

*National Aeronautics  
and Space Administration*

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**BUDGET ESTIMATES**

**FISCAL YEAR**

**1966**

**Volume III**

**CONSTRUCTION OF FACILITIES**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1966 ESTIMATES

CONSTRUCTION OF FACILITIES

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

GENERAL STATEMENT

This appropriation provides for the design, construction, purchase of equipment, modernization of facilities, and for advanced design of facilities planned for future authorization. The major program elements may be summarized as follows:

MANNED SPACE FLIGHT: These projects will support the Apollo spacecraft and Saturn launch vehicle development and test efforts. Specific items included will provide for needed astronaut training facilities, engineering work areas and augmentation of support facilities.

SCIENTIFIC INVESTIGATIONS IN SPACE: Projects in this category will support activities in space science. They will provide for needed improvements in the testing of spacecraft and experiments carried as spacecraft payloads for the unmanned lunar and planetary exploration program, for improvements in other facilities for unmanned spacecraft missions and for necessary improvements to launch area facilities for the medium class and small launch vehicles.

ADVANCED RESEARCH AND TECHNOLOGY: These estimates cover projects for research, laboratory and supporting facilities for the Electronics Research Center, and for contractor technical facilities used in research pertinent to large advanced liquid-fueled engine systems.

AIRCRAFT TECHNOLOGY AND SUPPORTING OPERATIONS: Estimates for these projects include facilities to support the V/STOL and advanced aircraft programs and facilities for tracking and data acquisition.

The appropriation for FY 1965 was \$262,880,500. The same amount was authorized for 1965. \$74,700,000 is requested for FY 1966; a decrease of \$188,180,500 from the 1965 appropriation. Total expenditures for construction of facilities are estimated to be \$406,000,000 in FY 1966, a decrease of \$118,000,000 from the \$524,000,000 estimated for FY 1965.

The budget request contains \$78,000 to provide fall-out shelters for selected new facilities. The amount has been determined in consultation with the Department of Defense based on DOD policy and criteria.

The format for reflecting fall-out shelters in each of the projects in the budget request varies. The reason is to distinguish among those facilities in which provision for fall-out protection is either inherent in the structure, provision is required, or, because of prohibitive costs and

hazardous areas provision for fall-out protection would not be desirable.

This volume contains material in support of the requested authorization and appropriation for FY 1966.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1966 ESTIMATES

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

	<u>Fiscal Year 1964</u>	<u>Fiscal Year 1965</u>	<u>Fiscal Year 1966</u>
<u>Budget Activity</u>			
1. Manned Space Flight.....	\$496,841,600	\$213,481,500	\$27,325,000
2. Scientific Investigations in Space.....	16,698,700	5,765,000	8,377,000
3. Space Applications.....	3,933,000	---	---
4. Space Technology.....	60,949,700	23,812,000	20,435,000
5. Aircraft Technology.....	2,585,000	4,452,000	762,000
6. Supporting Activities.....	<u>134,442,300</u>	<u>15,370,000</u>	<u>17,301,000</u>
Total Budget Plan.....	<u>\$715,450,300</u>	<u>\$262,880,500</u>	<u>\$74,700,000</u>
 <u>Financing:</u>			
Appropriation.....	\$680,000,000	\$262,880,500	\$74,700,000
Transferred from:			
"Research, development, and operation" (77 Stat. 439).....	20,046,300	---	---
"Administrative operations" (77 Stat. 439).....	<u>13,300,000</u>	---	---
Appropriation (adjusted).....	713,346,300	262,880,500	74,700,000
Transfer from "Research, development, and operation" in FY 1964 (76 Stat. 731, 75 Stat. 355, and 77 Stat. 439).	<u>2,104,000</u>	---	---
Total financing of budget plan.....	<u>\$715,450,300</u>	<u>\$262,880,500</u>	<u>\$74,700,000</u>

SUM 1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1966 ESTIMATES

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

	<u>Fiscal Year</u> <u>1964</u>	<u>Fiscal Year</u> <u>1965</u>	<u>Fiscal Year</u> <u>1966</u>
1. MANNED SPACE FLIGHT.....	<u>\$496,841,600</u>	<u>\$213,481,500</u>	<u>\$27,825,000</u>
John F. Kennedy Space Center, NASA.....	280,520,300	85,377,200	7,295,000
Manned Spacecraft Center Marshall Space Flight Center.....	36,142,000	24,443,000	4,400,000
Michoud Plant.....	30,081,000	14,999,700	4,776,000
Mississippi Test Facility.....	9,058,000	6,313,500	300,000
Various Locations.....	96,163,300	54,182,000	2,121,000
Facility Planning and Design.....	44,877,000	28,166,100	6,133,000
	---	---	2,800,000
2. SCIENTIFIC INVESTIGATIONS IN SPACE.....	<u>\$16,698,700</u>	<u>\$5,765,000</u>	<u>\$8,377,000</u>
Ames Research Center....	96,000	---	2,749,000
Goddard Space Flight Center.....	13,164,500	500,000	2,400,000
Jet Propulsion Laboratory	3,243,200	2,895,000	---
John F. Kennedy Space Center, NASA.....	170,000	1,741,000	1,300,000
Various Locations.....	5,000	---	---
Wallops Station.....	20,000	629,000	1,048,000
Facility Planning and Design.....	---	---	880,000
3. SPACE APPLICATIONS.....	<u>\$3,933,000</u>	<u>\$ ---</u>	<u>\$ ---</u>
Goddard Space Flight Center.....	3,933,000	---	---

SUM 2

	<u>Fiscal Year 1964</u>	<u>Fiscal Year 1965</u>	<u>Fiscal Year 1966</u>
4. SPACE TECHNOLOGY.....	<u>\$60,949,700</u>	<u>\$23,812,000</u>	<u>\$20,435,000</u>
Ames Research Center.....	11,464,000	3,100,000	---
Electronics Research Center.....	4,820,000	10,050,000	10,000,000
Langley Research Center....	9,872,700	3,253,000	7,568,000
Lewis Research Center.....	20,468,000	1,555,000	867,000
Nuclear Rocket Development Station.....	4,190,000	---	---
Various Locations.....	10,135,000	5,854,000	---
Facility Planning and Design.....	---	---	2,000,000
5. AIRCRAFT TECHNOLOGY.....	<u>\$2,585,000</u>	<u>\$4,452,000</u>	<u>\$762,000</u>
Ames Research Center.....	20,000	2,630,000	---
Flight Research Center.....	2,495,000	---	---
Langley Research Center....	70,000	1,322,000	682,000
Lewis Research Center.....	---	500,000	---
Facility Planning and Design.....	---	---	80,000
6. SUPPORTING ACTIVITIES.....	<u>\$134,442,300</u>	<u>\$15,370,000</u>	<u>\$17,301,000</u>
Goddard Space Flight Center	84,000	1,291,000	---
Jet Propulsion Laboratory..	---	725,000	---
John F. Kennedy Space Center, NASA.....	4,000,000	1,955,000	---
Various Locations.....	129,803,300	10,279,000	15,561,000
Wallops Station.....	555,000	1,120,000	---
Facility Planning and Design.....	---	---	1,740,000
TOTAL PLAN.....	<u>\$715,450,300</u>	<u>\$262,880,500</u>	<u>\$74,700,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1966 ESTIMATES

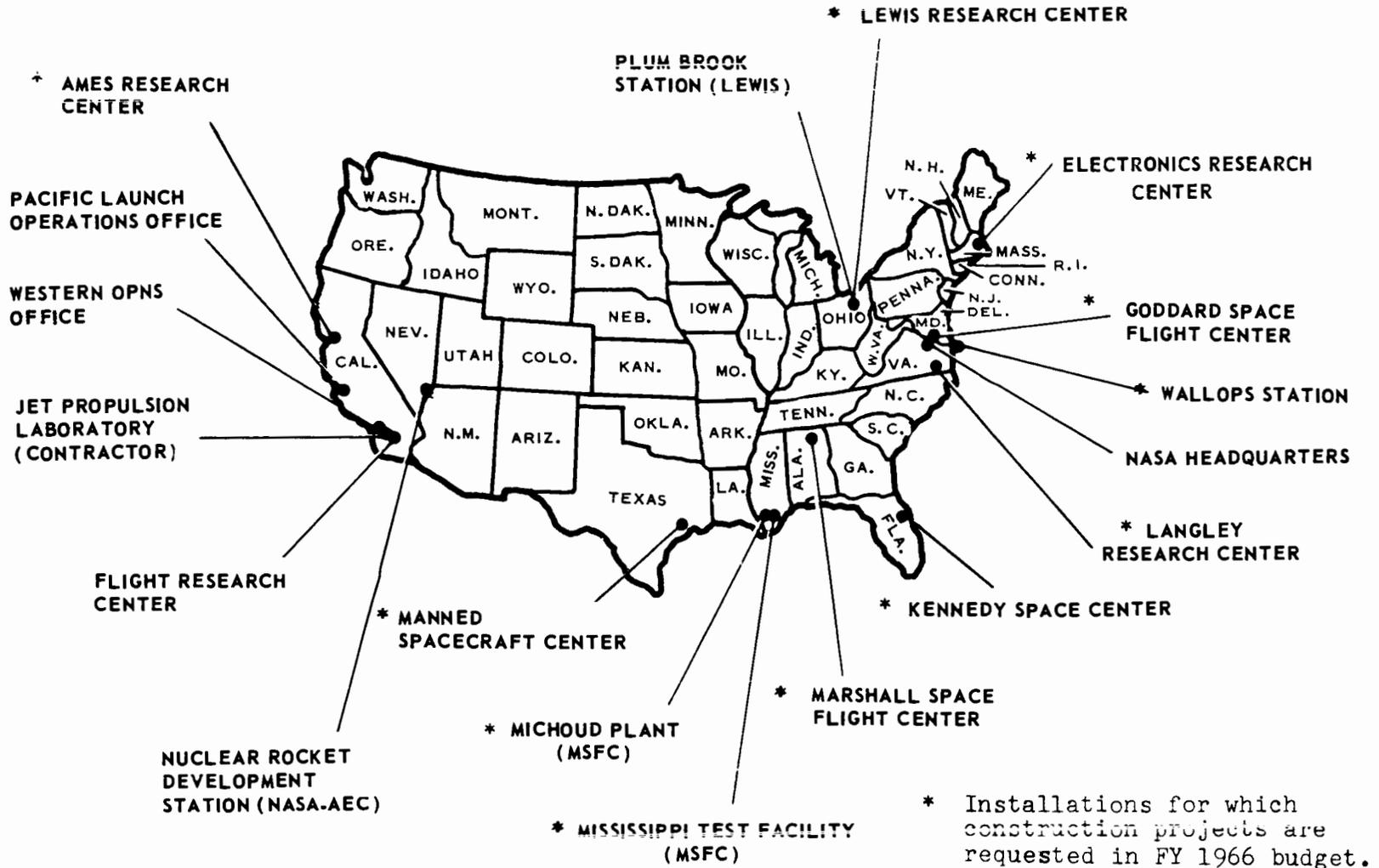
SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN BY LOCATION

<u>Location</u>	<u>Fiscal Year 1964</u>	<u>Fiscal Year 1965</u>	<u>Fiscal Year 1966</u>
Ames Research Center.....	\$11,580,000	\$5,730,000	\$2,749,000
Electronics Research Center.....	4,820,000	10,050,000	10,000,000
Flight Research Center.....	2,495,000	---	---
Goddard Space Flight Center.....	17,181,500	1,791,000	2,400,000
Jet Propulsion Laboratory.....	3,243,200	3,620,000	---
John F. Kennedy Space Center, NASA.....	284,690,300	89,073,200	8,595,000
Langley Research Center.....	9,942,700	4,575,000	8,250,000
Lewis Research Center.....	20,468,000	2,055,000	867,000
Manned Spacecraft Center.....	36,142,000	24,443,000	4,400,000
Marshall Space Flight Center....	30,081,000	14,999,700	4,776,000
Michoud Plant.....	9,058,000	6,313,500	300,000
Mississippi Test Facility.....	96,163,300	54,182,000	2,121,000
Nuclear Rocket Development Station.....	4,190,000	---	---
Various Locations.....	184,820,300	44,299,100	21,694,000
Wallops Station.....	575,000	1,749,000	1,048,000
Facility Planning and Design <sup>1/</sup> ..	---	---	7,500,000
Total Plan.....	<u>\$715,450,300</u>	<u>\$262,880,500</u>	<u>\$74,700,000</u>

<sup>1/</sup>Amounts appropriated in fiscal year 1964 and 1965 are reflected by location.

A geographic location of NASA installations is shown on the following page. Installations for which construction projects are requested in the fiscal year 1966 budget are identified.

# NASA INSTALLATIONS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

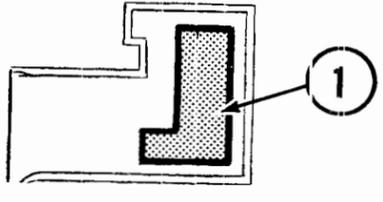
FISCAL YEAR 1966 ESTIMATES

AMES RESEARCH CENTER

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Location plan.....	CF 1-1
Summary.....	CF 1-2
Office of Space Science and Applications Project:	
Systems engineering facility.....	CF 1-3

AMES RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

LOCATION PLAN



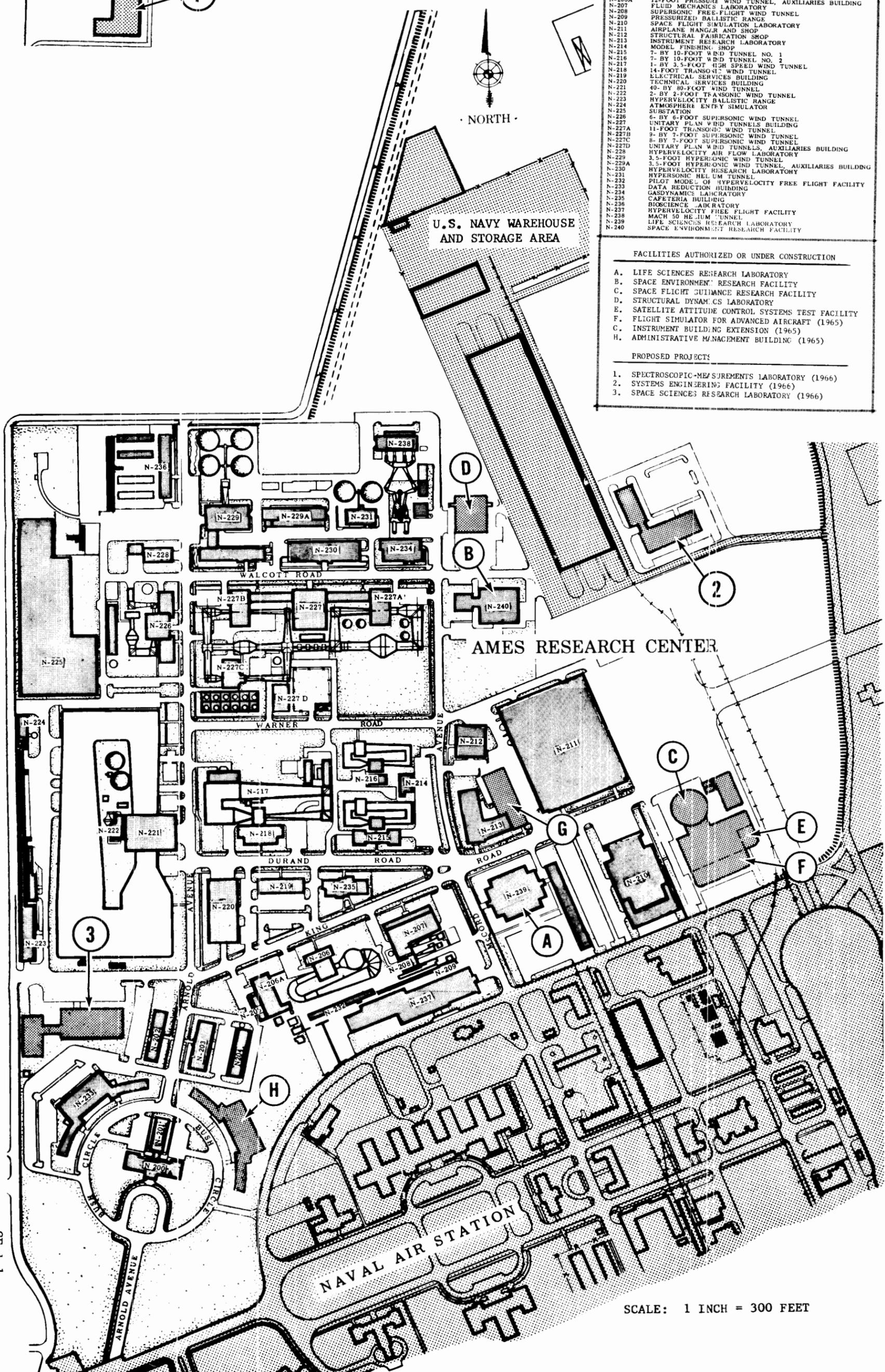
LEGEND	
N-200	ADMINISTRATION BUILDING
N-201	AUDITORIUM
N-202	ADMINISTRATION BUILDING ANNEX
N-203	ENGINEERING SERVICES BUILDING
N-204	SPACE TECHNOLOGY BUILDING
N-205	10-BY 14-INCH SUPERSONIC WIND TUNNEL
N-206	12-FOOT PRESSURE WIND TUNNEL
N-206A	12-FOOT PRESSURE WIND TUNNEL, AUXILIARIES BUILDING
N-207	FLUID MECHANICS LABORATORY
N-208	SUPERSONIC FREE-FLIGHT WIND TUNNEL
N-209	PRESSURIZED BALLISTIC RANGE
N-210	SPACE FLIGHT SIMULATION LABORATORY
N-211	AIRPLANE HANGAR AND SHOP
N-212	STRUCTURAL FABRICATION SHOP
N-213	INSTRUMENT RESEARCH LABORATORY
N-214	MODEL FINISHING SHOP
N-215	7-BY 10-FOOT WIND TUNNEL NO. 1
N-216	7-BY 10-FOOT WIND TUNNEL NO. 2
N-217	1-BY 3.5-FOOT HIGH SPEED WIND TUNNEL
N-218	14-FOOT TRANSONIC WIND TUNNEL
N-219	ELECTRICAL SERVICES BUILDING
N-220	TECHNICAL SERVICES BUILDING
N-221	40-BY 80-FOOT WIND TUNNEL
N-222	2-BY 2-FOOT TRANSONIC WIND TUNNEL
N-223	HYPERVELOCITY BALLISTIC RANGE
N-224	ATMOSPHERE ENTRY SIMULATOR
N-225	SUBSTATION
N-226	6-BY 6-FOOT SUPERSONIC WIND TUNNEL
N-227	UNITARY PLAN WIND TUNNELS BUILDING
N-227A	11-FOOT TRANSONIC WIND TUNNEL
N-227B	9-BY 7-FOOT SUPERSONIC WIND TUNNEL
N-227C	8-BY 7-FOOT SUPERSONIC WIND TUNNEL
N-227D	UNITARY PLAN WIND TUNNELS, AUXILIARIES BUILDING
N-228	HYPERVELOCITY AIR FLOW LABORATORY
N-229	3.5-FOOT HYPERSONIC WIND TUNNEL
N-229A	3.5-FOOT HYPERSONIC WIND TUNNEL, AUXILIARIES BUILDING
N-230	HYPERVELOCITY RESEARCH LABORATORY
N-231	HYPERSONIC HELIUM TUNNEL
N-232	PILOT MODEL OF HYPERVELOCITY FREE FLIGHT FACILITY
N-233	DATA REDUCTION BUILDING
N-234	GASDYNAMICS LABORATORY
N-235	CAFETERIA BUILDING
N-236	BIOSCIENCE LABORATORY
N-237	HYPERVELOCITY FREE FLIGHT FACILITY
N-238	MACH 50 HELIUM TUNNEL
N-239	LIFE SCIENCES RESEARCH LABORATORY
N-240	SPACE ENVIRONMENT RESEARCH FACILITY

FACILITIES AUTHORIZED OR UNDER CONSTRUCTION	
A.	LIFE SCIENCES RESEARCH LABORATORY
B.	SPACE ENVIRONMENT RESEARCH FACILITY
C.	SPACE FLIGHT GUIDANCE RESEARCH FACILITY
D.	STRUCTURAL DYNAMICS LABORATORY
E.	SATELLITE ATTITUDE CONTROL SYSTEMS TEST FACILITY
F.	FLIGHT SIMULATOR FOR ADVANCED AIRCRAFT (1965)
G.	INSTRUMENT BUILDING EXTENSION (1965)
H.	ADMINISTRATIVE MANAGEMENT BUILDING (1965)

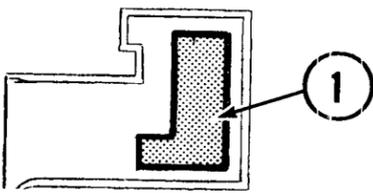
PROPOSED PROJECTS	
1.	SPECTROSCOPIC MEASUREMENTS LABORATORY (1966)
2.	SYSTEMS ENGINEERING FACILITY (1966)
3.	SPACE SCIENCES RESEARCH LABORATORY (1966)



SCALE: 1 INCH = 300 FEET

AMES RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

LOCATION PLAN



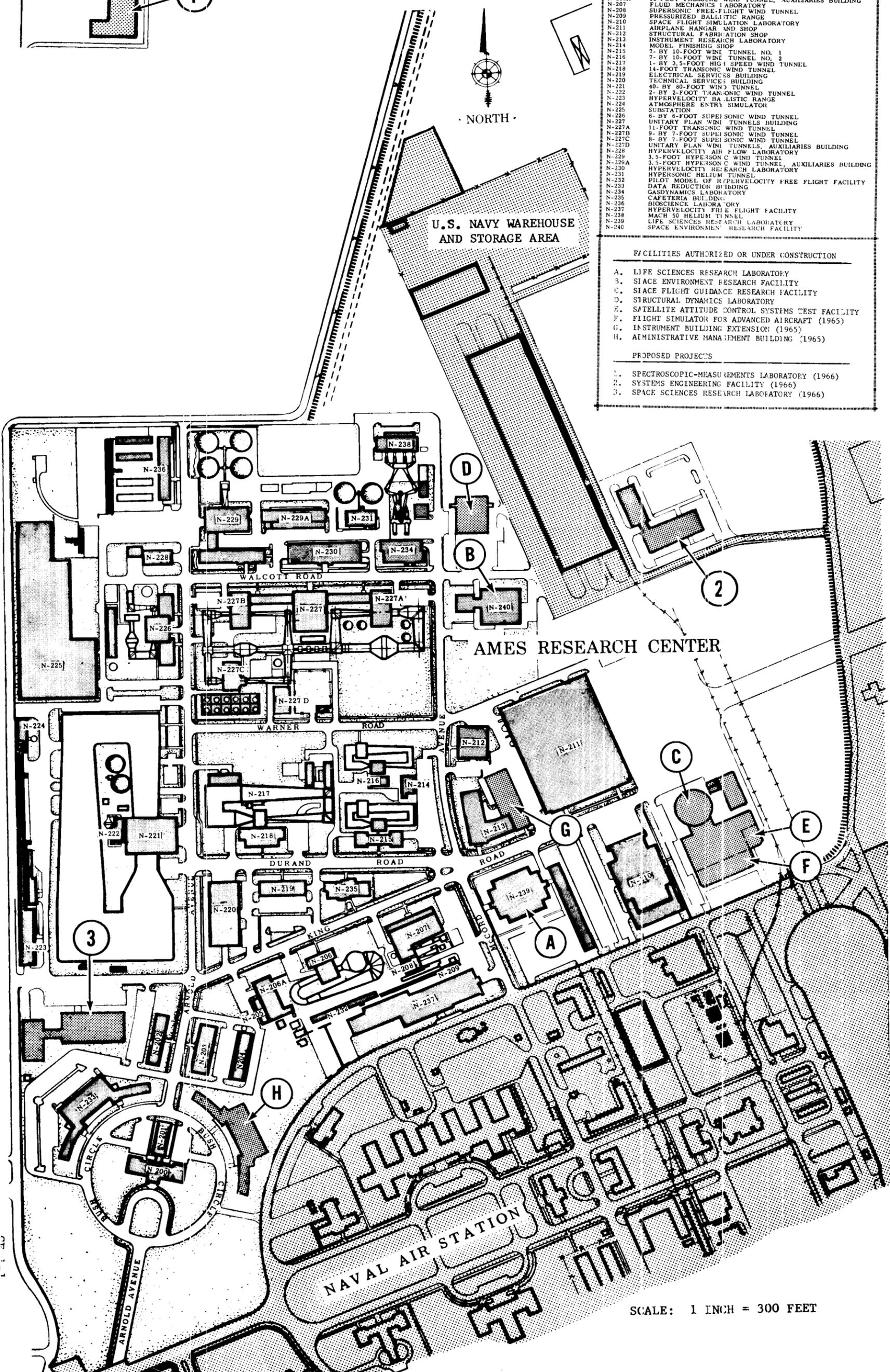
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N-238	MACH 50 HELIUM TUNNEL
N-239	LIFE SCIENCES RESEARCH LABORATORY
N-240	SPACE ENVIRONMENT RESEARCH FACILITY

FACILITIES AUTHORIZED OR UNDER CONSTRUCTION	
A.	LIFE SCIENCES RESEARCH LABORATORY
B.	SPACE ENVIRONMENT RESEARCH FACILITY
C.	SPACE FLIGHT GUIDANCE RESEARCH FACILITY
D.	STRUCTURAL DYNAMICS LABORATORY
E.	SATELLITE ATTITUDE CONTROL SYSTEMS TEST FACILITY
F.	FLIGHT SIMULATOR FOR ADVANCED AIRCRAFT (1965)
G.	INSTRUMENT BUILDING EXTENSION (1965)
H.	ADMINISTRATIVE MANAGEMENT BUILDING (1965)

PROPOSED PROJECTS	
1.	SPECTROSCOPIC-MEASUREMENTS LABORATORY (1966)
2.	SYSTEMS ENGINEERING FACILITY (1966)
3.	SPACE SCIENCES RESEARCH LABORATORY (1966)



CF 1-1

SCALE: 1 INCH = 300 FEET

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Ames Research Center	Advanced Res. & Tech.	Moffett Field, California	Santa Clara	Mountain View			
INSTALLATION MISSION		PERSONNEL STRENGTH		FY 1964	FY 1965	FY 1966	
Laboratory research in aerodynamics, thermodynamics materials, structures, guidance and control, space sciences, environmental biology, life detection, life synthesis, human factors and fundamental physics and chemistry; project management of unmanned space flight projects (Scientific probes and satellites); development of scientific-experiment payloads for space flight projects managed at Ames and elsewhere.		NASA PERSONNEL (End of Year)		2204	2205	2205	
		CONTRACTOR AND OTHER PERSONNEL		292	350	378	
		<b>TOTAL ALL PERSONNEL</b>		<b>2496</b>	<b>2555</b>	<b>2583</b>	
		LAND		NO. ACRES			
		NASA-OWNED		115			
OTHER GOVERNMENT AGENCY-OWNED		120					
NON-FEDERAL (Leases, easements)		-0-					
<b>TOTAL LAND</b>		<b>235</b>					
<b>TOTAL CAPITAL INVESTMENT</b>		<b>\$ 155,427.0</b>					
		<i>(Including NASA-Owned Land) (as of June 30, 19 64 )</i>					
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1966 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Systems Engineering Facility	OSSA	96.0	2,749.0	---	2,845.0		
ALL OTHER PROJECTS		48,835.0					
<b>TOTALS</b>		<b>48,931.0</b>	<b>2,749.0</b>				

GP 1-2

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
SYSTEMS ENGINEERING FACILITY

AUTHORIZATION LINE ITEM: Ames Research Center

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

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

COGNIZANT NASA INSTALLATION: Ames Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$96,000
FY 1966 Estimate	<u>2,749,000</u>
Total Funding Through FY 1966	<u>\$2,845,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,798,200</u>
Site improvement	LS	---	\$38,000	38,000
Roads, parking, walks	LS	---	72,100	72,100
Utilities	LS	---	91,400	91,400
Electrical distribution	LS	---	101,900	101,900
Building	Sq. Ft.	57,925	21.61	1,252,000
Special building construction features	LS	---	242,800	242,800
<u>Equipment</u>				<u>\$940,800</u>
Packaged clean room	LS	---	25,900	25,900
Vibration, acceleration and shock equipment	LS	---	105,700	105,700
Solar concentrator	LS	---	51,700	51,700
Temperature, humidity and altitude chamber	LS	---	41,300	41,300

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Spin table	LS	---	\$77,100	\$77,100
Optics equipment	LS	---	61,600	61,600
Reaction-control tester	LS	---	50,600	50,600
Analog computer	LS	---	103,000	103,000
Digital components	LS	---	258,800	258,800
Pulse-code-modulation telemetry equipment	LS	---	113,400	113,400
Magnetic and RF screen room	LS	---	51,700	51,700
<u>Design</u>	---	---	---	---
		Subtotal		\$2,739,000
Fallout Shelter	---	---	---	\$10,000
		TOTAL		<u>\$2,749,000</u>

PROJECT PURPOSE:

The proposed facility will provide laboratory space and equipment for development, test, evaluation and checkout of flight hardware and of advanced systems under development for future spacecraft.

PROJECT DESCRIPTION:

The facility will be located on real property available through a use permit from the U. S. Navy. The new concrete structure includes a two-story test area of 9,100 square feet and a laboratory wing with two stories and a basement. The total floor area will be approximately 58,000 square feet. No major simulators or test chambers are included, but equipment adequate for components or small-systems test, research, and development will be provided. A clean room will be provided for the preparation of spacecraft hardware and precision equipment. The vibration system, small centrifuge, and shock tester will simulate transportation, launch, and flight loads on the flight equipment and development models. Heat fluxes corresponding to solar constants from 10 to 100 times that on earth will be obtained through use of a solar collector. Temperature, humidity and altitude chambers will simulate spacecraft environments for flight articles. Optical equipment will be used for developmental work on guidance and attitude control systems and components. Telemetry test equipment, command and ranging simulation equipment, as well as computer equipment, will be used for the testing and evaluation of spacecraft data systems and for development of data coding methods, on-board data processors, encoders and decoders, and data storage systems.

PROJECT JUSTIFICATION:

Early in 1963 the Ames Research Center was assigned project management responsibility for two important flight programs, the Pioneer and Biosatellite. In our efforts to broaden the base of unmanned scientific space investigations tailored to support manned space flight, the Ames Research Center made temporary housing arrangements for the 105 engineers and technicians of the Systems Engineering Division and the Pioneer and Biosatellite project management teams in hastily constructed office space inside the large airplane hangars, and squeezed-in temporary quarters at several other scattered locations around Ames.

The proposed Systems Engineering Facility is designed to house these technical groups in a contiguous area and provide laboratory and test bay space for Systems Engineering Division support for bench testing and flight certification of spacecraft components, subsystems, and experiments developed both in-house at the Ames Research Center and by contractors. It is planned that complete flight ready spacecraft will be environmentally tested at larger facilities of the contractor or at other NASA Centers possessing the total systems testing capability. However, it is essential that a limited capability for the small scale environmental testing be developed to permit Ames to do an effective project management job by providing the tools required to assure that the quality and reliability of components selected for flight will meet the rigorous space flight requirements.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

AMES RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

SYSTEMS ENGINEERING FACILITY

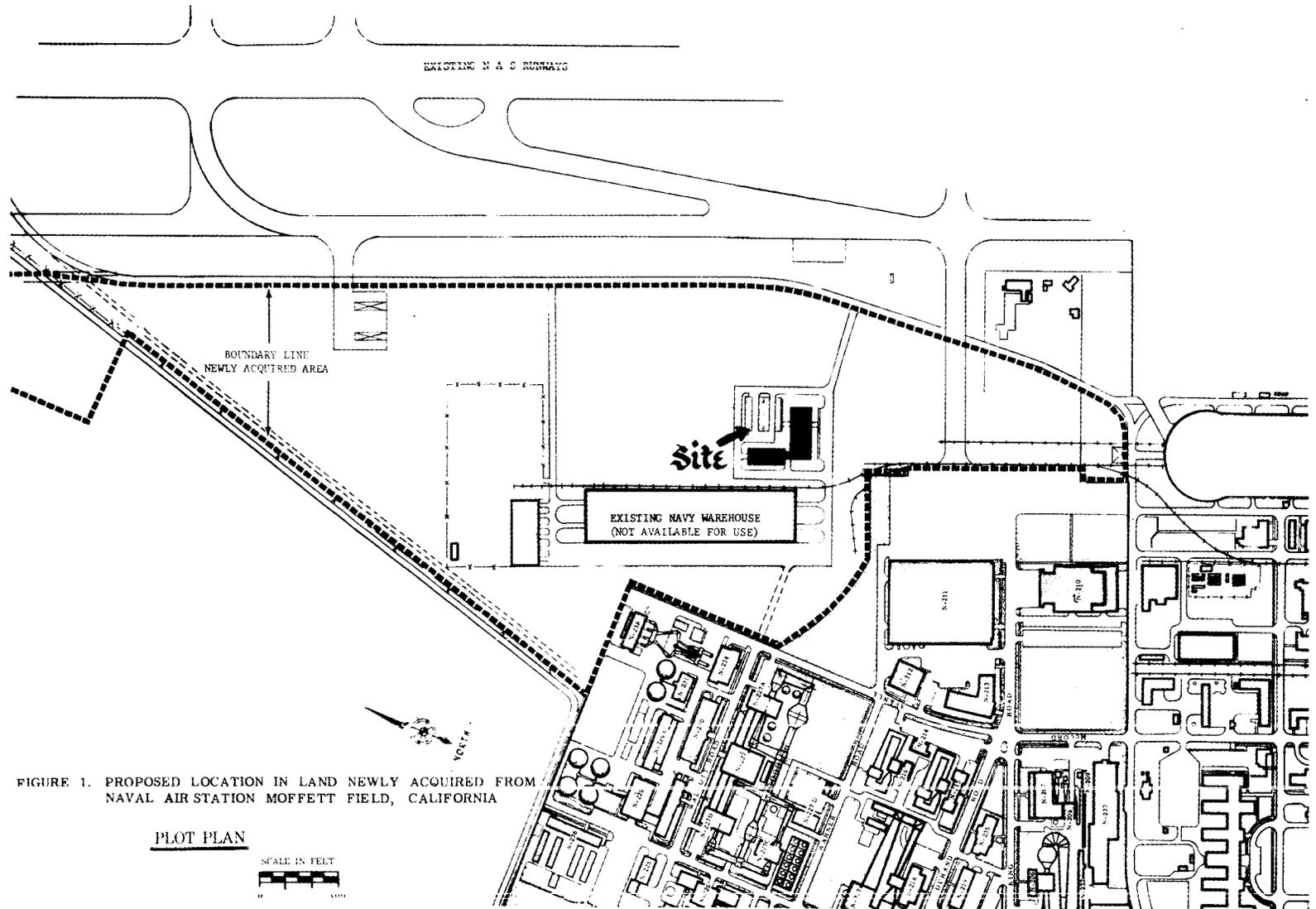
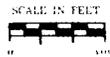


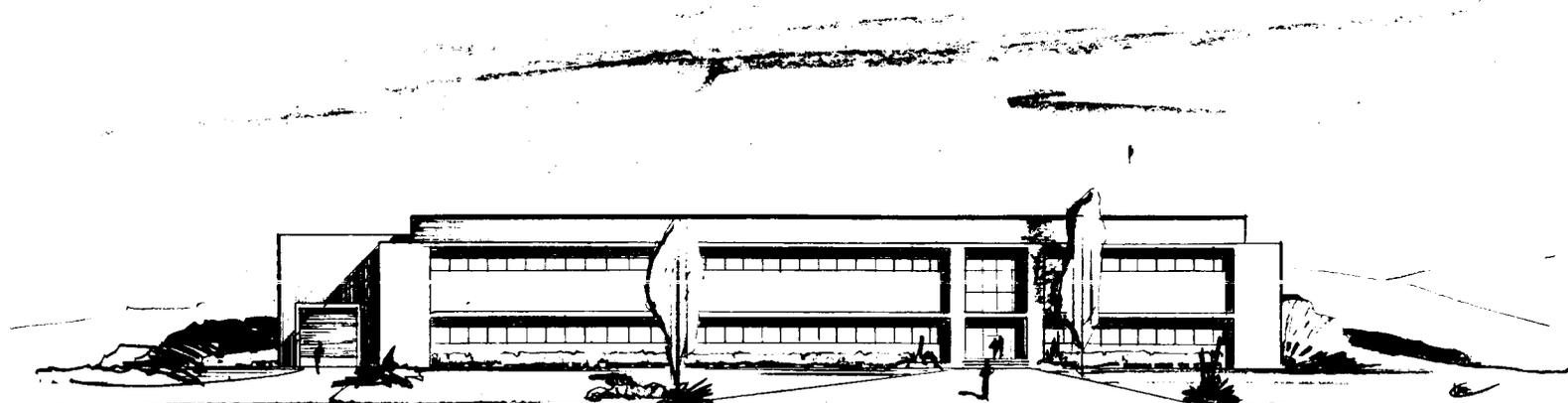
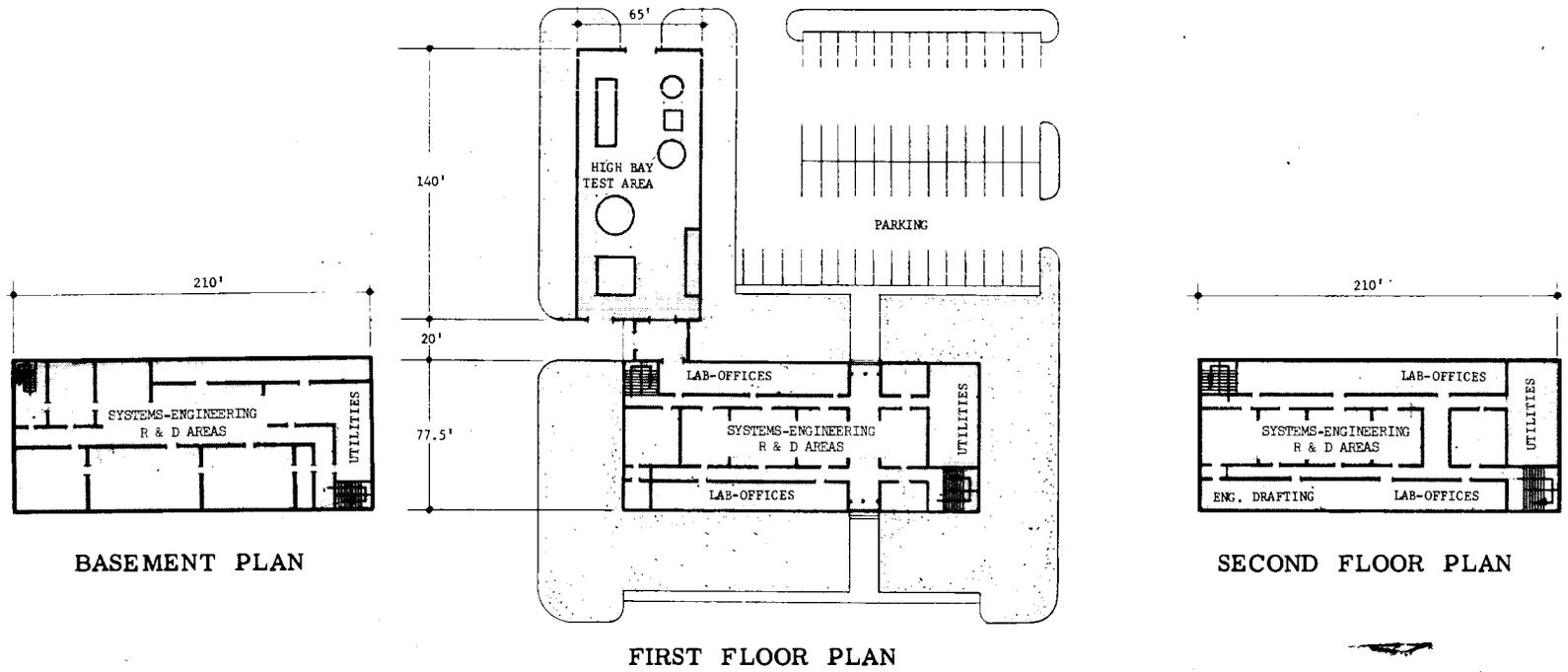
FIGURE 1. PROPOSED LOCATION IN LAND NEWLY ACQUIRED FROM  
NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA

PLOT PLAN



AMES RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

SYSTEMS ENGINEERING FACILITY



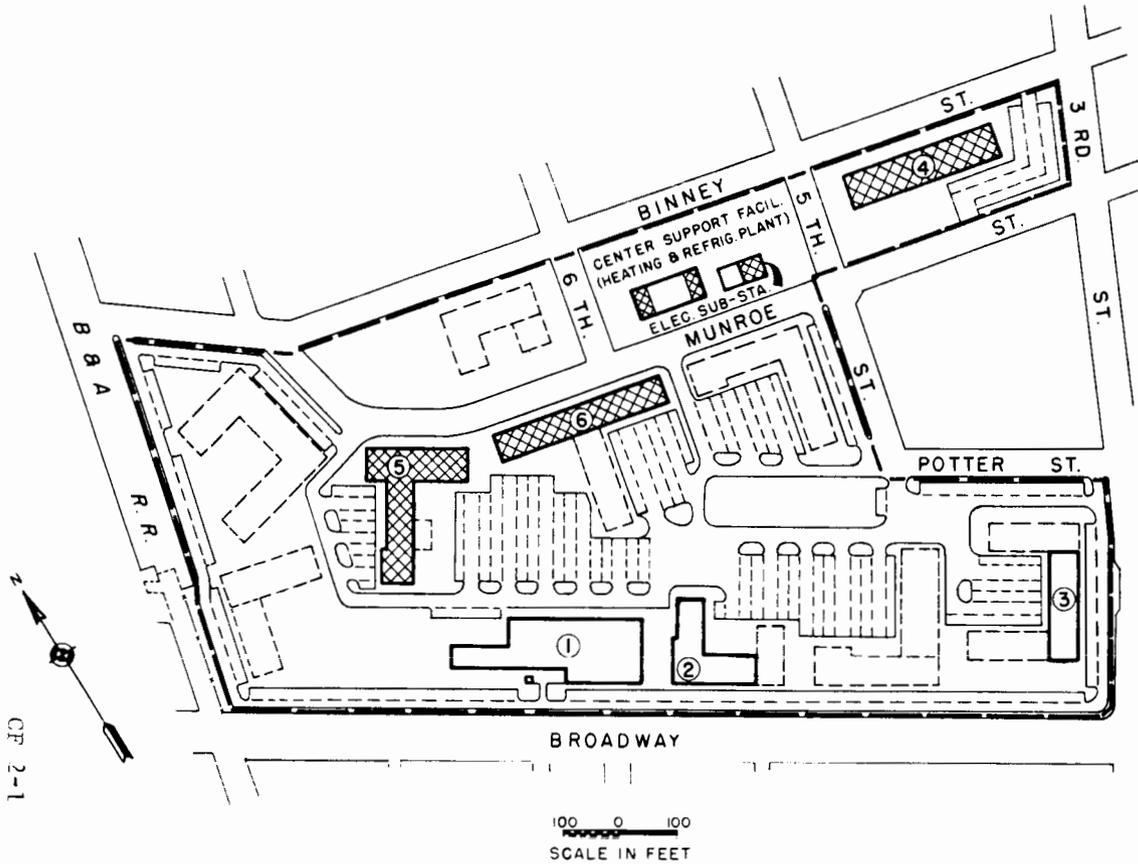
CF 1-7

FIGURE 2

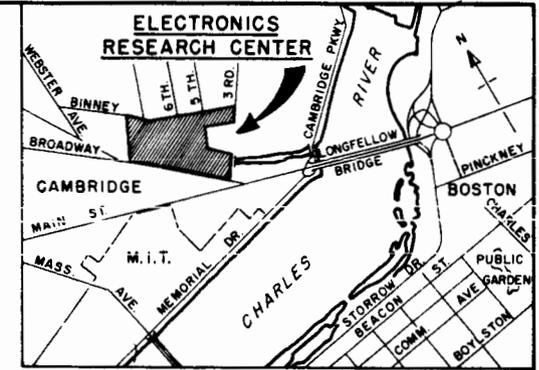
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1966 ESTIMATES  
ELECTRONICS RESEARCH CENTER

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Optical communications laboratory.....	CF 2-7
Microwave radiation laboratory.....	CF 2-11
Center support facilities, second phase.....	CF 2-15

ELECTRONICS RESEARCH CENTER  
 FISCAL YEAR 1966 ESTIMATES  
**LOCATION PLAN**  
 CAMBRIDGE, MASS.  
 (CONDITIONAL)



CF 2-1



0 0.1 0.2 0.3 0.4 0.5  
 SCALE IN MILES

- ① ENGINEERING & ADMINISTRATION BUILDING
- ② ELECTRONIC COMPONENTS LABORATORY
- ③ QUALIFICATIONS & STANDARDS LABORATORY
- ④ MICROWAVE RADIATION LABORATORY
- ⑤ SPACE GUIDANCE LABORATORY
- ⑥ OPTICAL COMMUNICATIONS LABORATORY

**LEGEND**

- FY-65 FACILITIES
- FACILITIES PROPOSED IN 1966 ESTIMATES
- FUTURE FACILITIES
- PROJECT BOUNDARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY						
Electronics Research Center	Advanced Res. & Tech.	Cambridge, Mass.	Middlesex	-----						
INSTALLATION MISSION				PERSONNEL STRENGTH	FY 1964	FY 1965	FY 1966			
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.				NASA PERSONNEL (End of Year)	25	250	550			
				CONTRACTOR AND OTHER PERSONNEL	-	-	-			
				<b>TOTAL ALL PERSONNEL</b>	<b>25</b>	<b>250</b>	<b>550</b>			
				LAND				NO. ACRES		
				NASA-OWNED				-		
OTHER GOVERNMENT AGENCY-OWNED				-						
NON-FEDERAL (Leases, easements)				-						
<b>TOTAL LAND</b>				<b>-</b>						
<b>TOTAL CAPITAL INVESTMENT</b>				<b>\$ -</b>						
(Including NASA-Owned Land) (as of June 30, 1964)										
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1966 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)					
Space Guidance Laboratory	OART	110.0	3,900.0	-0-	4,010.0					
Optical Communications Laboratory	OART	98.0	2,100.0	-0-	2,198.0					
Microwave Radiation Laboratory	OART	100.0	3,000.0	-0-	3,100.0					
Center Support Facilities (Second Phase)	OART	85.0	1,000.0	-0-	1,085.0					
ALL OTHER PROJECTS	OART	14,875.0								
<b>TOTALS</b>			15,268.0	10,000.0						

CF 2-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

SPACE GUIDANCE 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 1965 and Prior Years	\$110,000
FY 1966 Estimate	<u>3,900,000</u>
Total Funding Through FY 1966	<u>\$4,010,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,562,000</u>
Laboratory	Sq. Ft.	46,400	\$32.39	1,503,000
Site preparation	LS	---	12,300	12,300
Roads and parking	LS	---	14,600	14,600
Utilities	LS	---	32,100	32,100
<u>Equipment</u>				<u>\$2,338,000</u>
Inertial test equipment	LS	---	995,000	995,000
Instrumentation equipment	LS	---	827,000	827,000
Analysis equipment	LS	---	200,000	200,000
Special electronic support	LS	---	316,000	316,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$3,900,000</u>

#### PROJECT PURPOSE:

This project will provide laboratory facilities and equipment for electronic research to advance the state-of-the-art related to space guidance systems and components.

#### PROJECT DESCRIPTION:

The two-story building provides laboratory office space, major equipment and special purpose testing space, with approximately 46,400 square feet of floor area. 30,000 square feet on the first and second floors will be devoted to laboratory facilities and related office space, and 5,000 square feet of basement area will be used for utilities, maintenance requirements and limited storage. 11,400 square feet will contain air-bearing test tables, precision centrifuges and specialized calibration and alignment equipment. Special building provisions to maintain the environment essential to the operation of the research equipment in this laboratory will be provided. 148 parking spaces will be included as a part of the site development. Building utilities will be connected to the central systems for heating, chilled water, water distribution, electric power, sanitary sewers, communications, and drainage provided at the Center.

Laboratory equipment will be provided to analyze, test, simulate and generate concepts, techniques and elements for future space navigation and guidance systems. Specialized test and simulation devices will include equipment for sensing and generating velocities, accelerations, angular rates, gravity forces and inertial references as well as 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.

#### PROJECT JUSTIFICATION:

The laboratory will conduct research in guidance and navigation techniques and concepts, and new guidance instrumentation. The building will be occupied by 150 personnel. Theoretical studies, investigations, experimentation and tests in trajectory analysis, inertial reference and sensory techniques, navigation and guidance components and techniques as well as the testing of electromagnetic and optical guidance devices on a component and subsystem basis will be undertaken.

Present space guidance systems were originally developed for aircraft and ballistic missiles which required very high accuracy for short duration flights. This technology has been extended and applied to present space missions. For example; the Saturn guidance system is an extension of Redstone and Pershing technology, and the Apollo guidance system is an outgrowth of developments for Polaris. 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 very reliable,

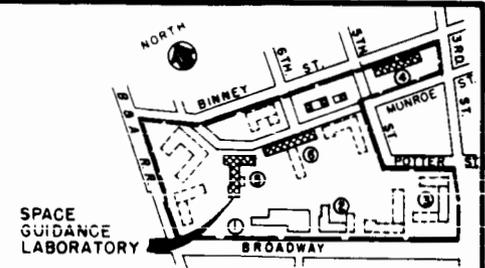
lightweight systems capable of operating for extremely long periods without serious degradation in performance.

In order to achieve this high level of reliability, future guidance systems must incorporate long-life components with few moving parts, negligible drift rates, and low power requirements. Basic research toward securing these objectives is beginning; e. g., the use of coherent light beams in laser gyros is being explored; the gyroscopic properties of atomic nuclei and rotating fluids are being studied; and, the characteristic motion of a vibrating piezoelectric cylinder, acted upon by external forces, is being analyzed. The chief aim of research of this nature is to contribute to the NASA mission by discovering advanced concepts leading to more reliable, less complex, and cheaper guidance systems.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

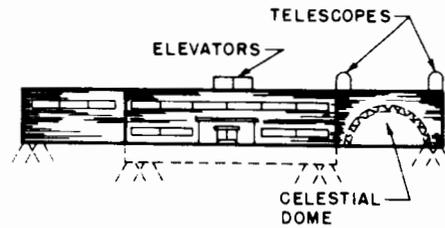
ELECTRONICS RESEARCH CENTER  
 FISCAL YEAR 1966 ESTIMATES  
**SPACE GUIDANCE LABORATORY**

SCALE IN FEET  
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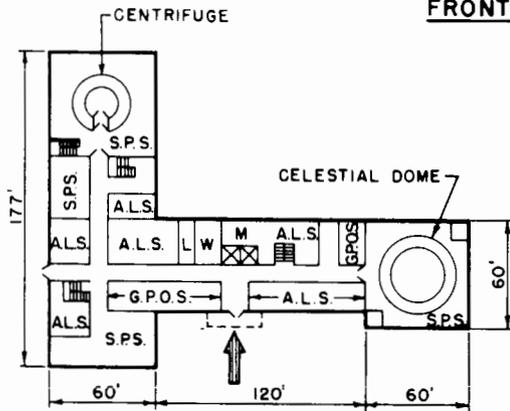


**SITE PLAN**

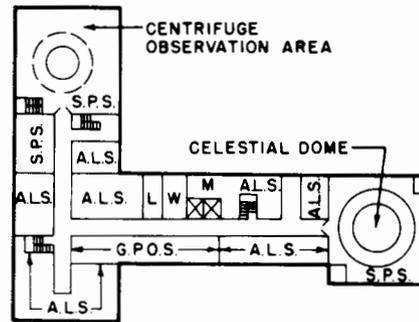
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 SCALE IN FEET



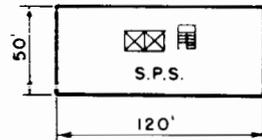
**FRONT ELEVATION**



**FIRST FLOOR PLAN**



**SECOND FLOOR PLAN**



**BASEMENT PLAN**

- ① ENGINEERING & ADMINISTRATION BUILDING
- ② ELECTRONIC COMPONENTS LAB.
- ③ QUALIFICATIONS & STANDARDS LAB.
- ④ MICROWAVE RADIATION LAB.
- ⑤ SPACE GUIDANCE LAB.
- ⑥ OPTICAL COMMUNICATIONS LAB.

**SYMBOLS**

- FY-65 FACILITIES
- ▨ FACILITIES PROPOSED IN 1966 ESTIMATES
- FUTURE FACILITIES
- PROJECT BOUNDARY

**LEGEND**

- ⊠ ELEVATOR
- ▣ STAIRWAY
- G.P.O.S. GENERAL PURPOSE OFFICE SPACE
- A.L.S. ANALYSIS-LABORATORY SPACE
- S.P.S. SPECIAL PURPOSE SPACE
- M MEN'S LAVATORY
- W WOMEN'S LAVATORY
- L WOMEN'S LOUNGE
- ➔ MAIN ENTRANCE
- ⚓ PILE FOUNDATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

OPTICAL COMMUNICATIONS LABORATORY

AUTHORIZATION LINE ITEM: Electronics Research Laboratory

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 1965 and Prior Years	\$98,000
FY 1966 Estimate	<u>2,100,000</u>
Total Funding Through FY 1966	<u>\$2,198,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$809,000</u>
Laboratory	Sq. Ft.	32,000	\$23.75	760,000
Site preparation and foundations	LS	---	17,350	17,350
Roads and parking	LS	---	17,000	17,000
Utilities	LS	---	14,650	14,650
<u>Equipment</u>				<u>\$1,291,000</u>
Optical transmission equipment	LS	---	207,200	207,200
Optical reception equipment	LS	---	512,300	512,300
Optical analysis equipment	LS	---	328,000	328,000
Optics preparation and material equipment	LS	---	243,500	243,500

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u><u>\$2,100,000</u></u></b>

**PROJECT PURPOSE:**

This project will provide laboratory facilities and equipment for electronic research to advance the state-of-the-art, related to optical communications systems and components.

**PROJECT DESCRIPTION:**

The building will be single story with full basement. The ground floor (16,000 square feet) and 10,000 square feet of the basement area will be used for laboratory and office space. The remaining 6,000 square feet of basement area will be used for utility and storage.

Dark rooms and shielded rooms for protection of personnel from high intensity light radiation sources and elimination of undesired optical interferences from natural and man-made sources will be provided. The facility will contain optical test chambers and spectrographic analysis equipment. Building provisions to maintain the environment essential to the operation of the research equipment will be included. Site development will include 96 parking spaces. The building utilities will be connected to the central heating, chilled water, water supply, electric power, communications, alarm, and storm and sanitary sewer systems.

The laboratory will contain equipment for the measurement, analysis, generation and reception of optical energy in the 100 Angstroms to 100 microns wave length region. An analog computer in addition to other data collection and reduction equipment is required for extracting, restoring and analyzing information from laser-pulsed sources. Standard 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:**

This laboratory will conduct research on optical radiation sources and components, data transmission and recovery techniques, and propagation phenomena. The building will be occupied by approximately 125 personnel.

The revival of interest in optics, together with 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, computers and displays, power transmission, and workshop technology. Few of these concepts have progressed beyond basic research. The need for a better understanding of 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 sensitivities 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  $10^{-8}$  seconds 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 birefringence scanners, image converters and image orthicons, may be useful for reconnaissance on the dark side of planets.

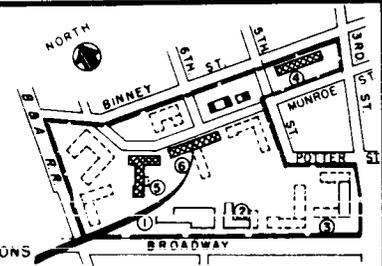
The vertical distribution of radiation near the earth, as well as the spectrum of the sun and stars are largely unknown. Such unknowns have caused malfunctions of infrared horizon seekers. They affect the performance of passive optical communication devices and introduce undesirable complications into 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 spectrum of background radiation and stray light caused by the solar corona 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 communication 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. In addition a program of laser technology development, including optical communication concepts utilizing the laser will be conducted. 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, 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

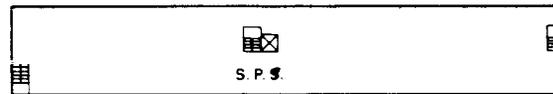
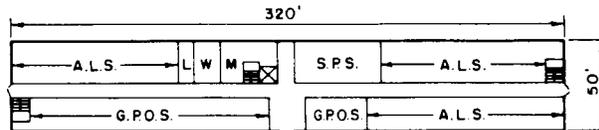
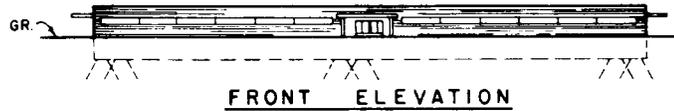
ELECTRONICS RESEARCH CENTER  
 FISCAL YEAR 1966 ESTIMATES  
**OPTICAL COMMUNICATIONS LABORATORY**

SCALE IN FEET  
 0 10 25 50 75 100



OPTICAL COMMUNICATIONS LABORATORY

**SITE PLAN**  
 0 200 400 600  
 SCALE IN FEET



- ① ENGINEERING & ADMINISTRATION BUILDING
- ② ELECTRONIC COMPONENTS LAB.
- ③ QUALIFICATIONS & STANDARDS LAB.
- ④ MICROWAVE RADIATION LAB.
- ⑤ SPACE GUIDANCE LAB.
- ⑥ OPTICAL COMMUNICATIONS LAB.

**SYMBOLS**

- FY-65 FACILITIES
- ▣ FACILITIES PROPOSED IN 1966 ESTIMATES
- FUTURE FACILITIES
- PROJECT BOUNDARY

**LEGEND**

- ⊠ ELEVATOR
- ⊞ STAIRWAY
- G.P.O.S. GENERAL PURPOSE OFFICE SPACE
- A.L.S. ANALYSIS-LABORATORY SPACE
- S.P.S. SPECIAL PURPOSE SPACE
- M MEN'S LAVATORY
- W WOMEN'S LAVATORY
- L WOMEN'S LOUNGE
- ➡ MAIN ENTRANCE
- ⊞ PILE FOUNDATION

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
MICROWAVE RADIATION 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 1965 and Prior Years	\$100,000
FY 1966 Estimate	<u>3,000,000</u>
Total Funding Through FY 1966	<u>\$3,100,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,028,000</u>
Laboratory	Sq. Ft.	40,000	\$24.95	998,000
Site preparation	LS	---	8,000	8,000
Roads and parking	LS	---	10,000	10,000
Utilities	LS	---	12,000	12,000
<u>Equipment</u>				<u>\$1,972,000</u>
Microwave measurements and analysis equipment	LS	---	965,600	965,600
Microwave transmission equipment	LS	---	277,100	277,100
Microwave reception equipment	LS	---	604,500	604,500
Data collection and reduction	LS	---	53,300	53,300
Microwave materials and preparation equipment	LS	---	71,500	71,500

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u>\$3,000,000</u></b>

PROJECT PURPOSE:

This project will provide laboratory facilities and equipment for electronic research to advance the state-of-the-art, related to microwave radiation.

