NPS Form 10-900
(7-81)

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 Rendezvous Docking Simulator

and/or common Real-Time Dynamic Simulator

2. Location

street & number Langley Research Center ___ not for publication

city, town Hampton ___ vicinity of **congressional district**

state Virginia **code** 51 **county** Hampton **code** 650

3. Classification

Category	Ownership	Status	Present Use	
___ district	X public	___ occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
___ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
X object	___ in process	X yes: restricted	___ government	___ scientific
	___ being considered	___ yes: unrestricted	___ industrial	___ transportation
		___ no	___ military	X other: Inactive

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	_X_ altered	___ moved date _____
___ fair	___ unexposed		

Describe the present and original (if known) physical appearance

The Rendezvous Docking Simulator (RDS) is in Building 1244 in the East Area of the Langley Research Center. The RDS is a full-scale dynamic facility which was used to study pilot-controlled docking of various types of space vehicles. It was built in 1963 and simulated contolled docking procedures for both the Gemini spacecraft with the Agena booster and the Apollo Lunar Excursion Module with the Command Module.

The simulator consists of an overhead carriage and cable-suspended gimbal system. The carriage is electrically driven and provides three degrees of freedom in translation. The gimbal is hydraulically driven and provides three degrees of freedom in rotation. Thus, the pilot flies the vehicle in six-degree-of-freedom motion which is controlled in a closed-loop fashion through a ground-based analog computer. The operating volume of the simulator is 210 feet horizontally by 15 feet laterally and 40 feet vertically. This enabled the test pilots to dock with target Gemini and Apollo spacecraft in a three dimensional mode.[1] Depending upon the test, either a full scale module of the Gemini or Apollo spacecraft, could be hung from the simulator.

After the completion of the Apollo program the Rendezvous Docking Simulator was modified to solve open-and-closed loop pilot control problems, aircraft landing approaches, simulator validation studies, and passenger ride quality studies. The name of the facility was changed and it is now called the Real-Time Dynamic Simulator. Modifications to the facility consisted of removing the Apollo Command Module cockpit and installing an aircraft cockpit. The system was also linked to the Langley real-time digital computer system and Langley landing terrain scene generator.[2] At the present time this facility is no longer in use.

8. Significance

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

Specific dates 1963-1972 **Builder/Architect** NASA

Statement of Significance (in one paragraph)

The Rendezvous Docking Simulator is significant because it permitted NASA to train Gemini and Apollo astronauts in docking procedures they had to master before attempting to land on the moon. The simulator gave the astronauts the experience of a docking spacecraft in a safe three dimensional mode that closely approximated a space environment. Training received here and in the Lunar Landing Research Facility was indispensable to accomplishing the goal of landing men on the moon by 1969.

The decision by President Kennedy to land a man on the moon by 1969 meant that NASA had to quickly decide the method of accomplishing the journey. NASA engineers decided that the best method of accomplishing the goal of the moon landing was through the concept of the lunar orbit rendezvous (LOR) which called for a single Saturn V launch of two spacecraft into lunar orbit where one would remain in orbit and the other would descend to the moon. Successful completion of this method of traveling to the moon meant that the vehicle on the moon would have to boost itself back into lunar orbit, rendezvous, and dock with the mother ship and then return to the Earth.

The LOR technique was a bold decision to speed up the schedule for landing a man on the moon. To accomplish this mission it was essential that Apollo astronauts be trained in all aspects and problems likely to arise in the attempt to dock the Apollo Command and Lunar Excursion Modules in lunar orbit. Failure to accomplish this docking would result in the failure of the entire mission and the likely loss of the lives of the astronauts. This justified the need for the Rendezvous Docking Simulator. Only when the Apollo astronauts had successfully mastered rendezvous and docking skills, learned on this facility, would NASA give permission for the attempt to land on the moon.

9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acreage of nominated property Less than 1 acre

Quadrangle name Newport News North **Quadrangle scale** 1:24,000

UMT References

	Zone	Easting	Northing		Zone	Easting	Northing
A	18	377520	4105060	B			
C				D			
E				F			
G				H			

Verbal boundary description and justification

The boundary of the Rendezvous and Docking Simulator is contained within the perimeter of Building 1244 in the East Area of the Langley 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

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Attest: **date**

Chief of Registration

Footnotes

1. Howard G. Hatch, Jr., Jack E. Pennington, and Jere B. Cobb, Dynamic Simulation of Lunar Module Docking with Apollo Module in Lunar Orbit NASA TN D-3972 (Hampton, Va: Langley Research Center, No Date), p. 3.

