pace Administration
Ames Research Center
Moffett Field, California 94035

Reply to Attn of: RFA:213-1

September 10, 1981

TO: Robert E. Mobley, Chief, Research Facilities Engineering Branch

FROM: George H. Holdaway

SUBJECT: Facilities Master Planning and 1981 Document

Facilities Planning is a continuous process, however this month we will be distributing the 1981 Master Plan and next month I will be retiring. Prior to retiring I would like to thank you and your staff for the time you were able to put into the present Plan. As you know, often my prior expressions have been ones of frustration in the relocation of near-term facilities and not enough effort on planning future utilities. This note is intended to end on the positive.

In the earlier stages of the updating of the current Master Plan, Marc Cohen did a lot to critique the prior efforts and made specific contributions to several sections of the report, e.g. Geology and Meteorology, layout of Technical Services Division facilities, and draft of future facilities write-ups. His efforts are appreciated and would have been recognized more completely, if his assignment had continued through the final phases of the Master Planning effort.

Future assignments to the Master Planning effort are, of course, up to the Director of Research Support, your Division Chief and Chief of Facilities Planning Office. However, I would hope that the type of contribution of your staff, which has improved the planning process in the past, will continue into the future.

Thanks again.

George H. Holdaway

George H. Holdaway

cc:
SWhite, Jr., 200-5
MMCohen, 213-8

AG
CRC

GHHoldaway:dd 9-10-81/6323

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Facilities Master Plan

NASA
National Aeronautics and Space Administration
Ames Research Center · Moffett Field · California 94035

ROCKRISE
ODERMATT
MOUNTJOY
ASSOCIATES
ARCHITECTURE URBAN DESIGN LAND PLANNING
GEORGE T. ROCKRISE, FAIA, AIP, ASLA ROBERT A. ODERMATT, AIA ROBERT C. MOUNTJOY, AIA

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Copy Number 149

July 27, 1981

C.A. Syvertson, Director
National Aeronautics and Space Administration
Ames Research Center
Moffett Field, California 94035

Dear Mr. Syvertson:

We are pleased to transmit herewith the fourth updating of the Facilities Master Plan for Ames Research Center. Since the publication of the first Master Plan in 1966, Ames has participated in many scientific achievements and seen many changes in national goals and priorities. Just as Ames has developed the capabilities to meet the challenges of the nation's changing goals, so must its Master Plan provide a flexible guideline for planning that can remain responsive through time to variations and changes in Ames' planning goals.

In this year of severe budgetary cuts in all national programs, there may be a tendency to be unduly pessimistic for the future. The thrust of this current plan is to maintain the continuity of time-tested ideas from prior plans and incorporate a "realistic" prediction of future events, without abandoning the visionary outlook so essential to a research center.

It has been our objective, with your help, to establish a flexible planning framework that can readily respond to change and at the same time serve as a day-to-day working tool for decision-making. Only time and your commitment to the implementation of the objectives of the plan will determine the effectiveness of our joint efforts.

Again, we wish to express our appreciation to all of you at Ames that participated and contributed so significantly to this current updating. Particular thanks to the members of the Ames Facilities Planning Board and the Ames Facilities Review Board for their insight and guidance, and to George Holdaway for his thorough and painstaking efforts to coordinate all of the participants and data required to make this a substantial document.

Through our long association we have been privileged to participate in many decisions affecting the direction of planning at Ames Research Center; we have also felt involved in your many other accomplishments in the scientific community through this association. We thank you for that opportunity.

Sincerely,

Robert C. Mountjoy

Robert C. Mountjoy

ROCKRISE ODERMATT MOUNTJOY ASSOCIATES

APPROVED:

C.A. Syvertson

C.A. Syvertson, Director
National Aeronautics and Space Administration
Ames Research Center

Date: July 27, 1981

Table of Contents

• Indicates graphics

1 Introduction

PURPOSE

During an early period of rapid growth at NASA installations throughout the country, the need for long-range planning for future facilities was obvious. In recent years there has been a shortage of federal funds and construction has been limited to the most essential facilities. Under these circumstances, planning assumes a greater importance by ensuring that funds are spent for the most worthwhile new facilities, that full use is made of existing facilities, and that modifications to existing facilities are made without limiting the long-range flexibility of the Center.

Ames primary goal in master planning is to identify facility and land requirements, and to provide sufficient flexibility to permit the shifting of Ames' special talents for a wide variety of opportunities and problems as National objectives change.

Ames Research Center published its last facilities master plan in May of 1976. Consistent with existing NASA policy of updating the Master Plan about every three years, the present document has been prepared.

PLANNING ORGANIZATION AND RESPONSIBILITY

The Directorate of Research Support has basic responsibility to organize, direct and control the planning activities for facilities budgets and facilities construction for the whole of Ames Research Center. As a result, overall responsibility for preparation and continuing review of the Master Plan is also assigned to this office. However, the close involvement of each organizational Directorate is essential to make the Master Plan truly representative of the requirements of the total Center.

The basic organization of Ames Research Center is outlined by the Organization Chart on page 2.1. The Directorate and Division responsible for updating of the Ames Facilities Master Plan and Facilities Utilization Reports are shaded.

The Research Facilities and Instrumentation Division plays a major role in the planning, budgeting and use of construction resources. Primary responsibility for development and modifications to the Master Plan is assigned to the Facilities Planning Office of this Division. Division staff contribute engineering, cost estimating and architectural expertise to the planning effort. This staff also provides technical supervision of all contracts for Preliminary Engineering Reports and for final design of facilities. Information on individual future facility requirements is supplied by the technical staff of the various research directorates.

The first Master Planning Board was established on June 24, 1966, and similar boards have functioned through the middle of 1980. The organization of the planning/review activities has been modified to provide two boards as follows:

Facilities Planning Board (FPB)
This is a working board with meetings as required (at least 3 per year) to identify and implement Facility Planning activities, to coordinate and integrate facilities planning, to define and examine facilities planning issues, and to resolve conflicts or recommend resolutions. Composition of the FPB includes the Organizational Deputy Directors (Chairman, Deputy Director of Research Support), the Institutional Operations Office, the Resources Management Office, and The Facilities Planning and Utilization Officer — Secretary, the A&E Contractor (Non-voting), and other ex officio representatives as required.

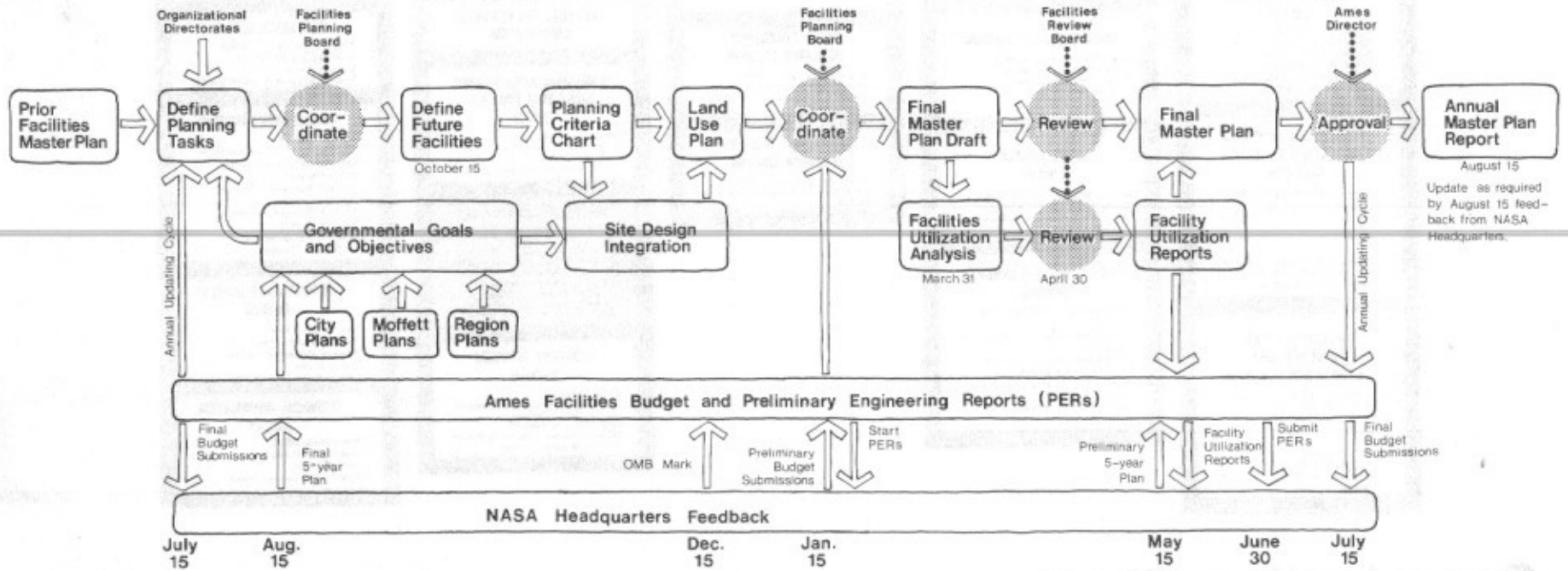
Facilities Review Board (FRB)
This is a review board of senior management with a formal review once a year and informal reviews as required, to approve or redirect all facilities planning and management activities. The FRB is composed of the Center Associate Director (Chairman Ex Officio), all Organizational Directors, Facilities Planning and Utilization Officer (Secretary, non-voting) and other Ex Officio as required.

The Center Director establishes final priorities and strategies with final approval, veto or redirection of all facilities planning and management activities.

APPROACH

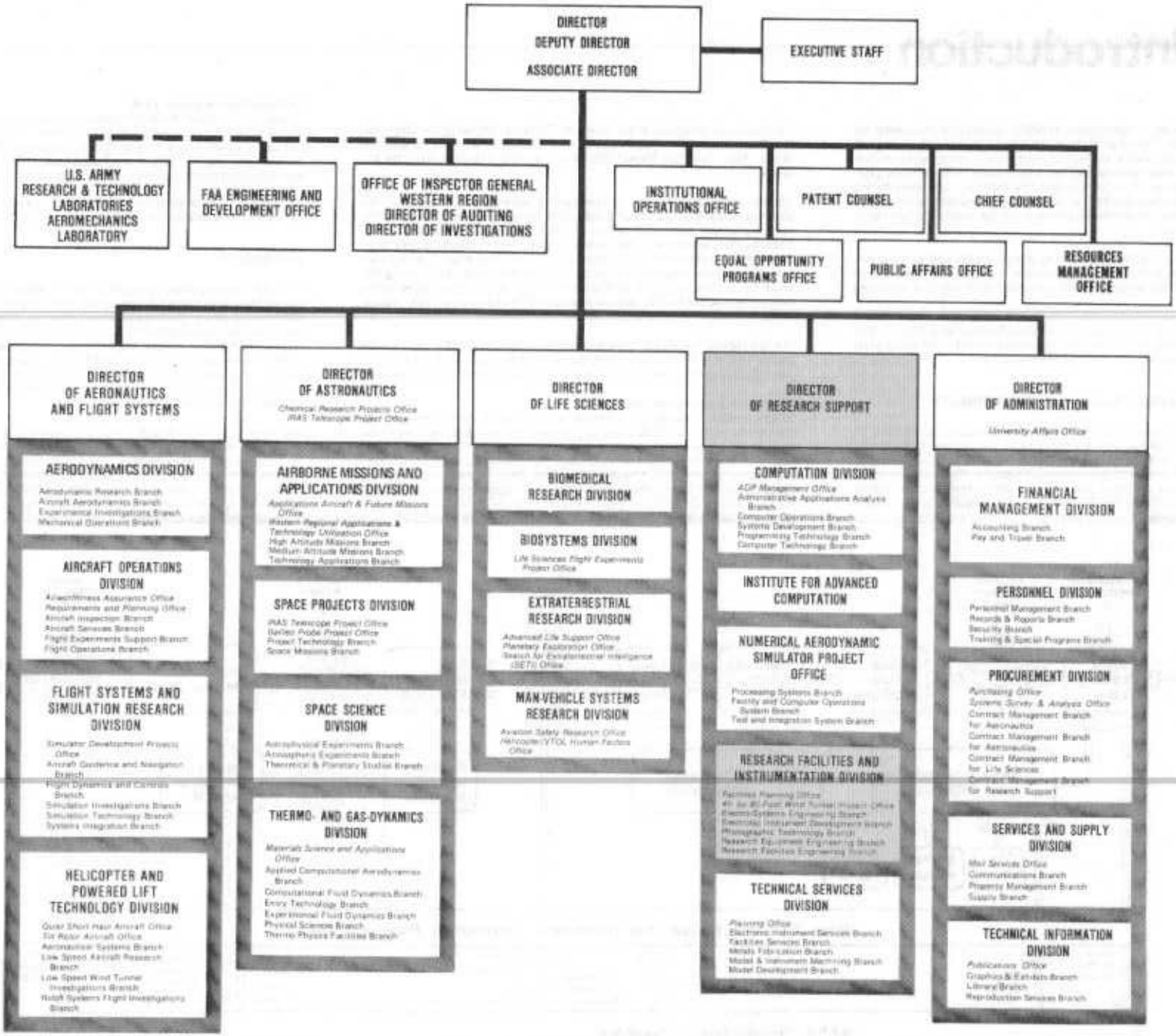
To assist the responsible organizations and individuals in the preparation of the Master Plan, Ames originally contracted with the San Francisco architectural and planning firm of Rockrise Odermatt Mountjoy Amis (now Rockrise Odermatt Mountjoy Associates) in August of 1965. This firm has again been selected by Ames to produce this fourth complete updating. The format of this updating is similar to the last plan, but the planning approach has been refined by Center experience with previous updatings and with greater emphasis upon input from Organizational Directorates, implementation methods, and annual updating of basic planning documents.

The Planning Process Diagram below indicates the steps required to develop the Master Plan. It is clear from the diagram that continuous input and criticism from responsible Ames individuals and organizations is an inherent part of the process. Although the diagram is presented in a linear fashion, note that the planning process is one of cyclical action and reaction. The Master Plan is constantly reassessed and annually reviewed against a changing matrix of goals, objectives and constraints.



Master Plan Updating and Planning Process Diagram

1.2



2.1

Organization Chart

2 Mission and Capabilities

MISSION AND CAPABILITIES

The programs of Ames Research Center are directed towards research and development of new aerospace technology. This technology primarily supports space exploration efforts and improves the safety and performance of aircraft. Additionally, this research often benefits civil problems ranging from biomedicine and environmental pollution to urban planning and transportation.

Current areas of research include: short haul aircraft technology, flight simulation, theoretical and experimental fluid mechanics, planetary atmospheres, airborne science and applications, and human-factors technology for aircraft and space vehicles.

The variety of individuals and facilities gives Ames Research Center a broad range of capabilities. The adjacent Organization Chart shows each Branch of specialized expertise linked to an interconnected network of Division and Directorate heads. This overriding structure enables Division and Directorate management to readily coordinate separate areas of expertise in response to shifts in program or emphasis. Related to this flexible manpower management ability is the opportunity to utilize a wide variety of facilities at Ames. An appreciation of this variety can be seen from the Existing Facility Tabulations on pages 7.5 to 7.10.

Also housed at the ARC are the Headquarters and the Aeromechanics Laboratory of the U.S. Army Research and Technology Laboratories. Army researchers, work in close cooperation with NASA personnel on programs of mutual interest, primarily in the field of rotorcraft technology.

AERONAUTICS AND FLIGHT SYSTEMS

The **mission** of this Directorate is to develop and demonstrate technology for advanced aircraft by conducting research in aerodynamics, flight dynamics, guidance and control.

The **capabilities** of the Aeronautics Directorate result from a diverse array of facilities: Subsonic to supersonic wind tunnels, flight simulators, research aircraft, and supporting laboratories.

Current programs center about the conduct of research and the development of technology for short haul aircraft including rotorcraft and vertical and short take-off and landing aircraft (VSTOL). In addition, due to the unique capabilities of facilities and personnel, the Directorate conducts investigations for civil and military aircraft development, weapons development, aviation safety, and Space Shuttle support.

Short haul aircraft research ranges from conceptual design through wind tunnel testing, to flight simulation to flight testing on research aircraft. The major experimental aircraft for aeronautical research are: the Rotor Systems Research Aircraft (RSRA), the Tilt Rotor Research Aircraft, and the Quiet Short Haul Research Aircraft (QSRA). The 40- by 80-Foot/ 80- by 120-Foot Wind Tunnel provides a unique capability for large scale rotorcraft and VSTOL testing. High speed wind tunnels, which include the Unitary Plan Wind Tunnels and the 12-foot Pressure Wind Tunnel, offer test capabilities that exist nowhere else in the country for investigating aerodynamics of advanced civil and military aircraft at speeds up to M3.5. The Flight Simulator for Advanced Aircraft (FSAA) and the Vertical Motion Simulator (VMS) produce in-flight conditions on the ground to allow realistic evaluation of advanced aircraft configurations, guidance and control concepts, and certification criteria for rotorcraft and other aircraft.

Basic research is also being pursued vigorously to advance the state of the art of aeronautical disciplines to support the development of advanced aircraft.

Future projects include enhancement of technology programs in rotorcraft and other VSTOL aircraft. At the same time technical capabilities and productivity of the facilities will be improved to meet the challenging new requirements and usage demand.

ASTRONAUTICS

The **mission** of the Astronautics Directorate includes roles in computational fluid dynamics; airborne research and applications; planetary probes; planetary mission operations and data analysis; and astronomical observation techniques.

The **capabilities** of this Directorate are numerous and diverse. Of note are the special facilities used to carry out its mission: arc jets, ballistic ranges, wind tunnels, and fire test facilities, to name a few. In addition, the directorate operates uniquely equipped airborne laboratories to serve as flying instrument platforms for use by scientists from all over the world to study the Earth, its atmosphere, and the heavens.

Current programs include the control of the still active Pioneer series of spacecraft, development of the telescope for IRAS (Infrared Astronomical Satellite), management of the probe and three Galileo probe experiments. Expertise in detectors and cryogenics is used to make infrared astronomy observations from airborne-spaceborne platforms which avoid obscuration caused by the Earth's atmosphere.

In addition to these space project tasks, a major effort is directed toward computational work in fluid dynamics and chemistry, with immediate applicability to the Space Shuttle aerothermodynamics, more efficient aircraft design, and studies of planetary atmospheres and climate. Research studies are being conducted in a broad area of polymer chemistry in order to enhance fire safety and improve human survivability in civil and military aircraft.

Computer modeling of the stratosphere is being performed to understand the unperturbed stratosphere and to predict the effects of various pollutants, such as aircraft emissions and flourocarbons, and those emitted by nature; for example, from volcanic eruptions.

Looking toward **future projects,** the Directorate is commencing design studies for the Shuttle Infrared Telescope Facility (SIRTF), and likely will develop and manage this new and exciting, large cryogenically-cooled instrument to be launched in the late 1980's.

LIFE SCIENCES

The **mission** of Life Sciences is to understand the origin of life on earth through the study of the underlying chemical events, to understand the effects of space flight upon humans and other life forms, and to provide environments, equipment and procedures in spacecraft and aircraft that will permit crews and passengers to exist safely and perform effectively.

Directorate **capabilities** are best described in terms of the research activities pursued. Biomedical research studies include a broad integrated investigation of human limits of adjustment to the environmental conditions of space flight, and development of remedial measures to assure the well-being of crewmembers and passengers. Planetary biology seeks to understand the origin and early evolution of life and life-related chemicals on earth and throughout the Universe, through systematic chemical and biological research. Aviation human-factors research activities will provide the technology base for solutions of human problems impeding the growth and safety of air transportation.

Current programs include management and support of all biomedical and biological investigations aboard Spacelab that use animal and plant specimens. The Directorate participates in the Soviet Cosmos Program, which also uses animal and plant specimens to investigate the effects of weightlessness on various biological systems. In the area of Aeronautical Life Sciences, research is directed toward identifying and resolving human factors operating problems in the current aeronautical environment, in developing technology and procedures for application in the future, and in developing effective flight simulation techniques for research and training. The National Aviation Safety Reporting System provides a data base for these activities.

A **future project** is the development of the capability to simulate full aeronautical missions, including air traffic control, in order to study and resolve human factors problems. Another future project is the development of a complete life support system for use in long-duration manned space missions.

RESEARCH SUPPORT

The **mission** of the Research Support Directorate is to provide a broad based technical capability through computation, instrumentation, engineering design, construction monitoring, manufacturing, and facility maintenance services to support the Center in pursuing its goals of contributing to the nation's world leadership in aeronautics, space, and related fields. Included in this task is the responsibility for the development and implementation of the facilities planning for Ames Research Center, as outlined in Section 1.

A major **capability** of this Directorate is the Central Computer Facility, which includes the ILLIAC-IV supercomputer, Control Data 7600, and other large systems. The Directorate also develops technologies for new research facilities and carries out the design and construction of these facilities. Unique in-house fabrication shops are also operated by this Directorate.

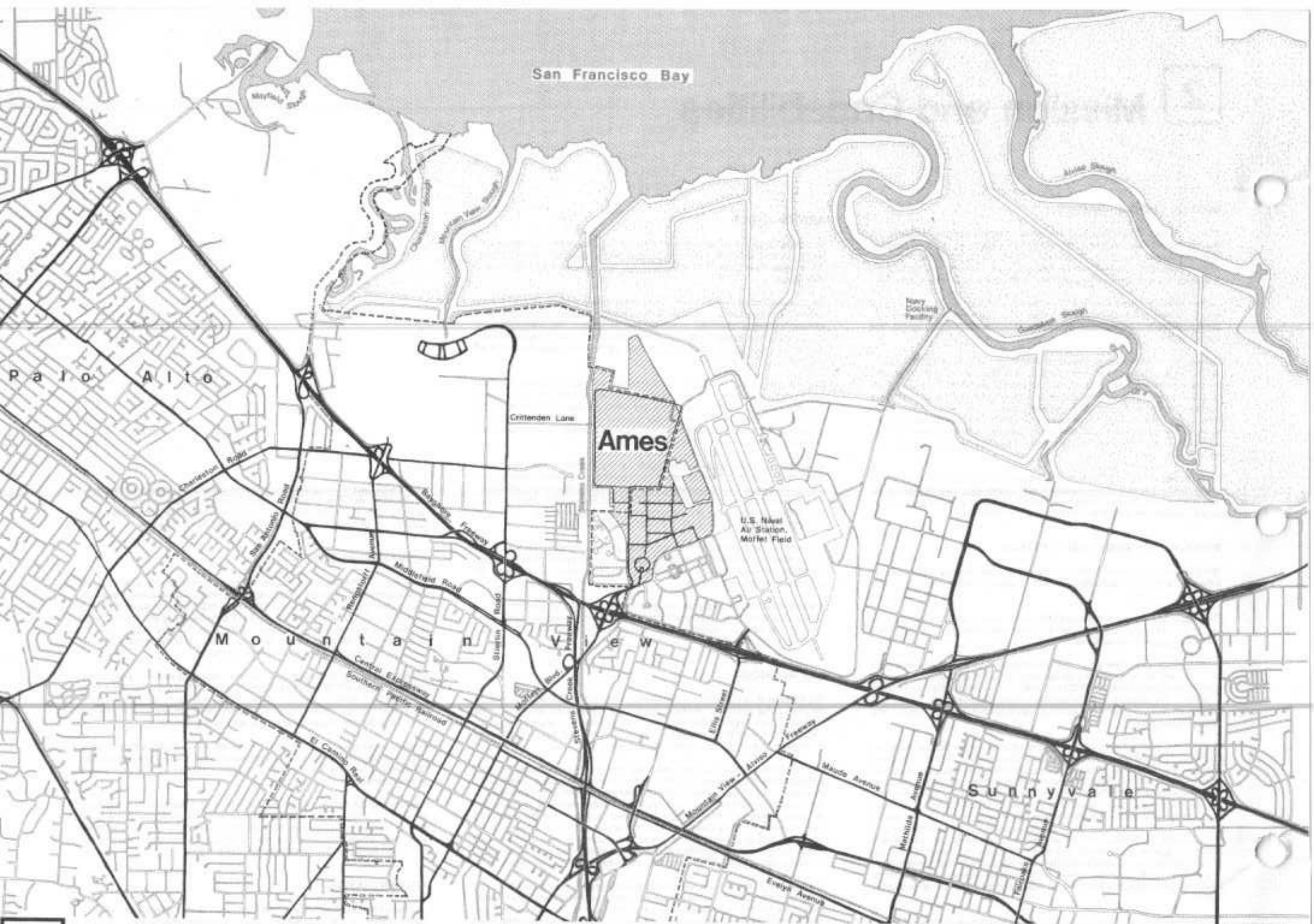
Current programs include modification of the 40- x 80-Foot Wind Tunnel, which will increase test speeds to 300 knots and add a new test section of 80 x 120 feet. The facility will enable full-scale testing of rotorcraft and large models of other aircraft.

Future projects include design and fabrication of a Numerical Aerodynamic Simulator, a unique large-scale, high-performance computational resource for solving viscous three-dimensional fluid flow equations at a speed 40 times faster than the largest computers now available. Depending on funding approval, this facility will be operational in October 1986.

ADMINISTRATION

The **mission** of Administration is to perform most of the business and administrative service functions that support Ames' day-to-day operations.

Capabilities of the Directorate include all of the purchasing, financial management, personnel management, supply and property management, communications, budgeting and resources control, printing and publishing for a research and development organization comprised of about 3,500 people with an annual budget of approximately $250 million.



3.1 Vicinity Map

Mountain View City Limit

0 500 2000 4000 8000 feet
0 152 610 1219 2438 meters

north

3 Installation Description

GEOGRAPHIC LOCATION

Ames Research Center is located on the northerly part of the Santa Clara Valley floor at the south end of San Francisco Bay. San Francisco is 56 kilometers (35 miles) to the northwest and San Jose is 16 kilometers (10 miles) to the southeast. The City of Mountain View is contiguous to Ames Research Center on the west and the U.S. Naval Air Station, Moffett Field, is contiguous to the south and east. In general, unincorporated Santa Clara County lands lie north of the Ames property. U.S. Highway 101 (Bayshore Freeway), immediately south of Ames, provides the primary vehicular access to Ames and Moffett Field.

HISTORY

The history of the Santa Clara Valley over the past several thousand years has seen four sequential cultures: Indian, Spanish, Mexican and American. Farming activity and subsequent filling, excavation and construction during the past 100 years have disturbed most evidence of prior historic periods. However, some Indian and early American remains still exist within the boundaries of Ames. As a result, arrangements were made for scientific evaluation of these finds by archaeologists from Stanford University. Section 12 of this report contains references for greater detail regarding Ames pre-history.

Aside from farming activity, the land surrounding Ames Research Center first began to develop in 1933 as a dirigible field for the Navy. Hangar I, the largest and oldest aircraft shelter at Moffett Field, originally housed the huge lighter-than-air ships that were the first tenants of the station. The hangar which covers 8 acres and is nearly 60 meters (200 feet) high remains a Bay Area landmark to this day, due to its predominance in the skyline and its unusual shape. Moffett Field was transferred to the Army for a while and returned to Navy use during World War II. It remains in use by the Navy today as the center of the Navy's antisubmarine force in the Pacific.

On land adjacent to Moffett Field, Ames Research Center was established by Congress on August 9, 1939 as the second research center of the National Advisory Committee for Aeronautics (NACA). The Center was named after Dr. Joseph S. Ames, who was a Committee member from 1915 until 1939 and served as its chairman from 1927 until 1939. Construction of the first permanent building, the "Flight Research Laboratory" began in February 1940, was completed in August 1940, and is now named the Flight Simulation Laboratory (N-210).

Ames Research Center's original purpose was clearcut and urgent — develop technology to help win World War II. Initially, the primary mission was to study aerodynamic problems of aircraft operating at high subsonic speeds. Although subsequent years called for continued military preparedness through advanced technology, there also emerged a growing role of Ames in supporting applications of technology for civilian use. The success of many contributions of Ames-type research to the economic strength and well-being of the nation is exemplified in civil aeronautics. Currently, 80% of all civil airplanes flying throughout the world are of U.S. manufacture.

The National Aeronautics and Space Administration (NASA) was established by Congress on October 1, 1958, as part of the Executive Branch of the U.S. Government, with primary responsibility for the exploration of space for peaceful purposes and for research in aeronautics. The National Advisory Committee for Aeronautics became the nucleus of the new civilian agency. In 1958, in common with other NACA centers, Ames Research Center became a field laboratory of NASA.

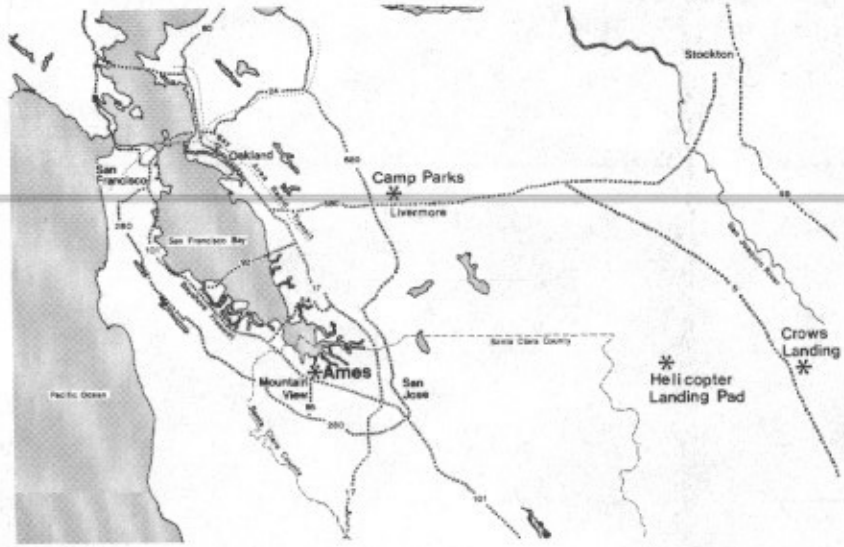
When the space age began in the late fifties, spacecraft were developed from aeronautical technology. Space vehicles required strong, lightweight structures similar to aircraft, and their design relied heavily upon the understanding of the theory and applications of fluid mechanics. As a consequence, expertise in fluid mechanics and aerodynamics, concentrated at Ames Research Center, was invaluable to the new space agency. For example, Ames scientists and engineers have developed the wingless lifting body that will enable astronauts to re-enter the earth's atmosphere and guide the spacecraft to a ground landing, instead of requiring the ocean free-falls of the early space program. This concept is being put to use in the Space Shuttle program.

Dr. Smith J. DeFrance was the first Director of Ames until his retirement in October 1965. Mr. H. Julian Allen became the second Director and served until late 1968. Dr. Hans Mark became the Director in February 1969, and served until May 1977 when he accepted a high level appointment in the Department of Defense. In April 1978, Mr. Clarence A. Syvertson became the fourth Director of Ames Research Center. Mr. Syvertson joined the Ames staff as a researcher over thirty years ago and has served in several research and management positions. Most recently, Mr. Syvertson held the position of Deputy Director for nine years. Mr. Syvertson is a fellow of the American Institute of Aeronautics and Astronautics and has been the recipient of several honor awards for his contributions to the advancement of aeronautical and space research.

The initial criteria used in in the selection of a site for Ames Research Center remain valid today. Electrical power was abundant and inexpensive. Although power costs have increased significantly, rates affecting Ames are still lower than in many parts of the country and regional capacity is greater than in most other locations. Favorable flying weather prevails essentially year-round. The proximity of three major universities, Stanford University, University of Santa Clara and the University of California, were important criteria to the Ames location. Ames' ongoing interaction with these institutions has increased significantly in recent years. (See Santa Clara County map, page 4.8)

National Map

0 205 410 820 miles
0 329.8 659.7 1319.4 kilometers



Regional Map

0 5 10 20 miles
0 8.04 16.09 32.18 kilometers

3.2

3.3 Grouping of Existing Research Facilities

FACILITY DESCRIPTION

The Ames Research Center occupies about 430 acres of land and has a facility value in excess of 560 million dollars and an estimated replacement value of over 1.7 billion dollars (March 1981). The locations and identification of the major existing facilities at Ames are shown on the map on page 7.3 Section 7 contains a detailed tabulation of information about each of these facilities.

In general, the physical plant of Ames comprises many specialized and unique facilities for aerospace research in the categories of physical science, space science and life science, all of which are included in the mission of the Center. Any facility could be described by one of three characteristics: functional utilization, type of construction and physical configuration.

Functional characteristics are distinguished at Ames by two major types: program-oriented facilities and institutional-support type facilities. Program-oriented structures include a variety of wind tunnels, covering the speed range from subsonic to hypersonic, motion-based flight simulators, atmosphere-entry heat simulators, advanced digital computation systems, free-flight ballistic test facilities and experimental aircraft for flight research. Additionally, Ames has a wide range of well-equipped ground-based and airborne laboratories for the study of solar and geophysical phenomena, life synthesis, life detection and life environmental factors.

In addition to these special purpose facilities, Ames also has the normal support type facilities such as office buildings, cafeteria, warehouses, utility substations and distribution systems, maintenance facilities, roads, walks, parking and recreational facilities that are essential to the effective operation of any large technical installation.

The construction classification of facilities at Ames relates to their degree of permanency and the materials used for the structural frame. **Permanent** facilities are those utilizing materials and construction methods appropriate to a building life-span of 25 years. Nearly all facilities at Ames are permanent buildings constructed of reinforced concrete or steel frame in conjunction with precast concrete wall panels, special insulated metal siding, or various combinations of these materials. **Semipermanent** construction incorporates the use of materials and construction methods suitable for a 15 year duration. The two semi-permanent buildings at Ames are constructed of a combination of concrete and wood. One steel-frame and sheet metal clad building and a number of relocatable units (trailers and portable buildings) are typical of the few **temporary** facilities existing at Ames. Construction of these structures embodies the use of materials and construction methods appropriate to a 5 year building life. Relocatable units will be phased-out as permanent structures become available.

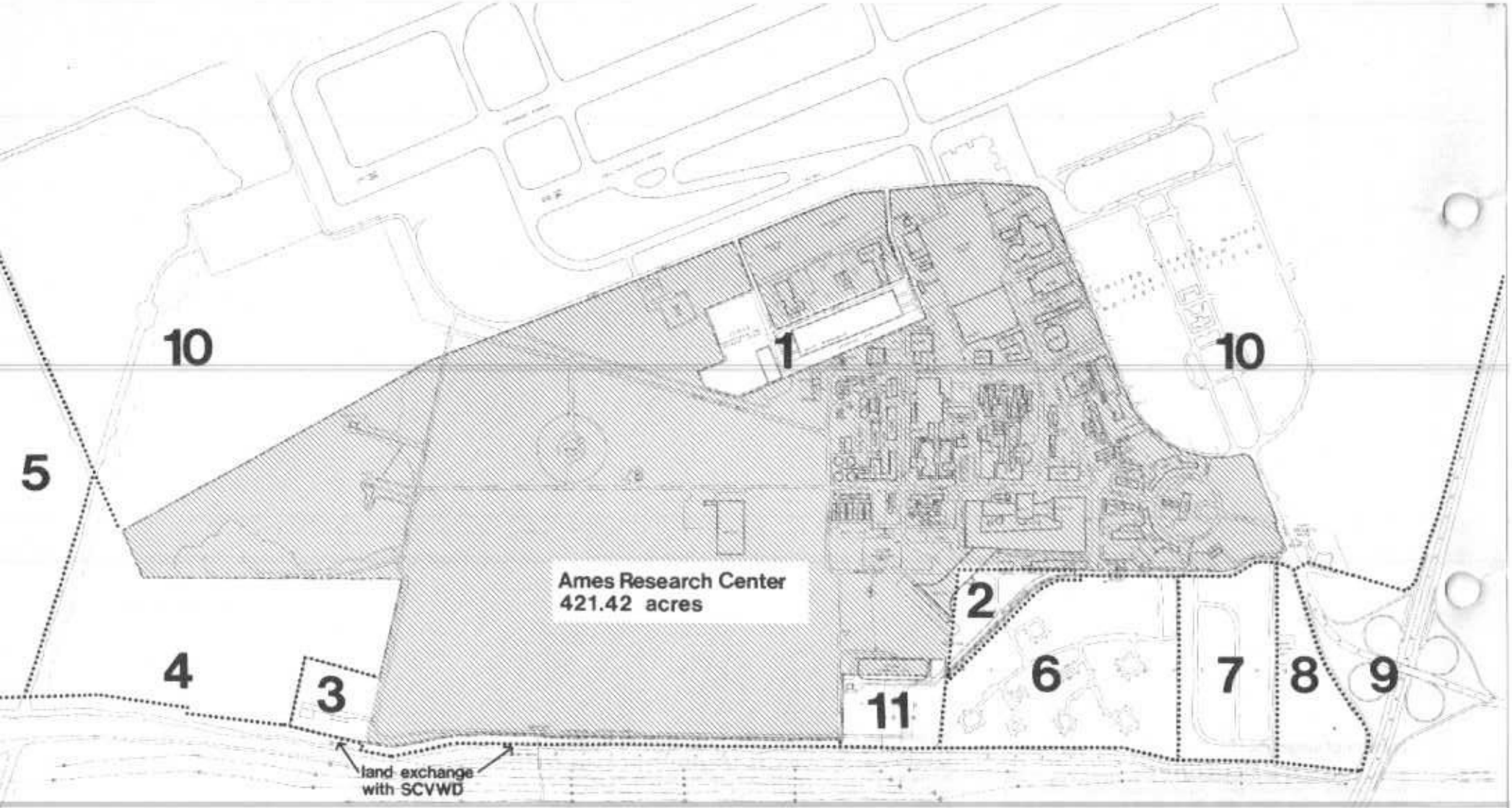
The third descriptive chracteristic of any Ames facility relates to the physical configuration required to satisfy its functional requirement. The wide variety of wind tunnels and pressure vessels are visually dominant and easily identified by their unique size, configuration and method of construction. Most high-bay laboratories and simulators are windowless and enclosed by concrete walls. Office spaces or integrated office-laboratory facilities are typically housed in one, two or three-story, rectangular buildings, enclosed by concrete walls with windows for natural illumination. Many facilities at Ames are of a "low-physical profile" nature, such as underground storage tanks and small, remote research and test structures requiring large areas of open space around them for test isolation or personnel safety clearance. Similarly, V/STOL research operations require runway and ramp areas, with very little structure. Larger aircraft runways are part of the Naval Air Station but are used by Ames and provide a great deal of open space to one edge of the Ames complex.

FACILITY VALUE

The following is a summary of the physical plant value of Ames Research Center as of December 31, 1960:

Category	Ames	Camp Parks	Crows Landing	Total
Land	$ 2,927,000	$ 1,000	$ —	$ 2,928,000
Buildings	212,470,000	567,000	212,000	213,249,000
Structures	10,023,000	86,000	246,000	10,355,000
Equipment	209,513,000	—	—	209,513,000
Construction in Progress	103,298,000	—	—	103,298,000
	$538,231,000	$654,000	$458,000	$539,343,000

The indicated land value is low because land transferred to NASA from the U.S. War Department and later from the U.S. Navy was based on accumulated costs which were always lower than actual or appraised values. In addition about $12,651,000 of NASA equipment and special test apparatus are held by contractors and grantees.



1 United States Navy
16.6 acres

2 United States Navy (Ames by use agreement)
6.96 acres

3 Santa Clara Valley Water District (SCVWD)
6.29 acres (Exchange for 4.21 acres)

4 Midpeninsula Regional Open Space District
53.9 acres

5 Leslie Salt Company
290.59 acres

6 United States Navy
41.73 acres

7 United States Navy
22.0 acres

8 United States Navy
13.02 acres

9 State of California

10 United States Navy

11 Pacific Gas & Electric Company
8.687 acres

Acres occupied:

421.42	Ames
2.08	SCVWD land exchange (3)
6.96	Use agreement, U.S.N. (2)
430.46	Total

3.5 **Property Map**

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

REAL ESTATE HOLDINGS

The Property Map on the adjacent page indicates Ames' current real estate holdings as well as the ownership and acreage of adjacent properties. The Historic Growth Diagrams on this page portray the sequence of parcel accumulation experienced by Ames from its inception to the present plan.

