CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

BUDGET SUMMARY

OFFICE OF MANAGEMENT SYSTEMS

SUMMARY OF RESOURCES BY APPROPRIATION

	FY 2001 OP PLAN REVISED	FY 2002 INITIAL OP PLAN	FY 2003 PRES BUDGET	Page Number
		(Millions of Dollars)		
Direct Programs:	50.9	121.9	60.1	
Human Space Flight Programs	16.3	46.5	18.2	CoF-7
Science, Aeronautics and Technology Programs	34.6	75.4	41.9	CoF-11
Institutional Support:	278.5	233.4	266.9	CoF-17
Institutional Support – Human Space Flight	118.9	77.7	74.9	
Institutional Support – Science, Aeronautics and Technology	159.6	155.7	192.0	
Total	329.4	355.3	327.0	

**Beginning in FY 2002, Institutional Support Construction of Facilities previously contained within the Mission Support account was allocated to the Human Space Flight (HSF) and the Science, Aeronautics and Technology (SAT) accounts based on the number for full time equivalent personnel within each Enterprise.*

GOALS

The goal of the Construction of Facilities (CoF) program is to ensure that the facilities critical to achieving NASA's space and aeronautics programs are constructed and continue to function effectively, efficiently, and safely, and that NASA installations conform to requirements and initiatives for the protection of the environment and human health.

CONTENT

NASA facilities are critical to the shuttle, sustaining payload and launch operations, and for providing critical national aeronautical and aerospace testing capabilities, which support NASA, military and private industry users. NASA has conducted a thorough review of its facilities infrastructure finding that the deteriorating plant condition warrants an increased repair and renovation rate to avoid safety hazards to personnel, facilities, and mission; and that some dilapidated facilities need to be replaced. Facility

revitalization is needed to maintain a facility infrastructure that is safe and capable of supporting NASA's missions. The Budget supports facilities funding to address these needs.

The Institutional Support Construction of Facilities (CoF) budget line item funds projects required for components of NASA's basic infrastructure and institutional facilities. Almost all of these projects are capital repair. Also included are funds for the design of facilities projects, advanced planning related to future facilities needs, and facilities-related sustaining engineering support. Beginning in FY 2002, the funding contained within Mission Support was allocated to the Human Space Flight (HSF) and Science, Aeronautics and Technology (SAT) accounts based on the number for full time equivalent personnel within each Enterprise. Funding for construction projects required for specific HSF or SAT programs/projects is included in the appropriate budget line item. Descriptions and cost estimates are shown as part of the Construction of Facilities program to provide a complete picture of NASA's budget requirement for facilities.

The institutional facility projects requested for FY 2003 continue the vital rehabilitation, modification, and repair of facilities to renew and help preserve and enhance the capabilities and usefulness of existing facilities and ensure the safe, economical, and efficient use of the NASA physical plant. They repair and modernize deteriorating and obsolete building and utility systems that have reached or exceeded their normal design life, are no longer operating effectively or efficiently, and cannot be economically maintained. These systems include mechanical, structural, cooling, steam, electrical distribution, sewer, and storm drainage. Some projects replace substandard facilities in cases where it is more economical to demolish and rebuild than it is to restore. In selected cases, additional square footage may be built when there are compelling reasons to support new or specialized technical and/or institutional requirements of a nature that cannot be provided by using existing facilities. Projects with estimated costs greater than $1.5 million are budgeted as discrete projects while projects greater than $0.5 million but not over $1.5 million are included as Minor Revitalization and Construction projects. Should residual resources become available from these projects, they will be used for urgently needed facility revitalization requirements. Congress will be notified before work is initiated for any such project that exceeds $1.5 million. Funds requested for Facility Planning and Design cover advance planning and design requirements for potential future projects, preparation of facility project design drawings and bid specifications, master planning, facilities studies, and engineering reports and studies. Also included are critical functional leadership activities directed at increasing the rate of return of constrained Agency resources while keeping the facility infrastructure safe, reliable, and available.

Institutional Support also includes the Environmental Compliance and Restoration (ECR) Program, which is critical to ensuring that statutory and regulatory environmental requirements and standards are met. NASA's environmental strategy demonstrates our commitment to protect the environment and provides for the protection and safety of human health. Focusing and directing our leadership and efforts into the principal areas of environmental compliance, remediation, restoration and conservation, and prevention achieve this commitment. The requested funds cover environmental activities required for compliance with environmental statutory and regulatory requirements and standards, orders, regulatory and cooperative agreements and support of environmental program initiatives, including the decommissioning of the Plum Brook Reactor.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY OF BUDGET PLAN BY APPROPRIATION AND PROJECT

PROJECT AND INSTALLATION	FY 2001	FY 2002	FY 2003	Page Number
		(Millions of Dollars)		
HUMAN SPACE FLIGHT PROGRAMS	16.3	46.5	18.2	CoF-7
INTERNATIONAL SPACE STATION	0.3	5.0	---	
Modify ISS Software Development Integration Laboratory (JSC)	---	5.0	---	
Facility Planning and Design	0.3	---	---	
SPACE SHUTTLE	15.6	39.5	15.0	
Replace Cell "E" Air Handling Units, Building 110 (MAF)	---	---	1.7	CoF-8
Replace Chilled Water, Steam, and Condensate Systems (110, 114) (MAF)	---	1.9	2.0	CoF-9
Replace Paint Spray Facility, Building 103 (MAF)	---	---	2.0	CoF-10
Repair Crane Hoist Trolley Motor Drive, Rotating Payload Servicing Facility (KSC)	---	1.6	---	
Repairs to the Vehicle Assembly Building (KSC)	---	25.0	*	
Restore Low Voltage Power System, Pad B (KSC)	---	2.0	---	
Repair and Modernize A-Complex (SSC)	---	3.0		
Contractor Claim on Replace Components Refurbishment Laboratory (KSC)	0.1	---	---	
Repair and Upgrade Substations 20A/20B (MAF)	1.8	---	---	
Minor Revitalization of Facilities at Various Locations				
Not in excess of $1.5 million per project	10.4	4.5	7.8	CoF-34
Facility Planning and Design	3.3	1.5	1.5	
PAYLOAD AND ELV SUPPORT	0.4	2.0	3.2	
Minor Revitalization of Facilities, not in excess of $1.5M	---	1.9	3.0	CoF-34
Facility Planning and Design	0.4	0.1	0.2	

*NASA's FY 2003 Budget request includes $61 million for Space Shuttle infrastructure revitalization budgeted under the Program Integration line of the Space Shuttle budget. FY 2003 funding for the VAB and other significant Shuttle infrastructure revitalization projects will be based on an assessment scheduled for completion in the latter half of FY 2002.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY OF BUDGET PLAN BY APPROPRIATION AND PROJECT

PROJECT AND INSTALLATION	FY 2001	FY 2002	FY 2003	Page Number
		(Millions of Dollars)		
SCIENCE, AERONAUTICS, AND TECHNOLOGY PROGRAMS	34.6	75.4	41.9	CoF-11
SPACE SCIENCE	7.2	43.6	21.7	
Construct Flight Projects Center (JPL)	---	12.4	16.5	CoF-12
Safety Renovations, Buildings 2 and 26 (GSFC)	---	1.7	---	
Construct 34-Meter Beam Waveguide Antenna, Madrid, Spain (JPL)	5.0	7.0	---	
Construct Propulsion Research Laboratory (MSFC)	---	22.0	---	
Construct Optical Interferometry Development Laboratory (JPL)	0.5	---	---	
Facility Planning and Design	1.7	0.5	5.2	
BIOLOGICAL AND PHYSICAL RESEARCH	11.6	9.8	2.8	
Construct Booster Applications Facility, Brookhaven National Laboratory	11.6	9.8	2.8	CoF-13
EARTH SCIENCE	---	2.5	3.4	
Construct Flight Projects Center (JPL)	---	2.5	3.4	CoF-12
AEROSPACE TECHNOLOGY	15.3	19.5	14.0	
Modify Cell W-2 for Dual-Spool Turbine Research, ERB (GRC)	---	---	10.0	CoF-15
Construct Rocket-Based Combined Cycle (RBCC) Test Facility (SSC)	10.0	8.0	4.0	CoF-16
Construct Visitor Center (LaRC)	---	1.5	---	
Construct Addition to Main Administration Building (SSC)	---	3.5	---	
Construct Propulsion Test Operations Facility (SSC)		1.5	---	
Upgrade E-Complex Test Capabilities (SSC)	---	5.0	---	
Replace Fan Blades, National Full-scale Aerodynamic Complex (ARC)	0.6	---	---	
Construction of Dry Room, Space Power Research Facility (GRC)	0.7			
Construct Propulsion Research Laboratory (MSFC)	2.0			
Facility Planning and Design	2.0	---	---	
SPACE OPERATIONS	0.5	---	---	
Facility Planning and Design	0.5	---	---	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY OF BUDGET PLAN BY APPROPRIATION AND PROJECT

PROJECT AND INSTALLATION	FY 2001	FY 2002	FY 2003	Page Number
		(Millions of Dollars)		
INSTITUTIONAL SUPPORT PROJECTS				CoF-17
Repair Roofs and Masonry, Various Buildings (GRC)	---	---	1.8	CoF-19
Repair Sanitary Sewer System (GRC)	4.4	3.9	1.6	CoF-20
Upgrade 150 PSIG Combustion Air System, ERB (GRC)	---	---	3.5	CoF-21
Realign Soil Conservation Service Road, Greenbelt (GSFC)	---	---	4.4	CoF-22
Repair Site Steam Distribution System (GSFC)	4.0	4.0	2.3	CoF-23
Relocate and Revitalize High Efficiency Antenna, DSS-65, Madrid Spain (JPL)	---	---	2.0	CoF-24
Construct Operations Support Building II, LC-39 Area (KSC)	13.0	12.8	5.6	CoF-25
Replace Air Handling Units, Headquarters Building (KSC)	---	---	2.0	CoF-26
Repairs to Air Conditioning Systems, Various Facilities (LaRC)	---	3.3	3.7	CoF-27
Upgrade Hangar Fire Suppression System, B1244 (LaRC)	---	---	2.8	CoF-28
Construct Replacement Office Building, 4600 Area (MSFC)	---	---	7.3	CoF-29
Replace Roof, External Tank Manufacturing Building (MAF)	---	12.0	11.0	CoF-30
Replace Site-Wide High Voltage Oil Switches (MAF)	---	---	2.8	CoF-32
Repairs to Airfield (WFF)	---	---	2.0	CoF-33
Construct Child Care Facility (ARC)	1.4	1.1	---	
Restore Electrical Distribution System (ARC)	8.7	8.9	---	
Rehabilitate and Modify Central Emergency Generator System (DFRC)	---	3.0	---	
Restore Parkway Bridge (GSFC)	---	2.9	---	
Connect Madrid Deep Space Complex to Commercial Power (JPL)	---	2.8	---	
Rehabilitate Aircraft Hangar, Ellington Field (JSC)	---	3.2	---	
Construct Operations Support Building, Pad A (KSC)	---	4.7	---	
Construct Replacement Air Traffic Control Tower, Shuttle Landing Facility (KSC)	---	2.0	---	
Rehabilitate Atmospheric Sciences Building, 1250 (LaRC)	---	2.4	---	
Replace Heater, 20-inch Mach 6 CF4 Tunnel (LaRC)	---	3.5	---	
Rehabilitate Interior, Office and Laboratory Building (MSFC)	---	1.8	---	
Rehabilitate and Modify Productivity Enhancement Complex (MSFC)	---	3.6	---	
Rehabilitate Precision Cleaning Facility (MSFC)	---	2.1	---	
Repair and Upgrade Substations 31, 32, and 33 (MAF)	---	2.4	---	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY OF BUDGET PLAN BY APPROPRIATION AND PROJECT

