National Aeronautics and Space Administration

BUDGET ESTIMATES

FISCAL YEAR 1967

Volume III

CONSTRUCTION OF FACILITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1967 ESTIMATES

CONSTRUCTION OF FACILITIES

TABLE OF CONTENTS

VOLUME III

NATIONAL AERONATUICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

GENERAL STATEMENT

This appropriation provides for contractual services for the design, construction and modification of facilities; the purchase of equipment related to construction and modification; and advance design of facilities planned for future authorization. The principal projects in the 1967 program are described below:

MANNED SPACE FLIGHT: The estimates include funding requirements for operational and testing facilities, utility installation, and additions and modifications to existing facilities, to support the Apollo spacecraft and Saturn launch vehicle programs and other research and support activities.

SCIENTIFIC INVESTIGATIONS IN SPACE: Projects in this category will support activities in space science. The estimates provide for modifications to launch facilities; new launch and servicing facilities for Delta vehicles, an Aerobee launch facility, and additional utility installations.

SPACE TECHNOLOGY: These projects comprise research laboratories, a support facility, and a chemical distribution facility.

AIRCRAFT TECHNOLOGY: Funds will provide for a V/STOL wind tunnel, expansion of the propulsion systems laboratory, and modifications for a hypersonic propulsion facility.

SUPPORTING ACTIVITIES: Funds are included for facility planning and design; a 40-foot antenna test bed, and a utility installation to support tracking and data acquisition requirements.

The appropriation for FY 1966 was $60,000,000 and the authorization was $62,376,350. The request for 1967 is $101,500,000; an increase of $41,500,000 from the 1966 appropriation. Total expenditures are estimated to be $300,000,000 in FY 1967, a decrease of $195,000,000 from the $495,000,000 estimated for FY 1966.

The budget request contains $20,000 to provide a fall-out shelter protection for a new facility at Kennedy Space Center. The amount has been determined in consultation with the Department of Defense based on DOD policy and criteria.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1967 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN AS RECONCILED TO FINANCING SCHEDULE

Budget Activity	Fiscal Year 1965	Fiscal Year 1966	Fiscal Year 1967
1. Manned Space Flight.....	$199,770,096	$21,401,350	$54,378,000
2. Scientific Investigations in Space.....	8,342,600	7,084,000	6,322,000
3. Space Applications.....	---	---	---
4. Space Technology.....	21,291,000	13,435,000	11,089,000
5. Aircraft Technology.....	3,729,000	682,000	21,011,000
6. Supporting Activities.....	27,974,000	16,984,650	8,700,000
Total Budget Plan.....	$261,106,696	$59,587,000	$101,500,000
Financing:			
Appropriation.....	$262,880,500	$60,000,000	$101,500,000
Transferred from (78 Stat. 658) - "Research and development".....	3,545,193	---	---
Appropriation (adjusted).....	266,425,693	60,000,000	101,500,000
Transferred from (78 Stat. 658) - "Research and Development".....	353,800	---	---
Reprogramming to or from (-) prior year budget plans.....	-5,672,797	-413,000	---
Total financing of budget plan.....	$261,106,696	$59,587,000	$101,500,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1967 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN
BY BUDGET ACTIVITY SHOWING LOCATION TOTALS INCLUDED IN EACH ACTIVITY

	Fiscal Year 1965	Fiscal Year 1966	Fiscal Year 1967
1. MANNED SPACE FLIGHT.....	$199,770,096	$21,401,350	$54,378,000
John F. Kennedy Space Center, NASA.....	85,044,000	6,895,000	36,497,000
Manned Spacecraft Center	23,907,500	4,180,000	13,800,000
Marshall Space Flight Center.....	12,454,096	2,309,450	581,000
Michoud Assembly Facility	6,449,500	284,750	700,000
Mississippi Test Facility.....	58,891,000	1,910,450	1,700,000
Various Locations.....	13,024,000	5,821,700	1,100,000
2. SCIENTIFIC INVESTIGATIONS IN SPACE.....	$8,342,600	$7,084,000	$6,322,000
Ames Research Center....	---	2,749,000	---
Goddard Space Flight Center.....	605,000	2,400,000	---
Jet Propulsion Laboratory	3,582,000	---	350,000
John F. Kennedy Space Center, NASA.....	2,180,800	887,000	1,379,000
Various Locations.....	275,800	---	4,388,000
Wallops Station.....	1,699,000	1,048,000	205,000
3. SPACE APPLICATIONS.....	$ ---	$ ---	$ ---
4. SPACE TECHNOLOGY.....	$21,291,000	$13,435,000	$11,089,000
Ames Research Center....	3,038,000	---	---
Electronics Research Center.....	10,000,000	5,000,000	10,000,000
Langley Research Center..	2,540,500	7,568,000	1,089,000
Lewis Research Center...	770,000	867,000	---
Various Locations.....	4,942,500	---	---

	Fiscal Year 1965	Fiscal Year 1966	Fiscal Year 1967
5. AIRCRAFT TECHNOLOGY.....	$3,729,000	$682,000	$21,011,000
Ames Research Center.....	2,630,000	---	---
Langley Research Center....	1,099,000	682,000	5,011,000
Lewis Research Center.....	---	---	16,000,000
6. SUPPORTING ACTIVITIES.....	$27,974,000	$16,984,650	$8,700,000
Goddard Space Flight Center	1,709,000	---	710,000
John F. Kennedy Space Center, NASA.....	1,393,000	---	---
Various Locations.....	14,872,000	14,361,000	990,000
Facility Planning and Design.....	10,000,000	2,623,650	7,000,000
TOTAL PLAN.....	$261,106,696	$59,587,000	$101,500,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

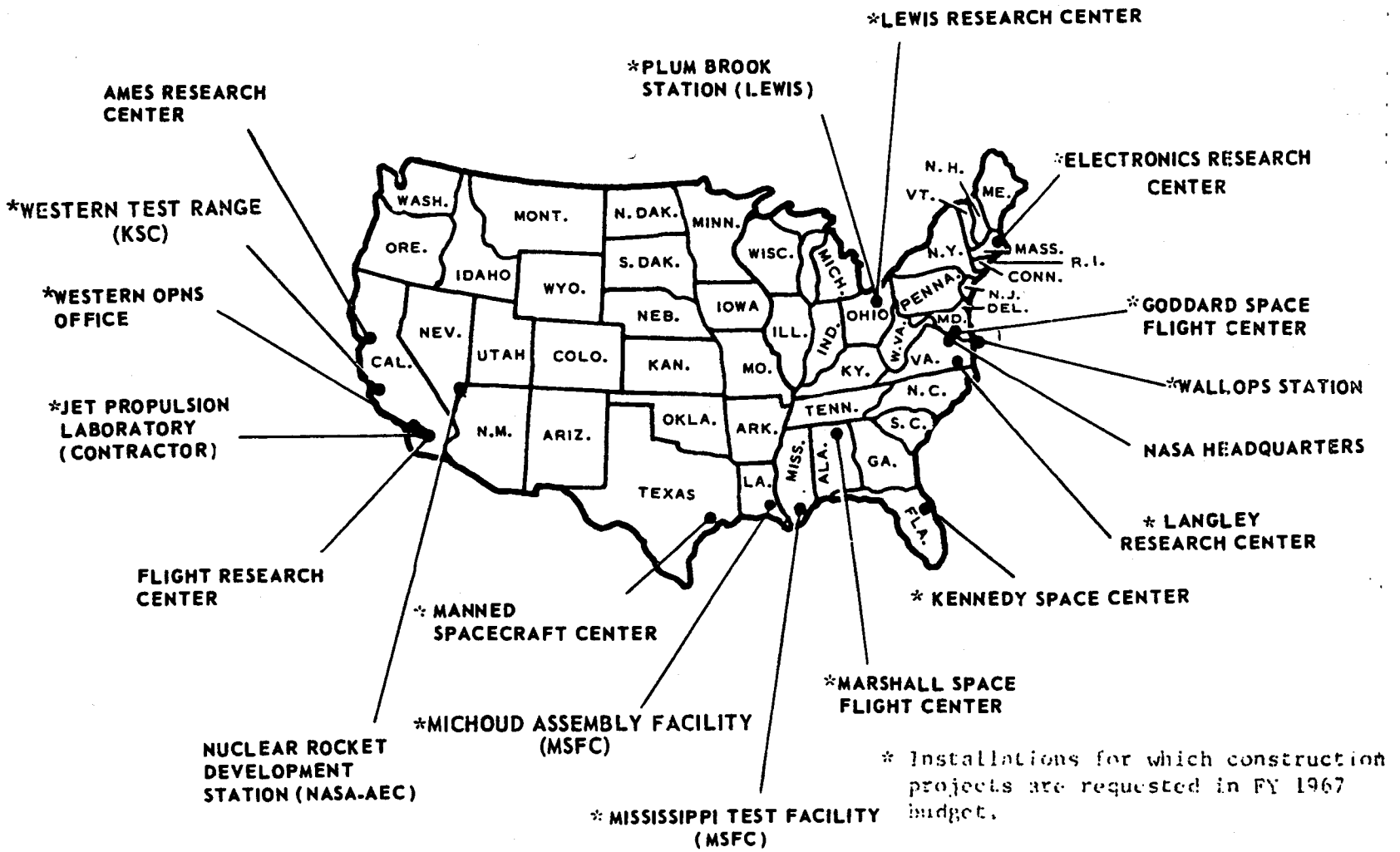
FISCAL YEAR 1967 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN BY LOCATION

Location	Fiscal Year 1965	Fiscal Year 1966	Fiscal Year 1967
Ames Research Center.....	$5,668,000	$2,749,000	$ ---
Electronics Research Center.....	10,000,000	5,000,000	10,000,000
Goddard Space Flight Center.....	2,314,000	2,400,000	710,000
Jet Propulsion Laboratory.....	3,582,000	---	350,000
John F. Kennedy Space Center, NASA.....	88,617,800	7,782,000	37,876,000
Langley Research Center.....	3,639,500	8,250,000	6,100,000
Lewis Research Center.....	770,000	867,000	16,000,000
Manned Spacecraft Center.....	23,907,500	4,180,000	13,800,000
Marshall Space Flight Center....	12,454,096	2,309,450	581,000
Michoud Assembly Facility.....	6,449,500	284,750	700,000
Mississippi Test Facility.....	58,891,000	1,910,450	1,700,000
Various Locations.....	33,114,300	20,182,700	6,478,000
Wallops Station.....	1,699,000	1,048,000	205,000
Facility Planning and Design....	10,000,000	2,623,650	7,000,000
Total Plan.....	$261,106,696	$59,587,000	$101,500,000

The geographic location of NASA installations is shown on the following page. Installations for which construction projects are requested in the fiscal year 1967 budget are identified.

NASA INSTALLATIONS



* Installations for which construction projects are requested in FY 1967 budget.

SUM 5
Revised 2/7/66

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

ELECTRONICS RESEARCH CENTER

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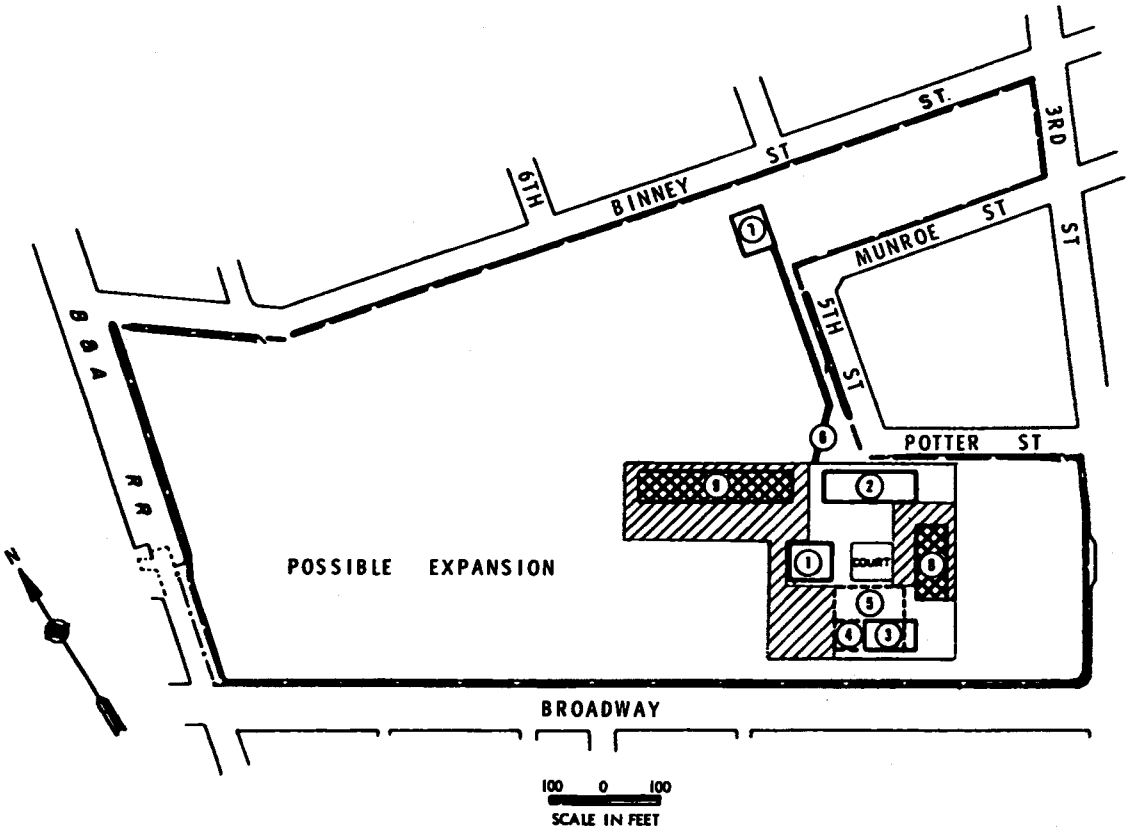
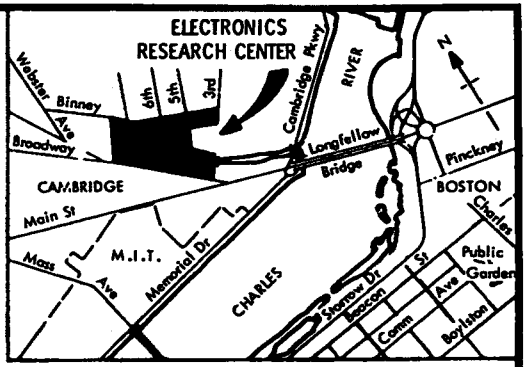
ELECTRONICS RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN

CAMBRIDGE, MASS





1. TOWER-E/A & GENERAL PURPOSE LABORATORIES
2. MICROWAVE RADIATION
3. AUDITORIUM
4. KITCHEN (BASEMENT)
5. DINING (BASEMENT)
6. UTILITY TUNNEL
7. CENTER SERVICE BUILDING
8. QUALIFICATIONS & STANDARDS/ELECTRONIC COMPONENTS LABORATORY
9. SPACE GUIDANCE/OPTICAL COMMUNICATIONS LABORATORY

LEGEND

- FY-65 & 66 FACILITIES
- FACILITIES PROPOSED IN 1967 ESTIMATES
- BASEMENTS ASSOCIATED WITH FY-67 FACILITIES
- PROJECT BOUNDARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Electronics Research Center	Advanced Research & Technology	Cambridge Massachusetts	Middlesex	---

INSTALLATION MISSION The mission of the Electronics Research Center is to increase the agency's capability in space electronics by providing the knowledge and advanced technology needed to overcome deficiencies in electronic systems and components. The Center organizes, manages, and conducts a comprehensive program of basic and applied space electronics research. It also provides a focal point for national space electronics research, coordinating nationwide research efforts and sponsoring electronics research conducted by industry, universities, and private institutions.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	250	550	1000
CONTRACTOR AND OTHER PERSONNEL	-0-	-0-	40
TOTAL ALL PERSONNEL	250	550	1040

LAND	NO. ACRES
NASA-OWNED	-
OTHER GOVERNMENT AGENCY-OWNED	-
NON-FEDERAL *(Leases, easements)*	-
TOTAL LAND	-

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ -

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1963 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Space Guidance/Optical Communications Laboratory	ART	624	4,954	-	5,578
Qualifications and Standards/Electronic Components Laboratory	ART	140	3,046	-	3,186
Center Support Facilities (Phase III)	ART	130	2,000	-	2,130
ALL OTHER PROJECTS		18,006			
TOTALS		18,900	10,000		

NASA FORM 1029 (REV. JUN 65) PREVIOUS EDITIONS ARE OBSOLETE.

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

SPACE GUIDANCE/OPTICAL COMMUNICATIONS
SPECIAL PURPOSE LABORATORY

AUTHORIZATION LINE ITEM: Electronics Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Cambridge, Middlesex County, Massachusetts

COGNIZANT NASA INSTALLATION: Electronics Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$624,000
FY 1967 Estimate	4,954,000
Total Funding Through FY 1967	$5,578,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$3,200,000
4-story laboratory building	Sq. Ft.	72,464	$33.98	2,462,000
Special construction	Sq. Ft.	72,464	10.18	738,000
Equipment				$1,754,000
Space Guidance Lab:				
Inertial test equipment	LS	---	235,300	235,300
Special instrumentation	LS	---	110,600	110,600
Optical devices	LS	---	346,200	346,200
Analysis equipment	LS	---	99,100	99,100
Electronic support equipment	LS	---	124,600	124,600

	Unit of Measure	Quantity	Unit Cost	Total Cost
Precision machinery equipment	LS	---	$42,300	$42,300
Instrumentation assembly equipment	LS	---	32.900	32,900
Optical Communications Lab:				
Optical transmission equipment	LS	---	239,300	239,300
Optical reception equipment	LS	---	277,600	277,600
Optical analysis equipment	LS	---	153,600	153,600
Optics preparation and material equipment	LS	---	92,500	92,500
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$4,954,000

PROJECT PURPOSE:

This project will provide laboratory facilities and special equipment for conducting research on space guidance and optical communications systems.

PROJECT DESCRIPTION:

This Special Purpose Laboratory is a four story building housing special research equipment for the Space Guidance and Optical Communications Laboratory functions. The basement, which extends under the podium level providing 26,900 square feet, will provide ground level support for heavy equipment and equipment requiring vibration-free mounting and extra height of more than twelve feet. The podium level and two upper floors, each with 15,200 square feet, will provide space for special research equipment of lesser building tolerances than that which is closely associated with the equipment installed at ground level. Space is provided for utility lines and local utility equipment items such as pumps, vacuum devices, fans, heat transfer units, electrical transformers, converters, regulators, etc., necessary to provide the special environment required for this research.

Laboratory equipment will be provided in the Space Guidance space to analyze, test, simulate and generate concepts, techniques and elements for future space navigation and guidance systems. Specialized test devices will include equipment for sensing and generating velocities, accelerations,

angular rates, gravity forces, and inertial references and will include analog and digital data collection and reduction equipment. Cryogenic and vacuum and magnetic field control equipment will be included for research on new types of guidance sensors.

Optical Communications portion of the building will contain special purpose equipment for the measurement, analysis, generation and reception of optical energy in the 100 Angstroms to 100 microns wave length region. Equipment such as spectrographs, optical benches and interferometers will be complemented by high intensity light sources, sensors, and special detectors for generating and analyzing the ultra-violet, infra-red and visible emissions.

PROJECT JUSTIFICATION:

The Space Guidance Laboratory will conduct research in guidance and navigation techniques and concepts, and in new guidance instrumentation. Theoretical studies, investigations, experimentation and tests in trajectory analysis, inertial reference and sensory techniques, navigation and guidance components development as well as the testing of electromagnetic and optical guidance devices on a component and subsystem basis will be undertaken.

Current space guidance systems were originally developed for aircraft and ballistic missiles which required very high accuracy for short duration flights. While the extended performance of these missile guidance systems is satisfactory for present missions, there is a pressing need to do research in guidance techniques optimized for long duration planetary flights. These new techniques must yield highly reliable, lightweight systems capable of operating for extremely long periods without serious degradation of performance.

The Space Optics Laboratory will conduct research on optical radiation sources and components, data transmission and recovery techniques, and propagation phenomena.

The emergence of the laser indicates that the wavelength band between 100 Angstroms and 100 microns offers an impressive potential for the solution of problems related to space exploration. Applications of optical concepts include communication, guidance and control, and computers and displays. Few of these concepts have progressed beyond basic research. The need for a better understanding of the related natural laws is evident.

The theoretical limits of the optical method have not been realized. Tracking and pointing accuracies of 0.1 seconds of arc at system sensitivity of 0.01 seconds of arc are theoretically possible with interferometric techniques, compared with minutes of arc for existing astronomical antennas. Ranging with a pulse rise time of a billionth of a second may become feasible over considerable distances with accuracies of a few meters, affording capability for topological soundings of the moon, or planets, from orbiting spacecraft. Lasers, used in conjunction with image converters and image orthicons, may be useful for reconnaissance on the dark side of planets.

The vertical distribution of radiation near the earth, as well as the spectra of the sun and stars are largely unknown. Such unknowns have caused malfunctions of infrared horizon seekers. They affect the performance of passive optical communication devices and introduce undesirable complications into the critical beam orientation procedures for optical communications. Optical instruments do not operate reliably in space when pointed within a few degrees of the sun, because intensity and spectra of space background radiation and stray light are not known with sufficient accuracy to be considered in the design of seekers. These data, once established, will help solve many of the problems of space exploration.

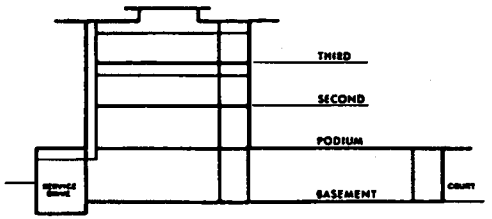
Laser and associated concepts for optical communications provide access to a frequency band that is at least three orders of magnitude wider than the entire R-F band. This facility will be used in the conduct of a program to explore the potentialities of this region for space application and to develop the technology to exploit this potential. It is believed that in 1975 a bit rate of one hundred million bits per second will be required over distances of several astronomical units and that optical means show promise in filling this requirement. In addition, research will be conducted on passive optical techniques, radiation detectors, and information theory. The laboratory program will provide the base for the development of light weight, reliable, optical components for precise optical systems which will enable space vehicles to operate for long periods of time at great distances.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

ELECTRONICS RESEARCH CENTER

FISCAL YEAR 1967 ESTIMATES

Space Guidance / Optical Communications Labs.



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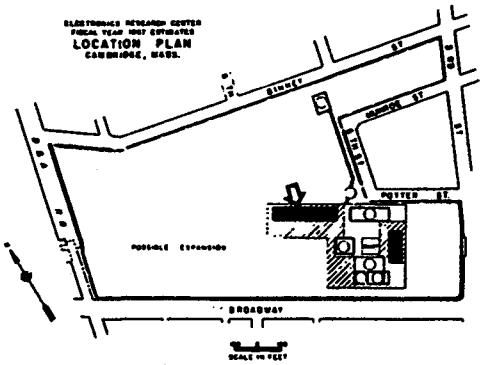
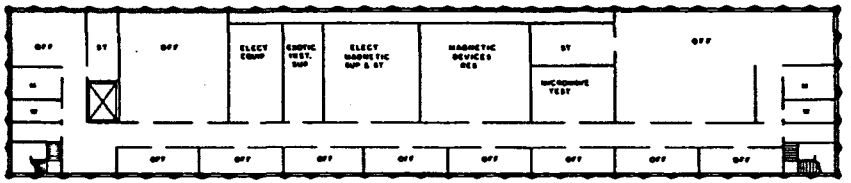
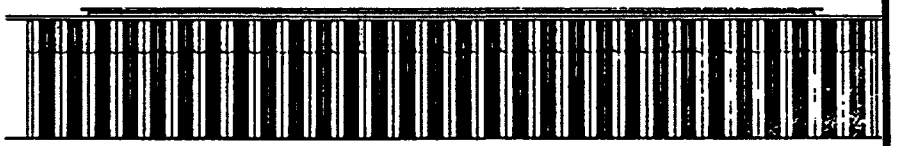
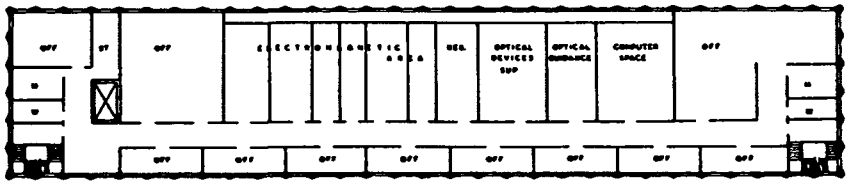




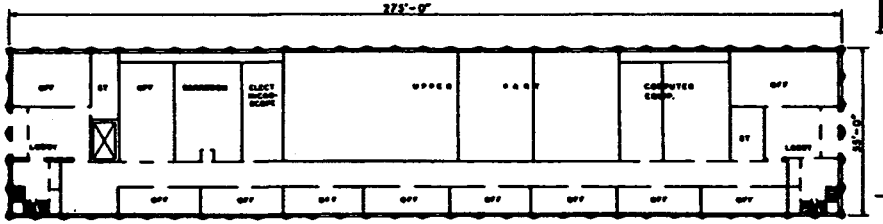
Third Floor Plan



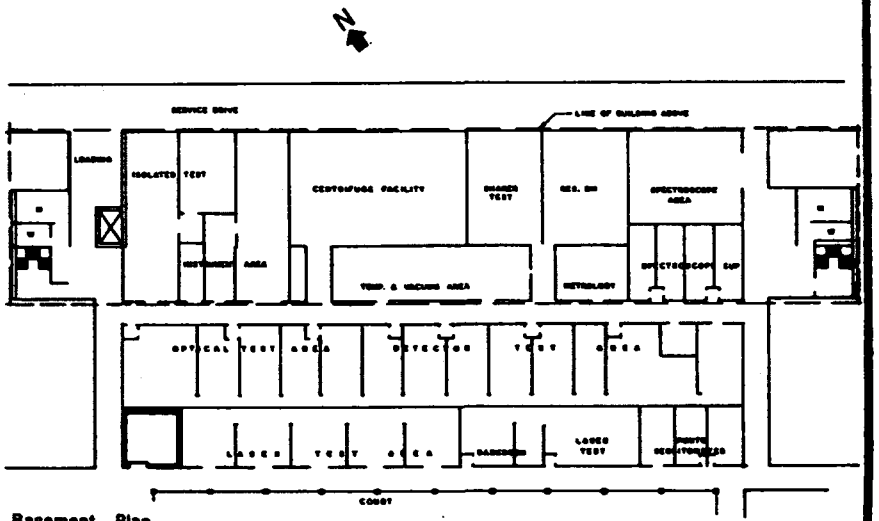
Elevation



Second Floor Plan



Podium Level Plan



Basement Plan

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

QUALIFICATIONS AND STANDARDS/ELECTRONIC COMPONENTS SPECIAL PURPOSE LABORATORY

AUTHORIZATION LINE ITEM: Electronics Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Cambridge, Middlesex County, Massachusetts

COGNIZANT NASA INSTALLATION: Electronics Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$140,000
FY 1967 Estimate	3,046,000
Total Funding Through FY 1967	$3,186,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,945,000
Building	Sq. Ft.	38,600	$33.16	1,280,000
Special construction	Sq. Ft.	38,600	17.22	665,000
Equipment				$1,101,000
Qualifications and standards environmental test equipment	LS	---	898,000	898,000
Electronic components lab-special lab equipment	LS	---	203,000	203,000
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter	---	---	---	-0-
		TOTAL		$3,046,000

PROJECT PURPOSE:

This project will provide the laboratory facilities and special purpose equipment for research in new electronic components and the standards by which to qualify them.

PROJECT DESCRIPTION:

This Special Purpose Laboratory Building will house in its four levels (Basement, Podium, 2nd and 3rd Floors) a variety of special research equipment and will provide working space for a number of personnel who will support the objectives of the Qualifications and Standards Laboratory and the Electronic Components Laboratory, both subdivisions of the Component Technology Division. The ground level (Basement) comprises 14,400 square feet of floor space in which will be located most of the equipment with unusual building design characteristics (i.e., greater than normal floor loads, specialized foundations, vibration isolation mounts and clear ceiling heights in excess of twelve feet). The podium (1st Floor) level consists of 8,000 square feet and will contain, like the 2nd and 3rd floors, a portion of the special laboratory areas for fabrication and modification of experimental electronic models and some of the research office spaces. The 2nd and 3rd floors each contain 8,000 square feet which will be devoted to the special laboratory areas with lesser load and clear height requirements as well as a number of research work spaces. The building will be of permanent type construction and will contain the necessary utility lines and equipments such as fans, pumps, electrical transformers, converter/regulators as required to provide the specialized environmental requirements of these laboratory areas.

PROJECT JUSTIFICATION:

The Electronic Components Laboratory is needed to provide facilities for increasing basic knowledge and for advancing technology in the area of electronic components in order to provide the necessary capability for meeting the electronic components requirements for successful accomplishment of NASA space missions. Advanced research will be carried out in the fields of solid state, low temperatures, quantum electronics, high temperatures, and mechanical and metallurgical studies. Materials research will be performed in semi-conductors, magnetics, dielectric materials evaluation, and radioisotopes and radiation. Microelectronic research will include thin films, microelectronic techniques and molecular electronics. Physical electronics research will include electron emission studies, plasma research

and surface studies. A capability is needed for advanced development of semiconductor devices, tubes, electromechanical devices, and optical and display devices. This facility is needed to provide special purpose laboratory space and research equipment to carry out the necessary in-house portion of the electronic components research program.

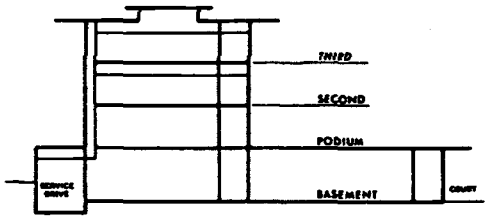
The Qualifications and Standards Laboratory will provide space and equipment to permit the staff to conduct component qualification testing and to establish electronic design and fabrication standards. The standards established by this laboratory will materially reduce the complications and unnecessarily high development costs which result when space systems are to be assembled from electronic components obtained from a large number of developers and suppliers, all working to different basic fabrication and reliability qualification standards. This laboratory will be the NASA focal point for promulgation of space electronic component qualifications and standards. These qualifications and standards will also be supplemented with laboratory developed qualified parts lists, calibration methods and procedures and environmental test criteria which will be invaluable to other groups within the Center, other NASA Centers, other government agencies and interested industrial and university groups.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

ELECTRONICS RESEARCH CENTER

FISCAL YEAR 1967 ESTIMATES

Qualifications & Standards / Electronics Components Labs.



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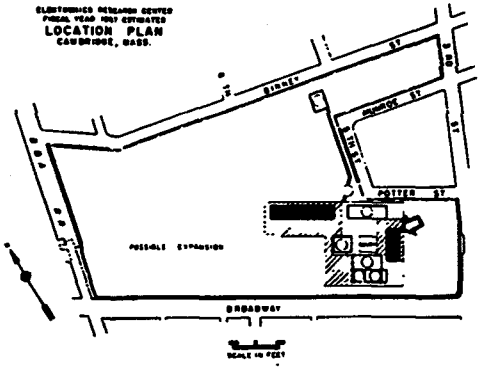
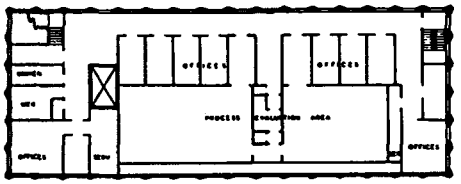
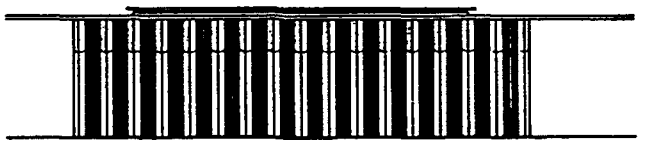
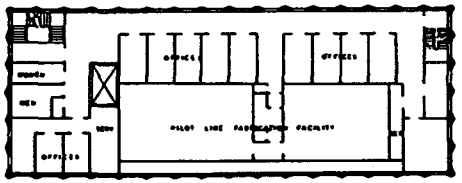




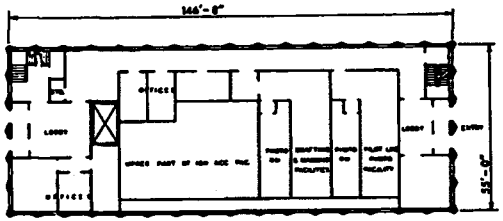
Third Floor Plan



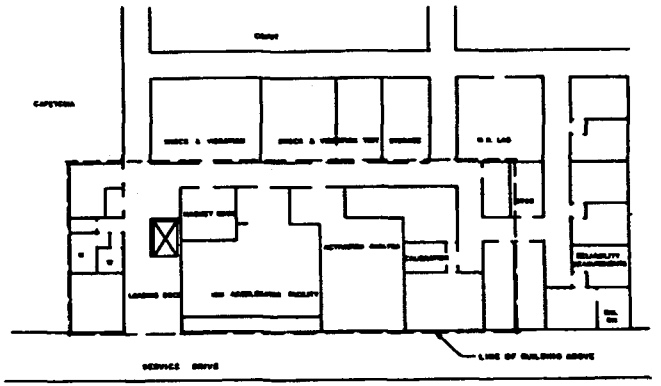
Elevation



Second Floor Plan



Podium Level Plan



Basement Plan

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

CENTER SUPPORT FACILITIES

AUTHORIZATION LINE ITEM: Electronics Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Cambridge, Middlesex County, Massachusetts

COGNIZANT NASA INSTALLATION: Electronics Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$130,000
FY 1967 Estimate	2,000,000
Total Funding Through FY 1967	$2,130,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$2,000,000
Basement mechanical spaces and equipment	Sq. Ft.	9,000	$38.24	344,000
Support shops in basement area	Sq. Ft.	14,000	36.07	505,000
Corridors and courts below podium	LS	---	155,000	155,000
Covered service drive	Sq. Ft.	9,000	34.57	311,000
Utilities	LS	---	590,000	590,000
Site preparation	LS	---	95,000	95,000
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$2,000,000

PROJECT PURPOSE:

This project will provide essential support utilities for the Electronics Research Center Laboratory Facilities requested for FY 1967.

PROJECT DESCRIPTION:

The project provides for all utilities and facilities beyond and under the building lines including the Podium which is not provided by the building construction. It provides for the extension of utility lines from those installed under prior year programs and new utility services from outside lines of the City and Public Utilities. The project also includes space and mechanical and electrical equipment in 9,000 square feet of mechanical equipment rooms located between the laboratory buildings beneath the podium and provides for covered corridors and open courts connecting the laboratories. Site improvements consist of grading and landscaping of areas exterior to the FY 1967 portion of the complex. Extension of the exterior perimeter Service Drive is provided for access to the new laboratory facilities and for providing covered utility line distribution spaces.

PROJECT JUSTIFICATION:

These Center Support Facilities are required to operate individual laboratories of the Electronics Research Center requested in the FY 1967 budget. Without these necessary utility supports the laboratories will not function.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

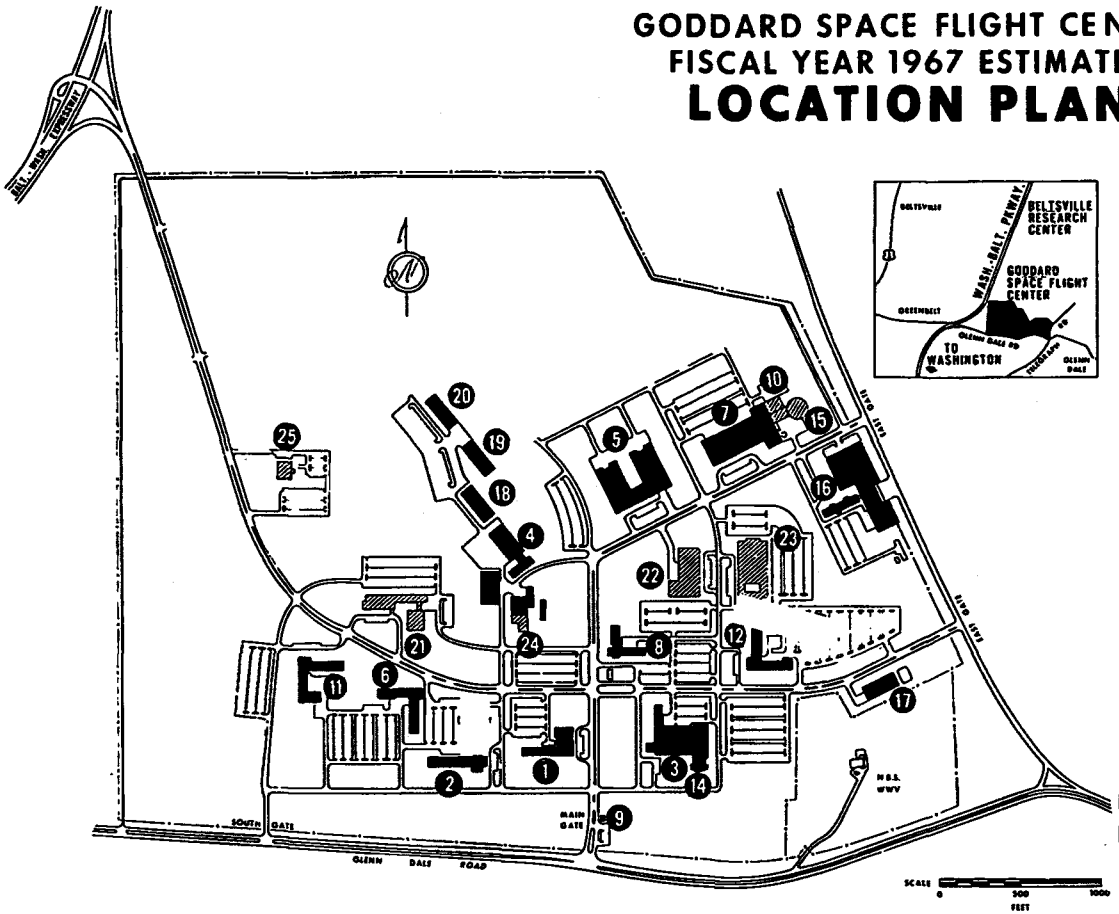
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

GODDARD SPACE FLIGHT CENTER

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1967 ESTIMATES
LOCATION PLAN



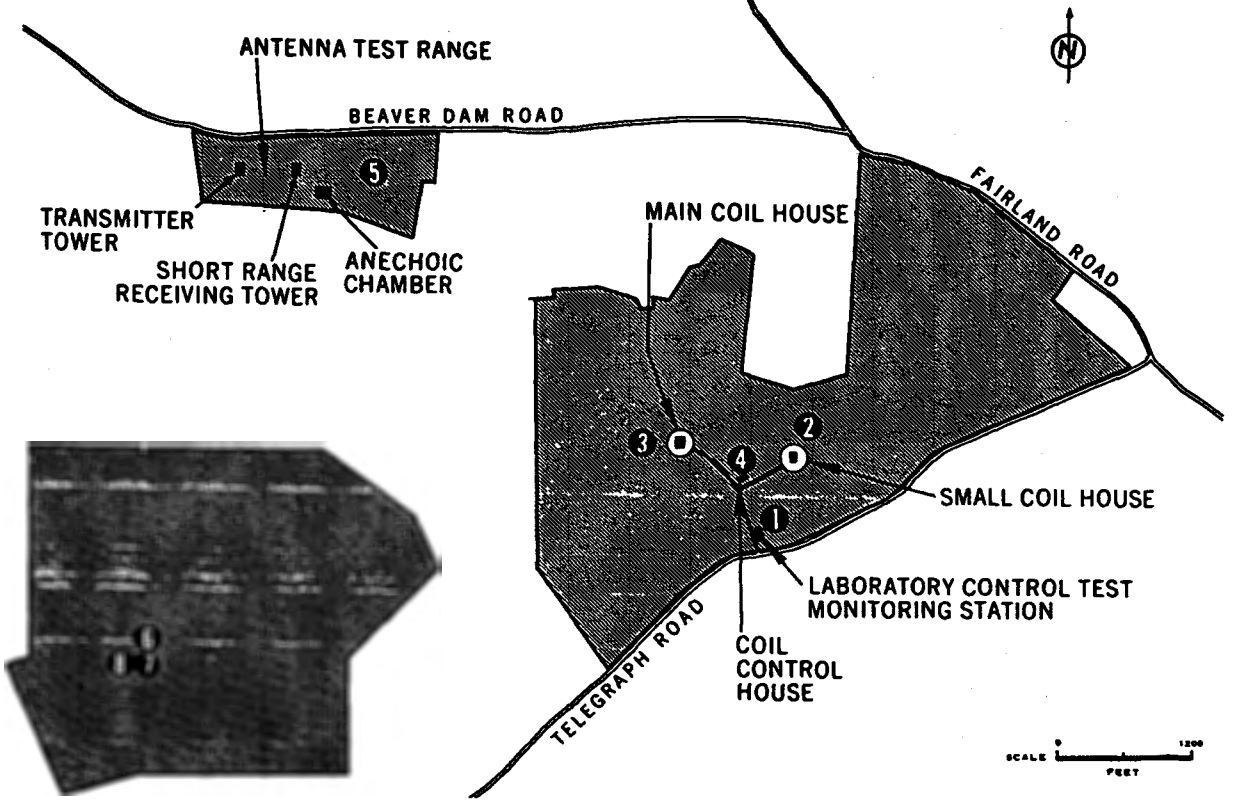
1. SPACE PROJECTS BUILDING
2. RESEARCH PROJECTS LABORATORY
3. CENTRAL FLIGHT CONTROL AND RANGE OPERATIONS LABORATORY
4. BOILER HOUSE AND ELECTRIC SUBSTATION
5. INSTRUMENT CONSTRUCTION AND INSTALLATION LABORATORY
6. SPACE SCIENCES LABORATORY
7. PAYLOAD TESTING FACILITY
8. SATELLITE SYSTEMS LABORATORY
9. GATE HOUSE
10. ENVIRONMENTAL TESTING LABORATORY
11. APPLIED SCIENCES LABORATORY
12. TRACKING AND TELEMETRY LABORATORY
14. SPACECRAFT OPERATIONS FACILITY
15. LAUNCH PHASE SIMULATOR
16. DEVELOPMENT OPERATIONS BUILDING
17. MULTI–PURPOSE BUILDING
18. MULTI–PURPOSE BUILDING
19. MULTI–PURPOSE BUILDING
20. MULTI–PURPOSE BUILDING
21. METEOROLOGICAL SYSTEMS DEVELOPMENT LABORATORY
22. MECHANICAL TEST FACILITY AND QUALITY ASSURANCE LABORATORY
23. DATA INTERPRETATION LABORATORY
24. ADDITION TO CENTRAL HEATING AND REFRIGERATION PLANT
25. NASA SPACE SCIENCE DATA CENTER

EXISTING FACILITIES

FACILITIES UNDER CONSTRUCTION

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1967 ESTIMATES

REMOTE SITE AREAS



CF 2-2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Goddard Space Flight Center	Space Science and Applications	Greenbelt, Maryland	Prince George's	Greenbelt, Maryland

INSTALLATION MISSION

This Center is responsible for complete development of unmanned sounding rockets and orbiting spacecraft experiments in basic and applied science. The work covers scientific satellites, and communications and weather satellites which orbit in cislunar space (region between the earth and the moon). In addition, the Center manages NASA's Delta rocket and two world-wide tracking, data acquisition and data reduction networks.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	3782	3625	3807
CONTRACTOR AND OTHER PERSONNEL	2306	2712	2869
TOTAL ALL PERSONNEL	6088	6337	6676

LAND	NO. ACRES
NASA-OWNED	554
OTHER GOVERNMENT AGENCY-OWNED	650
NON-FEDERAL *(Leases, easements)*	3
TOTAL LAND	1,207

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 197,236.0

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Forty-Foot Antenna Test Bed	TDA	10.0	710.0	-	720.0
ALL OTHER PROJECTS		82,227.6			
TOTALS		82,237.6	710.0		

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* *Includes work in process.*

798-050 O-66-4

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FORTY-FOOT ANTENNA TEST BED

SPACE TRACKING AND DATA ACQUISITION NETWORK (STADAN)

AUTHORIZATION LINE ITEM: Goddard Space Flight Center

PROGRAM OFFICE FOR THE PROJECT: Office of Tracking and Data Acquisition

LOCATION OF PROJECT: Greenbelt, Prince Georges County, Maryland

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$10,000
FY 1967 Estimate	710,000
Total Funding Through FY 1967	$720,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$120,000
Operations building addition	Sq. Ft.	1,700	$36.47	62,000
Raised floor system	Sq. Ft.	1,700	5.31	9,000
Servo-mechanical system and shelter	LS	---	2,000	2,000
Antenna and tower foundation	LS	---	14,000	14,000
Roads and walks	Sq. Yd.	1,580	8.22	13,000
Utilities	LS	---	17,000	17,000
Site preparation	Acre	6.5	462.00	3,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$590,000
Antenna mount, reflector, and (2) collimation towers	LS	---	$300,000	300,000
Drive and servo-system	LS	---	200,000	200,000
Installation and testing	LS	---	90,000	90,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$710,000

PROJECT PURPOSE:

The proposed project will provide Goddard Space Flight Center with a 40-foot antenna test bed for field tests and evaluations of improved data acquisition and control systems prior to their integration into the STADAN Network, and for testing of spacecraft RF compatibility with ground data acquisition and tracking systems.

PROJECT DESCRIPTION:

This project proposes the construction and erection of a 40-foot antenna test bed to be located at the STADAN Engineering and Test Facility site, which is adjacent to the Goddard Space Flight Center. The project includes an addition of seventeen hundred (1,700) square feet of operations area with raised floor system, on the northeast side of the STADAN Engineering and Test Facility. Included also are antenna and collimation tower foundations, a servo-mechanical system with shelter for the antenna, two collimation towers, an electrical distribution system for the antenna and collimation towers, site preparation, and roads. Existing utilities will be extended as required. The equipment to be installed consists of an antenna mount and reflector and an antenna drive and servo-system.

Prototype electronic systems (such as antenna feeds, parametric amplifiers, tracking receivers, time standard, etc.) from prior year SRT programs will be used to equip this 40-foot antenna data acquisition test bed for operational test capacility.

PROJECT JUSTIFICATION:

A 40-foot antenna test bed facility is required at Goddard Space Flight Center to make fundamental measurements of antenna structural parameters and antenna control systems, to perform complete integration and testing of new ground systems, to qualify the overall spacecraft/ground data acquisition system, and to evaluate the systems post-launch.

This facility will permit meaningful antenna structural and control system evaluations and tests on a full scale antenna and associated subsystems. Developments of improved data acquisition subsystems are needed in the STADAN Network to keep abreast of new concepts. Before new systems can be put in the network they must be thoroughly tested under simulated operational conditions in the field. It is not possible to do this testing at STADAN stations because of the operational workload at the stations. The 40-foot antenna test bed will allow a direct operational simulation of STADAN 40-foot antenna performance.

The second requirement for the 40-foot antenna at Goddard is to test spacecraft RF compatibility with ground data acquisition and tracking systems, and to acquire critical real-time data from satellites, including failure situations, where fast reaction is essential. Compatibility testing should be conducted at Goddard during the environmental test phase.