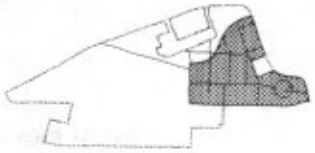
Several recent real estate transactions, negotiated since the last Master Plan update, affect the development of the Center. The land exchange with Pacific Gas & Electric Co. (indicated on the 1978 growth diagram) and a land use agreement with the Navy (Parcel 2 shown on page 3.5) has permitted Ames to begin construction of an 80-by 120-foot test section addition to the existing 40-by 80-foot Wind Tunnel.

Similarly, a land exchange with the Santa Clara Valley Water District (SCVWD) conducted through the General Services Administration (GSA) (shown as the 1981 growth diagram) will facilitate a long-range dike improvement and flood control program by SCVWD along Stevens Creek and provide Ames with a 6.29 acre parcel of land at the northwest corner of Ames' present site for use as a fire test and storage area.

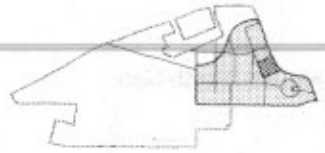
There are no encumbrances on the existing property other than easements granted to the Pacific Gas & Electric Company for gas transmission pipelines and electrical lines and to the City of Mountain View for a sewer main.

In addition to the Mountain View site, Ames owns approximately 8 acres of land at Camp Parks, a former Army installation near Mt. Pleasanton which is about 60 kilometers (37 highway miles) from Mountain View. This includes an 11,148 square meter (120,000 square foot) warehouse used for research equipment dead storage, storage of space and aeronautic exhibits, and for warehousing of replacement parts for Ames' aircraft. One-third of the warehouse is shared by the U.S. Department of Energy by use agreement.

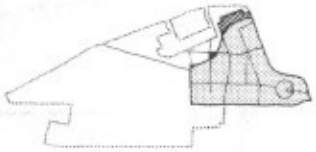
Research and development of aircraft operations, including joint NASA-FAA experiments for V/STOL, transport aircraft and air traffic control, is conducted by Ames through a use agreement with the Navy at Crows Landing. It is a Navy auxiliary landing field, located near the Town of Patterson, approximately 145 kilometers (90 highway miles) from Mountain View. Additionally, a helicopter landing pad is utilized on a former Navy bombing range at a remote site 23 kilometers (14 miles) west of Crows Landing. These outlying sites are shown on the Regional Map on page 3.2.



1939 101.37 Acres
United States War Department & Private Parties

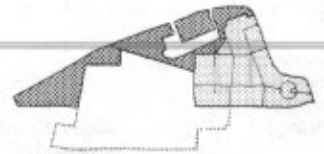


1943 5.80 Acres
United States Navy

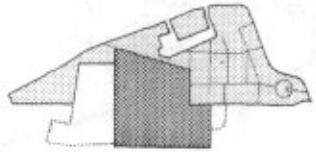


1951 5.30 Acres
United States Navy

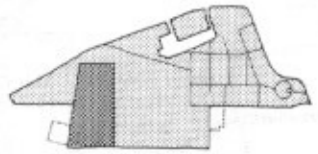
1958 2.50 Acres
United States Navy



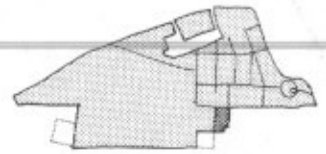
1964 110.73 Acres
United States Navy



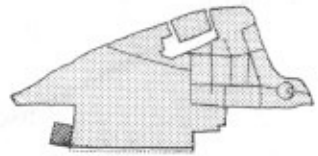
1967 139.83 Acres
General Services Administration



1973 55.5 Acres
General Services Administration

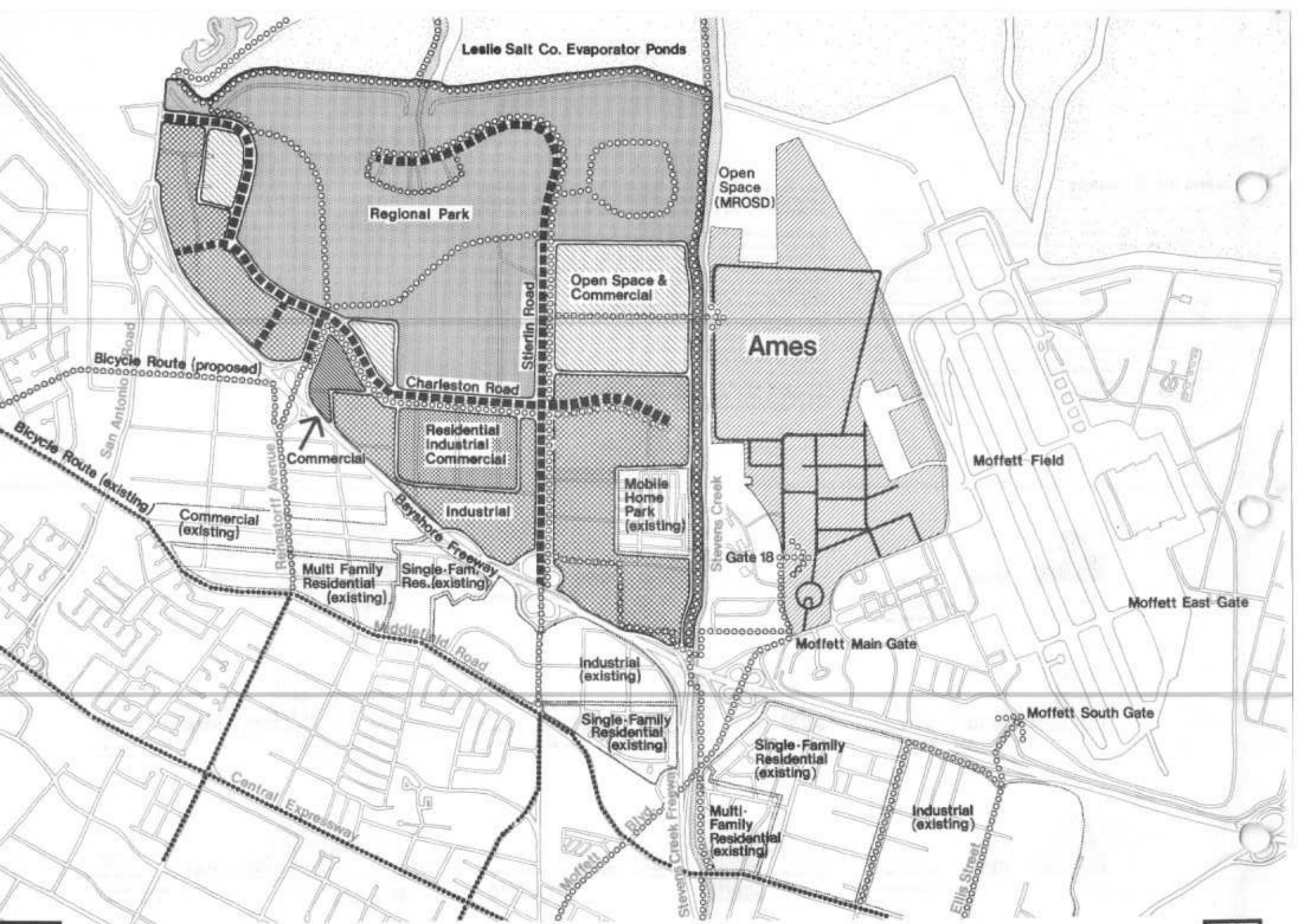


1978 Land Exchange 0.00 Acres
General Services Administration



1981 Land Exchange Net Gain: 2.08 Acres
General Services Administration

Historic Growth Diagrams



4.1 Community Map

4 Regional & Area Data

ADJACENT LAND USE

In general, the Ames-Moffett Field complex lies between and is surrounded by the cities of Mountain View and Sunnyvale. Ames Research Center and the western portion of Moffett Field are related to the City of Mountain View. The eastern portion of Moffett Field is generally oriented to the City of Sunnyvale because of its present activities east of the runway and its proximity to the Lockheed Missiles and Space Company of Sunnyvale.

The "North Bayshore Area Plan" adopted in 1977 by the Mountain View City Council, outlines the goals for the land west of Ames and north of the Bayshore Freeway, and is shown on the Community Map on page 4.1. Of the approximately 1500 acres of incorporated lands in the North Bayshore Area, about 45% is presently in public ownership and devoted to the development of a Shoreline Regional Park by the City of Mountain View. It is proposed that park visitors will have access to the salt evaporator ponds and San Francisco Bay to the north of Ames. South of the Park are roughly 800 acres of land proposed by the City of Mountain View to have a mixture of uses.

The Plan provides for a strip of approximately 350 acres adjacent to Bayshore Freeway for industrial facilities and corporate offices to be developed over the next 15 years in a park setting compatible with the Shoreline Regional Park. A 13 acre parcel at the northeast quadrant of the Rengstorff-Bayshore interchange is indicated on the Plan as commercial land use. This location near the Park is intended for hotel-motel purposes serving visitors in the area utilizing recreation facilities provided by the Park. Additionally, restaurants, conference facilities and other support activities would serve both the hotel-motel complex and the adjacent industrial and residential areas. A 70 acre parcel, southwest of the Stierlin-Charleston Road intersection is designated as mixed use: residential-industrial-commercial. The intention here is to integrate traditional single-family housing with small "home occupation" businesses. The existing 37 acre mobile home park will be allowed to remain because it provides an inexpensive, comfortable residential environment for low income and elderly groups. The remaining 320 acres located between the Shoreline Regional Park and the mixed-use area are assigned to open space uses, essentially agriculture, interspersed with some commerical recreation uses.

On the north-east boundary of Ames the Mid-Peninsula Regional Open Space District (MROSD) has recently acquired about 54 acres of wetlands adjacent to Stevens Creek as a marshland preserve. Between San Francisco Bay, the northern boundary of MROSD and the Navy are the salt evaporator ponds owned by the Leslie Salt Company. It is anticipated that these ponds will continue in operation for the foreseeable future.

Existing land uses east of Ames are fairly well established as aircraft runways, taxi-ways and approach zones for Moffett Field. It is not anticipated that these uses will change radically in the foreseeable future, and flight/building height restriction must be recognized for future Ames' facilities near this area.

The Bayshore Freeway separates Ames Research Center from the City of Mountain View to the south. The City is generally residential in character, with a commercial-institutional core and an area of industrial use generally bordering the Bayshore Freeway.

Present and future land uses in the Mountain View area appear to be compatible with the proposed facilities program of Ames. Continued close cooperation with Ames' neighbors should insure benefits to all parties.

ZONING

All of the incorporated land in the North Bayshore Area of Mountain View was zoned for industry in 1964. This provided an inventory of 1260 acres of industrially-zoned land for the future. Subsequently, in 1968, the demand for industrial land was re-evaluated and it was determined that only 350 acres would be required, and the Mountian View General Plan was revised to recommend this reduction.

In 1972, consistent with the adoption of the General Plan amendment for the North Bayshore Area described above, an "Industrial-Open Space Plan" was developed. Since that time, a "North Bayshore Area Plan" has been adopted by the Mountain View City Council and the Shoreline Regional Park Community Board. Its contents are described above in "Adjacent Land Use".

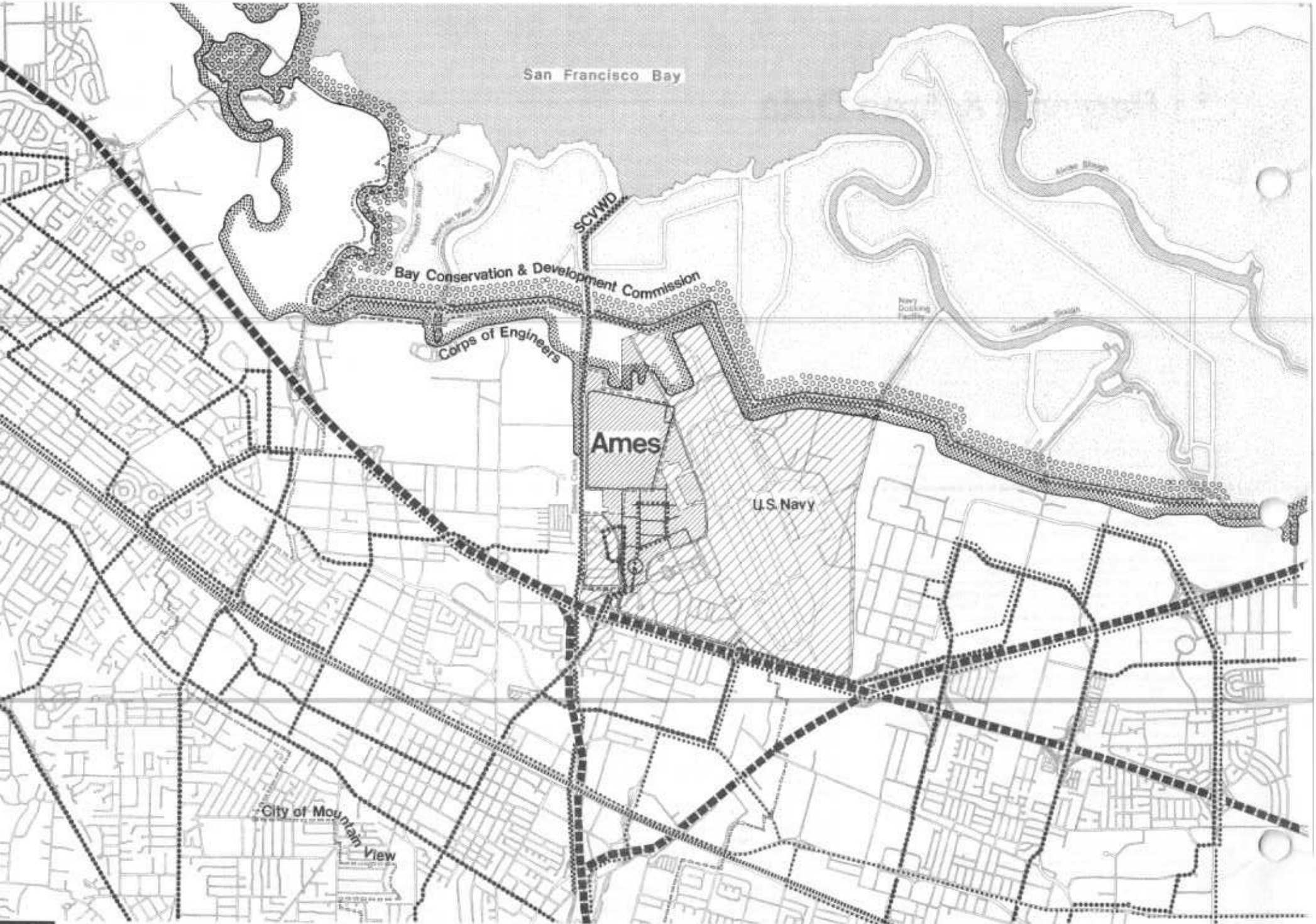
New zoning ordinances for the area are the key regulatory devices in achieving the policies of the Plan. Zoning for various parcels was derived from the limitations and potentials of each specific area. Existing zoning for the area is consistent with the Plan and with the staging and transition required to achieve the quality of development desired. Special zones have been created for the industrial area and the commercial area. A new zone has also been created for the combined open space and commercial activities. To date, one major land parcel in the North Bayshore Area has begun development and the city has adopted detailed zoning regulations to integrate it with the surrounding open space area.

EXPANSION

One of the purposes of the Master Plan since 1966 has been to anticipate future land needs for Ames Research Center. Presently, Ames has relatively underdeveloped space to the north, roughly twice as large as the existing developed area. Tabulation and analysis of proposed future land uses and facilities provides an indication of the amount of land required for proper development. This is discussed in detail in Sections 6 and 7.

The Warehouse and Storage Area (Parcel 1 on the Property Map — page 3.5) now exists under U.S. Navy jurisdiction as an island of approximately 16.6 acres in the surrounding Ames property. In 1968 this warehouse was planned to become available for Ames use; however, subsequent policy changes precluded acquisition of the warehouse and Ames has satisfied its present storage needs by the construction of a Supply Support Facility. However, to satisfy possible future research and development requirements, the Moffett warehouse might be acquired in exchange for NASA's funding the construction of a new Navy warehouse east of the runways.

Considering the current importance of missions assigned to Moffett Field, no Ames expansion is anticipated to the south, south-west or east, with the future possible exception of the Warehouse and Storage Area. The acquisiton and conversion to marshland of the property north of Ames by MROSD and current federal protection policies for "wetlands" precludes consideration of expansion of facilities in that direction; however, for safety reasons, Ames may consider acquiring the corner of this wetland within the secondary safety clearance zone of the Static Test Area (shown on the Land Use Map, page 6.1).



4.3

Planning Influences

S.C CO. TRANSIT:
Bus Routes
Express Bus Routes

CALTRANS:
Commuter Rail
Freeway

0 500 2000 4000 8000 feet
0 152 610 1219 2438 meters

north

LOCAL AND REGIONAL PLANNING

As concern over the environment has increased in recent years, federal, regional (Bay Area), and municipal planning groups have increased their influence over construction and development activities.

The adjacent Zones of Planning Influence Map indicates many of the planning groups which affect Ames. It can be seen that Ames Research Center and the areas surrouding it exist in a complex network of overlapping jurisdictions and environmental parameters. A description of each major group and its relationship to Ames follows:

Federal:

- **Environmental Protection Agency (EPA)**
  The Water Planning and Standards Branch and the Air Standards Branch review water and air quality effects prior to the construction of any governmental facility. If the proposed facility meets Federal emission standards a permit is issued. Thereafter, periodic testing of water and air quality is conducted to insure low pollutant levels.

  Two California agencies which administer separate state programs at the local level, are the California Water Quality Control Board and the Bay Area Air Pollution Control District.

- **U.S. Army Corps of Engineers**
  The regulatory program of the United States Army Corps of Engineers is aimed at preventing the obstruction of navigable waters, controlling the dumping of material into the oceans, and protecting the quality of the nation's water resources, by maintaining marshes, swamps, and environmentally valuable wetlands.

  Since the expansion of its jurisdiction in 1977, the Corps has authority to regulate all waters of the United States, primary tributaries of those waters and any contiguous or adjacent wetlands thereof.

  "Fast Land", or dry land not presently or formerly subject to tidal inundation, are not a part of the Corps' domain. A specific measure of this is the tidal line of mean higher high water, above which all land is exempt. However, **fresh** water wetlands fall within the Corps' control. These wetlands are defined as areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

  Land in the northernmost portion of Ames property as shown on the Zones of Planning Influence Map is within the Corps' control. The Corps is currently generating a list of vegetation types which may determine the extent of the fresh water wetland.

- **U.S. Navy**
  Master Planning for the Naval Air Station, Moffett Field, is accomplished under the auspices of the Western Division, Naval Facilities Engineering Command, San Bruno, California. The present Master Plan is scheduled for updating in FY 1982, and should reflect a ten-year planning cycle. No major changes in the current Master Plan are anticipated.

Regional:

- **Association of Bay Area Governments (ABAG)**
  ABAG is a council of local governments dealing with joint programs on a regional level. Membership includes 85 cities and 7 counties in the Bay Area. ABAG is the federally designated Metropolitan Clearinghouse for the Bay Area and it provides lines of communication between federal, state, regional and local agencies that deal with the issues of population change, economic growth and environmental preservation. It has developed a regional plan which provides a policy framework for land use, resource conservation, and many social services. Relative to Ames, it reviews and comments on development projects and on environmental impact statements required by law under the A-95 Circular from the Federal Office of Management and Budget.

  In early 1980 the Regional Airport Planning Committee, a joint advisory committee of ABAG and the Metropolitan Transportation Commission (MTC) submitted a revision of the Regional Airport Plan. The plan provides long-range development of air passenger, air cargo and general aviation facilities in the Bay Area. Included in the plan are mitigation proposals for ground transportation improvement, and control of noise and air pollution, such as a "noise budget", which must be met prior to major expansion. The plan suggests the possibility of designating a North Bay Airport to relieve airspace and noise problems around existing Bay Area airports. A study of the use of this airport for intrastate air service will be reviewed in the next 7-10 years.

Metropolitan Transportation Commission (MTC)
Responsibility for regional transportation planning while working closely with ABAG is the primary function of MTC. In lieu of expanded freeways, MTC wishes to maintain a philosophy of encouraging public rapid transit. The Southern Pacific Rail Line, shown on the Zones of Planning Influence Map, is scheduled for increased commute service as one peninsula transit alternative. It is fully mapped and described on page 4.6.

The Bayshore Freeway, as indicated on the adjacent map, is most directly influenced by the California Department of Transportation (Caltrans). Although current budgetary priorities have forced Caltrans into a generally "maintenance only" status, MTC's Regional Transportation Plan (1980 Revisions) and its 1979/1980 Transportation Improvement Program (TIP) propose the following minor upgrading to Bayshore Freeway in the vicinity of Ames:

(1) Auxiliary lane ramp metering from the junction with Route 17 to Moffett Boulevard (southbound).

(2) Ramp metering, High Occupancy Vehicle (HOV) bypass lanes and auxiliary lane (southbound) from Moffett Boulevard to San Mateo County line.

Caltrans' inability to fund major interchange improvements and ABAG's discouragment of new construction may well promote more use of public transit as highway growth lags behind population growth.

Bay Conservation and Development Commission (BCDC)
The California Legislature, in establishing the Bay Commission, has given it three major responsibilities:

(1) Regulation of all filling and dredging in San Francisco Bay (including all sloughs that are part of the Bay system) in accordance with the Commission's Bay Plan. The Bay Plan delineates specific areas and appropriate uses, which may allow bay filling or other modification if no alternative is available.

(2) Jurisdiction over any activity within a 100-foot strip inland from the bay, within which the commission must require public access to the Bay to the maximum extent feasible, consistent with the nature of new shoreline development, and insure that existing shoreline property suitable for high-priority purposes such as ports, water-related industry and recreation, is reserved for these purposes, thus minimizing pressures to fill the Bay.

(3) Jurisdiction over any proposed filling of salt ponds or managed wetlands (area diked off from the Bay) and preservation of the maximum amount of water area if filling is proposed.

Midpeninsula Regional Open Space District (MROSD)
The MROSD works with governmental and private organizations to acquire and preserve scenic and recreational lands in the foothills and baylands of San Mateo and Santa Clara Counties for the use and enjoyment of the public. The District evaluates, acquires and maintains lands important to the protection of natural vegetation and wildlife, scenic and historic preservation and the guiding of urban expansion.

In January 1980 the district owned 12 preserves totalling more than 7,000 acres, often adjacent to existing parks. MROSD is funded by property taxes, grants and donations and has no regulatory or zoning powers with regard to privately owned land but, when necessary, does have the power of eminent domain. A recently acquired marshland preserve area adjacent to Ames' northwest boundary is indicated on page 3.5 and 4.1.

Local:

- **Mountain View Planning Department**
  The future of the North Bayshore Area, including land use, traffic and access issues comprise the primary relationships between the Planning Department and Ames. However, because of the proximity of Mountain View to Ames, close and continuous coordination of noise control, security, utility planning, nature conservation and social services is also important.

- **Santa Clara County Planning Department**
  A county-wide overview of land use development patterns, transit and regional services is an essential component of the planning environment in which Ames Research Center exists. Responsibility for coordination of the various community development plans and maintaining conformance of these plans to an overall county framework are matters of prime importance to this agency. The County Planning Department also provides a liaison between city agencies and Bay Region planning groups.

- **Santa Clara County Transit District**
  This agency is responsible for the formulation of a county-wide transportation system. The Zones of Planning Influence Map indicates the recently established bus routes in the vicinity of Ames and portions of a proposed county rapid transit network.

- **Santa Clara Valley Water District (SCVWD)**
  The primary interaction between this agency and Ames centers about the future development of flood control facilities along Stevens Creek and San Francisco Bay. An extensive study, "Stevens Creek: A Plan of Opportunities", completed in June 1980, explores levee improvements along the creek. Levees which may be raised in implementing this plan are indicated on the adjacent map and page 8.16. SCVWD is acquiring permits and rights-of-way prior to levee construction; the land exchange with Ames along Stevens Creek, shown on the Property Map on page 3.5, is part of this process. The project will also include raising and lengthening the Crittenden Bridge across the creek adjacent to the Anderson property.

TRAFFIC

The ability of Ames Research Center to function properly is partially dependent upon its transportation linkages to the surrounding community. The region is predominately automobile-oriented and this section will deal with the issues resulting from that fact: first, a description of existing circulation conditions, and second, the formulation of circulation goals sought by Ames to facilitate its master plan.

Traffic to Ames originates primarily from the southern portion of the Santa Clara Valley. A recent geographic survey of Ames employee residences indicates that about 75% live in Santa Clara County south and east of Ames. Based on this distribution of personnel, traffic engineers have assigned daily trip counts to various highway approaches for arriving and departing Ames traffic. An estimated maximum of 5600 trips per day includes 1800 Ames civil service personnel and various part-time and other Ames employees, 700 visitors and 1200 contractor personnel. Major automobile routes into Ames can be seen on the Vicinity Map on page 3.1.

Ames and Moffett Field share the same security perimeter, thus, access to one area allows free passage to the other. The Ames-Moffett Field complex has the following major perimeter gates (see the Community Map on page 4.1):

(1) Moffet Main Gate (Moffett Blvd. interchange)
(2) Moffett South Gate (Ellis Street)
(3) Moffett East Gate (to Lockheed — open during working hours only)
(4) Ames Gate 18 (open during working hours only)

Each of the gates is manned by a Marine Corps guard who normally allows non-stop passage of permit-marked vehicles containing badged personnel. Access is unimpeded, with the exception of stopping "uncleared" cars, which results in a back-stacking of other cars until the unauthorized vehicle is directed out of the traffic flow.

The Moffett Boulevard-Bayshore Freeway interchange handles about 2000 daily trips to Ames. Approaches to this interchange include the Bayshore Freeway north and south, the Stevens Creek Freeway and Moffett Boulevard. This traffic enters Ames through either the Moffett Main Gate or Gate 18. The remaining 1000 trips enter and leave through the Moffett South Gate or East Gate. Northwest of Moffett Boulevard there are no Bayshore Freeway interchanges or overcrossings which give direct access to Ames. In the North Bayshore area, there are no street connections across Stevens Creek to Ames, except for a bridge at Crittenden Lane which presently does not provide regular access inside of the Ames security perimeter.

It is apparent that the Bayshore Freeway is of prime importance to Ames, and various traffic studies have dealt with the commute congestion problem. (See Section 12-Reference Documents.) In recent years, as a result of heavy peak-hour loading of both Ames and Navy personnel through the Moffett Main Gate, all inbound Ames traffic has been encouraged to use Gate 18 and provisions for staggered work hours have been made. Despite these rearrangements both the Moffett Main Gate and Gate 18 are operating beyond their design capacities at peak hours.

In 1966 an analysis of future traffic loading showed that a new entry to Ames would be necessary. During the intervening years the employee population of Ames has remained relatively stable and development to the north has not been as rapid as anticipated in 1966. Although the pressures for a new access road have not increased, subsequent updatings of the Master Plan have continued to recommend and make provision for a new access road to Ames as a long-range need and for emergency situations.

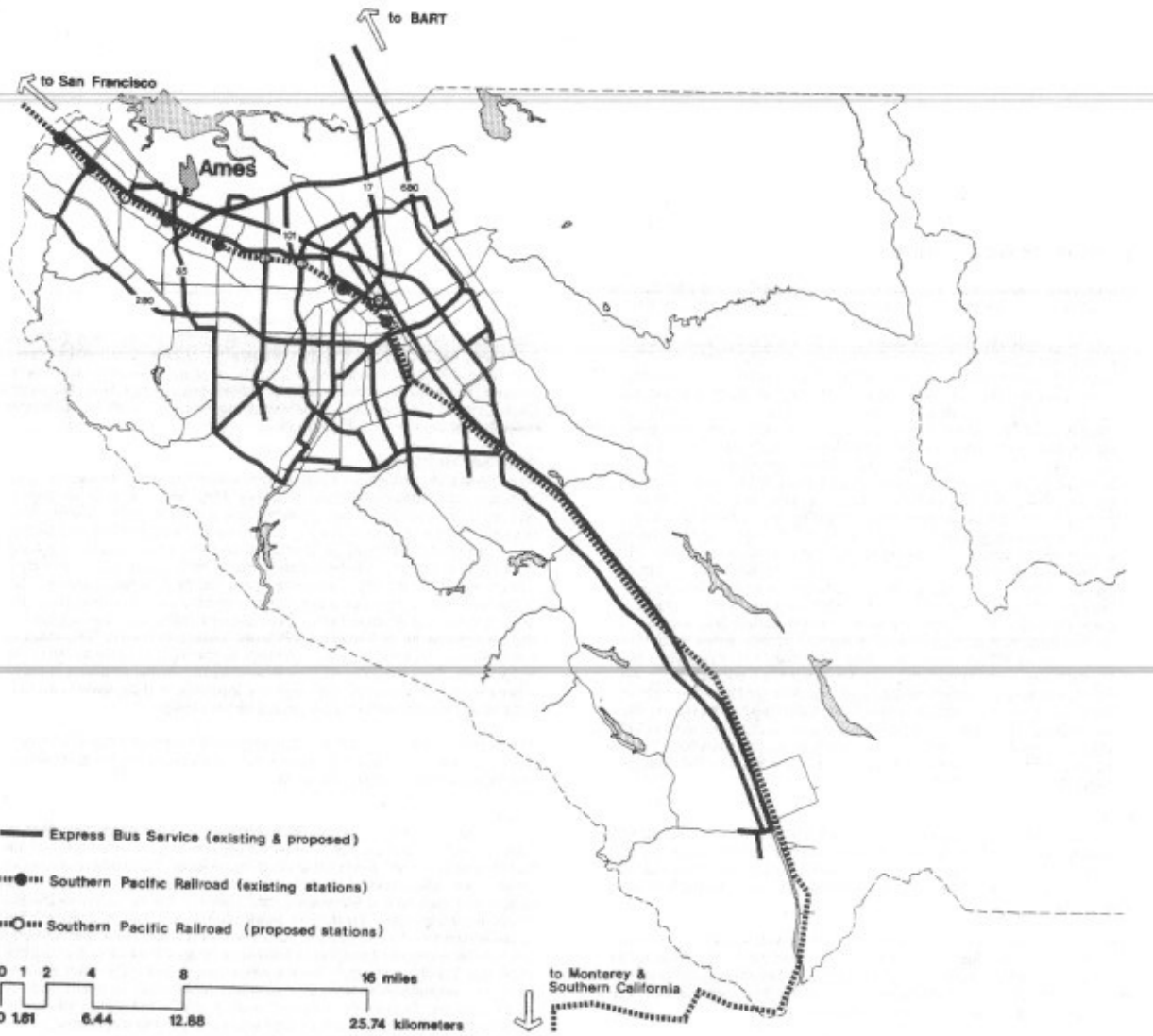
In March 1977, the City of Mountain View adopted the North Bayshore Area Plan to provide guidance to the overall policies and programs which will effect the future of the North Bayshore area. This report contained a recommendation for the extension of Charleston Road as a two-lane connector street from Stierlin Road east to Stevens Creek and connecting with a proposed new bridge and entry road to Ames. This extension would also connect with a realigned Moffett Boulevard extending northward from Ames Gate 18.

In July 1980, the Mountain View City Council elected not to approve Ames' request to construct, as part of a levee improvement project, the proposed new bridge and roadway across Stevens Creek, without assurance that the Moffett Boulevard extension would also be built concurrently. However, until major Bayshore Freeway interchange improvements are implemented which provide better access to the developing North Bayshore industrial area of Mountain View, the proposed Moffett Boulevard extension and bridge would result in heavier morning traffic by vehicles bound for industrial destinations, which would further impact the presently overloaded facilities at the Moffett Main Gate. For this reason, the Moffett Boulevard extension requested by the City was unacceptable to both Ames and the Navy; therefore the bridge construction proposal was rejected by the City and subsequently dropped from the Ames Levee Improvement Project.

In light of the above existing conditions relative to access, and in recognition of the various agencies involved in traffic planning for this area, the following planning goals have been formulated:

(1) Active coordination with the Navy to improve traffic flow at the Moffett Main Gate, while preserving the existing formal access route to the Ames Administrative Center.
(2) Extension of New Moffett Boulevard northward to provide access for a proposed visitor-oriented facility and for proposed new development on land north of the existing center.
(3) Encouragement and support of alternative energy-conserving transportation systems, e.g. transit, carpooling, bicycles.
(4) Continued cooperation and support of community traffic planning efforts to improve the overall circulation system within the North Bayshore area, including freeway interchange improvements and an east-west link across Stevens Creek if this can be accomplished without undue hardship to any community group or governmental entity.

Ames is moving towards the realization of these goals by maintaining an assertive coordinating role between the several agencies involved in planning for the North Bayshore area. Until a commonly acceptable and beneficial long-range solution to traffic circulation can be planned and implemented, the Master Plan will propose feasible alternatives to a new entry road, while attempting to provide flexibility for its addition at a future time.



Transit Map

PUBLIC TRANSIT

Until 1975 Santa Clara County's development pattern was based on auto-oriented objectives. An increasing realization that urban growth in the area will always outpace highway capacity and a growing concern for air quality and energy consumption have prompted a public transit-oriented approach to transportation. If the county's development patterns of scattered industrial sites surrounded by low density residential districts continue to grow, the present daily travel demand of 4.4 million trips is projected to reach 5.7 million by 1990. The Metropolitan Transportation Commission (MTC) and the Santa Clara County Planning Department, having studied the county intensively in the last several years, conclude that both public transit and control of urban growth patterns to shorten commute distances are the two major policies which will guide future transportation improvements.

The most recent of these studies by MTC, the Santa Clara Valley Corridor Evaluation (1979), made specific recommendations which were adopted into the Regional Transportation Plan (RTP) in July 1980. The most immediate of these improvements is the enlargement of the Santa Clara County Transit District bus system from 234 buses to 750, which, beyond 500 buses, would emphasize express service from residential terminals to industrial parks. At present there is an express and a local route travelling directly to Ames which connect with several major routes and thus serve a large area. The buses maintain a 30 minute headway during weekdays. The buses would also provide a feeder to the Southern Pacific Railroad and other regional transit modes. The RTP also proposes support of non-capital-intensive measures to encourage a more effective use of existing transit and highway systems. For example, the use of express lanes along the Bayshore Freeway and preferential parking for high occupancy vehicles, provisions for bicycles and pedestrians, and the encouragement of firms to stagger work hours and provide shuttle services to transit terminals.

Inter-county transit is accommodated by both the Southern Pacific Commuter Railroad, which runs between San Francisco and San Jose, and the Greyhound Bus lines. The Commuter Railroad, which has been recently acquired by Caltrans, will be upgrading its service from 30 trips per day to approximately 60. There are also plans to add more stations within the county to provide better access to this rail service. Also being considered as a long range alternative is the rail extension to the Bay Area Rapid Transit (BART) station in Daly City. BART extensions are under consideration to San Francisco Airport and from Fremont to San Jose. These BART and Southern Pacific rail lines would potentially interconnect with the Santa Clara County bus system, which would provide Ames commuters with an efficient region-wide alternative to automobile transport.

The coordination of each proposed alternative with existing transit modes will be guided by MTC to strengthen the regional transportation system as a whole.

SERVICES TO THE COMMUNITY

Flight and space research conducted at Ames has application to both the scientific community and the public at large. In response to an increasing demand, Ames has established several programs to provide information to the community:

The Earth Resources Aircraft Project has an extensive film library of color infra-red and black/white aerial photography. This library is of interest to a wide range of land-use and environmental professionals skilled in photo interpretation.

The Western Regional Applications and Technology Utilization Office provides the "coupling" between the technology and the user. The Office is responsible for identifying and disseminating technical information. In addition, the Office provides user support and the development of cooperative programs for the evaluation of appropriate technology. This is accomplished by increasing user awareness and maintaining continuing liaision.

At landmark occasions in space exploration Ames has invited members of the neighboring scientific community to view space activities by television monitors.

The Public Affairs Office maintains many programs of community concern. For example, a documentary film library in the City of Mountain View has been established. The office conducts tours of the Center for school and civic groups, and occasional open house events make the Center available to the public. A series of NASA Research exhibits travels to fairs, observatories and museums in the 11 western states. Teacher workshops draw people from the same multi-state area. In addition, the Public Affairs Office distributes publications about NASA Research to the general public.

The need for a facility to house technical artifacts and displays, in an area easily accessible to the general public, has been recognized by Ames. The proposed Technology Information Center (A-3), described on page 7.14, will fill this need.

EFFECTS ON THE COMMUNITY

Introduction (Quoted from the Introduction to NHB 8800.11, Implementing the Provisions of the National Environmental Policy Act, April 24, 1980, by NASA)

> "On November 29, 1978, the Council on Environmental Quality (CEQ) issued final regulations implementing the procedural requirements of the National Environmental Policy Act (NEPA). The regulations became effective on July 30, 1979, superseding the 1973 revised Guidelines and are binding to all Federal agencies. Further, the new regulations implement all aspects of NEPA, not just those provisions governing environmental impact statements as did the previous guidelines. In particular, the new CEQ regulations highlight integration of the consideration of environmental effects and the associated interdisciplinary analyses into the agency's decision processes. Not only do they address the procedural aspects of conducting environmental analyses and preparing and publishing environmental impact statements, but they specify that the agencies shall adopt procedures to ensure that decisions are made in accordance with the policies and purposes of the NEPA. Agency procedures should include provisions for: (1) designating major decision points for the agencies principal programs and ensuring that the NEPA process corresponds with them; (2) requiring that relevant environmental documents, comments, etc., accompany the proposal through existing agency review processes so that agency officials have the requisite information at hand when making decisions; and (3) requiring that the alternatives considered by the decisionmaker are encompassed by the range of alternatives discussed in the relevant environmental documents. The CEQ Regulations require that each agency, at the time of its decision, prepare a concise public record of decision, explaining the whys and wherefores of that decision." Implementing NASA procedures were published in the **Federal Register** as Subparts 1216.1 and 1216.3.

Noise
Ames Research Center has for many years been monitoring and effectively controlling the generation of noise by wind tunnels and other test facilities located on this site. Through the use of mufflers, enclosures, fan design and structure location, the local community will continue to be protected from noise disturbance.

The 11-foot Transonic Wind Tunnel, which in past years has stimulated a very small number of individual complaints, has now been completely enclosed for the purpose of noise reduction. Recent measurements indicate that noise from this facility should not be perceptible south of the Bayshore Freeway with normal background or ambient noise level masking.

The proposed 40- by 80-foot Wind Tunnel performance upgrading will be accomplished without an increase in noise disturbance through the use of the latest technology in fan design and acoustical treatment. Extensive engineering studies have been made and are on record to substantiate this projection.

The Static Test Facility has been located in a remote area away from the community west of Stevens Creek to mitigate any noise impact from its operation. More detailed analysis and evaluation of noise generation at Ames is included in the Environmental Impact Statement prepared for Ames Research Center and the EIS appendix for the Modification to the 40- by 80-foot Subsonic Wind Tunnel, referenced in Section 12.