PROJECT AND INSTALLATION	FY 2001	FY 2002	FY 2003	Page Number
		(Millions of Dollars)		
INSTITUTIONAL SUPPORT PROJECTS (Continued)				
Provide 34.5kV Alternate Feed to Substation G (GRC)	4.5	---	---	
Rehabilitate Distributed Control System (GRC)	3.0	---	---	
Restore Chilled Water Distribution System (GSFC)	5.0	---	---	
Replace Chillers, Space Flight Operations Facility (JPL)	1.7	---	---	
Upgrade 34M Beam Waveguide Antenna Subnet for KA-Band, Network (JPL)	1.9	---	---	
Rehabilitate Electrical Distribution System, 200 Area, WSTF (JSC)	2.5	---	---	
Construct Operations Support Building, Hypergol Maintenance Facility (KSC)	2.3	---	---	
Construct Operations Support Building, Pad B (KSC)	4.0	---	---	
Repairs to Primary Electrical Power System, (KSC)	3.5	---	---	
Repairs to Electrical Systems, East and West Areas (LaRC)	9.0	---	---	
Repair and Modernize Fluid Dynamics Vacuum Pump Facility (MSFC)	2.6	---	---	
Replace Roof, Building 4705 (MSFC)	1.4	---	---	
Replace Mechanical Equipment and Roof, Building 350 (MAF)	5.4	---	---	
Construct Propulsion Test Operations Facility (SSC)	10.5	---	---	
Upgrade E-Complex Test Capabilities (SSC)	17.9	---	---	
Repair Storm Drainage System (WFF)	2.7	---	---	
Minor Revitalization and Construction of Facilities at Various Locations, Not in excess of $1.5 million per project	109.3	80.3	91.9	CoF-34
Facility Planning and Design	15.7	15.7	17.2	CoF-40
Environmental Compliance and Restoration	44.1	57.0	105.0	CoF-43
Total - Institutional Support CoF	278.5	233.4	266.9	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY

HUMAN SPACE FLIGHT PROGRAMS

	FY 2003 PRES BUDGET (Millions)	Page Number
Space Shuttle:		
Replace Cell "E" Air Handling Units, Building 110/130 (MAF)	1.7	CoF-8
Replace Chilled Water, Steam, and Condensate Systems (110, 114) (MAF)	2.0	CoF-9
Replace Paint Spray Facility, Building 103 (MAF)	2.0	CoF-10
Minor Revitalization of Facilities at Various Locations, Not in excess of $1.5 million per project	7.8	CoF-34
Facility Planning and Design	1.5	
Payload and ELV Support:		
Minor Revitalization of Facilities at Various Locations, Not in excess of $1.5 million per project	3.0	CoF-34
Facility Planning and Design	0.2	
Total Human Space Flight	18.2	

PROJECT TITLE: Replace Cell E Air Handling Units 1 and 2, Buildings 110/130
COGNIZANT ENTERPRISE: Human Exploration & Development of Space

INSTALLATION: Michoud Assembly Facility
LOCATION: New Orleans, Orleans Parish, LA

FY 2003 COST ESTIMATE (Millions of Dollars):	1.7

PRIOR YEARS FUNDING:	0.1
Construction	---
Facility Planning and Design	0.1

PROJECT DESCRIPTION:
This project provides for the replacement of two air-handling units located in Building 130 that are critical to External Tank (ET) production. The two air-handling units support the internal and external tank drying systems of Cell E in the Vertical Assembly Building (110). The project also provides for the installation of a new platform north of the Cell E control room, and for modifications to the mechanical components such as ductwork, steam, condensate, chilled water piping, electrical power and instrumentation.

PROJECT JUSTIFICATION:
Cell E is one of six cells located in the Vertical Assembly Building. The cleaning operations of the ET liquid oxygen (LO2) tank, both internal and external, and the liquid hydrogen (LH2) tank, internal only, are done at this location. Critical elements to cleaning operations within Cell E are the drying and tank purging features. Air Handling Unit No. 2 supports drying subsequent to internal washing of flight hardware cleaned in Cell E. This unit also provides an air purge to the LO2/LH2 tank during tank entry. Air Handling Unit No. 1 supports external drying after external washing of the LO2/LH2 tank.

The two air-handling units being replaced were installed as part of the Cell E Tank Drying System in 1987. These units provide an increased drying capacity, thereby reducing production-processing time. However, the chilled water coil casings and the absolute filter housings are corroding. The pans for the units are rusted and deteriorated. In addition, problems such as the lack of accessibility to the flow vane actuator and the accumulation of trash in the air duct are maintenance concerns. This project will replace the units in kind, thereby satisfying existing requirements for LOX/LH2 cleanliness, temperature, airflow rate, dew point, etc. The new units and associated ductwork will be designed with consideration for the corrosive chemicals that are used during the cleaning processes, in particular, the internal process.

IMPACT OF DELAY
These units have been in continuous operation since 1987 and are extensively deteriorated resulting in loss of efficiency. The housings are corroding allowing air to bypass the coils, the absolute filter housings are deteriorating, the drip pans are rusted out, and there are recurring motor/fan alignment and bearing problems. Continued degradation of these units and associated components could impact ET production schedules.

PROJECT TITLE: Replace Chilled Water, Steam, and Condensate Systems (110/114) INSTALLATION: Michoud Assembly Facility
COGNIZANT ENTERPRISE: Human Exploration & Development of Space LOCATION: New Orleans, Orleans Parish, LA

FY 2003 COST ESTIMATE (Millions of Dollars):	2.0	PRIOR YEARS FUNDING:	2.2
		Construction	1.9
		Facility Planning and Design	0.3

PROJECT DESCRIPTION:
This project replaces and reconfigures chilled water, steam and condensate systems to meet current and future equipment requirements. New chilled water supply and return piping will be routed from the mechanical equipment room to the south side of the Vertical Assembly Building (VAB) and to the Building 130 chilled water pumps supporting Cell E. New steam and condensate piping will be routed from the 190 Tank Farm area to the south side of the VAB equipment and receiver stations. The project will also provide for the replacement of condensate receiver stations, shut-off valves, strainers, and control valves.

PROJECT JUSTIFICATION:
External Tank (ET) production demands for chilled water, steam, and condensate changed substantially from 1963 (original installation was for production of the Apollo Saturn S1-C booster program). The inability to supply adequate chilled water to reach required temperature/humidity thresholds during an ET production process is a continuing problem which occurs during the hot and humid months of the year. It then becomes necessary to wait hours or days for the ambient conditions to moderate so ET processing activities can proceed in the cells. Chilled water, steam, and condensate return systems are crucial for the continuation of ET operations within the VAB. Chilled water is provided to the air handling units for the dehumidification inside the cells (requires 17%-18% relative humidity for spray operations). Steam/condensate is provided to the air handling units for heating inside the cells (requires 90°$\pm$ 10° F cell environment and 196° supply temperature for tank heating).

The Vertical Assembly Building (VAB) chiller provides chilled water to the Building 110 heating, ventilation, and air-conditioning (HVAC) systems for the critical cooling and dehumidification parameters within the production cell systems. The HVAC systems use steam/condensate systems this heating means to condition the air entering critical cell environments and also prepare the surface temperature of the ET for foam application. The VAB steam condensate system has also deteriorated, causing back-ups, leakage, and reduced condensate feedwater for the boilers. Building 110 is the Vertical Assembly Building used for major assembly, Thermal Protection System ablator application, testing, and cleaning of the LH2 and LO2 tanks. Both the chilled water system and the steam/condensate systems were originally installed in 1963, making the majority of the systems almost 40 years old. The chilled water system capacity is unable to meet present year-round demands due to limitations imposed by existing piping system resistance and internal pipe corrosion. Current capacity delays ET production processing due to inability to meet stringent environmental parameters. The chiller supplying chilled water to Building 110 operates at full capacity during the summer in an attempt to maintain designed parameters in all critical cell environments.

IMPACT OF DELAY:
Continued degradation of system components and prolonged loss of chilled water, steam, or condensate would impact ET production activities and impact critical ET schedules. Also, delays in ET processing result from increased waiting times required to meet critical temperature and humidity requirements for spray operations in the cells.

PROJECT TITLE: Replace Paint Spray Facility, Building 103
COGNIZANT ENTERPRISE: Human Exploration & Development of Space

INSTALLATION: Michoud Assembly Facility
LOCATION: New Orleans, Orleans Parish, LA

FY 2003 COST ESTIMATE (Millions of Dollars):	2.0

PRIOR YEARS FUNDING:	0.2
Construction	---
Facility Planning and Design	0.2

PROJECT DESCRIPTION:
This project provides for the replacement of a paint spray facility and its associated components with an efficient state-of-the-art unit. The paint spray facility is located in the External Tank Manufacturing Building (103).

PROJECT JUSTIFICATION:
The paint spray facility to be replaced was installed in 1960. At MAF there are three areas where epoxy primer is applied to components of the External Tank. Cells K and P are where large amounts of the primer are applied to the LOX and LH2 tanks. The third area is the paint spray facility located east of the Chemical Clean Line Facility, Building 103. Smaller amounts of primer are used in this paint spray facility for flight hardware applications such as feed lines, cross beams and manhole covers.

The Paint Spray Facility, because of obsolescence, is the source of approximately 16 pounds per year of chromium emissions, which are about 67% of the actual chromium emissions from MAF. (Twenty-five pounds per year of chromium is MAF's regulatory threshold). Other major deficiencies identified by maintenance personnel are as follows: the facility lacks adequate air supply, doors are no longer sealed, outside air is sucked into the booth through cracks in the exterior wall, and the facility lacks temperature and humidity controls (temperature window is 65-90 degrees F, and relative humidity must be less than 70%). The facility does not meet humidity requirements at least 20% of the time; this is more prevalent during the warmer months resulting in a loss of productivity.