The combination of the developmental test requirements and the spacecraft test and support requirements makes it mandatory to have a 40-foot antenna data acquisition test bed facility at Goddard.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

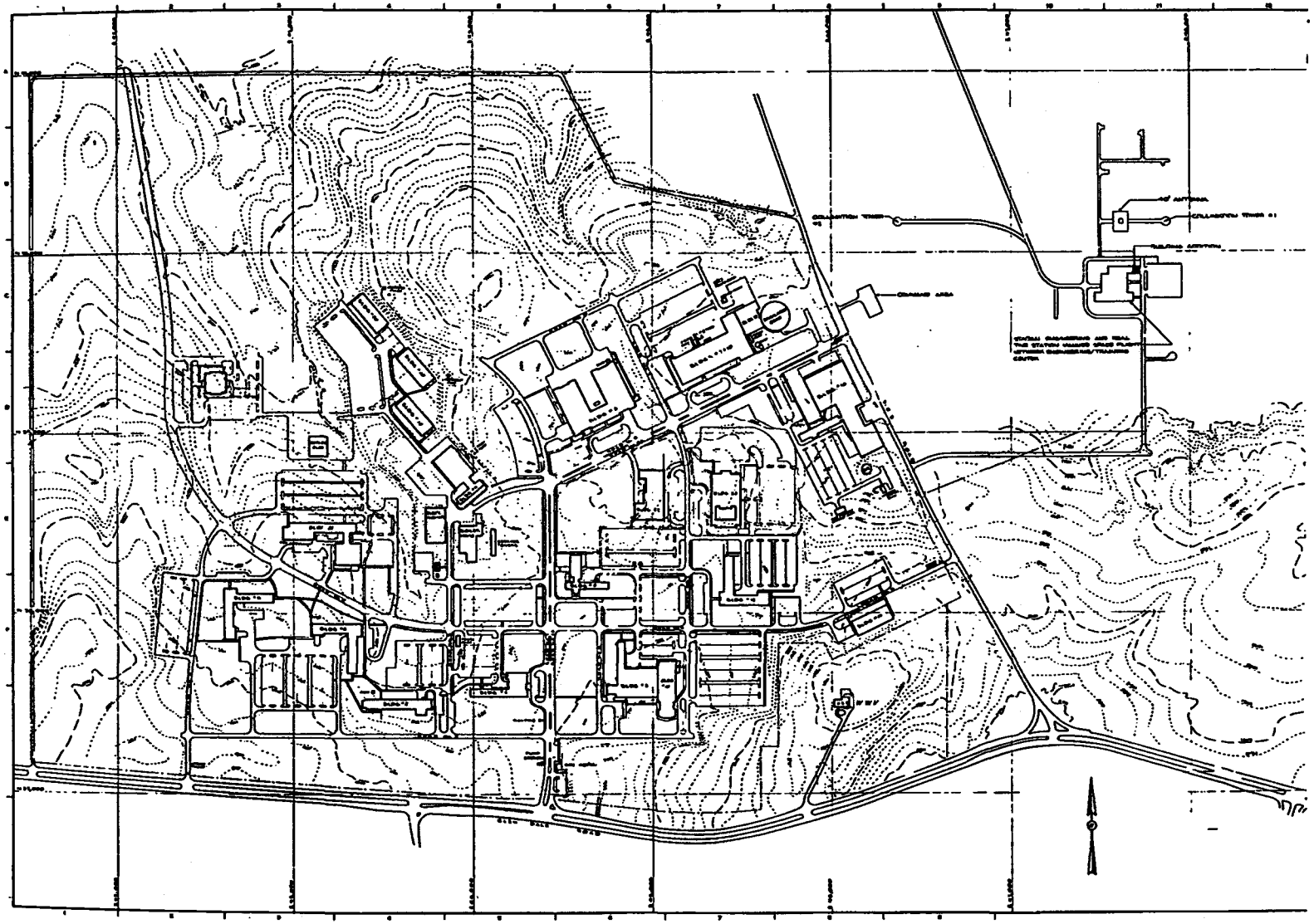
40-FOOT ANTENNA TEST BED

NATIONAL AERONAUTICS & SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

SITE LOCATION PLAN

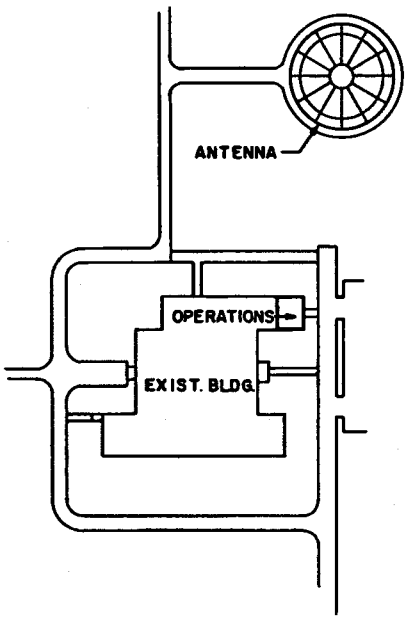


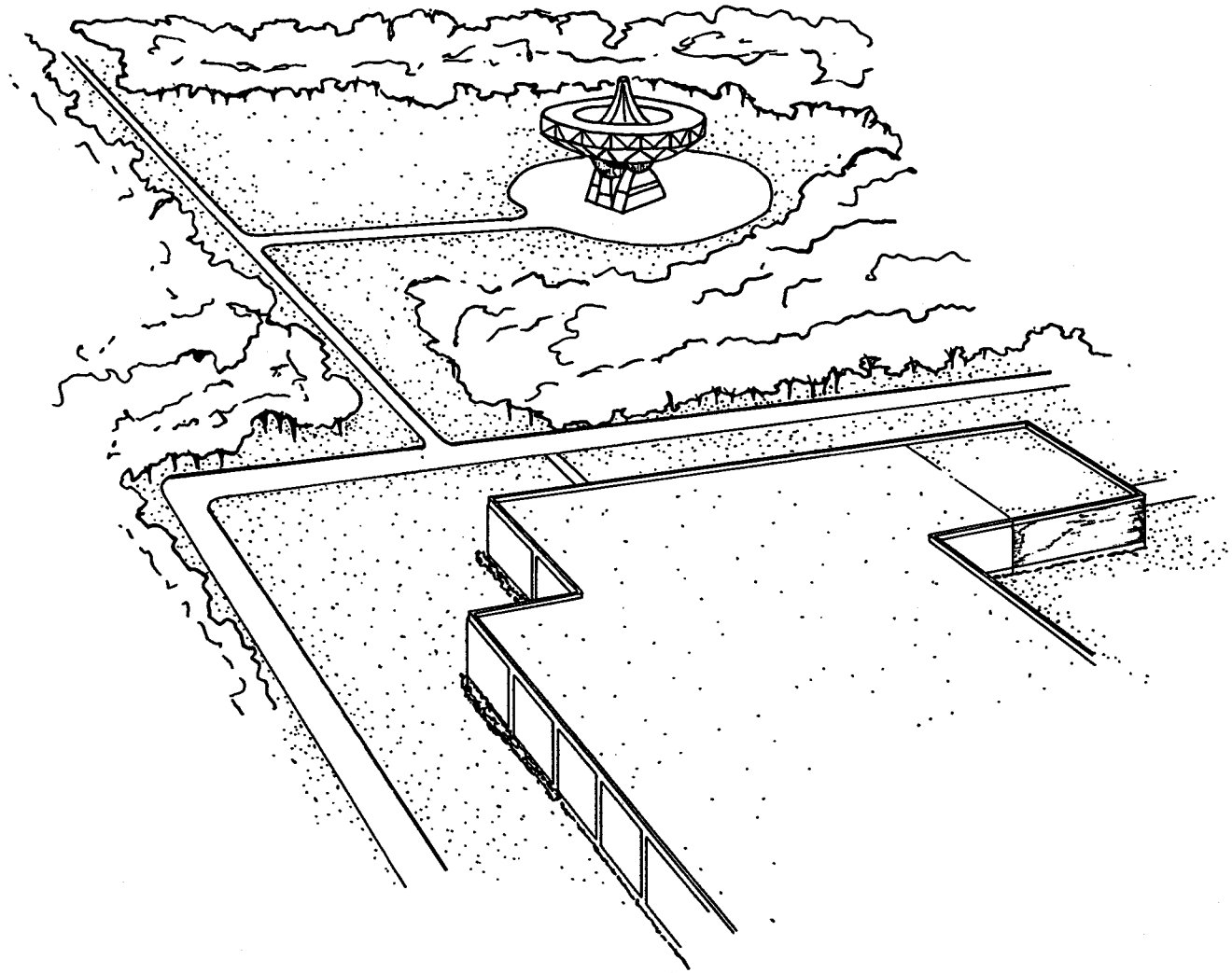
CF 2-7

GODDARD SPACE FLIGHT CENTER

FISCAL YEAR 1967 ESTIMATES

FORTY FOOT ANTENNA TEST BED



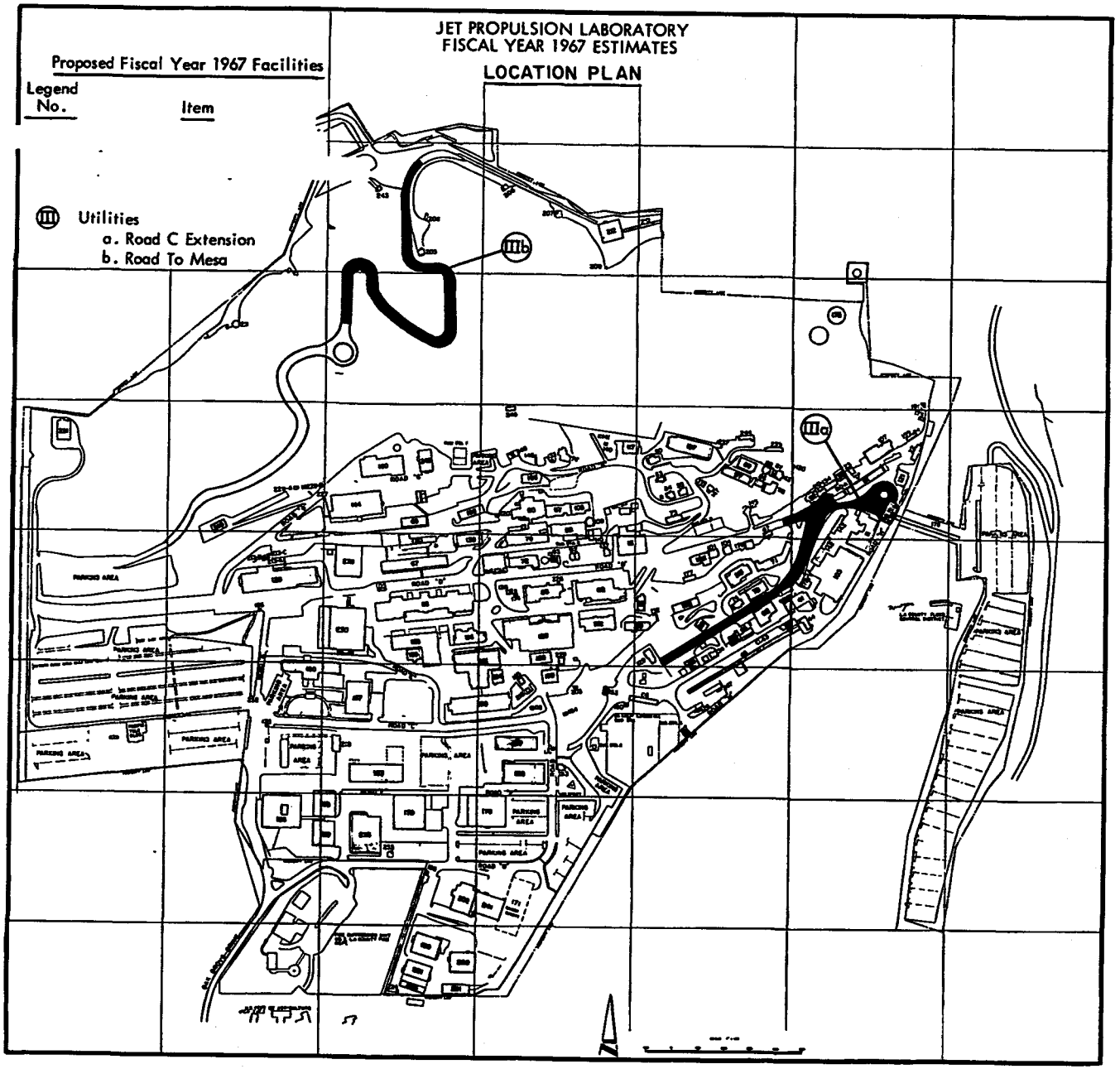


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

JET PROPULSION LABORATORY


JET PROPULSION LABORATORY
FISCAL YEAR 1967 ESTIMATES
LOCATION PLAN
Proposed Fiscal Year 1967 Facilities
Legend
No.
Item
III Utilities
a. Road C Extension
b. Road To Mesa
IIIb
IIIa

CF 3-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Jet Propulsion Laboratory	Space Science and Applications	Pasadena, California	Los Angeles	Pasadena, California

INSTALLATION MISSION

The Jet Propulsion Laboratory (JPL) is a government-owned research and development facility, operated by the California Institute of Technology under a contract with the National Aeronautics and Space Administration. The Laboratory carries out research programs and unmanned lunar and planetary space projects for NASA, and conceives and executes advanced development and experimental engineering investigations to further the technology required for the nation's space program.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
JPL PERSONNEL *(End of Year)*	3998	4250	4250
CONTRACTOR AND OTHER PERSONNEL	932	1061	1173
TOTAL ALL PERSONNEL	4930	5311	5423

LAND	NO. ACRES
NASA-OWNED	145.9
OTHER GOVERNMENT AGENCY-OWNED	--
NON-FEDERAL *(Leases, easements)*	25.8
TOTAL LAND	171.7

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 128,177.2

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Utilities Installations	SSA	3,308	350	2,000	5,658
ALL OTHER PROJECTS		34,569			
TOTALS		37,877	350		

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* *Includes work in process.*

798-030 O-66-5

CF 3-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

UTILITIES INSTALLATION

AUTHORIZATION LINE ITEM: Jet Propulsion Laboratory

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Pasadena, Los Angeles County, California

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$3,308,000
FY 1967 Estimate	350,000
Total Funding Through FY 1967	$3,658,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$350,000
Road "C" Extension				276,985
Grading and paving	Sq. Ft.	71,200	$1.84	131,133
Sidewalks, curb and gutter	Sq. Ft.	4,896	.69	3,378
Street lights	Each	19	789.81	15,006
Sanitary sewers and storm drains	LF	830	14.58	12,092
Power and communi-cations	LF	3,440	23.89	82,187
Underground utilities	LF	1,317	25.20	33,189
Mesa Road				73,015
Grading and paving	Sq. Ft.	37,000	1.74	64,380
Storm drains	LF	240	35.98	8,635

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$350,000

PROJECT PURPOSE:

This proposed project will provide a new east-west road and a road to the Mesa.

PROJECT DESCRIPTION:

This project will complete the main east-west road and extend a road to the research and development facilities located on top of the Mesa on Laboratory grounds.

Road C - Road C will be extended from its present termination south of building 129 to the intersection with road D and the eastern entrance to the Laboratory at the bridge across the Arroyo. As part of this project it will be necessary to demolish buildings 65 and 204 and move the electric substation A which are in the path of the road extension.

The materials processing equipment previously housed in building 65 is now installed in building 157 and the reduction in on-Lab propulsion systems testing has released building 204 for removal in accordance with the demolition plan which encompasses the original temporary structures which were the dominant buildings in the immediate post war era.

Road to Mesa - This road will be a continuation of the road to the one million gallon water storage tank built under the FY-65 utility program. The road will terminate in the vicinity of the spacecraft antenna range facility.

PROJECT JUSTIFICATION:

The present east-west road is inadequate to handle the on-Laboratory bus and truck traffic. The extension of road C will alleviate this traffic congestion. Construction of the road will also allow the Laboratory to rehabilitate the existing utilities in the area.

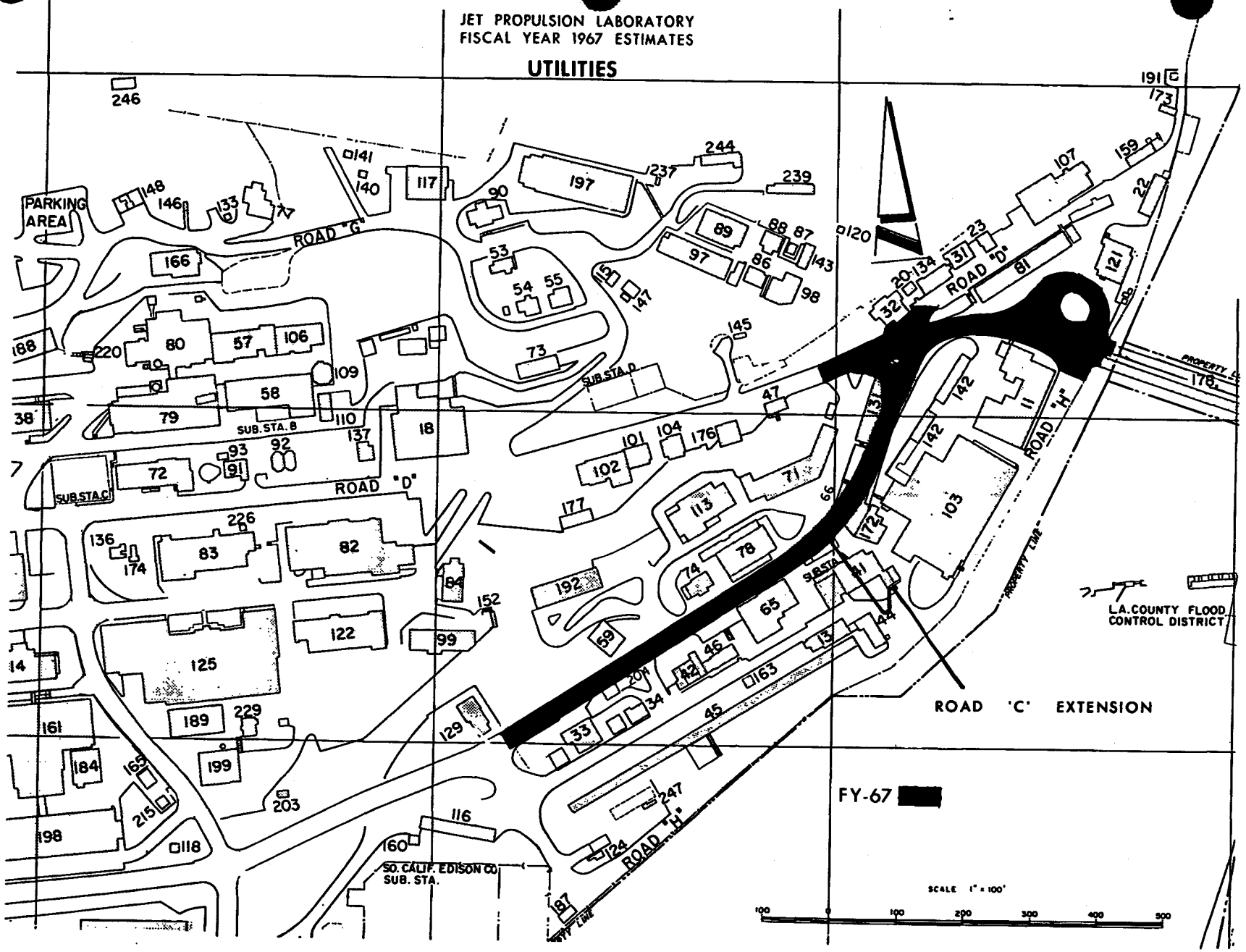
The unusual working hours often required of Laboratory personnel during various phases of spacecraft antenna testing and other activities poses a potential community relations problem since all truck and auto traffic must

flow through the adjoining residential area and enter the government property via an easement. The proposed 1,400-foot extension of the existing roadway to the water tank will diminish this problem as well as promote a more efficient Laboratory operation.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: $2,000,000 over the next five years.

JET PROPULSION LABORATORY
FISCAL YEAR 1967 ESTIMATES

UTILITIES



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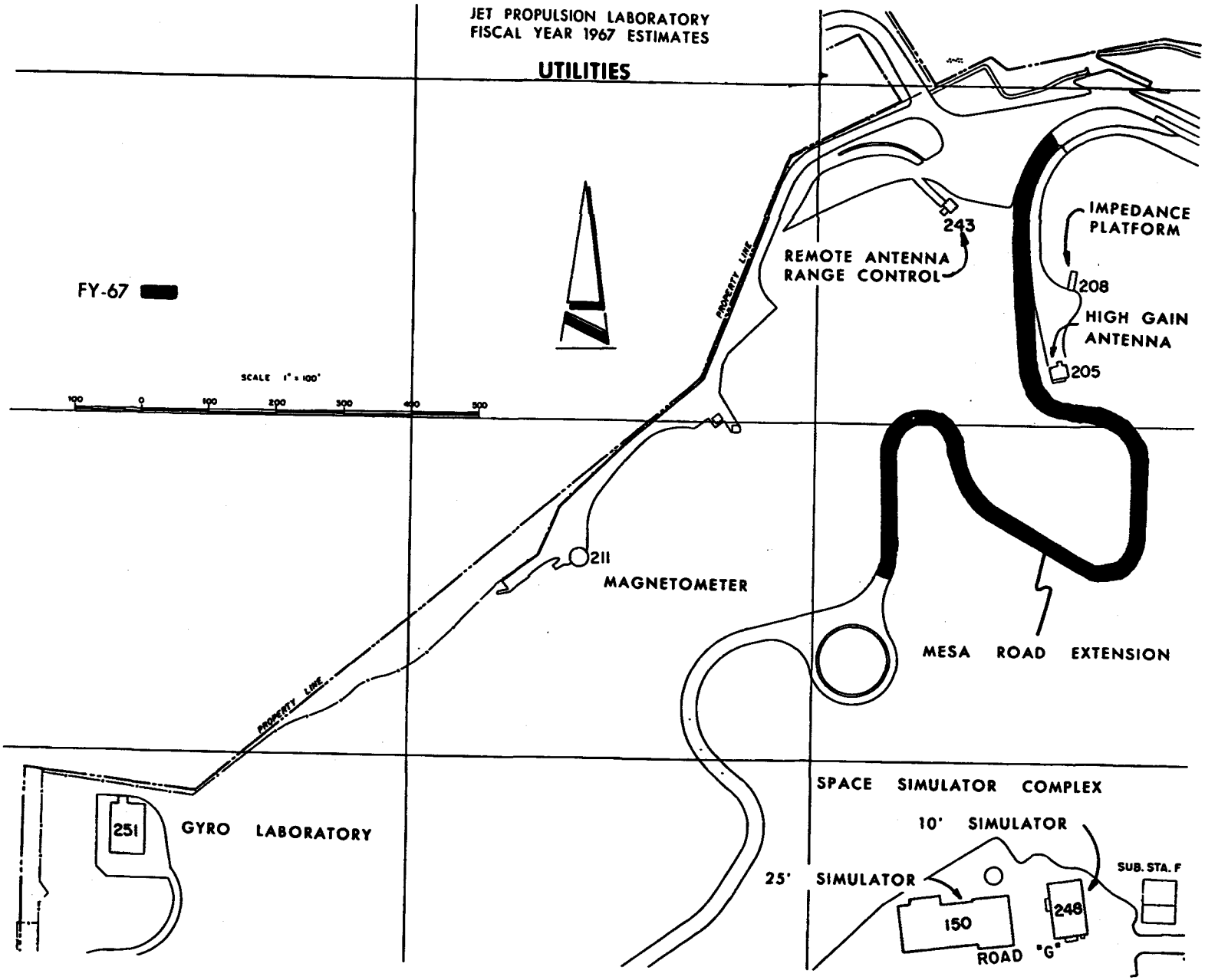
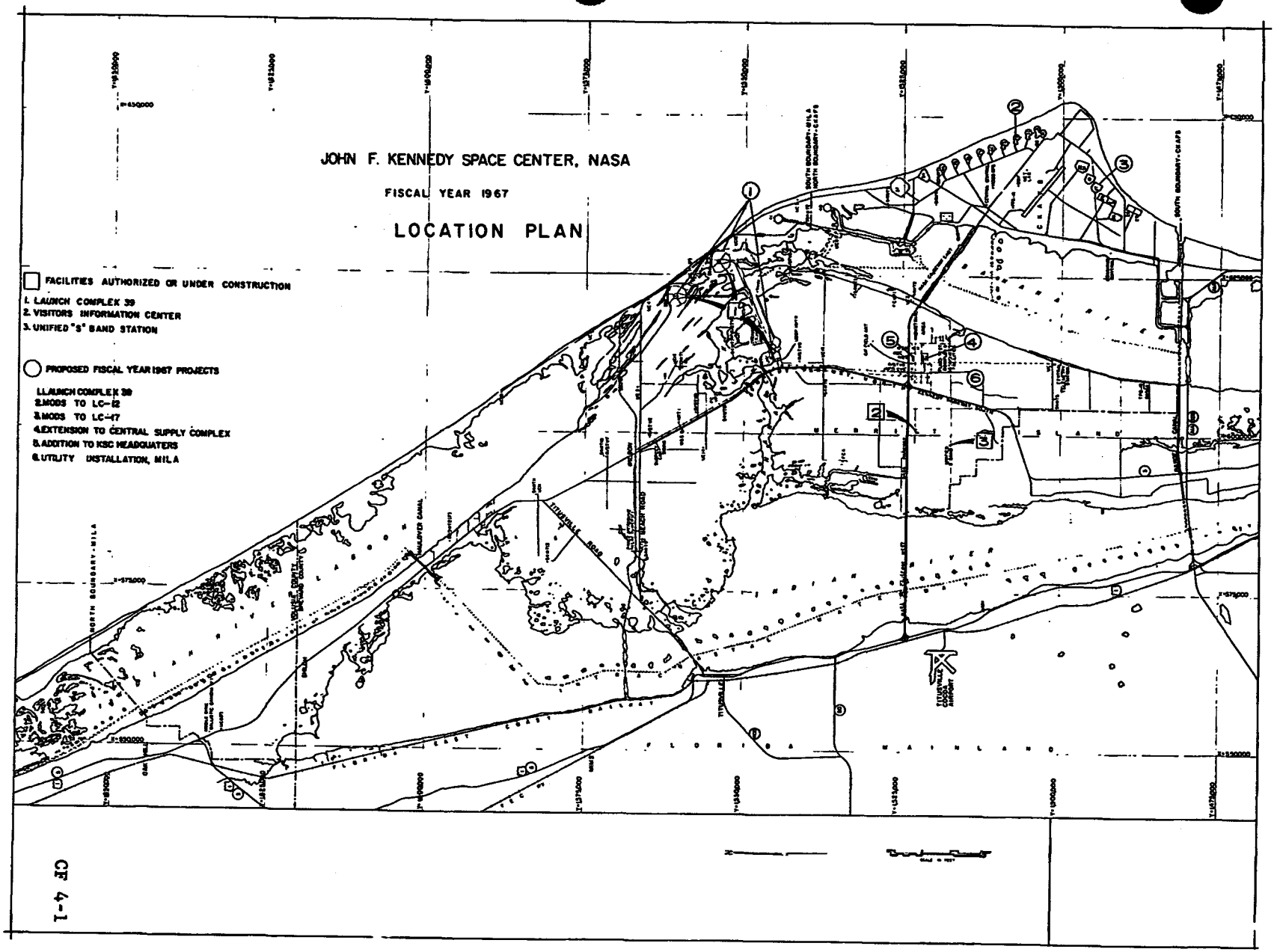

JET PROPULSION LABORATORY
FISCAL YEAR 1967 ESTIMATES
UTILITIES
FY-67
SCALE 1" = 100'
100 0 100 200 300 400 500
PROPERTY LINE
243
REMOTE ANTENNA
RANGE CONTROL
IMPEDANCE
PLATFORM
208
HIGH GAIN
ANTENNA
205
211
MAGNETOMETER
MESA ROAD EXTENSION
PROPERTY LINE
251
GYRO LABORATORY
SPACE SIMULATOR COMPLEX
10' SIMULATOR
25' SIMULATOR
SUB. STA. F
150
248
ROAD "G"

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

JOHN F. KENNEDY SPACE CENTER, NASA


JOHN F. KENNEDY SPACE CENTER, NASA
FISCAL YEAR 1967
LOCATION PLAN
FACILITIES AUTHORIZED OR UNDER CONSTRUCTION
1. LAUNCH COMPLEX 39
2. VISITORS INFORMATION CENTER
3. UNIFIED "S" BAND STATION
PROPOSED FISCAL YEAR 1967 PROJECTS
1. LAUNCH COMPLEX 39
2. MODS TO LC-12
3. MODS TO LC-17
4. EXTENSION TO CENTRAL SUPPLY COMPLEX
5. ADDITION TO KSC HEADQUARTERS
6. UTILITY INSTALLATION, MILA
TITUSVILLE
FLORIDA MAINLAND
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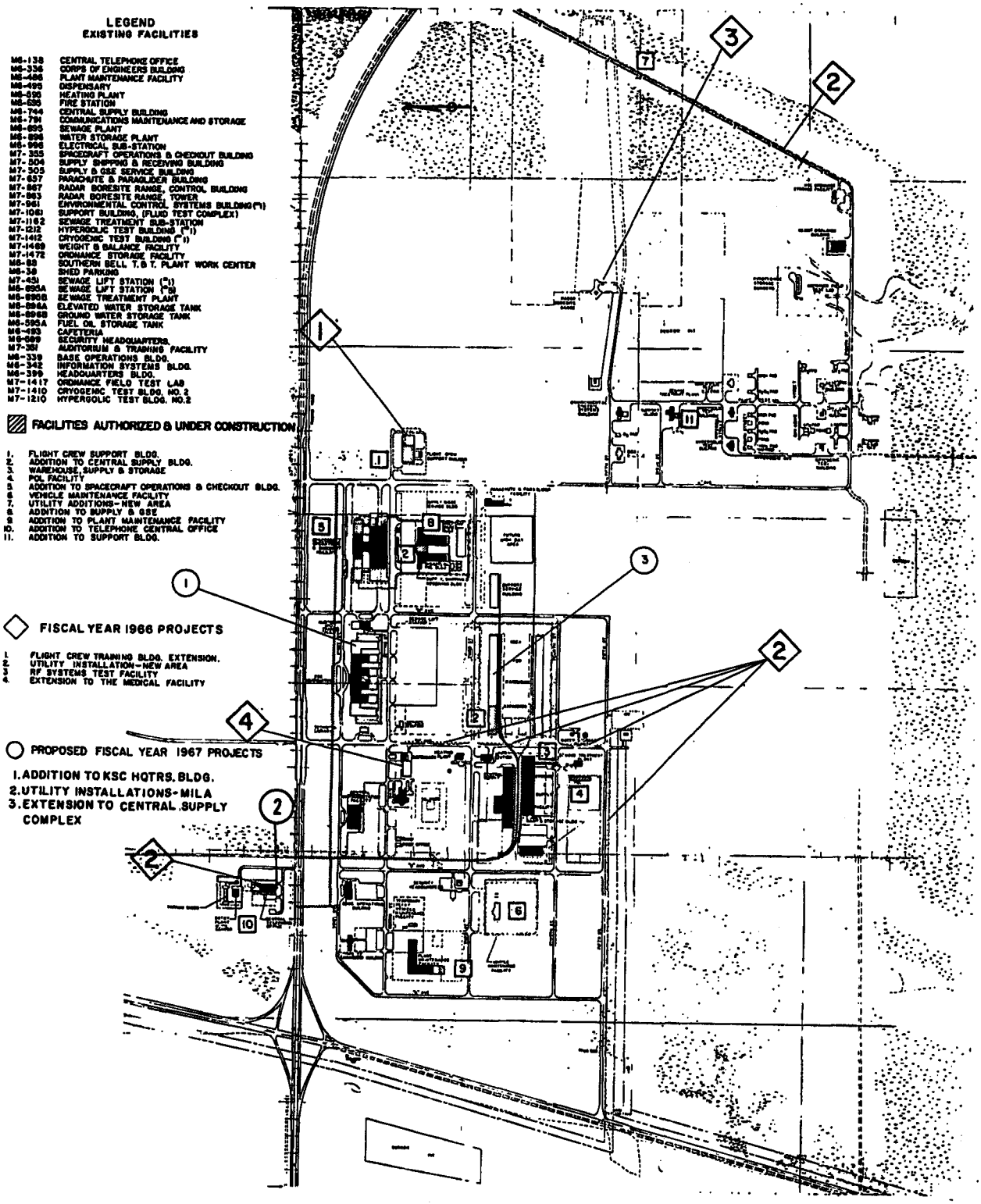
JOHN F. KENNEDY SPACE CENTER

FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
John F. Kennedy Space Center, NASA	Manned Space Flight	Merritt Island, Florida	Brevard	Cocoa Beach

INSTALLATION MISSION

The Center conducts overall planning and supervision of the integration, test, checkout, and launch of NASA space vehicle systems at the Eastern Test Range (ETR) and Merritt Island, and provides support services for all NASA elements located in the area.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	2491	2663	2764
CONTRACTOR AND OTHER PERSONNEL	8192	13847	14535
TOTAL ALL PERSONNEL	10683	16510	17299

LAND	NO. ACRES
NASA-OWNED	84,305
OTHER GOVERNMENT AGENCY-OWNED	121
NON-FEDERAL *(Leases, easements)*	3,351
TOTAL LAND	87,777

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 561,762.0

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1961 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Launch Complex 39	MSF	418,435.9	29,500.0	-	447,935.9
Extension to Central Supply Complex	MSF	5,857.0	600.0	-	6,457.0
Addition to KSC Headquarters Building	MSF	9,097.5	3,500.0	-	12,597.5
Utility Installations - MILA	MSF	179.0	2,897.0	-	3,076.0
Modifications to Launch Complex 17	SSA	1,921.0	740.0	6,000.0	8,661.0
Modifications to Launch Complex 12	SSA	1,283.0	639.0	5,000.0	6,922.0
ALL OTHER PROJECTS		388,359.6			
TOTALS		825,133.0	37,876.0		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

LAUNCH COMPLEX 39

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center, NASA

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center, NASA

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$418,435,867
FY 1967 Estimate	29,500,000
Total Funding Through FY 1967	$447,935,867

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	----
Construction				$14,840,000
Vehicle assembly building	LS	---	$11,450,000	11,450,000
Launch areas and crawlerways	LS	---	3,390,000	3,390,000
Equipment				$14,660,000
Mobile service structure	LS	---	700,000	700,000
Crawler transporters	LS	---	500,000	500,000
Propellant services	LS	---	3,070,000	3,070,000
Communications and TV	LS	---	4,340,000	4,340,000
Firing accessories	LS	---	2,500,000	2,500,000
Instrumentation	LS	---	3,550,000	3,550,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$29,500,000

PROJECT PURPOSE:

To continue the construction of facilities which will be used in direct support of assembly, checkout and launch of the Saturn V space vehicle and Apollo spacecraft.

PROJECT DESCRIPTION:

The project provides for the continuation of construction and activation of Launch Complex 39. The work started in prior years included the basic construction of the Vehicle Assembly Building, Launch Areas, and other facilities, and installation of related equipment and instrumentation. The following items of work will be required:

Vehicle Assembly Building - Fabrication and erection of work platforms, as well as complete outfitting of the building. Activation work will be accomplished which involves adjustments to, relocation of, and modifications to utilities, structures and equipment.

Launch Areas - Installation of redundant power and mechanical systems. In addition, activation work will be accomplished in such areas as the Pad Terminal Connecting Rooms and Environmental Control System Rooms. This consists of mechanical and electrical service extensions in support of vehicle and spacecraft ground support equipment.

Mobile Service Structure - Outfitting of the structure with piping and piping connections to service the Lunar Excursion Module (LEM).

Crawler-Transporter - Complete outfitting of the crawler, and incorporate modifications resulting from the testing program. This includes adjustments to the steering, braking and drive systems.

Propellant Services - Installation of propellant systems equipment in the launch control center and the launch area in accordance with current program requirements. Launch Control Center requirements include the installation of electric panels, a propellant tanking computer system and a digital events evaluator. At the launch areas propellant lines, pumps, valves and related connections will be installed.

Communications - Installation of communications and instrumentation networks to support current program requirements. Included are modifications to the paging system which augment the complex warning system, additions to the operational intercommunications system, and extension of the instrumentation network to include the ground measuring system.

Firing Accessories - Fabrication, installation, checkout and refurbishment after testing of the swing arms which will be mounted on the Launcher Umbilical Towers.

Instrumentation - Procurement, installation and interconnection of measurement recording systems between the Launch Control Center and the High Bay area. These systems will record vehicle measurements such as vibration, acoustics, meteorological data and radio frequency checkout.

PROJECT JUSTIFICATION:

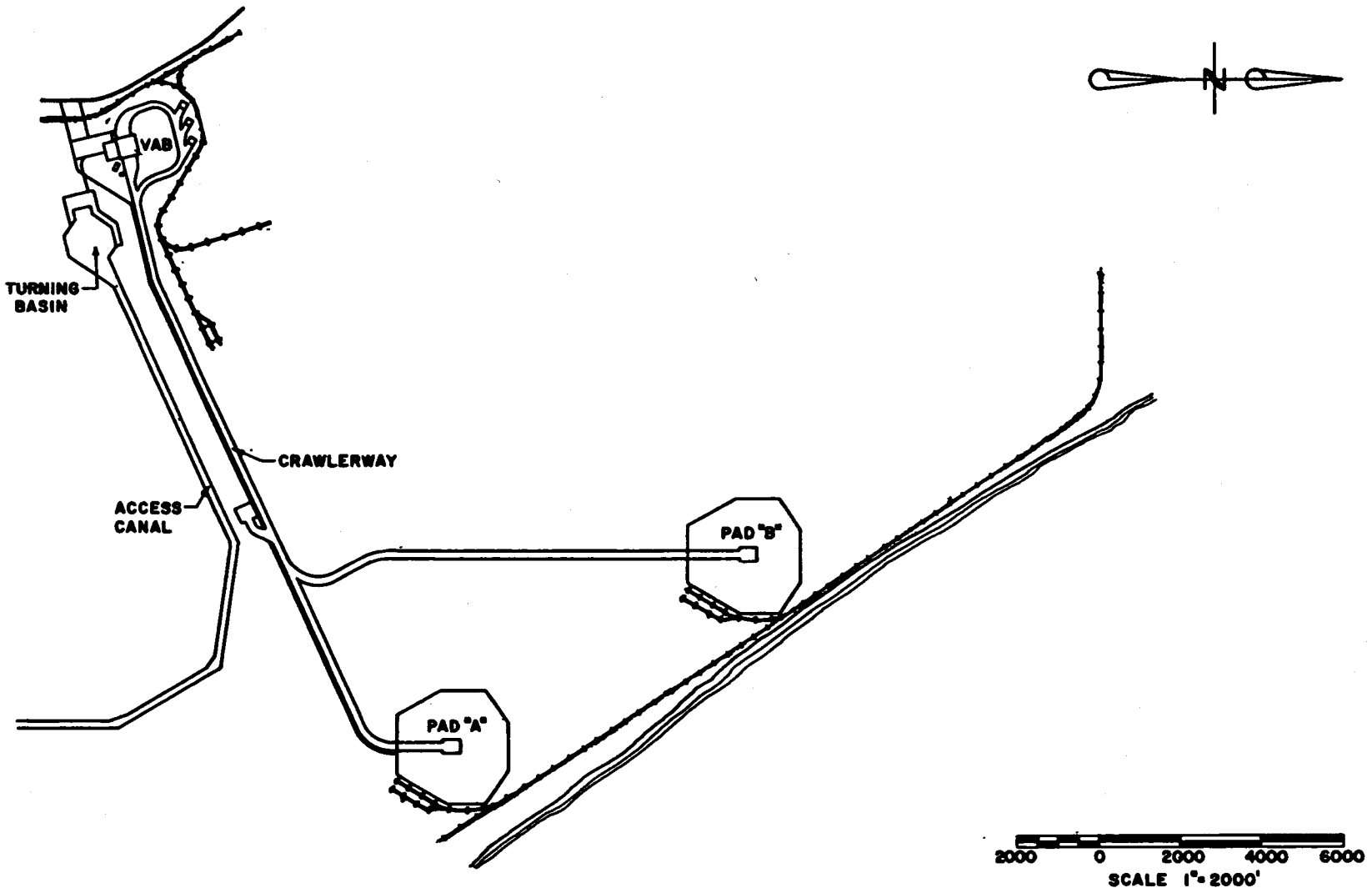
This project will continue the construction and outfitting of all elements of the complex necessary for assembly, checkout and launch of the Apollo/Saturn V space vehicle. It will also permit adaptation of all facilities and ground service equipment to the final configuration of the launch vehicle and spacecraft. This will require adjustments, relocations and modifications to utilities, structures and equipment.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: It is estimated that $5-10 million will be required on a yearly basis to meet technical modifications dictated by specific test requirements.

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1967 ESTIMATES

LAUNCH COMPLEX NO. 39



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

EXTENSION TO CENTRAL SUPPLY COMPLEX

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center, NASA

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center, NASA

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$5,857,000
FY 1967 Estimate	600,000
Total Funding Through FY 1967	$6,457,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$532,000
Utilities	LS	---	$34,000	34,000
Building	Sq. Ft.	50,520	9.86	498,000
Equipment				68,000
Bins, racks, etc.	LS	---	68,000	68,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$600,000

PROJECT PURPOSE:

This project will provide for construction of additional storage space phased to meet the requirements of the current program at the Kennedy Space Center.

PROJECT DESCRIPTION:

The project will provide an extension to existing storage facilities. Construction features will include a concrete frame structure with masonry curtain walls, and a steel frame roof similar to existing warehouse facilities. The structure will provide 50,520 square feet of enclosed storage area. Essential utilities will be included.

PROJECT JUSTIFICATION:

An addition to the Kennedy Space Center Supply Complex is required to keep pace with increases in Center population and contractor activities. Approximately 417,000 square feet will be required by the end of Calendar Year 1967 whereas only 366,374 square feet will be available.

Warehouse space currently available for the Kennedy Space Center is as follows:

Merritt Island Launch Area	309,140 square feet
Cape Kennedy	42,234 square feet
Vacated Residential Structures	15,000 square feet
	366,374 square feet

All existing space is being used to capacity for the storage of common use items and in support of launch contractors (spare parts for facilities, stage, and spacecraft hardware). The Center is currently utilizing all Air Force storage facilities on the Cape that are not presently required by the Air Force. Several of these buildings are converted hangars and temporary structures. In addition, approximately 15,000 square feet of former residences have been converted to storage. These former dwellings, which were acquired as part of the Merritt Island Land Purchase, are highly unsatisfactory since maintenance costs are excessive, security problems are severe, and the scattered nature of these buildings give rise to an inefficient operation.

Requirements for storage space were based upon an analysis of similar operations by the Air Force, and inputs by stage, spacecraft and support contractors. From these studies the following "Indicators" were developed which established the magnitude of warehouse space required.

The number of line items requiring storage will increase from 26,000 to 70,000

The volume of material to be handled will increase from 1,270 tons per month to an estimated 2,000 tons per month

The Center population to be supported will increase from 10,000 to 17,000

A direct extrapolation of the "Indicators" leads to the conclusion that warehouse space requirements must be doubled. However, by "second-decking" of supply bins, by reducing inventories through more frequent reordering of common supply items, and through the use of exterior storage whenever possible, the deficiency has been reduced to approximately 50,000 square feet by the end of 1967. The 42,000 square feet of space available in Air Force Cape storage facilities as well as the 15,000 square feet of former residences will be utilized for slow moving storage even with the construction of the proposed extension.

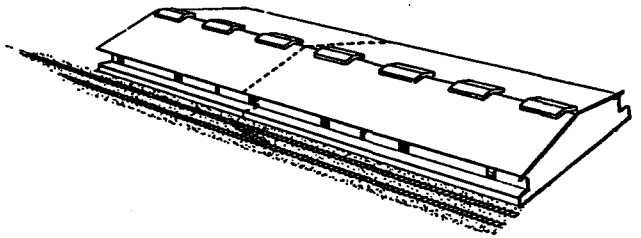
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

Additional space requirements will be dependent on the scope of future years' programs.

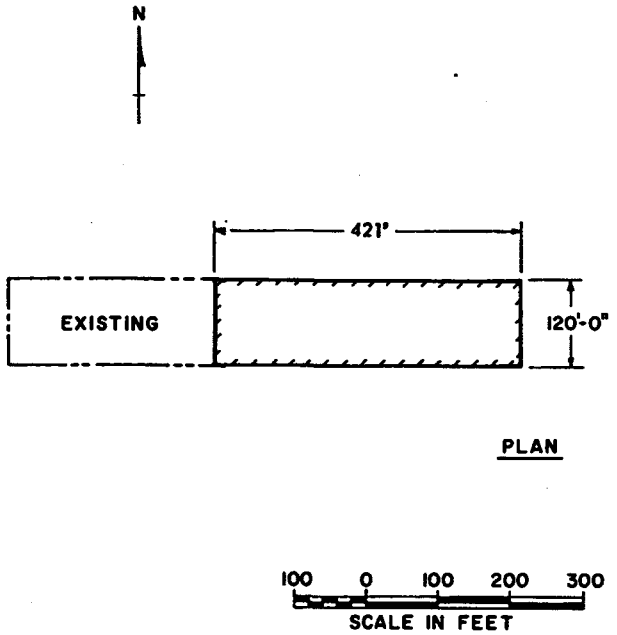
JOHN F. KENNEDY SPACE CENTER, NASA

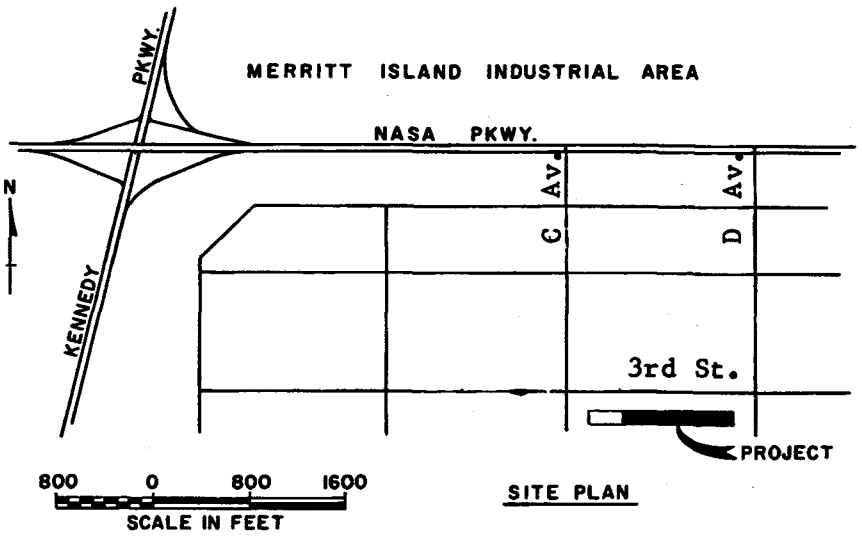
FISCAL YEAR 1967 ESTIMATES

EXTENSION TO CENTRAL SUPPLY COMPLEX



PERSPECTIVE





CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

ADDITION TO KSC HEADQUARTERS BUILDING

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center, NASA

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center, NASA

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$9,097,524
FY 1967 Estimate	3,500,000
Total Funding Through FY 1967	$12,597,524

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$3,330,000
Site Preparation	LS	---	$72,000	72,000
Utilities	LS	---	221,000	221,000
Building	Sq. Ft.	116,000	26.18	3,037,000
Equipment				$150,000
Communications	LS	---	70,000	70,000
Office equipment	LS	---	80,000	80,000
Design	---	---	---	---
		Subtotal		$3,480,000
Fallout Shelter	---	---	---	20,000
		TOTAL		$3,500,000

PROJECT PURPOSE:

This project will provide 116,000 square feet of engineering and administrative type space which will alleviate a personnel housing problem resulting from an increase in personnel through the Fiscal Year 1967-68 time period.

