

NAVAL AMMUNITION DEPOT EARLE, TRESTLE 2  
(Naval Weapons Station Earle, Trestle 2)  
Sandy Hook Bay  
Colts Neck vicinity  
Monmouth County  
New Jersey

HAER NJ-142-C  
*HAER NJ-142-C*

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
NORTHEAST REGIONAL OFFICE  
National Park Service  
U.S. Department of the Interior  
U.S. Custom House, 3rd Floor  
200 Chestnut Street  
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

NAVAL AMMUNITION DEPOT EARLE, TRESTLE 2  
(Naval Weapons Station Earle, Trestle 2)

HAER No. NJ-142-C

Location: Naval Ammunition Depot (NAD) Earle  
(currently Naval Weapons Station [NWS]  
Earle)  
Colts Neck Vicinity  
Monmouth County  
New Jersey

USGS Sandy Hook, NJ Quadrangle, 1:24,000  
UTM Coordinates: 18.580447.4478271  
18.580448.4478258  
18.580243.4478168  
18.580238.4478177

Construction Dates: 1944-45

Architect/Engineer: Shaw, Naess and Murphy, Architects/  
Engineers; Frank Grad and Sons, Architects

Contractor: J. Rich Steers, Inc.

Present Owner: Department of the Navy

Present Use: Railroad and Roadway Trestle

Significance: Funded in part by the Army, Naval Ammunition  
Depot Earle was commissioned in 1943 as the  
only major ordnance transshipment depot on  
the East Coast. Its mission was to  
facilitate the movement of ordnance from  
stateside production and storage facilities  
to the Navy and Army forces, then in the  
European theater of World War II.

Project  
Information:

The Department of the Navy plans to replace Pier 2, Pier 3, Trestle 2, and Trestle 3 at NWS Earle. These structures, and many of their associated buildings, were identified as meeting National Register Criterion A during a cultural resources investigation conducted at NWS Earle in 1999. The Department of the Navy and the New Jersey State Historic Preservation Office (NJ SHPO) have not reached an agreement concerning the specific definition or boundaries of the National Register-eligible architectural resources at NWS Earle to date; however, an assumption of eligibility for Pier 2, Pier 3, Trestle 2, and Trestle 3, as well as the historic buildings associated with these structures, was made for the purposes of this project. To mitigate the adverse effect of the proposed project to the piers, trestles, and associated buildings, the Department of the Navy, the NJ SHPO, and the Advisory Council on Historic Preservation entered into a Memorandum of Agreement stipulating written, graphic, and photographic documentation of the structures. This documentation was undertaken to fulfill these stipulations.

Historians:

Elizabeth Amisson, Sarah Farley, and Robert F. Panepinto, August 2003

Part I: Historical Information

A. World War II

As approved by the Secretary of the Navy in June 1943, NAD Earle, New Jersey, was to have 5,300'-0" of trestle (at a cost of \$150 per linear foot) and a 2000'-0" x 70'-0" pier (at a cost of \$5 per square foot). Shaw, Naess and Murphy and DeLeuw, Cather & Company provided the plans and specifications for NAD Earle. These two companies were familiar with the task at hand, having provided the same services for the Naval Ammunition Depot at McAlester, Oklahoma. To expedite the process, Shaw, Naess and Murphy opened an office in the Westinghouse Building on 5<sup>th</sup> Avenue in New York City in June 1943. On August 2, the Navy issued Contract NOy-6766 to the Elmhurst Contracting Company for the construction of Pier 1, the Barge Pier, the trestle connecting the pier to the shore, and pier utilities. This was the only pier area included in the original plans for the NAD Earle. The total cost of the project was \$3,832,615.00.<sup>1</sup>

The initial plans did not include facilities for a deep-water pier. According to Captain Burton H. Green, U.S. Navy, the first Commanding Officer of NAD Earle, the Bureau of Ordnance was aware of this and planned to load ships via barge or lighter in the bay. Captain Green met with the Commandant of the Third Naval District, Admiral Marquard, while visiting NAD Earle in September 1943, and the topic of a deep-water pier arose. Admiral Marquard took action to request the addition of a deep-water pier after learning that none was planned.<sup>2</sup> The Vice Chief

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<sup>1</sup> Ernest J. Benshimol, *History of U.S. Naval Ammunition Depot Earle, New Jersey*, (Subject Files [ACC No. A-12-1(1)], Loc No. R-105-6-4-5, Box 422, RG 181, National Archives and Record Administration, Northeast Branch, also on file at Naval Weapons Station Earle, Public Affairs Office), 48, 53-54, 67, 71.