PROJECT DESCRIPTION:

The building will be two-story with a partial basement. Approximately 20,000 square feet on the first and second floors will be devoted to laboratory facilities, and approximately 10,000 square feet to office space. The basement, approximately 10,000 square feet, will be divided for laboratory, utility and storage space. Screened rooms and anechoic chambers for protection against undesirable electromagnetic interferences will be provided. This facility will be used to conduct both transmission and reception experiments. Building provisions to maintain the proper environment required for research equipment will be included. The building utilities will be connected to the central heating, chilled water, water supply, electric power, sanitary sewers and communications systems. Access roads, walks, and parking for 100 autos will be provided.

The laboratory includes equipment for the measurement, analysis, generation and reception of electromagnetic energy over the range of centimeter, submillimeter, and pseudo-optic wavelengths. Equipment for extracting, restoring, and analyzing intelligence from complex electromagnetic propagation is complemented by special computer simulation equipment, both digital and analog. Standard correlation computers, cryogenic equipment, and standard microwave test equipment are included. A precision machine shop and electronic shop provide an in-house capability for building, assembling, packaging and checkout of special microwave components and circuits.

PROJECT JUSTIFICATION:

This laboratory is required for the conduct of research on microwave radiation sources, components, data transmission and recovery techniques, and propagation phenomena. The facility will be occupied by 180 personnel.

The primary objective of the laboratory is to develop techniques for providing reliable microwave links. Present technology falls far short of program objectives. A transmission from the moon that requires 3 watts requires

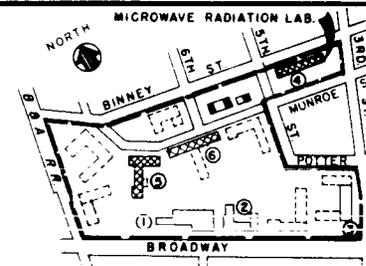
1000 watts for Mars. Methods to achieve much larger effective antenna apertures must be developed. Lightweight spacecraft antenna materials capable of withstanding high temperatures in space are required. Spacecraft antennas must have a high degree of dimensional stability over a long period of time, survive meteoroid bombardment, be highly radiation resistant, and fit compactly into the payload package.

Further investigations required to fulfill future space objectives include: minimizing multipath spurious response during lander-orbiter relay link operation, research toward prevention of ionic breakdown in antennas, refinement of theoretical models of R-F attenuation resulting from dust storms and meteorological effects, techniques for minimizing the effect of occultation, and prevention of plasma blackout during lander entry.

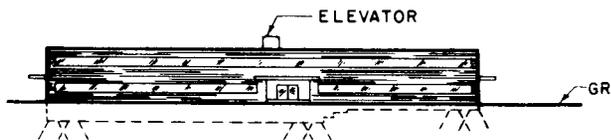
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

ELECTRONICS RESEARCH CENTER  
 FISCAL YEAR 1966 ESTIMATES  
**MICROWAVE RADIATION LABORATORY**

SCALE IN FEET  
 0 10 25 50 75 100

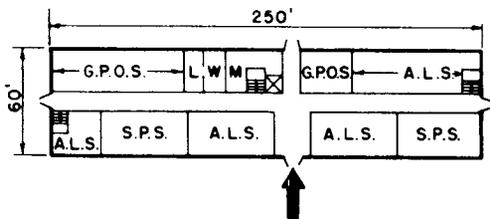


**SITE PLAN**  
 0 200 400 600  
 SCALE IN FEET

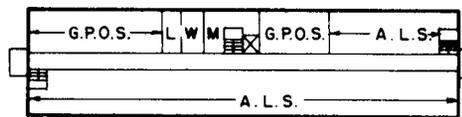


**FRONT ELEVATION**

- ① ENGINEERING & ADMINISTRATION BUILDING
- ② ELECTRONIC COMPONENTS LAB
- ③ QUALIFICATIONS & STANDARDS LAB
- ④ MICROWAVE RADIATION LAB.
- ⑤ SPACE GUIDANCE LAB.
- ⑥ OPTICAL COMMUNICATIONS LAB.



**FIRST FLOOR PLAN**



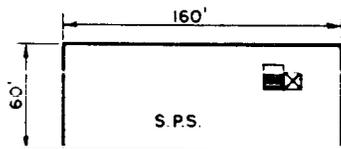
**SECOND FLOOR PLAN**

**SYMBOLS**

- FY-65 FACILITIES
- ▣ FACILITIES PROPOSED IN 1966 ESTIMATES
- FUTURE FACILITIES
- - - PROJECT BOUNDARY

**LEGEND**

- ⊠ ELEVATOR
- ⊞ STAIRWAY
- G.P.O.S. GENERAL PURPOSE OFFICE SPACE
- A.L.S. ANALYSIS-LABORATORY SPACE
- S.P.S. SPECIAL PURPOSE SPACE
- M MEN'S LAVATORY
- W WOMEN'S LAVATORY
- L WOMEN'S LOUNGE
- ➡ MAIN ENTRANCE
- ⊗ PILE FOUNDATION



**BASEMENT PLAN**

CP 2-14

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

CENTER SUPPORT FACILITIES, SECOND PHASE

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 1965 and Prior Years	\$85,000
FY 1966 Estimate	<u>1,000,000</u>
Total Funding Through FY 1966	<u>\$1,085,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,000,000</u>
Addition to Center heating and refrigeration plant	LS	---	\$295,000	295,000
Site preparation	LS	---	150,000	150,000
Utilities	LS	---	525,000	525,000
Roads	LS	---	30,000	30,000
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u><u>\$1,000,000</u></u>

PROJECT PURPOSE:

This project will provide site development and utility support facilities

to support the Electronics Research Center laboratories proposed for FY 1966.

PROJECT DESCRIPTION:

This project is the second phase of the site development and provision of support facilities for the Electronics Research Center located on an urban tract in Cambridge, Massachusetts. The site development and utility construction and installation covered in this project relate to the FY 1966 construction projects of the Center.

Site development includes additional site clearing, grading, top soil and seeding, security fencing, storm drainage, utility tunnels, roads, walkways and street lighting, required to support the additional laboratories requested in FY 1966.

The utility support facilities consist of the addition to the Center heating and refrigeration plant, warehouse-maintenance building, additions to the underground heat and chilled water distribution systems, sewage collection and disposal, underground electrical distribution systems, transformers, communication systems, and water systems. As in the case of the utilities previously provided for the Center, the heat, chilled water, electrical and water distribution systems will be constructed in utilidors to facilitate operation and maintenance of Center utilities.

PROJECT JUSTIFICATION:

The Center Support Facilities, Second Phase, are required to operate the individual laboratories of the Electronics Research Center requested in the FY 1966 Budget. Without these necessary site-developments and utility support, the laboratories requested cannot function.

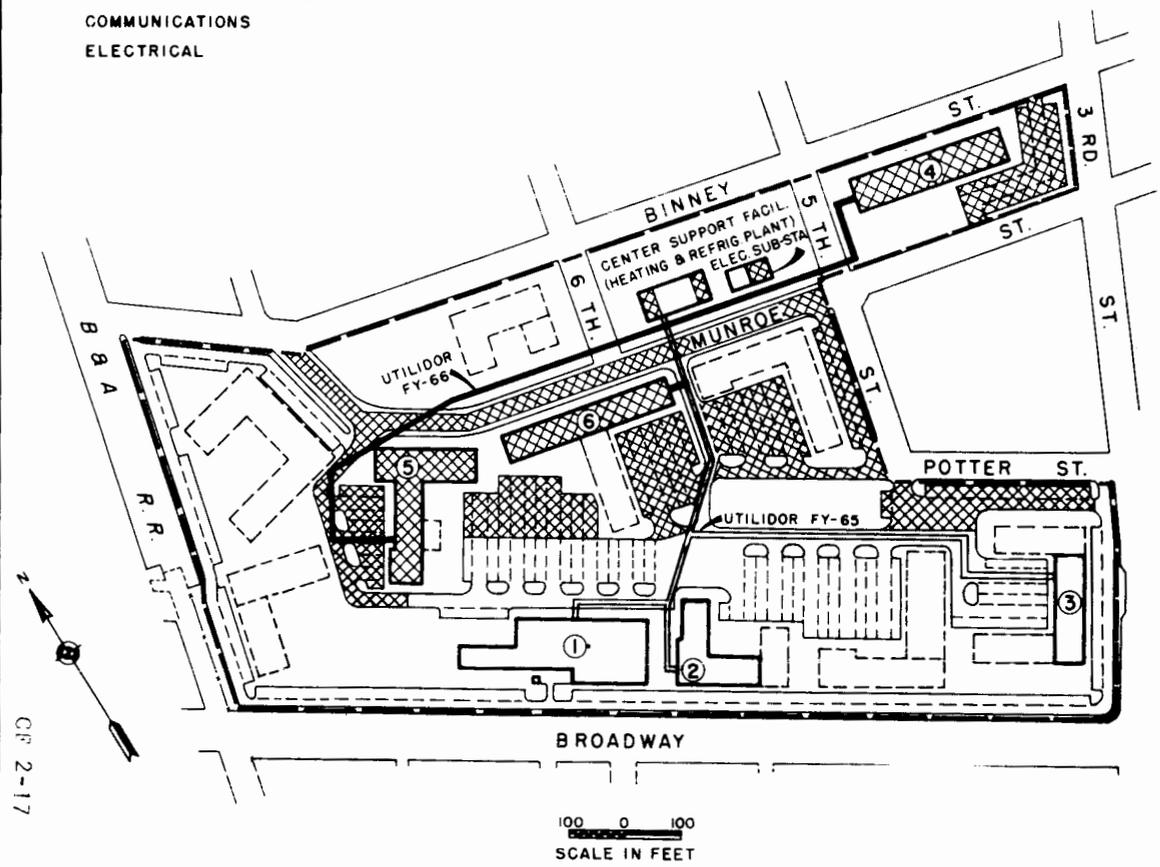
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

160-318-C-68

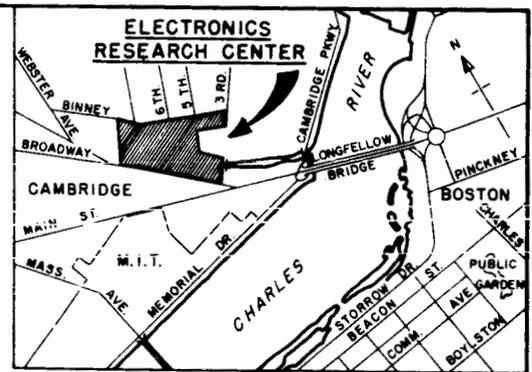
**UTILITY SERVICES  
IN UTILIDOR**

- HEAT LINES
- COOLING LINES
- WATER SUPPLY
- COMPRESSED AIR
- INDUSTRIAL WASTE
- SANITARY SEWER (PRESSURE SYS.)
- COMMUNICATIONS
- ELECTRICAL

**ELECTRONICS RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES  
CENTER SUPPORT FACILITIES  
SECOND PHASE**



CR 2-17



- ① ENGINEERING & ADMINISTRATION BUILDING
- ② ELECTRONIC COMPONENTS LABORATORY
- ③ QUALIFICATIONS & STANDARDS LABORATORY
- ④ MICROWAVE RADIATION LABORATORY
- ⑤ SPACE GUIDANCE LABORATORY
- ⑥ OPTICAL COMMUNICATIONS LABORATORY

**LEGEND**

- FY-65 FACILITIES
- ▣ FACILITIES PROPOSED IN 1966 ESTIMATES
- ⋯ FUTURE FACILITIES
- PROJECT BOUNDARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

GODDARD SPACE FLIGHT CENTER

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Summary.....	CF 3-3
Office of Space Science and Applications Projects:	
NASA space science data center.....	CF 3-4
Utility installation.....	CF 3-9

# GODDARD SPACE FLIGHT CENTER FISCAL YEAR 1966 ESTIMATES LOCATION PLAN

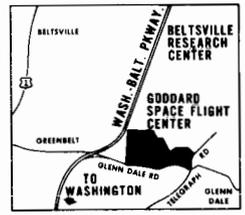


- 1 SPACE PROJECTS BUILDING
- 2 RESEARCH PROJECTS LABORATORY
- 3 CENTRAL FLIGHT CONTROL AND RANGE OPERATIONS LABORATORY
- 4 BOILER HOUSE AND ELECTRIC SUBSTATION
- 5 INSTRUMENT CONSTRUCTION AND INSTALLATION LABORATORY
- 6 SPACE SCIENCES LABORATORY
- 7 PAYLOAD TESTING FACILITY
- 8 SATELLITE SYSTEMS LABORATORY
- 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

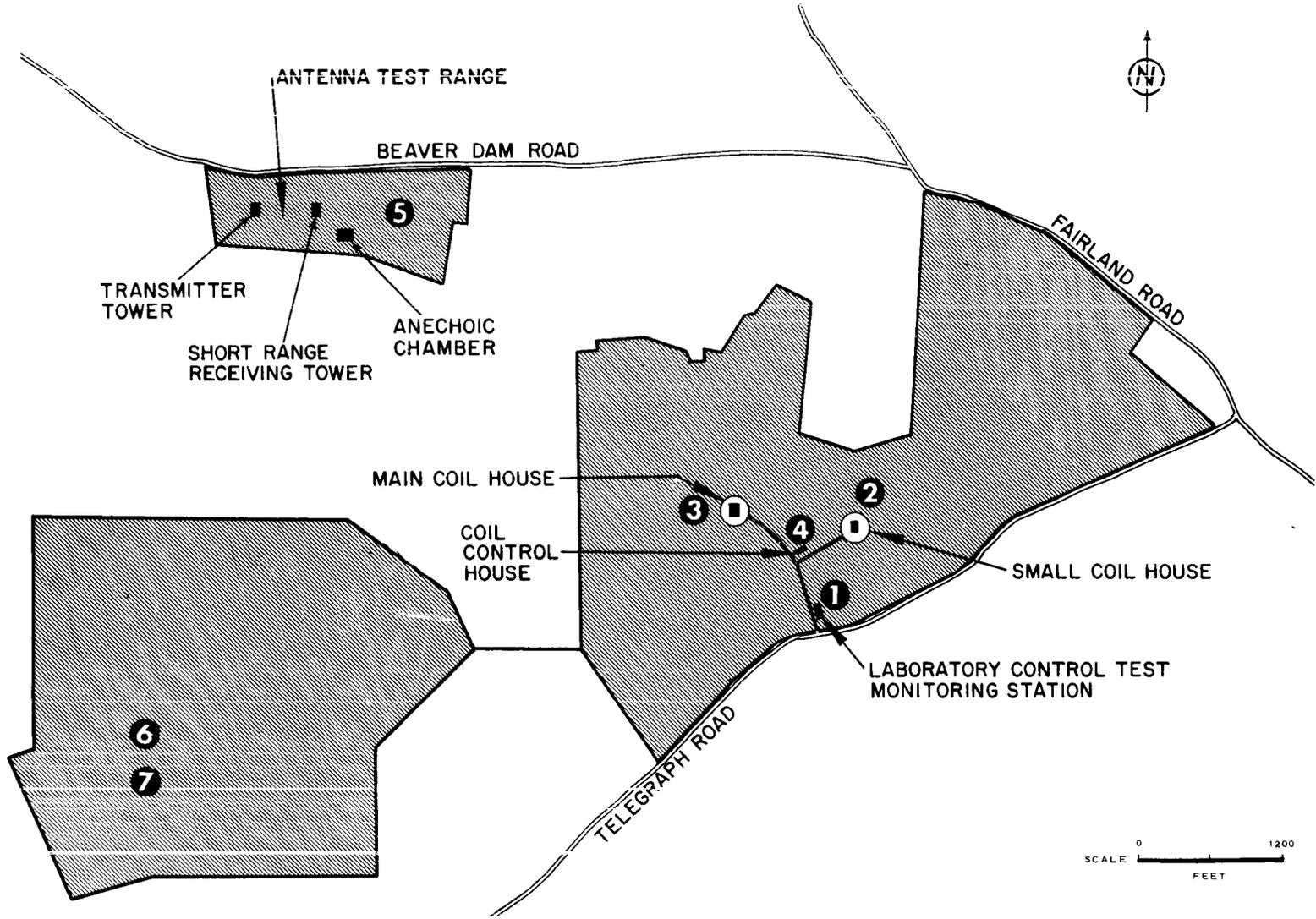
FACILITIES PROPOSED IN 1966 ESTIMATES

**66-1** NASA SPACE SCIENCE DATA CENTER

EXISTING FACILITIES  
 FACILITIES UNDER CONSTRUCTION  
 FACILITIES PROPOSED IN 1966 ESTIMATES



# REMOTE SITE AREAS



- ①② MAGNET FIELDS COMPONENT TEST FACILITY
- ③④ ATTITUDE CONTROL TEST FACILITY

- ⑤ ANTENNA TEST RANGE
- ⑥ STADAN ENGINEERING & REAL TIME STATION

- ⑦ MANNED SPACE FLIGHT TRAINING FACILITY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY				
Goddard Space Flight Center	Space Sci. & Appli.	Greenbelt, Maryland	Prince Georges	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 1964	FY 1965	FY 1966	
					NASA PERSONNEL (End of Year)	3,675	3,725	3,725
					CONTRACTOR AND OTHER PERSONNEL	1,892	2,310	2,320
					<b>TOTAL ALL PERSONNEL</b>	<b>5,567</b>	<b>6,035</b>	<b>6,045</b>
					LAND			NO. ACRES
					NASA-OWNED			530
		OTHER GOVERNMENT AGENCY-OWNED			652			
		NON-FEDERAL (Leases, easements)			-0-			
		<b>TOTAL LAND</b>			<b>1,182</b>			
		<b>TOTAL CAPITAL INVESTMENT</b>			<b>\$ 118,739.0</b>			
		<i>(Including NASA-Owned Land) (as of June 30, 1964)</i>						
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1966 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)			
NASA Space Science Data Center	OSSA	120.0	2,000.0	-0-	2,120.0			
Utility Installations	OSSA	45.0	400.0	-0-	445.0			
ALL OTHER PROJECTS		80,157.9						
<b>TOTALS</b>		<b>80,322.9</b>	<b>2,400.0</b>					

CF 3-3

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
NASA SPACE SCIENCE DATA CENTER

AUTHORIZATION LINE ITEM: Goddard Space Flight Center

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

LOCATION OF PROJECT: Greenbelt, Prince Georges County, Maryland

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$120,000
FY 1966 Estimate	<u>2,000,000</u>
Total Funding Through FY 1966	<u>\$2,120,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,590,000</u>
Building	Sq. Ft.	50,000	\$25.00	1,250,000
Raised floor system	Sq. Ft.	3,000	5.00	15,000
City water lines	LS	---	19,500	19,500
Chilled water lines	LS	---	78,000	78,000
Steam lines	LS	---	48,000	48,000
Sanitary and storm lines	LS	---	47,500	47,500
Electrical power and communications	LS	---	53,000	53,000
Roads, walks, parking	LS	---	79,000	79,000
<u>Equipment</u>				<u>\$410,000</u>
Data retrieval	LS	---	325,000	325,000
Microfilm and reproduction	LS	---	85,000	85,000
<u>Design</u>	---	---	---	---

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Fallout Shelter*</u>	---	---	---	<u>-0-</u>
		TOTAL		<u>\$2,000,000</u>

\*Based on a recent GSFC fallout shelter survey, adequate shelter areas in buildings existing or under construction are available to house the projected population of the Center, however some shelter is inherent to the structure and will be provided without additional cost.

PROJECT PURPOSE:

The objective of the NASA Data Center is the efficient collection and interchange of scientific data, both internally and with the scientific community. This project will provide the facilities required for the collection, organization, storage, retrieval, and dissemination of all scientific data resulting from NASA sponsored experiments in space and the upper atmosphere.

PROJECT DESCRIPTION:

This project will provide for the construction of a Space Science Data Center to be located north of the Applied Sciences Laboratory, Building No. 11 at the Goddard Space Flight Center. The Data Center will be approximately 50,000 square feet of area consisting of a ground floor and two additional floors. The facility will be of concrete and steel construction having masonry and steel partitions and conform to the existing architectural design of the Center. Raised flooring for the installation of cableways for electronic computers, data handling equipment and associated areas is required for efficient operation and low maintenance costs. Air conditioning will be installed to control temperature and humidity in the data handling and storage areas. Data retrieval, microfilm and reproduction equipment is also included in this project. Offices, including those set aside for study and resident research personnel, and parking facilities will be provided for approximately 150 personnel. By extending existing utilities, the necessary electrical, chilled water, steam and drainage systems will adequately support the proposed facility.

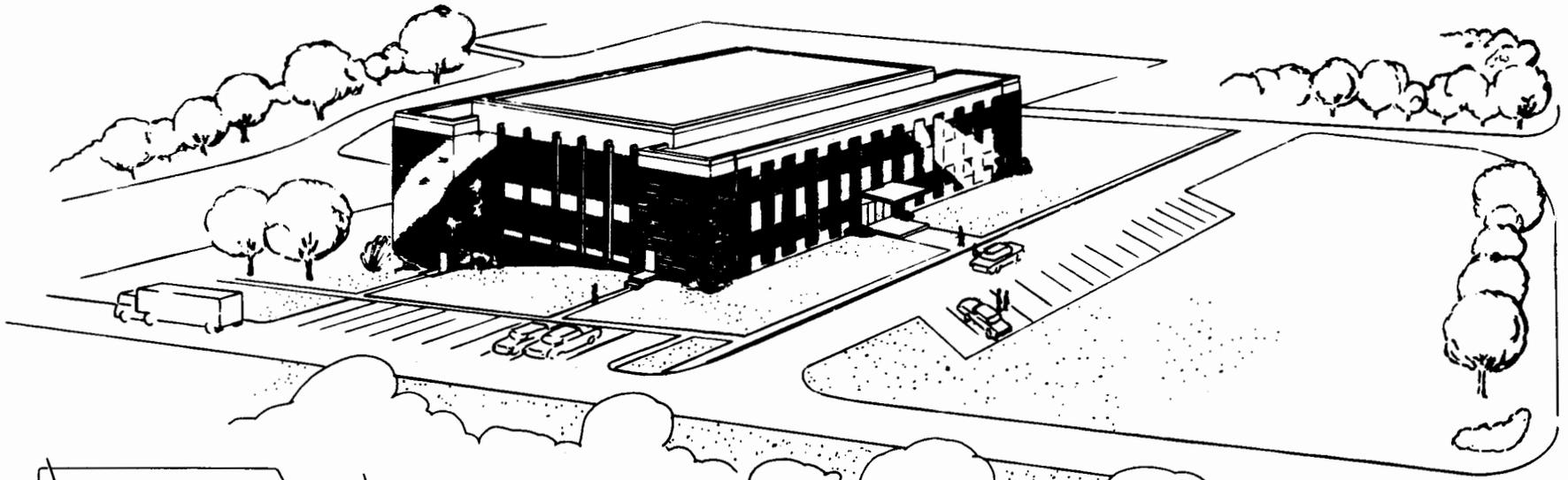
PROJECT JUSTIFICATION:

The National Aeronautics and Space Administration under its original implementing act is required to effect the widest possible dissemination of the results of all its research and development projects internally and to the scientific community. Large accumulations of scientific satellite data have been and are presently resulting in significant space science discoveries. However, no facility has been established for the control and utilization of much of this valuable and voluminous data. Although space science experiment information is available from various sources to interested personnel there

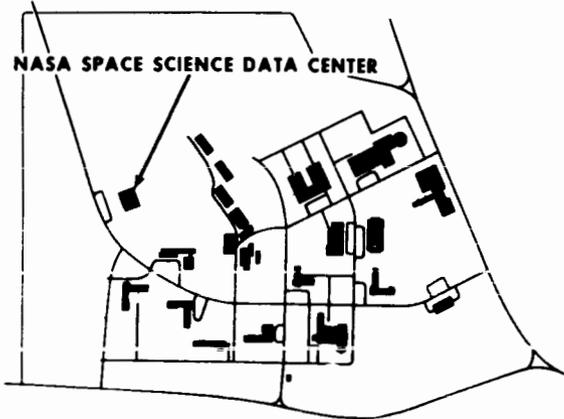
is no single source existing where the information accumulated from these experiments can be used in cooperation with information from other data centers, observatories, universities and experimenters thereby effectively communicating to the scientific community and NASA scientists the total spectrum of this scientific data. This data centralization task has been assigned by the NASA to the Goddard Space Flight Center. It is therefore necessary that an appropriate facility be established to provide the capability for present and foreseeable future requirements. The Space Science Data Center proposed herein will serve as a national repository and dissemination point for all NASA sponsored space science research data. This facility will enable the acquisition, organization, storage and retrieval of this data for dissemination internally and to the scientific community.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

GODDARD SPACE FLIGHT CENTER  
FISCAL YEAR 1966 ESTIMATES  
**NASA SPACE SCIENCE DATA CENTER**



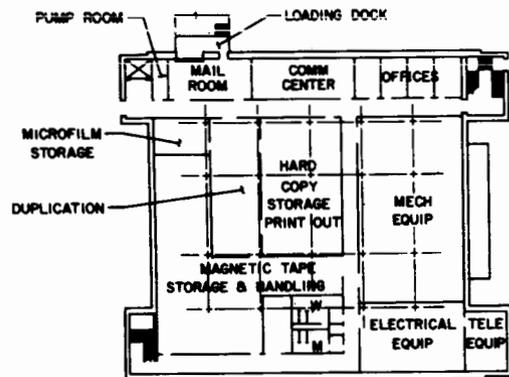
PERSPECTIVE



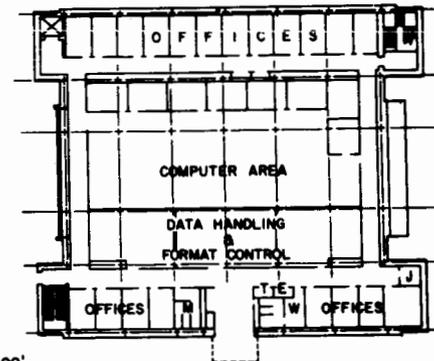
NASA SPACE SCIENCE DATA CENTER

LOCATION PLAN

GODDARD SPACE FLIGHT CENTER  
 FISCAL YEAR 1966 ESTIMATES  
**NASA SPACE SCIENCE DATA CENTER**



GROUND FLOOR

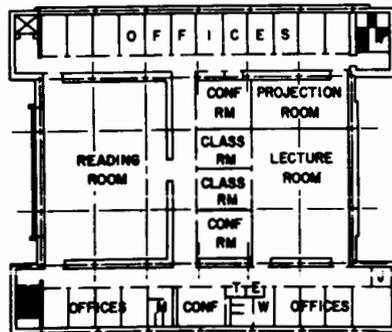


FIRST FLOOR

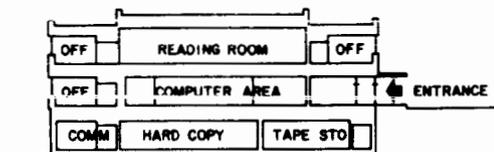


SCALE 0 25' 50' 75' 100'

CF 3-8



SECOND FLOOR



SECTION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

UTILITY INSTALLATION

AUTHORIZATION LINE ITEM: Goddard Space Flight Center

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

LOCATION OF PROJECT: Greenbelt, Prince Georges County, Maryland

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$45,000
FY 1966 Estimate	<u>400,000</u>
Total Funding Through FY 1966	<u>\$445,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$150,000</u>
Modifications to Buildings #3 and #14 including air-conditioning and electrical systems	LS	---	\$150,000	150,000
<u>Equipment</u>				<u>\$250,000</u>
Diesel generators	Each	2	75,000	150,000
Electrical switchgear and accessories	LS	---	100,000	100,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u>\$400,000</u>

PROJECT PURPOSE:

This project will provide an increase in auxiliary power for the centers' increasing Tracking and Data operations. This auxiliary power will serve as back-up during critical mission operations to preclude failure of computer, communications, and air conditioning equipment should the prime commercial power fail.

PROJECT DESCRIPTION:

This project provides for the installation of two (2) diesel generators in the basement of the Central Power Plant to meet increased critical power requirements for Tracking and Data Computer Systems in the Central Flight Control and Range Operations Laboratory (Building #3) and the Spacecraft Operations Facility (Building #14). The generators will compliment two (2) existing 300 KW diesel generators that are presently used for back-up during critical missions. The proposed generators, associated switchgear, and auxiliary equipment will be installed in space reserved for this purpose in the initial design of the power plant. Included in this project are modifications to electrical and air conditioning systems, in Buildings 3 and 14, which are required to extend the back-up system.

PROJECT JUSTIFICATION:

At present the Center uses two (2) 300 KW diesel generators, during critical missions, as back-up power for existing computer, communications, and air conditioning systems being operated in support of the mission. During these tracking operations, diesel and commercial power is used to operate redundant systems. Thus, in the event of commercial power failure, the back-up systems operating under diesel power insure continuous functioning of the vital tracking and communications equipment.

However, the increase in the amount of critical computer and communications equipment being installed in the Buildings 3 and 14 complex requires that additional diesel power and air conditioning back-up be provided. A tabulation of the existing power loads and the requirements for the additional back-up power is as follows:

EXISTING LOADS

Manned Space Flight tracking computers, Building No. 3	150	KW
1 Univac 490 switching system	100	KW
Computer and communications air conditioning systems	<u>300</u>	<u>KW</u>
TOTAL	<u>550</u>	

The Manned Space Flight tracking computers (at 150 KW) and the switching system (at 100 KW) are for electronic equipment power; the air conditioning systems (at 300 KW) are for operation of chilled water and air handling units in the building to provide air conditioning back-up. The two (2) existing 300 KW diesel units accommodate these loads.

The proposed additional diesel units will meet the requirements imposed by the following new loads:

NEW LOADS

Spacecraft control centers; OGO, OAO, OSO, Nimbus/Tiros	230 KW
Data support computers	75 KW
Computer and communication A/C system	<u>300</u> KW
TOTAL	<u>605</u>

The spacecraft control center loads represent the requirements of real time control and command operations during operations of the spacecraft noted above. It also includes loads to meet network communication requirements to assure timely issuance of instructions to the various network stations. The Data support computer loads are generated by both manned and unmanned missions. The air conditioning system back-up power is necessary to provide the rigid environmental requirements necessary for the efficient operation of the computers.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

JOHN F. KENNEDY SPACE CENTER, NASA

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RF systems test facility.....	CF 4-3
Flight crew training building extension.....	CF 4-7
Extension to the medical facility.....	CF 4-10
Utility installations - New area.....	CF 4-13
Office of Space Science and Applications Project:	
Modification to launch complex 17.....	CF 4-17

# JOHN F. KENNEDY SPACE CENTER

FISCAL YEAR 1966 ESTIMATES

## LOCATION PLAN

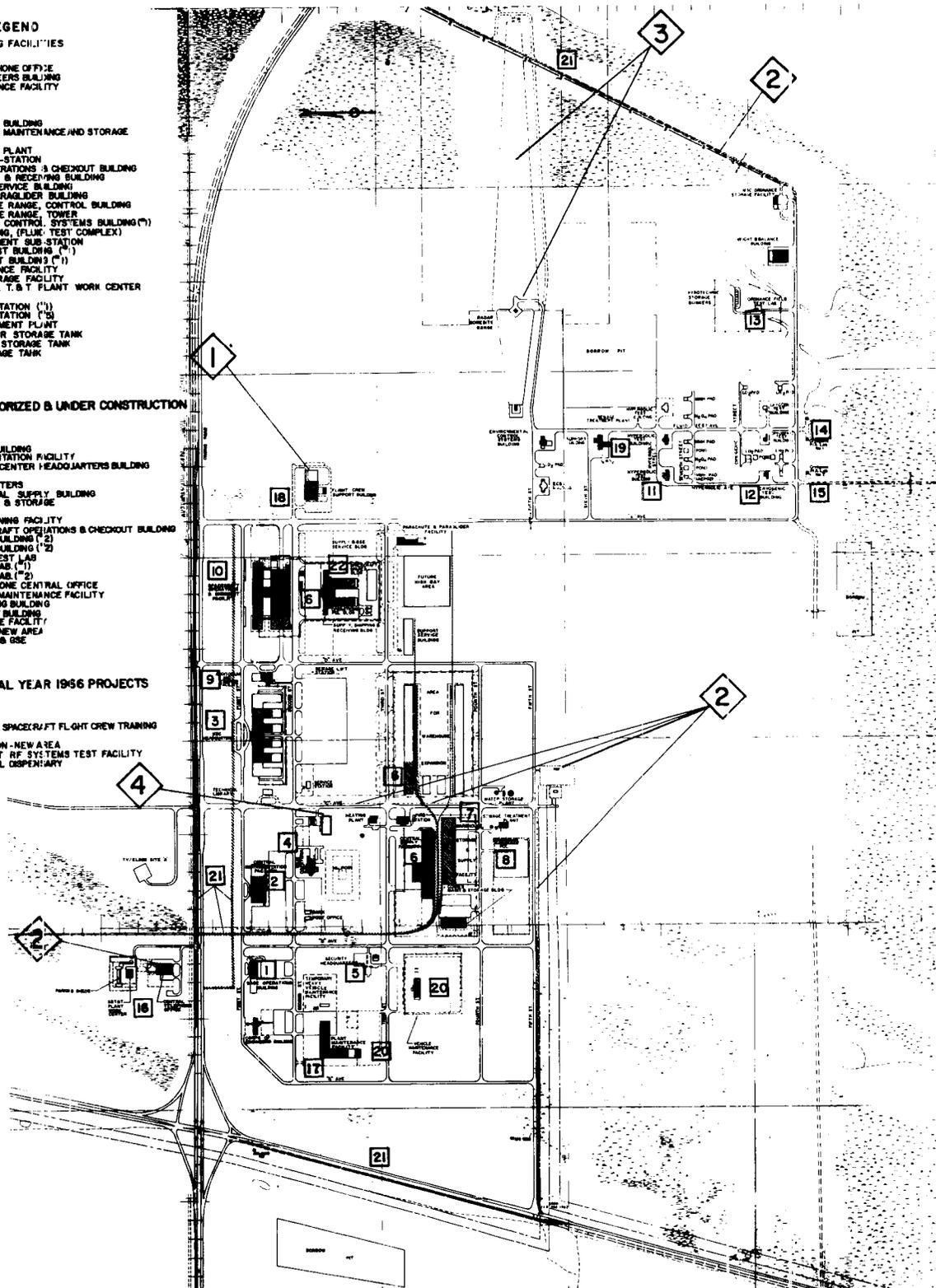
- LEGEND**  
EXISTING FACILITIES
- MS-138 CENTRAL TELEPHONE OFFICE
  - MS-336 CORPS OF ENGINEERS BUILDING
  - MS-486 PLANT MAINTENANCE FACILITY
  - MS-495 DISPENSARY
  - MS-595 HEATING PLANT
  - MS-695 FIRE STATION
  - MS-744 CENTRAL SUPPLY BUILDING
  - MS-791 COMMUNICATIONS MAINTENANCE/AND STORAGE
  - MS-895 SEWAGE PLANT
  - MS-896 WATER STORAGE PLANT
  - MS-996 ELECTRICAL SUB-STATION
  - M7-355 SPACECRAFT OPERATIONS & CHECKOUT BUILDING
  - M7-504 SUPPLY SHIPPING & RECEIVING BUILDING
  - M7-505 SUPPLY & GSE SERVICE BUILDING
  - M7-657 PARACHUTE & PARAGLIDER BUILDING
  - M7-867 RADAR BORESITE RANGE, CONTROL BUILDING
  - M7-863 RADAR BORESITE RANGE, TOWER
  - M7-961 ENVIRONMENTAL CONTROL SYSTEMS BUILDING (\*)
  - M7-1061 SUPPORT BUILDING, (FLUX TEST COMPLEX)
  - M7-1162 SEWAGE TREATMENT SUB-STATION
  - M7-1212 HYPERGOLIC TEST BUILDING (\*)
  - M7-1412 CRYOGENIC TEST BUILDING (\*)
  - M7-1489 WEIGHT & BALANCE FACILITY
  - M7-1472 ORDNANCE STORAGE FACILITY
  - MS-89 SOUTHERN BELL T. & T. PLANT WORK CENTER
  - MS-38 SHED PARKING
  - M7-451 SEWAGE LIFT STATION (\*)
  - MS-895A SEWAGE LIFT STATION (\*)
  - MS-895B SEWAGE TREATMENT PLANT
  - MS-895C ELEVATED WATER STORAGE TANK
  - MS-895D GROUND WATER STORAGE TANK
  - MS-895A FUEL OIL STORAGE TANK

**FACILITIES AUTHORIZED & UNDER CONSTRUCTION**

- 1. BASE OPERATIONS BUILDING
- 2. CENTRAL INSTRUMENTATION FACILITY
- 3. LAUNCH OPERATION CENTER HEADQUARTERS BUILDING
- 4. CAFETERIA
- 5. SECURITY HEADQUARTERS
- 6. ADDITION TO CENTRAL SUPPLY BUILDING
- 7. WAREHOUSE, SUPPLY & STORAGE
- 8. POL. FACILITY
- 9. AUDITORIUM & TRAINING FACILITY
- 10. ADDITION TO SPACECRAFT OPERATIONS & CHECKOUT BUILDING
- 11. HYPERGOLIC TEST BUILDING (\*)
- 12. CRYOGENIC TEST BUILDING (\*)
- 13. ORDNANCE FIELD TEST LAB
- 14. CRYOGENIC TEST LAB (\*)
- 15. CRYOGENIC TEST LAB (\*)
- 16. ADDITION TO TELEPHONE CENTRAL OFFICE
- 17. ADDITION TO PLANT MAINTENANCE FACILITY
- 18. FLIGHT CREW TRAINING BUILDING
- 19. ADDITION TO SUPPORT BUILDING
- 20. VEHICLE MAINTENANCE FACILITY
- 21. UTILITY ADDITIONS--NEW AREA
- 22. ADDITION TO SUPPLY & GSE

**PROPOSED FISCAL YEAR 1966 PROJECTS**

- 1. ADDITION TO MANNED SPACECRAFT FLIGHT CREW TRAINING BUILDING
- 2. UTILITY INSTALLATION--NEW AREA
- 3. MANNED SPACECRAFT RF SYSTEMS TEST FACILITY
- 4. ADDITION TO CENTRAL DISPENSARY



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 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	Cocoa Beach, Florida	Brevard	Cocoa Beach, Florida			
INSTALLATION MISSION		PERSONNEL STRENGTH			FY 19 64	FY 19 65	FY 19 66
The mission of the John F. Kennedy Space Center, NASA, is to conduct overall planning and supervision of the integration, test, checkout and launch of NASA space vehicle systems at the Air Force Eastern Test Range and Merritt Island, and to provide support services for all NASA elements located in the area.		NASA PERSONNEL (End of Year)			1,625	2,082	2,082
		CONTRACTOR AND OTHER PERSONNEL			5,797	8,793	10,602
		<b>TOTAL ALL PERSONNEL</b>			<b>7,422</b>	<b>10,875</b>	<b>12,684</b>
		LAND			NO. ACRES		
		NASA-OWNED			88,743		
		OTHER GOVERNMENT AGENCY-OWNED			-		
		NON-FEDERAL (Leases, easements)			3,340		
		<b>TOTAL LAND</b>			<b>92,083</b>		
		<b>TOTAL CAPITAL INVESTMENT</b>			<b>\$ 298,069.0</b>		
		(Including NASA-Owned Land) (as of June 30, 1964)					
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 59 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
RF Systems Test Facility	MSF	69.0	1,374.0	-0-	1,443.0		
Flight Crew Training Building Extension	MSF	2,453.0	1,425.0	-0-	3,878.0		
Extension to the Medical Facility	MSF	390.4	598.0	-0-	988.4		
Utility Installations - New Area	MSF	220.5	3,898.0	-0-	4,118.5		
Modifications to Launch Complex No. 17	SSA	77.0	1,300.0	-0-	1,377.0		
ALL OTHER PROJECTS			920,147.0				
<b>TOTALS</b>			<b>823,356.9</b>		<b>8,595.0</b>		

CF 4-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

RF SYSTEMS TEST FACILITY

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 1965 and Prior Years	\$69,000
FY 1966 Estimate	<u>1,374,000</u>
Total Funding Through FY 1966	<u>\$1,443,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,216,000</u>
Basic structure	Sq. Ft.	2,000	\$29.90	59,800
Air conditioning	LS	---	23,400	23,400
RF absorbent material	LS	---	87,400	87,400
Site development	LS	---	875,000	875,000
Utilities	LS	---	170,400	170,400
<u>Equipment</u>				<u>\$158,000</u>
Positioning equipment	LS	---	100,000	100,000
Intercommunication systems	LS	---	38,000	38,000
Cable	LF	3,500	5.71	20,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	None
		<b>TOTAL</b>		<u>\$1,374,000</u>

CF 4-3

PROJECT PURPOSE:

To provide a boresight range required for calibration and validation of the X-band radar used for rendezvous of the Apollo Command Module with the Lunar Excursion Module.

PROJECT DESCRIPTION:

This project will provide for design and construction of a manned spacecraft boresight range, which will consist of a fixed tower and an addition to the existing Gemini Radar Boresight Range Control Building. A flat level area between the fixed tower and the control building will be approximately 3,000 feet long, 150 feet wide at the fixed tower, and 500 feet wide at the control building. The surface levelness cannot vary by more than  $\pm\frac{1}{2}$  inch. A concrete slab, approximately 20 feet square, will be located in front of the control building to support the positioning equipment for the Apollo spacecraft.

The fixed tower will be approximately 50 feet high and will accommodate positioning equipment for adjustment of the radar transmitter to the desired position.

The two story L-shaped addition to the existing control building will have an area of approximately 2,000 square feet. The structure will be of masonry construction, with a special rubberoid outer covering to provide proper absorbent qualities. The first floor will house an equipment room and air conditioning equipment. The second floor will house control and data read-out equipment for the testing and calibration of the radar.

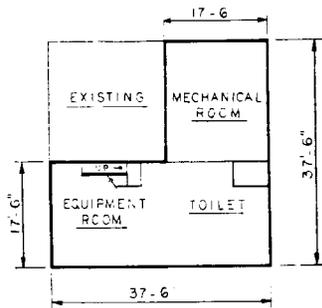
PROJECT JUSTIFICATION:

The X-band rendezvous radar system used to guide the Apollo Lunar Excursion Module to rendezvous with the Command Module, must be precisely calibrated or boresighted with each spacecraft prior to launch. The boresight accuracy, which must be within  $\pm 2$  milliradians, requires a range 3,000 feet long for proper calibration of the X-band systems. The existing Gemini Boresight Range, which operates in the L-band frequency region, is 1,000 feet long and not adequate for this purpose. This range cannot be extended because of existing structures and utilities. Boresighting of the Apollo radar system must be performed at Merritt Island as an integral part of pre-flight checkout operations to prevent possible misalignment due to transportation.

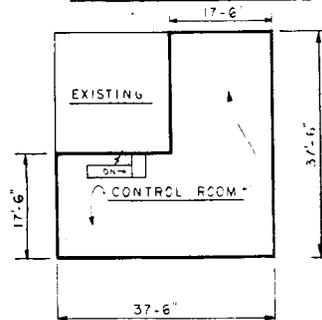
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER, NASA  
FISCAL YEAR 1966 ESTIMATES

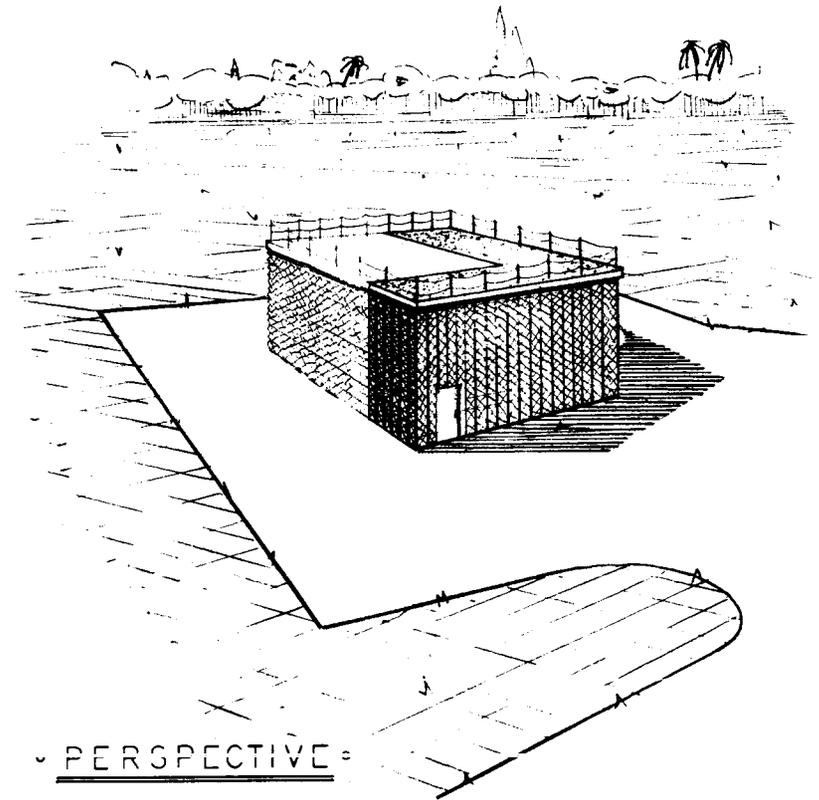
RF SYSTEMS TEST FACILITY



FIRST FLOOR PLAN



SECOND FLOOR PLAN

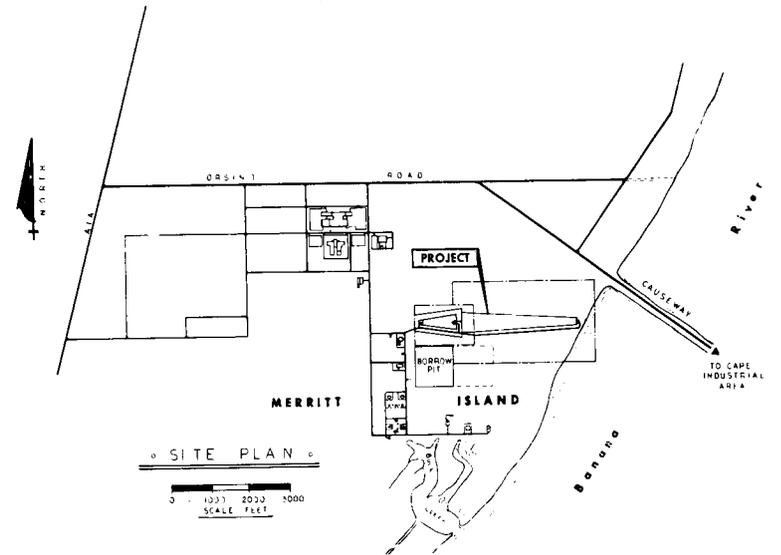
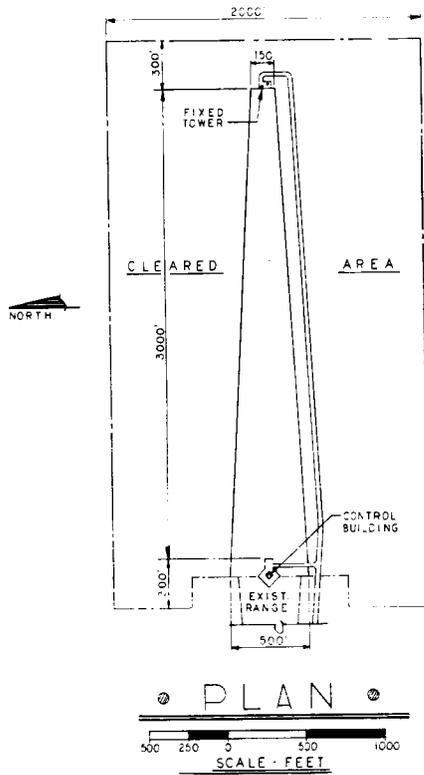


PERSPECTIVE

CIT 4-5

JOHN F. KENNEDY SPACE CENTER, NASA  
FISCAL YEAR 1966 ESTIMATES

RF SYSTEMS TEST FACILITY



CF 4-6

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

FLIGHT CREW TRAINING BUILDING EXTENSION

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 1965 and Prior Years	\$2,453,000
FY 1966 Estimate	<u>1,425,000</u>
Total Funding Through FY 1966	<u>\$3,878,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$989,300</u>
Basic building structure	Sq. Ft.	17,640	\$26.54	468,200
Air conditioning	LS	---	222,800	222,800
Emergency generator	LS	---	138,600	138,600
Site development	LS	---	35,000	35,000
Utilities	LS	---	124,700	124,700
<u>Equipment</u>				<u>\$435,700</u>
Intercommunication systems	LS	---	49,000	49,000
Operational Television system	LS	---	13,000	13,000
Cabling	LS	---	13,000	13,000
Office, shop and laboratory equipment	LS	---	45,700	45,700
Systems to connect power supplies, air conditioning and cabling systems for ground support equipment	LS	---	315,000	315,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u>\$1,425,000</u></b>

PROJECT PURPOSE:

This facility will provide additional space required for increasing flight crew training capability for Apollo manned launches.

PROJECT DESCRIPTION:

This project provides for an extension to both the existing Flight Crew Training Building and the related equipment building. The two-story extension to the Flight Crew Training Building will be constructed of reinforced concrete and masonry curtain walls and will contain approximately 16,800 square feet. Approximately 5,500 square feet of high-bay area (30 feet high) will be used to house two mission simulators, and approximately 3,300 square feet of low-bay area (11 feet high) will be used for supporting computers, peripheral equipment and consoles. Approximately, 8,000 square feet will be utilized for shops, computer programming and service areas. The one-story extension of the equipment building will have masonry walls and will provide approximately 800 square feet of space.

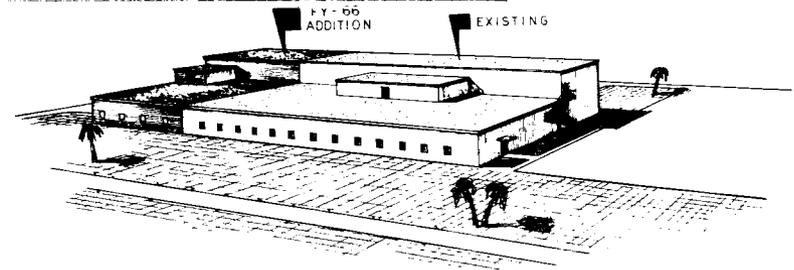
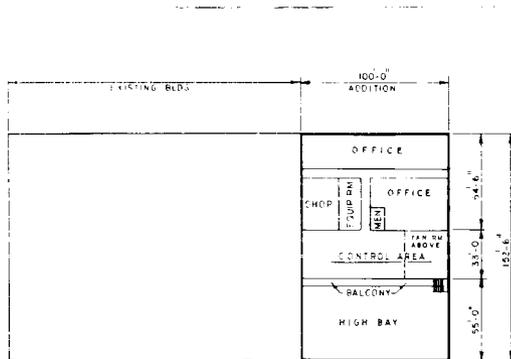
PROJECT JUSTIFICATION:

The three-man astronaut crew and its three-man back-up crew will undergo intensive pre-flight training at Cape Kennedy for the three-month period before each mission. The existing Apollo flight crew training equipment for the Command Module and Lunar Excursion Module consists of a set of two part-task trainers, which will be use for one month, and a set of two mission simulators, which will be used for the full three-month period. The extension to the present Flight Crew Training Building will provide space and related equipment for one additional set of two mission simulators to allow another crew with its back-up to train simultaneously. Only through this simultaneous training of crews can the planned launch schedule be met.

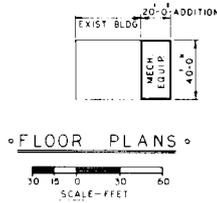
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER, NASA  
 FISCAL YEAR 1966 ESTIMATES

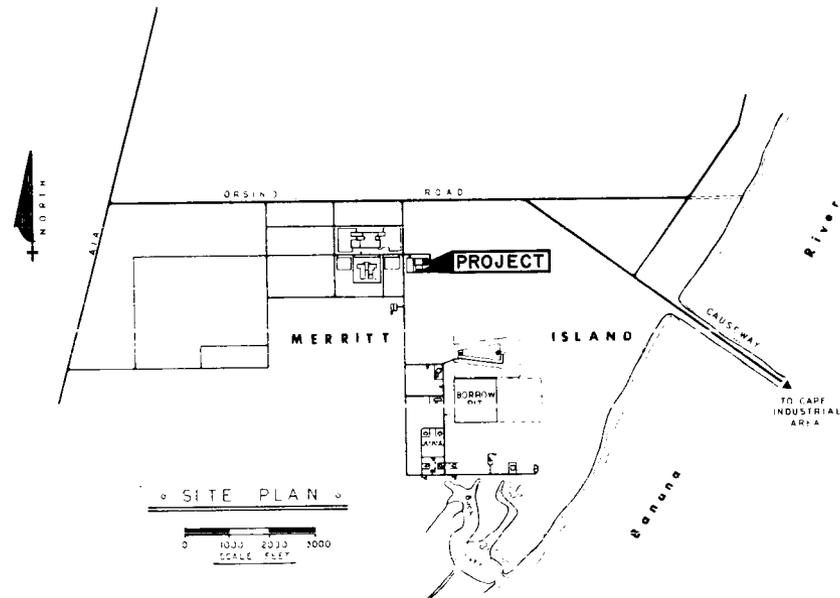
FLIGHT CREW TRAINING BUILDING EXTENSION



◦ PERSPECTIVE ◦



◦ FLOOR PLANS ◦



◦ SITE PLAN ◦

CF 4-9

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

EXTENSION TO THE MEDICAL FACILITY

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 1965 and Prior Years	\$390,400
FY 1966 Estimate	<u>598,000</u>
Total Funding Through FY 1966	<u>\$988,400</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$336,000</u>
Basic building structure	Sq. Ft.	8,650	\$29.80	257,800
Special structural requirements	LS	---	13,200	13,200
Special plumbing requirements	LS	---	6,000	6,000
Special electrical requirements	LS	---	10,500	10,500
Special doors (X-ray proof)	LS	---	3,600	3,600
Site development	LS	---	26,900	26,900
Utilities	LS	---	18,000	18,000
<u>Equipment</u>				<u>\$262,000</u>
Medical equipment	LS	---	262,000	262,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u>\$598,000</u></b>

**PROJECT PURPOSE:**

To provide additional space necessary to house a complete medical facility, where such functions as emergency treatment, normal health maintenance, and an environmental health program can be performed.

**PROJECT DESCRIPTION:**

This project provides for minor modifications to the existing dispensary building and the construction of approximately 8,700 square feet of additional office, laboratory and medical support space. The extension will be a one story masonry building.

**PROJECT JUSTIFICATION:**

The implementation of a satisfactory occupational medical program is essential to the maintenance of a safe working environment, the preservation of health, and the prompt treatment of on-the-job illnesses and injuries. Effective execution of such a program requires a facility which is adequate in size and properly equipped.

The facility presently available (a 4,600 square foot building), is inadequate to provide the normal health maintenance and emergency treatment functions for the current Civil Service and contractor personnel requiring service. As a result space has been improvised through the use of trailers.

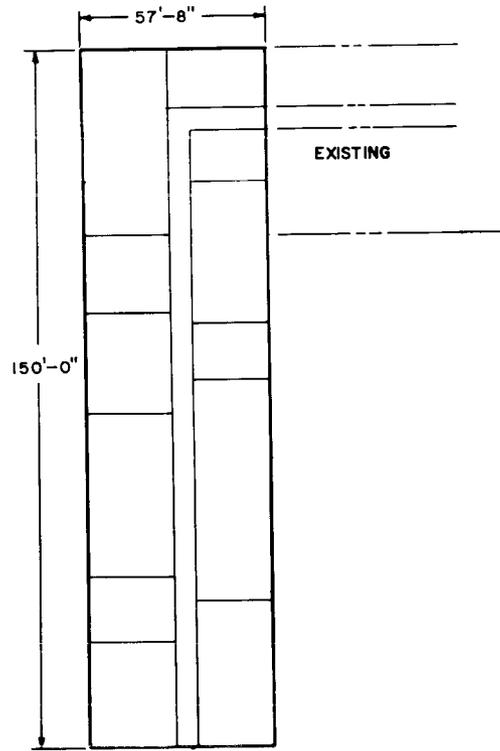
As the number of personnel to be served increases to approximately 13,000, additional space will be required to perform the normal health functions as well as to conduct the associated environmental health program. The basic activities requiring housing in support of this latter function are Industrial Hygiene, Radiation Control, and Sanitary Engineering. Each requires laboratory facilities and equipment for such diverse activities as collection and analysis of fumes and dust, survey and analysis of radioactive hazards, testing of water and sewage, and control of corrosion and pollution.

**ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT:** None

JOHN F. KENNEDY SPACE CENTER, NASA

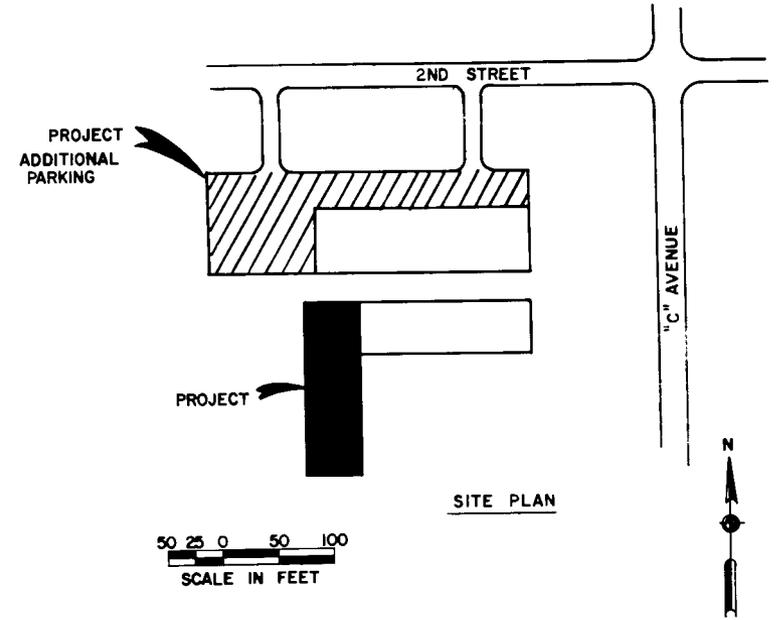
FISCAL YEAR 1966 ESTIMATES

EXTENSION TO THE MEDICAL FACILITY



FLOOR PLAN

CF 4-12



SITE PLAN

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

UTILITY INSTALLATIONS - NEW AREA

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 1965 and Prior Years	\$220,500
FY 1966 Estimate	<u>3,898,000</u>
Total Funding Through FY 1966	<u>\$4,118,500</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$508,000</u>
Basic building structure	Sq. Ft.	5,500	\$23.53	129,400
Air conditioning	LS	---	63,200	63,200
Tie-in and modifications to existing structure	LS	---	16,100	16,100
Utilities	LS	---	11,200	11,200
Site development	LS	---	22,200	22,200
Road	Sq. Yd.	8,300	5.30	44,000
Primary substation transformer	LS	---	165,700	165,700
Electric power line	LF	5,500	10.22	56,200
<u>Equipment</u>				<u>\$3,390,000</u>
Wideband transmission equipment	LS	---	330,000	330,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Wideband monitoring equipment	LS	---	218,000	218,000
Audio distribution equipment	LS	---	459,000	459,000
Technical control audio equipment	LS	---	454,000	454,000
Technical control wideband equipment	LS	---	327,000	327,000
Technical control support equipment	LS	---	110,000	110,000
Cable	LS	---	1,492,000	1,492,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
			<b>TOTAL</b>	<u><u>\$3,898,000</u></u>

PROJECT PURPOSE:

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

PROJECT DESCRIPTION:

Electric Power: Approximately 5,500 linear feet of three conductor aerial cable will be installed from the intersection of Orsino Road and Banana River Road, paralleling the Fluid Test Safety road, to the oil switch adjacent to the Ordnance Storage Building. A 10,000 KVA transformer and the necessary protection devices will be installed in the main substation.