PROJECT DESCRIPTION:

Approximately 116,000 gross square feet (87,000 net square feet) of engineering and administrative space at the Kennedy Space Center will be constructed as additions to the Kennedy Space Center Headquarters Building. These additions will house 988 personnel. Two wings, each two stories in height, will be constructed with reinforced concrete frame and masonry curtain walls. All interior and exterior utilities, access roads and parking facilities are also included.

PROJECT JUSTIFICATION:

By the end of Calendar Year 1967 the need for engineering and administrative type space at the Kennedy Space Center will assume critical proportions. Currently, a total of 7,123 personnel require administrative type space at the Center. However, during Fiscal Year 1967, the need for such space will increase to 11,473 personnel. Facilities currently in existence, under construction, or programmed will provide space for only 7,271 personnel. Thus, a deficiency of 4,202 spaces will exist during this time period.

The population factors outlined above were developed through an evaluation of ceilings for NASA personnel, while contractor personnel needs were based on negotiated contracts, and/or known resources ceilings for the time period. The following is a listing of NASA and contractor personnel who will require space, as well as the basis for estimate:

Organization	Administrative Space Requirements	Basis for Estimate
NASA	2,091	Established ceilings
Other Government	106	Agency projections
Support Contractors	5,102	Negotiated contracts
Stage Contractors	4,174	Negotiated contracts, or forecasts based on contracts currently under negotiation.
Total	11,473	

In order to alleviate the deficiency of 4,202 spaces, the following alternative courses of action have been considered:

Construct a new facility to provide space for 988 personnel resulting in an overall Center factor of 89 square feet per person. Since this

factor is far below accepted standards, it will be necesary to overcrowd all permanent facilities, and continue maximum use of trailers and substandard structures. This is considered to be the most effective and economical alternative.

Lease 116,000 square feet of commercial space. The annual cost (at $4.50 per square foot) will be $522,000. Since the cost of a new building can be amortized in about seven years, this is not considered to be an economical alternative.

Purchase additional trailers. The Center, by the end of 1967, will have in operation a total of 96,000 square feet of trailer space. If the proposed building addition is not constructed, an equivalent amount of trailer space (116,000 SF) must be purchased. This will require about 290 additional trailers having a useful life of eight years, at a total cost of $1,595,000. Installation costs will amount to $87,000. Since trailers are basically an ineffective and inefficient method for housing a permanent complement, this too is not considered to be an economical or effective alternative.

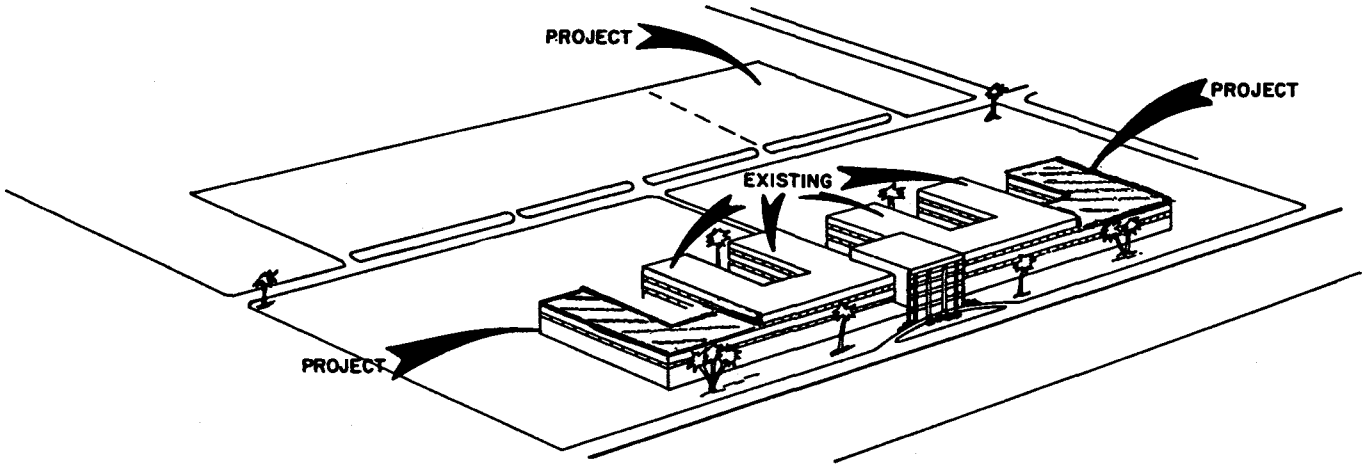
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

Any additional construction will be requested on a phased basis to provide for deficiencies as they occur in the future.

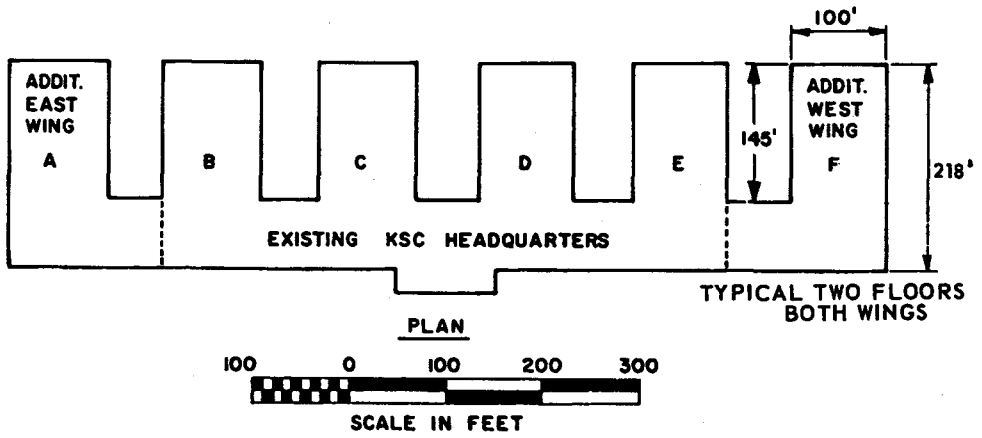
JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1967 ESTIMATES

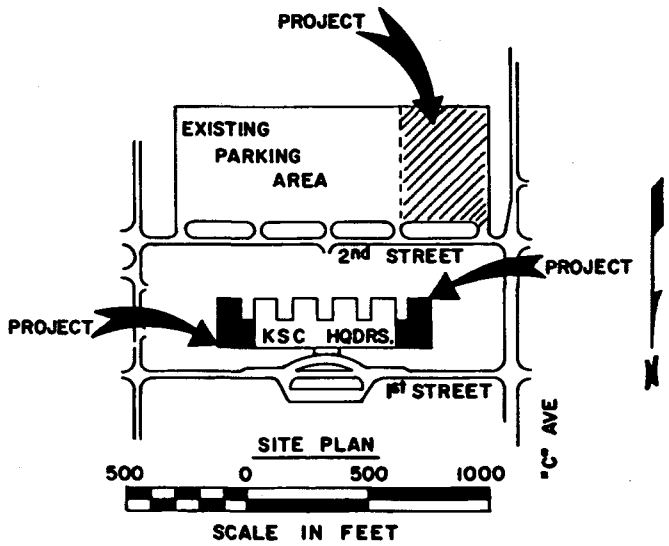
ADDITION TO KSC HEADQUARTERS BLDG.



PERSPECTIVE



PLAN



SITE PLAN

CF 4-15'

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

UTILITY INSTALLATIONS - MILA

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center, NASA

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center, NASA

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$179,000
FY 1967 Estimate	2,897,000
Total Funding Through FY 1967	$3,076,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,281,000
Electrical system extensions				1,199,000
13.2 KV distribution line	LF	(31,700)	($10.63)	(337,000)
69 KV circuit breakers	LS	---	(703,000)	(703,000)
Supervisory system and fault indicators	LS	---	(159,000)	(159,000)
Addition to central telephone office				82,000
Utilities	LS	---	(17,000)	(17,000)
Building	Sq. Ft.	(2,000)	(32.50)	(65,000)
Equipment				$1,616,000
Wideband channelizing	LS	---	621,000	621,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Testing and switching center				995,000
Wideband data and video	LS	---	(458,000)	(458,000)
Timing distribution	LS	---	(3,000)	(3,000)
Voice and voiceband data	LS	---	(397,000)	(397,000)
Recording	LS	---	(72,000)	(72,000)
Administrative telephone	LS	---	(15,000)	(15,000)
Teletype and fascimile	LS	---	(50,000)	(50,000)
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,897,000

PROJECT PURPOSE:

This project will provide the necessary additions to existing electrical distribution and communications systems consistent with the development of the John F. Kennedy Space Center, NASA.

PROJECT DESCRIPTION:

Electric Power - additions to the electrical system will include:

Tie-lines in the 13.2 Kilovolt (KV) distribution system between (a) the Fluid Test Area and the Central Telemetry Facility, and (b) the Frequency Control and Analysis Building and the Unified "S" Band Facility.

The installation of oil circuit breakers on the primary side of the industrial and instrumentation transformers in the Launch Complex 39 and the Merritt Island Industrial Area substations.

A supervisory control system and fault indicator devices on the existing 13.2 KV distribution system.

Communications - the expansion of the base communication system consists of:

Installation of wideband channelization equipment for multiplexing (dividing into more than one channel) 40 existing cable lines between Merritt Island and Cape Kennedy into two data channels each.

Construction of an addition to the existing Central Telephone Office, containing approximately 2,000 square feet.

Procurement and installation of Test and Switching Center equipment which consists of additional and/or enlarged audio, video and wideband monitoring, test, patching and switching equipment to be located at the Central Telephone Office. The equipment will be used for monitoring, testing, switching and recording of wideband data, voice band data, administrative telephone, teletype, facsimile and television circuits and displaying the status of all circuits in operation. The test and switching center consolidates test and switching capabilities, provides a central point for reporting trouble, insures that circuit criteria are met, and establishes responsibility for circuit control for all launch critical circuits.

PROJECT JUSTIFICATION:

The expansion of the utility systems is required to meet the orderly development of the Merritt Island Launch Area.

Electric Power:

The tie-lines from the Fluid Test Area to the Central Telemetry Facility, and from the Frequency Control and Analysis Building to the "S" Band Facility are necessary to provide a loop which will prevent interruption of operations if a power outage should occur in any single power line supplying these facilities. This will eliminate a possible loss of data due to power failure in a launch critical facility. A loss of power in either the Central Telemetry Facility, Frequency Control and Analysis Facility, or the "S" Band Facility would require a hold on any launch operation from the Kennedy Space Center.

Oil circuit breakers must be installed as protective devices on the primary side of the transformers. The equipment will restrict the trouble to the particular transformer circuit concerned. It will preclude voltage fluctuations on the other circuits in the systems and assure constant instrumentation power for better reliability.

The supervisory control system and fault indicators are required to provide a fast and efficient method for location and isolation of faults and outages in the electrical distribution system. These outages must be identified and repaired as early as possible to reduce the effects on launch critical facilities.

Communications:

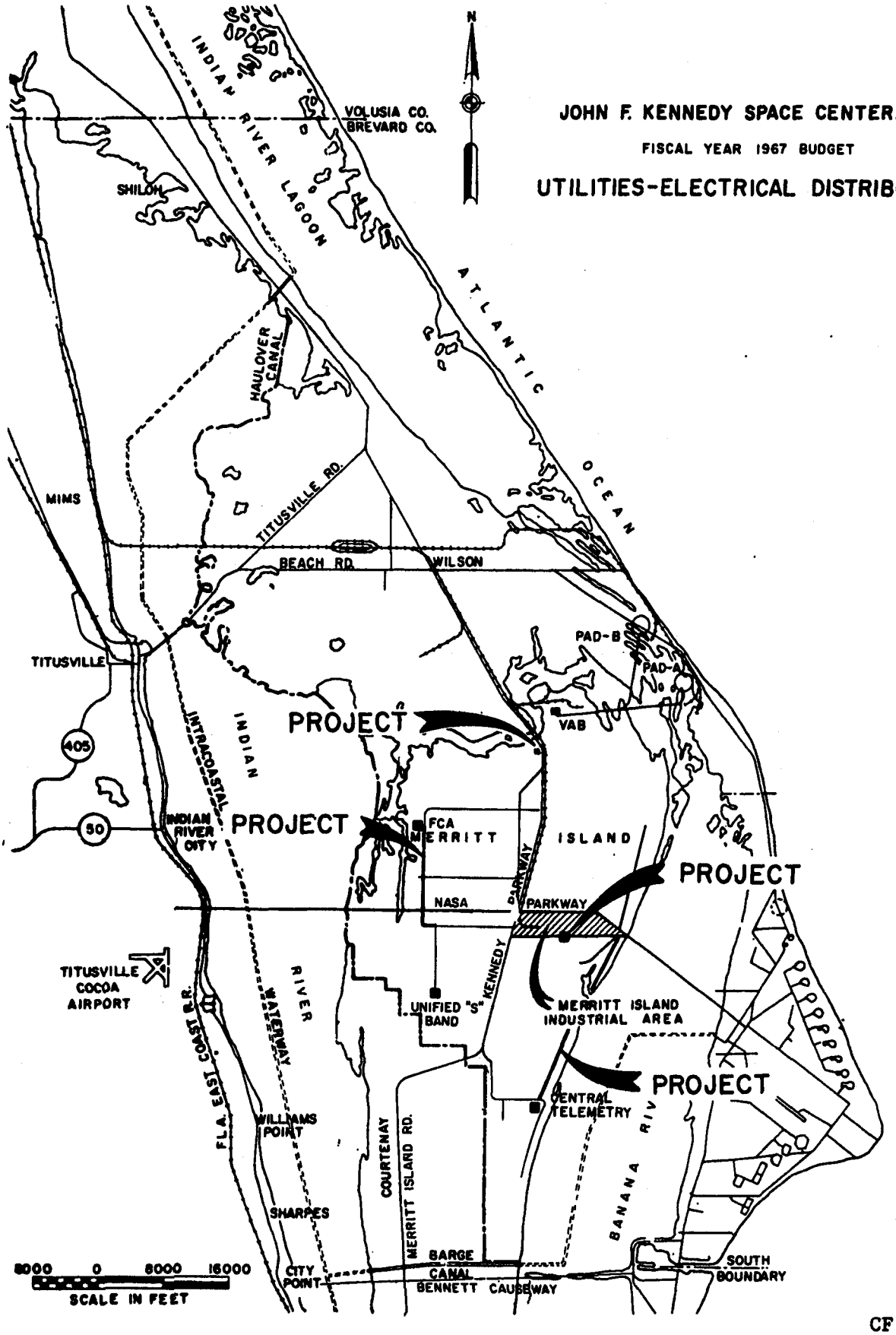
The wideband channelization system is necessary to increase the transmission capability to meet increased requirements for wideband data

and television circuits without the more costly installation of additional lines. Without this system or the installation of additional lines, adequate wideband circuits between the Central Telephone Office and the launch facilities at Cape Kennedy will not be available to support current launch programs. Certain simultaneous operations, such as spacecraft checkout, simulated count down, and launch from various complexes, cannot be performed.

The addition to the Central Telephone Office is necessary to house the Test and Switching Center equipment.

The installation of the test and switching equipment in a central location eliminates confusion and duplication in reporting and clearing trouble by manual means, permits maximum circuit flexibility, and establishes a single point of responsibility. This comprehensive knowledge of operational circuits is dictated by the quick response, approximately fifteen minutes, which is demanded in restoring a communications outage during prelaunch and launch operations.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: This project will provide the necessary utilities required for the facilities to be constructed in the FY 67 time frame. Additional utilities will be required to support future facilities.

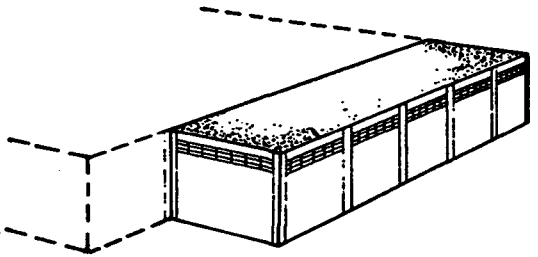

JOHN F. KENNEDY SPACE CENTER, NASA
FISCAL YEAR 1967 BUDGET
UTILITIES-ELECTRICAL DISTRIBUTION
N
VOLUSIA CO.
BREVARD CO.
INDIAN RIVER LAGOON
SHILOH
HAULOVER CANAL
ATLANTIC OCEAN
MIMS
TITUSVILLE RD.
BEACH RD.
WILSON
TITUSVILLE
PAD-B
PAD-A
VAB
PROJECT
405
50
INTRACOASTAL
INDIAN
INDIAN RIVER CITY
PROJECT
FCA
MERRITT
ISLAND
PROJECT
NASA
PARKWAY
PARKWAY
TITUSVILLE COCOA AIRPORT
UNIFIED "S" BAND
KENNEDY
MERRITT ISLAND INDUSTRIAL AREA
PROJECT
CENTRAL TELEMETRY
WATERWAY
RIVER
FLA. EAST COAST R.R.
WILLIAMS POINT
COURTENAY
MERRITT ISLAND RD.
BANANA RIV
SHARPES
BARGE CANAL
BENNETT CAUSEWAY
CITY POINT
SOUTH BOUNDARY
8000 0 8000 16000
SCALE IN FEET

JOHN F. KENNEDY SPACE CENTER, NASA

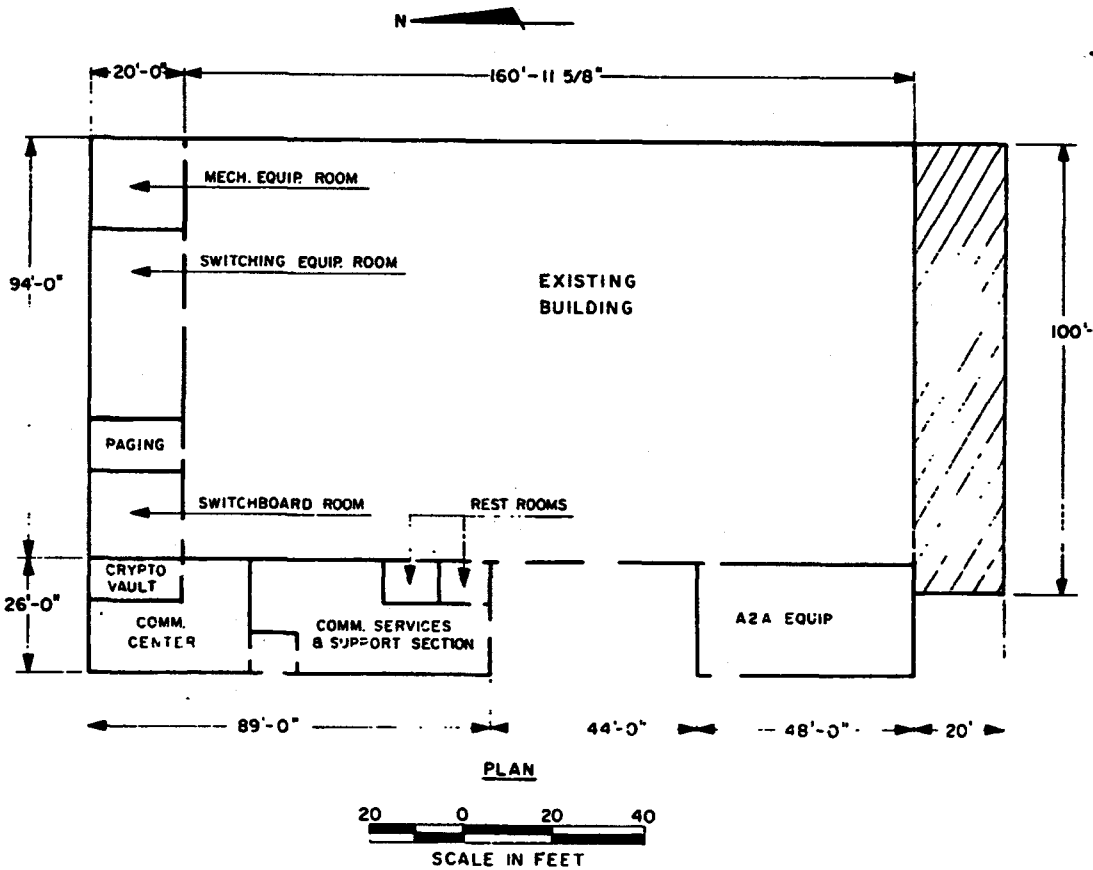
FISCAL YEAR 1967 ESTIMATES

UTILITY INSTALLATIONS - MILA

(ADDITION TO CENTRAL TELEPHONE OFFICE)



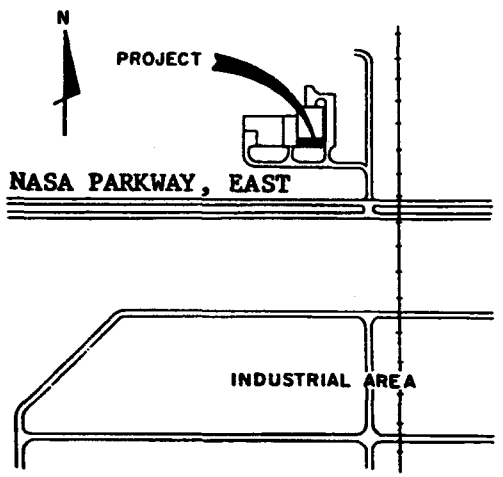
PERSPECTIVE



PLAN

20 0 20 40

SCALE IN FEET



SITE PLAN

400 0 400 800

SCALE IN FEET

CF 4-21

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

MODIFICATIONS TO LAUNCH COMPLEX 17

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Cape Kennedy, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center

TYPE OF CONSTRUCTION PROJECT: Alteration

FUNDING:

FY 1966 and Prior Years	$1,921,000
FY 1967 Estimate	740,000
Total Funding Through FY 1967	$2,661,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$235,000
Blockhouse modifications	LS	---	$135,000	135,000
Guided platform hoist	Each	2	50,000	100,000
Equipment				$505,000
Long-line cable replacement	LS	---	315,000	315,000
Pneumatic consoles replacement	LS	---	190,000	190,000
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$740,000

PROJECT PURPOSE:

To upgrade the present launch complex to provide the continuing support necessary for the multi-stage Delta Launch Vehicle and spacecraft.

PROJECT DESCRIPTION:

The Blockhouse will be structurally modified to be completely blast-resistant in accordance with Air Force Eastern Test Range requirements. The effective usable floor space during a launch operation will be increased by 650 square feet, to a 2,700 square foot area. The dividing wall in the central operations area will be removed to allow non-restrictive viewing in this area. Ground Support Equipment will be arranged for better and more effective space utilization.

The long-line instrumentation, power and control cables routed between the Blockhouse terminal board and the launcher terminal board at each of the two pads will be replaced with molded moisture-resistant multiconductor cables.

The four pneumatic consoles located near the base of each of the launchers and numerous secondary panels on the vehicle service towers will be replaced by one central console at each launch pad for the operational control of all nitrogen and helium purging, pressurization and checkout of the attitude control systems. These central consoles will be weatherproofed and equipped with controls that may be operated remotely from the Blockhouse.

One guided platform hoist, to operate between the ground and tenth level, will be attached to the exterior of each of the two launch vehicle service towers. The hoists will be used to lift spacecraft and support equipment to the upper platform levels.

PROJECT JUSTIFICATION:

Launch Complex 17 at Cape Kennedy was constructed in 1957 for the THOR missile program. The service structures have been modified by the Air Force and NASA to accommodate various upper stage and spacecraft configurations since the first application of the THOR booster to space mission use in 1959. To date 102 launchings have been conducted from this complex. Present and future spacecraft missions including communications satellites, weather satellites, Explorers, Pioneer, Orbiting Solar Observatories, Biosatellites, and other scientific and applications spacecraft will require continued usage of this complex for at least a minimum of seven years with an annual launch rate of ten to twelve missions.

The requirements for additional instrumentation equipment and associate operating personnel make it mandatory that the blast-resistant area of the blockhouse be expanded to meet launch and hazardous operation requirements. Removal of the dividing wall and rearrangement of the Ground Support Equipment will allow maximum operational flexibility.

Most of the long line cables between the blockhouse and the launch pad were installed in 1958. Prolonged exposure to the atmosphere, constant usage and blast damage effects have caused deterioration to such an extent that leakage resistance is at an unacceptable low level. Further, numerous splices and repairs have made the long line cables unreliable for critical circuits. If the reliability of the instrumentation circuitry is to be maintained, it is mandatory that the long line cables be replaced.

Existing pneumatic consoles have been in service since 1958 and are badly worn and corroded. These consoles, which play a major functional role in checkout and launch of the Delta Vehicle, have had an abnormally high rate of forty to fifty failures per year. The installation of a single console on each launch pad will provide a central unit of much higher reliability, eliminating associated panels located on the vehicle service towers and thereby reducing the present complement of operating personnel.

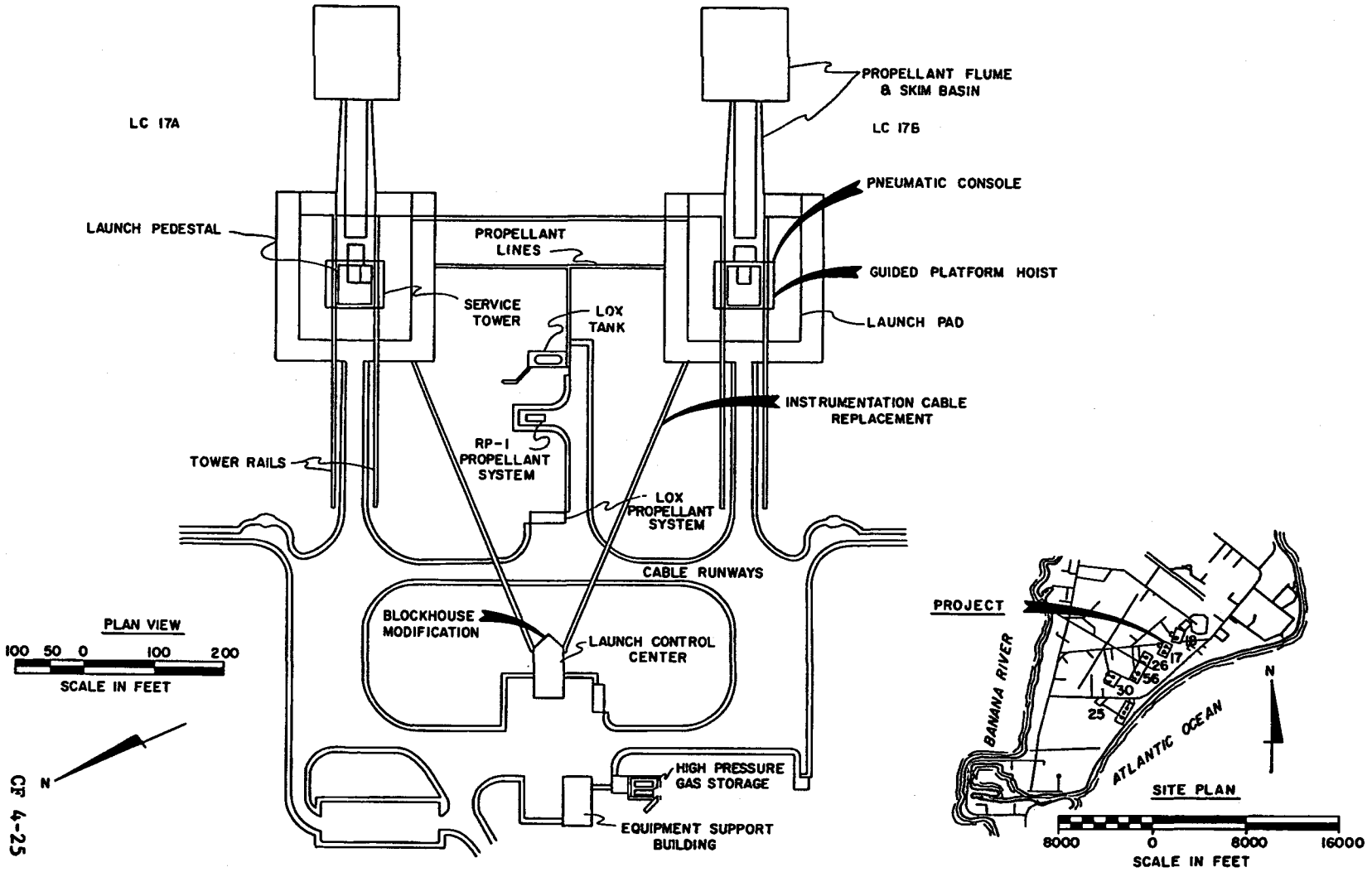
The present hoist system on the launch vehicle service towers is primarily a free fall system reatricted by hand-operated guide lines. This system does not provide a positive means to control the motion of equipment which is in transit; the equipment is subject to damage from striking against the tower. This hoist system can not be operated under wind conditions in excess of 15 knots. The proposed hoist system will be operable under much greater winds and will provide a controlled mode for hoisting equipment and spacecraft to the various platform levels. Greater safety to spacecraft and equipment components will be provided.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: $6,000,000

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1967 ESTIMATES

MODIFICATIONS TO LAUNCH COMPLEX NO. 17



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

MODIFICATIONS TO LAUNCH COMPLEX 12

AUTHORIZATION LINE ITEM: John F. Kennedy Space Center

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Cape Kennedy, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center

TYPE OF CONSTRUCTION PROJECT: Alteration

FUNDING:

FY 1966 and Prior Years	$1,283,000
FY 1967 Estimate	639,000
Total Funding Through FY 1967	$1,922,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$220,000
Blockhouse modifications	LS	---	$143,285	143,285
Vehicle and transfer room air-conditioning	LS	---	76,715	76,715
Equipment				$419,000
Operational communication	LS	---	11,345	11,345
Operational television	LS	---	90,000	90,000
Long-line cable replacement	LS	---	317,655	317,655
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$639,000

PROJECT PURPOSE:

This project will provide needed improvements to the launch complex for the multi-stage Atlas Agena Launch Vehicle and Spacecraft.

PROJECT DESCRIPTION:

In the Blockhouse Area, the interior will be modified to permit the relocation and rearrangement of ground support equipment (GSE) within the control areas; the observation area will be enlarged for complete separation from the mission operating area; and, an emergency source of air will be installed.

At the Launch Pad, the existing air-conditioning units supporting the launch vehicle airborne electronic pod cooling system, the transfer room, and the instrumentation compressor, brine chiller, heat exchanger, and condenser unit which make up the launch vehicle airborne electronic pod cooling system are to be replaced with a self-contained, weatherproof, corrosion resistant unit. The existing marginal capacity 15 ton and 10 ton air-conditioning units now used in the transfer and instrumentation rooms are to be replaced with modern and efficient package units. These units will be designed to meet the required demands and will utilize existing duct work.

The existing Operational Television System consisting of four cameras and four monitors is to be supplemented to provide a more efficient system consisting of:

Seven television camera installations with pan, tilt and zoomer system capabilities to be located at the present camera mounts; and north of the LO_2 Storage Area and at the spacecraft levels on the Umbilical Tower and on the Launch Service Tower.

Seven 21-inch monitors located in the blockhouse.
A central control console in the blockhouse.
Associate interconnecting cables.

Existing intercommunication stations are to be modified by the addition of an off on switch plus connecting cables to include the capability of side tone transmission.

The existing long-line instrumentation, power, and control cables between the terminal boards in the blockhouse and the terminal board at the launch pad are to be removed and replaced with molded, moisture-resistant, multi-conductor cables. One hundred fifty cables will be involved.

PROJECT JUSTIFICATION:

Launch Complex 12, constructed in 1957 to support the Air Force development of the single-stage Atlas Weapons system, has undergone extensive modifications as the multi-stage Atlas Agena vehicle developed. The following modifications are needed to provide continuing support.

The proposed observation area, while permitting better viewing, will restrict the movement of personnel and limit interference with launch operations.

The present control system was designed for operational modes connected with the Atlas weapons system with additional consoles and equipment to support increasing operational requirements located in any available space in the control area. The advance of the Atlas Agena programs makes it necessary that the existing equipment be relocated to permit maximum utilization of space and increased efficiency during launch operations.

The installation of a more reliable emergency air system in the blockhouse is part of a plan for preparedness in the event of a disaster. No method is available to predict the maximum duration of a possible disaster. At present, emergency air is provided by portable air packs, which have a limited capacity and are considered inadequate. The proposed system will insure that a source of air will be available for long duration and will provide a means for gauging low capacity due to prolonged use or leaks.

The eight-year-old air-conditioning systems at the launcher have only marginal capacity to meet present system demands. Equipment components have been corroded by atmospheric elements, with annual maintenance costs averaging $15,000 to $20,000. Component obsolescence has made it both difficult and expensive to obtain replacement parts. Installation of the new air-conditioning systems will permit more efficient and economical operations and will fulfill present and projected system requirements.

The present operational television system, designed and installed in 1956, is inadequate to monitor multi-stage Atlas Agena operations and does not provide surveillance of either spacecraft or liquid oxygen loading operations. The proposed system will provide the coverage needed for multi-stage vehicle operations and permit monitoring of spacecraft level operations.

The present intercommunication system permits dual reception, but only single transmission. The console operator now has to leave his main line of communications with the test conductor to transmit with another panel monitor. During the critical countdown period, the possibility of missing a command or report from the test conductor could have a serious effect on a launch. By modifying the present system to permit side-tone transmission, the operators will not have to change stations to transmit.

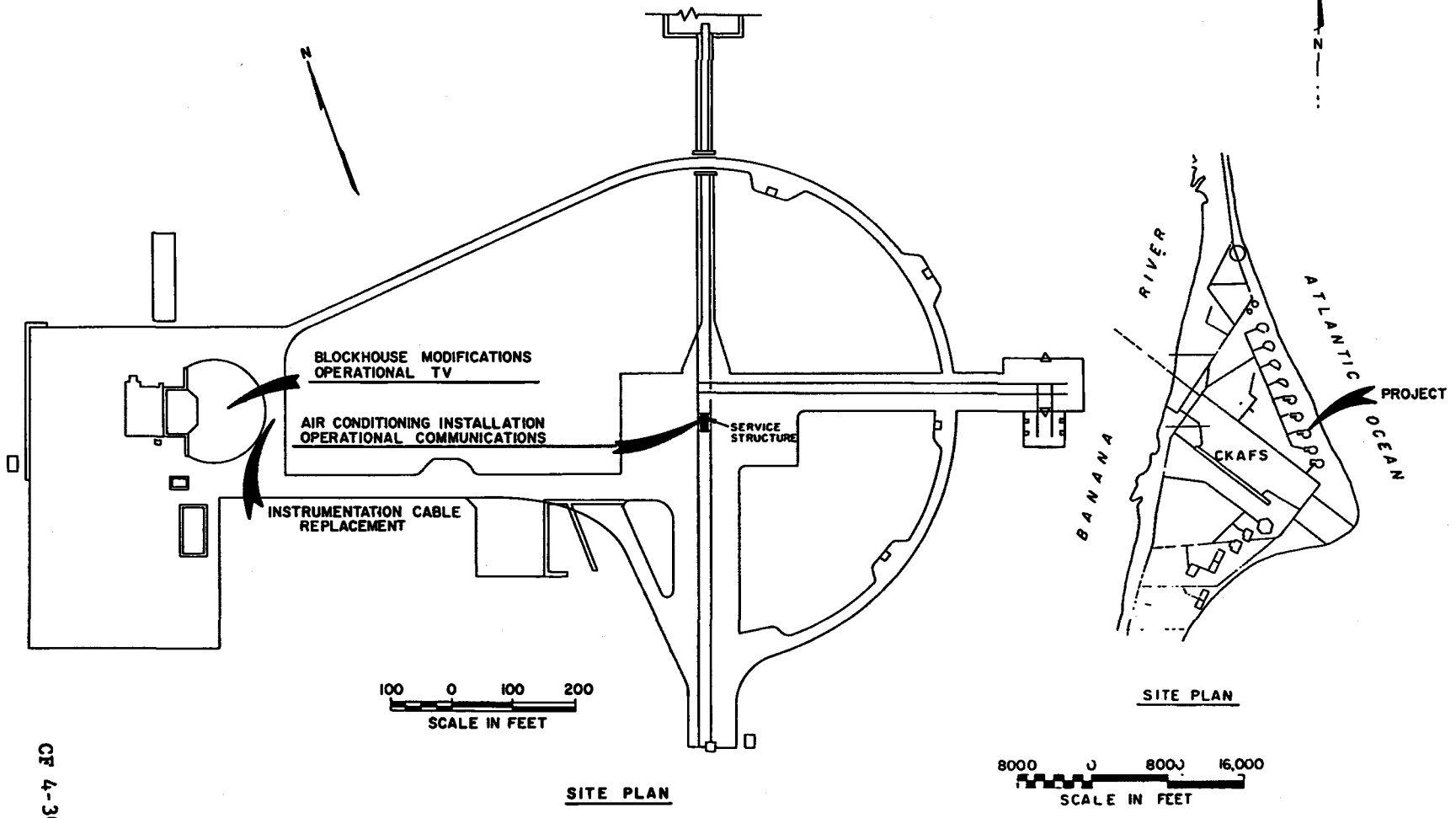
Existing long-line cables were severely damaged by a 1958 pad missile explosion and were made operational by extensive splicing. Leakage resistance, due to atmospheric exposure, insulation deterioration and the numerous splices, has limited the use of the majority of the cables to less reliable instrumentation circuits. Existing cable configurations make it more feasible to replace the entire cable installation. Based on known complex usage and the severe limitations of the present system, a new cable installation to maintain instrumentation reliability is mandatory.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: $5,000,000

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1967 ESTIMATES

MODIFICATIONS TO LAUNCH COMPLEX 12



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

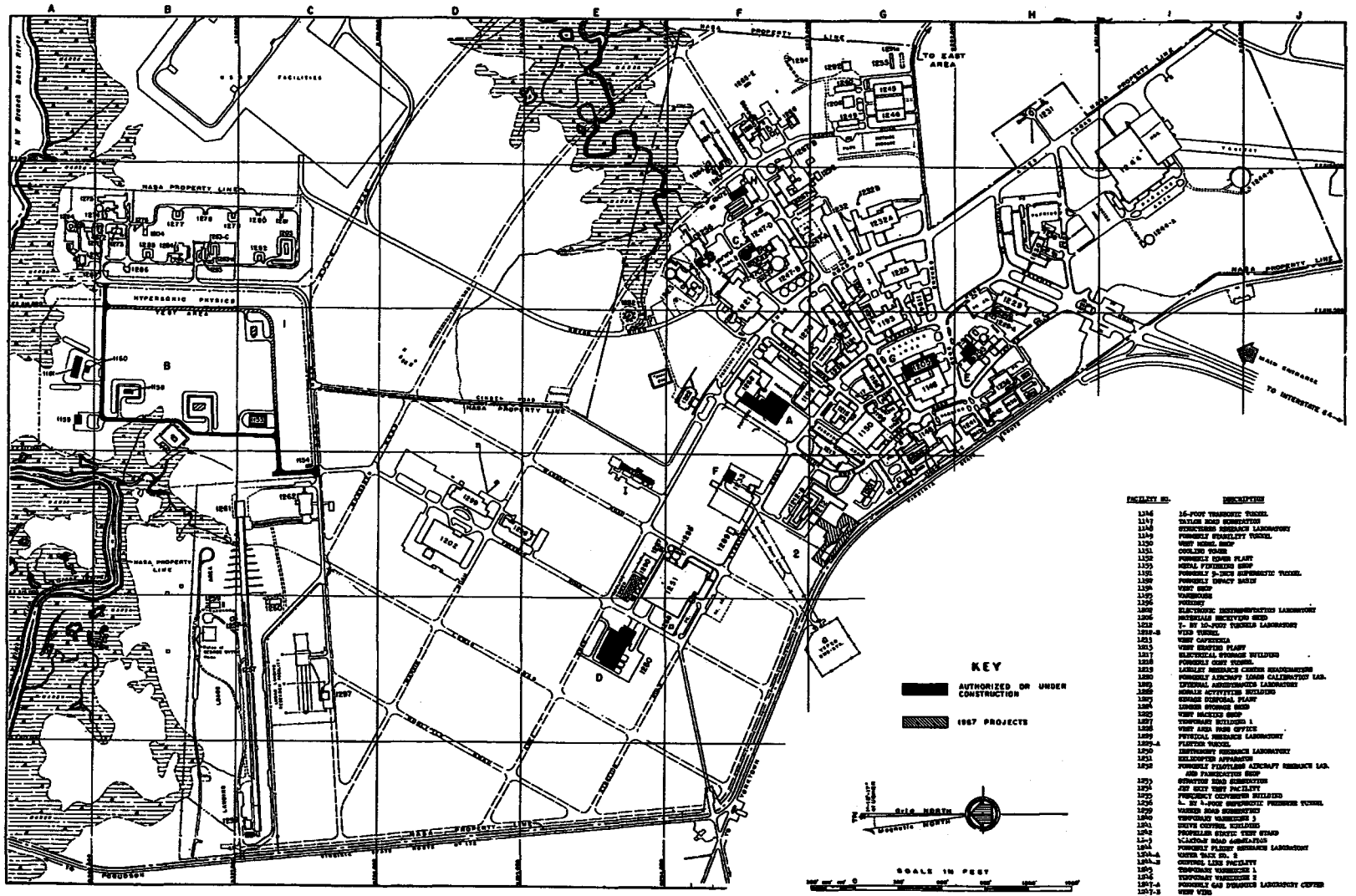
CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

LANGLEY RESEARCH CENTER

LANGLEY RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



PROPOSED FISCAL YEAR 1967 PROJECTS

1. REACTIVE CHEMICAL DISTRIBUTION AREA
2. V/STOL TRANSITION WIND TUNNEL

FACILITY NO.	DESCRIPTION
1146	16-FOOT TRANSONIC TUNNEL
1147	TAYLOR ROAD RECONSTRUCTION
1148	STRUCTURES RESEARCH LABORATORY
1149	FORMERLY STABILITY TUNNEL
1150	WEST SHOP
1151	COOLING TOWER
1152	FORMERLY BOILER PLANT
1153	METAL FINISHING SHOP
1154	FORMERLY 9-INCH SUPERSONIC TUNNEL
1154-1	FORMERLY IMPACT BASIN
1154-2	VENT SHOP
1155	WAREHOUSE
1156	FOSTER TUNNEL
1157	ELECTRONIC INSTRUMENTATION LABORATORY
1158	MATERIALS RESEARCH BLDG.
1159	7- BY 10-FOOT TUNNELS LABORATORY
1159-B	V/STOL TUNNEL
1161	WEST CAFETERIA
1163	WEST HEATING PLANT
1167	ELECTRICAL STORAGE BUILDING
1168	FORMERLY GUST TUNNEL
1169	LANGLEY RESEARCH CENTER HEADQUARTERS
1180	FORMERLY AIRCRAFT LOADS CALIBRATION LAB.
1181	EXPERIMENTAL AERODYNAMICS LABORATORY
1182	MORALE ACTIVITIES BUILDING
1183	GENERAL PURPOSE SHOP
1184	LUMBER STORAGE SHED
1185	WEST MACHINE SHOP
1186	TEMPORARY BUILDING 1
1188	WEST AREA POST OFFICE
1189	PHYSICAL RESEARCH LABORATORY
1190	FLUTTER TUNNEL
1191	INSTRUMENT RESEARCH LABORATORY
1192	ELECTRONIC APPARATUS
1193	FORMERLY FLIGHT-LOADS AIRCRAFT RESEARCH LAB. AND FABRICATION SHOP
1193	STRATTON ROAD CONSTRUCTION
1194	JET EXIT TEST FACILITY
1195	FREQUENCY CONVERSION BUILDING
1196	L- BY 4-FOOT SUPERSONIC PRESSURE TUNNEL
1198	WARNER ROAD RECONSTRUCTION
1199	TEMPORARY WAREHOUSE 3
1201	SOUTH CONTROL BUILDING
1202	PROPELLER STATIC TEST STAND
1203	WILLIAMS ROAD RECONSTRUCTION
1204	FORMERLY FLIGHT RESEARCH LABORATORY
1204-A	WATER TANK NO. 2
1204-B	CENTRAL LIBS FACILITY
1205	TEMPORARY WAREHOUSE 1
1212	TEMPORARY WAREHOUSE 2
1213-A	FORMERLY GAS DYNAMICS LABORATORY CENTER
1213-B	WEST WIND
1213-C	COOLING TOWER
1213-D	EAST WIND
1213-E	CONFERENCE BUILDING
1213-F	ARCH ROAD RECONSTRUCTION
1213-G	HIGH-PRESSURE SPHERE TANK
1214	TEMPORARY WAREHOUSE 5
1251	GUSTAVE PLAN WIND TUNNEL
1252	WATER TANK NO. 1
1254	ARMATURE STORAGE 1

FACILITY NO.	DESCRIPTION
1255	TEMPORARY WAREHOUSE 4
1256	9- BY 6-FOOT THERMAL STRUCTURES TUNNEL
1257	LANGLEY LOADS TRACK
1258	LANGLEY LOADS TRACK CONFERENCE BUILDING
1259	NORTH ARRESTING GEAR HOUSING
1260	SOUTH ARRESTING GEAR HOUSING
1261	LANGLEY LOADS TRACK SHED
1262	HIGH-SPEED AERODYNAMICS OFFICE AND SHOP
1263	CERAMIC-HEATED MACH 20 JET (PILOT MODEL)
1264	HIGH-TEMPERATURE MACH 7 JET (PILOT MODEL)
1265	8-FOOT HIGH-TEMPERATURE STRUCTURES TUNNEL
1266	HAYNES ROAD RECONSTRUCTION
1267	HIGH-TEMPERATURE MATERIALS LABORATORY
1268	DATA REDUCTION BUILDING
1269	GAGE SHED (HYPERSONIC PHYSICS TEST AREA)
1270	ROCKET PROPELLANT TEST UNIT, HPTA
1271	HPTA SHED, HPTA
1272	HEATING PLANT, HPTA
1273	OPERATIONS CENTER, HPTA
1274	CERAMIC-HEATED MACH 15 JET, HPTA
1275	DUNCY AND PROJECTILE TEST UNIT, HPTA
1276	IGNITER ASSEMBLY BUILDING, HPTA
1277	STORAGE A
1278	STORAGE B
1279	STORAGE C
1280	STORAGE D
1281	STORAGE E
1282	STORAGE F
1283	STORAGE G
1284	ROCKET PROPELLANT PROCESSING BUILDING, HPTA
1285	STORAGE H
1286	ROCKET ASSEMBLY AND PROPELLANT ALTERATION BUILDING
1287	TEMPORARY SHED
1288	SMALL SEWAGE COLLECTOR
1289	TEMPORARY STORAGE
1290	GENERATOR
1291	FIRE STATION
1292	FACILITIES MAINTENANCE BUILDING
1293	TERRAZON RESEARCH LABORATORY
1294	ROCKET MOTOR TEST APPARATUS
1295	SHED AND INSTRUMENTATION FOR 60-FOOT SPHERE
1296	SHED BUILDING
1297	LUNAR LANDING RESEARCH FACILITY
1298	VENTILATION AND CARBON MONOXIDE MONITORING
1299	VEHICLE ANTENNA TEST FACILITY AND ADDITION

FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

A	FLIGHT CONTROL RESEARCH FACILITY
B	HYDRAZINE AND TEST AREA FOR HIGHLY REACTIVE CHEMICAL MATERIALS
C	IRCO. CAP. FOR RACK 6 AND 8.5 VESSELS
D	LIFE SUPPORT TECHNOLOGY LABORATORY
E	THERMAL CONTROL SYSTEMS ACS ENLARGED ADDITION FOR DYNAMICS RESEARCH LAB.
F	UTILITY IMPROVEMENTS
G	PHYSICS RESEARCH LABORATORY
H	ADDITION TO CENTRAL HIGH-PRESSURE AIR SUPPLY
I	HOT GAS RADIATION RESEARCH FACILITY

WEST AREA

CF 5-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Langley Research Center	Advanced Research & Technology	Langley AFB	--	Hampton, Virginia

INSTALLATION MISSION The LRC undertakes research to provide a technical base for such missions as: (1) Manned and unmanned exploration of space; (2) Improvement of performance and utility of airborne flight. The Center plans, develops and operates necessary facilities; generates new and advanced concepts; provides research advice and assistance to other branches of the Government; disseminates scientific and technical information; searches for and identifies potential industrial applications involved in the course of research.