<sup>2</sup> Captain Burton H. Green, USN, "Informal History of Naval Ammunition Depot, Earle, New Jersey" (Memorandum to Captain Hutchins, U.S. Navy [Retired], Colts Neck, NJ: Naval Ammunition Depot Earle, 1944), 2.

of Naval Operations approved the request, earmarking an additional \$3.2 million for the addition.<sup>3</sup>

On January 5, 1944, the Navy Department's Bureau of Yards and Docks issued a letter of intent to J. Rich Steers, Inc. of New York, NY, for the "construction of [a] ship pier and approach, including dredging railroad track, and services" at NAD Earle. The initial cost of the bid was \$2.66 million, and work was expected to begin as soon as the Navy issued Notice to Proceed.<sup>4</sup> The contract for the project, NOy-7693, was dated February 4, 1944, and more specifically detailed the work as "Ships' Pier and Approach connecting with the Barge Pier together with a Pier Utility Building, railroad tracks, dredging and other work."<sup>5</sup>

As the Navy was moving ahead in January and early February 1944, the Army evaluated the Navy's NAD Earle project to determine its usefulness to the Army. They found the Barge Pier and Trestle in Sandy Hook Bay already functioning, and plans underway for Pier 2, the Navy Pier. At this stage, Contract NOy-7693 called for a 253'-0" extension of the 64'-0" wide barge pier; the construction of a 34'-0" x 2,772'-0" trestle; the construction of a 90'-0" x 687'-0" pier (Pier 2) with berthing for two ships; and dredging work. The Army concluded that they could not use the current barge pier to load Army cargo, as it was already fully utilized and would continue to be fully utilized by the Navy, but recognized a joint project would be appropriate because facilities for ship loading could be expanded. The Army therefore recommended construction of finger piers to provide six additional 600'-0" ships' berths and bypass trackage to avoid interference with the barge pier.<sup>6</sup> Figure 1 is a general construction map of the pier complex as it was constructed in 1944.

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<sup>3</sup> "Excerpts from report of NIG-Part II" (Third Naval District Inspection Report-II, New York, NY: Headquarters of the Commandant Third Naval District, 1945), 1. Henceforth NIG-Part II.

<sup>4</sup> L. W. Lancaster, "Record Report: Contract NOy-7693 Ships Piers and Approaches" (Colts Neck, NJ: Naval Ammunition Depot Earle, 1945), ii.

<sup>5</sup> Benshimol, 68.

<sup>6</sup> *Ibid.*, 119-121, 129, 131.

Major alterations to Contract NOy-7693 resulted in a great difference in price from the original bid cost. Initially, Contract NOy-7693 only included the construction of one new pier, the Navy Pier (Pier 2); however, after the contract was issued, the Army asked to have a pier added to the complex and provided funds for its construction. J. Rich Steers won the contract for the additional work, but during negotiations for the new contract, NOy-8987, the parties involved decided to incorporate the Army Pier (Pier 3) into the original contract. Since funds had already been paid out under NOy-8987, it could not be cancelled, and a change order was issued for the contracts, amending NOy-8987 to cover the money already paid and adding the construction of Pier 3 to NOy-7693. The addition of Pier 3 required some changes to the location of the piers.<sup>7</sup> The final cost of the project was \$8,056,786.99.<sup>8</sup>

According to Ernest J. Benshimol's "History of the U.S. Naval Ammunition Depot Earle, New Jersey" (1945), the pier area consisted of the following features when construction was completed:

1. Administration and service buildings, and personnel quarters
2. A dunnage yard<sup>9</sup>
3. Trackage and roadways
4. A barricaded siding area
5. Ship and barge piers, with connecting trestle across shallow water and tidal flats to the shore
6. A dredged marine area adjacent to the piers, connected by a dredged channel to the channels of Lower New York Bay.<sup>10</sup>

Construction was completed on June 4, 1945<sup>11</sup>; however, ships began using Pier 3 in June 1944.

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<sup>7</sup> Lancaster, 5.

<sup>8</sup> *Ibid.*, 3.

<sup>9</sup> Dunnage is packing material used to cushion cargo on a ship.

<sup>10</sup> Benshimol, 42.

The Record Report for Contract NOy-7693 was written at the completion of construction, and provided the Navy's analysis of the construction process and its comments about technical features of the design--plans, specifications, major changes--and unusual features encountered during construction. Overall, the design of the piers and trestles was thought to be satisfactory; however, the plans for the trestles and pier decks were modified. The trestles needed to be widened to handle a high volume of truck traffic. The need to widen the trestles was noted while construction was ongoing, since the facility went into operation before it was fully completed. The pier decks were formed entirely of reinforced concrete because of a lack of suitable wood to build a more economical ". . . combination reinforced concrete slab over a laminated wood deck," as initially proposed. A request was also made "that the platforms and ramps on both the Army and Navy Pier [sic] be made sparkproof by installing a wooden deck covering over the concrete."<sup>12</sup>

The initial plans for the project were abandoned after the Navy requested a wider trestle and the addition of Pier 3. Although the new plans were prepared in a very short term by Shaw, Naess and Murphy and Frank Grad and Sons, very few changes had to be made to them during the course of construction.<sup>13</sup> The specifications for the work were thought to be reasonable and did not cause any unexpected problems. The most significant changes to the plan were the additions of Trestle 3 and Pier 3.<sup>14</sup> Figure 2 is a general plan of the pier complex, including Pier 3 and Trestle 3, as it was constructed in 1944.

The Record Report for Contract NOy-7693 describes the structures built as "fairly standard," the notable exception being the all-reinforced concrete deck constructed on the piers. This led to a greater construction cost than was initially anticipated, but it

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<sup>11</sup> Lancaster, 3.

<sup>12</sup> *Ibid.*, 13.

<sup>13</sup> Benshimol, 72: Contract NOy-8986 was issued on February 10, 1944 for \$274,075.00.

