

**United States Department of the Interior
National Park Service**

For NPS use only

**National Register of Historic Places
Inventory—Nomination Form**

received

date entered

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic Unitary Plan Wind Tunnel

and/or common Unitary Plan Facility

2. Location

street & number Ames Research Center

not for publication

city, town Moffett Field

vicinity of

congressional district

state California

code 06

county Santa Clara

code 085

3. Classification

Category	Ownership	Status	Present Use	
<input type="checkbox"/> district	<input checked="" type="checkbox"/> public	<input type="checkbox"/> occupied	<input type="checkbox"/> agriculture	<input type="checkbox"/> museum
<input type="checkbox"/> building(s)	<input type="checkbox"/> private	<input type="checkbox"/> unoccupied	<input type="checkbox"/> commercial	<input type="checkbox"/> park
<input checked="" type="checkbox"/> structure	<input type="checkbox"/> both	<input type="checkbox"/> work in progress	<input type="checkbox"/> educational	<input type="checkbox"/> private residence
<input type="checkbox"/> site	Public Acquisition	Accessible	<input type="checkbox"/> entertainment	<input type="checkbox"/> religious
<input type="checkbox"/> object	<input type="checkbox"/> in process	<input checked="" type="checkbox"/> yes: restricted	<input checked="" type="checkbox"/> government	<input checked="" type="checkbox"/> scientific
	<input type="checkbox"/> being considered	<input type="checkbox"/> yes: unrestricted	<input type="checkbox"/> industrial	<input type="checkbox"/> transportation
		<input type="checkbox"/> no	<input type="checkbox"/> military	<input checked="" type="checkbox"/> other: Space Exploration

4. Owner of Property

name National Aeronautics and Space Administration (NASA)

street & number

city, town Washington

vicinity of

state D.C. 20546

5. Location of Legal Description

courthouse, registry of deeds, etc. National Aeronautics and Space Administration (NASA)

street & number Real Property Management Office Code NXG

city, town Washington

state D.C. 20546

6. Representation in Existing Surveys

title None

has this property been determined eligible? yes no

date federal state county local

depository for survey records

city, town

state

7. Description

Condition		Check one	Check one
<input checked="" type="checkbox"/> excellent	<input type="checkbox"/> deteriorated	<input type="checkbox"/> unaltered	<input checked="" type="checkbox"/> original site
<input type="checkbox"/> good	<input type="checkbox"/> ruins	<input type="checkbox"/> altered	<input type="checkbox"/> moved date _____
<input type="checkbox"/> fair	<input type="checkbox"/> unexposed		

Describe the present and original (if known) physical appearance

UNITARY PLAN FACILITY

The Unitary Plan Facility is a unique system of wind tunnels comprised of three test sections: an 11-by 11-Foot Transonic Tunnel (Mach 0.40 to 1.40), a 9-by 7-Foot Supersonic Tunnel (Mach 1.55 to 2.50), and an 8-by 7-Foot Supersonic Tunnel (Mach 2.45 to 3.45), all capable of operating at variable stagnation pressures. The major common element of the tunnel complex is its drive system, consisting of four intercoupled electric motors that can provide 134.23 MW (180,000 hp) continuously.¹

11-BY 11-FOOT TRANSONIC WIND TUNNEL

The 11-by 11-Foot Transonic Wind Tunnel is a closed-return, variable density tunnel with a fixed geometry, ventilated throat, and a single-jack flexible nozzle. Airflow is produced by a three-stage, axial-flow compressor powered by four wound-rotor, variable-speed, induction motors. For conventional steady-state tests, models are generally supported on a sting. Internal strain-gage balances are used to measure forces and moments. A schlieren system is available for studying flow patterns, either by direct viewing or by photographs, as well as a system for obtaining 51 X 101 cm (20 X 40 in.) shadowgraph negatives.²

9-BY 7-FOOT SUPERSONIC WIND TUNNEL

The 9-by 7-Foot Supersonic Wind Tunnel is a closed-return, variable-density tunnel equipped with an asymmetric, sliding-block nozzle. The test section Mach number can be varied by translating, in the streamwise direction, the fixed contour block that forms the floor of the nozzle. Airflow is produced by an 11-stage, axial-flow compressor powered by four variable-speed, wound-rotor, induction motors. For conventional, steady-state tests, models are generally supported on a sting. Internal strain-gage balances are used to measure forces and moments. A schlieren system is available for studying flow patterns, either by direct viewing or by photographs, as well as a system for obtaining 51 X 51 cm (20 X 20 in.) shadowgraph negatives.³

