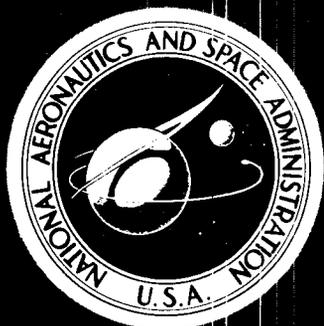


*National Aeronautics
and Space Administration*



BUDGET ESTIMATES

FISCAL YEAR 1970
Volume IV

RESEARCH AND PROGRAM MANAGEMENT

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 1970 ESTIMATES
RESEARCH AND PROGRAM MANAGEMENT

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RPM 1

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND PROGRAM MANAGEMENT

GENERAL STATEMENT

The Research and Program Management appropriation includes funding for research in Government laboratories, management of programs and other activities of the National Aeronautics and Space Administration. The present appropriation title has replaced the title of "Administrative operations", to be more descriptive of the activities provided for in the appropriation. Principally, these are:

Provide the personnel staff necessary for in-house research and to plan, manage, and support the Research and Development programs.

Provide operational capability to the laboratories and facilities for in-house research and planning, directing, and executing out-of-house research, development, and mission operations effort; general purpose computer capability and such necessary logistics support, as travel and transportation; maintenance and operation of facilities; and technical and administrative support.

The Research and Program Management appropriation request is subdivided into six functional categories, as follows:

1. Personnel Related Costs which is comprised of salaries and benefits for civil service personnel, over 70% of whom are technical, and for personnel of other government agencies detailed to NASA; and includes supporting personnel costs, i.e., the cost of moving expenses, as provided by law, the cost of recruiting and personnel investigation services provided by the Civil Service Commission, and personnel training.
2. Travel includes the cost of travel required for direction, coordination, and management of research and development and construction of facilities program activities, flight mission support and overseas travel to launch and tracking sites, and travel to meetings and technical seminars.
3. Automatic Data Processing includes the cost of the lease, purchase, and maintenance of equipment, and the cost of providing contract services for programming and operations for general purpose computer capability.
4. Facilities Services includes the cost of leasing research laboratories and facilities, minor construction, maintenance and related services; custodial services; facility operations; and range operations at the John F. Kennedy Space Center, NASA.

SUM 1

5. Technical Services includes the cost of certain engineering services, the dissemination of scientific and technical information derived from the technology utilization program, and education programs.
6. Administrative Support includes the cost of communications, administrative printing, administrative supplies, materials, equipment, transportation support, and other support services.

Installations are under the management direction of the Associate Administrator having primary responsibility for the research and development programs conducted at the installation. The Associate Administrator for Manned Space Flight is responsible for the Kennedy Space Center, Manned Spacecraft Center, and Marshall Space Flight Center; the Associate Administrator for Space Science and Applications is responsible for the Goddard Space Flight Center and Wallops Station; and the Associate Administrator for Advanced Research and Technology is responsible for the Ames Research Center, Electronics Research Center, Flight Research Center, Langley Research Center, Lewis Research Center, and the Space Nuclear Propulsion Office. The Associate Administrator for Organization and Management is the institutional director for NASA Headquarters.

1969 OPERATING PLAN

The budget request for 1969 for this appropriation was \$648.2 million. By floor action the authorization and appropriation were reduced to \$603.2 million. The effects of operating at this level and various alternative levels were assessed and it was concluded that after all possible reductions had been taken, it would be necessary at the \$603.2 million level to reduce planned employment in permanent positions by 4,900 positions. A reduction of this magnitude would have such disruptive effects on NASA that the successful and effective execution of the programs approved by Congress would have been impossible. It was concluded that the minimum operating level should not be less than \$623.3 million. This required a reduction of planned employment in permanent positions by 1,661 positions, which was considered to be the maximum reduction that could be taken and still provide a minimum employment level for support of the research and development programs. In addition to the reductions in personnel, it was necessary to reduce all other costs funded by the appropriation by over 10%.

After the reprogramming of \$20.1 million to sustain a minimum operating level, two major adjustments were necessary to provide for actions not provided for in the budget request. The first was for the second increment of the Federal Salary Act of 1967, effective in July 1968. The estimate for this increase was contained in a government-wide estimate in the President's budget, but not included in agency budgets. The cost of this increase, \$23.7 million, was provided by the Bureau of the Budget by transferring funds withheld from the Research and Development appropriation. The second major adjustment resulted from the decision to convert certain support service contractor functions at Goddard Space Flight Center to civil service operations. The largest number of these contracts had been financed in

Research and Development. Consequently, \$1.5 million was transferred from Research and Development to this appropriation to fund 559 civil service positions during the latter portion of the year. The following table summarizes the development of the 1969 operating plan:

| | |
|---|----------------------|
| Authorization amount..... | \$603,173,000 |
| Increase to minimum operating level... | <u>+20,108,000</u> |
| Subtotal..... | \$623,281,000 |
| General salary increase..... | +23,719,000 |
| Conversion of support service contract functions..... | <u>+1,541,000</u> |
| Subtotal..... | \$648,541,000 |
| Transfer to GSA..... | <u>-280,000</u> |
| Planned FY 1969 program level..... | <u>\$648,261,000</u> |

1969 MANPOWER PROGRAM

In the 1969 budget, NASA provided for an employment level of 32,727 civil service employees in permanent positions for 1969. Subsequent to the submission of the budget it was determined that plans for a reduction in force at Marshall Space Flight Center could not be consummated as planned and the Bureau of the Budget approved an increase of 120 positions to a new level of 32,847. Early in May 1968, as it became increasingly apparent that the FY 1969 operating budget would be significantly below our request, action was taken to restrict employment prior to the end of FY 1968 in order to avoid large and disruptive reductions in personnel after the beginning of the 1969 fiscal year.

During June 1968, the NASA management determined that the minimum adequate staffing level was 31,186 positions, a reduction of 1,661 from the plan. Action was continued to reduce strength through attrition to avoid or reduce the requirement for later involuntary separations.

The only modification to the year end plan has been the establishment of 559 civil service positions to perform certain functions which had been accomplished with support service contracts at the Goddard Space Flight Center. In the 1969 budget, 155 positions were authorized for that center to replace contractor operations which the Civil Service Commission determined to be improper. During 1969, NASA continued its comprehensive study of support service contracts at Goddard and determined, on the basis of these reviews that certain additional support service contracts were sufficiently similar to those previously criticized by the Civil Service Commission to require civil service performance in lieu of the contractor operations. With the approval of the Bureau of the Budget, 810 civil service positions will be established to replace the contract support, 559 in 1969 and 251 in 1970. The conversion in 1969 results in the year end estimate of 31,745 positions for 1969.

1970 BUDGET ESTIMATE

The 1970 budget estimate is based on a continuation of the operating level established in 1969. With the exception of personnel, all functional categories will be funded slightly below the 1969 level. The increase in personnel is related to the full year's cost to this appropriation of the contract conversion at Goddard Space Flight Center, which will require an increase of \$5.8 million over the cost in 1969. This increase is offset by a corresponding decrease in the Research and Development appropriation, where the contract services were funded in 1969.

The cost of the third and final increment of the Federal Salary Act of 1967, to be effective in July 1969, is not included in this budget. The government-wide estimate for this increase is included in the President's budget.

1970 MANPOWER PROGRAM

NASA plans a year end complement of 31,600 in 1970, a net decrease of 145 from 1969. It is planned to abolish 452 positions throughout the agency. The reduction is offset by increases of 251 at Goddard Space Flight Center to complete the conversion of support service contract functions to civil service operations, and 56 at the Electronics Research Center to provide for minimum adequate staffing.

DISTRIBUTION BY FUNCTIONAL CATEGORY

The following summary table indicates the distribution of the total appropriation requirements:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--------------------------------|----------------------|----------------------|----------------------|
| Personnel related costs..... | \$432,294,000 | \$463,722,000 | \$469,550,000 |
| Travel..... | 15,095,000 | 14,625,000 | 14,600,000 |
| Automatic data processing..... | 32,045,000 | 24,636,000 | 23,829,000 |
| Facilities services..... | 94,297,000 | 85,896,000 | 84,954,000 |
| Technical services..... | 20,505,000 | 17,398,000 | 16,860,000 |
| Administrative support..... | <u>45,057,000</u> | <u>41,984,000</u> | <u>41,107,000</u> |
| Total..... | <u>\$639,293,000</u> | <u>\$648,261,000</u> | <u>\$650,900,000</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1970 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

SUMMARY OF OBLIGATIONS BY INSTALLATION

| | <u>Fiscal Year 1968</u> | <u>Fiscal Year 1969</u> | <u>Fiscal Year 1970</u> |
|--|-----------------------------|-----------------------------|-----------------------------|
| <u>MANNED SPACE FLIGHT</u> | <u>\$315,098,000</u> | <u>\$312,028,000</u> | <u>\$307,450,000</u> |
| John F. Kennedy Space Center, NASA..... | 93,131,000 | 97,669,000 | 97,501,000 |
| Manned Spacecraft Center..... | 95,737,000 | 97,998,000 | 97,748,000 |
| Marshall Space Flight Center.... | 126,230,000 | 116,361,000 | 112,201,000 |
| <u>SPACE SCIENCE AND APPLICATIONS</u> | <u>\$77,073,000</u> | <u>\$82,510,000</u> | <u>\$88,053,000</u> |
| Goddard Space Flight Center..... | 68,305,000 | 73,490,000 | 79,024,000 |
| Wallops Station..... | 8,768,000 | 9,020,000 | 9,029,000 |
| <u>ADVANCED RESEARCH AND TECHNOLOGY</u> .. | <u>\$189,059,000</u> | <u>\$193,924,000</u> | <u>\$195,600,000</u> |
| Ames Research Center..... | 33,781,000 | 34,036,000 | 34,050,000 |
| Electronics Research Center..... | 15,352,000 | 17,237,000 | 18,566,000 |
| Flight Research Center..... | 9,469,000 | 9,680,000 | 9,615,000 |
| Langley Research Center..... | 62,213,000 | 62,947,000 | 63,308,000 |
| Lewis Research Center..... | 66,222,000 | 67,845,000 | 68,061,000 |
| Space Nuclear Propulsion Office..... | 2,022,000 | 2,179,000 | 2,000,000 |
| <u>SUPPORTING OPERATIONS</u> | | | |
| NASA Headquarters..... | <u>\$58,063,000</u> | <u>\$59,799,000</u> | <u>\$59,797,000</u> |
| TOTAL..... | <u>\$639,293,000</u> | <u>\$648,261,000</u> | <u>\$650,900,000</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1970 ESTIMATES

NUMBER OF PERSONNEL POSITIONS

| | <u>Fiscal Year 1968</u> | <u>Fiscal Year 1969</u> | <u>Fiscal Year 1970</u> |
|--|-----------------------------|-----------------------------|-----------------------------|
| <u>MANNED SPACE FLIGHT.....</u> | <u>13,961</u> | <u>13,285</u> | <u>13,035</u> |
| John F. Kennedy Space Center, NASA..... | 2,917 | 2,921 | 2,881 |
| Manned Spacecraft Center..... | 4,604 | 4,383 | 4,303 |
| Marshall Space Flight Center.... | 6,440 | 5,981 | 5,851 |
| <u>SPACE SCIENCE AND APPLICATIONS....</u> | <u>4,316</u> | <u>4,731</u> | <u>4,900</u> |
| Goddard Space Flight Center..... | 3,822 | 4,243 | 4,412 |
| Wallops Station..... | 494 | 488 | 488 |
| <u>ADVANCED RESEARCH AND TECHNOLOGY..</u> | <u>12,040</u> | <u>11,577</u> | <u>11,533</u> |
| Ames Research Center..... | 2,083 | 1,974 | 1,956 |
| Electronics Research Center..... | 794 | 844 | 900 |
| Flight Research Center..... | 566 | 539 | 534 |
| Langley Research Center..... | 4,037 | 3,885 | 3,849 |
| Lewis Research Center..... | 4,452 | 4,235 | 4,195 |
| Space Nuclear Propulsion Office. | 108 | 100 | 99 |
| <u>SUPPORTING OPERATIONS</u> | | | |
| NASA Headquarters..... | <u>2,154</u> | <u>2,152</u> | <u>2,132</u> |
| <u>TOTAL PERMANENT POSITIONS.....</u> | <u>32,471</u> | <u>31,745</u> | <u>31,600</u> |
| <u>POSITIONS OTHER THAN</u> <u>PERMANENT.....</u> | <u>2,170</u> | <u>2,193</u> | <u>2,193</u> |
| <u>TOTAL POSITIONS.....</u> | <u>34,641</u> | <u>33,938</u> | <u>33,793</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 1970 ESTIMATES
RESEARCH AND PROGRAM MANAGEMENT
DISTRIBUTION OF OBLIGATIONS BY FUNCTION
BY INSTALLATION
(Thousands of dollars)

| <u>FUNCTION</u> | <u>Total NASA</u> | <u>Subtotal OMSF</u> | <u>J. F. Kennedy Space Center, NASA</u> | <u>Manned Spacecraft Center</u> | <u>Marshall Space Flight Center</u> | <u>Subtotal OSSA</u> | <u>Goddard Space Flight Center</u> | <u>Wallops Station</u> | <u>Subtotal OART</u> | <u>Ames Research Center</u> | <u>Electronics Research Center</u> | <u>Flight Research Center</u> | <u>Langley Research Center</u> | <u>Lewis Research Center</u> | <u>Space Nuclear Propulsion Office</u> | <u>Headquarters</u> |
|----------------------------------|-------------------|----------------------|---|---------------------------------|-------------------------------------|----------------------|------------------------------------|------------------------|----------------------|-----------------------------|------------------------------------|-------------------------------|--------------------------------|------------------------------|--|---------------------|
| <u>Personnel</u> | | | | | | | | | | | | | | | | |
| 1968 | \$432,294 | \$191,209 | \$37,248 | \$63,669 | \$90,292 | \$55,328 | \$50,160 | \$5,168 | \$149,608 | \$26,872 | \$10,118 | \$7,228 | \$48,694 | \$54,851 | \$1,845 | \$36,149 |
| 1969 | 463,722 | 202,840 | 43,297 | 68,938 | 90,605 | 62,664 | 57,043 | 5,621 | 160,040 | 28,426 | 11,944 | 7,589 | 51,613 | 58,579 | 1,889 | 38,178 |
| 1970 | 469,550 | 201,806 | 44,296 | 70,025 | 87,485 | 68,163 | 62,513 | 5,650 | 161,557 | 28,358 | 12,843 | 7,583 | 51,974 | 58,984 | 1,815 | 38,024 |
| <u>Travel</u> | | | | | | | | | | | | | | | | |
| 1968 | 15,095 | 7,340 | 661 | 3,929 | 2,750 | 2,045 | 1,919 | 126 | 3,474 | 731 | 308 | 184 | 1,130 | 954 | 167 | 2,236 |
| 1969 | 14,625 | 6,869 | 771 | 3,923 | 2,175 | 1,771 | 1,639 | 132 | 3,360 | 630 | 318 | 189 | 1,132 | 896 | 195 | 2,625 |
| 1970 | 14,600 | 6,530 | 679 | 3,773 | 2,078 | 2,054 | 1,918 | 136 | 3,391 | 630 | 351 | 197 | 1,132 | 896 | 185 | 2,625 |
| <u>Automatic Data Processing</u> | | | | | | | | | | | | | | | | |
| 1968 | 32,045 | 17,506 | 1,214 | 6,243 | 10,049 | 6,011 | 5,951 | 60 | 7,177 | 1,634 | 1,382 | 92 | 3,541 | 528 | --- | 1,351 |
| 1969 | 24,636 | 14,151 | 1,045 | 6,059 | 7,047 | 5,490 | 5,426 | 64 | 3,693 | 994 | 1,329 | 85 | 950 | 335 | --- | 1,302 |
| 1970 | 23,829 | 13,685 | 914 | 5,975 | 6,796 | 5,452 | 5,385 | 67 | 3,315 | 583 | 1,225 | 85 | 1,145 | 277 | --- | 1,377 |
| <u>Facilities Services</u> | | | | | | | | | | | | | | | | |
| 1968 | 94,297 | 64,989 | 42,291 | 11,609 | 11,089 | 8,106 | 5,707 | 2,399 | 20,415 | 3,425 | 1,668 | 1,109 | 6,373 | 7,840 | --- | 787 |
| 1969 | 85,896 | 58,989 | 41,376 | 9,307 | 8,306 | 7,493 | 5,193 | 2,300 | 18,756 | 2,997 | 1,786 | 1,099 | 6,749 | 6,125 | --- | 658 |
| 1970 | 84,954 | 57,368 | 40,722 | 8,693 | 7,953 | 7,422 | 5,141 | 2,281 | 19,496 | 3,458 | 2,375 | 1,056 | 6,554 | 6,053 | --- | 668 |
| <u>Technical Services</u> | | | | | | | | | | | | | | | | |
| 1968 | 20,505 | 5,216 | --- | 2,090 | 3,126 | 872 | 826 | 46 | 2,028 | 109 | 1,038 | 29 | 145 | 697 | 10 | 12,389 |
| 1969 | 17,398 | 3,057 | --- | 1,850 | 1,207 | 823 | 753 | 70 | 1,937 | 84 | 933 | 42 | 138 | 645 | 95 | 11,581 |
| 1970 | 16,860 | 2,828 | --- | 1,668 | 1,160 | 737 | 675 | 62 | 1,752 | 84 | 823 | 42 | 138 | 665 | --- | 11,543 |
| <u>Administrative Support</u> | | | | | | | | | | | | | | | | |
| 1968 | 45,057 | 28,838 | 11,717 | 8,197 | 8,924 | 4,711 | 3,742 | 969 | 6,357 | 1,010 | 838 | 827 | 2,330 | 1,352 | --- | 5,151 |
| 1969 | 41,984 | 26,122 | 11,180 | 7,921 | 7,021 | 4,269 | 3,436 | 833 | 6,138 | 905 | 927 | 676 | 2,365 | 1,265 | --- | 5,455 |
| 1970 | 41,107 | 25,233 | 10,890 | 7,614 | 6,729 | 4,225 | 3,392 | 833 | 6,089 | 937 | 949 | 652 | 2,365 | 1,186 | --- | 5,560 |
| <u>Total</u> | | | | | | | | | | | | | | | | |
| 1968 | 639,293 | 315,098 | 93,131 | 95,737 | 126,230 | 77,073 | 68,305 | 6,768 | 189,655 | 33,781 | 15,352 | 9,469 | 62,212 | 66,222 | 2,022 | 58,063 |
| 1969 | 648,261 | 312,028 | 97,669 | 97,998 | 116,361 | 82,510 | 73,490 | 9,020 | 193,924 | 34,036 | 17,237 | 9,680 | 62,947 | 67,845 | 2,179 | 59,799 |
| 1970 | 650,900 | 307,450 | 97,501 | 97,748 | 112,201 | 88,053 | 79,024 | 9,029 | 195,600 | 34,050 | 18,566 | 9,615 | 63,308 | 68,061 | 2,000 | 59,797 |

SUM 7

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 FISCAL YEAR 1970 ESTIMATES
 RESEARCH AND PROGRAM MANAGEMENT
 DISTRIBUTION OF OBLIGATIONS BY OBJECT CLASSIFICATION
 BY FUNCTION
 (Thousands of Dollars)

| Object Classification | Total NASA | Personnel | Travel | Automatic Data Processing | Facilities Services | Technical Services | Administrative Support |
|--------------------------------------|------------------|------------------|-----------------|---------------------------|---------------------|--------------------|------------------------|
| <u>Fiscal Year 1968</u> | | | | | | | |
| Personnel compensation | \$396,536 | \$396,536 | --- | --- | --- | --- | --- |
| Personnel benefits | 30,382 | 30,382 | --- | --- | --- | --- | --- |
| Benefits for former personnel | 336 | 336 | --- | --- | --- | --- | --- |
| Travel & transp. of persons | 16,803 | 202 | \$15,095 | --- | --- | --- | \$1,506 |
| Transportation of things | 4,090 | 635 | --- | --- | --- | \$123 | 3,332 |
| Rents, communications, and utilities | 48,683 | --- | --- | \$17,138 | \$18,270 | --- | 13,275 |
| Printing and reproduction | 7,286 | --- | --- | --- | --- | 728 | 6,558 |
| Other services | 107,204 | 2,203 | --- | 12,196 | 63,513 | 18,396 | 10,896 |
| Supplies and materials | 17,214 | --- | --- | --- | 8,402 | 530 | 8,282 |
| Equipment | 5,825 | --- | --- | 2,711 | 2,283 | 728 | 1,103 |
| Lands and structures | 1,829 | --- | --- | --- | 1,829 | --- | --- |
| Grants, subsidies & contributions | 82 | --- | --- | --- | --- | --- | 82 |
| Insurance claims and indemnities | 23 | --- | --- | --- | --- | --- | 23 |
| Totals | \$633,293 | \$632,294 | \$15,095 | \$32,045 | \$94,297 | \$20,505 | \$45,057 |
| <u>Fiscal Year 1969</u> | | | | | | | |
| Personnel compensation | \$428,060 | \$428,060 | --- | --- | --- | --- | --- |
| Personnel benefits | 32,477 | 32,477 | --- | --- | --- | --- | --- |
| Benefits for former personnel | 283 | 283 | --- | --- | --- | --- | --- |
| Travel & transp. of persons | 16,356 | 241 | \$14,625 | --- | --- | --- | \$1,490 |
| Transportation of things | 4,023 | 505 | --- | --- | --- | \$143 | 3,375 |
| Rents, communications, and utilities | 47,324 | --- | --- | \$14,109 | \$18,174 | --- | 15,041 |
| Printing and reproduction | 6,342 | --- | --- | --- | --- | 769 | 5,573 |
| Other services | 52,812 | 2,156 | --- | 10,466 | 56,383 | 15,507 | 8,300 |
| Supplies and materials | 15,960 | --- | --- | --- | 8,290 | 406 | 7,264 |
| Equipment | 3,380 | --- | --- | 61 | 1,925 | 573 | 821 |
| Lands and structures | 1,124 | --- | --- | --- | 1,124 | --- | --- |
| Grants, subsidies & contributions | 83 | --- | --- | --- | --- | --- | 83 |
| Insurance claims and indemnities | 37 | --- | --- | --- | --- | --- | 37 |
| Totals | \$648,261 | \$663,722 | \$14,625 | \$24,636 | \$85,896 | \$17,398 | \$41,984 |
| <u>Fiscal Year 1970</u> | | | | | | | |
| Personnel compensation | \$433,723 | \$433,723 | --- | --- | --- | --- | --- |
| Personnel benefits | 32,951 | 32,951 | --- | --- | --- | --- | --- |
| Benefits for former personnel | --- | --- | --- | --- | --- | --- | --- |
| Travel & transp. of persons | 16,339 | 232 | \$14,600 | --- | --- | --- | \$1,507 |
| Transportation of things | 3,987 | 504 | --- | --- | --- | \$143 | 3,340 |
| Rents, communications, and utilities | 46,963 | --- | --- | \$13,536 | \$18,293 | --- | 15,134 |
| Printing and reproduction | 6,342 | --- | --- | --- | --- | 773 | 5,569 |
| Other services | 90,697 | 2,140 | --- | 10,278 | 55,604 | 14,975 | 7,700 |
| Supplies and materials | 15,768 | --- | --- | --- | 8,321 | 422 | 7,025 |
| Equipment | 2,849 | --- | --- | 15 | 1,583 | 547 | 704 |
| Lands and structures | 1,153 | --- | --- | --- | 1,153 | --- | --- |
| Grants, subsidies, & contributions | 92 | --- | --- | --- | --- | --- | 92 |
| Insurance claims and indemnities | 36 | --- | --- | --- | --- | --- | 36 |
| Totals | \$650,900 | \$669,550 | \$14,600 | \$23,829 | \$84,954 | \$16,640 | \$41,107 |

SUM 8

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 FISCAL YEAR 1970 ESTIMATES
 RESEARCH AND PROGRAM MANAGEMENT
 DISTRIBUTION OF OBLIGATIONS BY OBJECT CLASSIFICATION
 BY INSTALLATION
 (Thousands of dollars)

| Object Classification | Total NASA | Subtotal OHSF | J. P. Kennedy Space Center, NASA | Manned Spacecraft Center | Marshall Space Flight Center | Subtotal OSSA | Goddard Space Flight Center | Wallops Station | Subtotal OARI | Ames Research Center | Electronics Research Center | Flight Research Center | Langley Research Center | Lewis Research Center | Space Nuclear Propulsion Office | HDOTRS. |
|--------------------------------------|----------------|----------------|----------------------------------|--------------------------|------------------------------|---------------|-----------------------------|-----------------|----------------|----------------------|-----------------------------|------------------------|-------------------------|-----------------------|---------------------------------|---------------|
| FISCAL YEAR 1968 | | | | | | | | | | | | | | | | |
| Personnel compensation | 398,536 | 176,401 | 34,300 | 58,839 | 83,262 | 51,123 | 46,374 | 4,749 | 138,293 | 24,852 | 9,269 | 6,677 | 45,019 | 50,828 | 1,648 | 32,719 |
| Personnel benefits | 30,382 | 13,297 | 2,625 | 4,344 | 6,328 | 3,801 | 3,436 | 365 | 10,526 | 1,890 | 695 | 498 | 3,437 | 3,823 | 183 | 2,758 |
| Benefits for former personnel | 336 | 176 | --- | 8 | 168 | --- | --- | --- | 29 | --- | --- | --- | --- | 29 | --- | 131 |
| Travel & transportation of persons | 16,803 | 8,877 | 1,815 | 4,172 | 2,890 | 2,137 | 1,944 | 193 | 3,526 | 753 | 319 | 186 | 1,137 | 961 | 170 | 2,263 |
| Transportation of things | 4,090 | 2,008 | 1,473 | 436 | 99 | 1,274 | 1,148 | 126 | 533 | 43 | 49 | 15 | 260 | 156 | 10 | 275 |
| Rents, communications, and utilities | 48,683 | 23,912 | 7,668 | 8,214 | 8,030 | 8,314 | 7,918 | 396 | 13,950 | 3,846 | 1,795 | 237 | 4,321 | 3,751 | --- | 2,507 |
| Printing and reproduction | 7,286 | 5,125 | 3,808 | 604 | 713 | 177 | 121 | 56 | 358 | 15 | 95 | 15 | 122 | 111 | --- | 1,626 |
| Other services | 107,204 | 73,492 | 35,508 | 16,163 | 21,821 | 6,174 | 4,903 | 1,271 | 13,007 | 1,610 | 2,112 | 1,325 | 3,887 | 4,062 | 11 | 14,531 |
| Supplies and materials | 17,214 | 3,118 | 4,715 | 1,858 | 2,545 | 2,170 | 1,069 | 1,101 | 5,345 | 531 | 455 | 298 | 2,178 | 1,883 | --- | 581 |
| Equipment | 6,825 | 1,926 | 940 | 807 | 179 | 1,196 | 772 | 424 | 3,056 | 149 | 563 | 154 | 1,585 | 605 | --- | 647 |
| Lands and structures | 1,829 | 753 | 268 | 291 | 194 | 707 | 620 | 87 | 369 | 31 | --- | 63 | 263 | 12 | --- | --- |
| Grants, subsidies & contributions | 82 | --- | --- | --- | --- | --- | --- | --- | 61 | 61 | --- | --- | --- | --- | --- | 21 |
| Insurance claims and indemnities | 23 | 13 | 11 | 1 | 1 | --- | --- | --- | 6 | --- | --- | 1 | 4 | 1 | --- | 4 |
| Totals | 639,293 | 315,098 | 93,131 | 95,737 | 126,230 | 77,073 | 68,305 | 8,768 | 189,059 | 33,781 | 15,352 | 9,469 | 62,213 | 66,222 | 2,022 | 58,063 |
| FISCAL YEAR 1969 | | | | | | | | | | | | | | | | |
| Personnel compensation | 428,060 | 187,385 | 39,909 | 63,913 | 83,563 | 57,949 | 52,778 | 5,171 | 148,159 | 26,404 | 11,012 | 7,014 | 47,740 | 54,313 | 1,676 | 34,567 |
| Personnel benefits | 32,477 | 14,031 | 2,991 | 4,632 | 6,408 | 4,334 | 3,929 | 405 | 11,269 | 1,991 | 820 | 531 | 3,634 | 4,094 | 199 | 2,843 |
| Benefits for former personnel | 283 | 149 | --- | --- | 149 | --- | --- | --- | 30 | --- | --- | --- | --- | 30 | --- | 104 |
| Travel & transportation of persons | 16,356 | 3,409 | 1,988 | 4,165 | 2,256 | 1,870 | 1,659 | 211 | 3,409 | 654 | 325 | 192 | 1,140 | 902 | 196 | 2,668 |
| Transportation of things | 4,023 | 2,102 | 1,660 | 356 | 86 | 1,127 | 1,000 | 127 | 512 | 30 | 46 | 30 | 250 | 144 | 12 | 282 |
| Rents, communications, and utilities | 47,324 | 24,253 | 8,004 | 8,695 | 7,554 | 8,472 | 8,028 | 444 | 11,602 | 3,466 | 2,185 | 236 | 2,715 | 3,000 | --- | 2,997 |
| Printing and reproduction | 6,342 | 4,360 | 3,035 | 600 | 725 | 184 | 128 | 56 | 331 | 9 | 66 | 16 | 125 | 115 | --- | 1,467 |
| Other services | 92,812 | 60,642 | 34,294 | 13,335 | 13,013 | 5,815 | 4,573 | 1,242 | 12,537 | 892 | 2,198 | 1,210 | 4,625 | 3,516 | 96 | 13,818 |
| Supplies and materials | 15,960 | 3,805 | 4,632 | 1,837 | 2,336 | 2,000 | 1,000 | 1,000 | 4,646 | 455 | 366 | 250 | 2,175 | 1,400 | --- | 509 |
| Equipment | 3,380 | 1,430 | 897 | 363 | 170 | 442 | 179 | 263 | 996 | 74 | 219 | 125 | 278 | 300 | --- | 512 |
| Lands and structures | 1,124 | 443 | 243 | 100 | 100 | 316 | 216 | 100 | 365 | --- | --- | 75 | 260 | 30 | --- | --- |
| Grants, subsidies & contributions | 83 | --- | --- | --- | --- | --- | --- | --- | 61 | 61 | --- | --- | --- | --- | --- | 22 |
| Insurance claims and indemnities | 37 | 19 | 16 | 2 | 1 | 1 | --- | 1 | 7 | --- | --- | 1 | 5 | 1 | --- | 10 |
| Totals | 648,261 | 312,028 | 97,669 | 97,998 | 116,361 | 82,510 | 73,490 | 9,020 | 193,924 | 34,036 | 17,237 | 9,680 | 62,947 | 67,845 | 2,179 | 59,799 |
| FISCAL YEAR 1970 | | | | | | | | | | | | | | | | |
| Personnel compensation | 433,723 | 186,676 | 40,903 | 64,900 | 80,873 | 63,069 | 57,869 | 5,200 | 149,535 | 26,333 | 11,805 | 7,012 | 48,062 | 54,694 | 1,629 | 34,443 |
| Personnel benefits | 32,951 | 13,876 | 3,015 | 4,694 | 6,167 | 4,714 | 4,309 | 405 | 11,418 | 1,994 | 890 | 527 | 3,673 | 4,151 | 183 | 2,943 |
| Benefits for former personnel | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Travel & transportation of persons | 16,339 | 3,066 | 1,880 | 4,015 | 2,171 | 2,162 | 1,938 | 224 | 3,443 | 654 | 362 | 200 | 1,140 | 902 | 185 | 2,668 |
| Transportation of things | 3,987 | 2,091 | 1,655 | 356 | 80 | 1,141 | 1,014 | 127 | 472 | 30 | 55 | 30 | 219 | 135 | 3 | 283 |
| Rents, communications, and utilities | 46,963 | 24,141 | 7,785 | 8,930 | 7,426 | 8,456 | 8,012 | 444 | 11,315 | 3,267 | 2,086 | 236 | 2,746 | 2,980 | --- | 3,051 |
| Printing and reproduction | 6,342 | 4,354 | 3,029 | 600 | 725 | 184 | 128 | 56 | 357 | 9 | 92 | 16 | 125 | 115 | --- | 1,447 |
| Other services | 90,697 | 53,155 | 33,768 | 12,179 | 12,208 | 5,543 | 4,301 | 1,242 | 13,163 | 1,200 | 2,692 | 1,093 | 4,625 | 3,553 | --- | 13,836 |
| Supplies and materials | 15,768 | 3,699 | 4,577 | 1,822 | 2,300 | 2,059 | 1,059 | 1,000 | 4,501 | 455 | 396 | 275 | 2,175 | 1,200 | --- | 509 |
| Equipment | 2,849 | 915 | 615 | 150 | 150 | 395 | 189 | 206 | 994 | 78 | 188 | 150 | 278 | 300 | --- | 545 |
| Lands and structures | 1,153 | 459 | 259 | 100 | 100 | 329 | 205 | 124 | 365 | --- | --- | 75 | 260 | 30 | --- | --- |
| Grants, subsidies & contributions | 92 | --- | --- | --- | --- | --- | --- | --- | 30 | 30 | --- | --- | --- | --- | --- | 62 |
| Insurance claims and indemnities | 36 | 18 | 15 | 2 | 1 | 1 | --- | 1 | 7 | --- | --- | 1 | 5 | 1 | --- | 10 |
| Totals | 650,900 | 307,450 | 97,501 | 97,748 | 112,201 | 88,053 | 79,024 | 9,029 | 195,600 | 34,050 | 18,566 | 9,615 | 63,308 | 68,061 | 2,000 | 59,797 |

SUM 9

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1970 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

ANALYSIS OF REQUIREMENTS FOR PASSENGER-CARRYING MOTOR VEHICLES

The appropriation language provides for the acquisition of thirty-five passenger motor vehicles, for replacement purposes only. All vehicles for replacement will meet the criteria established by the General Services Administration for replacement of vehicles due to age or mileage, or both of these factors.

A summary analysis of inventory transactions by type of vehicle in FY 1970 is as follows:

| | <u>Total</u> | <u>Medium Sedans</u> | <u>Other Sedans</u> | <u>Station Wagons</u> | <u>Ambulances</u> | <u>Buses</u> |
|--|--------------|----------------------|---------------------|-----------------------|-------------------|--------------|
| Planned fleet, July 1, 1969 | 186 | 1 | 48 | 107 | 13 | 17 |
| Number to be purchased in FY 1970..... | 35 | - | 16 | 18 | - | 1 |
| Number of disposals planned: | -35 | - | -12* | -22 | - | -1 |
| To be replaced by identical vehicle type..... | (31) | (-) | (12) | (18) | (-) | (1) |
| To be replaced by another vehicle type..... | <u>(4)</u> | <u>(-)</u> | <u>(-)</u> | <u>(4)*</u> | <u>(-)</u> | <u>(-)</u> |
| Planned fleet, June 30, 1970..... | <u>186</u> | <u>1</u> | <u>52</u> | <u>103</u> | <u>13</u> | <u>17</u> |

* Four station wagon disposals will be replaced with "Other Sedans."

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|----------------|---------------|---------------|---------------|---------------------------|
| Personnel..... | \$432,294,000 | \$463,722,000 | \$469,550,000 | +\$5,828,000 |

DESCRIPTION:

The estimate for personnel and related costs includes the regular pay, overtime, holiday, Sunday and nightwork differential pay of NASA personnel in permanent, temporary, part-time and intermittent positions, and the cost of military personnel and personnel of other agencies detailed to NASA. It also includes the Government's contribution to the Civil Service Retirement Fund for permanent employees, the contribution to social security for other than permanent employees, the Government's share of the cost of employees' life insurance and health benefits, incentive awards and the cost of severance pay. The estimate provides for the cost of travel to initial duty station, and travel and shipment of household goods for transferred employees. Reimbursement to the Civil Service Commission for security investigations and payments to other agencies and nongovernment institutions for personnel training are also included in this activity.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|----------------------|----------------------|----------------------|
| Kennedy Space Center..... | \$37,248,000 | \$43,297,000 | \$44,296,000 |
| Manned Spacecraft Center..... | 63,669,000 | 68,938,000 | 70,025,000 |
| Marshall Space Flight Center.. | 90,292,000 | 90,605,000 | 87,485,000 |
| Goddard Space Flight Center... | 50,160,000 | 57,043,000 | 62,513,000 |
| Wallops Station..... | 5,168,000 | 5,621,000 | 5,650,000 |
| Ames Research Center..... | 26,872,000 | 28,426,000 | 28,358,000 |
| Electronics Research Center... | 10,118,000 | 11,944,000 | 12,843,000 |
| Flight Research Center..... | 7,228,000 | 7,589,000 | 7,583,000 |
| Langley Research Center..... | 48,694,000 | 51,613,000 | 51,974,000 |
| Lewis Research Center..... | 54,851,000 | 58,579,000 | 58,984,000 |
| Space Nuclear Propulsion Office..... | 1,845,000 | 1,889,000 | 1,815,000 |
| NASA Headquarters..... | <u>36,149,000</u> | <u>38,178,000</u> | <u>38,024,000</u> |
| Total..... | <u>\$432,294,000</u> | <u>\$463,722,000</u> | <u>\$469,550,000</u> |

BASIS OF FUND REQUIREMENTS:

The planned end of year employment for NASA civil service personnel includes 31,745 permanent employees in 1969 and 31,600 permanent employees in 1970 for a reduction of 145. The plan for nonpermanent employees is 2,193 in both 1969 and 1970. The total complement, therefore, is 33,938 positions in 1969 and 33,793 positions in 1970. The distribution of the permanent positions by installation is as follows:

DISTRIBUTION OF POSITIONS BY INSTALLATION

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|---------------|---------------|---------------|---------------------------|
| <u>Permanent Positions</u> | | | | |
| Kennedy Space Center..... | 2,917 | 2,921 | 2,881 | -40 |
| Manned Spacecraft Center..... | 4,604 | 4,383 | 4,303 | -80 |
| Marshall Space Flight Center... | 6,440 | 5,981 | 5,851 | -130 |
| Goddard Space Flight Center.... | 3,822 | 4,243 | 4,412 | +169 |
| Wallops Station..... | 494 | 488 | 488 | --- |
| Ames Research Center..... | 2,083 | 1,974 | 1,956 | -18 |
| Electronics Research Center.... | 794 | 844 | 900 | +56 |
| Flight Research Center..... | 566 | 539 | 534 | -5 |
| Langley Research Center..... | 4,037 | 3,885 | 3,849 | -36 |
| Lewis Research Center..... | 4,452 | 4,235 | 4,195 | -40 |
| Space Nuclear Propulsion Office..... | 108 | 100 | 99 | -1 |
| Headquarters..... | <u>2,154</u> | <u>2,152</u> | <u>2,132</u> | <u>-20</u> |
| Subtotal..... | 32,471 | 31,745 | 31,600 | -145 |
| <u>Nonpermanent Positions</u> | <u>2,170</u> | <u>2,193</u> | <u>2,193</u> | <u>---</u> |
| Total..... | <u>34,641</u> | <u>33,938</u> | <u>33,793</u> | <u>-145</u> |

The number of permanent positions requested in the 1969 budget was 32,727. This was increased by the Bureau of the Budget to 32,847 subsequent to submission of the budget. Because of reductions in the budget, the initial operating plan was established at 31,186, a reduction of 1,661 positions from the budget request as adjusted. As a result of studies conducted at the Goddard Space Flight Center over a period of approximately one year, it was determined to convert certain functions performed by support service contractors to civil service operations, requiring the establishment of 810 civil service positions over a two year period. The 1969 increment of 559 positions increased the plan for permanent positions from 31,186 to 31,745.

The establishment of the operating level of 31,186 positions required a reduction of approximately 5% in the planned employment. The reductions were distributed by installation in such a manner that would provide the best possible support to approved programs within the reduced agency employment level. In view of the heavy Apollo launch schedule at Kennedy Space Center, the employment was maintained at about the planned level. On the other hand, the planned increase at the Electronics Research Center was reduced with an employment level nearly 13% below the plan. The largest reduction was at Marshall Space Flight Center, where 525 positions (8.1%) were reduced from the plan. Reductions in other major installations ranged between 2.6% and 5.6%.

The following table summarizes the changes for 1969 permanent position allocations by Institutional Director from the 1969 budget to the current plan.

CHANGES IN THE 1969 PERMANENT POSITION PLAN

| <u>Institutional Director</u> | <u>Plan in 1969 Budget</u> | <u>Adjustment Approved by BOB</u> | <u>Reductions from Budget Request</u> | <u>Support Contractors Conversion</u> | <u>1969 Plan in 1970 Budget</u> |
|-------------------------------------|----------------------------|-----------------------------------|---------------------------------------|---------------------------------------|---------------------------------|
| Manned Space Flight | 13,896 | +120 | -731 | --- | 13,285 |
| Space Science and Applications..... | 4,338 | --- | -166 | +559 | 4,731 |
| Advanced Research and Technology... | 12,214 | --- | -637 | --- | 11,577 |
| NASA Headquarters.. | <u>2,279</u> | <u>---</u> | <u>-127</u> | <u>---</u> | <u>2,152</u> |
| Total..... | <u>32,727</u> | <u>+120</u> | <u>-1,661</u> | <u>+559</u> | <u>31,745</u> |

Permanent Positions

NASA is planning 31,600 permanent positions in 1970, a net reduction of 145 positions from 1969. The final increment of 251 positions for conversion of support service contract functions to civil service operations at the Goddard Space Flight Center is included in this budget. The Goddard increase is partially offset by plans to abolish 82 existing positions, for a net increase of 169 positions. The only other increase is at the Electronics Research Center, where an increase of 56 positions to a total of 900 is planned. These two increases are offset by decreases of 370 positions at other installations. The following table summarizes the changes planned in 1970 from the 1969 plan for allocation of positions to Institutional Directors:

CHANGES FROM 1969 TO THE 1970 PERMANENT POSITION PLAN

| <u>Institutional Director</u> | <u>1969 Plan</u> | <u>Support Contractors Conversion</u> | <u>Addition for ERC</u> | <u>Planned Reductions in 1970</u> | <u>1970 Plan in 1970 Budget</u> |
|--------------------------------------|------------------|---------------------------------------|-------------------------|-----------------------------------|---------------------------------|
| Manned Space Flight. | 13,285 | --- | | -250 | 13,035 |
| Space Science and Applications..... | 4,731 | +251 | | -82 | 4,900 |
| Advanced Research and Technology.... | 11,577 | --- | +56 | -100 | 11,533 |
| NASA Headquarters... | <u>2,152</u> | <u>---</u> | <u>---</u> | <u>-20</u> | <u>2,132</u> |
| Total..... | <u>31,745</u> | <u>+251</u> | <u>+56</u> | <u>-452</u> | <u>31,600</u> |

Nonpermanent Positions

The 1969 and 1970 plans for nonpermanent positions are 2,193. These positions are required for a variety of programs, the largest of which is the NASA summer employment program. NASA hires college students and high school and college faculty members during the summer to provide these people exposure to the NASA programs and government operations. The benefits to the participants are numerous, and the education and training they receive is a considerable national asset.

A portion of the nonpermanent positions is used to provide for NASA's participation in the President's Youth Opportunity Campaign. This program provides underprivileged youths the opportunity to work at summer jobs at the various NASA installations, when unskilled personnel can be effectively used. Some of these positions are used during the remainder of the year to provide for the agency's participation in the President's Youth Opportunity Back to School Drive. This program continues during the school year, and the underprivileged youths are employed at a variety of unskilled tasks during a limited workweek of not more than 16 hours.

As in the past, the agency continues to provide significant training opportunities for technically oriented college students participating in the cooperative training program throughout the year. The student employed under a cooperative training agreement works for a term at a NASA installation and then spends a term in regular study at his college or university. This work-study program combines practical experience with theory and has been a significant recruitment source for NASA.

Experts and consultants are also included under nonpermanent positions. They are usually employed for a few days at a time when their expertise is required.

The following table summarizes the planned utilization of personnel:

DISTRIBUTION OF PERMANENT POSITIONS BY PROGRAM

| <u>Direct Positions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|---------------|---------------|---------------|
| <u>Manned Space Flight</u> | <u>10,468</u> | <u>9,972</u> | <u>9,752</u> |
| Apollo..... | 8,472 | 7,875 | 6,681 |
| Space flight operations..... | 1,696 | 1,801 | 2,780 |
| Advanced missions..... | 300 | 296 | 291 |
| <u>Space Science and Applications</u> | <u>3,082</u> | <u>3,371</u> | <u>3,396</u> |
| Physics and astronomy..... | 1,339 | 1,641 | 1,586 |
| Lunar and planetary exploration..... | 337 | 400 | 466 |
| Bioscience..... | 225 | 207 | 206 |
| Space applications..... | 653 | 662 | 681 |
| Launch vehicle procurement..... | 528 | 461 | 457 |
| <u>University Affairs</u> | | | |
| Sustaining university program..... | <u>29</u> | <u>30</u> | <u>29</u> |
| <u>Advanced Research and Technology</u> | <u>8,025</u> | <u>7,786</u> | <u>7,748</u> |
| Basic research..... | 1,310 | 1,251 | 1,230 |
| Space vehicle systems..... | 1,414 | 1,323 | 1,297 |
| Electronics systems..... | 1,145 | 1,108 | 1,122 |
| Human factor systems..... | 351 | 337 | 348 |
| Space power and electric propulsion systems..... | 1,029 | 998 | 989 |
| Nuclear rockets..... | 186 | 163 | 160 |
| Chemical propulsion..... | 312 | 304 | 295 |
| Aeronautical vehicles..... | 2,278 | 2,302 | 2,307 |
| <u>Tracking and Data Acquisition</u> | <u>1,054</u> | <u>1,080</u> | <u>1,161</u> |
| <u>Technology Utilization</u> | <u>45</u> | <u>44</u> | <u>43</u> |
| Subtotal, direct positions..... | <u>22,703</u> | <u>22,283</u> | <u>22,129</u> |
| <u>Indirect Positions</u> | | | |
| Director and staff..... | 910 | 888 | 886 |
| Administrative support..... | 4,795 | 4,550 | 4,616 |
| Research and development support..... | <u>4,063</u> | <u>4,024</u> | <u>3,969</u> |
| Subtotal, indirect positions..... | <u>9,768</u> | <u>9,462</u> | <u>9,471</u> |
| Total, permanent positions..... | 32,471 | 31,745 | 31,600 |
| Other than permanent positions..... | <u>2,170</u> | <u>2,193</u> | <u>2,193</u> |
| Total..... | <u>34,641</u> | <u>33,938</u> | <u>33,793</u> |

The NASA workforce may be summarized by broad occupational groupings as follows:

COMPOSITION OF PERMANENT STAFF BY OCCUPATIONAL GROUP

| <u>Occupational Group</u> | <u>1968</u> | | <u>1969</u> | | <u>1970</u> | |
|---------------------------------------|---------------|----------------|---------------|----------------|---------------|----------------|
| | <u>Number</u> | <u>Percent</u> | <u>Number</u> | <u>Percent</u> | <u>Number</u> | <u>Percent</u> |
| Professional scientists and engineers | 13,933 | 42.9 | 13,706 | 43.2 | 13,707 | 43.4 |
| Technicians..... | 4,399 | 13.6 | 4,563 | 14.4 | 4,515 | 14.3 |
| Wage board..... | 4,515 | 13.9 | 4,166 | 13.1 | 4,148 | 13.1 |
| Professional administrative..... | 4,393 | 13.5 | 4,273 | 13.4 | 4,218 | 13.3 |
| Clerical..... | <u>5,231</u> | <u>16.1</u> | <u>5,037</u> | <u>15.9</u> | <u>5,012</u> | <u>15.9</u> |
| Total..... | <u>32,471</u> | <u>100.0</u> | <u>31,745</u> | <u>100.0</u> | <u>31,600</u> | <u>100.0</u> |

As reflected above, professional scientists and engineers comprise over forty-three percent of the NASA work force. Technicians and technically oriented wage board employees, who work in direct support of the professional technical staff, make up another twenty-seven percent of the complement. The types of positions included in each category are described below:

Professional scientists and engineers include professional employees engaged in aerospace research, development, operations, and related work, including the development and operation of specialized facilities and supporting equipment. In addition, positions in the medical and biological sciences are included.

Technician positions include scientific and engineering aids, shop superintendents, quality assurance specialists, production planners and inspectors, technicians in drafting, photography, and related positions.

Wage board positions include trade, craft and general labor positions (both supervisory and nonsupervisory) which are compensated on the basis of prevailing local wage rates.

Professional administrative positions include professional management positions in the fields of general management, financial management, procurement, contracting, personnel, security, library and editorial work, and related fields for which a university degree or the equivalent, and specialized training and experience are basic qualifications.

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Clerical positions include secretarial, specialized and general clerical, administrative assistant, and related positions, the qualification requirements for which are clerical training and experience or specialized non-professional experience in the areas of supply, fiscal, logistics, statistics, or related activities.

SUMMARY OF PERSONNEL COSTS:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|----------------------|----------------------|----------------------|
| A. <u>COMPENSATION AND BENEFITS</u> | | | |
| 1. <u>COMPENSATION</u> | | | |
| a. Permanent positions... | \$382,615,000 | \$411,451,000 | \$416,587,000 |
| b. Nonpermanent positions | 5,294,000 | 5,098,000 | 5,185,000 |
| c. Reimbursable details | 3,828,000 | 4,088,000 | 4,074,000 |
| d. Overtime and holiday pay..... | 6,294,000 | 6,916,000 | 7,374,000 |
| e. Other compensation.... | <u>505,000</u> | <u>507,000</u> | <u>503,000</u> |
| Subtotal..... | \$398,536,000 | \$428,060,000 | \$433,723,000 |
| 2. <u>BENEFITS</u> | <u>30,179,000</u> | <u>32,129,000</u> | <u>32,349,000</u> |
| Subtotal..... | <u>\$428,715,000</u> | <u>\$460,189,000</u> | <u>\$466,072,000</u> |
| B. <u>SUPPORTING COSTS</u> | | | |
| 1. Transfer of personnel.... | \$1,387,000 | \$1,379,000 | \$1,340,000 |
| 2. Civil Service Commission services..... | 89,000 | 105,000 | 105,000 |
| 3. Personnel training..... | <u>2,103,000</u> | <u>2,049,000</u> | <u>2,033,000</u> |
| Subtotal..... | <u>\$3,579,000</u> | <u>\$3,533,000</u> | <u>\$3,478,000</u> |
| Total, Personnel..... | <u>\$432,294,000</u> | <u>\$463,722,000</u> | <u>\$469,550,000</u> |

| | | | |
|-------------------------------------|---------------|---------------|---------------|
| 1. <u>COMPENSATION</u> | \$398,536,000 | \$428,060,000 | \$433,723,000 |
| a. <u>Permanent Positions</u> | 382,615,000 | 411,451,000 | 416,587,000 |

The largest segment of cost, compensation of personnel in permanent positions, amounts to \$416,587,000 in 1970, an increase of \$5.1 million over 1969. The increase is the result of the conversion of support service contract functions to civil service operations, which will cost

\$5.6 million more in 1970 than in 1969 for the full year's cost of the 1969 conversion, and the cost of the additional 251 positions added during 1970. When this additional cost is excluded, the 1970 level is \$.5 million less than 1969. Thus, the cost of new positions at the Electronics Research Center, the cost of career development promotions and within grade salary increases, and the full year's cost of 1969 wage board increases will be more than offset by the savings resulting from planned lower employment. The following table illustrates these changes.

| | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|----------------------|----------------------|---------------------------|
| Base compensation for per- manent positions..... | \$409,948,000 | \$409,467,000 | -\$481,000 |
| Conversion of contract functions to civil service operations..... | <u>1,503,000</u> | <u>7,120,000</u> | <u>+5,617,000</u> |
| Total..... | <u>\$411,451,000</u> | <u>\$416,587,000</u> | <u>+\$5,136,000</u> |

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect. The derivation of the cost for personnel in permanent positions is detailed below:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|-------------------|-------------------|-------------------|
| Cost of position structure - beginning of the year..... | \$372,222,000 | \$388,146,000 | \$415,399,000 |
| Cost of additions to the structure: | | | |
| New positions..... | 5,061,000 | 6,478,000 | 3,133,000 |
| Salary legislation and pay raises..... | 17,589,000 | 23,278,000 | --- |
| Within grade advances..... | 6,359,000 | 6,642,000 | 6,227,000 |
| Career development..... | 5,909,000 | 5,646,000 | 4,702,000 |
| Structural changes..... | 126,000 | 150,000 | --- |
| Abolished positions..... | -15,656,000 | -12,725,000 | -4,742,000 |
| Effect of separation replace- ment policy..... | <u>-3,464,000</u> | <u>-2,216,000</u> | <u>-3,993,000</u> |
| Cost of position structure - end of year..... | \$388,146,000 | \$415,399,000 | \$420,726,000 |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|-----------------------------|-----------------------------|-----------------------------|
| Offsets: | | | |
| Lapse of new positions..... | \$-3,378,000 | \$-4,605,000 | \$-1,578,000 |
| Delay in filling vacancies..... | -2,807,000 | -1,677,000 | -3,789,000 |
| Lapse on salary legislation and pay raises..... | -5,201,000 | -1,553,000 | --- |
| Lapse on within grade advances..... | -3,565,000 | -3,788,000 | -3,108,000 |
| Lapse on career development increases..... | -2,703,000 | -2,983,000 | -2,393,000 |
| Partial year funding of separations..... | +1,748,000 | +1,228,000 | +2,100,000 |
| Partial year funding of abolished positions..... | +9,613,000 | +7,201,000 | +2,389,000 |
| Terminal leave payments..... | +1,191,000 | +1,162,000 | +1,108,000 |
| Work days in excess of 52 weeks..... | --- | +1,598,000 | +1,618,000 |
| Reimbursement received from other government agencies..... | <u>-429,000</u> | <u>-531,000</u> | <u>-486,000</u> |
| Net cost of permanent positions..... | <u>\$382,615,000</u> | <u>\$411,451,000</u> | <u>\$416,587,000</u> |

Development of Salary Structure and Cost Estimate

The cost of new positions represents the salary requirements for additional positions to be allocated during the year. The salary level projected for them is slightly less than the projected agency average salary.

The increased costs due to salary legislation and pay raises are the result of Congressional action, the revision of special pay provisions by the Civil Service Commission and the periodic wage surveys for Wage Board employees. The increase shown for 1968 represents the first increment of the Federal Salary Act of 1967, effective in October 1967, and the periodic wage surveys conducted in 1968. The cost in 1969 represents the second increment of the Federal Salary Act and the cost of wage surveys conducted in 1969. The cost of the third and final increment of the Federal Salary Act is not included in this budget request.

The calculations for within grade advances, career development, and the effect of the separation replacement policy savings are derived through modification of the beginning inventory of grade levels and skill groups, after determining the number of separations that can be expected, based on current experience, the number who meet the time and performance criteria NASA has established for promotions, estimating within grade salary increases for employees who meet the statutory time and quality requirements and planning the replacement of vacated positions at a generally lower level than those held by the former employees.

The changing character of work patterns results in shifts in the position structure between Wage Board and General Schedule positions. These structure changes differ from installation to installation to meet the needs of each.

The offset item, abolished positions, is the annual salary cost of the actual position reductions in 1968 and 1969, and those planned for 1970. The other offset item, effect of separation replacement policy, is the savings in annual salaries resulting from the agency policy of replacing two-thirds of the separations in professional positions at the entrance level rather than at the grade of the separated employee.

The cost of the position structure at the end of the year and the net cost, that is compensation actually paid, differ because the end-year structure carries all salaries on an annual salary basis. The differences between the salary structure and compensation are generally characterized as lapse items, and may be either deductive or additive in the schedule, depending upon the type of actions.

The lapse on new positions represents the savings for the additional positions which become available to the agency during the fiscal year for the period of time required to place the new employees on the rolls.

Delays in filling vacancies represent the savings in annual salaries for the interval between the time an employee leaves the agency and the time a

replacement is placed on the rolls. For 1970, this time interval is estimated at about five weeks. The estimate of savings in 1970 is higher than that for 1969 because in 1969 a larger number of positions was abolished rather than refilled after being vacated.

The savings from lapse on salary legislation and pay raises results because these are effective for only part of the year in which they occur. The pay legislation in 1968 was effective in October and resulted in approximately a twenty-five percent savings in annual cost. On the other hand, the increase in 1969 became effective early in July, with a considerably smaller savings. Wage Board employees' increases are established at various times during the year, and vary by geographical location, and the savings amount reflects these variances.

Lapses on within grade advances and career development increases represent the savings for the period that employees were paid at salaries lower than those held at the end of the year. Partial year funding of abolished positions represents the cost of these positions before they were abolished. Partial year funding of separations is the cost of positions at the higher rate, which subsequently are filled at a lower grade because of the separation replacement policy.

Terminal leave payments are for accrued annual leave due separating employees and are an offset against the salary savings realized by the separation. The estimate is based upon prior experience.

