Landmarks Preservation Commission
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LP-0895

DRY DOCK #1 (Dock Street at the foot of 3rd Street), Brooklyn Navy Yard, Borough of Brooklyn, Built 1840-1851.

Landmark Site: Borough of Brooklyn Tax Map Block 2023, Lot 1

On July 22, 1975, the Landmarks Preservation Commission held a public hearing on the proposed designation as a Landmark of the Dry Dock #1, Brooklyn Navy Yard and the proposed designation of the related Landmark Site (Item No. 2). The hearing had been duly advertised in accordance with the provisions of law. Two witnesses spoke in favor of designation. There were no speakers in opposition to designation.

DESCRIPTION AND ANALYSIS

Dry docks are great chambers below water level used for the repair and construction of ships. A ship can be brought in from the adjoining body of water once the chamber has been filled with water. The chamber is then drained, allowing the ship to rest on wooden blocks so that work on the ship may proceed. After the work is completed, the chamber is flooded to outside water level, the gate is opened, and the ship can depart.

The construction of Dry Dock #1 in the Brooklyn Navy Yard was one of the great feats of American engineering in the first half of the 19th century. Construction began in 1840 and was not finished until 1851; by that time over two million dollars had been spent on the project. The dry dock was the first permanent one in the New York area and its construction, after great difficulties were overcome, as the then Director of the Bureau of Yards and Dock wrote, put the New York Yard: "on a par, in great measure, in point of advantage and accomodation, with those at Boston and Norfolk."

Plans for a dry dock at the New York Navy Yard in Brooklyn were first projected in 1826. At that time, it was decided by the Navy to build three dry docks at Boston, New York, and Norfolk, Virginia. Lack of adequate funds prevented the commencement of the New York facility until the completion of the other two in 1836. The area was then surveyed by Loammi Baldwin, in 1837-38, and on October 1, 1841, excavation started under the direction of Edward H. Courtenay, Professor of Civil Engineering at West Point; however, funds ran out the next year, and work was halted.

This was followed by a two-year hiatus in construction, caused by uncertainties about the Navy Yard's future location. The opening of the Croton Aqueduct in 1842 would have made it desirable to have the Dry Dock in Manhattan, where it could easily be flooded with water from the Aqueduct. The difficulty of building on the Brooklyn site made the move to Manhattan additionally desirable, but no suitable site on Manhattan could be found, and it was decided to remain in Brooklyn. The possibility of building a floating dry dock, which would have been cheaper, was then explored, but also rejected. Finally, excavation work was resumed on October 10, 1844, with General William Gibbs McNeill as chief engineer. He was succeeded in April, 1845 by W.P.S. Sanger. The next year William J. McAlpine assumed responsibility for the project.

McAlpine (1811-1890) was a major figure in the history of engineering in the United States. Born in New York, he grew up in Newburgh and Rome, New York and in 1827, he was apprenticed to John B. Jervis, then working on the construction of the Carbondale (Illinois) railway. He remained there until 1836, engaged principally in the construction of railroads and canals. The Brooklyn Dry Dock, for which he became chief engineer in 1846, was his first major project. He remained there until 1849, and subsequently designed and built the Chicago and Albany waterworks. He was State Engineer of New York in 1852-54, and railroad commissioner in 1855-57. In constructing the Third Avenue Bridge over the Harlem River in 1860 (now replaced), he became the first person in the North to apply the system of sinking cast-iron cylinders into gravel by means of compressed air--something that had previously been done on only two occasions, both in the south. A list of his projects during the post-Civil War period includes among other items, the Ohio & Mississippi Rail Road, the Tehauantepec Inter-Oceanic Railway in Mexico, bridges over the Missouri, Niagara, and Harlem Rivers, the water supply systems of Montreal, Norfolk, Philadelphia, San Francisco, Toronto, and closer to home, Staten Island, as well as a system for bringing water from the Ramapo River to New York. He also designed the foundations for the State Capitol in Albany, and a project for an "Arcade" railway under Broadway. As the Encyclopedia of American Biography noted: "...for thirty years there were very few great public works of improvement undertaken in the United States regarding which his advice was not sought for, at least in Europe." One of the earliest members of the American Society of Civil Engineers, he served as its president in 1869 and was the first American elected to the Institute of Civil Engineers of Great Britain.