8-BY 7-FOOT SUPERSONIC WIND TUNNEL

The 8-by 7-Foot Supersonic Wind Tunnel is a closed-return, variable-density tunnel equipped with a symmetrical, flexible-wall throat (the side walls are positioned by a series of jacks operated by hydraulic motors). The upper and lower surfaces are fixed. Airflow is produced by an 11-stage, axial-flow compressor powered by four variable-speed, wound-rotor, induction motors. For conventional, steady-state tests, models are generally supported on a sting. Internal strain-gage balances are used to measure forces and moments. A schlieren system is available for studying flow patterns, either by direct viewing or by photographs, as well as a system for obtaining 51 X 51 cm (20 X 20 in.) shadowgraph negatives.⁴

8. Significance

Period	Areas of Significance—Check and justify below			
<input type="checkbox"/> prehistoric	<input type="checkbox"/> archeology-prehistoric	<input type="checkbox"/> community planning	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> archeology-historic	<input type="checkbox"/> conservation	<input type="checkbox"/> law	<input checked="" type="checkbox"/> science
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> literature	<input type="checkbox"/> sculpture
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> architecture	<input type="checkbox"/> education	<input checked="" type="checkbox"/> military	<input type="checkbox"/> social/ humanitarian
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> art	<input checked="" type="checkbox"/> engineering	<input type="checkbox"/> music	<input type="checkbox"/> theater
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> commerce	<input type="checkbox"/> exploration/settlement	<input type="checkbox"/> philosophy	<input type="checkbox"/> transportation
<input checked="" type="checkbox"/> 1900-	<input type="checkbox"/> communications	<input type="checkbox"/> industry	<input type="checkbox"/> politics/government	<input checked="" type="checkbox"/> other (specify) Aeronautical Research Space Exploration
<input type="checkbox"/> invention				

Specific dates 1955-Present **Builder/Architect** NACA

Statement of Significance (in one paragraph)

The Ames Unitary Plan Wind Tunnel is significant because it represents the continual development of superior technical aeronautical research facilities after the end of the Second World War. These research facilities formed the foundation upon which the National Aeronautics and Space Administration would draw in 1958 to launch the American effort to land a man on the moon.

Since the construction of the Variable Density Wind Tunnel at Langley in 1921 the National Advisory Committee on Aeronautics (NACA) had built an impressive variety of technical research facilities upon which the American aircraft industry was based. These technical facilities had enabled the American aircraft industry to produce the airplanes that dominated the skies in both commercial and military applications. By 1945 the American lead in this field seemed to be evaporating. The technological achievements of the German missiles and jet aircraft indicated a lag in American aeronautical research. To assume technological leadership, the Federal Government proposed a coordinated national plan of facility construction that would encompass not only NACA, but the Air Force, industry, and universities as well. This plan, known as the Unitary Plan Act, passed Congress on October 27, 1949, and resulted in the construction of an entire new series of wind tunnel complexes to support the American Aircraft industry.⁵

The Ames Unitary Plan Wind Tunnel Complex was a product of this legislation. Construction of the facility began in 1950-1951 and lasted until 1955. Because no one wind tunnel could meet all of the demands for additional research facilities simulating the entire range of aircraft and missile flight, NACA chose to build the Ames tunnel with three separate test sections drawing power from a common centralized power plan. The transonic test section spanned 11 x 11 feet, while the two supersonic sections were smaller: 9 x 7 feet and 8 x 7 feet. Giant valves 20 feet in diameter supplied air from one supersonic leg to another.⁶

The American west coast aircraft industry quickly capitalized on the Ames Unitary Plan Wind Tunnel Complex. The famed Boeing fleet of commercial transports and the Douglas DC-8, DC-9, and DC-10 were all tested here. In addition such military aircraft as the F-111 fighter, the C-5A transport and the B-1 bomber were tested. In addition to aircraft, in the 1960s and 1970s almost all NASA manned space vehicles including the Space Shuttle were tested in the Ames Unitary Plan Wind tunnel complex.⁷

9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acree of nominated property Less than a acre

Quadrangle name Mountain view

Quadrangle scale 1:24,000

UMT References

A ¹⁰ ~~03~~ ^{EG CRUES 11 1986} 5 8 3 2 0 0 4 1 4 1 4 0 0
Zone Easting Northing

B
Zone Easting Northing

C

D

E

F

G

H

Verbal boundary description and justification

The boundary of the Unitary Plan Wind Tunnel is shown as the green line on the accompanying map entitled "Building Location Chart, NASA, Ames Research Center."

