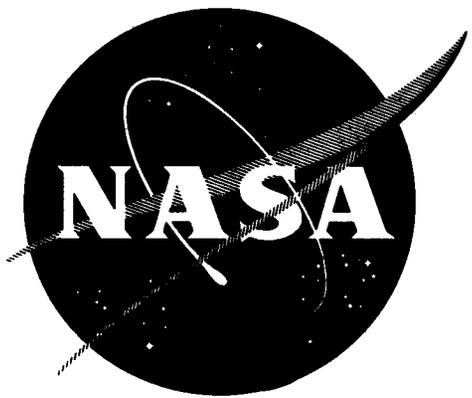


Mr. L. J. Kelly

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



ESTIMATES OF APPROPRIATIONS

FISCAL YEAR 1961

VOLUME I

SALARIES AND EXPENSES
CONSTRUCTION AND EQUIPMENT
LEGISLATIVE PROGRAM

February 15, 1960

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

AMENDMENTS TO NASA 1961 BUDGET

(House Document No. 329, dated February 8, 1960)

<u>Item</u>	<u>Page number</u>	<u>Revised or new page</u>
House Document No. 329.....	---	New
<u>APPROPRIATION SUMMARY</u>	1	Revised
<u>SALARIES AND EXPENSES:</u>		
Appropriation language.....	2	Revised
Program and financing.....	3	Revised
Object classification.....	6,7	Revised
Summary and index.....	8	Revised
Summary - Salaries and Expenses.....	9	Revised
Summary - Salaries and Expenses - 1961.....	10	Revised
01 - Personal services.....	11	Revised
Data on personal services.....	12	Revised
Summary analysis of personal services.....	13	Revised
Summary by objects - NASA total.....	39	Revised
Summary by objects - Huntsville facility.....	47	Revised
<u>RESEARCH AND DEVELOPMENT:</u>		
Appropriation language.....	100	Revised
Program and financing.....	101,102	Revised
Program and performance.....	104,105	Revised
Object classification.....	106,107,108	Revised
Summary and index.....	109	Revised
Manned space flight.....	164,165,167	Revised
Liquid rockets.....	174,176	Revised
Saturn.....	193,194	Revised

<u>Item</u>	<u>Page number</u>	<u>Revised or new page</u>
<u>CONSTRUCTION AND EQUIPMENT:</u>		
Appropriation language.....	300	Revised
Program and financing.....	301	Revised
Program and performance.....	304	Revised
Object classification.....	305	Revised
Summary of programs.....	306	Revised
Summary and index.....	308	Revised
Saturn static test facility.....	380,384,385	Revised
Addition to checkout building.....	411-1,411-2, 411-3	New New
Completion of Saturn launching complex.....	413	Revised
Escape mechanism.....	415-1,415-2, 415-3	New New
Hydrogen system.....	415-4,415-5	New
New Saturn launching complex.....	415-6 to 415-14 in- clusive	New New
Staging building.....	415-15,415-16	New
<u>LEGISLATIVE PROGRAM:</u>		
Legislative proposals.....	503	Revised
Appropriation authorization.....	512,513,514	Revised

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

INDEX

TL
521.3
.138
1152
1961
V.1

	<u>Page No.</u>
APPROPRIATION SUMMARY.....	1
SALARIES AND EXPENSES:	
Appropriation language.....	2
Program and financing.....	3
Program and performance.....	4
Object classification.....	6
Summary and index.....	8
Object summaries.....	11-38
Location summaries.....	39-51
RESEARCH AND DEVELOPMENT:	
Appropriation language.....	100
Program and financing.....	101
Program and performance.....	103
Object classification.....	106
Summary and index.....	109
Program writeups.....	110-203
CONSTRUCTION AND EQUIPMENT:	
Appropriation language.....	300
Program financing.....	301
Program and performance.....	302
Object classification.....	305

	<u>Page No.</u>
Summary of construction and equipment programs.....	306
Summary and index.....	307
Project writeups.....	308-427
 LEGISLATIVE PROGRAM:	
Summary.....	500
Amendment to National Aeronautics and Space Act, as amended.....	504
Appropriation authorization.....	512

AMENDMENTS TO THE BUDGET, FISCAL YEAR 1961, FOR
 THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

COMMUNICATION

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

AMENDMENTS TO THE BUDGET FOR THE FISCAL YEAR 1961, IN
 THE AMOUNT OF \$113,000,000, FOR THE NATIONAL AERONAUTICS
 AND SPACE ADMINISTRATION

FEBRUARY 8, 1960.—Referred to the Committee on Appropriations and ordered
 to be printed

THE WHITE HOUSE,
 Washington, February 8, 1960.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith for the consideration of
 the Congress amendments to the budget for the fiscal year 1961, in
 the amount of \$113 million, for the National Aeronautics and Space
 Administration.

The details of these amendments, the necessity therefor, and the
 reasons for their submission at this time are set forth in the attached
 letter from the Acting Director of the Bureau of the Budget, with
 whose comments and observations thereon I concur.

Respectfully yours,

DWIGHT D. EISENHOWER.

EXECUTIVE OFFICE OF THE PRESIDENT,
 BUREAU OF THE BUDGET,
 Washington, D.C., February 3, 1960.

The PRESIDENT,
 The White House.

SIR: I have the honor to submit herewith for your consideration
 amendments to the budget for the fiscal year 1961 in the amount of
 \$113 million for the National Aeronautics and Space Administration,
 as follows:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Budget page	Heading	Original estimate	Revised estimate	Increase
163	Salaries and expenses.....	\$167,560,000	\$170,760,000	\$3,200,000
164	Research and development..... (Add the following proviso at the end of the paragraph under this heading): : Provided, That \$80,000,000 of this appropriation shall be immediately available.	545,153,000	621,453,000	76,300,000
165	Construction and equipment..... (Add the following proviso at the end of the paragraph under this heading): : Provided, That \$1,000,000 of this appropriation shall be immediately available.	89,287,000	122,787,000	33,500,000

The foregoing amendments to the 1961 budget, involving increases
 in the amount of \$113 million, are required to accelerate the develop-
 ment of high thrust space vehicles. On the basis of studies since the
 preparation of the 1961 budget it appears desirable to apply \$90
 million additional to the Saturn super booster program, \$8 million
 additional to the development of a high energy engine for use in the
 second stage of the Saturn vehicle, and \$15 million additional to the
 very high thrust single chambered engine development program.
 The proposed language provisions making a portion of the amounts
 under "Research and development" and "Construction and equip-
 ment" immediately available anticipate prompt congressional action
 on the 1961 authorizing legislation and appropriations and would
 permit the National Aeronautics and Space Administration to proceed
 with certain contracting actions necessary in 1960 to meet the ac-
 celerated program schedules.

I recommend that the foregoing amendments to the budget be trans-
 mitted to the Congress.

Respectfully yours,

ELMER B. STAATS,
 Acting Director of the Bureau of the Budget.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

APPROPRIATION SUMMARY

	<u>Salaries and Expenses</u>	<u>Research and Development</u>	<u>Construction and Equipment</u>	<u>Total</u>
<u>APPROVED, FISCAL YEAR 1959:</u>				
Independent Offices Appropriation Act, 1959; P.L. 85-844.....	\$78,100,000	---	\$23,000,000	\$101,100,000
Supplemental Appropriation Act, 1959; P.L. 85-766.....	5,000,000	\$50,000,000	25,000,000	80,000,000
Second Supplemental Appropriation Act, 1959; P.L. 86-30.....	3,186,300	---	---	3,186,300
Transfers from DOD (72 Stat. 433).....	---	<u>154,619,532</u>	---	<u>154,619,532</u>
Total.....	<u>\$86,286,300</u>	<u>\$204,619,532</u>	<u>\$48,000,000</u>	<u>\$338,905,832</u>
<u>APPROVED, FISCAL YEAR 1960:</u>				
Supplemental Appropriation Act, 1960; P.L. 86-213.....	\$91,400,000	\$335,350,000	\$73,825,000	\$500,575,000
Appropriation transfer; P.L. 86-213.....	---	<u>-15,000,000</u>	<u>15,000,000</u>	---
Total.....	<u>\$91,400,000</u>	<u>\$320,350,000</u>	<u>\$88,825,000</u>	<u>\$500,575,000</u>
<u>REQUESTED, FISCAL YEAR 1960:</u>				
Supplemental estimates.....	---	<u>\$12,200,000</u>	<u>\$10,800,000</u>	<u>\$23,000,000</u>
<u>REQUESTED, FISCAL YEAR 1961:</u>				
Regular estimates.....	<u>\$170,760,000</u>	<u>\$621,453,000</u>	<u>\$122,787,000</u>	<u>\$915,000,000</u>

**NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION**

SALARIES AND EXPENSES

ESTIMATES OF APPROPRIATIONS

FISCAL YEAR 1961

NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION

SALARIES AND EXPENSES

For necessary expenses, not otherwise provided for, of the National Aeronautics and Space Administration, including rental of office space within the District of Columbia; hire of passenger motor vehicles; not to exceed \$2,885,000 for expenses of travel; and uniforms or allowances therefor, as authorized by the Act of September 1, 1954, as amended (5 U.S.C. 2131); \$91,400,000

_____	\$5,849,000
_____	\$170,760,000

(42 U.S.C. 2451 et seq.;

50 U.S.C. 151-160, 511-515;

Supplemental Appropriation Act, 1960; authorizing
legislation to be proposed for 1961.)

Appropriated 1960, \$91,400,000 Estimate 1961, ^a\$170,760,000

^aIncludes \$34,316,000 transferred in the estimates from "Salaries and expenses, Advanced Research Projects Agency, Department of Defense." The amounts obligated in 1959 and 1960 are shown in the schedule as comparative transfers.

Appropriation title:
 (C. 130 O. & I. a. flush)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 SALARIES AND EXPENSES

Program and Financing

	19 59 actual	1960 estimate	19 61 estimate
<u>Program by activities:</u>			
1. Aeronautical and space research.....	\$77,147,637	\$74,000,000	\$73,940,000
2. Space flight development and operations.....	8,814,289	30,000,000	86,420,000
3. Program direction.....	5,069,915	8,000,000	10,400,000
Total program costs.....	91,031,841	112,000,000	170,760,000
4. Relation of costs to obligations: Costs financed from obligations of other years, net (-)	-1,055,326	-5,600,000	.....
Total program (obligations).....	89,976,515	106,400,000	170,760,000
<u>Financing:</u>			
Comparative transfer from (-) Department of Defense	-5,000,000	-15,000,000	.....
1959 appropriation available in 1958.....	1,011,781	.....	.....
Unobligated balance no longer available.....	298,004	.....	.....
<u>Appropriation (new obligational authority)...</u>	86,286,300	91,400,000	170,760,000

Type size:
 6 point,
 22 lines

Use in preparing schedules of obligations accompanying estimates for
 lump-sum appropriations

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SALARIES AND EXPENSES

PROGRAM AND PERFORMANCE

This appropriation provides for the salaries and operating expenses (other than supplies, equipment, and construction) of the research and development centers and other activities operated by the National Aeronautics and Space Administration with Government personnel.

1. Aeronautical and space research.--Research is conducted at the Langley, Ames, Lewis, and Flight research centers, located at Langley Air Force Base, Va.; Sunnyvale, Calif.; Cleveland, Ohio; and Edwards Air Force Base, Calif., respectively. The level of operations at these centers will be substantially the same in 1961 as in 1960.

2. Space flight development and operations.--The Goddard Space Flight Center at Beltsville, Md., will be the data center for NASA space operations; it will also be responsible for payloads, primarily for earth satellites, and for directing the manned space flight program. The Wallops station in Virginia will be utilized for launching sounding rockets, test vehicles, and small satellites. The NASA facility at Huntsville, Ala., will engage in space vehicle development including the Saturn very high thrust booster project. NASA personnel are also located at the Atlantic and Pacific missile ranges and worldwide tracking stations. The large increase in 1961 results primarily from the inclusion for the first time in this appropriation of the full amount of salaries and expenses for the Huntsville facility which is being transferred to NASA from the Army. This facility was supported previously by funds for specific missile and space projects, chiefly of the Department of Defense, through the mechanism of work orders placed with the Army industrial fund at the Army Ballistic Missiles Agency. Other increases are required in 1961 for the Goddard Space Flight Center and Wallops station because of increased workload.

3. Program direction.--Increased funding for personnel is required at the NASA headquarters as the size and complexity of the programs continues to grow.

4. Relation of costs to obligations.--The relationship is derived from year-end balances of selected resources and applicable adjustment as reflected in the following table:

	<u>1958</u> actual	<u>1959</u> actual	<u>1960</u> estimate	<u>1961</u> estimate
Selected resources at end of year:				
Inventories and items on order:				
Unpaid undelivered orders (appropriation balances obligated for goods and services on order not yet received).....	\$5,472,781	\$4,215,268	\$215,268	\$315,268
Advances (payments for goods and services on order not yet received).....	94,869	93,369	3,369	3,369
Accrued annual leave (leave earned and not taken by employees, charged to activity costs).....	-4,677,125	-5,552,948	-6,262,948	-6,562,948
Unapplied costs (costs in- curred not yet assigned to activities).....	<u>382,480</u>	<u>1,323,876</u>	<u>523,876</u>	<u>723,876</u>
Total selected resources at end of year.....	1,273,005	79,565	-5,520,435	-5,520,435
Selected resources at start of year.....		-1,273,005	-79,565	5,520,435
Adjustment of selected resources reported at start of year.....		<u>138,114</u>	<u>.....</u>	<u>.....</u>
Costs financed from obligations of other years, net (-).....		-1,055,326	-5,600,000	.....

Appropriation title:
 (O. 120 C. & I. a. 825b)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 SALARIES AND EXPENSES

Object Classification

Type size:
 6 point,
 22 picas

Use in preparing schedules of obligations accor. varying estimates for
 lump-sum appropriations

U. S. GOVERNMENT PRINTING OFFICE 16-38504-4

	19 59 actual	1960 estimate	1961 estimate
Total number of permanent positions.....	8,930	10,086	16,373
Full-time equivalent of all other positions.....	.....	8	30
Average number of all employees.....	8,326	9,693	16,130
Number of employees at end of year.....	8,879	10,031	16,327
Average GS grade and salary.....	9.0 \$7,399	9.3 \$7,585	9.6 \$7,838
Average salary for grades established by the Administrator of the NASA.....	\$5,995	\$6,264	\$6,213
01 Personal services:			
Permanent positions.....	\$57,831,267	\$69,926,440	\$117,857,000
Positions other than permanent.....	2,329	67,900	250,000
Other personal services.....	911,524	2,286,460	10,518,000
Total personal services.....	58,745,120	72,280,800	128,625,000
02 Travel.....	1,097,218	2,866,400	5,849,000
03 Transportation of things.....	374,696	191,000	442,000
04 Communication services.....	451,869	883,600	1,314,000
05 Rents and utility services:			
Electric power.....	6,191,226	6,494,800	7,843,000
Other utilities.....	398,367	469,000	600,000
Rentals.....	1,541,553	2,585,000	15,399,000

(Mono cast: 21.4)

(Mono cast: 7.9)

(Mono cast: 7.9)

(Mono cast: 7)

Standard Form 3a
 (Approved by
 President
 June 15, 1923
 Revised October 28,
 1947)

Appropriation title:
 (C. 130 C. & L. a. flush)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 SALARIES AND EXPENSES

Object Classification

Type size:
 6 point,
 22 lines

Use in preparing schedules of obligations accompanying estimates for
 lump-sum appropriations

U. S. GOVERNMENT PRINTING OFFICE 16-51007-4

	1959 actual	1960 estimate	1961 estimate
06 Printing and reproduction.....	\$160,466	\$203,000	\$363,000
07 Other contractual services:			
Research contracts.....	816,510	.....	.....
Repairs and alterations.....	1,091,832	.....	.....
Miscellaneous services.....	935,780	214,000	1,292,500
Services performed by other agencies:			
Research services.....	148,367	.....	.....
Security investigations.....	178,595	500,000	1,248,000
Other services.....	5,206,718	15,000,000	.....
08 Supplies and materials.....	6,513,992	.....	.....
09 Equipment.....	3,402,407	.....	.....
11 Grants, subsidies, and contributions.....	3,719,808	4,566,300	7,618,500
13 Refunds, awards, and indemnities.....	3,202	134,000	147,000
15 Taxes and assessments.....	10,570	12,100	19,000
1959 Program obligated in 1958.....	-1,011,781	.....	.....
Total obligations.....	89,976,515	106,400,000	170,760,000

(Mono cast: 21.0)

(Mono cast: 7.9)

(Mono cast: 7.9)

(Mono cast: 7)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SALARIES AND EXPENSES

The Salaries and Expenses appropriation provides for the costs of salaries of all NASA employees and for the costs of certain other operating expenses of the type for which estimates may be prepared and funds committed on an annual basis. These other expenses include travel, transportation of household goods, routine type communication expenses, all rents and utility services, printing and reproduction, security investigations, health program and life insurance costs, and contributions to the retirement fund. The fiscal year 1961 estimates provide for a total staffing level of 16,373 by the end of the fiscal year 1961. Of this total, 683 are required for NASA Headquarters and the balance of 15,690 for field activities.

The overall complex of the NASA organizational structure has been created largely by the integration of existing organizations and parts of organizations. The nucleus was provided by the 8,040 staff members of the laboratories and the headquarters of the NACA. To this were added 400 members from the Vanguard team, transferred from the Naval Research Laboratory. Seven hundred new positions were provided in the first fiscal year, and an additional 700 in the current fiscal year to round out the staff and to provide the technical and scientific skills that were not present in the older laboratories but are required for the new business of space exploration. The proposed budget program reflects an additional increase to a total strength of 16,373 by the end of the fiscal year 1961. Almost 90 percent of the increase results from the assimilation of a single group, that of the Huntsville, Alabama, agency, under the leadership of Dr. von Braun. The remaining fraction of the growth is needed to balance the skills of the organization and to properly effect the integration. In this process of rapidly assembling existing groups into a coherent and effective organization, while concurrently developing a complex program of unusually high scientific and technical content, and at the same time carefully interlacing and coordinating our efforts with other governmental, scientific, and industrial organizations, it has been understandably necessary to increase the Headquarters staff. In recognition of the fact that at least part of the work burden at Headquarters is interim in nature, the NASA has strongly resisted expanding its Headquarters beyond what was foreseen as the longer term needs of a more stable organization and program growth. The net result has

been long hours in concerted effort by most of the staff. It would not have been possible to accomplish the objectives to date without the staff growth that has been realized, nor can proper performance in the future be anticipated with less than the staffing requirements requested for the fiscal year 1961.

With the added work load of the recent assignment of responsibility for development of super boosters, an addition to the Headquarters staff is required. Recognizing the absolute essentiality of attaining the best possible launch vehicle performance in terms of timely availability of load lifting capacity, and paying respect to the resulting need for reducing the number of types of launch vehicles in order to optimize reliability, the staff function of directing launch vehicle development and operations has been separated from the balance of the space flight programs. This has resulted in the functional staff organization at Headquarters shown on page 13-1. Aside from the Office of the Administrator and the special staff offices he requires, the four functional staff elements now include the Office of Business Administration, the Office of Advanced Research Programs, the Office of Space Flight Programs, and the new Office of Launch Vehicle Programs. The total NASA staff strength intended is 16,373 people. It is the policy of the Administration to delegate all responsibility for program implementation and detailed program initiation to the field centers. Functional areas of responsibility have been assigned to each of the centers, and a brief discussion of each of them follows. Their channel of communication and responsibility to the Headquarters staff is indicated on the chart on page 13-1.

The Langley, Lewis, Ames and Flight Research Centers are the laboratory centers which constituted the research capability of the National Advisory Committee for Aeronautics. Organizationally and for program integration purposes they report to the Office of Advanced Research Programs in the Headquarters. Although their individual staff levels have been stabilized for the past few years and the proposed staff strengths for fiscal year 1961 exactly coincide with the fiscal year 1960 staff numbers, the program of work at each of these centers has undergone a major change in the past one and one-half years. Whereas, by far the bulk of the work of two years ago was oriented toward the current and advanced needs of aeronautical developments, the combination of significantly reduced numbers of aircraft development projects in the United States and the needs for research in support of the space flight program have rapidly shifted the emphasis of research efforts at the centers to the astronautics end of the spectrum. This change has resulted in substantial problems for the research center staffs in reorganizing and retraining for the new tasks, hiring in new technical disciplines as the effort in areas of waning interest is decreased, the modification of old facilities and the creation

of new to accommodate the new research regimes. This reorientation is progressing at a very satisfactory rate.

Although the total effort in aeronautics has markedly decreased there is still very important work being conducted in this research area. The very low speed regime of flight is being extensively investigated in wind tunnels and by actual flight tests to explore the possibilities of vertical take-off and landing craft as well as those which have very short take-off and landing characteristics. As long as there is a continuing interest in the Department of Defense and the possibility of industrial application there are likely to be continuing research requirements in this area.

At the other end of the spectrum of flight within the atmosphere, there are still challenging research problems to be solved in connection with supersonic and hypersonic flight. Of course, many of the hypersonic flight problems are equally applicable to space vehicles, for the departure and re-entry phases of flight from and to the earth. The work in high-speed aerodynamics, materials and aircraft operating problems are, however, some areas in which there is continuing interest for development of high-speed military aircraft and missiles, and possible application to supersonic commercial transports. Further, the NASA facilities stand ready to support specific applied research should additional developments of high-speed aircraft indicate the requirement.

At the Langley Research Center, a staff of 3,220 will conduct research in structures and materials, the aerodynamics of re-entry vehicles, continuing work in aircraft aerodynamics and fundamental research in plasma physics. This center, is located near Hampton, Virginia, and is the oldest and the largest of the research establishments. It has a plant investment of approximately \$154,000,000

The Lewis Research Center, located at Cleveland, Ohio, represents a facility investment of \$148,000,000 and employs a staff of 2,736 people. Its primary research mission is investigations related to propulsion. Research programs are now active on chemical rockets with emphasis on high energy propellants, on nuclear rockets, and on electrical propulsion devices. Electrical power generation in support of this latter area of propulsion research also requires major attention from the center.

At the Ames Research Center, in the Santa Clara Valley of California, on the Moffett Naval Air Station, a staff of 1,440 conducts a comprehensive research program in facilities with

an original construction value of \$107,000,000. The principal areas of work are space environmental physics, including simulation techniques, gas dynamics research at extreme speeds, and automatic stabilization, guidance and control of space vehicles. There are also under experimental evaluation at this center several full-scale models of vertical take-off and landing craft.

The Flight Research Center at Edwards, California, is a relatively small but unique and highly specialized facility. On the edge of Rogers Dry Lake, it takes advantage of this 75 square mile flat surface as an ideal testing ground of research aircraft. Four hundred sixteen staff members are currently concentrating most of their efforts on the flight evaluation of the X-15. A limited number of flights have already been conducted by the contractor's flight crew. It is anticipated that center personnel will shortly begin the flight research program wherein the pilot will be propelled substantially above the earth's atmosphere and experience the characteristics of space flight for durations of a few minutes. The coming year should be of high interest in this project if the program goes as expected.

In the space flight side of the program there are three major research and development centers at work, and three locations in which we have varying levels of investment for purposes of launching space vehicles. In research and development activities the work has been divided into two categories -- launch vehicle development and operations on the one hand, and spacecraft development and operations on the other.

Two centers are primarily engaged in spacecraft development and, again, a functional division in the work has assigned to the Goddard Space Flight Center the primary responsibility for those projects concerned with earth orbiting craft both in their development and operation as well as supporting research and test as necessary for the mission. It is at this center that the Vanguard team served as a nucleus for a staff which is projected to grow until it numbers 2,000 with the proposed fiscal year 1961 budget. The staff is currently housed in several different locations in the Washington area and at the Langley Research Center. However, the badly needed space research facilities for this center are under construction at Greenbelt, Maryland, and the first of these will become available for beneficial occupancy by the middle of this summer. The satellite and sounding rocket program, the manned space flight program, and the application of space vehicles, including passive communications and meteorology, are the major program elements of this center.

The responsibility for the other major area of spacecraft development is assigned to the Jet Propulsion Laboratory at Pasadena, California. It is the exploration of deep space, including the lunar and interplanetary flights. This Laboratory is employed in the NASA program through the medium of a contract with the California Institute of Technology. The staff at the present time totals approximately 2,700 people, including several hundred currently engaged in the systems engineering of an Army weapon, the Sergeant ballistic missile. As the activity on this weapon system is phased out, some decrease in the total staff size is anticipated, but present plans indicate that a stable requirement will persist for about 2,400 people.

It is in the area of work of this organization that one becomes most impressed with the extreme complexity of the spacecraft which must be created to carry out the interesting missions in lunar and interplanetary exploration. The NASA program anticipates a major flight experiment of this kind at approximately three-month intervals in the time period affected by our proposed budget. A vast amount of creative engineering is a prerequisite to each flight, and the data analysis of the quantities of information recorded also represents a tremendous task. It is clear that this work will require a major fraction of NASA resources in the years to come.

The launch vehicle development and operation task is assigned to the NASA Huntsville Facility. The decision to transfer this facility to NASA was taken recently, and the plan to carry out this decision is currently before the Congress. It provides for a transfer of 5,500 people under the leadership of Dr. von Braun. The development facilities which will also be transferred had an original investment cost of approximately \$100,000,000. The major project activity of the group at the present time is, and for some time will be, the development of the Saturn booster and the integration of the upper stages. There are also numerous other activities at this center, including work on several Army missile systems, which will be carried on in accordance with the agreements that have been made with the Department of Defense.

The responsibility for launch vehicle operation as well as development comes under the von Braun group. For this purpose a missile firing laboratory is maintained at the Atlantic Missile Range at Cape Canaveral, Florida, which will supervise all NASA vehicle launchings from that site and will actually carry out the launching of vehicles developed at Huntsville.

In the time period pertinent to the fiscal year 1961 budget some space flight operations will also be conducted from the Pacific Missile Range. It is planned to launch from this location all spacecraft which require Polar orbits. Although the launch operations will be carried

out largely by contract, a small group of NASA technical and administrative liaison people will be located at the site.

At Wallops Island, off the Virginia coast, the NASA has a small launching service organization which conducts the numerous launchings of the sounding rocket program and the solid propellant orbital vehicle which will be brought into service during the current calendar year. A staff of 300 people operates a facility valued at approximately \$18,000,000. The work is largely in response to the needs of the sounding rocket and satellite programs.

To round out the organizational structure is the Western Operations Office. This office is established in Santa Monica, California, with a staff of about 40 people. Its function is to perform liaison with the many development contractors engaged in our program and to carry out contract administration as required. The existence of this office greatly reduces the requirement for travel to this area by personnel of the Headquarters and various other centers.

Detailed fiscal year 1961 staffing charts for each NASA activity are presented on pages 13-2 through 13-29. These charts are followed by detailed breakdowns by object of expenditure, of the funds requested for those expenses, other than personal services, that make up the balance of the requirement under the Salaries and Expenses appropriation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SALARIES AND EXPENSES

SUMMARY AND INDEX

<u>Page No.</u>	<u>Object</u>	<u>Fiscal Year 1959</u>	<u>Fiscal Year 1960</u>	<u>Fiscal Year 1961</u>
11	01 Personal services.....	\$58,745,120	\$72,280,800	\$128,625,000
14	02 Travel.....	1,097,218	2,866,400	5,849,000
16	03 Transportation of things.....	374,696	191,000	442,000
17	04 Communication services.....	451,869	883,600	1,314,000
18	05 Rents and utility services.....	8,131,146	9,548,800	23,842,000
32	06 Printing and reproduction.....	160,466	203,000	363,000
33	07 Other contractual services.....	3,377,802	714,000	2,540,500
34	08 Supplies and materials.....	6,513,992	---	---
35	09 Equipment.....	3,402,407	---	---
36	11 Grants, subsidies, and contributions....	3,719,808	4,566,300	7,618,500
37	13 Refunds, awards, and indemnities.....	3,202	134,000	147,000
38	15 Taxes and assessments.....	10,570	12,100	19,000
	Total.....	\$85,988,296	\$91,400,000	\$170,760,000
	Unobligated balance.....	298,004	---	---
	TOTAL APPROPRIATIONS.....	<u>\$86,286,300</u>	<u>\$91,400,000</u>	<u>\$170,760,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SUMMARY - SALARIES AND EXPENSES

Page No.		Number of employees at end of fiscal year			Appropriations		
		1959 Actual	1960 Estimated	1961 Estimated	1959 Actual	1960 Actual	1961 Requested
40	NASA Headquarters.....	428	683	683	\$5,538,860	\$7,549,300	\$9,890,000
41	Langley Center.....	3,297	3,220	3,220	30,568,970	27,445,500	29,295,000
42	Ames Center.....	1,478	1,440	1,440	16,299,035	14,257,050	15,244,000
43	Lewis Center.....	2,783	2,736	2,736	27,215,227	24,840,200	25,724,000
44	Flight Center.....	336	416	416	3,154,208	3,038,150	3,679,000
45	Goddard Center.....	782	1,214	2,000	2,021,100	11,802,270	25,084,000
46	Wallops Station.....	171	225	300	1,356,820	1,700,100	2,678,000
47	NASA Huntsville.....	---	100	5,500	---	227,000	58,313,000
48	Western Office.....	7	32	46	94,815	338,930	515,500
49	AMRO Office.....	4	20	26	20,000	201,500	278,000
50	PMRO Office.....	---	---	6	---	---	59,500
51	Wright Office.....	---	---	---	17,265	---	---
39	Total.....	<u>9,286</u>	<u>10,086</u>	<u>16,373</u>	<u>\$86,286,300</u>	<u>\$91,400,000</u>	<u>\$170,760,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SUMMARY - SALARIES AND EXPENSES - FISCAL YEAR 1961

	NASA Headqtrs.	Langley Center	Ames Center	Lewis Center	Flight Center	Goddard Center	Wallops Station	Huntsville Facility	Western Office	AMR Office	PMR Office	Total
Estimated end of year employment..	683 \$5,936,774	3,220 \$22,444,084	1,440 \$10,518,547	2,736 \$19,894,614	416 \$2,936,752	2,000 \$15,711,806	300 \$1,925,284	5,500 \$40,175,000	46 \$419,605	26 \$236,265	6 \$48,000	16,373 \$120,246,731
01 All personal services.....	6,200,000	22,609,000	10,650,000	20,101,000	3,120,000	15,834,000	1,915,000	47,540,000	393,000	226,000	37,000	128,625,000
02 Travel.....	1,100,000	460,000	160,000	300,000	135,000	2,210,000	150,000	1,281,000	25,000	18,000	10,000	5,849,000
03 Transportation.....	14,000	12,000	15,000	20,000	3,000	236,000	22,000	100,000	10,000	5,000	5,000	442,000
04 Communications.....	535,000	82,000	42,000	94,000	20,000	244,000	40,000	229,000	12,000	12,000	4,000	1,314,000
05 Rents and utilities:												
Electric power.....	---	2,592,000	2,612,000	2,405,000	14,000	75,000	145,000	---	---	---	---	7,843,000
Other utilities.....	---	---	125,000	435,000	15,000	25,000	---	---	---	---	---	600,000
Rentals.....	30,000	1,815,000	826,000	853,000	150,000	5,363,000	264,000	6,050,000	46,000	---	---	15,399,000
06 Printing.....	100,000	26,000	15,000	10,000	2,000	25,000	5,000	100,000	---	---	---	363,000
07 Contractual services:												
Life insurance.....	20,000	74,000	35,000	66,000	10,000	46,000	6,000	132,000	1,700	1,000	500	392,200
Health program.....	38,000	181,000	81,000	154,000	19,000	101,000	16,000	306,000	2,500	1,500	300	900,300
Security investigations.....	1,248,000	---	---	---	---	---	---	---	---	---	---	1,248,000
11 Retirement.....	384,000	1,441,000	677,000	1,283,000	188,000	919,000	114,000	2,570,000	25,300	14,500	2,700	7,618,500
13 Awards.....	140,000	1,000	1,000	1,000	1,000	2,000	---	1,000	---	---	---	147,000
15 Taxes.....	1,000	2,000	3,000	2,000	2,000	4,000	1,000	4,000	---	---	---	19,000
Total.....	<u>\$9,890,000</u>	<u>\$29,295,000</u>	<u>\$15,244,000</u>	<u>\$25,724,000</u>	<u>\$3,679,000</u>	<u>\$25,084,000</u>	<u>\$2,678,000</u>	<u>\$58,313,000</u>	<u>\$515,500</u>	<u>\$278,000</u>	<u>\$59,500</u>	<u>\$170,760,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

01 PERSONAL SERVICES

<u>Analysis by location:</u>	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
NASA Headquarters.....	\$2,471,433	\$4,927,400	\$6,200,000
Langley Center.....	22,183,397	22,482,200	22,609,000
Ames Center.....	10,236,443	10,566,200	10,650,000
Lewis Center.....	19,408,144	20,187,500	20,101,000
Flight Center.....	2,161,741	2,657,500	3,120,000
Goddard Center.....	2,734,824	9,471,250	15,828,000
Wallops Station.....	644,213	1,374,600	1,915,000
<u>NASA Huntsville.....</u>	---	212,000	47,540,000
Western Office.....	47,882	241,650	399,000
AMRO Office.....	14,682	160,500	226,000
PMRO Office.....	---	---	37,000
Wright Office.....	14,354	---	---
Total, all locations.....	59,917,113	<u>\$72,280,800</u>	<u>\$128,625,000</u>
Funded under "Research & Development".....	-1,171,993		
Total.....	<u>\$58,745,120</u>		

Analysis of positions and cost:

End of year employment.....	9,286	10,086	16,373
Position lapses.....	-810	-401	-273
Average number of positions ^{1/}	<u>8,476</u>	<u>9,685</u>	<u>16,100</u>
Annual cost of positions, end of year.....	\$65,142,007	\$73,254,506	\$120,246,731
Lapses.....	-6,294,304	-3,328,066	-2,389,731
Net cost of positions.....	58,847,703	69,926,440	117,857,000
Intermittent employment.....	4,016	67,900	250,000
Regular pay above 52-week base.....	246,121	558,710	463,000
Overtime and holiday pay.....	620,874	1,361,000	9,087,000
Nightwork differential.....	155,514	169,300	451,000
Living and quarters allowances.....	4,952	10,000	20,000
Additional pay for service abroad.....	2,842	13,000	30,000
Uniform allowances.....	7,780	10,000	17,000
Payments to other agencies for reimbursable details....	27,311	164,450	450,000
Total, all personal services.....	<u>\$59,917,113</u>	<u>\$72,280,800</u>	<u>\$128,625,000</u>

^{1/} Includes positions filled by military personnel.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

DATA ON PERSONAL SERVICES

	Number of employees at end of fiscal year			Obligations for personal services		
	1959 <u>Actual</u>	1960 <u>Estimated</u>	1961 <u>Estimated</u>	1959 <u>Actual</u>	1960 <u>Estimated</u>	1961 <u>Estimated</u>
NASA Headquarters.....	428	683	683	\$2,471,433	\$4,927,400	\$6,200,000
Langley Center.....	3,297	3,220	3,220	22,183,397	22,482,200	22,609,000
Ames Center.....	1,478	1,440	1,440	10,236,443	10,566,200	10,650,000
Lewis Center.....	2,783	2,736	2,736	19,408,144	20,187,500	20,101,000
Flight Center.....	336	416	416	2,161,741	2,657,500	3,120,000
Goddard Center.....	782	1,214	2,000	2,734,824	9,471,250	15,834,000
Wallops Station.....	171	225	300	644,213	1,374,600	1,915,000
NASA Huntsville.....	---	100	5,500	---	212,000	47,540,000
Western Office.....	7	32	46	47,882	241,650	393,000
AMRO Office.....	4	20	26	14,682	160,500	226,000
PMRO Office.....	---	---	6	---	---	37,000
Wright Office.....	---	---	---	14,354	---	---
Total.....	<u>9,286</u>	<u>10,086</u>	<u>16,373</u>	<u>\$59,917,113</u>	<u>\$72,280,800</u>	<u>\$128,625,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SUMMARY ANALYSIS OF PERSONAL SERVICES

	<u>NASA Headqtrs.</u>	<u>Langley Center</u>	<u>Ames Center</u>	<u>Lewis Center</u>	<u>Flight Center</u>	<u>Goddard Center</u>	<u>Wallops Station</u>	<u>Huntsville Facility</u>	<u>Western Office</u>	<u>AMR Office</u>	<u>PMR Office</u>	<u>Total</u>	
1 9 5 9	Authorized end of year employment.	465 \$3,990,356	3,300 \$22,315,765	1,490 \$10,375,505	2,783 \$19,650,195	336 \$2,339,130	827 \$6,508,842	172 \$1,000,971	- \$64,455	7 \$74,350	6 ---	- \$66,319,569	
	Actual end of year employment.....	428 3,678,369	3,297 22,209,951	1,478 10,374,891	2,783 19,606,568	336 2,316,670	782 5,852,969	171 986,974	- 64,455	7 51,160	4 ---	- 65,142,007	
	Estimated end of year employment..	683 5,861,774	3,220 22,329,084	1,440 10,458,547	2,736 19,799,614	416 2,921,952	1,214 9,343,806	225 1,319,974	100 727,000	32 305,605	20 187,150	- 73,254,506	
1 9 6 0	Net cost of positions.....	4,683,100	22,117,100	10,389,850	19,875,690	2,482,000	8,492,450	1,288,100	202,000	238,350	157,800	---	69,926,440
	All other personal services.....	244,300	365,100	176,350	311,810	175,500	978,800	86,500	10,000	3,300	2,700	---	2,354,360
	Total personal services.....	<u>\$4,927,400</u>	<u>\$22,482,200</u>	<u>\$10,566,200</u>	<u>\$20,187,500</u>	<u>\$2,657,500</u>	<u>\$9,471,250</u>	<u>\$1,374,600</u>	<u>\$212,000</u>	<u>\$241,650</u>	<u>\$160,500</u>	<u>---</u>	<u>\$72,280,800</u>
	Within-grade salary advancements..	\$75,000	\$115,000	\$60,000	\$95,000	\$14,800	\$80,000	\$5,310	\$190,000	\$2,000	\$1,115	---	\$638,225
	New positions.....	-	-	-	-	-	786 6,288,000	75 600,000	5,400 39,258,000	14 112,000	6 48,000	6 48,000	6,287 46,354,000
	Estimated end of year employment..	683 5,936,774	3,220 22,444,084	1,440 10,518,547	2,736 19,894,614	416 2,936,752	2,000 15,711,806	300 1,925,284	5,500 40,175,000	46 419,605	26 236,265	6 48,000	16,373 120,246,731
	Deduct regular lapses.....	29,274	112,584	52,547	99,114	14,352	46,806	6,634	200,000	1,605	710	---	563,626
	Deduct new position lapses.....	---	---	---	---	---	1,572,000	150,000	---	28,000	12,000	12,000	1,774,000
1 9 6 1	Deduct within-grade lapses.....	37,500	57,500	30,000	47,500	7,400	40,000	2,650	95,000	1,000	555	---	319,105
	Add terminal leave.....	7,000	21,000	30,000	60,000	4,000	40,000	5,000	100,000	---	---	---	267,000
	Net lapse deduction.....	59,774	149,084	52,547	86,614	17,752	1,618,806	154,284	195,000	30,605	13,265	12,000	2,389,731
	Net cost of positions.....	5,877,000	22,295,000	10,466,000	19,808,000	2,919,000	14,093,000	1,771,000	39,980,000	389,000	223,000	36,000	117,857,000
	Intermittent employment.....	75,000	---	---	---	---	75,000	---	100,000	---	---	---	250,000
	Regular pay for excess days.....	22,800	86,500	40,600	76,500	11,300	60,400	7,600	154,500	1,600	1,000	200	463,000
	Overtime and holiday pay.....	125,000	181,000	78,000	138,000	139,500	1,300,000	120,300	7,000,000	2,400	2,000	800	9,087,000
	Nightwork differential.....	---	45,000	64,000	72,000	100	55,600	14,300	200,000	---	---	---	451,000
	Other allowances.....	200	1,500	1,400	6,500	100	50,000	1,800	5,500	---	---	---	67,000
	Reimbursable details.....	100,000	---	---	---	50,000	200,000	---	100,000	---	---	---	450,000
	All other personal services.....	323,000	314,000	184,000	293,000	201,000	1,741,000	144,000	7,560,000	4,000	3,000	1,000	10,768,000
	Total personal services.....	<u>\$6,200,000</u>	<u>\$22,609,000</u>	<u>\$10,650,000</u>	<u>\$20,101,000</u>	<u>\$3,120,000</u>	<u>\$15,834,000</u>	<u>\$1,915,000</u>	<u>\$47,540,000</u>	<u>\$393,000</u>	<u>\$226,000</u>	<u>\$37,000</u>	<u>\$128,625,000</u>

**NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION**

STAFFING CHARTS

ESTIMATES OF APPROPRIATIONS

FISCAL YEAR 1961

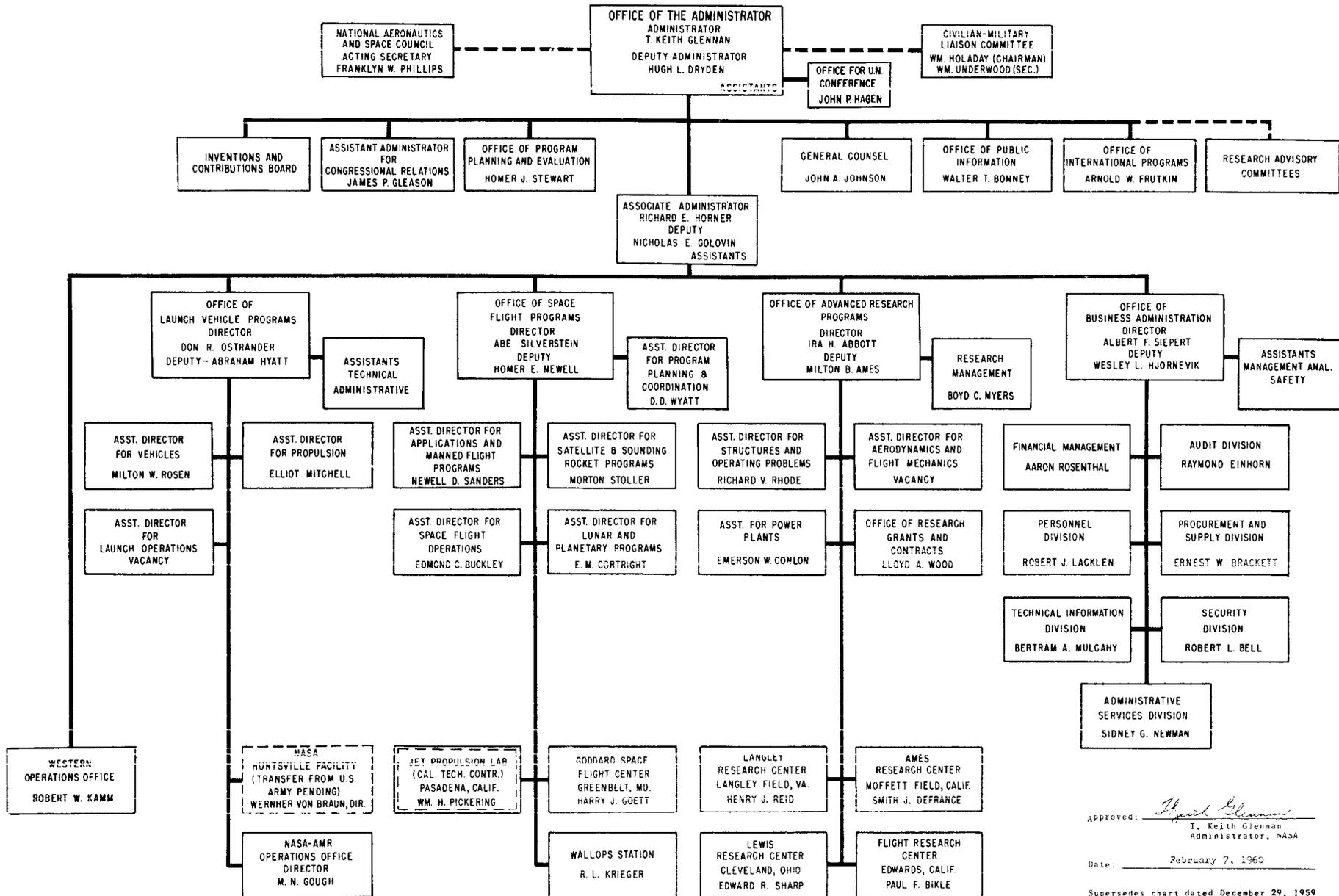
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

PROPOSED PERSONNEL STAFFING CHARTS

<u>Location</u>	<u>Page No.</u>
NASA.....	13-1
NASA Headquarters.....	13-2
Summary of staffing requirements.....	13-3
Langley Research Center.....	13-20
Ames Research Center.....	13-21
Lewis Research Center.....	13-22
Flight Research Center.....	13-23
Goddard Space Flight Center.....	13-24
Wallops Station.....	13-25
NASA Huntsville Facility.....	13-26
Western Operations Office.....	13-27
Atlantic Missile Range Operations Office.....	13-28
Pacific Missile Range Operations Office.....	13-29

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



Approved: *T. Keith Glennan*
 T. Keith Glennan
 Administrator, NASA

Date: February 7, 1960

Supersedes chart dated December 29, 1959

3 \$23,335

1 Excepted Chief, technical program analysis	15,000
2 GS-15 Special assistant to the associate administrator	25,540
1 GS-15 Specialist for facilities and equipment	12,770
1 GS-15 Specialist for systems integration	12,770
1 GS-15 Specialist for propulsion	12,770
1 GS-15 Technical analyst (vehicles and propulsion)	12,770
1 GS-15 Technical analyst (subsystems)	12,770
1 GS-15 Technical analyst (payload development)	12,770
1 GS-15 Specialist (program integration and reports)	12,770
1 GS-13 Chief, program management center	9,890
9 Other GS personnel	53,835
24	\$263,655

1 GS-15 Programs officer, cooperative program	12,770
6 Other GS personnel	40,400
10	\$95,210

OFFICE OF LAUNCH VEHICLE PROGRAMS	
1 Excepted Director of launch vehicle programs	\$21,000
1 Excepted Deputy director of launch vehicle programs	19,000
1 GS-15 Technical assistant to the director	12,770
1 GS-14 Staff assistant	11,595
4 Other GS personnel	31,040
8	\$95,405

SPACE FLIGHT PROGRAMS	
1 Excepted Director of space flight programs	\$21,000
1 Excepted Deputy director of space flight programs	19,000
3 Other GS personnel	14,750
5	\$54,750

ADVANCED RESEARCH PROGRAMS	
1 Excepted Director of advanced research programs	\$21,000
1 Excepted Deputy director of advanced research programs	19,000
2 Other GS personnel	11,650
4	\$51,650

OFFICE OF BUSINESS ADMINISTRATION	
1 Excepted Director of business administration	
1 Excepted Deputy director	
1 Excepted Assistant director	
3 Other GS personnel	
6	

ASSISTANTS	
1 Excepted Chief, analysis and requirements	\$15,500
1 GS-15 Chief, budget programming	12,770
1 GS-15 Specialist, mission requirements	12,770
1 GS-15 Specialist, vehicle analysis	12,770
1 GS-15 Specialist, vehicle design	12,770
1 Other GS personnel	4,940
7	\$71,520

PROGRAM PLANNING AND COORDINATION	
1 Excepted Assistant director	\$19,000
2 Excepted Scientific assistant	34,000
1 Excepted Technical assistant	17,000
1 Excepted Technical assistant	16,500
1 GS-15 program planning control officer	12,770
1 GS-14 Program control assistant	11,355
1 GS-13 Program control assistant	9,890
6 Other GS personnel	34,620
14	\$155,135

RESEARCH MANAGEMENT	
1 Excepted Technical assistant for research management	\$15,500
2 GS-15 Staff assistant	27,940
2 GS-14 Staff assistant	23,190
10 Other GS personnel	47,685
15	\$114,315

FINANCIAL MANAGEMENT	
1 Excepted Director of financial management	\$16,500
1 GS-15 Manager	16,000
1 GS-15 Fiscal Officer	13,070
1 GS-15 Fiscal Officer	12,770
1 GS-15 Contractor systems accountant	12,770
1 GS-14 Contractor systems accountant	11,355
1 GS-13 Assistant budget officer	10,610
2 GS-13 Budget analyst	20,260
2 GS-13 Fiscal systems accountant	19,780
1 GS-13 Financial reporting analyst	9,890
29 Other GS personnel	165,585
40	\$296,820

1 Excepted Dir	
1 GS-15 Manager	
1 GS-15 Mobiliz	
2 GS-14 Manager	
2 GS-13 Manager	
1 GS-13 Manager	
1 GS-13 Manager	
11 Other GS pers	
18	
Safety Office	
1 GS-15 Safety	
1 Other GS pers	
2	

VEHICLES	
1 Excepted Assistant director for vehicles	\$17,000
1 Excepted Chief, Saturn class vehicles	16,500
1 Excepted Chief, advanced vehicle development	16,000
1 Excepted Chief, Scout class vehicles	15,000
1 Excepted Specialist, guidance systems	15,000
1 GS-15 Chief, Centaur class vehicles	13,070
1 GS-15 Project manager, Saturn class vehicles	12,770
1 GS-15 Project manager, Scout class vehicles	12,770
1 GS-15 Project manager, Centaur class vehicles	12,770
1 GS-15 Specialist, electro-mechanical systems	12,770
1 GS-14 Specialist, aerothermodynamics	11,355
1 GS-14 Staff assistant	11,355
5 Other GS personnel	28,590
17	\$188,950

APPLICATIONS AND MANNED SPACE FLIGHT PROGRAMS	
1 Excepted Assistant director	\$19,000
1 Excepted Chief, manned space flight	17,000
1 Excepted Chief, advanced technology	15,500
1 Excepted Chief, communications satellites	15,000
1 Excepted Head, manned satellites	15,000
1 Excepted Head, advanced manned systems	15,000
1 Excepted Chief, meteorological satellites	15,000
1 GS-15 Space and aeronautical scientist	12,770
1 GS-15 Head, auxiliary power units	12,770
1 GS-15 Executive assistant	12,770
1 GS-14 Head, advanced components	11,595
9 Other GS personnel	51,430
26	\$212,835

STRUCTURES AND OPERATING PROBLEMS	
1 Excepted Assistant director of advanced research programs	\$19,000
1 Excepted Chief, structures and operating problems	16,500
1 Excepted Chief, materials research program	16,500
1 Excepted Assistant chief, structures and operating problems	15,500
1 GS-15 Aeronautical research engineer	13,070
2 GS-14 Aeronautical research engineer	25,110
2 GS-14 Aeronautical research scientist	23,190
2 GS-14 Materials research engineer	22,950
1 GS-13 Aeronautical research scientist	9,890
1 GS-13 Materials research engineer	9,890
9 Other GS personnel	42,070
22	\$213,670

PERSONNEL DIVISION	
1 Excepted Director of personnel	\$16,000
1 GS-15 Examinations and standards officer	12,770
1 GS-15 Classification and organization officer	12,770
1 GS-14 Regulations and procedures officer	11,835
1 GS-14 Assistant classification and organization officer	11,355
1 GS-13 Assistant examinations and standards officer	10,130
1 GS-13 Classification and organization analyst	10,130
1 GS-13 Assistant regulations and procedures officer	9,890
1 GS-13 Examinations and standards analyst	9,890
1 GS-13 Training officer	9,890
1 GS-13 Personnel program survey officer	9,890
18 Other GS personnel	106,725
29	\$231,515

1 Excepted Dire	
2 GS-14 Auditor	
9 GS-13 Auditor	
7 Other GS pers	
19	

PROPULSION	
1 Excepted Assistant director for propulsion	\$16,500
1 Excepted Chief, solid rockets	16,500
1 Excepted Chief, liquid rockets	15,500
1 Excepted Chief, nuclear propulsion	15,500
1 Excepted Chief, space propulsion	15,500
1 Excepted Manager, nuclear electric generator systems	15,000
1 Excepted Manager, electro-static propulsion and plasma	15,000
1 Excepted Coordinator, advanced technology	15,000
1 GS-15 Project manager, large thrust engines	13,970
1 GS-15 Manager, advanced technology	12,770
1 GS-15 Manager, nuclear heat transfer systems	12,770
1 GS-14 Project manager, liquid rockets	12,555
1 GS-14 Manager, rocket development and sounding rockets	11,355
1 GS-14 Staff assistant	11,355
5 Other GS personnel	23,450
19	\$228,725

SATELLITE AND SOUNDING ROCKET PROGRAMS	
1 Excepted Assistant director	\$19,000
1 Excepted Chief, geophysics	16,500
1 Excepted Chief, flight systems	16,500
1 Excepted Head, chemistry	15,500
1 Excepted Head, energetic particles	15,000
1 Excepted Head, aeronomy	15,000
1 Excepted Head, stellar and galactic	14,500
1 Excepted Chief, astronomy and astrophysics	14,500
1 GS-15 Head, geophysics	12,770
1 GS-15 Head, ionospheric physics	12,770
1 GS-15 Head, astrophysics	12,770
1 GS-15 Executive assistant	12,770
3 GS-14 Space and aeronautical scientist	34,785
1 GS-13 Head, solar physics	10,130
9 Other GS personnel	45,460
25	\$267,955

AERODYNAMICS AND FLIGHT MECHANICS	
1 Excepted Assistant director of advanced research programs	\$19,000
1 Excepted Chief, aerodynamics and flight mechanics research programs	16,500
1 Excepted Aeronautical research scientist	15,000
1 Excepted Aeronautical research engineer	15,000
3 GS-15 Aeronautical research engineer	38,310
3 GS-14 Control and guidance research engineer	35,745
1 GS-13 Aeronautical research engineer	11,090
7 Other GS personnel	32,720
18	\$183,365

SECURITY DIVISION	
1 Excepted Director of security	\$15,000
1 GS-15 Assistant director of security	13,070
1 GS-14 Security specialist	11,355
1 GS-13 Personnel security officer	9,890
1 GS-13 Chief, NASA Headquarters security service	9,890
18 Other GS personnel	106,345
23	\$165,550

1 Excepted Direc	
1 GS-15 Assista	
1 GS-15 Chief, I	
1 GS-15 Chief, I	
1 GS-15 Chairma	
1 GS-15 Chief, I	
1 GS-14 Facilita	
1 GS-14 Chief, c	
1 GS-14 Chief, c	
1 GS-14 Transpor	
1 GS-14 Utilitie	
1 GS-14 Procure	
1 GS-13 Contract	
1 GS-13 Regulat	
1 GS-13 Reports	
3 GS-13 Procure	
1 GS-13 Procure	
1 GS-13 Property	
23 Other GS pers	
44	

LAUNCH OPERATIONS	
1 Excepted Assistant director for launch operations	\$16,500
1 Excepted Chief, launch projects	15,500
1 Excepted Chief, range support	15,500
2 GS-15 Manager, range support unit	25,540
1 GS-14 Manager, launch projects	11,355
1 GS-14 Staff assistant	11,355
3 Other GS personnel	14,500
10	\$110,250

SPACE FLIGHT OPERATIONS	
1 Excepted Assistant director	\$19,000
1 Excepted Chief, operations	17,000
1 Excepted Head, flight missions operations	17,000
1 Excepted Chief, advanced development	16,500
1 Excepted Head, telemetry systems	15,500
1 Excepted Head, data and computing systems	15,500
1 Excepted Staff scientist, computations	15,000
1 GS-15 Head, tracking systems	12,770
1 GS-15 Head, communications operations	12,770
1 GS-15 Electronic engineer	13,470
1 GS-15 Space and aeronautical scientist	12,770
1 GS-15 Head, data processing and coordination	12,770
1 GS-14 Executive assistant	11,595
1 GS-14 Space and aeronautical scientist	11,595
1 GS-14 Head, network operations	11,595
1 GS-13 Engineer, construction coordination	10,130
1 GS-13 Space and aeronautical scientist	10,130
8 Other GS personnel	43,690
25	\$279,275

POWER PLANTS	
1 Excepted Assistant director of advanced research programs	\$19,000
1 Excepted Chief, power plants research	16,500
1 Excepted Propulsion scientist	15,500
2 GS-15 Aeronautical power plant engineer	26,740
1 GS-15 Mechanical engineer	13,070
1 GS-15 Propulsion scientist	12,770
1 GS-14 Aeronautical research engineer	11,355
2 GS-13 Aeronautical research engineer	20,620
6 Other GS personnel	27,070
16	\$162,025

TECHNICAL INFORMATION DIVISION	
1 GS-15 Director of technical information	\$13,070
1 GS-13 Librarian	9,890
1 GS-13 Technical information specialist	9,890
34 Other GS personnel	177,515
37	\$210,365

41 GS personnel	
12 Wage board pe	
53	

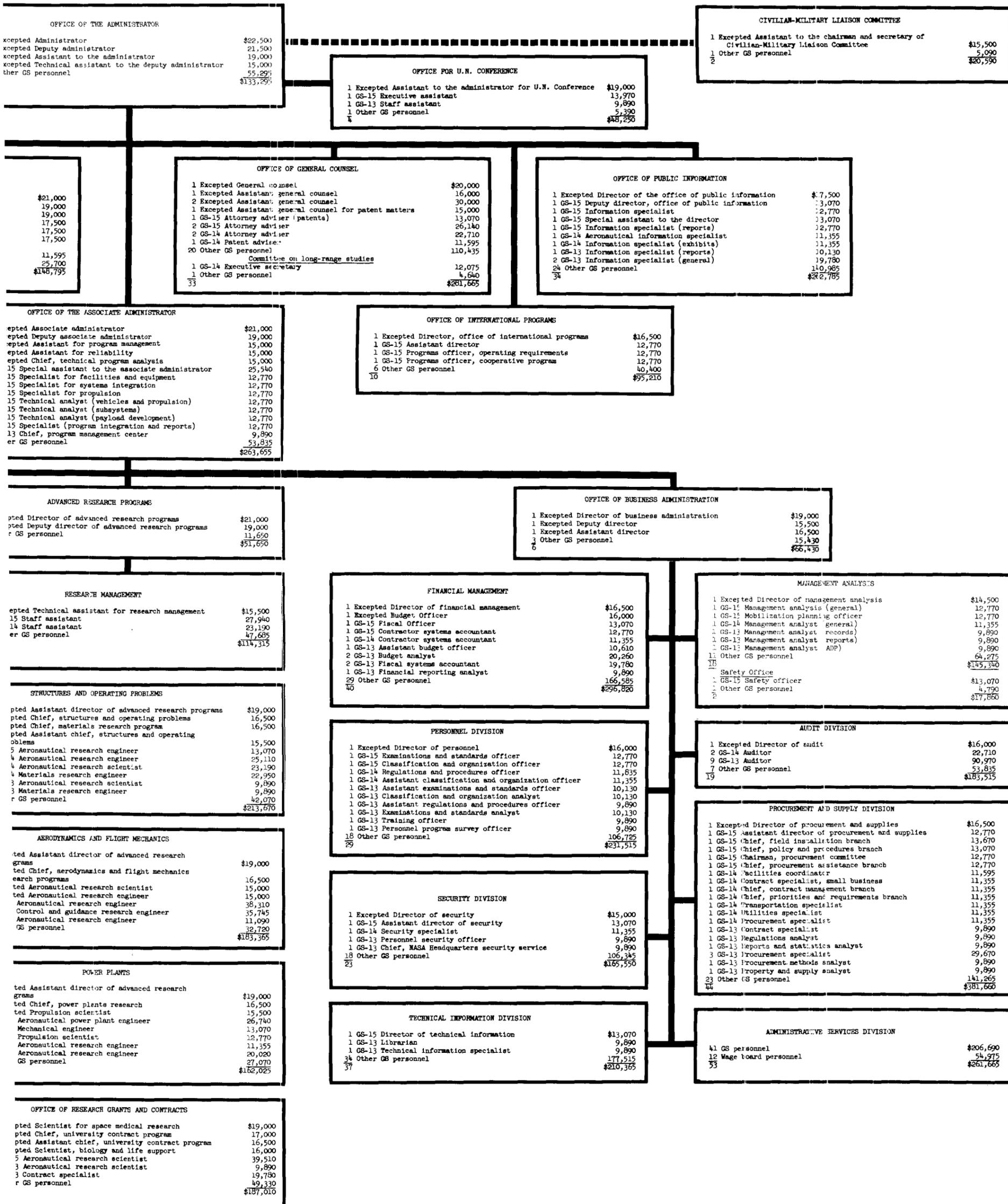
LUNAR AND PLANETARY PROGRAMS	
1 Excepted Assistant director	\$19,000
1 Excepted Chief, flight systems	17,000
1 Excepted Chief, program coordination	16,500
1 Excepted Chief, sciences	16,000
1 Excepted Head, planetary and interplanetary systems	16,000
1 Excepted Head, lunar systems	16,000
1 Excepted Head, spacecraft technology	15,000
1 Excepted Head, lunar sciences	15,000
1 Excepted Head, planetary and interplanetary sciences	15,000
1 Excepted Staff scientist	15,000
2 GS-15 Space and aeronautical scientist	26,140
1 GS-14 Head, scientific experiments	11,835
1 GS-14 Space and aeronautical scientist	11,355
7 Other GS personnel	36,510
21	\$246,340

OFFICE OF RESEARCH GRANTS AND CONTRACTS	
1 Excepted Scientist for space medical research	\$19,000
1 Excepted Chief, university contract program	17,000
1 Excepted Assistant chief, university contract program	16,500
1 Excepted Scientist, biology and life support	16,000
3 GS-15 Aeronautical research scientist	33,510
1 GS-13 Aeronautical research scientist	9,890
2 GS-13 Contract specialist	15,700
10 Other GS personnel	49,330
20	\$187,010

AUTICS AND SPACE ADMINISTRATION

PROPOSED PERSONNEL STAFFING CHART FISCAL YEAR 1961

NASA HEADQUARTERS

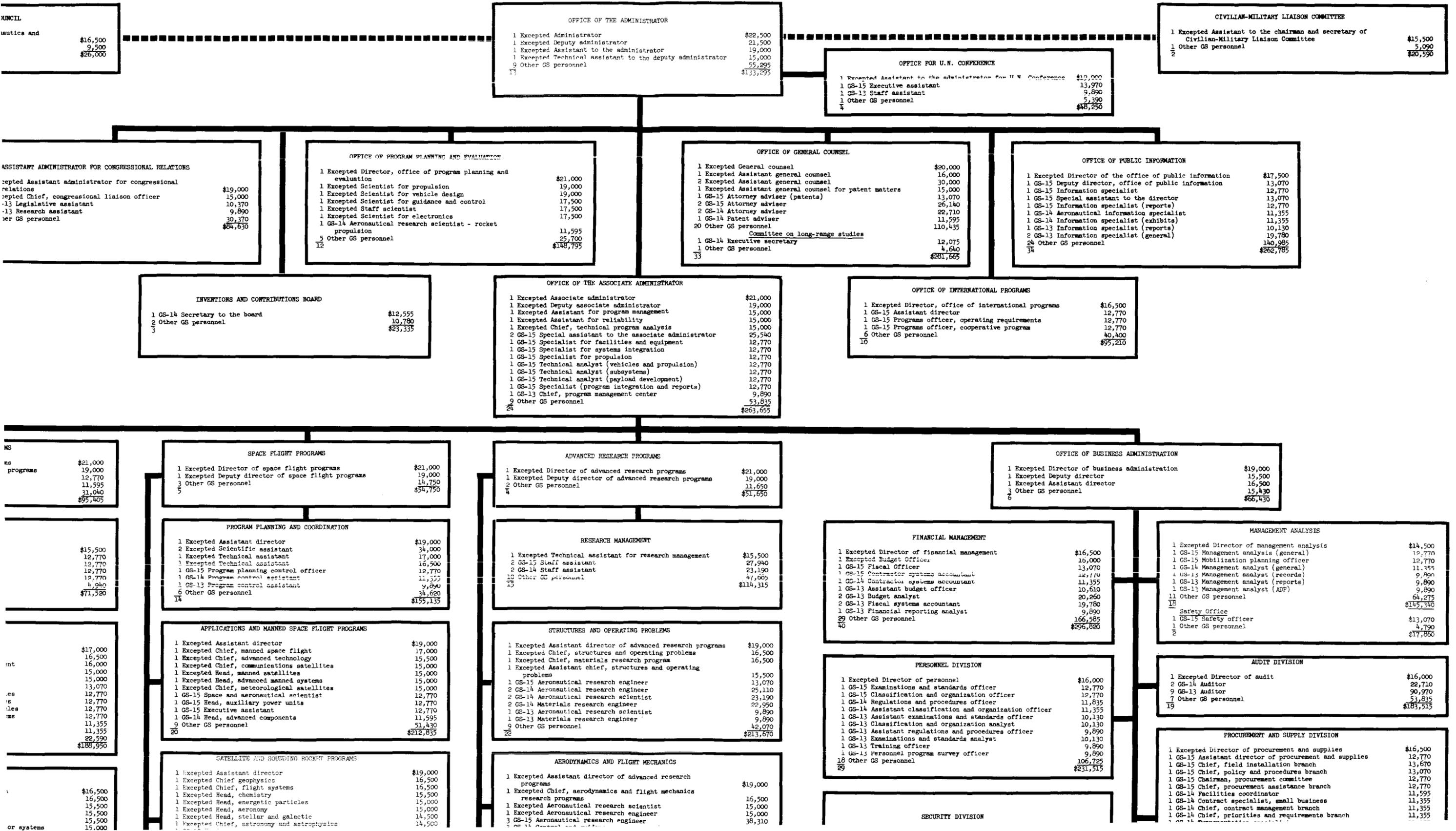


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED PERSONNEL STAFFING CHART

FISCAL YEAR 1961

NASA HEADQUARTERS



NATIONAL AERONAUTICS AND

PROPOSED PERSONNEL STAFF
FISCAL YEAR 1964

NASA HEADQUARTERS

NATIONAL AERONAUTICS AND SPACE COUNCIL		
1 Excepted Acting secretary, National Aeronautics and Space Council		\$16,500
2 Other GS personnel		9,500
3		\$26,000

OFFICE OF THE ADMINISTRATOR		
1 Excepted Administrator		
1 Excepted Deputy administrator		
1 Excepted Assistant to the administrator		
1 Excepted Technical assistant to the deputy		
9 Other GS personnel		
13		

ASSISTANT ADMINISTRATOR FOR CONGRESSIONAL RELATIONS		
1 Excepted Assistant administrator for congressional relations	\$19,000	
1 Excepted Chief, congressional liaison officer	15,000	
1 GS-13 Legislative assistant	10,370	
1 GS-13 Research assistant	9,390	
2 Other GS personnel	30,370	
9	\$84,630	

OFFICE OF PROGRAM PLANNING AND EVALUATION		
1 Excepted Director, office of program planning and evaluation	\$21,000	
1 Excepted Scientist for propulsion	19,000	
1 Excepted Scientist for vehicle design	19,000	
1 Excepted Scientist for guidance and control	17,500	
1 Excepted Staff scientist	17,500	
1 Excepted Scientist for electronics	17,500	
1 GS-14 Aeronautical research scientist - rocket propulsion	11,595	
5 Other GS personnel	25,700	
12	\$148,795	

INVENTIONS AND CONTRIBUTIONS BOARD		
1 GS-14 Secretary to the board	\$12,555	
2 Other GS personnel	10,730	
3	\$23,335	

OFFICE OF THE ASSOCIATE ADMINISTRATOR		
1 Excepted Associate administrator		
1 Excepted Deputy associate administrator		
1 Excepted Assistant for program management		
1 Excepted Assistant for reliability		
1 Excepted Chief, technical program analysis		
2 GS-15 Specialist assistant to the associate administrator		
1 GS-15 Specialist for facilities and equipment		
1 GS-15 Specialist for systems integration		
1 GS-15 Specialist for propulsion		
1 GS-15 Technical analyst (vehicles and propulsion)		
1 GS-15 Technical analyst (subsystems)		
1 GS-15 Technical analyst (payload development)		
1 GS-15 Specialist (program integration and coordination)		
1 GS-13 Chief, program management center		
9 Other GS personnel		
24		

OFFICE OF LAUNCH VEHICLE PROGRAMS		
1 Excepted Director of launch vehicle programs	\$21,000	
1 Excepted Deputy director of launch vehicle programs	19,000	
1 GS-15 Technical assistant to the director	12,770	
1 GS-14 Staff assistant	11,595	
4 Other GS personnel	31,040	
8	\$95,405	

SPACE FLIGHT PROGRAMS		
1 Excepted Director of space flight programs	\$11,000	
1 Excepted Deputy director of space flight programs	19,000	
3 Other GS personnel	14,750	
5	\$44,750	

ADVANCED RESEARCH PROGRAMS		
1 Excepted Director of advanced research programs		
1 Excepted Deputy director of advanced research programs		
2 Other GS personnel		
4		

ASSISTANTS		
1 Excepted Chief, analysis and requirements	\$15,500	
1 GS-15 Chief, budget programming	12,770	
1 GS-15 Specialist, mission requirements	12,770	
1 GS-15 Specialist, vehicle analysis	12,770	
1 GS-15 Specialist, vehicle design	12,770	
1 Other GS personnel	4,940	
6	\$71,520	

PROGRAM PLANNING AND COORDINATION		
1 Excepted Assistant director	\$15,000	
2 Excepted Scientific assistant	14,000	
1 Excepted Technical assistant	17,000	
1 Excepted Technical assistant	16,500	
1 GS-15 Program planning control officer	12,770	
1 GS-14 Program control assistant	11,355	
1 GS-13 Program control assistant	9,890	
6 Other GS personnel	31,620	
14	\$157,135	

RESEARCH MANAGEMENT		
1 Excepted Technical assistant for research management		
2 GS-15 Staff assistant		
2 GS-14 Staff assistant		
10 Other GS personnel		
15		

VEHICLES		
1 Excepted Assistant director for vehicles	\$17,000	
1 Excepted Chief, Saturn class vehicles	16,500	
1 Excepted Chief, advanced vehicle development	16,000	
1 Excepted Chief, Scout class vehicles	15,000	
1 Excepted Specialist, guidance systems	15,000	
1 GS-15 Chief, Centaur class vehicles	13,070	
1 GS-15 Project manager, Saturn class vehicles	12,770	
1 GS-15 Project manager, Scout class vehicles	12,770	
1 GS-15 Project manager, Centaur class vehicles	12,770	
1 GS-15 Specialist, electro-mechanical systems	12,770	
1 GS-14 Specialist, aerothermodynamics	11,355	
1 GS-14 Staff assistant	11,355	
5 Other GS personnel	22,590	
17	\$188,950	

APPLICATIONS AND MANNED SPACE FLIGHT PROGRAMS		
1 Excepted Assistant director	\$9,000	
1 Excepted Chief, manned space flight	17,000	
1 Excepted Chief, advanced technology	15,500	
1 Excepted Chief, communications satellites	15,000	
1 Excepted Head, manned satellites	15,000	
1 Excepted Head, advanced manned systems	15,000	
1 Excepted Chief, meteorological satellites	15,000	
1 GS-15 Space and aeronautical scientist	12,770	
1 GS-15 Head, auxiliary power units	12,770	
1 GS-15 Executive assistant	12,770	
1 GS-14 Head, advanced components	11,595	
9 Other GS personnel	31,430	
20	\$212,835	

STRUCTURES AND OPERATING PROBLEMS		
1 Excepted Assistant director of advanced research programs		
1 Excepted Chief, structures and operating problems		
1 Excepted Chief, materials research programs		
1 Excepted Assistant chief, structures and operating problems		
1 GS-15 Aeronautical research engineer		
2 GS-14 Aeronautical research engineer		
2 GS-14 Aeronautical research scientist		
2 GS-14 Materials research engineer		
1 GS-13 Aeronautical research scientist		
1 GS-13 Materials research engineer		
9 Other GS personnel		
22		

PROPULSION		
1 Excepted Assistant director for propulsion	\$16,500	
1 Excepted Chief, solid rockets	16,500	
1 Excepted Chief, liquid rockets	15,500	
1 Excepted Chief, nuclear propulsion	15,500	
1 Excepted Chief, space propulsion	15,500	
1 Excepted Manager, nuclear electric generator systems	15,000	
1 Excepted Manager, electro-static propulsion and plasma	15,000	
1 Excepted Coordinator, advanced technology	15,000	
1 GS-15 Project manager, large thrust engines	13,970	
1 GS-15 Manager, advanced technology	12,770	
1 GS-15 Manager, nuclear heat transfer systems	12,770	
1 GS-14 Project manager, liquid rockets	12,555	
1 GS-14 Manager, rocket development and sounding rockets	11,355	
1 GS-14 Staff assistant	11,355	
5 Other GS personnel	23,450	
19	\$222,725	

SATELLITE AND SOUNDING ROCKET PROGRAMS		
1 Excepted Assistant director	\$19,000	
1 Excepted Chief geophysics	16,500	
1 Excepted Chief, flight systems	16,500	
1 Excepted Head, chemistry	15,500	
1 Excepted Head, energetic particles	15,000	
1 Excepted Head, aeronomy	15,000	
1 Excepted Head, stellar and galactic	14,500	
1 Excepted Chief, astronomy and astrophysics	14,500	
1 GS-15 Head, geophysics	12,770	
1 GS-15 Head, ionospheric physics	12,770	
1 GS-15 Head, astrophysics	12,770	
1 GS-15 Executive assistant	12,770	
3 GS-14 Space and aeronautical scientist	34,785	
1 GS-13 Head, solar physics	10,130	
9 Other GS personnel	45,460	
25	\$327,955	

AERODYNAMICS AND FLIGHT MECHANICS		
1 Excepted Assistant director of advanced research programs		
1 Excepted Chief, aerodynamics and flight mechanics research programs		
1 Excepted Aeronautical research scientist		
1 Excepted Aeronautical research engineer		
3 GS-15 Aeronautical research engineer		
3 GS-14 Control and guidance research engineer		
1 GS-13 Aeronautical research engineer		
7 Other GS personnel		
18		

LAUNCH OPERATIONS		
1 Excepted Assistant director for launch operations	\$16,500	
1 Excepted Chief, launch projects	15,500	
1 Excepted Chief, range support	15,500	
2 GS-15 Manager, range support unit	25,540	
1 GS-14 Manager, launch projects	11,355	
1 GS-14 Staff assistant	11,355	
3 Other GS personnel	14,500	
10	\$110,250	

SPACE FLIGHT OPERATIONS		
1 Excepted Assistant director	\$9,000	
1 Excepted Chief, operations	17,000	
1 Excepted Head, flight missions operations	17,000	
1 Excepted Chief, advanced development	16,500	
1 Excepted Head, telemetry systems	15,500	
1 Excepted Head, data and computing systems	15,500	
1 Excepted Staff scientist, computations	15,000	
1 GS-15 Head, tracking systems	12,770	
1 GS-15 Head, communications operations	12,770	
1 GS-15 Electronic engineering	13,970	
1 GS-15 Space and aeronautical scientist	12,770	
1 GS-15 Head, data processing and coordination	12,770	
1 GS-14 Executive assistant	11,595	
1 GS-14 Space and aeronautical scientist	11,595	
1 GS-14 Head, network operations	11,595	
1 GS-13 Engineer, construction coordination	10,130	
1 GS-13 Space and aeronautical scientist	10,130	
8 Other GS personnel	43,680	
25	\$279,275	

POWER PLANTS		
1 Excepted Assistant director of advanced research programs		
1 Excepted Chief, power plants research		
1 Excepted Propulsion scientist		
2 GS-15 Aeronautical power plant engineer		
1 GS-15 Mechanical engineer		
1 GS-15 Propulsion scientist		
1 GS-14 Aeronautical research engineer		
2 GS-13 Aeronautical research engineer		
6 Other GS personnel		
16		

LUNAR AND PLANETARY PROGRAMS		
1 Excepted Assistant director	\$19,000	
1 Excepted Chief, flight systems	17,000	
1 Excepted Chief, program coordination	16,500	
1 Excepted Chief, sciences	16,000	
1 Excepted Head, planetary and interplanetary systems	16,000	
1 Excepted Head, lunar systems	16,000	
1 Excepted Head, spacecraft technology	15,000	
1 Excepted Head, lunar sciences	15,000	
1 Excepted Head, planetary and interplanetary sciences	15,000	
1 Excepted Staff scientist	15,000	
2 GS-15 Space and aeronautical scientist	26,140	
1 GS-14 Head, scientific experiments	11,835	
1 GS-14 Space and aeronautical scientist	11,355	
7 Other GS personnel	36,510	
21	\$346,340	

OFFICE OF RESEARCH GRANTS AND CONTRACTS		
1 Excepted Scientist for space medical research		
1 Excepted Chief, university contract programs		
1 Excepted Assistant chief, university contract programs		
1 Excepted Scientist, biology and life sciences		
3 GS-15 Aeronautical research scientist		
1 GS-13 Aeronautical research scientist		
2 GS-13 Contract specialist		
10 Other GS personnel		
23		

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA HEADQUARTERS

SUMMARY OF STAFFING REQUIREMENTS

	<u>Actual staffing</u> <u>June 30, 1959</u>		<u>Authorized staffing</u> <u>June 30, 1960</u>		<u>Proposed staffing</u> <u>June 30, 1960</u>	
Office of the Administrator and staff offices...	91	\$851,545	118	\$1,130,475	147	\$1,388,210
Office of Business Administration.....	185	1,252,304	219	1,562,740	271	1,960,720
Office of Advanced Research Programs.....	66	633,925	83	805,210	95	912,035
Office of Space Flight Programs.....	83	910,990	80	938,880	110	1,216,290
Office of Launch Vehicle Programs.....	<u>3</u>	<u>29,605</u>	<u>33</u>	<u>383,505</u>	<u>60</u>	<u>688,850</u>
Total.....	<u>428</u>	<u>\$3,678,369</u>	<u>533</u>	<u>\$4,820,810</u>	<u>683</u>	<u>\$6,166,105</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA Headquarters

Distribution of Staffing Requirements

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>ADMINISTRATOR AND STAFF OFFICES:</u>						
<u>Office of the administrator:</u>						
Administrator.....	1	Excepted \$22,500	1	Excepted \$22,500	1	Excepted \$22,500
Deputy administrator.....	1	" 21,500	1	" 21,500	1	" 21,500
Assistant to the administrator.....	2	" 33,500	1	" 19,000	1	" 19,000
Technical assistant to the deputy administrator.....	1	" 15,000	1	" 15,000	1	" 15,000
Assistant to the administrator.....	-	---	1	GS-15 12,770	-	---
Special assistant to the administrator.....	1	GS-14 11,835	-	---	-	---
Below GS-13.....	7	40,075	6	34,895	6	34,895
Total.....	<u>13</u>	<u>144,410</u>	<u>11</u>	<u>125,665</u>	<u>10</u>	<u>112,895</u>
<u>Office of the associate administrator:</u>						
Associate administrator.....	1	Excepted 21,000	1	Excepted 21,000	1	Excepted 21,000
Deputy associate administrator.....	-	---	1	" 19,000	1	" 19,000
Assistant for program management.....	-	---	1	" 15,000	1	" 15,000
Assistant for reliability.....	-	---	-	---	1	" 15,000
Chief technical program analysis.....	-	---	-	---	1	" 15,000
Special assistant to the associate administrator.....	-	---	1	GS-15 12,770	2	GS-15 25,540
Specialist for facilities and equipment.....	-	---	-	---	1	" 12,770
Specialist for systems integration.....	-	---	-	---	1	" 12,770
Specialist for propulsion.....	-	---	-	---	1	" 12,770
Technical analyst (vehicles and propulsion).....	-	---	-	---	1	" 12,770
Technical analyst (subsystems).....	-	---	-	---	1	" 12,770
Technical analyst (payload development).....	-	---	-	---	1	" 12,770
Specialist (program integration and reports)....	-	---	-	---	1	" 12,770
Chief, program management center.....	-	---	-	---	1	GS-13 9,890
Below GS-13.....	<u>1</u>	<u>6,885</u>	<u>4</u>	<u>25,475</u>	<u>9</u>	<u>53,835</u>
Total.....	<u>2</u>	<u>27,885</u>	<u>8</u>	<u>93,245</u>	<u>24</u>	<u>263,655</u>

	<u>Actual staffing</u> June 30, 1959		<u>Authorized staffing</u> June 30, 1960		<u>Proposed staffing</u> June 30, 1960	
<u>International conferences:</u>						
Assistant to the administrator for international conferences.....	-	---	1 Excepted	\$19,000	1 Excepted	\$19,000
Executive assistant.....	-	---	1 GS-15	13,970	1 GS-15	13,970
Staff assistant.....	-	---	1 GS-13	9,890	1 GS-13	9,890
Below GS-13.....	-	---	1	5,390	1	5,390
Total.....	-	---	4	<u>48,250</u>	4	<u>48,250</u>
<u>Inventions and contributions board:</u>						
Secretary to the board.....	1	GS-14 \$12,555	1	GS-14 12,555	1	GS-14 12,555
Below GS-13.....	2	10,330	1	5,390	2	10,780
Total.....	3	<u>22,885</u>	2	<u>17,945</u>	3	<u>23,335</u>
<u>National Aeronautics and Space Council:</u>						
Acting secretary, National Aeronautics and Space Council.....	1	Excepted 16,500	1	Excepted 16,500	1	Excepted 16,500
Below GS-13.....	1	4,790	1	4,790	2	9,500
Total.....	2	<u>21,290</u>	2	<u>21,290</u>	3	<u>26,000</u>
<u>NASA classification board:</u>						
Below GS-13.....	2	<u>12,370</u>	3	<u>20,400</u>	3	<u>20,400</u>
<u>Civilian-Military Liaison Committee:</u>						
Assistant to the chairman and secretary of Civilian-Military Liaison Committee.....	1	Excepted 15,500	1	Excepted 15,500	1	Excepted 15,500
Below GS-13.....	1	5,090	1	5,090	1	5,090
Total.....	2	<u>20,590</u>	2	<u>20,590</u>	2	<u>20,590</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Assistant administrator for Congressional relations:</u>						
Assistant administrator for congressional relations.....	1	Excepted \$19,000	1	Excepted \$19,000	1	Excepted \$19,000
Chief, congressional liaison officer.....	-	---	1	" 15,000	1	" 15,000
Legislative assistant.....	1	GS-13 10,370	1	GS-13 10,370	1	GS-13 10,370
Research assistant.....	-	---	1	" 9,890	1	" 9,890
Below GS-13.....	3	19,790	4	25,880	5	30,370
Total.....	5	49,160	8	80,140	9	84,630
<u>Office of general counsel:</u>						
General counsel.....	1	Excepted 20,000	1	Excepted 20,000	1	Excepted 20,000
Assistant general counsel.....	1	" 16,000	1	" 16,000	1	" 16,000
Assistant general counsel.....	2	" 30,000	2	" 30,000	2	" 30,000
Assistant general counsel for patent matters....	1	" 15,000	1	" 15,000	1	" 15,000
Attorney adviser (patents).....	1	GS-15 13,070	1	GS-15 13,070	1	GS-15 13,070
Attorney adviser.....	1	" 12,770	2	" 26,140	2	" 26,140
Attorney adviser.....	1	GS-14 11,355	2	GS-14 22,710	2	GS-14 22,710
Patent adviser.....	1	" 11,595	1	" 11,595	1	" 11,595
Attorney adviser.....	1	GS-13 9,890	-	---	-	---
Below GS-13.....	15	87,050	17	92,480	20	110,435
<u>Committee on long-range studies:</u>						
Executive secretary.....	1	GS-14 12,075	1	GS-14 12,075	1	GS-14 12,075
Below GS-13.....	1	4,640	1	4,640	1	4,640
Total.....	27	243,445	30	263,710	33	281,665
<u>Office of international programs:</u>						
Director, office of international programs.....	1	Excepted 15,000	1	Excepted 16,500	1	Excepted 16,500
Assistant director.....	-	---	1	GS-15 12,770	1	GS-15 12,770
Programs officer, operating requirements.....	-	---	1	" 12,770	1	" 12,770
Programs officer, cooperative program.....	-	---	-	---	1	" 12,770
Below GS-13.....	1	5,580	4	20,440	6	40,400
Total.....	2	20,580	7	62,480	10	95,210

