

Building 5, Circulating Water Channel/Turbulence Bldg.
NSF Carderock Historic District
MIHP # M:29-52 - 25
Montgomery County
West Bethesda
1942
Public

Building 5, Circulating Water Channel/Turbulence Building, is located in the central portion of the 183.6-acre Naval Support Facility (NSF) Carderock, formerly known as the Naval Surface Warfare Center Carderock Division (NSWCCD). The installation is composed of 123 buildings and structures that function as research laboratories, administration facilities, and operations and utility structures. At the center of the installation is the David Taylor Model Basin (DTMB) (Buildings 1-4), a group of interconnected buildings that include a model basin, an administration building, a shop building, and a laboratory. The David Taylor Model Basin (Buildings 1-4) was listed in the NRHP in 1985 (M:29-47). In 1996 the NSF Carderock Historic District was determined eligible for the NRHP, and 44 of the 116 built resources were recognized as contributing resources in the historic district. Building 5 is a contributing resource in the historic district.

Building 5 is the Circulating Water Channel/Turbulence Building. The building stands on the northwest side of the model basin (Building 4). The main block of the building is two stories and is constructed of poured concrete. The building has a flat parapet roof. The main block of the building is attached to the model basin on its south elevation. The rear (east) section of the building has two additions.

The Circulating Water Channel/Turbulence Building was constructed in 1942 to test the drag of towed underwater devices and to observe the flow around appendages such as thrusters, struts, rudders, and diving planes. The building was designed with an open test section that is 22 feet wide and 60 feet long. A stream of water up to 9 feet deep flows through the test section at a maximum speed of 10 knots. The channel holds up to 664,000 gallons of water. It has continued to operate in this capacity since its construction.

7. Description

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Condition

excellent deteriorated
 good ruins
 fair altered

Prepare both a one paragraph summary and a comprehensive description of the resource and its various elements as it exists today.

Building 5 is located in the central portion of the 183.6-acre Naval Support Facility (NSF) Carderock, formerly known as the Naval Surface Warfare Center Carderock Division (NSWCCD). Located approximately 12 miles northwest of Washington, D.C., near Bethesda, Maryland, NSF Carderock is situated north of the Potomac River and is bordered by the Clara Barton Parkway to the south and MacArthur Boulevard to the north and east. The installation is composed of 123 buildings and structures that function as research laboratories, administration facilities, and operations and utility structures. At the center of the installation is the David Taylor Model Basin (DTMB) (Buildings 1-4), a group of interconnected buildings that include a model basin, an administration building, a shop building, and a laboratory. The DTMB was listed in the National Register of Historic Places in 1985 (M:29-47). In 1996 the NSF Carderock Historic District was determined eligible for the National Register, and 44 of the 116 buildings were recognized as *contributing resources* in the historic district. Building 5 is a contributing resource in the NSF Carderock Historic District.

Building 5 is the Circulating Water Channel/Turbulence Building and was constructed in 1942. The building stands on the northwest side of the DTMB (Building 4). The building is two stories high above a solid concrete foundation and has an irregular-shaped rectangular plan. It is constructed of poured concrete and has a flat parapet roof. The main block of the building is attached to the model basin on its south elevation. The rear (east) section of the building has two additions. The first addition is attached to the east elevation of the main block. It is two stories on the south and one story on the north. The second addition is a one-story concrete-block structure that is attached to the east elevation of the first addition.

The west elevation of the main block has a metal-roll up door and a flush single-leaf metal door. The second story is unfenestrated. The north elevation of the building has a large glass-block window on the west end of the elevation on the first story. A smaller glass block window is east of the larger window on the first story. The second story of the north elevation has two 16-light metal-sash windows. The east elevation of the main block has paired four-light metal-sash awning windows on the second story.

The one- and two-story addition is constructed of poured concrete and has a flat roof. The eastern elevation is covered in vinyl siding on its first story. It has three paired one-over-one metal-sash windows on its north elevation. A single-leaf door is located on its east elevation. The one-story concrete-block addition is attached to the first addition south of this door.

The concrete-block addition has one story and a shed roof that slopes downward to the south. The fascia of the roof is covered in vinyl siding. A one-over-one metal-sash replacement window is located on the north elevation of the addition. A flush double-leaf metal door pierces the east elevation. The south elevation has a single-leaf door and a metal louvered vent.