<sup>14</sup> Lancaster, 13-14.

was precipitated by a wartime shortage of lumber. The addition of Pier 3 and its associated trestle required the extension of the completion time from July 3, 1944, to September 1, 1944. A hurricane on September 14, 1944, necessitated repairs to the lighting systems, pumps and intake cribs, and the fire protection system, as well as general cleanup. Severe cold weather in January 1945 caused damage to the 10" salt-water fire line, necessitating further repairs. When the project was completed, L. W. Lancaster, the senior engineer for the project and author of the Record Report, rated the contractor's overall performance on the project as outstanding.<sup>15</sup>

#### B. Post-World War II

After the surrender of Japan, the process for sending ammunition to the military forces arrayed overseas was reversed. Between August 1, 1945, and May 18, 1946, over 372,000 tons of ammunition were received at NAD Earle for dispersal to inland bases, making it the largest site on the East Coast for the return of ammunition. This also necessitated changes to the dunnaging process.<sup>16</sup> Railroad cars were temporarily dunnaged on the piers to speed up the process of unloading the large volume of ammunition being returned to Earle. The cars were then moved to the dunnaging yard on the shore for more thorough dunnaging before being shipped to their final destinations.<sup>17</sup>

During the second half of the 1940s and the early 1950s, various quality assurance and maintenance projects were undertaken at

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<sup>15</sup> *Ibid.*, 3-4, 15-16.

<sup>16</sup> The Cultural Resource Group, Louis Berger & Associates, Inc., "Architectural Resources Survey: Naval Weapons Station Earle, Monmouth County, New Jersey" (n.p.: The Cultural Resource Group, Louis Berger & Associates, Inc., 1999), 14-15; *History of U.S. Naval Ammunition Depot, Earle, New Jersey, Volume II: History of the Naval Ammunition Depot, Earle, Red Bank, New Jersey, from 1 August 1945 to 31 December 1948* (Earle, NJ: Naval Ammunition Depot Earle, n.d.). Henceforth, *Hist. of USNAD Earle*, vol. II; Dunnaging is the use of various materials, in the case of NAD Earle, wood, to protect and prevent the shifting of loads during transportation.

<sup>17</sup> *Hist. of USNAD Earle*, vol. II.

NAD Earle. One of the necessities of wartime was to get things done quickly; this is not to say that quality control was ignored, but that the need to get facilities built was often so urgent that it allowed for the use of substandard materials. For example, the rails used for the tracks at NAD Earle were a poor grade of relayer (previously used tracks) that did not always match. Record Reports for Contracts NOy-13426 and 12862 indicate that 4.8 miles of track were replaced on the piers and trestles between December 1945 and January 1949, owing to the poor quality of the original track.<sup>18</sup>

Routine maintenance was also conducted on the piers following the war. The Navy completed resurfacing Piers 1 and 3 in July 1952 at a cost of \$821,000.00. Storm damage to the piers and trestles was also completed in July of the same year at a cost of \$312,400.00.<sup>19</sup> The following year, new saltwater pumps were ordered to replace all of the existing saltwater pumps on the pier that had begun to corrode.<sup>20</sup> Figure 3 is a plan of the piers and trestles as they appeared in 1953. Pier 4 was not yet constructed at this date.

The Navy renamed NAD Earle the NWS Earle (NWS Earle) in 1974. The internal Navy reorganization that led to the name change also added the mission of serving as the homeport for *USS Nitro*.<sup>21</sup>

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<sup>18</sup> "Record Report Lump-Sum Contract NOy-12862 Specification No. 17051" (Earle, NJ: Naval Ammunition Depot Earle, 1948, ACC No. 59A249, Box 142763A, RG 181, National Archives and Record Administration, Northeast Branch); "Record Report Lump-Sum Contract NOy-13426 Specification No. 17575 (Revised)" (Earle, NJ: Naval Ammunition Depot Earle, 1949, ACC No. 59A249, Box 142763A, RG 181, National Archives and Record Administration, Northeast Branch).

<sup>19</sup> T. A. Hartung, "Completed Public Works Portion of Standard DIG Questionnaire for Subject Inspection" (New York, NY: Headquarters of the Commandant, Third Naval District, 1952, ACC No. 59A250, Box 141174B, RG 181, National Archives and Record Administration, Northeast Branch).

<sup>20</sup> "Fire Protection Survey of USNAD, Earle, NJ; Supplement to OPNAV REPORT 11320-2" (New York, NY: District Public Works Office, Third Naval District, 1953, ACC No. 59A250, Box 141174B, RG 181, National Archives and Record Administration, Northeast Branch).

<sup>21</sup> The Cultural Resource Group, 18.

