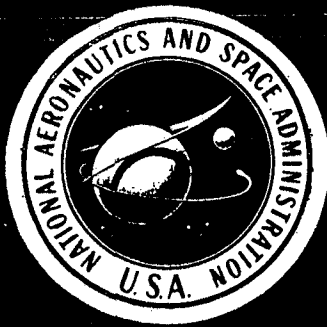


*National Aeronautics
and Space Administration*



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

<u>Budget Activity</u>	<u>Fiscal Year 1969</u>	<u>Fiscal Year 1970</u>	<u>Fiscal Year 1971</u>
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.....	<u>19,875,000</u>	<u>32,621,000</u>	<u>20,275,000</u>
Total Budget Plan.....	<u>\$32,080,000</u>	<u>\$53,233,000</u>	<u>\$34,600,000</u>
<u>Financing:</u>			
Appropriation.....	\$21,800,000	\$53,233,000	\$34,600,000
Transferred from other accounts.....	<u>11,140,000</u>	<u>---</u>	<u>---</u>
Appropriation (adjusted)	\$32,940,000	\$53,233,000	\$34,600,000
Reprogramming to prior year budget plans.....	<u>-860,000</u>	<u>---</u>	<u>---</u>
Total financing of budget plan.....	<u>\$32,080,000</u>	<u>\$53,233,000</u>	<u>\$34,600,000</u>

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

	<u>Fiscal Year 1969</u>	<u>Fiscal Year 1970</u>	<u>Fiscal Year 1971</u>
1. MANNED SPACE FLIGHT.....	<u>\$10,719,000</u>	<u>\$14,250,000</u>	<u>\$2,000,000</u>
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.....	<u>\$1,100,000</u>	<u>\$1,595,000</u>	<u>\$700,000</u>
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.....	<u>---</u>	<u>---</u>	<u>\$5,350,000</u>
Goddard Space Flight Center..	---	---	2,050,000
Various Locations.....	---	---	3,300,000
4. SPACE TECHNOLOGY.....	<u>\$386,000</u>	<u>---</u>	<u>\$6,275,000</u>
Ames Research Center.....	386,000	---	1,525,000
Jet Propulsion Laboratory....	---	---	1,250,000
Nuclear Rocket Development Station.....	---	---	3,500,000
5. AVIATION TECHNOLOGY.....	<u>---</u>	<u>\$4,767,000</u>	<u>---</u>
Langley Research Center.....	---	4,767,000	---
6. SUPPORTING ACTIVITIES.....	<u>\$19,875,000</u>	<u>\$32,621,000</u>	<u>\$20,275,000</u>
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.....	<u>\$32,080,000</u>	<u>\$53,233,000</u>	<u>\$34,600,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

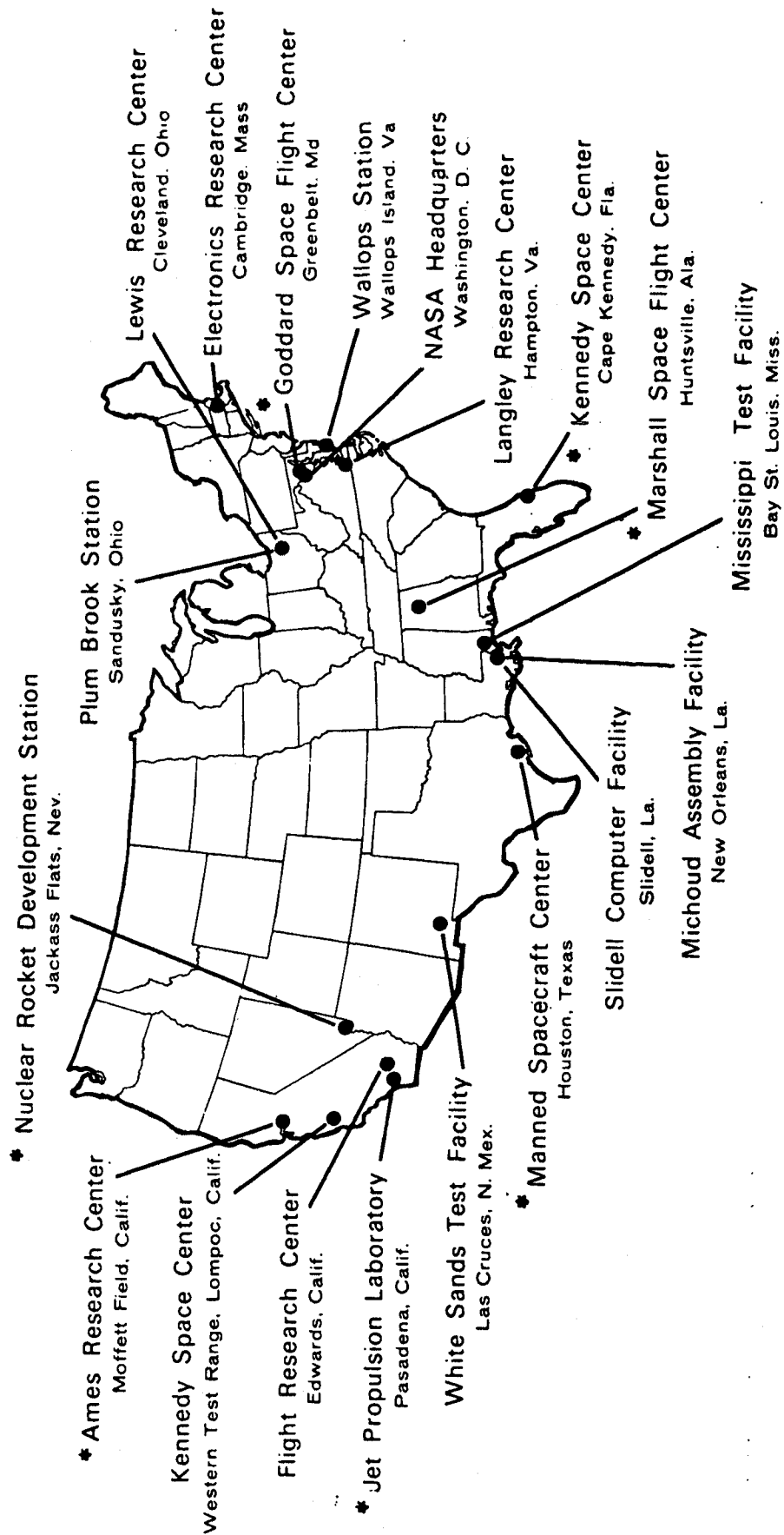
FISCAL YEAR 1971 ESTIMATES

SUMMARY OF CONSTRUCTION OF FACILITIES BUDGET PLAN BY LOCATION

<u>Location</u>	<u>Fiscal Year 1969</u>	<u>Fiscal Year 1970</u>	<u>Fiscal Year 1971</u>
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..	<u>1,000,000</u>	<u>3,500,000</u>	<u>5,000,000</u>
Total Plan.....	<u>\$32,080,000</u>	<u>\$53,233,000</u>	<u>\$34,600,000</u>

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
Michoud 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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Location plan.....	CF 1-1
Summary.....	CF 1-2
Office of Advanced Research and Technology Project:	
Polymer research laboratory.....	CF 1-3

AMES RESEARCH CENTER
FISCAL YEAR 1971 ESTIMATES
LOCATION PLAN

LEGEND

200	ADMINISTRATIVE BUILDING
201	ADMINISTRATIVE BUILDING
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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



RESEARCH CENTER

AMES RESEARCH CENTER

NAVAL AIR STATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
INSTALLATION SUMMARY
CONSTRUCTION OF FACILITIES
FISCAL YEAR 19 71 BUDGET ESTIMATES

(Dollars in thousands)

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

Laboratory research in aerodynamics, thermodynamics, materials, structures, guidance and control, space sciences, environmental biology, life detection, life synthesis, human factors, and fundamental physics and chemistry, project management of unmanned spaceflight projects (scientific probes and satellites); development of scientific-experiment payloads for spaceflight projects managed at Ames and elsewhere.

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 <u>71</u> (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Polymer Research Laboratory	OART	70	1,525		1,595
TOTAL			1,525		

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

PROJECT TITLE: Polymer Research Laboratory

AUTHORIZATION LINE ITEM: Ames Research Center

COGNIZANT PROGRAM OFFICE: Office of Advanced Research and Technology

COGNIZANT INSTALLATION: Ames Research Center

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

TYPE OF PROJECT: New

FUNDING:

FY 1970 and Prior Years	\$70,000
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FY 1971 Estimate	<u>1,525,000</u>
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Total Funding Through FY 1971	<u>\$1,595,000</u>
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Estimated Future Year CoF Funding	None
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PROJECT PURPOSE AND SCOPE:

To provide an adequate research laboratory and support environment at Ames Research Center so that chemical research relating to polymers may be carried out efficiently and safely. Laboratory space for such activities as bio-polymers, photo-radiation chemical kinetics, synthetic and analytical chemistry, coatings, research, plastics and composites, and physical testing and process development will be provided. Functions such as materials compounding and evaluation as well as properties measurement require a special environment. The overall function takes or evolves fundamental knowledge to design and build polymers to solve NASA problems, many of which have other applications in the national interest such as the reduction of fire and aircraft crash hazards and the development of synthetic materials of importance to the aircraft industry.

PROJECT DESCRIPTION:

This project provides for the construction of a chemical research type laboratory having a total floor area of about 23,600 square feet. The research area will be divided into eight laboratories and each will contain exhaust hoods, chemical benches, sinks, and other associated equipment. Included is the related office, storage, mechanical/utility, and circulation

space. Special features include radiation and electrical shielding, special ventilation, and special filtration of inlet and exhaust from some laboratories. Certain areas will require very close control of temperature and humidity. Most of the needed instrumentation and equipment for this facility already exists. However, certain minor equipment relating to a cobalt radiation source is included with the project. All necessary site work, utilities, and paving are provided.

PROJECT COST ESTIMATE:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$1,390,000</u>
Site development	LS	---	\$120,000	120,000
Building	Sq. Ft.	23,600	34.20	807,000
Special environmental control and shielding	LS	---	325,000	325,000
Utilities	LS	---	138,000	138,000
<u>Equipment</u>	LS	---	135,000	<u>135,000</u>
<u>Fallout Shelter</u>	---	---	---	---
		TOTAL		<u><u>\$1,525,000</u></u>

PROJECT JUSTIFICATION:

The basic requirement is to provide a chemistry laboratory which will house all applied chemistry research at Ames Research Center with primary considerations for personnel safety, operational efficiency, and adaptability to changing research objectives. The Polymer Research Laboratory building is required to support the functions of chemical research which are generally unique. In addition to space and aeronautical research, these investigations do have a direct application to other national problems, such as reductions in fire and aircraft crash hazards.

Suitable space is not available at the Center to house this important activity. This research work is currently being carried on in makeshift quarters now scattered in eight locations throughout the Center. The Analytical Laboratory is located on the mezzanine floor of the Gas Dynamics Laboratory. This location is crowded and lacks adequate protection for the handling of hazardous and toxic chemicals and cannot be expanded in its present location. Another activity, the Chemical Synthesis Laboratory, is located on part of the upper floor of the Electrical Services Building which

is located in close proximity to the cafeteria. Processing the ingredient materials contained in new plastics involves handling and working with toxic and explosive mixtures. Because of the danger of toxic exhaust fume ingestion by the cafeteria air conditioning system, many necessary operations have been curtailed. Laboratory space is generally inadequate and was not designed for this kind of operation. Because of the second-story location of these laboratories, evacuation in the event of fire or explosion could be very difficult.

The Plastics and Coatings Development Laboratory is located in the Hypersonic Helium Tunnel Building. The Processing Development operation is carried out in part of a paint shop in yet another location. Tests of the fire quenching and fire protection properties of these new materials are conducted in temporary space in the Payload Test and Integration Facility. Research in membrane tests is presently being conducted in the penthouse of the Instrument Research Building, an area little suited to this type of research.

All of these operations involve a certain amount of material which is known to be toxic, and a number of new materials whose toxicity has yet to be determined. Therefore, the Center has exercised extreme care in their handling and use and, in many instances, has been forced to conduct its operations on weekends or at night when the number of people in the vicinity is minimal. This restriction greatly handicaps the Center's ability to efficiently carry out its day-to-day work on new chemistry problems of vital concern to NASA.

In connection with the overall agency-space utilization analysis, an in-depth study of the situation at Ames was made. This detailed study, supported by industrial expertise, reviewed the need for these laboratory facilities and the practicality of meeting this need with available space. The study conclusions fully support the urgent need for a new facility as proposed.

The polymer research effort at Ames is a problem-solving activity in the field of aeronautics, life sciences, and space technology, in which a new ingredient (polymer science) is being added to the methodology. The classical polymer chemistry approach has been to create new materials first and find applications later. At Ames, the problem is defined first and a new polymer is then tailored to solve the problem. Thus, the Chemical Research Projects Office concentrates its efforts on developing new polymers to meet specific requirements which have been identified by other research activities.

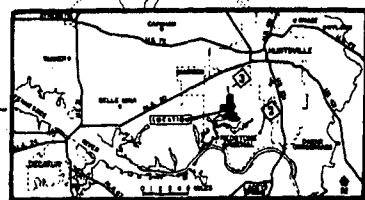
The research being conducted by this group is in the field of rapidly expanding techniques and, for the most part, the Center is utilizing people whose past experience is in allied fields of science. This situation requires a larger amount of effort devoted to day-to-day direction of the work than is normally required in older well-established scientific

disciplines. Because the people are now scattered in different buildings, valuable research time is lost travelling from location to location. The consolidation of this effort under one roof will allow a more effective and efficient utilization of research manpower at the Ames Research Center. The prime element of justification is the need for space of the type and standard required so that this vital activity may be carried out efficiently and safely. There is no other satisfactory solution to the problem than to provide a new facility.