IMPACT OF DELAY
Replacement of the Paint Spray Facility is urgent. Chromium emissions resulting from major system deficiencies are fast approaching the maximum emission rate allowed by law.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY

SCIENCE, AERONAUTICS, AND TECHNOLOGY PROGRAMS

	FY 2003 PRES BUDGET (in millions)	Page Number
Space Science		
Construct Flight Projects Center (JPL)	16.5	CoF-12
Facility Planning and Design	5.2	
Biological and Physical Research		
Construct Booster Applications Facility, Brookhaven National Laboratory, Phase 4	2.8	CoF-13
EARTH SCIENCE		
Construct Flight Projects Center (JPL)	3.4	CoF-12
AEROSPACE TECHNOLOGY		
Modify Cell W-2 for Dual-Spool Turbine Research, ERB (GRC)	10.0	CoF-15
Construct Rocket-Based Combined Cycle (RBCC) Test Facility (SSC)	4.0	CoF-16
Total Science, Aeronautics, and Technology	41.9	

PROJECT TITLE: Construct Flight Projects Center, Phase 2
COGNIZANT ENTERPRISE: Space Science

INSTALLATION: Jet Propulsion Laboratory
LOCATION: La-Canada-Flintridge, Los Angeles County, CA

FY 2003 COST ESTIMATE (Millions of Dollars)	19.9*
Project Elements:	
Sitework	1.5
Structural	2.0
Architectural	6.0
Mechanical	6.4
Electrical	4.0

PRIOR YEARS FUNDING:	15.6
Construction	14.8
Facility Planning and Design	0.8

*FY 2003 funding includes $16.5 million included within Space Science and $3.4M included within Earth Science.

PROJECT DESCRIPTION:
The scope of this project was revised at no increase to the cost in order to incorporate the results of studies and preliminary design, and a scope increase was noted in the NASA FY 2002 Initial Operating Plan. The changes include an increase in gross square meters (GSM) of the building from 12,000 to approximately 17,800, a decrease in offices from 800 to approximately 700 and the incorporation of a project review center for approximately 400 people. The building will be located on the southeast corner of Surveyor and Mariner Roads and will also contain conference rooms, and support facilities. A structural steel framework will support concrete over steel deck floor and roof slabs. The building exterior will be a high performance glass and aluminum curtain wall system with a single ply membrane roof. Heating, ventilating, and air-conditioning (HVAC) and electrical equipment will be modern high efficiency units in fully integrated, digitally controlled systems. Forty-four wooden trailers (2,100 GSM) and six 1940s vintage buildings (4,000 GSM) will be demolished. The Design-Build procurement methodology will be used for this project. The total estimated construction cost for phases 1 and 2 is $35 million.

PROJECT JUSTIFICATION:
The new building will make optimal use of scarce building sites at JPL, ease the over crowded conditions at the Oak Grove campus, and allow demolition of substandard trailers and buildings that are costly to operate and maintain. Missions can be accomplished more effectively, efficiently, and safely while improving employee morale. Expensive off-site leased space will be vacated and the need for additional off-site leases will be avoided. This helps meet NASA's objective to minimize off-site leases. Annual costs of $4-5 million for modular units and off-site leases will be avoided.

IMPACT OF DELAY:
Employees would continue to work in substandard trailers and buildings that are very costly to operate and maintain. Personnel would continue to occupy increasingly expensive off-site leased space, with additional leased space required. Employee effectiveness, efficiency, and moral would continue to be at risk.

PROJECT TITLE: Construct Booster Applications Facility, Phase 6 | INSTALLATION: Brookhaven National Laboratory
COGNIZANT ENTERPRISE: Biological and Physical Research | LOCATION: Long Island, NY

FY 2003 COST ESTIMATE (Millions of Dollars):	2.8	PRIOR YEARS FUNDING:	31.2
		Construction	31.2

PROJECT DESCRIPTION:
This project constructs a Booster Applications Facility (BAF) adjacent to the existing Brookhaven National Laboratory (BNL) Alternating Gradient Synchrotron (AGS) Booster. Conventional construction includes site clearing and preparation; new roads and parking areas; booster wall penetration; tunnel construction with access/egress corridors at both ends of the tunnel; and construction of two pre-engineered metal buildings, one for protecting power supplies and switchgear, and the other to provide laboratory workspace. The project modifies the AGS Booster to accommodate installation of hardware required to perform slow extraction. Booster modifications include relocation of the beam dump and a wall current monitor; installation of new septum magnets; provision of new power supplies; rewiring for higher currents; and reconfiguration of existing vacuum chambers. The project constructs a 63-meter Beam Transport System (BTS) in the new tunnel capable of providing a 20-degree bend (to eliminate direct line-of-sight) between the booster ring and the target area, and capable of distributing the beam over a 15-centimeter x 15-centimeter target area. The BTS consists of a 10-centimeter diameter vacuum pipe with a thin window in front of the target and a fast-closing valve to protect the booster vacuum from a window break; magnetic elements to transport and shape the beam on target; a cooling system using low conductivity water; and cable trays and cabling for direct current (DC) power and controls. The project includes all distributed systems, central services, and process controls required for operation of the BAF, including a relay-based personnel access control system that permits entrance to radiation areas only when safe to do so. The project upgrades one of the two existing BNL Tandem accelerators to 16 megavolts and modifies it to enable concurrent use by AGS and BAF. The project provides for outfitting of the experimental areas of research in biological systems, including dosimeters, computer systems, and other electronic equipment. Project provides for all supporting infrastructure and utilities. This is the sixth increment of this $34 million project.

PROJECT JUSTIFICATION:
The BAF will provide a ground-based facility in which to conduct important research aimed at understanding and assessing health risks and developing effective countermeasures against galactic cosmic radiation. Such a capability does not currently exist. The BAF will provide the capability to simulate all major ion components and energies of the galactic cosmic rays and solar proton events. Once the BAF becomes operational, BNL will provide NASA access to more than 2,000 beam-hours-per-year in order to meet all of the goals of NASA's Strategic Radiation Health Plan for Space Radiation Health Research.

The BAF will benefit the International Space Station (ISS) by providing a ground-based facility for meeting operational, scientific, and technology goals in radiation protection. The BAF will provide a capability for accurate calibration of radiation detectors used to monitor crewmember exposures on ISS and verify doses as regulated by OSHA. It will also provide a facility for developing shielding augmentation for ISS, which would increase astronaut safety and extend crew stays. The BAF will enable critical research and measurements for assessing health risks from heavy-ions that comprise up to 50 percent of the biological dose on ISS. Acquiring this scientific knowledge will allow NASA to maximize crew stay times and reduce costs from excessive crew changes.

The National Research Council and the National Council of Radiation Protections and Measurements in independent reviews have informed NASA that the scientific basis to estimate risk from galactic cosmic radiation during long-term space flight does not exist. The BAF will benefit long-duration missions by providing a unique ground-based facility in which to conduct critical research to obtain knowledge of potential health effects and for he development of ground analogs, biological countermeasures, and radiation shielding strategies.

IMPACT OF DELAY:
Delaying this project would greatly impact NASA's ability to pursue vital research on space radiation effects required to enable development of maximum-exposure guidelines and of radiation countermeasures such as shielding. NASA's ability to safety carry out extended crew stays at the ISS and other potential future long-duration space flights would be severely curtailed. Delay of this project would also delay our ability to calibrate radiation detectors without which NASA cannot accurately monitor ISS crewmembers' exposure to radiation. These impacts will translate into increased ISS operations cost due to more frequent crew changes, and increased risk to astronauts due to limited knowledge of space radiation effects.

PROJECT TITLE: Modify Cell W-2 for Dual-Spool Turbine Tech, ERB (23)
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Glenn Research Center
LOCATION: Cleveland, OH

FY 2003 COST ESTIMATE (Millions of Dollars)	10.0
Project Elements:	
Combustion Air & Exhaust Subsystems	2.7
Power Absorption Subsystem	2.3
Manifolds, Support Structure & Bearing Cartridges	1.5
Misc. Support Systems	1.2
Electrical & Control Subsystems	1.1
Structural Modifications	1.2

PRIOR YEARS FUNDING:	2.3
Preliminary Engineering Report	0.3
Facility Planning and Design	2.0

PROJECT DESCRIPTION:
This project provides for the modifications to Cell W-2 of the Engine Research Building (ERB) No. 23. These modifications will provide a Dual Spool Turbine Facility (DSTF) for continuous flow testing of highly loaded, closely coupled turbine systems. Existing Glenn Central Systems such as the 150 psig Combustion Air System and the Altitude Exhaust System will be modified as part of this project. Combustion Air will be heated to 1000 °F using a new non-vitiated air heater system. A custom-designed inlet air manifold will introduce uniform heater air into the inlet of the test section. Custom-designed bearing cartridges will accommodate a wide size and weight range of high-pressure (HP) and low-pressure (LP) turbine rotors. Turbine power absorption will be accomplished using two new synchronous generators controlled by the Glenn Variable Frequency System. A new exhaust manifold will be used to collect the primary and cooling air flows from the test section outlet. All exhaust will be ported to the Glenn Altitude Exhaust System. Facility health monitoring and control will be accomplished using Programmable Logic Controllers (PLCs) mounted in an existing control room.

PROJECT JUSTIFICATION:
In the search for ultra-efficient gas turbine engines, one of the major areas of potential improvement is the reduction of size and number of turbine stages. One promising technique to accomplish this is to rely on a single high-work, high-pressure turbine close-coupled to a counter-rotating low-pressure turbine. The operating envelope of the DSTF will accommodate a wide range of commercial and military applications with high- pressure turbine sections up to 46 inches in diameter and low-pressure turbine sections up to 70 inches in diameter. There is very limited experimental capability in the U.S. to test and measure the details of the complex flow interactions in such turbine systems. The DSTF will provide this capability. The large scale and high expansion ratio aspects designed into the DSTF will allow for accurate computer code validation and support the robust requirements of the Ultra Efficient Engine Technology (UEET) Program.

IMPACT OF DELAY:
Delay in building the DSTF will jeopardize the attainment of UEET Level 1 milestones. Also, two new dual-spool test facilities are known to exist in Europe. Consequently, delay in building the DSTF will delay U.S. engine companies in the development of ultra-efficient engine technology.

PROJECT TITLE: Construct Rocket Based Combined Cycle (RBCC) Test Facility, Phase 4 INSTALLATION: Stennis Space Center
COGNIZANT ENTERPRISE: Aerospace Technology LOCATION: Bay St. Louis, MS

FY 2003 COST ESTIMATE (Millions of Dollars)	4.0	PRIOR YEARS FUNDING:	22.0
Project Elements:		Construction	21.0
Controls, Instrumentations and Activation	4.0	Facility Planning and Design	1.0

PROJECT DESCRIPTION:
This project provides for the design and construction of a "free jet" facility to test up to a 50k-thrust rocket engine with a maximum of Mach 0.75 air supply system. Construction will include the sitework, test cell structure, a structure for a Test Control Center (TCC), offices, and a high-bay area for engine preparation and storage. The project will also include installation of gas and cryogenic storage and transfer systems. Project provides for supporting infrastructure and utilities. This is the fourth and final increment of this $26 million project.

PROJECT JUSTIFICATION:
The potential benefits of Rocket Based Combined Cycle (RBCC) engines over traditional rocket propulsion have been considered for many years. The primary benefit is the improvement in payload mass fraction resulting in less cost per pound to orbit. RBCC technologies must be matured and the maturing process will require ground testing due to the complex interactions of chemical kinetics, fluid mechanics and compressible flow effects that occur in RBCC engines.

The RBCC Program requires testing of a rocket engine and possible engine clusters to simulate flight conditions at subsonic conditions. This testing is critical to the engine prototype development and future production testing of the engine. A testing facility is required for sea level testing, sea level freejet testing to a Mach 0.75 and altitude testing. No facility is currently available for testing criteria for this type of technology. A Government owned facility will provide control of facility availability, control of test readiness on a day to day basis, and enhanced understanding of the interactions between facility and test article (engine) including air heating and storage systems, thrust measurement systems, and controls and data acquisition systems. The RBCC propulsion test facility will have high productivity goals. Initial estimates are 10 tests per month.

