National Aeronautics and Space Administration

BUDGET ESTIMATES

FISCAL YEAR 1971

Volume III

CONSTRUCTION OF FACILITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

GENERAL STATEMENT

This appropriation provides for contractual services for the design, major rehabilitation, and modification of facilities; the construction of new facilities; the purchase of related equipment and advance design activities related to facilities planned for future authorization. The principal projects in the 1971 program are described below:

MANNED SPACE FLIGHT: This activity includes funding for construction of support facilities at the John F. Kennedy Space Center, NASA, Kennedy Space Center, Fla.; a calibration laboratory at the Manned Spacecraft Center, Houston, Tex.; and a multi-spectral photographic laboratory at the Marshall Space Flight Center, Huntsville, Ala.

SCIENTIFIC INVESTIGATIONS IN SPACE: The estimates for this activity provide for modifications to a solar simulator at the Jet Propulsion Laboratory, Pasadena, Calif.

SPACE APPLICATIONS: Funds for this activity will provide for an earth resources technology laboratory at the Goddard Space Flight Center, Greenbelt, Md.; and alterations to a space launch complex at the Western Test Range, Vandenberg Air Force Base, Calif.

SPACE TECHNOLOGY: The estimate for this activity will provide for a polymer research laboratory at the Ames Research Center, Moffett Field, Calif.; an isotope thermoelectric systems applications laboratory at the Jet Propulsion Laboratory; and an engine/stage test stand at the Nuclear Rocket Development Station, Jackass Flats, Nev.

AVIATION TECHNOLOGY: No 1971 projects.

SUPPORTING ACTIVITIES: This activity includes funds for facility planning and design; for an addition to the powerplant at the Goldstone Complex, Fort Irwin, Calif.; for the relocation of a transportable tracking station; and for essential rehabilitation of and modifications to facilities at NASA installations and at plants operated by contractors for NASA.

The appropriation for FY 1970 was $53,233,000 and the authorization was $58,200,000. The request for 1971 is $34,600,000 a decrease of $18,633,000 from the 1970 appropriation. Total expenditures are estimated to be $72,000,000 in FY 1971, an increase of $12,000,000 from the $60,000,000 estimated for FY 1970.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1971 ESTIMATES

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

	Fiscal Year 1969	Fiscal Year 1970	Fiscal Year 1971
Budget Activity			
1. Manned Space Flight.....	$10,719,000	$14,250,000	$2,000,000
2. Scientific Investigations in Space.....	1,100,000	1,595,000	700,000
3. Space Applications.....	---	---	5,350,000
4. Space Technology.....	386,000	---	6,275,000
5. Aviation Technology.....	---	4,767,000	---
6. Supporting Activities.....	19,875,000	32,621,000	20,275,000
Total Budget Plan.....	$32,080,000	$53,233,000	$34,600,000
Financing:			
Appropriation.....	$21,800,000	$53,233,000	$34,600,000
Transferred from other accounts.....	11,140,000	---	---
Appropriation (adjusted)	$32,940,000	$53,233,000	$34,600,000
Reprogramming to prior year budget plans.....	-860,000	---	---
Total financing of budget plan.....	$32,080,000	$53,233,000	$34,600,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1971 ESTIMATES

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

	Fiscal Year 1969	Fiscal Year 1970	Fiscal Year 1971
1. MANNED SPACE FLIGHT.....	$10,719,000	$14,250,000	$2,000,000
John F. Kennedy Space Center, NASA.....	7,364,000	12,500,000	575,000
Manned Spacecraft Center.....	1,333,000	1,750,000	900,000
Marshall Space Flight Center.	---	---	525,000
Michoud Assembly Facility....	400,000	---	---
Various Locations.....	1,622,000	---	---
2. SCIENTIFIC INVESTIGATIONS IN SPACE.....	$1,100,000	$1,595,000	$700,000
Goddard Space Flight Center..	---	670,000	---
John F. Kennedy Space Center, NASA.....	600,000	---	---
Jet Propulsion Laboratory....	---	---	700,000
Wallops Station.....	500,000	500,000	---
Various Locations.....	---	425,000	---
3. SPACE APPLICATIONS.....	---	---	$5,350,000
Goddard Space Flight Center..	---	---	2,050,000
Various Locations.....	---	---	3,300,000
4. SPACE TECHNOLOGY.....	$386,000	---	$6,275,000
Ames Research Center.....	386,000	---	1,525,000
Jet Propulsion Laboratory....	---	---	1,250,000
Nuclear Rocket Development Station.....	---	---	3,500,000
5. AVIATION TECHNOLOGY.....	---	$4,767,000	---
Langley Research Center.....	---	4,767,000	---
6. SUPPORTING ACTIVITIES.....	$19,875,000	$32,621,000	$20,275,000
Various Locations.....	18,875,000	29,121,000	15,275,000
Facility Planning and Design.	1,000,000	3,500,000	5,000,000
TOTAL PLAN.....	$32,080,000	$53,233,000	$34,600,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

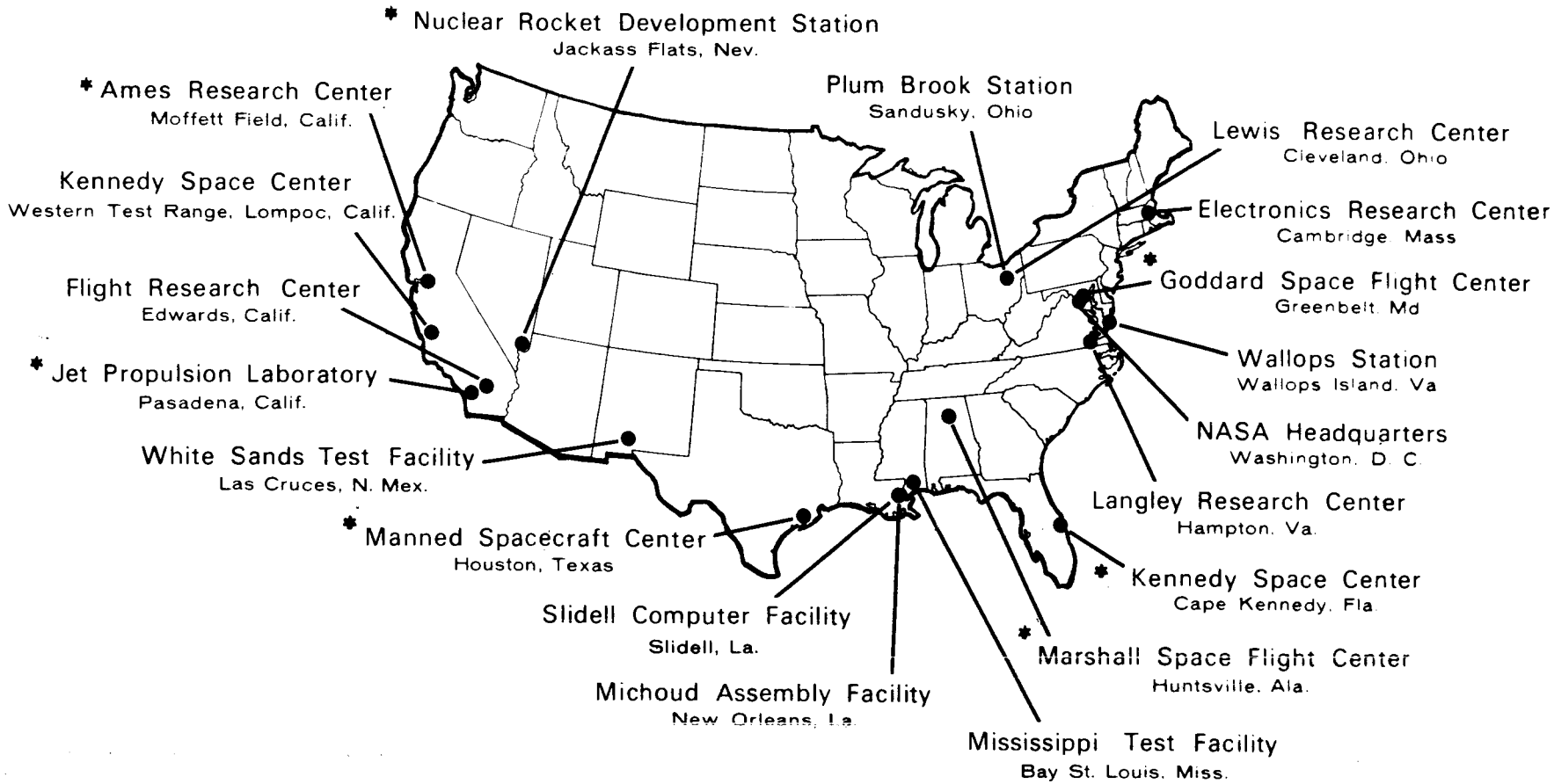
FISCAL YEAR 1971 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN BY LOCATION

Location	Fiscal Year 1969	Fiscal Year 1970	Fiscal Year 1971
Ames Research Center.....	$386,000	---	$1,525,000
Goddard Space Flight Center...	---	$670,000	2,050,000
Jet Propulsion Laboratory.....	---	---	1,950,000
John F. Kennedy Space Center, NASA.....	7,964,000	12,500,000	575,000
Langley Research Center.....	---	4,767,000	---
Manned Spacecraft Center.....	1,333,000	1,750,000	900,000
Marshall Space Flight Center..	---	---	525,000
Michoud Assembly Facility.....	400,000	---	---
Nuclear Rocket Development Station.....	---	---	3,500,000
Wallops Station.....	500,000	500,000	---
Various Locations.....	20,497,000	29,546,000	18,575,000
Facility Planning and Design..	1,000,000	3,500,000	5,000,000
Total Plan.....	$32,080,000	$53,233,000	$34,600,000

The geographic location of NASA installations is shown on the following page. Installations for which construction projects are requested in the fiscal year 1971 budget are identified.

NASA INSTALLATIONS



* Installations for which construction projects are requested in the FY 1971 budget estimates.

CAPITALIZED VALUE OF NASA'S FACILITIES
AS OF JUNE 30, 1969
(IN-HOUSE AND CONTRACTOR-HELD FACILITIES)
(DOLLARS IN THOUSANDS)

Date Prepared: September 19, 1969

Reporting Installation	Land	Buildings	Other Structures and Facilities	Leasehold Improvements	Equipment	Fixed Assets in Progress	Total
OFFICE OF MANNED SPACE FLIGHT							
Kennedy Space Center	$ 71,018	$ 281,739	$ 423,552	$ -	$ 81,348	$101,215	$ 958,872
Western Test Range Operation Div.	-	-	-	-	3,464	-	3,464
Various Locations (Contractor-Held)	-	-	-	-	84,957	-	84,957
Manned Spacecraft Center	5,459	131,558	28,712	-	177,748	15,852	359,329
White Sands Test Facility	-	8,976	17,754	-	4,035	1,205	31,970
Various Locations (Contractor-Held)	3,570	24,415	5,142	8	48,303	-	81,438
Marshall Space Flight Center	95	109,762	45,238	93	194,893	3,861	353,942
Michaud Assembly Facility	7,504	63,220	25,039	-	40,998	-	136,761
Mississippi Test Facility	19,729	64,716	166,900	-	23,677	1,181	276,203
Sidell Computer Facility	63	4,446	823	-	5,097	-	10,429
Various Locations (Contractor-Held)	3,491	27,046	38,739	23	83,038	14,010	166,347
Total	$110,929	$ 715,878	$ 751,899	$124	$ 747,558	$137,324	$2,463,712
OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY							
Ames Research Center	$ 2,372	$ 167,099	$ 2,987	$ -	$ 58,434	$ 4,510	$ 235,402
Various Locations (Contractor-Held)	-	47	-	1	2,377	-	2,425
Electronics Research Center	1,384	-	4	-	20,341	14,713	36,442
Various Locations (Contractor-Held)	-	-	-	-	272	-	272
Flight Research Center	-	7,658	2,135	-	36,650	595	47,038
Various Locations (Contractor-Held)	-	-	-	-	94	-	94
Langley Research Center	110	106,180	134,424	-	111,395	19,370	371,479
Various Locations (Contractor-Held)	6	15,217	25	-	3,180	-	18,428
Lewis Research Center	310	110,301	39,240	140	57,349	9,979	217,319
Plum Brook Station	1,287	74,746	17,728	-	10,252	7,069	111.082
Various Locations (Contractor-Held)	99	4,240	4,007	5	32,369	10,314	51,034
Space Nuclear Propulsion Office	-	18,957	6,917	-	3,987	17	29,878
Various Locations (Contractor-Held)	-	-	-	-	20,146	232	20,378
Total	$ 5,568	$ 504,445	$ 207,467	$146	$ 356,846	$ 66,799	$1,141,271
OFFICE OF SPACE SCIENCE AND APPLICATIONS							
Goddard Space Flight Center	$ 1,205	$ 68,626	$ 11,681	$297	$ 182,616	$ -	$ 264,425
*Tracking Stations	339	17,305	41,839	-	201,326	-	260,809
Various Locations (Contractor-Held)	-	88	45	4	37,960	-	38,097
Jet Propulsion Laboratory	1,067	44,012	6,563	414	79,515	-	131,571
Tracking Stations (Deep Space Net.)	-	9,160	21,403	-	31,291	-	61,854
Wallops Station	986	21,423	41,629	-	34,954	2,809	101,801
Various Locations (Contractor-Held)	-	2,544	270	-	3,906	-	6,720
NASA Pasadena Office	-	-	-	-	11	-	11
Total	$ 3,597	$ 163,158	$ 123,430	$715	$ 571,579	$ 2,809	$ 865,288
OTHER							
Headquarters	$ -	$ -	$ -	$ -	$ 6,627	$ -	$ 6,627
Various Locations (Contractor-Held)	-	-	-	-	8,240	-	8,240
Total	$ -	$ -	$ -	$ -	$ 14,867	$ -	$ 14,867
Grand Total	$120,094	$1,383,481	$1,082,796	$985	$1,690,850	$206,932	$4,485,138

* Includes capital type facilities of the MSF and STADA networks and other supporting activities including equipment aboard ships and aircraft.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

AMES RESEARCH CENTER

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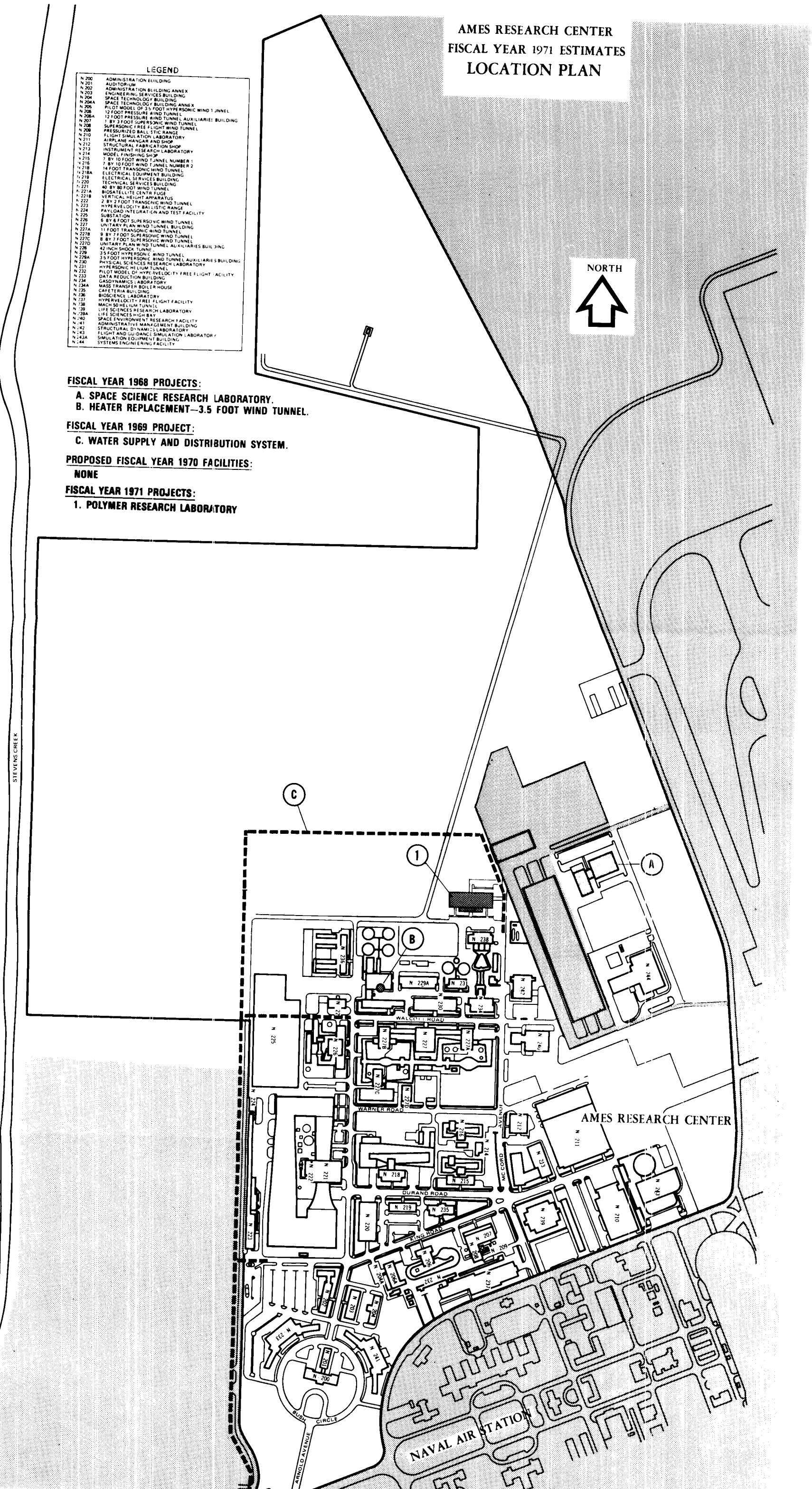
Office of Advanced Research and Technology Project:	
Polymer research laboratory	CF 1-3

AMES RESEARCH CENTER
FISCAL YEAR 1971 ESTIMATES
LOCATION PLAN



LEGEND

N 200	ADMINISTRATION BUILDING
N 201	AUDITORIUM
N 202	ADMINISTRATION BUILDING ANNEX
N 203	ENGINEERING SERVICES BUILDING
N 204	SPACE TECHNOLOGY BUILDING
N 204A	SPACE TECHNOLOGY BUILDING ANNEX
N 205	PILOT MODEL OF 3.5 FOOT HYPERSONIC WIND TUNNEL
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 NUMBER 1
N 216	7 BY 10 FOOT WIND TUNNEL NUMBER 2
N 218	14 FOOT TRANSONIC WIND TUNNEL
N 218A	ELECTRICAL EQUIPMENT BUILDING
N 219	ELECTRICAL SERVICES BUILDING
N 220	TECHNICAL SERVICES BUILDING
N 221	40 BY 80 FOOT WIND TUNNEL
N 221A	BIOSATELLITE CENTRIFUGE
N 221B	VERTICAL HEIGHT APPARATUS
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 TUNNEL 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 TUNNEL AUXILIARIES BUILDING
N 228	42 INCH 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 234A	MASS TRANSFER BOILER HOUSE
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 239A	LIFE SCIENCES HIGH BAY
N 240	SPACE ENVIRONMENT RESEARCH FACILITY
N 241	ADMINISTRATIVE MANAGEMENT BUILDING
N 242	STRUCTURAL DYNAMICS LABORATORY
N 243	FLIGHT AND GUIDANCE SIMULATION LABORATORY
N 243A	SIMULATION EQUIPMENT BUILDING
N 244	SYSTEMS ENGINEERING FACILITY

FISCAL YEAR 1968 PROJECTS:

A. SPACE SCIENCE RESEARCH LABORATORY.
B. HEATER REPLACEMENT—3.5 FOOT WIND TUNNEL.

FISCAL YEAR 1969 PROJECT:

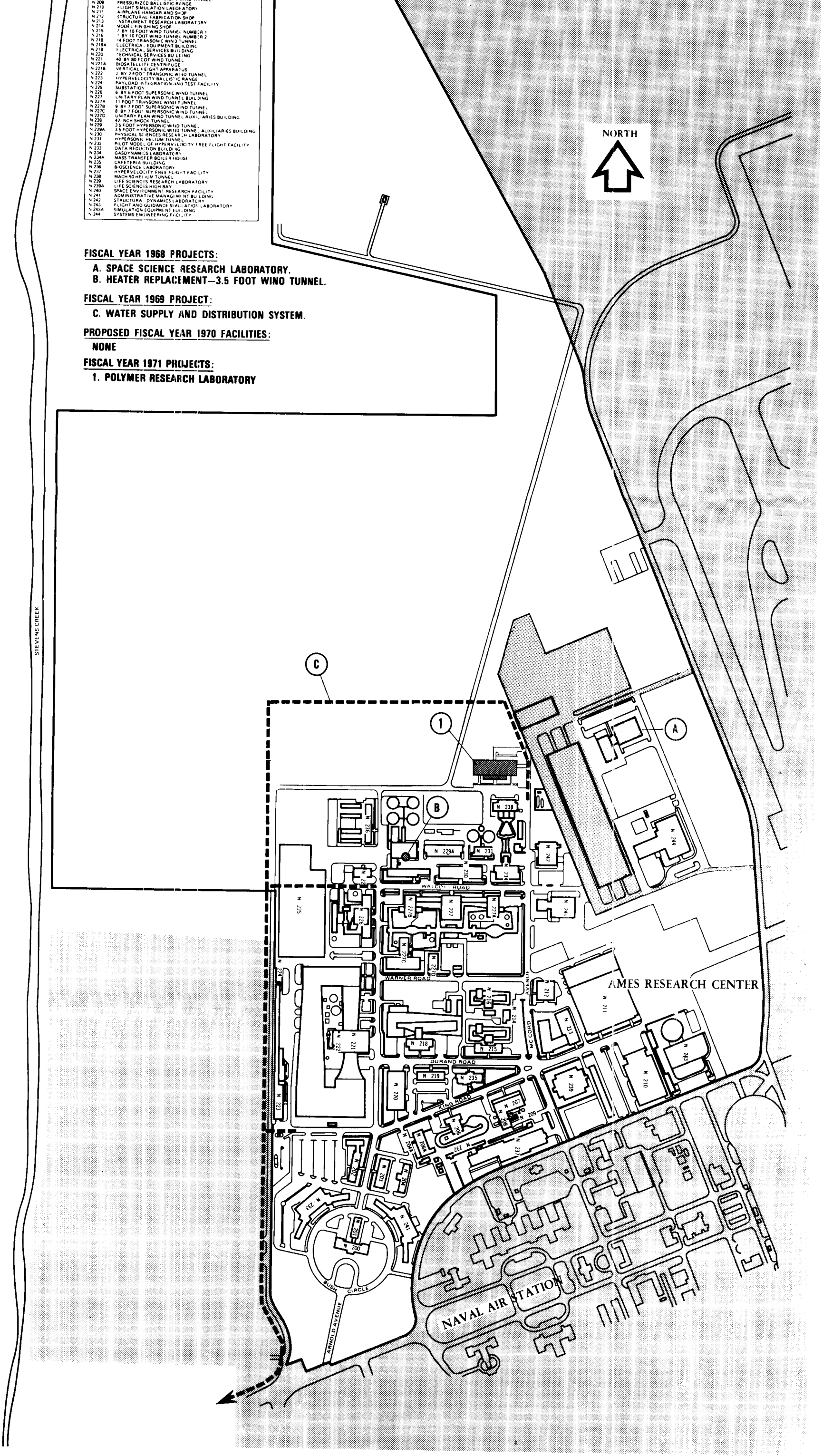
C. WATER SUPPLY AND DISTRIBUTION SYSTEM.

