a new 3,000 ton unit; upgrading of the center chilled water pumping system and installation of new pumps in the central plant to hydraulically isolate the chiller loop and the distribution loop; and replacement of portions of the site distribution system piping to include removal of deteriorated and undersized pipe sections and balancing of chilled water systems to all buildings.

Asbestos insulation on existing piping shall be removed to the extent that it is necessary to perform the work. All asbestos work shall conform to Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $5,000,000 |
| Chiller Replacement . . . . . | LS | --- | --- | 2,500,000 |
| Upgrade Chilled Water Pump System | LS | --- | --- | 1,500,000 |
| Replace Distribution Piping . . . | LS | --- | --- | 1,000,000 |
| Total . . . . . | | | | $5,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan
Figure 2 - Proposed Chiller Plant Layout

OTHER EQUIPMENT SUMMARY: None

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# GODDARD SPACE FLIGHT CENTER
# FISCAL YEAR 1994 ESTIMATES
# RESTORATION AND MODERNIZATION OF CHILLED WATER SYSTEM

## LOCATION PLAN

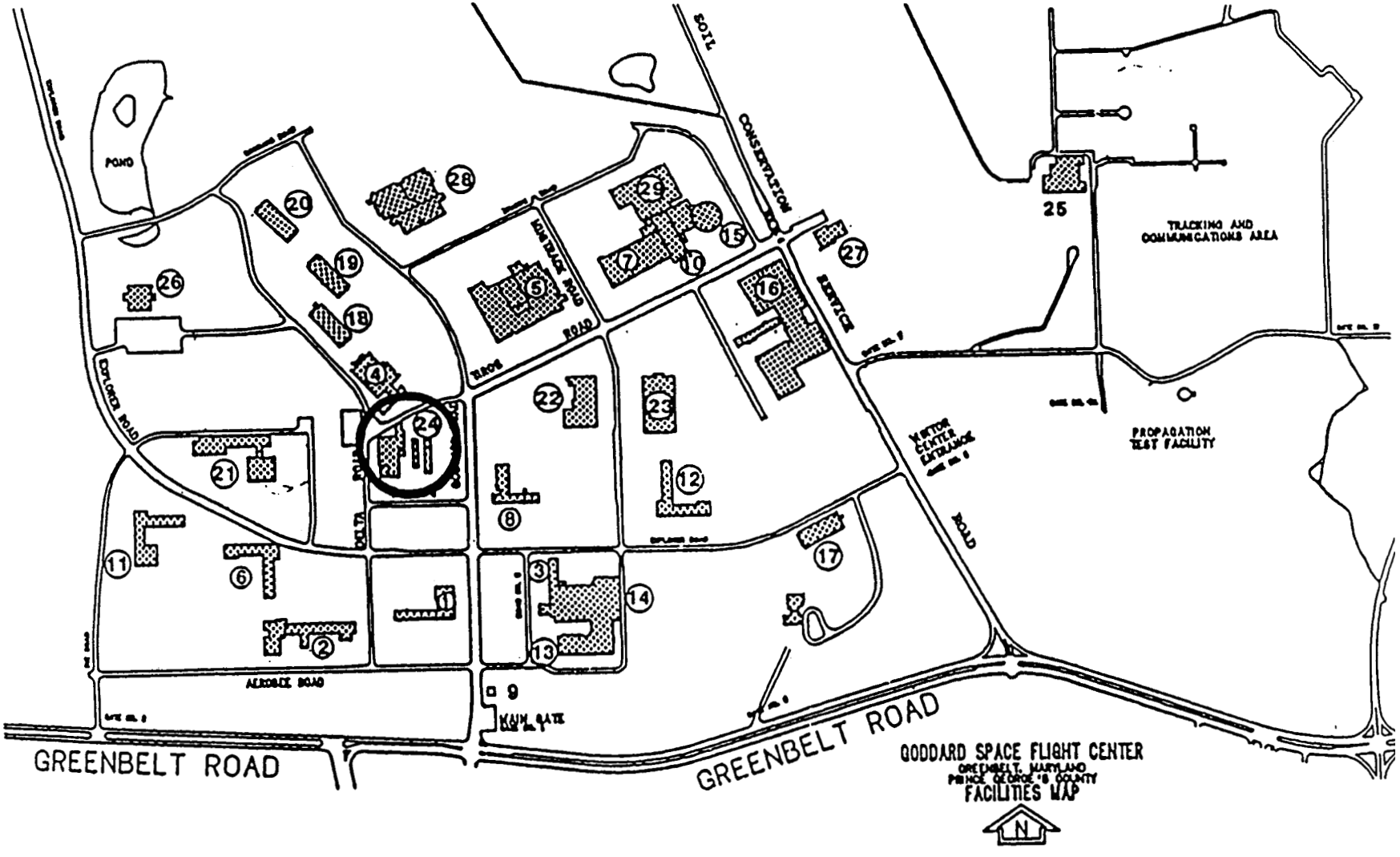



FIGURE 1

# GODDARD SPACE FLIGHT CENTER
# FISCAL YEAR 1994 ESTIMATES
# RESTORATION AND MODERNIZATION OF CHILLED WATER SYSTEM

## PROPOSED CHILLER PLANT LAYOUT

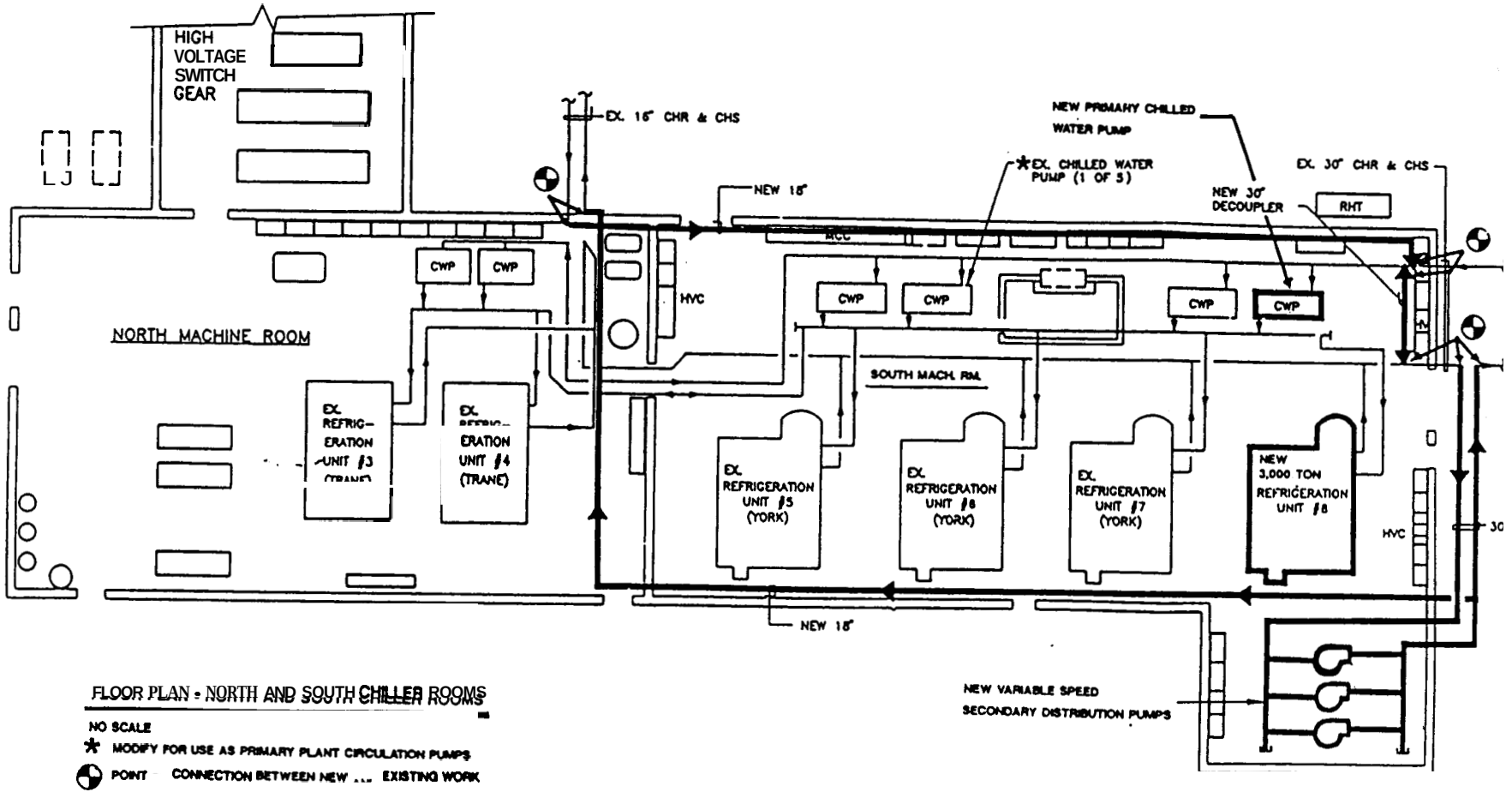



FIGURE 2

Jet Propulsion
Laboratory

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

JET PROPULSION LABORATORY

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Space Science:** | | |
| Modifications to Cooling Systems, Various Buildings | 2,900,000 | CF 7-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Modifications to Cooling Systems, Various Buildings

INSTALLATION: **Jet Propulsion Laboratory**

FY **1994** CoF Estimate: **$2,900,000**

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

COGNIZANT HEADQUARTERS OFFICE: Office of Space Science

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $ **214,000** | --- | $ **214,000** |
| Capitalized Investment . . . . . | --- | $14,032,883 | 14,032,883 |
| Total . . . . . | $ 214,000 | $14,032,883 | $14,246,883 |

**SUMMARY PURPOSE AND SCOPE**

The project will replace eight obsolete air conditioning water chillers with five state-of-the-art chillers. This will eliminate the need to obtain expensive hand-made replacement parts and use ozone depleting refrigerants. Replacement of high maintenance, obsolete equipment with modern efficient machines using environmentally acceptable refrigerants will provide the laboratory with additional cooling capacity and lower operating and maintenance costs.

PROJECT JUSTIFICATION:

The project will remove chillers that are decades old, beyond their economic lives, unreliable, inefficient and very difficult and expensive to maintain. Repair parts are very difficult or impossible to obtain. The chillers use environmentally unacceptable refrigerant. Chiller replacement will allow the use of non-ozone depleting refrigerants. The replacement chillers in Buildings 168 and 169 will be sized to accommodate additional cooling loads anticipated for new adjacent facilities, thereby saving construction funds and equipment space. The chillers to be removed from Building 126 are thirty to forty years old and cannot handle occasional low cooling requirements. The new chiller in Building 238 will be able to accommodate the occasional low cooling requirements for both buildings and eliminate three very high maintenance cost refrigeration units.

IMPACT OF DELAY:

If this project is not approved, inefficient and costly operation of the obsolete chillers will continue at Buildings 125, 126, 168, 169 and 238. It will impede JPL's ability to provide needed cooling for personnel and equipment, and repairs will be required with increased frequency. The new chillers will use environmentally acceptable refrigerants and save significant cost to bring the old existing units into compliance with California environmental laws.

PROJECT:

The project will remove eight chillers from four buildings. Two chillers from Building 125 will be replaced with a single 225-ton chiller, the primary chilled water pump will be increased to match the higher total tonnage and new higher capacity condenser water pumps will be provided. Two 25-year-old water chillers (110-tons each) in Building 168 and one 18-year-old water chiller (140-ton) in Building 169 will be replaced with larger (225-ton), more efficient machines. This will compensate for the increased cooling loads in Buildings 168, 169, and 186. Three small, aging chillers will be removed from Building 126, a 200-ton water chiller will be added to the adjacent Building 238, a new primary-secondary chilled water pumping arrangement will be added to Building 238, and Building 126 cooling requirements will be serviced by the secondary loop from Building 238. This project will also modify the controls and chilled water piping in Building 126. The existing 6" condenser water line serving the Building 126 chillers will be converted to chilled water service by insulating and re-supporting the pipe runs. The existing 10-inch condenser water mains to Building 238 will be changed out to 12-inch lines to handle the additional 200-ton chiller.

In all cases, allowances have been made for temporary mounted chillers connected with fire hoses for cooling during periods of removal and re-installation of chillers.

| PROJECT COST ESTIMATE | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $2,900,000 |
| Mechanical . . . . . | LS | --- | --- | 2,400,000 |
| 'Electrical . . . . . | LS | --- | --- | 500,000 |
| Total . . . . . | | | | $2,900,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan
Figure 2 - Schematics

OTHER EQUIPMENT SUMMARY: None

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**JET PROPULSION LABORATORY**
**FISCSL YEAR 1994 ESTIMATES**
**MODIFICATIONS TO COOLING SYSTEMS, VARIOUS BUILDINGS**
**LOCATION PLAN**

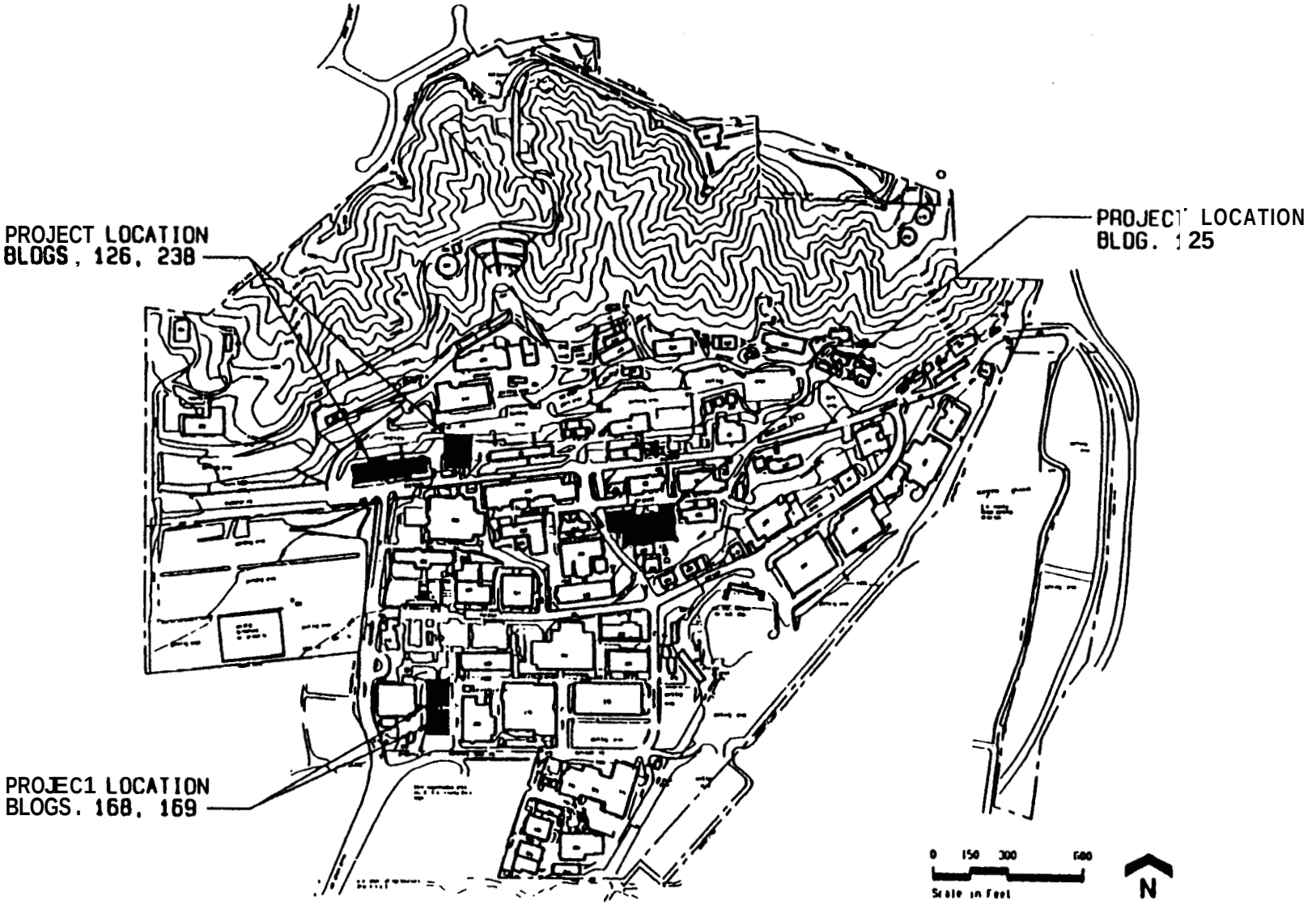
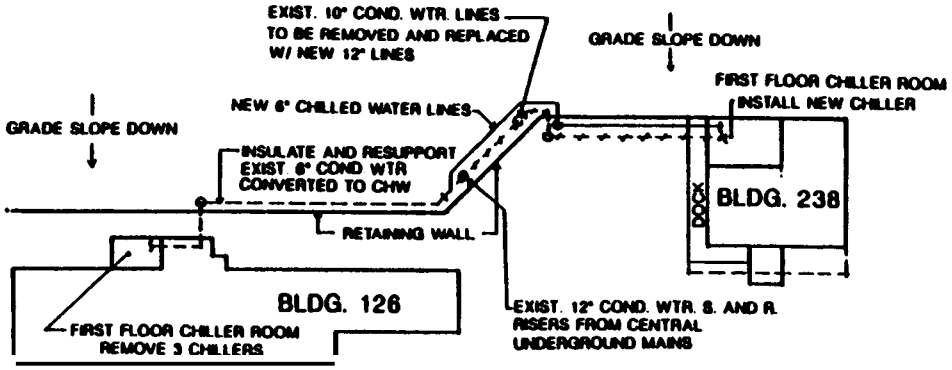
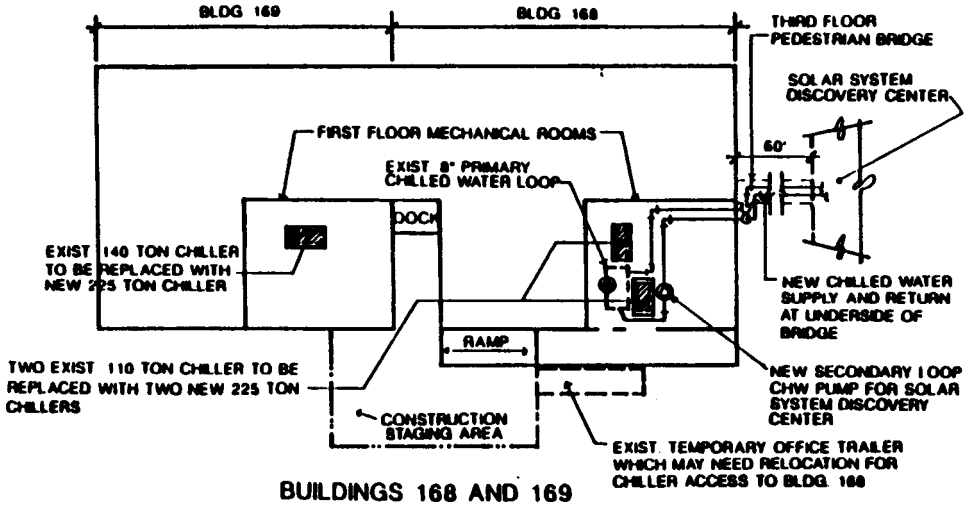



**FIGURE 1**

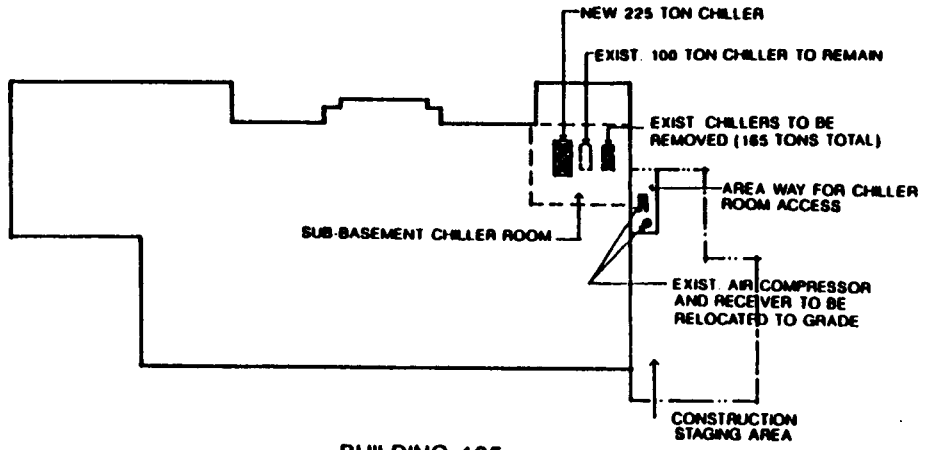
# JET PROPULSION LABORATORY
# FISCAL YEAR 1994 ESTIMATES
# MODIFICATIONS TO COOLING SYSTEMS, VARIOUS BUILDINGS
# SCHEMATICS




BUILDINGS 126 AND 238




BUILDINGS 168 AND 169




BUILDING 125

FIGURE 2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

WALLOPS FLIGHT FACILITY

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Mission To Planet Earth:** | | |
| Restoration of Airfield | 5,200,000 | CF 8-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Restoration of Airfield

INSTALLATION: Wallops Flight Facility

FY 1994 CoF Estimate: $5,200,000

LOCATION OF PROJECT: Wallops Island, Accomack County, Virginia

COGNIZANT HEADQUARTERS OFFICE: Mission to Planet Earth

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $300,000 | $ ----- | $ 300,000 |
| Capitalized Investment . . . . . | --- | 35,828,914 | 35,828,914 |
| Total . . . . . | $300,000 | $35,828,914 | $36,128,914 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the restoration of airfield runways, taxiways, drainage structures/systems, aprons, including the installation of separate controls for the Precision Approach Path Indicator (PAPI) and Runway End Identification Light (REIL) systems on each of the airfield runways and the construction of a 6,000 foot road around the approach to Runway 10/28.

PROJECT JUSTIFICATION

Wallops Flight Facility (WFF) is a flight testing facility with elaborate tracking and data systems. The sparsely populated area has a low-density, 5-mile air traffic control zone. This ideal research airfield has been utilized for an average of 180 test periods per year. Each test period involves from one to four hours of tracking and data system activation and from 1 to 30 aircraft movements. This level of utilization is expected for the indefinite future.

All three runways and supporting taxiways and aprons must be maintained in an operational status to provide a high level of safety, flexibility in normal operations, and efficient crosswind research. All runways must be available for use in adverse wind or other weather conditions. The taxiways must also be maintained in an operational status to provide the full capability to conduct multiaircraft operations.

At the present time, in order to operate the PAPI system during daylight hours, the runway lights must be turned on, wasting large amounts of electrical energy. The REIL systems on Runways 10-28 and 17-35 will operate only when the runway edge lights are set very bright. This creates a glare problem to aircraft pilots. The existing airfield lighting vault is too small to accommodate the needed new equipment to correct these problems.

The construction of the road around the runway approach will eliminate the safety hazard of directly crossing the runway.

**IMPACT OF DELAY:**

Delay of this project will cause accelerated deterioration of the existing airfield surfaces, make the airfield less safe for aircraft operations, more costly to repair in the future, and will increase the risk to future aircraft research flights.

## PROJECT:

This project will provide for the repair of Runways 17/35 and 10/28, taxiways, aprons, drainage structure/systems, which consists of surface milling; placement of bituminous concrete over existing bituminous concrete surfaces only; cleaning and resealing of cracks in bituminous concrete; placements of a fabric reinforced system for crack control; restriping; repair of rigid pavement surfaces; the routing, cleaning, and resealing of joints, cracks, and spalls; and the construction of drainage structures/systems adjacent to pavement edges. The PAPI and REIL Systems work consists of the installation of 85,000 linear feet of 5,000 volt airfield lighting cable, 25,000 linear feet of bare copper cable, 3-4KW regulators, a 235 square foot addition to the airfield lighting vault, and new brightness controls for the PAPI systems. The road work consists of excavation, drainage, and the placement of crusher run and surface treatment necessary for the construction of a 6,000 foot road around the approach to Runway 10/28.