The building has an open test section that is 22 feet wide and 60 feet long. A stream of water up to 9 feet deep flows through the test section at a maximum speed of 10 knots, and the channel holds up to 664,000 gallons of water. The water for the channel is pumped by two propeller-type pumps that are 12.5 feet in diameter and driven by connected 1,250 horsepower electric motors. Since the motors rotate at constant speed, the rate of the water flow is regulated by adjusting the pitch of the propeller blades while the pumps are running. Windows, 4x11.5 feet, are located on the walls and on the bottom of the test section to allow visual observations and photography. The object being tested is held stationary in the moving stream of water and the forces exerted by the water are measured by dynamometers (Carlisle 1998:542; Research Facilities at the David Taylor Model Basin October 1964:14).

8. Significance

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Period	Areas of Significance	Check and justify below		
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> health/medicine	<input type="checkbox"/> performing arts
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> archeology	<input type="checkbox"/> education	<input type="checkbox"/> industry	<input type="checkbox"/> philosophy
<input type="checkbox"/> 1800-1899	<input checked="" type="checkbox"/> architecture	<input type="checkbox"/> engineering	<input type="checkbox"/> invention	<input type="checkbox"/> politics/government
<input checked="" type="checkbox"/> 1900-1999	<input type="checkbox"/> art	<input type="checkbox"/> entertainment/ recreation	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion
<input type="checkbox"/> 2000-	<input type="checkbox"/> commerce	<input type="checkbox"/> ethnic heritage	<input type="checkbox"/> law	<input type="checkbox"/> science
	<input type="checkbox"/> communications	<input type="checkbox"/> exploration/ settlement	<input type="checkbox"/> literature	<input type="checkbox"/> social history
	<input type="checkbox"/> community planning		<input type="checkbox"/> maritime history	<input type="checkbox"/> transportation
	<input type="checkbox"/> conservation		<input checked="" type="checkbox"/> military	<input type="checkbox"/> other: _____

Specific dates 1938-1970 **Architect/Builder** U.S. Navy, Bureau of Yards and Docks

Construction dates 1942

Evaluation for:

National Register

Maryland Register

not evaluated

Prepare a one-paragraph summary statement of significance addressing applicable criteria, followed by a narrative discussion of the history of the resource and its context. (For compliance projects, complete evaluation on a DOE Form – see manual.)

Significance Summary

In 1985 the DTMB and associated buildings (Buildings 1-4) were listed in the National Register. The campus of buildings created at Carderock from 1938 to 1958 was determined eligible for the National Register as the Naval Surface Warfare Center Carderock Division Historic District (NSWCCD) in 1996. The determination of eligibility stated that NSF Carderock possesses the qualities of exceptional significance under Criterion G "within the historic context of military research, design, testing, and evaluation." It also stated that NSF Carderock meets Criteria A for events that have made a significant contribution to military technology and Criterion C for its intact collection of RDT&E buildings and facilities. The period of significance for the historic district was determined as beginning in 1938 when the model basin was constructed and ending in 1958, the end date of physical model testing and the official mission change to include computer research and testing. In 1996, 116 resources were recorded at NSF Carderock and 44 were determined as contributing to the historic district (Melhuish 1996).

In 2006 Berger updated the ICRMP for NSF Carderock. In October-November 2005 Buildings 16 and 18 were re-evaluated and found to be eligible for the National Register as contributing elements in the historic district. This evaluation also recommended that the period of significance for the historic district (originally 1938 to 1958) warranted expansion to 1970, marking the completion of the Anechoic Test facility and the close of the 20 "Golden Years of Research" at DTMB (Bowers 2005).

Building 5, the Circulating Water Channel Building, is considered a contributing element in the National Register-eligible NSF Carderock Historic District.

Historic Context

The David Taylor Model Basin (1937 to 1952)

The United States Navy constructed its first laboratory for studying ship construction and technology in 1898 at the Washington Navy Yard. The United States Experimental Model Basin, as it was called, was built under the auspices of Rear Adm. David Watson Taylor. Initial research involved a basin and a carriage that towed wooden ship models. In 1912, as the Navy moved toward aeronautical endeavors, the facility explored wind tunnel technology. The Navy's first wind tunnel was operational by 1914. The Navy soon outgrew these facilities as ship and aircraft testing evolved and no space at the Navy Yard was available for expansion.