Reimbursement received from other government agencies reflects the expected payments, chiefly from the Environmental Sciences Services Administration, for work performed by NASA.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--------------------------------|-------------|-------------|-------------|
| b. Nonpermanent positions..... | \$5,294,000 | \$5,098,000 | \$5,185,000 |

The cost of nonpermanent positions is for the varied temporary employment programs carried on by NASA, such as the cooperative student training program, the summer student and faculty employment programs, participation in the President's Youth Opportunity Campaign, and other similar programs. The increase in 1970 is a result of a slightly higher cost per manyear.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|------------------------------|-------------|-------------|-------------|
| c. Reimbursable details..... | \$3,828,000 | \$4,088,000 | \$4,074,000 |

The services of a small group of military officers and civilian detailees from other government agencies are utilized in the conduct of NASA's programs where such use is appropriate. In accordance with existing agreements, NASA reimburses the parent organization for the salaries and related costs of the detailees.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|----------------------------------|-------------|-------------|-------------|
| d. Overtime and holiday pay..... | \$6,294,000 | \$6,916,000 | \$7,374,000 |

The increase in overtime and holiday pay in 1969 and 1970 over 1968 is a result of the heavy Saturn V/Apollo flight activity in the latter half of 1969 and in 1970. The manned space flight overtime cost was \$4.1 million in 1968, a year of light manned flight activity, and will rise to \$4.7 million in 1969 and \$5.2 million in 1970. Despite this heavy requirement, the overtime estimate for NASA is \$1.4 million less than in 1967, when overtime as a percentage of permanent compensation was 2.4% and about half of 1966, when the percentage was 4.2%. The comparable percentages for the succeeding years are 1.6% in 1968, 1.7% in 1969, and 1.8% in 1970.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|----------------------------|-------------|-------------|-------------|
| e. Other compensation..... | \$505,000 | \$507,000 | \$503,000 |

Other compensation costs provide for cost of living allowances, the cost of nightwork differential for which any employee whose regular tour of duty includes time between 6:00 p.m. and 6:00 a.m. receives ten percent additional compensation; and for Sunday work, for which any employee whose regular scheduled work includes Sunday, receives an increase of twenty-five percent for that day. The costs are relatively stable over the three years.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|------------------|--------------|--------------|--------------|
| 2. BENEFITS..... | \$30,179,000 | \$32,129,000 | \$32,349,000 |

In addition to compensation, NASA makes an employer's contribution to personnel benefits as authorized and required by law. The following table indicates the costs of personnel benefits by the major categories:

| <u>Category of Cost</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|---------------------|---------------------|---------------------|
| Contribution to the Civil Service Retirement Fund..... | \$24,927,000 | \$26,575,000 | \$26,968,000 |
| Contribution for employee life insurance..... | 1,317,000 | 1,423,000 | 1,419,000 |
| Contribution for employee health insurance..... | 2,807,000 | 2,916,000 | 2,907,000 |
| Contribution to FICA..... | 158,000 | 153,000 | 155,000 |
| Incentive awards..... | 273,000 | 295,000 | 298,000 |
| Other personnel benefits..... | 361,000 | 484,000 | 602,000 |
| Severance pay..... | 336,000 | 283,000 | --- |
| Total..... | <u>\$30,179,000</u> | <u>\$32,129,000</u> | <u>\$32,349,000</u> |

The largest portion of the personnel benefits cost is the agency's contribution to the Civil Service Retirement Fund. NASA contributes to the fund an amount equal to six and one-half percent of each permanent employee's salary. The increase in 1970 is directly related to the increase in personnel compensation.

The agency contribution toward the cost of employee life and health insurance is based upon employee participation. FICA or social security contributions are for nonpermanent employees who are not covered by the Civil Service Retirement Act.

The incentive awards program provides for cash awards for outstanding contributions to NASA, superior employee performance and for improvement of the agency's operations. The cost of the program remains relatively stable. Other personnel benefits provide for reimbursement to the Department of Labor for workmen's compensation cost and such items as uniform allowances and a special commuting allowance for personnel at the Nuclear Rocket Development Station in Nevada. The increase requested in 1970 is to pay for the increased workmen's compensation billing provided by the Labor Department. The severance pay estimate is related to the legal requirement to pay severance pay for employees separated through no fault of their own. There is no known requirement for severance pay in 1970.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--------------------------|-------------|-------------|-------------|
| B. SUPPORTING COSTS..... | \$3,579,000 | \$3,533,000 | \$3,478,000 |

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment; for security investigations and other recruitment costs; and for maintaining and expanding the skills of our employees.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-------------------------------|-------------|-------------|-------------|
| 1. Transfer of personnel..... | \$1,387,000 | \$1,379,000 | \$1,340,000 |

The legislation approved in 1966 provided that the government would pay for certain relocation costs, such as the expenses of selling and buying a home, the cost of one trip to the new duty station for the purpose of securing new housing, and the cost of family relocation allowances. The estimate is based on experienced cost rates. The reduction of \$39,000 results from a lower number of moves planned as the NASA strength declines.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 2. Civil Service Commission services..... | \$89,000 | \$105,000 | \$105,000 |

The Civil Service Commission conducts security investigations for NASA. The cost of security investigations is a function of two variables, the number of investigations to be conducted and the unit-charge made by the

Civil Service Commission. Compilation of installation estimates of the number to be conducted and the projected unit-charge for each year is the basis for the cost estimate.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|----------------------------|-------------|-------------|-------------|
| 3. Personnel training..... | \$2,103,000 | \$2,049,000 | \$2,033,000 |

The maintenance and expansion of the skills of personnel is essential to an organization such as NASA which is charged with the responsibility for complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training is provided by other government agencies. When employees participate in training courses of other agencies, NASA is able to benefit from existing programs. The remainder of the training is provided through nongovernmental sources; the cost is for tuition, fees and related costs for training at colleges, universities, technical institutes and related institutions; and for the cost of seminars and workshops in which groups of employees receive training in courses of agency-wide interest. Such training is used to maintain and to expand employee skills. The estimate is based on a continuation of current training programs with the decrease of \$16,000 resulting from the planned personnel reduction.

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RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

TRAVEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-------------|--------------|--------------|--------------|---------------------------|
| Travel..... | \$15,095,000 | \$14,625,000 | \$14,600,000 | \$-25,000 |

DESCRIPTION:

The estimates include the cost of transportation, per diem, and incidental costs required for employee travel for the purpose of direction and coordination of Research and Development and Construction of Facilities program activities; travel for contract management and flight mission support; travel to launching sites and tracking stations, and for administrative travel. It also includes the cost of travel to NASA-sponsored meetings and conferences, as well as meetings sponsored outside NASA, when such travel is in the interest of the agency; of travel by non-NASA employees (31 USC 22a); and of travel by unpaid members of research advisory committees. Charter, contract, or lease of passenger aircraft and the cost of local transportation by taxi, bus, or private automobile for which the employee is reimbursed are included in the estimate. Costs for travel to initial duty station and for permanent change of station are excluded from this estimate and included under Personnel Related Costs.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-----------------------------------|---------------------|---------------------|---------------------|
| Kennedy Space Center..... | \$661,000 | \$771,000 | \$679,000 |
| Manned Spacecraft Center..... | 3,929,000 | 3,923,000 | 3,773,000 |
| Marshall Space Flight Center..... | 2,750,000 | 2,175,000 | 2,078,000 |
| Goddard Space Flight Center..... | 1,919,000 | 1,639,000 | 1,918,000 |
| Wallops Station..... | 126,000 | 132,000 | 136,000 |
| Ames Research Center..... | 731,000 | 630,000 | 630,000 |
| Electronics Research Center..... | 308,000 | 318,000 | 351,000 |
| Flight Research Center..... | 184,000 | 189,000 | 197,000 |
| Langley Research Center..... | 1,130,000 | 1,132,000 | 1,132,000 |
| Lewis Research Center..... | 954,000 | 896,000 | 896,000 |
| Space Nuclear Propulsion Office.. | 167,000 | 195,000 | 185,000 |
| NASA Headquarters..... | <u>2,236,000</u> | <u>2,625,000</u> | <u>2,625,000</u> |
| Total..... | <u>\$15,095,000</u> | <u>\$14,625,000</u> | <u>\$14,600,000</u> |

BASIS OF FUND REQUIREMENTS:

SUMMARY OF TRAVEL BY MAJOR CATEGORY

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|---------------------|---------------------|---------------------|---------------------------|
| <u>Program Related Travel</u> | | | | |
| Direction, coordination, and management of Research and Development and Construction of Facilities program activities..... | \$9,551,000 | \$8,731,000 | \$8,586,000 | \$-145,000 |
| Flight mission support. | 1,283,000 | 1,606,000 | 1,724,000 | +118,000 |
| Overseas travel to launch and tracking sites..... | <u>516,000</u> | <u>449,000</u> | <u>498,000</u> | <u>+49,000</u> |
| Subtotal..... | <u>\$11,350,000</u> | <u>\$10,786,000</u> | <u>\$10,808,000</u> | <u>\$+22,000</u> |
| <u>Meetings and Technical Seminars</u> | | | | |
| Government-sponsored meetings..... | \$1,150,000 | \$1,187,000 | \$1,186,000 | \$-1,000 |
| Other than government- sponsored meetings and technical seminars.... | <u>830,000</u> | <u>738,000</u> | <u>733,000</u> | <u>-5,000</u> |
| Subtotal..... | <u>\$1,980,000</u> | <u>\$1,925,000</u> | <u>\$1,919,000</u> | <u>\$-6,000</u> |
| <u>Administrative Travel....</u> | <u>\$1,765,000</u> | <u>\$1,914,000</u> | <u>\$1,873,000</u> | <u>\$-41,000</u> |
| <u>Total, Travel.....</u> | <u>\$15,095,000</u> | <u>\$14,625,000</u> | <u>\$14,600,000</u> | <u>\$-25,000</u> |
| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |

Direction, coordination,
and management of
programs..... \$9,551,000 \$8,731,000 \$8,586,000 \$-145,000

The travel most directly related to Research and Development and Construction of Facilities activities is included under program related travel. The amount for this purpose accounts for approximately 75% of the travel requirements in 1970. The largest individual item is for direction, coordination, and management of research and development and construction of facilities program activities. Because of the complexity of the programs and the distribution of contractor and subcontractor effort throughout the entire United States, coordination and management of activities requires frequent

examination by personnel responsible for the program. The costs for this travel are expected to be slightly lower in 1970 than in 1969 as the result of a reduced need for travel related to management of launch vehicle and spacecraft development activities.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|----------------------------|-------------|-------------|-------------|---------------------------|
| Flight mission support.... | \$1,283,000 | \$1,606,000 | \$1,724,000 | \$+118,000 |

As projects reach the flight stage, support is required for prelaunch, launch, and post-launch activities. The amount of travel required for this purpose is directly related to both the number and complexity of the launches. The increase (\$118,000) is reflected in the travel requirements for Manned Spacecraft Center and Goddard Space Flight Center to support the approved Apollo launch schedule.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|-------------|-------------|-------------|---------------------------|
| Overseas travel to launch and tracking sites..... | \$516,000 | \$449,000 | \$498,000 | \$+49,000 |

Overseas travel to launch and tracking sites includes travel required for instrumentation of the tracking sites, inspection of the sites prior to launch, and the cost of travel of additional personnel required during launches. The increase of \$49,000 is related to the conversion of contractor functions for tracking and data acquisition effort to a civil service operation at the Goddard Space Flight Center. This travel was formerly included as part of the contract funded under Research and Development.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|-------------|-------------|-------------|---------------------------|
| Meetings and technical seminars..... | \$1,980,000 | \$1,925,000 | \$1,919,000 | \$-6,000 |

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government-sponsored and non-government-sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field arising outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government-sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend any meetings of the types described is granted only after assurance that the meeting attendance will be in the interest of NASA. The estimate for this travel in 1970 is \$6,000 less than 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|----------------------------|-------------|-------------|-------------|---------------------------|
| Administrative travel..... | \$1,765,000 | \$1,914,000 | \$1,873,000 | \$-41,000 |

Administrative travel includes travel for the direction and coordination of general management matters. It includes travel by functional managers in such areas as personnel, financial management, and procurement; to assure that agency policies and procedures are being implemented and carried out properly throughout the agency. Travel by senior officials to review center requirements and operations and the travel of center officials to NASA Headquarters is provided for in this category. This category also includes the cost of travel in and around the vicinity of the centers, including bus and taxi services and rental of motor vehicles, and travel of unpaid members of research advisory committees. The reduction in 1970 is due primarily to the reduced staffing at Marshall Space Flight Center.

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

AUTOMATIC DATA PROCESSING

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|------------------------------|--------------|--------------|--------------|---------------------------|
| Automatic data processing... | \$32,045,000 | \$24,636,000 | \$23,829,000 | \$--807,000 |

DESCRIPTION:

The funds budgeted in this category provide for the acquisition of automatic data processing (ADP) equipment by lease or purchase, maintenance of NASA-owned equipment, and the procurement of programming and operation services. Both electronic data processing and ancillary electric accounting machine equipment are included. The overall requirement for ADP is divided by appropriation in accordance with the purpose served by the equipment. The Research and Program Management appropriation provides for the general purpose scientific and business data processing which support the overall installation operations and scientific and technical applications where it is impractical to distribute the funding to a directly supported program or project. Other appropriations provide for data processing systems and operations which are dedicated to specific programs or projects, or are integrated into larger systems. Additional information concerning ADP equipment requirements may be found in the special ADP analysis which appears in Volume I of this budget.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|----------------------------------|---------------------|---------------------|---------------------|
| Kennedy Space Center..... | \$1,214,000 | \$1,045,000 | \$914,000 |
| Manned Spacecraft Center..... | 6,243,000 | 6,059,000 | 5,975,000 |
| Marshall Space Flight Center.... | 10,049,000 | 7,047,000 | 6,796,000 |
| Goddard Space Flight Center..... | 5,951,000 | 5,426,000 | 5,385,000 |
| Wallops Station..... | 60,000 | 64,000 | 67,000 |
| Ames Research Center..... | 1,634,000 | 994,000 | 583,000 |
| Electronics Research Center..... | 1,382,000 | 1,329,000 | 1,225,000 |
| Flight Research Center..... | 92,000 | 85,000 | 85,000 |
| Langley Research Center..... | 3,541,000 | 950,000 | 1,145,000 |
| Lewis Research Center..... | 528,000 | 335,000 | 277,000 |
| NASA Headquarters..... | <u>1,351,000</u> | <u>1,302,000</u> | <u>1,377,000</u> |
| Total..... | <u>\$32,045,000</u> | <u>\$24,636,000</u> | <u>\$23,829,000</u> |

BASIS OF FUND REQUIREMENTS:

SUMMARY OF AUTOMATIC DATA PROCESSING

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|---------------------|---------------------|---------------------|---------------------------|
| Lease of equipment..... | \$17,137,000 | \$14,109,000 | \$13,536,000 | \$-573,000 |
| Purchase of equipment... | 2,711,000 | 61,000 | 15,000 | -46,000 |
| Maintenance of equipment | <u>1,849,000</u> | <u>2,373,000</u> | <u>2,408,000</u> | <u>+35,000</u> |
| Subtotal, Equipment... | 21,697,000 | 16,543,000 | 15,959,000 | -584,000 |
| Programming and operation services..... | <u>10,348,000</u> | <u>8,093,000</u> | <u>7,870,000</u> | <u>-223,000</u> |
| Total, automatic data processing..... | <u>\$32,045,000</u> | <u>\$24,636,000</u> | <u>\$23,829,000</u> | <u>\$-807,000</u> |
| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
| Lease of equipment..... | \$17,137,000 | \$14,109,000 | \$13,536,000 | \$-573,000 |

The lease requirements for ADP equipment represent approximately 57% of the total ADP costs funded from the Research and Program Management appropriation. The estimate for 1970 is \$573,000 lower than the amount required in 1969. The largest decrease, \$392,000, will occur at Ames Research Center. This decrease is attributable to the planned release of current central computers (IBM 7040/7094 direct-coupled system) to be replaced by a new central third generation computer in 1970. This system will be used principally for Research and Development. However, a charge will be made to the Research and Program Management appropriation on a share-usage basis. As a result of the full activation of new third generation equipment, enabling the release of older types of equipment, the FY 1970 lease costs at Kennedy Space Center are estimated to be \$131,000 lower than FY 1969 and \$84,000 lower at the Marshall Space Flight Center. In addition, small decreases are planned at the Goddard Space Flight Center (\$28,000) and at the Lewis Research Center (\$13,000). Except for Headquarters, where an increase of \$75,000 is planned for the purpose of acquiring augmentory components to meet increased workload requirements, the ADP lease costs at all other installations are estimated to remain essentially the same level as in 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|----------------------------|-------------|-------------|-------------|---------------------------|
| Purchase of equipment..... | \$2,711,000 | \$61,000 | \$15,000 | \$-46,000 |

The requirement for equipment to be purchased in 1970 amounts to \$15,000 and is \$46,000 less than the amount for purchase in 1969. Of the \$15,000 required in 1970, \$12,000 will be required at the Ames Research Center and \$3,000 at the Marshall Space Flight Center. These amounts are required for the purchase of small component-type equipment to be used in conjunction with the primary systems.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-----------------------------|-------------|-------------|-------------|---------------------------|
| Maintenance of equipment... | \$1,849,000 | \$2,373,000 | \$2,408,000 | \$+35,000 |

The funds required for ADP maintenance will be \$35,000 more than the amount required in 1969. This net increase of \$35,000 results from an increase of \$195,000 at the Langley Research Center required to provide maintenance support for the components of the third generation equipment becoming operational in 1970, and for the full-year's costs of the portion which will become operational in 1969. This increase is partially offset by a reduction of \$140,000 at the Marshall Space Flight Center due to the phase-out of older systems. The remaining \$20,000 reduction is distributed throughout the other NASA installations.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|--------------|-------------|-------------|---------------------------|
| Programming and operation services..... | \$10,348,000 | \$8,093,000 | \$7,870,000 | \$-223,000 |

In 1970, the cost of contractor programming and operation services which are related to the larger and more sophisticated systems in operation are estimated to be \$223,000 lower than 1969. The largest decrease (\$104,000) is due to the reduction in automatic data programming services required at the Electronics Research Center. The remainder of the decrease (\$119,000) results from a planned decrease in support contractor effort, and from the centralization and consolidation of automatic data processing capability associated with the installation of third generation equipment at other NASA installations.

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

FACILITIES SERVICES

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--------------------------|--------------|--------------|--------------|---------------------------|
| Facilities services..... | \$94,297,000 | \$85,896,000 | \$84,954,000 | \$-942,000 |

DESCRIPTION:

Facilities services includes the rental of lands and buildings; the procurement of electricity, water, gas, and other utilities; maintenance of buildings and grounds; and minor construction and facility modifications. It also includes custodial services consisting of security services, janitorial services, cleaning, exterminating, and refuse handling, laundry and fire protection. Funds required also provide for the maintenance and repair of general purpose instruments, research equipment, and shop equipment. Requirements for general purpose building materials, hardware, electronics supplies and materials, as well as procurement of mechanical, laboratory and shop equipment are also included in the estimate. The requirement for major contractual service effort at the Merritt Island Launch Area and reimbursement to the Air Force for services provided to the Kennedy Space Center are also covered in this category.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-----------------------------------|---------------------|---------------------|---------------------|
| Kennedy Space Center..... | \$42,291,000 | \$41,376,000 | \$40,722,000 |
| Manned Spacecraft Center..... | 11,609,000 | 9,307,000 | 8,693,000 |
| Marshall Space Flight Center..... | 11,089,000 | 8,306,000 | 7,953,000 |
| Goddard Space Flight Center..... | 5,707,000 | 5,193,000 | 5,141,000 |
| Wallops Station..... | 2,399,000 | 2,300,000 | 2,281,000 |
| Ames Research Center..... | 3,425,000 | 2,997,000 | 3,458,000 |
| Electronics Research Center..... | 1,668,000 | 1,786,000 | 2,375,000 |
| Flight Research Center..... | 1,109,000 | 1,099,000 | 1,056,000 |
| Langley Research Center..... | 6,373,000 | 6,749,000 | 6,554,000 |
| Lewis Research Center..... | 7,840,000 | 6,125,000 | 6,053,000 |
| NASA Headquarters..... | 787,000 | 658,000 | 668,000 |
| Total..... | <u>\$94,297,000</u> | <u>\$85,896,000</u> | <u>\$84,954,000</u> |

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BASIS OF FUND REQUIREMENTS:

SUMMARY OF FACILITIES SERVICES

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|---------------------|---------------------|---------------------|---------------------------|
| <u>Acquisition of Facilities</u> | | | | |
| Rental of real property | \$1,921,000 | \$1,846,000 | \$1,540,000 | \$-306,000 |
| Minor construction and modifications..... | <u>1,829,000</u> | <u>1,124,000</u> | <u>1,153,000</u> | <u>+29,000</u> |
| Subtotal..... | <u>\$3,750,000</u> | <u>\$2,970,000</u> | <u>\$2,693,000</u> | <u>\$-277,000</u> |
| <u>Maintenance and Related Services</u> | | | | |
| Maintenance, repair, and alteration of buildings and grounds. | \$13,745,000 | \$10,472,000 | \$9,653,000 | \$-319,000 |
| Maintenance and repair of equipment..... | 2,927,000 | 2,475,000 | 2,787,000 | +312,000 |
| Custodial services..... | <u>11,959,000</u> | <u>9,920,000</u> | <u>10,082,000</u> | <u>+162,000</u> |
| Subtotal..... | <u>\$28,631,000</u> | <u>\$22,867,000</u> | <u>\$22,522,000</u> | <u>\$-345,000</u> |
| <u>Operation of Facilities</u> | | | | |
| Utilities..... | \$12,729,000 | \$12,616,000 | \$13,116,000 | \$+500,000 |
| Supplies and equipment. | <u>10,689,000</u> | <u>10,222,000</u> | <u>9,911,000</u> | <u>-311,000</u> |
| Subtotal..... | <u>\$23,418,000</u> | <u>\$22,838,000</u> | <u>\$23,027,000</u> | <u>\$+189,000</u> |
| <u>Range Operations.....</u> | <u>\$38,498,000</u> | <u>\$37,221,000</u> | <u>\$36,712,000</u> | <u>\$-509,000</u> |
| <u>Total, Facilities Services.....</u> | <u>\$94,297,000</u> | <u>\$85,896,000</u> | <u>\$84,954,000</u> | <u>\$-942,000</u> |
| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
| Rental of real property.... | \$1,921,000 | \$1,846,000 | \$1,540,000 | \$-306,000 |

Rental of land and property is required to house personnel and provide storage and warehouse space for supplies and materials where space is not available in government-owned facilities. Funds required for this purpose are estimated at \$1,540,000 in 1970, a decrease of \$306,000 under the 1969 estimate. The major decrease is at the Electronics Research Center, as a result of the movement into permanent facilities planned in 1970.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|-------------|-------------|-------------|---------------------------|
| Minor construction and modifications..... | \$1,829,000 | \$1,124,000 | \$1,153,000 | \$+29,000 |

This activity provides for additions, modifications, and minor construction of facilities within statutory limitations. The requirements are of a continuing nature which are generated by changes in the research and development program, as well as development of new technology. The estimate for 1970 is based on continuing the economies achieved in 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|--------------|--------------|-------------|---------------------------|
| Maintenance, repair, and alteration of buildings and grounds..... | \$13,745,000 | \$10,472,000 | \$9,653,000 | \$-819,000 |

The amount estimated for maintenance and repair of buildings and grounds is estimated at \$9,653,000, a decrease of \$819,000 from 1969. The major decrease is at the Manned Spacecraft Center (\$593,000) which is attributed to a reduction in the level of activity at White Sands Test Facility. The remaining decrease results from generally lower effort throughout the agency.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|-------------|-------------|-------------|---------------------------|
| Maintenance and repair of equipment..... | \$2,927,000 | \$2,475,000 | \$2,787,000 | \$+312,000 |

Maintenance and repair of equipment consists of work necessary to keep mechanical laboratory and shop equipment operational. The increase results primarily from the cost of transfer and installation of equipment into permanent facilities at the Electronics Research Center.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-------------------------|--------------|-------------|--------------|---------------------------|
| Custodial services..... | \$11,959,000 | \$9,920,000 | \$10,082,000 | \$+162,000 |

The requirement for custodial services increases by \$162,000 in 1970 as compared to 1969. There is a major increase of \$262,000 which will be required to fund service contracts for security guards, janitorial services, fire protection, cleaning and refuse removal in the new permanent facilities at the Electronics Research Center. Except for the cost of security guard services, these expenses were previously covered in the lease contract. This increase is partially offset by reductions in custodial services at the Manned Spacecraft and Marshall Space Flight Centers associated with reduced activity and such actions as lengthened cleaning cycles and reduced guard posts.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|----------------|--------------|--------------|--------------|---------------------------|
| Utilities..... | \$12,729,000 | \$12,616,000 | \$13,116,000 | \$+500,000 |

Funds required for utilities will increase in 1970 by \$500,000 to a total of \$13,116,000. Major increases occur at the Electronics Research Center, \$158,000, connected with the transfer to permanent facilities; at Manned Spacecraft Center, \$153,000, which is related primarily to increased usage of the Flight Crew Training Facility and the full operation of the Lunar Receiving Laboratory; and at the Ames Research Center, \$156,000, for electric power for wind tunnel operations.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-----------------------------|--------------|--------------|-------------|---------------------------|
| Supplies and equipment..... | \$10,689,000 | \$10,222,000 | \$9,911,000 | \$-311,000 |

The estimate for supplies and equipment in 1970 represents a decrease of \$311,000. The major reduction (\$226,000) is at the manned space flight centers and is associated with lower requirements for common supplies and significantly lower levels of equipment purchases. These decreases at the manned space flight centers are also related to the planned reductions in maintenance of buildings and grounds and custodial services. Similar reductions are planned at other installations.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-----------------------|--------------|--------------|--------------|---------------------------|
| Range operations..... | \$38,498,000 | \$37,221,000 | \$36,712,000 | \$-509,000 |

Over 40 percent of the estimate for all of NASA facilities services relates to services procured at the Kennedy Space Center through major support contractors for services, utilities, and for support received from the Air Force Eastern Test Range. Services received through contractors are primarily utilized at the Merritt Island Launch Area. These services are provided by three major support contractors and cover facilities engineering and planning, maintenance, repair and operation of facilities and utilities; maintenance of roads and grounds; supply operations; fire protection; industrial health services; security; computer operations; publication and graphics support; photography and library services. Reimbursements to the Air Force, except for utilities, are primarily for requirements at the Cape Kennedy Air Force Station complex; including maintenance and repair of buildings and equipment; security; exterminating; printing; medical services; photography and supply support. For convenience in understanding the total requirement, these activities are consolidated under Facilities Services, and not distributed to other categories. The estimate for range operations in 1970 is \$36,712,000 a decrease of \$509,000 from the 1969 level. The following table summarizes funding requirements by purpose:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|---------------------|---------------------|---------------------|---------------------------|
| ADP operations..... | \$2,377,000 | \$2,895,000 | \$3,023,000 | \$+128,000 |
| Utilities..... | 3,614,000 | 3,705,000 | 3,630,000 | -75,000 |
| Maintenance, repair, alteration, and operation of facilities..... | 15,247,000 | 16,127,000 | 16,055,000 | -72,000 |
| Protective services..... | 5,130,000 | 5,694,000 | 5,518,000 | -176,000 |
| Janitorial and cleaning services..... | 672,000 | 961,000 | 505,000 | -456,000 |
| Support services..... | <u>11,458,000</u> | <u>7,839,000</u> | <u>7,981,000</u> | <u>+142,000</u> |
| Total..... | <u>\$38,498,000</u> | <u>\$37,221,000</u> | <u>\$36,712,000</u> | <u>\$-509,000</u> |

The estimated decrease in Range Operations results from the phase-down of Apollo-Saturn IB launch activity and related facilities at Cape Kennedy Air Force Station, and concentration of the Manned Apollo launch activity at Launch Complex 39, Merritt Island, Kennedy Space Center.

The bulk of the projected reduction is in protective and janitorial services for Launch Complexes 34 and 37, with some additional reductions in facility-related costs. The decreased utility costs related to Saturn IB activity is partially offset by rate increases, and by increased consumption at Launch Complex 39. The estimates for ADP operations and support services, such as technical documentation and supply services, will increase due to anticipated cost escalation in service contract support.

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

TECHNICAL SERVICES

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-------------------------|--------------|--------------|--------------|---------------------------|
| Technical services..... | \$20,505,000 | \$17,398,000 | \$16,860,000 | \$-538,000 |

DESCRIPTION:

The estimate for technical services provides for the costs of engineering services, and of scientific and technical information and educational/informational programs. Included in the engineering services are the costs of engineering design and reliability and quality assurance studies. The scientific and technical information programs, which furnish up-to-date reporting of scientific and technical programs, provide for the support of the technical libraries located at various installations, the acquisition and dissemination of scientific and technical literature, and for educational/informational programs.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-----------------------------------|---------------------|---------------------|---------------------|
| Manned Spacecraft Center..... | \$2,090,000 | \$1,850,000 | \$1,668,000 |
| Marshall Space Flight Center..... | 3,126,000 | 1,207,000 | 1,160,000 |
| Goddard Space Flight Center..... | 826,000 | 753,000 | 675,000 |
| Wallops Station..... | 46,000 | 70,000 | 62,000 |
| Ames Research Center..... | 109,000 | 84,000 | 84,000 |
| Electronics Research Center..... | 1,038,000 | 933,000 | 823,000 |
| Flight Research Center..... | 29,000 | 42,000 | 42,000 |
| Langley Research Center..... | 145,000 | 138,000 | 138,000 |
| Lewis Research Center..... | 697,000 | 645,000 | 665,000 |
| Space Nuclear Propulsion Office.. | 10,000 | 95,000 | --- |
| NASA Headquarters..... | <u>12,389,000</u> | <u>11,581,000</u> | <u>11,543,000</u> |
| Total..... | <u>\$20,505,000</u> | <u>\$17,398,000</u> | <u>\$16,860,000</u> |

BASIS OF FUND REQUIREMENTS:

SUMMARY OF TECHNICAL SERVICES

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|---------------------|---------------------|---------------------|---------------------------|
| <u>ENGINEERING SERVICES</u> | <u>\$2,464,000</u> | <u>\$1,875,000</u> | <u>\$1,613,000</u> | <u>\$-262,000</u> |
| <u>SCIENTIFIC AND TECHNICAL INFORMA- TION AND EDUCA- TIONAL PROGRAMS</u> | | | | |
| Operation of NASA technical library | 2,251,000 | 1,672,000 | 1,524,000 | -148,000 |
| Educational/infor- mation programs.. | 4,035,000 | 3,857,000 | 3,827,000 | -30,000 |
| Scientific and technical infor- mation..... | <u>11,755,000</u> | <u>9,994,000</u> | <u>9,896,000</u> | <u>-98,000</u> |
| Subtotal..... | <u>18,041,000</u> | <u>15,523,000</u> | <u>15,247,000</u> | <u>-276,000</u> |
| Total..... | <u>\$20,505,000</u> | <u>\$17,398,000</u> | <u>\$16,860,000</u> | <u>\$-538,000</u> |
| <u>ENGINEERING SERVICES.</u> | <u>\$2,464,000</u> | <u>\$1,875,000</u> | <u>\$1,613,000</u> | <u>\$-262,000</u> |

Engineering services provide for reliability and quality assurance studies; engineering design services for the design of minor construction, repair and alteration projects, special tooling, equipment and machine parts; and other related engineering services such as the contractor-provided nuclear safety effort at the Plum Brook Reactor under the management of the Lewis Research Center. Of the total amount of \$1,613,000 planned in 1970 for Engineering Services, \$517,000 is for the nuclear safety effort.

The \$1,613,000 requested for 1970 is \$262,000 less than the \$1,875,000 anticipated for 1969. The largest decrease, \$95,000, is planned for the Nuclear Rocket Development Station due to the completion of studies such as the practical handling and shipping of NERVA-spent fuel elements, the extension of a fire alarm system and an integrated study of the effects of radiation on existing and future radio frequency communication systems. The Electronics Research Center will be \$51,000 under the 1969 requirements as a result of a reduction in the amount of contractual services provided for consulting services and management surveys, and the completion of contract support for the design of laboratory equipment. Other major reductions will occur at Headquarters; \$53,000 due to the completion of the systems design trade-off studies; and at the Manned Spacecraft Center, \$40,000 decrease for engineering design services, which is consistent with their planned reduction in the maintenance program area. The remaining decreases will occur at various

installations as a part of the overall attempt to reduce costs in this appropriation during 1970.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|--------------|--------------|--------------|---------------------------|
| <u>SCIENTIFIC AND TECHNICAL INFORMATION AND EDUCATIONAL PROGRAMS</u> | \$18,041,000 | \$15,523,000 | \$15,247,000 | \$-276,000 |

Included in these programs are the costs of the technical libraries, educational/information programs and the scientific and technical information services. The funding required to finance these programs is \$15,247,000 in 1970, a decrease of \$276,000 from the 1969 level. These costs are summarized as follows:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---------------------------------------|-------------|-------------|-------------|---------------------------|
| Operation of technical libraries..... | \$2,251,000 | \$1,672,000 | \$1,524,000 | \$-148,000 |

The cost of the operation of technical libraries in 1970 will be \$1,524,000 which is a decrease of \$148,000 under 1969. The major portion of these decreases occur at the Goddard Space Flight Center, \$74,000, due to the conversion of 12 contract positions to civil service during the last half of 1970, and there is a \$71,000 decrease for the Electronics Research Center largely due to computerizing selected library functions previously performed manually, such as inventory screening and data retrieval.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|-------------|-------------|-------------|---------------------------|
| Educational/Informational Programs..... | \$4,035,000 | \$3,857,000 | \$3,827,000 | \$-30,000 |

The educational/information programs provide for the gathering and dissemination of information about the agency's programs to the mass communication media, the general public, and to the educational community at the elementary and secondary levels. The cost for these programs in 1970 is estimated to be \$3,827,000 which is \$30,000 less than the estimate for 1969, as a result of the continued effort to reduce costs in 1970.

Assistance to the mass communications media includes the gathering and exposition of newsworthy material in support of their requests. This material and assistance is in several forms such as press kits, news releases, television and radio information tapes and clips, and feature material.

Educational programs and media development activities are designed to serve the expressed needs of students and teachers through the secondary level and

respond to requests for information about NASA activities from the general public.

Of these activities, the spacemobile program, a touring lecture-demonstration program is the most extensive. The 30 mobile units each of which is manned by a qualified and experienced former teacher are used in about 12,000 lecture-demonstrations a year. Most of these demonstrations were to in-school groups, scheduled in coordination with state and local school administrators. Over 400 demonstrations were for teachers at workshops and other in-service training sessions. Over three million people attended live spacemobile lectures, an additional eight million saw or heard the lectures on radio and television.

Other educational activities include:

- (1) Development of space-related materials on instruction to supplement regular course material;
- (2) Assistance to over 1,000 teacher workshops and professional education meetings with over 30,000 teachers participating;
- (3) Sponsorship of the Youth Science Congresses in cooperation with the National Science Teachers Association; and
- (4) Participation in Science Fairs and other programs.

As new knowledge adds to and supplants old knowledge, the agency tries to stay abreast in its educational/information materials. Publications, motion pictures, and exhibits are the resource material used to communicate the latest information about space exploration and what is being learned.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|--------------|-------------|-------------|---------------------------|
| Scientific and technical information..... | \$11,755,000 | \$9,994,000 | \$9,896,000 | \$-98,000 |

The scientific and technical information activity includes the cost of the NASA Scientific and Technical Information Facility, documentation services, manuscript preparation, systems development and translation services. These services are estimated to cost \$9.9 million in 1970 which is approximately \$.1 million less than required in 1969. This decrease is primarily attributable to the planned reduction in motion picture services and film documentation at the Marshall Space Flight Center. The remaining effort will remain essentially at the same funding level as planned for 1969. The largest requirement is the NASA Scientific and Technical Information Facility under the cognizance of Headquarters, which will cost \$4.7 million in 1970. The level of cost for all other information services, estimated at \$5.2 million, is essentially the same as 1969. These costs are for the documentation of

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worldwide aerospace journal literature; the preparation of manuscript material such as handbooks, data compilations, monographs, and technical reviews; analyzing, evaluating, and testing new methods and systems in the field of scientific communications to increase the effectiveness of the technical information program; and translating foreign language technical books, reports, and journal articles required to meet the needs of NASA and its contractor scientific personnel which are used to keep abreast of world developments in the space sciences and related fields.

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

ADMINISTRATIVE SUPPORT

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--------------------------------------|--------------|--------------|--------------|---------------------------|
| Administrative support services..... | \$45,057,000 | \$41,984,000 | \$41,107,000 | \$-877,000 |

DESCRIPTION:

Included in Administrative Support Services are general services which support overall installation operations. The administrative expenses for communications, printing and reproduction, supplies, materials and equipment, transportation (motor pool, administrative aircraft services and operations, and movements by common carrier), and other services (installation operations and medical services), are provided for in this function.

DISTRIBUTION OF FUND REQUIREMENTS BY INSTALLATION:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-----------------------------------|---------------------|---------------------|---------------------|
| Kennedy Space Center..... | \$11,717,000 | \$11,180,000 | \$10,890,000 |
| Manned Spacecraft Center..... | 8,197,000 | 7,921,000 | 7,614,000 |
| Marshall Space Flight Center..... | 8,924,000 | 7,021,000 | 6,729,000 |
| Goddard Space Flight Center..... | 3,742,000 | 3,436,000 | 3,392,000 |
| Wallops Station..... | 969,000 | 833,000 | 833,000 |
| Ames Research Center..... | 1,010,000 | 905,000 | 937,000 |
| Electronics Research Center..... | 838,000 | 927,000 | 949,000 |
| Flight Research Center..... | 827,000 | 676,000 | 652,000 |
| Langley Research Center..... | 2,330,000 | 2,365,000 | 2,365,000 |
| Lewis Research Center..... | 1,352,000 | 1,265,000 | 1,186,000 |
| NASA Headquarters..... | <u>5,151,000</u> | <u>5,455,000</u> | <u>5,560,000</u> |
| Total..... | <u>\$45,057,000</u> | <u>\$41,984,000</u> | <u>\$41,107,000</u> |

BASIS OF FUND REQUIREMENTS:**SUMMARY OF ADMINISTRATIVE SUPPORT SERVICES**

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|---------------------|---------------------|---------------------|---------------------------|
| <u>COMMUNICATIONS</u> | | | | |
| Leased lines and long distance tolls..... | \$4,535,000 | \$5,112,000 | \$5,183,000 | \$+71,000 |
| Local telephone service..... | 5,464,000 | 6,178,000 | 6,347,000 | +169,000 |
| Other communications.... | <u>1,736,000</u> | <u>2,089,000</u> | <u>2,054,000</u> | <u>--35,000</u> |
| Subtotal..... | <u>11,735,000</u> | <u>13,379,000</u> | <u>13,584,000</u> | <u>+205,000</u> |
| <u>ADMINISTRATIVE PRINTING</u> | <u>6,559,000</u> | <u>5,573,000</u> | <u>5,569,000</u> | <u>-4,000</u> |
| <u>SUPPLIES, MATERIALS AND EQUIPMENT</u> | | | | |
| Supplies and materials.. | 8,281,000 | 7,264,000 | 7,025,000 | -239,000 |
| Equipment..... | <u>1,914,000</u> | <u>1,832,000</u> | <u>1,583,000</u> | <u>-249,000</u> |
| Subtotal..... | <u>10,195,000</u> | <u>9,096,000</u> | <u>8,608,000</u> | <u>-488,000</u> |
| <u>TRANSPORTATION</u> | | | | |
| Center operations..... | 7,016,000 | 5,782,000 | 5,579,000 | -203,000 |
| Common carrier..... | <u>1,038,000</u> | <u>1,005,000</u> | <u>996,000</u> | <u>-9,000</u> |
| Subtotal..... | <u>8,054,000</u> | <u>6,787,000</u> | <u>6,575,000</u> | <u>-212,000</u> |
| <u>ADMINISTRATIVE SUPPORT SERVICES</u> | | | | |
| Installation support services..... | 6,925,000 | 5,894,000 | 5,523,000 | -371,000 |
| Medical services..... | <u>1,589,000</u> | <u>1,255,000</u> | <u>1,248,000</u> | <u>-7,000</u> |
| Subtotal..... | 8,514,000 | 7,149,000 | 6,771,000 | -378,000 |
| Total, Administrative Support Services..... | <u>\$45,057,000</u> | <u>\$41,984,000</u> | <u>\$41,107,000</u> | <u>\$-877,000</u> |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---------------------|--------------|--------------|--------------|---------------------------|
| COMMUNICATIONS..... | \$11,735,000 | \$13,379,000 | \$13,584,000 | +\$205,000 |

The funds required for communications are estimated at \$13,584,000 for 1970, an increase of \$205,000 over 1969. Included in this estimate are the costs of leased lines, long distance tolls, local telephone exchange services, and other communications, such as TWX and postage. Installations and their major subinstallations are located in twelve states and the District of Columbia. In addition, business is conducted with companies and institutions in all the states. Consequently, the cost of communications to integrate these centers of work is large. Costs for certain operational communications related to flight activities and dedicated leased lines are excluded from the Research and Program Management appropriation, but are included in the Research and Development appropriation. A summary of communication costs follows:

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--|-------------|-------------|-------------|---------------------------|
| Leased lines and long distance tolls..... | \$4,535,000 | \$5,112,000 | \$5,183,000 | +\$71,000 |

The cost of leased lines and long distance tolls provide for the intercity telephone services for the various installations. The cost of leased lines includes the leasing of the circuits and associated equipment for rapid and reliable contact with contractor plants and other key sites. Long distance toll costs are in addition to the cost of leased lines and include both commercial tolls and reimbursement to the General Services Administration for NASA's use of the Federal Telecommunications System. The increase in requirements of \$71,000 is largely at the Manned Spacecraft Center and is related to the full year cost of tariff increases during 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-----------------------------|-------------|-------------|-------------|---------------------------|
| Local telephone service.... | \$5,464,000 | \$6,178,000 | \$6,347,000 | +\$169,000 |

Local telephone service includes not only the cost of providing on-site telephone exchange services, but also the cost of off-site service in the area immediately surrounding our installations. The amount of service provided each installation is determined by the number of personnel, both civil service and contractor, served by the exchange. The increase in 1970 is largely due to increased rates effective in 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---------------------------|-------------|-------------|-------------|---------------------------|
| Other communications..... | \$1,736,000 | \$2,089,000 | \$2,054,000 | \$-35,000 |

Other communications costs provide for costs for cable services, TWX services, and postage. The decrease in 1970 is principally related to the planned reduction of facsimile transmission operations in 1970.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|------------------------------|-------------|-------------|-------------|---------------------------|
| ADMINISTRATIVE PRINTING..... | \$6,559,000 | \$5,573,000 | \$5,569,000 | \$-4,000 |

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions, are included. In 1970, the costs for printing are \$4,000 less than in 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---|--------------|-------------|-------------|---------------------------|
| SUPPLIES, MATERIALS AND EQUIPMENT..... | \$10,195,000 | \$9,096,000 | \$8,608,000 | \$-488,000 |

Administrative supplies, materials, and equipment include those items of a general nature which service the entire installation. Excluded are supplies, materials, equipment, and related services which are related directly to a specific project (funded in the R&D appropriation) and those that are facility oriented (included in Facilities Services). Of the amount required in 1970, \$7,025,000 is for supplies and materials, and \$1,583,000 for purchased and rented equipment. The overall requirement decreases by \$488,000 in 1970. The largest part of the decrease is \$311,000 at the Kennedy Space Center. There also is a decrease of \$165,000 at the Manned Spacecraft Center reflecting a significant reduction in the requirements for furniture and office equipment. For all other installations there is a net decrease of \$12,000 in funds required for these administrative costs.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|---------------------|-------------|-------------|-------------|---------------------------|
| TRANSPORTATION..... | \$8,054,000 | \$6,787,000 | \$6,575,000 | \$-212,000 |

Transportation services include local motor pool operations and associated services, center aircraft operations and services, as well as the movement of supplies, materials, equipment, and related items by common carrier.

The \$212,000 decrease for 1970 consists of reductions of \$113,000 at the Marshall Space Flight Center and \$94,000 at the Kennedy Space Center due to reduced requirements for motor vehicle services and aircraft maintenance. For all other installations there is a net decrease of \$5,000, indicating that fund requirements are approximately the same as for 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|--------------------------------------|-------------|-------------|-------------|---------------------------|
| ADMINISTRATIVE SUPPORT SERVICES..... | \$8,514,000 | \$7,149,000 | \$6,771,000 | \$-378,000 |

Administrative support services include installation support services and center medical services. The funding required for 1970 is \$6,771,000, which is \$378,000 less than in 1969.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|------------------------------------|-------------|-------------|-------------|---------------------------|
| Installation support services..... | \$6,925,000 | \$5,894,000 | \$5,523,000 | \$-371,000 |

Installation support services include those services which support the installation generally; such as logistics support, supply operations, mail and messenger services, and other related services. The decrease of \$371,000 consists of \$286,000 at the Manned Space Flight Centers due to the planned reduced level of activity and lower civil service and support contractor population; \$118,000 at the Goddard Space Flight Center as a result of converting support service contract functions to a civil service operation; and other decreases at the research centers for \$75,000. These decreases are offset by an increase of \$108,000 at Headquarters to fund NASA's share of the cost of operation of the Federal Information Center and the producing of a film on safety.

| | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>Change in 1970</u> |
|-----------------------|-------------|-------------|-------------|---------------------------|
| Medical services..... | \$1,589,000 | \$1,255,000 | \$1,248,000 | \$-7,000 |

Medical services include the cost of the installations' health units and of employee health maintenance programs. The cost in 1970 is estimated to be \$1,248,000 which is \$7,000 less than the estimate for 1969, due to the lower level of manpower projected by the end of 1970.

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

JOHN F. KENNEDY SPACE CENTER

MISSION:

The Kennedy Space Center, formerly the Launch Operations Directorate of the Marshall Space Flight Center, was established at Cape Kennedy, Florida, as a separate Center within NASA in July 1962. It serves as the primary Center within NASA for the test, checkout, and launch of space vehicles. This presently includes launch of manned and unmanned vehicles at Kennedy Space Center, Florida, and unmanned vehicles at the Air Force Western Test Range. The Center is now concentrating on the Apollo Saturn V manned launches, as well as scientific unmanned launches. Kennedy Space Center is specifically responsible for:

1. Launch vehicle checkout and preparation.
2. Spacecraft and payload checkout and preparation.
3. Launch facility design, construction, maintenance, and operations, including advanced planning and studies leading to development of new launch operation concepts and techniques.
4. Final integration and integrated checkout of vehicle, spacecraft and launch facilities, and the conduct of actual launch operations.
5. Operation and coordination of supporting facilities, ground support equipment, and tracking and data acquisition and logistics support required for operation of all NASA activities at the Eastern and Western Test Ranges.
6. Technical and administrative support services for all NASA elements located in the area.

In fulfilling its assigned programs, the Kennedy Space Center has developed into a highly flexible "space port" capable of handling a wide variety of launch activities for present and future manned and unmanned space missions.

DESCRIPTION:

The Kennedy Space Center is situated approximately 50 miles east of Orlando, Florida, in northeast Brevard County.

The total land area occupied by the installation is 87,760 acres, including 83,783 acres owned by NASA. In addition to the land area occupied, the state of Florida has dedicated to the United States exclusive use rights to some 53,553 acres of State-owned submerged lands.

In addition to the operation and maintenance of all facilities at the Kennedy Space Center, the Center is responsible for certain facilities within the national Eastern Test Range launch area. The total capital investment of Kennedy Space Center including work in progress, contractor-held facilities at various locations, and the Western Test Range, as of June 30, 1968, was \$1,050,510,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$37,248,000 | \$43,297,000 | \$44,296,000 |
| Travel..... | 661,000 | 771,000 | 679,000 |
| Automatic data processing..... | 1,214,000 | 1,045,000 | 914,000 |
| Facilities services..... | 42,291,000 | 41,376,000 | 40,722,000 |
| Technical services..... | --- | --- | --- |
| Administrative support..... | <u>11,717,000</u> | <u>11,180,000</u> | <u>10,890,000</u> |
| Total, fund requirements..... | <u>\$93,131,000</u> | <u>\$97,669,000</u> | <u>\$97,501,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 1,899 | 1,880 | 1,754 |
| Space flight operations..... | 30 | 44 | 132 |
| Advanced missions..... | 9 | 11 | 11 |
| <u>Space Science and Applications</u> | | | |
| Launch vehicle procurement..... | <u>145</u> | <u>145</u> | <u>143</u> |
| Subtotal, positions by program.. | <u>2,083</u> | <u>2,080</u> | <u>2,040</u> |

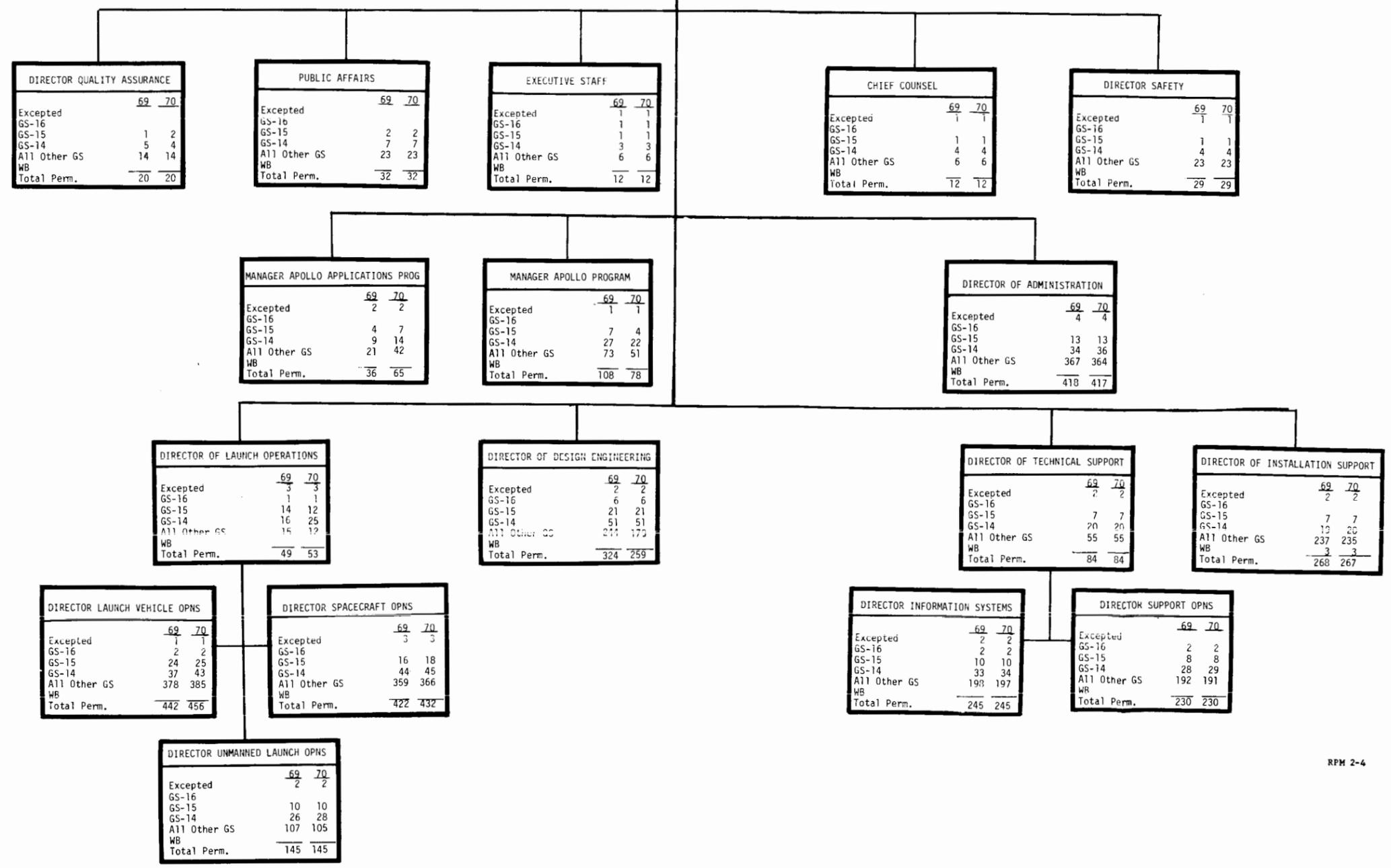
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-------------------------------------|--------------|--------------|--------------|
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 97 | 97 | 97 |
| Administrative support..... | 507 | 532 | 532 |
| Research and development support... | <u>230</u> | <u>212</u> | <u>212</u> |
| Subtotal, indirect positions..... | <u>834</u> | <u>841</u> | <u>841</u> |
| Total, permanent positions..... | <u>2,917</u> | <u>2,921</u> | <u>2,881</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 ORGANIZATION & STAFFING CHART
 JOHN F. KENNEDY SPACE CENTER

| STAFFING SUMMARY | | | |
|------------------|--------|--------|--|
| Excepted | 69 | 70 | |
| GS-16 | 30 | 30 | |
| GS-15 | 14 | 14 | |
| GS-14 | 150 | 153 | |
| GS-14 | 372 | 393 | |
| All Other GS | 2,352 | 2,288 | |
| Wage Board | 3 | 3 | |
| Total Permanent | 2,921* | 2,881* | |

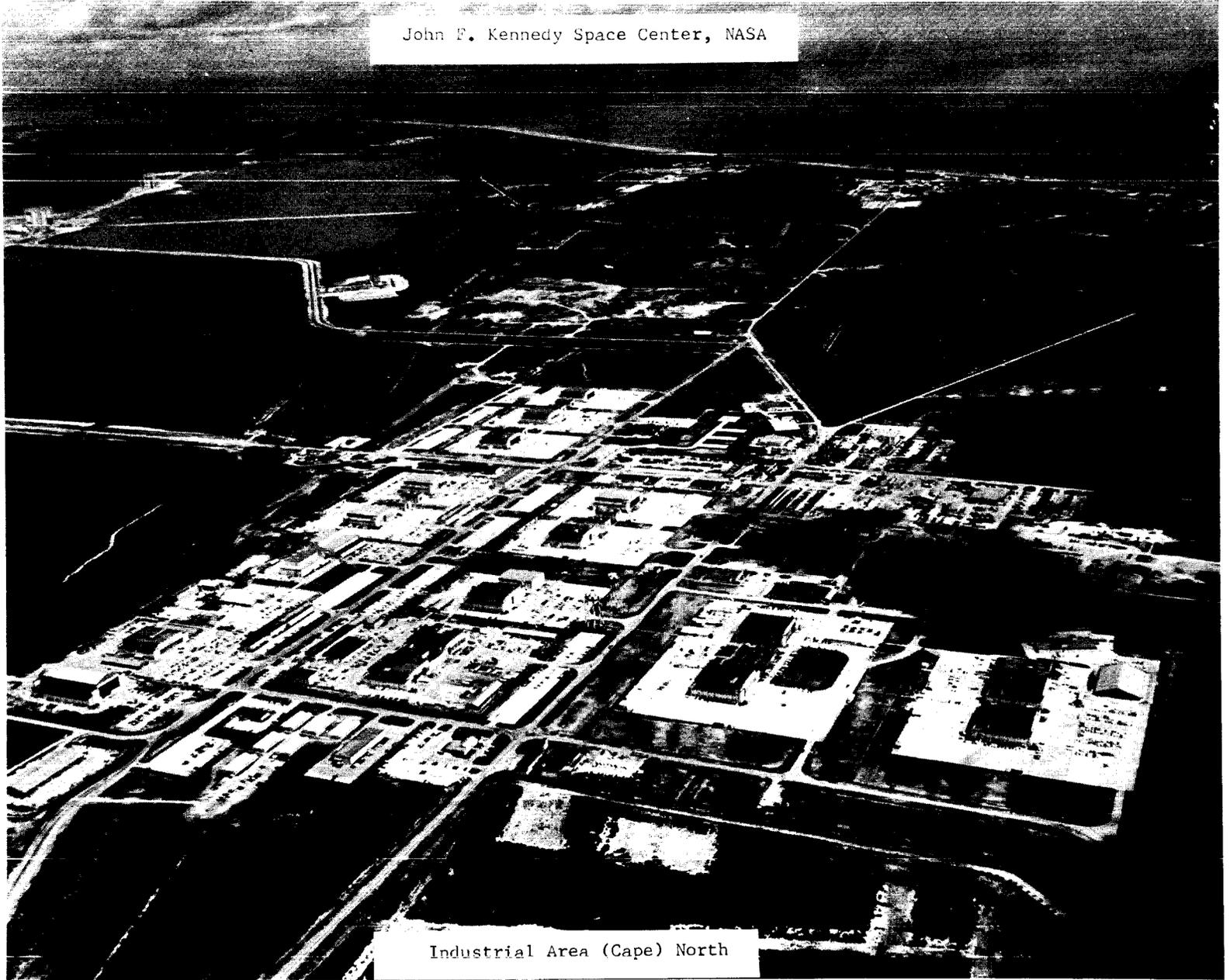
*NOTE: Includes 34 permanent positions assigned to Daytona Beach Operations which are not functionally a part of Kennedy Space Center and are not reflected on the organization chart.

| DIRECTOR | | | |
|--------------|----|----|--|
| Excepted | 69 | 70 | |
| GS-16 | 3 | 3 | |
| GS-15 | 3 | 3 | |
| GS-14 | | | |
| All Other GS | 5 | 5 | |
| WB | | | |
| Total Perm. | 11 | 11 | |