### C. Recent History

There was a resurgence of activity at NWS Earle during the late 1970s. The construction of facilities to support the homeporting of additional ships was underway or about to be underway during 1977 and 1978. The Commanding Officer met with the Leonardo Taxpayers Association to brief them on the plans in May 1978. New insulated fresh water and sewage lines on the piers and trestles were put into service in August of the same year. Plans for a new pier, Pier 4, also were developed.<sup>22</sup>

By 1980, two additional ships were stationed at NWS Earle, the *USS Suribachi* and *USS Butte*, and improvements to the piers and trestles continued.<sup>23</sup> Contracts totaling \$5.5 million were awarded in Fiscal Year 1981 for improvements to the piers and utilities. During April 1981, new bumper facings were installed on the loading docks at Piers 2 and 3. During September, a tug berth was constructed on the east side of Pier 3, and construction was started to enclose the "Wye" area at the junction of Trestles 2 and 3. By November, new support pilings were installed and minor concrete patching was finished on Piers 2 and 3.<sup>24</sup>

Improvements continued through 1982. The Navy awarded contracts for the repair of the fender systems on the piers (\$1 million) and structural repairs to the piers themselves (\$2 million). In addition, the Navy designed a contract for a Phase I rehabilitation of the undersides of the concrete decks on Pier 3 and Trestle 3, which also included rehabilitation of the fire protection ramps on Pier 2. Finally, construction began on

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<sup>22</sup> Naval Weapons Station Earle, "Command History, 1978" (Colts Neck, NJ: Naval Weapons Station Earle, 1978), 7, 14, 20.

<sup>23</sup> The Cultural Resource Group, 18.

<sup>24</sup> Naval Weapons Station Earle, "Command History, 1981" (Colts Neck, NJ: Naval Weapons Station Earle, 1981), 11, 21.

general pier improvement and the utilities at the junctions of Trestles 2 and 3.<sup>25</sup>

Contracts totaling \$6 million were completed in 1983, \$4 million of which were for structural repairs to the pier. Work completed that year included:

1. renovating the expansion joints on Pier 3
2. spraying gunite and grout underneath Piers 2 and 3
3. replacing several pier pilings and string pieces
4. repairing the base of bollards (also known as bitts) on Piers 2 and 3.

Life-ring brackets and life-rings were placed on the piers and trestles. Repairs commenced on the fire main systems at Piers 2 and 3, and boilers in the pier buildings were repaired.<sup>26</sup>

By 1990, two additional ships were homeported at NWS Earle--the ammunition/oiler ships *USS Detroit* and *USS Seattle*. The homeporting of these two ships required extensive additions to the waterfront area, including 500 additional housing units and the construction of another pier, Pier 4.<sup>27</sup> Figures 4 and 5 are plans of the pier complex as it appeared in 1989, after Pier 4 was constructed. Major repairs to the railroad tracks on Trestle 2 were also undertaken. Two major improvement projects began during 1991. The first, awarded under \$47.7 million contract to the Pile Foundation Construction, Inc. of Averne, NY, involved the construction of a new trestle, Trestle 1A. Groundbreaking for this project occurred on September 10, 1991. The second project involved over \$11 million in infrastructure repairs to NWS Earle. Approximately \$2.8 million for repairs to the piers timbers, \$2 million for repairs to the Pier 3 railroad, and

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<sup>25</sup> Naval Weapons Station Earle, "Command History, 1982" (Colts Neck, NJ: Naval Weapons Station Earle, 1982), 10-11, 19.

<sup>26</sup> Naval Weapons Station Earle, "Command History, 1983" (Colts Neck, NJ: Naval Weapons Station Earle, 1983), 12-13, 22-23.

<sup>27</sup> The Cultural Resource Group, 18.

\$635,000.00 for road improvements were included in this undertaking.<sup>28</sup>

Improvements to the piers and trestles continued into the late 1990s and the new century. Figure 6 is a plan of the pier complex as it appeared in 1994. In 1998, the repair and replacement of all telephone equipment on the piers provided more lines for the homeported and visiting ships, while the opening of the new Pier Recreation Center in Building S-454, the former pier firehouse, provided sailors with the opportunity for rest and relaxation.<sup>29</sup> \$4.3 million in repair continued on Pier 2 into 2001. Concrete and rail installation was completed by November of that year. Electrical cable replacement, connection, and power-up on Pier 3 were also finished in 2001.<sup>30</sup>

#### D. Buildings

Buildings S-63, S-454, S-455, and 3A are situated between Trestles 2 and 3 in the area of the pier complex known as the "Wye" area, which is located where Trestles 2, 3, and 4 branch off from Trestle 1A. Building S-63 (Pump House, "Wye" Area) has served as a pump house since its construction in 1944, providing water to fight fires on the pier. It may also provide fresh water for the workers and ships tied up at the piers.<sup>31</sup> After S-63, the oldest of the buildings located in the "Wye" area is S-454 (Pier Fire Station, "Wye" area), constructed in 1952. When surveyed in 1996, this building was vacant, but it underwent renovation in 1998 and reopened as the Admiral J. M. Boorda

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<sup>28</sup> Naval Weapons Station Earle, "Command History, 1991" (Colts Neck, NJ: Naval Weapons Station Earle, 1991), 6.

<sup>29</sup> Naval Weapons Station Earle, "Command History, 1998" (Colts Neck, NJ: Naval Weapons Station Earle, 1998), 8, 25.

<sup>30</sup> Naval Weapons Station Earle, "Command History, 2001" (Colts Neck, NJ: Naval Weapons Station Earle, 2001), 18-20.

<sup>31</sup> M.H. Bowers, Cultural Resource Survey Form-K, Building S-63/Pumphouse, in "Architectural Resources Survey Naval Weapons Station Earle, Monmouth County, New Jersey" (n.p.: The Cultural Resource Group, Louis Berger & Associates, Inc., 1999); The Cultural Resource Group, 73.

