National Aeronautics and Space Administration

BUDGET ESTIMATES

FISCAL YEAR 1968

Volume III

CONSTRUCTION OF FACILITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

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VOLUME III

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1968 ESTIMATES

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

	Fiscal Year 1966	Fiscal Year 1967	Fiscal Year 1968
Budget Activity			
1. Manned Space Flight.....	$17,477,496	$43,821,000	$27,900,000
2. Scientific Investigations in Space.....	8,024,300	4,879,000	6,985,000
3. Space Applications.....	---	---	---
4. Space Technology.....	13,435,000	8,589,000	8,335,000
5. Aircraft Technology.....	682,000	21,011,000	3,170,000
6. Supporting Activities.....	18,589,160	6,700,000	7,810,000
Total Budget Plan.....	$58,207,956	$85,000,000	$54,200,000
Financing:			
Appropriation.....	$60,000,000	$83,000,000	$54,200,000
Transferred from "Research and development" (79 Stat. 534 and 80 Stat. 676).....	940,300	2,000,000	---
Appropriation (adjusted).....	60,940,300	85,000,000	54,200,000
Reprogramming to or from prior year budget plans....	-2,732,344	---	---
Total financing of budget plan.....	$58,207,956	$85,000,000	$54,200,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1968 ESTIMATES

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

	Fiscal Year 1966	Fiscal Year 1967	Fiscal Year 1968
1. MANNED SPACE FLIGHT.....	$17,477,496	$43,821,000	$27,900,000
John F. Kennedy Space Center, NASA.....	6,029,570	34,021,000	22,595,000
Manned Spacecraft Center.....	4,180,000	9,100,000	2,425,000
Marshall Space Flight Center.	1,955,690	---	870,000
Michoud Assembly Facility....	296,819	700,000	2,010,000
Various Locations.....	5,015,417	---	---
2. SCIENTIFIC INVESTIGATIONS IN SPACE.....	$8,024,300	$4,879,000	$6,985,000
Ames Research Center.....	2,749,000	---	2,195,000
Goddard Space Flight Center..	2,400,000	---	565,000
Jet Propulsion Laboratory....	940,300	350,000	1,195,000
John F. Kennedy Space Center, NASA.....	887,000	1,737,000	2,290,000
Various Locations.....	---	2,587,000	---
Wallops Station.....	1,048,000	205,000	740,000
3. SPACE APPLICATIONS.....	---	---	---
4. SPACE TECHNOLOGY.....	$13,435,000	$8,589,000	$8,335,000
Electronics Research Center..	5,000,000	7,500,000	6,220,000
Langley Research Center.....	7,568,000	1,089,000	---
Lewis Research Center.....	867,000	---	2,115,000
5. AIRCRAFT TECHNOLOGY.....	$682,000	$21,011,000	$3,170,000
Ames Research Center.....	---	---	3,170,000
Langley Research Center.....	682,000	5,011,000	---
Lewis Research Center.....	---	16,000,000	---

	Fiscal Year 1966	Fiscal Year 1967	Fiscal Year 1968
6. SUPPORTING ACTIVITIES.....	$18,589,160	$6,700,000	$7,810,000
Goddard Space Flight Center.	---	710,000	---
Jet Propulsion Laboratory...	---	---	1,930,000
Various Locations.....	14,361,000	990,000	2,880,000
Facility Planning and Design.....	4,228,160	5,000,000	3,000,000
TOTAL PLAN.....	$58,207,956	$85,000,000	$54,200,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

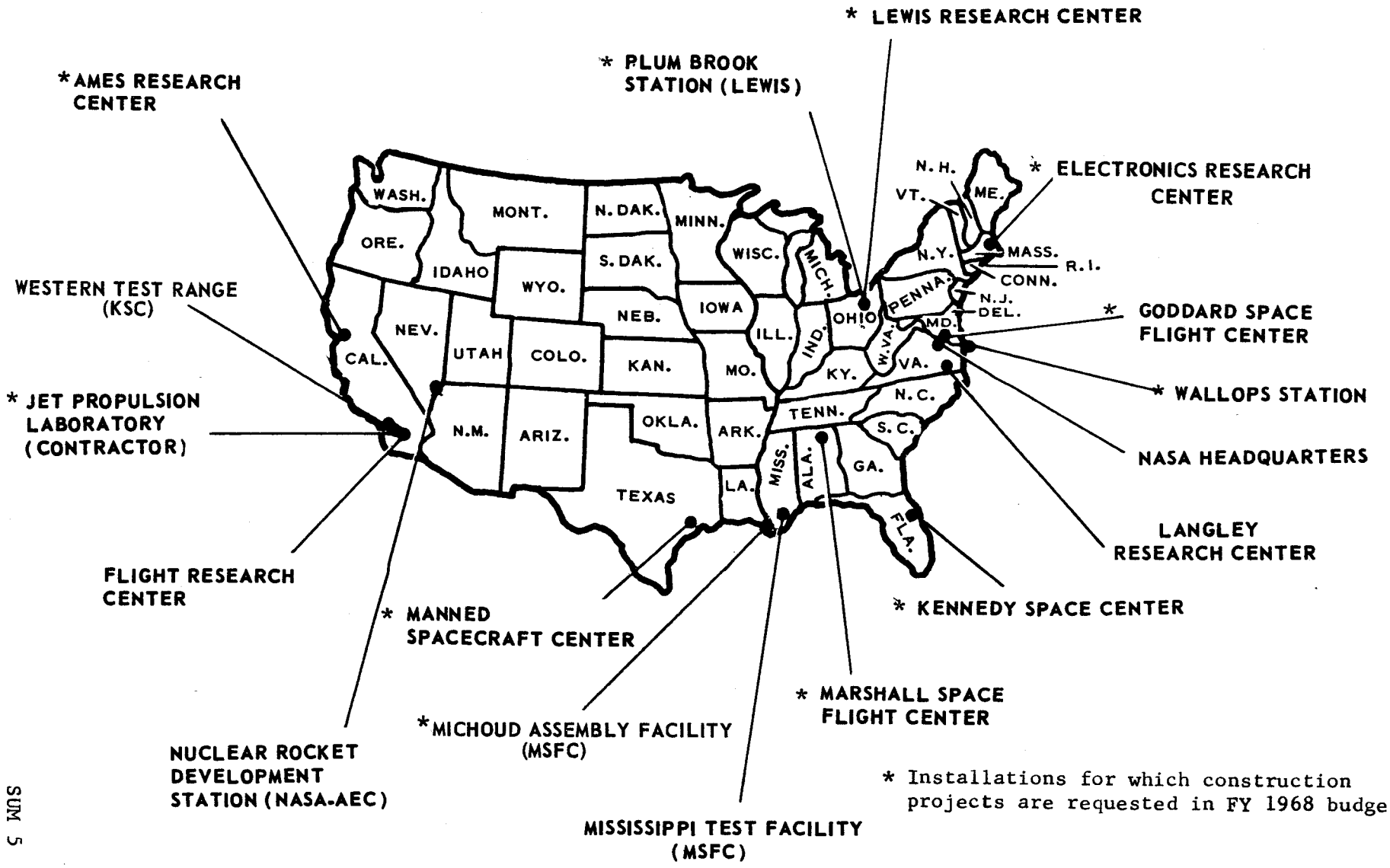
FISCAL YEAR 1968 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN BY LOCATION

Location	Fiscal Year 1966	Fiscal Year 1967	Fiscal Year 1968
Ames Research Center.....	$2,749,000	---	$5,365,000
Electronics Research Center.....	5,000,000	$7,500,000	6,220,000
Goddard Space Flight Center.....	2,400,000	710,000	565,000
Jet Propulsion Laboratory.....	940,300	350,000	3,125,000
John F. Kennedy Space Center, NASA.	6,916,570	35,758,000	24,885,000
Langley Research Center.....	8,250,000	6,100,000	---
Lewis Research Center.....	867,000	16,000,000	2,115,000
Manned Spacecraft Center.....	4,180,000	9,100,000	2,425,000
Marshall Space Flight Center.....	1,955,690	---	870,000
Michoud Assembly Facility.....	296,819	700,000	2,010,000
Various Locations.....	19,376,417	3,577,000	2,880,000
Wallops Station.....	1,048,000	205,000	740,000
Facility Planning and Design.....	4,228,160	5,000,000	3,000,000
Total Plan.....	$58,207,956	$85,000,000	$54,200,000

The geographic location of NASA installations is shown on the following page. Installations for which construction projects are requested in the fiscal year 1968 budget are identified.

NASA INSTALLATIONS



* Installations for which construction projects are requested in FY 1968 budget.

SUM 5

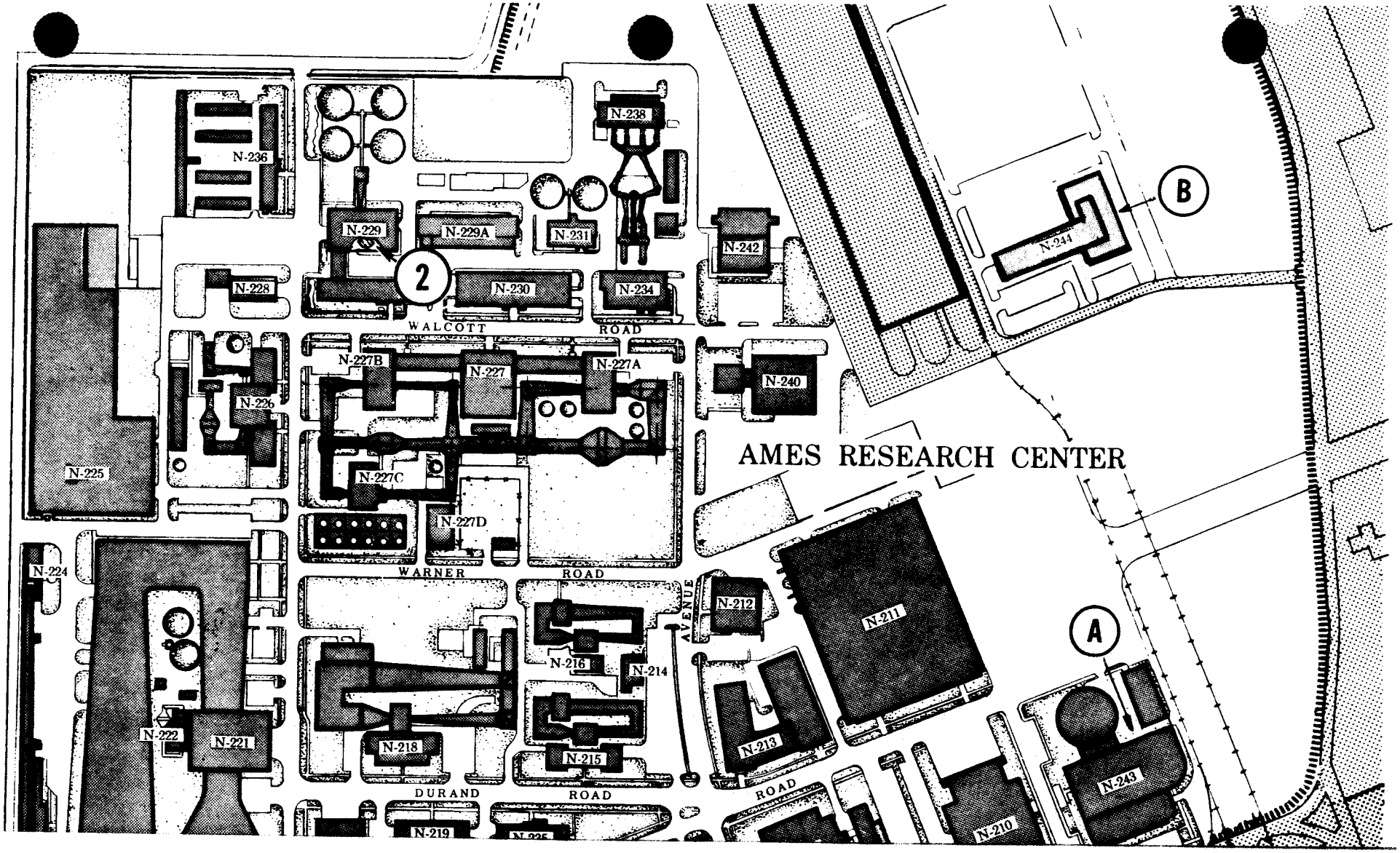
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

AMES RESEARCH CENTER

SCALE: 1 INCH = 300 FEET


AMES RESEARCH CENTER
N-236
N-238
N-229
N-229A
N-231
N-242
N-228
N-230
N-234
WALCOTT ROAD
N-227B
N-227
N-227A
N-240
N-226
N-225
N-227C
N-227D
N-224
WARNER ROAD
N-212
N-211
N-216
N-214
AVENUE
N-222
N-221
N-218
N-215
N-213
DURAND ROAD
ROAD
N-219
N-210
N-243
N-244
2
A
B

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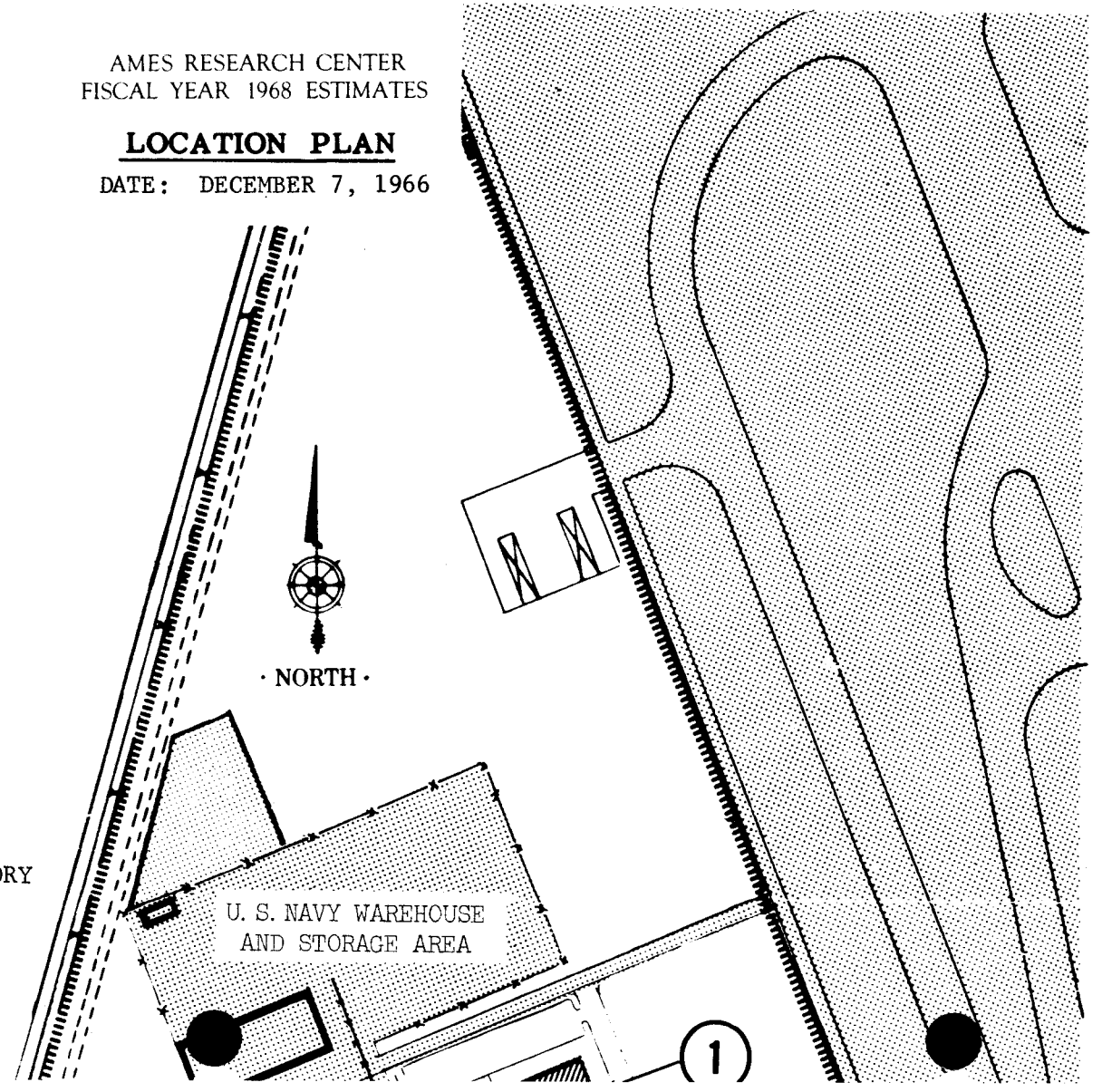
AMES RESEARCH CENTER
FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN

DATE: DECEMBER 7, 1966

LEGEND	
N-200	ADMINISTRATION BUILDING
N-201	AUDITORIUM
N-202	ADMINISTRATION BUILDING ANNEX
N-203	ENGINEERING SERVICES BUILDING
N-204	SPACE TECHNOLOGY BUILDING
N-204A	SPACE TECHNOLOGY BUILDING ANNEX
N-206	12-FOOT PRESSURE WIND TUNNEL
N-206A	12-FOOT PRESSURE WIND TUNNEL, AUXILIARIES BUILDING
N-207	1- BY 3- FOOT SUPERSONIC WIND TUNNEL
N-208	SUPERSONIC FREE-FLIGHT WIND TUNNEL
N-209	PRESSURIZED BALLISTIC RANGE
N-210	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-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	PAYLOAD INTEGRATION AND TEST FACILITY
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, AUXILIARY BUILDING
N-228	1- FOOT SHOCK TUNNEL
N-229	3.5-FOOT HYPERSONIC WIND TUNNEL
N-229A	3.5-FOOT HYPERSONIC WIND TUNNEL, AUXILIARIES BUILDING
N-230	PHYSICAL SCIENCES 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
N-241	ADMINISTRATIVE MANAGEMENT BUILDING
N-242	STRUCTURAL DYNAMICS LABORATORY
N-243	FLIGHT AND GUIDANCE SIMULATION LABORATORY
N-244	SYSTEMS ENGINEERING FACILITY



FACILITIES UNDER CONSTRUCTION

A. FLIGHT AND GUIDANCE SIMULATION LABORATORY
B. SYSTEMS ENGINEERING FACILITY

AUTHORIZED PROJECTS (1967) - NONE

PROPOSED PROJECTS - FY 1968

1. S[redacted]E SCIENCE RESEARCH LABORATORY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Ames Research Center	Advanced Research and Technology	Moffett Field, California	Santa Clara	Mountain View, California

INSTALLATION MISSION

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.

LAND	NO. ACRES
NASA-OWNED	225.7
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	225.7
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$195,697

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Space Science Research Laboratory	SSA	98	2,195		2,293
Heater Replacement, 3.5 foot Wind Tunnel	ART	190	3,170		3,360
ALL OTHER PROJECTS		50,422			
TOTALS		50,710	5,365		

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

* *Includes work in process.*

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

SPACE SCIENCE RESEARCH LABORATORY

AUTHORIZATION LINE ITEM: Ames Research Center

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

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

COGNIZANT NASA INSTALLATION: Ames Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$98,000
FY 1968 Estimate	2,195,000
Total Funding Through FY 1968	$2,293,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,845,000
Site development	LS	---	$36,400	36,400
Roads, parking, walks	LS	---	32,200	32,200
Utilities	LS	---	23,000	23,000
Electrical construction	LS	---	57,500	57,500
Building construction	Sq. Ft.	71,560	21.76	1,557,500
Special building construction features	LS	---	138,400	138,400
Equipment				$332,000
Installation and alteration to long path gas cell, low level counting lab., etc.	LS	---	107,500	107,500
Ion probe	Each	1	99,400	99,400
Ultraclean room	LS	---	50,300	50,300
Flight systems integration and calibration equipment	LS	---	74,800	74,800

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
		Subtotal		$2,177,000
Fallout Shelter	---	---	---	18,000
		TOTAL		$2,195,000

PROJECT PURPOSE:

This facility will provide adequate laboratories, research equipment areas, and engineering space for the Space Sciences Division, which was established at Ames in 1962, and consolidate over $2,000,000 worth of existing scientific research equipment and Space Science personnel currently located in five temporary areas at the Center.

PROJECT DESCRIPTION:

The proposed laboratory building will consist of two stories, a basement, and a mechanical equipment room located on the roof, with a total floor area of approximately 58,000 square feet. It will include physics and chemistry laboratories, a refrigerated room, and a data processing room. An adjoining test bay of approximately 13,000 square feet will provide for the calibration and integration of flight experiments and sounding rocket payloads. The test bay will also house an existing long path optical gas cell, 25 meters in length, and an existing low level radioactivity counting laboratory, including shielding.

PROJECT JUSTIFICATION:

The Space Sciences Division at Ames conducts research in the space sciences encompassing both space flight and ground based laboratory activities. The scope of these activities is divided basically into scientific research in the fields of planetary atmospheres, planetary geology, astrophysics, and interplanetary particles and magnetic fields. The Division is now heavily involved in flight experiments, and facilities to breadboard such experiments are required for testing, integration, and the calibration of components prior to final assembly for programs underway. The present direct flight and post flight commitments include plasma probe experiments on Explorers XIV, XVIII, XXI, XXVIII, and XXXIII, OGO I and III, and Pioneers VI, VII, C and D; and magnetometer experiments for the anchored IMP E and Pioneer C, D and E. A galactic hydrogen experiment is under development, and numerous other experiments involving infrared telescopes, resonance probes, lasers, fast neutron detectors, and ion mass analyzers are being planned as part of the on-going research work. Experiments designed to detect magnetic fields and particles on the surface of the moon are being proposed for Apollo or Apollo Applications Programs. Associated with these

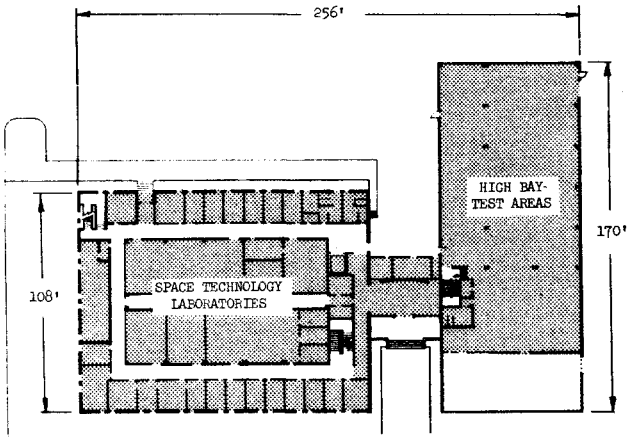
current or projected flight experiments is a coordinated supporting ground based research program, much of which involves heavy equipment such as a hypervelocity vertical gas gun used in lunar impact studies, and an infrared gas cell, used in support of planetary atmosphere programs, both facilities being unique in the scientific world.

The various research equipments are presently housed in temporary locations in high vibration and noise environments which make the conduct of precise scientific investigations extremely difficult and inefficient. Most of the space occupied by the Space Sciences Division has been borrowed from other organizations. For instance, the optical gas cell and radioactivity counting laboratory are located in hangar space which should be immediately returned to the aeronautical programs for their expanded requirements.

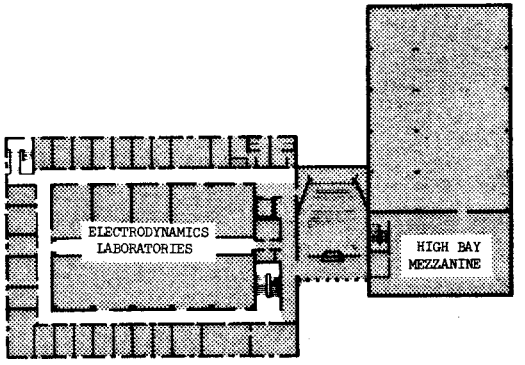
ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

AMES RESEARCH CENTER
FISCAL YEAR 1968 ESTIMATES

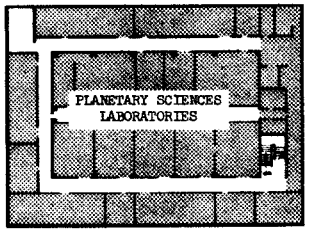
SPACE SCIENCE RESEARCH LABORATORY



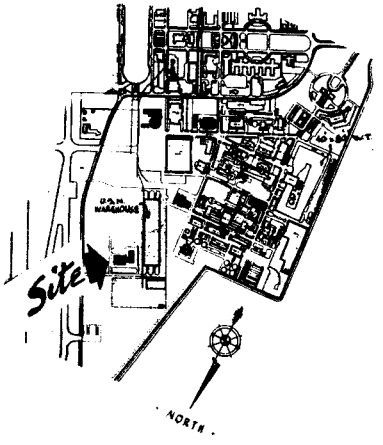
FIRST FLOOR PLAN



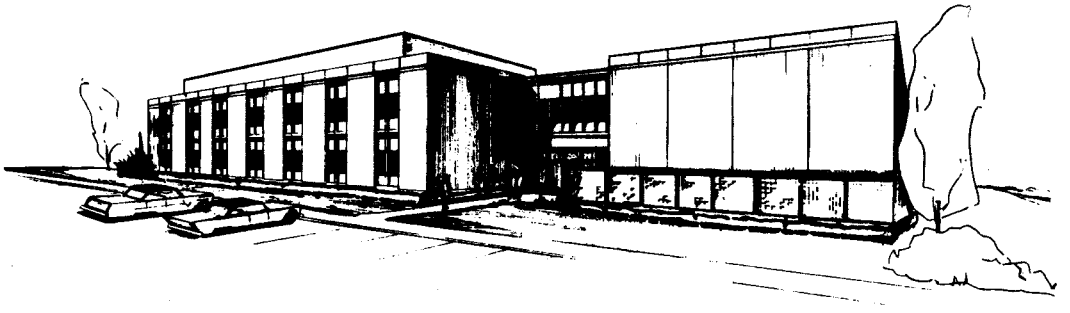
SECOND FLOOR PLAN



BASEMENT PLAN



PLOT PLAN



PERSPECTIVE

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

HEATER REPLACEMENT, 3.5 FOOT WIND TUNNEL

AUTHORIZATION LINE ITEM: Ames Research Center

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

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

COGNIZANT NASA INSTALLATION: Ames Research Center

TYPE OF CONSTRUCTION PROJECT: Alteration

FUNDING:

FY 1967 and Prior Years	$190,000
FY 1968 Estimate	3,170,000
Total Funding Through FY 1968	$3,360,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$3,001,000
Removal of existing refractory	LS	---	$10,000	10,000
Installation of new refractory	LS	---	66,000	66,000
Refractory (matrix) material	LS	---	2,184,000	2,184,000
Refractory (insulation) material	LS	---	741,000	741,000
Equipment				$169,000
Instrumentation	LS	---	74,000	74,000
Grate support system	LS	---	95,000	95,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$3,170,000

PROJECT PURPOSE:

The purpose of the alteration is to replace the present refractory pebbles, refractory insulation, grate support system, and instrumentation of the heater of the 3.5 foot hypersonic wind tunnel with newly designed components that will greatly improve the allowable performance of the wind tunnel. This increased performance will permit better simulation of the flight environment at hypersonic speeds. Correct simulation is critical to various studies such as those involving viscous effects. The other major purpose of the alteration is to minimize the abrasion of models, instrumentation, and model support systems by minimizing the dust from erosion of the refractory materials.

PROJECT DESCRIPTION:

The existing 3.5 foot hypersonic wind tunnel is essentially a blowdown wind tunnel consisting primarily of a storage type pebble-bed heater, a tandem arrangement of interchangeable nozzles, a test section model support area, a supersonic-subsonic diffuser, an aftercooler and vacuum storage spheres. A gas recompression, separation and storage system with necessary buildings and controls complete the basic components.

The structure was designed to operate in a test range of from Mach number 5 to 15 at a maximum stagnation temperature and pressure of 4,500° Rankine (R) and 1,800 pounds per square inch absolute (psia) respectively. Mach number is varied in four discrete steps at 5, 7, 10 and 15 with fixed geometry nozzles. In the present configuration the facility is temperature limited to 3,500° R by the ceramic pebble-bed, and testing at the lower Mach number of 5 is severely limited by the damaging effects on models of ceramic dust in the airstream. At Mach number 7 dusting effects are tolerable although some model damage is evident, and at higher Mach numbers the problem vanishes since the dusting phenomenon is related to air flow through the heater which decreases with increasing Mach number.

In a routine run, the pebble-bed is heated by an atmospheric burner located at top of heater shell to a predetermined temperature distribution so that during the test run, gas flow at a set temperature and pressure can be expanded through the nozzle and the test performed for the maximum time interval.

The following modifications and additions are illustrated in the attached figure and are proposed to correct the dusting problem and to increase the maximum temperature to 4,500° R.

1. Replacement of the pebble-bed core of the air heater with a cored brick configuration incorporating ceramic fabrication technology advances which have occurred since the facility was constructed. In order to insure alignment of holes in the matrix and to prevent relative motion, the bricks will be interlocked.

2. The use of dense, yttria-stabilized zirconia as the cored brick material in the high temperature sections of the heater.
3. Replacement of the existing wall insulating refractory material with yttria and calcia-stabilized zirconia as well as alumina.
4. Replacement of the refractory support system (grate system).

The above modifications and additions will be accomplished with a minimum facility down time of approximately three months.

PROJECT JUSTIFICATION:

The major effort in the 3.5 foot hypersonic wind tunnel at Ames Research Center is aerodynamic testing to improve the technology concerning hypersonic flight including air-breathing vehicles for commercial and military transports, recoverable launch vehicles, entry vehicles, and low altitude interceptor missiles. The maximum operating temperature is presently limited to 3,500° R due to the ceramic materials used. A further limitation to the test conditions at the lower Mach numbers is a severe dusting problem which occurs for large volumes of air flow through the pebble-bed. The allowable operating pressures at a Mach number of 5 are too low to permit duplication of flight conditions at low altitudes.

A material research study which was implemented at Ames Research Center has shown that cored brick made of yttria-stabilized zirconia when used as the heater matrix will permit operation at temperatures up to 4,500° R with essentially dust-free conditions (less than 0.0001 pounds dust per pound of air). The cored brick, in addition to essentially eliminating the dusting problem, permits the facility to be operated at a higher pressure since for a given mass flow, the pressure drop across the heater is only about one-fourth that with pebbles. Increasing the temperature limit to 4,500° R will permit the 3.5 foot wind tunnel to duplicate full-scale flight temperatures at a Mach number of 7 and thus support hypersonic air-breathing vehicle research at the desired Mach number levels. This increased operating temperature potential will also provide for more realistic data at Mach numbers of 10 and 15 for specific tests where viscous effects may be dominant.

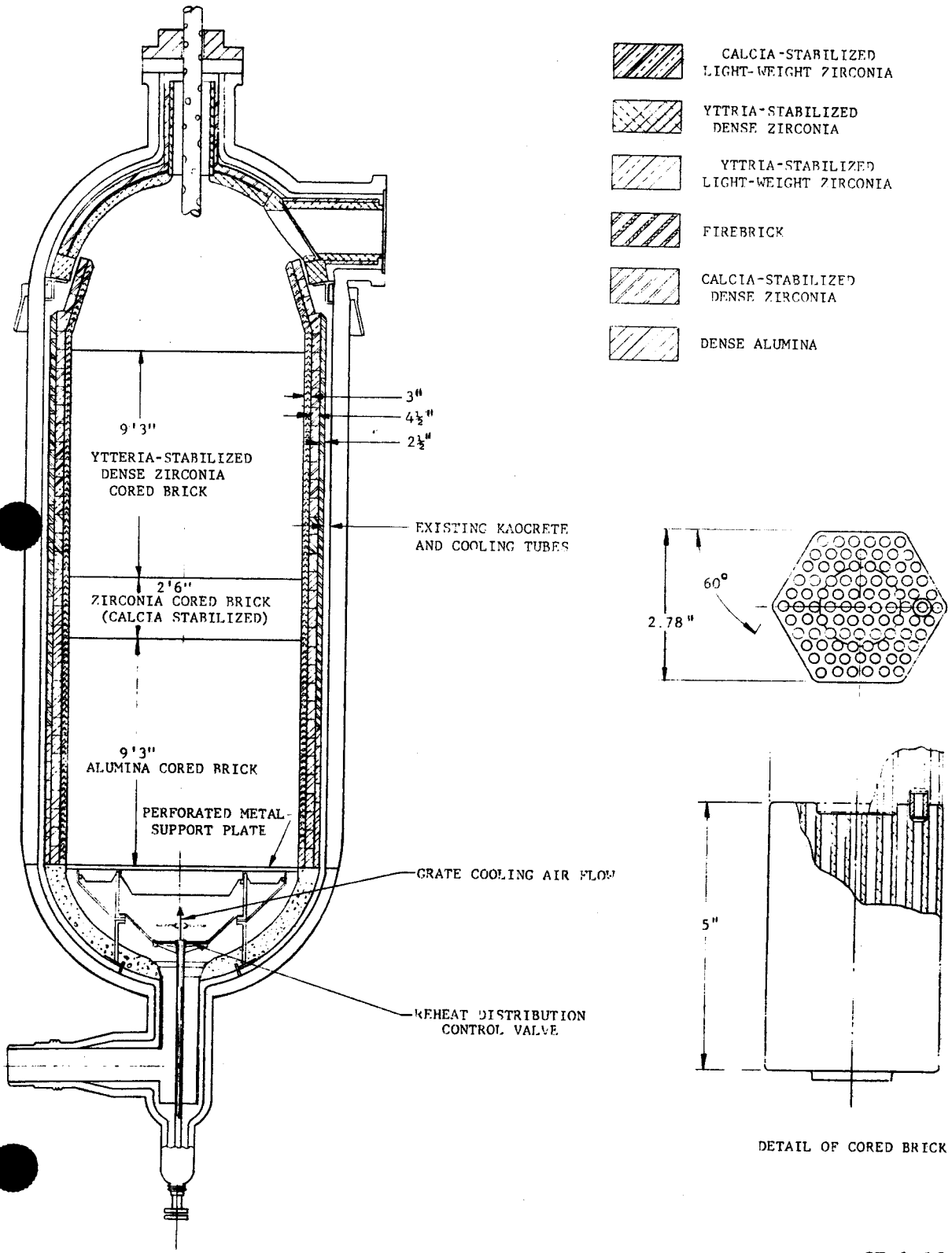
The additional temperature will also permit supersonic combustion studies since auto ignition of hydrogen would be possible (this requires the 4,500° R heater temperature). The present hypersonic-scramjet research and development would be enhanced since the large tunnel size would permit component combinations such as the inlet-combustor system to be tested to determine the fuel-air mixing length requirement, burning length, and overall efficiency of the system. The high temperature capability would also permit the use of ablating materials to determine the effect of ablation on boundary-layer flow (transition, etc.) and the attendant effect on heat transfer.

This modification will significantly increase the usefulness of the 3.5 foot hypersonic wind tunnel through an important extension of the operable Mach number-temperature-pressure range. Hence, actual flight conditions (Reynolds No. & enthalpy) can be duplicated in the laboratory over a much larger portion of the hypersonic flight corridor.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

AMES RESEARCH CENTER
FISCAL YEAR 1968 ESTIMATES

HEATER REPLACEMENT, 3.5- FOOT WIND TUNNEL



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

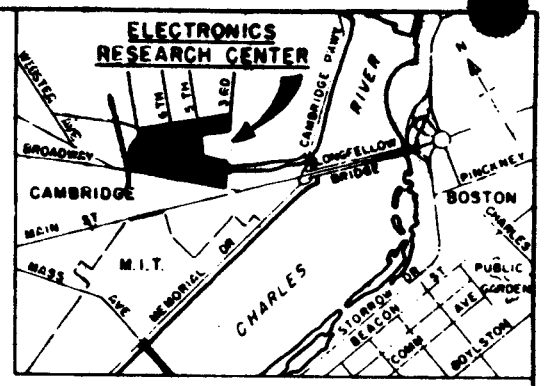
FISCAL YEAR 1968 ESTIMATES

ELECTRONICS RESEARCH CENTER

ELECTRONICS RESEARCH CENTER
FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN

CAMBRIDGE, MASS.



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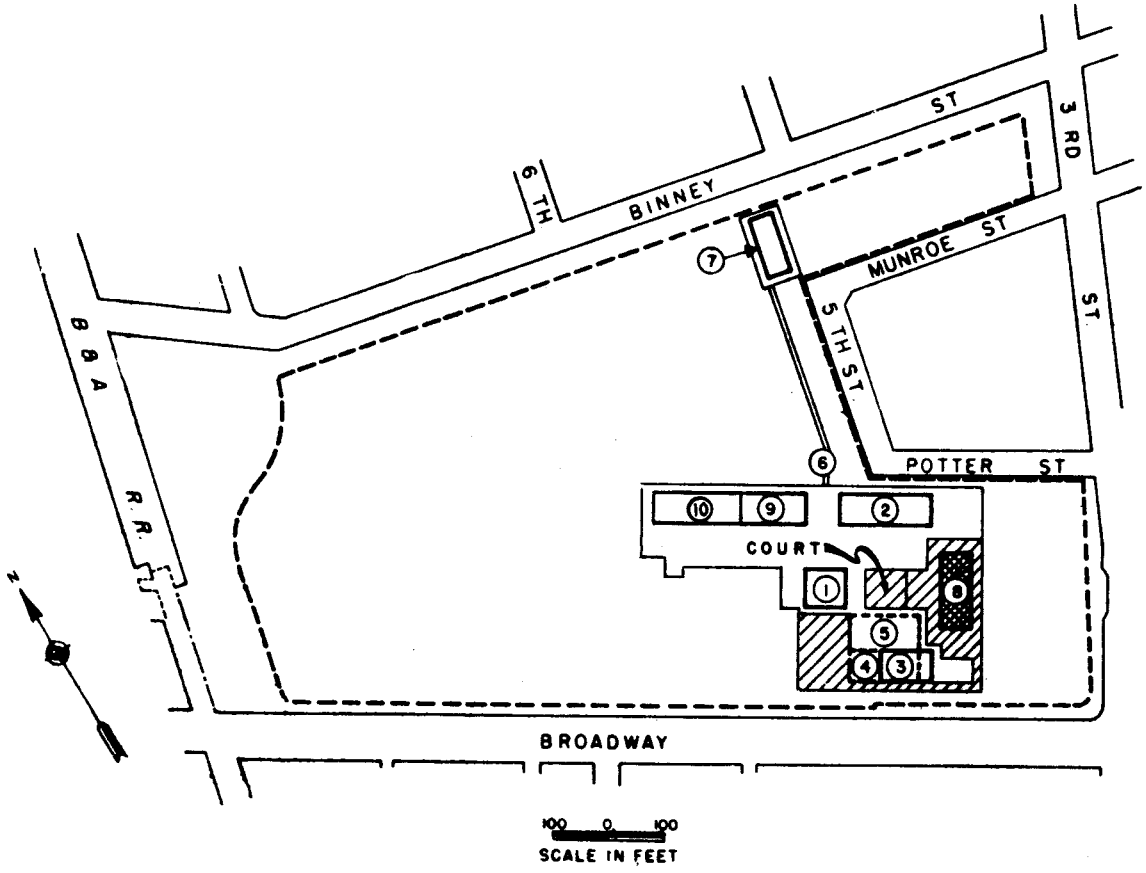
SCALE IN MILES



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

LEGEND

- FY 65, 66 & 67 FACILITIES
- FACILITIES PROPOSED IN 1968 ESTIMATES
- BASEMENTS ASSOCIATED WITH FY 68 FACILITIES
- PROJECT BOUNDARY

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

LAND	NO. ACRES
NASA-OWNED	6.3
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	6.3
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$2,887

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Qualifications and Standards/Component Technology					
Special Purpose Laboratory	ART	133	4,200		4,333
Center Support Facilities III	ART	145	2,020		2,165
ALL OTHER PROJECTS		26,122			
TOTALS		26,400	6,220		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

QUALIFICATIONS AND STANDARDS/COMPONENT TECHNOLOGY

SPECIAL PURPOSE LABORATORY

AUTHORIZATION LINE ITEM: Electronics Research Center

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

LOCATION OF PROJECT: Cambridge, Middlesex County, Massachusetts

COGNIZANT NASA INSTALLATION: Electronics Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$133,000
FY 1968 Estimate	4,200,000
Total Funding Through FY 1968	$4,333,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$2,158,000
Building	Sq. Ft.	50,000	$28.40	1,420,000
Special construction	Sq. Ft.	50,000	14.76	738,000
Equipment				$2,042,000
Qualification and Standards Lab.				
Environmental test equipment	LS	---	662,437	662,437
Processing equipment	LS	---	284,073	284,073
Inspection and failure analysis	LS	---	332,985	332,985
Design criteria	LS	---	386,505	386,505

	Unit of Measure	Quantity	Unit Cost	Total Cost
Component Technology Lab.				
Materials for components	LS	---	53,048	53,048
Component development	LS	---	68,942	68,942
Supporting basic research	LS	---	254,010	254,010
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$4,200,000

PROJECT PURPOSE:

This special purpose facility will provide equipment and facilities for the Qualifications and Standards Laboratory to perform research and advanced development on techniques for improving the reliability of current and future space electronic components. The Component Technology Laboratory will conduct a program of basic and applied research to probe the nature of materials, and to develop advanced types of electronic components.