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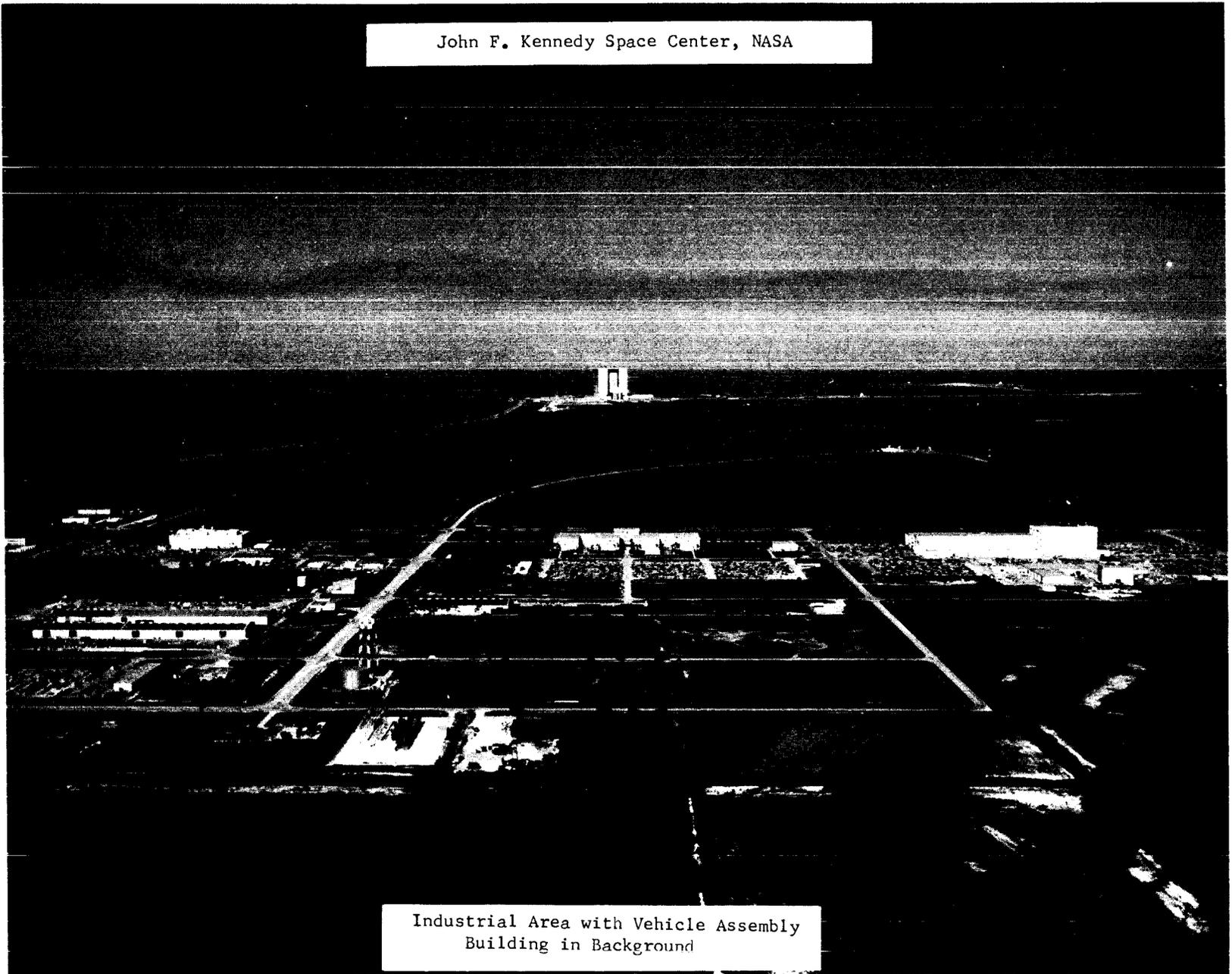
John F. Kennedy Space Center, NASA



Industrial Area (Cape) North

RPM 2-7

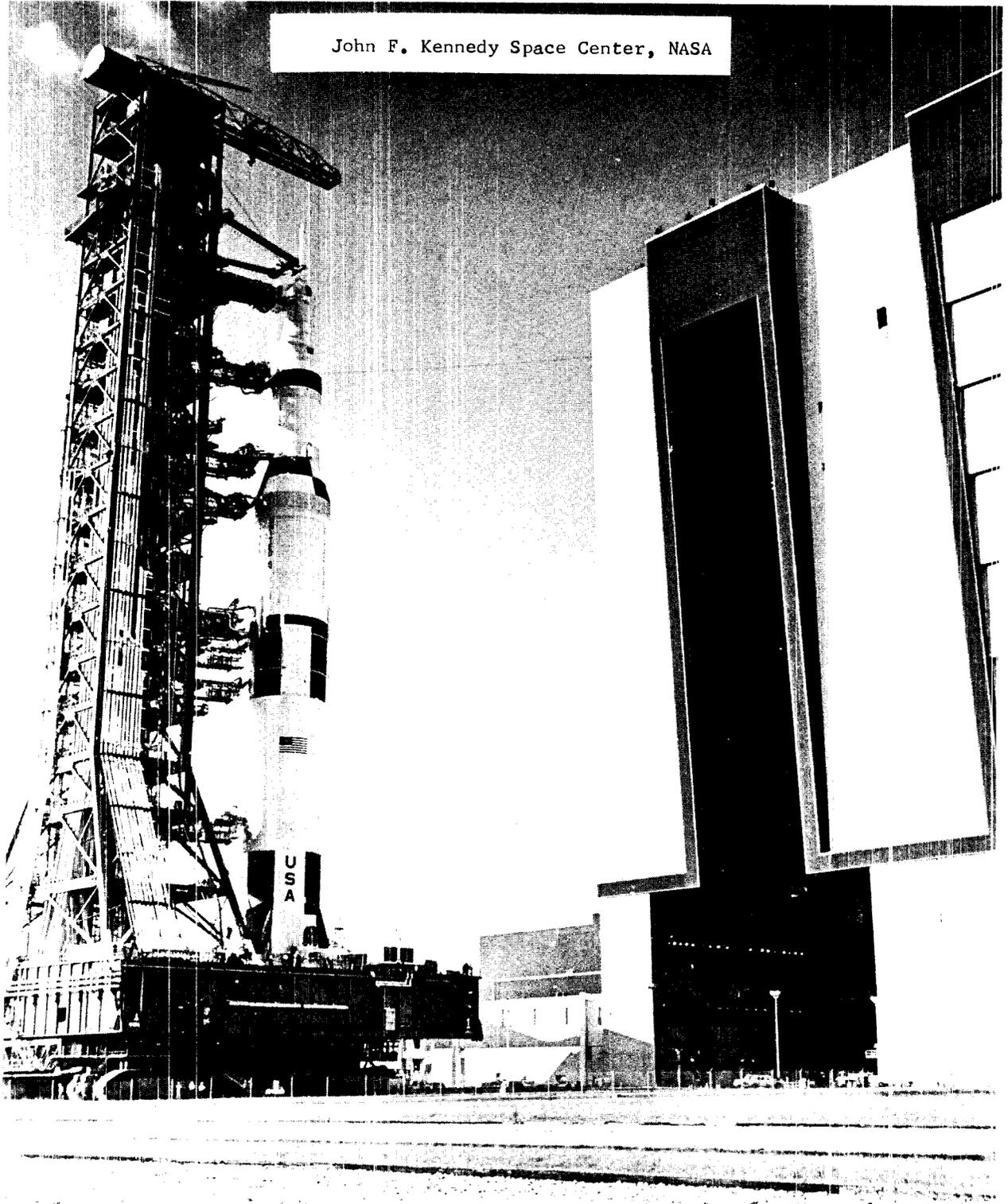
John F. Kennedy Space Center, NASA



Industrial Area with Vehicle Assembly
Building in Background

RPM 2-8

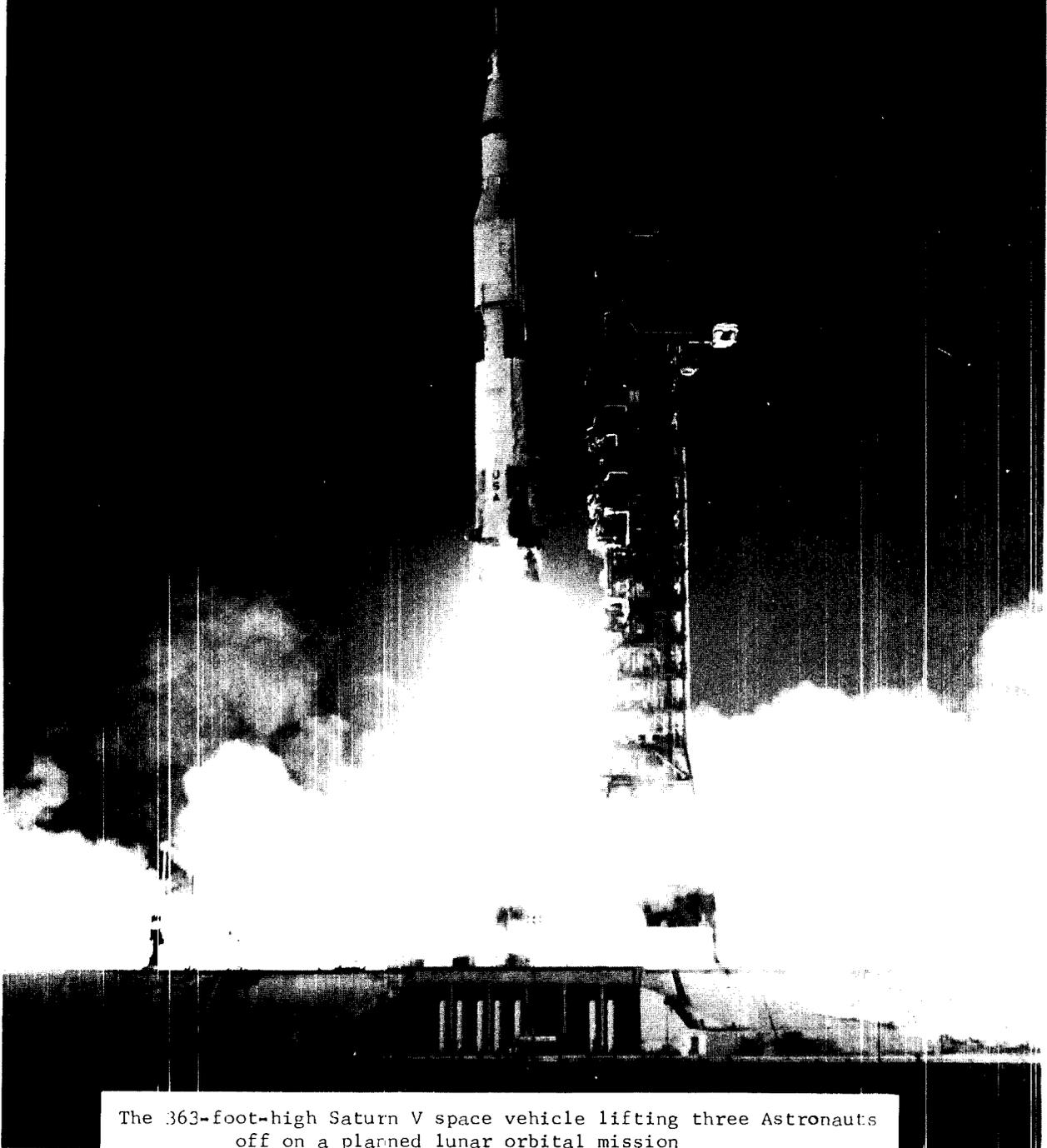
John F. Kennedy Space Center, NASA



The Apollo/Saturn V Space Launch Vehicle

RPM 2-9

John F. Kennedy Space Center, NASA



The 363-foot-high Saturn V space vehicle lifting three Astronauts off on a planned lunar orbital mission

RPM 2-10

John F. Kennedy Space Center, NASA



RPM 2-11

Visitors Information Center

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

MANNED SPACECRAFT CENTER

MISSION:

The Manned Spacecraft Center was established in November 1961 at Houston, Texas, as NASA's primary Center for the design, development, and manufacture of manned spacecraft, and for selection and training of astronaut crews and the conduct of space flight missions. Manned Spacecraft Center and its predecessor organization, the NASA Space Task Group, have completed two major programs: (1) the Mercury program, which was the United States' pioneering venture into manned space flight; and (2) the Gemini program, which extended manned flight capability in space in many significant ways. Manned Spacecraft Center is now heavily engaged in the Apollo program and is also proceeding with necessary spacecraft modifications for the Apollo Applications project as well as program planning and technical analysis of other post-Apollo activities.

The Apollo program utilizes the capabilities of the Manned Spacecraft Center in several ways. This Center is responsible for:

1. The design, development, and fabrication of the Apollo spacecraft, including the command and service modules, and the lunar module.
2. Overall program management and control of the spacecraft including module integration, testing, and qualification.
3. Conduct of a program of spacecraft environmental testing.
4. Selection and training of astronauts and preparation of primary and backup crews for each mission.
5. Operation of the Mission Control Center and control of the space flight missions from lift-off to recovery.
6. Development of scientific experiments to be flown on Apollo flights.
7. Operation of the Lunar Receiving Laboratory, which provides a central complex where samples of materials brought to earth by lunar exploration teams may be received, quarantined, processed, undergo limited experiments, and be distributed to the scientific community for further analysis.

The longer duration flights planned for the post-Apollo missions will make it necessary to use the experienced personnel of this Center to upgrade spacecraft and lunar module subsystems. This Center is also responsible for the

development of earth sensor experiment modules and biomedical, bioscience, and behavioral experiment modules to be flown on Apollo Applications missions.

DESCRIPTION:

The Manned Spacecraft Center is located two miles east of the town of Webster, Texas. The site is approximately 20 miles southeast of downtown Houston and 25 miles northwest of Galveston, Texas. Total NASA-owned land at Houston consists of 1,620 acres. The Center also occupies an additional 55,861 acres at the White Sands Test Facility. The total capital investment of the Manned Spacecraft Center, including fixed assets in progress, contractor-held facilities at various locations, and the White Sands Test Facility, as of June 30, 1968, is \$420,878,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$63,669,000 | \$68,938,000 | \$70,025,000 |
| Travel..... | 3,929,000 | 3,923,000 | 3,773,000 |
| Automatic data processing..... | 6,243,000 | 6,059,000 | 5,975,000 |
| Facilities services..... | 11,609,000 | 9,307,000 | 8,693,000 |
| Technical services..... | 2,090,000 | 1,850,000 | 1,668,000 |
| Administrative support..... | <u>8,197,000</u> | <u>7,921,000</u> | <u>7,614,000</u> |
| Total, fund requirements..... | <u>\$95,737,000</u> | <u>\$97,998,000</u> | <u>\$97,748,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 2,905 | 2,743 | 2,104 |
| Space flight operations..... | 273 | 280 | 860 |
| Advanced missions..... | 79 | 80 | 80 |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 12 | 13 | 20 |
| Lunar and planetary exploration..... | 8 | 9 | 15 |
| Space applications..... | 48 | 52 | 45 |
| <u>Advanced Research and Technology</u> | | | |
| Space vehicle systems..... | 8 | 8 | 8 |
| Electronics systems..... | 7 | 3 | 6 |
| Human factor systems..... | 4 | 4 | 16 |
| Chemical propulsion..... | <u>1</u> | <u>2</u> | <u>---</u> |
| Subtotal, positions by program.... | <u>3,345</u> | <u>3,194</u> | <u>3,154</u> |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 93 | 72 | 73 |
| Administrative support..... | 837 | 692 | 671 |
| Research and development support..... | <u>329</u> | <u>425</u> | <u>405</u> |
| Subtotal, indirect positions..... | <u>1,259</u> | <u>1,189</u> | <u>1,149</u> |
| Total, permanent positions..... | <u>4,604</u> | <u>4,383</u> | <u>4,303</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER

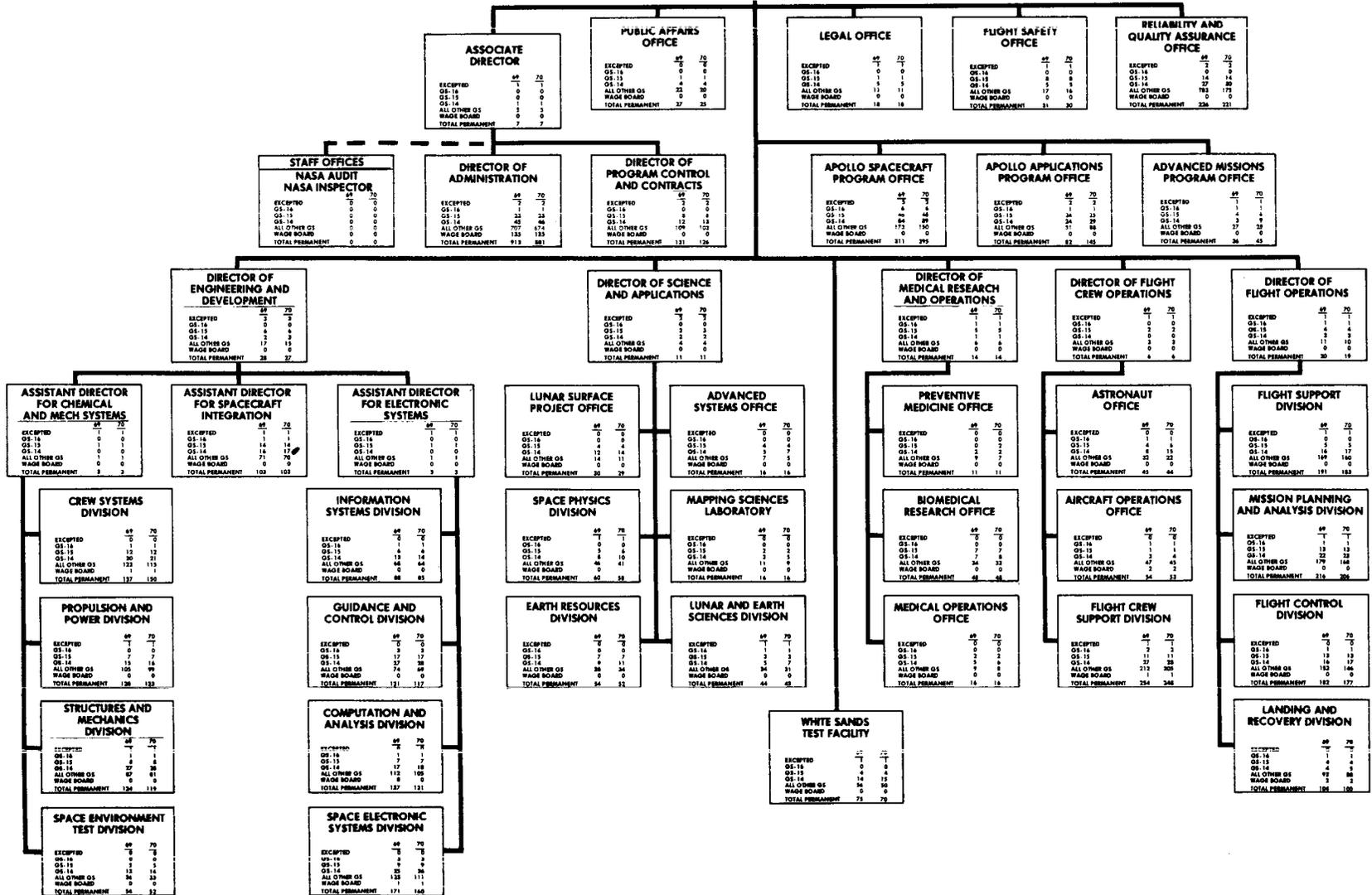
HOUSTON, TEXAS

DECEMBER 16, 1968

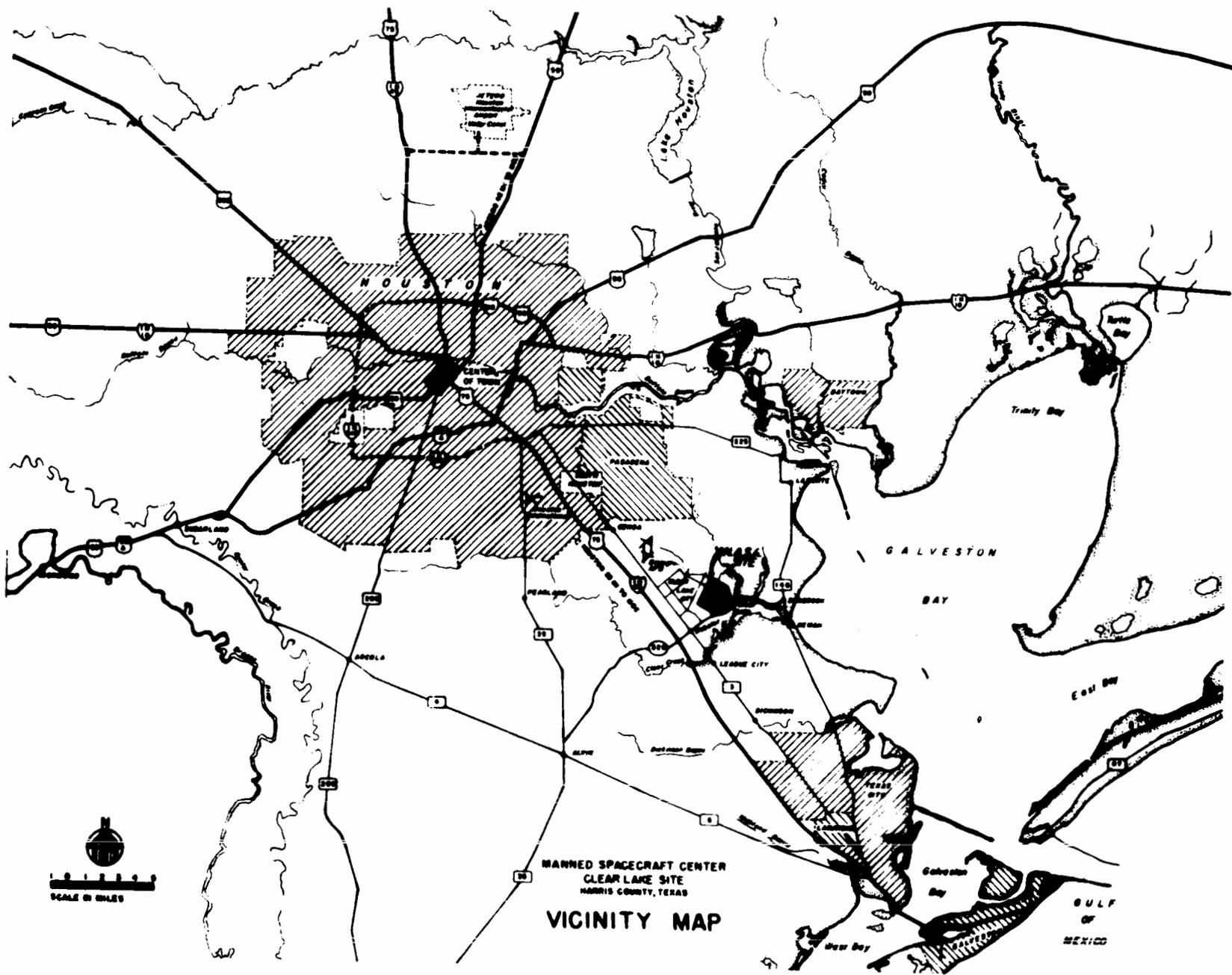
| STAFFING SUMMARY | | | |
|------------------|-------|-------|-------|
| | AS | TS | TOTAL |
| EXCEPTED | 49 | 70 | 119 |
| OS-14 | 26 | 26 | 52 |
| OS-15 | 924 | 283 | 1,207 |
| OS-16 | 344 | 827 | 1,171 |
| ALL OTHER OS | 379 | 3130 | 3,509 |
| WAGE BOARD | 143 | 163 | 306 |
| TOTAL PERMANENT | 1,025 | 3,222 | 4,247 |

| DIRECTOR DEPUTY DIRECTOR | | | |
|-----------------------------|----|----|-------|
| | AS | TS | TOTAL |
| EXCEPTED | 0 | 0 | 0 |
| OS-14 | 0 | 0 | 0 |
| OS-15 | 0 | 0 | 0 |
| OS-16 | 0 | 0 | 0 |
| ALL OTHER OS | 4 | 4 | 8 |
| WAGE BOARD | 0 | 0 | 0 |
| TOTAL PERMANENT | 4 | 4 | 8 |

| SPECIAL ASSISTANTS | | | |
|--------------------|----|----|-------|
| | AS | TS | TOTAL |
| EXCEPTED | 1 | 1 | 2 |
| OS-14 | 0 | 0 | 0 |
| OS-15 | 0 | 0 | 0 |
| OS-16 | 1 | 1 | 2 |
| ALL OTHER OS | 0 | 0 | 0 |
| WAGE BOARD | 0 | 0 | 0 |
| TOTAL PERMANENT | 2 | 2 | 4 |



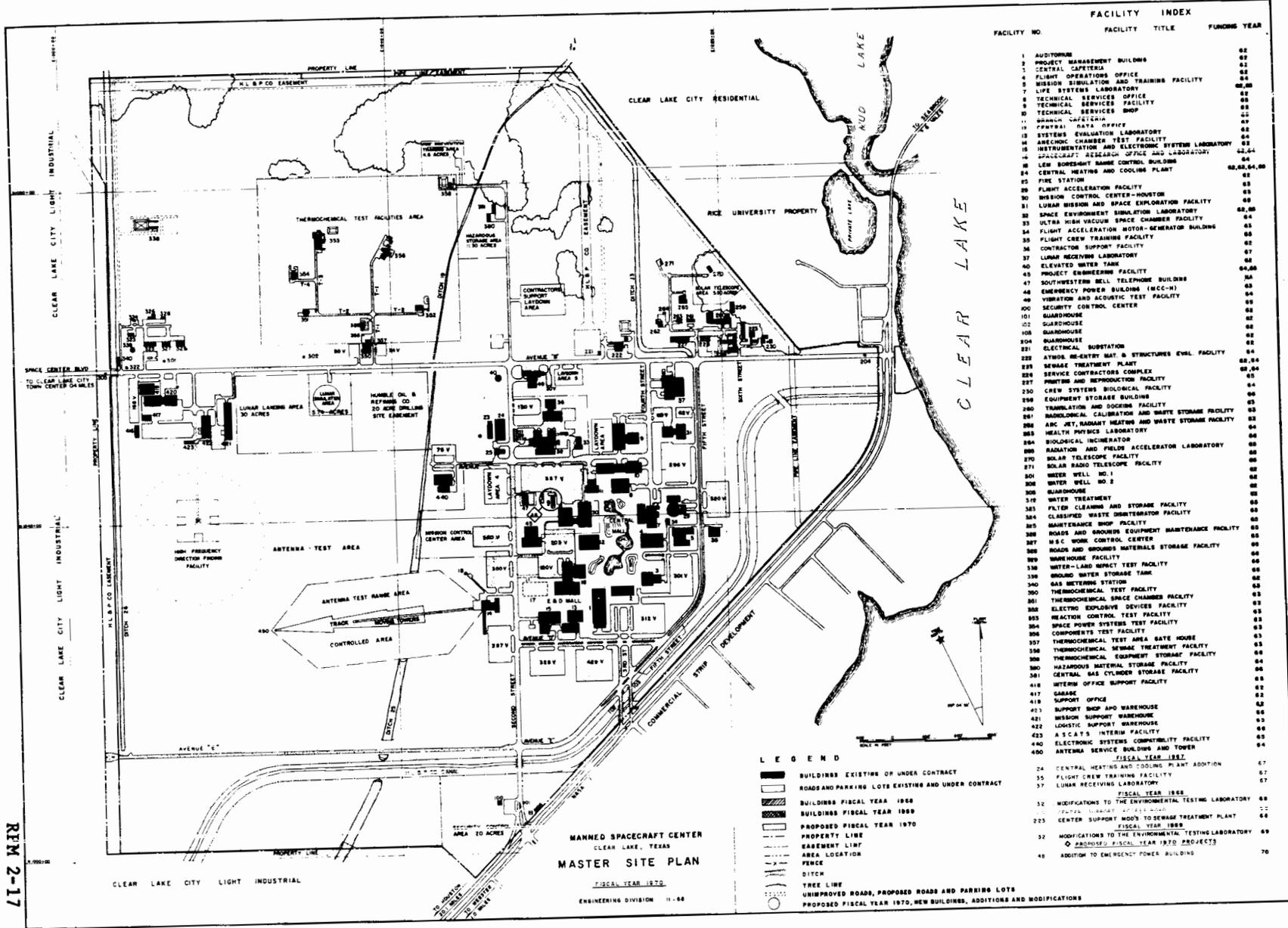
RPM 2-15



MANNED SPACECRAFT CENTER
 CLEAR LAKE SITE
 HARRIS COUNTY, TEXAS
VICINITY MAP

RPM 2-16





FACILITY INDEX

| FACILITY NO. | FACILITY TITLE | FISCAL YEAR |
|--------------|--|-------------|
| 1 | AUDITORIUM | 62 |
| 2 | PROJECT MANAGEMENT BUILDING | 62 |
| 3 | CENTRAL CAFETERIA | 62 |
| 4 | FLIGHT OPERATIONS OFFICE | 62 |
| 5 | MISSION SIMULATION AND TRAINING FACILITY | 62,68 |
| 6 | TECHNICAL SERVICES OFFICE | 62 |
| 7 | LIFE SYSTEMS LABORATORY | 62 |
| 8 | TECHNICAL SERVICES OFFICE | 62 |
| 9 | TECHNICAL SERVICES FACILITY | 62 |
| 10 | TECHNICAL SERVICES SHOP | 62 |
| 11 | BRANCH CAFETERIA | 62 |
| 12 | FFPRAI DATA OFFICE | 62 |
| 13 | SYSTEMS EVALUATION LABORATORY | 62 |
| 14 | ANEMIC CHAMBER TEST FACILITY | 62 |
| 15 | INSTRUMENTATION AND ELECTRONIC SYSTEMS LABORATORY | 62,64 |
| 16 | SPACECRAFT RESEARCH OFFICE AND LABORATORY | 64 |
| 17 | LEW BURESMITH RANGE CONTROL BUILDING | 64,66,68,69 |
| 18 | CENTRAL HEATING AND COOLING PLANT | 62 |
| 19 | FIRE STATION | 62 |
| 20 | FLIGHT ACCELERATION FACILITY | 62 |
| 21 | MISSION CONTROL CENTER-HOUSTON | 62 |
| 22 | LUNAR MISSION AND SPACE EXPLORATION FACILITY | 62 |
| 23 | SPACE ENVIRONMENT SIMULATION LABORATORY | 62,68 |
| 24 | ULTRA HIGH VACUUM SPACE CHAMBER FACILITY | 64 |
| 25 | FLIGHT ACCELERATION MOTOR-GENERATOR BUILDING | 62 |
| 26 | FLIGHT CREW TRAINING FACILITY | 62 |
| 27 | CONTRACTOR SUPPORT FACILITY | 67 |
| 28 | LUNAR RECEIVING LABORATORY | 67 |
| 29 | ELEVATED WATER TANK | 64,68 |
| 30 | PROJECT ENGINEERING FACILITY | 64 |
| 31 | SOUTHWESTERN BELL TELEPHONE BUILDING | 64 |
| 32 | EMERGENCY POWER BUILDING (MCC-N) | 64 |
| 33 | VIBRATION AND ACOUSTIC TEST FACILITY | 64 |
| 34 | SECURITY CONTROL CENTER | 62 |
| 101 | GUARDHOUSE | 62 |
| 102 | GUARDHOUSE | 62 |
| 103 | GUARDHOUSE | 62 |
| 104 | GUARDHOUSE | 62 |
| 221 | ELECTRICAL SUBSTATION | 64 |
| 222 | ATMOSPHERIC ENTRY MAT. & STRUCTURES EVAL. FACILITY | 62,64 |
| 223 | SEWAGE TREATMENT PLANT | 62,64 |
| 224 | SERVICE CONTRACTORS COMPLEX | 62,64 |
| 225 | PRINTING AND REPRODUCTION FACILITY | 64 |
| 226 | CREW SYSTEMS BUILDING | 64 |
| 227 | EQUIPMENT STORAGE BUILDING | 64 |
| 228 | TRANSLATION AND DOCKING FACILITY | 62 |
| 229 | BIOLOGICAL CALIBRATION AND WASTE STORAGE FACILITY | 62 |
| 230 | ABC JET, RAMJET HEATER AND WASTE STORAGE FACILITY | 62 |
| 231 | HEALTH PHYSICS LABORATORY | 62 |
| 232 | BIOLOGICAL INCUBATOR AND FIELDS ACCELERATOR LABORATORY | 62 |
| 233 | SOLAR TELESCOPE FACILITY | 62 |
| 234 | SOLAR RADIO TELESCOPE FACILITY | 62 |
| 235 | WATER WELL NO. 1 | 62 |
| 236 | WATER WELL NO. 2 | 62 |
| 300 | GUARDHOUSE | 62 |
| 310 | WATER TREATMENT | 62 |
| 321 | FILTER CLEANING AND STORAGE FACILITY | 62 |
| 322 | CLASSIFIED WASTE DISPOSAL FACILITY | 62 |
| 323 | MAINTENANCE SHOP FACILITY | 62 |
| 324 | ROADS AND GROUNDS EQUIPMENT MAINTENANCE FACILITY | 62 |
| 325 | M.S.C. WORK CONTROL CENTER | 62 |
| 326 | ROADS AND GROUNDS MATERIALS STORAGE FACILITY | 62 |
| 327 | WAREHOUSE FACILITY | 62 |
| 328 | WATER-LAND IMPACT TEST FACILITY | 62 |
| 329 | GROUND WATER STORAGE TANK | 62 |
| 330 | GAS METERING STATION | 62 |
| 331 | THERMOCHEMICAL TEST FACILITY | 62 |
| 332 | THERMOCHEMICAL SPACE CHAMBER FACILITY | 62 |
| 333 | ELECTRO EXPLOSIVE DEVICES FACILITY | 62 |
| 334 | REACTION CONTROL TEST FACILITY | 62 |
| 335 | SPACE POWER SYSTEMS TEST FACILITY | 62 |
| 336 | COMPONENTS TEST FACILITY | 62 |
| 337 | THERMOCHEMICAL TEST AREA BATE HOUSE | 62 |
| 338 | THERMOCHEMICAL WASTE TREATMENT FACILITY | 62 |
| 339 | THERMOCHEMICAL EQUIPMENT STORAGE FACILITY | 62 |
| 340 | HAZARDOUS MATERIAL STORAGE FACILITY | 62 |
| 341 | CENTRAL GAS CYLINDER STORAGE FACILITY | 62 |
| 410 | WIPERS OFFICE SUPPORT FACILITY | 62 |
| 411 | SABAGE | 62 |
| 412 | SUPPORT OFFICE | 62 |
| 413 | SUPPORT SHOP AND WAREHOUSE | 62 |
| 414 | MISSION SUPPORT WAREHOUSE | 62 |
| 415 | LOGISTIC SUPPORT WAREHOUSE | 62 |
| 416 | INTERIM FACILITY | 62 |
| 417 | A.I.C.A.T.S. | 62 |
| 418 | ELECTRONIC SYSTEMS COMPATIBILITY FACILITY | 62 |
| 419 | ANTENNA SERVICE BUILDING AND TOWER | 62 |
| 420 | CENTRAL HEATING AND COOLING PLANT ADDITION | 67 |
| 421 | FLIGHT CREW TRAINING FACILITY | 67 |
| 422 | LUNAR RECEIVING LABORATORY | 67 |
| 423 | MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY | 62 |
| 424 | FFPRAI LABORATORY ADDITION | 62 |
| 425 | CENTRAL SUPPORT SHOP TO SEWAGE TREATMENT PLANT | 62 |
| 426 | MODIFICATIONS TO THE ENVIRONMENTAL TESTING LABORATORY | 69 |
| 427 | PROPOSED FISCAL YEAR 1970 SUBJECTS | 62 |
| 428 | ADDITION TO EMERGENCY POWER BUILDING | 70 |

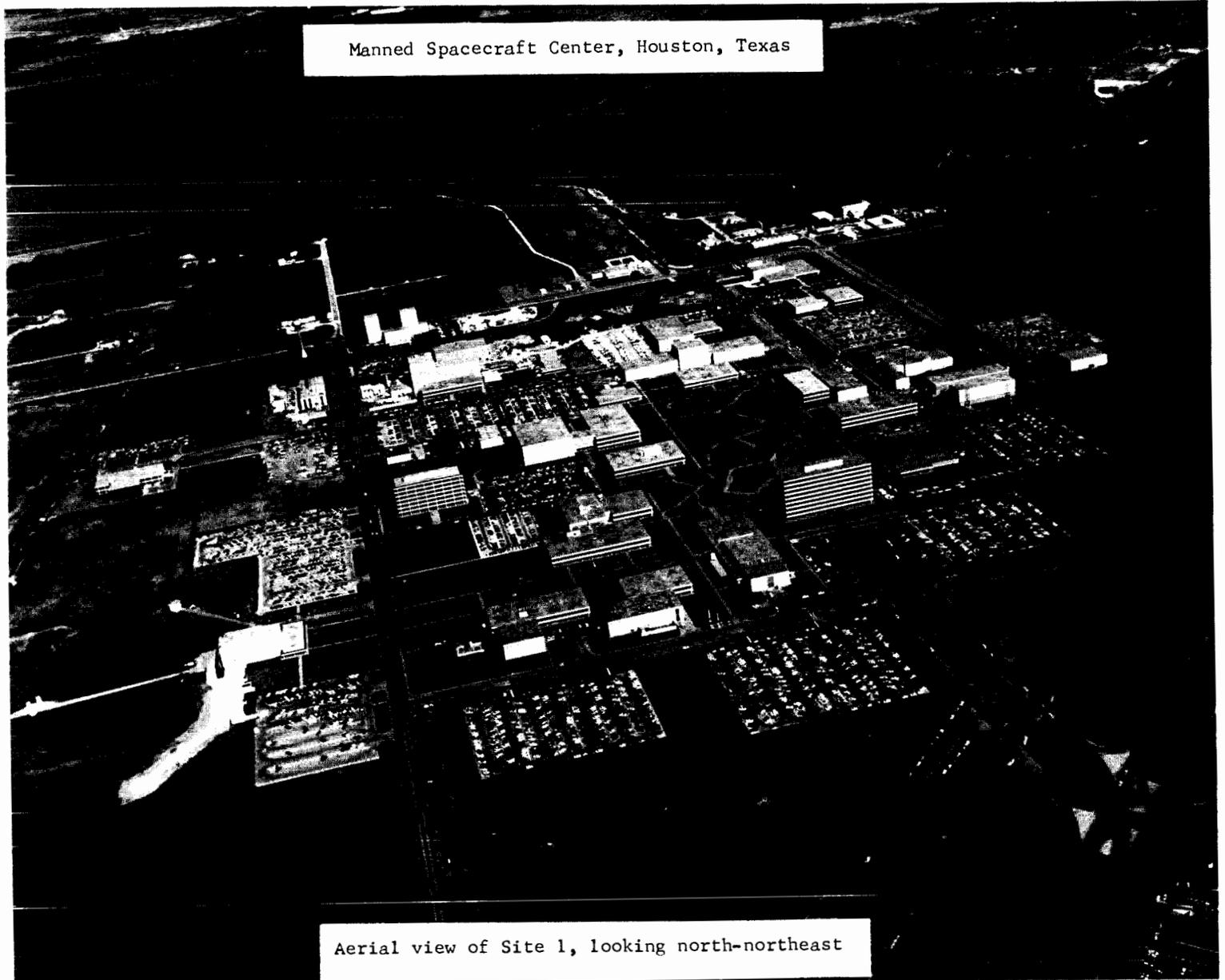
LEGEND

- BUILDINGS EXISTING OR UNDER CONTRACT
- ▨ ROADS AND PARKING LOTS EXISTING AND UNDER CONTRACT
- ▩ BUILDINGS FISCAL YEAR 1968
- ▧ BUILDINGS FISCAL YEAR 1969
- ▦ PROPOSED FISCAL YEAR 1970
- PROPERTY LINE
- EASEMENT LINE
- AREA LOCATION
- PERCE
- DITCH
- TREE LINE
- UNIMPROVED ROADS, PROPOSED ROADS AND PARKING LOTS
- PROPOSED FISCAL YEAR 1970, NEW BUILDINGS, ADDITIONS AND MODIFICATIONS

RFM 2-17

MANNED SPACECRAFT CENTER
 CLEAR LAKE, TEXAS
MASTER SITE PLAN
 FISCAL YEAR 1970
 ENGINEERING DIVISION 11-64

Manned Spacecraft Center, Houston, Texas



Aerial view of Site 1, looking north-northeast

RPM 2-18

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

GEORGE C. MARSHALL SPACE FLIGHT CENTER

MISSION:

The Marshall Space Flight Center (MSFC) at Huntsville, Alabama, became a part of NASA in July 1960, and serves as NASA's primary center for the design, development, and testing of large launch vehicles and space transportation systems. MSFC is also engaged in payload development and payload integration for post-Apollo flights. MSFC includes the component field activities at Michoud Assembly Facility (MAF) at New Orleans, Louisiana; the Slidell Central Computer Facility nearby; and the Mississippi Test Facility (MTF) in southwest Mississippi. The Center is now proceeding with the direction and management of the following:

1. The Saturn IB, which provides a launch vehicle for Apollo spacecraft development and serves as the carrier for all Apollo Applications missions.
2. The Saturn V, which provides the launch vehicle for manned lunar landing missions, planetary missions, and future very large scientific satellite payloads.
3. Selected payloads for Apollo Applications missions, such as the Saturn I Workshop, and the Apollo Telescope Mount.

In carrying out its management responsibilities, the Marshall Space Flight Center has developed the capability to:

1. Design and develop large launch vehicle systems, including vehicle systems test and integration, tailored to manned and unmanned payload requirements.
2. Design and develop scientific payloads, space stations, and systems required for on-going and future space exploration.
3. Develop and integrate scientific experiment payload packages to be flown on Saturn/Apollo and subsequent post-Apollo missions.
4. Conduct systems engineering and overall systems integration of vehicles and payloads.
5. Technical and business management of industrial programs involving space vehicles, payloads and systems.

RPM 2-19

In support of its assigned programs, Marshall also maintains the research and development capability to conduct advanced studies on launch vehicle and space systems, space navigation techniques, astronautics, and space science investigations. Its capability for research and for management of large industrial programs gives the Marshall Space Flight Center a highly flexible base for space programs.

DESCRIPTION:

Operations of the Marshall Space Flight Center are conducted at three primary locations.

The first location, the main Marshall Space Flight Center site is near Huntsville, Alabama, on Army property at the Redstone Arsenal. The Center occupies 1,797 acres under a nonrevocable use permit from the Army, and 64 leased acres. The capital investment as of June 30, 1968 was \$512,117,000. Certain facilities such as the Redstone Arsenal Air Field and some utilities are used jointly by NASA and the Army. The Huntsville location has deep-water access via the Tennessee, Ohio and Mississippi Rivers.

The second location, the Michoud Assembly Facility, is located 15 miles east of New Orleans, Louisiana. The main facility occupies approximately 897 acres and the Slidell Central Computer Facility, a satellite facility 20 miles to the northeast, occupies 14 additional acres. The capital investment as of June 30, 1968, was \$147,004,000. Michoud facility space totals 3,559,016 square feet, including the main assembly plant, covering an area of 43 acres under one roof. MSFC exercises overall management of the facility, while a support contractor provides administrative and technical services, and the vehicle prime contractors produce the Saturn I and Saturn V booster stages at this location. The Michoud Assembly Facility is on the Gulf Intra-Coastal Waterway, and has deep-water access via the Mississippi River.

The third location, the Mississippi Test Facility, is in southwest Mississippi, approximately 50 miles northeast of New Orleans, Louisiana. Total land area is 138,870 acres of which 13,428 acres make up the actual test area owned by NASA. The remaining 125,442 acres are held as a buffer zone. In the buffer area, 7,558 acres are owned by NASA, and 117,884 acres are under restrictive easement. Capital investment for the Mississippi Test Facility as of June 30, 1968, was \$286,452,000. Test stands include a dual-position stand for testing the Saturn V first stage (S-IC), and two stands for testing the 1,000,000 pound thrust Saturn V second stage (S-II). MSFC exercises overall management of the facility, while a support contractor provides administrative and technical services, and the vehicle prime contractors are responsible for conducting tests on the stands. The site has deep-water access for transporting large boosters via the Pearl River and the Intra-Coastal Waterway.

The total capital investment of the Marshall Space Flight Center, including fixed assets in process and contractor-held facilities at various locations, as of June 30, 1968, was \$945,573,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| | <u>FUNDS</u> | | |
|--------------------------------|----------------------|----------------------|----------------------|
| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$90,292,000 | \$90,605,000 | \$87,485,000 |
| Travel..... | 2,750,000 | 2,175,000 | 2,078,000 |
| Automatic data processing..... | 10,049,000 | 7,047,000 | 6,796,000 |
| Facilities services..... | 11,089,000 | 8,306,000 | 7,953,000 |
| Technical services..... | 3,126,000 | 1,207,000 | 1,160,000 |
| Administrative support..... | <u>8,924,000</u> | <u>7,021,000</u> | <u>6,729,000</u> |
| Total, fund requirements.... | <u>\$126,230,000</u> | <u>\$116,361,000</u> | <u>\$112,201,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 3,414 | 3,007 | 2,580 |
| Space flight operations..... | 1,217 | 1,345 | 1,659 |
| Advanced missions..... | 159 | 154 | 150 |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 10 | 10 | 11 |
| Lunar and planetary exploration..... | 11 | 13 | 14 |
| Bioscience..... | 5 | 6 | 7 |
| Space applications..... | 6 | 6 | 6 |
| Launch vehicle procurement..... | 6 | 5 | 7 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 46 | 27 | 29 |
| Space vehicle systems..... | 89 | 60 | 55 |
| Electronics systems..... | 83 | 55 | 53 |
| Human factor systems..... | 11 | 4 | 3 |
| Space power and electric propulsion systems..... | 10 | 4 | 3 |
| Nuclear rockets..... | 32 | 27 | 25 |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| Chemical propulsion..... | 12 | 8 | 10 |
| Aeronautical vehicles..... | - | 2 | 2 |
| <u>Tracking and Data Acquisition.....</u> | 10 | 12 | 12 |
| <u>Technology Utilization.....</u> | <u>10</u> | <u>10</u> | <u>10</u> |
| Subtotal, positions by program..... | <u>5,131</u> | <u>4,755</u> | <u>4,636</u> |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 137 | 131 | 130 |
| Administrative support..... | 642 | 597 | 592 |
| Research and development support..... | <u>530</u> | <u>498</u> | <u>493</u> |
| Subtotal, indirect positions..... | <u>1,309</u> | <u>1,226</u> | <u>1,215</u> |
| Total, permanent positions..... | <u>6,440</u> | <u>5,981</u> | <u>5,851</u> |

**NATIONAL AERONAUTIC AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING CHART
MARSHALL SPACE FLIGHT CENTER**

OFFICE OF DIRECTOR

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 62 | 73 |
| GS-16 | 0 | 6 |
| GS-15 | 1 | 1 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 0 | 0 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 24 | 23 |

SAFETY OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 0 | 0 |
| GS-14 | 1 | 1 |
| ALL OTHER GS | 8 | 3 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 14 | 14 |

ASST DIR. FOR SCIENTIFIC & TECH ANALYSIS

| | | |
|------------------------|----------|----------|
| EXCEPTED | 62 | 73 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 0 | 0 |
| ALL OTHER GS | 0 | 0 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 1 | 1 |

EXECUTIVE STAFF

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 62 | 73 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 0 | 0 |
| ALL OTHER GS | 35 | 34 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 50 | 49 |

PUBLIC AFFAIRS OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 48 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 21 | 20 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 25 | 24 |

CHIEF COUNSEL

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 42 | 73 |
| GS-16 | 0 | 0 |
| GS-15 | 1 | 1 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 10 | 10 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 15 | 15 |

PATENT COUNSEL

| | | |
|------------------------|----------|----------|
| EXCEPTED | 43 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 1 | 1 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 3 | 3 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 8 | 8 |

STAFFING SUMMARY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 64 | 72 |
| GS-16 | 43 | 40 |
| GS-15 | 58 | 58 |
| GS-14 | 371 | 373 |
| ALL OTHER GS | 176 | 143 |
| WAGEBOARD | 4077 | 3987 |
| TOTAL PERMANENT | 581 | 581 |

MANAGEMENT SERVICES OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 62 | 73 |
| GS-16 | 1 | 1 |
| GS-15 | 0 | 0 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 116 | 113 |
| WAGEBOARD | 220 | 188 |
| TOTAL PERMANENT | 151 | 146 |

PURCHASING OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 62 | 73 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 2 | 2 |
| ALL OTHER GS | 180 | 179 |
| WAGEBOARD | 220 | 228 |
| TOTAL PERMANENT | 192 | 188 |

TECHNICAL SERVICES OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 2 | 2 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 273 | 271 |
| WAGEBOARD | 220 | 228 |
| TOTAL PERMANENT | 461 | 461 |

FINANCIAL MANAGEMENT OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 5 | 5 |
| GS-14 | 13 | 13 |
| ALL OTHER GS | 128 | 125 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 146 | 143 |

MANPOWER UTILIZATION & ADMINISTRATION OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 101 | 99 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 112 | 110 |

FACILITIES & DESIGN OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 12 | 12 |
| ALL OTHER GS | 27 | 27 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 42 | 42 |

RESEARCH AND DEVELOPMENT OPERATIONS

| | | |
|------------------------|----------|----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 1 | 1 |
| GS-14 | 0 | 0 |
| ALL OTHER GS | 3 | 3 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 7 | 7 |

INDUSTRIAL OPERATIONS

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 0 | 0 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 4 | 4 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 16 | 16 |

ADVANCED SYSTEMS OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 3 | 3 |
| GS-15 | 1 | 1 |
| GS-14 | 11 | 11 |
| ALL OTHER GS | 16 | 16 |
| WAGEBOARD | 43 | 41 |
| TOTAL PERMANENT | 74 | 72 |

SYSTEMS ENGRG OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 1 | 1 |
| GS-14 | 10 | 10 |
| ALL OTHER GS | 21 | 21 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 52 | 50 |

EXPERIMENTS OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 1 | 1 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 16 | 15 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 23 | 22 |

OPERATIONS MANAGEMENT OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 0 | 0 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 20 | 19 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 23 | 22 |

CONTRACTS OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 0 | 0 |
| GS-14 | 3 | 3 |
| ALL OTHER GS | 14 | 14 |
| WAGEBOARD | 19 | 19 |
| TOTAL PERMANENT | 115 | 113 |

PLANNING & RESOURCES OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 4 | 4 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 26 | 25 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 34 | 33 |

PROJECT LOGISTICS OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 0 | 0 |
| GS-15 | 3 | 3 |
| GS-14 | 4 | 4 |
| ALL OTHER GS | 9 | 9 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 16 | 16 |

AERO-ASTRODYNAMICS LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 7 | 7 |
| GS-14 | 28 | 28 |
| ALL OTHER GS | 35 | 35 |
| WAGEBOARD | 226 | 219 |
| TOTAL PERMANENT | 297 | 290 |

ASTRONOMICS LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 4 | 4 |
| GS-15 | 5 | 5 |
| GS-14 | 59 | 59 |
| ALL OTHER GS | 102 | 102 |
| WAGEBOARD | 561 | 554 |
| TOTAL PERMANENT | 826 | 796 |

COMPUTATION LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 1 | 1 |
| GS-14 | 28 | 28 |
| ALL OTHER GS | 105 | 100 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 148 | 143 |

MANUFACTURING ENGINEERING LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 13 | 13 |
| GS-14 | 36 | 36 |
| ALL OTHER GS | 288 | 287 |
| WAGEBOARD | 286 | 250 |
| TOTAL PERMANENT | 651 | 590 |

SATURN III PROGRAM OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 26 | 26 |
| ALL OTHER GS | 72 | 69 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 102 | 107 |

SATURN/APOLLO APPLICATIONS PROGRAM OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 3 | 3 |
| GS-14 | 10 | 10 |
| ALL OTHER GS | 27 | 27 |
| WAGEBOARD | 68 | 46 |
| TOTAL PERMANENT | 90 | 88 |

SATURN V PROGRAM OFFICE

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 2 | 2 |
| GS-15 | 6 | 6 |
| GS-14 | 19 | 19 |
| ALL OTHER GS | 65 | 65 |
| WAGEBOARD | 187 | 181 |
| TOTAL PERMANENT | 279 | 273 |

ENGINE PROGRAM OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 7 | 7 |
| GS-14 | 27 | 27 |
| ALL OTHER GS | 34 | 32 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 75 | 73 |

PROPULSION & VEHICLE ENGINEERING LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 7 | 7 |
| GS-15 | 31 | 33 |
| GS-14 | 110 | 104 |
| ALL OTHER GS | 47 | 44 |
| WAGEBOARD | 22 | 22 |
| TOTAL PERMANENT | 267 | 258 |

QUALITY & RELIABILITY ASSURANCE LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 4 | 4 |
| GS-14 | 29 | 29 |
| ALL OTHER GS | 62 | 62 |
| WAGEBOARD | 377 | 363 |
| TOTAL PERMANENT | 461 | 463 |

SPACE SCIENCES LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 14 | 14 |
| ALL OTHER GS | 20 | 20 |
| WAGEBOARD | 88 | 83 |
| TOTAL PERMANENT | 125 | 120 |

TEST LABORATORY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 64 | 68 |
| GS-16 | 1 | 1 |
| GS-15 | 5 | 5 |
| GS-14 | 18 | 18 |
| ALL OTHER GS | 31 | 31 |
| WAGEBOARD | 78 | 78 |
| TOTAL PERMANENT | 107 | 111 |

MICRODUT ASSEMBLY FACILITY

| | | |
|------------------------|------------|------------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 12 | 12 |
| ALL OTHER GS | 126 | 124 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 151 | 148 |

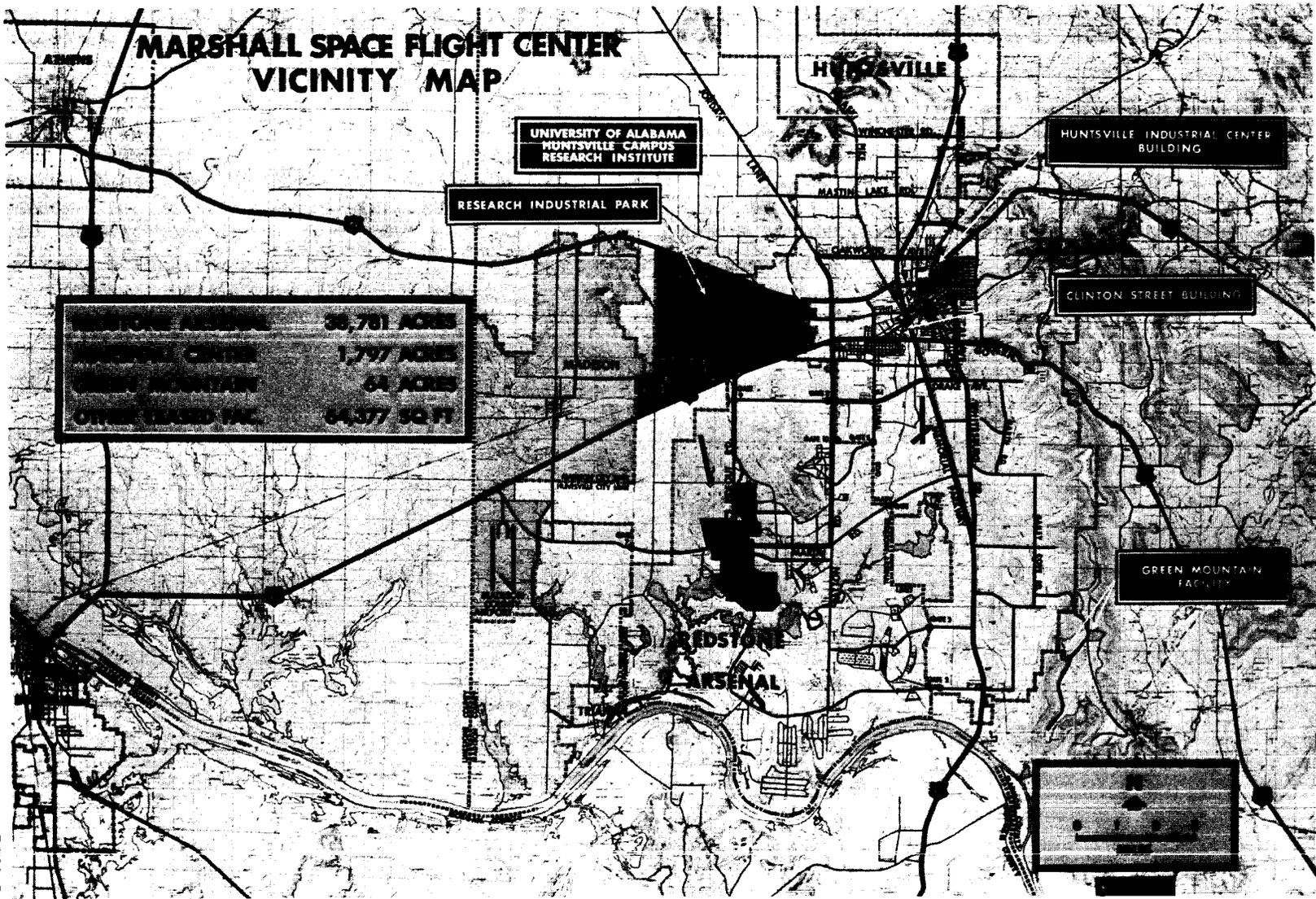
MISSION OPERATIONS OFFICE

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 9 | 9 |
| ALL OTHER GS | 30 | 29 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 45 | 44 |