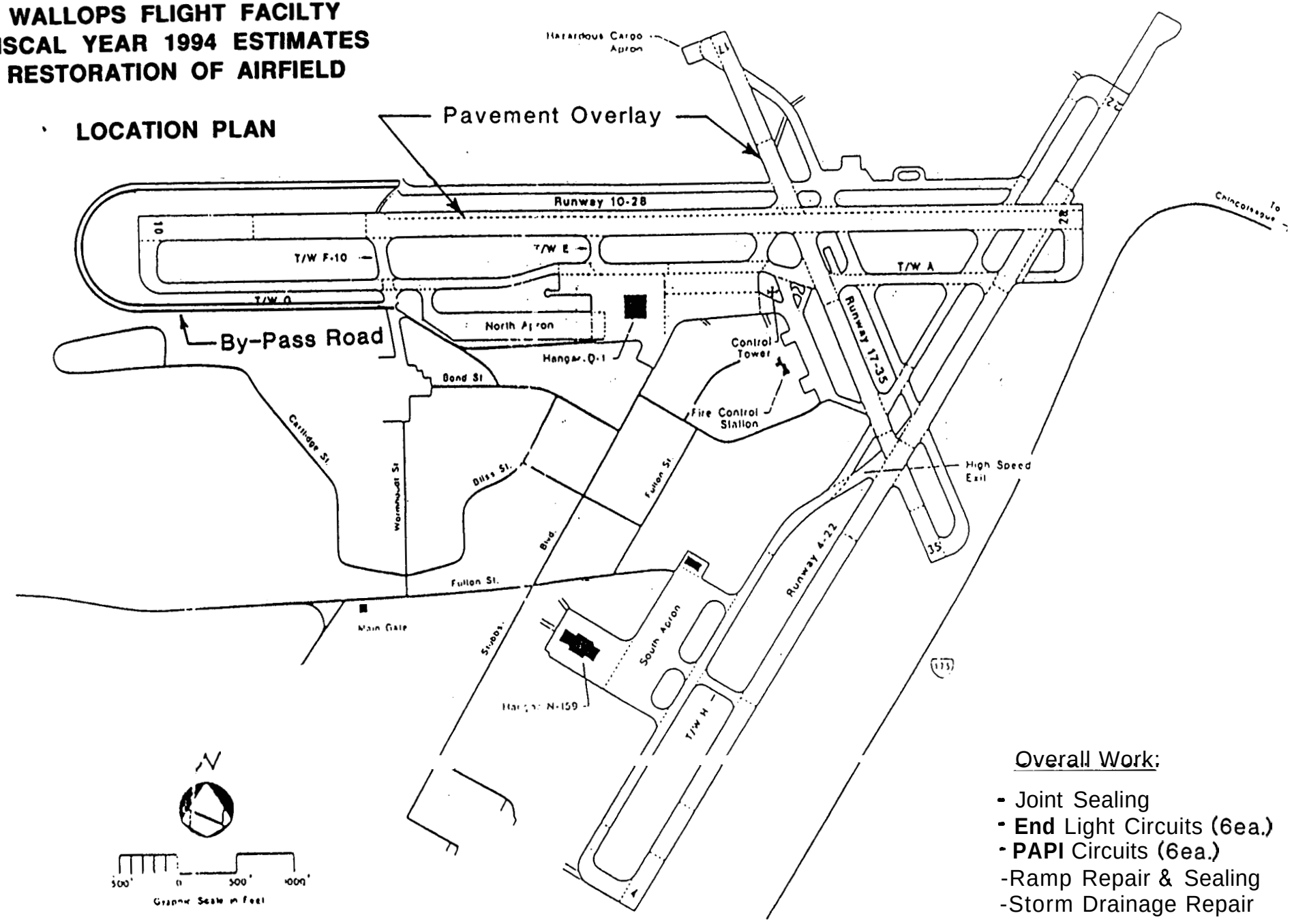
| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction: . . . . . | --- | --- | --- | $5,200,000 |
| pavement Repair and Sealing . . . . . | LS | --- | --- | 3.250. 000 |
| Pavement Overlay . . . . . | LS | --- | --- | 690.000 |
| Restriping Pavement . . . . . | LS | --- | --- | 160.000 |
| Storm Drainage Structure Repair . . . . | LS | --- | --- | 220. 000 |
| By-Pass Road Construction . . . . . | LS | --- | --- | 530. 000 |
| Lighting System Modifications . . . . . | LS | --- | --- | 350,000 |
| Total . . . . . | | | | $5.200. 000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan

FUTURE ESTIMATED CoF FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**WALLOPS FLIGHT FACILTY**
**FISCAL YEAR 1994 ESTIMATES**
**RESTORATION OF AIRFIELD**

- **LOCATION PLAN**




Overall Work:

- Joint Sealing
- **End** Light Circuits (6ea.)
- **PAPI** Circuits (6ea.)
- Ramp Repair & Sealing
- Storm Drainage Repair

FIGURE **1**

**CF 8-4**

Aeronautical
Facilities

FISCAL YEAR 1994 BUDGET ESTIMATES
CONSTRUCTION OF FACILITIES
AERONAUTICAL FACILITIES

**Aeronautics Facilities Upgrade**

The FY 1994 CoF Budget significantly augments the National Aeronautics Facilities Upgrade Program which was initiated in FY 1993. The major thrust of this program is the identification and construction of aeronautical research and development facilities needed to enhance the United States' competitive advantage in the world aeronautics markets. To support this effort, the National Facilities Study is making a critical review of present and future facility requirements. This will determine the high priority capabilities that are needed to lead us into the next century. This program will provide the resources to develop that capability.

**Aeronautical Facilities Revitalization**

In FY 1994, this program provides for the rehabilitating of the control systems in the National Full-scale Aerodynamics Complex, upgrading the Outdoor Aerodynamic Research Facility, and the modernization of the Unitary Plan Wind Tunnel Complex at Ames Research Center. The Unitary Plan Wind Tunnel Complex is the final project in this revitalization program begun in FY 1988. It will require $30 million in FY 1995 to complete its modernization to improve productivity, reliability, and quality of test results.

Upgrade
Program

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

NATIONAL AERONAUTICS FACILITIES PROGRAM

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Aeronautics:** | | |
| National Aeronautics Facilities Upgrade Program..... | 181,000,000 | CF 9A-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: National Aeronautics Facilities Upgrade Program

INSTALLATION: Various Locations

FY 1994 CoF Estimate: $181,000,000

LOCATION OF PROJECT: Various Locations

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $330,000 | $25,000,000 | $25,330,000 |
| Capitalized Investment . . . . . | --- | --- | --- |
| Total . . . . . | $330,000 | $25,000,000 | $25,330,000 |

SUMMARY PURPOSE AND SCOPE:

This program continues an effort begun in FY 1993 to upgrade the United States aeronautics facilities capability. The United States has been increasingly challenged in world aeronautics markets for some time. Since 1984, its share of those markets has dropped with a corresponding loss of numerous aerospace jobs. It is important that this trend be reversed, The new Administration is encouraging implementation of a national goal to infuse the United States' aerospace industry with the capability to develop a new generation of civil and military aircraft which will outperform the competing products of its international competition at comparable or lower cost. This program will contribute to that goal by providing the high priority facilities needed to enable development of a significant portion of the required advanced aeronautical technology.

## PROJECT:

Ground test facilities play an essential role in the process of bringing an aircraft from the concept stage to finished product. One of the reasons our nation had been so preeminent in the past is that our ground test facilities were the finest in the world. However, today some foreign wind tunnels, for instance, have greater capability and higher productivity than the U.S. counterparts. Some of our facilities can no longer satisfy industry's needs to the degree they once did. New and upgraded wind tunnels and other related test facilities are required to enhance industry's ability to develop and bring to market the next generation of significantly more competitive U.S. aircraft.

Presently, the average age of U.S. wind tunnels is about 40 years. In addition, certain composite materials testing facilities have become inadequate. Some tunnels have testing backlogs of up to 2 years due to low productivity. Reynolds Numbers and flow conditions fall short of those needed for some next generation aircraft, especially for development of new large aircraft. Tunnel acoustic measuring conditions also need improvement. These testing capabilities are essential in the development of environmentally compatible future aircraft. For example, high Reynolds Number testing capability is essential to assess problems such as laminar flow control, high lift device design, and adaptive wing configurations. These problems cannot be adequately simulated in current test facilities.

This program aims to provide the essential upgrades and new test facilities that are determined to be needed for the U.S. to maintain its preeminence in aeronautics. The program that is developed will be a consequence of the on-going National Facility Study and other similar studies.

### IMPACT OF DELAY:

Delay in this program will allow U.S. foreign competitors to enhance the position they now have in quality of research facilities. These facilities could assist development of foreign aircraft which exceed the capability of those manufactured in the U.S.

### DESCRIPTION OF WORK:

The essential elements of this project are:

Acoustic modifications to the 40 x 80 wind tunnel and other upgrades at Ames Research Center: This tunnel will provide the only large-scale aeroacoustic testing capability in the United States in direct support of the high speed civil transport program. It is essential to the development and testing of large-scale Phase II engine and suppressors for validation of integrated noise suppression in takeoff and climbout prior to flight. It will provide a world

class capability by creating the largest quiet, anechoic wind tunnel in the world, with a test section capable of full-scale and large-scale test up to maximum test section velocities of Mach 0.45. The project includes: a new 42-inch deep test section acoustic lining; a new variable-speed and variable-pitch control for the fan drive; acoustic treatment at critical locations of tdnnel sidewalls; and other supporting upgrades of auxiliary systems.

Facility studies, definition of requirements, design, and construction of a new or drastically modified set of U.S. wind tunnels: This will be initiated on the most urgent facility needs identified in the National Facility Study. Preliminary results of the National Facility Study indicate a need to construct new wind tunnels and upgrade existing tunnels. For example, the National Transonic Facility at Langley Research Center will be modified to increase its reliability, effeciency, and productivity. Deactivation of some existing unproductive facilities is also being investigated. It is imperative that funds be available to begin this effort in FY 1994 in order to minimize the lead time needed for facilities upgrades and construction.

Modifications for Composite Technology Center, Lewis Research Center: Research in advanced composite materials is important in the development of the lowest weight, most fuel-efficient next generation aircraft. This research is also critical for development of high-temperature aerospace propulsion and power systems. Current research programs, such as High Speed Research and advanced rockets require research in light, high temperature composites to enable low weight, long life systems. Providing this integrated facility for composite characterization and research in fabrication processing guided by modelling will shorten the development cycle for each key material for propulsion and power systems. The existing Materials and Structures Building is severely deteriorated and is inadequate for modern advanced composite materials development. This project will construct an addition of approximately 45,000 square feet to the building for composite materials and chemical analysis laboratories. The existing 45-year-old building will be modified to improve life and environmental safety and to improve efficiency of building systems.

**FY 1994 PROJECT COST ESTIMATE:**

The preliminary cost estimates are based on initial estimates of studies, requirements definition analyses, designs, and construction or modification of other facilities. As the National Facilities Plan matures, recommendations are validated and refined, and studies progress, revisions, additions and/or deletions to facilities requirements and estimated costs may be necessary.

| | FY 1993 | FY 1994 |
|---|---|---|
| Acoustic Modifications to 40 X 80 Wind Tunnel (ARC) . . . . . | $25,000,000 | --- |
| Facility Studies, Requirements Definition, Design, and Modification and Construction of National Aeronautics Facilities, Various Locations . . . . . | --- | 158,000,000 |
| Modification for Composite Technology Center (LeRC) . . . . . | --- | 23,000,000 |
| Total . . . . . | $25,000,000 | $181,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Perspective of Composite Technology Center

OTHER EQUIPMRNT SUMMARY: Research & Development Funding in the amount of $19,000,000 has been identified to support research on components, pilot models, instrumentation, and other items.

FUTURE CoF FUNDING REQUIRED TO COMPLETE THIS PROJECT: To continue this effort additional resources will be required in subsequent fiscal years.

LEWIS RESEARCH CENTER
FISCAL YEAR 1994 ESTIMATES
MODIFICATIONS FOR COMPOSITE TECHNOLOGY CENTER

PERSPECTIVE

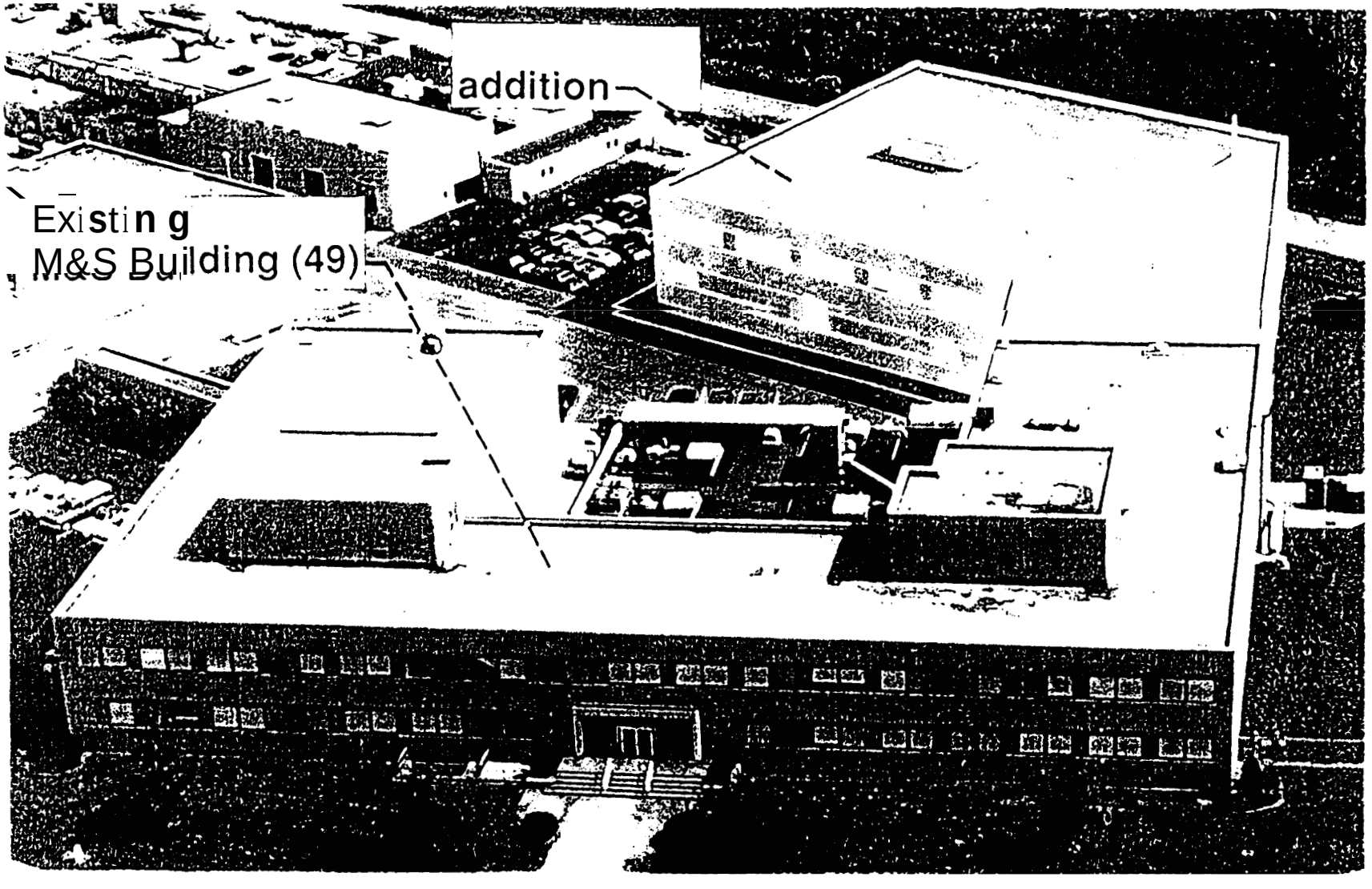



FIGURE 1

Revitalization
Program

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

AERONAUTICAL FACILITIES REVITALIZATION

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Aeronautics:** | | |
| Rehabilitation of Control Systems, National Full-Scale Aerodynamics Complex, Ames Research Center | 2,100,000 | CF 9B-1 |
| Upgrade of Outdoor Aerodynamic Research Facility, Ames Research Center | 3,900,000 | CF 9B-6 |
| Modernization of the Unitary Plan Wind Tunnel Complex, Ames Research Center | 25,000,000 | CF 9B-11 |
| Total | 31,000,000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Rehabilitation of Control Systems. National Full-scale Aerodynamics Complex

INSTALLATION: Ames Research Center

FY 1994 CoF Estimate: $2,100,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $208,000 | --- | $ 208,000 |
| Capitalized Investment . . . . . | --- | $143.892.370 | 143,892,370 |
| Total. . . . . | $208,000 | $143,892,370 | $144,100,370 |

SUMMARY PURPOSE AND SCOPE:

This project will replace the control systems for the model support systems in the 40 by 80 and 80 by 120 foot legs of the National Full-scale Aerodynamics Complex (NFAC) with current technology distributed control systems that will improve the operation of this valuable national resource. This project is included in the Aeronautical Facilitiies Revitalization Program.

PROJECT JUSTIFICATION:

This project is required to replace obsolete and inefficient control systems in the NFAC. This wind tunnel complex provides aerodynamic results vital to United States commercial and defense aeronautical programs. The present model support hardware was designed over ten years ago and uses computers that were commercially available at that time. As a result, today the digital control systems are too slow to handle the servo control loops required by present test models. The old circuitry was custom designed, and replacement equipment and parts are no longer available. Problems with the control systems include an excessive number of failures, lack of diagnostic capabilities, excessive time to repair, insufficient data displayed for operators, and operational inflexibility.

As a result, long periods of downtime are being experienced prior to and during wind tunnel operation, seriously reducing the productivity of the facility. It is now estimated that during a typical complex test program, the actual run time is approximately 15 to 17 percent of total occupancy time. This figure is substantially lower than the 25 to 30 percent run time/occupancy time ratio expected in modern tunnels.

IMPACT OF DELAY:

An increasing rate of failures can be expected with continued operation. The resulting lost time will further reduce available test time in the NFAC. As a result, some test programs will have to be deferred indefinitely. Productivity and efficiency will be reduced, resulting in increased backlogs and higher costs for scheduled tests.

PROJECT:

This project will replace the controls and displays for the model support systems in both legs of the National Full-scale Aerodynamic Complex with conventional distributed control systems, including diagnostic capability and operator displays and controls. The distributed control system (DCS) will absorb the position and rate control loop functions of the existing model support control system. The drive variable pitch control system and its related displays will be replaced, and a new smart annunciator package will be provided.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $2,100,000 |
| Demolition . . . . . | LS | --- | --- | 100,000 |
| DCS System and Hardware . . . | LS | --- | --- | 1,000,000 |
| Installation . . . . | LS | --- | --- | 1,000,000 |
| Total . . . . . | | | | $2,100,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan  Figure 2 - System Drawing

OTHER EQUIPMENT SUMMARY: None

FUTURE COF FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# AMES RESEARCH CENTER
## FISCAL YEAR 1994 ESTIMATES
## REHABILITATION OF CONTROL SYSTEMS, NATIONAL FULL-SCALE AERODYNAMICS COMPLEX

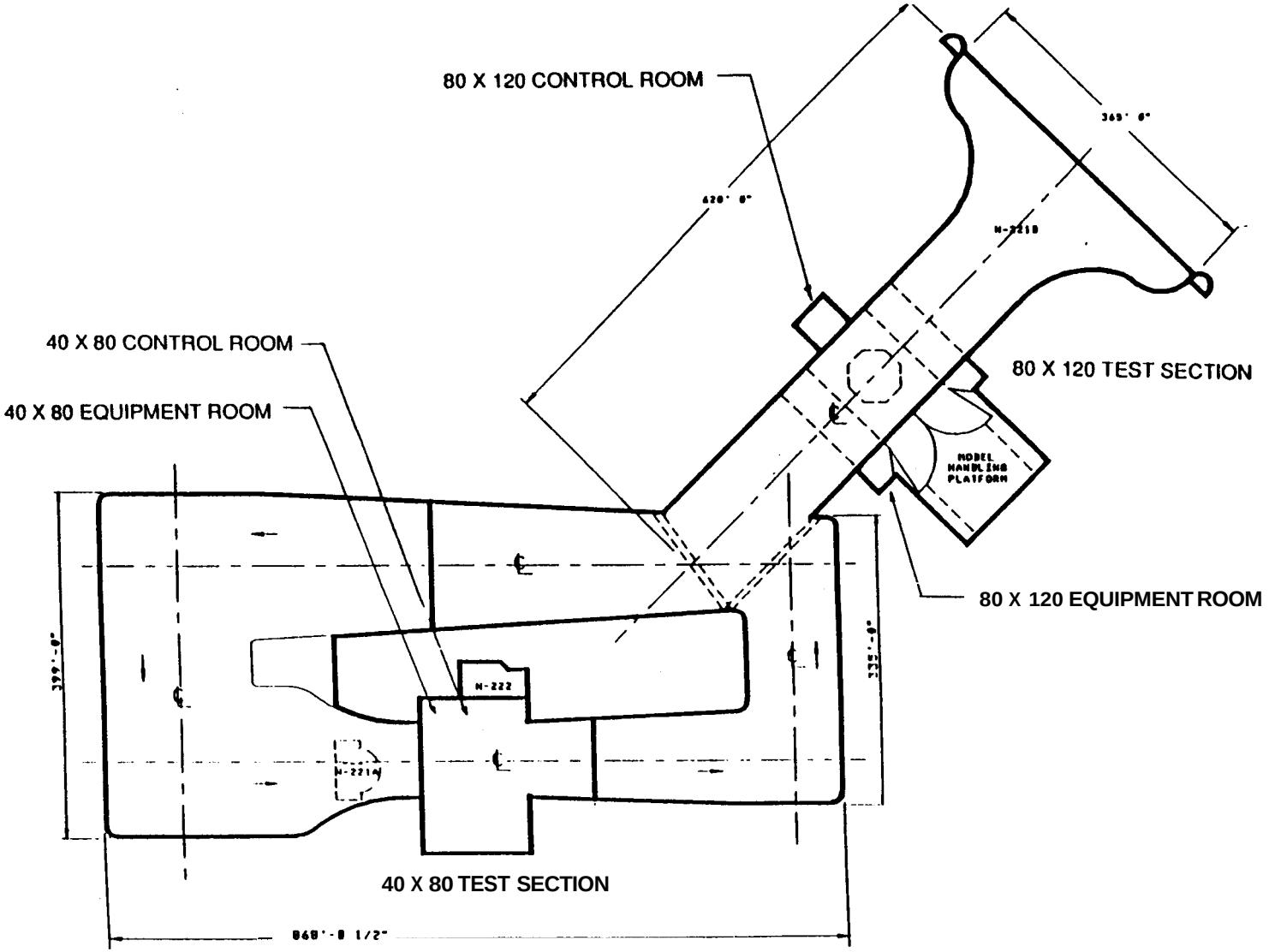



**FIGURE 1**
**SITE PLAN**

AMES RESEARCH CENTER
FISCAL YEAR 1994 ESTIMATES
REHABILITATION OF CONTROL SYSTEMS, NATIONAL FULL-SCALE AERODYNAMICS COMPLEX

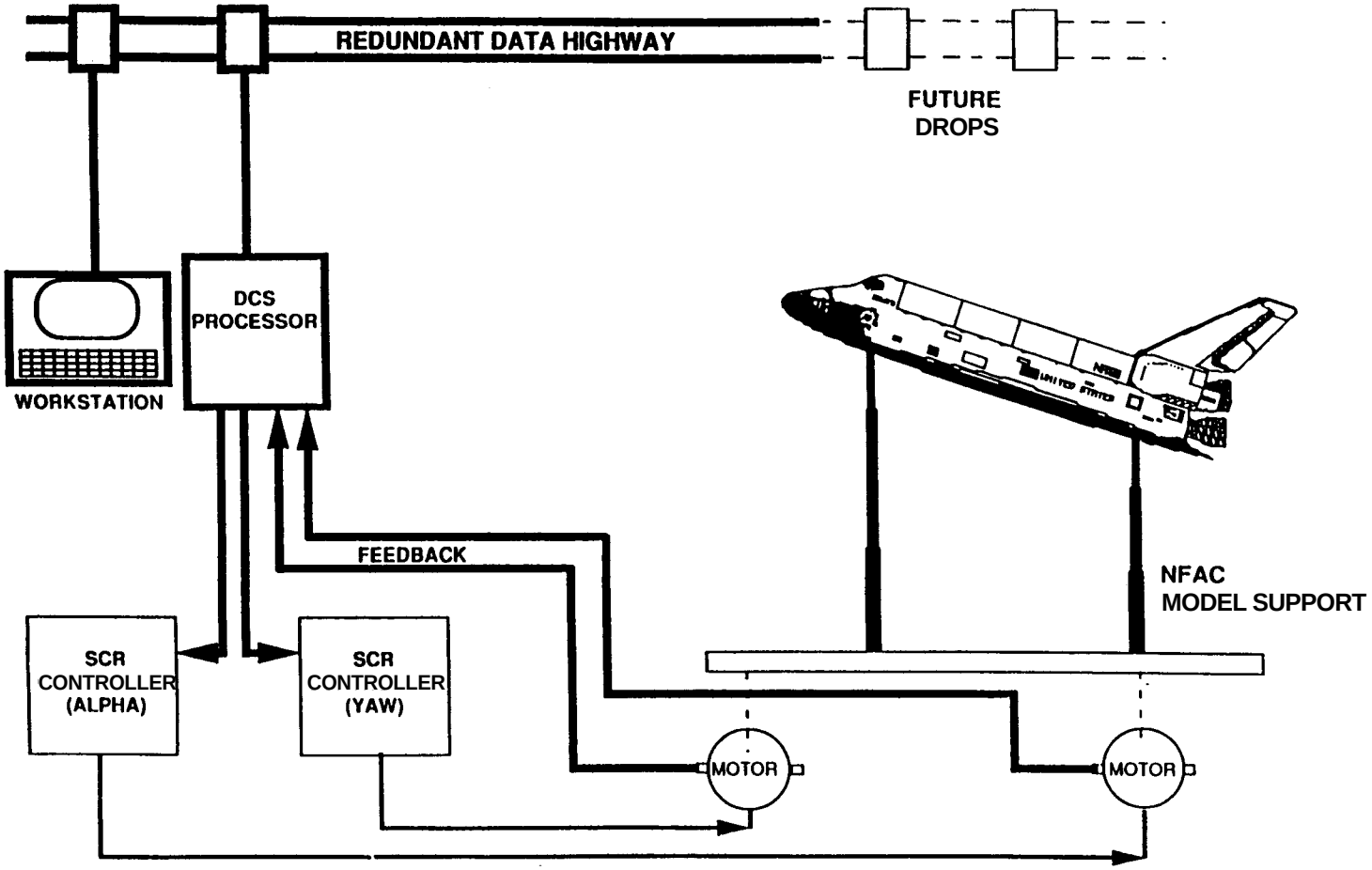



FIGURE 2
SYSTEM DRAWING
(ONE OF TWO SYSTEMS SHOWN)

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Upgrade of Outdoor Aerodynamic Research Facility

INSTALLATION: Ames Research Center

FY 1994 CoF Estimate: $3,900,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding | $239,693 | --- | $ 239,693 |
| Capitalized Investment | --- | $6,433,880 | 6,433,880 |
| Total | $239,693 | $6,433,880 | $6,673,573 |

SUMMARY PURPOSE AND SCOPE

This project enlarges the Outdoor Aerodynamic Research Facility (OARF) N-249, at Ames Research Center's Moffett Field site to support testing of models and aircraft sized for the 80 x 120 foot leg of the National Full-scale Aerodynamics Complex (NFAC). The work includes an enlarged model support system; modification of the existing concrete pit and model support framework; development of large-model accessways to the facility; and modification of the storm water drainage system.