Fleet Recreation Center in October of that year.<sup>32</sup> Building S-455 (Battery Recharging Shop, "Wye" area) is a modern structure built in 1983.<sup>33</sup> It has most likely always functioned in its current capacity as a battery recharging shop. The most recent building constructed in the "Wye" area is Building 3A (Port Services, "Wye" area). This twelve-sided building has housed operations and administrative offices since its construction in 1988.<sup>34</sup>

#### E. Conclusion

The Trestles and Piers at NWS Earle play a critical role in the delivery of ammunition to the ships of the U.S. Navy. Since their construction in 1944, the structures have evolved in response to changes in their mission brought about by technological advances. In 2002, Port Operations provided berthing and hotel services for seventy-four ships. The waterfront pier complex is unique in design and offers five ship berths with a wide range of services including tugboat and harbor pilots twenty-four hours a day; 4,000 amp shore power; steam; potable water; cable TV; phone lines; fiber optic T-1 connectivity; and line handlers.<sup>35</sup>

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<sup>32</sup> The Cultural Resource Group, 73; Naval Weapons Station Earle, "Command History, 1998" (Colts Neck, NJ: Naval Weapons Station Earle, 1998), 25.

<sup>33</sup> The Cultural Resource Group, 73.

<sup>34</sup> *Ibid.*, 74.

<sup>35</sup> Naval Weapons Station Earle, "Command History, 2002" (Colts Neck, NJ: Naval Weapons Station Earle, 2002), 13.

## Part II: Descriptive Information

### A. General Character and Conditions

As constructed in 1944, Trestle 2 consisted of a reinforced concrete deck supported on timber piles (Figures 7 and 8). The structure was approximately 1410'-0" long and ranged in width from 46'-0" to 61'-0" (only the northeastern-most 82'-0" being 61'-0" wide). A vehicular lane ran down the middle of the deck, and a single railroad track was imbedded in the deck on both sides of the vehicular lane.<sup>36</sup> No buildings were historically located on this structure, and none have been erected since 1944; however, several buildings, including S-63, S-454, 3A, and S-455, are located in the "Wye" area between Trestles 2 and 3. The orientations of most of these buildings indicate that they are physically more closely related to Trestle 3 than to Trestle 2. An exception to this is Building S-455, which was constructed in 1983 at the eastern corner of the "Wye" area and faces southwest. Trestle 2 has changed little over time--the overall dimensions and configuration of features have not changed dramatically; however, some materials have been replaced and general maintenance performed. These alterations are explained in detail in the previous section of this report. Figure 9 is an outline plan of the trestle as it appeared in 1999.

### B. Substructures

Trestle 2 was constructed upon creosoted timber piles.<sup>37</sup> Pile bents were spaced 8'-0" apart and longitudinal batter piles were spaced 1'-3" to 5'-10" apart. Longitudinal bracing and cross-bracing was comprised of 3" x 10" and 4" x 10" timber members. Pile caps consisted of 12" x 12" members spaced 8'-0" apart (atop the pile bents).<sup>38</sup> Members throughout the superstructure were fastened with 1" bolts.<sup>39</sup>

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<sup>36</sup> Shaw, Naess and Murphy and Frank Grad and Sons, *Ships Piers and Approaches, U.S. Naval Ammunition Depot, Earle, New Jersey* (n.p.: Shaw, Naess and Murphy and Frank Grad and Sons, 1944), Bureau of Yards and Docks, Y & D Drawing No. 279401, 279402, and 279403. Hereafter, Y & D Drawing No.

<sup>37</sup> Lancaster, 6.

<sup>38</sup> Ibid.; Y & D Drawing No. 279370, 279375, 279376, and 279377.

The concrete slab deck was reinforced with two layers (bottom and top) of 5/8" and 7/8" steel bars spaced at intervals ranging from 12" to 18" in the longitudinal direction and from 6" to 18" in the transverse direction.<sup>40</sup> The concrete slab was 1'-10-1/2" thick.<sup>41</sup> Expansion joints were spaced 46'-0" apart.<sup>42</sup> Grooves were built into the deck to accommodate eighty-five-pound rails set flush with the top of the deck.<sup>43</sup> Wood ladders measuring 2'-0" in width were spaced mid-way between the pile bents under the edges of the deck.<sup>44</sup>

### C. Fire Protection System

The fire protection system on the pier complex consisted of the following features located in the Utilities Building (Building S-63), facing Trestle 3 in the "Wye" area:

- One 2,000-gallon per minute, 125-pound pressure, electrical-driven, deep well turbine pump;
- two standby 1,000-gallon per minute, 125-pound pressure gasoline engine-driven, deep well turbine pumps;
- a 700-gallon per minute, fifty-pound pressure, electrical-driven, deep well turbine pump to circulate the water in the mains to prevent freezing; and
- a 175-gallon per minute, ninety-foot head, automatic electric-driven centrifugal pump to supply water to plumbing fixtures when no other pump was operating.<sup>45</sup>

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<sup>39</sup> Y & D Drawing No. 279375.

<sup>40</sup> *Ibid.*, 279397, 279402, and 279403.

<sup>41</sup> *Ibid.*, 279386.

<sup>42</sup> *Ibid.*, 279389.

<sup>43</sup> *Ibid.*, 279374 and 279397; Lancaster, 10.

<sup>44</sup> Y & D Drawing No. 279386.