In May 1936 Congress appropriated \$3.5 million for land acquisition and construction of a new facility. The site at Carderock was chosen for its location near Washington, D.C., and the Navy headquarters, its access to the Potomac River in order to fill the basins, and its bedrock foundation that would support the massive testing mechanisms. In addition, the site was large enough for a 100 percent expansion in 50 years (Carlisle 1998:140).

Maryland Historical Trust

Maryland Inventory of Historic Properties Form

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Construction started at the Carderock campus on September 8, 1937, and it was dedicated on November 4, 1939 (Carlisle 1998:145). It was named the David Taylor Model Basin in honor of Rear Adm. David Watson Taylor. Commander Ben Moreell is credited with the design of the new basin. The initial buildings constructed on the campus included an interconnecting administration building, shop, and laboratory building (Nos. 1, 2, and 3) arranged in a linear pattern. These support buildings reflect the influence of the streamlined Art Moderne style favored by the federal government during the 1940s. The model basin was constructed parallel to the three structures and housed a deep water basin, a shallow water and turning basin, and a high speed basin. The main entrance to the interconnecting office buildings, shop, and lab was designed to face south, toward the Potomac River. A large, grassy "meadow" fronted the centered main entrance of Building 2 and extended south toward the river. This vast south lawn added to the open and campus-like feeling of the facility but also allowed for future expansion. In 1985 the DTMB and associated buildings were listed in the National Register.

The primary mission of the DTMB, as defined by Congress, was to investigate and determine the most suitable and desirable shapes and forms for naval vessels and aircraft (Melhuish 1996). During its first year of operation, the DTMB was mostly involved in design work, but at the outset of World War II, activities at the DTMB were focused on war-related topics. Research became a major directive, and new facilities and staff were added to support research activities. New facilities added to the installation included a research pit for explosion testing (1941), wind tunnels and associated buildings (1942), a pentagonal test pond to test underwater explosives (1943), the Circulating Water Channel to test the angles and drag of submerged towed devices (1942), and two supersonic wind tunnels that had been dismantled in Germany and installed at Carderock (1946) (Melhuish 1996).

During this rapid expansion, careful consideration was given to the overall physical planning and growth of the installation. Under the direction of Capt. H.S. Howard, the installation grew with the addition of 47 acres in 1943 and 55 acres in 1946. Howard wrote in 1945, "Having in mind the architecture of the main building, I visualize something in the nature of a college campus or graduate school grown up around and in front of the main building. A row of buildings might well grow to the east and to the west of the main building toward the south but the central area should be kept free of building so that eventually a U-shaped group is formed with the open end toward the Highway" (Carlisle 1998:192). The campus of buildings created at Carderock during this period was determined eligible for the National Register as the Naval Surface Warfare Center Carderock Division Historic District in 1996.

The "Golden Age of Research" (1952 to 1970)

Expansion of the aerodynamics facilities at Carderock after World War II coincided with a "drastic realignment" of mission that inaugurated a "Golden Age of Research" at DTMB (McCarthy 1993:30, 34). In 1952 the Navy established the Applied Mathematics Department at Carderock and introduced computer-based research, beginning with a Universal Automatic Computer in 1953 and the Livermore Atomic Research Computer in 1960. The basin itself was also improved after World War II: construction began on a new 36-inch water tunnel in 1955 and on a maneuvering basin and a large rotating arm basin (under one roof and called the Maneuvering and Seakeeping [MASK] facility) in 1956. The MASK facility was ready for calibration and use in 1961, and the water tunnel was completed the following year (Brownell 1962:2-3).

Facilities at Carderock expanded again in 1964 with the Acoustics and Vibration Laboratory, which brought together scientists and engineers from several other departments to play a lead Navy role in measurement and diagnosis of full-scale radiated noise signatures from ships and submarines, which was an area of inquiry of paramount importance to the Navy's submarine warfare programs (McCarthy 1993:32). Four years later the Structural Mechanics department obtained a major new facility featuring five high-pressure deep submergence tanks for testing the hulls of underwater vehicles and a test bed for stressing large model ship structures under loads up to 250,000 pounds. On March 31, 1967, the Marine Engineering Laboratory at Annapolis and the Carderock facilities were merged to form the David Taylor Naval Ship Research and Development Center.

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By 1970 the acoustics department had significantly expanded its capabilities with the addition of acoustic ranges off Washington and California, plus, at Carderock, completion of an Anechoic Data Analysis Center and an anechoic flow facility consisting of a subsonic wind tunnel equipped with an anechoic chamber. That same year the Systems Development Department was created "with the intention of providing a total ship systems, hardware-oriented focus" (McCarthy 1993:32-36). The "Golden Age" of research at DTMB came to an end in the 1970s, as funding declined and the staff was reduced from 3,122 to 2,482 (McCarthy 1993:33).