PROPOSED FISCAL YEAR 1970 FACILITIES:

NONE

FISCAL YEAR 1971 PROJECTS:

1. POLYMER RESEARCH LABORATORY


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 NUMBER 1
N 216 7 BY 10 FOOT WIND TUNNEL NUMBER 2
N 218 14 FOOT TRANSONIC WIND TUNNEL
N 218A ELECTRICAL EQUIPMENT BUILDING
N 219 ELECTRICAL SERVICES BUILDING
N 220 TECHNICAL SERVICES BUILDING
N 221 40 BY 80 FOOT WIND TUNNEL
N 221A BIOSATELLITE CENTRIFUGE
N 221B VERTICAL HEIGHT APPARATUS
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 TUNNEL 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 TUNNEL AUXILIARIES BUILDING
N 228 42 INCH 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 234A MASS TRANSFER BOILER HOUSE
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 239A LIFE SCIENCES HIGH BAY
N 240 SPACE ENVIRONMENT RESEARCH FACILITY
N 241 ADMINISTRATIVE MANAGEMENT BUILDING
N 242 STRUCTURAL DYNAMICS LABORATORY
N 243 FLIGHT AND GUIDANCE SIMULATION LABORATORY
N 243A SIMULATION EQUIPMENT BUILDING
N 244 SYSTEMS ENGINEERING FACILITY
FISCAL YEAR 1968 PROJECTS:
A. SPACE SCIENCE RESEARCH LABORATORY.
B. HEATER REPLACEMENT—3.5 FOOT WIND TUNNEL.
FISCAL YEAR 1969 PROJECT:
C. WATER SUPPLY AND DISTRIBUTION SYSTEM.
PROPOSED FISCAL YEAR 1970 FACILITIES:
NONE
FISCAL YEAR 1971 PROJECTS:
1. POLYMER RESEARCH LABORATORY
NORTH
STEVENS CREEK
AMES RESEARCH CENTER
NAVAL AIR STATION
WALCOTT ROAD
WARNER ROAD
DURAND ROAD
KING ROAD
MC CORD AVENUE
BUSH CIRCLE
ARNOLD AVENUE
A
B
C
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

GODDARD SPACE FLIGHT CENTER

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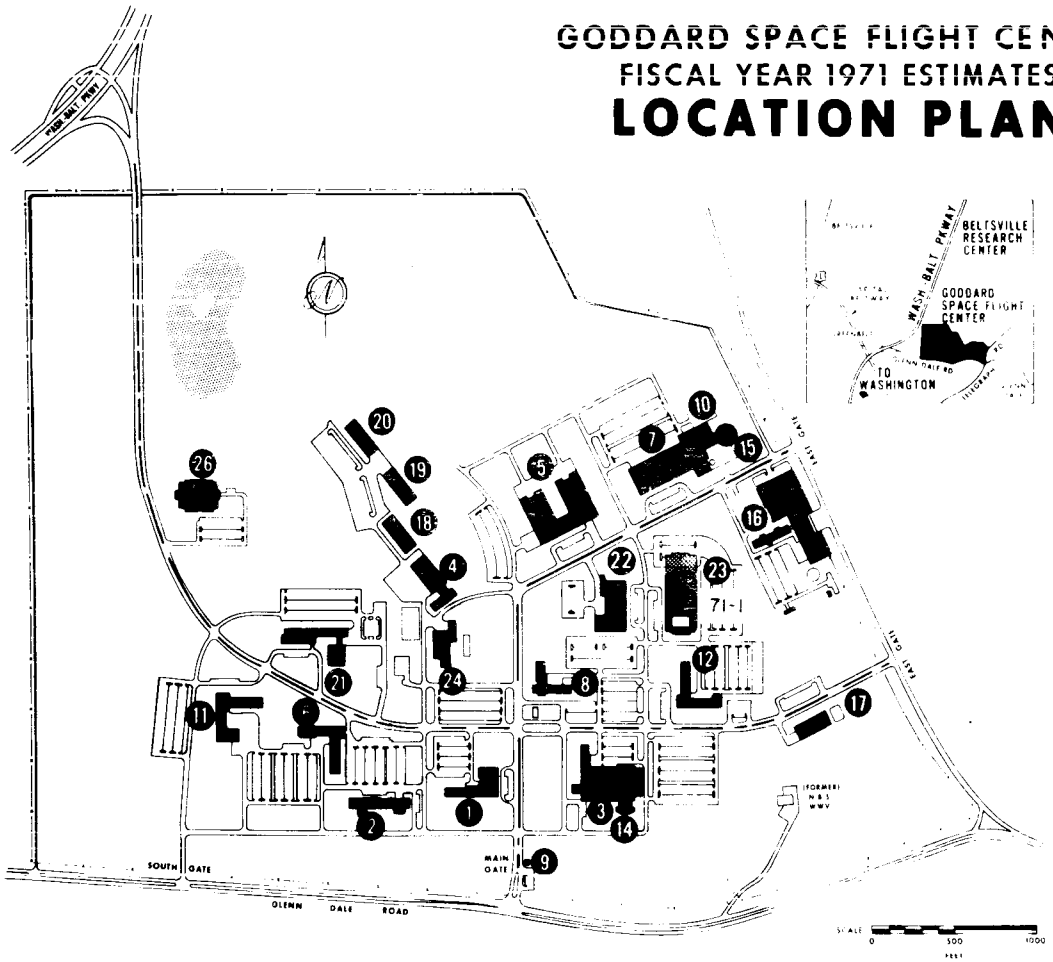
Office of Space Science and Applications Project:	
Earth resources technology laboratory	CF 2-3

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1971 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

FACILITIES PROPOSED IN 1971 ESTIMATES

71-1 Earth Resources Technology Laboratory

EXISTING FACILITIES
FACILITIES UNDER CONSTRUCTION
FACILITIES PROPOSED IN 1971 ESTIMATES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 71 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Earth Resources Technology Laboratory	OSSA	67	2,050		2,117
TOTAL			2,050		

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Earth Resources Technology Laboratory

AUTHORIZATION LINE ITEM: Goddard Space Flight Center

COGNIZANT PROGRAM OFFICE: Office of Space Science and Applications

COGNIZANT INSTALLATION: Goddard Space Flight Center

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

TYPE OF PROJECT: Addition

FUNDING:

FY 1970 and Prior Years	$67,000
FY 1971 Estimate	2,050,000
Total Funding Through FY 1971	$2,117,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

This project will provide office, laboratory, and special purpose space for the Earth Resources Technology Satellite (ERTS) control center and data processing facilities, and other related activities.

PROJECT DESCRIPTION:

This project proposes the construction of a three-story 45,000 square foot addition to the north end of the Data Interpretation Laboratory, Building 23, at the Goddard Space Flight Center. Construction will conform to existing standards with electrical, plumbing, heating, ventilating and air conditioning systems to support this special facility. Masonry-reinforced concrete and steel construction will be utilized. Fire protection and smoke detection systems will be included.

The development of the ERTS project requires the acquisition of certain specialized equipment which will be made available from the Research and Development appropriation. New equipment to be procured, totaling approximately $7 million, includes mission control center computer system and related displays and data handling systems.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$2,050,000
Site development	LS	---	$35,000	35,000
Main building addition	Sq. Ft.	45,000	25.00	1,125,000
Plumbing,heating, and air-conditioning systems	Sq. Ft.	45,000	10.00	450,000
Electrical installations	Sq. Ft.	45,000	5.00	225,000
Raised floor	Sq. Ft.	30,000	5.00	150,000
Fire protection system	LS	---	65,000	65,000
Equipment	---	---	---	---
Fallout Shelter (Not Feasible)	---	---	---	None
		TOTAL		$2,050,000

PROJECT JUSTIFICATION:

The Earth Resources Technology Satellite (ERTS) is an earth sensing system which provides a continuous imagery coverage of the U. S. continent land mass and adjacent coastal and oceanic areas under a defined set of conditions. The satellite will be equipped with two multichannel electronic sensors which will continuously relay information to three ground receiving stations. The data received from the ground stations must be processed and provided to scientists while the mission is in progress as a major aspect of determining the optimum application of space technology to resources surveys of water and land mass areas. The effective acquisition and utilization of the large amount of data which will become available from the ERTS project requires the availability of a control center, data processing equipment and facilities for principal investigators, all tied together into an integrated system.

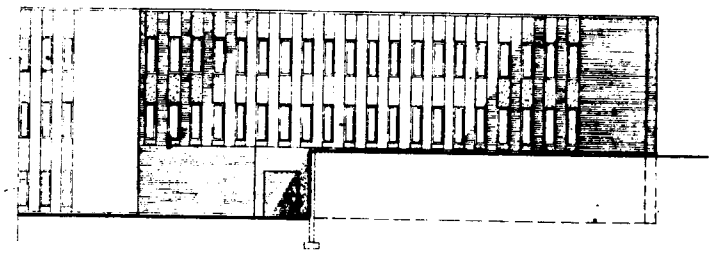
This project will provide the office, laboratory, and special purpose space for the ERTS control center, data processing capability, and house the ERTS project team. Due to the urgency of the need for a control center to support the ERTS-A mission, the Control Center and other related facilities will be housed within the existing third floor of the Goddard Data Interpretation Laboratory, Building 23. This project, through an addition to this same building, will provide the facilities required to permit a proper examination of data as it is received, and to use this

information for operational control of the satellite. In addition, space must be provided for user agency principal investigators who will require real time access to the data while the ERTS satellites are in orbit and to relocate certain data reduction functions displaced by the rearrangement of the third floor, Building 23. ERTS ground equipment will be procured and installed specifically for these missions since it has been established that time sharing of equipment is not feasible with this operational mode.

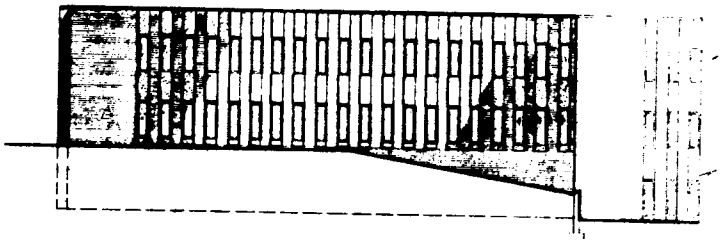
All facilities at GSFC have been examined and alternate solutions explored. The construction of an addition to Building 23 for the purpose outlined was determined to be the most prudent solution. The proposed solution utilizes 26,000 square feet on the third floor of Building 23 and provides for the addition of 45,000 square feet. This total of 71,000 square feet is the minimum now estimated to be required for these important ERTS project activities.

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1971 ESTIMATES

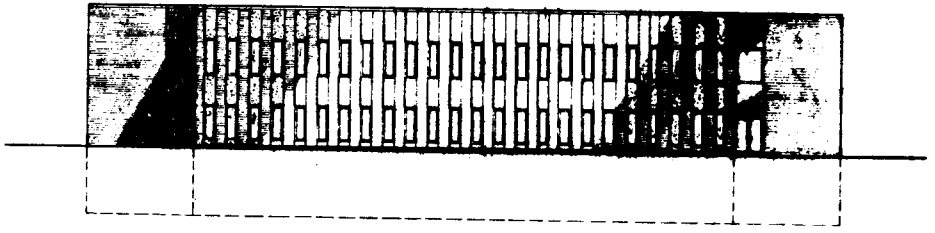
Earth Resources Technology Laboratory



EAST ELEVATION



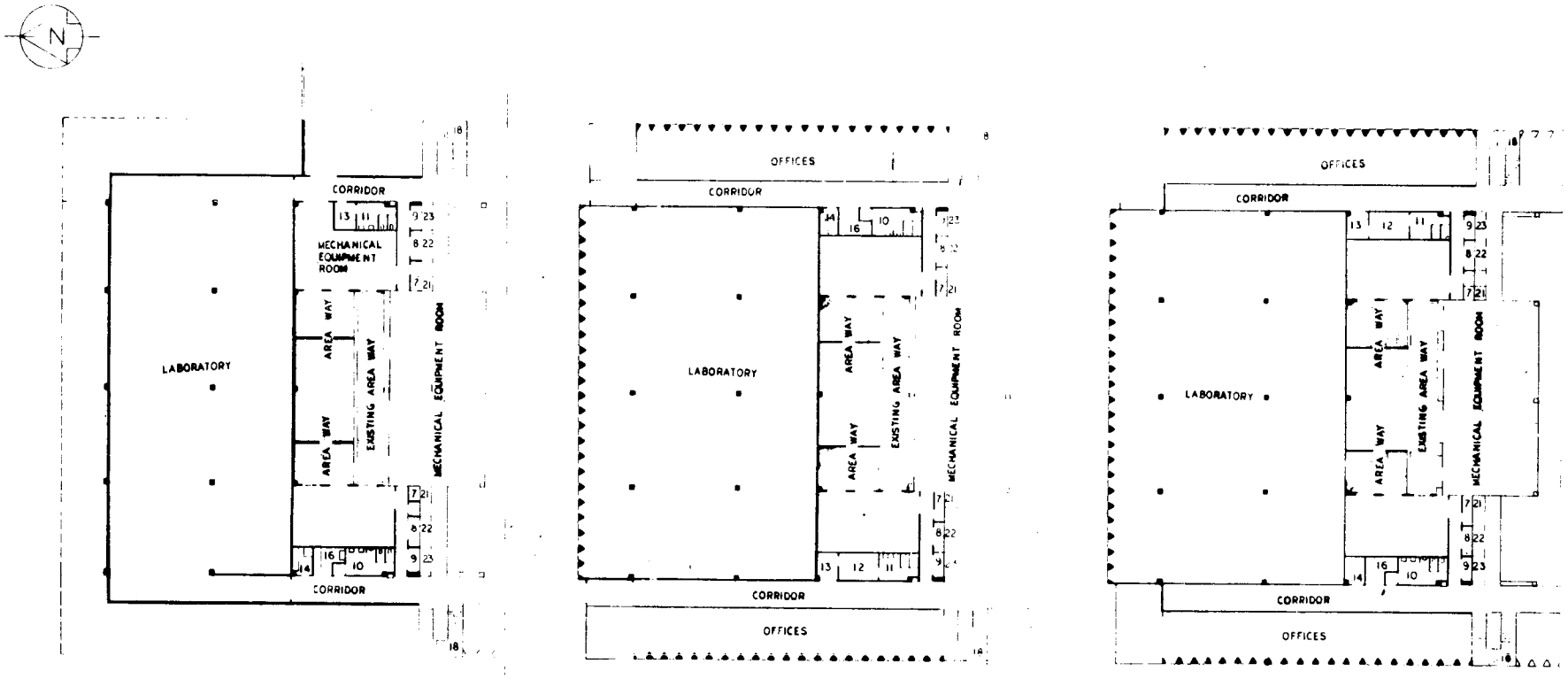
WEST ELEVATION



NORTH ELEVATION

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1971 ESTIMATES

Earth Resources Technology Laboratory



GROUND FLOOR

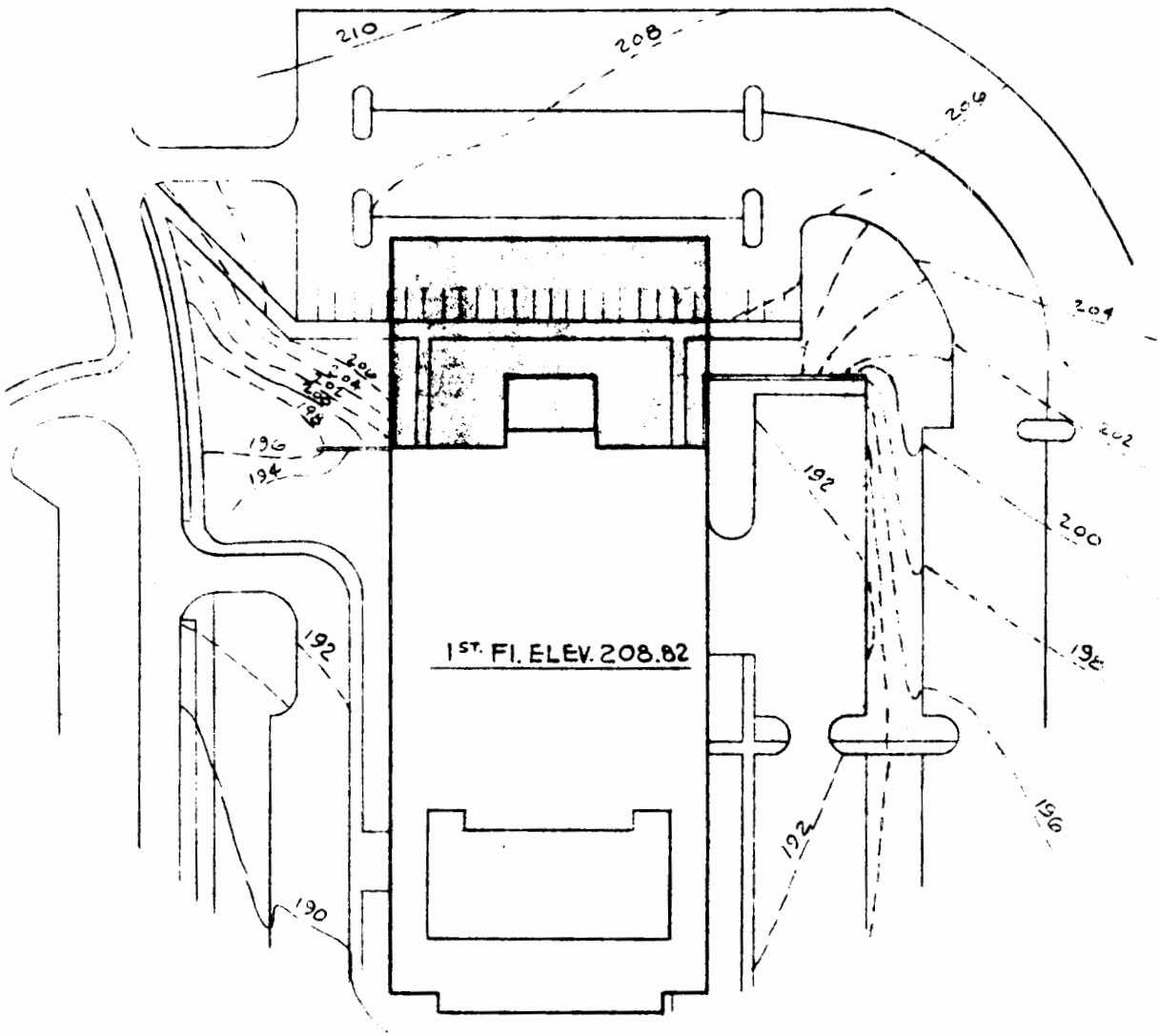
FIRST FLOOR

SECOND FLOOR

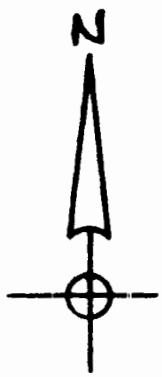
THREE STORY ADDITION

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1971 ESTIMATES

EARTH RESOURCES TECHNOLOGY LABORATORY



BUILDING 23



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

JET PROPULSION LABORATORY

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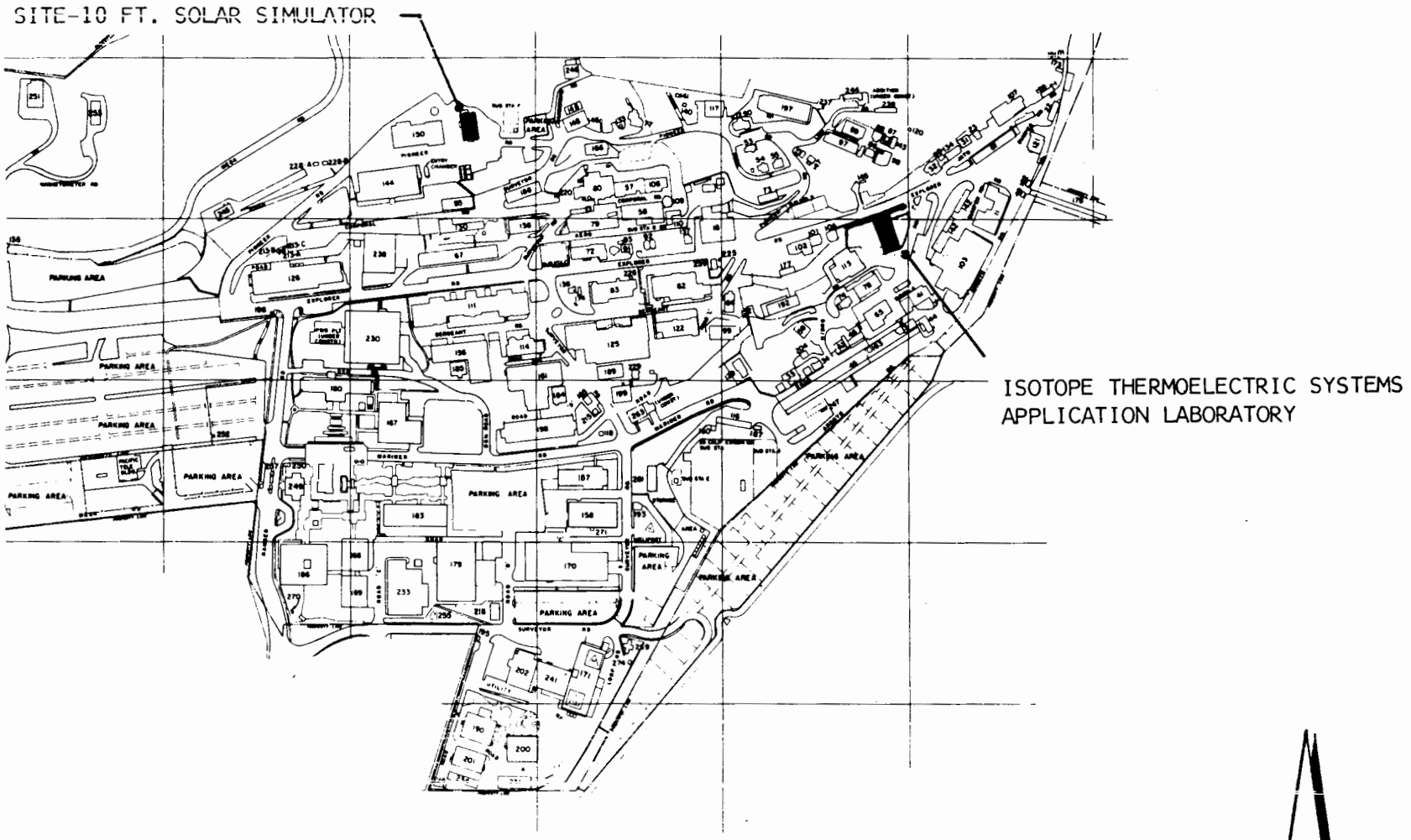
Office of Space Science and Applications Project:	
Solar simulator modifications	CF 3-3
Office of Advanced Research and Technology Project:	
Isotope thermoelectric systems application laboratory	CF 3-7

JET PROPULSION LABORATORY
FISCAL YEAR 1971 ESTIMATES



LOCATION PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 1971 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Solar Simulator Modifications	OSSA	1,721	700		2,421
Isotope Thermoelectric Systems Application Laboratory	OART	60	1,250		1,310
TOTAL			1,950		

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CF 332

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Solar Simulator Modifications

AUTHORIZATION LINE ITEM: Jet Propulsion Laboratory

COGNIZANT PROGRAM OFFICE: Office of Space Science and Applications

COGNIZANT INSTALLATION: Jet Propulsion Laboratory

LOCATION OF PROJECT: Pasadena, Los Angeles County, California

TYPE OF PROJECT: Modification

FUNDING:

FY 1970 and Prior Years	$1,721,480
FY 1971 Estimate	700,000
Total Funding Through FY 1971	$2,421,480
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To provide the capability for simulating solar radiation energy in an existing 10-foot simulator, at intensity levels to be encountered by a spacecraft at a distance from the sun equivalent to the planet Mercury, and to retain the capability for testing at lower intensity levels.