IMPACT OF DELAY:
A delay of this project would prevent the technologies to be developed in accordance with the NASA Strategic Plan within the Aerospace Technology goal to revolutionize space launch capabilities reducing payload cost to low-cost orbit by an order of magnitude during the period of 2003-2009.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY OF INSTITUTIONAL SUPPORT RESOURCES REQUIREMENTS

	FY 2001 OP PLAN REVISED	FY 2002 INITIAL OP PLAN	FY 2003 PRES BUDGET	Page Number
Discrete Projects	109.4	80.4	52.8	CoF-18
Minor Revitalization and Construction	109.3	80.3	91.9	CoF-34
Facility Planning and Design	15.7	15.7	17.2	CoF-40
Environmental Compliance and Restoration	44.1	57.0	105.0	CoF-43
TOTAL	278.5	233.4	266.9	
Distribution of Program Amount by Installation				
Johnson Space Center	35.8	20.6	21.8	
Kennedy Space Center	48.4	33.4	30.5	
Marshall Space Flight Center	32.9	34.6	35.5	
Stennis Space Center	42.0	10.9	10.9	
Ames Research Center	21.1	21.1	11.6	
Dryden Flight Research Center	5.3	8.5	5.1	
Glenn Research Center	30.5	31.0	85.9	
Langley Research Center	17.8	20.6	17.9	
Goddard Space Flight Center	23.4	23.7	20.0	
Jet Propulsion Laboratory	17.3	24.1	22.5	
Headquarters	4.0	4.9	5.2	
TOTAL	278.5	233.4	266.9	

CONSTRUCTION OF FACILITIES

FISCAL YEAR 2003 ESTIMATES

SUMMARY

INSTITUTIONAL SUPPORT

	FY 2003 PRES BUDGET (Millions)	Page Number
Institutional Support Discrete Projects:		
Repair Roofs and Masonry, Various Buildings (GRC)	1.8	CoF-19
Repair Sanitary Sewer System (GRC)	1.6	CoF-20
Upgrade 150 PSIG Combustion Air System, ERB (GRC)	3.5	CoF-21
Realign Soil Conservation Service Road, Greenbelt (GSFC)	4.4	CoF-22
Repair Site Steam Distribution System (GSFC)	2.3	CoF-23
Relocate and Revitalize High Efficiency Antenna, DSS-65, Madrid Spain (JPL)	2.0	CoF-24
Construct Operations Support Building II, LC-39 Area (KSC)	5.6	CoF-25
Replace Air-Handling Units, Headquarters Building (KSC)	2.0	CoF-26
Repairs to Air Conditioning Systems, Various Facilities (LaRC)	3.7	CoF-27
Upgrade Hangar Fire Suppression System, B1244 (LaRC)	2.8	CoF-28
Construct Replacement Office Building, 4600 Area (MSFC)	7.3	CoF-29
Replace Roof, External Tank Manufacturing Building (MAF)	11.0	CoF-30
Replace Site-Wide High Voltage Oil Switches (MAF)	2.8	CoF-32
Repairs to Airfield (WFF)	2.0	CoF-33
Total Discrete Projects	52.8	

PROJECT TITLE: Repair Roofs and Masonry, Various Buildings
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Glenn Research Center
LOCATION: Cleveland, OH

FY 2003 COST ESTIMATE (Millions of Dollars)	1.8	PRIOR YEARS FUNDING:	0.2
		Facility Planning and Design	0.2

PROJECT DESCRIPTION:
This project is the first of three phases to repair and/or replace deteriorated and damaged roofing systems on various existing buildings throughout the Center. Roofing membranes, insulation, flashing, pitch pockets, roof curbs, and walk pads that are judged to be defective will be removed and replaced with new material. Sealing joints with weatherproof materials will repair existing building parapet walls and copingstones. The estimated cost of construction for all three phases is $8.2 million dollars.

PROJECT JUSTIFICATION:
The repair and/or replacement of deteriorated roofing systems will reduce damage to interior spaces of buildings. Water damage has caused financial loss attributed to replacement of computer equipment, wind tunnel systems, research, laboratory equipment, furniture, interior building finishes, and the disruption of employee work areas. Unchecked water penetration into perimeter masonry walls has caused considerable damage to buildings due to annual freeze/thaw cycles, typical in the Northeast Ohio area. Present roofing systems, which are severely damaged, require an increasingly large amount of annual budget funding for maintenance.

IMPACT OF DELAY:
Failure to replace roofing systems could result in risk to personnel safety, and potentially extensive and costly damage to wind tunnel systems, research, and building systems. The annual budget will continue to be used to repair roof leaks, parapet walls, and displace employees from their work areas.

PROJECT TITLE: Repair Sanitary Sewer System, Phase 5
INSTALLATION: Glenn Research Center
COGNIZANT ENTERPRISE: Aerospace Technology
LOCATION: Cleveland, OH

FY 2003 COST ESTIMATE (Millions of Dollars)	1.6	PRIOR YEARS FUNDING:	10.8
		Construction	10.1
		Facility Planning and Design	0.7

PROJECT DESCRIPTION:
This project is the fifth of five phases to repair the aging sanitary sewer system. The scope includes replacing sewer mains, eliminating cross connections between the sanitary and storm water systems, and repair/installing oil-water separators. It also includes excavation, backfill, and pavement repair necessary to replace sewer lines and manholes. It will improve the hydraulics of the system, greatly reduce maintenance and operating costs, and eliminate noncompliance discharges to the storm outfalls.

PROJECT JUSTIFICATION:
The existing sanitary sewer system is more than fifty years old and is in poor condition. This project will reduce treatment and maintenance costs associated with operating the aging sanitary sewer system and eliminate nonconformance discharges to storm outfalls. This project will reduce maintenance costs by reducing the need for emergency repairs on broken lines. It will reduce treatment costs by reducing inflow and infiltration into the sanitary sewer. In addition, it will eliminate noncompliance discharges to storm sewer outfalls caused by broken sanitary lines and cross connections to comply with National Pollution Discharge Elimination Systems permits.

IMPACT OF DELAY:
Without the project, avoidable and costly treatment of storm water discharged through the sanitary sewer system would continue. In addition, continued breaks and blockages in sewer lines are increasingly more likely to occur, requiring costly emergency repairs. Continued noncompliance notices could result in increased inspections, increased monitoring, and fines by the Ohio EPA.

PROJECT TITLE: Upgrade 150 PSIG Combustion Air System, ERB
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Glenn Research Center
LOCATION: Cleveland, OH

FY 2003 COST ESTIMATE (Millions of Dollars)	3.5	PRIOR YEARS FUNDING:	0.2
		Construction	
		Facility Planning and Design	0.2

PROJECT DESCRIPTION:
This project provides for the installation of a 150-psig compressor at 38 pounds/second in the Engine Research Building (64). The scope includes the fabrication and installation of a 150-psig compressor and associated air and cooling water piping, electric power, and controls.

PROJECT JUSTIFICATION:
Anticipated high-pressure air demand exceeds the current system capacity. The recent addition of the Advanced Subsonic Combustor Rig (ASCR) compressor (1250 psig) in the Engine Research Building (ERB) and the projected future usage are limited by the 150-psig stage mass flow rate. When capacity is exceeded, large compressors located in the Central Air Equipment Building (64) are required to operate at low capacity. It is inefficient and expensive to use these compressors for this requirement. This situation also results in a loss or delay of research at some facilities due to scheduling conflicts and increased utility costs. Other test facilities such as Test Cells (CE-5, CE-9, & C-22) and the 9x15 wind tunnel cannot run when the ASCR is running.

IMPACT OF DELAY:
The existing compressors require major inspections every four years. Unscheduled maintenance shutdowns will increase resulting in increasing delays to research. Scheduling conflicts will continue as the demand for high-pressure air increases.

PROJECT TITLE: Realign Soil Conservation Service Road
COGNIZANT ENTERPRISE: Office of Mission of Planet Earth

INSTALLATION: Goddard Space Flight Center
LOCATION: Greenbelt, MD

FY 2003 COST ESTIMATE (Millions of Dollars)	4.4	PRIOR YEARS FUNDING:	0.4
		Facility Planning and Design	0.4

PROJECT DESCRIPTION:
The project will reroute non-NASA traffic, currently along Soil Conservation Road, around a consolidated center perimeter. Work includes constructing new roadways and parking areas, upgrading existing roadways, realigning security fence perimeters, constructing new and temporary gates. Ancillary work includes site demolition, grading and landscaping, traffic controls, signage, lighting, utility modifications, and environmental remediation.

PROJECT JUSTIFICATION:
Currently, Soil Conservation Service (SCS) road cuts the Center in half. This causes security concerns and problems by denying the Center a contiguous secure campus. Additionally, the splitting of the Center by the road results in pedestrian and vehicular safety concerns and problems. The project will also enable the realization of a number of key goals contained in the Goddard Space Flight Center (GSFC) Master Plan. First, it will facilitate the creation of a single, safer security perimeter. Relocating the road is a part of consolidating major functional activities at GSFC, in turn helping to improve facilities efficiencies. The site area currently occupied by the Soil Conservation Service road will provide building sites for new, highly quality facilities such as the future Space Science building, which addresses critical quality problems for one of GSFC's Core Competencies. In addition, existing buildings that are freed up by shifting existing organizations will allow for the creation of a Partnering and Outreach Zone.

IMPACT OF DELAY:
Delay will perpetuate current safety, quality, unified campus, and efficiency problems. In particular, delaying this project would cause a commensurate postponement in satisfying critical facilities requirements for the Space Sciences Directorate, a GSFC Core Competency. Addressing many of these problems may require interim facilities fixes at substantial cost to the CoF program. Further, projected operational cost savings would be postponed.

PROJECT TITLE: Repair Site Steam Distribution System, Phase 5
COGNIZANT ENTERPRISE: Earth Science

INSTALLATION: Goddard Space Flight Center
LOCATION: Greenbelt, MD

FY 2003 COST ESTIMATE (Millions of Dollars)	2.3

PRIOR YEARS FUNDING:	13.9
Construction	12.9
Facility Planning and Design	1.0

PROJECT DESCRIPTION:
This project comprises the fifth phase of a multi-year program to rehabilitate the site steam distribution system. It includes completion of the loop providing redundant steam to the East Campus, the replacement of three lines supplying steam to individual buildings, and completion of the west campus loop. Construction includes replacement of the steam and condensate lines, upgrading steam manholes, all site work required to install the new lines, and removal of the existing lines when feasible. This is the last phase for this work.

PROJECT JUSTIFICATION:
The central steam distribution system was originally installed in the early 1960s and is at the end of its useful life. The piping is experiencing frequent leaks and failures due to deterioration. Lack of redundancy and risk of pipe failure threaten the supply of steam to critical buildings. The degradation of the system poses possible safety risks to operations and maintenance workers. This project is a part of the on-going restoration program, which will improve system efficiency, reduce maintenance cost and restore reliability.