	<u>Actual staffing</u> June 30, 1959	<u>Authorized staffing</u> June 30, 1960	<u>Proposed staffing</u> June 30, 1960
<u>Office of program planning and evaluation:</u>			
Director, office of program planning and evaluation.....	1 Excepted \$21,000	1 Excepted \$21,000	1 Excepted \$21,000
Scientist for propulsion.....	1 " 19,000	1 " 19,000	1 " 19,000
Scientist for vehicle design.....	1 " 19,000	1 " 19,000	1 " 19,000
Scientist for guidance and control.....	1 " 17,500	1 " 17,500	1 " 17,500
Staff scientist.....	- ---	- ---	1 " 17,500
Scientist for electronics.....	- ---	1 Excepted 17,500	1 " 17,500
Aeronautical research scientist - rocket propulsion.....	1 GS-14 11,595	1 GS-14 11,595	1 GS-14 11,595
Below GS-13.....	3 15,200	4 20,500	5 25,700
Total.....	<u>8 103,295</u>	<u>10 126,095</u>	<u>12 148,795</u>
<u>Office of public information:</u>			
Director of the office of public information..	1 Excepted 17,500	1 Excepted 17,500	1 Excepted 17,500
Deputy director, office of public information.	1 GS-15 12,770	1 GS-15 13,070	1 GS-15 13,070
Information specialist.....	1 " 12,770	1 " 12,770	1 " 12,770
Special assistant to the director.....	- ---	1 " 13,070	1 " 13,070
Information specialist (reports).....	1 GS-14 11,595	1 " 12,770	1 " 12,770
Aeronautical information specialist.....	- ---	1 GS-14 11,355	1 GS-14 11,355
Information specialist (exhibits).....	- ---	1 " 11,355	1 " 11,355
Information specialist (reports).....	1 GS-13 10,130	1 GS-13 10,130	1 GS-13 10,130
Information specialist (general).....	2 " 19,780	2 " 19,780	2 " 19,780
Below GS-13.....	<u>18 101,090</u>	<u>21 128,865</u>	<u>24 140,985</u>
Total.....	<u>25 185,635</u>	<u>31 250,665</u>	<u>34 262,785</u>
TOTAL, ADMINISTRATOR AND STAFF OFFICES.....	<u>91 \$851,545</u>	<u>118 \$1,130,475</u>	<u>147 \$1,388,210</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>OFFICE OF BUSINESS ADMINISTRATION:</u>						
<u>Office of the director:</u>						
Director of business administration.....	1	Excepted \$19,000	1	Excepted \$19,000	1	Excepted \$19,000
Deputy director.....	-	---	1	" 15,500	1	" 15,500
Assistant director.....	-	---	-	---	1	" 16,500
Below GS-13.....	<u>1</u>	<u>5,470</u>	<u>2</u>	<u>10,450</u>	<u>3</u>	<u>15,430</u>
Total.....	<u>2</u>	<u>24,470</u>	<u>4</u>	<u>44,950</u>	<u>6</u>	<u>66,430</u>
<u>Management analysis:</u>						
Director of management analysis.....	1	Excepted 14,500	1	Excepted 14,500	1	Excepted 14,500
Management analyst (general).....	2	GS-14 23,190	1	GS-15 12,770	1	GS-15 12,770
Mobilization planning officer.....	-	---	1	" 12,770	1	" 12,770
Management analyst (general).....	-	---	-	---	1	GS-14 11,355
Management analyst (records).....	-	---	1	GS-13 9,890	1	GS-13 9,890
Management analyst (reports).....	-	---	-	---	1	" 9,890
Management analyst (ADP).....	-	---	-	---	1	" 9,890
Below GS-13.....	<u>8</u>	<u>49,550</u>	<u>9</u>	<u>57,240</u>	<u>11</u>	<u>64,275</u>
Total.....	<u>11</u>	<u>87,240</u>	<u>13</u>	<u>107,170</u>	<u>18</u>	<u>145,340</u>
<u>Safety office:</u>						
Safety officer.....	1	GS-14 12,555	1	GS-15 13,070	1	GS-15 13,070
Below GS-13.....	<u>1</u>	<u>4,640</u>	<u>1</u>	<u>4,790</u>	<u>1</u>	<u>4,790</u>
Total.....	<u>2</u>	<u>17,195</u>	<u>2</u>	<u>17,860</u>	<u>2</u>	<u>17,860</u>
<u>Administrative services division:</u>						
Below GS-13.....	<u>45</u>	<u>216,419</u>	<u>49</u>	<u>241,215</u>	<u>53</u>	<u>261,665</u>

	<u>Actual staffing</u> June 30, 1959		<u>Authorized staffing</u> June 30, 1960		<u>Proposed staffing</u> June 30, 1960	
<u>Audit division:</u>						
Director of audit.....	-	---	1 Excepted	\$16,000	1 Excepted	\$16,000
Auditor.....	2 GS-14	\$22,710	2 GS-14	22,710	2 GS-14	22,710
Auditor.....	2 GS-13	20,740	4 GS-13	41,520	9 GS-13	90,970
Below GS-13.....	6	44,905	7	53,835	7	53,835
Total.....	<u>10</u>	<u>88,355</u>	<u>14</u>	<u>134,065</u>	<u>19</u>	<u>183,515</u>
<u>Budget and fiscal division:</u>						
Director of financial management.....	-	---	1 Excepted	16,500	1 Excepted	16,500
Budget officer.....	1 Excepted	16,000	1 "	16,000	1 "	16,000
Fiscal officer.....	1 GS-15	12,770	1 GS-15	13,070	1 GS-15	13,070
Contractor systems accountant.....	-	---	-	---	1 "	12,770
Contractor systems accountant.....	-	---	-	---	1 GS-14	11,355
Assistant budget officer.....	1 GS-13	10,370	1 GS-13	10,610	1 GS-13	10,610
Budget analyst.....	1 "	9,890	1 "	10,130	2 "	20,260
Fiscal systems accountant.....	1 "	9,890	1 "	9,890	2 "	19,780
Financial reporting analyst.....	-	---	-	---	1 "	9,890
Below GS-13.....	<u>18</u>	<u>99,645</u>	<u>22</u>	<u>131,605</u>	<u>29</u>	<u>166,585</u>
Total.....	<u>23</u>	<u>158,565</u>	<u>28</u>	<u>207,805</u>	<u>40</u>	<u>296,820</u>
<u>Personnel division:</u>						
Director of personnel.....	1 Excepted	16,000	1 Excepted	16,000	1 Excepted	16,000
Examinations and standards officer.....	1 GS-15	12,770	1 GS-15	12,770	1 GS-15	12,770
Classification and organization officer.....	1 "	12,770	1 "	12,770	1 "	12,770
Regulations and procedures officer.....	1 GS-14	11,595	1 GS-14	11,835	1 GS-14	11,835
Assistant classification and organiza- tion officer.....	1 "	11,355	1 "	11,355	1 "	11,355
Assistant examinations and standards officer.	1 GS-13	10,130	1 GS-13	10,130	1 GS-13	10,130
Classification and organization analyst.....	1 "	10,130	1 "	10,130	1 "	10,130
Assistant regulations and procedures officer.	1 "	9,890	1 "	9,890	1 "	9,890
Examinations and standards analyst.....	1 "	9,890	1 "	10,130	1 "	10,130
Training officer.....	-	---	1 "	9,890	1 "	9,890
Personnel program survey officer.....	-	---	1 "	9,890	1 "	9,890
Below GS-13.....	<u>11</u>	<u>53,770</u>	<u>12</u>	<u>61,570</u>	<u>18</u>	<u>106,725</u>
Total.....	<u>20</u>	<u>158,300</u>	<u>23</u>	<u>186,360</u>	<u>29</u>	<u>231,515</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Procurement and supply division:</u>						
Director of procurement and supplies.....	1	Excepted \$16,500	1	Excepted \$16,500	1	Excepted \$16,500
Assistant director of procurement and supplies.....	-	---	-	---	1	GS-15 12,770
Chief, field installation branch.....	1	GS-15 13,370	1	GS-15 13,670	1	" 13,670
Chief, policy and procedures branch.....	1	" 13,070	1	" 13,070	1	" 13,070
Chairman, procurement committee.....	1	" 12,770	1	" 12,770	1	" 12,770
Chief, procurement assistance branch.....	1	GS-14 11,355	1	" 12,770	1	" 12,770
Facilities coordinator.....	-	---	1	GS-14 11,595	1	GS-14 11,595
Contract specialist, small business.....	1	GS-14 11,355	1	" 11,355	1	" 11,355
Chief, contract management branch.....	-	---	1	" 11,355	1	" 11,355
Chief, priorities and requirements branch.....	1	GS-13 10,130	1	" 11,355	1	" 11,355
Contract negotiator.....	4	" 39,560	-	---	-	---
Transportation specialist.....	-	---	1	GS-14 11,355	1	GS-14 11,355
Utilities specialist.....	-	---	1	" 11,355	1	" 11,355
Procurement specialist.....	-	---	1	" 11,355	1	" 11,355
Contract specialist.....	1	GS-13 9,890	1	GS-13 9,890	1	GS-13 9,890
Regulations analyst.....	-	---	1	" 9,890	1	" 9,890
Reports and statistics analyst.....	-	---	1	" 9,890	1	" 9,890
Procurement specialist.....	-	---	2	" 19,780	3	" 29,670
Procurement methods analyst.....	-	---	-	---	1	" 9,890
Property and supply analyst.....	-	---	-	---	1	" 9,890
Below GS-13.....	<u>19</u>	<u>104,420</u>	<u>19</u>	<u>107,255</u>	<u>23</u>	<u>141,265</u>
Total.....	<u>31</u>	<u>242,420</u>	<u>36</u>	<u>305,210</u>	<u>44</u>	<u>381,660</u>

Security division:

Director of security.....	1	Excepted 15,000	1	Excepted 15,000	1	Excepted 15,000
Assistant director of security.....	1	GS-15 13,070	1	GS-15 13,070	1	GS-15 13,070
Security specialist.....	1	GS-13 9,890	1	GS-14 11,355	1	GS-14 11,355
Personnel security officer.....	1	" 9,890	1	GS-13 9,890	1	GS-13 9,890
Chief, NASA Headquarters security service.....	-	---	1	" 9,890	1	" 9,890
Below GS-13.....	<u>11</u>	<u>62,780</u>	<u>15</u>	<u>84,805</u>	<u>18</u>	<u>106,345</u>
Total.....	<u>15</u>	<u>110,630</u>	<u>20</u>	<u>144,010</u>	<u>23</u>	<u>165,550</u>

	<u>Actual staffing</u> June 30, 1959		<u>Authorized staffing</u> June 30, 1960		<u>Proposed staffing</u> June 30, 1960	
<u>Technical information division:</u>						
Director of technical information.....	1 GS-15	\$12,770	1 GS-15	\$13,070	1 GS-15	\$13,070
Librarian.....	1 GS-13	9,890	1 GS-13	9,890	1 GS-13	9,890
Technical information specialist.....	-	---	1 "	9,890	1 "	9,890
Below GS-13.....	24	126,050	27	141,245	34	177,515
Total.....	<u>26</u>	<u>148,710</u>	<u>30</u>	<u>174,095</u>	<u>37</u>	<u>210,365</u>
TOTAL, OFFICE OF BUSINESS ADMINISTRATION.....	<u>185</u>	<u>\$1,252,304</u>	<u>219</u>	<u>\$1,562,740</u>	<u>271</u>	<u>\$1,960,720</u>

ADVANCED RESEARCH PROGRAMS:

Office of the Director:

Director of advanced research programs.....	-	---	1 Excepted	\$21,000	1 Excepted	\$21,000
Deputy director of advanced research programs.	1 Excepted	\$19,000	1 "	19,000	1 "	19,000
Technical assistant for research management...	1 "	15,500	1 "	15,500	1 "	15,500
Staff assistant.....	2 GS-15	27,940	2 GS-15	27,940	2 GS-15	27,940
Staff assistant.....	-	---	2 GS-14	23,190	2 GS-14	23,190
Staff assistant.....	1 GS-13	11,090	-	---	-	---
Below GS-13.....	9	46,140	11	52,305	12	59,335
Total.....	<u>14</u>	<u>119,670</u>	<u>18</u>	<u>158,935</u>	<u>19</u>	<u>165,965</u>

Aerodynamics and flight mechanics research:

Assistant director of advanced research programs.....	1 Excepted	19,000	1 Excepted	19,000	1 Excepted	19,000
Chief, aerodynamics and flight mechanics research programs.....	1 "	15,500	1 "	16,500	1 "	16,500
Aeronautical research scientist.....	1 "	15,000	1 "	15,000	1 "	15,000
Aeronautical research engineer.....	1 "	15,000	1 "	15,000	1 "	15,000
Aeronautical research engineer.....	1 GS-15	13,070	2 GS-15	26,140	3 GS-15	38,310
Control and guidance research engineer.....	1 GS-14	12,555	3 GS-14	35,745	3 GS-14	35,745
Aeronautical research engineer.....	2 GS-13	22,180	1 GS-13	11,090	1 GS-13	11,090
Below GS-13.....	5	23,090	6	28,180	7	32,720
Total.....	<u>13</u>	<u>135,395</u>	<u>16</u>	<u>166,655</u>	<u>18</u>	<u>183,365</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Power plants research program:</u>						
Assistant director of advanced research programs.....	-	---	1 Excepted	\$19,000	1 Excepted	\$19,000
Chief, power plants research.....	1 Excepted	\$16,500	1 "	16,500	1 "	16,500
Propulsion scientist.....	-	---	1 "	15,500	1 "	15,500
Aeronautical power plant engineer.....	1 GS-15	13,970	2 GS-15	26,740	2 GS-15	26,740
Mechanical engineer.....	1 "	13,070	1 "	13,070	1 "	13,070
Propulsion scientist.....	-	---	-	---	1 "	12,770
Aeronautical research engineer.....	2 GS-14	24,150	1 GS-14	11,355	1 GS-14	11,355
Aeronautical research engineer.....	1 GS-13	10,130	1 GS-13	10,130	2 GS-13	20,020
Below GS-13.....	5	22,150	6	27,070	6	27,070
Total.....	<u>11</u>	<u>99,970</u>	<u>14</u>	<u>139,365</u>	<u>16</u>	<u>162,025</u>

Structures and operating problems:

Assistant director of advanced research programs.....	1 Excepted	19,000	1 Excepted	19,000	1 Excepted	19,000
Chief, structures and operating problems....	1 "	16,500	1 "	16,500	1 "	16,500
Assistant chief, structures and operating problems.....	1 "	15,500	1 "	15,500	1 "	15,500
Aeronautical research engineer.....	1 GS-15	13,070	1 GS-15	13,070	1 GS-15	13,070
Aeronautical research engineer.....	2 GS-14	25,110	2 GS-14	25,110	2 GS-14	25,110
Aeronautical research scientist.....	2 "	23,190	2 "	23,190	2 "	23,190
Aeronautical research scientist.....	-	---	-	---	1 GS-13	9,890
Below GS-13.....	7	33,325	6	28,330	7	32,870
Total.....	<u>15</u>	<u>145,695</u>	<u>14</u>	<u>140,700</u>	<u>16</u>	<u>155,130</u>

Materials:

Chief, materials research program.....	-	---	1 Excepted	16,500	1 Excepted	16,500
Materials research engineer.....	-	---	1 GS-14	11,595	2 GS-14	22,950
Materials research engineer.....	1 GS-13	10,130	1 GS-13	9,890	1 GS-13	9,890
Below GS-13.....	-	---	1	4,640	2	9,200
Total.....	<u>1</u>	<u>10,130</u>	<u>4</u>	<u>42,625</u>	<u>6</u>	<u>58,540</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Research grants and contracts:</u>						
Scientist for space medical research.....	1	Excepted \$19,000	1	Excepted \$19,000	1	Excepted \$19,000
Chief, university contract program.....	1	" 17,000	1	" 17,000	1	" 17,000
Assistant chief, university contract program.	1	" 16,500	1	" 16,500	1	" 16,500
Scientist, biology and life support.....	1	" 16,000	1	" 16,000	1	" 16,000
Aeronautical research scientist.....	1	GS-15 13,970	1	GS-15 13,970	3	GS-15 39,510
Aeronautical research scientist.....	1	GS-13 9,890	1	GS-13 9,890	1	GS-13 9,890
Contract specialist.....	-	---	2	" 19,780	2	" 19,780
Below GS-13.....	6	30,705	9	44,790	10	49,330
Total.....	<u>12</u>	<u>123,065</u>	<u>17</u>	<u>156,930</u>	<u>20</u>	<u>187,010</u>
TOTAL, ADVANCED RESEARCH PROGRAMS.....	<u>66</u>	<u>\$633,925</u>	<u>83</u>	<u>\$805,210</u>	<u>95</u>	<u>\$912,035</u>

SPACE FLIGHT PROGRAMS:

Office of the director:

Director of space flight programs.....	1	Excepted \$21,000	1	Excepted \$21,000	1	Excepted \$21,000
Deputy director of space flight programs.....	-	---	1	" 19,000	1	" 19,000
Assistant director.....	1	Excepted 19,000	-	---	-	---
Administrative assistant.....	1	GS-15 13,970	-	---	-	---
Below GS-13.....	2	11,820	3	14,750	3	14,750
Total.....	<u>5</u>	<u>65,790</u>	<u>5</u>	<u>54,750</u>	<u>5</u>	<u>54,750</u>

Program planning coordination:

Assistant director.....	1	Excepted 19,000	1	Excepted 19,000	1	Excepted 19,000
Scientific assistant.....	-	---	-	---	2	" 34,000
Technical assistant.....	1	Excepted 17,000	1	Excepted 17,000	1	" 17,000
Technical assistant.....	-	---	1	" 16,500	1	" 16,500

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Program planning coordination (continued):</u>						
Program planning control officer.....	-	---	1 GS-15	\$12,770	1 GS-15	\$12,770
Program control assistant.....	-	---	-	---	1 GS-14	11,355
Program control assistant.....	-	---	-	---	1 GS-13	9,890
Below GS-13.....	4	\$22,160	4	22,250	6	34,620
Total.....	<u>6</u>	<u>58,160</u>	<u>8</u>	<u>87,520</u>	<u>14</u>	<u>155,135</u>

Satellite and sounding rocket programs:

Assistant director.....	1 Excepted	17,000	1 Excepted	19,000	1 Excepted	19,000
Chief geophysics.....	1 "	16,500	1 "	16,500	1 "	16,500
Chief, flight systems.....	-	---	1 "	16,500	1 "	16,500
Head, chemistry.....	1 Excepted	14,500	1 "	15,500	1 "	15,500
Chief, science program analyst.....	1 GS-15	12,770	-	---	-	---
Head, energetic particles.....	-	---	-	---	1 Excepted	15,000
Head, aeronomy.....	-	---	-	---	1 "	15,000
Head, stellar and galactic.....	-	---	1 Excepted	14,500	1 "	14,500
Chief, astronomy and astrophysics.....	1 GS-14	11,595	1 "	14,500	1 "	14,500
Head, geophysics.....	-	---	1 GS-15	12,770	1 GS-15	12,770
Head, ionospheric physics.....	-	---	1 "	12,770	1 "	12,770
Head, astrophysics.....	-	---	-	---	1 "	12,770
Executive assistant.....	-	---	1 GS-15	12,770	1 "	12,770
Space and aeronautical scientist.....	2 GS-14	23,190	3 GS-14	34,785	3 GS-14	34,785
Space and aeronautical scientist.....	1 GS-13	11,090	-	---	-	---
Head, solar physics.....	1 "	10,130	1 GS-13	10,130	1 GS-13	10,130
Below GS-13.....	6	27,895	5	25,230	9	45,460
Total.....	<u>15</u>	<u>144,670</u>	<u>18</u>	<u>204,955</u>	<u>25</u>	<u>267,955</u>

	<u>Actual staffing</u> June 30, 1959	<u>Authorized staffing</u> June 30, 1960	<u>Proposed staffing</u> June 30, 1960
<u>Lunar and planetary programs:</u>			
Assistant director.....	1 Excepted \$17,000	1 Excepted \$19,000	1 Excepted \$19,000
Chief, flight systems.....	- ---	1 " 17,000	1 " 17,000
Chief, program coordination.....	1 " 16,500	1 " 16,500	1 " 16,500
Chief, sciences.....	1 " 16,000	1 " 16,000	1 " 16,000
Head, planetary and interplanetary systems...	- ---	1 " 16,000	1 " 16,000
Head, lunar systems.....	- ---	1 " 16,000	1 " 16,000
Head, spacecraft technology.....	1 Excepted 15,000	1 " 15,000	1 " 15,000
Head, lunar sciences.....	- ---	- ---	1 " 15,000
Head, planetary and interplanetary sciences..	- ---	- ---	1 " 15,000
Staff scientist.....	- ---	- ---	1 " 15,000
Space and aeronautical scientist.....	1 GS-15 13,070	1 GS-15 13,370	2 GS-15 26,140
Head, scientific experiments.....	- ---	1 GS-14 11,835	1 GS-14 11,835
Space and aeronautical scientist.....	- ---	- ---	1 " 11,355
Below GS-13.....	4 22,730	4 23,190	7 36,510
Total.....	<u>9 100,300</u>	<u>13 163,895</u>	<u>21 246,340</u>

Applications and manned space flight:

Assistant director.....	1 Excepted 19,000	1 Excepted 19,000	1 Excepted 19,000
Chief, manned space flight.....	1 " 16,000	1 " 17,000	1 " 17,000
Chief, advanced technology.....	1 " 15,500	1 " 15,500	1 " 15,500
Head, advanced technology.....	1 " 15,500	- ---	- ---
Chief, communications satellites.....	1 " 15,000	1 Excepted 15,000	1 Excepted 15,000
Head, manned satellites.....	1 " 15,000	1 " 15,000	1 " 15,000
Head, advanced manned systems.....	- ---	1 " 15,000	1 " 15,000
Chief, meteorological satellites.....	1 GS-15 12,770	1 " 15,000	1 " 15,000
Space and aeronautical scientist.....	1 " 13,070	- ---	1 GS-15 12,770
Head, auxiliary power units.....	- ---	- ---	1 " 12,770
Executive assistant.....	- ---	1 GS-15 12,770	1 " 12,770
Head, advanced components.....	1 GS-14 11,595	1 GS-14 11,595	1 GS-14 11,595
Below GS-13.....	4 19,200	6 37,960	9 51,430
Total.....	<u>13 152,635</u>	<u>15 173,825</u>	<u>20 212,835</u>

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960	
<u>Space flight operations:</u>						
Assistant director.....	1	Excepted \$19,000	1	Excepted \$19,000	1	Excepted \$19,000
Chief, operations.....	-	---	1	" 17,000	1	" 17,000
Head, flight missions operations.....	-	---	1	" 17,000	1	" 17,000
Chief, advanced development.....	1	Excepted 16,500	1	" 16,500	1	" 16,500
Head, telemetry systems.....	1	" 15,500	1	" 15,500	1	" 15,500
Head, data and computing systems.....	-	---	1	" 15,500	1	" 15,500
Staff scientist, computations.....	1	Excepted 15,000	1	" 15,000	1	" 15,000
Head, tracking systems.....	-	---	1	GS-15 12,770	1	GS-15 12,770
Head, communications operations.....	-	---	1	" 12,770	1	" 12,770
Electronic engineer.....	1	GS-15 13,970	1	" 13,970	1	" 13,970
Space and aeronautical scientist.....	-	---	1	" 12,770	1	" 12,770
Head, data processing and coordination.....	-	---	-	---	1	" 12,770
Executive assistant.....	1	GS-14 11,595	1	GS-14 11,595	1	GS-14 11,595
Space and aeronautical scientist.....	1	" 11,595	1	" 11,595	1	" 11,595
Head, network operations.....	1	" 11,595	1	" 11,595	1	" 11,595
Engineer, construction coordination.....	1	GS-13 10,130	1	GS-13 10,130	1	GS-13 10,130
Space and aeronautical scientist.....	1	" 10,130	1	" 10,130	1	" 10,130
Below GS-13.....	3	17,340	5	31,110	8	43,680
Total.....	<u>13</u>	<u>152,355</u>	<u>21</u>	<u>253,935</u>	<u>25</u>	<u>279,275</u>
<u>Propulsion:</u>						
Assistant director for propulsion.....	1	Excepted 19,000	-	---	-	---
Chief, rocket vehicle development program.....	1	" 17,000	-	---	-	---
Chief, rocket booster development program.....	1	" 16,500	-	---	-	---
Chief, large engine rocket program.....	1	" 15,500	-	---	-	---
Chief, nuclear engine program.....	1	" 15,500	-	---	-	---
Chief, analyses and requirements.....	1	" 15,500	-	---	-	---
Space and aeronautical scientist.....	1	" 15,000	-	---	-	---
Space and aeronautical scientist.....	2	GS-15 26,740	-	---	-	---
Space and aeronautical scientist.....	4	GS-14 48,300	-	---	-	---
Space and aeronautical scientist.....	1	GS-13 10,130	-	---	-	---
Below GS-13.....	8	37,910	-	---	-	---
Total.....	<u>22</u>	<u>237,080</u>	<u>-</u>	<u>---</u>	<u>-</u>	<u>---</u>
TOTAL, SPACE FLIGHT PROGRAMS.....	<u>83</u>	<u>\$910,990</u>	<u>80</u>	<u>\$938,880</u>	<u>110</u>	<u>\$1,216,290</u>

	Actual staffing June 30, 1959	Authorized staffing June 30, 1960	Proposed staffing June 30, 1960
<u>OFFICE OF LAUNCH VEHICLE PROGRAMS:</u>			
<u>Office of the director:</u>			
Director.....	- ---	1 Excepted \$21,000	1 Excepted \$21,000
Deputy director.....	- ---	1 " 19,000	1 " 19,000
Technical assistant to the director.....	- ---	1 GS-15 12,770	1 GS-15 12,770
Chief, budget and programming.....	- ---	- ---	1 " 12,770
Staff assistant.....	- ---	1 GS-14 11,595	1 GS-14 11,595
Below GS-13.....	- ---	3 26,500	4 31,040
Total.....	- ---	<u>7 90,865</u>	<u>9 108,175</u>
<u>Analysis and requirements:</u>			
Chief.....	- ---	1 Excepted 15,500	1 Excepted 15,500
Specialist, mission requirements.....	- ---	1 GS-15 12,770	1 GS-15 12,770
Specialist, vehicle analysis.....	- ---	1 " 12,770	1 " 12,770
Specialist, vehicle design.....	- ---	- ---	1 " 12,770
Below GS-13.....	- ---	1 4,940	1 4,940
Total.....	- ---	<u>4 45,980</u>	<u>5 58,750</u>
<u>Vehicles:</u>			
Assistant director for vehicles.....	- ---	1 Excepted 17,000	1 Excepted 17,000
Chief, Saturn class vehicles.....	- ---	- ---	1 " 16,500
Chief, advanced vehicle development.....	- ---	- ---	1 " 16,000
Chief, Scout class vehicles.....	- ---	1 Excepted 15,000	1 " 15,000
Specialist, guidance systems.....	- ---	1 GS-15 13,070	1 " 15,000
Chief, Centaur class vehicles.....	- ---	1 " 12,770	1 GS-15 13,070
Project manager, Saturn class vehicles.....	- ---	- ---	1 " 12,770
Project manager, Scout class vehicles.....	- ---	- ---	1 " 12,770
Project manager, Centaur class vehicles.....	- ---	- ---	1 " 12,770
Specialist, electro-mechanical systems.....	- ---	- ---	1 " 12,770
Specialist, aerothermodynamics.....	- ---	1 GS-14 11,355	1 GS-14 11,355
Staff assistant.....	- ---	- ---	1 " 11,355
Below GS-13.....	- ---	1 4,790	5 22,590
Total.....	- ---	<u>6 73,985</u>	<u>17 188,950</u>

	<u>Actual staffing</u> June 30, 1959	<u>Authorized staffing</u> June 30, 1960	<u>Proposed staffing</u> June 30, 1960
<u>Propulsion:</u>			
Assistant director for propulsion.....	-	---	1 Excepted \$16,500
Chief, solid rockets.....	-	---	1 " 16,500
Chief, liquid rockets.....	-	---	1 " 15,500
Chief, nuclear propulsion.....	-	---	1 " 15,500
Chief, space propulsion.....	-	---	1 " 15,500
Manager, nuclear electric generator systems...	-	---	1 Excepted 15,000
Manager, electro-static propulsion and plasma.	-	---	1 " 15,000
Coordinator, advanced technology.....	-	---	1 " 15,000
Project manager, large thrust engines.....	-	---	1 GS-15 13,970
Manager, advanced technology.....	-	---	1 " 12,770
Manager, nuclear heat transfer systems.....	-	---	1 " 12,770
Project manager, liquid rockets.....	-	---	1 GS-14 12,555
Manager, rocket development and sounding rockets.....	-	---	1 " 11,355
Staff assistant.....	-	---	1 " 11,355
Below GS-13.....	-	---	3 14,370
Total.....	-	---	10 119,895
	-	---	19 222,725

Launch operations:

Assistant director for launch operations.....	-	---	1 Excepted 16,500
Chief, launch projects.....	-	---	1 " 15,500
Chief, range support.....	-	---	1 " 15,500
Manager, range support unit.....	-	---	2 GS-15 25,540
Manager, launch projects.....	-	---	1 GS-14 11,355
Staff assistant.....	-	---	1 " 11,355
Below GS-13.....	-	---	3 14,500
Total.....	-	---	1 16,500
	-	---	10 110,250

	Actual staffing June 30, 1959		Authorized staffing June 30, 1960		Proposed staffing June 30, 1960			
<u>Technical representatives:</u>								
Technical representative (Huntsville).....	1	GS-15	\$13,970	1	GS-15	\$13,970	-	---
Technical representative (Rocketdyne).....	1	GS-14	11,595	-	-	---	-	---
Space projects liaison assistant (Huntsville)	-	-	---	1	GS-13	9,890	-	---
Below GS-13.....	<u>1</u>		<u>4,040</u>	<u>3</u>		<u>12,420</u>	-	---
Total.....	<u>3</u>		<u>29,605</u>	<u>5</u>		<u>36,280</u>	-	---
TOTAL, LAUNCH VEHICLE PROGRAMS.....	<u>3</u>		<u>\$29,605</u>	<u>33</u>		<u>\$383,505</u>	<u>60</u>	<u>\$688,850</u>
TOTAL NASA HEADQUARTERS.....	<u>428</u>		<u>\$3,678,369</u>	<u>533</u>		<u>\$4,820,810</u>	<u>683</u>	<u>\$6,166,105</u>

← 150 →

ASSISTANT DIRECTOR		
1	Excepted Assistant Director	\$19,000

ASSISTANT DIRECTOR		
1	Excepted Assistant Director	\$18,000

ASSISTANT DIRECTOR		
1	Excepted Assistant Director	\$18,500
1	Excepted Technical Assistant to the Associate Director	16,500
2	GS-13 Aeronautical Research Scientist, Technical Staff Assistant	21,460
4	Total	\$56,460

OFFICE OF CHIEF, TECHNICAL SERVICES		
1	Excepted Chief of Technical Services	\$16,000
1	GS-15 Assistant Chief of Technical Services	13,970
1	GS-14 Engineering Planning Officer	12,555
1	All other GS employees	2,320
4	Totals	\$47,915

CHIEF OF ADMINISTRATIVE SERVICES		
1	GS-15 Administrative Services	13,970
1	All other GS employees	2,320
2	Total	\$16,290

AERO-PHYSICS DIVISION		
1	Excepted Chief of Division	\$ 18,000
1	Excepted Assistant Chief of Division	15,500
1	Excepted Head, Gas Dynamics Branch	15,000
1	GS-15 Assistant Chief of Division	13,970
1	GS-15 Head, Internal Aerodynamics Branch	13,970
1	GS-15 Head, 11-Inch Hypersonic Tunnel Section	13,370
1	GS-15 Head, 20-Inch Hypersonic Tunnel Section	13,370
1	GS-15 Head, Aero-Thermodynamics Section	13,370
1	GS-15 Head, Applied Gas Dynamics Section	13,370
1	GS-15 Head, Magnetohydrodynamics Section	13,370
1	GS-15 Aeronautical Research Engineer	13,370
1	GS-14 Division Executive	12,555
1	GS-14 Head, Hypersonic Branch	12,555
1	GS-14 Assistant Head, Internal Aerodynamics Branch	12,555
1	GS-14 Head, High Temperature Fluid Mechanics Section	11,835
1	GS-14 Head, Helium Tunnels Section	11,835
1	GS-14 Head, Inlet Aerodynamics Section	12,555
1	GS-14 Head, Supersonic Aerodynamics	12,555
4	Aeronautical Research Engineer	48,060
1	GS-13 Head, Thermal Projects Section	10,370
23	GS-13 Aeronautical Research Engineer	248,590
2	GS-13 Mechanical Engineer	22,180
101	All other GS employees	659,185
66	All WB employees	421,836
215	Total	\$1,653,326

APPLIED MATERIALS AND PHYSICS DIVISION		
1	Excepted Chief of Division	\$ 16,000
2	Excepted Assistant Chief of Division	31,000
1	Excepted Assistant to Chief of Division	15,500
1	Excepted Head, Flight Physics Branch	15,000
1	Excepted Head, High Temperature Materials Branch	15,000
1	GS-15 Head, Spacecraft and Missile Dynamics Branch	13,970
1	GS-15 Head, Vehicle Performance Branch	13,970
1	GS-15 Assistant Head, High Temperature Materials Branch	13,970
1	GS-15 Assistant Head, Vehicle Performance Branch	13,070
1	GS-14 Head, Systems Analysis Section	12,555
1	GS-14 Head, Systems Application Section	11,835
1	GS-14 Head, Heat Transfer Section	11,835
1	GS-14 Head, Reentry Performance Section	11,835
1	GS-14 Head, Space Vehicle Group	11,835
5	GS-14 Aeronautical Research Engineer	59,175
1	GS-13 Head, Vehicle Systems Section	10,370
1	GS-13 Aeronautical Rocket Power Plant Research Engineer	10,370
15	GS-13 Aeronautical Research Engineer	159,870
108	All other GS employees	718,800
22	All WB employees	158,602
170	Total	\$1,523,962

AERO-SPACE MECHANICS DIVISION		
1	Excepted Chief of Division	\$ 16,000
1	Excepted Associate Chief of Division	15,500
1	Excepted Head, Guidance and Control Branch	15,500
1	Excepted Head, Operations Branch	15,500
1	GS-15 Technical Assistant to Chief of Division	13,970
1	GS-15 Head, Airworthiness Branch	13,370
1	GS-15 Head, Dynamic Stability Branch	13,370
1	GS-15 Head, Flight Mechanics Branch	13,370
1	GS-15 Head, Recovery Systems Branch	13,370
1	GS-15 Head, VTOL Branch	13,370
1	GS-15 Assistant Head, Guidance and Control Board	13,370
1	GS-15 Head, VTOL Section	13,370
1	GS-15 Head, Pilots Section	13,370
1	GS-15 Aeronautical Research Engineer	13,370
1	GS-15 Aeronautical Research Engineer and Pilot	13,370
1	GS-14 Assistant Head, Airworthiness Branch	11,835
1	GS-14 Assistant Head, Flight Mechanics Branch	12,795
1	GS-14 Head, Reentry Vehicle Dynamics Section	12,555
1	GS-14 Head, Control and Simulation Section	11,835
7	GS-14 Aeronautical Research Engineer	83,325
1	GS-14 Aeronautical Research Engineer and Pilot	11,835
1	GS-13 Head, Systems Analysis Section	11,090
15	GS-13 Aeronautical Research Engineer	161,310
1	GS-13 Aeronautical Research Engineer and Pilot	10,370
96	All other GS employees	630,795
52	All WB employees	351,327
192	Total	\$1,523,452

PLANNING SECTION		
1	GS-13 Head, Planning Section	\$11,090
8	All other GS employees	50,330
9	Total	\$61,420

SAFETY OFFICE		
2	All other GS employees	\$13,990

ELECTRICAL SERVICE DIVISION		
1	GS-15 Chief of Division	\$ 13,970
1	GS-15 Assistant Chief of Division	13,370
1	GS-15 Head, Electrical Engineering Branch	13,370
1	GS-14 Head, Electrical Power Distribution Section	12,555
1	GS-14 Head, Electrical Power Utilization Section	12,555
1	GS-13 Head, Electrical Service Branch	11,090
1	GS-13 Electrical Operations Engineer	12,555
4	GS-13 Electrical Engineer	42,200
20	All other GS employees	136,056
103	All other WB employees	630,228
124	Total	\$916,487

PATENT ADVISORY STAFF		
1	GS-14 Patent Advisor	13,970
2	All other GS employees	2,320
4	Total	\$16,290

FISCAL DIVISION		
1	GS-14 Chief of Division	13,970
51	All other GS employees	42,200
52	Total	\$56,170

OFFICE SERVICES DIVISION		
1	GS-13 Chief of Division	13,970
44	All other GS employees	11,090
8	All other WB employees	42,200
57	Total	\$67,260

FULL-SCALE RESEARCH DIVISION		
1	Excepted Chief of Division	\$ 16,000
2	Excepted Assistant Chief of Division	31,000
1	Excepted Technical Consultant	15,500
1	GS-15 Head, Dynamics Branch	13,970
1	GS-15 Head, 0-Foot Tunnels Branch	13,970
1	GS-15 Head, Full-Scale Analysis Branch	13,970
1	GS-15 Head, General Aerodynamics Branch	13,370
1	GS-15 Head, Large Scale Compressible Flow Branch	13,970
1	GS-15 Head, 7- by 10-Foot Tunnels Branch	13,970
1	GS-15 Head, Supersonic Section	13,370
1	GS-15 Head, Components Section	13,970
1	GS-14 Assistant Head, Dynamics Branch	12,555
1	GS-14 Head, 16-Foot Transonic Tunnel Section	12,795
1	GS-14 Head, Configurations Section	12,555
13	GS-14 Aeronautical Research Engineer	157,975
1	GS-13 Division Executive	11,090
25	GS-13 Aeronautical Research Engineer	272,010
1	GS-13 Mechanical Engineer	10,370
136	All other GS employees	898,289
66	All other WB employees	422,992
257	Total	\$1,983,094

DYNAMIC LOADS DIVISION		
1	Excepted Chief of Division	\$ 17,500
2	Excepted Assistant Chief of Division	30,500
1	GS-15 Head, Acoustics Branch	13,970
1	GS-15 Head, Landing and Impact Branch	13,970
1	GS-15 Head, Structural Dynamics Branch	13,370
1	GS-15 Head, Vibration and Flutter Branch	13,970
1	GS-15 Head, Aeroelasticity and Flutter Section	13,370
1	GS-15 Head, Analysis Section	13,970
1	GS-14 Head, Atmospheric Inputs Section	12,555
1	GS-14 Head, Vibration and Dynamics Section	13,970
3	GS-14 Aeronautical Research Engineer	36,945
1	GS-13 Head, Dynamics Response Section	10,370
11	GS-13 Aeronautical Research Engineer	118,390
52	All other GS employees	346,995
15	All WB employees	94,090
93	Total	\$761,760

INSTRUMENT RESEARCH DIVISION		
1	Excepted Chief of Division	\$ 15,500
1	Excepted Assistant Chief of Division	15,000
1	Excepted Head, Measurements Research Branch	15,000
1	GS-15 Head, Tracking and Ground Instrumentation	15,000
1	GS-15 Head, Unit for Project Mercury	13,370
1	GS-15 Assistant Head, Unit for Project Mercury	15,370
1	GS-15 Head, Data Systems Branch	13,370
1	GS-15 Head, Ground Facilities Instrumentation Branch	13,370
1	GS-15 Head, Instrument Standards and Systems Integration Branch	13,370
1	GS-15 Head, Navigation and Communications Research Branch	13,370
1	GS-14 Assistant Head, Data Systems Branch	11,835
1	GS-14 Head, Read-Out Equipment Development Section	11,835
1	GS-14 Head, Telemeter Instrumentation Section	11,835
1	GS-14 Head, Instrument Physics Research Section	12,555
1	GS-14 Head, Telemeter Techniques Research Section	11,835
1	GS-14 Head, Automatic Controls Section	11,835
1	GS-14 Head, Communications Research Section	11,835
2	GS-14 Research Engineer (Aeronautical Instrumentation)	23,670
1	GS-13 Division Executive	10,370
1	GS-13 Instrumentation Technical Assistant	10,370
1	GS-13 Assistant Head, Instrument Standards and Systems Integration Branch	11,090
1	GS-13 Head, Fluid Mechanics Instrumentation Section	11,090
1	GS-13 Head, General Mechanical Instrumentation Section	10,370
1	GS-13 Head, Structural Mechanics Instrumentation Section	10,370
1	GS-13 Head, Thermal and Optical Instrumentation Section	10,370
1	GS-13 Head, Vehicle Instrumentation Section	11,090
1	GS-13 Head, Navigation and Guidance Research Section	11,090
1	GS-13 Head, Systems Analysis Section	11,090
23	GS-13 Research Engineer (Aeronautical Instrumentation)	245,470
1	GS-13 Aeronautical Research Engineer (Aerodynamic)	11,090
156	All other GS employees	1,041,770
166	All other WB employees	\$1,119,706
373	Total	\$2,731,551

ENGINEERING SERVICE DIVISION		
1	GS-15 Chief of Division	\$ 14,210
1	GS-15 Assistant Chief of Division	13,970
1	GS-15 Head, Facilities Engineering Branch	13,370
1	GS-15 Head, Machine Design Branch	13,370
1	GS-15 Assistant Head, Machine Design Branch	13,370
1	GS-14 Head, Cost Engineering Staff	11,835
1	GS-14 Head, General Engineering Branch	12,555
1	GS-14 Head, Structural Engineering Section	12,555
1	GS-14 Head, Plant Engineering Section	11,595
1	GS-14 Head, Systems Engineering Section	12,555
1	GS-14 Head, Equipment Engineering Section	12,555
1	GS-14 Head, East Engineering Section	12,555
1	GS-14 Head, West Engineering Section	12,555
1	GS-14 Head, Dynamic Model Engineering Section	12,075
1	GS-14 Head, Instrument Engineering Section	12,555
1	GS-14 Mechanical Systems Analysis Engineer	12,555
1	GS-13 Head, Contract Engineering Staff	10,130
1	GS-13 Head, Inspection	11,090
1	GS-13 Assistant Head, Plant Engineering Section	11,090
1	GS-13 Assistant Head, Cost Engineering Section	11,090
1	GS-13 Assistant Head, West Engineering Section	11,090
1	GS-13 Assistant Head, Instrument Engineering Section	11,090
2	GS-13 Mechanical Engineer	22,180
3	GS-13 Structural Engineer	32,550
10	GS-13 Mechanical Equipment Design Engineer	108,740
1	GS-13 Design and Construction Engineer	11,090
4	GS-13 Process Systems Design Engineer	43,680
2	GS-13 Pilotless Aircraft Design Engineer	21,220
147	All other GS employees	1,077,750
1	All WB employees	9,175
192	Total	\$1,596,401

PERSONNEL DIVISION		
1	GS-15 Chief of Division	13,970
1	GS-14 Assistant Chief of Division	13,970
1	GS-13 Head, Training	13,970
1	GS-13 Head, Employee Organization	13,970
1	GS-13 Head, Classification	13,970
46	All other GS employees	42,200
52	Total	\$136,000

PHOTOGRAPHIC DIVISION		
1	GS-13 Chief of Division	13,970
39	All other GS employees	11,090
38	All other WB employees	42,200
76	Total	\$67,260

THEORETICAL MECHANICS DIVISION		
1	Excepted Chief of Division	\$ 17,000
1	GS-15 Assistant to the Chief	13,370
1	GS-15 Assistant to the Chief	13,370
1	GS-15 Head, Analytical Computing Branch	13,370
1	GS-15 Head, Mathematical Physics Branch	14,210
1	GS-15 Head, Stability Analysis Branch	13,370
1	GS-15 Head, Dynamic Analysis Section	13,370
1	GS-15 Head, Missile Systems Section	13,370
1	GS-15 Aeronautical Research Engineer	13,370
1	GS-14 Division Executive	12,555
5	GS-14 Aeronautical Research Engineer	61,975
10	GS-13 Aeronautical Research Engineer	108,960
1	GS-13 Research Engineer (Aeronautical Instrumentation)	10,370
61	All other GS employees	515,555
2	All other WB employees	11,078
109	Total	\$847,113

STRUCTURES RESEARCH DIVISION		
1	Excepted Chief of Division	\$ 17,000
1	Excepted Assistant Chief of Division	15,500
1	Excepted Head, Structural Configurations Branch	15,000
1	GS-15 Head, Fatigue Section	13,370
1	GS-15 Head, Structural Mechanics Branch	13,370
1	GS-15 Head, Special Projects Branch	13,970
1	GS-15 Head, Thermal Protection Section	13,370
1	GS-15 Head, Plant Structures Branch	13,970
1	GS-15 Aeronautical Research Engineer	13,370
1	GS-14 Head, Solid State Physics Section	11,835
1	GS-14 Head, Structural Strength Section	11,835
1	GS-14 Head, Materials Application Section	11,835
1	GS-14 Head, Temperature Control Section	11,835
1	GS-14 Head, Dynamics and Aeroelasticity Section	11,035
1	GS-14 Head, Aero-Thermal Facility Branch	11,835
1	GS-14 Assistant Head of Aero-Thermal Facility Branch	11,835
1	GS-14 Head, 8-Foot High Temperature Structures Tunnel	11,835
1	GS-14 Head, Plant Structures Branch	12,555
1	GS-14 Aeronautical Research Engineer	12,555
1	GS-13 Head, Materials Section	11,090
1	GS-13 Head, Elasticity and Plasticity Section	11,090
1	GS-13 Head, Aero-Thermo Elasticity Section	10,850
1	GS-13 Head, Thermo-Structural Dynamics Section	11,090
1	GS-13 Head, Structural Heat Transfer Section	11,035
1	GS-13 Head, Research Techniques Section	11,090
9	GS-13 Aeronautical Research Engineer	97,890
89	All other GS employees	589,790
28	All other WB employees	179,620
151	Total	\$1,182,310

* Positions not included in totals, as these are dual function positions; positions are included under Tracking and Ground Instrumentation Unit for Project Mercury.

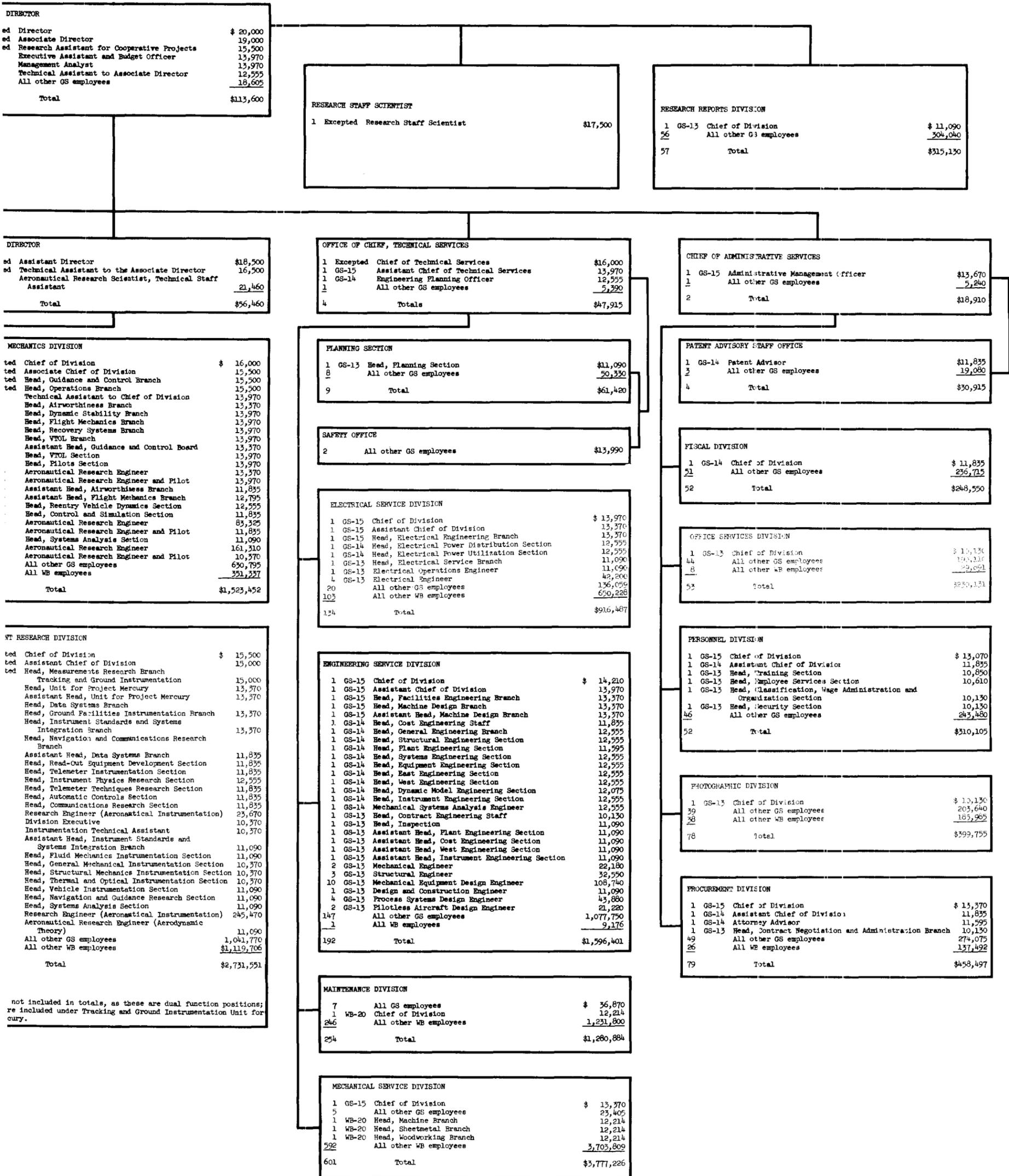
MAINTENANCE DIVISION		
7	All GS employees	\$ 36,870
1	WB-20 Chief of Division	12,214
246	All other WB employees	1,231,800
254	Total	\$1,280,884

UNITARY PLAN WIND TUNNEL DIVISION		
1	Excepted Chief of Division	\$ 16,000
1	GS-15 Assistant Chief of Division	13,970
4	GS-14 Aeronautical Research Engineer	48,780
2	GS-13 Aeronautical Research Engineer	20,740
33	All other GS employees	203,015
24	All WB employees	141,886
65	Total	\$444,391

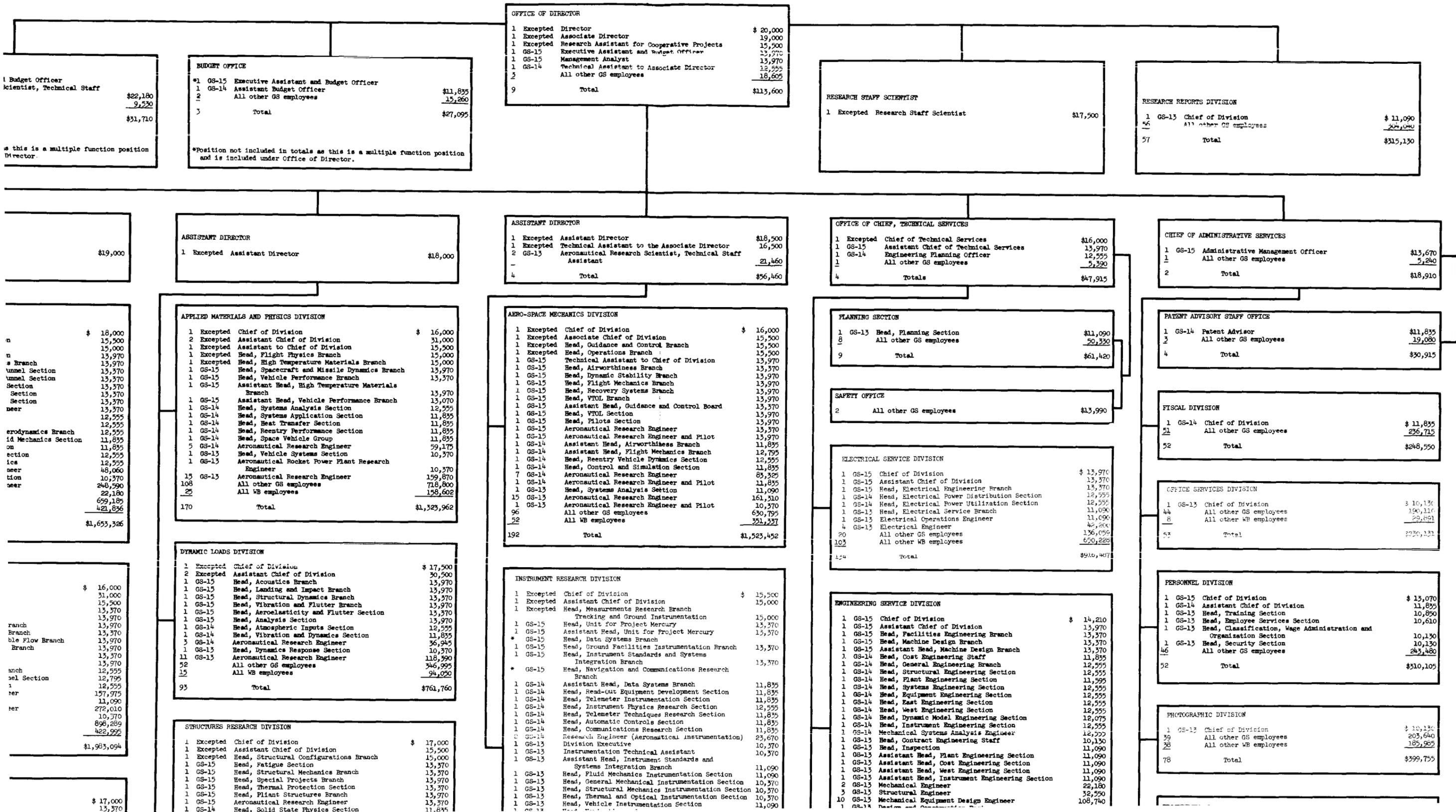
MECHANICAL SERVICE DIVISION		
1	GS-15 Chief of Division	\$ 13,370
5	All other GS employees	23,405
1	WB-20 Head, Machine Branch	12,214
1	WB-20 Head, Sheetmetal Branch	12,214
1	WB-20 Head, Woodworking Branch	12,214
592	All other WB employees	3,703,809
601	Total	\$3,777,226

PROCUREMENT DIVISION		
1	GS-15 Chief of Division	13,970
1	GS-14 Assistant Chief of Division	13,970
1	GS-14 Attorney Adv	13,970
1	GS-13 Head, Contract	13,970
49	All other GS employees	42,200
26	All WB employees	42,200
79	Total	\$136,000

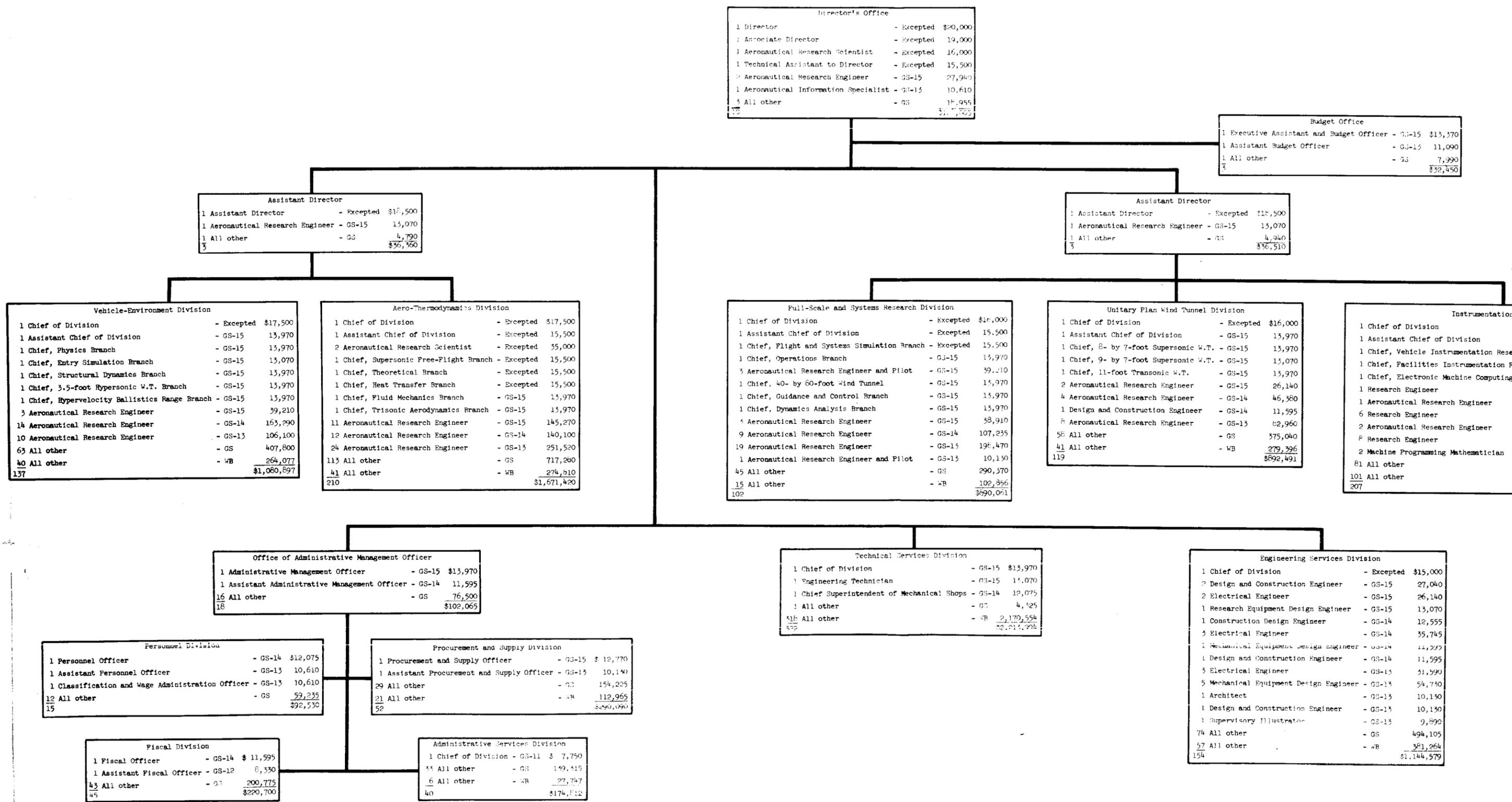
AERONAUTICS AND SPACE ADMINISTRATION
Proposed personnel staffing chart
F. Y. 1961
LANGLEY RESEARCH CENTER



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Proposed personnel staffing chart
F. Y. 1961
LANGLEY RESEARCH CENTER



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 PROPOSED PERSONNEL STAFFING CHART
 FISCAL YEAR 1961
 AMES RESEARCH CENTER



ASSISTANT DIRECTOR		
1 Excepted Assistant director		\$18,500

ASSISTANT DIRECTOR		
1 Excepted Assistant director		\$18,500
1 Other GS personnel		5,240
2		\$23,740

OFFICE OF BUSINESS ADMINISTRATION		
1 GS-15 Business manager		\$13,670
1 GS-15 Assistant business manager		13,370
1 GS-14 Assistant budget officer		11,595
1 GS-13 Aeronautical information specialist		10,130
1 GS-13 Patent officer		10,370
14 Other GS personnel		86,505
19		\$145,640

TECHNICAL SERVICES DIVISION		
1 Excepted Chief of technical services		\$16,000
1 Excepted Associate chief of technical services		15,500
1 GS-14 Engineering planning officer		13,003
1 GS-14 Safety officer		12,555
10 Other GS personnel		57,677
6 Wage board personnel		41,977
20		\$156,732

PROPULSION CHEMISTRY DIVISION		
1 Excepted Chief of division		\$18,000
4 GS-15 Head, research branch		55,280
3 GS-15 Research engineer		40,710
2 GS-14 Chemist		24,390
14 GS-14 Research engineer		168,810
1 GS-13 Chemist		11,090
18 GS-13 Research engineer		192,900
59 Other GS personnel		441,490
1 Wage board personnel		5,827
103		\$956,497

ADVANCED PROPULSION DIVISION		
1 Excepted Chief of division		\$16,500
3 Excepted Head, research branch		45,000
1 GS-15 Head, research branch		13,970
4 GS-15 Research engineer		54,680
1 GS-14 Head, research branch		12,555
11 GS-14 Research engineer		133,785
15 GS-13 Research engineer		164,430
50 Other GS personnel		361,775
88		\$802,695

PERSONNEL DIVISION		
1 GS-14 Personnel officer		\$11,595
1 GS-13 Placement officer		10,370
32 Other GS personnel		172,475
34		\$194,440

PLUM BROOK RESEARCH FACILITIES		
1 GS-15 Chief, construction and technical services		\$13,970
1 GS-14 Assistant chief, construction and technical services		12,555
20 Other GS personnel		109,405
88 Wage board personnel		534,664
110		\$670,594

FABRICATION		
1 GS-15 Chief of division		
1 GS-14 Head, service branch		
2 GS-13 Metallurgist		
17 Other GS personnel		
170 Wage board personnel		
191		

PROPULSION AERODYNAMICS DIVISION		
1 Excepted Chief of division		\$16,500
2 Excepted Assistant chief of division		30,500
2 GS-15 Head, research branch		27,940
1 GS-15 Research engineer		13,370
12 GS-14 Research engineer		147,540
19 GS-13 Research engineer		206,870
46 Other GS personnel		332,840
83		\$775,580

MATERIALS AND STRUCTURES DIVISION		
1 Excepted Chief of division		\$17,000
1 Excepted Assistant chief of division		15,500
4 GS-15 Head, research branch		55,280
2 GS-15 Research engineer		27,340
3 GS-14 Physicist		36,225
9 GS-14 Research engineer		110,115
2 GS-13 Chemist		22,180
3 GS-13 Physicist		32,550
17 GS-13 Research engineer		182,530
63 Other GS personnel		468,860
105		\$967,580

ACCOUNTING AND AUDIT DIVISION		
1 GS-13 Fiscal officer		\$10,130
40 Other GS personnel		187,045
41		\$197,175

PLANT SERVICES DIVISION		
1 GS-13 Chief of division		\$11,090
53 Other GS personnel		269,105
111 Wage board personnel		591,968
165		\$872,163

ENGINEERING		
1 GS-15 Chief of division		
1 GS-15 Assistant chief		
1 GS-15 Head, service branch		
1 GS-14 Assistant chief		
5 GS-14 Head, service branch		
1 GS-14 Electrical engineer		
5 GS-13 Electrical engineer		
10 GS-13 Mechanical engineer		
107 Other GS personnel		
1 Wage board personnel		
133		

PROPULSION SYSTEMS DIVISION		
1 Excepted Chief of division		\$16,500
2 Excepted Head, research branch		30,500
2 Excepted Assistant head, research branch		30,000
1 GS-15 Assistant to the chief, research division		14,450
3 GS-15 Head, research branch		40,710
4 GS-15 Research engineer		54,080
18 GS-14 Research engineer		220,950
14 GS-13 Research engineer		150,460
71 Other GS personnel		535,760
116		\$1,093,410

INSTRUMENT AND COMPUTING DIVISION		
1 Excepted Chief of division		\$16,000
1 Excepted Head, research branch		15,000
1 GS-15 Assistant chief, research division		13,970
2 GS-15 Head, research branch		27,340
2 GS-14 Head, research branch		25,110
7 GS-14 Research engineer		85,965
21 GS-13 Research engineer		224,730
149 Other GS personnel		910,205
74 Wage board personnel		473,262
258		\$1,791,582

ADMINISTRATIVE SERVICES DIVISION		
15 Other GS personnel		\$70,485
3 Wage board personnel		12,854
18		\$83,339

TEST INSTALLATIONS DIVISION		
1 WB-20 Chief of division		\$11,710
5 Other GS personnel		24,750
312 Wage board personnel		1,948,277
318		\$1,984,737

FACILITIES ENGINEERING		
1 Excepted Chief of division		
1 GS-15 Assistant chief		
3 GS-14 Head, service branch		
4 GS-14 Head, service branch		
1 GS-14 Mechanical engineer		
1 GS-14 Structural engineer		
1 GS-13 Head, service branch		
3 GS-13 Electrical engineer		
9 GS-13 Mechanical engineer		
3 GS-13 Structural engineer		
67 Other GS personnel		
94		

FLUID SYSTEMS DIVISION		
1 Excepted Chief of division		\$18,000
2 Excepted Assistant chief of division		31,000
1 Excepted Head, research branch		15,000
3 GS-15 Head, research branch		40,710
2 GS-15 Aeronautical research pilot		27,940
3 GS-15 Research engineer		41,310
1 GS-14 Aeronautical research pilot		11,835
18 GS-14 Research engineer		218,790
23 GS-13 Research engineer		251,710
50 Other GS personnel		363,275
104		\$1,019,570

NUCLEAR REACTOR DIVISION		
1 Excepted Chief of division		\$17,000
3 GS-15 Head, research branch		41,910
8 GS-15 Research engineer		109,960
1 GS-14 Head, research branch		11,595
4 GS-14 Physicist		48,060
15 GS-14 Research engineer		177,765
5 GS-13 Physicist		54,250
11 GS-13 Research engineer		118,150
96 Other GS personnel		702,300
1 Wage board personnel		5,574
145		\$1,286,584

PROCUREMENT AND SUPPLY DIVISION		
1 GS-14 Procurement and supply officer		\$11,355
1 GS-13 Assistant procurement and supply officer		10,130
1 GS-13 Property management officer		10,130
63 Other GS personnel		365,790
21 Wage board personnel		110,760
87		\$508,165

FACILITIES OPERATIONS DIVISION		
1 GS-15 Chief of division		\$13,070
1 GS-14 Head, service branch		11,595
2 GS-13 Electrical engineer		22,180
20 Other GS personnel		151,320
362 Wage board personnel		2,382,905
406		\$2,581,070

TECHNICAL PUBLICATIONS DIVISION		
1 GS-13 Chief of division		\$9,890
63 Other GS personnel		349,675
23 Wage board personnel		122,803
87		\$482,368

AERONAUTICS AND SPACE ADMINISTRATION
PROPOSED PERSONNEL STAFFING CHART
FISCAL YEAR 1961
LEWIS RESEARCH CENTER

OFFICE OF DIRECTOR		
Excepted Director		\$20,000
Excepted Associate director		19,000
Excepted Assistant to the director		15,500
GS-15 Assistant to the director		27,940
Other GS personnel		24,545
		\$106,985

OFFICE OF BUSINESS ADMINISTRATION		
Business manager		\$13,670
Assistant business manager		13,370
Assistant budget officer		11,595
Aeronautical information specialist		10,130
Patent officer		10,370
Other GS personnel		86,505
		\$145,640

TECHNICAL SERVICES DIVISION		
1 Excepted Chief of technical services		\$16,000
1 Excepted Associate chief of technical services		15,500
1 GS-14 Engineering planning officer		13,035
1 GS-14 Safety officer		12,555
10 Other GS personnel		57,875
6 Wage board personnel		41,974
20		\$156,739

PERSONNEL DIVISION		
4 Personnel officer		\$11,595
3 Placement officer		10,370
Other GS personnel		172,475
		\$194,440

PLUM BROOK RESEARCH FACILITIES		
1 GS-15 Chief, construction and technical services		\$13,970
1 GS-14 Assistant chief, construction and technical services		12,555
20 Other GS personnel		109,405
88 Wage board personnel		534,664
110		\$670,594

FABRICATION DIVISION		
1 GS-15 Chief of division		\$13,370
1 GS-14 Head, service branch		12,555
2 GS-13 Metallurgist		20,740
17 Other GS personnel		114,165
170 Wage board personnel		1,151,093
191		\$1,311,923

ACCOUNTING AND AUDIT DIVISION		
3 Fiscal officer		\$10,130
Other GS personnel		167,045
		\$177,175

PLANT SERVICES DIVISION		
1 GS-13 Chief of division		\$11,090
53 Other GS personnel		269,105
111 Wage board personnel		591,968
165		\$872,163

ENGINEERING DESIGN DIVISION		
1 GS-15 Chief of division		\$13,970
1 GS-15 Assistant chief of division		13,970
1 GS-15 Head, service branch		13,970
1 GS-14 Assistant head, service branch		12,555
5 GS-14 Head, service section		62,055
1 GS-14 Electrical engineer		11,835
5 GS-13 Electrical engineer		54,010
10 GS-13 Mechanical engineer		108,020
107 Other GS personnel		741,250
1 Wage board personnel		3,848
133		\$1,035,483

ADMINISTRATIVE SERVICES DIVISION		
Other GS personnel		\$70,485
Wage board personnel		12,854
		\$83,339

TEST INSTALLATIONS DIVISION		
1 WB-20 Chief of division		\$11,710
5 Other GS personnel		24,750
312 Wage board personnel		1,948,277
318		\$1,984,737

FACILITIES ENGINEERING DIVISION		
1 Excepted Chief of division		\$15,000
1 GS-15 Assistant chief of division		13,970
3 GS-14 Head, service branch		37,665
4 GS-14 Head, service section		49,500
1 GS-14 Mechanical engineer		11,595
1 GS-14 Structural engineer		11,595
1 GS-13 Head, service section		11,090
3 GS-13 Electrical engineer		33,270
9 GS-13 Mechanical engineer		100,050
3 GS-13 Structural engineer		32,310
67 Other GS personnel		512,050
94		\$828,095

PROCUREMENT AND SUPPLY DIVISION		
4 Procurement and supply officer		\$11,355
3 Assistant procurement and supply officer		10,130
3 Property management officer		10,130
Other GS personnel		365,790
Wage board personnel		110,760
		\$508,165

FACILITIES OPERATIONS DIVISION		
1 GS-15 Chief of division		\$13,070
1 GS-14 Head, service branch		11,595
2 GS-13 Electrical engineer		22,180
20 Other GS personnel		151,320
382 Wage board personnel		2,382,905
406		\$2,581,070

TECHNICAL PUBLICATIONS DIVISION		
13 Chief of division		\$9,890
Other GS personnel		349,675
Wage board personnel		122,803
		\$482,368

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PROPOSED PERSONNEL STAFFING CHART
FISCAL YEAR 1961
LEWIS RESEARCH CENTER

OFFICE OF DIRECTOR		
1 Excepted Director		\$20,000
1 Excepted Associate director		13,000
1 Excepted Assistant to the director		15,500
2 GS-15 Assistant to the director		27,940
5 Other GS personnel		24,545
10		\$106,985

DEPARTMENT DIRECTOR	
Director	\$18,500

ASSISTANT DIRECTOR		
1 Excepted Assistant director		\$18,500
1 Other GS personnel		5,240
2		\$23,740

OFFICE OF BUSINESS ADMINISTRATION		
1 GS-15 Business manager		\$13,670
1 GS-15 Assistant business manager		13,370
1 GS-14 Assistant budget officer		11,595
1 GS-13 Aeronautical information specialist		10,130
1 GS-13 Patent officer		10,370
14 Other GS personnel		86,505
19		\$145,540

TECHNICAL SERVICES DIVISION		
1 Excepted Chief of technical services		\$16,000
1 Excepted Associate chief of technical services		15,500
1 GS-14 Engineering planning officer		13,035
1 GS-14 Safety officer		12,555
10 Other GS personnel		57,675
6 Wage board personnel		41,974
20		\$156,739

CHEMISTRY DIVISION	
Division	\$18,000
Chief of division	55,280
Head, research branch	40,710
Research engineer	24,390
Research engineer	168,810
Research engineer	11,090
Research engineer	192,900
Research engineer	441,490
Research engineer	3,827
50	\$956,497

ADVANCED PROPULSION DIVISION		
1 Excepted Chief of division		\$16,500
3 Excepted Head, research branch		45,000
1 GS-15 Head, research branch		13,970
4 GS-15 Research engineer		54,680
1 GS-14 Head, research branch		12,555
11 GS-14 Research engineer		133,785
15 GS-13 Research engineer		164,430
50 Other GS personnel		361,775
86		\$802,695

PERSONNEL DIVISION		
1 GS-14 Personnel officer		\$11,595
1 GS-13 Placement officer		10,370
32 Other GS personnel		172,475
34		\$194,440

PLUM BROOK RESEARCH FACILITIES		
1 GS-15 Chief, construction and technical services		\$13,970
1 GS-14 Assistant chief, construction and technical services		12,555
20 Other GS personnel		109,405
88 Wage board personnel		534,664
110		\$670,594

FABRICATION DIVISION		
1 GS-15 Chief of division		\$13,370
1 GS-14 Head, service branch		12,555
2 GS-13 Metallurgist		20,740
17 Other GS personnel		114,165
170 Wage board personnel		1,151,093
191		\$1,311,923

AERODYNAMICS DIVISION	
Division	\$16,500
Chief of division	30,500
Head, research branch	27,940
Research engineer	13,370
Research engineer	147,540
Research engineer	206,870
Research engineer	332,840
63	\$775,560

MATERIALS AND STRUCTURES DIVISION		
1 Excepted Chief of division		\$17,000
1 Excepted Assistant chief of division		15,500
4 GS-15 Head, research branch		55,280
2 GS-15 Research engineer		27,340
3 GS-14 Physicist		36,225
9 GS-14 Research engineer		110,115
2 GS-13 Chemist		22,180
3 GS-13 Physicist		32,550
17 GS-13 Research engineer		182,530
63 Other GS personnel		468,860
105		\$967,580

ACCOUNTING AND AUDIT DIVISION		
1 GS-13 Fiscal officer		\$10,130
40 Other GS personnel		187,045
41		\$197,175

PLANT SERVICES DIVISION		
1 GS-13 Chief of division		\$11,090
53 Other GS personnel		269,105
111 Wage board personnel		591,968
165		\$872,163

ENGINEERING DESIGN DIVISION		
1 GS-15 Chief of division		\$13,970
1 GS-15 Assistant chief of division		13,970
1 GS-15 Head, service branch		13,970
1 GS-14 Assistant head, service branch		12,555
5 GS-14 Head, service section		62,055
1 GS-14 Electrical engineer		11,835
5 GS-13 Electrical engineer		54,010
10 GS-13 Mechanical engineer		108,020
107 Other GS personnel		741,250
1 Wage board personnel		3,848
133		\$1,035,483

SYSTEMS DIVISION	
Division	\$16,500
Chief of division	30,500
Head, research branch	30,000
Assistant chief, research division	14,450
Head, research branch	40,710
Research engineer	54,080
Research engineer	220,950
63	\$407,190

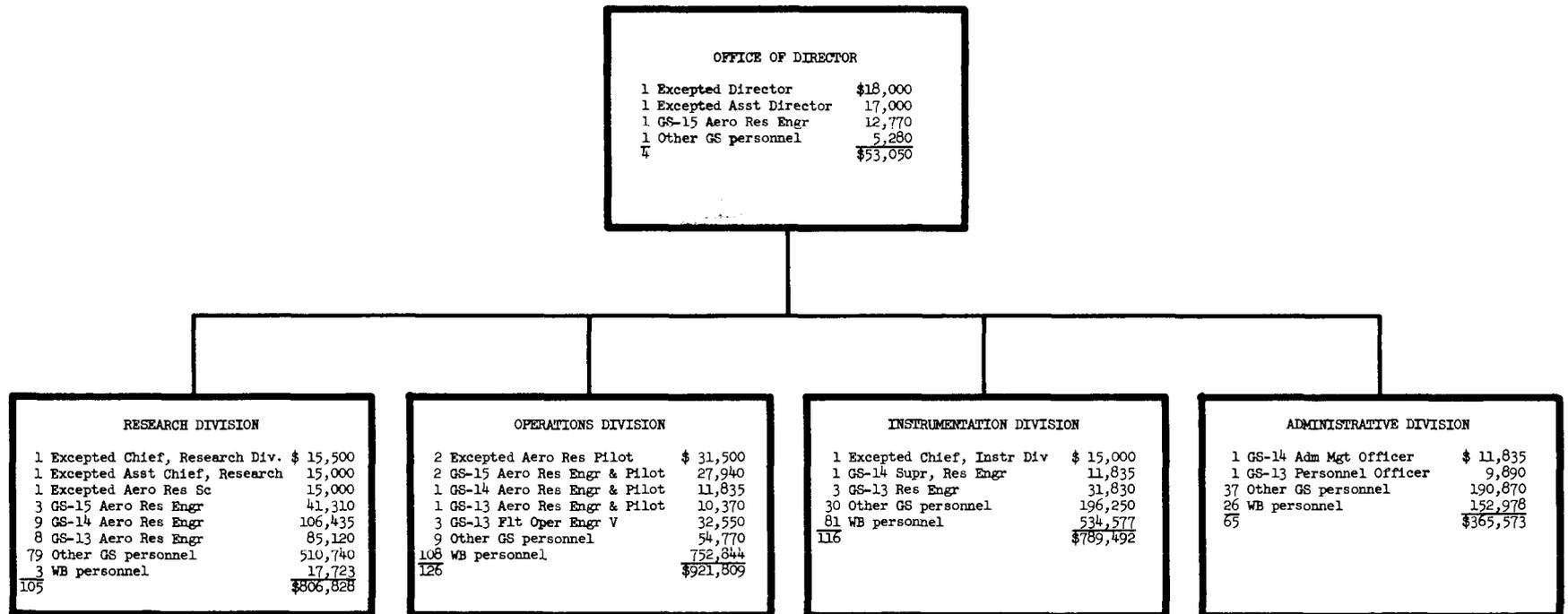
INSTRUMENT AND COMPUTING DIVISION		
1 Excepted Chief of division		\$16,000
1 Excepted Head, research branch		15,000
1 GS-15 Assistant chief, research division		13,970
2 GS-15 Head, research branch		27,340
2 GS-14 Head, research branch		25,110

ADMINISTRATIVE SERVICES DIVISION		
15 Other GS personnel		\$70,485
3 Wage board personnel		12,854
18		\$83,339

TEST INSTALLATIONS DIVISION		
1 WB-20 Chief of division		\$11,710
5 Other GS personnel		24,750
312 Wage board personnel		1,948,277
318		\$1,984,737

FACILITIES ENGINEERING DIVISION		
1 Excepted Chief of division		\$15,000
1 GS-15 Assistant chief of division		13,970
3 GS-14 Head, service branch		37,665
4 GS-14 Head, service section		49,500
1 GS-14 Mechanical engineer		11,595

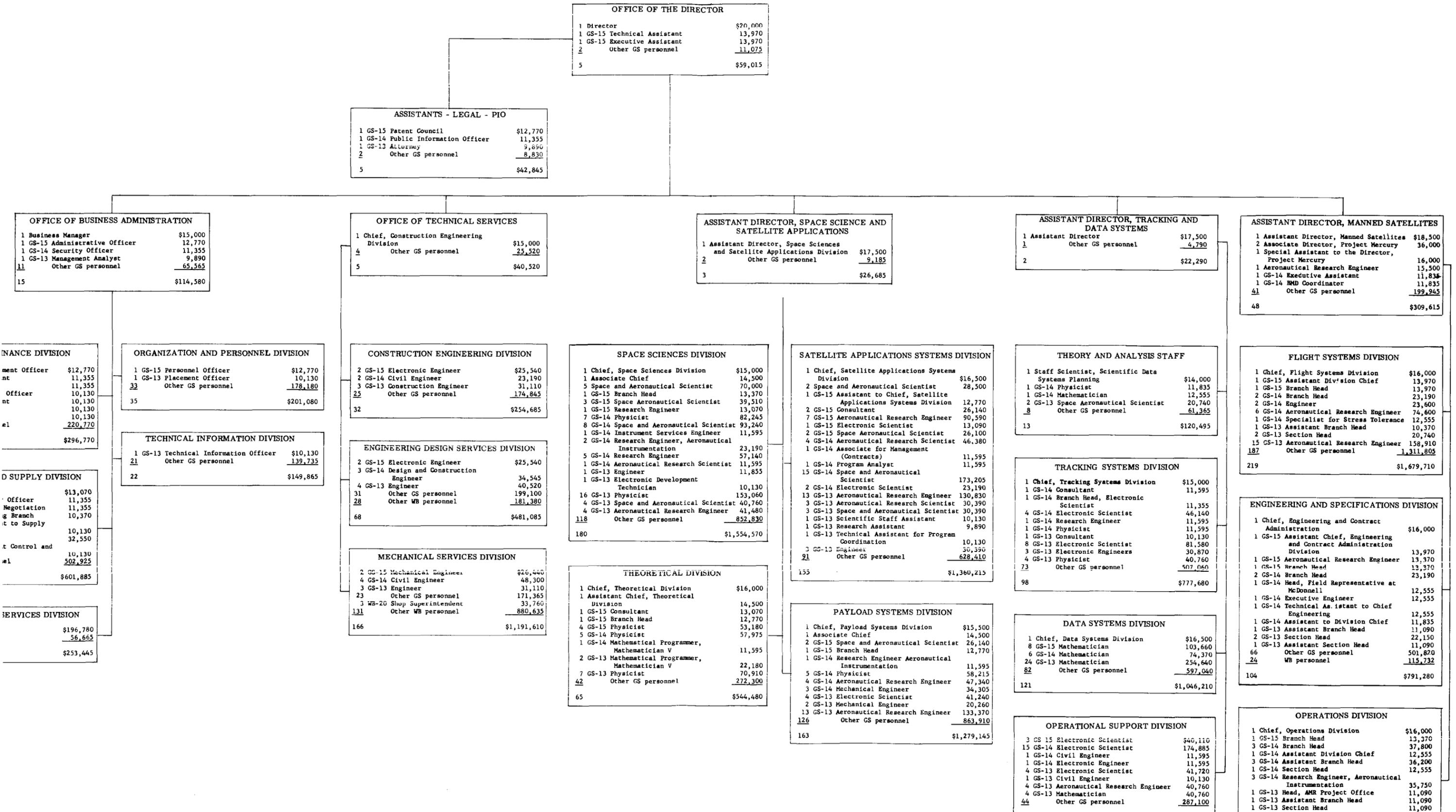
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PROPOSED PERSONNEL STAFFING CHART
FISCAL YEAR 1961
FLIGHT RESEARCH CENTER



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Proposed Personnel Staffing Chart
Fiscal Year 1961

GODDARD SPACE FLIGHT CENTER



OFFICE OF THE DIRECTOR		
1	Director	\$20,000
1	GS-15 Technical Assistant	13,970
1	GS-15 Executive Assistant	13,970
2	Other GS personnel	11,075
		\$59,015

ASSISTANTS - LEGAL - PIO		
1	GS-15 Patent Council	\$12,770
1	GS-14 Public Information Officer	11,355
1	GS-13 Attorney	9,890
2	Other GS personnel	8,830
		\$42,845

OFFICE OF BUSINESS ADMINISTRATION		
1	Business Manager	\$15,000
1	GS-15 Administrative Officer	12,770
1	GS-14 Security Officer	11,355
1	GS-13 Management Analyst	9,890
11	Other GS personnel	65,365
		\$114,580

OFFICE OF TECHNICAL SERVICES		
1	Chief, Construction Engineering Division	\$15,000
4	Other GS personnel	25,320
		\$40,520

ASSISTANT DIRECTOR, SPACE SCIENCE AND SATELLITE APPLICATIONS		
1	Assistant Director, Space Sciences and Satellite Applications Division	\$17,500
2	Other GS personnel	9,185
		\$26,685

ASSISTANT DIRECTOR, TRACKING AND DATA SYSTEMS		
1	Assistant Director	\$17,500
1	Other GS personnel	4,790
		\$22,290

ASSISTANT DIRECTOR, MANNED SATELLITES		
1	Assistant Director, Manned Satellites	\$18,500
2	Associate Director, Project Mercury	36,000
1	Special Assistant to the Director, Project Mercury	16,000
1	Aeronautical Research Engineer	15,500
1	GS-14 Executive Assistant	11,835
1	GS-14 BMD Coordinator	11,835
41	Other GS personnel	199,945
		\$309,615

FINANCE DIVISION		
1	Chief, Finance Division	\$12,770
1	GS-15 Administrative Officer	11,355
1	GS-14 Security Officer	11,355
1	GS-13 Management Analyst	10,130
1	GS-13 Management Analyst	10,130
1	GS-13 Management Analyst	10,130
1	GS-13 Management Analyst	10,130
11	Other GS personnel	220,770
		\$296,770

ORGANIZATION AND PERSONNEL DIVISION		
1	GS-15 Personnel Officer	\$12,770
1	GS-13 Placement Officer	10,130
33	Other GS personnel	178,180
		\$201,080

CONSTRUCTION ENGINEERING DIVISION		
2	GS-15 Electronic Engineer	\$25,540
2	GS-14 Civil Engineer	23,190
3	GS-13 Construction Engineer	31,110
25	Other GS personnel	174,845
		\$254,685

SPACE SCIENCES DIVISION		
1	Chief, Space Sciences Division	\$15,000
1	Associate Chief	14,500
5	Space and Aeronautical Scientist	70,000
1	GS-15 Branch Head	13,370
3	GS-15 Space Aeronautical Scientist	39,510
1	GS-15 Research Engineer	13,070
7	GS-14 Physicist	82,245
8	GS-14 Space and Aeronautical Scientist	93,240
1	GS-14 Instrument Services Engineer	11,595
2	GS-14 Research Engineer, Aeronautical Instrumentation	23,190
5	GS-14 Research Engineer	57,140
1	GS-14 Aeronautical Research Scientist	11,595
1	GS-13 Engineer	11,855
1	GS-13 Electronic Development Technician	10,130
16	GS-13 Physicist	153,060
4	GS-13 Space and Aeronautical Scientist	40,760
4	GS-13 Aeronautical Research Engineer	41,480
118	Other GS personnel	852,830
		\$1,554,570

SATELLITE APPLICATIONS SYSTEMS DIVISION		
1	Chief, Satellite Applications Systems Division	\$16,500
2	Space and Aeronautical Scientist	28,500
1	GS-15 Assistant to Chief, Satellite Applications Systems Division	12,770
2	GS-15 Consultant	26,140
7	GS-15 Aeronautical Research Engineer	90,590
1	GS-15 Electronic Scientist	13,090
2	GS-15 Space Aeronautical Scientist	26,100
4	GS-14 Aeronautical Research Scientist	46,380
1	GS-14 Associate for Management (Contracts)	11,595
1	GS-14 Program Analyst	11,595
15	GS-14 Space and Aeronautical Scientist	173,205
2	GS-14 Electronic Scientist	23,190
13	GS-13 Aeronautical Research Engineer	130,830
3	GS-13 Aeronautical Research Scientist	30,390
3	GS-13 Space and Aeronautical Scientist	30,390
1	GS-13 Scientific Staff Assistant	10,130
1	GS-13 Research Assistant	9,890
1	GS-13 Technical Assistant for Program Coordination	10,130
3	GS-13 Engineer	30,350
21	Other GS personnel	628,410
		\$1,360,215

THEORY AND ANALYSIS STAFF		
1	Staff Scientist, Scientific Data Systems Planning	\$14,000
1	GS-14 Physicist	11,835
1	GS-14 Mathematician	12,555
2	GS-13 Space Aeronautical Scientist	20,740
8	Other GS personnel	61,365
		\$120,495

FLIGHT SYSTEMS DIVISION		
1	Chief, Flight Systems Division	\$16,000
1	GS-15 Assistant Division Chief	13,970
1	GS-15 Branch Head	13,970
2	GS-14 Branch Head	23,190
2	GS-14 Engineer	23,600
6	GS-14 Aeronautical Research Engineer	74,600
1	GS-14 Specialist for Stress Tolerance	12,555
1	GS-13 Assistant Branch Head	10,370
2	GS-13 Section Head	20,740
15	GS-13 Aeronautical Research Engineer	158,910
187	Other GS personnel	1,311,805
		\$1,679,710

DEPARTMENT OF SUPPLY DIVISION		
1	Chief, Department of Supply	\$13,070
1	GS-15 Administrative Officer	11,355
1	GS-14 Negotiation Branch	11,355
1	GS-14 Negotiation Branch	10,370
1	GS-13 Control and	10,130
1	GS-13 Control and	32,550
1	GS-13 Control and	10,130
1	GS-13 Control and	502,925
		\$601,885