Communications: A 5,500 square foot masonry addition to the Central Telephone Office will be constructed, which will extend the full length on the north and west sides of the present building. Outside communication and instrumentation cabling will be provided for all facilities scheduled for completion during this time frame. Work includes design, procurement, and installation of equipment and cable with major equipment components being technical control and wide band transmission equipment.

Roads: Approximately 4,000 linear feet of varying widths of roadway in the MILA Industrial Area will be provided. This work will complete provisions for four-lane traffic on "C" Avenue from Second Street south to Fifth Street, and on Fifth Street from "B" Avenue east to "C" Avenue.

PROJECT JUSTIFICATION:

The expansion of the utility and road systems is required to increase service capability to meet the orderly development of the Merritt Island Launch Area.

Electric Power - Installation of aerial cable is required along Fluid Test Safety Road to provide a loop feed to the Fluid Test Complex, which will provide the flexibility needed to prevent loss of test data and interruption of operations in the event of power outage during test and checkout operations. Installation of a transformer is necessary because completion of the FY 1965 addition to the Operations and Checkout Building will increase the demand on the existing main substation by approximately 7,000 KVA, which is beyond the capability of the present system.

Communications

(a) The completion of new construction during the Fiscal Year 1966-67 time period and concurrent personnel increases will impose requirements for additional communications equipment. New equipment and facilities cannot be accommodated in the existing Central Telephone Office Building. For example, space is now available for ten switchboard positions, but thirteen positions will be needed by 1967. Moreover, space is needed for required additional switching equipment, a cryptographic vault, and additional wide-band terminal and repeater equipment.

(b) Additional communication and instrumentation cabling will be required to provide video, audio, and data transmission in support of facilities which will become operational during this period. The cabling is needed to provide internal communication, as well as additional communication between Merritt Island Launch Area, Cape Kennedy Air Force Station, and Patrick Air Force Base.

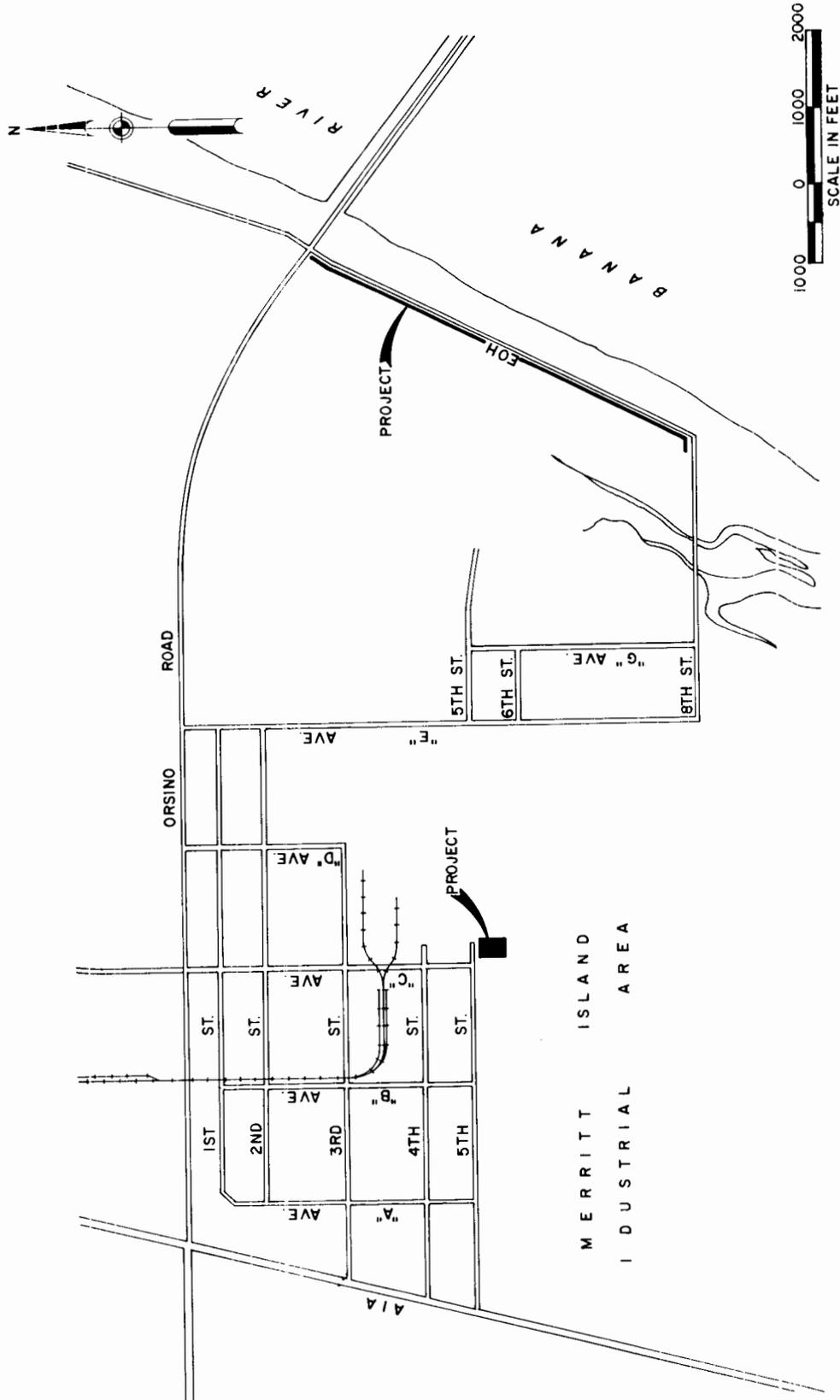
Roads - The build-up of the Merritt Island Industrial Area and concentration of personnel necessitates the addition of two lanes to both Fifth Street and "C" Avenue. More than 5,000 vehicles per day will use these major arteries. Accepted standards dictate that traffic of this magnitude requires four lanes for safe and efficient operation.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1966 ESTIMATES

# UTILITY INSTALLATION - NEW AREA



SITE PLAN

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
MODIFICATIONS TO LAUNCH COMPLEX 17

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

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, NASA

TYPE OF CONSTRUCTION PROJECT: Alterations

FUNDING:

FY 1965 and Prior Years	\$77,000
FY 1966 Estimate	<u>1,300,000</u>
Total Funding Through FY 1966	<u>\$1,377,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>	---	---	---	---
<u>Equipment</u>				<u>\$1,300,000</u>
Operational television system	LS	---	\$233,000	233,000
Second stage propellant loading system	LS	---	1,026,000	1,026,000
Air conditioning for environmental enclosure	LS	---	41,000	41,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$1,300,000</u>

PROJECT PURPOSE:

This project provides facility alterations to improve the Delta second stage propellant loading system, remote TV monitoring system, and the environmental control of service areas around the vehicle upper stages and the spacecraft.

PROJECT DESCRIPTION:

This project consists of the following additions and modifications:

- a. Second-Stage propellant loading system.
- b. Operational Television System on pads 17A and 17B
- c. Air conditioning unit for environmental enclosures.

The second stage propellant loading system consists of two 1,000 gallon storage tanks, one for the oxidizer (inhibited Red Fuming Nitric Acid) and one for the fuel (Unsymmetrical Dimethyl Hydrazine) together with supply lines, valves, a remote console and flow measuring system.

The operational television system consists of:

- a. Six 21" TV monitors
- b. Two 17" TV monitors
- c. Twelve TV cameras with weatherproof enclosures
- d. Eight pan tilt systems
- e. Eight zoomar systems
- f. One central control console
- g. Interconnecting cables and fixtures, remote camera selector controls, and video transmission equipment required for a usable system.

The operational TV system will provide remote control from a central console located within the blockhouse with monitors within easy view of the Propulsion Console operator, the Test Conductor, the Launch Director, and Telemetry Tracker. Weatherproof TV cameras located at each launcher will scan propellant servicing system lines and operations, view all vehicle and spacecraft umbilicals, and observe spacecraft third stage and thrust augmented delta solid motor installation and operations. Two TV cameras having wide angle lens and explosion proof enclosures will be mounted on existing mounts on each launch deck. Four TV cameras, having pan, tilt, and zoom lens features will be mounted on ground level near the corners of the apron of each launcher. Pictures from the launch deck and launcher apron cameras will be displayed on six 21" monitors located in the blockhouse. A selector switch will be provided to switch from the six TV cameras of Pad A or Pad B. Also, two stepping switches (remote controlled from Hangar AE) will be provided to step through three TV cameras on each launcher for remote viewing on existing monitors in Hangar AE, Mission Control Center.

The environmental enclosure air conditioning provides a 40 ton air conditioning unit and connections to existing ducts to supply conditioned air to the environmental enclosure surrounding the second stage and spacecraft levels of each gantry. Air-conditioned environmental enclosures provide contamination protection for the Delta space launch vehicle guidance and control area and to the spacecraft area.

PROJECT JUSTIFICATION:

The second stage propellant loading system is required to replace the present system of trailer supply which is manually operated and of insufficient capacity (600 gallons) for the Improved Delta. This system will provide accurate remote controlled propellant transfer in a safe, efficient manner.

The operational television system will supplement the present system installed in 1956 to support the single stage Thor missile tests and is presently inadequate for multistage vehicle and spacecraft operations. The proposed system provides a means of visual monitoring for overall flight readiness and is the only means of viewing strategic areas of the vehicle and launcher during fueling and terminal countdown. This system will permit interested personnel to view the operations from a safe distance, alleviating congestion on the launch pad and decreasing the number of people exposed during hazardous operations.

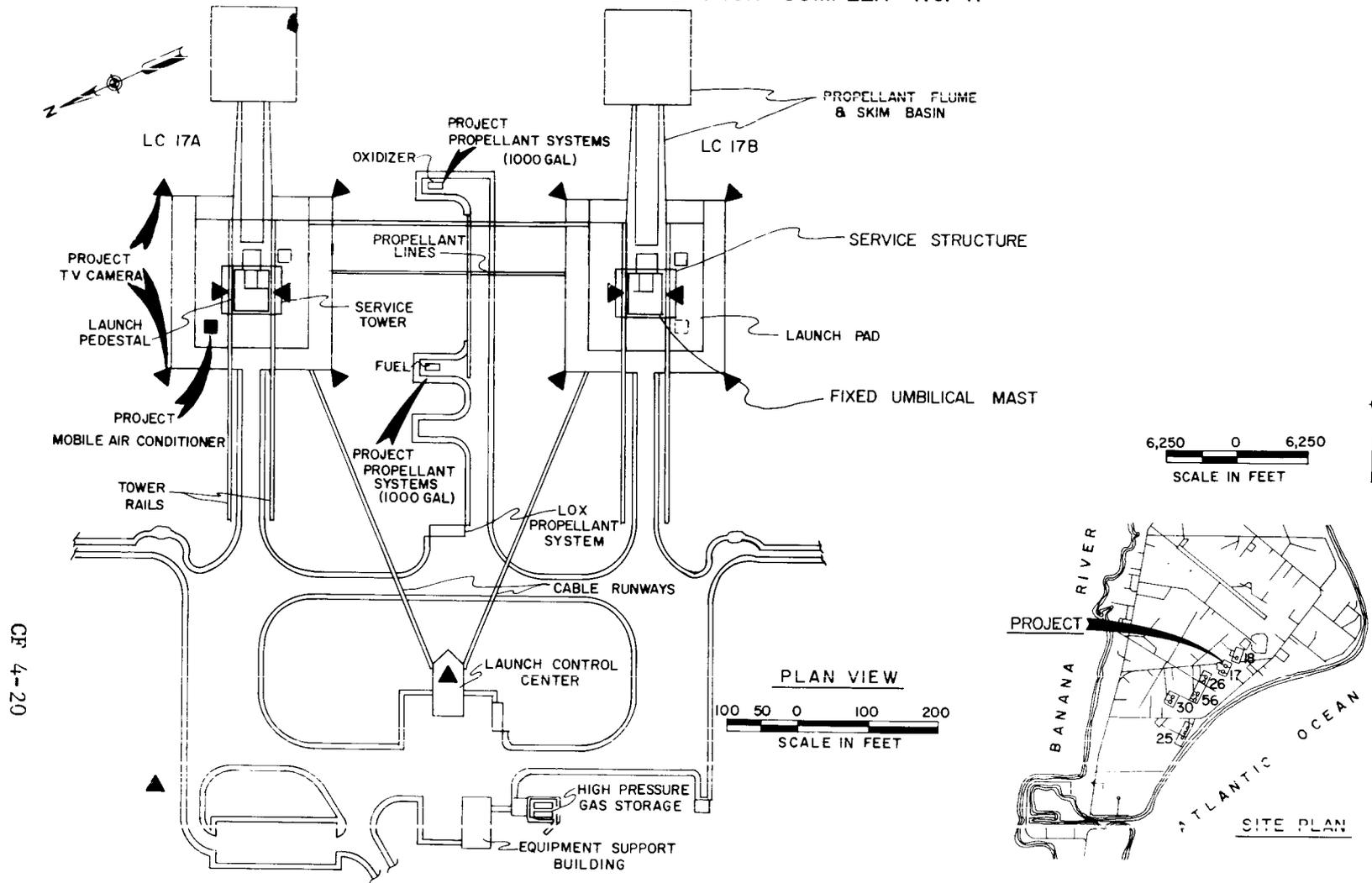
The air conditioning unit for environmental enclosures is required to provide a controlled environment for the upper levels of the gantries where spacecraft and vehicle guidance checkout are performed. Sensitive ground support equipment for spacecraft is located on these levels and needs protection. This equipment must be operational ready by June 1966. The environmental control is now being provided on a limited non-interference basis by borrowed Air Force Eastern Test Range (AFETR) equipment. AFETR will not commit continued support.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1966 ESTIMATES

MODIFICATIONS TO LAUNCH COMPLEX NO. 17



CF 4-20

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

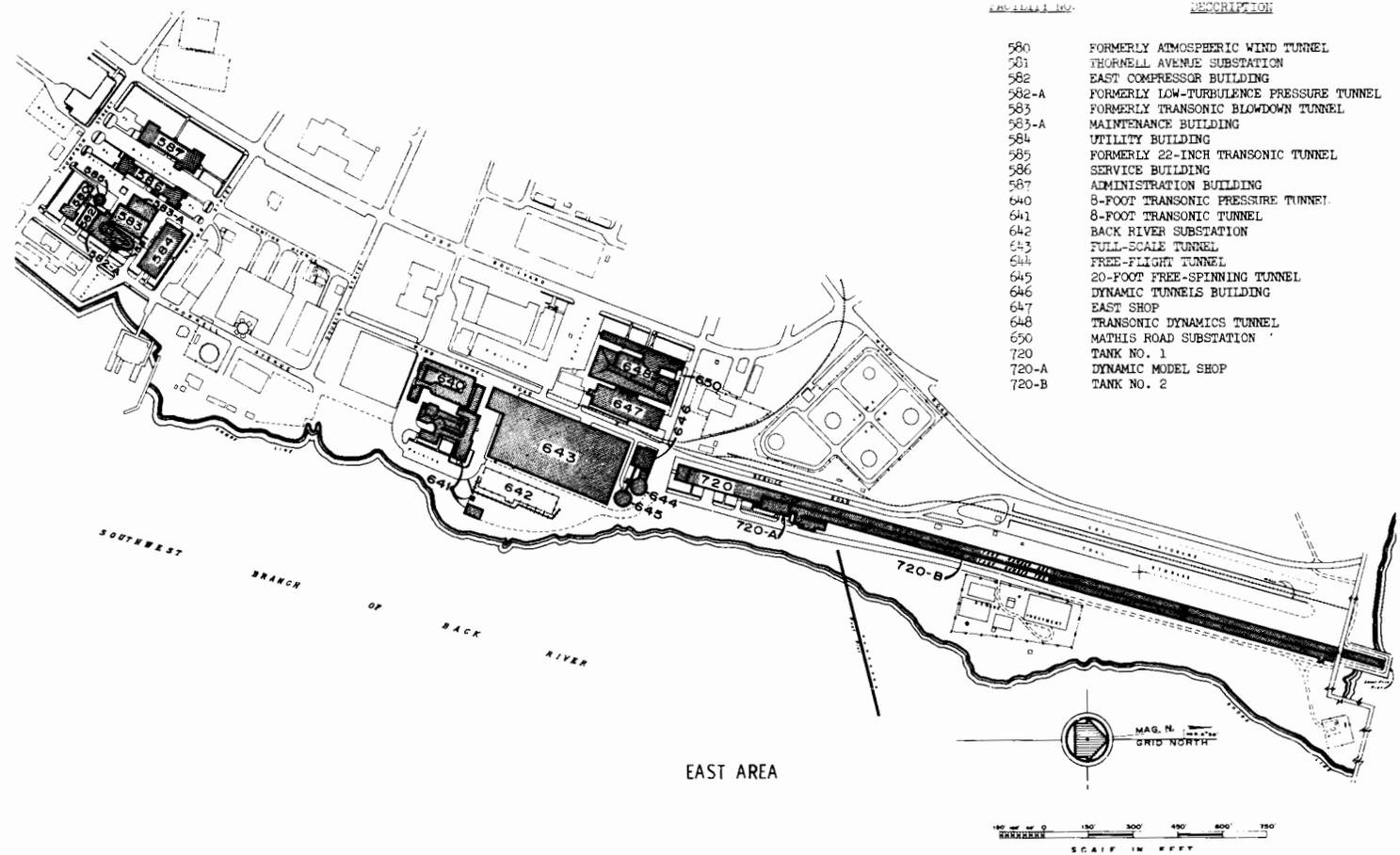
LANGLEY RESEARCH CENTER

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Office of Advanced Research and Technology Projects:	
Flight control research facility.....	CF 5-4
Light support technology laboratory.....	CF 5-8
Increased capabilities of 20 inch mach 6 and mach 8.5 tunnels....	CF 5-12
Magazine and test area for highly reactive chemical materials....	CF 5-15

LANGLEY RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

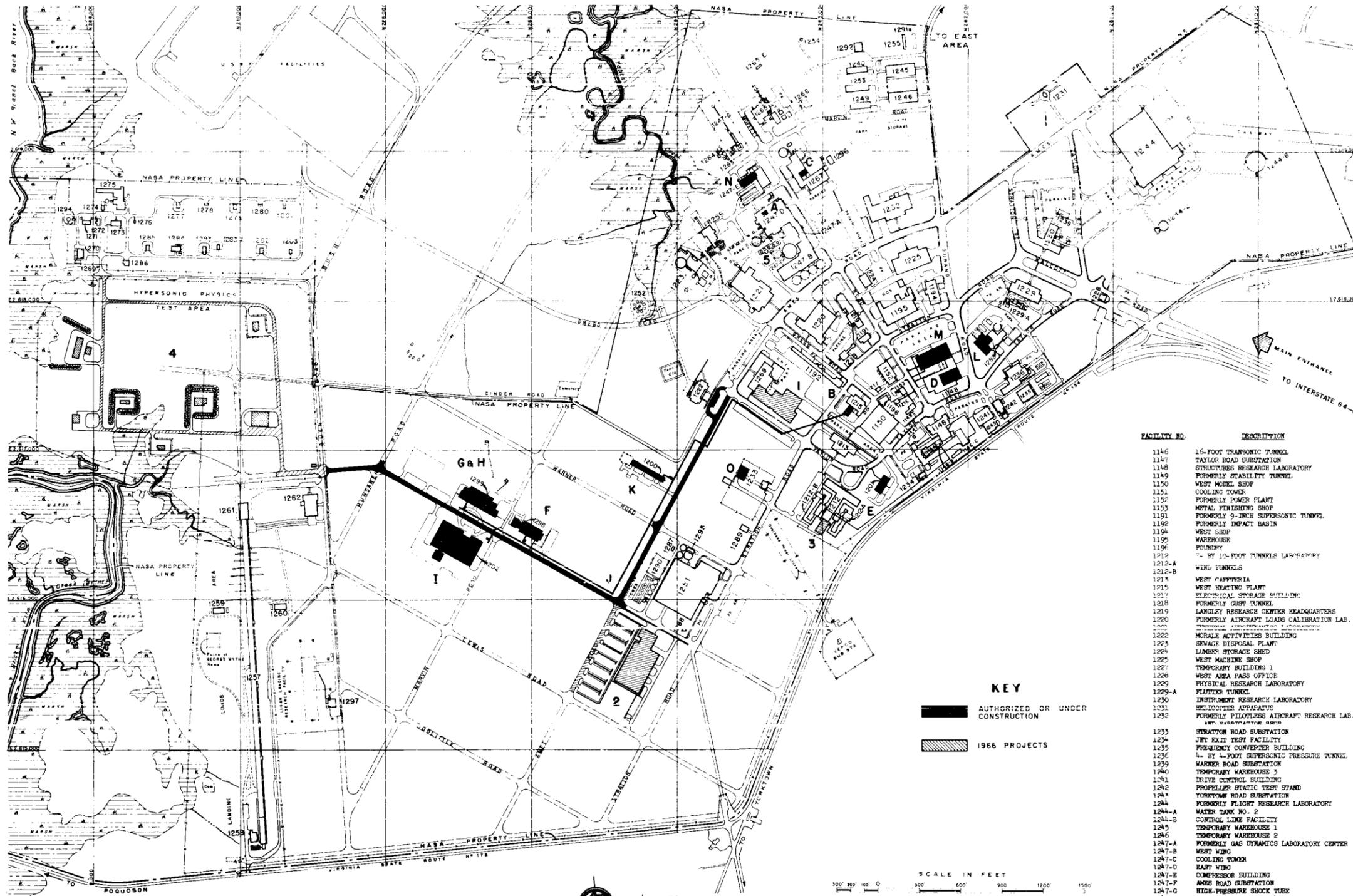
LOCATION PLAN



CF 5-1

LANGLEY RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

LOCATION PLAN



**KEY**  
 AUTHORIZED OR UNDER CONSTRUCTION  
 1966 PROJECTS

SCALE IN FEET  
 0 300 600 900 1200 1500

WEST AREA

- PROPOSED FISCAL YEAR 1966 PROJECTS**
1. FLIGHT CONTROL RESEARCH FACILITY
  2. LIFE SUPPORT TECHNOLOGY LABORATORY
  3. V/STOL RESEARCH LABORATORY
  4. MAGAZINE AND TEST AREA FOR HIGHLY REACTIVE CHEMICAL MATERIALS
  5. INCREASE RESEARCH CAPABILITY M-6 AND 8.5 TUNNELS

FACILITY NO.	DESCRIPTION
1146	16-FOOT TRANSONIC TUNNEL
1147	TAYLOR ROAD SUBSTATION
1148	STRUCTURES RESEARCH LABORATORY
1149	FORMERLY STABILITY TUNNEL
1150	WEST MODEL SHOP
1151	COOLING TOWER
1152	FORMERLY POWER PLANT
1153	METAL FINISHING SHOP
1191	FORMERLY 9-INCH SUPERSONIC TUNNEL
1192	FORMERLY IMPACT BASIN
1193	WAREHOUSE
1194	FOUNDRY
1195	7- BY 10-FOOT TUNNELS LABORATORY
1212-A	WIND TUNNELS
1213	WEST CAPPELLARIA
1215	WEST HEATING PLANT
1217	ELECTRICAL STORAGE BUILDING
1218	FORMERLY GUST TUNNEL
1219	LANGLEY RESEARCH CENTER HEADQUARTERS
1220	FORMERLY AIRCRAFT LOADS CALIBRATION LAB.
1221	MORALE ACTIVITIES BUILDING
1222	WASTE DISPOSAL PLANT
1223	LUNGER STORAGE SHED
1225	WEST MACHINE SHOP
1227	TEMPORARY BUILDING 1
1228	WEST AREA PASS OFFICE
1229	PHYSICAL RESEARCH LABORATORY
1229-A	FILTER TUNNEL
1230	INSTRUMENT RESEARCH LABORATORY
1231	HELICOPTER APPARATUS
1232	FORMERLY PILOTLESS AIRCRAFT RESEARCH LAB.
1233	STRATTON ROAD SUBSTATION
1234	JET LEAK TEST FACILITY
1235	FREQUENCY CONVERTER BUILDING
1236	4- BY 4-FOOT SUPERSONIC PRESSURE TUNNEL
1239	WARNER ROAD SUBSTATION
1240	TEMPORARY WAREHOUSE 3
1241	DRIVE CONTROL BUILDING
1242	PROPELLER STATIC TEST STAND
1243	YORKTOWN ROAD SUBSTATION
1244	FORMERLY FLIGHT RESEARCH LABORATORY
1244-A	WATER TANK NO. 2
1244-B	CONTROL LINE FACILITY
1245	TEMPORARY WAREHOUSE 1
1246	TEMPORARY WAREHOUSE 2
1247-A	FORMERLY GAS DYNAMICS LABORATORY CENTER
1247-B	WEST WING
1247-C	COOLING TOWER
1247-D	EAST WING
1247-E	COMPRESSOR BUILDING
1247-F	AGES ROAD SUBSTATION
1247-G	HIGH-PRESSURE SHOCK TUBE
1249	TEMPORARY WAREHOUSE 4
1251	UNITARY PLANT WIND TUNNEL
1252	WATER TANK NO. 1
1253	TEMPORARY WAREHOUSE 5
1254	AMMUNITION STORAGE 1
1255	TEMPORARY WAREHOUSE 6
1256	9- BY 6-FOOT THERMAL STRUCTURES TUNNEL
1257	LANDING LOADS TRACK

FACILITY NO.	DESCRIPTION
1258	LANDING LOADS TRACK COMPRESSOR BUILDING
1259	NORTH ARRESTING GEAR HOUSING
1260	SOUTH ARRESTING GEAR HOUSING
1261	LANDING LOADS TRACK SHOP
1262	HIGH-SPEED HYDRODYNAMICS OFFICE AND SHOP
1263	CERAMIC HEATED JET (PILOT MODEL)
1264	HIGH-TEMPERATURE MACH 7 JET (PILOT MODEL)
1265	8-FOOT HIGH-TEMPERATURE STRUCTURES TUNNEL
1266	MOFFETT ROAD SUBSTATION
1267	HIGH-TEMPERATURE MATERIALS LABORATORY
1268	DATA REDUCTION BUILDING
1269	GATE HOUSE (HYPERSONIC PHYSICS TEST AREA)
1270	ROCKET PROPELLANT TEST UNIT, HPTA
1271	OPEN SPEED, HPTA
1272	HEATING PLANT, HPTA
1273	OPERATIONS CENTER, HPTA
1274	CERAMIC HEATED MACH 14 JET, HPTA
1275	IMPACT 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	SOLAR ENERGY COLLECTOR
1289	TEMPORARY STORAGE
1290	SUBSTATION
1291	TEMPORARY STORAGE
1292	FACILITIES MAINTENANCE BUILDING
1293	DYNAMICS RESEARCH LABORATORY
1294	ROCKET MOTOR TEST APPARATUS
1295	SHOP AND INSTRUMENTATION FOR 60-FOOT SPHERE
1296	SHOP BUILDING
1297	LUNAR LANDING RESEARCH FACILITY

**FACILITIES AUTHORIZED AND UNDER CONSTRUCTION**

LETTER	DESCRIPTION
A	EQUIPMENT FOR MAGNETOPLASMA DYNAMICS RESEARCH
B	ADDITION TO HEATING PLANT
C	ADD. POWER SUPPLY AND IMPROVED ARC CHAMBER FOR 10-MEGAWATT ARC TUNNEL
D	ENVIRONMENTAL RESEARCH FACILITIES FOR SPACECRAFT COMPONENTS AND MATERIALS
E	PARTICLE ACCELERATOR FOR SIMULATION OF MICRO-METEOROID IMPACT
F	STABILIZATION AND CONTROL EQUIPMENT LABORATORY
G/H	VEHICLE ANTENNA TEST FACILITY AND ADDITION TO VEHICLE ANTENNA TEST FACILITY
I	ELECTRONIC INSTRUMENTATION LABORATORY
J	UTILITY INSTALLATIONS
K	HOT GAS RADIATION RESEARCH FACILITY
L	THERMAL CONTROL HOUSING AND BUILDING ADDITION FOR DYNAMICS RESEARCH LABORATORY
M	FATIGUE RESEARCH LABORATORY
N	CENTRAL HIGH-PRESSURE AIR SUPPLY
O	UTILITY IMPROVEMENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Langley Research Center	Office of Adv. Research & Tech.	Langley AFB Hampton, Virginia		Hampton, Virginia			
INSTALLATION MISSION		PERSONNEL STRENGTH		FY 19 64	FY 19 65	FY 19 66	
LRC Mission - Undertake 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; plan, develop and operate necessary facilities; generate new and advanced concepts; provide research advice and assistance to other branches of the Government; disseminate scientific and technical information; search for and identify potential industrial applications involved in the course of research.		NASA PERSONNEL (End of Year)		4330	4308	4308	
		CONTRACTOR AND OTHER PERSONNEL		482	502	566	
		<b>TOTAL ALL PERSONNEL</b>		<b>4812</b>	<b>4810</b>	<b>4874</b>	
		LAND		NO. ACRES			
		NASA-OWNED		540			
		OTHER GOVERNMENT AGENCY-OWNED		3618			
		NON-FEDERAL (Leases, easements)		72			
		<b>TOTAL LAND</b>		<b>4230</b>			
		<b>TOTAL CAPITAL INVESTMENT</b>		<b>\$ 249,776.0</b>			
		(Including NASA-Owned Land) (as of June 30, 1964)					
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 65 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Flight Control Research Facility	OART	201.0	3,576.0	-0-	3,777.0		
Life Support Technology Laboratory	OART	164.0	2,492.0	-0-	2,656.0		
Increase Research Capabilities of M-6 and 8.5 Tunnels	OART	50.0	682.0	-0-	732.0		
Magazine and Test Area for Highly Reactive Chemical Mats.	OART	90.0	1,500.0	-0-	1,590.0		
ALL OTHER PROJECTS		58,488.0					
<b>TOTALS</b>		<b>58,993.0</b>	<b>8,250.0</b>				

CF 5-3

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

FLIGHT CONTROL RESEARCH FACILITY

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 1965 and Prior Years	\$201,000
FY 1966 Estimate	<u>3,576,000</u>
Total Funding Through FY 1966	<u>\$3,777,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$2,738,000</u>
Building	Sq. Ft.	72,420	\$21.48	1,555,400
Raised floor	LS	---	89,100	89,100
Air conditioning	LS	---	266,600	266,600
Elevator	LS	---	40,000	40,000
Site work and paving	LS	---	68,900	68,900
Mechanical utilities	LS	---	30,400	30,400
Electrical utilities	LS	---	187,600	187,600
<u>Equipment</u>				<u>\$1,311,000</u>
Projection spheres	LS	---	183,000	183,000
Fixed base study stations	LS	---	202,000	202,000
Visual cue generation	LS	---	470,000	470,000
Signal distribution and recording	LS	---	406,000	406,000
Building furnishing and equipment	LS	---	50,000	50,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
		Subtotal		\$3,549,000
<u>Fallout Shelter</u>	---	---	---	<u>27,000</u>
		TOTAL		<u>\$3,576,000</u>

PROJECT PURPOSE:

This project provides research capability in the guidance and control aspects of future manned flight missions and fundamental investigations leading to the optimization of man's performance in aerospace systems.

PROJECT DESCRIPTION:

This facility will be equipped with research devices including visual cue generation, projection and display subsystems; a signal conditioning and transmission network to connect the centralized equipment with study stations in the facility and with special purpose simulators at other Langley sites; modularly designed, quick change cockpits for use at the study stations. The facility will include flexibility to accommodate a large number of widely varied studies and features to permit rapid test setup and configuration changes. The facility, to be housed in an addition to the Data Reduction Center, will provide space for:

1. A high ceiling area for two visual cue projection spheres.
2. The visual cue generation and simulation control equipment, fixed-base crew stations (wherein the crew remains stationary and the visual cues and simulation provide the effect of motion and supporting cockpit assembly), checkout and program preparation areas.
3. A human performance laboratory to study such problems as information sensing, display, interpretation and decision making, and human characteristics in man-machine systems.
4. The effective integration of existing computing equipment into the simulation complex, together with new equipment.
5. The personnel to conduct the manned flight control and human performance research as well as the allied research and development work in computing techniques and advanced simulator technology.

PROJECT JUSTIFICATION:

Effective integration of the astronauts into the spacecraft system is a major factor in the reliability, safety, and achievement of the research objectives of future space flight missions. Extensive research is required to determine optimum control techniques, to improve methods of displaying information to flight crews, to determine man's capability and function in the control system, and to determine the effect of guidance and control on the design of spacecraft and missions. The use of simulators offers the only means for providing an accurate and realistic representation of the flight environment.

The primary effort at Langley in this area has been concerned with the role of man in the control of spacecraft. These studies have been made through the implementation of special-purpose, mission-oriented facilities such as the Rendezvous Docking Simulator, the Lunar Orbit-Lunar Approach Apparatus, the Lunar Landing Research Facility, and the 4-man Supersonic Transport Simulator. These facilities, although useful for simulation of specific missions, do not provide the flexibility and accessibility needed for the development of advanced display and control concepts.

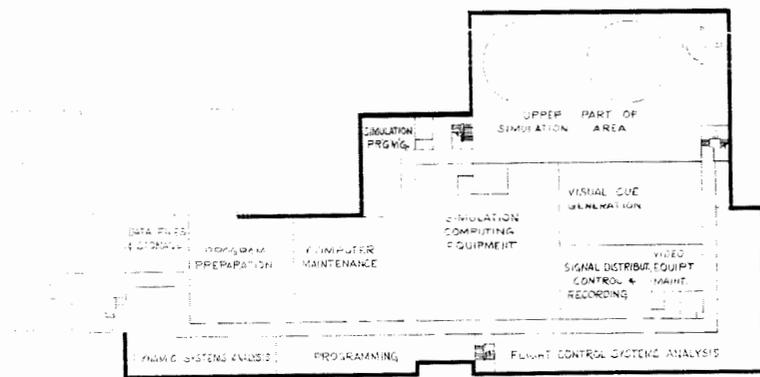
The Flight Control Research Facility will provide the basic tools for conducting advanced research for future manned missions. It will incorporate a variety of simulators and computing equipment into a well integrated, flexible complex capable of handling research studies with the necessary accuracy and completeness. It will also allow for integration of the existing special purpose simulators into the new complex to carry out the needed research in an economical and efficient manner.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

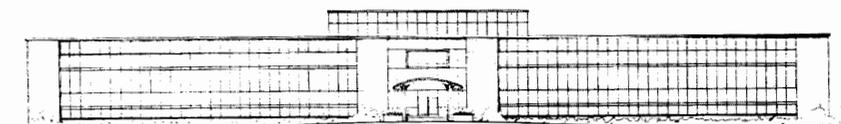
LANGLEY RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

FLIGHT CONTROL RESEARCH FACILITY

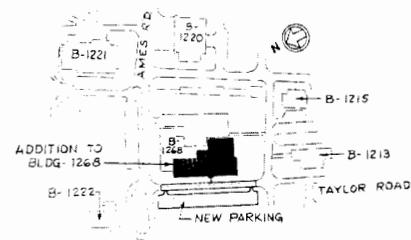
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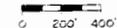
SECOND FLOOR PLAN



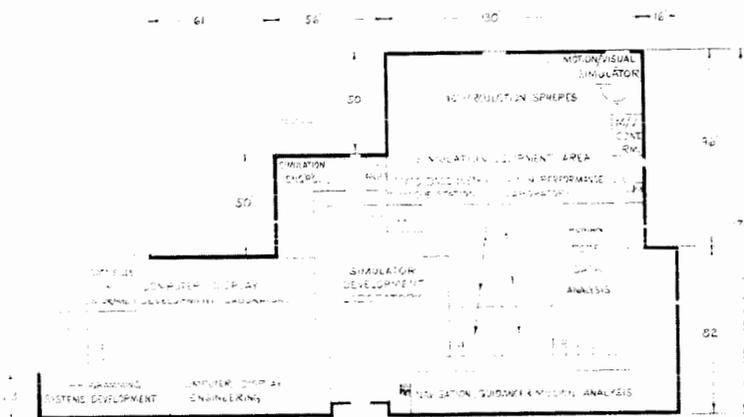
FRONT ELEVATION



PLOT PLAN



LEGEND  
 --- EXISTING CONSTRUCTION  
 --- NEW CONSTRUCTION



FIRST FLOOR PLAN



CF 5-7

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

LIFE SUPPORT TECHNOLOGY LABORATORY

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 1965 and Prior Years	\$164,000
FY 1966 Estimate	<u>2,492,000</u>
Total Funding Through FY 1966	<u>\$2,656,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,617,000</u>
Building	Sq. Ft.	42,000	\$25.44	1,068,400
Special building equipment	LS	---	92,800	92,800
Grading, paving, landscaping	LS	---	73,200	73,200
Mechanical utilities	LS	---	168,700	168,700
Electrical utilities	LS	---	213,900	213,900
<u>Equipment</u>				<u>\$834,000</u>
Environmental simulators	LS	---	757,200	757,200
Laboratory equipment	LS	---	23,400	23,400
Laboratory mechanical systems	LS	---	53,400	53,400
<u>Design</u>	---	---	---	---
		Subtotal		<u>\$2,451,000</u>

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Fallout Shelter</u>	---	---	---	<u>41,000</u>
		TOTAL		<u><u>\$2,492,000</u></u>

PROJECT PURPOSE:

This project will provide research capability to obtain and apply the technology necessary to equip future manned space vehicles of extended duration with optimum life support systems.

PROJECT DESCRIPTION:

The Life Support Technology Laboratory will contain approximately 42,000 square feet of laboratory. Included in this facility will be:

1. An advanced systems experimental laboratory to initiate and develop promising concepts for life support processes, components, and subsystems,
2. A laboratory for the conception and initial evaluation of instrumentation to monitor and control advanced life support subsystems and integrated systems,
3. Laboratories for the evaluation and testing of advanced concepts concerned with water reclamation from biological wastes, humidity control, and wash facilities,
4. A laboratory for making test setups, and instrumenting systems and subsystems for evaluation,
5. An environmental component and systems laboratory for the testing and evaluation of advanced components and subsystems for the control of the environment within the spacecraft,
6. A full scale integrated systems test area which will contain a large test chamber required for the evaluation and subsequent modification of complete and integrated manned life support systems including environmental control, water recovery, food provision, and waste management,
7. A major subsystems test area for the checkout and evaluation of vehicle structures, airlocks, erectable and deployable structures, and functional mockups of various projected missions as well as for dynamics and stability studies associated with manned vehicles,
8. A temperature control laboratory for the research and scale testing associated with both passive and active thermal control concepts for manned space vehicles,

9. A test laboratory to determine the physical, mechanical, and degradation characteristics of candidate materials for manned spacecraft and to evaluate their toxic characteristics,

10. A food and waste management systems laboratory for research on optimum methods of preparing and dispensing food and processing the associated refuse and biological wastes,

11. A contaminant control and biological test laboratory for research on detection, analysis, and control of gas, vapor, biological and particulate toxic substances occurring in spacecraft environments.

PROJECT JUSTIFICATION:

In future years man will engage in space explorations of extended duration at increasing distances from the earth. Planning for these longer-duration missions has established the need for improved life support systems. Present life support systems used on the Mercury vehicle and planned for Gemini and Apollo are relatively simple containing chemical absorbers, high-pressure gas storage, and simple humidity controls. These non-regenerative systems are inadequate for space missions beyond about 30 days. For longer missions regenerative and reclamation type systems must be used to avoid excessive weight penalties. Longer duration missions will also demand that these systems, which will be quite complex, also be extremely reliable. New concepts must be explored and new technologies established in order to provide these missions with optimum life support systems.

The primary effort for life support technology has been concentrated at the Langley Research Center. However, this effort has been hampered because of the lack of adequate laboratory space and equipment to accomplish the planned objectives in this area. This project will provide the laboratory space needed to undertake a concentrated research program. Research to be accomplished will include the development of promising concepts into tested hardware, the integration of this hardware into working prototype systems, and the evaluation of these systems in simulated mission exercises. Other research will deal with the sensing and control of contaminants and the pertinent aspects of repair and maintenance. In addition to these investigations, coordination and integration of these experiments and systems must be carried out with other spacecraft systems such as the instrumentation, structures, and control systems which influence the final configuration.

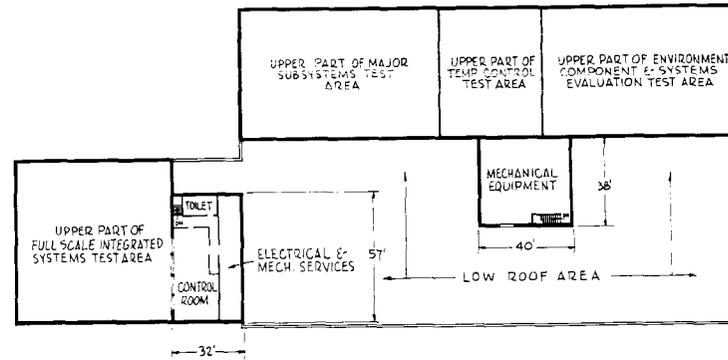
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LANGLEY RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

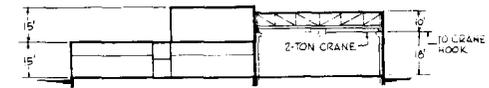
LIFE SUPPORT TECHNOLOGY LABORATORY



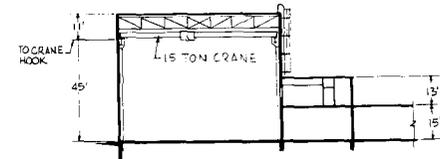
FRONT ELEVATION



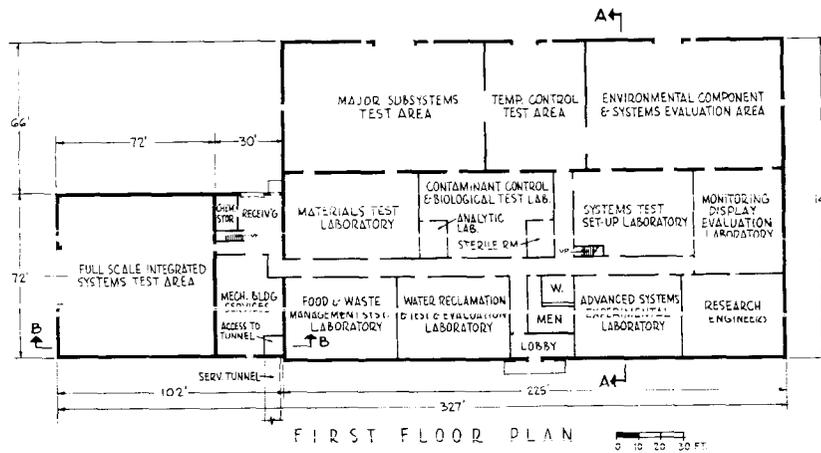
ROOF PLAN



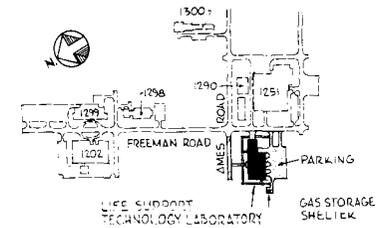
SECTION A-A



SECTION B-B



FIRST FLOOR PLAN



LOCATION PLAN

OF 5-11

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

INCREASED CAPABILITIES OF 20-INCH MACH 6 AND MACH 8.5 TUNNELS

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 1965 and Prior Years	\$50,000
FY 1966 Estimate	<u>682,000</u>
Total Funding Through FY 1966	<u>\$732,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$223,070</u>
Building	Sq. Ft.	2,488	30.37	75,550
Foundations and exhaust tube support	LS	---	27,870	27,870
Site work and paving	LS	---	8,880	3,880
Electrical utilities	LS	---	67,630	67,630
Mechanical utilities	LS	---	43,140	43,140
<u>Equipment</u>				<u>\$458,930</u>
Vacuum storage sphere	LS	---	154,500	154,500
Air coolers	LS	---	128,750	128,750
Vacuum system	LS	---	134,280	134,280
Equipment installation	LS	---	41,400	41,400

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<b><u>\$682,000</u></b>

PROJECT PURPOSE:

This project will provide for increasing the research capabilities of the 20-Inch Mach 6 and 8.5 tunnels in the following respects:

Reducing starting and stopping loads so that winged hypersonic vehicles may be studied.

Providing an order of magnitude increase in available Reynolds number range.

PROJECT DESCRIPTION:

This project will provide a 60-foot diameter vacuum sphere to increase the research capabilities of the 20-Inch Mach 6 and Mach 8.5 tunnels. An existing 41-foot diameter sphere, which does not presently serve these facilities, will be connected to the proposed 60-foot sphere to allow combined use of both spheres. A pumping system utilizing existing pumps and motors will be used to evacuate these spheres. A weathertight shelter will enclose the pumps, associated equipment, and exhaust air coolers.

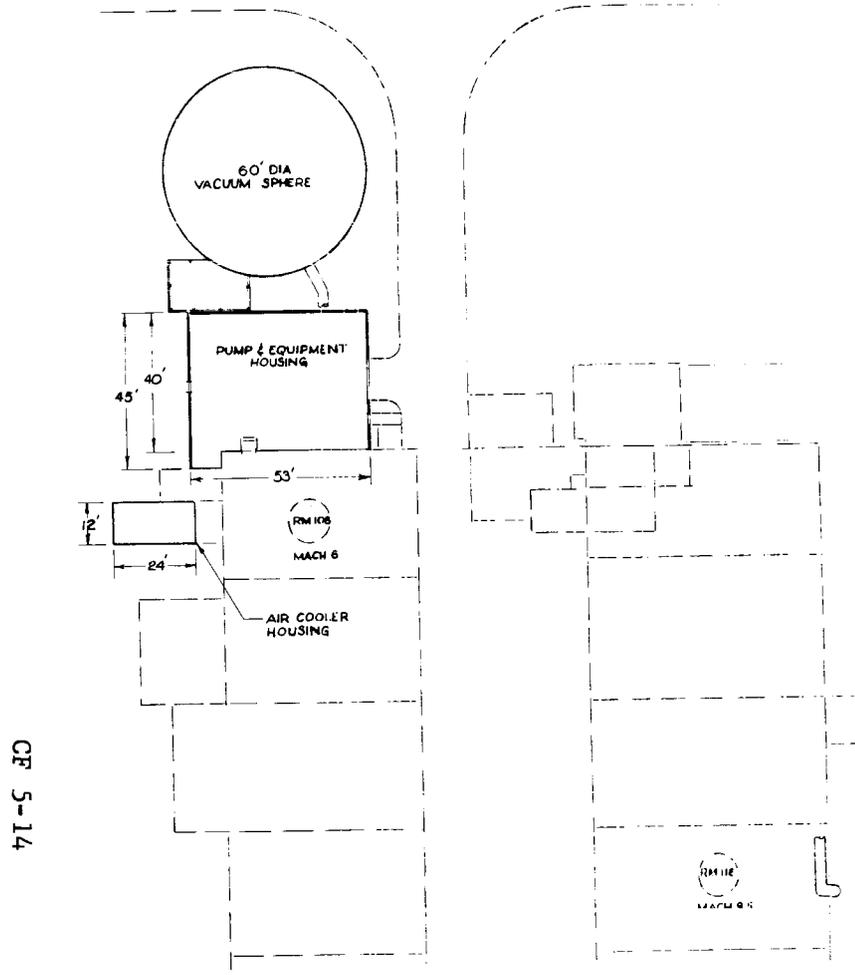
PROJECT JUSTIFICATION:

Theoretical studies of winged vehicles capable of achieving sustained hypersonic flight speeds indicate very promising applications in the area of recoverable boosters and earth-to-orbit flight. Experimental aerodynamic studies are required to ascertain if this theoretical potential can be realized. The presently constituted tunnels at Langley are not suitable for obtaining the required information. The 20-Inch Mach 6.0 and 8.5 tunnels are correctly sized, and operate in the required Mach number range of 5.5 to 8.5, however, the method by which these intermittent type tunnels operate imposes such severe starting and stopping aerodynamic loads that experiments with winged vehicles are not possible. These limitations can be overcome by reducing the back pressure at the downstream end of the tunnels. This reduction can be accomplished by increasing the vacuum capacity at the tunnel exit.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

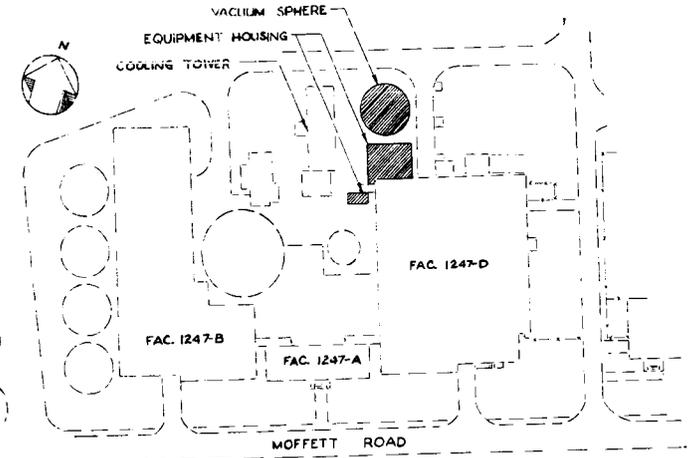
LANGLEY RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

INCREASE RESEARCH CAPABILITY OF 20-INCH MACH 6 AND MACH 8.5 TUNNELS



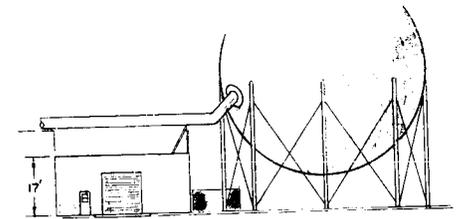
FACILITY PLAN

0 25 FT.



PLOT PLAN

0 100 FT.



EAST ELEVATION

LEGEND  
--- EXISTING CONSTRUCTION  
— NEW CONSTRUCTION

CF 5-14

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

MAGAZINE AND TEST AREA FOR HIGHLY REACTIVE CHEMICAL MATERIALS

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 1965 and Prior Years	\$90,000
FY 1966 Estimate	<u>1,500,000</u>
Total Funding Through FY 1966	<u>\$1,590,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,500,000</u>
Rocket magazine	LS	---	\$122,400	122,400
Rocket test facilities	LS	---	337,200	337,200
Rocket assembly building	LS	---	245,000	245,000
Chemical magazine	LS	---	222,600	222,600
Site development	LS	---	572,800	572,800
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u>\$1,500,000</u>

PROJECT PURPOSE:

This project will provide permanent type facilities that will permit the safe conduct of solid rocketry testing with high energy modern propellants. The facilities and test area will supplement the existing facilities in the hypersonic physics area.

PROJECT DESCRIPTION:

This project will provide small rocket test facilities, a rocket assembly building to support the test facilities, a rocket magazine, and chemical magazines. Locations, distances, and design features will be in accordance with current safety codes to permit continuation of ongoing effort. The test facilities will include three test cells and a control house with barricading and distances suitable for a rocket using 3,000 lbs. of class 9 propellant material. Concrete and steel structure of the test stands will be designed to withstand peak stresses possible in the event of rocket malfunctions. The rocket assembly building will permit operations on a rocket of up to 3,000 pounds of class 9 propellant. The rocket magazine will be designed for a maximum of 9,000 pounds of class 9 solid rocket propellant. The chemical magazine facility will provide segmented areas for various flammable chemicals utilized in the varied research activities. This entire facility will be located on an existing isolated site.

PROJECT JUSTIFICATION:

The primary requirement for this project is to permit continuation of ongoing program activities in full compliance with current safety codes and safe operational procedures. The Langley Research Center has conducted programs of rocket motor development and flight programs utilizing rocket motors for 20 years.

The missions requiring the Langley rocket facility support include:

1. National procurement agency for the solid fueled Scout rocket (developed at Langley)

Evaluating, trouble-shooting, failure analysis  
Improving performance

2. Flight re-entry projects, such as:

Apollo support  
Communications blackout  
Detection, and  
re-entry heating

3. Orbital projects, such as:

Micrometeoroid study satellites

4. Atmospheric and space probes

5. Support of solid propulsion rocket development

This Center has developed a competence in solid rockets which is unique and does not duplicate support available in industry or in other government laboratories with which Langley staff frequently consult. The particular competence may best be illustrated by noting that it has contributed greatly to the perfect performance of the 4-stage Scout vehicle in the last 10 launches. The contributions were based in part on analysis and static firings of individual stages in ground test facilities.

Existing Langley rocket facilities will be retained for use as needed but with smaller motor limits in accordance with revised safety standards.

The Center has no chemical magazine area for the many chemicals used in modern technology which are toxic or flammable. The number and use of such chemicals, many in plastic fabrication applications, has proliferated. Although stringent safety procedures are enforced, good management requires that a suitably restricted magazine be provided for receiving and dispensing such chemicals.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

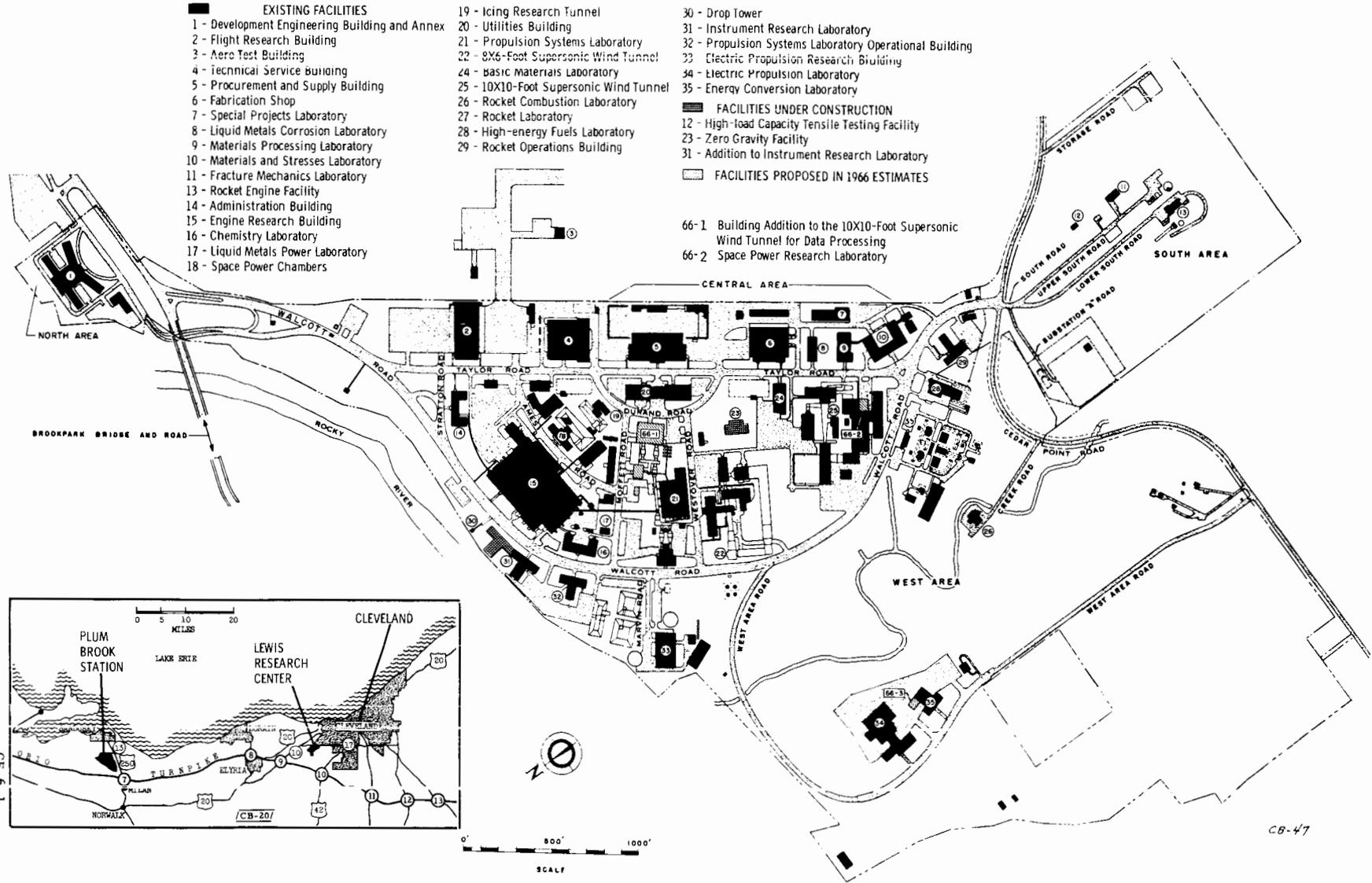
FISCAL YEAR 1966 ESTIMATES

LEWIS RESEARCH CENTER  
(Plum Brook Station)

	<u>Page No.</u>
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Summary.....	CF 6-3
Office of Advanced Research and Technology Projects:	
Building addition for the 10x10 foot supersonic wind tunnel for data processing.....	CF 6-4
Space power research laboratory.....	CF 6-8

LEWIS RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

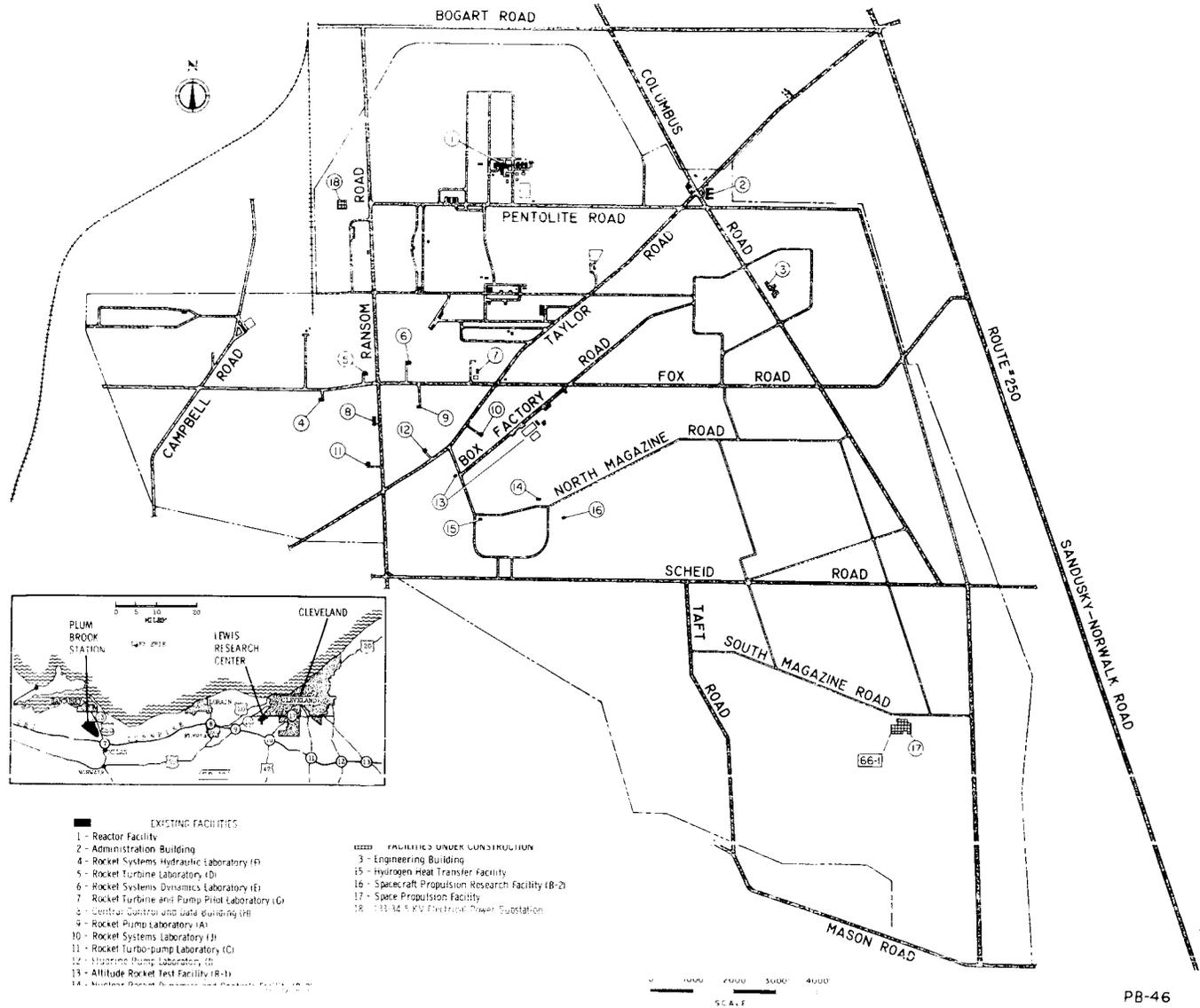
LOCATION PLAN



CE 6-1

CB-47

LEWIS RESEARCH CENTER  
 PLUM BROOK STATION  
 FISCAL YEAR 1966 ESTIMATES  
 LOCATION PLAN



CP 5-2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Lewis Research Center <sup>1/</sup>	Advanced Research & Technology	Cleveland, Ohio	Cuyahoga	Cleveland, Ohio			
INSTALLATION MISSION		PERSONNEL STRENGTH		FY 19 64	FY 19 65	FY 19 66	
Research and development in the areas of advanced propulsion and space power generation. In-house projects include: materials and metallurgy; bearings, seals and heat transfer problems at cryogenic and liquid-metal temperatures; combustion and direct-energy conversion processes; chemical, nuclear and electric rockets and their accessories; system control dynamics; plasmas and magnetohydrodynamics; and zero-gravity effects. The Center maintains technical management of many NASA contracts, including the Centaur, Agena, M-1 and large solid propellant rockets.		NASA PERSONNEL (End of Year)		4859	4847	4847	
		CONTRACTOR AND OTHER PERSONNEL		300	340	365	
		<b>TOTAL ALL PERSONNEL</b>		<b>5159</b>	<b>5187</b>	<b>5212</b>	
		LAND		NO. ACRES			
		NASA-OWNED		6,380			
		OTHER GOVERNMENT AGENCY-OWNED		-			
		NON-FEDERAL (Leases, easements)		15			
		<b>TOTAL LAND</b>		<b>6,395</b>			
		<b>TOTAL CAPITAL INVESTMENT</b> (Including NASA-Owned Land) (as of June 30, 19 64 )		<b>\$ 239,998.0</b>			
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 59 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)		TOTAL ALL YEARS (Estimated)	
Building Addition to 10 x 10-foot Supersonic Wind Tunnel for Data Processing Space Power Research Laboratory	OART	23.0	407.0	-0-		430.0	
	OART	27.0	460.0	-0-		487.0	
ALL OTHER PROJECTS		93,663.0					
<b>TOTALS</b>			93,713.0	<u>1/</u> 867.0			

CP 6-3

<sup>1/</sup> Includes Plum Brook Station

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

BUILDING ADDITION TO THE 10 x 10 FOOT SWT  
FOR DATA PROCESSING

AUTHORIZATION LINE ITEM: Lewis Research Center

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

LOCATION OF PROJECT: Cleveland, Cuyahoga County, Ohio

COGNIZANT NASA INSTALLATION: Lewis Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$23,000
FY 1966 Estimate	<u>407,000</u>
Total Funding Through FY 1966	<u>\$430,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$383,700</u>
Building	Sq. Ft.	14,480	\$25.85	374,300
Site preparation	LS	---	1,300	1,300
Roads and parking	LS	---	---	---
Utilities	LS	---	8,100	8,100
<u>Equipment</u>				<u>\$23,300</u>
Card and table cabinets	LS	---	15,100	15,100
Office furniture	LS	---	8,200	8,200
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		TOTAL		<u>\$407,000</u>

CF 5-4

## PROJECT PURPOSE:

This project will provide an acceptable location for data processing equipment that is presently on order and required to process the increased data load.