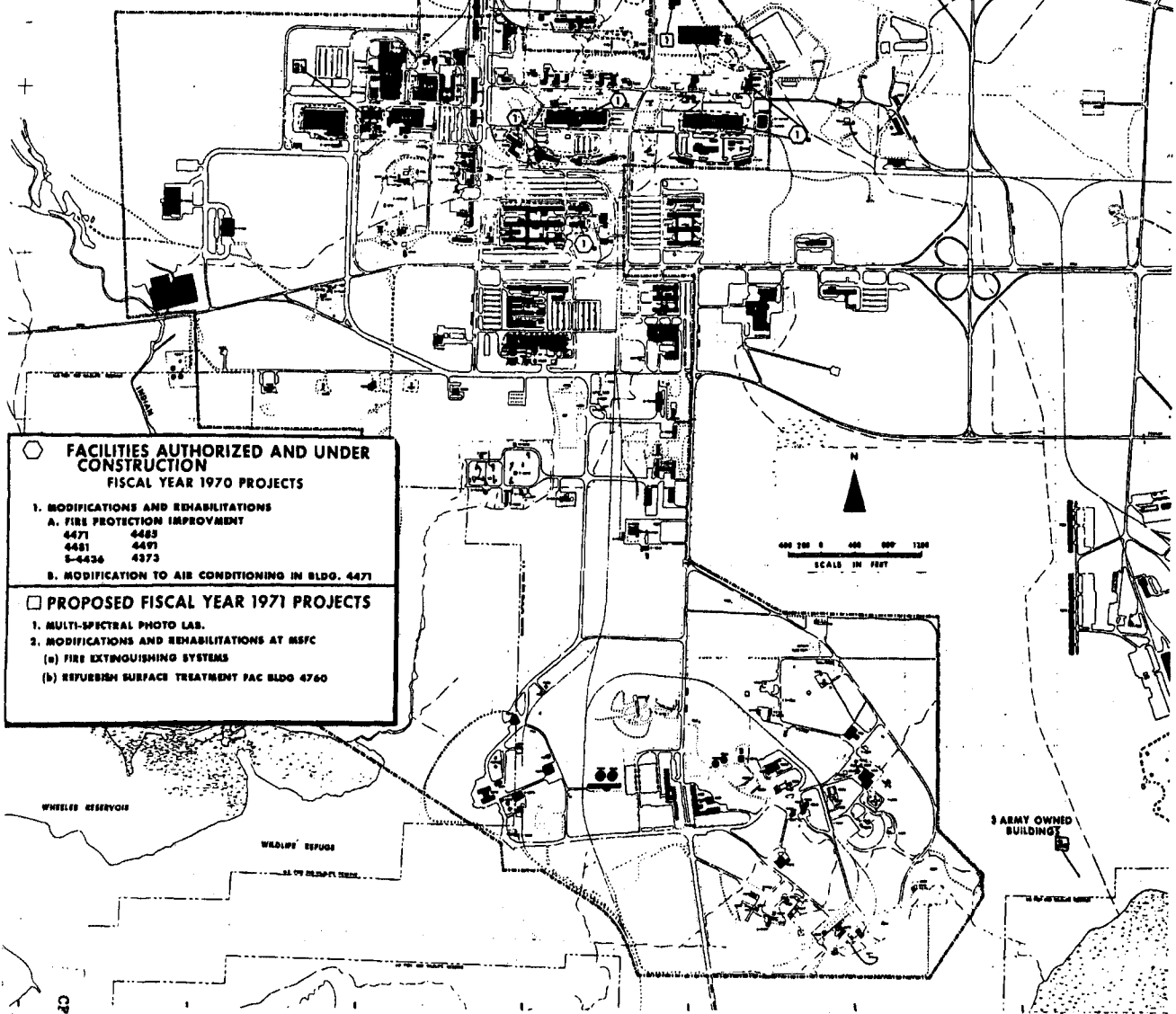
MARSHALL SPACE FLIGHT CENTER **FISCAL YEAR 1971 ESTIMATES** **LOCATION PLAN**

LEGEND **EXISTING FACILITIES**

BLDG NO	TITLE OF USE	BLDG NO	TITLE OF USE
4300	CENTRAL LAB & OFFICE BLDG	4667	BOILER HOUSE
4301	ENGINEERING & ADMINISTRATION	4670	BLACK HOUSE
4302	PROJECT CONTROL OFFICE	4671	STATIC TEST TOWER
4307	CENTRAL COMMUNICATIONS	4303	COMPONENTS TEST LABORATORY
4343	STORAGE FACILITY	4304	COLD CALIBRATION TEST STAND
4349	TECHNICAL SERVICES OFFICE	4600	NON-DESTRUCTIVE TESTING LAB
4350	TECHNICAL MAINTENANCE	4600	PROP & VEHICLE CHG LAB
4306	CATERING	4610	NATURAL STORAGE
4311	AERO-ASTROPHYSICS OPERATIONS	4610	COMPRESSOR EQUIPMENT
4312	SECURITY GUARD LIGHT	4610	CHG OFFICE & SHOP
4313	SERVICE SHOPS	4610	HYDRAULIC TEST SHOP
4314	TEST & DEVELOPMENT SHOP	4610	TEST UNIT/LOAD TEST ARMES
4318	STORAGE	4610	ACCELERATION TEST CELL
4320	FUEL TEST STAND	4610	LOW TEMPERATURE LAB
4321	TRAINING	4610	HYDRAULIC TEST SHOP
4322	NITROGEN MANUFACTURING	4610	HIGH PRESSURE AIR COMP BLDG
4323	PHOTO LABORATORY	4610	TRANSPORTATION HANGAR
4324	PLANT MAINTENANCE	4610	TEST SHOP & INSTRUMENT LAB
4327	EQUIPMENT STORAGE	4610	COMPONENTS SUPPORT SHOP
4373	ASTRONOMICS LABORATORY	4610	F-1 PREPARATION SHOP
4424	FIRE STATION (ARMY)	4610	SSE ASSEMBLY BUILDING
4428	BOILER ROOM	4610	SUPPORT BUILDING
4471	ENGINE MAINTENANCE OFFICE & SHOP	4610	COMPONENT LABORATORY
4479	HAZARDOUS OPERATIONS LAB	4610	TEST LAB ENGINEERING
4479	ACCELERATION TEST & CALIBRATION	4610	CENTRAL WATER PUMP HOUSE
4481	ADMINISTRATION & ENGINEERING	4610	SATUR V STATIC TEST STAND
4482	VEHICLE MAINTENANCE SHOP	4610	WEST AREA BLOCK HOUSE
4483	ADMINISTRATIVE MAINTENANCE SHOP	4610	F-1 ENGINE TEST STAND
4487	PERSONNEL MANAGEMENT OFFICE	4610	ASSEMBLY SHOP
4487	ASTRONOMICS LABORATORY	4610	QUALITY ASSURANCE LAB
4488	AUTOMATIC DATA PROCESSING	4610	LIQUID HYDROGEN TEST STAND
4412	ELECTRIC SHOP	4610	PRECISION MACHINE SHOP
4413	MACHINE SHOP	4610	MANUFACTURING ENGINEERING LAB
4414	TECHNICAL DOCUMENTATION	4610	FIELD MATERIALS TESTING LAB
4414	LIQUID HYDROGEN TEST STAND	4610	STEAM PLANT (ARMY)
4415	TEST STAND	4610	MACHINE SHOP
4415	TEST STAND BUILDING	4610	STRUCTURE FABRICATION SHOP
4415	SUPPORT BUILDING	4610	AERO-ASTROPHYSICS FACILITY
4415	TEST STAND BUILDING	4610	TEST LAB & OFFICE
4415	ADAPTIVE MODEL TEST FACILITY	4610	COMPRESSOR STATION
4415	F-1 TURBO PUMP TEST FACILITY	4610	HOUSE POWER/LIGHT TEST STAND
4415	SATUR V DYNAMIC TEST STAND	4610	HIGH ALTITUDE TEST CHAMBER
4415	DYNAMIC CONTING. CENTER	4610	COMP. SUB-ASSEMBLY SHOP
4415	PROPELLANT SUPPORT SHOP	4610	HANGAR FOR VEHICLE COMP
4415	ENGINE TEST STAND	4610	SURFACE TREATMENT PLANT
4415	TEST LABORATORY ENGINEERING	4610	



VICINITY MAP



FACILITIES AUTHORIZED AND UNDER CONSTRUCTION
FISCAL YEAR 1970 PROJECTS

1. MODIFICATIONS AND REHABILITATIONS

A. FIRE PROTECTION IMPROVEMENT

4471 4483
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) REFRESH SURFACE TREATMENT FAC BLDG 4760

WHEELS RESERVOIR

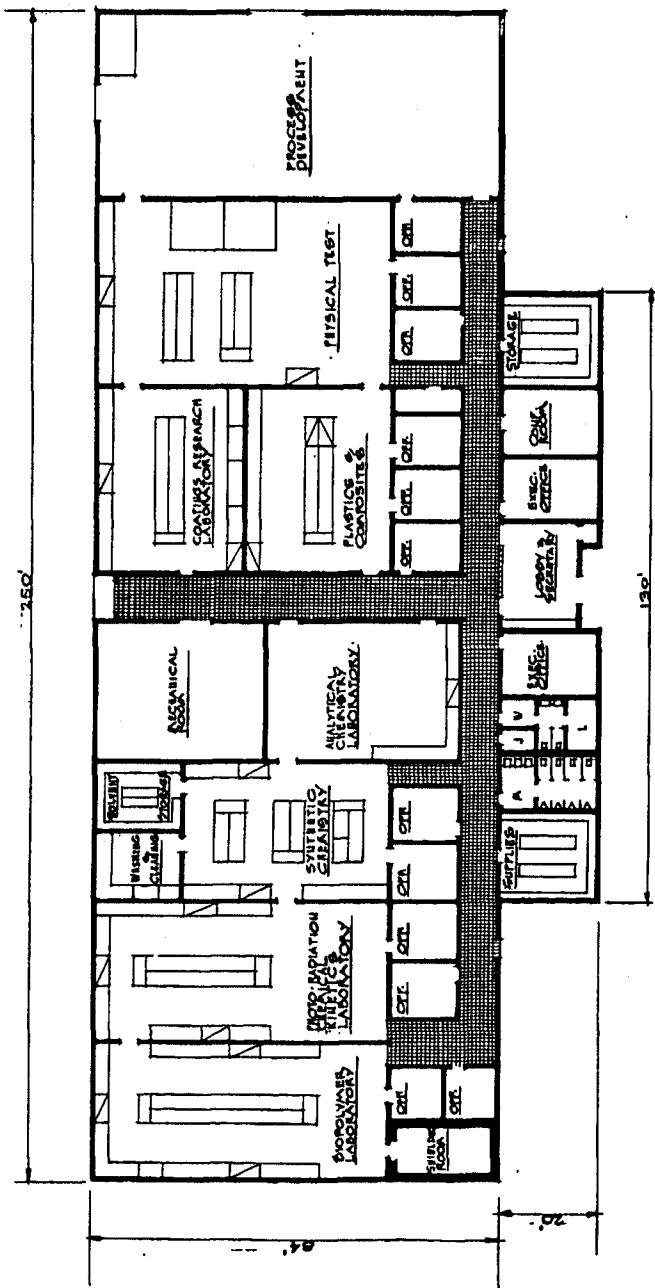
WILDLIFE REFUGES

ARMY OWNED BUILDING

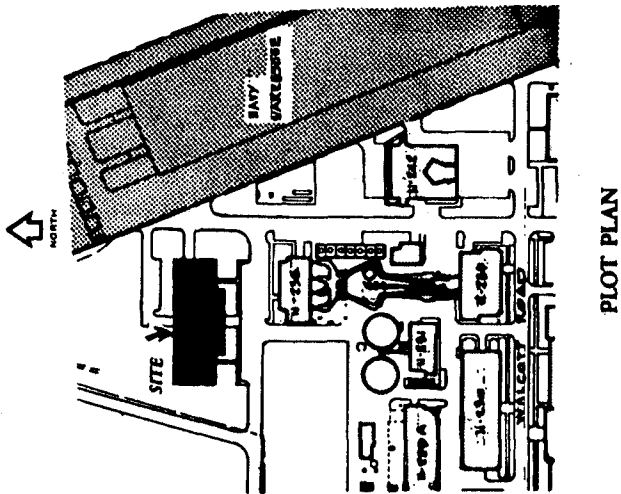
AMES RESEARCH CENTER

FISCAL YEAR 1971 ESTIMATES

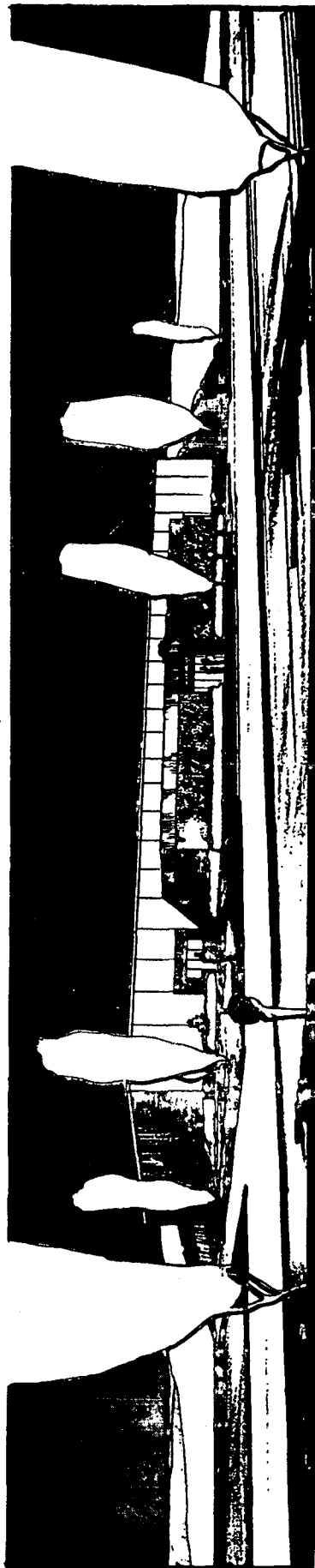
POLYMER RESEARCH LABORATORY



FLOOR PLAN



PLOT PLAN



PERSPECTIVE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

GODDARD SPACE FLIGHT CENTER

	<u>Page No.</u>
Location plan.....	CF 2-1
Summary.....	CF 2-2
Office of Space Science and Applications Project:	
Earth resources technology laboratory.....	CF 2-3

(Dollars in thousands)

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.

NASA FORM 1029 JUN 69 PREVIOUS EDITIONS ARE OBSOLETE.

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	<u>2,050,000</u>
Total Funding Through FY 1971	<u>\$2,117,000</u>
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:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$2,050,000</u>
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
<u>Equipment</u>	---	---	---	---
<u>Fallout Shelter (Not Feasible)</u>	---	---	---	<u>None</u>
			<u>TOTAL</u>	<u>\$2,050,000</u>

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.

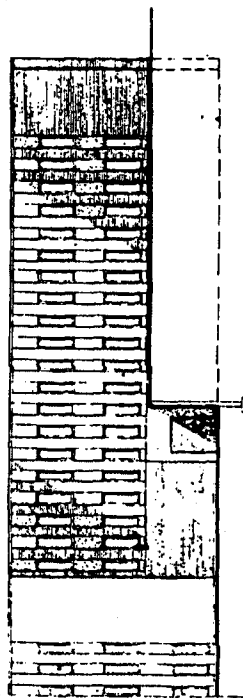
This project will provide the office, laboratory, and special purpose space for the ERTS control center, data processing capability, and house the ERTS project team. Due to the urgency of the need for a control center to support the ERTS-A mission, the Control Center and other related facilities will 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.