IMPACT OF DELAY:
A major failure could occur in the campus-wide steam distribution system, resulting in the loss of steam supply to several buildings. That may seriously impact the operations in those buildings. The delay will also increase the operation and maintenance costs to keep the remaining deteriorated portions of the system operational.

PROJECT TITLE: Relocate and Revitalize High Efficiency Antenna DSS-65
COGNIZANT ENTERPRISE: Space Science

INSTALLATION: JPL Deep Space Network
LOCATION: Madrid DSCC, Madrid, Spain

FY 2003 COST ESTIMATE (Millions of Dollars)	2.0	PRIOR YEARS FUNDING:	0.2
		Facility Planning and Design	0.2

PROJECT DESCRIPTION:
This project will construct a new foundation for the DSS-65 antenna at the Madrid Deep Space Communications Complex (MDSCC), located near Madrid, Spain. Following this construction, the antenna will be partially disassembled and subsequently moved from its current location to its new foundation and reassembled. The new foundation will likely be located within 100 meters of the current antenna location. Various mechanical components that have been damaged as a result of previous foundation displacement will be replaced. These include the azimuth track assembly and the antenna azimuth wheel assemblies.

PROJECT JUSTIFICATION:
DSS-65 is an operational 34-meter High Efficiency (HEF) Antenna of the Deep Space Network (DSN). DSS-65 construction was completed in 1986 and the antenna began to track spacecraft that same year. In 1994, evidence of structural problems on the antenna began to appear. Subsequent analysis of the soil conditions determined that the antenna foundation was constructed upon weak rock and without a footing, causing the movement of the foundation. Several efforts over the years have been employed to stop the movement of the antenna foundation. However, none of the efforts undertaken have proven adequate. Consequently, detailed engineering studies of the problem have determined that it is best to move the antenna, rather than attempting to stabilize the current foundation in place or building the new foundation in the current antenna location. This implementation will also result in less antenna downtime, as the antenna will be able to remain operational during the new foundation construction phase.

IMPACT OF DELAY:
The DSS-65 foundation will continue its differential movement move. As the foundation moves, the integrity of the antenna structure will become increasingly compromised. The deterioration in the antenna structure will result in significant antenna downtime that will affect tracking of spacecraft.

PROJECT TITLE: Construct Operations Support Building II, LC-39 Area, Phase 3
INSTALLATION: Kennedy Space Center
COGNIZANT ENTERPRISE: Office of Space Flight
LOCATION: Brevard County, Merritt Island, FL

FY 2003 COST ESTIMATE (Millions of Dollars):	5.6
Project Element:	
Architectural and Structural	2.6
Mechanical	1.5
Electrical	1.5

PRIOR YEARS FUNDING:	28.2
Construction	25.8
Facility Planning and Design	2.4

PROJECT DESCRIPTION:
This project provides for the construction of a second Operations Support Building in the LC-39 Vehicle Assembly Building (VAB) area. The complex will be approximately 200,000 square feet and accommodate approximately 1,000 workers. The complex will support operational areas and consist of offices, training rooms, computer rooms, multi-media conference rooms, Mission Conference Center with observation deck, technical libraries, Exchange store, snack bar, storage, miscellaneous support areas and parking. Facility systems to be included are heating, ventilation, and air conditioning (HVAC); electrical power; natural gas; water; sewage; fire detection and protection; and paging and area warning systems. The project will also upgrade the existing central utilities and control systems in order to support the new complex. This is the third and final increment of this $31.4M project. Non-construction funding in the amount of $14 million will be budgeted to provide for systems furniture, communication systems, computer equipment, and other such outfitting and activation costs.

PROJECT JUSTIFICATION:
A critical need exists to eliminate 280 trailer equivalents of dilapidated substandard housing affecting the safety, morale and welfare of approximately 700 Shuttle processing workers, transient Launch fallback personnel, and personnel who attend training. This project allows consolidation of fragmented programs affecting approximately 300 workers currently scattered across the Center supporting LC-39 operations and Spaceport Technology Center strategies. Additional substandard housing will be eliminated when vacated permanent housing currently being used by the fragmented programs is backfilled. KSC's heavy salt corrosive environment has aggressively attacked and severely corroded the existing 20-year-old portable office trailers and modified railroad boxcars. These units have mold and indoor air quality problems; rotting and termite infested siding and floor substructures; roof and siding that leak; plumbing that does not drain properly; tripping hazards, such as uneven floors and exterior stairs that are wobbly and unstable; and numerous other code violations. Trailers and modular housing have 24 times more environmental health complaints than comparable permanent facilities. This contributes to intensive and unscheduled maintenance having excessive costs; highly inefficient and costly energy consumption; and working environments that barely meet minimum safety and health standards.

IMPACT OF DELAY:
People would continue to work in deteriorated, grossly substandard conditions, which adversely affects morale and productivity, and could potentially affect their health and safety. Maintenance would continue to cost approximately $1.3 million/year more than for conventional permanent facilities and 47% more energy would continue to be consumed. Productivity would continue at lower levels also because people working on the same program are not in close proximity and have to travel greater distances.

PROJECT TITLE: Replace Air-Handling Units, Headquarters Building
INSTALLATION: Kennedy Space Center
COGNIZANT ENTERPRISE: Human Exploration & Development of Space
LOCATION: Brevard County, Merritt Island, FL

FY 2003 COST ESTIMATE (Millions of Dollars):	2.0	PRIOR YEARS FUNDING:	0.2
		Facility Planning and Design	0.2

PROJECT DESCRIPTION:
This project provides for the replacement of seven 35-year-old air-handling units in the west end (Wings E and F) of the KSC Headquarters Building (M6-399), and includes the installation of direct digital controls compatible with the Industrial Area Chiller Plant's utility control system for efficiency and energy conservation purposes. An outdoor air intake system will be installed to provide dehumidification and building pressurization to address Health and Safety problems within the building. Heat load calculations and a test and balance of the system will be performed to ensure all areas are adequately covered. This project is the first of three phases to replace all the air-handling units and associated controls, and the air distribution system ductwork serving this facility. Estimated total construction cost is $6 million. Non-construction funds in the amount of $100,000 per phase will be budgeted separately to fund the temporary relocation of ~170 occupants per wing and for activation.

PROJECT JUSTIFICATION:
The 35-year-old air-handling units and associated ductwork in the KSC Headquarters Building have exceeded their life span by fifteen years. The units and the ductwork are structurally deteriorated, energy inefficient, and difficult and costly to maintain. Their deterioration, in conjunction with an inadequate design for the humid climate, makes it difficult to provide adequate cooling and ventilation inside the facility. Indoor air quality problems prevail, putting at risk the health and safety of building occupants. Workers Compensation claims have already been filed and the potential for OSHA complaints and lawsuits exists. This project will bring the KSC Headquarters Building into compliance with the ASHRAE Indoor Air Quality Standards for Hot and Humid Climates, the Environmental Protection Agency (EPA) Guidelines for Building Air Quality, and the Executive Order on Energy Efficiency and Water Conservation at Federal Facilities. Modern air-handling units and accessible ductwork will improve maintainability, improve indoor air quality, and enhance energy management.

IMPACT OF DELAY
Delay of this project will continue to expose occupants to prevailing indoor air quality problems, which impacts the morale and productivity of the workforce. The potential will continue to exist for additional Workers Compensation claims. The facility will also continue to experience high energy and maintenance costs wasting valuable operations and maintenance resources.

PROJECT TITLE: Repairs to Air Conditioning Systems, Various Facilities
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Langley Research Center
LOCATION: Hampton, VA

FY 2003 COST ESTIMATE (Millions of Dollars)	3.7
Project Elements:	
Building 1230 (East Wing):	2.3
Building 1236:	1.4

PRIOR YEARS FUNDING:	0.4
Facility Planning and Design	0.4

PROJECT DESCRIPTION:
The project provides new terminal induction units with four pipe fan coil units and a primary/secondary pumping system for Building 1230. The existing steam absorption chiller will be utilized for chilled water and a new steam to hot water converter will provide the heating. A separate outside unit with a total enthalpy wheel will be installed to provide the proper amount of preconditioned ventilation air to each of the fan coil units. A new variable air volume (VAV) system comprised of a VAV terminal units with a hot water reheat coil will be utilized in building 1236. A new central air handler with a variable frequency drive will provide conditioned air to the VAV units. A new air-cooled packaged chiller will be installed in the courtyard area to provide chilled water and a new steam to hot water converter will provide the heating. A separate outside air unit with a total energy enthalpy wheel will be installed to provide ventilation to the individual rooms. A direct digital control system for both buildings will allow control and monitoring from Building 1215. Additional work to the buildings includes the remediation of asbestos from the mechanical systems, interior partitions, and building finishes. Life safety improvements will include the installation of a complete wet pipe sprinkler system, improvements to the fire alarm system, upgrades to the smoke detectors, and improvements of the integrity of fire rated paths of egress. Electrical work will include installation of required power connections to all new equipment and replacement of obsolete distribution panels. A redesigned lighting layout and the replacement of inefficient lamps and fixtures will improve lighting levels and require less maintenance and energy to operate.

PROJECT JUSTIFICATION:
These air conditioning units have reached the end of their useful lives. The equipment is old, unreliable, and incapable of performing under stress, such as maintaining consistent temperature levels in the summertime. The number of service calls is increasing and maintenance costs are high. The majority of this equipment was identified for replacement by the Facility Assessment Review conducted in 1993.

IMPACT OF DELAY:
The air conditioning and fume hood systems are critical to the safety and operations in these facilities. Failures of this equipment affects performance and making emergency repairs is expensive and causes significant disruptions. These air conditioning units must be repaired and replaced in a timely manner.

PROJECT TITLE: Upgrade Hangar Fire Suppression System (1244)
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Langley Research Center
LOCATION: Hampton, VA

FY 2003 COST ESTIMATE (Millions of Dollars)	2.8
Project Elements:	
Architectural & Structural	1.3
Mechanical	1.3
Controls & Electrical	0.2

PRIOR YEARS FUNDING:	0.1
Facility Planning and Design	0.1

PROJECT DESCRIPTION:
Provide an Aqueous Film Forming Foam (AFFF)-water deluge system(s) and supplemental protection systems designed and tested per National Fire Protection Association (NFPA) 16 and NFPA 11 or 11A respectively. Provide a new fire detection system compatible with the Center wide system per NFPA 72. Provide supplemental under-wing foam/water systems to cover the specified floor areas beneath the aircraft to be protected. Fire control is to be achieved in 30 seconds and extinguished within 60 seconds. The primary aircraft of concern is the Boeing 757. The existing hose stations provided within the hangar are designed for water application only. These stations will be upgraded to meet NFPA requirements.

PROJECT JUSTIFICATION:
The existing water-deluge system does not provide satisfactory protection per Section 3-1.1 of NFPA 409 and Chapter 7 of NASA Standard 8719.11 - NASA Safety Standard For Fire Protection. Supplemental protection systems, such as under wing foam nozzles are required for Hangar areas housing aircraft having wing areas in excess of 3,000 sq. ft. per Section 3-3.1 of NFPA 409.

IMPACT OF DELAY:
Delay could lead to loss of buildings, aircraft and equipment, as well as potential loss of life in the event of an aircraft fire.