PERSONNEL STRENGTH	FY 19	FY 19	FY 19
NASA PERSONNEL *(End of Year)*	4374	4304	4249
CONTRACTOR AND OTHER PERSONNEL	477	544	587
TOTAL ALL PERSONNEL	4851	4848	4836

LAND	NO. ACRES
NASA-OWNED	540
OTHER GOVERNMENT AGENCY-OWNED	3619
NON-FEDERAL *(Leases, easements)*	17
TOTAL LAND	4176

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 276,178

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Reactive Chemical Distribution Area	ART	74	1,089	-	1,163
V/STOL Transition Research Wind Tunnel	ART	548	5,011	-	5,559
ALL OTHER PROJECTS		65,264			
TOTALS		65,886	6,100		

CF 5-2

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

REACTIVE CHEMICAL DISTRIBUTION AREA

AUTHORIZATION LINE ITEM: Langley Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Hampton, Virginia

COGNIZANT NASA INSTALLATION: Langley Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$74,000
FY 1967 Estimate	1,089,000
Total Funding Through FY 1967	$1,163,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$892,800
Liquid propellant magazine - hydrazine	LS	---	$205,200	205,200
Liquid propellant magazine - nitrogen tetroxide	LS	---	160,500	160,500
Liquid propellant magazine - hydrogen peroxide	LS	---	245,400	245,400
Site development	LS	---	281,700	281,700
Equipment				$196,200
Laboratory equipment	LS	---	196,200	196,200

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,089,000

PROJECT PURPOSE:

This project will provide an area with safe and proper conditions for receiving, interim storage, and distribution for operational use of reactive chemicals employed in various research programs.

PROJECT DESCRIPTION:

The project will consist of a reactive chemical distribution area at the Langley Research Center. It will include three magazines for storage of hydrogen peroxide, hydrazine, and nitrogen tetroxide, with necessary access roads and utilities. Storage capacity will be provided for 200,000 pounds of hydrogen peroxide, 50,000 pounds of hydrazine, and 50,000 pounds of nitrogen tetroxide. The location of this facility will be in an area reserved for hazardous operations. Adequate water pollution control systems have been incorporated into this project.

PROJECT JUSTIFICATION:

The Langley Research Center has an urgent need for a reactive chemical distribution area providing safe and proper conditions for receiving, interim storage, and distribution for operational use of reactive chemicals now employed in various research programs. The limited magazine facilities now available for these reactive liquid propellants are insufficient to meet present and anticipated needs. The use of reactive chemicals has greatly increased with resultant increases in the quantities of these chemicals which must be handled at any one time. These quantities greatly exceed accepted quantity-distance limits for reactive chemicals in those facilities used to handle and dispense such materials. To assure safe operations the Center has necessarily employed special procedures and precautionary measures involving these reactive chemicals which are costly and time-consuming. Increasing program requirements necessitate improved handling facilities to alleviate increasing schedule delays which result from these operating restrictions.

The reactive chemicals are utilized in a wide variety of research efforts, several of which are defined as follows:

Space Mechanics Research: A wide variety of research programs are being conducted on the Lunar Landing Research Facility involving the use of highly

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reactive liquid propellant fuels and oxidizers. The basic LEM landing research program utilizes large quantities of hydrogen peroxide and is well established with the principal purposes of determining the handling requirement for manned lunar (or other planetary) landing vehicles and establishing piloting techniques for the final letdown, contact and take-off (including aborts). In addition Astronaut Maneuvering Units are presently being developed for space use. These units will require thorough testing under the most realistic conditions possible. A research system is being installed that will permit six-degree-of-freedom operation and testing under zero and lunar "g" conditions. Although most testing will be accomplished with cold gas and peroxide, some operations must be performed with the actual system and the more reactive hydrazine and nitrogen tetroxide propellants. Other various advanced space mechanics research projects are anticipated requiring the cited reactive chemical materials.

Materials Research: Research data are urgently needed on materials for rocket motor components such as nozzles, insulators, etc., which must satisfactorily perform in highly erosive environments at temperatures and pressures of up to 7,800 degrees fahrenheit (F) and 1,000 pounds per square inch (psi) for up to two minutes duration. An existing test apparatus utilizing hydrazine-based fuels and nitrogen tetroxide oxidizer is currently employed in this research. In addition a hybrid gas generator also using nitrogen tetroxide as an oxidizer will be employed in this vital research effort in the near future. This research will permit utilization of higher performance propulsion systems for future launch and space applications.

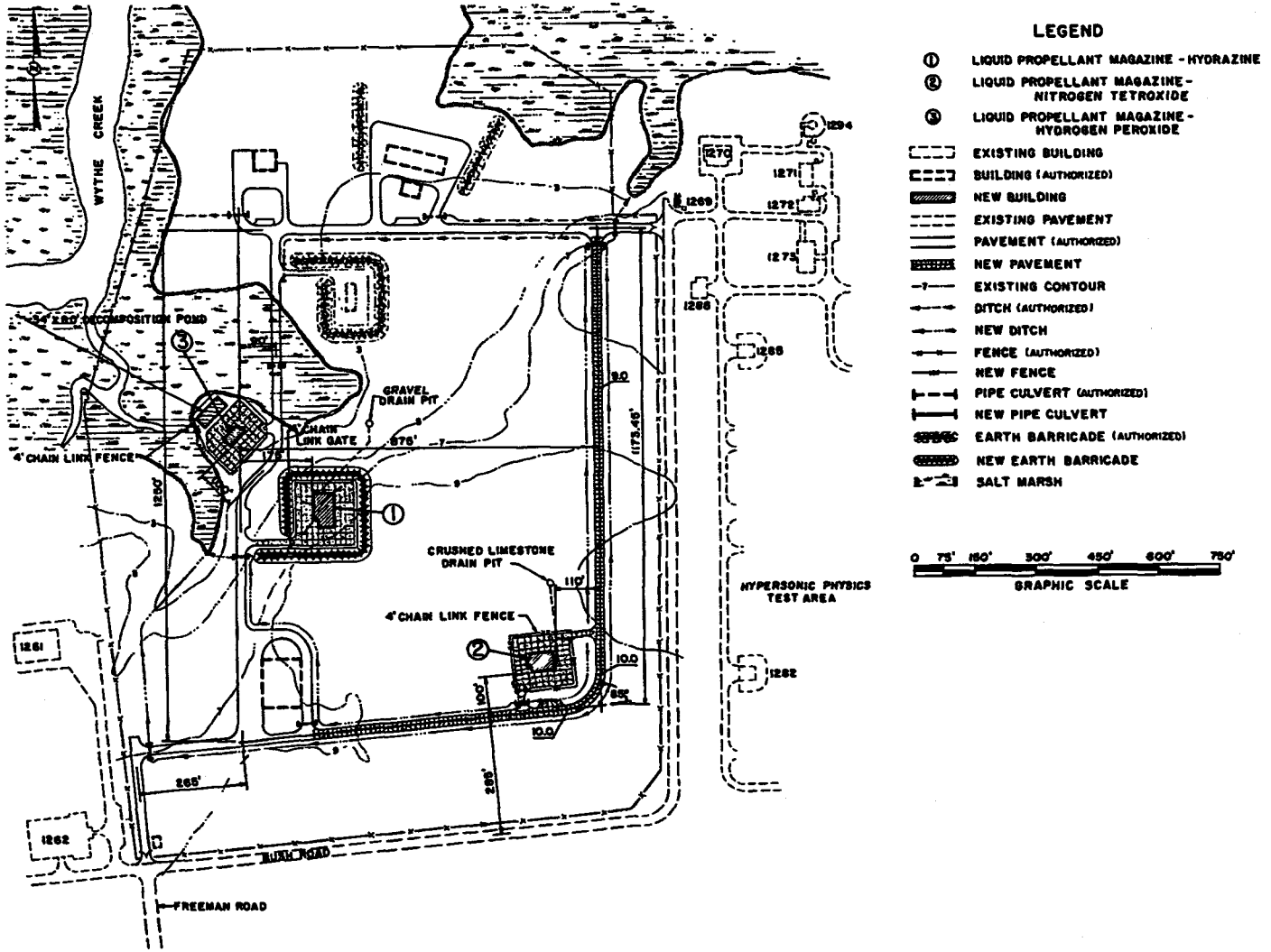
Launch Vehicle Research: A continuing research program into launch vehicle dynamics, guidance and control, thrust augmentation, etc., is being pursued through wind tunnel studies (Langley 16-foot Tunnel) which utilize hydrogen peroxide as an energy source and a flow medium. These studies are providing invaluable research data in the cited areas at a relatively low cost.

Construction of the requested magazine area for reactive liquid propellants will permit meeting of anticipated program needs in these areas of research.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LANGLEY RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

REACTIVE CHEMICAL DISTRIBUTION AREA



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

V/STOL TRANSITION RESEARCH WIND TUNNEL

AUTHORIZATION LINE ITEM: Langley Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Hampton, Virginia

COGNIZANT NASA INSTALLATION: Langley Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$548,000
FY 1967 Estimate	5,011,000
Total Funding Through FY 1967	$5,559,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$3,459,100
Tunnel structure	LS	---	$3,041,600	3,041,600
Site preparation	LS	---	417,500	417,500
Equipment				$1,551,900
Test section	LS	---	733,900	733,900
Instrumentation	LS	---	40,000	40,000
Tunnel drive and system control	LS	---	778,000	778,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$5,011,000

PROJECT PURPOSE:

This project provides a facility to obtain quantitative research on the factors affecting the stability, control, and performance of V/STOL aircraft in transition and in STOL (short take-off and landing).

PROJECT DESCRIPTION:

The project consists of a closed wind tunnel with a 15 x 21.5 foot test section housed within a 100 x 80 x 60 foot high two-story test chamber. A 15 x 50 foot control room will be located adjacent to the test section on the second floor level of the test chamber. A 50 x 100 x 35 foot high single story model preparation area will be constructed adjacent to the test chamber and will be connected to the shop area of the existing 7 x 10 foot tunnel. The test section will be equipped with a model support system which permits fixing the model in the air stream at varying angles of attack and sideslip, and allows for varying the height of the model over a removable endless belt (moving-ground board installation) capable of simulating landing conditions up to 200 knots. The wind tunnel will be powered by an 8000 horsepower electric motor coupled to a 40 foot diameter propeller.

The existing 300 mph 7 x 10 foot Wind Tunnel at Langley will be demolished and the existing boundary layer piping relocated.

PROJECT JUSTIFICATION:

The development of V/STOL aircraft has progressed to the point where major improvements in the wind tunnel facilities used to obtain quantitative research information on the factors affecting the stability, control, and performance of V/STOL aircraft in transition and in short take-off and landing (STOL) operation are urgently needed. A reliable capability to investigate these characteristics is of vital importance to both military and civilian users.

The test-section-to-model-size-ratio for V/STOL wind tunnel testing must be greater than for conventional aircraft configurations, because the adverse effect of the walls on data accuracy is increased by the higher lift-to-air-velocity conditions of V/STOL flight.

To keep data corrections for wall effects within tolerable limits, i.e. where their uncertainties are not large enough to be significant, and at the same time to use models of sufficient size to represent appropriate details, requires a test section more than 15 x 20 feet in cross section. This provides the same capability for V/STOL research as the 7 x 10 foot wind tunnels have provided for many years in conventional aircraft research.

For several years NASA has crudely approximated this capability by installation of a short test section in the throat of one of the 7 x 10 foot tunnels. Although severely limited in speed, and suffering from very poor flow conditions due to its location and necessarily short test section, studies in this makeshift arrangement have demonstrated beyond doubt the value of the proposed facility which would eliminate these limitations.

Of the wind tunnels available to NASA only two are large enough to meet the size requirements, the 40 x 80 foot tunnel at Ames Research Center and 30 x 60 foot tunnel at Langley Research Center. The 40 x 80 foot tunnel is fully scheduled for two-shift operation, through the end of calendar year 1967, in support of Federal Aviation Agency Programs (large scale models of the Supersonic Transport, "Tee-tail", etc.), Department of Defense Programs (AF-F-111, AF-VTOL fighter, Army helicopter, AF-C5A, AF-CX6, etc.), and NASA programs (lifting reentry bodies, spacecraft recovery parachutes, spacecraft recovery rotors, space capsule aerodynamics, etc.), as well as continuing with NASA basic aerodynamic research. Realistically, it is not possible to consider cancellation or diversion of these full scale programs to accommodate small scale V/STOL research. It is expected that this high utilization rate for the 40 x 80 foot tunnel will be maintained in the foreseeable future.

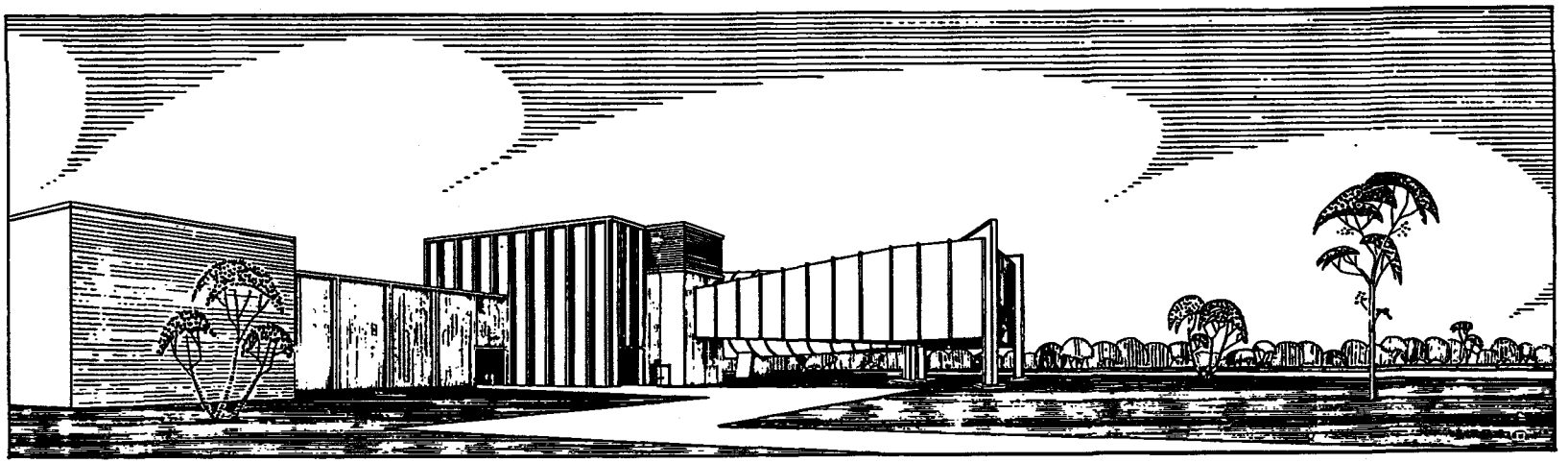
The 30 x 60 foot tunnel is an open throat facility providing a unique capability of making free-flight dynamic stability and control studies of models of new aircraft. It is expected that a high utilization rate for the 30 x 60 foot tunnel will also be maintained in the foreseeable future. Modification of the 30 x 60 foot facility to provide the characteristics desired in the proposed V/STOL facility would be extensive and would require closing of the throat with the resulting loss of the unique free-flight test capability. Extensive modifications to the tunnel-wall liners to provide the contraction ratios required to attain the high transition speeds desired, and a major change in the tunnel drive and power control systems to obtain the flow characteristics required would also be necessary. It has been estimated that the cost for modifying the 30 x 60 foot tunnel would be as much as the estimated cost for the new facility.

The proposed facility will provide a vital V/STOL research test capability not readily available in this country. The proposed facility would enable much needed general V/STOL research investigations to be conducted over the complete transition speed range at essentially full scale dynamics conditions. The test section size and configuration have been chosen to minimize the effects of the tunnel wall constraints and Reynolds number at the critical transition speed ranges under consideration in the V/STOL area. Test models of a size permitting the quick modifications desired during research investigations can be easily accommodated in this facility.

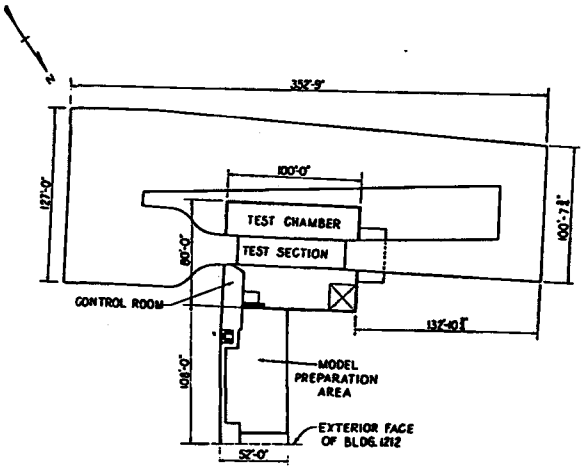
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LANGLEY RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

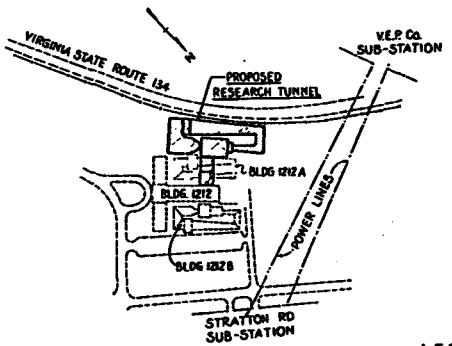
V/STOL TRANSITION RESEARCH WIND TUNNEL



PERSPECTIVE



FLOOR PLAN



PLOT PLAN

LEGEND
EXISTING
DEMOLISH
NEW

CF 5-10

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

LEWIS RESEARCH CENTER

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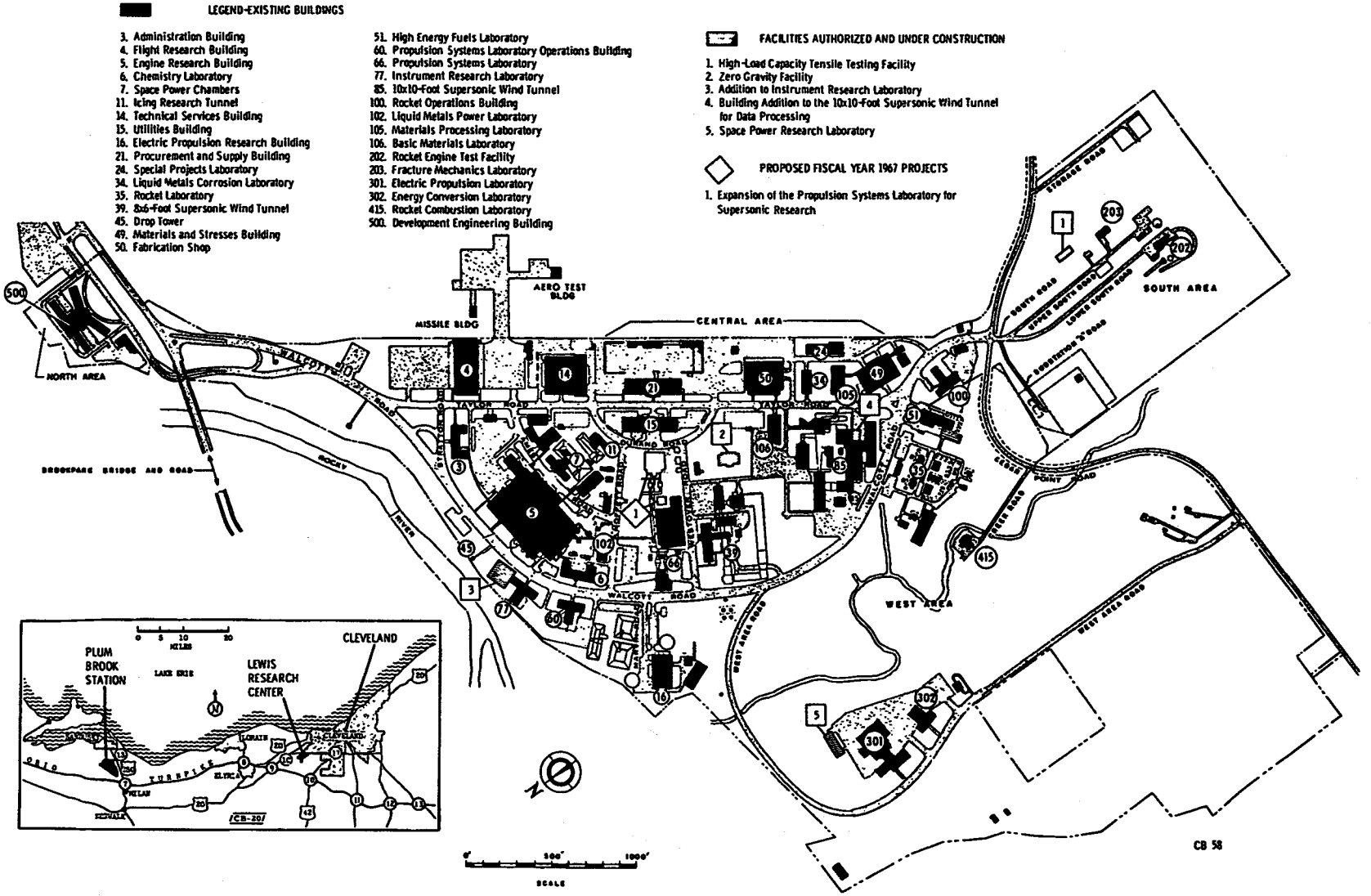
LEWIS RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

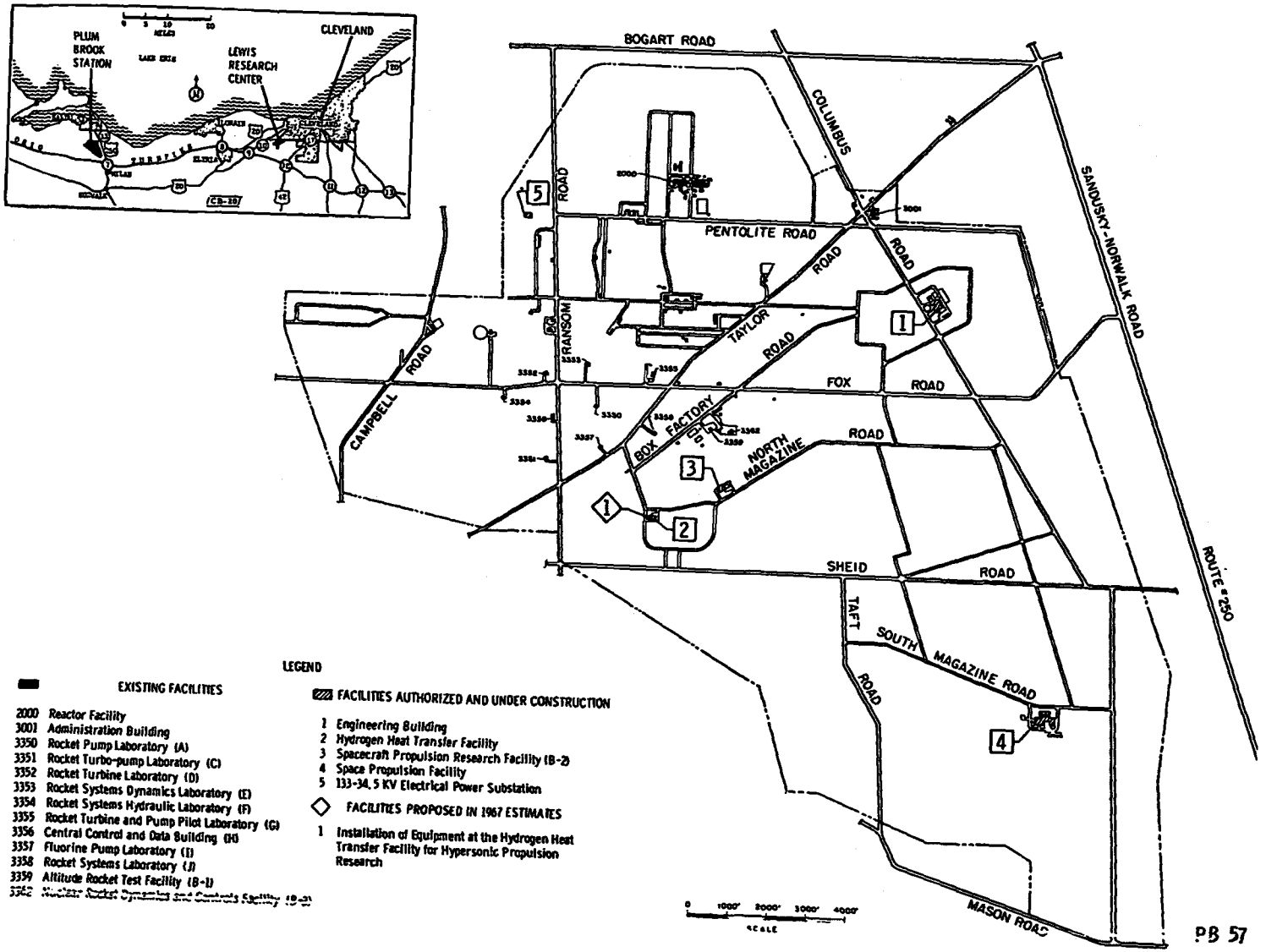
LOCATION PLAN



CF 6-1

LEWIS RESEARCH CENTER
PLUM BROOK STATION
FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



LEGEND

EXISTING FACILITIES

2000 Reactor Facility
3001 Administration Building
3350 Rocket Pump Laboratory (A)
3351 Rocket Turbo-pump Laboratory (C)
3352 Rocket Turbine Laboratory (D)
3353 Rocket Systems Dynamics Laboratory (E)
3354 Rocket Systems Hydraulic Laboratory (F)
3355 Rocket Turbine and Pump Pilot Laboratory (G)
3356 Central Control and Data Building (H)
3357 Fluorine Pump Laboratory (I)
3358 Rocket Systems Laboratory (J)
3359 Altitude Rocket Test Facility (B-1)
3360 Nuclear Rocket Dynamics and Controls Facility (B-2)

FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

1 Engineering Building
2 Hydrogen Heat Transfer Facility
3 Spacecraft Propulsion Research Facility (B-2)
4 Space Propulsion Facility
5 133-34.5 KV Electrical Power Substation

FACILITIES PROPOSED IN 1967 ESTIMATES

1 Installation of Equipment at the Hydrogen Heat Transfer Facility for Hypersonic Propulsion Research

CF 6-2

PB 57

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Lewis Research Center	Advanced Research & Technology	Cleveland, Ohio Sandusky, Ohio 1/	Cuyahoga, Erie	Cleveland Sandusky

INSTALLATION MISSION The Center provides research and development in the areas of advanced propulsion and space power generation. Basic and applied research is conducted in-house on materials and metallurgy; cryogenic and liquid-metal heat-transfer fluids; pumps and turbines; combustion processes, propellants, tankage, injectors, chambers, and nozzles; system control dynamics; plasmas and magnetohydrodynamics; space meteoroid damage and zero-gravity effects. The Center maintains technical management of NASA contracts on chemical and electric propulsion and on nuclear and solar space power systems, including the Centaur and Agena engine programs.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	4917	4842	4779
CONTRACTOR AND OTHER PERSONNEL	441	453	510
TOTAL ALL PERSONNEL	5358	5295	5289

LAND	NO. ACRES
NASA-OWNED	6330
OTHER GOVERNMENT AGENCY-OWNED	-
NON-FEDERAL *(Leases, easements)*	65
TOTAL LAND	6395

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 19 65)*	$ 265,754

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Expansion of Propulsion Systems Laboratory for Supersonic Research (Cleveland)	ART	700	14,000	-	14,700
Installation of Equipment at Hydrogen Heat Transfer Facility for Hypersonic Propulsion Research (Plum Brook)	ART	197	2,000	-	2,197
ALL OTHER PROJECTS		91,228			
TOTALS		92,125	16,000		

CF 6-3

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* *Includes work in process.*

1/ Includes Plum Brook Station at Sandusky, Ohio.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

EXPANSION OF THE PROPULSION SYSTEMS LABORATORY FOR SUPERSONIC RESEARCH

AUTHORIZATION LINE ITEM: Lewis Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Lewis Research Center, Cleveland, Cuyahoga County, Ohio

COGNIZANT NASA INSTALLATION: Lewis Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$700,000
FY 1967 Estimate	14,000,000
Total Funding Through FY 1967	$14,700,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,350,000
Site improvements	LS	---	$20,000	20,000
Utilities and miscellaneous items	LS	---	140,000	140,000
Special construction, foundations, pads	LS	---	400,000	400,000
Hot turbine and engine test building	Sq. Ft.	31,000	21.61	670,000
Cold turbine cell	Sq. Ft.	5,200	17.30	90,000
Expansion of cooling tower water pump house	Sq. Ft.	2,070	14.49	30,000
Equipment				$12,650,000
Combustion air systems and heaters	LS	---	3,300,000	3,300,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Altitude exhaust system and coolers	LS	---	$5,200,000	$5,200,000
Test chambers	LS	---	845,000	845,000
Dynamometers, gear boxes, hydraulic system	LS	---	1,020,000	1,020,000
Cranes and safety systems, fuel systems	LS	---	575,000	575,000
Cooling towers and piping	LS	---	585,000	585,000
Electrical controls systems	LS	---	500,000	500,000
Data acquisition systems	LS	---	600,000	600,000
Process electric power and communication systems	LS	---	25,000	25,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$14,000,000

PROJECT PURPOSE:

The purpose of this project is to provide a facility for full scale research on advanced engine components and engines to power supersonic airplanes at speeds up to Mach 3.

PROJECT DESCRIPTION:

The project consists of three test chambers for conducting full scale research of engine components and engines under cold flow and operating conditions. The test chambers will be connected to combustion air and exhaust systems of the existing Propulsion Systems Laboratory. Additional air heaters and exhaust gas coolers will provide the test conditions of 535 pounds of air per second at 165 pounds per square inch (psi), up to 1,200 degrees Fahrenheit (F.), and to reduce 3,500° F. exhaust gas to 170° F. Research runs of one hour at 100 percent power or seven hours at 40 percent power will be possible. Fuels will be delivered at ranges up to 320 gallons per minute, 500 psi, and at temperatures up to 500° F.; existing storage capacity is up to 100,000 gallons. Remote control operation of the system will be provided with monitoring of engine function and data acquisition. Data will be taken with 200 channels each of high and low speed digital recording wired directly to the existing central data system. The system will provide instant readback to operations personnel, plus permanent records. Safety systems will provide detection of various hazards, and fire control. Television monitoring will be provided for surveillance of the test chambers and other parts of the facility. Air intakes and exhausts will be treated to provide acceptable noise level.

Industrial type structures will house the chambers and service areas. Brick masonry portions contain control and data acquisition rooms. The facility will occupy approximately two acres at the Lewis Research Center and the site selection has been carefully determined by functional connections as well as economic considerations in association with the existing equipment of the Propulsion Systems Laboratory. Modifications are involved in increases of capacity of the cooling tower, basins and water pump house. Generally, structures will be of concrete foundations, steel frame, masonry and metal siding, acoustically treated, all compatible in design with adjacent Center structures.

PROJECT JUSTIFICATION:

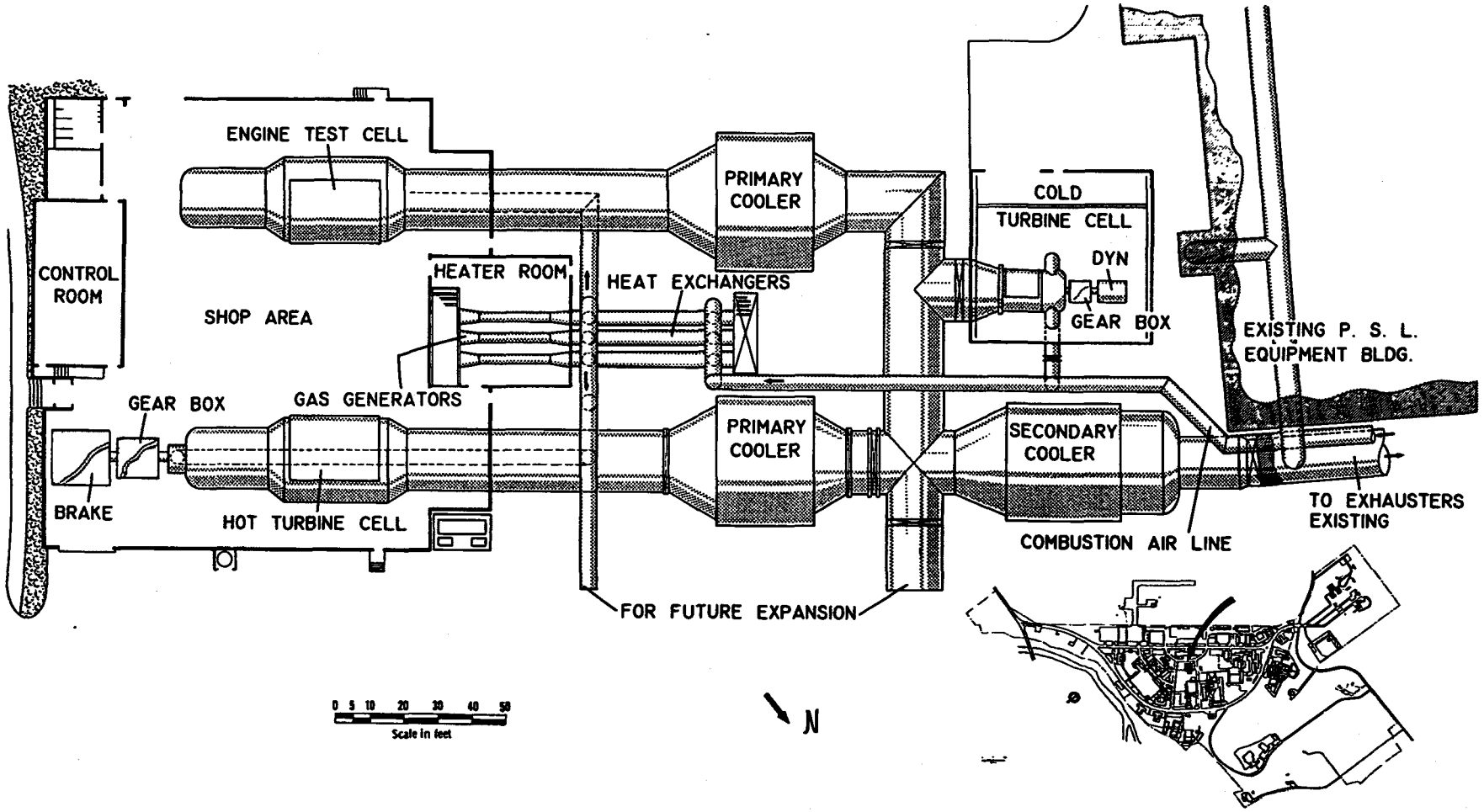
Intensive research and extensive testing of engine components and engines must be done in order to provide economically feasible and thoroughly reliable supersonic aircraft engines. The testing and research required must be performed under simulated flight conditions, and facilities for such demands do not now exist. The Propulsion Systems Laboratory at Lewis Research Center is now able to provide exhauster and compressor capacity for the simulation required and is singularly equipped with other equipment such as central data systems, basic heating capacity and basic cooling capacity so as to provide a strong support for developing the ultimate needs of test facilities for supersonic engine research.

This research is urgently required and the proposal herein offers the most expeditious and economical method of providing suitable facilities for the task.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LEWIS RESEARCH CENTER
FISCAL YEAR 1967 ESTIMATES

EXPANSION OF THE PROPULSION SYSTEMS LABORATORY FOR SUPERSONIC RESEARCH



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

INSTALLATION OF EQUIPMENT AT THE HYDROGEN HEAT TRANSFER FACILITY
FOR
HYPERSONIC PROPULSION RESEARCH

AUTHORIZATION LINE ITEM: Lewis Research Center

PROGRAM OFFICE FOR THE PROJECT: Office of Advanced Research and Technology

LOCATION OF PROJECT: Plum Brook Station, Sandusky, Erie County, Ohio

COGNIZANT NASA INSTALLATION: Lewis Research Center

TYPE OF CONSTRUCTION PROJECT: Modifications and Additions

FUNDING:

FY 1966 and Prior Years	$197,000
FY 1967 Estimate	2,000,000
Total Funding Through FY 1967	$2,197,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$170,600
Site improvements	LS	---	$120,100	120,100
Building modifications	LS	---	7,300	7,300
Building addition	Sq. Ft.	2,400	18.00	43,200
Equipment				$1,829,400
Gas storage and fuel systems	LS	---	347,800	347,800
Fuel heater	LS	---	59,600	59,600
Transition elbow for pebble bed heater	LS	---	28,000	28,000
N2-02 mixing chamber	LS	---	31,700	31,700
Nozzles	LS	---	398,500	398,500

	Unit of Measure	Quantity	Unit Cost	Total Cost
Test Chamber	LS	---	82,000	82,000
Diffuser	LS	---	28,900	28,900
Cooling water systems	LS	---	41,600	41,600
Spray cooler	LS	---	50,800	50,800
Steam supply systems	LS	---	337,500	337,500
Ejector	LS	---	47,500	47,500
Safety systems	LS	---	64,600	64,600
Instrumentation	LS	---	225,600	225,600
Electrical controls	LS	---	85,300	85,300
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,000,000

PROJECT PURPOSE:

The purpose of this project is to add equipment to the Hydrogen Heat Transfer Facility to provide a free jet in which to conduct hypersonic propulsion research at Mach 5-7 with a primary objective of testing and developing supersonic burning ram jet engines and components of reasonable scale.

PROJECT DESCRIPTION:

The equipment addition to the Hydrogen Heat Transfer Facility will provide a Mach 5-7 free jet having true air composition and altitude simulation to simulate representative flight trajectories. Nitrogen gas will be heated to 4500 degrees Rankine (R) in the existing graphite pebble bed heat exchanger and will be mixed with oxygen or a nitrogen-oxygen mixture to achieve a true air composition at a temperature of 2900 degrees Rankine (R). Stagnation pressure will be 1200 pounds per square inch.

It is proposed to provide a graphite lined transition section and elbow to the existing pebble bed heater. Also provided will be a nitrogen-oxygen mixing chamber downstream of the heater. The equipment will include three interchangeable hypersonic nozzles (each approximately 15 feet long) which will produce Mach 5, 6, and 7 free jets about 42 inches diameter. The test chamber will be about 12 feet in diameter by 18 feet long and will include an engine mount for force measurement devices. Connected to the test chamber will be a 40 foot long diffuser section discharging to atmosphere through a spray cooler and steam driven ejector exhaust system. Cooling water will be provided for the nozzles, test chamber, diffuser and spray cooler.

Existing hydrogen storage will be utilized as a fuel source for the research engine. Additional nitrogen-oxygen gas storage will be provided and existing gas storage will be relocated to accommodate this project. An extension to the existing facility building will be provided to house the test chamber and nozzle.

PROJECT JUSTIFICATION:

Development and testing of air-breathing engines in the hypersonic speed range requires the availability of large heated air facilities with capability of close simulation of flight static temperature, pressure, and Reynolds number. At Lewis Research Center and elsewhere, a major deterrent to research and development in the hypersonic range of air-breathing engines is the lack of any facility which can test complete engines above Mach 5 with complete simulation. There are a number of research problems which have not been resolved at Mach 5-7 including inlet-burner matching, ignition, fuel-air mixing, thermal choking, cooling and structures.

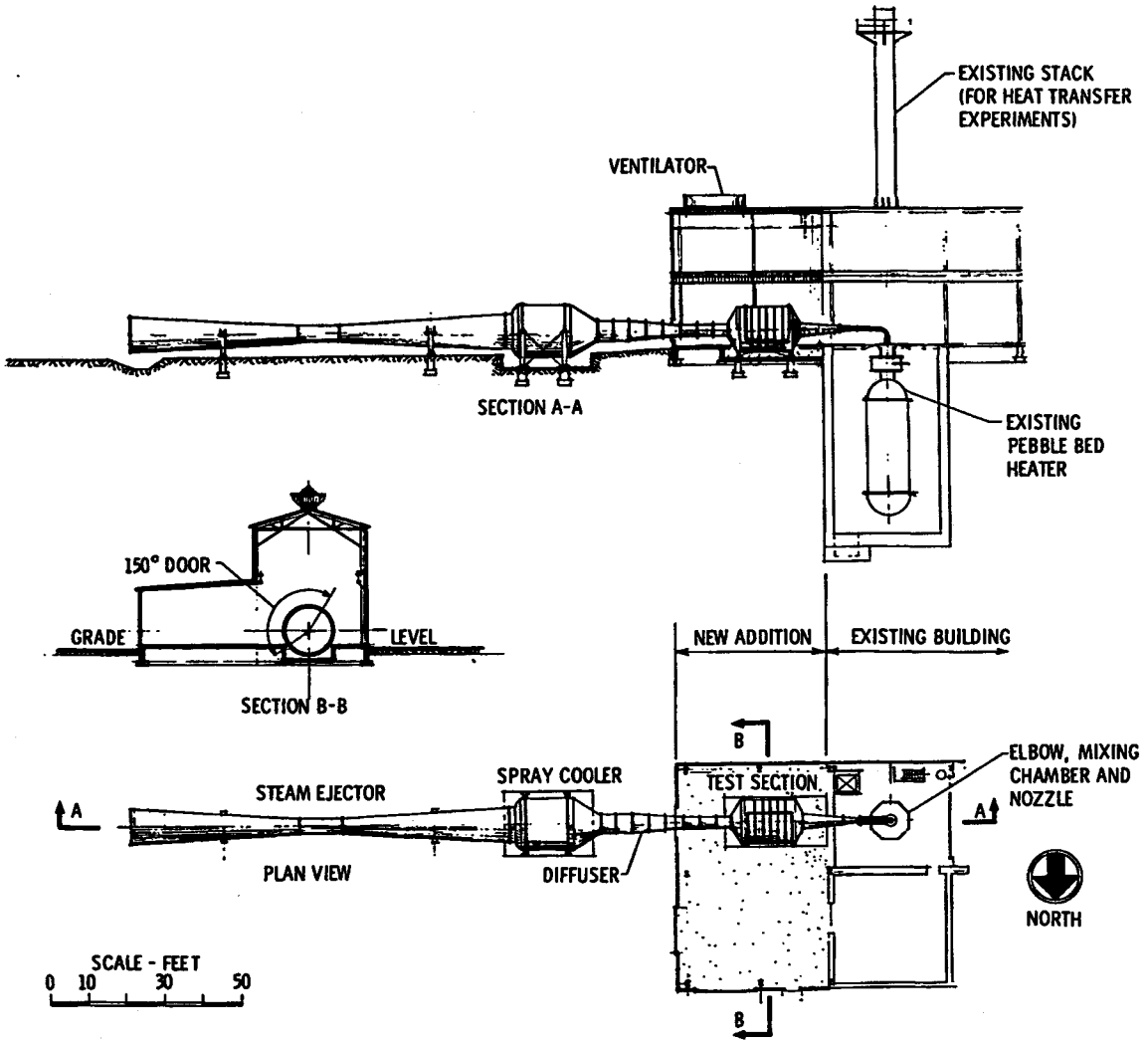
This request is concerned with a facility using a concept that has not been previously used. The heater materials problem is obviated to some extent by using graphite to heat nitrogen, and mixing the oxidant downstream of the graphite heater. With this scheme, Mach 5-7 conditions can be simulated by mixing hot nitrogen with oxygen or oxygen- nitrogen mixtures.