List all states and counties for properties overlapping state or county boundaries

state	code	county	code

11. Form Prepared By

name/title Harry A. Butowsky

organization National Park Service date May 15, 1984

street & number Division of History telephone (202) 343-8168

city or town Washington, D.C. 20240 state

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

national state local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature

title date

For NPS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest: date

Chief of Registration

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Continuation sheet

Item number 8

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The Ames Unitary Plan Wind Tunnel Complex is a landmark in the development of conventional wind tunnels and represents the continuing effort of the National Advisory Committee on Aeronautics to provide the American Aircraft and Aerospace industries with the best research facilities possible to insure the technological superiority of the industry. It provides the logical crossover point from NACA to NASA and has contributed equally to both the development of advanced American aircraft and manned spacecraft.

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Continuation sheet

Item number 7, 8

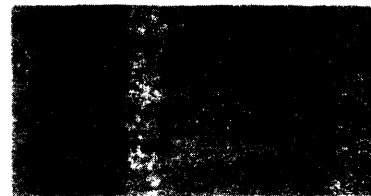
Page 3

Footnotes

1. Ames Research Facilities Handbook (Moffett Field, California: National Aeronautics and Space Administration, 1982), p. 14.
2. Ibid., 16.
3. Ibid., 18.
4. Ibid., 20.
5. Donald D. Baals and William R. Corliss, Wind Tunnels of NASA (Washington, D.C.: National Aeronautics and Space Administration, 1981), pp. 66-67.
6. Ibid.
7. Ibid.

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Continuation sheet

Item number 9

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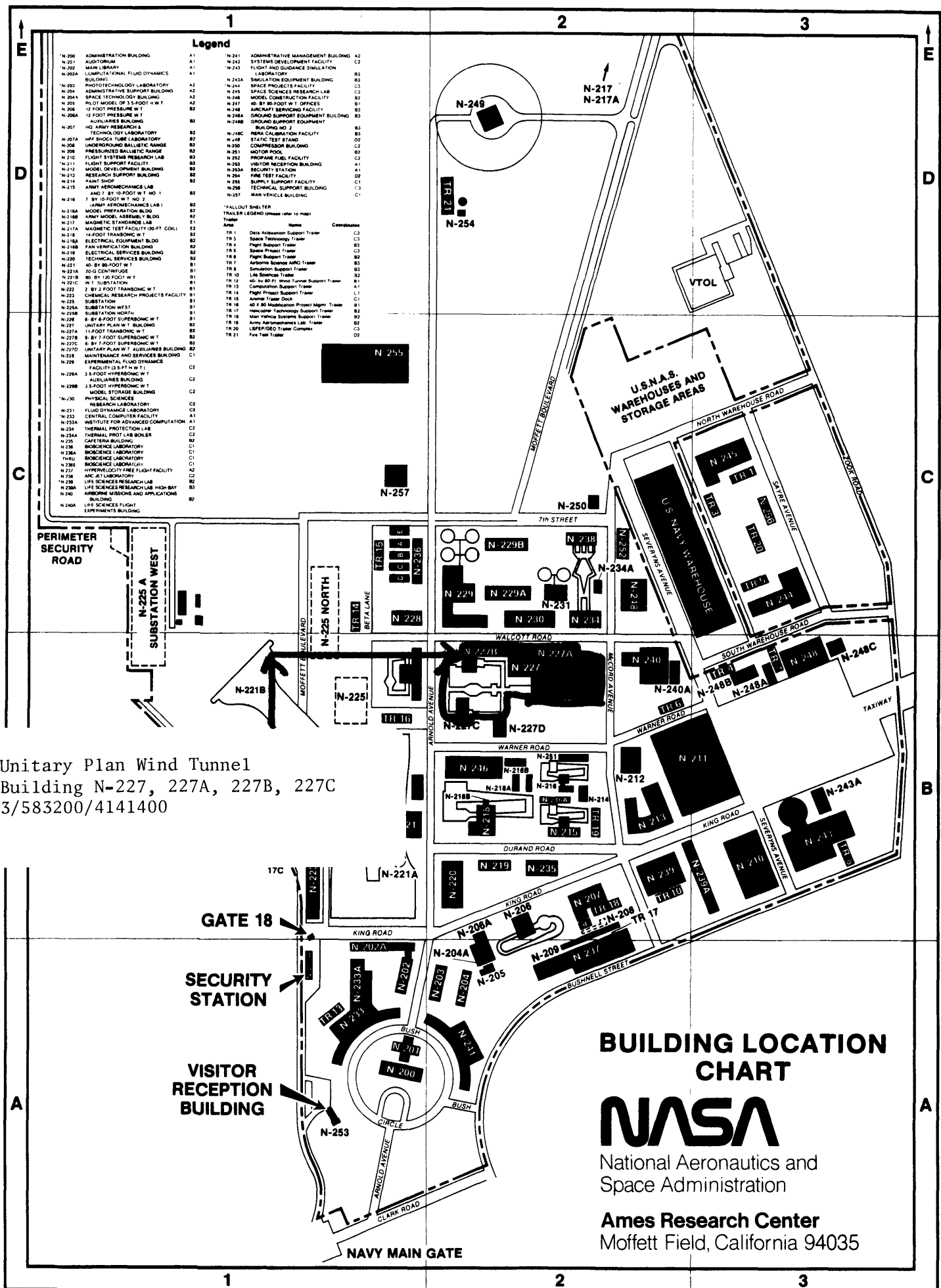
Bibliography