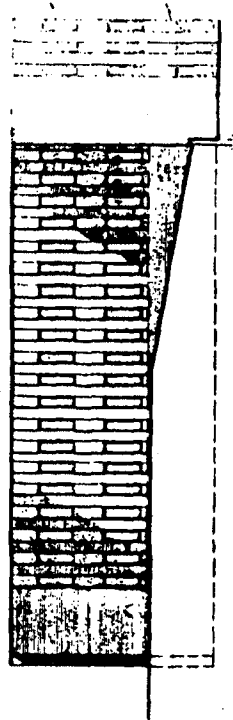
All facilities at GSFC have been examined and alternate solutions explored. The construction of an addition to Building 23 for the purpose outlined was determined to be the most prudent solution. The proposed solution utilizes 26,000 square feet on the third floor of Building 23 and provides for the 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

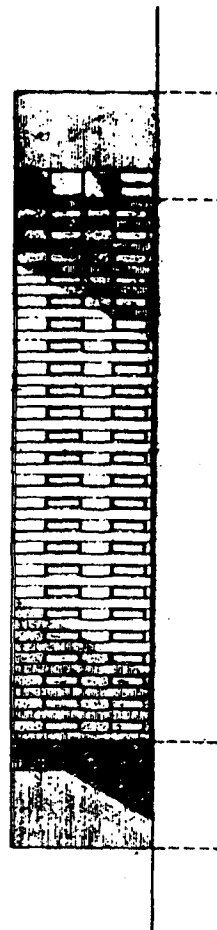
Earth Resources Technology Laboratory



EAST ELEVATION



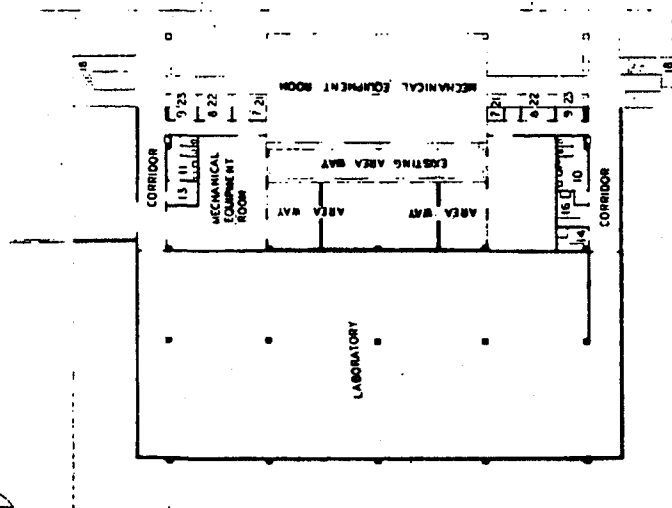
WEST ELEVATION



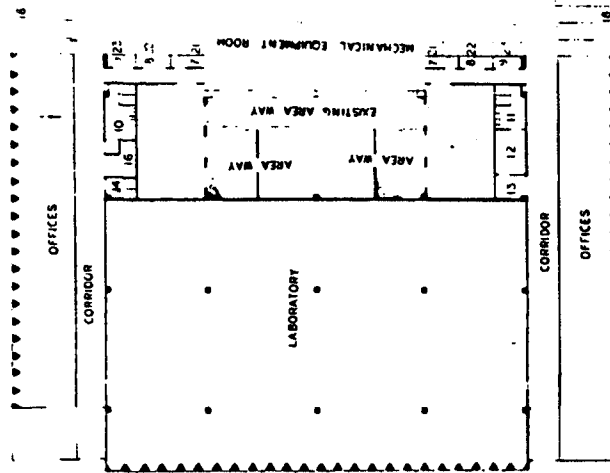
NORTH ELEVATION

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1971 ESTIMATES

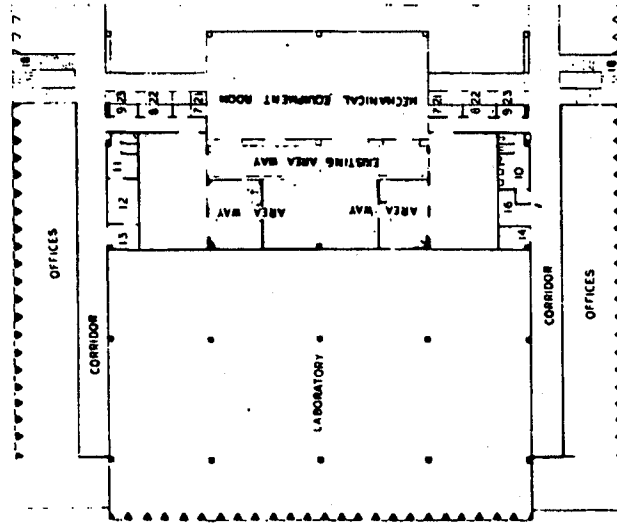
Earth Resources Technology Laboratory



GROUND FLOOR



FIRST FLOOR



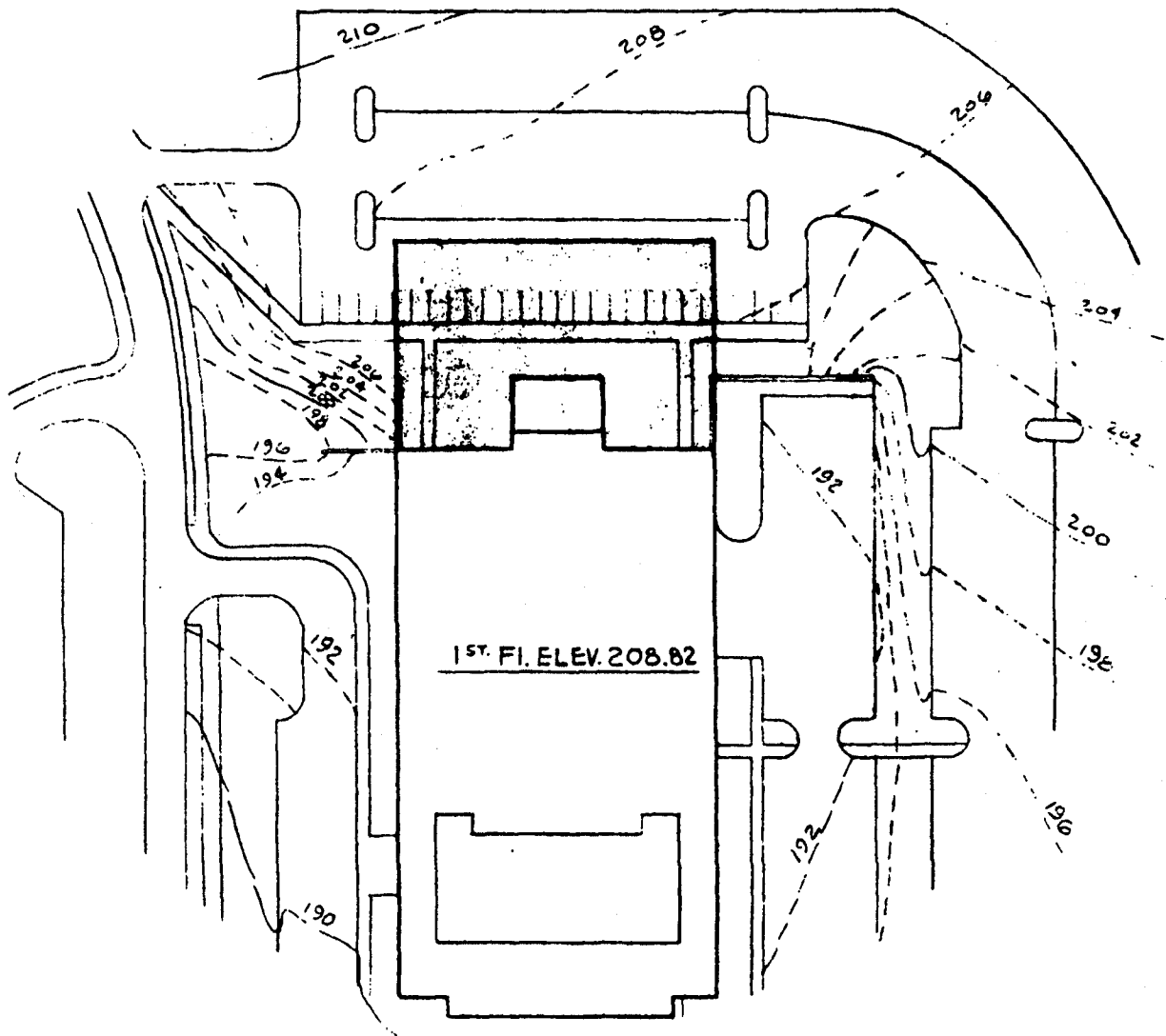
SECOND FLOOR

THREE STORY ADULTS-N

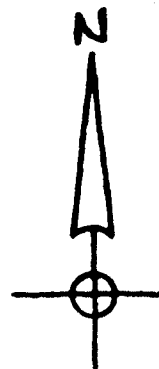
GRAPHIC SCALE 1" = 10' 0" 2" = 20' 0"

GODDARD SPACE FLIGHT CENTER FISCAL YEAR 1971 ESTIMATES

EARTH RESOURCES TECHNOLOGY LABORATORY



BUILDING 23



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

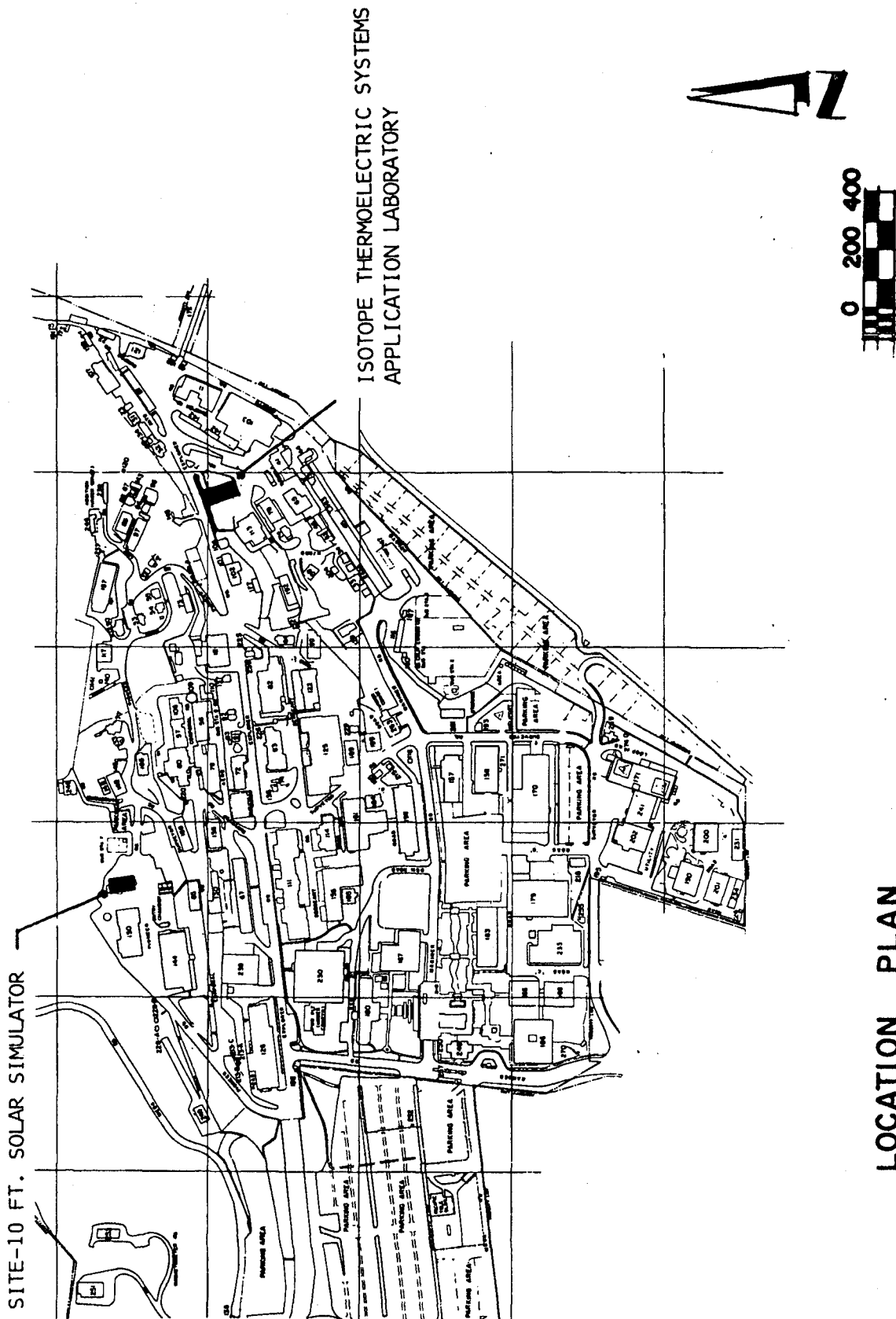
CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

JET PROPULSION LABORATORY

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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



(Dollars in thousands)

INSTALLATION MISSION

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 <u>71</u> (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		

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	<u>700,000</u>
Total Funding Through FY 1971	<u>\$2,421,480</u>
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 $\pm 5\%$ in uniformity with $\pm 2 \frac{1}{2}^\circ$ 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:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>	---	---	---	---
<u>Equipment</u>	---	---	---	<u>\$700,000</u>
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
<u>Fallout Shelter</u>	---	---	---	---
			<u>TOTAL</u>	<u>\$700,000</u>