Water and Air Pollution
Ames Research Center has no independent systems by which sewage or other pollutants are discharged directly to the bay. About one quarter of Ames sewage is presently collected and given primary treatment by the Moffett Field system with ultimate conveyance to the Sunnyvale sewage treatment facility. The majority of Ames sewage is diverted to a City of Mountain View trunk sewer located in Moffett Boulevard and through Ames property to a secondary treatment plant in Palo Alto. This system, following the drainage characteristics of the existing site, has permitted a simple connection and interception network. In the future Ames will continue its present policy of off-site disposal of any toxic chemicals, including dry and liquid radioactive wastes. This policy is implemented by a State licensed contractor operating in compliance with EPA requirments. Recycling of resources is practiced by Ames, including mercury and oil which are reclaimed from disposed wastes. Currently, there is no indication that Ames is producing any unacceptable sewage.

The Federal Environmental Protection Agency and the Bay Area Air Pollution Control District do not find any Ames facility to be producing air pollutants in excess of current air quality standards.

Visual
Ames' location north of the Bayshore Freeway has the beneficial effect of lessening the visual impact of its larger facilities on the residential areas of the City of Mountain View, which are south of the freeway. The existing and future development along both sides of the Bayshore Freeway also act as visual buffers and constitute a transitional zone between the suburban residential character of Mountain View and the industrial natures of Ames' facilities. Because adjacent land in the North Bayshore Area is planned to be used primarily as industrial and open space, future building at Ames will not have the negative effect that it might have upon those areas where people's everyday environment (i.e., residential) allowed an awareness of the large size and scale of Ames' facilities. Conversely, although large in size, a well-proportioned and graceful structure can add to the image and identity of the community, as the dirigible hangar at Moffett Field has done for many years.

Traffic
The effect of Ames' traffic on the community is discussed in detail on page 4.5.

COMMUNITY PROFILE

Population

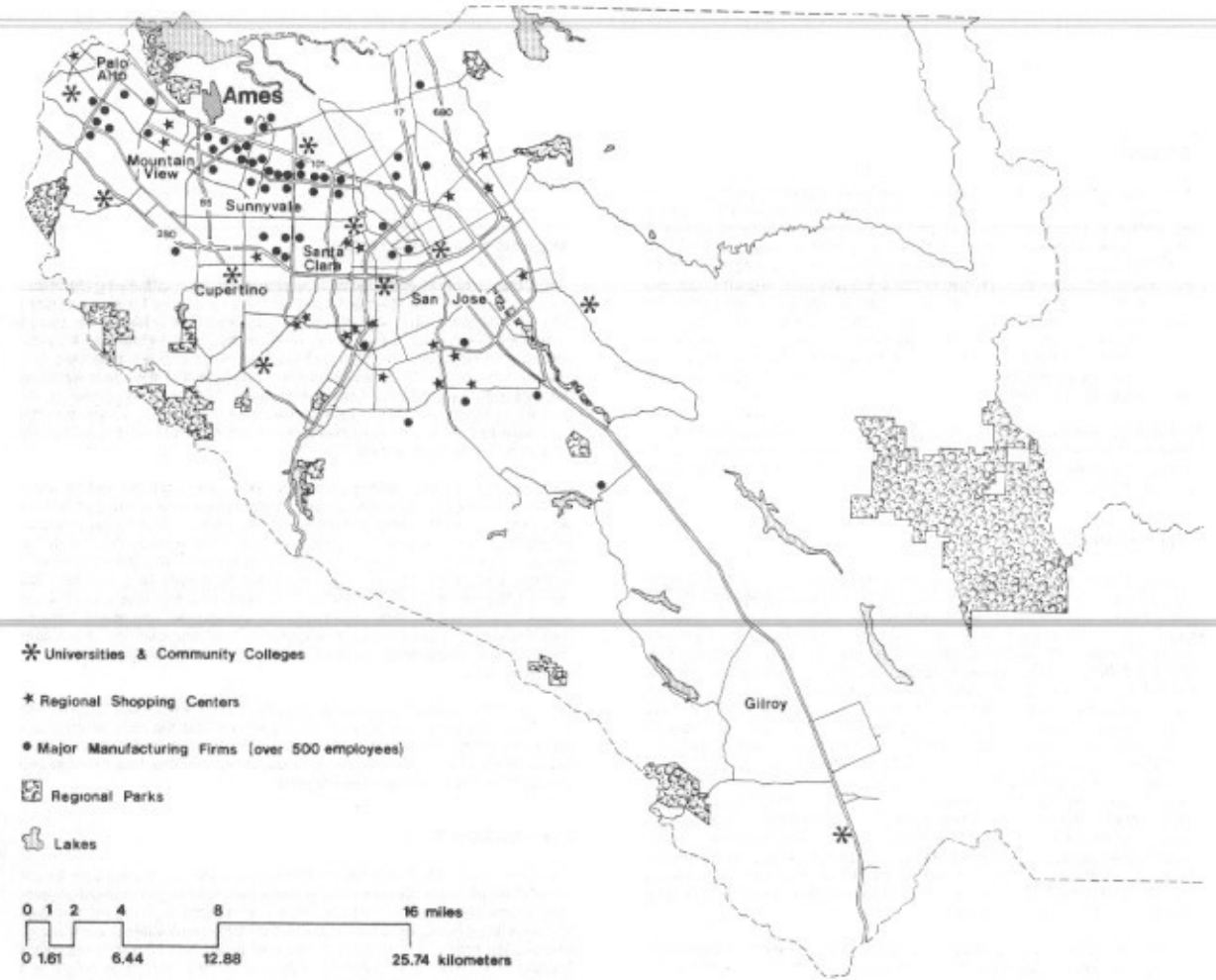
Population as of April 1, 1975 (Santa Clara County Special Census)

San Francisco Bay Area	5,128,310
Santa Clara County	1,169,006
City of Mountain View	55,095
City of San Jose	551,224 (San Jose is the fastest growing major city in the United States)
City of Sunnyvale	102,154

Education

There are 313 elementary and 57 secondary schools in Santa Clara County. The county's median level of education ranks above both National and California averages.

Santa Clara County also possesses an excellent system of higher education. Six community colleges have grown from a total enrollment of 44,533 in 1970 to 79,360 in 1979. These colleges are taxpayer-supported and charge no tuition to county residents. In addition, three universities — San Jose State, University of Santa Clara, and Stanford University — all located in the county, bring the student population close to 100,000 or nearly 10% of the entire county population. Toward the end of the last decade it was calculated that Santa Clara County had perhaps the most educated labor force in the country, with one out of every ten professionals holding Ph.D. degrees.



Industry

The county's rapid development began during the 1950's, almost solely in response to its emergence as an electronics center. Since 1975 the number of jobs in Santa Clara County has increased by more than 150,000. Currently, two out of five jobs are related to the manufacturing of electronic equipment, making the county one of the five major research and development centers in the U.S. More new products have been invented in the county in the past decade than in any similar-sized area.

Seven of the larger manufacturing firms are:

Lockheed Missiles and Space Center — missiles, space and ground vehicles, energy and environmental equipment (16,000 employees)

Hewlett-Packard — computers, calculators and semi-conductors (11,700 employees)

International Business Machines — electronic computer equipment (10,000 employees)

National Semiconductor — electronic components & semiconductors (8,200 employees)

Memorex — magnetic recording tape (6,800 employees)

General Electric — electric motors, nuclear power plants (5,900 employees)

F.M.C. Corporation — food machinery and ordnance (5,600 employees)

Retailing

Because of the unusually large portion of its population participating in its work force, Santa Clara County has the highest median family income in the state, $25,782 in 1979. As a result, county residents spend more per capita on retail items than the average state resident. There are eleven regional retail centers located predominantly along the Bayshore Freeway and Interstate 280 — two of which are near Ames in the City of Mountain View.

Cultural Activities

In additon to the continuous array of cultural events at each of the colleges and universities in the area, the county contains a new 2,700 seat Center for the Performing Arts in San Jose and a symphony orchestra which is the oldest in California.

Museums include the Rosicrucian Egyptian Museum, the Winchester Mystery House and the Foothill College Electronics Museum. Art galleries are numerous, and include the D. Saisset Gallery at the University of Santa Clara and the Stanford University Museum of Art.

Recreation

Due to the mild climate in the Santa Clara Valley, recreational activities are predominantly outdoors. The proximity of San Francisco Bay for sailing and the Santa Cruz mountains for hiking, fishing and camping offer a choice of amenities not available in many parts of the country. The Pacific coast, from Half Moon Bay to Santa Cruz, provides 64 kilometers (40 miles) of beaches, cliffs and surf. The Stevens Creek Park chain, in planning stages, will eventually run from the bay marshlands, through the surrounding communities and into the rolling hills and redwood forests of the Santa Cruz mountains.

Housing

Increases in employment, population, speculative investment, combined with sluggish housing construction have created a chronic housing shortage in Santa Clara County. The county offers an existing housing stock which is predominantly single-family. Most housing is new, about 80% having been built since 1950. However, due to rapidly rising contruction costs and a shrinking supply of buildable land, the historical single-family trend is being modified to reflect more condominiums, townhouses and cluster units. In the northern half of the county, the number of jobs is far in excess of available housing for those job-holders, a factor which contributes considerably to transportation and traffic problems.

Santa Clara County Map

5 Geology and Meteorology

GENERAL GEOLOGY

The Ames site is located in the gently sloping Santa Clara Valley, which is a large northwest-trending structural trough, bounded on the northeast by the Diablo Range and on the southwest by the Santa Cruz Mountains. The geological formation underlying Ames resulted from the erosion of these bordering mountain ranges and the deposition of soils by stream action, interlaced with extensive clay layers similar to those now underlying San Francisco Bay. The soils are alluvial and sedimentary deposits consisting of alternating layers of unconsolidated clay, silt, sand and gravel. Beneath the site, the depth of alluvium is estimated at between 400 and 700 meters (1300 and 2300 feet), underlain by the San Franciscan rock formation. Existing geologic analysis of the site indicates that seismic ground rupture is highly unlikely.

FOUNDATION SOILS

Available data from previous soil investigations at Ames indicated that the site is blanketed by a highly plastic, black sandy to silty clay several feet thick, which is locally called adobe. Underlying the adobe to depths of 2.5 to 3 meters (8 to 10 feet) are generally firm clay soils containing a few lenses of sandy silts. These, in turn, are generally underlain to depths up to 30 meters (100 feet) by weaker soils consisting of clays containing layers of sands and silts.

SURFACE WATER

San Francisco Bay, including its waters in the salt evaporation ponds north of Ames, is the most significant body of water in the vicinity. Several sloughs near Ames carry surface runoff into the Bay — Guadalupe and Alviso to the east, Mountain View and Charleston Sloughs to the west. Stevens Creek parallels Ames' western boundary. See the Vicinity Map on page 3.1 for the relationship of Ames to the Bay and adjacent water courses.

From available data, it was determined that highest high water in the Bay near Ames rises to a height of approximately 2.33 meters (7.5 feet) above mean sea level. As a result, Stevens Creek is subject to tidal action to about 305 meters (1000 feet) south of the Crittenden Lane bridge. A series of Santa Clara Valley Water District (SCVWD) flood control levees along Stevens Creek and the Leslie Salt evaporator levees north of Ames provide marginal protection from tidal inundation to Ames' property. Proposed improvements to the levee system are described on Page 4.4 under the SCVWD heading. Additional protection is provided by the east-west leg of the Perimeter Security Road.

Tsunamis, long period waves usually caused by underwater earthquakes, are not expected to pose a flood hazard to Ames. Because of the configuration of the San Francisco Bay, a 20 foot wave runup at the Golden Gate, likely to occur only once every 200 years, would be dissipated before reaching the levees north of the Center.

Most of Moffett Field and Ames' lands drain to the North. Winter storm water frequently ponds in unfilled portions of the northern third of Ames' underdeveloped property. As a result of subsidence, a large portion of the underdeveloped property is now within the potential of possible flooding by a 100-year (one percent) flood.

GROUND WATER

A perched groundwater table is often encountered at depths ranging from 2.1 to 3 meters (7 to 10 feet) over much of the site, and in recent years is very near the surface in northern portions of Ames. Groundwater occurs in two basic aquifer zones: a shallow water table zone extending to depths of 18 to 30 meters (60 to 100 feet), and a deep artesian zone from about 49 meters (160 feet) downward to perhaps 300 meters (1000 feet) or more. Separating the two zones is a massive and impermeable clay body, forming the bottom of the overlying shallow groundwater zone and the confining cap of the deep zone below. The deep artesian supply supports medium-to-high capacity wells and was the historical source of practically all water used throughout this region. In the last few years the originally high artesian well pressure, depleted through use, has partially returned.

The property owned by Ames once utilized six or more artesian wells. All of these wells have been abandoned and capped. The old wells have been replaced by one new well to be used for agricultural (lease) purposes and as an emergency source of water by Ames.

SUBSIDENCE

A gradual subsidence of the land surface in the Santa Clara Valley has been observed since 1932. The subsidence has been closely studied by several governmental agencies and is attributed to the decline of artesian pressure caused by extensive groundwater pumping from the deep aquifers described above. Between 1938 and 1972, the land surface subsided 1.7 to 1.8 meters (5.5 to 6.0 feet) at Ames Research Center, with rates increasing from north to south across the site. The majority of this subsidence occurred after 1945. A state-implemented water importation scheme became available in 1965 and has increased substantially in usage since that time. This supply, together with several years of higher than normal rainfall, has resulted in a marked decline in well usage and a corresponding replenishment of the underground artesian pressures. The Hetch-Hetchy Project import system of the San Francisco Water Department has also furnished increasing quantities of water to local public entities and to Ames. Since 1969, local subsidence has essentially stopped, so that the possibility of significant future ground subsidence due to groundwater depletion appears to be remote. In the improbable event that heavy groundwater depletion occurs in the future, maximum subsidence should not exceed an additional two feet and differential subsidence should be negligible as it has been in the past.

As indicated above, local variations in land subsidence are now stopped and structural damage to existing or future buildings appears very unlikely. However, the design of future utilities and drainage channels flowing toward San Francisco Bay should allow for a possible loss of grade due to land subsidence. Pumping of groundwater from within the Ames property should be carefully monitored to determine its effect on groundwater removal and land subsidence. The single remaining well, used for agricultural and emergency purposes only, should not significantly affect the existing water table.

SEISMIC CONSIDERATIONS

There are no known earth faults or evidence of faults underlying the Ames Research Center. The Hayward Fault and the Calaveras Fault, both active northwest-trending faults, are located approximately 14.5 kilometers and 21 kilometers (9 miles and 13 miles) northeast of the site, respectively. A similar northwest-trending fault, the San Andreas Fault, is located approximately 14.5 kilometers (9 miles) southwest of the site. Geophysical and seismic evidence has delineated several other faults within the Santa Clara Valley, including the Palo Alto and Stanford Faults located 1.6 and 4.8 kilometers (1 and 3 miles) southwest of the site and the Silver Creek Fault 8 kilometers (5 miles) to the northeast. These faults are inactive.

Based on the available geologic data, the possibility of ground rupture within the Ames Research Center due to earthquakes appears remote and should not be a factor in the siting of structures. Relatively severe ground shaking should be anticipated at Ames during moderate and major earthquakes along the nearby major faults, and dynamic ground response studies should be included in the soil investigations for major structures to reduce to a minimum the possible hazards during earthquakes. The potential of bay mud consolidation and/or liquefaction of sand layers and the subsequent settlement hazards should also be included in soil investigations for all new facilities. It is known that sand layers exist at various depths and locations especially near the banks of Stevens Creek.

With the above precautions, it is felt that the field of earthquake engineering and seismic building code provisions have advanced to the point where buildings at the Ames Research Center can be designed and constructed so as to reduce to a practical minimum the possibility of serious structural damage and loss of life during even major earthquakes.

FOUNDATION TYPES

Due to the presence of expansive adobe surface soils, all foundations should be established below the zone of seasonal moisture changes to avoid undesirable volume changes in these soils. Generally, relatively light-weight one-story and two-story buildings could be supported on continuous exterior wall footings and isolated interior spread footings founded at depths of 2½ to 3 feet below the lowest adjacent final grade. Buildings up to three stories in height and underlain by a basement could be supported on a mat foundation, with adequate provision made for dewatering due to the high groundwater table. High-rise buildings and buildings particularly sensitive to settlement should be supported on driven displacement piles. A more detailed report and additional data on geology and foundation design are included in the Technical Supplement to the 1973 Master Plan.

CLIMATE

Ames Research Center is located at the southern end of San Francisco Bay. The Bay terminates in salt marshes north of Ames, and northwest the Bay becomes a widening area of open water. Santa Clara Valley extends to the southeast with the closest point of the Pacific Ocean approximately 25 miles west. The mountainous terrain surrounding Ames forms a protected bowl.

The Annual Weather Graphs below depict monthly data from the climatological station at Moffett Field. Seasonal weather changes are summarized below.

Ames enjoys a mediterranean or dry summer sub-tropical climate. Severe winter storms with heavy rain and gale winds occur only occasionally. Thunderstorms, although very infrequent, may occur during any period of the year and are usually of light intensity.

Summer weather is dominated by night and morning high fog or stratus (usually dissipated before noon) and dominated by the sea breeze emanating from the cool waters of the Bay. Both influences combine to moderate daily temperatures.

The occurence of fog on or near the ground increases from a negligible value in May to a maximum of 19% of the time in December, then decreases to 3% in March. Passage of sub-tropical storm fronts is mild and of short duration. A small variation in temperature between summer and winter (65° average in July to 49° average in January) accounts for mild winter conditions.

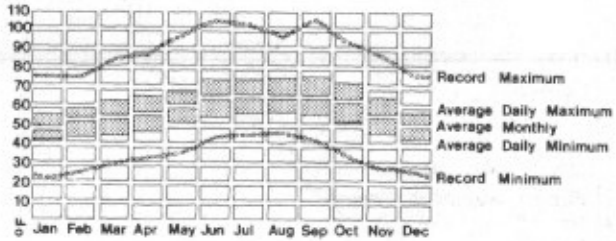
Visual obstructions also include some haze and smoke. This haze is trapped below a strong inversion based between 1,000 and 2,000 feet persisting through most of the summer. Inversions close to the ground are not common during the summer, but occur more frequently during fall and winter conditions.

All of the above climatic conditions contribute favorably to the performance of flight operations year around.

Available solar radiation at Ames is quite high, averaging 49.1 kBtu per square foot per month. With mild ambient temperatures prevailing year-round, opportunities for energy conservation through the use of natural lighting and heating in Ames facilities are significant.

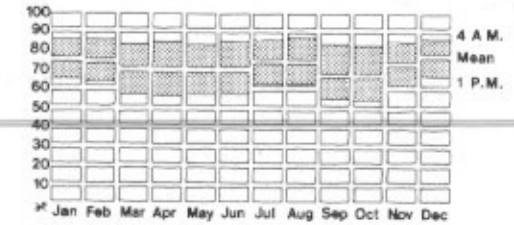
Temperature

Average · · · 58° Fahrenheit



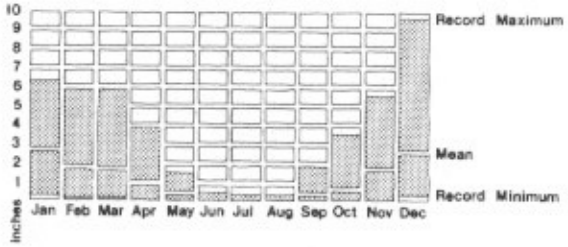
Relative Humidity

Average · · · 74 %



Precipitation

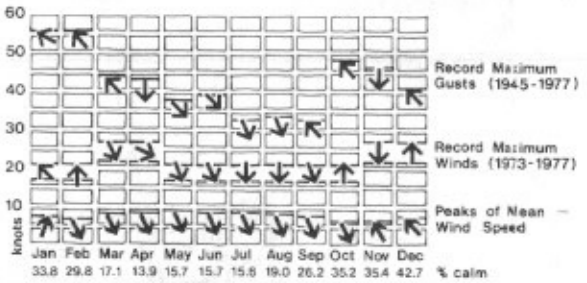
Average · · · 1.1 inches / month



Wind Velocity & Direction

Average Wind · · · 4.7 knots
Average Calm · · · 25%

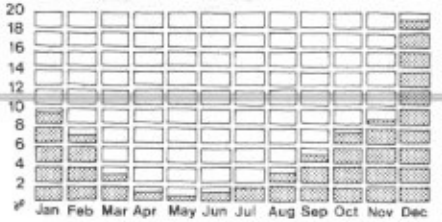
↑ north



Fog

% of Hourly Observations

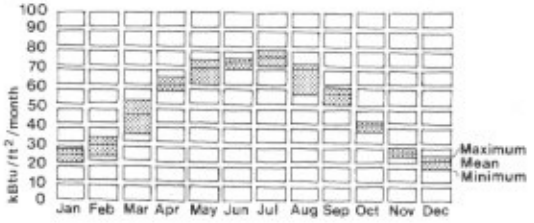
Average · · · 41.7 hours / month or approx. 2 days / month



Solar Radiation

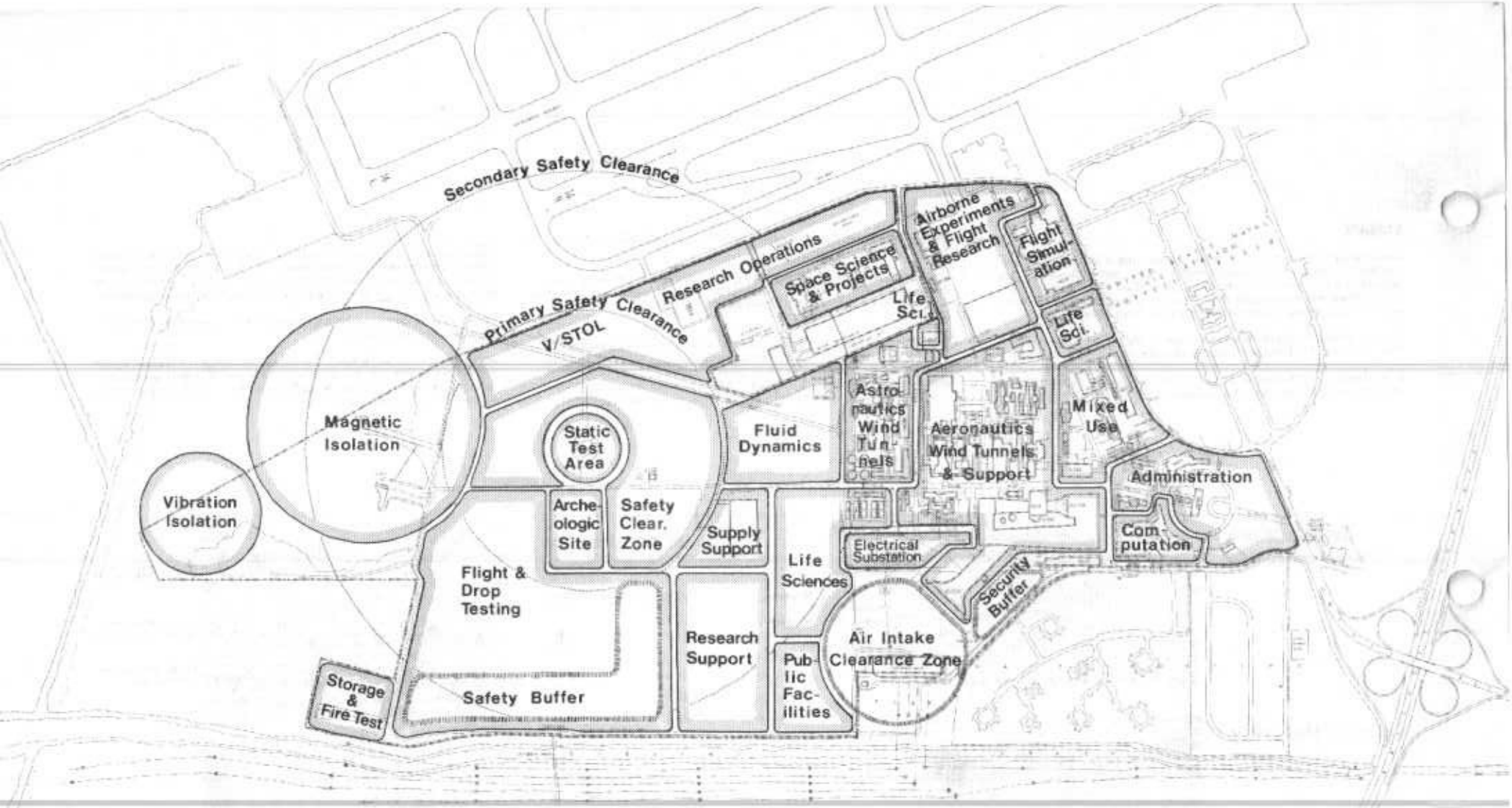
on a horizontal surface

Average · · · 49.1 kBtu / ft² / month



Annual Weather Graphs

5.2

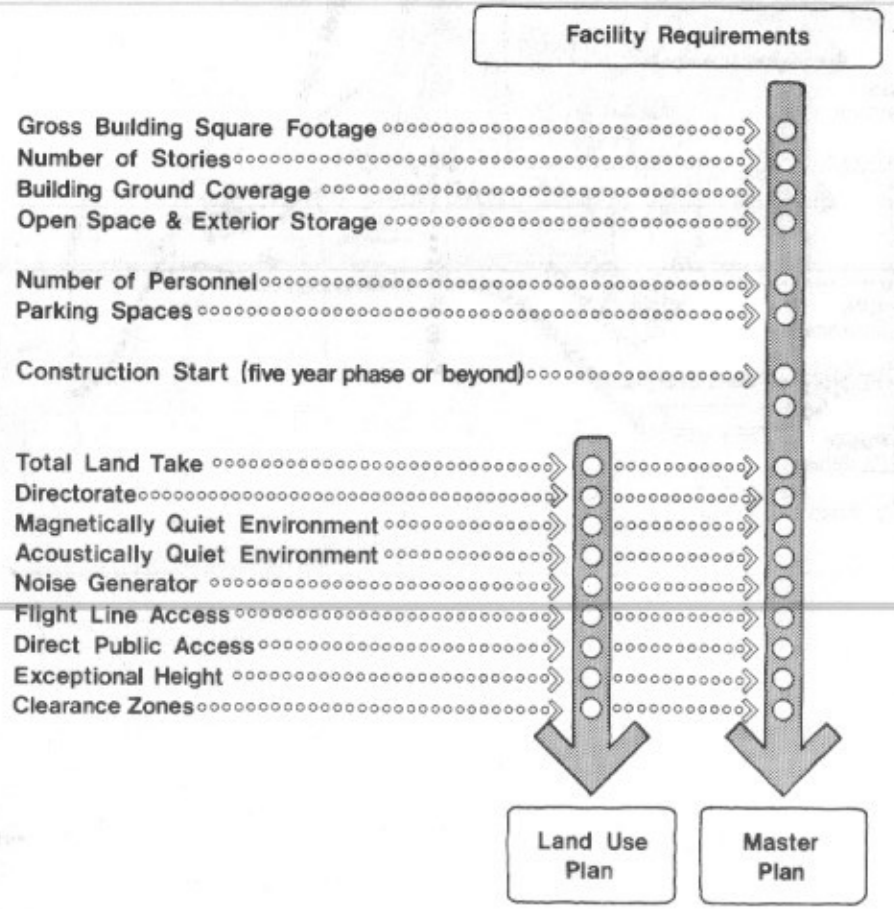


6.1 Land Use Plan

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

6 Land Use



Planning Criteria Diagram

LAND USE PLAN

The form and structure of the Land Use Plan on the adjacent page is derived from two major sources (based primarily on the Five Year Plan).

(1) **The Planning Criteria Diagram** — reproduced on this page, guides the collection and analysis of data for individual future facilities;

(2) **Site Design Integration** — generated from the functional relationships between various land uses and from any planning constraints of the site. (See pages 6.3 through 6.8.) As the site design is developed it must also be integrated with Ames, NASA Headquarters and other governmental directives and guidelines.

Plan, criteria and integration evolve in a cyclical manner; feedback from one set of goals and parameters will affect the development of the other sets. For example, input of a specific site design feature may result in conflict with a facility requirement from the Criteria Diagram, resulting in a revision to both the Land Use Plan and the original site design input.

PLANNING CRITERIA DIAGRAM

The Planning Criteria Diagram organizes design data for each of the proposed facilities into two categories, ranging from the general to the specific:

(1) **The Land Use Plan** — land take, directorate category, function and locational criteria are used to determine the size and location of land uses. As the plan develops, several facilities may coalesce in one land use area, or an individual facility may require an area of its own.

(2) **The Master Plan** — all of the data, including that used for the Land Use Plan, determines the location, orientation, access and building characteristics of individual facilities.

UNDERDEVELOPED LAND

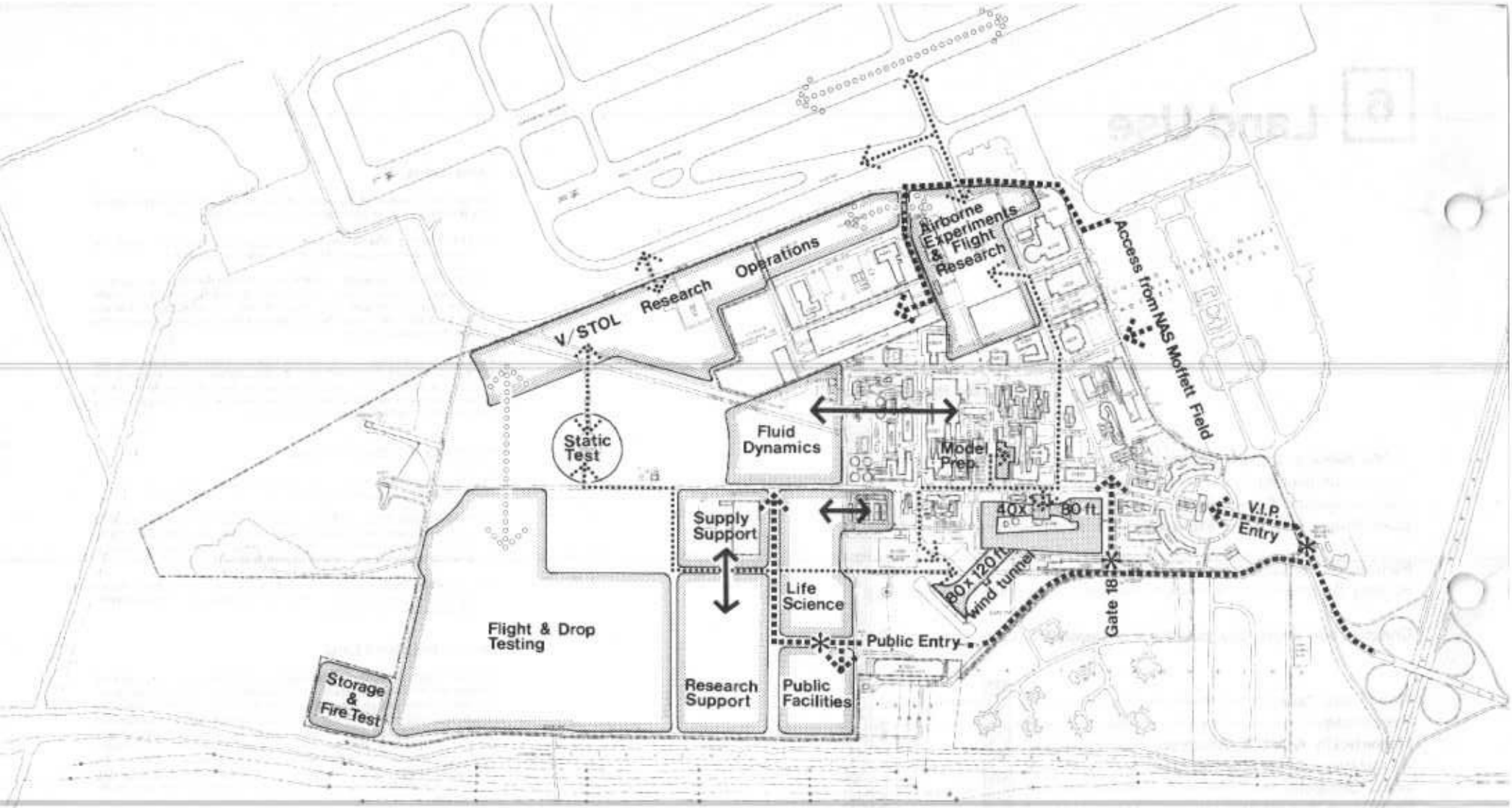
The major planning emphasis of this report continues to be concernec with the underdeveloped land. Historically, lack of development in this area has stemmed from the fact that each new facility built must bear the cost of utility and road extensions to it. As a result, a process of construction infilling within the existing developed area has occurred. The effect is highly contrasting: roughly one-third of the site is very densely built-up and the remainder is virtually vacant. Since the last Master Plan the Supply Support Facility (N-255) and Fire Test Facility (N-254) have been built in the underdeveloped area, beginning the planned implementation to avoid further congestion of the existing developed site.

Two concepts for budgeting and funding of new roads and utilities in underdeveloped areas should be considered.

(1) Road and utility extensions would be paid for as separately justified projects, independent of any new buildings using those extensions.

(2) Road and utilities, if financed through new facility construction, would be built in incremental stages so that the total costs of any extension may be distributed over time and several projects. Wherever functionally feasible, facilities to be built first should be located nearest to the existing developed area. Later facilities should locate nearest the end of road and utility extensions. Additionally, initial provision for temporary services to a high-priority remote facility would be replaced with permanent utility extensions as soon as possible. In this way, the cost for each facility located on underdeveloped land will be greatly reduced.

The first concept provides greatest assurance that the objectives of the Master Plan will be met. As long as the construction costs for roads and utilities continue to be financed through new facility construction, the Master Plan will be subject to changes based upon immediate financial expediency rather than long-range, rational planning criteria. A shortfall of funding for these utilities will likely require a revision in the location of a proposed new facility that, for other planning reasons, may have been sited beyond the end of existing roads or utilities. The Master Plan will attempt to provide flexibility in anticipation of this possibility.



Functional Linkages
Automobile Movement
Aircraft Ground Movement
Aircraft Flight Path
Security Checkpoints

6.3

Functional Relationships

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

FUNCTIONAL LINKAGES

The adjacent Functional Relationships Map illustrates several examples of land uses relating to other functions. Linkages can occur between two different land uses (Research Support - Supply Support), between a general land use and a specific facility (V/STOL Research Operations - Static Test Stand), or between a land use and a traffic system (Public Facilities - Public Entry).

Inherent in the growth process of any large and complex installation is the problem of maintaining functional grouping of related facilities as new development occurs. At Ames, directorate grouping of Aeronautics, Astronautics and Life Sciences is more important than the consolidation of Research Support or Administration. The support linkages of the latter two directorates to the three research directorates might favor dispersion of support facilities over their consolidation in one area. The historical dispersion of these two directorate facilities must be recognized as a necessary part of the planning process.

TRANSITIONAL AREAS

Some land uses and buildings are transitional, to be phased out over time as higher priority demands for land or facilities are generated. Also, the original use may become either obsolete or incompatible with new uses.

Two transitional land-use areas are shown on the Land Use Plan: Flight and Drop Testing and the Archeologic Site. Present planning is to leave these areas undisturbed. By the time pressure to develop these areas occurs, drop testing must be relocated or phased out and archeological investigation will be completed.

Similarly, changing missions and goals dictate a transitional approach to the use of existing buildings and structures. Some buildings are projected to have less intense utilization due to either completed NASA programs or obsolete equipment. Ames personnel working in these buildings will be reassigned to other facilities, while other governmental agencies may make use of them for their own programs. Only a few facilities may be completely abandoned and removed. These changes in use are discussed in detail in Section 7.

AUTOMOBILE MOVEMENT

The Functional Relationships Map indicates three entry points into Ames Research Center which require a security checkpoint:

(1) **The Existing V.I.P. Entry** will remain a major ceremonial access point. The Administration building and Auditorium located near this entrance will often be visited by national and international officials and other V.I.P.s.

(2) **Gate 18** will remain a major entry for Ames employees who work in the existing developed portion of the site, and will remain the main truck entry even after a public entry is built.

(3) **The Public Entry** will function in two ways, depending upon the phasing of building construction adjacent to it. As Research Support and Public Facilities are built near the entry, most visitor related activities will occur there. A visitor parking area, outside of the security perimeter, will accommodate automobile and pedestrian traffic generated by activities of the Public Facilities. Additionally, this entry will provide direct employee access to other facilities proposed for construction on the northern portions of the site.

The extension of Moffett Boulevard from Gate 18 to the Public Entry will be outside of the security perimeter. As a public access route from the south it can become an important orientation device for the automobile visitor because it skirts most of the western edge of the developed site. Views into the Center along this route will be dominated by the 80- by 120-foot Wind Tunnel.

Access to Ames from Moffett Field is presently unimpeded because the security perimeter surrounds Ames and Moffett Field in common.

AIRCRAFT MOVEMENT

Ground and flight movement of aircraft is of four distinct categories:

(1) Storage (in the Airborne Experiments & Flight Research Area) to runways for flight experiments.

(2) Storage to V/STOL Research and Static Test Areas by both ground and flight movements.

(3) Storage to Model Preparation and wind tunnel testing.

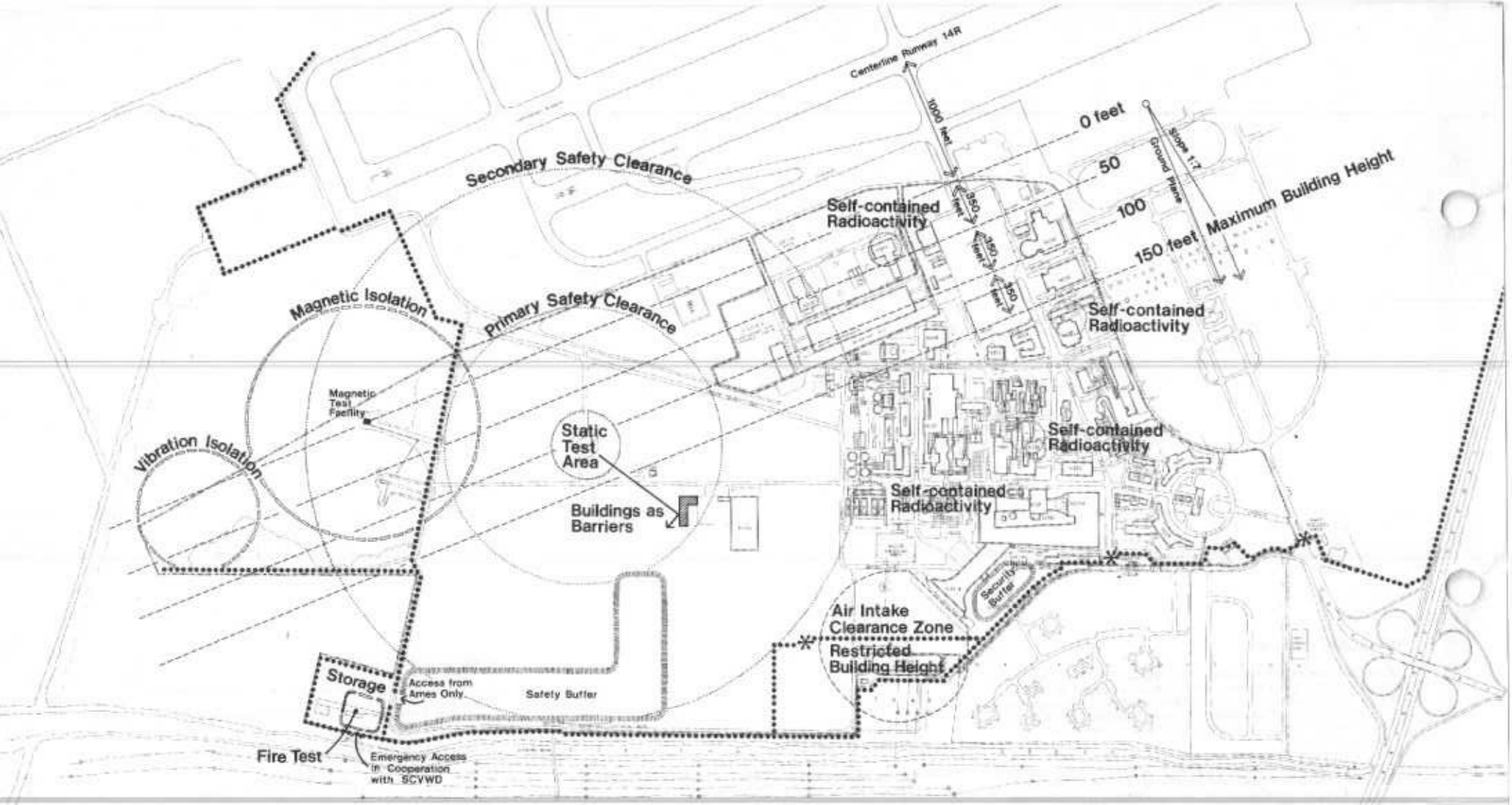
(4) V/STOL Research Area by air to Flight and Drop Testing area.