PROJECT DESCRIPTION:

This special purpose laboratory building will house in its four levels (basement, podium, 2nd and 3rd floors) a variety of special research equipment and provide working space for a number of personnel who will support the objectives of the Qualifications and Standards Laboratory and the Component Technology Laboratory, both subdivisions of electronic components research. This laboratory will provide working space for twenty scientists and ten lab technicians. The ground level (basement) comprises 20,000 square feet of floor space in which will be located most of the equipment with unusual building design characteristics (i.e., greater than normal floor loads, specialized foundations, vibration isolation mounts and ceiling heights in excess of twelve feet). The podium (1st floor) level consists of 10,000 square feet and will contain, like the 2nd and 3rd floors, a portion of the special laboratory areas for fabrication and modification of experimental electronic components and some of the research office spaces. The 2nd and 3rd floors each contain 10,000 square feet which will be devoted to the special laboratory areas with lesser load and height requirements. The building will be of permanent type construction and will contain the necessary utility lines and equipment such as fans, pumps, electrical transformers, and converter/regulators as required to provide the specialized environmental requirements of these laboratory areas.

ROJECT JUSTIFICATION:

Qualifications and Standards Laboratory - This portion of the project is required to provide facilities to house the Qualifications and Standards Laboratory and permit the staff to conduct component qualification testing and evaluation, conduct the physical, chemical and metallurgical studies necessary to determine mechanisms of failure in components and to establish electronic design fabrication and testing standards. The standards established by this laboratory will materially reduce the complexity and high development costs which result when space systems are to be assembled from electronic components obtained from a large number of developers and suppliers using different basic fabrication and reliability qualification standards. This laboratory will be the NASA focal point for promulgation of space electronic component qualifications and standards. These qualifications and standards will also be supplemented with laboratory developed qualified parts lists, calibration methods and procedures, and environmental test criteria which will be invaluable to other groups within the Center, other NASA Centers, other government agencies and interested industrial and university groups. Special types of equipment will be used for subjecting electronic parts and devices to environmental rigors simulating those of space flight. These include large vibrators, shock testers, and accelerators, all requiring massive and ultra stable supports, thermal-vacuum chambers, ovens, and cryogenic chambers to be used for testing components in conditions that simulate the extreme temperatures and the vacuum of flight to deep space, and radiation sources to simulate the radiation of space.

Special processing equipment for assembling new versions of advanced types of components, and for reproducing the procedures used in making electronic components, will be used to determine the effect upon performance and quality of variations in those processes. These include epitaxy-growing equipment, diffusion furnaces, vacuum evaporators, microbonders and welders, laminar flow benches, photographic equipment, ion generators and electron beam guns. These require maximum precision of process, ultracleanliness, and accuracy of dimension; accordingly, this equipment requires special vibration free mountings, and an environment that is free from contamination that would affect the parts being processed.

A variety of electronic microscopes and probes, all uniquely constructed for use in examining electronic parts, together with X-ray analyzers, infrared probes, spectrometers, lasers, gas analyzers, ionscrubbers, and micro balances, will be used to detect the minute differences in dimensions, color, surface roughness, micro welds, and chemical composition.

Component Technology Laboratory - This portion of the project is to provide facilities to house the Component Technology Laboratory and permit it to increase basic knowledge for advancing technology in the area of electronic components to provide the necessary capability to meet the requirements for successful accomplishment of NASA space missions. Advanced research will be carried out in the fields of solid state physics, low temperature, quantum electronics, high temperature, and imperfections in crystal structure. Materials research will be performed in semiconductors, magnetics, dielectrics, and materials evaluation. Microelectronic research will include thin films microelectronic techniques and molecular electronics. Physical electronics research will include electron emission studies, plasma research and surface studies. A capability is needed for advanced development of semiconductor devices, vacuum tubes, electromechanical devices, and optical and display devices. This facility is needed to provide special purpose laboratory space and research equipment to carry out the necessary in-house portion of the electronic components research program. This facility will house equipment for high magnetic field studies, radiation effect studies and other unique component development studies.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

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ELECTRONICS RESEARCH CENTER

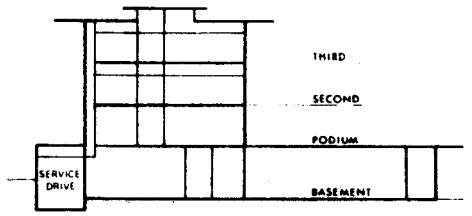
FISCAL YEAR 1968 ESTIMATES

Qualifications & Standards / Component Technology

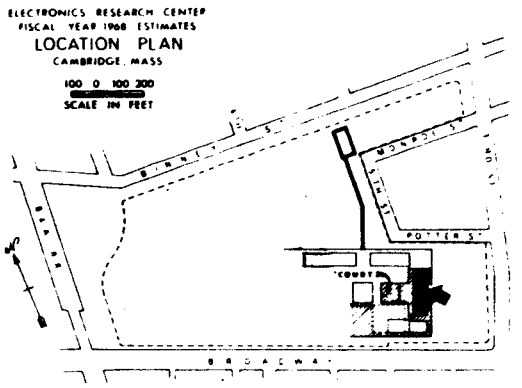
Special Purpose Laboratory

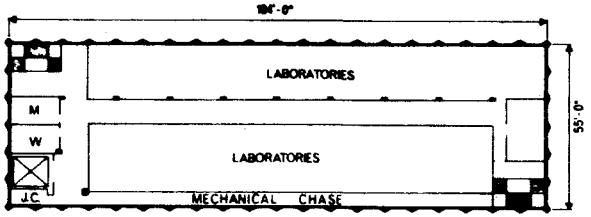
0 8 16 32 48

SCALE IN FEET

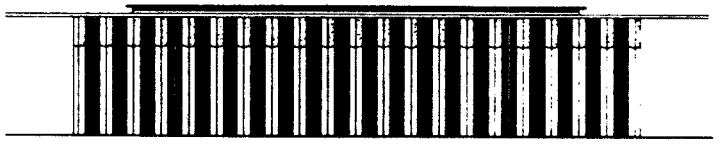


Section

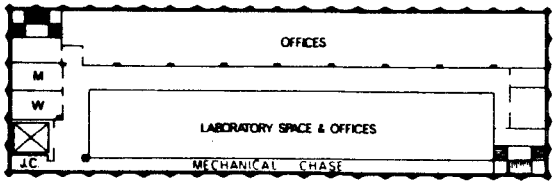




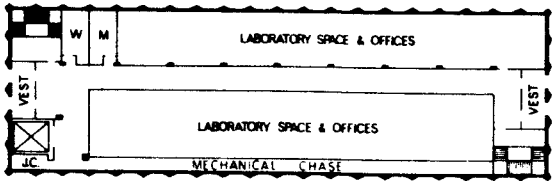
Third Floor Plan



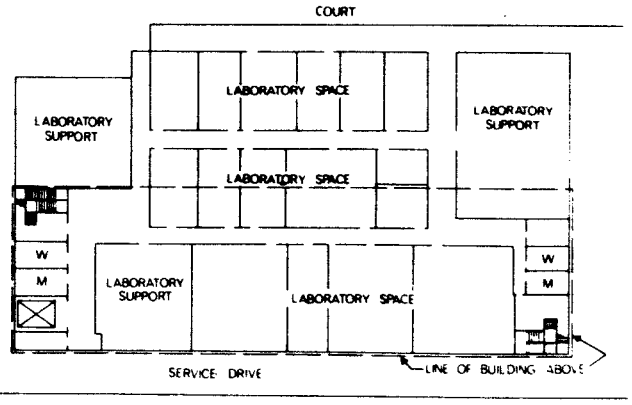
Elevation



Second Floor Plan



Podium Level Plan



Basement

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

CENTER SUPPORT FACILITIES III

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 1967 and Prior Years	$145,000
FY 1968 Estimate	2,020,000
Total Funding Through FY 1968	$2,165,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,670,000
Service drive	Sq. Ft.	8,500	$34.00	289,000
Basement mech. space	Sq. Ft.	2,200	36.00	79,000
Technical support shops (basement)	Sq. Ft.	13,100	36.00	472,000
Refrigeration equipment	LS	---	200,000	200,000
Utilities extension, parking and site preparation	LS	---	630,000	630,000
Equipment				$350,000
Technical support shop equipment	LS	---	350,000	350,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,020,000

PROJECT PURPOSE:

This project will be the third phase of utilities work and is required to provide support utilities to the mechanical rooms and buildings proposed for the FY 1968 Construction of Facilities Program. It will also provide space for the technical support shop which will provide support for the laboratories. This project will further provide the center court which ties in the architectural treatment of the Center, and provide for additions to the Refrigeration Plant and allow for overall site preparation.

PROJECT DESCRIPTION:

This project will provide all utilities and facilities beyond the laboratory building lines and under and including the portions of the podium which will not be provided by the building construction. It will provide for the extension of utilities, installed in previous years, and installation of new utilities from outside lines of the city of Cambridge and public utilities. This project will also include electrical and mechanical equipment for the mechanical equipment rooms adjacent to the laboratory buildings. In addition, basement space will be constructed to accommodate the support shop. This space will be of special construction to accept the heavy loads and will provide greater than normal ceiling height for special shop equipment. This space also will provide, where necessary, specially designed foundations for unusually sensitive test equipment to be located in these shops. This project includes increased capacity of utilities in the service building due to the growth of the Center. Additional auto parking spaces, area grading and site improvements are a part of this work.

Equipment will be provided in this program to properly equip technical support shops to provide the necessary machinery, fabrication and test facilities to cover a broad range of research laboratory requirements.

PROJECT JUSTIFICATION:

Mechanical Spaces and Utilities - The Mechanical Spaces and Utilities, new and extensions, including increased refrigeration capacity, are required in order to permit the individual laboratories of the Center to operate. Without these necessary utilities, the new low rise laboratories will not function.

Machine Shop - The laboratories have a strong demand for high quality, versatile, in-house mechanical support for producing extreme accuracy characteristics required in space research support work. The fabrication and assembly shops will provide precision machining, assembling, fitting, metal forming services, and products of specialized wood and plastic equipment for use in research hardware. It will permit skilled personnel to accompany engineers and scientists on field installations problems or tests.

The fabrication shops will also provide a shop-stores system of individual shop stores which will contain material, parts, mechanical tools, and hardware which would be made available to research scientists for loan and issue.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

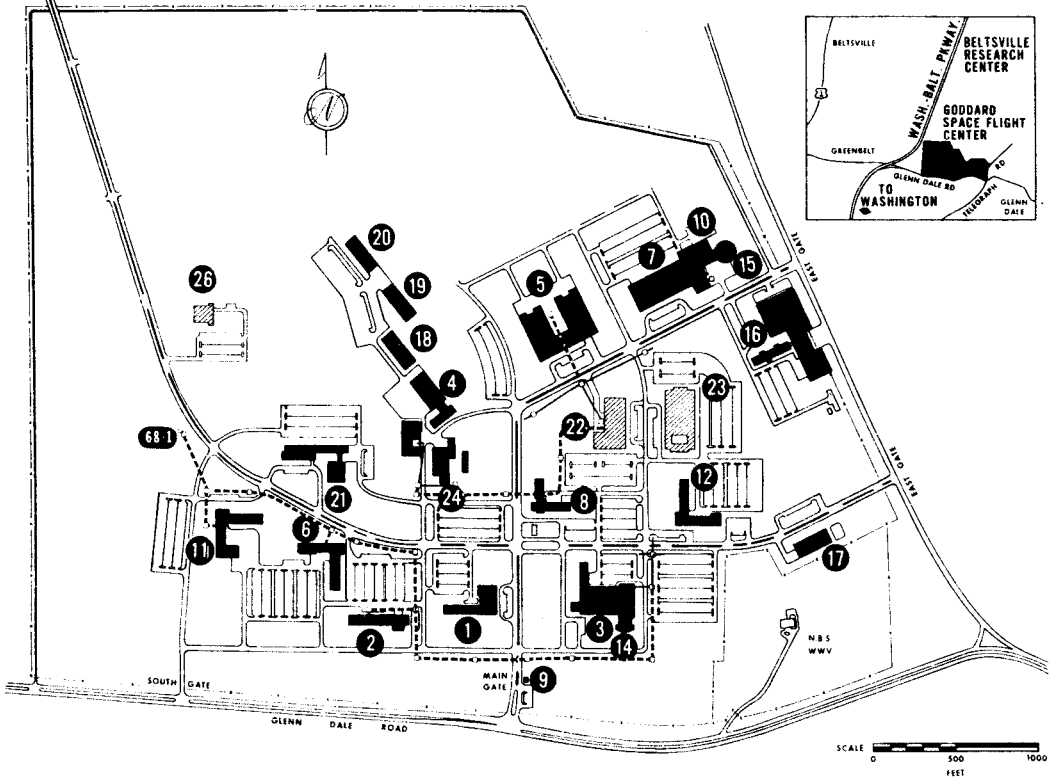
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

GODDARD SPACE FLIGHT CENTER

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1968 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
26. NASA SPACE SCIENCE DATA CENTER

CONSTRUCTION PROPOSED IN FY 1968

68-1 UTILITY MODIFICATION AND INSTALLATION

EXISTING FACILITIES

FACILITIES UNDER CONSTRUCTION

CONSTRUCTION PROPOSED IN FY 1968

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

This Center is responsible for complete development of unmanned sounding rockets and orbiting spacecraft experiments in basic and applied science. The work covers scientific satellites, and communications and weather satellites which orbit in cis-lunar 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.

LAND	NO. ACRES
NASA-OWNED	552.7
OTHER GOVERNMENT AGENCY-OWNED	638.8
NON-FEDERAL *(Leases, easements)*	3.0
TOTAL LAND	1,194.5
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 272,276

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 19 68 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Utility Modification and Installation	SSA	35	565		600
ALL OTHER PROJECTS		82,807			
TOTALS		82,842	565		

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* *Includes work in process.*

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

UTILITY MODIFICATION AND INSTALLATION

AUTHORIZATION LINE ITEM: Goddard Space Flight Center

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

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

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Alteration

FUNDING:

FY 1967 and Prior Years	$35,000
FY 1968 Estimate	565,000
Total Funding Through FY 1968	$600,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$565,000
Electrical equipment and primary cable	LS	---	304,000	304,000
Manholes and duct bank	LS	---	261,000	261,000
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$565,000

PROJECT PURPOSE:

This project provides for converting portions of the existing 4,160 volt power system load to the existing 13,800 volt power system (which has the capacity to absorb this conversion) to ensure Center-wide electric power reliability and the installation of power and communication ducts in areas now saturated.

PROJECT DESCRIPTION:

The conversion of a portion of the site electrical power 4,160 volt distribution system requires modifications and/or the installation of primary switches, small transformers, etc., in Buildings 2, 5, 6, 8, and 11, and primary power cables between those buildings as required. Basic transformer capacity of all buildings affected will remain the same except for Building 5, which present and future demand and operational requirements necessitates increasing the capacity of this system from 1,000 Kilovolt-Amperes (KVA) to 2,000 KVA by the installation of a second transformer, for which provision was made when the building was constructed. In addition, underground power and communication ducts will be extended and installed in areas where present ducts are now saturated and provide for future requirements.

PROJECT JUSTIFICATION:

The 4,160 volt system at Goddard Space Flight Center has two (2) transformers, each served by one (1) of two 35 KV feeders from the Potomac Electric Power Company (PEPCO) system on the primary side, and connected to a common bus on the secondary side. To ensure the degree of reliability now required for tracking and data real time functions and critical scientific experiments performed at the Center, each transformer should have the capacity to carry the entire load of the secondary bus for extended periods of time in the event the other transformer is out of service for maintenance or system failure. The load on the 4,160 volt system, however, has grown beyond the capacity of one transformer, and in the event one transformer is out of service it is necessary to remove area loads from the system. This operation greatly increases the probability of a complete 4,160 volt system failure due to human error and makes it necessary to curtail or cancel certain operations at the Center.

Until the present, transformer down time has been due to primary feeder outages, but there is also a possibility that a transformer failure can occur. The most common cause of primary feeder outages to date has been severe lightning storms, but there have been outages due to fallen trees and line pole failure on the PEPCO feeders beyond the installation property.

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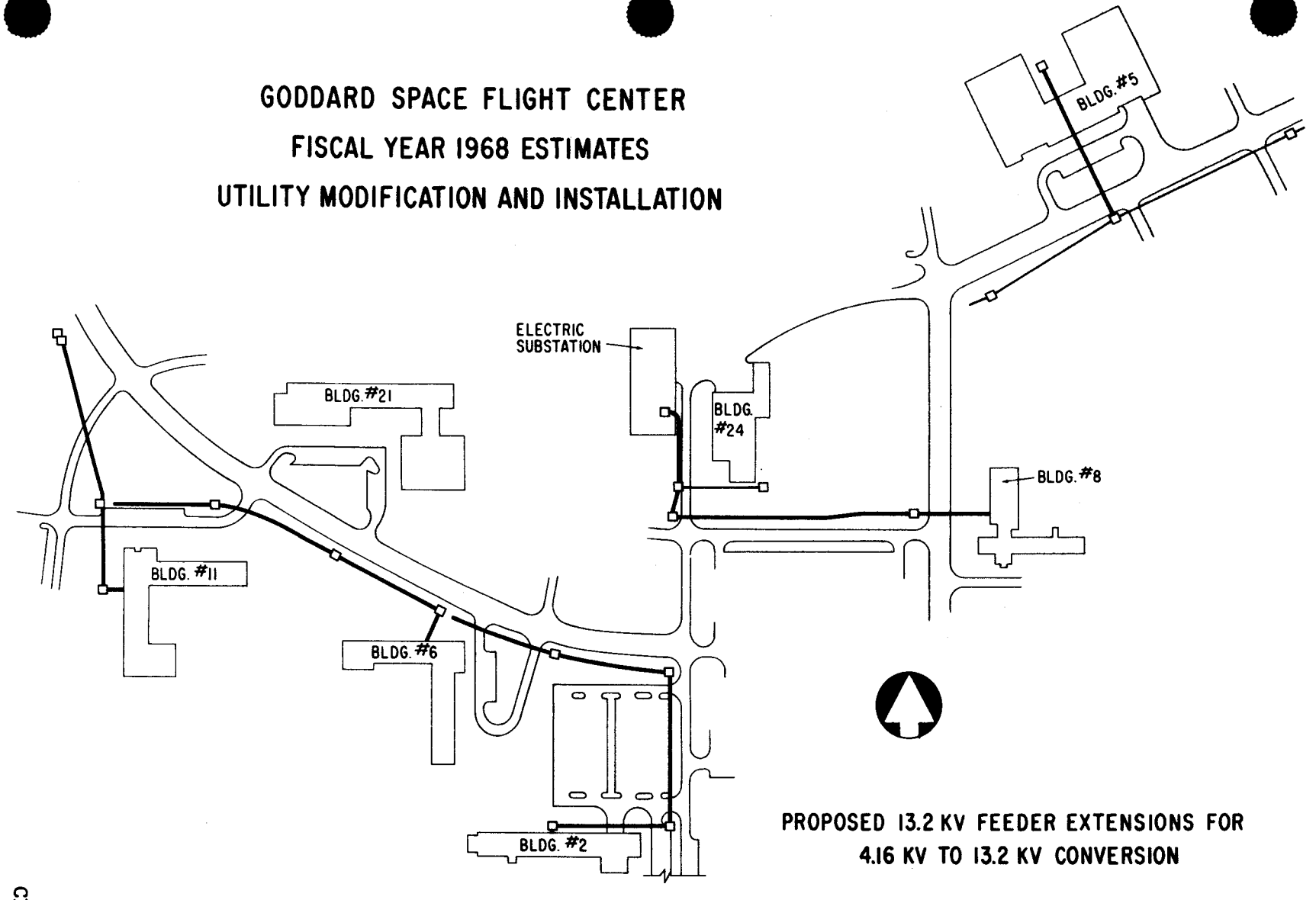
To provide the reliability now required at the Center, it is proposed that portions of the 4,160 volt system load be transferred to the existing 13,800 volt system which has considerable reserve capacity at the substation. With this transfer, the load on the 4,160 volt system will be reduced to a value which can be carried by one transformer for extended periods of time.

The growth in the use of automatic data processing systems with the accompanying increase in data transmission lines, and the installation of duplicate power feeders to provide the reliability required for tracking and data real time functions have saturated existing underground duct systems in several areas. Interconnections between the various components of the 360 series computer system will further impact the power and communication duct system. It is proposed that additional ducts be installed in the impacted areas to relieve these crowded conditions and provide a reasonable capacity for normal growth.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1968 ESTIMATES
UTILITY MODIFICATION AND INSTALLATION

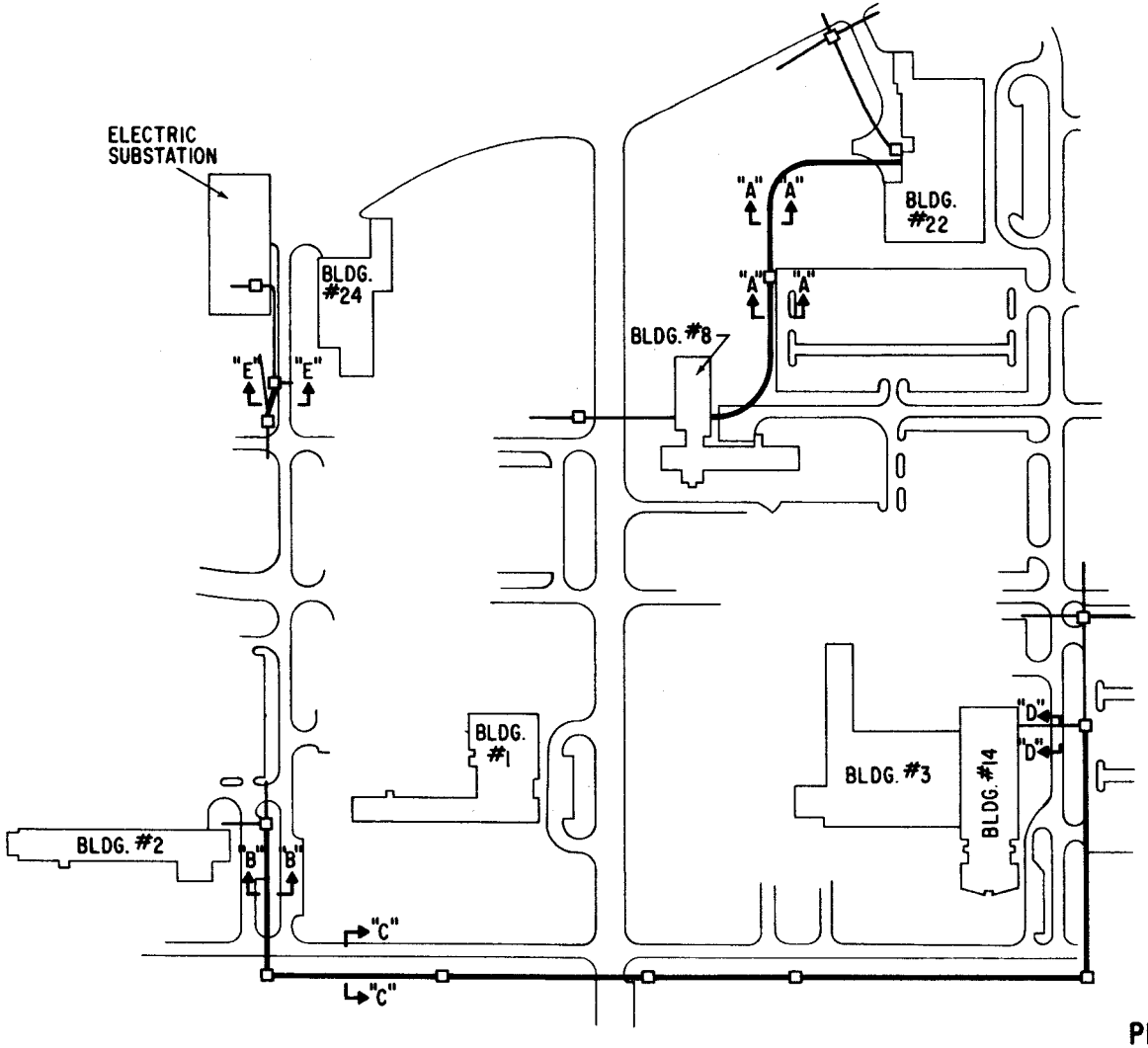


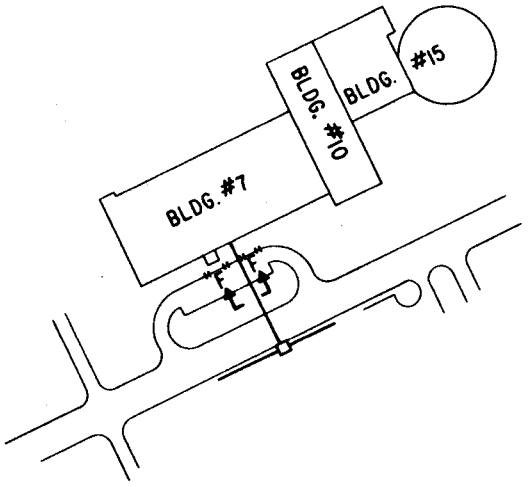
PROPOSED 13.2 KV FEEDER EXTENSIONS FOR
4.16 KV TO 13.2 KV CONVERSION

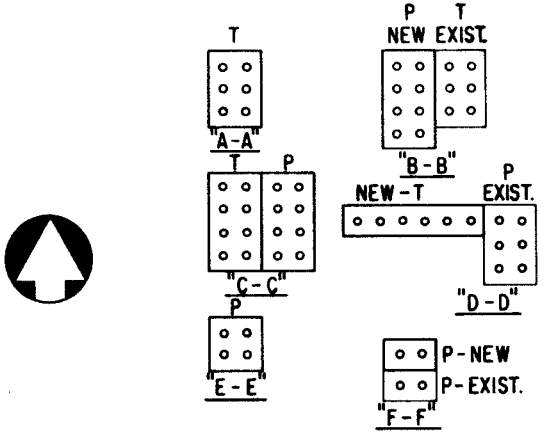
CF 3-6

GODDARD SPACE F HT CENTER

FISCAL YEAR 1968 ESTIMATES - UTILITY MODIFICATION AND INSTALLATION







UNDERGROUND DUCT SECTIONS

PROPOSED ADDITIONAL UNDERGROUND POWER AND COMMUNICATIONS DUCT BANK EXTENSIONS

CF 3-7

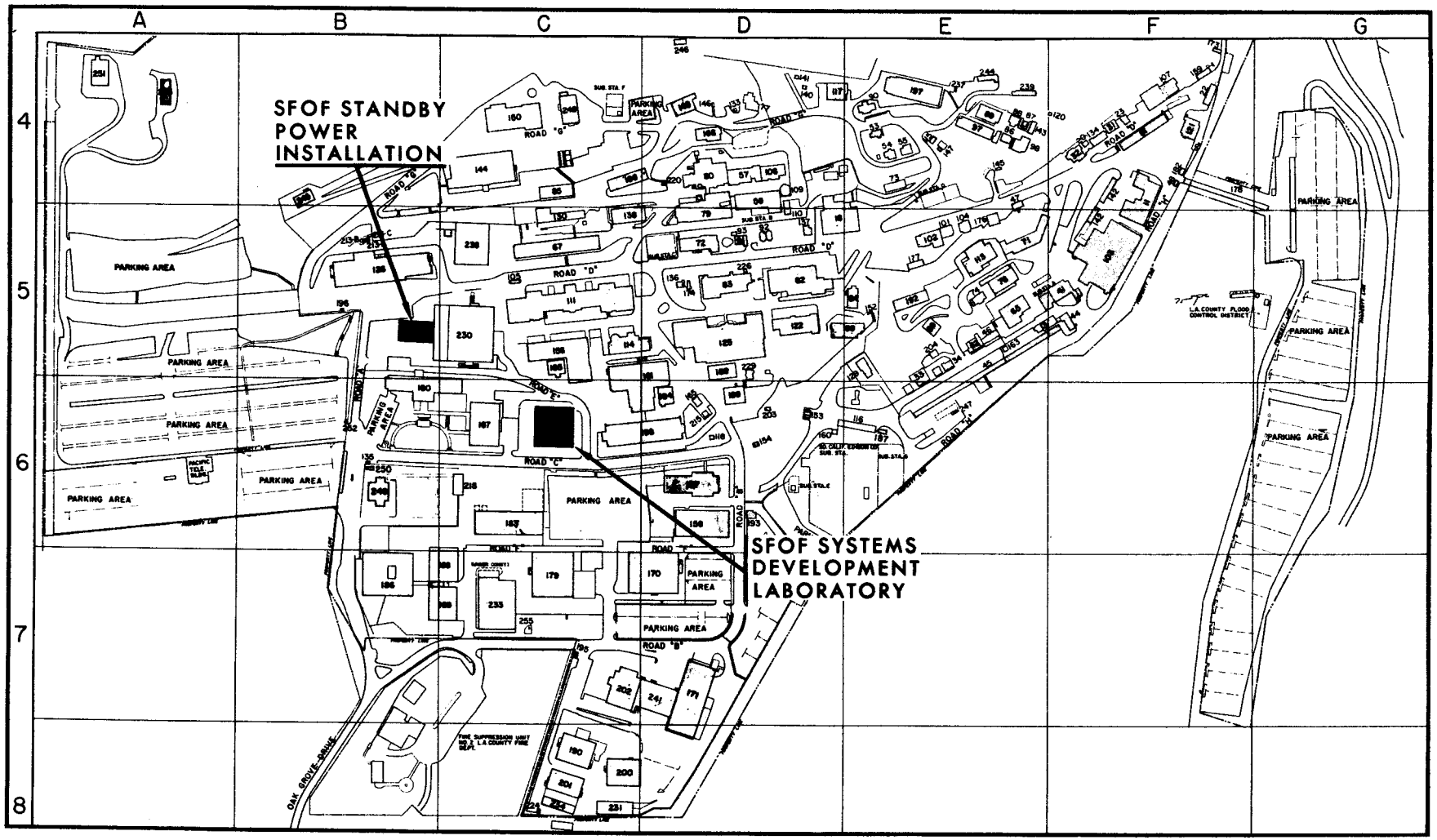
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

JET PROPULSION LABORATORY

JET PROPULSION LABORATORY
FISCAL YEAR 1968 ESTIMATES
LOCATION PLAN



JET PROPULSION LABORATORY
FISCAL YEAR 1968 ESTIMATES
BUILDING LEGEND

BLDG. NO.	TITLE	LOCATION
11	Space Sciences Laboratory	4-F
13	Offices, Lab & Shop	5-E
18	Structural Test Lab	5-D
20	Shop Test Cell No 2 (Liquid)	4-F
22	Thermocouple Lab	4-F
23	Shop Test Cell No 12 (Liquid)	4-F
31	Test Cell (Liquid)	4-F
32	Test Cell (Liquid)	4-F
33	Test Cell (Liquid)	5-E
34	Shop Test Cell No 33 (Liquid)	5-E
41	Hi Temp Lab	5-F
42	Test Cell (Liquid)	5-E
44	Credit Union	5-F
45	Aerodynamics & Steam Lab	5-E
46	Shop Test Cell No 42 (Liquid)	5-E
47	Plant Protection	4-E
48	Guard Shelter	4-F
53	Conditioning Lab (Solid)	4-E
54	Blending Lab (Solid)	4-E
55	Mixing Lab (Solid)	4-E
57	Test Cell (Air Fuel)	4-D
58	Compressor Building	4-D
59	Chem. Lab	5-E
65	Materials Lab	5-E
66	Carpenter Shop	5-F
67	Engineering Offices & Lab	5-C
71	Mechanics Stores	5-E
72	Engineering Offices	5-D
73	Utilities Area Storage	4-E
74	Test Cell (Chemistry)	5-E
77	Soil Science Lab	4-D
78	Hydraulics Lab	5-E
79	Wind Tunnel (20 Inch)	4-D
80	Wind Tunnel (12 & 21 Inch)	4-D
81	Space Sciences Lab	4-F
82	Environmental Test Lab	5-D
83	Chem. Lab & Eng. Office	5-D
84	Test Cell & Solid Chemistry	5-E
85	Space Sciences Office	4-C
86	Oxidizer Grinding (Solid)	4-E
87	Ovens (Solid)	4-E
88	Mixing Lab (Solid)	4-E
89	Processing Lab (Solid)	4-E
90	Shop-Test Cell No 51	4-E
91	Air Dryer (Wind Tunnel)	5-D
92	Cooling Tower (Wind Tunnel)	5-D
93	Vaporizer (Wind Tunnel)	5-D
97	Development Lab & Offices	4-E
98	Preparation Shop (Solid)	4-E
99	Chemistry Lab (Solid)	5-E
101	Transportation Offices	5-E
102	Transportation Shop	5-E
103	Fabrication Shop	5-F
104	First Aid	5-E
105	Guard Shelter	5-C
106	Test Cell (Air Fuel)	4-D
107	Test Cell	4-F
109	Cooling Tower (Wind Tunnel)	4-D
110	Fuel Storage Tank	4-D
111	Administration Bldg.	5-C
113	Gas Metering Lab	5-E
114	Cafeteria & Offices	5-C
115	Heating Plant (Solid)	4-E
116	Propellant Storage Dock	6-E
117	Test Cell (Solid)	4-D
118	Cooling Tower	6-D
120	Cooling Tower	4-F
121	Cafeteria	4-F
122	Engineering Offices	5-D
124	Incinerator	6-E
125	Combined Electronics	5-D
126	Administrative Services	5-B
129	Test Cell (Chemistry)	5-E
130	Space Science Lab	5-C
131	Maintenance Storage	4-F
133	Service Dock	4-D
134	Shop Test Cell	4-F
135	Guard Shelter	6-B
136	Cooling Tower	5-D
137	Cooling Tower	5-D
138	Engineering Offices	5-C
140	Magazine X Temp	4-D
141	Magazine X Temp	4-D
142	Utilities Dock	4-F
143	Solid Rocket Dock	4-E
144	Environmental Lab	4-C
145	Magazine-Propellant	4-E
146	Magazine-Temp	4-D
147	Cooling Tower	4-E
148	Energy Conversion Lab	4-D
150	25 Foot Space Simulator	4-C
152	Hazardous Chemical Storage	5-E
153	Magazine-Solid Propellant	6-D
154	Magazine-General Storage	6-D
156	Guided Missile Engineering	5-C
157	Matl. Research Lab	6-D
158	Matl. Research Process Lab	6-D
159	Pump House (Water)	4-F
160	Pump House (Sewage)	6-D
161	Guidance Lab	5-C
163	Cooling Tower	5-E
165	Cooling Tower	6-D
166	Cooling Tower	4-D
167	Cafeteria	6-C
168	Space Sciences Instrmt Sys Lab	7-C
169	Surveyor Project Bldg.	7-C
170	Fabrication Shop	7-D
171	Matl. Services Bldg	7-D
172	Carpenter Shop	5-F
173	Test Shelter	4-F
174	Cooling Tower	5-D
175	Water Reservoir	3-F
176	Fire House	5-E
177	Heavy Equip. Servicing Shed	5-E
178	Bailey Bridge	4-F
179	Spacecraft Assy. Facility	7-C
180	Central Engr. Bldg	6-B
182	Bus Stop Shelter	4-F
183	Physical Science Lab	6-C
184	Electronic Stores	6-D
185	Telecommunications Annex	6-C
186	Space Sciences Division Bldg	7-B
187	Chemical Storage	6-E
188	Engineering Facilities Bldg	4-C
189	Electronics Lab Annex	5-D
190	Engineering Offices	8-C
191	Hazardous Test Bay	3-F
192	Propulsion Component Storage	5-E
193	Heliport Dispatchers Office	6-D
195	Guard Shelter	7-C
196	Guard Shelter	5-B
197	Solid Propellant Process Lab	4-E
198	Guidance Lab	6-D
199	Celestial Simulator Bldg	6-D
200	Plant Engineering Services	8-C
201	Carpenter Shop	8-C
202	Plant Engineering Bldg	7-C
203	Emitter Storage Bldg	6-D
204	Test Cell "F" Equip. Bldg	5-E
205	High Gain Antenna Tower	2-C
206	Rotator Platform	2-D
207	Rotator Pad	2-D
208	Impedance Platform	2-C
209	Illuminator Tower	2-D
210	Blaine Track	2-D
211	Magnetometer Bldg	3-B
212	Antenna Laboratory	2-D
213	Cooling Towers 'A', 'B' & 'C'	5-B
215	Cooling Tower	6-D
218	Visitor Control Building	6-C
220	C.R.S. Terminal Bldg	4-D
224	Sewer Lift Station	8-C
226	Solvent Storage Bldg	5-D
227	Guard Shelter	4-C
228	Cooling Towers (A & B)	4-B
229	Shielded Room Bldg	5-D
230	Space Flight Operations Command Facility	5-C
231	Paint Shop	8-C
232	Communications Assy. Bldg. (Proposed)	
233	Engineering Devlpmt Bldg	7-C
234	Lumber Storage Bldg	8-C
235	Microwave Lab (Proposed)	
237	Cooling Tower	4-E
238	Telecommunications Lab	5-C
239	Low Temp. Solid Propellant Mag	4-E
240	High Magnetic Test Facility (Prop)	
241	Shipping & Receiving Dock	7-D
242	Fuel & Oxidizer Stor. Dock (Prop)	
243	Remote Antenna Range Contr. Bldg.	2-C
244	Hi Temp. Storage Magazine	4-E
245	Spectroscopy Lab	4-B
246	Soils Test Lab	4-D
247	Dynamitron	6-E
248	Ten Ft. Space Simulator	4-C
249	Central Security Control Bldg. (Prop)	
250	Main Guard Gate (Proposed)	
251	Gyro Lab	4-A
252	Guard Shelter	6-B
253	LowMag. Interference Lab. (Prop)	
255	Sewage Lift Station	7-C
256	Model Range Control Bldg. (Prop)	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

LAND	NO. ACRES
NASA-OWNED	145.9
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	25.8
TOTAL LAND	171.7
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 126,612

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 19 68 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Space Flight Operations Facility Systems Development Laboratory	SSA	66	1,195		1,261
Standby Power Plant for Space Flight Operations Facility	TDA	135	1,930		2,065
ALL OTHER PROJECTS		38,965			
TOTALS		39,166	3,125		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

SPACE FLIGHT OPERATIONS FACILITY SYSTEMS DEVELOPMENT LABORATORY

AUTHORIZATION LINE ITEM: Jet Propulsion Laboratory

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

LOCATION OF PROJECT: Pasadena, Los Angeles County, California

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$66,000
FY 1968 Estimate	1,195,000
Total Funding Through FY 1968	$1,261,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,127,000
Site preparation	LS	---	$15,000	15,000
Utilities	LS	---	40,000	40,000
Building construction	Sq. Ft.	36,000	28.39	1,022,000
Special raised computer laboratory flooring	Sq. Ft.	10,000	5.00	50,000
Equipment				68,000
Primary switchgear and transformer	LS	---	30,000	30,000
Special electrical and intercommunications system	LS	---	22,500	22,500
Installation of science computer facility	LS	---	15,500	15,500

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	Unit Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter	---	---	---	-0-
		TOTAL		$1,195,000

PROJECT PURPOSE:

The proposed structure will provide laboratory work space adjacent to the Space Flight Operations Facility (SFOF) to accommodate supporting automatic data processing system research and development activities.