TECHNICAL INFORMATION DIVISION		
1	GS-13 Technical Information Officer	\$10,130
21	Other GS personnel	139,735
		\$149,865

ENGINEERING DESIGN SERVICES DIVISION		
2	GS-15 Electronic Engineer	\$25,540
3	GS-14 Design and Construction Engineer	34,545
4	GS-13 Engineer	40,520
31	Other GS personnel	199,100
28	Other WB personnel	181,380
		\$481,085

THEORETICAL DIVISION		
1	Chief, Theoretical Division	\$16,000
1	Assistant Chief, Theoretical Division	14,500
1	GS-15 Consultant	13,070
1	GS-15 Branch Head	12,770
4	GS-15 Physicist	53,180
5	GS-14 Physicist	57,975
1	GS-14 Mathematical Programmer, Mathematician V	11,595
2	GS-13 Mathematical Programmer, Mathematician V	22,180
7	GS-13 Physicist	70,910
42	Other GS personnel	272,300
		\$544,480

PAYLOAD SYSTEMS DIVISION		
1	Chief, Payload Systems Division	\$15,500
1	Associate Chief	14,500
2	GS-15 Space and Aeronautical Scientist	26,140
1	GS-15 Branch Head	12,770
1	GS-14 Research Engineer Aeronautical Instrumentation	11,595
5	GS-14 Physicist	58,215
4	GS-14 Aeronautical Research Engineer	47,340
3	GS-14 Mechanical Engineer	34,305
4	GS-13 Electronic Scientist	41,240
2	GS-13 Mechanical Engineer	20,260
13	GS-13 Aeronautical Research Engineer	133,370
126	Other GS personnel	863,910
		\$1,279,145

TRACKING SYSTEMS DIVISION		
1	Chief, Tracking Systems Division	\$15,000
1	GS-14 Consultant	11,595
1	GS-14 Branch Head, Electronic Scientist	11,355
4	GS-14 Electronic Scientist	46,140
1	GS-14 Research Engineer	11,595
1	GS-14 Physicist	11,595
1	GS-13 Consultant	10,130
8	GS-13 Electronic Scientist	81,580
3	GS-13 Electronic Engineers	30,870
4	GS-13 Physicist	40,760
73	Other GS personnel	507,060
		\$777,680

ENGINEERING AND SPECIFICATIONS DIVISION		
1	Chief, Engineering and Contract Administration	\$16,000
1	GS-15 Assistant Chief, Engineering and Contract Administration Division	13,970
1	GS-15 Aeronautical Research Engineer	13,370
1	GS-15 Branch Head	13,370
2	GS-14 Branch Head	23,190
1	GS-14 Head, Field Representative at McDonnell	12,555
1	GS-14 Executive Engineer	12,555
1	GS-14 Technical Assistant to Chief Engineering	12,555
1	GS-14 Assistant to Division Chief	11,835
1	GS-13 Assistant Branch Head	11,090
2	GS-13 Section Head	22,150
1	GS-13 Assistant Section Head	11,090
66	Other GS personnel	501,820
24	WB personnel	115,732
		\$791,280

SERVICES DIVISION		
1	Chief, Services Division	\$196,780
1	GS-15 Branch Head	56,665
		\$253,445

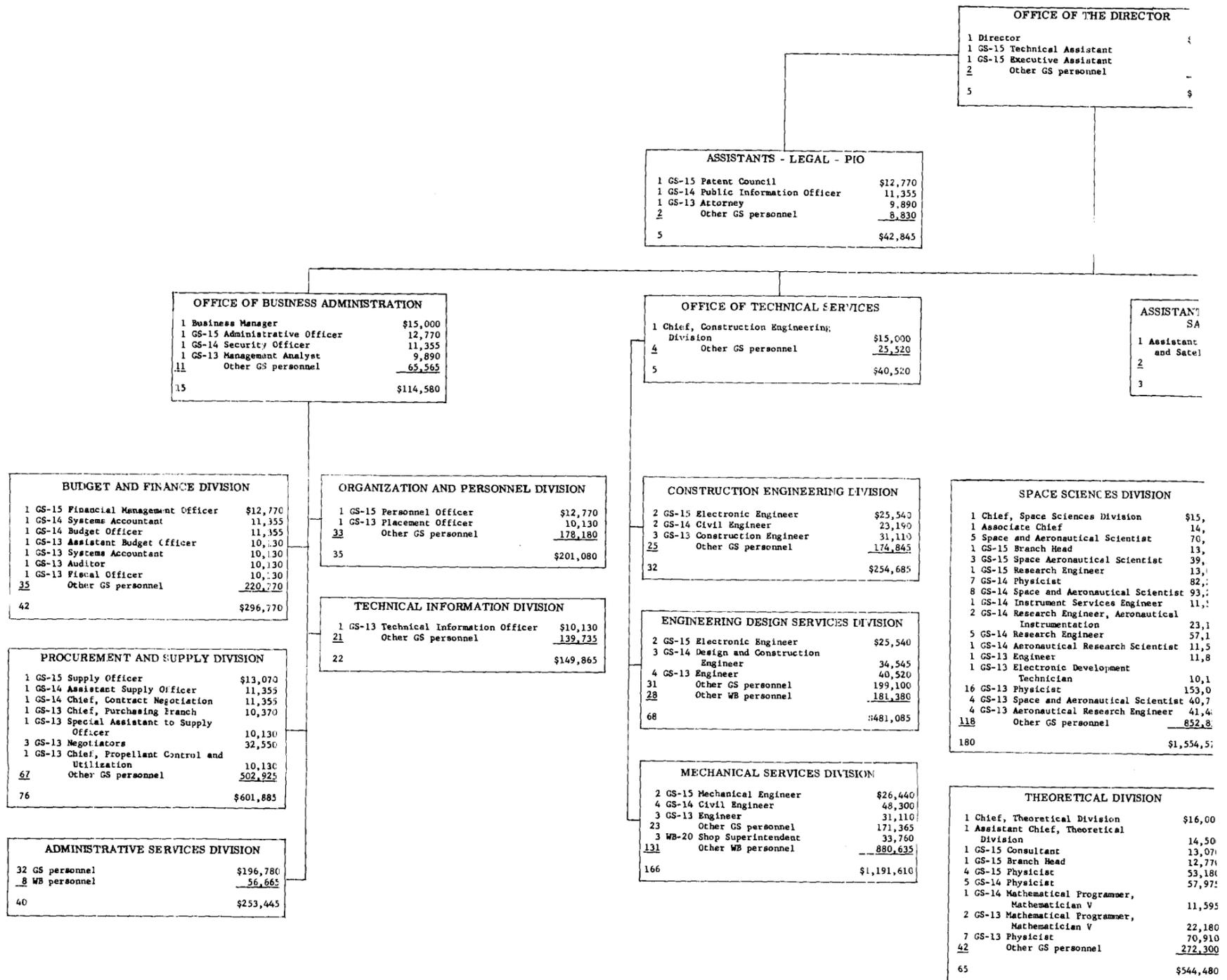
DATA SYSTEMS DIVISION		
1	Chief, Data Systems Division	\$16,500
8	GS-15 Mathematician	103,660
6	GS-14 Mathematician	74,370
24	GS-13 Mathematician	254,640
82	Other GS personnel	597,040
		\$1,046,210

OPERATIONS DIVISION		
1	Chief, Operations Division	\$16,000
1	GS-15 Branch Head	13,370
3	GS-14 Branch Head	37,800
1	GS-14 Assistant Division Chief	12,555
3	GS-14 Assistant Branch Head	36,200
1	GS-14 Section Head	12,555
3	GS-14 Research Engineer, Aeronautical Instrumentation	35,750
1	GS-13 Head, AMR Project Office	11,090
1	GS-13 Assistant Branch Head	11,090
1	GS-13 Section Head	11,090

NATIONAL AERONAUTICS AND SPACE

Proposed Personnel Staffing Chart
Fiscal Year 1961

GODDARD SPACE FLIGHT CENTER



OFFICE OF THE DIRECTOR		
1	Director	\$20,000
1	GS-15 Technical Assistant	11,970
1	GS-15 Executive Assistant	13,970
2	Other GS personnel	11,075
5		\$59,015

ASSISTANTS - LEGAL - PIO		
1	GS-15 Patent Council	\$12,770
1	GS-14 Public Information Officer	11,355
1	GS-13 Attorney	9,890
2	Other GS personnel	8,830
5		\$42,845

OFFICE OF BUSINESS ADMINISTRATION		
1	Business Manager	\$15,000
1	GS-15 Administrative Officer	12,770
1	GS-14 Security Officer	11,355
1	GS-13 Management Analyst	9,890
11	Other GS personnel	65,565
15		\$114,580

OFFICE OF TECHNICAL SERVICES		
1	Chief, Construction Engineering Division	\$15,000
4	Other GS personnel	25,520
5		\$40,520

ASSISTANT DIRECTOR, SPACE SCIENCE AND SATELLITE APPLICATIONS		
1	Assistant Director, Space Sciences and Satellite Applications Division	\$17,500
2	Other GS personnel	9,185
3		\$26,685

ASSISTANT DIRECTOR, TRACKING AND DATA SYSTEMS		
1	Assistant Director	\$17,500
1	Other GS personnel	4,790
2		\$22,290

ASSISTANT		
1	Assistant	
2	Associate	
1	Specialist	
1	Project	
1	Aeronaut	
1	GS-14 Exa	
1	GS-14 RM	
41	Oct	
48		

BUDGET AND FINANCE DIVISION		
1	GS-15 Financial Management Officer	\$12,770
1	GS-14 Systems Accountant	11,355
1	GS-14 Budget Officer	11,355
1	GS-13 Assistant Budget Officer	10,130
1	GS-13 Systems Accountant	10,130
1	GS-13 Auditor	10,130
1	GS-13 Fiscal Officer	10,130
35	Other GS personnel	220,770
42		\$296,770

ORGANIZATION AND PERSONNEL DIVISION		
1	GS-15 Personnel Officer	\$12,770
1	GS-13 Placement Officer	10,130
33	Other GS personnel	178,180
35		\$201,080

CONSTRUCTION ENGINEERING DIVISION		
2	GS-15 Electronic Engineer	\$25,540
2	GS-14 Civil Engineer	23,190
3	GS-13 Construction Engineer	31,110
25	Other GS personnel	174,845
32		\$254,685

SPACE SCIENCES DIVISION		
1	Chief, Space Sciences Division	\$15,000
1	Associate Chief	14,500
5	Space and Aeronautical Scientist	70,000
1	GS-15 Branch Head	13,370
3	GS-15 Space Aeronautical Scientist	39,510
1	GS-15 Research Engineer	13,070
7	GS-14 Physicist	82,245
8	GS-14 Space and Aeronautical Scientist	93,240
1	GS-14 Instrument Services Engineer	11,595
2	GS-14 Research Engineer, Aeronautical Instrumentation	23,190
5	GS-14 Research Engineer	57,140
1	GS-14 Aeronautical Research Scientist	11,595
1	GS-13 Engineer	11,855
1	GS-13 Electronic Development Technician	10,130
16	GS-13 Physicist	153,060
4	GS-13 Space and Aeronautical Scientist	40,760
4	GS-13 Aeronautical Research Engineer	41,480
118	Other GS personnel	852,830
180		\$1,554,570

SATELLITE APPLICATIONS SYSTEMS DIVISION		
1	Chief, Satellite Applications Systems Division	\$16,500
2	Space and Aeronautical Scientist	28,500
1	GS-15 Assistant to Chief, Satellite Applications Systems Division	12,770
2	GS-15 Consultant	26,140
7	GS-15 Aeronautical Research Engineer	90,590
1	GS-15 Electronic Scientist	13,090
2	GS-15 Space Aeronautical Scientist	26,100
4	GS-14 Aeronautical Research Scientist	46,380
1	GS-14 Associate for Management (Contracts)	11,595
1	GS-14 Program Analyst	11,595
15	GS-14 Space and Aeronautical Scientist	173,205
2	GS-14 Electronic Scientist	23,190
13	GS-13 Aeronautical Research Engineer	130,830
3	GS-13 Aeronautical Research Scientist	30,390
3	GS-13 Space and Aeronautical Scientist	30,390
1	GS-13 Scientific Staff Assistant	10,130
1	GS-13 Research Assistant	9,890
1	GS-13 Technical Assistant for Program Coordination	10,130
3	GS-13 Engineer	30,390
21	Other GS personnel	628,410
155		\$1,360,215

THEORY AND ANALYSIS STAFF		
1	Staff Scientist, Scientific Data Systems Planning	\$14,000
1	GS-14 Physicist	11,835
1	GS-14 Mathematician	12,555
2	GS-13 Space Aeronautical Scientist	20,740
8	Other GS personnel	61,365
13		\$120,495

FI		
1	Chief, FI	
1	GS-15 Ass	
1	GS-15 Bra	
2	GS-14 Bra	
2	GS-14 Eng	
6	GS-14 Aer	
1	GS-14 Spe	
1	GS-13 Ass	
2	GS-13 Sec	
15	GS-13 Aer	
187	Oct	
219		

PROCUREMENT AND SUPPLY DIVISION		
1	GS-15 Supply Officer	\$13,070
1	GS-14 Assistant Supply Officer	11,355
1	GS-14 Chief, Contract Negotiation	11,355
1	GS-13 Chief, Purchasing Branch	10,370
1	GS-13 Special Assistant to Supply Officer	10,130
3	GS-13 Negotiators	32,550
1	GS-13 Chief, Propellant Control and Utilization	10,130
67	Other GS personnel	502,925
76		\$601,885

TECHNICAL INFORMATION DIVISION		
1	GS-13 Technical Information Officer	\$10,130
21	Other GS personnel	139,735
22		\$149,865

ENGINEERING DESIGN SERVICES DIVISION		
2	GS-15 Electronic Engineer	\$25,540
3	GS-14 Design and Construction Engineer	34,545
4	GS-13 Engineer	40,520
31	Other GS personnel	199,100
28	Other WB personnel	181,380
68		\$481,085

THEORETICAL DIVISION		
1	Chief, Theoretical Division	\$16,000
1	Assistant Chief, Theoretical Division	14,500
1	GS-15 Consultant	13,070
1	GS-15 Branch Head	12,770
4	GS-15 Physicist	53,190
5	GS-14 Physicist	57,975
1	GS-14 Mathematical Programmer, Mathematician V	11,595
2	GS-13 Mathematical Programmer, Mathematician V	22,180
7	GS-13 Physicist	70,910
42	Other GS personnel	272,300
65		\$544,480

PAYLOAD SYSTEMS DIVISION		
1	Chief, Payload Systems Division	\$15,500
1	Associate Chief	14,500
2	GS-15 Space and Aeronautical Scientist	26,140
1	GS-15 Branch Head	12,770
1	GS-14 Research Engineer Aeronautical Instrumentation	11,595
5	GS-14 Physicist	58,215
4	GS-14 Aeronautical Research Engineer	47,340
3	GS-14 Mechanical Engineer	34,305
4	GS-13 Electronic Scientist	41,240
2	GS-13 Mechanical Engineer	20,260
13	GS-13 Aeronautical Research Engineer	133,370
126	Other GS personnel	863,910
163		\$1,279,145

TRACKING SYSTEMS DIVISION		
1	Chief, Tracking Systems Division	\$15,000
1	GS-14 Consultant	11,595
1	GS-14 Branch Head, Electronic Scientist	11,355
4	GS-14 Electronic Scientist	46,140
1	GS-14 Research Engineer	11,595
1	GS-14 Physicist	11,595
1	GS-13 Consultant	10,130
8	GS-13 Electronic Scientist	81,580
3	GS-13 Electronic Engineers	30,870
4	GS-13 Physicist	40,760
73	Other GS personnel	507,060
98		\$777,680

ENGINEERING		
1	Chief, Eng	
1	GS-15 Admini	
1	GS-15 Ass	
1	GS-15 Aer	
1	GS-15 Brar	
2	GS-14 Brar	
1	GS-14 Heac	
1	GS-14 Mecl	
1	GS-14 Exec	
1	GS-14 Tech	
1	GS-14 Eng	
1	GS-14 Assi	
1	GS-13 Sect	
1	GS-13 Sect	
66	Other	
24	WB P	
104		

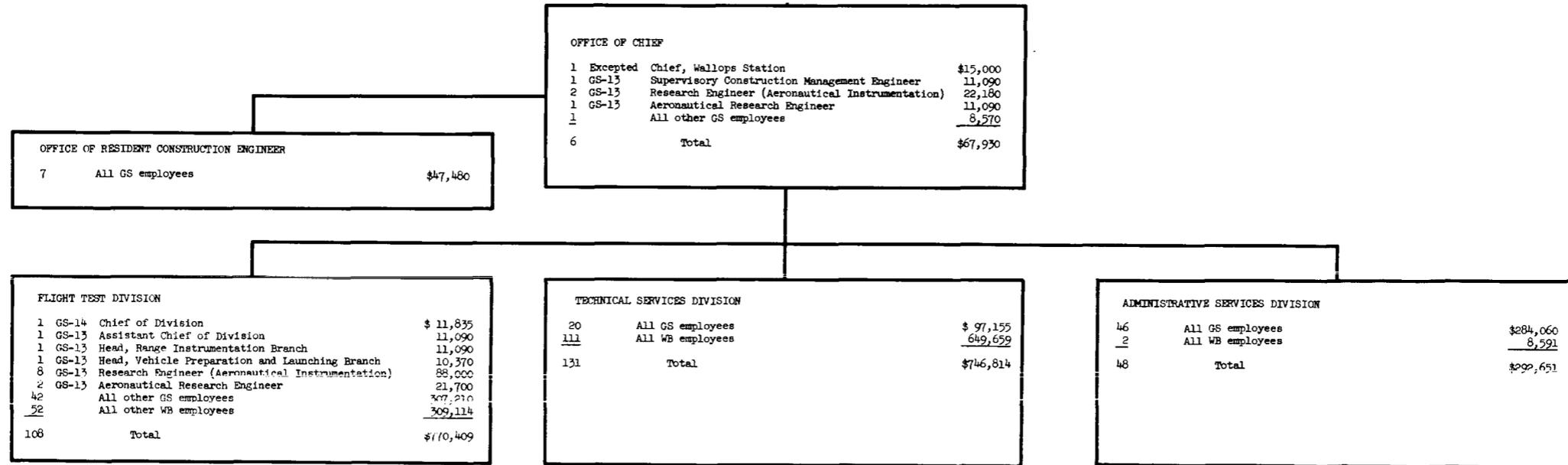
ADMINISTRATIVE SERVICES DIVISION		
32	GS personnel	\$196,780
8	WB personnel	56,665
40		\$253,445

DATA SYSTEMS DIVISION		
1	Chief, Data Systems Division	\$16,500
8	GS-15 Mathematician	103,660
6	GS-14 Mathematician	74,370
24	GS-13 Mathematician	254,640
82	Other GS personnel	597,040
121		\$1,046,210

OPERATIONAL SUPPORT DIVISION		
3	GS-15 Electronic Scientist	\$40,110
15	GS-14 Electronic Scientist	174,885
1	GS-14 Civil Engineer	11,595
1	GS-14 Electronic Engineer	11,595
4	GS-13 Electronic Scientist	41,720
1	GS-13 Civil Engineer	10,130
4	GS-13 Aeronautical Research Engineer	40,760
4	GS-13 Mathematician	40,760
44	Other GS personnel	287,100
77		\$658,655

OPERATIONAL SUPPORT		
1	Chief, Oper	
1	GS-15 Bran	
3	GS-14 Bran	
1	GS-14 Assi	
3	GS-14 Assi	
1	GS-14 Sect	
3	GS-14 Reser	
1	GS-13 Head	
1	GS-13 Assi	
1	GS-13 Sect	
24	GS-13 Aeron	
163	Other	
38	WB pe	
241		

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Proposed personnel staffing chart
F. Y. 1961
WALLOPS STATION



5 Other GS Personnel \$33,970
7 \$58,635

2 Other GS Personnel 7,510
3 \$15,840

SATURN

1 GS-17 Director	\$ 15,375
3 GS-15 Aero Res Engr	38,910
3 GS-14 Aero Res Engr	37,665
2 GS-14 Physical Sci Adm	25,190
4 GS-13 General Engr	41,480
12 Other GS Personnel	73,520
25	\$230,140

FUTURE PROJECTS

1 Director (Excepted)	\$15,000
2 GS-15 Aero Res Engr	41,910
1 GS-14 Aero Res Engr	12,555
2 GS-13 Aero Res Engr	22,180
3 GS-12 Aero Res Engr	26,430
5 Other GS Personnel	26,935
14	\$145,010

WEAPONS SYSTEMS

1 GS-17 Director	\$ 15,615
1 GS-15 Aero Res Engr	13,970
1 GS-15 Gen Engr	13,970
5 GS-14 Gen Engr	62,775
1 GS-14 Aero Pwr Plant Res Engr	12,555
1 GS-14 Elect Engr	12,555
1 GS-14 Mech Engr	12,555
1 GS-14 Mech Engr	10,130
1 GS-13 Elect Engr	10,130
1 GS-13 Program Spec	10,130
1 GS-13 Equipment Spec	10,130
6 Other GS Personnel	24,980
21	\$211,200

PROGRAM COORDINATION

1 GS-15 Chief	\$13,970
3 GS-15 Ind Engr	38,310
4 GS-14 Ind Engr	46,380
3 GS-14 Program Specialist	34,785
4 GS-13 Program Specialist	30,390
10 GS-13 Ind Engr	101,300
12 Other GS Personnel	45,335
37	\$310,470

TECHNICAL SERVICES OFFICE

1 GS-15 Ch (Gen Engr)	\$ 12,770
1 GS-15 Ch, Engr Br	12,770
1 GS-15 Gen Engr	12,770
4 GS-15 Gen Engr	51,080
1 GS-14 Ch, Safety Br	11,595
1 GS-14 Civil Engr	11,595
1 GS-14 Ch, Matl Svc Br	11,595
1 GS-13 Ch, Engr Mgt & Maint	10,130
1 GS-13 Gen Sup Ofc	9,890
2 GS-13 Struct Engr	20,260
4 GS-13 Mech Engr	40,520
5 GS-13 Air Cond Engr	40,520
4 GS-13 Elec Engr	40,520
1 GS-13 Sanitary Engr	10,130
2 GS-13 Civil Engr	20,260
1 GS-13 Gen Engr	10,130
1 GS-13 Safety Engr	10,130
180 Other GS Personnel	849,910
453 WB Personnel	2,813,130
685	\$4,009,835

FINANCIAL MANAGEMENT OFFICE

1 GS-15 Chief	\$ 13,370
1 GS-15 Deputy	12,770
1 GS-15 Budget Officer	12,770
1 GS-14 Asst Budget Officer	11,355
1 GS-14 Fin Mgmt Spec	11,355
3 GS-13 Br Ch (Accountants)	29,670
91 Other GS Personnel	381,665
89	\$472,935

PERSONNEL & ADMIN SVC OFFICE

1 GS-15 Office Chief	\$ 12,770
1 GS-15 Personnel Officer	12,770
1 GS-15 Chief, Tech Info Br	12,770
1 GS-14 Dep Personnel Off	11,355
1 GS-14 Pera Program Spec	11,355
1 GS-14 Medical Officer	11,355
1 GS-14 Ch, Tech Publ Sec	11,355
1 GS-14 Chief, Grap Engr & Mdl	11,355
1 GS-14 Communications Engr	11,355
1 GS-14 Security Officer	11,355
1 GS-13 Personnel Asst	6,800
1 GS-13 Training Officer	6,800
3 GS-13 Pers Mgt Asst	29,670
1 GS-13 Ch, Photo Lab	9,890
1 GS-13 Communications Engr	9,890
1 GS-13 Asst Security Officer	9,890
1 GS-13 Ch, Admin Services	9,890
233 Other GS Personnel	1,185,820
16 WB Personnel	72,796
268	\$1,465,421

PROCUREMENT

1 GS-15 Chief	
1 GS-15 Dep	
1 GS-15 Ind	
5 GS-14 Br Ch	
8 GS-13 Contr	
4 GS-13 Ind	
1 GS-13 Br Ch	
102 Other GS Personnel	
123	

AEROBALLISTICS LABORATORY

1 Lab Dir (PL 313)	\$ 18,000
1 Dep Dir (Excep)	16,000
1 Ch, Dyn Anal Br (Excep)	15,000
1 GS-15 Ch, Aerophy & Geophy Br	13,970
1 GS-15 Ch, Aerody Anal Br	13,970
1 GS-15 Ch, Exper Aerody Br	13,970
1 GS-15 Ch, Fut Projs Anal Br	13,970
1 GS-15 Ch, Flight Eval Br	13,970
3 GS-15 Physicist	41,910
6 GS-15 Aero Res Engr	83,820
5 GS-14 Physicist	62,775
4 GS-14 Aero Res Engr	50,220
1 GS-14 Ind Engr	12,555
6 GS-13 Physicist	66,540
1 GS-13 Mathematician	11,090
11 GS-13 Aero Res Engr	121,990
147 Other GS Personnel	918,252
19 WB Personnel	122,721
211	\$1,610,723

COMPUTATION LABORATORY

1 Lab Dir (PL 313)	\$ 17,500
1 Dep Dir (Excep)	15,500
1 GS-15 Ch, Flight Sim Br	13,970
1 GS-15 Ch, Digital Projs Br	13,970
1 GS-15 Ch, Data Reduct Br	13,970
3 GS-15 Mathematicians	41,910
1 GS-15 Res Engr	13,970
1 GS-15 Digital Comp Sys Admin	13,970
4 GS-14 Mathematicians	50,220
2 GS-14 Res Engr	25,110
1 GS-14 Electronic Engr	12,555
1 GS-14 Digital Comp Sys Admin	12,555
1 GS-13 Program Ofc	11,090
3 GS-13 Mathematicians	33,270
1 GS-13 Res Engr	11,090
1 GS-14 Elect Engr	11,090
1 GS-13 Electronic Engr	11,090
1 GS-13 Physicist	11,090
99 Other GS Personnel	703,167
3 WB Personnel	19,297
127	\$1,045,294

FABRICATION & ASSY ENGR LAB

1 Lab Dir (PL 313)	\$ 17,500
1 Dep Dir (Excep)	15,500
1 GS-15 Ch, Plant Engr & Opr Br	13,970
1 GS-15 Ch, Assy Engr Br	13,970
1 GS-15 Ch, Elect Engr Br	13,970
1 GS-15 Ch, Mech Engr Br	13,970
1 GS-15 Ch, Fab Engr Br	13,970
1 GS-15 Ch, Methods Res & Dev	13,970
4 GS-15 Aero Res Engr	55,880
1 GS-15 Mech Engr	13,970
7 GS-14 Aero Res Engr	87,885
2 GS-14 Mech Engr	25,110
2 GS-14 Aero Matl Res Engr	25,110
2 GS-14 Ind Engr	25,110
2 GS-14 Elect Engr	25,110
5 GS-14 Prod Spec	62,775
1 GS-14 Shop Super	12,555
3 GS-13 Aero Res Engr	33,270
10 GS-13 Mech Engr	110,090
2 GS-13 Aero Matl Res Engr	22,180
1 GS-13 Adm Ofc	11,090
7 GS-13 Ind Engr	77,630
3 GS-13 Elect Engr	33,270
11 GS-13 Prod Spec	121,990
2 GS-13 Chemist & Physicist	22,180
164 Other GS Personnel	1,112,861
605 WB Personnel	3,308,294
842	\$5,903,180

GUIDANCE & CONTROL LABORATORY

1 Dir (PL 313)	\$ 18,000
1 Dep Dir (PL 313)	17,500
1 Ch, Gyro & Stab Br (Excep)	15,000
1 Ch, Electro-Mech Engr (Excep)	15,000
1 GS-15 Ch, Mal Instr Dev Br	15,615
1 GS-15 Ch, Applied Res Br	13,970
1 GS-15 Ch, Pilot Manuf Dev Br	13,970
1 GS-15 Ch, Elect Ntwrk Sys Br	13,970
1 GS-15 Ch, Navigation Br	13,970
1 GS-15 Ch, Advanced Stud Br	13,970
1 GS-15 Ch, Flight Dyn Br	13,970
23 GS-15 Aero Res Engr	321,310
1 GS-15 Physicist	13,970
59 GS-14 Aero Res Engr	740,745
2 GS-14 Mech Engr	25,110
2 GS-14 Physicist	25,110
79 GS-13 Aero Res Engr	876,110
1 GS-13 Admin Ofc	11,090
1 GS-13 Electronics Engr	11,090
1 GS-13 Physicist	11,090
1 GS-13 Prod Cont Spec	11,090
349 Other GS Personnel	2,435,308
280 WB Personnel	1,808,800
810	\$6,455,758

MISSILE FIRING LABORATORY

1 Lab Dir (PL 313)	\$18,000
1 GS-17 Dep Dir	15,375
1 Ch, EE, Meas & Tr Br (Excep)	15,000
1 GS-15 Ch, El Eng Guid & Cont	13,970
1 GS-15 Ch, Str & Mec Engr Br	13,970
7 GS-15 Aero Res Engr	97,790
2 GS-15 Aero Res Adm	27,940
1 GS-15 Ind Engr	13,970
1 GS-15 Elect Engr	12,555
10 GS-14 Aero Res Engr	125,550
1 GS-14 Mech Engr	12,555
18 GS-13 Res Engr	225,990
1 GS-13 Ind Engr	11,090
1 GS-13 Pub Writer	11,090
1 GS-13 Physicist	11,090
169 Other GS Personnel	1,083,197
107 WB Personnel	691,220
324	\$2,401,767

RESEARCH PROJECTS LABORATORY

1 Lab Dir (PL 313)	\$ 18,000
1 Dep Dir (Excep)	15,500
1 Ch, Phy & Astrophy Sec (Excep)	15,000
1 GS-15 Ch, Nuclear Phys Sec	13,970
1 GS-15 Ch, Space Environ Sec	12,555
1 GS-15 Ch, Elec Sys Sec	13,970
1 GS-15 Ch, Space Thermody Sec	13,970
1 GS-13 Special Fields Sec	11,090
2 GS-14 Aero Res Adm	25,110
4 GS-14 Aero Res Engr	50,220
1 GS-14 Electronic Engr	12,555
2 GS-13 Aero Res Adm	22,180
2 GS-13 Physicist	11,090
1 GS-13 Aero Res Engr	11,090
1 GS-13 Electronic Engr	11,090
1 GS-13 Ind Spec	11,090
32 Other GS Personnel	219,144
54	\$498,714

STRUCTURES & MECHANICS LAB

1 Lab Dir (PL 313)	\$ 18,000
1 GS-17 Dep Dir	15,375
1 Ch, Prop & Mech Br (Excep)	15,000
1 Ch, Engr Matl Br (Excep)	15,000
1 Aero Res Engr (Excep)	15,000
1 GS-15 Ch, Fut Projs Des Br	13,970
1 GS-15 Ch, Str Br	13,970
1 GS-15 Ch, Mal Sys Engr Br	13,970
1 GS-15 Aero Matl Res Engr	13,970
1 GS-15 Mech Engr	13,970
6 GS-15 Aero Pwr Plt Res Engr	83,820
16 GS-15 Aero Res Engr	237,490
1 GS-15 Aero Res Admin	13,970
11 GS-14 Aero Matl Res Engr	138,105
1 GS-14 Mech Engr	12,555
1 GS-14 Aero Pwr Plt Res Engr	138,105
33 GS-14 Aero Res Engr	414,315
1 GS-14 Ind Engr	12,555
1 GS-14 Chemist	12,555
1 GS-14 Shop Supt	12,555
1 GS-13 Admin Ofc	11,090
14 GS-13 Aero Matl Res Engr	155,260
19 GS-13 Aero Pwr Plt Res Engr	210,710
54 GS-13 Aero Res Engr	598,860
1 GS-13 Physicist	11,090
1 GS-13 Chemist	11,090
314 Other GS Personnel	2,058,570
149 WB Personnel	968,750
645	\$5,249,910

SYS ANALYSIS & RELIABILITY LAB

1 Lab Dir (PL 313)	\$ 17,500
1 Dep Dir (Excep)	15,500
1 GS-15 Ch, Elec Sys Anal Br	13,970
1 GS-15 Ch, Performance Test Br	13,970
1 GS-15 Ch, Mech Sys Anal Br	13,970
1 GS-15 Ch, Reliability Br	13,970
1 GS-15 Physicist	13,970
5 GS-15 Gen Engr	69,850
3 GS-15 Mech Engr	41,910
1 GS-15 Aero Res Engr	13,970
1 GS-14 Aero Res Admin	12,555
1 GS-14 Physicist	12,555
8 GS-14 Gen Engr	100,440
1 GS-14 Supv Inspector	12,555
5 GS-14 Mech Engr	62,775
2 GS-14 Electronic Engr	25,110
4 GS-14 Aero Res Engr	50,220
8 GS-13 Gen Engr	88,720
2 GS-13 Supv Inspector	22,180
8 GS-13 Mech Engr	88,720
2 GS-13 Electronic Engr	22,180
5 GS-13 Aero Res Engr	55,450
1 GS-13 Anal Statist	11,090
196 Other GS Personnel	1,429,653
98 WB Personnel	633,080
358	\$2,855,863

SYSTEMS SUPPORT EQUIPMENT LAB

1 GS-18 Lab Dir	\$ 17,500
1 Dep Dir (Excep)	15,500
1 GS-15 Ch, Electrical Br	13,970
1 GS-15 Ch, Mechanical Br	13,970
1 GS-15 Ch, Sys Engr Br	13,970
1 GS-14 Ch, Test Br	12,555
7 GS-15 Aero Res Engr	97,790
1 GS-15 Aero Pwr Plt Res Engr	13,970
13 GS-14 Aero Res Engr	163,215
1 GS-14 Aero Matl Res Engr	12,555
4 GS-14 Aero Pwr Plt Res Engr	50,220
1 GS-14 Equip spec	12,555
1 GS-14 Ind Engr	12,555
1 GS-13 Admin Ofc	11,090
18 GS-13 Aero Res Engr	199,620
3 GS-13 Aero Matl Res Engr	33,270
4 GS-13 Aero Pwr Plt Res Engr	44,360
1 GS-13 Ind Engr	11,090
64 Other GS Personnel	426,747
153 WB Personnel	988,380
278	\$2,164,882

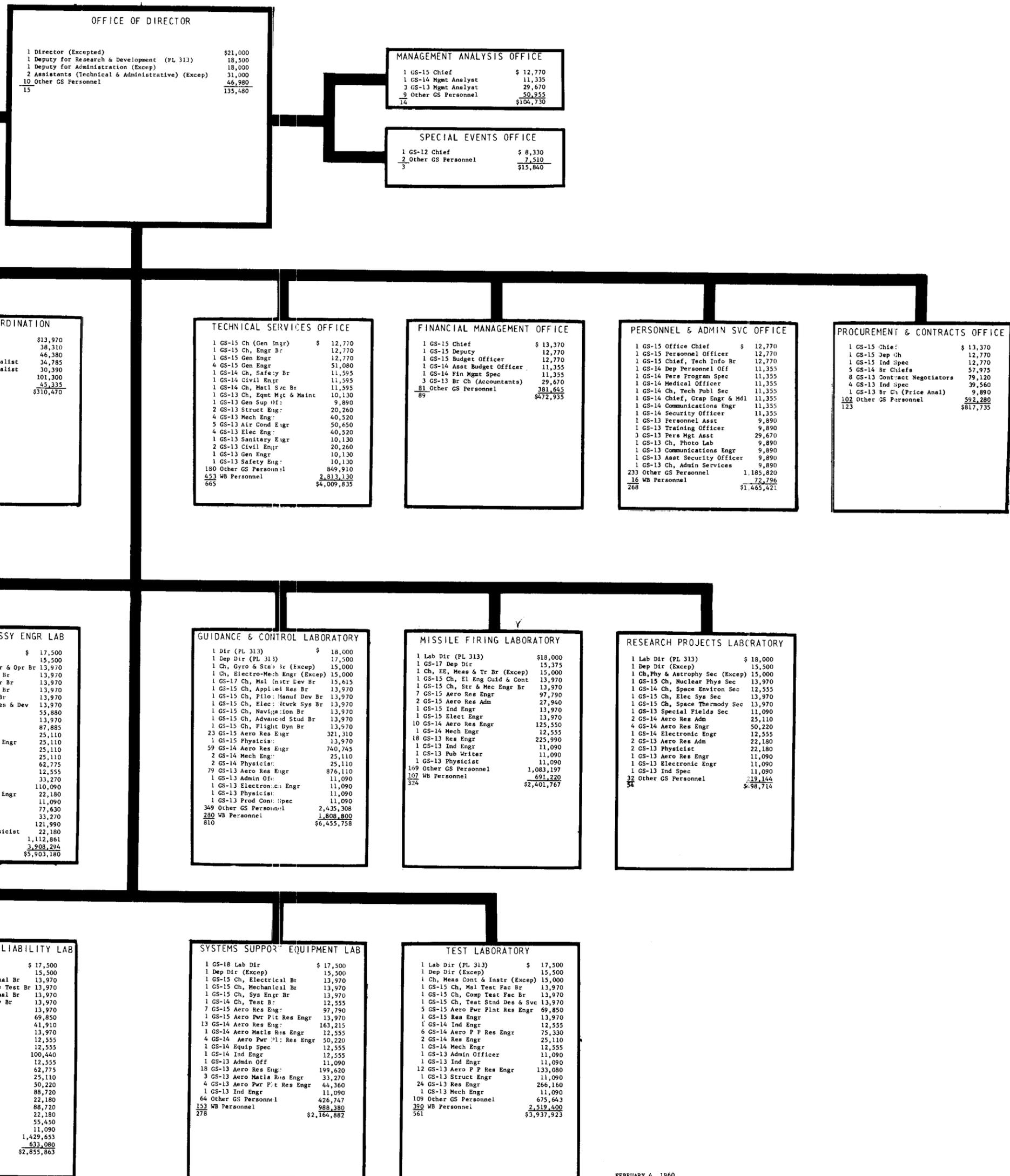
TEST LABORATORY

1 Lab Dir (PL 313)	\$ 17,500
1 Dep Dir (Excep)	15,500
1 Ch, Meas Unit & Instr (Excep)	15,000
1 GS-15 Ch, Mal Test Fac Br	13,970
1 GS-15 Ch, Comp Test Fac Br	13,970
1 GS-15 Ch, Test Std Des & Svc	13,970
5 GS-15 Aero Pwr Plt Res Engr	69,850
1 GS-15 Res Engr	13,970
1 GS-14 Ind Engr	12,555
6 GS-14 Aero P P Res Engr	75,330
2 GS-14 Res Engr	25,110
1 GS-14 Mech Engr	12,555
1 GS-13 Admin Officer	11,090
1 GS-13 Ind Engr	11,090
12 GS-13 Aero P Res Engr	133,080
1 GS-13 Struct Engr	11,090
24 GS-13 Res Engr	266,160
1 GS-13 Mech Engr	11,090
109 Other GS Personnel	675,643
390 WB Personnel	2,519,400
501	\$3,937,923

AERONAUTICS and SPACE ADMINISTRATION

STAFFED PERSONNEL STAFFING CHART - FY 1961

HUNTSVILLE FACILITY



NATIONAL AERONAUTICS and SPACE ADMINISTRATION
PROPOSED PERSONNEL STAFFING CHART - FY 1961
HUNTSVILLE FACILITY

OFFICE OF DIRECTOR		
1 Director (Excepted)		\$21,000
1 Deputy for Research & Development (PL 313)		18,500
1 Deputy for Administration (Excep)		18,000
2 Assistants (Technical & Administrative) (Excep)		11,000
10 Other GS Personnel		66,280
15		135,480

LEGAL OFFICE		
1 GS-15 Chief	\$12,770	
1 GS-14 Attorney (Patents)	11,595	
2 GS-12 Attorney (General)	29,700	
5 Other GS Personnel	29,410	
9	\$73,555	

PUBLIC INFORMATION OFFICE		
1 GS-15 Chief	\$13,070	
1 GS-14 Assistant	11,595	
5 Other GS Personnel	33,970	
7	\$58,635	

MANAGEMENT ANALYSIS OFFICE		
1 GS-15 Chief	\$ 12,770	
1 GS-14 Mgmt Analyst	11,355	
3 GS-13 Mgmt Analyst	29,670	
9 Other GS Personnel	50,955	
14	\$104,750	

SPECIAL EVENTS OFFICE		
1 GS-12 Chief	\$ 8,330	
2 Other GS Personnel	7,510	
3	\$15,840	

FUTURE PROJECTS		
1 Director (Excepted)	\$15,000	
2 GS-15 Aero Res Engr	41,910	
1 GS-14 Aero Res Engr	12,555	
2 GS-13 Aero Res Engr	22,180	
3 GS-12 Aero Res Engr	26,430	
5 Other GS Personnel	26,935	
14	\$145,010	

WEAPONS SYSTEMS		
1 GS-17 Director	\$ 15,615	
1 GS-15 Aero Res Engr	13,970	
1 GS-15 Gen Engr	13,970	
5 GS-14 Gen Engr	62,775	
1 GS-14 Aero Pwr Plant Res Engr	12,555	
1 GS-14 Elect Engr	12,555	
1 GS-14 Elect Engr	11,595	
1 GS-14 Mech Engr	12,555	
1 GS-13 Elect Engr	10,130	
1 GS-13 Program Spec	10,370	
1 GS-13 Equipment Spec	10,130	
6 Other GS Personnel	24,980	
21	\$211,200	

PROGRAM COORDINATION		
1 GS-15 Chief	\$13,970	
3 GS-15 Ind Engr	38,310	
4 GS-14 Ind Engr	46,380	
4 GS-13 Program Specialist	34,785	
30,390		
10 GS-13 Ind Engr	101,300	
12 Other GS Personnel	45,335	
37	\$310,470	

TECHNICAL SERVICES OFFICE		
1 GS-15 Ch (Gen Engr)	\$ 12,770	
1 GS-15 Ch, Engr Br	12,770	
1 GS-15 Gen Engr	12,770	
4 GS-15 Gen Engr	51,080	
1 GS-14 Ch, Safety Br	11,595	
1 GS-14 Civil Engr	11,595	
1 GS-14 Ch, Matl Svc Br	11,595	
1 GS-13 Ch, Eqmt Mgt & Maint	10,130	
1 GS-13 Gen Sup Ofc	9,890	
2 GS-13 Struct Engr	20,260	
4 GS-13 Mech Engr	40,520	
5 GS-13 Air Cond Engr	50,650	
4 GS-13 Elec Engr	40,520	
1 GS-13 Sanitary Engr	10,130	
2 GS-13 Civil Engr	20,260	
1 GS-13 Gen Engr	10,130	
1 GS-13 Safety Engr	10,130	
180 Other GS Personnel	849,910	
453 WB Personnel	2,813,130	
665	\$4,009,835	

FINANCIAL MANAGEMENT OFFICE		
1 GS-15 Chief	\$ 13,370	
1 GS-15 Deputy	12,770	
1 GS-15 Budget Officer	12,770	
1 GS-14 Asst Budget Officer	11,355	
1 GS-14 Pers Mgmt Spec	11,355	
3 GS-13 Br Ch (Accountants)	29,670	
81 Other GS Personnel	381,645	
89	\$472,935	

PERSONNEL & ADMIN SVC OFFICE		
1 GS-15 Office Chief	\$ 12,770	
1 GS-15 Personnel Officer	12,770	
1 GS-15 Chief, Tech Info Br	12,770	
1 GS-14 Dep Personnel Off	11,355	
1 GS-14 Pers Program Spec	11,355	
1 GS-14 Medical Officer	11,355	
1 GS-14 Ch, Tech Publ Sec	11,355	
1 GS-14 Chief, Grap Engr & Mdl	11,355	
1 GS-14 Communications Engr	11,355	
1 GS-14 Security Officer	11,355	
1 GS-13 Personnel Asst	9,890	
1 GS-13 Training Officer	9,890	
3 GS-13 Pers Mgt Asst	29,670	
1 GS-13 Ch, Photo Lab	9,890	
1 GS-13 Communications Engr	9,890	
1 GS-13 Asst Security Officer	9,890	
1 GS-13 Ch, Admin Services	9,890	
233 Other GS Personnel	1,185,820	
16 WB Personnel	72,796	
268	\$1,465,421	

PROCUREMENT & CONTRACTS OFFICE		
1 GS-15 Chief	\$ 13,970	
1 GS-15 Dep Ch	12,770	
1 GS-15 Ind Spec	12,770	
5 GS-14 Br Chiefs	57,975	
8 GS-13 Contract Negotiators	79,120	
4 GS-13 Ind Spec	39,560	
1 GS-13 Br Ch (Price Anal)	9,890	
102 Other GS Personnel	592,280	
123	\$817,735	

AEROBALLISTICS LABORATORY		
1 Lab Dir (PL 313)	\$ 18,000	
1 Dep Dir (Excep)	15,000	
1 Ch, Dyn Anal Br (Excep)	15,000	
1 GS-15 Ch, Aerophy & Geophy Br	13,970	
1 GS-15 Ch, Aerody Anal Br	13,970	
1 GS-15 Ch, Exper Aerody Br	13,970	
1 GS-15 Ch, Put Projs Anal Br	13,970	
1 GS-15 Ch, Flight Eval Br	13,970	
3 GS-15 Physicist	41,910	
6 GS-15 Aero Res Engr	83,820	
5 GS-14 Physicist	50,220	
4 GS-14 Aero Res Engr	62,775	
1 GS-14 Ind Engr	12,555	
6 GS-13 Physicist	66,540	
1 GS-13 Mathematician	11,090	
11 GS-13 Aero Res Engr	121,990	
147 Other GS Personnel	918,252	
19 WB Personnel	122,721	
211	\$1,610,723	

COMPUTATION LABORATORY		
1 Lab Dir (PL 313)	\$ 17,500	
1 Dep Dir (Excep)	15,500	
1 GS-15 Ch, Flight Sim Br	13,970	
1 GS-15 Ch, Digital Projs Br	13,970	
1 GS-15 Ch, Data Reduct Br	13,970	
3 GS-15 Mathematicians	41,910	
1 GS-15 Res Engr	13,970	
1 GS-15 Digital Comp Sys Admin	13,970	
4 GS-14 Mathematicians	50,220	
2 GS-14 Res Engr	25,110	
1 GS-14 Electronic Engr	12,555	
1 GS-14 Digital Comp Sys Admin	12,555	
1 GS-13 Program Ofc	11,090	
3 GS-13 Mathematicians	33,270	
1 GS-13 Res Engr	11,090	
1 GS-13 Electronic Engr	11,090	
1 GS-13 Physicist	11,090	
99 Other GS Personnel	703,167	
3 WB Personnel	19,297	
127	\$1,045,294	

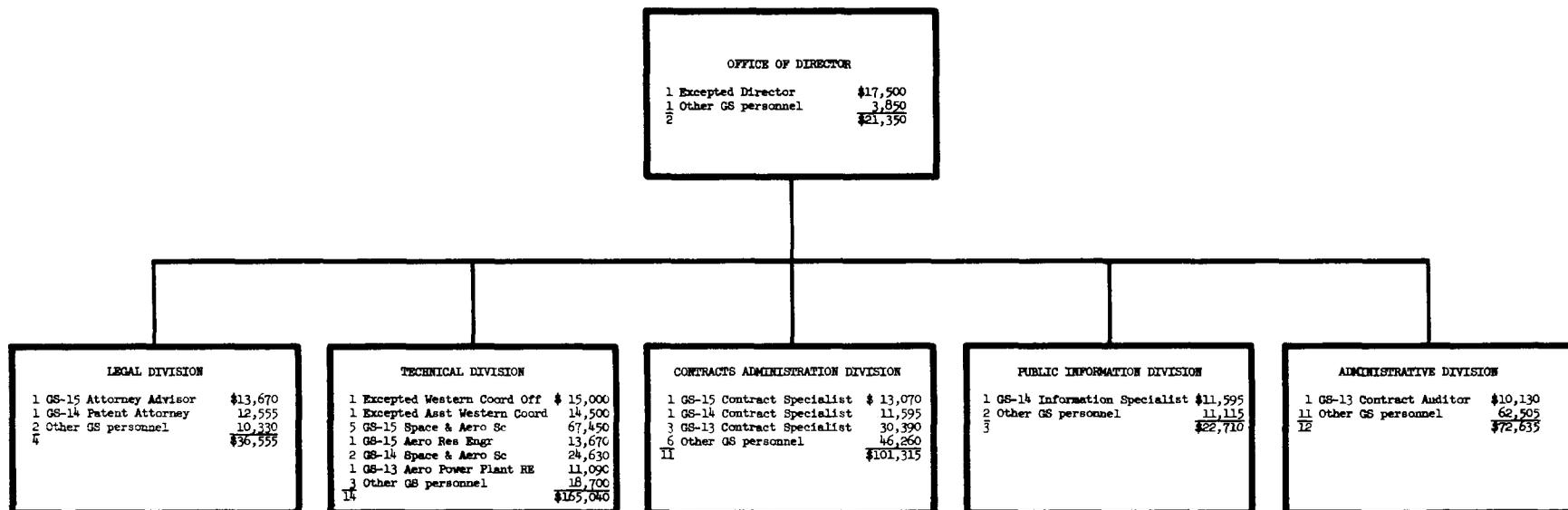
FABRICATION & ASSY ENGR LAB		
1 Lab Dir (PL 313)	\$ 17,500	
1 Dep Dir (Excep)	15,500	
1 GS-15 Ch, Plant Engr & Opr Br	13,970	
1 GS-15 Ch, Assy Engr Br	13,970	
1 GS-15 Ch, Elect Engr Br	13,970	
1 GS-15 Ch, Mech Engr Br	13,970	
1 GS-15 Ch, Fab Engr Br	13,970	
1 GS-15 Ch, Methods Res & Dev	13,970	
4 GS-15 Aero Res Engr	55,880	
1 GS-15 Mech Engr	13,970	
7 GS-14 Aero Res Engr	87,885	
2 GS-14 Mech Engr	25,110	
2 GS-14 Aero Matl Res Engr	25,110	
2 GS-14 Ind Engr	25,110	
2 GS-14 Elect Engr	25,110	
5 GS-14 Prod Spec	62,775	
1 GS-14 Shop Super	12,555	
3 GS-13 Aero Res Engr	33,270	
10 GS-13 Mech Engr	110,090	
2 GS-13 Aero Matl Res Engr	22,180	
1 GS-13 Adm Ofc	11,090	
7 GS-13 Ind Engr	77,630	
3 GS-13 Elect Engr	33,270	
11 GS-13 Prod Spec	121,990	
2 GS-13 Chemist & Physicist	22,180	
164 Other GS Personnel	1,112,861	
605 WB Personnel	3,908,294	
842	\$5,903,180	

GUIDANCE & CONTROL LABORATORY		
1 Dir (PL 313)	\$ 18,000	
1 Dep Dir (PL 313)	17,500	
1 Ch, Gyro & Stab Br (Excep)	15,000	
1 Ch, Electro-Mech Engr (Excep)	15,000	
1 GS-17 Ch, Hsl Instr Dev Br	15,615	
1 GS-15 Ch, Applied Res Br	13,970	
1 GS-15 Ch, Pilot Manuf Dev Br	13,970	
1 GS-15 Ch, Elect Netwrk Sys Br	13,970	
1 GS-15 Ch, Navigation Br	13,970	
1 GS-15 Ch, Advanced Stud Br	13,970	
1 GS-15 Ch, Flight Dyn Br	13,970	
23 GS-15 Aero Res Engr	321,310	
1 GS-15 Physicist	13,970	
59 GS-14 Aero Res Engr	740,745	
2 GS-14 Mech Engr	25,110	
2 GS-14 Physicist	25,110	
79 GS-13 Aero Res Engr	876,110	
1 GS-13 Admin Ofc	11,090	
1 GS-13 Electronics Engr	11,090	
1 GS-13 Physicist	11,090	
1 GS-13 Prod Cont Spec	11,090	
349 Other GS Personnel	2,435,308	
280 WB Personnel	1,808,800	
810	\$6,455,758	

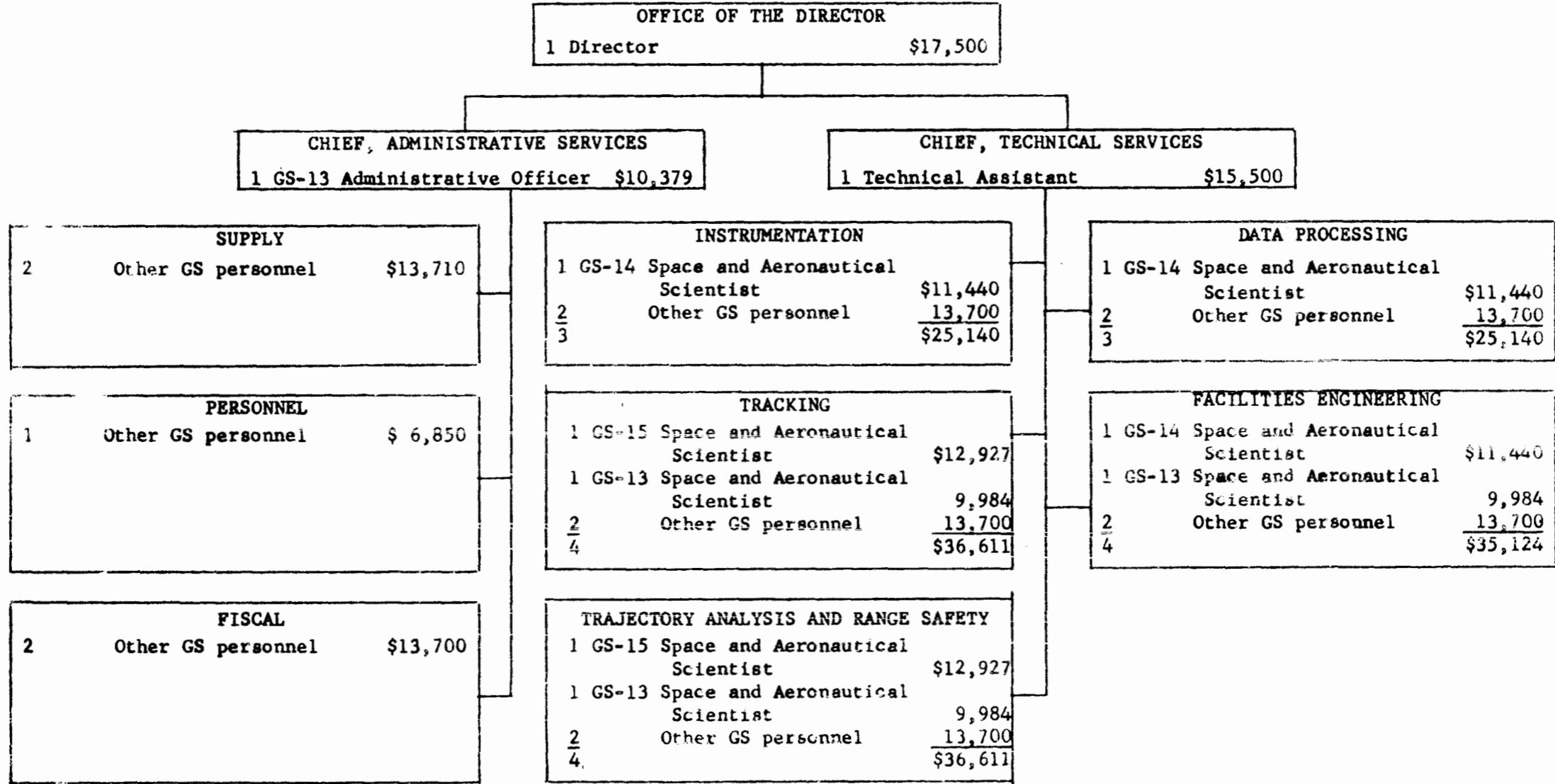
MISSILE FIRING LABORATORY		
1 Lab Dir (PL 313)	\$18,000	
1 GS-17 Dep Dir	15,375	
1 Ch, EE, Meas & Tr Br (Excep)	15,000	
1 GS-15 Ch, El Eng Guid & Cont	13,970	
1 GS-15 Ch, Str & Mec Engr Br	13,970	
7 GS-15 Aero Res Engr	97,790	
2 GS-15 Aero Res Adm	27,940	
1 GS-15 Ind Engr	13,970	
1 GS-15 Elect Engr	13,970	
10 GS-14 Aero Res Engr	125,550	
1 GS-14 Mech Engr	12,555	
18 GS-13 Res Engr	225,990	
1 GS-13 Ind Engr	11,090	
1 GS-13 Pub Writer	11,090	
1 GS-13 Physicist	11,090	
169 Other GS Personnel	1,083,197	
107 WB Personnel	691,220	
324	\$2,401,767	

RESEARCH PROJECTS LABORATORY		
1 Lab Dir (PL 313)	\$ 18,000	
1 Dep Dir (Excep)	15,500	
1 Ch, Phys & Astrophy Sec (Excep)	15,000	
1 GS-15 Ch, Nuclear Phys Sec	13,970	
1 GS-14 Ch, Space Environ Sec	12,555	
1 GS-15 Ch, Elec Sys Sec	13,970	
1 GS-15 Ch, Space Thermody Sec	13,970	
1 GS-13 Special Fields Sec	11,090	
2 GS-14 Aero Res Adm	25,110	
4 GS-14 Aero Res Engr	50,220	
1 GS-14 Electronic Engr	12,555	
2 GS-13 Aero Res Adm	22,180	
2 GS-13 Physicist	22,180	
1 GS-13 Aero Res Engr	11,090	
1 GS-13 Electronic Engr	11,090	
1 GS-13 Ind Spec	11,090	
32 Other GS Personnel	219,144	
54	\$498,714	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PROPOSED PERSONNEL STAFFING CHART
FISCAL YEAR 1961
WESTERN OPERATIONS OFFICE



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Proposed Personnel Staffing Chart
Fiscal Year 1961
ATLANTIC MISSILE RANGE OPERATIONS OFFICE



OFFICE OF THE DIRECTOR
1 Director \$17,500

CHIEF, ADMINISTRATIVE SERVICES
1 GS-13 Administrative Officer \$10,379

CHIEF, TECHNICAL SERVICES
1 Technical Assistant \$15,500

SUPPLY
2 Other GS personnel \$13,710

PERSONNEL
1 Other GS personnel \$ 6,850

FISCAL
2 Other GS personnel \$13,700

INSTRUMENTATION
1 GS-14 Space and Aeronautical Scientist \$11,440
2 Other GS personnel 13,700
3 \$25,140

TRACKING
1 GS-15 Space and Aeronautical Scientist \$12,927
1 GS-13 Space and Aeronautical Scientist 9,984
2 Other GS personnel 13,700
4 \$36,611

TRAJECTORY ANALYSIS AND RANGE SAFETY
1 GS-15 Space and Aeronautical Scientist \$12,927
1 GS-13 Space and Aeronautical Scientist 9,984
2 Other GS personnel 13,700
4 \$36,611

DATA PROCESSING
1 GS-14 Space and Aeronautical Scientist \$11,440
2 Other GS personnel 13,700
3 \$25,140

FACILITIES ENGINEERING
1 GS-14 Space and Aeronautical Scientist \$11,440
1 GS-13 Space and Aeronautical Scientist 9,984
2 Other GS personnel 13,700
4 \$35,124

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED PERSONNEL STAFFING CHART
FISCAL YEAR 1961
PACIFIC MISSILE RANGE OPERATIONS OFFICE

1 GS-15 Director	\$12,770
1 GS-15 Deputy director	12,770
1 GS-13 Aeronautical and space scientist	9,890
3 Other GS personnel	<u>12,570</u>
<u>6</u>	<u>\$48,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

O2 TRAVEL

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$370,940	\$922,700	\$1,100,000
Langley Center.....	238,457	403,800	460,000
Ames Center.....	99,485	110,000	160,000
Lewis Center.....	130,516	180,000	300,000
Flight Center.....	71,389	90,000	135,000
Goddard Center.....	170,496	1,053,500	2,210,000
Wallops Station.....	9,496	71,400	150,000
NASA Huntsville.....	---	---	1,281,000
Western Office.....	3,219	20,000	25,000
AMRO Office.....	1,356	15,000	18,000
PMRO Office.....	---	---	10,000
Wright Office.....	1,864	---	---
	<u>\$1,097,218</u>	<u>\$2,866,400</u>	<u>\$5,849,000</u>
Total, all locations.....			

Analysis by types of travel:

Direction and coordination of program activities at NASA installations.....	\$131,983	\$338,900	\$1,110,000
Coordination of program activities with other Government agencies and the scientific community.....	362,490	781,600	1,440,000
Travel of technicians to launching sites and global tracking stations.....	111,690	943,000	1,949,500
Management of business activities.....	125,745	206,200	383,600
Meetings of NASA technical committees and working panels	207,119	303,600	360,000

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by types of travel (continued):</u>			
Meetings of technical and scientific societies.....	\$89,966	\$129,000	\$189,500
Travel to initial duty stations.....	30,214	86,000	250,300
Temporary assignments and transfers.....	13,836	19,300	32,500
Travel to emergency relocation site.....	1,180	2,000	2,000
Reimbursement for local transportation and toll charges.	12,058	16,800	21,600
Travel of consultants and lecturers.....	7,078	40,000	110,000
Travel of Congressional members and staffs.....	<u>3,859</u>	<u>---</u>	<u>---</u>
 Total, all types of travel.....	 <u>\$1,097,218</u>	 <u>\$2,866,400</u>	 <u>\$5,849,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

03 TRANSPORTATION OF THINGS

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$49,588	\$54,000	\$14,000
Langley Center.....	111,456	8,000	12,000
Ames Center.....	35,934	10,000	15,000
Lewis Center.....	111,755	15,000	20,000
Flight Center.....	9,709	7,000	3,000
Goddard Center.....	41,255	80,000	236,000
Wallops Station.....	14,999	7,000	22,000
NASA Huntsville.....	---	---	100,000
Western Office.....	---	5,000	10,000
AMRO Office.....	---	5,000	5,000
PMRO Office.....	---	---	5,000
	<u>---</u>	<u>---</u>	<u>5,000</u>
Total, all locations.....	<u>\$374,696</u>	<u>\$191,000</u>	<u>\$442,000</u>
<u>Analysis by types of transportation:</u>			
Transportation of supplies and equipment.....	\$251,966	---	---
Drayage and other local transportation.....	18,739	---	---
Transportation of household goods and personal effects.	<u>103,991</u>	<u>191,000</u>	<u>442,000</u>
	<u>---</u>	<u>---</u>	<u>---</u>
Total, all types of transportation.....	<u>\$374,696</u>	<u>\$191,000</u>	<u>\$442,000</u>

1/ Funded under "Research and Development".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

04 COMMUNICATION SERVICES

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$205,531	\$432,000	\$535,000
Langley Center.....	51,009	70,000	82,000
Ames Center.....	32,573	35,000	42,000
Lewis Center.....	71,039	75,000	94,000
Flight Center.....	62,313	15,000	20,000
Goddard Center.....	17,377	203,000	244,000
Wallops Station.....	5,842	33,600	40,000
NASA Huntsville.....	---	---	229,000
Western Office.....	4,361	10,000	12,000
AMRO Office.....	1,776	10,000	12,000
PMRO Office.....	---	---	4,000
Wright Office.....	48	---	---
Total, all locations.....	<u>\$451,869</u>	<u>\$883,600</u>	<u>\$1,314,000</u>
 <u>Analysis by types of service:</u>			
Local telephone and exchange service.....	\$125,225	\$195,770	\$249,000
Long-distance toll charges.....	149,181	430,130	627,000
Telegraph service.....	37,072	137,625	257,900
Postage.....	78	75	100
Penalty mail.....	80,000	120,000 ^{1/}	180,000 ^{1/}
Leased lines.....	60,313	---	---
Total, all types of communication services	<u>\$451,869</u>	<u>\$883,600</u>	<u>\$1,314,000</u>

^{1/} Funded under "Research and Development".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

05 RENTS AND UTILITY SERVICES

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$16,559	\$103,000	\$30,000
Langley Center.....	2,709,143	2,971,000	4,407,000
Ames Center.....	2,651,526	2,828,000	3,565,000
Lewis Center.....	2,608,431	3,044,800	3,693,000
Flight Center.....	81,565	93,000	179,000
Goddard Center.....	3,774	338,000	5,463,000
Wallops Station.....	50,101	125,000	409,000
NASA Huntsville.....	---	---	6,050,000
Western Office.....	10,047	46,000	46,000
	<u>\$8,131,146</u>	<u>\$9,548,800</u>	<u>\$23,842,000</u>
Total, all locations.....			

Analysis by types of rents and services:

Electric power:

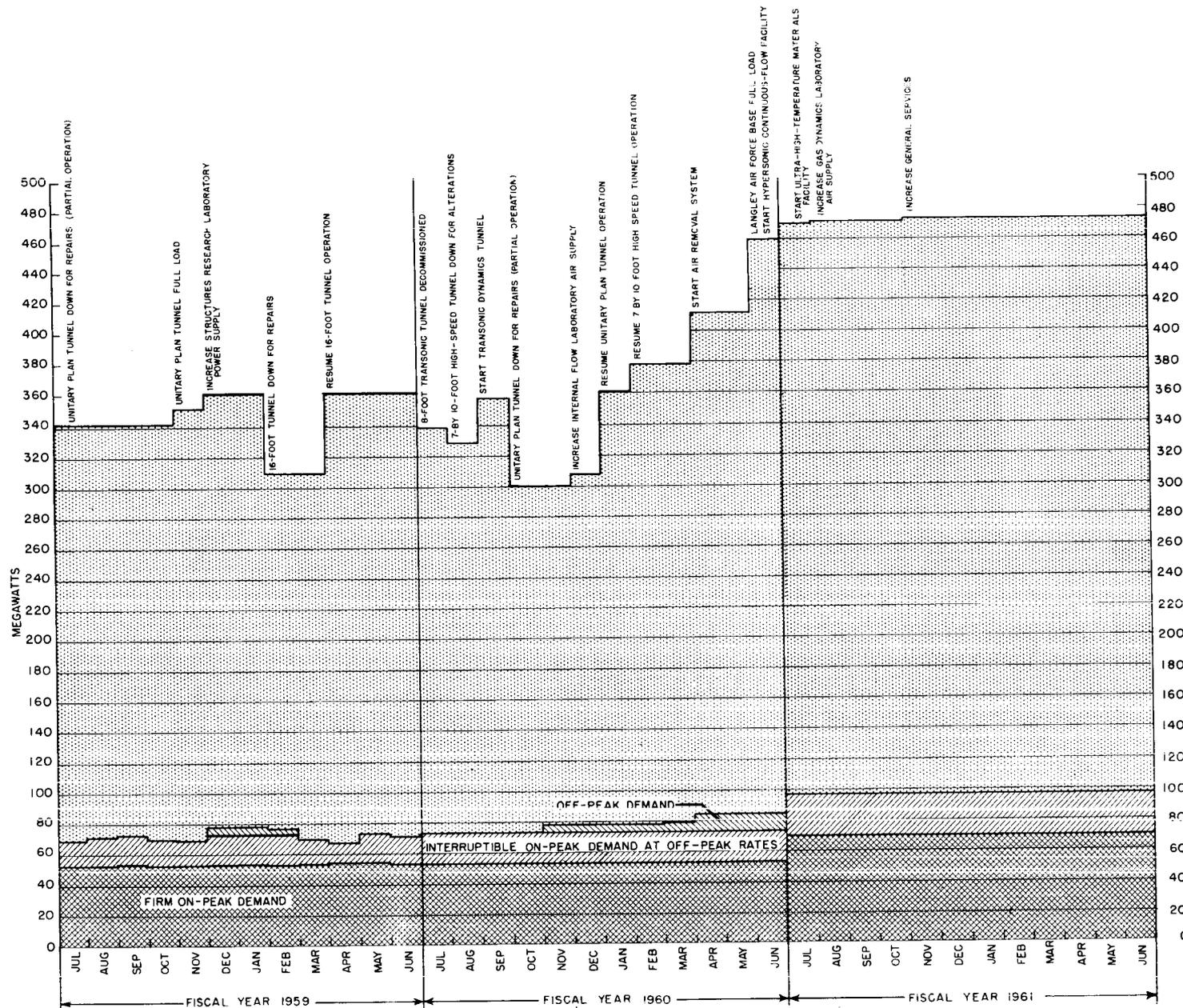
Langley Center.....	\$1,880,782	\$2,032,000	\$2,592,000
Ames Center.....	2,238,271	2,268,000	2,612,000
Lewis Center.....	2,014,946	2,073,800	2,405,000
Flight Center.....	7,152	8,000	14,000
Goddard Center.....	---	8,000	75,000
Wallops Station.....	50,075	105,000	145,000
NASA Huntsville.....	---	---	---
	<u>\$6,191,226</u>	<u>\$6,494,800</u>	<u>\$7,843,000</u>
Total, electric power.....			

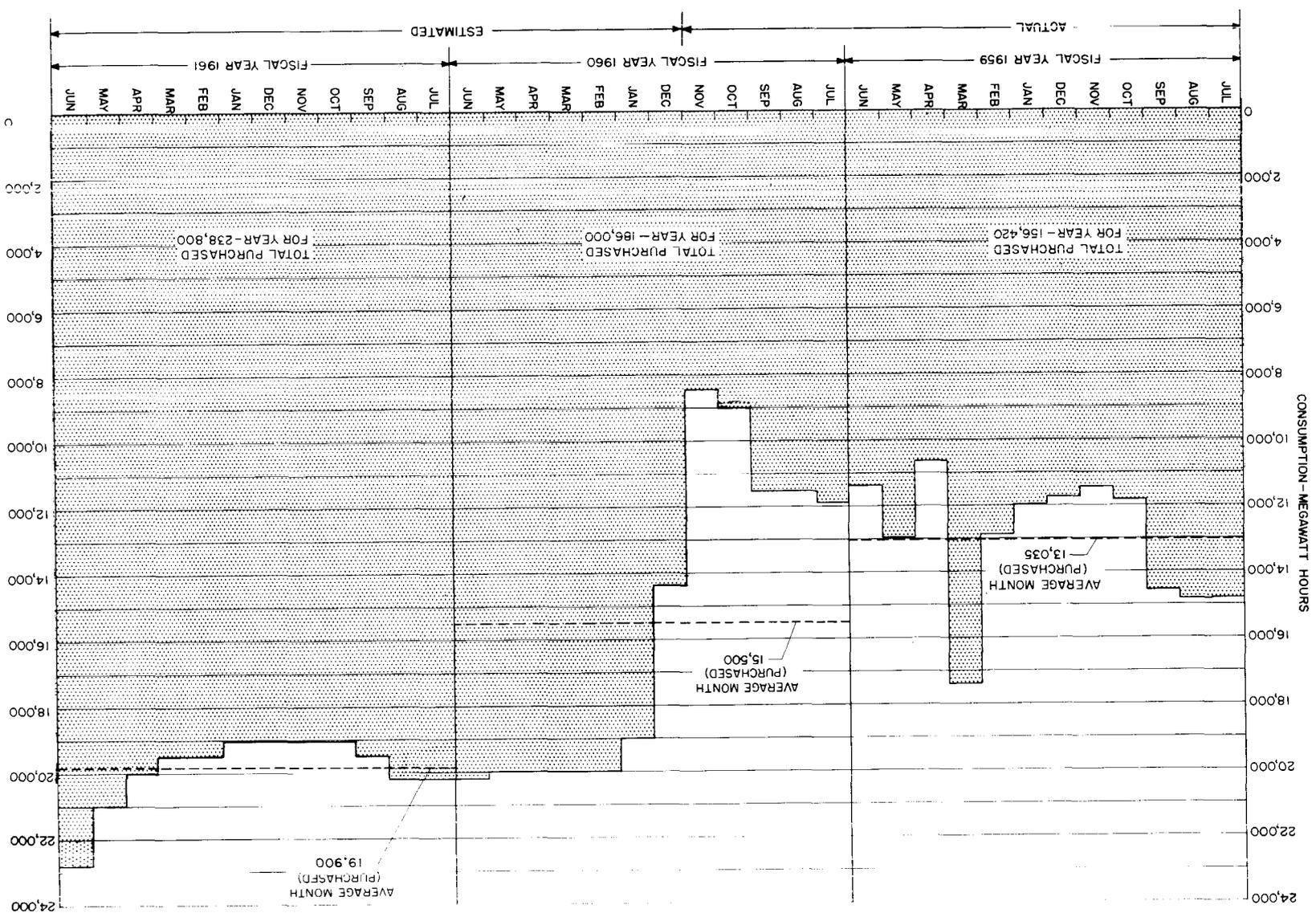
1/ Electric power and other utilities for NASA Huntsville will be provided by contract with the Department of the Army; funding included under object 07, Support of NASA Plant, in the "Research and Development" appropriation.

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Water:</u>			
Ames Center.....	\$36,224	\$45,000	\$60,000
Lewis Center.....	42,276	51,000	60,000
Flight Center.....	204	250	250
Goddard Center.....	<u>---</u>	<u>2,000</u>	<u>25,000</u>
Total, water.....	<u>78,704</u>	<u>98,250</u>	<u>145,250</u>
<u>Gas:</u>			
Ames Center.....	36,698	44,000	64,000
Lewis Center.....	274,284	317,000	375,000
Flight Center.....	<u>7,750</u>	<u>8,750</u>	<u>14,750</u>
Total, gas.....	<u>318,732</u>	<u>369,750</u>	<u>453,750</u>
<u>Miscellaneous utility services:</u>			
Ames Center.....	<u>931</u>	<u>1,000</u>	<u>1,000</u>
Total, miscellaneous utility services....	<u>931</u>	<u>1,000</u>	<u>1,000</u>
<u>Data-reduction equipment rental:</u>			
NASA Headquarters.....	12,071	---	---
Langley Center.....	825,188	936,000	1,812,000
Ames Center.....	338,753	469,000	826,000
Lewis Center.....	275,987	600,000	850,000
Flight Center.....	66,210	75,500	149,500
Goddard Center.....	3,774	328,000	5,363,000
Wallops Station.....	---	19,900	263,900
NASA Huntsville.....	<u>---</u>	<u>---</u>	<u>6,050,000</u>
Total, data-reduction equipment rental...	<u>1,521,983</u>	<u>2,428,400</u>	<u>15,314,400</u>

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Miscellaneous rentals:</u>			
NASA Headquarters.....	\$4,488	\$103,000	\$30,000
Langley Center.....	3,173	3,000	3,000
Ames Center.....	649	1,000	2,000
Lewis Center.....	938	3,000	3,000
Flight Center.....	249	500	500
Wallops Station.....	26	100	100
Western Office.....	<u>10,047</u>	<u>46,000</u>	<u>46,000</u>
Total, miscellaneous rentals.....	<u>19,570</u>	<u>156,600</u>	<u>84,600</u>
Total, all rents and utility services.....	<u>\$8,131,146</u>	<u>\$9,548,800</u>	<u>\$23,842,000</u>

LANGLEY RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES
TOTAL CONNECTED LOAD AND ELECTRIC DEMAND BY MONTHS





LANGLEY RESEARCH CENTER
 FISCAL YEAR 1961 ESTIMATES
 ELECTRIC ENERGY CONSUMPTION BY MONTHS

LANGLEY RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

ELECTRIC POWER REQUIREMENTS, UTILIZATION, AND COST

(CALCULATIONS AS OF DECEMBER, 1959)

Facility	Connected load to nearest megawatt			Hours of running time for month shown			Average percent of full connected load			Total consumption for month shown (M.W.H.)			Average monthly consumption (megawatt hours) and cost for year shown		
	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
1. General services	18	19	20	720	720	720	20	20	20	2,300	2,740	2,880	1,800	2,000	2,000
2. 8-foot transonic tunnel	22	--	--	37	---	---	39	--	--	316	-----	-----	163	-----	-----
3. 8-foot transonic pressure tunnel ^a	38	38	38	131	60	40	16	22	33	807	500	500	806	530	400
4. 16-foot transonic tunnel	53	53	53	26	30	35	28	41	54	385	650	1,000	538	900	900
5. 30- by 60-foot full-scale tunnel	8	8	8	27	35	35	19	18	36	8	50	100	52	50	100
6. Transonic dynamics tunnel	--	30	30	---	40	40	--	4	42	-----	50	500	-----	60	400
7. 7- by 10-foot tunnels (2)	14	14	14	45	22	50	42	32	71	266	100	500	190	100	400
8. 4-foot supersonic pressure tunnel	40	40	40	81	55	30	18	34	33	1,291	750	400	1,060	640	400
9. 9-inch supersonic tunnel	4	4	4	16	25	50	52	50	50	33	50	100	71	80	100
10. Gas dynamics laboratory	15	15	17	200	200	200	1	7	15	33	200	500	306	400	400
11. Internal flow laboratory	16	20	20	52	140	140	60	60	60	498	1,680	1,680	371	1,300	1,500
12. Hypersonic continuous-flow facility	--	36	36	---	50	50	--	46	53	-----	950	950	-----	90	750
13. Ultra-high-temperature materials facility	--	--	12	---	---	50	--	--	58	-----	-----	350	-----	-----	250
14. Air removal system ^b	--	30	30	---	20	40	--	100	100	-----	600	1,200	-----	150	1,200
15. Miscellaneous facilities	41	44	44	176	176	176	22	36	36	1,919	2,800	2,800	2,077	2,400	2,400
16. Unitary Plan tunnel	92	92	92	102	170	170	36	45	45	3,380	7,000	7,000	5,138	6,500	6,500
17. Langley Air Force Base ^c	--	15	15	---	720	720	--	19	22	-----	2,100	2,400	463	300	2,200
Totals	361	458	473							11,390 ^d	20,220	22,860	13,035	15,500	19,900
Total energy purchased for average month													13,035	15,500	19,900
Average base rate per megawatt hour													4.41	4.34	4.31
Average fuel adjustment charge per megawatt hour													2.67	2.78	2.70
Average total rate per megawatt hour													7.08	7.12	7.02
<u>ENERGY COST FOR AVERAGE MONTH</u>													\$ 92,269	\$110,433	\$139,700

	Average on-peak monthly demand to nearest megawatt			Average off-peak monthly demand to nearest megawatt		
	F.Y. 1959	F.Y. 1960	F.Y. 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
Total demand	73	73	97	73	78	97
Free interruptible demand	-20	-20	-27	0	0	0
Free off-peak demand	0	0	0	-53	-53	-70
Billing demand	53	53	70	20	25	27
Average rate per megawatt	1,008	998	1,013	200	200	200

<u>DEMAND COST FOR AVERAGE MONTH</u>	\$55,419	\$55,900	\$70,900	\$4,000	\$5,000	\$5,400	\$ 57,419	\$ 58,900	\$ 76,500
<u>AVERAGE MONTHLY POWER COST</u>							\$ 149,688	\$ 169,333	\$ 216,000
<u>TOTAL ANNUAL COST OF ELECTRIC POWER</u>							\$1,880,782 ^e	\$2,052,000	\$2,592,000
<u>AVERAGE OVERALL COST OF ELECTRIC POWER PER MEGAWATT HOUR PURCHASED</u>							11.25	10.92	10.85

^aIncludes boundary-layer compressors which also power 2- by 2-foot high Mach number apparatus.

^bServes both 16-foot transonic tunnel and 7- by 10-foot tunnels.

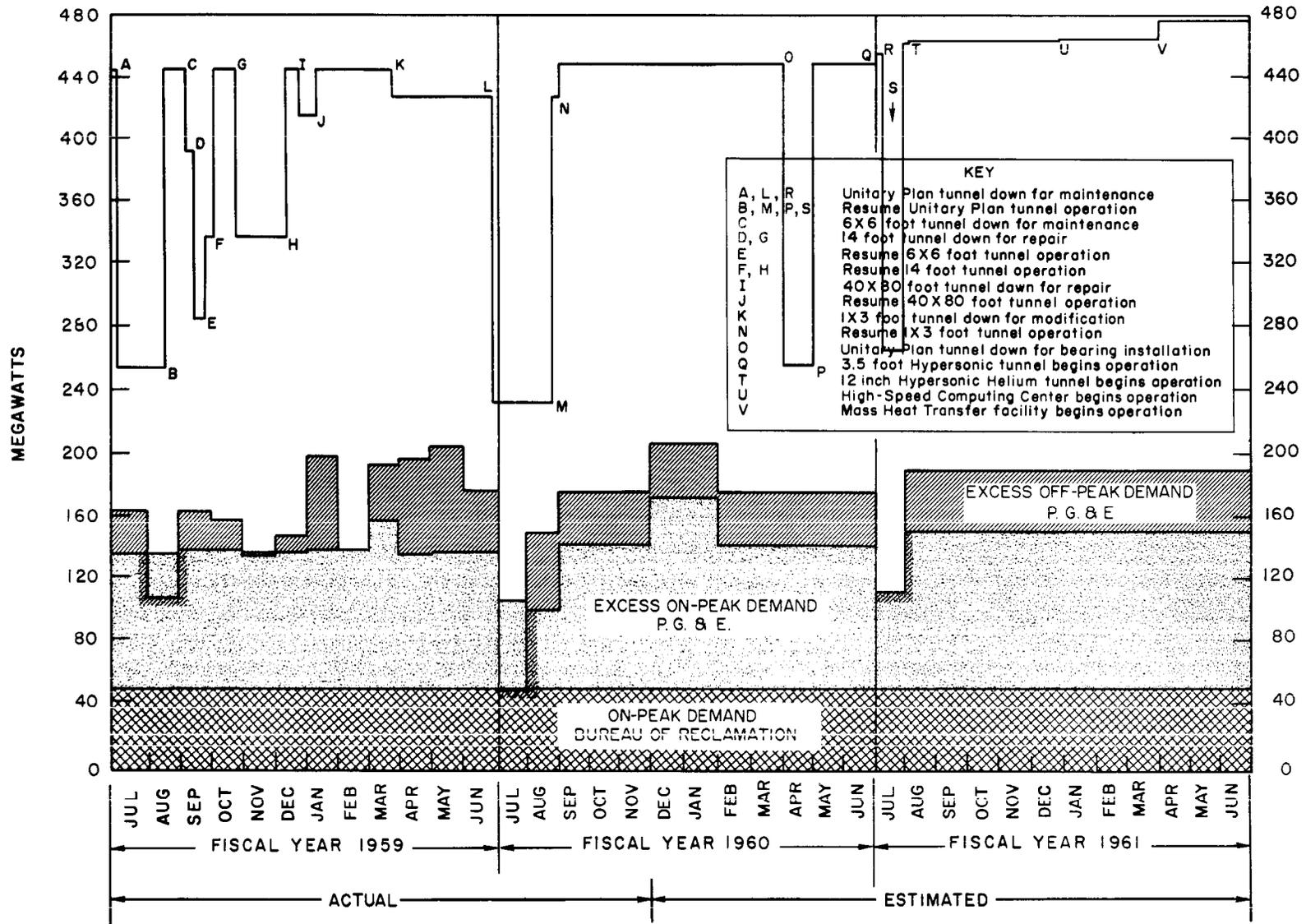
^cCost of electric power supplied to Air Force Base in F.Y. 1959 was \$63,983; estimated cost for F.Y. 1960 is \$39,300 and for F.Y. 1961 is \$277,200.

^dJune 1959 was not a typical month because consumption by large facilities was reduced below normal.

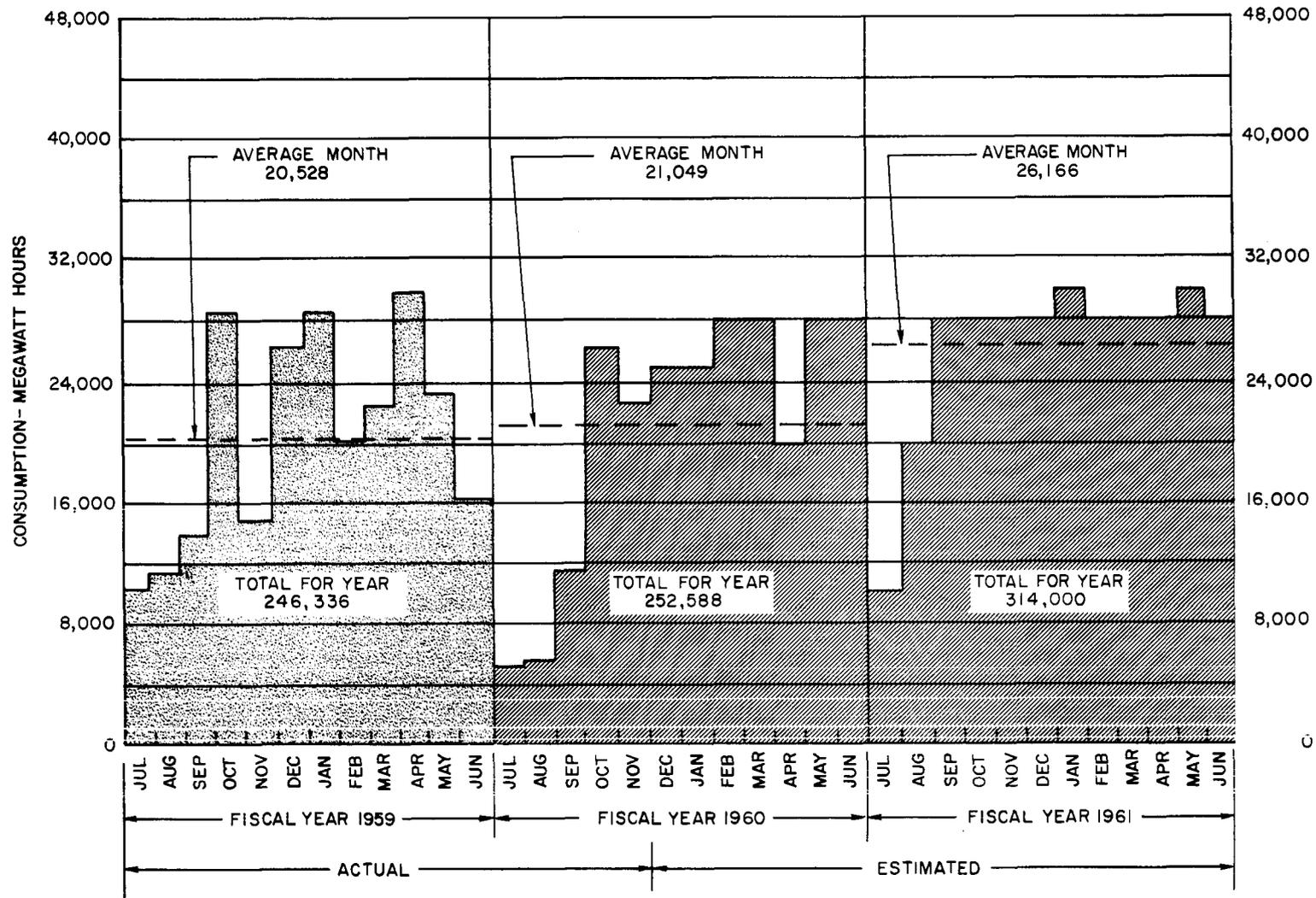
^eTotal annual cost includes, in addition to total of monthly power bills, a one-time lump-sum payment of \$84,522.