## PROJECT:

This project is necessary to increase the testing capabilities of the Outdoor Aerodynamic Research Facility in support of the 80 x 120 foot leg of the NFAC. The proposed improvements will enable the OARF to accommodate large models and aircraft scheduled for testing in the 80 x 120 foot leg of the NFAC. The checkout of these models in the OARF will free the 80 x 120 foot ley for other aeronautical testing during model preparation. The OARF has been used for many years to evaluate models and aircraft entering the 40 x 80 foot leg of the NFAC. Hundreds of valuable wind tunnel occupancy hours have been saved by discovering and correcting faulty test hardware prior to using the 40 x 80 tunnel test section. In a similar manner, by increasing the size of the OARF to accommodate models sized for the 80 x 120 foot test section, valuable tunnel time in this leg can also be saved. Currently, large models or aircraft must be checked out in the 80 x 120 wind tunnel itself. This practice increases the time required for each test; limits the number of scheduled test runs; and increases the backlog of other tests because of lowered productivity.

In addition, engine checkouts must also now be performed in the tunnel test section, further reducing time available for actual testing, and increasing hazards to personnel and the tunnel because of the increased time that fuels are in the tunnel; and the risk that an engine will fail while being checked out. Enhancement of the capability of the Outdoor Aerodynamic Research Facility will reduce the backlog, improve utilization of the 80 x 120 foot wind tunnel, and will improve safety by allowing engine checkouts outdoors.

**IMPACT OF DELAY:**

Model checkout operations and engine checkout will continue to be performed in the test section of the 80 x 120 foot wind tunnel. Continuation of the current approach to model checkout will limit the availability of a unique test facility. Such a delay will result in continuing backlogs in availability of this facility for national aeronautics testing programs.

## PROJECT:

The project includes a new model support system consisting of two main struts and one tail strut. The proposed load carrying capability will be +/- 150,000 lbs vertical load or lift, +/- 50,000 lbs longitudinal thrust, and +/- 50,000 lbs side force. Tread width and tail length will be adjustable by locally controlled electric motors. The tail strut will be adjustable to provide a +/- 10 degree pitch range. A concrete pit will be constructed to accommodate the increased tread and tail width requirements of the model support struts and recess all model support mechanisms below grade. *An* access road will be provided from the test section of the 80 x 120 leg of the NFAC to the OARF. Finally, the storm drainage system will be modified to drain the concrete pit and model support system area to an existing oil-water separator.

| PROJE COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction | --- | --- | --- | $3,900,000 |
| Roadways . . . . . | LS | --- | --- | 812,000 |
| Foundation and Pit . . . . . | LS | --- | --- | 1,303,000 |
| Model Support . . . . . | LS | --- | --- | 1,127,000 |
| Model Services . . . . . | LS | --- | --- | 164,000 |
| Electrical . . . . . | LS | --- | --- | 494,000 |
| Total . . . . . | | | | $3,900,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan Figure 2 - Schematic

OTHER EQUIPMENT SUMMARY: Existing main struts and ball joints will be provided as Government-furnished equipment.

FUTURE CoF ESTIMATED FUNDING REOUIRED TO COMPLETE THIS PROJECT: None

# AMES RESEARCH CENTER
# FISCAL YEAR 1994 ESTIMATES
# UPGRADE OF OUTDOOR AERODYNAMIC RESEARCH FACILITY

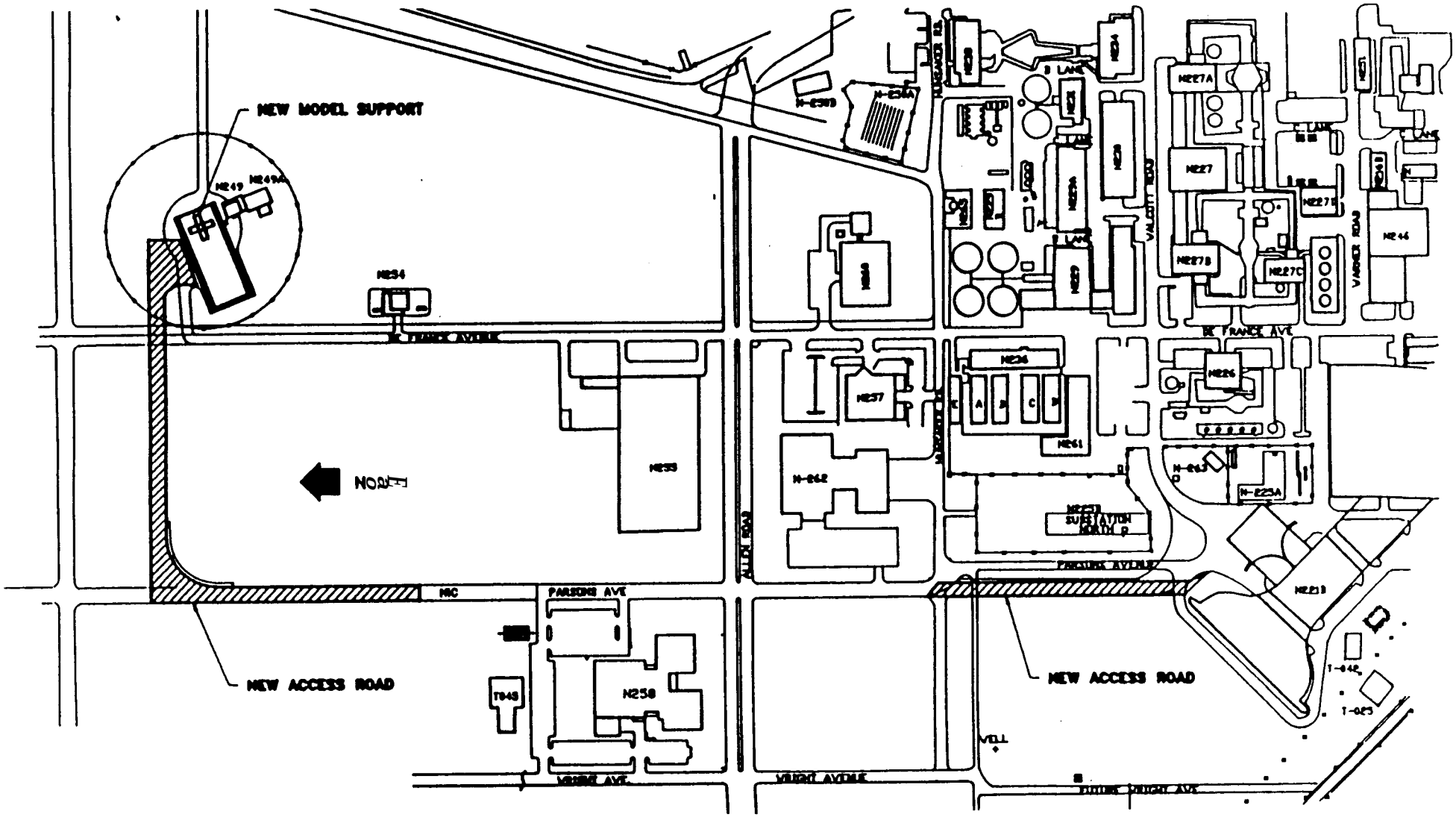



**FIGURE 1**
**SITE PLAN**

AMES RESEARCH CENTER
FISCAL YEAR 1994 ESTIMATES
UPGRADE OF OUTDOOR AERODYNAMIC RESEARCH FACILITY

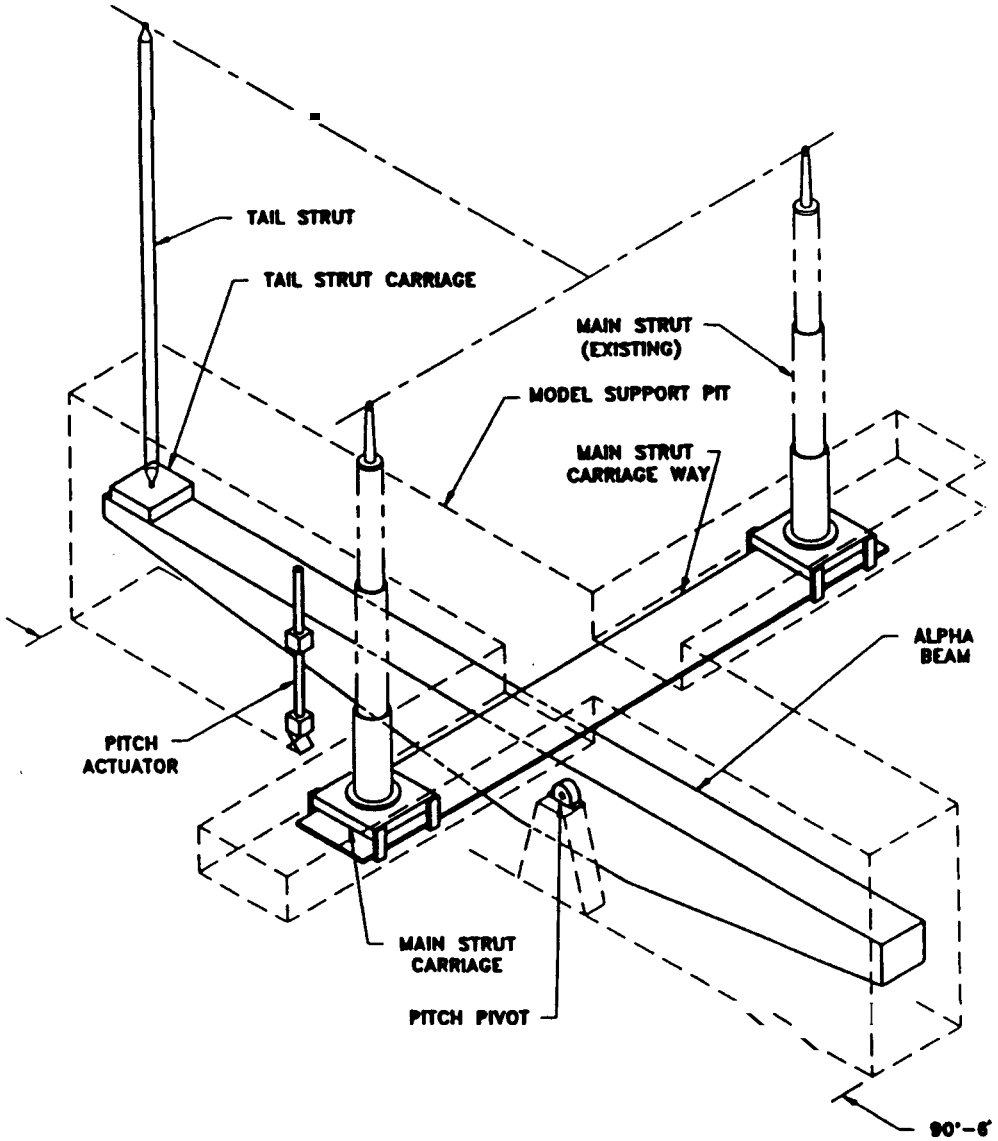



FIGURE 2
SCHEMATIC

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Modernization of the Unitary Plan Wind Tunnel Complex

INSTALLATION: Ames Research Center

FY 1994 CoF Estimate: $25,000,000

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

COGNIZANT HEADQUARTERS OFFICE: Office of Aeronautics

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $4,600,000 | $ 8,000,000 | $12,600,000 |
| Capitalized Investment . . . . . | --- | 50,273,412 | 50,273,412 |
| Total . . . . . | $4,600,000 | $58,273,412 | $62,873,412 |

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 construction of the project. This project is included in the Aeronautical Facilities Revitalization Program.

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.

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 Mercury, Gemini, Apollo, and Space Shuttle spacecraft. For example, programs such as the Air Force F-22, Navy F-18 E/F, Boeing Large Subsonic Aircraft, Douglas MD-90 and MD-12, and NASA High Speed Research (HSRP), are already on the test schedule along with a significant amount of classified testing. The improvements in control and flow quality to be implemented in this project will significantly increase the quality of the simulation.

Repair or replacement of tunnel components that have reached the end of their useful life. 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 with incalculable detrimental consequences.

## PROJECT:

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 |
|---|---|---|---|---|
| Construction | --- | --- | --- | $25,000,000 |
| Facility Refurbishments | LS | --- | --- | 6,900,000 |
| Refurbish and Replace Tunnel Control System | LS | --- | --- | 12,400,000 |
| Repair of Pressure Vessels | LS | --- | --- | 4,500,000 |
| Flow Quality Improvements | LS | --- | --- | 1,200,000 |
| Total | | | | $25,000,000 |

Note: This cost estimate provides for the FY 1994 increment of the project. Prior FY 1993 provided $8.0 million and $30.0 million is estimated for FY 1995. The total cost of the project is estimated to be approximately $63 million.

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

OTHER EOUIPMSNT SUMMARY: Data acquisition systems, model check-out equipment, and advanced instrumentation estimated to cost $9.8 million will be located in this facility.

FUTURS CoF ESTIMATED FUNDING REOUIRED TO COMPLETE THIS PROJECT: Based on prefinal design, it is estimated that $30 million will be required to complete the project, however, as field investigations progress and design becomes more mature, an updated final increment estimate will be developed.

# AMES RESEARCH CENTER
# FISCAL YEAR 1994 ESTIMATES
# MODERNIZATION OF THE UNITARY PLAN WIND TUNNEL COMPLEX

## SITE PLAN

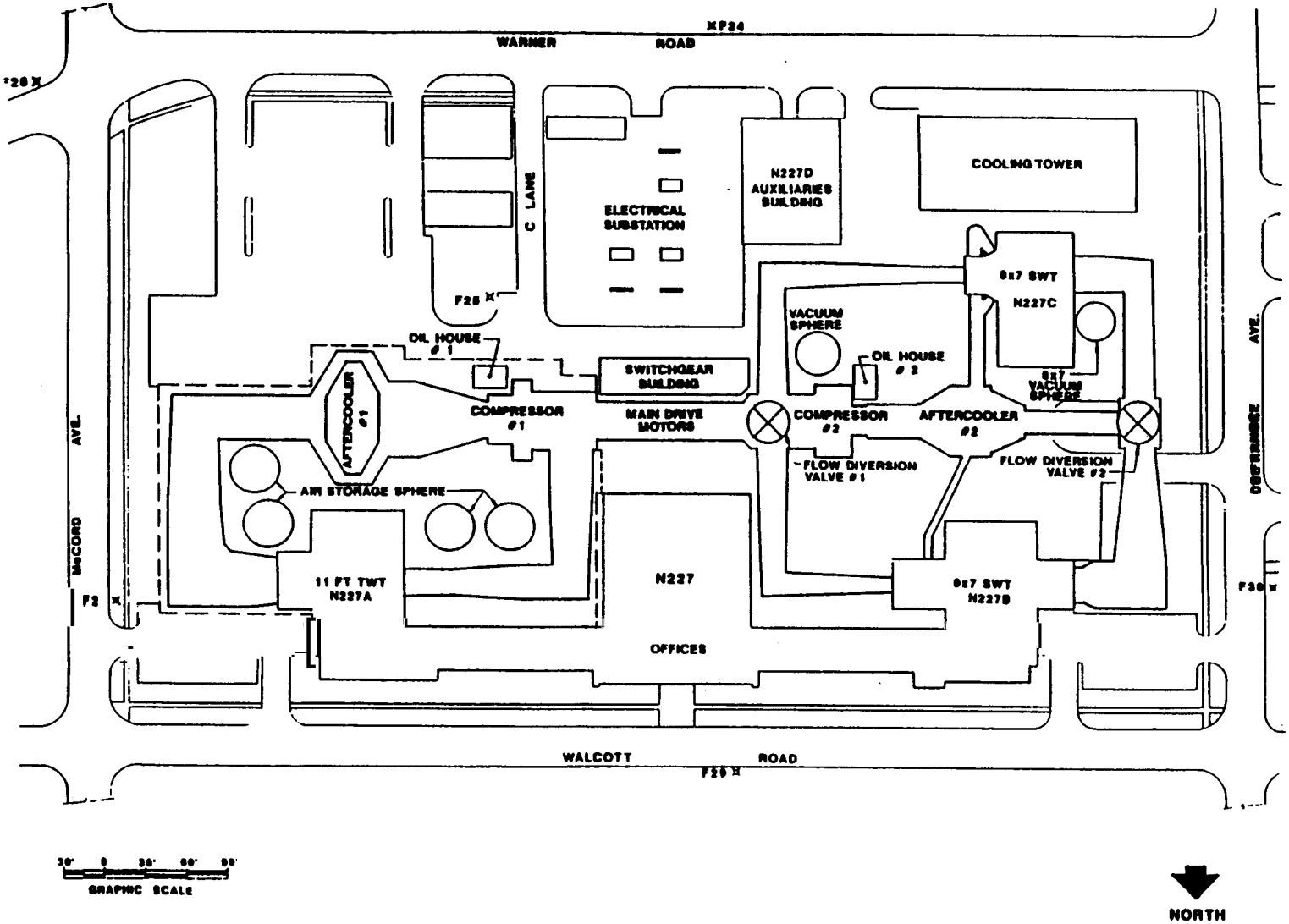
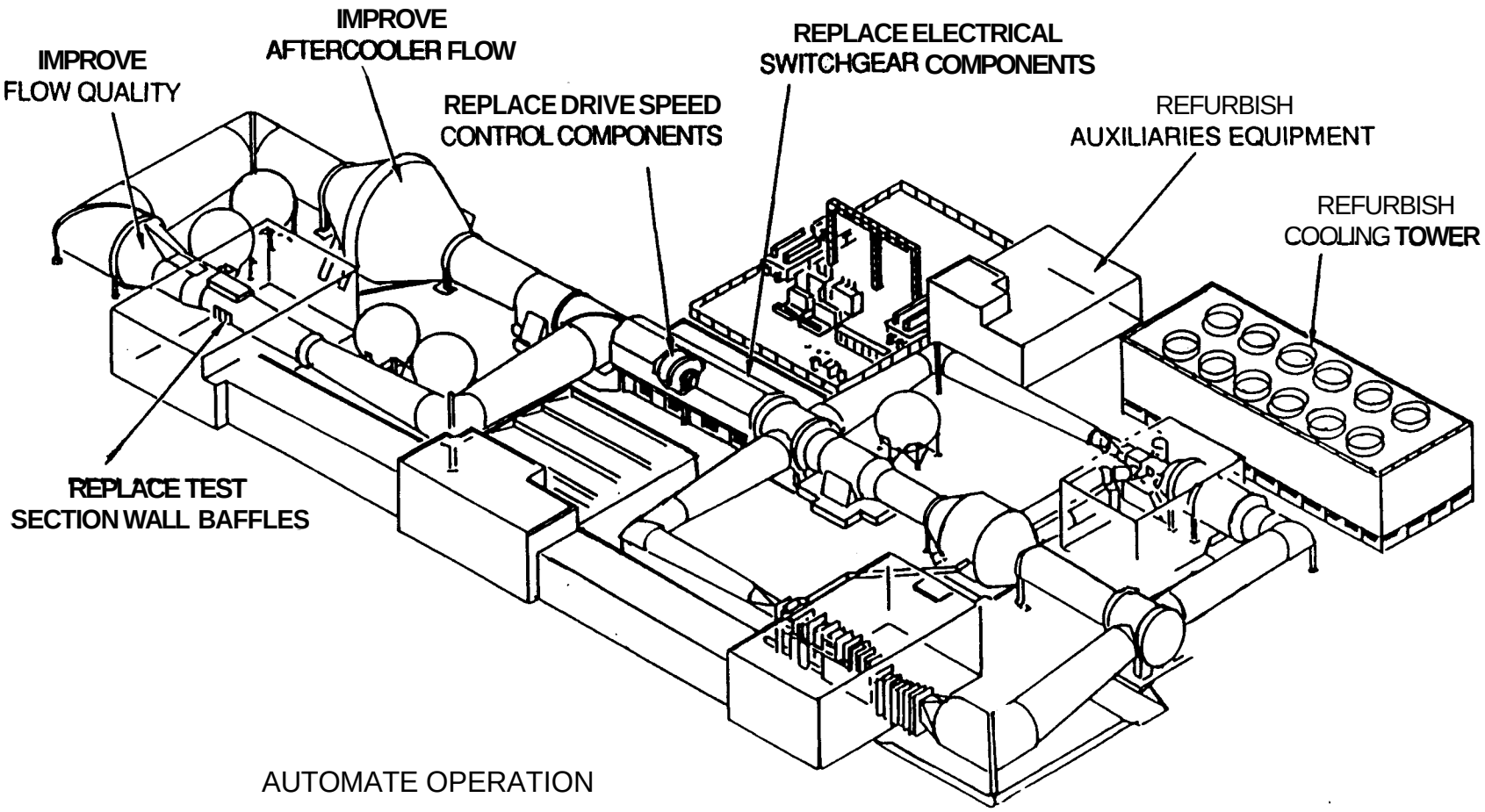



FIGURE 1

CF 9B-14

## AMES RESEARCH CENTER
## FISCAL YEAR 1994 ESTIMATES
## MODERNIZATION OF THE UNITARY PLAN WIND TUNNEL COMPLEX

### PERSPECTIVE




AUTOMATE OPERATION
TUNNELS
UPWT AUXILIARIES

RECERTIFY PRESSURE SYSTEMS
TUNNEL SHELLS
AIR PIPING

**FIGURE 2**

Langley
Research Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

LANGLEY RESEARCH CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Mission To Planet Earth:** | | |
| Construction of EOSDIS Distributed Active Archive Center (DAAC)..... | 8,000,000 | CF 10-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Construction of EOSDIS Distributed Active Archive Center (DAAC)

INSTALLATION: Langley Research Center

FY 1994 CoF ESTIMATE: $8,000,000

LOCATION OF PROJECT: Hampton, Virginia

COGNIZANT HEADQUARTERS OFFICE: Mission to Planet Earth

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $760,000 | --- | $ 760,000 |
| Capitalized Investment . . . . . | --- | $16,454,906 | 16,454,906 |
| Total . . . . . | $760,000 | $16,454,906 | $17,214,906 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the construction of an approximately 37,000 square foot facility addition to house data processing, data archiving, support space and mechanical/electrical equipment. This facility will house Langley's Distributed Active Archive Center (DAAC) in support of the Earth Observing System (EOS) Program.

PROJECT JUSTIFICATION:

The EOS consists of a scientific research program, a space-based observing system, and a data and information system. It has been determined that the data processing and storage requirements of the project, the Earth Observing System Data Information System (EOSDIS), will be best served with a distributed processing concept with remotely located computer centers at key locations across the country having responsibility for designated experiments and data products.

Langley Research Center (LaRC) will house one of the key Distributed Active Archive Centers with responsibility for routine processing of the EOS data as well as for archiving and full-service distribution of that data. Additional facility space is needed at Langley to support the significant increase of computing and data storage capacity, communications equipment, and support functions essential to meeting EOSDIS program mission and goals.

The EOS Program has put a major emphasis on the data and information system, EOSDIS. EOSDIS is planned to acquire a comprehensive, global, 15-year scientific data set; to maximize the utility of this data set for scientific purposes; and to facilitate its easy access by the research community. Langley's role in this program as a DAAC will be to provide full-service computational support capability for atmospheric and environmental scientists. This facility will contain all the computational resources required to convert raw instrument data into meaningful science products, including the provision of automated archival data storage and retrieval systems, products review in support of science investigators, and media distribution of science products.