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

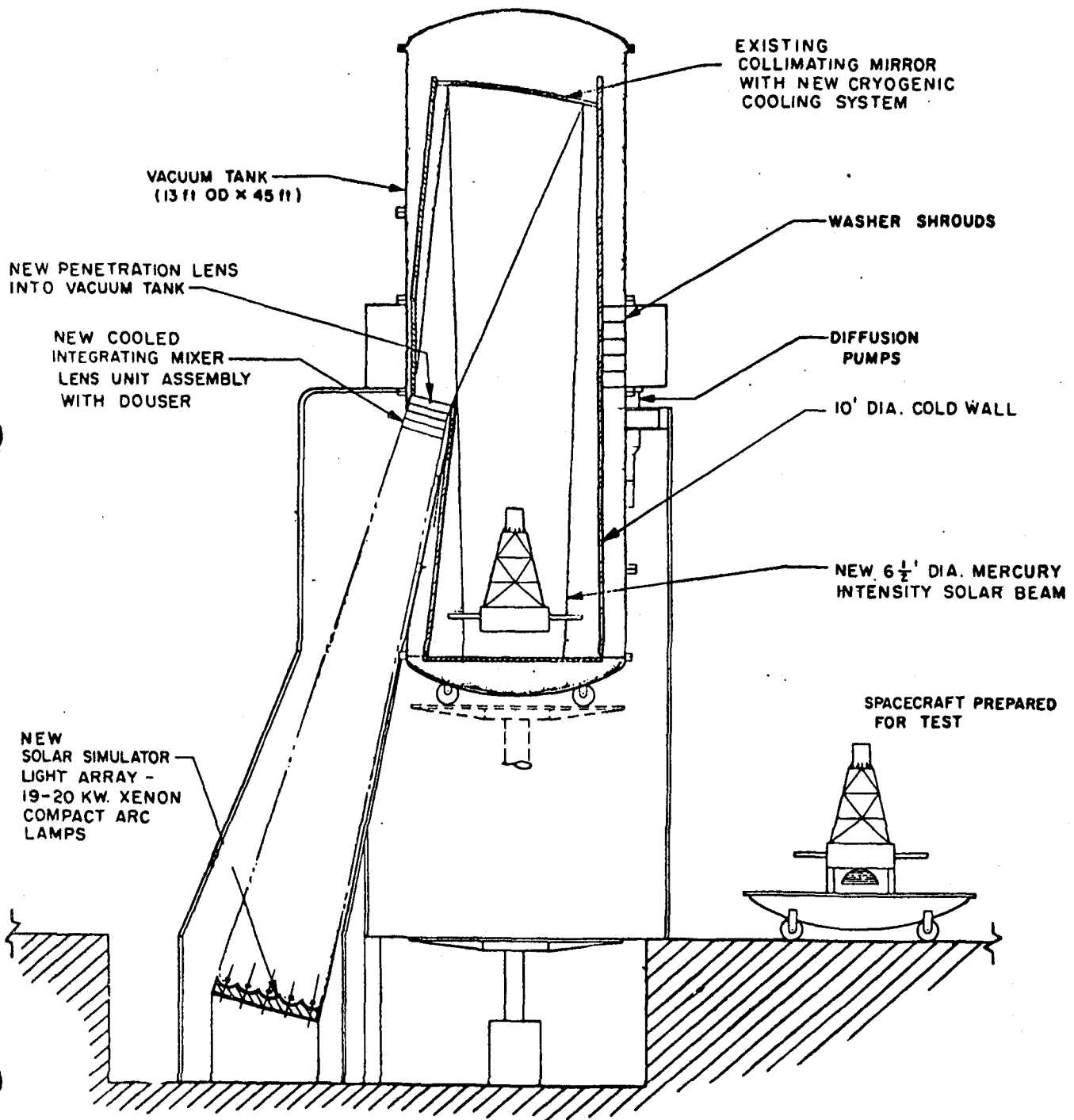
experience to 780 watts per square foot of solar energy. We believe that the only reasonable solution is to minimize the reliability risks by adequate testing under simulated flux equivalent to that expected to be encountered in space.

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)



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
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FY 1971 Estimate	<u>1,250,000</u>
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Total Funding Through FY 1971	<u>\$1,310,000</u>
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Estimated Future Year CoF Funding	None
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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 DESCRIPTION:

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:

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

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.

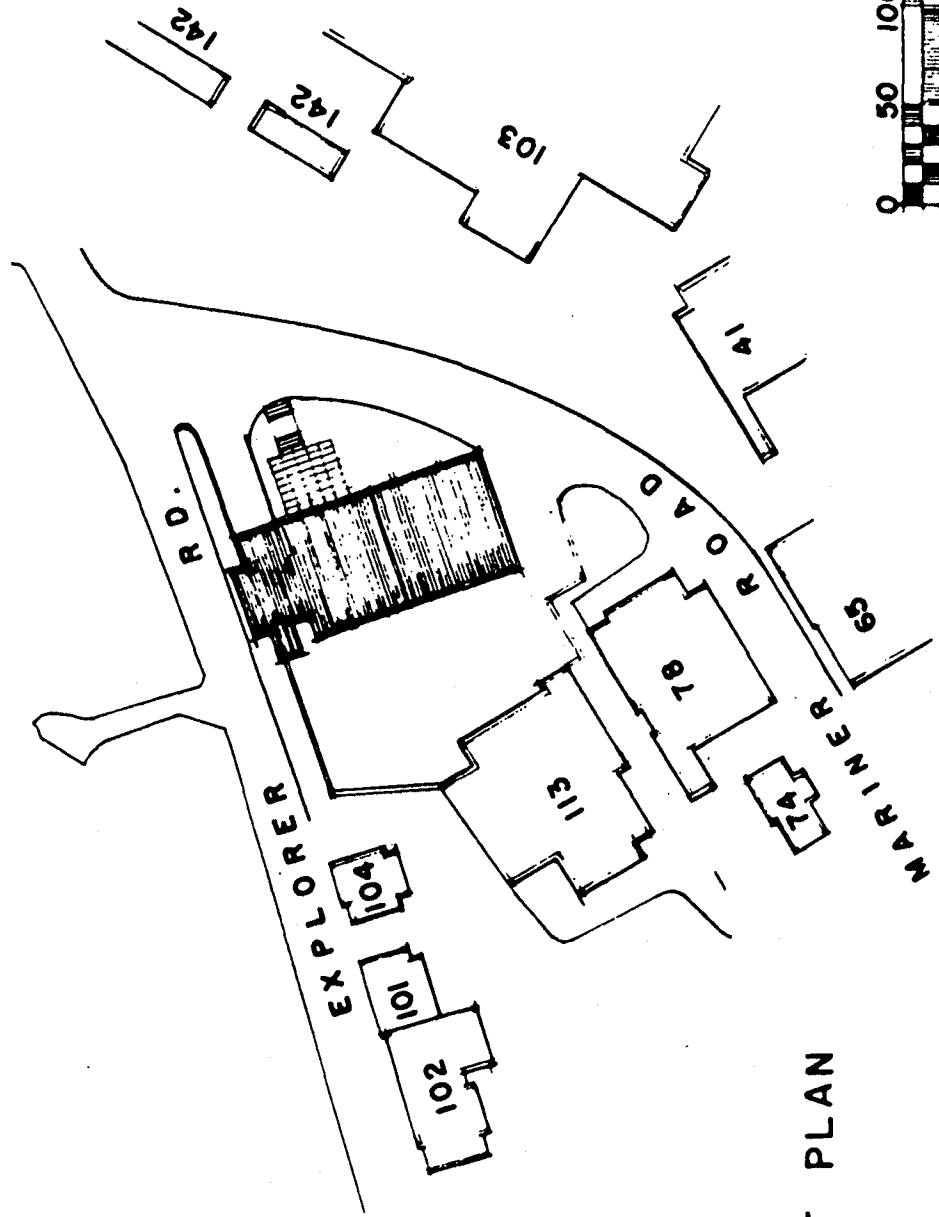
The problem of utilizing RTG power sources in the presence of sensitive scientific instrumentation is also complicated by the fact that the fuel capsules contain minute quantities of impurities in the fuel compounds that cannot be removed. These impurities contribute significantly to the total radiation 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

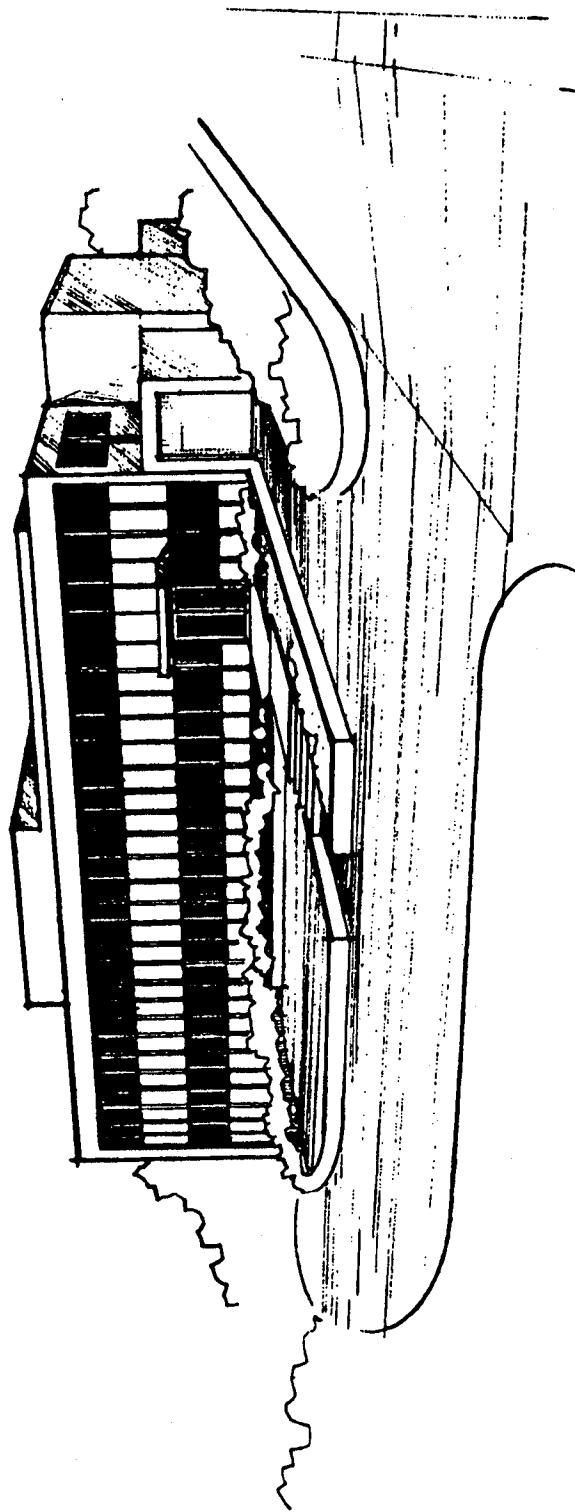
ISOTOPE THERMOELECTRIC SYSTEMS APPLICATION LABORATORY



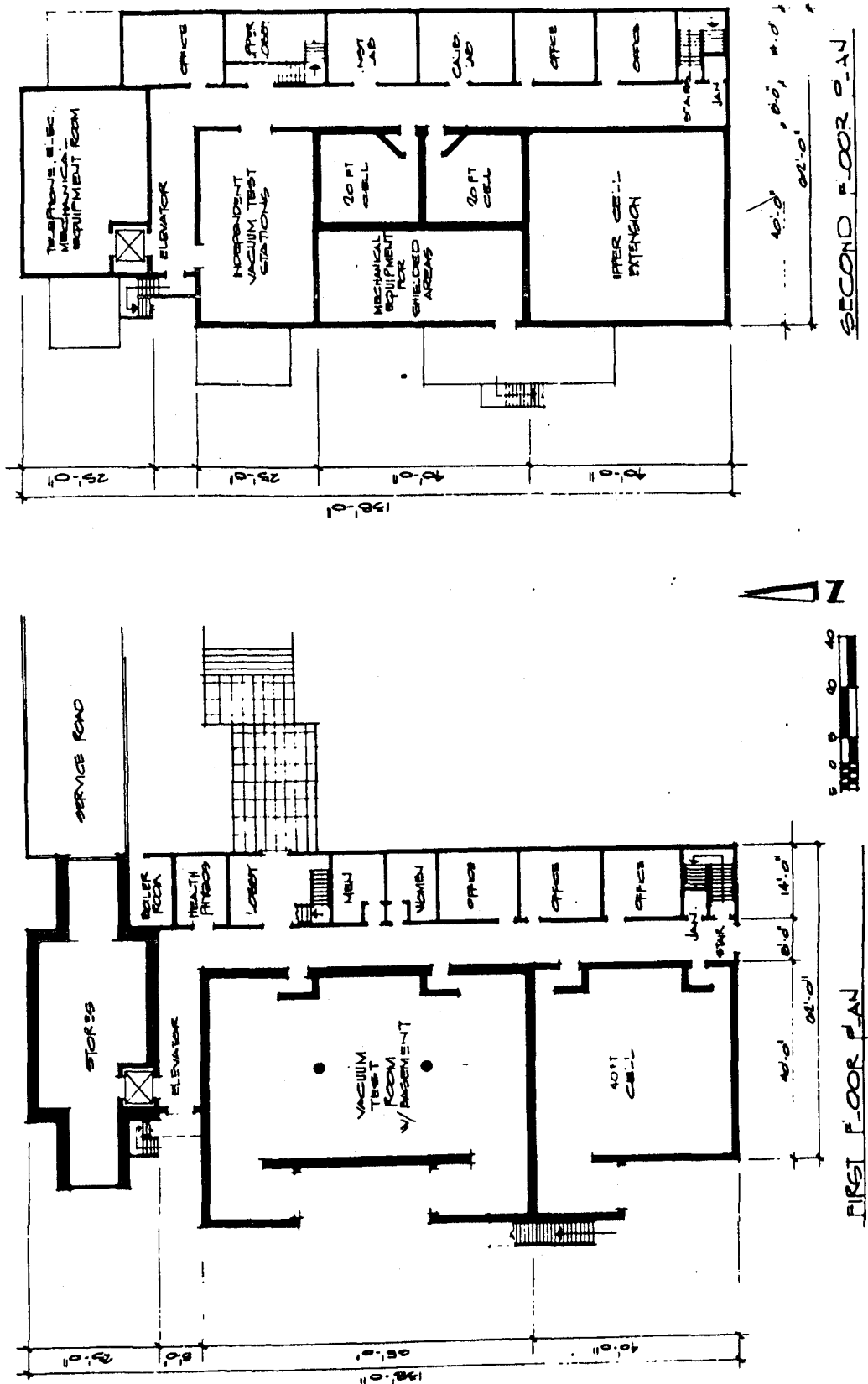
PLOT PLAN

**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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Office of Manned Space Flight Project:

Launch support facilities..... CF 4-4

JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LOCATION PLAN

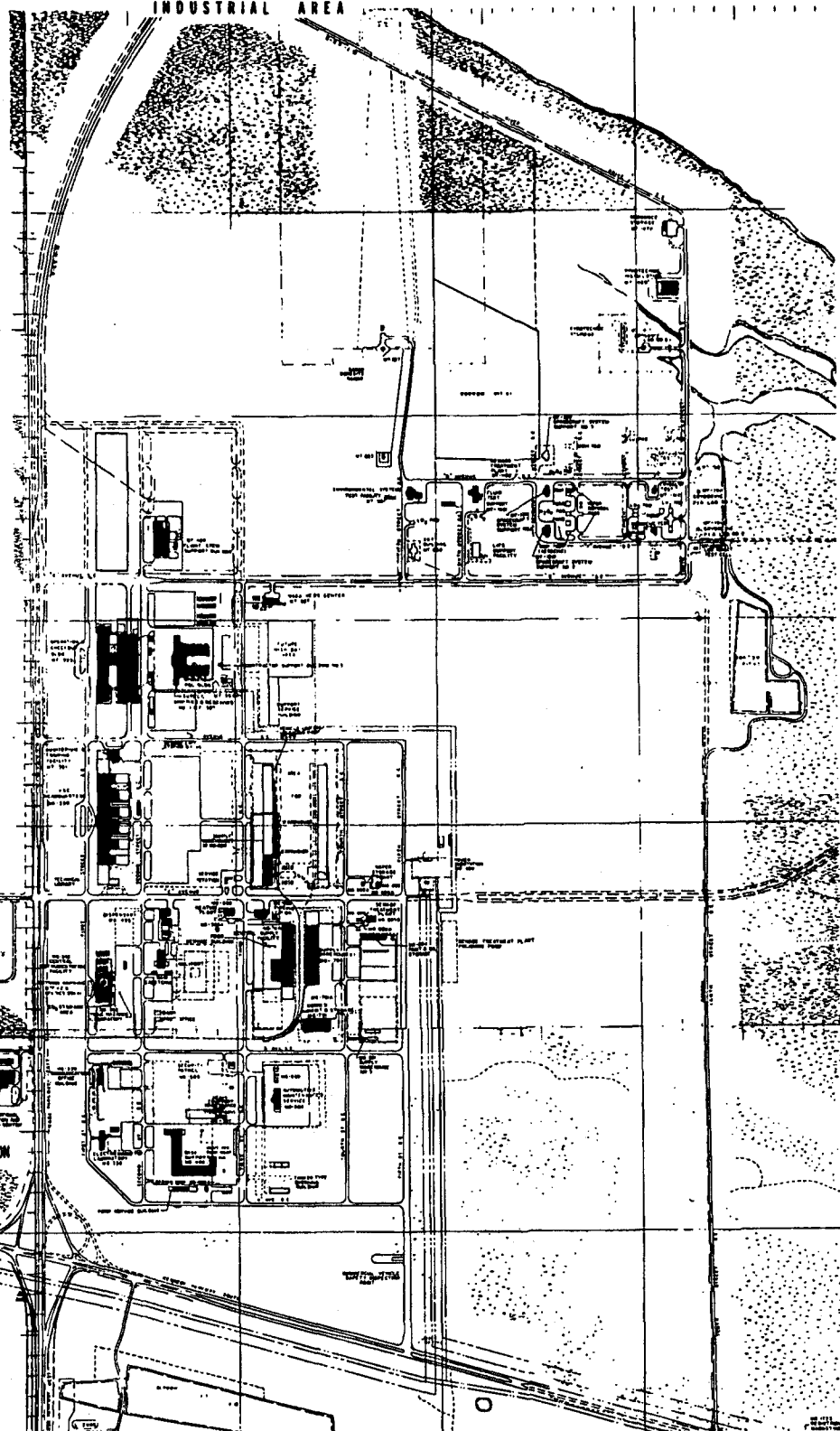
LEGEND

EXISTING FACILITIES

- WG-34 PARKING SHEDS
- WG-98 SOUTHERN BELL T. & T. PLANT WORK CENTER
- WG-138 COMMUNICATIONS, DISTRIBUTION AND SWITCHING CENTER
- WG-336 ELECTROMAGNETIC LABORATORY
- WG-339 COMMUNICATIONS OFFICE BUILDING
- WG-342 CENTRAL INSTRUMENTATION FACILITY
- WG-382 TOXIC HAZARDS LABORATORY
- WG-399 KSC HEADQUARTERS
- WG-488 BASE SUPPORT
- WG-488A LOADING DOCK
- WG-493 MAIN CAFETERIA
- WG-495 DISPENSARY
- WG-587 HEAVY EQUIPMENT MAINTENANCE SHOP
- WG-589 SECURITY PATROL
- WG-595 HEATING PLANT
- WG-595A FUEL OIL STORAGE TANK
- WG-688 AUTOMOTIVE MAINTENANCE SERVICE
- WG-695 FIRE STATION
- WG-698 SUPPLY WAREHOUSE NO. 2
- WG-744 CENTRAL SUPPLY FACILITY
- WG-781 COMMUNICATIONS MAINTENANCE AND STORAGE
- WG-794 SUPPLY WAREHOUSE NO. 1
- WG-891 SUPPLY WAREHOUSE NO. 3
- WG-894 PAINT AND OIL STORAGE
- WG-895 SEWAGE TREATMENT PLANT
- WG-895A SEWAGE LIFT STATION
- WG-895B SEWAGE TREATMENT PLANT
- WG-896 WATER STORAGE PLANT
- WG-896A ELEVATED WATER STORAGE TANK
- WG-896B GROUND WATER STORAGE TANK
- WG-896 POWER SUBSTATION
- W7-351 AUDITORIUM AND TRAINING FACILITY
- W7-355 OPERATION AND CHECKOUT BUILDING
- W7-409 FLIGHT CREW SUPPORT BUILDING
- W7-451 SEWAGE LIFT STATION
- W7-505 SUPPLY, SHIPPING AND RECEIVING NO.1
- W7-554 OPERATIONS P.O.L. BUILDING
- W7-657 NASA NEWS CENTER
- W7-863 RADAR HOMESITE RANGE, TOWER
- W7-867 RADAR HOMESITE RANGE, CONTROL BUILDING
- W7-867 ENVIRONMENTAL SYSTEMS TEST FACILITY
- W7-1061 FLUID TEST SUPPORT
- W7-1182 SEWAGE TREATMENT PLANT
- W7-1210 SPACECRAFT SYSTEM SUPPORT NO.2
- W7-1212 SPACECRAFT SYSTEM SUPPORT NO.1
- W7-1410 CRYOGENIC TEST NO.2
- W7-1412 CRYOGENIC TEST NO.1
- W7-1417 ORDNANCE LABORATORY NO.2
- W7-1489 PYROTECHNIC INSTALLATION
- W7-1472 ORDNANCE STORAGE
- W7-1509 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

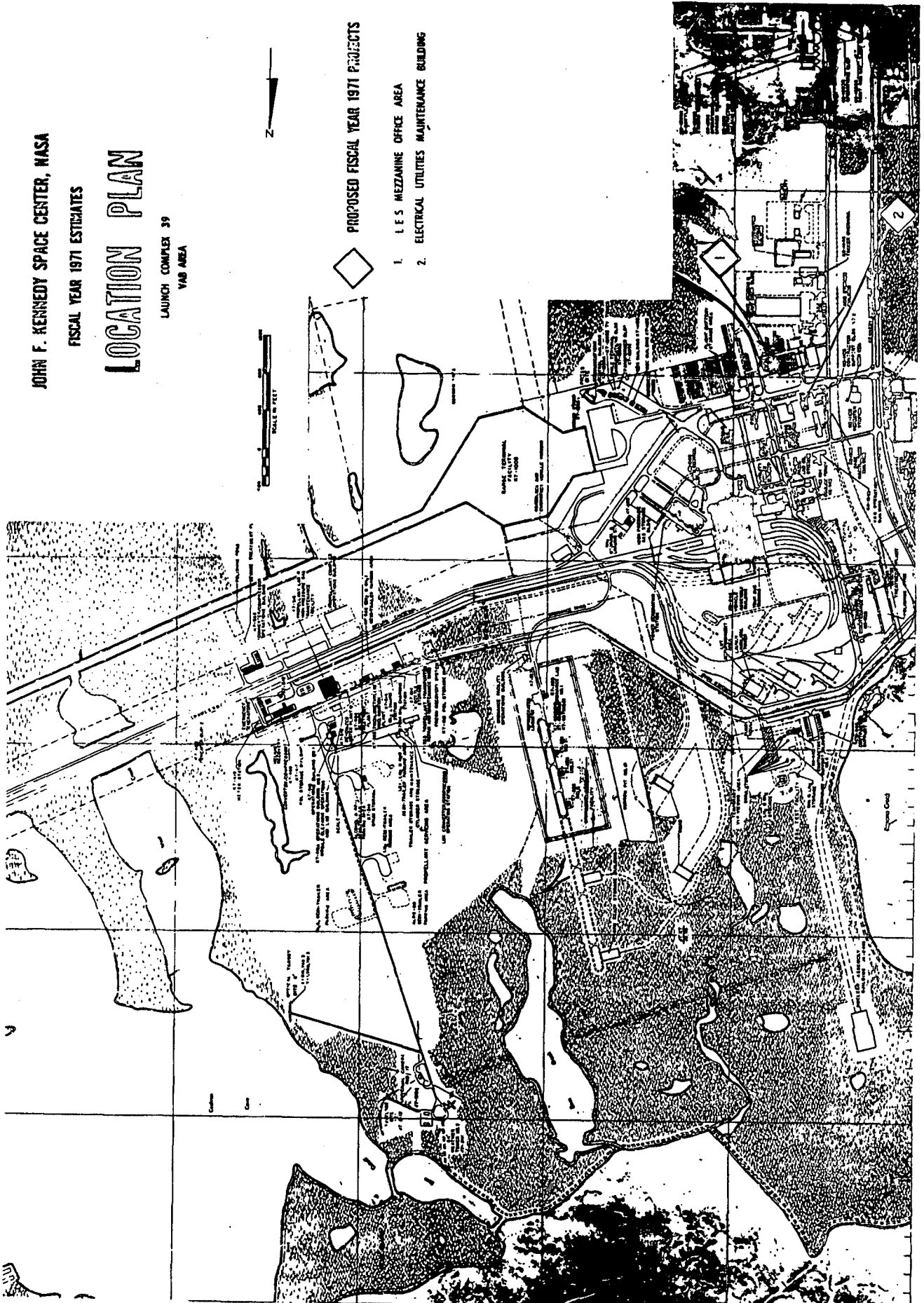
LAUNCH COMPLEX 39

VAB AREA



PROPOSED FISCAL YEAR 1971 PROJECTS

1. L & S MEZZANINE OFFICE AREA
2. ELECTRICAL UTILITIES MAINTENANCE BUILDING



(Dollars in thousands)

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.

NASA FORM 1029 JUN 69

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	<u>575,000</u>
Total Funding Through FY 1971	<u>\$608,000</u>
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:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$575,000</u>
Electrical utilities maintenance building:				<u>170,000</u>
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:				<u>52,000</u>
Modification work	Sq. Ft.	2,870	18.12	(52,000)

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Communications distribution and switching center:				<u>\$353,000</u>
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
<u>Equipment</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	---
				<u>\$575,000</u>

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.

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.

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.

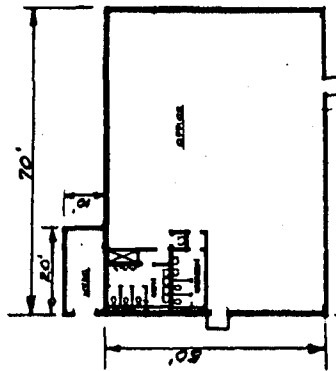
Kennedy Space Center has a large number of trailers in use. Many of these will be eight years old or older by the end of Fiscal Year 1971. Since the normal useful life of a trailer in this area is eight years, replacement will be essential in the very near future. Since launch support activities are 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

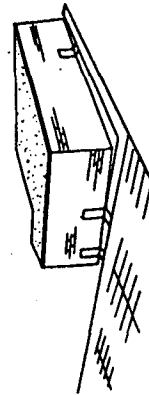
FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

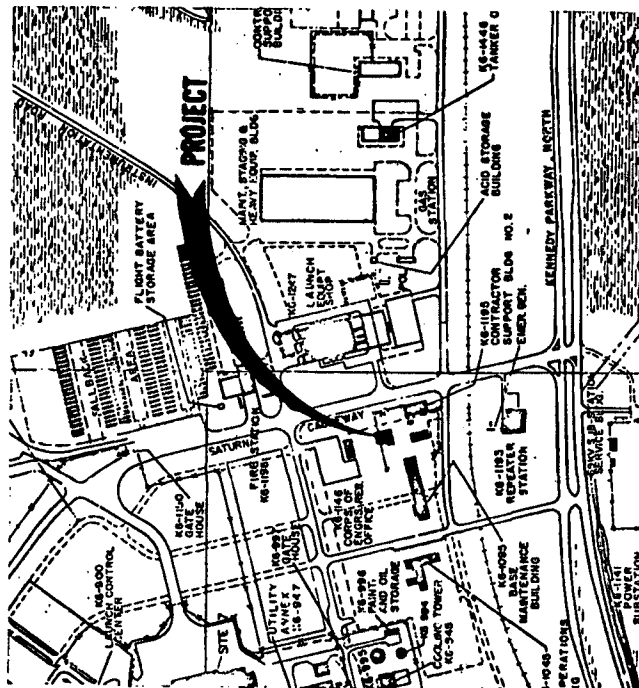
ELECTRICAL UTILITIES MAINTENANCE BUILDING



FLOOR PLAN



PERSPECTIVE



PLOT PLAN

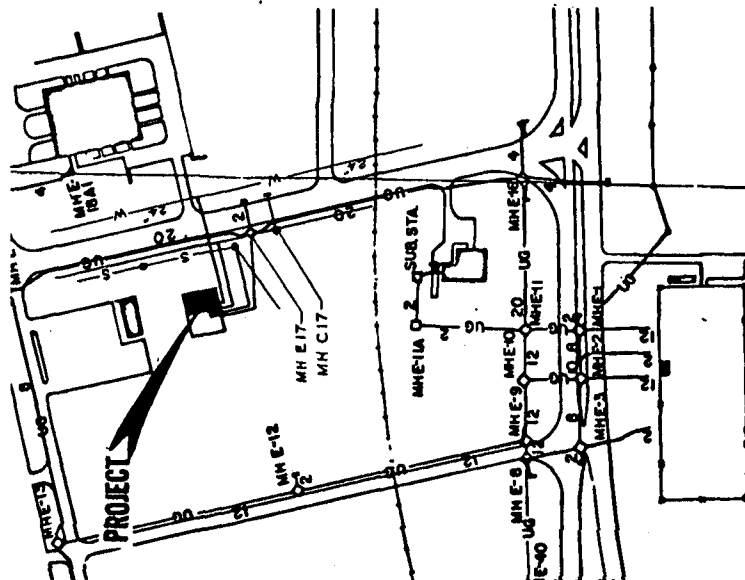


JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

ELECTRICAL UTILITIES MAINTENANCE BUILDING



SITE UTILITIES PLAN



LEGEND

EXISTING	PROGRAM
—●— S — SEWAGE	—●— S —
—●— HW — HIGH TEMP HOT WATER	—●— HW —
—●— W — WATER	—●— W —
—●— ELECTRICAL (UNDER GROUND)	—●—
—●— ELECTRICAL (OVER HEAD)	—●—
—●— COMMUNICATIONS (U/G DUCT)	—●—

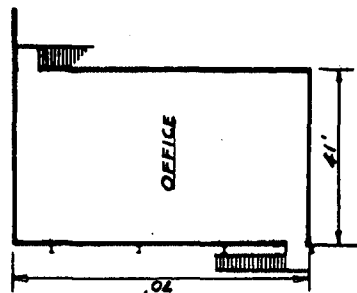
NO EXTERIOR HIGH TEMP HOT WATER REQUIRED

JOHN F. KENNEDY SPACE CENTER, NASA

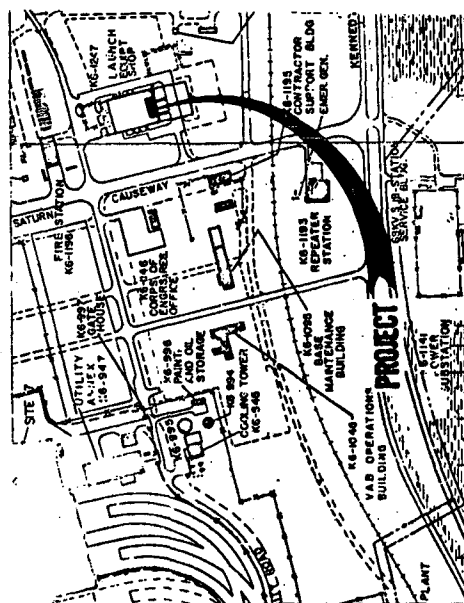
FISCAL YEAR 1971 ESTIMATES

LAUNCH SUPPORT FACILITIES

LES MEZZANINE OFFICE AREA



FLOOR PLAN



PLOT PLAN

NO EXTERIOR UTILITIES



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

MANNED SPACECRAFT CENTER

Page No.