PROJECT DESCRIPTION:

The proposed laboratory building will consist of two stories and a basement with a total floor area of approximately 36,000 square feet. The building will be of a steel frame and reinforced concrete construction and will be air-conditioned. Provision for a 7,960 square foot science computing facility, a 7,625 square foot data processing development workshop, a 4,800 square foot telecommunications development laboratory, and 6,400 square feet of engineering office space for related technical and operational personnel are incorporated in the design of this laboratory. Existing second generation automatic data processing equipment of the scientific computing facility, special purpose and peripheral equipment such as key punches, verifiers, assorters, printers, and reproducers will be located with prototype third generation automatic data systems hardware.

PROJECT JUSTIFICATION:

The modern high speed digital computer has profoundly affected the technology utilized in space research and exploration. Every technical discipline is affected--propulsion, structures, guidance, electronics, communications; and every phase is affected--research, development, test, mission control, and post-flight analysis. The application of computers is increasing rapidly in all areas of research, spacecraft design, spacecraft command and control, and spacecraft testing. Utilization of computers at the Jet Propulsion Laboratory falls into three broad classes: mission control and operations; the solution of engineering and scientific problems; and computer-based data systems for special purposes.

In the first category, the Space Flight Operations Facility is used to support a number of programs. The assignment of earth based command control and data acquisition responsibilities for automated spacecraft (such as the Langley Research Center managed Lunar Orbiter and the Ames Research Center managed Pioneer) to the JPL Deep Space Network (which was

already fully committed to Surveyor and Mariner mission control as well as backup of the Manned Space Flight Network for Apollo missions) has resulted during calendar year 1966 and early 1967 in essentially doubling the Mission Control Center supporting computers and peripheral equipment (such as the Surveyor television and Lunar Orbiter photographic reconstruction systems located in the Space Flight Operations Facility).

These multimission control activities have preempted joint use of the SFOF control center equipment and work areas. Technical personnel of the Systems Division and Deep Space Network who previously used the SFOF as a spawning ground for experimentation, development, and integration of software and new hardware components into the vital ground-based supporting data systems are in critical need of laboratory space.

The development, checkout and test of new computer-based support systems capabilities will be carried out in the data processing development workshop and the telecommunications development laboratory on a non-interference basis with the SFOF operational activity. Technology utilized in the operational mode such as display systems, communications systems and simulation systems employing off-the-shelf third generation ADP equipment will be breadboarded by technical personnel of the Systems Division and Deep Space Network.

The second category, general scientific and engineering computing systems now temporarily housed in one of the old wooden frame buildings will be located in the scientific computing laboratory along with the direct operating personnel, and computer support services which include tape libraries, key punch equipment, and various other files and support equipment, which due to lack of space are now duplicated in other locations.

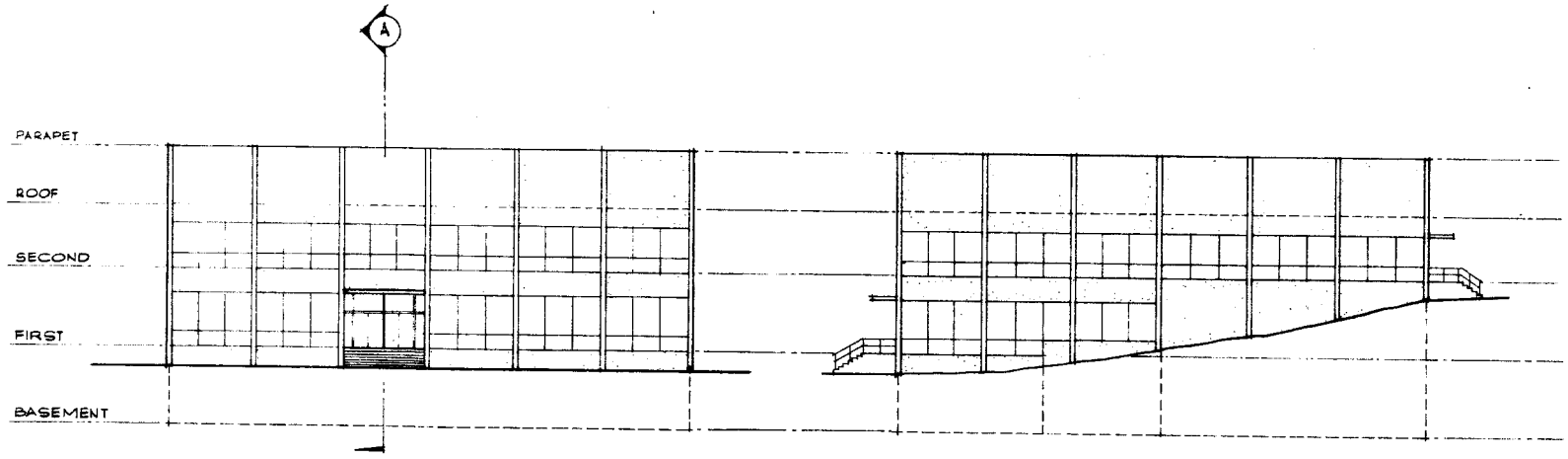
The third category of equipment development, special computer-based data systems such as the Apollo Lunar Surface Experiment Package (ALSEP), Solar Wind Spectrometer Engineering Evaluation Computers will also be conducted in this facility.

Existing Deep Space Information System equipment will be located in a screen room in the communication laboratory to enable exhaustive tests of a complete telecommunications system including flight and ground support equipment. This capability does not now exist, with the consequence that important difficulties may not be discovered until after complete spacecraft or experiment system testing has commenced, at which time remedies are are expensive, difficult to check out, and time consuming, when the flight schedules can least afford delays.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

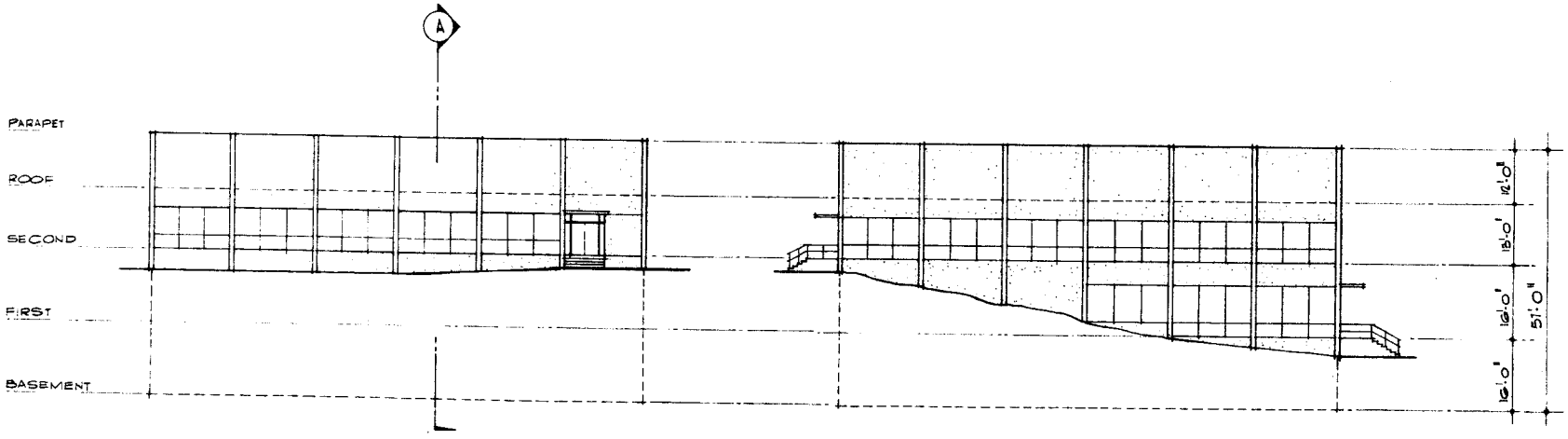
JET PROPULSION LABORATORY
FISCAL YEAR 1968 ESTIMATES

SFOF SYSTEMS DEVELOPMENT LABORATORY



SOUTH ELEVATION
SCALE 1/16" = 1'-0"

EAST ELEVATION
SCALE 1/16" = 1'-0"



NORTH ELEVATION
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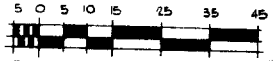
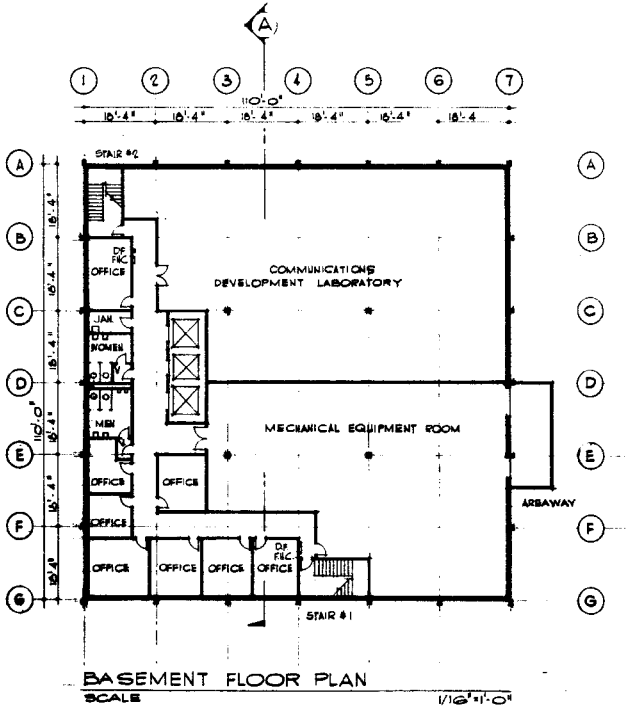
WEST ELEVATION
SCALE 1/16" = 1'-0"

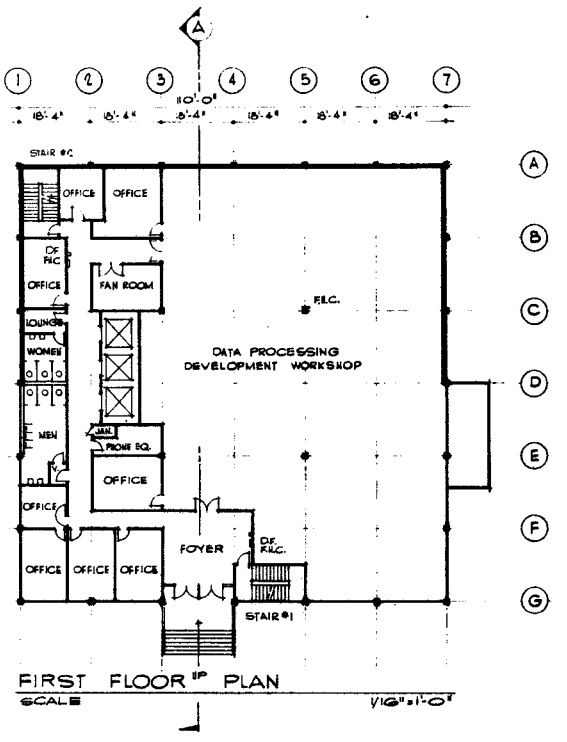


JET PROPULSION LABORATORY
FISCAL YEAR 1968 ESTIMATES

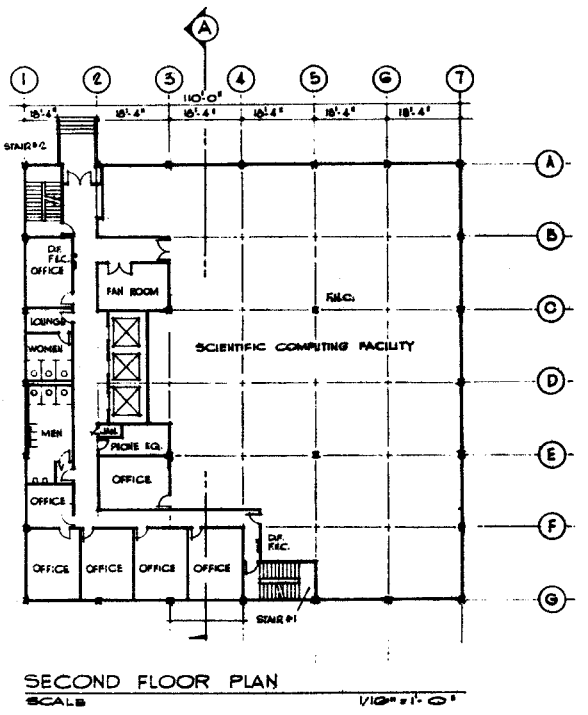
SFOF SYSTEMS DEVELOPMENT LABORATORY



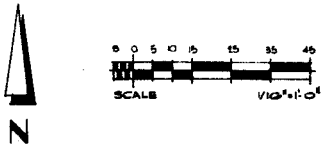
BASEMENT FLOOR PLAN
SCALE 1/16"=1'-0"



FIRST FLOOR PLAN
SCALE 1/16"=1'-0"



SECOND FLOOR PLAN
SCALE 1/16"=1'-0"



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

STANDBY POWER PLANT FOR SPACE FLIGHT OPERATIONS FACILITY DEEP SPACE NETWORK

AUTHORIZATION LINE ITEM: Jet Propulsion Laboratory

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

LOCATION OF PROJECT: Pasadena, Los Angeles County, California

COGNIZANT NASA INSTALLATION: Jet Propulsion Laboratory

TYPE OF CONSTRUCTION PROJECT: Addition to existing building

FUNDING:

FY 1967 and Prior Years	$135,000
FY 1968 Estimate	1,930,000
Total Funding Through FY 1968	$2,065,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$512,000
Building addition	Sq. Ft.	8,200	$37.07	304,000
Relocate and modify existing 500 kilowatt engine generators	Each	2	29,000	58,000
Electrical distribution modifications	LS	---	52,000	52,000
Mechanical distribution	LS	---	58,000	58,000
Utilities	LS	---	25,000	25,000
Site development	LS	---	15,000	15,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$1,418,000
Primary generating equipment	LS	---	$466,000	466,000
No break generating system	LS	---	564,000	564,000
Switchgear	LS	---	265,000	265,000
Air conditioning	LS	---	100,000	100,000
Freight hoist (5 ton)	Each	1	15,000	15,000
Maintenance crane (5 ton)	Each	1	8,000	8,000
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,930,000

PROJECT PURPOSE:

It is the purpose of this project to provide power plant equipment and an engine generator room, with its control room, for emergency standby power for the Space Flight Operations Facility (SFOF).

PROJECT DESCRIPTION:

This project provides for the construction of an approximately 8,200 square foot addition on the west side of building 230 (SFOF). This addition will be at basement level. The area will provide space for installation of additional engine generators with their accessories and controls. The no-break power supplies will be installed in the east basement where the two existing engine generators are located. Certain modifications to the power distribution in the building are necessary in conjunction with the installation of the no-break and standby power systems. A 250 ton refrigeration chiller with its cooling tower will be added to the existing air conditioning system.

PROJECT JUSTIFICATION:

This project is essential to insure reliable, continuous emergency power for critical equipment during mission operations, in the event that commercial power sources should fail or be interrupted.

As a result of the expansion of SFOF computers, consoles, displays, and associated utilities since the initial construction of the facility, power requirements have increased from 1,500 Kilovolt Amperes (KVA) to 3,500 KVA. This increased requirement has been met by an appropriate increase in commercial power sources. However, the emergency standby power supply source

must be correspondingly increased. The existing building does not provide adequate space to install the necessary additional emergency power units and consequently must be expanded.

Computer equipment is extremely sensitive to input voltage variations; such variations can result in a loss of essential data during a critical mission period. The no-break power supplies will be used to isolate the computer voltage critical equipment from commercial power system voltage dips, etc. and will be carried on a separate bus system.

The additional air conditioning equipment is essential to insure minimum back up to environmental control of critical computer instrumentation utilized during mission operations for extended periods of time.

Without this project, the SFOF building will not have sufficient and dependable standby power to permit operation in the event of a commercial power failure during a critical mission period.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

JET PROPULS[illegible] LABORATORY
FISCAL YEAR 1968 ESTIMATES

S.F.O.F. STANDBY POWER INSTALLATION

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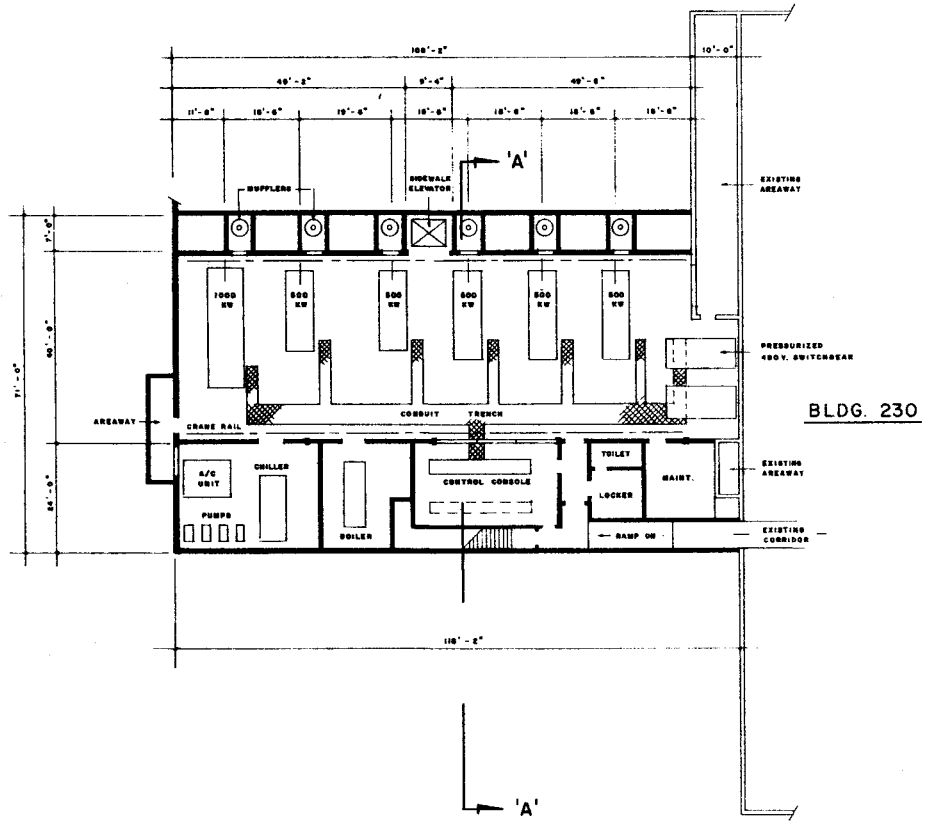

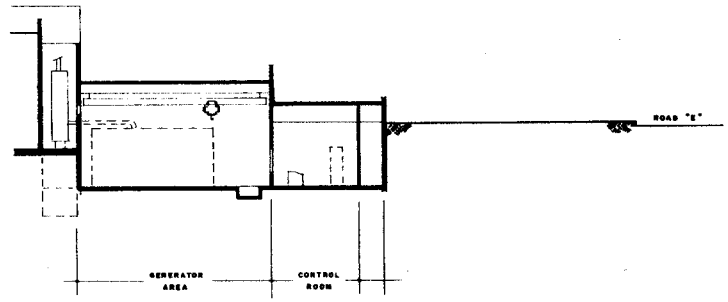

- FLOOR PLAN -

SECTION 'A' - 'A'

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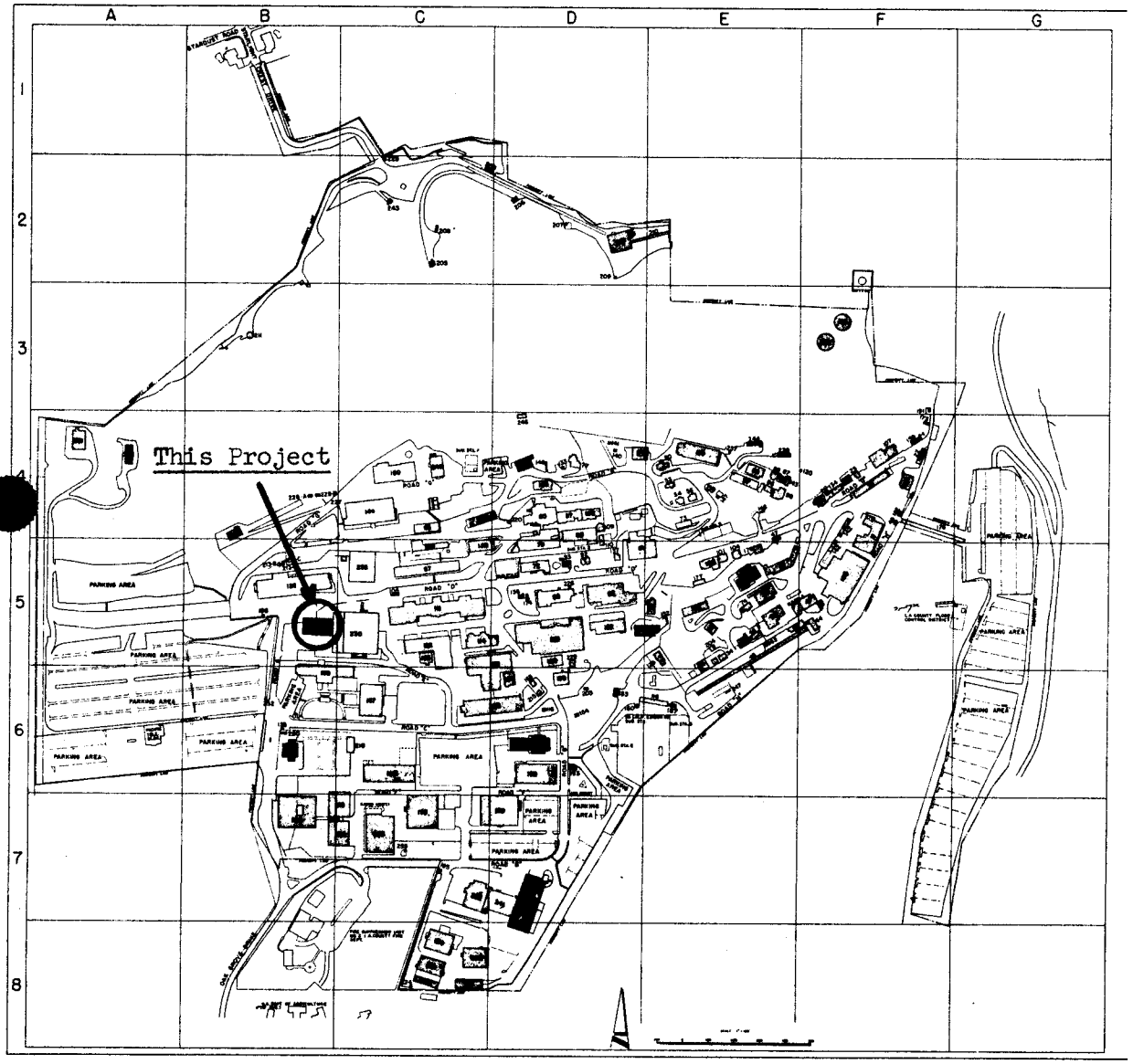
JET PROPULSION LABORATORY
FISCAL YEAR 1968 ESTIMATES

S.F.O.F. STANDBY POWER INSTALLATION



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

JOHN F. KENNEDY SPACE CENTER, NASA

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1968 ESTIMATES

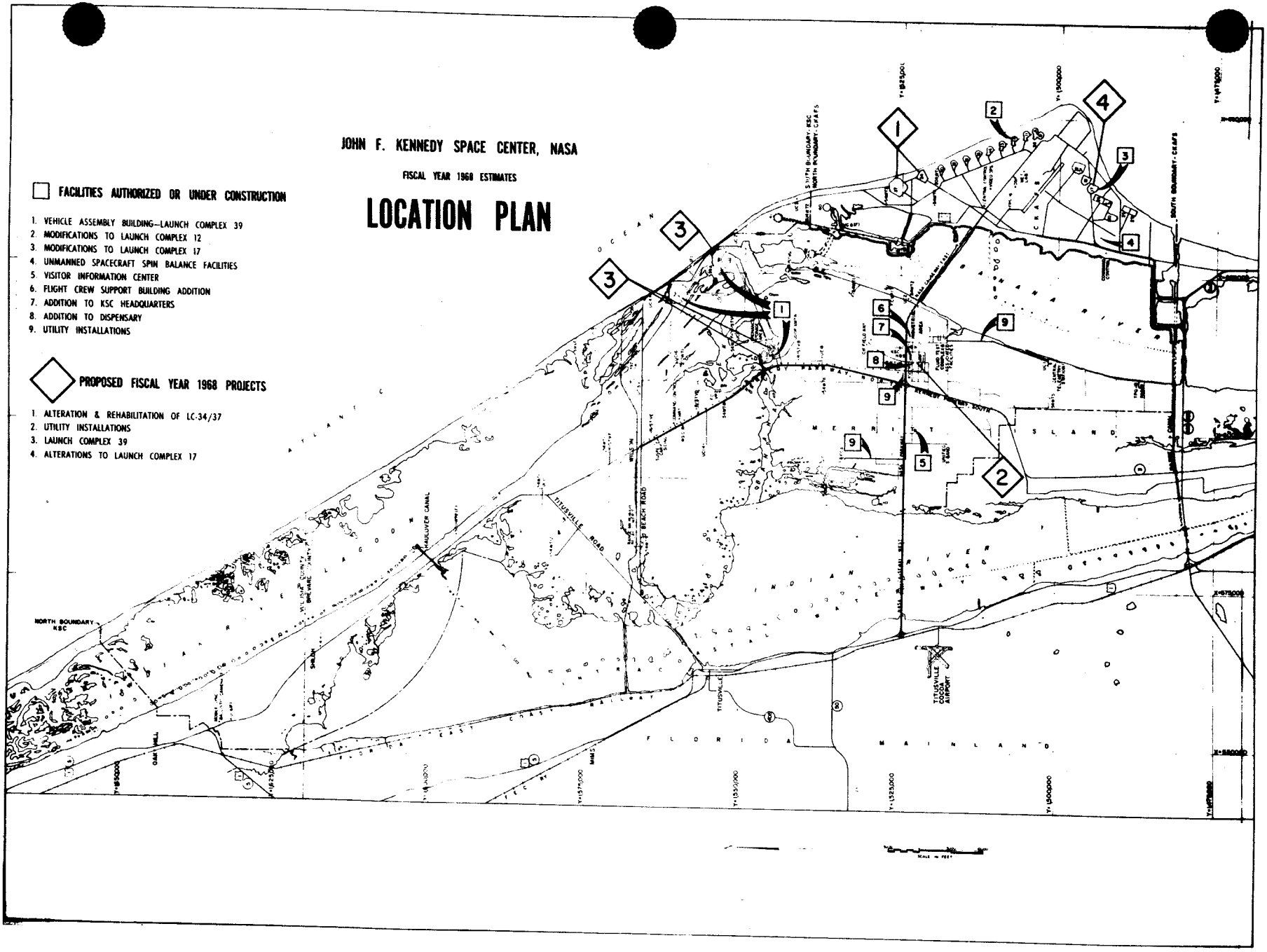
LOCATION PLAN

☐ **FACILITIES AUTHORIZED OR UNDER CONSTRUCTION**

1. VEHICLE ASSEMBLY BUILDING—LAUNCH COMPLEX 39
2. MODIFICATIONS TO LAUNCH COMPLEX 12
3. MODIFICATIONS TO LAUNCH COMPLEX 17
4. UNMANNED SPACECRAFT SPIN BALANCE FACILITIES
5. VISITOR INFORMATION CENTER
6. FLIGHT CREW SUPPORT BUILDING ADDITION
7. ADDITION TO KSC HEADQUARTERS
8. ADDITION TO DISPENSARY
9. UTILITY INSTALLATIONS

◇ **PROPOSED FISCAL YEAR 1968 PROJECTS**

1. ALTERATION & REHABILITATION OF LC-34/37
2. UTILITY INSTALLATIONS
3. LAUNCH COMPLEX 39
4. ALTERATIONS TO LAUNCH COMPLEX 17



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

The Center conducts 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 provides support services for all NASA elements located in the area.

LAND	NO. ACRES
NASA-OWNED	84,424
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	3,340
TOTAL LAND	87,764
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 19 66)*	$ 808,549

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Launch Complex 39	MSF	473,257	16,660		489,917
Alteration and Rehabilitation of Launch Complex Nos. 34 and 37	MSF	97,860	5,725		103,585
Utility Installation	MSF	68,047	210		68,257
Alterations to Launch Complex 17	SSA	4,664	2,290	3,000	9,954
ALL OTHER PROJECTS		238,012			
TOTALS		881,840	24,885		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

LAUNCH COMPLEX 39

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

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

COGNIZANT NASA INSTALLATION: John F. Kennedy Space Center

TYPE OF CONSTRUCTION PROJECT: Alterations

FUNDING:

FY 1967 and Prior Years	$473,256,845
FY 1968 Estimate	16,660,000
Total Funding Through FY 1968	$489,916,845

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$13,730,000
Vehicle assembly building, launch area facilities	LS	---	$11,350,000	11,350,000
Launch umbilical tower refurbishment area	LS	---	482,000	482,000
Gaseous helium storage facility	LS	---	678,000	678,000
Modifications to pads A and B	LS	---	550,000	550,000
Modifications to mobile service structure	LS	---	250,000	250,000
Modifications to crawlerways	LS	---	420,000	420,000
Equipment				$2,930,000
Modifications to launch umbilical towers	LS	---	1,200,000	1,200,000
Photo support system	LS	---	900,000	900,000
Instrumentation	LS	---	830,000	830,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$16,660,000

PROJECT PURPOSE:

This project provides for continuing the construction and outfitting of Launch Complex 39, and for modifications required in direct support of the erection, checkout, and launch of the Saturn V launch vehicles and Apollo spacecraft.

PROJECT DESCRIPTION:

In Fiscal Year 1968, the following work must be accomplished at Launch Complex 39:

Vehicle Assembly Building (VAB), Launch Area Facilities - Activation of the third high bay of the Vehicle Assembly Building and the third firing room of the Launch Control Center. This work includes the final adjustments and modifications to utilities, structural items and equipment in order that the facility may be adapted to the vehicle and/or spacecraft configuration.

Funds will be required for contractual modifications resulting from settlement of disputes concerning such items as the values of work accomplished, differences in interpretation of specifications, changes in site conditions, and project delay beyond the control of the contractor.

Launch Umbilical Tower (LUT) Refurbishment Area - Modifications to Launch Umbilical Tower Park Position No. 3, will include an air compressor facility to provide a capability for sand blasting and spray painting operations; power interface pedestals to support welding operations, lighting, and general power source requirements; and an elevator/stairway pedestal to provide access from the ground to the forty foot level, or top deck. Also included are site preparation, utilities and high pressure gas lines that are needed for the refurbishment operations.

Gaseous Helium Storage Facility - Additions to the helium storage capability, consisting of a battery of twenty 250 cubic foot tanks housed in a 1,500 square foot monolithic concrete building. Also included are the associated pipes, valves, manifold truck loading system, and hardstand.

Modifications to Pads A and B - The crawlerway tracks on Pads A and B will be modified by the installation of a leveling course of grout over the existing metal grid tracks, and the installation of a sheet metal plate surfacing.

Modifications to Mobile Service Structure - Installation of disk brakes in the vertical drive system of the first two platforms to augment the existing brakes on the motors. This will incorporate automatic braking if the speed of a platform exceeds the desired rate, or if power fails.

Modification to Crawlerways - Removal of existing pockets of marine clay below the surface of the crawlerway and replacement with suitable fill material.

Modification to Launch Umbilical Towers - Installation of additional power supplies on the Launch Umbilical Towers, including switch gear, transformers, and panels, and a power monitoring system to allow remote control from the Launch Control Center. Also included are modifications to the engine deluge systems, the umbilical arm cooling water systems, and the wiring systems of the instrumentation network.

Photo Support Systems - Installation of camera mounts, heat protection devices, remote control equipment, and related cables for the photographic system at Pad B.

Instrumentation - Installation of tracking and sensing equipment and instruments at Pad B, and improvements to such equipment on Pad A.

PROJECT JUSTIFICATION:

Activation of the third high bay of the VAB, which is presently under construction, is necessary so that the facility may be adapted to the final configuration of the Saturn V space vehicle, and the LUT on which the vehicle will be erected. Based on the activation related to the first two high bays, it is known that utilities, communication systems, platforms, piping systems, and ground service equipment must undergo interface fit tests and facility checkout which will result in final adjustments and modifications. Funds will also be required for the settlement of contractor entitlements which will be negotiated. Based on an evaluation of completed construction contracts, it is known that a large number of contract modifications will be finalized during this period. Funds, over and above those currently authorized, will be required to effect settlement.

Exterior facilities must be provided to support the refurbishment of the Launch Umbilical Towers between launches. This work cannot be performed within the VAB due to the adverse effects of these operations on internal environmental and communications systems.

During the past year, operational tests and facility checkouts have been conducted to validate the constructed facilities. These operations, such as the movement of the crawler-transporters on the crawlerway and at the pad, wet tests, hot and cold flow tests, and fit tests with the LUT and a checkout vehicle, have indicated that various modifications are necessary to improve the operational capability of the complex. As an example, during operations at Pad A with the LUT and Mobile Service Structure, it was quite difficult to maneuver the crawler transporter into the "let down" position. This was due to the composition of the existing trackways on the pad, consisting of a metal grid system filled with concrete, which caused excessive friction between crawler and the track, and a hanging of the crawler shoes on this uneven surface. Installation of metal plates on the tracks will relieve this situation, enabling the crawler to reduce its "let down" or "pick up" time. Another example is the platform braking problem on the Mobile Service Structure. During fit and operational tests at Pad A, it was determined that the existing disk brakes on the vertical drive motors are adequate under normal operating conditions. However, should a failure occur on any part of the drive system which raises or lowers the platforms, stresses could develop which could cause failure of the platform supports. The additional disk brakes on the drive system of each platform will eliminate this condition.

