NPS Form 10-900
(7-81)

Man in Space Theme Study
Federal Agency Nomination

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
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street & number Ames Research Center ___ not for publication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	
___ district	_X_ public	___ occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
_X_ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	_X_ yes: restricted	_X_ government	_X_ scientific
	___ being considered	___ yes: unrestricted	___ industrial	___ transportation
		___ no	___ military	_X_ 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
_X_ excellent	___ deteriorated	___ unaltered	_X_ original site
___ good	___ ruins	___ altered	___ moved date _____
___ fair	___ 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			
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion
___ 1400–1499	___ archeology-historic	___ conservation	___ law	X science
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture
___ 1600–1699	___ architecture	___ education	X military	___ social/ humanitarian
___ 1700–1799	___ art	X engineering	___ music	___ theater
___ 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	___ transportation
X 1900–	___ communications	___ industry	___ politics/government	X other (specify) Aeronautical Research
		___ invention		Space Exploration

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 skys in both commerical 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

Acreage of nominated property Less than a acre

Quadrangle name Mountain view **Quadrangle scale** 1:24,000

UMT References

	Zone	Easting	Northing
A	~~10~~ 03	583200	4141400
B			
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
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

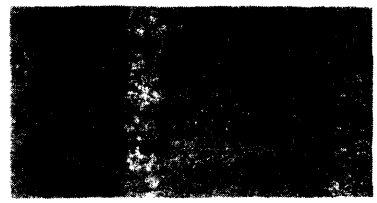
date

Keeper of the National Register

Attest: **date**

Chief of Registration

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.



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.

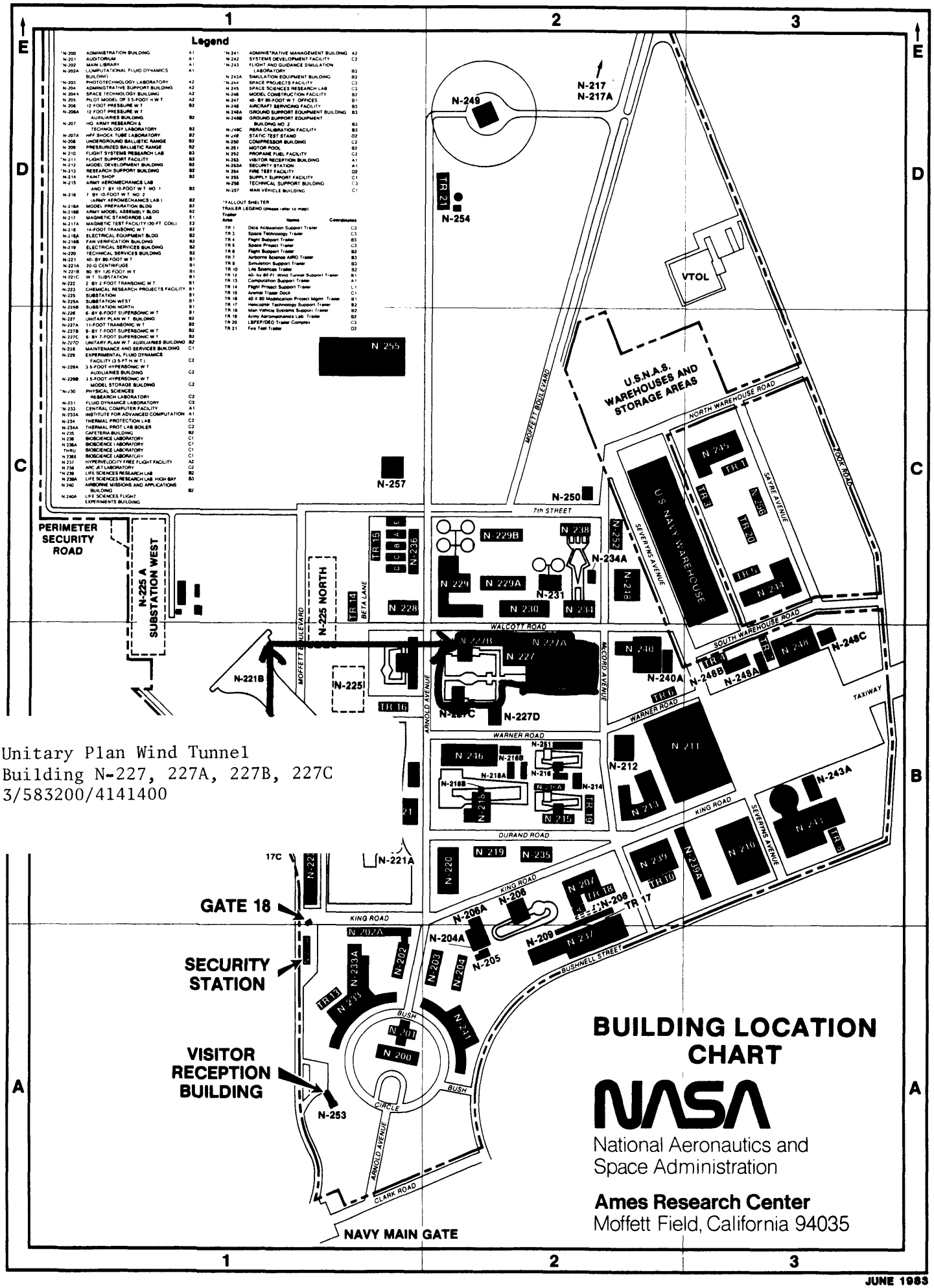
Bibiography

Ames Research Facilities Handbook. Moffett Field, California: National Aeronatuics 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.



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