AMES RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

TOTAL CONNECTED LOAD AND ELECTRIC POWER DEMAND BY MONTHS



AMES RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES
ELECTRIC ENERGY CONSUMPTION BY MONTHS



AMES RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

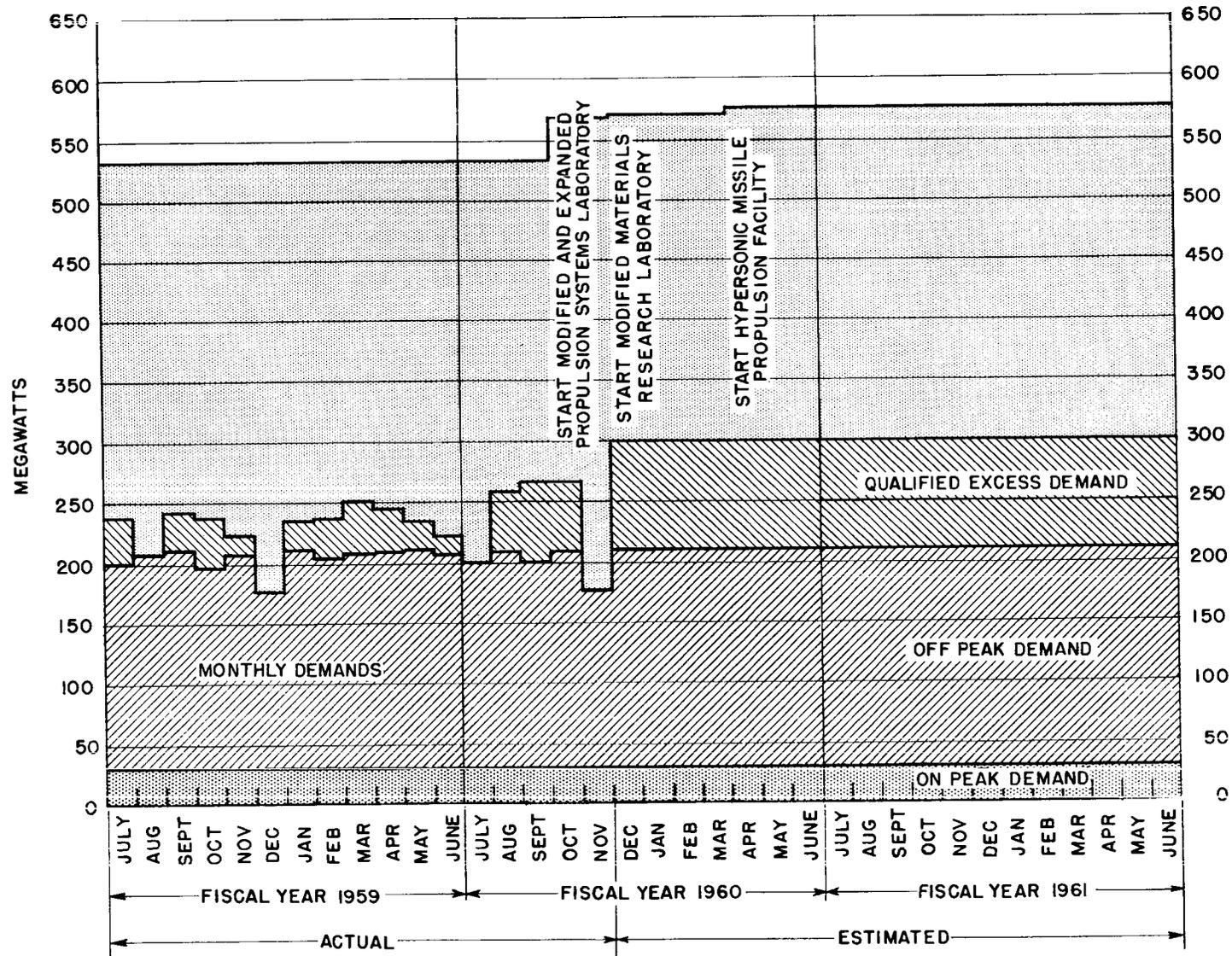
ELECTRIC POWER REQUIREMENTS, UTILIZATION, AND COST

(Calculations as of December, 1959)

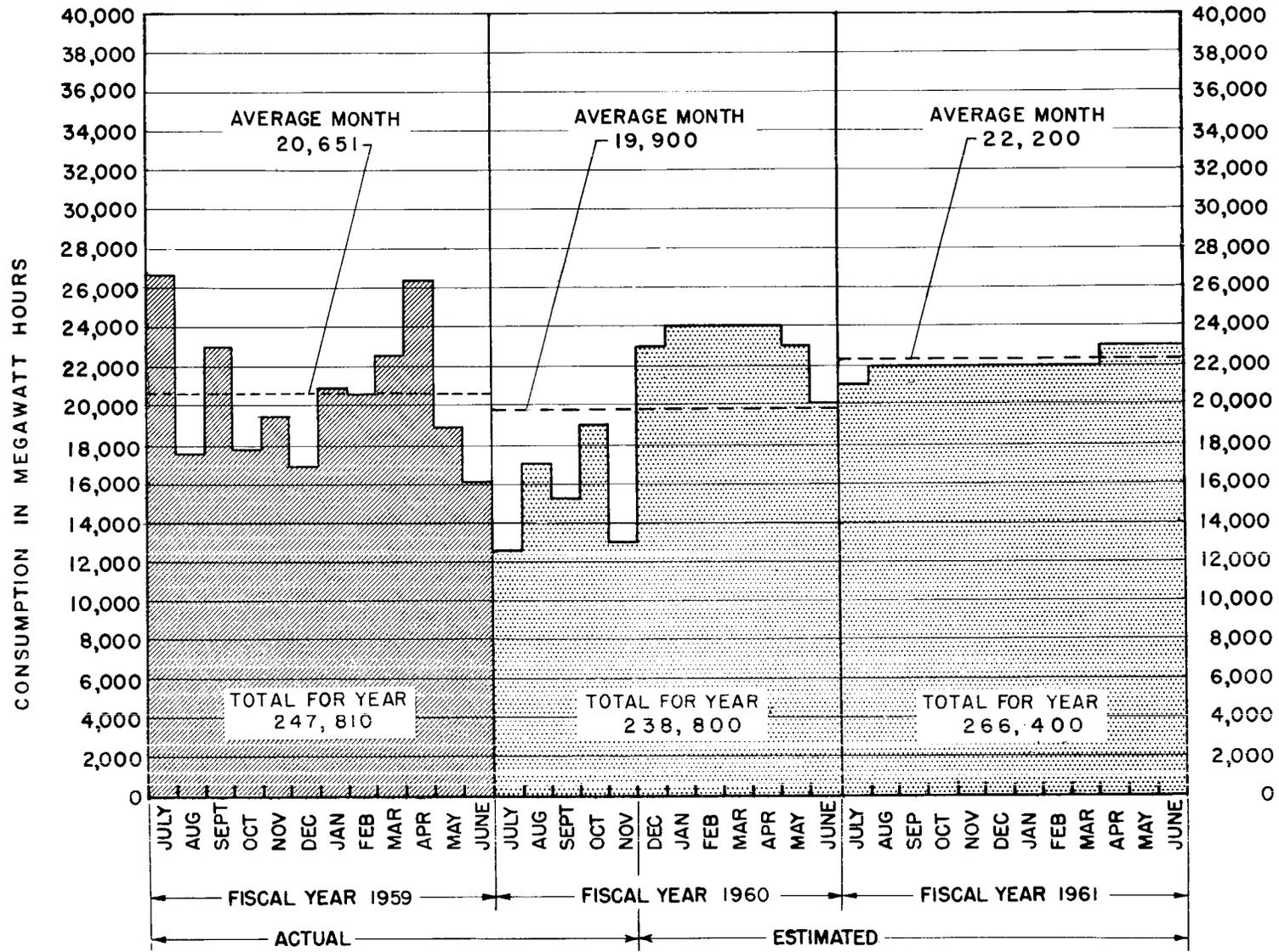
	Connected load, to nearest megawatt			Hours of running time for month shown			Av. percent of full connected load			Total consumption for month shown (megawatt hours)			Av. monthly consumption (megawatt hours) and cost for year shown		
	Feb. 1959	Feb. 1960	Feb. 1961	Feb. 1959	Feb. 1960	Feb. 1961	Feb. 1959	Feb. 1960	Feb. 1961	Feb. 1959	Feb. 1960	Feb. 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
	1959	1960	1961	1959	1960	1961	1959	1960	1961	1959	1960	1961	1959	1960	1961
1. General services	10	10	15	672	696	672	29	33	15	1,926	2,300	2,500	1,820	2,000	2,100
2. 7- by 10-foot tunnels (2)	3	3	3	5	5	5	40	20	20	6	3	3	5	5	5
3. 14-foot transonic tunnel	109	109	109	14	15	15	49	49	49	754	800	800	1,708	500	500
4. 12-foot pressure tunnel	11	11	11	69	65	65	43	56	56	330	400	400	163	160	160
5. 12-foot tunnel compressor No. 1	4	4	4	57	60	60	69	83	83	158	200	200	106	104	110
6. 12-foot tunnel compressor No. 2	4	4	4	173	175	175	75	86	86	518	600	600	439	440	430
7. 40- by 80-foot tunnel	30	30	30	39	40	40	26	29	29	300	350	350	275	270	250
8. 1- by 3-foot supersonic tunnel	19	19	19	114	120	120	21	26	26	449	600	600	303	400	450
9. 6- by 6-foot supersonic tunnel	52	52	52	45	75	75	56	64	64	1,310	2,500	2,500	1,329	1,070	1,005
10. Motor-generator sets	9	9	9	160	168	160	17	16	17	239	247	245	104	100	105
11. Unitary Plan tunnel	194	194	194	180	240	240	41	43	42	14,170	20,000	19,600	14,276	16,000	20,850
12. 3.5-foot hypersonic tunnel	---	---	12	---	---	30	---	---	55	---	---	200	---	---	100
13. 12-inch hypersonic helium tunnel	---	---	1	---	---	20	---	---	10	---	---	2	---	---	2
14. Mass transfer cooling and aerodynamics facility	---	---	14	---	---	---	---	---	---	---	---	---	---	---	100
Total	445	445	477							20,160	23,000	23,000			
Total energy purchased for average month													20,528	21,049	26,167
(Bureau of Reclamation)													(13,208)	(13,345)	(16,000)
(Pacific Gas and Electric Co.)													(7,320)	(7,704)	(10,167)
Average rate per megawatt hour													4.38	4.36	4.36
(Bureau of Reclamation)													(3.37)	(3.31)	(3.19)
(Pacific Gas and Electric Co.)													(6.20)	(6.20)	(6.20)
ENERGY COST FOR AVERAGE MONTH													89,925	91,874	114,033
(Bureau of Reclamation)													(44,539)	(44,111)	(51,000)
(Pacific Gas and Electric Co.)													(45,386)	(47,763)	(63,033)
	Av. on-peak or firm demand to nearest megawatt			Av. off-peak or non-firm demand to nearest megawatt											
	F.Y. 1959		F.Y. 1960	F.Y. 1961		F.Y. 1959		F.Y. 1960	F.Y. 1961						
	Bur. of Recl.	P.G. & E.	Bur. of Recl.	P.G. & E.	Bur. of Recl.	P.G. & E.	P.G. & E.	P.G. & E.	P.G. & E.						
Metered demand	50	86	50	87	50	97	29	26	37						
Billing demand	50	86	50	87	50	97	29	26	37						
Average rate per megawatt	750	683	750	683	750	683	158	158	158						
DEMAND COST	(37,500)	(58,957)	(37,500)	(59,444)	(37,500)	(60,180)									
TOTAL DEMAND COST FOR AVERAGE MONTH	96,457		96,944		103,688		4,582	4,139	5,257	101,039	101,083	108,945			
GROSS AVERAGE MONTHLY POWER COST										190,954	192,957	222,978			
Power factor adjustment										-1,507	-1,518	-1,804			
Discount for relief of substation costs										-4,102	-4,077	-3,924			
"Wheeling" charge										+1,168	+1,638	+417			
NET AVERAGE MONTHLY POWER COST										186,523	189,000	217,667			
TOTAL ANNUAL COST OF ELECTRIC POWER										2,238,271	2,268,000	2,612,000			
AVERAGE OVER-ALL COST OF ELECTRIC POWER PER MEGAWATT HOUR PURCHASED										9.09	8.98	8.32			

LEWIS RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

TOTAL CONNECTED LOAD AND POWER DEMAND BY MONTHS



ELECTRIC ENERGY CONSUMPTION BY MONTHS



LEWIS RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

ELECTRIC POWER REQUIREMENTS, UTILIZATION, AND COST

(CALCULATIONS AS OF DECEMBER, 1959)

Facility	Connected load to nearest megawatt			Hours of running time for month shown			Av. percent of full connected load			Total consumption for month shown (M.W.H.)			Av. monthly consumption (M.W.H.) and cost for year shown		
	Jan. 1959	June 1960	June 1961	Jan. 1959	June 1960	June 1961	Jan. 1959	June 1960	June 1961	Jan. 1959	June 1960	June 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
	1. General services.....	44	51 ⁽¹⁾	51	744	720	720	11	12	12	3,658	4,500	4,500	4,615	4,500	4,500
2. Engine research building.....	57	57	57	170	180	180	23	24	24	2,202	2,500	2,500	2,073	2,500	2,500
3. Altitude tunnel, duct laboratory, 3-ft. supersonic tunnel, and icing research tunnel.....	50	50	50	16	50	50	49	40	40	388	1,000	1,000	584	1,000	1,000
4. 8-by 6-foot supersonic tunnel.....	77	77	77	92	75	90	91	87	87	6,455	5,000	6,000	6,302	5,000	6,000
5. Unitary Plan tunnel.....	198	198	198	44	45	65	61	56	54	5,289	5,000	7,000	5,618	5,000	6,200
6. Propulsion systems laboratory.....	105	114 ⁽²⁾	111	280	150	150	10	9	9	2,978	2,000	2,000	1,459	1,900	2,000
Totals.....	531	574	574							20,970	20,000	23,000	20,651	19,900	22,200
Total energy purchased for average month.....													20,651	19,900	22,200
Average base rate per megawatt hour.....													4.69	5.68	5.81
Average fuel adjustment per megawatt hour.....													.91*	-0-	-0-
Average total rate per megawatt hour.....													5.60	5.68	5.81
ENERGY COST FOR AVERAGE MONTH.....													115,653	112,915	129,057

	Av. on-peak monthly demand to nearest megawatt					Av. off-peak monthly demand to nearest megawatt			F.Y. 1959	F.Y. 1960	F.Y. 1961	
	July 1958-1959	Jan. 1959-1959	Feb. June 1959-1959	July Jan. 1959-1960	Feb. June 1960-1960	F.Y. 1961	F.Y. 1959	F.Y. 1960				F.Y. 1961
Total metered demand.....	30.11		30.03	30	30	30	210	210	210			
Power factor adjustments...	-		-	-	-	-	-	-	-			
Free off-peak demand.....	-		-	-	-	-	210	210	210			
	<u>30.11</u>		<u>30.03</u>	<u>30</u>	<u>30</u>	<u>30</u>	<u>0</u>	<u>0</u>	<u>0</u>			
Rate per megawatt.....	1,716		1,955	1,955	1,947	1,947	150	150	150			
DEMAND COST												
FOR AVERAGE MONTH.....	51,678		58,650	58,650	58,400	58,400	0	0	0	54,583	58,546	58,100
GROSS AVERAGE MONTHLY POWER COST.....										170,236	171,461	187,457
Discount 3 percent.....										-5,107	-5,144	-5,624
NET AVERAGE MONTHLY POWER COST.....										165,129	166,317	181,833
TOTAL ANNUAL COST OF ELECTRIC POWER.....										1,981,544	1,995,800	2,182,000
AVERAGE OVERALL COST OF POWER PER MEGAWATT HOUR PURCHASED.....										8.00	8.36	8.19

January presents a more typical situation than June for Fiscal Year 1959.

* Fuel adjustment base changed on February 1, 1959 from \$1.00/ton to \$6.80/ton base.

(1) Begin operation of modified materials research laboratory in December, 1959 and begin operation of hypersonic missile propulsion facility in April, 1960.

(2) Begin operation of modified and expanded propulsion systems laboratory in October, 1959.

LEWIS RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

ELECTRIC POWER REQUIREMENTS, UTILIZATION, AND COST

(CALCULATIONS AS OF DECEMBER, 1959)

Sandusky, Ohio	Connected load to nearest megawatt			Hours of running time for month shown			Av. percent of full connected load			Total consumption for month shown (M.W.H.)			Av. monthly consumption (M.W.H.) and cost for year shown		
	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
1. Component research facility for nuclear propulsion.....	1 ⁽¹⁾	13 ⁽²⁾	13	-	240	480	-	29	26	175	900	1,650	152	400	1,650
2. Rocket systems research facility...	1 ⁽¹⁾	4 ⁽²⁾	4	-	60	60	-	25	25	-	60	60	-	60	60
3. High-energy rocket engine research facility.....	1 ⁽¹⁾	.15 ⁽³⁾	.15	-	40	40	-	50	50	-	3	3	-	3	3
Totals.....	-	17.15	17.15							175	963	1,713	152	463	1,713
Total energy purchased for average month.....													152	463	1,713
Average base rate per megawatt hour.....													9.39	8.07	7.05
Average coal charge per megawatt hour.....													.25	.25	.25
Average total rate per megawatt hour.....													9.64	8.32	7.30
<u>ENERGY COST FOR AVERAGE MONTH.....</u>													1,466	3,850	12,038
	Av. on-peak monthly demand to nearest megawatt														
	F.Y. 1959	F.Y. 1960	F.Y. 1961												
Total metered demand.....	.849	1.85	5.0												
Rate per megawatt.....	1,553	1,436	1,309												
<u>DEMAND COST FOR AVERAGE MONTH.....</u>													1,318	2,650	6,545
<u>AVERAGE MONTHLY POWER COST.....</u>													2,784	6,500	18,583
<u>TOTAL ANNUAL COST OF ELECTRIC POWER.....</u>													33,402	78,000	223,000
<u>AVERAGE OVERALL COST OF POWER PER MEGAWATT HOUR PURCHASED.....</u>													18.32	14.04	10.85

(1) Facility under construction.
(2) Initial operation scheduled for March, 1960.
(3) Initial operation scheduled for June, 1960.

WALLOPS STATION
FISCAL YEAR 1961 ESTIMATES

ELECTRIC POWER REQUIREMENTS, UTILIZATION, AND COST
(CALCULATIONS AS OF DECEMBER, 1959)

Facility	Connected load, megawatts			Hours of running time for month shown			Average percent of full connected load			Total consumption for month shown (M.W.H.)			Average monthly consumption (megawatt hours) and cost for year shown		
	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	June 1959	June 1960	June 1961	F.Y. 1959	F.Y. 1960	F.Y. 1961
General services, Wallops Island	2.6	5.0	6.0	720	720	720	9.7	9.2	9.3	181.4	330.0	400.0	182.9	292.0	360.0
Average base rate per megawatt hour													12.72	17.40	12.51
Average fuel adjustment charge per megawatt hour													4.70	4.60	4.60
Average total rate per megawatt hour													17.42	17.00	16.91
Energy cost for average month													3,192	4,811	6,089
							Average monthly demand, megawatts								
							F.Y. 1959	F.Y. 1960	F.Y. 1961						
							Demand	0.74	1.3	1.5					
							Average rate per megawatt	1,564	1,496	1,483					
Demand cost for average month													1,157	1,945	2,225
Gross average monthly power cost													4,349	6,756	8,314
Discount 5 percent for primary installation ¹													176	261	320
Average monthly power cost													4,173	6,495	7,994
Total annual cost of electric power													50,075	77,940	95,932
Average overall cost of electric power per megawatt hour purchased													22.82	22.95	22.21
General services, Chincoteague	---	5.4	7.0	---	720	720	---	3.9	4.0	---	150.0	200.0	---	100	175
Average base rate per megawatt hour														13.13	12.64
Average fuel adjustment charge per megawatt hour														4.60	4.60
Average total rate per megawatt hour														17.73	17.24
Energy cost for average month														1,473	3,017
							Average monthly demand, megawatts								
							F.Y. 1959	F.Y. 1960	F.Y. 1961						
							Demand	---	0.45	0.80					
							Average rate per megawatt	---	1,700	1,996					
Demand cost for average month														177	1,245
Gross average monthly power cost														2,350	4,262
Discount 5 percent for primary installation ¹														55	173
Average monthly power cost														2,295	4,089
Total annual cost of electric power														17,060	49,048
Average overall cost of electric power per megawatt hour purchased														22.55	23.37
TOTAL, WALLOPS STATION															
AVERAGE MONTHLY POWER COST													4,173	6,495	7,994
TOTAL ANNUAL COST OF ELECTRIC POWER													50,075	101,000	145,000
AVERAGE OVERALL COST OF ELECTRIC POWER PER MEGAWATT HOUR PURCHASED													22.82	22.95	22.50

¹Discount applies to demand cost and energy cost excluding fuel adjustment.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

06 PRINTING AND REPRODUCTION

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$121,492	\$142,000	\$180,000
Langley Center.....	18,103	25,000	26,000
Ames Center.....	14,221	7,000	15,000
Lewis Center.....	5,198	4,000	10,000
Flight Center.....	1,203	2,000	2,000
Goddard Center.....	249	20,000	25,000
Wallops Station.....	---	3,000	5,000
NASA Huntsville.....	---	---	100,000
	<u>---</u>	<u>---</u>	<u>---</u>
Total, all locations.....	<u>\$160,466</u>	<u>\$203,000</u>	<u>\$363,000</u>
<u>Analysis by types of printing:</u>			
Administrative semiannual report.....	\$9,141	\$10,000	\$10,000
Technical reports.....	77,185	125,000	170,000
Annual volume of consolidated technical reports.....	---	14,000	18,000
Printed forms and letterheads.....	1,943	4,000	15,000
Miscellaneous printing, binding, and storage of type....	<u>72,197</u>	<u>50,000</u>	<u>150,000</u>
Total, all types of printing.....	<u>\$160,466</u>	<u>\$203,000</u>	<u>\$363,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

07 OTHER CONTRACTUAL SERVICES

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$1,555,818	\$516,800	\$1,306,000
Langley Center.....	701,930	66,850	255,000
Ames Center.....	325,324	31,000	116,000
Lewis Center.....	581,202	59,700	220,000
Flight Center.....	132,643	7,450	29,000
Goddard Center.....	6,804	26,000	147,000
Wallops Station.....	70,927	4,000	22,000
NASA Huntsville.....	---	1,000	438,000 -
Western Office.....	3,048	700	4,200
AMRO Office.....	50	500	2,500
PMRO Office.....	---	---	800
Wright Office.....	56	---	---
	<u> </u>	<u> </u>	<u> </u>
Total, all locations.....	<u>\$3,377,802</u>	<u>\$714,000</u>	<u>\$2,540,500</u>
 <u>Analysis by types of services:</u>			
Research contracts.....	\$816,510	--- ^{1/}	--- ^{1/}
Repairs and alterations.....	1,090,917	--- ^{1/}	--- ^{1/}
Miscellaneous contractual services.....	754,529	--- ^{1/}	--- ^{1/}
Federal life insurance.....	182,166	214,000	392,200
Federal health program.....	---	---	900,300 -
Services by other Government agencies:			
Research services.....	148,367	--- ^{1/}	--- ^{1/}
Security investigations.....	178,595	500,000 ^{1/}	1,248,000 ^{1/}
Other services.....	206,718	--- ^{1/}	--- ^{1/}
	<u> </u>	<u> </u>	<u> </u>
Total, other contractual services.....	<u>\$3,377,802</u>	<u>\$714,000</u>	<u>\$2,540,500</u>

1/ Funded under "Research and Development".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

08 SUPPLIES AND MATERIALS

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$191,115	---	---
Langley Center.....	2,385,304	---	---
Ames Center.....	1,177,031	---	---
Lewis Center.....	1,994,105	---	---
Flight Center.....	297,161	---	---
Wallops Station.....	467,789	---	---
Western Office.....	1,352	---	---
AMRO Office.....	125	---	---
Wright Office.....	<u>10</u>	<u>---</u>	<u>---</u>
Total, all locations.....	<u>\$6,513,992</u>	<u>---^{1/}</u>	<u>---^{1/}</u>

^{1/} Funded under "Research and Development".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

09 EQUIPMENT

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$311,855	---	---
Langley Center.....	707,611	---	---
Ames Center.....	1,024,215	---	---
Lewis Center.....	1,019,887	---	---
Flight Center.....	185,820	---	---
Goddard Center.....	94,413	---	---
Wallops Station.....	41,080	---	---
Western Office.....	<u>17,526</u>	<u>---</u>	<u>---</u>
Total, all locations.....	<u>\$3,402,407</u>	<u>---</u> ^{1/}	<u>---</u> ^{1/}

^{1/} Funded under "Research and Development".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS

<u>Analysis by location:</u>	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
NASA Headquarters.....	\$152,505	\$321,400	\$380,000
Langley Center.....	1,420,251	1,416,150	1,441,000
Ames Center.....	644,968	665,850	677,000
Lewis Center.....	1,236,204	1,271,200	1,280,000
Flight Center.....	129,084	163,200	188,000
Goddard Center.....	91,719	607,520	911,000
Wallops Station.....	40,068	81,000	114,000
NASA Huntsville.....	---	14,000	2,585,000
Western Office.....	3,122	15,480	25,300
AMRO Office.....	954	10,500	14,500
PMRO Office.....	---	---	2,700
Wright Office.....	933	---	---
Total, all locations.....	<u>\$3,719,808</u>	<u>\$4,566,300</u>	<u>\$7,618,500</u>

Calculation of Government contributions to retirement fund:

Total, all personal services.....		\$125,425,000
Personal services not subject to retirement deductions:		
Intermittent employment.....	\$250,000	
Overtime and holiday pay.....	5,887,000	
Nightwork differential applicable to classified employees.....	100,000	
Other allowances.....	67,000	
Reimbursements for details from other Government agencies.....	450,000	
Terminal leave payments.....	267,000	
Salaries subject to deductions for social security.....	<u>1,196,000</u>	<u>-8,217,000</u>
Total, personal services subject to retirement deductions		<u>\$117,208,000</u>
Total, Government contributions computed at 6-1/2%...		<u>\$7,618,500</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

13 REFUNDS, AWARDS, AND INDEMNITIES

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$1,506	\$129,000	\$140,000
Langley Center.....	555	1,000	1,000
Ames Center.....	711	1,000	1,000
Lewis Center.....	885	1,000	1,000
Flight Center.....	---	1,000	1,000
Goddard Center.....	---	1,000	2,000
NASA Huntsville.....	<u>---</u>	<u>---</u>	<u>1,000</u>
 Total, all locations.....	 <u>\$3,202</u>	 <u>\$134,000</u>	 <u>\$147,000</u>
 <u>Analysis by types of awards and claims:</u>			
Incentive awards.....	\$1,721	\$5,000	\$7,000
Tort claims.....	<u>1,481</u>	<u>129,000</u>	<u>140,000</u>
 Total, all awards and claims.....	 <u>\$3,202</u>	 <u>\$134,000</u>	 <u>\$147,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

15 TAXES AND ASSESSMENTS

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
<u>Analysis by location:</u>			
NASA Headquarters.....	\$967	\$1,000	\$1,000
Langley Center.....	1,106	1,500	2,000
Ames Center.....	3,434	3,000	3,000
Lewis Center.....	1,657	2,000	2,000
Flight Center.....	1,438	2,000	2,000
Goddard Center.....	1,968	2,000	4,000
Wallops Station.....	---	500	1,000
NASA Huntsville.....	---	---	4,000
Western Office.....	---	100	---
	<u> </u>	<u> </u>	<u> </u>
Total, all locations.....	<u>\$10,570</u>	<u>\$12,100</u>	<u>\$19,000</u>
<u>Analysis by types of taxes and assessments:</u>			
Social security taxes (FICA).....	<u>\$10,570</u>	<u>\$12,100</u>	<u>\$19,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	9,286	10,086	16,373
Annual cost of permanent positions (end of year).....	\$65,142,007	\$73,254,506	\$120,246,731
Deduct lapses.....	6,294,304	3,328,066	2,389,731
Net cost of permanent positions.....	58,847,703#	69,926,440	117,857,000
Intermittent employment.....	4,016#	67,900	250,000
Regular pay above 52-week base.....	246,121#	558,710	463,000
Overtime and night-work differential.....	776,388#	1,530,300	9,538,000
Other allowances.....	15,574*	33,000	67,000
Reimbursable details.....	27,311	164,450	450,000
TOTAL PERSONAL SERVICES.....	<u>59,917,113#</u>	<u>72,280,800</u>	<u>128,625,000</u>
02 TRAVEL.....	1,285,911#	2,866,400	5,849,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	103,991#	191,000	442,000
All other.....	279,887#	1,485,000*	3,993,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	60,313	156,500*	336,000*
All other.....	391,556	883,600	1,314,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	6,191,226	6,494,800	7,843,000
Other utilities.....	398,367	469,000	600,000
Rentals.....	1,541,553	2,585,000	15,399,000
06 PRINTING AND REPRODUCTION.....	160,466	203,000	363,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	816,510	---	---
Repairs and alterations.....	1,221,710#	2,012,100*	5,060,000*
Miscellaneous services.....	947,020#	1,522,400*	7,403,000*
Services by other Government agencies.....	20,421,095#	2,556,000*	5,079,000*
Security investigations.....	178,595	500,000	1,248,000
Federal life insurance.....	185,440#	214,000	392,200
Federal health program.....	---	---	900,300
08 SUPPLIES AND MATERIALS.....	6,927,053#	8,636,000*	17,607,000*
09 EQUIPMENT.....	3,632,845#	6,316,000*	11,867,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	3,785,722#	4,566,300	7,618,500
13 REFUNDS, AWARDS, AND INDEMNITIES.....	3,202	134,000	147,000
15 TAXES AND ASSESSMENTS.....	10,868#	12,100	19,000
TOTAL.....	108,460,443	114,084,000	222,105,000
Partially (#) or fully funded (*) under			
"Research & Development".....	-22,472,147	-22,684,000	-51,345,000
Unobligated balance.....	298,004	---	---
TOTAL ALLOTMENT.....	<u>\$86,286,300</u>	<u>\$91,400,000</u>	<u>\$170,760,000</u>

NASA HEADQUARTERS

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	428	683	683
Annual cost of permanent positions (end of year)....	\$3,678,369	\$5,861,774	\$5,936,774
Deduct lapses.....	1,291,973	1,178,674	59,774
Net cost of permanent positions.....	<u>2,386,396</u>	<u>4,683,100</u>	<u>5,877,000</u>
Intermittent employment.....	1,029	50,000	75,000
Regular pay above 52-week base.....	14,165	45,400	22,800
Overtime and night-work differential.....	42,405	108,600	125,000
Other allowances.....	127	300	200
Reimbursable details.....	27,311	40,000	100,000
TOTAL PERSONAL SERVICES.....	<u>2,471,433</u>	<u>4,927,400</u>	<u>6,200,000</u>
02 TRAVEL.....	370,940	922,700	1,100,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	13,798	54,000	14,000
All other.....	35,790	200,000*	300,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	4,524	34,000*	40,000*
All other.....	201,007	432,000	535,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	16,559	103,000	30,000
06 PRINTING AND REPRODUCTION.....	121,492	142,000	180,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	816,510	---	---
Repairs and alterations.....	6,282	10,000*	10,000*
Miscellaneous services.....	307,650#	469,000*	570,000*
Services by other Government agencies.....	271,314#	580,000*	620,000*
Security investigations.....	178,595	500,000	1,248,000
Federal life insurance.....	7,467	16,800	20,000
Federal health program.....	---	---	38,000
08 SUPPLIES AND MATERIALS.....	211,776#	240,000*	320,000*
09 EQUIPMENT.....	349,241#	150,000*	165,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	152,505	321,400	384,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	1,506	129,000	140,000
15 TAXES AND ASSESSMENTS.....	967	1,000	1,000
TOTAL.....	<u>5,539,356</u>	<u>9,232,300</u>	<u>11,915,000</u>
Partially (#) or fully funded (*) under "Research & Development".....	-90,047	-1,683,000	-2,025,000
Unobligated balance.....	<u>89,551</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>\$5,538,860</u>	<u>\$7,549,300</u>	<u>\$9,890,000</u>

LANGLEY RESEARCH CENTER

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	3,297	3,220	3,220
Annual cost of permanent positions (end of year)....	\$22,209,951	\$22,329,084	\$22,444,084
Deduct lapses.....	308,964	211,984	149,084
Net cost of permanent positions.....	<u>21,900,987</u>	<u>22,117,100</u>	<u>22,295,000</u>
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	84,099	168,000	86,500
Overtime and night-work differential.....	197,791	196,000	226,000
Other allowances.....	520	1,100	1,500
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>22,183,397</u>	<u>22,482,200</u>	<u>22,609,000</u>
02 TRAVEL.....	238,457	403,800	460,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	29,534	8,000	12,000
All other.....	81,922	117,400*	120,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	8,500*	10,000*
All other.....	51,009	70,000	82,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	1,880,782	2,032,000	2,592,000
Other utilities.....	---	---	---
Rentals.....	828,361	939,000	1,815,000
06 PRINTING AND REPRODUCTION.....	18,103	25,000	26,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	597,659#	565,200*	958,000*
Miscellaneous services.....	230,136#	228,000*	246,000*
Services by other Government agencies.....	82,997	82,000*	138,000*
Security investigations.....	---	---	---
Federal life insurance.....	72,342	66,850	74,000
Federal health program.....	---	---	181,000
08 SUPPLIES AND MATERIALS.....	2,562,086#	3,224,500*	5,610,000*
09 EQUIPMENT.....	768,028#	1,037,000*	2,018,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	1,420,251	1,416,150	1,441,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	55	1,000	1,000
15 TAXES AND ASSESSMENTS.....	1,106	1,500	2,000
TOTAL.....	31,046,225	32,708,100	38,395,000
Partially (#) or fully funded (*) under			
"Research & Development".....	-518,403	-5,262,600	-9,100,000
Unobligated balance.....	<u>41,148</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>\$30,568,970</u>	<u>\$27,445,500</u>	<u>\$29,295,000</u>

AMES RESEARCH CENTER

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	1,478	1,440	1,440
Annual cost of permanent positions (end of year)....	\$10,374,891	\$10,458,547	\$10,518,547
Deduct lapses.....	265,178	68,697	52,547
Net cost of permanent positions.....	10,109,713	10,389,850	10,466,000
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	39,186	78,900	40,600
Overtime and night-work differential.....	86,393	80,000	142,000
Other allowances.....	1,151	1,000	1,400
Reimbursable details.....	---	16,450	---
TOTAL PERSONAL SERVICES.....	10,236,443	10,566,200	10,650,000
02 TRAVEL.....	99,485	110,000	160,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	9,005	10,000	15,000
All other.....	26,929	40,000*	45,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	---
All other.....	32,573	35,000	42,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	2,238,271	2,268,000	2,612,000
Other utilities.....	73,853	90,000	125,000
Rentals.....	339,402	470,000	828,000
06 PRINTING AND REPRODUCTION.....	14,221	7,000	15,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	160,832	508,500*	766,000*
Miscellaneous services.....	124,306	240,500*	252,000*
Services by other Government agencies.....	8,165	18,000*	107,000*
Security investigations.....	---	---	---
Federal life insurance.....	32,021	31,000	35,000
Federal health program.....	---	---	81,000
08 SUPPLIES AND MATERIALS.....	1,177,031	1,500,000*	1,500,000*
09 EQUIPMENT.....	1,024,215	1,330,000*	1,400,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	644,968	665,850	677,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	711	1,000	1,000
15 TAXES AND ASSESSMENTS.....	3,434	3,000	3,000
TOTAL.....	16,245,865	17,894,050	19,314,000
Partially (#) or fully funded (*) under "Research & Development".....	---	-3,637,000	-4,070,000
Unobligated balance.....	53,170	---	---
TOTAL ALLOTMENT.....	<u>\$16,299,035</u>	<u>\$14,257,050</u>	<u>\$15,244,000</u>

LEWIS RESEARCH CENTER

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	2,783	2,736	2,736
Annual cost of permanent positions (end of year)....	\$19,606,568	\$19,799,614	\$19,894,614
Deduct lapses.....	434,278	+76,076	86,614
Net cost of permanent positions.....	<u>19,172,290</u>	<u>19,875,690</u>	<u>19,808,000</u>
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	74,555	152,310	76,500
Overtime and night-work differential.....	155,409	153,500	210,000
Other allowances.....	5,890	6,000	6,500
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>19,408,144</u>	<u>20,187,500</u>	<u>20,101,000</u>
02 TRAVEL.....	130,516	180,000	300,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	16,959	15,000	20,000
All other.....	94,796	173,000*	300,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	574	3,000*	6,000*
All other.....	70,465	75,000	94,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	2,014,946	2,073,800	2,405,000
Other utilities.....	316,560	368,000	435,000
Rentals.....	276,925	603,000	853,000
06 PRINTING AND REPRODUCTION.....	5,198	4,000	10,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	300,759	528,000*	669,000*
Miscellaneous services.....	219,735	467,000*	700,000*
Services by other Government agencies.....	3,336	5,000*	5,000*
Security investigations.....	---	---	---
Federal life insurance.....	57,372	59,700	66,000
Federal health program.....	---	---	154,000
08 SUPPLIES AND MATERIALS.....	2,181,761#	2,800,000*	4,000,000*
09 EQUIPMENT.....	1,019,887	2,280,000*	3,500,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	1,236,204	1,271,200	1,283,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	845	1,000	1,000
15 TAXES AND ASSESSMENTS.....	<u>1,657</u>	<u>2,000</u>	<u>2,000</u>
TOTAL.....	27,356,639	31,096,200	34,904,000
Partially (#) or fully funded (*) under			
"Research & Development".....	-187,656	-6,256,000	-9,180,000
Unobligated balance.....	<u>46,244</u>	---	---
TOTAL ALLOTMENT.....	<u>\$27,215,227</u>	<u>\$24,840,200</u>	<u>\$25,724,000</u>

FLIGHT RESEARCH CENTER

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	336	416	416
Annual cost of permanent positions (end of year)....	\$2,316,670	\$2,921,952	\$2,936,752
Deduct lapses.....	228,443	439,952	17,752
Net cost of permanent positions.....	<u>2,088,227</u>	<u>2,482,000</u>	<u>2,919,000</u>
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	8,784	22,400	11,300
Overtime and night-work differential.....	64,638	125,000	139,600
Other allowances.....	92	100	100
Reimbursable details.....	---	28,000	50,000
TOTAL PERSONAL SERVICES.....	<u>2,161,741</u>	<u>2,657,500</u>	<u>3,120,000</u>
02 TRAVEL.....	71,389	90,000	135,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	903	7,000	3,000
All other.....	8,806	16,600*	9,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	52,036	108,000*	108,000*
All other.....	10,277	15,000	20,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	7,152	8,000	14,000
Other utilities.....	7,954	9,000	15,000
Rentals.....	66,459	76,000	150,000
06 PRINTING AND REPRODUCTION.....	1,203	2,000	2,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	94,493	92,500*	60,000*
Miscellaneous services.....	33,036#	40,000*	85,000*
Services by other Government agencies.....	861	2,500*	4,000*
Security investigations.....	---	---	---
Federal life insurance.....	6,138	7,450	10,000
Federal health program.....	---	---	19,000
08 SUPPLIES AND MATERIALS.....	299,866#	250,000*	400,000*
09 EQUIPMENT.....	202,792#	324,000*	384,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	129,084	163,200	188,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	85	1,000	1,000
15 TAXES AND ASSESSMENTS.....	<u>1,438</u>	<u>2,000</u>	<u>2,000</u>
TOTAL.....	3,155,713	3,871,750	4,729,000
Partially (#) or fully funded (*) under			
"Research & Development".....	-21,562	-833,600	-1,050,000
Unobligated balance.....	<u>20,057</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>\$3,154,208</u>	<u>\$3,038,150</u>	<u>\$3,679,000</u>

GODDARD SPACE FLIGHT CENTER

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	782	1,214	2,000
Annual cost of permanent positions (end of year)....	\$5,852,969	\$9,343,806	\$15,711,806
Deduct lapses.....	<u>3,351,540</u>	<u>851,356</u>	<u>1,618,806</u>
Net cost of permanent positions.....	2,501,429#	8,492,450	14,093,000
Intermittent employment.....	2,987#	17,900	75,000
Regular pay above 52-week base.....	21,095#	71,900	60,400
Overtime and night-work differential.....	201,519#	786,000	1,355,600
Other allowances.....	7,794*	23,000	50,000
Reimbursable details.....	---	80,000	200,000
TOTAL PERSONAL SERVICES.....	<u>2,734,824#</u>	<u>9,471,250</u>	<u>15,834,000</u>
02 TRAVEL.....	359,189	1,053,500	2,210,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	33,792#	80,000	236,000
All other.....	16,645#	916,000*	1,012,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	3,179	---	---
All other.....	14,198	203,000	244,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	8,000	75,000
Other utilities.....	---	2,000	25,000
Rentals.....	3,774	328,000	5,363,000
06 PRINTING AND REPRODUCTION.....	249	20,000	25,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	1,651*	107,800*	600,000*
Miscellaneous services.....	20,876#	50,000*	131,000*
Services by other Government agencies.....	20,054,010*	1,807,000*	1,600,000*
Security investigations.....	---	---	---
Federal life insurance.....	7,746#	26,000	46,000
Federal health program.....	---	---	101,000
08 SUPPLIES AND MATERIALS.....	25,257*	210,000*	1,227,000*
09 EQUIPMENT.....	210,076	1,100,000*	1,498,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	157,633#	607,520	919,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	1,000	2,000
15 TAXES AND ASSESSMENTS.....	<u>2,266#</u>	<u>2,000</u>	<u>4,000</u>
TOTAL.....	23,645,365	15,993,070	31,152,000
Partially (#) or fully funded (*) under			
"Research & Development".....	-21,654,479	-4,190,800	-6,068,000
Unobligated balance.....	<u>30,214</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>\$2,021,100</u>	<u>\$11,802,270</u>	<u>\$25,084,000</u>

WALLOPS STATION

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	171	225	300
Annual cost of permanent positions (end of year).....	\$986,974	\$1,319,974	\$1,925,284
Deduct lapses.....	374,787	31,874	154,284
Net cost of permanent positions.....	612,187	1,288,100	1,771,000
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	3,793	10,400	7,600
Overtime and night-work differential.....	28,233	74,600	134,600
Other allowances.....	---	1,500	1,800
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	644,213	1,374,600	1,915,000
02 TRAVEL.....	9,496	71,400	150,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	7,000	22,000
All other.....	14,999	20,000*	80,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	3,000*	72,000*
All other.....	5,842	33,600	40,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	50,075	105,000	145,000
Other utilities.....	---	---	---
Rentals.....	26	20,000	264,000
06 PRINTING AND REPRODUCTION.....	---	3,000	5,000
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	58,878	189,500*	191,000*
Miscellaneous services.....	9,535	20,000*	42,000*
Services by other Government agencies.....	412	61,500*	2,000*
Security investigations.....	---	---	---
Federal life insurance.....	2,102	4,000	6,000
Federal health program.....	---	---	16,000
08 SUPPLIES AND MATERIALS.....	467,789	405,000*	540,000*
09 EQUIPMENT.....	41,080	70,000*	125,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	40,068	81,000	114,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	---
15 TAXES AND ASSESSMENTS.....	---	500	1,000
TOTAL.....	1,344,515	2,469,100	3,730,000
Partially (#) or fully funded (*) under			
"Research & Development".....	---	-769,000	-1,052,000
Unobligated balance.....	12,305	---	---
TOTAL ALLOTMENT.....	\$1,356,820	\$1,700,100	\$2,678,000

NASA HUNTSVILLE FACILITY

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	---	100	5,500
Annual cost of permanent positions (end of year)....	---	\$727,000	\$40,175,000
Deduct lapses.....	---	<u>525,000</u>	<u>195,000</u>
Net cost of permanent positions.....	---	202,000	39,980,000
Intermittent employment.....	---	---	100,000
Regular pay above 52-week base.....	---	5,600	154,500
Overtime and night-work differential.....	---	4,400	7,200,000
Other allowances.....	---	---	5,500
Reimbursable details.....	---	---	<u>100,000</u>
TOTAL PERSONAL SERVICES.....	---	<u>212,000</u>	<u>47,540,000</u>
02 TRAVEL.....	---	---	1,281,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	---	100,000
All other.....	---	---	2,124,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	100,000*
All other.....	---	---	229,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	---	---	6,050,000
06 PRINTING AND REPRODUCTION.....	---	---	---
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	100,000
Repairs and alterations.....	---	---	1,800,000*
Miscellaneous services.....	---	---	5,370,000*
Services by other Government agencies.....	---	---	2,603,000*
Security investigations.....	---	---	---
Federal life insurance.....	---	1,000	132,000
Federal health program.....	---	---	306,000
08 SUPPLIES AND MATERIALS.....	---	---	4,000,000*
09 EQUIPMENT.....	---	---	2,755,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	---	14,000	2,570,000
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	1,000
15 TAXES AND ASSESSMENTS.....	---	---	<u>4,000</u>
TOTAL.....	---	\$227,000	\$77,065,000
Partially (#) or fully funded (*) under			
"Research & Development".....	---	---	-18,752,000
Unobligated balance.....	---	---	---
TOTAL ALLOTMENT.....	---	<u>\$227,000</u>	<u>\$58,313,000</u>

WESTERN OPERATIONS OFFICE

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 Obligated	F.Y. 1960 Estimated	F.Y. 1961 Estimated
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	7	32	46
Annual cost of permanent positions (end of year)....	\$64,455	\$305,605	\$419,605
Deduct lapses.....	16,820	67,255	30,605
Net cost of permanent positions.....	<u>47,635</u>	<u>238,350</u>	<u>389,000</u>
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	247	2,300	1,600
Overtime and night-work differential.....	---	1,000	2,400
Other allowances.....	---	---	---
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>47,882</u>	<u>241,650</u>	<u>393,000</u>
02 TRAVEL.....	3,219	20,000	25,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	5,000	10,000
All other.....	---	1,000*	1,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	---
All other.....	4,361	10,000	12,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	10,047	46,000	46,000
06 PRINTING AND REPRODUCTION.....	---	---	---
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	1,148	10,600*	6,000*
Miscellaneous services.....	1,746	7,900*	7,000*
Services by other Government agencies.....	---	---	---
Security investigations.....	---	---	---
Federal life insurance.....	154	700	1,700
Federal health program.....	---	---	2,500
08 SUPPLIES AND MATERIALS.....	1,352	4,500*	6,000*
09 EQUIPMENT.....	17,526	22,000*	15,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	3,122	15,480	25,300
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	---
15 TAXES AND ASSESSMENTS.....	---	100	---
TOTAL.....	90,557	384,930	550,500
Partially (#) or fully funded (*) under			
"Research & Development".....	---	-46,000	-35,000
Unobligated balance.....	<u>4,258</u>	---	---
TOTAL ALLOTMENT.....	<u>\$94,815</u>	<u>\$338,930</u>	<u>\$515,500</u>

ATLANTIC MISSILE RANGE OPERATIONS OFFICE

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	4	20	26
Annual cost of permanent positions (end of year)....	\$51,160	\$187,150	\$236,265
Deduct lapses.....	36,675	29,350	13,265
Net cost of permanent positions.....	<u>14,485</u>	<u>157,800</u>	<u>223,000</u>
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	197	1,500	1,000
Overtime and night-work differential.....	---	1,200	2,000
Other allowances.....	---	---	---
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>14,682</u>	<u>160,500</u>	<u>226,000</u>
02 TRAVEL.....	1,356	15,000	18,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	5,000	5,000
All other.....	---	1,000*	1,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	---
All other.....	1,776	10,000	12,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	---	---	---
06 PRINTING AND REPRODUCTION.....	---	---	---
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	---	---	---
Miscellaneous services.....	---	---	---
Services by other Government agencies.....	---	---	---
Security investigations.....	---	---	---
Federal life insurance.....	50	500	1,000
Federal health program.....	---	---	1,500
08 SUPPLIES AND MATERIALS.....	125	2,000*	3,000*
09 EQUIPMENT.....	---	3,000*	4,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	954	10,500	14,500
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	---
15 TAXES AND ASSESSMENTS.....	---	---	---
TOTAL.....	<u>18,943</u>	<u>207,500</u>	<u>286,000</u>
Partially (#) or fully funded (*) under			
"Research & Development".....	---	-6,000	-8,000
Unobligated balance.....	<u>1,057</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>\$20,000</u>	<u>\$201,500</u>	<u>\$278,000</u>

PACIFIC MISSILE RANGE OPERATIONS OFFICE

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	F.Y. 1959 <u>Obligated</u>	F.Y. 1960 <u>Estimated</u>	F.Y. 1961 <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	---	---	6
Annual cost of permanent positions (end of year)....	---	---	\$48,000
Deduct lapses.....	---	---	<u>12,000</u>
Net cost of permanent positions.....	---	---	36,000
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	---	---	200
Overtime and night-work differential.....	---	---	800
Other allowances.....	---	---	---
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>---</u>	<u>---</u>	<u>37,000</u>
02 TRAVEL.....	---	---	10,000
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	---	5,000
All other.....	---	---	1,000*
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	---
All other.....	---	---	4,000
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	---	---	---
06 PRINTING AND REPRODUCTION.....	---	---	---
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	---	---	---
Miscellaneous services.....	---	---	---
Services by other Government agencies.....	---	---	---
Security investigations.....	---	---	---
Federal life insurance.....	---	---	500
Federal health program.....	---	---	300
08 SUPPLIES AND MATERIALS.....	---	---	1,000*
09 EQUIPMENT.....	---	---	3,000*
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	---	---	2,700
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	---
15 TAXES AND ASSESSMENTS.....	---	---	---
	<u>---</u>	<u>---</u>	<u>---</u>
TOTAL.....	---	---	64,500
Partially (#) or fully funded (*) under			
"Research & Development".....	---	---	-5,000
Unobligated balance.....	<u>---</u>	<u>---</u>	<u>---</u>
TOTAL ALLOTMENT.....	<u>---</u>	<u>---</u>	<u>\$59,500</u>

WRIGHT-PATTERSON LIAISON OFFICE

ESTIMATES OF APPROPRIATIONS - SALARIES AND EXPENSES - FISCAL YEAR 1961

	<u>F.Y. 1959</u> <u>Obligated</u>	<u>F.Y. 1960</u> <u>Estimated</u>	<u>F.Y. 1961</u> <u>Estimated</u>
01 PERSONAL SERVICES:			
Number of permanent positions (end of year).....	---	---	---
Annual cost of permanent positions (end of year)....	---	---	---
Deduct lapses.....	+14,354	---	---
Net cost of permanent positions.....	<u>14,354</u>	---	---
Intermittent employment.....	---	---	---
Regular pay above 52-week base.....	---	---	---
Overtime and night-work differential.....	---	---	---
Other allowances.....	---	---	---
Reimbursable details.....	---	---	---
TOTAL PERSONAL SERVICES.....	<u>14,354</u>	---	---
02 TRAVEL.....	1,864	---	---
03 TRANSPORTATION OF THINGS:			
Household goods.....	---	---	---
All other.....	---	---	---
04 COMMUNICATION SERVICES:			
Leased lines.....	---	---	---
All other.....	48	---	---
05 RENTS AND UTILITY SERVICES:			
Electric power.....	---	---	---
Other utilities.....	---	---	---
Rentals.....	---	---	---
06 PRINTING AND REPRODUCTION.....	---	---	---
07 OTHER CONTRACTUAL SERVICES:			
Research contracts.....	---	---	---
Repairs and alterations.....	8	---	---
Miscellaneous services.....	---	---	---
Services by other Government agencies.....	---	---	---
Security investigations.....	---	---	---
Federal life insurance.....	48	---	---
Federal health program.....	---	---	---
08 SUPPLIES AND MATERIALS.....	10	---	---
09 EQUIPMENT.....	---	---	---
11 GRANTS, SUBSIDIES, AND CONTRIBUTIONS.....	933	---	---
13 REFUNDS, AWARDS, AND INDEMNITIES.....	---	---	---
15 TAXES AND ASSESSMENTS.....	---	---	---
	<u>17,265</u>	---	---
TOTAL.....	17,265	---	---
Partially (#) or fully funded (*) under "Research & Development".....	---	---	---
Unobligated balance.....	---	---	---
	<u>\$17,265</u>	---	---
TOTAL ALLOTMENT.....	<u>\$17,265</u>	---	---

**NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION**

CONSTRUCTION AND EQUIPMENT

ESTIMATES OF APPROPRIATIONS

FISCAL YEAR 1961

CONSTRUCTION
& EQUIPMENT

CONSTRUCTION AND EQUIPMENT

[For an additional amount for "Construction and equipment", as authorized by Public Law 86-12, \$21,825,000, to remain available until expended.]

For construction and equipment for the National Aeronautics and Space Administration and for the acquisition or condemnation of real property [at Cleveland, Ohio] as authorized by law, [\$52,000,000] to remain available until expended. *Provided*, That no part of the foregoing appropriation shall be available for purposes authorized by section 3 of Public Law 86-45 until fourteen days have elapsed after notification as required by law to the Committee on Science and Aeronautics of the House of Representatives and the Committee on Aeronautical and Space Sciences of the Senate.

\$122,787,000

:Provided, That \$1,000,000 of this appropriation shall be immediately available

(42 U.S.C. 2451 et seq.;

50 U.S.C. 151-160, 511-515;

Supplemental Appropriation Act, 1960; authorizing legislation to be proposed for 1961.)

Appropriated 1960, \$73,825,000 Estimate 1961, ^a\$122,787,000

Appropriated (adjusted) 1960, \$88,825,000

^aIncludes \$13,000,000 transferred in the estimates from "Salaries and expenses, Advanced Research Projects Agency, Department of Defense." The amounts obligated in 1959 and 1960 are shown in the schedule as comparative transfers.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION AND EQUIPMENT

Program and Financing

	Costs to this appropriation					Analysis of 1961 financing			Appropriation required to complete
	Total estimate	To June 30, 1958	1959 actual	1960 estimate	1961 estimate	Deduct selected resources and unobligated balance, start of year	Add selected resources and unobligated balance, end of year	Appropriation required for 1961	
Program by activities:									
1. Aeronautical and space research facilities:									
(a) Langley Research Center.....	\$67,904,134	\$21,377,200	\$10,600,207	\$9,291,727	\$5,500,000	\$14,678,000	\$21,135,000	\$11,957,000	.....
(b) Ames Research Center.....	25,465,548	2,688,412	5,259,895	4,669,241	6,000,000	11,868,000	6,848,000	980,000	.....
(c) Lewis Research Center.....	62,968,189	19,642,728	10,038,970	8,636,491	5,500,000	15,550,000	19,150,000	9,100,000	.....
(d) Flight Research Center.....	1,850,000	.....	.....	350,000	1,500,000	1,500,000	.....	.....	.....
2. Space flight development and operations facilities:									
(a) Goddard Space Flight Center..	27,437,000	.....	166,832	4,000,168	10,000,000	13,770,000	13,270,000	9,500,000	.....
(b) Wallops Station.....	21,753,000	141,764	1,232,623	4,878,613	6,000,000	11,500,000	9,500,000	4,000,000	.....
(c) Jet Propulsion Laboratory....	12,755,000	.....	.....	1,955,000	3,000,000	5,800,000	7,800,000	5,000,000	.....
(d) NASA Huntsville facility.....	28,392,000	.....	1,472,899	169,101	3,000,000	.....	23,750,000	26,750,000	.....
(e) Atlantic Missile Range.....	36,340,000	.....	1,154,803	7,235,197	4,700,000	200,000	23,250,000	27,750,000	.....
(f) Pacific Missile Range.....	760,000	.....	.....	460,000	300,000	300,000	.....	.....	.....
(g) Various locations:									
Tracking facilities.....	69,520,000	.....	271	16,424,729	32,500,000	25,345,000	20,595,000	27,750,000	.....
Propulsion development facilities.....	9,950,000	.....	.....	3,450,000	3,000,000	6,500,000	3,500,000	.....	.....
3. Reserves.....	69,773	.....	.....	.....	.....	69,773	69,773	.....	.....
Total program costs.....	365,164,644	43,850,104	29,926,500	61,520,267	81,000,000	107,080,773	148,867,773	122,787,000	.....
4. Relation of costs to obligations: Obligations incurred for costs of other years, net.....			10,719,300	43,512,798	50,287,000				
Total program (obligations).....			40,645,800	105,033,065	131,287,000				
Financing:									
Comparative transfers from (-) Department of Defense.....			-2,627,702	-6,864,298	.....			
Unobligated balance brought forward.....			-29,431,638	-39,413,540	-30,069,773				
Unobligated balance carried forward.....			39,413,540	30,069,773	21,569,773				
<u>New obligational authority.....</u>			48,000,000	88,825,000	122,787,000				
New obligational authority:									
Appropriation.....			48,000,000	73,825,000	122,787,000				
Transferred from "Research and development" (P.L. 86-213).....			.....	15,000,000	.....			
<u>Appropriation (adjusted).....</u>			48,000,000	88,825,000	122,787,000				

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONSTRUCTION AND EQUIPMENT

PROGRAM AND PERFORMANCE

This appropriation provides for the modernization of existing facilities, the construction of new facilities including design by contract, and the purchase of major items of equipment. The costs shown in 1961 include those related to projects authorized in prior years. The principal projects proposed for construction in 1961 are as follows:

1. Aeronautical and space research facilities.--(a) Langley Research Center.--Proposed projects include an aerothermal dynamics facility to simulate the environment of vehicles in the hypersonic speed ranges and a laboratory to study the dynamics of objects in various density, temperature, acceleration, and vibration environments.

(b) Ames Research Center.--Additional equipment for a centrifuge to test the effects of high acceleration in space vehicle equipment will be procured in 1961.

(c) Lewis Research Center.--It is proposed to construct a basic materials research laboratory and a laboratory for research on energy conversion and power generation processes and equipment.

(d) Flight Research Center.--Projects funded under the 1960 appropriation will be completed in 1961, and no new projects are proposed.

2. Space flight development and operations facilities.--(a) Goddard Space Flight Center.--The proposed construction in 1961 consists of a payload test facility, a satellite systems laboratory, and utility installations.

(b) Wallops Station.--Improvements to be added in 1961 include a system to determine the precise trajectory of launched vehicles, an operations computing center, and the modernization of certain existing support equipment.

(c) Jet Propulsion Laboratory.--The 1961 program includes the acquisition of approximately three acres of land, the modernization of laboratory facilities, a solid propellant facility, a liquid propellant test cell, an antenna range, and the acquisition of approximately three acres of land.

(d) NASA Huntsville facility.--It is proposed to construct in 1961 a Saturn static test facility, a central laboratory and office facility, a dynamic test facility, an addition to a fabrication laboratory, an extension to an assembly building, a pressure test cell, and additions to the engineering and guidance and control buildings, all to enable the Huntsville facility to carry forward the Saturn project and its work on other space flight development projects.

(e) Atlantic Missile Range.--Completion of the Saturn launching complex and an addition to the engineering and laboratory building are proposed in 1961. In addition, a supplemental appropriation is anticipated for 1960 and is shown under Proposed for later transmission.

(f) Pacific Missile Range.--Launching facilities funded under the 1960 appropriation will be completed in 1961. No new projects are proposed in 1961.

(g) Various locations.--

Tracking facilities.--The 1961 program includes additional electronic and optical equipment; control and data processing equipment; and accessory equipment, shelters, and utilities. These items are required to improve the capabilities of the Minitrack satellite tracking network and the net for tracking deep space probes and to complete the special tracking stations for the Mercury manned space flights. In addition, a supplemental appropriation is anticipated for 1960 for the Mercury net, and is shown under Proposed for later transmission.

Propulsion development facilities.--Projects initiated in 1959 and 1960 will be completed in 1961. No new projects are proposed in 1961.

3. Relation of costs to obligations.--The relationship is derived from year-end balances of selected resources as reflected in the following table:

	<u>1958</u> actual	<u>1959</u> actual	<u>1960</u> estimate	<u>1961</u> estimate
Selected resources at end of year:				
Inventories and items on order:				
Unpaid undelivered orders (appropriation balances obligated for goods and services on order not yet received).....	\$22,163,679	\$33,475,086	\$76,911,000	\$127,698,000
Advances (payments for goods and services on order not yet received).....	<u>615,223</u>	<u>23,116</u>	<u>100,000</u>	<u>100,000</u>
Total selected resources at end of year.....	22,778,902	33,498,202	77,011,000	127,798,000
Selected resources at start of year (-).....		<u>-22,778,902</u>	<u>-33,498,202</u>	<u>-77,011,000</u>
Obligations incurred for costs of other years, net.....		10,719,300	43,512,798	50,787,000

Standard Form 2a
 (Approved by
 President
 June 15, 1923
 Revised October 28,
 1947)

Appropriation title:
 (C. 130 C. & I. c. flush)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 CONSTRUCTION AND EQUIPMENT

Object Classification

Type size:
 6 point,
 22 lines

Use in preparing schedules of obligations as showing estimates for
 lump-sum appropriations

U. S. GOVERNMENT PRINTING OFFICE 16-58514-4

	1959 actual	1960 estimate	1961 estimate
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION			
09 Equipment.....	\$5,000,000	\$25,000,000	\$25,000,000
10 Lands and structures.....	35,645,800	79,440,445	106,287,000
Total, National Aeronautics and Space Administration.....	40,645,800	104,440,445	131,287,000
ALLOCATION ACCOUNTS			
07 Other contractual services.....	.....	11,620	.....
10 Lands and structures.....	.....	581,000	.....
Total, allocation accounts.....	.....	592,620	.....
Total obligations.....	40,645,800	105,033,065	131,287,000

(Mono cast: 21.4)

(Mono cast: 7.9)

(Mono cast: 7.9)

(Mono cast: 7)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

SUMMARY OF CONSTRUCTION AND EQUIPMENT PROGRAMS

<u>Program and location</u>	<u>Fiscal Year 1959</u>	<u>Fiscal Year 1960</u>	<u>Fiscal Year 1960 Supplemental</u>	<u>Fiscal Year 1961</u>
<u>Aeronautical and space research facilities:</u>				
Langley Research Center.....	\$10,850,000	\$4,535,000	---	\$11,957,000
Ames Research Center.....	3,720,000	6,305,000	---	980,000
Lewis Research Center.....	7,800,000	6,660,000	---	9,100,000
Flight Research Center.....	---	1,850,000	---	---
<u>Space flight development and operations facilities:</u>				
Goddard Space Flight Center.....	3,867,000	14,070,000	---	9,500,000
Wallops Station.....	16,193,000	---	---	4,000,000
Jet Propulsion Laboratory.....	---	7,755,000	---	5,000,000
NASA Huntsville Facility.....	---	---	---	26,750,000
Atlantic Missile Range.....	---	740,000	4,000,000	27,750,000
Pacific Missile Range.....	---	760,000	---	---
Various locations:				
Equipment and instrumentation for:				
Minitrack net.....	95,000	4,205,000	---	4,750,000
Deep space net.....	2,550,000	3,500,000	---	8,000,000
Mercury net.....	2,425,000	28,995,000	6,800,000	15,000,000
Propulsion development facilities.....	500,000	7,950,000	---	---
Facilities for Rover program.....	---	1,500,000	---	---
<u>Total.....</u>	<u>48,000,000</u>	<u>88,825,000</u>	<u>10,800,000</u>	<u>122,787,000</u>
Transferred from Research and Development				
appropriation.....	---	-15,000,000	---	---
Appropriated to NACA.....	23,000,000	---	---	---
Appropriated to NASA.....	<u>25,000,000</u>	<u>73,825,000</u>	<u>10,800,000</u>	<u>122,787,000</u>
<u>Total appropriations.....</u>	<u>\$48,000,000</u>	<u>\$73,825,000</u>	<u>\$10,800,000</u>	<u>\$122,787,000</u>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

CONSTRUCTION AND EQUIPMENT - 1961 PROGRAM

SUMMARY AND INDEX

<u>Page No.</u>		<u>Estimated cost</u>
	<u>LANGLEY RESEARCH CENTER (Hampton, Virginia)</u>	\$11,957,000
309	Hypersonic aerothermal dynamics facility.....	\$7,957,000
316	Dynamics research laboratory.....	4,000,000
	<u>AMES RESEARCH CENTER (Moffett Field, California)</u>	980,000
322	Centrifuge equipment.....	980,000
	<u>LEWIS RESEARCH CENTER (Cleveland, Ohio)</u>	9,100,000
325	Energy conversion laboratory.....	5,050,000
329	Basic materials research laboratory.....	4,050,000
	<u>GODDARD SPACE FLIGHT CENTER (Beltsville, Maryland)</u>	9,500,000
335	Payload testing facility.....	3,555,000
339	Satellite systems laboratory.....	4,636,000
342	Utility installations.....	1,309,000
	<u>PILOTLESS AIRCRAFT STATION (Wallops Island, Virginia)</u>	4,000,000
345	Precision trajectory determination system.....	1,910,000
348	Operations computing center.....	350,000
350	Equipment modernization.....	1,740,000

Page No.		Estimated cost
	<u>JET PROPULSION LABORATORY (Pasadena, California)</u>	<u>\$5,000,000</u>
353	Plot plan	
354	Land acquisition.....	\$60,000
355	Modernization of laboratory facilities.....	2,335,300
368	Solid propellant facility.....	1,954,700
373	Liquid propellant test cell.....	500,000
376	Antenna range.....	150,000
	<u>NASA HUNTSVILLE FACILITY (Huntsville, Alabama)</u>	<u>26,750,000</u>
379	Plot plan	
380	Saturn static test facility.....	10,800,000
386	Central laboratory and office facility.....	4,400,000
389	Dynamic test facility.....	600,000
394	Pressure test cell.....	650,000
396	Extension to assembly building.....	2,500,000
399	Addition to engineering building.....	1,137,000
405	Completion of guidance and control building.....	1,948,000
409	Addition to fabrication laboratory.....	215,000
411-1	Addition to checkout building.....	4,500,000
	<u>ATLANTIC MISSILE RANGE (Cape Canaveral, Florida)</u>	<u>27,750,000</u>
412	Plot plan	
413	Completion of Saturn launching complex.....	2,250,000
415-1	Escape mechanism.....	300,000
415-4	Hydrogen system.....	2,500,000
415-6	New Saturn launching complex.....	21,000,000
415-15	Staging building.....	1,400,000
416	Addition to engineering and laboratory building.....	300,000
	<u>VARIOUS LOCATIONS</u>	<u>27,750,000</u>
419	Tracking facilities.....	27,750,000
	<u>TOTAL PROGRAM</u>	<u>\$122,787,000</u>

7.0
~
.6
.65
2.5
2.25
13.0

LANGLEY RESEARCH CENTER

FISCAL YEAR 1961 ESTIMATES

HYPERSONIC AEROTHERMAL DYNAMICS FACILITY

1. DESCRIPTION:

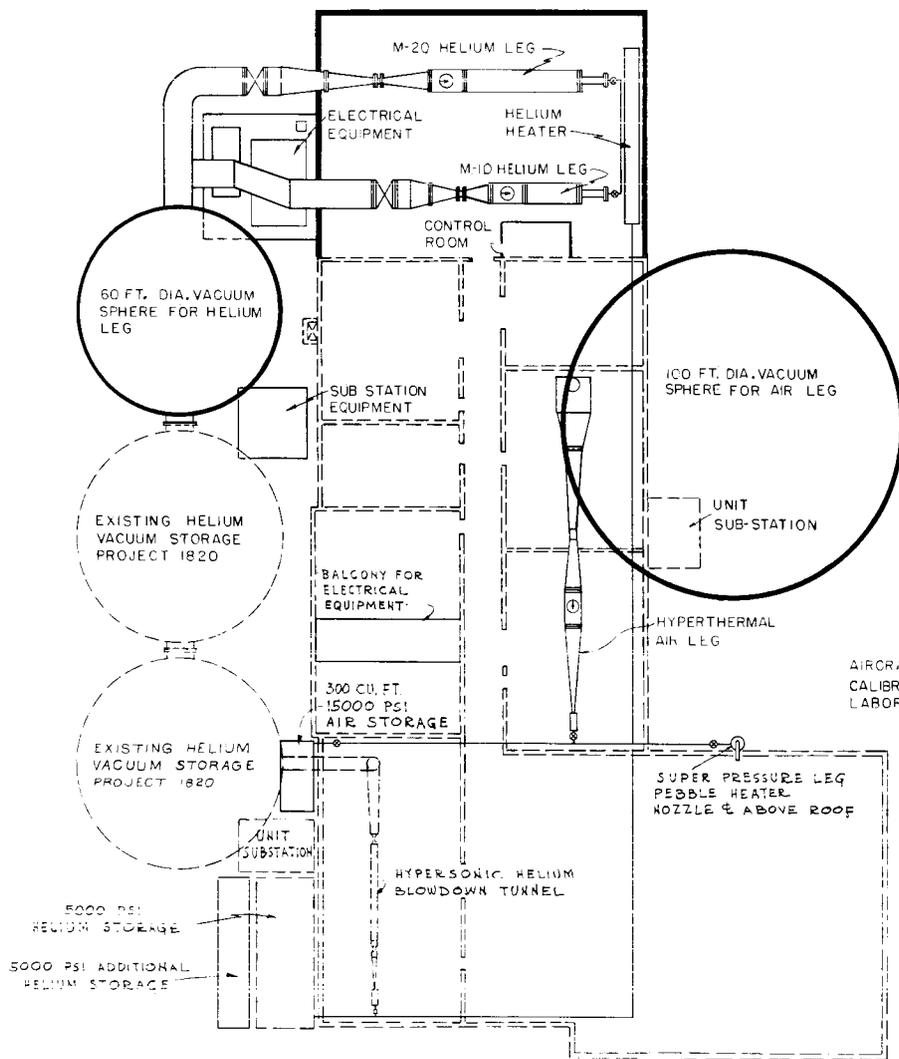
This project proposes the construction of a facility for simulating vehicle environment in the hypersonic speed ranges. As indicated in the drawing on the following page the facility will consist of two main systems, one using air and the other using helium. The air system will be located in the west wing of the gas dynamics laboratory, and the helium system will be located in an extension to the west wing.

The system using helium as the test medium is required primarily for aeroelastic studies. This system will have two legs with test sections approximately 4 feet in diameter, one providing test speeds up to Mach 10 and the other to Mach 20; each leg will be capable of heated operation up to 650° F. Running times will be of the order of 20 seconds.

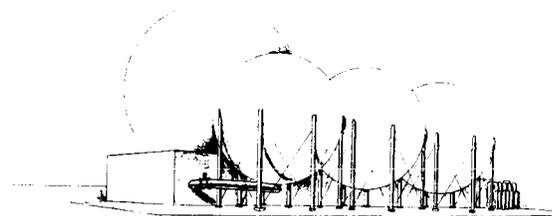
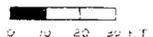
The other system will employ air and will be used primarily for the study of aerothermal problems. The air for this system will be stored at 15,000 psi; this pressure will be obtained by a topping compressor that will draw on an existing 1,800-psi air supply. This system will also have two legs. One leg (the hyperthermal leg) will employ continuous-arc heating from a 10,000-kw d-c current to generate temperatures in the 7,000° R to 16,000° R temperature range. Interchangeable throats and liners for the water-cooled conical nozzle will be used to produce simulated velocities, altitudes, and temperatures in the Mach 12 to 20 flight regime. Running times up to 3 or 4 minutes are expected. The temperature and pressure potential of this leg will open the way to even higher velocities as the state of the art advances in arc generation at high pressures. The other leg of the air system (the superpressure leg) will consist of a superpressure zirconia pebble heater capable of supplying 4,500° R air at pressures up to 15,000 psi. Running times of about 20 seconds are expected for this leg.

LANGLEY RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

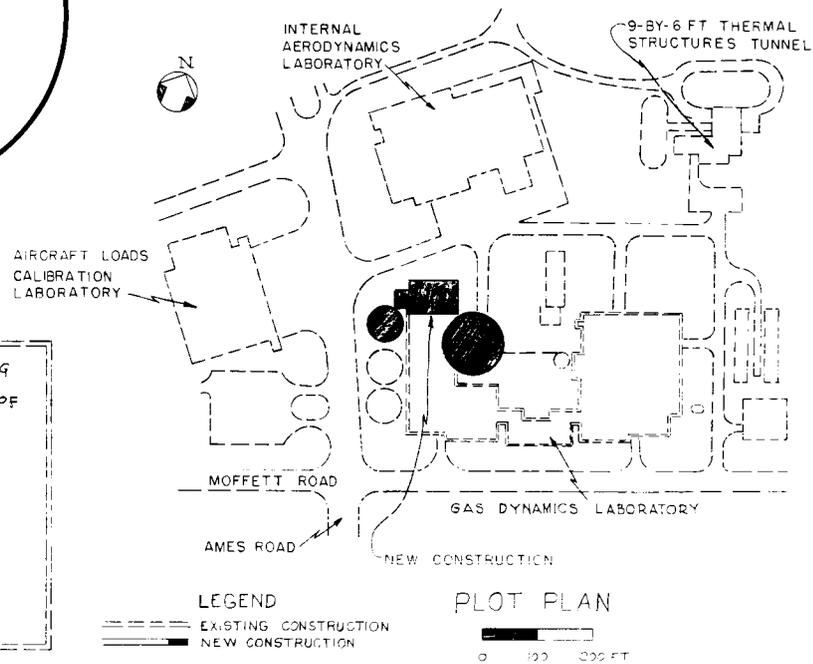
HYPERSONIC AEROTHERMAL DYNAMICS FACILITY



FIRST FLOOR PLAN



PERSPECTIVE



LEGEND

--- EXISTING CONSTRUCTION
— NEW CONSTRUCTION

PLOT PLAN



Both the air and helium systems will exhaust to vacuum tanks. The closed-cycle helium plant of the 20-inch hypersonic helium tunnel will be enlarged and the helium system of the proposed facility will obtain its helium from this plant.

Some of the instrumentation of the proposed facility will be shared by the air and helium legs, and existing data recording instrumentation in the same building will be used. The electric power supply substation and equipment for the proposed facility will serve the electrical storage heater for the helium system as well as the arc-generation equipment for the hyperthermal air leg.

2. JUSTIFICATION:

The lack of solution to urgent problems in the hypersonic speed range is seriously retarding the conception and efficient design of new vehicles and the improvement of a wide variety of existing and planned vehicles which must reenter the earth's atmosphere from orbital or space flight or be capable of sustained flight at hypersonic speeds. The study of these problems cannot be undertaken without advances in the capability of simulating the vehicles' environment beyond that obtainable with present-day research facilities. At present, there are no large air tunnels capable of exceeding Mach 12 for significant testing times, and these wind tunnels are not yet capable of simulating the temperatures, velocities, and air densities of flight at this Mach number. Because different types of vehicles have different trajectories, a wide variety of environmental conditions must be simulated. On vehicles such as Dyna Soar, for example, the most critical maneuver problem and the most critical heating problem occur at velocities well beyond those obtainable with existing facilities. In addition, for ICBM-type vehicles or manned capsules such as Project Mercury, the critical aerodynamic and materials problems that occur at the high temperatures and velocities experienced by these vehicles cannot be studied efficiently with existing facilities. Current vehicles have many deficiencies in their design because of these facility limitations. Future vehicles will impose even more stringent demands on facilities. For example, some vehicles returning from far-space or lunar missions will reenter the earth's atmosphere at velocities exceeding escape velocity, and the most efficient trajectory for returning freighter vehicles from space could produce air temperatures near the vehicle that would be greater than those for a near-earth ballistic missile.

The hyperthermal air leg of the proposed facility will, by use of continuous-arc heating, be able to produce the very high temperatures of hypersonic flight and will open the way for large increases in the Mach number, velocity, and temperature capability of air wind tunnels. The tunnel will be able to duplicate the velocities and temperatures in the Mach 20 flight regime. It is not possible to simulate these conditions with any method depending on chemical fuels, whereas arc heating has almost unlimited temperature-producing capabilities. The growth potential of the continuous-arc tunnel is therefore chiefly limited by the engineering ability to handle high-temperature air without melting or eroding the walls of its container. The proposed facility will have the potential to increase its Mach number, air temperature, and velocity as the state of the art advances in throat survival and arc-chamber survival under high pressures. With the present state of the art in these fields, the proposed hyperthermal leg will permit many of the problems of the Mach 20 flight regime to be undertaken for the first time using a facility with sufficient testing time to study conclusively the survival ability and aerodynamic efficiency of reentry vehicles of many types.

The superpressure air leg, although restricted to a lower temperature than the hyperthermal leg, will have the advantage of being able to operate at stagnation pressures much greater than those that can be used in the hyperthermal leg. It will, therefore, be able to obtain the high unit Reynolds number and heating rates that are required to explore many problems, such as throat survival and nozzle cooling for hypersonic ram jets, superpressure facilities, and rocket nozzles. This leg will permit, in conjunction with the use of small models, the economical testing to destruction that will be necessary in some studies of cooling, materials, and heat protection schemes such as ablation. This leg also has the potential of powering hypersonic nozzles to Mach 17 with Reynolds numbers well beyond those possible in the hyperthermal leg.

In addition to and associated with the aerothermal problems of the hypersonic speed regime are important aeroelastic problems that have not been experimentally studied. The aeroelastic phenomena are associated with the interaction of structural deformations and aerodynamic loads, and the resulting problems may range from divergence (static loads) through dynamic stability (low-frequency loads) to flutter (high-frequency loads). The consequence of inadequate design for these aeroelastic instabilities is usually catastrophic failure of the complete mission. Experimental investigations of these phenomena at hypersonic Mach numbers are urgently needed for both preliminary and detail design and require

the consideration of a wide range of configurations, materials, methods of construction, and flight envelopes. No adequate facility exists at the present time for the study of the aeroelastic problems in the Mach number dynamic pressure range which includes that encountered by hypersonic airplanes, reentry vehicles, and the antimissile missiles. It is not possible within the present state of the art to construct air tunnels that can provide the range and magnitude of dynamic pressure and Mach number necessary to explore these effects.

As a testing medium, the aeroelasticity leg will use helium which provides several distinct practical advantages for aeroelastic studies. First, the time scale of aeroelastic phenomena of concern does not allow appreciable direct coupling of thermal effects with aeroelastic forces. Hence, it is possible to separate heating effects from aeroelastic phenomena, and this may be done in a wind tunnel at hypersonic speeds using helium as a test medium. This is possible because heat is not required to avoid liquefaction of helium until Mach numbers well in excess of 20 are reached. Tests may be run without heat, and a nominal amount of heat may be added to isolate certain thermal effects on aeroelastic phenomena. The aeroelastic models can thus be greatly simplified (less expensive), and the usual model construction techniques which have proven so successful in the past may be directly applicable.

Secondly, a high dynamic pressure is needed for aeroelastic studies. Conventional tunnels designed for aerodynamic studies do not have this capability. By using helium, a much higher dynamic pressure is obtainable as compared to air for given stagnation pressures. For the proposed tunnel, the dynamic pressure at Mach 10 will approach 7,000 pounds per square foot and for Mach 20 would be nearly 1,000 pounds per square foot. The pilot model hypersonic aeroelasticity tunnel now operating at Mach 7 has proven the adequacy of helium as a test medium; however, it is far too small for most aeroelastic studies (inclusion of pressure cells, for example).

Adequate study of both the aeroelastic and aerothermal problems requires a usable test core of at least 2 feet. Because of the thick boundary layers at the Mach numbers to be encountered in the hyperthermal and hypersonic dynamics legs of this facility, test sections of the order of 4 feet in diameter are required. For this size test section, a closed-cycle helium system, which permits the helium to be purified and reused, is required for economic reasons in the hypersonic dynamics leg. The helium plant of the present 20-inch hypersonic tunnel will be enlarged, and this plant will operate the Mach 10 and Mach 20 helium legs of the facility and, in addition, will eliminate the severe restrictions on running time and on

The frequency of runs now imposed on the 20-inch hypersonic tunnel. In addition, the combining and sharing of various features and supporting equipment of the air and helium systems of the proposed facility will eliminate considerable duplication of new equipment and will permit maximum use of existing equipment and instrumentation.

3. COST ESTIMATE:

Helium heating system and pebble heater.....		\$434,000 }
Helium heating system.....	\$311,000	
Pebble heater and ceramics.....	123,000 -	
Electrical equipment and power system.....		1,236,000
Outdoor switchgear primary cable and substation construction.....	75,200	
10,000-KW industrial ignitron rectifier.....	663,500	
Regulating equipment.....	71,400	
Resistor.....	95,700	
Secondary cable and control.....	127,600	
Arc starting equipment.....	76,500	
Auxiliary unit substation.....	58,600	
Starter group assemblies and auxiliary controls and wiring.....	67,500	
Equipment foundations and housing, building and utility revisions and additions.....		479,000
Alterations to existing building and utilities.....	138,000	
Building addition and mechanical hoisting equipment.....	201,000	
Equipment foundations.....	140,000	
Settling chambers, arc chamber and test section.....		1,615,000
Settling chambers and arc chamber.....	230,000	
Nozzles and test section.....	657,400	
Model support systems.....	575,100	
Mechanical parts of Schlieren systems and second minimum.....	152,500	

Pressure, vacuum, helium, and air piping.....		\$613,000
Water cooling system and aftercooler.....		329,000
Air, helium, and vacuum storage.....		963,000
15,000 psi air storage.....	\$120,000	
5,000 psi helium storage.....	145,000	
100-foot diameter sphere for air leg.....	573,000	
60-foot diameter sphere for helium leg.....	125,000	
Controls.....		311,000
Multistage vacuum pumping and air dryer for the air system.....		675,000
Additional helium purification equipment and modifications to existing system.....		382,000
Instrumentation.....		700,000
Data recording equipment.....	\$175,000	
Force measuring instrumentation.....	143,000	
Pressure measuring instrumentation.....	120,000	
Temperature measuring instrumentation.....	40,000	
Optical instrumentation.....	40,000	
Recording and read-out equipment.....	103,000	
Programmer and test parameter instrumentation.	79,000	
Design and engineering services.....		<u>220,000</u>
Total estimated cost.....		<u>\$7,957,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 36 months

LANGLEY RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES
DYNAMICS RESEARCH LABORATORY

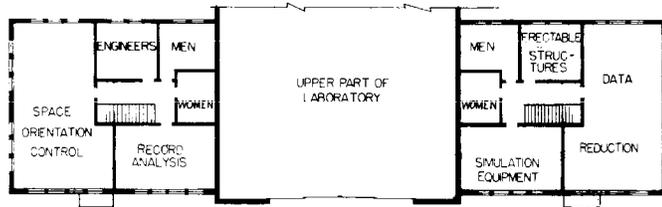
1. DESCRIPTION:

This project provides for the construction and instrumentation of a research laboratory designed to study dynamics problems of high performance aircraft, missiles, space vehicles, space stations, and satellite packages in simulated density, temperature, acceleration, and vibration environments. A drawing of the proposed facility is shown on the following page. The laboratory will provide the capability for study of both the structural dynamics of the vehicles and their components, and the free-body dynamics with respect to space orientation control, guidance, and navigation. Configurations envisioned include erectable space structures and parallel boost configurations as well as the more conventional configurations. The following items are proposed for construction and installation under this project:

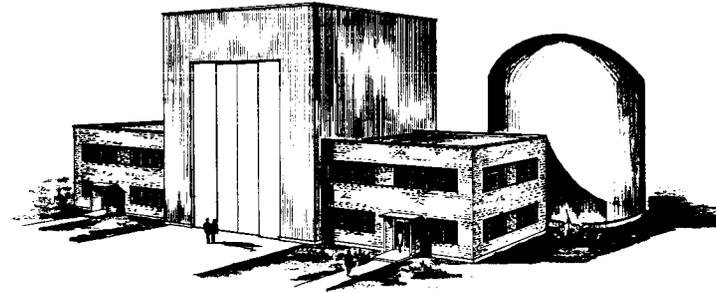
- (a) A modernization of the vibration facilities of the Langley Center including the addition of required shakers ranging from an increase in the present number of 50-pound capacity shakers to electronic and hydraulic vibration systems up to 25,000-pound capacity. The electronic systems will be capable of supplying sinusoidal as well as complex random force inputs to structures and instrumentation packages.
- (b) A large backstop capable of handling dynamic models of space stations, space vehicles, and boost configurations; components of full-scale space stations, vehicles, and boost systems; and satellite packages and vehicle instrumentation packages.
- (c) An environmental heat and hard vacuum chamber capable of simulating atmospheric density and heat conditions of hyper-

LANGLEY RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

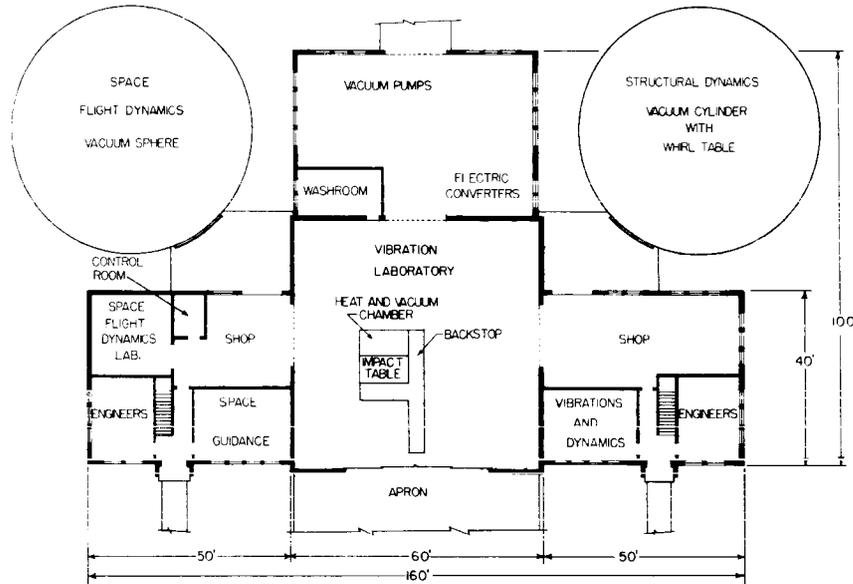
DYNAMICS RESEARCH LABORATORY



SECOND FLOOR PLAN

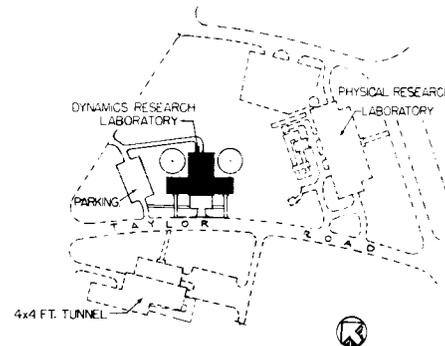


PERSPECTIVE



FIRST FLOOR PLAN

0 5 10 20 FT



LOCATION PLAN

0 50 100 FT.