The first category mandates that future hangar and aircraft servicing facilities should be near the runway areas. Ease of access is particularly critical for V/STOL research. However, immediate adjacency of buildings to runways is limited by a flight-building height restriction shown on page 6.5.

Access to the Static Test Area may be accomplished via the taxiway and V/STOL Research Operations Area as shown on the adjacent Functional Relationships Map.

The third category involves the deepest penetration of aircraft from the Storage Area into the site. Two alternative routes shown on the Functional Relationships Map provide access to the 40- by 80- and 80- by 120-foot Wind Tunnels. The principal (northern) route with a 120-foot clear right-of-way can be accommodated by extensions to existing roads if aircraft turning movements are minimized. Larger aircraft, tested in the 80- by 120-foot Wind Tunnel, will use the northern route, after preparation or pre-testing in the Static Test Area. The southern route primarily utilizes existing streets. Smaller aircraft will use the southern route, be prepared in N-246 and tested mostly in the 40- by 80-foot Wind Tunnel.

The fourth activity involves flight movement of aircraft from the V/STOL Research area to the undeveloped northwest corner of the site where flight and drop testing are conducted.



- Isolation Zones
- Potential Hazard Zones
- Building Height Restriction
- Security Perimeter Fence
- Security Checkpoints
- Safety & Security Buffer

6.5 Site Constraints

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

MAGNETIC ISOLATION

Special testing environments and facilities are required to develop and calibrate instruments used to measure magnetic fields in space. In general, facilties of this type require that the ambient magnetic noise level be quite low (0-1 gamma).

The area designated as Magnetic Isolation on the adjacent Site Constraints Map presently contains two related facilities which require a low magnetic noise environment: the Magnetic Standards Laboratory and the Magnetic Test Facility. There are now no other facilities within the 1700-foot diameter isolation zone which would jeopardize the accuracy of magnetic measurements. It is recommended that, unless the magnetic testing program is discontinued, the zone remain free of other structures.

A study of the ambient magnetic noise level in and near the Ames wind tunnel complex was included in the 1973 Master Plan. Findings showed that the ambient magnetic noise level in the Magnetic Isolation Zone remained within acceptable levels. The Unitary Plan Wind Tunnel (N-227) was operating at an increased power level at the time of the test. This tunnel complex is quite large and the closest of all the wind tunnels to the Magnetic Test Facility. It would be the most likely to produce interference, but did not.

VIBRATION ISOLATION

In 1963 Dames and Moore, consultants in applied earth sciences, prepared for Ames Research Center a study of ground vibrations. The study determined the frequencies and amplitudes of ground motion at fourteen selected locations of the Center, with and without the operation of nearby equipment and facilities. The result of those measurements was plotted in the 1973 Master Plan and detailed tabulations are included in the Technical Supplement to the 1968 Plan.

A review of the data indicates that a "vibration-free" area does not exist, and consideration must be given to vibration isolation foundations in the design of buildings containing equipment sensitive to vibrations. The area labeled as Vibration Isolation on the Site Constraints Map has been designated for future use by facilities which are hypersensitive to vibration. This area has one of the lowest general background vibration levels of the entire site.

STATIC TEST AREA

An existing hazard zone is indicated on the Site Constraints Map by two large concentric circles. Each zone corresponds to a different type of failure of a powered model or V/STOL aircraft at the Static Test Area:

(1) **Primary Safety Clearance Zone** — a 1000-foot radius which relates to the maximum predicted flight of an irregular, high-drag object, which is the most probable projectile in the event of tip failure of a test rotor.

(2) **Secondary Safety Clearance Zone** — a 2000-foot radius which depicts the maximum theoretical flight of a streamlined, low-drag object, which is less likely to occur.

Accidents at the Static Test Area are possible because research is constantly expanding the state of aerodynamic knowledge. Prior to construction of the test stand, there had been test failures in the 40- by 80-foot Wind Tunnel, causing damage to that facility. The "safety-trial" aspect of the static test stand will probably guarantee its continued use throughout the time frame of this master plan.

The safety clearance zones (particularly the Primary Clearance Zone) must be recognized when considering site locations for new facilities. Where functional relationships require new facilities to be located within the Primary Safety Clearance Zone, three planning devices should be used:

(1) The building facades facing the Static Test Area should be constructed of penetration-resistant materials.

(2) The buildings should be sited with all facade openings, such as windows, oriented away from the test area.

(3) Buildings should be grouped together to form a protective barrier for any equipment and activities located in open areas near those buildings.

These recommendations apply to areas within the Secondary Safety Clearance Zone to a lesser degree. These precautions will serve equally well to protect building occupants from the noise levels normally associated with powered-model testing at the Static Test Area.

No building should occur within the smallest circle labeled as the Static Test Area. Sensitive acoustical measurements are taken from points around the perimeter of the area and any building within that zone would interfere with those measurements, as well as interfere with the smooth wind flow over the test model.

FIRE TEST

Existing Building N-254 provides facilities for small-scale fire test research. Occasionally, there is a need to test the burning characteristics of larger quantities of experimental materials than is possible under laboratory conditions. The proposed location provides sufficient isolation for carefully controlled burning under direct supervison of the Navy Fire Department. Because of the infrequent usage and the ability to schedule during weather periods with appropriate inversion conditions, fire test operations will not be environmentally detrimental to other facilities or to the surrounding community.

RADIOACTIVITY

Concern over environmental safety has encouraged extensive monitoring of radioactivity by Ames Research Center since 1964:

(1) Daily — individual researchers check their work areas for excessive radiation.

(2) Bimonthly — contracting laboratories conduct surveys to preclude contamination of waste water and work areas.

(3) Annually — contracting laboratories monitor the radioactive levels of soil, vegetation, and waste water at specific and constant sites. A summary of their findings is included in the 1973 Master Plan.

The general radioactive environment at Ames is similar to that of the surrounding community and is due primarily to the atmospheric fallout from international nuclear testing; this has decreased in recent years as a result of controls and limitations. At facility scale, radioactivity is of relatively low intensity and self-contained because only small trace amounts of radioisotopes are used in biological experiments. Shielding is accomplished totally within the confines of the laboratory. As a result, there is presently no need for a remote radioacitvity isolation zone nor any need to incorporate any special site design shielding.

BUILDING HEIGHT RESTRICTIONS

A building height restriction applies over the area in front of the 80- by 120-foot Wind Tunnel intake, as shown on the Site Constraints Map on page 6.5. Uniform air flow into the air intake "funnel" of the wind tunnel would probably be disrupted by any large building located within the restriction zone. Dense tree groups would also have the same effect and may cause test interference from the scattering of leaves into the tunnel enclosure.

Two types of restrictions govern building heights near the Moffett Field runways:

(1) **Navy** — no structures will project upward through a sloping plane created by an angle of one foot of elevation for every seven feet horizontally, beginning on the ground along a line 1000 feet west of the centerline of runway 14R. This sloping plane continues upward to 150 feet in height where it extends horizontally to the west. Buildings may project through this 150-foot horizontal plane if provided with obstruction lighting.

(2) **Federal Aviation Agency** — FAA has review capacity for any structures near the aircraft ramps and V/STOL Research Operations Area.

SECURITY RESTRICTIONS

The Site Constraints Map on page 6.5 indicates several methods of effecting security at Ames; security checkpoints are indicated on page 6.3. The common Ames-Moffett Field complex is surrounded by a perimeter fence which acts to keep unauthorized personnel out of the area. Immediately inside the fence in the underdeveloped portion of the Ames site is a perimeter security road. This road is patrolled frequently by Navy police. At a limited number of gate locations along the security perimeter, public access is continuously monitored by Marine sentries.

The storage area shown on the Site Constraints Map will be surrounded by a fence and have limited emergency access from the west. A road located along the top of the Stevens Creek levee, outside the perimeter fence, may provide an approach to that area, with permission of the Santa Clara Valley Water District. Locked entry into the storage area for Ames personnel will occur via the perimeter security road.

A double security fence will be provided around the Land Use Area designated "Public Facilities". This arrangement will permit unrestricted access during operating hours but will allow the entire area to be secured when the facilities are unoccupied. Similar protective fencing is provided for the Substation West with access for PG&E available from a public road.

The security buffers shown on the Site Constraints Map should remain as open space between the buildings bordering them and the perimeter fence. Attractive landscaping of those areas should be in keeping with the massive scale of the buildings adjacent to them and yet remain fairly open to allow for visual inspection along the perimeter.

Because no security perimeter exists between Ames and Moffett Field, individual building monitoring, visitor registration and personnel badging are utilized as another method of security at Ames. Vehicle patrols throughout the Ames site are frequently conducted to monitor activities.

BUFFERS

The Site Constraints Map indicates two large buffers and an Air Intake Clearance Zone bordering the western edge of the site. They function as noise, visual, safety and security barriers between Ames and the surrounding community. The open space character of these areas, particularly of the northern buffer, can allow an ongoing agricultural use to continue.

The air intake requirements of the 80- by 120-foot Wind Tunnel prohibit any physical obstructions near its intake port. Moderate earth berming, tree planting and a shallow lake constitute the treatment of the Air Intake Clearance Zone and the southern buffer.

The northern buffer may accomodate model storage areas within it. The visual impact of outdoor storage areas can be mitigated by a surrounding series of earth berms and extensive tree planting. This type of landscaping will screen unattractive areas and serve as a backdrop for public oriented buildings.

A storm drainage area (shown on the Site Drainage Plan, 6.15) included in the northern buffer may provide an opportunity for a naturally landscaped water area which can serve as a visual extension of the buffer.

NOISE CONTROL

Noise level measurements have been conducted for many years at Ames to monitor and control the generation of noise by Ames facilities. However, the noise environment at Ames derives from both on-site and off-site noise sources. The significant off-site sources consist of aircraft operations at Moffett Field and vehicular traffic on the Bayshore Freeway. On-site noise emanates primarily from wind tunnels and the Static Test Area.

Noise levels in the surrounding community are discussed briefly in Section 4 and in greater detail in the Environmental Impact Statement prepared for Ames Research Center and referenced in Section 12.

Noise levels within the Center have a distribution of low- and middle-frequency sound similar to the surrounding community, but at significantly higher decibel levels. The high-frequency components of the noise spectrum will be in much greater evidence locally than at a distance of one or two miles.

There are several methods of noise control which affect the process of master planning. The following methods are used and planned at Ames to minimize sound intrusion on-site and into the community.

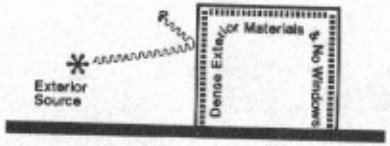
(1) **Construction Techniques** — The most effective method of noise attenuation is achieved by sound insulation of individual buildings that are noise generators. As examples, the 11-foot Transonic Wind Tunnel has been enclosed in an acoustical barrier structure and its blow-down system equipped with a muffler. A muffler has also been installed on the 12-foot Pressure Wind Tunnel. Where enclosure of the source is not feasible, the sides of buildings facing noise sources such as wind tunnels should be constructed of a dense material and should have no apertures. Poured-in-place concrete or heavy pre-cast concrete panels are the best systems available for primary sound isolation.

(2) **Structural Barriers** — Building construction methods suggested above can effectively screen middle and high frequency noise sources from the community and from other portions of the Center by allowing the buildings to block and redirect noise. The density of building presently within the Ames complex aids in this regard.

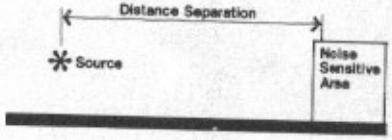
(3) **Building Orientation and Location** — Certain types of noise can be controlled by either directing the noise away from other facilities or by locating the noise source away from noise-sensitive areas. The existing high density of the built-up portion of Ames prevents this type of control in that area. However, as the Center develops northward, noise-sensitive future facilities should be separated from existing and future noise sources. (See also Open Areas described below.)

(4) **Landscape and Earth Buffers** — The effectiveness of buffers at Ames cannot be heavily relied upon to eliminate noise within the Center or in the community. Due to the large radiating surfaces of many of Ames' wind tunnels, the buffers would have to be monumental in size in order to be only moderately effective. However, one and two story noise sources can utilize dense landscape planting and earth berming for partial sound attenuation.

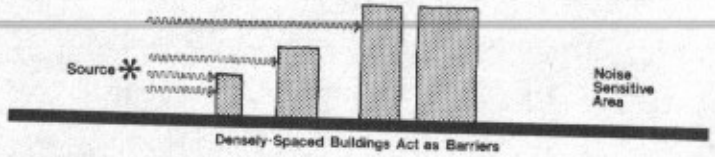
(5) **Open Area** — Where barriers or buffers are ineffective methods of noise control for a particular facility, the use of intervening open space is an alternative. By doubling the distance between a noise source and an affected facility, the atmosphere will attenuate the sound to one-fourth the previous perceived noise level. This distance/noise level ratio means that a large amount of open space between a noise source and the surrounding community will prevent much of the noise from being a disturbance.



Construction Techniques

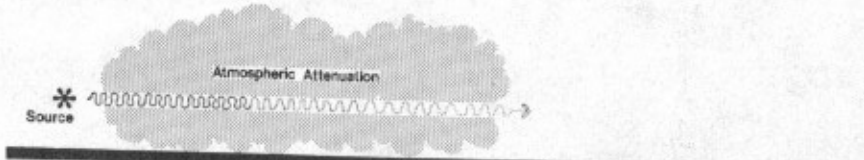


Building Orientation & Location



Structural Barriers

Landscaping & Earth Buffers

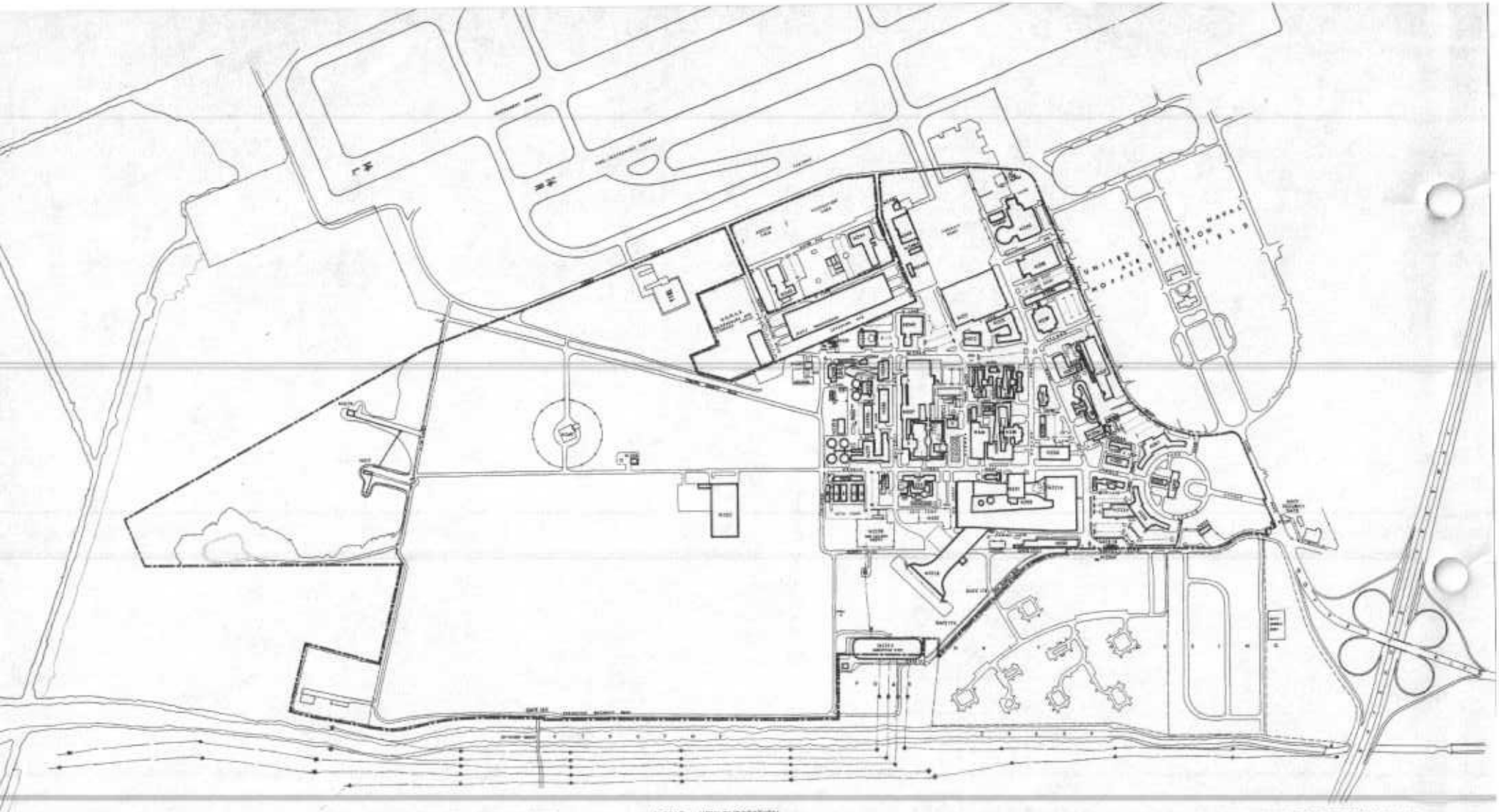


Open Space

Noise Control Methods

71 Aerial Photograph


0 75 150 300 600 1200 feet
183 366 meters
7.2



N-200 ADMINISTRATION BUILDING
N-201 AUDITORIUM
N-202 MAIN LIBRARY
N-202A COMPUTATIONAL FLUID DYNAMICS BLDG.
N-203 PHOTOTECHNOLOGY LABORATORY
N-204 ADMINISTRATIVE SUPPORT BUILDING
N-204A SPACE TECHNOLOGY BUILDING
N-205 PILOT MODEL OF 3.5-FOOT H.W.T.
N-206 12-FOOT PRESSURE W.T.
N-206A 12-FOOT PRESSURE W.T. AUX. BUILDING
N-207 HQ. ARMY RESEARCH & TECHNOLOGY LABORATORY
N-207A HPF SHOCK TUBE LABORATORY
N-208 UNDERGROUND BALLISTIC RANGE
N-209 PRESSURIZED BALLISTIC RANGE
N-210 FLIGHT SYSTEMS RESEARCH LAB.
N-211 FLIGHT SUPPORT FACILITY
N-212 MODEL DEVELOPMENT BUILDING

N-213 RESEARCH SUPPORT BUILDING
N-214 PAINT SHOP
N-215 ARMY AEROMECHANICS LAB. & 7 x 10 FT. W.T. NO. 1
N-216 7 x 10-FOOT W.T. NO. 2 (ARMY AEROMECHANICS LAB)
N-216A MODEL PREPARATION BUILDING
N-216B ARMY MODEL ASSEMBLY BUILDING
N-217 MAGNETIC STANDARDS LABORATORY
N-217A MAGNETIC TEST FACILITY (20-FT. COIL)
N-218 14-FOOT TRANSONIC W.T.
N-218A ELECTRICAL EQUIPMENT BUILDING
N-218B FAN VERIFICATION BUILDING
N-219 ELECTRICAL SERVICES BUILDING
N-220 TECHNICAL SERVICES BUILDING
N-221 40 x 80-FOOT WIND TUNNEL
N-221A 20-G CENTRIFUGE
N-221B 80 x 120 FOOT WIND TUNNEL

N-221C NEW SUBSTATION
N-222 2 x 2-FOOT TRANSONIC W.T.
N-223 CHEMICAL RESEARCH PROJECTS FACILITY
N-225 ELECTRICAL SUBSTATION
N-225A ELECTRICAL SUBSTATION WEST
N-225B ELECTRICAL SUBSTATION NORTH
N-226 6 x 6-FOOT SUPERSONIC W.T.
N-227 UNITARY PLAN W.T. BUILDING
N-227A 11-FOOT TRANSONIC W.T.
N-227B 9 x 7-FOOT SUPERSONIC W.T.
N-227C 9 x 7-FOOT SUPERSONIC W.T.
N-227D UNITARY PLAN W.T. AUX. BUILDING
N-228 MAINTENANCE AND SERVICES BUILDING
N-229 EXPERIMENTAL FLUID DYNAMICS FACILITY (3.5-FT. H.W.T.)
N-229A 3.5-FOOT H.W.T. AUX. BUILDING
N-229B 3.5-FOOT H.W.T. MODEL STORAGE BLDG.
N-230 PHYSICAL SCIENCES RESEARCH LAB.

N-231 FLUID DYNAMICS LABORATORY
N-233 CENTRAL COMPUTER FACILITY
N-233A INSTITUTE FOR ADVANCED COMPUTATION
N-234 THERMAL PROTECTION LABORATORY
N-234A THERMAL PROTECTION LAB. BOILER
N-235 CAFETERIA BUILDING
N-236 BIOSCIENCE LABORATORY
N-236,A,B,C,D,E ANIMAL LABORATORIES
N-237 HYPERVELOCITY FREE-FLIGHT FACILITY
N-238 ARC JET LABORATORY
N-239 LIFE SCIENCES RESEARCH LABORATORY
N-239A LIFE SCIENCES RES. LAB. HIGH BAY
N-240 AIRBORNE MISSIONS AND APPLICATIONS BUILDING
N-241 ADMINISTRATIVE MANAGEMENT BUILDING
N-242 SYSTEMS DEVELOPMENT FACILITY
N-243 FLIGHT & GUIDANCE SIMULATION LAB.

N-243A SIMULATION EQUIPMENT BUILDING
N-244 SPACE PROJECTS FACILITY
N-245 SPACE SCIENCES RESEARCH LABORATORY
N-246 MODEL CONSTR. FACILITY
N-247 40 x 80-FOOT W.T. OFFICES
N-248 AIRCRAFT SERVICING FACILITY
N-248A GROUND SUPPORT EQUIPMENT BUILDING
N-248B GROUND SUPPORT EQUIPMENT BLDG. NO. 2
N-248C RSRA CALIBRATION FACILITY
N-249 STATIC TEST STAND
N-250 COMPRESSOR BUILDING
N-251 MOTOR POOL
N-252 PROPANE FUEL FACILITY
N-253 VISITOR RECEPTION BUILDING
N-253A SECURITY STATION
N-254 FIRE TEST FACILITY
N-255 SUPPLY SUPPORT FACILITY

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

7.3 Existing Facilities

7 Buildings & Structures

EXISTING FACILITIES

The Existing Facilities Map on the adjacent page indicates the location of all permanent facilities at Ames Research Center. On the following pages is a tabulation of data related to those facilities. This information has been coordinated with Ames' real property officer as of December 31, 1980, and reconciled with current Ames real property records and physical space utilization records. The following is an explanation of the facility tabulation:

Facility Number — This is the Center's official numerical designation for major and minor buildings or a group of related structures.

Facility Name — The official name of the building or structure. In the tabulation no official name or number has been assigned to trailers or portable buildings.

Classification Code — The accounting code generated by the function of the building.

Year Authorized — The year in which funds for construction of the facility were made available.

Year Completed — The year in which construction of the facility was finished and its primary research equipment became operational.

Type of Construction — The first code entry designates:

P - Permanent

S - Semi-permanent

T - Temporary

The second entry (preceded by a slant) indicates the major structural frame:

C - Concrete, reinforced or pre-cast

M - Masonry

S - Steel

W - Wood

Where appropriate, combinations of these framing materials are indicated sequentially, with the first frame letter reflecting the major material used.

Total Gross Floor Area — The total gross floor area of a building in square meters, measured from its exterior perimeter. Square feet in each case are shown in parentheses.

Net Usable Floor Area — The total net enclosed floor area of a building in square meters. Excluded are the perimeter walls, interior structural walls, interior structural columns and partitions and utilitarian areas, such as: corridors, bathrooms, utility chases or stairways. Square feet in each case are shown in parentheses.

Number of Floors — The number of floors. "R" indicates that there are usable rooms on the roof, which are not included in the number of floors. "M" or "B" indicate the presence of a mezzanine or basement, respectively, also not included in the floor count.

Basement — The number of basement levels.

High Bay Area — Where appropriate, the net usable are in square meters (which is already included as part of the Net Usable Floor Area), followed by the clear height in meters. If this height is determined by the hook height of an overhead crane, the number is annotated with an "H". These areas and heights in feet are shown in parentheses.

Initial Use — The purpose for which the facility was originally intended, using such descriptive space utilization categories as office, laboratory, shop, hangar, etc. where appropriate.

Current Primary use — The major use of the facility as of December 1980, using the same procedure as for "Initial Use".

Suitability — The following code designations are correlated to "Current Primary Use":

A - Facility which was intended for its present use and is fully suitable for such use.

B - Facility which was intended for a use different than its present use and should be considered for reversion to its initially intended use if: (1) a requirement exists and (2) adequate and suitable replacement can be provided.

C - Facility which is sub-standard for its present use but which can be economically upgraded for such present or other use if: (1) a requirement exists and (2) adequate and suitable replacement can be provided.

D - Facility which is sub-standard for its present use but which cannot be economically upgraded and which should be considered for a lower functional use or disposal.

E - Facilites such as trailers and temporary structures (not tabulated for this Master Plan updating).

Current Secondary Uses — Secondary or ancillary use of the facility, using the same procedure as for "Initial Use".

Suitability — One of the above code designations "A" through "E" as related to "Current Secondary Uses".

Remarks — Special features or capabilities of the facility.

Book Value — Current as of December 31, 1980.

FACILITY NUMBER	FACILITY NAME	CLASSIF. CODE	YEAR AUTH.	YEAR COMP.	TYPE OF CONST.	TOTAL GROSS FLOOR AREA		NET USEABLE FLOOR AREA		NO. OF FLOORS	BASE-MENT	HIGH BAY AREA
						SQUARE METERS	SQUARE FEET	SQUARE METERS	SQUARE FEET			
N-200	ADMINISTRATION BUILDING	610-10	1942	1943	P/C	2,571	(27,670)	1,688	(18,174)	2	1	
N-201	AUDITORIUM	610-10	1943	1944	P/C	1,387	(14,932)	851	(9,157)	1	1	
N-202	MAIN LIBRARY	740-76	1949	1950	P/C	2,464	(26,517)	1,765	(18,994)	2	1	
N-202A	COMPUTATIONAL FLUID DYNAMICS BUILDING	390-00	1965	1965	P/C	938	(10,094)	664	(6,984)	2		
N-203	PHOTOTECHNOLOGY LABORATORY	610-20	1941	1942	P/C-S	2,144	(23,080)	1,459	(15,706)	2	1	
N-204	ADMINISTRATIVE SUPPORT BUILDING	610-10	1952	1955	S/C-W	1,384	(14,681)	1,069	(10,858)	2		
N-204A	SPACE TECHNOLOGY BUILDING	310-20	1952	1955	P/C	587	(6,314)	494	(5,317)	2		
N-205	PILOT MODEL 3.5-FT. HYPERSONIC W.T.	330-20	1950	1957	P/C	234	(2,517)	198	(2,125)	1		
N-206	12-FT. PRESSURE WIND TUNNEL	330-30	1944	1946	P/C	1,605	(17,278)	731	(7,871)	3		
N-206A	12-FT. PRESSURE WIND TUNNEL AUXILIARIES BLDG.	331-30	1944	1946	P/C	1,114	(11,996)	856	(9,216)	2		
N-207	HQ. ARMY RESEARCH & TECHNOLOGY LABORATORY	330-40	1944	1946	P/C	2,129	(22,915)	1,781	(19,173)	2		
N-207A	HFF SHOCK TUBE LABORATORY	390-00	1948	1958	P/C	279	(3,000)	237	(2,556)	1		279 M² @ 6.1 M-H (3,000 FT² @ 20 FT-H)
N-208	UNDERGROUND BALLISTIC RANGE	390-00	1950	1951	P/C	209	(2,255)	148	(1,594)	1		
N-209	PRESSURIZED BALLISTIC RANGE	390-00	1956	1957	P/C	162	(1,740)	140	(1,512)	1		
N-210	FLIGHT SYSTEMS RESEARCH LABORATORY	310-40	1940	1940	P/C	7,365	(79,279)	5,515	(59,370)	2R		1,144 @ 9.1-H (12,310 @ 30-H)
N-211	FLIGHT SUPPORT FACILITY	310-40	1944	1946	P/C	14,304	(153,976)	12,403	(133,511)	2		
N-212	MODEL DEVELOPMENT BUILDING	220-11	1950	1950	P/C	1,429	(15,380)	1,288	(13,869)	1M		896 @ 6.1-H (9,641 @ 20-H)
N-213	RESEARCH SUPPORT BUILDING	610-10	1948	1950	P/C	9,349	(100,633)	5,921	(63,734)	2R	1	
N-214	PAINT SHOP	219-11	1942	1942	P/C	266	(2,860)	228	(2,454)	1		
N-215	ARMY AEROMECHANICS LAB. & 7x10 FT. W.T. NO. 1	330-10	1940	1941	P/C	1,477	(15,571)	1,108	(11,927)	2		
N-216	7x10-FT. W.T. NO. 2 (ARMY AEROMECHANICS LAB.)	330-10	1940	1941	P/C	520	(5,599)	433	(4,662)	1		
N-216A	MODEL PREPARATION BUILDING	330-10	1967	1966	P/C	359	(3,867)	359	(3,867)	1		
N-216B	ARMY MODEL ASSEMBLY BUILDING	330-10	1969	1969	P/C	462	(4,971)	357	(3,840)	1		
N-217	MAGNETIC STANDARDS LAB.	310-20	1964	1964	P/W	79	(846)	71	(767)	1		
N-217A	MAGNETIC TEST FACILITY (20-FT. COIL)	310-20	1971	1971	P/W	200	(2,158)	193	(2,080)	1		
N-218	14-FT. TRANSONIC WIND TUNNEL	330-60	1940	1941-55	P/C	3,553	(38,244)	2,834	(30,501)	4		
N-218A	ELECTRICAL EQUIPMENT BUILDING	219-11	1940	1941	P/C	501	(5,392)	457	(4,920)	1	1	

A

INITIAL USE	CURRENT PRIMARY USE	SUIT-ABILITY	CURRENT SECONDARY USES	SUIT-ABILITY	REMARKS	BOOK VALUE	FACILITY NUMBER
MANAGEMENT OFFICES AND CONFERENCE ROOMS	SAME AS INITIAL USE	A	COMMUNICATIONS	A	HEAD ADMINISTRATION BUILDING	$1,462,052	N-200
AUDITORIUM AND CAFETERIA	AUDITORIUM	C	BASEMENT OFFICES	A	SEATING CAPACITY: 380 MULTI-MEDIA CAPABILITY	850,980	N-201
LIBRARY AND ADMINISTRATION SERVICES	LIBRARY		NONE		—	993,571	N-202
OAST DIVISION OFFICES	COMPUTATIONAL FLUID DYNAMICS OFFICES	A	APPLIED COMPUTATIONAL AERO-DYNAMICS OFFICES	A	—	—	N-202A
SCIENCE LAB FOR DESIGN AND CONSTRUCTIONOF INSTRUMENTS	PHOTOTECHNOLOGY	A	FISCAL MANAGEMENT OFFICES	A	SOLAR HOT WATER SYSTEM INSTALLED	1,083,255	N-203
LOW-DENSITY HEAT TRANSFER	PUBLIC AFFAIRS OFFICE TECHNOLOGY UTILIZ. OFF.	A	NASA OFFICE OF INSPECTOR GENERAL	C	FIRST FLOOR REHAB. 1980-81 FOR BRIEFING ROOM & OFFICES	2,097,232	N-204
SHOPS	VERTICAL GUN AND LABS	A	SUPPORTING SHOPS	A	—	96,552	N-204A
SAME AS TITLE (3.5 - FT TEST SECTION)	SAME AS TITLE	C	NONE		—	47,732	N-205
TEST CHAMBER, SHOPS, OFFICES, LOW TURBULENCE WIND TUNNEL (12 - FT TEST SECTION)	LANDING AERODYNAMICS CHARACTERISTICS	A	OFFICES FOR PROPERTY MANAGEMENT BRANCH	C	M = 0 TO 1.0, MODERNIZATION PROPOSED	4,801,299	N-206
SAME AS TITLE	SAME AS TITLE	A	NONE		—	1,142,208	N-206A
1 x 3-FT SUPERSONIC W.T. OFFICES, TEST CHAMBER, SHOPS, MACH RANGE	OFFICES REHABILITATED FOR U.S. ARMY	A	ELECTRIC ARC JET LABS & SUPPORT AREAS	C	TUNNEL ON STANDBY, M = 0.4 TO 0.9 M = 1.4 TO 6.0	5,185,826	N-207
SAME AS TITLE	EQUIPMENT STORAGE	A	NONE		UNDERUTILIZED, REHAB. PROPOSED	79,340	N-207A
SAME AS TITLE	NONE	A	NONE		ON STANDBY	100,761	N-208
SAME AS TITLE	NONE	A	NONE		ON STANDBY	993,924	N-209
FLIGHT RESEARCH LAB. & HANGAR	FLIGHT RESEARCH	A	FLIGHT SIMULATORS	A	NEW ROTORCRAFT CONTROLS LABS, 1980-81	5,871,033	N-210
HANGAR, OFFICES, SHOPS	HANGAR	A	OFFICES & SHOPS	C	—	3,345,036	N-211
HEAVY METALS	MODEL SHOP	A	LOCKER ROOM	C	HAS A MEZZANINE OF 209 SQ M (2,248 SQ FT) NET	374,776	N-212
LABS, OFFICES, SHOPS	OFFICES AND LABORATORIES	A	SHOPS	A&B	—	3,413,260	N-213
SAME AS TITLE	SAME AS INITIAL USE	C	NONE		—	59,544	N-214
OFFICES & LABS., SUBSONIC WIND TUNNEL	SUBSONIC WIND TUNNEL	A	DISPENSARY	A	M = 0 TO 0.33, MODERNIZATION PROP-OSED	1,134,388	N-215
SUBSONIC WIND TUNNEL	SAME AS INITIAL USE	A	NONE		M = 0 TO 0.34	—	N-216
SAME AS TITLE	SAME AS INITIAL USE	A	ROTOR TEST ROOM	A	—	1,763,978	N-216A
SAME AS TITLE	SAME AS INITIAL USE	A	STORAGE	A	—	—	N-216B
STANDARDS LABORATORY FOR CALIBRATING INSTRUMENTS	SAME AS INITIAL USE	A	CERTIFICATION OF FLIGHT MAGNETOMETERS	A	CAN TEST PAYLOADS UP TO 0.8M (2.5 FT) IN DIAMETER	25,100	N-217
NULL FIELD FOR MAGNETIC MAPPING OF SPACECRAFT	SAME AS INITIAL USE	A	MAGNETICALLY CONTROLLED ENVIRONMENT FOR SPACE FLIGHT PROJECTS	A	CAN TEST SPACECRAFT & PAYLOADS UP TO 3.0M (10 FT) IN DIAMETER	142,775	N-217A
16-FT SUBSONIC WIND TUNNEL	AERO TESTS IN 14-FT TRANSONIC WIND TUNNEL	A	FACILITIES, SERVICES, SHOPS, OFFICES & SUPPLIES	C	M = 0.6 TO 1.2, REHAB. & MODIFICATION PROPOSED	11,949,804	N-218
SAME AS TITLE	SAME AS TITLE	A	NONE		—	11,375	N-218A

FACILITY NUMBER	FACILITY NAME	CLASSIF. CODE	YEAR AUTH.	YEAR COMP.	TYPE OF CONST.	TOTAL GROSS FLOOR AREA		NET USEABLE FLOOR AREA		NO. OF FLOORS	BASE-MENT	HIGH BAY AREA
						SQUARE METERS	SQUARE FEET	SQUARE METERS	SQUARE FEET			
N-218B	FAN VERIFICATION BUILDING	330-10	1975	1977	T/W	32	(340)	32	(340)	1		
N-219	ELECTRICAL SERVICES BUILDING	219-11	1940	1941	P/C	1,501	(16,160)	1,117	(12,023)	2		
N-220	TECHNICAL SERVICES BUILDING	220-10	1940	1940	P/C	3,520	(37,888)	2,963	(31,599)	2		1,017 M² @ 9.1M-H (10,951 FT² @ 30 FT-H)
N-221	40 x 80-FT WIND TUNNEL	330-10	1941	1944	P/C	14,020	(150,906)	9,847	(105,995)	3		
N-221A	20-G CENTRIFUGE	390-00	1964	1964	P/C	516	(5,554)	495	(5,326)	1		
N-221B	80 x 120-FT SUBSONIC WIND TUNNEL	330-10	1977	—	P/SC	1,596	(5,237)	1,596	(5,237)	1		
N-222	2 x 2-FT TRANSONIC WIND TUNNEL	330-60	1950	1951	P/C	311	(3,348)	306	(3,295)	1		
N-223	CHEMICAL RESEARCH PROJECTS FACILITY	390-00	1955	1955	P/C	2,145	(23,092)	2,024	(21,786)	1		
N-225	ELECTRICAL SUBSTATION	812-10	1940	1940	P/S-C	2,787	(30,000)		N.A.	N.A.		
N-225A	ELECTRICAL SUBSTATION WEST	812-10	1978	1979	P/S	11,148	(120,000)		N.A.	N.A.		
N-225B	ELECTRICAL SUBSTATION NORTH	812-10	1940-78	1979	P/S	5,110	(55,000)		N.A.	N.A.		
N-226	6 x 6-FT SUPERSONIC WIND TUNNEL	330-40	1946	1946	P/C	3,101	(33,383)	2,158	(23,227)	2		
N-227	UNITARY PLAN WIND TUNNEL BUILDING	330-40	1952	1955	P/C	4,528	(48,735)	2,985	(32,133)	3		690 @ 6.1-H (7,432 @ 20-H)
N-227A	11-FT TRANSONIC WIND TUNNEL	330-60	1952	1956	P/C	1,854	(19,960)	1,389	(14,947)	2		
N-227B	9 x 7-FT SUPERSONIC WIND TUNNEL	330-40	1952	1955	P/C	1,841	(19,820)	1,036	(11,150)	2		
N-227C	8 x 7-FT SUPERSONIC WIND TUNNEL	330-40	1952	1956	P/C	1,282	(13,800)	966	(10,400)	2		
N-227D	UNITARY PLAN W.T. AUXILIARIES BLDG.	331-40	1952	1955	P/C	1,125	(12,110)	746	(8,030)	1		
N-228	MAINTENANCE AND SERVICES BUILDING	219-11	1952	1949	T/S	743	(8,000)	490	(5,275)	1		
N-229	EXPERIMENTAL FLUID DYNAMICS FACILITY (3.5-FT. H.W.T.)	330-20	1958	1961	P/C	4,313	(46,426)	3,186	(34,291)	2		
N-229A	3.5-FT HYPERSONIC WIND TUNNEL AUXILIARIES BUILDING	331-20	1958	1961	P/C	2,223	(23,926)	1,836	(19,767)	1	1	
N-229B	3.5-FT HYPERSONIC WIND TUNNEL MODEL STORAGE BUILDING	330-20	1975	1976	P/S	450	(4,847)	437	(4,699)	1		
N-230	PHYSICAL SCIENCES RESEARCH LABORATORY	310-10	1959	1960	P/C	2,929	(31,523)	1,887	(20,317)	2		327 @ 6.4-H (3,516 @ 21-H)
N-231	FLUID DYNAMICS LABORATORY	330-40	1959	1960	P/C	687	(7,396)	602	(6,476)	1		
N-233	CENTRAL COMPUTER FACILITY	310-15	1960	1990	P/C	4,855	(52,268)	3,151	(33,917)	2	1	
N-233A	INSTITUTE FOR ADVANCED COMPUTATION	310-15	1971	1972	P/C	2,942	(31,664)	1,457	(15,682)	1	1	
N-234	THERMAL PROTECTION LABORATORY	310-40	1961	1962	P/C	2,292	(24,667)	1,534	(16,515)	2	1	
N-234A	THERMAL PROTECTION LAB. BOILER	310-40	1961	1962	P/C	206	(2,216)	183	(1,967)	3		34 @ 12.2-H (362 @ 40-H)
N-235	CAFETERIA BUILDING	740-28	1964	1964	S/C-W	869	(9,350)	675	(7,263)	1		
N-236, A, B,C,D,E	BIOSCIENCE LABORATORY	310-30	1963	1964	P/C	3,560	(38,320)	2,555	(27,507)	2R		