PROJECT DESCRIPTION:

This project provides for replacement of the existing 8-foot diameter, one solar constant beam, with a modified and improved system designed to produce a high quality, well-collimated 6 1/2-foot diameter beam of radiant energy at a maximum intensity of 780 watts per square foot. This maximum intensity level was selected because current mission studies propose an encounter with the planet Mercury at a solar distance of 0.42 astronomical units or greater. Lower intensity will continue to be available at 6 1/2- and 8-foot diameters with existing equipment.

The proposed system will replace the 25 existing 5 Kw arc lamp/reflector/power supply units with 19 new 20 Kw lamp packages, including the necessary starters, console controls, monitoring instrumentation and power wiring. A new optical mixer unit, with its associated cooling system will be installed.

The 10-foot diameter collimating mirror will be provided with an improved temperature control capability. Ultimate performance should be better than ±5% in uniformity with ±2 1/2° collimation.

There are no other concurrent major alterations anticipated to the vessel, shroud or cryogenic control systems, vessel penetration or building structure itself.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction	---	---	---	---
Equipment	---	---	---	$700,000
20 Kw lamps	LS	---	$55,000	55,000
Gimbaled collector assemblies (19)	LS	---	235,000	235,000
Mixer optics	LS	---	40,000	40,000
Mixer structure and installation	LS	---	40,000	40,000
Mirror cooling	LS	---	45,000	45,000
Array truss assembly	LS	---	25,000	25,000
Water cooling systems	LS	---	50,000	50,000
Power supplies and starters	LS	---	150,000	150,000
Power and control wiring	LS	---	60,000	60,000
Fallout Shelter	---	---	---	---
	TOTAL			$700,000

PROJECT JUSTIFICATION:

The thermal control of spacecraft for a Venus/Mercury mission is an extremely difficult and demanding problem. Not only must the spacecraft survive the high solar intensity at Mercury, but it must also adjust to the very large intensity changes from earth orbit (factor of six). The development and verification testing of spacecraft performance and reliability under these simulated solar flux conditions is essential for maximum confidence in overall mission success. Thermal control techniques do not at present permit reliable extrapolation of existing

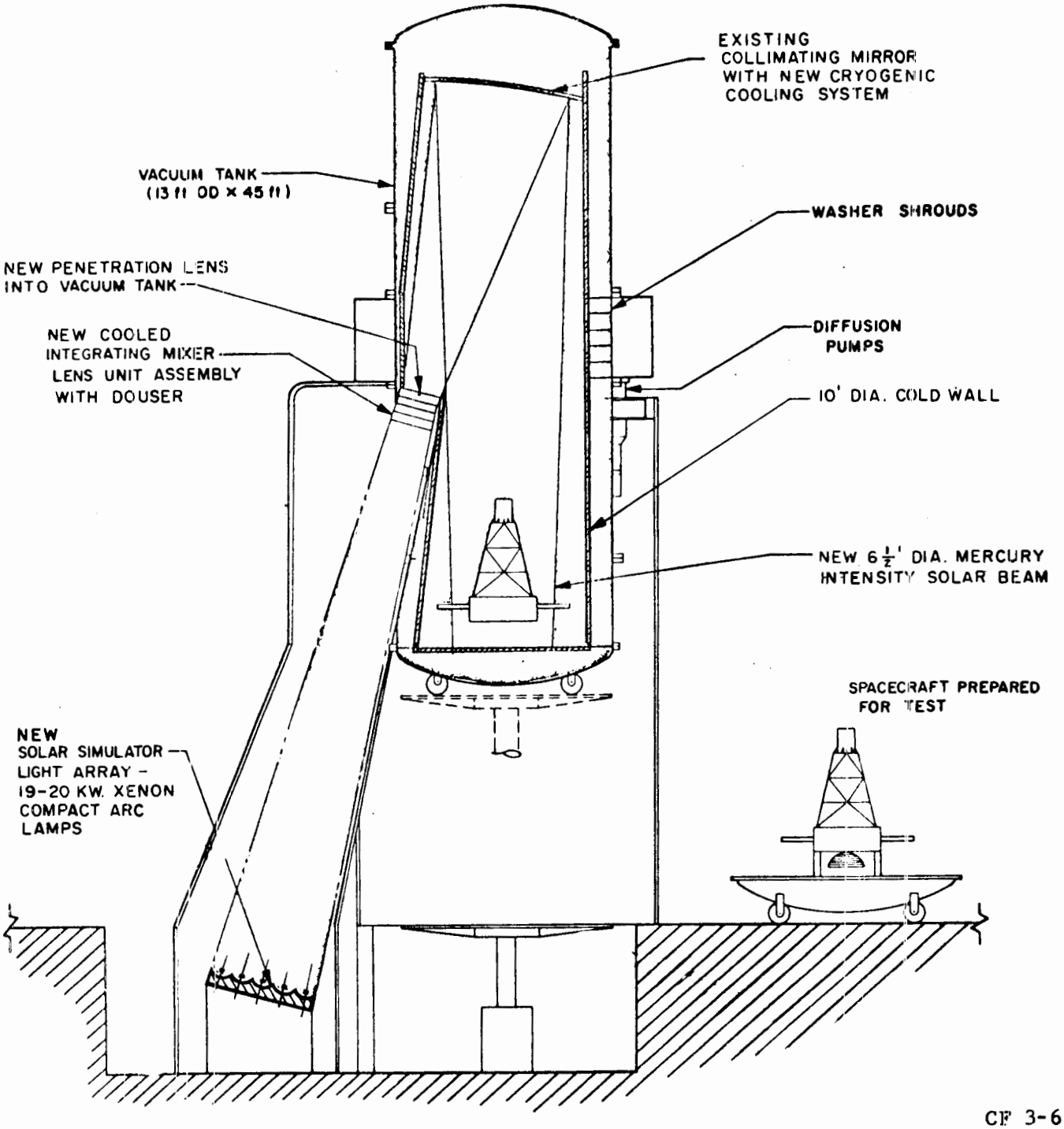
experience to 780 watts per square foot of solar energy. We believe that the only reasonable solution is to minimize the reliability risks by adequate testing under simulated flux equivalent to that expected to be encountered in space.

The value of simulator testing was fully established during a previous Venus mission where space simulator tests carried out at intensities somewhat greater than one solar constant indicated the need for changes in the thermal control system. However, any attempt to extrapolate from this level of thermal control data to the high levels existing at Mercury radically increases the probability of a serious or catastrophic failure. The proposed modifications will provide the testing capability which will minimize the possibility of failure at a relatively modest cost.

The capability of testing spacecraft at Mercury solar intensity levels does not currently exist in the United States. Because of the technical characteristics of the presently installed optical system, the modifications proposed represent the most economical and timely approach to achieve most of this capability.

Because of the lead time associated with the required optical element procurements and the relatively long fabrication times, this project must be funded in FY 1971 so that it will support a 1973 mission.

JET PROPULSION LABORATORY
FISCAL YEAR 1971 ESTIMATE
MODIFICATIONS TO THE 10 FOOT SOLAR SIMULATOR
(MERCURY INTENSITY CAPACITY)



CF 3-6

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Isotope Thermoelectric Systems Application Laboratory

AUTHORIZATION LINE ITEM: Jet Propulsion Laboratory

COGNIZANT PROGRAM OFFICE: Office of Advanced Research and Technology

COGNIZANT INSTALLATION: Jet Propulsion Laboratory

LOCATION OF PROJECT: Pasadena, Los Angeles County, California

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	$60,000
FY 1971 Estimate	1,250,000
Total Funding Through FY 1971	$1,310,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To provide radiologically secure laboratory facilities for the testing, evaluation, and storage of nuclear fueled thermoelectric elements and devices for spacecraft on-board power systems.

PROJECT DESCRIPITON:

This project provides for the construction of a research laboratory building especially designed for the testing and application of devices utilizing nuclear fuels for the next generation of on-board spacecraft power, and for the testing and qualification of radioisotope fueled thermoelectric generators (RTG) as auxiliary power sources. This facility will provide approximately 17,600 gross square feet of floor space including three "warm cells" (one 40' cell and two 20' cells). The high bay isolation rooms will be available for radiation mapping, spectrum, interference and cumulative dosage studies. Space will also be available for long duration performance evaluations of nuclear fueled RTG assemblies and electrically heated single generator units. A central laboratory stores area will be provided so existing security and radiological requirements of all control agencies may be accommodated.

A minimum amount of space will be made available for necessary administrative, safety, operations, data processing and office functions to create an efficient and functional laboratory complex. Existing equipment is available to meet the initial needs of this new facility.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$1,250,000
Site development	LS	---	$55,000	55,000
Utilities	LS	---	60,000	60,000
Building	Sq. Ft.	17,600	64.50	1,135,000
Equipment	---	---	---	---
Fallout Shelter	---	---	---	---
		TOTAL		$1,250,000

PROJECT JUSTIFICATION:

Future space missions will be of such long duration and will travel so far from the sun that electric power systems depending on the sun's energy cannot produce sufficient dependable power with a long enough lifetime to operate the spacecraft experiments, electronics and communications. Therefore, future space missions need a unique power supply independent of the sun. The currently available power systems are not able to support long duration missions such as the "grand tour", the outer planet explorers, and the "out of the ecliptic missions" which are now under definition. To solve some of the problems to be faced in these long duration missions; NASA has established a research project titled Thermoelectric Outer Planet Spacecraft (TOPS) to develop and design the critical components and constituents of the spacecrafts which will fly these long duration missions. Part of the TOPS project includes the design and development of radioisotope fueled thermoelectric generators (RTG). These multi-hundred watt RTG units are being developed by the AEC. The RTG units are scheduled for delivery to JPL early in calendar year 1972. The laboratory facility provided by this project is needed to receive, store, test, and work with the RTG units. Without this laboratory facility at JPL, NASA cannot proceed with the Spacecraft/RTG system integration work. Extensive ground tests and evaluation must be carried out in this facility in order to develop an 8 to 12 year life isotope power supply which does not create harmful effects on the spacecraft, its equipment or experiments.

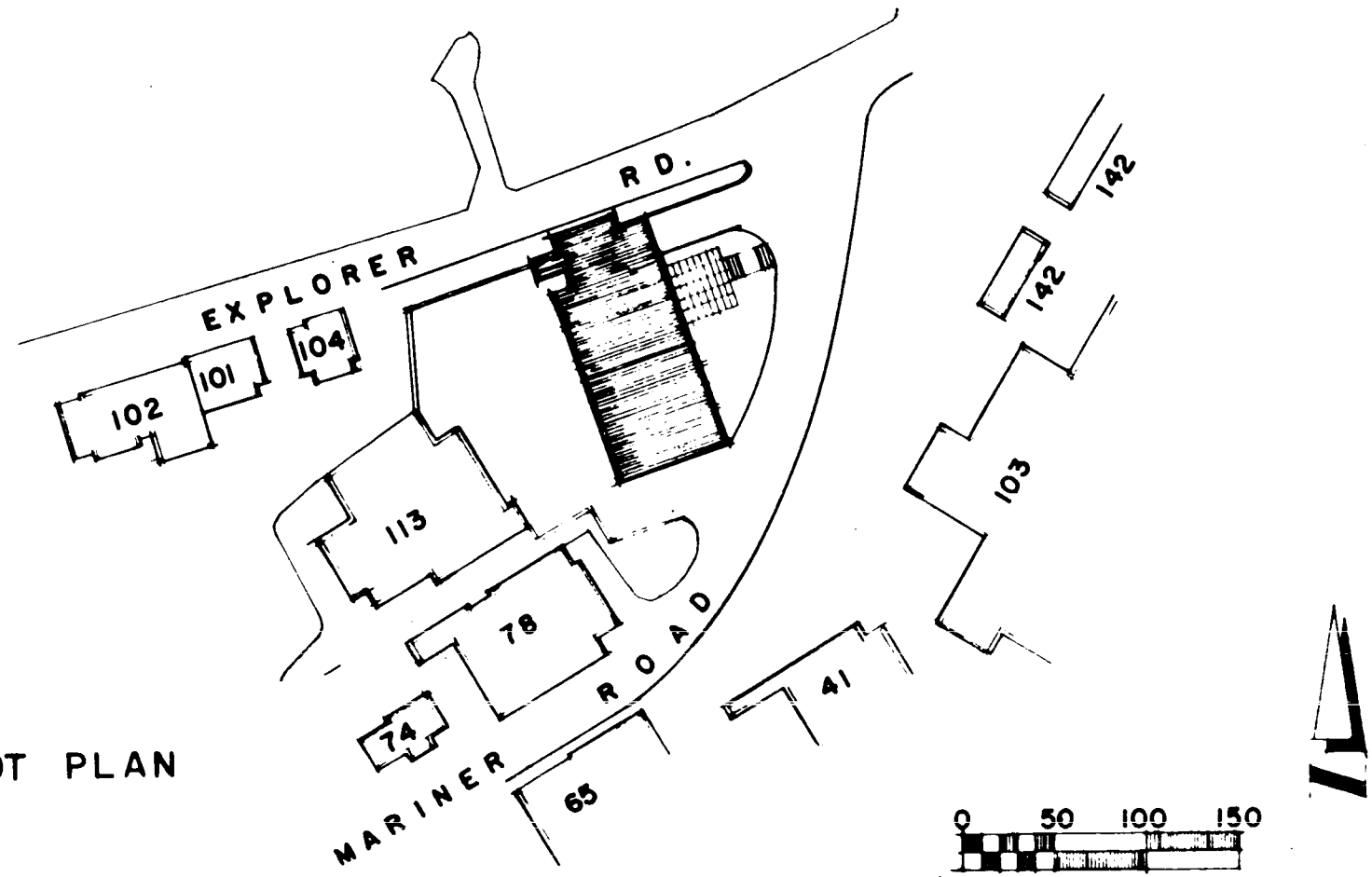
The problem of utilizing RTG power sources in the presence of sensitive scientific instrumentation is also complicated by the fact that the fuel capsules contain minute quantities of impurities in the fuel compounds that cannot be removed. These impurities contribute significantly to the total radiation pattern of the unit, both as to the type of elementary particle and the energy level. In order to develop scientific instrument packages which give reliable, accurate data, it is required that they be thoroughly tested and calibrated in conjunction with the actual fueled capsules which will power the flight spacecraft.

From the work to be carried out in this facility, NASA will be able to resolve technological problems involving reliable prediction of performance and useful life, the handling and control of radiation, and the successful integration of the spacecraft equipment, power supply and experiments.

The proposed laboratory facility will create a new and indispensable capability needed to develop and evaluate secondary power systems and to provide state-of-the-art data regarding spacecraft systems and integration problems for all classes of advanced spacecraft.

JET PROPULSION LABORATORY
FISCAL YEAR 1971 ESTIMATES

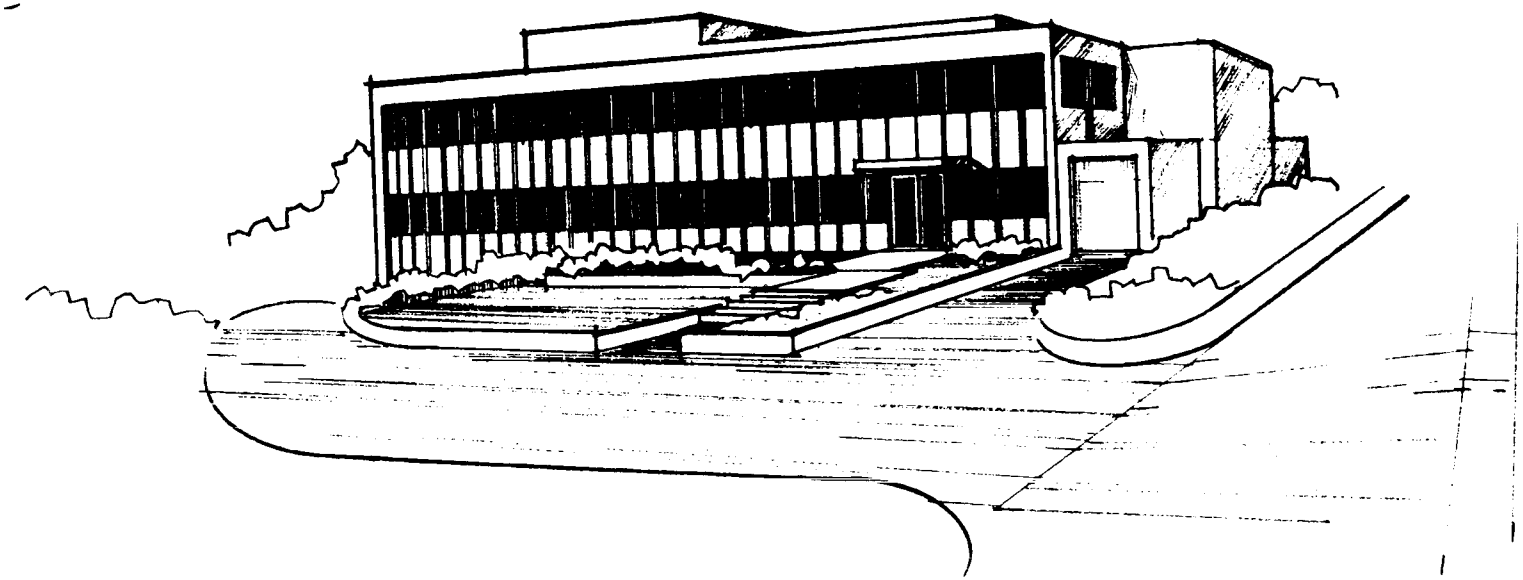
ISOTOPE THERMOELECTRIC SYSTEMS
APPLICATION LABORATORY



PLOT PLAN

JET PROPULSION LABORATORY
FISCAL YEAR 1971 ESTIMATES

ISOTOPE THERMOELECTRIC SYSTEMS APPLICATION LABORATORY

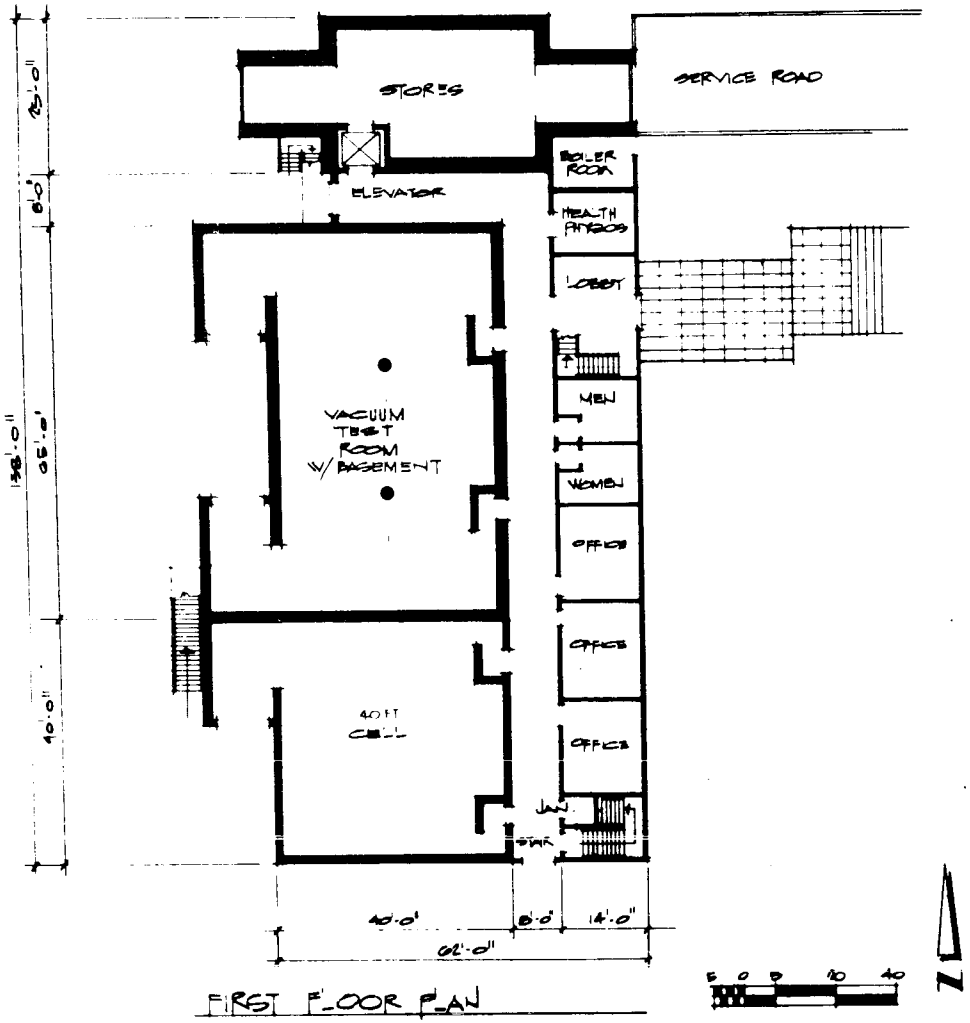


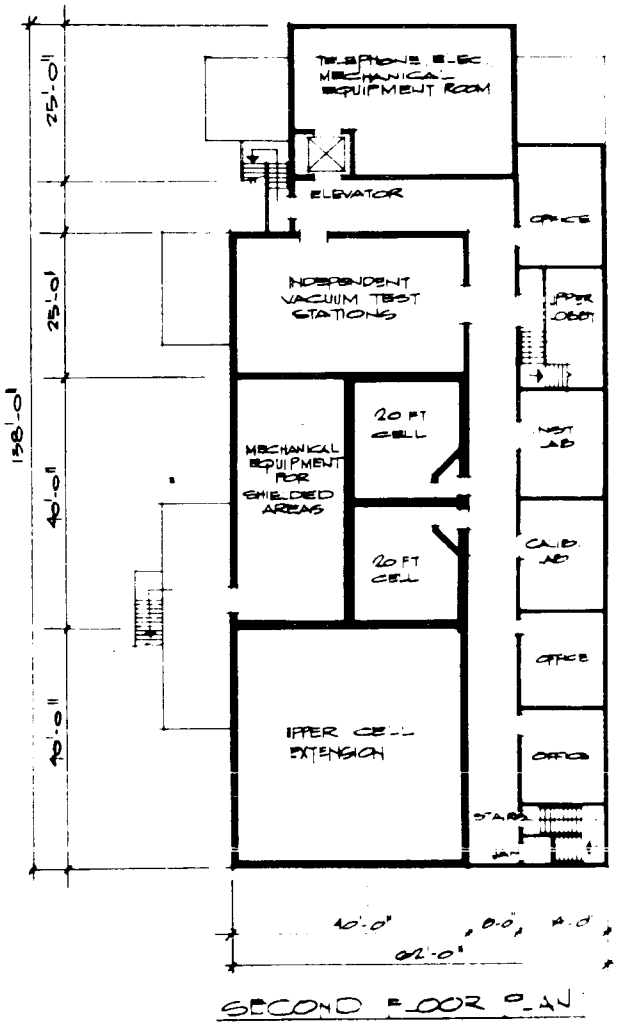
JET PROPULSION LABORATORY

FISCAL YEAR 1971 ESTIMATES

ISOTOPE THERMOELECTRIC SYSTEMS

APPLICATION LABORATORY





NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

JOHN F. KENNEDY SPACE CENTER, NASA

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Summary	CF 4-3
Office of Manned Space Flight Project:	
Launch support facilities	CF 4-4