LEGEND
 ===== EXISTING CONSTRUCTION
 ————— NEW CONSTRUCTION

sonic flight while simultaneously conducting vibration, acceleration, and fatigue research on vehicle structural and instrumentation components and control systems.

- (d) A whirl table capable of providing large acceleration fields simultaneously while simulating other vibrational and flight environments.
- (e) Simulation equipment to provide means for the study of gain and phase effects in semimechanical and analog studies of structural servo feedback induced vibrations and instabilities, and for the control and programming of environmental test conditions; provisions are included for a tie-in to existing computing facilities at the Langley Center.
- (f) A shock and impact loading table to simulate and study effects of shock loads arising from conditions such as boost ignition and burnout, stage separation and landing impact.
- (g) Apparatus for simulating electromagnetic field and other environmental effects on the spin stabilization of space vehicles and packages; apparatus to provide free suspension of space orientation control and guidance systems and stabilized vehicles; and apparatus to provide suitable radiation simulation of celestial space reference bodies.
- (h) A vacuum sphere 60 feet in diameter for the study of space orientation control, guidance, and navigation.
- (i) A vacuum cylinder 60 feet in diameter and 60 feet high with provisions for the installation of the whirl table and with provisions for studying the behavior of large space vehicle components at high altitudes, including the behavior of erectable structures.

- (j) A building for offices, shops, setup and control of tests, computing and data reduction equipment, and support machinery.
- (k) The necessary vacuum pumps to complement the equipment presently available at the Langley Center and to permit pump down of either the vacuum sphere or the cylinder to a moderate vacuum in approximately 2 hours.

2. JUSTIFICATION:

The development of satellites in the United States has been greatly hampered by lack of adequate facilities for research information on problems in dynamics and hence has proceeded on a cut and try, ad hoc test basis. The dynamic characteristics of vehicles are basic ingredients in the analysis of design for efficient performance and structural integrity. Lack of information on the dynamic characteristics has contributed to failures. Many of these have been caused by broken and malfunctioning equipment due to large repeated loads which lead to high vibratory response and fatigue of vehicle elements. The motions of the fuel and the vibratory deformations of the vehicle, coupling with the control system, as well as unbalance of the spinning payloads have also caused loss of vehicles. The future ferry-reentry vehicles, space stations, and vehicles for landing on the moon will generate many dynamics problems which must be solved.

Loss or malfunction of vehicles could be avoided and a more efficient structure could be obtained by appropriate applied research and by more comprehensive proof testing of the vehicle components and payloads under conditions which more nearly simulate the combined environments which the vehicles will experience. The laboratory under this project is designed primarily to provide simulated environments, from launch to orbit to landing, for research to obtain the structural efficiency and integrity demanded for high performance and to insure the reliable operation of the vehicle.

The present Langley vibration laboratory was planned nearly 20 years ago and was equipped to vibrate propeller blades and aircraft flutter models. Although some modernization has been made and new equipment added, the present facilities are totally inadequate for vibration research on space vehicles. The proposed facility will provide a larger laboratory, equipped with more versatile equipment of greater capacity designed primarily to do research

on, and supplement analyses of, vibration, shock, and other dynamics problems. In order to minimize cost and cope with the size and complexity of existing and planned vehicles, research will be carried out by means of dynamic models, full-scale tests of components, and by the use of simulators.

The proposed laboratory will provide the unique facilities required to handle many dynamics problems on a variety of configurations and systems. The equipment will provide, for example, the research capability necessary to:

- (a) Spin and vibrate space stations and models up to 50 feet in diameter in vacuum to determine stresses, loads, leakage, and other factors essential to improve the structural integrity of the vehicle.
- (b) Study the performance of various types of stabilization and guidance systems over long periods of time of the order of several months.
- (c) Study the dynamics and loads problems of rendezvous of two vehicles while in vacuum, including the transfer of occupants.
- (d) Vibrate dynamic models of large multistage vehicles in order to obtain the vibration modes and to study problems of structural feedback and servo systems.
- (e) Study separately, and in combination, the effects of noise, vibration, acceleration, heat, vacuum, etc., on space and reentry vehicles.

3. COST ESTIMATE:

Building.....	\$519,000 -
Utilities and paving.....	65,000
Backstop and foundation.....	550,000
Impact and shock table.....	30,000

Cranes.....		\$49,500
Vacuum system.....		723,500
Environment test cell.....		112,500
Centrifuge.....		104,500
Electrical systems.....		530,000
Instrumentation.....		1,200,000
Vibration test system.....	\$350,000	
Weights, balances and accessories		
for backstop.....	75,000	
Orientation and stabilization equipment.....	300,000	
Radiation simulation system.....	100,000	
Simulation computer system.....	75,000	
Data recording and readout equipment.....	100,000	
Auxiliary laboratory instrumentation.....	200,000	
Shop equipment and furniture.....		22,000
Design and engineering services.....		<u>94,000</u>
Total estimated cost.....		<u>\$4,000,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 24 months

AMES RESEARCH CENTER

FISCAL YEAR 1961 ESTIMATES

CENTRIFUGE EQUIPMENT

1. DESCRIPTION:

The Ames 30-foot centrifuge is a minimum facility using surplus electrical drive equipment of marginal performance. It uses approximately two-thirds of the capacity of the existing analog computer and lacks separate supporting instrumentation. In order to make the centrifuge capable of independent operation, improve its performance to the design maximum, and equip it with instruments for adequate pilot display and safety of operation, the following items are required:

- (a) Electronic control equipment consisting of two analog computer consoles providing 200 d.c. amplifiers, 10 coordinate resolvers, 20 servo multipliers, 20 electrical multipliers, 20 diode function generators, recorders, plotters and special mechanical resolvers.
- (b) Electrical drive equipment to replace temporary surplus electrical drives; the five motors involved power the three gimbal drives on the cab, the centrifuge arm rotation, and the drive for vertical translation of the cab.
- (c) Instrument equipment consisting of specialized instrumentation which must duplicate aircraft instruments in appearance yet be driven by the outputs from analog and digital computers.

2. JUSTIFICATION:

Electronic control equipment: Experience with the pitch-roll chair has shown that the analog computer element of the control system is one of the basic factors influencing the utilization of a simulator. Even the simplest problems that can be run on the centrifuge require about two-thirds of the Ames Center's existing computer capacity, resulting in severe interference with the other uses of the computer.

In addition, the complexity of the computer setup and the fact that it is involved in the safety of the operation make it essential that an independent computer setup be available at all times for the simulator.

Electrical drive equipment: The use of surplus electrical drives has resulted in a performance decrement of 20-30 percent from that required on the basis of analog computer studies. This has an adverse effect on research requiring the simulation of rocket-boosted take-off and trajectories and high-speed aileron rolls on conventional aircraft. The installation of new drive equipment will permit the facility to meet its design requirements.

Instrument equipment: Simulator instrumentation is always plagued by the problem of keeping up with ever-changing aircraft cockpit appearance. To provide the proper display for the pilot without having to start over again for each simulation it is necessary to provide a flexible system of standard servo outputs and followers driving movements whose dials and entire external appearance can be modified radically and relatively easily. The items proposed in this project will furnish the basic hardware for such a system. In general, the actual instruments cannot be used because on the simulator they must be driven by the analog computer rather than by physical inputs, such as motion or air pressure.

3. COST ESTIMATE:

Computer equipment.....		\$390,000
Electrical drive equipment.....		435,000
Three gimbal drives.....	\$127,000	
Vertical and spin drives.....	308,000	
Instrument equipment.....		155,000
Specialized instruments.....	35,000	
Displays and oscilloscopes.....	10,000	
Advanced control system mockups.....	25,000	
Instrument positioning equipment.....	25,000	
Transducers, transmission, and recording equipment.....	60,000	
		<hr/>
Total estimated cost.....		<u>\$980,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 8 months

LEWIS RESEARCH CENTER

FISCAL YEAR 1961 ESTIMATES

ENERGY CONVERSION LABORATORY

1. DESCRIPTION:

This project proposes the construction of an integrated complex of facilities for a broad research program on energy conversion and power generation processes and equipment. Major components of the facility comprise highly specialized equipment and instrumentation, suitable laboratory spaces for the equipment, control rooms and required services, as follows:

Radiant energy conversion facilities: Equipment to produce a variety of radiant energy sources, including electromagnetic waves, and neutron beams of various energies; and equipment for preparing special cells, and related devices.

Thermal energy conversion facilities: Equipment to provide thermal energy sources, and instrumentation and apparatus for testing and evaluating systems.

Chemical properties equipment: Advanced instrumentation for ascertaining properties of matter in its various states in support of energy conversion research as well as other researches at the laboratory pertaining to propulsion and space research.

Liquid metal pump facility: A test facility for pump research including cycle heater, condenser, research pump, prime mover, flow control instrumentation and liquid metal storage and purification equipment.

Liquid metal turbine facility: A closed-loop turbine rig including boiler, research turbine, condenser, service pump, power absorber, controls and instrumentation.

Systems dynamics and cavitation facility: A small scale closed-loop rig including pump, heat exchanger, lines and ducting, test sections, supply tank and special devices for studying fundamental dynamics and cavitation characteristics of liquid metals.

Liquid metal heat transfer facility: A multi-closed loop heat transfer rig involving fluid supply tank, pumps, test section, heat source, purging and cleaning equipment and instrumentation for studying convectors, nucleate boiling, condensation and evaporation phenomena of liquid metals at temperatures from 1,000° to 2,500° F.

Friction and lubrication apparatus: A friction test rig and vacuum chambers for investigation of bearings and seals for liquid metal applications.

A drawing of the proposed energy conversion laboratory is presented on the following page.

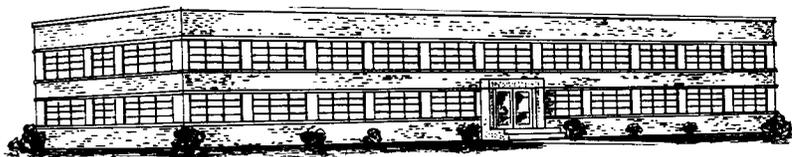
2. JUSTIFICATION:

A prime requirement for effective space flight and space exploration is light-weight, efficient electrical production devices. Not only is the need for light weight and high efficiency very great, but the power requirements for future space vehicles vary over extremely wide ranges of duration, average power, and peak power. To adequately meet these requirements, a broad research program on a wide variety of energy conversion processes is essential. Such a program must encompass exploratory, basic research on various concepts of direct conversion processes, applied research on turbo-electric system components, research into the heat transfer and thermodynamic and hydrodynamic characteristics of novel working fluids.

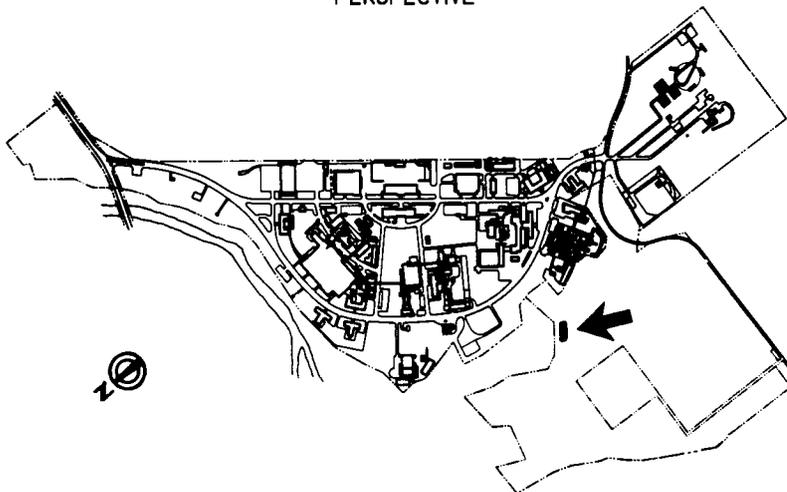
Exploratory research on direct conversion processes includes the production of electrical energy from heat and radiation of various kinds. Typical concepts requiring experimental investigation are photovoltaic cells of various kinds, photogalvanic cells, microwave amplifiers, thermopiles, plasma diodes, and utilization of energy gaps in semi-conductors or artificial metals. Such direct conversion methods offer the promise of improved reliability for long term space missions through the elimination of rotating machinery. The theoretical efficiencies are comparable to those of conventional electric power generation equipment. The direct conversion devices also hold promise for improved lifetime against meteoroid penetrations of the power plant waste heat radiator.

To achieve light-weight, turbo electric systems requires vaporized and liquefied metals at high temperatures as the working fluid. There are therefore introduced a host of new problems relating to the unusual hydrodynamic and thermodynamic properties of these fluids

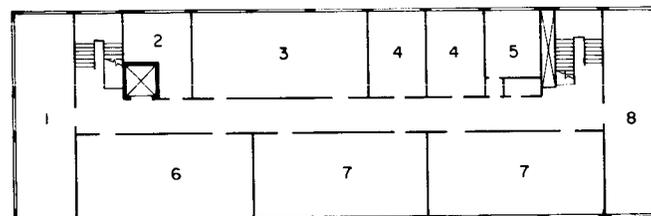
ENERGY CONVERSION LABORATORY



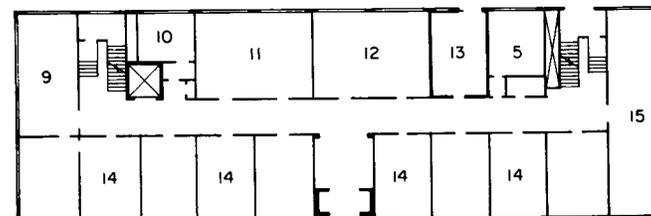
PERSPECTIVE



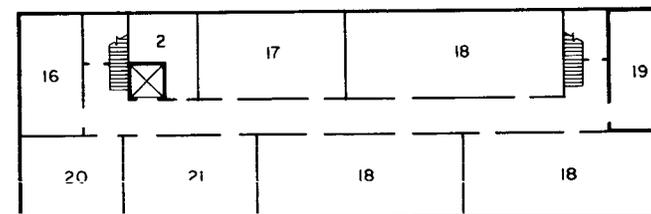
PLOT PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT PLAN



- | | |
|---|--|
| 1. ELECTRIC GENERATOR, MICROWAVE GENERATORS AND RECEIVERS | 12. MICROSCOPES |
| 2. STOCK ROOM | 13. CHEMICAL PROPERTIES LABORATORY |
| 3. MASS SPECTROSCOPY | 14. OFFICES |
| 4. SPECTROSCOPIC LABORATORY | 15. SPECTROMETER, LIGHT SOURCES |
| 5. MENS ROOM | 16. X-RAY DIFFRACTION CAMERA |
| 6. IMAGE FURNACE, HEATERS, VACUUM EQUIPMENT | 17. SHOP AREA |
| 7. VACUUM FURNACE | 18. EQUIPMENT ROOM |
| 8. GAS CHROMATOGRAPHY | 19. PROTON BEAM SOURCE, X-RAY EQUIP, MONOCHROMATORS |
| 9. CONFERENCE ROOM | 20. MEASURING EQUIPMENT, HALL COEFF., THERMOELECTRIC POWER |
| 10. WOMENS ROOM | 21. ELECTRON GUN, ULTRAVIOLET LIGHT, SUN SOURCE |
| 11. CHEMISTRY LABORATORY | |

as well as to the design and operation of such high-temperature components as pumps, turbines, evaporators, and heat exchangers. To rapidly and effectively develop this new technology will require a well coordinated research program on all these problems. Pumps must be capable of operating with these fluids near their boiling point; turbines must operate with high efficiency and with considerable moisture in the working fluid; the cavitation phenomena of liquid metals in valves and pumps need be determined; the mechanism of the flashing of the liquid into the vapor phase needs study; and knowledge of the general heat transfer, hydrodynamic and thermodynamic properties of these liquids and their vapors is virtually non-existent.

3. COST ESTIMATE:

Building.....		\$785,000
Site preparation and utility connections.....		190,000
Equipment.....		3,850,000
Radiant energy conversion equipment.....	\$450,000	
Thermal energy conversion equipment.....	480,000	
Chemical properties equipment.....	340,000	
Liquid metal pump.....	390,000	
Liquid metal turbine.....	840,000	
Systems dynamics and cavitation equipment.....	160,000	
Liquid metal heat transfer equipment.....	620,000	
Friction and lubrication apparatus.....	570,000	
Design and engineering services.....		<u>225,000</u>
Total estimated cost.....		<u>\$5,050,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 27 months

LEWIS RESEARCH CENTER

FISCAL YEAR 1961 ESTIMATES

BASIC MATERIALS RESEARCH LABORATORY

1. DESCRIPTION:

A basic materials research laboratory is required to extend the scope and magnitude of the materials research capabilities of NASA to the field of space vehicles. The drawing on the following page indicates the type of structure being proposed in this project. Equipment will be provided as follows:

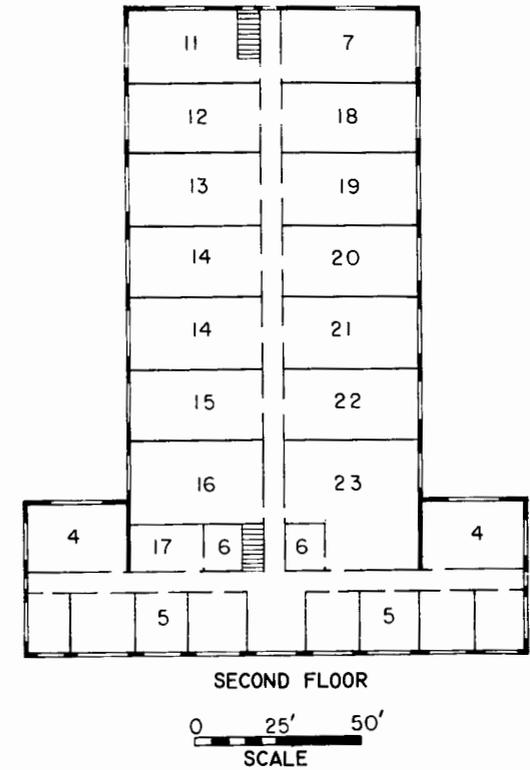
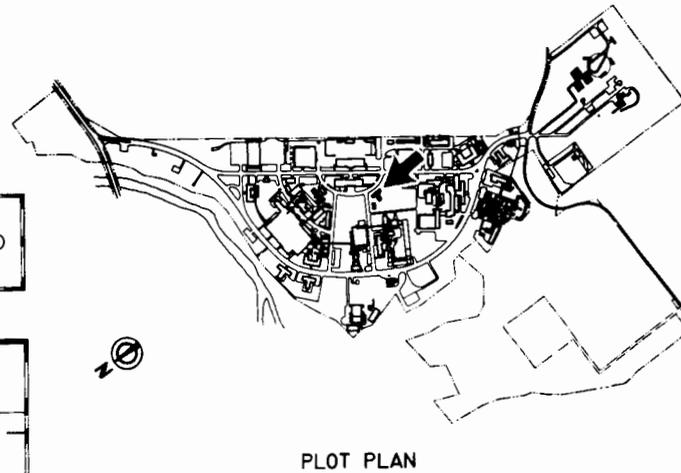
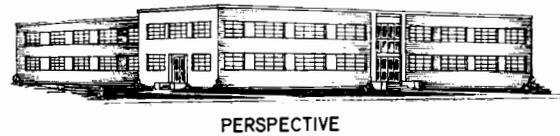
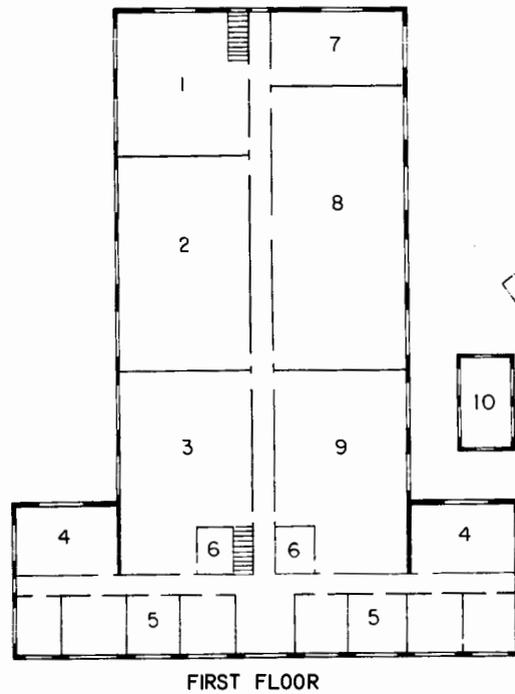
Physics and chemistry of solids equipment: This category will include equipment for basic research on ion and radiation damage, the chemistry and physics of surfaces under very high vacuum, the nature of imperfections in solids, elementary processes involved in the mechanical behavior of solids, chemical binding in refractory materials, and the chemistry of the reactions of dissociated gases with metals and ceramics at very high temperatures. Experimental apparatus required for these studies includes a Van de Graaff electron accelerator for radiation damage research, and ion accelerator in the 10,000-50,000 volt range for surface ion damage studies, cryogenic equipment for study of radiation effects at very low temperatures, and neutron diffraction equipment to be used in conjunction with the Lewis Center's nuclear reactor for study of the structure of imperfections in metals and ionic solids.

Corrosion research equipment: This equipment is needed for the production of very high purity liquid metals, for the operation of static corrosion capsules, and for the operation of circulating systems required in the evaluation and study of corrosion and mass transfer in both the liquid and vapor state.

Composite materials equipment: It is proposed to provide mechanical processing equipment to prepare and process fibers and whiskers, and to permit the fabrication of metallic fibers. The equipment will include swagers, wire drawing benches, melting and blowing apparatus, gas jet torches, seeding and spinning equipment, a powder rolling mill capable of producing sheet, a large capacity rolling mill, and equipment for such advance forming techniques as deforming at very high pressures,

LEWIS RESEARCH CENTER
FISCAL YEAR 1961 ESTIMATES

BASIC MATERIALS RESEARCH LABORATORY



1. WELDING, BRAZING AND JOINING
2. ULTRA-PURE MATERIALS
3. COMPOSITE MATERIALS
4. OFFICE
5. OFFICES
6. WASHROOM
7. RADIATION DAMAGE
8. CORROSION RESEARCH

9. HIGH TEMPERATURE, HIGH PRESSURE
10. CRYOGENIC TANK RESEARCH
11. ELECTRON DIFFRACTION
12. HIGH TEMPERATURE CHEMISTRY
13. SURFACE CHEMISTRY
14. SPACE ENVIRONMENT
15. LIQUID METALS
16. SPECIMEN PREPARATION

17. DARK ROOM AND GLASS BLOWING
18. OXIDATION
19. METAL PHYSICS
20. DIFFUSION STUDIES
21. NUCLEAR MAGNETIC RESONANCE
22. MECHANICAL PROPERTIES
23. DUCTILE CERAMICS

explosive forming, and production of composite structures. Whisker growing equipment will include chemical tanks, vapor deposition apparatus, high pressure tanks, electro-deposition tanks, and very high vacuum chambers.

Ultra-pure materials equipment: Melting equipment capable of operation at very high temperatures and vacuum, vapor deposition equipment, and equipment for chemically processing and purifying refractory metals and ceramics will be provided.

Welding, brazing, and joining equipment: Investigations in this field will require facilities for vacuum and hydrogen brazing, fluxing facilities, heat treating baths, and furnaces. Welding equipment of all types, automatic welders for seam welding, hydrogen arc pressure welding, as well as ultrasonic and electron beam welders, will be provided for studying the properties of metals, semi-conductors and insulators. Electrical and thermal conductivity characteristics will be evaluated. The variation of these properties with such parameters as temperature, composition and structure would also be studied. The equipment required will include devices for the preparation of high purity materials such as high vacuum zone refining equipment, processing equipment, furnaces, molding machines, and testing equipment for making precise electrical measurements.

High pressure-high temperature equipment: This category will include a hydraulic press capable of producing pressures in excess of one million pounds per square inch, associated with a resistance heater power supply for obtaining high temperatures, Bridgeman apparatus, and apparatus for determining crystallographic properties of materials.

Cryogenic tank research equipment: Equipment will be provided for conducting research on minimum weight propellant tankage for booster and space propulsion systems using cryogenic propellants such as liquid hydrogen, liquid oxygen, and liquid fluorine. Also required will be equipment for photoelastic studies, tankage insulation studies, and studies of shock absorption devices for landing vehicles.

2. JUSTIFICATION:

To meet expanding NASA research responsibilities it is mandatory that the scope and magnitude of the NASA materials research effort be substantially expanded, primarily to study the unique and entirely new materials problems that are encountered in space vehicles.

The materials problems in space vehicles arise from three sources. First, the vehicle itself operates in a novel (and in some respects still unknown) environment. Second, novel propulsion systems are being devised and many of these subject materials to severely corrosive environments. Third, there is a need for weight reduction in order to eliminate the penalty of high propellant usage in bringing unnecessary weight in space.

A basic materials research laboratory is proposed to conduct research on these problems, as follows:

Physics and chemistry of solids research: Basic research in the physics and chemistry of solids is needed to gain an understanding of the behavior of materials under space environment conditions in order that their limitations will be known and in order that new or improved materials can be developed.

Corrosion research: One method which has been proposed for the generation of electricity for electric propulsion and auxiliary power devices is through the use of a turbo-generator system in which the turbine is driven by the vapors of the alkali metals (sodium, rubidium, lithium, etc.). These vapors are then recirculated after being condensed in a radiator. Such a system would offer considerable weight saving over the use of a straight gaseous heat transfer medium. The alkali metals are known to be very corrosive at mild temperatures. At temperatures near and above their boiling point this corrosion can be anticipated to be much more severe.

Composite materials research: Wires, when they are drawn to very fine sizes, exhibit unusual strength relative to more massive forms of the same materials. By incorporating very strong wires, fibers or filaments with relatively weak matrix materials, it should be possible to make unusually strong, or strong and light weight structures. A common material known to have a strength of almost 2 million pounds per square inch is iron, but only when it is in whisker form. By combining very strong metallic and ceramic whiskers, in relatively weak matrix materials, it may be possible to obtain significantly stronger materials for use in an infinite number of propulsion systems applications. New and radically different composites are needed for future outer air and space vehicles. The development of useful combinations and configurations will require basic materials research and the development and evaluation of the finished items.

Ultra-pure materials research: A high temperature and vacuum apparatus along with extremely precise analytical facilities to prepare and analyze ultra-high purity metals and ceramics is required to realize the potential of the most refractory materials. The properties of many refractory metals and ceramics are ill-defined because of their varying composition and purity. In other cases, the known properties reflect undesirable characteristics which may be due to impurities. Tungsten, the most refractory metal, for example, has been considered for many advanced propulsive devices but it apparently lacks the ductility required to enable it to be fabricated. This lack of ductility may be associated with trace amounts (on the order of a few parts per million) of interstitial gases such as oxygen, nitrogen, and hydrogen. It has been hypothesized that many ceramics may show improvements in ductility and toughness if both their composition and purity could be controlled.

Welding, brazing, and joining research: The joining of ultra-thin laminates of different materials with varying physical properties (i.e., coefficient of linear expansion), poses a difficult problem. Joining of dissimilar materials such as metal-plastics and metal-ceramic combinations provides another major research area. As research with the more refractory metals brings them into more common usage, methods for joining these metals to themselves and to each other must be studied. Cold joining of materials by ultrasonic welding affords promise as a means of preventing weld damage of adjacent metal areas. This is an entirely new area of research with extensive potential applications to propulsion systems.

High pressure-high temperature research: It is possible that many metals and ceramics systems unobtainable by conventional melting or powder techniques could be synthesized by high pressure metallurgy. Significant improvements in hardness, strength, fatigue creep, and ductility properties of metals, ceramics, and cermet materials may be obtainable.

Cryogenic tank research: For rocket boosters and space propulsion systems, the propellant tankage makes up a sizable portion of the vehicle structure. Because of the high cost of putting extra weight in orbit or in transporting the weight to other planets, every means possible must be evaluated to determine minimum weight tankage for the propellants of interest for nuclear and chemical rockets. Information available on material properties and construction techniques applicable to hydrogen and fluorine tankage is extremely meager so, consequently, added research is required. Another area of research is that of determining optimum construction practices in discontinuity regions, i.e., regions of welding and joining.

3. COST ESTIMATE:

Building.....	\$1,050,000
Utility connections.....	50,000
Equipment.....	2,895,000
Crane.....	\$50,000
Equipment for study of physics and chemistry of solids.....	600,000
Corrosion research equipment.....	200,000
Composite materials equipment.....	495,000
Ultra-pure materials equipment.....	250,000
Welding, brazing, and joining equipment.....	300,000
High-pressure, high temperature equipment.....	500,000
Equipment for cryogenic tank research.....	500,000
Design and engineering services.....	<u>55,000</u>
Total estimated cost.....	<u>\$4,050,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 15 months

GODDARD SPACE FLIGHT CENTER

FISCAL YEAR 1961 ESTIMATES

PAYLOAD TESTING FACILITY

1. DESCRIPTION:

It is proposed to construct an integrated laboratory to house the necessary facilities and personnel for the testing and evaluation of all scientific probes, payloads, or satellites developed by the Goddard Space Flight Center. As indicated in the drawing on the following page, the building will consist of a multistory office area for scientific and administrative offices interconnected to a single story laboratory area containing a high center bay with bridge crane and paralleled on either side by low bays for bulky research facilities, isolatable test cells, instrumentation rooms and supporting equipments. The building will provide about 60,000 square feet of space, including fall-out shelters in accordance with OCDM requirements.

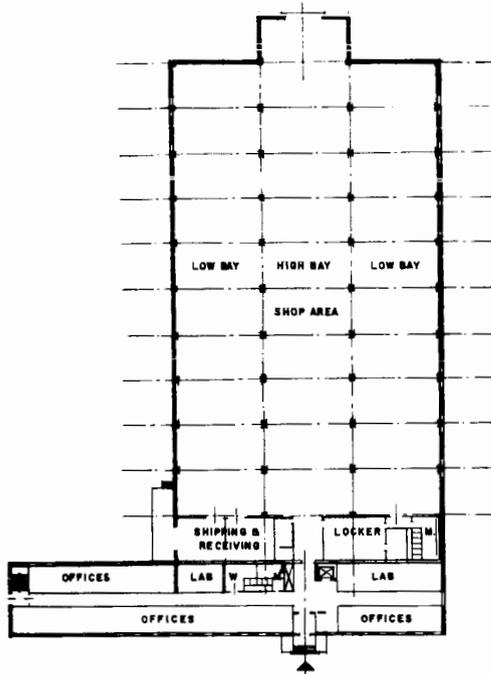
2. JUSTIFICATION:

The proposed facility represents an orderly progression in the long range development of the Goddard Space Flight Center and is in consonance with the rapid scientific developments permitting larger space payloads. Heretofore, the test and evaluation function has had to be accommodated in temporary quarters in scattered locations and has often been accomplished in "borrowed" research facilities with attendant delays.

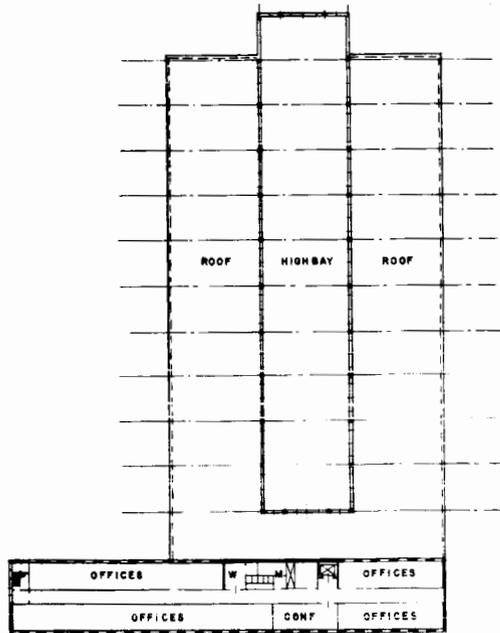
With the increasing size, complexity and cost of scientific payloads, it is mandatory that they be thoroughly tested and evaluated as integrated systems prior to actual flight. The facility proposed in this project will permit the simulation separately, sequentially, or in compatible combinations, the extremes of the natural and induced environmental forces which a space vehicle experiences in its life cycle of ground handling, launch, flight, re-entry and landing. The advanced type research facilities required (limited only by existing technology) will reproduce the effects of solar radiation, the earth's albedo (infra-red radiation), the cold of outer space, the vacuum of outer space, primary cosmic or Van Allen Belt radiation, and the induced effects from the booster or control rockets of shock, spin, roll, vibration and acceleration.

PAYLOAD TESTING FACILITY

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1961 ESTIMATES



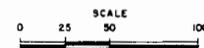
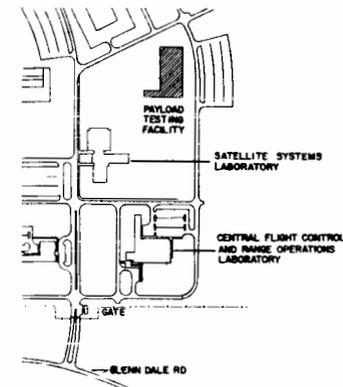
1ST FLOOR PLAN



2ND FLOOR PLAN



WEST ELEVATION



To achieve a high reliability of success in our space vehicles (payloads), it is imperative that a thorough and comprehensive test and evaluation be made of complete systems in prototype and of the flight hardware. Such tests of prototype can resolve technical difficulties at an early stage and thus enhance the quality of scientific data finally achieved. Flight unit hardware can be tested to assure high reliability of mission and avert costly flight failures or mission aborts. For example, malfunctioning of a guidance relay under induced vibrations of launching could be detected in the laboratory which might change a lunar probe from a failure to a success. Or, considering the combined effects of solar radiation and the low pressure (vacuum) in outer space, the malfunctioning of over-heated, hermetically sealed electronic units which sometimes explode might be uncovered through a combined thermal-vacuum test. Further, the need for precisely balancing the final flight payload is an absolute necessity. Minor errors here can be the difference between hitting and missing the moon by several diameters. Likewise, the structural dynamics and interactions between multistages or separation of payload and motor can often be determined to the required accuracy only by testing an exact replica of the flight unit under simulated conditions.

In addition to the system test functions to be carried out in the laboratory, the scientific and technical staff will conduct a research and development program concerned with advancing test technology and methods, and attempting "break-throughs" in simulation techniques and equipments which currently limit ground duplication of space effects.

3. COST ESTIMATE:

Building construction.....	\$1,250,000
Research equipment.....	2,230,000
Thermal-vacuum systems.....	\$860,000
Environmental test chambers.....	90,000
Vibration systems.....	300,000
Centrifuges.....	75,000
Shock testers.....	25,000
Mechanical test equipment.....	150,000
Balancing equipment.....	60,000
Nondestructive test equipment.....	75,000

Data handling systems.....	345,000	
Combined environment facility.....	250,000	
Design and engineering services.....		<u>75,000</u>
Total estimated cost.....		<u>\$3,555,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 26 months

GODDARD SPACE FLIGHT CENTER

FISCAL YEAR 1961 ESTIMATES

SATELLITE SYSTEMS LABORATORY

1. DESCRIPTION:

This project proposes the construction of a laboratory building that will provide the Goddard Center with facilities for the development and integration of large satellite systems. The building will provide about 100,000 square feet of space, including fall-out shelters in accordance with OCDM requirements. A sketch of the proposed facility is presented on the following page. The building will include an enlarged cafeteria required for the increased staff, an auditorium for the Center's technical and staff meetings, and provisions for a permanent library. As part of this project, the existing interim cafeteria equipment presently located in the space projects building will be moved and the area converted to engineering design space in accordance with the original long-range plan for that structure.

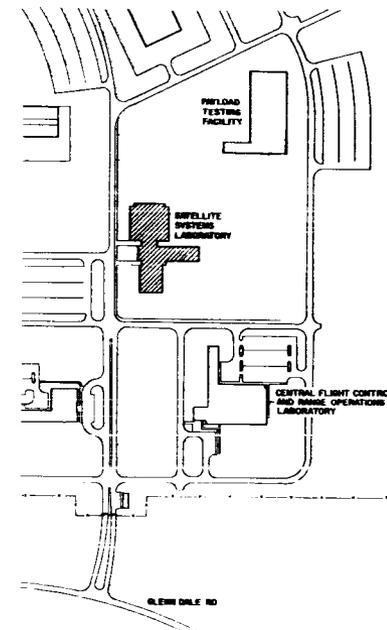
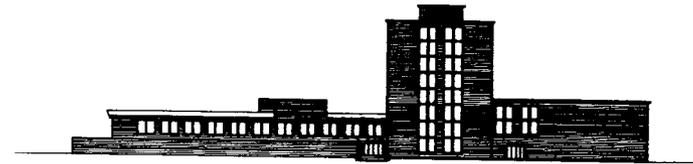
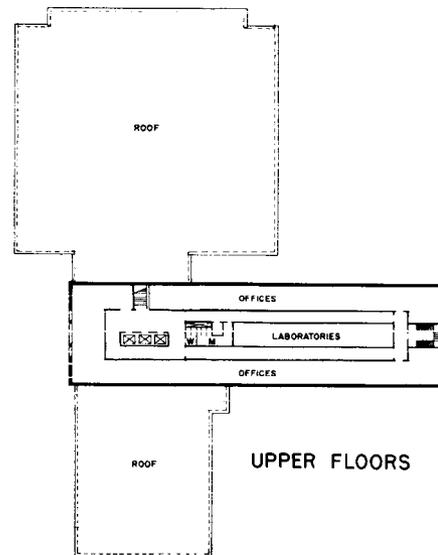
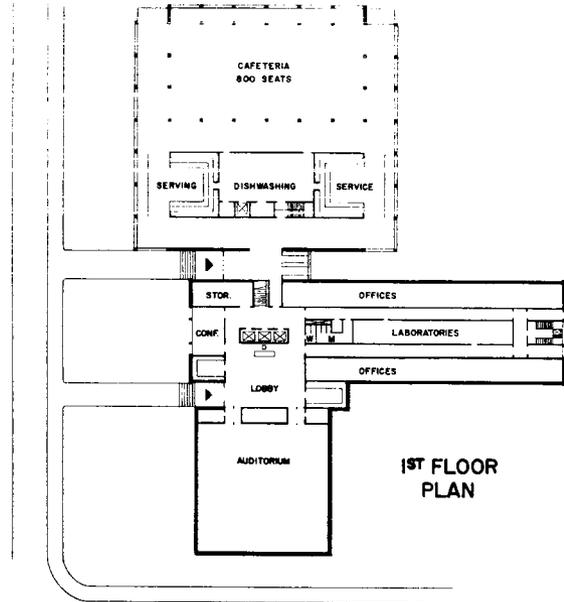
2. JUSTIFICATION:

The increased thrust being provided by current booster development programs will provide for increasingly larger and more complex satellite systems and payloads. The conception, construction, and integration of these complex systems requires additional facilities and personnel skilled in payload system integration and management.

Typical payloads are those for Nimbus and for the orbiting astronomical satellite. The Nimbus satellite, weighing upwards of 600 pounds, contains television, electrostatic tape records, radiation sensors and scanners, and other instruments intended to study the meteorology of the earth. The satellite will contain an elaborate control system consisting of pneumatic and gyro wheel elements for stabilizing the satellite with respect to the earth. Thus, the cameras and other sensors will always be looking straight down at the surface. In addition, a near polar orbit is planned, which will result in much greater coverage. To design and integrate such a complex system as a complete unit, a process necessary for mission success, facilities and personnel working together in a single area are needed.

SATELLITE SYSTEMS LABORATORY

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1961 ESTIMATES



SCALE
0 25 50 100

Another larger and more complex payload is the orbiting astronomical satellite which will weight more than 3,000 lbs. and contain a vast array of astronomical instrumentation. From this highly stabilized platform, telescopes will be pointed to definite objects of the sky for astro-physical study. Still another type of payload weighing up to 3,000 lbs. will be composed of separate satellite systems some of which will be ejected as individual satellites. All components of these systems must be brought together in a single area for integration and systems testing.

The work involved in the integration and testing of these payload systems includes the development of attitude orientation devices requiring gyro and jet stabilization systems; the development of precise steering controls for predetermined flight programs; the development of integrated satellite payloads including mechanical, power, and signal compatibility of various experiments or subsystems; the study of special trajectory requirements; flight stability analysis; and the development of separation techniques.

The implementation of this work requires a location at the Goddard Center with access to the instrument shops, the environmental checkout facilities, and the scientific staff developing the sensor components. The proposed building will enable the Center to group its scientific, technical and administrative staff efficiently in accordance with their related functions.

3. COST ESTIMATE:

Building construction.....		\$3,700,000
Research equipment.....		650,000
Gyro-test facility including associated computer..	\$400,000	
Check-out ground receiving and decoding equipment.	200,000	
Shielded rooms.....	50,000	
Revisions to space projects building.....		70,000
Design and engineering services.....		<u>216,000</u>
Total estimated cost.....		<u>\$4,636,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 26 months

GODDARD SPACE FLIGHT CENTER

FISCAL YEAR 1961 ESTIMATES

UTILITY INSTALLATIONS

1. DESCRIPTION:

This project covers the necessary additional utility installations required by the Goddard Center. The project includes the erection of a security fence and gate house, site and road improvements, utility extensions, and additions to the heating plant. The proposed work is indicated on the plot plan of the Goddard Center shown on the following page.

2. JUSTIFICATION:

At the Goddard Space Flight Center, authorized in the fiscal year 1959, the NASA is establishing a development center from which space programs can be planned, monitored, controlled and evaluated. In conjunction with the two additional buildings being proposed for construction in the fiscal year 1961, additional supporting utility installations will be required. The central power, steam generating, and refrigeration plants must be enlarged; extensions will have to be made to the underground utility distribution systems; site clearing and grading is required; additions will have to be made to site roads and parking areas; a property fence and gate house will have to be erected; and the installation of alarm and traffic control systems for security operations will be required.

In addition, the improvement of Glen Dale Road, currently a secondary county road, from the Baltimore-Washington Parkway to Telegraph Road is necessary. The Goddard Space Flight Center site occupies approximately two-thirds of this front footage on the north side of Glen Dale Road; a fair share of the estimated cost of improvement is approximately one-third. The required additional right-of-way for widening the road is available from Government property.

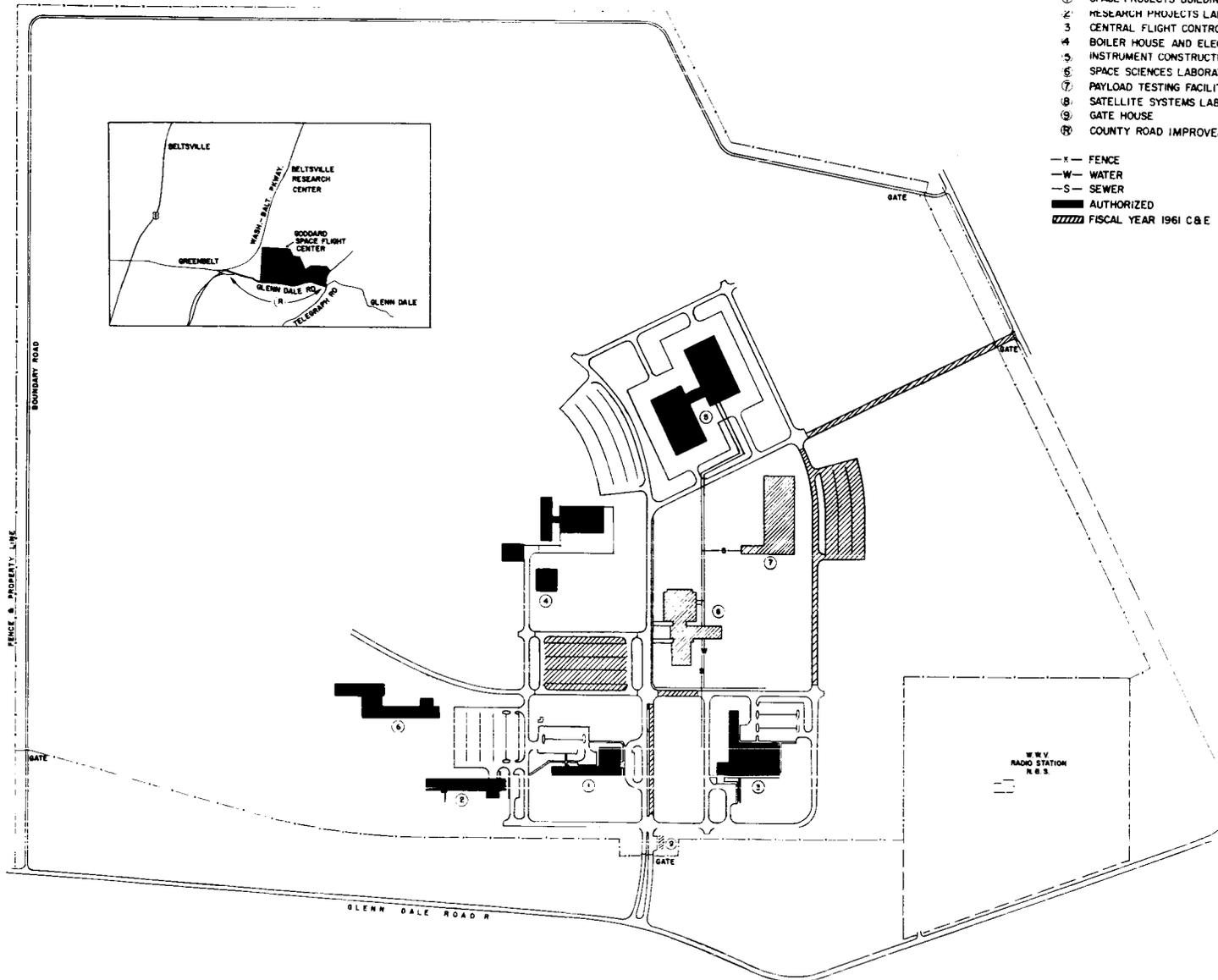
UTILITY INSTALLATIONS

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1961 ESTIMATES

LEGEND

- ① SPACE PROJECTS BUILDING
- ② RESEARCH PROJECTS LABORATORY
- ③ CENTRAL FLIGHT CONTROL AND RANGE OPERATIONS LABORATORY
- ④ BOILER HOUSE AND ELECTRIC SUBSTATION
- ⑤ INSTRUMENT CONSTRUCTION AND INSTALLATION LABORATORY
- ⑥ SPACE SCIENCES LABORATORY
- ⑦ PAYLOAD TESTING FACILITY
- ⑧ SATELLITE SYSTEMS LABORATORY
- ⑨ GATE HOUSE
- Ⓜ COUNTY ROAD IMPROVEMENT

- X- FENCE
- W- WATER
- S- SEWER
- AUTHORIZED
- ▨ FISCAL YEAR 1961 C & E



SCALE 1" = 200'

3. COST ESTIMATE:

Additions to the central heating plant.....	\$460,000
Extension of power, water and sewer utilities.....	220,000
Site work and roads.....	240,000
Improvement to county road.....	200,000
Boundary fence and clearing.....	82,000
Gate house, security and traffic control equipment.....	<u>87,000</u>
Total estimated cost.....	<u>\$1,309,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time.....	26 months
--------------------------------------	-----------

WALLOPS STATION

FISCAL YEAR 1961 ESTIMATES

PRECISION TRAJECTORY DETERMINATION SYSTEM

1. DESCRIPTION:

This project covers the installation of a system to provide precise real-time determination of the trajectory parameters of rocket research vehicles utilizing small, lightweight transponders (20 pounds) in the vehicles. A high resolution, precision interferometer and a real-time data handling and computing system will be used with a tracking radar to determine position, velocity, and flight-path angles; and the predicted impact location for recovery. The system will be designed so that the addition of command-control equipment will enable trajectory control of research vehicles. Buildings will be provided to house one active and two passive units of the radio interferometer. A sketch of the proposed installation is shown on the following page.

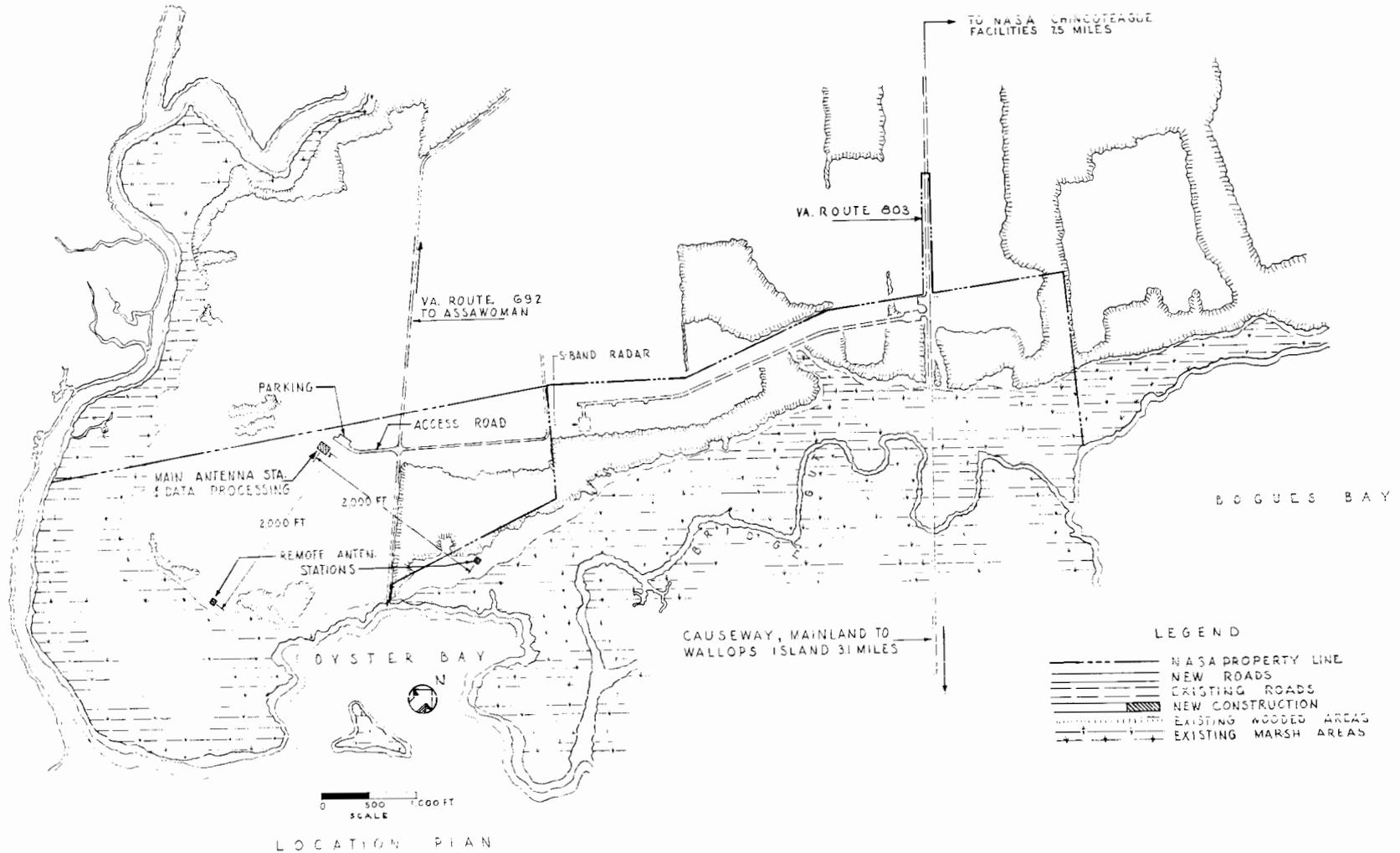
2. JUSTIFICATION:

Future research programs require that trajectory parameters be accurately determined at extreme ranges by a system which uses minimum payload weight in the vehicle. This is essential in order to have useful payload for research experiments while still utilizing economically feasible rocket propulsion systems. Existing and presently planned equipment is capable of velocity determination of only 200-500 feet per second at the ranges of these future vehicles. This must be supplemented with a system capable of velocity measurement to 10 feet per second or better to permit accurate prediction of the impact location of vehicles which are used in research programs where recovery of the vehicle is necessary. For example, ablation tests and studies of certain radiation effects in space require recovery of test vehicles.

The system is essential as part of the equipment required to control staging and guidance corrections to achieve the required flight trajectories. When used with the proper command-control system, it will permit correction of the cumulative errors in inertial reference systems which are extremely difficult to hold to the required error tolerances under

WALLOPS STATION
FISCAL YEAR 1961 ESTIMATES

PRECISION TRAJECTORY DETERMINATION SYSTEM



the increased accelerations experienced in solid-fuel rocket systems. Without this system, it will become increasingly difficult and expensive, if not impossible, to maintain adequate accuracy from internal preset controls.

3. COST ESTIMATE:

Site preparation.....		\$200,000
Roads and utilities.....	\$125,000	
Interstation transmission and communication lines.....	75,000	
Buildings.....		460,000
Main antenna station building.....	320,000	
Two remote antenna station buildings.....	140,000	
Precision interferometer.....		1,000,000
Transmission system.....	300,000	
Range-rate subsystem.....	200,000	
Two angular-rate substations.....	500,000	
Real-time data handling and computer-input equipment.....		<u>250,000</u>
Total estimated cost.....		<u>\$1,910,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 24 months

WALLOPS STATION

FISCAL YEAR 1961 ESTIMATES

OPERATIONS COMPUTING CENTER

1. DESCRIPTION:

This project is requested to provide a center capable of handling data reduction at the Wallops Station. The main computing machines will be rented, but it will be necessary to provide funds for (1) the purchase of auxiliary equipment such as film readers, strip chart readers, automatic data plotters, small desk-type calculators, and a tape to card converter for telemetering data; and (2) remodeling part of an existing building at the Wallops Station to house the rented computers and the related equipment.

2. JUSTIFICATION:

Data from the Wallops Station's firings are now reduced at the Langley Center and are, in general, handled in a manner tailored for aerodynamic research. By 1961, the volume of firings scheduled for the Station (involving the Langley, Goddard, Ames, and Lewis Centers, and many sounding rocket contractors) makes it essential that facilities be provided at Wallops Station to reduce promptly to a tabulated form radar, rawinsonde, optical, and Doppler data. In addition, the ability to compute dispersion characteristics and impact predictions will increase the safety factor, reduce clearance areas, and aid in the recovery of some payloads.

3. COST ESTIMATE:

Equipment.....		\$260,000
Automatic plotter.....	\$25,000	
Strip chart and film readers.....	92,000	
Telemeter tape to card converter.....	80,000	
Doppler chronograph.....	50,000	
Miscellaneous equipment.....	13,000	

Air conditioning.....	\$60,000
Building modification.....	<u>30,000</u>
Total estimated cost.....	<u>\$350,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time.....	10 months
--------------------------------------	-----------

WALLOPS STATION
FISCAL YEAR 1961 ESTIMATES
EQUIPMENT MODERNIZATION

1. DESCRIPTION:

An improvement in the technical capabilities of the Wallops Station is required in three equipment areas, as follows:

Vehicle checkout equipment: This portion of the project covers the procurement of equipment required in the testing of vehicles and their components prior to launching. The project includes the procurement of microwaves and VHF antenna pattern systems for radar beacon, telemeter, and destruct antenna measurements; the procurement of environmental test and checkout equipment for vehicles and their associated components; and the construction and outfitting of two shielded telemeter checkout rooms in existing buildings.

Radio-frequency monitoring equipment: Equipment is required to monitor, measure, and locate radio-frequency interference in the Wallops Station area. The equipment will consist of field strength and frequency meters covering a frequency range from 30 cycles to 1,000 megacycles with recorders and fixed stations and van-type installations. Spectrum analyzers will be employed to cover a frequency range from 10 to 44,000 megacycles to allow spectral observations of pulse signal characteristics, frequency modulation identification, and the comparison of two radio-frequency signals having similar frequency separation. Servo-operated directional antennas will be used to locate interference sources.

Launching and handling equipment: Additional equipment is required to prepare, transport, position, and launch the larger research vehicles which will be operational in 1961. The project includes a launcher and associated cabling, two umbilical towers, and mobile handling equipment.

2. JUSTIFICATION:

Existing facilities at the Wallops Station were planned on the basis that all preliminary checkout, environmental tests, and antenna pattern measurements would be performed before

the vehicle arrived at the Wallops Station for firing. Current planning, however, indicates that in several program areas vehicles will be shipped directly from contractors to the Wallops Station with payloads built by outside scientific groups who could not be expected to provide checkout facilities. It is necessary that provisions be made to properly test these vehicles and payloads.

The number and variety of firings scheduled for the Wallops Station will inevitably result in radio-frequency interference. To prevent the loss of data or delays in firings resulting from such interference, equipment must be provided to pinpoint the source and characteristics of radiation interfering with electronic systems utilized for communications, launching, tracking, and data relaying functions. Monitoring of specific frequency bands is necessary to establish clear channels and to determine whether the Wallops Station's operational frequency assignments and schedules are maintained within the specified limitations.

The larger research vehicles scheduled for launching from Wallops Island by 1961 will require additional equipment and facilities. The increase in size alone of the vehicles necessitates higher capacity handling equipment. Where possible, equipment will be secured that can be used for different size stages. In some cases, equipment will have to be designed especially for a particular vehicle.

Since the setup and checkout time in the launching area for a large research vehicle can run into weeks, the single Scout launcher will not be adequate for the Wallops Station schedule by 1962. An additional launcher of comparable size and capability will be needed for research vehicles using the larger rocket motors now available and under development.

Recent developments have proven the need for umbilical towers to adequately handle and program the missile cable requirements during a countdown. The towers are not only necessary to properly handle the operation but are a vital necessity for adequate pad safety.

Wallops will be scheduling more launchings during the hours of darkness. This is a requirement of many scientific experiments and is also dictated at times by range availability on long-range launches. An adequate night lighting system is a necessity for safe night operation.

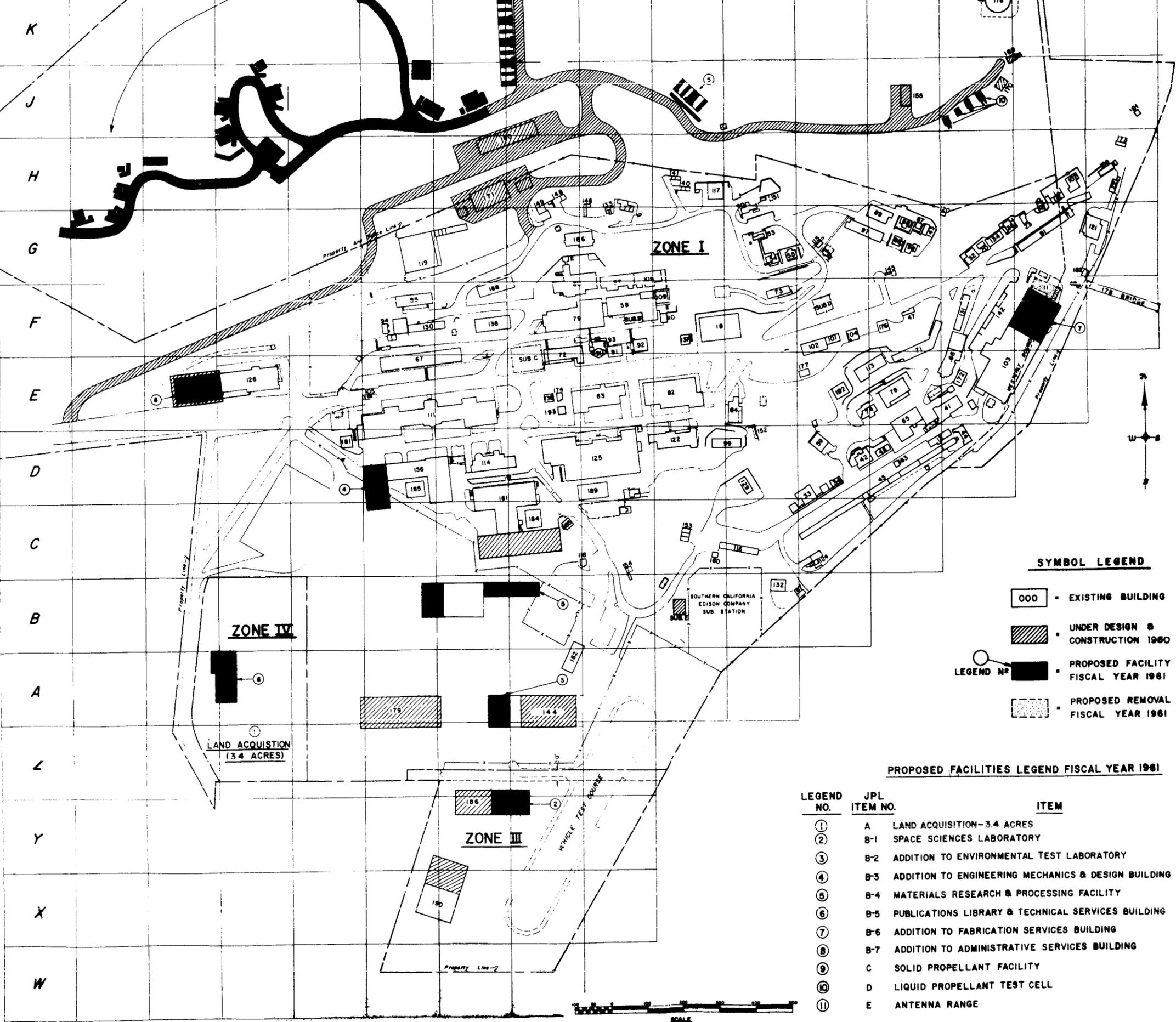
3. COST ESTIMATE:

Vehicle checkout equipment.....		\$800,000
Antenna pattern systems.....	\$90,000	
Reliability test equipment.....	290,000	
Telemeter check room equipment.....	50,000	
Beacon test equipment.....	25,000	
Destruct receiver test equipment.....	15,000	
Airframe and rocket inspection, alignment, and radiograph equipment.....	200,000	
Construction of shielded telemeter check rooms.....	130,000	
 Radio-frequency monitoring equipment.....		100,000
 Launching and handling equipment.....		840,000
Launcher.....	308,000	
Power and control cable.....	95,000	
Night lighting equipment.....	105,000	
Positioning trailers and adaptors.....	156,000	
Tug.....	8,000	
Transportation trailers.....	11,000	
Missile manipulator.....	75,000	
Umbilical towers.....	82,000	
 Total estimated cost.....		<u>\$1,740,000</u> ✓

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 12 months

- 79 WIND TUNNEL (20 INCH) F-9
- 80 WIND TUNNEL (12 @ 21 INCH) F-9
- 81 PLANT ENGINEERING & MECHANICS SERV G-16
- 82 ENVIRONMENTAL TEST LABORATORY E-11
- 83 CHEMISTRY LAB. & ENGINEERING OFFICES F-10
- 84 TEST CELL & SOLID CHEMISTRY F-12
- 85 MILIT LIAISON & WIND TUNNEL ENGIN E-14
- 86 OXIDIZER GRINDING (SOLID) G-14
- 87 OVENS (SOLID) G-14
- 88 MIXING LAB (SOLID) G-14
- 89 PROCESSING LABORATORY (SOLID) G-14
- 90 SHOP-TEST CELL #51 (SOLID) F-10
- 91 AIR DRYER (WIND TUNNEL) F-10
- 92 COOLING TOWER (WIND TUNNEL) F-10
- 93 VAPORIZER (WIND TUNNEL) F-10
- 94 ANTENNA TEST TOWER F-7
- 97 DEVELOPMENT LABORATORY & OFFICES G-13
- 98 PREPARATION SHOP (SOLID) G-13
- 99 CHEMISTRY LABORATORY (SOLID) G-12
- 101 TRANSPORTATION OFFICES F-13
- 102 TRANSPORTATION SHOP F-13
- 103 FABRICATION & INSPECTION SHOPS F-13
- 104 FIRE DEPARTMENT & FIRST AID F-13
- 105 GUARD HOUSE (MAIN GATE) G-7
- 106 TEST CELL (AIR FUEL) G-10
- 107 SOLID PROPELLANT CHEMISTRY LAB. H-16
- 109 COOLING TOWER (WIND TUNNEL) F-11
- 110 FUEL STORAGE DOCK F-11
- 111 ADMINISTRATIVE & ENGINEERING F-7
- 112 TEST CELL (LIQUID) H-16
- 113 GAS METERING LAB. & OFFICES H-11
- 114 CAFETERIA & OFFICES E-8
- 115 HEATING PLANT (SOLID) G-13
- 116 PROPELLANT STORAGE DOCK. C-12
- 117 TEST CELL (SOLID) H-11
- 118 COOLING TOWER SOUTH OF #125 H-10
- 119 STORAGE & DISPOSAL G-7
- 120 COOLING TOWER NORTH EAST OF #86 G-15
- 121 CAFETERIA G-17
- 122 ENGINEERING OFFICES G-11
- 124 INCUBATOR G-13
- 125 COMBINED ELECTRONICS LABORATORY D-10
- 126 ADMINISTRATIVE SERVICES D-5
- 129 TEST CELL (CHEM) F-12
- 130 ENGINEERING OFFICES & MESSAGE CENTER F-15
- 131 MAINTENANCE STORAGE F-15
- 132 ACID STORAGE DOCK G-12
- 133 SERVICE DOCK G-10
- 134 SHOP - TEST CELL (LIQUIDS) G-8
- 135 GUARD HOUSE (SOUTH GATE) E-9
- 136 COOLING TOWER WEST OF #83 E-9
- 137 COOLING TOWER WEST OF #18 F-11
- 138 ENGINEERING OFFICE (WIND TUNNEL) F-8
- 139 SOLID PROPELLANT PROCESSING LAB. H-8
- 140 MAGAZINE X TEMP (NORTH OF #17) G-11
- 141 MAGAZINE X TEMP (NORTH OF #17) H-11
- 142 UTILITIES DOCK F-15
- 143 SOLID ROCKET DOCK (EAST OF #87) G-14
- 144 ENVIRONMENTAL TEST LABORATORY A-9
- 145 MAGAZINE (NORTH OF #47) H-10
- 146 MAGAZINE (WEST OF #77) H-9
- 147 COOLING TOWER (SOUTH WEST OF #97) G-13
- 148 MAGAZINE LOW TEMP (WEST OF #77) H-9
- 149 MAGAZINE HIGH TEMP (WEST OF #77) H-9
- 150 TEST CELL CONTROL (SOLID PROP) J-11
- 151 TEST CELL (SOLID PROP) K-11
- 152 HAZARDOUS CHEMICAL STORAGE D-12
- 153 MAGAZINE (SOLID) (SOUTH OF #129) C-11
- 154 MAGAZINE GENERAL STORAGE J-14
- 156 INSTRUMENTATION (LIQUID PROP) J-14
- 156 ENGINEERING MECHANICS & DESIGN D-7
- 157 TEST CELL CONTROL (SOLID PROP) L-9
- 158 STORAGE & CONDITIONING MAGAZINE(SOL PROP) L-8
- 159 PUMP HOUSE (WATER) H-17
- 160 PUMP HOUSE (SE WAGE) C-11
- 161 GUIDANCE LABORATORY D-8
- 162 GROUND EQUIPMENT SHOP A-9
- 163 COOLING TOWER (NORTH OF #45) D-14
- 165 COOLING TOWER (S.E. OF #81) C-9
- 166 COOLING TOWER (N. OF #80) G-9
- 167 TEST CELL (SOLID) M-8
- 168 CONTROL ROOM & SHOP (SOLID) L-9
- 169 TEST CELL (LIQUID) K-15
- 170 CONTROL ROOM & SHOP (LIQUID) J-15
- 171 UTILITY DISTRIBUTION CENTER H-8
- 172 TEMP CARPENTER SHOP E-15
- 173 TEST BAY CONTROL ROOM H-17
- 174 COOLING TOWER WEST OF #83 E-9
- 175 WATER RESERVOIR K-15
- 176 FIRE HOUSE F-14
- 177 TRANSPORTATION SERVICE SHED E-13
- 178 BAILEY BRIDGE F-17
- 179 VEHICLE ASSEMBLY A-7
- 180 PROCESSING LABORATORY (SOLID PROP) H-8
- 181 CLASSIFIED DOCUMENT STORAGE WALT D-8
- 182 BUS STOP SHELTER G-8
- 183 WATER TANK (PROPOSED) N-7
- 184 GUIDANCE LABORATORY ANNEX C-9
- 185 ENGINEERING MECHANICS & DESIGN ANNEX D-7
- 186 REPORTS & PERIODICALS Y-8
- 187 CHEMICAL STORAGE B-13
- 188 STORAGE BUILDING W. T. SPARE PARTS F-8
- 189 ELECTRONICS LABORATORY ANNEX D-10
- 190 TEMPORARY ENGINEERING X-7
- 191 TEST BAY J-17
- 192 PROPULSION COMPONENT STORAGE E-13
- 193 TEMPORARY FACILITIES OFFICE E-9
- 194 SOLID PROPELLANT TEST CELL L-9



SYMBOL LEGEND

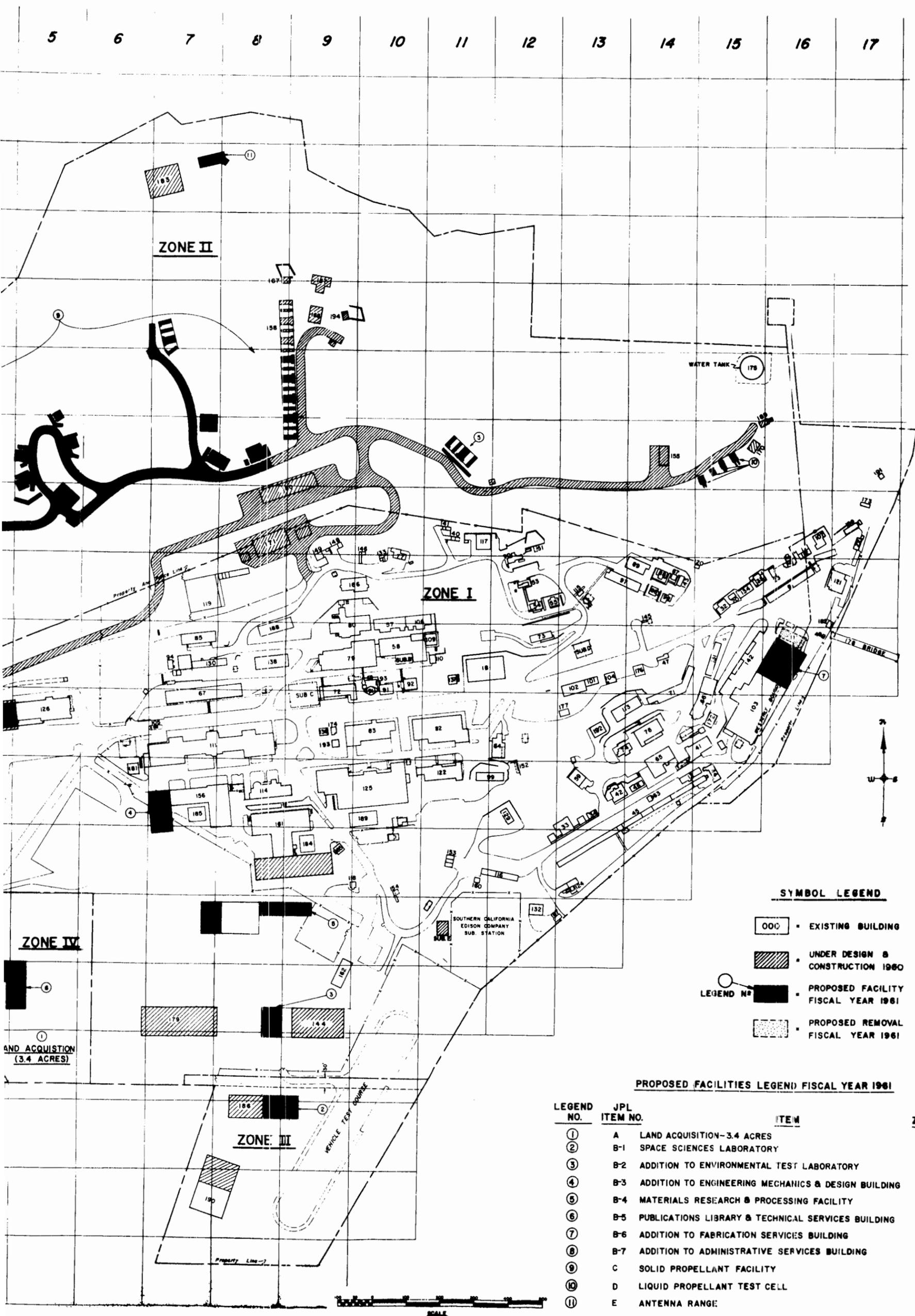
- 000 - EXISTING BUILDING
- [Hatched Box] - UNDER DESIGN & CONSTRUCTION 1960
- [Solid Black Box] - PROPOSED FACILITY FISCAL YEAR 1961
- [Dotted Box] - PROPOSED REMOVAL FISCAL YEAR 1961

PROPOSED FACILITIES LEGEND FISCAL YEAR 1961

LEGEND NO.	JPL ITEM NO.	ITEM	ZONE	KEY
①	A	LAND ACQUISITION-3.4 ACRES	IV	A-5
②	B-1	SPACE SCIENCES LABORATORY	III	Y-9
③	B-2	ADDITION TO ENVIRONMENTAL TEST LABORATORY	I	A-9
④	B-3	ADDITION TO ENGINEERING MECHANICS & DESIGN BUILDING	I	D-7
⑤	B-4	MATERIALS RESEARCH & PROCESSING FACILITY	I	B-8
⑥	B-5	PUBLICATIONS LIBRARY & TECHNICAL SERVICES BUILDING	IV	A-5
⑦	B-6	ADDITION TO FABRICATION SERVICES BUILDING	I	F-16
⑧	B-7	ADDITION TO ADMINISTRATIVE SERVICES BUILDING	I	E-4
⑨	C	SOLID PROPELLANT FACILITY	II	J-3 TO J-11
⑩	D	LIQUID PROPELLANT TEST CELL	II	J-15
⑪	E	ANTENNA RANGE	II	N-7

JET PROPULSION LABORATORY
FISCAL YEAR 1961 ESTIMATES

SITE PLAN



SYMBOL LEGEND

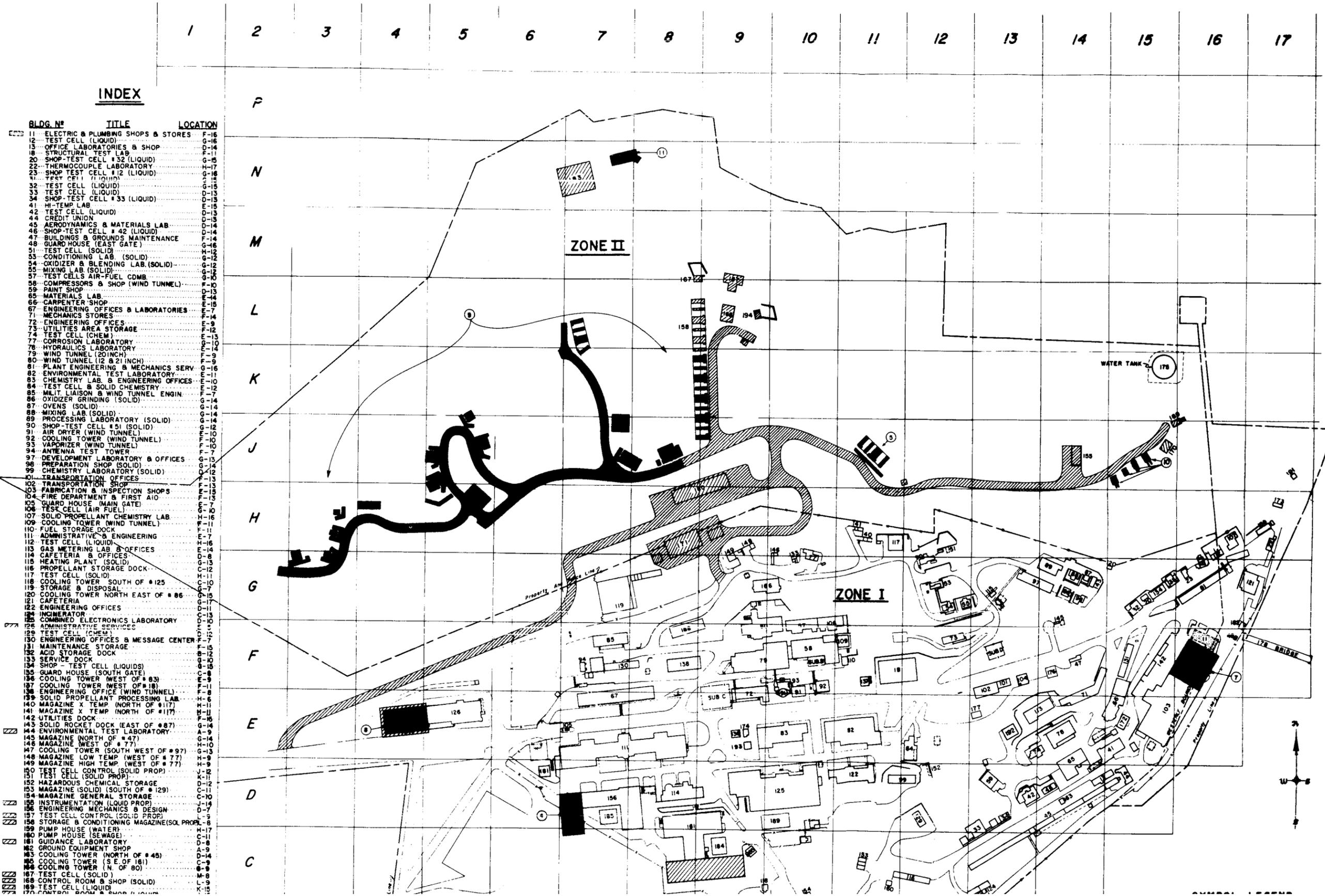
- OOO - EXISTING BUILDING
- [Hatched Box] - UNDER DESIGN & CONSTRUCTION 1960
- [Solid Black Box] - PROPOSED FACILITY FISCAL YEAR 1961
- [Dotted Box] - PROPOSED REMOVAL FISCAL YEAR 1961

PROPOSED FACILITIES LEGEND FISCAL YEAR 1961

LEGEND NO.	JPL ITEM NO.	ITEM	ZONE	KEY
①	A	LAND ACQUISITION-3.4 ACRES	IV	A-5
②	B-1	SPACE SCIENCES LABORATORY	III	Y-9
③	B-2	ADDITION TO ENVIRONMENTAL TEST LABORATORY	I	A-9
④	B-3	ADDITION TO ENGINEERING MECHANICS & DESIGN BUILDING	I	D-7
⑤	B-4	MATERIALS RESEARCH & PROCESSING FACILITY	I	B-6
⑥	B-5	PUBLICATIONS LIBRARY & TECHNICAL SERVICES BUILDING	IV	A-5
⑦	B-6	ADDITION TO FABRICATION SERVICES BUILDING	I	F-16
⑧	B-7	ADDITION TO ADMINISTRATIVE SERVICES BUILDING	I	E-4
⑨	C	SOLID PROPELLANT FACILITY	II	J-3 TO J-11
⑩	D	LIQUID PROPELLANT TEST CELL	II	J-15
⑪	E	ANTENNA RANGE	II	N-7

JET PROPULSION LABORATORY
FISCAL YEAR 1961 ESTIMATES

SITE PLAN



INDEX

BLDG. N°	TITLE	LOCATION
11	ELECTRIC & PLUMBING SHOPS & STORES	F-16
12	TEST CELL (LIQUID)	G-16
13	OFFICE LABORATORIES & SHOP	D-14
18	STRUCTURAL TEST LAB	F-11
20	SHOP-TEST CELL #32 (LIQUID)	G-15
22	THERMOCOUPLE LABORATORY	H-17
23	SHOP TEST CELL #12 (LIQUID)	G-16
31	TEST CELL (LIQUID)	G-15
32	TEST CELL (LIQUID)	G-15
33	TEST CELL (LIQUID)	D-13
34	SHOP-TEST CELL #33 (LIQUID)	D-13
41	HI-TEMP LAB	E-15
42	TEST CELL (LIQUID)	D-13
44	CREDIT UNION	D-13
45	AERODYNAMICS & MATERIALS LAB	D-13
46	SHOP-TEST CELL #42 (LIQUID)	D-14
47	BUILDINGS & GROUNDS MAINTENANCE	F-14
48	GUARD HOUSE (EAST GATE)	G-16
51	TEST CELL (SOLID)	H-12
53	CONDITIONING LAB. (SOLID)	G-12
54	OXIDIZER & BLENDING LAB. (SOLID)	G-12
55	MIXING LAB. (SOLID)	G-12
57	TEST CELLS AIR-FUEL CDMB.	G-10
56	COMPRESSORS & SHOP (WIND TUNNEL)	F-10
59	PAINT SHOP	D-10
65	MATERIALS LAB.	E-14
66	CARPENTER SHOP	E-15
67	ENGINEERING OFFICES & LABORATORIES	E-7
71	MECHANICS STORES	E-7
72	ENGINEERING OFFICES	E-9
73	UTILITIES AREA STORAGE	F-12
74	TEST CELL (CHEM)	E-13
77	CORROSION LABORATORY	E-10
76	HYDRAULICS LABORATORY	E-10
79	WIND TUNNEL (20 INCH)	F-9
80	WIND TUNNEL (12 & 21 INCH)	F-9
81	PLANT ENGINEERING & MECHANICS SERV.	G-16
82	ENVIRONMENTAL TEST LABORATORY	E-11
83	CHEMISTRY LAB. & ENGINEERING OFFICES	E-10
84	TEST CELL & SOLID CHEMISTRY	F-12
85	MILIT. LIAISON & WIND TUNNEL ENGIN.	F-7
86	OXIDIZER GRINDING (SOLID)	G-14
87	Ovens (SOLID)	G-14
88	MIXING LAB. (SOLID)	G-14
89	PROCESSING LABORATORY (SOLID)	G-14
90	SHOP-TEST CELL #51 (SOLID)	G-14
91	AIR DRYER (WIND TUNNEL)	F-10
92	COOLING TOWER (WIND TUNNEL)	F-10
93	VAPORIZER (WIND TUNNEL)	F-10
94	ANTENNA TEST TOWER	F-7
97	DEVELOPMENT LABORATORY & OFFICES	G-13
98	PREPARATION SHOP (SOLID)	G-12
99	CHEMISTRY LABORATORY (SOLID)	D-12
101	TRANSPORTATION OFFICES	F-13
102	TRANSPORTATION SHOP	F-13
103	FABRICATION & INSPECTION SHOPS	F-13
104	FIRE DEPARTMENT & FIRST AID	F-13
105	GUARD HOUSE (MAIN GATE)	F-7
106	TEST CELL (AIR FUEL)	G-10
107	SOLID PROPELLANT CHEMISTRY LAB.	H-16
109	COOLING TOWER (WIND TUNNEL)	F-11
110	FUEL STORAGE DOCK	F-11
111	ADMINISTRATIVE & ENGINEERING	E-7
112	TEST CELL (LIQUID)	H-16
113	GAS METERING LAB. & OFFICES	E-14
114	CAFETERIA & OFFICES	D-8
115	HEATING PLANT (SOLID)	G-13
116	PROPELLANT STORAGE DOCK	C-12
117	TEST CELL (SOLID)	H-11
118	COOLING TOWER SOUTH OF #125	G-10
119	STORAGE & DISPOSAL	G-10
120	COOLING TOWER NORTH EAST OF #86	G-15
121	CAFETERIA	G-17
122	ENGINEERING OFFICES	D-11
124	GENERATOR	H-3
125	COMBINED ELECTRONICS LABORATORY	D-10
126	ADMINISTRATIVE SERVICES	H-3
129	TEST CELL (CHEM)	F-12
130	ENGINEERING OFFICES & MESSAGE CENTER	F-5
131	MAINTENANCE STORAGE	F-5
132	ACID STORAGE DOCK	G-12
133	SERVICE DOCK	G-10
134	SHOP-TEST CELL (LIQUIDS)	C-15
135	GUARD HOUSE (SOUTH GATE)	E-8
136	COOLING TOWER WEST OF #83	F-11
137	COOLING TOWER WEST OF #18	F-11
138	ENGINEERING OFFICE (WIND TUNNEL)	F-8
139	SOLID PROPELLANT PROCESSING LAB.	H-6
140	MAGAZINE X TEMP (NORTH OF #117)	H-11
141	MAGAZINE X TEMP (NORTH OF #117)	H-11
142	UTILITIES DOCK	F-16
143	SOLID ROCKET DOCK (EAST OF #87)	G-14
144	ENVIRONMENTAL TEST LABORATORY	A-9
145	MAGAZINE (NORTH OF #77)	G-9
146	MAGAZINE WEST OF #77	H-10
147	COOLING TOWER (SOUTH WEST OF #97)	G-13
148	MAGAZINE LOW TEMP (WEST OF #77)	H-9
149	MAGAZINE HIGH TEMP (WEST OF #77)	H-9
150	TEST CELL CONTROL (SOLID PROP)	J-12
151	TEST CELL (SOLID PROP)	K-11
152	HAZARDOUS CHEMICAL STORAGE	D-12
153	MAGAZINE (SOLID) (SOUTH OF #129)	C-11
154	MAGAZINE GENERAL STORAGE	C-10
155	INSTRUMENTATION (LIQUID PROP)	J-14
156	ENGINEERING MECHANICS & DESIGN	D-7
157	TEST CELL CONTROL (SOLID PROP)	L-9
158	STORAGE & CONDITIONING MAGAZINE (SOLID PROP)	L-8
159	PUMP HOUSE (WATER)	H-17
160	PUMP HOUSE (SEWAGE)	C-11
161	GUIDANCE LABORATORY	D-8
162	GROUND EQUIPMENT SHOP	A-9
163	COOLING TOWER (NORTH OF #45)	D-14
164	COOLING TOWER (S.E. OF 161)	C-9
165	COOLING TOWER (N. OF 80)	G-9
167	TEST CELL (SOLID)	M-8
168	CONTROL ROOM & SHOP (SOLID)	L-9
169	TEST CELL (LIQUID)	L-9
170	CONTROL ROOM & SHOP (LIQUID)	K-15
176	WATER TANK	

JET PROPULSION LABORATORY

FISCAL YEAR 1961 ESTIMATES

LAND ACQUISITION

1. DESCRIPTION:

This project proposes the acquisition of 3.4 acres of privately owned land contiguous to the south westerly boundary of the laboratory. The areas is identified as zone IV in the site plan on the preceding page.