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

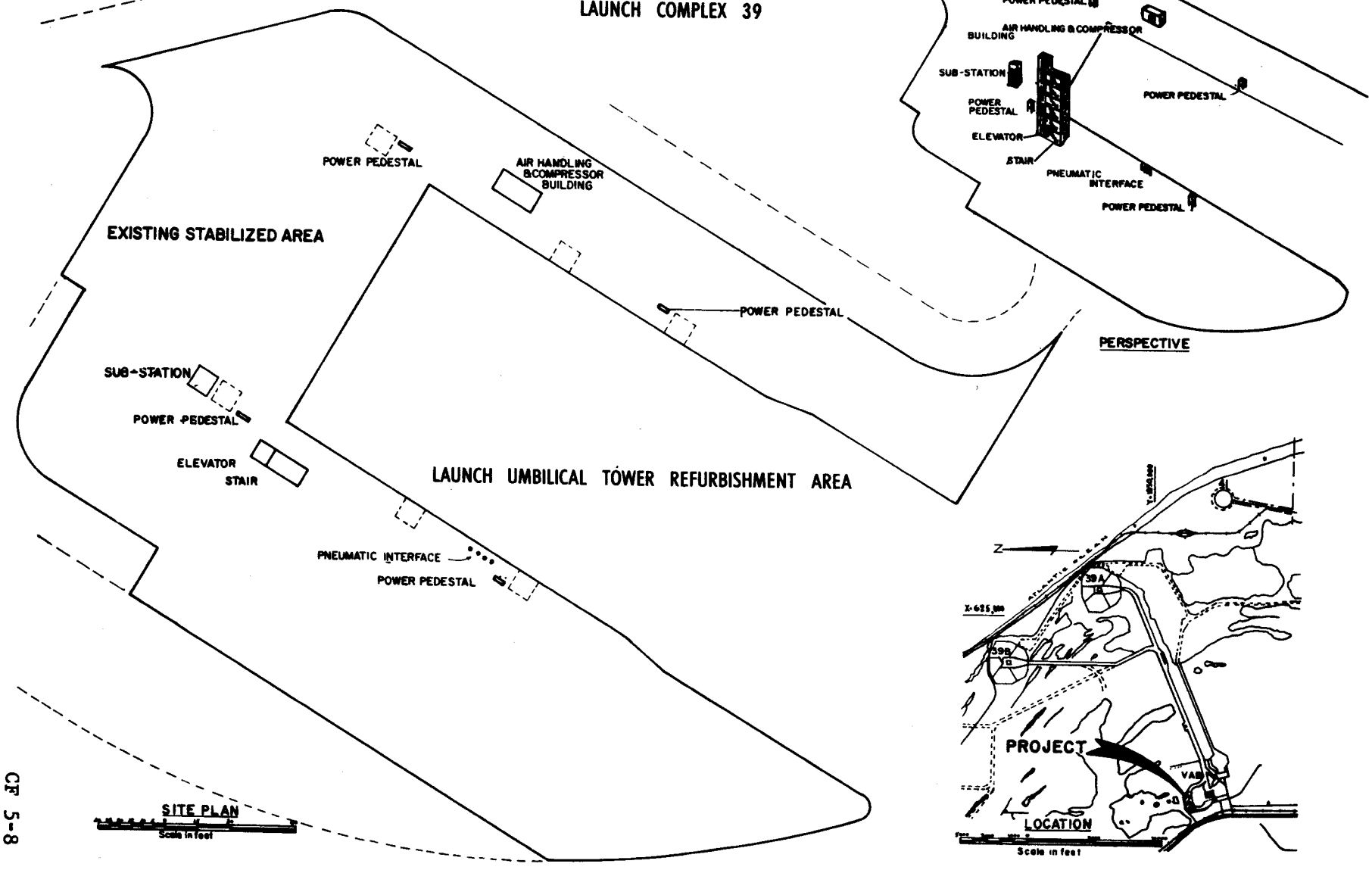
243-381 O - 67 - 8

JOHN F. KENNEDY SPACE CENTER, NASA
FISCAL YEAR 1968 ESTIMATE
LAUNCH COMPLEX 39
LAUNCH AREA A
LAUNCH AREA "B"
MATCH LINE
MATCH LINE
X = 625,
X = 620,
X = 615,0
X = 610,0
2000
1000
0
1000
SCALE IN FEET

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1968 ESTIMATE

LAUNCH COMPLEX 39

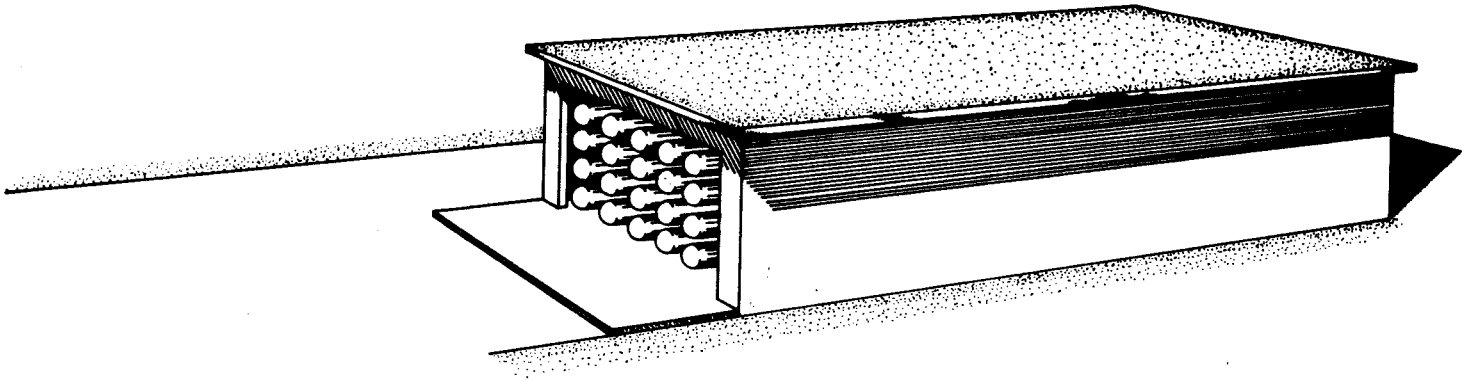


CF 5-8

JOHN F. KENNEDY SPACE CENTER NASA

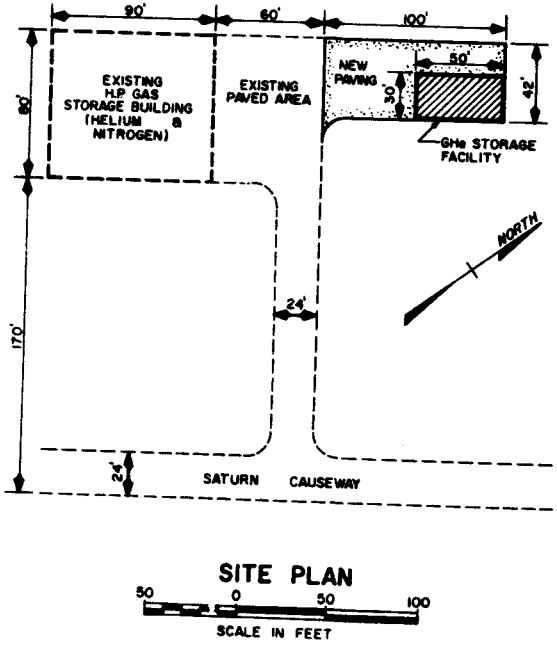
FISCAL YEAR 1968 ESTIMATES

LAUNCH COMPLEX 39



PERSPECTIVE

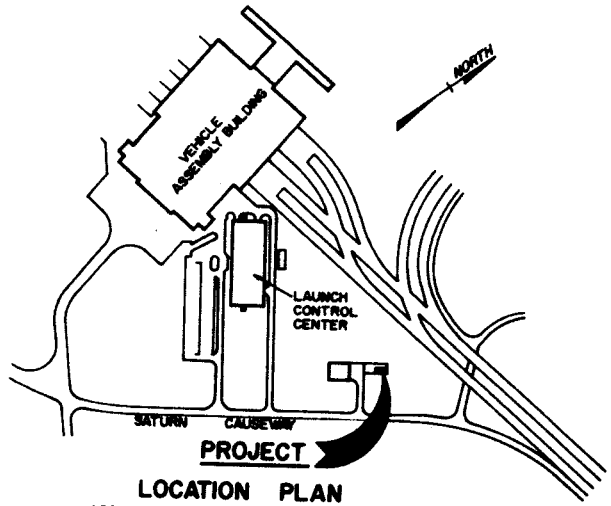
GASEOUS HELIUM STORAGE FACILITY



SITE PLAN

50 0 50 100

SCALE IN FEET



LOCATION PLAN

400 0 400 800

SCALE IN FEET

CE 5-9

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

ALTERATION AND REHABILITATION OF LAUNCH COMPLEX NOS. 34 AND 37

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: Alteration and Rehabilitation

FUNDING:

FY 1967 and Prior Years	$97,859,834
FY 1968 Estimate	5,725,000
Total Funding Through FY 1968	$103,584,834

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$3,525,000
Service structure and umbilical tower modifications	LS	---	$1,200,000	1,200,000
Service structure elevator modifications	LS	---	1,350,000	1,350,000
Propellant and high pressure modifications	LS	---	625,000	625,000
Instrumentation and communications systems	LS	---	350,000	350,000
Equipment				2,200,000
Service structure and umbilical tower	LS	---	900,000	900,000
Instrumentation and communication system	LS	---	1,300,000	1,300,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$5,725,000

PROJECT PURPOSE:

This project will provide for the alteration and rehabilitation of Launch Complex Nos. 34 and 37 facilities as required to support the continuing launch programs.

PROJECT DESCRIPTION:

The project will provide for the alteration and rehabilitation of each basic complex and includes all structural, electrical, mechanical, and propellant systems. Specifically, the project involves major repair work on the following items:

Service Structure and Umbilical Tower - Repair, replace or install materials and equipment such as structural members, electrical distribution main circuit breakers, the environmental control system and associated utility systems.

Service Structure Elevators - Replacement of the worn and obsolete drum type elevators.

Propellant and High Pressure Gas Systems - Repair and/or replacement of worn pumps, valves, piping and related systems.

Instrumentation and Communication Systems - Repair and/or replacement of deteriorated or obsolete cabling, equipment and instrumentation.

PROJECT JUSTIFICATION:

This project is required to maintain the complexes in a state of operational readiness for continuing launch programs. The launch program and the exposure of the facilities to the corrosive atmosphere have caused deteriorating effects on the basic structure and critical subsystems.

Based on experience and analysis, a rehabilitation and renovation program will have to be undertaken in the FY 1968 period to maintain the facilities in a condition to support continuing launch programs. Repairs or replacements must be undertaken that will encompass deteriorated structural members, electrical and environmental control systems, cabling, piping and instrumentation. A program of this type, which is essentially nonrecurring

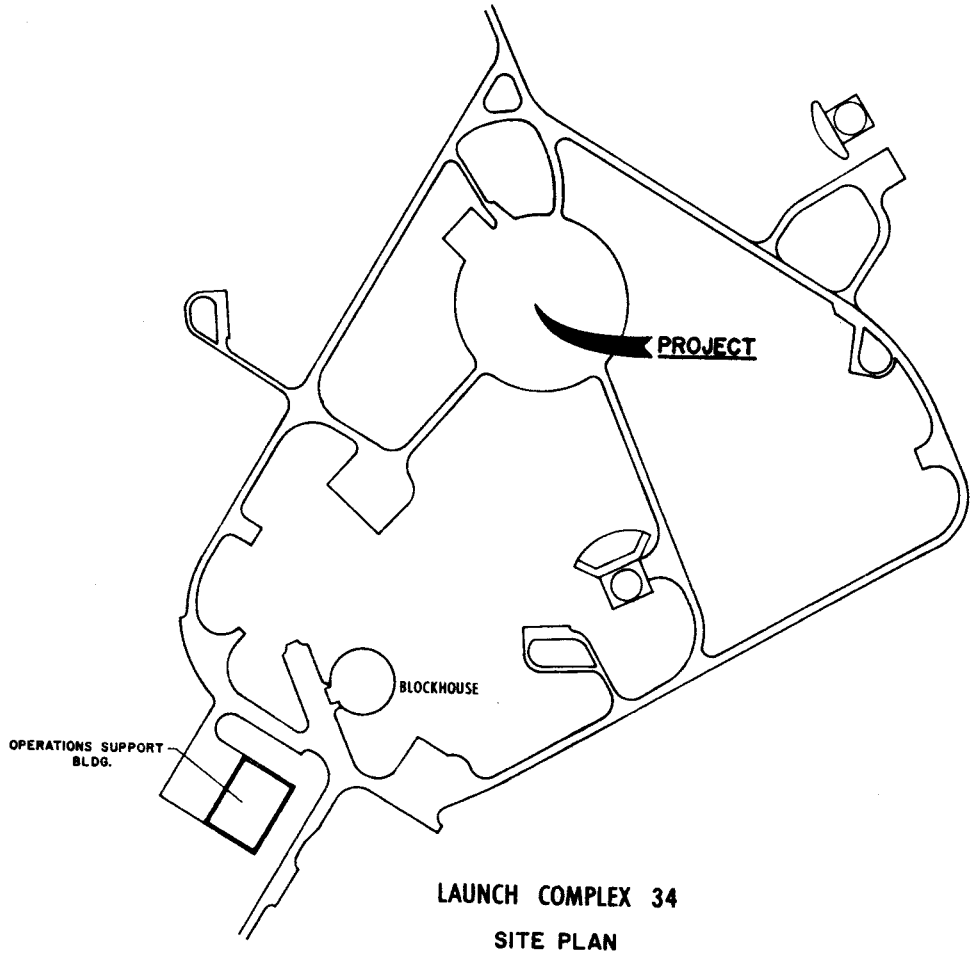
maintenance, is normal on any major structure. In this case the cycle has been accelerated by the manned and unmanned launches from these complexes and the corrosive effects of local climatic conditions.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: This requirement will be dependent upon the extent of follow-on and future programs. An estimated yearly expenditure of between $1 and $2 million will be required to safeguard the current investment.

JOHN F. KENNEDY SP[illegible] CENTER, NASA

FISCAL YEAR 1968 ESTIMATES

ALTERATION & REHABILITATION OF LC-34/37

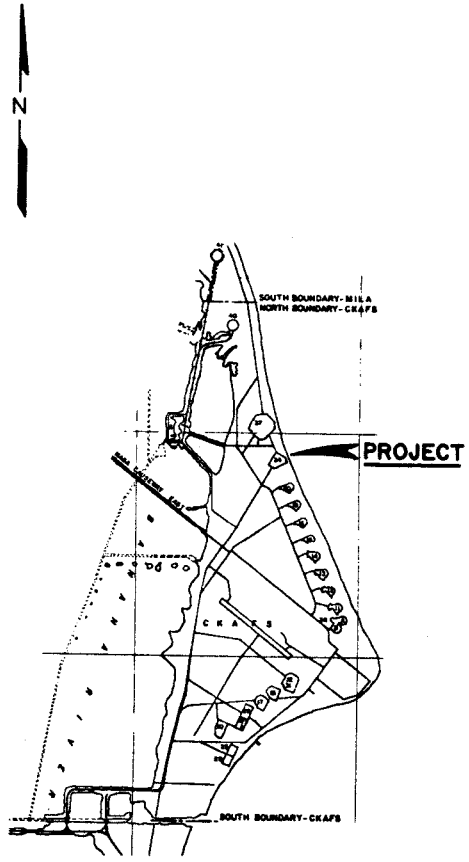


LAUNCH COMPLEX 34

SITE PLAN

200 0 200 400 600

SCALE IN FEET



LOCATION MAP

10,000 0 10,000 20,000

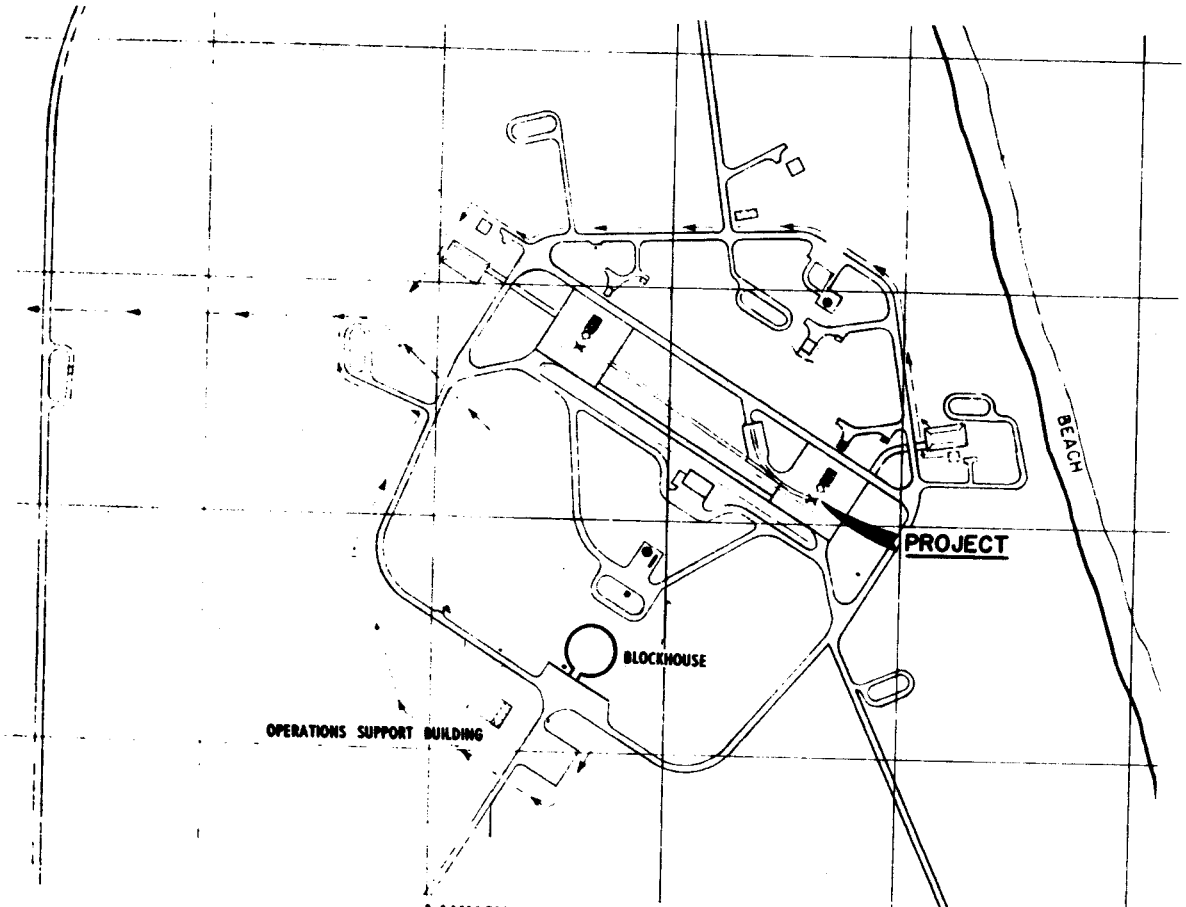
SCALE IN FEET

CF 5-13

JOHN F. KENNEDY SP[illegible] CENTER, NASA

FISCAL YEAR 1968 ESTIMATES

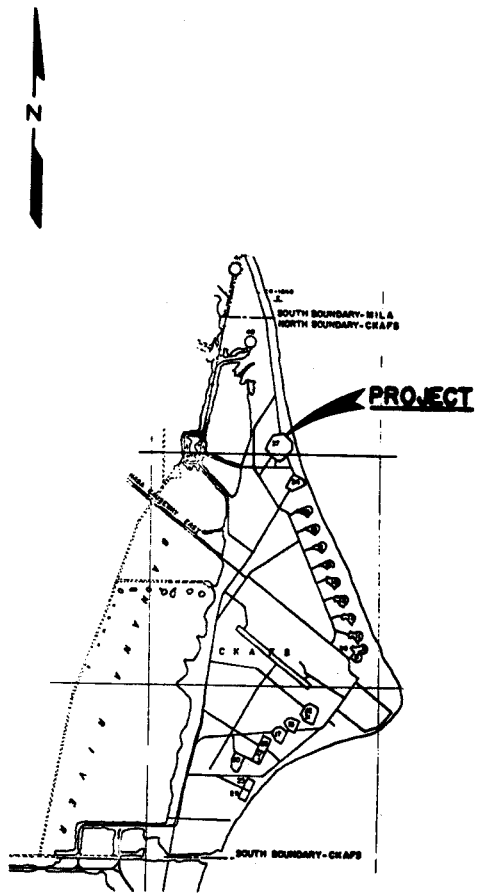
ALTERATION & REHABILITATION OF LC-34/37



LAUNCH COMPLEX 37
SITE PLAN

400 0 400 800 1200

SCALE IN FEET



LOCATION MAP

10,000 0 10,000 20,000

SCALE IN FEET

CF 5-14

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

UTILITY INSTALLATION

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 1967 and Prior Years	$68,047,202
FY 1968 Estimate	210,000
Total Funding Through FY 1968	$68,257,202

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$210,000
High temperature hot water system	LS	---	$210,000	210,000
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
			TOTAL	$210,000

PROJECT PURPOSE:

This project will provide for necessary extensions and improvements to the high temperature hot water distribution system in the Merritt Island Industrial Area.

PROJECT DESCRIPTION:

This project provides for the installation of approximately 9,300 feet of high temperature hot water supply and return lines with necessary valves and fittings to interconnect the three high temperature hot water systems which presently serve the Merritt Island Industrial Area.

PROJECT JUSTIFICATION:

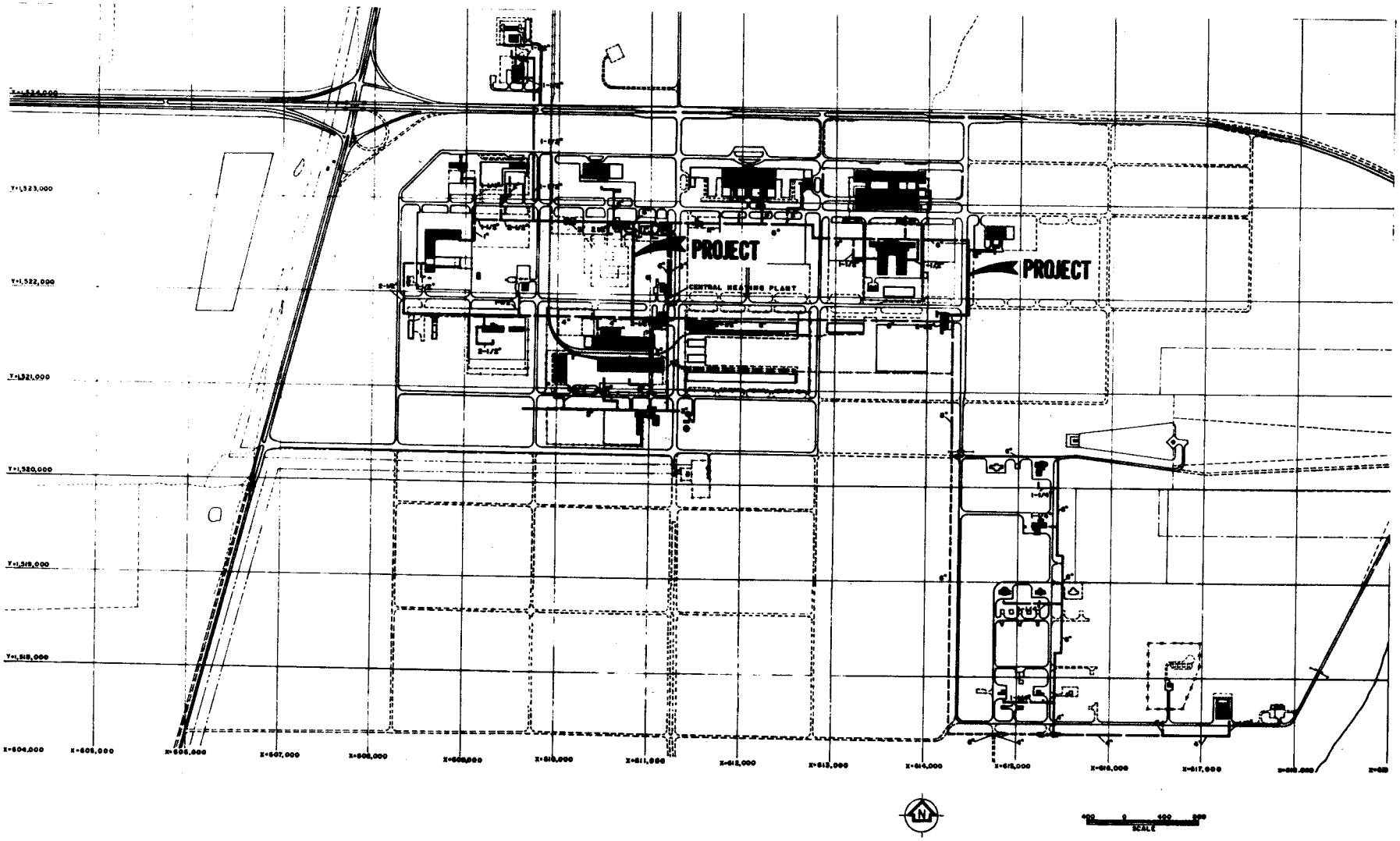
The Merritt Island Industrial Area is presently divided into three zones, each served by a separate high temperature hot water distribution system which provides temperature and humidity control to all the facilities in the complex. Under this arrangement, a break in the main line serving any one zone would cause a total loss of environmental control for all facilities served in that area. Many of the facilities, such as the computer rooms, laboratories, and spacecraft facilities require constant precise temperature and humidity control. Certain key activities which are interrelated are performed in facilities located in separate zones as exemplified by the Central Instrumentation Facility (Zone 1), Operations and Checkout (Zone 2) and the Fluid Test Complex (Zone 3). Because of their interdependence it is imperative that environmental control be maintained in all these facilities to assure continued operations during test and launch periods. This project provides for the interconnection of the three high temperature hot water zones to assure an efficient and effective system.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: It is anticipated that additional funds will be required for utilities and center development to support any future construction program.

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1968 ESTIMATE

UTILITY INSTALLATIONS



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

ALTERATIONS 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: Merritt Island, Brevard County, Florida

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

TYPE OF CONSTRUCTION PROJECT: Alterations

FUNDING:

FY 1967 and Prior Years	$4,663,500
FY 1968 Estimate	2,290,000
Total Funding Through FY 1968	$6,953,500

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,883,000
Launch vehicle service structure	LS	---	$1,296,000	1,296,000
Umbilical tower	LS	---	341,000	341,000
Environmental enclosure	LS	---	129,000	129,000
Launcher deck	LS	---	117,000	117,000
Equipment				$407,000
Intercommunications system	LS	---	150,000	150,000
Complex public address system	LS	---	73,000	73,000
Launch control system consoles and instrumentation	LS	---	184,000	184,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,290,000

PROJECT PURPOSE:

This project will provide the dual launch pad capability at Launch Complex 17 to support the preflight testing, checkout and launching of the long tank version of the Delta launch vehicle.

PROJECT DESCRIPTION:

Major alterations and extensions will be made to the launch vehicle mobile service structure and the fixed umbilical tower and launcher deck area on Launch Pad 17B to match the new external dimension of the stretched Delta configuration. The major alterations include:

Service Structure Alterations (Pad 17B) - The existing service structure on the launch pad will be increased in height by 14½ feet by major structural additions at the base so that the special work platforms and upper stage and spacecraft fueling, electrical and instrumentation connections on the vehicle service structure will be in the proper location to carry out the prelaunch checks and servicing the Delta vehicle which will use the 14½ foot longer Thor space booster as the first stage. New railroad car trucks and tracks will be required to carry the added strucural weight of the tower and additional cables, pipes, ducts and associated equipment will be installed to connect with the propellant and gaseous nitrogen storage tanks. The upper stage and spacecraft environmental enclosure will be extended to provide additional protection to the launch vehicle and operations crews.

Umbilical Tower Extension (Pad 17B) - The fixed umbilical tower will be extended by splicing in a 14½ foot section so as to retain the same relative location of the external power, instrumentation and fueling connections on the tower to the vehicle, a new elevator and two mechanically operated swing-away catwalks will be added to the tower to provide limited personnel access to the upper portion of the vehicle if required after the mobile service structure has been removed just prior to launch. The new structural steel section will have the necessary cables, pipes, ducts, and associated hardware to reconnect the existing fueling and launch control equipment to the space vehicle.

Launcher Deck Modifications (Pad 17B) - The exposed deck surrounding the launcher and hold down arms which support the vehicle prior to launch will be refurbished and strengthened by adding heavier steel plates and re-arranging some of the cables and pipes in the immediate vicinity of the launcher.

Launch Complex Intercommunications - A new intercommunication system and public address system will be installed at the complex. The launch complex operational communication system which permits instantaneous voice contact between personnel in the blockhouse, at the launch pad, range control center, mission director, and the global tracking station network will be replaced throughout with new equipment which is compatible with the Air Force Eastern Test Range Communication System. All instruments located at the launcher and installed on the vehicle service structure and umbilical tower will be weatherproofed. Protective storage cabinets will be located at each intercom station for the storage of headsets and microphones.

PROJECT JUSTIFICATION:

The Delta launch rate, averaging eight missions per year from Cape Kennedy, requires the use of the two existing pads, 17A and 17B, in order to maintain the capability and flexibility to support the mission requirements of programs such as Pioneer, Biosatellite, Intelstat, and the Explorer class spacecraft launchings. The modification to Pad 17A, started in FY 1967, will be ready to support the first Long Tank Delta mission in the spring of 1968. To minimize the ground facilities constraints for future scheduled missions using the Delta vehicle, it is necessary to initiate the alterations to Pad 17B during FY 1968. By prefabricating structural members and scheduling some of the updating work concurrently with the launch operation activity on Pad B while Pad A is being modified will reduce the time interval during which Delta launchings will be limited to a single pad.

Of several alternate engineering approaches considered, the proposed extension to the vehicle service structure and umbilical tower was determined to be the most practical approach. Structural analysis and detailed facility condition studies have indicated that, although the basic structure is almost ten years old and has been continuously exposed to the severe corrosive environment of the Florida east coast, the proposed alterations can extend the useful life of these structures for several more years at approximately one half the cost of a new facility.

The increase in thrust of the first stage engine and the solid propellant thrust augmentation system has essentially doubled the force of the flame impingement at lift off. Considerable damage occurs to the launch deck during each launch such as, blown steel plates and burned plumbing and wiring in the immediate vicinity of the launcher. New heavy steel deck plates and the re-arrangement of vulnerable launch vehicle servicing lines is required to minimize the refurbishment time and costs.

The collateral communication system was designed to support the single stage Thor weapons system development launchings in 1957. This intercommunication system has been added to in piecemeal fashion, as new requirements have developed to tie in the additional engineers and technicians preparing the upper stages of the Delta and spacecraft for launch. The system is now overloaded to the point that the existing amplifiers do not have the capacity to provide proper audio gain during countdown and has in some instances caused communications failure between the blockhouse and launch pad. A similar limitation exists in the amplifier capacity of the public address system which is used to contact personnel who, by the nature of their work, must move around the launch complex.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: $3,000,000

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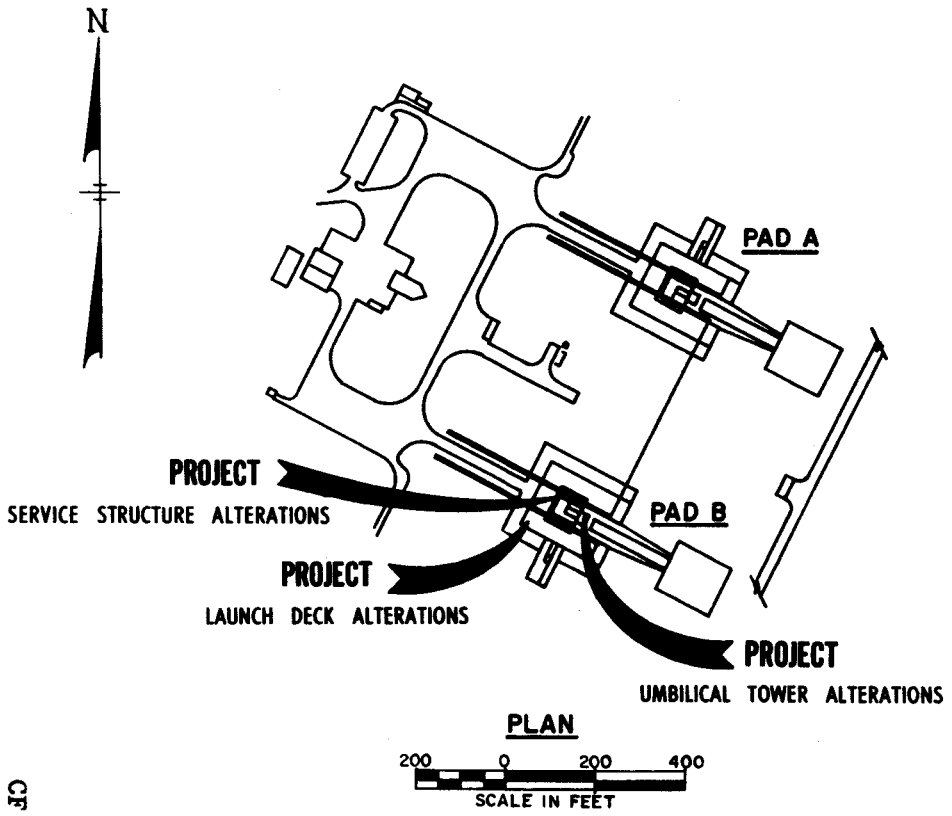
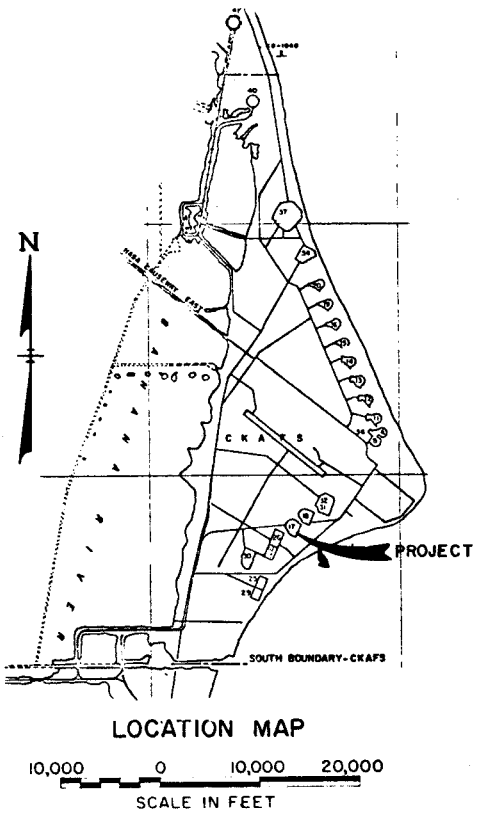
JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1968 ESTIMATE