<sup>45</sup> Lancaster, 10.

In addition, a 10" cast iron water main extended along one side of the section of the trestle measuring 34'-0" wide and along both sides of the remainder of the trestle and the piers. This main connected with the ends of water mains on the piers to permit connection of fire boat pumpers, and cross-connected with the fire protection system on the Barge Pier and Trestle. A total of nineteen fire hydrants were spaced at intervals of approximately 150'-0" along the mains. The hydrants were connected to open head sprinklers spaced 8'-0" apart on each side of the fire bulkhead walls and to sprinkler systems in the decontamination buildings (Building 4N on Pier 2 and Building 4A on Pier 3). The fire bulkhead walls were of timber construction and located at the deck construction joints. They extended across the trestles and piers and from the bottoms of the deck slabs to 2'-0" below mean low water. The sprinkler lines were controlled manually by quick opening valves.<sup>46</sup>

A complete fire alarm system was installed in Piers 2 and 3. It consisted of five "Master type stations," five auxiliary stations, four electro-mechanical gongs, two compressed air-operated "Daphone" horn plants, one control unit, recording equipment, and "necessary accessories and wiring."<sup>47</sup>

#### D. Fender System

The fender system for the pier complex consisted of Type A and Type B fenders. Type A, used along the outshore (northeastern) end of Pier 2 and along Trestles 2 and 3, consisted of the following: A fender pile in line with each bent, located 4'-0" from the edge of the deck, and connected to the deck with two 4" x 10" timber members; 12" x 12", continuous timber members behind the piles and between the 4" x 10" members; and 10" x 12" chocks between the piles. Type B, used along the sides of Piers 2 and 3 and the outshore end of Pier 3, consisted of a fender pile in line with each pile bent, located along the edge of the deck, and 10" x 12" inch timber chocks between piles.<sup>48</sup>

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<sup>46</sup> *Ibid.*, 10-11.

<sup>47</sup> *Ibid.*, 11.

<sup>48</sup> *Ibid.*, 8.

Part III: Sources of Information

A. Engineering Drawings

Dewberry & Davis. *Asbestos Operations and Maintenance Plan, U.S. Naval Weapons Station Earle*. Colts Neck, NJ: Naval Weapons Station Earle, 1999. Printed from a CD provided by Naval Weapons Station Earle, Base Civil Engineering Office.

Han-Padron Associates and Day & Zimmerman, Inc. *Pier Improvements*. N.p.: Han-Padron Associates and Day & Zimmerman, Inc., 1989.

Naval Ammunition Depot Earle. *Master Shore Station Development Plan, Part IV Section 2, Area Development Plan, Structures*. Colts Neck, NJ: Naval Ammunition Depot Earle, 1953. Printed from a CD provided by Naval Weapons Station Earle, Base Civil Engineering Office.

Naval Weapons Station Earle, Base Civil Engineering Office. *Building Use Location, Trestle & Piers, Waterfront Area Map*. Colts Neck, NJ: Naval Weapons Station Earle, Base Civil Engineering Office, 1994. Printed from a CD provided by Naval Weapons Station Earle, Base Civil Engineering Office.

Shaw, Naess and Murphy and Frank Grad and Sons. *Ships Piers and Approaches, U.S. Naval Ammunition Depot, Earle, New Jersey*. N.p.: Shaw, Naess and Murphy and Frank Grad and Sons, 1944. Printed from a CD provided by Naval Weapons Station Earle, Base Civil Engineering Office.

B. Historic Views

Danforth, Lew. "Loading Piers-N.A.D. Earle, N.J." 1951. Illustration filed at Naval Weapons Station Earle, Public Affairs Office.

Original photographs of pier complex at Naval Ammunition Depot Earle/Naval Weapons Station Earle. 1944-76. Filed at Naval Weapons Station Earle, Public Affairs Office.