INITIAL USE	CURRENT PRIMARY USE		CURRENT SECONDARY USES	SUIT-ABILITY	REMARKS	BOOK VALUE	FACILITY NUMBER
FAN STUDY FOR 40 x 80 FT W.T. MODIFICATION	NONE	A	NONE	A	RETAIN UNTIL W.T. MODIFICATION IS ACCEPTED	N.A.	N-218B
UTIL. SERVICES, SHIPPING & RECEIVING	MATERIALS RESEARCH, DEVELOPMENT & FABRICATION	B	ELECTRICAL MAINTENANCE SHOP	A	REHABILITATION & MODIFICATION PROPOSED	$ 447,134	N-219
MACHINE AND MODEL SHOPS	MACHINE SHOPS	A	NONE		—	656,398	N-220
TEST CHAMBER, SHOP, OFFICES, SUBSONIC W.T.	HIGH LIFT AND V/STOL AERODYNAMICS	A	"HEALTH IMPROVEMENT FACILITY" LOCKER ROOM, 1961	A	PRESENT MODIFICATION WILL ADD 80 x 120 FT TEST SECTION	17,415,757	N-221
SAME AS TITLE	G-TOLERANCE	A	NONE	C	—	182,712	N-221A
SAME AS TITLE	UNDER CONSTRUCTION	A	NONE	A	UNDER CONSTRUCTION	N.A.	N-221B
BALLISTIC RANGE & OFFICES	BASIC AIRFOIL RESEARCH	C	TESTING WITH HEAVY GASES		MODERNIZATION PROPOSED	1,759,072	N-222
SAME AS TITLE	POLYMER CHEMISTRY LABS.	C	OFFICES	C	—	3,512,738	N-223
	SAME AS TITLE	A	SAME	A	BUS CAPACITY 456 MVA TRANSFORMER CAPACITY 426 MVA	INCLUDED IN "OTHER STRUCTURES"	N-225
					—	—	N-225A
OFFICES, TEST CHAMBER LABS, SHOPS	AERODYNAMIC TESTS	A	OFFICES FOR CONTRACTOR	C	M = 0.25 TO 2.2	6,432,109	N-225B
OFFICES, LABS & SHOPS	OFFICES, LABS, & SHOPS	A	NONE			3,462,353	N-226
11-FT TRANSONIC W.T.	INLET AND AERO TESTS	A	NONE		M = 0.4 TO 1.4	11,047,074	N-227
9 x 7 FT SUPERSONIC W.T.	INLET AND AERO TESTS	A	NONE		M = 1.55 TO 2.55	8,990,713	N-227A
8 x 7 FT SUPERSONIC W.T.	INLET AND AERO TESTS	A	NONE		M = 2.45 TO 3.5	9,097,360	N-227B
SAME AS TITLE	SAME AS TITLE	A	NONE		—	2,529,769	N-227C
CONST. BLDG., 0.3-M (1-FT) SHOCK TUNNEL	MAINTENANCE SHOP	D	TRAINING SHOP	D	DEMOLITION PROPOSED IF OCCUPANTS CAN BE RELOCATED	1,750,346	N-227D
TEST CHAMBERS, OFFICES, LABS & SHOPS	STABILITY & AEROTHERMAL TESTS	A	OFFICES, LABORATORIES, SHOPS	A	TEST MACH. NOS. 5, 7, 10	16,891,807	N-228
SAME AS TITLE	SAME AS TITLE	A	NONE		—	—	N-229
SAME AS TITLE	SAME AS TITLE	A	NONE		—	—	N-229A
LABORATORIES, OFFICES	BASIC RESEARCH	A	NONE		—	1,522,409	N-229B
TEST CHAMBERS, OFFICES, LAB	TESTS TO VERIFY 3-D CODES FOR VISCOUS FLO	A	NONE		TEST MACH. NOS. 0.1 TO 3.0	3,305,528	N-230
COMPUTER BAYS, OFFICES	VARIOUS COMPUTERS	A	OFFICES AND LABS	A	ADDITION PROPOSED	3,293,575	N-231
ILLIAC IV COMPUTER & OFFICES	ILLIAC IV COMPUTER	A	OFFICES AND LABS	A	ADDITION PROPOSED	1,207,926	N-233
TEST AREAS, LABS, OFFICES, SHOPS, ARC HEATED TUNNELS	HEAT SHIELD TESTS	A	OFFICES		M = 2.5 TO 14	10,561,204	N-233A
SAME AS TITLE	SAME AS TITLE	A	—		—	579,623	N-234
CAFETERIA	CAFETERIA	A	CONFERENCES AND EMPLOYEE RECREATION ACTIVITIES	A	CAPACITY 370 TO 436 AVERAGE USE, SPLIT SHIFT 500 TO 600	284,807	N-234A
LABS, ANIMAL HOLDING AREAS, OFFICES	LABORATORIES & FOUR ANIMAL HOLDING AREAS	A	OFFICES	A	ANIMAL RECEIVING LAB. HAS BEEN ADDED, N-236 E	1,826,627	N-235
							N-236

FACILITY NUMBER	FACILITY NAME	CLASSIF. CODE	YEAR AUTH.	YEAR COMP.	TYPE OF CONST.	TOTAL GROSS FLOOR AREA		NET USEABLE FLOOR AREA		NO. OF FLOORS	BASE-MENT	HIGH BAY AREA
						SQUARE METERS	SQUARE FEET	SQUARE METERS	SQUARE FEET			
N-237	HYPERVELOCITY FREE FLIGHT FACILITY	330-20	1963	1966	P/C	5,610	(60,384)	3,780	(40,685)	2	1	
N-238	ARC JET LABORATORY	330-40	1964	1966	P/C	1,582	(17,030)	1,451	(15,614)	1	1	
N-239	LIFE SCIENCES RESEARCH LABORATORY	310-30	1964	1965	P/C	11,694	(125,876)	7,190	(77,395)	3R	1	
N-239A	LIFE SCIENCES RESEARCH LABORATORY HIGH BAY	310-30	1964	1966	P/C	2,646	(28,485)	2,470	(26,585)	2		881 M² @ 6.1 M-H (9,478 FT² @ 20 FT-H)
N-240	AIRBORNE MISSIONS AND APPLICATIONS BLDG.	310-20	1964	1967	P/C	3,844	(41,376)	3,350	(36,060)	2		561 @ 5.8-H (6,036 @ 19-H)
N-241	ADMINISTRATIVE MANAGEMENT BUILDING	610-10	1964	1965	P/C	5,794	(62,370)	3,835	(41,283)	2	1	
N-242	SYSTEMS DEVELOPMENT FACILITY	390-00	1964	1967	P/C	2,582	(27,794)	1,771	(19,029)	2		252 @ 6.4-H (2,708 @ 21-H) 137 @ 29.3-H (1,473 @ 96-H)
N-243	FLIGHT & GUIDANCE SIMULATION LABORATORY	310-41	1965	1967	P/C	9,625	(103,610)	6,739	(72,536)	2	1	1,105 @ 18.3-H (11,889 @ 60-H)
	(a) FLIGHT SIMULATION FOR ADV. AIRCRAFT	310-41	1965	1969	P/C	1,033	(11,116)		N.A.	2		
	(b) SPACE FLIGHT GUIDANCE RESEARCH FACILITY	310-41	1963	1971	P/C	1,231	(13,248)		N.A.	2	1	
	(c) VERTICAL MOTION SIMULATOR	310-41	1975	1976	P/C	375	(4,036)		N.A.	2		236 @ 33.5-H (2,536 @ 110-H)
N-243A	SIMULATION EQUIPMENT BUILDING	310-41	1965	1967	P/C	920	(9,900)	828	(8,913)	2	1	409 @ 7.9-H (4,398 @ 26-H)
N-244	SPACE PROJECTS FACILITY	310-21	1965	1967	P/C	7,583	(81,626)	4,911	(52,858)	2R	1	785 @ 7.0-H (8,451 @ 23-H)
N-245	SPACE SCIENCES RESEARCH LABORATORY	310-20	1969	1971	P/C	7,079	(76,200)	4,398	(47,340)	2R	1	358 @ 9.4-H (3,849 @ 31-H)
N-246	MODEL CONSTRUCTION FACILITY	220-11	1972	1975	P/S	3,387	(36,455)	3,126	(33,645)	1		2,787 @ 12.2-H (30,000 @ 40-H)
N-247	40 x 80-FT WIND TUNNEL OFFICES	610-90	1972	1975	P/C	1,043	(11,224)	537	(5,778)	2		
N-248	AIRCRAFT SERVICING FACILITY	310-40	1972	1973	P/S	3,212	(34,573)	2,925	(31,483)	1		
N-248A	GROUND SUPPORT EQUIPMENT BUILDING	310-40	1973	1974	P/S	373	(4,010)	373	(4,010)	1		
N-248B	GROUND SUPPORT EQUIPMENT BUILDING NO. 2	310-40	1976	1976	P/S	279	(3,000)	279	(3,000)	1		
N-248C	RSRA CALIBRATION FACILITY	310-40	1978	1978	P/S	232	(2,500)	232	(2,500)	1		232 @ 7.3-H (2,500 @ 24-H)
N-249	STATIC TEST STAND	310-41	1973	1974	P/C	115	(1,238)	82	(885)	B	1	
N-250	COMPRESSOR BUILDING	890-25	1974	1975	P/S	289	(3,113)	289	(3,113)	1		
N-251	MOTOR POOL	219-10	1974	1975	P/S	348	(3,744)	348	(3,774)	1		
N-252	PROPANE FUEL FACILITY	411-80	1965	1966	P/S		N.A.		N.A.	1		
N-253	VISITOR RECEPTION BUILDING	610-10	1975	1977	P/C	293	(3,156)	166	(1,791)	1		
N-254	FIRE TEST FACILITY	390-00	1976	1979	P/S	182	(1,967)	148	(1,590)	1		148 @ 12 (1,590 @ 40)
N-255	SUPPLY SUPPORT FACILITY	610-30	1977	1978	P/C	7,234	(77,889)	7,072	(76,122)	2		1,394 @ 4.9-H (15,000 @ 16-H) 4,183 @ 6.4 (45,022 @ 21)

INITIAL USE	CURRENT PRIMARY USE	SUIT-ABILITY	CURRENT SECONDARY USES	SUIT-ABILITY	REMARKS	BOOK VALUE	FACILITY NUMBER
TEST CHAMBERS, LABS, OFFICES	OFFICES, SHOPS & LABORATORIES	A	NONE	A	—	$ 5,869,360	N-237
VARIOUS TEST CHAMBERS	HEAT SHIELD PANEL TESTING & ARC JET DEVELOPMENT	A	NONE	A	HIGH ENTHALPY FACILITIES	7,738,301	N-238
LIFE SCIENCE LABORATORIES, OFFICES	LIFE SCIENCE RESEARCH	A	NONE	A	FIRST FLOOR REHAB. & MODIFICATION FOR COMPUTER FACILITIES, 1980	7,949,674	N-239
LIFE SCIENCE LABORATORIES	LABORATORIES & SIMULATORS	A	A FEW OFFICES	C	LUNAR RECEIVING LAB. IS ON STAND BY	—	N-239A
LABS, OFFICES	AIRBORNE MISSIONS & APPLICATIONS, LIFE SCIENCE SPACE-FLIGHT EXPERIMENTS	A	TELECOMMUNICATIONS		LIFE SCIENCES ADDITION, 1980-81 FLIGHT EXPERIMENT FACILITY (L-1)	2,257,006	N-240
OFFICES, MAIL ROOMS, COMMUNICATIONS AND PRINTING	OFFICES	A	MAILROOM, FILES, COMMUNICATIONS, PRINTING	A	—	1,575,501	N-241
STRUCTURAL DYNAMICS TEST AREAS, SHOPS, OFFICES	SAME AS TITLE	A	—	A	—	2,072,701	N-242
TEST AREAS, COMPUTER LABS, OFFICES	TEST AREAS, COMPUTER LABS, OFFICES	A	SEE PRIMARY USES UNDER (a), (b), & (c)		—	19,877,143	N-243
SIM. ADV. AIRCRAFT CONCEPTS	AIRCRAFT HANDLING QUALITIES	A	AIRCRAFT CERTIFICATION & ACCIDENT INVESTIGATIONS	A	INTERCHANGABLE CAB WORKSHOP ASSOCIATED	—	
MOTION SIMULATOR (CENTRIFUGE)	NONE	A	NONE	A	TO BE CONVERTED TO A 200G GEOTECHNICAL CENTRIFUGE, 1982-83	—	
APPROACH & LANDING SIMULATION	SAME AS INITIAL USE	A	VTOL, SPACE SHUTTLE SIMULATION		—	—	
SAME AS TITLE	SAME AS TITLE	A	—		—	—	N-243A
TEST AREAS, LABS, OFFICES	SPACE PROJECTS, DEVELOPMENT & MANAGEMENT	A	RELIABILITY AND QUALITY ASSURANCE TESTS		MODIFICATION FOR FIRE SAFETY, 1982	2,640,202	N-244
LABS, SUPPORT AREAS, OFFICES	SAME AS TITLE	A	LECTURE ROOM FOR 100 PEOPLE	A	MODIFICATION FOR FIRE SAFETY 1962	2,505,918	N-245
SHOPS & MODEL CHECK OUT	SHOPS & MODEL CHECK OUT	A	—		—	1,017,881	N-246
OFFICE	OFFICE	A	—		—	337,614	N-247
HANGAR	HANGAR	A	OFFICES	A	PREFAB. "NOSEDOCK" FOR C-141 WITH TWO ADDITIONS FOR OFFICES	948,810	N-248
AIRCRAFT SUPPORT EQUIP. GARAGE	STORAGE	A	—		—		N-248A
SAME AS TITLE	SAME AS TITLE	A	NONE	A	—		N-248B
SAME AS TITLE	SAME AS TITLE	A	NONE	A	PROPOSED MODIFICATION FOR DYNAMIC TESTING		N-248C
TEST OF POWERED MODELS & AIRCRAFT PRIOR TO TUNNEL TESTS	SAME AS INITIAL USE	A	ACOUSTIC TESTS	A	PROPOSED NEW TEST APPARATUS CONSTRUCTION, 1981	406,291	N-249
SAME AS TITLE	SAME AS TITLE	A	—		ADDITION PROPOSED, 1982	1,608,809	N-250
SAME AS TITLE	SAME AS TITLE	A	—		NEW FACILITY NOT CAPITALIZED	91,480	N-251
SAME AS TITLE	SAME AS TITLE	A	NONE	A	NEW FACILITY NOT CAPITALIZED	218,540	N-252
RECEPTION AND BADGING	SAME AS TITLE	A	DISPLAY AND EXHIBIT	A	—	199,216	N-253
SAME AS TITLE	SAME AS TITLE	A	NONE	A	—	240,496	N-254
STORAGE, SHIPPING AND RECEIVING WAREHOUSE	STORAGE, SHIPPING AND RECEIVING	A	OFFICES	A	DESIGNATED FOR FUTURE ADDITIONS	1,637,422	N-255

PLANNING GOALS

Given the foregoing framework of land use, functional relationships, site constraints, community influences and existing facilities, Ames planners must identify the future facilities required to satisfy the overall mission of the Center, and then organize those facilities into a logical master plan for development. The following sections will describe in detail these proposed future facilities and the infrastructure of utilities, roads, and landscaping needed to support them. But first, to develop such a plan, and second, to evaluate the validity of the plan, it is necessary to document the major planning goals to be addressed:

1) Consolidate facilities of the same directorate in unified areas, whenever possible.

2) Accommodate future expansion and flexibility in the siting and phasing of new facilities.

3) Avoid increased density of development in existing built-up areas.

4) Eliminate trailers and portable units whenever possible.

5) Work with other agencies to improve vehicular access and circulation and preserve flexibility for a new entry from the adjoining community in the future.

6) Lessen impact of on-street parking by providing more internal parking lots and by encouraging alternative energy-conserving transportation systems.

7) Evaluate the re-use potential of existing facilities in lieu of new construction.

8) Encourage energy-conscious design and orientation of facilities, both new and retrofited.

9) Extend the landscaping program throughout the center to complement the various land use requirements and to enhance the amenities of the site and facilities.

10) Develop a method of funding utility extensions that will not inhibit facility construction on underdeveloped portions of the site.

11) Recognize and acknowledge necessary safety clearance requirements of various facilities for the protection of employees and visitors.

ENVIRONMENTAL DESIGN

Preceding sections of this report have dealt with a broad array of functional and locational criteria which the Master Plan must satisfy. The emphasis has been upon making the plan "work". Ideally, all of the proposed facilities should be located where they will function best: they should not conflict with other facilities; and the total arrangement should readily accommodate change.

Of equal importance is the physical image of the Master Plan and how it relates to the people that visit and work at the Center. This is the province of Environmental Design. Three major elements set the environmental framework of the Plan: streets, buildings, and the open space between them.

Each of these elements of design have been considered in the development of the Master Plan illustrated on pages 7.15 - 7.16. Reference to those pages will assist in understanding the discussion which follows.

Streets are visual unifiers of the plan. They provide view corridors from one area of the Center to another and help to organize the buildings along their path. The northwest extension of New Moffett Boulevard, providing access to a proposed visitor-oriented facility and a new entry gate, will be clearly defined by trees and open space, which channelize vehicular movement and create a sense of arrival. As the road curves around the 80-by-120 foot Wind Tunnel, there are varying dramatic views of the Tunnel, followed by a vista across the lake and into the Ames complex, thus orienting the visitor to his location and destination. The internal extensions of Arnold Avenue and Moffett Boulevard to the north and the east-west development of 8th Street provide the beginnings of a logical gridwork to which future buildings can develop a unified orientation or focus. Additionally, these three streets should receive landscaping treatment that is consistent with that of the existing area in order to tie the new and the old together. The landscaped Perimeter Security Road, as it runs northward along Stevens Creek and then east towards the Navy runway, provides visual definition of the "edge" of the Ames property.

Buildings, both existing and proposed, will be the most visually dominant elements of the plan. People will perceive buildings at Ames in many different ways and from various vantage points. Also, these same buildings vary drastically in scale and form, ranging from the large size and unusual shape of the 80-by-120 foot Wind Tunnel, to a more typical and human-scaled office building.

A consistent architectural "vocabulary" should be developed to give clarification and a sense of unity to all of Ames' buildings. Structural form, if that form truly relates to the building's function, should be openly expressed because it serves to delineate the activities contained by that form. Scale can be dealt with by the use of consistent proportions for different buildings. Modular facade components, if treated consistently from building to building, would allow people to relate to elements of human measure and make it possible to compare buildings of various sizes.

Carefully controlled use of surface materials would be the best means to achieve continuity between buildings and produce an identifiable image. Textured concrete facades are prevalent among existing facilities and should continue in use. Concrete connotes permanence and minimal maintenance which are appropriate images for a research center. Precast concrete panels, when used in a modular fashion, create a unity and rhythm among buildings. Exposed structural steel framework, infilled with either concrete or metal panels, also has a precedent at Ames. Its use is appropriate particularly for large, high-bay areas.

Color is an often-neglected method of achieving environmental harmony. Reference to the aerial photograph of Ames Research Center on page 1.1 illustrates the fact that the overall color impression is one of light and reflective surfaces. This silver-gray quality is appropriate to the metallic structure of many of the test facilities and true to the natural finish of concrete structures. For large scale facilities the lighter tone helps to minimize the bulk of the structure and the reflective surfaces are practical in this climate for controlling heat gain into the interiors. To overcome what might seem a monotonous surrounding of gray and silver, brighter accent colors could be applied to doors, window trim, ventilators, louvers and other details of the structures. This technique has been used successfully for accenting doors at the Systems Development Facility (N-242). A palette of compatible accent colors should be prepared for use on both existing and future buildings.

A comprehensive graphics and signage system should also be developed and implemented for the Ames complex. The purpose of such a system, in addition to providing information and orientation, is to unify and personalize the visual image of the site, and provide a graceful transition from large scale research facilities down to the scale of the pedestrian. The system could logically contain four categories of signs: direction, identification, control/instruction, and information. This signage, if styled consistently and located properly relative to the function it announces, can greatly enhance orientation and Center unity. This will be of added importance as facilities are constructed beyond the presently developed areas and as more visitor-oriented activities are provided.

Finally, the siting and orientation of individual buildings can harmonize the entire Center. The 80-by-120 foot Wind Tunnel, located at the periphery of the built-up area, will be a landmark for entering visitors and employees. The roadway grid creates "blocks" of space within which buildings of the Life Sciences and Research Support Directorates can be clustered and inter-related. Opportunities also exist for grouping buildings around roadway intersections and on opposite sides of major thoroughfares to provide continuity and order even though development will be much less dense and will be implemented over time.

Open space provides a meaningful setting for the buildings shown in the plan. Although streets are often thought of as open space; the intent here is to deal more with the spaces given over to people rather than to the automobile. There are many types of open space at Ames — this diversity lends an exuberence and interest to the plan.

Exterior space may be either "open" or "closed". Broad, expansive open areas are an appropriate foreground for many of the larger facilities. The safety and security buffer, adjacent to Stevens Creek, together with the clearance zone around the Static Test Stand, will provide a large foreground for people visiting the nearby Shoreline Regional Park. The lake in front of the 80-by-120 foot Wind Tunnel is another example of "open space" which relates dramatically to the scale of the Wind Tunnel, and which can be appreciated by occupants of vehicles entering and leaving by New Moffett Boulevard and by the personnel housed in the buildings immediately north and northwest of the lake. "Closed" spaces are created by placement of buildings or dense landscaping around an area to form a well-defined exterior "room". This device will be used to create a protected courtyard within the grouping of Life Science Buildings L-2, L-4, and L-7.

The character of open space is often determined by the human activity which occurs within it. Space can be defined as either active or passive. Active spaces, characterized by the congregation of people and events, include the plaza in front of the Technical Information Center. Outdoor displays and informal meetings should be encouraged by the attractive landscaping and courtyard setting of this visitor-oriented facility. The gathering of tour groups and the normal bustle of visitors leaving and entering Ames should create a very animated environment. Passive spaces, by contrast, are used for quiet, individual activities. A pathway network around the lake adjacent to the large Wind Tunnel would encourage noontime strolling and picnicing.

The plan can be made to function well. However, to insure an amenable place for people in the plan, an awareness of Environmental Design concepts, such as those suggested above, is essential.

PLANNING WITH UNCERTAINTY

Second only to the expertise of Ames' scientific and engineering staff, the Center's research and development facilities are its most valuable asset. They are also the most difficult, of all of Ames' resources, to specify in terms of future requirements. Three factors influence the future prediction:

(1) The self-guiding nature of research: tomorrow's research results will define new problems requiring facilities that are unforeseeable today.

(2) Research facilities are often themselves the product of research. While the need for a facility may be foreseeable today, the technology on which its design must depend may be beyond the present "state of the art".

(3) Future research and development programs at Ames, which justify the construction of future facilities, will be strongly influenced by forces not entirely controlled by Ames' management. Changing national goals in space and aeronautics may alter program courses; national political-economic developments may influence the growth rate of the Center; and the U.S. Congress, which must authorize each facility, may take exception to the need for any or every facility proposed by Ames.

Realistic planning is nonetheless necessary for Ames to insure efficient, economical and flexible future operation. The planning *process* must allow for some uncertainties in order to remain a day-to-day *working* tool from inception through implementation of the Master Plan.

PREDICTION

It is difficult to predict the exact scope, timing, or physical characteristics of proposed Ames facilities for any time beyond the most immediate future. This is due to the rapidly changing nature of NASA research and changing priorities in national goals and budget. As a result, the future facilities shown on the Master Plan are not definitive but represent the best possible projection of needs at this time. The Center's current five-year plan for the construction of facilities provides the most reliable source for these projections.

Once the planner departs from the broad scale of the Land Use Plan and begins detailed planning for individual facilities, especially in the time frame beyond the first five years, the ability to accurately predict diminishes greatly. It is essential that the maximum amount of planning options be maintained in order to accommodate unanticipated building program changes. The development of a consistent and incrementally adaptable utility traffic network will best provide a framework for any future changes, anticipated or not.

IMPLEMENTATION

Developing a Master Plan is but the first step; its goals must then be consistently pursued. To insure that physical development follows the concepts of the Plan, a commitment to implementation must be made. This degree of commitment to the Plan has accomplished over the past ten years the acquisition of the land necessary to support Ames' foreseeable development needs and the beginnings of development on this land.

There are several key elements of the Plan which would encourage further utilization of the underdeveloped northern land. The immediate pressure for growth in the Life Sciences Directorate encourages infill development between the existing Center and the Supply Support Facility (N-255) now constructed in the northern land. The internal extension of Moffett Boulevard as a route for moving flight models from the Static Test Stand (N-249) to the 80-by-120 foot Wind Tunnel (N-221B), and the construction of a new 8th Street, linking Arnold Avenue and Moffett Boulevard, will encourage and support the development of proposed new facilities along these streets. As demand for additional space increases for the Research Support Directorate, 8th Street will be extended westward and a strong impetus will then be created to extend New Moffett Boulevard to serve these facilities. Once access via New Moffett Boulevard and utilities are established, it will make practicable the provision of a new entry gate, located to allow easy public access to the proposed Technical Information Center (A-3), outside the security perimeter.

Phasing of facilities is shown in the Master Plan in two increments. Equally important is the phasing of road and utilities. Facilities and road/utility networks to be built up should be located as close as possible to the existing built-up area. In this way, the cost of extending roads and utilities into the new land can be minimized. Second phase construction of facilities should occur nearest to the first phase buildings. Later phases can either extend the built-up area further northward or begin to infill into open areas of previous phases. Obviously, not all buildings can be located in this way due to overriding functional constraints. However, if the phasing principal can be applied whenever possible, the reduction of road and utility networks to incremental stages will greatly ease the funding of those items.

Not every new facility can be built simultaneously. Implementation of the Plan *over time* provides both opportunities and difficulties. A protracted building process can allow for the introduction of new technologies and research directions which a "fixed" plan, built all at once, cannot possibly foresee. This opportunity will be easily missed if the plan becomes too rigid and does not allow for change. Also, as each new facility is built, it consumes a certain portion of previously usable land and will inherently reduce the number of future planning options remaining for the unused land. Site selection for each new facility should be looked at in light of preserving the greatest quantity of possible alternatives. The present master plan, although "fixed" in terms of this report, should be thought of as part of an ongoing evolutionary process.

Construction of new facilities in the underdeveloped portions of the site does not preclude a well-planned program of rehabilitation of the existing facility network. As a result of current efforts, the useful life of most Ames facilities will be prolonged indefinitely; however, temporary buildings such as N-228 will be removed as soon as possible.

Understanding of the process of change and an awareness of the broad scale implications of any form of development are responsibilities of the Ames Facilities Planning Board. For example, the desire of a particular researcher to place a temporary structure or equipment trailer in a parking lot may seem to have little further consequence. However, that trailer may be used for a year or more and will displace some offstreet parking which is already in short supply; it will cause greater traffic congestion due to those displaced drivers searching for another place to park; and the trailer use will diminish the justification to build new research facilities in the open land, while further intensifying this built-up area. The researcher, although well-intentioned, may only focus upon his need for the trailer as an immediate expedient to fulfill his mission. The Facilities Planning Board, aware of the broad implications of any form of development, should continuously review any proposed facilities, even those as seemingly minor as a trailer.

There are a myriad of choices to be made in implementing the Master Plan. Growth implies change, and change can only be accommodated in a meaningful way through an understanding of the overall planning process.

FUTURE FACILITIES

For convenience, the following proposed facility descriptions are grouped by directorate, thus also relating them generally by program or functional use. The descriptions are brief and are primarily intended to convey an impression of the purpose and general characteristics of each planned facility. The designators used throughout the Master Plan (which include a letter code for each directorate, followed by an individual facility number) are:

F - Aeronautics and Flight Systems

S - Astronautics

L - Life Sciences

R - Research Support

A - Administration and Others

N - Existing Buildings (refer to Master Plan rendering, on page 7.15 - 7.16, for directorate)

Aeronautics and Flight Systems

F 1 Modification to the 12-Ft. Pressure Wind Tunnel (Partly under construction)
This major modification to the 12-Ft. PWT consists of modernization of the wind tunnel test section and other systems and the construction of additions for model build-up and check-out and for housing computer equipment. The modernization will provide an airlock system to allow model access without depressurization of the tunnel circuit, a cart type model handling system, automation of wind tunnel control systems, remote control for compressor blade pitch, new composite material compressor blades, and rehabilitation of the make-up air and refrigeration systems. The building additions consist of a 6,000 gross sq. ft. two-story structure to the south side of the existing wind tunnel test chamber and a 2,000 gross sq. ft., single-story structure to the east side of Bldg. N-206. The first addition is under construction and will provide space to house computer equipment associated with a new data acquisition system which, when installed, will substantially improve the speed and quality of data gathering. The second addition will consist of model build-up and check-out areas with connecting elevator and stairway compatible with the new cart model-handling system.

These modifications will provide a significant improvement of overall wind tunnel productivity. This improvement will be achieved through reduction of tunnel pump-up time, reduced tunnel down-time for inspection/maintenance, improved model preparation and handling capabilities, better tunnel control and faster data gathering.

F 2 Aircraft Parking Ramp Addition (Under Construction)
Existing ramp and hangar space is presently inadequate to handle the aircraft assigned to the Center. This addition provides for the construction of 40,000 sq. ft. of aircraft parking area to the east of the existing parking ramp to meet the current and projected needs of the Center for storage, maintenance and servicing of flight vehicles. The addition will be identical for existing ramps in engineering design to provide full and compatible use.

F 3 Modifications to the Static Test Stand, N-249 (Under Construction)
This modification provides for the addition of a gantry crane and variable frequency power source and for improvements to the model support system. The gantry crane will be self propelled along a 250-ft. track with a maximum load capacity of 75 tons. It will be compatible with handling models of the size and weight which could be tested in the 80 X 120-Ft. wind tunnel. The variable frequency power will consist of a variable frequency motor-generator set capable of providing the power and speed control to drive the Ames Rotor Test Apparatus at power values up to 3000 HP. The building to house this equipment has a 40 X 50 ft. footprint. Modifications to the model support system consist of the provision for roll motion capability which is not now available. Future modifications include the possible addition of overhead model support capability. These modifications are required to provide improved testing capability, to assure compatability with the 80 X 120-Ft. wind tunnel, and to assure safe and efficient handling of the large scale models at this important test facility.

F 4 Aerodynamic Research Laboratory (first 5-years)
This project provides for construction of a 25,000 gross sq. ft. building for a laboratory complex to investigate pressing problems in fluid mechanics and aerodynamics. Housed in the building will be three small research wind tunnels to utilize and enhance the pumping capabilities of each other, to share support personnel and to provide advanced non-intrusive diagnostic instrumentation. The existing Ames 2- X 2-Ft. Transonic Wind Tunnel requires a better, less crowded location and needs to be repowered with a surplus 9000 HP drive motor, a new compressor, and cart system for testing with more than one test section, and thus will be relocated as one of the tunnels of the new complex. Finally, a laser laboratory is required for developing advanced non-intrusive laser diagnostic technology.

Included in the building will be a control room, shop, optics and instrumention room, photographic dark room, offices, storage space, and a laser laboratory. The new 40,000 SCFM compressor will drive the two small research tunnels and any other research apparatus plus provide additional vacuum to the relocated 2 X 2-Ft. tunnel. A subsonic wind tunnel and a water tunnel will be new. All three tunnels will be designed for maximum optical viewing.

F 5 7- X 10-Ft. W.T. #1, Control Room Expansion (N-215 Modification) (first 5-years)
This control room expansion provides for a two-story 1200 sq. ft. addition to the 7- X 10-Ft. #1 control room. Additionally, the existing model balance system will be replaced with a new reliable and more accurate system. The new control room area will provide a proper environment for modern electronic test and data equipment and will allow an unobstructed area in the test chamber for open-jet acoustical testing.

F 6 Rotorcraft Dynamic Loads Test Facility, N-248C (first 5-years)
This facility will provide a full-scale dynamic test capability for advanced research rotorcraft. Included will be the capability for accurate measurement of vibrating forces and moments and the fuselage dynamic environment of advanced/research rotorcraft, which is not now possible with the existing Static Calibration rig. The facility will be used for dynamic calibration of rotor balance systems and for experimental definition of advanced research rotorcraft.

F 7 Rotorcraft Operations Area (first 5-years)
This project will provide an improved and dedicated flight test area consisting of a 1800 X 200-Ft. turf hover area extending from the existing VTOL pad and terminated by a new 200 X 200-Ft. paved pad. This operations area will provide a dedicated hover and flight test zone which is out of the Moffett Field Naval Air Station tower control and within Center boundaries. It will provide capability for forward, sideward and rearward translations, accelerations in a straight line to speeds of 60 knots, and some limited transitions and landing patterns utilizing open air space west of the facility. Additionally, a new 4400 sq. ft. flight data acquisition facility will be constructed. This building will serve as a flight test experiment control room and data acquisition facility. The building will provide an unobstructed line-of-sight to the Rotorcraft Operations Area and other flight operations areas at the Center; additionally, computerized data acquisition equipment and other support equipment will be housed in the facility.

F 8 Aircraft Hangar (First 5-years)
This facility will provide additional hangar and shop space required for maintenance, modification, equipment installation, inspection, and other operations associated with research and experiment platform aircraft. These activities are presently conducted in overcrowded hangers; this new hangar will allow for the separation of various basic types of aircraft into respective hangars. For example, the high altitude missions aircraft and necessary support personnel could be located together in a single hangar. Each aircraft group would then be able to consolidate its operation in a more efficient and satisfactory situation. Construction of this hangar will require the relocation of vehicle maintenance buildings N-246A and N-248B.

F 9 Advanced Technology Transonic Wind Tunnel (first 5-years)
This wind tunnel will consist of a new transonic "Leg" of the Unitary Plan Wind Tunnel Complex. The tunnel will consist of a new 11 X 11-Ft. test section circuit parallel to the existing 11 X 11-Ft. Transonic Wind Tunnel Test Section and will utilize the drive motors, compressor, and auxiliary systems of that tunnel. The new leg will be isolated from the 11 X 11-Ft. leg circuit by a rotating valve system similar to that already employed for operation of the 6 X 7-Ft. and 9 X 7-Ft. legs of the UPWT complex. The new tunnel will incorporate an adaptive wall test section designed for high-speed production testing. Major improvements in the quality of data and in the range of aerodynamic investigations achievable can be gained with an adaptive wall test section of this size. In addition to providing a test capability that will improve the prediction of flight performance from wind tunnel data, the new test section will significantly enhance the national transonic testing capability.

F 10 Unsteady Flow Research Facility (first 5-years)
This facility will consist of a wind tunnel test section in which unsteady aerodynamics can be produced to perform research in the basic physics of unsteady flows. Included will be high-pressure air and vacuum systems, data acquisition and processing equipment, and shop and laboratory equipment areas. With this facility significant gains in understanding, and subsequent control of both unsteady and separated turbulent flows can be gained by the experimental study of such flows over a wide range of variables such as frequency, oscillating wave form, imposed pressure gradient, and Reynolds number.

Astronautics

S 1 U-2 Aircraft Support Building (first 5-years)
This project consists of a 6,000 sq. ft. building which will relieve present crowded conditions and will include shops for sensor and camera test and repair, storage rooms for pressure suits, film and sensors, and general storage. Aircraft power, humidity and temperature control will be provided. In 1981, the Center is scheduled to accept delivery of a new high altitude, airborne experimental aircraft, the ER-2. The aircraft support facility will provide required shop and storage areas for support equipment for the ER-2 and the two U-2Cs presently based at the Center.

S 2 N-250 Addition (Compressor Building, first 5-years)
This facility will be a 5,000 sq. ft. extension of Bldg. N-250 of standard metal construction to house two new 3000 psi reciprocating air compressors. Supporting concrete foundation for the compressors and installation of 15-ton bridge crane are included in the building extension. Additionally, a cooling tower will be installed adjacent to the building. This building addition and compressor installation will increase the amount of high-pressure air to the existing distribution system which feeds all major facilities and will specifically serve the modernized 12-Ft. PWT.

S 3 Technical Support Building Annexes (A, B, & C, first 5-years)
This proposal is for the construction of three 4,000 sq. ft. modular buildings over a 5-year period. Each building will provide space for general office and conference use and will be independent from one another. Additionally, tie-in for temporary trailers will be provided to satisfy occasional peak requirements. The flexibility of the space provided by these annexes will alleviate existing overcrowded conditions while allowing future readjustments of space allocations at minimal cost to meet new requirements.

Life Sciences

L 1 Life Science Flight Experiment Facility, N-240 Addition (under construction)
This facility will consist of a new 12,000 sq. ft. two-story office/lab addition to the east side of Bldg. N-240 and modification of the existing 3000 sq. ft. high-bay of the building. The facility is required to support development, integration, testing and checkout of life sciences flight experiments. It will include biological laboratories and electrical and mechanical shops for experiment equipment development. Data processing facilities will provide systems for testing and check-out of spacelab experiment interface equipment and hardware components.

L 2 Man/Vehicle Systems Research Facility (first 5-years)
This facility consists of a new 14,500 sq. ft. laboratory which is required to house an aircraft simulation system capable of simulating multiple aircraft (two with full crews), terminal area, Air Traffic Control (ATC) and air crew interactions. The facility will consist of two aircraft cockpits, one fixed and one moving-base, a functional terminal area ATC capability and a visual scene generation system. The fixed-base cockpit will be a fully functional representation of a current generation aircraft. The moving-base cockpit will be provided with a flexible array of all-electronic computer generated display systems. This cockpit will be configured with advanced instrument display technology, fully representative of future generation aircraft. System components will be implemented with a high degree of fidelity, with particular attention devoted to the human factors aspect of the simulation. Other important aspects will be provision of navigation and communication signals, weather effects and the capability for initiating, monitoring and controlling various system malfunctions.

A flexible computer laboratory will provide overall control of the simulation, solution of aerodynamic equations, collection and analysis of data. The cockpit scene generator will be a computer-generated image (CGI) system capable of depicting both day and night wide-angle scenes that may include visual representations of other aircraft as well as special visual conditions representing fog, clouds and other meterological conditions.