**IMPACT OF DELAY:**

If this facility is not constructed at this time, there will not be adequate space at LaRC to support currently scheduled deliveries of computer and communications equipment in FY 1995, FY 1996 and FY 1997. LaRC will not be able to adequately support NASA's commitment to the Earth Radiation Budget and Upper Atmospheric Research elements of the Earth Observing System and Mission to Planet Earth Program.

## PROJECT:

This project will provide an approximately 37,000 square foot, two-story addition to the southwest side of the Data Reduction Center Annex Computer Complex, Building 1268B. Floor dimensions are 103' x 180' on the first and second floors. This facility is a fully integrated production facility with major computing equipment and archival capability. The facility will provide approximately 60 percent of the floor space as raised floor for computing equipment with office areas for operations and maintenance support personnel. Other major areas are for power and HVAC systems, user work areas, media distribution, conference facilities, library, and media storage. The facility includes environmental control and fire detection/suppression equipment. Perimeter doors and walls will be designed to provide adequate security. The facility space provides for support offices, data processing, data archival, and site support areas including storage and distribution, equipment/logistical support, conference rooms, library, and mechanical/electrical equipment location. This facility size is based on the dimensions necessary to accommodate project EOSDIS requirements through the year 2015.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $8,000,000 |
| Site Work . . . . . | LS | --- | --- | 1,940,000 |
| Architectural/Structural . . . . . | LS | --- | --- | 3,680,000 |
| Mechanical . . . . . | LS | --- | --- | 1,620,000 |
| Electrical . . . . . | LS | --- | --- | 760,000 |
| Total . . . . . | | | | $8,000,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Location Plan
Figure 2 - Floor Plans

OTHER EQUIPMENT SUMMARY: R&D funding of approximately $64 million will be required to outfit 'the facility with the necessary communications systems and related equipment.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

# LANGLEY RESEARCH CENTER
# FISCAL YEAR 1994 ESTIMATES
# CONSTRUCTION OF EOSDIS DISTRIBUTED ACTIVE ARCHIVE CENTER (DAAC)

## LOCATION PLAN

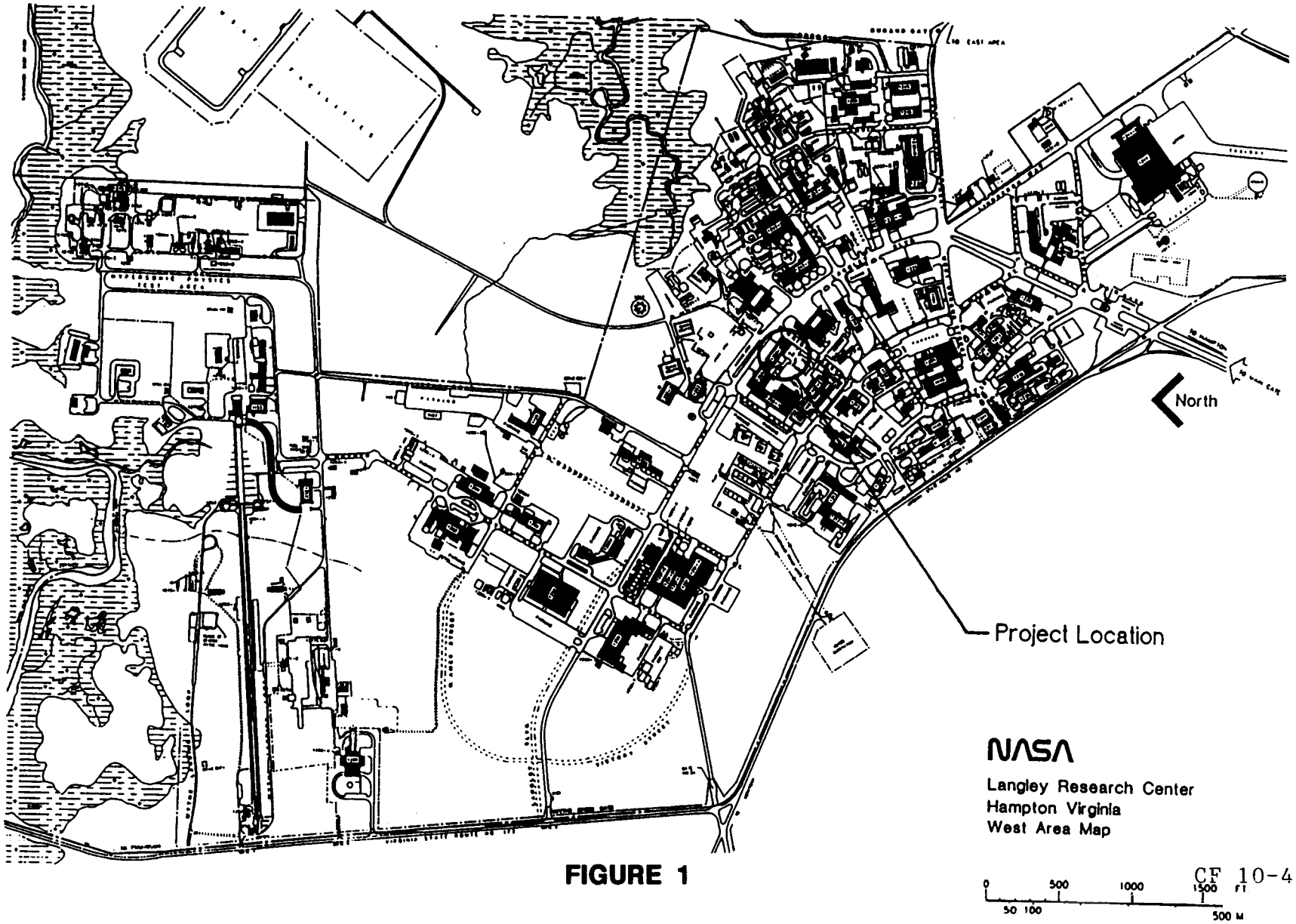
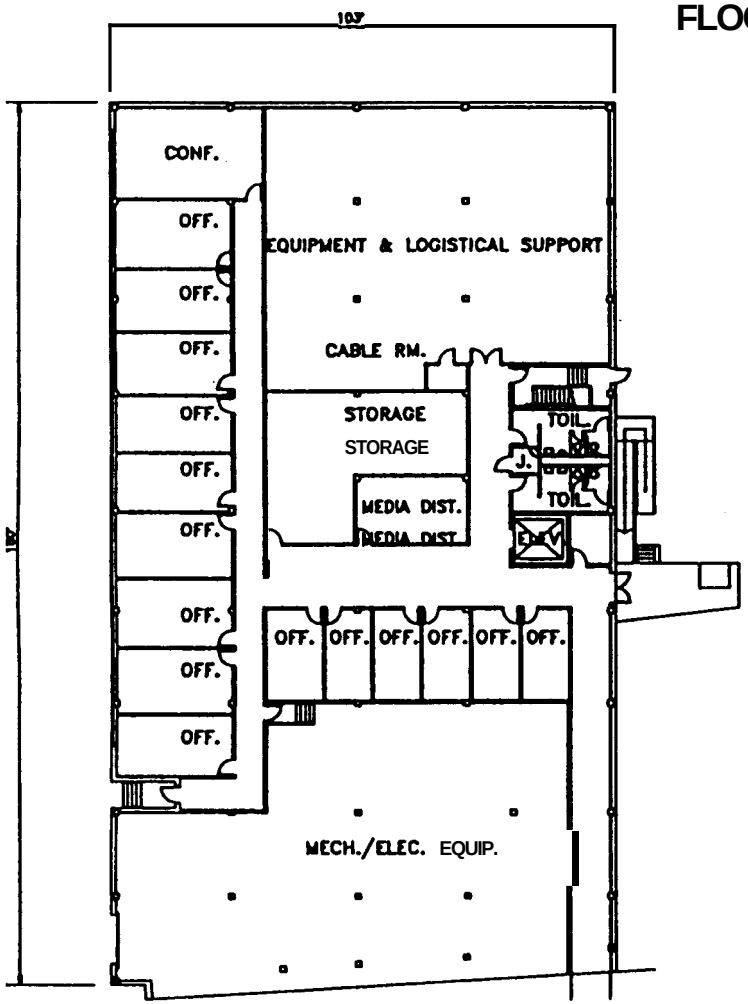



**FIGURE 1**

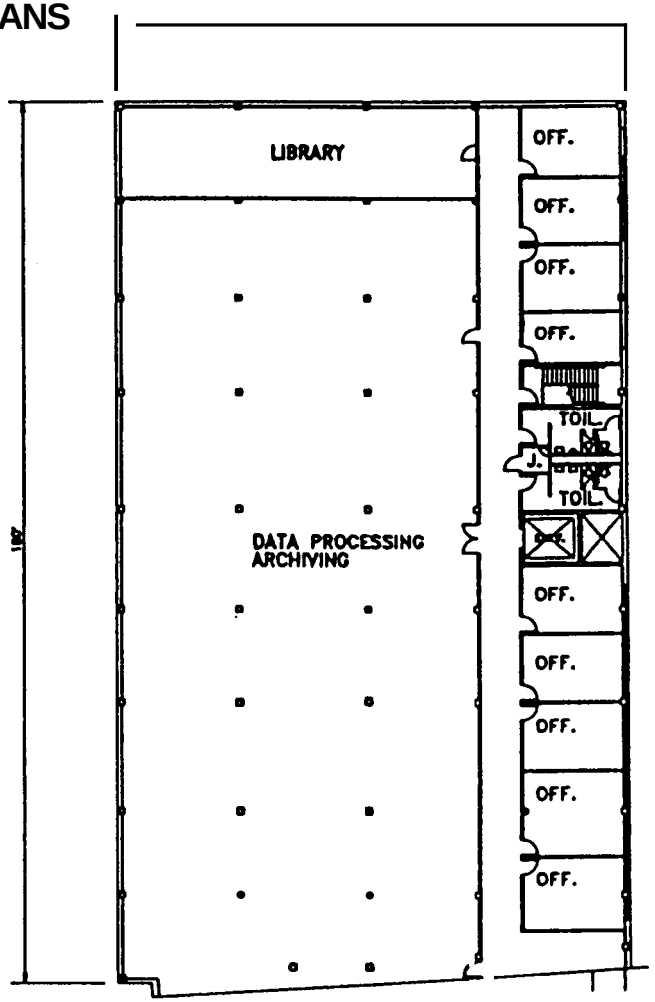
# LANGLEY RESEARCH CENTER
# FISCAL YEAR 1994 ESTIMATES
# CONSTRUCTION OF EOSDIS DISTRIBUTED ACTIVE ARCHIVE CENTER (DAAC)

## FLOOR PLANS




ENTRANCE FROM
EXISTING BUILDING

FIRST FLOOR PLAN




ENTRANCE FROM
EXISTING BUILDING

SECOND FLOOR PLAN

north

FIGURE 2

Lewis
Research Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

LEWIS RESEARCH CENTER

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Advanced Concepts and Technology:** | | |
| Rehabilitation of Rocket Engine Test Facility..... | 12,500,000 | CF 11-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Rehabilitation of Rocket Engine Test Facility

INSTALLATION: Lewis Research Center

FY **1994** CoF Estimate: $12,500,000

LOCATION OF PROJECT: Cleveland, Cuyahoga County, Ohio

COGNIZANT HEADQUARTERS OFFICE: Office of Advanced Concepts and Technology

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | **$1,230,000** | --- | **$1,230,000** |
| Capitalized Investment . . . . . | --- | $7,777,000 | 7,777,000 |
| Total . . . . . | **$1,230.00 0** | $7,777,000 | $2,007. 000 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the rehabilitation and modernization of the Rocket Engine Test Facility (RETF) to ensure capability to conduct space propulsion technology programs needed to support Chemical Transfer Propulsion activities, High Thrust Chemical Propulsion Base Research and Technology (RCT), and Earth-to-Orbit Chemical Propulsion. This project will rehabilitate and restore the exhaust muffler/scrubber, water supply, and waste water treatment systems; add capability for advanced liquid fuels; rehabilitate the gas storage systems; rehabilitate facility communication and control systems; rehabilitate the facility site; and construct a new control building.

PROJECT JUSTIFICATION:

The Rocket Engine Test Facility (RETF) is the sole NASA facility for conducting Chemical Propulsion research and technology. This facility's rehabilitated capability is essential for the development of technology for future applications such as the Lunar Transfer Vehicles, Mars Transfer Vehicles, and Advanced Launch Vehicles. This project will ensure the integrity of this facility and will enhance the safety and productivity of its operations.

Lewis Research Center has the lead role in both the Agency's Chemical Transfer Propulsion program and Propulsion Base Research and Technology, in addition to a major role in Earth-to-Orbit Propulsion. These programs require the use of RETF's unique capabilities, which enable work on technology for high area ratio (1000:1) nozzles that will be required for deep space missions. The RETF has the necessary services and capabilities to conduct research in all areas of chemical propulsion using high-performance propellants, such as hydrogen-oxygen, and has operating expertise developed over the past **35** years. Other testing planned for the RETF includes investigations of advanced turbomachinery for hydrogen-oxygen propulsion systems, investigations of potential Lunar/Mars derived fuels, advanced cooling concepts, combustion stability, thrust chamber life, liquid oxygen cooling, and metallized propellants. The NASA Chemical Propulsion Facilities Assessment Team determined that this facility will be required through the year 2020 to conduct these and similar technology programs.

The current **36** year old facility has been conducting rocket tests on a frequent basis. Attendant with the facility age and level of activity is the deterioration of the exhaust muffler/scrubber, which attenuates noise, cools, and cleanses the exhaust from experimental rocket tests. Recent inspections have shown dramatic deterioration, with approximately **60** percent of the capacity unusable and deterioration accelerating rapidly. The cooling water supply system and the waste water treatment systems are also deteriorated and must be repaired to ensure continued test capability. Valves in the supply lines are badly worn and thousands of gallons of water are lost each day through leakage. Some valves are no longer manufactured and repair parts are unavailable, thereby requiring their replacement. This project will significantly improve reliability and productivity through decreased downtime for breakdowns and maintenance.

IMPACT OF DELAY:

Delay of this project will significantly increase the risk of facility shutdown because of system failure. This would seriously impact the critical research activities for Chemical Transfer Propulsion, Propulsion Base Research and Technology, and Earth-to-Orbit Propulsion.

## PROJECT:

The work includes the rehabilitation of the muffler/scrubber spray system, water supply system, waste water systems, and support structures. Also included is the rehabilitation of the instruments and control systems; installation of a 6,000 psig gaseous hydrogen system, relocation of the existing liquid oxygen system, replacement of existing hydrazine tanks with high pressure, fuel and water run tanks, rehabilitation of gas storage systems (hydrogen, helium, nitrogen), and installation of controls, monitoring and electrical systems; and rehabilitation of the distributed control system, control cabling, conduits, the facility buildings and communication systems, and construction of a new control building.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $12,500,000 |
| Rehabilitate Muffler/Scrubber System . . | LS | --- | --- | 3,647,000 |
| Modify High Pressure and Advanced Fuel Systems . . . . . | LS | --- | --- | 3,312,000 |
| Rehabilitate Facility Systems and Construct Control Building . . . . . | LS | --- | --- | 5,541,000 |
| Total . . . . . | | | | $12,500,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Site Plan

OTHER EQUIPMENT SUMMARY: None

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None

**LEWIS RESEARCH CENTER**
**FISCAL YEAR 1994 ESTIMATES**
**REHABILITATION OF ROCKET ENGINE TEST FACILITY**

**SITE PLAN**

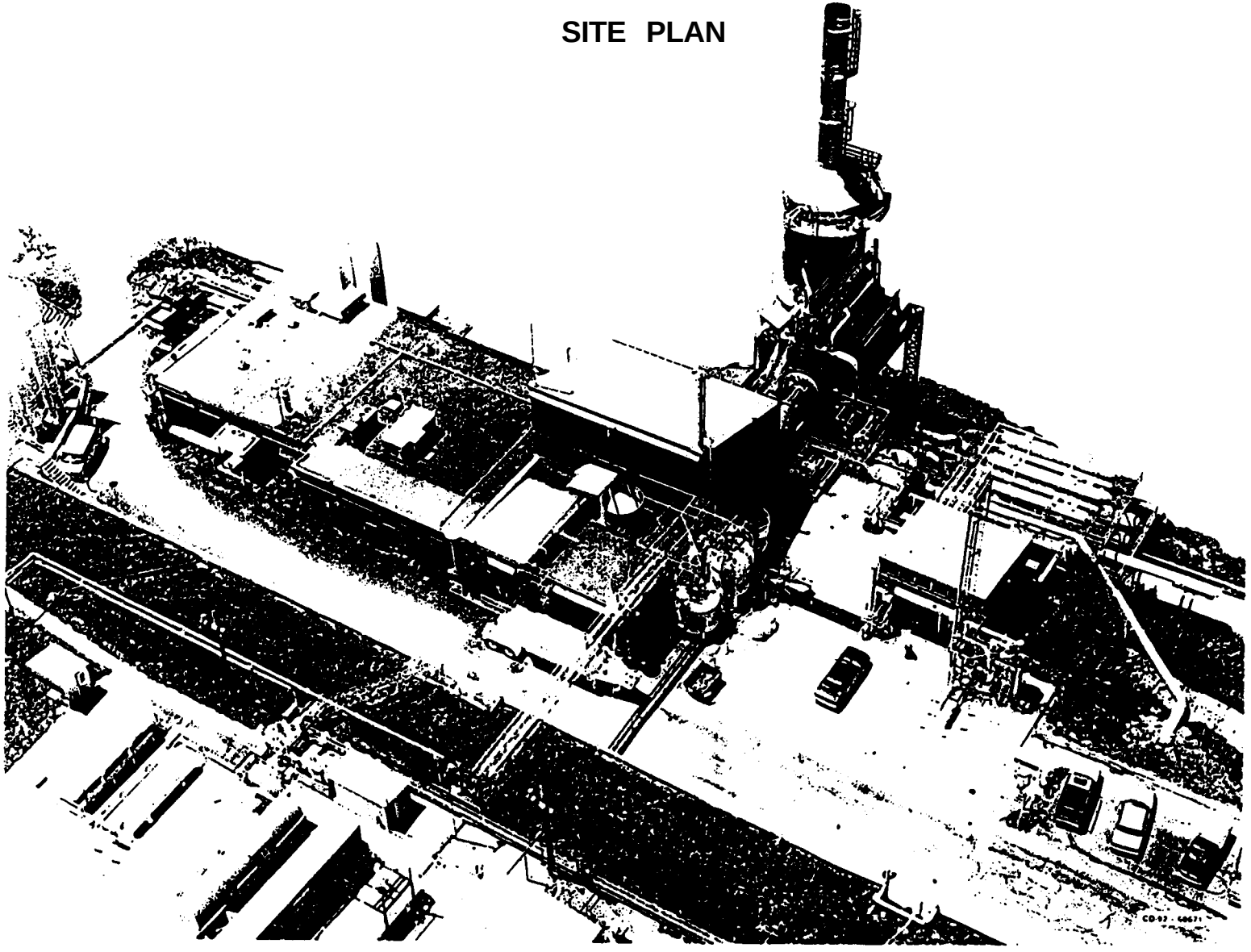


**FIGURE 1**

Various
Locations

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1994 ESTIMATES

SUMMARY

VARIOUS LOCATIONS

| | Amount (Dollars) | Page No. |
|---|---|---|
| **Space Communications:** | | |
| Construction of 34-Meter Multifrequency Antenna, Goldstone (JPL) ..... | 17,600,000 | CF 12-1 |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Construction of 34-Meter Multifrequency Antenna, Goldstone, California

INSTALLATION: Jet Propulsion Laboratory

FY 1994 CoF Estimate: $17,600,000

LOCATION OF PROJECT: Goldstone, California

COGNIZANT HEADQUARTERS OFFICE: Office of Space Communications

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

| | Planning and Design | Construction | Total |
|---|---|---|---|
| Specific CoF Funding . . . . . | $240,000 | --- | $240,000 |
| Capitalized Investment . . . . . | --- | --- | --- |
| Total . . . . . | $240,000 | --- | $240,000 |

SUMMARY PURPOSE AND SCOPE:

This project provides for the construction of a 34-meter high efficiency beam waveguide (BWG) type multifrequency antenna and facilities at Goldstone Deep Space Communications Complex. The new antenna will provide performance improvements for mission support.

PROJECT JUSTIFICATION

This project initiates the construction of a second subnet of 34-meter high efficiency beam waveguide antennas to the Deep Space Network complexes in Goldstone, California; Madrid, Spain; and Canberra, Australia. The support requirements of the total mission set in the latter 1990s exceed the capability of the existing antenna network. The addition of a second 34-meter multifrequency antenna subnet is vital to ensure Deep Space Network capability in meeting mission support requirements. The new 34-meter multifrequency antennas will provide the additional support capability needed, including X-Band up and downlink.

IMPACT OF DELAY:

This project for Goldstone must begin in FY 1994, so that the new antenna at Goldstone can be completed by August 1996 to provide the full Deep Space Network (DSN) operational configuration needed for the period of intense mission support. Current missions and high priority planned missions included in this period are the Galileo mission to Jupiter, Mars Observer, Cassini, Mars Environmental Survey Pathfinder, Near Earth Asteroid Rendezvous, and Pluto Very Small Spacecraft Flyby. The Deep Space Network also will continue to support the distant Voyager and Pioneer spacecraft in their extended mission phases. Delay of this project would adversely affect the full availability of reliable Deep Space Network support that is needed to meet the intense mission support requirements.

## PROJECT:

This project includes the design, fabrication, and installation of the antenna structure, panels, gearboxes, bearings, electric drives, encoders, beam waveguide mirrors, subreflector, and subreflector positioner. It also provides for the construction of the foundation and pedestal, as well as all facilities in and around the antenna structure and pedestal, including the antenna apron security fence, heating, ventilation, air conditioning, electrical power distribution and fire detection and suppression systems.

In addition, this project provides for the construction of site facilities including paved access road, trenches, drainage, flood control devices, water main and distribution system.

| PROJECT COST ESTIMATE: | Unit of Measure | Quantity | Unit Cost | Cost |
|---|---|---|---|---|
| Construction . . . . . | --- | --- | --- | $17,600,000 |
| Antenna Construction . . . . . | LS | --- | --- | 17,600,000 |
| Total . . . . . | | | | $17,600,000 |

LIST OF RELATED GRAPHICS: Figure 1 - Antenna Configuration

OTHER EQUIPMENT SUMMARY: Antenna microwave equipment and electronics and related antenna engineering support required to make this antenna initially operable will be provided with $25 million in Space Flight Control and Data Communications resources over Fiscal Years 1994 through 1996.

FUTURE CoF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT: None for this specific project; however, similar new 34-meter high efficiency beam waveguide antennas are planned for Madrid, Spain and Canberra, Australia.