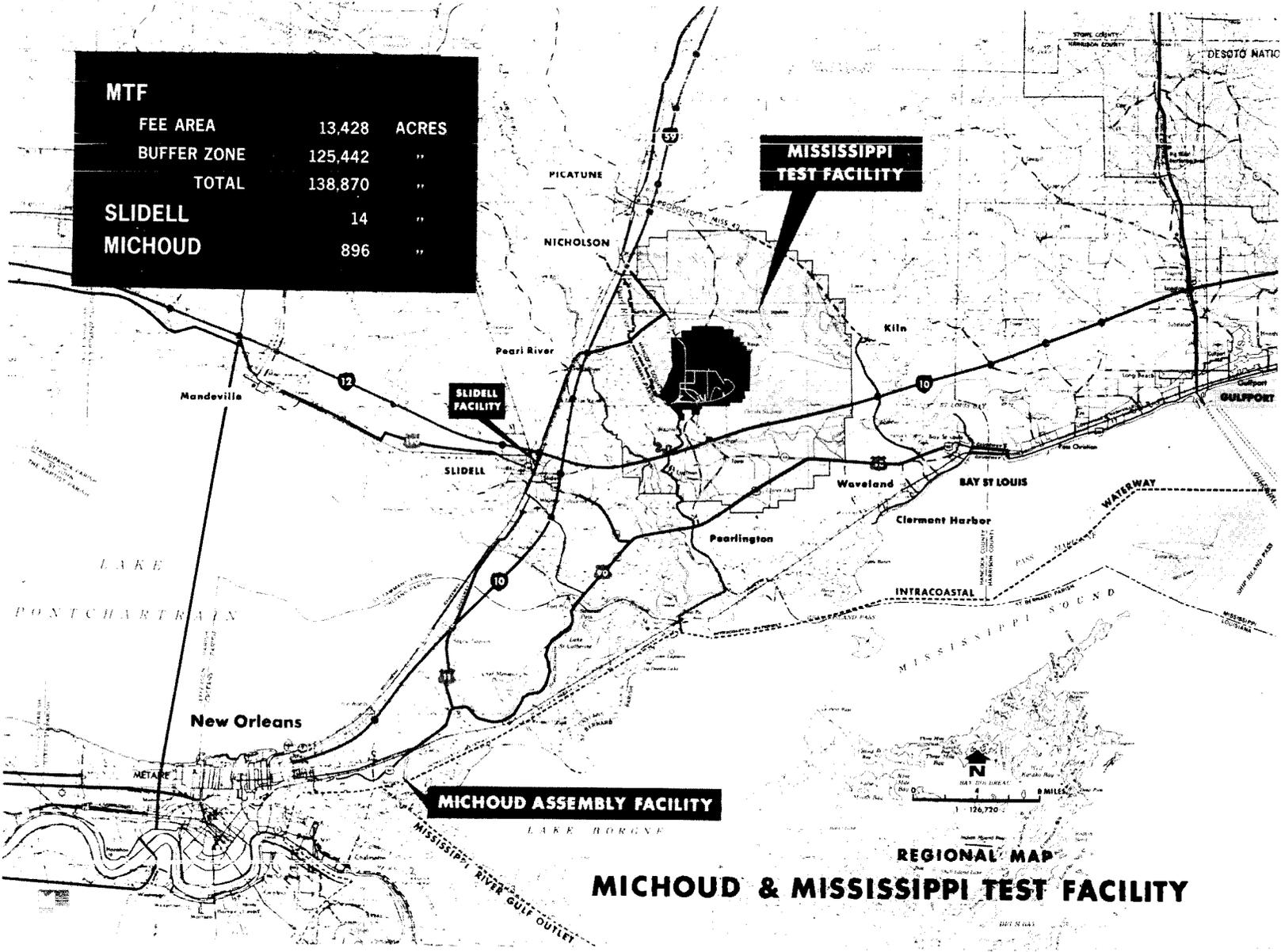
MISSISSIPPI TEST FACILITY

| | | |
|------------------------|-----------|-----------|
| EXCEPTED | 69 | 70 |
| GS-16 | 1 | 1 |
| GS-15 | 5 | 5 |
| GS-14 | 10 | 10 |
| ALL OTHER GS | 61 | 59 |
| WAGEBOARD | 0 | 0 |
| TOTAL PERMANENT | 78 | 76 |

RPM 2-23



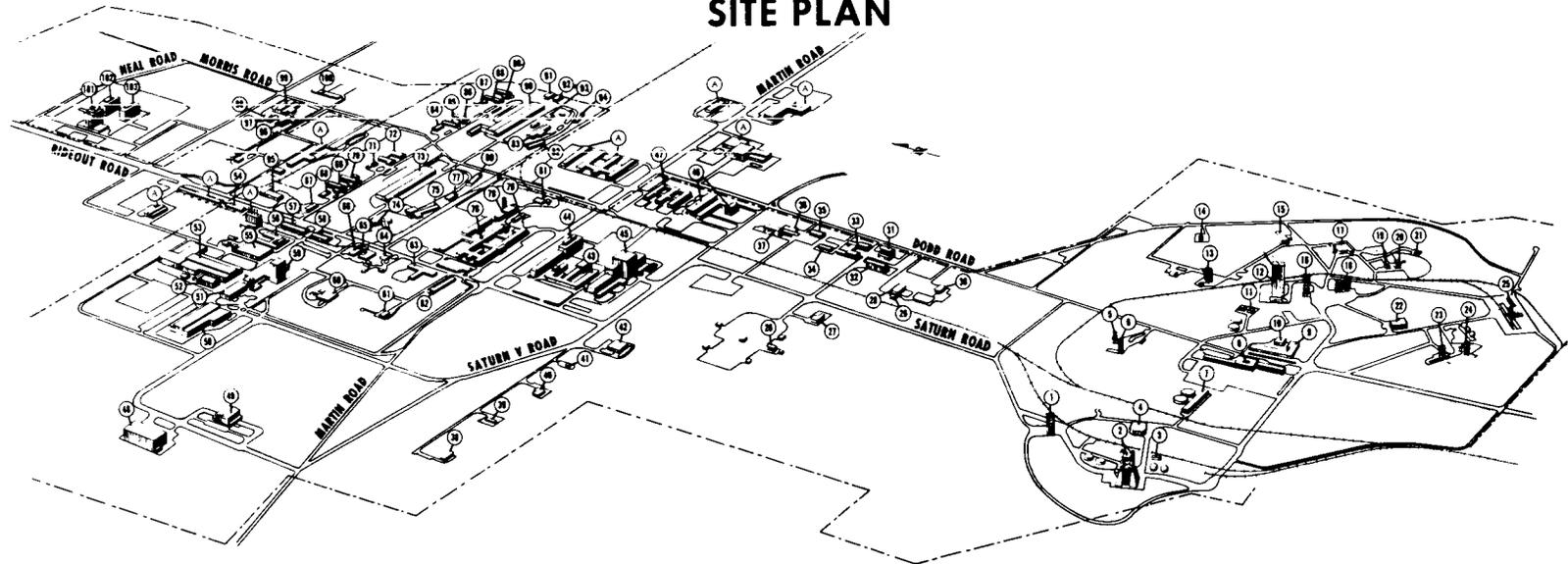
| | | | |
|----------------|---------|-------|--|
| MTF | | | |
| FEE AREA | 13,428 | ACRES | |
| BUFFER ZONE | 125,442 | " | |
| TOTAL | 138,870 | " | |
| SLIDELL | 14 | " | |
| MICHOU | 896 | " | |



REGIONAL MAP
MICHOU & MISSISSIPPI TEST FACILITY

RPM 2-25

MARSHALL SPACE FLIGHT CENTER SITE PLAN



TEST AREA

WEST AREA

- 1 4696 F-1 ENGINE TEST STAND
- 2 4670 SATURN STATIC TEST STAND (S-1C)
- 3 4674 HELIUM COMPRESSOR BUILDING
- 4 4674 CONTROL CENTER BUILDING
- 5 INTERIM TEST STAND
- 6 JUPITER "HOP" TEST STAND
- 7 4667 PUMP HOUSE
- 8 4666 TEST DIVISION ENGINEERING BUILDING

EAST AREA

- 9 4566 ENGINEERING BUILDING
- 10 4567 BOILER HOUSE AND PUMP STATION
- 11 S-4549 DEIONIZED WATER TREATMENT PLANT
- 12 4550 ADVANCED SATURN DYNAMIC TEST STAND
- 13 4522 TEST STAND (LOX-LH2 COMPONENTS)
- 14 4530 TEST STAND (LOX-RP COMPONENTS)
- 15 4561 CONTROL AND SERVICE CENTER
- 16 4557 DYNAMIC TEST STAND (SATURN 1/1B)
- 17 4583 COMPONENTS TEST LABORATORY
- 18 4548 F-1 TURBO TEST FACILITY
- 19 S-4539 TEST PREPARATION BUILDING
- 20 4540 ACOUSTIC MODEL TEST FACILITY
- 21 4541 CONTROL BUILDING
- 22 4570 BLOCKHOUSE
- 23 4564 POWER PLANT TEST STAND (H-1 ENGINE)
- 24 4514 LIQUID HYDROGEN FACILITY (S-1VB)
- 25 4572 STATIC TEST TOWER (S-1/1B)

TEST SUPPORT AREA

- 26 4646 GSE TEST CONTROL CENTER
- 27 4648 HIGH PRESSURE FLUID TEST FACILITY
- 28 S-4659 SUPPORT BUILDING (N2 VAPORIZATION FAC)
- 29 S-4660 BOILER HOUSE
- 30 S-4647 GAS STORAGE & COMPRESSOR BLDG.
- 31 S-4655 ENGINE PREPARATION BUILDING
- 32 S-4654 SATURN V GSE ASSEMBLY BUILDING
- 33 S-4653 COMPONENTS SUPPORT BUILDING
- 34 4678 SUB STORES BUILDING
- 35 S-4654 TECHNICAL SYSTEMS WAREHOUSE
- 36 S-4651 SHOP BUILDING (QUONSET)
- 37 4649 TRANSPORTATION HANGAR

ENGINEERING & LABORATORY AREA

PROPULSION & VEHICLE ENGINEERING

- 38 4628 LOW TEMPERATURE TEST FACILITY
- 39 4622 LIQUID HYDROGEN TEST PAD
- 40 4623 ACCELERATOR AND TEST CELL FACILITY
- 41 4624 HYDROGEN PEROXIDE STATION
- 42 4605 NON-DESTRUCTIVE TEST LABORATORY
- 43 4612 MATERIALS LABORATORY
- 44 5510 PROPULSION & VEHICLE ENG. LAB
- 45 4619 STRUCTURES AND MECHANICS LABORATORY
- 46 4650 GUIDED MISSILE TEST SHOP & INSTRUMENT LAB.
- 47 4643 COMPUTATION LABORATORY

MANUFACTURING & QUALITY

- 48 S-4755 VEHICLE COMPONENTS HANGAR
- 49 S-4752 COMPONENTS AND SUBASSEMBLY ACCEPTANCE BLDG.

- 50 4708 MISSILE ASSEMBLY AND INSPECTION HANGAR
- 51 4760 SURFACE TREATMENT FACILITY
- 52 S-4706 C-3 MOCK-UP SHELTER
- 53 4705 MISSILE ASSEMBLY SHOP AND HANGAR
- 54 4723 MATERIAL TEST LABORATORY
- 55 4711 PRECISION MACHINE SHOP
- 56 4712 FIELD OFFICE BUILDING (MECHANICAL ENG. LAB)
- 57 4727 MACHINE SHOP AND OFFICE BUILDING
- 58 4728 EQUIPMENT TEST SHOP
- 59 4707 MISSILE COMPONENT HANGAR & HYDROSTATIC TEST

ASTRONICS AND GENERAL SUPPORT

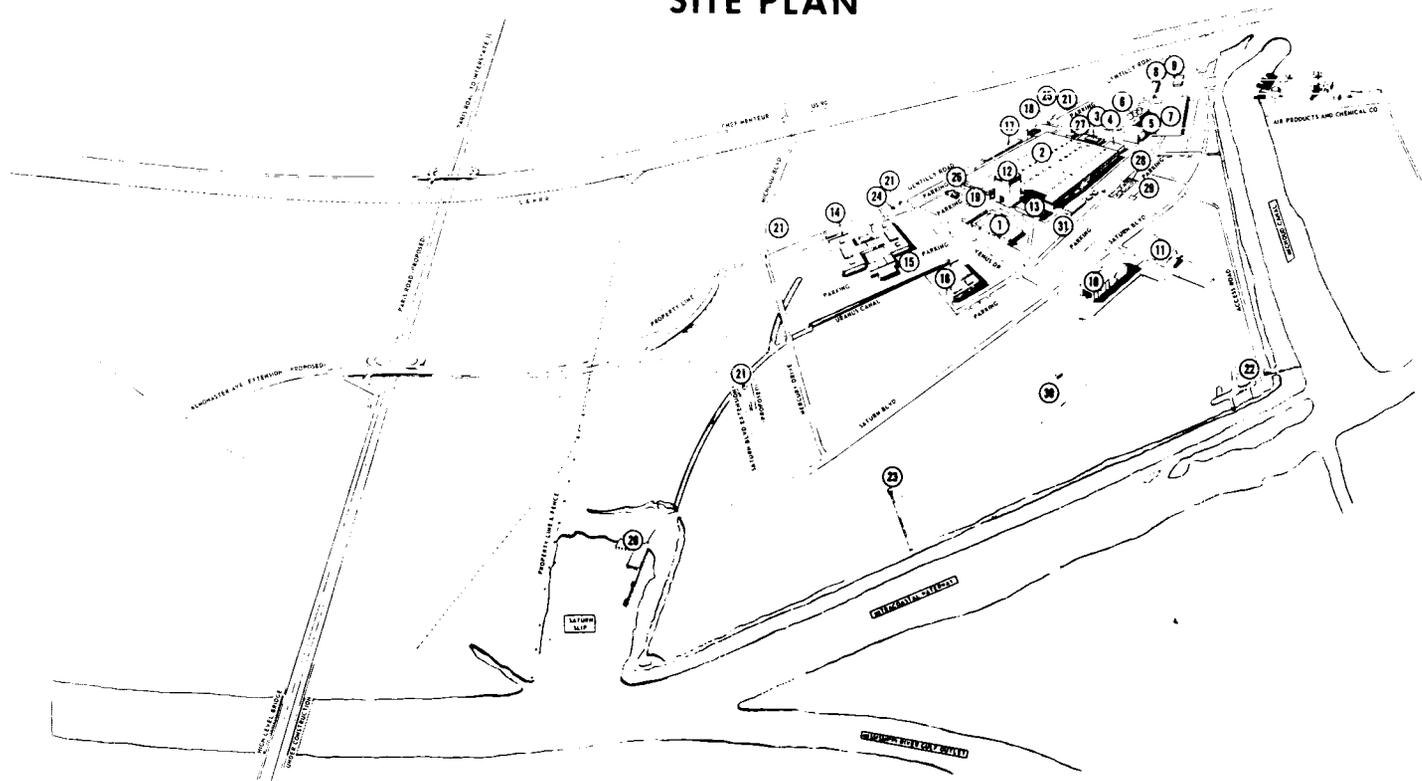
- 60 4750 HIGH ALTITUDE TEST FACILITY
- 61 4748 LIQUID PROPELLANT TEST SUPPORT BUILDING
- 62 S-4747 AIR COMPRESSOR STATION
- 63 4746 OFFICE TEST LABORATORY
- 64 4741 BERYLLIUM FACILITY
- 65 4732 WIND TUNNEL FACILITY
- 66 4733 VACUUM TANK FACILITY
- 67 4306 CAFETERIA
- 68 4312 OFFICE BUILDING
- 69 4311 SHOCK TUNNEL FACILITY
- 70 4313 STRUCTURAL TESTING LABORATORY STORAGE
- 71 4332 ENVIRONMENTAL TEST LABORATORY
- 72 4331 TESTING AND DEVELOPMENT SHOP
- 73 4471 STORAGE AND OFFICE BUILDING
- 74 4485 FINANCIAL MANAGEMENT OFFICE BUILDING
- 75 4491 COMPUTATION LABORATORY
- 76 4487 GUIDANCE AND CONTROL BUILDING ASTRONICS LABORATORY

- 77 S-4479 STORAGE SHED
- 78 4476 ACCELERATION AND ENVIRONMENTAL TEST FACILITY
- 79 S-4436 AUTOMATION CHECKOUT BUILDING
- 80 4492 ELECTRICAL SYSTEM LABORATORY
- 81 4475 HAZARDOUS OPERATIONS LABORATORY
- 82 4493 MACHINE AND SHEET METAL SHOP
- 83 4483 VEHICLE MAINTENANCE SHOP
- 84 4352 NITROGEN STORAGE BUILDING
- 85 4351 ADMINISTRATIVE BUILDING
- 86 4353 PHOTOGRAPHIC LABORATORY
- 87 4372 EQUIPMENT STORAGE (LAUNCHING AND HANDLING)
- 88 4371 STORAGE (SPECIFIC ITEMS)
- 89 4373 E.S.E. LABORATORY
- 90 4481 ENGINEERING AND MACHINE SHOP/OFFICE
- 91 S-4498 STORAGE BUILDING (QUONSET)
- 92 S-4499 STORAGE BUILDING (QUONSET)
- 93 4482 OPERATIONS SUPPORT BUILDING
- 94 4494 TECHNICAL DOCUMENTATION CENTER

HEADQUARTERS AREA

- 95 4207 CENTRAL COMMUNICATIONS FACILITY
- 96 4201 STORAGE BUILDING
- 97 S-4204 BUTLER BUILDING (STORAGE AND SHOPS)
- 98 S-4251 SUPPORT SERVICES EQUIPMENT SHED
- 99 4250 TECHNICAL SERVICES OPERATIONS BUILDING
- 100 4249 SUPPORT SERVICES OPERATIONS AND MEDICAL CENTER
- 101 4200 CENTRAL LABORATORY AND OFFICE BUILDING
- 102 4202 PROJECT ENGINEERING BUILDING
- 103 4201 ENGINEERING AND ADMINISTRATION BUILDING
- ARMY BUILDINGS

MICHLOUD ASSEMBLY FACILITY SITE PLAN



MANUFACTURING AND ASSEMBLY

1. BOOSTER HANGAR
2. MANUFACTURING
3. LABORATORY
4. BATTERY CHARGING & STORAGE
5. BOILER HOUSE
6. COOLING TOWER
7. VEHICLE COMPONENT SUPPLY
8. MAINTENANCE SUPPLY
9. HAZARDOUS MATERIAL STORAGE

TEST FACILITIES

10. S-1C STAGE TEST & CHECKOUT FACILITY

11. HIGH PRESSURE TEST FACILITY
12. VERTICAL ASSEMBLY & HYDROSTATIC TEST
13. SYSTEMS ENGINEERING

ENGINEERING & ADMINISTRATION

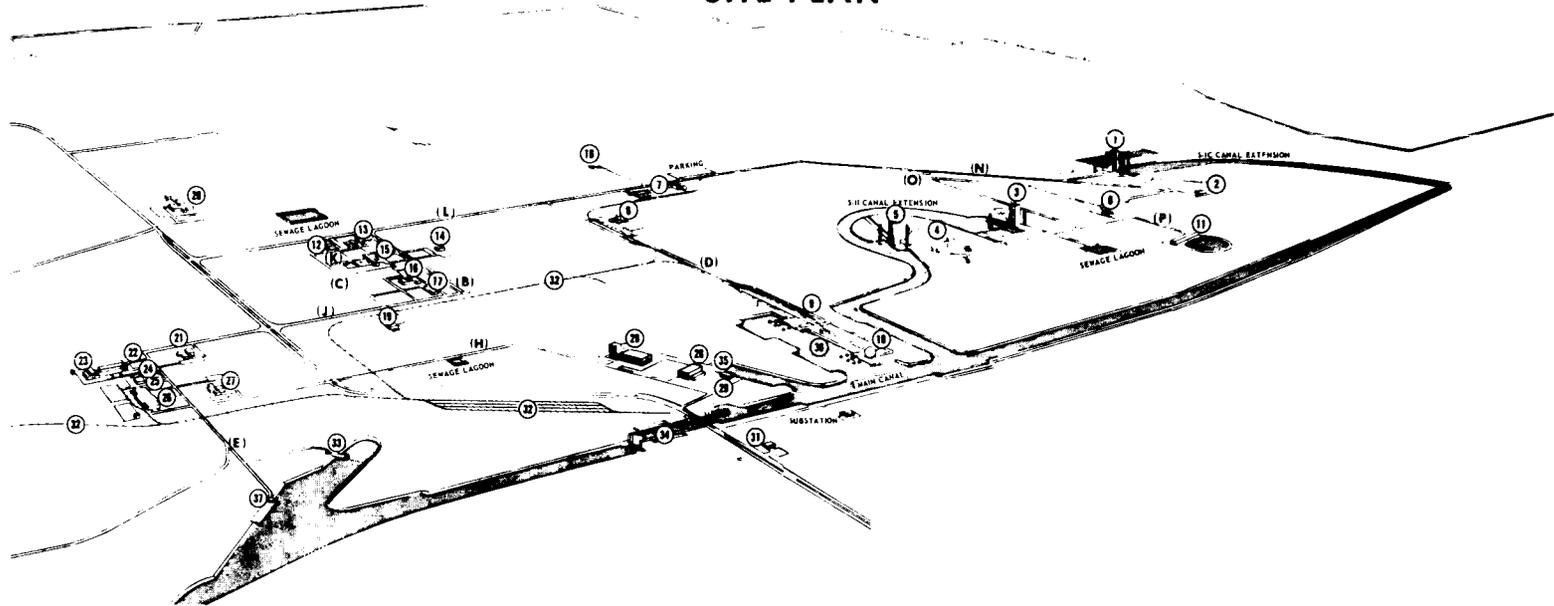
14. OFFICE AND ENGINEERING BUILDING
15. CAFETERIA
16. CONTRACTOR SERVICES BUILDING
17. ADMINISTRATION
18. ENGINEERING

TRANSPORTATION, UTILITIES & MISC

19. MAINTENANCE SHOP
20. SATURN BARGE DOCK

21. GUARD HOUSE
22. MAIN PUMP STATION
23. PUMP STATION NO 2
24. PUMP STATION NO 3
25. MAIN SUBSTATION
26. WEST MASTER SUBSTATION
27. PAINT SHOP
28. CHEMICAL WASTE LAGOON
29. CHEMICAL WASTE WELL (PROPOSED)
30. SALVAGE YARD
31. TRANSPORTATION

MISSISSIPPI TEST FACILITY SITE PLAN



SATURN V TEST COMPLEX

1. SATURN S-IC STATIC TEST FAC. (DUAL POSITION)
2. S-IC TEST CONTROL CENTER
3. S-II POSITION A-2
4. S-II TEST CONTROL CENTER
5. S-II POSITION A-1
6. DATA ACQUISITION CENTER
7. HIGH PRESSURE GAS COMPRESSOR FACILITY
8. RP-1 STORAGE AND TRANSFER AREA
9. LH2 TRANSFER AREA
10. LOX STORAGE AND TRANSFER AREA
11. HI PR WATER STORAGE, PUMP, & DISTR SYSTEM

ENGINEERING AND ADMINISTRATION COMPLEX

12. COMMUNICATIONS & TELEPHONE BUILDING
13. TEST AREA CONTROL CENTER
14. DATA HANDLING CENTER
15. OFFICE AND ADMINISTRATION BUILDING

16. ELECTRONICS INSTR & MATERIALS LAB
17. SONIC MEASURING FACILITY
- ACOUSTIC LAB
18. SONIC MEASURING FACILITY
- METEOROLOGY LAB
19. CENTRAL HEATING PLANT

INDUSTRIAL COMPLEX

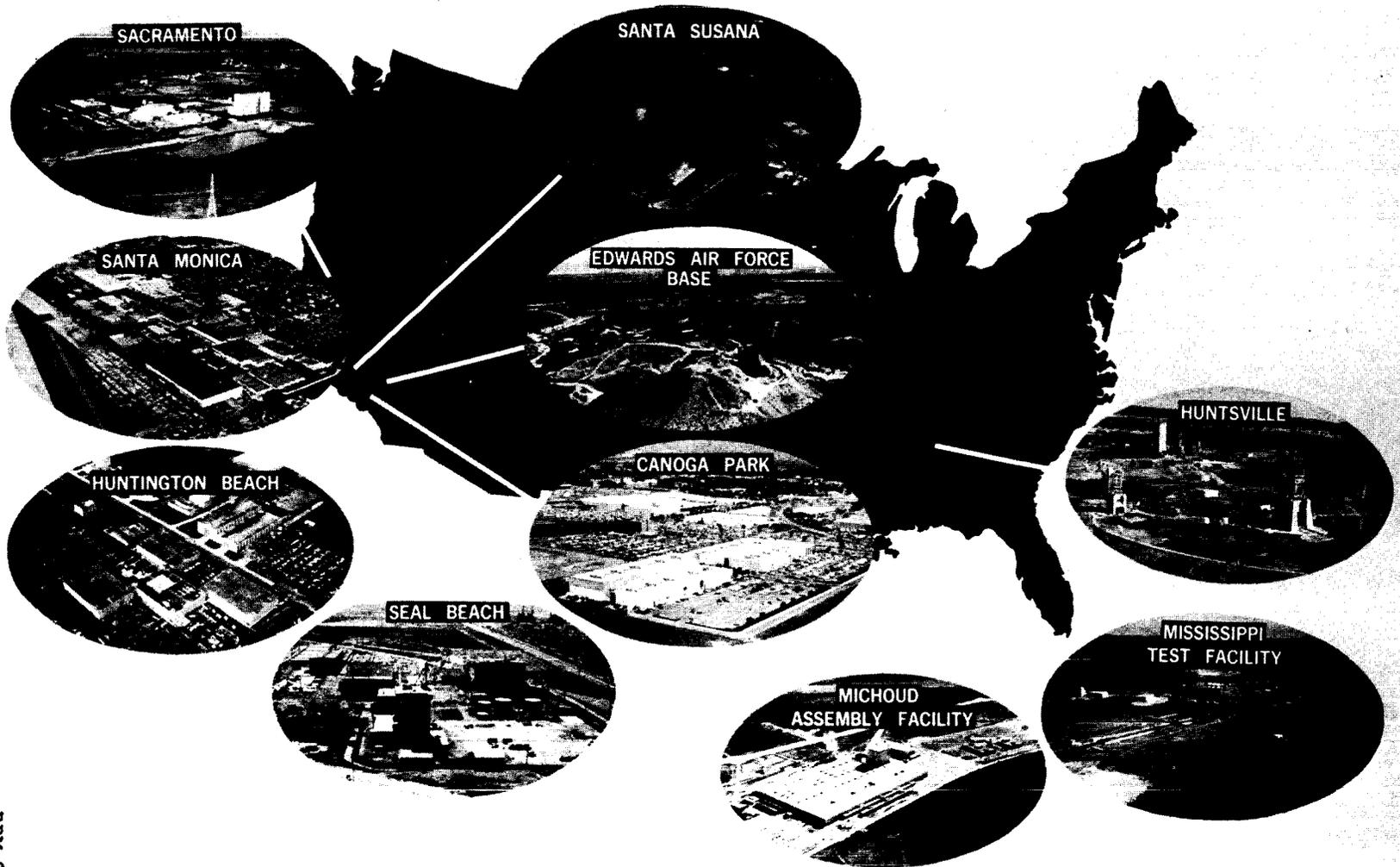
20. COMPONENTS SERVICE FACILITY
21. EMERGENCY SERVICES BLDG.
22. SITE MAINTENANCE BLDG.
23. TEST MAINTENANCE BLDG.
24. COMPRESSED GAS CYLINDER STORAGE
25. INFLAMMABLE MATERIAL STORAGE
26. WAREHOUSE
27. MOBILE EQUIPMENT OPERATION BLDG.
28. S-IC STAGE STORAGE BUILDING
29. S-II STAGE STORAGE & C/O FAC.
30. CRYOGENIC BARGE SERVICE BUILDING

31. SECURITY CONTROL FACILITY

TRANSPORTATION & MISC.

32. RAILROAD & SWITCHING YARD
33. RP-1 TRANSFER DOCK
34. NAVIGATION LOCK & BRIDGE
35. BOOSTER TRANSFER DOCK
36. CRYOGENIC DOCK AND CANAL EXTENSION
37. CONSTRUCTION DOCK

MARSHALL SPACE FLIGHT CENTER PROGRAM FACILITIES



AERIAL VIEW OF LOAD TEST ANNEX HUNTSVILLE



ASTRO. LAB.

P&VE LAB.

LOAD TEST ANNEX

RPM 2-30

RDO B400-135E

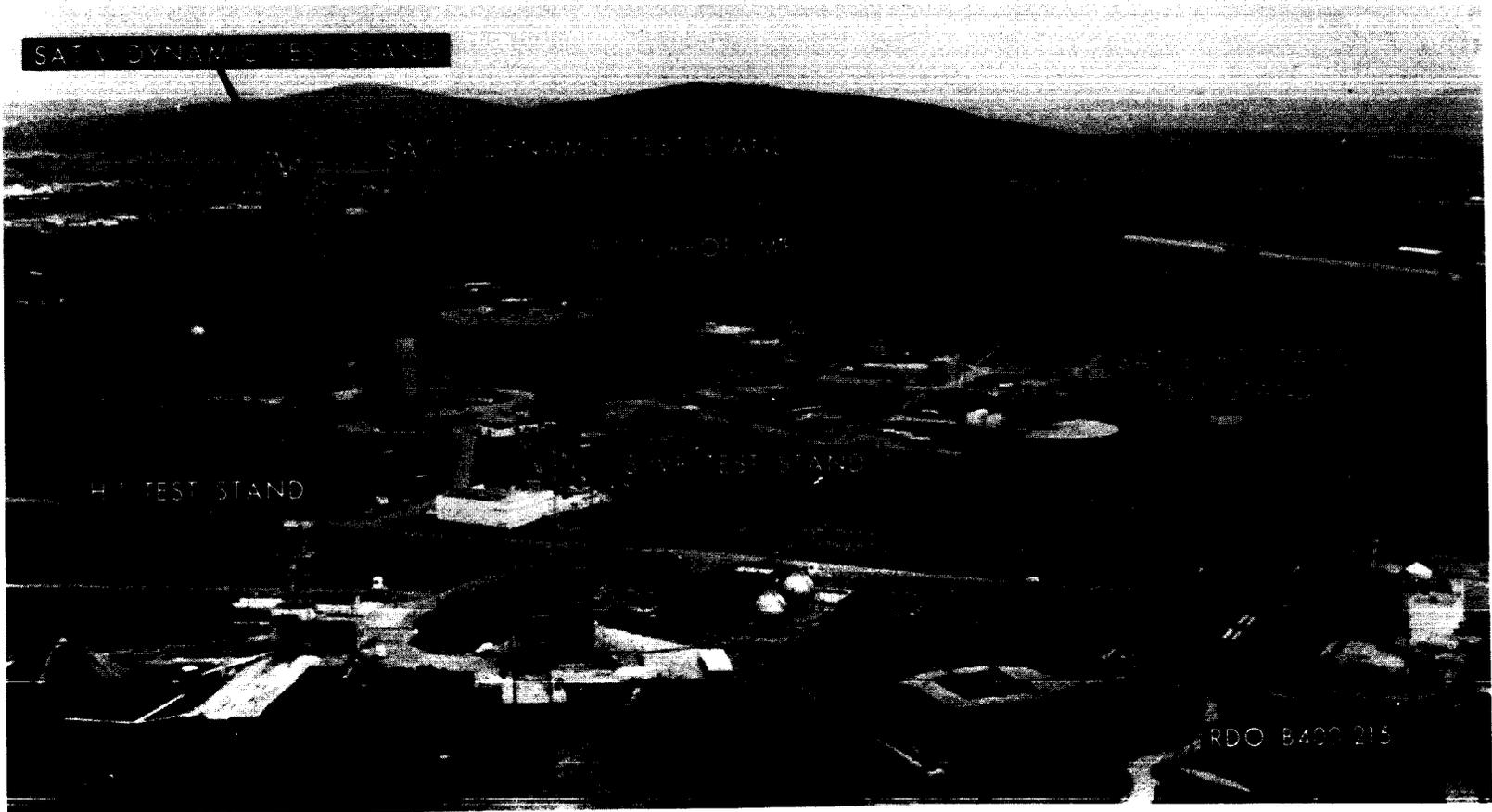
MANUFACTURING ENGINEERING LAB. AERIAL VIEW
HUNTSVILLE



RPM 2-31

PDO 8400 127D

EAST TEST AREA - HUNTSVILLE



SAT V DYNAMIC TEST STAND

SAT V DYNAMIC TEST STAND

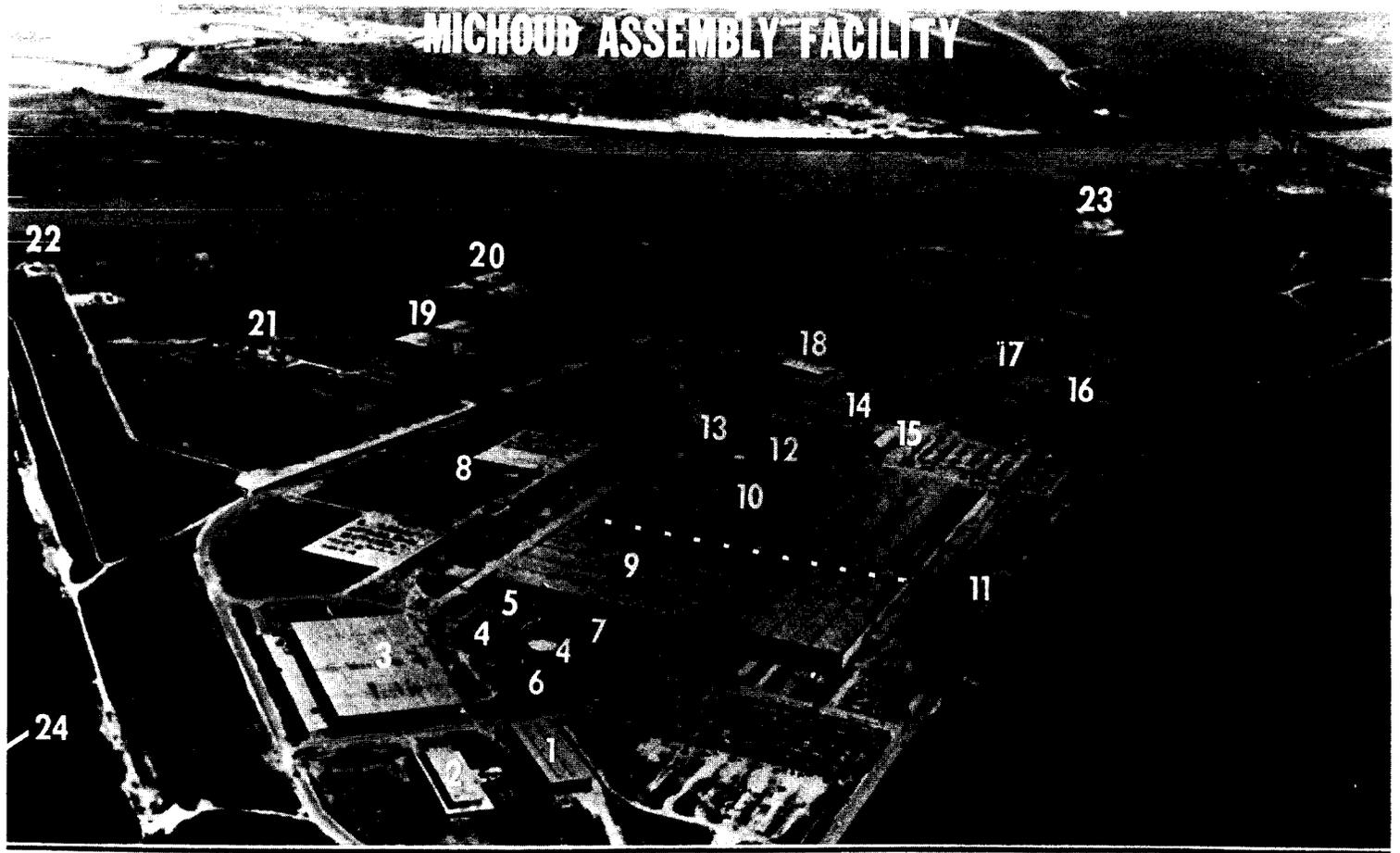
RESEARCH CENTER

H-1 TEST STAND

SAT V TEST STAND

RPM 2-32

RDO B400 215



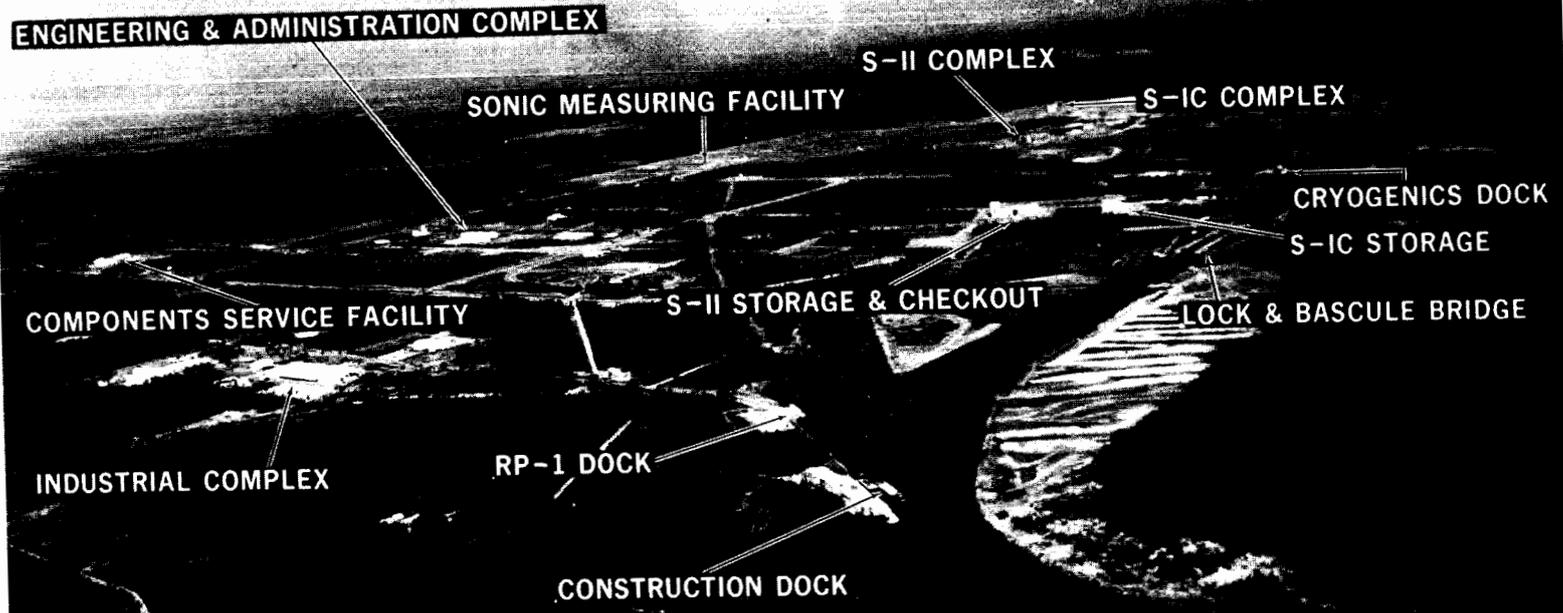
- 1. MAINTENANCE SUPPLY
- 2. HAZARDOUS MATLS
- 3. VEHICLE COMPONENT SUPPLY
- 4. BOILER PLANT & FUEL TANKS
- 5. BATTERY CHARGING
- 6. COOLING TOWER
- 7. LABORATORY
- 8. CHEMICAL WASTE RESERVOIR

- 9. CHRYSLER FAB AREA (S-1B)
- 10. BOEING FAB AREA (S-1C)
- 11. ENGINEERING BUILDINGS
- 12. VERT ASSY & HYDROSTATIC TEST
- 13. SYSTEMS ENGINEERING BLDG
- 14. BOOSTER HANGAR
- 15. MAINTENANCE
- 16. ENGINEERING & OFFICE BLDG

- 17. CAFETERIA
- 18. CONTRACTOR SERVICES BLDG
- 19. STAGE TEST & CHECK OUT
- 20. SALVAGE YARD
- 21. HIGH PRESSURE TEST FACILITY
- 22. MAIN PUMPING STATION
- 23. BARGE DOCK
- 24. LOX & LH₂ PLANT

RPM 2-33

MISSISSIPPI TEST FACILITY—AERIAL VIEW



HPM 2-34

IND A7845F

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

GODDARD SPACE FLIGHT CENTER

MISSION:

The Goddard Space Flight Center, established in 1959 as the first major United States laboratory devoted to the investigation and exploration of space, conducts a wide-ranging program of experimentation in the space sciences and space applications. As a result, Goddard Space Flight Center has developed many diverse capabilities: the management of complex satellite projects; the development of wholly integrated spacecraft, ranging from systems engineering to development, integration, and testing; the development and operation of satellite tracking networks; data acquisition and analysis; and scientific research to include both theoretical studies and the development of many significant scientific experiments flown in satellites.

Although the majority of Goddard Space Flight Center's personnel are at the Greenbelt site, other personnel are located at the Goddard Institute for Space Studies in New York City, and throughout the world, managing the operation of satellite tracking and communications network stations.

Goddard Space Flight Center is responsible for the management of communications and meteorological satellite programs, such as the Applications Technology and Nimbus Satellites; the management of scientific satellite projects to include the Orbiting Geophysical (OGO), Orbiting Solar (OSO), and the Orbiting Astronomical (OAO) Observatories and the Explorer series; project management of NASA's Delta launch vehicle; management and operation of two worldwide tracking and data acquisition networks, the Space Tracking and Data Acquisition Network and the Manned Space Flight Network; and the development of the sounding rocket program.

Significant achievements of the Goddard Space Flight Center in 1968 included:

Scientific Satellites - Major scientific satellites successfully orbited in 1968 included: OAO A2, for ultraviolet (UV) sky survey and photometry of brighter objects; OGO-V for interdisciplinary studies in particles and fields; Explorer 38 (RAE-A) for radio astronomy; and Explorer 36 (GEOS-II) for geodesy in support of the National Geodetic Satellite Program. The Center also participated in technical management and launch of HEOS-I for ESRO, the first spacecraft for this organization for investigation of the solar wind and cosmic rays.

Meteorological and Communications Satellites - During 1968, Goddard Space Flight Center, on behalf of the Environmental Science Services Administration, launched two operational weather satellites, ESSA VII and VIII. One Intelsat,

RPM 2-35

operational communications satellite of the Communications Satellite Corporation, was also launched by this Center during 1968.

Sounding Rockets - The sounding rocket program consisted of 175 scientific rocket launchings in 1968, including 17 launches in conjunction with foreign scientists.

Tracking and Data Acquisition - The Goddard-managed Space Tracking and Data Acquisition Network provided communications and tracking coverage for unmanned scientific and applications satellites in 1968. The Manned Space Flight Network provided global tracking support for the first manned Apollo flight (Apollo 7), and support for the circumlunar manned Apollo flight (Apollo 8).

DESCRIPTION:

The Goddard Space Flight Center, located 15 miles northeast of Washington, D.C. at Greenbelt, Maryland, is situated on a 554-acre main site. Three additional plots of 639 acres comprise the remote site area and contain the Goddard Antenna Test Range, the Goddard Optical Facility, the Propulsion Research Facility, the Magnetic Fields Component Test Facility, the Attitude Control Test Facility, and the Network Training and Test Facility. Total capital investment as of June 30, 1968, under the cognizance of Goddard Space Flight Center, including the Manned Space Flight Network, the Space Tracking and Data Acquisition Network, Apollo ships, and the Goddard Space Flight Center main site at Greenbelt, Maryland, is \$614,860,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$50,160,000 | \$57,043,000 | \$62,513,000 |
| Travel..... | 1,919,000 | 1,639,000 | 1,918,000 |
| Automatic data processing..... | 5,951,000 | 5,426,000 | 5,385,000 |
| Facilities services..... | 5,707,000 | 5,193,000 | 5,141,000 |
| Technical services..... | 826,000 | 753,000 | 675,000 |
| Administrative support..... | <u>3,742,000</u> | <u>3,436,000</u> | <u>3,392,000</u> |
| Total, fund requirements..... | <u>\$68,305,000</u> | <u>\$73,490,000</u> | <u>\$79,024,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|---------------------|---------------------|---------------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 3 | 8 | 8 |
| Space flight operations..... | 14 | 4 | 4 |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 1,064 | 1,395 | 1,334 |
| Lunar and planetary exploration..... | 31 | 67 | 103 |
| Bioscience..... | 11 | 9 | 10 |
| Space applications..... | 420 | 415 | 445 |
| Launch vehicle procurement..... | 33 | 33 | 33 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 2 | 2 | 1 |
| Space vehicle systems..... | 53 | 53 | 39 |
| Electronics systems..... | 64 | 79 | 76 |
| Space power and electric propulsion systems..... | 48 | 45 | 36 |
| Chemical propulsion..... | 8 | 13 | 8 |
| <u>Tracking and Data Acquisition</u> | 810 | 833 | 921 |
| <u>Technology Utilization</u> | <u>3</u> | <u>3</u> | <u>3</u> |
| Subtotal, positions by program..... | <u>2,564</u> | <u>2,959</u> | <u>3,021</u> |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 15 | 16 | 16 |
| Administrative support..... | 835 | 846 | 942 |
| Research and development support..... | <u>408</u> | <u>422</u> | <u>433</u> |
| Subtotal, indirect positions..... | <u>1,258</u> | <u>1,284</u> | <u>1,391</u> |
| Total, permanent positions..... | <u><u>3,822</u></u> | <u><u>4,243</u></u> | <u><u>4,412</u></u> |

**GODDARD SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING SUMMARY**

| STAFFING SUMMARY | |
|------------------|-----------|
| Excepted | 69 70 |
| GS-16 | 37 37 |
| GS-15 | 34 34 |
| GS-14 | 284 285 |
| GS-13 | 541 544 |
| All Other GS | 3137 3236 |
| Wage Board | 210 276 |
| TOTAL | 4243 4412 |
| PERMANENT | |

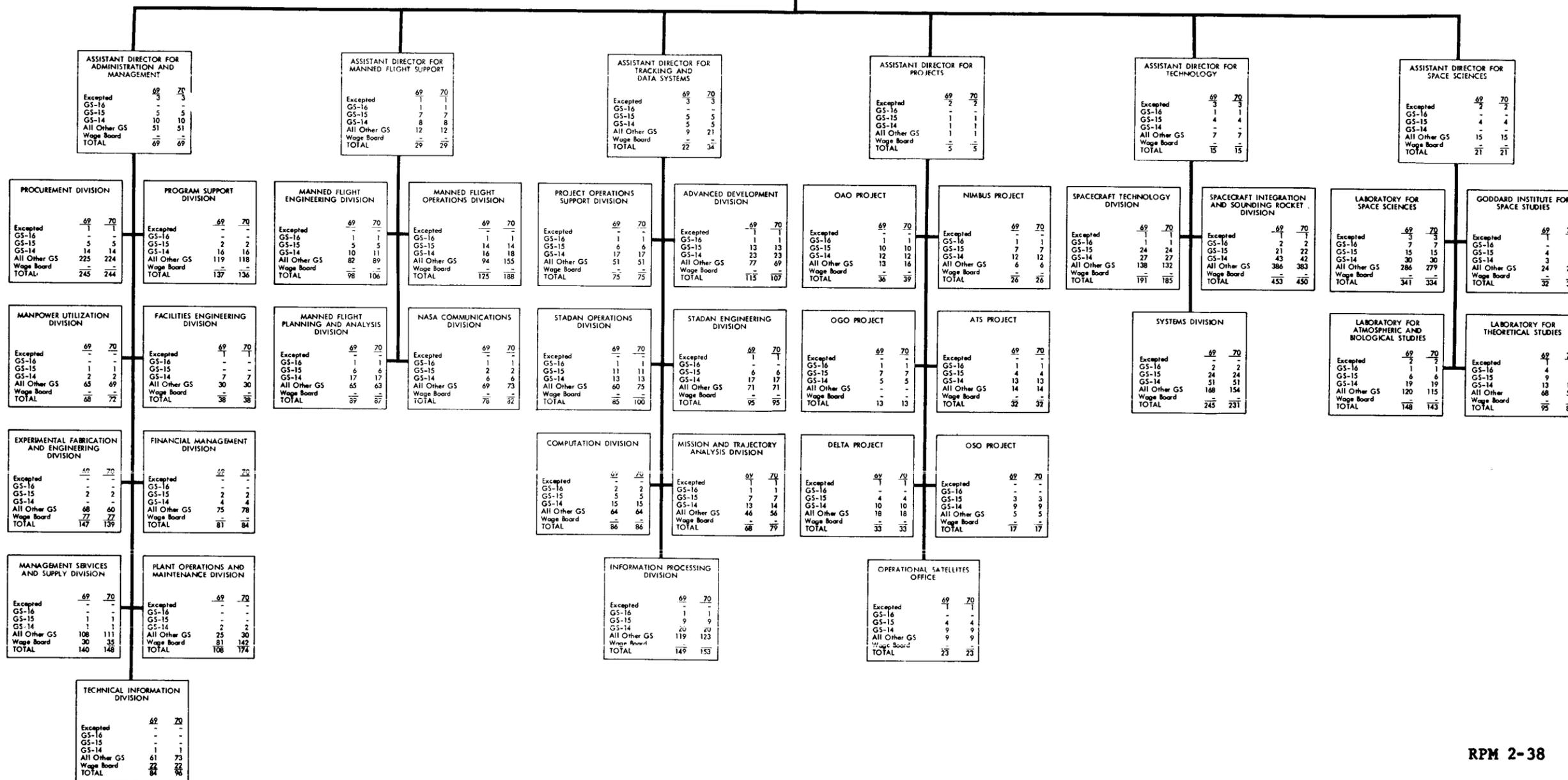
| CHIEF ADVANCED PLANS STAFF | |
|----------------------------|-------|
| Excepted | 69 70 |
| GS-16 | 1 1 |
| GS-15 | 3 3 |
| GS-14 | 1 1 |
| All Other GS | 2 2 |
| Wage Board | - - |
| TOTAL | 7 7 |

| OFFICE OF THE DIRECTOR | |
|------------------------|-------|
| Excepted | 69 70 |
| GS-16 | 3 3 |
| GS-15 | - - |
| GS-14 | - - |
| All Other GS | 6 6 |
| Wage Board | - - |
| TOTAL | 9 9 |

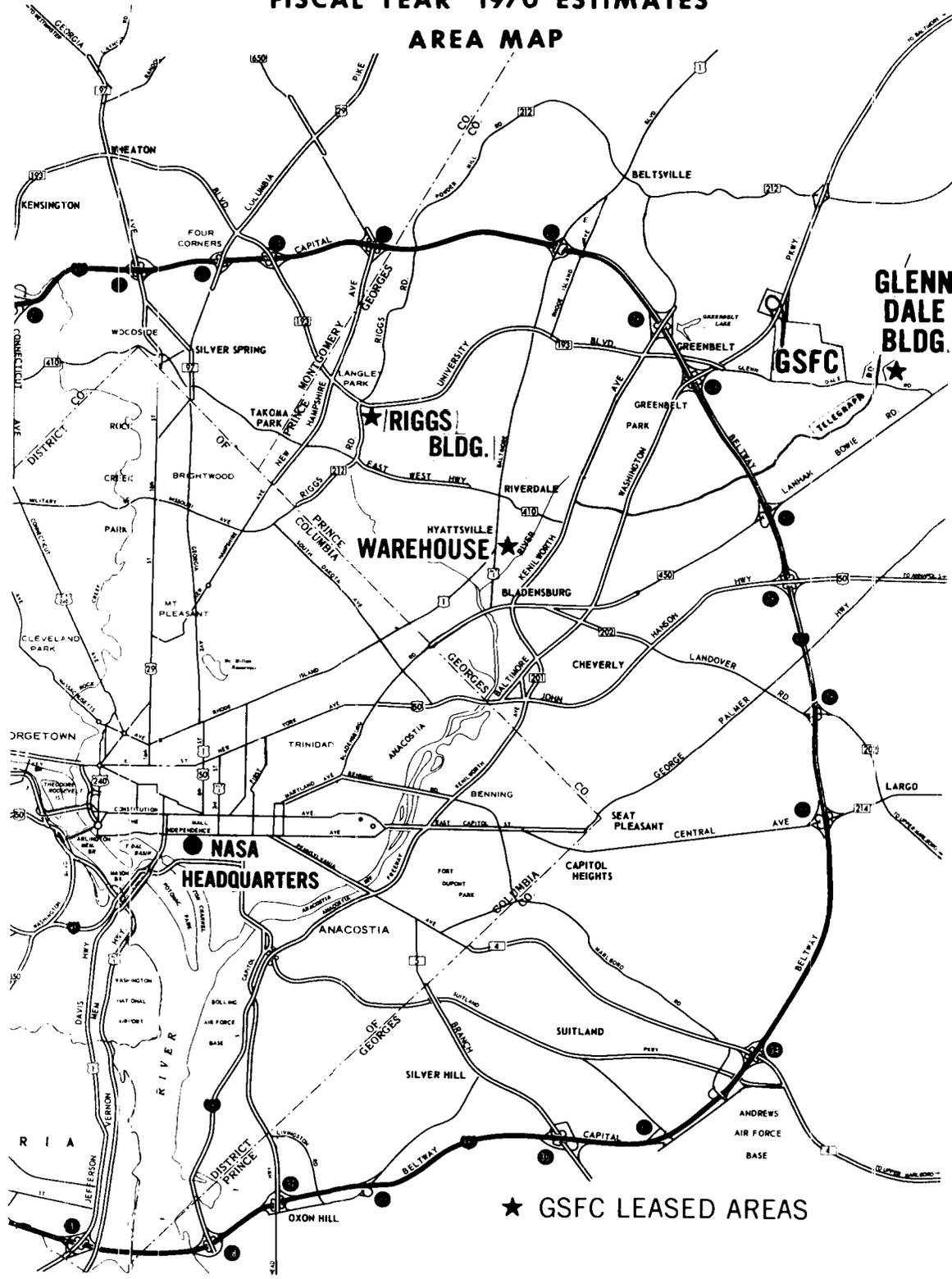
| ASSISTANT DIRECTOR FOR SYSTEMS RELIABILITY | |
|--|-------|
| Excepted | 69 70 |
| GS-16 | 2 2 |
| GS-15 | - - |
| GS-14 | 3 3 |
| All Other GS | 5 5 |
| Wage Board | - - |
| TOTAL | 12 12 |

| TEST AND EVALUATION DIVISION | |
|------------------------------|---------|
| Excepted | 69 70 |
| GS-16 | 1 1 |
| GS-15 | 12 12 |
| GS-14 | 35 35 |
| All Other GS | 164 165 |
| Wage Board | - - |
| TOTAL | 212 213 |

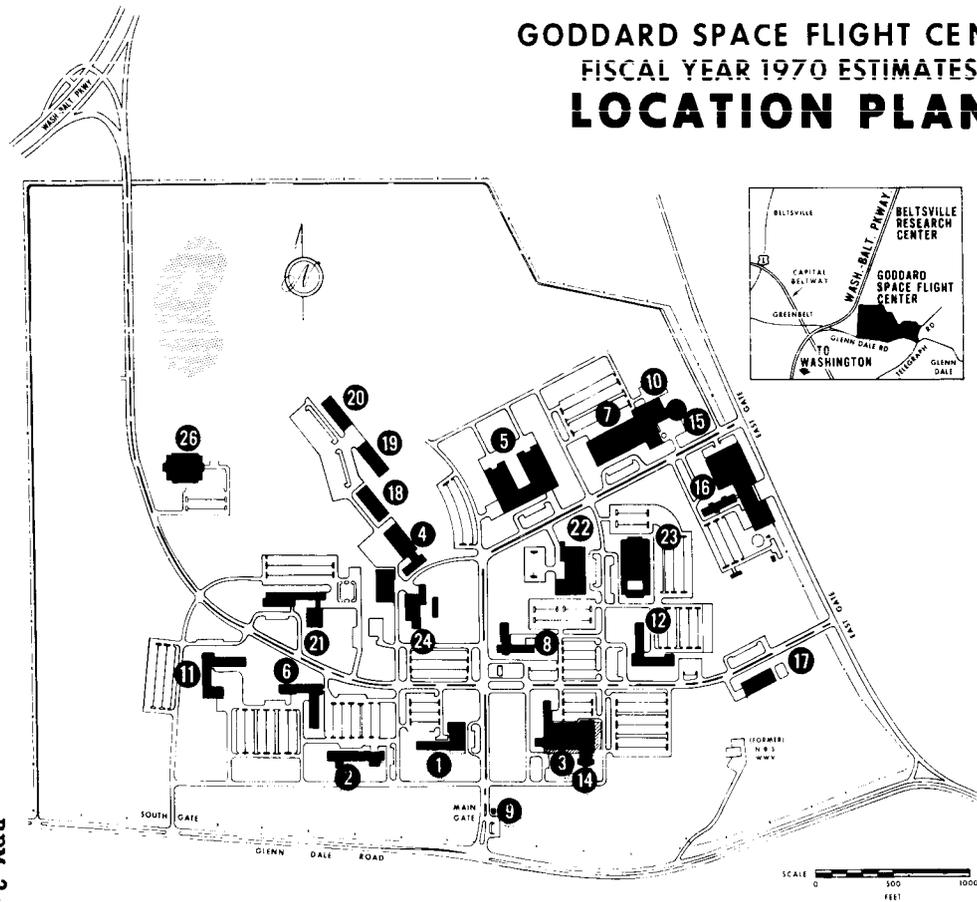
| QUALITY ASSURANCE DIVISION | |
|----------------------------|-------|
| Excepted | 69 70 |
| GS-16 | - - |
| GS-15 | 2 2 |
| GS-14 | 8 8 |
| All Other GS | 36 38 |
| Wage Board | - - |
| TOTAL | 46 48 |



GODDARD SPACE FLIGHT CENTER FISCAL YEAR 1970 ESTIMATES AREA MAP



GODDARD SPACE FLIGHT CENTER FISCAL YEAR 1970 ESTIMATES LOCATION PLAN



- 1 SPACE PROJECTS BUILDING
- 2 RESEARCH PROJECTS LABORATORY
- 3 CENTRAL FLIGHT CONTROL AND RANGE OPERATIONS LABORATORY
- 4 BOILER HOUSE AND ELECTRIC SUBSTATION
- 5 INSTRUMENT CONSTRUCTION AND INSTALLATION LABORATORY
- 6 SPACE SCIENCES LABORATORY
- 7 PAYLOAD TESTING FACILITY
- 8 SATELLITE SYSTEMS LABORATORY
- 9 GATE HOUSE
- 10 ENVIRONMENTAL TESTING LABORATORY
- 11 APPLIED SCIENCES LABORATORY
- 12 TRACKING AND TELEMETRY LABORATORY
- 14 SPACECRAFT OPERATIONS FACILITY
- 15 LAUNCH PHASE SIMULATOR
- 16 DEVELOPMENT OPERATIONS BUILDING
- 17 MULTI-PURPOSE BUILDING
- 18 MULTI-PURPOSE BUILDING
- 19 MULTI-PURPOSE BUILDING
- 20 MULTI-PURPOSE BUILDING
- 21 METEOROLOGICAL SYSTEMS DEVELOPMENT LABORATORY
- 22 MECHANICAL TEST FACILITY AND QUALITY ASSURANCE LABORATORY
- 23 DATA INTERPRETATION LABORATORY
- 24 ADDITION TO CENTRAL HEATING AND REFRIGERATION PLANT
- 26 NASA SPACE SCIENCE DATA CENTER

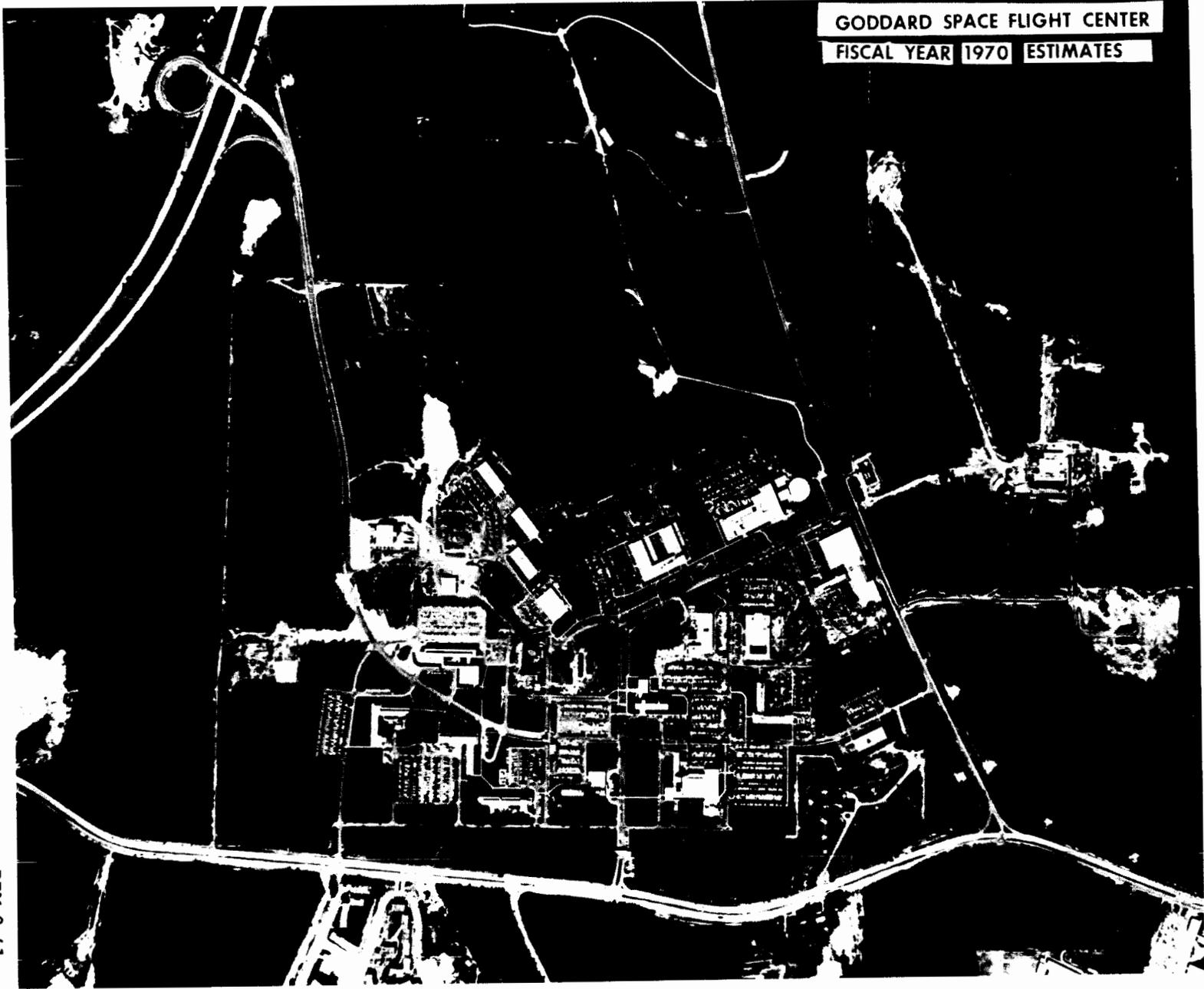
FACILITIES PROPOSED IN 1970 ESTIMATES

70-1 FIRE PROTECTION AND PREVENTION MODIFICATIONS - 17 BLDGS.