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

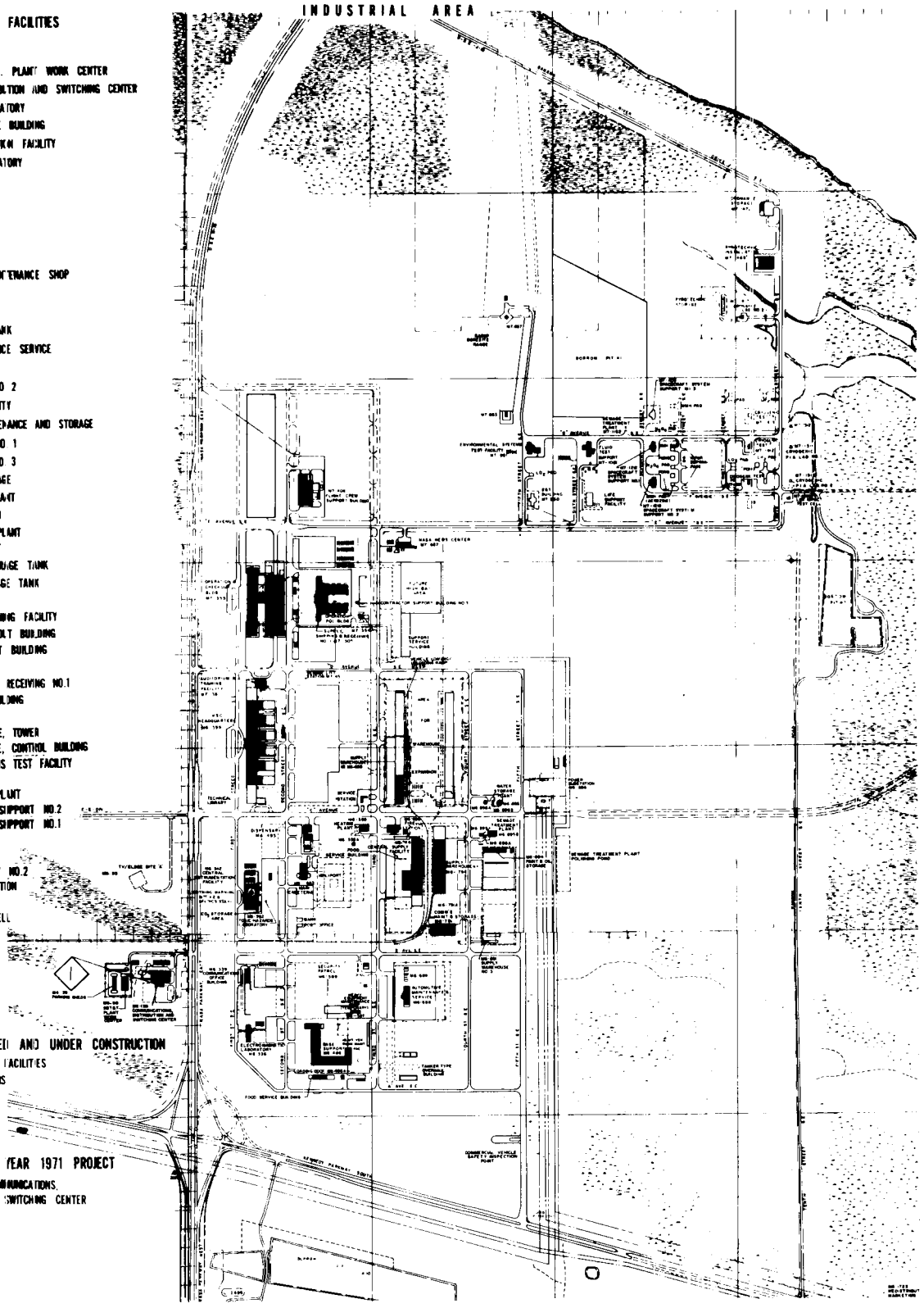
LOCATION PLAN

INDUSTRIAL AREA

LEGEND

EXISTING FACILITIES

M6-38	PARKING SHEDS
M6-60	SOUTHERN BELL T. & T. PLANT WORK CENTER
M6-138	COMMUNICATIONS, DISTRIBUTION AND SWITCHING CENTER
M6-336	ELECTROMAGNETIC LABORATORY
M6-339	COMMUNICATIONS OFFICE BUILDING
M6-342	CENTRAL INSTRUMENTATION FACILITY
M6-392	TOXIC HAZARDS LABORATORY
M6-399	K S C HEADQUARTERS
M6-486	BASE SUPPORT
M6-486A	LOADING DOCK
M6-493	MAIN CAFETERIA
M6-495	DISPENSARY
M6-587	HEAVY EQUIPMENT MAINTENANCE SHOP
M6-589	SECURITY PATROL
M6-595	HEATING PLANT
M6-595A	FUEL OIL STORAGE TANK
M6-688	AUTOMOTIVE MAINTENANCE SERVICE
M6-695	FIRE STATION
M6-698	SUPPLY WAREHOUSE NO 2
M6-744	CENTRAL SUPPLY FACILITY
M6-791	COMMUNICATIONS MAINTENANCE AND STORAGE
M6-794	SUPPLY WAREHOUSE NO 1
M6-891	SUPPLY WAREHOUSE NO 3
M6-894	PAINT AND OIL STORAGE
M6-895	SEWAGE TREATMENT PLANT
M6-895A	SEWAGE LIFT STATION
M6-895B	SEWAGE TREATMENT PLANT
M6-896	WATER STORAGE PLANT
M6-896A	ELEVATED WATER STORAGE TANK
M6-896B	GROUND WATER STORAGE TANK
M6-996	POWER SUBSTATION
M7-351	AUDITORIUM AND TRAINING FACILITY
M7-355	OPERATION AND CHECKOUT BUILDING
M7-409	FLIGHT CREW SUPPORT BUILDING
M7-451	SEWAGE LIFT STATION
M7-505	SUPPLY, SHIPPING AND RECEIVING NO.1
M7-554	OPERATIONS P O L BUILDING
M7-657	NASA NEWS CENTER
M7-863	RADAR BORESITE RANGE, TOWER
M7-867	RADAR BORESITE RANGE, CONTROL BUILDING
M7-961	ENVIRONMENTAL SYSTEMS TEST FACILITY
M7-1061	FLUID TEST SUPPORT
M7-1162	SEWAGE TREATMENT PLANT
M7-1210	SPACECRAFT SYSTEM SUPPORT NO.2
M7-1212	SPACECRAFT SYSTEM SUPPORT NO.1
M7-1410	CRYOGENIC TEST NO.2
M7-1412	CRYOGENIC TEST NO.1
M7-1417	ORDNANCE LABORATORY NO.2
M7-1469	PYROTECHNIC INSTALLATION
M7-1472	ORDNANCE STORAGE
M7-1509	LOX IMPACT TEST CELL



☐ FACILITIES AUTHORIZED AND UNDER CONSTRUCTION
1. MANNED SPACECRAFT FACILITIES
2. UTILITY INSTALLATIONS

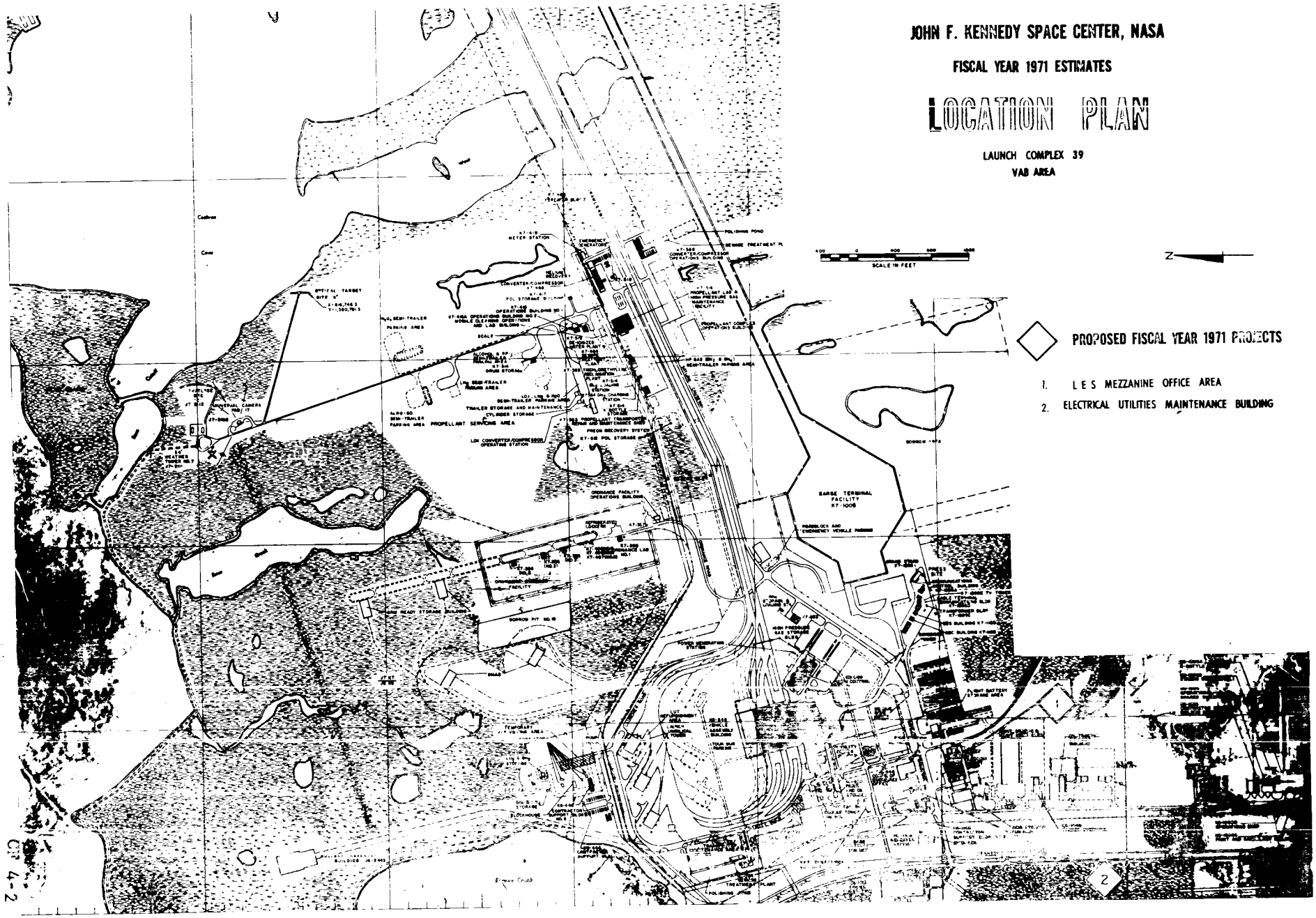
◇ PROPOSED FISCAL YEAR 1971 PROJECT
1. ADDITION TO COMMUNICATIONS, DISTRIBUTION AND SWITCHING CENTER

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LOCATION PLAN

LAUNCH COMPLEX 39
VAB AREA



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION	COGNIZANT PROGRAM OFFICE FOR INSTALLATION
John F. Kennedy Space Center, NASA	Manned Space Flight

LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
Cape Kennedy and Merritt Island	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 and Western Test Ranges, and Merritt Island, and provides support services for all NASA elements located in the area.

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 71 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Launch Support Facilities	MSF	33	575		608
TOTAL			575		

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Launch Support Facilities

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

COGNIZANT PROGRAM OFFICE: Office of Manned Space Flight

COGNIZANT INSTALLATION: John F. Kennedy Space Center, NASA

LOCATION OF PROJECT: Merritt Island, Brevard County, Florida

TYPE OF PROJECT: New Construction, Alterations, and Addition

FUNDING:

FY 1970 and Prior Years	$33,000
FY 1971 Estimate	575,000
Total Funding Through FY 1971	$608,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To provide: (1) a 3,700 square foot facility to house the electrical utilities maintenance and operations personnel, (2) alteration of 2,870 square feet of existing space to house personnel managing the modifications and repair of launch equipment and, (3) a 5,500 square foot addition to the Communications Distribution and Switching Center to adequately house personnel directly supporting Center communications and instrumentation systems operations, and to modify the existing structure to enhance utilization and personnel safety. All of these are in support of launch operations.

PROJECT DESCRIPTION:

Electrical Utilities Maintenance Building - This sub-project is for the construction of a single story office-type building containing approximately 3,700 square feet. The building will be heated and air conditioned. Necessary sitework and utilities are included. The facility will be located at Saturn Causeway and Contractor Road in the general vicinity of the Vehicle Assembly Building.

Launch Equipment Shop Office Area - This sub-project provides for the conversion of 2,870 square feet of mezzanine space in the Launch Equipment Shop from an open and unfinished condition into fully useable support space.

The work will include the installation of floor surfacing, insulated suspended ceiling, and painted gypsum board walls, suitable lighting and air conditioning, and will include the replacement of an access stairway.

Communications Distribution and Switching Center - This sub-project provides for the construction of a single story 5,500 square foot addition to the Communications Distribution and Switching Center. The addition will be a reinforced concrete frame structure with masonry block walls. All necessary site preparation, paving and utilities are included in this project.

Included also are modifications to the air conditioning systems of the existing building. Existing systems consist of one chilled water system and four direct expansion units. The direct expansion units will be replaced with a chilled water unit which will be connected to the existing chilled water system. This will provide a single more effective and economical air conditioning system for the entire building. Modifications to the interior of the existing structure in the form of partition and equipment rearrangement will also be necessary to provide safe access between work areas.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$575,000
Electrical utilities maintenance building:				170,000
Building construction	Sq. Ft.	3,700	$31.00	(114,700)
Site preparation	LS	---	19,000	(19,000)
Water	LS	---	3,300	(3,300)
Sewer	LS	---	2,500	(2,500)
Exterior electrical	LS	---	24,000	(24,000)
Parking	Sq. Yd.	1,000	6.50	(6,500)
Launch equipment shop office area:				52,000
Modification work	Sq. Ft.	2,870	18.12	(52,000)

	Unit of Measure	Quantity	Unit Cost	Total Cost
Communications distribution and switching center:				$353,000
Addition	Sq. Ft.	5,500	$32.55	179,000
Arch/structural	Sq. Ft.	5,500	(18.73)	(103,000)
Mechanical	Sq. Ft.	5,500	(4.91)	(27,000)
Electrical	Sq. Ft.	5,500	(7.46)	(41,000)
Fire protection	Sq. Ft.	5,500	(1.45)	(8,000)
Modifications to existing building	LS	---	63,000	63,000
Site preparation	LS	---	13,000	13,000
Exterior electrical	LS	---	72,000	72,000
Parking and drainage	LS	---	26,000	26,000
Equipment	---	---	---	---
Fallout Shelter	---	---	---	---
	TOTAL			$575,000

PROJECT JUSTIFICATION:

This project is required to provide suitable and adequate space to house some 125 personnel accomplishing permanent and essential operations at these specific locations. These personnel are currently situated in 15 deteriorating trailers and 1,330 square feet of other substandard space at these three locations and require permanent adequate housing in these areas.

Electrical Utilities Maintenance Building - This building will provide space for approximately 30 engineering, supervisory and other personnel who support the operation and maintenance of the Launch Complex 39 electrical distribution system.

These personnel perform a continuing, permanent, and vital function, but are presently housed in two trailers and a substandard building located at Launch Complex 39. The substandard facility is a construction "shack" built in 1963 for use by an early construction contractor. It is substandard since it does not provide adequate environmental control, lighting, sanitary facilities or proper office space to house this important function.

Launch Equipment Shop Office Area - This alteration work will provide adequate permanent office space to house some 45 personnel now occupying 6 trailers located adjacent to the Launch Equipment Shop. These personnel support the modification and repair of launch support equipment, including such items as tail service masts and hold down arms. This function is essential to launch operations and must be accommodated in adequate and nearby space.

Communications Distribution and Switching Center - This addition and alteration work is necessary to adequately house some fifty personnel now accommodated in seven trailers located immediately adjacent to and east of the existing Communications Distribution and Switching Center. In addition, alterations to the existing facility are required to provide adequate and safe personnel circulation areas, and an efficient and economical air conditioning system.

General - All three sub-projects above involve the replacement of trailers with more appropriate facilities. This not only reflects the fact that these are permanent continuing functions but in addition they are functions which must be carried out in the given areas involved.

With regard to trailers, experience has shown that the operating and maintenance costs for trailers are significantly higher than for permanent office space. In addition, productivity of personnel is greatly reduced because of the need to conduct business between scattered trailers serving the same function. The problem is compounded during inclement weather, since sanitary facilities are not available in trailers, and employees must travel outdoors to the nearest permanent facility.

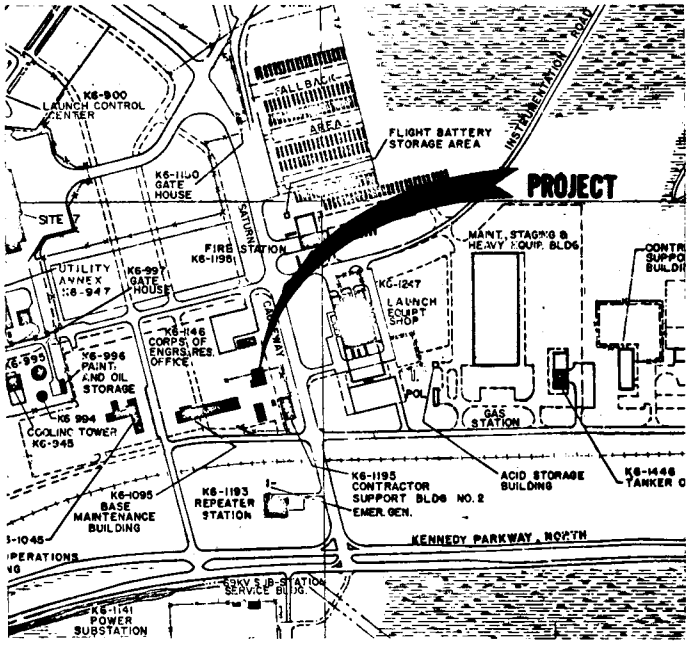
Kennedy Space Center has a large number of trailers in use. Many of these will be eight years old or older by the end of Fiscal Year 1971. Since the normal useful life of a trailer in this area is eight years, replacement will be essential in the very near future. Since launch support activities are a continuing and important function, the trailers must be replaced by permanent facilities for effective and more economical operation.