VARIOUS LOCATIONS
FISCAL YEAR 1994 ESTIMATES
CONSTRUCTION OF 34-METER MULTIFREQUENCY ANTENNA, GOLDSTONE, CALIFORNIA

## ANTENNA CONFIGURATION

REAR ELEVATION

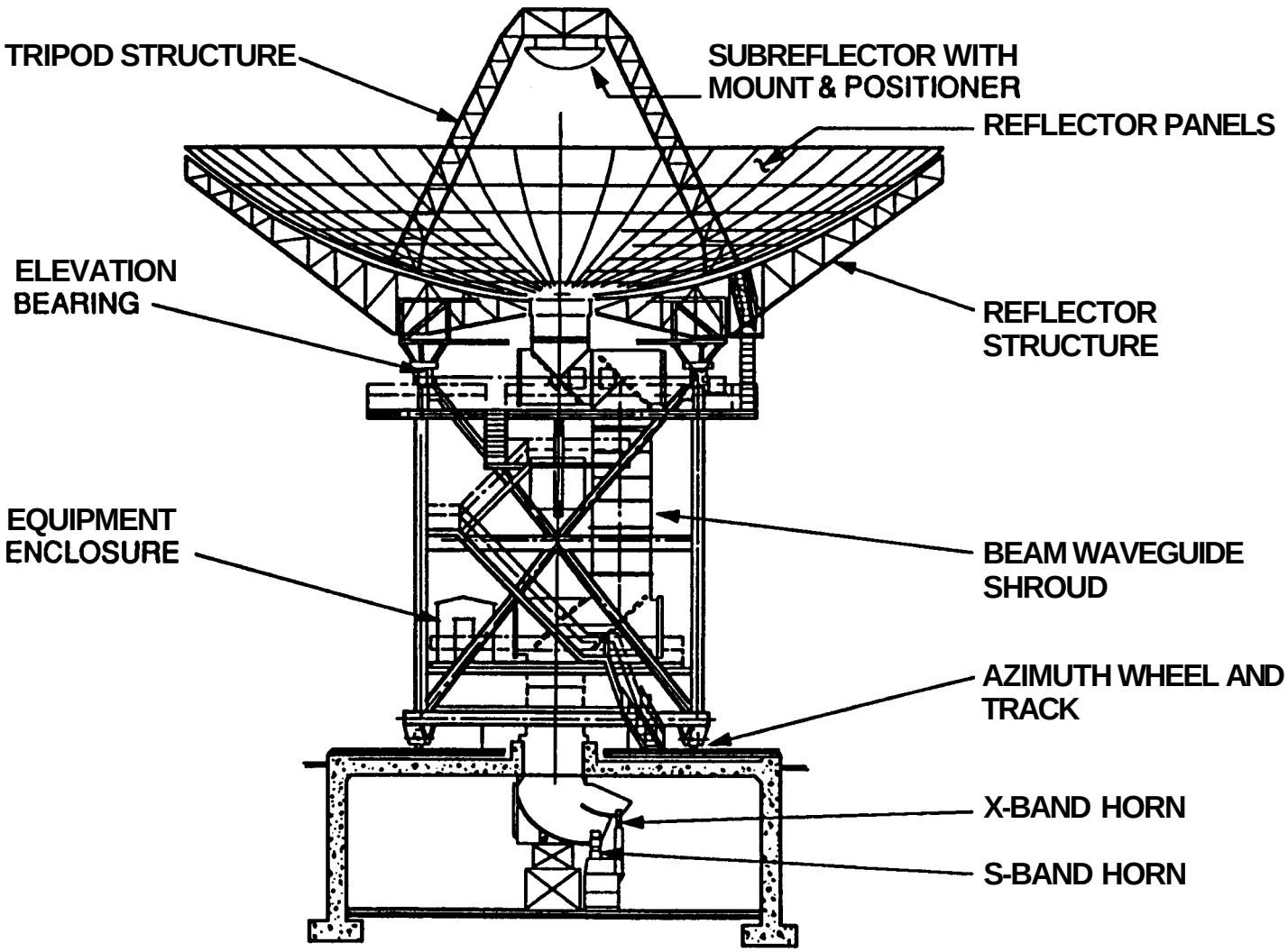



FIGURE 1

Repair

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

**SUMMARY**

REPAIR

| Summary of Project Amounts by Location: | Amount | |
|---|---|---|
| Ames Research Center | $3.270. 000 | CF 13-3 |
| Dryden Flight Research Facility | 1.020. 000 | CF 13-4 |
| Goddard Space Flight Center | 2.700. 000 | CF 13-4 |
| Jet Propulsion Laboratory | 3.200. 000 | CF 13-6 |
| Johnson Space Center | 2.430. 000 | CF 13-7 |
| Kennedy Space Center | 3.690. 000 | CF 13-8 |
| Langley Research Center | 3.800. 000 | CF 13-9 |
| Lewis Research Center | 3.560. 000 | CF 13-10 |
| Marshall Space Flight Center | 3.650. 000 | CF 13-11 |
| Michoud Assembly Facility | 2.600. 000 | CF 13-13 |
| Stennis Space Center | 1.700. 000 | CF 13-14 |
| Wallops Flight Facility | 2.380. 000 | CF 13-14 |
| Various Locations | 1.500. 000 | CF 13-15 |
| Miscellaneous Projects Not in Excess of $250. 000 Each | 500,000 | CF 13-16 |
| Total | $36.000. 000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

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

INSTALLATION: Various Locations

FY 1994 CoF Estimate: $36,000,000

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FY 1992: $31,700,000 FY 1993: $31,900,000

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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 1994 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. It is estimated that at least 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 $4.9 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:

Proposed repair projects for FY 1994 totaling $36 million are described under "PROJECT COST ESTIMATE." This repair program has been distilled from requests in excess of $62 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 $500,000.

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 | $8,950,000 |
| b. | General Purpose Buildings | 6,850,000 |
| c. | Technical Buildings/Structures | 8,950,000 |
| d. | Pavements and Drainage | 2,770,000 |
| e. | Building Exteriors and Roofs | 8,480,000 |

PROJECT COST ESTIMATE

A. Ames Research Center (ARC) . . . . . $3,270,000

1. Repair Steam Vacuum System Boiler and Feedwater System, N-234A . . . . 600,000

Pressurized components of the boiler feed-water system of the Arc Jet steam vacuum system in Building 234A will be repaired and replaced in this project. This system supports operation of all Arc Jet facilities. A rupture in the system can result in a high-pressure steam release, which can have catastrophic results. The boiler is approximately 30 years old and requires replacement to assure continued safe operation.

2. Repair of Pressure Systems . . . . . 500,000

This project provides for repair and replacement of underground high-pressure air lines linking compressor and storage facilities with research facilities. It includes pipe replacement, corrosion control, and reconnection of instrumentation and control systems. The high-pressure lines have been in use since the 1960s. Corrosion-caused leaks and weld defects have been discovered. Significant structural damage has already occurred in one building where an air leak caused upheaval of the floor. The system requires repair to reduce the risk of catastrophic failure.

3. Repair Roof, N-243 . . . . . 500,000

The Flight Guidance and Simulation Laboratory roof will be replaced with a new roof sloped to allow water runoff. Included are insulation, membranes, flashings, and drains. The roof is currently leaking and maintenance efforts have proven futile in providing a permanent solution. Interior ceiling tiles and walls have been damaged by 13 leaks over the past two years. The roof is deteriorated and is at the end of its life.

4. Repair High Reynolds Channel II Pressure Control System, N-231 . . . . 420,000

This project will replace the High Reynolds Channel (HRC) II pressure control valve to control the flow of 3,000 psi air to the HRC facility. The work will include piping modifications and replacement of valve hydraulics and controls. The current valve configuration causes undesirable and disruptive pressure fluctuations at certain operating pressures, limiting research capabilities.

5. Repair Heating, Ventilating, and Air Conditioning System, Area B, N-241 . . . . . 400,000

This project will include replacement of the chiller, chilled water pump, and air handling unit supporting Area B of the Administrative Management Facility. The existing system is over 22 years old and is beyond its useful life. Chillers and the air handler are corroded

and operating beyond design capacity. Comprehensive rebalancing of the system is needed due to additions and modifications for computer rooms and offices.

6. Repair Heating, Ventilating, and Air Conditioning System, N-213 . . . . . 850,000

This project provides for replacement of two boilers, a chiller, and other air conditioning equipment in the Research Support Building. The HVAC system in the east half of the building is over 28 years old, and the system in the west half of the building is over 35 years old. Both have repeatedly broken down during the last few years, and can no longer be repaired economically because replacement parts must be custom fabricated.

B. Dryden Flight Research Facility (DFRF) . . . . . $1,020,000

1. Repair Building 4820 . . . . . 450,000

This project provides for repair and replacement of various components of the Flight Loads Research Facility. The work includes the roof; the heating, ventilating, and air conditioning (HVAC) system; and the compressed air system and ceiling fans. The building is dilapidated. The roof leaks, and the HVAC system shuts down intermittently, causing overheating of computers. The compressed air system is 25 years old, energy inefficient, and not adequately sized.

2. Repair Building 4826 . . . . . 570,000

This project provides for repair of the roof; heating, ventilating, and air conditioning (HVAC) system; and floor of the Aircraft Maintenance Dock. The roof is over 20 years old and can no longer be maintained. The HVAC is old and unrepairable because parts must be custom fabricated. The floor is cracked and uneven due to settlement of the subgrade. Repairs must be accomplished to assure a safe work environment.

C. Goddard Space Flight Center (GSFC) . . . . . $2,700,000

1. Repair Roofs, Various Buildings . . . . . 550,000

This project provides for removal of existing roof assemblies and replacement with a modified bitumen single ply roof system. Roof replacement will take place for portions of Buildings 8, 20, and 12, comprising an approximate total area of 46,200 square feet. Flashing, coping, and parapets will be repaired or replaced as necessary. The building roofs identified are at significant risk of failure. The roofs are maintenance problems, and the risk to people, space, and equipment requires that they be repaired as soon as possible.

2. Repair Heating, Ventilating, and Air Conditioning (HVAC) Induction Systems, Various Buildings . . . . . 700,000

This project provides for the replacement of approximately 1,790 control valves on HVAC induction units in Buildings 3, 7, 14, 16, 21, 22, 23, 26, and 99. The project includes replacement of deteriorated control valves, branch isolation valves, and modifications to associated piping connections. The valves, couplings, and associated piping for induction units in these buildings are badly deteriorated. This condition results in leakage, erratic temperature/humidity control, and high maintenance costs.

3. Repair Building Exteriors and Foundations, Buildings 3 and 13/14 . . . 400,000

This project proposes the repair of various building elements in the Building 3/13/14 complex. This includes the repair/installation of footing drains, repair of cracks in foundation walls, waterproofing of the foundations, removal and replacement of sidewalks, regrading the landscaped areas to direct water away from the building complex, associated excavation, resealing of the curtain wall system, and replacement of the curtain wall parapet cap and sealant. The Building 3/13/14 complex shows numerous signs of water damage. Many of the rooms affected are transformer rooms and mechanical rooms on the basement and sub-basement levels. The cause of this leakage has been determined to be ineffective or non-existent waterproofing, damaged drain systems, improper grading, dry and cracked sealants, and cracks in the building foundation. The proposed work will restore facility integrity and minimize potential loss of property caused by water damage.

4. Repair Paved Surfaces . . . . . 600,000

This project proposes the repair and upgrade of Explorer Road to four lanes from Building 2 to the Building 17 gate; repairs to exterior sites adjoining Buildings 12, 13, 14, and 28, including sidewalks, parking surface overlays, sealing cracks in the parking surfaces, painting parking stalls, seal coating, and repair of curbs, gutters, and drainage basins; and regrading of lawn areas to prevent ponding of rain water. This project is required for the increased usage of Explorer Road projected as a result of Eastern Campus development. This work is also required to eliminate current excessive maintenance and to restore good operating conditions. Numerous potholes, depressions, and alligatoring have developed, resulting in accelerated deterioration and unsafe conditions. Sidewalks are cracked and uplifted, causing tripping hazards.

5. Repair Interior Lighting System, Various Buildings . . . . . 450,000

This project provides for replacing the existing high bay lighting systems with a state-of-the-art high-intensity discharge lighting system in Buildings 7, 11, 15, 16W and 22. The existing high bay lighting systems in these buildings are nearly 30 years old and require complete replacement. Operation and maintenance costs are excessive due to age. The new high-intensity discharge lighting will provide a more reliable, efficient and maintainable system.

D. Jet Propulsion Laboratory (JPL) . . . . . $3,200,000

1. Repair Curtain Wall System, Space Flight Support Building (264) . . . . 900,000

This project provides for the repair of approximately 45,000 square feet of existing curtain wall on all four sides of this seven-story building. Repair will include replacement of the corroded horizontal and vertical aluminum mullions, all glazing and sealing gaskets, and application of building sealants. The building experiences severe leakage on all sides. Mullions are corroded and glass plates have blown out creating hazard potential to personnel. Water leakage soaks carpeting, electrical cords, and electrical equipment creating hazardous conditions and increasing maintenance costs.

2. Replace Ceiling and Lighting Systems, Instrumentation Systems Laboratory (168) . . . . . 900,000

This project provides for the replacement of the ceiling system and light fixtures in laboratories and corridors. The heating, ventilating and air conditioning system (HVAC) will be modified to eliminate corridors as a return plenum. Air registers above doors will be eliminated and replaced with new air diffusers and return registers in the ceilings. Smoke-tight gasket seals will be installed on corridor doors. Spot removal and encapsulation of asbestos fire proofing will be provided on selected areas of the building's structure. These repairs are required to bring this building into compliance with fire, seismic and other life safety codes.

3. Repair Paving on Mesa, Gyro and Magnetometer Roads . . . . . 500,000

This project provides for the repair of approximately 125,000 square feet of Mesa Road and approximately 600 linear feet of Gyro and Magnetrometer Roads leading up to Buildings 251 and 253 and the parking areas adjacent to the buildings. The deteriorated asphaltic concrete will be removed and replaced with approximately three inches of new asphaltic concrete on six inches of crushed aggregate base course. Resetting of existing manholes, valve boxes, and catch basins and construction of curbs and gutters will be accomplished to accommodate site requirements. This pavement, which is over twenty years old, is severely deteriorated. It is cracked, alligatored and ravelled with bumps, depressions and potholes.

4. Replace Paving, West Parking Lot . . . . . 900,000

This project provides for the removal and replacement of approximately 400,000 square feet of asphalt paving on the West Parking Lot. The paving will be removed, ground and reused as a base for the new approximate 2 1/2 inch thick asphalt paving. Concrete surface drainage system will be provided to accommodate run-off to the existing storm water control system. The parking layout will be re-designed and striped to provide the maximum number of parking stalls and designated handicapped parking spaces. This is the original pavement from

1962, and the surface has settled in spots, leaving an uneven surface with numerous cracks that allow water to penetrate causing additional deterioration.

E. Johnson Space Center (JSC) . . . . . $2,430,000

1. Repair Standby-Power Diesel Engines, Building 48 . . . . . 900,000

This project provides for the replacement of three diesel engines with an uninterruptible power supply system in the Emergency Power Building, Building 48. The generators are approximately 30 years old and have exceeded their useful, reliable life. These critical systems provide emergency power to the Mission Control Center.

2. Repair Electrical Power Distribution Equipment, Building 24 . . . . . 600,000

This project provides for the replacement of major electrical equipment in the Central Heating and Cooling Plant, Building 24. The existing transformer will be replaced and connected to a new Motor Control Center (MCC) by a new 3,000 ampere bus duct and main tie breakers. An existing 400 ampere MCC will also be replaced. The existing MCC is over 30 years old and has exceeded its useful life. Replacing the transformer and MCC will increase the electrical distribution system reliability.

3. Repair 400 Area Altitude Simulation System, White Sands Test Facility (WSTF) . . . . . 510,000

This project provides for the overhaul and refurbishment of the diesel engines, associated power transmission units, and water and alcohol pumps that supply fluids to the chemical steam generation modules for the 400 Area altitude simulation system. The engines and pumps are over 25 years old and have exceeded their useful life. These systems are a vital part of the altitude simulation system used for testing propulsion engines and systems in NASA's space flight programs.

4. Repair Base Wide Roads and Parking Areas, White Sands Test Facility (WSTF) . . . . . 420,000

This project provides for repair of deteriorated roads and parking lots at the WSTF. Work includes repairing cracks, broken edges, utility trench cuts, rebuilding road shoulders, applying a bituminous surface seal, paving additional areas, and restriping on-site roads and parking areas. The edges of many roadways and corners are broken and in need of repair to prevent water migration beneath the pavement. If these pavements are allowed to deteriorate further, complete replacement will be required at a much higher cost.

F. Kennedy Space Center (KSC) . . . . . $3,690,000

1. Repair Operation and Checkout (O&C) Building Roof, Area J . . . . . 370,000

This project will replace approximately 36,500 square feet of roof system on the O&C Building. Work will include replacing insulation and flashing. The condition of this part of the roof has deteriorated such that normal maintenance is no longer adequate, and water entering the building could cause damage to flight hardware and ground support equipment. This facility is the primary payload assembly and checkout facility.

2. Repair Aboveground Hot Water Piping, Industrial Area . . . . . 650,000

This project will replace approximately 2,000 feet of high temperature hot water piping and approximately 38,000 feet of aluminum jacket and insulation. Mower guards will be installed to prevent damage to the piping and insulation. Piping and insulation need to be replaced because of mechanical damage and weathering caused by environmental conditions. Additional protection is required to prevent further damage to the piping and insulation system.

3. Repair Shuttle Landing Substations . . . . . 620,000

This project replaces the 70,000 volt single-phase regulators in the Shuttle Landing substation. The substation enclosures are badly corroded and are susceptible to water intrusion. Additionally, these substations, which provide electrical power to the Shuttle Landing Facility (SLF) Approach lighting systems, are obsolete. Replacement/spare parts for these 20-year-old systems are difficult and expensive to obtain. A safe reliable visual guidance system is vital to SLF and Shuttle night operations. The existing obsolete system needs to be replaced with an up-to-date, reliable system to assure safe SLF and Shuttle night operations.

4. Repair Building 836 Firex System, Vandenberg . . . . . 850,000

This project will replace the existing wet pipe sprinkler fire protection system at NASA Vandenberg Building 836 with a dry pipe pre-action sprinkler system. The sprinkler system is approximately 30 years old, which increases the risk of serious damage to spacecraft and flight hardware due to mechanical failure of the wet pipe system. The existing systems are pressurized to 140 psi, and significant leaks have occurred in the past few years. Recent failures have required riser valve and pipe replacement because of corrosion.

5. Repair Kennedy Parkway North . . . . . 600,000

This project repairs Kennedy Parkway northbound from NASA Causeway to Saturn Causeway, approximately 4.5 miles of two-lane road. Approximately 2,000 tons of asphalt concrete will be required as a leveling course due to settling of the road bed. A 1-inch

asphaltic concrete overlay will be applied to approximately 65,000 square yards of pavement along with approximately 72,000 feet of pavement striping. This road is a primary traffic route for KSC personnel and is used for transporting Shuttle payloads. Cracking has caused moisture to enter the road base causing deterioration of the base and thus undermining the wearing course.

6. Repair Hangar N Roof, Cape Canaveral Air Force Station . . . . . 600,000

This project replaces approximately 33,800 square feet of existing built-up roofing at Hangar N with a new 4-ply built-up roofing system, including insulation, graveltop, gutters and flashing. Accrued deterioration due to weathering (ponding water, ultra-violet rays, expansion and contraction of materials) has caused breaks, splits, and ridging of the roof system and has allowed water intrusion. Normal maintenance of this roof system is no longer adequate.

G. Langley Research Center (LaRC) . . . . . $3,800,000

1. Repairs to High Pressure System, Various Facilities . . . . . 600,000

This project provides for repairs to the high pressure systems at various facilities at Langley Research Center. The work to be done under this project 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, the Gas Dynamics Laboratory (1247), the Radiation Re-entry Laboratory (1275), and the Structures and Materials Laboratory (1148). 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. Repairs to Chilled Water System (1268/1268A) . . . . . 550,000

This project provides for the replacement of an existing 22-year-old centrifugal chiller (No. 4) and installation of a new cooling tower serving the Central Scientific Computing Facility at LaRC. The work includes the removal of an existing chiller, modifications to foundations, piping, and electrical service for the installation of the new chiller. The work will also include all pumps, piping that interconnects with the existing cooling water system, controls, and electrical components associated with the installation of the new cooling tower. Implementation of this project is necessary to ensure the reliability of the chilled water system which supports LaRC's computing facility.

3. Replace Roof, Building 1250 . . . . . 400,000

This project provides for the replacement of approximately 25,100 square feet of existing built-up roofing above the office area and the high bay area of the Environmental and Space Sciences Laboratory, Building 1250. The new roof will consist of rigid roof insulation

covered by a 4-ply built-up roof system, complete with necessary roof drains and associated plumbing, flashing, facia, pitch pockets, cant strips, gravel stops and new expansion joints/seals where necessary. Also the old abandoned exhaust housings will be removed. Because normal maintenance is no longer effective, replacement of this roof is required to ensure the integrity of the facility and to prevent damage to equipment.

4. Repairs to Kramer Drive System (1241) . . . . . 900,000

The project provides for rewinding of the "A1", "A2", and "A3" machines in the Kramer speed control drive system located in facility 1241. It will also replace the DC loop power cables with new cables. The failure of this 45-year-old Kramer Drive speed control system would result in the shutdown of the 16-Foot Transonic Tunnel and the National Transonic Facility.

5. Replacement of 100-Foot Sphere Steam Ejector (1247) . . . . . 570,000

This project provides for the replacement of the existing 30-year-old steam ejector system with a new 3- or 4-stage system. The connection point to the vacuum sphere system will be relocated to provide additional flexibility. A new, more efficient system would eliminate excessive maintenance costs, reduce steam consumption, increase productivity, and greatly diminish the noise and the vapor cloud created by the existing system configuration.

6. Replace 10,000 CFM Compressor for 8-Foot Transonic Pressure Tunnel (640) . . . . . 780,000

This project provides for the replacement of the 40-year-old 10,000 CFM compressor serving the 8-Foot Transonic Pressure Tunnel located in Building 640 of Langley Research Center's East Area. The project will include replacement of the compressor and its ancillary equipment and modifications to the existing compressor foundations and subsystems. The compressor has deteriorated over the years and it is extremely difficult to obtain replacement parts to keep it in working condition. Failure of the compressor would halt operation of the 8-Foot Transonic Pressure Tunnel.

**H. Lewis Research Center (LeRC)** . . . . . **$3,560,000**

1. Repair Central Water Distribution System . . . . . 900,000

This project provides for the repair of the central water distribution system. The work includes the replacement of the incoming 24" diameter domestic water supply located along Hangar Access Road. It also includes connecting the 8" to 23" diameter existing piping that distributes water to the Center. Mineral deposits on the inside of the main supply line have contributed to 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.

2. Repair 34.5 KV Equipment, Building (142) . . . . . 900,000

This projects provides necessary repairs to the 34.5 kV electric power distribution system at LeRC to ensure safe and reliable power to critical institutional loads. The work includes removal and replacement of cable in poor condition, installation of a new bus to provide a second source of power to Substation C, and rehabing transformers and related auxiliary equipment. This project will avoid shutdown during maintenance periods, eliminate single point failures, and improve system reliability and safety.

3. Repair Steam Trenches, Various Locations . . . . . 900,000

This project provides for the repair and replacement of piping and valves at various locations 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 Sanitary Sewer System, Plum Brook Station . . . . . 860,000

This project will repair or replace segments of the sanitary sewer system at Plum Brook, which have high inflow/infiltration rates that result in excessive flow into treatment plant. Portions of the system needing repair are lower Taylor Road branch; upper Maintenance Road branch; Garage branch, which includes hazardous waste cleanup; K-site branch; upper Taylor Road branch; Administration branch; Chemical Laboratory branch; and Space Power Facility branch. This project phase will repair the system and result in reduced flows into the regional sewer district and reduce treatment costs.

I. Marshall Space Flight Center (MSFC) . . . . . $3,650.000

1. Replace High Pressure Air Storage Capacity . . . . . 850,000

This project provides for the purchase and installation of one air carbon steel storage vessel in the Test Area to restore capacity lost as a result of the down rating of existing air and hydrogen vessels. In order to satisfy the current demand for high-pressure air, the Center is operating its air stations for two 8-hour shifts per day, 7 days per week. As existing vessels deteriorate due to age, they are downrated or taken out of service. It is no longer economical nor practical to make up for this loss of capacity by making operational changes such as working additional shifts.

2. Repairs to High Pressure Piping System . . . . . 600,000

This project provides for the replacement of approximately 7,000 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, and continued piecemeal repairs are costly and disruptive to testing activities.

3. Repair Roof of Computer Facility (4663) . . . . . 650,000

This project provides for the replacement of the roof on Building 4663. The work includes replacement of approximately 75,000 square feet of roofing membranes, installation of a lightweight R-30 roof insulation system, selective replacement of flashing, and the 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 Exterior of Engineering and Development Laboratory (4708) . . . 850,000

This project provides for exterior repairs to Building 4708. The work includes the replacement of exterior asbestos siding with new insulated metal panels; and the repair, replacement, or installation (as required) of windows, gutters, downspouts, entrance canopies, curbs, and sidewalks. Building 4708 is a 292,000 square foot high bay facility, over 30 years old and very deteriorated. The new insulated siding and windows will provide an energy-efficient and low-maintenance building envelope.

5. Repair Multipurpose High-Bay Facility (4655) . . . . . 700,000

This project provides for repairs to Building 4655. The work includes the replacement of windows and exterior siding; replacement or installation, as required, of heating, ventilation, and air conditioning systems; and restoration of the electrical distribution system. Also included is the restoration and/or reconfiguration of interior surfaces, restrooms, interior lighting, and emergency exit signs. Building 4655 is an 11,200 square foot high-bay facility. It is over 25 years old and requires extensive maintenance. The new insulated siding and windows will provide an energy-efficient and low-maintenance building envelope. Restoration of this facility will bring it into compliance with applicable codes and significantly improve its functionality.

J. Michoud Assembly Facility (MAF) . . . . . $2,600,000

1. Repair Building 102, Zone 8 . . . . . 600,000

This project provides for the repair of the interior systems of Zone 8 of the Engineering Building (above the cafeteria). The work includes replacement of the supply/return ddct work, electrical distribution/cabling system, existing acoustical ceiling/lighting system, and modification of the overhead sprinkler and fire alarm systems. This building is over 40 years old and has never received a major interior building restoration. These repairs are required to provide an adequate workplace environment.

2. Repair Sewer Lift Stations . . . . . 300,000

This project provides for the repair of sewer lift stations that are part of the Center's sanitary sewer system. The work includes replacement of components such as pumps/motors, electrical systems, piping/valves, flotation devices, and surge tanks. Also included is the repair of the walls in the wet wells of the lift stations. These stations are over 45 years old and have never been overhauled. The pumps, valves, and pipes are leaking; the motors are continuously failing; the controls do not function; and the electrical systems are obsolete.