2. Technical Facilities Catalog Vol. 1. (Washington, D.C.: National Aeronautics and Space Administration, 1974), pp. 3-44, 3-45.

Bibliography

Benson, Charles D., and Faherty, William Barnaby. Moonport: A History of Apollo Launch Facilities and Operations. Washington D.C.: National Aeronautics and Space Administration, 1979.

Brooks, Courtney G., Grimwood, James, and Swenson, Jr., Loyd S. Chariots for Apollo: A History of Manned Lunar Spacecraft. Washington, D.C.: National Aeronautics and Space Administration, 1979.

Hatch, Howard G., Pennington, Jack E., and Cobb, Jere B. Dynamic Simulation of Lunar Module Docking with Apollo Command Module in Lunar Orbit. NASA TN D-3972. Hampton, Va.: Langley Research Center, No Date Given.

Langley Research Center Staff. A Compilation of Recent Research Related to the Apollo Mission. TM X-890. Hampton, Va.: Langley Research Center, No Date Given.

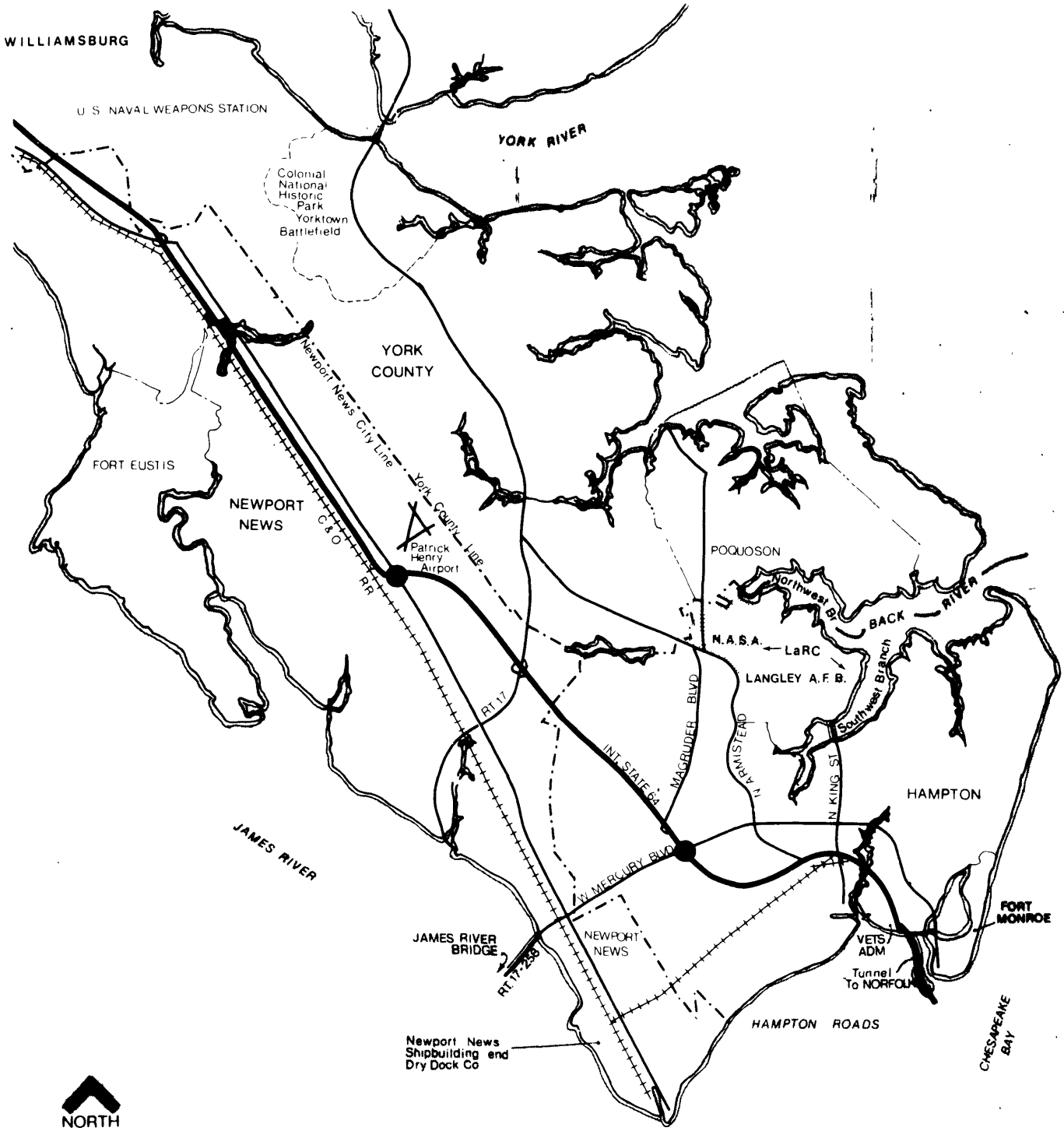
Levine, Arnold S. Managing NASA in the Apollo Era. Washington, D.C.: National Aeronautics and Space Administration, 1982.