At the New York Dry Dock, McAlpine was primarily responsible for solving the massive problems of the site. The first of these was the cofferdam, built across the mouth of the dry dock area in order to keep water out during excavation. The original dam consisted of wood piles thirty feet long placed ten feet apart, held together by planks and iron bolts and filled in with silt. This soon proved inadequate, and a second, similar dam was built inside the first one, however, on July 3, 1846, the dams breached, filling the excavation with water and delaying work for forty-four days. Another breach occurred on September 17, and it was decided to build a new dam outside the first one. This one made of piles forty feet long and fifteen inches square, using gravel as the fill, held.

The next problem that McAlpine had to contend with was the problem of underground springs that constantly flooded the excavation. In addition, these springs spewed out sand which tended to undermine the foundations. In a manuscript History of the Work, attached to his Annual Report of 1850, now in the National Archives, Washington, D.C., McAlpine tells how he dealt with conditions at a typical spring. First, hollow piles were driven at the spring site, so that water could flow through them, but with insufficient force to carry the sand with it, however, the water flowed around them instead. Next, he attempted to fill in the spring; one hundred and fifty cubic feet of cobblestones and pebbles were poured in. These sank to a depth of ten feet below the level of the excavation, so fifty more cubic feet of stone and pebbles were added. The water flowed around this too. He then tried laying six feet of concrete, inserting small tubes through which the water could flow. This succeeded temporarily, but the spring soon broke through it another site fourteen feet away, moreover, the sand that the spring continued to bring up was causing the piles and the concrete around them to settle. More piles were driven and finally an area of one thousand square feet around the spring was planked, and

on top of this, he laid dry cement, topped by a layer of brick with Roman motar, upon which the stone foundations of the dry dock were laid. Small vent holes were provided to allow the water to come up through the masonry, and the sand ceased to flow.

Once the excavations were finished, McAlpine proceeded to lay the foundations for the Brooklyn Dry Dock, making use of his backlog of experience as described above. Tests indicated the presence of quicksand here extending to a depth of about seventy-five feet. Six thousand five hundred and thirty-nine piles, thirty-two and a half feet long and fourteen inches in diameter were driven, set 2½ feet apart. In addition, there were one thousand seven hundred and forty four tongue and groove sheet piles, fifteen and a quarter feet long and five inches thick. The space between the piles was then excavated two and a half feet in depth and filled in with concrete masonry forming a pile cap. The piles were then sawed off so that the tops were all level, and were capped by yellow pine timber, twelve by fifteen inches running at right angles to the axis of the dock, and bolted to the piles. The space in between these was then filled in with concrete. Above this layer, there were another two layers of yellow pine timber and concrete fill with timbers breaking joints.

The masonry superstructure consists of some twenty-three thousand cubic yards of facing stone which is granite from the Frankfort and Sullivan quarries in Maine and from the Millstone quarry in Connecticut. The back-up interior stonework came from Staten Island and Highland Quarry, New York. The stone at the bottom of the dry dock is laid in the form of a great inverted arch to withstand the uplifting forces. The floor of the dock is flat, except for a central groove one foot wide. It is thirty feet wide and made of blocks roughly two feet wide and three feet deep. The sides of the dock are stepped. The lowest five steps rise about one foot each, and are laid with alternating steps of headers and stretchers. The headers, about two feet deep, are three feet eight inches long, and the stretchers about seven feet three inches long. Above this are thirteen steps, each rising two feet three inches, also set in the same pattern. The headers are three feet seven inches long, and the stretchers are six feet six inches long. The tops of the steps are eighteen inches deep. The dock's landward end terminates in a curve, and the seaward end is an inverted arch set back to accommodate a large metal floating gate.