ALTERATIONS TO LAUNCH COMPLEX 17



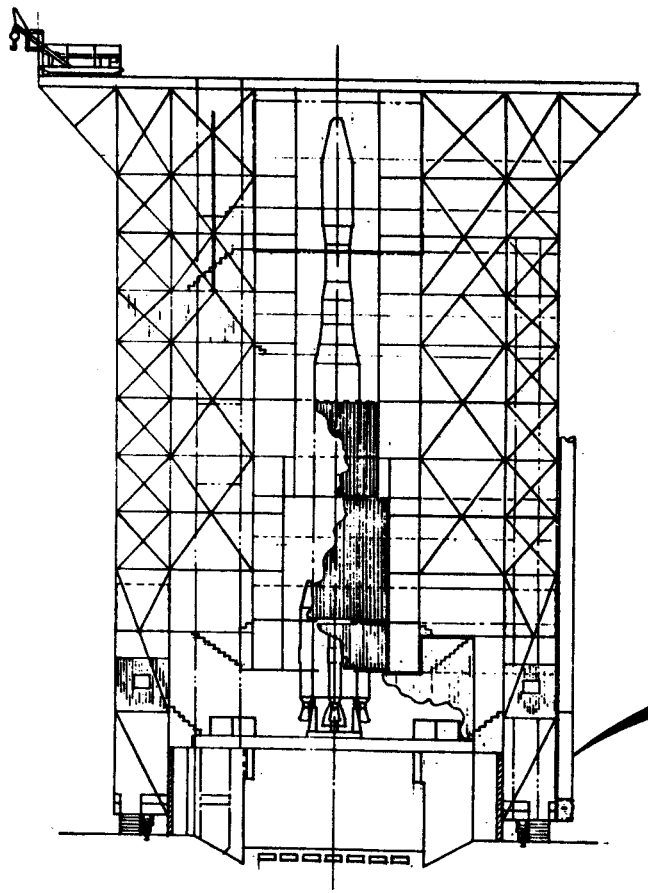


JOHN F. KENNEDY SPACE CENTER, NASA

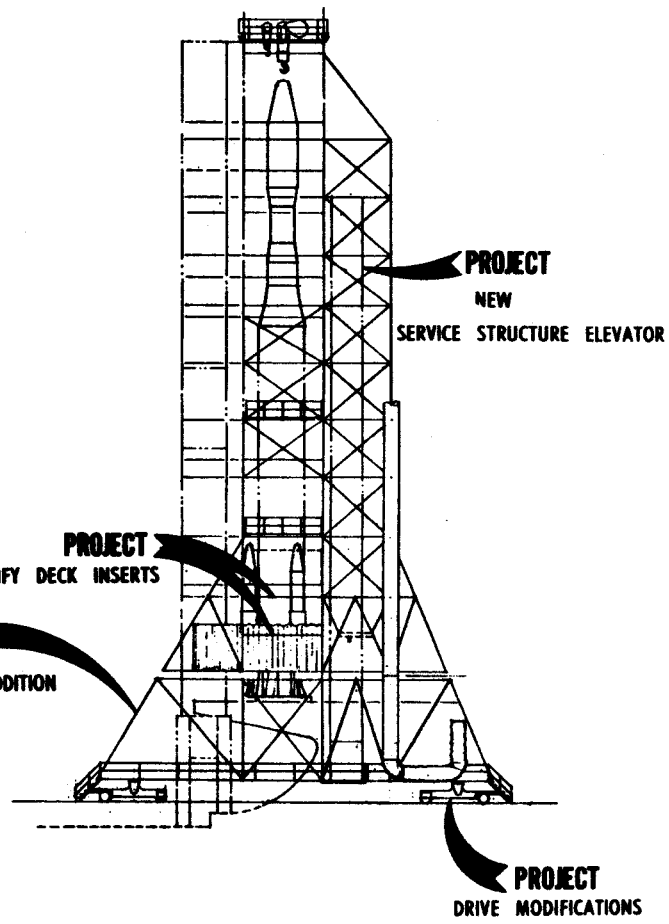
FISCAL YEAR 1968 ESTIMATES

ALTERATIONS TO LAUNCH COMPLEX 17

SERVICE STRUCTURE ALTERATIONS



EAST ELEVATION
NO SCALE



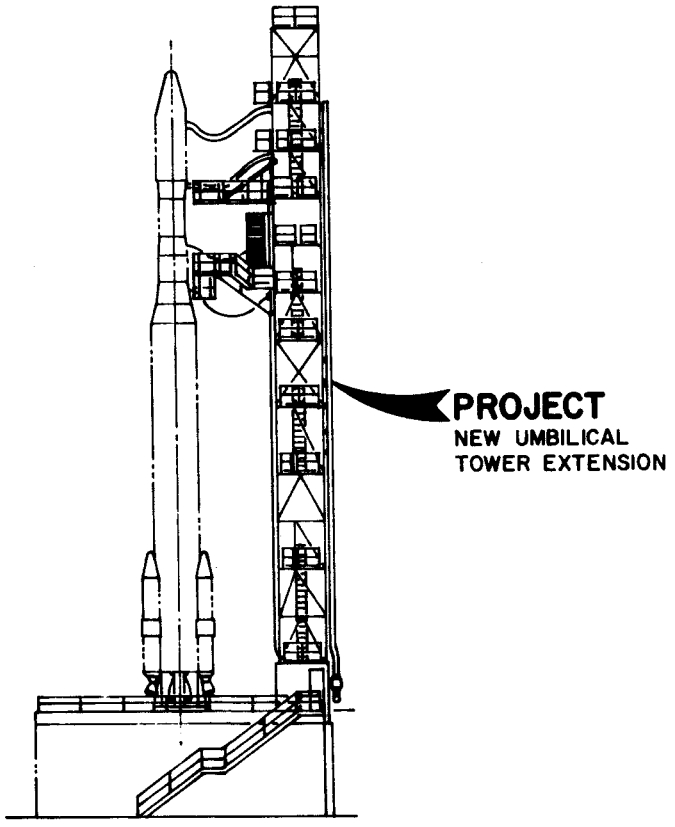
NORTH ELEVATION
NO SCALE

JOHN F. KENNEDY SPACE CENTER, NASA

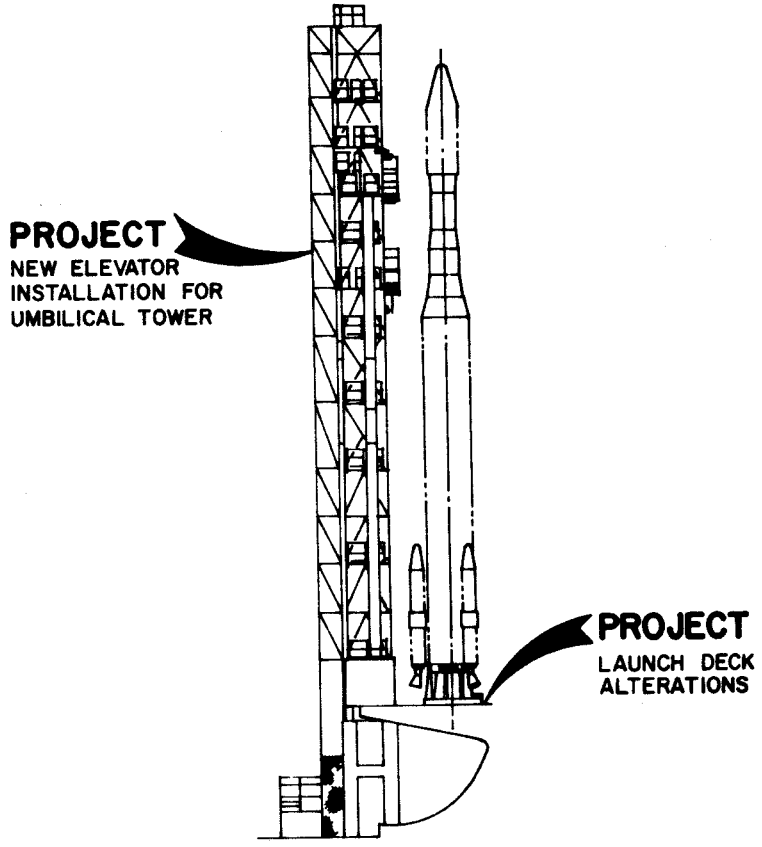
FISCAL YEAR 1968 ESTIMATES

ALTERATIONS TO LAUNCH COMPLEX 17

UMBILICAL TOWER ALTERATIONS



WEST ELEVATION
NO SCALE



NORTH ELEVATION
NO SCALE

CF 5-24

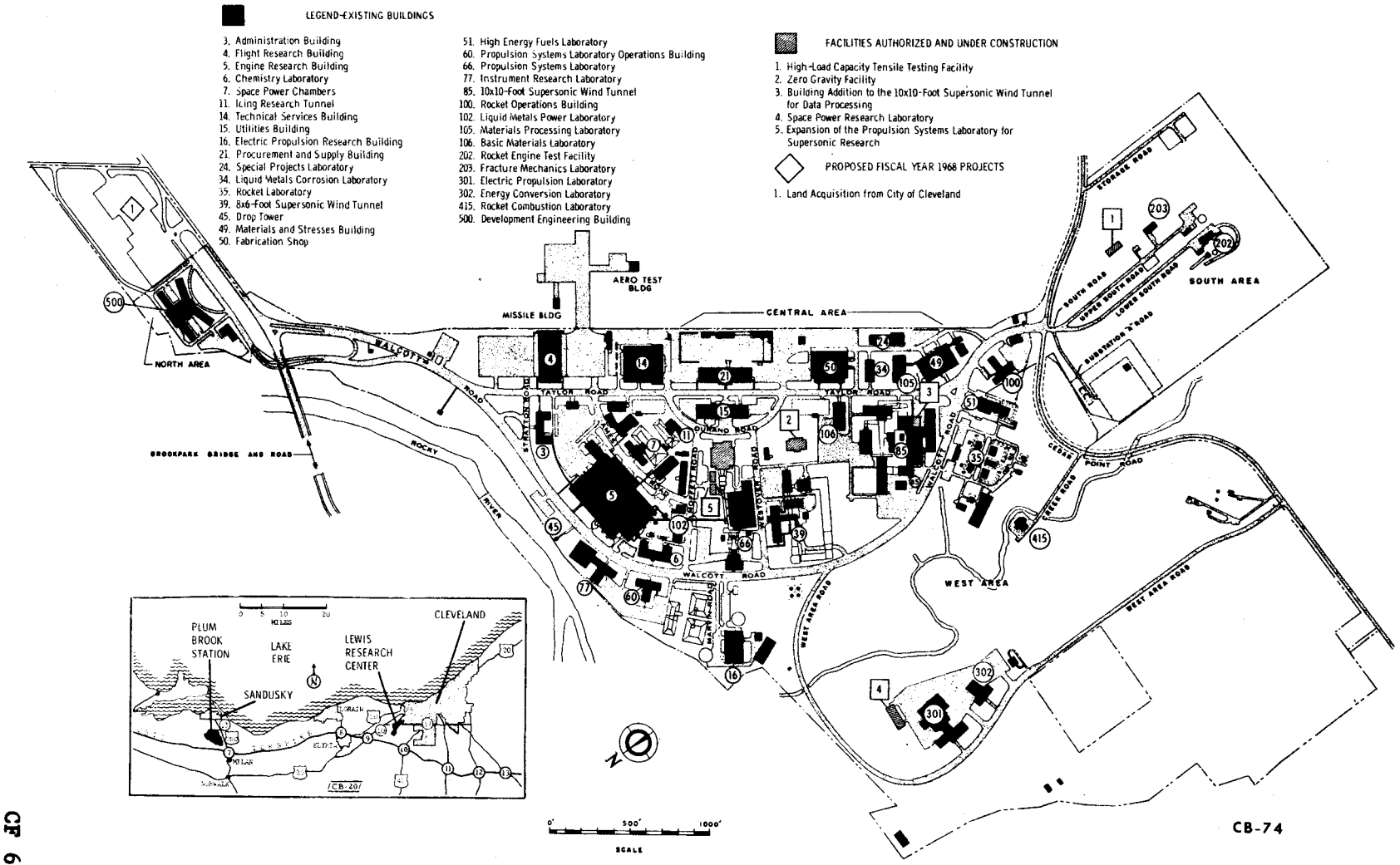
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

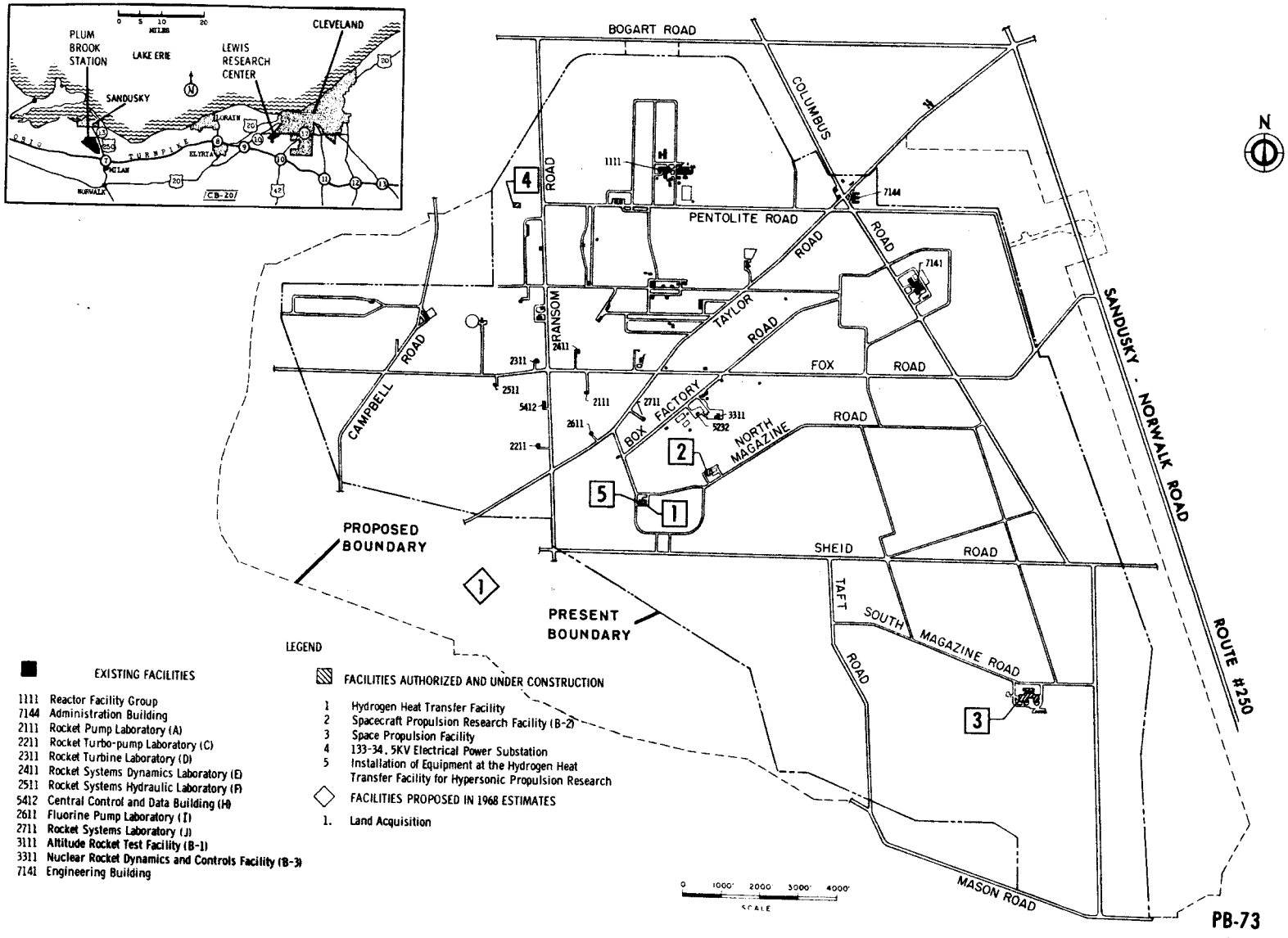
LEWIS RESEARCH CENTER

LOCATION PLAN



LEWIS RESEARCH CENTER
PLUM BROOK STATION
FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN



LEGEND

■ EXISTING FACILITIES

1111 Reactor Facility Group
7144 Administration Building
2111 Rocket Pump Laboratory (A)
2211 Rocket Turbo-pump Laboratory (C)
2311 Rocket Turbine Laboratory (D)
2411 Rocket Systems Dynamics Laboratory (E)
2511 Rocket Systems Hydraulic Laboratory (F)
5412 Central Control and Data Building (H)
2611 Fluorine Pump Laboratory (I)
2711 Rocket Systems Laboratory (J)
3111 Altitude Rocket Test Facility (B-1)
3311 Nuclear Rocket Dynamics and Controls Facility (B-3)
7141 Engineering Building

▨ FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

1 Hydrogen Heat Transfer Facility
2 Spacecraft Propulsion Research Facility (B-2)
3 Space Propulsion Facility
4 133-34, 5KV Electrical Power Substation
5 Installation of Equipment at the Hydrogen Heat Transfer Facility for Hypersonic Propulsion Research

◇ FACILITIES PROPOSED IN 1968 ESTIMATES

1. Land Acquisition

PB-73

CF 6-2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

LAND	NO. ACRES
NASA-OWNED	6,330
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	65
TOTAL LAND	6,395
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 292,229

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 59 THRU CURRENT YEAR	FY 19 68 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Land Acquisition (Cleveland)	ART	-0-	15		15
Land Acquisition (Plum Brook)	ART	96	2,100		2,196
ALL OTHER PROJECTS		108,028			
TOTALS		108,124	2,115		

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

* *Includes work in process.*

1/ Includes Plum Brook Station at Sandusky, Ohio.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

LAND ACQUISITION (CLEVELAND)

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 1967 and Prior Years	$ -0-
FY 1968 Estimate	15,000
Total Funding Through FY 1968	$15,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	Acre	15	$1,000	$15,000
Construction	---	---	---	---
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$15,000

PROJECT PURPOSE:

The purpose of this project is to purchase 15 acres of land leased by the Government.

PROJECT DESCRIPTION:

The land involved consists of 15 acres now leased from the City of Cleveland. It is located north of Brookpark Road and adjacent to the Lewis Research Center's North 10 acres, on which the Development Engineering Building and the Development Engineering Building Annex have been recently constructed. Ninety percent of the parking facilities for these two office buildings, with housing for about 1,000 persons, are located on the leased land. An extension of Underpass Road, which was recently constructed under Brookpark Road to relieve traffic congestion at the Center's main entrance, also passes over this leased land to give a direct access to Grayton Road.

PROJECT JUSTIFICATION:

If, at some future date, the City of Cleveland requires the land for municipal purposes and refuses to renew the lease there will be insufficient parking space for the Development Engineering Buildings and the efficiency of Government operations will suffer. There is no other adjacent land which could be used for parking. Loss of our lease would also cut off our direct access to Grayton Road which feeds traffic into the Center from the north.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

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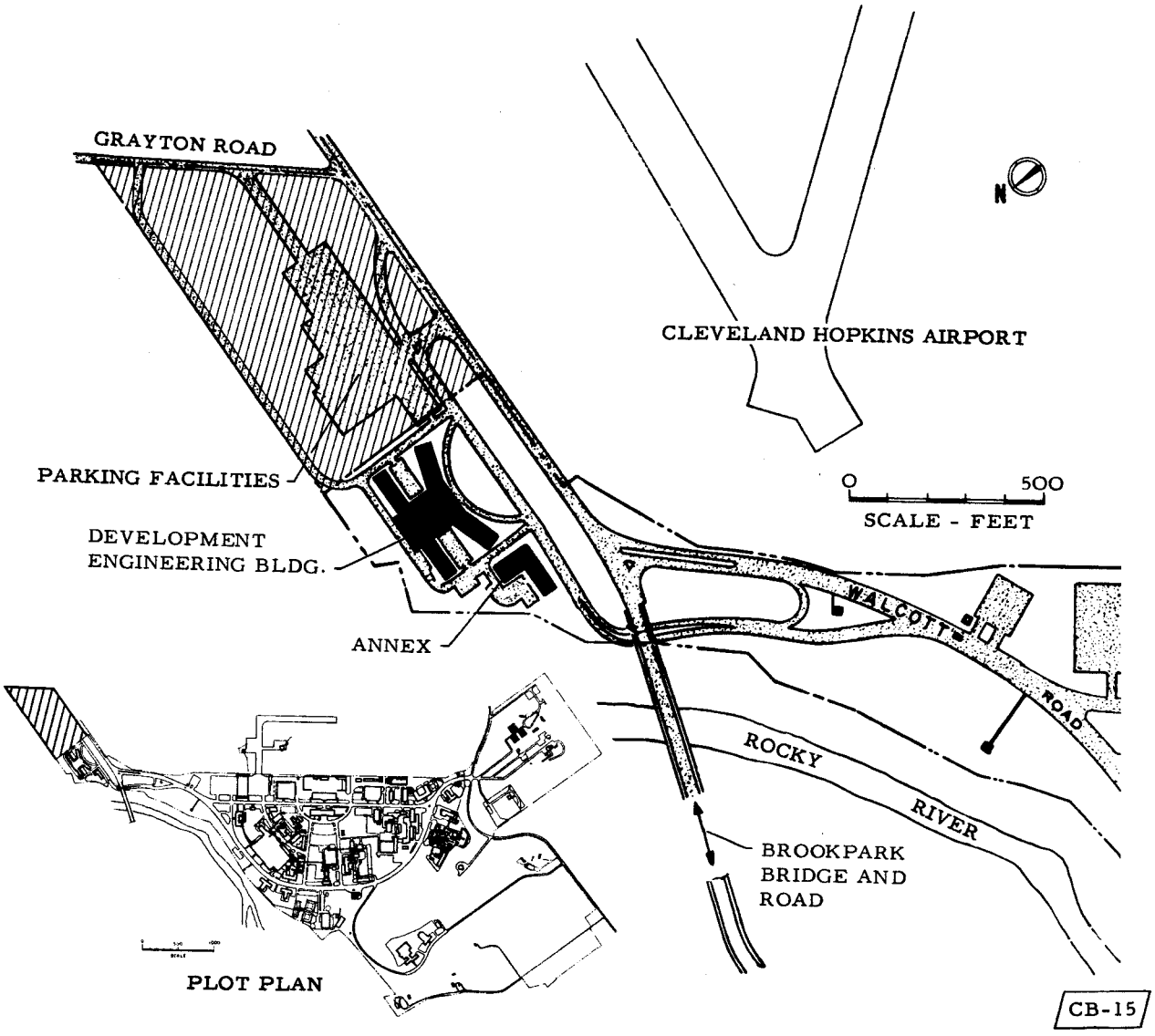
LAND ACQUISITION FROM CITY OF CLEVELAND



CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

LAND ACQUISITION (PLUM BROOK)

AUTHORIZATION LINE ITEM: Lewis Research Center (Plum Brook)

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

LOCATION OF PROJECT: Sandusky, Erie County, Ohio

COGNIZANT NASA INSTALLATION: Lewis Research Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$96,000
FY 1968 Estimate	2,100,000
Total Funding Through FY 1968	$2 196,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	Acre	3,000	$700.00	$2,100,000
Construction	---	---	---	---
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,100,000

PROJECT PURPOSE:

The acquisition of land proposed under this project will allow for the establishment of a buffer zone around the perimeter of the Plum Brook Station, precluding the establishment of a concentrated populace immediately adjacent to the Plum Brook Station. It will also provide land for a future entrance to the station from U. S. Route 250.

PROJECT DESCRIPTION:

This project involves the acquisition of approximately 3,000 acres of land surrounding Plum Brook Station, for the establishment of a buffer zone and a future entrance.

PROJECT JUSTIFICATION:

Plum Brook Station, Sandusky, Ohio was established to conduct the large scale, and more hazardous research programs assigned to the Lewis Research Center. The Station has been developed from a tract of land obtained from the U. S. Army Ordnance Department. The Ordnance Works was utilized for the manufacture and storage of ammunition. Because of the potential explosion hazard, the U. S. Army established a "buffer zone" surrounding the present boundary of Plum Brook Station thus preventing the construction of homes and industrial plants immediately adjacent to the Ordnance Works. When the Army no longer required the Plum Brook works for the manufacture of ammunition, and prior to its acquisition by Lewis Research Center, the U. S. Army returned the "buffer zone" land parcels to private use. The deeds to these parcels contained a recapture clause and restrictions limiting the use of land to agriculture for a period of twenty years after date of title transfer. These restrictions will begin to expire in 1969. NASA management believes that the buffer zone concept has great merit and is requesting that a modified buffer zone be reestablished.

Realistically, the growth of Plum Brook Station is limited by boundaries imposed by Ohio Route 250, Mason, Patton Tract, and Bogart Roads. The proposed buffer zone is in basic conformity with these boundaries and contains an area of approximately 3,000 acres which is about equal to the area of the Ordnance buffer zone. However, certain areas within the natural boundaries have been omitted for economic or other practical reasons.

The maximum hazard associated with a facility may be established either by the facility itself or by the experiment therein. In the case of the Plum Brook reactor, the maximum hazard is set by the 60 megawatt reactor and the experiments contribute little or nothing to the maximum hazard. Conversely, for all other existing test facilities the experiment determines the nature and magnitude of the hazard. For example, the maximum hazard assignable to the Spacecraft Propulsion Research Facility (Building No. 3211) is different for every test program because it is set primarily by the kinds and amount of propellant in the vehicle to be tested. Therefore, except for the reactor, available exclusion distance can strongly determine the ultimate capability of existing facilities at the Station.

The increased experimental activity scheduled for Plum Brook Station will create hazardous and nuisance conditions from which the immediately surrounding community can best be protected by exclusion distance. The present shape of the Station boundaries have large indentations which severely restrict the potential use of the existing facilities. By obtaining the parcels of land set forth in the subject project, the Station boundaries will provide greater exclusion distances from existing facilities. This will allow the utilization of existing facilities for expanded research programs and still retain a minimum potential hazard to the surrounding residential areas.

Noise, radiation, toxicity and explosions are the principle types of hazards and nuisances associated with research programs.

Noise generally falls into the nuisance category, but, when sufficient energy is present, noise can produce structural damage at considerable distance, i.e., broken glass, cracked plaster, etc. Generally speaking, noise poses the least threat to life and property but causes the most complaints from citizens of the community. The Station has several facilities which can produce nuisance level noise at the property line. Examples are the steam ejectors for the "B" Complex, rocket engines at the Rocket Systems Test Sites ("J" Area), the exhaust jet from the Heat Transfer Facility, and the proposed ejector for the Cryogenic Propellant Tank Laboratory ("K" Site). Although studies are not yet complete, preliminary information indicates that the Hypersonic Tunnel Facility with a ramjet engine is likely to produce noise levels in the highest nuisance range.

The value of the proposed buffer can be illustrated by a couple of examples. Acquisition of the proposed buffer zone would increase the property line distance from 1,500 to 3,400 feet for the Cryogenic Propellant Tank Laboratory (Building No. 2811) and from 2,300 to 5,900 feet for the Hypersonic Tunnel Facility (Building No. 3411). The extra distance would provide an added attenuation of 13.5 and 17 decibels, respectively for the two facilities. Such a reduction is very significant at over-all sound levels in the 100 decibel range. A 10 decibel attenuation is equivalent to halving the perceived loudness. Since sound power at the source is proportional to rocket engine thrust, attenuations of 13.5 and 17 decibels would be equivalent to reducing the source strength by 1 and 1½ orders of magnitude, respectively. This would easily change NASA's potential position from a highly objectionable to an excellent neighbor.

Many rocket propellants are toxic (fluorine, nitrogen tetroxide, aeroxine, hydrazine, etc.) and therefore pose a significant safety and operating problem. The dilution of such materials into the atmosphere is strongly influenced by weather conditions. The advantage of distance can be illustrated by considering the Spacecraft Propulsion Research Facility ("B-2" stand). The proposed buffer would increase the fence line distance from about 3,800 feet to about 7,200 feet. For a moderately unfavorable weather condition (typical of late Fall through Spring), the extra distance would allow a slightly greater than threefold increase in the quantity of a toxic material that could be accidentally released for dissipation into the atmosphere. For materials such as hydrogen fluoride, the numbers would

crease from about 1000 to 3000 pounds and for materials such as nitrogen troxide (N_2O_4), the value would be increased from about 3000 to 10,500 pounds.

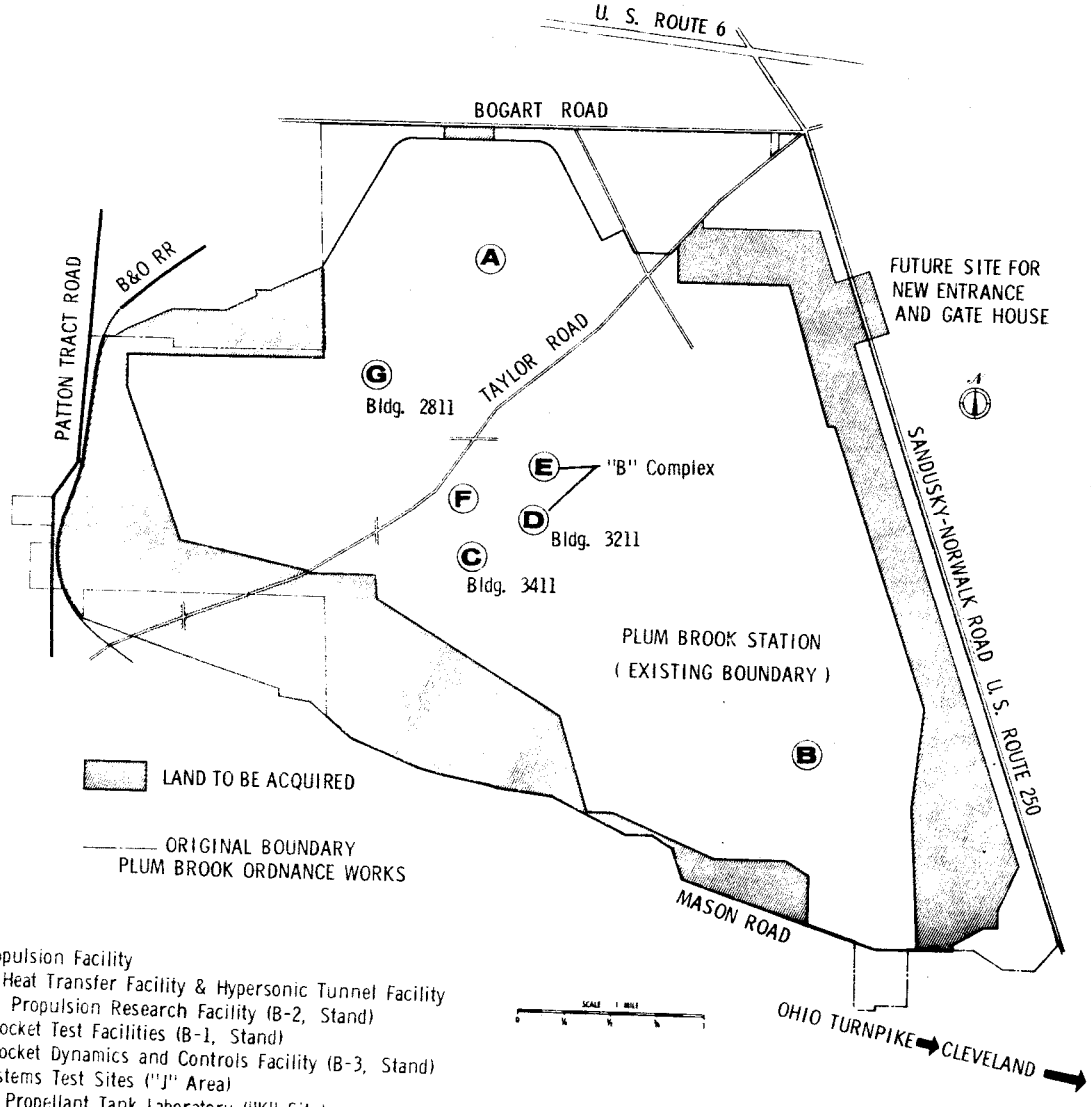
Toxicity and explosion hazards will always exist at Plum Brook because the Station was established to run tests using substantial quantities of liquid hydrogen, liquid fluorine, nitrogen tetroxide, and other hazardous propellants. The buffer zone would provide an added safety zone of low to zero population density. Presently, Plum Brook can store about 450,000 gallons of liquid hydrogen in the Station's dewars. The largest storage dewar holds 200,000 gallons and the Advanced Nuclear Rocket Dynamics and Controls Facility run tank holds 46,000 gallons. The Cryogenic Propellant Tank Laboratory facility is working with flight-weight prototype tanks having capacities approaching 5,000 gallons. The Heat Transfer Facility has a 6,000 gallon liquid hydrogen supply dewar that can be pressurized to over 2000 pounds per square inch gauge (PSIG). Fluorine is handled in trailers having a capacity of 5,000 pounds.

Radiation exposure is probably the worst type of accident and the least probable to occur. The AEC and the State of Ohio impose rigorous controls on the planned release of radioactive material. Therefore, increased exclusion distance is only beneficial for increased operating convenience and in case of an accident. The proposed buffer zone will not change the situation for the Plum Brook reactor facility but would increase the fence line distance from 3,000 feet to 4,000 feet for the Space Propulsion Facility.

TIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

LEWIS RESEARCH CENTER
FISCAL YEAR 1968 ESTIMATES

LAND ACQUISITION (PLUM BROOK)



A Reactor
B Space Propulsion Facility
C Hydrogen Heat Transfer Facility & Hypersonic Tunnel Facility
D Spacecraft Propulsion Research Facility (B-2, Stand)
E Altitude Rocket Test Facilities (B-1, Stand)
Nuclear Rocket Dynamics and Controls Facility (B-3, Stand)
F Rocket Systems Test Sites ("J" Area)
G Cryogenic Propellant Tank Laboratory ("K" Site)

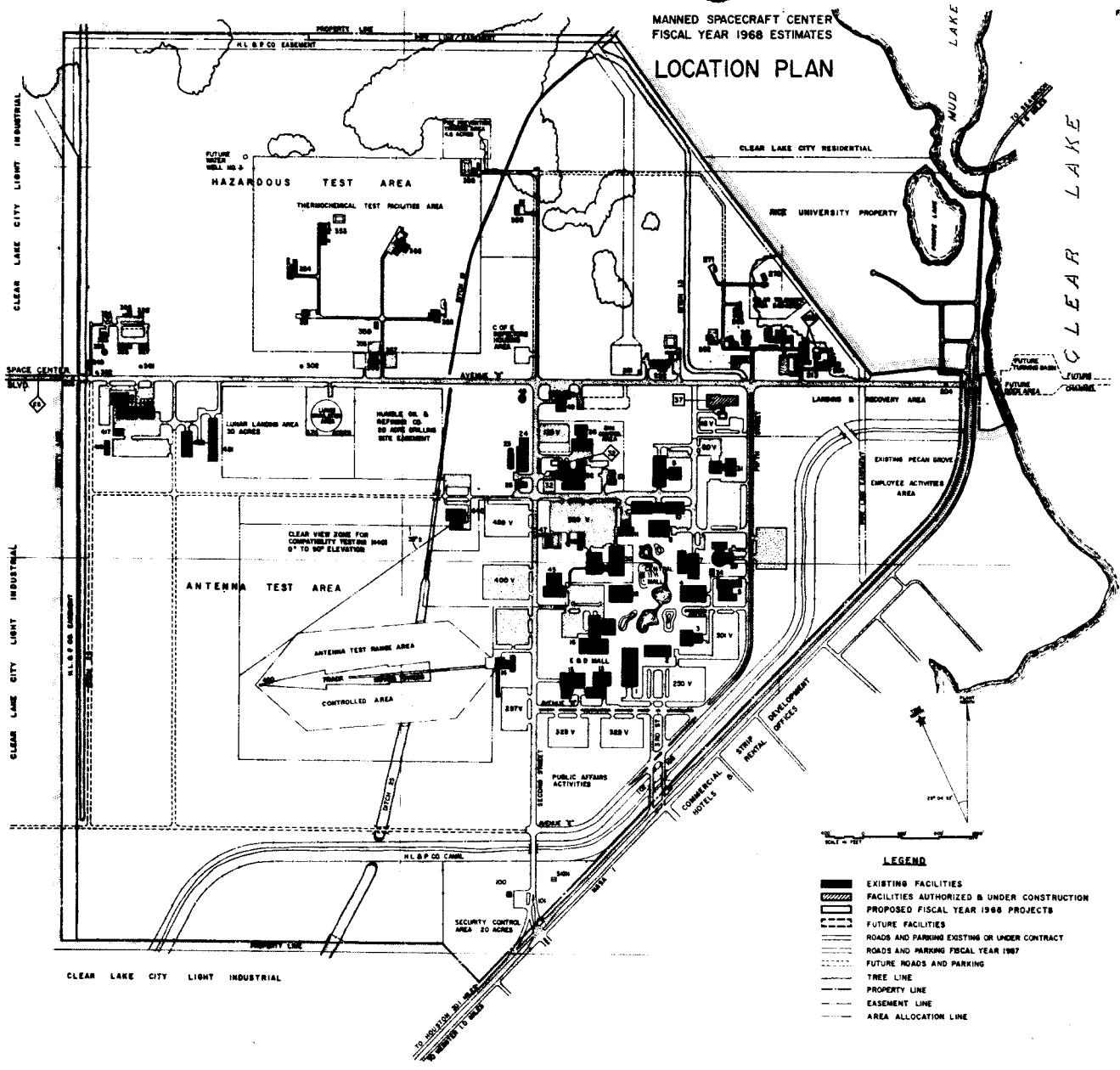
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

MANNED SPACECRAFT CENTER

MANNED SPACECRAFT CENTER
FISCAL YEAR 1968 ESTIMATES
LOCATION PLAN



LEGEND

- EXISTING FACILITIES
- FACILITIES AUTHORIZED & UNDER CONSTRUCTION
- PROPOSED FISCAL YEAR 1968 PROJECTS
- FUTURE FACILITIES
- ROADS AND PARKING EXISTING OR UNDER CONTRACT
- ROADS AND PARKING FISCAL YEAR 1967
- FUTURE ROADS AND PARKING
- TREE LINE
- PROPERTY LINE
- EASEMENT LINE
- AREA ALLOCATION LINE

FACILITY NO	FACILITY TITLE	FUNDING YEAR
	EXISTING FACILITIES	
1	AUDITORIUM	62
2	PROJECT MANAGEMENT BUILDING	62
3	CENTRAL CAFETERIA	62
4	FLIGHT OPERATIONS OFFICE	62
5	MISSION SIMULATION AND TRAINING FACILITY	64
7	LIFE SYSTEMS LABORATORY	62
8	TECHNICAL SERVICES OFFICE	62
9	TECHNICAL SERVICES FACILITY	65
10	TECHNICAL SERVICES SHOP	62
11	BRANCH CAFETERIA	66
12	CENTRAL DATA OFFICE	62
13	SYSTEMS EVALUATION LABORATORY	62
14	ANECHOIC CHAMBER TEST FACILITY	64
15	INSTRUMENTATION AND ELECTRONIC SYSTEMS LABORATORY	62
16	SPACECRAFT RESEARCH OFFICE AND LABORATORY	62, 64
24	CENTRAL HEATING AND COOLING PLANT	62,63,64,66
25	FIRE STATION	66
29	FLIGHT ACCELERATION FACILITY	63
30	MISSION CONTROL CENTER-HOUSTON	63
31	LUNAR MISSION AND SPACE EXPLORATION FACILITY	69
32	SPACE ENVIRONMENT SIMULATION LABORATORY	62,66
33	ULTRA HIGH VACUUM SPACE CHAMBER FACILITY	64
34	FLIGHT ACCELERATION MOTOR-GENERATOR BUILDING	63
36	E&C CONTRACTOR SUPPORT FACILITY	62
40	ELEVATED WATER TANK	62
46	PROJECT ENGINEERING FACILITY	64,69
47	SOUTHWESTERN BELL TELEPHONE BUILDING	NA
48	EMERGENCY POWER BUILDING (MCC-H)	63
49	VIBRATION AND ACOUSTIC TEST FACILITY	64
100	SECURITY CONTROL CENTER	66
101	GUARDHOUSE	62
102	GUARDHOUSE	62
103	GUARDHOUSE	62
204	GUARDHOUSE	62
221	ELECTRICAL SUBSTATION	62
222	ATMOS RE-ENTRY MAT & STRUCTURES EVAL FACILITY	64
223	SEWAGE TREATMENT PLANT	62,64
224	FIELD CONSTRUCTION OFFICE	62,66
227	PRINTING AND REPRODUCTIONS FACILITY	66
230	CREW SYSTEMS BIOLOGICAL FACILITY	64
260	TRANSLATION AND DOCKING FACILITY	63
261	RADIOLOGICAL CALIBRATION AND WASTE STORAGE FACILITY	63
262	ARC JET, RADIANT HEATING AND ACOUSTIC TEST FACILITY	63
263	HEALTH PHYSICS LABORATORY	64
268	RADIATION AND FIELDS ACCELERATOR LABORATORY	65
270	SOLAR TELESCOPE FACILITY	65
301	WATER WELL NO 1	62
302	WATER WELL NO. 2	62
306	GUARDHOUSE	66
322	WATER TREATMENT	62
323	FILTER CLEANING AND STORAGE FACILITY	69
324	CLASSIFIED WASTE DISINTEGRATOR FACILITY	69
325	MAINTENANCE SHOP FACILITY	65
326	ROADS AND GROUND EQUIPMENT MAINTENANCE FACILITY	65
327	MSC WORK CONTROL CENTER	69
328	ROADS AND GROUNDS MATERIALS STORAGE FACILITY	69
339	GROUND WATER STORAGE TANK	62
340	GAS METERING STATION	62
350	THERMOCHEMICAL TEST FACILITY	63
351	THERMOCHEMICAL SPACE CHAMBER FACILITY	63
352	ELECTRO-EXPLOSIVE DEVICES FACILITY	69
353	REACTION CONTROL TEST FACILITY	69
354	SPACE POWER SYSTEMS TEST FACILITY	63
355	CHEMICAL STORAGE BUILDING	63
356	COMPONENTS TEST FACILITY	69
367	THERMOCHEMICAL TEST AREA GATE HOUSE	69
380	THERMOCHEMICAL SEWAGE TREATMENT FACILITY	63
388	HAZARDOUS MATERIAL STORAGE FACILITY	64
416	ITEM-IN OFFICE SUPPORT FACILITY	66
417	GARAGE	66
418	SUPPORT OFFICE	66
420	SUPPORT SHOP AND WAREHOUSE	62
421	MISSION SUPPORT WAREHOUSE	66
428	LOGISTIC SUPPORT WAREHOUSE	66
440	ELECTRONIC SYSTEMS COMPATIBILITY FACILITY	66
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36	MODIFICATIONS TO ENVIRONMENTAL TESTING LABORATORY	67
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C6	CENTER SUPPORT — ACCESS ROAD	66

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1968 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

The Manned Spacecraft Center conducts the development of spacecraft for manned space flight programs. The Center is also responsible for manned space flight operations and conduct of astronaut training.

LAND	NO. ACRES
NASA-OWNED	1,620
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	1,620
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 294,709

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Modifications to the Environmental Testing Laboratory	MSF	48,261	1,900		50,161
Center Support Facilities	MSF	21,245	525		21,770
ALL OTHER PROJECTS		22,931			
TOTALS		92,437	2,425		

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

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 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: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: Modification

FUNDING:

FY 1967 and Prior Years	$48,261,050
FY 1968 Estimate	1,900,000
Total Funding Through FY 1968	$50,161,050

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,900,000
Addition of double man-lock to chamber "A"	LS	---	$410,000	410,000
Rehabilitation of solar simulation system	LS	---	1,490,000	1,490,000
Rehabilitation of simulator modules	LS	---	(830,000)	(830,000)
Replacement of simulator modules	LS	---	(540,000)	(540,000)
Modification of instrumentation controls and utilities	LS	---	(120,000)	(120,000)

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,900,000

PROJECT PURPOSE:

This project provides the necessary modifications and additions to improve the safety and operational effectiveness of the Environmental Testing Laboratory.

PROJECT DESCRIPTION:

In the Fiscal Year 1968 time period, the following changes will be made:

a. The existing single manlock in Chamber A will be converted to a double manlock. The double manlock will essentially consist of two single locks with an interconnecting door. Each lock will be nine feet by ten feet, with facilities for three men and will be equipped with pumping connections, three unbilical connections, and viewports.

b. Components, subsystems and controls associated with the radiant sources of the solar simulator system of Chambers A and B will be modified and replaced to restore the operating characteristics and performance standards which are specified for these items.