L 3 SETI Support Facility (first 5-years)
This facility will be a new 4,225 sq. ft. office, computer lab, data storage and conference building required to support the Search for Extraterrestrial Intelligence (SETI) program. SETI involves laboratory development and testing of microwave instrumentation for signal detection, data analysis, and data storage and retrieval. Large amounts of data will be generated and must be processed and stored. SETI is a joint program with the Jet Propulsion Laboratory, and involves a guest observer program with most of the research performed under NASA grants.

L 4 Aeronautical Life Science Laboratory (first 5-years)
This project will provide approximately 40,000 sq. ft. of new laboratory space to house personnel and equipment in support of the Aeronautical Human Factors Research. A flexible, integrated laboratory complex is required which will house existing fixed-base simulators, laboratory control and computer equipment, and other specialized equipment for studying man/machine interactions. These interactions include those between aircrews and ground controllers, and between aircrews and automated or advanced flight deck systems. The laboratory will also support fundamental studies of aircrew training, performance and workload measurement requiring moderate fidelity but not full mission simulations.

L 5 Controlled Ecological Systems Chamber (first 5-years)
This facility will provide approximately 11,000 sq. ft. of offices and flexible laboratory facilities for conducting closed, controlled environmental and ecological systems studies. The mission of the facility will be to permit scientific exploration of the biological, physical, chemical and mechanical aspects of the problems of recycling materials within closed systems.

The facility will be equipped with electrical and mechanical utilities and computer devices necessary to control and operate closed system food growing, waste processing and mineral separation capabilities. A variety of closed systems will be constructed with many different configurations and degrees of complexity. Specialized equipment would include various kinds of teleoperators for non-invasive manipulations within the experimental chambers. After approximately 5 or 6 years of operation of this proposed facility, it will be expanded to provide the necessary experimental settings and developments culminating in systems capable of supporting humans in space or on lunar or planetary surfaces.

L 6 Planetary Sample Receiving Lab (beyond 5-years)
This facility will provide a new Planetary Sample Receiving Laboratory to support a Mars surface sample return mission. The building will include facilities for contamination prevention and containment of planetary samples, toxicity and hazard analyses, life detection and chemical and geological analyses. Special features include biological barriers, sample containment chambers, clean-room environment, remote handling equipment, sophisticated instrumentation, support laboratories and office space.

The containment facility with a ground floor and basement will have a floor area of 26,000 sq. ft. The attached laboratory and office support facility with two floors and a basement will have a floor area of 30,000 sq. ft.

L 7 Man-Machine Integration-Simulation Laboratory (beyond 5-years)
This facility will consist of a 10,000 sq. ft. laboratory building to support man-machine integration research. The research focus is the translation of human factors findings from aviation to other fields of research. The research will include experimentation involving interactive situations such as space-related control consoles and nuclear power plant operations. Additionally, aviation-related technology for remote machine operations and long distance problem solving will be extended, modified, and validated for other fields such as space communications and energy systems management. The laboratory will consist of flexible experiment areas which can be reconfigured to simulate a wide spectrum of advanced operator consoles. For improved simulation fidelity, the experiment areas will be acoustically isolated from the outside environment.

Research Support

R 1 N-233A Addition (under construction)
This addition to Bldg. N-233A will provide 3,100 sq. ft. of flexible open-space office area to the north-east corner of the building, required to house the staff of the Institute for Advanced Computation (IAC) and will connect with existing offices and computer equipment of the IAC. This facility will centralize the base of operation of the IAC, improve operational efficiency, and reduce congestion caused by termination of rented space.

R 2 N-233 Addition, Tape Library (under construction)
This project will provide a 2,000 sq. ft. addition to Bldg. N-233 for tape library storage of all the Central Computer Facilities magnetic tapes within a unified system. Initially, manual retrieval of tapes will be used. Ultimately, an automatic retrieval system will be installed. This addition will be close to the central administrative and scientific interactive processors and will be isolated for security and fire protection.

R 3 Non-Destructive Testing Facility (first 5-years)
This facility will provide a 12,000 sq. ft. industrial building which will include inspection, testing, balance, sanding, finishing, and work staging areas. The facility will be used to inspect, test balance and maintain wind tunnel blades and other equipment. Presently, these activities are conducted at various different locations in crowded, substandard conditions. Newer processing techniques require more complicated procedures which cannot be performed with the present arrangement. This control facility will provide an efficient testing and maintenance capability required for the Center's wind tunnel equipment.

R 4 Numerical Aerodynamic Simulation (NAS) Facility (first 5-years)
This facility is required to house and support a computation system tailored to the numerical simulation of aerodynamic flows about aerospace vehicles. The computational system will include a specially constructed processor designed to solve the equations of fluid dynamics at speeds many times greater than is now possible, resulting in a quantum jump in the usefulness of computational fluid dynamics as an aerodynamic research and development tool.

The building will house, and will support continuous NAS operations. Total facility usable floor area for NAS operations, maintenance and research personnel will be 60,000 sq. ft., with the potential for a 100% expansion of the computer and computer support areas.

R 5 Research Engineerng Systems Facility (first 5-years)
This facility is required to provide office and laboratory space to augment presently overcrowded and inadequate conditions existing in the Simulation Sciences and Life Sciences Offices and laboratories. It will accommodate the space requirements of Simulation Sciences and Life Sciences activities in the existing Research Facilities Engineering Building, N-213. The personnel and functions displaced from Building N-213 will, in turn, be housed in the new office and laboratory building of this project. Because of its location close to Simulation and Life Science facilities, the use of Building N-213 is essential to efficient support of Simulation and Life Sciences researchers. On the other hand, one of the present occupants, the Research Facilities and Instrumentation Division, has no requirement to be located near or around any other facility. It is proposed to move some 160 — 180 engineering personnel from Bldg. N-213 into a new building of about 60,000 gross sq. ft. and for the subsequent movement of 160 — 180 Simulation Science and Life Science engineers and scientists from congested Buildings N-243, N-239 and existing temporary trailers.

R 6 Heating and Cooling Plant (first 5-years)
The projected costs and availability of conventional fossil fuels dictate that alternate approaches be sought for central heating and cooling. The numerical aerodynamic simulator and new central computer facility will be steady sources of large quantities of low grade waste heat from the data processing equipment. Waste heat from these facilities would be used for heating and cooling new buildings in the area of the Center north of 7th Street.

This facility will have the capability of collecting, exchanging and distributing heat in a transfer medium (water or ethylene glycol). This heat might also be used for back-up heat pumps for cooling. This plant would also be able to consume low heat content fuel such as trash, low grade coal and various forms of "biomass".

R 7 Maintenance Support Shop (first 5-years)
This facility will house maintenance contractor personnel. The present maintenance shop, a temporary building erected 37 years ago, N-228, is scheduled for demolition. Included in the new facility will be shops for the plumbers, painters, carpenters, electricians and heating/ventilation/air conditioning mechanics. Office space for the resident supervisory and support personnel is included. This shop will be used as a staging area for work to be accomplished throughout the Center.

R 8 Equipment Repair Shop (first 5-years)
This 5,000 sq. ft. shop will provide a safe, clean environment to diagnose and repair equipment such as compressors, pumps, valves and motors. Presently such equipment is repaired in place with attendant inefficiencies and additional down-time. The configuration design will improve the efficiency and quality of repair operations. This facility will have a high bay, two roll-up doors, a bridge crane and normal shop utilities.

R 9 Large Scale Model Preparation Building (beyond 5-years)
This 20,000 sq. ft. shop will provide space for preparation, modification and fabrication of large wind tunnel models for the 80 X 120-Ft. Wind Tunnel. This facility will be equipped with large-scale metal working equipment and will include composites and fiberglass work areas. The high bay facility will be located adjacent to the model transport right-of-way on Moffett Boulevard leading to the 80 X 120-Ft. W.T. test section (N-221B).

R 10 Central Computer Facility (beyond 5-years)
It is proposed to provide a facility to accommodate an expected expansion of center computing requirements in the areas of large scale scientific interactive and batch computing, administrative data processing, mass data storage facilities and data communication and graphics display services. It is estimated that about 60,000 sq. ft. are required to be added to the presently crowded computer rooms, offices and support areas of the Computation Division. This facility will utilize and accommodate state-of-the-art advances in computer technology.

Administration and Others

A 1 Technical Support Building (under construction)
This facility will consist of a 4,000 sq. ft. open-plan office building to support housing requirements for long-term but transitory activities. The flexibility of the open office concept allows for re-configuration periodically to meet specific project or activity office space requirements. As the need develops, future buildings of the same design will form a cluster of 4 structures radiating from a central covered walk to provide the maximum flexibility in their use.

A 2 Compressed Gas Cylinder Storage Facility (first 5-years)
This facility will provide a covered storage building to house cylinders containing flammable and inert gasses and oxidizers. The facility will consist of a 3,850 sq. ft. building with loading dock, and will provide separate locked areas for the various types of cylinders being stored. The facility will alleviate hazards associated with the existing storage area and will conform to OSHA and Ames Safety Manual Standards.

A 3 Technology Information Center (beyond 5-years)
This project will provide a facility where NASA's aerospace projects and programs can be made available to the public through dynamic display, exhibits and both formal and audio-visual presentations. The facility will include an auditorium, meeting rooms, video-tape viewing area, exhibits repair area, scientific demonstration area, a resource center, rest rooms, offices and a lounge with a souvenir-information counter. This facility is in conformance with NASA's statutory responsibility of the Space Act of 1958 to disseminate information on all program activities in the widest practical manner.

Ames Research Center

National Aeronautics & Space Administration

Moffett Field California

For Official Use Only

1981

Aeronautics & Flight Systems – F

Astronautics – S

Life Sciences – L

Research Support – R

Administration & Others – A

Existing Facilities

Proposed Facilities – first five year period

Proposed Facilities – beyond five year period

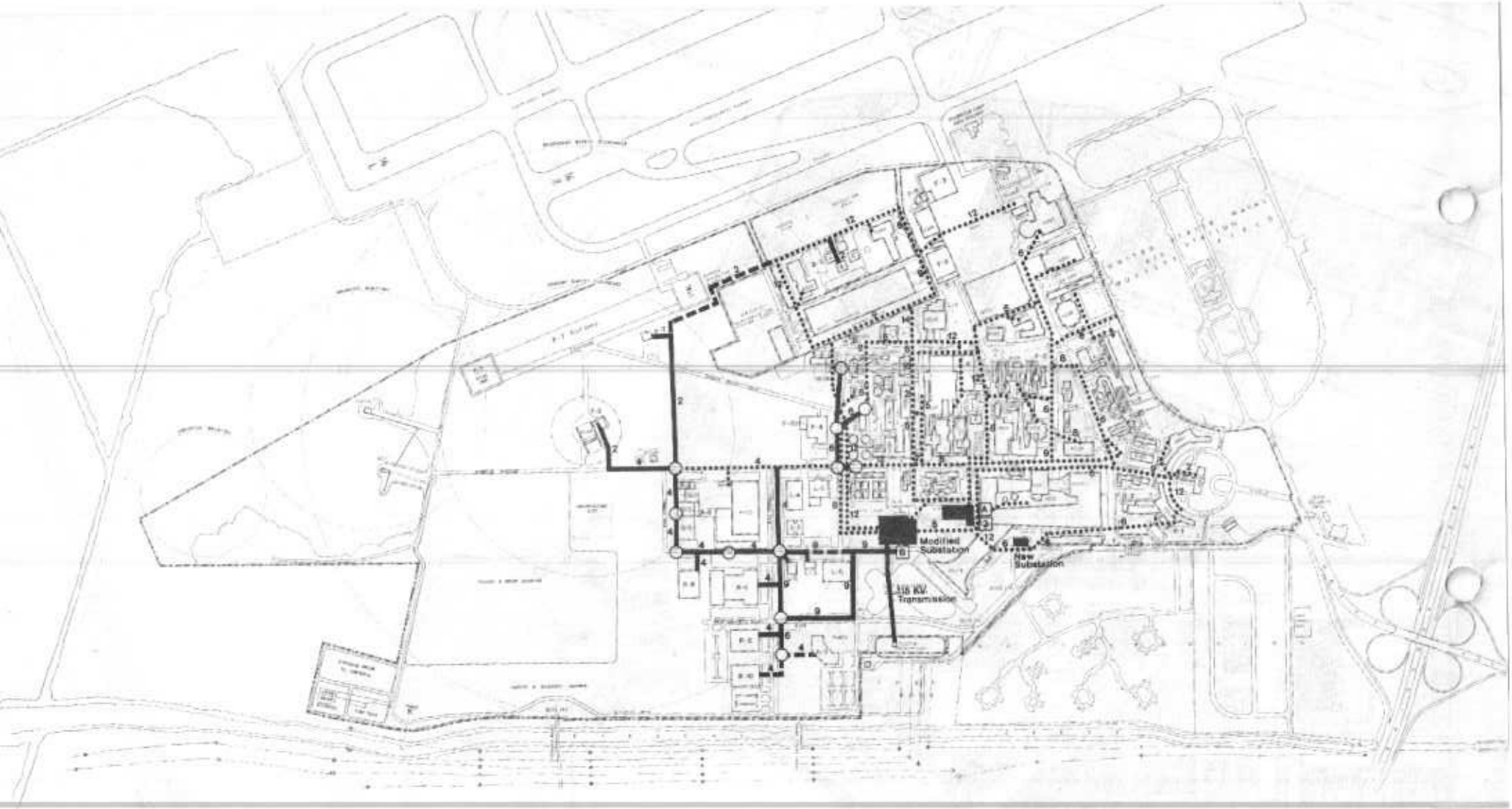
Existing Property Line

Security Line

7.15 Master Plan


PROPOSED FIRE STATION
TAXIWAY
RECREATION AREA
SOCCER FIELD
EXISTING TETHER PAD & HOVER AREA
VTOL
U.S.N.A.S. WAREHOUSES AND STORAGE AREAS
NAVY WAREHOUSE
SEVERYNS AVE
AIRCRAFT RAMP
UNITED STATES NAVAL AIR STATION
MOFFETT FIELD
F-1
F-2
F-4
F-5
F-6
F-7
F-8
F-9
F-10
S-1
S-2
S-3
L-1
L-3
L-4
L-5
L-6
L-7
R-1
R-2
R-3
R-4
R-5
R-6
R-7
R-8
R-9
R-10
A-2
A-3
N210
N211
N212
N213
N220
N221
N221A
N221B
N222
N225A SUBSTATION WEST
N225B SUB STATION NORTH
N227
N229B
N233A
N243
N246
N247
N251
N253
N253A
N255
9TH STREET
8TH STREET
7TH STREET
5TH STREET
MOFFETT BOULEVARD
NEW MOFFETT BLVD
NEW GATE
PLAZA
LAKE & AIR INTAKE CLEARANCE ZONE
GATE 17
GATE 17A
GATE 17B
GATE 17C
GATE 18
BETA LANE
GAMMA LANE
ARNOLD AVENUE
WALCOTT ROAD
DURAND ROAD
WARNER
CIRCLE
BUSH
NAVY SECURITY GATE
NAVY DISPENSARY
SECURITY ROAD
FUTURE BICYCLE BRIDGE
P G & E
NAVY HOUSING
STEVENS CREEK
MOFFETT BLVD
BAYSHORE FREEWAY
0 75 150 300 600 1200 feet
0 23 46 91 183 366 meters

7.16



Existing Primary Feeders
Proposed Feeders – first five year period
Proposed Feeders – beyond five year period
Future Significant Manholes
Vaults
Number of Ducts

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

8.1 Electrical

8 Utilities

ELECTRICAL POWER DISTRIBUTION

Ames Research Center requires large amounts of electrical power to drive its technical research equipment. These loads vary in time and size, and are occasionally large enough to require special scheduling.

Ames contracts with the Pacific Gas and Electric Company for supply of this electrical energy. This power is generated by both Pacific Gas and Electric Company, and the United States Bureau of Reclamation. Power from the Bureau of Reclamation generating stations is transferred over Pacific Gas and Electric Company power transmission system lines under a contract with the federal government. Power required in excess of that available from the Bureau of Reclamation is purchased from the Pacific Gas and Electric Company. Present power supply appears adequate to meet present and foreseeable future needs of Ames.

Power is supplied to the Pacific Gas and Electric Company switching station located at the Ames substation by eight 115 KV transmission lines connected to a dual bus structure. Circuit breakers between the transmission lines and bus selector switches have an interrupting rating of 5,000,000 KVA to protect the circuits.

In addition to power supplied to the distribution system, selected critical loads are provided with standby generating equipment to protect special equipment and experiments from damage which would result from failure of the primary power source.

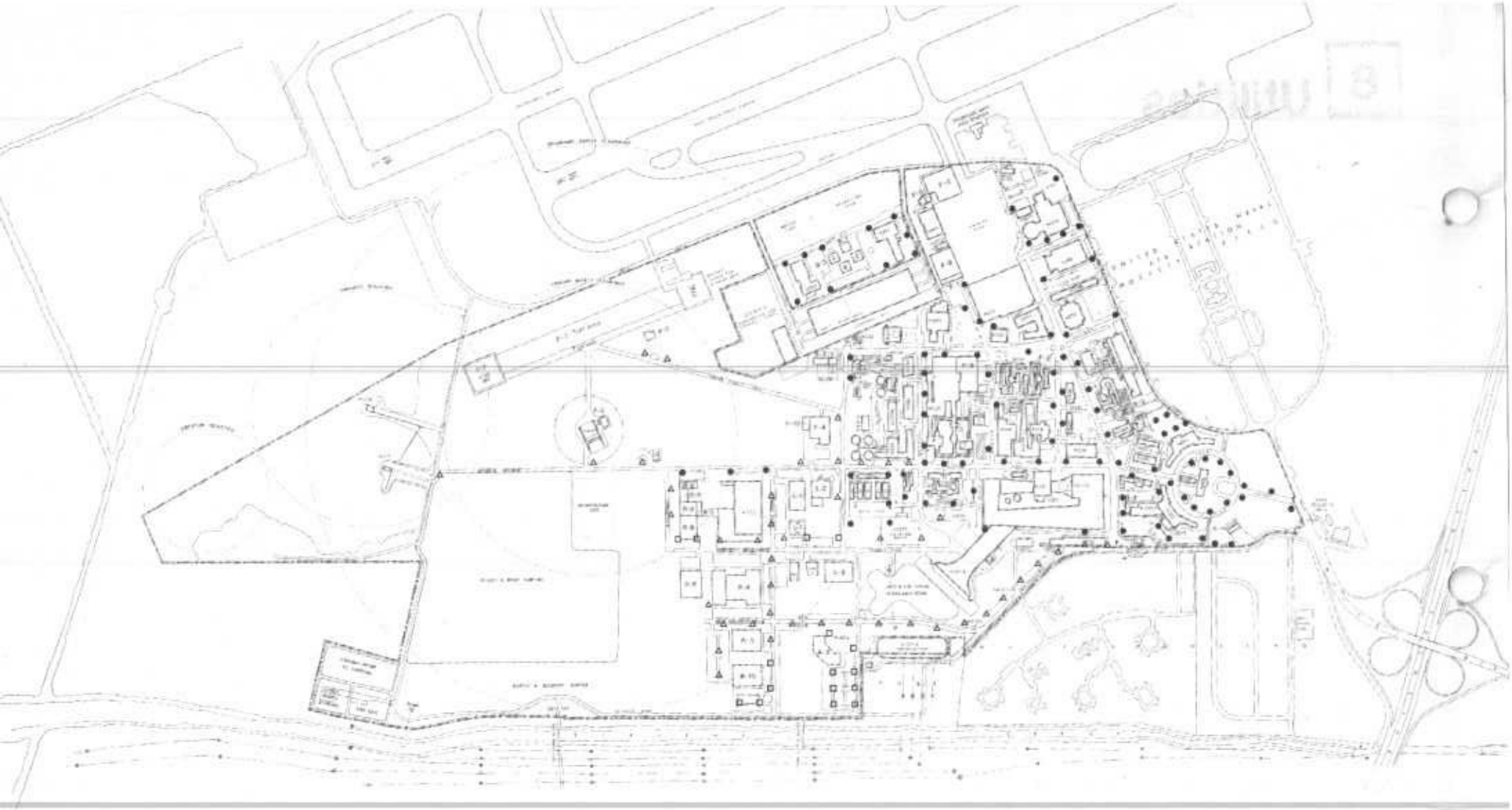
To avoid costly penalties for high load peaks, experimental operations are scheduled to keep peak power demands as low and as steady as possible. Limits are 175 Megawatts for daytime and 260 Megawatts at night, referred to as "On" and "Off" peak hours. To manage this usage of electrical power, Ames maintains an extensive electrical power monitoring system that furnishes data on instantaneous demand, integrated demand, and power factor for the total Center, and the instantaneous demand and on-peak and off-peak energy consumption of 12 of the major loads.

To increase the effectiveness of its energy management policies, Ames has a computerized power scheduling and management system. This system permits the power manager to instantaneously change operating limits and will give alarms to the power users of actual or anticipated abnormal operating conditions. Such a system (1) permits maximum use of existing electrical loads within limited demand constraints, (2) conserves energy by eliminating false starts of facilities during periods that will not accommodate the intended load demand profile, (3) increases the percentage usage of lower cost energy (USBR), and (4) lowers the monthly demand charges. This system is capable of producing savings of up to $220,000 per year.

The addition to the 40- by 80-foot Wind Tunnel required the relocation of Pacific Gas and Electric Company's switching substation from the south side of Ames' substation to an area east of Stevens Creek. Two 115 KV circuits have been extended from the relocated bus structure to the existing but modified Ames substation. A new 100 MVA substation was constructed adjacent to the 40- by 80-foot Wind Tunnel as part of its repowering program.

The power company's projection of anticipated load growth on their system does not indicate a need for conversion to a higher voltage sooner than 10 or more years in the future. Six of the present circuits can be increased in capacity by substituting larger conductors for those now in use.

Most of the existing duct lines use common manholes for both primary power and communication cables. All new lines will provide separate manholes or equivalent construction to separate communication cables from distribution conductors. New duct lines for building power circuits will contain adequate spare ducts for probable technical circuits.



• Existing Street Lighting
△ Proposed Street Lighting--first five year period
□ Proposed Street Lighting--beyond five year period

8.3 Street Lighting

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

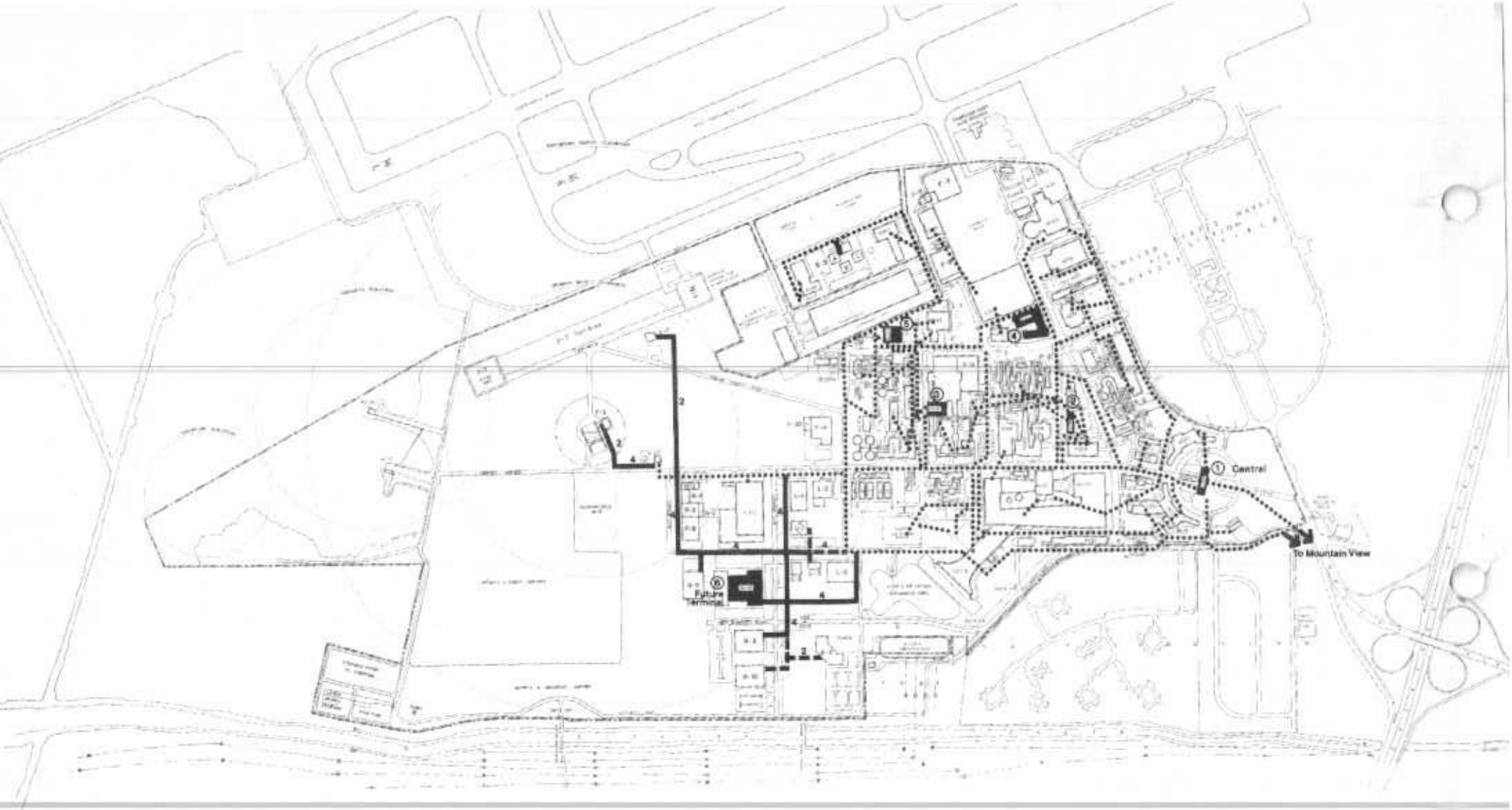
STREET LIGHTING

Security requirements as well as traffic safety establish criteria for roadway illumination at Ames. The existing street lighting system consists essentially of incandescent and mercury vapor luminaire fixtures mounted 16 feet above the roadway. Power to the existing street lighting system is distributed at 120 volts from relay stations located in selected buildings. The lighting of the parking lots which are adjacent to the Administrative Management Building (N-241) and the Life Sciences Research Laboratory (N-239) is provided by circuits from these buildings rather than from the street lighting system.

Lighting on the flight apron east of Building N-211 is provided by circuits from Building N-211 and N-243. The Static Test Stand (N-249) outdoor lighting is provided from circuits in N-249.

The existing street lighting system should be updated by replacing the existing standards and lighting fixtures with types similar to those recommended for the proposed street extensions.

The new system of street extensions will be illuminated by high pressure sodium lighting on standards located approximately 150 feet apart with each luminaire providing a lighting capacity of 20,000 lumens mounted 30 feet above the roadway on mounting arms which overhang the roadway.



Existing Feeders
Proposed Feeders–first five year period
Proposed Feeders–beyond five year period
⑥ Terminal Station
Number of Ducts

8.5

Communications

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

COMMUNICATIONS

The existing telephone system is distributed from a main frame and dialing apparatus located in the Administration Building (N-200), and four cable terminal stations located in the following buildings:

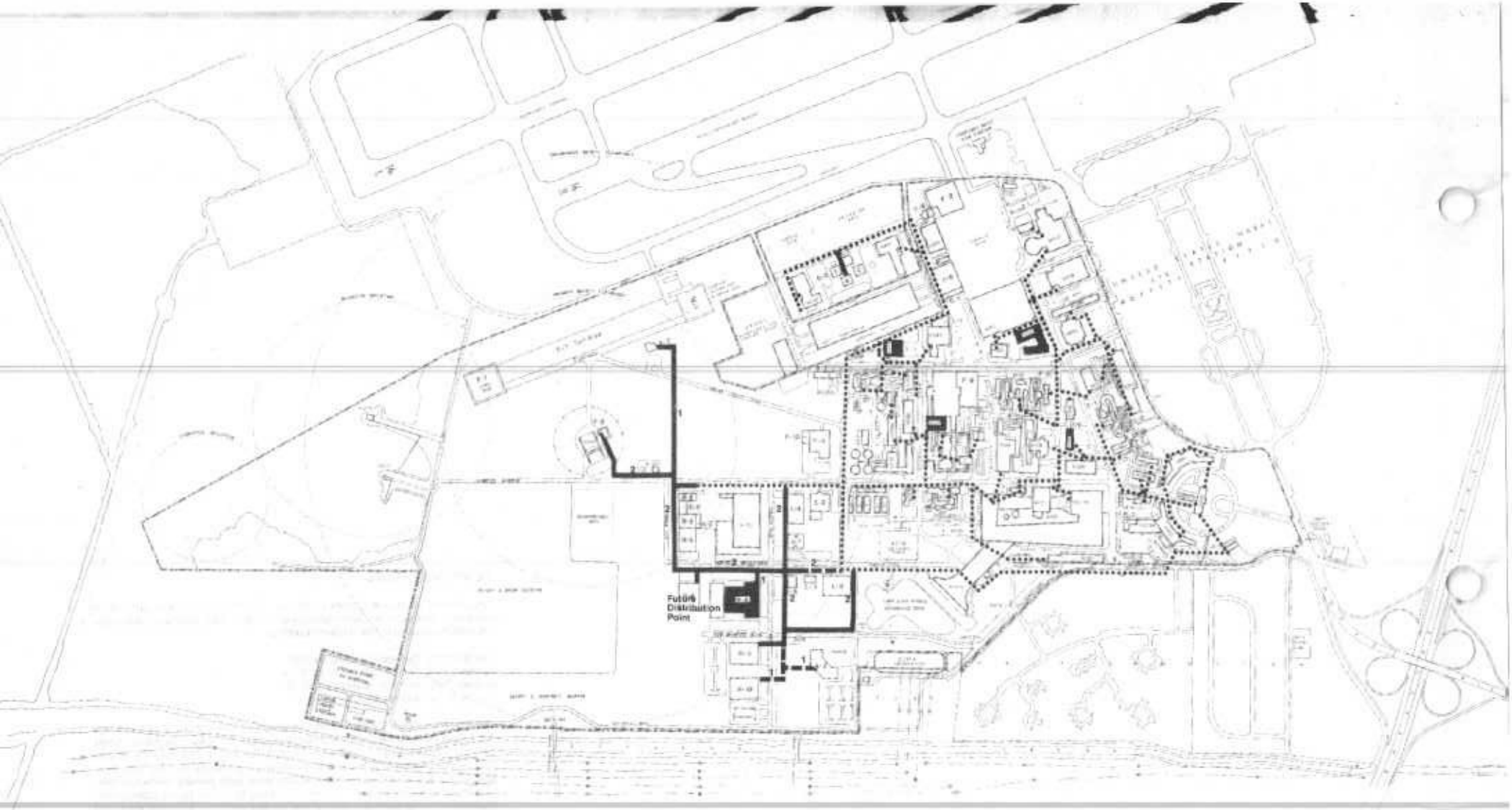
The Electrical Services Building (N-219)
Instrument Research Laboratory (N-213)
Unitary Plan Wind Tunnel Building (N-227)
Structural Dynamics Laboratory (N-242)

The Communication Center is in the basement of Building N-200 and contains the telephone consoles and commercial teletype services. The ASCF (Ames Satellite Communication Facility), located in Building N-240, contains access to commercial satellites, NASA experimental satellites and the Technical Control Facility associated with the NASCOM Voice/Data circuits. NASCOM teletype transmit capabilities are located in Building N-200 as part of normal communication center functions with remote receive terminals in project areas and the ASCF. A direct cable interconnection exists between the N-200 and N-240 areas.

The Emergency Control Center located in N-213 contains the NASA emergency radio and minimal telephone services. During emergencies, communications to other NASA installations and to other stations outside of Ames will be attempted using established commercial teletype and telephone services, NASA emergency radio network, and/or the NASCOM voice system. Direct communications will be maintained between the Emergency Control Center in Building N-213, the Moffett Field Naval Air Station and the Communication Center in N-200.

The telephone equipment, except for the underground cable, is furnished, installed, and maintained by the Pacific Telephone and Telegraph Company under a service agreement with Ames. Ames does any major underground cable maintenance required since the majority of existing underground duct banks contain both electrical and telephone cables in common manholes.

The proposed system of underground communications duct banks to serve the new facilities will consist of four parallel conduits which will provide spare conduit runs for fire, safety and security alarms as well as computer ties. This communications distribution system will be separated completely from the electrical power system.



Existing Cables
Proposed Cable Construction–first five year period
Proposed Cable Construction–beyond five year period
Distribution Point
4 Number of Ducts

8.7

Fire Alarm & Safety Detection

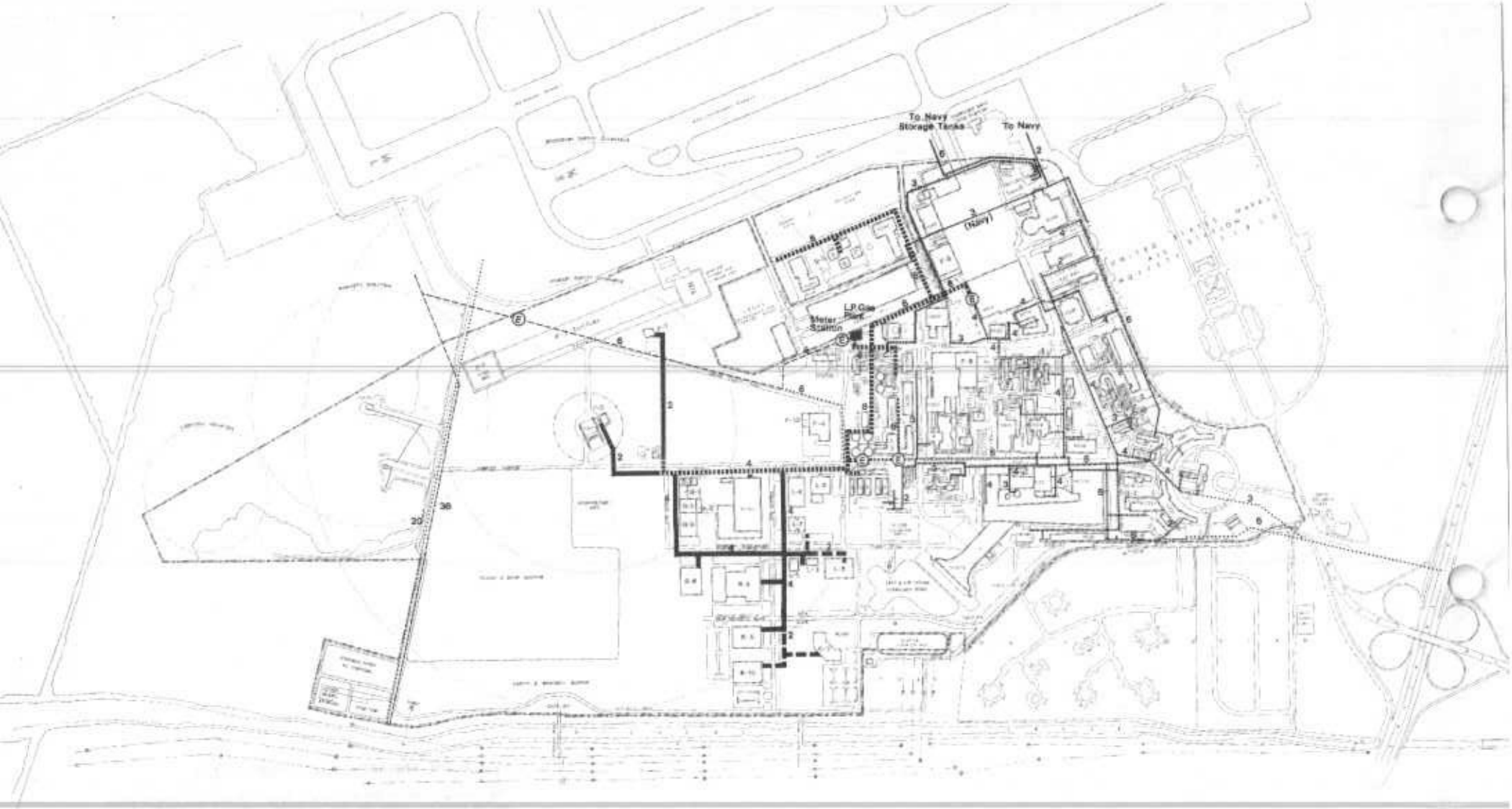
0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

FIRE ALARM AND SAFETY DETECTION SYSTEM

The Fire Alarm and the Safety Detection System are separate systems with a central reporting station and control equipment location in the Emergency Control Duty Office in Building N-213. The Fire Alarm System is a completely supervised Class A Positive Non-Interfering System. Each building contains a transmitter that sends a coded signal to the receiver and printer in the Emergency Control Duty Office. The coded signal indentifies the sending building by building number and this is retransmitted to the Navy Fire Department. The transmitter is activated by automatic detectors, flow switches in sprinkler systems, or manually activated pull boxes. Fire alarms are also reported by telephone to the Emergency Control Duty Office using the Ames universal emergency telephone number.

The Safety Detection System consists of a supervisory data center for monitoring of utilities, protective devices, and experimental tests. Off normal or status conditions are indicated on printers at the Emergency Control Duty Office and at the Facilities Services Branch. Wiring for the systems consists of a loop of cables between four distribution centers and an infeed from the control equipment at the Emergency Control Duty Office. Individual buildings are connectedto the loop by a multiconductor telephone-type cable from the building to one of the four distribution centers. The cable is used for both the Fire Alarm System and the Safety Detection System. As new facilities are constructed, they will include fire protection systems, monitoring of utilities, protective devices, and experimental tests, and a multiconductor telephone-type cable to one of the existing distribution points or to a proposed new distribution point in the Numerical Aerodynamic Simulation Building (R-4).