JOHN F. KENNEDY SPACE CENTER, NASA

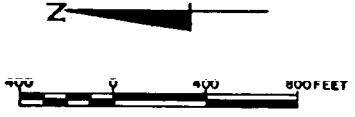
FISCAL YEAR 1971 ESTIMATES

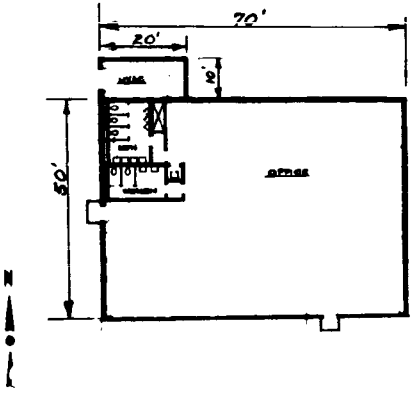
LAUNCH SUPPORT FACILITIES

ELECTRICAL UTILITIES MAINTENANCE BUILDING

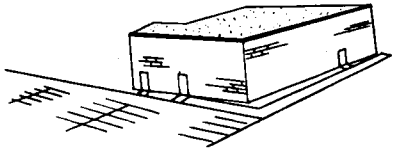


PLOT PLAN





FLOOR PLAN



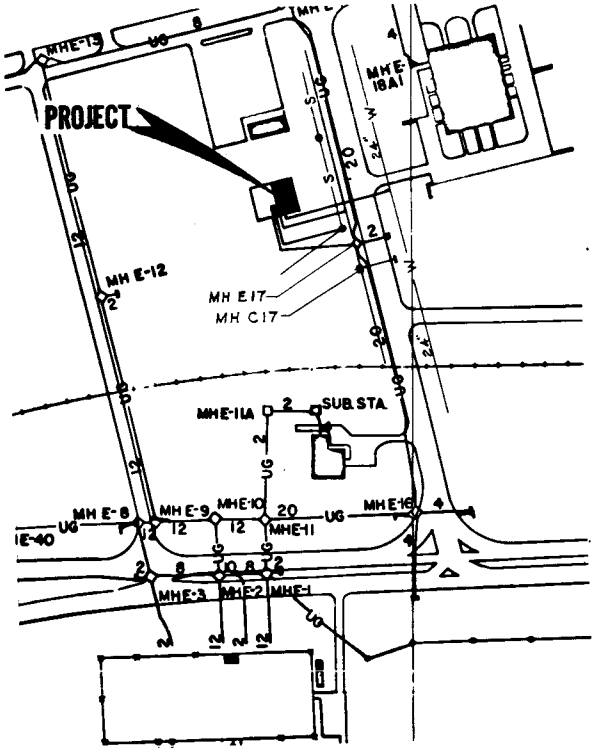
PERSPECTIVE

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

ELECTRICAL UTILITIES MAINTENANCE BUILDING



SITE UTILITIES PLAN

200 0 200 400 600

SCALE IN FEET

N

LEGEND

EXISTING		PROGRAM
—•—S—	SEWAGE	—•—S—
—•—HW—	HIGH TEMP HOT WATER	—•—HW—
—•—W—	WATER	—•—W—
—◆—	ELECTRICAL (UNDER GROUND)	—◆—
—•—•—	ELECTRICAL (OVER HEAD)	—•—•—
10W4 6C	COMMUNICATIONS (U/G DUCT)	10W4 6C

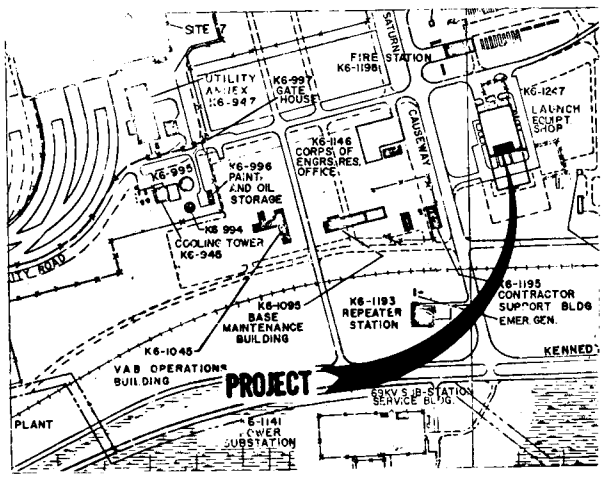
NO EXTERIOR HIGH TEMP HOT WATER REQUIRED

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

LES MEZZANINE OFFICE AREA

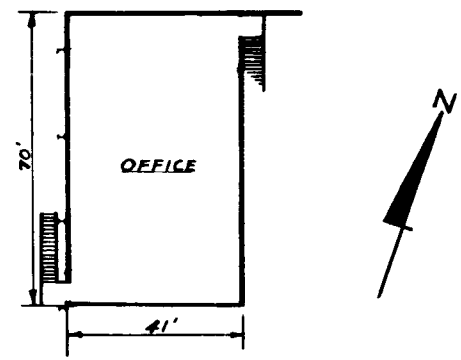


PLOT PLAN

NO EXTERIOR UTILITIES

400 0 400 800 FEET

N



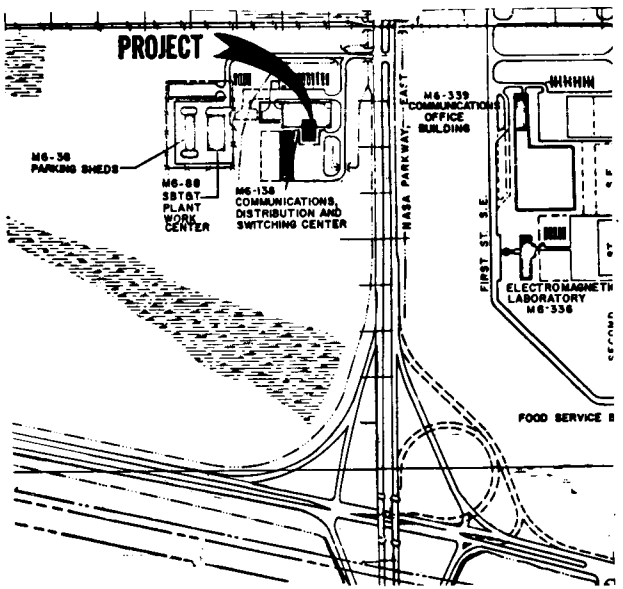
FLOOR PLAN

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

ADDITION TO COMMUNICATIONS, DISTRIBUTION AND SWITCHING CENTER

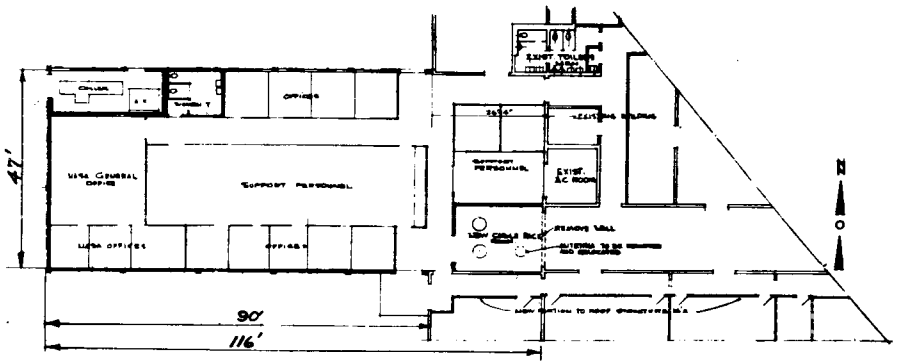


PLOT PLAN

400 0 400 800 FEET

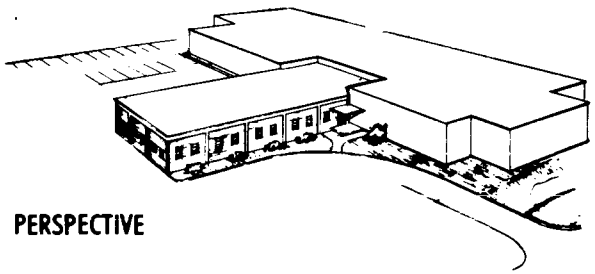
NO EXTERIOR UTILITIES

N



FLOOR PLAN

0 10 20 30 40 50 60 FEET



PERSPECTIVE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

MANNED SPACECRAFT CENTER

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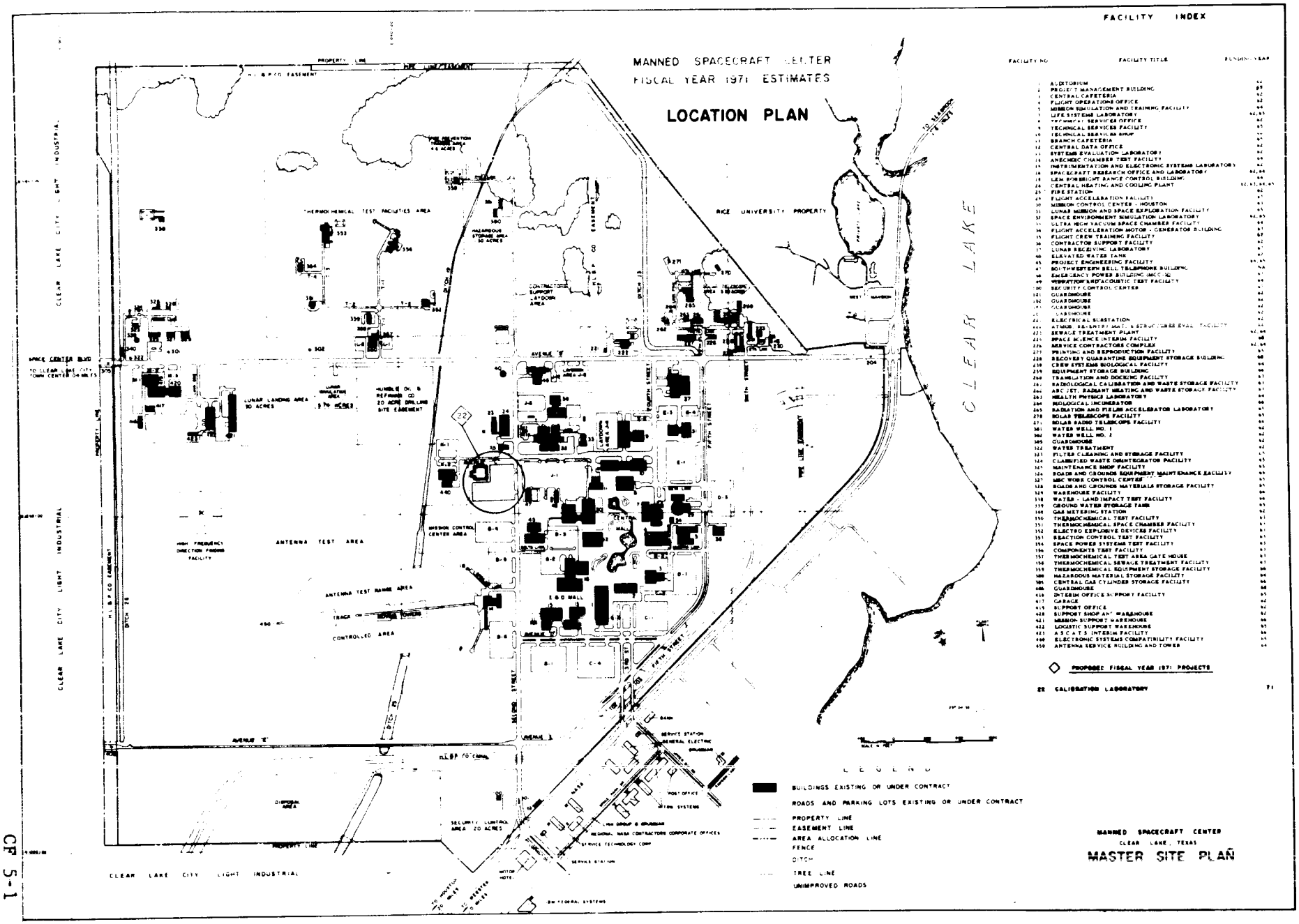
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MISSION CONTROL CENTER AREA
CONTROLLED AREA
SECURITY CONTROL AREA 20 ACRES
CLEAR LAKE CITY LIGHT INDUSTRIAL
SPACE CENTER BLVD
AVENUE "E"
FIFTH STREET
FOURTH STREET
SIXTH STREET
E & D MALL
CENTRAL MALL
H.L.&P. CO. CANAL
H.L.&P. CO. EASEMENT
PROPERTY LINE
DITCH 26
DISPOSAL AREA
SERVICE STATION
GENERAL ELECTRIC
POST OFFICE
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

The Manned Spacecraft Center has as its primary mission the development of spacecraft for Manned Space Flight programs. The Center is also responsible for Manned Space Flight operations, conduct of astronaut training, and earth resources aircraft project.

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 71 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Calibration Laboratory	MSF	60	900		960
TOTAL			900		

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NASA-HQ

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Calibration Laboratory

AUTHORIZATION LINE ITEM: Manned Spacecraft Center

COGNIZANT PROGRAM OFFICE: Office of Manned Space Flight

COGNIZANT INSTALLATION: Manned Spacecraft Center

LOCATION OF PROJECT: Houston, Harris County, Texas

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	$60,000
FY 1971 Estimate	900,000
Total Funding Through FY 1971	$960,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To provide environmentally-controlled facility to adequately house some 100 personnel and associated equipment involved in the standardization and calibration of measuring instruments used by the development and test laboratories, shops, biological and medical activities and quality assurance activities at the Manned Spacecraft Center.

PROJECT DESCRIPTION:

This project provides for the construction of a 22,000 square foot environmentally-controlled Calibration Laboratory Facility. The building will be a steel frame structure with metal siding matching other laboratory buildings in the general area. Existing equipment will be relocated to the new facility. Major laboratories to be included in this facility are:

Electrical-Electronic Reference Standards for maintaining secondary electrical-electronic standards and working instrumentation in a dust free, vibration controlled and electrically shielded room with close environmental control tolerance of 73°F ± 1°F and relative humidity of 40% ± 10%.

Physical Science Reference Standards for maintaining primary standards for calibration of secondary standards in a closely controlled environment of 68°F ± 1/2°F temperature, and relative humidity of 40% ± 10%. This laboratory will also be dust free and vibration isolated.

Electrical-Electronic Calibration Laboratory to calibrate instruments used in measuring current, voltage, power, resistance, capacitance, inductance, frequency, and phase.

Physical Sciences Equipment Calibration Laboratory to calibrate instrumentation used in measuring dimensions, mass, temperature, force, torque, pressure, vibration, angles, liquid and gaseous flow, vacuum, humidity, acoustics, illumination, radiation and others.

Analytical Laboratory for quantitative and qualitative analysis of materials from the lightest gases through the heaviest metals, for purity and contamination content, and determination of partial contaminants.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$900,000
Building	Sq. Ft.	22,000	$38.00	836,000
Site preparation	LS	---	32,500	32,500
Utilities	LS	---	31,500	31,500
Equipment	---	---	---	---
Fallout Shelter	---	---	---	---
		TOTAL		$900,000

PROJECT JUSTIFICATION:

The Calibration Laboratory is required to house locally needed reference standards originating with the National Bureau of Standards. This is necessary in order to standardize all measuring instruments and devices used at the Center. The proposed facility will also house calibration

laboratories necessary to insure the reliability and accuracy of measurements for electrical, electronic, physical, mechanical, biological and medical activities.

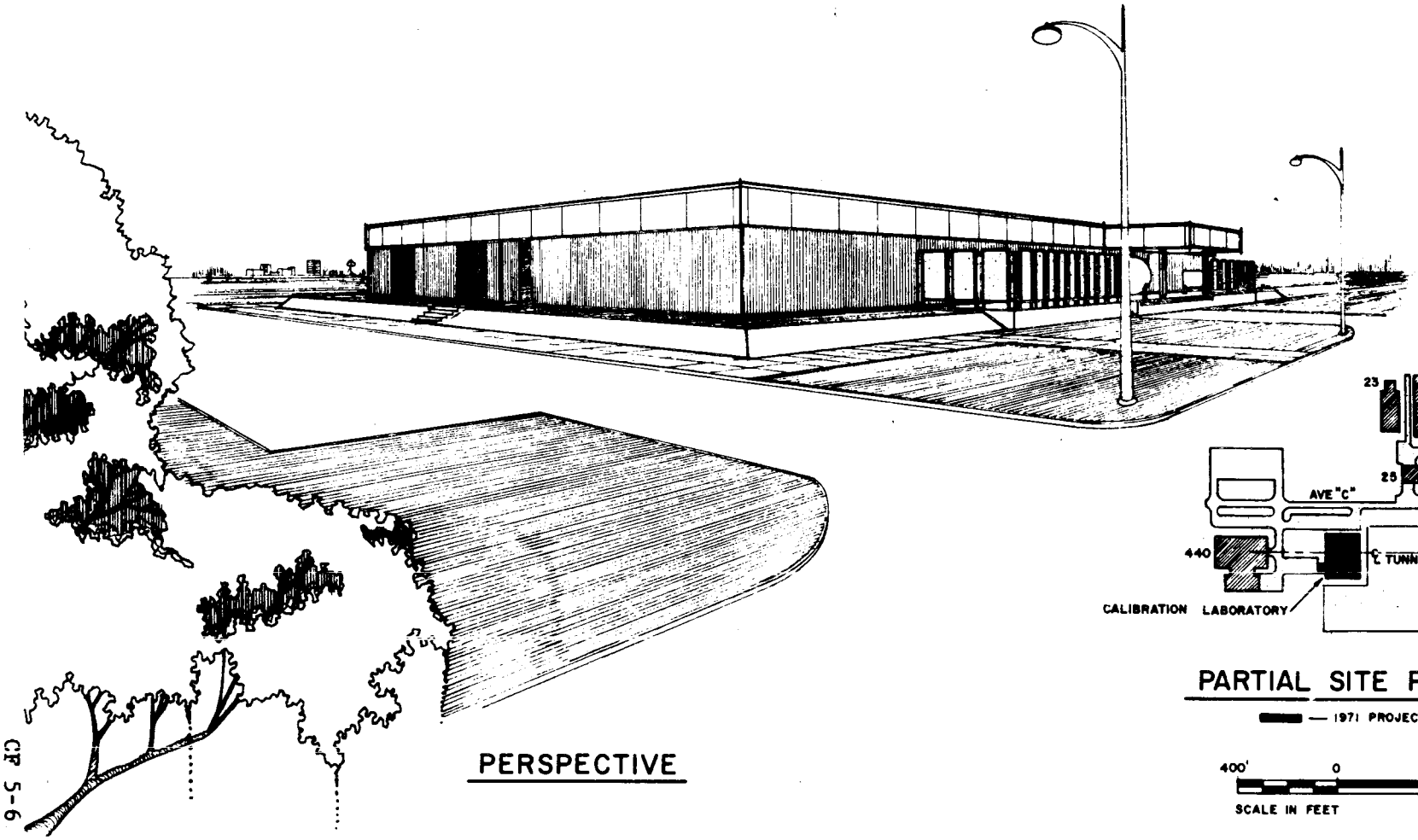
Calibration activities are currently carried out in sixteen scattered areas in the high bay and mezzanine area of the Instrumentation and Electronic Systems Laboratory Building and two other buildings, one of which is located at Ellington Air Force Base. These facilities are either substandard, overcrowded or lack the proper temperature and humidity controls and generally do not provide adequately stable platforms and other essential features needed for the work to be performed. The high bay area is also used as an Environment Test Area. Several of the calibration activities are located adjacent to "shake tables", located in the Environmental Test Area. When this equipment is in use vibrations are sufficiently severe to require all calibration efforts to cease at frequent and unpredictable intervals. In addition to vibrations from the "shake tables", which interrupt all calibration efforts, the opening of the high bay door results in sudden temperature changes and creates air turbulence throughout the laboratory area which can result in calibration errors. Calibration activities are also interrupted during the operation of an open cage makeshift elevator to the mezzanine and an overhead 10 ton crane. Under normal working conditions, the vibration of the building can be observed through oscillation of mercury or other liquids contained in beakers or equipment gauges located throughout the laboratories.

The Instrumentation and Electronic Systems Laboratory Building was designed and is used principally for the development and testing of spacecraft electrical systems and subsystems. Approximately 300 persons including those involved with calibration activities, are occupying the approximately 46,000 square feet of space in this building which was designed for 175 persons. The situation is such that calibration of instruments must be conducted in hallways, aisles and other totally unsuitable areas. Items to be calibrated cannot be properly cleaned because there is no adjacent area available for cleaning equipment and solvents.

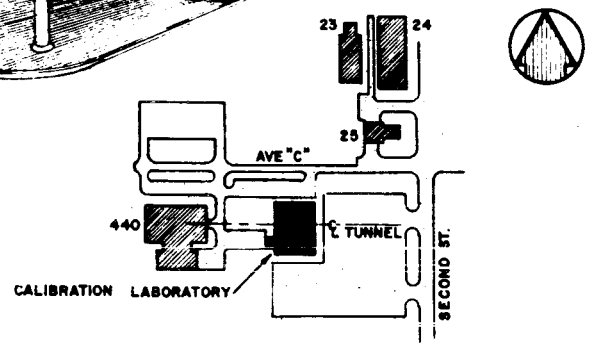
In view of the significance and importance of instrument calibration to space programs, a facility which is designed and constructed to specifically accommodate the unique needs of this function is essential to the Center. Without such a facility, calibration of equipment and instrumentation will continue to lack the high degree of reliability and quality assurance necessary for the calibration activities and in addition require more effort and time to accomplish. The Calibration Laboratory is required in support of current and future space programs, such as the Apollo Applications, Lunar Exploration and Earth Resources Survey, Space Station and Space Shuttle. As mission and payloads grow in complexity, calibration work increases and assumes even greater significance in terms of quality and reliability. The present need for and trend toward instrument miniaturization adds to the critical need for increased accuracy and quality assurance.

MANNED SPACECRAFT CENTER
FISCAL YEAR 1971 ESTIMATES

CALIBRATION LABORATORY



PERSPECTIVE



PARTIAL SITE PLAN

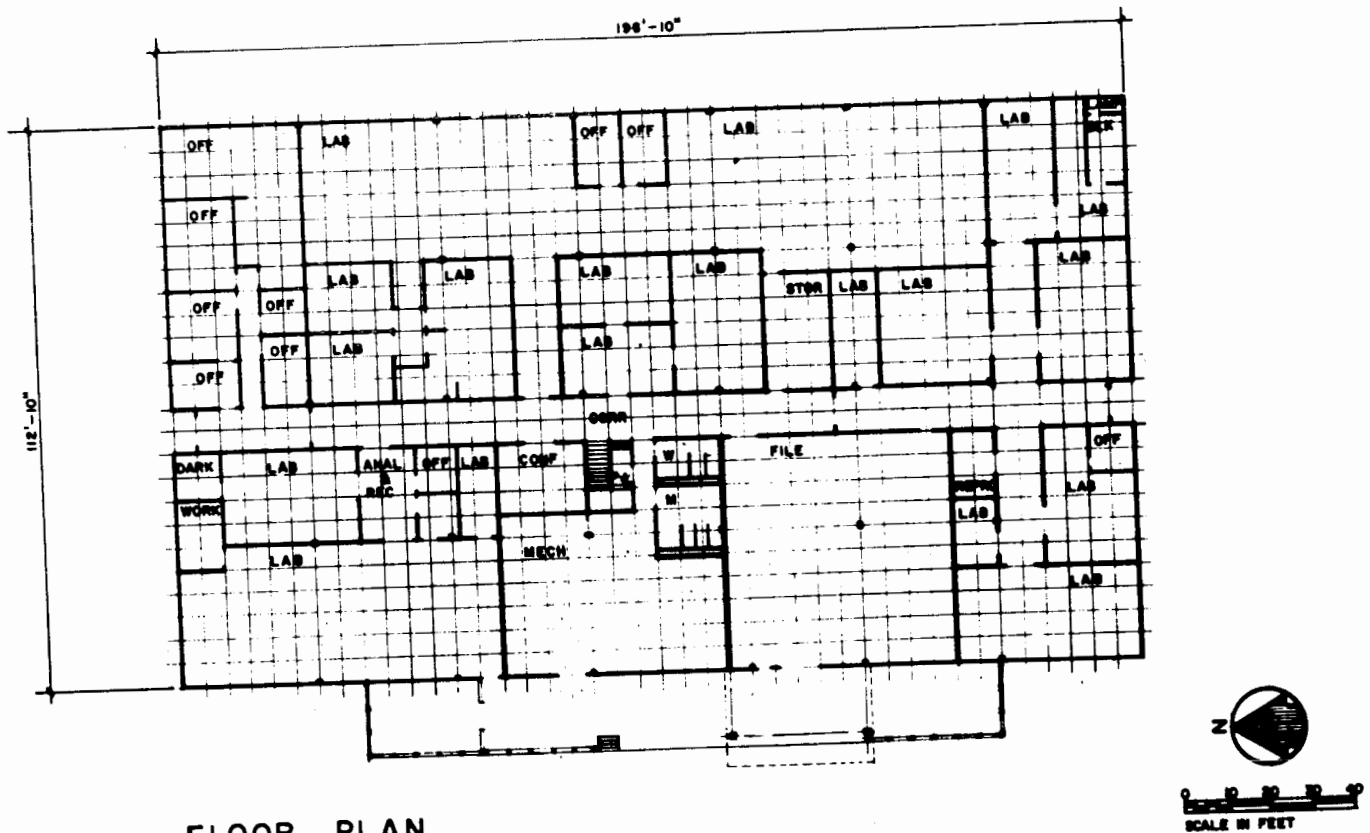
— 1971 PROJECT

400' 0 400' 800'