PROJECT JUSTIFICATION:

The Laboratory now possesses the basic capability to simulate lunar conditions for testing spacecraft and evaluating the ability of astronauts to perform usefully within this environment. However, technological development, new requirements, and experience gained from operations and actual flights dictate a program for the improvement and upgrading of this facility.

The single manlock at the 31 foot level of Chamber A is the only access to the upper portion of the spacecraft and crew station. At the time the Chamber was designed, the single manlock was considered a practical and economical solution to problems of ingress and egress, surveillance, control, and recovery of man in a simulated space environment. However, based on operating experience and practice of rescue procedures it has been determined that the single manlock should be converted to a double manlock. During manned operations one medical observer is required to be on standby

in the manlock for each occupant of the Chamber. A double manlock will provide greater operational flexibility for ingress and egress to the chamber by permitting the medical personnel to remain in one lock under continuous environmental conditions while test engineers and crewmen move to and from the Chamber through the second lock. Exchanges of medical personnel will also be permitted during a test with one of the single manlocks always under pressure environment. The double manlock will make it possible to continue rescue operations in the event of a malfunction in one of the locks thus precluding a possible disaster.

Operating experience indicates that in early FY 1968 the solar simulation system will require rehabilitation in order to retain operating characteristics and reliability. The carbon arc radiant source is a complex mechanical device. Operation at high temperature levels and the production of carbon particles, which filter through the mechanism, result in a need for frequent repair and replacement of worn parts. This repair is now being accomplished through routine maintenance. By Fiscal Year 1968 the system will have operated approximately 1,500 hours which is the limit of its life expectancy. Therefore, a general rehabilitation of the entire system will be necessary in order to maintain design standards.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: Due to the complex and sophisticated nature of this facility $1 to $2 million will be required on a yearly basis to retain present capabilities and incorporate technological advances.

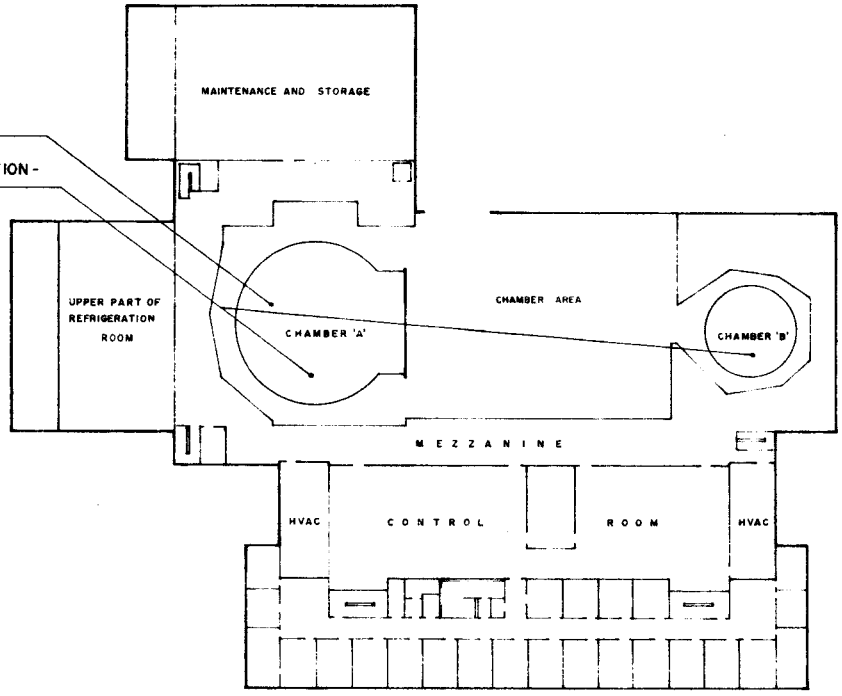
NASA
S-66-67917

MANNED SPACECRAFT CENTER
FISCAL YEAR 1968 ESTIMATES

MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY

BUILDING 32 MODIFICATIONS FY 68

1. ADDITION OF DOUBLE MANLOCK TO CHAMBER 'A'.
2. REHABILITATION OF SOLAR SIMULATION - CHAMBERS 'A' AND 'B'.



FLOOR PLAN

CF 7-6

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

CENTER SUPPORT FACILITIES

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: Houston, Harris County, Texas

COGNIZANT NASA INSTALLATION: Manned Spacecraft Center

TYPE OF CONSTRUCTION PROJECT: Alteration/Extension

FUNDING:

FY 1967 and Prior Years	$21,245,031
FY 1968 Estimate	525,000
Total Funding Through FY 1968	$21,770,031

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$525,000
Modifications to the sewage treatment plant	LS	---	$160,000	160,000
Access road	LS	---	365,000	365,000
Road construction with curbs and gutter	LS	---	(183,500)	(183,500)
Remove temporary road and ditch	LS	---	(30,000)	(30,000)
Lower pipeline	LS	---	(28,000)	(28,000)
Storm drainage system	LS	---	(123,500	(123,500)
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$525,000

PROJECT PURPOSE:

This project will provide an increase in sewage treatment capacity and plant efficiency, and an access road from a major off-site thoroughfare to the western boundary of Manned Spacecraft Center.

PROJECT DESCRIPTION:

Modifications to the Sewage Treatment Plant - These modifications will provide for alterations to the aerobic digester, addition to solids separation capacity, and installation of additional sludge drying facilities. The modifications will provide a more efficient and more composite plant which is necessary to assure continued compliance with antipollution regulations.

Access Road - This portion of the project provides for the off-site construction of approximately 0.45 miles of road, designated as Space Center Boulevard, on right of way dedicated for public use. Specifically the road will connect Avenue B (a four lane, on-site road which terminates at the west boundary of MSC) to Bay Area Boulevard (a major traffic artery between the Gulf Freeway and Highway 146 that will parallel the northwest boundary of MSC). The work also includes removal of a temporary two lane road which provides access to Clear Lake City, lowering of a oil transmission pipeline, installation of curbs and gutters and a storm drainage system.

Harris County has agreed to accept the maintenance responsibility after final road construction is accepted.

PROJECT JUSTIFICATION:

Modifications to the Sewage Treatment Plant - Final effluent from the MSC sewage treatment plant is discharged into Clear Lake since no other disposal area is available. Regulations of the State of Texas and the requirements of the Federal Water Pollution Control Act specify that no waste shall be discharged into such waters if it contains any substances in concentrations which are hazardous to health or will result in harm to domestic animals, fish or wildlife.

Since Clear Lake serves as the principal boating and fishing ground in the Houston area, the contamination of this body of water is a matter of concern to the State of Texas. The State Legislature has established a corporate body known as the Clear Creek Basin Authority to develop and execute a comprehensive long range program for control of water pollution in the Clear Lake area. This authority has found that in order to preclude an early contamination of the lake all sewage disposal plants in the area, including the plant at MSC, must be operated at the highest level of efficiency.

A recent survey of the sewage treatment plant has indicated that certain modifications must be made to improve operating efficiency in order to attain a final effluent that will not contribute to the problem.

Access Road - State-NASA Road 1, which is the major access to the Manned Spacecraft Center, passes through a rapidly expanding mixture of residential and commercial developments. The heavy traffic volume on State-NASA Road 1 causes congestion during the morning and evening traffic peaks resulting in long delays and hazardous driving conditions. Despite staggered working shifts traffic entering and leaving the Center is delayed up to 30 minutes due to congestion on the serving highway. The average daily traffic volume on this major access presently exceeds 21,000 vehicles per day and is projected to increase to 37,000 vehicles per day by 1970. State-NASA Road 1 was designed for a daily volume of 18,000 vehicles.

A solution to this congestion is to provide an additional major ingress-egress point which is served by a different highway. The access road to be provided by this project will connect with the Bay Area Boulevard which is being constructed adjacent to the northwest boundary of the installation by the State of Texas, Harris County and the Humble Oil and Refining Company. The proposed access road will divert traffic from State-NASA Road 1 and provide an efficient distribution of traffic flow to and from the installation.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: It is anticipated that additional funds will be required for utilities and Center development to support any future construction programs.

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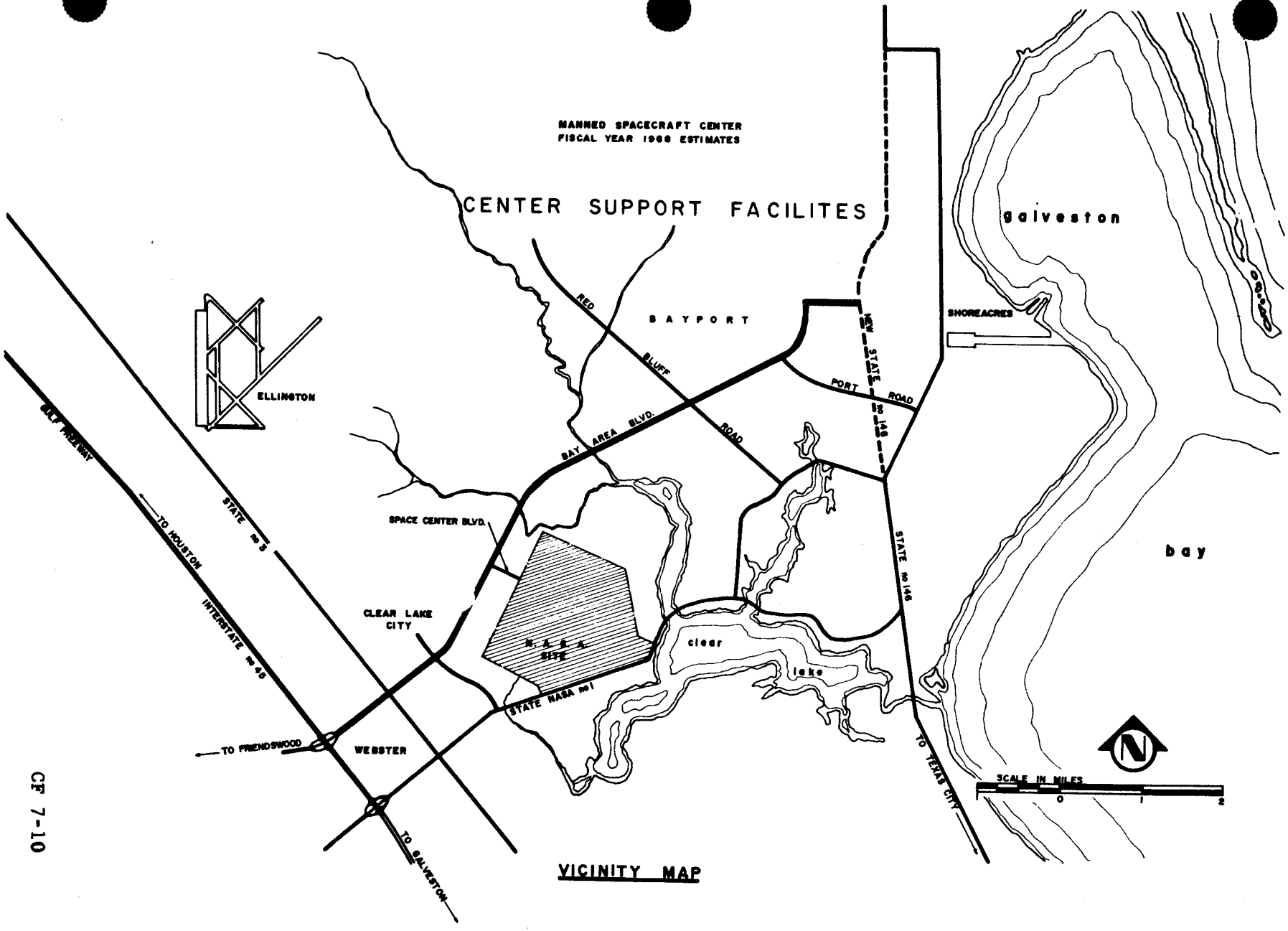
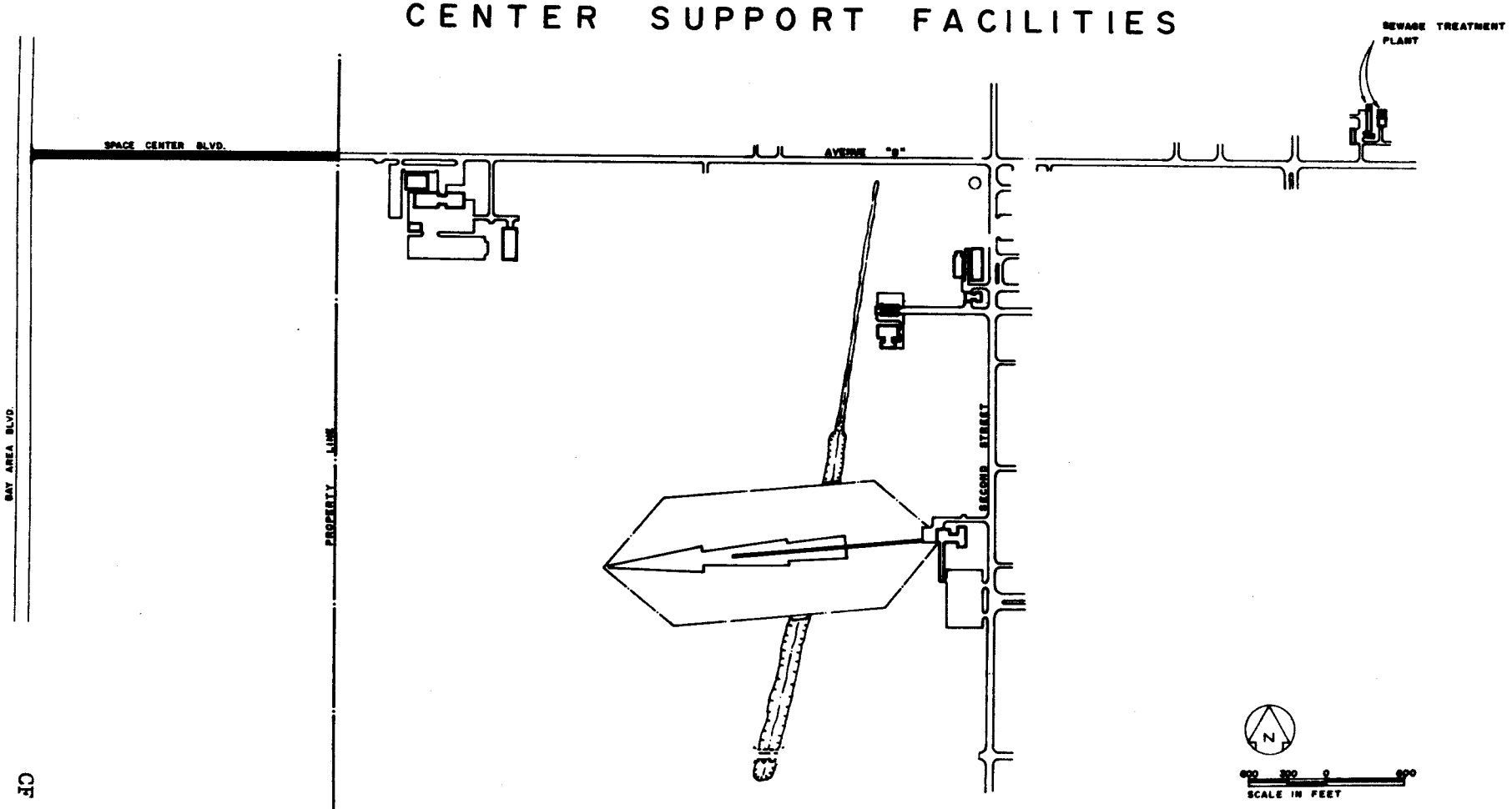


VICINITY MAP

CENTER SUPPORT FACILITIES



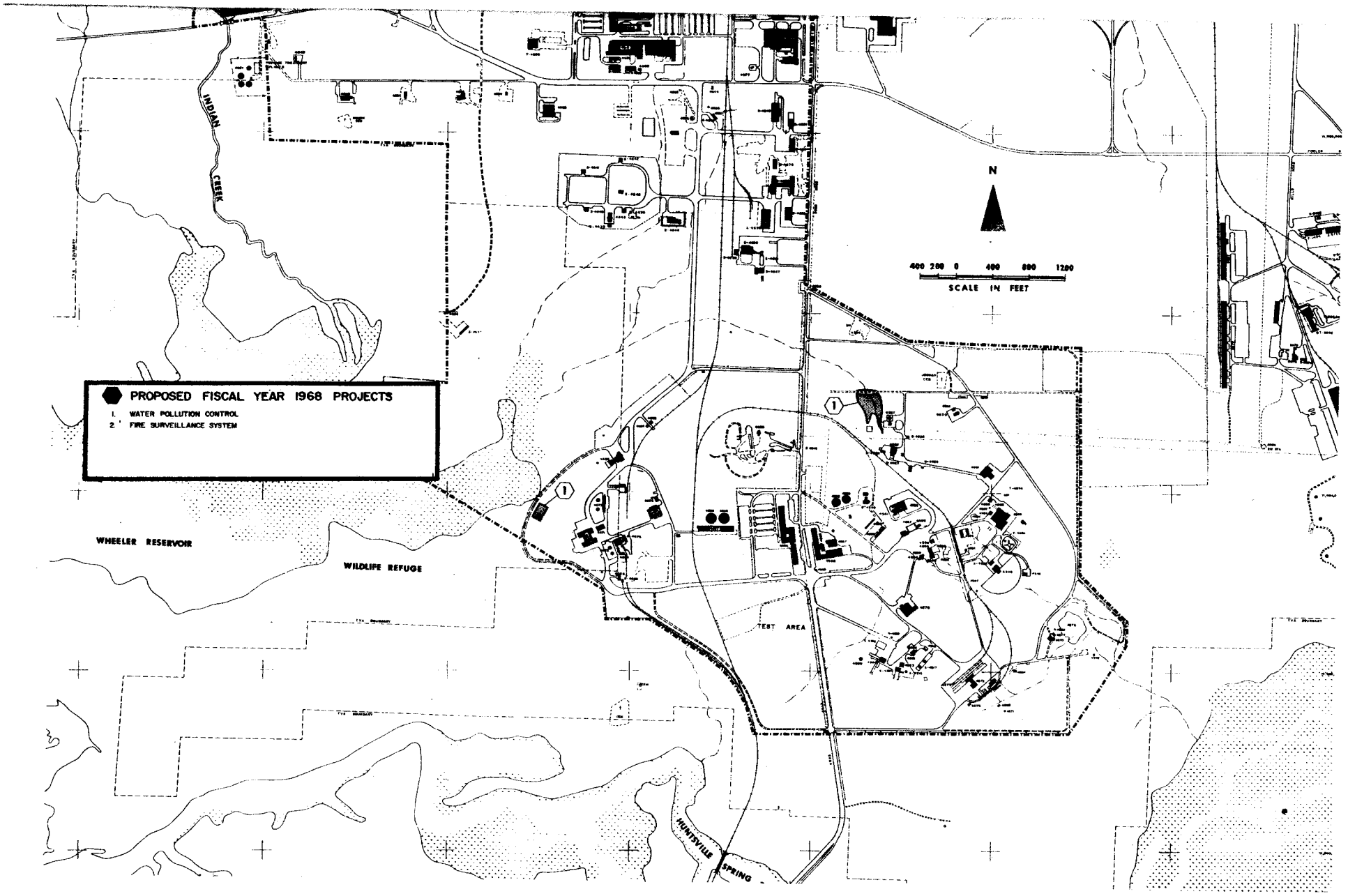
SITE PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

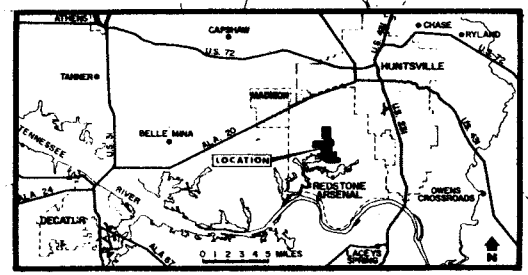

PROPOSED FISCAL YEAR 1968 PROJECTS
1. WATER POLLUTION CONTROL
2. FIRE SURVEILLANCE SYSTEM
N
400 200 0 400 800 1200
SCALE IN FEET
INDIAN CREEK
WHEELER RESERVOIR
WILDLIFE REFUGE
TEST AREA
HUNTSVILLE SPRING

CE 8-1

MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN



VICINITY MAP

LEGEND

EXISTING FACILITIES

BLDG. NO.	TITLE OR USE
4200	CENTRAL LAB & OFFICE BLDG.
4201	ENGINEERING & ADMINISTRATION
4202	PROJECT ENGINEER OFFICE
4207	CENTRAL COMMUNICATIONS
4241	STORAGE FACILITY
4249	TECHNICAL SERVICES OFFICE
4250	TECHNICAL MAINTENANCE
4306	CAFETERIA
4311	AERO-ASTRODYNAMICS OPERATIONS
4312	SECURITY GUARD UNIT
4313	SERVICE SHOPS
4331	TEST & DEVELOPMENT SHOP
4332	STORAGE
4350	FUEL TEST STAND
4351	TRAINING
4352	NITROGEN MANUFACTURING
4353	PHOTO LABORATORY
4371	PLANT MAINTENANCE
4372	EQUIPMENT STORAGE
4373	ASTRIONICS LABORATORY
4424	FIRE STATION (ARMY)
4435	MOTOR POOL
4471	SPACE MUSEUM, OFFICE & WHSE.
4475	HAZARDOUS OPERATIONS LAB.
4476	ACCELERATION TEST & CALIBRATION
4481	ADMINISTRATION & ENGINEERING
4482	VEHICLE MAINTENANCE SHOP
4483	AUTOMOTIVE MAINTAINANCE SHOP
4485	FINANCIAL MANAGEMENT OFFICE
4487	ASTRIONICS LABORATORY
4491	AUTOMATIC DATA PROCESSING
4492	ELECTRIC SHOP
4493	MACHINE SHOP
4494	TECHNICAL DOCUMENTATION
4514	LIQUID HYDROGEN TEST STAND
4522	TEST STAND
S-4523	TEST STAND BUILDING
S-4524	SUPPORT BUILDING
4530	TEST STAND BUILDING
4531	SUPPORT BUILDING
4540	ACOUSTICS MODEL TEST FACILITY
4548	F-1 TURBO PUMP TEST FACILITY
4550	SATURN V DYNAMIC TEST STAND
4557	SATURN I/IB DYNAMIC TEST STAND
4558	DYNAMIC CONTROL CENTER
4561	PROPELLANT SUPPORT SHOP
4564	ENGINE TEST STAND
4566	TEST LABORATORY ENGINEERING

BLDG. NO.	TITLE OR USE
4567	BOILER HOUSE
4570	BLOCK HOUSE
4572	STATIC TEST TOWER
4583	COMPONENTS TEST LABORATORY
4588	COLD CALIBRATION TEST STAND
4605	NON-DESTRUCTIVE TESTING LAB
4610	PROP. & VEHICLE ENG. LAB.
4612	MATERIALS STORAGE
4613	COMPRESSOR EQUIPMENT
4616	ENG. OFFICE & SHOP
4618	HYDRAULIC TEST SHOP
4619	TEST UNIT/LOAD TEST ANNEX
4623	ACCELERATION TEST CELLS
4628	LOW TEMPERATURE TEST
S-4646	G S E BLOCKHOUSE
S-4647	HIGH PRESS. AIR COMPR. BLDG.
S-4648	HIGH PRESSURE FLUID FACILITY
S-4649	TRANSPORTATION HANGAR
4650	TEST SHOP & INSTRUMENT LAB
4653	COMPONENTS SUPPORT SHOP
S-4655	F-1 PREPARATION SHOP
S-4656	G S E ASSEMBLY BUILDING
S-4659	SUPPORT BUILDING
S-4660	BOILER PLANT
4663	COMPUTATION LABORATORY
4666	TEST LAB ENGINEERING
4667	INDUSTRIAL WATER PUMP HOUSE
4670	SATURN V STATIC TEST STAND
4674	WEST AREA BLOCK HOUSE
4696	F-1 ENGINE TEST STAND
4705	ASSEMBLY SHOP
4707	STRUCTURE FABRICATION SHOP
4708	QUALITY ASSURANCE LAB.
4710	LIQUID HYDROGEN TEST STAND
4711	PRECISION MACHINE SHOP
4712	MANUFACTURING ENGINEERING LAB.
4723	FIELD MATERIALS TESTING LAB.
4725	STEAM PLANT (ARMY)
4727	MACHINE SHOP
4728	EQUIPMENT TEST SHOP
4732	AERO-ASTRODYNAMICS FACILITY
4741	BERYLLIUM LAB.
4746	TEST LAB. & OFFICES
4747	COMPRESSOR STATION
4748	LIQUID PROPELLANT TEST STAND
4750	HIGH ALTITUDE TEST CHAMBER
S-4752	COMP. & SUB-ASSEMBLY SHOP
S-4755	HANGAR FOR VEHICLE COMP.
4760	SURFACE TREATMENT PLANT

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

The Marshall Space Flight Center conducts 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.

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	1,797
NON-FEDERAL *(Leases, easements)*	64
TOTAL LAND	1,861
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 376,519

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Water Pollution Control	MSF	38	350		388
Fire Surveillance System	MSF	60	520		580
ALL OTHER PROJECTS		139,460			
TOTALS		139,558	870		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

WATER POLLUTION CONTROL

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 1967 and Prior Years	$38,000
FY 1968 Estimate	350,000
Total Funding Through FY 1968	$388,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$350,000
Industrial area lagoons and piping	LS	---	$247,400	247,400
Structural test area lagoon	LS	---	31,000	31,000
Dynamic test stand lagoon	LS	---	46,000	46,000
Industrial sewer extension	LS	---	7,000	7,000
Test area fuel collection basin	LS	---	17,000	17,000
Cyanide disposal facility	LS	---	1,600	1,600
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$350,000

PROJECT PURPOSE:

This project will provide facilities for treatment of the chemical wastes generated by testing and manufacturing operations to preclude pollution of receiving streams and lakes.

PROJECT DESCRIPTION:

This project provides for the construction of holding basins, the installation of evaporators, acid resistant piping, and associated flow control devices to control the disposal of industrial waste into the Tennessee River and its tributaries. Construction will include:

Industrial Area Lagoons - Five lagoons, with piping and control devices will be constructed to treat the industrial wastes generated in the manufacturing complex. A 4,500,000 gallon lagoon will be constructed to receive wastes from the existing industrial sewer and reduce the chemical concentration by neutralization and dilution. Dichromate laden waters from the Hydrostatic Test Facility will be collected and delivered to a separate 500,000 gallon lagoon. The diluted effluent from both lagoons will be discharged into Indian Creek at controlled rates and during favorable periods of river flow. Wastes that cannot be reduced by dilution, will be collected in a 100,000 gallon holding lagoon, then pumped through steam evaporators. The resulting concentrate will be detained in a 25,000 gallon lagoon. On an annual basis, this residue will be removed to a 200,000 gallon holding area for ultimate disposal.

Structural Test Area Lagoon - The existing pond which receives dichromate and chromium wastes from the Load Test Annex will be lined and a nozzle and flow indicator installed.

Dynamic Test Area Lagoon - The existing 740,000 gallon lagoon will be enlarged to a 1,000,000 gallon capacity, and lined to hold sodium dichromate and chromium wastes from the Dynamic Test Stand. A valve, nozzle and flow indicator will be installed at the lagoon outlet to control discharge and permit dilution.

Industrial Sewer Extension - The existing sewer will be extended 500 feet to carry expended hydraulic oils from the Astrionics Engineering Laboratory to the industrial lagoon.

Test Area Fuel Collection Basin - A concrete enclosure will be constructed with a skimming weir within the existing holding basin to receive spills of RP-1 fuel from F-1 and S-IC static test stands.

Cyanide Disposal Facility - A lined and fenced disposal area, filled with lime, will be constructed approximately 1.5 miles east of the Center but within the Redstone Arsenal for dumping cyanide solutions from various laboratories.

PROJECT JUSTIFICATION:

All agencies of the Federal Government are directed by Executive Order to reduce sources of stream pollution to the lowest practical level. The facilities which will be provided by this project are needed to dispose of the harmful wastes, dilute the remaining effluent, and control the discharge so as to assure that the outflow from the Center is not detrimental to public health, marine life or wildlife.

The Redstone Arsenal is located north of the Wheeler Reservoir, on land which partially overlaps an area which the Tennessee Valley Authority has established as a National Wildlife Refuge. Untreated wastes from the Arsenal are presently discharged into Indian Creek and Huntsville Spring Branch which flow into the Wheeler Reservoir and the Wildlife Refuge Area. Aside from NASA, this pollution is a matter of concern to the Tennessee Valley Authority and the U.S. Public Health Service. These agencies have conducted investigations regarding pollution of the Wheeler Reservoir and concur with the need for corrective action. Unless the facilities included in this project are provided this pollution will continue.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

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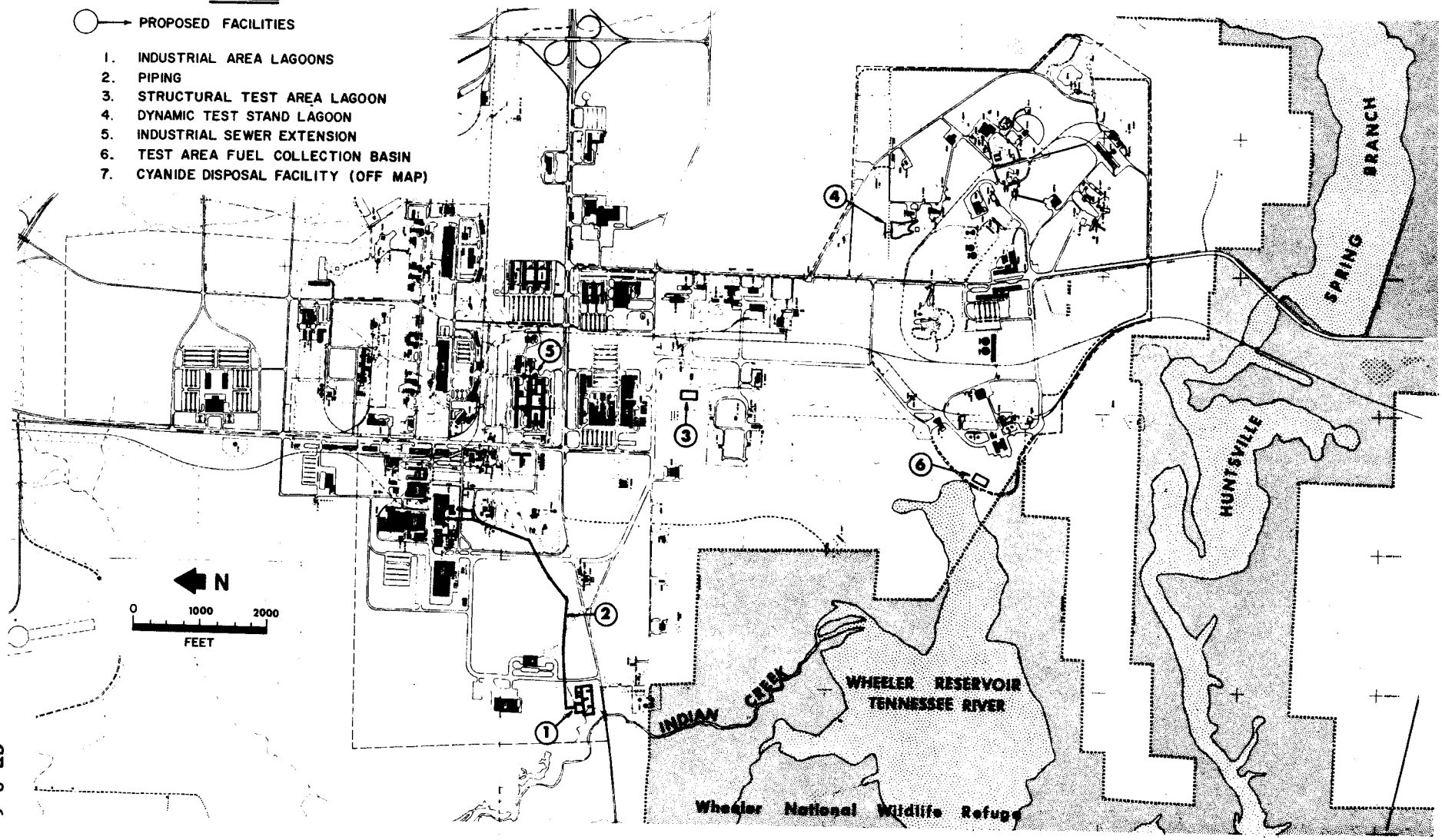
MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1968 ESTIMATES

WATER POLLUTION CONTROL



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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

FIRE SURVEILLANCE SYSTEM

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 1967 and Prior Years	$60,000
FY 1968 Estimate	520,000
Total Funding Through FY 1968	$580,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$5,800
Fire station addition	Sq. Ft.	270	$21.48	5,800
Equipment				$514,200
Primary equipment and console (communications building)	LS	---	195,000	195,000
Secondary equipment and graphic panel (fire station)	LS	---	53,200	53,200
Installation/modifications of fire detection systems	LS	---	192,000	192,000
Signal transmitter panel modifications	LS	---	74,000	74,000

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$520,000

PROJECT PURPOSE:

This project will provide a centralized fire detection and reporting system at Marshall Space Flight Center.

PROJECT DESCRIPTION:

The project provides for the installation of a central automatic fire detection and reporting system which will include:

a. Installation of primary equipment and a console in the Communications Building, which will serve as the control center for monitoring the system.

b. Construction of a 270 square foot addition to the Fire Station, installation of secondary equipment, and a graphic panel.

c. Installation and/or modification of fire detection units in 109 buildings.

d. Modification of the signal transmission panel covering a total of 138 facilities in order to tie to the central console in the Communications Building.

PROJECT JUSTIFICATION:

There are 138 facilities that should be provided with an adequate fire detection and reporting system in order to reduce the possibility of major financial loss and to insure the continued availability of these facilities in support of the Center mission. A recent analysis by an architect-engineer firm revealed that only 29 of the 138 facilities are so equipped. The remaining 109 require either upgrading of the present system or the installation of completely new equipment. The more recently constructed facilities have adequate fire surveillance systems, but the older facilities, acquired from the Army, require complete new systems or major improvement to those which exist. In no case, however, is there provision for reporting to a central station. In order to allow a quick response by fire fighting personnel a centralized reporting system must be provided.

To date, the number of major fires at this Center has been small, but several fires have occured which through fortuitous circumstances caused only minimal damage. The most significant incident concerned a fire in

the basement of the F-1 Engine Test Stand. This fire occurred during off-duty hours, but two employees, not normally on duty, noticed the smoke and immediately notified the fire department. Had these employees not been present, the results could have been considerably more severe.