PROJECT TITLE: Construct Replacement Office Building, 4600 Area
COGNIZANT ENTERPRISE: Human Exploration & Development of Space

INSTALLATION: Marshall Space Flight Center
LOCATION: Huntsville, AL

FY 2003 COST ESTIMATE (Millions of Dollars):	7.3
Project Element:	
Site Utilities	4.3
Civil/Structural	1.6
Architectural/Mechanical/Electrical	1.4

PRIOR YEARS FUNDING:	2.4
Facility Planning and Design	2.4

PROJECT DESCRIPTION:
This project replaces about 130,000 SF of mostly 1940's vintage office buildings scattered throughout the 4600 and 4700 area with a five-story office building of approximately 120,000 square feet that will accommodate about 500 people. Existing facilities are in an extreme state of disrepair and cannot be economically rehabilitated. Site utilities will include basic electrical, potable water, sanitary sewer, chilled water, communications, and storm drainage. Utility runs to the site will be sized to facilitate future construction of additional replacement office buildings over the next several years. Mechanical systems will provide climate control, potable water, sanitary sewer, chilled water, and sprinkler systems. Climate controls will be connected to the existing center-wide utility control system. The building will house a special conferencing facility and the basement will be designed to serve double-duty as a shelter for personnel during severe weather (i.e. tornadoes). Two roads will be improved to provide ease of access to the facility. The new facility will have asphalt-paved surface parking with hard surface access (such as concrete pavers) around the building. Landscaping is included. This project will be funded in two increments ($7.3M in FY03/$16.7M in FY04). Estimated total construction cost is $24 million. About $5 million in non-construction funds are also being budgeted separately for the activation and outfitting costs associated with this project.

PROJECT JUSTIFICATION:
All building systems and components of the facilities to be replaced are in need of major repairs and upgrading. This finding was supported by a recent 100% Facilities Condition Assessment Study. These buildings greatly contribute to the Center's maintenance backlog – the structures have been patched, pieced, minimally modified with utilities and communications to support projects and manage space shortages, and will be demolished once they are vacated. The new building will provide more efficient utilization of space than the buildings it will replace. It will consolidate dislocated staff in a productive, healthy and efficient working environment. And it will significantly reduce costs associated with energy usage and facility maintenance and repair. This project has a discounted payback period of six years.

IMPACT OF DELAY
These buildings are very costly to operate and maintain and are high energy-consumers. Delay of this project would force the accomplishment of some uneconomical major repairs that could be avoided if the buildings are vacated soon. Continued use of the existing facilities will also result in further degradation of employee morale and productivity, and will delay the energy savings and productivity improvements that can be gained over the life of the new building.

PROJECT TITLE: Replace Roof, External Tank Manufacturing Building, Phase 2
COGNIZANT ENTERPRISE: Human Exploration & Development of Space

INSTALLATION: Michoud Assembly Facility
LOCATION: New Orleans, Orleans Parish, LA

FY 2003 COST ESTIMATE (Millions of Dollars):	11.0
Project Element:	
Site Preparation and Demolition	1.8
Precast Concrete Panels/Moisture Control	0.7
Lightweight Purlins/Fasteners	0.3
Roof Deck Insulation/Foamglass	1.9
Built-up Roofing	1.8
Reflective Coating	1.1
Membrane Roofing	2.5
Miscellaneous/Equipment Rental/Piping/Lightning Protection	0.9

PRIOR YEARS FUNDING:	12.4
Construction	12.4
Facility Planning and Design	0.4

PROJECT DESCRIPTION:
This project is the second and final phase to replace Building 103 roofing system (1,679,200 square feet) and roof drainage piping. Components of the roofing system to be replaced include deteriorated timber purlins (replaced using light gauge steel); damaged concrete planks; base sheet; 4-ply built-up felt system; glaze coat and reflective topcoat. Repairing the roof drainage piping involves removing/replacing downspouts, as well as using lining material to repair a portion of the downspouts that are inaccessible. The horizontal run-outs that connect the downspouts to roof drains will also be replaced. Cast iron/galvanized pipe will be replaced with PVC or fiberglass pipe to ensure reliability.

PROJECT JUSTIFICATION:
Building 103, the "External Tank Manufacturing Building," was constructed in 1943. It is primarily used for Shuttle External Tank assembly (chemical cleaning, component cleaning, component painting, harness fabrication, heat treating, machining, riveting, tube fabrication, and welding) and new business (X33, RLV, and NCAM). Building 103 has a roof area of approximately 40 acres. An in-house study completed in September 1998 found the roof to be deteriorated beyond the capabilities of a major maintenance restoration project. Roof leaks that can cause damage to production equipment and flight hardware and injury to personnel if not addressed are occuring throughout various areas of the building. Surface deficiencies and a high moisture content were also found.

Building 103 also has approximately 100 downspouts for draining rainwater from the roof. The fire water system and air handling units also drain into the downspouts. The downspouts penetrate the floor slab and tie into the main storm drainage pipes that run to the Borrow Canal. During severe rainfall, storm water is forced out of faulty joints and runs out onto the factory floor and utility trenches. This creates hazardous conditions to personnel. Temporary repairs are made on damaged downspouts to stop leaks. Approximately 40% of the downspouts are not accessible because electrical panels or other equipment block access to them. Horizontal run-outs connect the downspouts to the roof drains. There are three different types of run-outs: cast iron, galvanized, and fiberglass. The majority of leaks in Building 103 stem from the horizontal run-outs. Cracks form on the top of the cast iron pipe making them unnoticeable until rainwater leaks. Holes form around the galvanized pipe and allow rain to infiltrate the building. Several repairs are made on these run-outs during periods of severe weather.

IMPACT OF DELAY

Failure to replace roofing system will result in risk to personnel safety, and potentially extensive and costly damage to flight hardware and production equipment. As the downspouts, horizontal run-outs and 4-ply roof continue to deteriorate, more leaks will occur.

PROJECT TITLE: Replace Site-wide High Voltage Oil Switches
COGNIZANT ENTERPRISE: Human Exploration & Development of Space

INSTALLATION: Michoud Assembly Facility
LOCATION: New Orleans, Orleans Parish, LA

FY 2003 COST ESTIMATE (Millions of Dollars):	2.8	PRIOR YEARS FUNDING:	0.1
		Facility Planning and Design	0.1

PROJECT DESCRIPTION:
This project provides for the replacement of approximately 48 high-voltage oil switches site-wide at the Michoud Assembly Facility. The 13,800-volt electrical distribution switches supply electrical power to every building on site. This project will reconfigure the respective areas to accept replacement switches, redistribute loads to isolate switches, remove and install switches, and re-terminate 13.8 kV feeders consistent with the replacement configuration.

PROJECT JUSTIFICATION:
Major suppliers have indicated that replacement parts for these switches will no longer be provided because of system safety and reliability. Companies have also reported explosions attributed to these oil switches, and maintenance personnel at MAF have been forced to utilize non-standard replacement parts to repair them. The replacement parts carry no certification of reliability or switch congruence from the manufacturers. Many of the switches contain fuses that are no longer available, and should a fault occur that causes these fuses to expire, the electrical load would be de-energized for an extended time resulting in the disruption of operations. Manufacturer recommends replacement with sulfur hexaflouride or vacuum technology type switches.

IMPACT OF DELAY
Many of the switches contain fuses that are no longer available. Not replacing the oil switches and fuses would result in continued forced utilization of non-standard replacement parts and continued use of replacement parts carrying no certification of reliability, and safety risk to personnel in the event of a switch explosion.

PROJECT TITLE: Repairs To Airfield
COGNIZANT ENTERPRISE: Aerospace Technology

INSTALLATION: Wallops Flight Facility
LOCATION: Accomack County, VA

FY 2003 COST ESTIMATE (Millions of Dollars)	2.0	PRIOR YEARS FUNDING:	0.2
		Facility Planning and Design	0.2

PROJECT DESCRIPTION:
Repair of six sections of Runway 4-22, one section of the high-speed taxiway, and two sections of runway approaches to 4-22 by milling approximately 70,400 square meters of existing pavement and resurfacing with 2.5" of asphalt concrete; sealing of longitudinal and transverse cracking in 10 sections, approximately 88,200 square meters of Runway 4-22; and applying herbicide and crack fill/sealant on the Runway 4-22 overrun.

PROJECT JUSTIFICATION:
Cracks have developed in these paved surfaces with missing sections, or deteriorated joint sealant. If not addressed, the deterioration will continue, with cracks becoming wider and deeper, leading to spalling of surfaces at section corners, Foreign Object Debris (FOD) will result from the spalling, and block cracking. Swelling and block cracking may result in areas with an irregular surface. These conditions would present a hazard to aircraft. Continued deterioration would require more extensive repair efforts than the above-mentioned milling and resurfacing, at a much greater expense.

IMPACT OF DELAY:
If this project is not implemented runway will continue to crack and deteriorate, damage will reach the underlying pavement layers and base materials, resulting in extensive and costly future repairs to restore the runway to a safe operating conditions. Postponement will also result in increased number and severity of failures. Risk of Aircraft engine, structural, and tire damage due to Foreign Objects will continue and increase.

PROJECT TITLE: Minor Revitalization & Construction of Facilities, Not in Excess of $1.5 million Per Project
COGNIZANT Office: Office of Management Systems LOCATION: Various

	Institutional Support	Human Space Flight Programs
FY 2003 COST ESTIMATE (Millions of Dollars)	91.9	10.8
Location:		
Ames Research Center	9.3	
Dryden Flight Research Center	4.2	
Glenn Research Center	10.7	
Goddard Space Flight Center	8.5	
Jet Propulsion Laboratory	12.2	
Johnson Space Center	12.9	
Kennedy Space Center	11.9	9.4
Langley Research Center	9.4	
Marshall Space Flight Center	3.5	
Stennis Space Center	9.3	1.4

PROGRAM DESCRIPTION:
Proposed projects for FY 2003 are identified under "MINOR PROJECT COST ESTIMATE". They include Institutional Support projects totaling $91.9 million for components of the basic infrastructure and institutional facilities, and $10.4 million to accomplish specific Human Space Flight projects. The $10.4 million is included in the appropriate budget line items of the Human Space Flight appropriation. The cost estimates are shown here to provide a complete picture of NASA's minor program budget requirement for facilities.

These resources provide for revitalization and construction of facilities at NASA field installations and Government-owned industrial plants supporting NASA activities. The request includes facility revitalization and construction needs for FY 2003 that are greater than $500 Millions but not in excess of $1.5 million per project. Revitalization projects provide for the repair, modernization, and/or upgrade of facilities and collateral equipment. Repair and modernization projects restore facilities and components thereof, including collateral equipment, to a condition substantially equivalent to their originally intended and designed capability. Repair and modernization work includes the substantially equivalent replacement of utility systems and collateral equipment necessitated by incipient or actual breakdown. It also includes major preventive measures that are normally accomplished on a cyclic schedule, and those quickly needed out of cycle based on adverse condition information revealed during predictive testing and inspection efforts. Upgrade projects may include not only some restoration of current functional capability, but also enhancement of the condition of a facility so that it can more effectively accomplish its designated purpose or increase its functional capability. Occasionally minor facility construction projects will be required to provide for either the construction of small new facilities or additions to existing facilities. The facilities being revitalized or constructed in this program are expected to remain active in the

long term and are consistent with current and anticipated Agency roles and missions. Annual funding will be required for continuing minor revitalization and construction needs.