SCALE IN FEET

MANNED SPACECRAFT CENTER
FISCAL YEAR 1971 ESTIMATES

CALIBRATION LABORATORY



FLOOR PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

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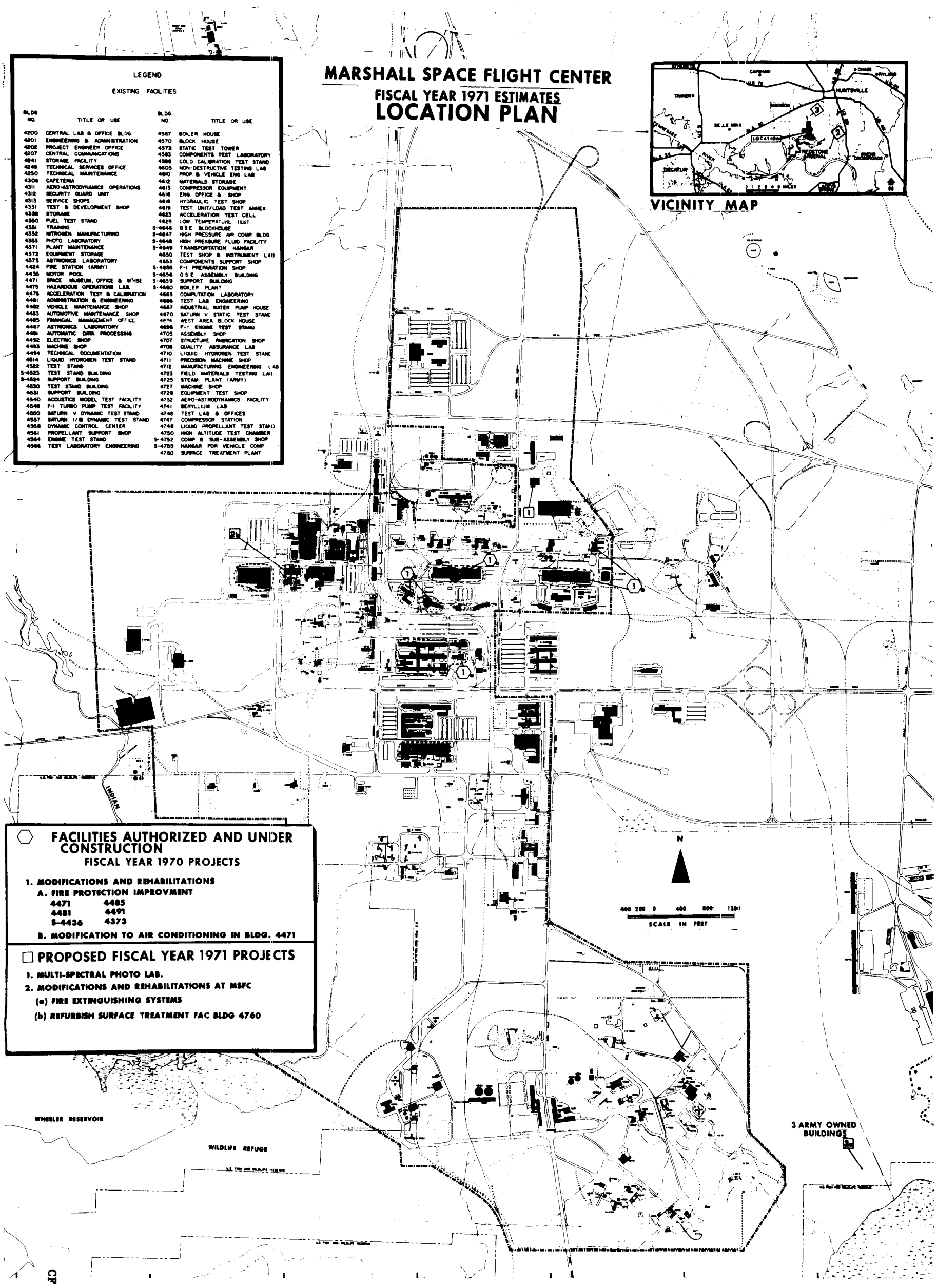
Multi-spectral photographic laboratory	CF 6-3

MARSHALL SPACE FLIGHT CENTER

FISCAL YEAR 1971 ESTIMATES

LOCATION PLAN



LEGEND

EXISTING FACILITIES

BLDG. NO.	TITLE OR USE	BLDG. NO.	TITLE OR USE
4200	CENTRAL LAB & OFFICE BLDG	4567	BOILER HOUSE
4201	ENGINEERING & ADMINISTRATION	4570	BLOCK HOUSE
4202	PROJECT ENGINEER OFFICE	4572	STATIC TEST TOWER
4207	CENTRAL COMMUNICATIONS	4583	COMPONENTS TEST LABORATORY
4241	STORAGE FACILITY	4588	COLD CALIBRATION TEST STAND
4249	TECHNICAL SERVICES OFFICE	4605	NON-DESTRUCTIVE TESTING LAB
4250	TECHNICAL MAINTENANCE	4610	PROP & VEHICLE ENG LAB
4306	CAFETERIA	4612	MATERIALS STORAGE
4311	AERO-ASTRODYNAMICS OPERATIONS	4613	COMPRESSOR EQUIPMENT
4312	SECURITY GUARD UNIT	4616	ENG. OFFICE & SHOP
4313	SERVICE SHOPS	4618	HYDRAULIC TEST SHOP
4331	TEST & DEVELOPMENT SHOP	4619	TEST UNIT/LOAD TEST ANNEX
4338	STORAGE	4623	ACCELERATION TEST CELL
4350	FUEL TEST STAND	4629	LOW TEMPERATURE TEST
4351	TRAINING	S-4646	GSE BLOCKHOUSE
4352	NITROGEN MANUFACTURING	S-4647	HIGH PRESSURE AIR COMP BLDG.
4353	PHOTO LABORATORY	S-4648	HIGH PRESSURE FLUID FACILITY
4371	PLANT MAINTENANCE	S-4649	TRANSPORTATION HANGAR
4372	EQUIPMENT STORAGE	4650	TEST SHOP & INSTRUMENT LAB
4373	ASTRIONICS LABORATORY	4653	COMPONENTS SUPPORT SHOP
4424	FIRE STATION (ARMY)	S-4655	F-1 PREPARATION SHOP
4436	MOTOR POOL	S-4656	GSE ASSEMBLY BUILDING
4471	SPACE MUSEUM, OFFICE & W'HSE	S-4659	SUPPORT BUILDING
4475	HAZARDOUS OPERATIONS LAB.	S-4660	BOILER PLANT
4476	ACCELERATION TEST & CALIBRATION	4663	COMPUTATION LABORATORY
4481	ADMINISTRATION & ENGINEERING	4666	TEST LAB ENGINEERING
4482	VEHICLE MAINTENANCE SHOP	4667	INDUSTRIAL WATER PUMP HOUSE
4483	AUTOMOTIVE MAINTENANCE SHOP	4670	SATURN V STATIC TEST STAND
4485	FINANCIAL MANAGEMENT OFFICE	4674	WEST AREA BLOCK HOUSE
4487	ASTRIONICS LABORATORY	4696	F-1 ENGINE TEST STAND
4491	AUTOMATIC DATA PROCESSING	4705	ASSEMBLY SHOP
4492	ELECTRIC SHOP	4707	STRUCTURE FABRICATION SHOP
4493	MACHINE SHOP	4708	QUALITY ASSURANCE LAB
4494	TECHNICAL DOCUMENTATION	4710	LIQUID HYDROGEN TEST STAND
4614	LIQUID HYDROGEN TEST STAND	4711	PRECISION MACHINE SHOP
4522	TEST STAND	4712	MANUFACTURING ENGINEERING LAB
S-4523	TEST STAND BUILDING	4723	FIELD MATERIALS TESTING LAB.
S-4524	SUPPORT BUILDING	4725	STEAM PLANT (ARMY)
4530	TEST STAND BUILDING	4727	MACHINE SHOP
4531	SUPPORT BUILDING	4728	EQUIPMENT TEST SHOP
4540	ACOUSTICS MODEL TEST FACILITY	4732	AERO-ASTRODYNAMICS FACILITY
4548	F-1 TURBO PUMP TEST FACILITY	4741	BERYLLIUM LAB
4550	SATURN V DYNAMIC TEST STAND	4746	TEST LAB. & OFFICES
4557	SATURN I/IB DYNAMIC TEST STAND	4747	COMPRESSOR STATION
4558	DYNAMIC CONTROL CENTER	4748	LIQUID PROPELLANT TEST STAND
4561	PROPELLANT SUPPORT SHOP	4750	HIGH ALTITUDE TEST CHAMBER
4564	ENGINE TEST STAND	S-4752	COMP & SUB-ASSEMBLY SHOP
4566	TEST LABORATORY ENGINEERING	S-4755	HANGAR FOR VEHICLE COMP
		4760	SURFACE TREATMENT PLANT

⬡ FACILITIES AUTHORIZED AND UNDER CONSTRUCTION

FISCAL YEAR 1970 PROJECTS

1. MODIFICATIONS AND REHABILITATIONS
   A. FIRE PROTECTION IMPROVMENT
      4471 4485
      4481 4491
      S-4436 4373
   B. MODIFICATION TO AIR CONDITIONING IN BLDG. 4471

☐ PROPOSED FISCAL YEAR 1971 PROJECTS

1. MULTI-SPECTRAL PHOTO LAB.
2. MODIFICATIONS AND REHABILITATIONS AT MSFC
   (a) FIRE EXTINGUISHING SYSTEMS
   (b) REFURBISH SURFACE TREATMENT FAC BLDG 4760

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 71 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Multi-Spectral Photographic Laboratory	MSF	36	525		561
TOTAL			525		

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Multi-Spectral Photographic Laboratory

AUTHORIZATION LINE ITEM: Marshall Space Flight Center

COGNIZANT PROGRAM OFFICE: Office of Manned Space Flight

COGNIZANT INSTALLATION: Marshall Space Flight Center

LOCATION OF PROJECT: Huntsville, Madison County, Alabama

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	$36,000
FY 1971 Estimate	525,000
Total Funding Through FY 1971	$561,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To replace an existing but extremely substandard structure, now utilized on an interim basis by Marshall Space Flight Center as a photographic laboratory, with a new facility designed to support the Center in multi-spectral photographic analysis and related photographic work.

PROJECT DESCRIPTION:

This project provides for the construction of a single story building of approximately 14,000 square feet. The building will be a laboratory-type structure equipped with temperature, humidity and dust control systems. The facility will provide for the processing and printing of still and motion picture film, as well as the special types of films documenting research and development tests and projects. Laboratory facilities for the fabrication, assembly and checkout of photographic systems and instrumentation in support of specific projects will be provided. Support space, including secure film holding and storage facilities, special lighting, and utilities, including a water filtration system, and access drives will be included. Existing equipment will be relocated to the new facility.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$525,000
Building	Sq. Ft.	14,000	33.50	469,000
Site development	LS	---	20,000	20,000
Utilities	LS	---	36,000	36,000
Equipment	---	---	---	---
Fallout Shelter	---	---	---	---
		TOTAL		$525,000

PROJECT JUSTIFICATION:

The building now used as a photographic laboratory by Marshall Space Flight Center was erected in 1943 as a chemical manufacturing and processing plant. In 1961, the pressing needs of the space program led to the interim conversion of this high bay, mill-type structure to serve photographic laboratory needs. While it has served in this capacity ever since, the age and deteriorating condition of the structure, as well as its fundamentally poor construction constitute a severe limitation on the quality of effort required by this laboratory.

Approximately twenty-five percent of the total photographic workload is devoted to programs and tests which are totally dependent upon film documentation for data collection. An additional fifty percent of the workload is in direct support of research, development, tests, and evaluation of programs conducted at the Center, while the balance is required for general Center support. An important function of the Photographic Division is to promote the use of new techniques and to keep abreast of advanced technology. To meet this challenge, suitable and adequate facilities are required.

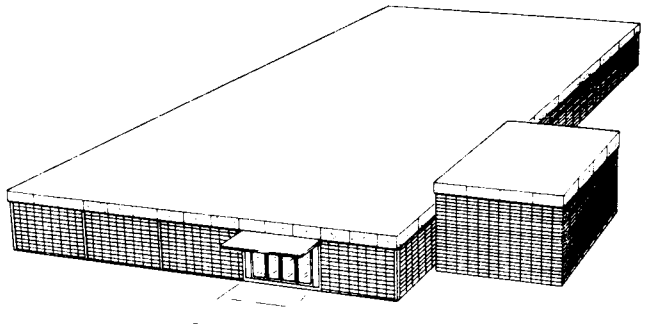
To attain the stringent requirements dictated by advancement in the photographic sciences and to optimize the quality of product, a controlled environment and reliable processing facilities are basic prerequisites. The present laboratory, even if modified cannot meet these requirements due to location, type of construction and existing environmental systems. The present interim facility is located within 20 feet of a road so that heavy vehicular traffic and the operation of nearby test facilities give rise to severe vibration in this light frame structure.

MARSHALL SPACE FLIGHT CENTER

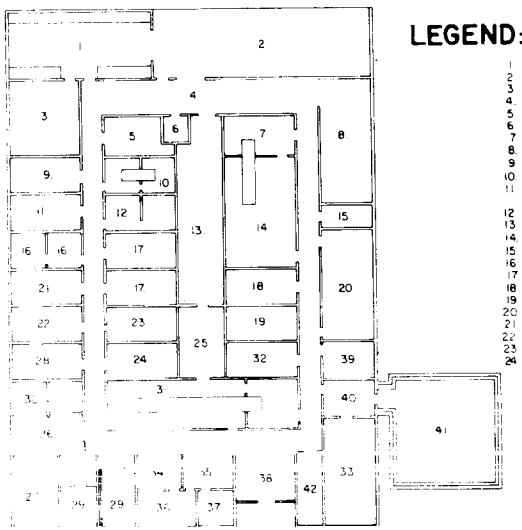
FISCAL YEAR 1971 ESTIMATES

MULTI-SPECTRAL PHOTOGRAPHIC LAB

NORTH ELEVATION



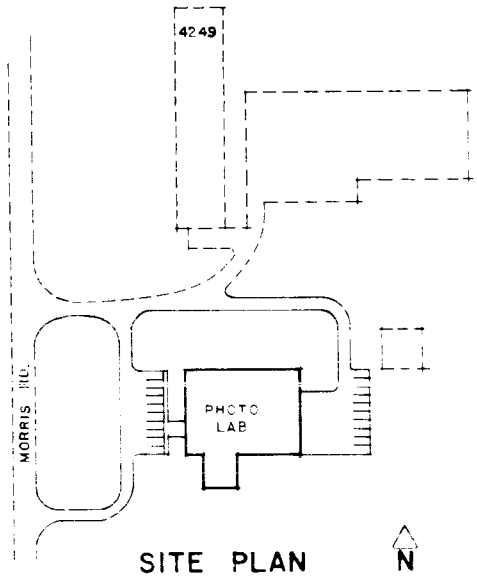
PERSPECTIVE



FLOOR PLAN

LEGEND:

1 CAMERA READY ROOM
2 PLATFORM
3 CAMERA STORAGE
4 CORRIDOR
5 LAB CHIEF
6 REF
7 AUTO ENLARGE
8 MECH
9 INSTRUMENTATION
10 VERSAMAT
11 INSTRUMENTATION WORK ROOM
12 STILL NEGATIVE
13 CHEMICAL MIX & STORAGE
14 FINISH & DRY ROOM
15 TELE
16 MOTION PICTURE PRINT
17 B & W MOTION PICTURE
18 HAND ENLARGE
19 COPY CAMERA DARK ROOM
20 COPY CAMERA
21 SLIDE MOUNT
22 WRITER
23 COLOR PRINTS
24 COLOR TRANSPARENCY
25 CHEMICAL ANALYSIS
26 FILE
27 VAULT
28 EDITING
29 TOILET
30 CHIEF EDITOR
31 COLORED MOTION PICTURE DEV
32 EXPERIMENTAL PHOTO
33 SCREENING
34 CONFER
35 SEC
36 CHIEF
37 DEPUTY CHIEF
38 ENTRY
39 PORTRAIT
40 INTERLOCK
41 CAMERA WORK ROOM
42 STORAGE



SITE PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

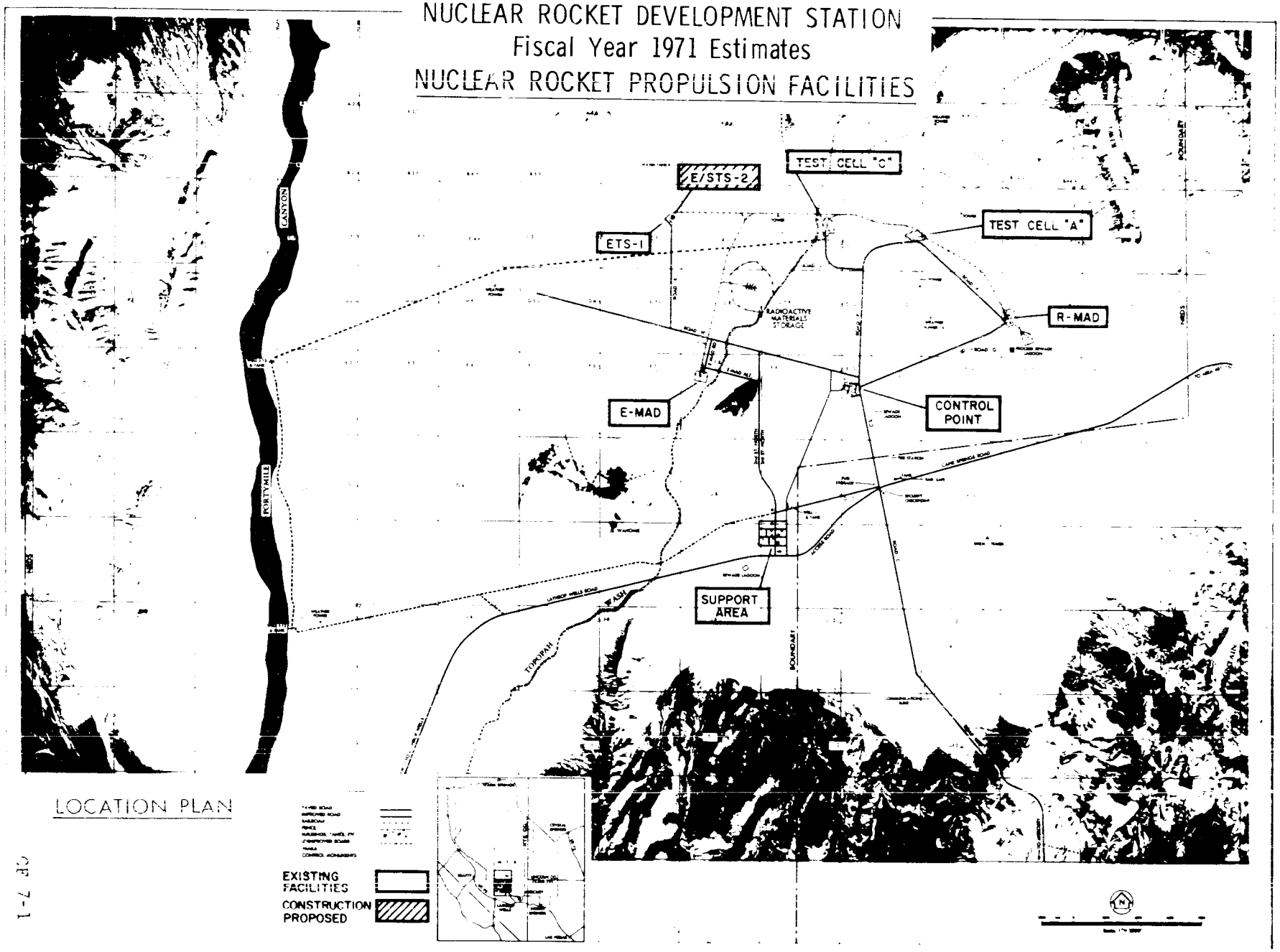
CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

NUCLEAR ROCKET DEVELOPMENT STATION

	Page No.
Location plan	CF 7-1
Summary	CF 7-2
Office of Advanced Research and Technology Project:	
Engine/Stage test stand No. 2	CF 7-3

NUCLEAR ROCKET DEVELOPMENT STATION
Fiscal Year 1971 Estimates
NUCLEAR ROCKET PROPULSION FACILITIES



LOCATION PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

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

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 71 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Engine/Stage Test Stand No. 2	OART		3,500	45,000	48,500
TOTAL			3,500		

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NACA-HQ

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Engine/Stage Test Stand No. 2

AUTHORIZATION LINE ITEM: Nuclear Rocket Development Station

COGNIZANT PROGRAM OFFICE: Office of Advanced Research and Technology

COGNIZANT INSTALLATION: Space Nuclear Propulsion Office

LOCATION OF PROJECT: Jackass Flats, Nye County, Nevada

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	---*
FY 1971 Estimate	$3,500,000
Total Funding Through FY 1971	$3,500,000
Estimated Future Year Funding	$45,000,000

PROJECT PURPOSE:

The nuclear rocket stage development program will require early system development tests, within the nuclear and space environment, to serve as a basis for flight systems design verification. This project will provide the necessary test facility capability to demonstrate the operational performance of the nuclear stage with the NERVA engine from very low power to full power conditions, including qualification of the NERVA engine stage and establishment of reliability and flight confidence factors for various flight profiles.

PROJECT DESCRIPTION:

The primary objective of the nuclear rocket stage development program is to confirm the validity of flight-systems design and to qualify the systems for flight. To achieve these goals, a ground test module will be used as a test bed. Construction of a new test facility at the Nuclear Rocket

*Excludes cost of ETS-1.

Development Station, Nevada, is required to accommodate this nuclear ground test module. The new facility will be designated as Engine/Stage Test Stand 2 (E/STS-2) and will subsequently be constructed near the existing Engine Test Stand-1 (ETS-1) complex in order to utilize appropriate existing capabilities. The major elements of the proposed facility are: (1) Cryogenic systems; (2) High-pressure gas systems; (3) Process water systems; (4) Exhaust duct and steam generation system; (5) Contaminated waste disposal system; (6) Instrumentation and control systems; (7) Test stand superstructure and substructure; (8) Facility shields; (9) Control center; (10) Utilities and (11) Site work.

The requested funding in FY 1971 is for the first increment of this facility. It involves the provision of steam generating capacity which will be necessary for E/STS-2 and will also beneficially augment the existing capacity for ETS-1 operations. This $3,500,000 is required to procure equipment including storage vessels, heat exchangers, and associated pumps, piping, valves, instrumentation and controls. This will provide about 20 minutes additional full steam flow rated capacity for the steam generation and delivery system (SGDS) of the common complex (ETS-1/E/STS-2). This, being in addition to 20 minutes of steam currently provided at ETS-1, will give the needed total of 40 minutes full steam flow rated capacity for the common complex.

PROJECT COST ESTIMATE:

	Unit of Measure	E/STS-2 Total Cost	FY 1971 Cost
Land Acquisition	---	---	---
Construction		$12,810,000	---
Test stand	LS	7,410,000	---
Buildings	LS	2,320,000	---
Utilities	LS	2,080,000	---
Site work	LS	1,000,000	---
Equipment		35,690,000	$3,500,000
Test support system	LS	16,840,000	---
NERVA altitude simulation system	LS	11,500,000	3,500,000
Instrumentation and control	LS	7,350,000	---
Fallout Shelter	---	---	---
	TOTAL	$48,500,000*	$3,500,000

*Excluding $3,500,000 of design to be programmed as Facility Planning and Design (FP&D).