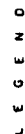
Location plan..... CF 5-1

Summary..... CF 5-2

Office of Manned Space Flight Project:

Calibration laboratory..... CF 5-3

LOCATION PLAN



BUILDINGS EXISTING ON UNDER CONTRACT
ROADS AND MINING LOTS EXISTING ON UNDER CONTRACT
PROPERTY LINE
EASEMENT LINE
AREA ALLOCATION LINE
FENCE
UTCH
FREE LINE
UNIMPROVED ROADS

WANNED SPACECRAFT CENTER CLEAR LAKE, TEXAS MASTER SITE PLAN

[illegible]

EXPENSE FIELD YEAR 1971 PROJECT

23 CALIFORNIA LABORATORY

CF 5-1

(Dollars in thousands)

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	<u>900,000</u>
Total Funding Through FY 1971	<u>\$960,000</u>
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 $73^{\circ}\text{F} \pm 1^{\circ}\text{F}$ and relative humidity of $40\% \pm 10\%$.

Physical Science Reference Standards for maintaining primary standards for calibration of secondary standards in a closely controlled environment of $68^{\circ}\text{F} \pm 1/2^{\circ}\text{F}$ temperature, and relative humidity of $40\% \pm 10\%$. 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:

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

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.

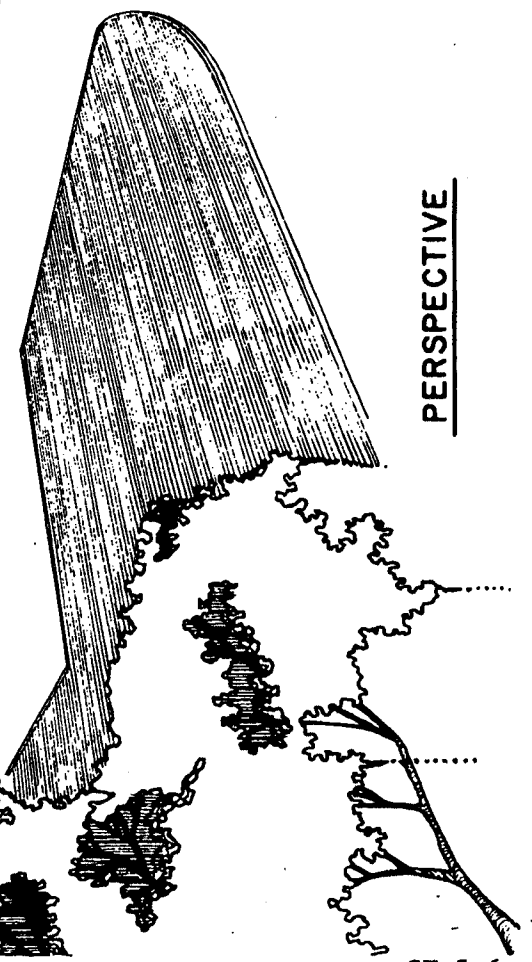
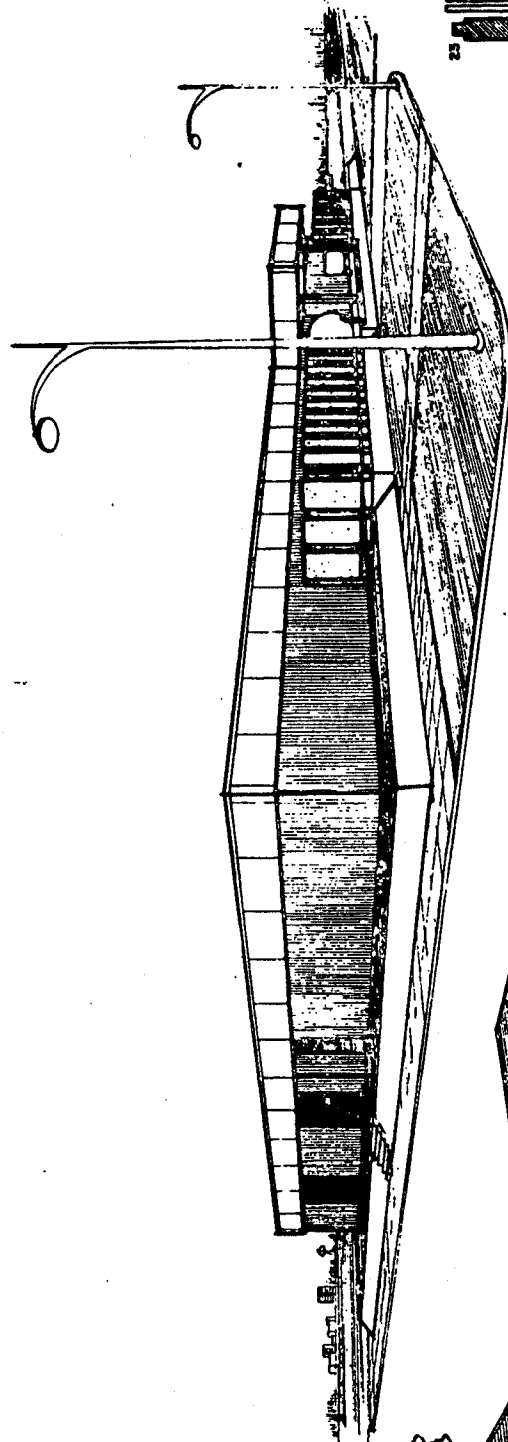
Calibration activities are currently carried out in sixteen scattered areas in the high bay and mezzanine area of the Instrumentation and Electronic Systems Laboratory Building and two other buildings, one of which is located at Ellington Air Force Base. These facilities are either substandard, overcrowded 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.

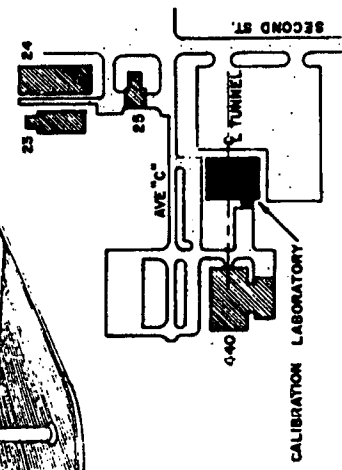
In view of the significance and importance of instrument calibration to space programs, a facility which is designed and constructed to specifically accommodate the unique needs of this function is essential to the Center. Without such a facility, calibration of equipment and instrumentation will continue 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



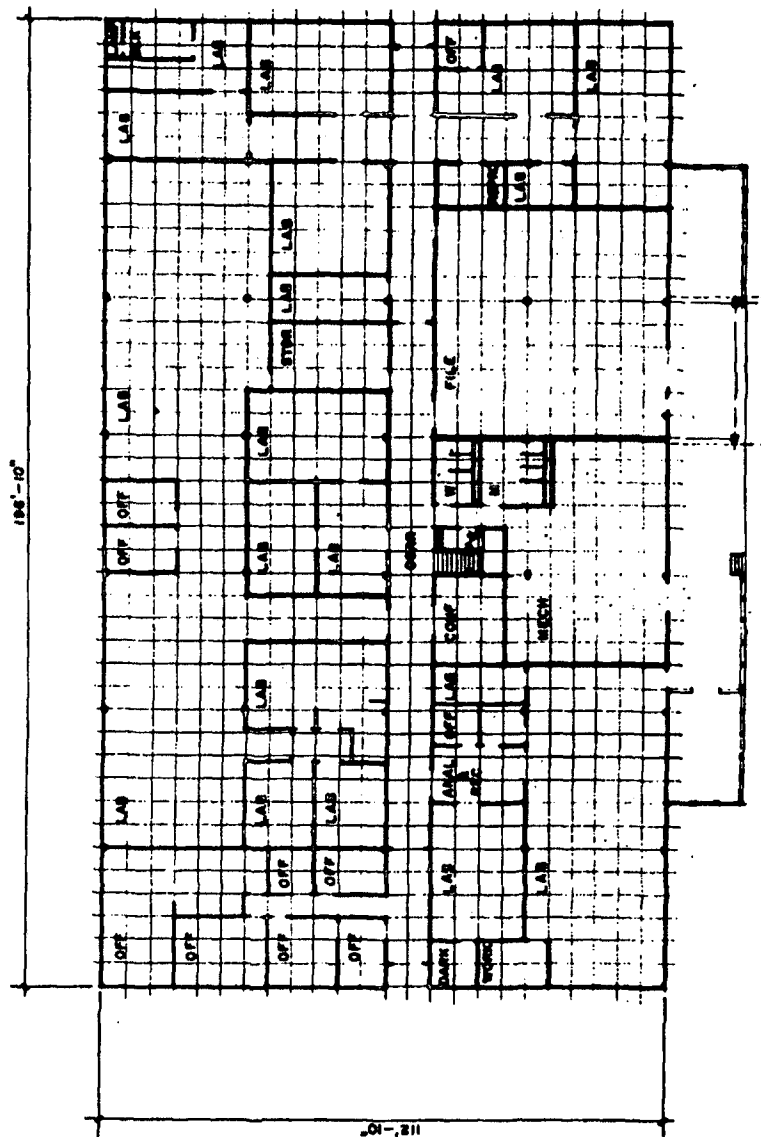
PARTIAL SITE PLAN

— 1971 PROJECT



MAINED SPACECRAFT CENTER
FISCAL YEAR 1971 ESTIMATES

CALIBRATION LABORATORY



FLOOR PLAN



SCALE IN FEET

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

FISCAL YEAR 1971 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

Page No.

Location plan.....	CF 6-1
Summary.....	CF 6-2
Office of Manned Space Flight Project:	
Multi-spectral photographic laboratory.....	CF 6-3

(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	

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 <u>71</u> <i>(Estimated)</i>	FUTURE YEARS <i>(Estimated)</i>	TOTAL ALL YEARS <i>(Estimated)</i>
Multi-Spectral Photographic Laboratory	MSF	36	525		561
TOTAL			525		

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
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FY 1971 Estimate	<u>525,000</u>
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Total Funding Through FY 1971	<u>\$561,000</u>
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Estimated Future Year CoF Funding	None
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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:

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

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.

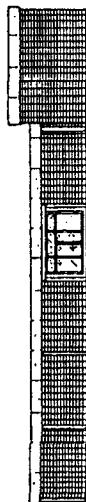
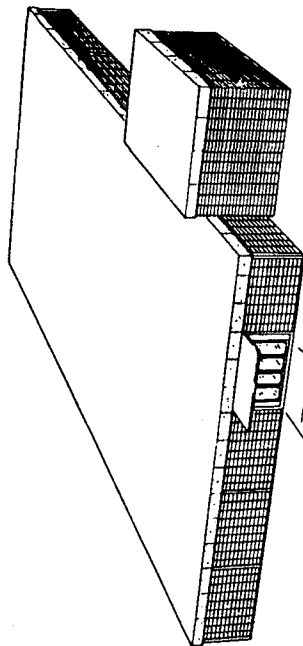
Approximately twenty-five percent of the total photographic workload is devoted to programs and tests which are totally dependent upon film documentation for data collection. An additional fifty percent of the workload is in direct support of research, development, tests, and evaluation of programs conducted 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

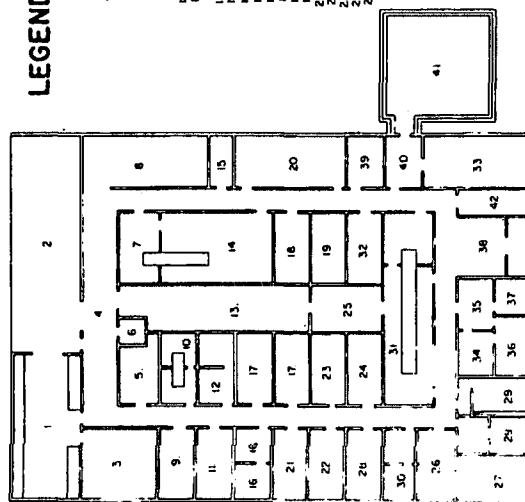
MULTI-SPECTRAL PHOTOGRAPHIC LAB



NORTH ELEVATION

LEGEND:

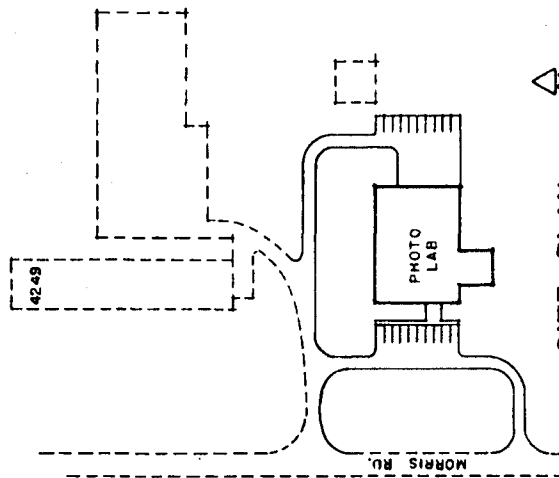
- | | |
|---------------------------|-----------------------|
| 1. CAMERA READY ROOM | 25. CHEMICAL ANALYSIS |
| 2. CAMERA STORAGE | 26. FILE |
| 3. CORRIDOR | 27. VAULT |
| 4. LAB CHIEF | 28. EDITING |
| 5. AUTO ENLARGE | 29. CHIEF EDITOR |
| 6. MECH | 30. COLORED MOTION |
| 7. INSTRUMENTATION | 31.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



FLOOR PLAN



PERSPECTIVE



SITE PLAN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CONSTRUCTION OF FACILITIES