EXISTING FACILITIES
 FACILITIES UNDER CONSTRUCTION
 FACILITIES PROPOSED IN 1970 ESTIMATES

RPM 2-40

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1970 ESTIMATES



RPM 2-41

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

WALLOPS STATION

MISSION:

Wallops Station is primarily a launch and aeronautical test facility completely owned and operated by NASA for the purpose of conducting scientific experiments. Research at Wallops is devoted to gathering information about the earth's atmosphere and its near-space environment, and to the field of aeronautics.

The rocket-borne experiments flown from the Wallops Island Range are conceived, and for the most part designed and built, by scientists and engineers in the laboratories and research centers of NASA, other Government agencies, colleges and universities, and the worldwide scientific community.

In addition to supporting the rocket-propelled experiments, Wallops uses its facilities for many other research projects, such as space component tests utilizing helicopter or aircraft drops; slow speed landing techniques for jet aircraft; anti-skid tests on grooved runways; noise abatement; and laser and radar tracking of aircraft and satellites. A sizeable portion of Wallops effort is devoted to NASA's program of international cooperation in space research. More than 50 countries have sent representatives to observe operations and procedures. Wallops has assisted 17 of these countries with training of personnel, activation of their launch sites, or launching their experiments. Another important element of the Wallops research program is the four-stage Scout vehicle, capable of performing a variety of missions, including the launching of small satellites, high altitude probes, and atmospheric reentry tests. Wallops' mission also includes management of several NASA sponsored projects, such as the Orbiting Frog Otolith (OFO) project; the Experimental Inter-American Meteorological Rocket Network (EXAMETNET); a Bio-Space Technology Training Program for bioscientists; and implementation of remote site launching and tracking facilities, including a mobile range facility transportable anywhere, and an Arctic launch site at Point Barrow, Alaska.

Wallops personnel participate in these tasks and perform those engineering functions necessary to design and establish ground facilities and instrumentation systems compatible with test requirements. However, the primary mission of Wallops Station is to prepare, assemble, and launch experimental payloads, position them correctly in space at the right velocity; track them; and acquire meaningful data.

In the early years, research at Wallops was concentrated on obtaining aerodynamic data at transonic and low supersonic speeds, as part of the

effort to penetrate the sound barrier of flight. Today, the facility is obtaining scientific data about the atmosphere and the space environment utilizing launch vehicles ranging in size from the small Arcas and Hasp meteorological rockets to the 72-foot Scout with orbital capability. Twelve satellites have been launched to date. Since its origin in 1945, Wallops has launched more than 7,000 research vehicles consisting of from one to seven stages in the quest for scientific knowledge.

Wallops Station's achievements during 1968 include: the launching of 451 sounding rockets, 1 satellite, 2 reentry measurements, and 165 test rockets; conducting the fourth annual Bio-Space Technology Training Program; and launching the second and third in a series of four Gravity Preference experiments. Scout vehicle launches included the Explorer XXXVII satellite, Reentry F and RAM C-B. Seventy foreign nationals representing 15 countries visited the installation to observe its operations or seek assistance in establishing a sounding rocket facility of their own. The preliminary design phase of the OFO project has been completed. This project will provide data on frog's balance mechanism under weightlessness and repeated acceleration while in orbit. Several aeronautical projects were either initiated or continued, such as the anti-skid tests on grooved runways, noise abatement, the Gemini V/STOL tests, and the paraglider tests. A new Federal Job Information Center was opened to provide service for residents of Virginia's Eastern Shore who are rather isolated from areas where jobs are more plentiful.

DESCRIPTION:

Wallops Station includes three separate areas on the Atlantic coast of Virginia's eastern shore: the main base (formerly Chincoteague Naval Air Station), the Wallops Island launching site and the Wallops mainland. The administrative offices, the range control center, support shops and the main telemetry buildings are located on the main base. Wallops Island is about seven miles southeast of the main base and is connected to the mainland by a causeway and bridge. The island is about five miles long and its widest point is only one-half mile. Located on the island are rocket storage buildings, blockhouses, assembly shops and the launch sites. The Wallops mainland is a one-half mile strip west of the island and houses the radar and optical tracking sites. An additional Wallops holding is the Eastville tracking site located about 50 miles south of Wallops Station.

Wallops Station, totaling 6,561 acres, consists of 2,313 acres on the main base; 3,000 acres on Wallops Island, 108 acres on the mainland tracking site and 1,140 acres of unusable marsh land. The Eastville tracking site consists of an additional 53 acres of government-owned property. The total capital investment as of June 30, 1968, including off-site holdings was \$103,388,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| | <u>FUNDS</u> | | |
|--------------------------------|--------------------|--------------------|--------------------|
| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$5,168,000 | \$5,621,000 | \$5,650,000 |
| Travel..... | 126,000 | 132,000 | 136,000 |
| Automatic data processing..... | 60,000 | 64,000 | 67,000 |
| Facilities services..... | 2,399,000 | 2,300,000 | 2,281,000 |
| Technical services..... | 46,000 | 70,000 | 62,000 |
| Administrative support..... | <u>969,000</u> | <u>833,000</u> | <u>833,000</u> |
| Total, fund requirements..... | <u>\$8,768,000</u> | <u>\$9,020,000</u> | <u>\$9,029,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 60 | 65 | 65 |
| Bioscience..... | 7 | 2 | 2 |
| Space applications..... | 11 | 11 | 11 |
| <u>Advanced Research and Technology</u> | | | |
| Space vehicle systems..... | 14 | 14 | 14 |
| Electronics systems..... | 20 | 15 | 15 |
| Human factor systems..... | 5 | 8 | 8 |
| Aeronautical vehicles..... | 8 | 11 | 11 |
| <u>Tracking and Data Acquisition.....</u> | <u>118</u> | <u>118</u> | <u>118</u> |
| Subtotal, positions by program..... | <u>243</u> | <u>244</u> | <u>244</u> |

RPM 2-44

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---------------------------------------|-------------|-------------|-------------|
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 7 | 7 | 7 |
| Administrative support..... | 103 | 106 | 106 |
| Research and development support..... | <u>141</u> | <u>131</u> | <u>131</u> |
| Subtotal, indirect positions..... | <u>251</u> | <u>244</u> | <u>244</u> |
| Total, permanent positions..... | <u>494</u> | <u>488</u> | <u>488</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 ORGANIZATION AND STAFFING CHART
 WOLLOPS STATION

STAFFING CHART

| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 2 | 2 |
| GS-16 | 1 | 1 |
| GS-15 | 9 | 10 |
| GS-14 | 22 | 25 |
| All Other GE | 364 | 370 |
| Wage Board | <u>90</u> | <u>80</u> |
| Total Permanent | 488 | 488 |

DIRECTOR

| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 2 | 2 |
| GS-14 | 1 | 2 |
| All Other GS | <u>4</u> | <u>3</u> |
| Total Permanent | 7 | 7 |

FLIGHT TEST DIVISION

| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| GS-15 | 3 | 3 |
| GS-14 | 5 | 5 |
| All Other GS | 122 | 132 |
| Wage board | <u>10</u> | <u>--</u> |
| Total Permanent | 140 | 140 |

RANGE ENGINEERING DIVISION

| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| GS-16 | 1 | 1 |
| GS-15 | 4 | 5 |
| GS-14 | 14 | 15 |
| All Other GS | <u>77</u> | <u>75</u> |
| Total Permanent | 96 | 96 |

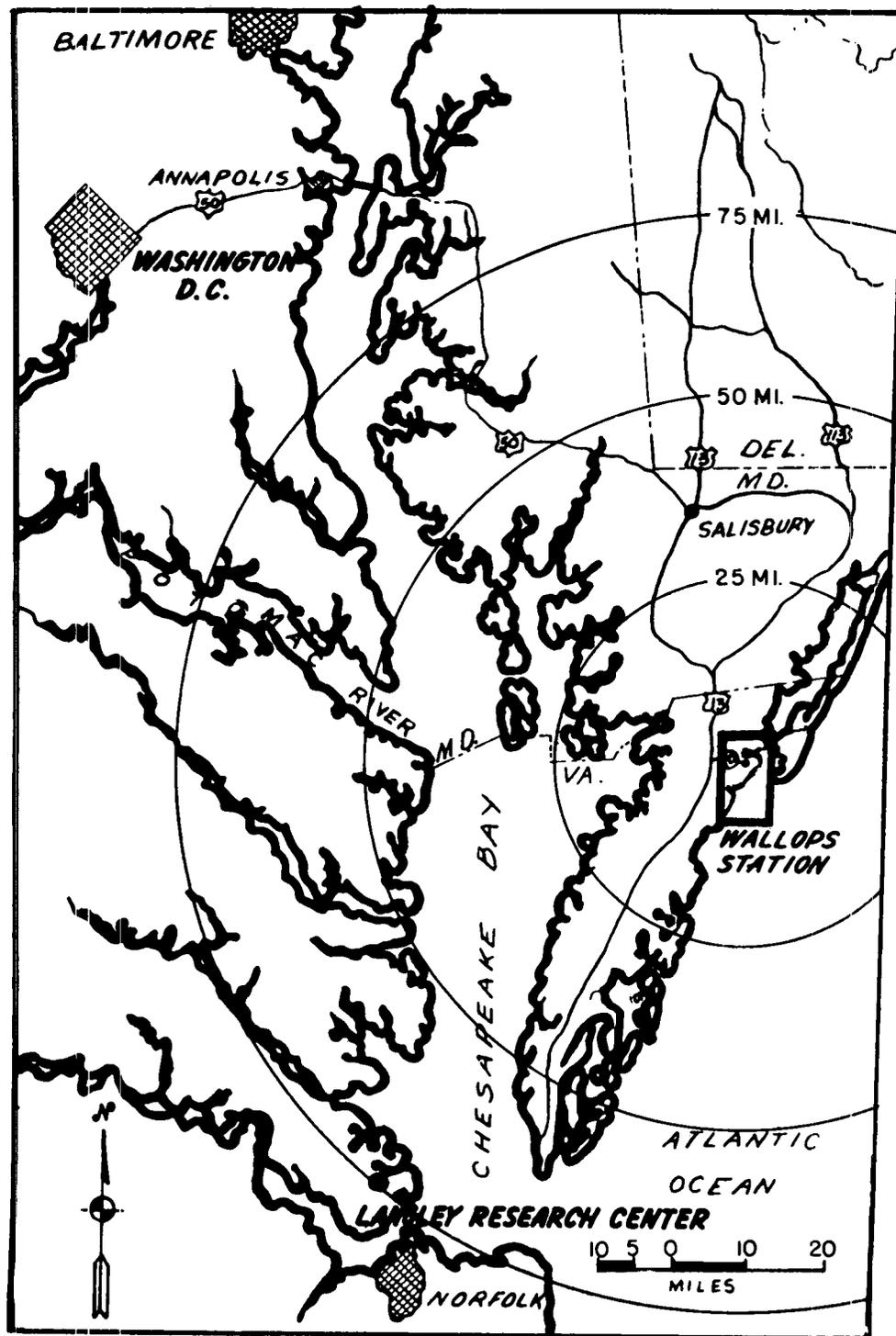
ADMINISTRATIVE MANAGEMENT DIVISION

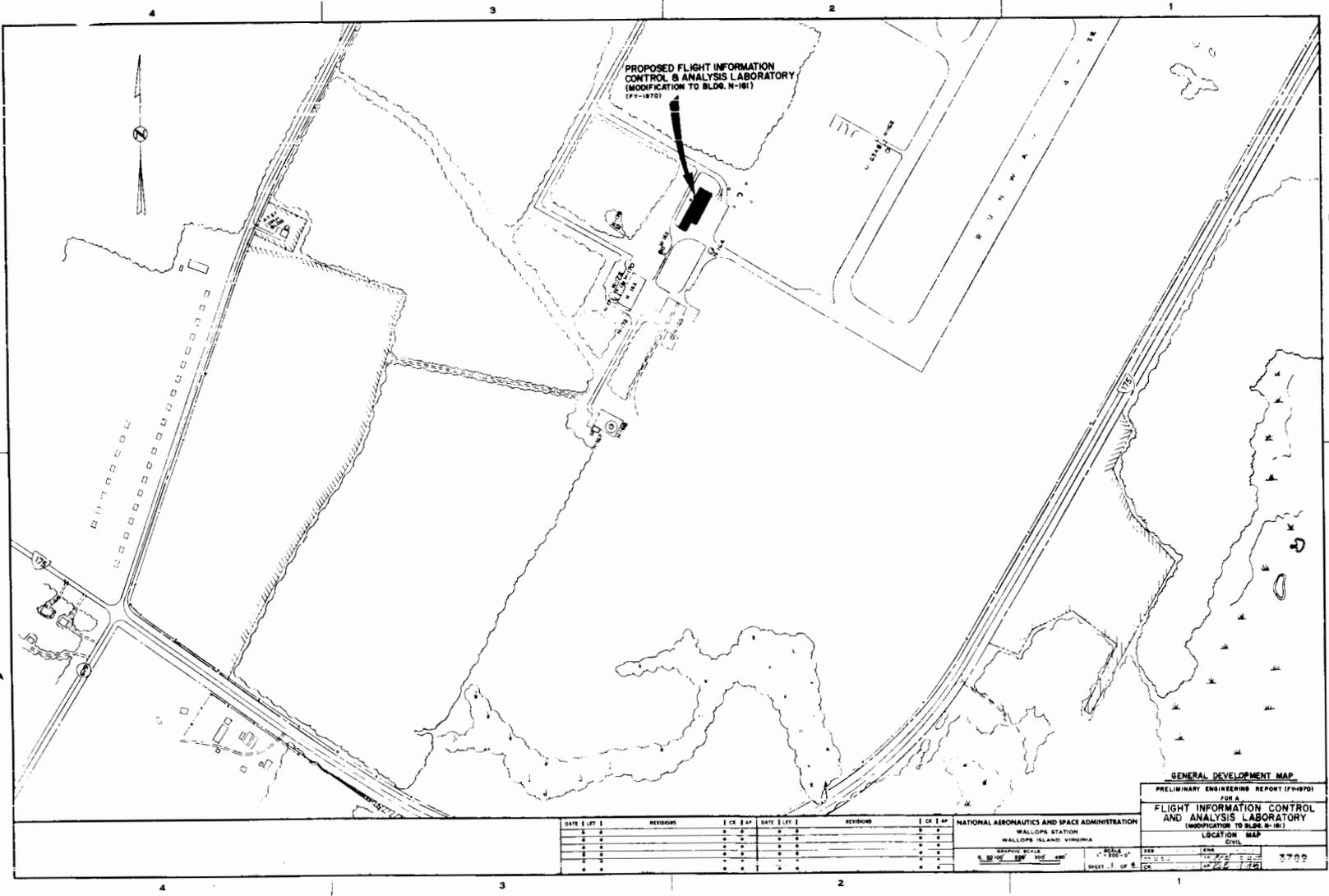
| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | <u>99</u> | <u>99</u> |
| Total Permanent | 101 | 101 |

TECHNICAL SERVICES DIVISION

| | 69 | 70 |
|-----------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 2 |
| All Other GS | 62 | 61 |
| Wage Board | <u>80</u> | <u>80</u> |
| Total Permanent | 144 | 144 |

WALLOPS STATION LOCATION





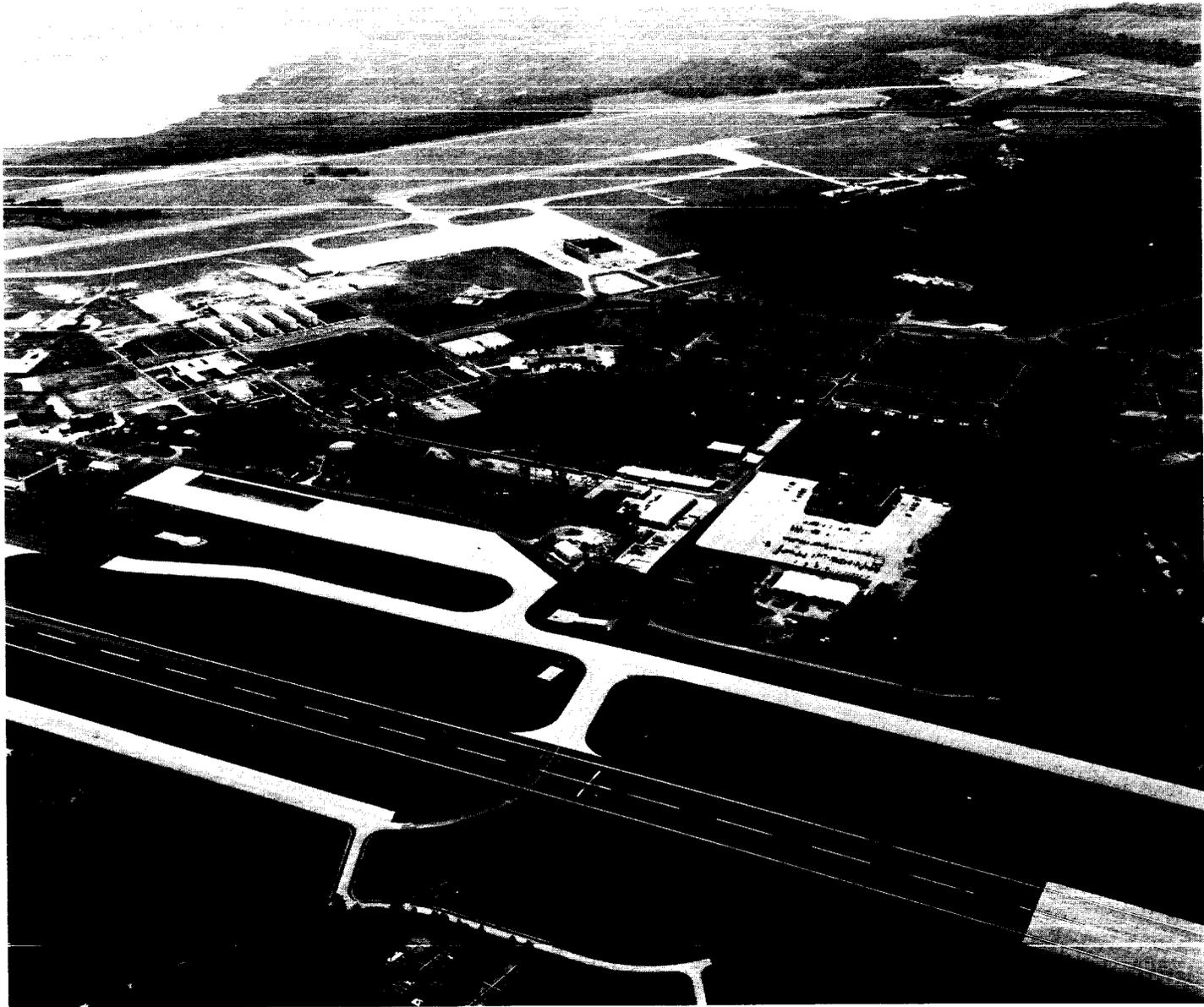
PROPOSED FLIGHT INFORMATION CONTROL & ANALYSIS LABORATORY (MODIFICATION TO BLDG. N-181) (FY-1870)

GENERAL DEVELOPMENT MAP
 PRELIMINARY ENGINEERING REPORT (FY-1870)
 FOR A
FLIGHT INFORMATION CONTROL AND ANALYSIS LABORATORY
 (MODIFICATION TO BLDG. N-181)
 LOCATION: WALLOPS STATION, VIRGINIA
 SCALE: AS SHOWN
 SHEET 1 OF 4

| DATE | BY | REVISIONS | DATE | BY | REVISIONS |
|------|----|-----------|------|----|-----------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 WALLOPS STATION
 WALLOPS ISLAND, VIRGINIA
 DRAWING TITLE: GENERAL DEVELOPMENT MAP
 SCALE: AS SHOWN
 SHEET 1 OF 4

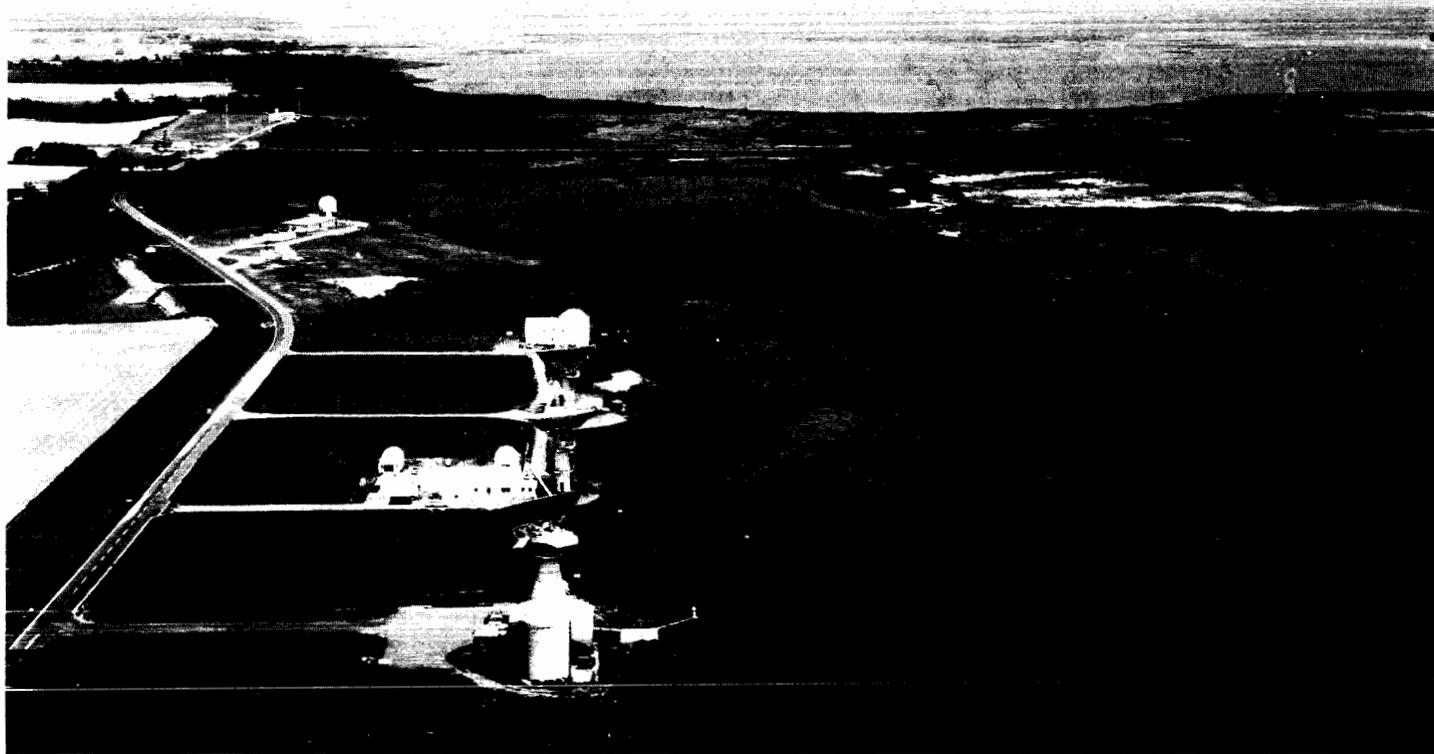
RPM 2-48



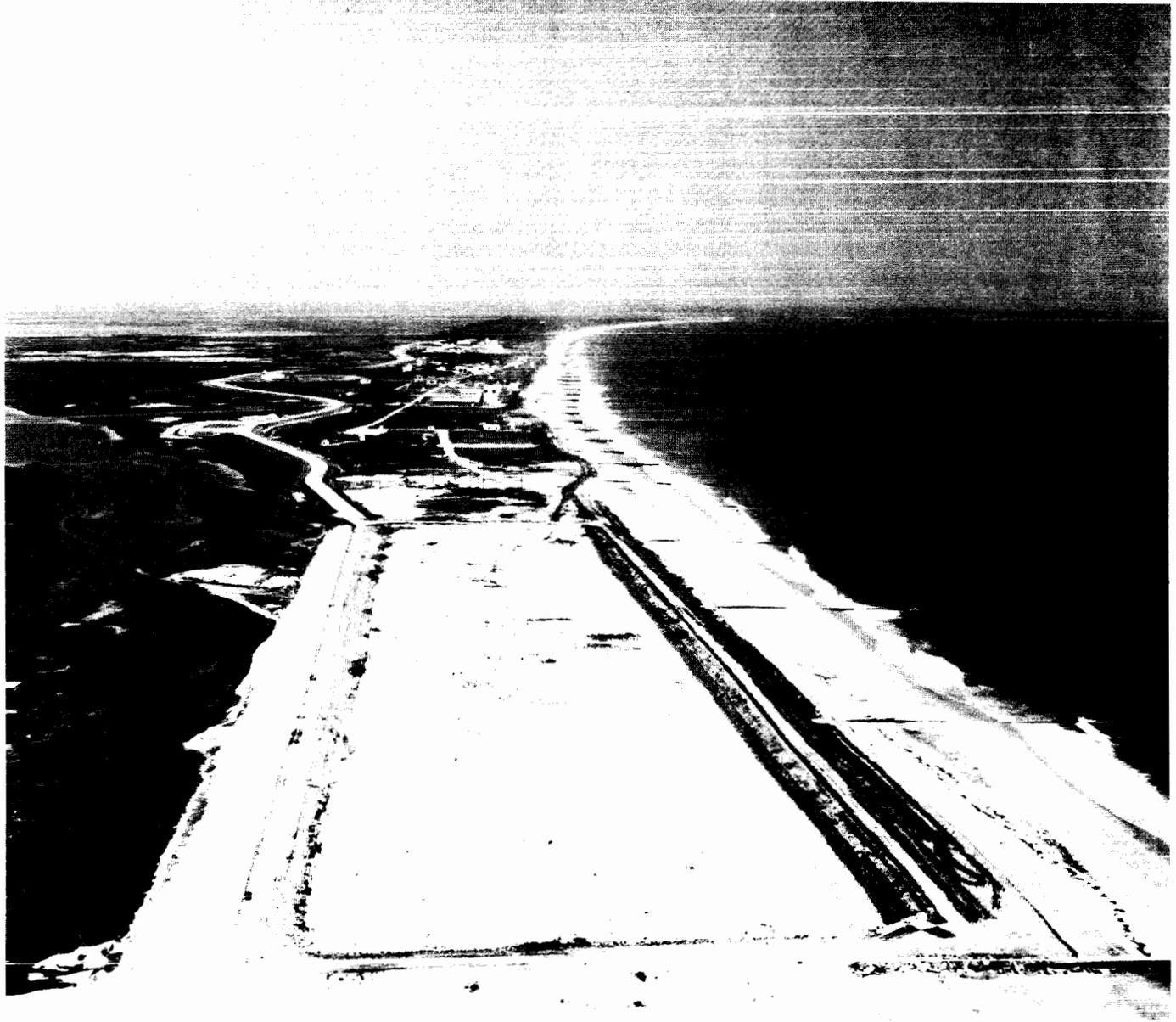
RPM 2-49

WALLOPS STATION

RPM 2-50



Tracking Radar Facilities on Wallops Mainland



RPM 2-51

South Wallops Island Looking North

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

AMES RESEARCH CENTER

MISSION:

The programs at the Ames Research Center are directed at research and development in the areas of aircraft and spacecraft technology as well as application to national needs of the new science and technology growing out of the aerospace program. In carrying out this mission, the Center works closely with the aerospace and educational communities in an effort to take full advantage of the nation's manpower capabilities. More specifically, Ames Research Center has, in addition to the traditional research mission in the physical sciences, a major research responsibility in the life and space sciences, flight project management responsibility, and the operational responsibility for the NASA Convair 990 aircraft to conduct airborne scientific experiments.

In the current and budget years, this installation has flight project management responsibility for the Pioneer and Biosatellite projects. Pioneer provides scientific observations of phenomena in interplanetary space from an unmanned spacecraft, and the Biosatellite project explores the biological effects of the space environment on primates and other earth organisms.

Research in the physical sciences includes studies in atmosphere entry and environmental physics, guidance and control systems, and aeronautics. The work in entry and environmental physics includes basic studies of the physics of high-temperature gases, the stability, control, and performance of a wide range of spacecraft configurations, and of materials and structures for spacecraft. In the area of gas physics, particular emphasis is placed on problems associated with flight into earth and other planetary atmospheres. Through this effort, significant contributions have been made to the design of the Mercury, Gemini, and Apollo spacecraft, the design of Mars and Venus entry vehicles, and the design of ballistic missiles.

The work in guidance and control systems is broad in nature and is applicable to manned and unmanned spacecraft, as well as aircraft. Current emphasis in guidance systems is directed mainly at current and follow-on manned missions. This includes an intensive theoretical and experimental effort in the areas of midcourse navigation and terminal guidance with a smaller effort directed at studies involving lunar approach, lunar landing, and rendezvous. The research in control systems is directed at examining various techniques applicable to unmanned satellites and probes and techniques applicable to vertical and short take-off (V/STOL) aircraft, the supersonic transport, and manned spacecraft.

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The research program in aeronautics is directed at fundamental studies in aerodynamics, propulsion and operating problems associated with supersonic aircraft with particular emphasis on the supersonic transport, a wide variety of V/STOL vehicles, and hypersonic research aircraft. This includes studies of piloting problems with numerous fixed-base, moving-base, and flight simulators.

Research in the space sciences includes studies in the field of solar physics, planetary environments, and geophysics. This includes ground based and sounding rocket experiments as well as experiments requiring specialized instruments aboard satellites and space probes. The work covers studies pertaining to magnetic fields and plasmas in space, studies to determine the composition and structure of planets and of planetary and stellar atmospheres, and studies of cratering mechanics in natural materials to aid in understanding the structure of lunar surfaces.

Research in the life sciences is conducted in three major areas: (1) basic research in the physiological and behavioral sciences concerned with obtaining a basic understanding of the effects of terrestrial and extraterrestrial environments and of space flight stresses upon living organisms, including man; (2) studies in exobiology oriented towards the prediction, detection, and study of extraterrestrial fossils, chemicals, and life forms; and (3) research in long-term advanced life support systems and in the human factors aspects of the relationships between man and the machines which will transport and support him during lunar and planetary exploration.

DESCRIPTION:

The Ames Research Center was established in 1940, and is located at the southern end of San Francisco Bay on land contiguous to the U.S. Naval Air Station, Moffett Field, California. Its physical plant comprises many specialized facilities for aerospace research in the traditional physical sciences as well as the space sciences and life sciences, all of which are included in the mission of the Center. These include conventional wind tunnels, entry-heating simulators, and free-flight ballistic test facilities capable of conducting tests at speeds up to and above earth escape speed as well as laboratories equipped to study solar and geophysical phenomena, life synthesis, life detection, and life environmental factors. The Ames Research Center occupies about 365 acres of land. Certain other facilities, such as the utilities and airfield runways, are used jointly by NASA and the Navy. The total capital investment of the Ames Research Center, including work in progress and contractor-held facilities, as of June 30, 1968, was \$226,711,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$26,872,000 | \$28,426,000 | \$28,358,000 |
| Travel..... | 731,000 | 630,000 | 630,000 |
| Automatic data processing..... | 1,634,000 | 994,000 | 583,000 |
| Facilities services..... | 3,425,000 | 2,997,000 | 3,458,000 |
| Technical services..... | 109,000 | 84,000 | 84,000 |
| Administrative support..... | <u>1,010,000</u> | <u>905,000</u> | <u>937,000</u> |
| Total, fund requirements..... | <u>\$33,781,000</u> | <u>\$34,036,000</u> | <u>\$34,050,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 8 | 7 | 7 |
| Space flight operations..... | 3 | 3 | 3 |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 63 | 60 | 57 |
| Lunar and planetary exploration..... | 113 | 107 | 107 |
| Bioscience..... | 164 | 156 | 153 |
| Space applications..... | 1 | 1 | 1 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 371 | 355 | 355 |
| Space vehicle systems..... | 218 | 207 | 205 |
| Electronics systems..... | 172 | 163 | 160 |
| Human factor systems..... | 171 | 163 | 163 |
| Space power and electric propulsion systems..... | 7 | 5 | 5 |
| Aeronautical vehicles..... | <u>353</u> | <u>353</u> | <u>353</u> |
| Subtotal, direct positions..... | <u>1,644</u> | <u>1,580</u> | <u>1,569</u> |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---------------------------------------|--------------|--------------|--------------|
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 50 | 40 | 40 |
| Administrative support..... | 318 | 278 | 271 |
| Research and development support..... | <u>71</u> | <u>76</u> | <u>76</u> |
| Subtotal, indirect positions..... | <u>439</u> | <u>394</u> | <u>387</u> |
| Total, permanent positions..... | <u>2,083</u> | <u>1,974</u> | <u>1,956</u> |

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING CHART
AMES RESEARCH CENTER**

| STAFFING SUMMARY | | |
|------------------|------|------|
| | 69 | 70 |
| Excepted | 21 | 21 |
| GS-16 | 29 | 29 |
| GS-15 | 128 | 130 |
| GS-14 | 295 | 291 |
| All Other GS | 1048 | 1015 |
| Wage Board | 348 | 342 |
| Total Permanent | 1974 | 1956 |

| DIRECTOR | | |
|-----------------|----|----|
| | 69 | 70 |
| Excepted | 2 | 2 |
| GS-16 | 2 | 2 |
| GS-15 | 3 | 3 |
| GS-14 | - | - |
| All Other GS | 9 | 6 |
| Wage Board | - | - |
| Total Permanent | 13 | 13 |

| OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY (NASA HEADQUARTERS) | | |
|---|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | - | - |
| Wage Board | - | - |
| Total Permanent | - | - |

| TECHNOLOGY UTILIZATION OFFICE | | |
|-------------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | 2 | 2 |
| Wage Board | - | - |
| Total Permanent | 4 | 4 |

| PROGRAMS & RESOURCES OFFICE | | |
|-----------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | 8 | 7 |
| Wage Board | - | - |
| Total Permanent | 11 | 10 |

| PUBLIC AFFAIRS OFFICE | | |
|-----------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | 5 | 4 |
| Wage Board | - | - |
| Total Permanent | 6 | 6 |

| MEDICAL OFFICE | | |
|-----------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | - | - |
| All Other GS | - | - |
| Wage Board | - | - |
| Total Permanent | 1 | 1 |

| LEGAL OFFICE | | |
|-----------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | - | - |
| All Other GS | 3 | 4 |
| Wage Board | - | - |
| Total Permanent | 5 | 6 |

| DIRECTOR AERONAUTICS & FLIGHT MECHANICS | | |
|---|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | 2 | 2 |
| GS-14 | 1 | 1 |
| All Other GS | 4 | 4 |
| Wage Board | - | - |
| Total Permanent | 8 | 8 |

| DIRECTOR ASTRONAUTICS | | |
|-----------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 1 | 1 |
| Wage Board | - | - |
| Total Permanent | 3 | 3 |

| DIRECTOR FOR LIFE SCIENCES | | |
|----------------------------|----|----|
| | 69 | 70 |
| Excepted | 2 | 2 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | 3 | 3 |
| Wage Board | - | - |
| Total Permanent | 5 | 5 |

| DIRECTOR DEVELOPMENT | | |
|----------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 1 | 1 |
| Wage Board | - | - |
| Total Permanent | 3 | 3 |

| DIRECTOR ADMINISTRATION | | |
|-------------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 2 | 2 |
| All Other GS | 1 | 1 |
| Wage Board | - | - |
| Total Permanent | 4 | 4 |

| MISSION ANALYSIS DIVISION | | |
|---------------------------|----|----|
| | 69 | 70 |
| Excepted | 4 | 3 |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 11 | 11 |
| All Other GS | 26 | 26 |
| Wage Board | - | - |
| Total Permanent | 47 | 47 |

| AERONAUTICS DIVISION | | |
|----------------------|-----|-----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 2 | 2 |
| GS-15 | 6 | 7 |
| GS-14 | 15 | 15 |
| All Other GS | 68 | 66 |
| Wage Board | 42 | 42 |
| Total Permanent | 133 | 132 |

| THERMO- & GAS-DYNAMICS DIVISION | | |
|---------------------------------|-----|-----|
| | 69 | 70 |
| Excepted | 2 | 2 |
| GS-16 | 2 | 2 |
| GS-15 | 20 | 20 |
| GS-14 | 20 | 20 |
| All Other GS | 85 | 85 |
| Wage Board | 30 | 30 |
| Total Permanent | 159 | 159 |

| EXOBIOLGY DIVISION | | |
|--------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 3 | 3 |
| All Other GS | 37 | 35 |
| Wage Board | - | - |
| Total Permanent | 43 | 41 |

| SYSTEMS ENGINEERING DIVISION | | |
|------------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 7 | 7 |
| GS-14 | 10 | 10 |
| All Other GS | 17 | 10 |
| Wage Board | - | - |
| Total Permanent | 29 | 28 |

| SERVICES & SUPPLY DIVISION | | |
|----------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 51 | 45 |
| Wage Board | 19 | 19 |
| Total Permanent | 71 | 65 |

| RESEARCH FACILITIES & EQUIPMENT DIVISION | | |
|--|-----|-----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 5 | 5 |
| GS-14 | 10 | 10 |
| All Other GS | 99 | 99 |
| Wage Board | 54 | 54 |
| Total Permanent | 209 | 209 |

| FULL-SCALE & SYSTEMS RESEARCH DIVISION | | |
|--|-----|-----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 6 | 6 |
| GS-15 | 15 | 15 |
| GS-14 | 20 | 20 |
| All Other GS | 70 | 70 |
| Wage Board | 6 | 6 |
| Total Permanent | 117 | 117 |

| VEHICLE ENVIRONMENT DIVISION | | |
|------------------------------|-----|-----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 5 | 5 |
| GS-15 | 12 | 12 |
| GS-14 | 14 | 15 |
| All Other GS | 85 | 84 |
| Wage Board | 34 | 34 |
| Total Permanent | 151 | 151 |

| ENVIRONMENTAL BIOLOGY DIVISION | | |
|--------------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 2 | 2 |
| GS-15 | 1 | 1 |
| GS-14 | 6 | 6 |
| GS-13 | 6 | 6 |
| All Other GS | 35 | 35 |
| Wage Board | 4 | 4 |
| Total Permanent | 54 | 54 |

| PROJECT PIONEER | | |
|-----------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | 6 | 6 |
| GS-14 | 11 | 11 |
| All Other GS | 24 | 23 |
| Wage Board | - | - |
| Total Permanent | 42 | 41 |

| FISCAL DIVISION | | |
|-----------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 51 | 50 |
| Wage Board | - | - |
| Total Permanent | 52 | 51 |

| TECHNICAL SERVICES DIVISION | | |
|-----------------------------|-----|-----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | 20 | 20 |
| Wage Board | 191 | 185 |
| Total Permanent | 213 | 207 |

| INSTRUMENTATION DIVISION | | |
|--------------------------|-----|-----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | 5 | 5 |
| GS-14 | 9 | 9 |
| All Other GS | 60 | 60 |
| Wage Board | 181 | 181 |
| Total Permanent | 177 | 177 |

| SPACE SCIENCES DIVISION | | |
|-------------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 2 | 2 |
| GS-15 | 15 | 15 |
| GS-14 | 11 | 11 |
| All Other GS | 25 | 25 |
| Wage Board | 10 | 10 |
| Total Permanent | 55 | 55 |

| BIOTECHNOLOGY DIVISION | | |
|------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 15 | 15 |
| All Other GS | 36 | 36 |
| Wage Board | - | - |
| Total Permanent | 53 | 53 |

| PROJECT BIOSATELLITE | | |
|----------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 15 | 15 |
| All Other GS | 37 | 37 |
| Wage Board | 4 | 4 |
| Total Permanent | 56 | 56 |

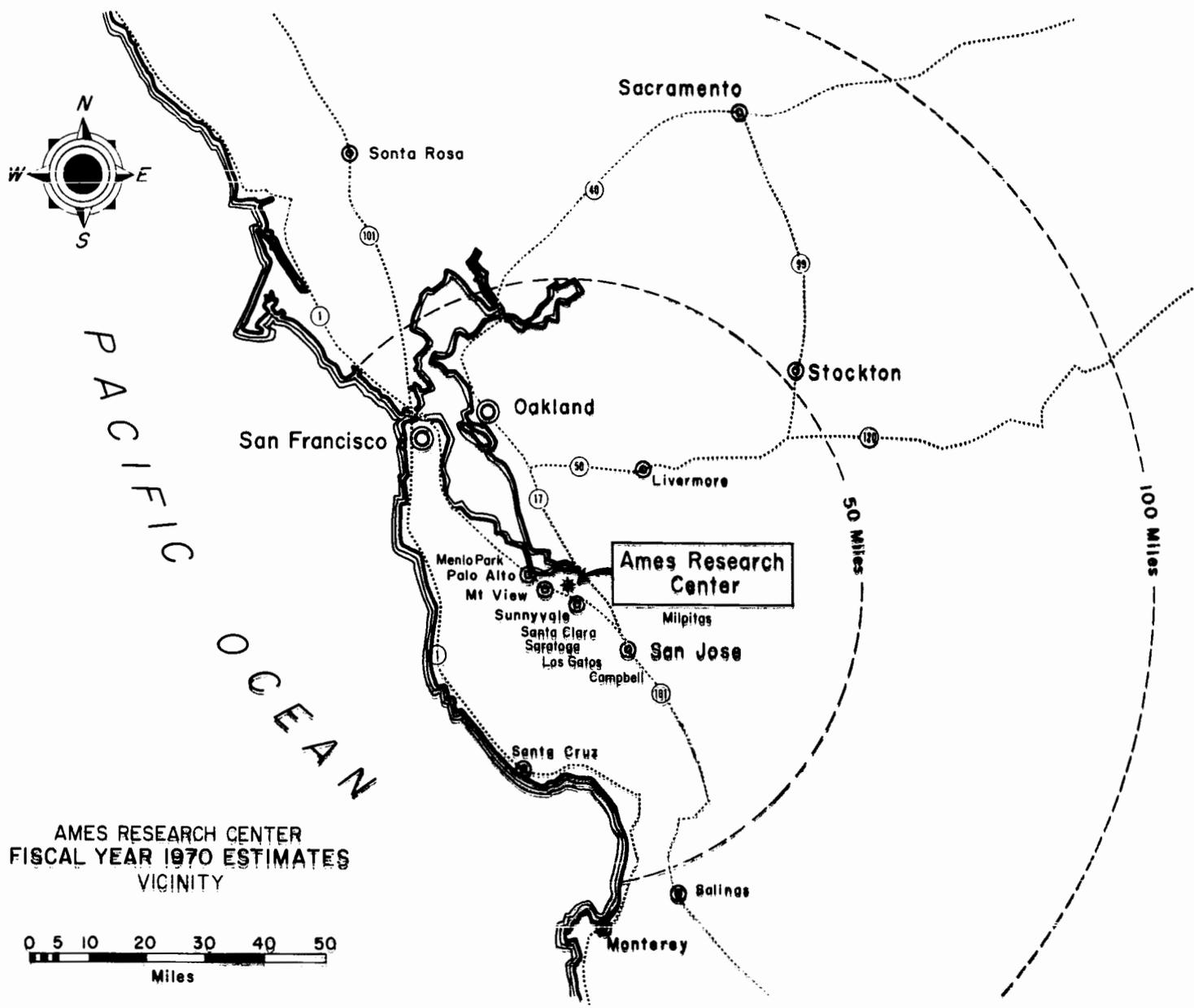
| PERSONNEL DIVISION | | |
|--------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | - | - |
| All Other GS | 45 | 45 |
| Wage Board | - | - |
| Total Permanent | 46 | 46 |

| COMPUTATION DIVISION | | |
|----------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | 2 | 2 |
| GS-14 | 5 | 5 |
| All Other GS | 41 | 41 |
| Wage Board | - | - |
| Total Permanent | 49 | 49 |

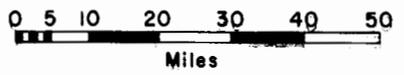
| SIMULATION SCIENCES DIVISION | | |
|------------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 4 | 4 |
| GS-14 | 7 | 7 |
| All Other GS | 19 | 19 |
| Wage Board | - | - |
| Total Permanent | 31 | 31 |

| PROCUREMENT DIVISION | | |
|----------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 4 | 4 |
| GS-14 | 2 | 2 |
| All Other GS | 57 | 57 |
| Wage Board | - | - |
| Total Permanent | 63 | 63 |

| TECHNICAL INFORMATION DIVISION | | |
|--------------------------------|----|----|
| | 69 | 70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 52 | 52 |
| Wage Board | 10 | 10 |
| Total Permanent | 63 | 63 |



AMES RESEARCH CENTER
 FISCAL YEAR 1970 ESTIMATES
 VICINITY



RPM 2-57

AMES RESEARCH CENTER
 FISCAL YEAR 1970 ESTIMATES
 LOCATION PLAN
 DECEMBER 10, 1968

LEGEND

| | |
|--------|---|
| N 20X | ADMINISTRATION BUILDING |
| N 20 | AUDITORIUM |
| N 20C | ADMINISTRATION BUILDING ANNEX |
| N 20E | ENGINEERING SERVICES BUILDING |
| N 20F | SPACE TECHNOLOGY BUILDING |
| N 20A | SPACE TECHNOLOGY BUILDING ANNEX |
| N 20E | PILOT MODEL OF 3.5 FOOT HYPERSONIC WIND TUNNEL |
| N 20E | 12 FOOT PRESSURE WIND TUNNEL |
| N 20E | 12 FOOT PRESSURE WIND TUNNEL AUXILIARIES BUILDING |
| N 207 | 1 BY 3 FOOT SUPERSONIC WIND TUNNEL |
| N 208 | SUPERSONIC FREE FLIGHT WIND TUNNEL |
| N 208 | PRESSURIZED BALLISTIC RANGE |
| N 210 | FLIGHT SIMULATION LABORATORY |
| N 211 | AIRPLANE HANGAR AND SHOP |
| N 212 | STRUCTURAL FABRICATION SHOP |
| N 213 | INSTRUMENT RESEARCH LABORATORY |
| N 214 | MODEL FINISHING SHOP |
| N 215 | 7 BY 10 FOOT WIND TUNNEL NUMBER 1 |
| N 216 | 7 BY 10 FOOT WIND TUNNEL NUMBER 2 |
| N 218 | 14 FOOT TRANSONIC WIND TUNNEL |
| N 218A | ELECTRICAL EQUIPMENT BUILDING |
| N 219 | ELECTRICAL SERVICES BUILDING |
| N 220 | TECHNICAL SERVICES BUILDING |
| N 221 | 40 BY 80 FOOT WIND TUNNEL |
| N 221A | 30 SATELLITE CENTRIFUGE |
| N 221B | VERTICAL HEIGHT APPARATUS |
| N 222 | 7 BY 2 FOOT TRANSONIC WIND TUNNEL |
| N 223 | HYPERVELOCITY BALLISTIC RANGE |
| N 224 | PAVILION INTEGRATION AND TEST FACILITY |
| N 225 | SUBSTATION |
| N 226 | 9 BY 6 FOOT SUPERSONIC WIND TUNNEL |
| N 227 | JUNITARY PLAN WIND TUNNEL BUILDING |
| N 227A | 11 FOOT TRANSONIC WIND TUNNEL |
| N 227B | 8 BY 7 FOOT SUPERSONIC WIND TUNNEL |
| N 227C | 8 BY 7 FOOT SUPERSONIC WIND TUNNEL |
| N 227D | JUNITARY PLAN WIND TUNNEL AUXILIARIES BUILDING |
| N 228 | 42 INCH SHOCK TUNNEL |
| N 229 | 15 FOOT HYPERSONIC WIND TUNNEL |
| N 229A | 15 FOOT HYPERSONIC WIND TUNNEL AUXILIARIES BUILDING |
| N 230 | PHYSICAL SCIENCES RESEARCH LABORATORY |
| N 231 | HYPERSONIC HELIUM TUNNEL |
| N 232 | PILOT MODEL OF HYPERVELOCITY FREE FLIGHT FACILITY |
| N 233 | DATA REDUCTION BUILDING |
| N 234 | FLUID DYNAMICS LABORATORY |
| N 234A | MASS TRANSFER BOILER HOUSE |
| N 235 | CAFETERIA BUILDING |
| N 236 | BIOSCIENCE LABORATORY |
| N 237 | HYPERVELOCITY FREE FLIGHT FACILITY |
| N 238 | MACH 50 HELIUM TUNNEL |
| N 239 | PHYSICAL SCIENCES RESEARCH LABORATORY |
| N 239A | PHYSICAL SCIENCES HIGH BAY |
| N 240 | SPACE ENVIRONMENT RESEARCH FACILITY |
| N 241 | ADMINISTRATIVE MANAGEMENT BUILDING |
| N 242 | STRUCTURAL DYNAMICS LABORATORY |
| N 243 | FLIGHT AND GUIDANCE SIMULATION LABORATORY |
| N 243A | SIMULATION EQUIPMENT BUILDING |
| N 244 | SYSTEMS ENGINEERING FACILITY |



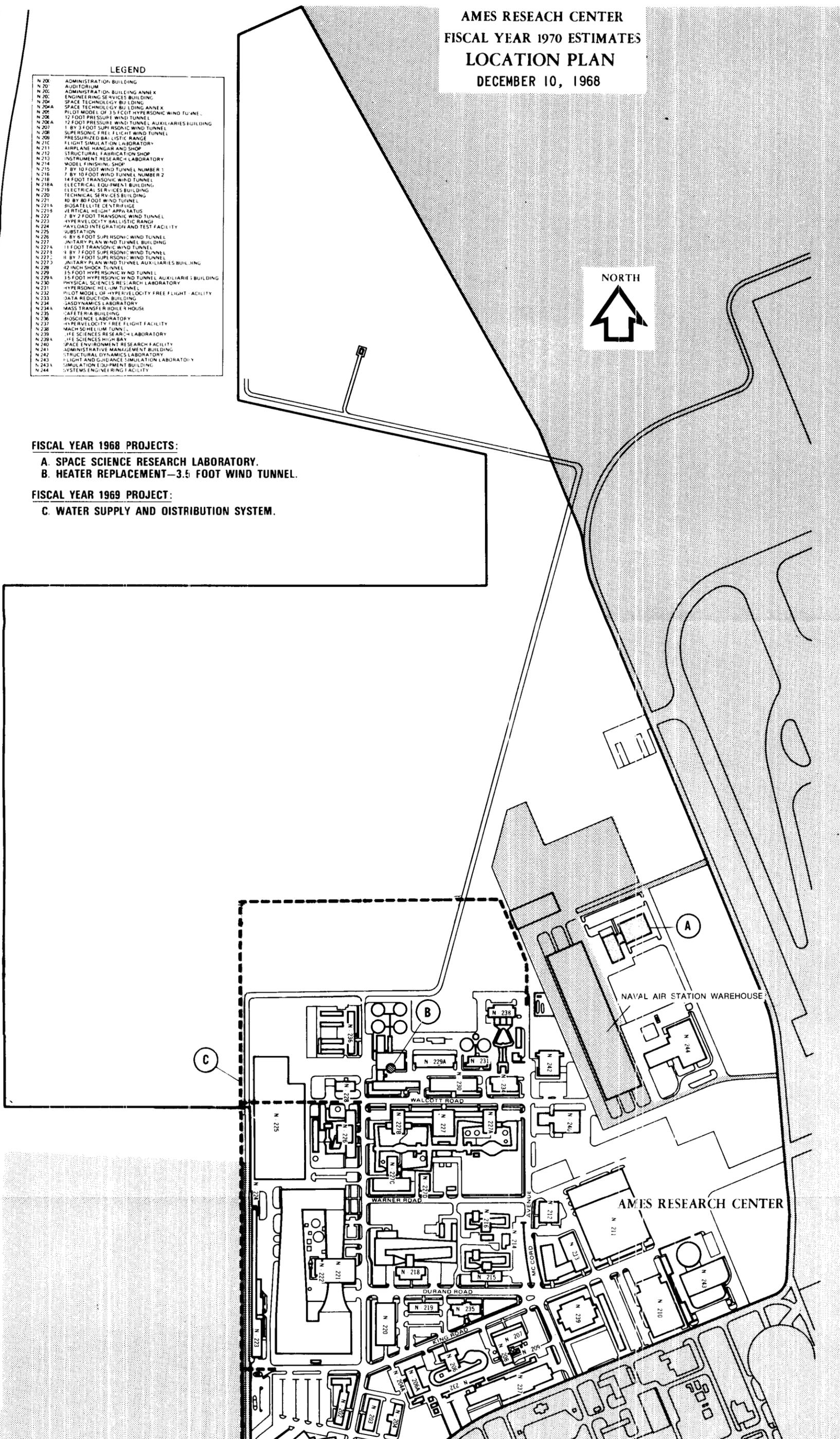
FISCAL YEAR 1968 PROJECTS:

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

FISCAL YEAR 1969 PROJECT:

- C. WATER SUPPLY AND DISTRIBUTION SYSTEM.