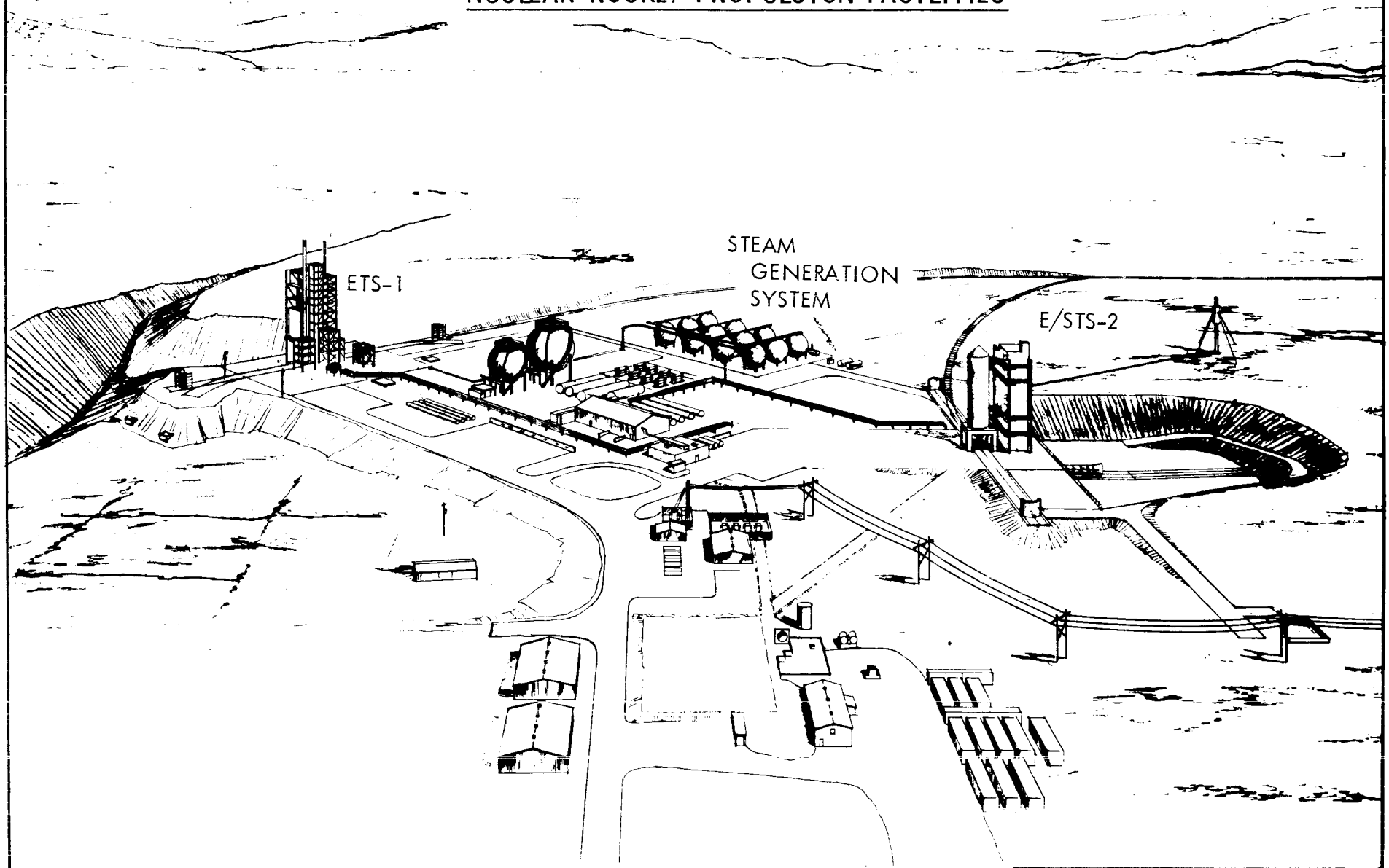
PROJECT JUSTIFICATION:

A ground test facility is required to develop and qualify the nuclear rocket stage for flight. The total capability provided by this project is considered the minimum necessary to proceed with the development of a nuclear propulsion module with a minimum of funding commensurate with NASA schedules and safety and reliability standards.

An existing test facility, ETS-1, is being modified and up-graded separately from this project in order to accommodate the development test of the NERVA nuclear engine. However, ETS-1 is not capable of accommodating the nuclear stage. Accordingly, Engine/Stage Test Stand-2 (E/STS-2) will be required to provide this test capability.

The initial increment of funding requested in 1971 is to provide a steam generation system for altitude simulation. The steam capacity to be provided by this project is basic and essential to the future E/STS-2 and is being added at this time to take advantage of the increased capability it can also provide for testing the NERVA engine on ETS-1.

NUCLEAR ROCKET DEVELOPMENT STATION
Fiscal Year 1971 Estimates
NUCLEAR ROCKET PROPULSION FACILITIES



ETS-1 E/STS-2 COMPLEX

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

VARIOUS LOCATIONS

	Page No.
Summary	CF 8-1
Office of Organization and Management Project:	
Rehabilitation and modification of facilities	CF 8-2
Office of Space Science and Applications Project:	
Alterations to launch complex 2	CF 8-6
Office of Tracking and Data Acquisition Projects:	
Power plant addition, 210' antenna facility	CF 8-11
Relocation of transportable facility	CF 8-15

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY

CONSTRUCTION OF FACILITIES

FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

INSTALLATION MISSION

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 1971 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Rehabilitation and Modification of Facilities	O&M	10,360	14,000		24,360
Alterations to Launch Complex 2	OSSA	4,641	3,300		7,941
Power Plant Addition, 210' Antenna Facility	OTDA	35	750		785
Relocation of a Transportable Facility	OTDA	25	525		550
TOTAL			18,575		

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NASA-HQ

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

VARIOUS LOCATIONS

REHABILITATION AND MODIFICATION OF FACILITIES

PROJECT PURPOSE:

To provide for major rehabilitation and modification of facilities at NASA field installations and Government-owned industrial plants engaged in NASA activities. The purpose of this program is to protect, preserve, and improve the general capabilities or usefulness of these facilities, and to insure the continued safe, economical, and efficient use of NASA's physical plant.

PROJECT DESCRIPTION:

Projects proposed to be accomplished within this program are outlined under "Project Cost Estimate" and total $14.0 million. These projects represent items considered to be of the highest priority at this time, and have been carefully selected from a list totalling $36 million on the basis of relative urgency and expected return on the investment involved. It is recognized, however, that during the course of the year some rearrangement of priorities may be necessary and possibly a change in some of the items to be accomplished within allocated funds may be required.

PROJECT COST ESTIMATE:

I. OFFICE OF MANNED SPACE FLIGHT	$6,610,000
A. Kennedy Space Center	2,605,000
(1) Rehabilitate Pad A, Launch Complex 39	380,000
(2) Rehabilitate Power Systems	275,000
(3) Rehabilitate Air Conditioning Systems	250,000
(4) Building Fire Protection	552,000
(5) Rehabilitate Instrumentation and Communication Systems	574,000
(6) Rehabilitate Roofs and Building Exteriors	304,000
(7) Rehabilitate Electric Power Industrial Area, Western Test Range	165,000
(8) Rehabilitate Spacecraft Area, Building 836, Western Test Range	105,000

B.	Manned Spacecraft Center	680,000
	(1) Rehabilitate Air Conditioning Systems.....	225,000
	(2) Rehabilitate Cooling Tower, Building 24.....	200,000
	(3) Structural and Roof Repairs, Ellington Air Force Base.....	255,000
C.	Marshall Space Flight Center	2,200,000
	(1) Refurbish Surface Treatment Facility, Building 4760	500,000
	(2) Install Fire Extinguisher Systems.....	1,700,000
D.	Michoud Assembly Facility	250,000
	(1) Rehabilitate Utilities Systems.....	250,000
E.	Mississippi Test Facility	375,000
	(1) Rehabilitate High Pressure Gas Facility.....	375,000
F.	Various Locations	500,000
	(1) Rehabilitation and Modification of Industrial Plants	500,000
II.	OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY	$3,230,000
A.	Ames Research Center	535,000
	(1) Modification of Electrical Utilities.....	280,000
	(2) Building Fire Protection Systems.....	255,000
B.	Flight Research Center	315,000
	(1) Rehabilitate Utilities Systems.....	315,000
C.	Langley Research Center	1,152,000
	(1) Replacement Boiler for Heating Plant.....	700,000
	(2) Rehabilitate Fire Alarm and Monitoring Systems.....	452,000

D.	Lewis Research Center	894,000
	(1) Rehabilitate Research and Control Building.....	327,000
	(2) Replacement of Boiler No. 5.....	115,000
	(3) Rehabilitate Dryer and Heat Exchangers at the Engine Research Building and the Propulsion Systems Laboratory.....	452,000
E.	Plum Brook Station	334,000
	(1) Rehabilitate Utilities Systems.....	334,000
III.	OFFICE OF SPACE SCIENCE AND APPLICATIONS	$2,790,000
A.	Goddard Space Flight Center	1,090,000
	(1) Fire Protection and Safety Modifications.....	485,000
	(2) Central Refrigeration System.....	605,000
B.	Jet Propulsion Laboratory	870,000
	(1) Erosion Control and Storm Drainage.....	140,000
	(2) Fire Protection and Prevention.....	260,000
	(3) Rehabilitate Road Networks and Parking Areas.....	330,000
	(4) Rehabilitate Buildings 233 and 238.....	140,000
C.	Wallops Station	830,000
	(1) Rehabilitate Hangar Building D-1.....	355,000
	(2) Rehabilitate Buildings E-106 and E-107.....	290,000
	(3) Rehabilitate Building X-15.....	185,000
IV.	OFFICE OF TRACKING AND DATA ACQUISITION	$1,370,000
A.	Fire Protection and Safety Improvements.....	1,370,000
	(1) Fire Alarm and Detection Systems.....	200,000
	(2) Water Supply and Distribution Systems.....	700,000

(3) Hose Stations and Hydrants.....	100,000
(4) Water Sprinkler Systems.....	370,000
TOTAL.....	$14,000,000

PROJECT JUSTIFICATION:

The NASA physical plant at initial cost totals about $4.5 billion. Its current replacement value is about $7.5 billion. It is composed of two major segments. The first and oldest consists of the research centers and industrial plants which are now, in many cases, over 25 years old. The second segment is composed of the more recent facilities acquired to support the Manned Space Flight program. Both segments of the plant have been exposed to hard and continued usage and particularly the older segment has experienced a long history of changing utilization and adaptation. Rehabilitation and modification of these facilities is required as a continuing program. This is necessary to: (1) protect the capital investment represented by these facilities; (2) insure their continued and reliable operation; (3) improve their capabilities and usefulness to NASA mission accomplishment; (4) provide a safer environment for personnel, (5) and to overcome the cumulative effects of wear, deterioration, and obsolescence.

Only major rehabilitation and modification of facilities type work is included, and are of the magnitude that they cannot be accomplished by day-to-day maintenance or by minor repair efforts. Routine maintenance, major additions, new construction, and projects which qualify as special or specific program requirements are excluded.

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Alterations to Launch Complex 2

AUTHORIZATION LINE ITEM: Various Locations

COGNIZANT PROGRAM OFFICE: Office of Space Science and Applications

COGNIZANT INSTALLATION: John F. Kennedy Space Center

LOCATION OF PROJECT: Western Test Range, Vandenberg Air Force Base, California

TYPE OF PROJECT: Modification

FUNDING:

FY 1970 and Prior Years	$4,640,798
FY 1971 Estimate	3,300,000
Total Funding Through FY 1971	$7,940,798
Estimated Future Year CoF Funding	Will be dependent on future flight programs requiring polar orbit launching.

PROJECT PURPOSE AND SCOPE:

The purpose of this project is to improve the safety and operational efficiency of the Complex and to keep pace with launch vehicle requirements.

PROJECT DESCRIPTION:

This project provides for the following alterations and additions to Space Launch Complex 2W:

Mobile Service Structure

Alterations will be made to the mobile service structure to provide adequate work space and access to the vehicle including: relocation, modification and addition of new platform levels; elevator modifications; installation of new weather and environmental enclosures for the elevated work area; and modification and upgrading of the electrical, compressed air, GN_2 purge ventilation, lighting and lightning protection systems; modification of the rail system, provision of new guy cables and hoists, and repaving of the service structure area.

Umbilical Tower

A new umbilical tower will be constructed similar in design to the Delta umbilical towers located at Kennedy Space Center. This includes all electrical, mechanical and communications equipment, blast wall modifications, and replacement of defective wiring and fixtures on the service structure. Modifications will be made to the launch deck areas as required by the vehicle including new blast deflectors, modifications to the electrical, mechanical and gas systems, installation of a new concrete deck, and resurfacing of the surrounding paved area.

Cryogenic Systems

Launch and support cryogenic and related systems supplying gaseous and liquid helium and nitrogen will be removed from trailers and permanently installed. They will be modified and upgraded as necessary to insure reliable performance.

Control Center

Blockhouse control and monitoring console will be rearranged, updated, and augmented to accommodate current and modified launch vehicle configurations. Modifications will be made of the associated interconnecting mechanical, propulsion, and electrical systems between and in the blockhouse and launch deck.

PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction				$2,096,000
Mobile service structure modification	LS	---	$880,000	880,000
Umbilical tower	LS	---	685,000	685,000
Launch mount support	LS	---	81,000	81,000
Fuel and LOX transfer piping and pneumatic systems modification	LS	---	450,000	450,000

PROJECT COST ESTIMATE (Cont'd)

	Unit of Measure	Quantity	Unit Cost	Total Cost
Equipment				$1,204,000
Modifications to first stage propellant loading system	LS	---	$500,000	500,000
Modifications to launch control and monitoring console	LS	---	550,000	550,000
Solid motor alignment system	LS	---	154,000	154,000
Fallout Shelter (Not feasible)	---	---	----	None
		TOTAL		$3,300,000

PROJECT JUSTIFICATION:

Space Launch Complex 2 is used for all direct polar orbital launches for NASA and ESSA scientific, earth resources technology, and operational weather satellite missions. Present programmed missions require new launch vehicle configurations with solid strap-on motors. This project provides for necessary modifications to Space Launch Complex 2 to meet the programmed launch requirements. In addition, the service structure and umbilical tower electrical power systems will be upgraded to conform to approved launch area safety standards. Upgrading of the blockhouse and launch pad support equipment will improve operational efficiency and flexibility.

JOHN F. KENNEDY SPACE CENTER, NASA

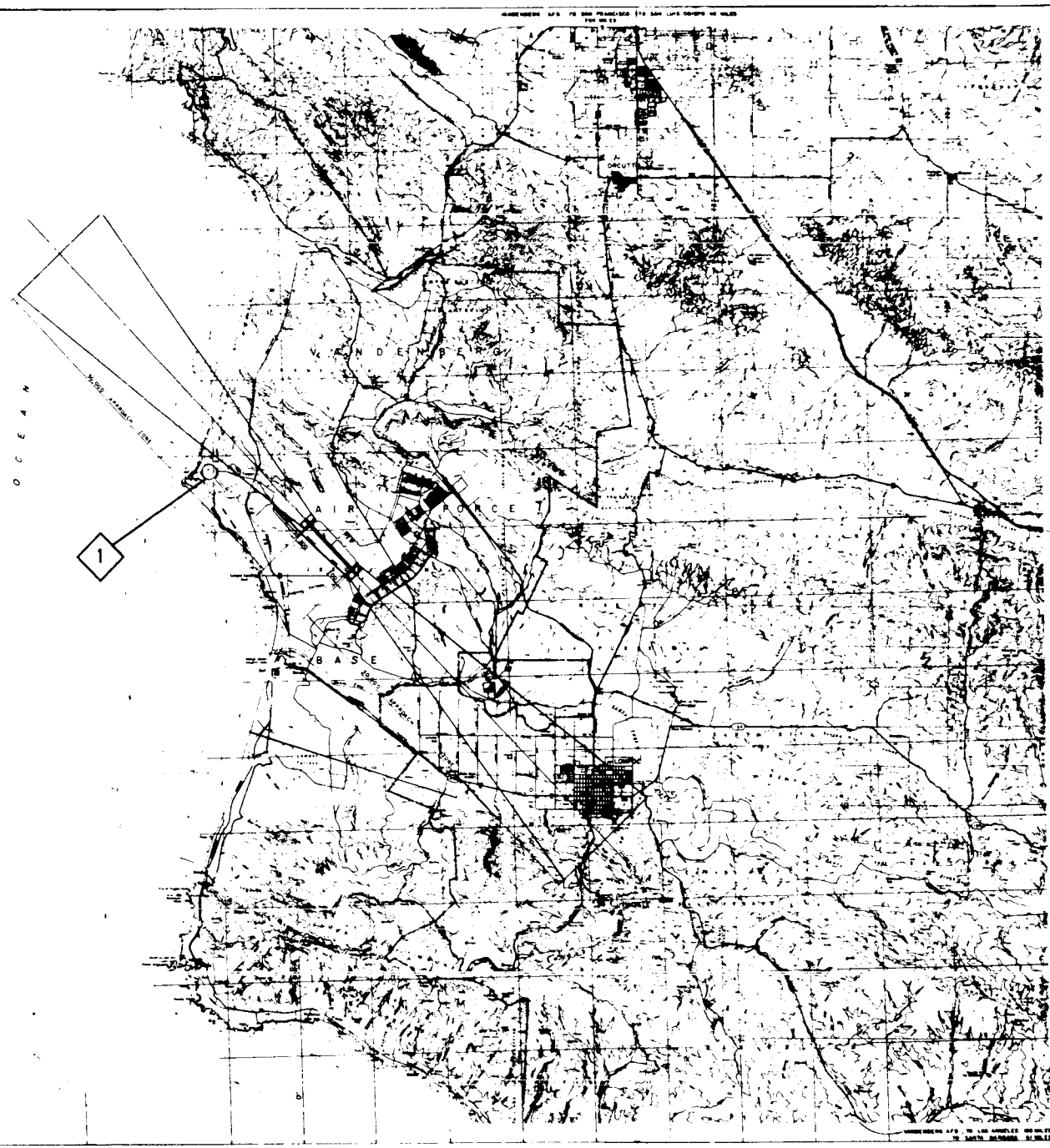
WESTERN TEST RANGE

FISCAL YEAR 1971 ESTIMATES

LOCATION PLAN

PROPOSED FISCAL YEAR 1971 PROJECT

1. ALTERATIONS AND ADDITIONS TO SPACE LAUNCH COMPLEX - 2
V.A.F.B., CALIF.



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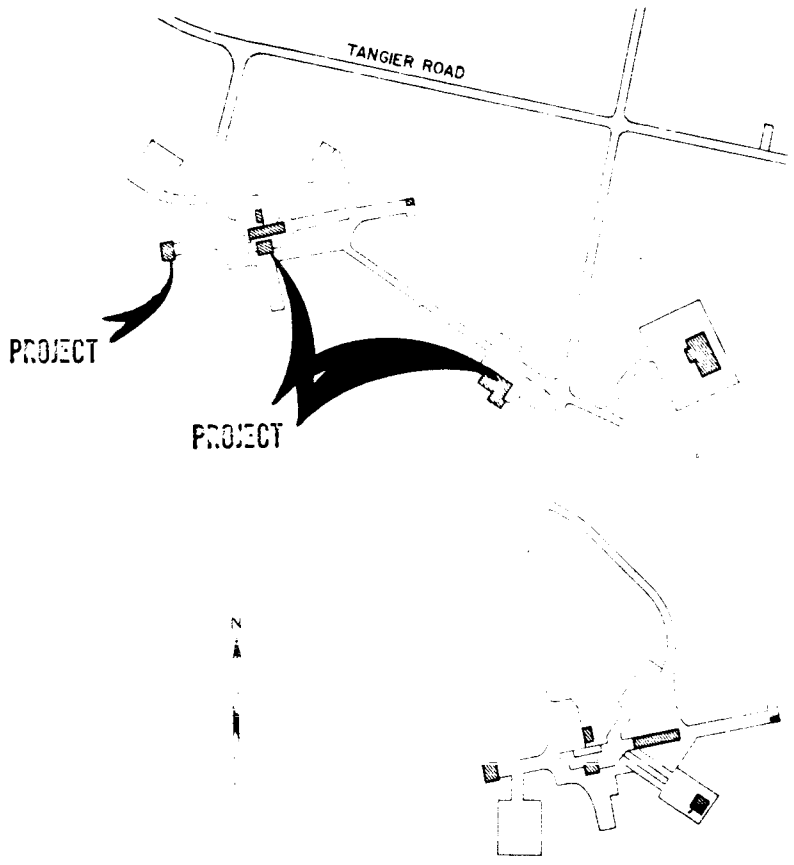
JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

ALTERATIONS AND ADDITIONS TO SPACE LAUNCH COMPLEX - 2

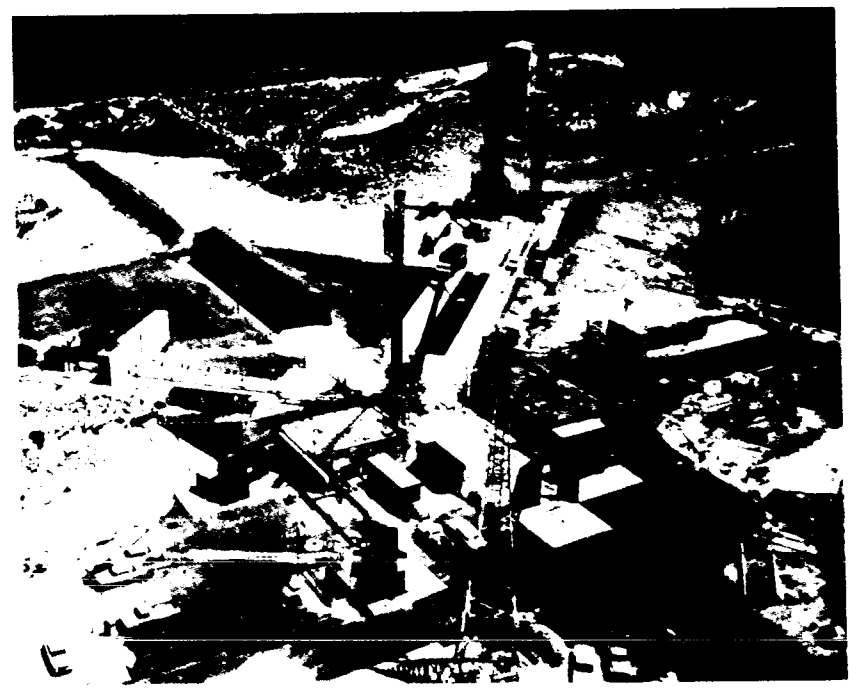
V A F B, CALIF.



SITE PLAN
(VANDENBERG AIR FORCE BASE)

500 0 500

SCALE IN FEET



PERSPECTIVE

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Power Plant Addition, 210 Foot Antenna Facility

AUTHORIZATION LINE ITEM: Various Locations

COGNIZANT PROGRAM OFFICE: Office of Tracking and Data Acquisition

COGNIZANT INSTALLATION: Jet Propulsion Laboratory Pasadena, California

LOCATION OF PROJECT: Goldstone Complex, Fort Irwin, California

TYPE OF PROJECT: Addition

FUNDING:

FY 1970 and Prior Years	$35,000
FY 1971 Estimate	750,000
Total Funding Through FY 1971	$785,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

To provide an additional 3000 Kilowatt (KW) generating power capability required for the operation of a high powered transmitter.

PROJECT DESCRIPTION:

This project provides for the construction of a 5060 square foot power plant addition, together with the procurement and installation of four 750 KW engine generating sets and associated equipment and switch-gear. The project will also provide for an extension of existing underground power and electrical distribution systems and all necessary supporting features.