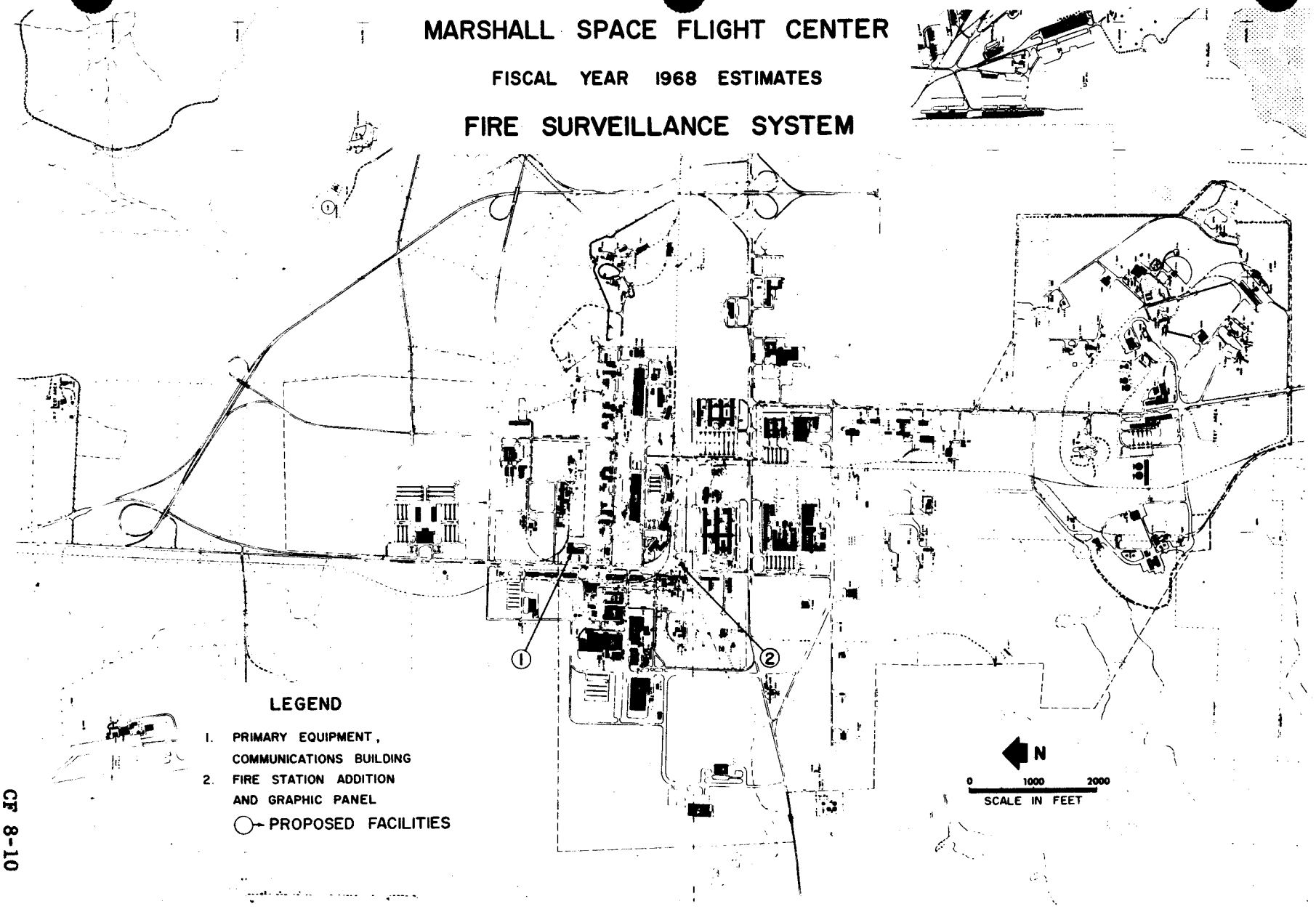
In the past it has been possible to depend upon the presence of technicians and engineers during long duration tests, custodial personnel, and roving security guards, as an integral part of the fire surveillance and reporting system. However, even this minimal detection and reporting capability will be degraded in the future because of a trend toward automation of long duration tests, and significant budgetary limitations which will reduce the number of custodial and security personnel who will be present during off-duty hours.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1968 ESTIMATES

FIRE SURVEILLANCE SYSTEM



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

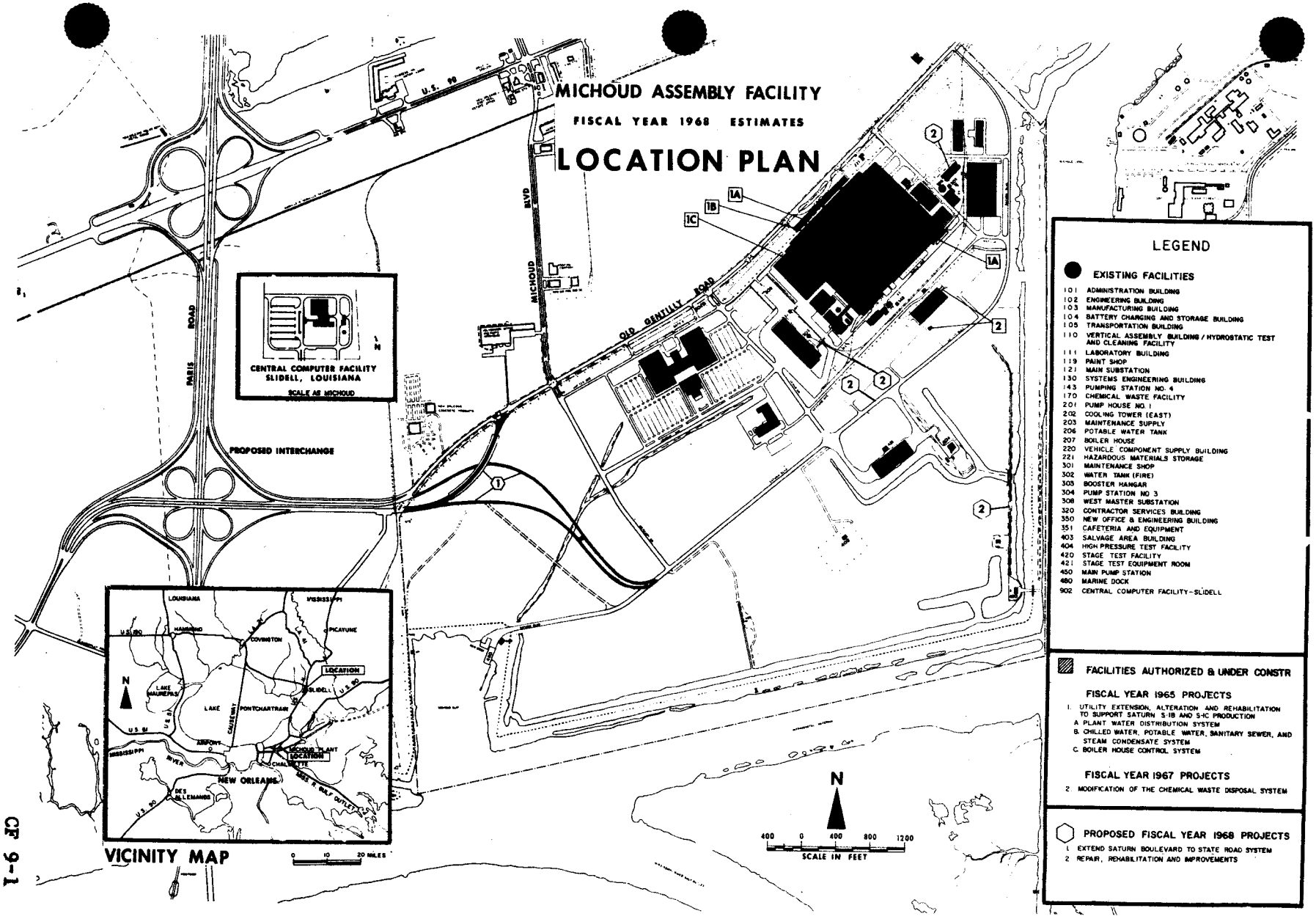
FISCAL YEAR 1968 ESTIMATES

MICHOUD ASSEMBLY FACILITY

MICHOUD ASSEMBLY FACILITY

FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN



VICINITY MAP

LEGEND

EXISTING FACILITIES

101	ADMINISTRATION BUILDING
102	ENGINEERING BUILDING
103	MANUFACTURING BUILDING
104	BATTERY CHARGING AND STORAGE BUILDING
105	TRANSPORTATION BUILDING
110	VERTICAL ASSEMBLY BUILDING / HYDROSTATIC TEST AND CLEANING FACILITY
111	LABORATORY BUILDING
119	PAINT SHOP
121	MAIN SUBSTATION
130	SYSTEMS ENGINEERING BUILDING
143	PUMPING STATION NO. 4
170	CHEMICAL WASTE FACILITY
201	PUMP HOUSE NO. 1
202	COOLING TOWER (EAST)
203	MAINTENANCE SUPPLY
206	POTABLE WATER TANK
207	BOILER HOUSE
220	VEHICLE COMPONENT SUPPLY BUILDING
221	HAZARDOUS MATERIALS STORAGE
301	MAINTENANCE SHOP
302	WATER TANK (FIRE)
303	BOOSTER HANGAR
304	PUMP STATION NO 3
308	WEST MASTER SUBSTATION
320	CONTRACTOR SERVICES BUILDING
350	NEW OFFICE & ENGINEERING BUILDING
351	CAFETERIA AND EQUIPMENT
403	SALVAGE AREA BUILDING
404	HIGH PRESSURE TEST FACILITY
420	STAGE TEST FACILITY
421	STAGE TEST EQUIPMENT ROOM
450	MAIN PUMP STATION
480	MARINE DOCK
902	CENTRAL COMPUTER FACILITY-SLIDELL

FACILITIES AUTHORIZED & UNDER CONSTR

FISCAL YEAR 1965 PROJECTS

1. UTILITY EXTENSION, ALTERATION AND REHABILITATION TO SUPPORT SATURN S-IB AND S-IC PRODUCTION
   - A. PLANT WATER DISTRIBUTION SYSTEM
   - B. CHILLED WATER, POTABLE WATER, SANITARY SEWER, AND STEAM CONDENSATE SYSTEM
   - C. BOILER HOUSE CONTROL SYSTEM

FISCAL YEAR 1967 PROJECTS

2. MODIFICATION OF THE CHEMICAL WASTE DISPOSAL SYSTEM

PROPOSED FISCAL YEAR 1968 PROJECTS

1. EXTEND SATURN BOULEVARD TO STATE ROAD SYSTEM
2. REPAIR, REHABILITATION AND IMPROVEMENTS

CF 9-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

The Michoud Assembly Facility manufacturers of the first stage booster of the Saturn family of launch vehicles.

LAND	NO. ACRES
NASA-OWNED	905
OTHER GOVERNMENT AGENCY-OWNED	6
NON-FEDERAL *(Leases, easements)*	
TOTAL LAND	911
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$134,450

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Extension of Saturn Boulevard to State Road System	MSF	84	1,130		1,214
Repair, Rehabilitation and Improvements	MSF	23,460	880		24,340
ALL OTHER PROJECTS		20,038			
TOTALS		43,582	2,010		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

EXTENSION OF SATURN BOULEVARD TO STATE ROAD SYSTEM

AUTHORIZATION LINE ITEM: Michoud Assembly Facility

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: New Orleans, Orleans Parish, Louisiana

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$84,350
FY 1968 Estimate	1,130,000
Total Funding Through FY 1968	$1,214,350

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,130,000
Road (two lanes)	Mile	1.6	$336,250	538,000
Overpass	LS	---	510,000	510,000
Gate house	LS	---	4,500	4,500
Electrical and lighting	LS	---	77,500	77,500
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$1,130,000

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PROJECT PURPOSE:

This project will provide a road extension which will connect the Michoud Facility with limited access highways now under construction by the City of New Orleans and the State of Louisiana.

PROJECT DESCRIPTION:

This project provides 8,200 feet of two lane road extensions including a two lane overpass. The resulting road network will provide an efficient and safe access for Michoud personnel traveling to the north, south, or west of the plant.

Specifically, a direct connection will be provided between Saturn Boulevard and the new Paris Road - Almonaster Avenue clover leaf interchange. The connection will consist of a two lane eastbound and a two lane westbound paved road separated by a median strip. Construction will also include rerouting of the eastbound Gentilly two lane road through Michoud property with an overpass over Saturn Boulevard.

In order to enhance safety, lighting will be provided for the entire road and directional curbed islands will be constructed at all intersections. The work is being accomplished in conjunction with that of the City and State so that it will be completed simultaneously with the overall road network. The location of the road is such that an exchange of approximately three acres of land under the custody of the Department of Army for an equivalent acreage held by NASA will be required.

PROJECT JUSTIFICATION:

The entire roadnet serving the general area is being reconstructed to provide a series of high speed, limited access routes connecting to the City of New Orleans. Major segments of the system are now under construction. In their planning and design of the roadnet, the City and State have taken into account the traffic requirement of the Facility. This project is required to provide the essential connections to the improved City-State road system.

Vehicular traffic to and from Michoud creates a total average volume of 12,600 vehicles per day with peak surges exceeding 3,000 vehicles per hour. The City of New Orleans and the State of Louisiana have recognized the growth of this area and are therefore constructing an adequate high speed system to serve the Facility, other nearby industrial installations and the residential communities. Unless compatible connections are constructed, the benefit of the City-State system will not be realized and congestion around the plant will continue.

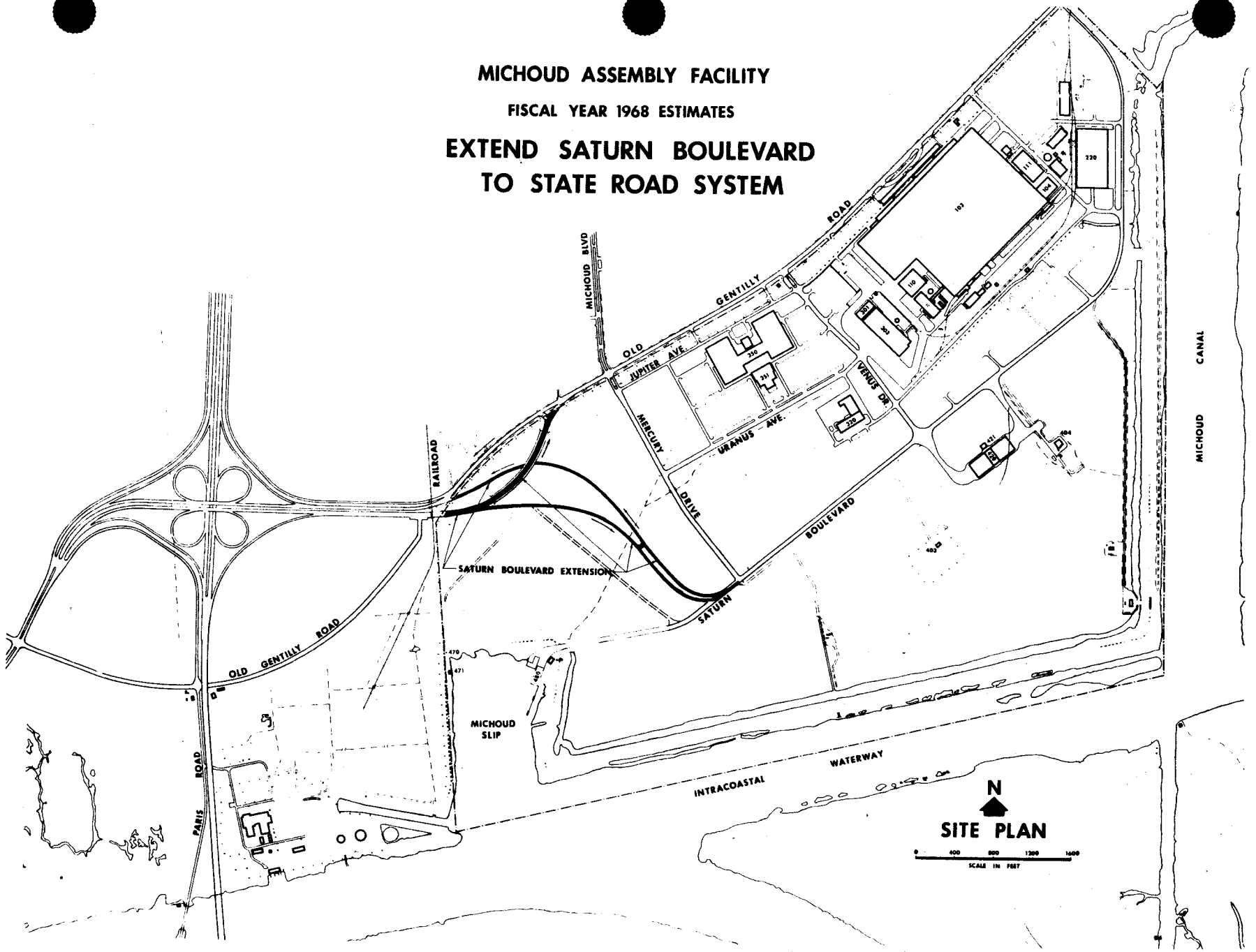
Presently, this congestion causes hazardous traffic conditions in the vicinity of the gates. During the 12 month period ending June 1966, 28 accidents were recorded with property damage varying from minor amounts to several thousand dollars. Some accidents involved as many as four vehicles, with injuries requiring hospitalization. With the completion of the new high speed roadnet, this condition will worsen unless the extension provided by this project is constructed.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

MICHOUD ASSEMBLY FACILITY

FISCAL YEAR 1968 ESTIMATES

EXTEND SATURN BOULEVARD TO STATE ROAD SYSTEM



CF 9-6

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

REPAIR, REHABILITATION AND IMPROVEMENTS

AUTHORIZATION LINE ITEM: Michoud Assembly Facility

PROGRAM OFFICE FOR THE PROJECT: Office of Manned Space Flight

LOCATION OF PROJECT: New Orleans, Orleans Parish, Louisiana

COGNIZANT NASA INSTALLATION: Marshall Space Flight Center

TYPE OF CONSTRUCTION PROJECT: Repair and Rehabilitation

FUNDING:

FY 1967 and Prior Years	$23,459,866
FY 1968 Estimate	880,000
Total Funding Through FY 1968	$24,339,866

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$880,000
Rehabilitation of electrical systems	LS	---	$220,000	220,000
Heating, cooling systems and collateral equipment	LS	---	410,000	410,000
Roads	LS	---	100,000	100,000
Water tower	LS	---	150,000	150,000
Equipment	---	---	---	---
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$880,000

PROJECT PURPOSE:

This project provides for the repair, rehabilitation, improvement and/or replacement of utility systems, equipment and roads at the Michoud Assembly Facility.

PROJECT DESCRIPTION:

This project will provide for repairs and improvements which are essential to the operation of the plant and the protection of the Government investment in this facility. Specific areas of work include: replacement of deteriorated lighting and primary electrical systems; rehabilitation or replacement of worn heating and cooling equipment; rebuilding sections of roads that have failed due to subsoil conditions, and the replacement of the present 200,000 gallon elevated water storage tank.

PROJECT JUSTIFICATION:

Many of the existing utility systems were built in 1942 using war time materials. This, coupled with long periods of inactivity, has resulted in an unusually high number of major breakdowns in electrical, water, steam, and other systems.

While an extensive rehabilitation program was undertaken at the time the Michoud Assembly Facility was activated for the Saturn program it was not possible to correct all deficiencies, some of which could only be ascertained after a period of operation. Based on this experience it has been found that portions of the electrical distribution system and underground utility lines are subject to frequent failure and must be replaced. Similarly, the high cost of repairs that is being encountered in keeping the cooling and heating system in operation, requires that the equipment be rehabilitated or replaced. The age and condition of the 2,200 ton compressor, which supplies the chilled water for the air conditioning system, dictates a major rebuilding. The amount of repair that has been necessary to keep the induced draft fans of the main cooling tower in operation necessitates the replacement of this equipment. Presently, one of the boilers can only be operated at about half of its rated capacity and therefore, requires major rehabilitation.

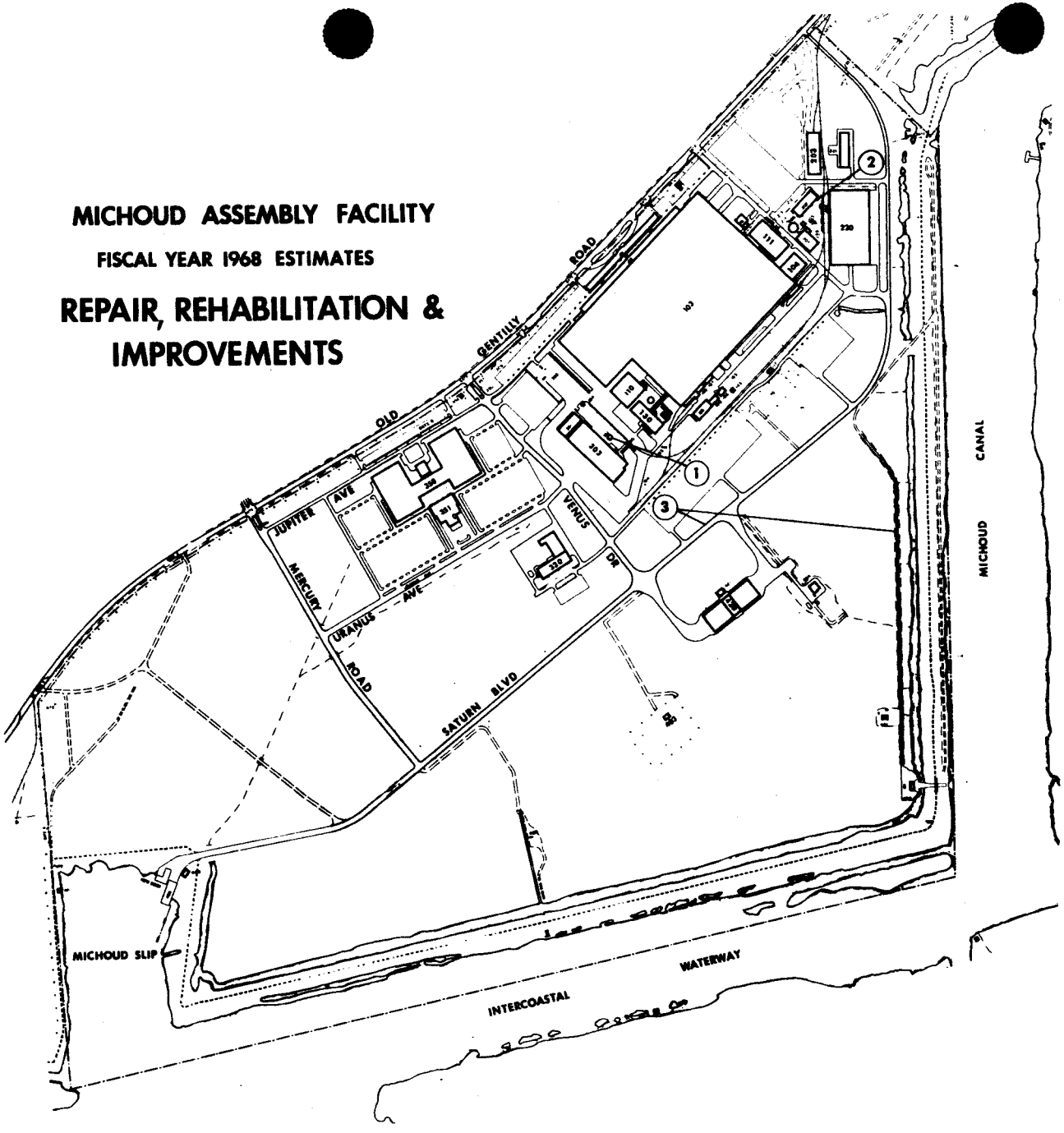
The soil conditions and weather in the Michoud area have caused the roads to shift, crack and subside. A rebuilding of sections of the primary roadnet is necessary. These include the roads over which stages are transported to the dock for shipment and those leading to the primary flood control pumping station. The elevated water tower, which provides the reserve for fire fighting, has corroded to the point where it is nearing structural instability. Replacement is necessary because the present tank has passed the point of economical repair.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: It is estimated that about $500,000 per year will be required to protect the Government investment at the Michoud Assembly Facility, and keep the plant in operation.

MICHOUD ASSEMBLY FACILITY

FISCAL YEAR 1968 ESTIMATES

REPAIR, REHABILITATION & IMPROVEMENTS



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SITE PLAN

0 400 800 1200 1600

SCALE IN FEET

LEGEND

1. REPLACE 200,000 GAL. WATER TANK
2. REPLACE COOLING EQUIPMENT
3. ROAD REPAIR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

WALLOPS STATION

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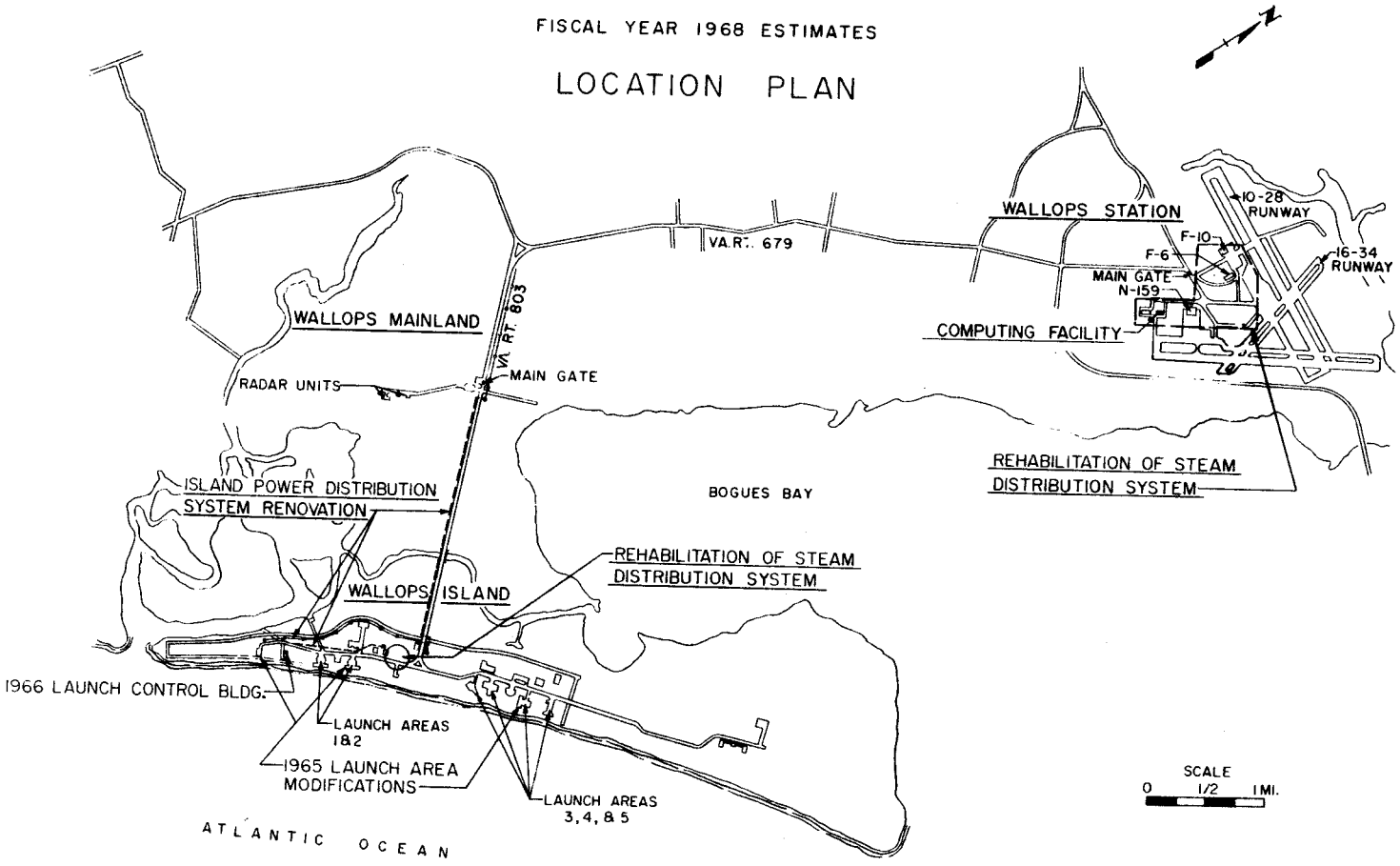
WALLOPS STATION

FISCAL YEAR 1968 ESTIMATES

LOCATION PLAN



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

LAND	NO. ACRES
NASA-OWNED	6,561.3
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	9.6
TOTAL LAND	6,570.9
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 82,567

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Power and Steam Distribution System Renovation	SSA	44	740	500	1,284
ALL OTHER PROJECTS		37,060			
TOTALS		37,104	740		

CF 10-2

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

POWER AND STEAM DISTRIBUTION SYSTEM RENOVATION

AUTHORIZATION LINE ITEM: Wallops Station

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

LOCATION OF PROJECT: Wallops Station, Accomack County, Virginia

COGNIZANT NASA INSTALLATION: Wallops Station

TYPE OF CONSTRUCTION PROJECT: Alterations and Replacement

FUNDING:

FY 1967 and Prior Years	$44,000
FY 1968 Estimate	740,000
Total Funding Through FY 1968	$784,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$568,640
Power system				368,640
Switchgear building and shelters	Sq Ft.	(1,489)	($14.30)	(21,293)
Piling	LF	(1,980)	(4.40)	(8,712)
Manhole and duct bank	LS	---	(58,960)	(58,960)
Underground lines	Sq Ft.	(23,300)	(10.00)	(233,090)
Overhead lines	LF	(6,400)	(3.85)	(24,640)
Relocate equipment and lines	LS	---	(21,945)	(21,945)
Steam system				200,000
Steam lines (underground)	LF	(1,300)	(8.20)	(10,700)

	Unit of Measure	Quantity	Unit Cost	Total Cost
Steam lines (overhead)	LF	(2,500)	(12.00)	(30,000)
Concrete trench	LF	(1,300)	(31.00)	(40,300)
Concrete supports	LS	---	(12,000)	(12,000)
Steam line insulation	LF	(8,000)	(5.26)	(42,000)
Individual heating plants	LS	---	(30,000)	(30,000)
Cooling wells and manholes	LS	---	(16,000)	(16,000)
Demolition	LS	---	(19,000)	(19,000)
Equipment				$171,360
Switchgear and associated equipment	LS	---	171,360	171,360
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
			TOTAL	$740,000

PROJECT PURPOSE:

This project will provide for the repair, replacement and extension of portions of the Wallops Island power and steam distribution systems and portions of the steam distribution system on the Wallops Main Base.

PROJECT DESCRIPTION:

The electric power distribution system renovations will consist of the following: Installation of an underground direct burial 15 kilovolt (KV) primary feeder from the Delmarva Power and Light Company's lines at the Wallops' mainland entrance along the road to Wallops Island; replacement of the Wallops Island lead covered cables; installation of a 15 KV electric overhead power feeder on Wallops Island from the switching station along the by-pass road to the south launch area; installation of switchgear on the two existing 2,400 volt feeders serving the southern portion of Wallops Island; switching and switchgear equipment; a one thousand (1,000) square foot switching station building; a three hundred (300) square foot switching building for the 2,400 volt system; several small enclosed area switching shelters for the protection of the switching and isolation equipment; and relocation of the existing voltage regulator on the Wallops mainland.

The rehabilitation of the steam distribution systems consists of renewal, repair and replacement of overaged, damaged, and unsafe portions of the Wallops Main Base and Wallops Island steam distribution systems. On Wallops Main Base the installation of individual heating plants in Building A-1, B-129, N-116, and E-34 are planned to replace portions of the central steam heating distribution system serving these buildings. The replacement of deteriorated overhead mains with underground steam lines to Buildings C-15, E-104 and E-52 and the repair and replacement of approximately 6,000 feet of insulation on overhead steam and condensate lines will be accomplished. On Wallops Island the installation of new above ground steam and condensate lines mounted on concrete pedestals are planned to replace the deteriorated overhead steam lines serving the assembly and work shops in the southern portion of the Island.

PROJECT JUSTIFICATION:

The existing overhead power line serving Wallops Island from the mainland is over twenty years old. The continuous exposure to a saline environment has shortened the material life of this line causing frequent repairs of the lead shielding and insulation cover. Also, due to the gradual power load growth over the years, the line is now reaching its capacity to carry the load without excessive voltage drops. The proposed new direct burial underground feeder alongside the causeway road will provide for present and future Wallops Island power demands, particularly to the south launch area facilities. The existing line, located approximately two hundred feet off the causeway in a marshland area, will be retained as a standby source.

At present, when repairs or selective area shutdown of power supply is required, it is necessary to shut down the power to all facilities serving the southern portion of Wallops Island. The installation of selective isolation switching equipment on the feeders will provide sectional operation, interruption and short circuit protection, personnel safety, and more reliability in the Island electrical distribution system.

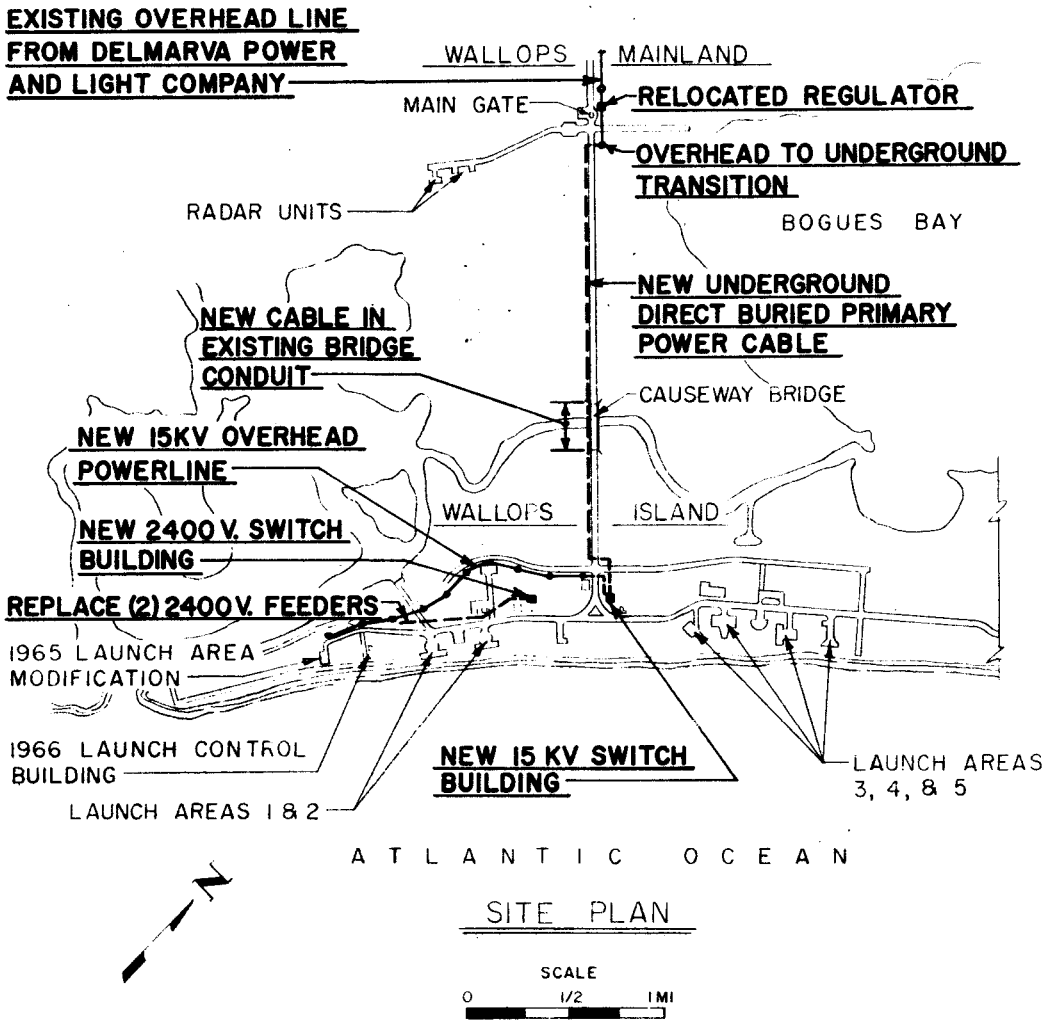
The steam distribution system at Wallops Station Main Base has been in continuous service since the early 1940's. During Fiscal Year 1966 it was necessary to replace the four boilers, which had been converted from coal to fuel oil in 1953, and replace or repair portions of the steam lines at the Main Base for safety reasons. It is now necessary to continue this latter phase or renovation. Many of the remaining steam lines on the Main Base and Wallops Island are badly corroded and leaking; the wooden supports have rotted and are unsafe; and the insulation has deteriorated. These portions of the steam and condensate lines will be replaced or repaired at both Wallops Station and Wallops Island. Individual small heating plants will be installed in outlying areas.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: $500,000.

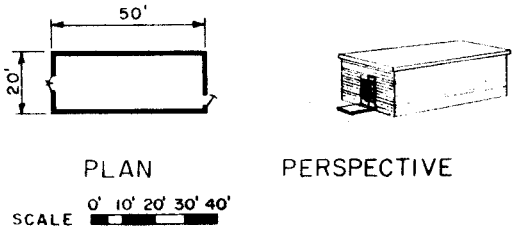
WALLOPS STATION

FISCAL YEAR 1968 ESTIMATES

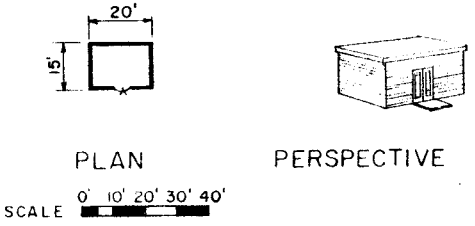
ISLAND POWER DISTRIBUTION SYSTEM RENOVATION



SITE PLAN



15KV SWITCH BUILDING



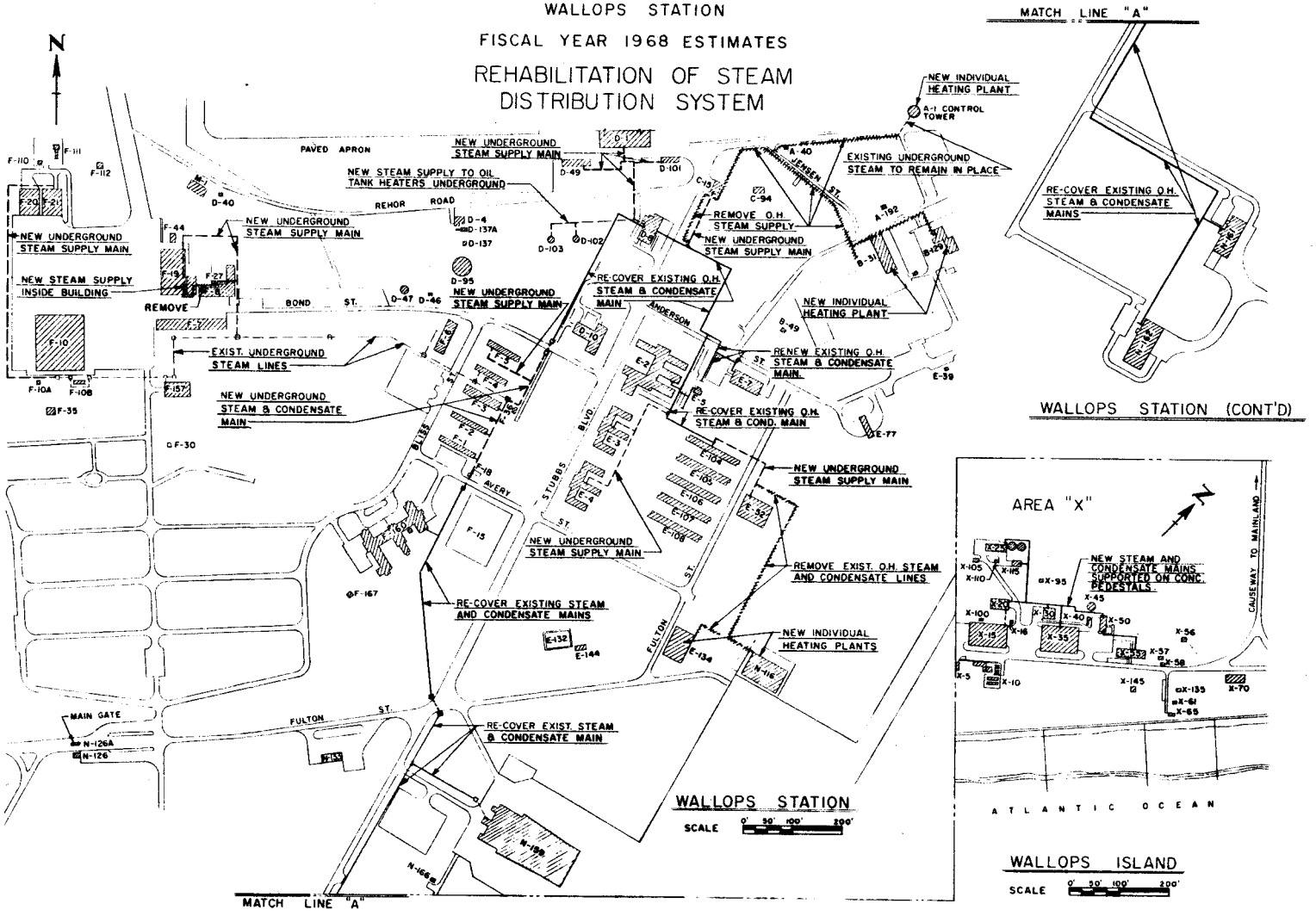
2400V SWITCH BUILDING

CF 10-6

WALLOPS STATION

FISCAL YEAR 1968 ESTIMATES

REHABILITATION OF STEAM DISTRIBUTION SYSTEM



WALLOPS STATION (CONT'D)

CF 10-7

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

VARIOUS LOCATIONS

243-381 O - 67 - 17

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	Not
TOTAL LAND	Applicable
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 19)*	$ Not Applicable

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 19 59 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Phased Array Antenna System	TDA	26	2,880		2,906
ALL OTHER PROJECTS		646,048			
TOTALS		646,074	2,880		

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

PHASED ARRAY ANTENNA SYSTEM

AUTHORIZATION LINE ITEM: Various Locations

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

LOCATION OF PROJECT: Goldstone Complex, Fort Irwin, California

COGNIZANT NASA INSTALLATION: Goddard Space Flight Center

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$26,000
FY 1968 Estimate	2,880,000
Total Funding Through FY 1968	$2,906,000

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$263,000
Operations building	Sq. Ft.	2,000	$35.00	70,000
Electrical substation	KVA	3,125	34.88	109,000
Electrical distribution	LS	---	41,000	41,000
Antenna foundations	Each	10,800	2.04	22,000
Water and sanitary sewer	LS	---	4,000	4,000
Site preparation	LS	---	5,000	5,000
Access roads and walks	Sq. Yd.	2,400	5.00	12,000
Equipment				$2,617,000
Antennas (40, 80, and 240 megacycles)	Each	10,800	121.66	1,314,000
Transmission line	LF	5,500,000	.07	385,000
Electronic equipment	LS	---	918,000	918,000

243-381 O - 67 - 18

	Unit of Measure	Quantity	Unit Cost	Total Cost
Design	---	---	---	---
Fallout Shelter (Not feasible)	---	---	---	None
		TOTAL		$2,880,000

PROJECT PURPOSE:

This project provides for a unique NASA antenna field with associated equipment and facilities required to support the Sunblazer project which will commence in 1968.