Installation of this equipment will not reduce the facility capability for heat transfer experiments.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LEWIS RESEARCH CENTER
PLUM BROOK STATION
FISCAL YEAR 1967 ESTIMATES

INSTALLATION OF EQUIPMENT AT HYDROGEN HEAT TRANSFER FACILITY FOR HYPERSONIC PROPULSION RESEARCH



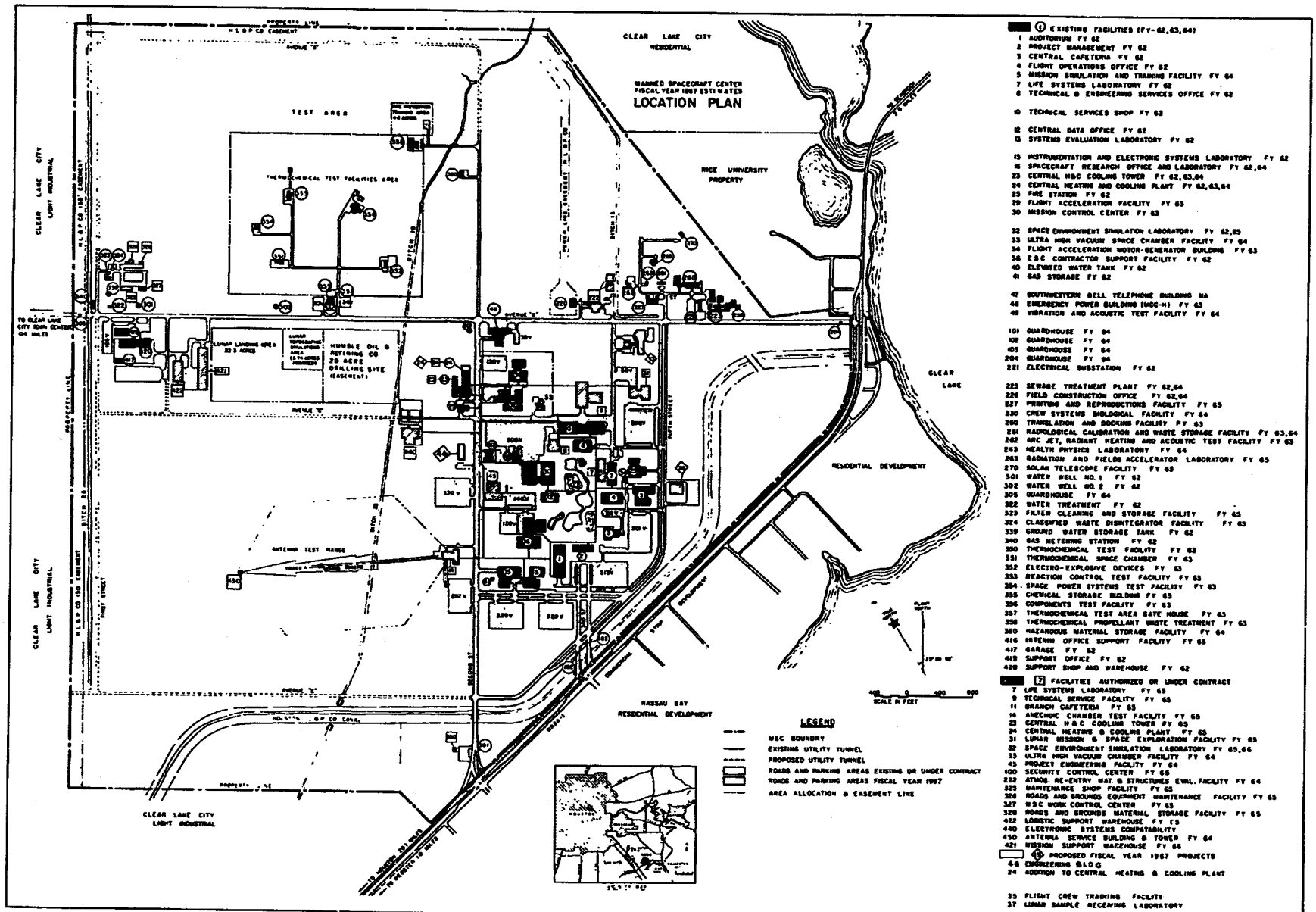
CF 6-11

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

MANNED SPACECRAFT CENTER


MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES
LOCATION PLAN
CLEAR LAKE CITY
RESIDENTIAL
TEST AREA
RICE UNIVERSITY
PROPERTY
CLEAR LAKE CITY
LIGHT INDUSTRIAL
CLEAR LAKE
RESIDENTIAL DEVELOPMENT
NASSAU BAY
RESIDENTIAL DEVELOPMENT
ANTENNA TEST RANGE
HUMBLE OIL & REFINING CO
20 ACRE
DRILLING SITE
EASEMENT
LEGEND
MSC BOUNDRY
EXISTING UTILITY TUNNEL
PROPOSED UTILITY TUNNEL
ROADS AND PARKING AREAS EXISTING OR UNDER CONTRACT
ROADS AND PARKING AREAS FISCAL YEAR 1967
AREA ALLOCATION & EASEMENT LINE
SCALE IN FEET
1 EXISTING FACILITIES (FY-62,63,64)
1 AUDITORIUM FY 62
2 PROJECT MANAGEMENT FY 62
3 CENTRAL CAFETERIA FY 62
4 FLIGHT OPERATIONS OFFICE FY 62
5 MISSION SIMULATION AND TRAINING FACILITY FY 64
7 LIFE SYSTEMS LABORATORY FY 62
8 TECHNICAL & ENGINEERING SERVICES OFFICE FY 62
10 TECHNICAL SERVICES SHOP FY 62
12 CENTRAL DATA OFFICE FY 62
13 SYSTEMS EVALUATION LABORATORY FY 62
15 INSTRUMENTATION AND ELECTRONIC SYSTEMS LABORATORY FY 62
16 SPACECRAFT RESEARCH OFFICE AND LABORATORY FY 62,64
23 CENTRAL H&C COOLING TOWER FY 62,63,64
24 CENTRAL HEATING AND COOLING PLANT FY 62,63,64
25 FIRE STATION FY 62
29 FLIGHT ACCELERATION FACILITY FY 63
30 MISSION CONTROL CENTER FY 63
32 SPACE ENVIRONMENT SIMULATION LABORATORY FY 62,65
33 ULTRA HIGH VACUUM SPACE CHAMBER FACILITY FY 64
34 FLIGHT ACCELERATION MOTOR-GENERATOR BUILDING FY 63
36 E&C CONTRACTOR SUPPORT FACILITY FY 62
40 ELEVATED WATER TANK FY 62
41 GAS STORAGE FY 62
47 SOUTHWESTERN BELL TELEPHONE BUILDING NA
48 EMERGENCY POWER BUILDING (MCC-H) FY 63
49 VIBRATION AND ACOUSTIC TEST FACILITY FY 64
101 GUARDHOUSE FY 64
102 GUARDHOUSE FY 64
103 GUARDHOUSE FY 64
204 GUARDHOUSE FY 64
221 ELECTRICAL SUBSTATION FY 62
223 SEWAGE TREATMENT PLANT FY 62,64
226 FIELD CONSTRUCTION OFFICE FY 62,64
227 PRINTING AND REPRODUCTIONS FACILITY FY 65
230 CREW SYSTEMS BIOLOGICAL FACILITY FY 64
260 TRANSLATION AND DOCKING FACILITY FY 63
261 RADIOLOGICAL CALIBRATION AND WASTE STORAGE FACILITY FY 63,64
262 ARC JET, RADIANT HEATING AND ACOUSTIC TEST FACILITY FY 63
263 HEALTH PHYSICS LABORATORY FY 64
265 RADIATION AND FIELDS ACCELERATOR LABORATORY FY 65
270 SOLAR TELESCOPE FACILITY FY 65
301 WATER WELL NO. 1 FY 62
302 WATER WELL NO. 2 FY 62
305 GUARDHOUSE FY 64
322 WATER TREATMENT FY 62
323 FILTER CLEANING AND STORAGE FACILITY FY 65
324 CLASSIFIED WASTE INCINERATOR FACILITY FY 65
339 GROUND WATER STORAGE TANK FY 62
340 GAS METERING STATION FY 62
350 THERMOCHEMICAL TEST FACILITY FY 63
351 THERMOCHEMICAL SPACE CHAMBER FY 63
352 ELECTRO-EXPLOSIVE DEVICES FY 63
353 REACTION CONTROL TEST FACILITY FY 63
354 SPACE POWER SYSTEMS TEST FACILITY FY 63
355 CHEMICAL STORAGE BUILDING FY 63
356 COMPONENTS TEST FACILITY FY 63
357 THERMOCHEMICAL TEST AREA GATE HOUSE FY 63
358 THERMOCHEMICAL PROPELLANT WASTE TREATMENT FY 63
360 HAZARDOUS MATERIAL STORAGE FACILITY FY 64
416 INTERIM OFFICE SUPPORT FACILITY FY 65
417 GARAGE FY 62
419 SUPPORT OFFICE FY 62
420 SUPPORT SHOP AND WAREHOUSE FY 62
7 FACILITIES AUTHORIZED OR UNDER CONTRACT
7 LIFE SYSTEMS LABORATORY FY 65
9 TECHNICAL SERVICE FACILITY FY 65
11 BRANCH CAFETERIA FY 65
14 ANECHOIC CHAMBER TEST FACILITY FY 65
23 CENTRAL H & C COOLING TOWER FY 65
24 CENTRAL HEATING & COOLING PLANT FY 65
31 LUNAR MISSION & SPACE EXPLORATION FACILITY FY 65
32 SPACE ENVIRONMENT SIMULATION LABORATORY FY 65,66
33 ULTRA HIGH VACUUM CHAMBER FACILITY FY 64
45 PROJECT ENGINEERING FACILITY FY 64
100 SECURITY CONTROL CENTER FY 65
222 ATMOS. RE-ENTRY MAT. & STRUCTURES EVAL. FACILITY FY 64
325 MAINTENANCE SHOP FACILITY FY 65
326 ROADS AND GROUNDS EQUIPMENT MAINTENANCE FACILITY FY 65
327 MSC WORK CONTROL CENTER FY 65
328 ROADS AND GROUNDS MATERIAL STORAGE FACILITY FY 65
422 LOGISTIC SUPPORT WAREHOUSE FY 65
440 ELECTRONIC SYSTEMS COMPATABILITY
450 ANTENNA SERVICE BUILDING & TOWER FY 64
421 MISSION SUPPORT WAREHOUSE FY 66
6 PROPOSED FISCAL YEAR 1967 PROJECTS
48 ENGINEERING BLDG
24 ADDITION TO CENTRAL HEATING & COOLING PLANT
35 FLIGHT CREW TRAINING FACILITY
37 LUNAR SAMPLE RECEIVING LABORATORY

CF 7-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Manned Spacecraft Center	Manned Space Flight	Houston, Texas	Harris	Houston

INSTALLATION MISSION

The Manned Spacecraft Center has as its primary mission the development of spacecraft for manned space flight programs. The Center is also responsible for manned space flight operations and conduct of astronaut training.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	4431	4928	4876
CONTRACTOR AND OTHER PERSONNEL	3112	5078	5366
TOTAL ALL PERSONNEL	7543	10006	10242

LAND	NO. ACRES
NASA-OWNED	1600
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	1600

TOTAL CAPITAL INVESTMENT *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 241,093.5

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1962 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Lunar Sample Receiving Laboratory	MSF	495	9,100		9,595
Flight Crew Training Facility	MSF	60	1,100		1,160
Engineering Building	MSF	145	2,600		2,745
Center Support Facilities	MSF	56	1,000		1,056
ALL OTHER PROJECTS		85,659			
TOTALS		86,415	13,800		

CF 7-2

NASA FORM 1029 (REV. JUN 65) PREVIOUS EDITIONS ARE OBSOLETE.

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

LUNAR SAMPLE RECEIVING LABORATORY

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$495,000
FY 1967 Estimate	9,100,000
Total Funding Through FY 1967	$9,595,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$5,924,900
Site preparation	LS	---	$385,900	385,900
Utilities	LS	---	126,700	126,700
Building	Sq. Ft.	86,800	39.52	3,430,300
Sample receiving laboratory	LS	---	(2,337,400)	(2,337,400)
Low level radiation counting lab	LS	---	(355,600)	(355,600)
Crew reception building	LS	---	(737,300)	(737,300)
Special construction features	LS	---	1,982,000	1,982,000
Biological barrier systems	LS	---	(1,324,900)	(1,324,900)
Shielding and underground structure	LS	---	(475,700)	(475,700)
Radon absorption system	LS	---	(181,400)	(181,400)

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$3,175,100
Vacuum systems	LS	---	$1,430,000	1,430,000
Biological cabinet and support equipment	LS	---	1,181,000	1,181,000
Low level radiation counting equipment	LS	---	398,400	398,400
Medical equipment	LS	---	165,700	165,700
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$9,100,000

PROJECT PURPOSE:

This project will provide a central laboratory complex where samples of materials brought to earth by lunar exploration teams may be received, quarantined, processed, undergo limited experiments, and be distributed to the scientific community for further analysis; and where a simultaneous quarantine of the returned spacecraft, astronauts and associated personnel can be effected.

PROJECT DESCRIPTION:

The facility will house all functions required to receive, process and distribute samples of lunar materials and to facilitate the necessary quarantine of lunar exploration teams and spacecraft. It will incorporate all special features necessary to maintain strict quarantine standards while a variety of limited experiments are performed within a rigidly controlled environment prior to processing the samples for distribution. Principal features of this laboratory will include a gross area of approximately 86,800 square feet divided into three separate but connected structures; a two story sample laboratory of 57,500 square feet, a partially underground low level radiation counting laboratory of 7,300 square feet, and a single story crew reception building of 22,000 square feet. Specific features of each building are as follows:

Sample Receiving Laboratory (57,500 SF) - This will be a two story steel frame structure with precast concrete wall panels which will consist of the sample laboratory, support laboratories and offices. The sample laboratory will be a limited access area surrounded by a biological barrier necessary to meet the stringent quarantine requirements imposed on the samples and to prevent contamination by terrestrial organisms. Special air handling equipment and techniques will be used to maintain the integrity of the biological barrier. The

sample laboratory will house vacuum chambers and biological experimentation cabinets for receiving, decontaminating and opening the sample containers. Equipment will be available to isolate the samples while under test for biological life, or other substances that may be infectious, toxic or harmful to man, animal or plantlife. Facilities will also be installed for cataloguing and preparing the samples for distribution to universities and laboratories for further detailed scientific analysis.

Low Level Radiation Counting Laboratory (7,300 SF) - This laboratory will consist of two sections; an underground (approximately 50 feet below surface) ultra-low-level counting facility, and an above ground service facility. The size of the underground laboratory will be approximately 2,500 square feet. It will house a control room and radiation counting equipment which will be located in an area shielded by a low count material such as olivine or dunite enclosed in a low count metal shield. The above ground facility will be a standard steel frame, precast concrete structure with a gross area of approximately 4,800 square feet, which will be connected to the Sample Receiving Laboratory by means of a 70 foot enclosed corridor. This facility will house all mechanical and electrical equipment, maintenance areas and offices to support the radiation counting laboratory.

Crew Reception Building (22,000 SF) - This will be a single story building of steel frame construction with precast concrete wall panels. The building will provide living quarters and medical facilities for the returned astronauts, astronaut medical team and supporting personnel. Space will be provided for storage of the spacecraft and the spacecraft recovery isolation van and trailer. These areas will be surrounded by a biological barrier. This building will also be connected to the Sample Receiving Laboratory by means of a 28 foot enclosed corridor.

PROJECT JUSTIFICATION:

This project is required to provide the quarantine capability for lunar samples, the lunar exploration team, and the spacecraft, upon their return to earth from a lunar mission. Requirements for specific areas are as follows:

Sample Receiving and Low Level Radiation Counting Laboratories - One of the more significant aspects of the Apollo scientific program is the return of samples of lunar material. These samples will undergo analysis by outstanding scientists at universities and other recognized laboratories. The possibility, however, of contaminating the earth with pathogenic organisms from the moon requires that the samples be quarantined at a central location while tests are made to establish the presence

or absence of pathogens. A central point of distribution is also required to assure that the samples are catalogued and identified properly as they are received, divided and distributed. During the quarantine period it is important that time-dependent scientific experiments, such as low level radiation counting, be commenced as quickly as possible since valuable data could be lost through delay. This requires that such experiments take place at the Sample Receiving Laboratory.

While many of the facility features and equipment are applications of existing technology, several represent true extensions of present capabilities. For example, low level radiation counting apparatus will incorporate a sensitivity ten times greater than the best now existing. The extra-high vacuum chamber will permit essential operations in an environment which will minimize the possibility of contamination from earth sources.

The need for a facility of this type has been recognized by the scientific community. Within NASA various panels have made extensive studies and noted the need in special reports. External to NASA, the Space Science Board of the National Academy of Sciences has endorsed an approach as proposed by this project.

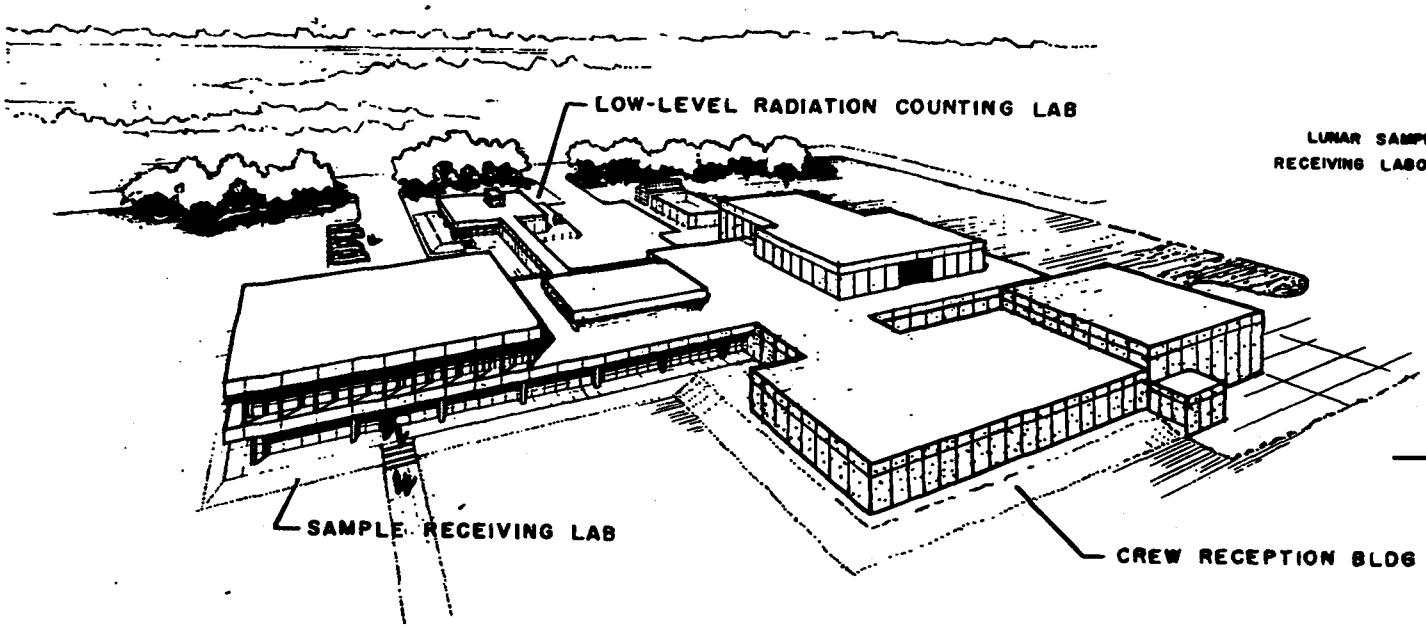
Crew Reception Building - In order to provide for the quarantine requirements of the Public Health Service, a Crew Reception Building is necessary. Upon return to earth, the spacecraft, astronauts, and the astronaut medical team must be placed into a spacecraft recovery isolation van and transported, under strict quarantine, from the recovery area to the Crew Reception Building where, during the quarantine period, they will reside, undergo medical examinations and participate in experiments. Only after favorable completion of all necessary biological quarantine clearance tests will the astronauts and equipment be released.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

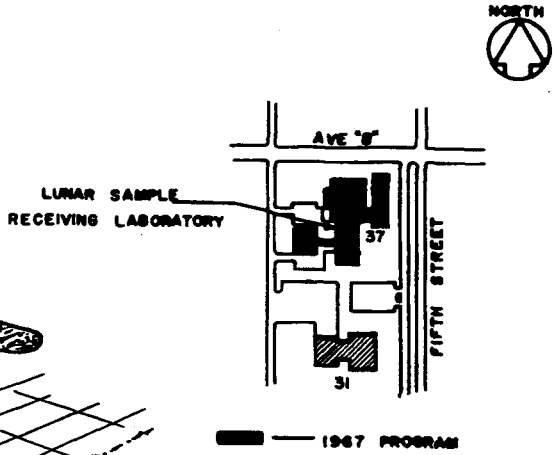
Based on current program requirements, no future year funding is anticipated.

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

LUNAR SAMPLE RECEIVING LABORATORY



PERSPECTIVE

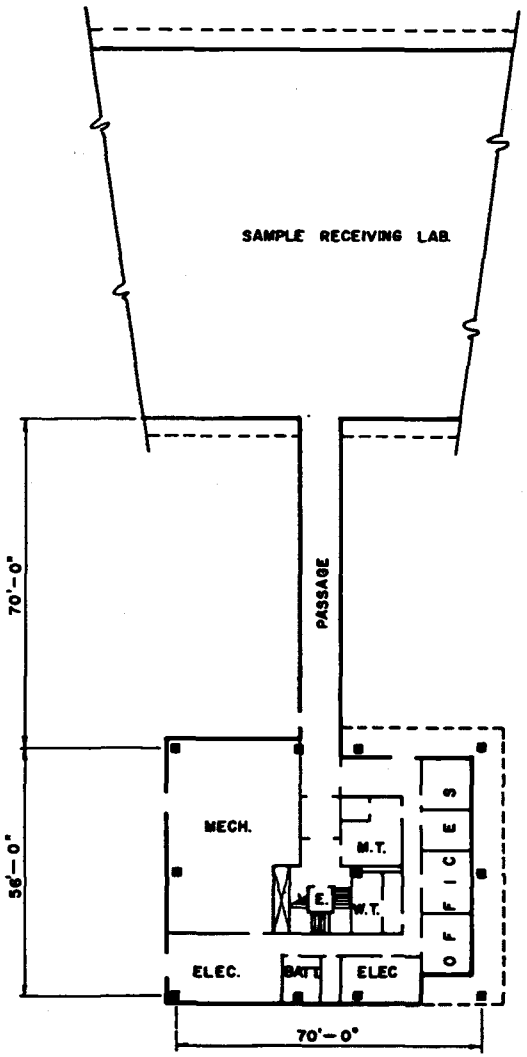


PARTIAL SITE PLAN

CF 7-7

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

LUNAR SAMPLE RECEIVING LABORATORY



FLOOR PLAN

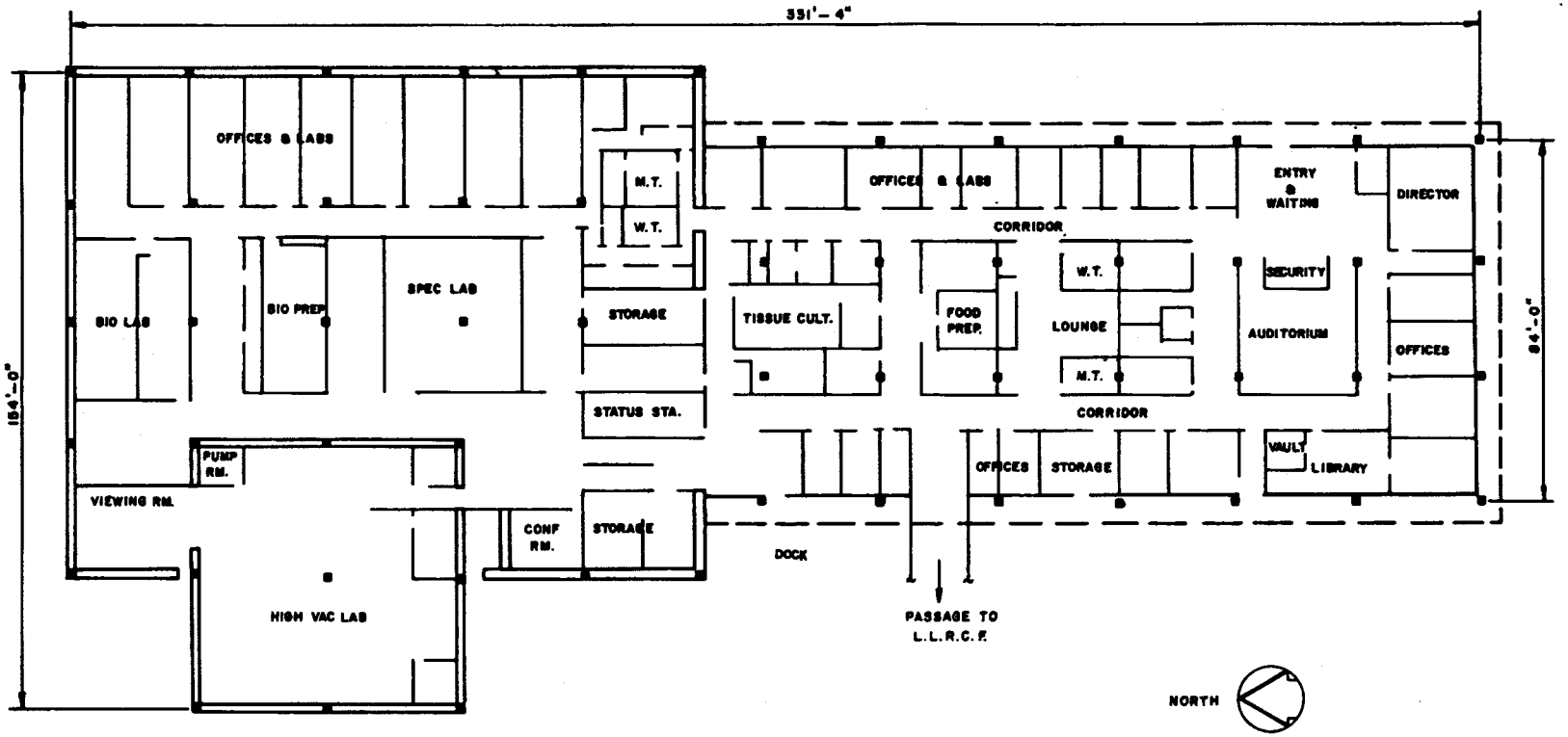
LOW-LEVEL RADIATION COUNTING LABORATORY

NORTH

20 0 20 40
SCALE IN FEET

CF 7-8

LUNAR SAMPLE RECEIVING LABORATORY



FIRST FLOOR PLAN

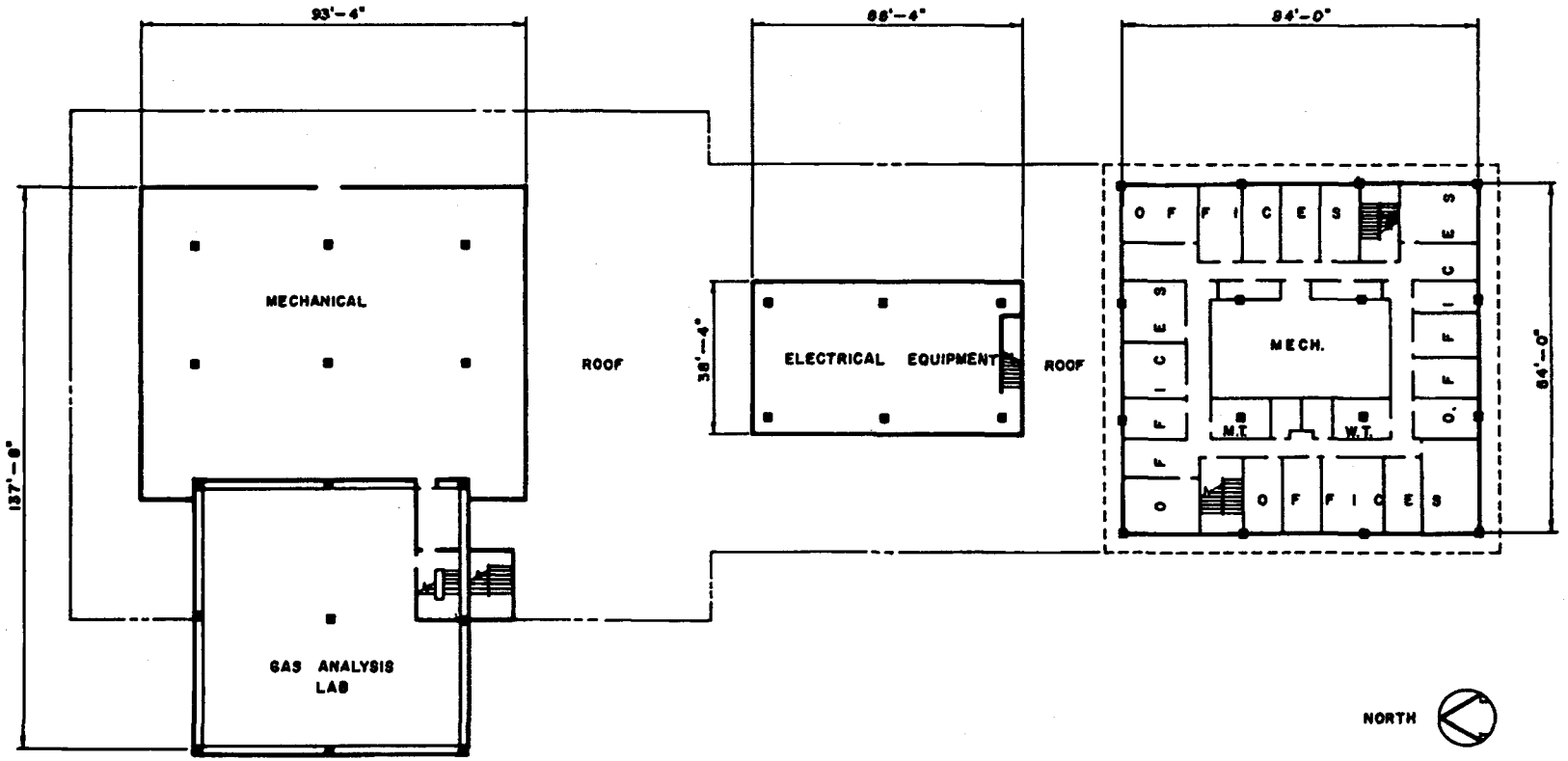
SAMPLE RECEIVING LABORATORY

20 0 20 40

SCALE IN FEET

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

LUNAR SAMPLE RECEIVING LABORATORY



SECOND FLOOR PLAN

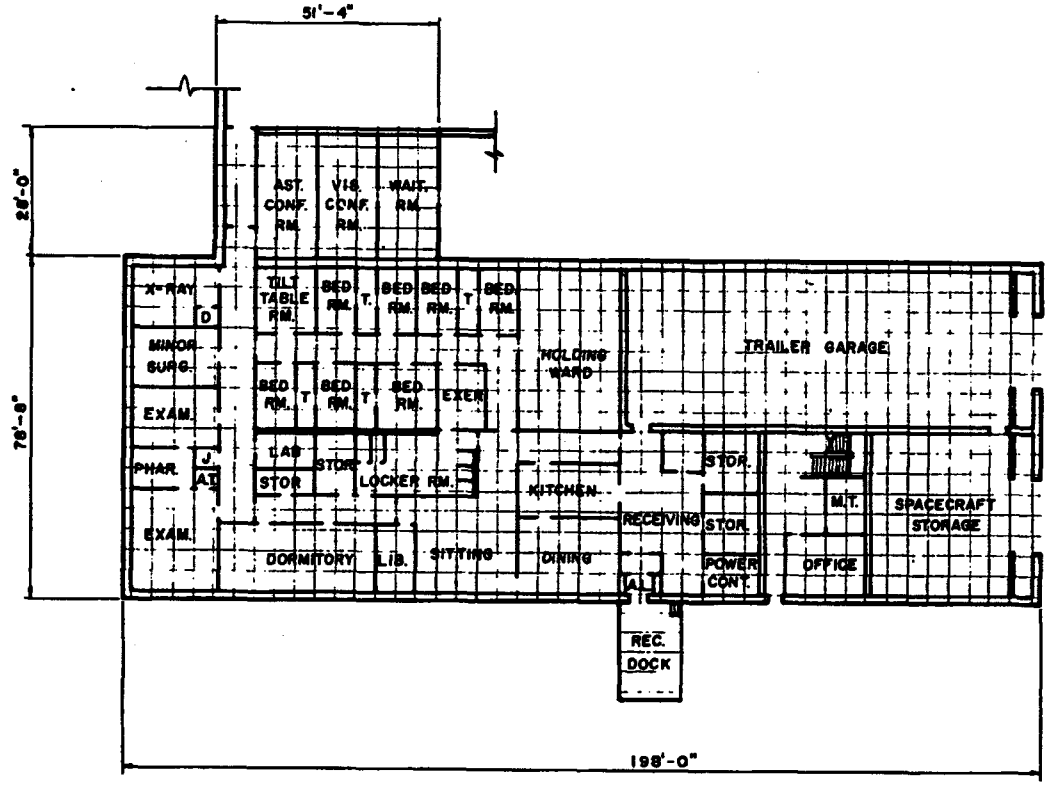
SAMPLE RECEIVING LABORATORY

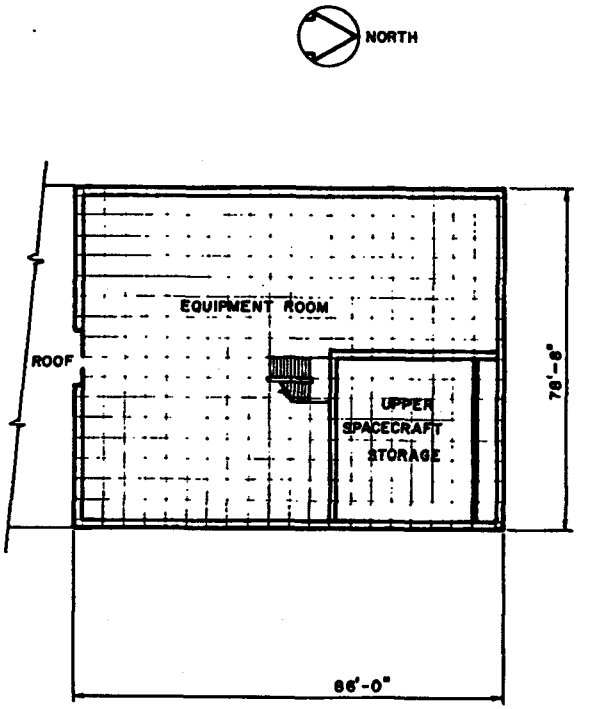
20 0 20 40
SCALE IN FEET

CF 7-10

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

LUNAR SAMPLE RECEIVING LABORATORY





CF 7-11

20 0 20 40

SCALE IN FEET

FIRST FLOOR PLAN

CREW RECEPTION BLDG.

SECOND FLOOR PLAN

CREW RECEPTION BLDG.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FLIGHT CREW TRAINING FACILITY

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$60,000
FY 1967 Estimate	1,100,000
Total Funding Through FY 1967	$1,160,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,071,000
Site preparation	LS	---	$27,900	27,900
Utilities	LS	---	250,000	250,000
Building	Sq. Ft.	22,300	26.82	598,100
Elevated flooring	LS	---	35,000	35,000
Air handling system	LS	---	160,000	160,000
Equipment	---	---	29,000	29,000
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$1,100,000

PROJECT PURPOSE:

This project will provide additional capability for training astronauts through the use of Apollo spacecraft simulators.

PROJECT DESCRIPTION:

The project will provide the necessary space and supporting facilities for one Command Module Mission Simulator, and a Lunar Excursion Module (LEM) Mission Simulator. Associated with the simulator areas will be crew stations, instructor's stations and computer complexes. Facilities and space will also be made available for simulator maintenance, off-line equipment storage, optical equipment maintenance, a suit room, debriefing area, and library facilities for film graphics, card-tapes and engineering drawings.

Architectural features will include a two story high bay simulator area constructed of precast concrete panels with a gross area of approximately 22,300 square feet.

All utilities will be included. Chilled water and steam will be furnished by the Central Heating and Cooling Plant.

PROJECT JUSTIFICATION:

Flight crew training in support of the Apollo program requires training in the control and operation of spacecraft. Thus, facilities, adequate in terms of numbers and types, are needed for simulation of the Command Module and the Lunar Excursion Module missions.

Facilities are now available for one set of Apollo Spacecraft Mission Simulators and Trainers in the Mission Simulation and Training Facility. These facilities are adequate for launch schedules through Calendar Year 1967. However, by Calendar Year 1968, flight schedules will call for launches at two month intervals. In order to provide the crews needed for this frequency level, additional simulators and the necessary housing must be made available. Current schedules indicate that this facility must be included in the Fiscal Year 1967 Program in order to be available for the two month schedule cycle.

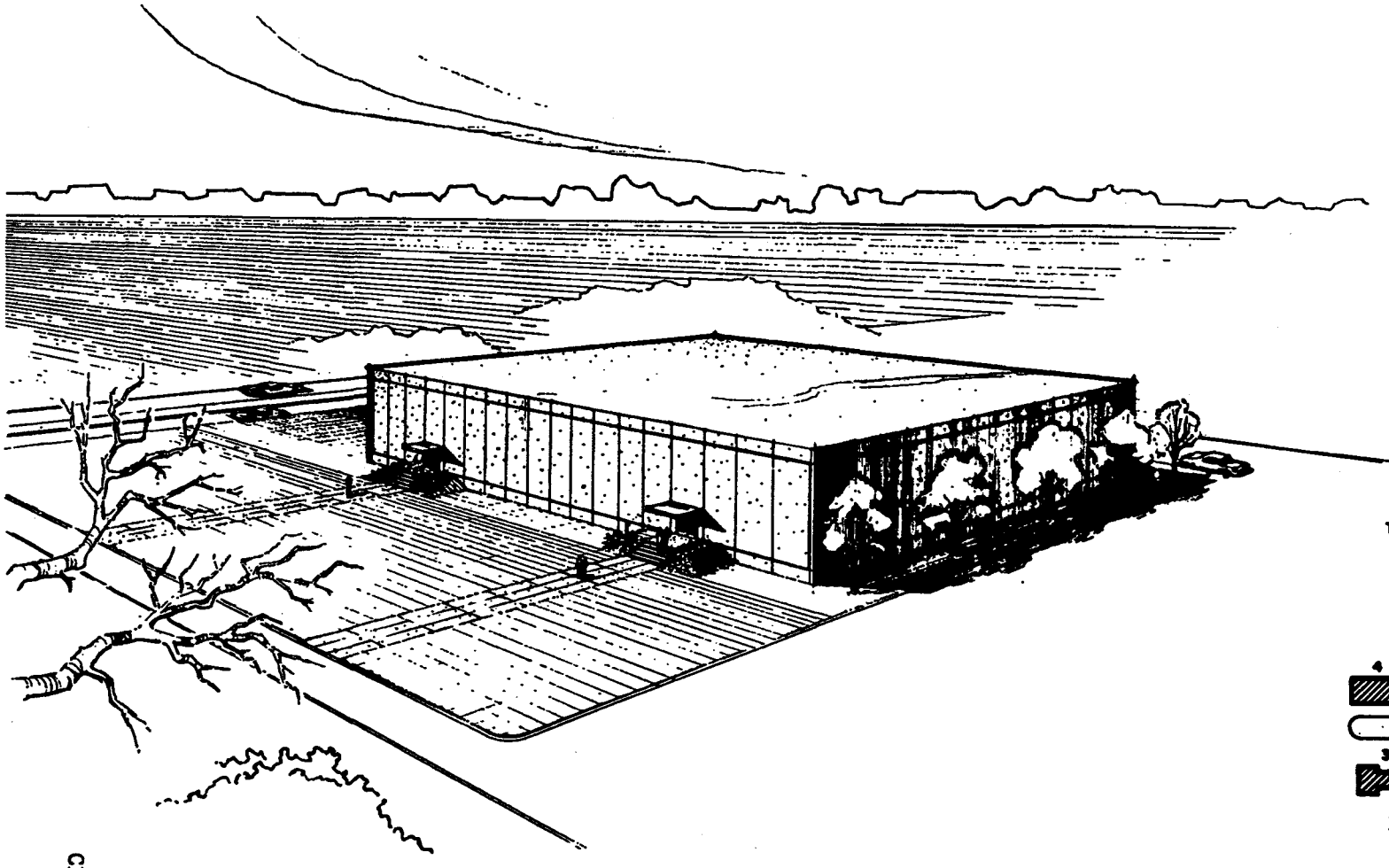
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

Based on current program requirements, no future year funding is anticipated.

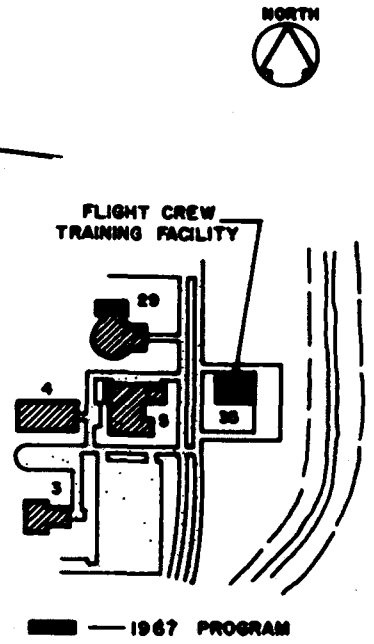
798-050 O-66-14

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

FLIGHT CREW TRAINING FACILITY



PERSPECTIVE

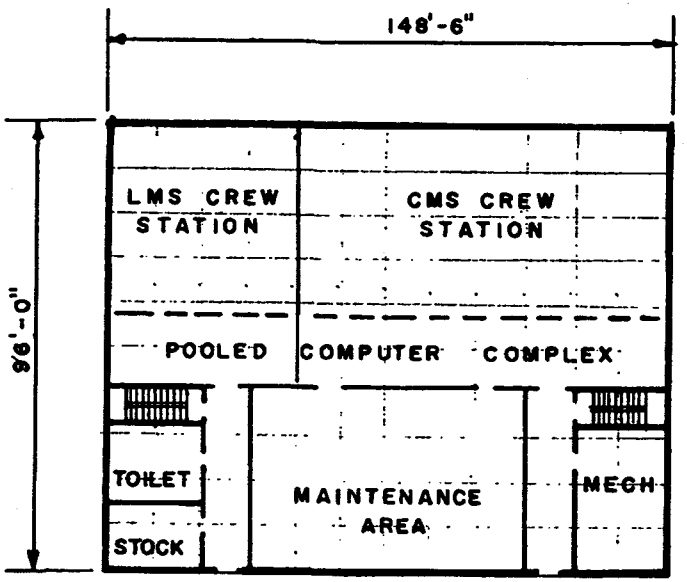


1967 PROGRAM

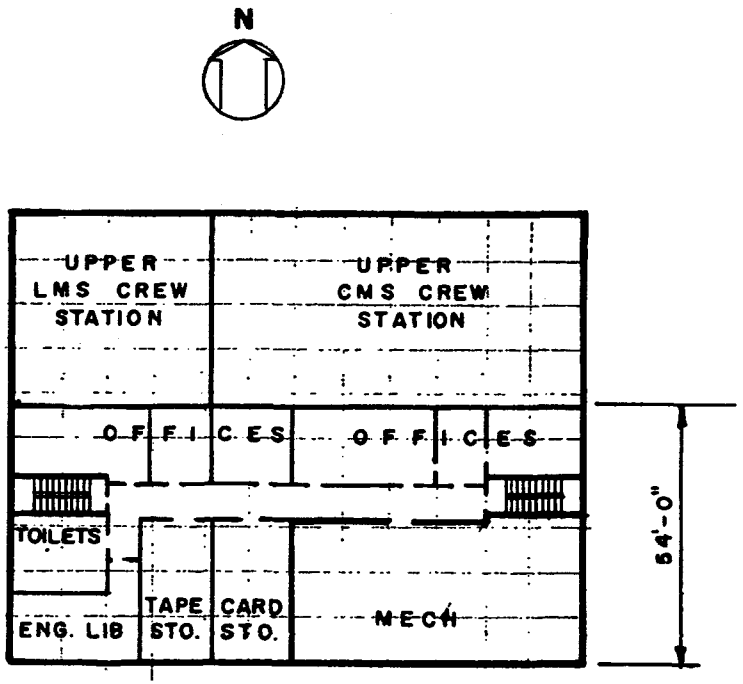
PARTIAL SITE PLAN

CF 7-14

FLIGHT CREW TRAINING FACILITY



FIRST FLOOR PLAN



SECOND FLOOR PLAN

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

ENGINEERING BUILDING

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$145,000
FY 1967 Estimate	2,600,000
Total Funding Through FY 1967	$2,745,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$2,600,000
Site preparation	LS	---	$43,300	43,300
Utilities	LS	---	171,400	171,400
Building	Sq. Ft.	90,112	26.47	2,385,300
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$2,600,000

PROJECT PURPOSE:

This project will provide the Manned Spacecraft Center with administrative type space for Center functions associated with manned space flight mission operations, and the development, test, and evaluation of manned spacecraft systems and subsystems.

PROJECT DESCRIPTION:

The building will be a five story, steel frame precast concrete structure, with a gross area of approximately 90,112 square feet (67,580 net square feet). It will accommodate 704 engineering and administrative personnel. A mechanical room will be provided on the roof and chilled water and steam will be provided from the Central Heating and Cooling Plant.

PROJECT JUSTIFICATION:

The construction of adequate housing for Manned Spacecraft Center personnel has not kept pace with population growth. Firm estimates for the Fiscal Year 1967 time period, based on ceilings established within resources estimates and contracts, either negotiated or currently under negotiation, indicate that engineering-administrative space will be required for 4,065 NASA and other Government agency personnel and 2,838 contractor personnel, for a total of 6,903 spaces. Construction up to and including Fiscal Year 1966 will result in the availability of 528,000 net square feet of space which is not adequate to meet the total requirements. Approximately 550 personnel will continue to be housed in substandard facilities at Ellington Air Force Base. To alleviate the remaining deficiency one or a combination of the following alternatives must be implemented:

Rehabilitate additional, substandard World War II barracks type structures at Ellington Air Force Base.

Lease commercial properties adjacent to Clear Lake, or within the City of Houston.

Construct a new engineering facility which will provide space for 704 personnel resulting in an overall Center factor of 96 square feet per person.

An analysis of the problem leads to the conclusion that the third alternative is the most economical means for meeting housing requirements on a long term basis. It will also result in greater effectiveness and higher productivity of personnel by minimizing dispersion and dislocation of organizational functions.

Increasing the number of personnel at Ellington Air Force Base would require the rehabilitation of additional, substandard, World War II barracks type structures. Experience indicates that the rehabilitation of substandard space to meet this requirement would necessitate an initial expenditure of

$706,230. This estimate does not include the cost of repairs to roads and utilities, or the cost of additional services such as cafeterias, industrial medicine and transportation to and from Clear Lake. Consideration must also be given to the basic unsatisfactory housing these facilities would provide and the high cost required to maintain even minimum standards of safety and habitability.

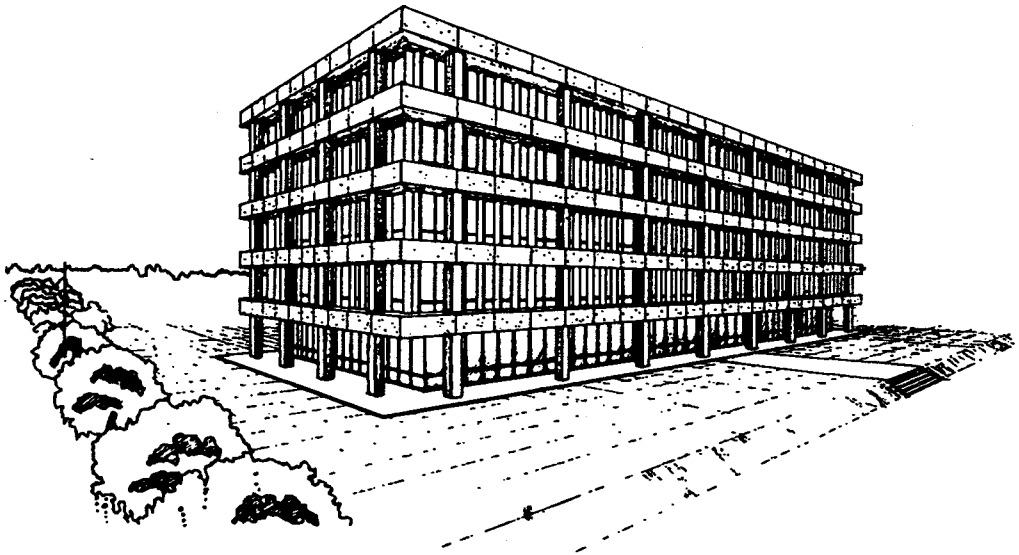
Leasing is also considered to be less economical and effective than construction of a new building. The rental for commercial properties in the Clear Lake area is in excess of $5.00 per square foot per annum; therefore, the cost of a new building can be amortized in about six years. If there are no commercial properties available in the Clear Lake area, the acquisition of facilities within the City of Houston would be necessary. The loss of productivity and efficiency resulting from excess travel time (forty-five minutes each way) is a very important factor that militates against such a scheme.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

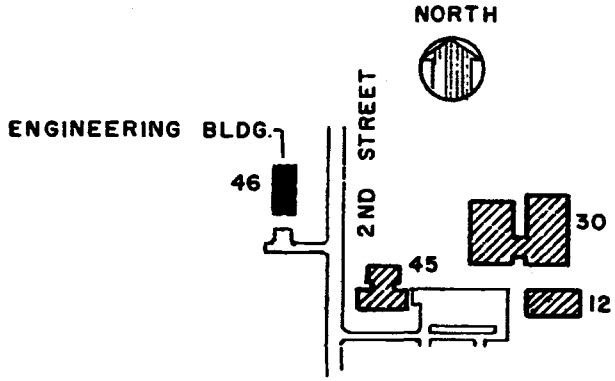
Any additional construction will be requested on a phased basis to provide for deficiencies as they occur in the future.