Existing Supply Main–P G & E
Abandoned High Pressure Supply Main
Existing Low Pressure Gas Main–7 ½ psi.
Existing Medium Pressure Gas Main–15 psi.
Existing High Pressure Gas Main–20 psi.
Proposed High Pressure Gas Main–first five year period
Proposed High Pressure Gas Main–beyond five year period
Ⓔ Existing Pressure Reducing Valve
9 Pipe Size In Inches
Existing Jet Fuel Lines to Navy & NASA Boiler at N-234A

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

8.9 Gas

GAS DISTRIBUTION

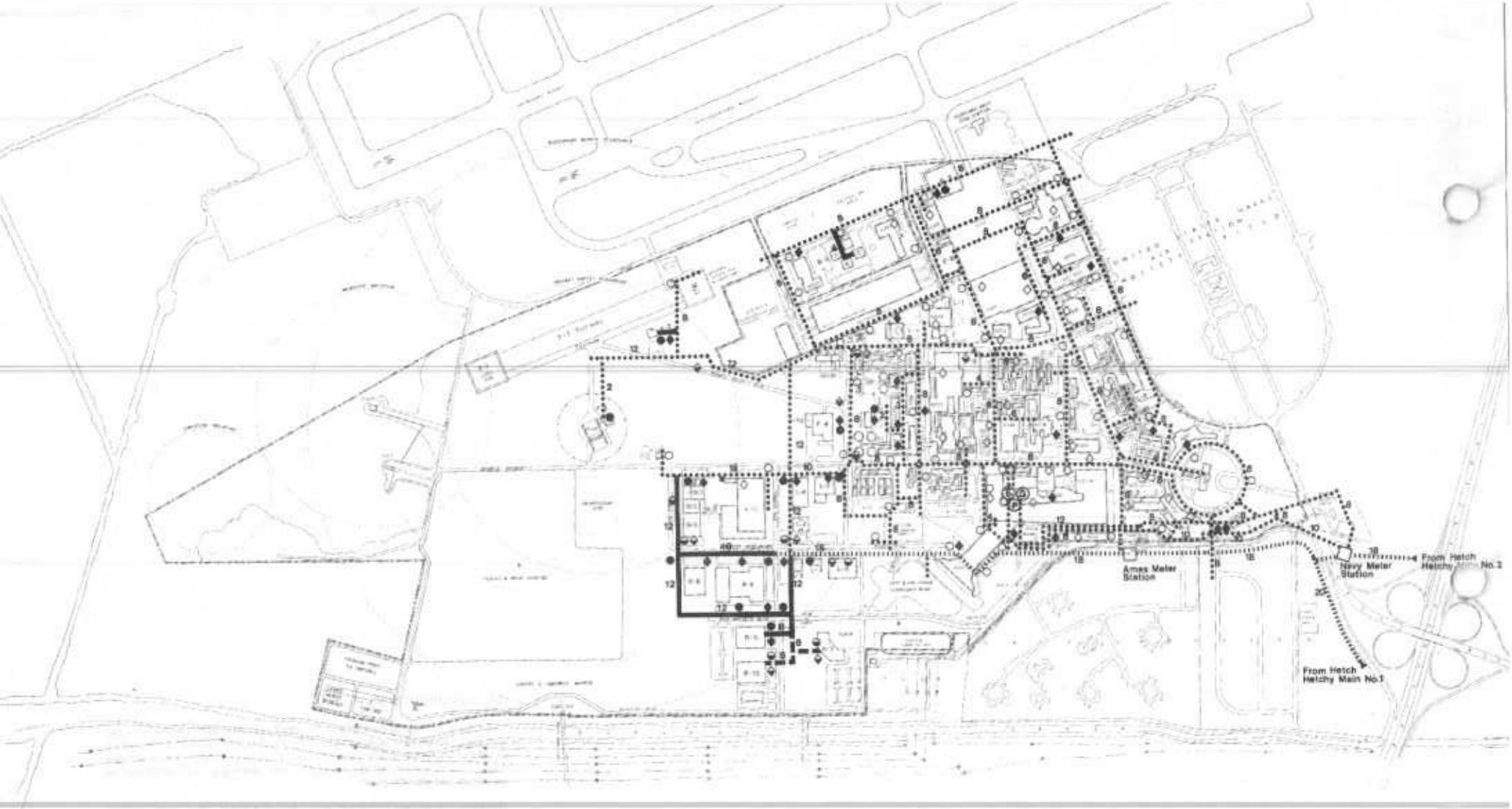
The natural gas distribution system is owned and operated by Ames. The gas is supplied on an interruptible basis by Pacific Gas and Electric company from its 36-inch diameter supply main which crosses the northern portion of Ames property. The system includes a single point metering and a central liquified petroleum gas standby plant.

The proposed system for the future development ties into the existing system on Arnold Avenue to provide complete basic loops serving the proposed facilities.

Because of past budget limitations and the necessity of constructing projects one at a time, it has been necessary to supply gas to each new facility for self-contained heating and cooling systems, rather than constructing a central energy plant as previously recommended in the 1966 Master Plan. Due to the growing nationwide shortage of natural gas, the frequency and duration of service interruptions are expected to increase year by year and finally, natural gas may be unavailable within about 25 years. It would, therefore, be necessary to convert all natural gas-fired equipment to alternate fuels.

One large boiler in Building N-234A is now converted to burn aircraft jet fuel (JP-5) and is connected to Ames and Navy storage tanks as shown on page 8.9.

This Master Plan recommends the construction of a Heating and Cooling Plant (R-6) with the versatility to operate on gas, oil, electricity and coal. Hot water for heating and chilled water for cooling would be distributed to most new facilities and to existing facilities as their mechanical components require replacement. A large amount of rejected heat will be available from the NAS facility (R-5). This heat will be used to ameliorate Heating and Cooling Plant energy requirments if economically feasible.



- Existing Supply Main
- Existing Distribution Main
- Proposed Distribution Main – first five year period
- Proposed Distribution Main – beyond five year period
- Existing Sprinkler
- Proposed Sprinkler – first five year period
- Proposed Sprinker – beyond five year period
- Existing Fire Hydrant
- Proposed Fire Hydrant – first five year period
- Proposed Fire Hydrant – beyond five year period
- Existing 200,000 Gallon Elevated Storage Tank
- Existing 750,000 Gallon Ground Storage Tank
- Existing Booster
- Existing Meter Station
- 12 Pipe Size in Inches

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

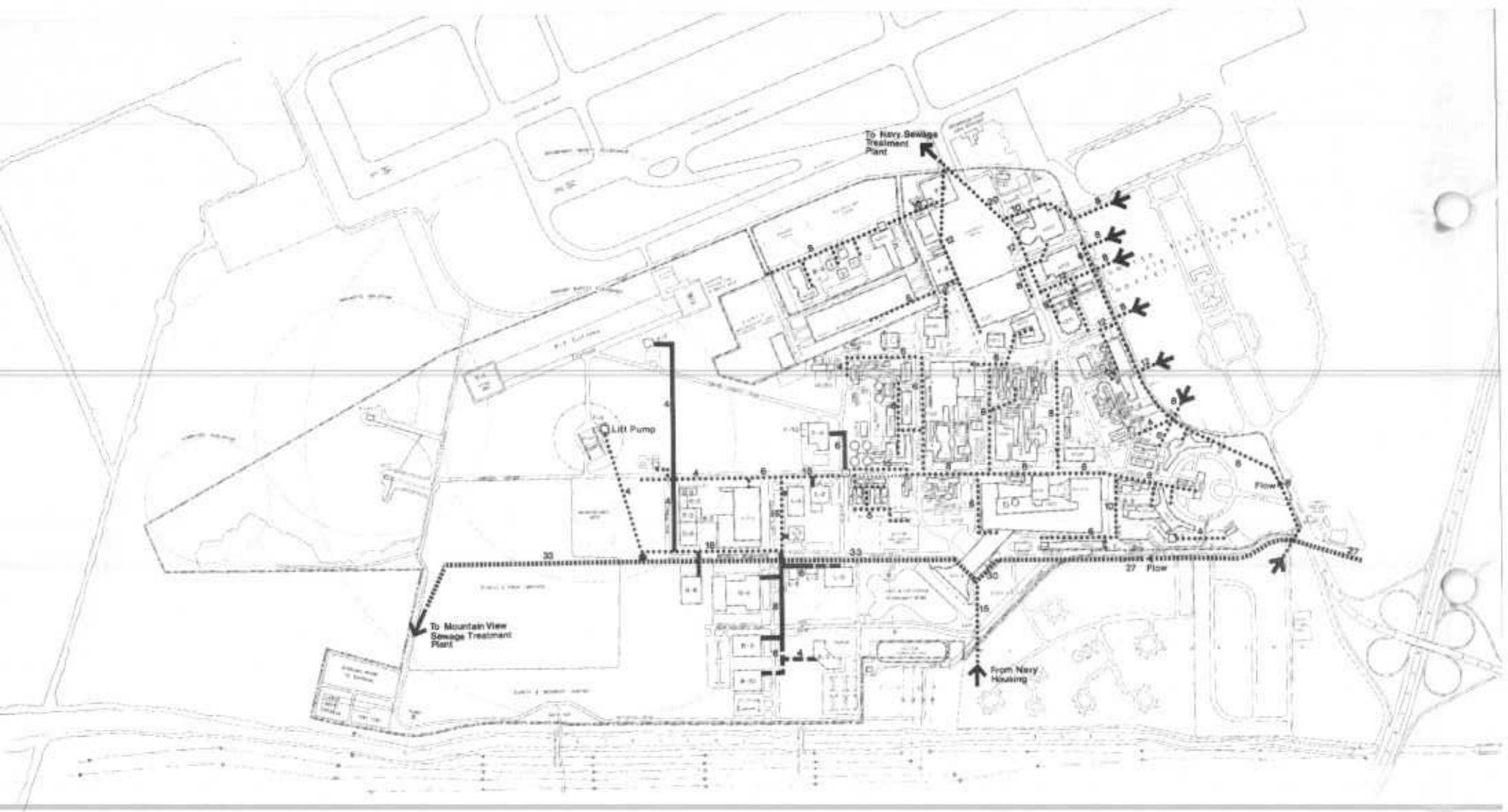
north

8.11 Water

WATER DISTRIBUTION

Water is supplied to Ames and the Navy by 18 and 20-inch supply mains which connect to the San Francisco Water Department (Hetch Hetchy) transmission mains on Tyrella Avenue and adjacent to Stevens Creek respectively. The two supply mains allow continuity of service in the event that one of the mains requires maintenance, and eliminate the need to construct expensive and space consuming storage facilities on-site. Service inside the facility is provided by looped distribution lines generally sized at 8, 10 and 12 inches. The aircraft hangars (Buildings N211 & N248) are also served by an 18-inch high pressure fire water line running from N221 down Warner Road. This line is charged to 130 psi by a pump station at N221 which draws from the existing 750,000 gallon tank at N221. On-site transmission lines are stubbed off at the north end of existing development and are available for extension to service new facilities.

The extended lines are designed to provide a strong loop system to assure adequate fire flows in the development. It is estimated that approximately 50% of the daily water demand at the existing and proposed facilities will be generated by research requirements.



Existing Sewer Main
Existing Sewer Main Abandoned
Existing Mountain View Trunk System
Existing Lift Station
Existing Control Manhole
Sewer From Navy Property
Proposed Sewer Main – first five year period
Proposed Sewer Main – beyond five year period
Pipe Size In Inches
New Lift Station

8.13

Sanitary Sewer

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

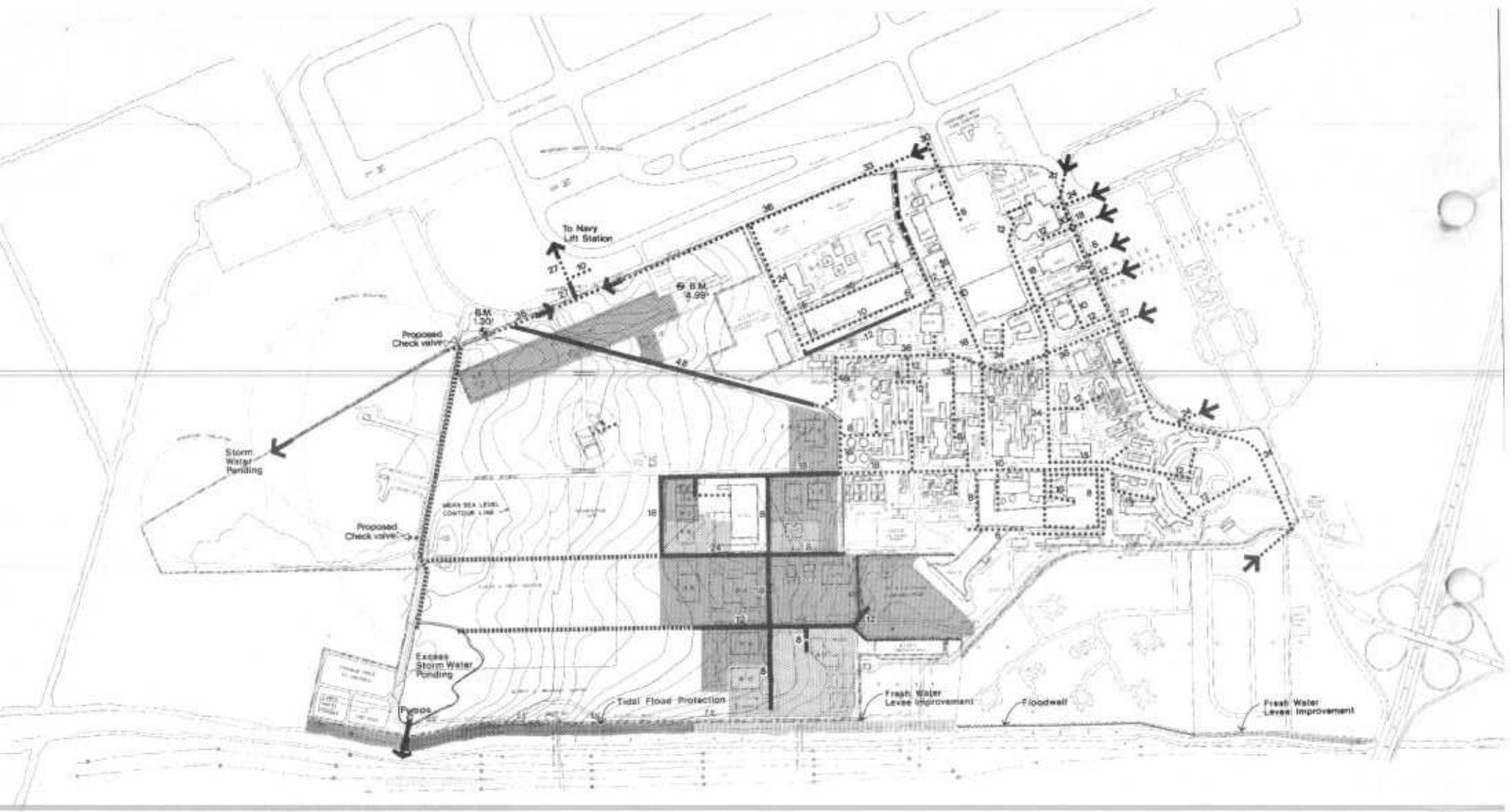
north

SANITARY SEWER

About seventy-five percent of Ames sewage flows northerly by gravity in a collection system to a control manhole where it is metered and diverted into a Mountain View trunk line. This line runs to the old Mountain View sewage treatment facility which ceased treatment operations with the start-up of a new secondary treatment facility in Palo Alto. The new facility will serve the combined needs of Mountain View, Palo Alto, and Los Altos, and will ultimately provide tertiary treatment. Mountain View's old facility is still used to pump the City's sewage to Palo Alto. Remaining sewage from Ames flows northeast under the Moffett Field runway, and is eventually conveyed to the sewage treatment facility in Sunnyvale.

Another joint Mountain View, Palo Alto, Los Altos system will soon provide treatment and disposal of special chemicals and industrial wastes which cannot be discharged into the main system. Tank trucks will collect these wastes from the various users and transport them to a special handling and treatment facility where high chemical concentrations will be reduced to within acceptable limits, and the waste will be introduced into the normal treatment process. Ordinances specifying maximum concentration loads for flow into the Mountain View sewerage system are expected to be enacted in the near future to satisfy the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

Sanitary flow from the new facilities (within the prescribed concentration limits) will be discharged into an Ames line, and then flow to a control meter pit and into the Mountain View trunk line.



- Existing Storm drain
- Proposed Storm drain – first five year period
- Proposed Storm drain – beyond five year period
- Grading – first five year period
- Grading – beyond five year period
- Existing Drainage Ditch To Remain
- Proposed Drainage Channel – first five year period
- Existing Culvert
- Existing Storm Drain From Navy
- 24 Pipe Size in Inches
- B.M. Bench Mark (National Geodetic Vertical Datum)

0 125 250 500 1000 2000 feet

0 38 76 152 305 610 meters

north

8.15

Site Drainage

SITE DRAINAGE

The existing storm drainage system serves, in addition to Ames' facilities, both the Navy's on-site warehouse complex and its 218 acre development just south of the Center. Runoff is conveyed northerly in an underground collection system and discharged into an open ditch which runs from the north end of the existing facility to a point near the north end of the adjacent Moffett Field runway. The flow is transported in a conduit under the runway to a Navy lift station (small 12-in. segment should be enlarged to match this 27-in. conduit) and is then pumped into an open ditch which runs to the Guadalupe Slough. (See Vicinity Map, page 3.1.) When runoff exceeds the flow capacities of the conduits and the open ditch on Center property, a pond forms in the northern portion of the site, augmenting existing natural groundwater collection in this low-lying area.

The proposed storm sewer plans continue to use this system to drain a majority of existing on- and off-site facilities. During the first 5 years, most of the ditch will be replaced by conduit to avoid interference with planned flight line ramp areas and V/STOL facilities, while a new underground system will be constructed to drain the new facilities and some existing facilities on the westerly portions of the Center. Storm water will be collected in the new development area and conveyed northward in line with the extensions of Moffett Boulevard and New Moffett Boulevard to an excess storm water drainage basin at the northwest corner of the Center, where it will be pumped into Stevens Creek. Facilities constructed beyond the first five year period will be connected to the system developed in the first phase. Sections of the proposed improvements to Stevens Creek levee system are shown below.

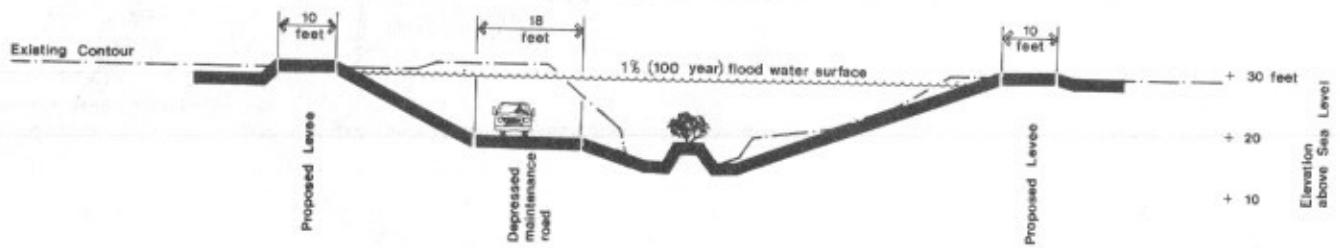
The present Ames-Navy complex generally slopes north and the minimum elevation recommended for development is reached near the northern end of the present site. This plan designates a staged program of site fill for the new development area to raise building sites and roadways to a minimum elevation of 10 feet mean sea level, leaving parking areas at existing grade. A more detailed discussion of the future site fill concept is given in Sections 9 and 10. The contours indicated are existing. Description of bench mark locations are given below. The perimeter security road along the 12th Street alignment serves as a dike between low-lying ground on either side of it. Surface runoff will continue to collect in the areas left unfilled. By means of a proposed drainage channel and check valves, this water can be conducted into the storm drainage basin adjacent to Stevens Creek, or alternatively, will pass under 12th Street into marsh areas to the north.

EXISTING BENCH MARKS (September 7, 1979 Data)

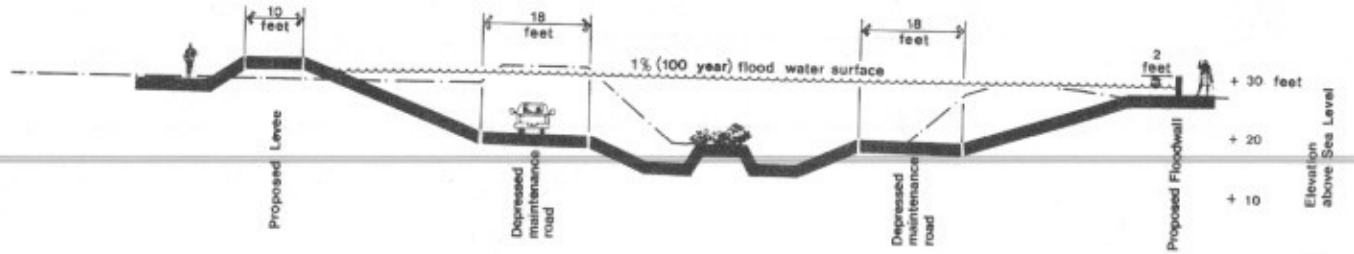
1. Tag in concrete stamped RCE 7147 — 1' west of steel corner of upright at northwest corner of 40' x 80' wind tunnel — Building N-221. Elevation: 15.26 feet.
2. USC & GS bronze disk stamped C 887 1948 in concrete base of steel leg of wind tunnel — Building N-218 (north-west leg of W.T.). Elevation: 15.46 feet.
3. USC & GS bronze disk stamped A 887 1948 in concrete apron near the northeast corner of Building N-211. Elevation: 12.77 feet.
4. RM 105 top of fire hydrant, 40 feet east centerline of Moffett Boulevard and 1800 feet north of King Road, 160 feet south of angle point Moffett Boulevard. Elevation: 13.40 feet.
5. RM 106 northwest corner of concrete box, 20 feet west centerline Moffett Boulevard and 0.5 mile northeast of Arnold Avenue, 160 feet south of end of former county road. Elevation: 1.20 feet.
6. Chiseled square on concrete ring around most westerly high pressure well west of Building N-250. Elevation: 11.69 feet.
7. Chiseled square in concrete at northwest corner of pit for Tether Stand near VTOL site. Elevation: 4.99 feet.
8. Chiseled square in concrete base of light standard at northwest corner of apron around pit of Static Test Stand — Building N-249. Elevation: 6.57 feet.

NOTE: Elevations based on NGVD (National Geodetic Vertical Datum)

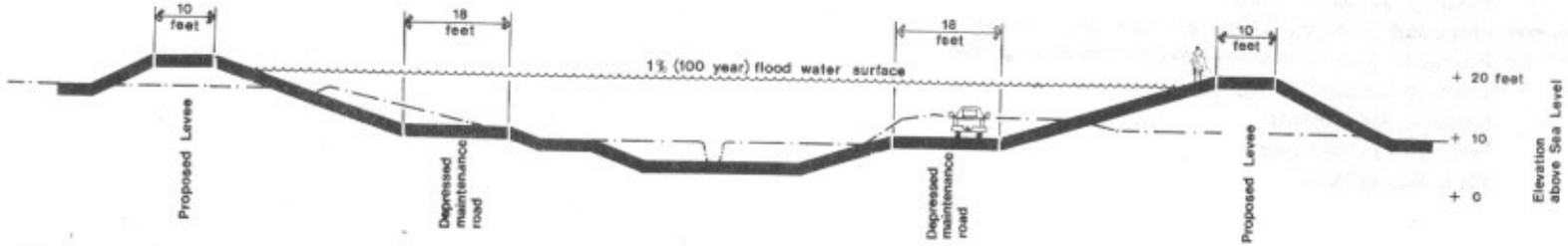
Stevens Creek Typical Section near Freeway (looking north)



Stevens Creek Typical Section at Floodwall



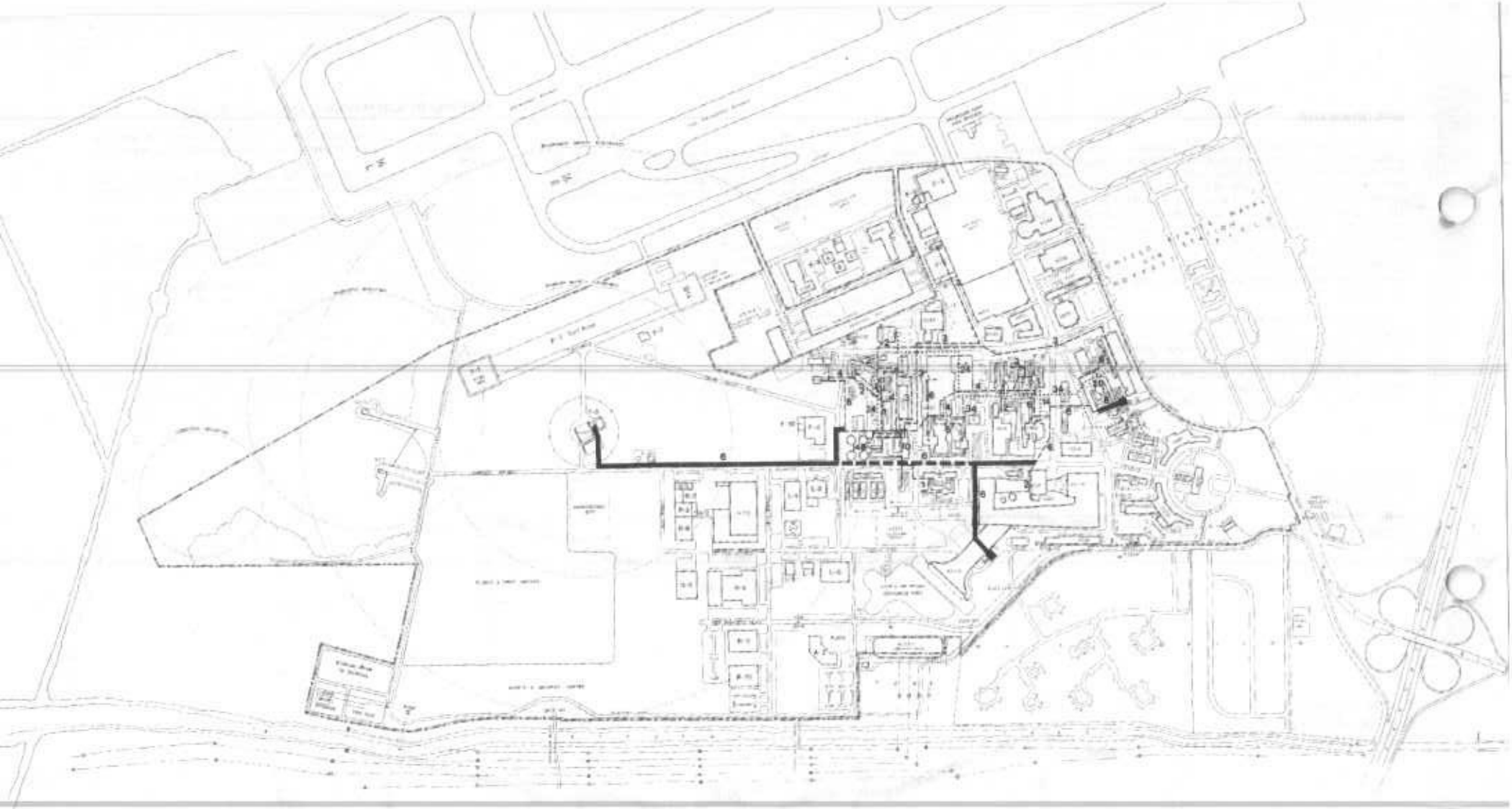
Stevens Creek Typical Section near Crittenden Bridge



Typical Sections of Levee System

0 4 8 16 32 feet
0 1.2 2.44 4.88 9.76 meters

8.16



Existing 3000 psi Line
Proposed 3000 psi Line – first five year period
Proposed 3000 psi Line – beyond five year period
Existing Vacuum or 140 psi line
Existing Air Storage
Proposed Air Storage
34 Pipe Size in Inches

8.17 High Pressure Air Systems

HIGH PRESSURE AIR SYSTEM

Ames uses high pressure air for both the source gas for hypersonic wind tunnels and auxiliary gas in other tunnels for such things as jet plume simulation. Vacuum and low pressure air are used to evacuate and pressurize recirculating pressure tunnels.

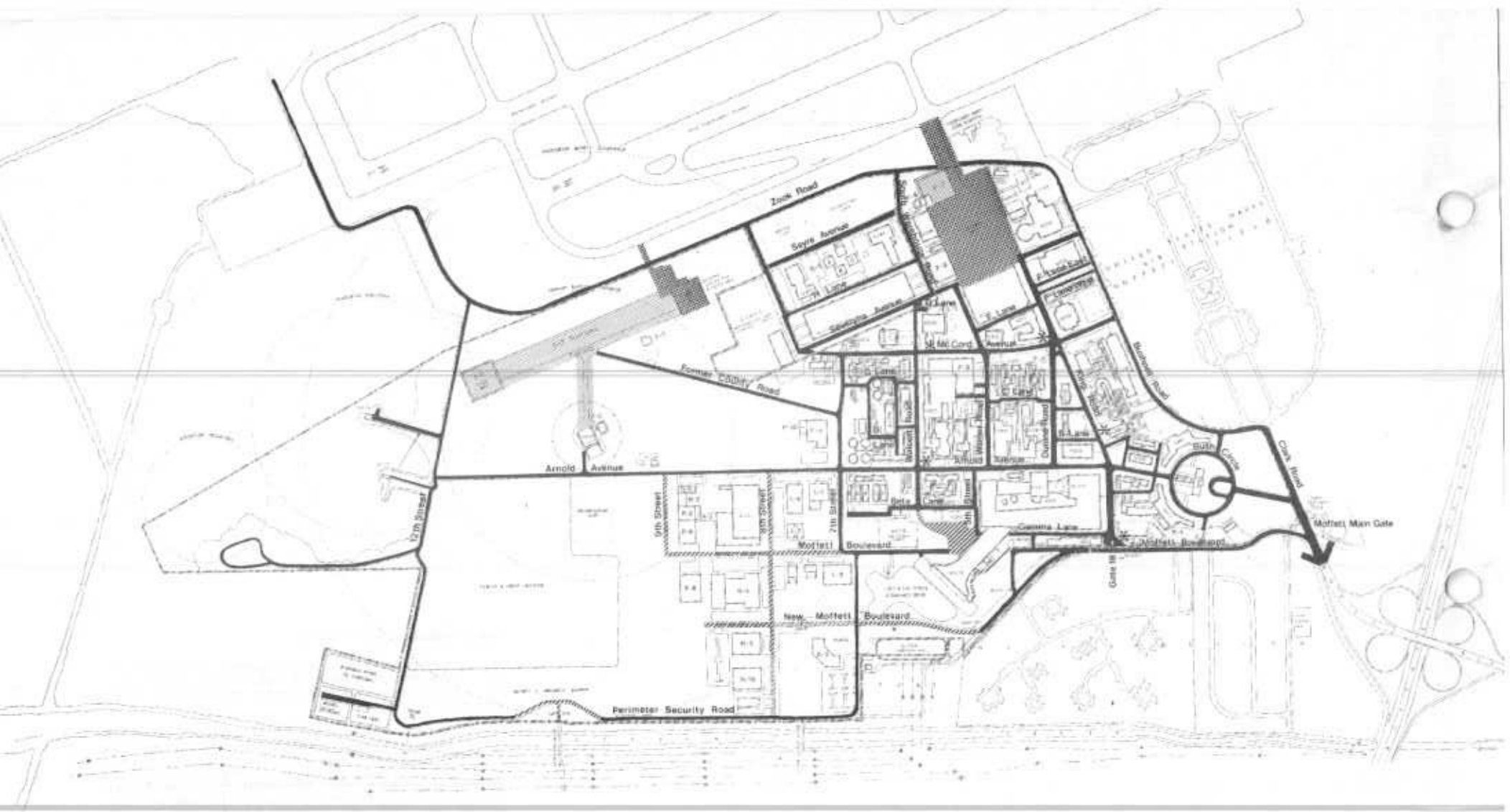
The 3,000 psi air system consists of four storage areas, three main pumping facilities, and an interconnection of piping to provide air to a number of wind tunnels (W.T.). A Compressor Building (N-250) and underground storage facility provide 30,000 cu. ft. of air storage and a pumping capacity of 8,000 standard cubic feet per minute (SCFM). An additional combined total of approximately 8,000 ft. of storage is located near the 3.5-ft. Hypersonic W.T. (N-229), and near the 7- by 10-ft. W.T. Compressor Building (N-216A). The 3.5-ft. Hypersonic W.T. Auxiliaries Building (N-229A) has a pumping capacity of 10,000 SCFM, while N-216A has a capacity of 2,000 SCFM. The 3.5-ft. W.T. is the largest user of this high pressure air, followed by Unitary W.T. (N-227), Thermal Protection Bldg. (N-234), 7- by 10-ft. W.T. (N-216), 14-ft. W.T. (N-218), and the new Propulsion Simulator Calibration Laboratory.

An additional 16,000 SCFM pumping capacity of 3,000 psi air is currently proposed for the expansion of the Compressor Building, N-250. (S-2 on the plan.)

A low pressure air system (vacuum to 140 psi) is used to evacuate and pressurize three main facilities: the Unitary Tunnels, the 14-ft. T.W.T., and the 12-ft. Pressure W.T. Pumping stations exist at Unitary Auxiliaries Bldg. (N-227D) and the 12-ft. Pressure W.T. Auxiliaries Building (N-206A). The system also connects to N-242, N-234, and N-207.

Proposed internal modifications to the 12-ft. Pressure W.T. will require a large capacity, high pressure air supply. This need will be supplied by the installation of 15,000 cu. ft. of 3,000 psi air storage (S-2) adjacent to the tunnel and interconnected with the central high pressure air system.

Also proposed, to supplement the needs of the 80- by 120-ft. Wind Tunnel (N-221B), is a new 15,000 cu. ft. capacity 3,000 psi air storage.



Existing Streets

Proposed Streets – first five year period

Proposed Streets – beyond five year period

Existing Aircraft Flight Operations Areas

Proposed Aircraft Flight Operations Areas – first five year period

* Existing Bus Stops

0 125 250 500 1000 2000 feet

0 38 76 152 305 610 meters

north

9.1

Internal Circulation

9 Transportation Facilities

AUTOMOBILES

The Internal Circulation Map on the adjacent page depicts both existing and proposed street locations within the boundaries of Ames. This map, combined with the adjacent Road Sections, is concerned with the *physical* characteristics of the street system within Ames. Three previous sections deal with the functional and aesthetic nature of the street system: (1) "Traffic" (page 4.5) discusses the linkage of Ames to the surrounding region via external transportation arteries; (2) "Automobile Movement (page 6.4) details the functional aspects of the existing and proposed entries into Ames; (3) "Environmental Design" (page 7.11) focuses upon the visual and aesthetic opportunities provided by the proposed street system.

Existing streets have developed in order of importance. Arnold Avenue, which runs almost the full length of the site, and McCord are the major north-south arterials; Bushnell, King and Walcott Roads are the major east-west arterials. At an intermediate level of importance, several east-west roads collect traffic and link to the major north-south streets. These include Durand, Warner and 7th Street. A third level of circulation includes the parking and service alleys located entirely within each major block such as Lanes B through H. Lastly, the perimeter roads, Zook, 12th Street and the Perimeter Security Road, provide access and surveillance to the more remote areas of the site and carry the least amount of traffic.

Proposed streets extend the existing grid system into the underdeveloped area. 8th Street will become a new major east-west arterial and the extensions of both Moffett and New Moffett Boulevards will be the major new north-south arterials. Construction phasing of proposed streets, as indicated on the Internal Circulation Map, corresponds to the phased construction of facilities located along each street. Initially, 8th Street will serve as the major access to the new development area and will eventually be extended from Arnold Avenue to the Security Perimeter Road. Extensions to Moffett Boulevard will occur as necessary to link facilities to 7th and 8th Streets. 9th Street will serve primarily as a model move route to Moffett Boulevard. New Moffett Boulevard will be extended in the period beyond 5 years as a public access to the Technical Information Center (A-3), and as a new security entrance to the site.

The Road Sections below graphically depict design guidelines for five major conditions within the proposed road system. Separate bike lanes should also be provided as an extension of the bicycle system planned for the North Bayshore Area (see Community Map, page 4.1). The New Moffett Boulevard guidelines reflect conditions previously established for a 50 foot right-of-way, including provisions for a bike lane.

The Major Internal Roads, such as Arnold Avenue and 8th Street, are recommended to be a minimum of 50 feet wide from curb to curb. Within this dimension a bike lane should be designated as a safety and convenience feature for the concentrated bicycle traffic expected along these routes. The sidewalk should be located on one side of the street adjacent to the curb edge in order to allow adequate tree planting around parking areas. On-street parking along the new major roads should not be permitted due to disruption of traffic flow and the hazard to bicyclists.

Minor Internal Roads are less wide than the major arterials because they carry less traffic. Walks should still be adjacent to the curb edge. Designated bike lanes are unnecessary and limited on-street parking could occur.

The remaining two road sections, which deal with aircraft movement, are explained below.

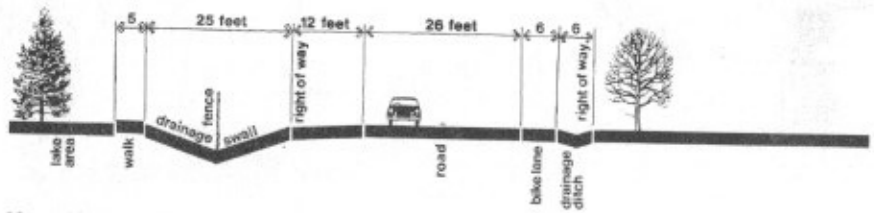
AIRCRAFT

Existing Aircraft Flight Operations Areas, shown on the Internal Circulation Map, include a large flight apron adjacent to existing aircraft hangars and the VTOL Tether Pad and Hover Area. Continued use is expected in these two areas.

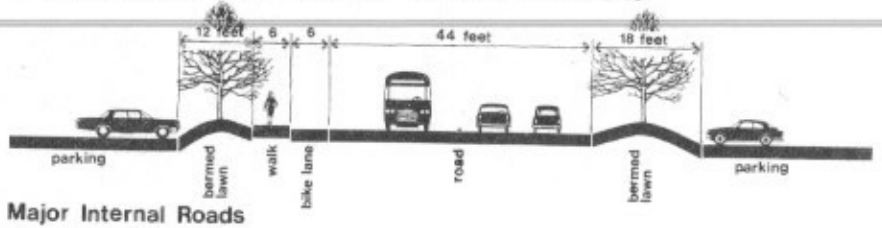
Proposed Aircraft Flight Operations Areas will provide space for three types of activities. A flight apron addition, adjacent to the existing aircraft ramp, will function much like the existing flight apron. A new VTOL Hover Pad and Taxiway/Turf Landing Area will extend the research capabilities of the existing VTOL pad. Finally, the access road to the Static Test Stand (N-249) must be widened to allow for the movement of larger aircraft.

The next to last Road Section explains the design criteria for large aircraft movement along proposed streets. The path of aircraft circulation from the Flight Apron and the Static Test Stand through the remainder of the site is shown on the Functional Relationships Map (page 6.3).

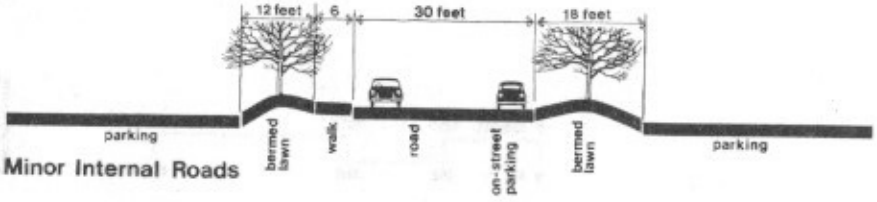
The remaining Road Section shows the relationship of ground cover and turf to the V/STOL Taxiway which will connect the existing and future hover areas.



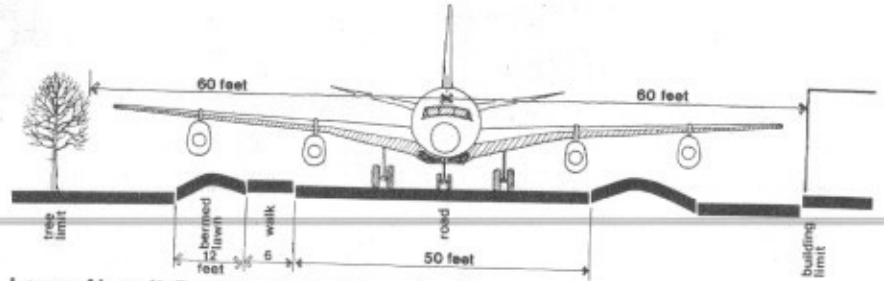
New Moffett Boulevard – between 7th Street & Gate 18



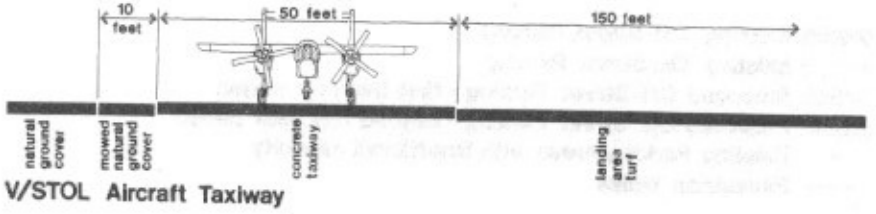
Major Internal Roads



Minor Internal Roads



Large Aircraft Route – Arnold Ave. · 9th Street · Moffett Blvd.