NSF Carderock (1971 to present)

When funding resumed under the Reagan Administration (1981 to 1989) in the 1980s, it was on a very different basis, as most of the Center's annual budget was contracted to private industry. The Center was increasingly involved in both design and hardware demonstration phases of vehicle development, and there was much less support for "fundamental research, exploratory development, and advanced development investigations" (McCarthy 1993:37, 40). NSF Carderock was established in January 1992 under the U.S. Navy's Laboratory Consolidation Plan. The division was formed by the merger of DTMB and the Naval Ship Systems Engineering Station, Philadelphia.

Building 5, the Circulating Water Channel/Turbulence Building

Building 5, the Circulating Water Channel/Turbulence Building, was built as part of the DTMB in 1942 and opened in 1944. The Circulating Water Channel Building was constructed to test the drag of towed underwater devices and to observe the flow around appendages such as thrusters, struts, rudders, and diving planes (Carlisle 1998:188; United States Navy 1964:14). The building is still being used in this capacity today.

9. Major Bibliographical References

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See continuation sheet.

10. Geographical Data

Acreage of surveyed property less than 0.5 acres
Acreage of historical setting less than 0.5 acres
Quadrangle name Falls Church

Quadrangle scale: 1:24000

Verbal boundary description and justification

The boundary of the property is the footprint of Building 105 within NSF Carderock located in West Bethesda.

11. Form Prepared by

name/title	Patti Kuhn, Architectural Historian		
organization	The Louis Berger Group, Inc.	date	4/4/2011
street & number	1250 23 rd Street, NW	telephone	202-303-2665
city or town	Washington	state	DC

The Maryland Inventory of Historic Properties was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

return to: Maryland Historical Trust
Maryland Department of Planning
100 Community Place
Crownsville, MD 21032-2023
410-514-7600

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Bowers, Martha H.

2005 Maryland Inventory of Historic Property Forms for Buildings 16 and 18, NSWCCD. Prepared for the United States Navy by The Louis Berger Group, Inc., Morristown, New Jersey. On file, Maryland Historical Trust, Crownsville.

Brownell, W.F.

1962 *Two New Hydromechanics Research Facilities at the David Taylor Model Basin.* Hydromechanics Laboratory Research and Development Report No. 1690. Department of the Navy, David Taylor Model Basin, Carderock, Maryland.

Carlisle, Rodney

1987 *Where the Fleet Begins: A History of the David Taylor Research Center.* Prepared for the David Taylor Naval Ship R & D Center, Carderock, Maryland, by History Associates Incorporated.

McCarthy, Justin H.