Long, Edward R., Pennington, Jack E., and Deal, Perry L. Remote Pilot-Controlled Docking with Television. NASA TN D-3044. Hampton, Va.: Langley Research Center, No Date Given.

Pennington, Jack E., Hatch, Howard, Jr., G., and Driscoll, Norman R. A Full-Size Pilot-Controlled Docking Simulation of the Apollo Command and Service Module with the Lunar Module. NASA TN D-3688. Hampton, Va.: Langley Research Center, 1966.

Technical Facilities Catalog Vol. 1. National Aeronautics and Space Administration, 1974.

U.S. Congress. House, United States Civilian Space Programs A Report prepared for the Subcommittee on Space Science and Applications. Serial D, Vol. 1, January 1981.



National Aeronautics and Space Administration

Langley Research Center
Hampton, Virginia
23665

FIGURE 1-1
Regional Map

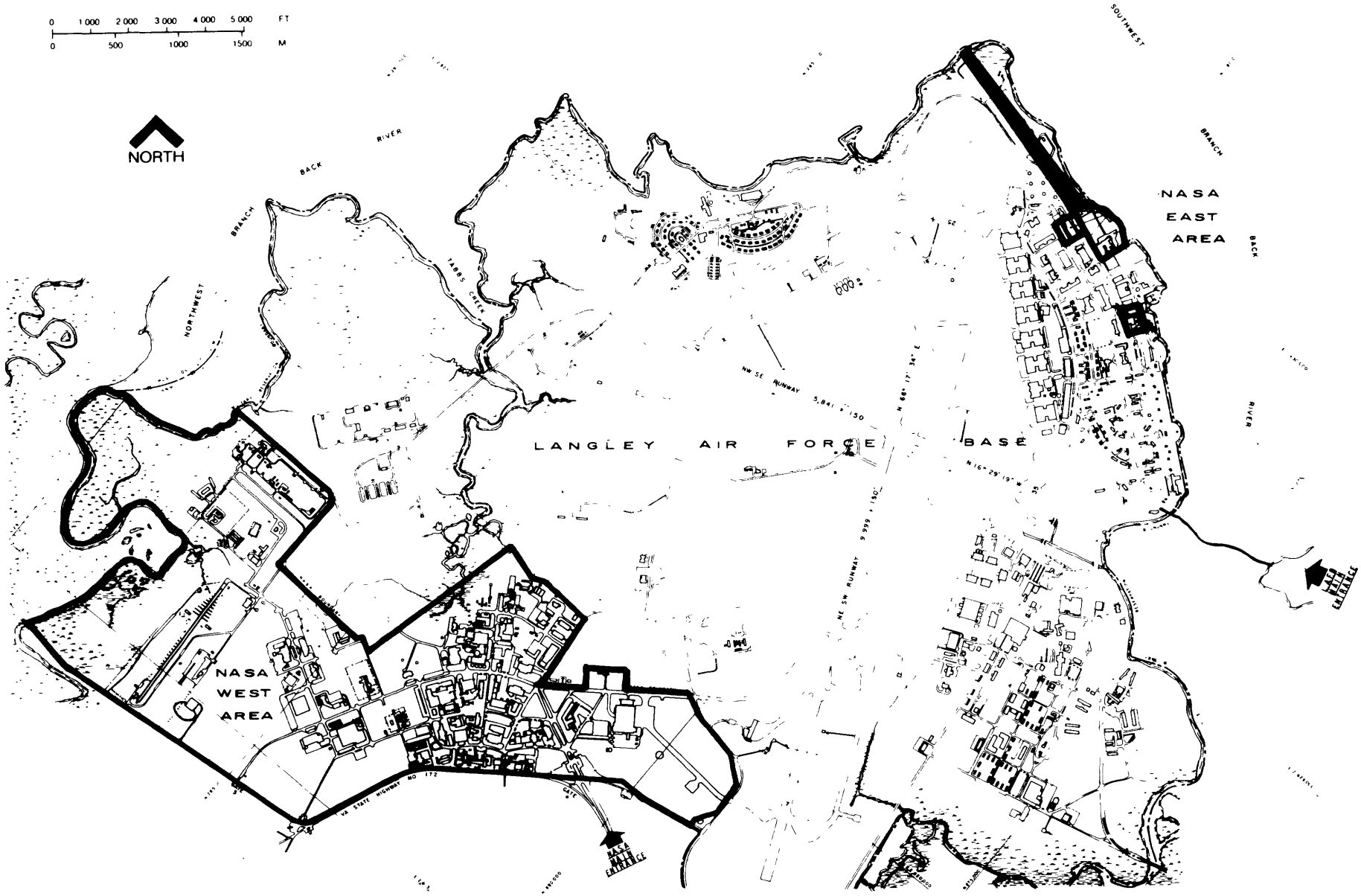


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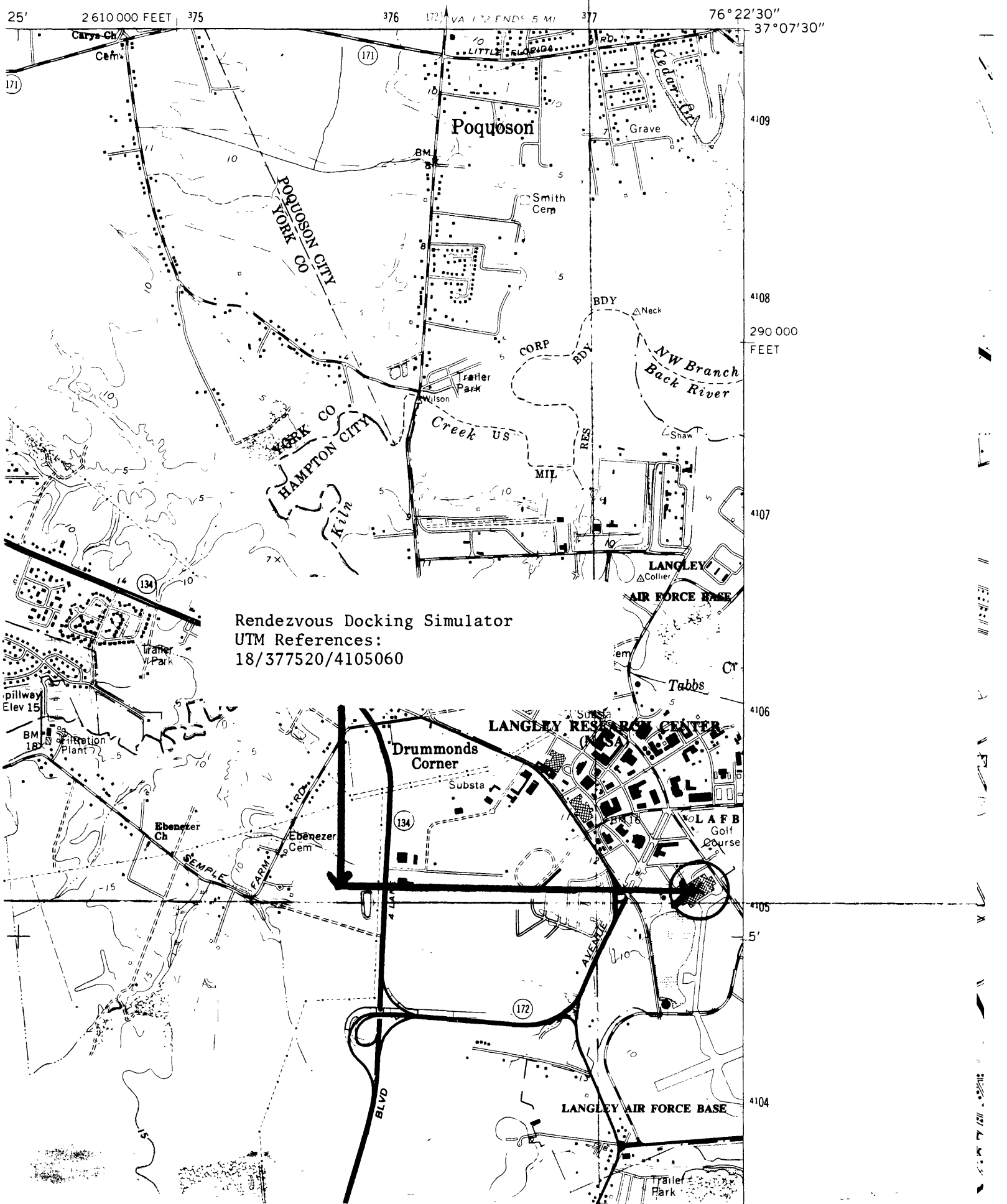
FIGURE 1-2
Combined East & West Area