Ames Research Facilities Handbook. Moffett Field, California: National Aeronautics and Space Administration, 1982.

Baals, Donald D., and Corliss, William R. Wind Tunnels of NASA. Washington, D.C.: National Aeronautics and Space Administration, 1981.

Hartman, Edwin P. Adventures in Research: A History of Ames Research Center 1940-1965. Washington, D.C.: National Aeronautics and Space Administration, 1970.

Technical Facilities Catalog Vol. 1 Washington, D.C.: National Aeronautics and Space Administration, 1974.



Legend

- N-200 ADMINISTRATION BUILDING A1
- N-201 AUDITORIUM A1
- N-202 MAIN LIBRARY A1
- N-202A COMPUTATIONAL FLUID DYNAMICS BUILDING A1
- N-203 PHOTO TECHNOLOGY LABORATORY BUILDING A2
- N-204 ADMINISTRATIVE SUPPORT BUILDING A2
- N-204A SPACE TECHNOLOGY BUILDING A2
- N-205 PILOT MODEL W/ 10 FOOT W T A2
- N-206 12 FOOT PRESSURE W T A2
- N-206A 12 FOOT PRESSURE W T AUXILIARIES BUILDING B2
- N-207 HQ ARMY RESEARCH & TECHNOLOGY LABORATORY B2
- N-207A HPF SHOCK TUBE LABORATORY B2
- N-208 UNDERBURNING BALLISTIC RANGE B2
- N-209 PRESSURIZED BALLISTIC RANGE B2
- N-210 FLIGHT SYSTEMS RESEARCH LAB B2
- N-211 FLIGHT SUPPORT FACILITY B2
- N-212 MODEL DEVELOPMENT BUILDING B2
- N-213 RESEARCH SUPPORT BUILDING B2
- N-214 PAINT SHOP B2
- N-215 ARMY AEROMECHANICS LAB AND 7 BY 10 FOOT W T NO 1 B2
- N-216 7 BY 10 FOOT W T NO 2 B2
- N-216A ARMY AEROMECHANICS LAB MODEL PREPARATION BLDG B2
- N-216B ARMY MODEL ASSEMBLY BLDG B2
- N-217 MAGNETIC STANDARDS LAB B2
- N-217A MAGNETIC TEST FACILITY 100-FT COIL B2
- N-218 14 FOOT TRANSDUC W T B2
- N-218A ELECTRICAL EQUIPMENT BLDG B2
- N-218B FAN VERIFICATION BUILDING B2
- N-219 ELECTRICAL SERVICES BUILDING B2
- N-220 TECHNICAL SERVICES BUILDING B2
- N-221 40 BY 80 FOOT W T B1
- N-221A 200 CENTRIFUGE B1
- N-221B 80 BY 120 FOOT W T B1
- N-222 2 BY 7 FOOT TRANSDUC W T B1
- N-223 CHEMICAL RESEARCH PROJECTS FACILITY B1
- N-223A SUBSTATION B1
- N-223B SUBSTATION WEST B1
- N-224 W T SUBSTATION B1
- N-226 6 BY 8 FOOT SUPERSONIC W T B1
- N-227 UNITARY PLAN W T AUXILIARIES BUILDING B2
- N-227A 11 FOOT TRANSDUC W T B2
- N-227B 9 BY 7 FOOT SUPERSONIC W T B2
- N-227C 6 BY 7 FOOT SUPERSONIC W T B2
- N-227D UNITARY PLAN W T AUXILIARIES BUILDING B2
- N-228 MAINTENANCE AND SERVICES BUILDING C1
- N-229 EXPERIMENTAL FLUID DYNAMICS FACILITY 13.5 FT W T C2
- N-229A 3.5 FOOT HYPERSONIC W T AUXILIARIES BUILDING C2
- N-229B 3.5 FOOT HYPERSONIC W T MODEL STORAGE BUILDING C2