PROJECT COST ESTIMATE:

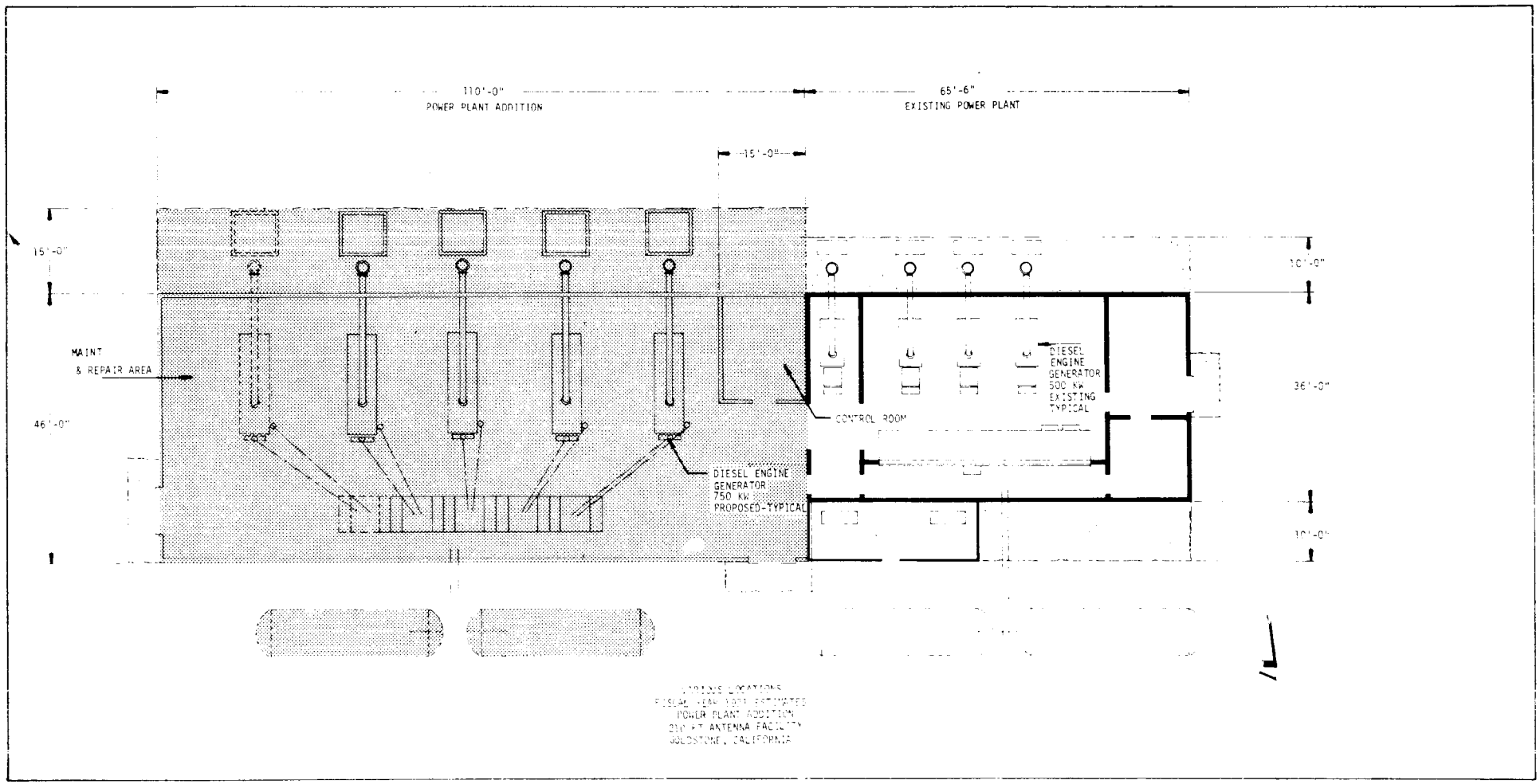
	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction	---	---	---	$270,000
Building addition	Sq. Ft.	5060	$35.00	177,000
Generator foundations	Each	4	12,000	48,000
Electrical distribution system	LS	---	45,000	45,000
Equipment				$480,000
Engine Generator Sets (4 each of 750 KW Capacity)	KW	3000	160.00	480,000
Fallout Shelter	---	---	---	---
		TOTAL		$750,000

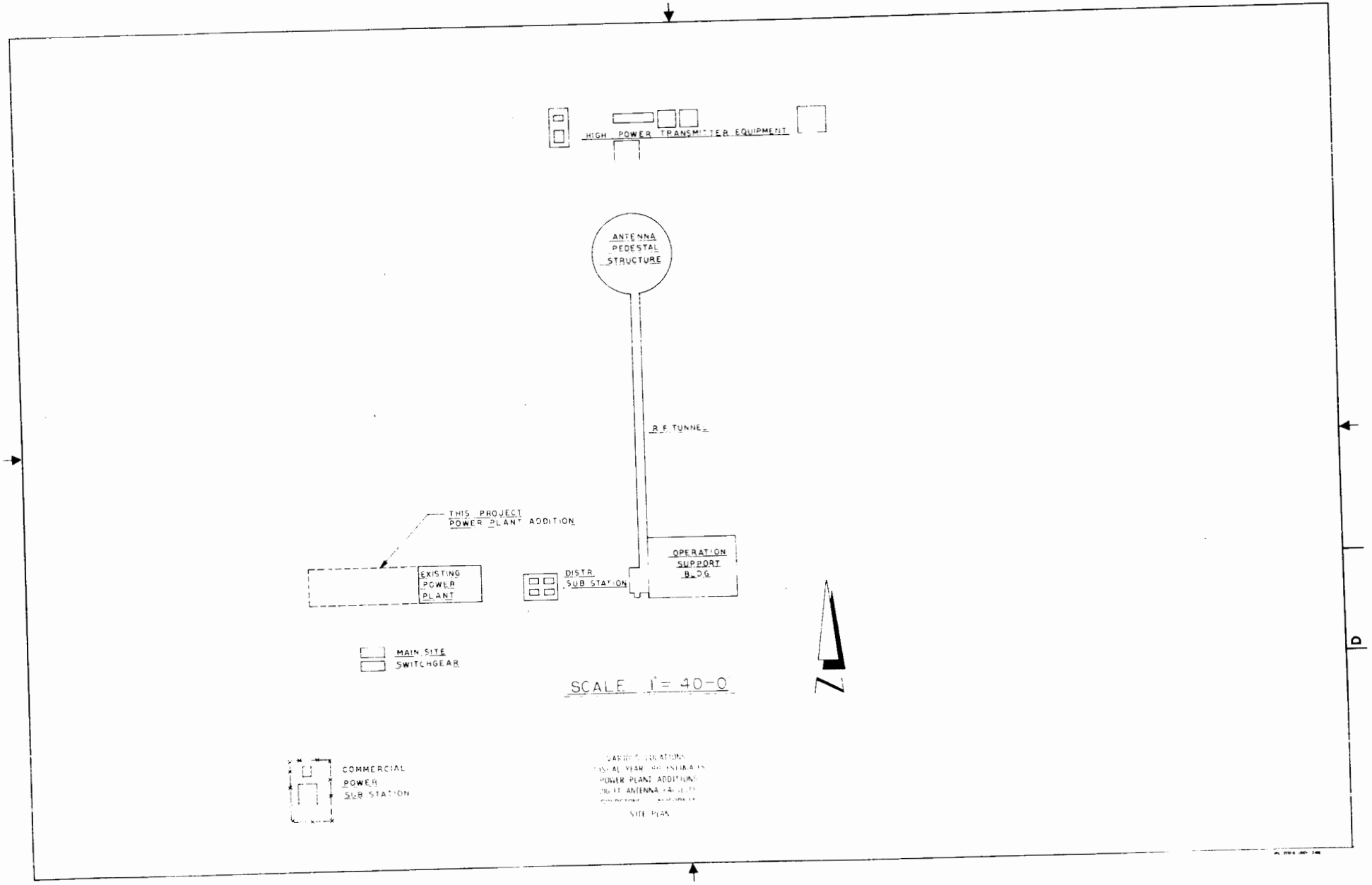
PROJECT JUSTIFICATION:

This project is required to provide additional operational electrical power associated with the high-powered transmitter on the Goldstone 210-foot antenna. High powered up-link support will begin with the Pioneer F (1972 launch). The present power system at Goldstone consists of (1) a commercial power service and (2) a on-station 2000 KW (4 each 500 KW) diesel-generating power plant. In order to ensure reliability and quality of power, the on-station generated power service is required during all mission support periods. Commercial power at the Goldstone complex is used at all other times.

The above existing power generating plant at the Mars 210' antenna now provides the electrical power to run the antenna system and all electronics and utilities associated with the station, including a 20 KW transmitter. It is now necessary to provide sufficient on-station power to serve the high power transmitter required for critical mission support to the approved planetary flight programs. This high power transmitter is driven by a 3500 HP motor generator set, which brings the total operational power load requirement for the station to approximately 5000 KW including minimum back-up.

Lead times for construction and activation of this additional capacity require funding in FY 1971.


110'-0"
POWER PLANT ADDITION
65'-6"
EXISTING POWER PLANT
15'-0"
15'-0"
MAINT
& REPAIR AREA
46'-0"
CONTROL ROOM
DIESEL
ENGINE
GENERATOR
500 KW
EXISTING
TYPICAL
DIESEL ENGINE
GENERATOR
750 KW
PROPOSED-TYPICAL
10'-0"
36'-0"
10'-0"
POWER PLANT ADDITION
210' FT ANTENNA FACILITY
GOLDSTONE, CALIFORNIA


HIGH POWER TRANSMITTER EQUIPMENT
ANTENNA PEDESTAL STRUCTURE
R.F. TUNNEL
THIS PROJECT POWER PLANT ADDITION
EXISTING POWER PLANT
DISTR. SUB STATION
OPERATION SUPPORT BLDG.
MAIN SITE SWITCHGEAR
SCALE 1" = 40'-0"
COMMERCIAL POWER SUB STATION
SITE PLAN

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Relocation of Transportable Facility

AUTHORIZATION LINE ITEM: Various Locations

COGNIZANT PROGRAM OFFICE: Office of Tracking and Data Acquisition

COGNIZANT INSTALLATION: Goddard Space Flight Center, Greenbelt, Maryland

LOCATION OF PROJECT: Santiago, Chile

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	$25,000
FY 1971 Estimate	525,000
Total Funding Through FY 1971	$550,000
Estimated Future Year CoF Funding	None

PROJECT PURPOSE AND SCOPE:

This project proposes construction necessary for the relocation of the transportable Unified S-Band facility at Grand Bahama Island which will be relocated to an existing Tracking and Data Acquisition station at Santiago, Chile, to provide support for the Apollo Applications Program (AAP).

PROJECT DESCRIPTION:

This project will provide for the construction of antenna foundations, trailer pads, supporting features, and necessary utilities and site development at Santiago, Chile.

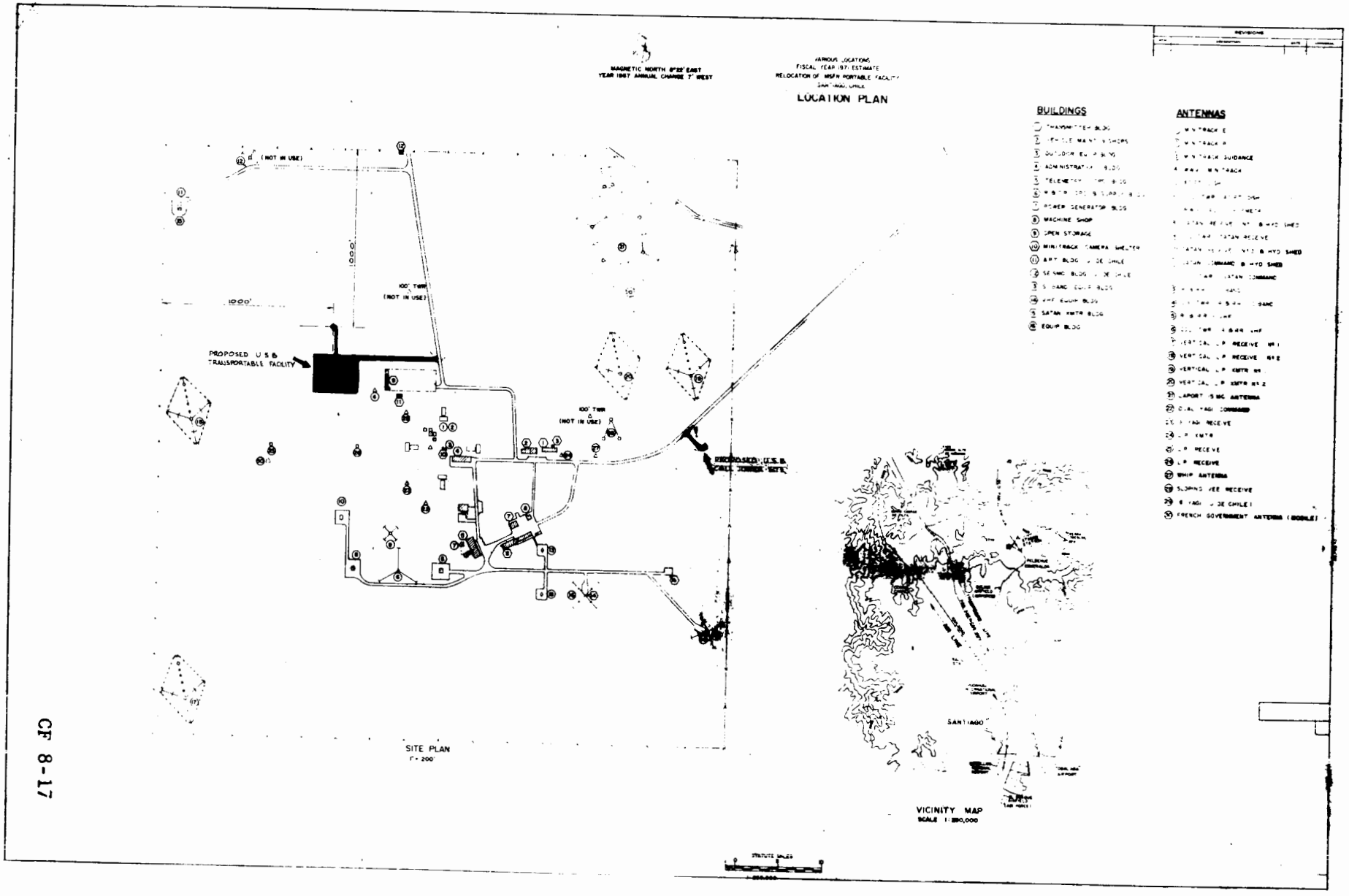
PROJECT COST ESTIMATE:

	Unit of Measure	Quantity	Unit Cost	Total Cost
Land Acquisition	---	---	---	---
Construction	---	---	---	$525,000
Concrete pads for vans	Each	12	$1,000	12,000
Antenna foundations	Each	2	11,000	22,000
Antenna erection	Each	2	28,000	56,000
Communications	LS	---	130,000	130,000
Roads and paving	LS	---	95,000	95,000
Site development	LS	---	65,000	65,000
Electrical distribution	LS	---	65,000	65,000
Utilities	LS	---	80,000	80,000
Equipment	---	---	---	---
Fallout Shelter	---	---	---	---
		TOTAL		$525,000

PROJECT JUSTIFICATION:

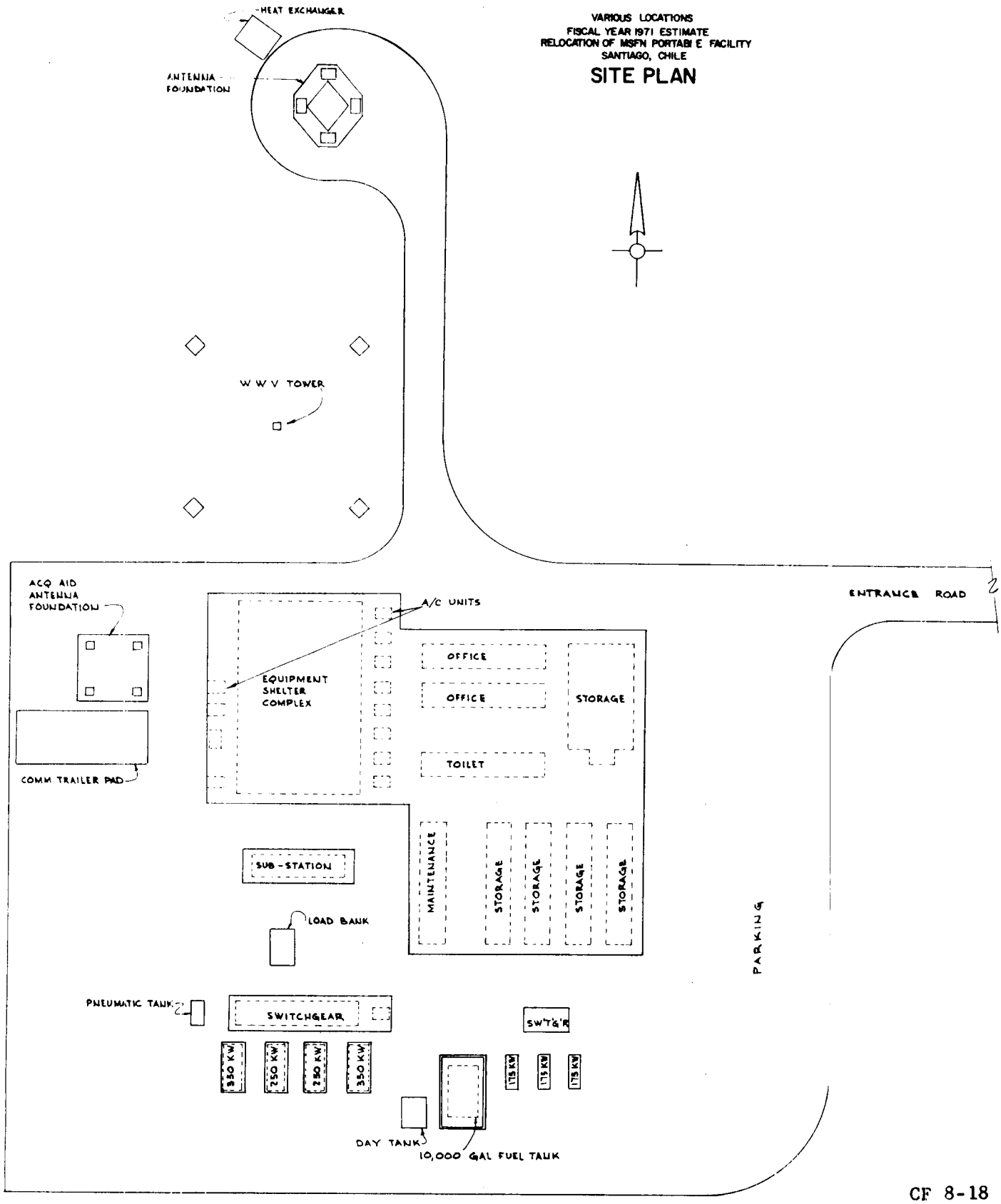
The existing configuration of the Manned Space Flight Network does not permit adequate support to long duration missions of the Apollo Applications Program in the South America area. Consequently, the transportable station presently located on Grand Bahama Island will be relocated to and co-located with the STADAN station at Santiago, Chile. The AAP workshop will be launched in late 1972.

Initial equipment is available and will be relocated.


MAGNETIC NORTH 8°28' EAST
YEAR 1967 ANNUAL CHANGE 7' WEST
VARIOUS LOCATIONS
FISCAL YEAR 197- ESTIMATE
RELOCATION OF MSFN PORTABLE FACILITY
LOCATION PLAN
BUILDINGS
ANTENNAS
(NOT IN USE)
100' TWR
(NOT IN USE)
1000'
PROPOSED U.S.B.
TRANSPORTABLE FACILITY
100' TWR
(NOT IN USE)
PROPOSED U.S.B.
SITE PLAN
1" = 200'
SANTIAGO
VICINITY MAP
SCALE 1:250,000
STATUTE MILES

VARIOUS LOCATIONS
FISCAL YEAR 1971 ESTIMATE
RELOCATION OF MSFN PORTABLE FACILITY
SANTIAGO, CHILE

SITE PLAN



CF 8-18

SCALE 1" = 20'

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

FACILITY PLANNING AND DESIGN

	Page No.
Summary	CF 9-1
Office of Organization and Management (NASA General)	
Facility planning and design	CF 9-2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 1971 BUDGET ESTIMATES

(Dollars in thousands)

NASA INSTALLATION		COGNIZANT PROGRAM OFFICE FOR INSTALLATION
All		Office of Organization and Management
LOCATION OF INSTALLATION	COUNTY	NEAREST CITY
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INSTALLATION MISSION

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 1971 (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Facility Planning and Design	O&M	59,131	5,000		Not Applicable
TOTAL			5,000		

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CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

Facility Planning And Design

The funds requested are to provide for the following advance planning and design activities related to facilities projects:

a. Preparation of preliminary engineering reports, cost estimates, and design and construction schedules.

b. Preparation of preliminary plans and specifications as well as final construction contract plans, specifications and associated cost estimates and schedules.

c. Necessary development and master planning for field installations.

d. Special facilities siting and other investigations, facilities methodology and other studies, and facilities reports.

The $5 million request for facility planning and design for FY 1971 is made up of two major segments:

a. Regular requirements - $3,500,000

b. Special requirements - $1,500,000

Regular requirements encompass the basic purposes outlined above while special requirements cover special needs which are related to large, complex future potential projects on which significant planning work should be accomplished prior to its inclusion in a budget request and for which planning lead time is exceptionally long.

Regular Requirements

a. Necessary updating of the development and master plans for field installations and special facilities studies investigations and reports is required. Charter plans are revised on an average of once every three years for each installation, with about one-third of the installations being involved in any one fiscal year.	$200,000

b.	Preparation of preliminary engineering reports, investigations and studies related to proposed facilities projects to be included in the subsequent FY 1973 Construction of Facilities program are provided for by this amount. These reports are required to permit the early and timely development of the best project required to meet the stated functional need and to provide the related basic data, cost estimates and schedules related to any such future budgetary proposals.	$700,000
c.	The amount requested will provide for the preparation of design, plans, drawings and specifications necessary for the accomplishment of the subsequent FY 1972 Construction of facilities program.	2,600,000
	Subtotal, Regular Requirements:	$3,500,000

Special Requirements

These special facilities planning and design requirements are generated by potential future projects, large in size and of a complex nature. These may be associated with future engine or space vehicles or such testing needs at the NERVA Engine/Stage Test Stand #2 proposed for the Nuclear Rocket Development Station, Nevada. These and like project needs require a long planning cycle. Early and progressive design work is essential to insure the ultimate best design, cost estimates and schedules. These projects then require added planning effort and associated design lead time well beyond that normally associated with preliminary engineering reports and general type facilities projects. For this reason, these requirements must be provided for over and above the regular facility planning and design needs.

Subtotal, Special Requirements:	$1,500,000
Total, Facility Planning and Design	$5,000,000