NEWPORT NEWS NORTH QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

5758 III NE
(POQUOSON EAST)



Rendezvous Docking Simulator
UTM References:
18/377520/4105060

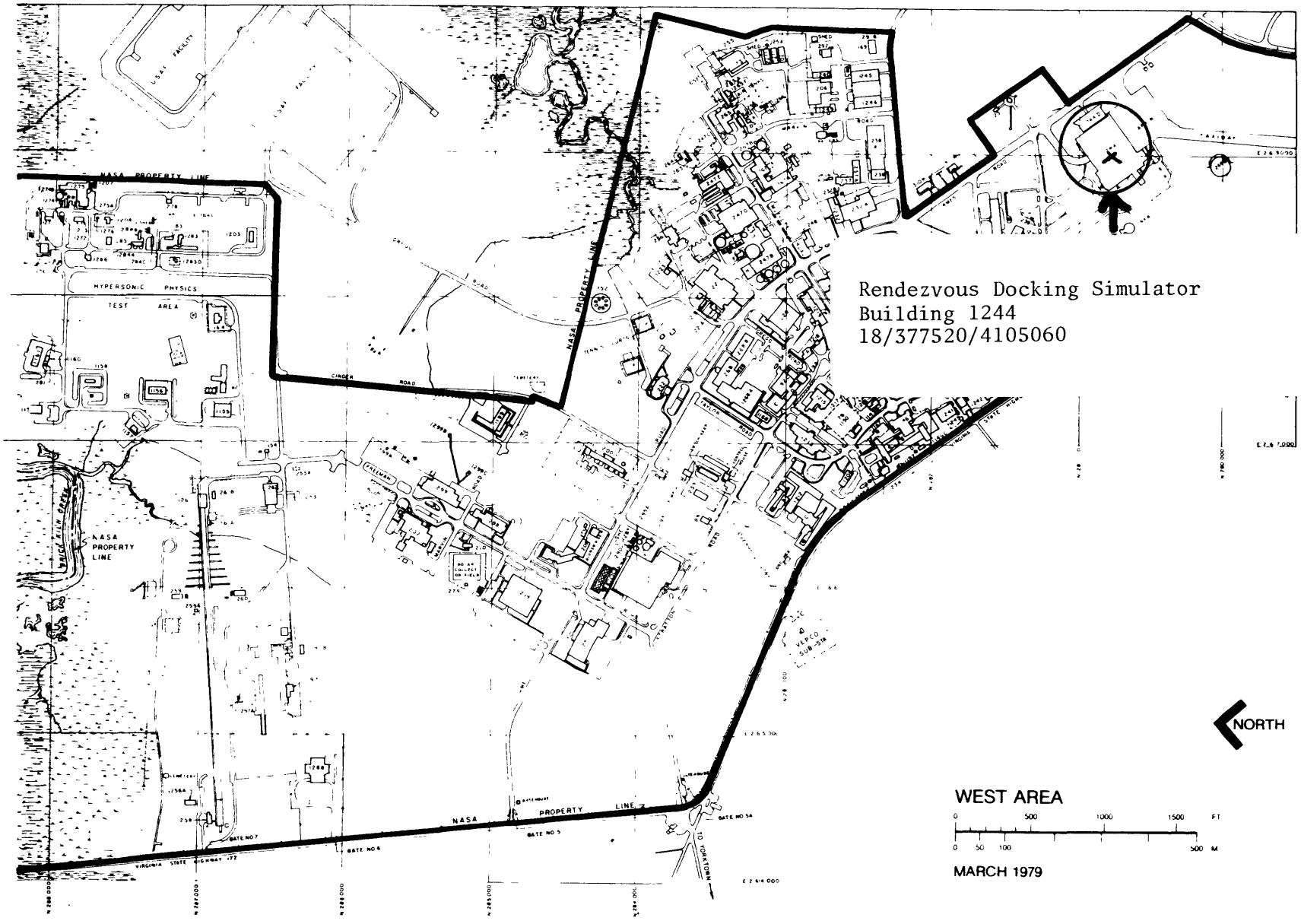