C. Bibliography

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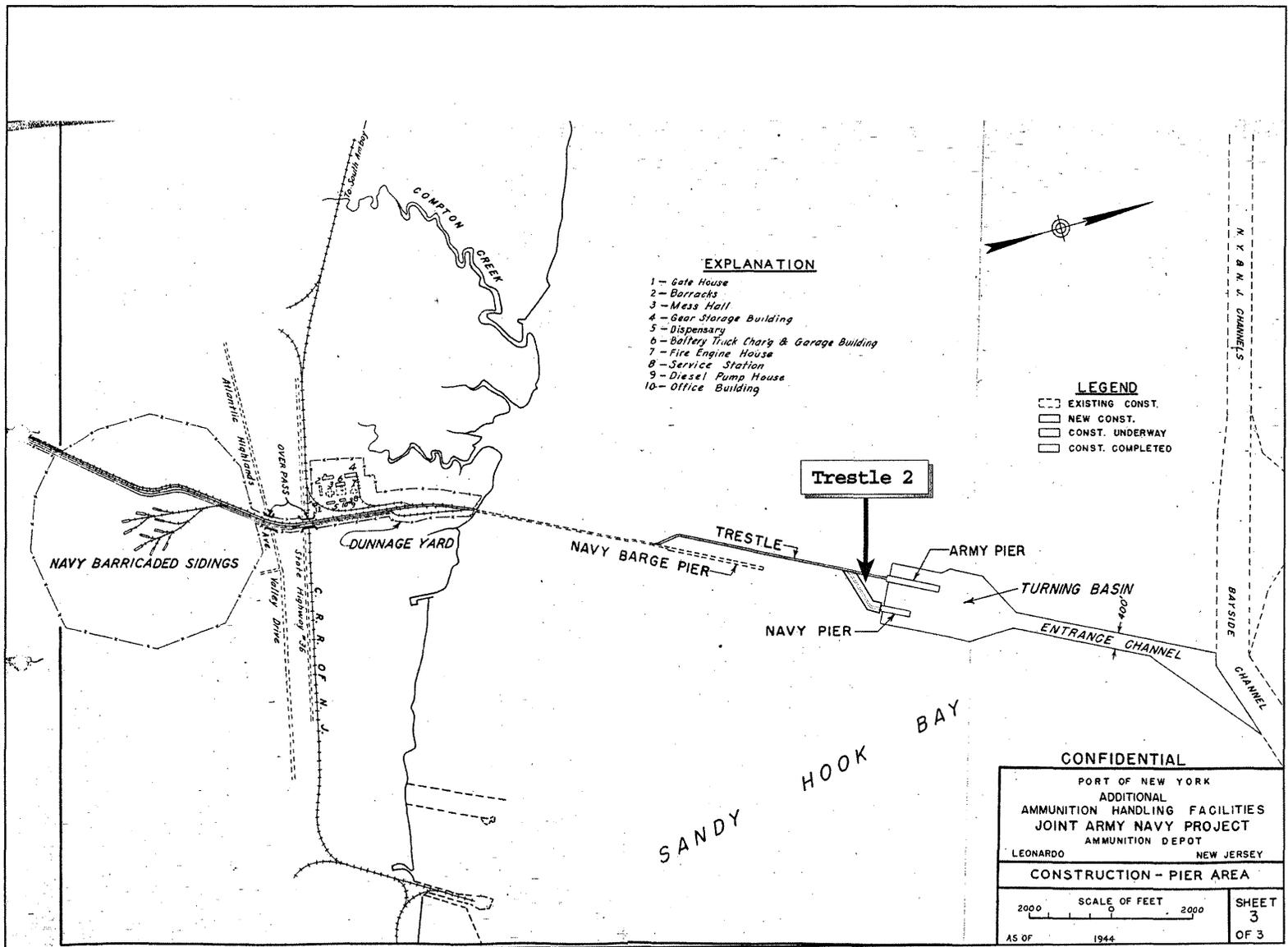
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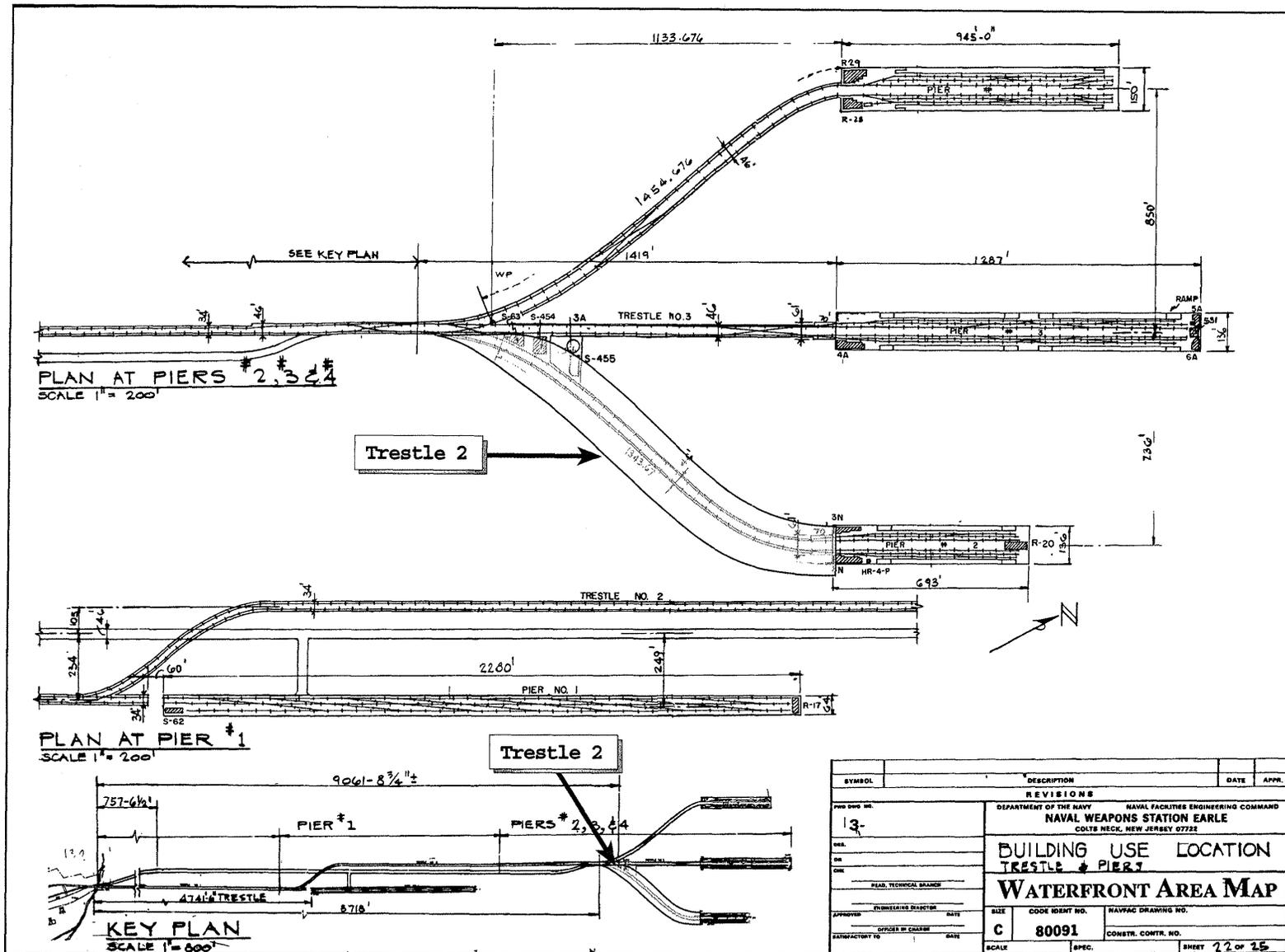
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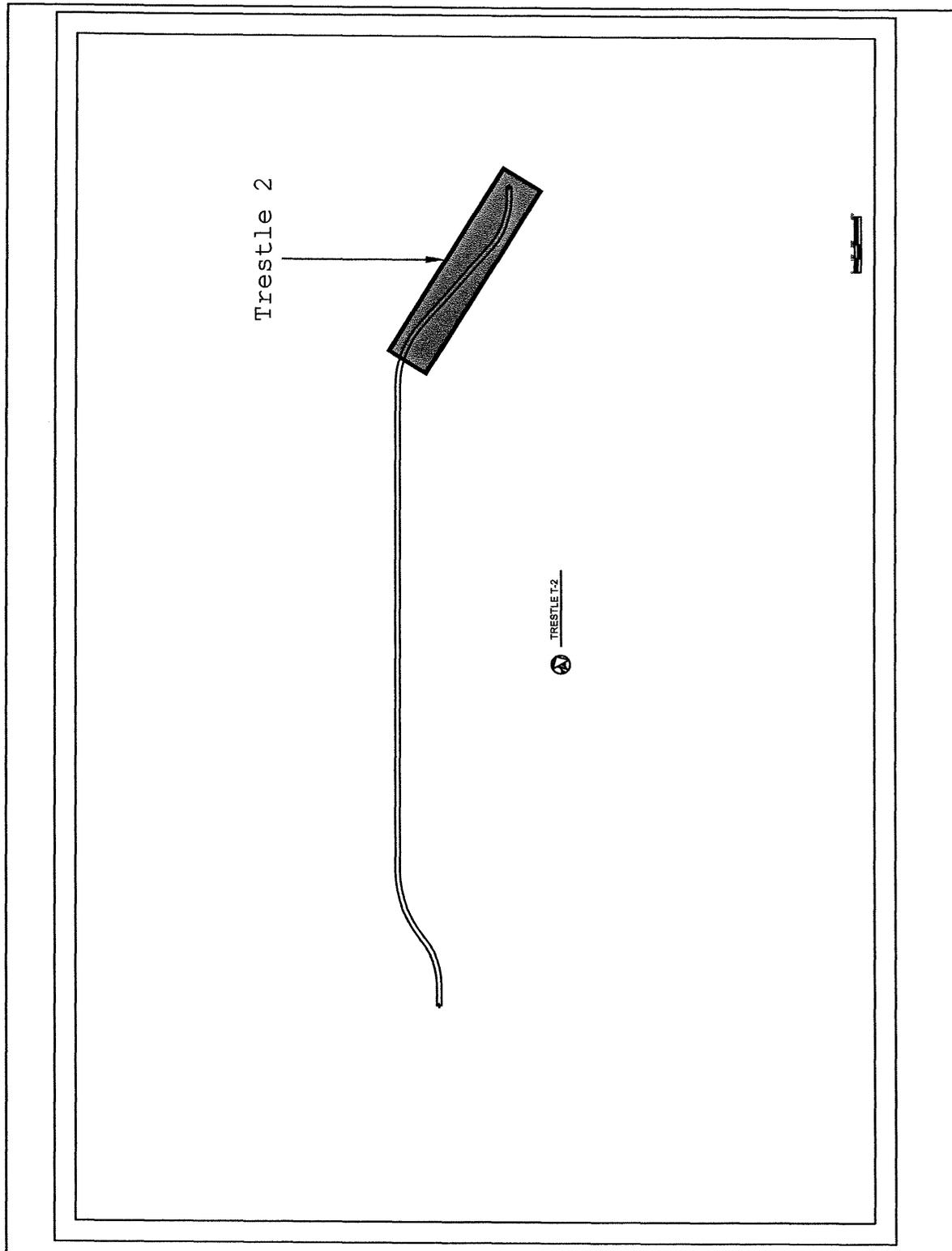
General Construction Map, Pier Area, 1944  
 (source: Lancaster 1945)

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Location Map and General Plan, Pier Area, 1994  
 (source: Naval Weapons Station Earle, Base Civil Engineering Office 1994)

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Outline Plan, Trestle 2, 1999  
(source: Dewberry & Davis 1999)