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

ENGINEERING BUILDING



PERSPECTIVE



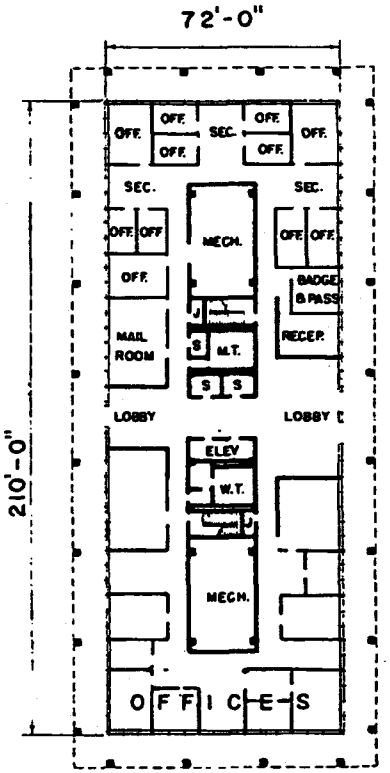
PARTIAL SITE PLAN

200' 0 400' 800'
SCALE IN FEET

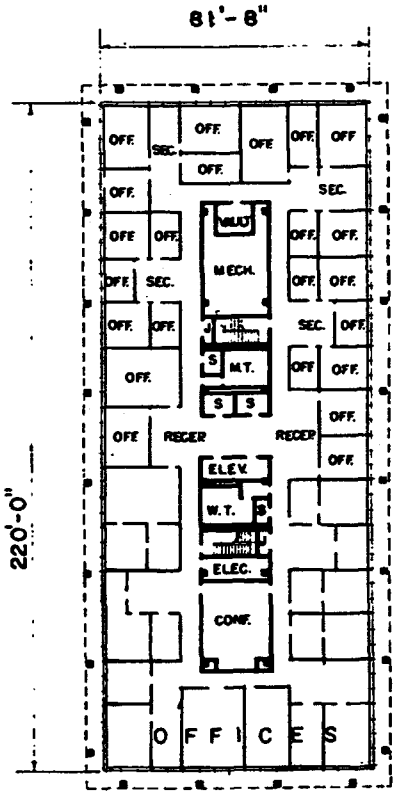
CF 7-19

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

ENGINEERING BUILDING



FIRST FLOOR PLAN



TYPICAL FLOOR PLAN
SECOND THRU FIFTH

PLANS

0 30 60
SCALE IN FEET

CF 7-20

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

CENTER SUPPORT FACILITIES

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$56,000
FY 1967 Estimate	1,000,000
Total Funding Through FY 1967	$1,056,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$354,400
Electrical distribution system extension	LS	---	$148,300	148,300
Central heating and cooling plant extension	Sq. Ft.	8,200	23.96	196,500
Site preparation	LS	---	9,600	9,600
Equipment				$645,600
Boiler and accessories	LS	---	235,100	235,100
Chiller and accessories	LS	---	360,500	360,500
Central mechanical control system	LS	---	50,000	50,000
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,000,000

PROJECT PURPOSE:

This project will provide for necessary additions to existing heating, air conditioning and electrical systems consistent with the development of the Manned Spacecraft Center.

PROJECT DESCRIPTION:

Central Heating and Cooling Plant Extension - This extension will include an addition of approximately 8,200 square feet to the Central Heating and Cooling Plant and the installation of one 60,000 pound/hour steam boiler and one 2,000 ton centrifugal refrigeration unit. Accessory equipment such as a cooling tower, operating and safety controls and piping will be provided. The construction will match the existing steel frame, precast concrete structure. In addition, the existing central mechanical control system will be expanded.

Electrical Distribution System Extension - This extension will provide for the installation of two new 12,470 volt feeders from the main sub-station to the FY 1967 Engineering Building.

PROJECT JUSTIFICATION:

Central Heating and Cooling Plant Extension - Through previous programs a steam capacity of 260,000 pound/hour was provided. The current demand is 238,000 pound/hour of steam which results in an operating factor of 91.5%. Upon completion of the projects included in this program the steam demand will be 272,000 pounds/hour. Therefore, additional boiler capacity is required. In order to approach the maximum operating efficiency of a boiler (83-87%) one 60,000 pound/hour boiler will be sufficient. This will result in an operating factor of 85%. Concurrently, the demand for chilled water will increase to 14,175 tons versus an availability of 14,000 tons. To meet this demand one 2,000 ton centrifugal refrigeration unit is required. This capacity will also allow for continued normal operation if one unit must be temporarily removed for maintenance or repairs.

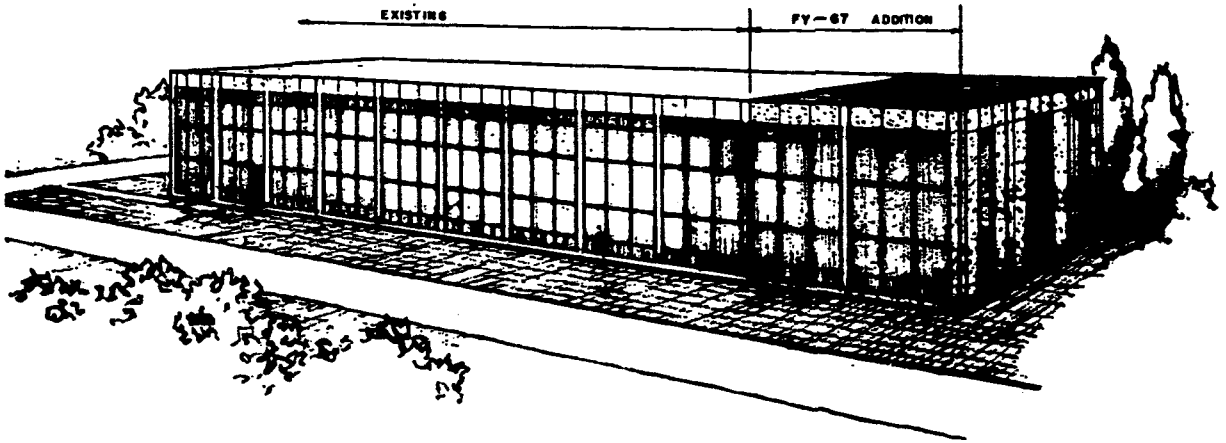
Electrical Distribution System Extension - The existing electrical feeders serving the proposed site for the FY 1967 Engineering Building are operating at maximum capacity. Additional electrical feeders must be provided from the main sub-station to furnish electrical power to this new facility.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

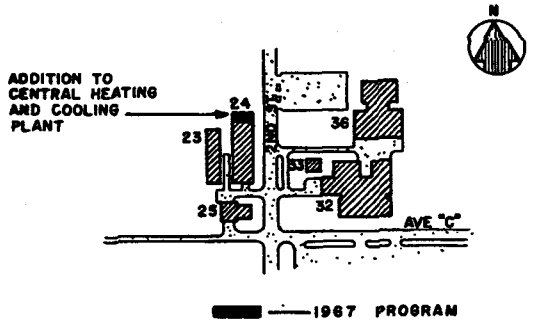
It is anticipated that additional funds will be required to support any future construction programs.

MANNED SPACECRAFT CENTER
FISCAL YEAR 1967 ESTIMATES

CENTER SUPPORT FACILITIES



PERSPECTIVE

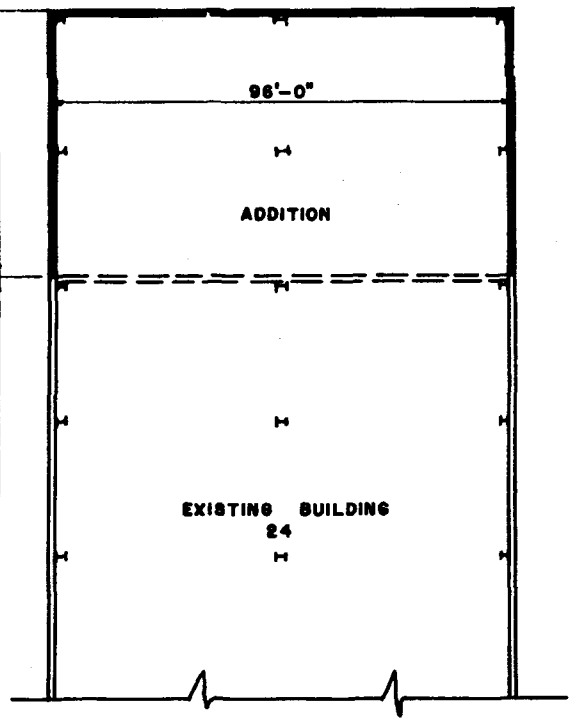


PARTIAL SITE PLAN

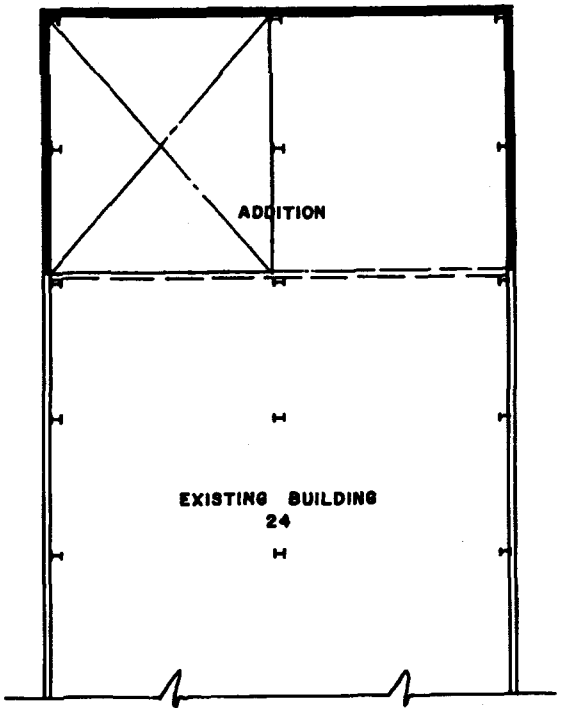
CF 7-24

CENTER SUPPORT FACILITIES

FY-67



FIRST FLOOR PLAN



SECOND FLOOR PLAN

CF 7-25

ADDITION TO CENTRAL HEATING AND COOLING PLANT — PLANS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

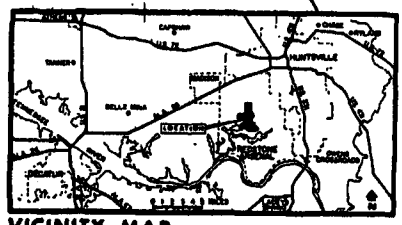
FISCAL YEAR 1967 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



VICINITY MAP

LEGEND

EXISTING FACILITIES

BLDG. NO.	TITLE OR USE
4200	CENTRAL LAB & OFFICE BLDG.
4201	ENGINEERING & ADMINISTRATION
4205	PROJECT ENGINEER OFFICE
4207	CENTRAL COMMUNICATIONS
4241	STORAGE FACILITY
4249	TECHNICAL SERVICES OFFICE
4250	TECHNICAL MAINTENANCE
4309	CAFETERIA
4311	AERO-ASTRODYNAMICS OPERATIONS
4312	SECURITY GUARD UNIT
4313	SERVICE SHOPS
4339	TEST AND DEVELOPMENT SHOP
4352	STORAGE
4350	FUEL TEST STAND
4351	TRAINING
4352	NITROGEN MANUFACTURING
4353	PHOTO LABORATORY
4371	PLANT MAINTENANCE
4372	EQUIPMENT STORAGE
4373	ASTRONICS LABORATORY
4424	FIRE STATION (ARMY)
4430	MOTOR POOL
4471	SPACE MUSEUM, OFFICE & WAREHOUSE
4478	HAZARDOUS OPERATIONS LAB.
4479	ACCELERATION TEST & CALIBRATION
4481	ADMINISTRATION & ENGINEERING
4482	VEHICLE MAINTENANCE SHOP
4483	AUTOMOTIVE MAINTENANCE SHOP
4489	FINANCIAL MANAGEMENT OFFICE
4487	ASTRONICS LABORATORY
4491	AUTOMATIC DATA PROCESSING
4488	ELECTRIC SHOP
4489	MACHINE SHOP
4494	TECHNICAL DOCUMENTATION
4514	LIQUID HYDROGEN TEST STAND
4540	ACOUSTICS MODEL TEST FACILITY
4550	SATURN V DYNAMIC TEST STAND
4557	SATURN I/IB DYNAMIC TEST STAND
4558	DYNAMIC CONTROL CENTER
4581	PROPELLANT SUPPORT SHOP
4584	ENGINE TEST STAND
4585	TEST LABORATORY ENGINEERING
4567	BOILER HOUSE
4570	BLOCK HOUSE
4572	STATIC TEST TOWER
4583	COMPONENTS TEST LABORATORY
4586	COLD CALIBRATION TEST STAND
4610	PROP & VEHICLE ENG. LAB
4611	MATERIALS LABORATORY
4613	COMPRESSOR EQUIPMENT
4615	ENG. OFFICE & SHOP
4616	HYDRAULIC TEST SHOP
4619	TEST UNIT / LOAD TEST ANNEX
4623	ACCELERATION TEST CELLS
4629	LOW TEMPERATURE TEST
4646	GSE BLOCKHOUSE
4650	TEST SHOP & INSTRUMENT LAB.
4653	COMPONENTS SUPPORT SHOP
4686	F-1 PREPARATION SHOP
4686	GSE ASSEMBLY BUILDING
4663	COMPUTATION LABORATORY
4666	TEST LAB ENGINEERING
4667	INDUSTRIAL WATER PUMP HOUSE
4670	SATURN V STATIC TEST STAND
4679	WEST AREA BLOCK HOUSE
4696	F-1 ENGINE TEST STAND
4705	ASSEMBLY SHOP
4707	STRUCTURE FABRICATION SHOP
4708	QUALITY ASSURANCE LAB
4710	LIQUID HYDROGEN TEST STAND
4711	PRECISION MACHINE SHOP
4718	MANUFACTURING ENG. LAB.
4723	FIELD MATERIALS TESTING LAB.
4725	STEAM PLANT (ARMY)
4727	MACHINE SHOP
4728	COMPONENT TEST SHOP
4736	AERO-ASTRODYNAMICS FACILITY
4741	BERYLLIUM LAB
4746	TEST LAB. & OFFICES
4747	COMPRESSOR STATION
4748	LIQUID PROPELLANT TEST STAND
4750	HIGH ALTITUDE TEST CHAMBER
4732	COMP & SUB-ASSEMBLY SHOP
4788	HANGER FOR VEHICLE COMP
4780	SURFACE TREATMENT PLANT

FACILITIES AUTHORIZED & UNDER CONSTRUCTION

1. COMPONENTS TEST FACILITY
2. EXTENSION TO LOAD TEST ANNEX
3. UTILITIES INSTALLATION
4. EXPANSION & MODERNIZATION OF INSTRUMENTATION OF H.P GAS AND PROPELLANT SYSTEM
5. MODERNIZATION OF INSTRUMENTATION SYSTEM IN EAST AREA
6. ADDITIONS TO COMMUNICATIONS BUILDING
7. EXTENSIONS TO SATURN V GROUND SUPPORT EQUIP TEST FACILITY
8. EXTENSION OF COMPONENTS TEST FACILITY INSTRUMENTATION
9. SATURN SUPPORT TEST AREA
10. EXTENSION TO UTILITY SYSTEM
11. EXTENSION TO THE PROPULSION AND VEHICLE ENGINEERING LABORATORY
- 12. TEST ENGINEERING BUILDING EXTENSION
- 13. ADDITIONS TO MATERIALS LABORATORY
- 14. NON-DESTRUCTIVE TESTING LABORATORY

*FY-1966 PROJECTS

PROPOSED FISCAL YEAR 1967 PROJECTS

1. HAZARDOUS OPERATIONS LAB ADDITION

N

SCALE IN FEET

CF 8-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Marshall Space Flight Center	Manned Space Flight	Huntsville, Alabama	Madison	Huntsville, Alabama

INSTALLATION MISSION

The mission of the Marshall Space Flight Center is to develop launch vehicles, engines and vehicle systems for Manned Space Flight programs. The Center also performs advanced studies and research in the general field of astronautics.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL (End of Year)	7431	7074	6997
CONTRACTOR AND OTHER PERSONNEL	5588	5381	5335
TOTAL ALL PERSONNEL	13019	12455	12332

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	1797
NON-FEDERAL (Leases, easements)	64
TOTAL LAND	1861

TOTAL CAPITAL INVESTMENT* (Including NASA-Owned Land) (as of June 30, 1965)	$ 319,555

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1961 THRU CURRENT YEAR	FY 1967 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Hazardous Operations Laboratory Addition	MSF	691	581		1,272
ALL OTHER PROJECTS		139,295			
TOTALS		139,986	581		

CE 8-2

NASA FORM 1029 (REV. JUN 65) PREVIOUS EDITIONS ARE OBSOLETE.

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

HAZARDOUS OPERATIONS LABORATORY ADDITION

AUTHORIZATION LINE ITEM: Marshall Space Flight Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Huntsville, Madison County, Alabama

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Extension

FUNDING:

FY 1966 and Prior Years	$691,000
FY 1967 Estimate	581,000
Total Funding Through FY 1967	$1,272,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$463,000
Building	Sq. Ft.	5,790	$25.39	147,000
Special air conditioning	LS	---	98,000	98,000
Special power	LS	---	93,000	93,000
Special piping	LS	---	49,000	49,000
Site development	LS	---	26,000	26,000
Utilities	LS	---	42,000	42,000
Sheltered test pad	Sq. Ft.	900	8.89	8,000
Equipment				$118,000
Dewars and laboratory equipment	LS	---	118,000	118,000
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$581,000

PROJECT PURPOSE:

This project will provide safe and adequate laboratory space for the development of improved instrumentation associated with hazardous fuels, acoustic loads, and vehicle fire detection systems and to continue development and improvement of primary power sources.

PROJECT DESCRIPTION:

The project provides for the construction of a 5,790 square foot addition to the Hazardous Operations Laboratory. The addition will be subdivided into six separate test preparation rooms. Test cells adjoining the laboratory will be used in conjunction with experiments involving RP-1 fuel, temperature, acoustics, plasma, flame, liquid hydrogen and fuel cells.

In addition, a 900 square foot covered test pad with a hydrogen storage tank will be provided north of the building for testing and calibration of measuring systems using liquid hydrogen. The preparation rooms will be of concrete block construction with air conditioning, tile floors and acoustical ceilings. The test cells will be constructed of reinforced concrete. Due to the hazardous materials that are used in the test area, all electrical installations will be explosion proof and special air conditioning will be installed to provide a minimum of twenty air changes per hour.

Special laboratory services will be provided, including special electrical power, compressed air, nitrogen, gaseous and liquid hydrogen and oxygen. Equipment will include test dewars and laboratory benches.

PROJECT JUSTIFICATION:

This facility is required for the development of accurate and reliable in-flight instrumentation. Such instrumentation is of prime importance to the space program since it affords the only means of evaluating performance. As more complex space projects are formulated, space vehicles with greater design sophistication will have to be fabricated. More sensitive instrumentation will be required to monitor the new performance characteristics under progressively difficult environmental conditions. To carry out its managerial role in connection with propulsion and flight vehicle systems, Marshall Space Flight Center must have the capability of evaluating and validating the performance and accuracy of instrumentation offered by many manufacturers in order to determine the products that are most suited for

798-050 O-66-16

incorporation into space vehicle systems. The Center must also have the capability of conducting research and development leading to improved sensors and measuring probes as well as determining methods of properly evaluating these products.

At the present time, this effort is severely hampered because the Center does not have facilities for conducting work in the areas of improved instrumentation associated with fuels, acoustics, vibration, high temperature thermal sensing and the improvement of power sources. Limited work on acoustics and vibration instrumentation is now carried out in a portion of an existing laboratory; however, the full capability of the sound generating equipment cannot be employed due to the structural characteristics of the building and the hazard that would be imposed on the occupants. Work with RP-1 fuels is now done in a small wood frame building which is badly crowded and lacks even the minimal safeguards that are normally provided for this type of work.

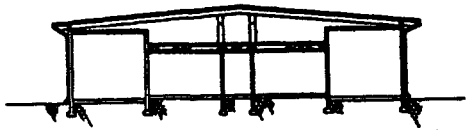
The addition to the Hazardous Operation Laboratory will provide the space required for the several areas of investigation and will incorporate the safety features that are needed to safeguard operating personnel and occupants of nearby areas.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MARSHALL SPACE FLIGHT CENTER

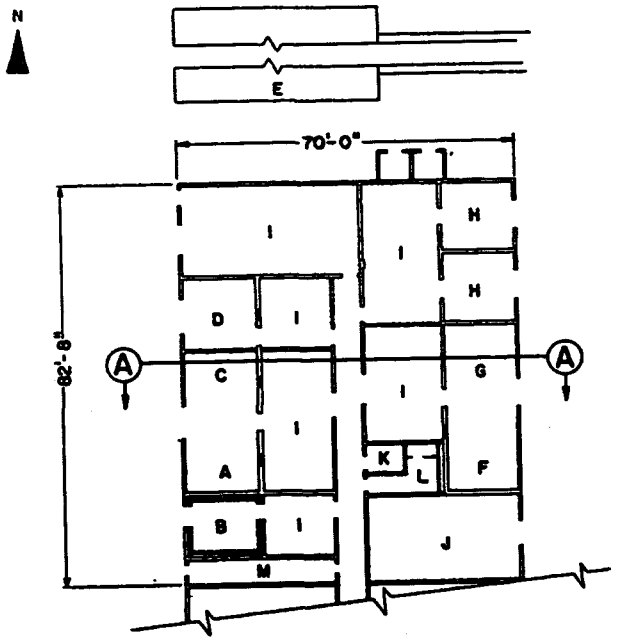
FISCAL YEAR 1967 ESTIMATES

HAZARDOUS OPERATIONS LABORATORY ADDITION



SECTION A-A

PERSPECTIVE

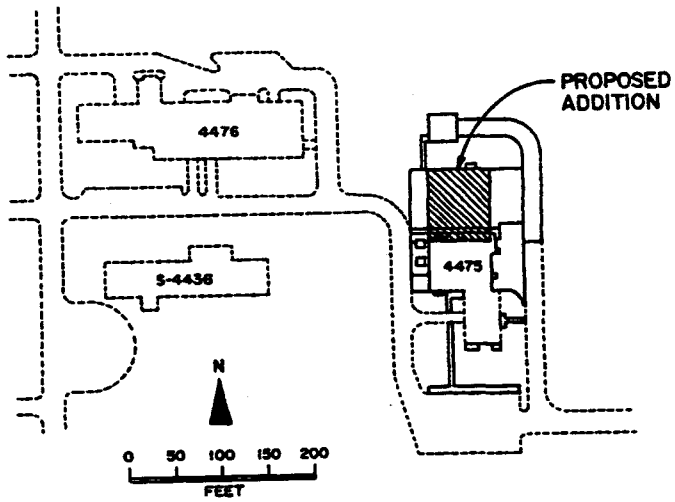


FLOOR PLAN

0 10 20 30 40
FEET

LEGEND

- A TEMPERATURE TEST CELLS
- B ACOUSTIC TEST CELL
- C PRESSURE TEST CELL
- D R.P.I. TEST CELL
- E LH_2 PAD
- F PLASMA TEST CELL
- G FLAME TEST CELL
- H FUEL CELL TEST CELLS
- I PREPARATION ROOMS
- J MECHANICAL EQUIPMENT ROOM
- K JANITOR ROOM
- L REST ROOM
- M BOTTLE STORAGE ROOM



SITE PLAN

MICHOUD ASSEMBLY
FACILITY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

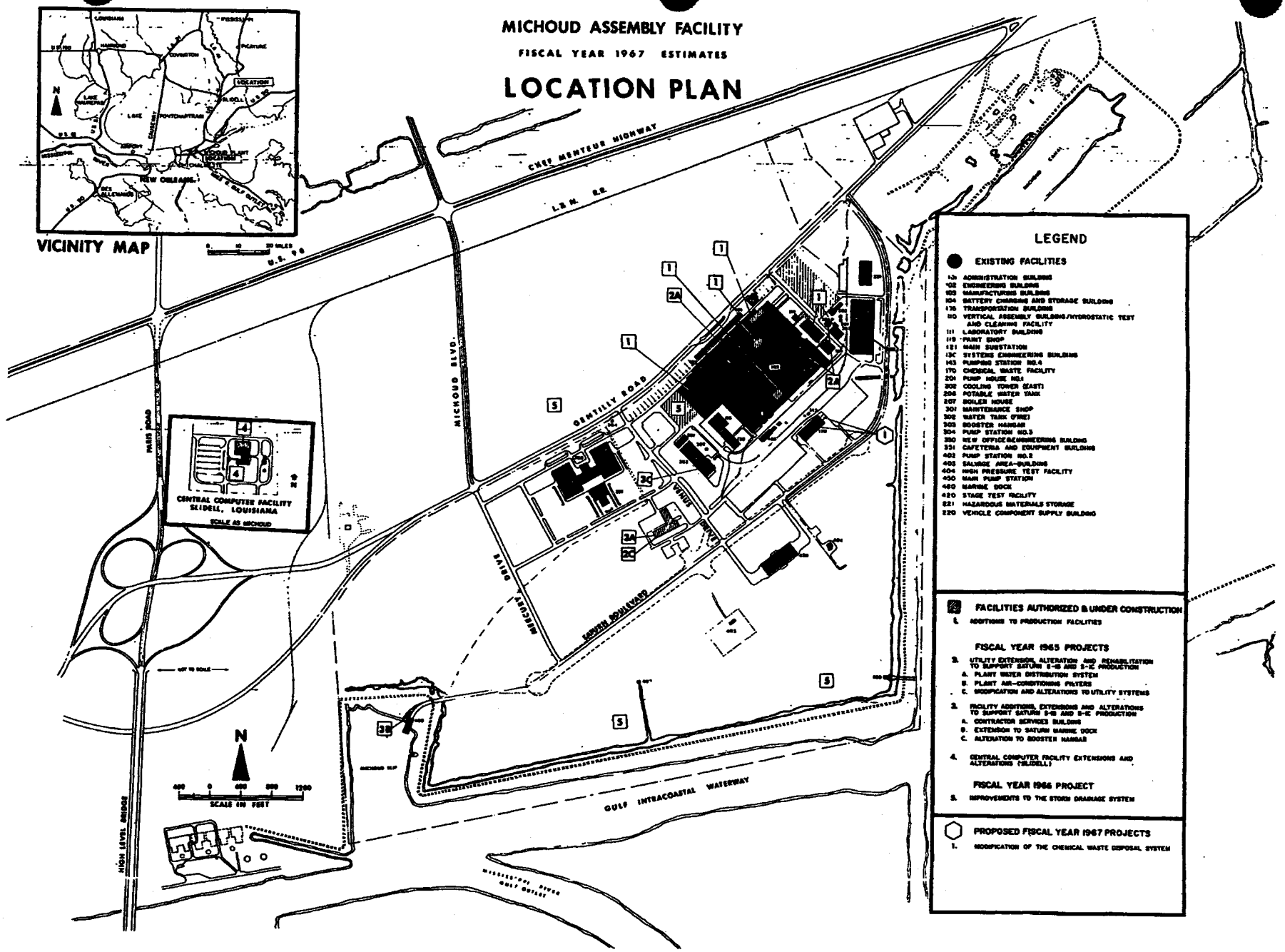
FISCAL YEAR 1967 ESTIMATES

MICHOUD ASSEMBLY FACILITY

MICHOUD ASSEMBLY FACILITY

FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Michoud Assembly Facility	Manned Space Flight	New Orleans, La.	Orleans Parish	New Orleans, La.

INSTALLATION MISSION

The mission of the Michoud Assembly Facility is the manufacturing of the first stages of the Saturn family of launch vehicles.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	280	295	295
CONTRACTOR AND OTHER PERSONNEL	11455	11313	11016
TOTAL ALL PERSONNEL	11735	11608	11311

LAND	NO. ACRES
NASA-OWNED	905
OTHER GOVERNMENT AGENCY-OWNED	6
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	911

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 117,617

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1962 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Modification of the Chemical Waste Disposal System	MSF	32	700		732
ALL OTHER PROJECTS		42,852			
TOTALS		42,884	700		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

MODIFICATION OF THE CHEMICAL WASTE DISPOSAL SYSTEM

AUTHORIZATION LINE ITEM: Michoud Assembly Facility

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: New Orleans, Orleans Parish, Louisiana

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION: New, Alteration

FUNDING:

FY 1966 and Prior Years	$32,000
FY 1967 Estimate	700,000
Total Funding Through FY 1967	$732,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$557,400
Deep well	LS	---	$254,600	254,600
Surface piping	LS	---	13,500	13,500
Rehabilitate existing well	LS	---	54,800	54,800
Rehabilitate existing collecting system	LS	---	220,000	220,000
Modification of holding pond	LS	---	14,500	14,500
Equipment				$142,600
Pump and gas engine	LS	---	115,300	115,300
Filters	LS	---	27,300	27,300
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$700,000

PROJECT PURPOSE:

This project will provide for the added capacity required for the chemical waste disposal system at the Michoud Assembly Facility.

PROJECT DESCRIPTION:

The project includes all work necessary to provide an adequate industrial waste disposal system consisting of an injection well approximately 6,650 feet deep, installation of a corrosion resistant pump and piping for 400 gallons per minute (GPM) service at 1,500 pounds per square inch pressure. Rehabilitation of the existing injection well, collecting system and holding pond are also included.

PROJECT JUSTIFICATION:

The disposal of certain by-products of booster manufacturing processes, such as chromium, cyanides, acids and alkalies, into natural drainage areas is prohibited. Such wastes must be treated or neutralized or disposed of by other methods.

The chemical wastes that generate at the Michoud plant are presently disposed of by deep well injection. They are collected in a 1,500,000 gallon holding pond at the rear of the plant and are then pumped into a 6,650 foot well by two 200 GPM pumps which are connected in parallel. The injection is made below the 5,700 foot level in compliance with Federal and State antipollution requirements.

Operating experience has shown that the present well cannot continuously accept the 400,000 gallons per day (GPD) of chemical waste that is being generated. During a 545 day operating period between February 1964 and July 1965, the system has been out of service 123 days or 22.6% of the time. During the disposal cycle it has been found that the pump head pressure gradually increases to the point where it is necessary to shut down the operation and clear the well by acid and water injections. During this operation chemical wastes continue to accumulate.

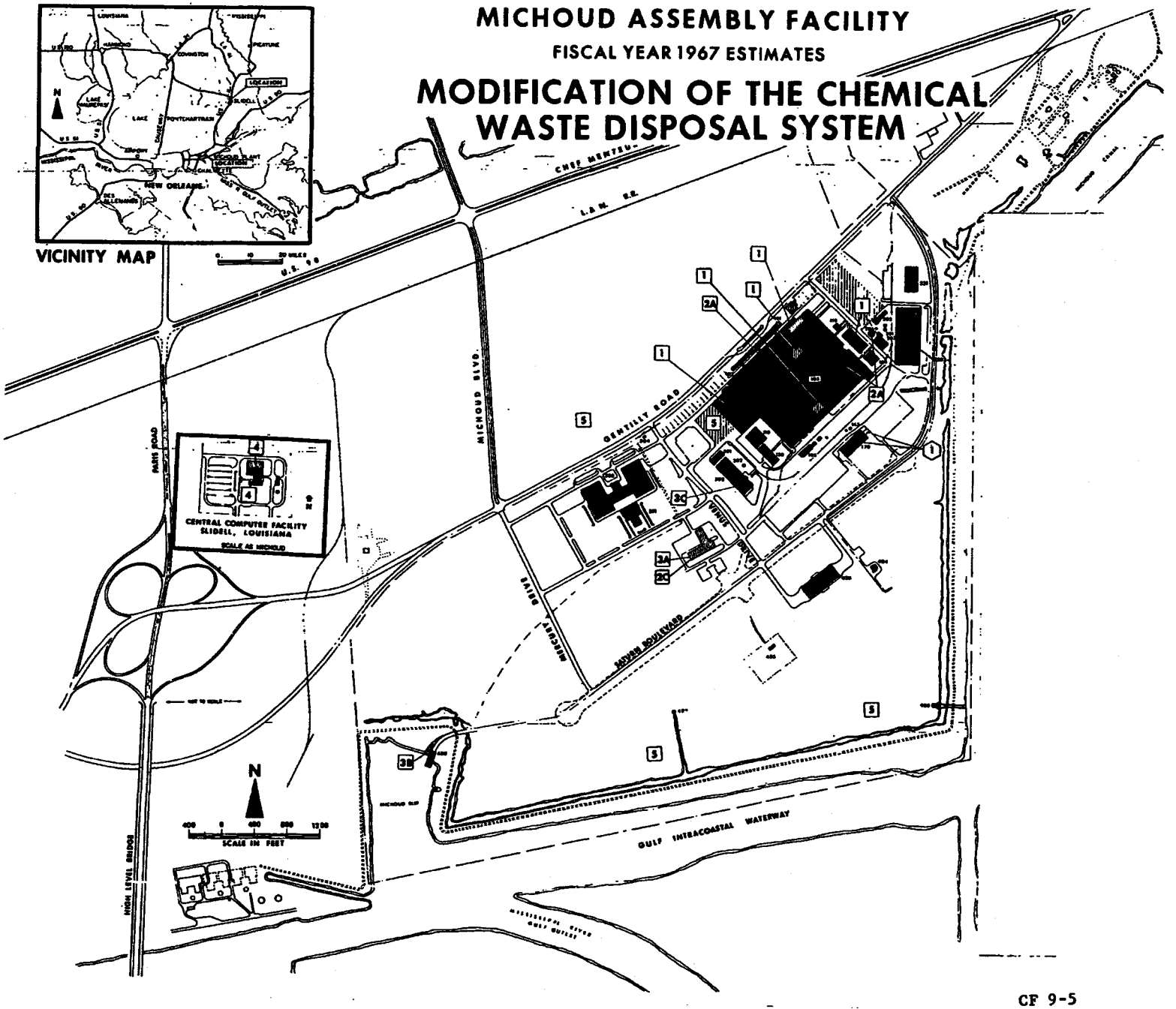
To determine the best solution to this problem a study was made of several methods of disposing of the chemical waste. These included neutralization, ion exchange and barge haulout. It was concluded that rehabilitation of the existing well together with additional injection capacity offered the most practicable, reliable and economical means of disposing of this waste. This project provides for the construction of the required added capacity.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MICHOUD ASSEMBLY FACILITY

FISCAL YEAR 1967 ESTIMATES

MODIFICATION OF THE CHEMICAL WASTE DISPOSAL SYSTEM



CF 9-5

798-050 O-66 (Face blank p. 254)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

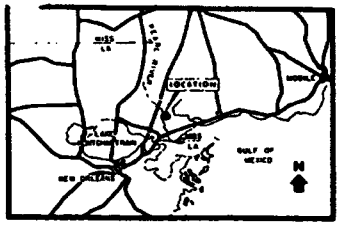
FISCAL YEAR 1967 ESTIMATES

MISSISSIPPI TEST FACILITY

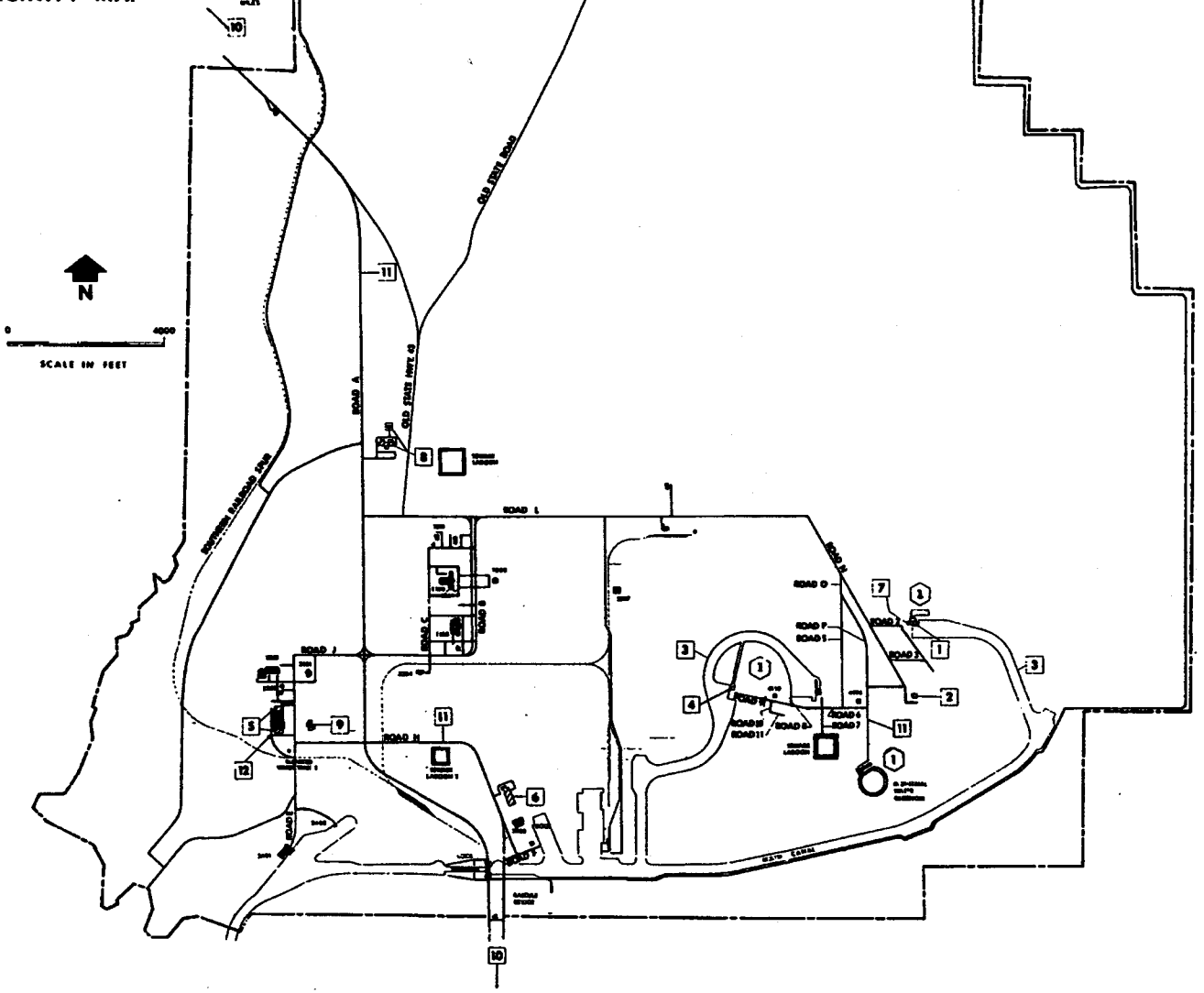
MISSISSIPPI TEST FACILITY

FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



VICINITY MAP



LEGEND

EXISTING FACILITIES

1000	DATA HANDING CENTER
1100	LAB AND ENGINEERING BUILDING
1103	ELECTRONICS, INSTRUMENTATION & MATERIALS LAB
1110	ACOUSTICS BUILDING
1200	TEST AREA CONTROL CENTER
1201	TELEPHONE BUILDING
2101	EMERGENCY SERVICE BUILDING
2201	SITE MAINTENANCE BUILDING
2202	COMPRESSED GAS CYLINDER STORAGE BUILDING
2203	INFLAMMABLE MATERIALS STORAGE BUILDING
2204	WAREHOUSE
2205	TEST MAINTENANCE BUILDING
2401	CONSTRUCTION DOCK
2402	RP-1 TRANSFER DOCK
3101	SECURITY CONTROL CENTER (SOUTH)
3201	CRYOGENICS MARINE SERVICE BUILDING
3202	S-IC STAGE STORAGE BUILDING
3204	CENTRAL HEATING PLANT
3205	CENTRAL COMPRESSOR BUILDING
3307	RP-1 CENTRAL STORAGE
4110	S-II CONTROL CENTER
4122	S-II TEST STAND (FIRST)
4400	HIGH PRESSURE INDUSTRIAL WATER PUMPING STATION
4999	DATA ACQUISITION CENTER
	BASCULE BRIDGE
	INDUSTRIAL WATER RESERVOIR
	NAVIGATION LOCK
	ELEVATED WATER TANK NO 1
	SEWAGE LAGOONS
	RAILROADS
	DOCK
7001	SECURITY CONTROL CENTER (NORTH)
8201	METEOROLOGICAL BUILDING

CONSTRUCTION

FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

1	S-IC TEST STAND (FIRST POSITION 220-B)
2	S-IC TEST CONTROL CENTER
3	TEST AREA WATERWAYS
4	S-II TEST STAND (SECOND)
5	WAREHOUSE ADDITIONS
6	S-II STAGE CHECKOUT AND STORAGE FACILITY
7	S-IC TEST STAND (SECOND POSITION 220-A)
8	COMPONENTS SERVICE FACILITIES
9	MOBILE EQUIPMENT OPERATIONS BUILDING
10	ACCESS ROADS (OUTSIDE FEE AREA)
11	AREA ROADS
12	SALVAGE MATERIALS STORAGE BUILDING

PROPOSED FISCAL YEAR 1967 PROJECTS

1. FACILITIES TO SUPPORT S-IC AND S-II TEST PROGRAM

798-030 O-66 (Face blank p. 236)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Mississippi Test Facility	Manned Space Flight	Pearl River, Miss.	Hancock	Bay St. Louis, Miss.

INSTALLATION MISSION

The mission of the Mississippi Test Facility is the static test firing of large vehicle stages and propulsion systems.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	43	120	120
CONTRACTOR AND OTHER PERSONNEL	1729	3440	2513
TOTAL ALL PERSONNEL	1772	3560	2633

LAND	NO. ACRES
NASA-OWNED	20,996
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	117,874
TOTAL LAND	138,870

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 164,854

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1963 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Facilities to Support S-IC and S-II Test Program	MSF	133,355	1,700		135,055
ALL OTHER PROJECTS		101,867			
TOTALS		235,222	1,700		

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* *Includes work in process.*

798-050 O-66-17

CF 10-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FACILITIES TO SUPPORT S-IC AND S-II TEST PROGRAM

AUTHORIZATION LINE ITEM: Mississippi Test Facility

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Hancock County, Mississippi

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Modifications and Extensions

FUNDING:

FY 1966 and Prior Years	$133,355,000
FY 1967 Estimate	1,700,000
Total Funding Through FY 1967	$135,055,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,095,000
S-IC dual test stand	LS	---	$77,000	77,000
High pressure water system	LS	---	556,000	556,000
High pressure gas system	LS	---	462,000	462,000
Equipment				$605,000
Tech system, S-IC stand and Test Control Center	LS	---	371,000	371,000
Tech system, 2nd S-II stand and Test Control Center	LS	---	167,000	167,000
Data Acquisition Facility	LS	---	67,000	67,000
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,700,000

PROJECT PURPOSE:

This project will provide additions and modifications to the Saturn V facilities to accommodate changes in the test programs for the S-IC and S-II stages.

PROJECT DESCRIPTION:

The project provides for modifications to the S-IC dual stand flame deflectors, additions to the high pressure water and high pressure gas systems and the procurement and installation of additional data acquisition equipment in the S-IC stand, the 2nd S-II stand, the Test Control Centers and the Data Acquisition Facility.

The water deluge system which serves the flame deflectors on the S-IC stand will be improved by the addition of 20,000 - 5/32 inch holes in the manifold plates of each deflector. The joints between the bottoms and sides of the deflectors will be modified so that cooling water can be applied directly to these areas. A 33,385 gallon per minute (GPM) pump will be installed in the High Pressure Industrial Water Facility to provide additional cooling water. Two 1,500 cubic foot 6,000 pounds per square inch (psi) gas storage vessels will be added to satisfy requirements for helium and nitrogen at the S-II test stand. X-Y recorders, signal conditioning equipment with the required power supply and cable assemblies will be installed in the S-IC test stand, the second S-II stand, the Test Control Centers and the Data Acquisition Facility.

PROJECT JUSTIFICATION:

During 1965 the S-IC All Systems Stage (S-IC-T) was successfully fired at Huntsville, the S-II Battleship stage was tested at Santa Susana and the All Systems S-II Stage (S-II-T) is currently undergoing tests at the Mississippi Test Facility. The experience gained from these testing programs dictates certain changes in the S-IC and S-II facilities at the Mississippi Test Facility (MTF).

During tests conducted at Marshall Space Flight Center (MSFC) it was found that the flame patterns varied from initial predictions and portions of the deflector became overheated. To correct this condition additional water outlets were provided in the manifold plates. As the MTF deflectors are patterned after the deflector on the S-IC stand at MSFC the same problem will occur. To assure that the needed cooling is provided at the proper location the additional water outlets will not be drilled until the first firing has taken place and the resulting flame pattern has been established.

The additional 33,385 GPM pump is needed to supply the required cooling water flow for S-IC test stand deluge system. Based on successive tests at MSFC, it is known that a flow of 359,500 gallons per minute is required for proper cooling of the flame deflector. The existing ten pump plant has a rated capacity of 333,850 gallons per minute. During initial operation the required flow will be provided by running the pumps above normal speeds. This, however, is an interim solution which requires all pumps to be in service at the time of test. An additional pump will provide the needed capacity, allow repair or maintenance to be undertaken in a normal manner and will safeguard against testing delay. The foundation and a portion of the piping for an additional pump was provided as part of the existing High Pressure Industrial Water Facility.

The experience gained during the testing of the S-II battleship stage demonstrated the need for greater quantities of both nitrogen and helium for purging, cleaning, pressurizing the fuel tank and lines, and operating the controls. The existing high pressure gas system cannot provide the needed supply unless ten hours is allowed between vehicle checkout and firing for the recharging of the gas storage vessels. Holds of this duration tend to invalidate the checkout operation and jeopardize the success of the test. With the installation of two additional storage vessels, recharging of the system will not be necessary. Tests will progress directly from checkout to firing and the total test time will be shortened.

To achieve greater reliability and improved performance of flight vehicles, more measurements of temperatures, pressures, and flow are needed than can be obtained with the instrumentation that is now installed in the test stands. To provide this information it is necessary that additional types of recorders, together with signal conditioning equipment, power and associated cabling be installed in the Test Stands, Test Control Centers, and the Data Acquisition Facility.

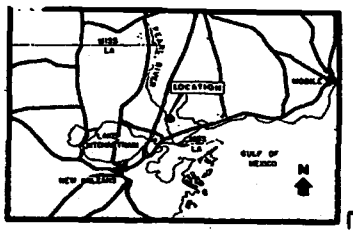
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:

None for this project. An estimated $1.5 million per year will be required for changes to the test stands and supporting systems resulting from changes in booster configuration and test programs.