STEVENS CREEK



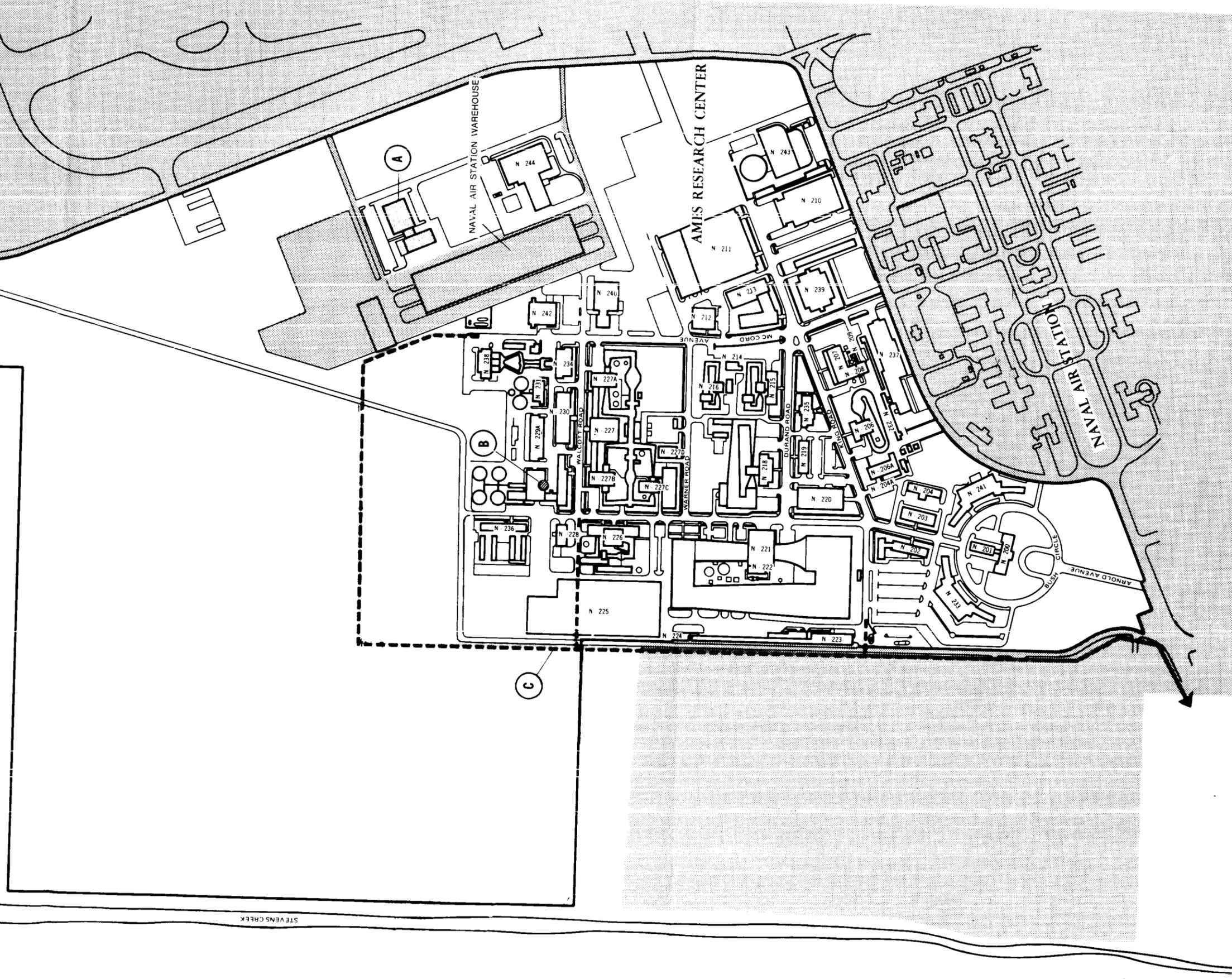
NAVAL AIR STATION WAREHOUSE

AMES RESEARCH CENTER

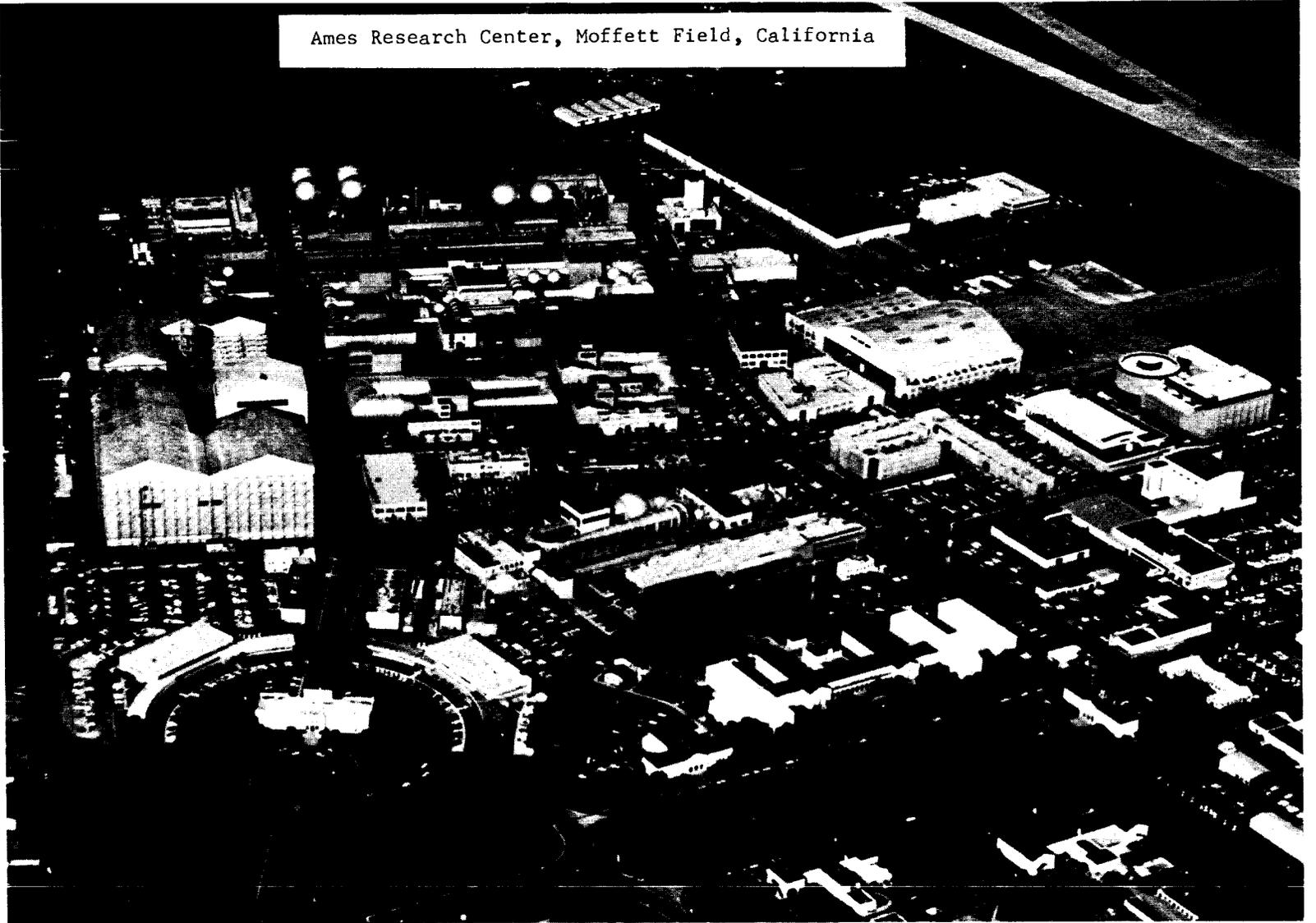


| | |
|--------|--|
| N 225 | SUBSTATION INTEGRATION AND TEST FACILITY |
| N 226 | 6 BY 6 FOOT SUPERSONIC WIND TUNNEL |
| N 227A | 11 FOOT TRANSONIC WIND TUNNEL BUILDING |
| N 227B | 11 FOOT TRANSONIC WIND TUNNEL |
| N 227C | 8 BY 7 FOOT SUPERSONIC WIND TUNNEL |
| N 227D | UNITARY PLANT AND TUNNEL AUXILIARIES BUILDING |
| N 228 | 35 FOOT SUPERSONIC WIND TUNNEL AUXILIARIES BUILDING |
| N 228A | 15 FOOT HYPERSONIC WIND TUNNEL AUXILIARIES BUILDING |
| N 228B | HYPERSONIC FLUX TUNNEL RESEARCH LABORATORY |
| N 228C | FLIGHT MODEL DEVELOPMENT VELOCITY FREE FLIGHT FACILITY |
| N 228D | FLIGHT AND GUIDANCE SIMULATION LABORATORY |
| N 228E | FLIGHT AND GUIDANCE SIMULATION BUILDING |
| N 228F | SYSTEMS ENGINEERING BUILDING |
| N 228G | CAFETERIA |
| N 228H | BOILER ROOM |
| N 228I | BOILER HOUSE |
| N 228J | SCIENCE LABORATORY |
| N 228K | SCIENCE LABORATORY |
| N 228L | SCIENCE LABORATORY |
| N 228M | SCIENCE LABORATORY |
| N 228N | SCIENCE LABORATORY |
| N 228O | SCIENCE LABORATORY |
| N 228P | SCIENCE LABORATORY |
| N 228Q | SCIENCE LABORATORY |
| N 228R | SCIENCE LABORATORY |
| N 228S | SCIENCE LABORATORY |
| N 228T | SCIENCE LABORATORY |
| N 228U | SCIENCE LABORATORY |
| N 228V | SCIENCE LABORATORY |
| N 228W | SCIENCE LABORATORY |
| N 228X | SCIENCE LABORATORY |
| N 228Y | SCIENCE LABORATORY |
| N 228Z | SCIENCE LABORATORY |

- FISCAL YEAR 1968 PROJECTS:**
- A. SPACE SCIENCE RESEARCH LABORATORY.
 - B. HEATER REPLACEMENT - 3.5 FOOT WIND TUNNEL.
- FISCAL YEAR 1969 PROJECT:**
- C. WATER SUPPLY AND DISTRIBUTION SYSTEM.



Ames Research Center, Moffett Field, California



RPM 2-59

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

ELECTRONICS RESEARCH CENTER

MISSION:

The mission of the Electronics Research Center is to increase the nation's capability in space by providing the knowledge and advanced technology needed to improve performance and reliability of space and aeronautical electronic systems and components. The Center meets this responsibility in two principal ways:

First, the Center organizes, manages, and conducts a comprehensive program of basic and applied aerospace electronics research to: (a) investigate concepts and techniques that will provide the technological foundation for the development of electronic equipment of reduced weight, size, power drain, and complexity, able to operate for long periods of time in the temperatures, radiation, vacuum, and other conditions of aerospace flight environment; (b) investigate concepts and techniques, establish performance characteristics, test procedures, and specifications for aerospace electronic components and techniques that will make aerospace electronics equipment inherently more reliable; and (c) devise new electronic concepts and techniques and prove their feasibility both analytically and experimentally, leading to aerospace electronic equipment with performance characteristics far beyond those of today.

Second, the Center provides a focal point for national aerospace electronics research, coordinating nationwide research efforts and sponsoring electronics research conducted by industry, universities, and private institutions. In this capacity, the Center: (a) responds to the needs of specific aerospace programs and projects for new electronic techniques, concepts, and devices, and helps shape future electronics research to resolve anticipated problems in these programs; (b) distributes knowledge about basic and applied research on aerospace electronics within NASA and also to industry, universities, and other members of the scientific and engineering community; and (c) provides to NASA programs and projects aerospace electronic scientists and engineers who are fully knowledgeable in the electronics state-of-the-art.

Electronics research being managed and conducted by the Center during FY 1969 and FY 1970 is largely contracted with industry and universities and is focused in the following areas:

1. Aerospace electronics materials and components.
2. Guidance and navigation of space vehicles, aircraft, and the supporting ground based equipment.
3. Space vehicle and aircraft control, stabilization and information systems.

4. Electronics system simulation, analysis, evaluation, and integration in the fields of guidance, control, navigation, tracking, communication and instrumentation.
5. Electrical and electronic power conditioning and distribution.
6. Bioelectronics.
7. Space and ground based computers, computing systems, and instrumentation technology.
8. Solid state physics, microwave propagation, microwave communications, and transmitting and receiving phenomena.
9. Optical communications.
10. Astrophysical measurements.

An in-house research effort is being conducted by the Center staff on those tasks offering great promise for aerospace electronics technology and on those problems requiring first-hand experience on the part of the Center personnel in order to contract, monitor, and evaluate related research with industry and universities.

DESCRIPTION:

The Electronics Research Center is being constructed on a tract in the Kendall Square area of Cambridge, Mass. The site, one and a half miles west of the center of Boston, Massachusetts, is immediately north of the Massachusetts Institute of Technology and one and a half miles from Harvard University. The tract is bounded on the north by Binney Street, on the south by Broadway, on the east by Third Street, and on the west by the Penn-Central Railroad. The total area to be occupied at the Kendall Square site in Cambridge is 24.3 acres, of which 8.8 acres have been acquired. The total capital investment as of June 30, 1968, was \$20,157,000.

Completion of construction of the initial permanent ERC facilities is scheduled as follows:

| | | |
|---------------------------------|---|-----------------|
| High-Rise Laboratory | - | October, 1969 |
| Auditorium and Office Addition | - | August, 1969 |
| Center Service Building | - | May, 1969 |
| Guidance Laboratory Building | - | October, 1969 |
| Optics Laboratory Building | - | September, 1969 |
| Shipping and Receiving Facility | - | August, 1969 |

SUMMARY OF RESOURCES REQUIREMENTS:

| | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$10,118,000 | \$11,944,000 | \$12,843,000 |
| Travel..... | 308,000 | 318,000 | 351,000 |
| Automatic data processing..... | 1,382,000 | 1,329,000 | 1,225,000 |
| Facilities services..... | 1,668,000 | 1,786,000 | 2,375,000 |
| Technical services..... | 1,038,000 | 933,000 | 823,000 |
| Administrative support..... | <u>838,000</u> | <u>927,000</u> | <u>949,000</u> |
| Total, fund requirements..... | <u>\$15,352,000</u> | <u>\$17,237,000</u> | <u>\$18,566,000</u> |

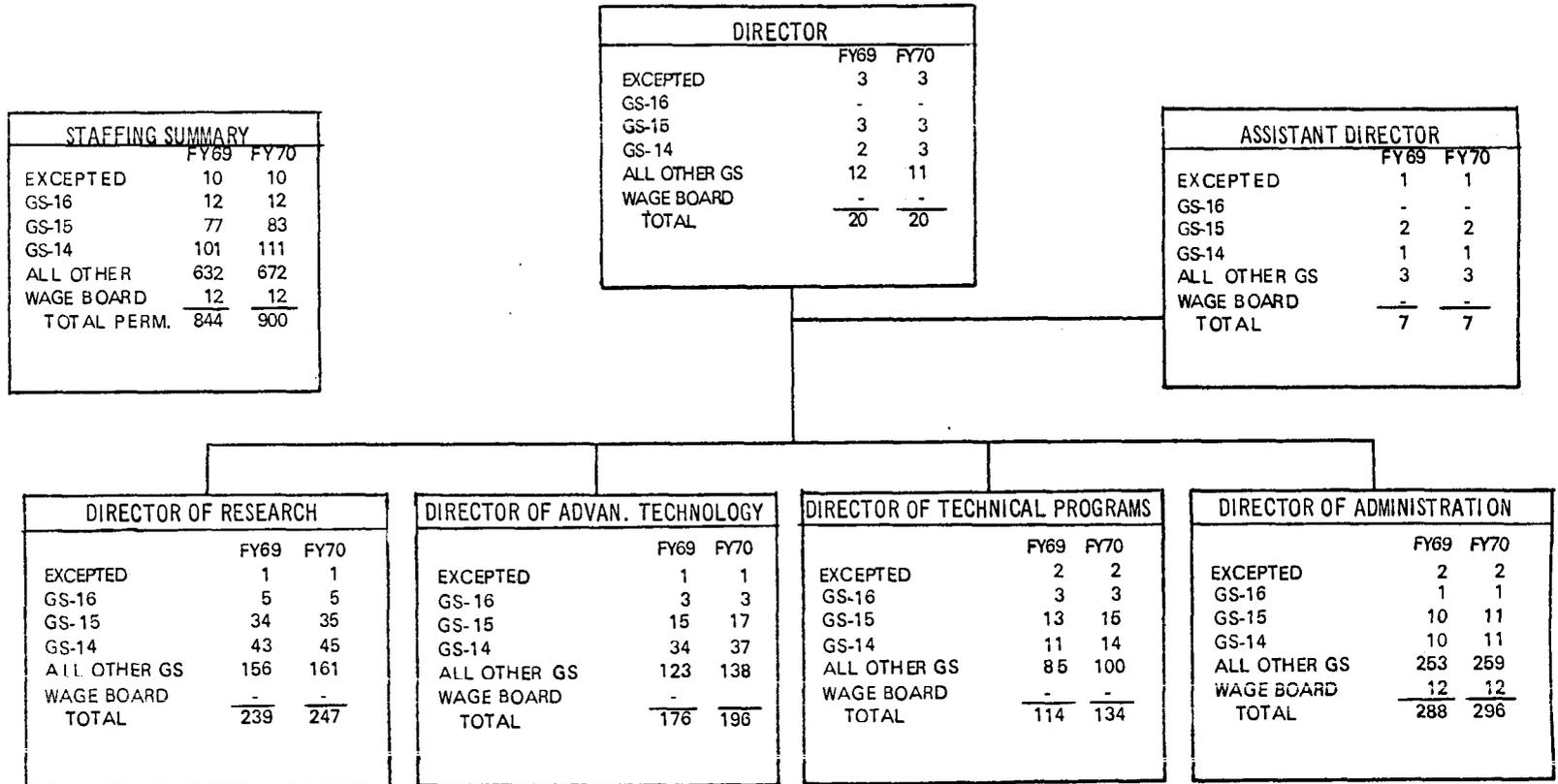
PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 3 | 4 | 4 |
| Lunar and planetary exploration..... | 1 | 1 | 1 |
| Space applications..... | 17 | 19 | 21 |
| Launch vehicle procurement..... | 27 | 30 | 32 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 98 | 106 | 116 |
| Space vehicle systems..... | 4 | 5 | 5 |
| Electronics systems..... | 289 | 315 | 341 |
| Human factor systems..... | 19 | 21 | 22 |
| Space power and electric propulsion systems..... | <u>24</u> | <u>26</u> | <u>30</u> |
| Subtotal, positions by program..... | <u>482</u> | <u>527</u> | <u>572</u> |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 23 | 23 | 24 |
| Administrative support..... | 197 | 199 | 205 |
| Research and development support..... | <u>92</u> | <u>95</u> | <u>99</u> |
| Subtotal, indirect positions..... | <u>312</u> | <u>317</u> | <u>328</u> |
| Total, permanent positions..... | <u>794</u> | <u>844</u> | <u>900</u> |

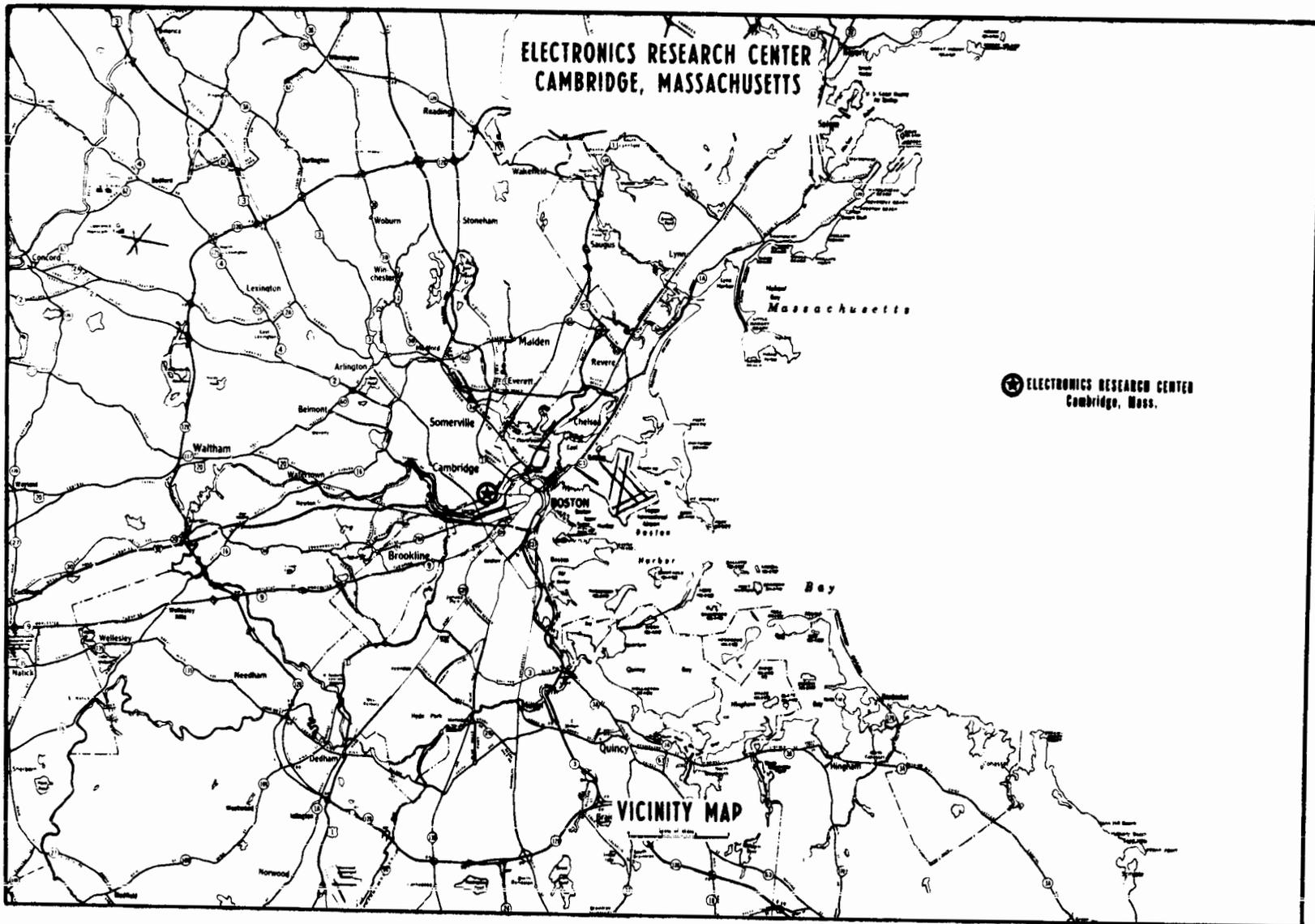
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ELECTRONICS RESEARCH CENTER

ORGANIZATION AND STAFFING CHART



RPM 2-63



RPM 2-64

**ELECTRONICS RESEARCH CENTER
FISCAL YEAR 1970 ESTIMATES
LOCATION PLAN
CAMBRIDGE, MASS.**

EXISTING FY 1965/1968

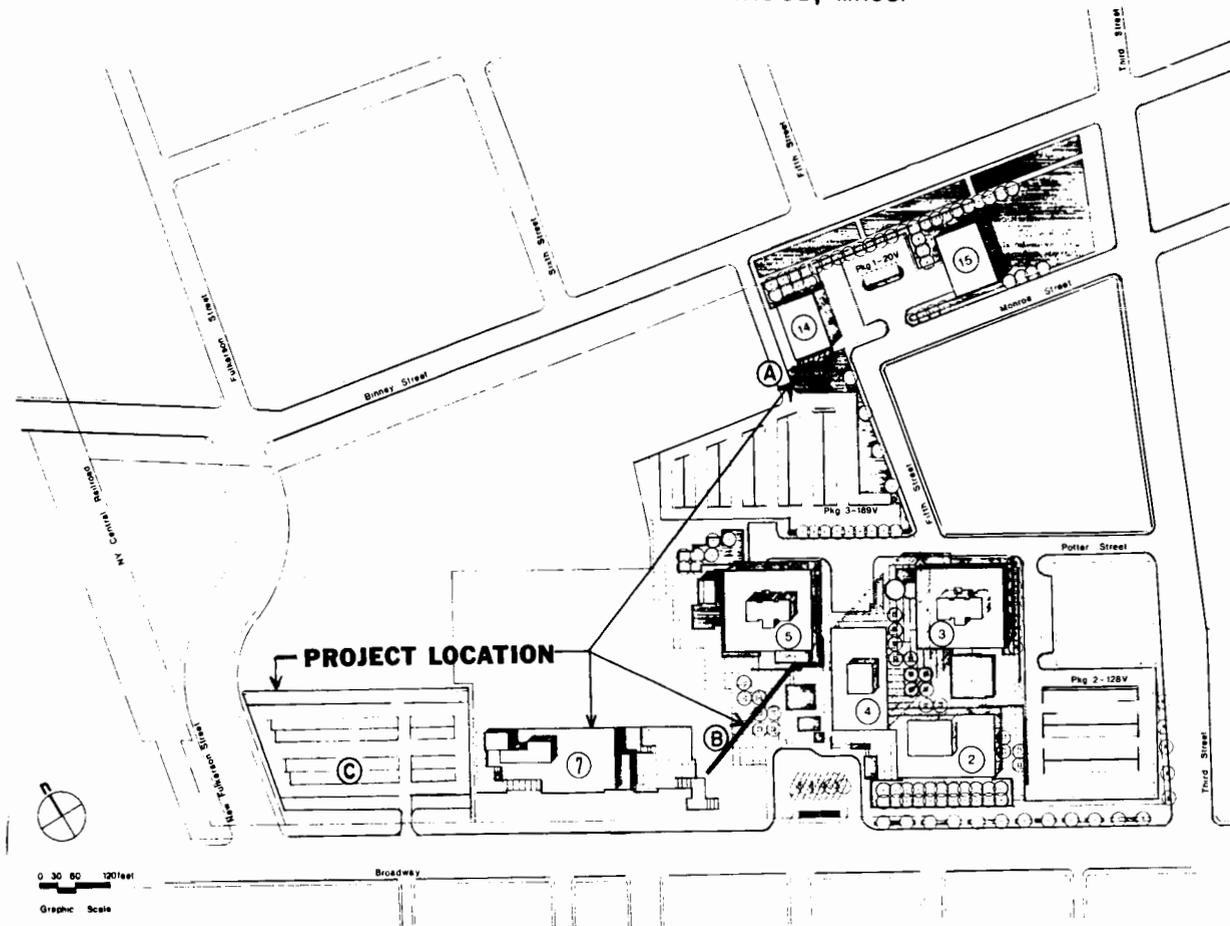
- 2. Auditorium
- 4. High Rise Laboratory
- 14. Center Service Building

EXISTING FY 1967

- 3. Optics Laboratory
- 5. Guidance Laboratory
- 15. Shipping and Receiving Facility

PROPOSED FY 1970

- 7. COMPUTER/INSTRUMENTATION RESEARCH LABORATORY
- CENTER SUPPORT FACILITIES III
 - A. BLDG. 14 ADDITION
 - B. UTILITY TUNNEL ADD.
 - C. PARKING AREA 6



RPM 2-65

ELECTRONICS RESEARCH CENTER
CAMBRIDGE, MASS.



RPM 2-66

AERIAL VIEW

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

FLIGHT RESEARCH CENTER

MISSION:

The Flight Research Center, established in 1947, conducts aeronautical and space research within and outside the atmosphere. The work includes effort on problems of take-off, landing, low-speed flights, supersonic and hypersonic flight, and re-entry to verify predicted characteristics and to identify unexpected problems in actual flight.

The current and projected programs at this Center include: aeronautical projects concerning general aviation and subsonic and supersonic transport research; space vehicle systems projects in which the flight behavior of advanced re-entry vehicles including M2-F2, HL-10, and X-24A heavy weight lifting bodies is studied; and electronic systems projects such as display, guidance, and control in advanced flight missions and improvements on systems and sensors used in biomedical monitoring, tracking, and data acquisition.

Most important of the facilities and special equipment for conducting programs at the Flight Research Center are the aircraft. They range from general aviation aircraft for handling qualities investigations to supersonic aircraft used for various research investigations having application to both civil and military aviation. Special purpose vehicles such as lifting bodies, variable stability aircraft, or airborne simulators are contractor procured or developed in-house. Specialized laboratory facilities are available to complement the flight activities with proper preliminary research and testing. Simulation equipment is used to guide and assist in the performance of productive flight activities. A two-station radar for tracking and data acquisition is operated to support the flight activity.

DESCRIPTION:

The Flight Research Center, Edwards, California, is 65 air miles northeast of Los Angeles. The Center is located at the north end of Edwards Air Force Base on 218 acres of land used under a permit from the Department of the Air Force. Utilities are provided by the Air Force on a reimbursable basis. The Center is adjacent to Rogers Dry Lake, a 55-square-mile area with a complex of runways varying in length from 5 to 11 miles.

The physical plant consists of an office-laboratory building with adjoining shops, a flight maintenance hangar and a calibration hangar, and a high temperature loads calibrations facility. Auxiliary buildings include warehouses, an auxiliary power systems building, and a communications building. The main station of the two-station radar range operated by the Center is located on the third floor of the Office-laboratory building. The total capital investment of the Flight Research Center, including work in progress and contractor-held facilities, as of June 30, 1968, is \$42,819,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| | <u>FUNDS</u> | | |
|--------------------------------|--------------------|--------------------|--------------------|
| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$7,228,000 | \$7,589,000 | \$7,583,000 |
| Travel..... | 184,000 | 189,000 | 197,000 |
| Automatic data processing..... | 92,000 | 85,000 | 85,000 |
| Facilities services..... | 1,109,000 | 1,099,000 | 1,056,000 |
| Technical services..... | 29,000 | 42,000 | 42,000 |
| Administrative support..... | <u>827,000</u> | <u>676,000</u> | <u>652,000</u> |
| Total, fund requirements..... | <u>\$9,469,000</u> | <u>\$9,680,000</u> | <u>\$9,615,000</u> |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|--|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Advanced Research and Technology</u> | | | |
| Space vehicle systems..... | 68 | 64 | 64 |
| Electronics systems..... | 20 | 20 | 20 |
| Human factor systems..... | 4 | 4 | 4 |
| Aeronautical vehicles..... | 325 | 311 | 306 |
| <u>Tracking and Data Acquisition</u> | 36 | 35 | 35 |
| <u>Technology Utilization</u> | <u>1</u> | <u>1</u> | <u>1</u> |
| Subtotal, positions by program..... | 454 | 435 | 430 |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 11 | 11 | 11 |
| Administrative support..... | <u>101</u> | <u>93</u> | <u>93</u> |
| Subtotal, indirect positions..... | <u>112</u> | <u>104</u> | <u>104</u> |
| Total, permanent positions..... | <u>566</u> | <u>539</u> | <u>534</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ORGANIZATION AND STAFFING CHART

FLIGHT RESEARCH CENTER

| STAFFING SUMMARY | | |
|------------------|------------|------------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 6 | 6 |
| GS-16 | 6 | 6 |
| GS-15 | 16 | 17 |
| GS-14 | 33 | 35 |
| All Other GS | 289 | 286 |
| Wage Board | 189 | 184 |
| Total Permanent | <u>539</u> | <u>534</u> |

| OFFICE OF THE DIRECTOR | | |
|------------------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 2 | 2 |
| GS-16 | 1 | 1 |
| GS-15 | 3 | 3 |
| GS-14 | - | - |
| All Other GS | 7 | 7 |
| Wage Board | 19 | 18 |
| Total Permanent | <u>32</u> | <u>31</u> |

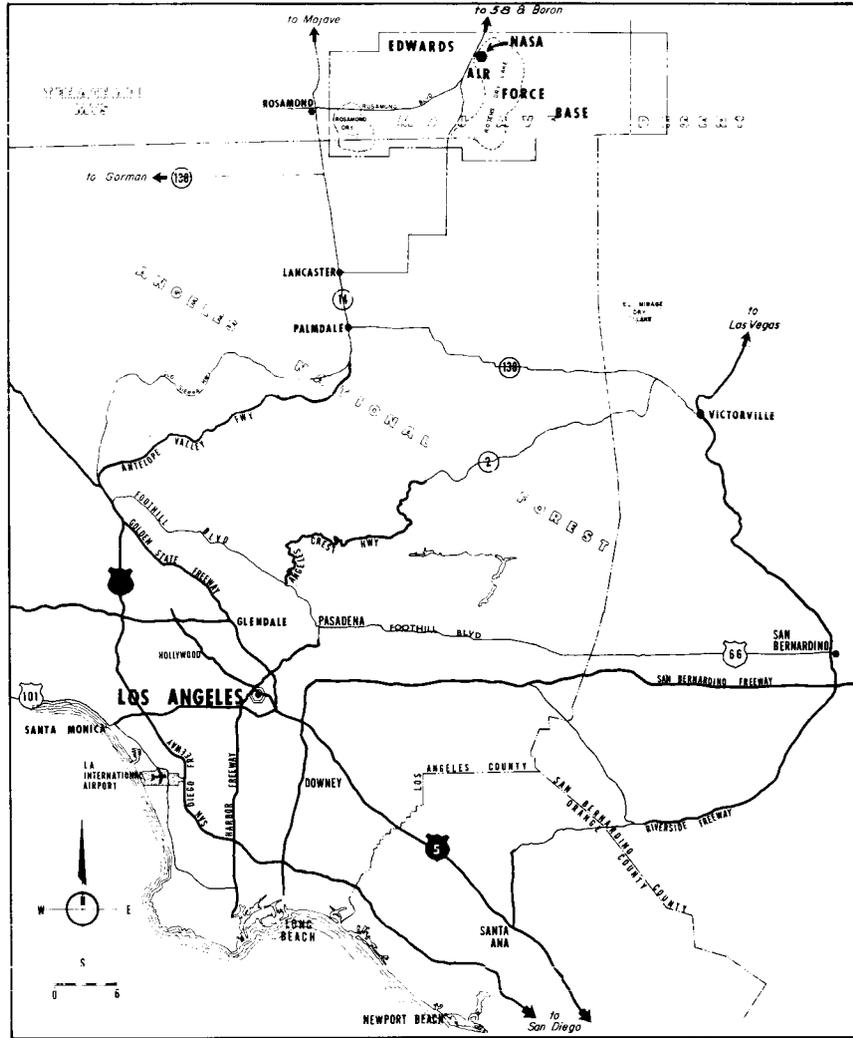
| RESEARCH DIVISION | | |
|-------------------|------------|------------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 1 | 1 |
| GS-16 | 4 | 4 |
| GS-15 | 5 | 6 |
| GS-14 | 16 | 17 |
| All Other GS | 79 | 77 |
| Wage Board | 7 | 7 |
| Total Permanent | <u>112</u> | <u>112</u> |

| OPERATIONS DIVISION | | |
|---------------------|------------|------------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 2 | 2 |
| GS-16 | - | - |
| GS-15 | 4 | 4 |
| GS-14 | 4 | 4 |
| All Other GS | 16 | 16 |
| Wage Board | <u>12</u> | <u>119</u> |
| Total Permanent | <u>147</u> | <u>145</u> |

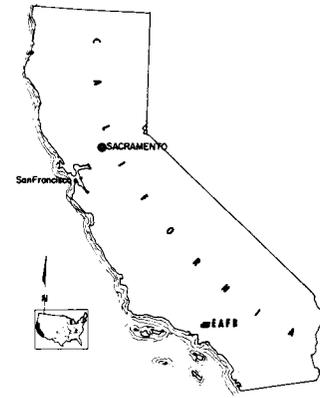
| DATA SYSTEMS DIVISION | | |
|-----------------------|------------|------------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 8 | 9 |
| All Other GS | 107 | 106 |
| Wage Board | <u>35</u> | <u>33</u> |
| Total Permanent | <u>152</u> | <u>150</u> |

| BIOMEDICAL OFFICE | | |
|-------------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | 1 | 1 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | 1 | 1 |
| All Other GS | 7 | 7 |
| Wage Board | - | - |
| Total Permanent | <u>9</u> | <u>9</u> |

| ADMINISTRATIVE DIVISION | | |
|-------------------------|-----------|-----------|
| | <u>CY</u> | <u>BY</u> |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 3 | 3 |
| GS-14 | 4 | 4 |
| All Other GS | 73 | 73 |
| Wage Board | <u>7</u> | <u>7</u> |
| Total Permanent | <u>87</u> | <u>87</u> |



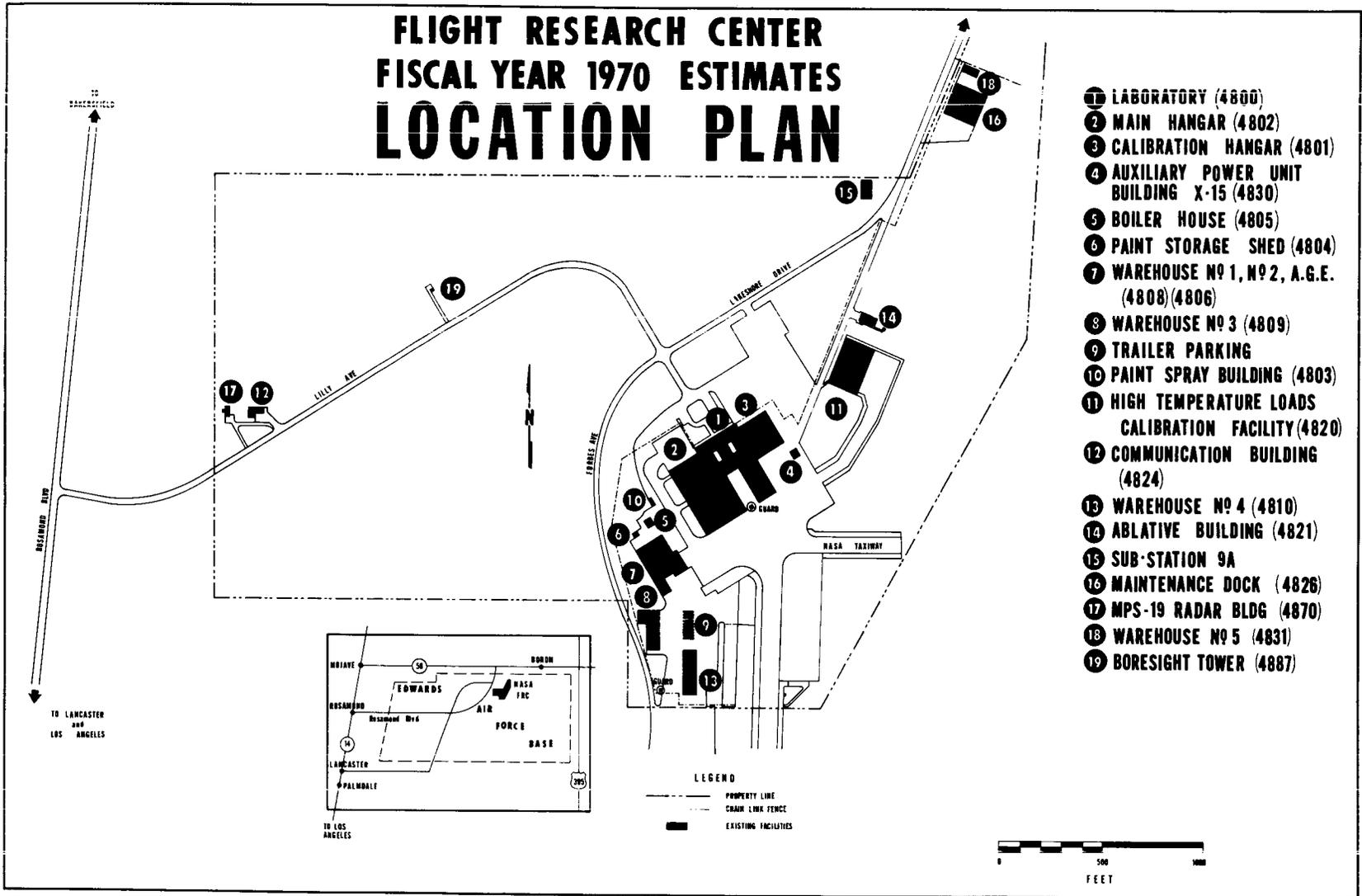
FLIGHT RESEARCH CENTER FISCAL YEAR 1970 ESTIMATES VICINITY MAP



KEY PLAN

RPM 2-70

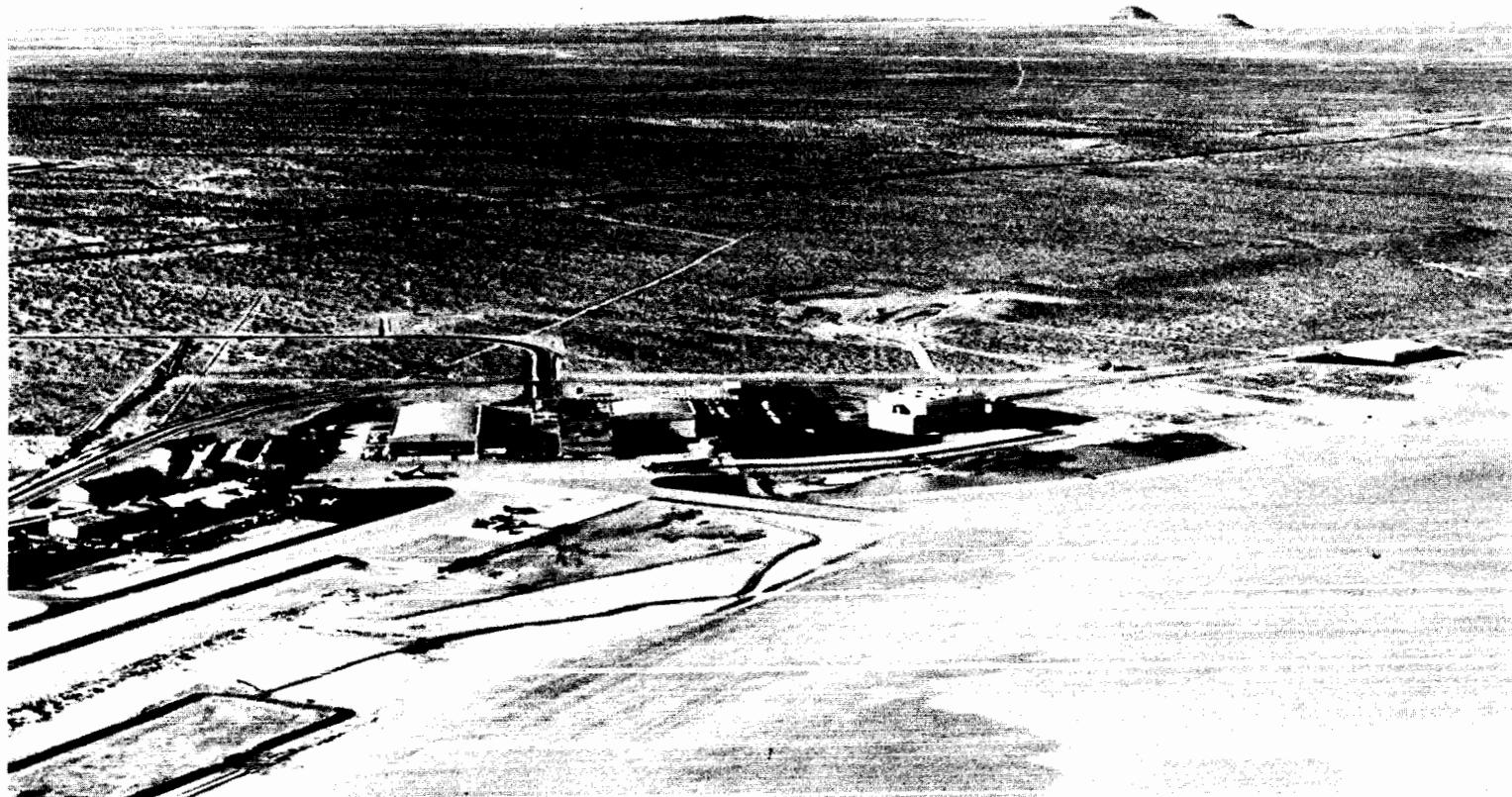
FLIGHT RESEARCH CENTER FISCAL YEAR 1970 ESTIMATES LOCATION PLAN



- 1 LABORATORY (4800)
- 2 MAIN HANGAR (4802)
- 3 CALIBRATION HANGAR (4801)
- 4 AUXILIARY POWER UNIT BUILDING X-15 (4830)
- 5 BOILER HOUSE (4805)
- 6 PAINT STORAGE SHED (4804)
- 7 WAREHOUSE No 1, No 2, A.G.E. (4808)(4806)
- 8 WAREHOUSE No 3 (4809)
- 9 TRAILER PARKING
- 10 PAINT SPRAY BUILDING (4803)
- 11 HIGH TEMPERATURE LOADS CALIBRATION FACILITY (4820)
- 12 COMMUNICATION BUILDING (4824)
- 13 WAREHOUSE No 4 (4810)
- 14 ABLATIVE BUILDING (4821)
- 15 SUB-STATION 9A
- 16 MAINTENANCE DOCK (4826)
- 17 MPS-19 RADAR BLDG (4870)
- 18 WAREHOUSE No 5 (4831)
- 19 BORESIGHT TOWER (4887)

RPM 2-71

FLIGHT RESEARCH CENTER
FISCAL YEAR 1970 ESTIMATES



RPM 2-72

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

LANGLEY RESEARCH CENTER

MISSION:

The mission of the Langley Research Center is to provide the advanced technology necessary for the development of civil and military aircraft having improved performance, utility and safety, and for the furtherance of space flight programs.

The Center's aeronautical research program is directed toward general aviation, V/STOL, subsonic jet transports, supersonic and hypersonic aircraft and uses both ground based and flight techniques. In high speed aerodynamics research major emphasis is given to generating, developing and refining aircraft configurations which maximize flight efficiency at all operating speeds. The supercritical wing for subsonic aircraft, and the fixed and variable planform wings for supersonic flight represent major efforts in this area. In the field of hypersonic research, work on vehicle configurations, efficient integration of advanced propulsion systems and demonstration of the technology for practical hypersonic ramjet aircraft propulsion systems is progressing. Current research on aircraft noise alleviation includes studying in detail the basic nature of propulsion system sound generation and propagation, operating procedures, and the effects of noise on man; and developing aircraft configuration features to minimize sonic boom effects.

A substantial portion of the Center's skills and resources is devoted to advancing national space flight programs. Vigorous research is under way to expose new opportunities for important progress in understanding and using the space environment; to evolve systems and operating concepts for achieving advanced space mission capabilities; and to assess the effectiveness, technical feasibility, and resource requirements of alternate approaches. Research is also under way to develop advanced design, construction, and operations technology for the optimum definition and successful achievement of national space flight goals. Langley manages and supports a number of these space flight projects.

The responsibility for managing the 1973 Mars mission (Viking), a major national space effort, has been assigned to the Center. The objectives are to obtain scientific data increasing our knowledge of both the Mars atmosphere and surface by means of an orbiter and surface lander. Particular emphasis will be placed on obtaining information relevant to life on the planet and the capability of the environment to support life.

The Langley Research Center has developed research teams in the technical areas of: aerodynamics, stability and control, airworthiness, fluid physics, flight environments, vehicle loading, structures and structural dynamics,

materials, energy conversion, navigation and control, communications, data sensing and handling, operational problems, crew performance and vehicular accommodations, life support, systems integration, flight operations, and air-breathing propulsion.

To support an effective attack on crucial flight problems, the Center's staff has developed and utilizes a unique complex of powerful research tools and techniques. These include a wide array of wind tunnel (continuous and intermittent) facilities for investigations of fluid flow phenomena and configuration characteristics; environmental test facilities for preflight determination of the reaction of flight systems and materials; flight simulators for the optimization of vehicle design requirements, and of operational techniques for complex manned missions involving navigation, rendezvous and dual vehicle maneuvering, extraterrestrial landings and surface operations; specialized laboratories for the development and evaluation of advanced life support systems, guidance and control components, propulsion and energy conversion devices, structures and materials, data sensors and processing equipment, and communications elements for future flight applications; and powerful analytical computing capabilities. For exploration and definition of an actual flight environment, Langley has pioneered in flight research using drop-test and free-flight models, rocket-propelled flight systems, satellites, and other space vehicles.

DESCRIPTION:

The Langley Research Center, Hampton, Virginia, is located approximately 100 air miles south of Washington, D.C. The Center occupies 773 acres of Government-owned land, divided into two areas by the runway facilities of Langley Air Force Base. The West Area consists of 750 acres, 430 owned by NASA and 320 under permit from the Air Force. The East Area comprises 23 acres under Air Force permit. Runways, some utilities, and certain other facilities are used jointly by NASA and the Air Force. In addition, there are 110 acres of NASA-owned land located in the City of Newport News, Virginia, 3,277 acres under permit from other Government agencies, and 9 acres under lease. The total acreage presently owned, under permit or leased, is 4,169. The total capital investment including fixed assets in progress, and contractor-held facilities at various locations, as of June 30, 1968, was \$358,608,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|--------------|--------------|--------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$48,694,000 | \$51,613,000 | \$51,974,000 |
| Travel..... | 1,130,000 | 1,132,000 | 1,132,000 |
| Automatic data processing..... | 3,541,000 | 950,000 | 1,145,000 |

| <u>Functions</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|-------------------------------|---------------------|---------------------|---------------------|
| Facilities services..... | 6,373,000 | 6,749,000 | 6,554,000 |
| Technical services..... | 145,000 | 138,000 | 138,000 |
| Administrative support..... | <u>2,330,000</u> | <u>2,365,000</u> | <u>2,365,000</u> |
| Total, fund requirements..... | <u>\$62,213,000</u> | <u>\$62,947,000</u> | <u>\$63,308,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| <u>1. Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 1 | 1 | 1 |
| Space flight operations..... | 43 | 15 | 12 |
| Advanced missions..... | 2 | 2 | 1 |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 62 | 35 | 36 |
| Lunar and planetary exploration..... | 115 | 144 | 168 |
| Bioscience..... | 4 | 2 | 2 |
| Space applications..... | 17 | 21 | 15 |
| Launch vehicle procurement..... | 49 | 47 | 42 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 275 | 276 | 255 |
| Space vehicle systems..... | 722 | 677 | 673 |
| Electronics systems..... | 436 | 412 | 405 |
| Human factor systems..... | 114 | 112 | 111 |
| Space power and electric propulsion systems..... | 29 | 30 | 27 |
| Chemical propulsion..... | 56 | 55 | 51 |
| Aeronautical vehicles..... | 846 | 846 | 846 |
| <u>Tracking and Data Acquisition.....</u> | <u>28</u> | <u>28</u> | <u>23</u> |
| <u>Technology Utilization.....</u> | <u>5</u> | <u>5</u> | <u>5</u> |
| Subtotal, positions by program..... | <u>2,804</u> | <u>2,708</u> | <u>2,673</u> |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---------------------------------------|---------------------|---------------------|---------------------|
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 22 | 22 | 22 |
| Administrative support..... | 446 | 428 | 428 |
| Research and development support..... | <u>765</u> | <u>727</u> | <u>726</u> |
| Subtotal, indirect positions..... | <u>1,233</u> | <u>1,177</u> | <u>1,176</u> |
| Total, permanent positions..... | <u><u>4,037</u></u> | <u><u>3,885</u></u> | <u><u>3,849</u></u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Organization and staffing chart
LANGLEY RESEARCH CENTER

| STAFFING SUMMARY | | | |
|------------------|------|------|--|
| | 69 | 70 | |
| Excepted | 27 | 27 | |
| GS-16 | 36 | 36 | |
| GS-15 | 150 | 150 | |
| GS-14 | 302 | 302 | |
| Other GS | 2613 | 2775 | |
| Wage Board | 727 | 727 | |
| Total Perm. | 3885 | 3849 | |

| DIRECTOR ASSOCIATE DIRECTOR | | | |
|--------------------------------|----|----|--|
| | 69 | 70 | |
| Excepted | 2 | 2 | |
| Other GS | 4 | 4 | |
| Total | 6 | 6 | |

| Executive Staff | | | |
|-----------------|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 1 | 1 | |
| GS-15 | 1 | 1 | |
| GS-14 | 1 | 1 | |
| Other GS | 9 | 9 | |
| Total | 14 | 14 | |

| OFFICE OF ASSISTANT DIRECTOR (GROUP 1) | | | |
|---|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 1 | 1 | |
| Total | 2 | 2 | |

| OFFICE OF ASSISTANT DIRECTOR (GROUP C) | | | |
|---|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 1 | 1 | |
| Total | 2 | 2 | |

| OFFICE OF ASSISTANT DIRECTOR (GROUP 3) | | | |
|---|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 3 | 3 | |
| GS-14 | 4 | 4 | |
| Other GS | 4 | 4 | |
| Total | 12 | 12 | |

| OFFICE OF ASSISTANT DIRECTOR FOR FLIGHT PROJECTS | | | |
|---|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 3 | 3 | |
| GS-14 | 1 | 1 | |
| Other GS | 8 | 8 | |
| Total | 12 | 12 | |

| OFFICE OF ASSISTANT DIRECTOR FOR ADMINISTRATION | | | |
|--|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 1 | 1 | |
| GS-14 | 1 | 1 | |
| Other GS | 2 | 2 | |
| Total | 6 | 6 | |

| OFFICE OF CHIEF, ENGINEERING AND TECHNICAL SERVICES | | | |
|--|----|----|--|
| | 69 | 70 | |
| GS-16 | 2 | 2 | |
| GS-15 | 4 | 4 | |
| GS-14 | 1 | 1 | |
| Other GS | 12 | 12 | |
| Total | 26 | 26 | |

| AERONAUTICAL AND SPACE MECHANICS DIVISION | | | |
|--|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 5 | 5 | |
| GS-15 | 6 | 7 | |
| GS-14 | 15 | 15 | |
| Other GS | 62 | 61 | |
| Total | 90 | 89 | |

| DYNAMIC LOADS DIVISION | | | |
|------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 2 | 2 | |
| GS-15 | 14 | 15 | |
| GS-14 | 25 | 26 | |
| Other GS | 82 | 75 | |
| Total | 124 | 119 | |

| AFRO-PHYSICS DIVISION | | | |
|-----------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 2 | 2 | |
| GS-16 | 4 | 4 | |
| GS-15 | 17 | 18 | |
| GS-14 | 18 | 20 | |
| Other GS | 118 | 110 | |
| Total | 159 | 154 | |

| APPLIED MATERIALS AND PHYSICS DIVISION | | | |
|---|-----|-----|--|
| | 69 | 70 | |
| Excepted | 3 | 3 | |
| GS-16 | 4 | 4 | |
| GS-15 | 17 | 17 | |
| GS-14 | 40 | 42 | |
| Other GS | 142 | 130 | |
| Wage Board | 11 | 11 | |
| Total | 217 | 207 | |

| OFFICE OF CHIEF COUNSEL | | | |
|-------------------------|----|----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-14 | 2 | 2 | |
| Other GS | 2 | 2 | |
| Total | 5 | 5 | |

| ADMINISTRATIVE SERVICES DIVISION | | | |
|-------------------------------------|----|----|--|
| | 69 | 70 | |
| GS-14 | 1 | 1 | |
| Other GS | 77 | 77 | |
| Total | 78 | 78 | |

| SAFETY OFFICE | | | |
|---------------|----|----|--|
| | 69 | 70 | |
| Other GS | 3 | 3 | |
| Total | 3 | 3 | |

| ANALYSIS AND COMPUTATION DIVISION | | | |
|--------------------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 3 | 3 | |
| GS-15 | 6 | 7 | |
| GS-14 | 5 | 7 | |
| Other GS | 133 | 130 | |
| Wage Board | 7 | 7 | |
| Total | 155 | 155 | |

| STRUCTURES RESEARCH DIVISION | | | |
|------------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 2 | 2 | |
| GS-16 | 4 | 4 | |
| GS-15 | 16 | 17 | |
| GS-14 | 22 | 23 | |
| Other GS | 26 | 29 | |
| Total | 140 | 135 | |

| FLIGHT MECHANICS AND TECHNOLOGY DIVISION | | | |
|---|-----|-----|--|
| | 69 | 70 | |
| Excepted | 2 | 2 | |
| GS-15 | 2 | 2 | |
| GS-14 | 13 | 14 | |
| GS-14 | 17 | 19 | |
| Other GS | 79 | 76 | |
| Wage Board | 11 | 11 | |
| Total | 124 | 124 | |

| VIKING PROJECT OFFICE | | | |
|-----------------------|----|-----|--|
| | 69 | 70 | |
| GS-16 | 3 | 3 | |
| GS-15 | 9 | 10 | |
| GS-14 | 12 | 14 | |
| Other GS | 61 | 62 | |
| Total | 85 | 109 | |

| MORL STUDIES OFFICE | | | |
|---------------------|----|----|--|
| | 69 | 70 | |
| GS-15 | 1 | 1 | |
| GS-15 | 1 | 1 | |
| GS-14 | 4 | 4 | |
| Other GS | 5 | 5 | |
| Total | 11 | 11 | |

| OFFICE OF PATENT COUNSEL | | | |
|--------------------------|----|----|--|
| | 69 | 70 | |
| GS-15 | 2 | 2 | |
| GS-14 | 1 | 1 | |
| Other GS | 4 | 4 | |
| Total | 7 | 7 | |

| FISCAL DIVISION | | | |
|-----------------|----|----|--|
| | 69 | 70 | |
| GS-15 | 1 | 1 | |
| GS-14 | 1 | 1 | |
| Other GS | 84 | 84 | |
| Total | 86 | 86 | |

| FABRICATION DIVISION | | | |
|----------------------|-----|-----|--|
| | 69 | 70 | |
| GS-15 | 1 | 1 | |
| GS-14 | 2 | 2 | |
| Other GS | 325 | 322 | |
| Wage Board | 270 | 261 | |
| Total | 598 | 592 | |

| FLIGHT INSTRUMENTATION DIVISION | | | |
|------------------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 1 | 1 | |
| GS-15 | 7 | 8 | |
| GS-14 | 50 | 52 | |
| Other GS | 194 | 182 | |
| Wage Board | 12 | 12 | |
| Total | 248 | 237 | |

| FULL-SCALE RESEARCH DIVISION | | | |
|------------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 3 | 3 | |
| GS-16 | 2 | 2 | |
| GS-15 | 26 | 27 | |
| GS-14 | 21 | 23 | |
| Other GS | 116 | 108 | |
| Total | 168 | 163 | |

| SCOUT PROJECT OFFICE | | | |
|----------------------|----|----|--|
| | 69 | 70 | |
| GS-15 | 2 | 2 | |
| GS-14 | 4 | 4 | |
| Other GS | 17 | 17 | |
| Total | 23 | 23 | |

| SPACE VEHICLE DESIGN CRITERIA | | | |
|-------------------------------|----|----|--|
| | 69 | 70 | |
| GS-16 | 1 | 1 | |
| GS-15 | 2 | 2 | |
| GS-14 | 1 | 1 | |
| Other GS | 2 | 2 | |
| Total | 6 | 6 | |

| OFFICE OF PUBLIC AFFAIRS | | | |
|--------------------------|----|----|--|
| | 69 | 70 | |
| GS-14 | 2 | 2 | |
| Other GS | 1 | 1 | |
| Total | 3 | 3 | |

| PERSONNEL DIVISION | | | |
|--------------------|----|----|--|
| | 69 | 70 | |
| GS-15 | 1 | 1 | |
| GS-14 | 5 | 5 | |
| Other GS | 22 | 22 | |
| Total | 28 | 28 | |

| FLIGHT VEHICLES AND SYSTEMS DIVISION | | | |
|---|-----|-----|--|
| | 69 | 70 | |
| GS-15 | 11 | 11 | |
| GS-14 | 18 | 18 | |
| Other GS | 121 | 119 | |
| Total | 150 | 148 | |

| INSTRUMENT RESEARCH DIVISION | | | |
|------------------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-16 | 1 | 1 | |
| GS-15 | 6 | 7 | |
| GS-14 | 15 | 14 | |
| Other GS | 150 | 142 | |
| Wage Board | 21 | 21 | |
| Total | 194 | 189 | |

| RESOURCE PROGRAMMING AND CONTROL OFFICE | | | |
|--|----|----|--|
| | 69 | 70 | |
| GS-14 | 3 | 3 | |
| Other GS | 28 | 28 | |
| Total | 31 | 31 | |