## PROJECT DESCRIPTION:

This project consists of a three-story and basement addition to the 10 x 10 Supersonic Wind Tunnel Building. The structure will be a steel frame with masonry curtain walls. The first floor and basement will be reinforced concrete. Exterior dimensions will be approximately 73 feet by 47 feet.

The basement will be used for mechanical and electrical equipment; the first floor for office space, conference area and toilet facilities; the second and third floors for the new computer and data processing equipment and office area.

The wall between the new and existing buildings will be removed on the second and third floors so that one large computer area will be obtained.

Special air-conditioning equipment will be used for the equipment with comfort conditioning being supplied for the building. A raised floor system will be used in the computer and data processing areas.

## PROJECT JUSTIFICATION:

Present data collection systems are incapable of processing the increased data load that is being generated in support of such research programs as the supersonic transport compressor and turbine components, injection tests, combustion instability, and simulated power system loop tests. To meet this requirement, additions to the present data system are being purchased. They include a 30,000 sample-per-second data system and telemetry data reduction system that will be used to process raw data tapes of Centaur and Agena shots.

The additional data processing equipment being delivered in the next twelve months cannot be housed in the present area. A survey of the buildings indicates no area of adequate size to accept the complete computing installation in an efficient, coordinated arrangement. A new computer building would greatly exceed the cost of the proposed addition.

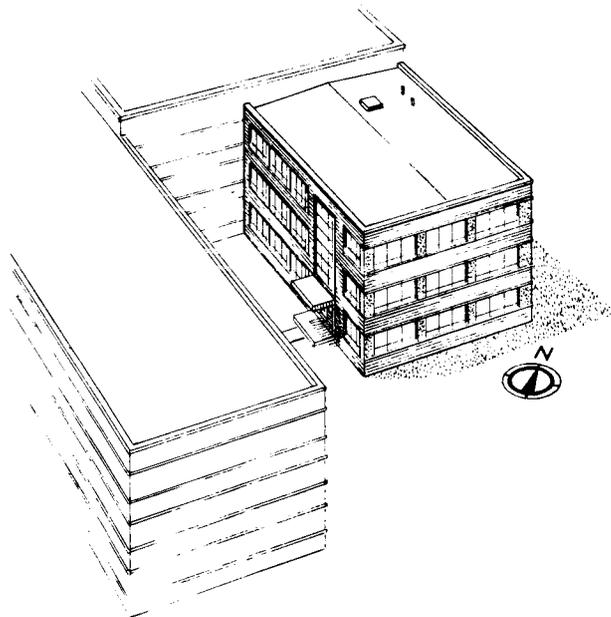
The large digital computers are a modified 1103 and 7094 Mod. - II. These, with their peripheral equipment, and all of the digital and analog data systems, are presently housed in two rooms of the 10 x 10 Supersonic Wind Tunnel office building. This area is already so overcrowded that peripheral equipment for those systems is located in adjoining offices. Without the proposed building addition, the telemetry system will have to be remotely located and additional people will be required to operate the new

data systems because the equipment could not be centrally located. The output of all digital data systems is accepted by a single computer and is formatted for further data processing. The proposed building addition will reduce the scattering of the systems and thereby reduce the possible need for a new computer.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

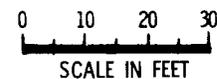
LEWIS RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

BUILDING ADDITION TO THE 10 X 10 FOOT SUPERSONIC WIND TUNNEL FOR DATA PROCESSING



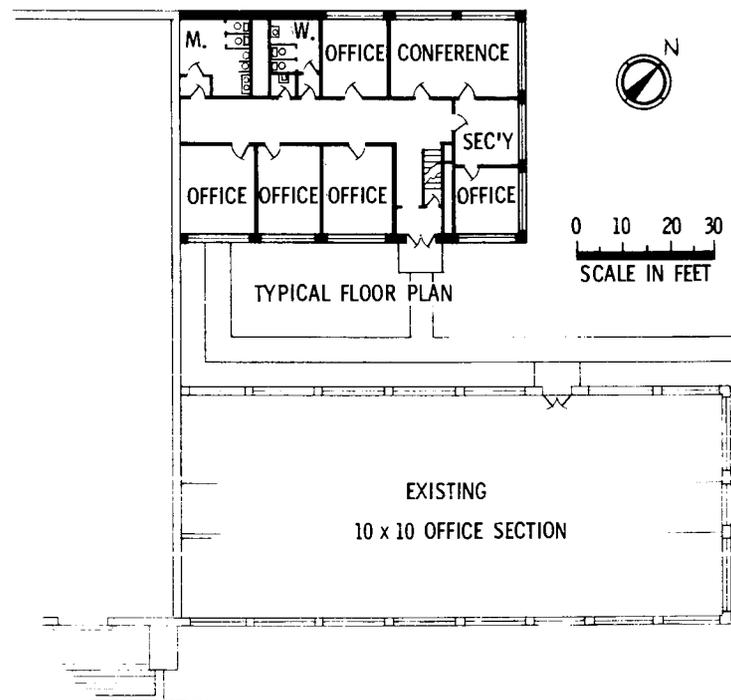
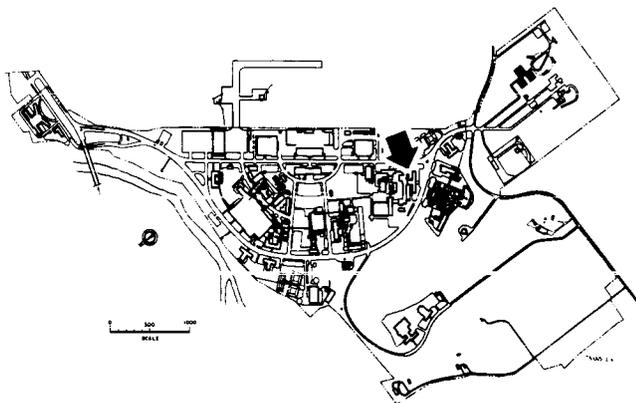
SOUTH ELEVATION

EAST ELEVATION



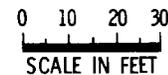
SCALE IN FEET

CF 6-7



TYPICAL FLOOR PLAN

EXISTING  
10 x 10 OFFICE SECTION



SCALE IN FEET

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
SPACE POWER RESEARCH LABORATORY

AUTHORIZATION LINE ITEM: Lewis Research Center

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

LOCATION OF PROJECT: Cleveland, Cuyahoga County, Ohio

COGNIZANT NASA INSTALLATION: Lewis Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$27,000
FY 1966 Estimate	<u>460,000</u>
Total Funding Through FY 1966	<u>\$487,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Ccost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$333,500</u>
Building	Sq. Ft.	13,300	\$ 21.21	282,100
Site development and utilities	LS	---	51,400	51,400
<u>Equipment</u>				<u>\$126,500</u>
Laboratory furniture	LS	---	47,250	47,250
Mechanical support services	LS	---	48,550	48,550
Electrical support services	LS	---	30,700	30,700
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$460,000</u>

PROJECT PURPOSE:

This project will expand research capabilities in electrochemistry, fuel cells, fused salt chemistry, secondary battery characteristics and thin-film photovoltaic cells as related to fundamentals and development of space electric power systems.

PROJECT DESCRIPTION:

This project provides a new building to be attached to the existing Energy Conversion Laboratory in the west area. It will be a two-story building, without basement, of about 13,000 square feet. The first floor will provide four laboratory areas and housing for central heating and air conditioning equipment; the second floor will provide six laboratory areas, an electrical equipment room and two small offices.

PROJECT JUSTIFICATION:

Continued improvement in chemical rocket capability generates an ever increasing need for improved auxiliary electric power systems. Since satellites and space probes require about one-fourth to one-half watts of electricity for each pound of space vehicle weight, power systems developing 1-10 kilowatts will soon be needed to match the launch capabilities of Saturn class boosters. Advanced solar cell systems, possibly of the thin-film type, and electrochemical power systems will play an important part in filling this need for auxiliary power.

The Lewis Research Center is actively engaged in in-house research aimed at the fundamentals of many potential space electric power systems. Largely missing from this Center's research and development effort is the intermediate phase of developing and debugging prototype or bread-board devices and studies, at bench scale, of the unit processes required for future, high power systems. Also missing is a significant effort on the fundamentals of electrochemistry. This facility will fill these gaps.

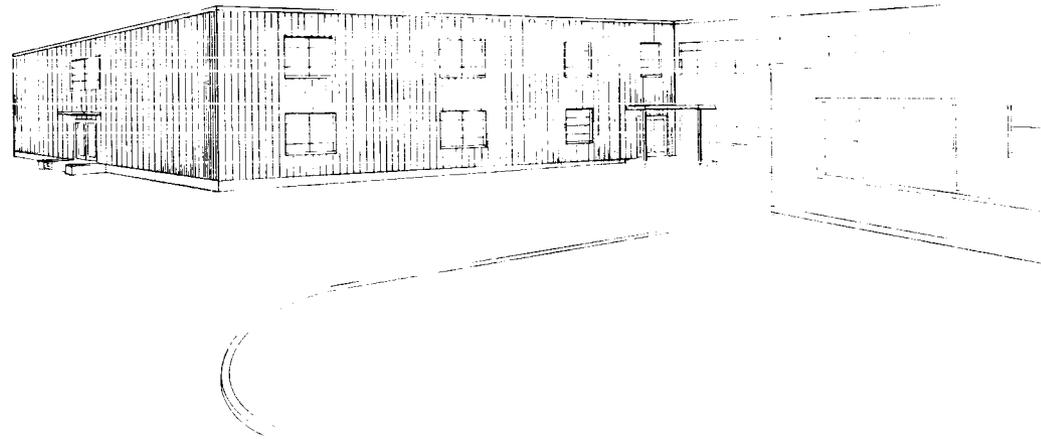
The facility will provide the capability for:

1. An increased research and development effort on the fabrication and evaluation of thin-film solar cells.
2. Increased work on improving the performance of conventional solar cells, especially in regards to lowering specific weights and increasing resistance to radiation damage.
3. Research on new types of high energy-density batteries.
4. The development and evaluation of fuel cell components.
5. Research on fused-salt electrochemical systems.

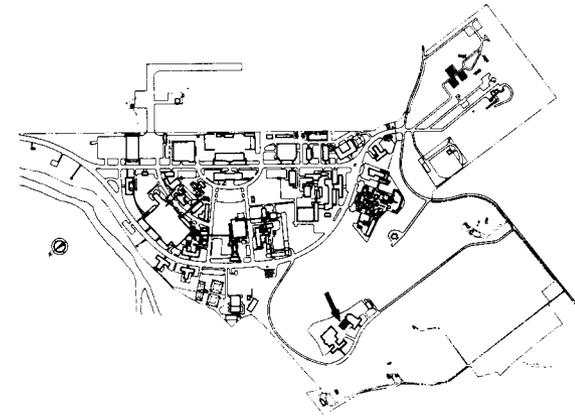
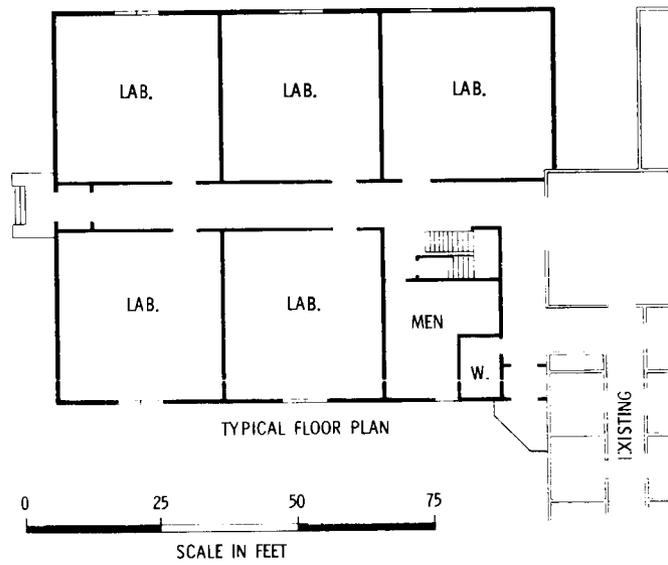
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LEWIS RESEARCH CENTER  
FISCAL YEAR 1966 ESTIMATES

SPACE POWER RESEARCH LABORATORY



CF 6-10



PLOT PLAN

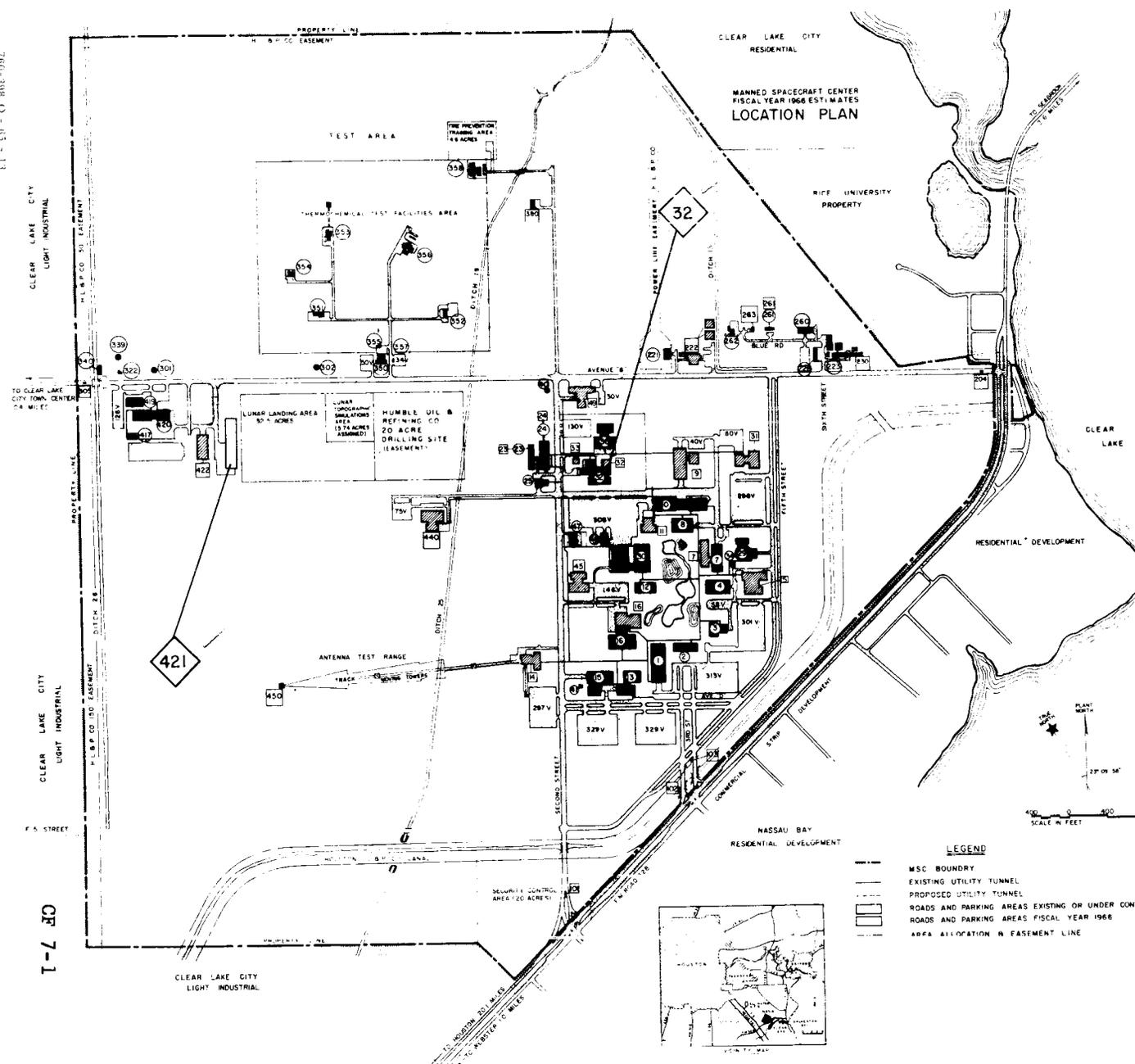
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

MANNED SPACECRAFT CENTER

	<u>Page No.</u>
Location plan.....	CF 7-1
Summary.....	CF 7-2
Office of Manned Space Flight Projects:	
Modifications to the environmental testing laboratory.....	CF 7-3
Center support facilities.....	CF 7-11



- ① EXISTING FACILITIES (FY-62,63)
- 1 AUDITORIUM FY 62
  - 2 PROJECT MANAGEMENT FY 62
  - 3 CENTRAL CAFETERIA FY 62
  - 4 FLIGHT OPERATIONS OFFICE FY 62
  - 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 & ELECTRONIC SYSTEMS LAB FY 62
  - 16 SPACECRAFT RESEARCH OFFICE & LABORATORY FY 62
  - 23 CENTRAL H & C COOLING TOWER FY 62, 63
  - 24 CENTRAL HEATING & COOLING PLANT FY 62, 63
  - 25 FIRE STATION FY 62
  - 29 FLIGHT ACCELERATION FACILITY FY 63
  - 30 INTEGRATED MISSION CONTROL FY 63
  - 32 SPACE ENVIRONMENT SIMULATION LABORATORY FY 62
  - 34 FLIGHT ACCELERATION MOTOR GENERATION BUILDING FY 63
  - 36 ESC CONTRACTOR SUPPORT FACILITY FY 62
  - 40 FLEATED WATER TANK FY 62
  - 41 GAS STORAGE FY 62
  - 47 SOUTHWESTERN BELL TELEPHONE BUILDING
  - 48 EMERGENCY POWER BUILDING (EMCC) FY 63
  - 221 ELECTRICAL SUBSTATION FY 62
  - 223 SEWAGE TREATMENT PLANT FY 62
  - 226 FIELD CONSTRUCTION OFFICE
  - 260 TRANSLATION & DOCKING SIMULATION FACILITY FY 63
  - 261 RADIOLOGICAL FACILITY FY 63
  - 262 ARC JET, RADIANT HEATING & ACOUSTIC TEST FACILITY FY 63
  - 301 WATER WELL FY 62
  - 302 WATER WELL FY 62
  - 322 WATER TREATMENT FY 62
  - 339 GROUND WATER STORAGE TANK FY 62
  - 340 GAS METERING STATION FY 62
  - 350 THERMOCHEMICAL TEST FACILITY FY 63
  - 351 THERMOCHEMICAL SPRAY CHAMBER FY 63
  - 352 ELECTRO-IONIC 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
  - 417 GARAGE FY 62
  - 419 SUPPORT OFFICE FY 62
  - 420 SUPPORT SHOP & WAREHOUSE FY 62

- ② FACILITIES AUTHORIZED OR UNDER CONTRACT
- 5 MISSION SIMULATION & TRAINING FACILITY FY 64
  - 7 LIFE SYSTEMS LABORATORY FY 65
  - 9 TECHNICAL SERVICES FACILITY FY 65
  - 11 BRANCH CAFETERIA FY 65
  - 14 ANECHOIC CHAMBER TEST FACILITY FY 64
  - 16 SPACECRAFT RESEARCH OFFICE & LABORATORY FY 64
  - 23 CENTRAL H & C COOLING TOWER FY 64, 65
  - 24 CENTRAL HEATING & COOLING PLANT FY 64, 65
  - 31 LUNAR MISSION & SPACE EXPLORATION FACILITY FY 65
  - 32 SPACE ENVIRONMENT SIMULATION LABORATORY FY 65
  - 33 ULTRA HIGH VACUUM CHAMBER FACILITY FY 64
  - 45 PROJECT ENGINEERING FACILITY FY 64
  - 49 VIBRATION & ACOUSTIC TEST FACILITY FY 64
  - 101 GUARDHOUSE FY 64
  - 102 GUARDHOUSE FY 64
  - 103 GUARDHOUSE FY 64
  - 104 GUARDHOUSE FY 64
  - 204 GUARDHOUSE FY 64
  - 222 ATMOS ENTRY SIMULATION FACILITY FY 64
  - 223 SEWAGE TREATMENT PLANT FY 64
  - 230 CREW SYSTEMS BIOLOGICAL FACILITY FY 64
  - 261 RADIOLOGICAL FACILITY FY 64
  - 263 HEALTH PHYSICS LABORATORY FY 64
  - 305 GUARDHOUSE FY 64
  - 380 HAZARDOUS MATERIAL STORAGE FACILITY FY 64
  - 422 LOGISTIC SUPPORT WAREHOUSE FY 65
  - 440 ELECTRONIC SYSTEMS COMPATIBILITY FACILITY FY 65
  - 450 ANTENNA SERVICE BUILDING & TOWER FY 64

- ③ PROPOSED FISCAL YEAR 1966 PROJECTS
- 32 MODIFICATIONS TO ENVIRONMENTAL TESTING LABORATORY
  - 421 MISSION SUPPORT WAREHOUSE

**LEGEND**

- M.S.C. BOUNDARY
- - - EXISTING UTILITY TUNNEL
- - - PROPOSED UTILITY TUNNEL
- ▭ ROADS AND PARKING AREAS EXISTING OR UNDER CONTRACT
- ▭ ROADS AND PARKING AREAS FISCAL YEAR 1966
- AREA ALLOCATION & EASEMENT LINE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Manned Spacecraft Center	Manned Space Flight	Clear Lake, Texas	Harris	Houston, Texas			
INSTALLATION MISSION		PERSONNEL STRENGTH			FY 19 64	FY 19 65	FY 19 66
The mission of the Manned Spacecraft Center is the development of spacecraft for Manned Space Flight programs. The Center is also responsible for Manned Space Flight operations and conduct of astronaut training.		NASA PERSONNEL (End of Year)			4,277	4,811	4,811
		CONTRACTOR AND OTHER PERSONNEL			1,519	2,907	3,720
		<b>TOTAL ALL PERSONNEL</b>			<b>5,796</b>	<b>7,718</b>	<b>8,531</b>
		LAND			NO. ACRES		
		NASA-OWNED			1,600		
OTHER GOVERNMENT AGENCY-OWNED			-				
NON-FEDERAL (Leases, easements)			477				
<b>TOTAL LAND</b>			<b>2,077</b>				
<b>TOTAL CAPITAL INVESTMENT</b> (Including NASA-Owned Land) (as of June 30, 19 64 )			<b>\$ 131,045.0</b>				
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 62 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Modifications to the Environmental Testing Laboratory Center Support Facilities	MSF	41,830.0	3,600.0	-0-	45,430.0		
	MSF	56.0	800.0	-0-	856.0		
ALL OTHER PROJECTS		133,658.0					
<b>TOTALS</b>		175,544.0	4,400.0				

CF 7-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Clear Lake, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: Alteration

FUNDING:

FY 1965 and Prior Years	\$41,830,000
FY 1966 Estimate	<u>3,600,000</u>
Total Funding Through FY 1966	<u>\$45,430,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$243,400</u>
Building	Sq. Ft.	6,075	\$26.26	159,500
Site preparation	LS	---	12,200	12,200
Utilities	LS	---	71,700	71,700
<u>Equipment</u>				<u>3,356,600</u>
Data acquisition system	LS	---	210,500	210,500
Mechanical pumping system	LS	---	278,600	278,600
Diffusion pumping and backing system	LS	---	292,800	292,800
Hot gaseous nitrogen recirculation system	LS	---	630,500	630,500
Cooling water system	LS	---	91,200	91,200
Leak detection	LS	---	102,500	102,500
Instrumentation	LS	---	277,200	277,200
Helium refrigeration system	LS	---	1,473,300	1,473,300

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$3,500,000</u>

PROJECT PURPOSE:

To provide the Environmental Chambers with an increased simulation capability, with improved operating efficiency, and with additional safety features for the astronauts.

PROJECT DESCRIPTION:

This project will provide for extensions to the Pump Equipment Wing (approximately 2,800 square feet) and Refrigeration Equipment Wing (approximately 3,300 square feet) to accommodate additional equipment for the vacuum pumping systems. A hard line data link system will be constructed between the Environmental Testing Laboratory and the Integrated Mission Control Center (IMCC), Central Data Facility and the Vibration and Acoustic Laboratory.

Other modifications to the chambers will include the addition of a closed-loop orbital simulator, a gas leak detection system, a 40,000 foot hold-mode, and a hot gaseous nitrogen recirculation system. To support these modifications, the air conditioning and cooling water systems will be expanded.

PROJECT JUSTIFICATION:

Modification of the environmental chambers is required to achieve optimum space simulation and to provide additional safety for the astronauts. A closed-loop orbital simulator for computer programming the intensities of the solar simulators and positions of the lunar plane must be provided to obtain accurate simulations and test data. To permit more realistic simulations, the Environmental Testing Laboratory, ground operational flight control equipment and real time data reduction equipment must be interconnected to form an operating system. The hard line data link system will perform this function.

At present, the chamber is evacuated from atmospheric pressure to maximum vacuum without a stop. A capability to hold the chamber at 40,000 feet must be provided to afford the astronauts greater safety. This feature will permit the chamber and all instrumentation to be checked prior to proceeding to the hard vacuum region ( $10^{-7}$  mmHg).

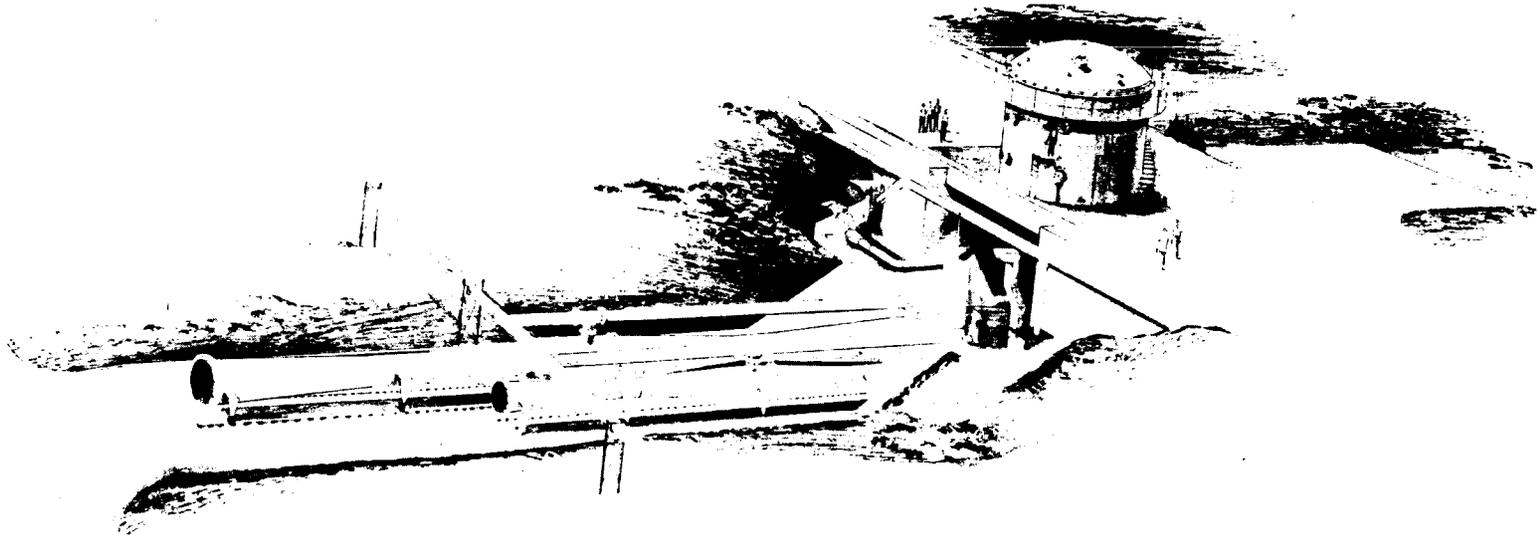
To achieve greater efficiency of operation, additional vacuum pumping must be provided to decrease the unproductive vacuum pumpdown time. The planned addition will reduce this unproductive time from 12 hours to 4 hours.

The installation of a hot gaseous nitrogen recirculation system is required to increase the chamber operating efficiency. The hot gaseous nitrogen recirculation system will decrease the cryopanel warm-up from 24 hours to 4 hours, thereby, permitting the chamber to be repressurized much sooner, upon completion of a test. The cryopanel must be warmed to near ambient temperature before repressurizing the chamber in order to prevent the contamination of the cryogenic system.

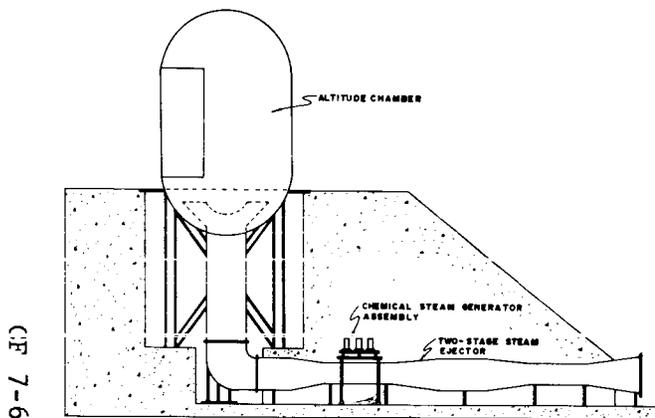
The manual leak detection methods now employed are time consuming and present potential delays to the test program. The planned automatic leak detection system will correct these deficiencies.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**MANNED SPACECRAFT CENTER  
FISCAL YEAR 1966 ESTIMATES  
MODIFICATIONS TO SERVICE MODULE TEST STAND NO.1 WSMR**

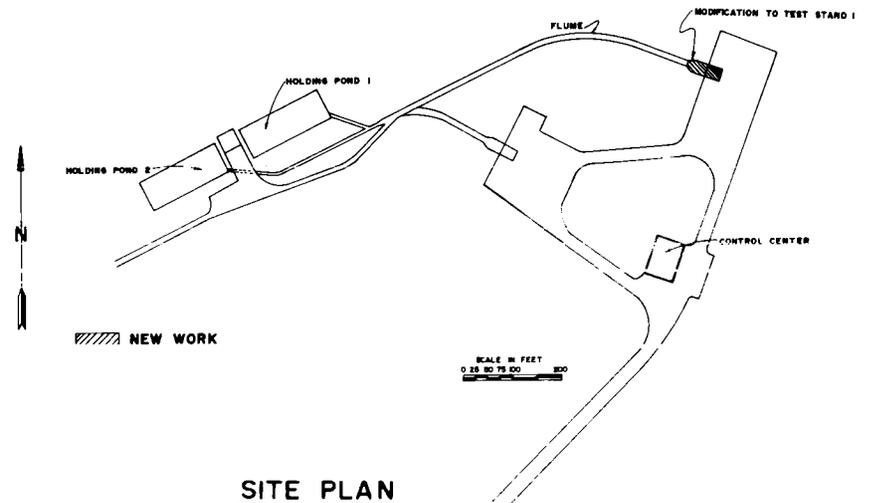


PERSPECTIVE



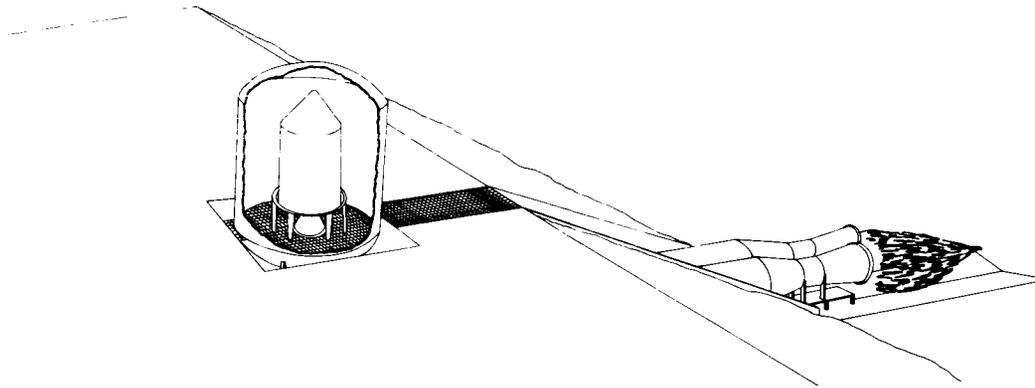
CP 7-6

PARTIAL ALTITUDE CHAMBER  
DIFFUSER-EJECTOR SECTION

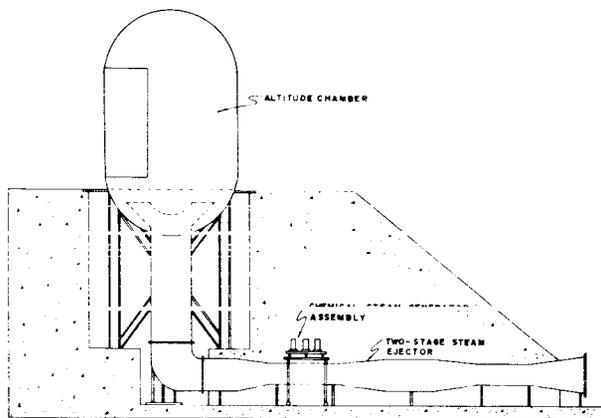


SITE PLAN

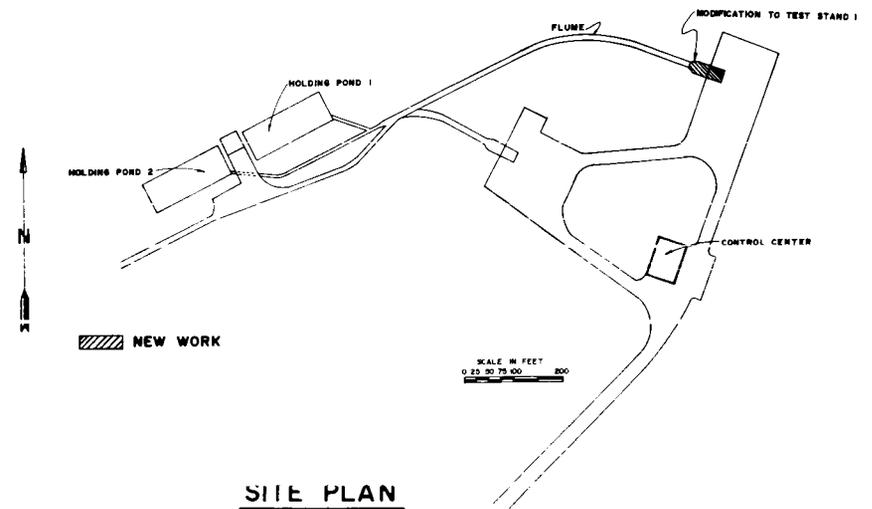
**MANNED SPACECRAFT CENTER**  
**FISCAL YEAR 1966 ESTIMATES**  
**MODIFICATIONS TO SERVICE MODULE TEST STAND NO. 1 WSMR**



PERSPECTIVE



PARTIAL ALTIMITUDE CHAMBER  
DIFFUSER-EJECTOR SECTION



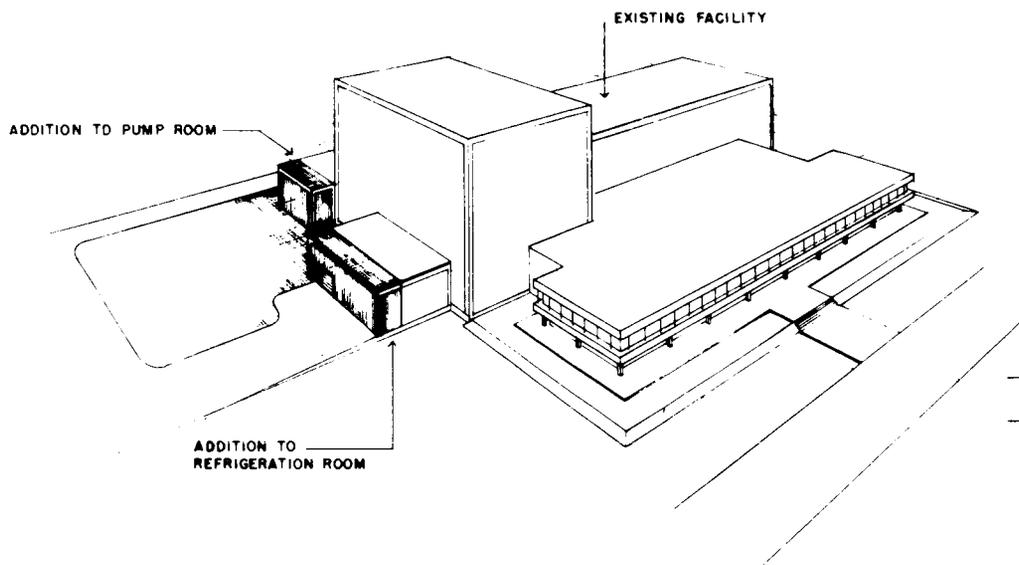
SITE PLAN

CIB 7-7

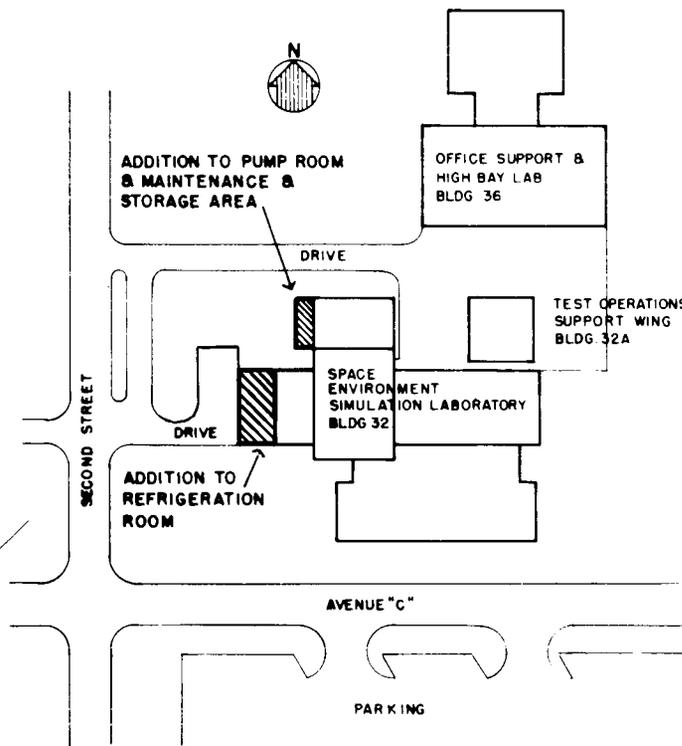
# MANNED SPACECRAFT CENTER

FISCAL YEAR 1966 ESTIMATES

## MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY



PERSPECTIVE



PARTIAL SITE PLAN

50 0 100 200  
SCALE IN FEET

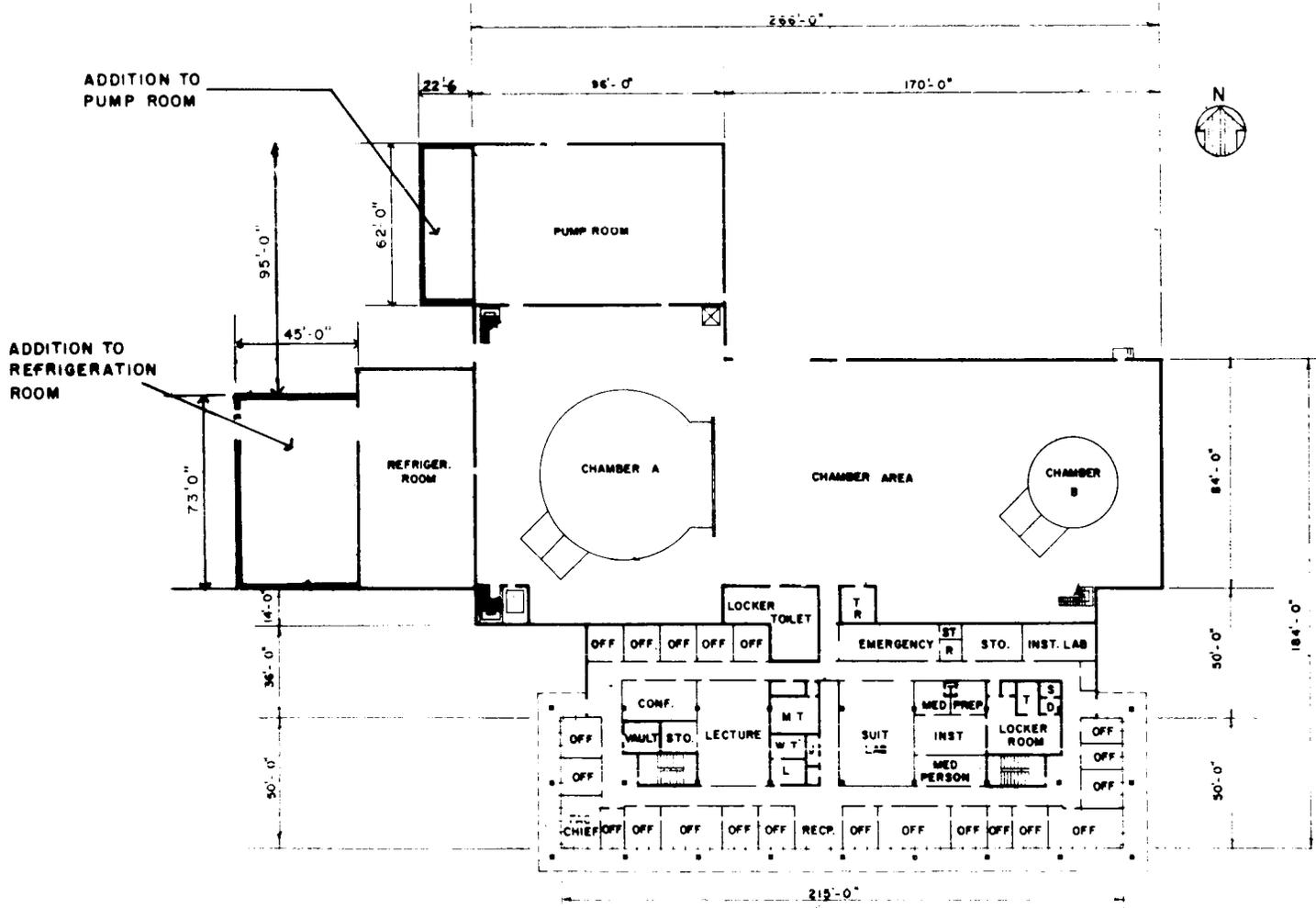
CF 7-8

PL 7-9-66-98-98

# MANNED SPACECRAFT CENTER

FISCAL YEAR 1966 ESTIMATES

## MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY



QR 7-9

**FIRST FLOOR PLAN**

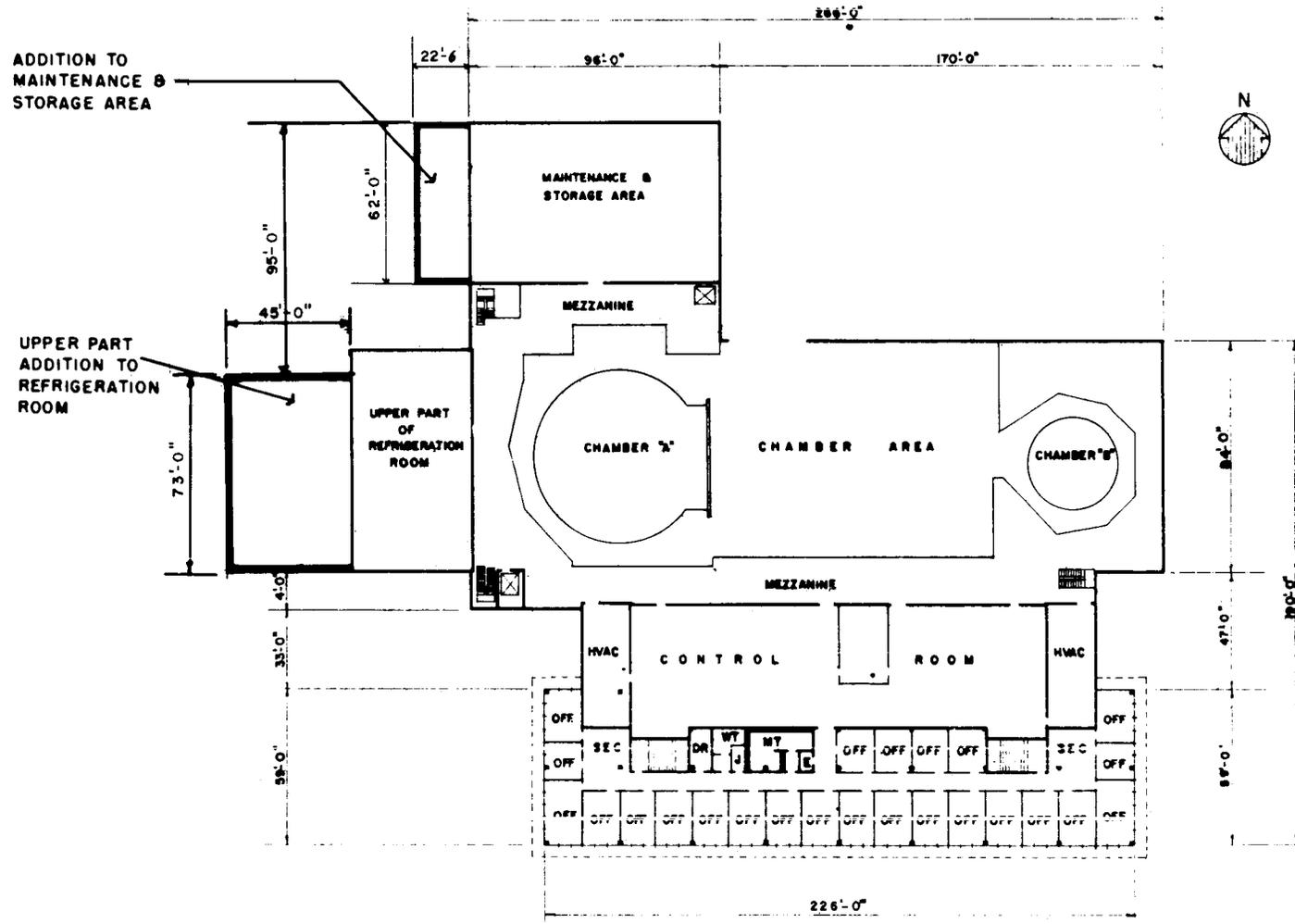
16 0 32 64  
SCALE IN FEET

# MANNED SPACECRAFT CENTER

FISCAL YEAR 1966 ESTIMATES

## MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY

GP 7 10.



**SECOND FLOOR PLAN**



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

CENTER SUPPORT FACILITIES

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Clear Lake, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$56,000
FY 1966 Estimate	<u>800,000</u>
Total Funding Through FY 1966	<u>\$856,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$300,000</u>
Warehouse	Sq. Ft.	60,876	\$10.45	636,200
Site development	LS	---	---	100,300
Utilities	LS	---	---	63,500
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter (Not feasible)</u>	---	---	---	<u>None</u>
		TOTAL		<u>\$800,000</u>

PROJECT PURPOSE:

The purpose of this project is to provide the necessary additional warehouse space for receiving, storing and issuing spacecraft components, spare

parts and general supplies in support of the Manned Spacecraft Center development and test programs.

PROJECT DESCRIPTION:

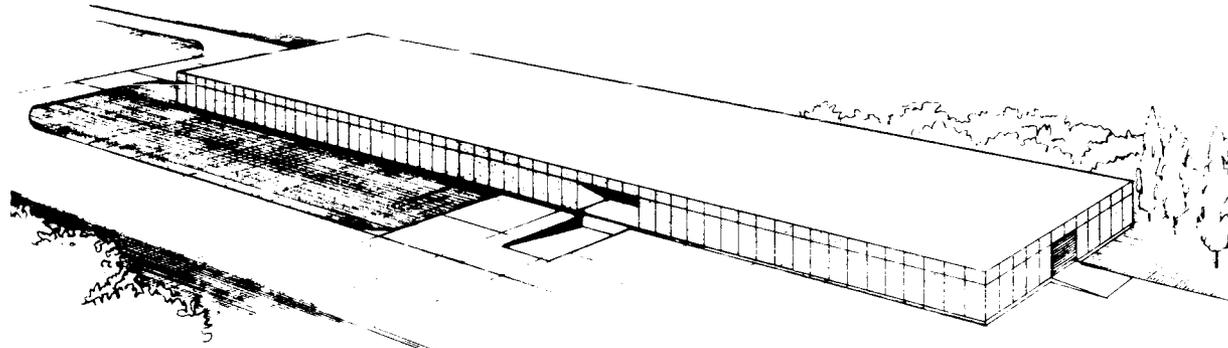
This project will provide for the construction of a warehouse building with an area of approximately 61,000 square feet. The building will be a single story, high-bay structure, 20 feet high, and will be constructed of steel frame and precast concrete wall panels. An area of approximately 32,000 square feet will have a controlled environment for storage of spacecraft spare parts.

PROJECT JUSTIFICATION:

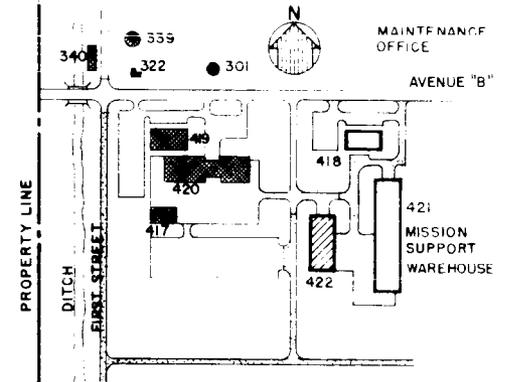
The construction of warehouse space has been planned as part of the phased construction to meet the requirements of the engineering and administrative operations as the Apollo development and test program is intensified. Fiscal Year 1962 and Fiscal Year 1965 Construction of Facility programs provided approximately 52,100 square feet of warehouse space at the Clear Lake site. The Fiscal Year 1966 facility will provide an additional 61,000 square feet. Approximately 70,000 individual line items will be handled in support of the development and test program. These 70,000 items will require approximately 98,000 square feet of storage area. The balance of the space is required for receiving, storing and issuing general supply items such as tools, film, piping, transformers, wire, and administrative supplies.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**MANNED SPACECRAFT CENTER**  
**FISCAL YEAR 1966 ESTIMATES**  
**CENTER SUPPORT FACILITIES**



**PERSPECTIVE**

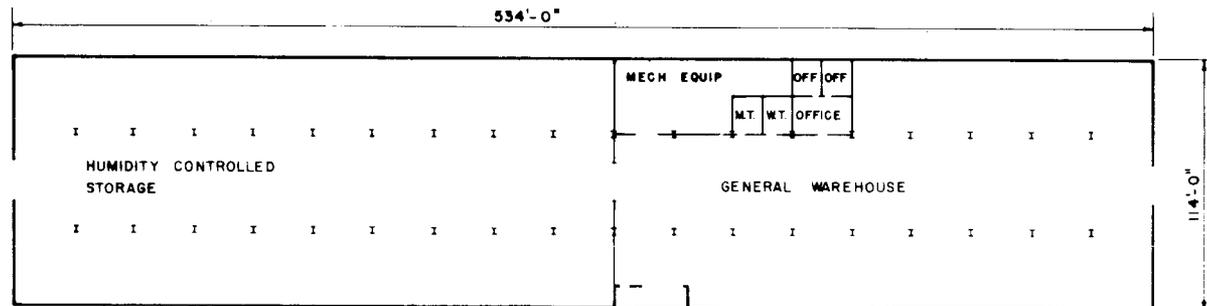


**PARTIAL SITE PLAN**



- LEGEND
- 1962 PROGRAM
  - 1965 PROGRAM
  - 1966 PROGRAM

CF 7-13



**PLAN- MISSION SUPPORT WAREHOUSE**



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

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Extension to high pressure gas system.....	CI' 8-13
LOX storage facility.....	CI' 8-19

# MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1966 ESTIMATES

## LOCATION PLAN



**LEGEND**  
EXISTING FACILITIES

4200 CENTRAL LAB & OFFICE BLDG.	4167 SKILER HOUSE
4201 ENGINEERING & ADMINISTRATION BLDG.	4170 BLOCKHOUSE
4207 CENTRAL COMMUNICATION FACILITY	4172 STATIC TEST TOWER
4241 STORAGE FACILITY	4183 COMPONENTS TEST LAB
4250 MAINTENANCE BLDG.	4186 COLD CALIB TEST STAND
4306 CAFETERIA	4110 PROP. & VEHICLE ENG. L.F.B.
4311 WIND TUNNEL OPERATIONS	4112 ENGINEERING OFFICES
4312 SECURITY GUARD UNIT	4113 COMPRESSOR BLDG.
4315 SERVICE SHOPS	4116 ENG. OFFICE & SHOP
4317 TEST & DEVELOP. SHOP	4118 HYDRAULIC TEST FACILITY
4322 STORAGE FACILITY	4119 TEST UNIT
4330 FUEL TEST STAND	4123 ACCELERATION TEST FACILITY
4351 TECH. INFO. BLDG.	4130 TEST SHOP
4352 NITROGEN MFG. BLDG.	4163 COMPUTATIONS DIVISION LAB
4353 PHOTO LAB	4166 ENGINEERING BUILDING
4371 PLANT MAINT.	4174 WEST AREA BLOCKHOUSE
4372 PLANT MAINT.	4105 ASSEMBLY SHOP
4373 PLANT MAINT.	4107 STRUCT. FABRIC SHOP
4424 FIRE STATION	4108 QUALITY ASSURANCE ENG. OFC.
4435 MOTOR POOL	4110 LIQUID HYDROGEN TEST STAND
4471 WAREHOUSE	4111 DEVELOPMENT SHOP
4481 ADMIN. & ENG. OFFICES	4112 MFG. ENG. OFFICE BLDG.
4482 VEHICLE MAINT. BLDG.	4123 OFFICE BLDG.
4483 AUTOMOTIVE MAINT. SHOP	4125 STEAM PLANT
4485 FINANCIAL MGMT. OFC.	4127 SHOP & LAB FACILITY
4487 ASTRONAUTS ENG. BLDG.	4128 RESEARCH & DEVELOP. FACILITY
4491 AUTOMATIC DATA PROCESS CENTER	4132 WIND TUNNEL
4492 ELECTRIC SHOP	4141 BERYLLIUM FACILITY
4493 MACHINE SHOP	4146 TEST LAB & OFFICES
4494 TECHNICAL DOCUMENTATION	4147 COMPRESSOR STATION
4537 DYNAMIC TEST STAND	4148 LIQUID PROPELLANT TEST STAND
4538 CONTROL BLDG.	4150 HIGH ALTITUDE TEST FACILITY
4561 PROPEL. SHOP SUPPORT FACILITY	5 4752 COMP. & SUBASSY ACCELT. BLDG.
4563 LOG STORAGE	4760 SURFACE TREATMENT FACILITY
4564 ENGINE TEST STAND	4628 LOW TEMPERATURE FACILITY
4566 TEST DIVISION ENG. BLDG.	