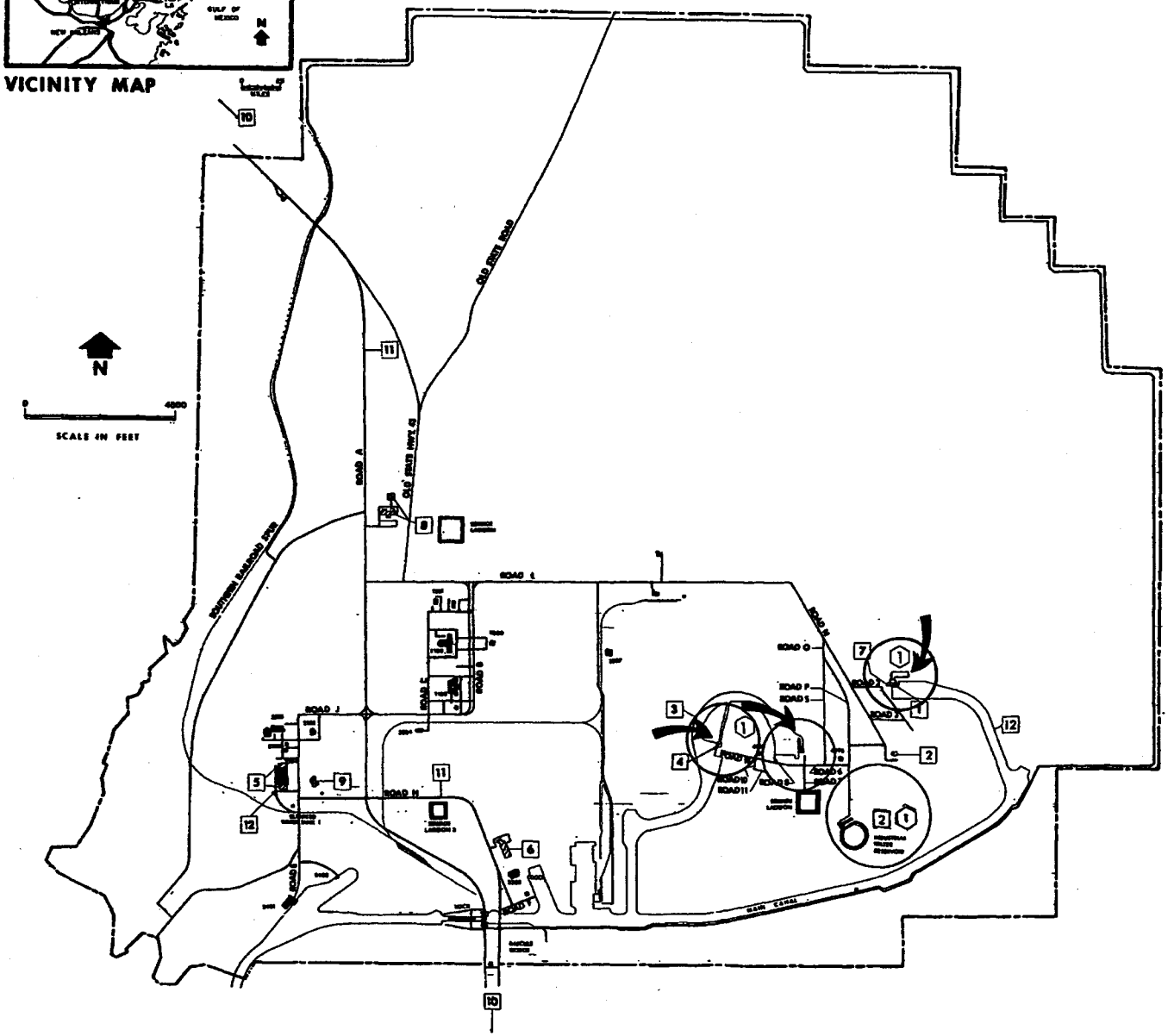
MISSISSIPPI TEST FACILITY

FISCAL YEAR 1967 ESTIMATES

FACILITIES TO SUPPORT S-IC AND S-II TEST PROGRAM



VICINITY MAP



798-050 O-66 (Face blank p. 264)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

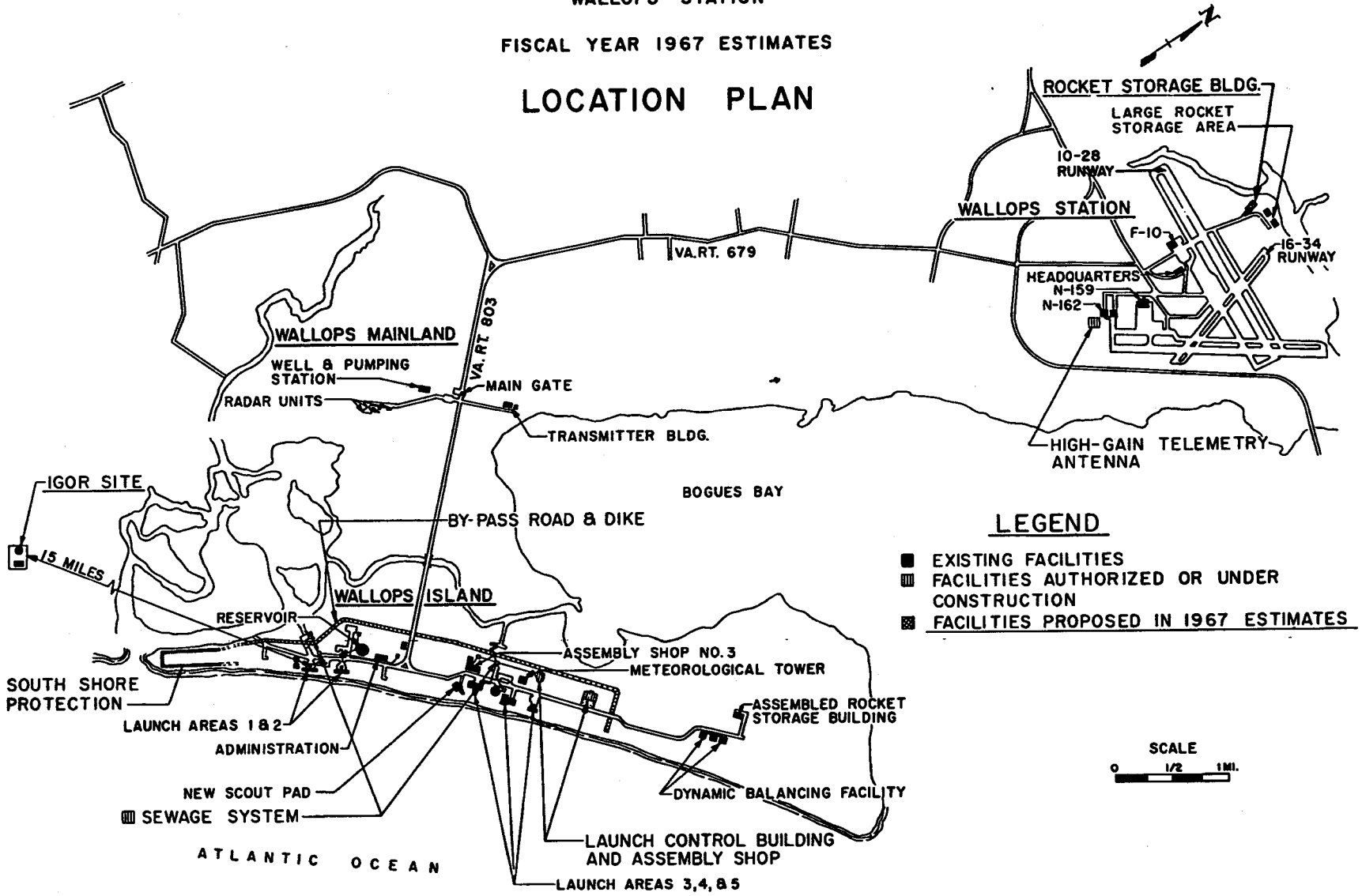
FISCAL YEAR 1967 ESTIMATES

WALLOPS STATION

WALLOPS STATION

FISCAL YEAR 1967 ESTIMATES

LOCATION PLAN



CF 11-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Wallops Station	Space Science and Applications	Eastern Shore of Virginia	Accomack	Salisbury, Maryland

INSTALLATION MISSION

The basic mission of the Station is to prepare, assemble, and launch scientific experiments, achieve the desired position, and velocity in space, track and acquire and record the data sought. These data are processed, analyzed, and reduced to meaningful form.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*	555	530	530
CONTRACTOR AND OTHER PERSONNEL	254	355	430
TOTAL ALL PERSONNEL	809	885	960

LAND	NO. ACRES
NASA-OWNED	6,561
OTHER GOVERNMENT AGENCY-OWNED	-
NON-FEDERAL *(Leases, easements)*	9
TOTAL LAND	6,570

TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ 75,323

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Rocket Storage Magazine	SSA	10	205	-	215
ALL OTHER PROJECTS		37,083			
TOTALS		37,093	205		

CF 11-2

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

ROCKET STORAGE MAGAZINE

AUTHORIZATION LINE ITEM: Wallops Station

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Wallops Station, Accomack County, Virginia

COGNIZANT NASA INSTALLATION: Wallops Station

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$10,000
FY 1967 Estimate	205,000
Total Funding Through FY 1967	$215,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$205,000
Site improvement	LS	---	$30,590	30,590
Utilities	LS	---	28,910	28,910
Building	Sq. Ft.	12,000	12.13	145,500
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$205,000

PROJECT PURPOSE:

This facility will provide approximately 12,000 square feet of additional enclosed magazine space for the storage of solid-propellant rocket motors, increasing the Wallops Station storage capability from 20,000 to 32,000 square feet.

PROJECT DESCRIPTION:

This 12,000 square foot storage building will be located in the Wallops Station main base magazine area north of the landing strip suitably isolated from existing magazines and population in accordance with the quantity-distance criteria for explosive storage. Convenient access to the Wallops Station airport will be provided to accommodate air delivery and shipping of boosters and assembled vehicle systems such as Scout. Provision of heat, insulation and forced ventilation will be included in order to maintain the storage temperature environment between 50° and 90° Fahrenheit. Suitable doors, access road, lighting, alarm systems and lightning arrestors will be incorporated.

PROJECT JUSTIFICATION:

High performance solid propellant formulations used in sounding rockets and Scout Launch Vehicle stages such as the Algol, Castor I and II, the X-254, X-258, X-259, Lance, Aerojet Jr., and Alcor motors require storage between 50° and 90° Fahrenheit in order to guarantee their reliability and repeatability of performance.

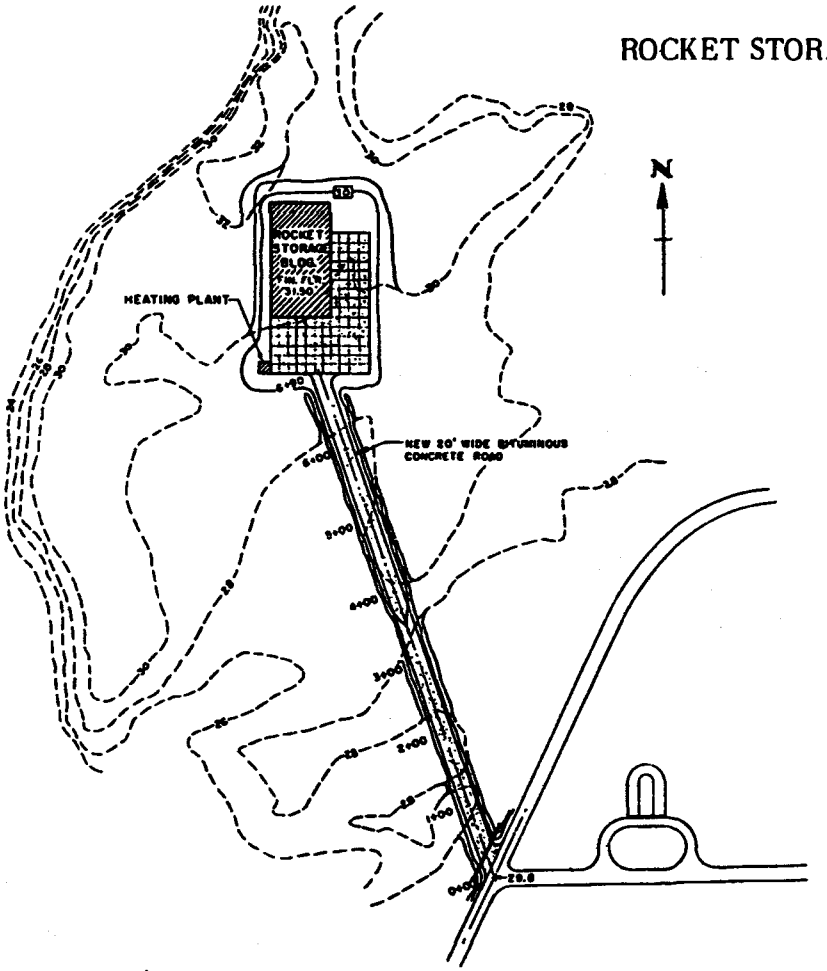
The original environmentally controlled storage magazine constructed in 1962 and the adjoining storage shed totaling 20,000 square feet of storage space are no longer capable of meeting the full storage requirements because of the increased use of the higher performance rocket motors which must be maintained at a fairly constant temperature. This, coupled with the single point assembly and checkout of the Scout Launch Vehicle, has increased the Rocket Storage Magazine area requirement to approximately 32,000 square feet. An inventory level of approximately 85 boosters and several assembled Scout Launch Vehicles on transporters are involved.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

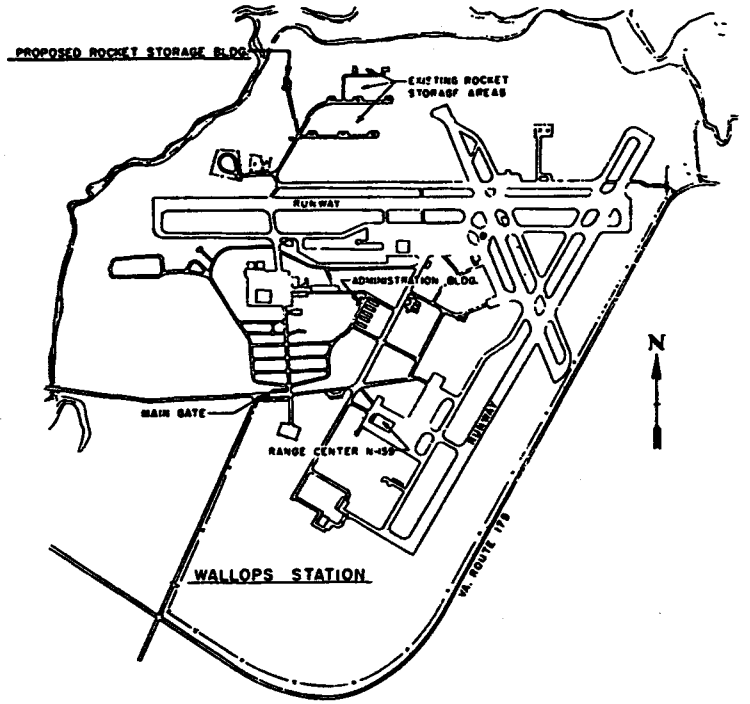
798-050 O-66-18

WALLOPS STATION
FISCAL YEAR 1967 ESTIMATES

ROCKET STORAGE MAGAZINE



SITE PLAN
SCALE: 1" = 80'-0"

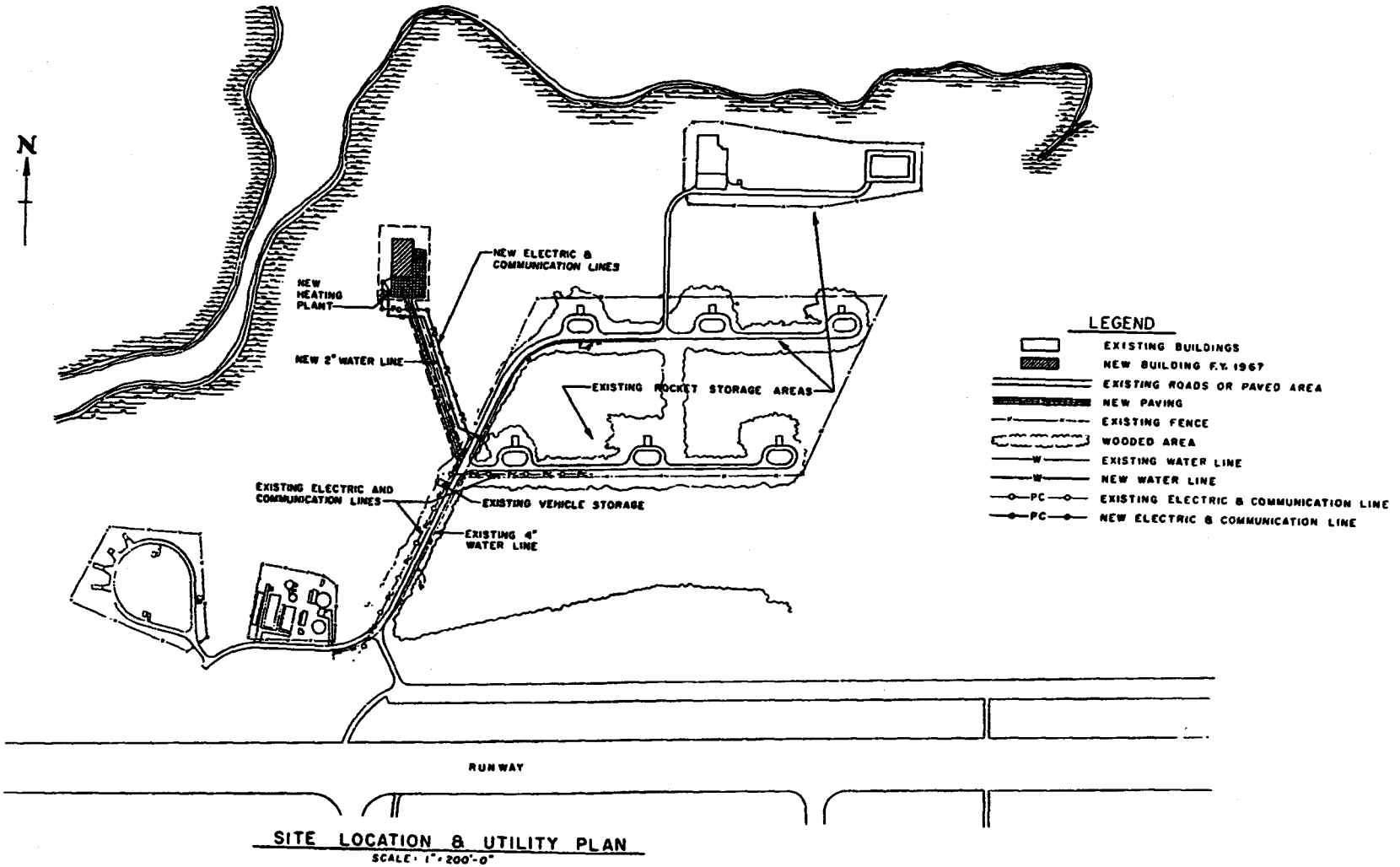


LOCATION MAP
NO SCALE

CF 11-5

WALLOPS STATION
FISCAL YEAR 1967 ESTIMATES

ROCKET STORAGE MAGAZINE

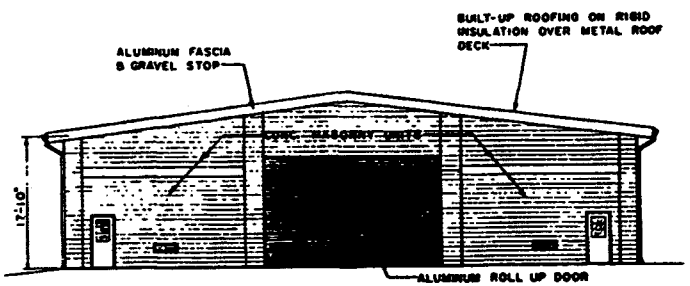


SITE LOCATION & UTILITY PLAN
SCALE: 1" = 200'-0"

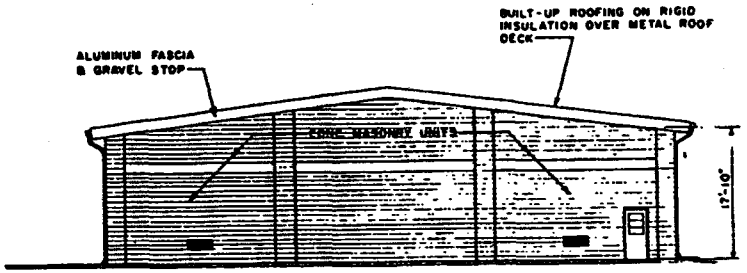
CF 11-6

WALLOPS STATION
FISCAL YEAR 1967 ESTIMATES

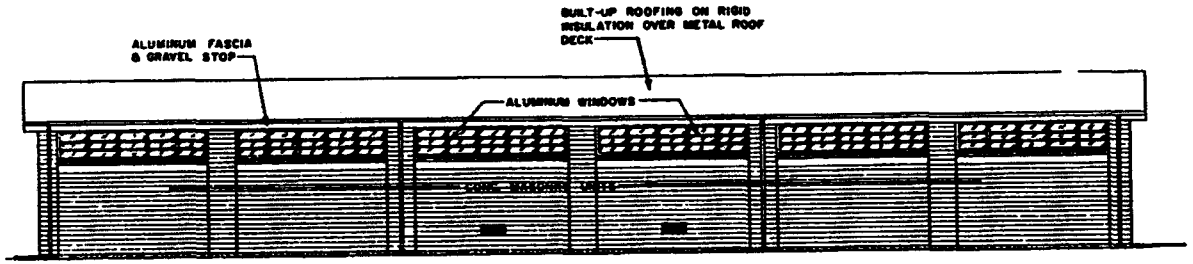
ROCKET STORAGE MAGAZINE



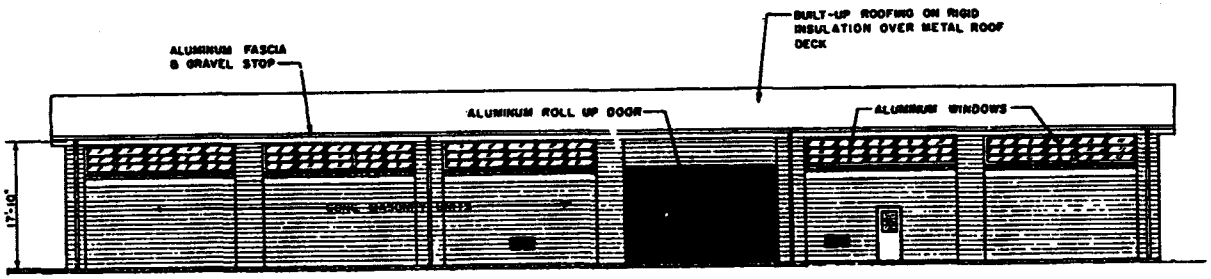
SOUTH ELEVATION
SCALE: 1/8"=1'-0"



NORTH ELEVATION
SCALE: 1/8"=1'-0"



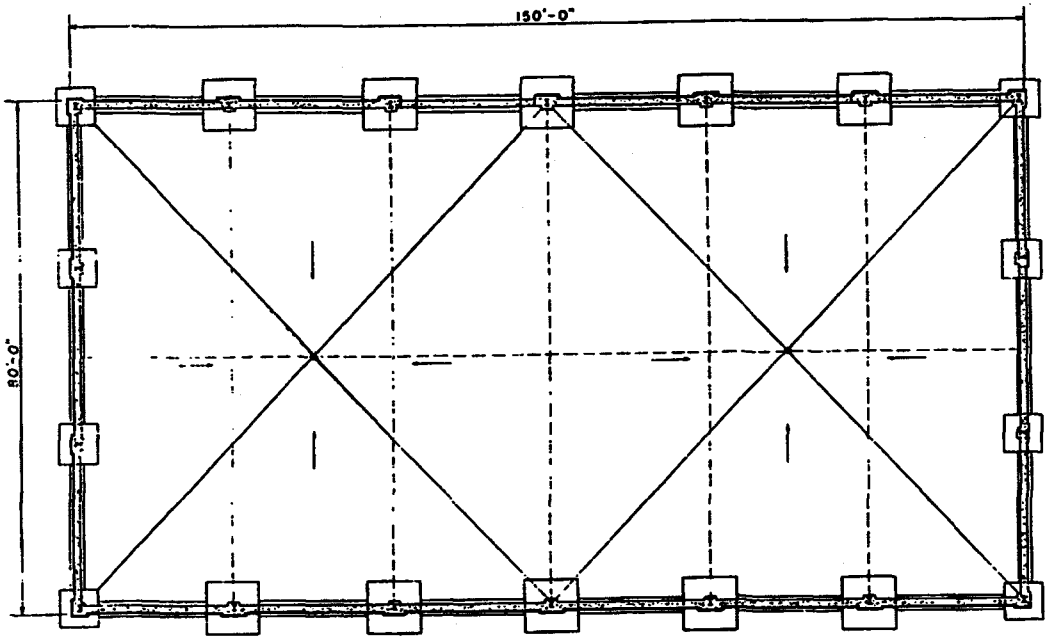
WEST ELEVATION
SCALE: 1/8"=1'-0"



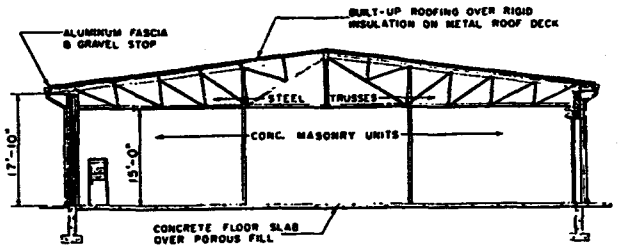
EAST ELEVATION
SCALE: 1/8"=1'-0"

WALLOPS STATION
FISCAL YEAR 1967 ESTIMATES

ROCKET STORAGE MAGAZINE



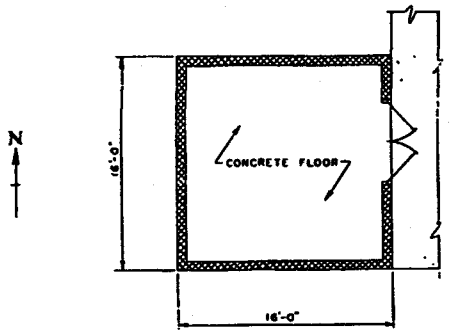
FOUNDATION PLAN
SCALE: 1/8"=1'-0"



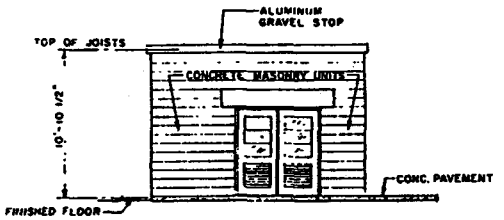
SECTION "A-A"
SCALE: 1/8"=1'-0"

WALLOPS STATION
FISCAL YEAR 1967 ESTIMATES

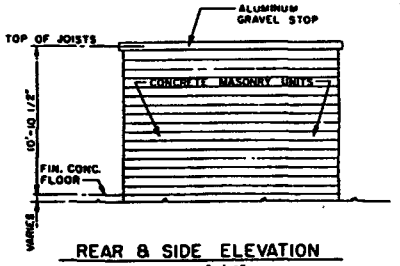
ROCKET STORAGE MAGAZINE
HEATING PLANT



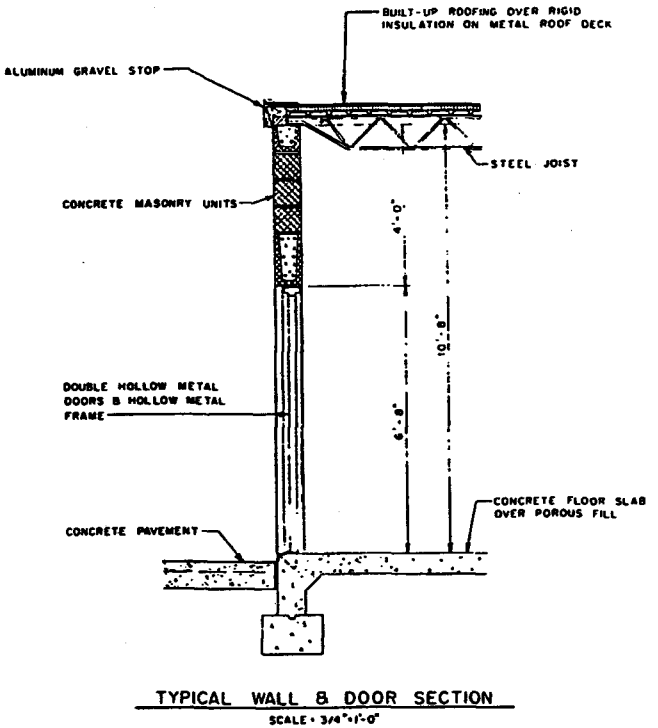
FLOOR PLAN
SCALE: 1/4"=1'-0"



FRONT ELEVATION
SCALE: 1/4"=1'-0"



REAR & SIDE ELEVATION
SCALE: 1/4"=1'-0"



TYPICAL WALL & DOOR SECTION
SCALE: 3/4"=1'-0"

CR 11-9

VARIOUS LOCATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

VARIOUS LOCATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 67 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Various Locations	Various	Not Applicable	Not Applicable	Not Applicable

INSTALLATION MISSION

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*			
CONTRACTOR AND OTHER PERSONNEL			
TOTAL ALL PERSONNEL	Not Applicable		

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	Not
TOTAL LAND	Applicable
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ Not Applicable

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1962 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Facilities for S-IVB Stage Program	MSF	11,496.2	1,100.0	-	12,596.2
Launch Vehicle Service Tower	SSA	145.0	2,443.0	-	2,588.0
Aerobee 350 Launch Facility	SSA	60.0	1,200.0	-	1,260.0
Spin Test Facility	SSA	38.0	745.0	-	783.0
Water Distribution and Sewage Disposal Systems	TDA	146.0	990.0	-	1,136.0
ALL OTHER PROJECTS		608,010.5			
TOTALS		619,895.7	6,478.0		

CF 12-1

NASA FORM 1029 (REV. JUN 65) PREVIOUS EDITIONS ARE OBSOLETE.

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FACILITIES FOR S-IVB STAGE PROGRAM

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Sacramento, California

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Extensions

FUNDING:

FY 1966 and Prior Years	$11,496,200
FY 1967 Estimate	1,100,000
Total Funding Through FY 1967	$12,596,200

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$744,000
Component test facilities	LS	---	$468,000	468,000
Vibration test facility	LS	---	276,000	276,000
Equipment				$356,000
Electrodynamic shaker	LS	---	280,000	280,000
Hydraulic shaker	LS	---	63,000	63,000
Hydraulic slip table	LS	---	13,000	13,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,100,000

CF 12-2

798-050 O-66-19

PROJECT PURPOSE:

This facility will provide for the continued development and testing of the S-IVB Stage and its components to meet the Apollo program requirements.

PROJECT DESCRIPTION:

This project provides for the construction of three new component test facilities at the Sacramento Test Center, Sacramento, California. These test facilities will be located in the vicinity of existing Test Stand Alpha 1. Two of the facilities will be used for component cryogenic pressure testing; the third will provide a vibration test capability. The two component cryogenic pressure test facilities, located east of the Alpha 1 Test Stand, will consist of an earth reveted 14 x 14 x 10 foot concrete cell with one open side. A gas heat exchanger will be located to service these two facilities. The vibration test facility located on the apron of Test Stand I will accommodate a 30,000 pound electrodynamic shaker and a 100,000 pound hydroshaker. The facility will consist of a 15 x 25 foot shaker base containing approximately one million pounds of reinforced concrete and a structure of steel framing, metal roof and roll-up canvas siding. The existing high pressure gas, cryogenic, communication, instrumentation systems and utilities will be extended to the three facilities to provide necessary services. Facility control panels, firex additions, transformer and other facility equipment will be required to support the test facilities.

PROJECT JUSTIFICATION:

To assure the continued success of our space program, it is necessary that the reliability of the booster systems be increased to the maximum. Information leading to this end can be obtained from flight data; however, only limited instrumentation can be included in a particular flight package so a full assessment of vehicle behavior is not possible.

To achieve maximum vehicle reliability at reduced costs and at the earliest possible time, the needed investigative work must be carried out in ground test facilities whenever possible. In order to continue the upgrading of the S-IVB booster, three new component test facilities are required for the testing of complete subassemblies and major components, such as full scale common bulkheads, tank domes, propellant ducts, valves and probes, and helium pressure spheres. No facilities exist today which have the required safety features or capacity to perform the hazardous testing of these items as complete units. Current testing is, therefore, restricted to the several portions that comprise the whole. The three new test facilities will correct this deficiency and make it possible to test the complete subassemblies and major components under conditions that simulate the environment to which they will be subjected during actual flight.

The phase out of the S-IV Stage allows this capability to be provided in an economical manner by taking maximum advantage of the facilities which now exist in the Alpha 1 Test Complex. The construction of the three test areas

and the installation of associated test equipment will provide the capability of conducting tests, including vibrational analysis, under cryogenic and sub-atmospheric conditions.

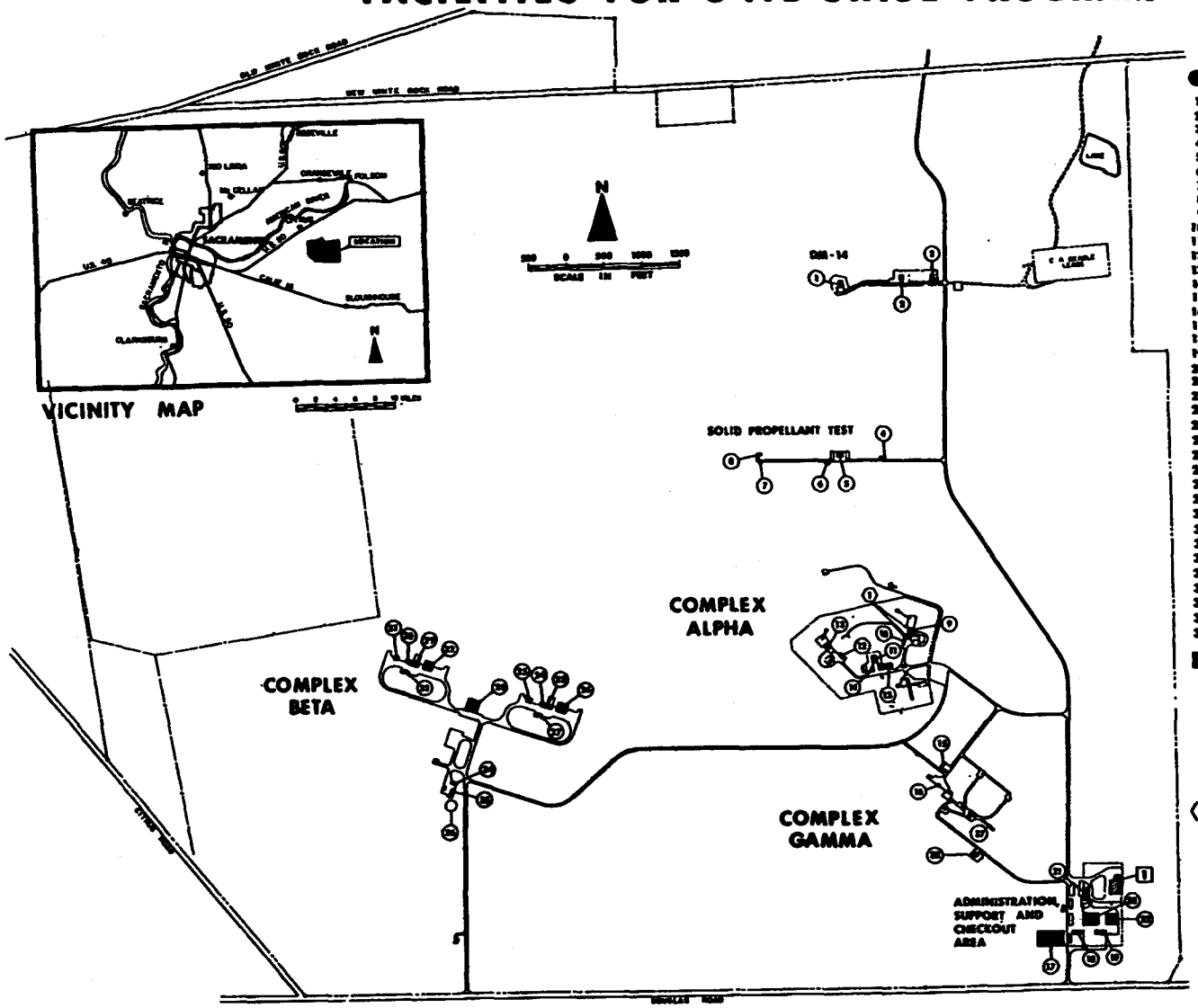
These facilities will also be used in the development of a high performance insulation which will allow vehicle weight reduction and improved performance.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: An estimated $1.0 to $2.0 million per year will be required for changes to this test complex resulting from technological advances.

VARIOUS LOCATIONS

FISCAL YEAR 1967 ESTIMATES

FACILITIES FOR S-IVB STAGE PROGRAM



LEGEND

● EXISTING FACILITIES

1 PROPELLANT STORAGE
2 PARTS STORAGE
3 ASSEMBLY BLDG
4 CONDITIONING CELLS
5 ASSEMBLY BLDG
6 CONTROL BLDG
7 SHOP
8 THRUST BLOCK
9 TEST STAND
10 SHOP
11 CONTROL BLDG
12 SHOP
13 DUAL TEST STAND
14 COMPRESSOR BLDG
15 CRYOSTAT
16 SUB STATION
17 ENGINEERING BLDG
18 SERVICE BLDG
19 ENGINEERING BLDG
20 MODIFICATION HANGAR
21 CAFETERIA
22 SYSTEMS EVALUATION BLDG
23 TEST STAND, BETA I
24 TERMINAL EQUIPMENT
25 LOX STORAGE
26 LH_2 STORAGE
27 TEST STAND SHOP
28 TEST CONTROL CENTER
29 TEST STAND BETA II
30 TERMINAL EQUIPMENT
31 LOX STORAGE
32 LH_2 STORAGE
33 TEST STAND SHOP
34 CALIBRATION TOWER
35 PUMP HOUSE
36 WATER STORAGE
37 ATTITUDE CONTROL MOTOR TEST
38 MAINTENANCE & ASSEMBLY BUILDING

■ FACILITIES AUTHORIZED & UNDER CONSTRUCTION

FISCAL YEAR 1965 PROJECT

1 CHECKOUT TEST FACILITY
2 MISCELLANEOUS MODIFICATIONS
NOTE: THESE MODIFICATIONS (ITEM 2) ARE OF A GENERAL NATURE AND ARE TOO WIDESPREAD TO LOCATE SPECIFICALLY

⬡ PROPOSED FISCAL YEAR 1967 PROJECT

1 ALPHA COMPLEX COMPONENT TEST FACILITIES 1, 2, AND 4

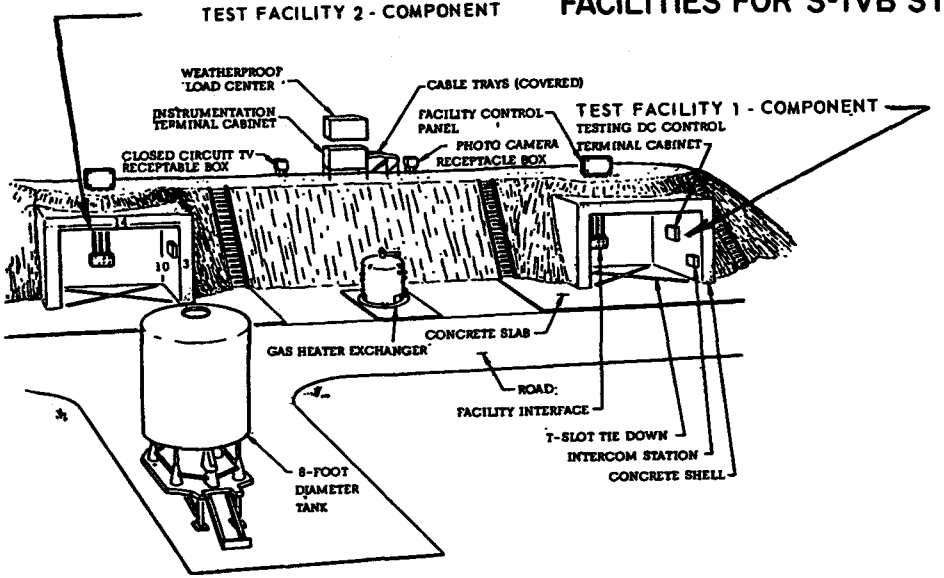
SACRAMENTO, CALIFORNIA

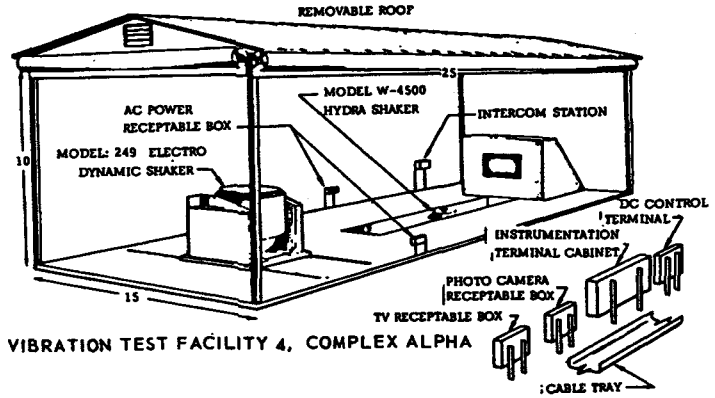
CF 12-5

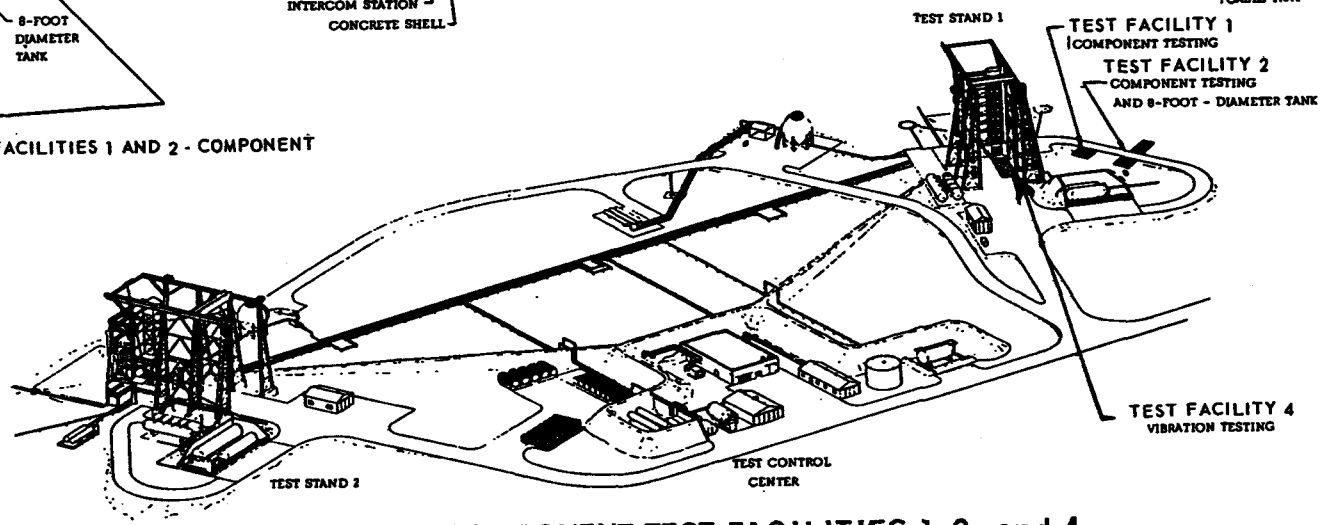
VARIOUS LOCATIONS

FISCAL YEAR 1967 ESTIMATES

FACILITIES FOR S-IVB STAGE PROGRAM







ALPHA COMPLEX COMPONENT TEST FACILITIES 1, 2, and 4

CF 12-6

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

LAUNCH VEHICLE SERVICE TOWER

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Western Test Range, California

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$145,000
FY 1967 Estimate	2,443,000
Total Funding Through FY 1967	$2,588,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,971,000
Foundation and structure	LS	---	$1,490,000	1,490,000
Elevator	Each	1	52,000	52,000
Crane	Each	1	69,000	69,000
Site preparation	LS	---	175,600	175,600
High pressure gas storage shelter	Sq. Ft.	800	33.00	26,400
Concrete safety barricades	Each	2	4,000	8,000
Utilities	LS	---	150,000	150,000
Equipment				$472,000
Instrumentation	LS	---	72,000	72,000
Pneumatic system - 1st stage	LS	---	85,000	85,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Pneumatic system - 2nd stage	LS	---	$60,000	$60,000
Hydraulic system test stand	LS	---	65,000	65,000
Electric power distribution system	LS	---	190,000	190,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,443,000

PROJECT PURPOSE:

This project will provide a Vehicle Service Tower and associated equipment for launching the Delta and Thor-Agena Vehicles.

PROJECT DESCRIPTION:

This project will provide for the construction of a Launch Vehicle Service Tower at Launch Complex 75-1 on Launch Emplacement 75-1-2 at the Western Test Range, for servicing the improved Delta and the Thor-Agena Vehicles. The structure will be fabricated of concrete and corrosion-resistant metals in order to minimize the high maintenance cost previously experienced from continuous exposure of materials to the salt water atmosphere characteristic of the vicinity. The structure will be used to erect vehicle stages and spacecraft on the launch pad, support equipment and personnel required for vehicle preparation and checkout, provide environmental protection of the vehicle stages on the launch pad, and support the various umbilicals that service the vehicle stages and spacecraft during checkout, propellant loading, and terminal launch operations. The service platforms will be adjustable to meet the specific work level requirements of the Delta, Thor-Agena and Thor-Ablestar Vehicle configurations. The upper levels will be air-conditioned for environmental control of the second-stage guidance section and spacecraft areas. A 40-foot reach, 360-degree, 12½-ton hammerhead crane will be mounted on top of the tower for the erection and mating of all stages, spacecrafts, and solid boosters.

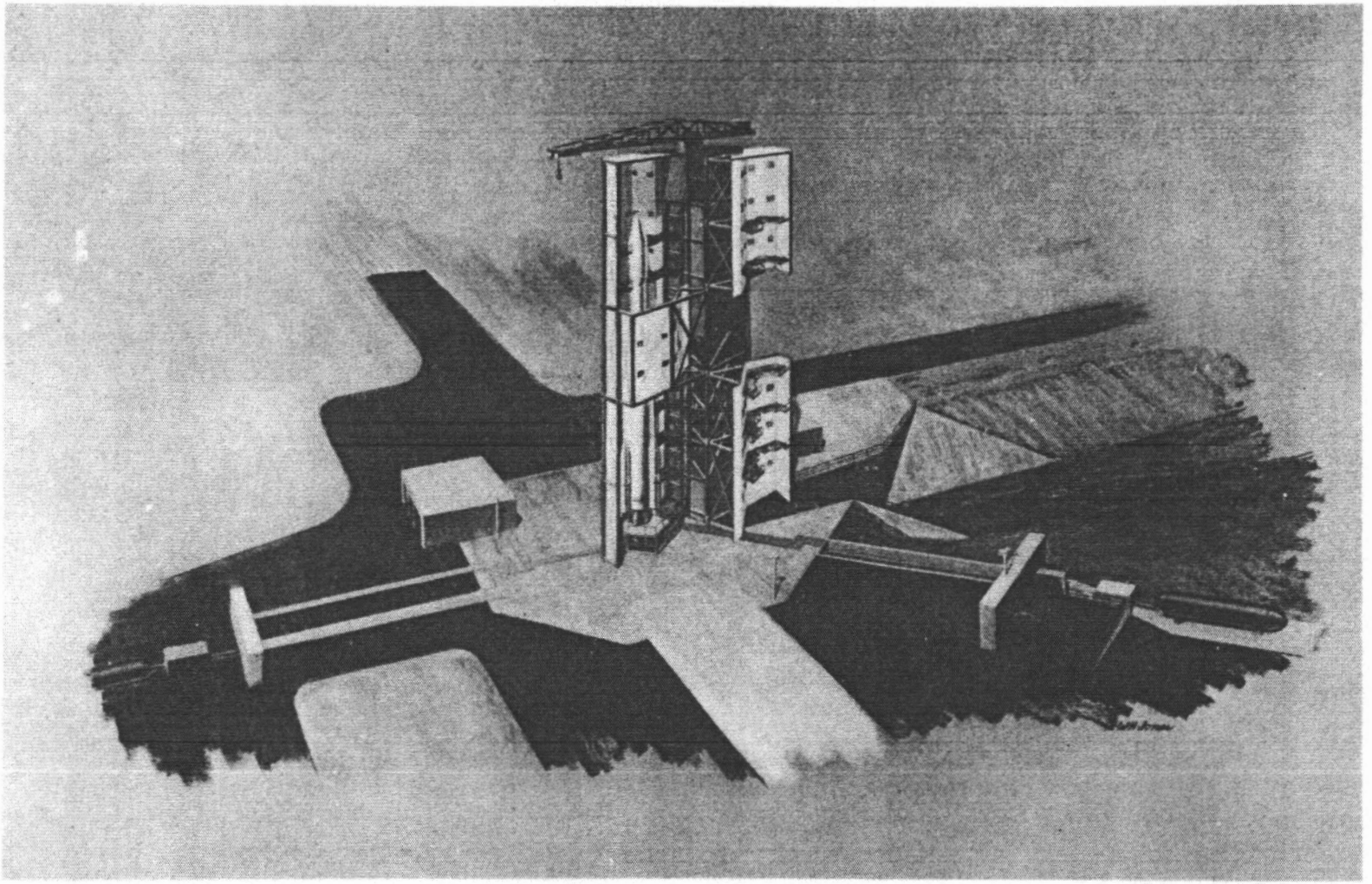
PROJECT JUSTIFICATION:

At present, only Pad 75-1-1 at the Western Test Range is capable of supporting Thor-Agena and Delta launchings of NASA missions. Past experience has shown that the scheduling of more than eight launchings per

year from one launch pad is excessive. The projected launch schedule for 1967 and subsequent years indicates a combined NASA, DOD, Weather Bureau launch rate of twelve missions per year. A second launch vehicle service structure is required on the adjoining Pad 75-1-2 to meet this schedule as well as provide for scheduling flexibility such as the Weather Bureau rapid call-up missions and to insure continued Polar Orbital operations in the event of a catastrophic accident on one of the launch pads.