This program includes revitalization and construction projects estimated to cost more than $500 Millions per project. Projects $500 Millions and less in magnitude are normally accomplished by routine day-to-day facility maintenance and repair activities provided for in Research Operations Support and direct program operating budgets. Projects estimated to cost more than $1.5 million are included as separate discrete projects in the budget request.

PROGRAM JUSTIFICATION:

NASA is experiencing "block obsolescence" because 90% of the agency's facilities have been in use for over 25 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. Continued piecemeal repair of these components is more costly in the long run than replacement or closure at the end of the economic life of the original components.

The NASA physical plant has a capital investment of over $6 billion with a current replacement value of more than $19 billion. A continuing program of revitalization of these facilities is required to accomplish the following:

a. Protect the capital investment in critical facilities by minimizing the cumulative effects of wear and deterioration.
b. Ensure that critical facilities are continuously available and that they operate at peak efficiency.
c. Improve the capabilities and usefulness of critical facilities and thereby mitigate the effects of obsolescence.
d. Provide a better and safer environment for all personnel.
e. Reduce current operating costs and avoid significantly greater future repair costs.

New construction will primarily replace substandard facilities in cases where it is more economical to demolish and rebuild than it is to restore. Included are projects that replace old and dilapidated trailers and other modular facilities that do not meet current occupational health and safety standards, and which no longer satisfy user functional requirements. In selected cases, additional square footage may be built when there are compelling reasons to support specialized requirements of a nature that cannot be provided for using existing facilities. Included in this latter category are technical, programmatic, and institutional projects that are essential to the accomplishment of an installation's mission objectives.

MINOR PROJECT COST ESTIMATE (Millions of Dollars):

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. The titles of the projects are designed to identify the primary intent of each project and may not always capture the entire scope or description of each project. Also, during the year, some rearrangement of priorities may be necessary which may force a change in some of the items to be accomplished. Any such changes, however, will be accomplished within total the resources available.

HUMAN SPACE FLIGHT PROGRAMS, $10.8 million

A. Kennedy Space Center (KSC), $9.4 million for the following:
1. Revitalize Cable Plant, Vandenberg Launch Site, Space Launch Complex-2 (ELV)
2. Consolidate Shop Facilities, Vandenberg Launch Site, Space Launch Complex-2 (ELV)
3. Modify Multi-Payload Processing Facility for Hazardous Capability, Building M7-1104 (PLC)
4. Restore Low Voltage Power System, LC-39A, Phase 3 (Space Shuttle)
5. Restore Low Voltage Power System, LC-39B, Phase 3 (Space Shuttle)
6. Replace 15KV Feeders, Shuttle Landing Facility Area (Space Shuttle)
7. Replace 15KV Feeder 609, N & K Electrical Power Distribution Line (Space Shuttle)
8. Replace Roof and Roof-Top Air-Handling Units, Building L6-247 (Space Shuttle)

B. Stennis Space Center (SSC), $1.4 million for the following:
1. Repair and Modernize Space Shuttle Main Engine A-2 Test Stand, Phase 4 (Space Shuttle)

INSTITUTIONAL SUPPORT: $91.9 million

A. Ames Research Center (ARC), $9.3 million for the following:
1. Replace Fire Pump, N221
2. Replace Fire Suppression & Alarm Systems, 245 & 215
3. Rehabilitate Fire Exits in N240 and Safety Upgrades, Various Buildings
4. Rehabilitate Fire Protection System and Modify for Americans with Disabilities Act, N19
5. Rehabilitate Arc-Jet Cooling System, N234, Phase III
6. Repair 11FT Turning Vanes, Set 1&2, N227A
7. Replace Main Drive Heat Exchangers, Unitary Plan Wind Tunnel, N227
8. Replace Chiller, N233
9. Rehabilitate and Modify 5-Megawatt Arc-Jet Heater, Developmental Arc-Jet Facility

B. Dryden Flight Research Center (DFRC), $4.2 million for the following:
1. Repair Roofs, Various Buildings
2. Install Aqueous Film Forming Foam Fire Suppression, B1623
3. Rehabilitate Sewer System
4. Construct Central HVAC Plant, Research Engineering Support Facility Area

C. Glenn Research Center (GRC), $10.7 million for the following:
1. Replace K1 & K2 Switchgear and Reinsulate Cables
2. Rehabilitate Special Projects Lab, Phase 1 (24)
3. Repair Water Systems, Plum Brook (PBS)
4. Construct Addition for ADA Modifications, Engineering & Supply Building (21) & Cafeteria (15)0
5. Rehabilitate & Modify Research Projects Building (100)
6. Rehabilitate & Modify Material Processing Building, Phase 3 (105)
7. Rehabilitate Electric Propulsion Laboratory (301)
8. Replace Inlet Guide Vanes, Icing Research Tunnel (11)
9. Replace CE-5B Pre-Heaters, Engine Research Building (5)
10. Upgrade Variable Frequency System (23)
11. Upgrade Heated Tube Facility, Cell 103 (51)

D. Goddard Space Flight Center (GSFC), $8.5 million for the following:
1. Repair Storm Drains, Phase VI, Wallops Flight Facility (WFF)
2. Repair Roofs, Greenbelt Various Buildings.
3. Repair Roofs (WFF)
4. Revitalization of Communications Ductbank, Phase III (WFF)
5. Rehabilitate Operations & Maintenance Facilities, Building F-16 (WFF)
6. Modifications to E-Complex, Phase II (WFF)
7. Modifications to HVAC, Building F-10 (WFF)
8. Repair Fire Protection & Domestic Water
9. Rehabilitate HVAC Building 23, Phase IV
10. Construct Auditorium/Conference/Training Facility (WFF)

E. Jet Propulsion Laboratory (JPL), $12.2 million for the following:
1. Modifications for Extreme Environment Biology & Geology Lab, Building 244
2. Revitalize Inflatable Structures/Solar Sail Development Facility, Building 299
3. Revitalize 34 Meter High Efficiency Antenna, DSS-45
4. Construct Monolithic Microwave Integrated Circuit (MMIC) Assembly & Testing Facility
5. Modify Hydraulic System for Hydrostatic Bearing, 70-Meter Antenna, DSS-14
6. Construct Addition to Building 126
7. Upgrade 2.4 KV Utilities
8. Upgrade Electrical Bank 25
9. Replace Roofs, Various Buildings
10. Fire Protection Upgrades, Phase 2, (Goldstone, CA)
11. Modify South Security Gate

F. Johnson Space Center (JSC), $12.9 million for the following:

1. Rehabilitate Electrical Utilization System, 300 Area, White Sands Test Facility (WSTF)
2. Rehabilitate Electrical Utilization System, 400 Area (WSTF)
3. Repair Mechanical System for Indoor Air Quality, Building 4 North
4. Upgrade Radio Telecommunications Facility
5. Rehabilitate Electrical Distribution System, Energy System Test Area
6. Rehabilitate Support Facilities, Buildings 270 and 276, Ellington Field
7. Rehabilitate Direct Current Power Supply Systems, Propulsion Areas (WSTF)
8. Upgrade Electrical Substation, Building 5
9. Replace Roofs, Buildings 16, 29, 38, 41
10. Replace Roof, Second TDRSS Ground Terminal (WSTF)
11. Rehabilitate Aircraft Hangar, Building 990, Ellington Field

G. Kennedy Space Center (KSC), $11.9 million for the following:

1. Upgrade Central Station Fire Monitoring System, Various Locations
2. Replace Airfield Lighting System, Shuttle Landing Facility
3. Upgrade Facilities For Disabled Access, Various Locations
4. Replace Medium And Low Voltage Power Systems, Shuttle Landing Facility
5. Repair Bridge Neoprene Bearing Pads, Industrial Area
6. Replace Secondary Distribution Switch Gear and Panels, Hangar "S"
7. Modify Platform Hoist Control Circuit, VAB, High Bays 1 and 2
8. Repair South Elevation Wall, O&C Building
9. Repair NASA Causeway East
10. Repair Roads And Paved Areas, LC-39 Area
11. Safety Modifications To Critical Lifting Devices, Phase 1
12. Construct Replacement Training Facility

H. Langley Research Center (LaRC), $9.4 million for the following:
1. Construct Model Prep/Storage & Data Processing Rooms, Experimental Test Range, B1299F
2. Modify Vacuum System, Hypersonic Facility Complex
3. Modify Reclaimer System, 20-Inch Mach 6 CF4 Tunnel, B1275
4. Replace Electrical Substations, B1247F
5. Automation Modifications to 31 Inch M 10 Tunnel, B1251A
6. Construct Addition to the Child Development Center, B1231
7. Demolition of Abandoned Facilities, Various Locations

I. Marshall Space Flight Center (MSFC), $3.5 million for the following:
1. Demolish Unsafe Facilities
2. Rehabilitate Bridge Cranes, Various Facilities, Phase 1
3. Replace Sprinkler Heads, Various Facilities
4. Replace Emergency Power Systems, Buildings 103 and 207, Michoud Assembly Facility

J. Stennis Space Center (SSC), $9.3 million for the following:
1. Repair and Modify HVAC System, Environmental Laboratory [B1105], Phase 3
2. Repair and Modernize Fire Alarm Systems, Various Facilities, Phase 3
3. Repairs to Facility Operations Building [B4010]
4. Repair and Modernize HVAC, 8100 Complex, Phase 1
5. Repair to Potable Water System
6. Repair and Modify Secondary Power Systems, Phase 4
7. Repair and Modernize 13.8 kV Unit Substation Transformers
8. Repair Roads and Paved Areas
9. Expand Energy Management Control System, Phase1

PROJECT TITLE: Facility Planning and Design (FP&D)
COGNIZANT OFFICE: Office of Management Systems LOCATION: Various

FY 2003 COST ESTIMATE (Millions of Dollars)	17.2
Project Elements:	
Master Planning	1.0
Sustaining Engineering Support	1.2
Project Planning and Design Activities	15.0

These funds are required to provide for advance planning and design activities; special engineering studies; facility engineering research; preliminary engineering efforts required to initiate design-build projects; preparation of final designs, construction plans, specifications, and associated cost estimates; and participation in facilities-related professional engineering associations and organizations as follows:

A. Master Planning, $1.0 million:
The NASA field installation master plans need to be periodically updated. The master plans are essential as reference documents for land use planning, identification of physical relationships of facilities, and proper orientation and arrangement of facilities. The updates reflect as-built condition of facilities and utility systems with emphasis on changes caused by recent facility construction and modifications.

B. Sustaining Engineering Support, $1.2 million:
Provisions for facility studies and specific engineering support continue in importance as evidenced in recent years. These efforts are important due to changing trends in construction equipment, materials, and fuels; the operation and maintenance costs for the physical plant; and energy conservation and efficiency. The following items are included:

1. Value Engineering, and Design and Construction Management Studies
Provides for critically important studies to improve the quality and cost effectiveness of NASA's facility components and construction practices, and to ensure that developing technology and industry best practices are incorporated into the agency's construction program. Also provides services necessary to predict and validate facility costs to aid in resources planning and studies to assess design and construction functional management.