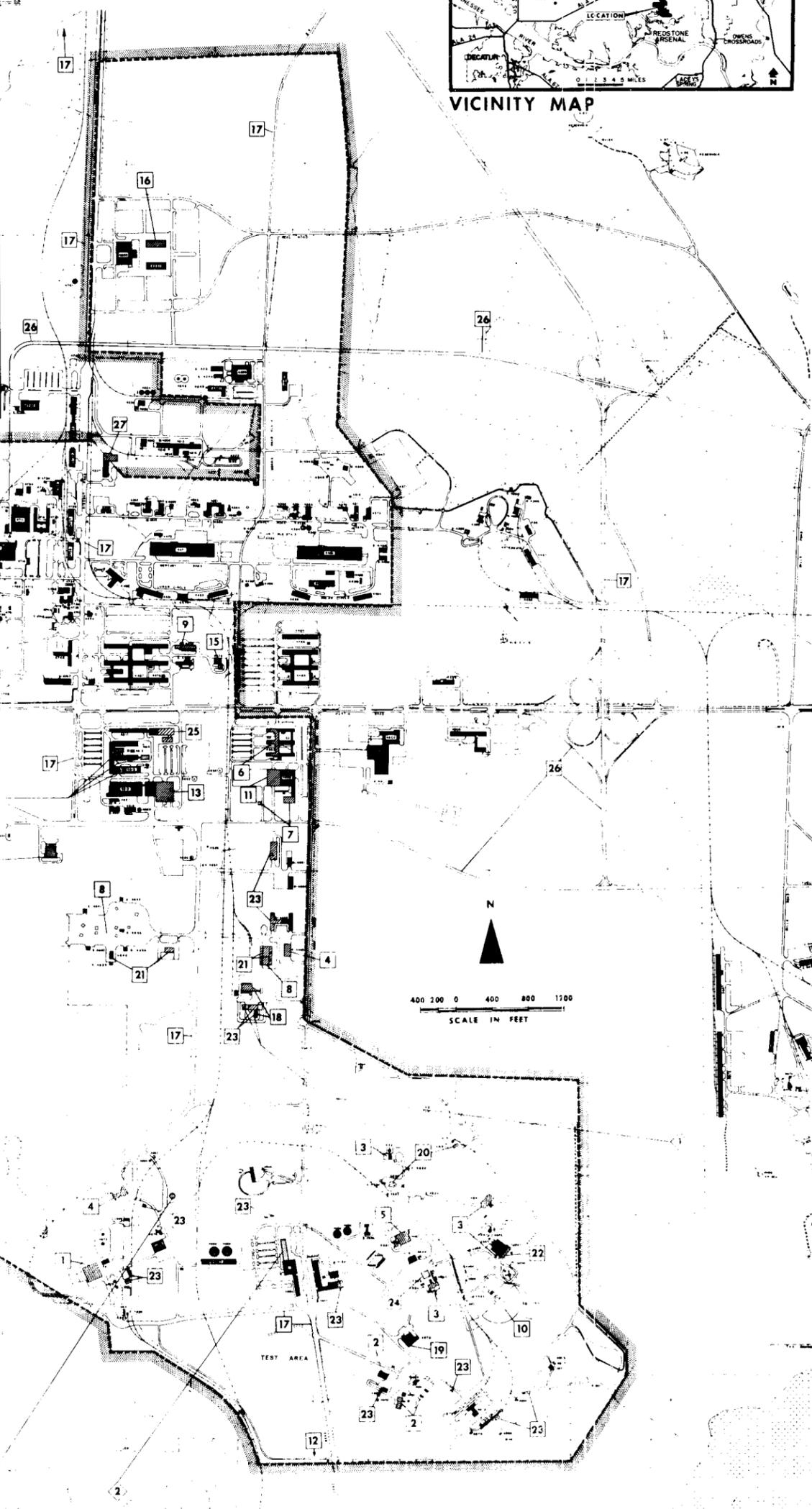
**FACILITIES AUTHORIZED & UNDER CONSTRUCTION**

- 1 SATURN STATIC TEST FACILITY
- 2 LIQUID HYDROGEN FACILITY
- 3 COMPONENTS TEST FACILITY
- 4 F-1 ENGINE TEST STAND
- 5 DYNAMIC TEST STAND
- 6 ADDITION TO COMPUTATION DIVISION BUILDING
- 7 INSTRUMENT LABORATORY
- 8 SATURN V GROUND SUPPORT EQUIPMENT TEST FACILITY
- 9 ACCELERATION TEST & CALIBRATION FACILITY
- 10 ACOUSTIC MODEL TEST FACILITY
- 11 ADDITIONS TO THE TEST SUPPORT SHOP
- 12 BARGE DOCK AND LOADING FACILITIES
- 13 EXTENSION TO THE LOAD TEST ANNE
- 14 HANGAR FOR VEHICLE COMPONENTS
- 15 HAZARDOUS OPERATION LABORATORY
- 16 PROJECT ENGINEER OFFICE
- 17 UTILITIES INSTALLATION
- 18 EXPANSION & MODERNIZATION OF H.P. GAS & PROPELLANT SYSTEM
- 19 MODERNIZATION OF INSTRUMENTATION SYSTEM IN EAST AREA
- 20 ADDITIONS TO COMPONENTS TEST FACILITY
- 21 EXTENSIONS TO SATURN V GROUND SUPPORT EQUIPMENT TEST FACILITY
- 22 EXTENSION OF COMPONENTS TEST FACILITY INSTRUMENTATION
- 23 SATURN SUPPORT TEST AREA
- 24 COLD FLOW TEST FACILITY
- 25 EXTENSION TO THE PROPELLSION & VEHICLE ENGINEERING LABORATORY
- 26 EXTENSION TO UTILITY SYSTEM
- 27 ADDITIONS TO COMMUNICATIONS BUILDING

**PROPOSED FISCAL YEAR 1966 PROJECTS**

- 1 EXTENSION TO HIGH PRESSURE GAS SYSTEMS
- 2 TEST ENGINEERING BUILDING EXTENSION
- 3 LOG STORAGE FACILITIES FOR THE WEST TEST AREA
- 4 NON DESTRUCTIVE TESTING LABORATORY
- 5 ADDITIONS TO MATERIALS LABORATORY

**LEGEND**  
MSFC BOUNDARY



CF 8-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 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		PERSONNEL STRENGTH		FY 19 64	FY 19 65	FY 19 66	
The mission of the Marshall Space Flight Center is the development of 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.		NASA PERSONNEL (End of Year)		7,355	7,220	7,195	
		CONTRACTOR AND OTHER PERSONNEL		5,454	5,986	6,088	
		<b>TOTAL ALL PERSONNEL</b>		<b>12,809</b>	<b>13,206</b>	<b>13,283</b>	
		LAND		NO. ACRES			
		NASA-OWNED		1,786			
OTHER GOVERNMENT AGENCY-OWNED		-					
NON-FEDERAL (Leases, easements)		64					
<b>TOTAL LAND</b>		<b>1,850</b>					
<b>TOTAL CAPITAL INVESTMENT</b> <i>(Including NASA-Owned Land) (as of June 30, 19 64 )</i>		<b>\$ 223,843.0</b>					
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 61 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Non-Destructive Testing Laboratory	MSF	59.0	708.0	-0-	767.0		
Additions to Materials Laboratory	MSF	72.0	1,107.0	-0-	1,179.0		
Test Engineering Building Extension	MSF	1,478.0	616.0	-0-	2,094.0		
Extension to High Pressure Gas Systems	MSF	117.0	1,415.0	-0-	1,532.0		
LOX Storage Facilities for West Test Area	MSF	76.0	930.0	-0-	1,006.0		
ALL OTHER PROJECTS		147,033.0					
<b>TOTALS</b>		<b>148,835.0</b>	<b>4,776.0</b>				

DR8-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

NON-DESTRUCTIVE TESTING LABORATORY

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: New

FUNDING:

FY 1965 and Prior Years	\$59,000
FY 1966 Estimate	<u>708,000</u>
Total Funding Through FY 1966	<u>\$767,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$445,900</u>
Basic building structure	Sq. Ft.	8,780	\$28.26	248,100
Special structural requirements	LS	---	37,000	37,000
Air conditioning	LS	---	34,900	34,900
Integral equipment (Such as special doors)	LS	---	41,000	41,000
Site development	LS	---	25,600	25,600
Utilities	LS	---	59,300	59,300
<u>Equipment</u>				<u>\$262,100</u>
Laboratory equipment	LS	---	262,100	262,100

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u>\$708,000</u></b>

**PROJECT PURPOSE:**

To provide for the construction of a laboratory for development of non-destructive materials testing and inspection techniques.

**PROJECT DESCRIPTION:**

The facility will be constructed as a single story, concrete block structure, with a gross area of approximately 8,800 square feet. The interior area will be divided into laboratories with minimal office space and necessary mechanical equipment. The structure will include four cells with radiation shielding and interior walls constructed of monolithic reinforced concrete. A radiation monitoring system, access and interlock system, and automatic shutdown equipment will also be included. Purchase, installation, and checkout of high-energy inspection equipment, ultrasonic and eddy current inspection equipment, X-ray diffraction and infrared radiation instrumentation, and surface inspection equipment will be provided as part of the total integrated facility.

**PROJECT JUSTIFICATION:**

Non-destructive testing is a technique used to detect and measure defects in materials without impairing the usefulness or degrading the properties of the materials tested. Although it is considered to be one of the most meaningful forms of testing available to space vehicle development, the state-of-the-art in both industry and Government lags far behind the development and application of new materials. The penalty to the space program is either the imposition of additional safety factors, with attendant increase in weight, or a compromise in reliability.

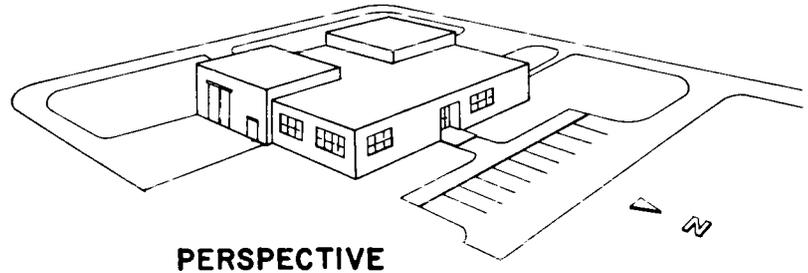
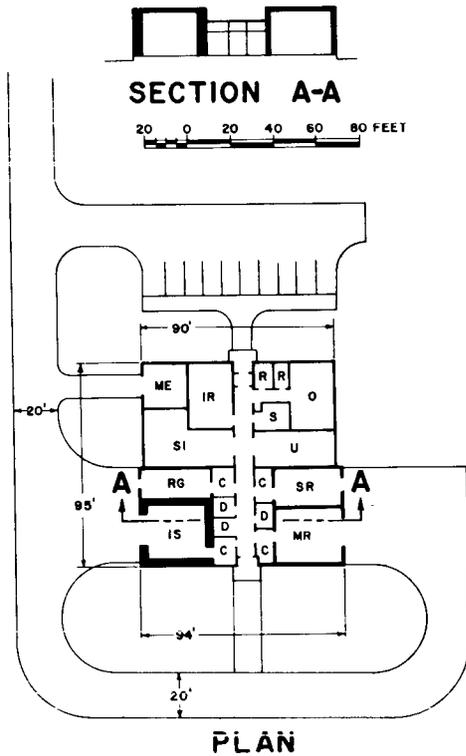
All known methods for non-destructive testing require further development through a combination of such techniques as X-ray, isotropic radiography, ultra-sonic testing, eddy current testing, infrared inspection, and chemical surface inspection. The performance of these techniques requires the integration of personnel and associated equipment within a single properly isolated facility, since high energy and radiation sources are generally involved. Existing laboratory space available for this function is currently limited to a small room in the Materials Laboratory. Without this facility, the important function of developing non-destructive testing techniques cannot be performed.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

# MARSHALL SPACE FLIGHT CENTER

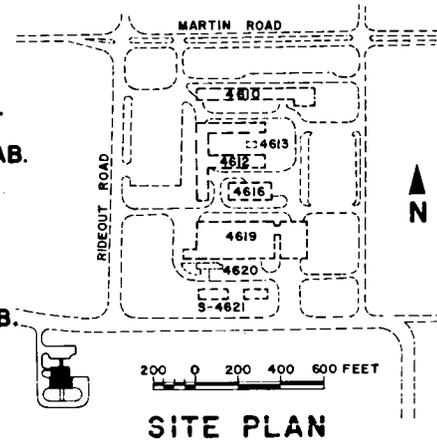
FISCAL YEAR 1966 ESTIMATES

## NON-DESTRUCTIVE TESTING LABORATORY



### LEGEND

- C CONTROL ROOM
- D DARK ROOM
- IR INFRARED ROOM
- IS RADIOISOTOPE LAB.
- ME MECHANICAL EQUIPMENT
- MR MOTION RADIOGRAPHY LAB.
- O OFFICE
- R REST ROOMS
- RG RADIOGRAPHY LAB.
- S STORAGE
- SI SURFACE INSPECTION LAB.
- SR SEARCHRAY LAB.
- U ULTRASONIC AND EDDY CURRENT LAB.



CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
ADDITIONS TO MATERIALS LABORATORY

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 1965 and Prior Years	\$72,000
FY 1966 Estimate	<u>1,107,000</u>
Total Funding Through FY 1966	<u>\$1,179,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$922,000</u>
Basic building structure	Sq. Ft.	22,534	\$23.83	537,000
Integral equipment including crane and elevator	LS	---	30,900	30,900
Special structural requirements	LS	---	9,400	9,400
Special electrical requirements	LS	---	10,400	10,400
Air conditioning	LS	---	292,000	292,000
Site development	LS	---	7,300	7,300
Utilities	LS	---	35,000	35,000
<u>Equipment</u>				<u>\$185,000</u>
Laboratory	LS	---	185,000	185,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		TOTAL		<u>\$1,107,000</u>

PROJECT PURPOSE:

This facility will provide the additional laboratory space required for the supervision of research and development contracts in materials technology supporting the Apollo flight program.

PROJECT DESCRIPTION:

The project will provide for the construction of three additions to the Materials Laboratory Building and for the procurement, fabrication, installation, and checkout of associated laboratory equipment. The additions to the east side of the existing structure will include: a single-story L-shaped structure approximately 5,500 square feet to house a wet instrument chemical laboratory; a single-story structure 130 feet by 50 feet, approximately 6,500 square feet, to house developmental welding and chemical metallurgy laboratories; and a two-story addition 100 feet by 51 feet, approximately 10,500 square feet, connected to the center wing of the Materials Laboratory Building to house physics, engineering and environmental laboratories

Construction features will be compatible with the existing building (concrete slab; concrete block) and partitioned into laboratory and office space,

PROJECT JUSTIFICATION:

The existing Materials Division Laboratory was constructed by the Army in support of materials engineering activities for the Redstone and Jupiter programs. With the transfer of the facility to NASA and the advent of the Saturn programs, the progressively increasing responsibility and workload of the Materials Division has necessitated a twofold increase in personnel and a commensurate increase in the amount and size of test and laboratory equipment. Space availability, however, remained static throughout these major expansions of personnel and equipment. The result is an overcrowded facility, and an inability to install the necessary laboratory apparatus. The additions to this laboratory are designed to alleviate currently overcrowded conditions and permit the relocation of expensive and sensitive items of laboratory equipment into adequate surroundings.

The Materials Division provides direct support to all center elements in the area of materials technology. The Division also supervises and evaluates the work of supporting research technology contractors, as well

as the materials programs conducted by prime contractors. This includes developmental engineering, design, evaluation, testing, inspection, and failure analysis of materials used on launch vehicles. The Division also maintains a program of surveillance, testing, and inspection throughout the life of each vehicle with a view towards continuous incorporation of improvements which will assure the highest degree of vehicle reliability.

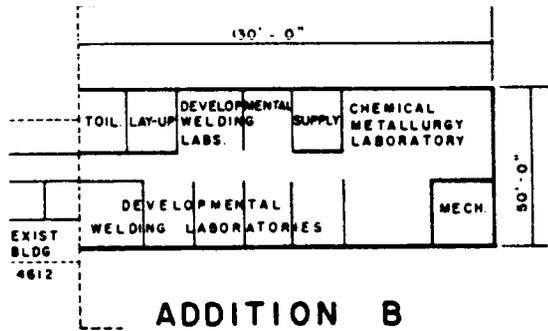
Development work with new materials is also a vital function in order to achieve a general upgrading of the vehicle. The newer titanium alloys, beryllium and beryllium composite materials, superalloys, magnesium-lithium alloys, polymeric materials, ceramic materials, and specialty materials including lubricants, fluids, and electrical materials are examples of this effort. Work with new techniques, such as improved welding and joining methods, cryogenic and high temperature insulation schemes, filament windings, material reinforcements, improved energy conversion and regulation methods are examples of efforts in this area. In addition, since many vehicle and ground support equipment problems develop because of material or component failures, it is essential that a comprehensive program and capability be maintained to diagnose failures and recommend remedial action. For example, the laboratory is currently investigating weld design allowables and tolerances in an effort to reduce the weight of launch vehicle stages without impairing structural integrity. Some of the laboratory's past contributions include: (1) the development of a special external insulation material which can reduce the weight of the S-II stage by 1,500 pounds; and (2) the development of a new type of lubricant suitable for both space environment and the extremely high load conditions prevalent on the launch pads.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

# MARSHALL SPACE FLIGHT CENTER

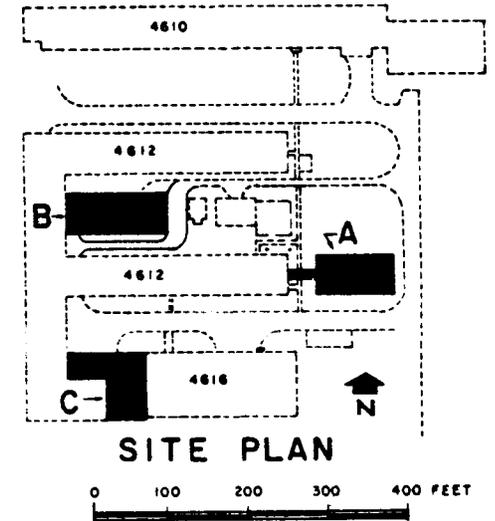
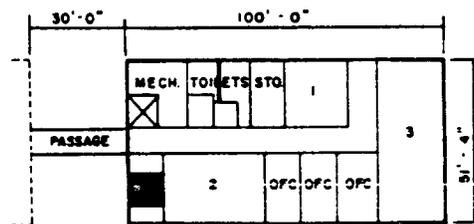
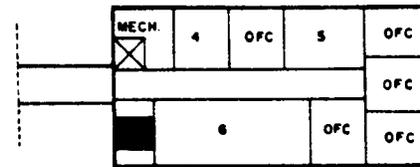
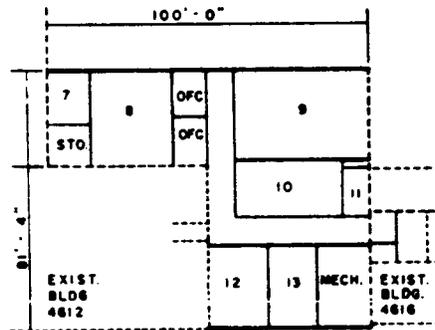
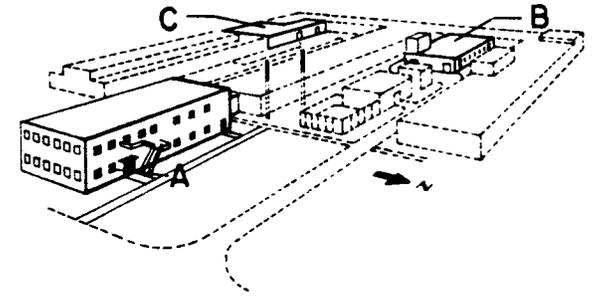
FISCAL YEAR 1966 ESTIMATES

## ADDITIONS TO MATERIALS LABORATORY



### LEGEND

1. HIGH FREQUENCY MATERIALS LABORATORY
2. ELECTRICAL MATERIALS LABORATORY
3. LUBRICATION LABORATORY
4. SOLID STATE LABORATORY
5. PHYSICAL PROPERTIES LABORATORY
6. THERMO-PHYSICS LABORATORY
7. ANALYTICAL BALANCE ROOM
8. WET CHEMISTRY LABORATORY
9. INSTRUMENTAL CHEMISTRY LABORATORY
10. EMISSION SPECTROSCOPY LABORATORY
11. DARK ROOM
12. ABSORPTION SPECTROSCOPY LABORATORY
13. INFRARED SPECTROSCOPY LABORATORY



CF 8-9

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
TEST ENGINEERING BUILDING EXTENSION

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 1965 and Prior Years	\$1,478,000
FY 1966 Estimate	<u>616,000</u>
Total Funding Through FY 1966	<u>\$2,094,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$531,800</u>
Building	Sq. Ft.	19,500	\$24.70	431,600
Site development	LS	---	14,200	14,200
Utilities and paving	LS	---	36,000	36,000
<u>Equipment</u>				<u>\$84,200</u>
Office furniture and equipment	LS	---	84,200	84,200
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u><u>\$616,000</u></u>

PROJECT PURPOSE:

To provide adequate engineering space required to house Test Division personnel who work in direct support of research, development and acceptance testing of boosters, engines and components for the Saturn IB and Saturn V projects.

PROJECT DESCRIPTION:

This project will provide for the construction of a 19,500 square foot extension to the existing Test Engineering Building (#4666) to house engineering and administrative personnel. The building will be a two-story reinforced concrete structure approximately 40 feet wide by 225 feet in length, connected to the existing building by a two story corridor, approximately 28 feet wide by 24 feet long. It will be equipped with movable type partitions, fluorescent lighting, composition tile floors, and the necessary heating and cooling systems.

PROJECT JUSTIFICATION:

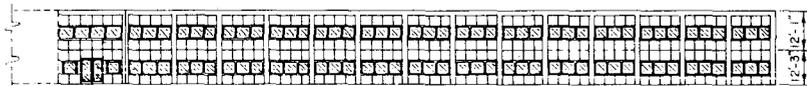
Test Division personnel require administrative and engineering space within the remotely sited Test Area. Two administrative type buildings are now available with a total net floor area of 37,500 square feet. These buildings are now housing, at 85 square feet per person, a total of 442 Test Division employees. An additional 230 people are housed in 36 trailers with a total of 20,000 square feet, or 87 square feet per person.

Trailers are basically an unsatisfactory method for housing engineering and administrative personnel on a long term basis. Within the Test Area, trailers are even more unsatisfactory since evacuation is necessary during the numerous static test firings of the F-1 engine and S-1 stages. In addition, activation of the S-IC Static Test Stand requires relocation of the trailers away from the Test Division center of operations which further downgrades operational effectiveness and efficiency.

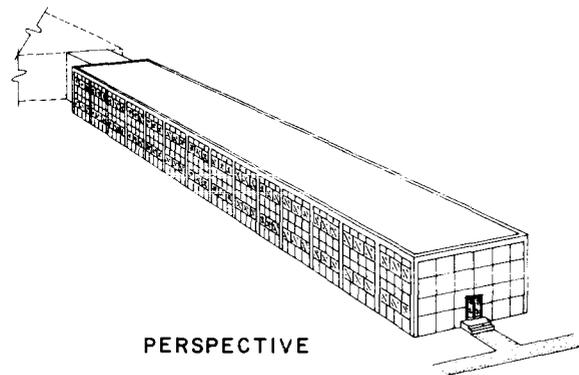
The planned addition to the Test Engineering Building will provide space for Test Division employees in quarters which will permit support of the Apollo Program with maximum effectiveness.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MARSHALL SPACE FLIGHT CENTER  
 FISCAL YEAR 1966 ESTIMATES  
 TEST ENGINEERING BUILDING EXTENSION



EAST ELEVATION



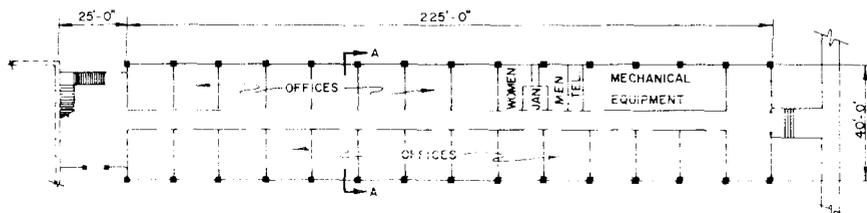
PERSPECTIVE



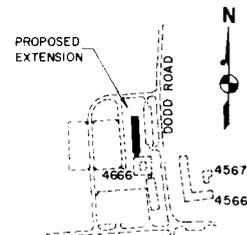
SECTION A-A



NORTH ELEVATION



FLOOR PLAN



SITE PLAN



CF 8-12

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

EXTENSION TO HIGH PRESSURE GAS SYSTEMS

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 1965 and Prior Years	\$117,000
FY 1966 Estimate	<u>1,415,000</u>
Total Funding Through FY 1966	<u>\$1,532,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$207,900</u>
Building	Sq. Ft.	5,540	\$23.92	132,500
Site development and utilities	LS	---	75,400	75,400
<u>Equipment</u>				<u>\$1,207,100</u>
Compressors, piping and valves	LS	---	664,700	664,700
Storage vessels	LS	---	542,400	542,400
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	None
		<b>TOTAL</b>		<u><u>\$1,415,000</u></u>

### PROJECT PURPOSE:

To provide the additional high pressure air and helium capability required to support the Saturn V test program.

### PROJECT DESCRIPTION:

This project provides for expansion of the centralized High Pressure Gas Systems Facility. Expansion of the air compressor facilities includes: (a) addition of two 20-foot bays to the east end of the air compressor building; (b) acquisition and installation of two air compressors with a combined capacity of 1,100 standard cubic feet per minute at 3,500 pounds per square inch gravity (psig), and two 1,250 cubic foot compressed air storage bottles; (c) interconnections to the existing distribution system, and (d) installation of a central control system.

Additions to the high pressure helium system include: (a) the addition of three 20-foot bays to the west end of the air compressor building; (b) the installation of two 5,000 psig helium compressors which will be relocated from the remote Helium Compressor Station to the air compressor building; (c) a new low temperature type helium purification system with valves, piping, and a central control system; (d) two 500 psig, 6,000 cubic foot helium receivers for rail car shipments, and one 5,000 psig 1,250 cubic foot helium bottle for high pressure storage; and (e) support facilities such as railroad siding, unloading station, as well as all the necessary distribution piping.

### PROJECT JUSTIFICATION:

By early calendar year 1967, four major new facilities (S-1C Static Test Stand, F-1 Engine Test Stand, Saturn V Dynamic Test Stand, and the Second Dual Components Test Stand) will be approaching full operation and will overtax the existing capability for supplying high pressure air and helium to the Test Area. The present air compressor capacity can support a requirement for 40,000,000 standard cubic feet per month; by 1967 the demand will rise to 50,000,000 standard cubic feet per month.

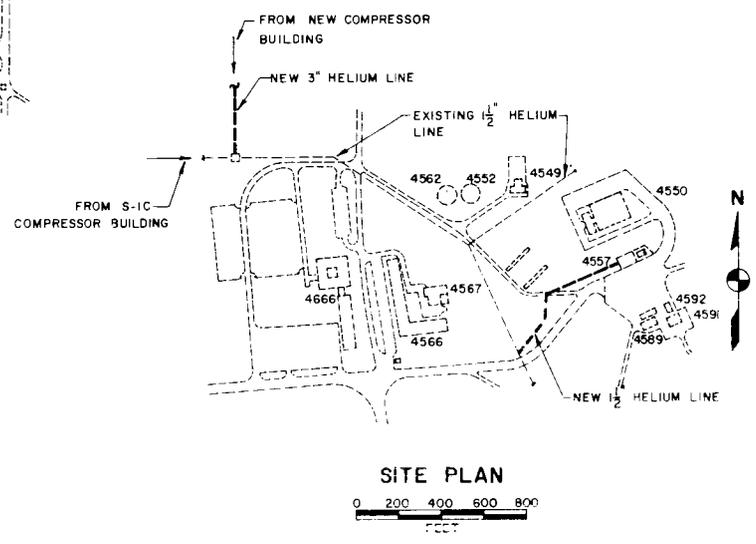
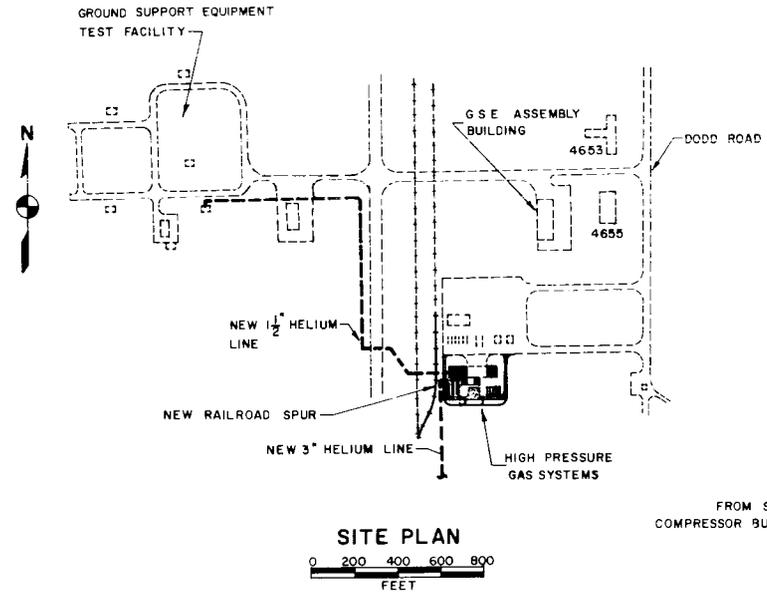
High pressure helium is used for purging and pressurizing liquid hydrogen and liquid oxygen systems and tanks. It is also used for pressure pumping liquid hydrogen from tanks into vehicle systems. With the increased use of liquid hydrogen in the Apollo Program considerably greater quantities of helium will be required. Current usage of gaseous helium averages 1,800,000 standard cubic feet per month; by 1967 the use rate is expected to reach 2,500,000.

The helium requirement is currently met by a compressor station located approximately two miles from the principal area of usage. Nearly 1,000 K bottles (capacity of approximately 230 standard cubic feet) are used per month as the supply medium. By converting from the small portable K bottles system to a centralized compressor system, with additional high pressure storage, and a fixed distribution piping system, the increased requirement can be met. Relocation of the two existing compressor units to a centrally located high pressure gas facility will permit more efficient and economical service,

particularly when coupled with a rail delivery system.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**MARSHALL SPACE FLIGHT CENTER**  
**FISCAL YEAR 1966 ESTIMATES**  
**EXTENSION TO HIGH PRESSURE GAS SYSTEMS**

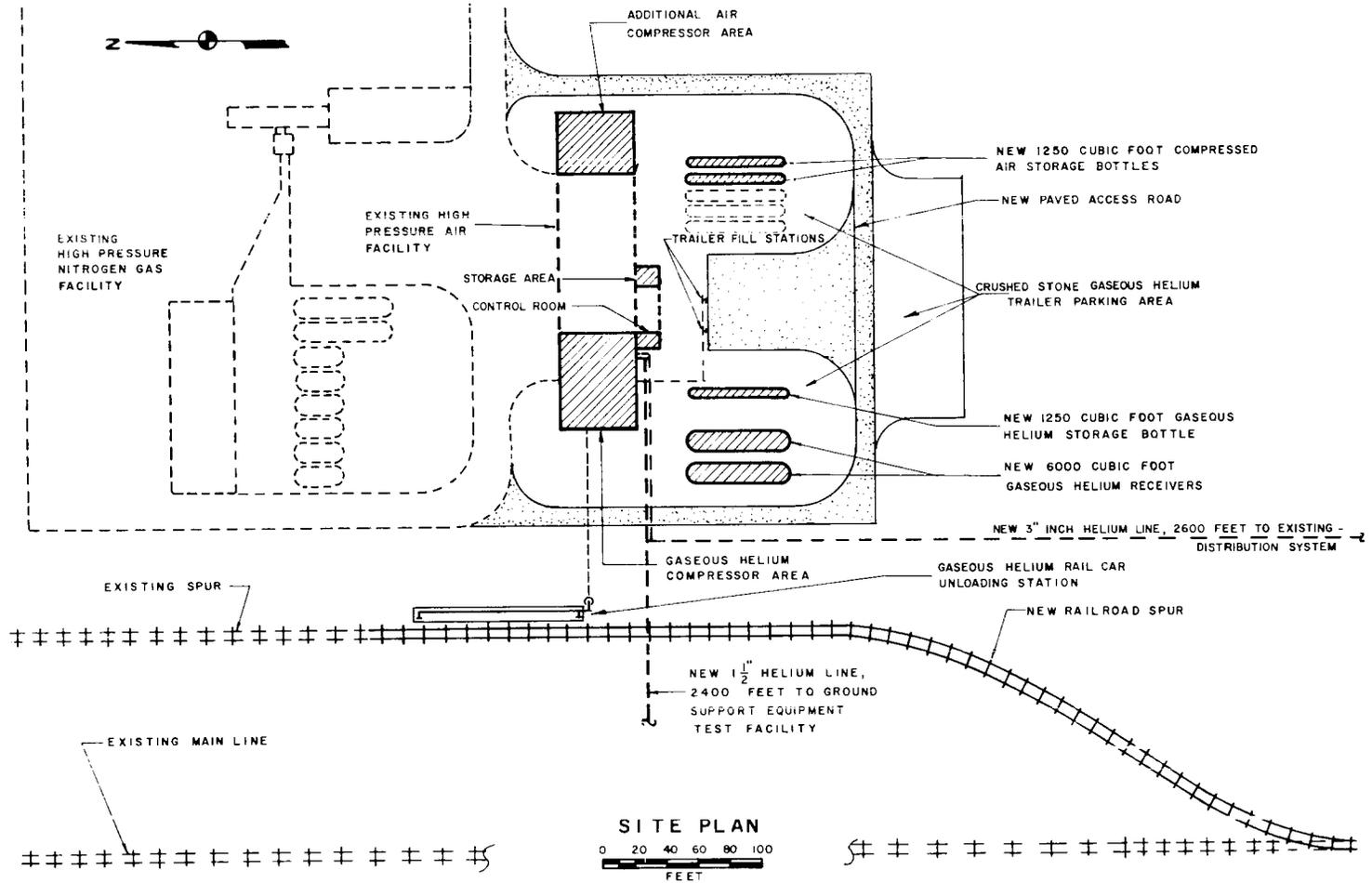


CF 8-16

# MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1966 ESTIMATES

## EXTENSION TO HIGH PRESSURE GAS SYSTEMS

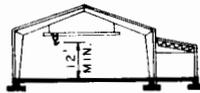


CF 8-17

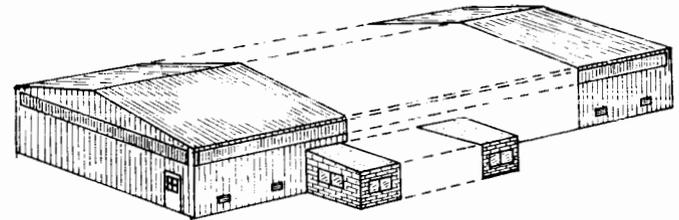
**MARSHALL SPACE FLIGHT CENTER**  
**FISCAL YEAR 1966 ESTIMATES**  
**EXTENSION TO HIGH PRESSURE GAS SYSTEMS**



ELEVATION



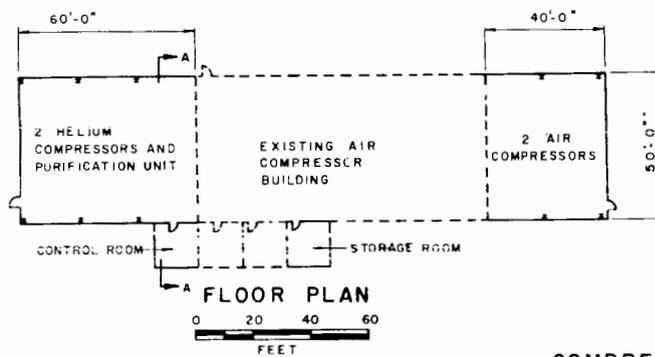
SECTION A-A



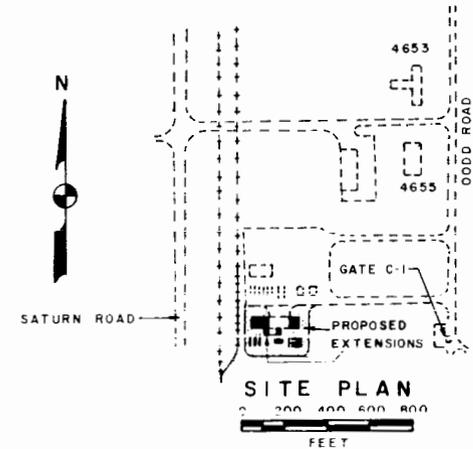
PERSPECTIVE



ELEVATION



COMPRESSOR BUILDING



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

LOX STORAGE FACILITIES FOR WEST TEST AREA

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: New

FUNDING:

FY 1965 and Prior Years	\$76,000
FY 1966 Estimate	<u>\$930,000</u>
Total Funding Through FY 1966	<u>\$1,006,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$192,600</u>
Tank pad and foundation	LS	---	\$28,700	28,700
Site development and utilities	LS	---	163,900	163,900
<u>Equipment</u>				<u>\$737,400</u>
Tank	Gals.	225,000	2.40	540,000
Piping	LS	---	197,400	197,400
<u>Design</u>	---	---	---	---
<u>Fallout Shelters</u> (Not feasible)	---	---	---	None
		<b>TOTAL</b>		<u><u>\$930,000</u></u>

PROJECT PURPOSE:

To provide the LOX storage capacity required to meet full duration firing

schedules on the S-1C and F-1 stands for the Saturn V.

PROJECT DESCRIPTION:

This project will provide for the construction of a LOX Storage Facility near the F-1 Engine Static Test Stand. The facility will consist of a 225,000 gallon spherical, vacuum jacketed LOX storage tank with associated transfer piping (including a connection to the existing six inch line from the S-1C Stand), transfer control station, pumps, filters, valves, paving and siding for both truck and tank car unloading. Necessary utilities, services and site work are included.

PROJECT JUSTIFICATION:

The original construction program for the F-1 Engine and S-1C Static Test Stands provided for construction of two 225,000 gallon LOX storage tanks to satisfy the initial needs of both facilities. Normally the F-1 Engine requires 75,000 gallons of LOX and the S-1C Stand 425,000 gallons for full duration firings. The early phases of the program called for the testing of single engines with progressive combinations of one, three and five engines.

As the testing program progresses and full duration firings become more frequent, the existing capacity becomes inadequate. For example, simulation of a twelve-hour hold requires "topping-off" at a rate of 16,000 gallons per hour to make up for the boil-off rate. The full duration firings which complete this test are not possible with the existing LOX storage capacity. An additional significant limitation of existing capacity is disruption of operations for maintenance or repair. Although maintenance can be scheduled, repairs are frequently unforeseen, and as a consequence pose the greatest threat to testing schedules.

Marketing conditions also affect the LOX storage problem. LOX suppliers, who were previously solely dependent upon NASA and the Army as customers, have now expanded the market to include regional steel mills. Thus, only a portion of the suppliers' production capacity is now available to NASA. Since scheduling LOX deliveries is dependent upon factors such as weather, equipment failures, hardware delivery and miscellaneous delays, increased capacity to stabilize delivery schedules becomes essential.

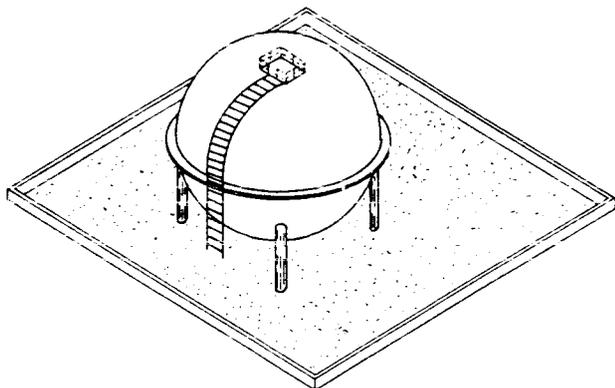
The problems set forth above can be solved with maximum efficiency and economy through the acquisition of a third 225,000 gallon capacity LOX storage tank. Although this tank will basically serve the F-1 Engine Test Stand, it will also provide reserve capacity for "topping-off" the S-1C tanks, and provide for greater flexibility of operation whenever tanks are out of service for maintenance or repair.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

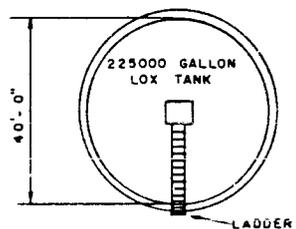
# MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1966 ESTIMATES

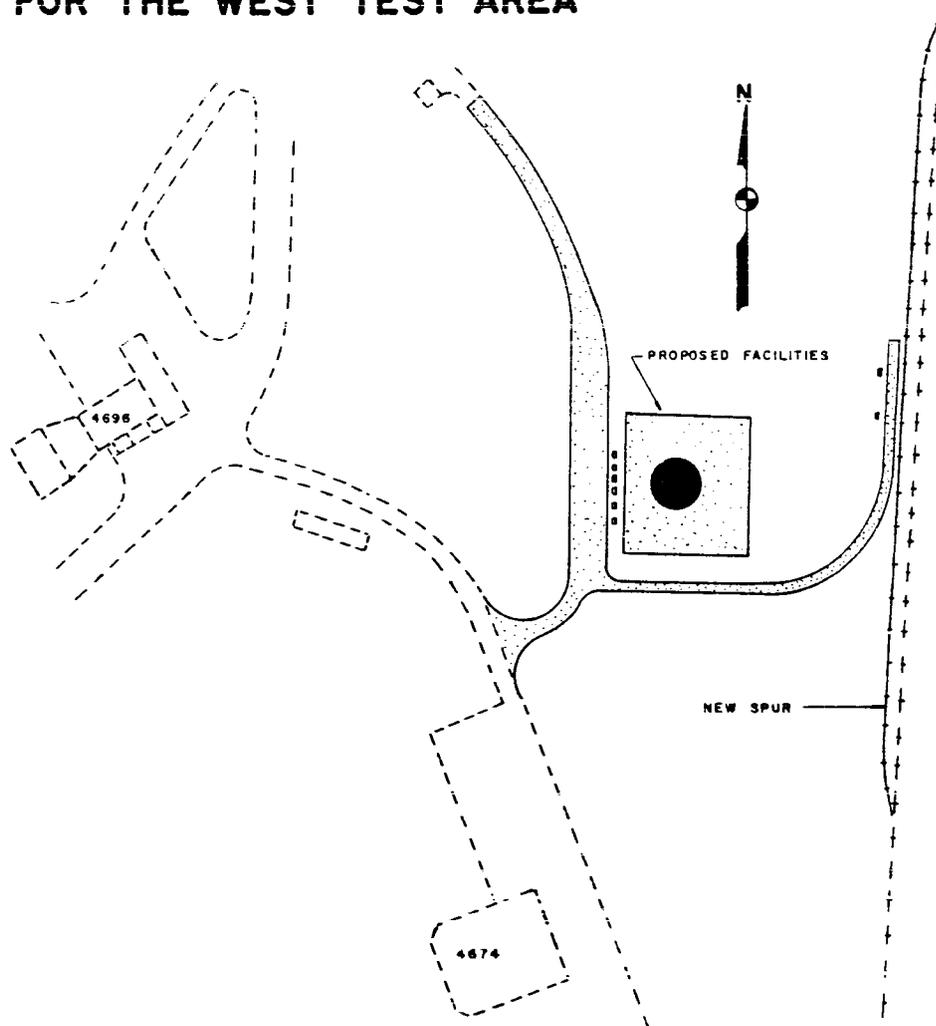
## LOX STORAGE FACILITIES FOR THE WEST TEST AREA



PERSPECTIVE



PLAN



SITE PLAN



CF 8-21

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

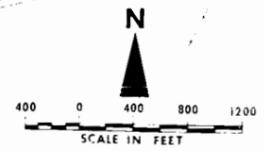
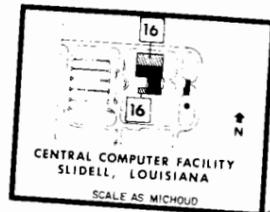
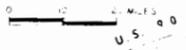
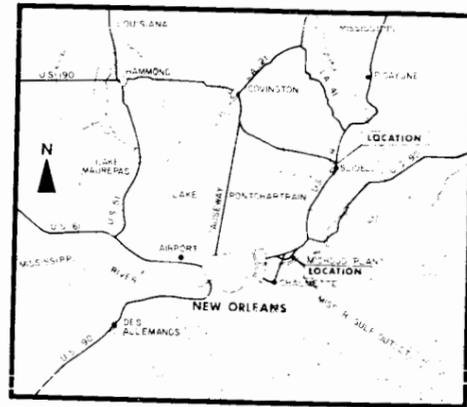
MICHOUD PLANT

	<u>Page No.</u>
Location plan.....	CF 9-1
Summary.....	CF 9-2
Office of Manned Space Flight Project:	
Improvements to storm drainage system.....	CF 9-3

# MICHOUD PLANT

FISCAL YEAR 1966 ESTIMATES

## LOCATION PLAN



LEGEND	
●	EXISTING FACILITIES
101	ADMINISTRATION BUILDING
201	ENGINEERING BUILDING
211	MANUFACTURING BUILDING
104	BATTERY CHARGING AND STORAGE BUILDING
105	TRANSPORTATION BUILDING
111	LABORATORY BUILDING
119	PAINT SHOP
121	MAIN SUBSTATION
130	SYSTEMS ENGINEERING BUILDING
443	PUMPING STATION NO. 4
170	CHEMICAL WASTE FACILITY
201	PUMP HOUSE NO. 1
202	COOLING TOWER
206	POTABLE WATER TANK
207	BOILER HOUSE
301	MAINTENANCE SHOP
302	WATER TANK (FIRE)
303	BOOSTER HANGAR
304	PUMP STATION NO. 3
402	PUMP STATION NO. 2
403	SALVAGE AREA BUILDING
450	MAIN PUMP STATION
480	MARINE DOCK
▨	FACILITIES AUTHORIZED & UNDER CONSTRUCTION
1	MODIFICATIONS TO MICHOUD PLANT
2	HIGH PRESSURE TEST FACILITY
3	HYDROSTATIC TEST AND CLEANING FACILITY
4	VERTICAL ASSEMBLY BUILDING
5	MICHOUD PLANT S-1C FACILITY MODIFICATIONS
6	NEW OFFICE ENGINEERING BUILDING
7	ADDITIONS TO PRODUCTION FACILITIES
8	PARKING AND SECURITY IMPROVEMENTS
9	ROAD AND AIRSTRIP REHABILITATION
10	VEHICLE COMPONENT SUPPLY BUILDING
11	HAZARDOUS MATERIAL STORAGE BUILDING
12	STAGE TEST FACILITY
FISCAL YEAR 1965 PROJECTS	
13	ALTERATIONS TO SATURN FIRST STAGE PRODUCTION FACILITIES
A	S-1C TANK WELD ASSEMBLY POSITION NUMBER 3
B	TOOLING FOUNDATIONS
C	WELDING BRIDGE CRANES
14	UTILITY EXTENSION, ALTERATION, AND REHABILITATION TO SUPPORT SATURN S-1B AND S-1C PRODUCTION
A	PLANT WATER DISTRIBUTION SYSTEM
B	PLANT AIR CONDITIONING FILTERS
C	EXTENSION OF ELEC. PRIMARY & STEAM MAINS TO SERVE NEW FACILITIES
15	FACILITY ADDITIONS, EXTENSIONS AND ALTERATIONS TO SUPPORT SATURN S-1B AND S-1C PRODUCTION
A	CONTRACTOR SERVICES BUILDING
B	EXTENSION TO SATURN MARINE DOCK
C	ALTERATION TO BOOSTER HANGAR
D	ADDITIONAL ROADS, PARKING
E	CENTRAL COMPUTER FACILITY EXTENSIONS AND ALTERATIONS (SLIDELL)
◇	PROPOSED FISCAL YEAR 1966 PROJECT
16	IMPROVEMENTS TO THE STORM DRAINAGE SYSTEM

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Michoud Plant	Manned Space Flight	New Orleans, La.	Orleans Parish	New Orleans			
INSTALLATION MISSION		PERSONNEL STRENGTH			FY 19 64	FY 19 65	FY 19 66
The mission of the Michoud Plant is the manufacturing of the booster stage for the Saturn family of launch vehicles.		NASA PERSONNEL (End of Year)			281	312	320
		CONTRACTOR AND OTHER PERSONNEL			10,985	12,050	11,450
		<b>TOTAL ALL PERSONNEL</b>			<b>11,266</b>	<b>12,362</b>	<b>11,770</b>
		LAND			NO. ACRES		
		NASA-OWNED			839		
		OTHER GOVERNMENT AGENCY-OWNED			72		
		NON-FEDERAL (Leases, easements)					
		<b>TOTAL LAND</b>			<b>911</b>		
		<b>TOTAL CAPITAL INVESTMENT</b> (Including NASA-Owned Land) (as of June 30, 1964)			<b>\$ 100,651.0</b>		
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1962 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Improvements to the Storm Drainage System	MSF	24.0	300.0	-0-	324.0		
ALL OTHER PROJECTS			\$55,494.0				
<b>TOTALS</b>			\$55,518.0	300.0			

CF 9-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

IMPROVEMENTS TO STORM DRAINAGE SYSTEM

AUTHORIZATION LINE ITEM: Michoud Plant

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 PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$24,000
FY 1966 Estimate	<u>300,000</u>
Total Funding Through FY 1966	<u>\$324,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>	LS	---	\$300,000	<u>\$300,000</u>
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$300,000</u>

PROJECT PURPOSE:

To provide storm drainage improvements at the Michoud Plant necessary to prevent flooding and damage of existing facilities and equipment.

PROJECT DESCRIPTION:

This project provides for storm drainage improvements at the Michoud Plant necessary to protect such facilities as the manufacturing building, the final stage checkout building, the high pressure test building, adjacent roads and parking areas.

Specific items of work consist of: rehabilitation of the east and south storage reservoirs adjacent to the levees; replacement of deficient drain lines; construction of new open ditches to carry storm drainage to the reservoirs; construction of new drain lines and catch basins to connect with the new ditches; filling and grading of areas adjacent to the new ditches and existing reservoirs in order to improve storm run-off; and seeding and sodding of all the graded areas for control of erosion.

PROJECT JUSTIFICATION:

The existing Michoud drainage system consists of a network of open ditches and drain pipes leading to catch basins and reservoirs. Storm water from the reservoirs is pumped over a levee into a canal. A residual is continuously maintained in the reservoirs to supplement the Michoud fire protection system.

The extensive network described above is required because of the heavy rainfall in the Michoud-New Orleans area. Weather Bureau records show that the average annual amount totals 64 inches (15 year frequency), with a maximum twenty-four hour rate of 13.7 inches and a maximum one hour rate of 3.4 inches. The area is also subject to tropical storms which occur about once every two years. Such a network for removal of storm drainage is essential to prevent excessive ponding and damaging floods.

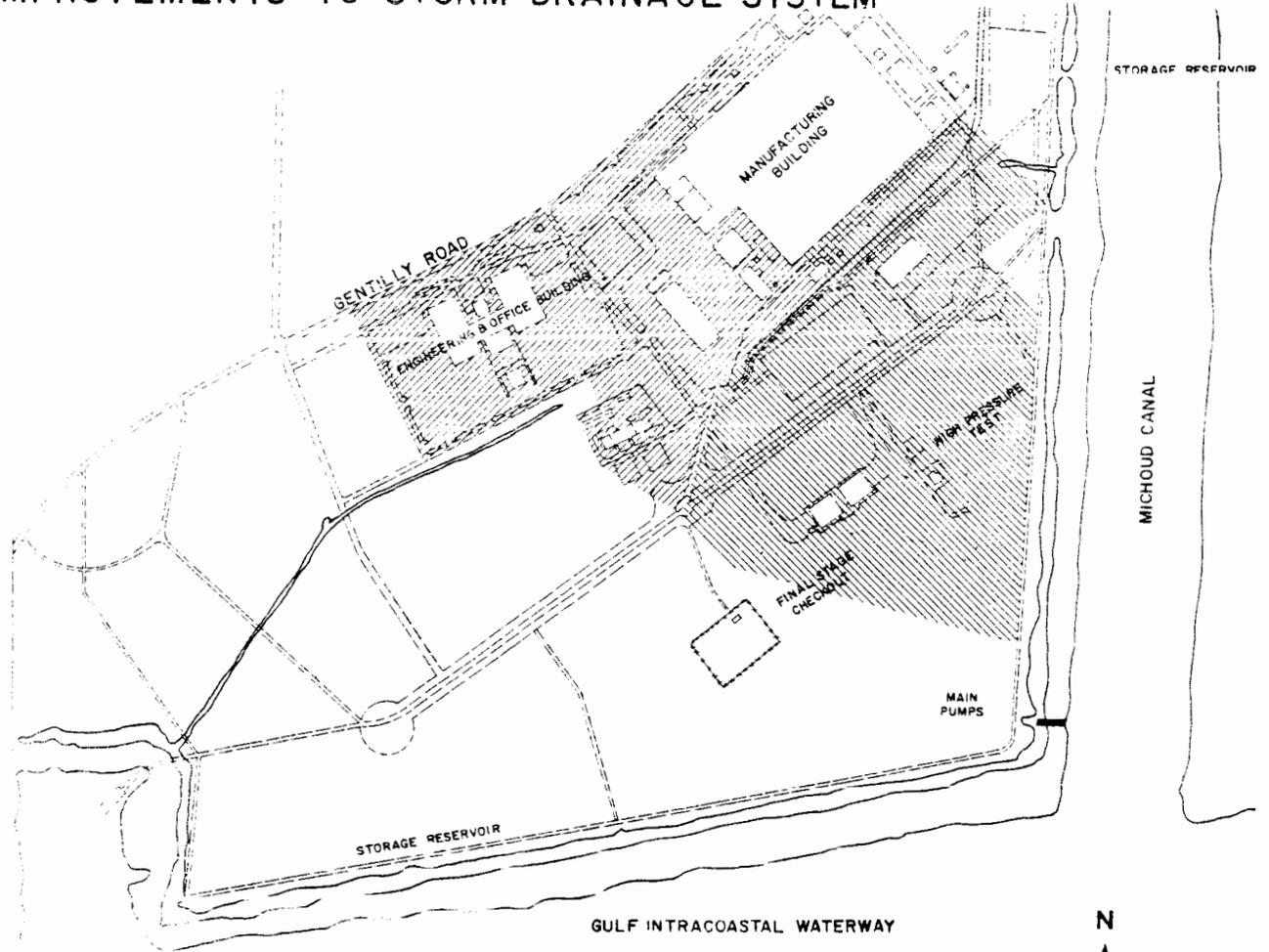
Through many years of plant inactivity and the resulting lack of maintenance, the Michoud drainage system lost much of its effectiveness. Silt and sludge accumulated throughout the system, and many lines suffered significant damage. In addition, new construction has added large paved areas which have increased both the rate and quantity of run-off. Although work in support of critical areas and new construction has been performed, a comprehensive project is required to integrate the entire system and provide the necessary flood protection to operating areas and equipment.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MICHOUD PLANT  
FISCAL YEAR 1966 ESTIMATES  
IMPROVEMENTS TO STORM DRAINAGE SYSTEM

LEGEND:

-  PUMP STATION NUMBER 3 DRAINAGE SYSTEM
-  PUMP STATION NUMBER 4 DRAINAGE SYSTEM



CP 9-5

SITE PLAN



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

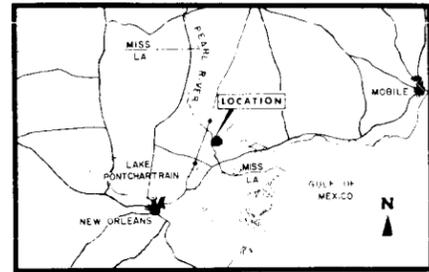
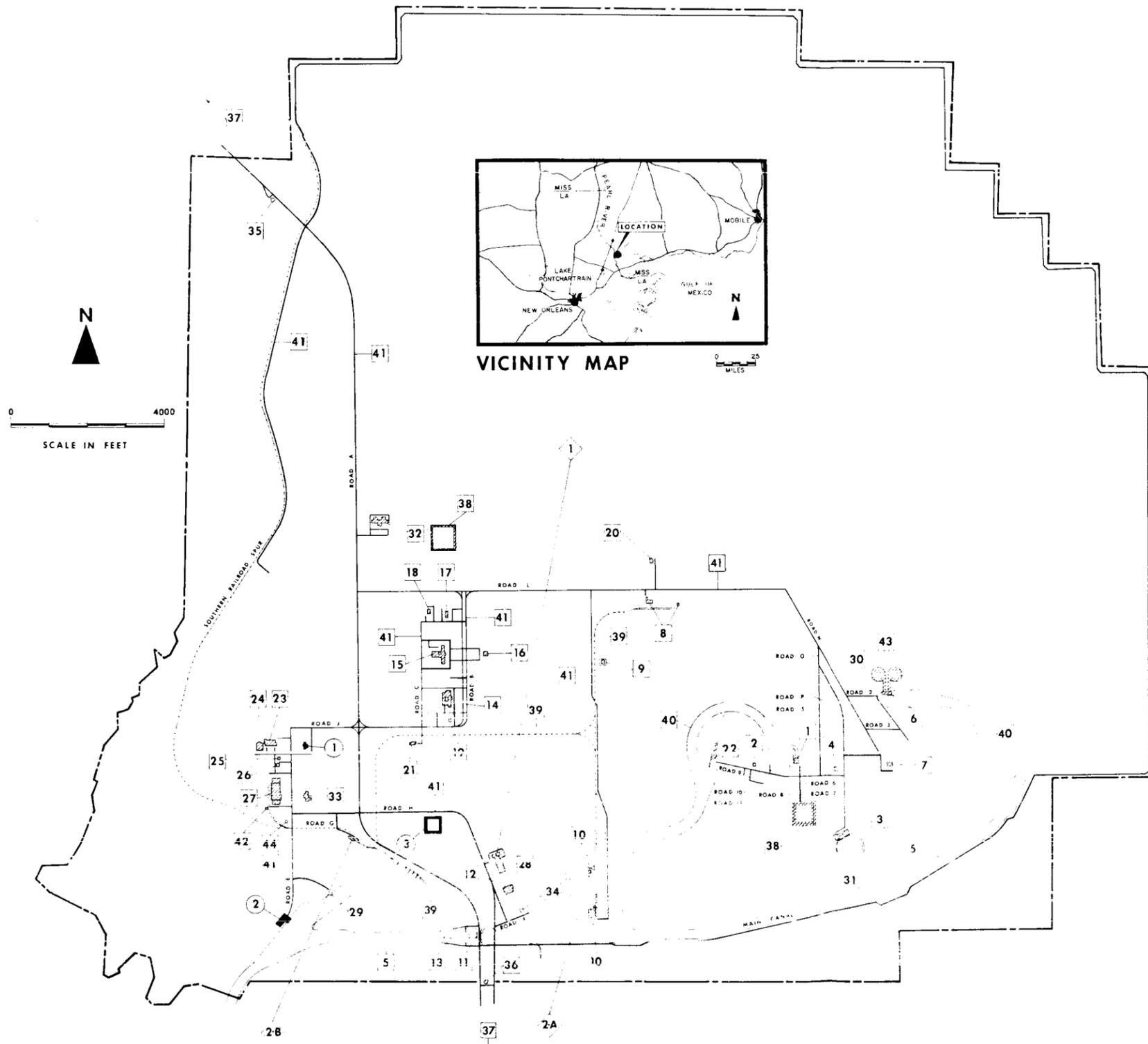
MISSISSIPPI TEST FACILITY

	<u>Page No.</u>
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Summary.....	CF 10-2
Office of Manned Space Flight Projects:	
Additions to S-II stage checkout and storage building.....	CF 10-3
General support facilities.....	CF 10-6

# MISSISSIPPI TEST FACILITY

FISCAL YEAR 1966 ESTIMATES

## LOCATION PLAN



VICINITY MAP

### LEGEND

● EXISTING FACILITIES

- 1 EMERGENCY SERVICE BUILDING
- 2 CONSTRUCTION DOCK
- 3 SEWAGE LAGOON NO. 2

□ FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

- 1 S-II TEST STAND (FIRST)
- 2 S-II TEST CONTROL CENTER
- 3 HIGH PRESSURE INDUSTRIAL WATER PUMPING STATION
- 4 DATA ACQUISITION CENTER
- 5 SAND DRYING
- 6 S-IC TEST STAND (FIRST POSITION (220 B))
- 7 S-IC TEST CONTROL CENTER
- 8 CENTRAL COMPRESSOR BUILDING
- 9 RP-1 CENTRAL STORAGE
- 10 CRYOGENICS STORAGE AND TRANSFER STATION
- 11 CANAL BRIDGE
- 12 S-II STAGE STORAGE BUILDING
- 13 NAVIGATION DOCK
- 14 FIBER OPTIC INSTRUMENTATION AND MATERIALS LABORATORY
- 15 OFFICE AND ADMINISTRATIVE BUILDING
- 16 DATA HANDLING CENTER
- 17 TEST AREA CONTROL CENTER
- 18 COMMUNICATIONS AND TELEPHONE BUILDING
- 19 ACOUSTICS LABORATORY
- 20 METEOROLOGICAL BUILDING
- 21 CENTRAL HEATING PLANT
- 22 S-IB TEST STAND (SECOND)
- 23 SITE MAINTENANCE BUILDING
- 24 TEST MAINTENANCE BUILDING
- 25 COMPRESSED GAS CYLINDER STORAGE BUILDING
- 26 INFLAMMABLE MATERIALS STORAGE BUILDING
- 27 WAREHOUSE
- 28 S-II STAGE CHECKOUT AND STORAGE FACILITY
- 29 RP-1 TRANSFER DOCK
- 30 S-IC TEST STAND (SECOND POSITION (220 A))
- 31 INDUSTRIAL WATER RESERVOIR
- 32 COMPONENT SERVICE FACILITY
- 33 MOBILE EQUIPMENT OPERATIONS BUILDING
- 34 CRYOGENICS BARGE SERVICE BUILDING
- 35 SECURITY CONTROL CENTER (NORTH)
- 36 SECURITY CONTROL CENTER (SOUTH)
- 37 ACCESS ROADS (OUTSIDE TEST AREA)
- 38 SEWAGE LAGOONS
- 39 RAILROADS
- 40 TEST AREA WATERWAYS
- 41 AREA ROADS
- 42 WASTE MATERIALS STORAGE BUILDING
- 43 S-II TEST STAND SOUND SUPPRESSORS
- 44 FILTERED WATER TANK

◇ PROJECTS AUTHORIZED AND UNDER CONSTRUCTION

○ PROJECTS AUTHORIZED AND UNDER CONSTRUCTION

○ GENERAL LIGHT FACILITY

○ GENERAL LIGHT FACILITY

CF 10-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 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			PERSONNEL STRENGTH	FY 19 64	FY 19 65	FY 19 66
			NASA PERSONNEL (End of Year)	43	126	143
			CONTRACTOR AND OTHER PERSONNEL	248	1,113	2,349
			<b>TOTAL ALL PERSONNEL</b>	<b>291</b>	<b>1,239</b>	<b>2,492</b>
LAND				NO. ACRES		
NASA-OWNED				21,391		
OTHER GOVERNMENT AGENCY-OWNED				-		
NON-FEDERAL (Leases, easements)				117,704		
<b>TOTAL LAND</b>				<b>139,095</b>		
TOTAL CAPITAL INVESTMENT				\$ 57,103.0		
<i>(Including NASA-Owned Land) (as of June 30, 19 64 )</i>						
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 62 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)	
Addition to S-II Stage Checkout & Storage Facility	MSF	4,748.7	1,177.0	-0-	5,925.7	
General Support Facilities	MSF	60.0	944.0	-0-	1,004.0	
ALL OTHER PROJECTS			246,209.3			
<b>TOTALS</b>			<b>251,018.0</b>	<b>2,121.0</b>		

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

ADDITIONS TO S-II STAGE CHECKOUT AND STORAGE BUILDING

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: Addition

FUNDING:

FY 1965 and Prior Years	\$4,748,700
FY 1966 Estimate	<u>1,177,000</u>
Total Funding Through FY 1966	<u>\$5,925,700</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$939,900</u>
Site development	LS	---	\$13,400	13,400
Vertical checkout bay (125 ft. high - 6 floors @ 60 x 63 ft.)	Sq. Ft.	22,680	40.85	925,500
<u>Equipment</u>				<u>\$237,100</u>
Stage checkout dolly	LS	---	91,100	91,100
Technical systems	LS	---	146,000	146,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	None
		<b>TOTAL</b>		<u>\$1,177,000</u>

PROJECT PURPOSE:

To provide a second vertical checkout bay required for the post static testing of the S-II stage of the Saturn V.