2. JUSTIFICATION:

The only other privately owned contiguous site is being rapidly developed and there is every reason to believe that zone IV will also undergo similar development unless the site is acquired. If this should happen, it will become almost impossible for the laboratory to extend its present area without excessive and prohibitive cost. Inasmuch as this area is the only privately owned land between the existing laboratory and the land owned by the City of Pasadena, its acquisition is considered to be a prudent and economical investment. It is proposed to locate the publications, library, and technical services building (funds for which are being requested in these estimates) in zone IV as indicated on the site plan.

3. COST ESTIMATE:

Total estimated cost..... \$60,000 ✓

JET PROPULSION LABORATORY

FISCAL YEAR 1961 ESTIMATES

MODERNIZATION OF LABORATORY FACILITIES

1. DESCRIPTION:

This project proposes the modernization of a number of facilities to provide more effective and efficient laboratories and supporting facilities. Brief descriptions and drawings of the proposed work follow:

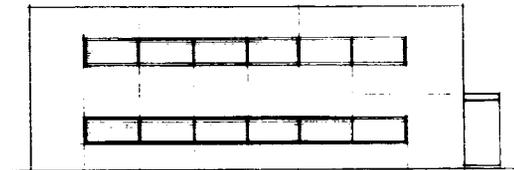
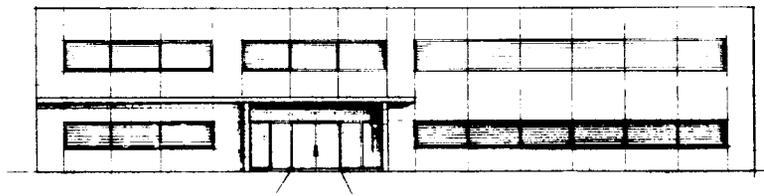
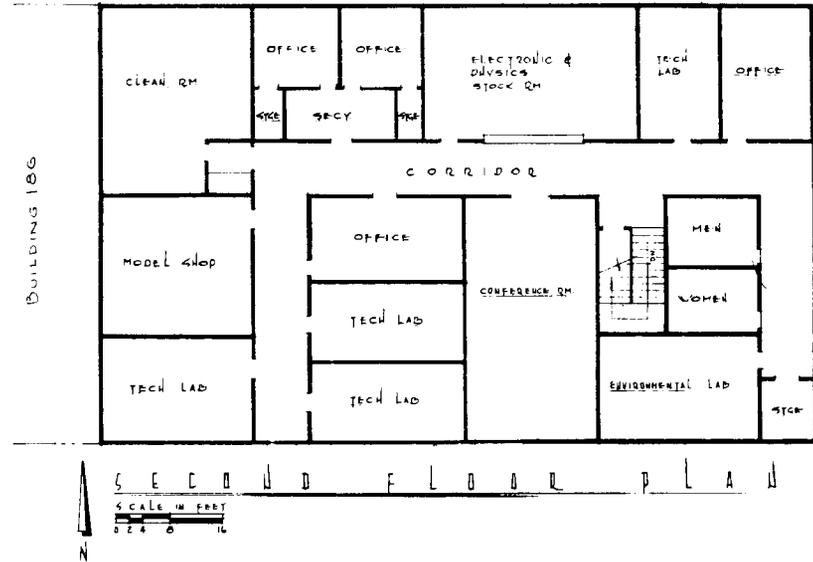
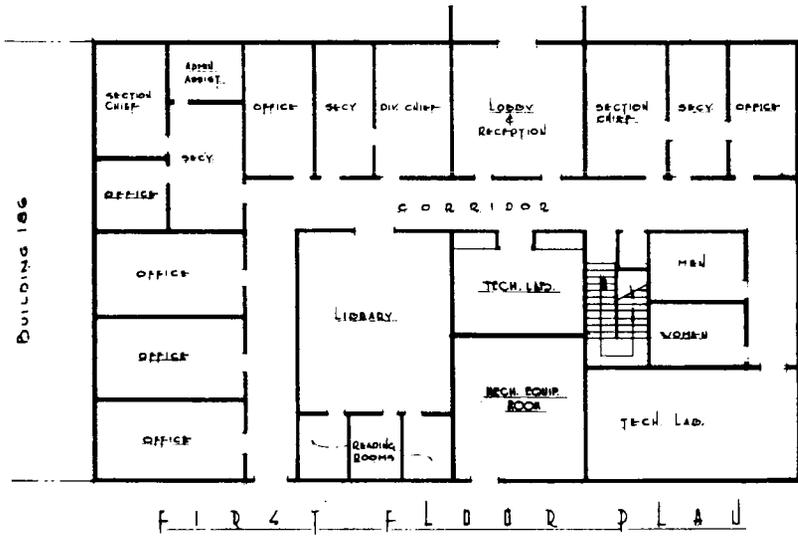
Space sciences laboratory: It is proposed to construct a two-story frame and stucco building of approximately 16,000 square feet to house laboratories and offices for personnel who will be associated with the new space sciences division. In addition to the office space for technical and administrative personnel, the building will provide laboratories for environmental testing and for electronics and physics research and precision model shops.

Addition to environmental test laboratory: In the designing of space vehicles it is essential that an environmental test laboratory be available where conditions of outer space can be duplicated and where various components of the vehicles can be tested under these conditions. This project proposes the construction of a 5,000 square foot addition to the environmental laboratory. The addition will contain offices for the technical and supporting personnel, and laboratories to house the following equipment:

- (a) Ultra high vacuum system for the simulation of space environments and the testing of guidance, propulsion and communication system component parts.
- (b) An equalization noise chamber for the investigation of the effects of acoustical noise on vehicle structures, payloads, and guidance equipment during the launch phase.
- (c) A control system for the automatic equalization of the random frequency vibration electromechanical exciter system now in use.

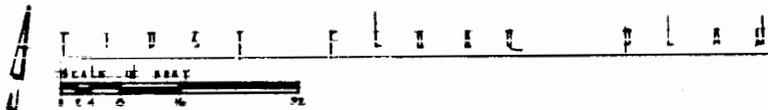
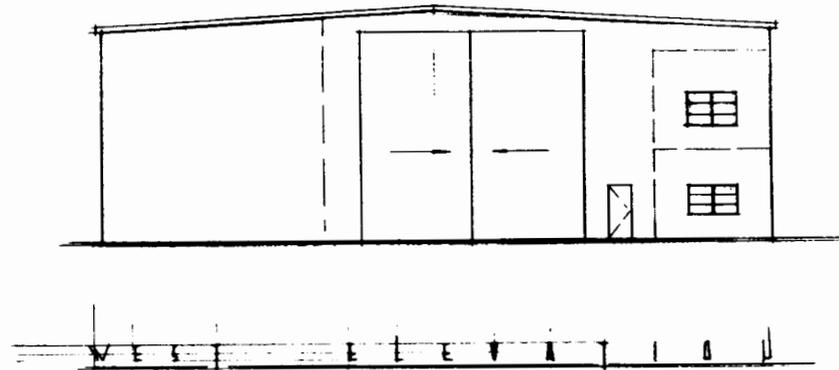
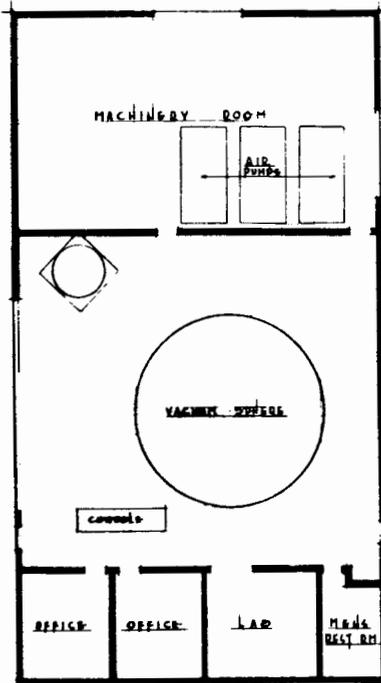
JET PROPULSION LABORATORY
FISCAL YEAR 1961 ESTIMATES

MODERNIZATION OF LABORATORY FACILITIES



SPACE SCIENCES LABORATORY

MODERNIZATION OF LABORATORY FACILITIES



ADDITION TO ENVIRONMENTAL TEST LABORATORY

- (d) A test chamber in which the temperature can be varied from -100° F to $+300^{\circ}$ F with the provision necessary to facilitate vibration testing inside the chamber.

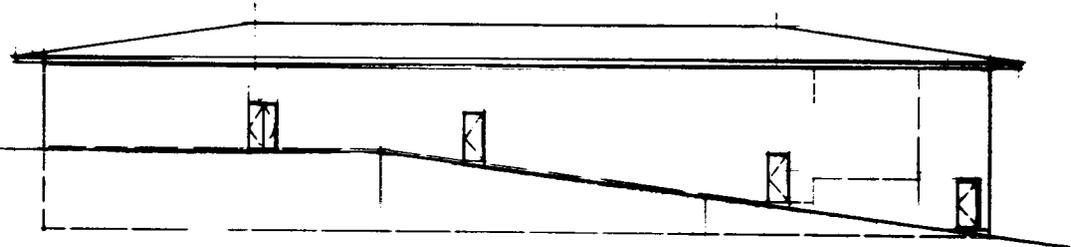
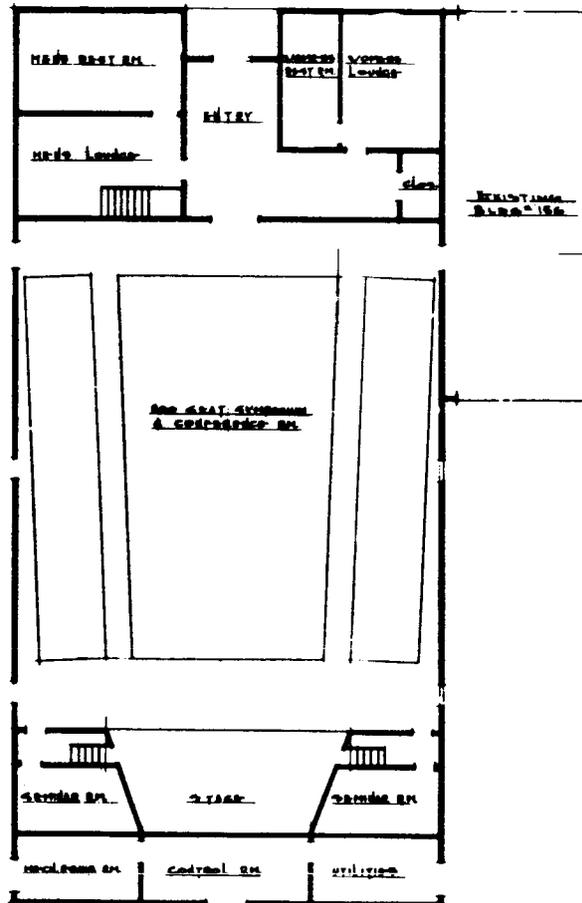
Addition to engineering mechanics and design building: This project proposes a one-story 8,000 square foot addition to the existing engineering mechanics and design building. The addition will consist of a large briefing or conference room capable of accommodating approximately 500 persons, plus two smaller seminar rooms, rest rooms and a utility room.

Materials research and processing facility: The construction of two laboratory buildings is proposed to provide the facilities required to carry out supporting research and advanced development work on materials for space vehicles. The research laboratory building will contain approximately 10,000 square feet and will be designed to house precision equipment of the type needed to study the behavior of materials at extremely high temperatures, such as those encountered in rockets and under conditions of outer space environment. The building will also contain offices for technical and supporting personnel. The processing laboratory will contain approximately 5,400 square feet and will be designed to house some of the fabrication and processing equipment needed to develop and test materials for space vehicle applications. Approximately 1,000 square feet will be assigned for chemical propulsion research and development.

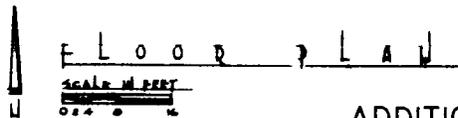
Publications, library, and technical services building: This project proposes the construction of a 17,000 square foot two-story building to house administrative groups. This building will contain the main library, the reproduction department, (blue printing, machines, printing presses, and etc.), a vault, a TWX room, a central documents control room, a document film room, a photo department, editorial offices for the technical reports group, and general administrative offices.

Addition to fabrication services building: This project proposes a 10,000 square foot addition to the present fabrication services building. It will be of frame and stucco construction. It will be a two-story building with the lower floor devoted to heavy machine shop equipment, a tool crib, a precision instrument and optical shop, and an optical precision assembly room. The second floor will contain the fabrication services offices, rest rooms, locker room, inspection and bond room, light machine equipment room, tool crib, precision grinding room, stock control room, and small room for storage of light weight materials.

MODERNIZATION OF LABORATORY FACILITIES

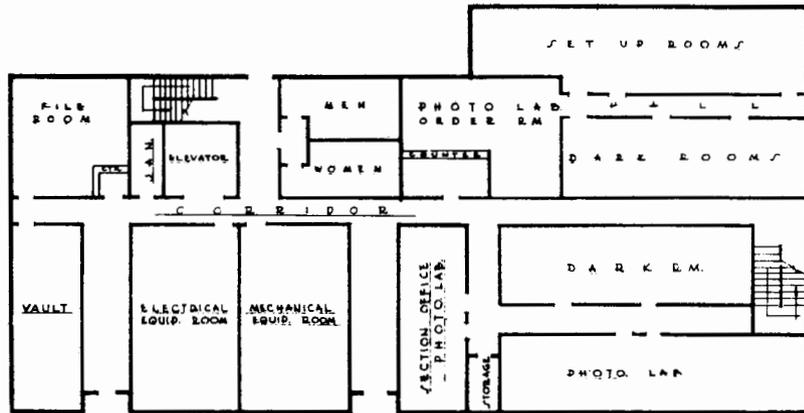


WEST ELEVATION



ADDITION TO ENGINEERING MECHANICS AND DESIGN BUILDING

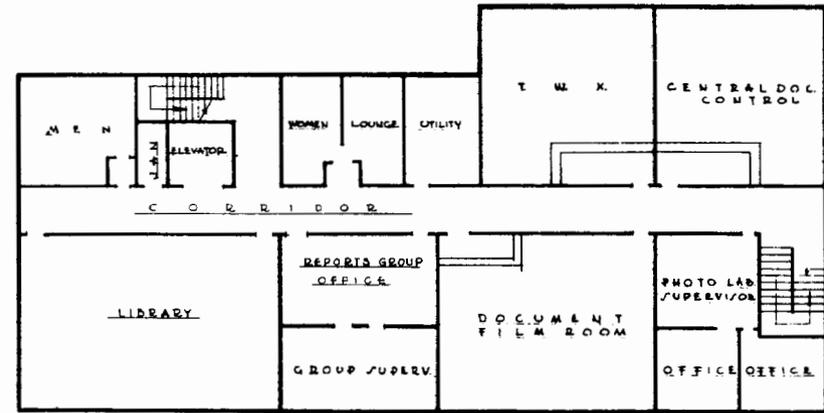
MODERNIZATION OF LABORATORY FACILITIES



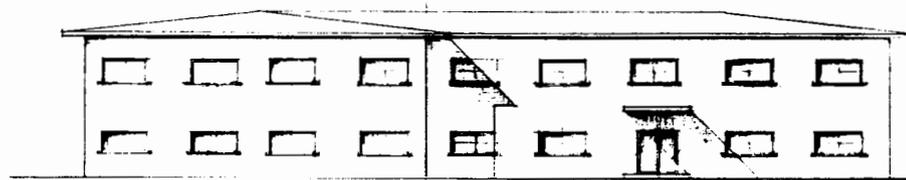
FIRST FLOOR PLAN



SCALE IN FEET
0 10 20



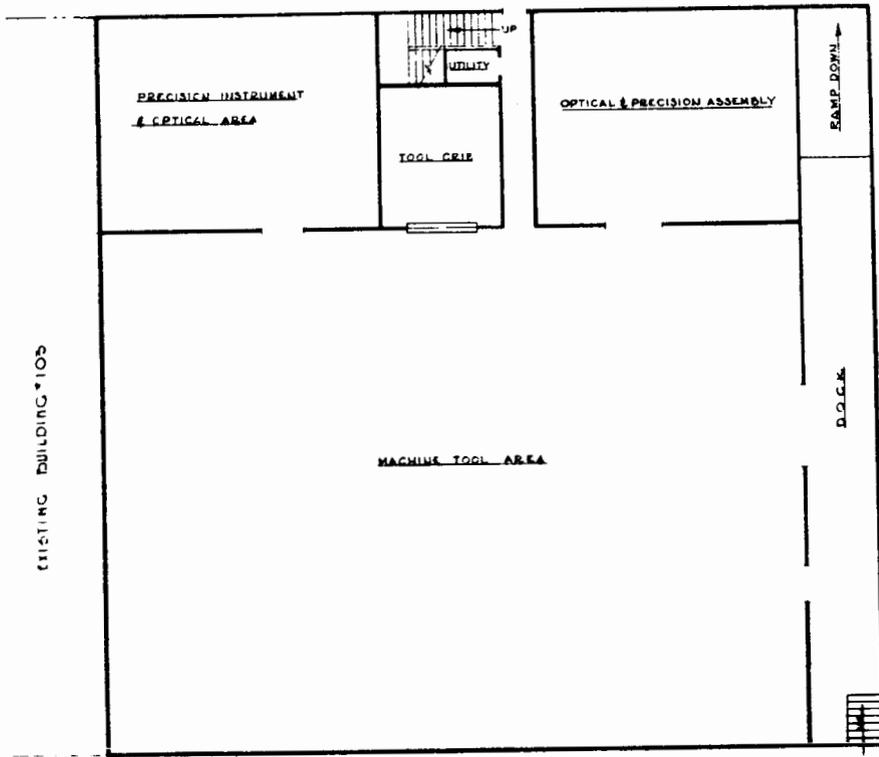
SECOND FLOOR PLAN



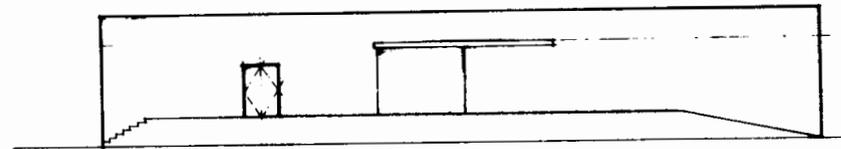
WEST ELEVATION

PUBLICATIONS, LIBRARY AND TECHNICAL SERVICES BUILDING

MODERNIZATION OF LABORATORY FACILITIES



FIRST FLOOR PLAN



NORTH ELEVATION



0 2 4 6 8 10
SCALE IN FEET

ADDITION TO FABRICATION SERVICES BUILDING

Addition to administrative services building: An 8,000 square foot third floor addition to the present administrative services building is required. The addition will contain offices and rest rooms and will provide additional work space for the purchasing, accounting, IBM, shipping, receiving, and property departments.

2. JUSTIFICATION:

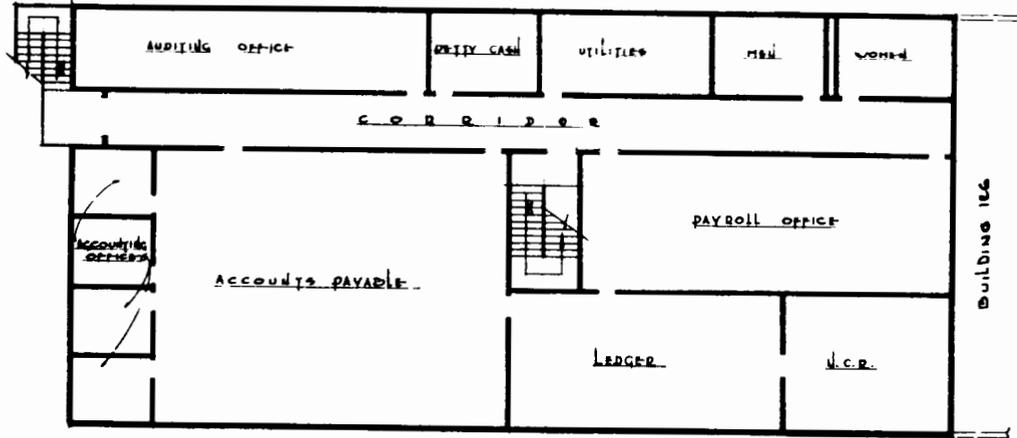
In general, the programs at the Jet Propulsion Laboratory have changed over a period of years. Since Sputnik I was launched, the laboratory has had a greatly expanded mission and has become involved in space probes. Under NASA, its mission has been concerned with lunar shots, and with guidance and communication systems. Its personnel growth has been rapid, and suitable buildings have not been constructed to keep pace with the increase in personnel. It has been necessary, therefore, to modernize existing facilities. In order to efficiently carry out the NASA programs it is necessary to continue the modernization program, to add general purpose and specialized facilities, and to regroup functions into efficient working entities.

Space sciences laboratory: The conduct of the national space flight program by the NASA requires that the laboratory establish a space sciences division which will maintain close technical liaison with scientists and engineers at other NASA laboratories and research centers. A number of the payload elements carried aboard vehicles developed under the technical direction of the Laboratory may be parts of experiments sponsored by other organizations and built elsewhere. This division will have the responsibility for insuring that the construction of the payload elements meets flight criteria and that the equipment is properly integrated into the vehicle payload and the over-all scientific mission. In order to carry out these objectives it is necessary to have this entire division in one building with the proper provision for offices and laboratories.

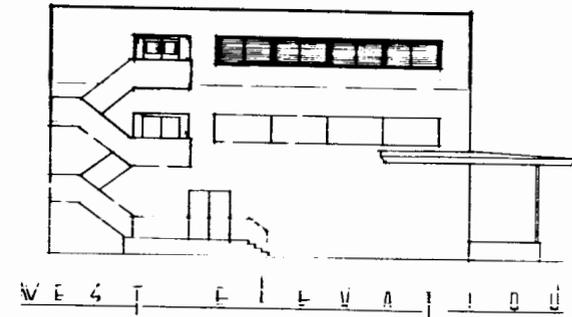
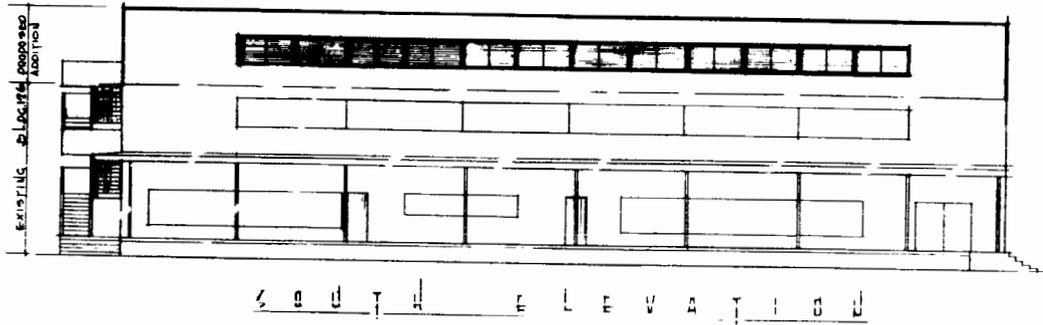
The division is intended to function at the international level in the conduct of its work. This means that the division will always have working a number of foreign scientists who have not yet received security clearances. This is the basic reason for locating the proposed building outside the Laboratory security fence.

Addition to environmental test laboratory: The reliability program of the laboratory is based on the philosophy of designing and testing to a verified safety margin. This can only be accomplished by means of comprehensive and integrated laboratory testing and use test techniques

MODERNIZATION OF LABORATORY FACILITIES



THIRD FLOOR PLAN
Scale 1/4" = 1'-0"
0 2 4 6 8 10



ADDITION TO ADMINISTRATIVE SERVICES BUILDING

wherein equipment can be shown to operate satisfactorily under environmental conditions, both natural and induced, at levels significantly in excess of those expected in actual flight use. To accomplish this, all critical environments must be simulated in the laboratory by the use of specially designed and constructed equipment and facilities. The laboratory has in the past maintained a leading position in the development of environmental design for typical guided missile environments and must now extend this capability to include the simulation of those conditions expected in deep space flight.

Addition to engineering mechanics and design building: In connection with its role in NASA projects, the laboratory's work involves numerous conferences with NASA personnel, contractors and subcontractors, and representatives of the national and international scientific community. Facilities are required for a large conference or briefing room in which to hold meetings of up to 500 persons.

Materials research and processing facility: The materials research and processing laboratories will be used to house the present equipment and also equipment for NASA approved programs. This group has a great need for adequate housing in both offices and laboratories. These groups have had no increase in work space for the last 6 or 7 years.

Performance of existing vehicles is limited by the lack of knowledge of the properties of materials at very high temperatures. Laboratories are needed to permit study of the mechanical, thermal and gas reaction properties of many different materials at 3500-6000° F or higher. The approach to a solution of these problems will be from the standpoint of metallurgy and ceramics and also from that of solid state physics. Development and testing of improved materials will be carried out on many types of space vehicle components. These will include rocket nozzles and other propulsion components, fuel tanks and solid fuel rocket cases, and equipment to operate in the very high vacuum of outer space. Part of the work will be aimed at providing engineering data required to design advanced types of space vehicles.

Some of the present limitations in space vehicle systems concern guidance and communications. It is planned to work in the new laboratories toward the development of solid state electronic devices which will permit considerable increases in sensitivity and range, together with major decreases in weight and size of space vehicle electronic devices and instruments for lunar and interplanetary space exploration.

Publications, library, and technical services building: This building is urgently needed to provide more space for the reports group and for related activities such as the reproduction photo departments.

Addition to fabrication services building: The present fabrication services building is inadequate in size for the volume and variety of work that it must perform. The proposed new addition will also eliminate the air conditioning problem that we encounter in the present building. No shop area has been added to this building since 1953 in spite of an increased demand from the engineering design section for high precision work.

Addition to administrative services building: In the present administrative services building the personnel in the accounting and purchasing department are provided with only 35 to 40 square feet per person; this is far below any accepted standards. The operations are at present scattered in several buildings and the new addition will permit the consolidation of all related groups into one building.

3. COST ESTIMATE:

Space sciences laboratory.....		\$500,000
Building.....	\$360,000	
Utilities.....	40,000	
Electronic equipment.....	50,000	
Chemical equipment.....	50,000	
 Addition to environmental test laboratory.....		250,000
Building.....	135,000	
Utilities.....	15,000	
Ultra high vacuum test chamber.....	50,000	
Acoustical test chamber.....	25,000	
Temperature test chamber.....	25,000	
 Addition to engineering mechanics and design building.....		200,000
Building.....	170,000	
Utilities.....	20,000	
Audio and visual equipment.....	10,000	

Materials research and processing facility.....		\$500,000
Building.....	\$405,000	
Utilities.....	45,000	
Research equipment.....	50,000	
Publications, library, and technical services building.....		435,300
Building.....	360,000	
Utilities.....	40,000	
Equipment.....	35,300	
Addition to fabrication services building.....		250,000
Building.....	175,000	
Utilities.....	25,000	
Machine tools.....	50,000	
Addition to administrative services building.....		200,000
Building.....	160,000	
Utilities.....	20,000	
Equipment.....	20,000	
		<hr/>
Total estimated cost.....		<u>\$2,335,300</u>

4. CONSTRUCTION SCHEDULE:

 Total estimated completion time..... 16 months

JET PROPULSION LABORATORY
FISCAL YEAR 1961 ESTIMATES
SOLID PROPELLANT FACILITY

1. DESCRIPTION:

It is proposed that a complex of buildings be constructed to house the solid propellant rockets and solid propellant chemistry sections. The buildings will be designed to process hazardous materials in quantities the laboratory cannot process in its present installations. All buildings will be designed to operate remotely, if necessary, keeping the safety of the personnel foremost.

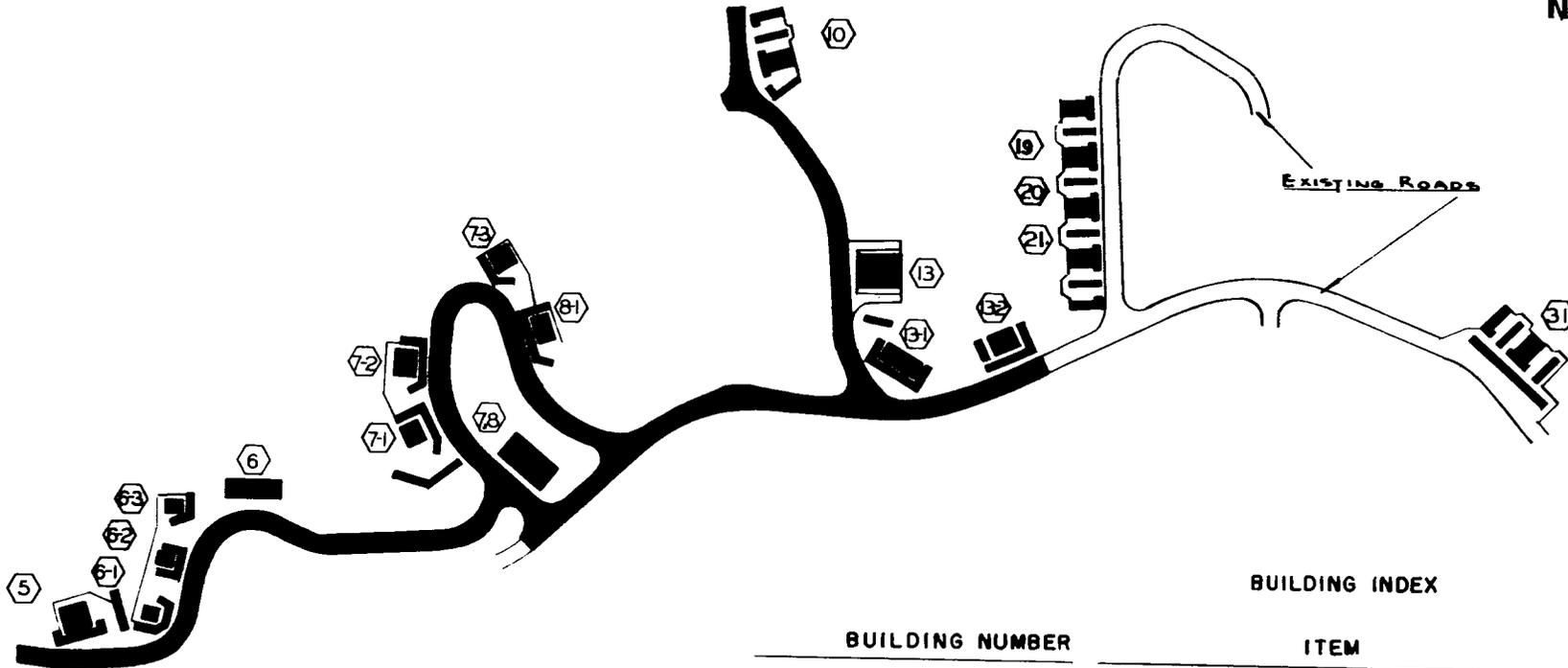
Oxidizer process buildings will be arranged to blend, dry and grind hazardous materials in a safe and efficient manner. Included in this complex are remote controlled propellant mixing and casting buildings which will be designed and geographically located so as to be in accordance with ordnance safety manual requirements. The completed solid propellant will be processed in a remotely controlled preparation building and subsequently transported to storage bays for conditioning before static firing. Also included are a group of hazardous storage magazines with a capacity great enough to accommodate a reasonable propellant development program. A solid propellant process laboratory will be constructed to test physical properties, burning rates, analyze oxidizer particle size, impact-sensitivity, and auto ignition of new propellants. Staff labs, chemistry labs, and shops will be provided to support the varied activities of this building.

The plot plan on the following page indicates the location of the buildings proposed for construction under this project

Cure building: The cure building will consist of one building with three earth-covered reinforced concrete cells, providing controlled temperature from ambient to 200° F for curing and conditioning solid propellants.

Storage and conditioning magazines: This building will consist of one building with 27 earth-covered reinforced concrete cells to provide controlled temperatures from -80° F to +200° F for the storage and conditioning of solid propellants.

SOLID PROPELLANT FACILITY
 PLOT PLAN



BUILDING INDEX

BUILDING NUMBER	ITEM
10	CURE BUILDING
19, 20, 21	STORAGE AND CONDITIONING MAGAZINES
5, 6, 6-1, 6-2, 6-3	BLENDER AND DRYING BUILDINGS
31	STORAGE AND CONDITIONING BUILDING
7, 8, 7-1, 7-2, 7-3, 8-1, 8-2	MIXER BUILDINGS
13, 13-1, 13-2	CHARGE PREPARATION BUILDINGS

Blender and drying buildings: Five separate buildings will be constructed. Three will house different types of oxidizer grinders, one will house blender dryer equipment to process oxidizers, and the fifth will house the control center from which all operations will be conducted remotely.

Storage and conditioning building: This building will contain nine earth-covered reinforced concrete cells and will provide controlled temperature from ambient to 200° F for the storage and conditioning of solid propellants.

Mixer buildings: A total of five buildings will be constructed; three will contain three bays with 200 pounds capacity each. The fourth building, a casting bay, will service all mix bays. The fifth building will contain a control center from which all operations will be conducted remotely.

Charge preparation buildings: Three separate buildings for the preparation of completed solid propellant charges will be provided. One building will provide an area for X-ray and visual inspection of solid propellant charges; the second building will provide space for the preparation of completed solid propellant charges; and the third building will house a lathe, mill, reamer, and vacuum recovery system for machining solid propellant charges.

2. JUSTIFICATION:

The Jet Propulsion Laboratory was established before safety codes dealing with solid rocket propellants were available. Subsequent safety code standards have made most of the solid rocket test facilities at the laboratory non-conforming. At the present time, all but 20 of the 100 facilities on the laboratory site are operating under waivers. These waivers make it impossible to modify any existing facilities to meet the changing program needs and thus severely restrict the potential growth of the solid propellant effort at the Laboratory. The recently acquired sixty-acre site has now permitted the relocation of several solid propellant facilities and associated equipment to a location where required safety code standards can be met. This project provides further relocation of additional solid propellant facilities.

3. COST ESTIMATE:

Cure building.....		\$85,000
Building.....	\$44,800	
Utilities.....	37,500	
Instrumentation and controls.....	2,700	

Storage and conditioning magazines.....		\$571,600
Buildings.....	\$360,000	
Utilities and barricades.....	141,600	
Instrumentation and controls.....	70,000	
Blender and drying buildings.....		100,000
Buildings.....	39,500	
Utilities.....	32,500	
Barricades.....	28,000	
Storage and conditioning building.....		90,800
Building.....	44,800	
Utilities.....	37,500	
Instrumentation and control.....	8,500	
Mixer buildings.....		260,000
Buildings.....	190,000	
Utilities.....	30,000	
Barricades.....	40,000	
Charge preparation buildings.....		258,800
Buildings.....	171,700	
Utilities.....	19,000	
Barricades.....	20,000	
Instrumentation and control.....	48,100	
Site utilities.....		588,500
Site preparation.....	153,500	
Chilled water lines.....	50,000	
Hot water lines.....	50,000	
Utility trenches.....	65,000	
Compressed air system.....	5,000	
Sewer system.....	10,000	
Water system.....	15,000	
Gas system.....	10,000	
Power distribution and transformers.....	130,000	

Erosion control.....	\$50,000	
Drainage system.....	25,000	
Paving.....	25,000	<u> </u>
Total estimated cost.....		<u>\$1,954,700</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 16 months

JET PROPULSION LABORATORY

FISCAL YEAR 1961 ESTIMATES

LIQUID PROPELLANT TEST CELL

1. DESCRIPTION:

Liquid propellant test cells: This facility consists of three liquid propellant engine test cells, each capable of accommodating two motor mounts for research investigations of combustion, heat transfer, and engine systems. Buildings will be constructed of reinforced concrete with 800 square feet of area in each building. A sketch of a typical cell is shown on the following page.

Control building: The control building will be used for remote operation and control of the test cells, and will require air conditioning. In addition, the building will be used for rocket-engine assembly and repair. It will be of frame stucco construction providing about 1,050 square feet of area.

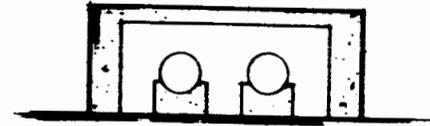
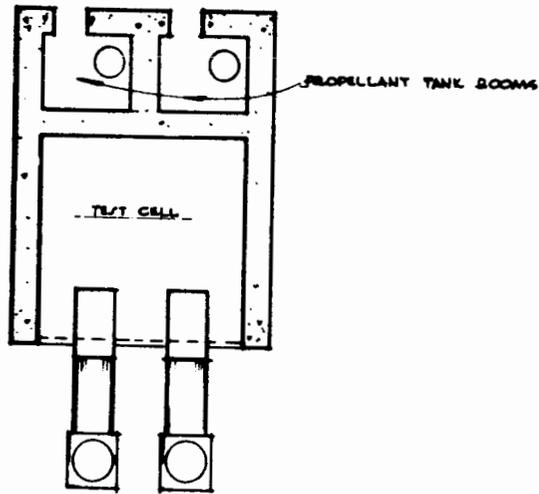
Ready storage: Three separate propellant ready-storage docks will be provided.

Equipment: Instrumentation, engine controls, propellant tanks and transfer system, sound suppression equipment, a supersonic diffuser for engine testing, and a nitrogen system will be provided.

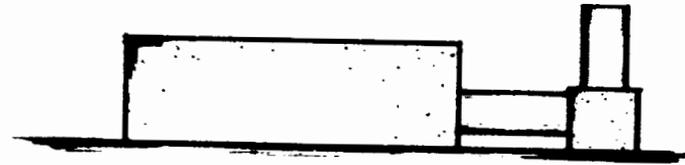
2. JUSTIFICATION:

The Jet Propulsion was established before safety codes dealing with liquid propellant rockets were available. Subsequent safety code standards have made most of the liquid propellant rockets test facilities at the laboratory nonconforming. At the present time, all but 20 of the 100 facilities on the laboratory site are operating under waivers. These waivers make it impossible to modify any existing facilities to meet the changing program needs and thus severely restrict the potential growth of the liquid propellant effort at the laboratory. A part of the liquid propellant facilities of the laboratory are being moved into a newly acquired 60-acre site on which safety standards can be met. This project will complete the move of the liquid propellant facilities and thereby eliminate the waivers of the ordnance safety manual under which the liquid propellant section is now operating.

LIQUID PROPELLANT TEST CELL



SOUTH ELEVATION



WEST ELEVATION



FLOOR PLAN

SCALE IN FEET
0 2 4 8 16

3. COST ESTIMATE:

Buildings.....		\$190,000
3 test cells at \$43,000.....	\$129,000	
1 control room.....	21,000	
3 docks.....	15,000	
Utilities.....	25,000	
Equipment.....		172,000
Valves, piping, tanks for 4 test cells.....	70,000	
Machine tools.....	10,000	
Nitrogen cascade.....	12,000	
Sound suppressors.....	80,000	
Instrumentation.....		138,000
Central recording system between instrumentation building, test cells and control building.....	124,000	
Instruments.....	14,000	
		<hr/>
Total estimated cost.....		<u>\$500,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 10 months

JET PROPULSION LABORATORY

FISCAL YEAR 1961 ESTIMATES

ANTENNA RANGE

1. DESCRIPTION:

The proposed antenna range has been designed to provide the facilities necessary to make highly accurate measurements of microwave energy levels in the frequency range from 30mc to 3,000mc and at K and X bands. The antennas listed will be of widely varying types, both omni-directional and with considerable directivity. This range will facilitate pattern accuracies in the order of 0.2 db and provisions have also been made for absolute gain measurements on a variety of air-borne and ground based antennas, as well as for research and advanced development in antenna design and microwave propagation associated with the fields of radio guidance and extremely long range communication.

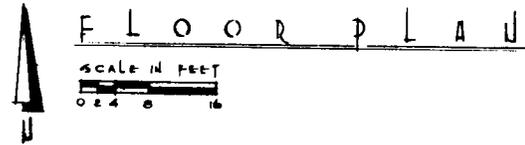
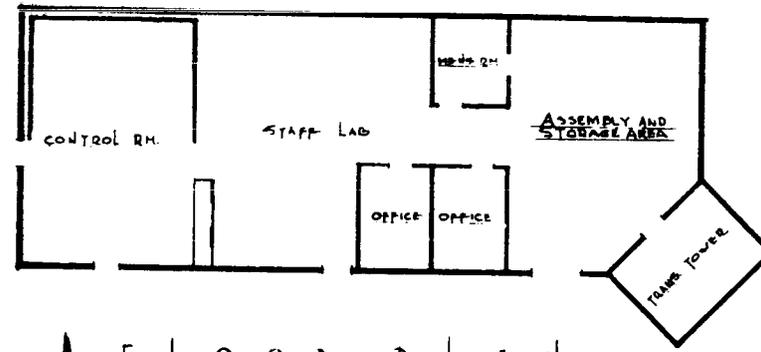
The facility is sited to make optimum use of the available location in terms of both present and projected plans and to provide the maximum number of useful ranges simultaneously operating on a noninterfering basis. The antenna laboratory and main transmitting tower will consist of a 30- by 80-foot building and will house instrumentation and recording equipment, modifications shop, control console, and a laboratory work area. The tower will be nonmetallic and will support the transmitters used in conjunction with the other elements of the range. It will be equipped with a small crane for hoisting the transmitters and their antennae. The control equipment and power supplies will be at the lower level with antenna mounts at various heights. A sketch of the proposed installation is shown on the following page.

2. JUSTIFICATION:

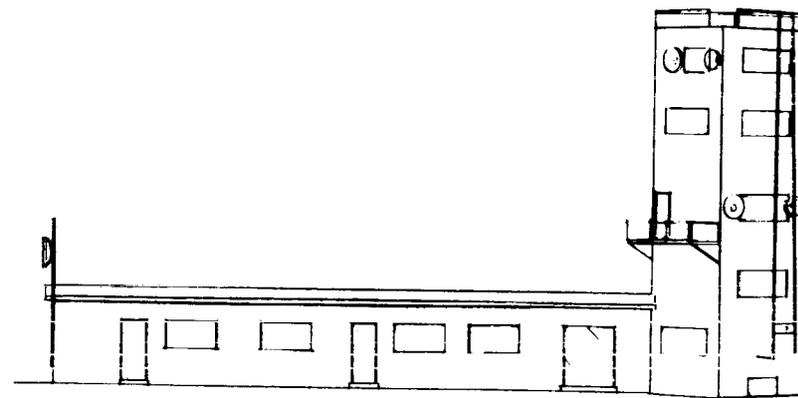
The urgent need for an antenna pattern range facility arises from the rapid growth of the Laboratory and the consequent encroachment on the existing antenna ranges by the construction of new buildings. The construction of a new antenna range facility is absolutely mandatory to continued research in the field of microwave propagation and extreme range communication systems. The facility will provide for the maximum number of transmitters originating from the main tower which can be operated simultaneously on a noninterfering basis. This provides optimum use of the only land that is available for antenna pattern measurement work.

JET PROPULSION LABORATORY
FISCAL YEAR 1961 ESTIMATES

ANTENNA RANGE



F L O O R P L A N



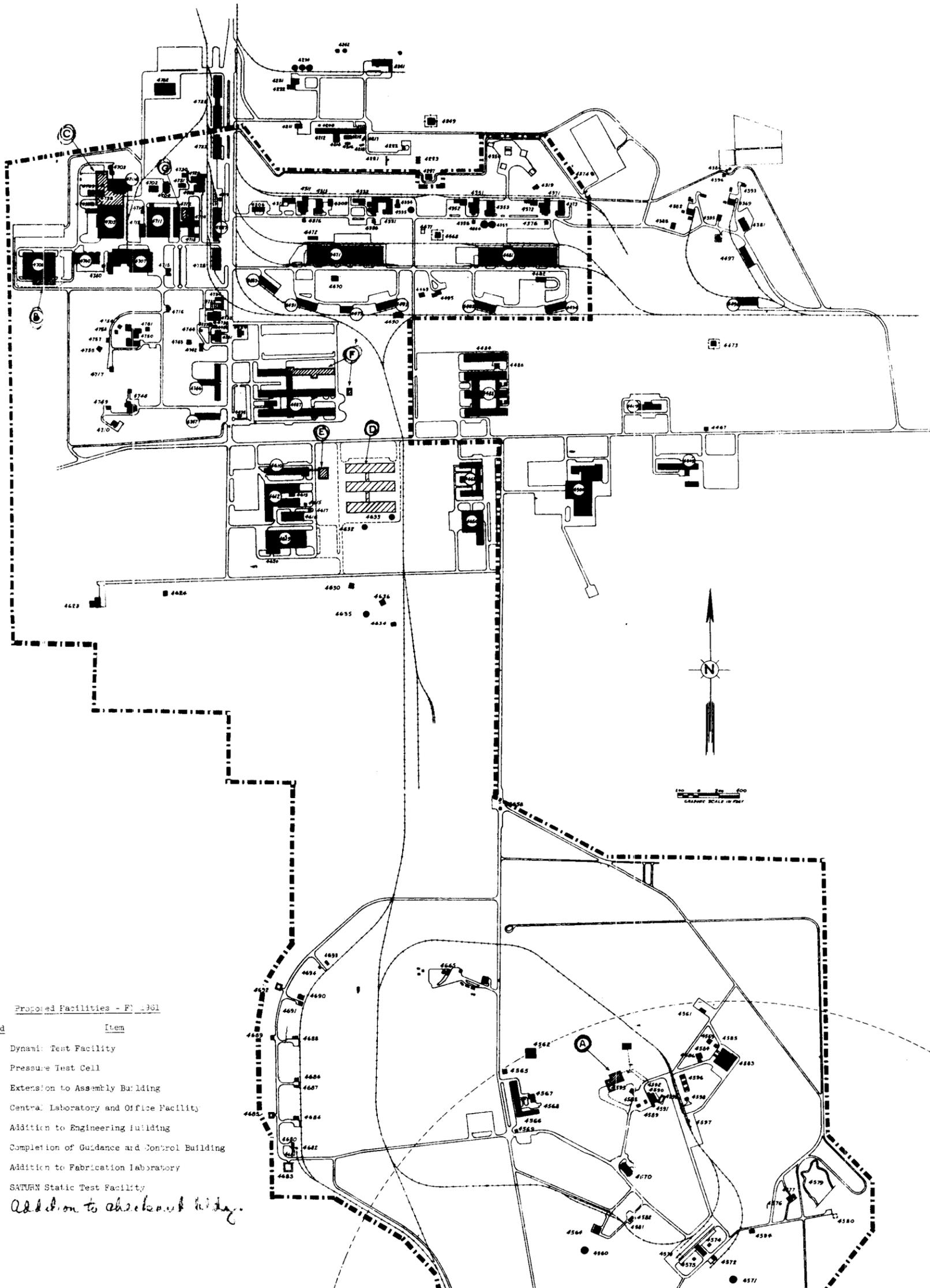
S O U T H E L E V A T I O N

3. COST ESTIMATE:

Antenna laboratory and main transmitter tower.....	\$75,000
Utilities.....	<u>75,000</u>
Total estimated cost.....	<u>\$150,000</u> ✓

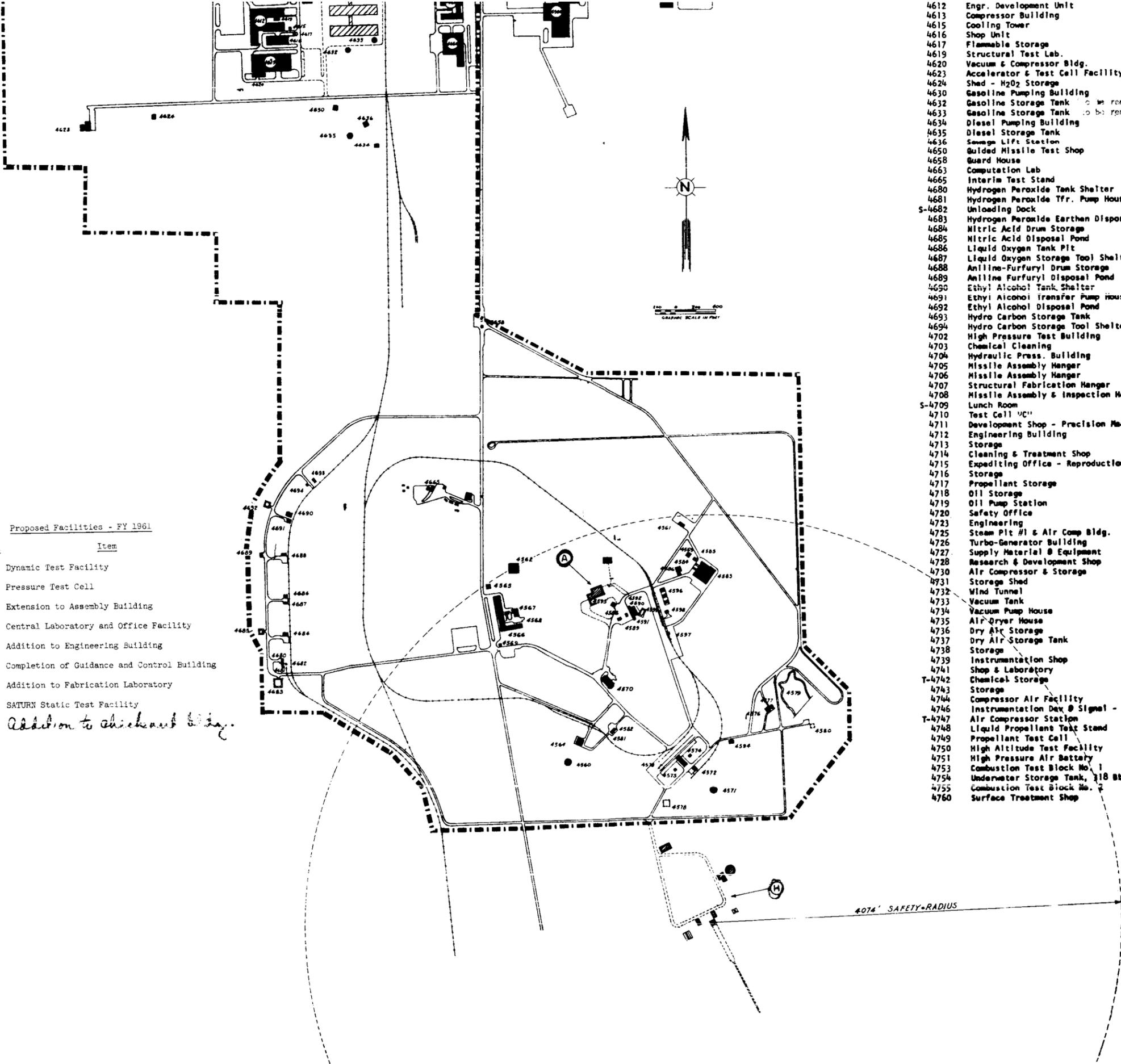
4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 8 months



- Proposed Facilities - F-1381
- | Legend | Item |
|--------|---|
| 3. (A) | Dynamic Test Facility |
| 4. (B) | Pressure Test Cell |
| 5. (C) | Extension to Assembly Building |
| 2. (D) | Central Laboratory and Office Facility |
| 6. (E) | Addition to Engineering Building |
| 7. (F) | Completion of Guidance and Control Building |
| 8. (G) | Addition to Fabrication Laboratory |
| 1. (H) | SATURN Static Test Facility |
| 9. (I) | Addition to checkout building |

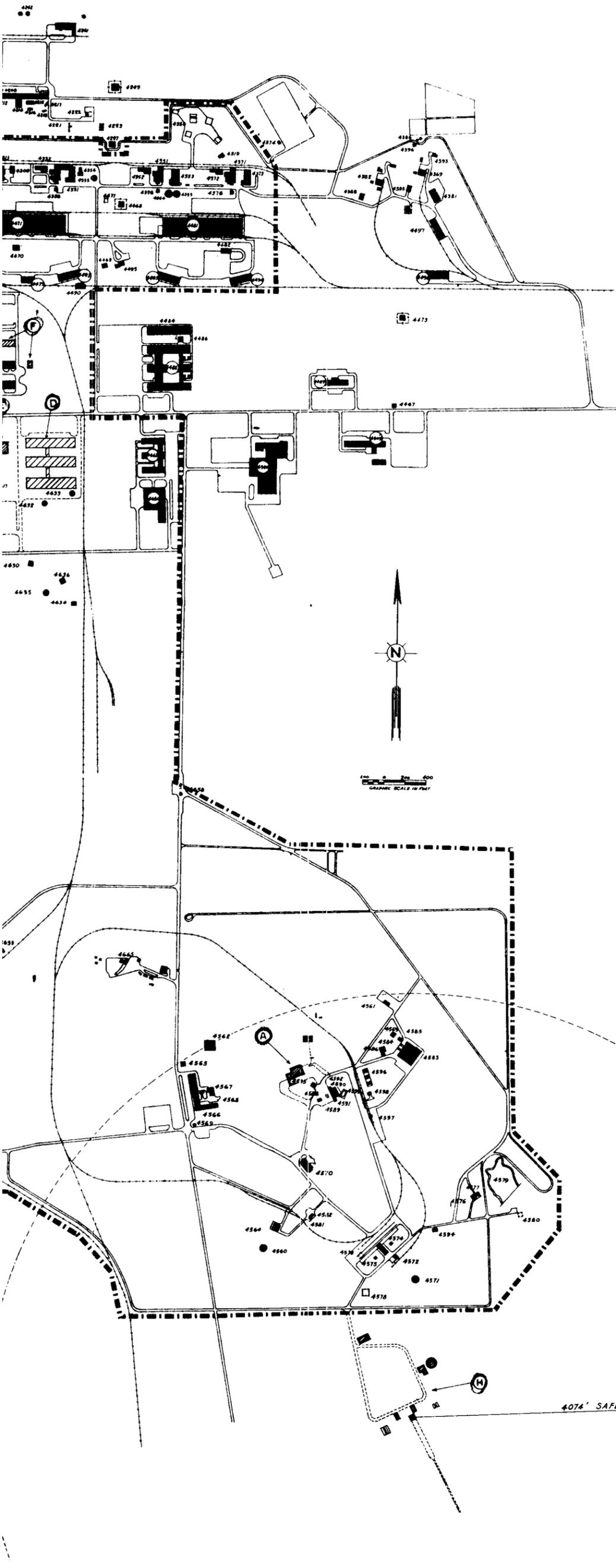
SITE PLAN



Proposed Facilities - FY 1961

- | Legend | Item |
|--------|---|
| 3. (A) | Dynamic Test Facility |
| 4. (B) | Pressure Test Cell |
| 5. (C) | Extension to Assembly Building |
| 2. (D) | Central Laboratory and Office Facility |
| 6. (E) | Addition to Engineering Building |
| 7. (F) | Completion of Guidance and Control Building |
| 8. (G) | Addition to Fabrication Laboratory |
| 1. (H) | SATURN Static Test Facility |
| 9. (I) | Addition to Aircraft Bldg. |

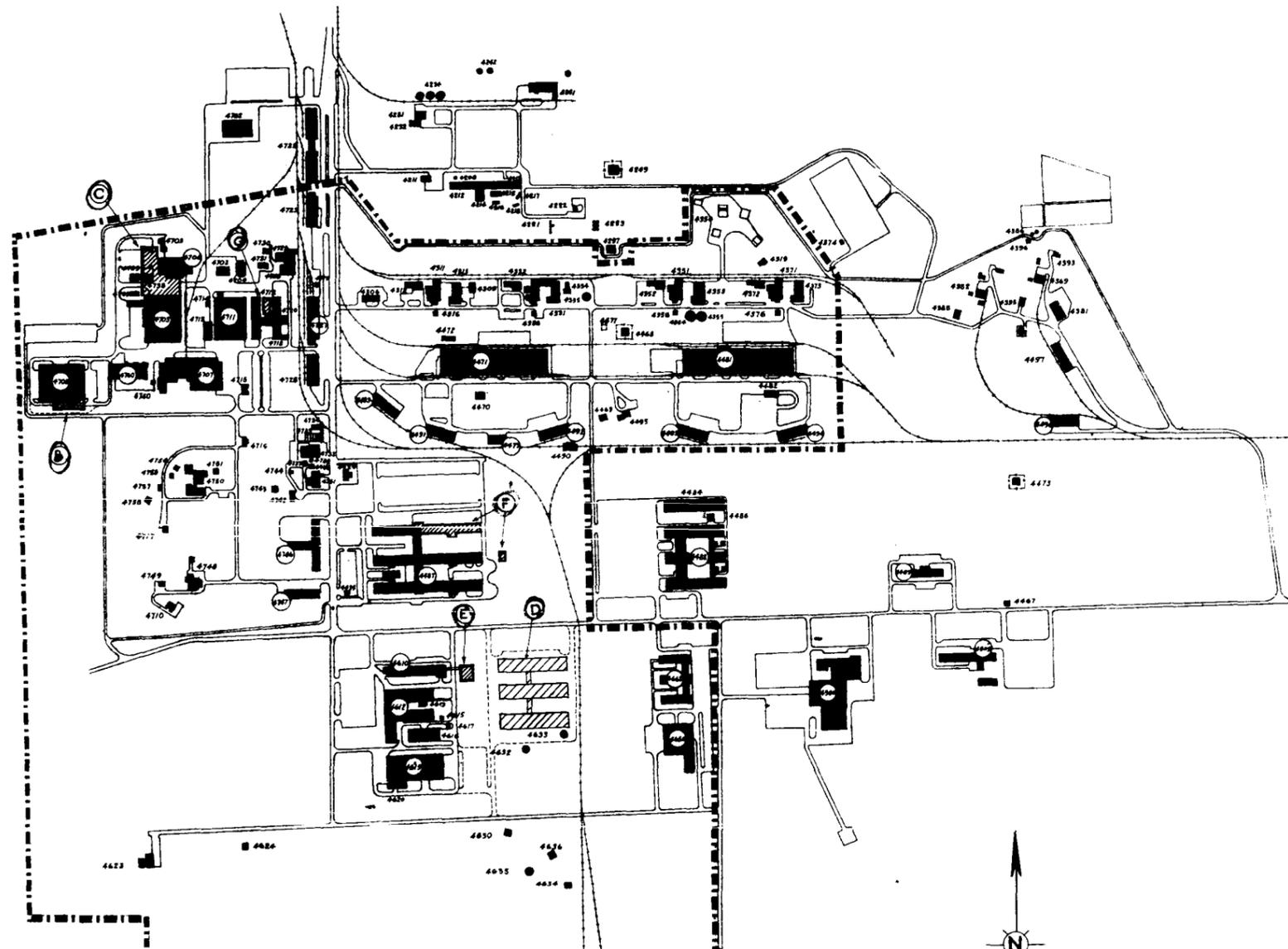
- 4612 Engr. Development Unit
- 4613 Compressor Building
- 4615 Cooling Tower
- 4616 Shop Unit
- 4617 Flammable Storage
- 4619 Structural Test Lab.
- 4620 Vacuum & Compressor Bldg.
- 4623 Accelerator & Test Cell Facility
- 4624 Shed - H2O2 Storage
- 4630 Gasoline Pumping Building
- 4632 Gasoline Storage Tank (to be removed)
- 4633 Gasoline Storage Tank (to be removed)
- 4634 Diesel Pumping Building
- 4635 Diesel Storage Tank
- 4636 Sewage Lift Station
- 4650 Guided Missile Test Shop
- 4658 Guard House
- 4663 Computation Lab
- 4665 Interim Test Stand
- 4680 Hydrogen Peroxide Tank Shelter
- 4681 Hydrogen Peroxide Tfr. Pump House
- S-4682 Unloading Dock
- 4683 Hydrogen Peroxide Earthen Disposal Pond
- 4684 Nitric Acid Drum Storage
- 4685 Nitric Acid Disposal Pond
- 4686 Liquid Oxygen Tank Pit
- 4687 Liquid Oxygen Storage Tool Shelter
- 4688 Aniline-Furfuryl Drum Storage
- 4689 Aniline Furfuryl Disposal Pond
- 4690 Ethyl Alcohol Tank Shelter
- 4691 Ethyl Alcohol Transfer Pump House
- 4692 Ethyl Alcohol Disposal Pond
- 4693 Hydro Carbon Storage Tank
- 4694 Hydro Carbon Storage Tool Shelter
- 4702 High Pressure Test Building
- 4703 Chemical Cleaning
- 4704 Hydraulic Press. Building
- 4705 Missile Assembly Hanger
- 4706 Missile Assembly Hanger
- 4707 Structural Fabrication Hanger
- 4708 Missile Assembly & Inspection Hanger
- S-4709 Lunch Room
- 4710 Test Cell "C"
- 4711 Development Shop - Precision Machine Shop
- 4712 Engineering Building
- 4713 Storage
- 4714 Cleaning & Treatment Shop
- 4715 Expediting Office - Reproduction
- 4716 Storage
- 4717 Propellant Storage
- 4718 Oil Storage
- 4719 Oil Pump Station
- 4720 Safety Office
- 4723 Engineering
- 4725 Steam Pit #1 & Air Comp Bldg.
- 4726 Turbo-Generator Building
- 4727 Supply Material & Equipment
- 4728 Research & Development Shop
- 4730 Air Compressor & Storage
- 4731 Storage Shed
- 4732 Wind Tunnel
- 4733 Vacuum Tank
- 4734 Vacuum Pump House
- 4735 Air Dryer House
- 4736 Dry Air Storage
- 4737 Dry Air Storage Tank
- 4738 Storage
- 4739 Instrumentation Shop
- 4741 Shop & Laboratory
- T-4742 Chemical Storage
- 4743 Storage
- 4744 Compressor Air Facility
- 4746 Instrumentation Dem. & Signal - TV Unit
- T-4747 Air Compressor Station
- 4748 Liquid Propellant Test Stand
- 4749 Propellant Test Cell
- 4750 High Altitude Test Facility
- 4751 High Pressure Air Battery
- 4753 Combustion Test Block No. 1
- 4754 Underwater Storage Tank, 118 Bbl.
- 4755 Combustion Test Block No. 2
- 4760 Surface Treatment Shop



- 4353 Maintenance
- 4354 Nitrogen Storage Tank (Surplus)
- 4355 Nitrogen Storage Tank (Surplus)
- 4356 Storage
- 4371 Trans. & Packaging
- 4372 Receiving Unit
- 4373 Ground Support Equipment Lab
- 4376 H S Scrubber
- 4424 Fire Station
- 4435 Motor Pool Building
- 4469 Maintenance Shop
- 4470 Shelter Shear
- 4471 Warehouse & Office
- 4472 Packaging & Preservation
- 4479 Storage Shed (Bottle Gas)
- 4481 SSE Lab & Engr. Ofc.
- 4482 Operations Support
- 4485 Electrical Systems Lab
- 4487 G&C Office, Lab, & Shops
- 4490 R R Track Scales
- 4491 Computing Eq. Building
- 4492 Wiring Lab
- 4493 Machine Shop
- 4494 Warehouse
- 4495 Maintenance Shop
- 4559 Vacuum Pump House
- 4560 Observation Bunker
- 4561 Shop - Support Facility
- 4562 Industrial Gas Storage
- 4564 Horizontal Test Stand
- 4566 Engineering Building
- 4567 Boiler House & Pump Station
- 4568 Sub-Station - 44 KV
- 4569 Guard House
- 4570 Blockhouse
- 4571 Observation Bunker
- 4572 Static Test Tower
- 4573 Static Test Tower Gantry Crane
- 4574 Static Test Tower Fuel Disposal Pit
- 4575 Static Test Tower Oxidizer Disposal Pit
- 4576 Liquid Waste Disposal Collection Tank
- 4577 LWD Sand Filter
- 4578 Liquid Waste Disposal Underground Tanks
- 4579 Liquid Waste Disposal Reservoir
- 4580 Liquid Waste Disposal Mix Chamber
- 4581 Nitrogen Booster Battery
- 4582 MBB Compressor Building
- 4583 Components Test Laboratory
- 4584 Components Test Lab Catch Tank Pit
- 4585 Components Test Lab Concrete Holding Pond
- 4586 Components Test Lab Earthen Holding Pond
- 4588 Cold Calibration Test Stand
- 4589 Cold Calibration Test Stand Observation Bldg
- 4590 Pit
- 4591 Cold Calibr Test Stand Oxidizer Dispal Pit
- 4592 Cold Calibr Test Stand Fuel Dispal Pit
- 4593 Cold Calibr Test Stand Earthen Holding Pond
- 4594 Fuel Storage Facility
- 4595 Static Test Observation
- 4596 Oxidizer Ready Storage
- 4597 Fuel Ready Storage - 10,000 Gallons
- 4598 Nitrogen Gas Ready Storage
- 4610 Engineering Office Unit
- 4612 Engr. Development Unit
- 4613 Compressor Building
- 4615 Cooling Tower
- 4616 Shop Unit
- 4617 Flammable Storage
- 4619 Structural Test Lab.
- 4620 Vacuum & Compressor Bldg.
- 4623 Accelerator & Test Cell Facility
- 4624 Shed - H2O2 Storage
- 4630 Gasoline Pumping Building
- 4632 Gasoline Storage Tank (to be removed)
- 4633 Gasoline Storage Tank (to be removed)
- 4634 Diesel Pumping Building
- 4635 Diesel Storage Tank
- 4636 Sewage Lift Station
- 4650 Guided Missile Test Shop
- 4658 Guard House
- 4663 Computation Lab
- 4665 Interim Test Stand
- 4680 Hydrogen Peroxide Tank Shelter
- 4681 Hydrogen Peroxide Tfr. Pump House
- S-4682 Unloading Dock
- 4683 Hydrogen Peroxide Earthen Disposal Pond
- 4684 Nitric Acid Drum Storage
- 4685 Nitric Acid Disposal Pond
- 4686 Liquid Oxygen Tank Pit
- 4687 Liquid Oxygen Storage Tool Shelter
- 4688 Aniline-Furfuryl Drum Storage
- 4689 Aniline Furfuryl Disposal Pond
- 4690 Ethyl Alcohol Tank Shelter
- 4691 Ethyl Alcohol Transfer Pump House
- 4692 Ethyl Alcohol Disposal Pond
- 4693 Hydro Carbon Storage Tank
- 4694 Hydro Carbon Storage Tool Shelter
- 4702 High Pressure Test Building
- 4703 Chemical Cleaning
- 4704 Hydraulic Press. Building
- 4705 Missile Assembly Hanger
- 4706 Missile Assembly Hanger
- 4707 Structural Fabrication Hanger
- 4708 Missile Assembly & Inspection Hanger
- S-4709 Lunch Room
- 4710 Test Cell "C"
- 4711 Development Shop - Precision Machine Shop
- 4712 Engineering Building
- 4713 Storage
- 4714 Cleaning & Treatment Shop
- 4715 Expediting Office - Reproduction
- 4716 Storage
- 4717 Propellant Storage
- 4718 Oil Storage
- 4719 Oil Pump Station
- 4720 Safety Office
- 4723 Engineering
- 4725 Steam Pit #1 & Air Comp Bldg.
- 4726 Turbo-Generator Building
- 4727 Supply Material & Equipment
- 4728 Research & Development Shop
- 4730 Air Compressor & Storage
- 4731 Storage Shed
- 4732 Wind Tunnel
- 4733 Vacuum Tank
- 4734 Vacuum Pump House
- 4735 Air Dryer House
- 4736 Dry Air Storage
- 4737 Dry Air Storage Tank
- 4738 Storage
- 4739 Instrumentation Shop
- 4741 Shop & Laboratory
- T-4742 Chemical Storage
- 4743 Storage
- 4744 Compressor Air Facility
- 4746 Instrumentation Dax & Signal - TV Unit
- T-4747 Air Compressor Station
- 4748 Liquid Propellant Test Stand
- 4749 Propellant Test Cell
- 4750 High Altitude Test Facility
- 4751 High Pressure Air Battery
- 4753 Combustion Test Block No. 1
- 4754 Underwater Storage Tank, 118 Bbl.
- 4755 Combustion Test Block No. 2
- 4760 Surface Treatment Shop

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES
SITE PLAN

4074' SAFETY-RADIUS



EXISTING FACILITIES

BLDG. NO.	TITLE
4306	Cafeteria
4309	Engine Test
4311	Supply & Equipment Reclassification
4312	Security Guard Hq.
4313	Rocketdyne Service Center
4316	Storage, Paint
4319	Oil Pump Sta. (Test Branch)
4331	Testing & Dev. Shop
4332	Environmental Test Lab
4334	Test Tower Instrumentation
4335	Centrifuge - 50,000 cu ft
4336	High Pressure Test
4350	Fuel Test Stand
4351	Supply Mgt - Catalog & Pub.
4352	Nitrogen Manufacturing Plant
4353	Maintenance
4354	Nitrogen Storage Tank (Surplus)
4355	Nitrogen Storage Tank (Surplus)
4356	Storage
4371	Trans. & Packaging
4372	Receiving Unit
4373	Ground Support Equipment Lab
4376	H S Scrubber
4424	Fire Station
4435	Motor Pool Building
4469	Maintenance Shop
4470	Shelter Shear
4471	Warehouse & Office
4472	Packaging & Preservation
4479	Storage Shed (Bottle Gas)
4481	SSE Lab & Engr. Ofc.
4482	Operations Support
4485	Electrical Systems Lab
4487	G&C Office, Lab. & Shops
4490	R R Track Scales
4491	Computing Eq. Building
4492	Wiring Lab.
4493	Machine Shop
4494	Warehouse
4495	Maintenance Shop
4559	Vacuum Pump House
4560	Observation Bunker
4561	Shop - Support Facility
4562	Industrial Gas Storage
4564	Horizontal Test Stand
4566	Engineering Building
4567	Boiler House & Pump Station
4568	Sub-Station - 44 KV
4569	Guard House
4570	Blockhouse
4571	Observation Bunker
4572	Static Test Tower
4573	Static Test Tower Gantry Crane
4574	Static Test Tower Fuel Disposal Pit
4575	Static Test Tower Oxidizer Disposal Pit
4576	Liquid Waste Disposal Collection Tank
4577	LWD Sand Filter
4578	Liquid Waste Disposal Underground Tanks
4579	Liquid Waste Disposal Reservoir
4580	Liquid Waste Disposal Mix Chamber
4581	Nitrogen Booster Battery
4582	NBB Compressor Building
4583	Components Test Laboratory
4584	Components Test Lab Catch Tank Pit
4585	Components Test Lab Concrete Holding Pond
4586	Components Test Lab Earthen Holding Pond
4588	Cold Calibration Test Stand
4589	Cold Calibration Test Stand Observation Bldg
4590	Pit
4591	Cold Calibr Test Stand Oxidizer Dispal Pit
4592	Cold Calibr Test Stnd Fuel Dispal Pit
4593	Cold Calibr Test Stnd Earthen Holding Pond
4594	Fuel Storage Facility
4595	Static Test Observation
4596	Oxidizer Ready Storage
4597	Fuel Ready Storage - 10,000 Gallons
4598	Nitrogen Gas Ready Storage
4610	Engineering Office Unit
4612	Engr. Development Unit
4613	Compressor Building
4615	Cooling Tower
4616	Shop Unit
4617	Flammable Storage
4619	Structural Test Lab.
4620	Vacuum & Compressor Bldg.
4623	Accelerator & Test Cell Facility
4624	Shed - H ₂ O ₂ Storage
4630	Gasoline Pumping Building
4632	Gasoline Storage Tank (to be removed)
4633	Gasoline Storage Tank (to be removed)
4634	Diesel Pumping Building
4635	Diesel Storage Tank
4636	Sewage Lift Station
4650	Guided Missile Test Shop
4658	Guard House
4663	Computation Lab
4665	Interim Test Stand
4680	Hydrogen Peroxide Tank Shelter

NASA HUNTSVILLE FACILITY
 FISCAL YEAR 1961 ESTIMATE
 SITE PLAN

C & E FOR LAUNCH VEHICLE PROGRAMS
FY 1961

NASA HUNTSVILLE FACILITY

<u>PROJECT</u>	<u>REQUIRED DATE</u>	<u>ESTIMATED COST</u>
1. SATURN Static Test Facility	Jan. 1963	\$ 10,800,000
2. Central Laboratory & Office Facility	Jan. 1962	4,400,000
3. Dynamic Test Facility	Mar. 1961	600,000*
4. Pressure Test Cell	May 1961	650,000**
5. Extension to Assembly Building	Nov. 1961	2,500,000***
6. Addition to Engineering Building	Oct. 1961	1,137,000
7. Completion of Guidance & Control Building	Nov. 1961	1,948,000
8. Addition to Fabrication Laboratory	June 1961	215,000
9. Addition to checkout Building	Sept. 1962	<u>4,500,000</u>
TOTAL		<u>\$ 26,750,000</u>

* Lada, Huntsville, advises they have enough ARPA/^{design}money for this.

** Design money available from ARPA on this project.

*** \$90,000 ARPA money available for design.

C & E FOR LAUNCH VEHICLE PROGRAMS
FY 1961

ATLANTIC MISSILE RANGE

<u>PROJECT</u>	<u>REQUIRED DATE</u>	<u>ESTIMATED COST</u>
1. Completion of SATURN Launch Complex	Mar. 1961	\$ 2,250,000
2. Escape Mechanism	Mar. 1961	300,000
3. Hydrogen System	Feb. 1962	2,500,000
4. New SATURN Launch Complex	Feb. 1962	21,000,000
5. Staging Building	Sept. 1961	1,400,000
6. Addition to Engineering & Laboratory Bldg.	July 1961	<u>300,000</u>
TOTAL		<u>\$ 27,750,000</u>

TOTAL C & E:

NASA HUNTSVILLE	\$ 26,750,000
NASA AMR	<u>27,750,000</u>
TOTAL C & E	<u>\$ 54,500,000</u>

Memorandum in response to request by Congressman Miller for inclusion in Congressional Testimony before the Committee on Science and Astronautics, Sub-committee No. 1. -- Page 77.

Prior to the transfer of the Saturn program from the Department of Defense to the NASA, the Army had planned to request appropriation in FY 1961 for facilities in support of the Saturn program totalling \$13,000,000. Of this amount, \$10,750,000 was to go to Huntsville and \$2,250,000 to Cape Canaveral as follows:

<u>Huntsville</u>	
Saturn Static Test Facility	\$7,000,000
Dynamic Test Facility	600,000
Pressure Test Cell	650,000
Extension to Assembly Building	2,500,000
	<u>\$10,750,000</u>
<u>Canaveral</u>	
Completion of Saturn Launch Complex	<u>2,250,000</u>
Total	\$13,000,000

Of these items, the Saturn Static Test Facility funded at \$7,000,000 would have provided a stand-by facility which could have been activated by installing additional equipment at extra cost in case of a catastrophic accident on the existing static test facility. The NASA funding level of \$10,800,000 will result in a facility completely equipped for first stage testing. It will provide the additional testing capacity necessary for the accelerated Saturn schedule.

The other facility items at Huntsville and Canaveral had either been proposed to the Army by Dr. von Braun's Development Operations Division or would have been proposed in FY 1962 under the old Saturn schedule. The need for these items was rendered critical by the problems attendant to the proposed transfer of the Development Operations Division to NASA and the acceleration of Saturn. NASA is increasing the workload on Huntsville not only by the acceleration of Saturn but by placing additional programs under Huntsville direction. Principally, Huntsville will be responsible for overall direction of the Centaur program and of the NASA program to adapt the Air Force Thor and Atlas Agena B vehicles to NASA missions. To carry out these broadened responsibilities within a manpower ceiling of 5500, the markedly improved working conditions and augmented technical facilities contributed by the additional \$7,700,000 of construction at Huntsville is considered mandatory.

Type of construction is:

For shop type buildings - transite on steel frame.

For office buildings - concrete and steel frame with walls of concrete block.

(Information supplied by Mr. Joe Lada, Huntsville).

RULE FOR SPACE ALLOCATION USED BY HUNTSVILLE

General Administrative Space - - - - - 80 square feet per person
Scientific & professional people - - - - - 90 to 100 square feet per person
Drafting room space - - - - - 120 square feet per person
Laboratory Chiefs, supervisors, etc. - - - - - 200 square feet per person

(Information supplied by Joe Lada, Huntsville).

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATE

SATURN STATIC TEST FACILITY

Description: A tower and associated facilities, constructed and instrumented to permit captive testing of space vehicles in the general class of the first stage of the SATURN vehicle.

Purpose: To provide for an accelerated flight test program while at the same time conducting an extensive research and development program on the SATURN missile. The requirement is important because:

- a. The existing test stand does not have the capability of serving both flight test and R&D objectives.
- b. A second stand is needed as back up in the event of a catastrophe which would damage or destroy the present stand.
- c. The stand is required:
 - (1) To prove design concepts.
 - (2) To establish engine operational limitations.
 - (3) To determine the effects of engine operation and efficiency after a single engine malfunction.
 - (4) To establish statistical data on reliability.
 - (5) To provide a final operational check on flight vehicles.

Required Date: January 1963.

SATURN STATIC TEST FACILITY (Continued):

Construction Time: 30 Months.

Characteristics:

- a. Tower: A heavy steel structure to support vertical static and dynamic loads of the missile and a light steel structure which will take horizontal loads from engine gimbaling and winds. This latter structure will support service and work platforms and will carry a gantry crane with its system of tracks.
- b. Terminal and Equipment Building: A two-story concrete building immediately adjacent to the tower for terminating instrumentation and control cables and for housing special power generators and power switch panels.
- c. Cable Tunnel: A tunnel leading from the termination building to a new instrumentation and control blockhouse, which will also be connected to the existing blockhouse and instrumentation systems through a system of conduits.
- d. Concrete Lined Trench: Carries deflector cooling water to a holding pond.
- e. Holding Pond: Collects deflector cooling water for subsequent discharge into Huntsville creek.

SATURN STATIC TEST FACILITY (Continued):

f. New Blockhouse: This construction houses all control equipment and consoles needed for the proposed tower and half the recorders needed for testing the SATURN first stage at the new tower. (The remainder of the recording instruments are at the existing blockhouse). Space will be available for new instrumentation in the future.

g. Associated Construction:

(1) Site work

- (a) Access roads
- (b) Railroads
- (c) General grading
- (d) Hardstands

(2) Utilities

- (a) Power lines
- (b) Potable water mains
- (c) Sanitary sewer lines
- (d) Septic tanks
- (e) A high pressure industrial water system
- (f) A reservoir and pumps for supplying deflector cooling water

SATURN STATIC TEST FACILITY (Continued):

(3) Supporting Facilities

- (a) A small maintenance shop building
- (b) Fuel and liquid oxygen tanks and piping systems
- (c) A high pressure nitrogen and air storage bottle system and piping network

Cost Estimate:

Tower	- - - - -	\$ 1,900,000
Deflector trench and pond	- - - - -	260,000
Site work	- - - - -	170,000
Fuel storage and handling	- - - - -	170,000
LOX storage and handling	- - - - -	450,000
High pressure gas system	- - - - -	330,000
Position support building	- - - - -	60,000
Industrial water system	- - - - -	370,000
Outside utilities	- - - - -	130,000
Instrumentation and control equipment	- - - - -	4,510,000
Gantry crane	- - - - -	440,000
Blockhouse	- - - - -	730,000
Design and engineering services	- - - - -	<u>1,280,000</u>
Total	- - - - -	<u>\$ 10,800,000</u>

NASA HUNTSVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

SATURN STATIC TEST FACILITY

1. DESCRIPTION:

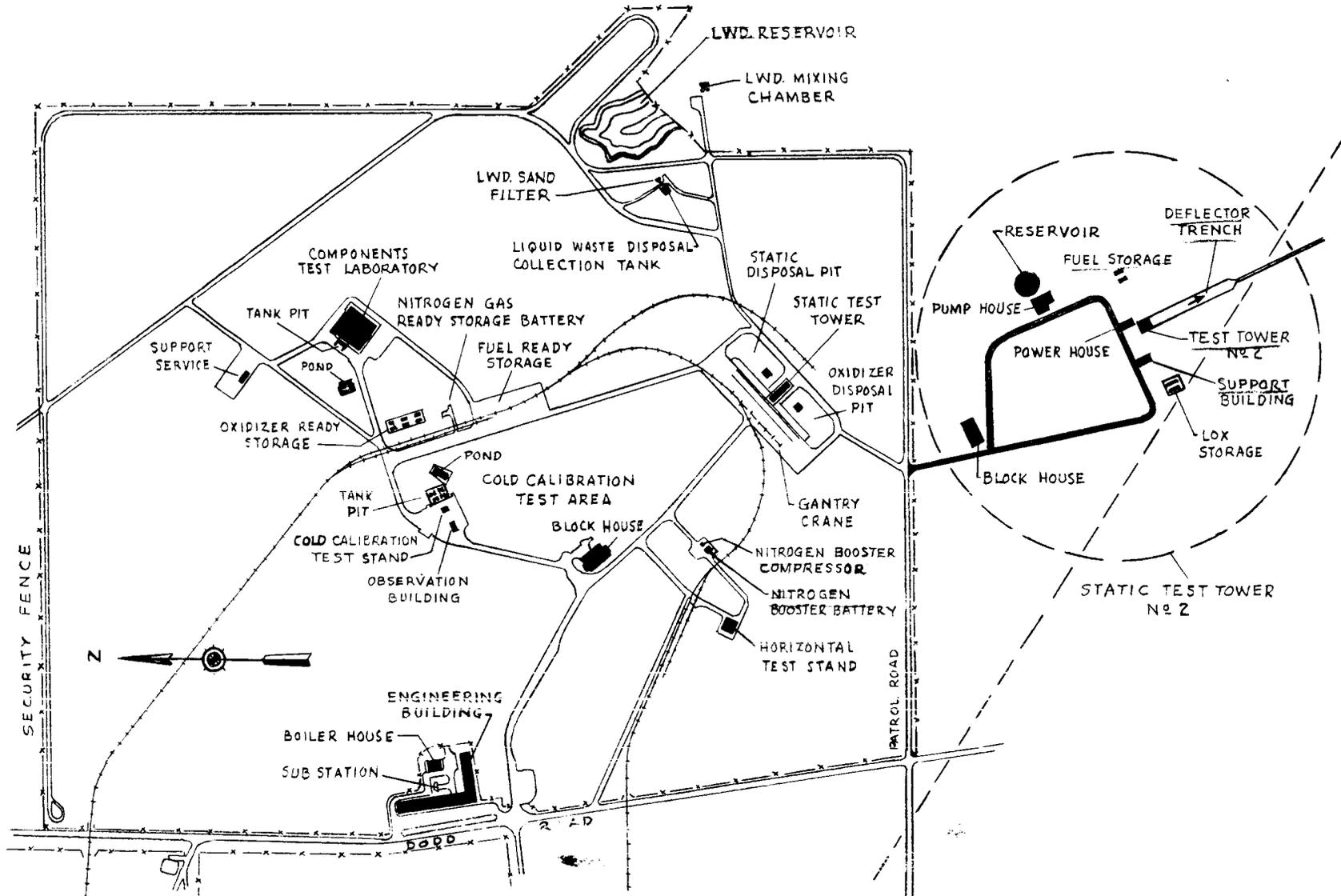
The construction and instrumentation of a tower is required to permit the captive testing of space vehicles in the general class of the first stage of the Saturn vehicle. The project includes all site improvements, utilities, support buildings, and equipment required to make the project fully useable, except for equipment that must be tailor-made to suit individual vehicles. The tower itself will consist of a heavy steel structure capable of carrying all vertical loads, both static and dynamic; and a light structure which will take horizontal loads from engine gimbaling or from winds, which will support service and work platforms, and which will also carry a gantry crane with its system of tracks. Leading from the tower will be a shallow, concrete-lined trench which will drain the deflector cooling water to a holding pond, which, in turn, will discharge into the Huntsville Spring Creek. Immediately adjacent to the tower will be a two-story concrete building for terminating instrumentation and control cables and for housing special power generators and power switch panels. A cable tunnel will lead from the termination building to a new instrumentation and control blockhouse, which will also be connected to the existing blockhouse and instrumentation system through a bank of conduits. In the new blockhouse will be all control equipment, and consoles needed for the proposed tower and half the recorders needed for testing the Saturn first stage at the new tower with the remainder of the recording being down in the existing blockhouse. Space will be available to add additional instrumentation in the future.