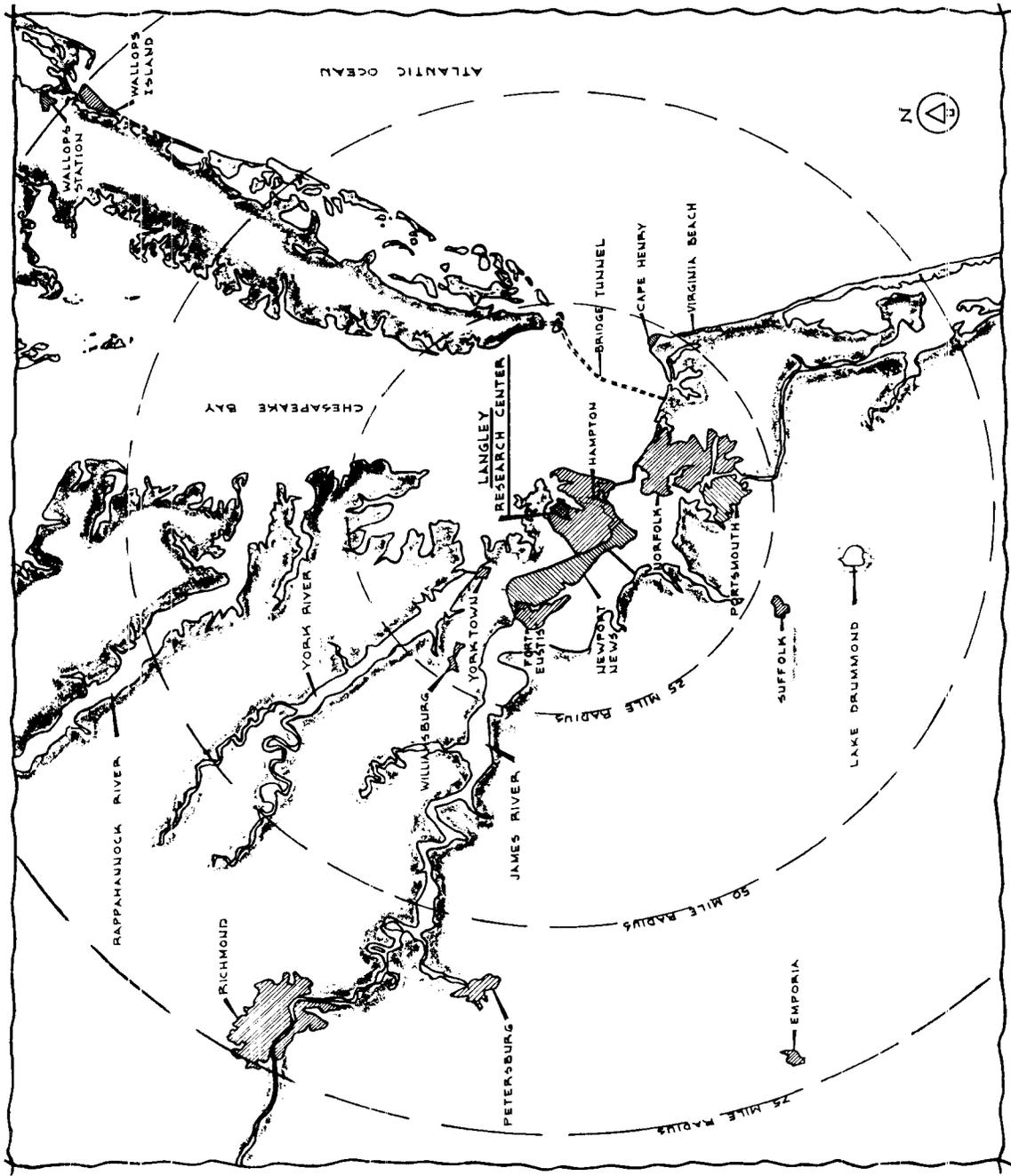
| PROCUREMENT DIVISION | | | |
|----------------------|-----|-----|--|
| | 69 | 70 | |
| Excepted | 1 | 1 | |
| GS-15 | 1 | 1 | |
| GS-14 | 1 | 1 | |
| Other GS | 115 | 115 | |
| Wage Board | 21 | 21 | |
| Total | 140 | 140 | |

| TECHNICAL INFORMATION AND UTILIZATION DIVISION | | | |
|---|-----|-----|--|
| | 69 | 70 | |
| GS-14 | 2 | 2 | |
| Other GS | 71 | 71 | |
| Wage Board | 34 | 34 | |
| Total | 107 | 107 | |

| RESEARCH MODELS AND FACILITIES DIVISION | | | |
|--|-----|-----|--|
| | 69 | 70 | |
| GS-15 | 5 | 5 | |
| GS-14 | 22 | 22 | |
| Other GS | 188 | 186 | |
| Total | 215 | 213 | |

| RESEARCH SUPPORT DIVISION | | | |
|---------------------------|-----|-----|--|
| | 69 | 70 | |
| GS-14 | 2 | 2 | |
| Other GS | 3 | 3 | |
| Wage Board | 226 | 226 | |
| Total | 231 | 231 | |

| RESEARCH SUPPORT DIVISION | | | |
|---------------------------|-----|-----|--|
| | 69 | 70 | |
| GS-14 | 2 | 2 | |
| Other GS | 3 | 3 | |
| Wage Board | 226 | 226 | |
| Total | 231 | 231 | |

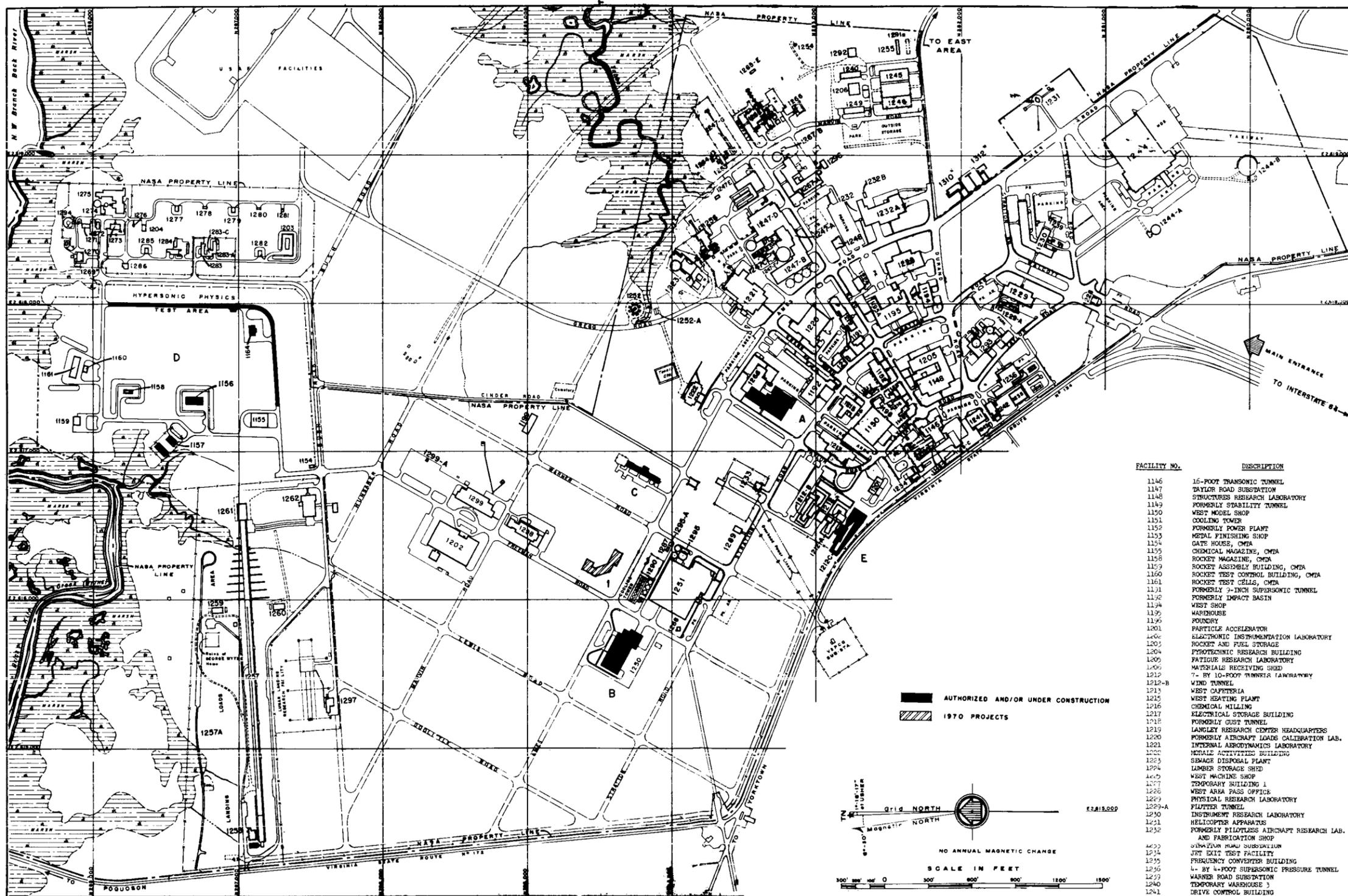


1" = 8 MILES

LANGLEY RESEARCH CENTER AND VICINITY

LANGLEY RESEARCH CENTER FISCAL YEAR 1970 ESTIMATES

LOCATION PLAN



- FACILITIES AUTHORIZED AND UNDER CONSTRUCTION**
- A FLIGHT CONTROL RESEARCH FACILITY
 - B LIFE SUPPORT TECHNOLOGY LABORATORY
 - C HOT-GAS RADIATION RESEARCH FACILITY
 - D REACTIVE CHEMICAL DISTRIBUTION AREA
 - E V/STOL TRANSITION RESEARCH WIND TUNNEL

- PROPOSED FISCAL YEAR 1970 PROJECTS**
- 1 AIRCRAFT NOISE REDUCTION LABORATORY

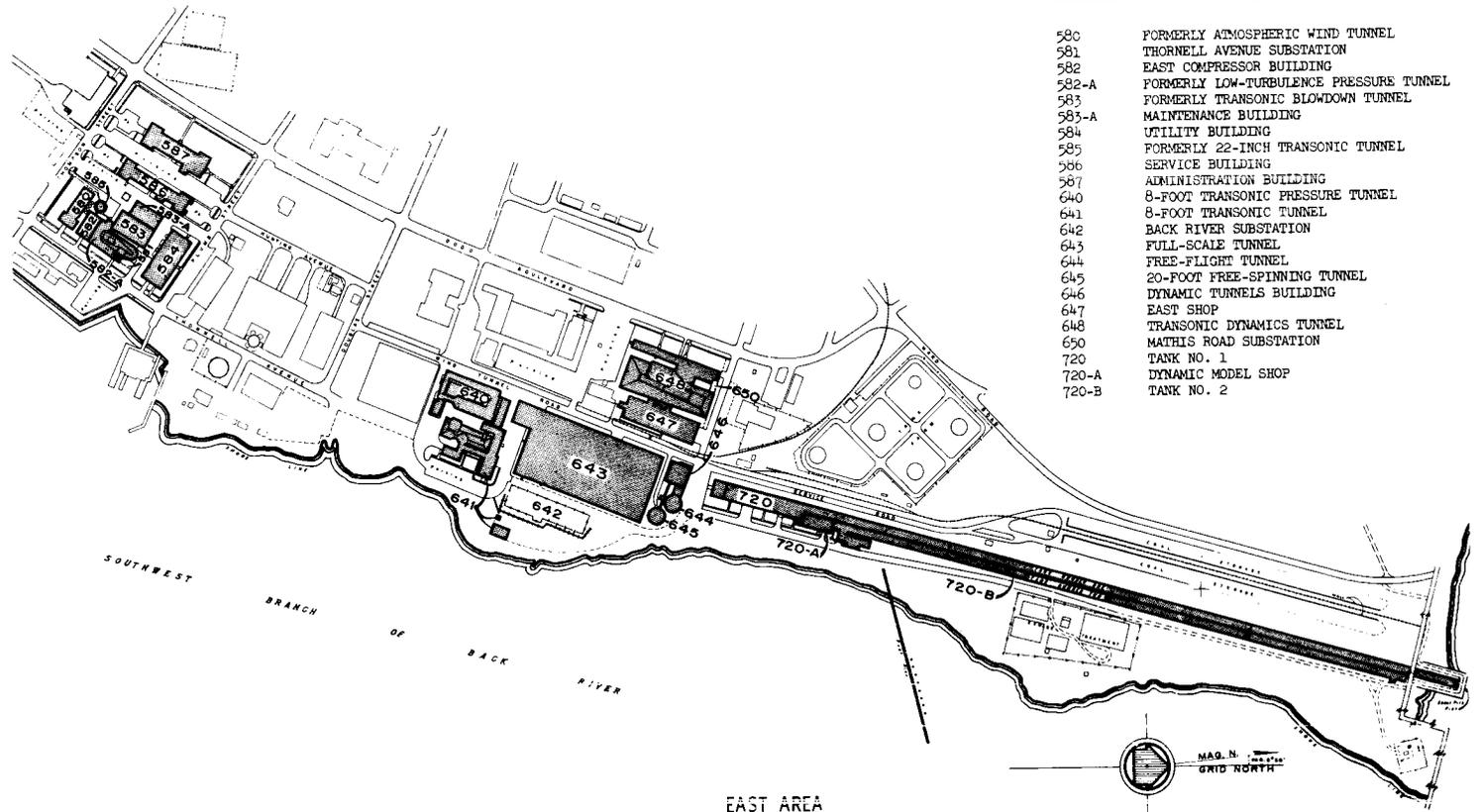
| FACILITY NO. | DESCRIPTION | FACILITY NO. | DESCRIPTION |
|--------------|--|--------------|---|
| 1146 | 15-FOOT TRANSONIC TUNNEL | 1246 | TEMPORARY WAREHOUSE 2 |
| 1147 | TAYLOR ROAD SUBSTATION | 1247-A | FORMERLY GAS DYNAMICS LABORATORY CENTER |
| 1148 | STRUCTURES RESEARCH LABORATORY | 1247-B | WEST WING |
| 1149 | FORMERLY STABILITY TUNNEL | 1247-C | COOLING TOWER |
| 1150 | WEST MODEL SHOP | 1247-D | EAST WING |
| 1151 | COOLING TOWER | 1247-E | COMPRESSOR BUILDING |
| 1152 | FORMERLY POWER PLANT | 1247-F | AMES ROAD SUBSTATION |
| 1153 | METAL FINISHING SHOP | 1247-G | HIGH-PRESSURE SHOCK TUBE |
| 1154 | GATE HOUSE, OMDA | 1248 | PLANT SAFETY BUILDING |
| 1155 | CHEMICAL MAGAZINE, OMDA | 1249 | TEMPORARY WAREHOUSE 4 |
| 1156 | ROCKET MAGAZINE, OMDA | 1251 | UNITARY FAN WIND TUNNEL |
| 1157 | ROCKET ASSEMBLY BUILDING, OMDA | 1252 | WATER TANK NO. 1 |
| 1158 | ROCKET TEST CONTROL BUILDING, OMDA | 1253 | AMMUNITION STORAGE 1 |
| 1159 | ROCKET TEST CELLS, OMDA | 1254 | TEMPORARY WAREHOUSE 6 |
| 1161 | FORMERLY 3-INCH SUPERSONIC TUNNEL | 1255 | 9- BY 6-FOOT THERMAL STRUCTURES TUNNEL |
| 1162 | FORMERLY IMPACT BASIN | 1256 | LANDING LOADS TRACK |
| 1164 | WEST SHOP | 1256 | LANDING LOADS TRACK COMPRESSOR BUILDING |
| 1165 | WAREHOUSE | 1257 | NORTH ARRESTING GEAR HOUSING |
| 1166 | FOUNDRY | 1258 | SOUTH ARRESTING GEAR HOUSING |
| 1201 | PARTICLE ACCELERATOR | 1261 | LANDING LOADS TRACK SHOP |
| 1202 | ELECTRONIC INSTRUMENTATION LABORATORY | 1262 | HIGH-SPEED HYDRODYNAMICS OFFICE AND SHOP |
| 1203 | ROCKET AND FUEL STORAGE | 1263 | CERAMIC-HEATED JET (PILOT MODEL) |
| 1204 | PROTECTIVE RESEARCH BUILDING | 1264 | HIGH-TEMPERATURE MACH 7 JET (PILOT MODEL) |
| 1205 | FATIGUE RESEARCH LABORATORY | 1265 | 8-FOOT HIGH-TEMPERATURE STRUCTURES TUNNEL |
| 1206 | MATERIALS RECEIVING SHED | 1266 | MOFFETT ROAD SUBSTATION |
| 1212 | 7- BY 10-FOOT TUNNEL LABORATORY | 1267 | HIGH TEMPERATURE MATERIALS LABORATORY |
| 1212-B | WIND TUNNEL | 1268 | DATA REDUCTION BUILDING |
| 1213 | WEST OPERATORIA | 1269 | GATE HOUSE (HYPERSONIC PHYSICS TEST AREA) |
| 1215 | WEST HEATING PLANT | 1270 | ROCKET PROPELLANT TEST UNIT, HPDA |
| 1216 | CHEMICAL MILLING | 1271 | OPEN SHED, HPDA |
| 1217 | ELECTRICAL STORAGE BUILDING | 1272 | HEATING PLANT, HPDA |
| 1218 | FORMERLY GUST TUNNEL | 1273 | OPERATIONS CENTER, HPDA |
| 1219 | LANGLEY RESEARCH CENTER HEADQUARTERS | 1274 | CERAMIC-HEATED MACH 15 JET, HPDA |
| 1220 | FORMERLY AIRCRAFT LOADS CALIBRATION LAB. | 1275 | IMPACT AND PROJECTILE TEST UNIT, HPDA |
| 1221 | INTERNAL AERODYNAMICS LABORATORY | 1276 | IGNITER ASSEMBLY BUILDING, HPDA |
| 1222 | METAL ACTIVITIES BUILDING | 1277 | STORAGE A |
| 1223 | SHADE DISPOSAL PLANT | 1278 | STORAGE B |
| 1224 | LUMBER STORAGE SHED | 1279 | STORAGE C |
| 1225 | WEST MACHINE SHOP | 1280 | STORAGE D |
| 1227 | TEMPORARY BUILDING 1 | 1281 | STORAGE E |
| 1228 | WEST AREA PASS OFFICE | 1282 | STORAGE F |
| 1229 | PHYSICAL RESEARCH LABORATORY | 1283 | STORAGE G |
| 1229-A | FLUTTER TUNNEL | 1284 | ROCKET PROPELLANT PROCESSING BUILDING, HPDA |
| 1230 | INSTRUMENT RESEARCH LABORATORY | 1285 | STORAGE H |
| 1231 | HELICOPTER APPARATUS | 1286 | ROCKET ASSEMBLY AND PROPELLANT ALTERNATION BUILDING |
| 1232 | FORMERLY FLUTELESS AIRCRAFT RESEARCH LAB. AND FABRICATION SHOP | 1287 | TEMPORARY SHED |
| 1233 | ORBITATION ROOM SUBSTATION | 1288 | SOLAR ENERGY COLLECTOR |
| 1234 | JET EXIT TEST FACILITY | 1289 | TEMPORARY STORAGE |
| 1235 | FREQUENCY CONVERTER BUILDING | 1290 | SUBSTATION |
| 1236 | 4- BY 4-FOOT SUPERSONIC PRESSURE TUNNEL | 1291 | PUMP STATION |
| 1237 | WARDEN ROAD SUBSTATION | 1292 | FACILITIES MAINTENANCE BUILDING |
| 1240 | TEMPORARY WAREHOUSE 3 | 1293 | DYNAMICS RESEARCH LABORATORY |
| 1241 | DRIVE CONTROL BUILDING | 1294 | ROCKET MOTOR TEST APPARATUS |
| 1242 | PROPELLER STATIC TEST STAND | 1295 | SHOP AND INSTRUMENTATION FOR 60-FOOT SPHERE |
| 1243 | PORTTOWN ROAD SUBSTATION | 1296 | SHOP BUILDING |
| 1244 | FORMERLY FLIGHT RESEARCH LABORATORY | 1297 | LUNAR LANDING RESEARCH FACILITY |
| 1244-A | WATER TANK NO. 2 | 1298 | STABILIZATION AND CONTROL EQUIPMENT LABORATORY |
| 1244-B | CONTROL LINE FACILITY | 1299 | VEHICLE ANTENNA TEST FACILITY AND ADDITION |
| 1245 | TEMPORARY WAREHOUSE 1 | | |

WEST AREA

333-246 O - 69 (Faces back of page RPM 2-78) No. 7

LANGLEY RESEARCH CENTER FISCAL YEAR 1970 ESTIMATES

LOCATION PLAN



| FACILITY NO. | DESCRIPTION |
|--------------|---|
| 580 | FORMERLY ATMOSPHERIC WIND TUNNEL |
| 581 | THORNELL AVENUE SUBSTATION |
| 582 | EAST COMPRESSOR BUILDING |
| 582-A | FORMERLY LOW-TURBULENCE PRESSURE TUNNEL |
| 583 | FORMERLY TRANSONIC BLOWDOWN TUNNEL |
| 583-A | MAINTENANCE BUILDING |
| 584 | UTILITY BUILDING |
| 585 | FORMERLY 22-INCH TRANSONIC TUNNEL |
| 586 | SERVICE BUILDING |
| 587 | ADMINISTRATION BUILDING |
| 640 | 8-FOOT TRANSONIC PRESSURE TUNNEL |
| 641 | 8-FOOT TRANSONIC TUNNEL |
| 642 | BACK RIVER SUBSTATION |
| 643 | FULL-SCALE TUNNEL |
| 644 | FREE-FLIGHT TUNNEL |
| 645 | 20-FOOT FREE-SPINNING TUNNEL |
| 646 | DYNAMIC TUNNELS BUILDING |
| 647 | EAST SHOP |
| 648 | TRANSONIC DYNAMICS TUNNEL |
| 650 | MATHIS ROAD SUBSTATION |
| 720 | TANK NO. 1 |
| 720-A | DYNAMIC MODEL SHOP |
| 720-B | TANK NO. 2 |

RPM 2-80



Langley Research Center



RPM 2-81

Langley Research Center



NPM 2-82

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

LEWIS RESEARCH CENTER

MISSION:

The Lewis Research Center's principal mission is research and development in the areas of aircraft and spacecraft propulsion, and power generation systems for spacecraft.

The Center's emphasis is predominantly research; however, the entire spectrum of activities is undertaken going from basic research to applied research to development. The scope of research ranges from work on individual components through complete systems.

Most of the critical areas which limit the performance of engines and power systems are the subjects of in-house research effort at this Center. Research by commercial and university laboratories is also conducted under contracts directed by Lewis Research Center personnel.

Several large launch vehicle and power generation development programs are assigned here. The Centaur, Atlas, and Agena launch vehicle programs are under this Center's supervision and tentative plans are underway for handling the Titan vehicle. The SNAP-8 nuclear powered electric generating system and SERT (Space Electric Rocket Test) contracts are directed, and there is also considerable supporting in-house research effort on these projects. New projects in their early phases include the development of a Quiet Engine (turbo-fan jet) and improved hydrogen-oxygen burning rocket engines.

Our research and development activities cover many technical fields. Some examples of major activity are discussed in the following paragraphs:

It is expected that engines for future supersonic planes will be of a turbo-fan design incorporating high bypass ratios, high compressor pressure ratios and high turbine inlet temperatures. A large part of the research effort at Lewis is aimed directly at solving the problems that limit the development of engines for supersonic flight. Among these research efforts are: slotted compressor blades to increase pressure ratio per stage, cooled turbine blades, high speed bearings, air inlets, exhaust nozzles, combustor configurations, higher energy fuels, and fuel tank fire hazard evaluations. A large addition to the Propulsion Systems Laboratory is being built to test full scale engines for supersonic airplanes.

The problems of the Supersonic Combustion Ramjet engine for hypersonic flight speeds up to Mach 7 are being studied in existing facilities, and construction of a new facility is underway at Plum Brook to extend the effort to engines of practical size.

At the lower end of the speed scale, the effects of cross flow on high pressure ratio lift fans for V/STOL aircraft are being investigated in the return passage of the 8-by-6-Foot Supersonic Wind Tunnel.

Contributions to rocket technology continue to flow from Lewis. Relatively small scale chemical rockets are used to study the problems of combustion instability, fuel-oxidant mixing, regenerative cooling of nozzles, ablative nozzles, and nozzle insulating coatings.

Propellant management systems for Centaur, Saturn S-IV and the Apollo Service Module vehicles were studied and their designs were based on data obtained in the Lewis Zero Gravity facilities. Current research includes studies of in-orbit propellant transfer, propellant re-orientation and slosh dynamics.

A full-scale Centaur vehicle will be installed in the Spacecraft Propulsion Research Facility early in 1969. This vehicle will be equipped with a prototype tank pressurizing system replacing the current pump system for feeding the propellants to the engine.

Electric rockets for deep space propulsion have benefited greatly from the work in the Electric Propulsion Research Building and the newer Electric Propulsion Laboratory. These buildings contain many large vacuum tanks where the space environment essential to electric propulsion research is approximated.

Many devices for power generation in space are being studied. The solar cell converts sunlight directly into electricity. Batteries and fuel cells convert stored chemicals into electricity. For a large and sustained power supply, however, an adaptation of the familiar turbine driven generator seems most practical. To achieve the tremendous weight reduction necessary means many years of intensive research and development. Instead of steam, the turbines will be driven by liquid metal vapor (Rankine cycle) or by heated gas (Brayton cycle). The only way to reject the waste heat is by direct radiation to space, so very large radiators will be required. High rotative speeds will reduce weight, but call for new designs of compressors, turbines, bearings and electric generators. The heat source may be either a nuclear reactor, or the sun's rays concentrated by a large concave mirror. A 20-foot flight weight mirror has been assembled at the Lewis Research Center.

Various problems in connection with the development of nuclear power systems and nuclear rockets are conducted at Plum Brook. A 60-megawatt thermal reactor facility is used to determine the effects of radiation on materials, on various electronic, hydraulic, and mechanical control systems, and on items of equipment.

A 28-million dollar Space Power Facility will be placed in operation at Plum Brook where nuclear powered electric generating systems will be operated under simulated space environment conditions for long periods of time.

Another type of electric generator and another source of energy are more distant prospects. A stream of ionized plasma flowing through a coil will generate electricity in that coil (magnetohydrodynamics). The success of this effort and of related activities depends largely on the development of superconducting electric magnets. The Lewis Research Center has been a leader in this field, and has constructed a magnet with a field of 140,000 gauss over a six-inch bore.

The performance of propulsion and power generation systems, launch vehicles, spacecraft, and practically all hardware is paced by physical limitations of available materials. The Center has maintained a substantial materials research effort aimed at raising these limitations and improving component and system performance. Our activity covers the entire temperature range of materials usage going from the cryogenic temperature of liquefied gases to the high temperatures encountered in the rocket nozzles of aircraft engine combustors and turbine wheels.

The material research includes both fundamental studies of what makes materials strong or weak and the development of new materials. "Super" alloys, corrosion resistant coatings, ultra pure tungsten, and composites made of metal whiskers, fibers, or sintered granules are among the many products investigated.

DESCRIPTION:

The Lewis Research Center occupies two sites in north central Ohio. The older one was established in 1941 on 200 acres adjacent to the Cleveland Municipal Airport. The original area has been expanded to 364 acres, of which 15 are leased from Cleveland for use as a parking lot. Funds for the purchase of these 15 acres have been appropriated. Here there are over 90 buildings, including two large supersonic wind tunnels, two zero-gravity research facilities (free-drop shafts, one of which is an underground evacuated shaft 477 feet deep in which zero gravity durations of about 10 seconds are obtained), a large Propulsion Systems Laboratory in which full-scale engines are operated under simulated high altitude conditions, three rocket laboratories, three materials research buildings, eighteen major space simulation facilities ranging from four to thirty feet in diameter, a 50-foot diameter Space Power Chamber 120 feet long in which altitudes up to 100,000 feet are simulated, an Energy Conversion Laboratory, an Instrument Research Laboratory, a High Energy Fuels Laboratory, a Chemistry Laboratory, an Engine Research Building containing 64 test cells and covering nearly four acres, four office buildings, machine shops and other service buildings.

A newer site, established in 1956, is located south of Sandusky, Ohio, about 50 miles west of Cleveland on land formerly occupied by the Plum Brook Ordnance Works. Known as the Plum Brook Station, it occupies 5,981 acres owned by the Government. Funds for the purchase of additional land to serve as a buffer zone around the present site have been appropriated. There are over 200 buildings on this site, 55 built by the NASA and the rest by the former tenants. The major facilities include a Reactor Facility, an Altitude

Rocket Test Facility, a Cryogenic Propellant Research Facility, a Heat Transfer Facility, a Spacecraft Dynamics Research Facility, a Rocket Pump Laboratory, a Rocket Turbine Laboratory, a Rocket Turbo-pump Laboratory, a Rocket Systems Hydraulic Laboratory, a Fluorine Pump Laboratory and a temporary site for testing rockets at sea-level conditions. A Spacecraft Propulsion Research Facility is nearing completion to test the ignition and operation of spacecraft propulsion systems after a period of soaking in a space environment. Also nearing completion is the Space Power Facility for testing full-scale nuclear powered electric generating systems. The research programs at Plum Brook are under the technical direction of personnel located at Cleveland. They are conducted at the larger site because of the need for large separation distances to minimize hazards. The total capital investment of the Lewis Research Center, including fixed assets in progress and contractor-held facilities at various locations, as of June 30, 1968 was \$385,733,000, of which \$107,901,000 represents facilities located at the Plum Brook Station.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$54,851,000 | \$58,579,000 | \$58,984,000 |
| Travel..... | 954,000 | 896,000 | 896,000 |
| Automatic data processing..... | 528,000 | 335,000 | 277,000 |
| Facilities services..... | 7,840,000 | 6,125,000 | 6,053,000 |
| Technical services..... | 697,000 | 645,000 | 665,000 |
| Administrative support..... | <u>1,352,000</u> | <u>1,265,000</u> | <u>1,186,000</u> |
| Total, fund requirements.... | <u>\$66,222,000</u> | <u>\$67,845,000</u> | <u>\$68,061,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Space Science and Applications</u> | | | |
| Space applications..... | 82 | 82 | 82 |
| Launch vehicle procurement..... | 239 | 174 | 174 |

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 488 | 453 | 443 |
| Space vehicle systems..... | 197 | 193 | 193 |
| Electronics systems..... | 23 | 13 | 13 |
| Space power and electric propulsion systems..... | 882 | 860 | 860 |
| Nuclear rockets..... | 51 | 40 | 40 |
| Chemical propulsion..... | 213 | 205 | 205 |
| Aeronautical vehicles..... | 716 | 746 | 756 |
| <u>Technology Utilization.....</u> | <u>7</u> | <u>7</u> | <u>7</u> |
| Subtotal, positions by program..... | 2,898 | 2,773 | 2,773 |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 19 | 19 | 19 |
| Administrative support..... | 538 | 510 | 510 |
| Research and development support..... | 997 | 933 | 893 |
| Subtotal, indirect positions..... | <u>1,554</u> | <u>1,462</u> | <u>1,422</u> |
| Total, permanent positions..... | <u>4,452</u> | <u>4,235</u> | <u>4,195</u> |

National Aeronautics and Space Administration Organization and Staffing Chart LEWIS RESEARCH CENTER Cleveland, Ohio

| STAFFING SUMMARY | | |
|------------------|------|------|
| | 69 | 70 |
| Excepted | 52 | 52 |
| GS-16 | 25 | 25 |
| GS-15 | 159 | 163 |
| GS-14 | 361 | 346 |
| Other GS | 2121 | 2108 |
| WB | 1538 | 1521 |
| Total permanent | 4296 | 4196 |

| DIRECTOR'S OFFICE | | |
|-------------------|----|----|
| | 69 | 70 |
| Excepted | 2 | 2 |
| GS-15 | 3 | 3 |
| Other GS | 4 | 4 |
| Total | 9 | 9 |

| ASSISTANT DIRECTOR FOR PUBLIC AFFAIRS | | |
|---------------------------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| Other GS | 17 | 17 |
| Total | 20 | 20 |

| PLANS AND PROGRAMS OFFICE | | |
|---------------------------|----|----|
| | 69 | 70 |
| GS-15 | 3 | 3 |
| GS-14 | 5 | 5 |
| Other GS | 6 | 6 |
| Total | 14 | 14 |

| BUDGET OFFICE | | |
|---------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-14 | 1 | 1 |
| Other GS | 8 | 8 |
| Total | 10 | 10 |

| OFFICE OF DEVELOPMENT EVALUATION AND MANAGEMENT REVIEW | | |
|--|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 1 | 1 |
| GS-15 | 1 | 2 |
| GS-14 | 12 | 11 |
| Other GS | 17 | 15 |
| Total | 32 | 30 |

| ASSOCIATE DIRECTOR FOR ADVANCED RESEARCH INSTITUTE | | |
|--|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-15 | 1 | 1 |
| Other GS | 1 | 1 |
| Total | 3 | 3 |

| ASSISTANT DIRECTOR FOR AEROSPACE SAFETY RESEARCH AND DATA INSTITUTE | | |
|---|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| Other GS | 7 | 7 |
| Total | 8 | 8 |

| RESEARCH INSTALLATIONS BRANCH | | |
|-------------------------------|----|----|
| | 69 | 70 |
| GS-15 | 1 | 1 |
| GS-14 | 4 | 4 |
| Other GS | 23 | 21 |
| Total | 28 | 26 |

| ELECTROMAGNETIC PROPULSION DIVISION | | |
|-------------------------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 1 | 1 |
| GS-15 | 6 | 7 |
| GS-14 | 12 | 11 |
| Other GS | 51 | 49 |
| Total | 71 | 69 |

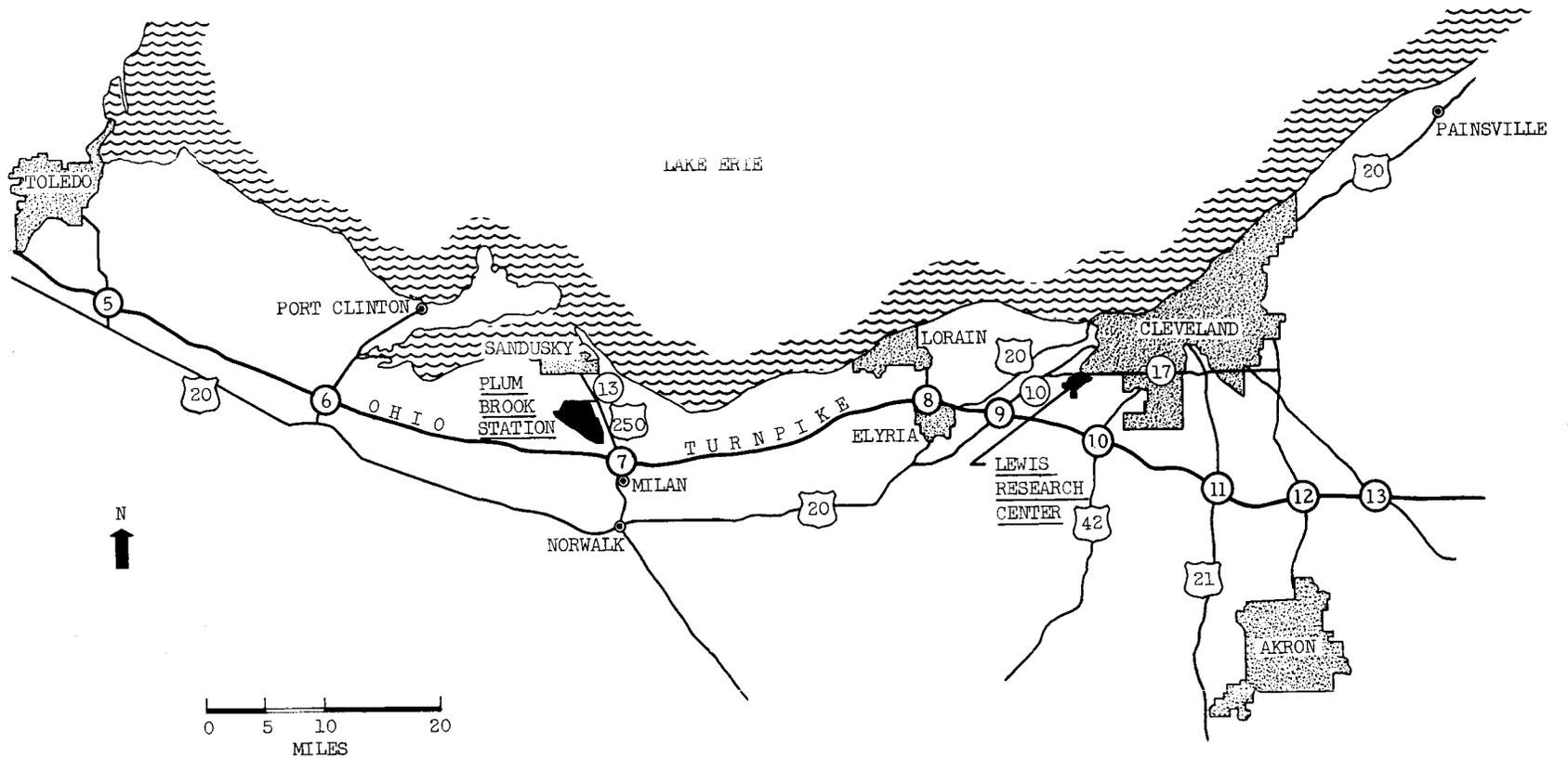
| PHYSICS AND CHEMISTRY DIVISION | | |
|--------------------------------|----|----|
| | 69 | 70 |
| Excepted | 1 | 1 |
| GS-16 | 2 | 2 |
| GS-15 | 12 | 13 |
| GS-14 | 28 | 27 |
| Other GS | 55 | 53 |
| Total | 98 | 96 |



RPM 2-88

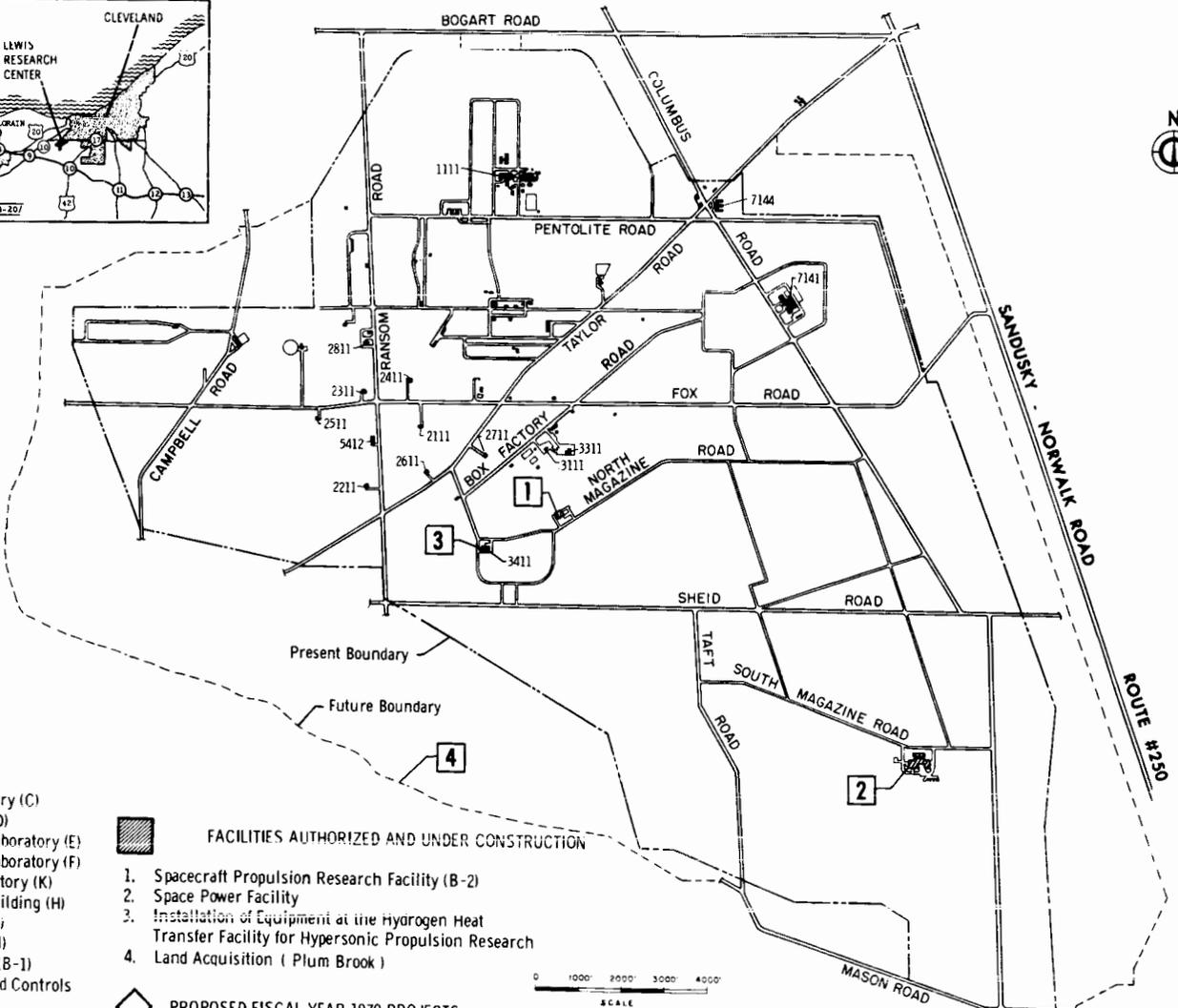
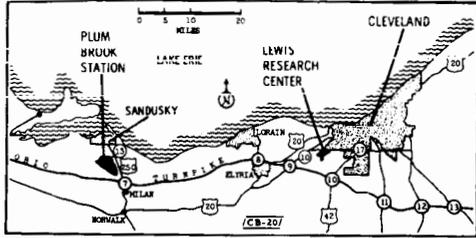
LEWIS RESEARCH CENTER
FISCAL YEAR 1970 ESTIMATES

LOCATION OF LEWIS RESEARCH CENTER INCLUDING
PLUM BROOK STATION



LEWIS RESEARCH CENTER
 PLUM BROOK STATION
 FISCAL YEAR 1970 ESTIMATES

LOCATION PLAN



LEGEND

- EXISTING FACILITIES**
- 1111 Reactor Facility Group
 - 7144 Administration Building
 - 2111 Rocket Pump Laboratory (A)
 - 2211 Rocket Turbo-pump Laboratory (C)
 - 2311 Rocket Turbine Laboratory (D)
 - 2411 Rocket Systems Dynamics Laboratory (E)
 - 2511 Rocket Systems Hydraulic Laboratory (F)
 - 2811 Cryogenic Propellant Laboratory (K)
 - 5412 Central Control and Data Building (H)
 - 2611 Fluorine Pump Laboratory (I)
 - 2711 Rocket Systems Laboratory (J)
 - 3111 Altitude Rocket Test Facility (B-1)
 - 3311 Nuclear Rocket Dynamics and Controls Facility (B-3)
 - 3411 Heat Transfer Facility
 - 7141 Engineering Building

- FACILITIES AUTHORIZED AND UNDER CONSTRUCTION**
- 1. Spacecraft Propulsion Research Facility (B-2)
 - 2. Space Power Facility
 - 3. Installation of Equipment at the Hydrogen Heat Transfer Facility for Hypersonic Propulsion Research
 - 4. Land Acquisition (Plum Brook)
- PROPOSED FISCAL YEAR 1970 PROJECTS**
- None



RPM 2-91

LEWIS RESEARCH CENTER
FISCAL YEAR 1970 ESTIMATES

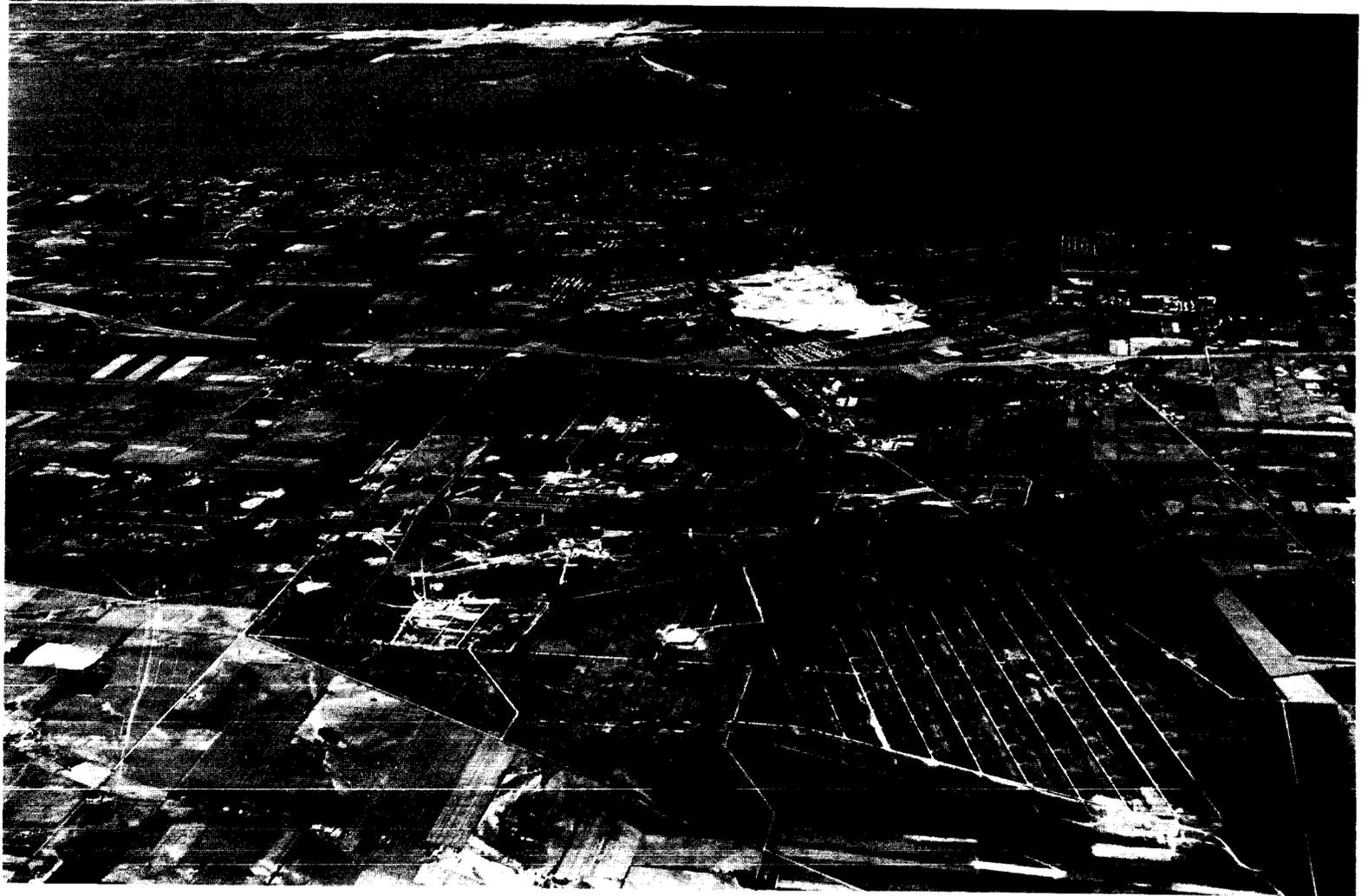
CLEVELAND FACILITIES



RPM 2-92

LEWIS RESEARCH CENTER
FISCAL YEAR 1970 ESTIMATES

PLUM BROOK FACILITIES



RPM 2-93

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

SPACE NUCLEAR PROPULSION OFFICE

MISSION:

The mission of the Space Nuclear Propulsion Office is to provide rocket propulsion systems for application to advanced orbital, lunar and planetary missions. In the conduct of this role, the primary objective is the development of a nuclear engine (NERVA) through Pre-Flight-Rating-Tests (PFRT) having a specific impulse of approximately 825 seconds and a thrust of approximately 75,000 pounds (equivalent to a reactor power of about 1,500 megawatts).

In addition to NERVA development, work includes effort to advance the technology of nuclear rocketry, and in particular specific impulse, duration and reactor recycling capability. Effort is also directed toward the development of vehicle technology, radiation effects studies, and studies to enhance the reliability of nuclear rocket components.

DESCRIPTION:

The Nuclear Rocket program is a joint AEC-NASA undertaking. To ensure an integrated program, the Space Nuclear Propulsion Office, established by an interagency agreement between NASA and the Atomic Energy Commission, manages all aspects of the program.

The Space Nuclear Propulsion Office consists of a Headquarters office located at Germantown, Maryland, and three field extensions located in Ohio, New Mexico, and Nevada. At the Nevada location, the Nuclear Rocket Development Station (NRDS) was established to provide a site for ground static testing of the reactors, engines, and eventually, vehicles associated with nuclear rocket development.

The Nuclear Rocket Development Station consists of an approximately 78,000-acre site owned by the Atomic Energy Commission, approximately 90 miles northwest of Las Vegas, Nevada. The total capital investment of NASA-funded facilities, including fixed assets in progress and contractor-held facilities, as of June 30, 1968, is \$49,852,000.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|--------------------|--------------------|--------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$1,845,000 | \$1,889,000 | \$1,815,000 |
| Travel..... | 167,000 | 195,000 | 185,000 |
| Automatic data processing..... | --- | --- | --- |
| Facilities services..... | --- | --- | --- |
| Technical services..... | 10,000 | 95,000 | --- |
| Administrative support..... | --- | --- | --- |
| Total, fund requirements..... | <u>\$2,022,000</u> | <u>\$2,179,000</u> | <u>\$2,000,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|-------------|-------------|-------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Advanced Research and Technology</u> | | | |
| Nuclear rockets..... | <u>103</u> | <u>96</u> | <u>95</u> |
| Subtotal, positions by program..... | 103 | 96 | 95 |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 3 | 3 | 3 |
| Administrative support..... | <u>2</u> | <u>1</u> | <u>1</u> |
| Subtotal, indirect positions..... | <u>5</u> | <u>4</u> | <u>4</u> |
| Total, permanent positions..... | <u>108</u> | <u>100</u> | <u>99</u> |

National Aeronautics and Space Administration
 Organization and Staffing Chart
 Space Nuclear Propulsion Office

| Staffing Summary | | |
|------------------------|------------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | 3 | 3 |
| GS-16 | 6 | 6 |
| GS-15 | 23 | 23 |
| GS-14 | 20 | 22 |
| All Other GS | <u>48</u> | <u>45</u> |
| Total Permanent | 100 | 99 |

| Office of the Manager | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | 2 | 2 |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | 1 | 1 |
| All Other GS | <u>-</u> | <u>-</u> |
| Total Permanent | 4 | 4 |

| Albuquerque Extension | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | - | - |
| All Other GS | <u>-</u> | <u>-</u> |
| Total Permanent | 1 | 1 |

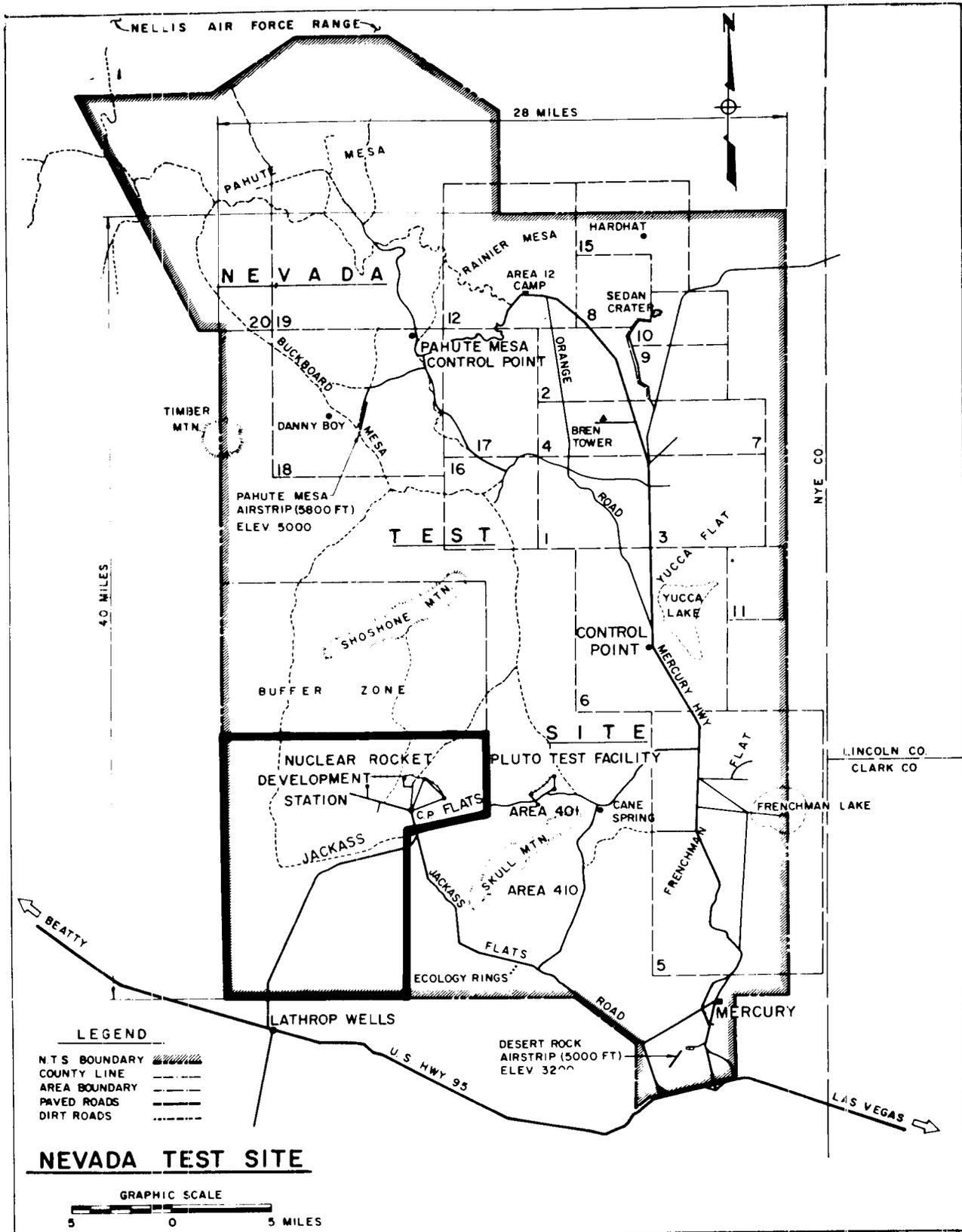
| NERVA Branch | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 3 | 3 |
| GS-14 | - | - |
| All Other GS | <u>-</u> | <u>-</u> |
| Total Permanent | 4 | 4 |

| Cleveland Extension | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | 1 | 1 |
| GS-16 | 2 | 2 |
| GS-15 | 14 | 14 |
| GS-14 | 15 | 17 |
| All Other GS | <u>30</u> | <u>28</u> |
| Total Permanent | 62 | 62 |

| Advanced Engine Branch | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | - | - |
| All Other GS | <u>1</u> | <u>1</u> |
| Total Permanent | 4 | 4 |

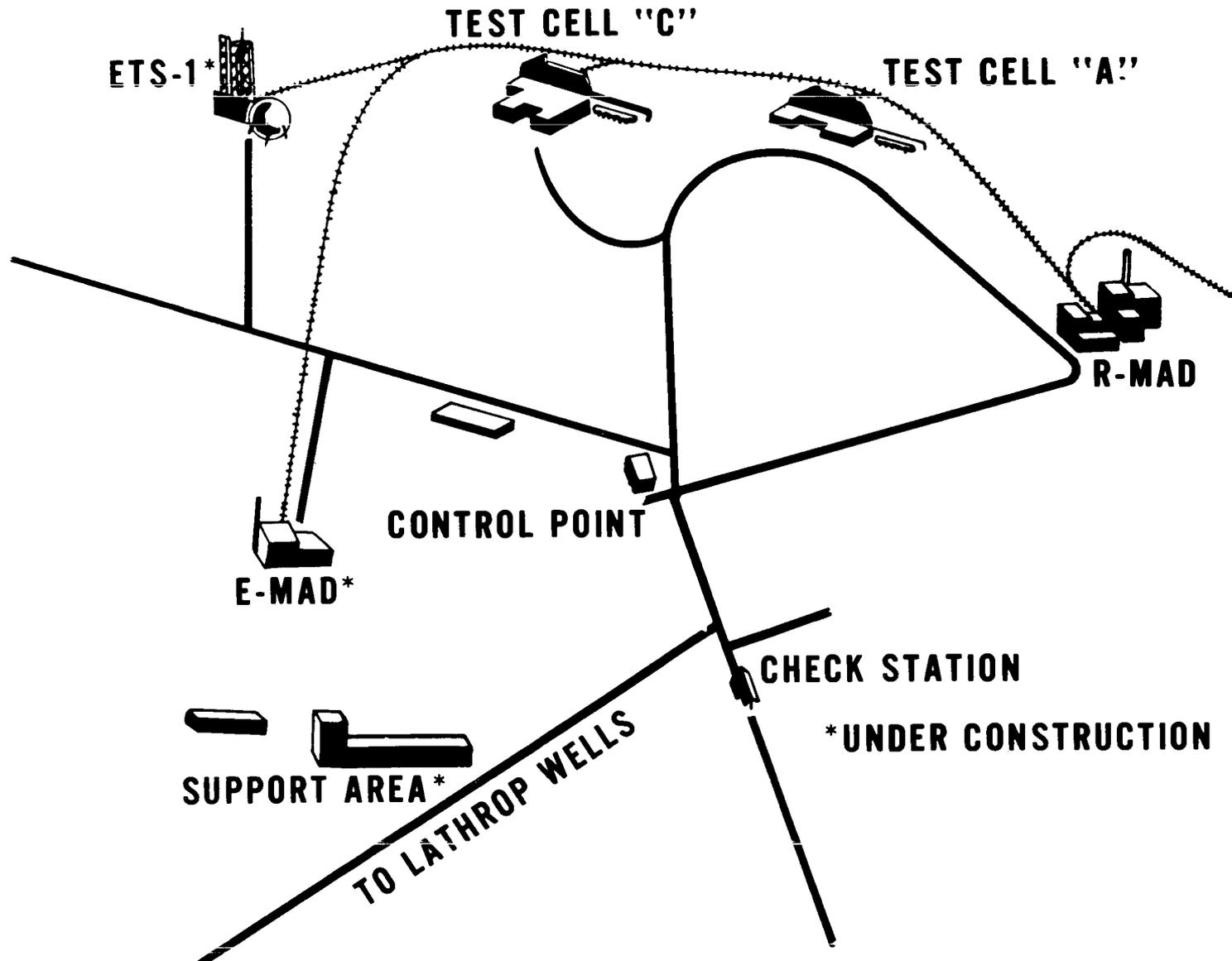
| Nevada Extension | | |
|------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | 2 | 2 |
| GS-14 | 4 | 4 |
| All Other GS | <u>17</u> | <u>16</u> |
| Total Permanent | 24 | 23 |

| Facilities & Equip. Branch | | |
|----------------------------|-----------|-----------|
| | <u>69</u> | <u>70</u> |
| Excepted | - | - |
| GS-16 | 1 | 1 |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | <u>-</u> | <u>-</u> |
| Total Permanent | 1 | 1 |



RPM 2-97

NUCLEAR ROCKET DEVELOPMENT STATION LAYOUT



RPM 2-98

NUCLEAR ROCKET DEVELOPMENT STATION



RPM 2-99

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1970 ESTIMATES

NASA HEADQUARTERS

MISSION:

The mission of the National Aeronautics and Space Administration Headquarters is to plan and provide executive direction for the programs authorized by the Congress, and to implement the national objectives stated in the National Aeronautics and Space Act of 1958, as amended. The principal statutory functions are:

1. To conduct research into, and for the solution of, problems of flight within and outside the earth's atmosphere and to develop, construct, test, and operate aeronautical and space vehicles for research purposes.
2. To conduct activities required for the exploration of space with manned and unmanned vehicles.
3. To arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations.
4. To provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

The following offices at Headquarters assist management in carrying out the technical aspects of this mission:

Office of Manned Space Flight - Responsible for all NASA activities directly involving manned space flight missions. Programs include:

Apollo - To provide a broad national capability for manned space exploration, including earth orbital, lunar orbital, and lunar surface operations, and to achieve the specific objective of manned lunar landing and return within this decade;

Space Flight Operations - To expand the participation and capabilities of men in scientific, technological and applied observations in space through earth orbital flights of increasing duration and complexity, initially using Saturn IB launch vehicles, modified Apollo spacecraft, the Saturn I Workshop, and the Apollo Telescope Mount and progressing to an orbital space station.