3. Repairs to Acceptance and Preparation Building . . . . . 900,000

This project provides for the repair of the heating, ventilation, and air conditioning (HVAC) and power systems in Building 420. The work includes replacement of air handling units with associated piping, valves, and controls; replacement of reheat coils in ductwork and control valves; and replacement of 480 v power distribution panels. Building 420 is a 27 year old, 110,000 square foot facility with four high bay cells. The HVAC system has exceeded its design service life. The power system is obsolete and spare parts are no longer manufactured for it. The proposed repairs will improve the reliability and maintainability of these systems, and reduce operations and maintenance cost.

4. Repairs to Vehicle Component Supply Building . . . . . 800,000

This project provides for the repair of the heating, ventilation, and air conditioning (HVAC) system in Building 220. The work includes replacement of selected air handling units with associated piping, valves, and controls; and replacement of the chilled water and steam piping, also with associated valves and controls, between Buildings 207 and 220. Building 220 is a 26 year old, 201,000 square foot facility. The equipment and piping to be replaced have exceeded their design service life and are very deteriorated. The proposed repairs will improve system reliability and maintainability, and reduce operations and maintenance cost.

K. Stennis Space Center (SSC) . . . . . $1,700,000

1. Repair Main Substation Switchgear and Enclosures . . . . . 800,000

This project provides for the replacement of the existing 13.8 kV main substation switchgear and the associated relaying and metering systems. Equipment to be replaced includes air circuit breakers, lightning arresters, relaying for overcurrent and ground fault detection and interruption, and metering. New solid state relaying, metering and utility control system equipment for the new bus tie breakers will be provided. New exterior vacuum circuit breakers with isolation and bypass switches will replace the existing air circuit breakers. The existing substation equipment is more than 30 years old and has exceeded its useful life. Three major component failures along with numerous failures have occurred in recent years.

2. Repair Shuttle Parkway . . . . . 900,000

This project provides for the resurfacing of the east and west bound lanes of Shuttle Parkway (Highway 607) from the Mississippi State highway maintenance limits to the north gate (approximately 28,800 square yards) and from the Mississippi State highway maintenance limits to the south gate (approximately 64,800 square yards). Work includes repairs to cracks in existing roads, base repairs, the application of a tack coat followed by overlaying with one and one-half inches of bituminous surface. Road shoulders will be dressed and seeded. Cyclic repair of this parkway is needed in order to preserve the road system from excessive surface deterioration, prevent further breakdown of pavement structure, and to maintain a high level of safety.

L. Wallops Flight Facility (WFF) . . . . . $2,380,000

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 north of Launch Area Five. 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 Storm Drainage System . . . . . 550,000

This project provides for the repair of approximately 45,000 linear feet of 8-inch to 54-inch storm drainage system piping and manholes on the mainbase and airfield areas. The work will include all related work such as street repair due to storm drainage damage to the subbase materials. Surface drainage problems will be corrected through the installation of new underground drains and the installation of swales and culverts. This project is required to repair deteriorated storm drains and to correct drainage deficiencies due to facility changes over the past 40 years. The work should be accomplished at this time to prevent additional

system deterioration, which could lead to the undermining of roads, airfield pavements, and structures.

3. Repair Exterior, Building F-10/10B . . . . . 350,000

This project provides for the repair of building F-10 and adjacent laboratory building F-10B. The work includes the covering of the brick exposed south side and southwest corner of building F-10 and the exterior of building F-10B with preformed metal panels; the addition of a new insulated roof system, thermal windows and doors, fire protection, and HVAC system in F-10B; enclosure of the exterior stairway in F-10 with steel frame, metal siding, windows and doors; and the addition of an equipment elevator with enclosure to serve the south side of F-10. The installation of the metal panels on F-10 and F-10B will protect the brick from further deterioration. The enclosure of the metal stair will complete the safety covering of the major exits from the building second floor and reduce heat loss. The elevator will permit movement of equipment between the laboratories within the south wing of the building.

4. Repair Exterior, Central Heating Plant, Building D-8 . . . . . 280,000

This project provides for the repair of the exterior brick wall at Central Heating Plant, Building 8. The work includes the installation of metal furring, metal panel siding, flashing, and trim; removal of existing steel windows; and the installation of new ventilating windows. The existing building was built in 1944 and the exterior brick facing has deteriorated causing water infiltration. The installation of metal siding will prevent further deterioration and provide water protection. The existing ventilation windows are inoperable and require replacement.

5. Repair of Roofs on Buildings D-1 and N-159 . . . . . 300,000

This project provides for the repair of the roofs on the north and south sides of building D-1 and east side of Building N-159. The work includes the replacement of the existing built-up roofs with an elastomeric membrane system, including insulation, flashing and coating. The north and south wings of Building D-1 house Aeronautical Operations and Facilities Engineering; the East wing of N-159 houses Observational Science personnel and laboratories. Both roofs have a history of leaks, wet insulation, ponding, and drainage problems. This project will remedy the defects and reduce maintenance costs.

M. Various Locations . . . . . $1,500,000

1. Repair Operations and Support Building, Bermuda Tracking Station . . . $800,000

This project replaces one 55-ton water chiller serving the Operations and Support building with a new 100-ton chiller. Construction of a twenty foot by eighty foot building enclosure is also provided. The project also includes the construction of two 990 square foot additions to the building for operations and extension of the existing electrical system and

heating, ventilating and air conditioning system. Other repairs include correction of hurricane damages to various exterior entrances, reconstructing 12 wooden vestibules with masonry, replacement of storm damaged windows, and installation of masonry windbreaks to protect the drum storage area. Bermuda experiences direct hits from hurricanes approximately once every five years. The chilled water system was installed in 1965 and has deteriorated because of age and the corrosive saline environment.

2. Repair Roads, Goldstone, California . . . . . 300,000

The project will provide for the resurfacing of all pavements at the DSS 13 Venus site. It will provide flood control for the site and its access road. Paving an additional parking area around the 34-meter antenna is necessary to meet current requirements. The existing access road to the 34-meter beam waveguide antenna at the Venus site and buildings requires protection against flash flood waters. Paving at DSS 13 is about 25 years old, is cracked and worn out, and requires resurfacing.

3. Repair Roads, Madrid Spain . . . . . 400,000

This project provides for deteriorated pavement repair and resurfacing of on-site roads, parking lots and antenna aprons at the Madrid Deep Space Communications Complex. Surface drainage problems will be corrected. Resurfacing will be composed of approximately two inches of hot mix asphalt concrete and includes the sealing of antenna aprons. Deficiencies in the existing drainage control system will be corrected to avoid more costly future repairs. The road surface has deteriorated and must be repaired to prevent major pavement failure.

N. Miscellaneous Projects Not In Excess of $750,000 Each . . . . . $ 500,000

Total . . . . . $36,000,000

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

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

Rehabilitation
and
Modification

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

SUMMARY

REHABILITATION AND MODIFICATION

| Summary of Project Amounts by Location | Amount | Page No. |
|---|---|---|
| Ames Research Center | $3.910.000 | CF 14-3 |
| Dryden Flight Research Facility | 680.000 | CF 14-4 |
| Goddard Space Flight Center | 3.730.000 | CF 14-5 |
| Jet Propulsion Laboratory | 2.300.000 | CF 14-6 |
| Johnson Space Center | 2.900.000 | CF 14-7 |
| Kennedy Space Center | 3.370.000 | CF 14-9 |
| Langley Research Center | 3.770.000 | CF 14-10 |
| Lewis Research Center | 3.500.000 | CF 14-11 |
| Marshall Space Flight Center | 4.050.000 | CF 14-12 |
| Michoud Assembly Facility | 1.800.000 | CF 14-14 |
| Stennis Space Center | 2.350.000 | CF 14-14 |
| Wallops Flight Facility | 2.200.000 | CF 14-15 |
| Various Locations | 1.220.000 | CF 14-17 |
| Miscellaneous Projects Not in Excess of $250.000 Each | 220,000 | CF 14-17 |
| Total | $36,000,000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

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

INSTALLATION: Various Locations

FY 1994 CoF Estimate: $36,000,000

FY 1992: $34,800,000 FY 1993: $34,000,000

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 1994 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 $4.9 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:

Proposed rehabilitation and modification projects for FY 1994 totaling $36 million are described under "PROJECT COST ESTIMATE." The total program of $36 million has been distilled from requests of more than $65 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 $220,000.

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 . . . . . | $12,400,000 |
| b. | Fire Detection/Protection Systems . . . . . | 820,000 |
| c. | General Purpose Buildings . . . . . | 12,450,000 |
| d. | Technical Buildings/Structures . . . . . | 10,330,000 |

PROJECT COST ESTIMATE

A. Ames Research Center (ARC) . . . . . $3,910,000

1. Rehabilitation and Modification of Space Flight Environmental Simulator 52-Ft Centrifuge (N-239A) . . . . . 900,000

This project provides for adaptation of this simulator for human research purposes while retaining original capability for animal research. It includes demolition of existing equipment, construction of human research enclosures, control room modifications, and ingress/egress modifications. This facility will provide the only United States capability for long term (up to one year) human continuous gravity investigation with a large radius device. It will expand and continue NASA's research capability in human response to artificial gravity.

2. Rehabilitation and Modification of Security Office, Building 15 . . . . . 900,000

This project provides for rehabilitation of a 20,000 gross square foot building, including installation of air conditioning and fire protection, and modification of heating and ventilation, electrical, lighting, and building layout. This building was originally built as a fire station and is now used as the security office. It contains neither air conditioning nor fire protection, and the electrical system does not meet current code. It is not adequate for use as a security office.

3. Modify Communications Underground Duct Network . . . . . 360,000

Expansion and repair of the existing communications duct network are included in this project, which consists of trenching and installation of duct banks and manholes. The existing ducts are filled to capacity and are damaged in some areas. Duct bank capacities have been exceeded due to use of personal computers and extensive networking demands. New duct banks are needed to meet center communications requirements.

4. Rehabilitation and Modification of Fire Sprinkler System (N-239) . . . . . 600,000

This project provides a new wet pipe automatic fire sprinkler and alarm system in Building N-239. Smoke detectors and alarm connections to the sprinkler, water flow, and valve tamper devices will also be provided, as well as new exterior water lines from the water mains to the building. This 126,000 gross square foot office and laboratory building is currently without sprinklers and must be upgraded to meet current NASA fire protection requirements. The existing alarm system has reached the end of its life and must be replaced.

5. Modify 80 X 120 Ft Wind Tunnel Power Supply for Model Utilities, N-221B . . . . . 550,000

This project includes modification of model utilities consisting of installation of a transformer in a unit substation to provide greater capability for model utilities power. Also, a feeder line from an Ames substation to the unit substation will be added. Power is presently not adequate to support individual mechanical systems, such as hydraulics, model air, model lubrication, and jet engine starts. Test objectives are now routinely limited due to lack of power. Ames is currently renting generator equipment that is neither adequate nor cost effective. Continued use of the 80 X 120 without this project prolongs inefficient operation and unnecessarily limits test program objectives.

6. Rehabilitation of Air Dryers, N-229A . . . . . 600,000

The air dryers on the lines from the 3,000 psi high-pressure air system to the 3.5-ft Hypersonic Wind Tunnel will be replaced in this project. Included are modifications to high-pressure air plumbing, provision of electric power for regeneration of dryer beds, and control and monitoring systems integration. The air dryers have exceeded their useful life, and maintenance downtime is causing slippage of research projects.

B. Dryden Flight Research Facility (DFRF) . . . . . $680,000

1. Rehabilitation and Modification of Backup Power System, Building 4875 . . . . . 330,000

This project provides for replacement of an existing 60 kilowatt (kW) generator with a 400 kW generator with connections to an existing 225 kV (kilovolt) uninterruptible power supply (UPS) at the UPS Facility. The 60 kW generator backs up facility telephone equipment and is not adequate. Existing commercial power is unreliable and numerous power outages have caused telephone equipment failures.

2. Modifications for Communications Complex Backup Power, Building 4824 . . . . . 350,000

Provide and install 225 kilovolt amps of uninterruptible power supply with 15 minutes of battery back-up. Provide weather-proof enclosure for batteries and rectifiers. Provide all wiring and controls to connect to existing systems. This complex provides radio frequency mission communications for aeronautic research missions and supports Space Transportation System Landings at Edwards, Air Force Base. It is essential that 15 minutes of uninterruptible power be provided, or critical computer programs will be damaged or lost.

C. Goddard Space Flight Center (GSFC) . . . . . $3.730.000

1. Modification to High Bay White Room, Building (2) . . . . . 900,000

This project provides for modification of approximately 5,000 sq. ft. of the High Bay Staging Facility. The modifications include upgrading the area to a class 100,000 clean room, installation of a three-ton overhead bridge crane, and providing mechanical equipment to support clean room and laboratory operations. This project will also provide for the construction of a 1,000 sq. ft. laboratory addition adjacent to the high bay room. The laboratory will include a hoist for transporting experiments and instrumentation to the high bay area. Electrical, architectural, fire protection and detection systems will also be modified and included as required. These high bay modifications are essential to meet the flight cleanliness requirements of the next generation of instruments being proposed for cosmic ray and gamma ray space research. Continued development of these instruments in a cost-effective manner is dependent on this facility capability.

2. Rehabilitation of Utility Control System . . . . . 480,000

This project will replace obsolete portions of the existing Utility Control System (UCS) for Buildings 6, 24, and 28 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.

3. Rehabilitation and Modification of Terrestrial Applications Facility, Building (22) . . . . . 650,000

This project provides for the renovation of approximately 11,000 square feet of space in Building 22 to accommodate new occupants. Modifications include the conversion of computer and other technical space into offices and new computer space, and the reworking of existing office space. Project work includes the relocation of wall partitions, HVAC systems, ceiling systems, floor tiles, and wall finishes as required. Rehabilitation of lighting, smoke detection and sprinkler systems is included. This project is an essential element in the Center's overall housing plan. Consolidation of organizations and like activities to promote operational efficiency are key tenets of this plan.

4. Rehabilitation and Modification of Technical Support Building (20) . . 900,000

This project proposes the rehabilitation of approximately 7,000 square feet of existing laboratory, office, and support space in the north end of the Technical Support Building, Building 20. The project includes demolition of existing partitions, flooring and ceiling systems, and associated mechanical and electrical systems. The project will install new partitions configured to meet user needs; new flooring and wall and ceiling finishes; will reconfigure mechanical ductwork/diffusers and electrical service distribution; and will replace lighting systems and provide new fire detection and suppression systems, as required. The project will also provide a new mezzanine containing approximately 5,600 square feet of office and support space, along with necessary services (including additional restroom facilities, fire egress stairs, and an elevator, as required). This project will assist the Center in implementing its overall housing plans and reflects consolidations that have taken place as a result of a recent reorganizations.

5. Modifications to Buildings 3/14 for Missions Operations Facility . . . 800,000

This project will modify approximately 10,000 square feet of space in Building 3/14 for the mission operations systems. Included is the installation of new ceiling, light fixtures, partitions, acoustical treatment and raised floor tiles. Modifications will be made to the heating, ventilating, and air conditioning system, fire protection and detection system, and electrical service. This work is required to reconfigure and upgrade space to integrate and accommodate personnel and support systems for expanding missions.

D. Jet Propulsion Laboratory (JPL) . . . . . $2,300,000

1. Modification for Analytical Chemistry Laboratory (67) . . . . . 800,000

This project provides for the renovation and upgrade of this two-story, wood-framed laboratory building to include a complete heating, ventilation and air conditioning system; new lighting; and an electrical upgrade to bring the facility into compliance with building codes. Structural changes will be made to accommodate functional needs for the facility. Temperature and dust controls will be included for the laser laboratories. Painting, replacement of ceilings, and new flooring is included as is installation of user-furnished fume hoods, cabinets, and work surfaces. Sinks and plumbing that are either obsolete or leaking will be replaced. Laboratories that have unwanted windows will have the windows removed and the openings sealed. Existing restrooms will be brought into substantial compliance with standards for the disabled.

2. Modification for Waste Water Recovery, Microdevices Laboratory (302) . . . . . 700,000

This project will modify the current waste water treatment system to remove concentrated dissolved solids from the discharge wastewater stream of the existing reverse osmosis water treatment system servicing the building. The solids will be separated by a centrifugal separator and trapped in a closed-circuit filter that can be removed and disposed of as non-hazardous solid waste. The current system discharges 30 to 50 gallons per minute on a continuous basis. Treatment of the waste discharge and recycling it to the cooling towers for make-up water will substantially reduce (approximately 13 to 20 million gallons per year) the Laboratory's sewer flow and reduce the use of city water by the same amount.

3. Modifications of Restrooms, Telecommunications Research Laboratory (238) . . . . . 800,000

This project will modify and upgrade the existing restrooms. On floors 2 through 7, the men's restrooms will be expanded to provide handicapped accessibility. The women's restrooms on floors 3, 5, and 7 will be relocated, and women's restrooms will be added on floors 2, 4, and 6. A shower will be added to each restroom on the second floor. Handicapped accessibility requirements will be incorporated into the restrooms. The project will include new plumbing fixtures, toilet accessories, light fixtures, showers, toilet partitions, urinal screens, ceramic tile floors and walls, doors, and painting. The ventilation system will be modified. There were no provisions made for women's restrooms on floors 2, 4, and 6 when the building was constructed in 1965. Female occupancy of the building has increased and is anticipated to continue. The existing restrooms do not provide accessibility for handicapped people.

E. Johnson Space Center (JSC) . . . . . $2,900,000

1. Upgrade Potable Water Pumping System, Building 322 . . . . . 650,000

This project provides for the modification of the existing potable water pumping system to increase the pumping capacity. The work includes replacement of the existing pump and the addition of a new 1,500 gallon per minute (GPM) pump. Other modifications include replacing the motor control center and transformer with those of greater capacities, installing a new electrical manhole and gas switch, installing an air conditioning window unit for humidity control, and a 190 square foot addition to the Water Treatment Plant Building to house the new switchgear and motor control center. A recent study indicated that the existing potable water pumping system will not be able to keep up with projected water demands for fire protection, domestic, and industrial uses unless these upgrades are completed.

2. Upgrade Sanitary Sewer System . . . . . 550,000

This project provides for modifications to the sanitary sewer system. The work includes installing a new lift station to serve the 300 and 400 areas and the installation of approximately 4,000 linear feet of 18-inch force main. This project is required to meet additional demands on the system caused by the addition of several new facilities.

3. Rehabilitate Air Conditioning System, Building 30E . . . . . 800,000

This project provides for the rehabilitation of the mechanical and electrical systems in the administration wing of the Mission Control Center, Building 30. The work includes installation of a new energy-conserving variable air volume system. Associated electrical modifications include installation of new lighting fixtures and switches along with spot asbestos abatement. The air conditioning and associated lighting system must be rehabilitated to provide for an efficient, reliable, and maintainable energy-conserving system.

4. Rehabilitate Mechanical Systems Support Buildings 100 Area, White Sands Test Facility . . . . . 600,000

This project provides for repair, refurbishment, and/or replacement of major heating, ventilating, and air conditioning (HVAC) systems in Buildings 110, 111, 112, 113, 114, 120, and 121. These are support buildings in White Sands Test Facility (WSTF) 100 Area. Work will replace obsolete equipment, include asbestos abatement, and provide control modifications for energy conservation. HVAC systems include air handling units, chillers, direct expansion refrigeration equipment, air distribution components, humidifiers, and control systems.

5. Modification of Equipment Receiving Enclosure (7) . . . . . 300,000

This project provides for modifications to an existing equipment receiving enclosure on the Crew Systems Laboratory, Building 7. The work includes the upgrade of the existing area by providing a chilled water and steam cooling and heating system for the area, adding a new exterior wall along the west side of the enclosure, weather sealing and insulating the area, upgrading the ceiling and floor, and correcting drainage problems in the general area. The project is required to provide a productive working environment to support development and pre-test checkout activities associated with extravehicular activity assembly operations and to support development testing of Lunar/Mars life support systems.

F. Kennedy Space Center (KSC) . . . . . $3,370,000

1. Replace Piping Systems, Utility Annex to Orbiter Processing Facility . . . . . 900,000

This project provides for replacing existing buried high temperature hot water, chilled water, and compressed air lines between the utility annex and the Orbiter Processing Facility (OPF) with lines installed above ground except at road crossings. The existing lines are very deteriorated from ground-water intrusion. Failure to provide reliable piping systems could result in loss of utility service to the OPF, impacting shuttle orbiter processing.

2. Renovate Occupational Health Facility East Wing Interior . . . . . 500,000

This project provides for renovation of approximately 14,000 square feet of the Occupational Health Facility (OHF) to make the existing facility more efficient. Treatment rooms, nurses' station, triage area, records storage, physicians' examing rooms, preventive medicine, and other support space will be expanded and rearranged to afford efficiency and privacy for patients. Increased medical services workload for Kennedy Space Center has greatly impacted the OHF capacity to provide physical examination and treatment functions. The number of physical examination requirements have increased dramatically over the past five years, which has compounded the current problem.

3. Replace LC-39 Pads A & B Air Handlers . . . . . 740,000

This project provides for replacement of four air handlers in the Pad A Pad Termination Connection Room (PTCR) and four air handlers in the Pad B PTCR. Work also includes asbestos removal; replacement of piping, valves, and controls; and required electrical modifications. The air handling units are 25 years old and the presence of asbestos makes proper maintenance difficult or impossible. Failure of these units will impact launch-sensitive areas of the second floor PTCR and first floor vehicle UPS unit.

4. Modify Hangar AM Air Conditioning System, Cape Canaveral . . . . . 590,000

This project will upgrade the air conditioning system in Hangar AM to assure proper environmental control. Two existing chilled water loops will be connected as one system to provide redundancy in the high bay cleanroom. The cooling tower, air handling unit (AHU), and controls will be refurbished and upgraded. An existing 25-ton AHU and controls will be replaced in the office areas. The existing 50-ton chiller and associated pumps and controls will be replaced. These modifications will correct the inefficient operating mode and reduce the dependency on temporary chillers.

5. Modify Hydraulic Surge Capacity . . . . . 640,000

This project provides for installation of a 100,000 gallon capacity sewage surge retention facility. Work also includes new pumps, aeration system with associated piping, and electrical modifications. The increased load on the sewage treatment plant due to present and planned new construction necessitates the installation of this surge capacity. Once installed, the plant operators will control flow at a constant design flow and hold peak accumulated sewage for treatment at low-flow periods.

G. Langlev Research Center (LaRC) . . . . . $3,770,000

1. Modifications to Office Space (1192) . . . . . 840,000

This project provides for modifications to Building 1192 to house computational research personnel; advanced, state-of-the-art computer equipment; and the Fluid Mechanics Division Office. The modifications consist of constructing new office spaces; replacing the lighting, ceiling, floor tiles, and wall finishes; and providing additional electrical power to support the computer equipment. The restrooms and air conditioning system will also be upgraded to current standards. The modified space will be used by research personnel, computer equipment, and office staff. This project will result in disposal of three existing inadequate and costly to maintain trailers currently used to house these functions.

2. Rehabilitation of General Rotor Aeroelasticity Laboratory (647) . . . . 900,000

This project provides for rehabilitation and modification of the General Rotor Aeroelasticity Laboratory located in Building 647 of the East Area. The rehabilitation provides replacement of ceilings, lights, wall finishes, and floor tiles in the high bay area, control room, office, lab areas, and shop area. The modifications include constructing an enclosure for an existing mobile hydraulic pump stand, construction of an interior room for model assembly, and upgrade of restrooms. The project also includes replacement of approximately 22,500 square feet of corrugated transite roofing panels with an insulated, pre-finished, corrosion resistant, standing seam sheet metal roof system. This project is essential to restore the proper environmental and operational conditions to support the model setup, checkout, and calibration before testing in the Transonic Dynamics Tunnel.

3. Modifications to the 20-Inch Supersonic Wind Tunnel (1247D) . . . . . 900,000

The modifications included in this project are a new closed-loop controlled model support system with injection/retraction and projection capability; modification and reuse of the existing variable second minimum and diffuser section from the Langley 6- by 28-Inch Transonic Wind Tunnel; installation of a quick-acting, retractable test cabin door; and a new exhaust line to the 100-foot sphere 5-foot vacuum duct. Implementation of this project is

necessary to meet research schedules and to improve the versatility of the only small, high-flow-quality supersonic facility at Langley Research Center.

4. Modifications to Thermal Acoustic Fatigue Apparatus (1221A) . . . . . 730,000

This project provides for the modification to the Thermal Acoustic Fatigue Apparatus (TAFA) located in Building 1221A. The project includes modifications to the air supply and regulator to accommodate new acoustic sources; additional acoustic sources to provide a 6 dB increase in the noise level and improved spectrum shaping capability; a new horn to couple the acoustic sources to the test section; modification of the downstream termination section; new removable water-cooled inserts in the test section to reduce the area from 1′ x 6′ to 1′ x 2′; and new removable inserts in the horn and transition sections to match the test section reduction. These modifications will provide a significant extension of test capability and permit the acquisition of dynamic response and sonic fatigue data over a larger proportion of the aerospace vehicle flight envelope. These modifications will also correct several acoustic deficiencies identified in a recent engineering study of the facility.