PROJECT DESCRIPTION:

This addition will consist of a high-bay area having floors with manually adjustable heights. The building frame will be structural steel; the exterior walls will be metal siding. The structure, 63 feet long x 60 feet wide x 125 feet high, will withstand hurricane wind velocities and will be designed to resist fragmentation damage in case of vehicle tank rupture. Sliding doors, 115 feet high, will be provided to permit stage entry in the vertical position. Requirements include five movable work platforms, a three ton traveling overhead crane, a stage checkout dolly and technical systems.

PROJECT JUSTIFICATION:

This facility is required to accomplish the post static checkout testing which is the final phase of acceptance testing of S-II stages. The checkout to be accomplished is a vital phase in establishing stage flight readiness since it will be the last complete checkout of the S-II stage prior to flight from Cape Kennedy.

The tests consist of mechanical systems checks, electrical systems checks, individual component checks, systems integration checkout, sequence tests, leak checks, S-IC/S-II interstage electrical integrity checkout, and telemetry checkout.

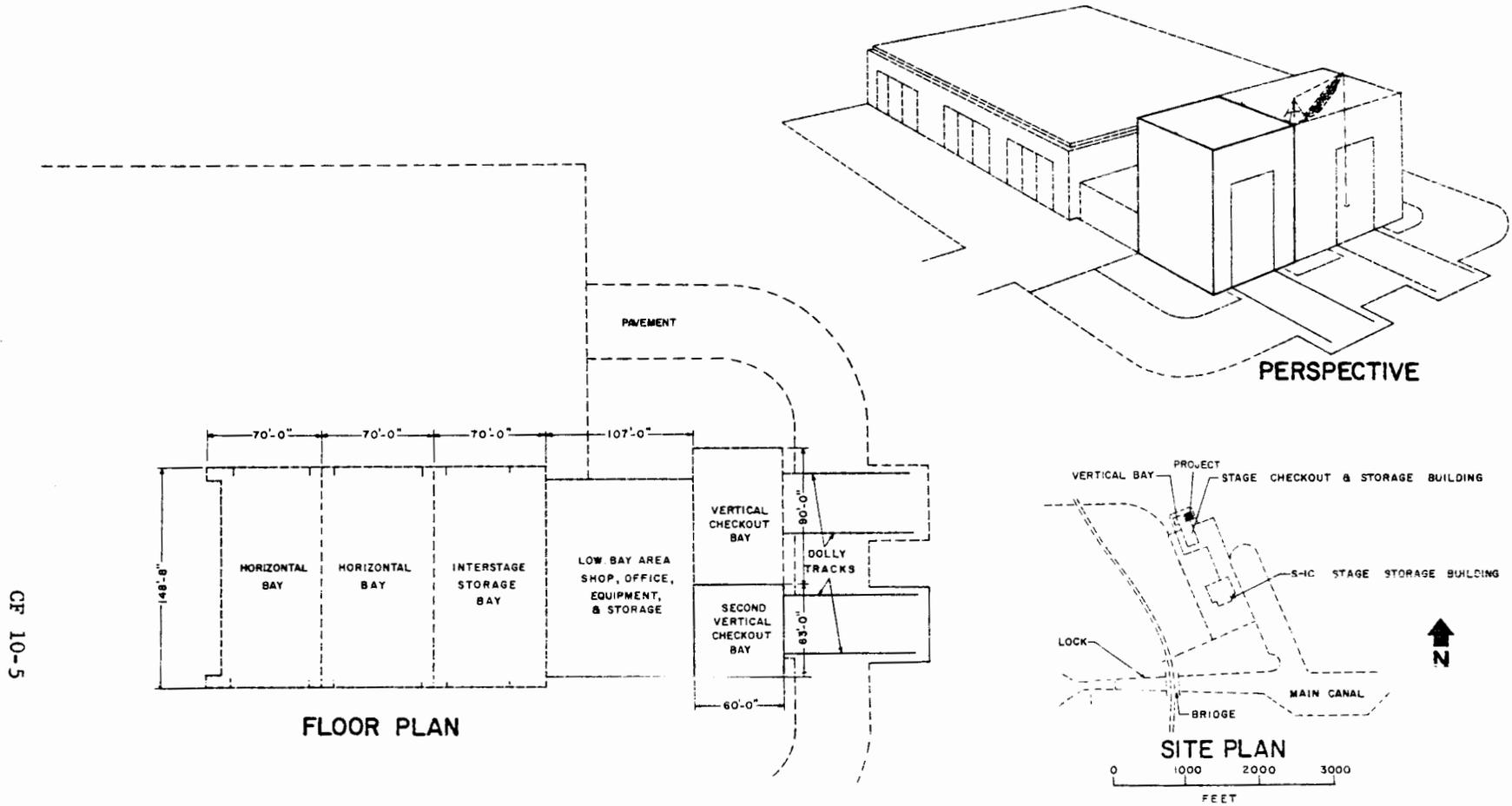
Time required for these tests is estimated to be three months per stage. To accomplish these tests, two vertical checkout bays are required. The first, which was funded in 1965, is adequate to achieve the required testing through Calendar Year 1966. With the increased stage delivery rate starting in Calendar Year 1967, a second vertical bay is required. This addition must be funded in Fiscal Year 1966 in order to be available by May 1967 for the post static checkout of the S-II-5 flight stage. At that time, the S-II-4 stage will be undergoing checkout in the first bay. From this time on, the two bays will be testing stages concurrently to meet the planned delivery schedules.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MISSISSIPPI TEST FACILITY

FISCAL YEAR 1966 ESTIMATES

ADDITION TO S-II STAGE CHECKOUT & STORAGE BUILDING



CF 10-5

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

GENERAL SUPPORT FACILITIES

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: New

FUNDING:

FY 1965 and Prior Years	\$60,000
FY 1966 Estimate	<u>944,000</u>
Total Funding Through FY 1966	<u>\$1,004,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$940,000</u>
Liquid hydrogen storage tank	Gals.	500,000	\$1.60	800,000
Locomotive shop	Sq. Ft.	1,800	22.78	41,000
Service pit and inside railroad	LS	---	4,800	4,800
Utilities	LS	---	22,000	22,000
Railroad spur	LF	1,000	22.80	22,800
Site preparation	LS	---	49,400	49,400
<u>Equipment</u>				<u>\$4,000</u>
Locomotive shop equipment	LS	---	4,000	4,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u>\$944,000</u>

CP 10-6

## PROJECT PURPOSE:

To provide on site liquid hydrogen storage capacity, a locomotive shop, a railroad spur and supporting utilities at the Mississippi Test Facility.

## PROJECT DESCRIPTION:

This project will provide the following support facilities at the Mississippi Test Facility:

Liquid Hydrogen Storage Tank - This item consists of a 500,000 gallon liquid hydrogen storage tank, two transfer platforms and associated equipment. The storage tank and its supporting structure will be designed for blast loading.

Locomotive Shop - This facility will be a prefabricated sheet metal structure on a concrete slab of about 1,800 square feet. Included will be a railroad track into the shop and equipment for basic maintenance and minor repairs. A concrete pit will be provided within the building for inspection and maintenance activities.

Railroad Spur - This item consists of 1,000 linear feet of railroad from the main track to the locomotive shop. Also included are drainage culverts and necessary site work.

Utilities - Included in this item will be extension of water and electrical distribution from main utility lines to the locomotive shop. Sewage treatment will be provided by a septic tank system. A fuel oil storage and dispensing system will also be provided.

## PROJECT JUSTIFICATION:

Liquid hydrogen will be transported to the Mississippi Test Facility by barges, which function as both carriers and storage vessels. In support of these operations, the liquid hydrogen storage tank will:

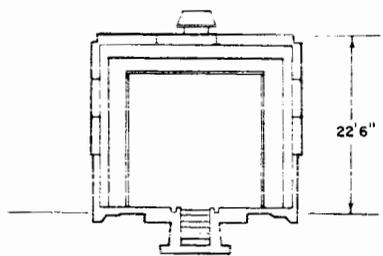
1. Provide reserve capacity when the barges require servicing, or in case of damage to one of the barges.
2. Permit top-off of partially empty barges, thus reducing the number of trips to the hydrogen plant. A round trip is 80 miles by water and requires 30 hours of barge travel time.
3. Supply liquid hydrogen short-term test demands when weather precludes barge movement. Testing can thus proceed on schedule regardless of weather conditions.

A locomotive shop is required for periodic inspection, minor routine maintenance, and shelter of the government-owned locomotive which is used for switching within the Fee Area. Movement of the locomotive to and from

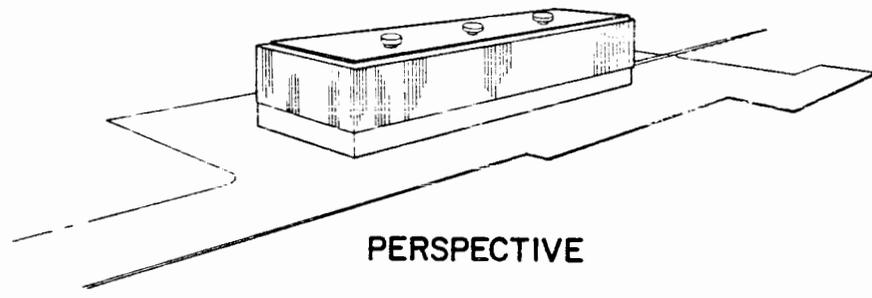
a New Orleans shop is an expensive and time consuming alternative to on-site performance of minor day-to-day maintenance.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

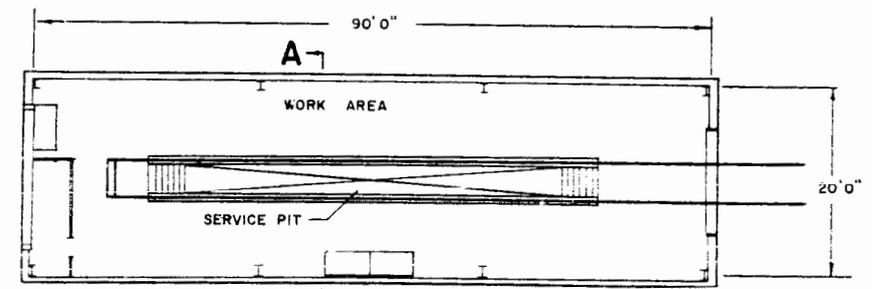
MISSISSIPPI TEST FACILITY  
 FISCAL YEAR 1966 ESTIMATES  
**GENERAL SUPPORT FACILITIES**



SECTION A-A

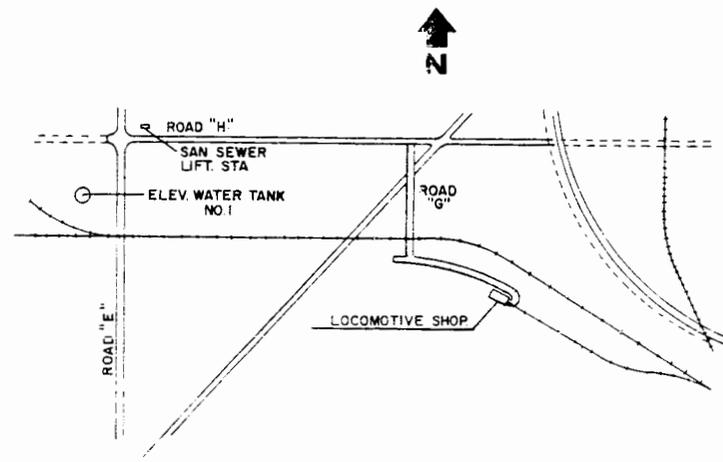


PERSPECTIVE



FLOOR PLAN  
 0 10 20 30  
 FEET

LOCOMOTIVE SHOP



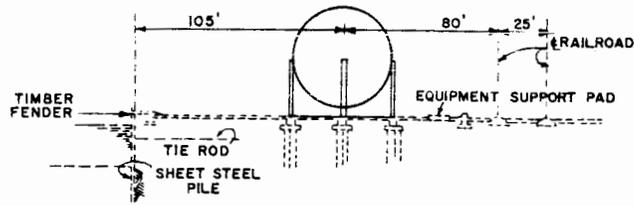
SITE PLAN  
 0 100 200  
 FEET

6-CT 10-9

# MISSISSIPPI TEST FACILITY

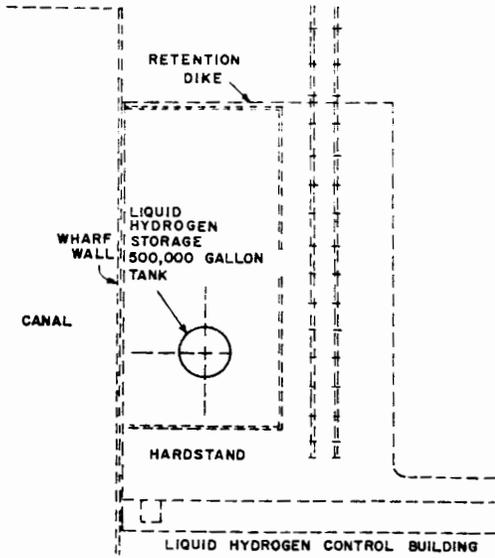
FISCAL YEAR 1966 ESTIMATES

## GENERAL SUPPORT FACILITIES



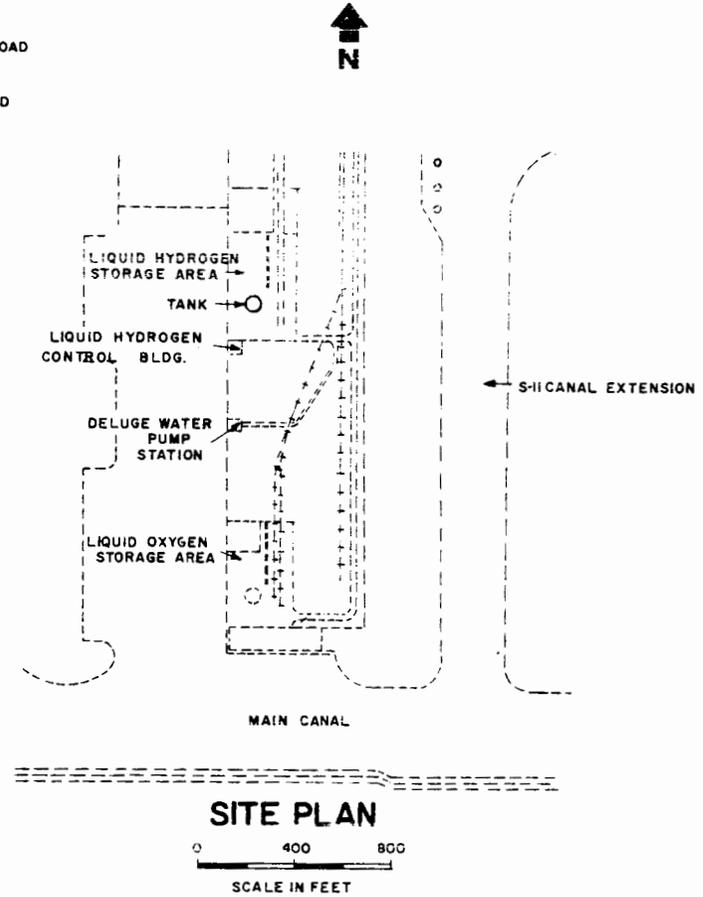
**TYPICAL SECTION**

AT STORAGE TANK  
NO SCALE



**PLAN**

0 100 200  
SCALE IN FEET



**SITE PLAN**

0 400 800  
SCALE IN FEET

## LIQUID HYDROGEN RECEIVING STORAGE

CF 10-10

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

VARIOUS LOCATIONS

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Facilities for S-II stage program.....	CF 11-13
Office of Tracking and Data Acquisition Projects:	
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Deep space antenna facility, Canberra, Australia.....	CF 11-22
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Apollo network ground station, Antigua, W. I. (facility for unified "S" band system).....	CF 11-34
Apollo network ground station, Antigua, W. I. (community support facilities).....	CF 11-37
Apollo network ground station, Grand Canary Islands.....	CF 11-42

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 BUDGET ESTIMATES  
(Dollars in Thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY			
Various Localities INSTALLATION MISSION	Manned Space Flight	Not applicable	Not applicable	Not applicable			
				PERSONNEL STRENGTH	FY 19 64	FY 19 65	FY 19 66
				NASA PERSONNEL (End of Year)			
				CONTRACTOR AND OTHER PERSONNEL			
				<b>TOTAL ALL PERSONNEL</b>			
				LAND	NO. ACRES		
				NASA-OWNED			
				OTHER GOVERNMENT AGENCY-OWNED			
				NON-FEDERAL (Leases, easements)			
				<b>TOTAL LAND</b>			
				<b>TOTAL CAPITAL INVESTMENT</b>	\$ ---		
				(Including NASA-Owned Land) (as of June 30, 19 64 )			
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 62 THRU CURRENT YEAR	FY 19 66 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Facilities for F-1 Engine Program	MSF	62,196.0	2,007.0	-0-	64,203.0		
Facilities for J-2 Engine Program	MSF	29,502.8	2,436.0	-0-	31,938.8		
Facilities for S-II Stage Program	MSF	2,863.7	1,690.0	-0-	4,553.7		
Deep Space Antenna Facility, Madrid, Spain	TDA	36.0	472.0	-0-	508.0		
Deep Space Antenna Facility, Canberra, Australia	TDA	38.0	510.0	-0-	548.0		
STADAN Facility, Fairbanks, Alaska	TDA	83.0	1,115.0	-0-	1,198.0		
Apollo Network Ground Station - Antigua (Fac. for Unified "S" - Band System)	TDA	162.0	2,700.0	-0-	2,862.0		
Apollo Network Ground Station - Antigua (Community Support Facilities)	TDA	210.0	3,090.0	-0-	3,300.0		
Apollo Network Ground Station - Canary Islands	TDA	120.0	7,674.0	-0-	7,794.0		
ALL OTHER PROJECTS		390,672.5					
<b>TOTALS</b>		485,884.0	21,694.0				

CF 11-1

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
FACILITIES FOR F-1 ENGINE PROGRAM

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Canoga Park, Santa Susana, and Edwards, California

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$62,196,000
FY 1966 Estimate	<u>2,007,000</u>
Total Funding Through FY 1966	<u>\$64,203,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,375,000</u>
Developmental test facilities	LS	---	\$785,000	785,000
Component test facilities	LS	---	220,000	220,000
Static test facilities	LS	---	370,000	370,000
<u>Equipment</u>				<u>\$632,000</u>
Laboratory and instrumentation equipment	LS	---	632,000	632,000
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$2,007,000</u>

PROJECT PURPOSE:

To provide facilities at Canoga Park, Santa Susana and Edwards for the continued development, manufacture and testing of the F-1 Engine.

PROJECT DESCRIPTION:

At Canoga Park construction will include a 1,200 square foot engine checkout cell, a 3,000 square foot Class II clean room, a 2,800 square foot acoustical test facility, a 4,000 square foot hydro-shaker test facility, augmentation of development equipment as well as additions and modifications to instrumentation and the liquid nitrogen and gaseous nitrogen distribution systems.

At Santa Susana, a 1,600 square foot turbo-pump support building will be erected. Miscellaneous modifications, test system additions and general facility modifications to the gaseous nitrogen, liquid nitrogen, helium, and high pressure propellant storage facilities will also be required.

Construction at Edwards will include modifications and improvements to area test support facilities, as well as modifications and additions to test stand instrumentation, power supplies and cryogenic transfer system.

Procurement and installation of additional development, test and instrumentation equipment is included for each of the three locations.

PROJECT JUSTIFICATION:

The facilities in this project are required to support the planned production rate of the F-1 engine and to assure its continued development.

At Canoga Park an additional engine checkout cell is required having a capability of supporting full pressure tests. This cell is required to support the normal product improvement program which parallels the production phase of the engine. By this means weaknesses which develop during engine firings are overcome and other improvements are incorporated into the system. The alternate to accomplishing this work in a test cell is to conduct the final tests on the stands. This is time consuming and unsatisfactory in view of the number of engines to be tested. All planned facilities at Canoga Park of this type are required for the testing of the production engines, therefore, an additional cell is needed to support product improvement. Associated with this test cell is a 3,000 square foot clean room. This room is required so that engines which develop leaks or are otherwise faulty can be disassembled, repaired, and reassembled in a contaminant free environment.

Facilities for the acoustical and vibrational loading of engine components and assemblies are also required. These facilities are largely

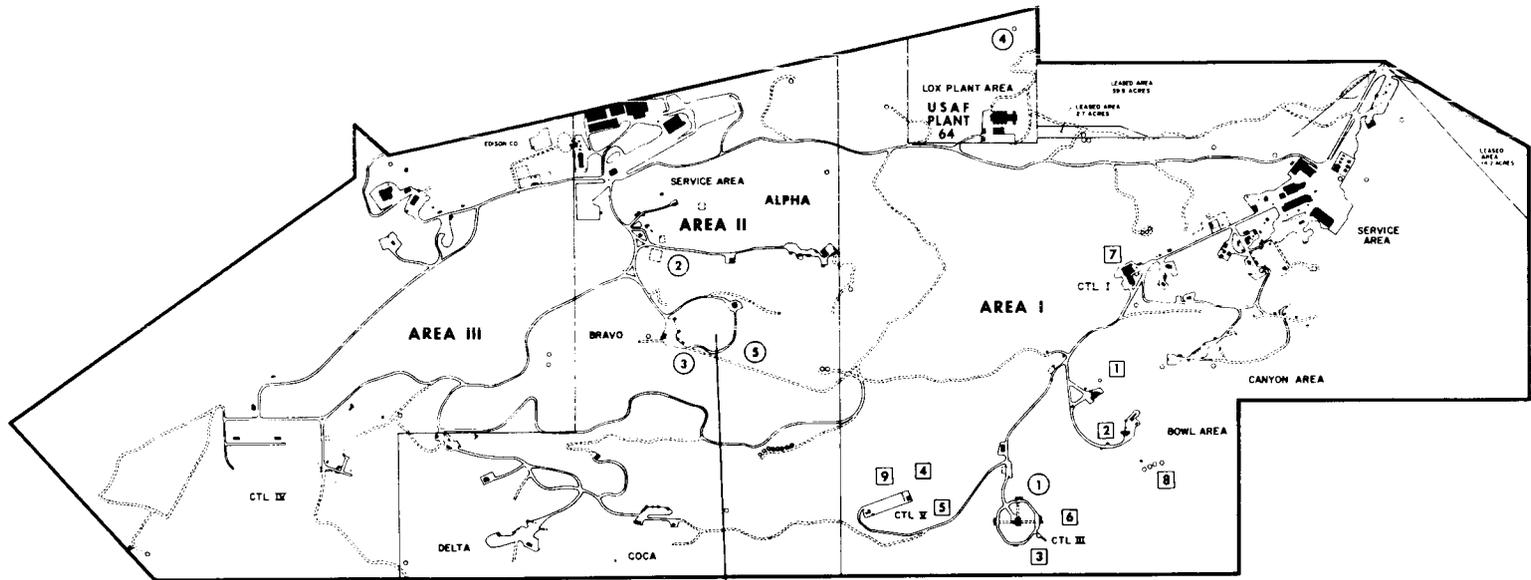
developmental in nature and are needed to provide an added capability of subjecting the engine components and assemblies to the sonic and vibration loads they will encounter prior to full scale operation on the test stand. As the F-1 engine undergoes further development, these forces will change. It is necessary that the engine components and assemblies be tested for their capability to withstand operational loads under conditions where failure will not result in a loss of the entire engine.

A turbo pump support building is needed in the Bravo test area at Santa Susana to provide shop space and storage for pump components. Pump testing was moved to the Bravo area because of safety considerations. These considerations became very critical as a result of an accident which virtually destroyed the pump test cell in Component Test Laboratory 3. The supporting shop and parts storage is still located in the former test area, some 2½ miles away from the present site.

At Edwards there will be need to modify the development test stands and related technical and support systems to accommodate changes in the engine development program. Development changes on the engines will continue to take place for considerable time after full production has been achieved. These changes will be generated as a result of flight operations, ground testing of production articles or changes dictated by the need for increased reliability.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**VARIOUS LOCATIONS**  
**FISCAL YEAR 1966 ESTIMATES**  
**FACILITIES FOR F-1 ENGINE PROGRAM**



**LEGEND**

● **EXISTING FACILITIES**

- 1 CTL-3
- 2 BRAVO 1
- 3 BRAVO 2
- 4 LN<sub>2</sub> LOX BUFFER STORAGE
- 5 MODIFICATION TO BRAVO AREA

▣ **FACILITIES AUTHORIZED & UNDER CONSTRUCTION**

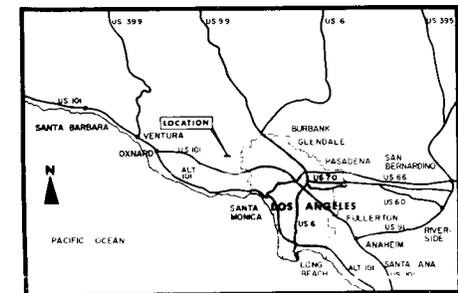
- FISCAL YEAR 1964 PROJECT**
- 1 ADDITIONAL INSTRUMENTATION RECORDING CENTER
- 2 BOWL AREA
- 3 ADDITIONAL STORAGE TANKS CTL-3
- 4 ADDITIONAL STORAGE BOTTLES CTL-5
- 5 MISC ITEMS FOR CTL-3 & CTL-5
- 6 ADDITIONAL INSTRUMENTATION
- FISCAL YEAR 1965 PROJECT**
- 7 LOX RUN TANK
- 8 FUEL RUN TANK
- 9 GN<sub>2</sub> BOTTLE

◇ **PROPOSED FISCAL YEAR 1966 PROJECT**

- 1 TURBOPUMP STORAGE & SERVICE
- 2 COMPONENTS TEST SYSTEMS
- 3 UTILITY SYSTEMS

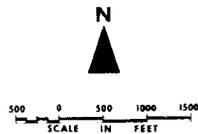
NOTE: THESE SYSTEMS (ITEMS 2 & 3) ARE OF A GENERAL NATURE AND TOO WIDESPREAD TO LOCATE SPECIFICALLY

SANTA SIBICANA, CALIFORNIA



**VICINITY MAP**

CF 11-5



**VARIOUS LOCATIONS**  
 FISCAL YEAR 1966 ESTIMATES  
**FACILITIES FOR F-1 ENGINE PROGRAM**

**LEGEND**

● EXISTING FACILITIES

- 1 LIQUID OXYGEN STORAGE
- 2 TEST STAND 2-A
- 3 TEST STAND 1-A
- 4 TEST STAND 1-B
- 5 FUEL STORAGE
- 6 WATER STORAGE
- 7 400,000 GAL. FIREX TANK
- 8 PUMP HOUSE AREA
- 9 MODIFICATION OF TEST STAND 1-B
- 10 CONTROL CENTER
- 11 TEST STAND 1-C
- 12 PRE-TEST BUILDING 1-C
- 13 TEST STAND 1-D
- 14 PRE-TEST BUILDING 1-D
- 15 TEST STAND 1-E
- 16 PRE-TEST BUILDING 1-E
- 17 RECLAMATION DAM
- 18 3,000,000 GAL. DEFLECTOR WATER TANK

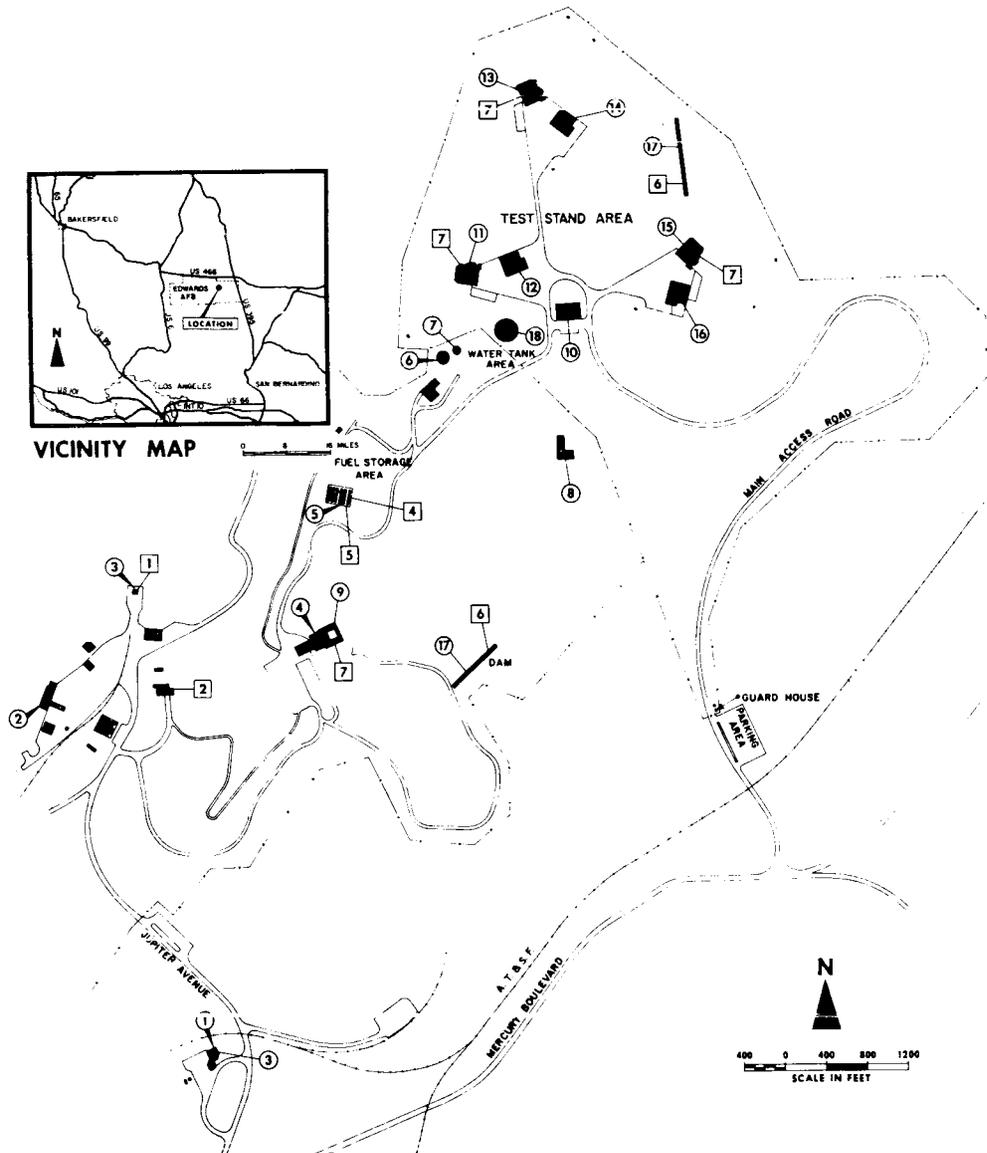
▣ FACILITIES AUTHORIZED & UNDER CONSTRUCTION

- FISCAL YEAR 1964 PROJECT
- 1 MODIFICATION OF TEST STAND 1-A
- 2 NEW VALVE SERVICING AREA & MISC. ITEMS
- FISCAL YEAR 1965 PROJECT
- 3 ADDITIONAL LOX STORAGE
- 4 ADDITIONAL FUEL STORAGE
- 5 FUEL SUPPLY SYSTEM
- 6 RECLAMATION DAMS MODIFICATION
- 7 FLAME CHANNEL MODIFICATIONS

◇ PROPOSED FISCAL YEAR 1966 PROJECT

- 1 IMPROVEMENTS TO DRAINAGE CHANNELS & BASINS, ROADS & PAVING
- 2 IMPROVEMENTS TO WATER SUPPLY SYSTEMS
- 3 IMPROVEMENTS TO UTILITY SYSTEMS
- 4 MODIFICATIONS & ADDITIONS TO TEST FACILITIES FOR PRODUCTION SUPPORT & R&D OPERATIONS
- 5 GENERAL IMPROVEMENTS TO TEST STANDS

NOTE: THESE PROPOSED FY-66 FACILITIES ARE OF A GENERAL NATURE AND TOO WIDESPREAD TO LOCATE SPECIFICALLY.



CF 11-6

**VARIOUS LOCATIONS**

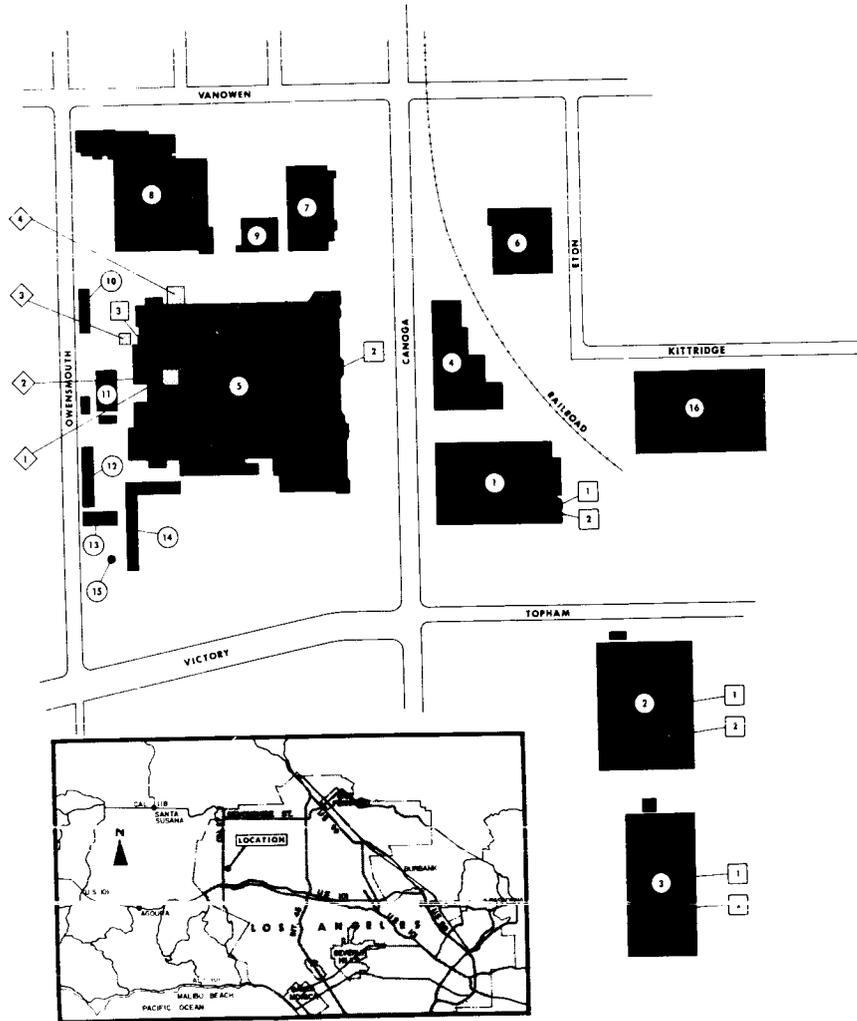
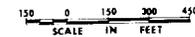
FISCAL YEAR 1966 ESTIMATES

**FACILITIES FOR F-1 ENGINE PROGRAM**

**LEGEND**

- **EXISTING FACILITIES**
  - 1 MANUFACTURING BUILDING NO. 1 (BLDG. NO. 6600)
  - 2 MANUFACTURING BUILDING NO. 2
  - 3 MANUFACTURING BUILDING NO. 3
  - 4 MATERIAL BUILDING (BLDG. NO. 6620)
  - 5 MAIN BUILDING (BLDG. NO. 6633)
  - 6 WAREHOUSE (BLDG. NO. 6701)
  - 7 ANNEX (BLDG. NO. 6733)
  - 8 VANOWEN (BLDG. NO. 21600)
  - 9 CAFE
  - 10 NORTH SHED
  - 11 MAINTENANCE BUILDING
  - 12 SOUTH SHED
  - 13 PAINT & CHEMICAL STORAGE
  - 14 SHED
  - 15 INCINERATOR
  - 16 MANUFACTURING BUILDING NO. 4
- ▨ **FACILITIES AUTHORIZED AND UNDER CONSTRUCTION**
  - FISCAL YEAR 1963 PROJECT
    - 1 EXPANSION OF R&D PRODUCTION MANUFACTURING EQUIPMENT
  - FISCAL YEAR 1964 PROJECT
    - 2 EXPANSION OF R&D PRODUCTION MANUFACTURING EQUIPMENT
  - FISCAL YEAR 1965 PROJECT
    - 3 ENGINE CHECKOUT CELL
- ◇ **PROPOSED FISCAL YEAR 1966 PROJECT**
  - 1 CLEAN ROOM
  - 2 ACCOUSTICAL ROOM
  - 3 ENGINE CHECKOUT CELL
  - 4 HYDROSHAKER ROOM
  - 5 LIQUID NITROGEN & GASEOUS NITROGEN SYSTEMS

NOTE: THESE SYSTEMS (ITEM 5) ARE OF A GENERAL NATURE AND TOO WIDESPREAD TO LOCATE SPECIFICALLY



VICINITY MAP

CANOGA PARK, CALIFORNIA

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
FACILITIES FOR J-2 ENGINE PROGRAM

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Canoga Park, Santa Susana, California

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$29,502,800
FY 1966 Estimate	<u>2,436,000</u>
Total Funding Through FY 1966	<u>\$31,938,800</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$2,130,000</u>
Bowl test area facilities	LS	---	\$626,000	626,000
Component test area facilities	LS	---	329,000	329,000
Delta test area facilities	LS	---	265,000	265,000
Delta 2 test stand modification	LS	---	480,000	480,000
Vertical test stand 2 modification	LS	---	215,000	215,000
Vertical test stand 3 modification	LS	---	215,000	215,000
<u>Equipment</u>				<u>\$306,000</u>
Environmental equipment	LS	---	90,000	90,000
Instrumentation	LS	---	141,000	141,000
Test equipment	LS	---	75,000	75,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	None
		TOTAL		<u>\$2,436,000</u>

PROJECT PURPOSE:

To provide facility additions and modifications at Canoga Park and Santa Susana, California, necessary for the continued development and improvement of the J-2 engine.

PROJECT DESCRIPTION:

Construction in the Santa Susana Bowl area will include a 5,000 gallon increase in the liquid hydrogen and a 1,500 gallon increase in the liquid oxygen run tanks of Vertical Test Stand No. 2. At the dual position Vertical Test Stand No. 3 there will be an increase of 5,000 gallons to the liquid hydrogen and 1,500 gallons to each of the liquid oxygen run tanks. Additional equipment for the recording system will be installed. The liquid oxygen storage will be increased by 28,000 gallons, liquid hydrogen storage by 45,000 gallons. Eight additional storage bottles will be provided for gaseous hydrogen, nitrogen and helium.

Component test area modifications will include a 45,000 gallon increase in both the liquid oxygen and hydrogen tankage supporting Test Laboratory III and a 45,000 gallon increase in the hydrogen storage for Laboratory V. Additional transfer lines and water distribution service will also be provided.

In the Delta area, construction supporting the dual position Delta 2 test stand will include structural modifications plus a 9,000 gallon increase to the liquid hydrogen and 3,000 gallon increase to the liquid oxygen run tanks. Additional storage will be provided in the Delta area in the form of a 45,000 gallon liquid hydrogen tank, an 80,000 gallon liquid oxygen tank together with 13 storage bottles for helium, gaseous hydrogen and nitrogen.

Additional environmental, instrumentation, and test equipment will be procured and installed at both Canoga Park and Santa Susana.

PROJECT JUSTIFICATION:

Existing J-2 facilities are highly specialized devices which must be continually advanced to accommodate engine modifications and testing requirements. These facilities must support the J-2 engine development and production programs through FY 1968 as well as follow-on effort projected through FY 1970.

Modifications and additions to the Bowl test area facilities are required

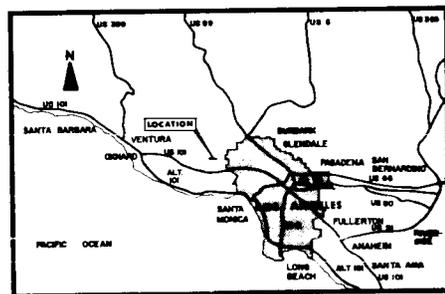
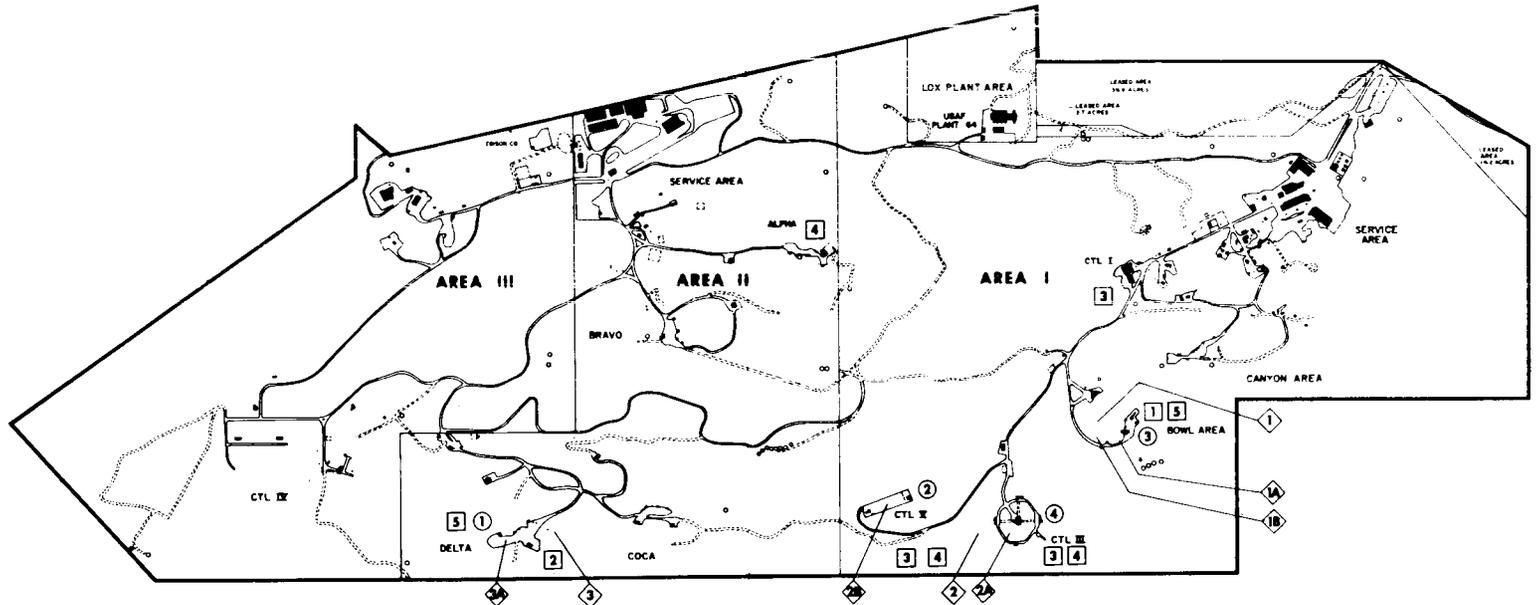
to support increased engine run times with a resulting increase in propellant consumption for each run. Much of the planned testing will be in the altitude facilities in this area where a 225 second run capability exists. This capability must be expanded by at least 10 per cent for continued engine development.

Modifications and additions to the Delta test stands are required in order to accommodate changes affecting engine reliability and improved performance. Substantiation of these changes in flight hardware will be accomplished on these stands. Longer run times are necessary to provide assurance that the engine is fully capable of operating for a reasonably longer time than is actually required in flight. This necessitates an increase in the sizes of the present propellant tanks and supply lines.

Additions and modification to the Component Test Laboratories III and V are required to support component and subsystem changes necessary to improve engine performance and reliability. For example, changes in the turbo pump necessitate certain changes in the Component Test Laboratory so that the pump can be given rigorous endurance runs before incorporation into the engine system. Larger fuel supply tanks must be installed to allow these extended duration runs.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**VARIOUS LOCATIONS**  
FISCAL YEAR 1966 ESTIMATES  
**FACILITIES FOR J-2 ENGINE PROGRAM**

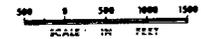


VICINITY MAP



**LEGEND**

- |   |  |  |
|---|--|--|
| <p>● EXISTING FACILITIES</p> <p>1 DELTA 2 TEST STAND-TWO TEST POSITIONS</p> <p>2 CTL-5</p> <p>3 BOWL</p> <p>4 CTL-3</p> | <p>■ FACILITIES AUTHORIZED &amp; UNDER CONSTRUCTION</p> <p>FISCAL YEAR 1963 PROJECT</p> <p>1 VTS-3 MODIFICATION</p> <p>FISCAL YEAR 1965 PROJECTS</p> <p>2 DELTA-1 MODIFICATION</p> <p>3 CTL</p> <p>4 PRODUCTION TEST FACILITIES</p> <p>5 DEVELOPMENT SUPPORT EQUIPMENT</p> | <p>◇ PROPOSED FISCAL YEAR 1966 PROJECTS</p> <p>1 BOWL AREA FACILITIES</p> <p>A VERTICAL TEST STAND NO. 2</p> <p>B VERTICAL TEST STAND NO. 3</p> <p>2 COMPONENT TEST AREA FACILITIES</p> <p>A CTL III</p> <p>B CTL V</p> <p>3 DELTA AREA FACILITIES</p> <p>A TEST STAND NO. 2</p> |
|---|--|--|



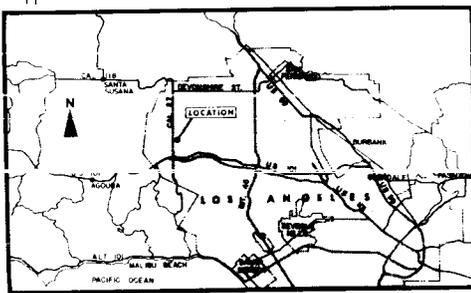
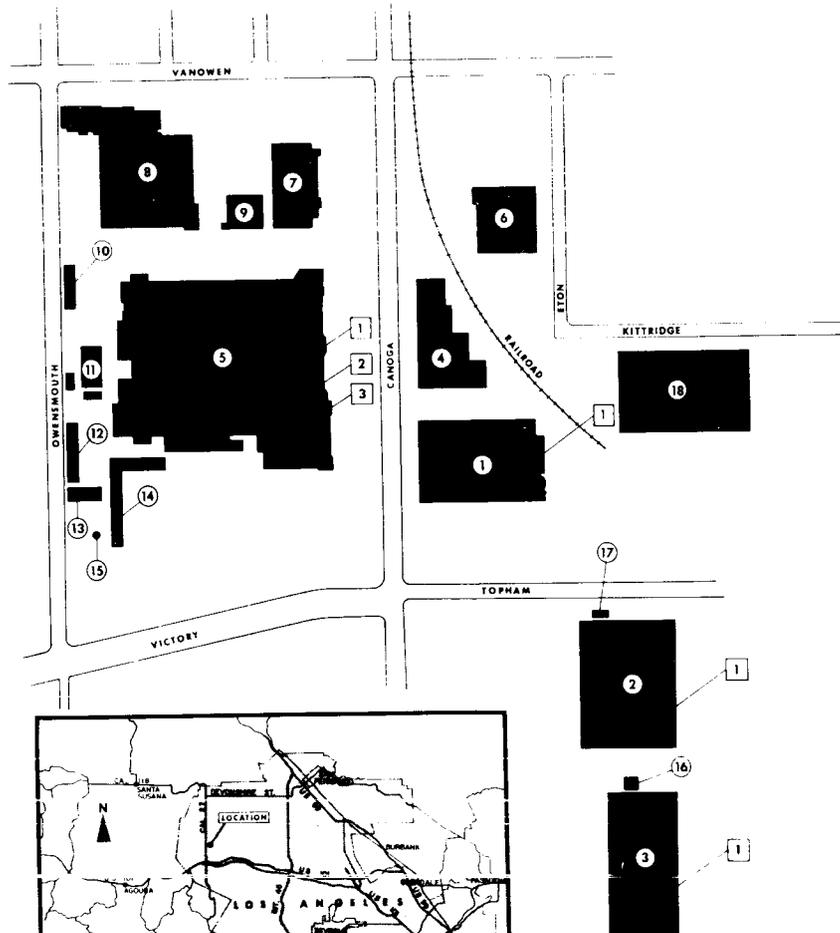
SANTA SUSANA, CALIFORNIA

CF 11-11

**VARIOUS LOCATIONS**  
 FISCAL YEAR 1966 ESTIMATES  
**FACILITIES FOR J-2 ENGINE PROGRAM**

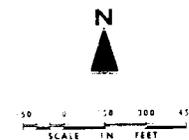
**LEGEND**

- **EXISTING FACILITIES**
- 1 MANUFACTURING BUILDING NO. 1 (BLDG. NO. 6600)
- 2 MANUFACTURING BUILDING NO. 2
- 3 MANUFACTURING BUILDING NO. 3
- 4 MATERIAL BUILDING (BLDG. NO. 6620)
- 5 MAIN BUILDING (BLDG. NO. 6633)
- 6 WAREHOUSE (BLDG. NO. 6701)
- 7 ANNEX (BLDG. NO. 6733)
- 8 VANOWEN (BLDG. NO. 21600)
- 9 CAFE
- 10 NORTH SHED
- 11 MAINTENANCE BUILDING
- 12 SOUTH SHED
- 13 PAINT & CHEMICAL STORAGE
- 14 SHED
- 15 INCINERATOR
- 16 HELIUM K BOTTLE BANK
- 17 NITROGEN GAS CYLINDER & COMPRESSOR
- 18 MANUFACTURING BUILDING NO. 4
  
- ▨ **FACILITIES AUTHORIZED & UNDER CONSTRUCTION**
- FISCAL YEAR 1964 PROJECT
- 1 EXPANSION OF R & D PRODUCTION MANUFACTURING EQUIPMENT
- FISCAL YEAR 1965 PROJECT
- 2 PRODUCTION TEST FACILITIES
- 3 DEVELOPMENT SUPPORT EQUIPMENT
- ◇ **PROPOSED FISCAL YEAR 1966 PROJECT**
- 1 ADDITIONAL EQUIPMENT
  
- NOTE: THIS EQUIPMENT WILL BE INSTALLED IN TOO WIDESPREAD AN AREA TO LOCATE SPECIFICALLY



VICINITY MAP

CANOGA PARK, CALIFORNIA



CF 11-12

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
FACILITIES FOR S-II STAGE PROGRAM

AUTHORIZATION LINE ITEM: Various Locations

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Santa Susana, Seal Beach, California

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$2,863,700
FY 1966 Estimate	<u>1,690,000</u>
Total Funding Through FY 1966	<u>\$4,553,700</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$875,000</u>
Bond lay-up area	LS	---	\$160,000	160,000
Vertical assembly modifications	LS	---	175,000	175,000
Bulkhead fabrication addition	LS	---	250,000	250,000
Ground service bldg. addition	LS	---	50,000	50,000
Electrical substation and transmission lines	LS	---	200,000	200,000
Helium transfer lines	LS	---	40,000	40,000
<u>Equipment</u>				<u>\$815,000</u>
Helium drying system	LS	---	200,000	200,000
Helium store bottles	LS	---	400,000	400,000
Instrumentation system	LS	---	215,000	215,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	None
		<b>TOTAL</b>		<b><u>\$1,690,000</u></b>

PROJECT PURPOSE:

To provide for the acquisition and construction of additional facilities at Seal Beach and Santa Susana, California for the development, testing, and manufacture of the S-II stage.

PROJECT DESCRIPTION:

At Seal Beach, a 40' x 40' x 20' high, room will be added to the Bulkhead Fabrication Facility for the bond lay-up activities. A 40' by 130' addition to the west end of the Bulkhead Fabrication facility and additional oven capacity will be provided for insulation lay-up. Modifications will be made to three stations in the Vertical Assembly Hydrostatic Facility to provide for tank entry.

At Santa Susana 5 additional 470 cubic feet high pressure helium storage bottles will be installed in the Coca area. The helium supply will be expanded at the AlfaBravo Cascade station and the transfer line from AlfaBravo to the Coca area will be increased. The existing Data Recording system will be expanded and the instrumentation tunnel will be enlarged near the Ground Service building. A new substation for the Coca area will be installed as well as a helium drying facility. A 15' by 33' two story addition will be provided at the Coca 4 Ground Service building to provide space for additional ground support equipment.

PROJECT JUSTIFICATION:

The 40' x 40' addition to the Bulkhead Fabrication facility is required for the bond lay-up activities in the manufacture of the common bulkhead. An engineering decision has been reached that the vacuum bell system of assembly must be used in place of the strip seal and hot sizing thus necessitating this addition. The 40' x 130' addition with additional oven capacity provides the needed space in the double seal insulation lay-up.

The modifications to the three stations in the Vertical Assembly Hydrostatic facility are required so that entry can be made into the LH<sub>2</sub> tank to effect design changes to the internal tank system as necessitated by the development program.

The five additional helium bottles in the Coca area at Santa Susana are required to satisfy the increased usage which generates as a result of the engineering design decision to use helium in place of hydrogen for purge and chill down operations. This decision also generates a requirement for the addition of a new helium complex at the AlfaBravo Cascade Station and an increase in the size of the transfer lines between the two areas.