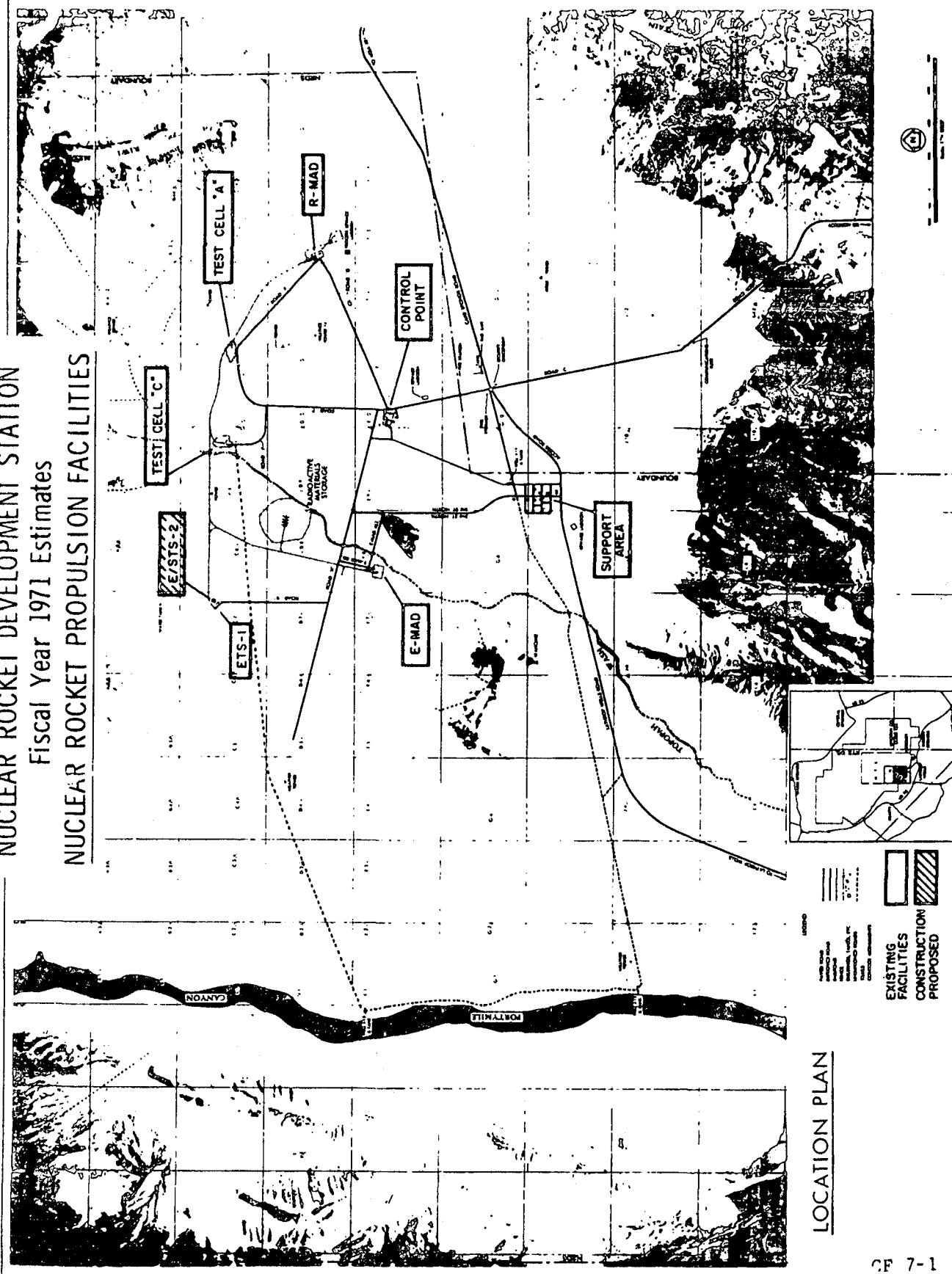
FISCAL YEAR 1971 ESTIMATES

NUCLEAR ROCKET DEVELOPMENT STATION

Page No.

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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

(Dollars in thousands)

INSTALLATION MISSION

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

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 super-structure 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
<u>Land Acquisition</u>	---	---	---
<u>Construction</u>		<u>\$12,810,000</u>	---
Test stand	LS	7,410,000	---
Buildings	LS	2,320,000	---
Utilities	LS	2,080,000	---
Site work	LS	1,000,000	---
<u>Equipment</u>		<u>35,690,000</u>	<u>\$3,500,000</u>
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	---
<u>Fallout Shelter</u>	---	---	---
TOTAL		<u>\$48,500,000*</u>	<u>\$3,500,000</u>

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

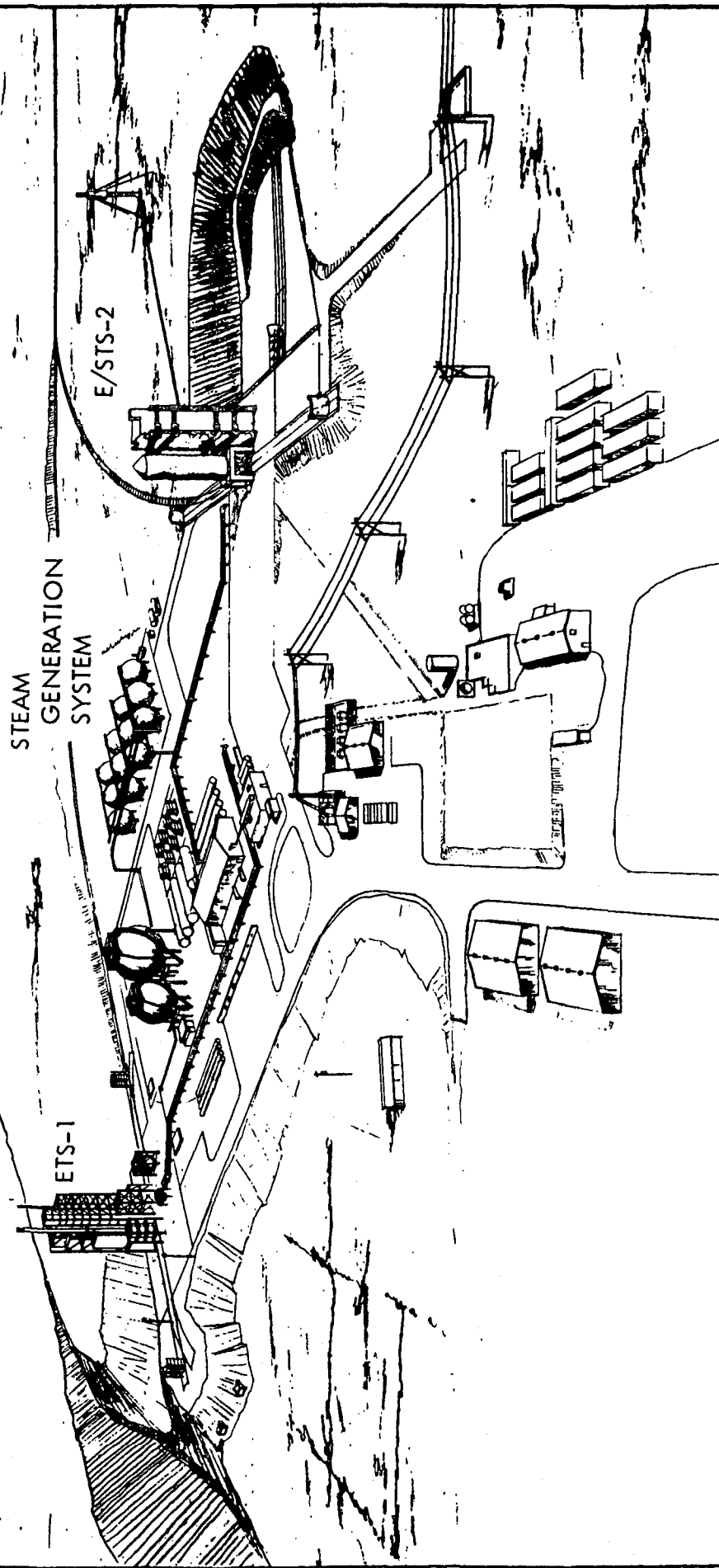
PROJECT JUSTIFICATION:

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

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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

(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 <i>(Estimated)</i>	FUTURE YEARS <i>(Estimated)</i>	TOTAL ALL YEARS <i>(Estimated)</i>
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		

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. <u>OFFICE OF MANNED SPACE FLIGHT</u>	<u>\$6,610,000</u>
A. <u>Kennedy Space Center</u>	<u>2,605,000</u>
(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.	<u>Manned Spacecraft Center</u>	<u>680,000</u>
	(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.	<u>Marshall Space Flight Center</u>	<u>2,200,000</u>
	(1) Refurbish Surface Treatment Facility, Building 4760	500,000
	(2) Install Fire Extinguisher Systems.....	1,700,000
D.	<u>Michoud Assembly Facility</u>	<u>250,000</u>
	(1) Rehabilitate Utilities Systems.....	250,000
E.	<u>Mississippi Test Facility</u>	<u>375,000</u>
	(1) Rehabilitate High Pressure Gas Facility.....	375,000
F.	<u>Various Locations</u>	<u>500,000</u>
	(1) Rehabilitation and Modification of Industrial Plants	500,000
II.	<u>OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY</u>	<u>\$3,230,000</u>
A.	<u>Ames Research Center</u>	<u>535,000</u>
	(1) Modification of Electrical Utilities.....	280,000
	(2) Building Fire Protection Systems.....	255,000
B.	<u>Flight Research Center</u>	<u>315,000</u>
	(1) Rehabilitate Utilities Systems.....	315,000
C.	<u>Langley Research Center</u>	<u>1,152,000</u>
	(1) Replacement Boiler for Heating Plant.....	700,000
	(2) Rehabilitate Fire Alarm and Monitoring Systems.....	452,000

D.	<u>Lewis Research Center</u>	<u>894,000</u>
	(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.	<u>Plum Brook Station</u>	<u>334,000</u>
	(1) Rehabilitate Utilities Systems.....	334,000
III.	<u>OFFICE OF SPACE SCIENCE AND APPLICATIONS</u>	<u>\$2,790,000</u>
A.	<u>Goddard Space Flight Center</u>	<u>1,090,000</u>
	(1) Fire Protection and Safety Modifications.....	485,000
	(2) Central Refrigeration System.....	605,000
B.	<u>Jet Propulsion Laboratory</u>	<u>870,000</u>
	(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.	<u>Wallops Station</u>	<u>830,000</u>
	(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.	<u>OFFICE OF TRACKING AND DATA ACQUISITION</u>	<u>\$1,370,000</u>
A.	Fire Protection and Safety Improvements.....	<u>1,370,000</u>
	(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.....	<u>\$14,000,000</u>

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	<u>3,300,000</u>
Total Funding Through FY 1971	<u>\$7,940,798</u>
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, GN₂ 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:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>				<u>\$2,096,000</u>
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)

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Equipment</u>				<u>\$1,204,000</u>
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
<u>Fallout Shelter</u> (Not feasible)	---	---	---	<u>None</u>
		TOTAL		<u>\$3,300,000</u>

PROJECT JUSTIFICATION:

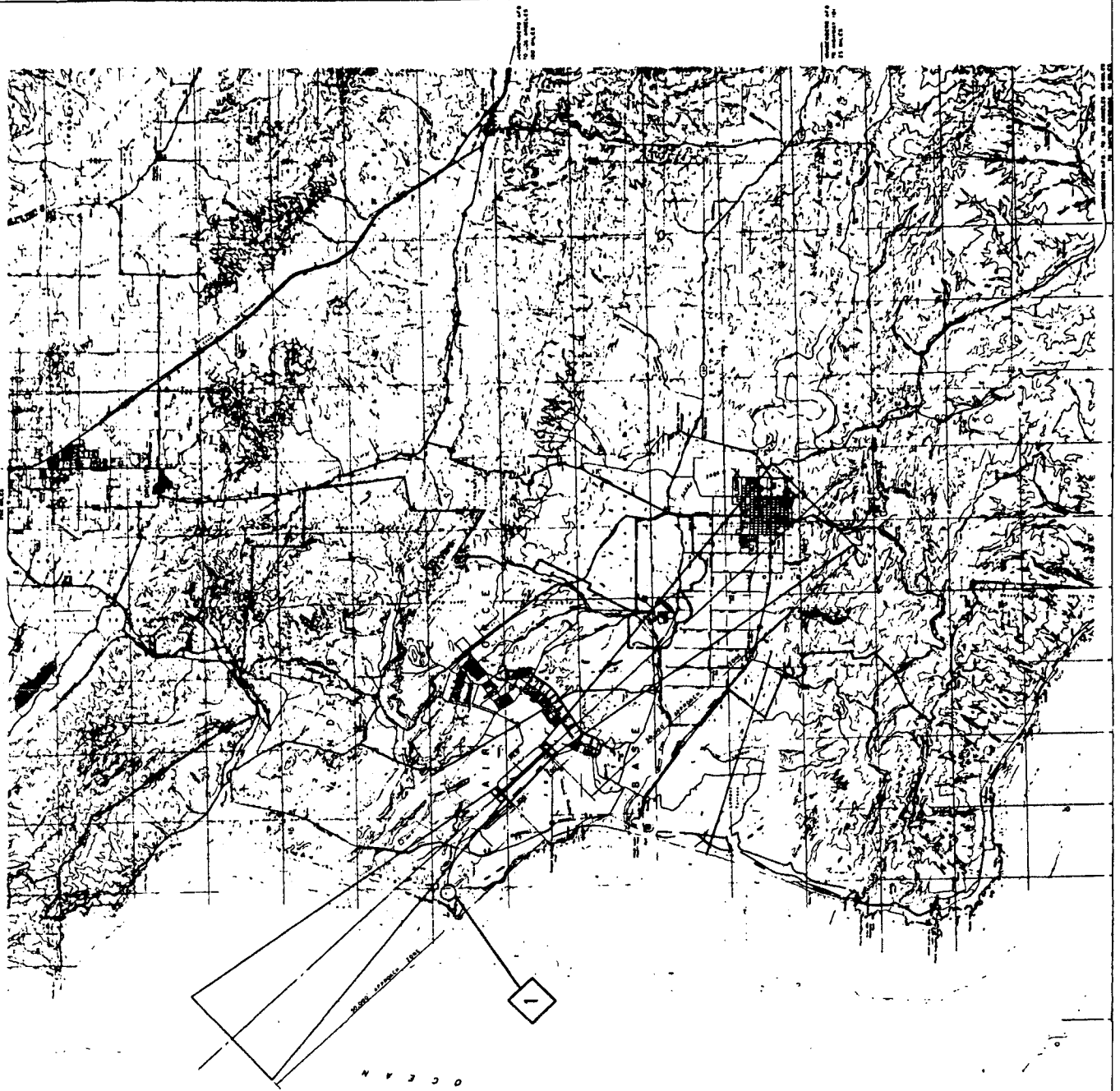
Space Launch Complex 2 is used for all direct polar orbital launches for NASA and ESSA scientific, earth resources technology, and operational weather satellite missions. Present programmed missions require new launch vehicle configurations with solid strap-on motors. This project provides for necessary 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
VAFB, CALIF