PROJECT DESCRIPTION:

The antenna field will consist of a fixed, three frequency (40, 80, and 240 megacycles (mc), planar array design on the basis of a nested cogeometric arrangement occupying an area of approximately 60 acres. Each frequency antenna element array will have 3,600 module units consisting of a crossed dipole, mounted on a stake plus reflector, amplifier and mixer. Supporting features consist of: an instrumentation and operations building (2,000 square feet) to house electronics equipment, an electrical substation, transmission cabling connecting the arrays with the operations building, and necessary roads, utilities, and site preparation. Construction will conform to the existing NASA area facilities. The facilities will be located on NASA owned land of approximately 60 acres.

PROJECT JUSTIFICATION:

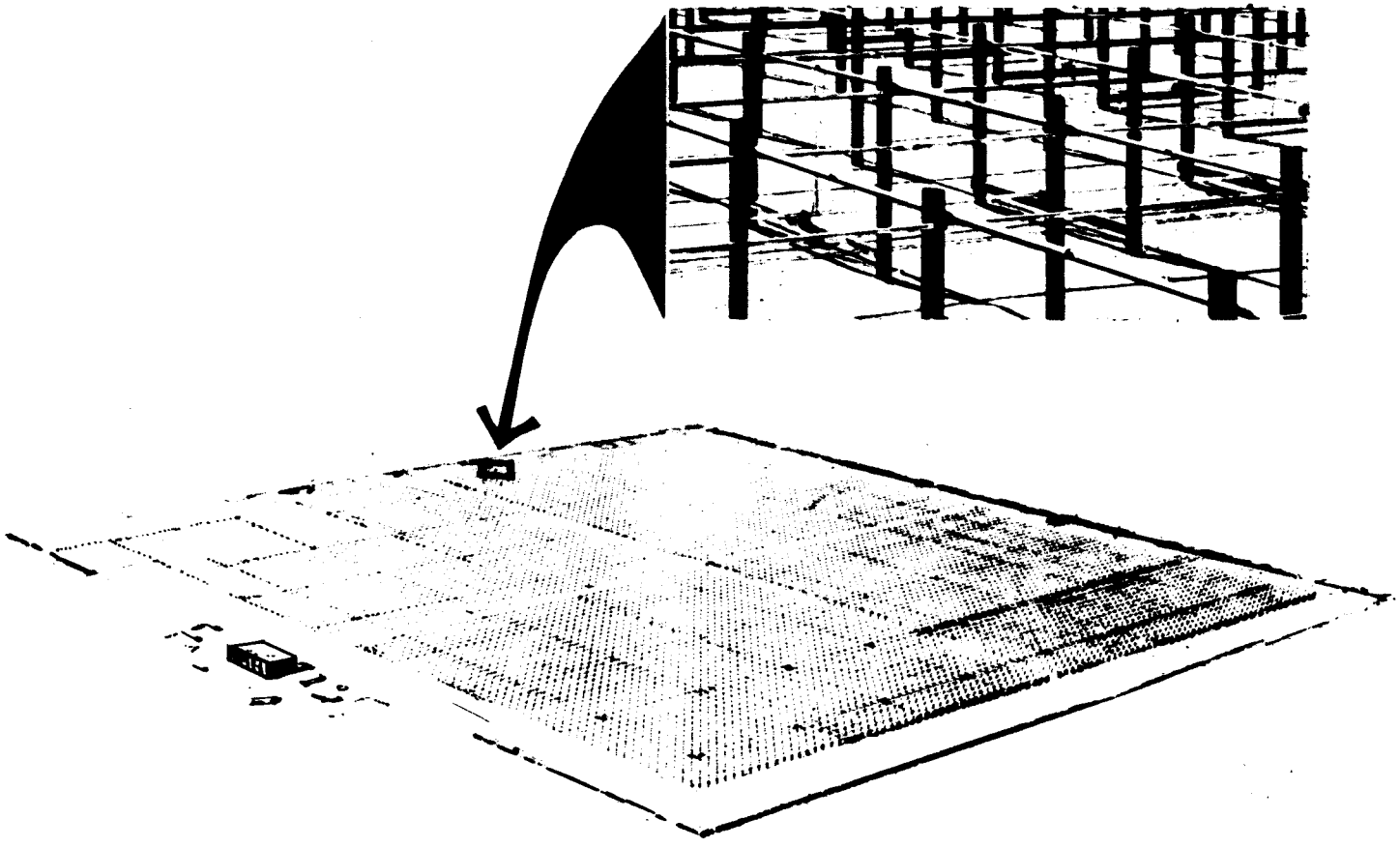
The Sunblazer project will launch a number of relatively small spacecraft into interplanetary space in order to obtain solar corona electron density data. Because of the spacecraft's size limitation, there is a limited payload weight for accommodating radio frequency instrumentation. In order to compensate for this equipment limitation and to accommodate the frequencies unique to the spacecraft, a large area ground antenna array is required. Existing antennas lack sufficient aperture, combined with beam steering mechanism, to provide this support. This project will provide an antenna system capable of receiving and transmitting at these frequencies with sufficient aperture to acquire the low power signals emitted by the Sunblazer spacecraft.

ESTIMATED FUTURE YEAR FUNDING FOR THIS PROJECT: None

VARIOUS LOCATIONS

FISCAL YEAR 1968 ESTIMATES

PHASED ARRAY ANTENNA SYSTEM



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

FACILITY PLANNING AND DESIGN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
All	Office of the Deputy Administrator	Not Applicable	Not Applicable	Not Applicable

INSTALLATION MISSION

See justification.

LAND	NO. ACRES
NASA-OWNED	
OTHER GOVERNMENT AGENCY-OWNED	
NON-FEDERAL *(Leases, easements)*	Not
TOTAL LAND	Applicable
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 19)*	$ Not Applicable

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Facility Planning and Design	AD	51,803	3,000	Not Applicable	Not Applicable
ALL OTHER PROJECTS					
TOTALS		51,803	3,000		

CF 12-1

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* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

FACILITY PLANNING AND DESIGN

Facility planning and design involves activities which are carried on continuously at a level which is related to the overall magnitude of the construction program. The funds required to carry on these activities are included in the continuing Facility Planning and Design account which is separately authorized each year.

The funds requested are used to conduct advance planning and design activities on projects for which construction funds will be requested in subsequent budgets, on master planning, and on other related advanced facility studies.

The manner in which the Facility Planning and Design funding has been utilized during the past two years and the amount included in the FY 1968 budget is as follows:

	Fiscal Years		
	1966	1967	1968
Final design of facilities.....	$2,066,000	$2,100,000	$2,100,000
Preliminary design of facilities..	1,153,500	2,700,000	800,000
Other studies.....	343,000	200,000	100,000
Total.....	$3,562,500	$5,000,000	$3,000,000

The $2.066 million of FY 1966 final design funds supplemented by $1.482 million of FY 1965 design funds have been utilized to cover the preparation of final and complete designs, plans and specifications of FY 1967 facilities. Similarly, the $2.1 million of FY 1967 final design funds are programmed for the design of facilities included in the FY 1968 budget. For FY 1968 it is estimated that $2.1 million will be required to carry out the final design activity on the FY 1969 facilities. The amount included for this activity is based on an estimated FY 1969 facility construction activity of $50 to $70 million.

The $1.153 million of preliminary design funds for FY 1966 have been utilized for the preparation of cost estimates and engineering studies that made up preliminary designs for the FY 1968 facilities. The $2.7 million of preliminary design funds for FY 1967 include $1.5 million for the completion of preliminary design for the Engine/Stage Test Stands 2-3 facility. An additional $1.0 million is programmed for the preliminary design of

FY 1969 facilities. The balance of $200 thousand is being reserved to supplement the $800 thousand of preliminary design funds included for FY 1968 to be used in preparing preliminary cost estimates and engineering studies of FY 1970 facilities estimated at a level of $60 to $80 million.

The $343 thousand for other studies in FY 1966 was used for the preparation of master plans at each of the centers and for the study of standard construction specifications at the Langley Research Center. $200 thousand is programmed in FY 1967 and $100 thousand budgeted in FY 1968 for the preparation and upgrading of master plans for the various NASA installations and for use on other construction studies.

U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 243-381

National Aeronautics and Space Administration

BUDGET AMENDMENT

FISCAL YEAR 1968

Don't Print - Amendment

FOR THE APPROPRIATIONS

RESEARCH AND DEVELOPMENT
CONSTRUCTION OF FACILITIES

CONSTRUCTION OF FACILITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION BILL

CONSTRUCTION OF FACILITIES

BUDGET AMENDMENT

For advance planning, design, and construction of facilities for the National Aeronautics and Space [Administration] *Administration*, and for the acquisition or condemnation of real property, as authorized by law, [$83,000,000] ~~*$54,000,000*~~ to remain available until expended. (*42 U.S.C. 2451, et seq., 50 U.S.C. 151–160, 511–515; Independent Offices Appropriation Act, 1967; additional authorizing legislation to be proposed.*) $76,700,000

Type size: 8 point 22 picas Case 180. Red underscore Case 210

STANDARD FORM 300
July 1964, Bureau of the Budget Circular No. A-11, Revised.
300-101

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

Amendment to Program and Financing (in thousands of dollars)

Identification code	1968 Request pending	1968 Proposed amendments	1968 Revised request
Program by activities:			
4. Space technology	21,400	8,400	29,800
All other activities	117,800	...	117,800
Total program costs, funded	139,200	8,400	147,600
Change in selected resources 1/	-47,200	14,100	-33,100
10 Total obligations	92,000	22,500	114,500
Financing:			
21 Unobligated balance available, start of year, for completion of prior year budget plans	-77,161	...	-77,161
24 Unobligated balance available, end of year, for completion of prior year budget plans	39,361	...	39,361
40 New obligational authority (appropriation)	54,200	22,500	76,700
Relation of obligations to expenditures:			
71 Total obligations (affecting expenditures)	92,000	22,500	114,500
72 Obligated balance, start of year	172,919	...	172,919
74 Obligated balance, end of year	-104,919	-22,500	-127,419
90 Expenditures	160,000	...	160,000

1/ Selected resources as of June 30, 1968, are as follows:

	Request pending	Proposed amendments	Revised request
Unpaid undelivered orders	60,697	14,100	74,797
Advances	105	...	105
Total selected resources	60,802	14,100	74,902

☆ GPO:1966—O-732-469

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1968 ESTIMATES

CONSTRUCTION OF FACILITIES

Amended Program and Financing (in thousands of dollars)

	Budget Plan			Costs to this appropriation		
	1966	1967	1968	1966	1967	1968
Program by activities:						
Direct program:						
1. Manned space flight.....	17,478	43,821	27,900	381,286	115,350	68,450
2. Scientific investigations in space.....	8,024	4,879	6,985	20,365	17,592	9,100
3. Space applications.....	.....	.....	.....	1,360	8	.....
4. Space technology.....	13,435	8,589	30,835	42,244	39,000	29,800
5. Aircraft technology.....	682	21,011	3,170	4,124	4,800	12,650
6. Supporting activities.....	18,589	6,700	7,810	119,810	65,450	27,600
Total direct program costs, funded.....	58,208	85,000	76,700	569,189	242,200	147,600
Reimbursable program:						
3. Space applications.....	.....	.....	.....	917	1,547	.....
Total program costs, funded.....	58,208	85,000	76,700	570,106	243,747	147,600
Change in selected resources[1]...	.....	.....	.....	-299,291	-107,805	-33,100
10 Total.....	58,208	85,000	76,700	270,815	135,942	114,500

CONSTRUCTION OF FACILITIES

Amended Program and Financing (in thousands of dollars) - Continued

	Budget Plan			Costs to this appropriation		
	1966	1967	1968	1966	1967	1968
10 Total	58,208	85,000	76,700	270,815	135,942	114,500
Financing:						
21 Unobligated balance available, start of year, for completion of prior year budget plans	.....	.....	.....	-293,492	-128,103	-77,161
22 Unobligated balance transferred from "Research and development" (75 Stat. 355, 76 Stat. 731, 77 Stat. 439 and 78 Stat. 658)	.....	.....	.....	-44,486	.....	.....
Reprogramming to or from prior year budget plans	2,732	.....	.....	.....	.....	.....
24 Unobligated balance available, end of year, for completion of prior year budget plans	.....	.....	.....	128,103	77,161	39,361
New obligational authority	60,940	85,000	76,700	60,940	85,000	76,700
New obligational authority:						
40 Appropriation	60,000	83,000	76,700	60,000	83,000	76,700
42 Transferred from "Research and development" (79 Stat. 534 and 80 Stat. 676)	940	2,000	.....	940	2,000	.....
43 Appropriation (adjusted)	60,940	85,000	76,700	60,940	85,000	76,700

CONSTRUCTION OF FACILITIES

Amended Program and Financing (in thousands of dollars) - Continued

	Budget Plan			Costs to this appropriation		
	1966	1967	1968	1966	1967	1968
Relation of obligations to expenditures:						
71 Total obligations (affecting expenditures)				270,815	135,942	114,500
72 Obligated balance, start of year				618,608	316,977	172,919
74 Obligated balance, end of year				-316,977	-172,919	-127,419
90 Expenditures				572,446	280,000	160,000

	1965	1966 Adjustments	1966	1967	1968
[1]Selected resources as of June 30 are as follows:					
Unpaid undelivered orders	515,037	.....	215,702	107,897	74,797
Advances	1,252	-1,191	105	105	105
Total selected resources	516,289	-1,191	215,807	108,002	74,902

	1966 actual	1967 estimate	1968 estimate
Note.--Reconciliation of budget plan to obligations:			
Total budget plan	58,208	85,000	76,700
Deduct portion of budget plan to be obligated in subsequent years	30,184	45,000	24,200
Add obligations of prior year budget plans	242,791	95,942	62,000
Total obligations	270,815	135,942	114,500

Type size: 8 point 22 picas Case 180. Red underscore Case 210

STANDARD FORM 300
July 1964, Bureau of the Budget Circular No. A-11, Revised.
300-101

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

Amendment to Object Classification (in thousands of dollars)

Identification code	1968 Request pending	1968 Proposed amendments	1968 Revised request
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION			
31.0 Equipment	24,080	3,600	27,680
32.0 Lands and structures	66,754	3,000	69,754
Total obligations, National Aeronautics and Space Administration	90,834	6,600	97,434
ALLOCATION ACCOUNTS			
32.0 Lands and structures	1,166	15,900	17,066
99.0 Total obligations	92,000	22,500	114,500
Obligations are distributed as follows:			
National Aeronautics and Space Administration	90,834	6,600	97,434
Department of Transportation, Bureau of Public Roads	1,166	....	1,166
Atomic Energy Commission	....	15,900	15,900

☆ GPO:1966—O-732-469

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Type size: 8 point 22 picas Case 180. Red undercore Case 210

STANDARD FORM 300
July 1964, Bureau of the Budget Circular No. A-11, Revised.
300-101

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

Amended Object Classification (in thousands of dollars)

Identification code	1966 actual	1967 estimate	1968 estimate
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION			
Direct obligations:			
31.0 Equipment	55,872	36,620	27,680
32.0 Lands and structures	207,914	94,645	69,754
Total direct obligations	263,786	131,265	97,434
Reimbursable obligations:			
31.0 Equipment	344	530	....
32.0 Lands and structures	45	412	....
Total reimbursable obligations	389	942	....
Total obligations, National Aeronautics and Space Administration	264,175	132,207	97,434
ALLOCATION ACCOUNTS			
32.0 Lands and structures	6,640	3,735	17,066
99.0 Total obligations	270,815	135,942	114,500
Obligations are distributed as follows:			
National Aeronautics and Space Administration	264,175	132,207	97,434
Department of Transportation, Bureau of Public Roads	6,312	3,578	1,166
Atomic Energy Commission	328	157	15,900
	(Memo cost: 21.5)	(Memo cost: 5)	(Memo cost: 5) (Memo cost: 4.9)

☆ GPO:1966—O-732-469

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BUDGET AMENDMENT

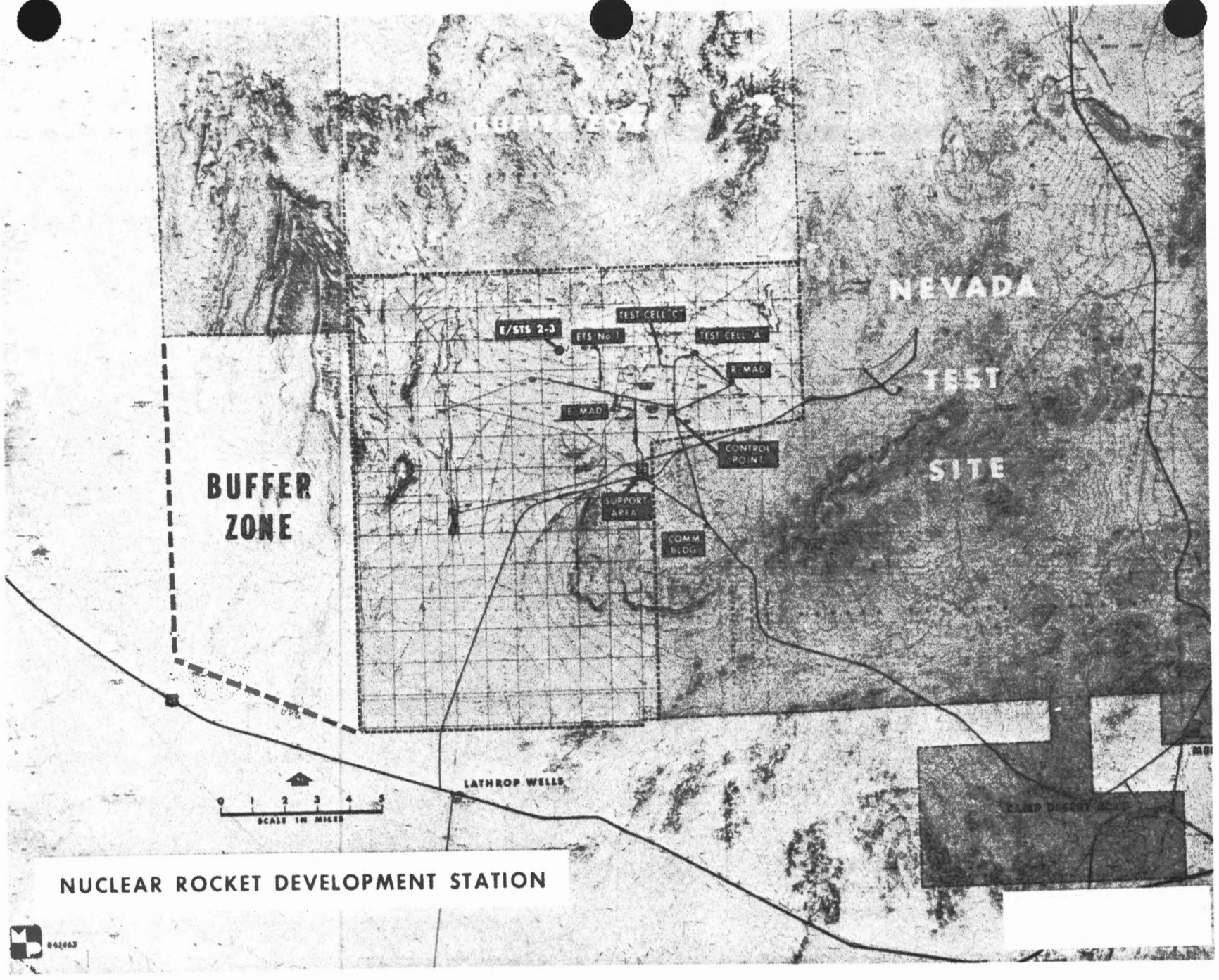
FISCAL YEAR 1968 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES AMENDED BUDGET PLAN BY LOCATION

Location	Fiscal Year 1966	Fiscal Year 1967	Fiscal Year 1968
Ames Research Center.....	$2,749,000	---	$5,365,000
Electronics Research Center.....	5,000,000	$7,500,000	6,220,000
Goddard Space Flight Center.....	2,400,000	710,000	565,000
Jet Propulsion Laboratory.....	940,300	350,000	3,125,000
John F. Kennedy Space Center, NASA.	6,916,570	35,758,000	24,885,000
Langley Research Center.....	8,250,000	6,100,000	---
Lewis Research Center.....	867,000	16,000,000	2,115,000
Manned Spacecraft Center.....	4,180,000	9,100,000	2,425,000
Marshall Space Flight Center.....	1,955,690	---	870,000
Michoud Assembly Facility.....	296,819	700,000	2,010,000
Nuclear Rocket Development Station, Nevada.....	---	---	22,500,000[a/]
Various Locations.....	19,376,417	3,577,000	2,880,000
Wallops Station.....	1,048,000	205,000	740,000
Facility Planning and Design.....	4,228,160	5,000,000	3,000,000
Total Plan.....	$58,207,956	$85,000,000	$76,700,000

a/ Budget amendment.

LOCATION PLAN



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 68 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION	LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Nuclear Rocket Development Station	Office of Advanced Research and Technology	Jackass Flats, Nevada	Nye	Las Vegas, Nevada

INSTALLATION MISSION

The mission of the Nuclear Rocket Development Station (NRDS) is to provide a site for ground static testing of the reactors, engines, and eventually, vehicles associated with nuclear rocket development.

LAND	NO. ACRES
NASA-OWNED	---
OTHER GOVERNMENT AGENCY-OWNED	90,000
NON-FEDERAL *(Leases, easements)*	---
TOTAL LAND	90,000
TOTAL CAPITAL INVESTMENT* *(Including NASA-Owned Land) (as of June 30, 1966)*	$ 31,881

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YEAR	FY 1968 *(Estimated)*	FUTURE YEARS *(Estimated)*	TOTAL ALL YEARS *(Estimated)*
Engine Stage Test Stand 2 and 3	OART	1,390	22,500 1/	52,610	76,500
ALL OTHER PROJECTS		14,565			
TOTALS		15,955	22,500		

1/ Includes $3,000,000 facility planning and design.

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

* *Includes work in process.*

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1968 ESTIMATES

AMENDED BUDGET

ENGINE/STAGE TEST STAND 2 AND 3

AUTHORIZATION LINE ITEM: Space Nuclear Propulsion Office

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

LOCATION OF PROJECT: Nuclear Rocket Development Station, Nevada (NRDS)

COGNIZANT NASA INSTALLATION: Space Nuclear Propulsion Office

TYPE OF CONSTRUCTION PROJECT: New

FUNDING:

FY 1967 and Prior Years	$1,390,000
FY 1968 Estimate	22,500,000
Total Funding Through FY 1968	$23,890,000

PROJECT COST ESTIMATE:

	Total Estimated Cost	Prior to FY 1968	FY 1968
Land Acquisition	---	---	---
Construction	$40,890,000	---	$15,900,000
Civil works	5,230,000	---	500,000
Test stand	13,610,000	---	9,650,000
Control center and tunnels	1,925,000	---	---
Electrical systems	2,025,000	---	250,000
Process piping systems	3,750,000	---	---
Cryogenic and high pressure gas systems	14,350,000	---	5,500,000

	Total Estimated Cost	Prior to FY 1968	FY 1968
Equipment	$30,220,000	---	$3,600,000
I&C systems	11,570,000	---	---
Steam generator system	6,800,000	---	---
Diffuser/ejector	11,850,000	---	3,600,000
Fallout Shelter	---	---	---
Total Construction and Equipment	$71,110,000	---	$19,500,000
Facility Planning and Design	5,390,000	$1,390,000*	3,000,000
TOTAL	$76,500,000	$1,390,000	$22,500,000

* These funds were provided from Facility Planning and Design.

PROJECT PURPOSE:

This project will provide facilities for the ground testing of nuclear rocket propulsion modules.

PROJECT DESCRIPTION:

The test complex will consist of two static test stands, a control center, and ancillary equipment. Each test stand will be capable of testing a nuclear propulsion module in a vertical position during 5000 MW (power) operations, with a thrust of approximately 250,000 pounds, for thirty minutes with the nozzle exhausting downward. The exhaust system will be designed to simulate the pressure seen by the nuclear rocket propulsion system at an altitude of 50-60,000 feet. The complex will be designed and constructed so that either test stand may be readied for operations independent of the activity at the other stand; however, simultaneous testing is not anticipated. The E/STS 2 and 3 complex will receive housekeeping and logistics support from the NRDS support staff and facilities.

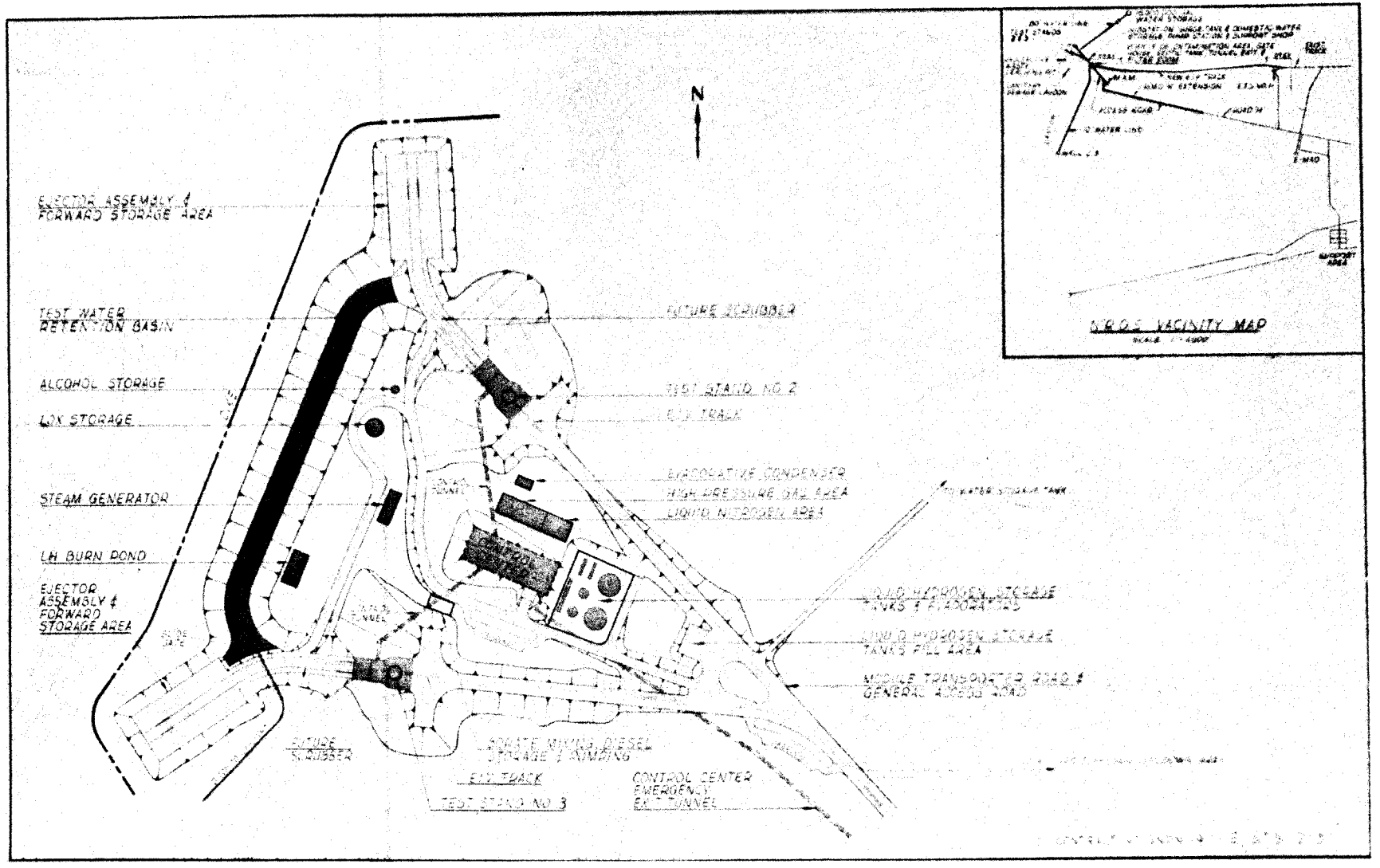
During fiscal year 1968 road networks and water and electrical power systems will be extended to the test site; the substructures for the test stands will be contracted for and construction begun; the long lead time cryogenic and high pressure gas piping system will be contracted for and vendor design and fabrication begun; the diffuser/ejector system will be contracted for and vendor designs, procurements and fabrication will be instituted. A substantial portion of the design funding is also provided.

PROJECT JUSTIFICATION:

The development of the 200,000 - 250,000 pound NERVA nuclear rocket engine requires the early construction of the testing facilities provided by this test complex. The long-lead time nature of these facilities makes them the pacing factor in the engine development program. Development planning indicates that the NERVA engine will be available for testing by the time the test facilities can be made ready to accommodate it. These test facilities will be needed for the development testing of the NERVA engine to perform engine mapping tests, start up tests, controls tests, duration tests, and qualification testing. The facilities will also be designed so that the static testing of a full nuclear rocket stage or a propulsion module can be conducted when such stage development is initiated. The propulsion module would include the NERVA nuclear rocket engine, propellant tank, and necessary instrument and control units. There are no other test stands in the United States which can provide such a nuclear rocket engine or stage testing capability.

The total existing capability of the country for testing nuclear powered rocket engines is now contained in Engine Test Stand No. 1 (ETS-1) at the Nuclear Rocket Development Station. ETS-1 is being used in the nuclear rocket engine technology development work for experimental system tests and can be used only for the low power mapping and start-up testing in the development program of the large NERVA engine. Because of the higher power level of the NERVA (200,000 - 250,000 pounds of thrust), ETS-1 cannot be used for full power tests of the NERVA engine.

ESTIMATED FUTURE YEAR FUNDING: $52,610,000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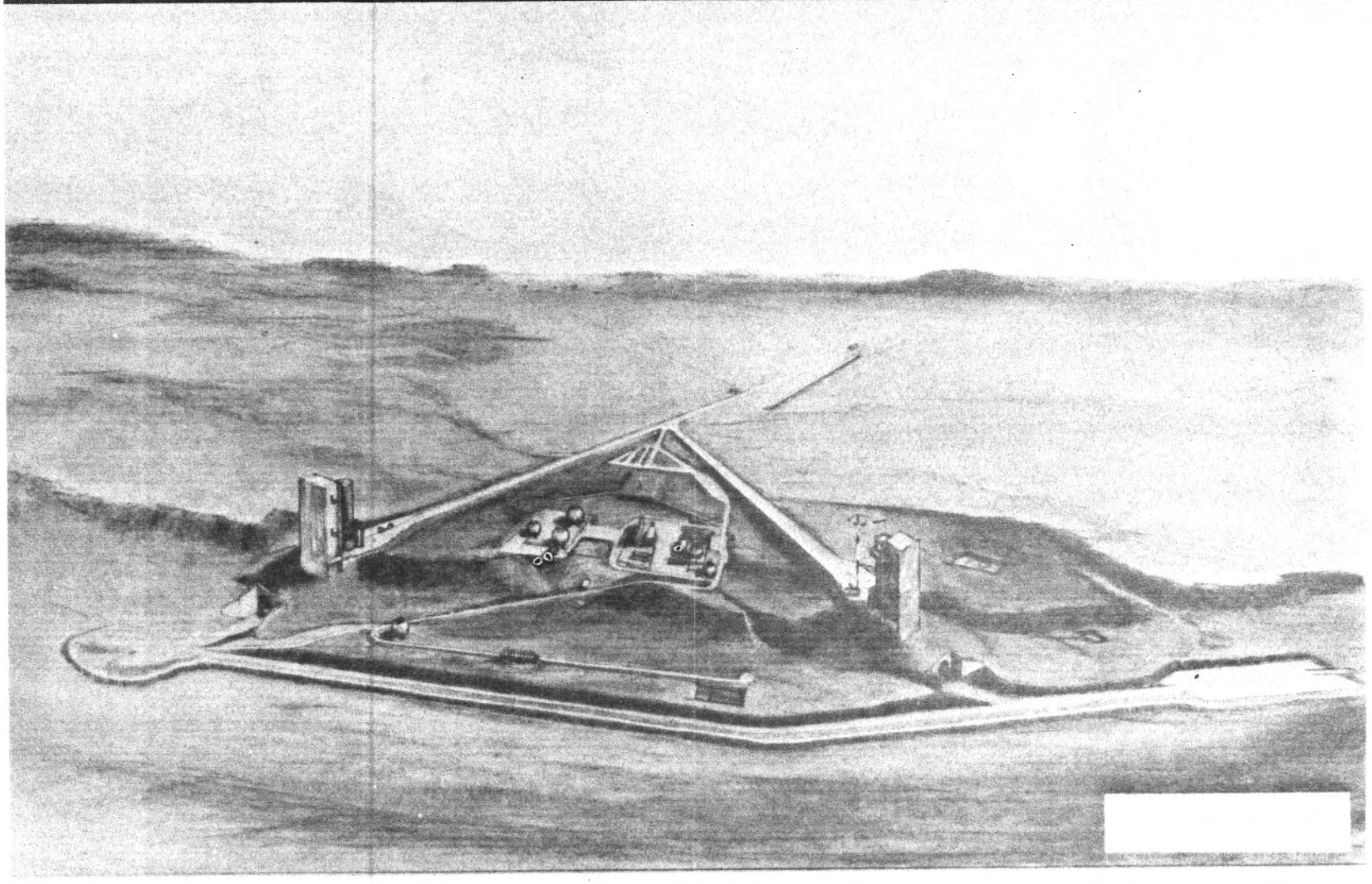
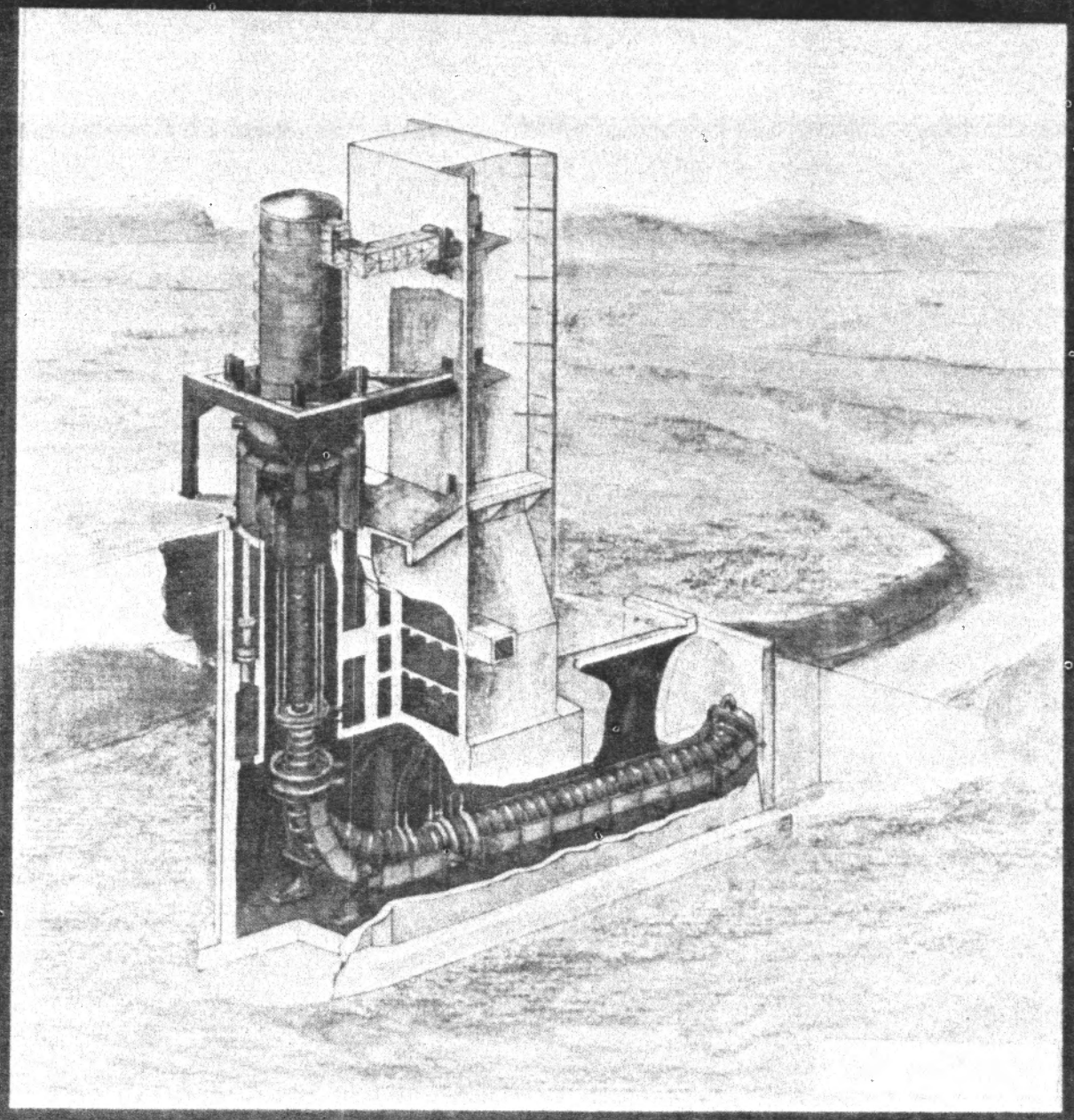
EJECTOR ASSEMBLY & FORWARD STORAGE AREA
TEST WATER RETENTION BASIN
ALCOHOL STORAGE
LOX STORAGE
STEAM GENERATOR
LH BURN POND
EJECTOR ASSEMBLY & FORWARD STORAGE AREA
FUTURE SCRUBBER
TEST STAND NO. 2
E.I.D. TRACK
EVAPORATIVE CONDENSER
HIGH PRESSURE GAS AREA
LIQUID NITROGEN AREA
CONTROL CENTER
SOLID HYDROGEN STORAGE TANKS & FLEXORAMAS
LIQUID HYDROGEN STORAGE TANKS FILL AREA
MISSILE TRANSPORTER ROAD & GENERAL ACCESS ROAD
FUTURE SCRUBBER
SOLID ROCKET MOTOR STORAGE & HOUSING
E.I.D. TRACK
TEST STAND NO. 3
CONTROL CENTER EMERGENCY EXIT TUNNEL
N.A.S.A. VICINITY MAP

ENGINE/STAGE TEST STAND 2 & 3 COMPLEX SITE PLAN



ENGINE/STAGE TEST STAND 2 & 3 CONCEPT



GPO 919-870

FISCAL YEAR 1968 BUDGET AMENDMENT