Site work in the project will consist of access roads and railroads; general grading, hardstands, and area drainage; utilities including power lines, potable water mains, sanitary sewer lines and septic tanks; and a high pressure industrial water system. A reservoir and pumps for supplying deflector cooling and fire fighting water will be provided. Supporting facilities will include a small maintenance shop building; fuel and liquid oxygen storage tanks and piping systems; and high pressure nitrogen and air storage bottles and piping networks.

Sketches of the proposed facility are shown on the following three pages.

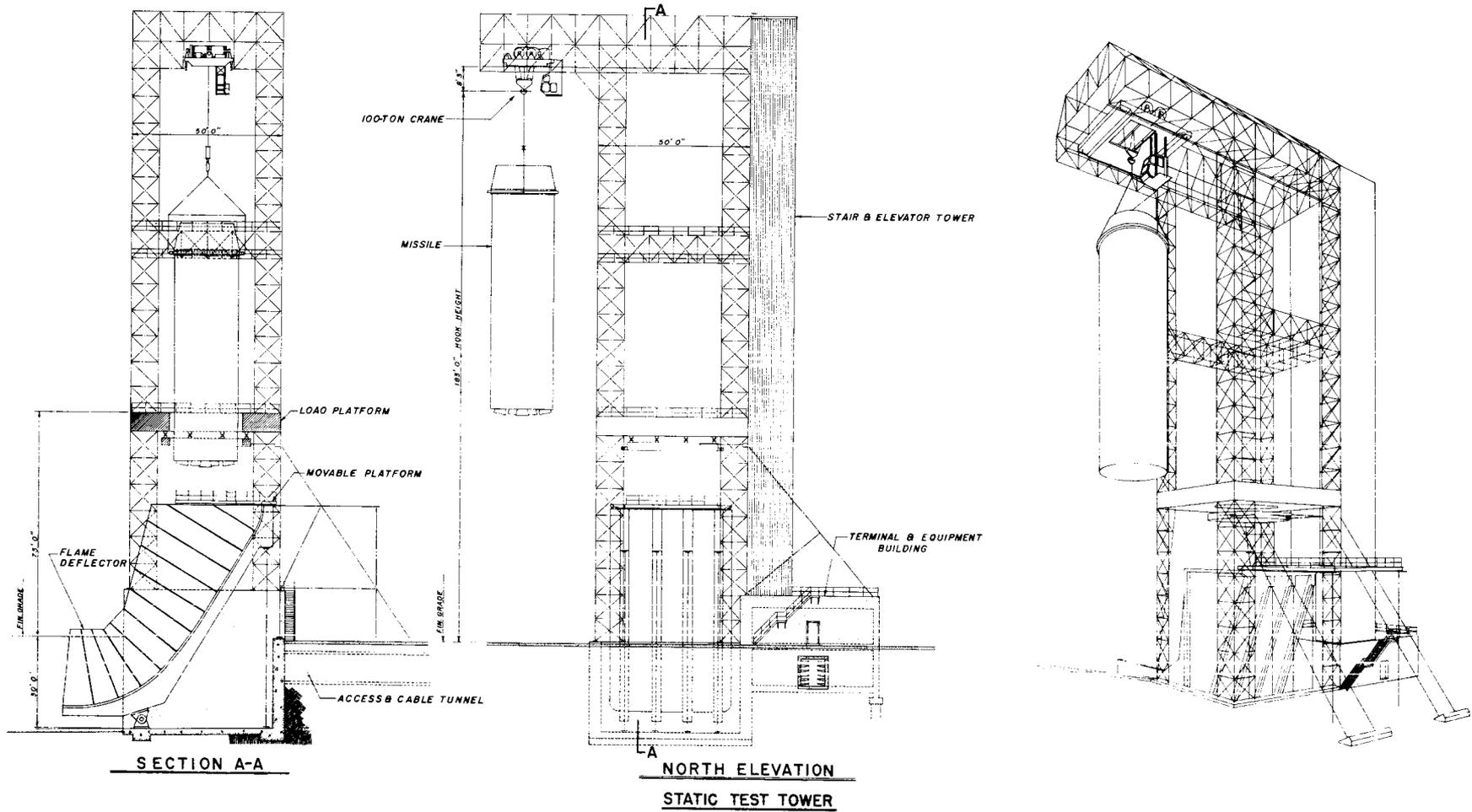
NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

SATURN STATIC TEST FACILITY



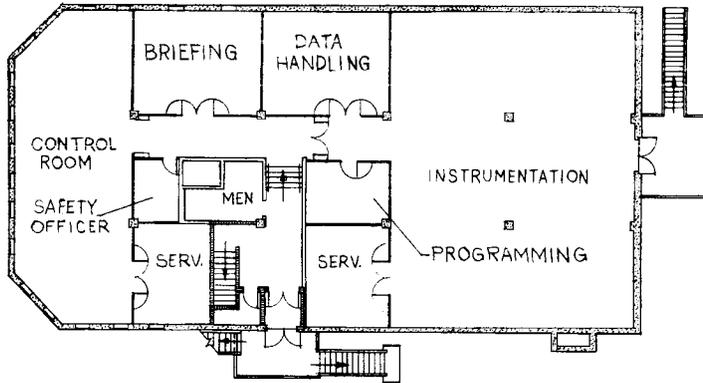
NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

SATURN STATIC TEST FACILITY

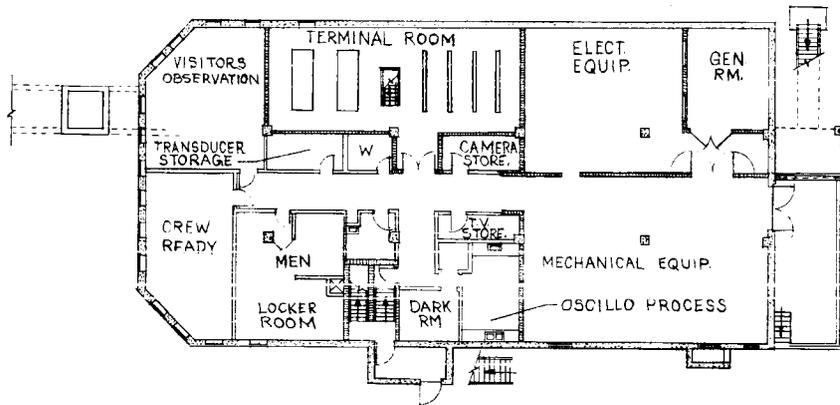


NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

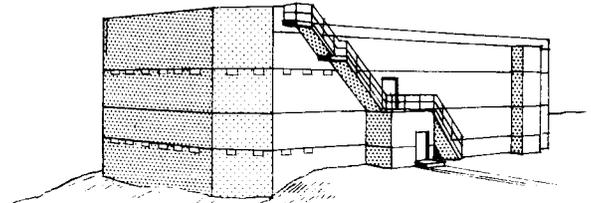
SATURN STATIC TEST FACILITY



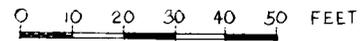
SECOND FLOOR PLAN



FIRST FLOOR PLAN



BLOCKHOUSE



E-778

2. JUSTIFICATION:

This facility will be used to perform captive testing of the complete first stages of the Saturn space vehicle. Such testing is required:

- (a) To prove design concepts.
- (b) To establish engine operational limitations.
- (c) To determine the effects on engine operation and efficiency of a single engine malfunction.
- (d) To establish statistical data on reliability.
- (e) To provide a final operational check on flight vehicles.

An existing static test tower does not have the capability of handling an accelerated flight program while at the same time conducting an extensive research and development program. The construction of a second stand will remove this conflict. Of perhaps greater importance than the operational advantages mentioned, is the back-up given the present stand in the case of a catastrophe. The additional stand will allow the Saturn program to proceed even if an explosion seriously damages the existing stand.

3. COST ESTIMATE:

Tower.....	\$1,900,000
Deflector trench and pond.....	260,000
Site work.....	170,000
Fuel storage and handling.....	170,000
LOX storage and handling.....	450,000
High pressure gas system.....	330,000
Position support building.....	60,000
Industrial water system.....	370,000
Outside utilities.....	130,000
Instrumentation and control equipment.....	4,510,000
Gantry crane.....	440,000

Blockhouse.....	730,000
Design and engineering services.....	<u>1,280,000</u>
Total estimated cost.....	<u>\$10,800,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 30 months *Jan 1963*

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

CENTRAL LABORATORY AND OFFICE FACILITY

Description: A combined laboratory and office building. This multi-story structure will provide a gross area of 205,000 square feet and a net area of approximately 144,000 square feet. In addition to the laboratory and office areas, the building will house a cafeteria, library, small auditorium, conference rooms, equipment rooms for specialized computing equipment, and heating and air conditioning equipment.

Purpose: This building will house the aeroballistics laboratory, the research projects laboratory, the staff offices of the missile firing laboratory, and the Development Operations Division. Supporting personnel who will be transferred to NASA will also occupy this building.

- a. Aeroballistics Laboratory: This laboratory performs research and development in the fields of theoretical aerodynamics, flight mechanics and vibration, flutter and guidance theory to provide a basis for the optimum design of space vehicles and the optimization of trajectory and orbit calculations. In addition, the Laboratory conducts analytical investigation of test flights, compiles and analyzes meteorological data for application to vehicle design, and carries on applied supporting research in the fields of aeroballistics and related sciences.

CENTRAL LABORATORY AND OFFICE FACILITY (Continued):

- b. Research Projects Laboratory: This laboratory coordinates and supervises supporting research programs, provides scientific coordination for various special research projects, and conducts independent research in thermal design, nuclear power problems and space physics.
- c. Missile Firing Laboratory: This laboratory has responsibility for all NASA Huntsville firings at Cape Canaveral.
- d. General: 32,000 square feet of space in this building will be devoted to a cafeteria, auditorium and conference rooms, library, special equipment rooms and mechanical equipment rooms. The remainder will be administrative space.

Required Date: January 1962.

1962-1-9
1962-1-7

Construction Time: 20 Months.

CENTRAL LABORATORY AND OFFICE FACILITY (Continued):

Characteristics: The structure will consist of reinforced concrete framing and cinder block exterior walls, and will provide a gross area of 295,000 square feet and a net area of 144,000 square feet.

The net area will be broken down as follows:

	<u>People</u>	<u>Square Feet</u>	
Air Ballistics Laboratory	250	25,500	} 38,500
Research Projects Laboratory	75	8,500	
Missile Firing Laboratory	45	4,500	
Development Operations Staff (von Braun & his people)	675	73,000	
Auditorium and Conference Rooms		9,000	} 32,500
Library (Technical)		5,000	
Special Equipment Rooms		8,000	
Mechanical Equipment Rooms		4,000	
Cafeteria		6,500	

\$ 35,000

\$ 110,000

10-45
10-1-48

140 sq ft/person app.

3 Includes equipment space.

CENTRAL LABORATORY AND OFFICE FACILITY (Continued):

Cost Estimate:

Site Preparation - - - - -	\$ 20,000
Roadway and parking areas - - - - -	110,000
Building (includes heating and air conditioning) - - - - -	3,485,000
Utilities - - - - -	100,000
Communications - - - - -	200,000
Collateral equipment - - - - -	100,000
Design and engineering services - - - - -	<u>385,000</u>
Total Estimated Cost - - - - -	<u>\$ 4,400,000</u>

NASA HUNTSVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

CENTRAL LABORATORY AND OFFICE FACILITY

1. DESCRIPTION:

This project provides for the construction of a combined laboratory and office building to house personnel of the aeroballistics and research projects laboratories plus staff personnel of the NASA Huntsville Facility. The proposed multi-story building will provide a gross area of 205,000 square feet and a net area of approximately 144,000 square feet. In addition to the laboratory and office areas, the facility will house a cafeteria, library, small auditorium, conference rooms, equipment rooms for specialized computing equipment, and heating and air-conditioning equipment. Drawings of the proposed construction are shown on the following page.

2. JUSTIFICATION:

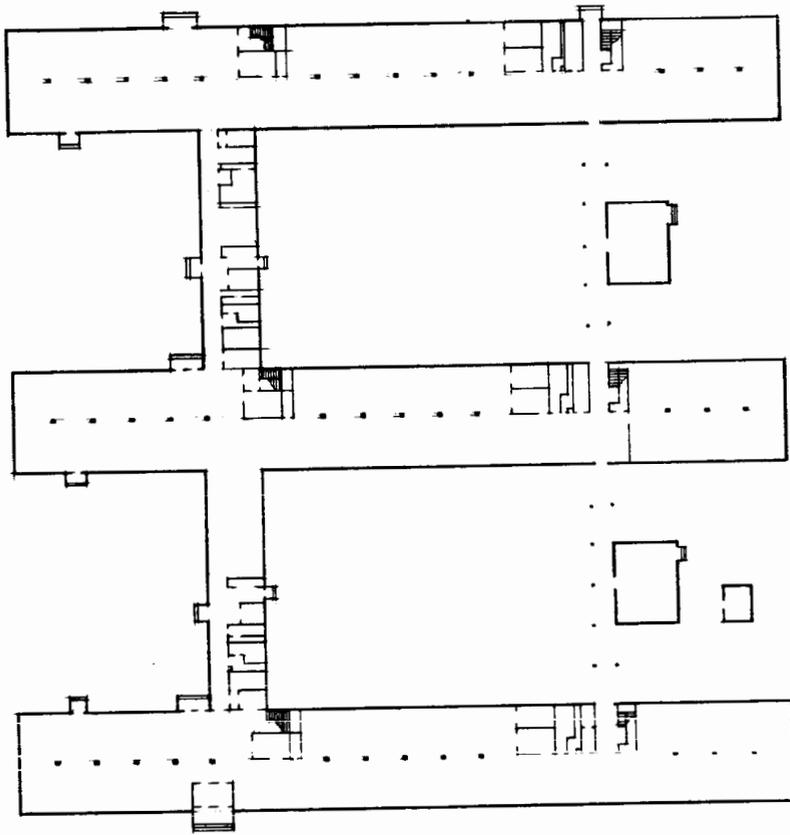
The proposed transfer of the ABMA development operations division to NASA and the resultant agreements necessary to provide an equitable share of buildings to both the Army and the NASA, will result in extreme congestion in many areas of operation in the development operations division. The greatest shortage of space will occur as a result of the agreement to retain buildings 4488 and 4484 for Army use. These buildings now house the aeroballistics laboratory, the research projects laboratory, and staff offices of the missile firing laboratory and the development operations division. In addition, space must be provided for supporting personnel who will be transferred to NASA.

The aeroballistics laboratory performs research and development in the fields of theoretical aerodynamics, flight mechanics and vibration, flutter, and guidance theory to provide a basis for the optimum design of space vehicles and the optimization of trajectory and orbit calculations. In addition, the laboratory conducts analytical investing action of test flights, compiles and analyzes meteorological data for application to vehicle design, and carries on applied supporting research in the fields of aeroballistics and related sciences.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

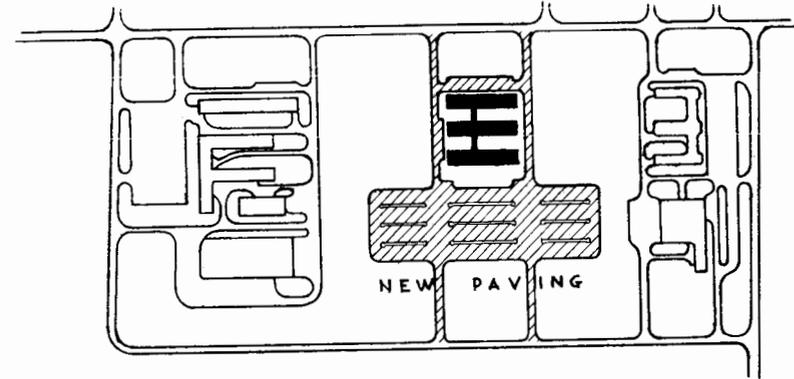
CENTRAL LABORATORY AND OFFICE FACILITY

E-778



FIRST FLOOR PLAN

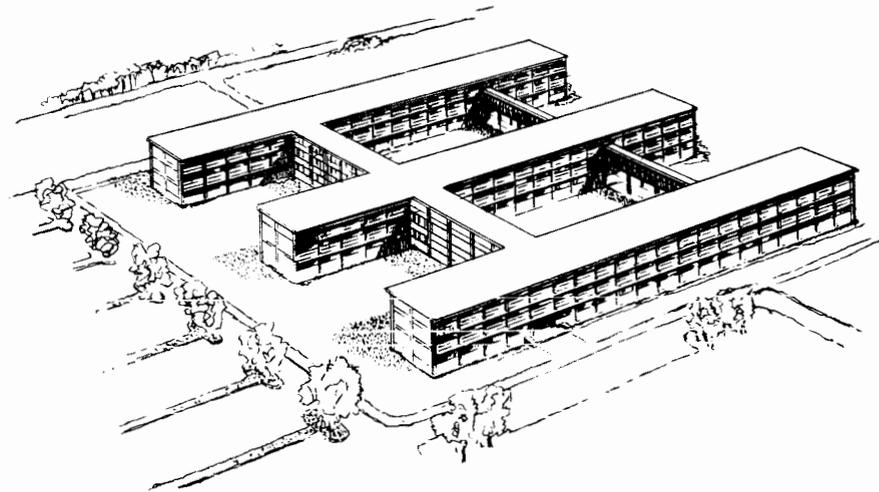
SCALE IN FEET
0 100 200



PLOT PLAN

SCALE IN FEET

0 400 800 1200



The research projects laboratory coordinates and supervises supporting research programs, provides scientific coordination for various special research projects, and conducts independent research in thermal design, nuclear power problems, and space physics. The missile firing laboratory has the responsibility for all NASA Huntsville Facility firings at Cape Canaveral. The office of the director of the missile firing laboratory and his staff are located at Huntsville. The office of the director of the NASA Huntsville Facility and supporting personnel provide supervision, and technical and administrative support to the ten laboratories of ABMA development operations division which will comprise the NASA Huntsville Facility. A total of 1,045 personnel will be housed in the building proposed for construction under this project.

3. COST ESTIMATE:

Site preparation.....	\$20,000	
Roadways and parking areas.....	110,000	4/17/59 #
Building (including heating and air conditioning).....	3,485,000	
Utilities.....	100,000	
Communications.....	200,000	
Collateral equipment.....	100,000	
Design and engineering services.....	<u>385,000</u>	
Total estimated cost.....	<u>\$4,400,000</u>	21.5/59 #

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 20 months Year 1962

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

DYNAMIC TEST FACILITY

Description: The facility will consist of two foundations capable of carrying the launcher arms and vehicle at the full flight weight. A steel superstructure will provide lateral support for the vehicle and working platforms at any point on the vehicle. The superstructure will also serve as a pedestal to support a stiff-leg derrick to be used for handling and placing the various stages. Structural members will be included to support the missile by long cables, allowing freedom in all directions, except the vertical, for vibration studies. One of the foundations will be used for tests requiring numerous work platforms and will provide maximum support for the missile, with the other being used when minimum fixed enclosures are required. Access for personnel to upper platforms will be by stairs and an elevator.

Purpose: The cost of large, multi-stage vehicles for space missions is so great that all feasible means of assuring success must be taken. There are no facilities in the United States where pre-flight testing can be accomplished with all stages in place and with or without full cargoes of propellants or simulated propellants on board. The construction here proposed will provide this required test capability. Some of the critical test areas in which this facility will be used are discussed below:

DYNAMIC TEST FACILITY (Continued):

- a. Mating and Bending Characteristics: When the various stages of a missile are joined together, a determination must be made as to the amount of misalignment which will occur. Any additional misalignment resulting from the additional weight of added propellants or from the intense cold of liquid oxygen in the missile tanks must also be measured. The structures are so complex and the degree of accuracy in measurements required is so great that any theoretical analysis must be experimentally checked. The information obtained will be used by the structural designers to check for adequate strength without excess weight, and by the guidance designers to make certain that the navigational system can compensate for measured deviations from perfect alignment. The fact that the various stages will often be manufactured in different plants makes such tests mandatory.
- b. Vibrational Analysis: The vehicles will have forces applied to them so that they will vibrate at their natural frequency. This will be checked against the frequencies generated by the propulsion and guidance systems to insure that there is no chance of a destructive buildup of forces due to their being in harmony with the vehicle. Also, vibrators will be used to simulate vibrations generated by the propulsion system to insure that no part of the vehicle, particularly the guidance system, will be damaged.

DYNAMIC TEST FACILITY (Continued):

c. Other Tests:

- (1) Hold-down releases. The engines will be replaced by hydraulic cylinders which will raise the vehicle several inches. In this manner it can be determined whether the hold-downs release together.
- (2) Wind effects on the vehicle
- (3) Training of launch crews
- (4) Calibration of fuel tanks
- (5) Fueling techniques
- (6) Assembly methods

Required Date: March 1961.

Construction Time: 10 Months.

DYNAMIC TEST FACILITY (Continued):

Characteristics:

- a. Two concrete foundations to support the weight of the missile.
- b. A steel tower to support work platforms and a gantry crane to lift the missile.
- c. An elevator.
- d. Propellant disposal system.
- e. Instrumentation conduit.

Associated Construction:

- a. Site preparation
- b. Paving
- c. Utilities

Cost Estimate:

Site preparation - - - - -	\$ 6,900
Foundations - - - - -	23,000
Tower - - - - -	221,150
Crane - - - - -	120,000
Elevator - - - - -	34,500
Propellant disposal system - - - - -	37,500
Paving - - - - -	10,400
Instrumentation conduit - - - - -	5,550
Utilities - - - - -	61,000
Design and engineering services - - - - -	80,000
Total Estimated Cost - - - - -	<u>\$ 600,000</u>

NASA HUNESVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

DYNAMIC TEST FACILITY

1. DESCRIPTION:

This project provides for the construction of a facility at which the large, multi-stage Saturn vehicles may be assembled and subjected to various mechanical, structural, and operational tests. The facility will allow the checkout of mechanical mating features; the determination of the natural frequency of the missile, both on the launcher arms and under simulated flight conditions; the temperature effects caused by liquid oxygen or nitrogen when held for various lengths of time; and the effect of simulated flight vibrations on the various stages of the missile. There will be the capability for other tests involving wind effects, fueling techniques, ground crew training, and assembly methods sketches of the proposed facility are shown on the following two pages.

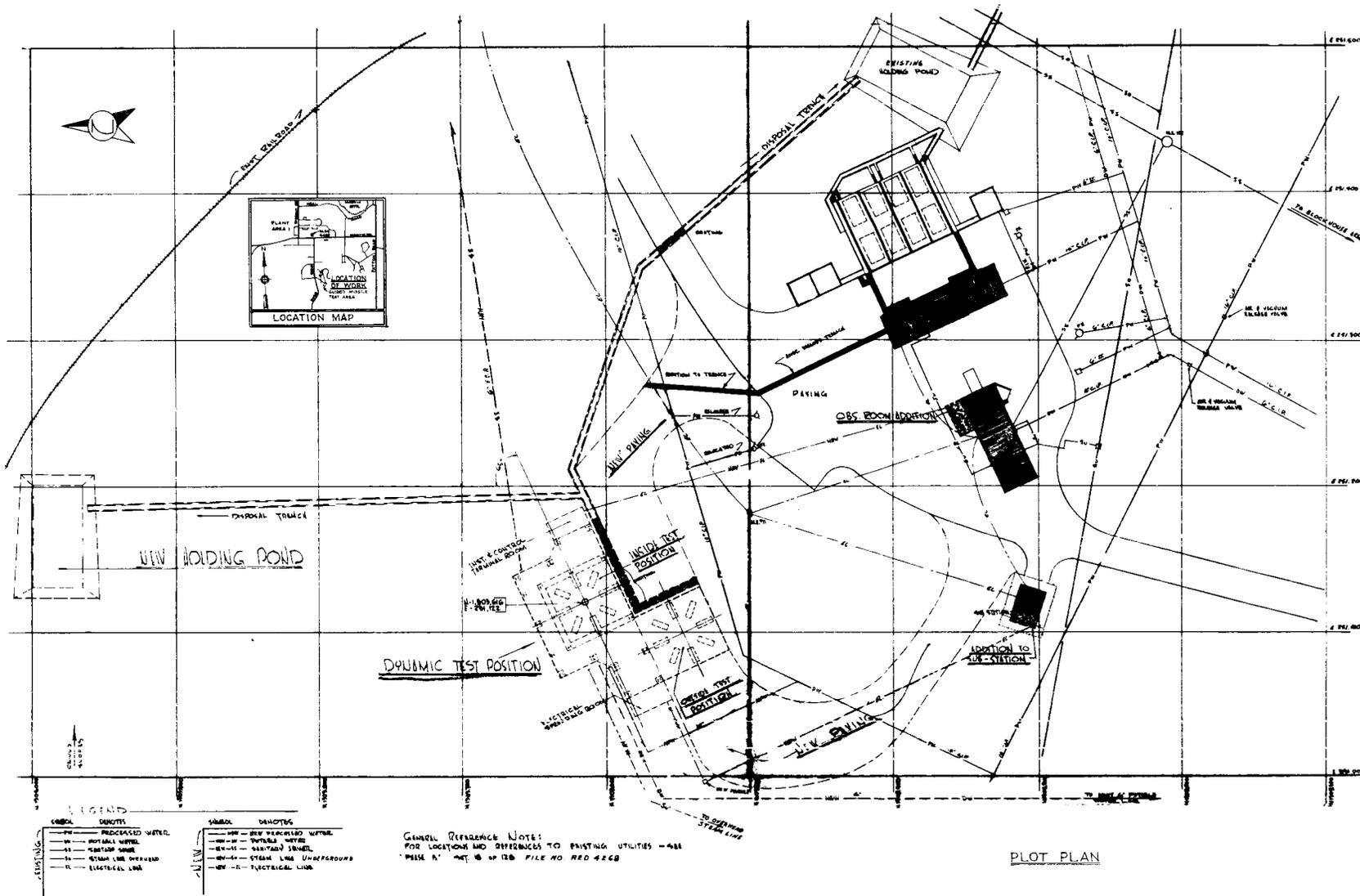
The facility will consist of two foundations capable of carrying the launcher arms and vehicle at the full flight weight. A steel superstructure will provide lateral support for the vehicle and working platforms at any point on the vehicle. The superstructure will also serve as a pedestal to support a stiff-leg derrick to be used for handling and placing the various stages. Structural members will be included to support the missile by long cables, allowing freedom in all directions, except the vertical, for vibrational studies. One of the foundations will be used for tests requiring numerous work platforms and will provide maximum support for the missile, with the other being used when minimum fixed enclosures are required. Access for personnel to upper platforms will be by stairs and an elevator.

Means will be incorporated in the project for carrying spilled propellants to remote holding ponds to minimize fire hazards. Power, water, and other utilities will be provided as needed, as well as a road, hardstands, and other site improvements. On-stand housing and conduit for instrumentation and control and for connections to the existing systems are a part of this project. Actual recording of test data will be accomplished with equipment available in an existing blockhouse.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

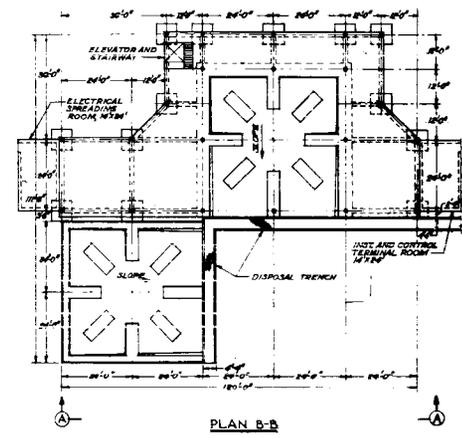
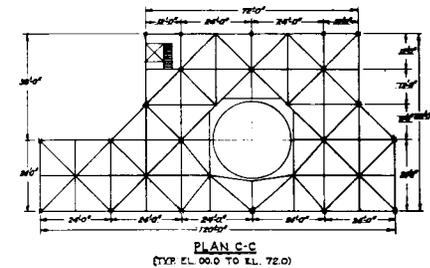
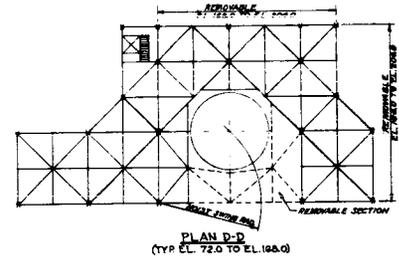
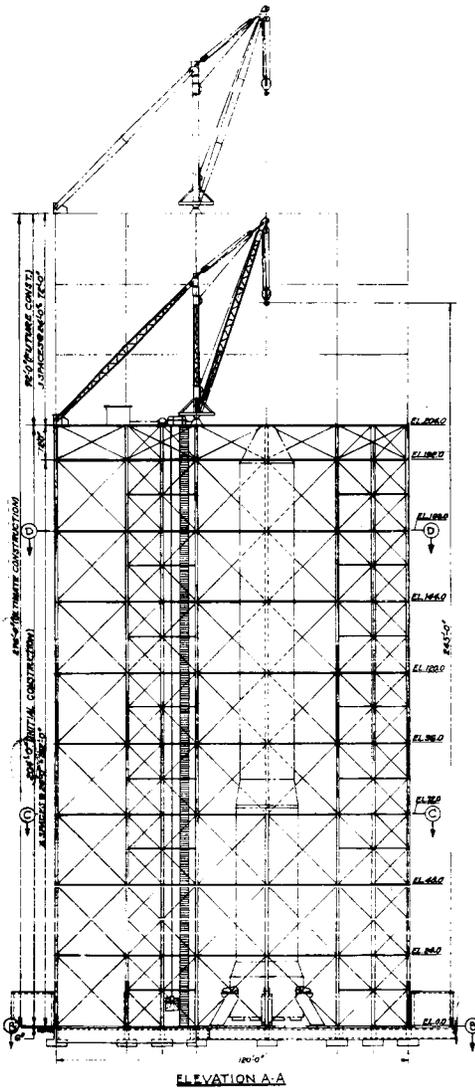
DYNAMIC TEST FACILITY

E-772



NASA HUNTSVILLE FACILITY
 FISCAL YEAR 1961 ESTIMATES

DYNAMIC TEST FACILITY



GENERAL ARRANGEMENT

E-778

2. JUSTIFICATION:

The cost of large, multi-stage vehicles for space missions is so great that all feasible means of assuring success must be taken. In the field of pre-flight testing with all stages in place, and with and without full cargoes of propellants or simulated propellants on board the required testing cannot now be done anywhere in the United States due to a lack of suitable facilities. The facility proposed in this project will provide the required test capabilities. Some of the critical test areas in which this facility will be used are discussed below:

Mating and bending characteristics: When the various stages of a vehicle are joined together, a determination must be made as to the amount of malalignment which will occur. Any additional malalignment resulting from the additional weight of added propellants or from the intense cold of liquid oxygen being held in the missile tanks must also be measured. The structures are so complex and the degree of accuracy in measurements required are so great that any theoretical analysis must be experimentally checked. The information obtained will be used by the structural designers to check for adequate strength without excess weight and by the guidance designers to make certain that the navigational system can compensate for measured deviations from perfect alignment. The fact that the various stages will often be manufactured in different plants makes such tests mandatory.

Vibrational analysis: The vehicles will have forces applied to them in such a way that they will vibrate at their natural frequency. This will be checked against the frequencies generated by the propulsion and guidance systems to insure that there is no chance of a destructive buildup of forces due to their being in harmony with the vehicle. Also, vibrators will be used to simulate vibrations generated by the propulsion system to insure that no part of the vehicles, particularly the guidance system, will be damaged.

Other tests: The launcher arms and release devices will be tested by replacing the engines with hydraulic cylinders, which will lift the vehicle several inches. The test will serve the purpose of proving that all the hold-downs release together. Other tests will be concerned with the effect of winds on the vehicle, the training of the launch crews, and calibration of the fuel tanks.

3. COST ESTIMATE:

Site preparation.....	\$6,900
Foundations.....	23,000
Tower.....	221,150
Crane.....	120,000
Elevator.....	34,500
Propellant disposal system.....	37,500
Paving.....	10,400
Instrumentation conduit.....	5,550
Utilities.....	61,000
Design and engineering services.....	<u>80,000</u>
Total estimated cost.....	<u>\$600,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 10 months *May 1961*

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

PRESSURE TEST CELL

Description: A building containing instrumentation and mechanical test equipment which will provide a pressure testing capability for the SATURN first stage cluster. The functions performed call for a blast-proof area.

Purpose: Mechanical, functional and pressure testing of the SATURN booster assembly. Tests will be conducted for failure in strength, function, leakage, and timing.

Required Date: May 1961.

Construction Time: 12 Months.

Cost: \$650,000

NASA HUNTSVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

PRESSURE TEST CELL

1. DESCRIPTION:

This project provides for the construction and instrumentation of mechanical test facilities that will provide the capability for pressure testing the Saturn first-stage cluster, for inspecting component parts, and for the analysis of hydraulic oil and propellant and sub-system contamination. A sketch of the proposed construction is presented on the following page.

2. JUSTIFICATION:

There is no pressure test cell available at the NASA Huntsville Facility to accommodate the test requirements for the present Saturn program. The proposed facility is necessary to provide a safe and completely blast-proof area to perform mechanical, functional, and pressure testing of the Saturn booster assembly. The booster and its components will be tested in the cell for failure in strength, function, leakage, and timing. The pressure testing of the Saturn boosters cannot be accomplished within existing facilities without endangering the building structure and its occupants.

3. COST ESTIMATE:

Building.....	\$475,500
Utilities and paving.....	2,000
Heating and air conditioning.....	50,000
Extension of existing monorail system.....	3,000
Laboratory exhaust system.....	4,500
High pressure, pneumatic, and hydraulic facilities.....	85,000
Relocation of high pressure bottle room.....	10,000
Design and engineering services.....	<u>20,000</u>
 Total estimated cost.....	 <u>\$650,000</u>

15700 20 14
\$32,000
21,160 Gross
\$30.71 sf.

4. CONSTRUCTION TIME:

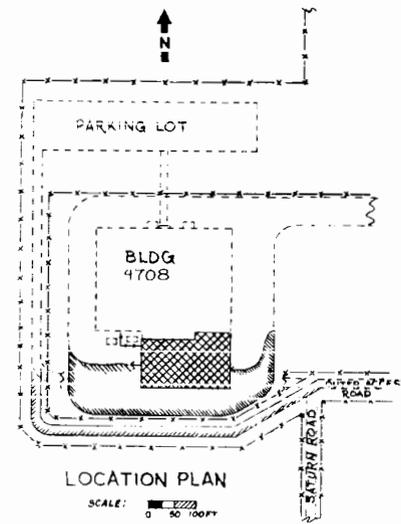
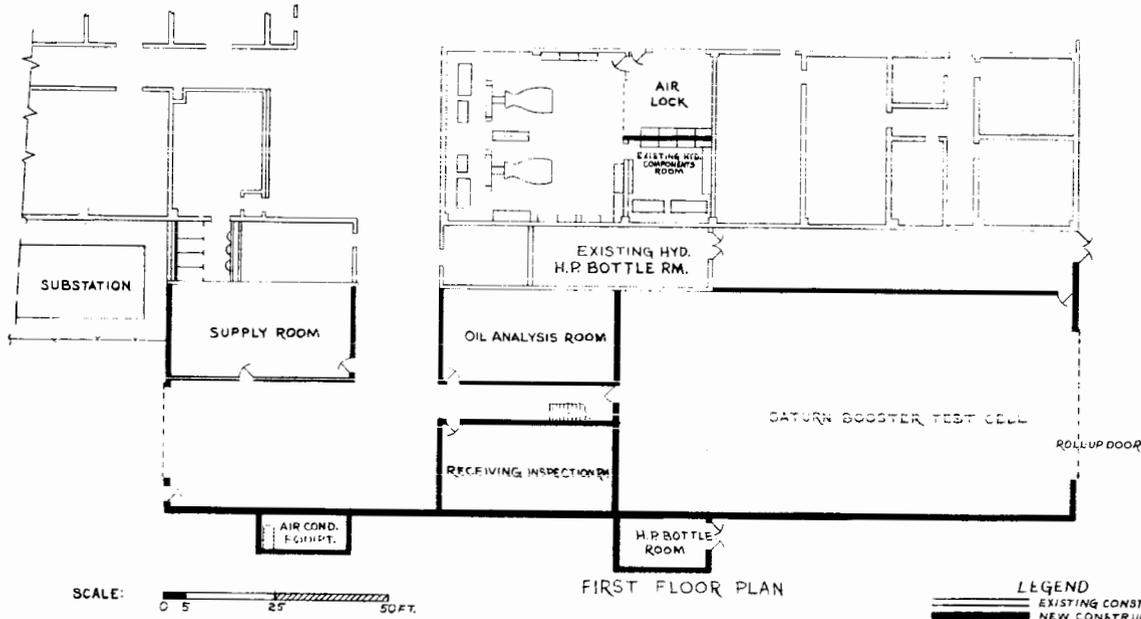
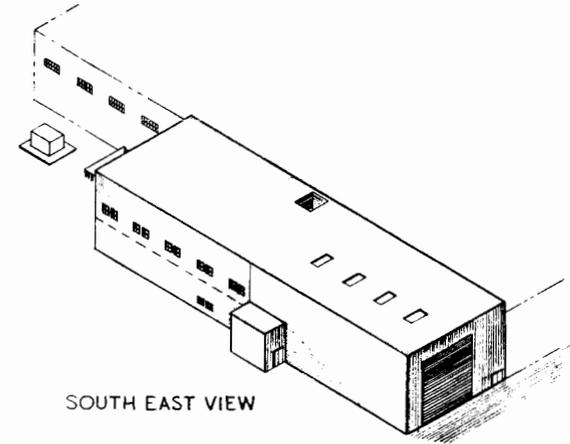
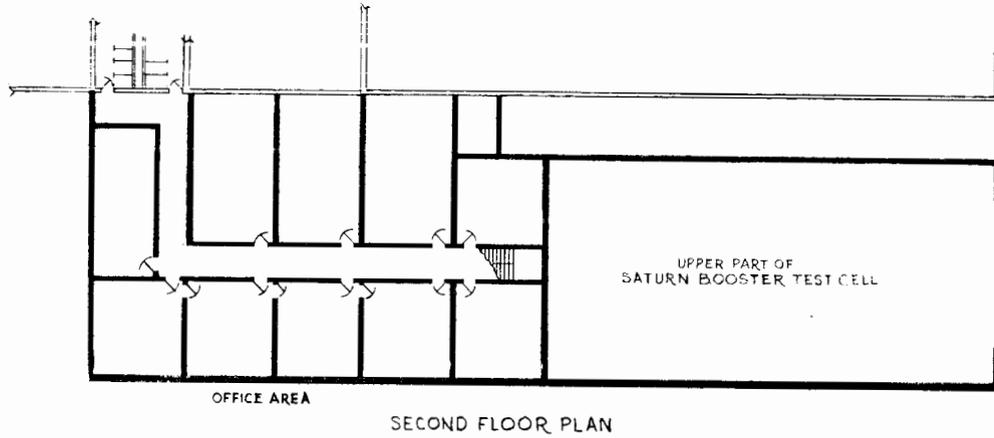
Total estimated completion time..... 12 months

July 1961

E-778

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

PRESSURE CELL



LEGEND
 ——— EXISTING CONSTRUCTION
 = = = NEW CONSTRUCTION

EXTENSION TO ASSEMBLY BUILDING

It will be noted that this project, "Extension to Assembly Building", contains a pressure test cell. This is in addition to the Pressure Test Cell programmed in the amount of \$650,000. It is possible a question may be raised over this duplication.

The explanation given by Mr. Joe Lada at Huntsville is that the missile will be checked after assembly in the pressure cell in the Assembly Building before it goes out for static test. It will be checked again in the pressure test cell after static test. The requirement for two pressure test cells arises from a matter of timing. If an attempt were made to use the same cell, this would result in a conflict in schedules.

(Information furnished by Mr. Joe Lada, Huntsville).

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

EXTENSION TO ASSEMBLY BUILDING

Description: An addition to missile assembly building 4705 and 4706 to supplement existing missile assembly facilities. Space and equipment will be supplied for test and quality control of assembly work.

Purpose:

- a. Assembly of the vehicle
- b. Pressure tests of sub-assembly components
- c. Cleaning of fuel lines and general cleaning
- d. Production engineering, equipment storage and administration

Additional Information: The SATURN production schedule will require the assembly of several first stage clustered boosters simultaneously. The present buildings will not accommodate this work.

Required Date: November 1961.

Construction Time: 16 Months.

Cost: (Refer to follow on sheet for breakdown) - - - - - \$2,500,000

NOTE: It will be noticed perhaps that this structure will contain 6,000 square feet of space for pressure test. Mr. Joe Lada of Huntsville explains that the test cell in this building will be used immediately after assembly of the vehicle and before static test. The Pressure Test Cell, previous line item, will be used after static test of the vehicle. Conflicts in scheduling would result if one test cell were used for both purposes.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES
EXTENSION TO ASSEMBLY BUILDING

1. DESCRIPTION:

It is proposed to construct and equip an addition to missile assembly Buildings 4705 and 4706 to supplement existing missile assembly facilities. Space and facilities will be provided for test and quality control of sub-assembly and assembly work. A sketch of the proposed work is shown on the following page. The addition will provide:

- (a) 55,000 square feet of additional space for general assembly work, including an extension of the existing bridge crane systems and the provision of necessary optical and supporting equipment.
- (b) 6,000 square feet of additional space for pressure tests of sub-assembly components, including provisions for high pressure air.
- (c) 3,500 square feet of additional area for cleaning large fuel suction lines of the Saturn first stage booster, including required equipment for de-humidifying and dust freeing the area, water and air treatment, and general cleaning equipment.
- (d) 12,100 square feet of additional space for production engineering, equipment, storage, and administration.

76,600 sq ft.

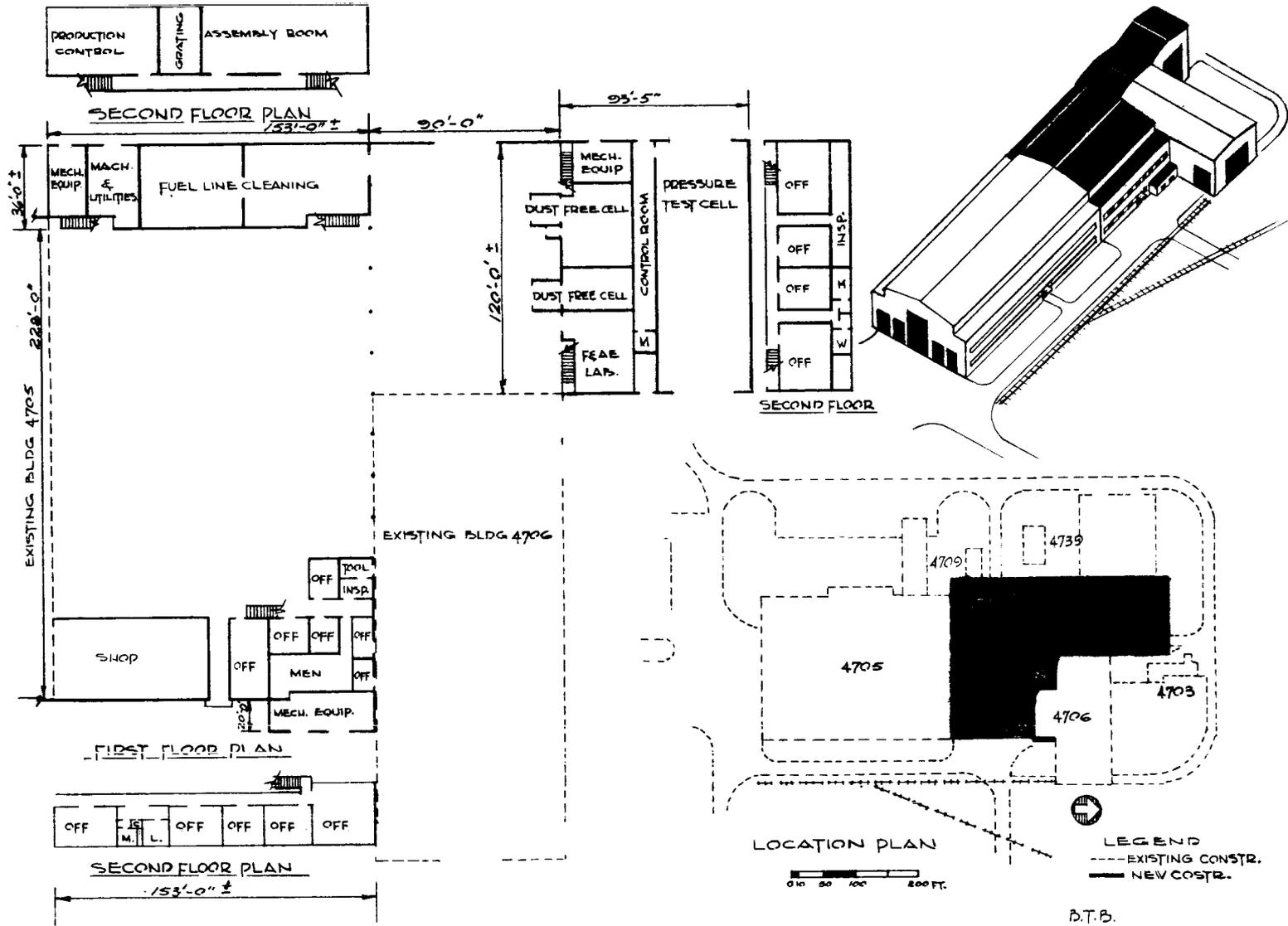
2. JUSTIFICATION:

Existing assembly facilities were not planned or designed for the development of vehicles approximating the diameters and lengths of the Saturn and future space vehicles. Space and facilities for the development and fabrication of Saturn components is being provided by minor modifications to existing shops and by the shifting of equipment between those shops.

E-778

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

EXTENSION TO ASSEMBLY BUILDING



However, the need for adequate floor space for assembly and for vehicle alignment, cannot be met without the construction of additional space. The Saturn production schedule will require space for the assembly of several first stage clustered boosters simultaneously.

In addition to providing the necessary floor space for final assembly the proposed addition will provide dust free, humidity controlled cleaning areas; quality control high pressure test facilities including required office space and facilities for other inspection work; and space for sub-assembly including vehicle wiring and engine build-up.

3. COST ESTIMATE:

Building.....	\$1,700,000	<i># 22/58 H</i>
Utilities and paving.....	50,000	
Optical equipment and assembly support equipment.....	100,000	
Cranes.....	150,000	
Fuel suction line cleaning equipment.....	200,000	
Pressure test equipment and instrumentation.....	100,000	
Design and engineering services.....	<u>200,000</u>	
Total estimated cost.....	<u>\$2,500,000</u>	

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 16 months *Nov 1961*

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

ADDITION TO ENGINEERING BUILDING

Description: An addition to the present Engineering Building No. 4610, consisting of an 80 x 100 foot six-story building. The new structure will be connected to the existing building at the second and third floor levels.

Purpose: To provide space in which to conduct research and development activities on:

- a. Structures
- b. Mechanics
- c. Propulsion
- d. Chemistry
- e. Materials

In the field of propulsion and mechanics this mission includes:

- a. Feasibility and design studies
- b. Analytical investigations in the preparation of technical proposals for future space flight programs
- c. Analytical and experimental research, development and design of structural components and complete airframes of satellites and space vehicles, which includes:

ADDITION TO ENGINEERING BUILDING (Continued):

- (1) Design of:
 - (a) Propulsion systems
 - (b) Propellant feed systems
 - (c) Cooling systems
 - (d) Mechanical assemblies
 - (e) Components
- (2) Methods and systems for protection of the space vehicle from aerodynamic heating.
- (3) Integration of propulsion units into space vehicle systems.

The building addition will also provide space for research and development in the field of chemistry and materials, and in the field of research and development on design of space vehicles.

Required Date: October 1961.

Construction Time: 15 Months.

Cost: \$1,137,000.

NOTE: The justification for this project refers to four buildings in which functions of this activity are now located. Huntsville advises that the four buildings will be used for supporting functions of the Huntsville activity and principally for plant maintenance.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES
ADDITION TO ENGINEERING BUILDING

1. DESCRIPTION:

It is proposed to construct an addition to the engineering building of the structures and mechanics laboratory. As indicated in the drawings on the following three pages, the proposed facility will include an 80-by 10-foot connection to Building 4610 at the second and third floor levels and the construction of a six story 80-by 100-foot engineering building. The existing facility plus the addition proposed in this project will house a total of approximately 600 personnel.

2. JUSTIFICATION:

The mission of the structures and mechanics laboratory is to conduct research and development activities in the fields of structures, mechanics, propulsion, chemistry, and materials as related to all types of space programs. Some of the key elements in the mission include:

Feasibility and design studies, and analytical investigations in the preparation of technical proposals for future spaceflight systems.

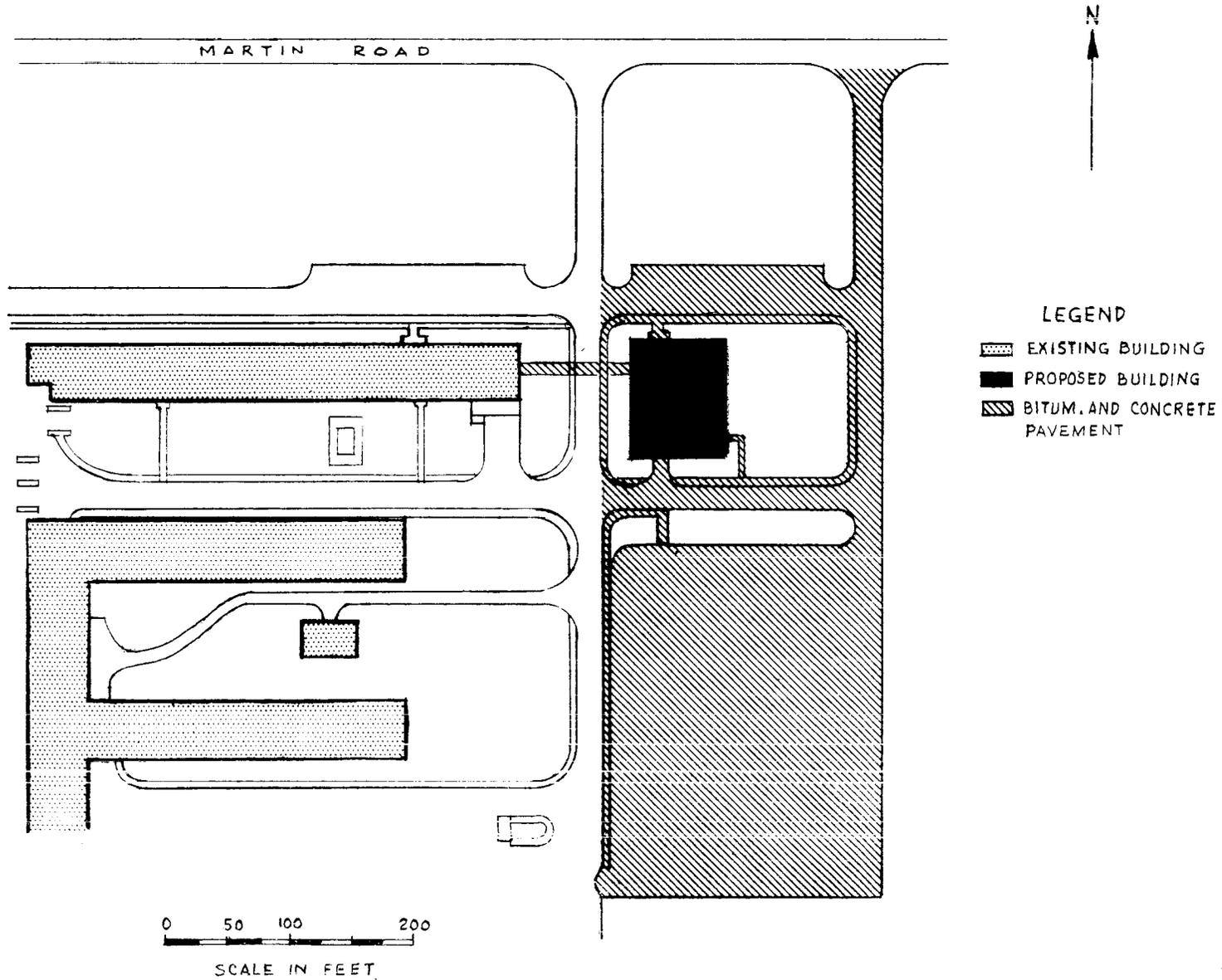
Analytical and experimental research, development, and design of structural components and complete airframes of satellites and space vehicles.

Research and development in the fields of propulsion and mechanics as related to space vehicles, including:

- (a) Design of propulsion systems, propellant feed systems, cooling systems, mechanical assemblies, and components.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

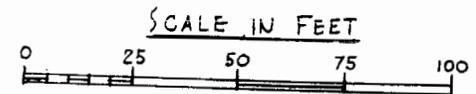
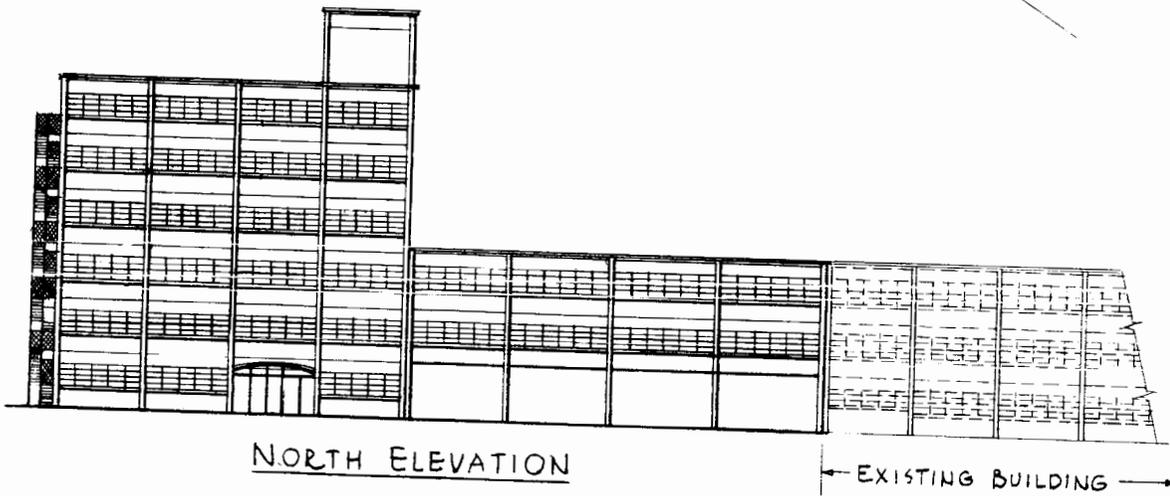
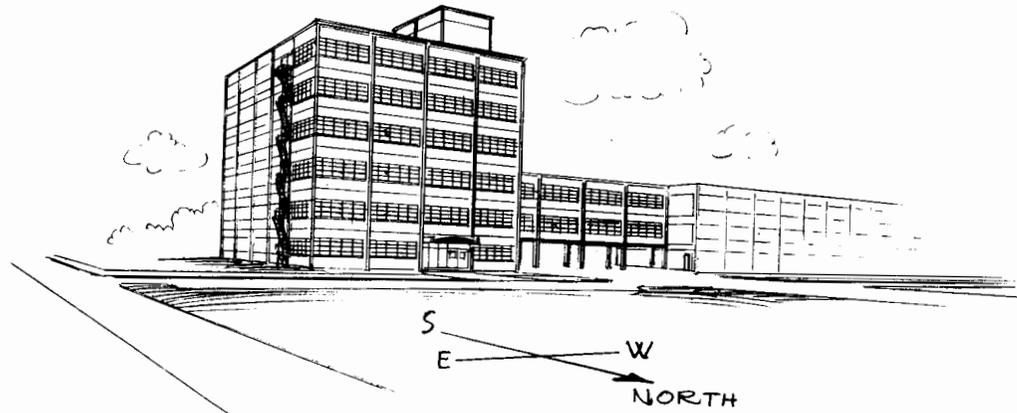
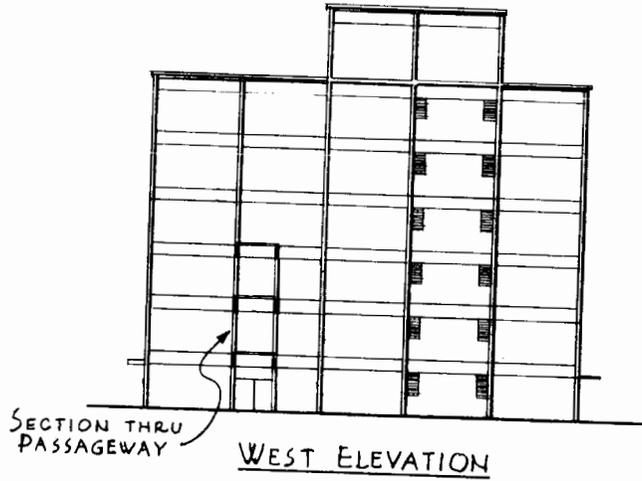
ADDITION TO ENGINEERING BUILDING



E-778

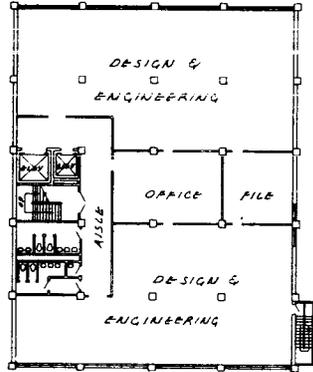
NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

ADDITION TO ENGINEERING BUILDING

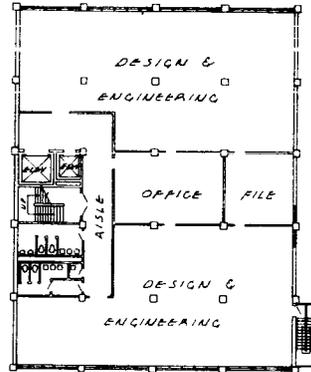


NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

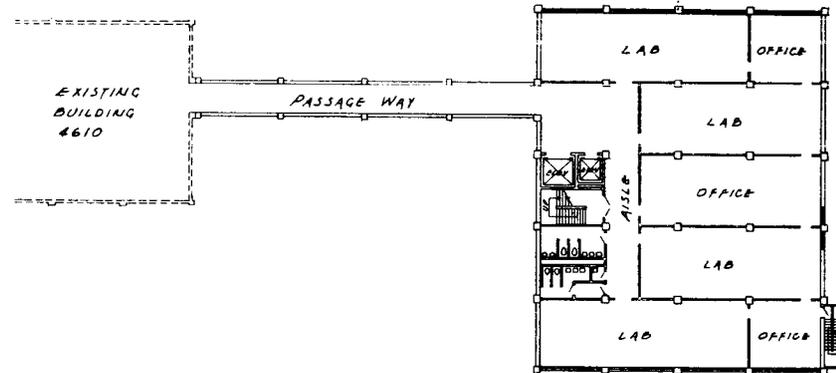
ADDITION TO ENGINEERING BUILDING



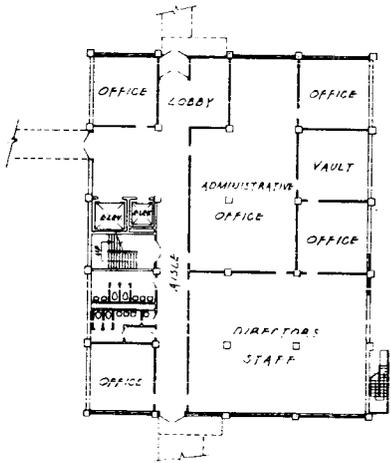
FIFTH FLOOR PLAN



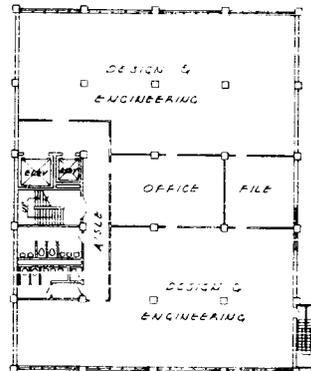
SIXTH FLOOR PLAN



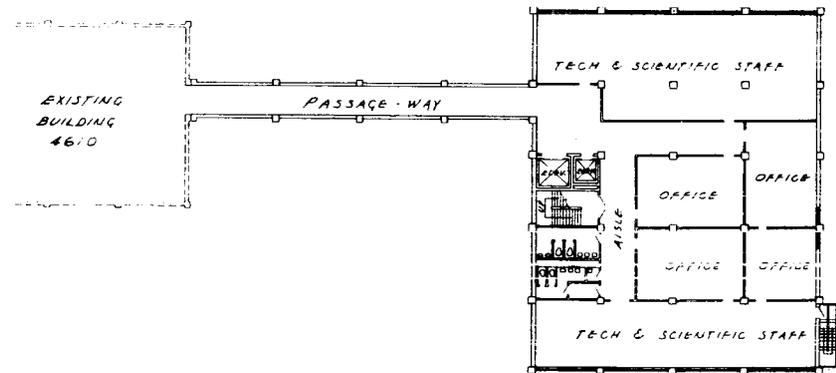
THIRD FLOOR PLAN



FIRST FLOOR PLAN



FOURTH FLOOR PLAN



SECOND FLOOR PLAN

E-778

- (b) Methods and systems for protection of the space vehicle system from aerodynamic heating.
- (c) Integration of propulsion units into space vehicle systems.

Research and development activities in the field of chemistry and materials as applied to the planning, design, manufacture, storage, and operation of space vehicles.

Research and development in the layout and design integration of space vehicles, including:

- (a) Development of preliminary layouts of space vehicles.
- (b) Coordination of design activity and integration of design requirements of structures, aerodynamics, guidance and control, and launching and handling equipment.
- (c) Analysis of weight, moment of inertia, product of inertia, center of gravity, and stability axes.
- (d) Review, standardization, and approval of all drawings and specifications required for complete documentation and release of final drawing assemblies.

To accomplish this mission, the technical personnel of the laboratory must perform with the utmost efficiency. They must be adequately housed and must be closely integrated. The design and analysis personnel of the laboratory are now located in four buildings. Three of the buildings are more than 1/2 mile from the laboratory complex of buildings. This presents a number of problems relating to proper coordination of design effort.

The main engineering building of the laboratory now provides 32,000 useable square feet of floor space. There are 602 personnel in this building and three outlying buildings who must be brought into the laboratory complex to function efficiently. There is not adequate room in the existing building to accommodate this number of people. Based on the maximum utilization

of useable floor area the total floor space required is approximately 71,000 square feet. This project will provide an additional 39,000 square feet of net useable area. Upon completion of the proposed addition, the staff of the structures and mechanics laboratory will have available an average of less than 120 square feet per person which is considered minimal for the types of personnel to be housed.

3. COST ESTIMATE:

Site work, roads, and parking areas.....	\$70,000	
Utilities and communications.....	59,000	\$ 21,000
Building, including heating and air conditioning.....	850,000	
Collateral equipment.....	45,000	
Design and engineering services.....	<u>113,000</u>	
Total estimated cost.....	<u>\$1,137,000</u>	\$ 29,000

4. CONSTRUCTION SCHEDULE:

Total estimated completion..... 15 months Oct 1961

Grave 48,000 SF @ \$17.70

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

COMPLETION OF GUIDANCE & CONTROL BUILDING

Description: The construction of two separate structures, one adjoining and one near Building No. 4487, the present guidance and control building, and containing approximately 61,000 square feet.

Purpose: To augment the present laboratory capability to permit investigations in the pure research and development area oriented to payloads, satellites, lunar probes and space vehicles. Laboratory work at this location has been principally devoted to research on surface-to-surface missiles. By reason of expansion of activities into the space area, the additional laboratory areas are required.

The functions which will be performed in the added space will include Research and Development in the fields of:

- a. Inertial, radio, midcourse and terminal guidance.
- b. Guidance computers, component evaluation and theory evaluation.
- c. Application of present principles of microminiaturization.
- d. Laboratories for infrared, optics and photosensitivity research.
- e. Cryogenics research.
- f. Solar battery research.

COMPLETION OF GUIDANCE & CONTROL BUILDING (Continued):

- g. Microwave components and satellite tracking systems.
- h. Hydraulic servo-mechanisms.
- i. Linear accelerator studies and centrifuge studies.

Required Date: November 1961.

Construction Time: 18 Months.

Cost: \$1,948,000.

NASA HUNTSVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

COMPLETION OF GUIDANCE AND CONTROL BUILDING

1. DESCRIPTION:

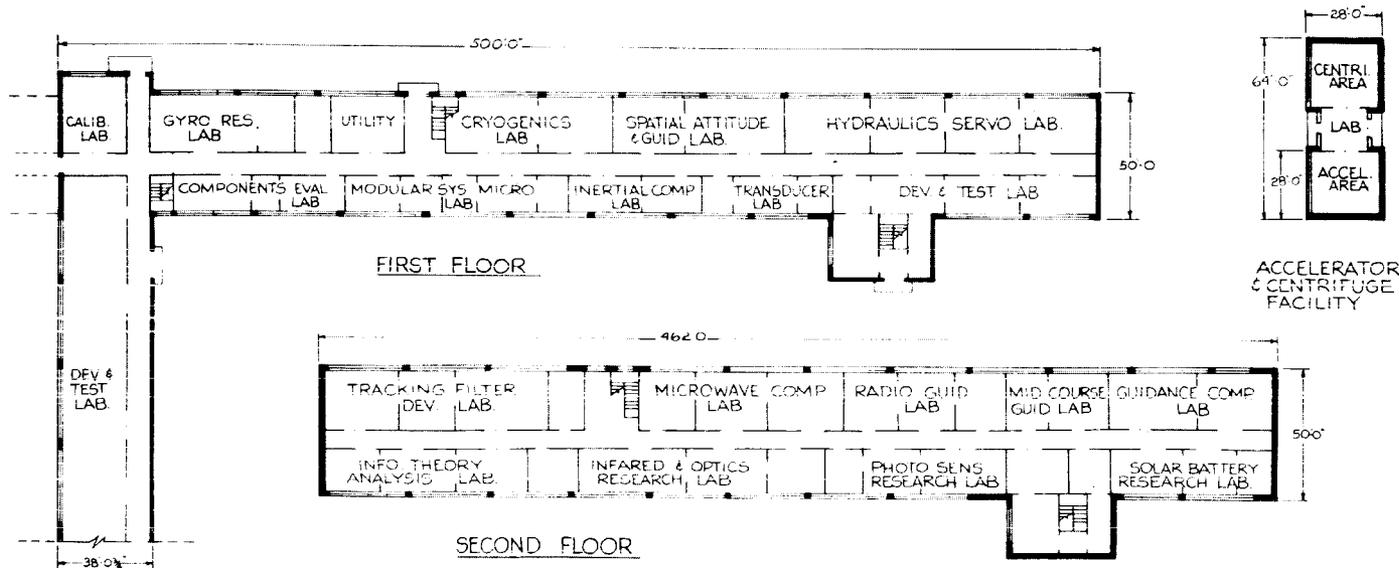
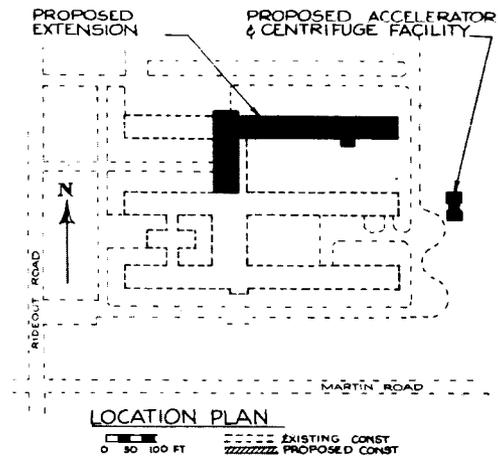
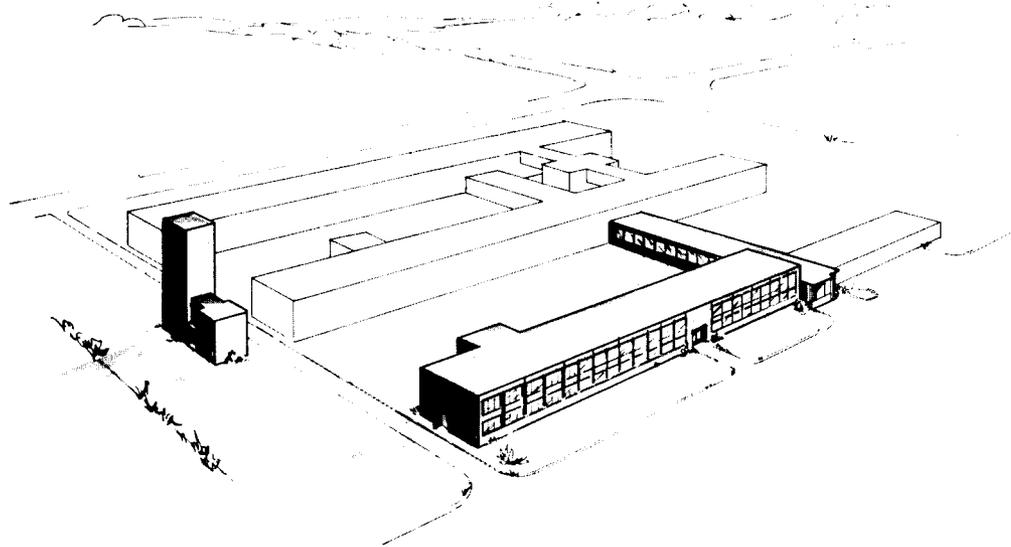
It is proposed to construct two separate structures adjacent to and near the existing building No. 4487 as indicated in the drawing on the following page. The main structure will consist of an east extension approximately fifty (50) feet by five hundred (500) feet, two floors high, and a south extension approximately thirty (30) feet by one hundred forty (140) feet, one floor high. The second structure will have an irregular shaped plan and will include a two story plus basement area for a constant azimuth centrifuge, a two story control room, and an eight-five (85) foot high enclosure for an expanded range linear accelerator. Special, closely controlled, air-conditioning will be provided for some environmental test areas. The proposed project which will provide approximately sixty-one thousand (61,000) square feet of floor area, will include the following:

- (a) Additional laboratories for investigation, research, and development in the fields of inertial, radio, midcourse and terminal guidance. Advanced work is necessary in guidance computers, component evaluation, theory evaluation, and application of present principles of micro-miniaturization.
- (b) Laboratories for infrared, optics and photosensitivity research involving spatial attitude and horizon or light seeking and sensing devices for lunar probes and satellites. In addition to the optical phases of this item, research also must be conducted in the physical relationship and performance of components under simulated spatial attitude conditions.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES

COMPLETION OF GUIDANCE AND CONTROL BUILDING

E-778



- (c) Laboratories and equipment for cryogenics research, investigation, and development. Studies will be undertaken on the performance of materials, components, and devices at temperatures approaching absolute zero and involving superconductivity with respect to micro-miniaturization, and cryogenic gyros.
- (d) Laboratories and equipment for solar battery research and application. Special light sources and sensitive measuring devices will be provided for the application and improvement of solar batteries for satellite electrical power use.
- (e) Laboratories for microwave components and satellite tracking systems research and development. These facilities will be used in the development of tracking transmitters, receivers, antennas, and transponders for tracking systems and space communications.
- (f) Laboratories and equipment for investigation, research, and development in the field of hydraulic servo-mechanisms. Flexible hydraulic laboratories and adequate equipment for five thousand (5,000) psi hydraulic systems such as that required in the Saturn program will be provided. Existing facilities are unsuitable and inadequate. The modernization proposed in this project will not only result in increased capabilities and efficiency but will also vacate "high roof" facilities necessary for increased capabilities in environmental testing laboratories. The increased environmental testing facilities will include twenty-five thousand (25,000) pound thrust vibration equipment, shock and impact simulation equipment, and large capacity vacuum and environmental chambers necessary to simulate conditions encountered by space probes and satellites.
- (g) A separate acceleration test building housing an expanded range linear accelerator and a centrifugal accelerator. The expanded range linear accelerator is a device using a pneumatic method as a working principle and having cycling operation. It will provide the means to subject sensitive components to the influence of linear acceleration. The

proposed device will greatly extend the range of linear acceleration tests with respect to peak acceleration, time of constant peak acceleration, and payload weight.

2. JUSTIFICATION:

Until recently the mission of the existing guidance and control building was related primarily to military weapons systems with major emphasis on the reliability of surface-to-surface vehicles. With missions now being shifted to pure research and development oriented to payloads, satellites, lunar probes and space vehicles, additional research criteria and requirements have been created. While all existing facilities will be utilized, additional technical capability for investigation, research, and development on problems peculiar to objects being subjected to space travel must be provided. These specialized facilities are required, not only for economy in avoiding trial and error research, but to assure the successful completion of the programs assigned to the NASA Huntsville Facility.

3. COST ESTIMATE:

Building structure.....	\$1,346,000	<i>22/01/81 OK</i>
Utilities.....	106,000	
Access road.....	10,000	
Research equipment.....	393,000	
Special electrical power.....	\$129,000	
Linear accelerator.....	98,000	
Centrifuge.....	104,000	
Cryogenic equipment.....	40,000	
Hydraulic equipment.....	22,000	
Laboratory furniture and accessories.....	31,000	
Design and engineering services.....	<u>62,000</u>	
Total estimated cost.....	<u>\$1,948,000</u>	<i>32/01/81</i>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 18 months

Jan 1962
U

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

ADDITION TO FABRICATION LABORATORY

Description: This new construction will provide approximately 9,000 square feet of operating space as an addition to Building No. 4712.

Purpose: To alleviate overcrowded conditions in the Fabrication Laboratory, and to provide adequate space for engineering and management operations. The SATURN program has increased the workload in this laboratory and as the program progresses, the requirement for the proposed addition becomes more acute.

Functions to be Performed:

- a. Tool engineering
- b. Manufacturing engineering
- c. Electrical engineering
- d. Plant layout engineering
- e. Master scheduling
- f. Equipment design
- g. Process engineering.
- h. Fabrication planning
- i. Management and administrative operations

ADDITION TO FABRICATION LABORATORY (Continued):

Required Date: June 1961.

Construction Time: 9 Months.

Cost: \$215,000

NASA HUNTSVILLE FACILITY

FISCAL YEAR 1961 ESTIMATES

ADDITION TO FABRICATION LABORATORY

1. DESCRIPTION:

This project covers the construction of an addition to the existing fabrication laboratory building No. 4712. The addition will be a new wing running north and south between existing wings, as indicated in the drawing on the following page. The addition will be used for engineering and management operations, and will relieve congestion in all operations in the existing building including tool engineering, manufacturing engineering, electrical engineering, facility and plant layout engineering, master scheduling, equipment design, process engineering, fabrication planning, management and administrative operations, and related activities. The new construction will provide approximately 9,000 square feet of operating space.

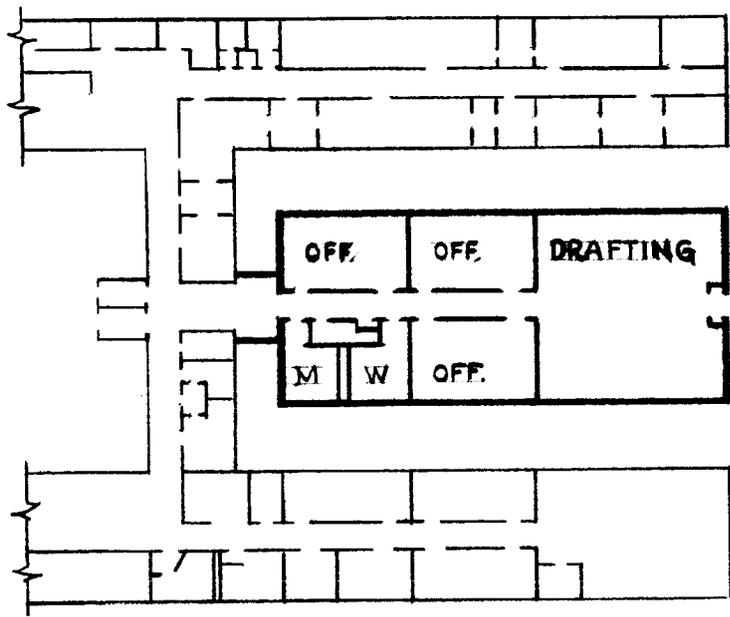
2. JUSTIFICATION:

The existing fabrication laboratory is overcrowded to the extent that all activities within the building are adversely affected. The existing facilities are entirely inadequate for management and engineering operations. A portion of the entrance lobby has been enclosed, and is now occupied as an engineering office. The engineering staff is working in cramped quarters, that is not conducive to effective creative results. Units of branches are housed in buildings at considerable distance from the present building. This results in adverse working conditions, with resulting difficult and inefficient functioning of liaison and coordination activities.

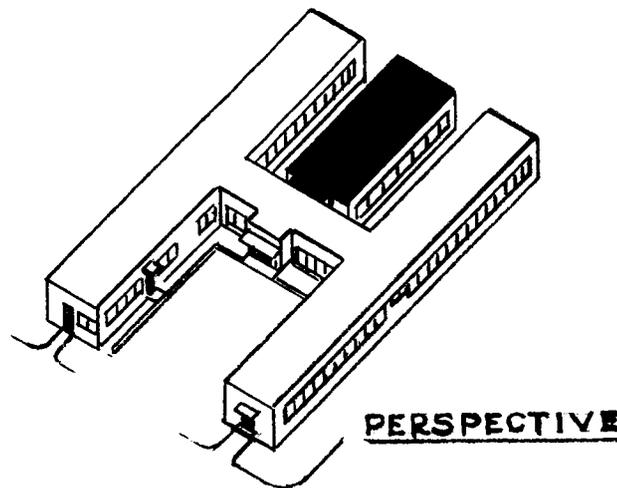
Construction of the addition proposed in this project is essential to relieve the present over crowding, and to increase the operating efficiency of the laboratory. The Saturn development program has increased the general engineering and planning work load in this laboratory and as the program progresses the requirement for the proposed addition becomes more acute.

ADDITION TO FABRICATION LABORATORY

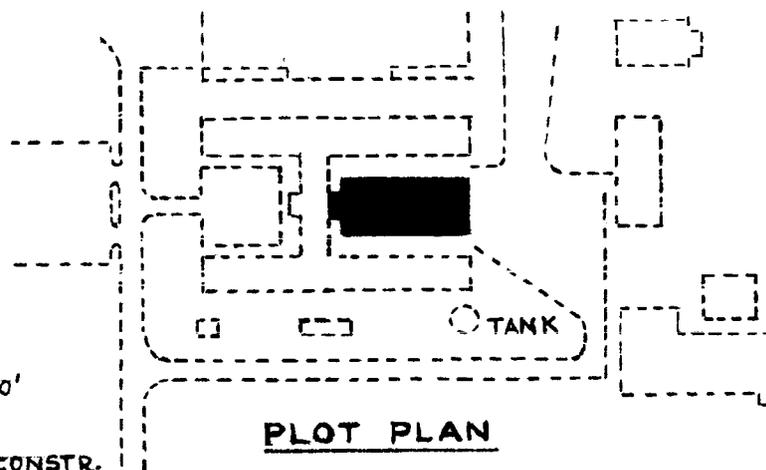
E-778



FLOOR PLAN



PERSPECTIVE



PLOT PLAN

0 10 50 100 200'

LEGEND
--- EXISTING CONSTR.
— NEW CONSTR.



3. COST ESTIMATE:

Building.....	\$160,000
Utilities, including air conditioning and heating.....	20,000
Landscaping, walks, and paving.....	15,000
Design and engineering services.....	<u>20,000</u>
Total estimated cost.....	<u>\$215,000</u>

5/17-5-09 HLEL

2315-01

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 9 months April 1961

NASA HUNTSVILLE FACILITY
FY 61 ESTIMATES

ADDITION TO CHECKOUT BUILDING

Description: Construction to provide an addition to the present checkout building, which will provide a gross area of 110,000 square feet.

Purpose: To provide sufficient space in the systems analysis and reliability laboratory to permit checkout of the SATURN booster, including sub-assemblies, both before and after static testing of the booster in the test stand.

Functions Which Will Be Performed:

- a. Checkout of upper stages and alignment of the complete system.
- b. Measuring and evaluating performance results.

Required Date: September 1962.

Construction Time: 26 Months.

Cost: \$4,500,000.

NASA HUNTSVILLE FACILITY
FISCAL YEAR 1961 ESTIMATES
ADDITION TO CHECKOUT BUILDING

1. DESCRIPTION:

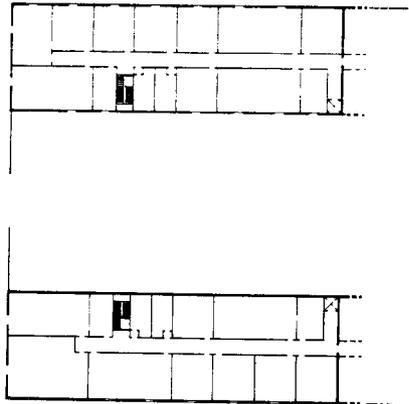
This project provides for the construction and instrumentation of additional facilities for the systems analysis and reliability laboratory. As indicated in the sketch on the following page, the planned addition will consist of a 200 foot extension to the existing checkout building. The addition will be designed to provide the performance test and reliability checkout capability necessary to carry out the recently accelerated Saturn program. A gross area of 110,000 square feet will be provided.

2. JUSTIFICATION:

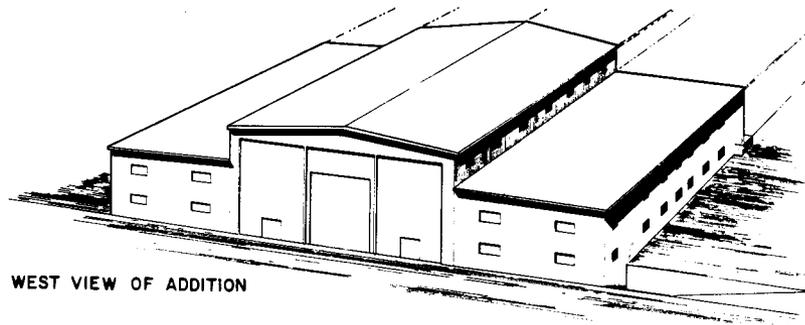
The systems analysis and reliability laboratory will perform a complete checkout of the Saturn booster, including components and sub-assemblies both before and after static testing of the booster in the test stand. In addition, the checkout of the upper stages and the alignment of the complete system will be performed. By measuring and evaluating performance results and by making corrections where indicated, this function will provide a reliable system and will minimize the possibility of malfunctioning during static test or during actual firing.

An elapsed time of twelve weeks each will be required for pre-static and final checkout. In addition, an estimated three weeks will be necessary for preparation of the checkout station to accomplish changes to ground and measuring equipment. The capability of the existing facility is not more than two Saturn vehicles per year, with a dummy or simplified single upper stage. The proposed facility will provide a checkout capability of four Saturns per year including presently planned upper stages. Since the present schedule indicates requirements exceeding existing capability early in calendar year 1962 and since the total estimated construction time of the proposed facility is approximately 26 months, fiscal year 1961 funding will be required.