5. Modifications to Shipping and Receiving Building (1206) . . . . . 400,000

The work provided in this project includes expanding the main shipping/receiving loading dock; installing an additional hydraulically operated loading ramp; upgrading the restrooms; constructing new office space; replacing four existing roll-up doors and installing one new roll-up door; and upgrading the heating, ventilating, and air conditioning system for existing offices. The modifications will improve efficiency and safety in the shipping/receiving area and free much needed warehouse floor space for warehouse operations.

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

1. Rehabilitation of Electrical System, Building (86) . . . . . 900,000

This project provides for the rehabilitation of the electrical system in the 10x10 Supersonic Wind Tunnel Office and Control Building (86). The work includes upgrading the power distribution system; lighting system rework with high-efficiency fixtures; replacement of fan coils and HVAC with tie-in to the Utility Control System (UCS); and installation of lighting fixtures, exit/emergency lights, and smoke detection systems. This building is underpowered and lighting is inefficient and inadequate. This project will upgrade the electrical system to comply with present codes and provide sufficient power and efficient lighting for this facility.

2. Rehabilitation of Mechanical and Electrical Systems **(105)** . . . . . 850,000

This project will provide new variable volume heating, ventilating, and air conditioning (HVAC); perimeter heat; and controls in the Materials Processing Lab (105). In addition, the electrical power distribution system will be upgraded and the lighting will be replaced with modern fixtures. As part of this project, asbestos will be removed from piping and mechanical components. The existing HVAC was installed in **1959** and requires constant repair. This project will upgrade the electrical and mechanical systems to comply with present codes and provide sufficient power and lighting for the building.

3. Rehabilitation of Mechanical and Electrical Systems (301) . . . . . 850,000

This project provides for the rehabilitation of the heating, ventilating, and air conditioning (HVAC) and lighting in the office section of the Electric Power Lab (EPL), Building 301. The work includes replacement of the lighting fixtures, chiller, heat exchanger, pumps, piping, HVAC units, control, and associated architectural and electrical work. The existing system was installed in **1961** and has experienced deterioration in condition and performance. The new mechanical and electrical systems will provide an efficient, reliable, and economical HVAC system for the EPL offices.

4. Rehabilitation of Mechanical System (302) . . . . . 900,000

This project provides for replacement of the existing undersized chillers in the Energy Conversion Lab (ECL), Building 302 with two new 100-ton capacity chillers and associated controls. In addition, a new ZOO-ton cooling tower and associated pumps, piping and controls will be installed. The electrical power will also be upgraded to support the new mechanical systems. The existing 30-year-old chillers are undersized and inefficient for air handling needs of the air-conditioning system.

I. Marshall Space Flight Center (MSFC) . . . . . $4,050,000

1. Rehabilitate Industrial Water System . . . . . 800,000

This project provides for the replacement of approximately 300 linear feet of 42-inch diameter water distribution lines and associated valves in the West Test Area. The Industrial Water System is critical to the operation of the test stands in this area. The piping to be replaced is severely corroded, the valves do not seal properly, and it is not economical to continue piecemeal repairs. The new water distribution line will be routed above grade rather than below grade to improve accessibility and maintainability, and to reduce the schedule impact to the ongoing test operations.

2. Rehabilitate and Modify Diesel Cooling System . . . . . 900,000

This project provides for the rehabilitation and modification of the diesel engine cooling water system at the West Test Area pumphouse. Existing heat exchangers will be restored and independent cooling pumps will be added to each diesel cooling system to assure adequate cooling water flow under all operating conditions. The existing heat exchangers are deteriorated and heavily corroded. The lack of flow through the heat exchangers is causing overheating and subsequent shutdown of the diesel engines during Test Area operations. This project significantly reduces the risk of a Test Area shutdown, and reduces operations and maintenance costs.

3. Modifications for Precision Optical Metrology and Assembly (4487) . . . 900,000

This project provides for the refurbishment of the east end of the laser tube adjacent to B-Wing. Work includes installation of heating, ventilation, and air conditioning (HVAC) and class 100K filters. Fixture storage and entrance areas will be added; interior area will be refinished to minimize out-gassing and dust contamination. An existing crane will be refurbished or replaced to meet clean room requirements. This project also provides for the construction of an approximately 2,200 square foot addition at the west end of B-Wing to support the 30-foot precision optical metrology vacuum chamber. A covered dock with a 1-ton monorail will be installed. All areas will require high purity air and power distribution for support equipment. Precision optical metrology, assembly, and test facilities are critical for support for multi-program (i.e., Advanced X-Ray Astrophysics Facility (AXAF), Optical Payloads) optical research and testing.

4. Modifications to Space Station Engineering and Development Building (4755) . . . . . 600,000

This project provides for modifications which consist of converting approximately 7,000 square feet of central high bay area into a two-story office area. The first floor will include a new main entrance lobby, an entry air-lock, administrative offices, and a large conference room. The second floor will consist of offices and engineering support areas for Center support personnel. This facility has been designated as the development area for the environmental control and life support system test bed for Space Station Freedom. All test and verification of program development hardware for the laboratory and habitat modules in advance of on-orbit assembly is taking place in this facility. This project addresses a shortfall of space to house the test and development personnel assigned to support the test program development.

5. Rehabilitate Exterior of Office Building (4746) . . . . . 850,000

This project provides for the rehabilitation of Building 4746. Work includes providing thermal protection to exterior walls by installing insulation, face brick, and new glass windows. Also included is the installation of a new sloped metal roof system over the existing flat roof and modification of the building entrances. Building 4746 is a 50-year-old, 18,300 square foot facility that was originally designed as a medical clinic but is now being used as an office building. This project will upgrade the facility to comply with current handicapped and building code standards, and provide an energy-efficient and low-maintenance building envelope.

J. Michoud Assembly Facility (MAF) . . . . . $1,800,000

1. Rehabilitate East 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 to improve accessibility and maintainability. Work to be done also includes the replacement of existing valves, or the addition of new valves, as required. The chilled water return system was originally installed in the 1940s and is very deteriorated. Pipe wall thickness has decreased by 50 percent in some areas due to severe corrosion, and 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. 24 . . . . . 900,000

This project provides for the replacement of the existing equipment with two 1,500 KVA transformers, associated switchgear, and a housekeeping pad. Substation No. 24 is 26 years old, difficult to maintain, and constantly overheating. The substation provides power for medical facilities, security and radio communication systems, and a cooling tower. It can no longer meet these requirements in its present configuration because of substantial load increases since its original installation.

K. Stennis Space Center (SSC) . . . . . $2,350,000

1. Rehabilitate SSME Engine Assembly Building (3203) . . . . . 630,000

This project provides for the rehabilitation of the Space Shuttle Main Engine (SSME) Assembly Building heating, ventilating and air-conditioning (HVAC) systems and associated pneumatic/electrical and Utility Control Systems (UCS). The existing HVAC systems and pneumatic controls are more than 25 years old, difficult to maintain, require high-cost replacement of parts, and have exceeded their 20-year normal life expectancy.

2. Modify Utility Control System . . . . . 820,000

This project provides for the modification of the Utility Control System (UCS) and the heating, ventilating and air conditioning (HVAC) systems at the Visitors' Center (B-1200), the Data Handling Center (B-1000), Water Well and Pump House #1 (B-3312), and the Lock Water Supply Pump Station (B-2311). Work includes the replacement of the pneumatic controls and refurbishment of the air handling units. The existing UCS and HVAC systems are more than 20 years old and no longer can provide the full control and energy savings that could be achieved by a replacement system.

3. Rehabilitate 13.8KV Electrical Distribution System . . . . . 900,000

This project provides for the rehabilitation of the switching capabilities of the 13.8kV electrical distribution system. Work includes the conversion of existing oil switches to modern gas insulated swithes. The existing oil switchgear is antiquated, difficult and costly to maintain, and several are leaking or taken out of service thereby limiting the original capability.

L. Wallops Flight Facility (WFF) . . . . . $2,200,000

1. Modifications to the Heating, Ventilating, and Air Conditioning (HVAC) Systems in Buildings E-107 and E-108 . . . . . 470,000

This project provides for modification of the HVAC systems in Buildings E-107 and E-108. The work includes installing louvers, exhaust fans, air handling units, refrigeration equipment, new duct work, supply air diffusers, return air registers, piping and control valves, and temperature and humidity controls; modification to outside air duct works; and testing and balancing of both the air and water flows to each floor of the two buildings. The present HVAC systems are undersized in capacity resulting in condensation collecting on the supply air diffusers, unbalanced air flow, mold and mildew problems, and irregular temperatures (hot and cold spots) throughout each building. The modification of these systems will provide adequate cooling, heating, air flow, humidity and temperature control for equipment and personnel.

2. Rehabilitation of Launch Vehicle Support Building (X-35) . . . . . 530,000

This project provides for the rehabilitation and modification of 8,100 square feet in Building X-35. It requires the installation of a 2,500 square foot metal partition; vinyl backed R-19 insulation with an 8 foot perimeter liner; heating system; power panel, outlets and lighting; restrooms; 7.5 ton bridge crane; 15-ton fixed hoist with footings and columns; 1,600 square foot enclosed area with a storage mezzanine and stairs; and the relocation of the air

compressor to an external shelter. The rehabilitation of Building X-35 is required to provide adequate space for sounding rocket launcher modifications and maintenance. This includes various size launchers for use on Wallops Island, at remote ranges, and other mobile sites.

3. Modification to Vehicle Assembly Building, White Sands Test Facility, New Mexico . . . . . 330,000

This project provides for the modification to the Vehicle Assembly Building at White Sands Test Facility. The work includes the installation of a fire protection system for the entire building, including a 25,000 gallon steel ground storage tank; concrete foundation; pre-fabricated metal shed; fire pump; piping and wet pipe sprinkler system; packaged heat pump; mechanical controls and electrical wiring for the HVAC system; the removal of an overhead door; construction of wall partition; interior finishes; and the installation of personnel doors in the altitude control system area. The current Vehicle Assembly Building was constructed in the 1960s and provides for the integration and testing of payloads launched at the White Sands Missile Range. Modifications will permit expansion of the altitude control system alignment area, provide a controllable environment for operations, and upgrade the facility to meet current code requirements of fire, safety, and protection for a mission critical facility.

4. Rehabilitation of Assembly Shop Building (W-15) . . . . . 320,000

This project, which provides for the rehabilitation of Building W-15, includes the demolition of interior partitions; raising the main floor elevation with 6 inches of concrete; paneling interior perimeter of the exterior walls; sand blasting and refinishing the vehicle shelter; installation of fire protection; thermal windows/doors; and an insulated overhead door. This building was originally built for vehicle assembly and check out, but was modified into a machine shop and storage area for the Scout program. This rehabilitation will convert the building into an assembly shop in support of the increased number of vehicles in the Sounding Rocket Program.

5. Rehabilitation of Materials Storage Building (B-31) . . . . . 550,000

This project provides for the rehabilitation of the Material Storage Building (B-31). The work includes the removal of the original roof and support structure, interior wood partitions, wood windows, personnel and overhead doors, and floor tile. Also included is the installation of structural steel support roof system covered with an elastomeric membrane; overhead and personnel doors; cleaning and painting interior and exterior masonry walls; thermal windows; heating; lighting and electrical service; pad mounted transformer; and a fire protection system. The current materials storage building has had minimal rework since it was constructed in 1945. New material and systems will stop the deterioration and leakage of the building, and provide the needed protection and security for high-cost maintenance vehicles and equipment.

M. Various Locations . . . . . $1,220,000

1. Modification of 70-Meter Antenna Foundation, Canberra, Australia . . . . . 500,000

This project provides a reinforced concrete ring foundation for support of the antenna to allow maintenance and repair of the hydrostatic bearing system. The hydrostatic bearing system, which allows the antenna to rotate, has deteriorated. Unless repaired, operation of the antenna will halt, and all tracking will be lost.

2. Modification of 70-Meter Antenna Foundation, Madrid, Spain . . . . . 360,000

This project provides a reinforced concrete ring foundation for support of the antenna to allow maintenance and repair of the hydrostatic bearing system. The hydrostatic bearing system, which allows the antenna to rotate, has deteriorated. Unless repaired, operation of the antenna will halt, and all tracking will be lost.

3. Modification of 70-Meter Antenna Foundation, Goldstone, California . . . . . 360,000

This project provides a reinforced concrete ring foundation to be used for support of the antenna to allow maintenance and repair of the hydrostatic bearing system. The hydrostatic bearing system, which allows the antenna to rotate, has deteriorated. Unless repaired, operation of the antenna will halt, and all tracking will be lost.

N. Miscellaneous Projects Not in Excess of $250,000 . . . . . $220,000

Total . . . . . $36,000,000

FUTURE CoF ESTIMATED FUNDING REOUIRED TO COMPLETE THIS PROJECT:

Approximately $50 million per year will be required for continuing rehabilitation and modification needs.

Minor
Construction

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

SUMMARY

| Summary of Project Amounts by Location: | Amount | Page No. |
|---|---|---|
| Ames Research Center | $730,000 | CF 15-3 |
| Goddard Space Flight Center | 720,000 | CF 15-3 |
| [redacted] Propulsion Laboratory | 720,000 | CF 15-3 |
| Johnson Space Center | 1,400,000 | CF 15-4 |
| Kennedy Space Center | 2,070,000 | CF 15-4 |
| Langley Research Center | 1,450,000 | CF 15-5 |
| Lewis Research Center | 1,400,000 | CF 15-6 |
| [redacted] Space Flight Center | 1,400,000 | CF 15-6 |
| Michoud Assembly Facility | 870,000 | CF 15-7 |
| Stennis Space Center | 1.300. 000 | CF 15-7 |
| Wallops Flight Facility | 1.250. 000 | CF 15-8 |
| Various Locations | 445. 000 | CF 15-8 |
| Miscellaneous Projects [redacted] in [redacted] $250. 000 Each | 245,000 | CF 15-9 |
| Total | $14.000.000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

PROJECT TITLE: Minor Construction of New Facilities and Additions to Existing Facilities, Not in Excess of $750,000 Per Project

INSTALLATION: Various Locations

FY 1994 CoF Estimate: $14,000,000

FY 1992: $12,900,000 FY 1993: $14,000,000

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 facilities. The FY 1994 request of $14 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 adaptions 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:

Included in the FY **1994** 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 totalling **$14** million are included in this resource request and have been distilled from a list totalling over $34 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 timeframe to support institutional needs and programmatic objectives. The following listing summarizes the cost distribution by category of work:

| | | |
|---|---|---|
| a. | General Purpose Buildings . . . . . | 4,395,000 |
| b. | Technical Buildings/Structures . . . . . | **9,605,000** |

PROJECT COST ESTIMATE:

A. Ames Research Center (ARC) . . . . . $730,000

1. Modification of Human Performance Research Laboratory (HPRL) High Bay (N-262) . . . . . 730,000

This project provides for construction of a multi-storied structure within the existing high bay of the HPRL. The space will include laboratories, offices, shops, and general support area. This construction is needed to provide space for the Computational Human Factor Research Office, which will relocate from Building N-269. Research requires that this office relocate to be in proximity to laboratory and high-bay activities.

B. Goddard Space Flight Center (GSFC) . . . . . $720,000

1. Construct Composite Materials Laboratory . . . . . 720,000

This project provides for the construction of an approximately 4,900 square foot laboratory building near the northeast corner of the Instrument Construction and Installation Laboratory (Building 5). The facility will include a 1,100 square foot assembly area; a 1,000 square foot composite laboratory including a fume hood; a 940 square foot lay-up and cutting room; and a 400 square foot machining/surface preparation room. External to the facility will be an autoclave and a walk-in freezer. The remaining space includes 1,460 square feet of support functions such as restrooms and mechanical equipment rooms. The facility will also include provision of all required utilities. Site work includes storm water management and erosion control measures. The Composite Materials Lab will increase the capability to perform in-house composite materials research and development instead of using scattered off-site locations.

C. Jet Propulsion Laboratory (JPL) . . . . . $720,000

1. Construct Flight Hardware Fabrication Addition (170) . . . . . 720,000

This project provides for the construction of an approximately 2,000 square foot mezzanine over a portion of the existing Sheet Metal Shop for the fabrication and assembly of precision flight assemblies and subassemblies. This new enclosed mezzanine will be a class 100,000 clean fabrication and assembly area accommodating up to 10 technicians. The mezzanine will require a vestibule to serve the clean area and will be accessible to the handicapped. JPL is developing instruments for various planetary missions which, due to the instruments' increasing sensitivity, are required to be fabricated in a clean environment yet still be in proximity to the existing sheet metal shop.

D. Johnson Space Center (JSC) . . . . . $1,400,000

1. Construct Laboratory Annex Building (14) . . . . . 700,000

This project provides for the construction of an approximately 6,000 square foot addition to the Antenna and Tracking Development Laboratory, Building 14. The new annex will include laboratory and office space. This addition is required to support critical Space Shuttle tasks by relieving overcrowded and confined conditions. It will move researchers out of premium laboratory space and into suitable office space.

2. Construct Metrology Laboratory Addition, (343) . . . . . 700,000

This project provides for the construction of an approximately 8,000 square foot addition to Building 343 for the Measurement Standards and Calibration Laboratory. The work includes providing a class 100 clean room, relocation of site utilities, heating, cooling, plumbing, electrical power, fire detection/suppression systems, a loading dock, and parking for 25 vehicles. This laboratory addition will eliminate the present overcrowding in the laboratory and provide a safe, state-of-the-art facility for calibration and repairs.

E. Kennedy Space Center (KSC) . . . . . $2,070,000

1. Construct Hypergol Oxidizer Decontamination Facility . . . . . 670,000

This project provides for the construction of a hypergol oxidizer rinsate recovery and processing facility. Work consists of demolition of existing storage transfer slip and equipment pad; construction of a new concrete slip with sump; construction of a new equipment slab; construction of a 3,750 sq. ft. minimum covered area for processing equipment and storage containers; and installation of tanks, fluid transfer components, manifolds and associated piping, and electrical modifications. Tanker and equipment rinsate have recently been categorized as hazardous waste. Activities for safing tankers, sampling melons, drums, components and flex hoses generate up to 20,000 gallons of hazardous waste a year. The cost of off-site disposal of this generated waste is very high. The activation of this decontamination and processing facility will reduce this generated waste to approximately 2,000 gallons and save operational costs.

2. Construct Transporter/Canister Facility Operations Support Bldg . . . 700,000

This project will provide space to be used by direct support personnel to the transporter/canister facility. The building will be approximately 5,200 sq. ft. It will provide office space for engineers and locker and break areas for technicians. A total of

approximately 45 people will be housed in this facility. Engineering is presently split between two trailers. To operate in a more efficient manner all personnel need to be in one area. A parking lot will be included as part of the project.

3. Construct Hydraulic Ground Support Equipment Building . . . . . 700,000

This project provides for the construction of a two-story 30 ft. x 40 ft. building to house orbiter ground coolant and hydraulic system equipment. Work includes relocation of a portable page unit electrical power; relocation of fire hydrant and safety shower; installation of HVAC, power, and fire protection; and relocation of environmental control system ducts. This project is necessary because the current ground cooling and hydraulic portable equipment has deteriorated and is no longer able to support orbiter operations adequately. Fixed equipment which requires an environmental enclosure will be delivered in FY 1993. The building and equipment will be utilized on every orbiter flow through the Orbiter Processing Facility.

F. Langley Research Center (LaRC) . . . . . $1,450,000

1. Construction of Activities Center Conference Facility Addition (1222) . . . . . 730,000

This project provides for the construction of an addition of approximately 4,200 square feet to existing building 1222 for use as a conference facility. The conference area can be subdivided into four or five smaller areas by movable rigid partitions and includes a mechanical room, storage space, and connection to existing utilities and landscaping. The work includes the necessary modifications to the existing building to accommodate the addition, associated utility connections, parking, site improvements, and landscaping. The new addition will reduce the need for use of off-Center conference facilities and allow various configurations of the available space.

2. Construction of University Affairs Complex - Training Center . . . . 720,000

This project provides for construction of a single-story addition of approximately 4,800 square feet to the University Affairs Complex, Building 1216. The addition will be capable of accommodating a second floor and will include teleconferencing rooms, computer-oriented training room, conference rooms, and traditional classrooms. The project will include site improvements, landscaping, parking, and modifications to the existing facility and utilities as required to accommodate the addition. Construction of this facility will enhance the Center's capabilities to provide "state-of-the-art" computer training opportunities to present and future staffs.

G. Lew1s Research Center (LeRC) . . . . . $1,400,000

1. Construction of Office Addition, Chemistry Laboratory (6) . . . . . 700,000

This project provides for the construction of an addition to the Chemistry Laboratory (6) of approximately 5,200 gross sq. ft. The one-story addition will be located on the southwest side of the building. Existing building systems will be modified or increased in capacity to support the addition. The design will allow for a future second floor addition. This building addition is required to provide the Aeronautics Directorate the necessary personnel space to relieve overcrowded and confined conditions in the existing Chemistry Laboratory Building.

2. Construction of Build-Up Area, Power Lift Facility (90) . . . . . 700,000

This project provides for the construction of a new approximately 2,900 sq. ft. model build-up building. The building will have a build-up area serviced by an overhead crane, test article storage area, and restrooms. Work will include site modifications, HVAC, utilities, service air, mechanical, and electrical systems. Model build-up space is required to service the expanded needs resulting from activities of the Powered Lift Facility (PLF) and the Nozzle Acoustics Test Rig (NATR). This building will provide for the protection of test articles and hardware and facilitate improved production time and quality assurance by being located adjacent to the research rig.

H. Marshall Space Flight Center (MSFC) . . . . . $1,400,000

1. Construct Addition to Aerophysics Building (4732) . . . . . 700,000

This project provides for construction of an approximately 5,000 square foot addition to Building 4732. The addition will be built to match the existing facility, and will include required utilities, building systems, interior finishes, an elevator for handicapped access, and additional parking. The project also provides for incidental alterations/modifications to the existing facility required to accommodate the addition. Construction of this addition will allow all test and project engineers of the Aerophysics Division to be located within the same complex where their program test activities are performed.

2. Construct Addition for Network Communications (4207) . . . . . 700,000

This project provides for construction of an approximately 5,000 square foot addition to Building 4207, including approximately 4,500 square feet of raised floor. The addition will be built to match the existing facility, and will include required utilities, building systems, and interior finishes. Redundant air-handling capacity and uninterruptible

power will be provided. The project also provides for incidental alterations/modifications to the existing facility required to accommodate the addition. Construction of this addition supports current and future mission communications requirements for all NASA locations.

I. Michoud Assembly Facility (MAF) . . . . . $870,000

1. Construct Hazardous Waste Transfer Area (218) . . . . . 450,000

This project provides for upgrading Waste Transfer Area 218 from a temporary storage area to a permanent storage area for hazardous waste. Work includes expansion of the containment area by approximately 2,500 square feet; installation of an eye wash, an emergency shower, an alarm system (pull station type), potable water lines, and lighting; construction of a roof structure over the containment area; and construction of a storage area for spill response materials. This project will improve safety and reduce operating costs associated with maintaining a short-term hazardous waste storage area in compliance with applicable Federal and State environmental regulations.

2. Construct Mezzanine in Facilities Operation Building (320) . . . . . 420,000

This project provides for construction of an approximately 2,000 square foot steel mezzanine and alteration of approximately 6,000 square feet of existing space in Building 320. Work includes required utilities, building systems, and interior finishes. Building 320 houses security offices and vehicle shops. This project will significantly improve the functionality of the facility in support of these functions.

J. Stennis Space Center (SSC) . . . . . $1,300,000

1. Construct Addition to Technical Contractor Building (2108) . . . . . 650,000

This project provides for the addition of approximately 6,600 square feet of office building to the rear of Building 2108. The foundation will be a concrete slab-on-grade. Work includes gypsum wallboard on metal studs, ceramic tile in restrooms, suspended acoustical ceilings, vinyl tile, HVAC, plumbing, and electrical systems. This addition will consolidate the engineering and science department support contractors from eight locations, which will greatly enhance the productivity and capability in supporting program requirements.

2. Construct Addition to Engineering Services Building (2104) . . . . . 650,000

This project provides for an approximately 3,400 square foot addition to the Engineering Services Building (2104). Construction will include a pre-engineered metal building on a concrete slab-on-grade with gypsum wall board, demountable partitions, suspended ceilings, HVAC, plumbing and electrical systems, a chilled water system, and an upgrade of the

existing system. The Engineering Services personnel work under crowded conditions and this addition will provide the professional environment required to support this organization.

K. Wallops Flight Facility (WFF) . . . . . $1,250,000

1. Construct Rocket Storage Facility . . . . . 720,000

This project provides for the construction of an approximately 8,000 sq. ft. Rocket Storage Facility on the north end of Wallops Island. The work includes sitework, excavation, concrete foundation and floor slab; erection of a pre-engineered metal building with insulated panels; overhead and personnel doors; electrical controls, lighting, heating, and ventilation; and high-low temperature alarm system with a communication line to Island Damage Control. This building will provide a rocket storage capacity that cannot be accommodated by any other facility on Wallops Island because of safety distance clearances. The building will be located in an isolated area on the north end of the island in order to satisfy safety criteria.