Advanced Missions - To plan a broad program of explorations which will achieve and maintain a position of space leadership for the United States.

The Office of Manned Space Flight has launch responsibility for all major manned and unmanned missions utilizing the three installations primarily concerned with the manned space flight programs. These installations are: the George C. Marshall Space Flight Center, including Mississippi Test Facility, Michoud Assembly Facility, and Slidell where a computer facility is located; the Manned Spacecraft Center, including NASA activities at the White Sands Test Facility; and the John F. Kennedy Space Center, NASA, including NASA activities at the Eastern and Western Test Ranges.

Office of Space Science and Applications - Responsible for the NASA automated space flight program directed toward scientific investigations of the earth, moon, sun, planets, and interplanetary space utilizing ground based, airborne, and space techniques such as sounding rockets, earth satellites, and deep space probes; for scientific experiments to be conducted by man in space and for assisting in the selection and training of astronaut-scientists; for the research and development of space flight applications in such areas as meteorology, communications, navigation, geodesy, and earth resources surveys, and for the support of operational systems using these developments; and for the development, procurement and use of light and medium class launch vehicles, such as Centaur.

The Office of Space Science and Applications has an overall institutional responsibility for those NASA installations primarily involved in space science and applications programs. These are the Goddard Space Flight Center, Wallops Station, the Jet Propulsion Laboratory (a Government-owned facility operated for NASA by the California Institute of Technology), and the NASA Pasadena Office, a component field activity of Headquarters.

Office of Advanced Research and Technology - Responsible for the planning, direction, execution, evaluation, documentation, and dissemination of the results of all NASA research and technology programs which are conducted primarily to demonstrate the feasibility of a concept, structure, component, or system which may have general application to the nation's aeronautical and space objectives. This office is also responsible for coordinating NASA's total program of supporting research and technology related to carrying out the specific flight missions in order to avoid unnecessary duplication and to insure an integrated and balanced agency research program.

In addition, this office has over-all institutional responsibility for the research centers primarily involved in carrying out NASA's advanced research programs. These installations are: the Ames Research Center, the Electronics Research Center, the Flight Research Center, the Langley Research Center, the Lewis Research Center, and the Space Nuclear Propulsion Office.

Office of Tracking and Data Acquisition - Responsible for the development, implementation, and operation of tracking, data acquisition, communications, and data processing facilities, systems, and services required for NASA flight missions. This office is also responsible for agency-wide coordination of the management of automatic data processing systems and services. In addition, this office provides for centralized planning and systems management for the administrative communications at NASA installations.

The NASA Pasadena Office - Pasadena, California, is a component field activity of the NASA Headquarters Office of Space Science and Applications. Its responsibilities are to negotiate and administer NASA contracts with the California Institute of Technology for the operation of the Jet Propulsion Laboratory; provide patent and technology utilization services as they relate to prime and subcontracts at the Jet Propulsion Laboratory; and perform such additional procurement, contract administration, public affairs, communications, financial management, and other functions as may be assigned by the Associate Administrator for Space Science and Applications.

DESCRIPTION:

The NASA Headquarters is located at 400 Maryland Avenue, S.W., Washington, D.C., and also occupies other buildings in the District of Columbia and near-by Virginia. Except for some office space leased in the District of Columbia and a storage area in Virginia, personnel occupy Government-owned buildings. The NASA Pasadena Office is physically located at the Jet Propulsion Laboratory in Pasadena, California.

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$36,149,000 | \$38,178,000 | \$38,024,000 |
| Travel..... | 2,236,000 | 2,625,000 | 2,625,000 |
| Automatic data processing..... | 1,351,000 | 1,302,000 | 1,377,000 |
| Facilities services..... | 787,000 | 658,000 | 668,000 |
| Technical services..... | 12,389,000 | 11,581,000 | 11,543,000 |
| Administrative support..... | <u>5,151,000</u> | <u>5,455,000</u> | <u>5,560,000</u> |
| Total, fund requirements.... | <u>\$58,063,000</u> | <u>\$59,799,000</u> | <u>\$59,797,000</u> |

PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| <u>Manned Space Flight</u> | | | |
| Apollo..... | 242 | 229 | 227 |
| Space flight operations..... | 116 | 110 | 110 |
| Advanced missions..... | 51 | 49 | 49 |
| <u>Space Science and Applications</u> | | | |
| Physics and astronomy..... | 65 | 59 | 59 |
| Lunar and planetary exploration..... | 58 | 59 | 58 |
| Bioscience..... | 34 | 32 | 32 |
| Space applications..... | 51 | 55 | 55 |
| Launch vehicle procurement..... | 29 | 27 | 26 |
| <u>Advanced Research and Technology</u> | | | |
| Basic research..... | 30 | 32 | 31 |
| Space vehicle systems..... | 41 | 42 | 41 |
| Electronics systems..... | 31 | 33 | 33 |
| Human factor systems..... | 23 | 21 | 21 |
| Space power and electric propulsion systems..... | 29 | 28 | 28 |
| Chemical propulsion..... | 22 | 21 | 21 |
| Aeronautical vehicles..... | 30 | 33 | 33 |
| <u>University Affairs</u> | | | |
| Sustaining university program..... | 29 | 30 | 29 |
| <u>Tracking and Data Acquisition.....</u> | 52 | 54 | 52 |
| <u>Technology Utilization.....</u> | 19 | 18 | 17 |
| Subtotal, positions by program..... | <u>952</u> | <u>932</u> | <u>922</u> |
| 2. <u>Indirect Positions:</u> | | | |
| Director and staff..... | 433 | 447 | 444 |
| Administrative support..... | 269 | 268 | 265 |
| Research and development support..... | 500 | 505 | 501 |
| Subtotal, indirect positions..... | <u>1,202</u> | <u>1,220</u> | <u>1,210</u> |
| Total, permanent positions..... | <u>2,154</u> | <u>2,152</u> | <u>2,132</u> |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING CHART

NASA HEADQUARTERS

| STAFFING SUMMARY | | |
|------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 196 | 196 |
| GS-16 | 86 | 86 |
| GS-15 | 412 | 412 |
| GS-14 | 355 | 359 |
| All Other GS | 1,083 | 1,099 |
| Wage Board | 20 | 20 |
| Total Perm. | 2,152 | 2,132 |

| ADMINISTRATOR | | |
|---------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 7 | 7 |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | 9 | 9 |
| Wage Board | - | - |
| Total Perm. | 16 | 16 |

| GENERAL COUNSEL | | |
|-----------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 6 | 6 |
| GS-16 | - | - |
| GS-15 | 9 | 9 |
| GS-14 | 10 | 10 |
| All Other GS | 26 | 26 |
| Wage Board | - | - |
| Total Perm. | 51 | 51 |

| POLICY | | |
|--------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 6 | 6 |
| GS-16 | - | - |
| GS-15 | 2 | 2 |
| GS-14 | 2 | 2 |
| All Other GS | 10 | 10 |
| Wage Board | - | - |
| Total Perm. | 20 | 20 |

| PROGRAMS PLANS & ANALYSIS | | |
|---------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 6 | 6 |
| GS-16 | - | - |
| GS-15 | 3 | 3 |
| GS-14 | 1 | 1 |
| All Other GS | 4 | 4 |
| Wage Board | - | - |
| Total Perm. | 14 | 14 |

| EXECUTIVE SECRETARY | | |
|---------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 2 | 2 |
| GS-16 | - | - |
| GS-15 | 5 | 5 |
| GS-14 | 6 | 6 |
| All Other GS | 43 | 43 |
| Wage Board | 5 | 5 |
| Total Perm. | 61 | 61 |

| MANAGEMENT DEVELOPMENT | | |
|------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 4 | 4 |
| GS-16 | - | - |
| GS-15 | 4 | 4 |
| GS-14 | 1 | 1 |
| All Other GS | 5 | 5 |
| Wage Board | - | - |
| Total Perm. | 14 | 14 |

| (AD HOC) AEROSPACE SAFETY ADVISORY PANEL | | |
|--|-------|-------|
| | FY-69 | FY-70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | - | - |
| Wage Board | - | - |
| Total Perm. | - | - |

| (AD HOC) PERSONNEL MANAGEMENT REVIEW COMMITTEE | | |
|--|-------|-------|
| | FY-69 | FY-70 |
| Excepted | - | - |
| GS-16 | - | - |
| GS-15 | - | - |
| GS-14 | - | - |
| All Other GS | - | - |
| Wage Board | - | - |
| Total Perm. | - | - |

| ORGANIZATION & MANAGEMENT | | |
|------------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 14 | 14 |
| GS-16 | - | - |
| GS-15 | 24 | 24 |
| GS-14 | 35 | 35 |
| All Other GS | 243 | 238 |
| Wage Board | 14 | 14 |
| Total Perm. | 330 | 325 |

| ADMINISTRATION | | |
|----------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 13 | 13 |
| GS-16 | - | - |
| GS-15 | 35 | 35 |
| GS-14 | 53 | 53 |
| All Other GS | 136 | 133 |
| Wage Board | - | - |
| Total Perm. | 237 | 234 |

| INDUSTRY AFFAIRS | | |
|------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 10 | 10 |
| GS-16 | 1 | 1 |
| GS-15 | 27 | 27 |
| GS-14 | 56 | 56 |
| All Other GS | 66 | 64 |
| Wage Board | - | - |
| Total Perm. | 160 | 158 |

| SPECIAL CONTRACTS NEGOTIATION & REVIEW | | |
|---|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 3 | 3 |
| GS-16 | - | - |
| GS-15 | 1 | 1 |
| GS-14 | - | - |
| All Other GS | 4 | 4 |
| Wage Board | - | - |
| Total Perm. | 8 | 8 |

| TECHNOLOGY UTILIZATION | | |
|------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 5 | 5 |
| GS-16 | - | - |
| GS-15 | 14 | 14 |
| GS-14 | 19 | 19 |
| All Other GS | 58 | 57 |
| Wage Board | - | - |
| Total Perm. | 96 | 95 |

| UNIVERSITY AFFAIRS | | |
|--------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 2 | 2 |
| GS-16 | 2 | 2 |
| GS-15 | 3 | 3 |
| GS-14 | 5 | 5 |
| All Other GS | 18 | 17 |
| Wage Board | - | - |
| Total Perm. | 30 | 29 |

| DOD & INTERAGENCY AFFAIRS | | |
|---------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 5 | 5 |
| GS-16 | - | - |
| GS-15 | 2 | 2 |
| GS-14 | 1 | 1 |
| All Other GS | 5 | 5 |
| Wage Board | - | - |
| Total Perm. | 13 | 13 |

| INTERNATIONAL AFFAIRS | | |
|-----------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 3 | 3 |
| GS-16 | 1 | 1 |
| GS-15 | 4 | 4 |
| GS-14 | 3 | 3 |
| All Other GS | 18 | 18 |
| Wage Board | - | - |
| Total Perm. | 29 | 29 |

| LEGISLATIVE AFFAIRS | | |
|---------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 3 | 3 |
| GS-16 | - | - |
| GS-15 | 5 | 5 |
| GS-14 | 2 | 2 |
| All Other GS | 17 | 17 |
| Wage Board | 1 | 1 |
| Total Perm. | 28 | 28 |

| PUBLIC AFFAIRS | | |
|----------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 5 | 5 |
| GS-16 | - | - |
| GS-15 | 16 | 16 |
| GS-14 | 20 | 20 |
| All Other GS | 64 | 64 |
| Wage Board | - | - |
| Total Perm. | 105 | 105 |

| MANNED SPACE FLIGHT | | |
|---------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 40 | 40 |
| GS-16 | 24 | 24 |
| GS-15 | 107 | 107 |
| GS-14 | 77 | 77 |
| All Other GS | 134 | 132 |
| Wage Board | - | - |
| Total Perm. | 382 | 380 |

| SPACE SCIENCE & APPLICATIONS | | |
|---------------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 29 | 29 |
| GS-16 | 24 | 24 |
| GS-15 | 61 | 61 |
| GS-14 | 35 | 39 |
| All Other GS | 144 | 138 |
| Wage Board | - | - |
| Total Perm. | 293 | 291 |

| TRACKING & DATA ACQUISITION | | |
|--------------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 6 | 6 |
| GS-16 | 6 | 6 |
| GS-15 | 19 | 19 |
| GS-14 | 9 | 9 |
| All Other GS | 14 | 12 |
| Wage Board | - | - |
| Total Perm. | 54 | 52 |

| ADVANCED RESEARCH & TECHNOLOGY | | |
|-----------------------------------|-------|-------|
| | FY-69 | FY-70 |
| Excepted | 27 | 27 |
| GS-16 | 28 | 28 |
| GS-15 | 71 | 71 |
| GS-14 | 20 | 20 |
| All Other GS | 65 | 63 |
| Wage Board | - | - |
| Total Perm. | 211 | 209 |

RESEARCH AND PROGRAM MANAGEMENT TYPE COSTS

FISCAL YEAR 1970 ESTIMATES

JET PROPULSION LABORATORY

The Jet Propulsion Laboratory (JPL) is a Government-owned facility managed and operated by the California Institute of Technology under a contract with NASA. The cost of operating the Laboratory is funded from the Research and Development appropriation, except for the lease of administrative aircraft and the purchase of passenger motor vehicles. These costs are funded from the Research and Program Management appropriation and are included in the NASA Headquarters budget presentation. The Research and Program Management type costs are presented for information only and are not a part of the NASA Research and Program Management budget.

MISSION:

The Jet Propulsion Laboratory performs a variety of engineering, scientific and management missions including:

1. Project management of complete automated spacecraft systems for lunar and planetary exploration.
2. Operation of the Deep Space Network including tracking and data acquisition activities required by lunar and planetary flights, as well as backup to the Manned Space Flight Network.
3. A continuing program of supporting research and technology.

Specific examples of the Jet Propulsion Laboratory's activity in these areas are:

Lunar Exploration - The final Surveyor mission was successfully completed in 1968. The Surveyor soft-landers have sampled and analyzed the lunar surface and established that its weight bearing capacity will permit a safe landing by Apollo astronauts. The highly successful Surveyors returned thousands of pictures of the lunar landscape as well as significant engineering and scientific data. Under a contract with the Jet Propulsion Laboratory, the spacecraft was designed and built by Hughes Aircraft Company with the Laboratory providing management and technical guidance. The Jet Propulsion Laboratory conducted the mission operations from the Space Flight Operations Facility, and was responsible for data evaluation.

Planetary Exploration - The Mariner series of automated spacecraft, our primary vehicle for planetary exploration, was designed at the Jet Propulsion Laboratory. The Laboratory has been responsible for the project management of all Mariner missions including the integration, assembly, and testing of the spacecraft. Mariner II accomplished the first successful flyby of Venus in 1962, and in 1965, Mariner IV photographed the surface of Mars as it passed

within 6,200 miles of the planet's surface. Mariner V was launched in June 1967 and four months later passed within 2,131 miles of Venus providing information on the atmospheric composition of the planet and other scientific data. Two Mariner missions which will fly by Mars are scheduled for launch early in 1969. Also additional Mariner missions are planned for 1971 and 1973.

Supporting Research and Technology - The Jet Propulsion Laboratory maintains a strong program of supporting research and technology, and advanced development. Much of the knowledge gained from active research in such areas as fluid physics, electrophysics, materials, applied mathematics, and guidance and control will be applied to future problems in space exploration.

Another activity of considerable importance is the development and fabrication of scientific experiments to be flown on vehicles other than Jet Propulsion Laboratory spacecraft. These include high-altitude balloons, Aerobee rockets, NASA aircraft, and earth orbiters. The scientific teams involved in these experiments frequently include faculty members of various universities and staff members from NASA field installations.

Tracking and Data Acquisition - The Jet Propulsion Laboratory manages the operation of the worldwide Deep Space Network. The Deep Space Network is comprised of the Space Flight Operations Facility in Pasadena as well as tracking and data acquisition stations located in California, Spain, South Africa and Australia. The Space Flight Operations Facility is the central communications and control facility for the conduct of flight missions. The Deep Space Network provides support not only to Jet Propulsion Laboratory managed flight missions, but also for projects such as Lunar Orbiter and Pioneer which are managed by other NASA field installations.

DESCRIPTION:

The Jet Propulsion Laboratory is located in Pasadena, California, approximately 20 miles north of downtown Los Angeles. Subsidiary facilities are located at Goldstone, California (tracking and data acquisition), Edwards Air Force Base, Muroc, California (solid propellant formulation and testing), and Table Mountain, California (open air testing and astronomy).

At Pasadena, the Laboratory occupies 175.9 acres of land of which 145.9 acres are owned by NASA and 30 acres are leased. At Goldstone, facilities are located on land occupied under permit from the Army. At Edwards Air Force Base, facilities are located on land occupied under permit from the Air Force. The facilities at Table Mountain are located on land occupied under permit from the Forest Service of the Department of Agriculture. The capital investment of the Jet Propulsion Laboratory, including the Deep Space Network and contractor-held facilities, as of June 30, 1968, was \$182,975,000.

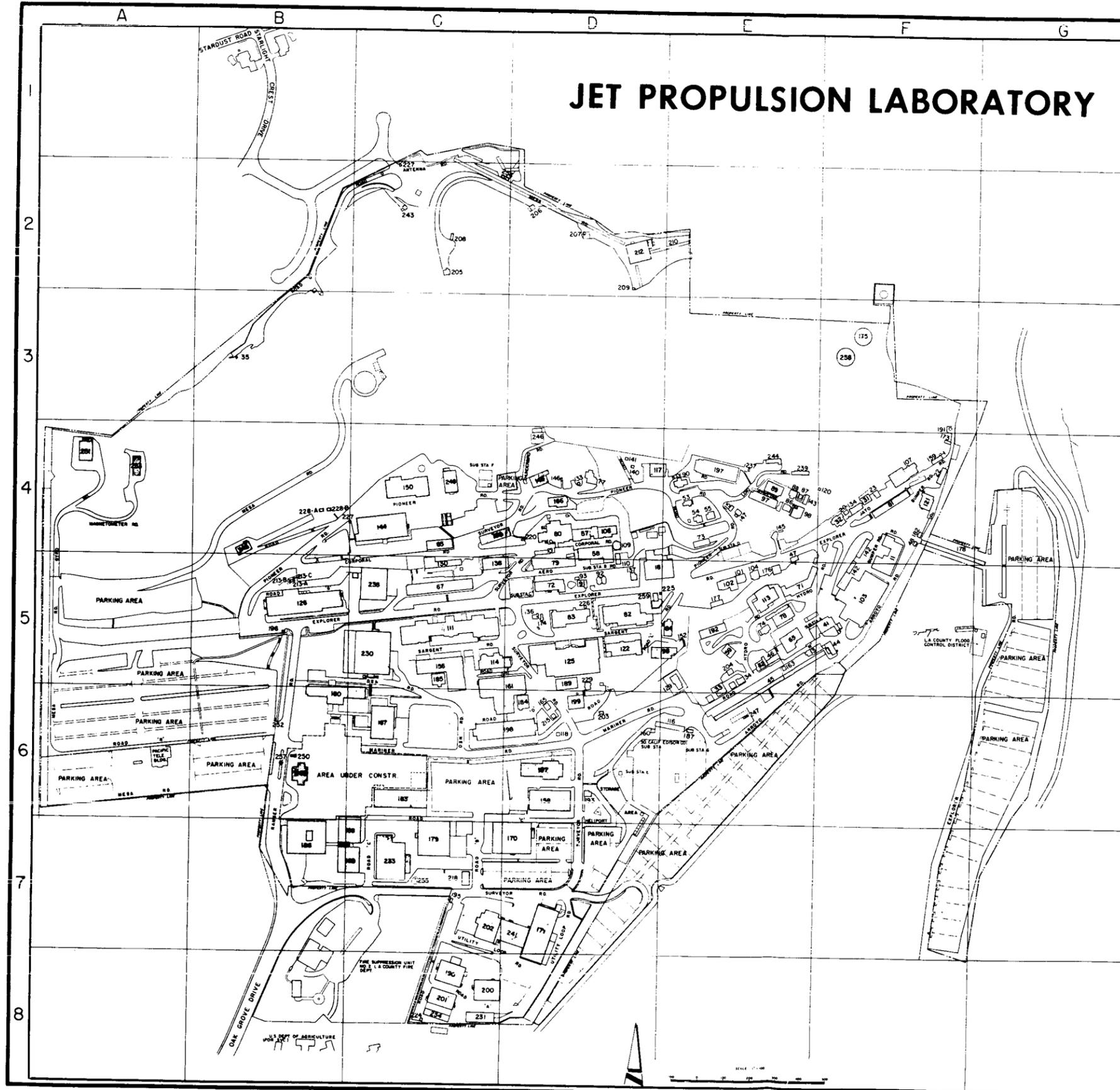
RPM 2-106

SUMMARY OF RESOURCES REQUIREMENTS:

| <u>Functions</u> | <u>FUNDS</u> | | |
|--------------------------------|---------------------|---------------------|---------------------|
| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
| Personnel..... | \$60,255,000 | \$60,140,000 | \$65,697,000 |
| Travel..... | 2,223,000 | 2,121,000 | 2,018,000 |
| Automatic data processing..... | 5,437,000 | 3,495,000 | 4,136,000 |
| Facilities services..... | 5,011,000 | 4,641,000 | 5,129,000 |
| Technical services..... | 920,000 | 702,000 | 750,000 |
| Administrative support..... | <u>2,419,000</u> | <u>2,218,000</u> | <u>2,351,000</u> |
| Total, fund requirements.... | <u>\$76,265,000</u> | <u>\$73,317,000</u> | <u>\$80,081,000</u> |

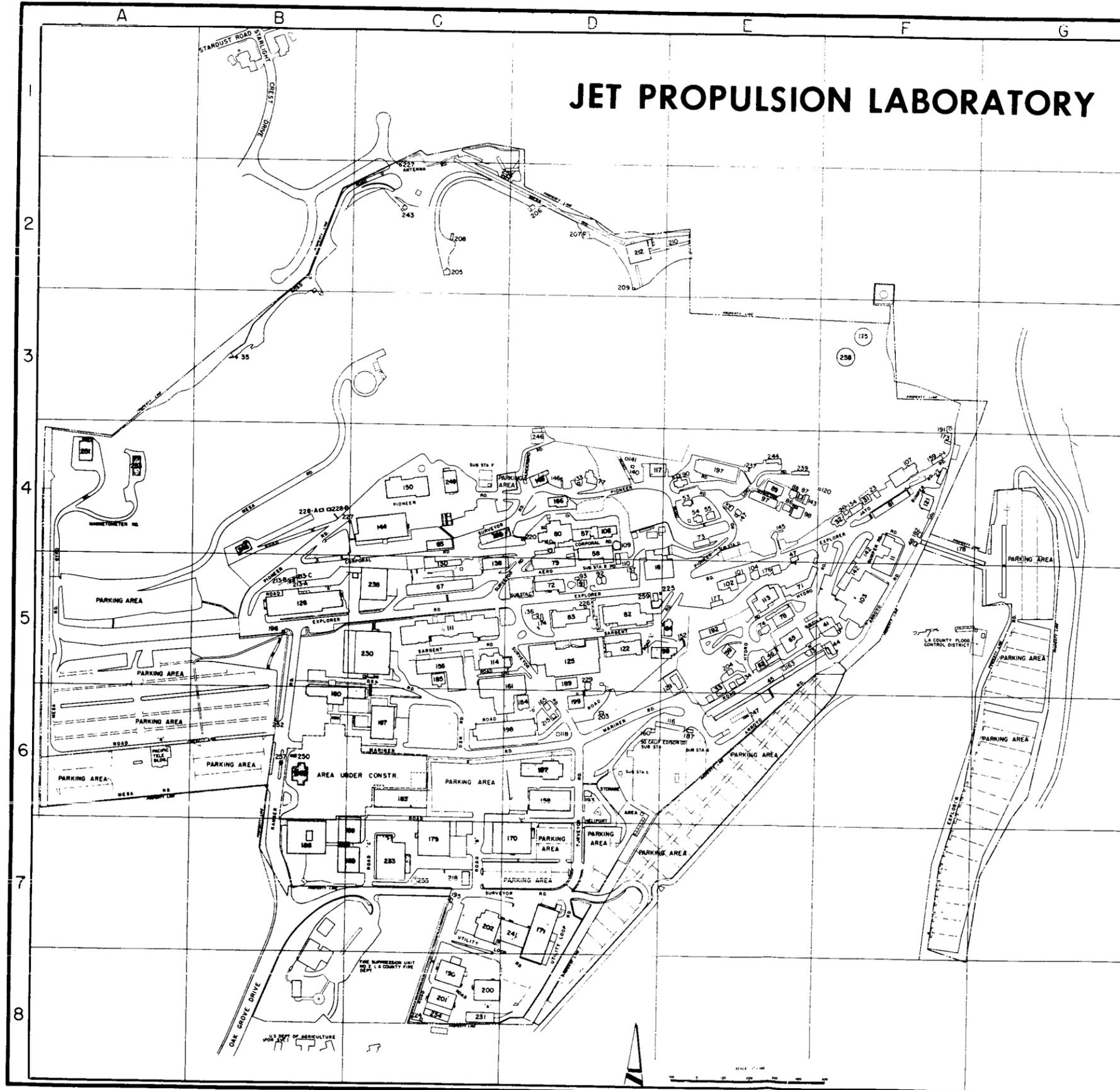
PERSONNEL

| | <u>1968</u> | <u>1969</u> | <u>1970</u> |
|---|--------------|--------------|--------------|
| 1. <u>Permanent Positions by Program:</u> | | | |
| Lunar and planetary exploration..... | 881 | 819 | 946 |
| Tracking and data acquisition..... | 326 | 344 | 368 |
| Supporting research and technology..... | 797 | 718 | 745 |
| Research and development services..... | <u>486</u> | <u>508</u> | <u>556</u> |
| Subtotal, positions by program..... | 2,490 | 2,389 | 2,615 |
| 2. <u>Indirect positions</u> | | | |
| | <u>1,660</u> | <u>1,601</u> | <u>1,755</u> |
| Total, permanent positions..... | <u>4,150</u> | <u>3,990</u> | <u>4,370</u> |



JET PROPULSION LABORATORY

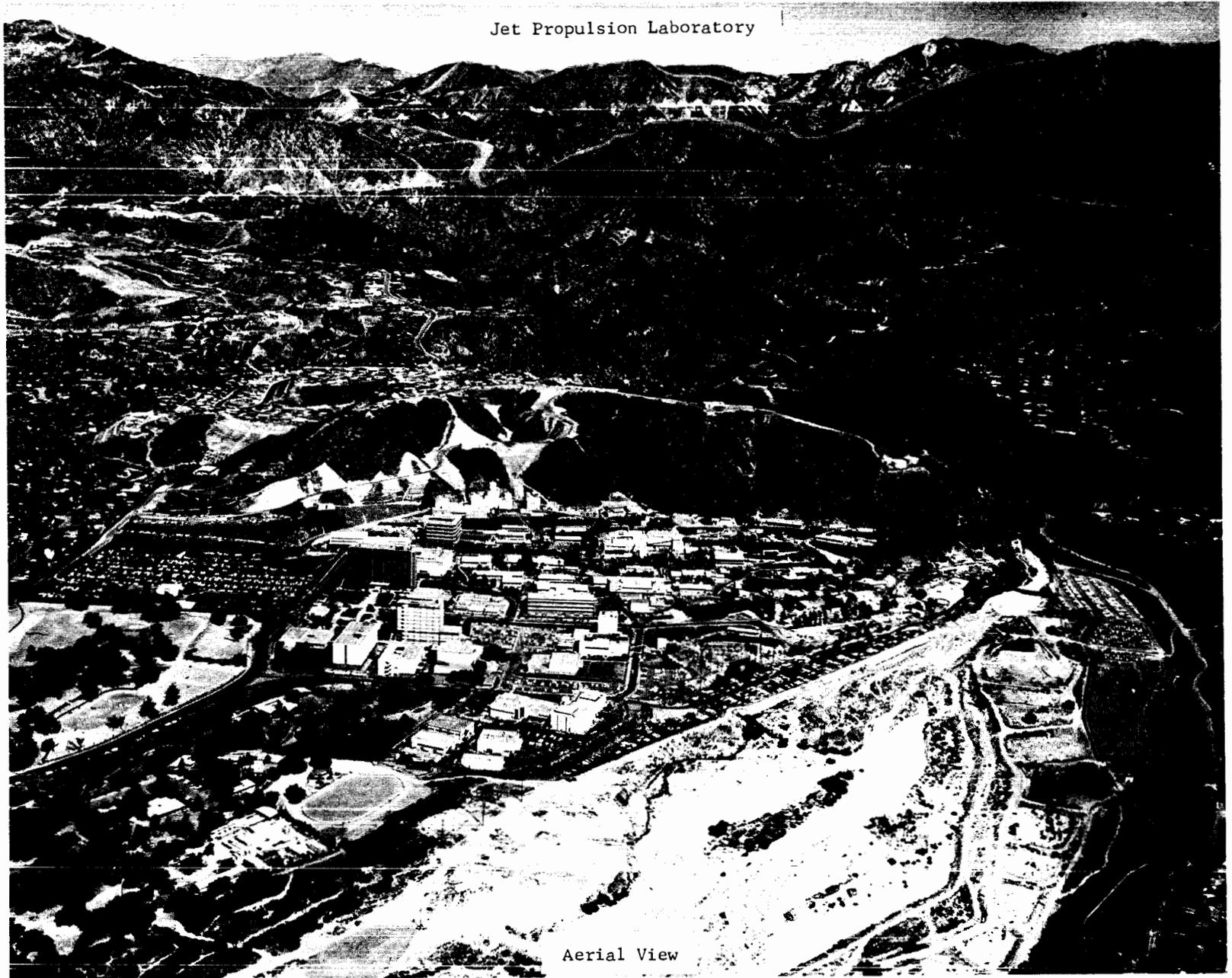
| BUILDING | | | LEGEND | | |
|-----------|-----------------------------------|----------|-----------|-----------------------------------|----------|
| Blgd. No. | Title | Location | Blgd. No. | Title | Location |
| 11 | SPACE SCIENCES LABORATORY | 4-F | 191 | HAZARDOUS TEST BAY | 3-F |
| 13 | OFFICES, LAB & SHOP | 5-E | 192 | PROPULSION ENGINEERING | 5-E |
| 18 | STRUCTURAL TEST LAB | 5-D | 193 | HELIPORT DISPATCHERS OFFICE | 6-D |
| 20 | SHOP TEST CELL #2 (LIQUID) | 4-F | 196 | GUARD SHELTER | 7-C |
| 22 | SPACE SCIENCES LAB | 4-F | 197 | SOLID PROPELLANT PROCESS LAB | 2-B |
| 23 | SHOP TEST CELL #12 (LIQUID) | 4-F | 198 | GUIDANCE LAB | 6-D |
| 31 | TEST CELL (LIQUID) | 4-F | 199 | CELESTIAL SIMULATOR BLDG | 4-F |
| 32 | TEST CELL (LIQUID) | 4-F | 200 | PLANT ENGINEERING SERVICES | 6-D |
| 33 | TEST CELL (LIQUID) | 5-E | 201 | CARPENTER SHOP | 8-C |
| 34 | SHOP TEST CELL #43 (LIQUID) | 5-E | 202 | PROCUREMENT OFFICES | 7-C |
| 35 | MAGNETIC FLUX TANK SHELTER | 3-B | 203 | EMITTER STORAGE BLDG | 6-D |
| 41 | HI TEMP LAB | 5-F | 204 | TEST CELL "F" EQUIP BLDG | 5-E |
| 42 | TEST CELL (LIQUID) | 5-F | 205 | HIGH GAIN ANTENNA TOWER | 2-C |
| 44 | CREDIT UNION | 3-F | 206 | ROTATOR PLATFORM | 2-D |
| 45 | IMPACT LABORATORY | 5-E | 207 | ROTATOR PAD | 2-D |
| 46 | SHOP TEST CELL #42 (LIQUID) | 5-E | 208 | IMPEDANCE PLATFORM | 2-C |
| 47 | PLANT PROTECTION | 4-E | 209 | ILLUMINATOR TOWER | 2-D |
| 48 | GUARD SHELTER | 4-F | 210 | BLAINE TRACK | 2-D |
| 53 | CONDITIONING LAB (SOLID) | 4-E | 212 | ANTENNA LABORATORY | 2-D |
| 54 | BLENDED LAB (SOLID) | 4-E | 213 | COOLING TOWERS "A, B & C" | 5-B |
| 55 | MIXING LAB (SOLID) | 4-D | 215 | COOLING TOWER | 6-D |
| 57 | TEST CELL (AIR FUEL) | 4-D | 218 | SECRETARIAL CENTER | 7-C |
| 58 | COMPRESSOR BUILDING | 4-D | 220 | CRS TERMINAL BUILDING | 1-D |
| 59 | CHEM LAB | 5-E | 224 | SEWER LIFT STATION | 8-C |
| 65 | MATERIALS LAB | 5-E | 225 | GUARD SHELTER | 4-B |
| 67 | MICROBIOLOGY FACILITY | 5-E | 226 | COLLECTOR STORAGE BLDG | 5-D |
| 71 | MATERIAL SERVICES STORAGE ANNEX | 5-E | 227 | GUARD SHELTER | 4-B |
| 72 | ENGINEERING OFFICE | 5-C | 228 | COOLING TOWERS (A & B) | 5-E |
| 73 | UTILITIES AREA STORAGE | 5-C | 229 | SMELTED ROOM BLDG. | 4-B |
| 74 | TEST CELL (CHEMISTRY) | 5-E | 230 | SPACE FLIGHT OPERATIONS FACILITY | 5-C |
| 77 | ROH SCIENCE LAB | 4-D | 231 | PAINT SHOP | 5-E |
| 78 | HYDRAULICS LAB | 5-E | 233 | SPACECRAFT DEVELOPMENT BLDG. | 7-C |
| 79 | WIND TUNNEL (20 INCH) | 4-D | 234 | LUMBER STORAGE BLDG. | 8-C |
| 80 | WIND TUNNEL (21 INCH) | 4-D | 237 | COOLING TOWER | 4-E |
| 81 | SPACE SCIENCES LAB | 4-F | 238 | TELECOMMUNICATIONS LAB | 5-C |
| 82 | ENVIRONMENTAL TEST LAB | 5-F | 239 | LOW TEMP SOLID PROPELLANT MAG | 4-E |
| 83 | ELECTRONIC PARTS & ENGINEERING | 5-D | 241 | SHIPPING & RECEIVING | 7-D |
| 84 | TEST CELL & SOLID CHEMISTRY | 5-E | 243 | REMOTE ANTENNA RANGE CONTR. BLDG. | 2-C |
| 85 | BUSINESS SYSTEMS OFFICE | 4-C | 244 | HI TEMP STORAGE MAGAZINE | 4-B |
| 86 | OXIDIZER GRINDING (SOLID) | 4-E | 245 | SPECTROSCOPY LAB | 4-U |
| 87 | OVENS (SOLID) | 4-E | 246 | SOILS TEST LAB | 4-C |
| 88 | MIXING LAB (SOLID) | 4-E | 247 | DYNAMITRON (TEMPORARY) | 6-E |
| 89 | PROCESSING LAB (SOLID) | 4-E | 248 | 70 FT SPACE SIMULATOR | 4-C |
| 90 | SHOP-TEST CELL #51 | 4-E | 249 | VISITORS RECEPTION BLDG. | 6-B |
| 91 | AIR DRYER (WIND TUNNEL) | 5-D | 250 | GUARD SHELTER | 4-A |
| 92 | COOLING TOWER (WIND TUNNEL) | 5-D | 251 | GYRO LAB | 6-B |
| 93 | VAPORIZER (WIND TUNNEL) | 5-D | 252 | GUARD SHELTER | 4-A |
| 97 | DEVELOPMENT LAB & OFFICES | 4-E | 253 | LOW MAG. INTERFERENCE LAB. | 4-A |
| 98 | PREPARATION SHOP (SOLID) | 4-E | 255 | SEWAGE LIFT STATION | 7-C |
| 99 | CHEMISTRY LAB (SOLID) | 5-E | 256 | MODEL RANGE CONTROL BLDG. | 7-C |
| 101 | TRANSPORTATION OFFICES | 5-E | 257 | GUARD ISLAND | 8-B |
| 102 | TRANSPORTATION SHOP | 5-E | 258 | WATER RESERVOIR | 3-F |
| 103 | FABRICATION SHOP | 5-F | 259 | LIQUID NITROGEN BOTTLING STORAGE | 5-D |
| 104 | FIRST AID | 5-E | | | |
| 106 | TEST CELL (AIR FUEL) | 4-D | | | |
| 107 | TEST CELL (AIR FUEL) | 4-F | | | |
| 109 | COOLING TOWER (WIND TUNNEL) | 4-D | | | |
| 110 | FUEL STORAGE DOCK | 4-D | | | |
| 111 | GENERAL OFFICES BLDG. | 5-C | | | |
| 113 | PROPULSION LABORATORY | 5-E | | | |
| 114 | CAFETERIA & OFFICES | 5-C | | | |
| 115 | HEATING PLANT (SOLID) | 4-E | | | |
| 116 | PROPELLANT STORAGE DOCK | 6-E | | | |
| 117 | TEST CELL (SOLID) | 4-D | | | |
| 118 | COOLING TOWER | 6-D | | | |
| 120 | COOLING TOWER | 4-F | | | |
| 121 | EMPLOYEE DEVELOPMENT CENTER | 4-F | | | |
| 122 | ENGINEERING OFFICES | 5-D | | | |
| 125 | COMBINED ELECTRONICS | 5-D | | | |
| 126 | VOYAGER PROJECT OFFICE | 5-B | | | |
| 129 | TEST CELL (CHEMISTRY) | 5-E | | | |
| 130 | ENGINEERING OFFICES | 5-C | | | |
| 133 | SERVICE TOWER | 5-E | | | |
| 134 | SHOP TEST CELL | 4-F | | | |
| 136 | COOLING TOWER | 5-D | | | |
| 137 | COOLING TOWER | 5-D | | | |
| 138 | ENGINEERING OFFICES | 5-C | | | |
| 140 | MAGAZINE X TEMP | 4-D | | | |
| 141 | MAGAZINE X TEMP | 4-D | | | |
| 142 | UTILITIES DOCK | 4-F | | | |
| 143 | SOLID ROCKET DOCK | 4-E | | | |
| 144 | ENVIRONMENTAL LAB. | 4-C | | | |
| 145 | MAGAZINE-PROPELLANT | 4-E | | | |
| 146 | MAGAZINE-TEMP | 4-D | | | |
| 147 | COOLING TOWER | 4-E | | | |
| 148 | ENERGY CONVERSION LABORATORY | 4-D | | | |
| 150 | 25 FOOT SPACE SIMULATOR | 4-C | | | |
| 152 | HAZARDOUS CHEMICAL STORAGE | 5-E | | | |
| 156 | COMPUTER PROGRAM OFFICE | 5-C | | | |
| 157 | ENGINEERING & MECHANICS BLDG | 6-D | | | |
| 158 | MATL RESEARCH PROCESS-LAB | 6-D | | | |
| 159 | PUMP HOUSE (WATER) | 4-F | | | |
| 160 | SEWAGE LIFT STATION | 6-D | | | |
| 161 | TELECOMMUNICATIONS LAB | 5-C | | | |
| 163 | COOLING TOWER | 5-E | | | |
| 165 | COOLING TOWER | 6-D | | | |
| 166 | COOLING TOWER | 4-D | | | |
| 167 | CAFETERIA | 6-C | | | |
| 168 | SPACE SCIENCES INSTRMT SYSTEM LAB | 7-C | | | |
| 169 | SURVEYOR PROJECT OFFICE | 7-C | | | |
| 170 | FABRICATION SHOP | 7-D | | | |
| 171 | MATERIALS SERVICE BLDG. | 7-D | | | |
| 173 | TEST SHELTER | 4-F | | | |
| 174 | COOLING TOWER | 5-D | | | |
| 175 | WATER RESERVOIR | 3-F | | | |
| 176 | FIRE HOUSE | 5-E | | | |
| 177 | HEAVY EQUIP SERVICING SHED | 5-E | | | |
| 178 | BAILEY BRIDGE | 4-F | | | |
| 179 | SPACECRAFT ASSY. FACILITY | 7-C | | | |
| 180 | CENTRAL ENGR. BLDG | 6-B | | | |
| 182 | BUS STOP SHELTER | 4-F | | | |
| 183 | PHYSICAL SCIENCE LAB | 6-C | | | |
| 184 | ELECTRONIC STORES | 6-D | | | |
| 185 | PROGRAMMING OFFICE | 5-C | | | |
| 186 | SPACE SCIENCES DIVISION BLDG | 7-B | | | |
| 187 | CHEMICAL STORAGE | 6-E | | | |
| 188 | ENGINEERING FACILITIES BLDG | 4-C | | | |
| 189 | ELECTRONICS LAB ANNEX | 5-D | | | |
| 190 | PROCUREMENT OFFICES | 6-C | | | |



JET PROPULSION LABORATORY

| BUILDING | | | LEGEND | | |
|-----------|-----------------------------------|----------|-----------|-----------------------------------|----------|
| Blgd. No. | Title | Location | Blgd. No. | Title | Location |
| 11 | SPACE SCIENCES LABORATORY | 4-F | 191 | HAZARDOUS TEST BAY | 3-F |
| 13 | OFFICES, LAB & SHOP | 5-E | 192 | PROPULSION ENGINEERING | 5-E |
| 18 | STRUCTURAL TEST LAB | 5-D | 193 | HELIPORT DISPATCHERS OFFICE | 6-D |
| 20 | SHOP TEST CELL #2 (LIQUID) | 4-F | 196 | GUARD SHELTER | 7-C |
| 22 | SPACE SCIENCES LAB | 4-F | 197 | SOLID PROPELLANT PROCESS LAB | 2-B |
| 23 | SHOP TEST CELL #12 (LIQUID) | 4-F | 198 | GUIDANCE LAB | 6-D |
| 31 | TEST CELL (LIQUID) | 4-F | 199 | CELESTIAL SIMULATOR BLDG | 4-F |
| 32 | TEST CELL (LIQUID) | 4-F | 200 | PLANT ENGINEERING SERVICES | 6-D |
| 33 | TEST CELL (LIQUID) | 5-E | 201 | CARPENTER SHOP | 8-C |
| 34 | SHOP TEST CELL #43 (LIQUID) | 5-E | 202 | PROCUREMENT OFFICES | 7-C |
| 35 | MAGNETIC FLUX TANK SHELTER | 3-B | 203 | EMITTER STORAGE BLDG | 6-D |
| 41 | HI TEMP LAB | 5-F | 204 | TEST CELL "F" EQUIP BLDG | 6-E |
| 42 | TEST CELL (LIQUID) | 5-E | 205 | HIGH GAIN ANTENNA TOWER | 2-C |
| 44 | CREDIT UNION | 3-F | 206 | ROTATOR PLATFORM | 2-D |
| 45 | IMPACT LABORATORY | 5-E | 207 | ROTATOR PAD | 2-D |
| 46 | SHOP TEST CELL #42 (LIQUID) | 5-E | 208 | IMPEDANCE PLATFORM | 2-C |
| 47 | PLANT PROTECTION | 4-E | 209 | ILLUMINATOR TOWER | 2-D |
| 48 | GUARD SHELTER | 4-F | 210 | BLAINE TRACK | 2-D |
| 53 | CONDITIONING LAB (SOLID) | 4-E | 212 | ANTENNA LABORATORY | 2-D |
| 54 | BLENDED LAB (SOLID) | 4-E | 213 | COOLING TOWERS "A, B & C" | 5-B |
| 55 | MIXING LAB (SOLID) | 4-D | 215 | COOLING TOWER | 6-D |
| 57 | TEST CELL (AIR FUEL) | 4-D | 218 | SECRETARIAL CENTER | 7-C |
| 58 | COMPRESSOR BUILDING | 4-D | 220 | CRS TERMINAL BUILDING | 1-D |
| 59 | CHEM LAB | 5-E | 224 | SEWER LIFT STATION | 8-C |
| 65 | MATERIALS LAB | 5-E | 225 | GUARD SHELTER | 4-B |
| 67 | MICROBIOLOGY FACILITY | 5-E | 226 | COLLECTOR STORAGE BLDG | 5-D |
| 71 | MATERIAL SERVICES STORAGE ANNEX | 5-E | 227 | GUARD SHELTER | 4-B |
| 72 | ENGINEERING OFFICE | 5-C | 228 | COOLING TOWERS (A & B) | 5-E |
| 73 | UTILITIES AREA STORAGE | 5-C | 229 | SMELTED ROOM BLDG. | 5-B |
| 74 | TEST CELL (CHEMISTRY) | 5-E | 230 | SPACE FLIGHT OPERATIONS FACILITY | 5-C |
| 77 | ROH SCIENCE LAB | 4-D | 231 | PAINT SHOP | 4-D |
| 78 | HYDRAULICS LAB | 5-E | 233 | SPACECRAFT DEVELOPMENT BLDG. | 7-C |
| 79 | WIND TUNNEL (20 INCH) | 4-D | 234 | LUMBER STORAGE BLDG. | 8-C |
| 80 | WIND TUNNEL (21 INCH) | 4-D | 237 | COOLING TOWER | 4-E |
| 81 | SPACE SCIENCES LAB | 4-F | 238 | TELECOMMUNICATIONS LAB | 5-C |
| 82 | ENVIRONMENTAL TEST LAB | 5-F | 239 | LOW TEMP SOLID PROPELLANT MAG | 4-E |
| 83 | ELECTRONIC PARTS & ENGINEERING | 5-D | 241 | SHIPPING & RECEIVING | 7-D |
| 84 | TEST CELL & SOLID CHEMISTRY | 5-E | 243 | REMOTE ANTENNA RANGE CONTR. BLDG. | 2-C |
| 85 | BUSINESS SYSTEMS OFFICE | 4-C | 244 | HI TEMP STORAGE MAGAZINE | 4-B |
| 86 | OXIDIZER GRINDING (SOLID) | 4-E | 245 | SPECTROSCOPY LAB | 4-U |
| 87 | OVENS (SOLID) | 4-E | 246 | SOILS TEST LAB | 4-C |
| 88 | MIXING LAB (SOLID) | 4-E | 247 | DYNAMITRON (TEMPORARY) | 6-E |
| 89 | PROCESSING LAB (SOLID) | 4-E | 248 | 10 FT SPACE SIMULATOR | 4-C |
| 90 | SHOP-TEST CELL #51 | 4-E | 249 | VISITORS RECEPTION BLDG. | 6-B |
| 91 | AIR DRYER (WIND TUNNEL) | 5-D | 250 | GUARD SHELTER | 4-A |
| 92 | COOLING TOWER (WIND TUNNEL) | 5-D | 251 | GYRO LAB | 6-B |
| 93 | VAPORIZER (WIND TUNNEL) | 5-D | 252 | GUARD SHELTER | 4-A |
| 97 | DEVELOPMENT LAB & OFFICES | 4-E | 253 | LOW MAG. INTERFERENCE LAB. | 4-A |
| 98 | PREPARATION SHOP (SOLID) | 4-E | 255 | SEWAGE LIFT STATION | 7-C |
| 99 | CHEMISTRY LAB (SOLID) | 5-E | 256 | MODEL RANGE CONTROL BLDG. | 7-C |
| 101 | TRANSPORTATION OFFICES | 5-E | 257 | GUARD ISLAND | 8-B |
| 102 | TRANSPORTATION SHOP | 5-E | 258 | WATER RESERVOIR | 3-F |
| 103 | FABRICATION SHOP | 5-F | 259 | LIQUID NITROGEN BOTTLING STORAGE | 5-D |
| 104 | FIRST AID | 5-E | | | |
| 106 | TEST CELL (AIR FUEL) | 4-D | | | |
| 107 | TEST CELL (WIND TUNNEL) | 4-F | | | |
| 109 | COOLING TOWER (WIND TUNNEL) | 4-D | | | |
| 110 | FUEL STORAGE DOCK | 4-D | | | |
| 111 | GENERAL OFFICES BLDG. | 5-C | | | |
| 113 | PROPULSION LABORATORY | 5-E | | | |
| 114 | CAFETERIA & OFFICES | 5-C | | | |
| 115 | HEATING PLANT (SOLID) | 4-E | | | |
| 116 | PROPELLANT STORAGE DOCK | 6-E | | | |
| 117 | TEST CELL (SOLID) | 4-D | | | |
| 118 | COOLING TOWER | 6-D | | | |
| 120 | COOLING TOWER | 4-F | | | |
| 121 | EMPLOYEE DEVELOPMENT CENTER | 4-F | | | |
| 122 | ENGINEERING OFFICES | 5-D | | | |
| 125 | COMBINED ELECTRONICS | 5-D | | | |
| 126 | VOYAGER PROJECT OFFICE | 5-B | | | |
| 129 | TEST CELL (CHEMISTRY) | 5-E | | | |
| 130 | ENGINEERING OFFICES | 5-C | | | |
| 133 | SERVICE TOWER | 5-E | | | |
| 134 | SHOP TEST CELL | 4-F | | | |
| 136 | COOLING TOWER | 5-D | | | |
| 137 | COOLING TOWER | 5-D | | | |
| 138 | ENGINEERING OFFICES | 5-C | | | |
| 140 | MAGAZINE X TEMP | 4-D | | | |
| 141 | MAGAZINE X TEMP | 4-D | | | |
| 142 | UTILITIES DOCK | 4-F | | | |
| 143 | SOLID ROCKET DOCK | 4-E | | | |
| 144 | ENVIRONMENTAL LAB. | 4-C | | | |
| 145 | MAGAZINE-PROPELLANT | 4-E | | | |
| 146 | MAGAZINE-TEMP | 4-D | | | |
| 147 | COOLING TOWER | 4-E | | | |
| 148 | ENERGY CONVERSION LABORATORY | 4-D | | | |
| 150 | 25 FOOT SPACE SIMULATOR | 4-C | | | |
| 152 | HAZARDOUS CHEMICAL STORAGE | 5-E | | | |
| 156 | COMPUTER PROGRAM OFFICE | 5-C | | | |
| 157 | ENGINEERING & MECHANICS BLDG | 6-D | | | |
| 158 | MATL. RESEARCH PROCESS-LAB | 6-D | | | |
| 159 | PUMP HOUSE (WATER) | 4-F | | | |
| 160 | SEWAGE LIFT STATION | 6-D | | | |
| 161 | TELECOMMUNICATIONS LAB | 5-C | | | |
| 163 | COOLING TOWER | 5-E | | | |
| 165 | COOLING TOWER | 6-D | | | |
| 166 | COOLING TOWER | 4-D | | | |
| 167 | CAFETERIA | 6-C | | | |
| 168 | SPACE SCIENCES INSTRMT SYSTEM LAB | 7-C | | | |
| 169 | SURVEYOR PROJECT OFFICE | 7-C | | | |
| 170 | FABRICATION SHOP | 7-D | | | |
| 171 | MATERIALS SERVICE BLDG. | 7-D | | | |
| 173 | TEST SHELTER | 4-F | | | |
| 174 | COOLING TOWER | 5-D | | | |
| 175 | WATER RESERVOIR | 3-F | | | |
| 176 | FIRE HOUSE | 5-E | | | |
| 177 | HEAVY EQUIP SERVICING SHED | 5-E | | | |
| 178 | BAILEY BRIDGE | 4-F | | | |
| 179 | SPACECRAFT ASSY. FACILITY | 7-C | | | |
| 180 | CENTRAL ENGR. BLDG | 6-B | | | |
| 182 | BUS STOP SHELTER | 4-F | | | |
| 183 | PHYSICAL SCIENCE LAB | 6-C | | | |
| 184 | ELECTRONIC STORES | 6-D | | | |
| 185 | PROGRAMMING OFFICE | 5-C | | | |
| 186 | SPACE SCIENCES DIVISION BLDG | 7-B | | | |
| 187 | CHEMICAL STORAGE | 6-E | | | |
| 188 | ENGINEERING FACILITIES BLDG | 4-C | | | |
| 189 | ELECTRONICS LAB ANNEX | 5-D | | | |
| 190 | PROCUREMENT OFFICES | 6-C | | | |

Jet Propulsion Laboratory



Aerial View