2. Facility Operation and Maintenance Studies
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. Facilities Utilization Analyses

Provides for the analyses of agency-wide facilities utilization data covering (1) office and other types of building space; (2) designated 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; (3) actions to improve facilities utilization; and (4) recommendations regarding consolidation/closure of Agency facilities.

4. Facilities Management Systems

Provides for continued engineering support for the technical updating of NASA's master text construction specifications to reflect the use of new materials, state-of-the-art construction techniques and current references to building codes and safety standards. Also provides engineering support for the Major Facilities Inventory, the Real Property Database and the Facilities Utilization Database systems.

5. Capital Leveraging Research Activities

Provides for modest participation in facilities related professional engineering associations, institutes, and organizations established to bring together major facility owners, contractors, and academia in proven research and study efforts to improve the quality and cost effectiveness of facilities engineering management practices for member organizations. Such organizations include, but are not limited to the Federal Facilities Council of the National Research Council, Construction Industry Institute, Fully Integrated and Automated Technology Consortium, and National Institute of Building Sciences. This also provides for independent research activities to address facility problems unique to NASA.

C. Project Planning and Design Activities: $15.0 million:

These resources provide for project planning and design activities associated with Mission Support construction projects. Project planning and design activities for construction projects required to conduct specific Human Space Flight or Science, Aeronautics, and Technology programs or projects are included in the appropriate budget line item.

1. Preliminary Engineering, $1.0 million:

This estimate provides for preparation of Preliminary Engineering Reports (PERs), investigations, project studies and other pre-project planning activities related to proposed facility projects. 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.

2. Related Special Engineering Support, $1.5 million:

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 similar field investigations and studies. These studies are required to support long-term project development strategies, and project specific designs, cost estimates, and schedules.

3. Design, $12.5 million:

The amount requested will provide for the preparation of designs, plans, drawings, and specifications necessary for the accomplishment of construction projects. Also provides technical and engineering support analyses, designs, and reviews required to verify, confirm and ensure suitability of construction designs within the project cost estimates. This work is associated with construction proposed for the FY 2005 program and with changes to projects proposed for the FY 2004 program. The goal is to obtain better facilities, faster and at a lower cost.

PROJECT TITLE: Environmental Compliance and Restoration Program
COGNIZANT OFFICE: Office of Management Systems, Environmental Management Division LOCATION: Various Locations

FY 2003 Cost Estimate (Millions of Dollars)	105.0
Location:	
Ames Research Center	0.6
Dryden Flight Research Center	0.6
Glenn Research Center	66.6
Goddard Space Flight Center	0.7
Jet Propulsion Laboratory	6.9
Johnson Space Center	1.2
Kennedy Space Center	9.0
Langley Research Center	0.1
Marshall Space Flight Center	6.7
Michoud Assembly Facility	1.8
Stennis Space Center	0.9
Wallops Flight Facility	0.7
White Sands Test Flight Facility	5.3
Headquarters	3.9

PROGRAM DESCRIPTION:
The Program provides for environmental activities necessary for compliance with environmental requirements including environmental program initiatives. Proposed environmental activities for FY 2003 are identified below under "ENVIRONMENTAL ACTIVITIES COST ESTIMATE" title. The Program includes activities necessary for NASA to comply with environmental statutory and regulatory requirements and standards, orders, regulatory and cooperative agreements, and support of environmental program initiatives. The Program focuses our efforts in the principal areas of environmental compliance, remediation, conservation, pollution prevention and closures. Within this framework, compliance with environmental requirements is performed, while simultaneously remediating previously contaminated sites, performing environmental closures, and promoting the identification of pollution prevention and conservation activities. Program activities include projects, studies, assessments, investigations, plans, designs, related engineering, program support, and sampling, monitoring, and operation of remedial treatment processes and sites as part of the remediation and cleanup measures. These activities will be performed at NASA installations, NASA-owned industrial plants supporting NASA activities, and other current or former NASA sites 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 provide for activities including regulatory agency oversight costs, to acquire land if necessary to implement environmental compliance and restoration measures, and to perform studies, assessments and other activities in support of functional leadership initiatives related to the environmental program.

PROGRAM JUSTIFICATION:

The Program represents this year's request on a phased approach in relation to the total Agency requirements for environmental remediation measures that must be implemented within the next several years, as well as for needed requirements for other environmental compliance measures and initiatives. The Program includes activities necessary for compliance with environmental statutory and regulatory requirements and standards, orders, regulatory and cooperative agreements, and support of environmental program initiatives. Based on relative urgency and potential health hazards and safety, these activities are the highest priority requirements currently planned for accomplishment in FY 2003. Deferral of these necessary compliance and remedial measures would preclude NASA from complying with environmental requirements and regulatory agreements, and could jeopardize NASA operations. As studies, assessments, investigations, plans, regulatory approvals, and designs progress and as new discoveries or regulatory requirements change, it is expected that priorities may change and revisions to these activities may be necessary.

The broad environmental categories summarizing the efforts proposed to be undertaken with the identified estimated costs are listed below. Remediation activities include one or more phases of a site cleanup program from site identification to final closeout, including but not limited to site assessments, site investigations, interim cleanup actions, testing and evaluation, remedial treatment systems and processes operation, sampling and monitoring, and other activities associated with CERCLA/RCRA cleanup requirements.

a. Environmental Remediation Activities and Initiatives --- Remediation (e.g. CERCLA, RCRA) . . . . . $ 35.2
b. Closure (Decommissioning of Plum Brook Reactor --- Atomic Energy Act). . . . . $ 64.0
c. Other Environmental Compliance Requirements and Initiatives ---
Compliance, Restoration, Prevention, Closures (e.g. CAA, CWA, RCRA, ESA, PPA). . . . . $ 5.8

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
RCRA = Resource Conservation and Recovery Act
CAA = Clean Air Act
CWA = Clean Water Act
ESA = Endangered Species Act
PPA = Pollution Prevention Act

ENVIRONMENTAL ACTIVITIES COST ESTIMATE: $105.0 million, as follows:

A. Ames Flight Research Center (ARC), $0.6 million

B. Dryden Flight Research Center (DFRC), $0.6 million

C. Glenn Research Center (GRC), $66.4 million* for the following:
1. Remediation of Contaminated Areas
1. Plum Brook Reactor Decommissioning Activities*
2. Sewage Treatment Plant Decommissioning and Reconnection at Plum Brook

*detailed estimate for Plum Brook Reactor Decommissioning activities totals $64.0M and is provided in the following section.

D. Goddard Space Flight Center (GSFC), $0.5 million

E. Jet Propulsion Laboratory (JPL), $6.7 million for the following:
1. Cleanup of Arroyo Saco Groundwater Contamination
2. Pasadena and Lincoln Avenue Agreements

F. Johnson Space Center (JSC), $0.8 million for the following:
1. Tier III NOx Controls for Engines and Boilers
2. Construction of Stormwater Sampling Stations

G. Kennedy Space Center (KSC), $3.7 million for the following:
1. Remediation at Fuel Storage Area #1 (CCAS)
2. Various Interim Measures, Various Locations (KSC and CCAS)
3. Remediation at the Hydrocarbon Burn Facility
4. GSA Reclamation yard Remediation
3. Wilson Corners Groundwater Treatment, Phase 3

H. Langley Research Center (LaRC), $0.1 million

I. Marshall Space Flight Center (MSFC), $5.9 million for the following:
1. CERCLA Investigation and Cleanup
2. RCRA Investigation and Cleanup, Santa Susana Field Laboratory
3. Groundwater Investigation and Cleanup, Santa Susana Field Laboratory

J. Michoud Assembly Facility (MAF), $1.8 million for the following:
1. Remediation Activities, Various Locations

K. Wallops Flight Facility (WFF), $0.2 million for the following

L. White Sands Test Facility (WSTF), $5.3 million for the following:
1. Groundwater Contamination Assessment and Remediation

M. Other (various locations), $13.1 million for the following:
Studies, Assessments, and Investigations; Plans; Designs; Sampling, Monitoring and Operation of Remedial Treatment Systems; Related Engineering and Program Support

PROJECT TITLE: Plum Brook Reactor Decommissioning
COGNIZANT OFFICE: Office of Management Systems

INSTALLATION: Glenn Research Center
LOCATION: Plum Brook Station Sandusky, OH

FY 2003 COST ESTIMATE (Millions of Dollars):	64.0
Project Elements:	
Decommissioning, Decontamination activities	12.2
Demolition, De-watering and Disposal activities	38.4
Environmental, Safety & Health monitoring, Construction & Project Management, Community Relations, Institutional & Technical Support	13.4

PRIOR YEARS FUNDING*:	29.0
**FY 1998 – FY 2002:*	
Pre-decommissioning work	8.8
Plans, studies and samplings	4.2
Decommissioning activities	16.0

PROJECT DESCRIPTION:
This project decommissions and demolishes the nuclear test reactor located in Plum Brook Station in Sandusky, Ohio. The reactor has been in standby mode since 1975. Work towards decommissioning began with the Nuclear Regulatory Commission required Decommissioning Plan in 1999. The decommissioning work will be performed in a phased approach and is expected to end in 2006. The actual completion date will depend on what is found as the decommissioning and demolition work evolves. In 2003, the primary work to be performed will be the demolition and disposal of the mockup reactor, hot cells, reactor fan and pump houses, and hot and cold retention areas. Ancillary de-watering activities necessary to maintain worksite integrity will also commence. Other activities continuing in 2003 include community relations; environmental, safety and health support; and asbestos abatement. The cost to complete all decommissioning work (recorded as a liability on NASA's Fiscal Year 2001 financial statements) is currently estimated at $152 million.

PROJECT JUSTIFICATION:
The Nuclear Regulatory Commission (NRC) is the regulatory agency requiring NASA to decommission the Plum Brook Reactor. NRC issues licenses for nuclear reactors. In 1998, the NRC, through the Plum Brook Station reactor licensing process, directed NASA to decommission the reactor by 2007. This research reactor has been without nuclear fuel and in mothball status since 1975. Decommissioning activities are required by NRC regulations under 10 CFR 20.82 (b) and 10 CFR 50 and require NASA to totally demolish the structure and transport all debris to regulated disposal facilities.

IMPACT OF DELAY:
With external containment breached and the reactor internals exposed, this project is at a critical juncture. Delay could eliminate or severely limit NASA's ability to dispose of radioactive waste in the only facility regulated to receive such waste. Without that disposal option, long-term on-site radioactive containment structures would have to be built and radiation-monitoring systems devised to meet NRC requirements until an alternative disposal site could be found. NASA would be faced with the interim costs for these measures and would still be required to ultimately decommission and dispose of the reactor site in accordance with NRV regulations. The NRC has notified the American public of the decommissioning, and the Ohio delegation and Sandusky Ohio community have been directly contacted with the projects overarching goals, objectives, and target end dates. Delay of this project would prevent NASA from honoring theses commitments, jeopardize NASA's credibility with the community, and significantly inflate the total cost to taxpayers.