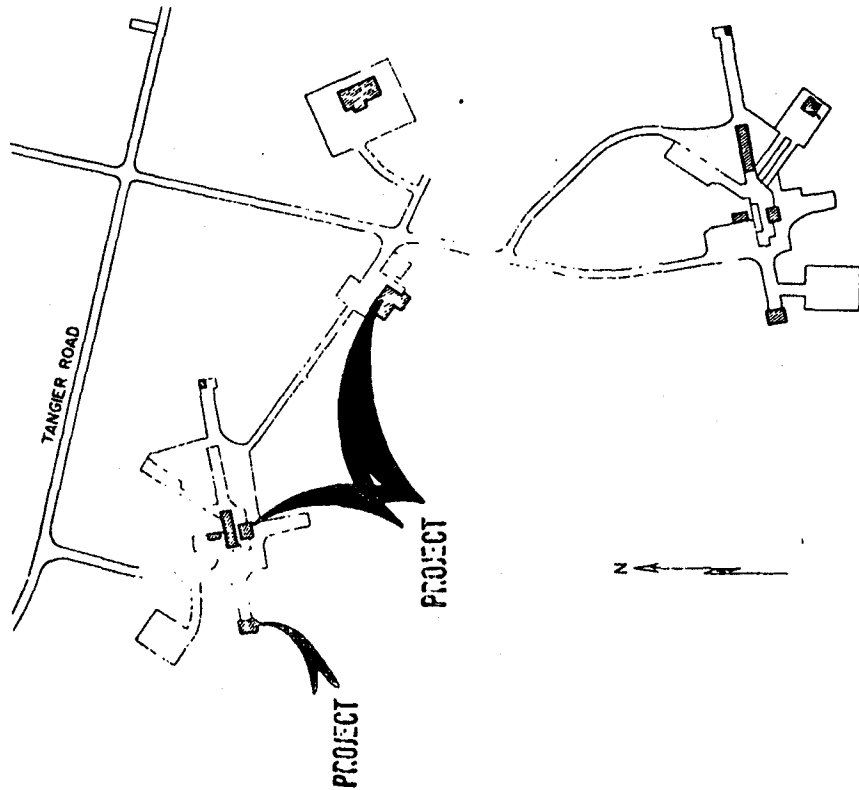


JOHN F. KENNEDY SPACE CENTER, NASA

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
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FY 1971 Estimate	<u>750,000</u>
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Total Funding Through FY 1971	<u>\$785,000</u>
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Estimated Future Year CoF Funding	None
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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:

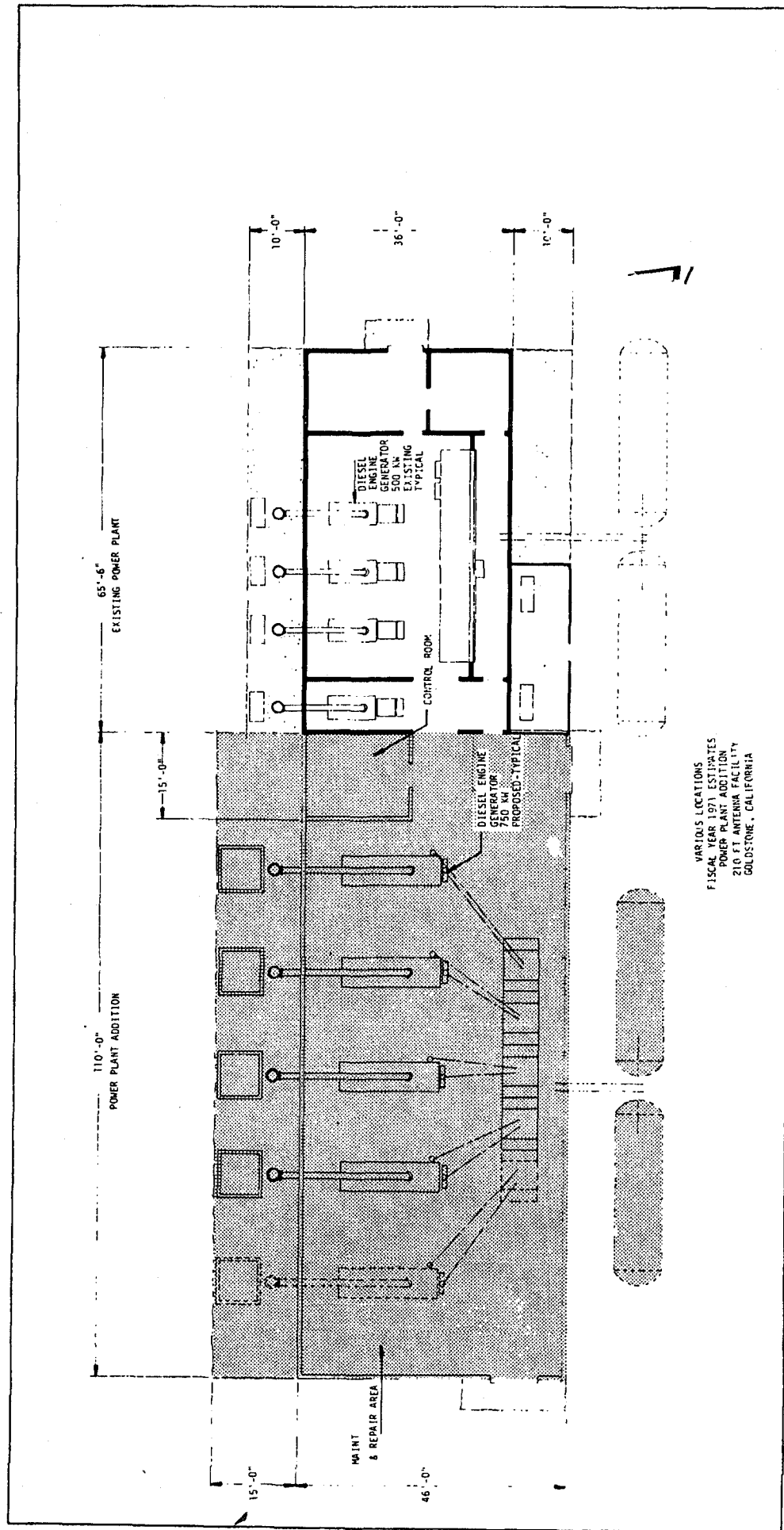
	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>	---	---	---	<u>\$270,000</u>
Building addition	Sq. Ft.	5060	\$35.00	177,000
Generator foundations	Each	4	12,000	48,000
Electrical distribution system	LS	---	45,000	45,000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

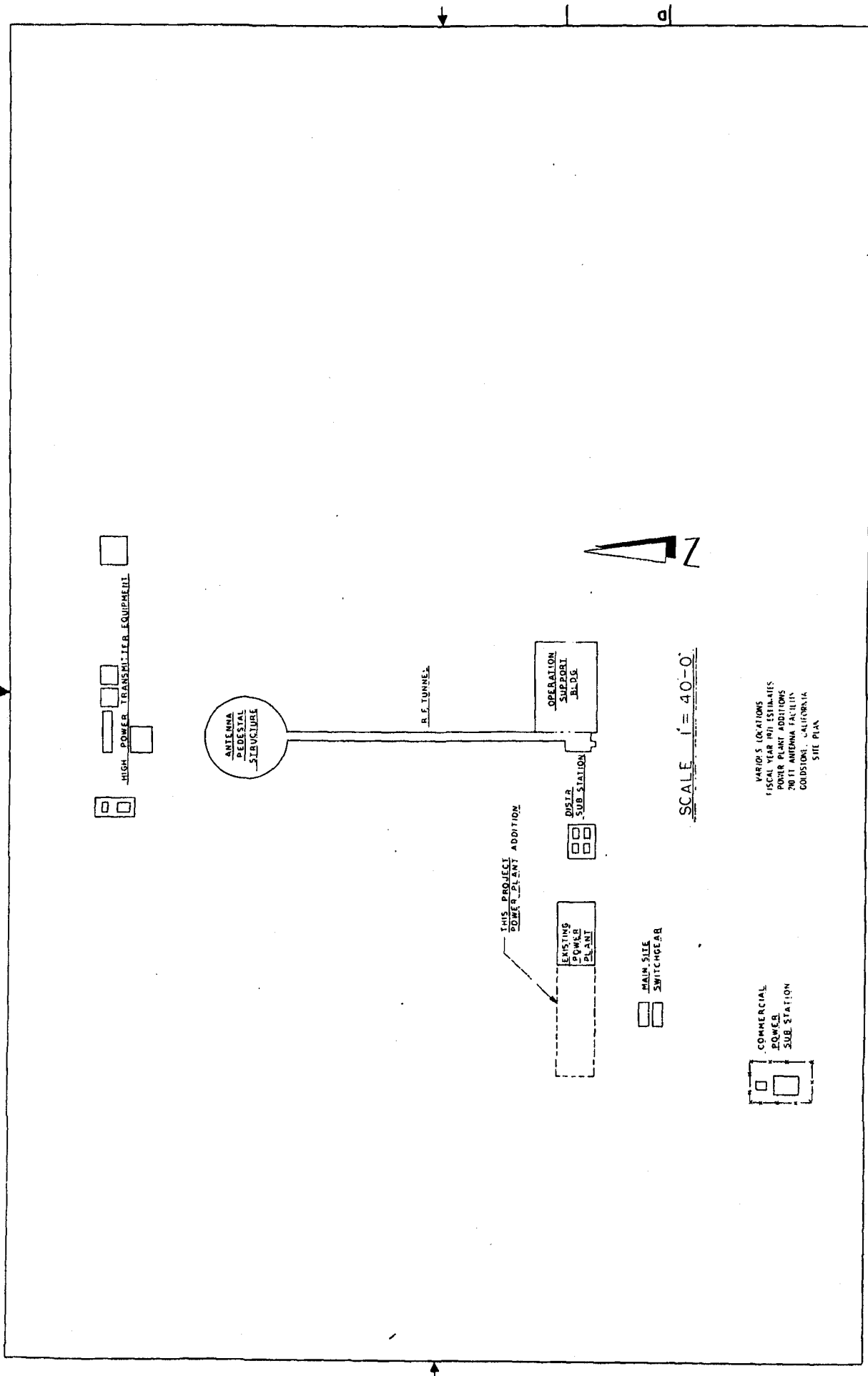
PROJECT JUSTIFICATION:

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.





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	<u>525,000</u>
Total Funding Through FY 1971	<u>\$550,000</u>
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:

	<u>Unit of Measure</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Land Acquisition</u>	---	---	---	---
<u>Construction</u>	---	---	---	<u>\$525,000</u>
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
<u>Equipment</u>	---	---	---	---
<u>Fallout Shelter</u>	---	---	---	---
		TOTAL		<u>\$525,000</u>

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.

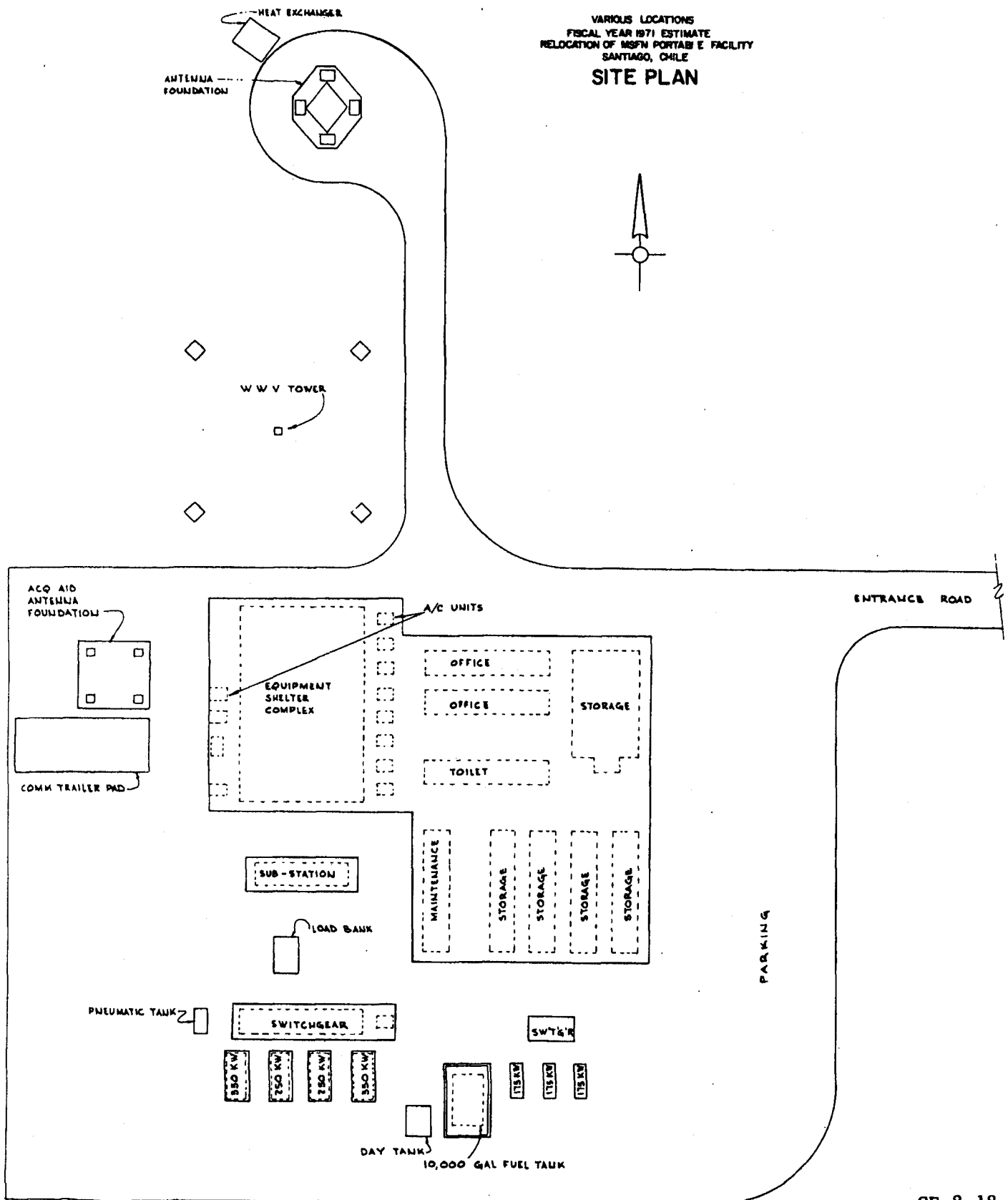
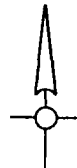
VARIOUS LOCATIONS
FISCAL YEAR 1971: ESTIMATE
RELOCATION OF 4504 PORTABLE "ADULT"
\$4,227,000.00

[illegible][illegible]

CF 8-17

VARIOUS LOCATIONS
FISCAL YEAR 1971 ESTIMATE
RELOCATION OF MSPN 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

(Dollars in thousands)

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

PROJECT LINE ITEM	COGNIZANT OFFICE	FY 1959 THRU CURRENT YR	FY 19 <u>71</u> (Estimated)	FUTURE YEARS (Estimated)	TOTAL ALL YEARS (Estimated)
Facility Planning and Design	O&M	59,131	5,000		Not Applicable
TOTAL			5,000		

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: | <hr/> \$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	<u>\$5,000,000</u>