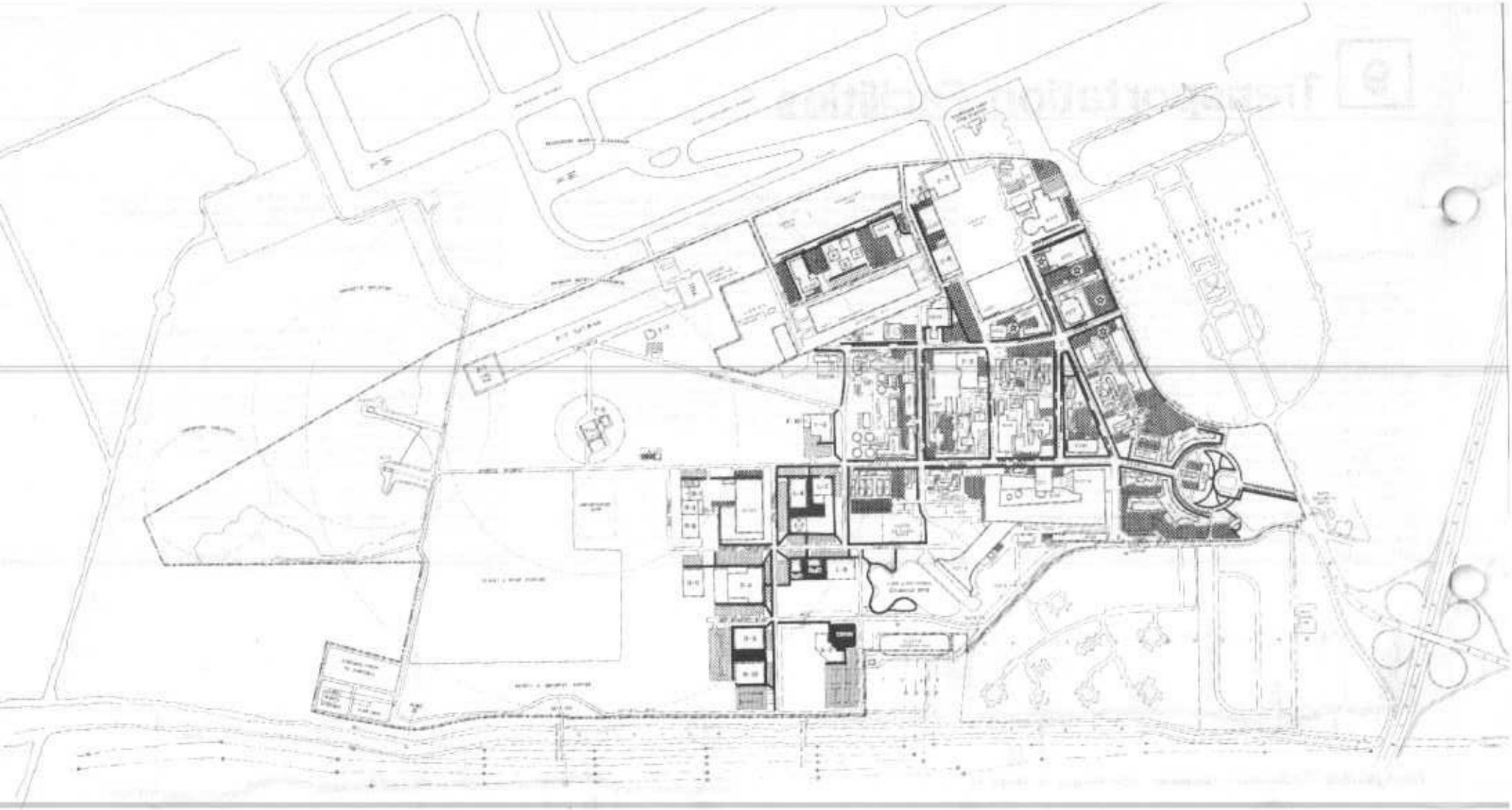


V/STOL Aircraft Taxiway

Road Sections

0 4 8 16 32 feet
0 1.2 2.44 4.88 9.76 meters

9.2



Existing Off-Street Parking
Existing On-Street Parking
Proposed Off-Street Parking – first five year period
Proposed Off-Street Parking – beyond five year period
☆ Existing Parking Areas with insufficient capacity
Pedestrian Walks

0 125 250 500 1000 2000 feet
0 38 76 152 305 610 meters

north

9.3 Parking & Walks

PARKING

One of the fringe benefits of working at Ames has been the ability to park next to, or very near the building where one works. Additionally, it is desirable to provide parking for visitors to each building. The combined demand requires parking throughout the site in a ratio of 8 spaces for every 10 employees. There are three principal factors which create a shortage of available parking spaces in certain portions of the existing built-up area. First, a concentration of people working in certain areas has caused parking congestion. Second, construction of new buildings within the built-up area and the placement of trailers in parking lots have displaced parking. Third, the influx of visitors, for both day-to-day business and periodic conferences involving large numbers of people, reduces the available parking for employees.

The Parking and Walks Map on the adjacent page indicates several existing areas with insufficient parking capacity. Several assumptions which were made as the proposed parking layout was developed should both lessen demand on existing parking and increase its supply.

- First, all new facilities constructed should provide their own off-street parking and not "borrow" from existing parking areas.
- Second, additional infilling of buildings within the built-up area should be discouraged.
- Third, if demand still exceeds parking supply in a few locations, or if a limited amount of expansion of existing buildings will eliminate parking, then the allocation of parking based upon size of ride groups should be considered.
- Fourth, trailers which currently are in automobile parking lots should be either moved to a non-parking area or eliminated entirely.

The general parking concept for the new development area organizes the parking into narrow strips which surround building groups, thus excluding automobiles from the primarily pedestrian area between the buildings in any one group. Although the parking areas are a dominant organizing element of the plan, they are designed so as not to be visually dominant. Parking areas are screened from the road by several methods:

(1) They will remain at grade, while road and building elevations will be built up 2-4 feet above existing grade.

(2) They are surrounded by an additional 2-3 foot high grass berm with street trees.

(3) They are no more than 2 cars deep, thus avoiding vast acreages of cars.

Due to their larger parking requirements, the parking areas for the Technology Information Center, (A-3) and the Research Engineering Systems Facility (R-5) exceed the two car maximum depth, requiring a thorough landscape treatment. The plan below shows two typical parking arrangements. A section of the landscape treatment through typical parking areas is shown on page 10.4.

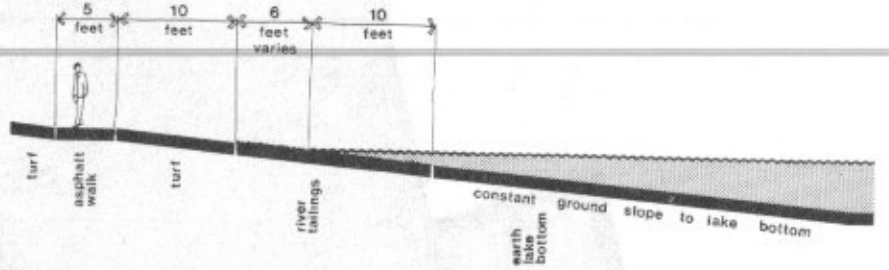
PEDESTRIANS

The Parking and Walks Map on the adjacent page shows the major pedestrian walkway network at the ultimate stage of development. Most of the walkways paralleling streets in the existing built-up area have already been constructed. Only a few extensions and filling of gaps are necessary to complete the continuity of the network in the built-up area. However, the majority of walkways in areas of frequent pedestrian use are not sufficiently wide to permit more than two people to walk abreast. A gradual program of walkway widening to a minimum of 5 feet should be continued, as has been started in the vicinity of the Cafeteria (N-235). Similarly, the program of providing ramps at the ends of all walks for wheelchairs should be continued.

Within the proposed development area there are two types of pedestrian walks. The first, predominantly adjacent to the street system, is an extension of the existing walkway network. This sidewalk network serves those people travelling from one block to another. The second type, characterized by wider pathways (8 feet) for a heavier use, is separated from auto circulation but ties into the sidewalk system at intervals. These paths consist of perimeter walks around buildings and adjacent to parking areas, which provide for pedestrian traffic from parking lots into buildings. Open spaces within building clusters are devoted entirely to pedestrian use, forming courtyards which are oriented towards views of the lake area and wind tunnel. These open areas serve as gathering places and as a visual focus for each group of buildings. Landscaping for these areas is discussed on page 10.4.

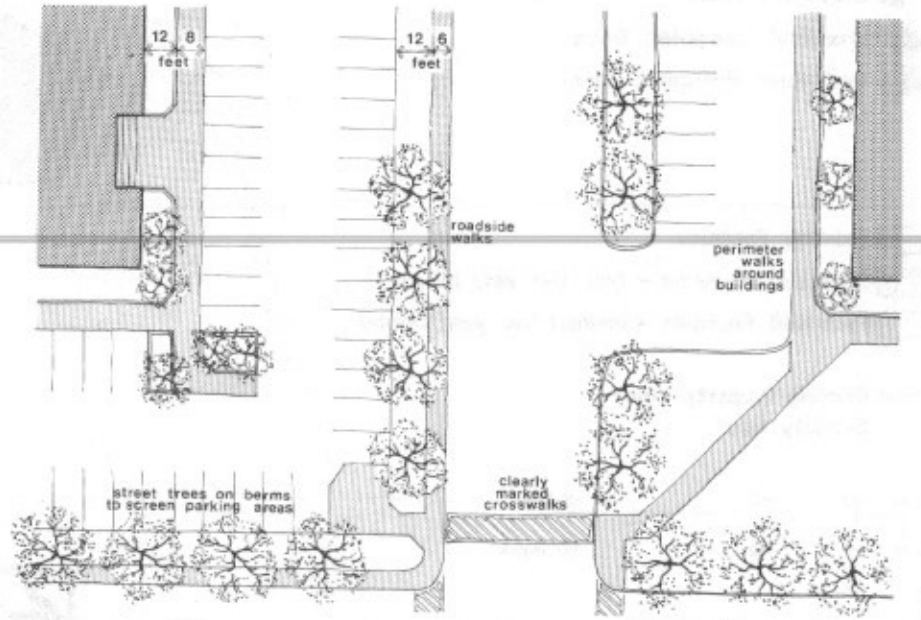
The "Plan of a Typical New Intersection", illustrated below shows several methods that would be used to separate and protect pedestrians from vehicular traffic.

Sidewalks adjacent to streets are recommended to be immediately adjacent to the curb to provide area for berming and landscaping next to parking areas. Walkway widths should be a minimum of six feet, particularly in areas of heavy pedestrian usage, such as Arnold Avenue. The walkway section below illustrates design criteria appropriate for the lake area.



Pedestrian & Bicycle Path around Lake near 80 x 120ft. wind tunnel

0 2 4 8 16 feet
0 0.6 1.2 2.44 4.88 meters



Plan of Typical New Intersection

0 8 16 32 64 feet
0 2.4 4.9 9.76 19.5 meters

Parking & Walks

9.4

Ames Research Center

National Aeronautics & Space Administration

Moffett Field, California

For Official Use Only

1981

Deciduous Trees

Broadleaf Evergreen Trees

Coniferous Evergreen Trees

Existing Facilities

Proposed Facilities — first five year period

Proposed Facilities — beyond five year period

Existing Property Line

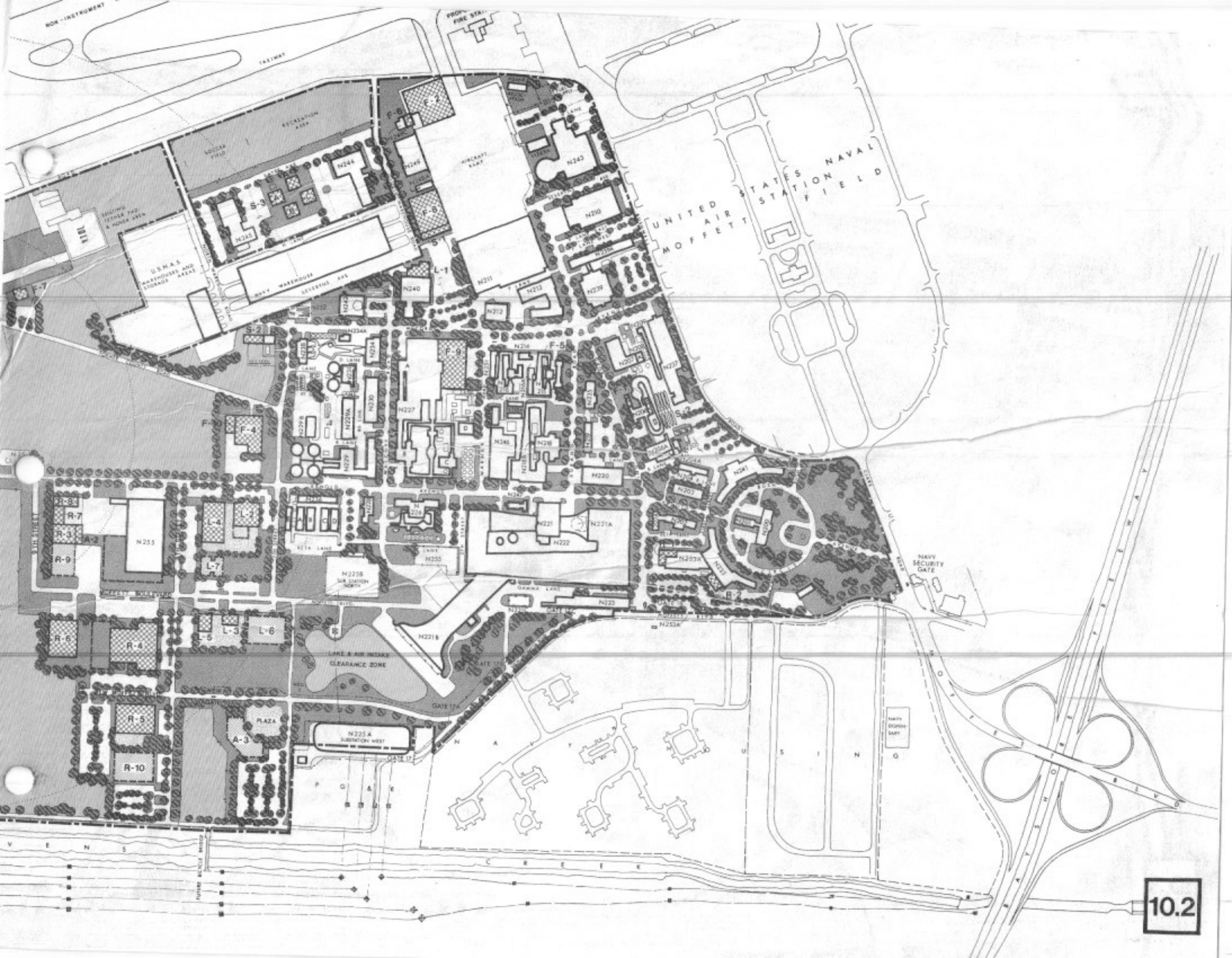
Security Line

0 75 150 300 600 1200 feet

0 23 46 91 183 366 meters

10.1 Landscape Master Plan

north


UNITED STATES NAVAL AIR STATION MOFFETT FIELD
NAVY SECURITY GATE
LAKE & AIR INTAKE CLEARANCE ZONE
PLAZA
GATE 17
GATE 17A
NAVY DISPENSARY
SHORELINE BLVD
PERIMETER ROAD
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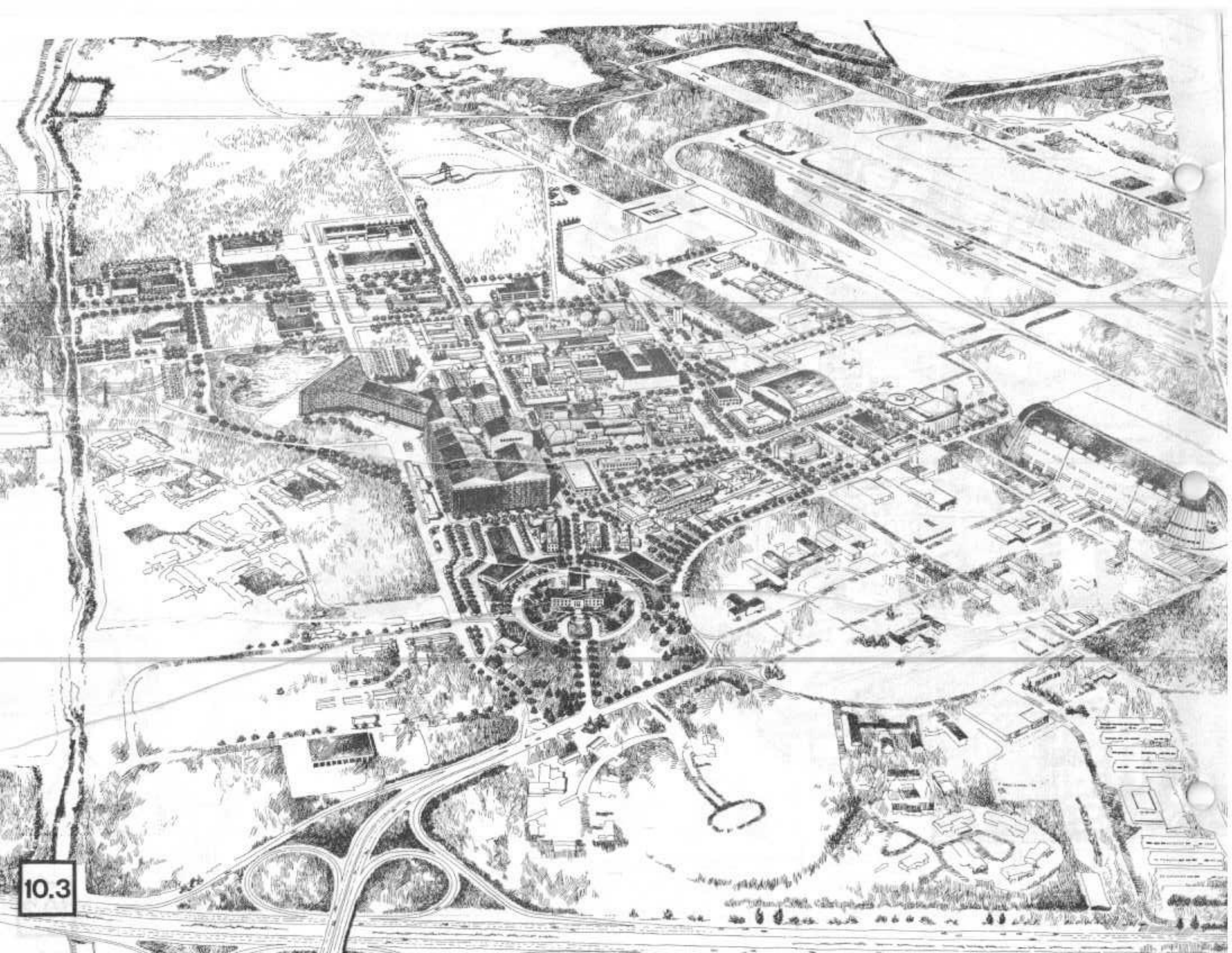


10.3

10 Landscape Planting and Conservation

GENERAL CONCEPTS

There is an unmistakable drama on this site. The overwhelming size of the wind tunnels gives way to vast panoramas of bay and mountains; the dynamic character of research co-exists with agriculture and wildlife; a pedestrian may encounter a giant airplane being towed to a test site, and further on, a ring-necked pheasant in search of food. It is the main objective of the landscaping portion of the Master Plan to preserve this drama as new construction is implemented.

The basic character of the new portion of Ames is one of openness. The structures will take advantage of new lands and respect the safety zones of their neighbors, thus providing buffer areas for lawn and tree plantings. Utilizing these buffers as a major resource in landscape planning, mounding and planted berms are proposed to mitigate the flat, gridded characteristics. Undesirable areas, such as parking lots and entrances, are properly screened by ground forms and plantings; the attractive and dramatic aspects are enhanced by framing and by ground planes of lawn or water. The natural areas are respected by their conserved naturalness.

Within the densely developed existing portion of Ames Research Center, the landscaping is more reactive: what space is available is generally planted. Current landscaping emphasis in this area is limited mainly to tree planting along streets and in parking lots. This part of Ames, a place of engineering, research and science, is formally landscaped, with little retention of its original natural state. Plantings are located not so much to hide the undesirable, but to establish human scale, to provide textural relief from the steel and concrete structures, to mitigate the large paved areas, and to link this "old" with the coming "new".

Two streets, Arnold Avenue, extending north to the Perimiter Security Road (12th Street), and the proposed 8th Street, extending west to the Perimeter Security Road, become major organizational forces for the new development on the site. Plantings along these spines are similar to existing plantings on the site, and the transition of "old" to "new" is eased. New structures are spaced irregularly along the tree-lined avenues, and views are afforded across open ground or water to both distant mountains and to the compact foreground of the existing research center. Near views of parking lots and service bays are selectively blocked.

Parking lots in the existing portion of Ames are relatively small but scattered. Tree canopies and perimeter landscaping are called for; but each area, beset by its own specific problems and requirements, must be individually designed. Parking lots in the new areas encircle groups of highly populated buildings, thus requiring a thorough landscape treatment to reduce their prominence.

Sight lines are controlled by grassed berms and plantings, and parking left at original grade. Adequately irrigated trees and night lighting should be located within the parking lots, and enhanced views of structures, vegetative screens, or distant mountains should be developed.

Courtyard spaces between buildings on the new portion of the site should be landscaped with phasing of new construction in mind. Planting must help to define the courtyard spaces and reinforce or frame views to distant features without precluding future construction of facilities.

The general intent of the site landscaping is to mitigate the undesirable, augment the attractive or dramatic, conserve the valuable, link all portions of the site, provide texture and scale to the daily lives of employees, and enhance the public image of the Center. The conditions of the Ames site (wind, water table, and airborne salt), limit the tree varieties available for use, and a list might include the plants that follow.

TREE PLANTING

Deciduous trees for street planting include: London plane (*Platanus acerifolia*) and white mulberry (*Morus alba*), and Modesto ash (*Fraxinus velutina "Modesto"*) while deciduous trees suitable for general use (including, in some cases, use as street trees) are: Chinese pistache (*Pistacia chinensis*), Chinese elm (*Ulmus parvifolia* and *Ulmus parvifolia varieties*), white alder (*Alnus rhombifolia*), Lombardy poplar (*Populus nigra "Italica"*), and sweet gum (*Liquidambar styraciflua*).

Broad-leafed evergreen trees provide year-round texture and color, and varieties suitable for Ames include: camphor trees (*Cinnamomum camphora*), carrot wood (*Cupaniopsis anacardiodes*), California pepper (*Schinus molle*), Brisbane box (*Tritania conferta*), swamp tea tree (or cajeput tree) (*Melaleuca leucadendra*), black acacia (*Acacia melanoxylon*), holly oak (*Quercus ilex*), Myoporum laetum and Myoporum laetum "Carsonii", beefwood (or she oak) (*Casuarina stricta*), red gum (*Eucalyptus camaldulensis*), and peppermint tree (*Agonis flexuosa*).

Coniferous evergreen trees are somewhat limited at Ames because of climate and soil. The following pines are the most suitable: Canary Island (*Pinus canariensis*), Japanese black (*Pinus thunbergii*), Monterey (*Pinus radiata*), Italian stone (*Pinus pinea*), and aleppo (*Pinus halepensis*). Arizona cypress (*Cupressus glabra*, also known as *Cupressus arizonica*) and Monterey cypress (*Cupressus macrocarpa*) are also acceptable plants.

In some areas of the site the water table is so high that only certain of the above plants may be used: white alder, bald cypress, Lombardy poplar, beefwood, black acacia, swamp tea tree, holly oak, desert gum, California pepper, and aleppo pine.

OTHER PLANTED AREAS

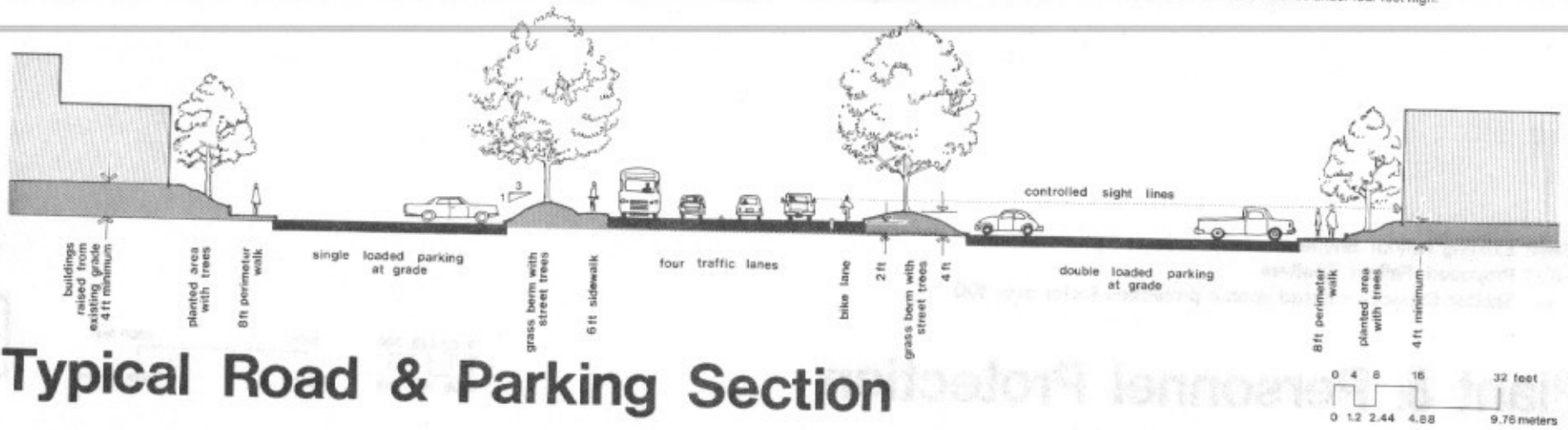
With a format of trees and bermed lawn areas serving as a continuous greenbelt between the parking areas and street traffic, planted areas adjacent to buildings should be landscaped with small trees, shrubs and ground covers. Trees could include *Pittosporum undulatum* (Victorian Box), *Ficus nitida* (Indian Laurel Fig), *Acacia longifolia* (Sydney Goldenwattle).
Shrub selections might be *Juniperus* varieties (Juniper varieties), *Coprosma repens* (Mirror Plant), *hebe* varieties (Veronica), *nerium oleander* (Oleander).
Ground Covers should be *Hedera helix* "Needlepoint" (Needlepoint Ivy), *Gazania* varieties (Gazania), *Vinca minor* (Dwarf periwinkle), and *Baccharis pilularis* (Coyote Bush).

PLAZA

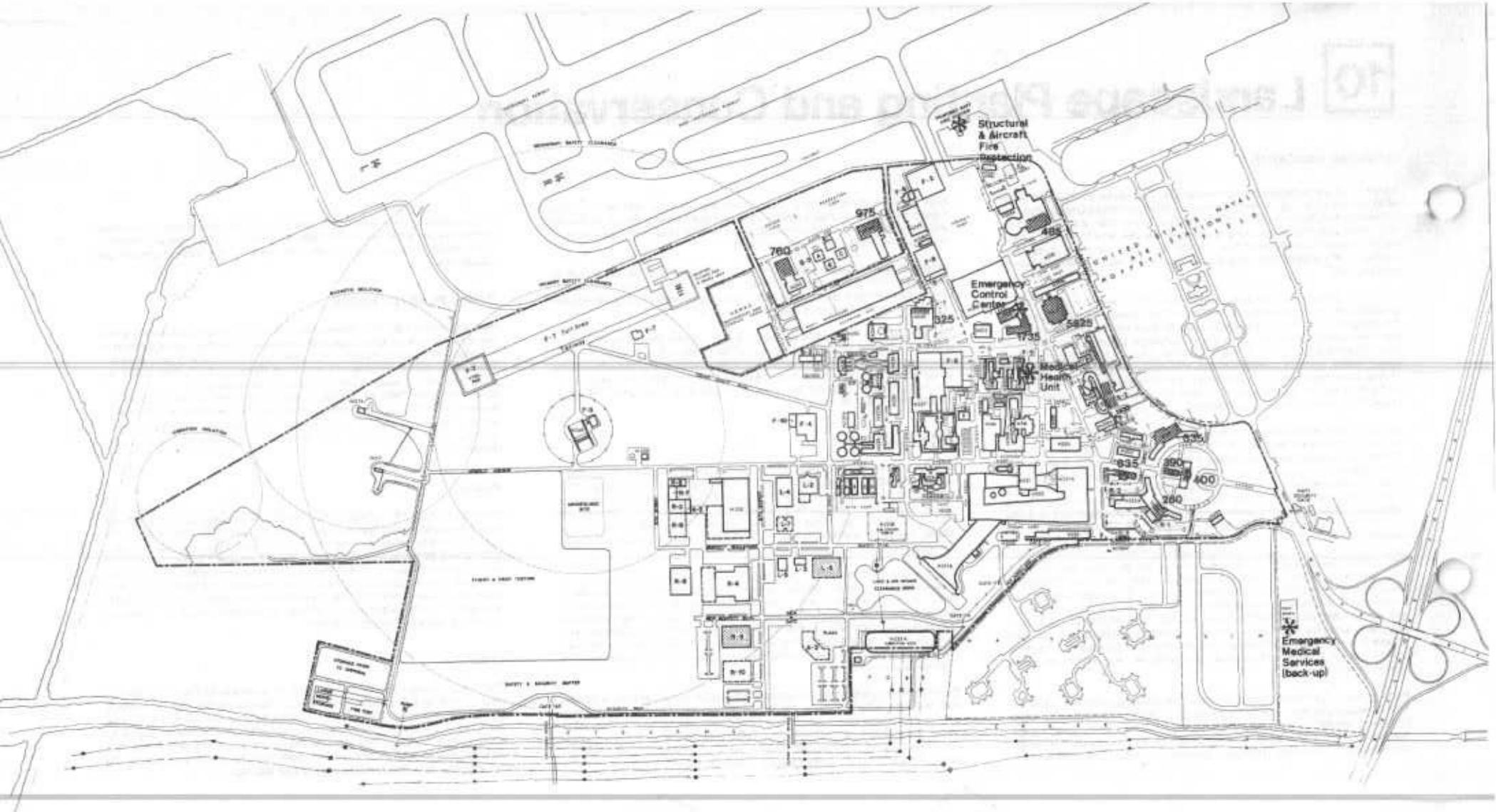
The entry to the public facilities area is dominated by a display area which acts as a foreground for the Technical Information Center (A-3). The plaza is composed of a large paved surface bordered by street trees and berms, and is open on one corner to maintain a strong visual connection to the lake area and wind tunnel extension from the Technical Information Center. Arrival to and departure from the plaza is signified by passing under a canopy of ornamental trees. The plaza is primarily a large model exhibit area and must remain flexible enough for a continuing rotation of exhibits. It can also function as a gathering place for group tours and public events.

LAKE

The lake serves as a debris-free surface at the air intake for the 80- by 120-foot Wind Tunnel, and is a major visual design element on the site. The lake is shallow; its edges are stabilized from erosion by river tailings (small stones), and a trail is proposed to permit circulation around it (see section on page 9.4). Since air flow considerations are vital, the ground plane around the lake may undulate only to a height of three feet, trees must be sparsely located at 100 foot intervals, and shrubs must be under four feet high.



Typical Road & Parking Section



Existing Fallout Shelters

Proposed Fallout Shelters

960 Shelter Capacity – based upon a protection factor over 100

11.1

Plant & Personnel Protection

0 125 250 500 1000 2000 feet

0 38 76 152 305 610 meters

north

11 Plant and Personnel Protection

EMERGENCY PREPAREDNESS

Ames Research Center has an Emergency Preparedness Program as part of a government-wide program under the Office of Preparedness of the General Services Administration (GSA). The intent of the program is to keep Ames ready for emergency contingencies such as fire, explosion, natural disaster (e.g. earthquakes), civil disturbance, bomb threat and attack on the United States. A key element of this program is a Facility Self Protection Plan for all of the Center's Personnel, by which the employees and their families will take steps to deal with any emergency.

An Emergency Control Center, staffed 24 hours a day, 7 days a week, operates from the basement of Building N-213. This office functions as a central command point for taking action in all emergency situations; by monitoring the Center's fire, critical security and maintenance alarms, and by operating a radio communications base for security and safety personnel.

Fire alarm and safety communication systems are discussed further in Section 8. Future plans call for a center-wide exterior television camera system which would be monitoried in the duty office. A radio paging system with a central console is located, monitored and operated within the duty office.

The well shown on the Master Plan on page 7.16 near the lake will be developed as an emergency source of water for Ames. Combined with several existing large storage tanks, the well should make Ames self-sufficient in the event that the water supply from the surrounding community is curtailed during an emergency.

FIRE PROTECTION

Ames Research Center utilizes several different fire fighting organizations. The Center owns a variety of fire/rescue vehicles specifically for use in aircraft fires. The Navy at Moffett Field responds to any Ames' fire call with either aircraft crash crews or structural fire fighting equipment. At present, Ames does not possess any structural fire fighting trucks and must rely upon Navy assistance. In the event of a major fire, crews from Mountain View and other nearby communities can readily back up the Ames and Navy efforts.

The Navy fire station is currently located in an area roughly central to Moffett Field. Plans are being formulated which would relocate this station nearer to existing flight operation areas just east of the Ames Flight Apron. This proposed location is shown on the Plant and Personnel Protection Map.

A program now in progress will eventually provide fire detection devices in all buildings at Ames. These devices will provide a signal at the Emergency Control Center (N-213) and the Navy fire station. See Section 8 for additional description of this system.

MEDICAL FACILITIES

Ames maintains a Health Unit, centrally located in Building N-215 and staffed during regular working hours by a physician, nurse, medical assistant and a secretary. This contractor-operated facility is responsible to the Ames Institutional Operations Office. The Health Unit responds to all emergency calls and a commercial ambulance is also dispatched. The facility is equipped for first aid, emergency and referral services. In addition, multiphasic physical examinations for Ames employees are conducted by the Health Unit. Full health or emergency care may be obtained from many hospitals in the surrounding community. For catastrophic emergencies, there are five additional physicians who are part of the NASA staff.

During the swing and graveyard shifts, medical emergencies are handled by dialing X5555 through which a commercial ambulance is dispatched to the scene. Additionally there is a large and rapidly growing number of personnel at the Center who are trained in first aid and CPR techniques. Emergencies such as combustible gas leaks, radiation problems, explosions, chemical spills, etc. are handled through the Duty Office by a safety contractor.

INDUSTRIAL SAFETY

The Ames Environmental Health and Safety Office continually monitors the Center's facilities and equipment to safeguard against any potential health or safety hazard. The Office adopts and disseminates health and safety standards for operational tests, and establishes and conducts programs in radiological safety, fire prevention and suppression, industrial hygiene and environmental health. In addition the Office supervises programs in sight and hearing conservation, and personnel protective clothing and equipment.

Relative to planning considerations, it must be noted that nationally recognized building safety codes have been unable to keep pace with the development of space vehicles and research equipment. Therefore, it is extremely important that the safety parameters of potentially hazardous operations be identified at the onset of planning.

Since land is available and functional relationships permit, future hazardous facilities will be remotely located from the more populated areas of the site. Examples of such remote facilities are the Flight and Drop Testing Area, the Fire Test Area and the existing Static Test Area. The Land Use Plan on page 6.1 illustrates this concept.

Future buildings (R-3, R-7, R-8, R-9) which, due to necessary functional considerations, must be located within the Primary Safety Clearance Zone, act to shield the outdoor loading/unloading area of the Warehouse (N-255) creating a courtyard protected from possible flying rotor parts accidentally projected from the Static Test Stand (N-249). The use of berming and tree planting will reinforce this shielding effect. Flight path clearance is another safety factor which has influenced the location of facilities. Runway clearances and building height limitations, as well as the building-barrier concept, are indicated graphically on the Site Constraints Map on page 6.5

RADIATION PROTECTION

Protection from radiation during day-to-day research operations is maintained by continuous review of safety procedures. These procedures are enforced by an Ames radiation safety committee. The committee reviews all ongoing and proposed uses of radiation sources to insure that such use will remain safe. Each researcher who uses radioactive materials is required to monitor his work area on a daily basis to avoid contamination of other areas.

The adjacent Plant and Personnel Protection Map indicates all of the existing major fallout shelters. The capacity of each shelter, based upon a protection factor of at least 100, is also indicated, (a factor of 40 is considered adequate). Total major shelter spaces, based upon at least a 100 factor, is 12,425. This amount is about four times the normal Ames population, including visitors. Drinking water receptacles to be filled are available for more than 12,500 people. In the event of disaster, the Emergency Control and several dispersed Emergency Command Centers are fully protected, equipped and ready to deal with radioactive fallout problems.

SECURITY

Ames is responsible for the regulation of visitors to the site and for controlling access to several facilities. This is accomplished by several means: First, a perimeter security fence surrounds all of the Ames property, connecting with the Moffett Field security fence at the runway area and the Moffett Main Gate. Second, access into the site is restricted to only a few entry points, which are continuously guarded by the Marine Sentries. Third, every Ames employee and visitor is required to wear an identification badge which may place certain restrictions on individuals. Last, a security patrol constantly roams throughout the site.

The Visitor Reception Building (N-253) receives all visitors and is located such that individuals or large groups can be processed outside the security perimeter, thus easing the flow of visitors at the security gates.

The proposed Technical Information Center (A-3) will also be located outside the security gate to allow free access during operating hours for a large number of visitors without congesting the existing security functions.

WATER AND AIR POLLUTION CONTROL

Water pollution at Ames is controlled by the systematic disposal of all harmful wastes and toxic waste chemicals and materials through the services of a licensed waste disposal contractor. Certain industrial wastes are recycled at Ames, thus never entering the regional sewer system. Monitoring of pollution levels, particularly radioactivity, is part of a continuous environmental protection program conducted at Ames. Storm water runoff, tested by regional and state water quality agencies, is collected on the site by a series of ditches, drainage lines and storm water ponds. Samples from this collection system are periodically made to detect the presence of any pollutants.

Air pollution at Ames is kept within the permissible levels through the use of exhaust filtration on the required building air exhaust systems. Further discussion of pollution control at Ames is included in Sections 4, 6 and 8.

FLOOD CONTROL

Two sets of controls are available to stop flooding at Ames: (1) perimeter levees — to prevent storm water or tsunami encroachment; (2) storm water catchment areas — to divert and hold surface water runnoff within the site.

There are several sets of perimeter levees which are built or planned to protect Ames property from peripheral inundation. Existing Leslie Salt Company levees, surrounding a series of evaporator ponds to the north of Ames, provide an initial line of defense against tsunami wave run-up and bay tidal flooding. The northern extension of the Perimeter Security Road (12th Street) includes a slightly elevated roadbed which will serve as additional protection if the Leslie Salt levees are overrun. The Navy presently has plans to improve levees along the entire northern property line of Ames and Moffett Field thus further protecting Ames from bay flooding. The Santa Clara Valley Water District is planning to improve and elevate the levees along Stevens Creek. This project would protect Ames from excessive storm water runoff, and 1% (100 year) floods.

The Site Drainage Map on page 8.15 indicates the planned system of surface water collection and containment for Ames underdeveloped land. Presently, the site drains to the north and areas south of 12th Street are subject to winter storm water ponding. With the introduction of controlled drainage channels parallel to 12th Street, this storm water can be collected in appropriate areas and subsequently pumped either into Stevens Creek or into the area north of the Magnetic Laboratories (N-217 and N-217A).

12 Documentation

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SECTION 9

None

SECTION 10

None

SECTION 11

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SECTION 12

None

OFFICES OF RECORD

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1. Missions and Capabilities
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3. Environmental Resources Document

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PRINTING AND COMPOSITION

K/P GRAPHICS — Mountain View, CA
ROBERT MATTOCH PRINTERS — San Francisco, CA