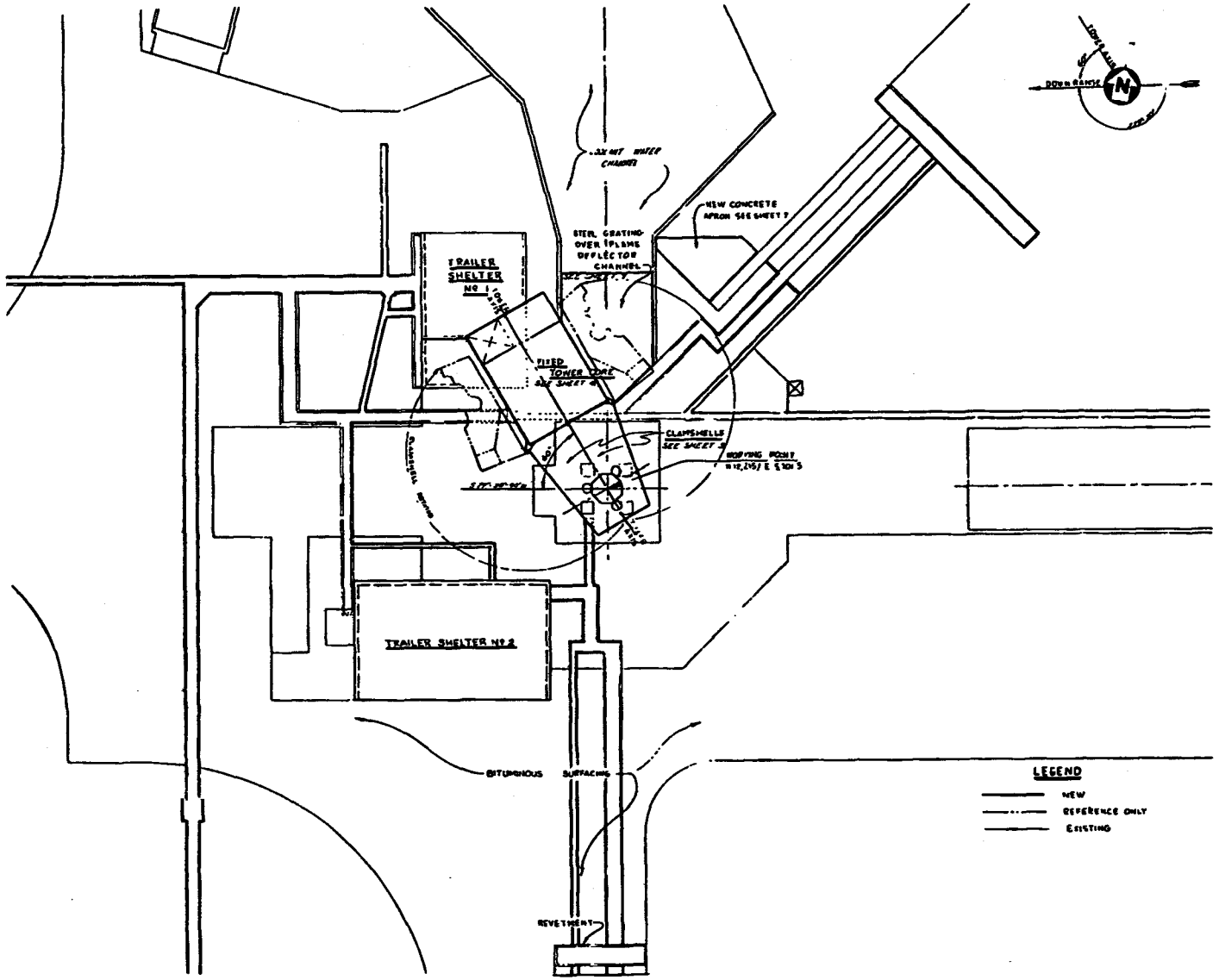
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS
FISCAL YEAR 1967 ESTIMATES
VEHICLE SERVICE TOWER
WESTERN TEST RANGE



798-050 O-66-20

VARIOUS LOCATIONS
FISCAL YEAR 1967 ESTIMATES
VEHICLE SERVICE TOWER
WESTERN TEST RANGE



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

AEROBEE 350 LAUNCH FACILITY

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: White Sands, New Mexico

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$60,000
FY 1967 Estimate	1,200,000
Total Funding Through FY 1967	$1,260,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,059,000
Launch tower structure	LS	---	$304,500	304,500
Boom structure	LS	---	180,600	180,600
Helium servicing building	Sq. Ft.	1,440	20.42	29,400
Propellant building	Sq. Ft.	900	28.78	25,900
Propellant loading system	LS	---	265,000	265,000
Azimuth and guide rail mechanism	LS	---	145,000	145,000
Utilities	LS	---	56,600	56,600
Site preparation	LS	---	52,000	52,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$141,000
Vehicle control console	LS	---	$64,000	64,000
Payload control console	LS	---	77,000	77,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,200,000

PROJECT PURPOSE:

This project will provide a capability for launching Aerobee 350 sounding rockets from White Sands, New Mexico.

PROJECT DESCRIPTION:

An Aerobee 350 Launch Tower will be integrated within the "Little Joe" launch complex making use of the existing blockhouse and Rocket Assembly Building to support the firings of heavy scientific payloads into the atmosphere at this location. The Launch Tower guide rails will be adjustable to accommodate both the 15 inch and the 22 inch diameter Aerobee configurations, and will be capable of remote pointing in firing Azimuth and elevation for timely windage adjustments. The lower half of the Launch Tower will be enclosed to permit all-weather operations.

PROJECT JUSTIFICATION:

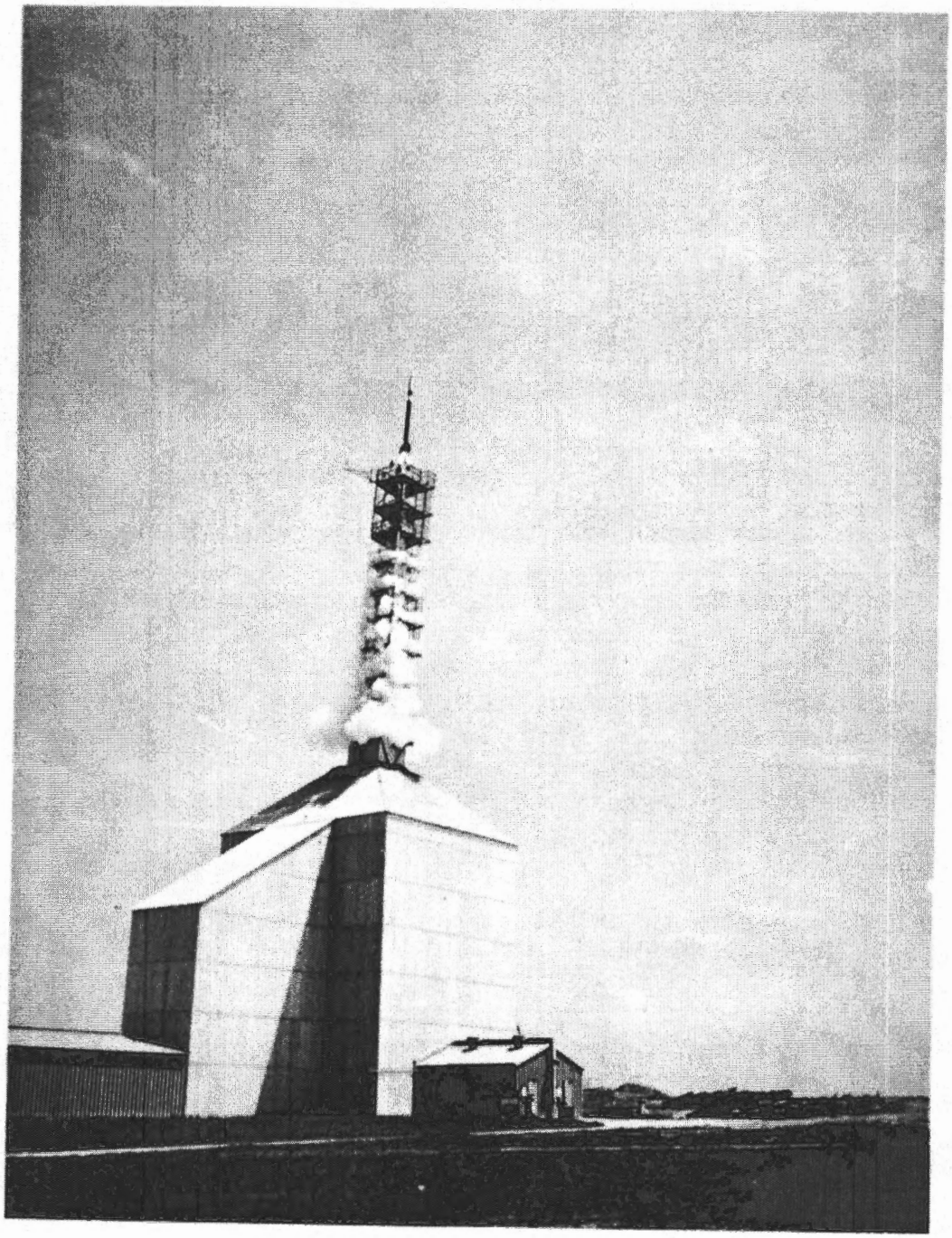
This facility will increase the capability of the NASA Sounding Rocket Program by providing an additional launch site for the Aerobee 350 vehicle. The Aerobee 350 provides the necessary payload capacity and trajectory capability required for many large scientific payloads such as X-ray, optic, and solar astronomy experiments containing large optical and astronomical telescopes of long focal length which will photograph discreet stars and X-ray sources. The payloads consist of the telescope and sensors plus required guidance apparatus and recovery parachutes.

Although the early developmental flights of the Aerobee 350 were conducted from Wallops Island, Virginia, experience to date has shown the structure of the atmosphere above the White Sands to be near optimum for astronomical

observations. Payload recovery is practical at White Sands, thus reuse of the payloads costing up to $250,000 each will be possible. The recovery of cameras, costly experimental equipment and film in processable condition is the only way data can be acquired from many sounding rocket experiments.

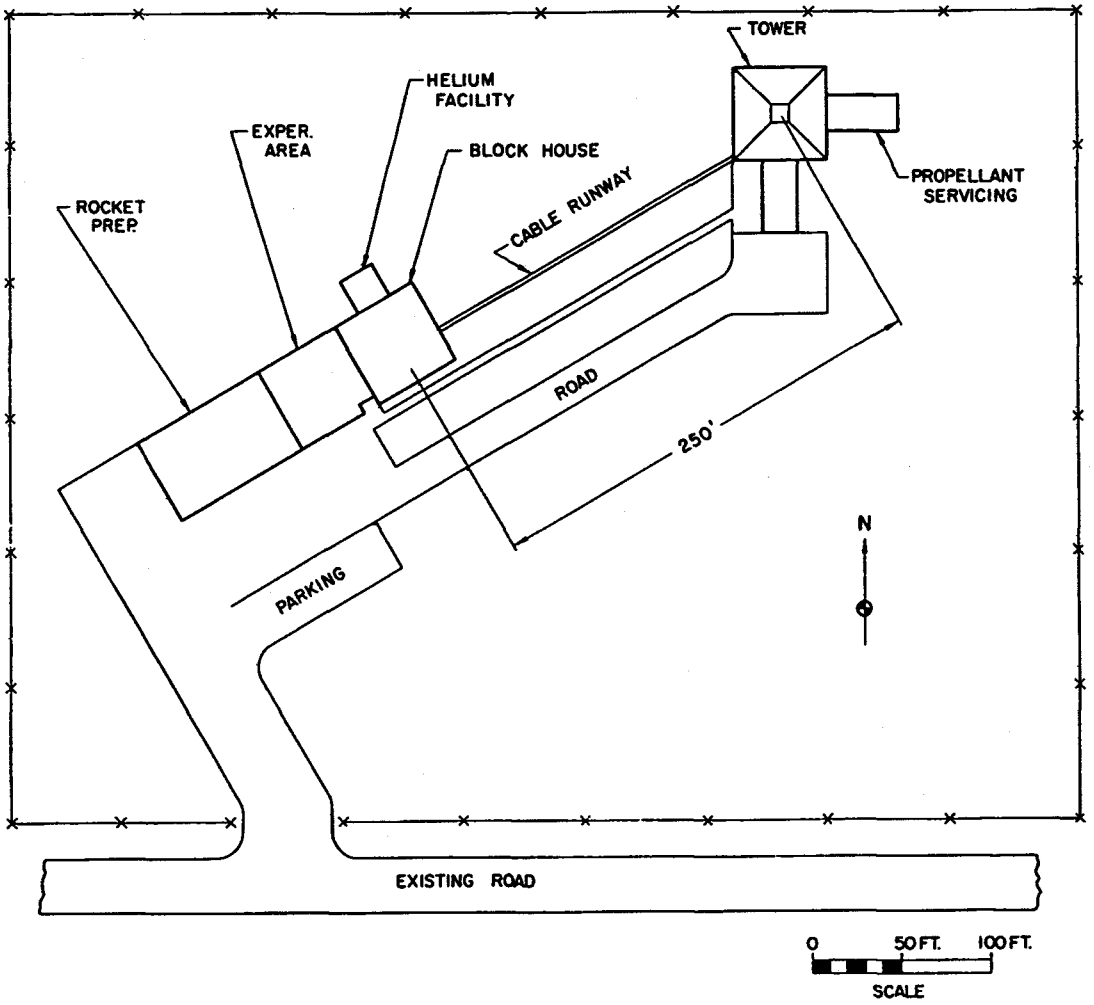
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

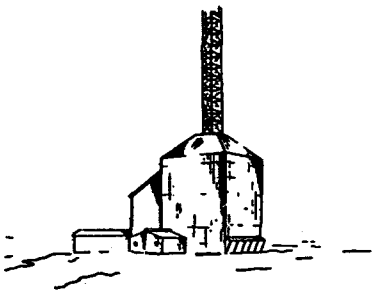
VARIOUS LOCATIONS
FISCAL YEAR 1967 ESTIMATES
AEROBEE 350 LAUNCH FACILITY
WHITE SANDS, NEW MEXICO



CF 12-15

VARIOUS LOCATIONS
FISCAL YEAR 1967 ESTIMATES
AEROBEE 350 LAUNCH FACILITY
WHITE SANDS, NEW MEXICO





CF 12-16

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

SPIN TEST FACILITY

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Space Science and Applications

LOCATION OF PROJECT: Western Test Range, California

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$38,000
FY 1967 Estimate	745,000
Total Funding Through FY 1967	$783,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$640,000
Spin test building	Sq. Ft.	2,300	$66.50	153,000
Cranes and monorail	LS	---	25,000	25,000
Control building	Sq. Ft.	2,500	54.00	135,000
Special air-conditioning and compressed air	LS	---	60,000	60,000
Site Preparation	LS	---	115,000	115,000
Utilities	LS	---	97,000	97,000
Communications	LS	---	30,000	30,000
TV monitoring system	LS	---	25,000	25,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$105,000
Dynamic balance machine	LS	---	$105,000	105,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$745,000

PROJECT PURPOSE:

This facility is required to conduct prelaunch operations on the Delta Launch Vehicle third stage, interstage adapter, spin table and aerodynamic shroud and to conduct final dynamic balancing checks of the third stage solid propellant rocket coupled to the spacecraft in the flight configuration.

PROJECT DESCRIPTION:

This project proposes the construction of a Delta vehicle third stage/spacecraft facility which will consist of two (2) buildings: A Control Building of approximately 2,500 square feet and a Spin Balance Building of approximately 2,300 square feet. The Spin Balance Building will contain a dynamic balance machine.

The Control Building will provide a main control area for housing equipment used for the remote controlled hazardous operations in the Spin Balance Building. Offices, sanitary facilities, stockroom, and an electrical/mechanical laboratory area of 800 sq. ft. equipped with a monorail having a 3-ton capacity hoist with a 30-foot hook height will be contained in this air-conditioned building.

The Spin Balance Building will consist of a main test area for the complete inspection and checkout of the third stage/spacecraft assembly and the testing of these assemblies on the dynamic balance machine. The test area will also contain an overhead bridge crane equipped with two, three (3) ton capacity hoists with a hook height of 30 feet. Since ordnance handling and balance operations will be conducted here, the building will be constructed to meet safety requirements and will contain conductive flooring, explosion-proof electrical utilities, safety shower, and air-conditioning to meet the temperature and humidity constraints.

798-050 O-66-21

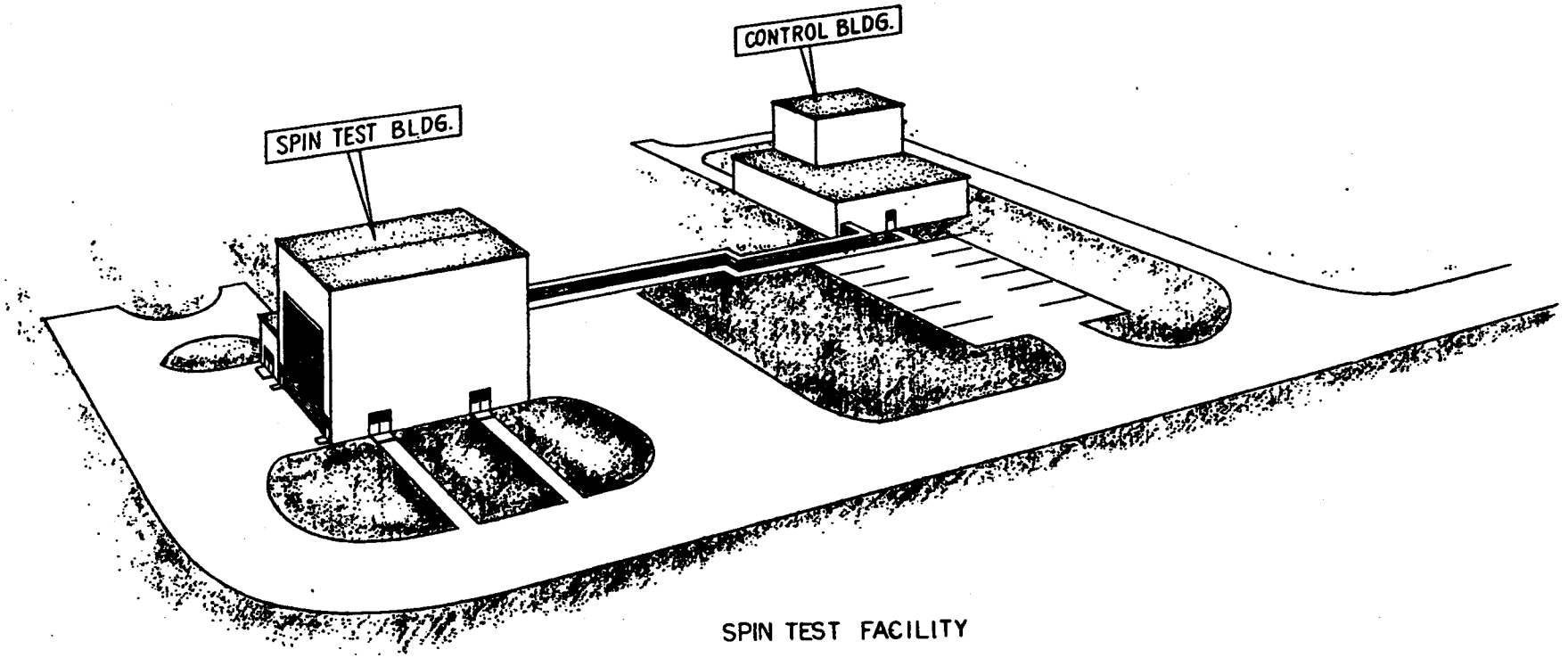
PROJECT JUSTIFICATION:

A Dynamic Balancing Facility is required at the Western Test Range to support Polar Orbit missions scheduled to use the Delta Launch Vehicle. Large spacecraft such as International Satellite for Ionospheric Studies (ISIS), Orbiting Solar Observatory (OSO) or Interplanetary Monitoring Platform (IMP) cannot be dynamically balanced with the third stage solid propellant rocket in the existing Scout Spin Test Facility due to the size of the building and the design limitations of the Scout Balancing Machine. Other prelaunch operations including the receipt and inspection of the third stage rocket motor, spacecraft attach fittings, interstage adapter and aerodynamic shroud will be conducted in this facility. The dynamic balancing of the third stage and spacecraft in the flight configuration is necessary to assure proper spin stabilization during third stage powered flight and in orbit.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS

FISCAL YEAR 1967 ESTIMATES
SPIN TEST FACILITY
WESTERN TEST RANGE



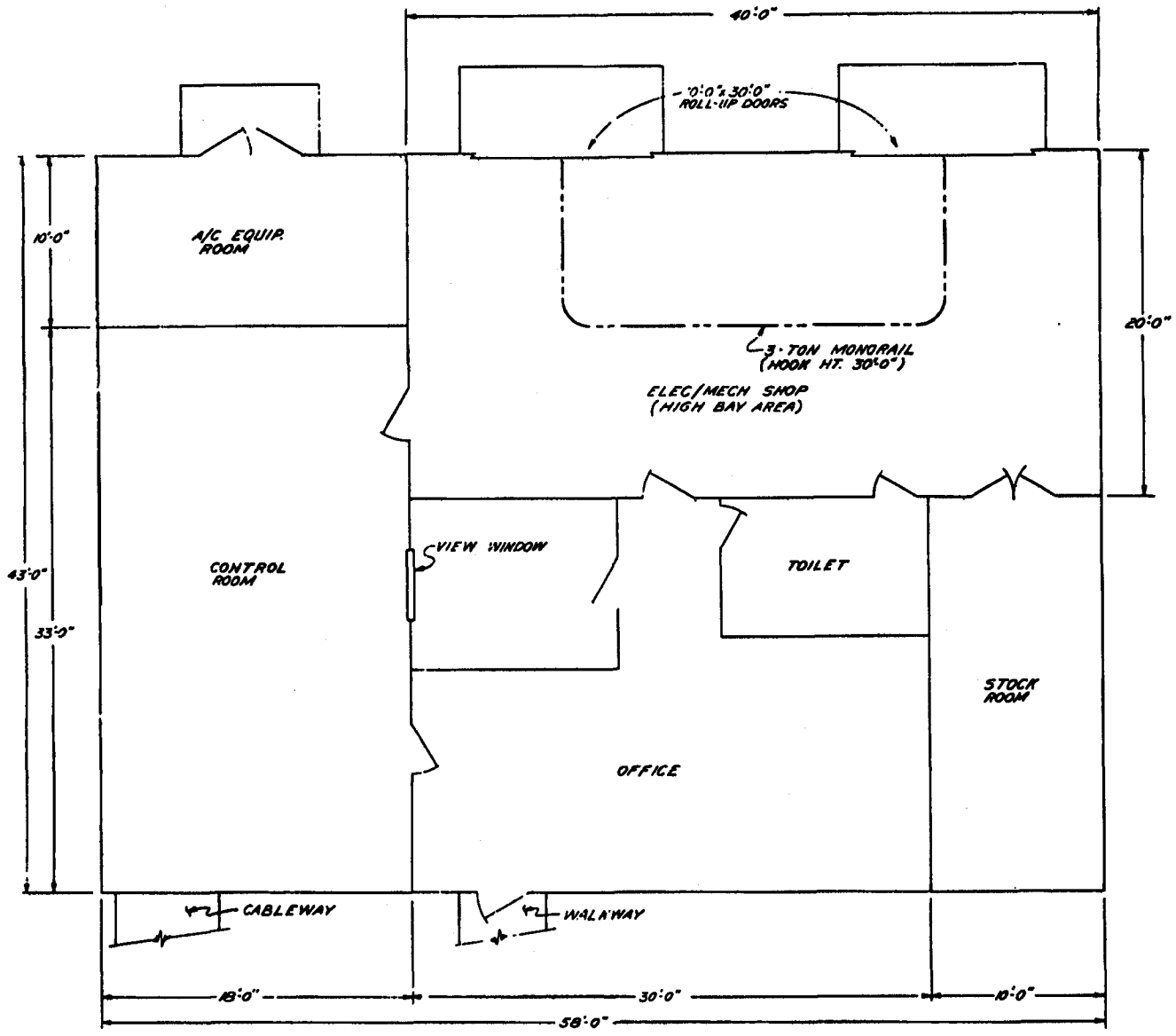
SPIN TEST FACILITY

PERSPECTIVE

CF 12-20

VARIOUS LOCATIONS

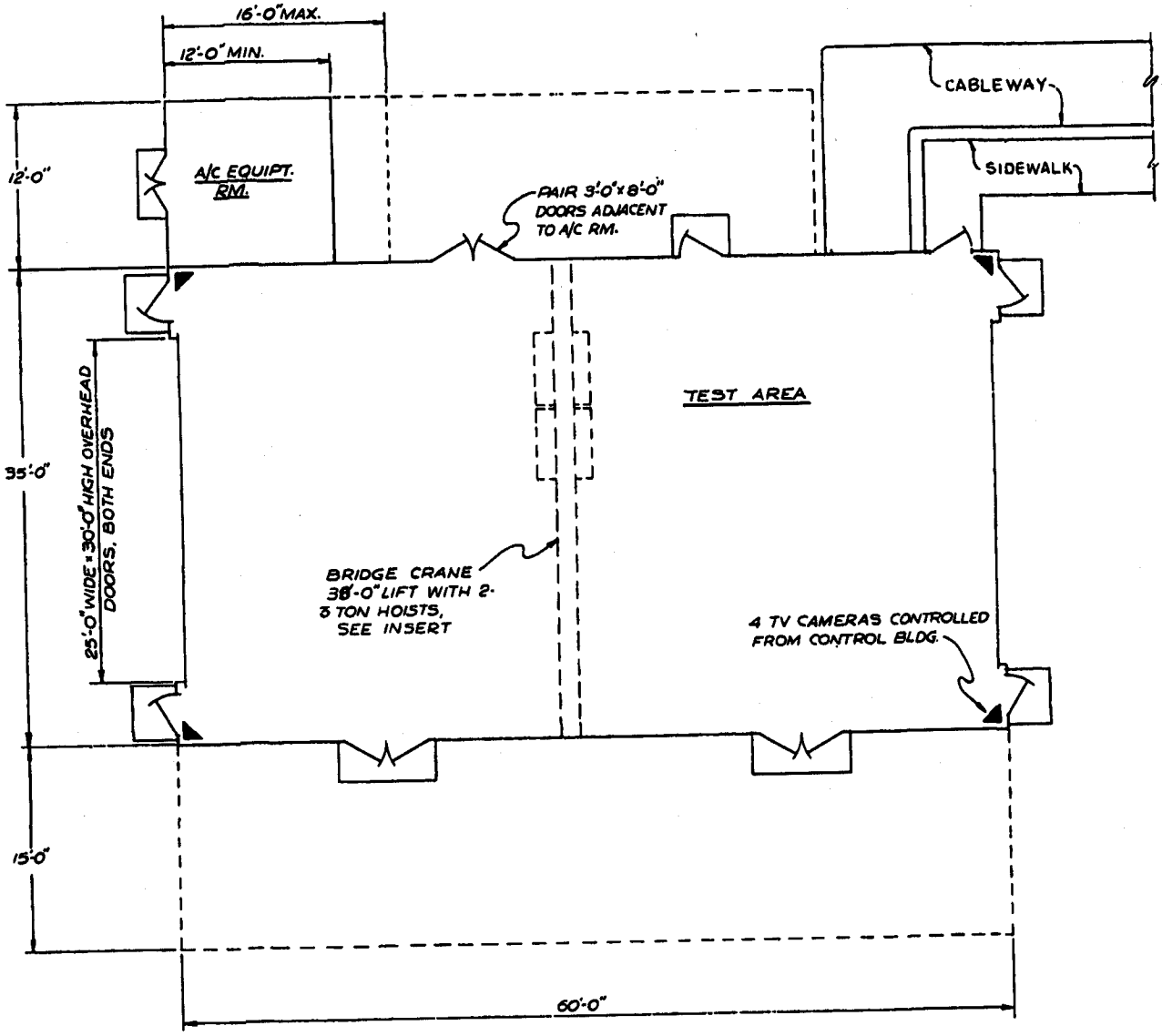
FISCAL YEAR 1967 ESTIMATES
SPIN TEST FACILITY
WESTERN TEST RANGE



SPIN TEST FACILITY
CONTROL BUILDING
FLOOR PLAN

VARIOUS LOCATIONS

FISCAL YEAR 1967 ESTIMATES
SPIN TEST FACILITY
WESTERN TEST RANGE



PLAN
SPIN TEST BLDG.

GROSS AREA: 2300 SQ.FT.

4 0 4 8
SCALE IN FEET

CF 12-22

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

WATER DISTRIBUTION AND SEWAGE DISPOSAL SYSTEMS

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Tracking and Data Acquisition

LOCATION OF PROJECT: Goldstone Complex, Fort Irwin, California

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1966 and Prior Years	$146,000
FY 1967 Estimate	990,000
Total Funding Through FY 1967	$1,136,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$915,000
Sanitary sewer	LF	5,640	$4.61	26,000
Septic tanks	LS	---	27,000	27,000
Oxidation ponds	LS	---	31,000	31,000
Water distribution system	LF	148,000	4.65	689,000
Storage tanks	GAL	400,000	0.35	142,000
Equipment				$75,000
Substation	KVA	112.5	44.40	5,000
Effluent pumping station	LS	---	21,000	21,000
Booster pumping station	LS	---	49,000	49,000
Design	---	---	---	---

	Unit of Measure	Quantity	Unit Cost	Total Cost
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$990,000

PROJECT PURPOSE:

The proposed water and sewage utilities will provide the Goldstone complex with an adequate water supply and sewage disposal system to accommodate the present demands and future requirements.

PROJECT DESCRIPTION:

Water Supply - The water distribution system will begin with the installation of a pumphouse at the new one million gallon water storage tank presently being constructed by the Corps of Engineers approximately one mile west of Fort Irwin along the road to Goldstone. Under this project the water will be pumped from this tank to a primary storage tank at the Venus site. From the primary tank, water will flow by gravity to storage tanks at each site. The tanks at each site will feed water to the site distribution system by gravity. Each site will be protected with check valves and the tanks will have sufficient capacity to maintain operations at the site during periods of repair or shutdown of the primary storage tank.

Sewage Disposal - Due to existing conditions, each site in the Goldstone complex will have slightly different methods of sewage disposal. The methods are listed below:

Echo - Three (3) septic tanks will be added at this site. The effluent from these and the existing tanks will discharge into a central collecting system and flow by gravity to an oxidation pond.

Venus - The requirement at this site is to install two (2) additional septic tanks and to enlarge the existing tile fields.

Pioneer - An additional septic tank will be added and the liquid will be pumped to an oxidation pond east of the dry lake.

Mars - Three (3) additional septic tanks will be added. These tanks will be connected to the existing tile fields. Excess flow to these tile fields will be conveyed to oxidation ponds.

Antenna Range - The existing tile field will be enlarged.

PROJECT JUSTIFICATION:

The individual sites that comprise the Goldstone complex are presently supplied with water by a tank truck hauling water from Fort Irwin to storage tanks at each site. Continued expansion of the Goldstone facilities has created a continually growing demand for water. It is not possible nor economically feasible to attempt to continue supplying water in the present manner. The proposed system will supply an adequate amount of water to provide operational capability on a twenty-four hour, three-hundred sixty-five day cycle. As the state of the art increases, the demand for water to maintain operational temperatures for the electronic equipment constantly increases resulting in more hauling time under present conditions. The functional capability of the present sewage disposal systems in the Goldstone complex has been exceeded due to the increase in personnel, thus providing more effluent, and the inability of the soil due to its cementaceous nature to accommodate the increased flow. The proposed systems will eliminate the presently incurred expenses due to continual septic tank pumping and the blocking of the sanitary facilities at the sites. The present proposal is designed to provide adequate capacity and treatment for the existing facilities and any reasonable future expansion.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

GOLDSTONE COMPLEX, FORT IRWIN, CALIFORNIA
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 ESTIMATES

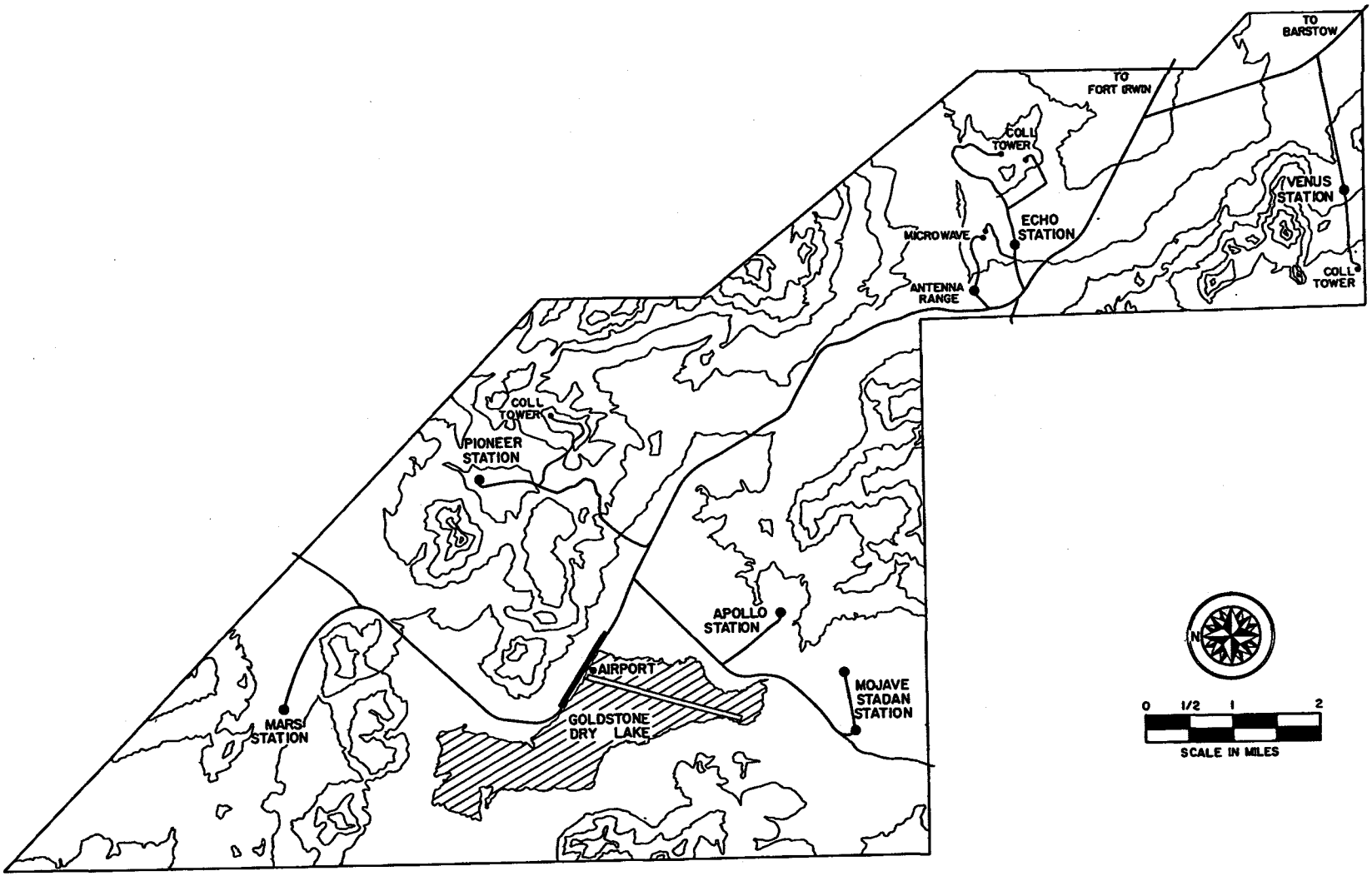
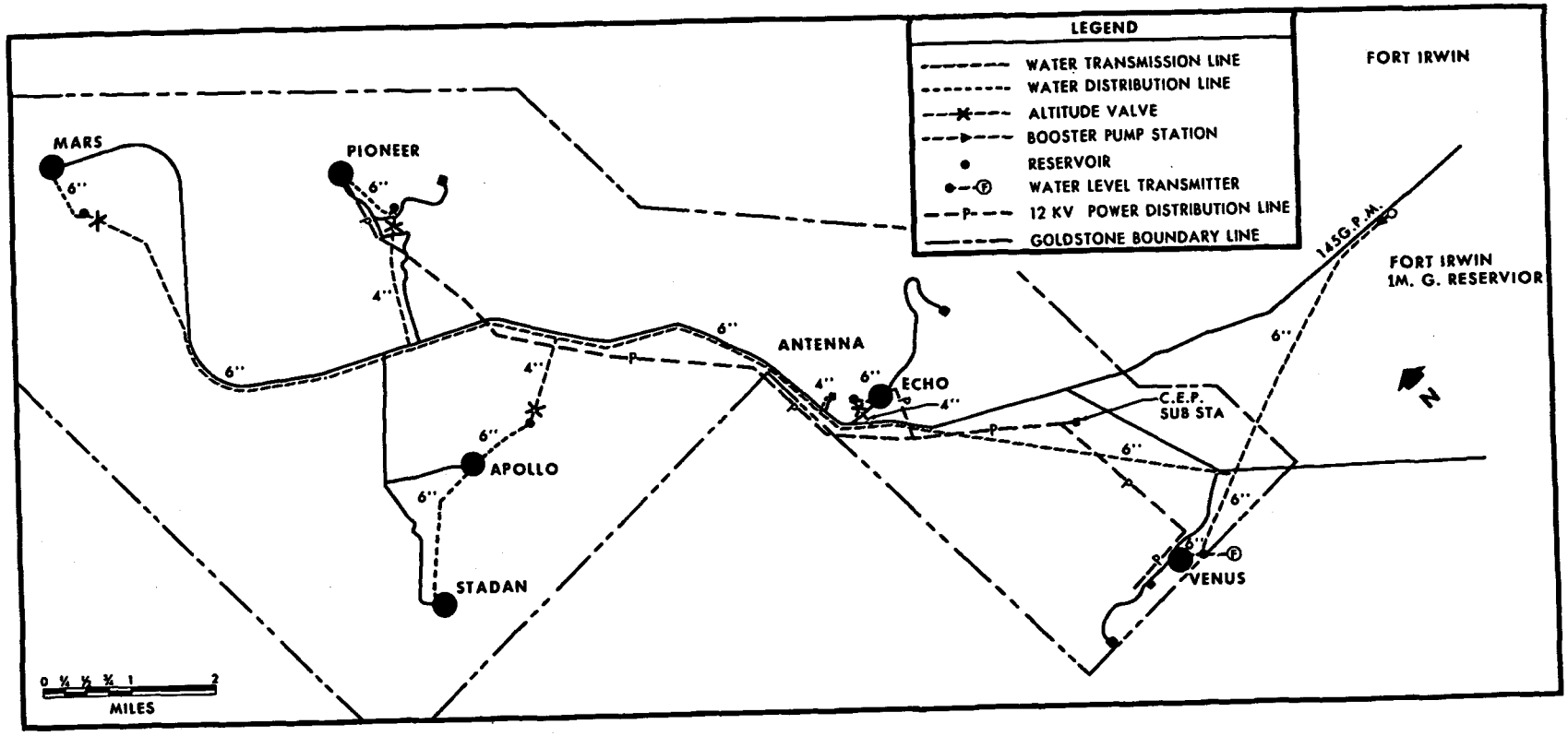


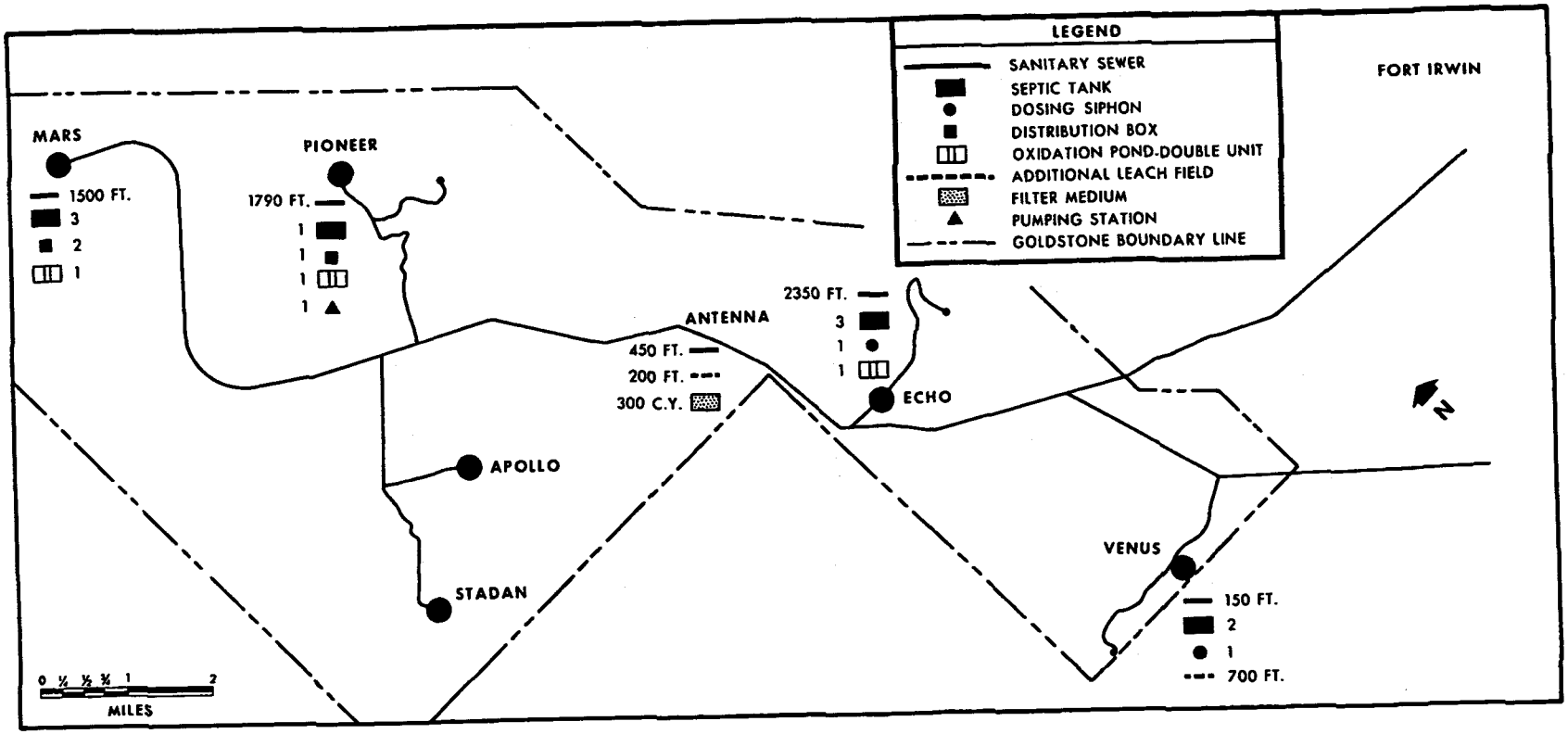
FIGURE STATION VICINITY MAP

798-030 O-66-22



GOLDSTONE COMPLEX, FORT IRWIN, CALIFORNIA
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 ESTIMATES

WATER DISTRIBUTION SYSTEM



GOLDSTONE COMPLEX, FORT IRWIN, CALIFORNIA
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 ESTIMATES

SEWER DISPOSAL SYSTEMS

CF 12-28

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FACILITY PLANNING AND DESIGN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1967 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
All	Office of Associate Administrator	---	---	---

INSTALLATION MISSION

See justification.

PERSONNEL STRENGTH	FY 1965	FY 1966	FY 1967
NASA PERSONNEL *(End of Year)*			
CONTRACTOR AND OTHER PERSONNEL			
TOTAL ALL PERSONNEL	Not Applicable		

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	Not Applicable
TOTAL LAND	
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1965)*	$ Not Applicable

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1962 THRU CURRENT YEAR	FY 1967 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Facility Planning and Design	AA	46,330	7,000	Not Applicable	Not Applicable
ALL OTHER PROJECTS					
TOTALS		46,330	7,000		

CF 13-1

NASA FORM 1029 (REV. JUN 65) PREVIOUS EDITIONS ARE OBSOLETE.

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1967 ESTIMATES

FACILITY PLANNING AND DESIGN

The funds requested are used to conduct advance planning and design activities on projects for which construction funds will be requested in subsequent budgets.

The $7.0 million request covers work in the following three areas: (a) $1.5 million for preliminary designs and other special studies, (b) $3.5 million for the preparation of complete plans and specifications of those projects to be included in the FY 1968 fiscal year construction program, and (c) $2.0 million to complete the detailed design plans and specifications for the highly complex two position engine and stage test stand associated with the NERVA program.

The $1.5 million for the first area covers the preparation and upgrading of master plans for the various NASA centers and other NASA installations, unforeseen construction studies, and the preparation of cost estimates and engineering studies which make up the preliminary designs for an estimated $80 to $100 million fiscal year 1969 construction program.

The $3.5 million for the second area covers the preparation of final and complete designs, plans, and specifications for an estimated FY 1968 facility construction activity amounting to a total of $80 to $100 million (excluding the Engine/Stage Test Stand 2-3 facility).

The $2.0 million for the third area covers the engineering and design of the Engine/Stage Test Stand 2-3 test complex which consists of two static test stands, a control center, and ancillary equipment. Each test stand will be capable of testing a nuclear rocket propulsion module in a vertical position during 5000 MW (power) operations. Studies, criteria development and site investigations are in progress and engineering and design will begin shortly. This work has been funded from prior years Facilities Planning and Design funds. $2.0 million are required in fiscal year 1967 to continue the engineering and design of this complex. The $50 million construction costs currently estimated for this test complex are not included in the $80 to $100 million figures shown for the second area requirements.

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