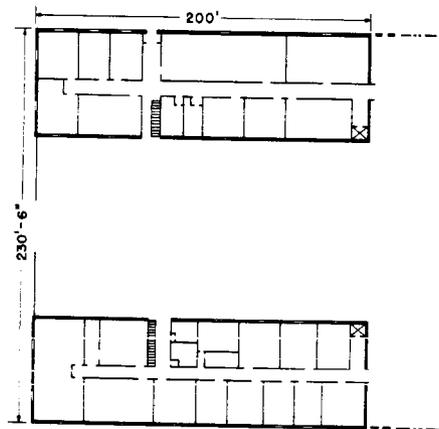
ADDITION TO CHECKOUT BUILDING



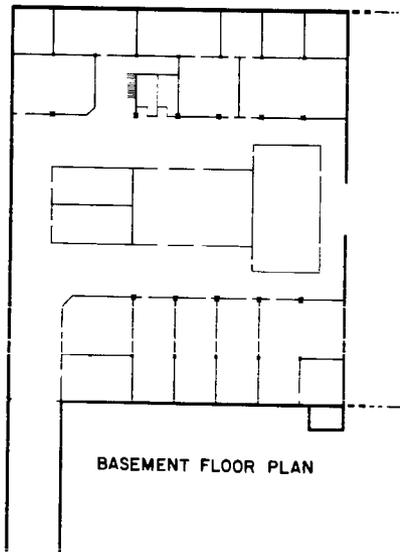
SECOND FLOOR PLAN



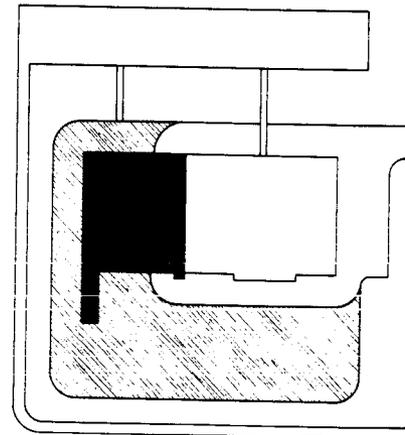
WEST VIEW OF ADDITION



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



WEST ADDITION
TO BLDG 4708
PLOT PLAN

3. COST ESTIMATE:

Building.....	\$2,900,000
Heating and air conditioning.....	127,500
Utilities, including communications.....	172,000
Site preparation and paving.....	108,000
Cranes and elevators.....	97,500
Instrumentation.....	745,000
Data processing equipment.....	\$240,000
Record processing equipment.....	40,000
Laboratory standards.....	75,000
Aircraft energizers.....	108,000
Cycle alternators.....	60,000
Static power supplies.....	48,000
Cycle inverters.....	45,000
Generators.....	75,000
Storage battery cells.....	54,000
 Design and engineering services.....	<u>350,000</u>
 Total estimated cost.....	<u>\$4,500,000</u>

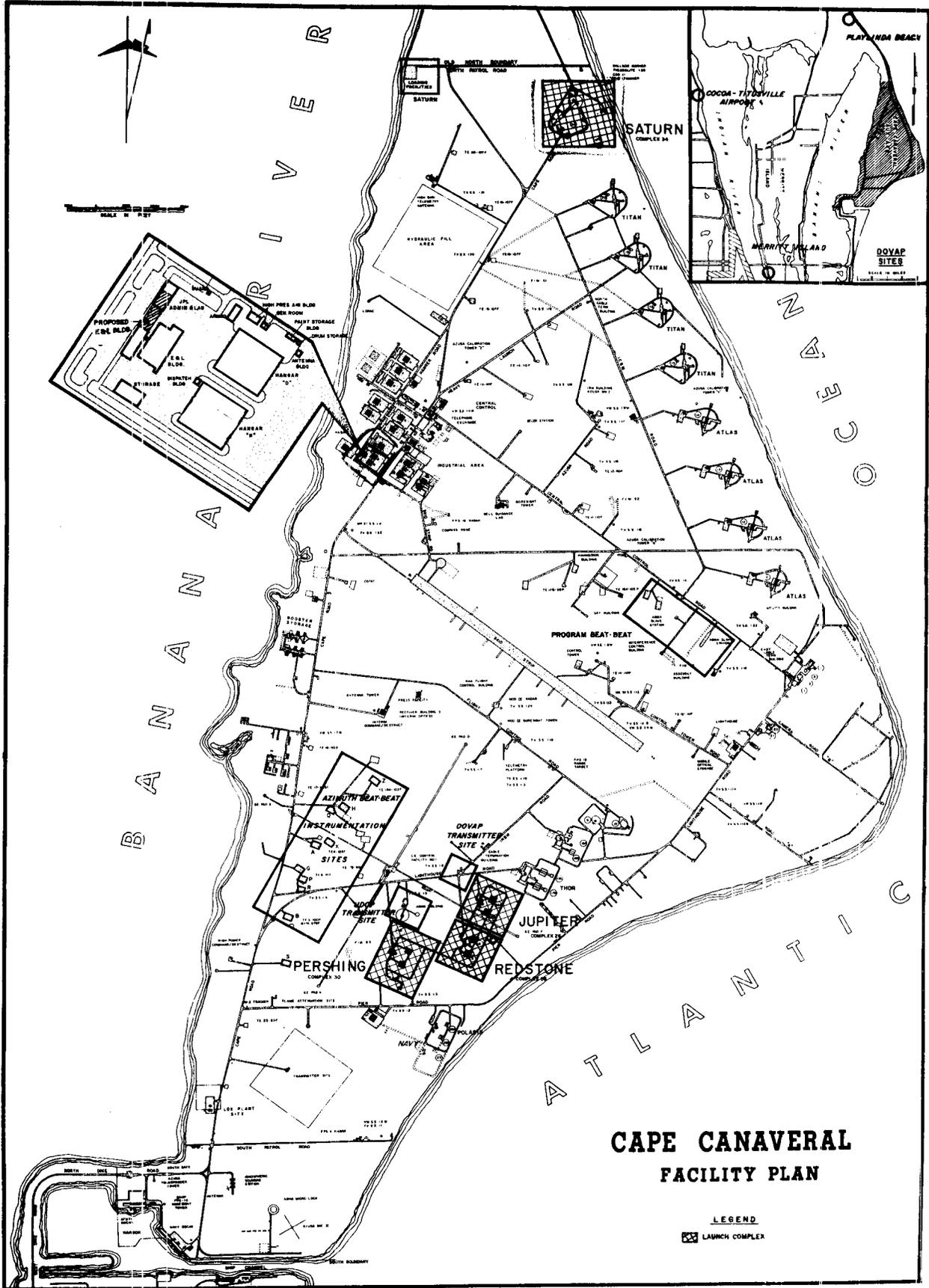
\$ 1,100,000
\$ 260,000

\$ 410,000

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 26 months

Sept 1952



ATLANTIC MISSILE RANGE
FY 61 ESTIMATES

COMPLETION OF SATURN LAUNCHING COMPLEX

Description: This construction completes the vertical launch complex No. 34 which was funded by the Department of Defense in fiscal years 1959 and 1960. The facilities herein requested provide collateral facilities and equipment necessary for preparation, launch and surveillance of the missile.

Purpose: To provide for -

- a. Blockhouse equipment.
- b. Minimum instrumentation for tracking, measuring and telemetering test flights.
- c. Procurement and installation of blockhouse equipment.
- d. Installation of collateral equipment for the SATURN staging building.
- e. Design and engineering services.

Required Date: March 1961.

Construction Time: 12 Months.

Cost: \$2,250,000.

ATLANTIC MISSILE RANGE

FISCAL YEAR 1961 ESTIMATES

COMPLETION OF SATURN LAUNCHING COMPLEX

1. DESCRIPTION AND JUSTIFICATION:

This project includes funds for the construction required to complete the Saturn vertical launch facility No. 34 and for the procurement and installation of collateral equipment. The Saturn facility, originally funded in the fiscal years 1959 and 1960 by the Department of Defense, is presently under construction. The facility will meet the minimum requirements for the research and development phase of the Saturn program. It will provide the capability to launch a 1-1/2-million pound thrust unit with its upper stages and will service vehicles up to 208 feet in total height. The complex will include a staging building, separately funded, to provide assembly area for the handling and mating of upper stages; minimum office space for upper stage contractor personnel; a minimum storage area for upper stage spares and components; and hurricane protection for the booster. A sketch of the launching complex is shown on the following page.

The funds requested in this project will provide for blockhouse equipment and minimum instrumentation for tracking, measuring, and telemetering flight tests; the procurement and final installation of blockhouse checkout equipment; the procurement and installation of collateral equipment required to complete the construction of the Saturn staging building, and necessary design and engineering services.

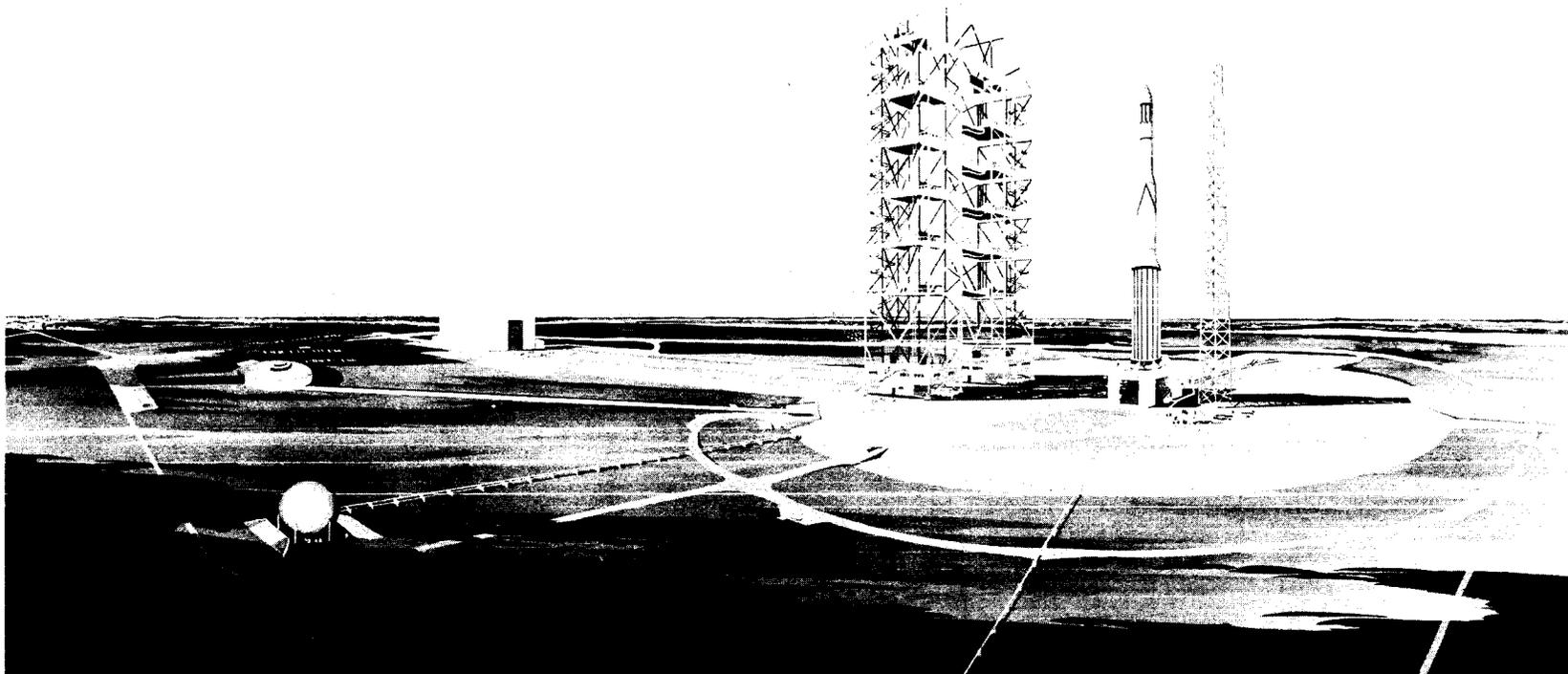
2. COST ESTIMATE:

Procurement and installation of collateral equipment for the staging building.....	\$525,000
Completion of instrumentation sites.....	100,000
Pad and blockhouse communication and electrical equipment.....	328,000
Blockhouse and pad maintenance and checkout equipment.....	360,000
Measuring and tracking equipment.....	787,000
Design and engineering services.....	<u>150,000</u>
Total estimated cost.....	<u>\$2,250,000</u>

15,000,000

ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

COMPLETION OF SATURN LAUNCHING COMPLEX



3. CONSTRUCTION SCHEDULE:

Total estimated completion time.....

12 months July 1961

ATLANTIC MISSILE RANGE

FISCAL YEAR 1961 ESTIMATES

ESCAPE MECHANISM

1. DESCRIPTION:

It is proposed to construct a safety escape mechanism for the Saturn launching complex currently under construction. The system will consist of a fully enclosed vertical descending manlift transferring to a horizontal belt for transporting personnel to the edge of the pad. Sketches of the proposed installation are shown on the following two pages.

2. JUSTIFICATION:

The height of the Saturn service tower (approximately as high as a 30-story building) and the increased working areas in comparison with all other structures in use, creates a critical personnel safety condition should fire break out with a fueled vehicle on the pad. Upwards of 30 persons would have to be evacuated from the five upper service levels, with the base of the tower probably a fire area. This would preclude the use of the service elevators.

3. COST ESTIMATE:

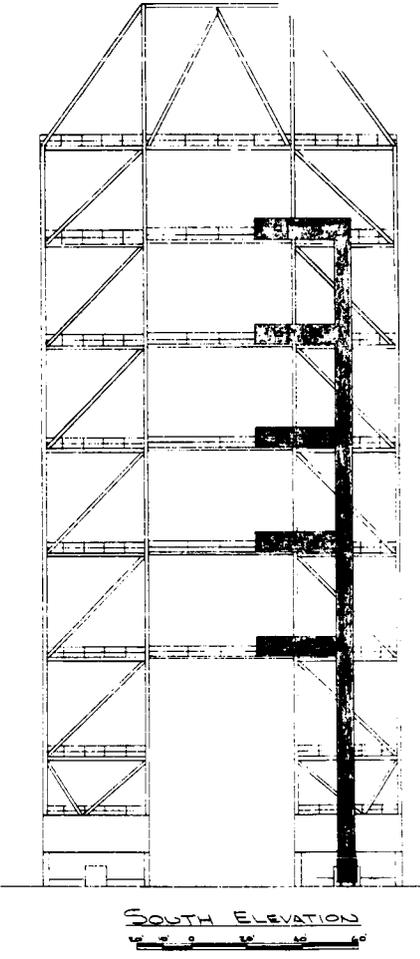
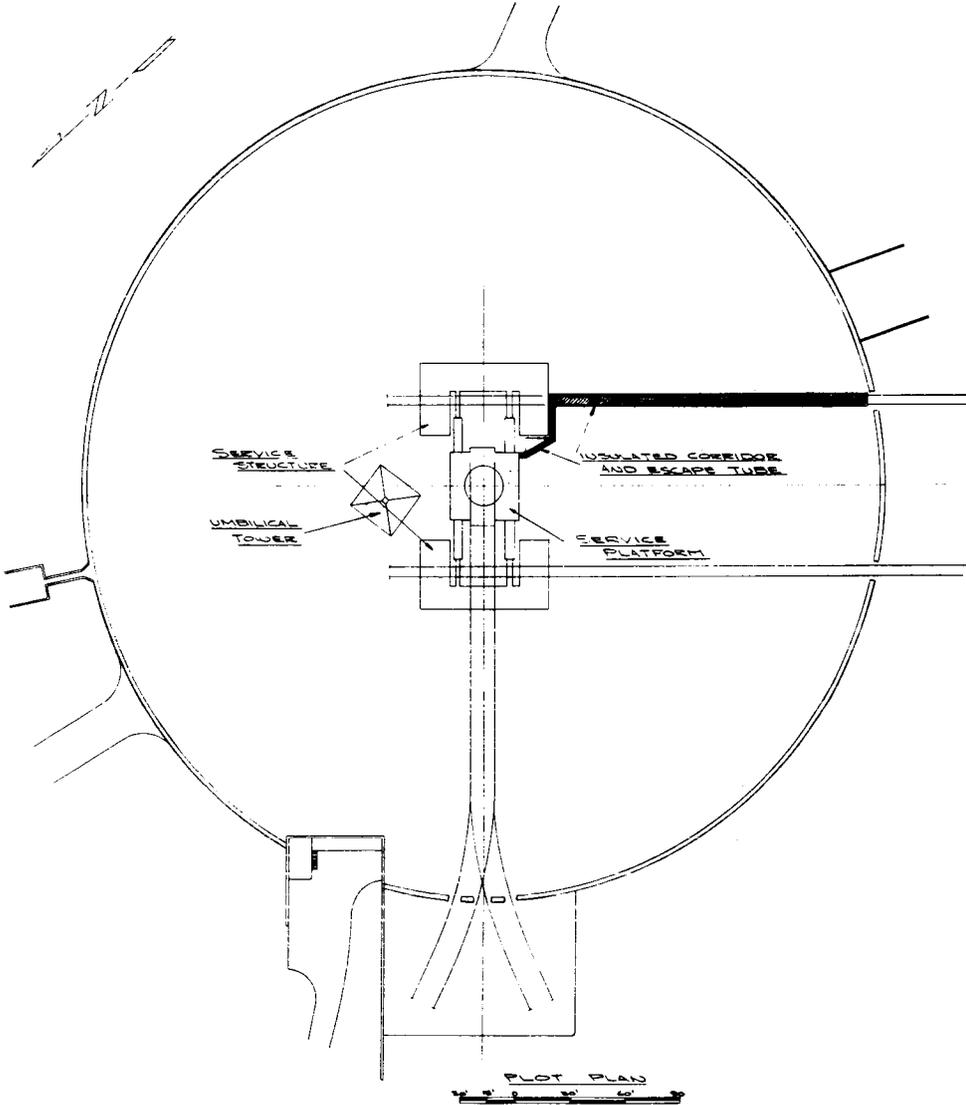
Escape tunnel.....	\$80,000
Rail extension.....	150,000
Manlift and tube.....	60,000
Manlift installation.....	<u>10,000</u>
Total estimated cost.....	<u>\$300,000</u>

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 18 months

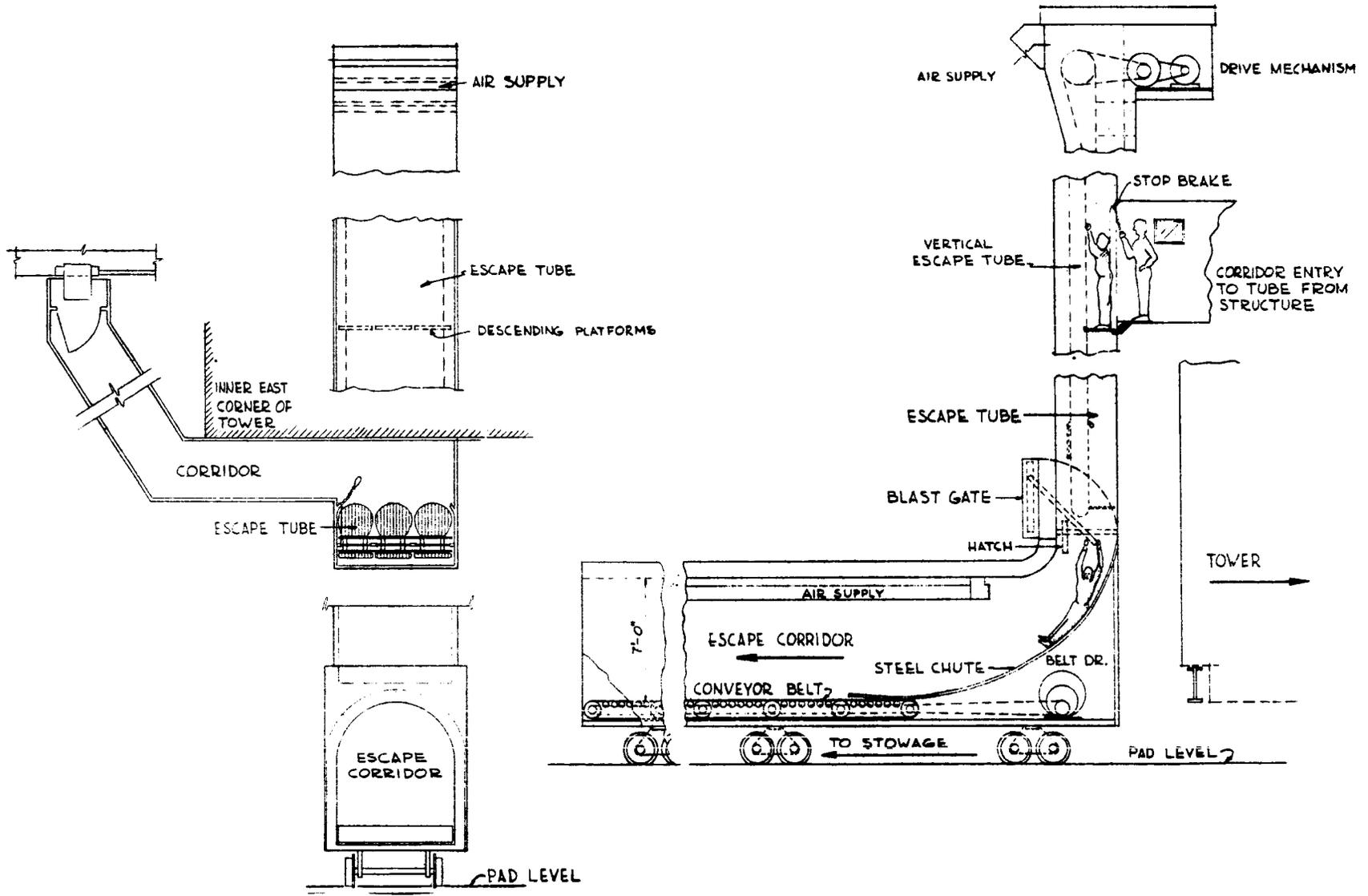
ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

ESCAPE MECHANISM



ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

ESCAPE MECHANISM



ATLANTIC MISSILE RANGE
FY 61 ESTIMATES

HYDROGEN SYSTEM

Description: A system for storage and transfer of hydrogen.

Purpose: To service SATURN upper stages with a maximum of safety. Explosion-proof wiring, vacuum insulation of storage tanks, and remote control of the servicing equipment is required.

Required Date: February 1962.

Construction Time: 18 Months.

Cost: \$2,500,000.

ATLANTIC MISSILE RANGE

FISCAL YEAR 1961 ESTIMATES

HYDROGEN SYSTEM

1. DESCRIPTION AND JUSTIFICATION:

Large quantities of liquid hydrogen will be required for Saturn upper stages. Because of its low boiling point and high flammability, special handling and storage techniques are necessary. Tank trucks will transport liquid hydrogen to the launch site from a generating plant 160 miles distant. The need for a closed cycle loading system dictates the requirement for storage and transfer facilities at the launching complex currently under construction. Explosion proof wiring, vacuum insulation of the storage tanks, and remote control of the fueling operation from the blockhouse are required.

Service tower modifications will also be required including the installation of explosion-proof wiring and hydrogen venting capabilities. These features are not included in the structure currently under construction.

2. COST ESTIMATE:

Hydrogen storage.....	\$440,000
Evaporation system and helium heat transfer system.....	176,000
Liquid nitrogen cooling system.....	296,000
Fuel and vent lines.....	484,000
Vacuum systems.....	304,000
Oxygen trace indicator.....	39,000
Computer and local control station.....	110,000
Blockhouse indicator and control station.....	139,000
Site development.....	87,000

Service tower modifications.....	\$182,000
Valve fittings and control apparatus.....	63,000
First H ₂ fill, installation, and testing.....	120,000
Venting and disposal system.....	<u>60,000</u>
Total estimated cost.....	<u>\$2,500,000</u>

3. CONSTRUCTION SCHEDULE:

Total estimated completion time.....	18 months
--------------------------------------	-----------

ATLANTIC MISSILE RANGE
FY 61 ESTIMATES

NEW SATURN LAUNCH COMPLEX

Description: A complex similar in construction and function to Launch Facility No. 34 now under construction for launch of the SATURN vehicle.

Purpose: To provide a completely independent SATURN launch complex at the Atlantic Missile Range which will provide a backup for the facilities under construction at Launch Complex No. 34 and for an increased firing rate.

Principal Features:

- a. Blockhouse
- b. Launch service structure
- c. Umbilical tower
- d. Pad and area development
- e. Fuel, liquid oxygen and high pressure gas facilities
- f. Liquid hydrogen facility
- g. Ground support equipment

Required Date: February 1962.

Construction Time: 18 Months.

Cost: \$21,000,000.

(An additional requirement for \$8,000,000 in FY 62 monies will be required to provide for certain relatively short lead time items).

ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES
NEW SATURN LAUNCHING COMPLEX

1. DESCRIPTION:

This project provides for the construction of a second, completely independent, Saturn launching complex at the Atlantic Missile Range. The proposed new complex will provide a back-up for the facilities presently under construction and a capability for increased firing rates. The proposed location for the new complex is north of the Saturn complex now under construction. Plot plans and sketches of the facilities proposed for construction under this project are shown on the following five pages.

Blockhouse: The blockhouse will be a concrete igloo-type structure for the protection of personnel and instrumentation during test firings. The dome will be constructed of reinforced concrete five feet thick covered with seven feet of fill dirt and an additional four inches of concrete to provide protection against extremely high blast pressures. Visual observation will be provided by two periscopes, protruding from the top of the dome.

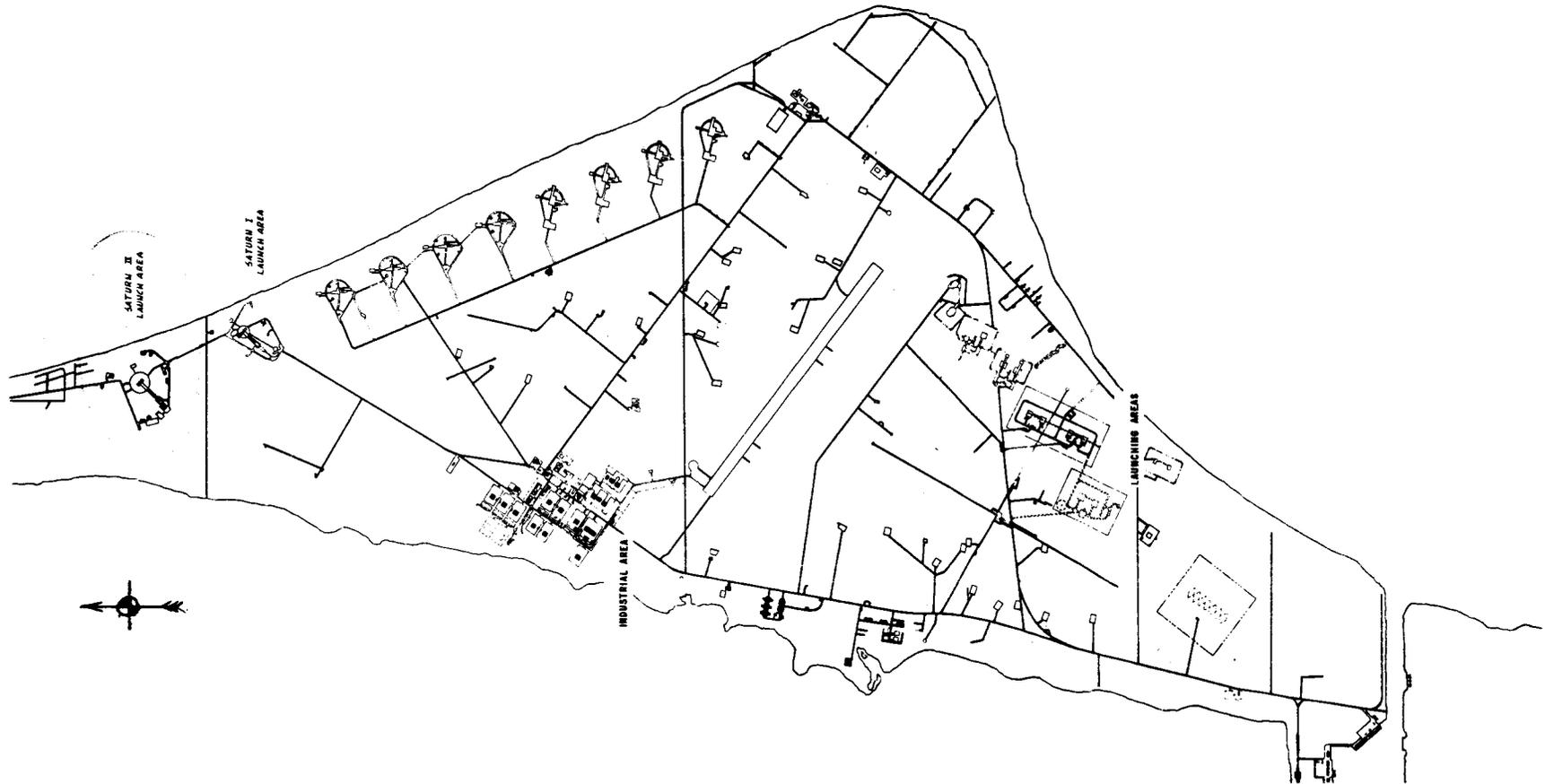
Launch service structure: The service structure will provide a means of erecting the missile on the launch pedestal in stages. It contains platforms for servicing and checking out the stages prior to launch. The service structure will be approximately the height of a 30-story building. It will be retractable to a rear parking area during firings. The bridge cranes will lift and position any of the stages of the Saturn vehicle. In the lower two floors of the structure, enclosed space will be provided for instrumentation and checkout of the missile.

Umbilical tower: The umbilical tower will carry fuel lines and power to the missile during checkout and pre-launch phases. Shortly before launching, the fuel and power lines will be disconnected and the umbilical arms swung out of the way of the vehicle's path.

Pad and area development: This item includes clearing and preparing the area for facilities installation; the construction of concrete work in the pad area, including the launch pad and pedestal, sub-pad rooms to house special instrumentation, revetments for the protection of

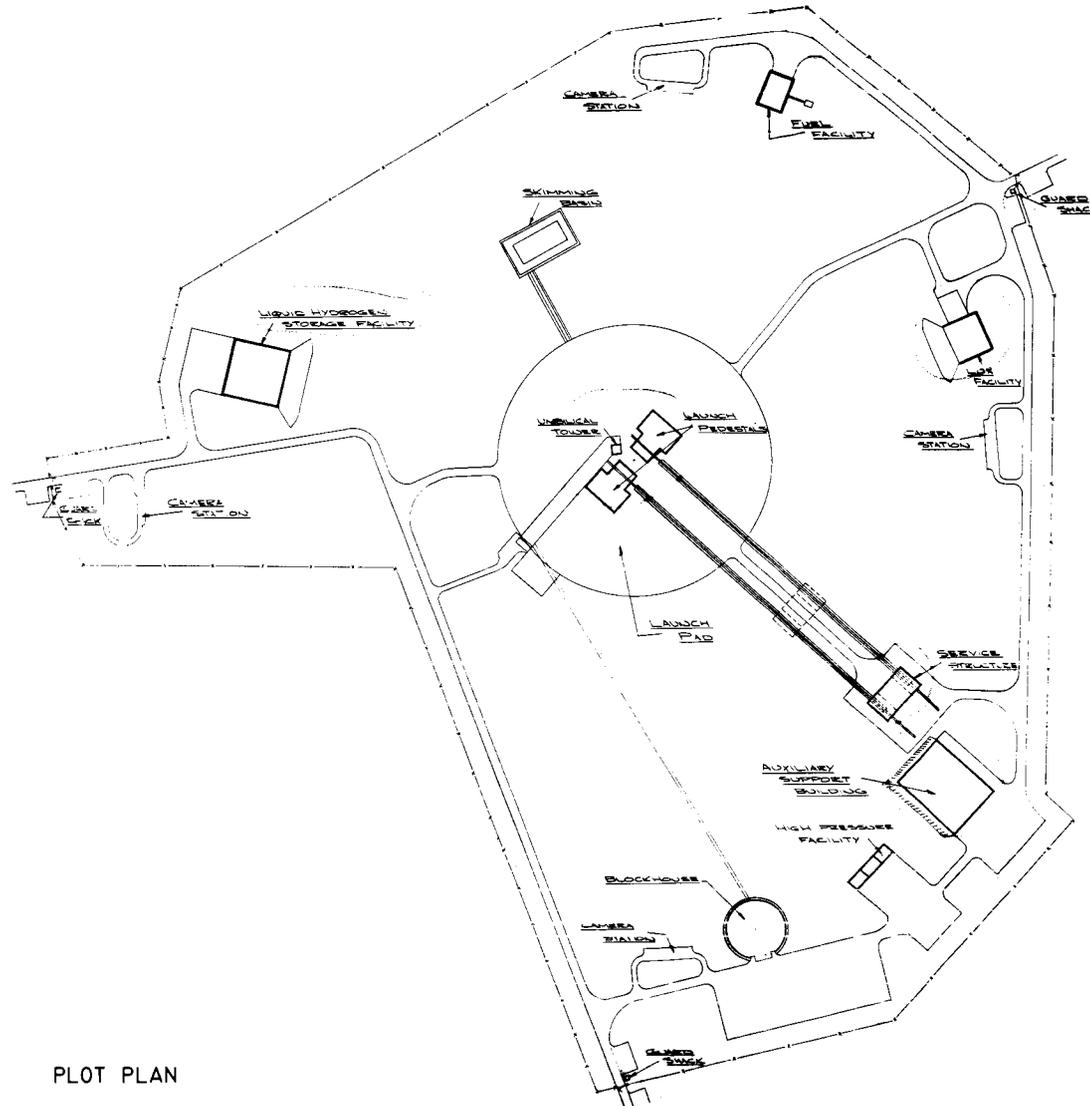
ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

NEW SATURN LAUNCHING COMPLEX



PLOT PLAN

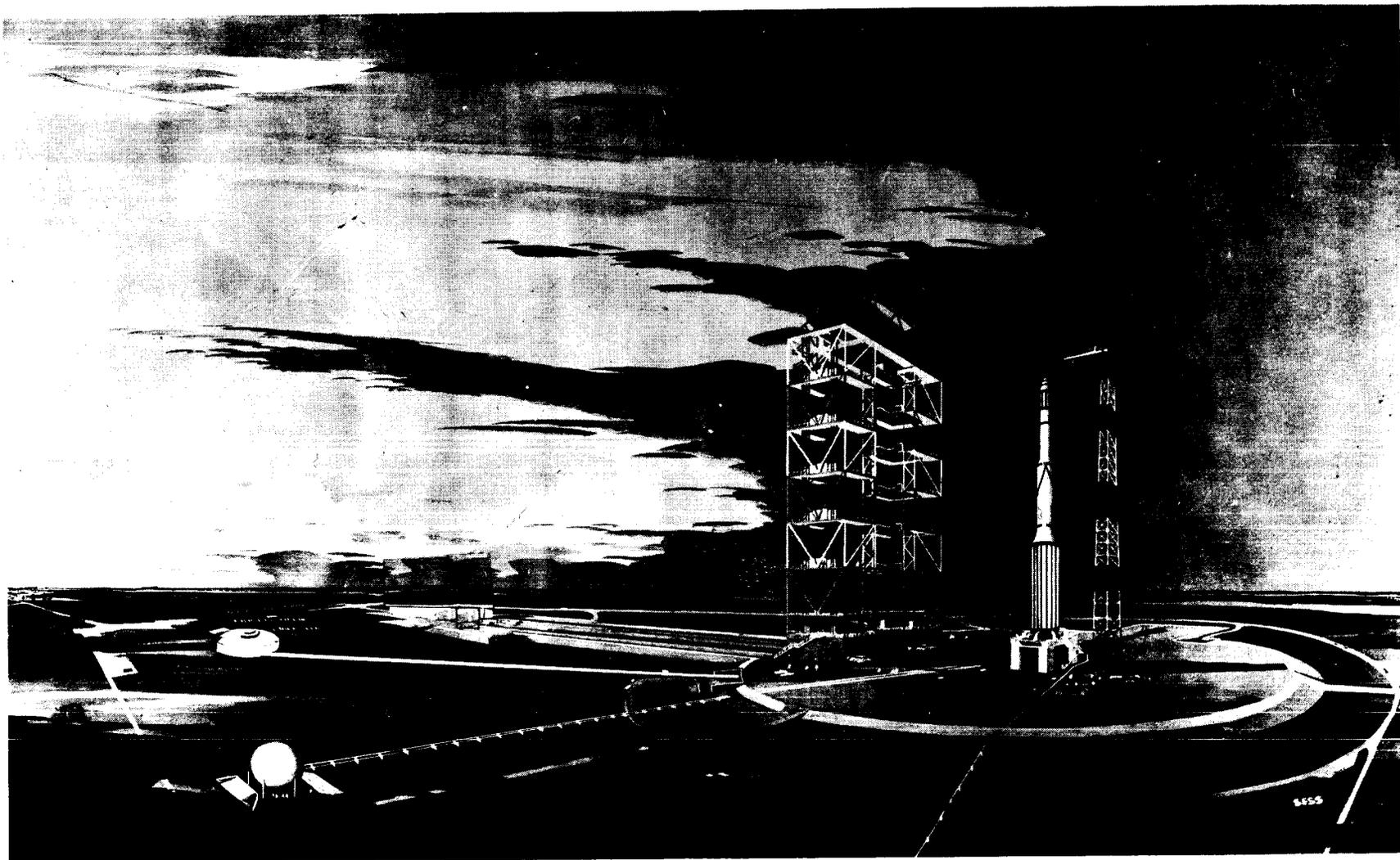
ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES
NEW SATURN LAUNCHING COMPLEX



PLOT PLAN

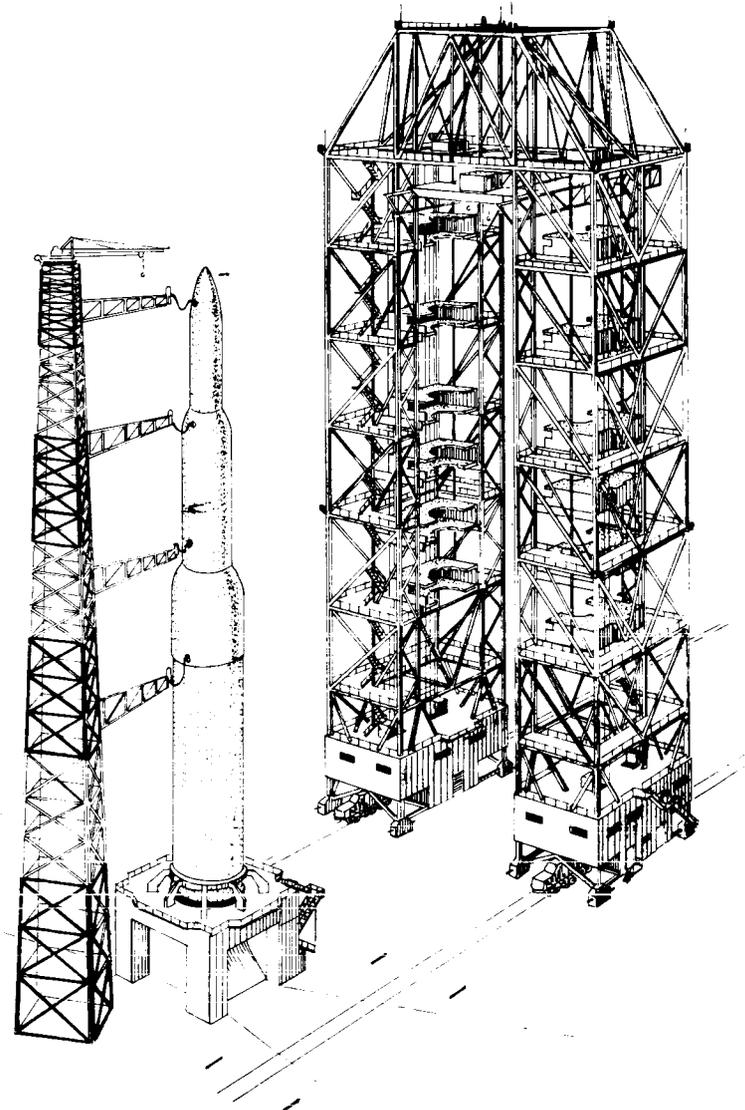
ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

NEW SATURN LAUNCHING COMPLEX



ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

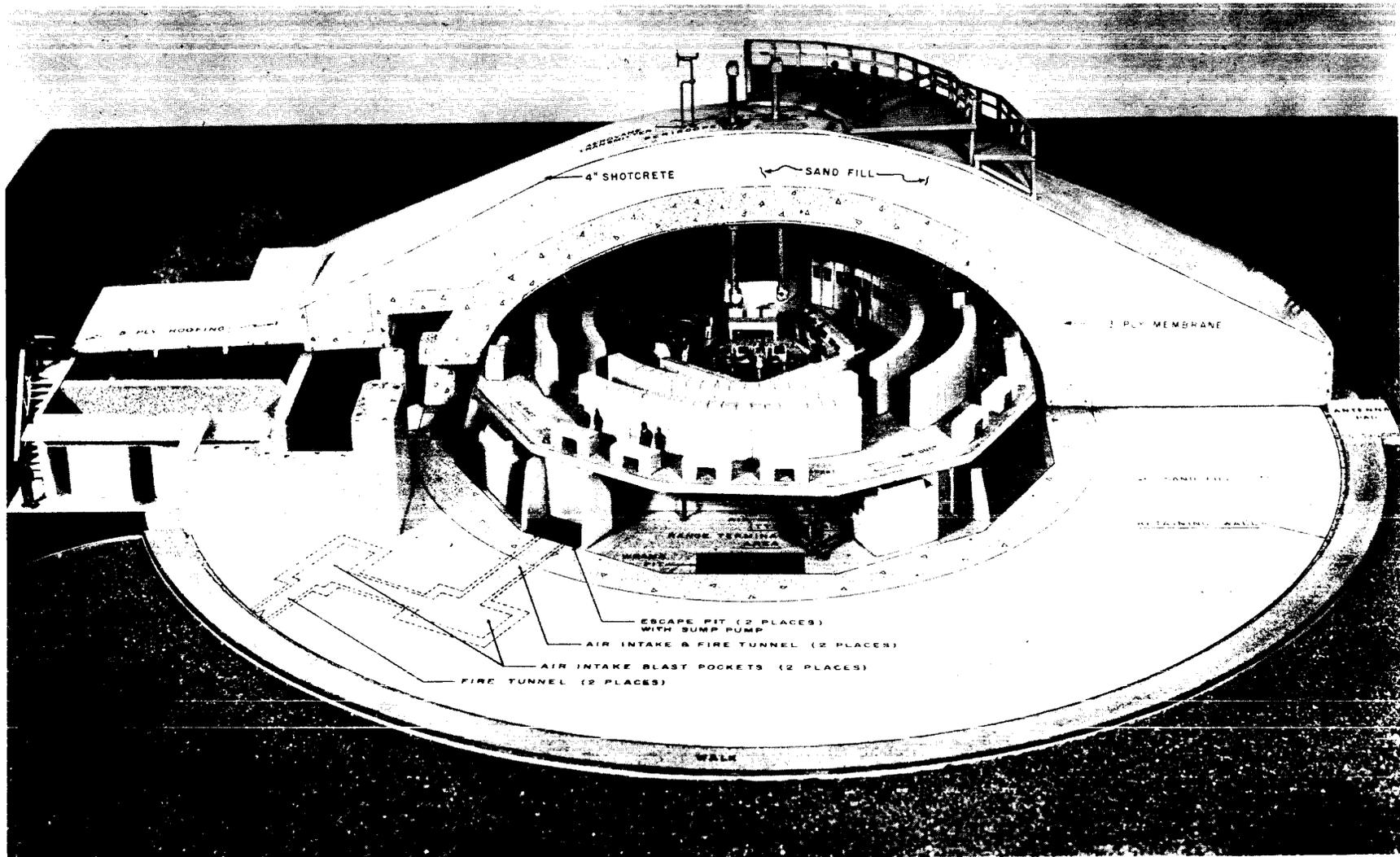
NEW SATURN LAUNCHING COMPLEX



LAUNCH STRUCTURES

ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

NEW SATURN LAUNCHING COMPLEX



BLOCKHOUSE

propellant storage facilities, and concrete roads within the complex; and extending base utilities such as water, electrical power and communications to the pad area.

Fuel, liquid oxygen, and high pressure gas facilities: Permanent storage and pumping facilities are required to provide fuel and liquid oxygen for the Saturn booster. Liquid oxygen storage capacity of 1,200,000 lb. will be provided by a 41-foot diameter spherical tank. A smaller 13,000 gallon tank will be used for topping. The fuel storage facility will contain two 28,000 gallon fuel tanks. High pressure gas will be used in pressurizing the tanks.

Liquid hydrogen facility: The quantities of liquid hydrogen needed for Saturn upper stages will require a permanent storage and transfer system for proper handling.

Ground support equipment: This item will provide for long lead time capital items of electrical, mechanical, and electronic equipment for vehicle checkout, handling, and launch control.

2. JUSTIFICATION:

The importance to the Nation of the Saturn program and the urgency of attaining desired goals have led to an alteration of certain concepts of operation at the launch site. In particular, recent specific guidelines concerning missions and schedules have permitted establishment of more firm requirements; and recently acquired information concerning blast effects of vehicles which explode during launch, has had considerable impact upon earlier concepts.

In brief, blast studies have established that the booster fuel load of 750,000 pounds could be considered equivalent to 10 percent of this weight in TNT, and that damage to the pad and associated facilities from an explosion of this magnitude would require approximately one year to repair. This finding obviously indicates the need for a second pad to insure maintaining schedules with a higher firing rate than one per year. A second consideration was to determine the minimum distance between pads to prevent damage to one missile from another which explodes on an adjacent pad. The study determined this distance to be approximately 4,000 feet. The time for checkout of complex Saturn vehicles will require that two missiles be worked on at the same time to meet firing schedules. Hence the second finding outdates the previous practice of providing common facilities for two pads; distances between pads will exceed tolerable runs for measuring leads and propellant lines. It is therefore apparent that a second, completely independent back-up launch complex is necessary to support the planned Saturn development schedule.

3. COST ESTIMATE:

Blockhouse.....		\$1,675,000
Service structure.....		8,150,000
Railroad and anchor.....	\$1,150,000	
Steel structure.....	3,100,000	
Moveable platforms.....	600,000	
Elevators.....	280,000	
Bridge crane.....	600,000	
Traction equipment.....	900,000	
Air conditioning and heating.....	150,000	
Communications and electrical system.....	670,000	
Miscellaneous mechanical equipment.....	230,000	
Enclosures.....	170,000	
Personnel escape mechanism.....	300,000	
Pad and area development.....		7,675,000
Launch pad and pedestal.....	1,520,000	
Site preparation and roads.....	965,000	
High pressure gas system.....	900,000	
High pressure water system.....	840,000	
Electrical distribution system.....	600,000	
Communications cabling.....	275,000	
Utilities and domestic water.....	125,000	
Extension of base utilities.....	2,450,000	
Umbilical tower.....		850,000
Fuel and oxygen storage facilities.....		900,000
Liquid hydrogen facility design.....		250,000
Ground support equipment.....		<u>1,500,000</u>
Total estimated cost.....		<u>\$21,000,000</u>

Items to be deferred include such items as servicing equipment for hydrocarbon fuel, liquid hydrogen, liquid oxygen, liquid nitrogen, and short lead time instrumentation. Approximately \$8,000,000 will be required to complete the equipment and activation of this facility in the fiscal year 1962.

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 18 months Jan 1962

ATLANTIC MISSILE RANGE
FY 61 ESTIMATES

STAGING BUILDING

Description: A building containing office and laboratory space and a storage area.

Purpose: To be used by upper stage contractors. The building will contain complete checkout equipment for sub-assemblies and individual stages.

Required Date: September 1961.

Construction Time: ¹²~~18~~ Months.

Cost: \$1,400,000.

1961-9
1400-9

ATLANTIC MISSILE RANGE

FISCAL YEAR 1961 ESTIMATES

STAGING BUILDING

1. DESCRIPTION AND JUSTIFICATION:

This project provides for the construction of a staging building required for the assembly, handling and mating of Saturn stages. It will provide office and laboratory spaces for upper stage contractors, storage area for spares and components, and hurricane protection for all stages, including the booster. It will contain complete checkout equipment for sub-assemblies as well as for individual stages.

The staging building will be located in an industrial area convenient to the unloading facility. Blast studies indicate that 3,000-4,000 feet from the pad is the minimum acceptable separation to remove it from the potential hazard of an explosion on the pad. A sketch of the proposed building is shown on the following page.

2. COST ESTIMATE:

Foundations and building shell.....	\$700,000
Partitions.....	150,000
Air conditioning, plumbing, and wiring.....	220,000
Bridge cranes.....	<u>330,000</u>
Total estimated cost.....	<u>\$1,400,000</u>

*25,540,000
628,000*

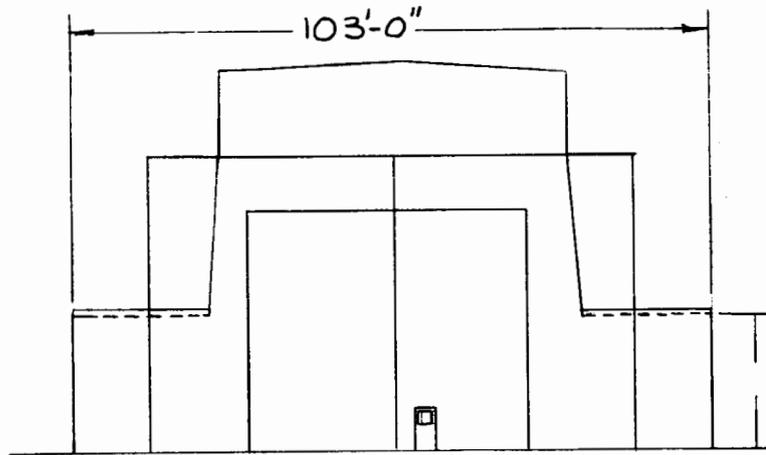
3. CONSTRUCTION SCHEDULE:

Total estimated completion time..... ¹²~~18~~ months

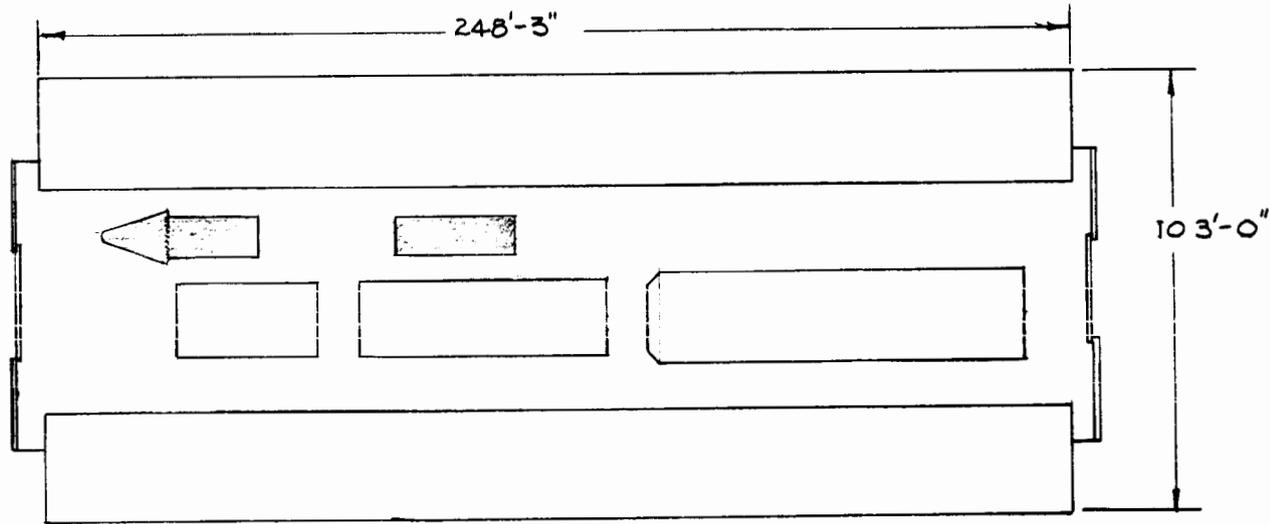
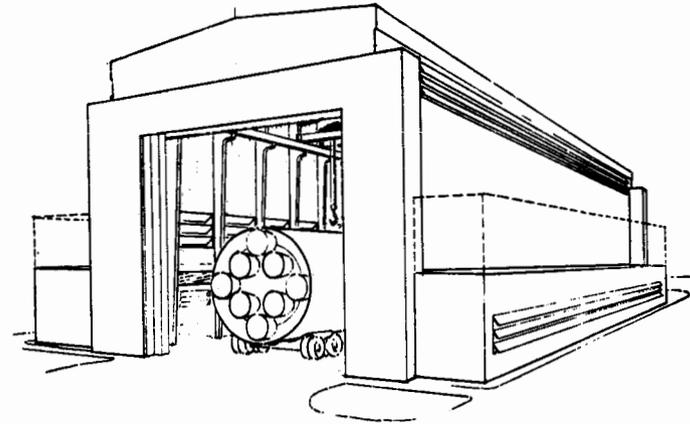
Make any cost adjustments for increased cost.

ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

STAGING BUILDING



ELEVATION



ATLANTIC MISSILE RANGE
FY 61 ESTIMATES

ADDITION TO ENGINEERING AND LABORATORY BUILDING

Description: An extension to the existing engineering and laboratory building at Cape Canaveral to provide an additional 11,000 square feet of usable engineering area.

Purpose: To provide space for the NASA Huntsville missile firing laboratory at Cape Canaveral.

The combined increased workload associated with JUNO II, MERCURY and SATURN has created a situation whereby additional engineering space will be required if the exacting standards of operation, teamwork and missile preparation are to be maintained. Some of the engineering staff are already working in trailers. Overall engineering space is already overcrowded.

Functions:

- a. Engineering administration
- b. Storage and inspection of components
- c. Assembly of components
- d. Checkout of handling equipment

Required Date: July 1961.

Construction Time: 12 Months.

Cost: \$300,000.

ATLANTIC MISSILE RANGE

FISCAL YEAR 1961 ESTIMATES

ADDITION TO ENGINEERING AND LABORATORY BUILDING

1. DESCRIPTION:

This project describes the need for an extension to the existing engineering and laboratory building to provide an additional 11,000 square feet of usable engineering area. A sketch of the proposed two story building is shown on the following page.

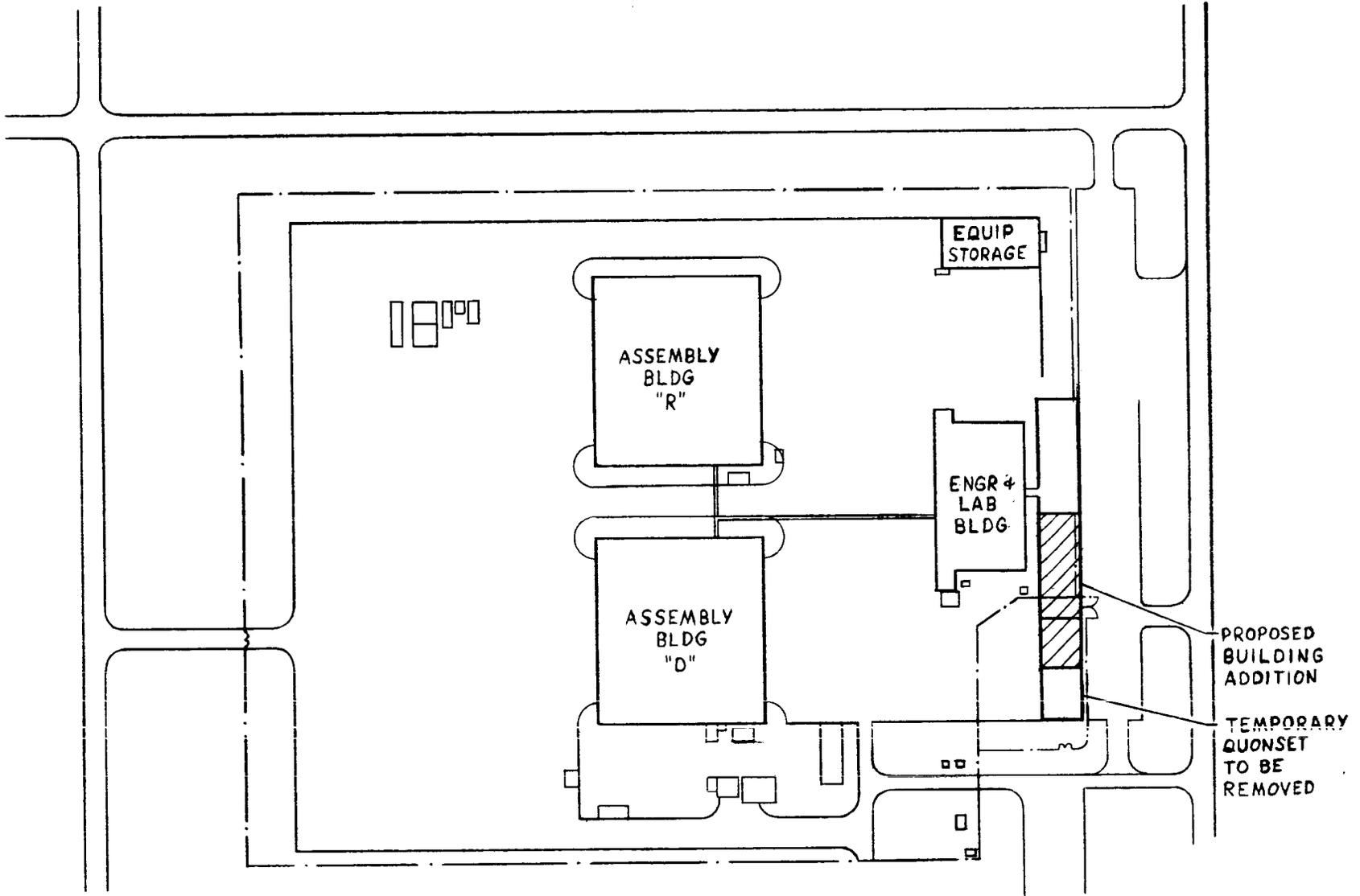
2. JUSTIFICATION:

The combined demand for laboratory, hangar, and engineering space available to the NASA Huntsville Facility's missile firing laboratory at Cape Canaveral are already overtaxing available space. The increased workload associated with the Juno II and Mercury programs is further aggravating this situation. By the time the full impact of the Saturn program is assimilated, additional space will be essential if the exacting standards of operation teamwork and hardware preparation so necessary to successful launch operations are to be maintained.

For lack of specialized engineering space existing personnel are being temporarily housed in laboratory and hangar space and in trailers. This arrangement impairs efficiency and undermines operational control since personnel whose efforts must be closely integrated are spread over a considerable area. Furthermore, the imperative need for additional space to store, inspect, and set up the increasing volume of vehicle components, and the checkout and handling equipment associated with these advanced programs, most particularly Saturn, requires either the complete evacuation of these personnel or the construction of additional laboratory and hangar space. The proposed provision of additional engineering and administrative space is decidedly the cheaper solution and will enable an efficiently organized operation.

ATLANTIC MISSILE RANGE
FISCAL YEAR 1961 ESTIMATES

ADDITION TO ENGINEERING AND LABORATORY BUILDING



E-778

3. COST ESTIMATE:

Building.....	\$157,000
Air conditioning.....	64,000
Electrical installations.....	53,000
Fire alarm.....	9,000
Design and engineering services.....	<u>17,000</u>
Total estimated cost.....	<u>\$300,000</u>

14 8/11 (OK)

4. CONSTRUCTION SCHEDULE:

Total estimated completion time..... 12 months

July 1961

VARIOUS LOCATIONS

FISCAL YEAR 1961 ESTIMATES

TRACKING FACILITIES

1. DESCRIPTION AND JUSTIFICATION:

This project covers improvements to be made to existing tracking facilities by the addition of basic tracking, data acquisition, communications, and computing capability essential to the accomplishment of new and more complex missions. Major objectives of the 1961 program include:

- (a) Construction of special meteorological data acquisition equipment and improved tracking equipment.
- (b) Continued improvements and modifications to the Minitrack stations.
- (c) Establishment of a new portable optical tracking equipment.
- (d) Establishment of new initial trajectory tracking equipment for deep space vehicles.
- (e) Establishment of flexible receiving capability at new deep space stations for various frequencies.
- (f) Improvement of facilities and data handling capability at deep space stations.
- (g) Completion of instrumentation and construction of Project Mercury tracking stations.

A more detailed discussion of the proposed improvements follows:

Facilities for satellite electronic and optical tracking (Minitrack net): At the beginning of the fiscal year 1961 there will be 14 Minitrack electronic satellite stations at the following locations: Blossom Point, Maryland; San Diego, California; Fort Myers, Florida; Antigua Island, West Indies; Quito, Ecuador; Lima, Peru; Antofagasta, Chile; Santiago, Chile; Woomera, Australia; Esselen Park, South Africa; Newfoundland; Fairbanks, Alaska; East Grand Forks, Minnesota; and England. The station in England will not be operational until the last quarter of 1960. These stations will aid in the tracking of satellites in high inclination orbits and of polar orbiting satellites and will have been adapted to the new tracking frequency of 136-137 mcs by the end of the fiscal year 1960. Improvements are required in automatic read-out equipment to expedite data collection and to permit the tracking of a greater number of satellites.

As more satellites are launched and remain in orbit, automatic data-read-out equipment will be needed for the Minitrack stations to permit more rapid data collection, and to permit the simultaneous tracking of the greater number of satellites in orbit. Data acquisition antennas will be procured for five stations for receiving greater quantities of data. New data recording and conversion units will be procured for telemetry purposes. Improvements will also be made in the telemetry receivers to accommodate the transmissions of data from new and more complex satellite payloads. Command transmitters will be modified and up-dated to meet the requirements of new satellites.

Meteorological satellites to be launched in the fiscal year 1961 will incorporate instruments for transmitting considerable more complex information than is generated by most other types of satellites. This additional complexity is comparable to the difference between transmissions of information of a few words at a time and transmissions of whole sentences or paragraphs of information at a time. Technically, the acquisition of complex information from satellites, such as the cloud cover television pictures which will be transmitted from meteorological satellites, requires wide bandwidth receiving systems on the ground.

At present, use is being made of non-NASA facilities at Deal, New Jersey and Kaena Point, Hawaii on a reimbursable basis. Although these stations have certain capabilities (high-gain antennas) for meteorological satellites, they were not designed for this use and are available to the meteorological program on a time-sharing basis only. While these stations will serve the needs of the meteorological program during early exploratory tests, it is necessary that NASA develop, on a full-time basis, data acquisition and display devices and

techniques which will serve as prototypes when turned over to an operating agency. The equipment to serve this purpose will consist of a high-gain antenna with supporting wide band receivers, recorders, and data display devices. This equipment will be originally located at Blossom Point, Maryland, one of the Minitrack sites. Adequate land is available and it is readily accessible to NASA and Weather Bureau scientists who are carrying out the meteorological program. As the program progresses, this equipment will be redeployed to other Minitrack sites if expansion of world coverage is found necessary. Concurrently this equipment can be utilized in the planned installation of a more precise tracking system which will be inherently more accurate than the present Minitrack system. A more accurate tracking technique is needed for future measurements in scientific programs.

The existing twelve Baker-Nunn optical stations which are permanent tracking camera installations installed and operated by the Smithsonian Astrophysical Observatory, are located as follows: Hobe Sound, Florida; Curacao, N.W.I.; Arequipa, Peru; Villa Dolores, Argentina; Olifantsfontein, South Africa; Cadiz, Spain; Shiraz, Iran; Naini-Tal, India; Woomera, Australia; Mitaka, Japan; Haleakala, Hawaii; White Sands, New Mexico. It is contemplated that additional optical sites consisting of mobile, non-tracking type cameras will be needed for geodetic satellites. These cameras will be used to provide the highly accurate data needed for determining the relative location of various land masses with the aid of satellites. Photographing the satellite in relation to known star positions can give accuracies of a few seconds of arc. The cameras will be moved periodically to new sites where new measurements are to be made to acquire the necessary map data. It is contemplated that these stations will have electronic ranging capability, command capability, and timing telemetry capability.

Facilities for deep space stations (deep space net): The tracking and reception of telemetry data from space probes require the provision of special, highly sensitive receiving systems located at several points on the earth's surface. These stations also provide a potential means for wide band width data reception. Each station will ultimately consist of two separate 85-foot parabolic antennas, one for transmitting and one for receiving signals. Associated with each is the supporting electromechanical equipment for controlling the antenna and the electronic receiving equipment and transmitting equipment.

The minimum requirement in connection with deep space vehicles is for three tracking stations spaced about 120 degrees apart on the earth's surface. These stations must be in locations where there is little or no electrical disturbances from other activities to interfere

with the faint signals received from space vehicles. The JPL facility at Goldstone (Camp Irwin), California, is the only currently operational deep space station. It is expected that a second station in Woomera, Australia will be operational during the fiscal year 1960. A third station in South Africa, is scheduled to be completed during the fiscal year 1961. The NASA will continue to make use of the Jodrell Bank 250-foot antenna station in England, on a cooperating basis. Substantial portions of the receiver equipment for 960 mcs were purchased for Australia and South Africa in the fiscal year 1960.

The three stations have programmed an operational capability for reception at only a single frequency (960 mcs). It is necessary to increase this minimal receiving capability to several other frequencies (136 mc, 183.6 mcs, 378 mcs, 225-260 mcs) in order to meet the requirements of the NASA lunar and satellite programs and for special requirements.

The stations will also require improved data handling equipment to provide a capability for processing large quantities of tracking and telemetry data automatically. This will improve the accuracy, reliability, and capacity of the network. Such capability will also permit more rapid relay of data between the stations in the network. These improvements will facilitate the use of these stations for handling lunar probes, communication satellites, meteorological satellites, highly elliptical scientific satellites, and for certain other special applications.

Except for some technical facilities programmed for Woomera, the other stations in the deep space network have no permanent technical, utility, or support facilities. Technical and utility facilities such as permanent control buildings, roads, air conditioning, water, sewage, antenna feed servicing tower, and fuel storage are required to insure reliable operation. Since there are virtually no back-up type facilities available, efforts must be made to insure continuous operation over extended periods of time despite climatic condition or utility variations. In like manner, the operational staff will require permanent housing, mess, and administration facilities. For illustration, the lunar hard landing mission planned for 1961 would require each station staff to operate almost continuously for approximately one month.

Lastly, a facility is required to track deep space vehicles very precisely during the first portion of flight close to the earth, but beyond the launching range instrumentation, in order to provide the data necessary to point initially the eighty-five foot dishes. This

facility will possess high tracking rates (six times those of the eighty-five foot dish) and precision ranging equipment necessary to establish a semi-definitive orbit in a short time period. The location of such a facility is dictated by the trajectory employed since the powered flight is interrupted and a period of coasting allowed. During the coast period the vehicle will generally leave the area covered by the range instrumentation. Therefore, when the final portion of powered flight is initiated, more tracking data must be obtained to ascertain the new trajectory. This initial trajectory tracking station will be co-located with the South African station but installed in a manner permitting relocation if new types of trajectories are later selected. Since the station tracks the payload signal, the majority of the equipment is designed for the 960 mc band. Funds will be used for the procurement and installation of antennas, servos, feeds, transmitter and ranging equipment. It is expected that advanced projects in the future will require additional facilities of this type.

Facilities and equipment for support of manned space flight (Mercury net): Proper execution of the manned satellite program requires the installation of various tracking radars, acquisition equipment, telemetry equipment, communications equipment and many associated items. A belt of approximately sixteen stations encircling the earth is being established to insure means for safe injection into orbit, midcourse tracking and communication, and precision determination of reentry and impact point. Great emphasis must be placed on assuring recovery of the vehicle. Therefore, a high order of reliability is necessary. Back-up equipments and systems are employed to increase reliability.

The work to be done under this project includes completion of station construction tasks, particularly affecting the ship stations and Australian and African stations.

Additional electronic tracking equipment and services remaining to be procured consists of modifications on S-band radar equipment for the U. S. Mainland; a seaborne radar tracking equipment together with stabilization equipment for installation aboard a ship in the Southern California area in the event of such a requirement; and radar accessory and modification equipment, requirements for which cannot be fully determined prior to early demonstration tests.

Additional requirements for data processing and handling equipment includes, computer and communications equipment for data handling; extended and improved ground communications to obtain high reliability, especially in the U. S. to Bermuda links where initial orbit conditions are most critical; additional communications items for the vehicle-to-earth link; and telemetry and radar data processing and displays which will be augmented, based on demonstration and tests of early prototypes now being purchased.

During this period a considerable demonstration and checkout program will be undertaken including system drills, development of special test equipment, and simulated flight programs to confirm the adequacy of the Mercury network.

2. COST ESTIMATE:

<u>MINITRACK NET</u>	<u>Fiscal Year 1959</u>	<u>Fiscal Year 1960</u>	<u>Fiscal Year 1960 Supplemental</u>	<u>Fiscal Year 1961</u>
<u>Station development and construction:</u>				
Initial site development.....	\$25,000	---	---	---
Station construction.....	70,000	\$784,000	---	\$450,000
Buildings and utilities.....	---	777,000	---	---
<u>Tracking and data acquisition equipment:</u>				
New electronic equipment, antenna arrays, and receivers.....	---	1,144,000	---	---
Modification kits.....	---	1,000,000	---	---
Telemetry equipment.....	---	500,000	---	---
Data acquisition antennas.....	---	---	---	400,000
Tracking filters and new Minitrack electronics.....	---	---	---	300,000
Command transmitters and modifica- tions, and calibration antennas.....	---	---	---	100,000
Wide band data acquisition equipment..	---	---	---	200,000
High-gain antennas and special equipment for meteorology and precision tracking.....	---	---	---	600,000
Optical components.....	---	---	---	250,000
Portable electronic ranging and support equipment.....	---	---	---	950,000
Special equipment for calibration and timing.....	---	---	---	300,000
<u>Data processing and handling equipment:</u>				
Automatic data read-out units.....	---	---	---	500,000
Data receiving, recording, and conversion units.....	---	---	---	700,000
Total, Minitrack net.....	<u>\$95,000</u>	<u>\$4,205,000</u>	<u>---</u>	<u>\$4,750,000</u>

<u>DEEP SPACE NET</u>	<u>Fiscal Year 1959</u>	<u>Fiscal Year 1960</u>	<u>Fiscal Year 1960 Supplemental</u>	<u>Fiscal Year 1961</u>
<u>Station development and construction:</u>				
Construction of permanent technical facilities.....	---	---	---	\$1,300,000
Construction of permanent support facilities.....	---	---	---	1,700,000
<u>Tracking and data acquisition equipment:</u>				
Initial Woomera receiving equipment and installation.....	\$1,547,000	\$1,500,000	---	---
Initial South Africa receiving equipment and installation.....	---	2,000,000	---	---
Goldstone transmitting equipment and installation.....	1,003,000	---	---	---
Improved receiving and tracking support equipment.....	---	---	---	3,000,000
Initial trajectory measurement equipment and facilities.....	---	---	---	1,000,000
<u>Data processing and handling equipment:</u>				
Data processing equipment for tracking and telemetry.....	---	---	---	<u>1,000,000</u>
Total, deep space net.....	<u>\$2,550,000</u>	<u>\$3,500,000</u>	<u>---</u>	<u>\$8,000,000</u>

MERCURY NET

<u>Station development and construction:</u>				
Initial site development.....	---	\$2,700,000	---	---
Station construction.....	---	---	\$2,245,000	\$2,400,000
Power generators and equipment shelters.....	---	1,900,000	690,000	---
Ship modifications.....	---	2,000,000	---	---
<u>Tracking and data acquisition equipment:</u>				
Procurement of long-lead time radar equipment.....	\$2,425,000	---	---	---

	<u>Fiscal Year</u> 1959	<u>Fiscal Year</u> 1960	<u>Fiscal Year</u> 1960 Supplemental	<u>Fiscal Year</u> 1961
Precision radar systems.....	---	1,750,000	---	---
Accessory equipment for radars.....	---	5,000,000	---	---
Precision radar support equipment.....	---	2,500,000	590,000	---
Active acquisition aids.....	---	1,900,000	---	---
S-band radar equipment.....	---	---	250,000	400,000
Seaborne radar and stabilization equipment.....	---	---	---	1,200,000
Radar accessory and modification equipment.....	---	---	---	500,000
<u>Data processing and handling equipment:</u>				
Digital data handling and telemetry equipment.....	---	1,500,000	---	---
Command transmitter and vehicle communications equipment.....	---	1,345,000	---	---
Telemetry recording and data handling equipment.....	---	2,000,000	---	---
Data transmission equipment.....	---	3,300,000	---	---
Communications and computer equipment.....	---	3,100,000	---	---
Extension and improvement of ground communications equipment.....	---	---	---	1,500,000
Vehicle to earth communications equipment.....	---	---	---	1,000,000
Telemetry and radar data processing and display equipment.....	---	---	1,425,000	2,800,000
<u>Demonstration, test, and checkout equipment:</u>				
Test and checkout of station equipment.....	---	---	---	3,000,000
Special test equipment.....	---	---	1,800,000	2,200,000
Total, Mercury net.....	<u>\$2,425,000</u>	<u>\$28,995,000</u>	<u>\$7,000,000</u>	<u>\$15,000,000</u>
Total estimated cost.....	<u>\$5,070,000</u>	<u>\$36,700,000</u>	<u>\$7,000,000</u>	<u>\$27,750,000</u>

GENERAL PROVISION[S]

Not to exceed 5 per centum of any appropriation made available to the National Aeronautics and Space Administration by this Act may be transferred to any other such appropriation, but the "Salaries and expenses" appropriation shall not be thereby increased.

[The general provisions applicable to appropriations contained in title I of the "Independent Offices Appropriation Act, 1960", shall apply to appropriations contained in this Act for the National Aeronautics and Space Administration.]

(Supplemental Appropriation Act, 1960.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

LEGISLATIVE PROGRAM

ESTIMATES OF APPROPRIATIONS

FISCAL YEAR 1961

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

LEGISLATIVE PROGRAM

<u>Subject matter of legislative proposal and summary of objectives</u>	<u>Drafts of legislation</u>	<u>Bills & reports</u>	<u>Appropriation forecast</u>	<u>Interested agencies</u>
<p>1. Clarification of responsibilities and changes in organization:</p> <p>The object is to implement the President's special message to the Congress, dated January 14, 1960.</p>	<p>See pages 504, 505, 506, 507, 510, and 511</p>	<p>None</p>	<p>No increase</p>	<p>Department of Defense</p>
<p>2. Patents and property rights in inventions:</p> <p>The object is to enable NASA to adopt patent policies and practices best suited to protect the interests of the United States and the equities of NASA contractors.</p>	<p>See pages 507 and 508</p>	<p>None</p>	<p>No increase</p>	<p>National Science Foundation</p> <p>Department of Defense</p>

<u>Subject matter of legislative proposal and summary of objectives</u>	<u>Drafts of legislation</u>	<u>Bills & reports</u>	<u>Appropriation forecast</u>	<u>Interested agencies</u>
<p>3. Indemnification:</p> <p>The object is to provide NASA with authority to indemnify contractors against unusually hazardous risks arising out of research and development contracts. Authority sought is co-extensive with that of the Department of Defense. (10 USC 2354).</p>	See pages 508, 509, and 510	H.R. 4148, 86th Cong. and S. 2110, 86th Cong.	No increase	Department of Defense
<p>4. Settlement of claims for past infringement of patents:</p> <p>The object is to provide NASA with authority, similar to 10 USC 2386 available to the Department of Defense, to settle claims for past infringement of patents.</p>	See page 506	None	No increase	Department of Defense
<p>5. Out-leasing for non-monetary consideration:</p>	See page 506	None	No increase	Department of Defense

<u>Subject matter of legislative proposal and summary of objectives</u>	<u>Drafts of legislation</u>	<u>Bills & reports</u>	<u>Appropriation forecast</u>	<u>Interested agencies</u>
The object is to provide NASA with authority, similar to 10 USC 2667(b)(5) available to the Department of Defense, to lease real property to others for non-monetary consideration.				
6. Clarification of provision for interagency cooperation:	See page 506	None	No increase	Department of Defense
The object is to clarify the authority of other departments or agencies to enter into contracts on behalf of NASA at NASA's request.				
7. Correction of an omission:	See page 507	None	No increase	Atomic Energy Commission
The object is to provide expressly for the delegability of a routine function concerning access to restricted data.				Department of Defense
8. Waiver of performance and payment bonds:	See page 511	None	No increase	Department of Defense
The object is to provide NASA with authority identical with that of the military				Treasury Department

<u>Subject matter of legislative proposal and summary of objectives</u>	<u>Drafts of legislation</u>	<u>Bills & reports</u>	<u>Appropriation forecast</u>	<u>Interested agencies</u>
services, to waive payment and performance bonds otherwise required by 40 USC 270a-270e in construction contracting.				
9. Fiscal year 1961 appropriation authorization.	See pages 512, 513, and 514	None	\$915,000,000	None
To authorize appropriations for NASA, as required by section 4 of Public Law 86-45.				
10. Fiscal year 1961 appropriation language.	See pages 2, 100, 300, and 427	None	\$915,000,000	None
To place appropriation language in agreement with estimates.				

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

AMENDMENT TO NATIONAL AERONAUTICS AND SPACE ACT, AS AMENDED,

AND FOR OTHER PURPOSES

A BILL

To amend the National Aeronautics and Space Act of 1958, as amended, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the National Aeronautics and Space Act of 1958, as amended (72 Stat. 426), is amended as follows:

(1) Section 102 is amended--

(A) by striking out subsection 102(b) and the first clause in subsection 102(c) ending with the colon, and inserting in lieu thereof the following:

"(b) The Congress declares that the general welfare and the security of the United States require that adequate provision be made for the exploration, scientific investigation, and utilization of space for peaceful purposes, and for research into problems of flight within and outside the earth's atmosphere. The Congress further declares that such activities shall be conducted so as to contribute materially to the following objectives:"

(B) by inserting the following new subsection:

"(c) The Congress further declares that the exploration, scientific investigation, and utilization of space for peaceful purposes shall be the responsibility of, and shall be directed by, a civilian agency."

(2) Section 103 is amended to read as follows:

"Section 103. As used in this Act --

"(1) the term 'spacecraft' means devices, manned and unmanned, which are designed to be placed into an orbit about the earth or into a trajectory to another celestial body, including all instrumentation, propulsion, and guidance contained therein;

"(2) the term 'launch vehicles' means devices which propel and guide spacecraft into an orbit about the earth or into a trajectory to another celestial body and includes all stages of multi-stage rockets used for such purposes;

"(3) the term 'space vehicles' means spacecraft, launch vehicles, and all other vehicles, except ballistic missiles, capable of flight without support from or dependence upon the earth's atmosphere, together with related equipment, devices, components, and parts; and

"(4) the term 'aeronautical vehicles' means all vehicles, other than space vehicles, designed for flight, together with related equipment, devices, components, and parts.

(3) Title II is amended by striking out the heading and inserting in lieu thereof the following:

"TITLE II - NATIONAL AERONAUTICS AND SPACE ADMINISTRATION".

(4) Section 201 is repealed.

(5) Section 202 is amended by changing the number to "201" and striking out the caption "National Aeronautics and Space Administration" and inserting in lieu thereof "Administrator and Deputy Administrator".

(6) Section 203 is amended --

(A) by changing the number to "202";

(B) by striking out paragraph 203(a) (1) and inserting in lieu thereof the following:

"(1) conduct research into problems of flight within and outside the earth's atmosphere with a view to their practical solution;

"(2) conduct such activities as may be required for the exploration, scientific investigation, and utilization of space for peaceful purposes, and develop space vehicles for use in such activities;"

(C) by changing the numbers of paragraphs (2) and (3) of subsection 203(a) to "(3)" and "(4)" respectively;

(D) by amending the clause following the first semicolon in paragraph 203(b) (3) to read as follows:

"to lease to others such real and personal property, and such lease may provide, notwithstanding section 321 of the Act of June 30, 1932 (40 U.S.C. 303b), or any other provision of law, for the maintenance, protection, repair, or restoration, by the lessee, of the property leased, or of the entire unit or installation where a substantial part of it is leased, as part or all of the consideration for the lease;"

(E) by inserting in paragraph 203(b) (6) immediately before "to transfer to" the following:

"to obtain by contract for,"

(F) by adding at the end of subsection 203(b) the following new paragraph (14):

"(14) to acquire releases, before suit is brought, for past infringement of patents."

(7) Section 204 is repealed.

(8) Section 205 is amended by changing the number to "203."

(9) Section 206 is amended--

(A) by changing the number to "204.";

(B) by repealing subsections (b) and (c);

(C) by changing the designation of subsection (d) to "(b)."

(10) Section 304 is amended--

(A) by inserting in subsection 304(b) immediately after "so certified by the Council or the Administrator," the following:

"or designee thereof,";

(B) by striking out of the first sentence of subsection 304(b) the words "any member, officer, or employee of the Council, or" and the words "as the case may be," and the words "Council or the" and "Council or" wherever they appear.

(11) Section 305 is amended to read as follows:

"Sec. 305. (a) Each contract or other arrangement entered into by the Administration, and each subcontract at all tiers thereunder, which has as one of its purposes the performance of experimental, developmental, or research work, shall contain provisions prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice thereunder in a manner calculated to protect the public interest and the equities of the contractor.

"(b) The Administrator or his designee may, whenever the contract provides for the vesting of title to an invention in the United States, waive the rights of the United States to such invention on such terms and conditions as he determines to be in the best interest of the United States: Provided, That any such waiver shall be subject to the

the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States.

"(c) The Administrator may waive, upon the same terms as provided in subsection (b) of this section, all or any part of the rights of the United States to inventions made in the performance of any work under any contract heretofore entered into by or for the Administration which have become the exclusive property of the United States. Any contract heretofore entered into by or for the Administration, on which final payment has not been made, may be amended without consideration to effectuate the purposes of this section: Provided, That no such amendment shall affect the status of inventions which have become the exclusive property of the United States.

"(d) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code."

(12) Section 306 is amended by amending the first two sentences to read as follows:

"Sec. 306. (a) Subject to the provisions of this section, the Administrator is authorized, upon his own initiative or upon application, to make a monetary award, in such amount and upon such terms as he shall determine to be warranted, to any individual, partnership, corporation, association, institution, or other entity for any scientific or technical contribution to the Administration which is determined by the Administrator to have significant value in the conduct of aeronautical and space activities. Each application made for any such award shall be referred to an Inventions and Contributions Board which shall be established by the Administrator within the Administration."

(13) A new section 308, captioned "Indemnification", is added to Title III as follows:

"Sec. 308. (a) With the approval of the Administrator, or his designee, any contract of the Administration for research or development, or both, may provide that the United States will indemnify the contractor against either or both of the following, but only to the extent that they arise out of the direct performance of the contract and to the extent not compensated by insurance or otherwise:

"(1) Claims (including reasonable expenses of litigation or settlement) by third persons, including employees of the contractor, for death, bodily injury, or loss of or damage to property, from a risk that the contract defines as unusually hazardous.

"(2) Loss of or damage to property of the contractor from a risk that the contract defines as unusually hazardous.

"(b) A contract, made under subsection (a), that provides for indemnification must also provide for--

"(1) Notice to the United States of any claim or suit against the contractor for the death, bodily injury, or loss of or damage to property; and

"(2) Control of or assistance in the defense by the United States, at its election, of that suit or claim.

"(c) No payment may be made under subsection (a) unless the Administrator, or his designee, certifies that the amount is just and reasonable.

"(d) Upon approval by the Administrator, payments under subsection (a) may be made from--

"(1) funds obligated for the performance of the contract concerned;

"(2) funds available for research or development, or both, and not otherwise obligated;

or

"(3) funds appropriated for those payments."

(14) A new section 309, captioned "Coordination and Cooperation," is added to Title III as follows:

"Sec. 309. (a) Nothing in this Act shall preclude the Department of Defense from undertaking such activities involving the utilization of space as may be necessary for the defense of the United States, including the development of weapons systems utilizing space vehicles and the conduct of supporting research connected therewith.

"(b) In order to accomplish the most efficient utilization of resources, responsibility for the development of each new launch vehicle, whether intended for use by the Administration or the Department of Defense or both, shall be assigned by the President to either the Administration or the Department of Defense.

"(c) The Administration and the Department of Defense shall advise and consult with each other on all matters within their respective jurisdictions relating to activities involving the utilization of space and research and development connected therewith and shall keep each other fully and currently informed with respect to such activities.

"(d) If the Secretary of Defense concludes that any request, action, proposed action, or failure to act on the part of the Administrator is adverse to the responsibilities of the Department of Defense, or the Administrator concludes that any request, action, proposed action, or failure to act on the part of the Department of Defense is adverse to the responsibilities of the Administration, and the Administrator and the Secretary of Defense are unable to reach an agreement with respect thereto, either the Administrator or the Secretary of Defense may refer the matter to the President for his decision.

Section 2. Section 799 of title 18 of the United States Code is amended by striking out "aircraft, missile, spacecraft, or similar vehicle," and inserting in lieu thereof "aeronautical or space vehicle,".

Section 3. The Act of April 29, 1941, as amended (40 U.S.C. 270e), is amended by inserting immediately before "or the Secretary of the Treasury" the words "the Administrator of the National Aeronautics and Space Administration," and by inserting immediately before "or Coast Guard" the words "National Aeronautics and Space Administration,".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1961 ESTIMATES

APPROPRIATION AUTHORIZATION

A BILL

To authorize appropriations to the National Aeronautics and Space Administration for salaries and expenses, research and development, construction and equipment, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there are hereby authorized to be appropriated to the National Aeronautics and Space Administration for the fiscal year 1961 (a) such sums as may be required for "Salaries and expenses" and for "Research and development," and (b) the sum of \$122,787,000 for "Construction and equipment," as follows:

(1) Langley Research Center, Hampton Virginia:

Hypersonic aerothermal dynamics facility and dynamics research laboratory, \$11,957,000.

(2) Ames Research Center, Moffett Field, California:

Centrifuge equipment, \$980,000.

(3) Lewis Research Center, Cleveland, Ohio:

Energy conversion laboratory and basic materials research laboratory \$9,100,000.

(4) Goddard Space Center, Greenbelt, Maryland:

Payload testing facility; satellite systems laboratory; and utility installations, \$9,500,000.

(5) Pilotless Aircraft Station, Wallops Island, Virginia:

Precision trajectory determination system; operations computing center; and equipment modernization, \$4,000,000.

(6) Jet Propulsion Laboratory, Pasadena, California:

Land acquisition; modernization of laboratory facilities; solid propellant facility; liquid propellant test cell; and antenna range, \$5,000,000.

(7) NASA Huntsville Facility, Huntsville, Alabama:

Saturn static test facility; central laboratory and office facility; dynamic test facility; pressure test cell; and additions to existing facilities for structures engineering, guidance and control, fabrication, checkout, and assembly, \$26,750,000.

(8) Atlantic Missile Range, Cape Canaveral, Florida:

Completion of the Saturn launching complex, escape mechanism, hydrogen system, new Saturn launching complex, staging building, and addition to the engineering and laboratory building, \$27,750,000.

(9) Various locations:

Tracking facilities, \$27,750,000.

(c) Appropriations for "Research and development" may be used for any items of a capital nature (other than acquisition of land) which may be required for the performance of research and development contracts: Provided, That none of the funds appropriated for "Research and development" pursuant to this Act may be used for construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$250,000, unless the Administrator or his designee notifies the Committee on Science and Astronautics of the House of Representatives and the Committee on Aeronautical and Space Sciences of the Senate of the nature, location, and estimated cost of such facility.

(d) Appropriations for "Research and development" may be used, in any amount not to exceed \$20,000 for emergencies and extraordinary expenses upon the approval or authority of the Administrator and his determination shall be final and conclusive upon the accounting officers of the Government.

(e) When so specified in an Appropriation Act, any amount appropriated for "Research and development" and for "Construction and equipment" may remain available without fiscal year limitation.

SEC. 2. Authorization is hereby granted whereby any of the amounts prescribed in subparagraphs (1), (2), (3), (4), (5), (6), (7), (8), or (9) of subsection 1 (b) may, in the discretion of the Administrator of the National Aeronautics and Space Administration, be varied upward 5 per centum to meet unusual cost variations, but the total of all work authorized under such subparagraphs shall not exceed a total of \$122,787,000.

SEC. 3. Any amount, not to exceed \$5,000,000, of the funds appropriated for "Construction and equipment" pursuant to this Act, may be used to construct, expand, or modify laboratories and other installations, if found by the Administrator to be necessary because of changes in the national program of aeronautical and space activities or new scientific or engineering developments and if the Administrator determines that deferral until the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities, and in connection therewith to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment: Provided, That upon reaching a final decision to implement, the Administrator or his designee shall notify the Committee on Science and Astronautics of the House of Representatives and the Committee on Aeronautical and Space Sciences of the Senate of the cost of such construction, expansion, or modification including those real estate actions pertaining thereto: Provided further, That no such funds shall be used for construction, expansion, or modification if authorization for such construction, expansion, or modification has been previously denied by the Congress; and additional appropriations are hereby authorized for purposes of this section in the amount of \$5,000,000.