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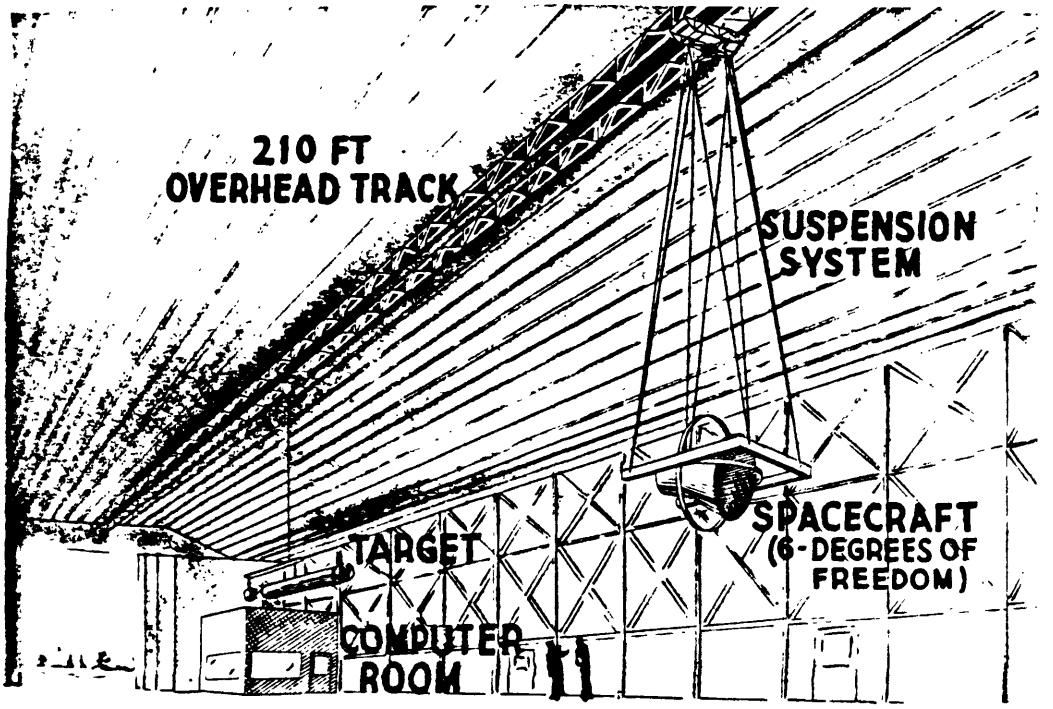
FIGURE 1-4
West Area

Rendezvous Docking Simulator



Source: Technical Facilities Catalog Vol. 1, 1967, p. 4-35.