2. Construct Payload Fabrication and Integration Facility . . . . . 530,000

This project provides for the construction of an approximately 4,800 square foot two-story metal building addition to the Sounding Rocket Fabrication and Text Complex at F-10. The work includes excavation and removal of existing concrete aprons; placement of new foundation and concrete floor slabs; the erection of a metal building addition with insulated wall and roof panels; second floor deck; finished walls, floors and ceiling; elevator; electric wiring and lighting; HVAC; fire protection system; and an overhead monorail (3-ton hoist capacity) on the first floor. During preparation for launch operations, the current facility does not provide adequate space for payload/experiment integration. This project will provide the needed addition of fabrication/laboratory space and will also provide room for two additional payloads to be integrated during peak periods.

L. Various Locations . . . . . $445,000

1. Construct Perimeter Security Fences and Patrol Road, Madrid, Spain . . . . . 445,000

This project provides for the extension of the perimeter fences and patrol road to surround additional land at the complex and includes approximately 1,650 meters of new complex perimeter road and approximately 2,375 meters of exterior wire-mesh fence suitable for intruder detection equipment. This project is required to enclose land to accommodate the planned FY 1993 34-meter Beam Wave Guide antenna and future antennas.

M. Miscellaneous Projects Not In Excess of $750,000 Each . . . . . $ 245,000

Total . . . . . $14,000,000

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

Approximately $20 million per year will be required for continuing minor construction needs.

Facility
Planning and
Design

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

SUMMARY

FACILITY PLANNING AND DESIGN

| | Amount | Page No. |
|---|---|---|
| Master Planning | $ 800,000 | CF 16-1 |
| Sustaining Engineering Support | 1,600,000 | CF 16-2 |
| Preliminary Engineering Reports and Related Special Engineering Support | 4,000,000 | CF 16-4 |
| Final Design | 20,600,000 | CF 16-4 |
| Total | $27,000,000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Facility Planning and Design

FY **1994** CoF Estimate: $27,000,000

FY **1992: $27,880,000** FY **1993: $23,300,000**

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 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 . . . . . $800,000

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. Representative candidates for FY 1994 master planning are as follows:

1. Ames Research Center

An update of the facilities inventory base to include current utilization with emphasis on changes caused by recent facility construction and modifications.

2. Marshall Space Flight Center

An update to reflect as-built condition of facilities and utility systems with emphasis on changes caused by recent facility construction and modifications.

B. Sustainin- Engineering Support . . . . . $1,600,000

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 1994 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 1994 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. Facility Operation and Maintenance Analysis

Provides for studies and engineering support where not otherwise provided for, at NASA field installations relative to functional management of maintenance, automated maintenance management systems, and facilities condition assessments. Included in this activity are field surveys to be conducted at selected NASA field installations to evaluate the effectiveness and efficiency of the operations and maintenance management activities, and to identify possible improvements in productivity.

3. 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.

4. 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.

5. 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. Also included is the ongoing effort to improve the NASA construction project status reporting and data system.

6. 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.

7. 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 . . . . . $4,000,000

1. Preliminary Engineering Reports (PERs) . . . . . (3,500,000)

This estimate provides for preparation of PERs, investigations, and project studies related to proposed facility projects in the FY 1996 and FY 1997 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 1996 construction projects is $3,000,000, which will permit updating of PERs for $40 to $60 million in construction, and the development of new PERs for an additional $140 to $150 million in projects.

An additional $500,000 has been included in this line for the completion of new PERs for approximately $20 to $30 million of construction projects which will be high priority candidates for inclusion in the FY 1997 Construction of Facilities program. The activity associated with FY 1997 will be confined to the highest priority candidates.

2. Related Special Engineering Support . . . . . (500,000)

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 . . . . . $20,600,000

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 1995 and FY 1996 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 1995 program, estimated to cost $230 to $250 million, and for $30 to $40 million of high potential projects proposed for the FY 1996 program. The final design amount included for FY 1995 candidates and for residual requirements of this nature which have accumulated from prior years activities is $17,700,000. For FY 1996 $2,900,000 is included and design activity will be confined to the highest priority candidates.

**Total** . . . . . $27,000,000 CF 16-4

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1994 ESTIMATES

SUMMARY

ENVIRONMENTAL COMPLIANCE AND RESTORATION

| Summary of Project Amounts by Location: | Amount | Paae No. |
|---|---|---|
| Ames Research Center | $2.950. 000 | CF 17-3 |
| Jet Propulsion Laboratory | 2.800. 000 | CF 17-4 |
| Johnson Space Center | 950. 000 | CF 17-4 |
| Kennedy Space Center | 5.500. 000 | CF 17-5 |
| Langley Research Center | 4.910. 000 | CF 17-6 |
| Lewis Research Center | 6.300. 000 | CF 17-7 |
| Marshall Space Flight Center | 2.890. 000 | CF 17-9 |
| Michoud Assembly Facility | 3.000. 000 | CF 17-10 |
| Stennis Space Center | 2.500. 000 | CF 17-10 |
| Wallops Flight Facility | 2.100. 000 | CF 17-11 |
| White Sands Test Facility | 2.230. 000 | CF 17-11 |
| Various Locations | 1.170. 000 | CF 17-12 |
| Miscellaneous Projects Not in Excess of $250. 000 Each | 2.750. 000 | CF 17-12 |
| Remedial Investigations. Feasibility Studies. Assessments. Studies. Design. and Related Engineering | 9,950,000 | CF 17-12 |
| Total | $50.000. 000 | |

CONSTRUCTION OF FACILITIES

FISCAL YEAR **1994** ESTIMATES

PROJECT TITLE: Environmental Compliance and Restoration Program

INSTALLATION: Various Locations

FY **1994** CoF Estimate: $50,000,000

FY **1992**: **$36,000,000** FY **1993**: **$40,000,000**

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 **1994** total **$50** million which has been distilled from requests of approximately $75 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 1994. 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 $9,950,000. Projects estimated to cost less than $250,000 have not been described or identified by specific location. The estimated cost of these projects is $2,750,000. 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 . . . . . | $5,440,000 |
| b. | Rehabilitation/Replacement of Polychlorinated Biphenyl (PCB) Transformers . . . . . | 860,000 |
| c. | Hazardous Waste Corrective Actions/Cleanups . . . . . | 27,030,000 |
| d. | Hazardous Waste Storage and Control . . . . . | 1,270,000 |
| e. | Oil Spill Prevention and Control . . . . . | 1,500,000 |
| f. | Air and Water Pollution Control . . . . . | 1,200,000 |

PROJECT COST ESTIMATES:

A. Ames Research Center (ARC) . . . . . $2,950,000

1. National Full-scale Aerodynamics Complex Underground Storage Tank Replacement (N221B) . . . . . 300,000

This project provides for the removal and replacement of an underground storage tank (UST) system and for site remediation adjacent to Building 221B. The single wall UST is located in a contaminated area preventing the effective use of the current vadose zone leak detection system required by UST regulations. The UST system will be removed and replaced with a new double wall tank system with leak detection and monitoring to prevent product releases in conformance with regulatory requirements. The project also includes the removal/treatment of contaminated soil, as needed for construction. The project is required for compliance with the Federal Resource Conservation and Recovery Act (RCRA), state, and local regulations.

2. Remediation of Groundwater Contamination, Middlefield-Ellis-Whisman (MEW) Superfund Site . . . . . 500,000

This project will continue to provide for NASA's contribution to the remediation of groundwater contamination from the MEW Superfund site. Ames has been designated a potentially responsible party (PRP) by the Environmental Protection Agency (EPA) for the MEW site contamination. The project provides a portion of the funds needed to treat and remove chlorinated solvents, metals, and petroleum hydrocarbon contamination in a groundwater plume currently extending under the Ames site. This project is covered by a Record of Decision (ROD) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) with the EPA and by state and local regulations.

3. Remediation of Agricultural Site . . . . . 350,000

This project provides for site remediation of the former agricultural site adjacent to Building N267. The soil and/or groundwater at this site is contaminated with metals, oils, and fuel components released from past practices and aboveground storage tanks and drums previously located at this site. As the extent of the contamination is assessed and evaluated, remedial action alternatives may involve excavation and/or treatment or capping of soil to prevent contaminant migration. The site remediation and closure will comply with Federal and state regulations and standards enforced by the Santa Clara Valley Water District.

4. Fuel System Replacement and Remediation (N211) . . . . . 1,800,000

This project initiates the work to provide for the removal, replacement and site remediation of the fuel system used by Flight Operations located in Building 211. Leak detection and monitoring, spill containment and site cleanup are required to conform with UST regulatory requirements. This project provides for the removal of existing tanks, piping and

appurtenances; soil and groundwater remediation as needed for construction; and installation of a defueling tank, fueling pits, double-walled supply piping and leak detection system which is fed by a central supply system. The project is required to comply with Federal RCRA, State of California and local regulations.

B. Jet Propulsion Laboratory (JPL) . . . . . $2,800,000

1. Cleanup of Arroyo Seco Groundwater Contamination . . . . . 2,000,000

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 trichloroethylene, carbon tetrachloride, and tetrachloroethylene beneath the site and nearby production wells, in excess of Federal and State of California standards. The project provides for ongoing assessments and studies to continue 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 therefore is subject to the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

2. Construct Air Pollution Control Units . . . . . 800,000

This project will initiate the work to provide for the construction of air pollution control devices and installation of emission monitoring systems at JPL-Oak Grove facilities. These control and monitoring devices are required to comply with the emission reduction requirements being incorporated as part of the South Coast Air Quality Management District (SCAQMD) air pollution control regulations. The work involves the addition of emission control devices to equipment in order to control and reduce emission levels and comply with current and pending Federal, state, and local air quality regulations.

C. Johnson Space Center (JSC) . . . . . $950,000

1. Upgrade Hazardous Waste Storage Facility (358) . . . . . 950,000

This project provides for modifications to the hazardous waste storage facility and processing areas to reduce waste at the Johnson Space Center and to meet permit standards and provide safe operation of the facility. This project is required to bring JSC into compliance with current regulations regarding hazardous waste storage. The existing storage facility does not meet standards for emergency egress under contingency plan requirements under 40 CFR 264, Subpart C. Other upgrades are required to prevent potential contamination during waste handling and to make more effective use of the area available. This includes the installation of tanks, a lift station, treatment/recovery units and associated equipment.

D. Kennedy Space Center (KSC) . . . . . $5,500,000

1. Groundwater Remediation, Component Cleaning Facility (CCF) . . . . . 1,000,000

This project provides for the cleanup and remediation of soil and groundwater contaminants in the area of the CCF lab. Preliminary investigations indicate that the soil and groundwater in the area of CCF have been contaminated with solvents and metals. This project involves soil removal and treatment, groundwater well installations, groundwater treatment system installation, and remediation. This project is required for compliance with the Federal Resource Conservation and Recovery Act (RCRA), state, and local regulations.

2. Groundwater Remediation, Area 55, CCAFS . . . . . 1,000,000

This project provides for the cleanup and remediation of soil and groundwater contaminants in Area 55, which is located at the Cape Canaveral Air Force Station. Preliminary investigations indicate that the soil and groundwater in Area 55 have been contaminated with solvents. This project provides for soil removal and treatment, groundwater well installations, groundwater treatment system installation, and remediation. This project is required for compliance with RCRA, state, and local regulations.

3. Groundwater Remediation, Launch Complex 36 (LC-36) . . . . . 1,500,000

This project provides for the cleanup and remediation of soil and groundwater contaminants in LC 36. Preliminary investigations indicate that the soil and groundwater have been contaminated with solvents. This project provides for soil removal and treatment, groundwater well installations, groundwater treatment system installation, and remediation. This project is required for compliance with RCRA, state, and local regulations.

4. PCB/Groundwater Remediation at the Non-Destruct Test Laboratory (NDTL) . . . . . 1,500,000

This project provides for site remediation of hydrocarbons and photo processing waste contaminants to surface water, soils, and groundwater at the NDTL. In addition, a room within NDTL has been found to be contaminated with polychlorinated biphenyls (PCBs). This project involves the excavation, treatment, removal, and disposal of contaminated soils; installation of groundwater wells and recovery and treatment systems; and the removal, disposal, and replacement of PCB contaminated concrete. This project is required for compliance with RCRA, state, and local regulations.

5. 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 POB transformers represents a potential hazard to human health and the environment and a significant potential for disruption of the Center's operations and schedules from leaks and/or fires. PCBs are regulated by the Toxic Substance Control Act (TSCA).

E. Langley Research Center (LaRC) . . . . . $4,910,000

1. Remediation of PCB/PCT at Tabbs Creek . . . . . 2,000,000

This project provides for continuation of the remediation of Tabbs Creek, contaminated with polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs). 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. The Center was cited with a Notice of Violation from the State Water Control Board for the unpermitted discharge of both PCBs and PCTs into Tabbs Creek and Back River, and for the contamination of shellfish in the area. The Center was also cited by the Environmental Protection Agency (EPA) as a noncomplying Federal facility within the Chesapeake Bay watershed. A Federal Facilities Compliance Agreement was signed with the 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).

2. Remediation at Stratton Substation . . . . . 800,000

This project provides for site remediation in and around the Stratton Substation. Sampling and analysis of the soil and groundwater at this site have detected PCB contamination resulting from leakage of PCB containing equipment. Following the definition and evaluation of the extent of the site contamination, remedial action alternatives may involve removal and disposal of contaminated soil and groundwater treatment. PCBs are regulated under the Federal TSCA rules.

3. Replace PCB/PCT Contaminated Air Distribution Piping . . . . . 350,000

This project provides for the replacement of approximately 4,000 lineal feet of aboveground and underground air distribution piping servicing some buildings in the Langley East Side. A portion of the PCB/PCT contamination encountered in the Langley storm drain system appears to have originated from traps located on the air distribution system piping of buildings served by air compressors lubricated with oil containing PCBs. To eliminate the

source of the contamination, replacement of the contaminated piping is required. PCBs are regulated under TSCA.

4. Removal, Disposal and Replacement of Critical PCB Transformers . . . . . 360,000

This project provides for the removal and replacement of approximately fourteen polychlorinated biphenyl (PCB) transformers with non-PCB units at various facilities. The project includes the disposal of the replaced units in accordance with environmental regulations. The project will prevent potential contamination and disruption of operations due to leaks, spills, or fires associated with these transformers. The transformers are considered critical to the Center operations. PCBs are regulated under the Toxic Substances Control Act (TSCA).

5. Remedial Investigation/Feasibility Study (RI/FS) for Construction Debris Landfill . . . . . 1,000,000

This study project provides for performing a Remedial Investigation/Feasibility Study (RI/FS) to investigate the extent and severity of site contamination for site remediation at the Construction Debris Landfill. This land area is marshy and adjacent to tidal wetlands. An initial study identified the presence of suspected drums and oily residues in the soil around the area. This study work includes performing site investigations to fully characterize and assess the site, define the extent of contamination, and to develop and evaluate remedial alternatives for site remediation. The project is required to ensure compliance with requirements under CERCLA.

6. Stormwater Runoff Control and Monitoring . . . . . 400,000

This project provides for modifications to the Center stormwater drainage system in the East and West Areas. Modifications to the storm drain system are required to control and monitor stormwater runoff discharging from Langley into the Chesapeake Bay in accordance with non-point source pollution regulations under the Clean Water Act. Langley is one of the Federal facilities located within the Chesapeake Bay watershed and a participant in the Chesapeake Bay Initiative.

F. Lewis Research Center (LeRC) . . . . . $6,300,000

1. Remediation Study/Inspection - Plum Brook Station . . . . . 1,500,000

This study project will initiate site activities required to verify, assess, and remediate site contamination at the Lewis - Plum Brook Station (PBS), a 6,432 acre site located in Sandusky, Ohio. The facility has been identified by the Environmental Protection Agency (EPA) as requiring site investigations. Solid and hazardous waste contamination may exist from past ordnance work by the Army and research activities by NASA. This initial effort will

include the preparation of project work plans and implementation of a site inspection and related work, leading to development of remedial investigation/feasibility studies (RI/FS) and remediation of identified contaminated areas. This study project will be conducted following the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) guidance.

2. Remediation of Underground Storage Tank Sites, Various Locations . . . . . 1,500,000

This project provides for continuation of the remediation of soil and/or groundwater from leaking underground storage tank (UST) sites within Lewis and Plum Brook Station (PBS). Site assessments of previously closed UST systems and systems undergoing removal indicate that some of these sites are contaminated with hazardous substances and/or petroleum products. The project includes removal/treatment of contaminants from the soils and groundwater, including performing sampling and analyses to achieve required cleanup levels. Site remediation is required to conform with the Resource Conservation and Recovery Act (RCRA), Federal, and state UST regulations.

3. Remedial Investigation/Feasibility Study (RI/FS) for South and North Central Areas . . . . . 2,300,000

This study project provides for the performance of Remedial Investigation/ Feasibility Study (RI/FS) for the South and North Central Areas project management units at Lewis. The RI/FS is to be conducted in response to results of a preliminary assessment and site inspection performed under the CERCLA process and the State of Ohio Environmental Protection Agency (OEPA) findings and orders issued to Lewis. 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.

4. Mercury Cleanup at Buildings 16 and 301 . . . . . 500,000

This project provides for cleanup of mercury contamination in Buildings 16 and 301. Both buildings have control rooms that contained mercury manometer boards, which historically have resulted in breakage and accidental spills of mercury inside buildings. Vacuum research facilities and specific areas within the buildings show evidence of mercury contamination. This project will provide follow-on cleanup at both buildings. The cleanup will require decontamination of equipment and structures to conform with Federal RCRA regulations.

5. Remediation of Building 415 Site . . . . . 500,000

This project provides for the removal and remediation of contaminated soil at the Building 415 site located in the West Area. The building was previously used for rocket fuel testing and storage and dispensing of chemicals and hazardous wastes. Preliminary assessment documentation indicates hazardous and petroleum contaminants may exist from these past activities. The work involves the removal/treatment of soil and/or groundwater contaminants

based on the results of scheduled investigations during building closure. Cleanup is required to conform with RCRA regulatory requirements.

G. Marshall Space Flight Center (MSFC) . . . . . $2,890,000

1. RCRA Facility Investigation (RFI) . . . . . 1,000,000

This project provides the 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. The PA indicates a potential for contamination of soil and groundwater resulting from past practices associated with the operations of the Center.

2. Cleanup of Groundwater Contamination, Santa Susana Field Laboratory (SSFL) . . . . . 500,000

This project is a continuation of the assessment/cleanup and characterization of the groundwater and hydrogeological regime currently under way at SSFL. The assessment/cleanup will consist of well installations, report preparation, and capital purchases. 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. This project is required to be in compliance with the Resource Conservation and Recovery Act (RCRA) and with the regulations of the state of California.

3. Cleanup of Solid Waste Management Units (SWMU), SSFL . . . . . 400,000

This project will provide for the characterization, assessment, and remediation of the most critical of the SWMUs identified by SSFL, the Environmental Protection Agency (EPA), and the state of California. The SWMUs involved in this cleanup include NASA's Area II SWMUs and sites associated with rocket engine testing on Rocketdyne's Areas I and III. This project will involve the installation of treatment units and a wide array of assessment methodologies including soil borings, well installations, sampling, and soil removal.

4. Remove and Replace Underground Storage Tanks, Various Locations . . . . . 990,000

This project continues a program to replace the underground storage tanks (UST) at MSFC. This project will remove and replace ten USTs with an aboveground system that will provide equivalent capabilities. These tanks must be replaced to comply with Federal and state of Alabama regulations.

H. Michoud Assembly Facility (MAF) . . . . . $3,000,000

1. Modify Aboveground Storage Tanks, Facility Wide . . . . . 1,000,000

This project continues the program to upgrade and modify aboveground chemical and petroleum product/waste tanks located throughout the facility. The work includes overfill alarms, secondary containment, visual-level indicators, dry disconnects, and emission controls needed to comply with Federal and state of Louisiana regulations.

2. Groundwater Remediation Activities . . . . . 2,000,000

This project is a continuation of the remediation activities associated with the Solid Waste Management Units (SWMU) identified during the Resource Conservation and Recovery Act (RCRA) facility investigation. The work includes well installation and contaminated soil/material removal and disposal. This project is required by MAF's RCRA permit.

I. Stennis Space Center (SSC) . . . . . $2,500,000

1. Remediation of Herbicide/Pesticide Area . . . . . 1,300,000

This project provides for the remediation of contaminated soil and groundwater associated with SSC herbicide/pesticide handling facility. Work will include well installation, contaminated material removal and disposal, and backfill of any excavated areas. The project is required to be in compliance with Federal and state of Mississippi regulations.

2. Replace Aboveground Storage Tanks . . . . . 500,000

This project provides for the replacement in one kind of one 100,000 gallon aboveground tank and the replacement of two 65,000 gallon tanks with one 100,000 gallon aboveground tank. Work will include installation of associated piping, spill prevention devices, and the disposal of the old tanks and any contaminated soil. This work is required to bring SSC into compliance with Federal and state of Mississippi regulations.

3. RCRA Facility Investigation (RFI) . . . . . 700,000

This project provides the work required for assessment, investigation, and removal actions at sites with potential contamination as identified in the Site Inspection (SI). The SI indicates a potential for contamination of soil and groundwater resulting from past practices associated with the operations of the Center.

J. Wallops Flight Facility (WFF) . . . . . $2,100,000

1. Removal of PCB Contaminated Soil, Scrapyard and Transformer Area . . . 1,100,000

This project provides for the removal and disposal of soil in the scrapyard and transformer pad areas which have been contaminated with polychlorinated biphenyls (PCBs) and mdrcury. The contamination was identified in the Preliminary Assessment required by the Environmental Protection Agency. This project is governed by the Toxic Substance Control Act (TSCA) and state of Virginia regulations.

2. Fire Training Area Remediation . . . . . 1,000,000

This project provides for the removal and disposal of soil and for the treatment and remediation of groundwater contaminated with volatile and semi-volatile organics. The work will include installation of groundwater wells and treatment units and groundwater sampling and analysis. This project is required by Federal and state of Virginia regulations.

K. White Sands Test Facility (WSTF) . . . . . $2,230,000

1. Groundwater Contamination Assessment and Remediation . . . . . 2,000,000

This project is the continuation of the ongoing groundwater assessment at WSTF. This project provides for the quantification, definition, and assessment of the impacts and the remedial alternatives available to WSTF. The project will also provide the RCRA Facility Investigation (RFI) and the Corrective Measures Study (CMS) reports as required by a RCRA 3008(h) consent order.

2. Contamination Assessment, Property Acquisition . . . . . 230,000

This project provides for the purchase of three parcels of privately owned land totaling approximately 210 acres located roughly 2.5 miles southwest of the WSTF boundary. The groundwater assessment that WSTF has been conducting has confirmed that groundwater contaminated with trichloroethylene (TCE) and freon has migrated in a southwesterly direction and is located adjacent to the private land. The purchase of the three parcels is necessary as groundwater well installation and assessment on the private land is now required. Acquisition of the private land will also provide NASA with a buffer zone and eliminate the possibility of development and drinking water well installation thereby reducing the potential of endangerment to human health.

L. Various Locations . . . . . $1,170,000

1. Replace Underground Storage Tanks, Madrid, Spain . . . . . 850,000

This project initiates the work for the replacement and upgrade of underground storage tank (UST) systems at the Madrid Deep Space Communications Complex (MDSCC). The USTs at the MDSCC consist of single wall steel tanks used for the storage of petroleum products and hazardous substances. This work involves the removal, replacement and upgrade of UST systems to provide for secondary containment, leak detection, and monitoring to prevent future releases. The project also includes the removal/disposal of contaminated soil and repair of surface areas. The UST system modifications will be in conformance with requirements under the Federal Resource Conservation and Recovery Act (RCRA) and local regulations.

2. Upgrade Hazardous Materials and Waste Storage Areas, Canberra, Australia . . . . . 320,000

This project provides for construction of an open-sided hazardous materials/waste storage shed and for removal, treatment, and disposal of contaminated soil at the Canberra Deep Space Communications Complex (CDSCC). The new roofed, open-sided storage shed will provide for the storage of hazardous materials and wastes and will be equipped with fire, safety, and ancillary equipment in accordance with environmental regulations. The project will also include the removal, treatment, and disposal of contaminated soils. The work is necessary for compliance with both local and U.S. environmental regulations.

M. Miscellaneous Projects Not in Excess of $750,000 Each . . . . . $2,750,000

N. Remedial Investigations, Feasibility Studies, Assessments, Studies, Design, and Related Engineering . . . . . $9,950,000

Total . . . . . $50,000,000

FUTURE COF ESTIMATED FUNDING REQUIRED TO COMPLETE THIS PROJECT:

Approximately $55-60 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.

DATE DUE

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# Fiscal Year 1994 Budget Estimates