From 1847 to 1849 McAlpine employed Thornton MacNess Niven, the noted architect, as master stonecutter, later entitled Master of Masonry. During this crucial period in the construction of the dry dock, Niven was responsible for overseeing the work of the stonecutters and masons. He first became associated with the project in 1846 when he was contracted to furnish some gravel. In 1847, when he hired him, McAlpine described Niven as: "a practical mechanic and excellent architect with wide experience in the construction of both public and privately owned buildings."

In 1849, McAlpine was dismissed for undisclosed reasons, and replaced by Charles B. Stuart. Soon after the cofferdam was removed, and on January 8, 1850, the first ship, the Dale, entered the dry dock for repairs. Work was completed in the spring of 1851, and the dry dock was then turned over to the Commandant of the Navy Yard. A final accounting revealed that two million, one hundred and forty-six thousand dollars had been spent in its construction.

The workings of the dock are most ingenious and interesting. There is a floating gate at the river end which can be raised and floated free to one side eliminating the need for hinges, thus permitting the largest possible ships to enter. When the ship has entered, the gate is floated back into position across the end of the dry dock and its interior ballast tanks are flooded, so that it sinks like a submarine, fitting into a groove at the dock's curved bottom thus completely sealing it in place at the mouth of the dry dock. The water can then be drained from the dry dock through giant culverts at each side and pumped out. As the water leaves the dry dock, the ship settles onto wood blocks that have been pre-set on either side of its keel to support the hull. When work on the ship has been completed and it is ready to be re-floated the dock is flooded by allowing the river water to pass through holes in the gate. The gate can only be floated when the water level outside the dock and inside the dock are the same. Once it has been floated by pumping all the water out of its ballast tanks, it is towed off to one side, and the ship can then leave the dry dock. The dry dock must be drained again in order to re-adjust the wood blocks to suit the hull of another ship. When empty, the drain pumps of the dry dock have to be operated for about one-half hour every day in order to drain it of rain-water, springwater, and leakage.

For one hundred and twenty five years, the granite walls of Dry Dock #1 have remained in good condition and it has functioned without need of major repairs, while other, newer dry docks have had their brick or concrete walls disintegrate and crumble. Among the ships which have been built or serviced in it are the Monitor, of Civil War fame, and the Niagra, which laid the first trans-Atlantic cable. The dry dock is now owned by the City of New York and operated by the New York Dry Dock Company.

FINDINGS AND DESIGNATION

On the basis of a careful consideration of the history, the architecture and other features of this building, the Landmarks Preservation Commission finds that the Dry Dock #1, Brooklyn Navy Yard, has a special character, special historical and aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City.

The Commission further finds that, among its important qualities, the construction of Dry Dock #1 was one of the great feats of 19th-century American engineering, that the dry dock brought the Naval Shipyard in New York up to par with the Navy Yards at Boston and Norfolk, that it was primarily the work of William J. McAlpine, a prominent figure in American engineering, that great problems were overcome in dealing with the difficult site where collapsing cofferdams, underground springs, and quicksand undermined the foundations, that the magnificent granite stonework was executed by skilled masons under the supervision of Thornton MacNess Niven, the noted architect, and that while other, newer dry docks have crumbled, Dry Dock No. 1 has never required extensive repairs and continues to function today making a vital contribution to the New York shipbuilding industry.

Accordingly, pursuant to the provisions of Chapter 63 of the Charter of the City of New York and Chapter 8-A of the Administrative Code of the City of New York, the Landmarks Preservation Commission designates as a Landmark the Dry Dock #1, (Dock Street at foot of 3rd Street), Brooklyn Navy Yard, Borough of Brooklyn and designates Tax Map Block 2023, Lot 1, Borough of Brooklyn as its Landmark Site.