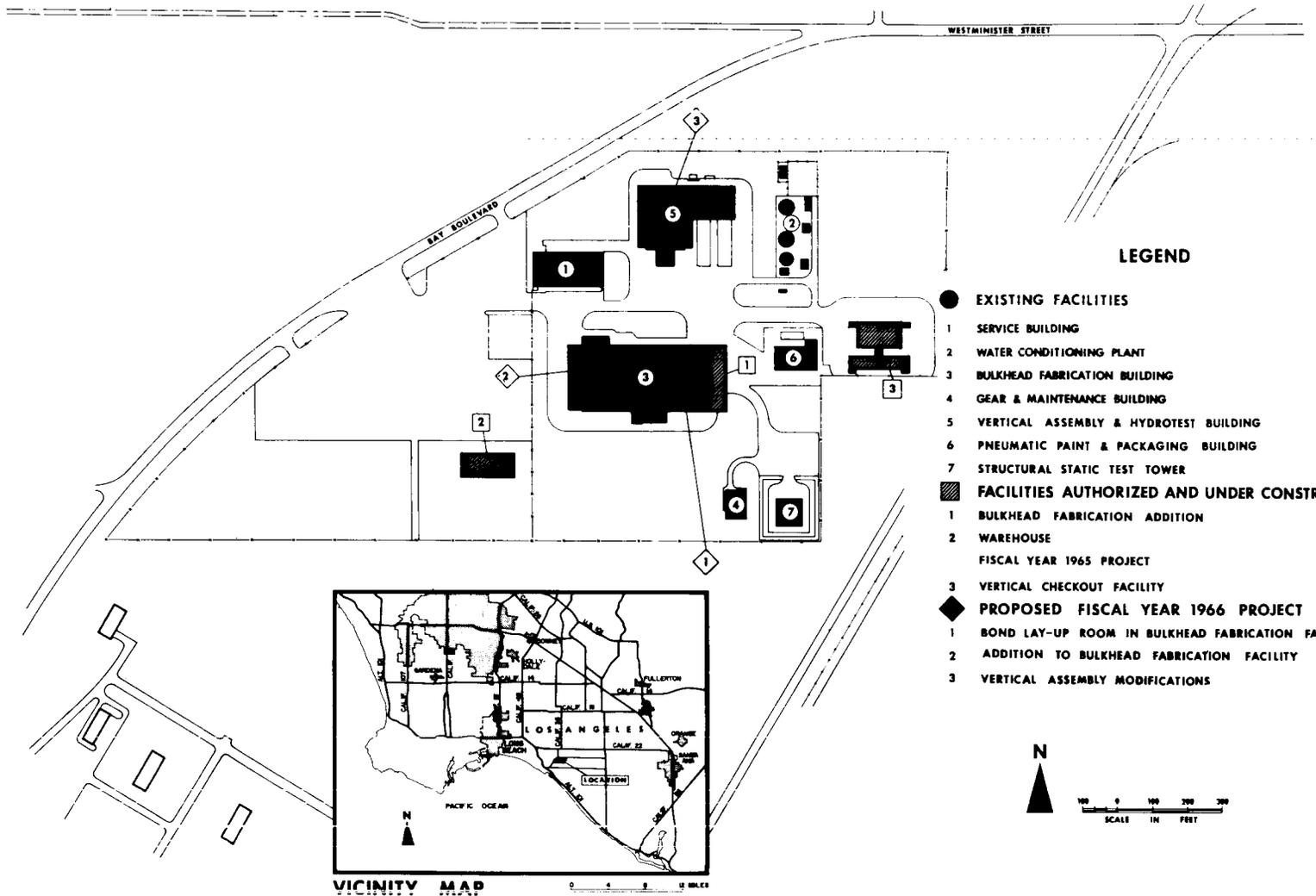
The expansion of the existing Recording Data system facility is required so that as development progresses and data requirements increase it will be possible to handle this added load. The present system has an expandable capability which will be activated.

The enlargement of the tunnel area near the Ground Service building at Coca is required so that additional instrumentation cables can be installed from the Control Center to Coca 4. This will also provide a means of installing future cables at a reduced cost.

The new electric substation in the Coca area is required to provide for increasing area loads, part of which are generated by additional environmental tests requiring hot gas. A helium drying facility is required to provide a capability of conditioning available helium to required test conditions.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

**VARIOUS LOCATIONS**  
**FISCAL YEAR 1966 ESTIMATES**  
**SATURN V SECOND STAGE (S-II) DEVELOPMENT FACILITIES**



SEAL BEACH, CALIFORNIA

CF 11-16

VARIOUS LOCATIONS

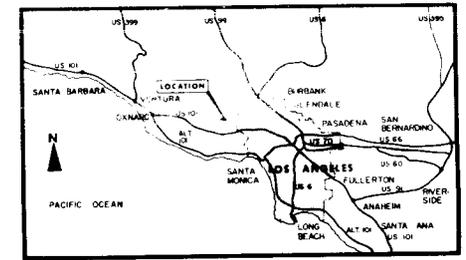
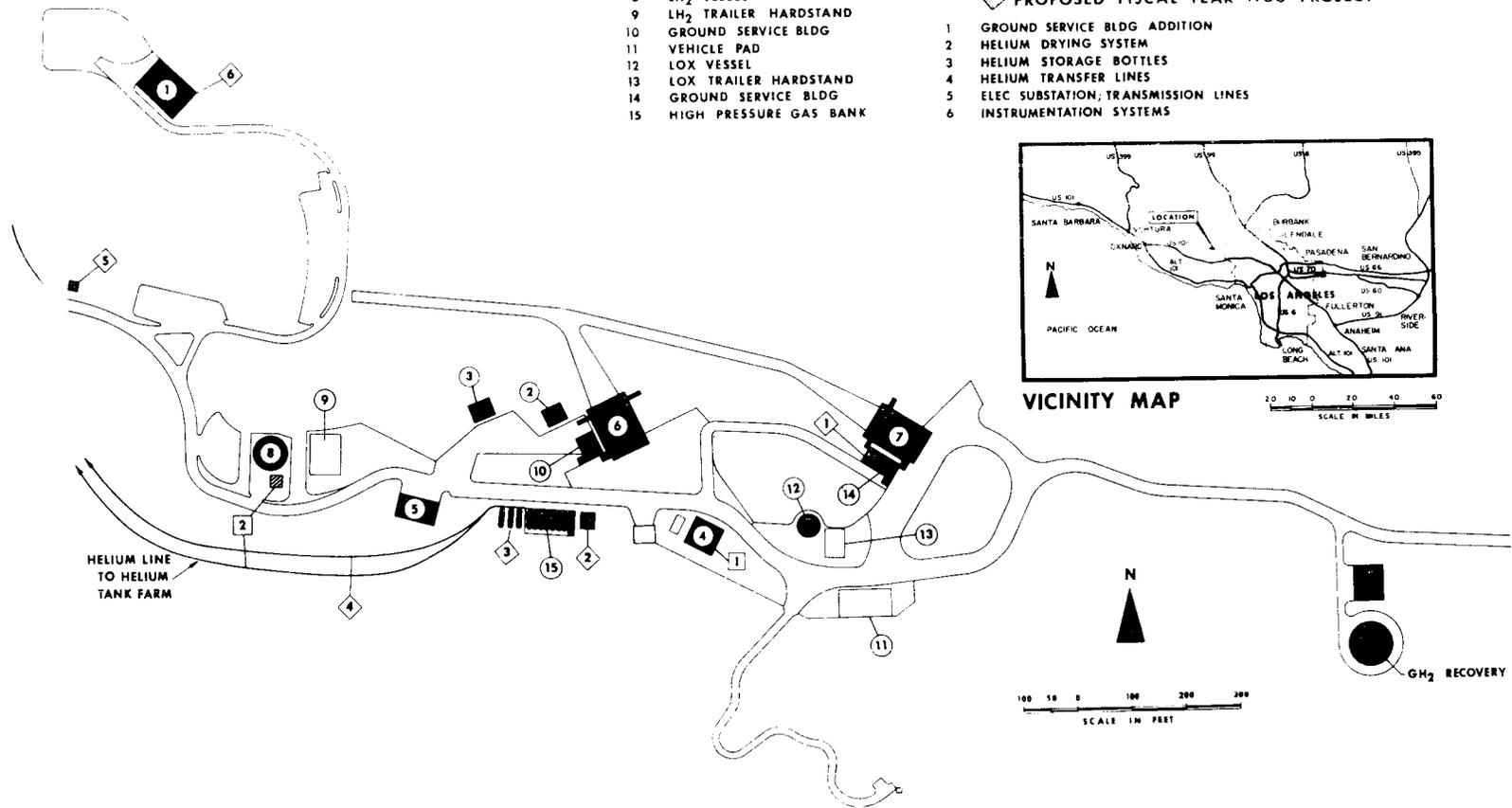
FISCAL YEAR 1966 ESTIMATES

SATURN V SECOND STAGE (S-II) DEVELOPMENT FACILITIES

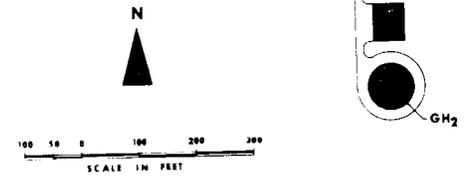
LEGEND

- EXISTING FACILITIES
- 1 CONTROL CENTER
  - 2 COCA 2 TEST STAND
  - 3 COCA 3 TEST STAND
  - 4 UPPER PRETEST BLDG
  - 5 LOWER PRETEST BLDG
  - 6 COCA 1 TEST STAND
  - 7 COCA 4 TEST STAND
  - 8 LH<sub>2</sub> VESSEL
  - 9 LH<sub>2</sub> TRAILER HARDSTAND
  - 10 GROUND SERVICE BLDG
  - 11 VEHICLE PAD
  - 12 LOX VESSEL
  - 13 LOX TRAILER HARDSTAND
  - 14 GROUND SERVICE BLDG
  - 15 HIGH PRESSURE GAS BANK

- ▨ FACILITIES AUTHORIZED & UNDER CONSTRUCTION
- FISCAL YEAR 1964 PROJECT
- 1 UPPER PRETEST BLDG
- FISCAL YEAR 1965 PROJECT
- 2 HIGH PRESSURE GAS & THERMAL CONTROL SYSTEM
- ◇ PROPOSED FISCAL YEAR 1966 PROJECT
- 1 GROUND SERVICE BLDG ADDITION
  - 2 HELIUM DRYING SYSTEM
  - 3 HELIUM STORAGE BOTTLES
  - 4 HELIUM TRANSFER LINES
  - 5 ELEC SUBSTATION; TRANSMISSION LINES
  - 6 INSTRUMENTATION SYSTEMS



VICINITY MAP  
SCALE IN MILES



COCA AREA  
SANTA SUSANA, CALIFORNIA

CF 11-17

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

APOLLO WING, MADRID DEEP SPACE FACILITY

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Madrid, Spain

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$36,000
FY 1966 Estimate	<u>472,000</u>
Total Funding Through FY 1966	<u>\$508,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$472,000</u>
New wing (first floor)	Sq. Ft.	4,600	\$40.00	184,000
(basement)	Sq. Ft.	4,000	17.50	70,000
Utilities	LS	---	5,900	5,900
Engine generator	LS	---	94,000	94,000
Tunnel	LS	---	29,400	29,400
Site development	LS	---	4,500	4,500
Air conditioning	LS	---	84,200	84,200
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<u>\$472,000</u>

PROJECT PURPOSE:

This project provides for the construction of a Manned Space Flight Net (MSFN) wing addition to the existing Control Building at the Deep Space Station, Madrid, Spain which will house electronic equipments to permit this antenna system to serve as essential backup to the prime Apollo station at Madrid.

PROJECT DESCRIPTION:

Exterior dimensions of the new wing are approximately 40 feet wide by 100 feet long. The building will consist of a basement area to serve as a raceway for equipment wiring and the air conditioning system plenum, and a floor space of 4,000 square feet to contain the technical equipment. In addition, there will be a mechanical utility structure of approximately 600 square feet to house the required heating and air conditioning equipment for this wing.

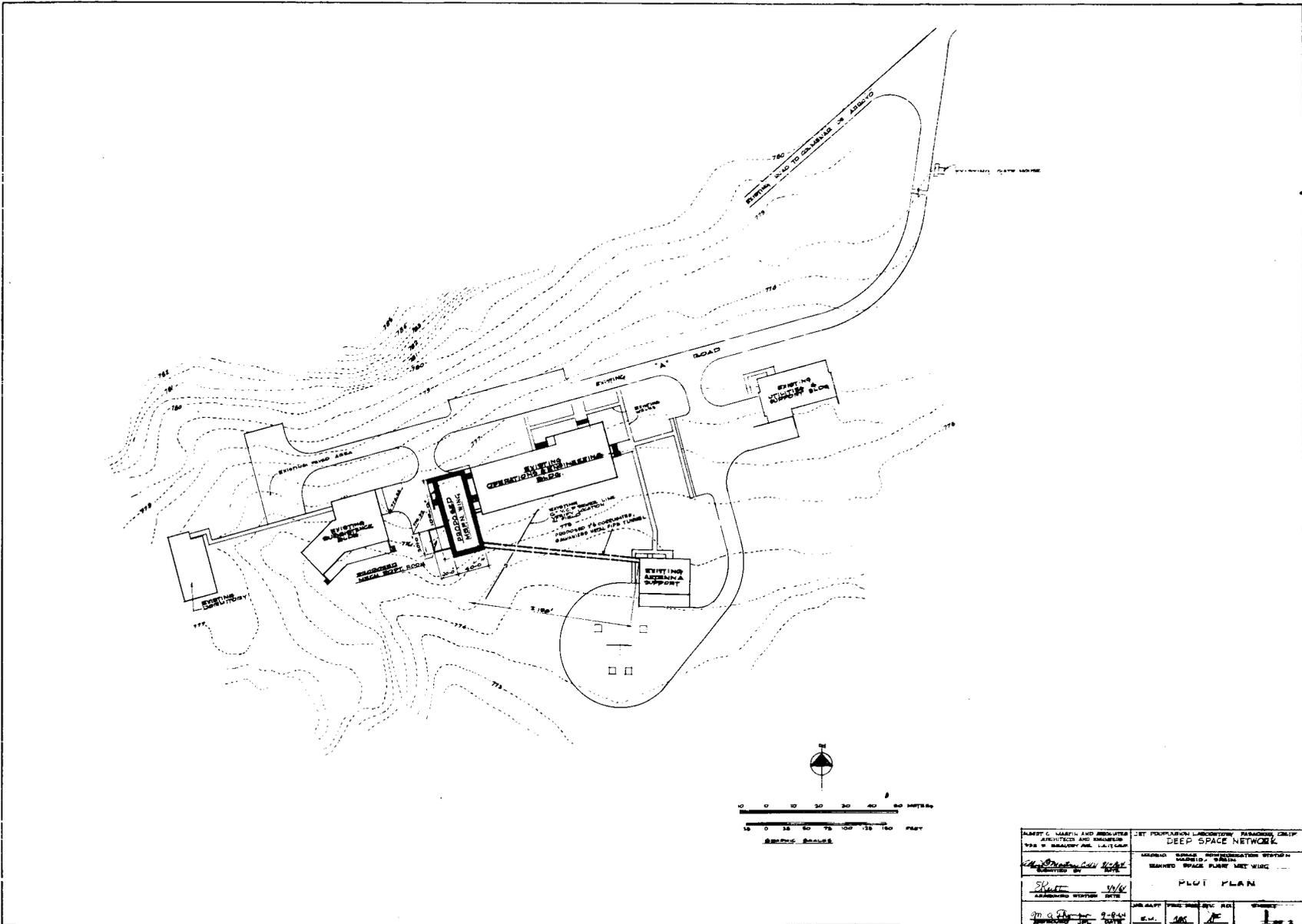
Architecturally, the addition will match the existing building.

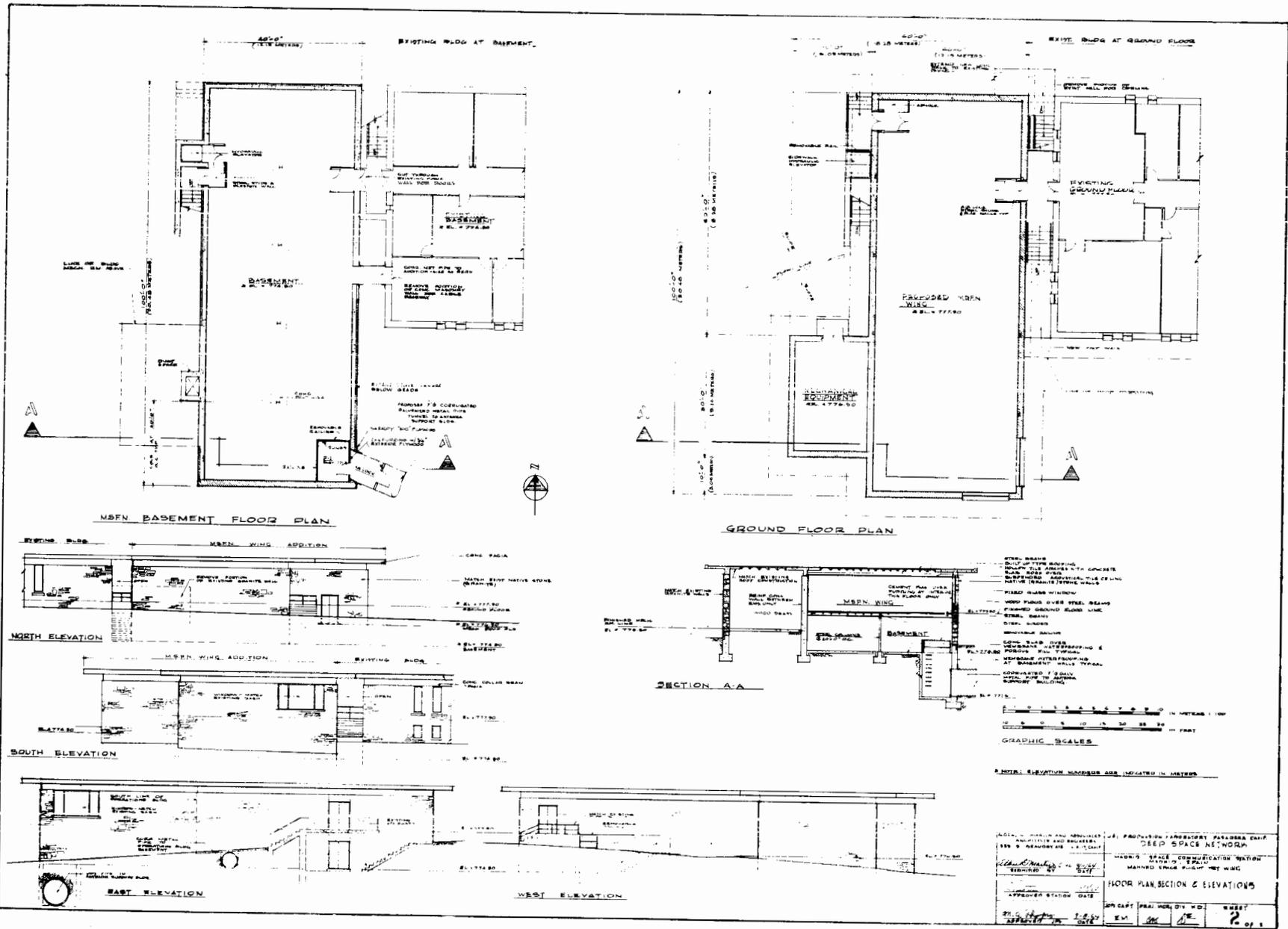
PROJECT JUSTIFICATION:

To support the lunar phases of the Apollo missions, three single prime 85 foot antenna stations are required at locations around the world, separated by approximately 120° of longitude, in order to provide continual spatial coverage. These prime Apollo antennas have been co-located with the Deep Space facilities to achieve maximum costs savings and to provide, in the near vicinity, a backup capability essential for Apollo missions in the event of a failure or malfunction of the single manned flight facility. To provide the deep space antenna with this capability, certain basic electronic equipment peculiar to Apollo support must be added to the station instrumentation. This equipment permits the transmission of data to the Apollo station for the major data handling and processing functions. The wing addition to the control building is required to house this equipment.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

GF 11-20





CF 11-21

1. DESIGN AND CONSTRUCTION 11-1-11 APPROVED BY DATE	2. PAULSON TRANSPORT PARTNERS EAST DESIGN SPACE NETWORK 11-1-11 3. WOODS BUILT COMMUNICATIONS PARTNERS 11-1-11 4. WOODS BUILT COMMUNICATIONS PARTNERS 11-1-11
<b>FLOOR PLAN SECTION &amp; ELEVATIONS</b>	
21.0 21.0 21.0	22.0 22.0 22.0
23.0 23.0 23.0	24.0 24.0 24.0
25.0 25.0 25.0	26.0 26.0 26.0
27.0 27.0 27.0	28.0 28.0 28.0
29.0 29.0 29.0	30.0 30.0 30.0
31.0 31.0 31.0	32.0 32.0 32.0
33.0 33.0 33.0	34.0 34.0 34.0
35.0 35.0 35.0	36.0 36.0 36.0
37.0 37.0 37.0	38.0 38.0 38.0
39.0 39.0 39.0	40.0 40.0 40.0
41.0 41.0 41.0	42.0 42.0 42.0
43.0 43.0 43.0	44.0 44.0 44.0
45.0 45.0 45.0	46.0 46.0 46.0
47.0 47.0 47.0	48.0 48.0 48.0
49.0 49.0 49.0	50.0 50.0 50.0
51.0 51.0 51.0	52.0 52.0 52.0
53.0 53.0 53.0	54.0 54.0 54.0
55.0 55.0 55.0	56.0 56.0 56.0
57.0 57.0 57.0	58.0 58.0 58.0
59.0 59.0 59.0	60.0 60.0 60.0
61.0 61.0 61.0	62.0 62.0 62.0
63.0 63.0 63.0	64.0 64.0 64.0
65.0 65.0 65.0	66.0 66.0 66.0
67.0 67.0 67.0	68.0 68.0 68.0
69.0 69.0 69.0	70.0 70.0 70.0
71.0 71.0 71.0	72.0 72.0 72.0
73.0 73.0 73.0	74.0 74.0 74.0
75.0 75.0 75.0	76.0 76.0 76.0
77.0 77.0 77.0	78.0 78.0 78.0
79.0 79.0 79.0	80.0 80.0 80.0
81.0 81.0 81.0	82.0 82.0 82.0
83.0 83.0 83.0	84.0 84.0 84.0
85.0 85.0 85.0	86.0 86.0 86.0
87.0 87.0 87.0	88.0 88.0 88.0
89.0 89.0 89.0	90.0 90.0 90.0
91.0 91.0 91.0	92.0 92.0 92.0
93.0 93.0 93.0	94.0 94.0 94.0
95.0 95.0 95.0	96.0 96.0 96.0
97.0 97.0 97.0	98.0 98.0 98.0
99.0 99.0 99.0	100.0 100.0 100.0

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

APOLLO WING, CANBERRA DEEP SPACE FACILITY

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Canberra, Australia

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$38,000
FY 1966 Estimate	<u>510,000</u>
Total Funding Through FY 1966	<u>\$548,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$510,000</u>
New wing (first floor)	Sq. Ft.	4,600	\$45.00	207,000
(basement)	Sq. Ft.	4,000	21.23	84,900
Utilities	LS	---	7,000	7,000
Engine generator	LS	---	91,700	91,700
Tunnel	LS	---	12,800	12,800
Site development	LS	---	3,200	3,200
Air conditioning	LS	---	103,400	103,400
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$510,000</u>

PROJECT PURPOSE:

This project provides for the construction of a Manned Space Flight Network (MSFN) wing addition to the existing Control Building at the Deep Space Station, Canberra, Australia which will house electronic equipments to permit this antenna system to serve as the essential backup to the prime Apollo station at Canberra.

PROJECT DESCRIPTION:

Exterior dimensions of the new wing are approximately 60 feet wide by 67 feet long. The building will consist of a basement area to serve as a raceway for equipment wiring and the air conditioning system plenum and a floor space of 4,000 square feet to contain the technical equipment. In addition, there will be a mechanical utility structure of approximately 600 square feet to house the required heating and air conditioning equipment for this wing.

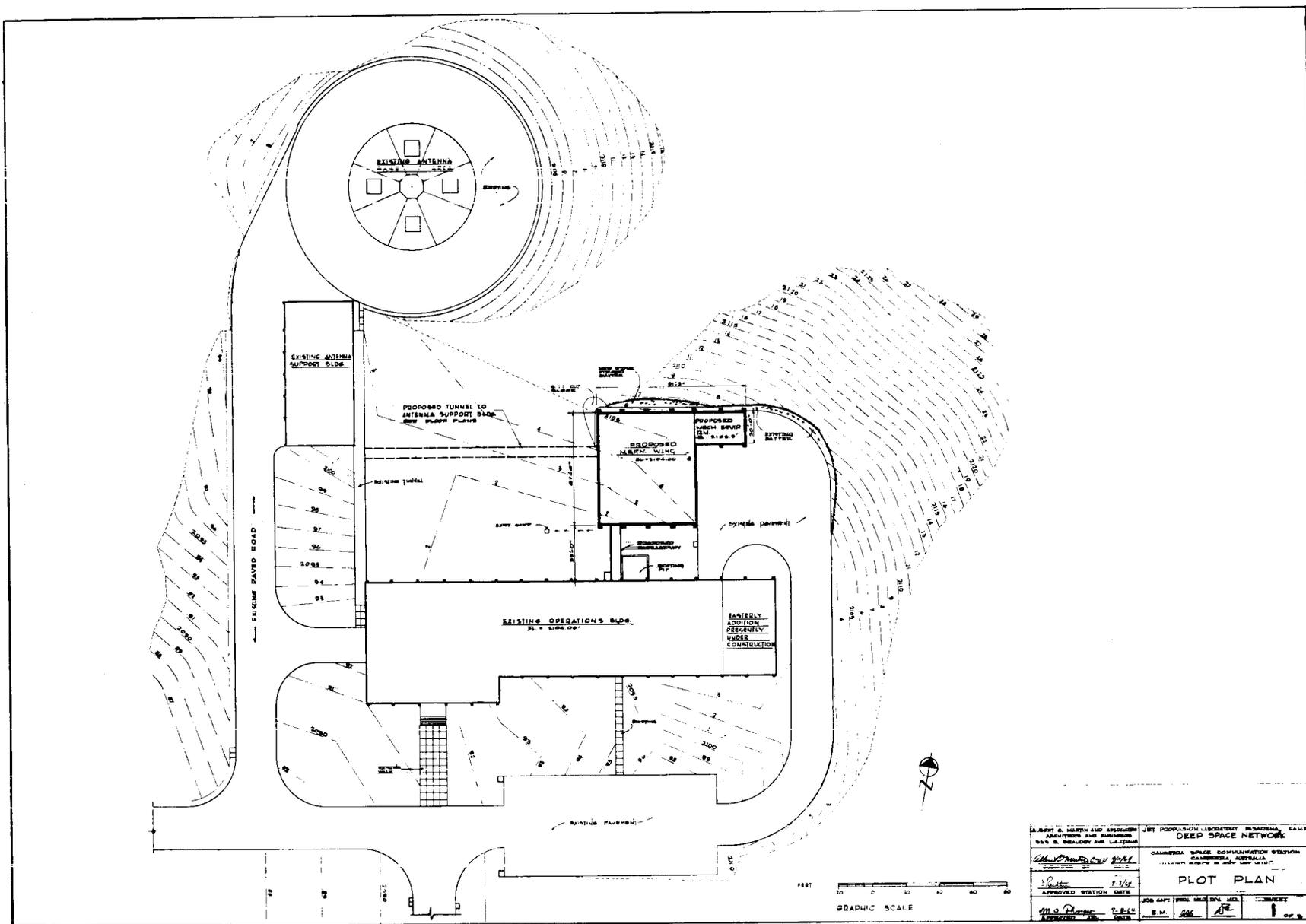
Architecturally, the addition will match the existing building.

PROJECT JUSTIFICATION:

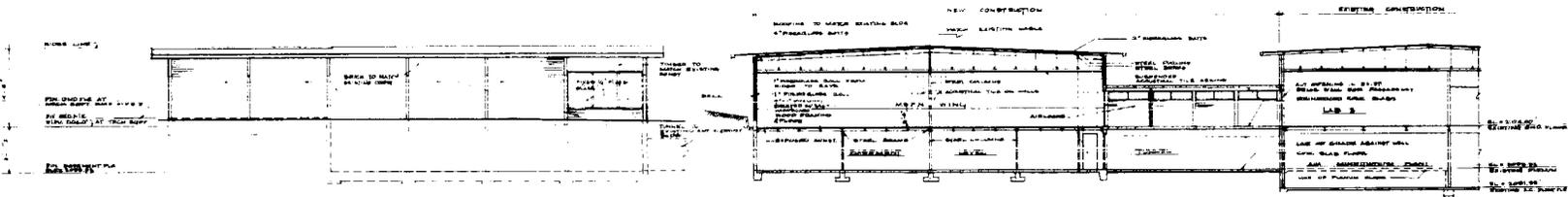
To support the lunar phases of the Apollo missions, three single , prime 85-foot antenna stations are required at locations around the world, separated by approximately 120° of longitude, in order to provide continual spatial coverage. These prime Apollo antennas have been co-located with the Deep Space facilities to achieve maximum cost savings and to provide, in the near vicinity, a backup capability essential for Apollo missions in the event of a failure or malfunction of the manned flight facility. To provide the deep space antenna with this capability, certain basic electronic equipment peculiar to Apollo support must be added to the station instrumentation. This equipment permits the transmission of data to the Apollo station for the major data handling and processing functions. The wing addition to the control building is required to house this equipment.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

CF 11-24

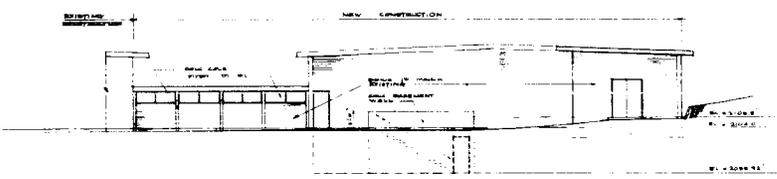


J. ROY & SONS ARCHITECTS ARCHITECTS AND ENGINEERS 285 S. BRADLEY AVE. LOS ANGELES <i>J. Roy</i> APPROVED STATION DATE	JET PROPULSION LABORATORY PASADENA, CALIF. <b>DEEP SPACE NETWORK</b> GARDNER SPACE COMMUNICATION STATION GARDNER, ARIZONA PLOT PLAN JOB CAPT. PHIL HARRIS, M.S. APPROVED DATE E.M. <i>PH</i> <i>PH</i> SHEET 1 OF 3
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NORTH ELEVATION

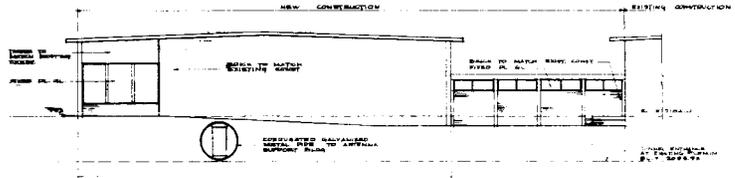
SECTION A-A



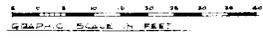
EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION



CF 11-25

ARCHITECTS ASSOCIATION ARCHITECTS AND ENGINEERS 888 S. MONROE AVE. SUITE 117 MELBOURNE, VIC. 3122 AUSTRALIA	PROJECT PROPONENT DEPARTMENT OF DEFENSE DEEP SPACE NETWORK CANBERRA SPACE COMMUNICATIONS CENTRE CANBERRA AUSTRALIA MANAGED SERVICE PROJECT NET KING
PROJECT TITLE SECTION & ELEVATIONS	DATE 11/21/01
JOB CAPT. PROJ. MGR. DWT. LIG.	SHEET NO. 3 OF 3



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

STADAN FACILITY EXPANSION

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Fairbanks, Alaska

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Extension and New

FUNDING:

FY 1965 and Prior Years	\$83,000
FY 1966 Estimate	<u>1,115,000</u>
Total Funding Through FY 1966	<u>\$1,198,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,115,000</u>
Operations building addition	Sq. Ft.	6,000	\$64.00	384,000
Utility and storage building - new	Sq. Ft.	7,900	56.33	445,000
Special air conditioning for high heat loss equipment	LS	---	85,000	85,000
Switchgear and transformers	LS	---	57,000	57,000
Utilities	LS	---	44,000	44,000
Site preparation, paving and landscaping	LS	---	36,000	36,000
Electrical distribution	LS	---	64,000	64,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<b><u>\$1,115,000</u></b>

**PROJECT PURPOSE:**

This project provides for additional technical operations area, maintenance area, and high-quality magnetic tape storage area at the STADAN Alaska Station. The expansion of technical and support facilities at this station is required to permit the NASA 85-foot Data Acquisition Facility (DAF) to effectively support and accommodate major scientific and application satellite program equipment.

**PROJECT DESCRIPTION:**

This project provides the construction of a new Utility and Storage Building of approximately 7,900 square feet and an addition to the Operations and Telemetry Building of approximately 6,000 square feet of technical area. The building construction will conform to the architectural appearance of the existing structures. Air-conditioning and humidity-temperature controls will be installed to provide the environment necessary for efficient operation of electronic equipment in all required areas. An elevated floor system will be installed in areas where electronic equipment cableways are necessary. The materials used in construction of the buildings shall be of the sub-arctic type especially suited to the extreme temperature ranges of the locale.

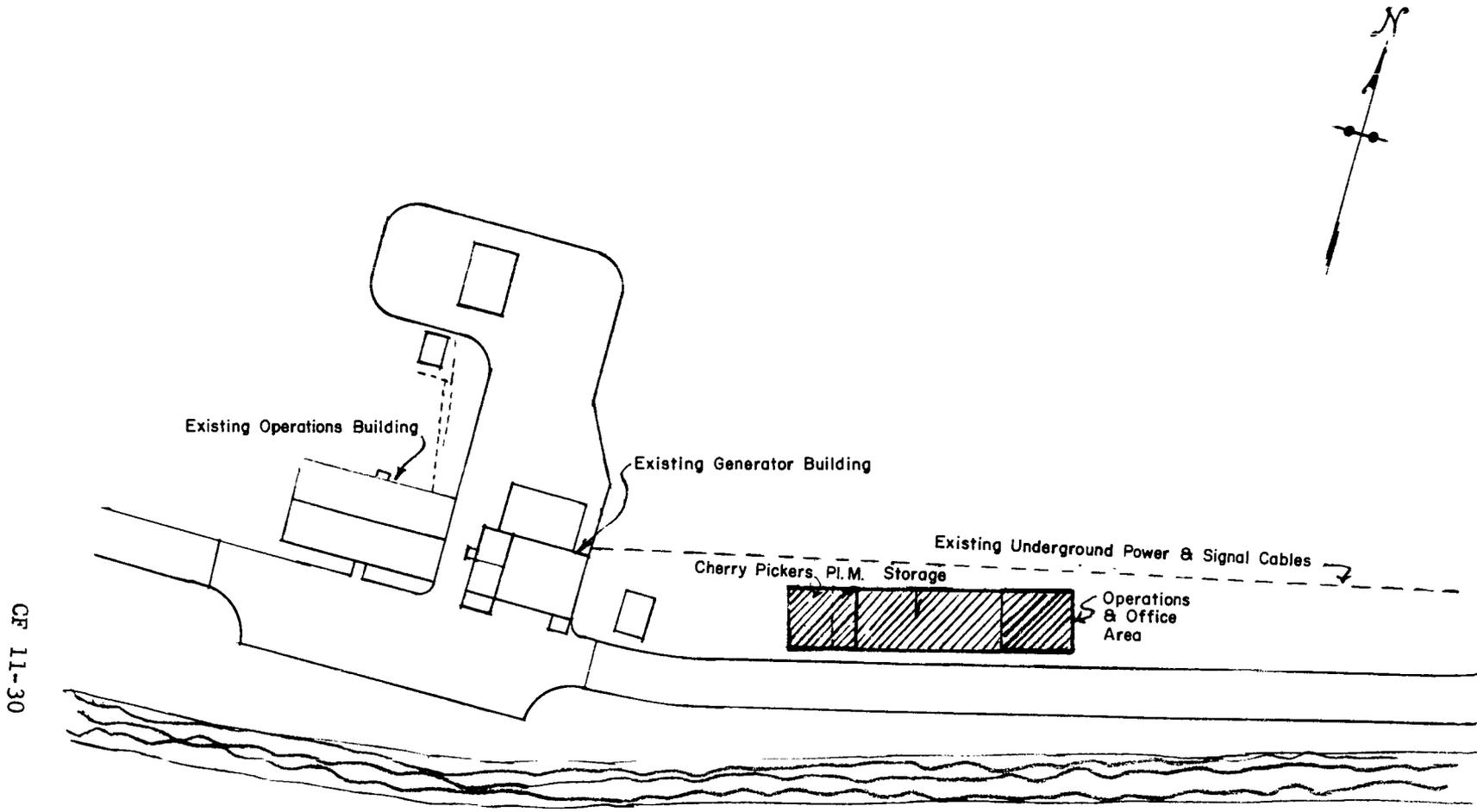
**PROJECT JUSTIFICATION:**

The Alaska 85-foot station was the first major Data Acquisition Facility (DAF) constructed by NASA and was completed prior to the full growth of the flight programs it is now required to support. Equipment installations necessary to properly support major scientific observatory programs have not only fully utilized the limited technical area, but have extended beyond this area, at the expense of needed maintenance and storage space. Additional spacecraft control and command consoles and wideband data transmission equipments have been and will be required at this facility in support of the meteorological and scientific observatory programs. These equipments are essential to the control, monitoring, and performance evaluation of the spacecraft in addition to the spacecraft experiments.

The Utility and Storage Building is necessary to house and adequately accommodate a combined electronic and hydraulic maintenance, vehicle maintenance, and related storage areas in support of the Alaska Facility complex. This area is especially critical for mass storage of high quality magnetic telemetry and computer tapes. Extreme weather conditions in the area restrict maintenance operations during a great part of the year. It is necessary that proper facilities be available to permit minimum maintenance under any weather condition. Space is also provided to install the electronics of the Minitrack interferometer system which will be moved to the DAF location from College, Alaska, to further consolidate operations and maintenance.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS  
FISCAL YEAR 1966 ESTIMATES  
**STADAN FACILITY, FAIRBANKS, ALASKA**  
STORAGE BUILDING

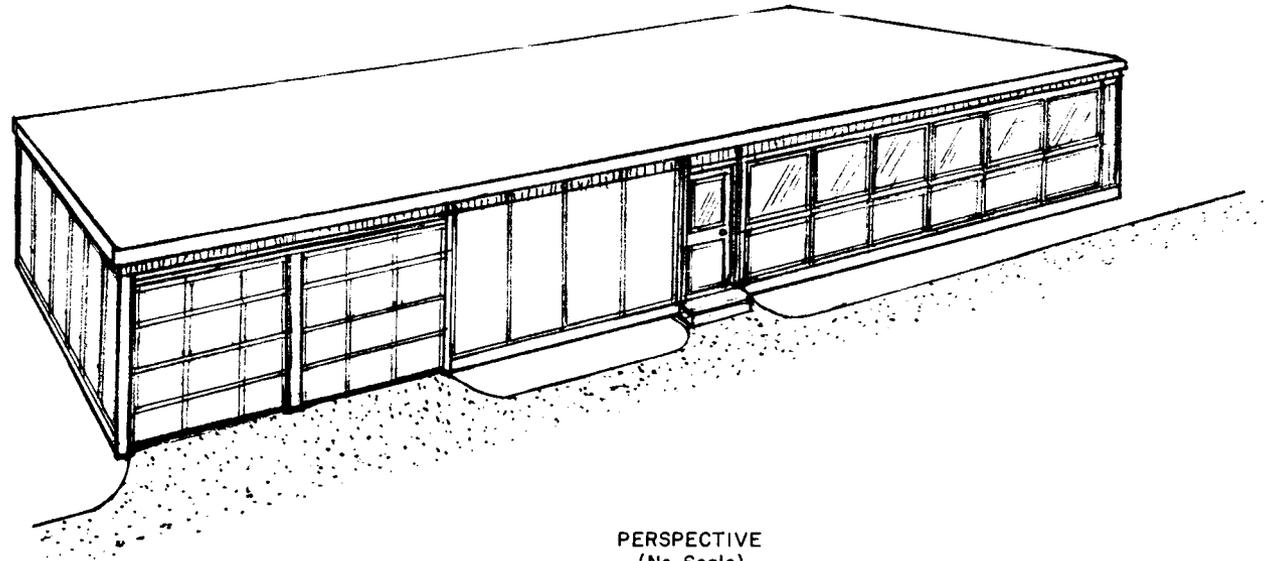


CF 11-30

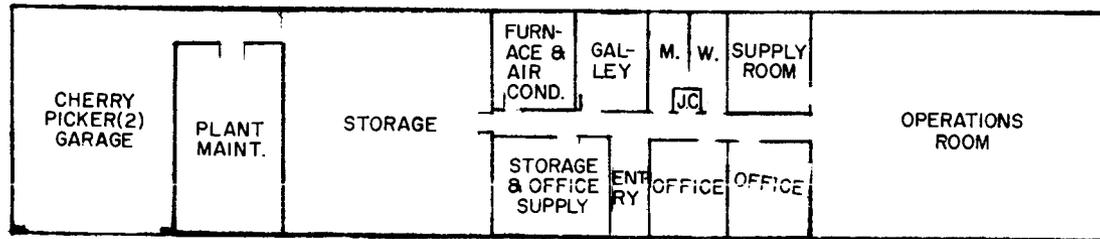
SITE PLAN  
(No Scale)

VARIOUS LOCATIONS  
 FISCAL YEAR 1966 ESTIMATES  
**STADAN FACILITY, FAIRBANKS, ALASKA**  
 STORAGE BUILDING

11-31



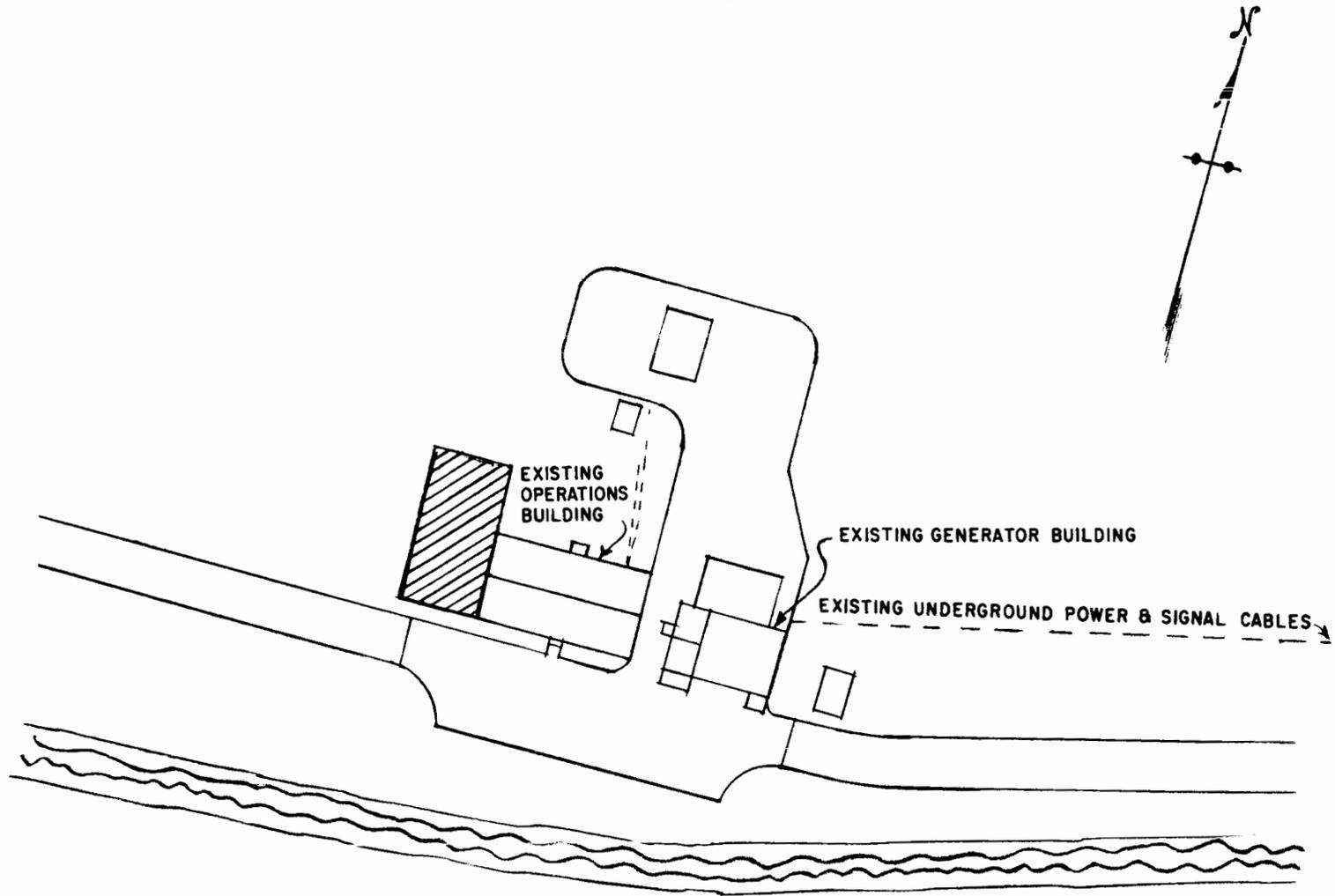
PERSPECTIVE  
 (No Scale)



PLAN  
 Scale: 1" = 30'-0"

GF 11-31

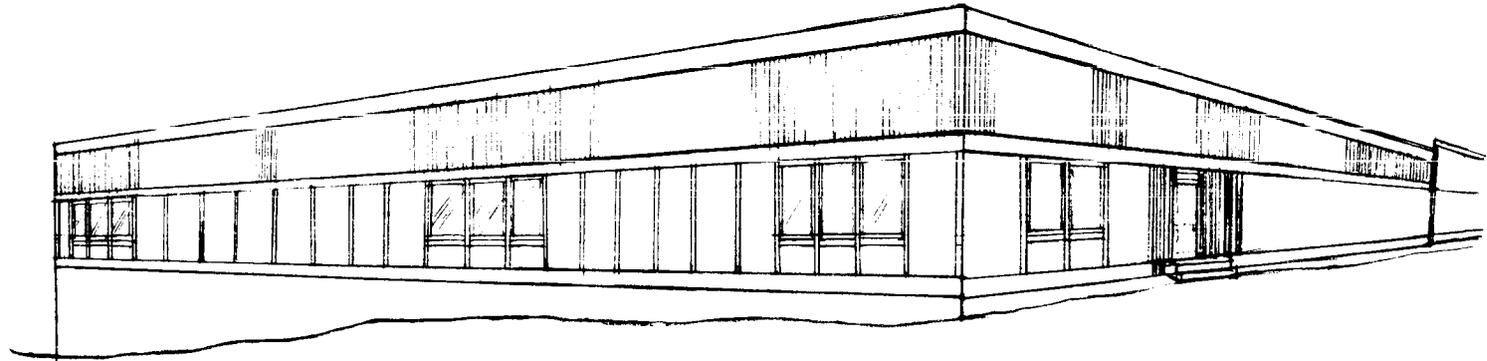
VARIOUS LOCATIONS  
FISCAL YEAR 1966 ESTIMATES  
**STADAN FACILITY, FAIRBANKS, ALASKA**  
ADDITION TO TELEMETRY BUILDING



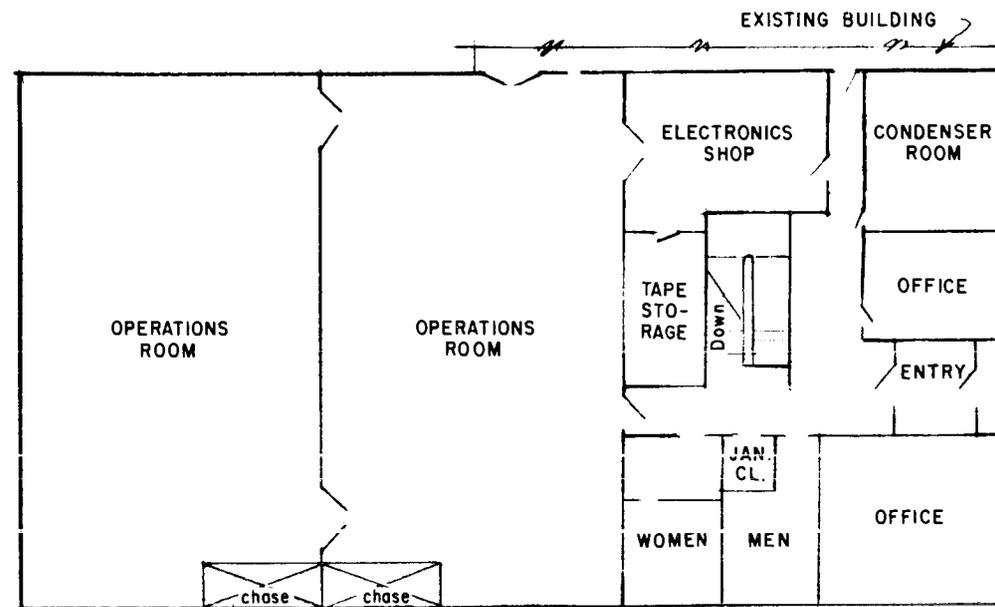
CF 11-32

SITE PLAN  
(No Scale)

VARIOUS LOCATIONS  
FISCAL YEAR 1966 ESTIMATES  
**STADAN FACILITY, FAIRBANKS, ALASKA**  
ADDITION TO TELEMETRY BUILDING



PERSPECTIVE  
(No Scale)



PLAN  
Scale: 1/16" = 1'-0"

CF 11-33

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
APOLLO NETWORK GROUND STATION

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Antigua, West Indies

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$162,000
FY 1966 Estimate	<u>2,700,000</u>
Total Funding Through FY 1966	<u>\$2,862,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	Acre	40	\$5,000	<u>\$200,000</u>
<u>Construction</u>				<u>\$2,500,000</u>
Instrumentation and operations building	Sq. Ft.	12,000	60	720,000
Generator building	Sq. Ft.	4,000	40	160,000
Collimation tower enclosure	LS	---	20,000	20,000
Generators, switchgear and transformers	LS	---	540,000	540,000
Utilities	LS	---	200,000	200,000
Fencing, roads, grading and landscaping	LS	---	125,000	125,000
Hydro-mechanical services	LS	---	40,000	40,000
Antenna and collimation tower foundations	LS	---	65,000	65,000
Collimation tower site grading and access roads	LS	---	100,000	100,000
Intra-site cable	LS	---	110,000	110,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Underground power and signal cables and electrical distribution	LS	---	\$120,000	\$120,000
Communications	LS	---	300,000	300,000
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
TOTAL				<u>\$2,700,000</u>

PROJECT PURPOSE:

This project provides for the construction of facilities required to install the Apollo S-Band System equipment at Antigua, West Indies, to support the orbital and lunar phases of the Apollo missions.

PROJECT DESCRIPTION:

The construction of an Operations Building and Generator Building (including generators, switchgear and transformers) is required. To support these structures and the antenna, site improvements including roads and grading, utility systems, and antenna and collimation tower foundations will be provided. Included in this project are funds for the acquisition of approximately 40 acres of land.

The Unified S-Band System, antenna and associated equipment for the Antigua Station, is being procured under prior year funding due to development and fabrication lead time involved.

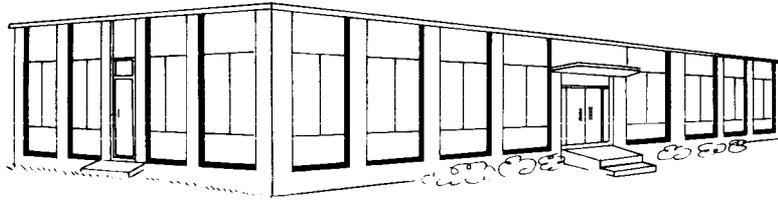
PROJECT JUSTIFICATION:

The Apollo flight program requires continuous coverage during the launch and insertion phases into orbit and during orbital checkout prior to the injection phase of a lunar mission. In order to provide network support to these orbital and lunar missions, in the launch azimuths of 90 to 108 degrees, this station at Antigua, West Indies, is considered mandatory. This project provides the facilities for the installation of the necessary S-Band tracking, telemetry reception, updata transmission and air-to-ground voice communication equipment.

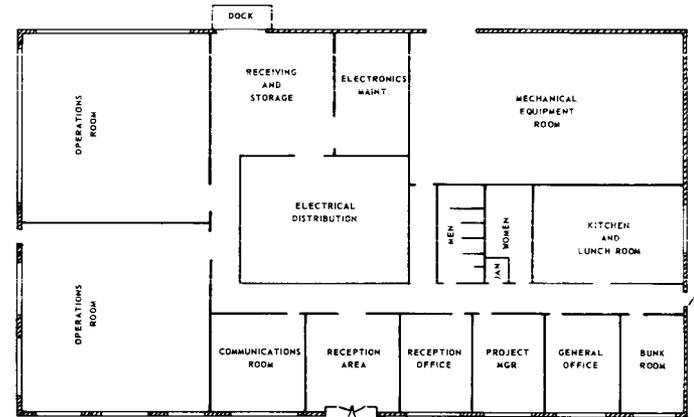
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS  
FISCAL YEAR 1966 ESTIMATES  
**APOLLO NETWORK GROUND STATION - ANTIGUA, W.I.**

**INSTRUMENTATION AND OPERATIONS BUILDING**

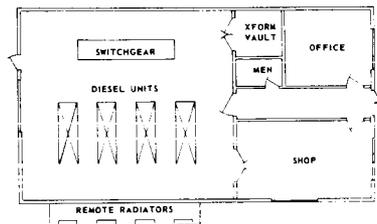


PERSPECTIVE

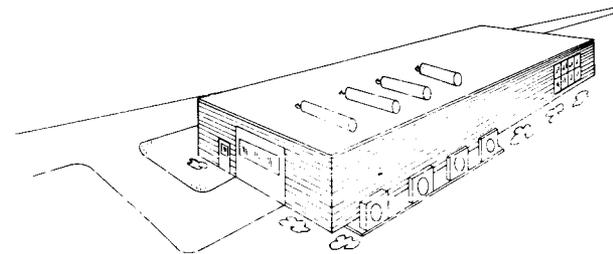


PLAN

**DIESEL-GENERATOR BLDG.**



PLAN



PERSPECTIVE

CF 11-36



CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
COMMUNITY SUPPORT FACILITIES

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Antigua, West Indies

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$210,000
FY 1966 Estimate	<u>3,090,000</u>
Total Funding Through FY 1966	<u>\$3,300,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction *</u>				<u>\$3,090,000</u>
Three (3) personnel buildings (officer-type quarters)	Sq. Ft.	18,000	\$55.56	1,000,000
One (1) personnel building (quonset-type building)	Sq. Ft.	4,000	30.00	120,000
Modifications to existing mess facility	Sq. Ft.	3,000	40.00	120,000
Cafeteria equipment	LS	---	80,000	80,000
Dry and cold storage addition (mess hall)	Sq. Ft.	2,500	36.00	90,000
Refrigeration equipment	LS	---	40,000	40,000
Laundry building addition	Sq. Ft.	4,000	35.00	140,000
Laundry equipment	LS	---	60,000	60,000
Power building addition	Sq. Ft.	4,000	55.00	220,000
Diesel generator	LS	---	70,000	70,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Diesel storage tank (150,000 gallon) including sitework, fencing, piping	LS	---	100,000	100,000
Water storage tanks, pumping stations and associated piping	LS	---	60,000	60,000
Sanitary and storm sewers	LS	---	70,000	70,000
General storage building	Sq. Ft.	4,800	37.50	180,000
Vehicle maintenance bldg. modifications	Sq. Ft.	1,600	31.25	50,000
Vehicle maintenance equipment	LS	---	25,000	25,000
Dispensary addition	Sq. Ft.	1,500	40.00	60,000
Dispensary equipment	LS	---	40,000	40,000
Recreation facilities addition	LS	---	150,000	150,000
Electrical distribution	LS	---	250,000	250,000
Site preparation and roads	LS	---	165,000	165,000
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	<u>None</u>
		<b>TOTAL</b>		<b><u>\$3,090,000</u></b>

\*The square foot and other construction costs are in conformance with previous construction agency (Navy) experience of construction on Antigua, West Indies.

**PROJECT PURPOSE:**

This project will provide for the construction of adequate community support facilities on the Island of Antigua to house and support the personnel of the Apollo Network Ground Station. These facilities augment the existing Air Force community.

**PROJECT DESCRIPTION:**

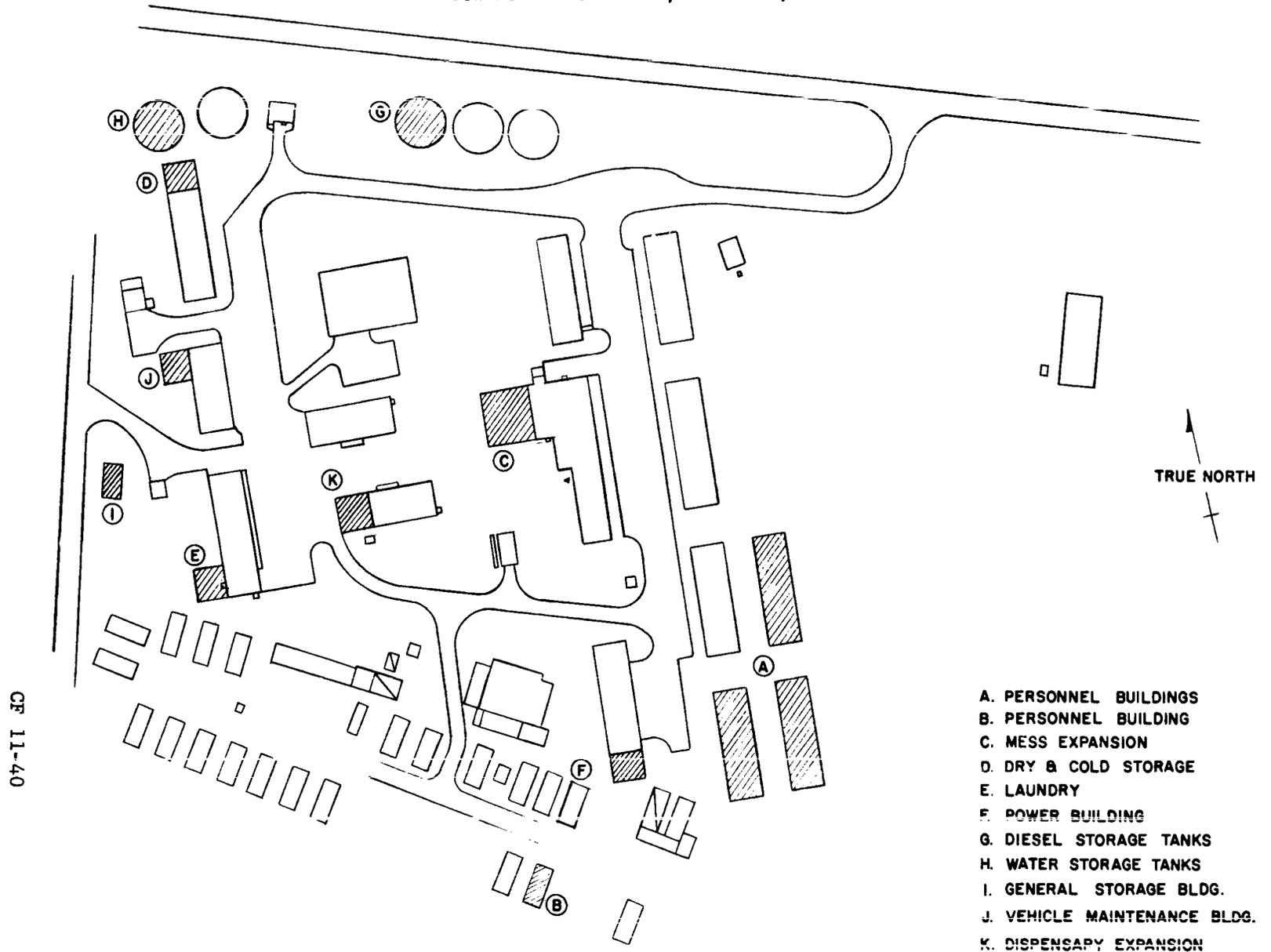
Community support facilities to be constructed consist of three (3) officer-type Barracks, a General Storage Building, additional Mess facilities, a Power Building addition, Water Storage tanks, Dispensary addition, and additional recreational facilities. Construction will be similar to the existing Air Base community facilities.