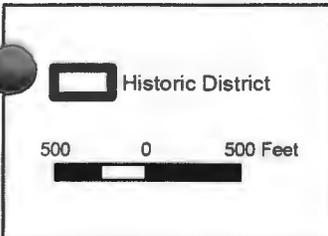
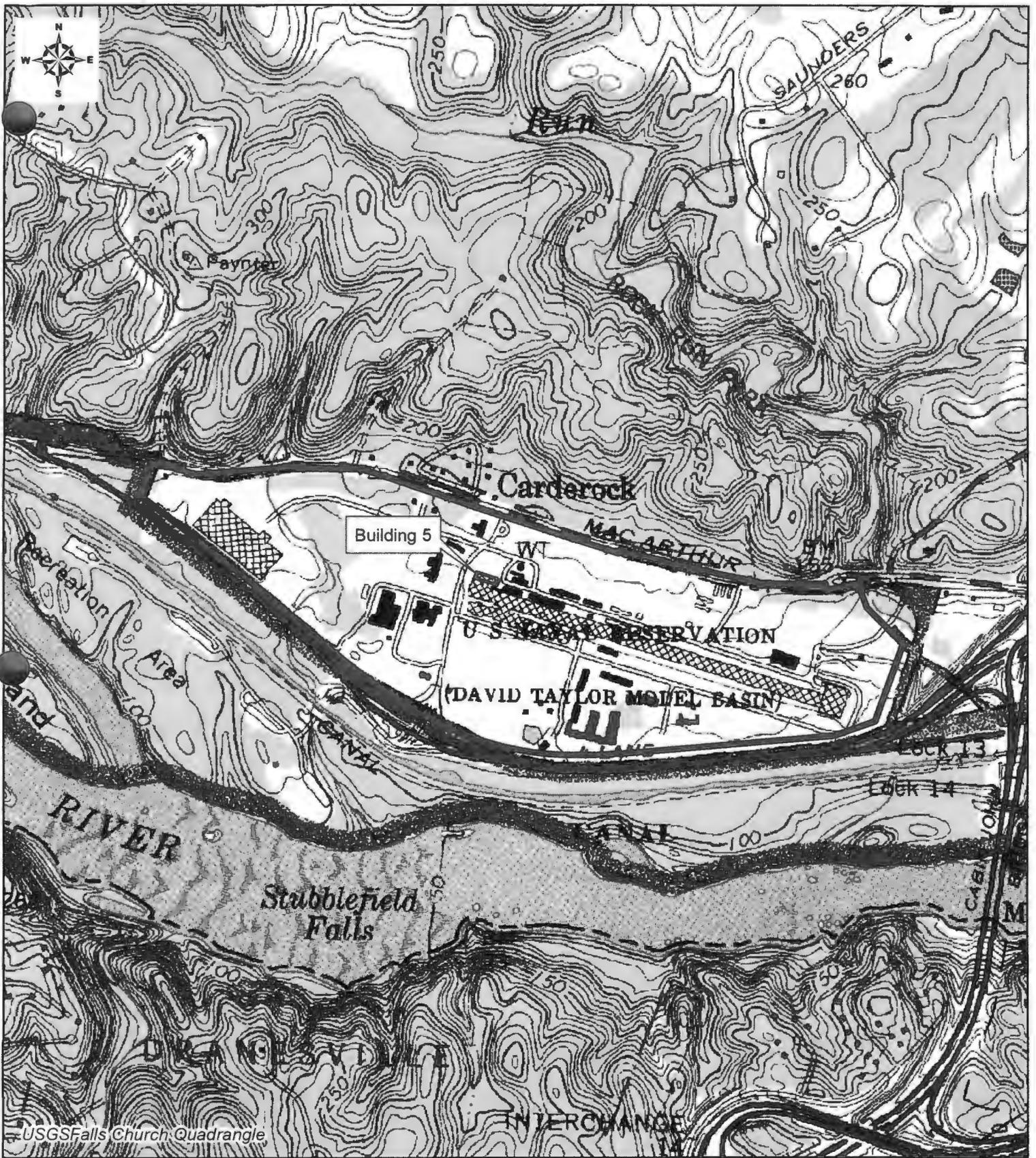
1993 David Taylor Research Center. In *A Half-Century of Marine Technology, 1943-1993*, edited by H. Benford and W.A. Fox. Society of North American Mechanical Engineers, Jersey City, New Jersey.

Melhuish, Geoffrey E.

1996 *Historical and Architectural Documentation of the Naval Surface Warfare Center Carderock Division, Maryland: Draft.* Prepared for Engineering Field Activity-Chesapeake, Washington, D.C., by R. Christopher Goodwin and Associates, Inc.

United States Navy

1964 Research Facilities at the David Taylor Model Basin. On file, Naval Surface Warfare Center Carderock Division, Carderock, Maryland.



Naval Support Facility, Carderock
 NSWCCD Historic District (MIHP No. M:29-52)25

Building Number 5



M: 29-52-25

NSWCCD HISTORIC DISTRICT (NSF BORDER TOWN)

BLDG 5. CIRCULATING WATER CHANNEL

MONTGOMERY COUNTY, MD

LOUIS BERGER GROUP

4/2010

MDSHPO

NORTHWEST CORNER, LOOKING SOUTHEAST

PHOTO 1 OF 3



M: 29-52-25

NSWCCD HISTORIC DISTRICT (NSF CARDEROCK)

BLDG 5. CIRCULATING WATER CHANNEL

MONTGOMERY COUNTY, MD

LOUIS BERGER GROUP

4/2010

MDSHPO

NORTHEAST CORNER, LOOKING SOUTHWEST

PHOTO 2 OF 3



M: 29-52-25

NSWCCD HISTORIC DISTRICT (NSF-CARDEROCK)

BLDG 5. CIRCULATING WATER CHANNEL

MONTGOMERY COUNTY, MD

LOUIS BERGER GROUP

4/2010

MDSHPO

SOUTHEAST CORNER, LOOKING NORTHWEST

PHOTO 3 OF 3