- N-230 PHYSICAL SCIENCES RESEARCH LABORATORY C2
- N-231 FLUID DYNAMICS LABORATORY C2
- N-232 CENTRAL COMPUTER FACILITY A1
- N-232A INSTITUTE FOR ADVANCED COMPUTATION A1
- N-234 THERMAL PROTECTION LAB C2
- N-234A THERMAL PROT LAB BOKER C2
- N-235 GAITHER BUILDING C1
- N-236 BIOSCIENCE LABORATORY C1
- N-236A BIOSCIENCE LABORATORY C1
- N-236B BIOSCIENCE LABORATORY C1
- N-237 HYPERVELOCITY FREE FLIGHT FACILITY A2
- N-238 ARC JET LABORATORY C2
- N-238A LIFE SCIENCES RESEARCH LAB HIGH BAY AERONAUTICAL RESEARCH AND APPLICATIONS BUILDING B2
- N-240 LIFE SCIENCES RESEARCH AND APPLICATIONS EXPERIMENTS BUILDING B2
- N-241 ADMINISTRATIVE MANAGEMENT BUILDING A2
- N-242 SYSTEMS DEVELOPMENT FACILITY C2
- N-243 FLIGHT AND GUIDANCE SIMULATION LABORATORY B3
- N-243A SIMULATION EQUIPMENT BUILDING B3
- N-244 SPACE PROJECTS FACILITY C3
- N-245 SPACE SCIENCES RESEARCH LAB C3
- N-246 MODEL CONSTRUCTION FACILITY B3
- N-247 40 BY 80 FOOT W T OFFICES B1
- N-248 AIRCRAFT SERVICES FACILITY B2
- N-248A GROUND SUPPORT EQUIPMENT BUILDING B3
- N-248B GROUND SUPPORT EQUIPMENT BUILDING NO 2 B3
- N-248C PERA CALIBRATION FACILITY B3
- N-249 STATIC TEST STAND B2
- N-250 COMPRESSOR BUILDING C2
- N-251 MOTOR POOL C2
- N-252 PROPANE FUEL FACILITY C2
- N-253 VISITOR RECEPTION BUILDING A1
- N-253A SECURITY STATION C2
- N-254 FINE TEST FACILITY C2
- N-255 SUPPLY SUPPORT FACILITY C1
- N-256 TECHNICAL SUPPORT BUILDING C3
- N-257 MAIN VEHICLE BUILDING C1
- N-258 *FALLOUT SHELTER
- N-259 TRAILER LEGEND (Please refer to map)

Trailer	Name	Coordinates
TR 1	Data Acquisition Support Trailer	C3
TR 2	Space Technology Trailer	C3
TR 3	Flight Support Trailer	B3
TR 4	Space Project Trailer	C3
TR 5	Space Project Trailer	C3
TR 6	Flight Support Trailer	B3
TR 7	Airborne Support Trailer	B3
TR 8	Simulation Support Trailer	B3
TR 9	L4E Science Trailer	B2
TR 10	40 by 80 Ft. Wind Tunnel Support Trailer	B2
TR 11	Computation Support Trailer	B1
TR 12	Flight Project Support Trailer	C1
TR 13	Armed Trailer Dock	C1
TR 14	40 x 80 Replication Project Magnet Trailer	B1
TR 15	Helicopter Technology Support Trailer	B2
TR 16	Main Vehicle Systems Support Trailer	B2
TR 17	Army Aeromechanics Lab Trailer	B2
TR 18	LP/EP/DEO Trailer Complex	C1
TR 19	Fire Test Trailer	C1

Unitary Plan Wind Tunnel
 Building N-227, 227A, 227B, 227C
 3/583200/4141400

BUILDING LOCATION CHART



National Aeronautics and Space Administration

Ames Research Center
 Moffett Field, California 94035