PROJECT JUSTIFICATION:

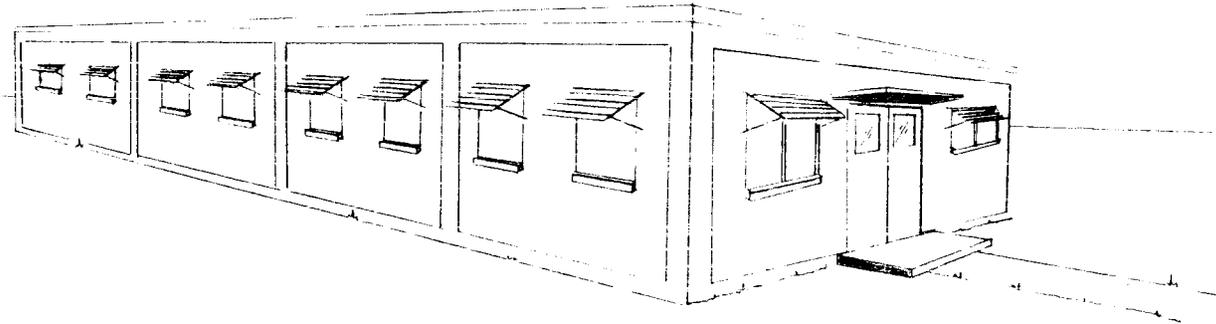
The Island of Antigua does not contain a population center adequate to house and support the Manned Space Flight Station personnel. The existing facilities located on the leased Coolidge Air Force Base are not adequate to support additional personnel. The construction of community support facilities is therefore required to support both the permanent and temporary duty personnel who will operate the Manned Space Flight Station.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

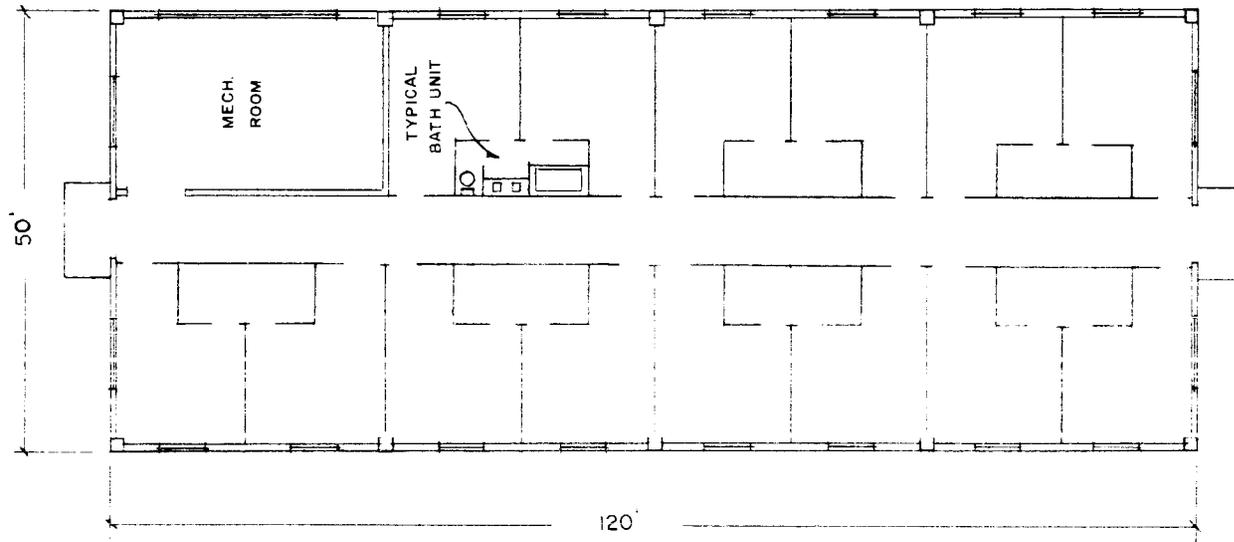
VARIOUS LOCATIONS  
 FISCAL YEAR 1966 ESTIMATES  
 COMMUNITY SUPPORT, ANTIGUA, W. I.



VARIOUS LOCATIONS  
FISCAL YEAR 1966 ESTIMATES  
**COMMUNITY SUPPORT, ANTIGUA, W. I.**  
PERSONNEL QUARTERS



PERSPECTIVE



CF 11-41

PLAN

CONSTRUCTION OF FACILITIES  
 FISCAL YEAR 1966 ESTIMATES  
APOLLO NETWORK GROUND STATION

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Grand Canary Island

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New and Extension

FUNDING:

FY 1965 and Prior Years	\$120,000
FY 1966 Estimate	<u>7,674,000</u>
Total Funding Through FY 1966	<u><u>\$7,794,000</u></u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,474,000</u>
Unified S-band antenna operations building	Sq. Ft.	5,600	\$33.04	185,000
Addition to existing telemetry building	Sq. Ft.	3,000	33.00	99,000
Raised floor system	Sq. Ft.	6,100	10.00	61,000
Generator building	Sq. Ft.	5,100	26.08	133,000
Hydro-mechanical building	Sq. Ft.	500	26.00	13,000
Generators, switchgear and transformers	LS	---	367,000	367,000
Utilities	LS	---	18,000	18,000
Site preparation, roads and fencing	LS	---	203,000	203,000
Electrical distribution and signal cabling	LS	---	350,000	350,000
Antenna foundations	LS	---	45,000	45,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Equipment</u>				<u>\$6,200,000</u>
Unified S-band 30 ft. antenna	Each	1	\$1,250,000	1,250,000
Unified S-band Apollo unique electronics	LS	---	255,000	255,000
Optical package	LS	---	30,000	30,000
Frequency standard	Each	1	50,000	50,000
TLM data processor	Each	1	400,000	400,000
TV monitor	Each	1	8,000	8,000
DCS data processor/encoder/modulator	LS	---	600,000	600,000
Systems consoles	Each	7	114,200	800,000
Group display	Each	1	100,000	100,000
Recorders	Each	3	84,300	253,000
Receiver and transmitter subsystems	LS	---	730,000	730,000
Ranging subsystem	LS	---	100,000	100,000
Test transponders	Each	2	50,000	100,000
Communications	LS	---	370,000	370,000
Spare parts	LS	---	454,000	454,000
Shipping, installation, integration and checkout	LS	---	700,000	700,000
<u>Design</u>	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	<u>None</u>
			<u>TOTAL</u>	<u>\$7,674,000</u>

PROJECT PURPOSE:

This project provides for the facility construction and the electronic equipment necessary to provide the Grand Canary Island manned flight station (now configured to support Gemini) with the full Apollo S-band capability for supporting the Apollo missions beginning in the third Quarter of Calendar Year 1967.

PROJECT DESCRIPTION:

The project provides the Apollo S-band system to fulfill the requirements of the Apollo orbital missions, and the facilities to accommodate the antenna and associated electronics.

Facilities required include an Antenna Operations Building, Power Building (with generators and switchgear), Hydro-Mechanical Building, and an expansion to the existing Telemetry Building. Also included are Antenna and

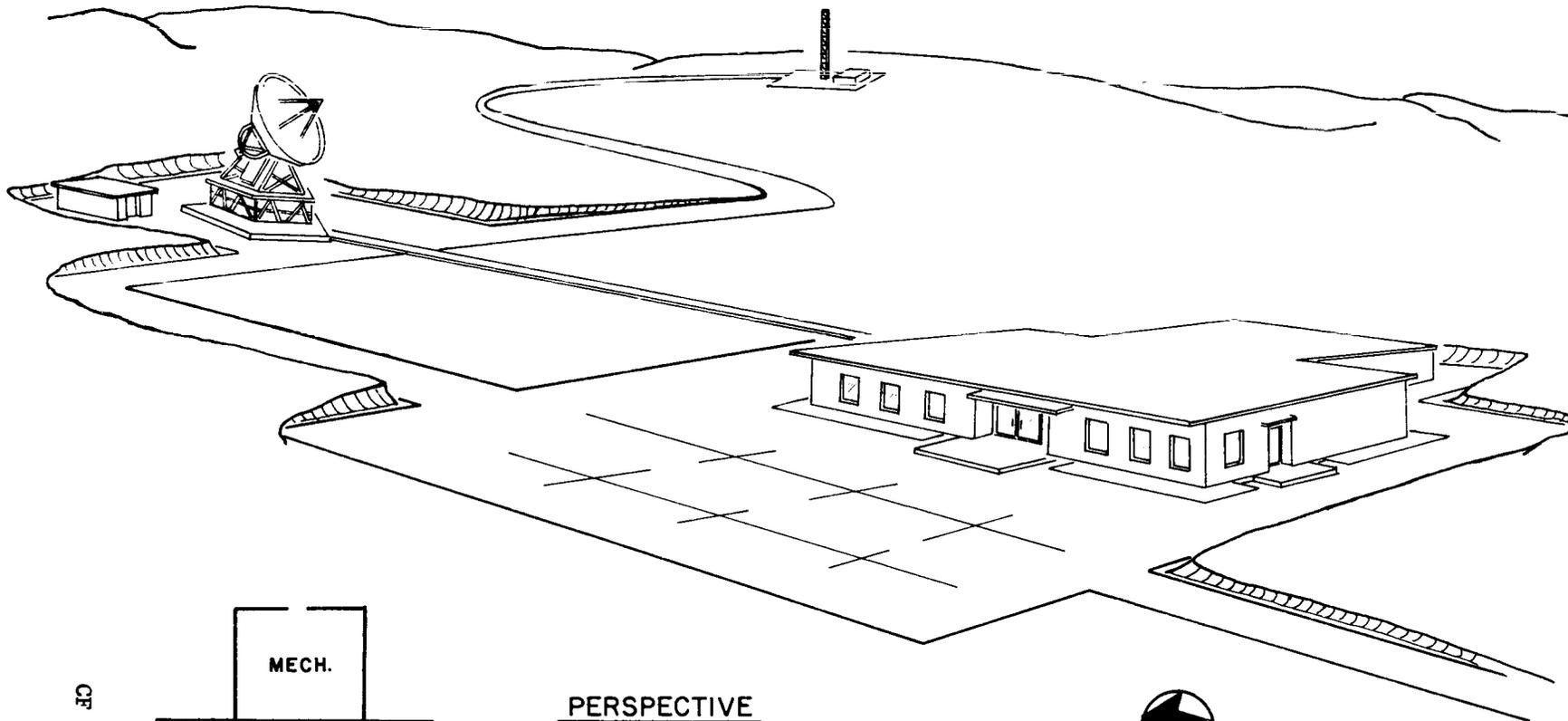
Collimation Tower foundations, sitework, roads and necessary utilities.

PROJECT JUSTIFICATION:

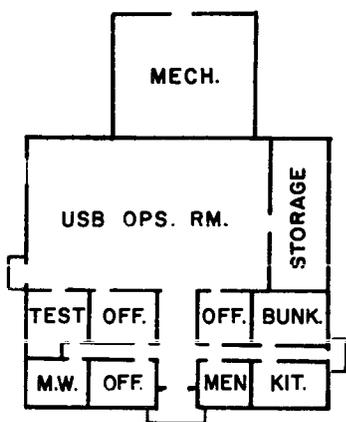
As a result of the normal and progressive refinement of Apollo flight program definition, the requirements on either an individual station or on network coverage may be altered. As a recent result of this process, it has been determined that ground support to the spacecraft for verification of orbital injection parameters on launch azimuths of 72 to 80 degrees and landing information for a sub-orbital abort, must be provided. In order to support these requirements, full Apollo S-band coverage from Grand Canary is necessary. The present station is configured solely for Gemini support. This limited capability is not adequate to meet the new Apollo requirements. Consequently, additional facilities and equipments are required to provide tracking, telemetry, updata transmission and air-to-ground voice communications to and from the Apollo spacecraft.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS,  
FISCAL YEAR 1966 ESTIMATES.  
APOLLO NETWORK GROUND STATION,  
GRAND CANARY ISLANDS



CF 11-45



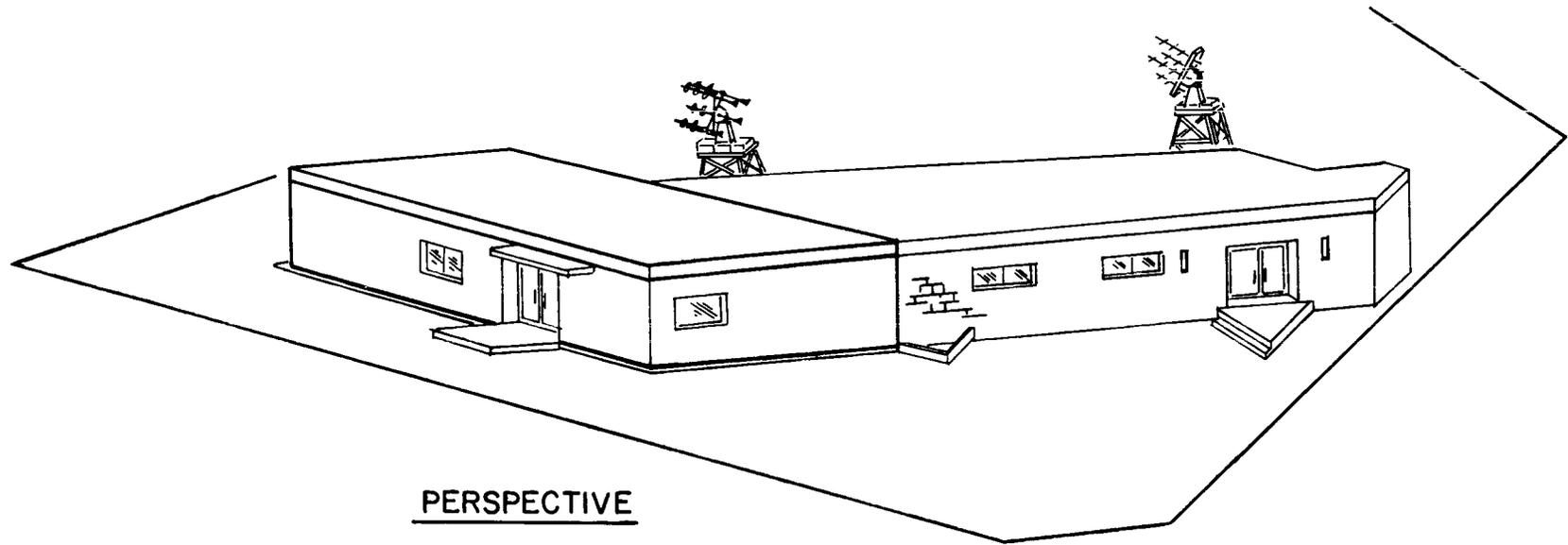
PERSPECTIVE



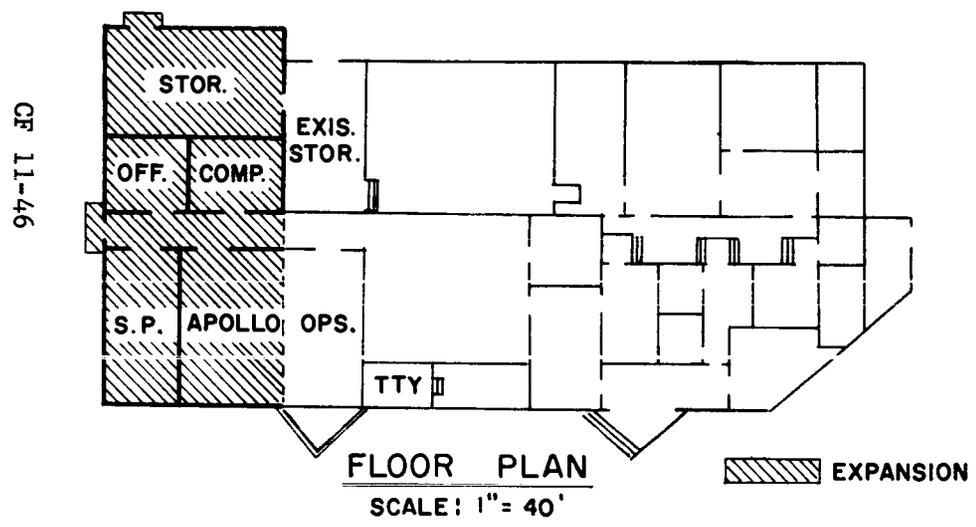
FLOOR PLAN  
SCALE: 1" = 40'

APOLLO - UNIFIED S-BAND FACILITY

VARIOUS LOCATIONS,  
FISCAL YEAR 1966 ESTIMATES.  
APOLLO NETWORK GROUND STATION,  
GRAND CANARY ISLANDS



PERSPECTIVE



T & C BUILDING EXPANSION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

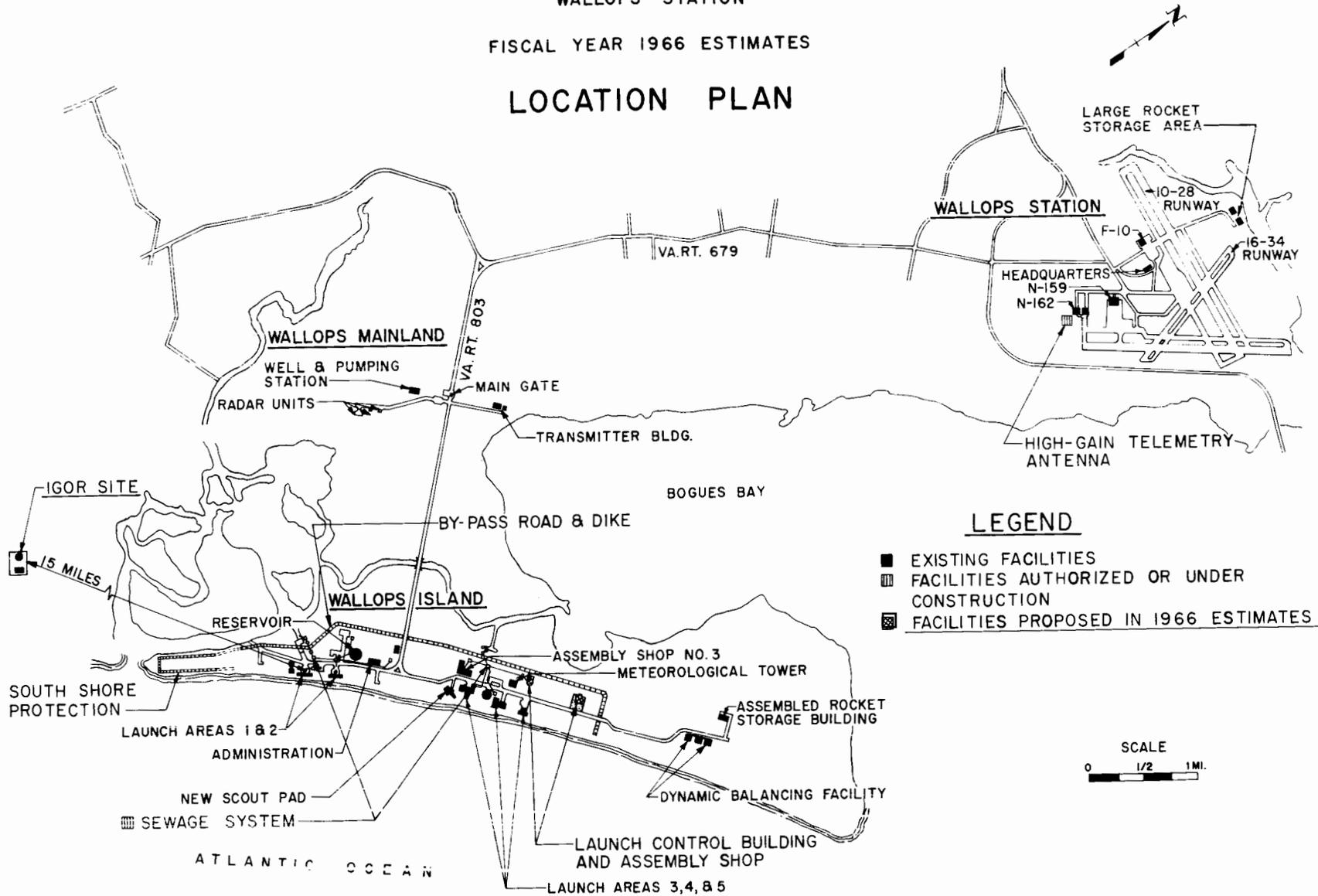
FISCAL YEAR 1966 ESTIMATES

WALLOPS STATION

	<u>Page No.</u>
Location plan.....	CF 12-1
Summary.....	CF 12-2
Office of Space Science and Applications Projects:	
Launch Control building.....	CF 12-3
Assembly shop.....	CF 12-10

WALLOPS STATION  
FISCAL YEAR 1966 ESTIMATES

LOCATION PLAN



LEGEND

- EXISTING FACILITIES
- ▣ FACILITIES AUTHORIZED OR UNDER CONSTRUCTION
- ▤ FACILITIES PROPOSED IN 1966 ESTIMATES



CF 12-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY		
WALLOPS STATION	Space Science & Applications	Eastern Shore of Virginia	Accomack, Virginia	40 Miles Northeast 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 and reduced to meaningful form, and analyzed.						
				PERSONNEL STRENGTH		
				FY 19 64	FY 19 65	FY 19 66
NASA PERSONNEL (End of Year)				530	530	530
CONTRACTOR AND OTHER PERSONNEL				209	227	223
<b>TOTAL ALL PERSONNEL</b>				<b>739</b>	<b>757</b>	<b>753</b>
				LAND		
				NO. ACRES		
NASA-OWNED				6,561.3		
OTHER GOVERNMENT AGENCY-OWNED				-0-		
NON-FEDERAL (Leases, easements)				9.4		
<b>TOTAL LAND</b>				<b>6,570.7</b>		
				TOTAL CAPITAL INVESTMENT		
				(Including NASA-Owned Lands as of June 30, 1964)		
				\$ 42,978.0		
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 59 THRU CURRENT YEAR	FY 19 60 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)	
Launch Control Building	OSSA	30.0	605.0	-0-	635.0	
Assembly Shop	OSSA	30.0	443.0	-0-	473.0	
ALL OTHER PROJECTS			\$36,525.0			
<b>TOTALS</b>			<b>36,585.0</b>	<b>1,048.0</b>		

CF 12-2

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

LAUNCH CONTROL BUILDING

AUTHORIZATION LINE ITEM: Wallops Station

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

LOCATION OF PROJECT: Wallops Island, Accomack County, Virginia

COGNIZANT NASA INSTALLATION: Wallops Station

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$30,000
FY 1966 Estimate	<u>605,000</u>
Total Funding Through FY 1966	<u>\$635,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$267,000</u>
Grading and piling	LS	---	\$28,900	28,900
Water and sewerage	LS	---	3,000	3,000
Electrical distribution	LS	---	18,300	18,300
Sub-station	LS	---	12,400	12,400
Roads and parking areas	LS	---	19,700	19,700
Launch control building	Sq. Ft.	3,160	58.45	184,700
<u>Equipment</u>				<u>\$138,000</u>
Cabling	LS		120,000	120,000
Trays	LS		55,000	55,000
Firing circuits	LS		48,000	48,000
Checkout consoles	LS		85,000	85,000
Control systems	LS		30,000	30,000

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<b><u>\$605,000</u></b>

PROJECT PURPOSE:

This project will provide a Launch Control Building (Blockhouse) for launch Pads Nos. 4 and 5 in the North Launch area to house the sounding rocket launch control, experiment monitoring consoles and personnel which are now squeezed into the Scout blockhouse.

PROJECT DESCRIPTION:

The proposed new facility will provide earth covered blast-resistant space for rocket launch control and check-out consoles on the first floor and cable termination racks and console interface equipment in the basement. The first floor will be a removable type floor system to allow complete access to cable trays and equipment in the basement. Space will be provided outside of the blast protected area for an office, toilet, storage, and mechanical and electrical equipment.

The blast protected area will consist of two floor levels approximately 28 feet by 36 feet. A one-story space will be provided for offices, toilet and building equipment approximately 28 feet by 32 feet. The facility electrical substation will be in an enclosure approximately 11 feet by 23 feet. The total area for the Launch Control Building is 3,165 square feet.

All portions of this facility will be of concrete construction with a steel joist framed roof, except the blast protected area which will have a concrete roof system with earth cover. A platform will be provided atop the earth fill for a television camera stand.

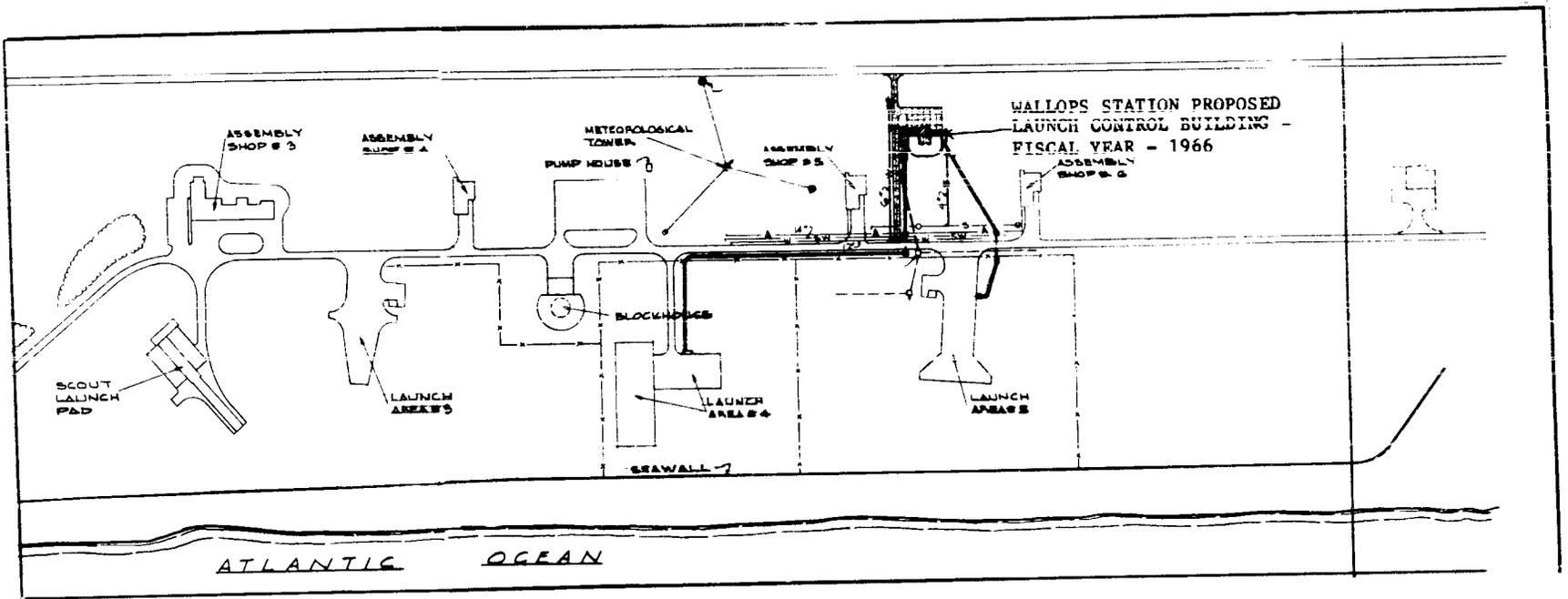
Concrete paving and extensions of existing station utilities systems will support the facility. Control cables in above-ground cable trays will connect the launch consoles with a small cable termination cubicle at Launch Pad No. 5, and with existing termination facilities at Launch Pad No. 4.

PROJECT JUSTIFICATION:

This project is required to relieve an overloaded condition that has existed for three years in this area. The north launch area supports flight programs such as radio-attenuation measurements, Trailblazer reentry heat-transfer experiments, space nuclear auxiliary power systems, solar-oriented control systems, meteor simulation, Vector solid-fuel rocket control systems,

component and system development programs, sounding rockets, and probes. The existing launch control building, which serves four pads and five launchers, is overcrowded on the upper level with two Scout checkout systems, a universal console, radio attenuate measurement console, and associated range interface equipment. The lower level is densely packed with cable entrances, termination racks, trays, and a launch programmer. The composite NASA/Air Force Scout launch schedule will require almost continuous use of the existing blockhouse, precluding the simultaneous use of Pads 4 and 5 for the sounding rocket program because of the severe overcrowding and congestion which now exists.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

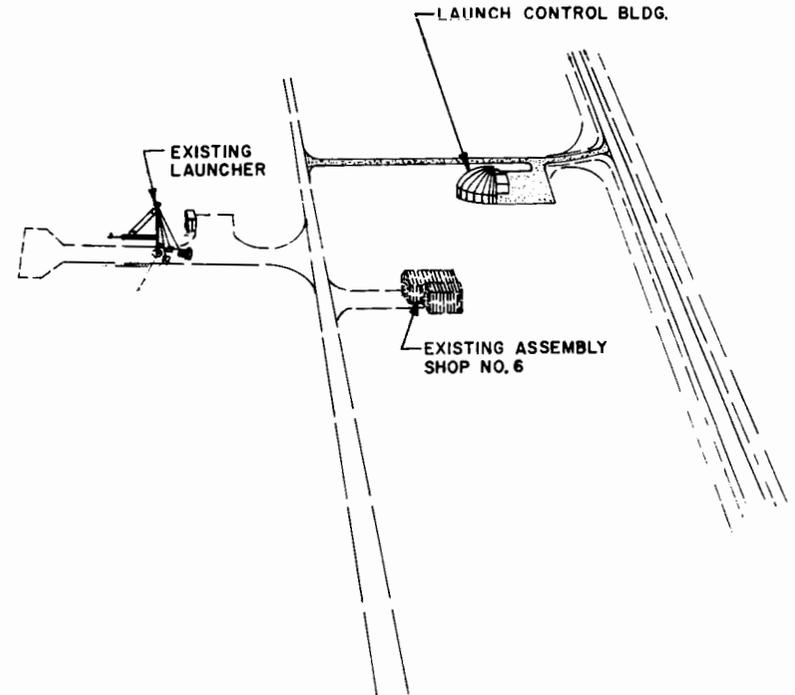
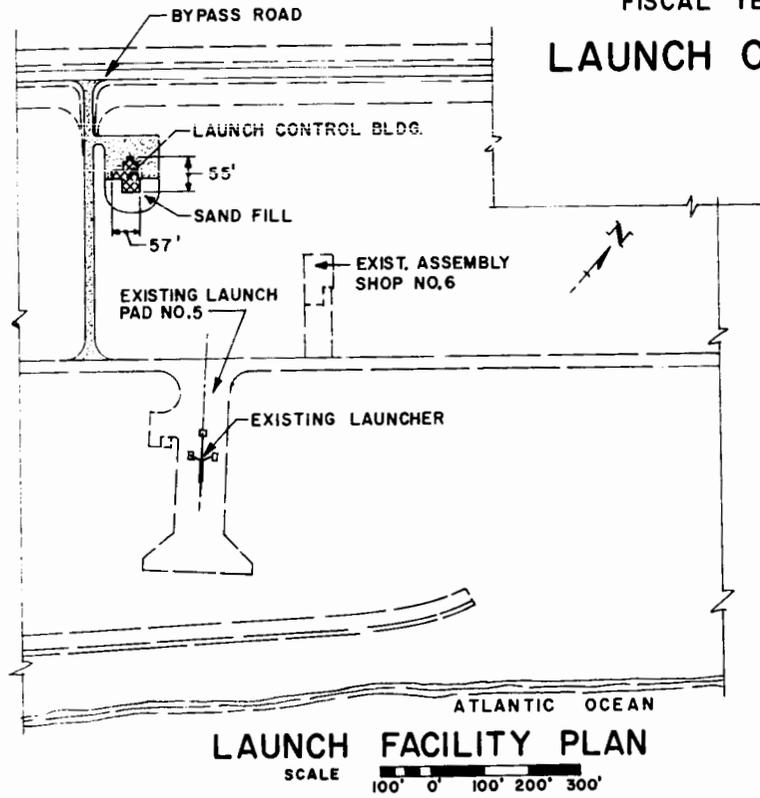


CF 12-6

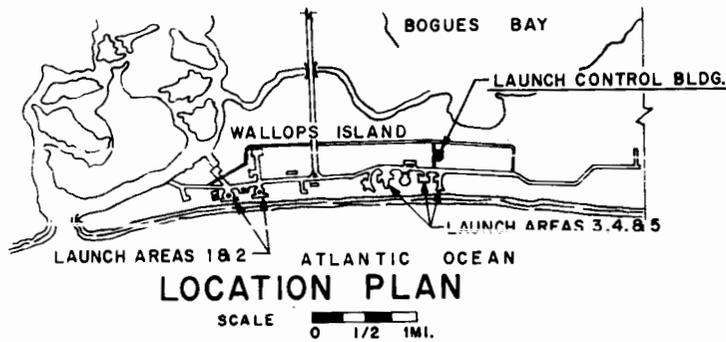


WALLOPS STATION  
 WASHINGTON, D. C.

WALLOPS STATION  
 FISCAL YEAR 1966 ESTIMATES  
**LAUNCH CONTROL BUILDING**



CF 12-7



PERSPECTIVE





CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

ASSEMBLY SHOP

AUTHORIZATION LINE ITEM: Wallops Station

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

LOCATION OF PROJECT: Wallops Island, Accomack County, Virginia

COGNIZANT NASA INSTALLATION: Wallops Station

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1965 and Prior Years	\$30,000
FY 1966 Estimate	<u>443,000</u>
Total Funding Through FY 1966	<u>\$473,000</u>

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$443,000</u>
Grading and piling	LS	---	\$29,700	29,700
Water and sewerage	LS	---	18,100	18,100
Electrical distribution	LS	---	15,800	15,800
Sub-station	LS	---	21,200	21,200
Roads and loading areas	LS	---	13,200	13,200
Assembly shop	Sq. Ft.	6,500	53.08	345,000
<u>Equipment</u>	---	---	---	---
<u>Design</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	<u>-0-</u>
		<b>TOTAL</b>		<u><u>\$443,000</u></u>

PROJECT PURPOSE:

This assembly shop will reduce the congestion and potential safety hazard that now exists in the North Sounding Rocket assembly area by providing three additional air-conditioned explosive safe assembly bays.

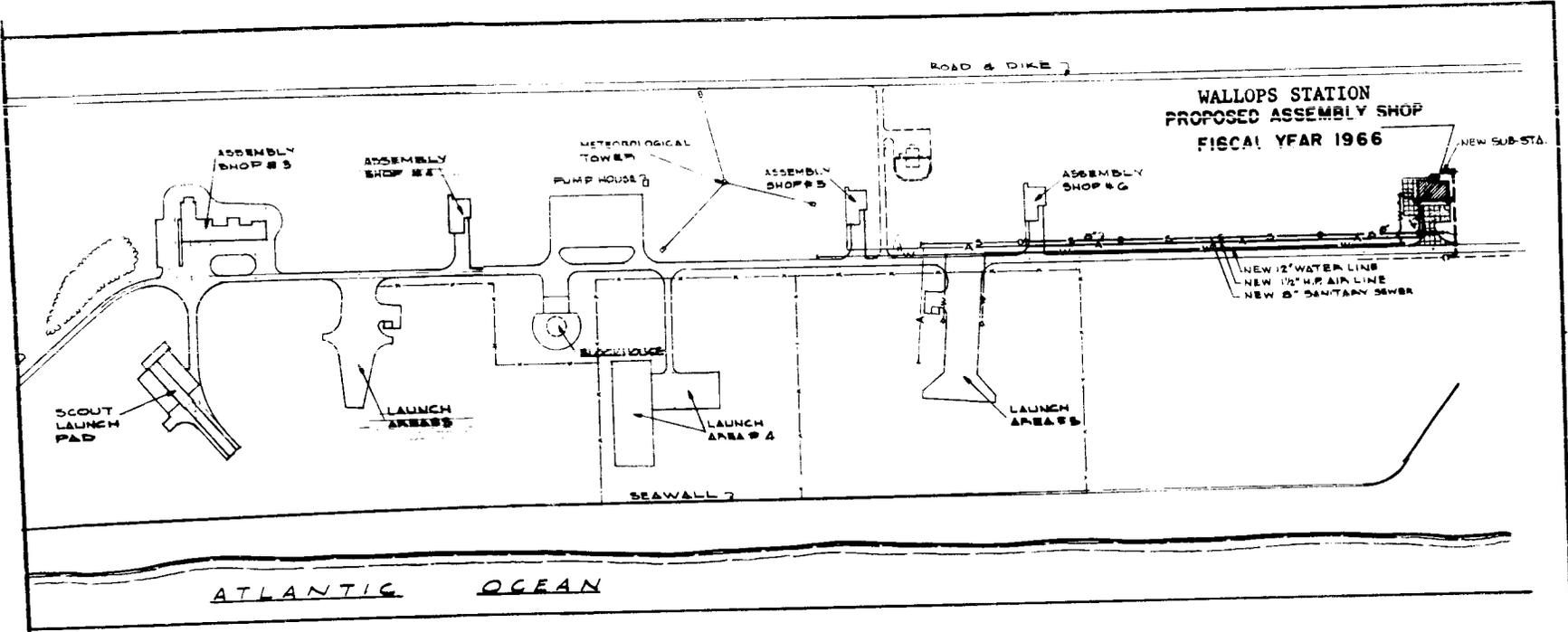
PROJECT DESCRIPTION:

This project will provide a 3 bay assembly building in the north launch area of Wallops Island containing 6,500 square feet of environmentally controlled space for the assembly and checkout of solid fuel, multi-stage rocket systems and payloads. Door and crane clearances will accommodate large payload-stage systems such as Wasp that require vertical assembly. The building will be constructed of structural steel, translucent panels, and 12-inch thick reinforced concrete bay separation walls. Utility requirements will be met by interfacing with existing water, sewerage, and power systems.

PROJECT JUSTIFICATION:

The existing assembly shop in the North Area is not capable of providing the required air-conditioned environment for the current and planned sounding rocket experiments such as ionospheric physics, energetic particles, aeronomy, Trailblazer, Wasp and SERT; nor is it possible to assemble and checkout the sounding rockets in an efficient manner due to the limited space available. It is planned that the sounding rocket stages will flow from the storage magazines to the proposed assembly bays for buildup. The completed stage will then be transferred to the large bay or to the existing shop depending upon the environmental requirements. There, the stages will be assembled into the completed vehicle and integrated with the payload for final combined prelaunch testing. The Assembly Shop is required to alleviate congestion that has been a serious problem for three years in the existing assembly areas, to provide a controlled environment capability for temperature and humidity sensitive fuel grains and payloads, and to avoid exceeding the explosive safety rating of the area. Continued operation with the present facilities alone will have a detrimental effect on vehicles, payloads, personnel and launch schedules.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

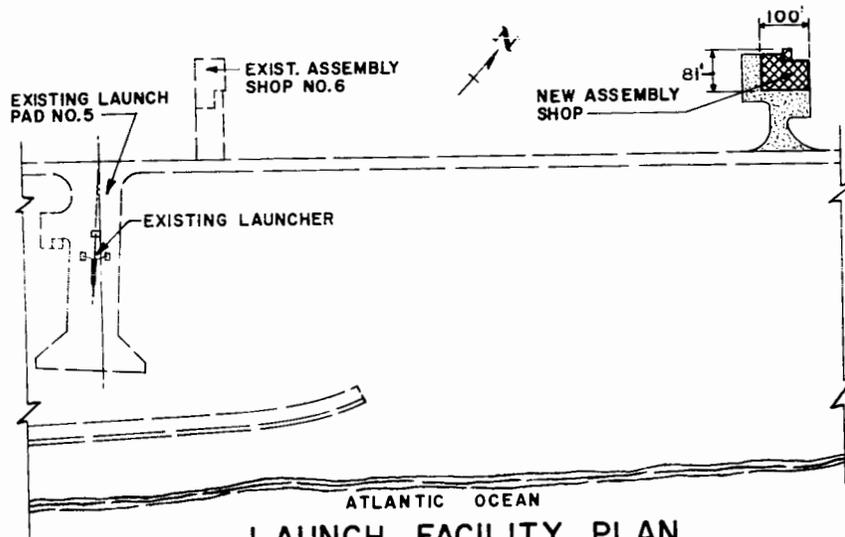


CF 12-12



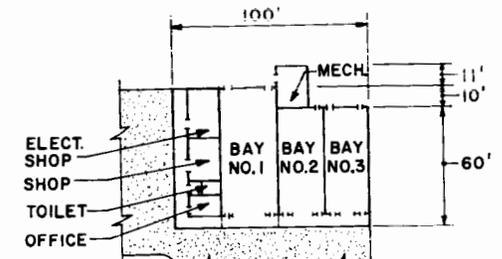
**WALLOPS STATION**  
 WALLOPS ISLAND, VIRGINIA

WALLOPS STATION  
 FISCAL YEAR 1966 ESTIMATES  
**ASSEMBLY SHOP**



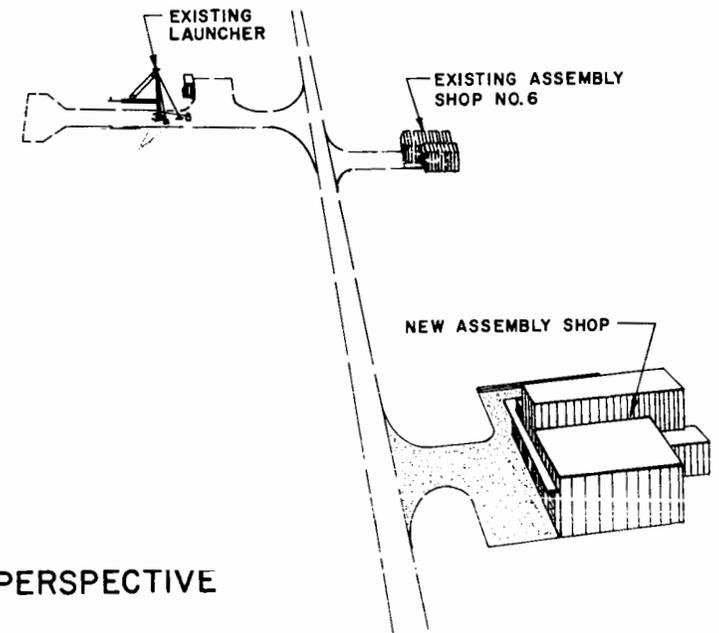
**LAUNCH FACILITY PLAN**

SCALE 0 100 200 300

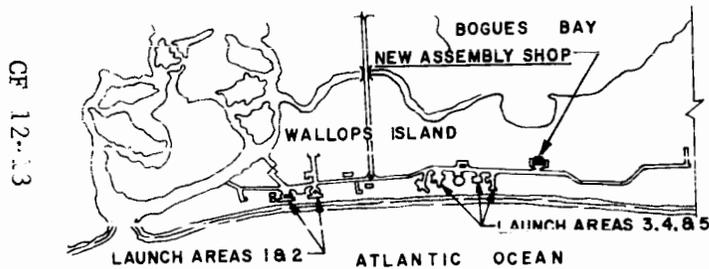


**ASSEMBLY SHOP PLAN**

SCALE 0' 20' 50' 75' 100'



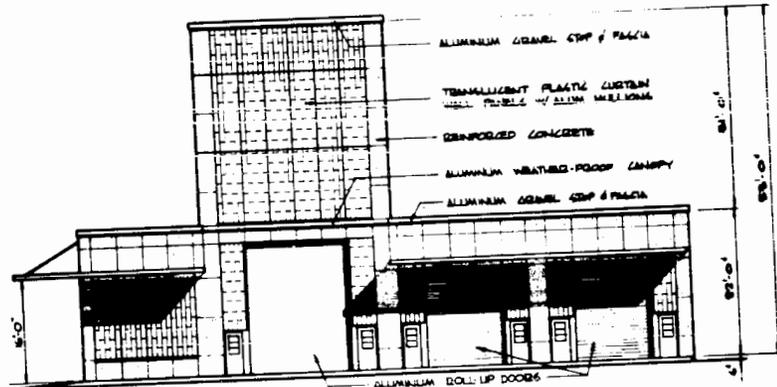
**PERSPECTIVE**



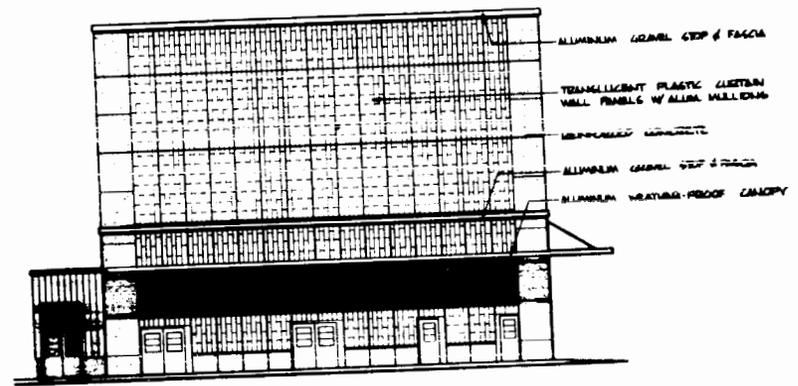
**LOCATION PLAN**

SCALE 0 1/2 1 MI.

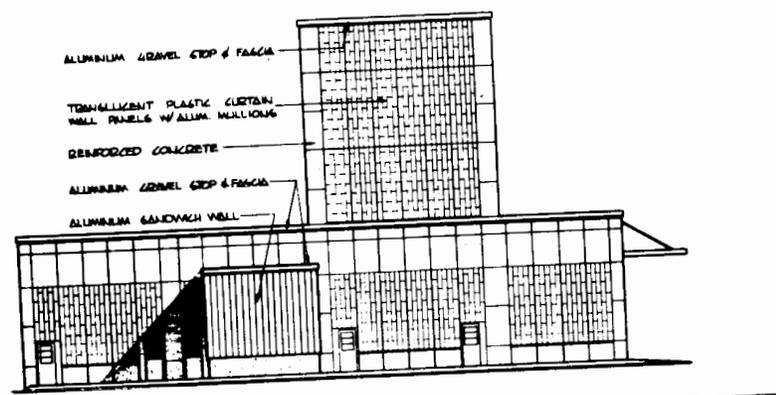
CF 12-63



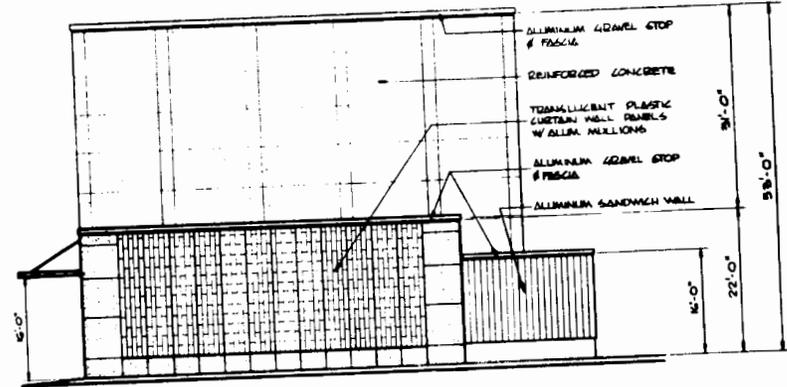
**SOUTHEAST ELEVATION**



**SOUTHWEST ELEVATION**



**NORTHEAST ELEVATION**



**NORTHWEST ELEVATION**

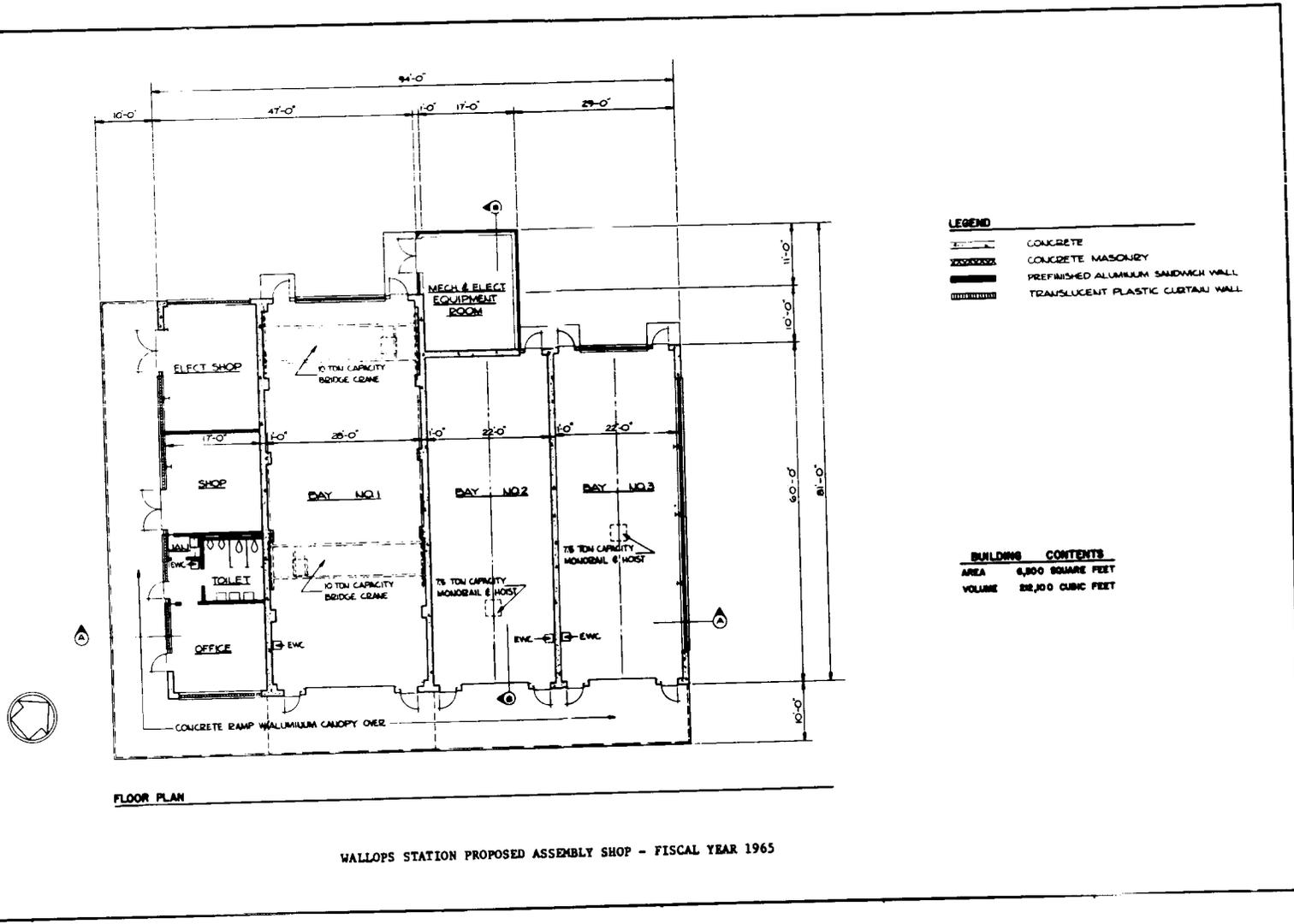
WALLOPS STATION PROPOSED ASSEMBLY SHOP - FISCAL YEAR 1966

CF 12-14



WALLOPS STATION  
WALLOPS ISLAND, VIRGINIA

CF 12-15

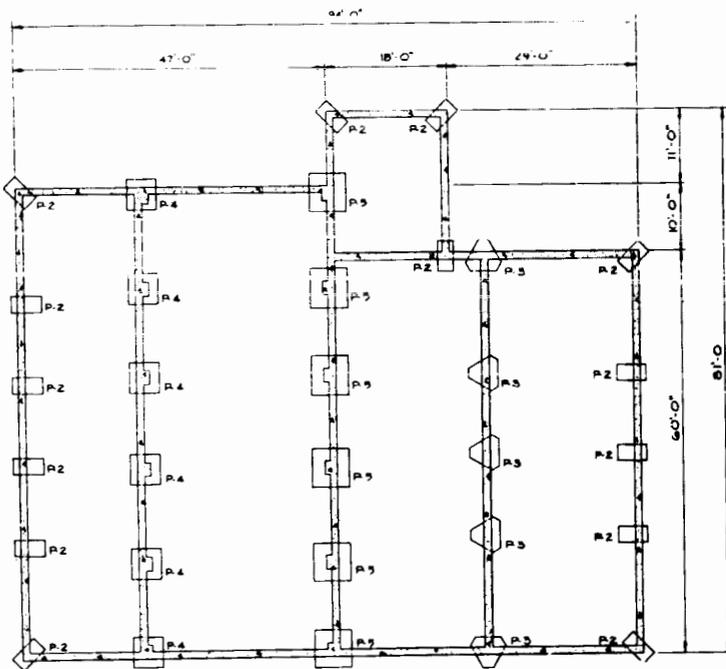


FLOOR PLAN

WALLOPS STATION PROPOSED ASSEMBLY SHOP - FISCAL YEAR 1965

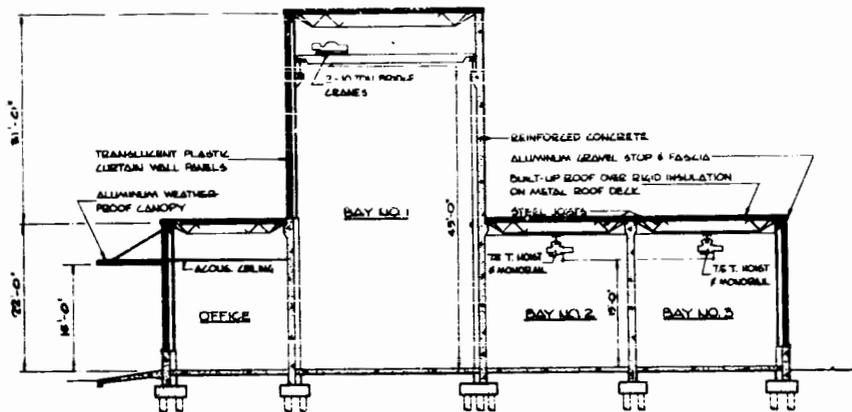


WALLOPS STATION  
WALLOPS ISLAND, VIRGINIA

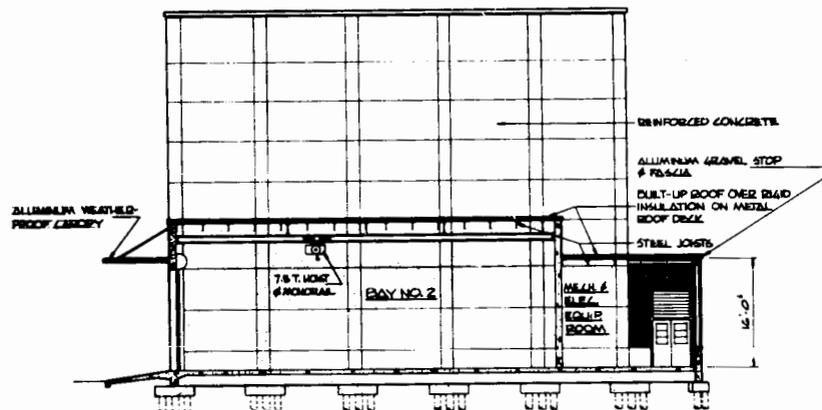


FOUNDATION PLAN

WALLOPS STATION PROPOSED ASSEMBLY SHOP - FISCAL YEAR 1966



SECTION "A-A"



SECTION "B-B"



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1966 ESTIMATES

FACILITY PLANNING AND DESIGN

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Office of the Associate Administrator (NASA General)	
Facility planning and design.....	CF 13-2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 66 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				PERSONNEL STRENGTH	FY 19	FY 19	FY 19
See Justification.				NASA PERSONNEL (End of Year)			
				CONTRACTOR AND OTHER PERSONNEL			
				<b>TOTAL ALL PERSONNEL</b>	Not Applicable		
				LAND	NO. ACRES		
				NASA-OWNED			
				OTHER GOVERNMENT AGENCY-OWNED			
				NON-FEDERAL (Leases, easements)			
				<b>TOTAL LAND</b>			
				<b>TOTAL CAPITAL INVESTMENT</b>	\$		
				<i>(Including NASA-Owned Land) (as of June 30, 19</i>			
PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 62 THRU CURRENT YEAR	FY 19 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)		
Facility Planning and Design	AA	\$43,937.0	\$7,500.0	Not Applicable	Not Applicable		
ALL OTHER PROJECTS							
<b>TOTALS</b>			<sup>1/</sup> (\$43,937.0)	\$7,500.0			

CF 13-1

NASA FORM 1029 (REV. NOV 64) PREVIOUS EDITIONS ARE OBSOLETE.

<sup>1/</sup> This amount is "non-add"; has been distributed in the appropriate installation summary sheets.

CONSTRUCTION OF FACILITIES  
FISCAL YEAR 1966 ESTIMATES  
FACILITY PLANNING AND DESIGN

AUTHORIZATION LINE ITEM: Facility Planning and Design

PROGRAM OFFICE: Office of the Associate Administrator (NASA General)

FUNDING:

FY 1965 and Prior Years	\$43,937,000
FY 1966 Estimate	<u>7,500,000</u>
Total Funding Through FY 1966	<u>\$51,437,000</u>

DESCRIPTION:

The funds requested under this item are required for advanced facility planning and design on projects for which construction funds may be requested in subsequent budgets.

JUSTIFICATION:

Long-range plans in several program areas must anticipate the need for the construction of facilities beyond the budget year for which estimates are being submitted. A considerable saving in time and an increase in the accuracy of construction cost estimates is possible with the availability of a facility planning and design fund which can be used to initiate the design of high-priority facilities prior to the enactment of project authorization and the appropriation of funds.

With these funds, NASA will continue as an on-going and continuing activity the general activity of facility planning and design of future construction projects which have not as yet been authorized or for which appropriations have not been made. NASA will also continue to make special project studies, feasibility studies, and other studies necessary to develop and improve overall criteria and standards for the design and construction of facilities.

CF 13-2