SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 95001160 Date Listed: 10/23/1995

Property Name: Navigation Structures at South Haven Harbor, Michigan

County: Van Buren State: MI

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Signature of the Keeper 8/9/2010 Date of Action

Amended Items in Nomination:

Section 5: Resource Count

The nomination is hereby amended to include two (2) contributing structures and one (1) noncontributing structure

The original submission neglected to count or describe the North Pierhead light or the catwalk connecting it to the shore. The cast iron, cylindrical light, constructed in 1903, and the steel catwalk are integral structures to the historic function and design of the pier.

Located on the South Pierhead is a modern, cylindrical light of the D-9 type, erceted between 1965 and 1980.

The Michigan State Historic Preservation Office was notified of this amendment.

DISTRIBUTION:

National Register property file
Nominating Authority (without nomination attachment)

1160

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Navigation Structures at South Haven Harbor, Michigan

other names/site number

2. Location

street & number Mouth of the Black River at Lake Michigan ☐ not for publication

city or town South Haven ☐ vicinity

state Michigan code MI county Van Buren code 159 zip code 49090

3. State/Federal Agency Certification

As the designated authority under the National Historic preservation Act, as amended, I hereby certify that this ☑ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☑ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☑ locally. (☐ See continuation sheet for additional comments.)

A. Jones Engineer, Corps Federal Preservation Officer 9-7-95
Signature of certifying official/Title Date

U.S. Army Corps of Engineers
State or Federal agency and bureau

In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

X Kathryn B. Eckert SHPO 11-30-93
Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:
☑ entered in the National Register.
☐ See continuation sheet.
☐ determined eligible for the National Register
☐ See continuation sheet.
☐ determined not eligible for the National Register.
☐ removed from the National Register.
☐ other, (explain:) _____

Signature of the Keeper
Entered in the National Register

Date of Action
~~SEP~~ OCT 23 1995

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☐ public-local
- ☐ public-State
- ☒ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		buildings
		sites
4	0	structures
		objects
4	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION/water-related

Current Functions
(Enter categories from instructions)

TRANSPORTATION/water-related
RECREATION/outdoor recreation

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: No style

Materials
(Enter categories from instructions)

foundation wood piles, steel sheeting
walls
roof
other wood, stone, steel sheeting, concrete

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

The U.S. Corps of Engineers (COE) owned structures at South Haven, Michigan, encompassed under this nomination include 1,904 ft of pier (i.e., North Pier, 1,095 ft; South Pier, 1,164 ft) and 1,930 ft of revetment (i.e., North Revetment, 1,055 ft; South Revetment, 875 ft) bracketing the COE maintained channel of the Black River (Figure 1). With the exception of a 400 ft length of the South Pier (Section A), the exposed substructure facade of all of these structures consist of either Type Z-27 or Z-38 interlocking steel sheet piling placed as a result of several repair episodes ongoing between 1962 and 1973 (Figures 1 through 5).

(Continued)

Narrative Description

The internal substructures of the two piers at South Haven consist largely of stone filled timber cribbing (Figures 2, 4, and 5). The north pier, extending 1,095 ft, possesses an internalized timber crib substructure reflective of six separate building episodes (Sections A, B, C, and D) dating to the 1870 through 1913 period. The timber crib substructure component of the 1,164 ft south pier accounts for all but 79 ft of the total structure. These were set in place during five building episodes (Sections A, H, K, K-1, K-2, and L) between 1868 and 1913 (Figures 4 and 5). A short, 79 ft replacement section (Section J) consisting of a driven wood plank pile (wakefield) wall was constructed in 1897-98 (Figure 4).

The revetment extensions of the north and south piers represent lineal structures extending for a combined 1,930 ft along the margins of the ship channel of the Black River. With the exception of Section D (116 ft) of the north revetment and Section N (780 ft) of the south revetment, the internal substructure of this building element is comprised of close driven round timber and/or wood plank sheet piling constructed between 1876 and 1911 (Figures 1 through 4). The internal substructure of Section D, of the north revetment consists of a 116 ft element of timber cribbing that once formed a continuation of the north pier at the time of its construction in 1868-69 (Figures 1 and 2). Section N (780 ft) of the south revetment was not added to the overall structure until 1950 and consists of a filled and steel sheet pile facade (Figures 1 and 4).

The exposed superstructure elements of the piers and revetments vary from 18 ft to 51 ft in width consisting of composite earth and stone fills, concrete curb and deck slabs. With the exception of the south pier the concrete superstructure elements predating the 1940 period have either been removed or adapted as internal fill supports for the more recently laid concrete deck slabs.

A schedule of the various construction-reconstruction episodes for the COE-owned South Haven piers and revetments can be presented as follows:

Construction Schedules

Structure	Section	Length (ft)	Substructure	Superstructure	Repaired
North Pier	A	404	1912-13, 1940	1940	1962
	B	200	1900	1930	1926
	C	287	1870-71, 1873-74, 1900-01	1930	1962
	D	204	1888-89, 1911	1931	1963
		1,095 (Total)			
North Revetment	D_1	116	1868-69, 1911	1921	1963
	E	270	1876, 1911	1911, 1930-31	1963
	F_1	70	1876, 1911	1911, 1930-31	1963
	F	181	1876, 1911	1911, 1930-31	1970, 1972
	G	418	1876, 1891-92, 1911	1940	1970, 1972
		1,055 (Total)			

Construction Schedules (cont.)

Structure	Section	Length (ft)	Substructure	Superstructure	Repaired
South Pier	A	400	1912-13, 1940	1940	---
	H	50	1899	1924	1970-72
	J	79	1897-98	1924	1964-65
	K-1	50	1887	1924	1970-72
	K	30	1871-74, 1899	1924-25	1970-72
	K-2	100	1871-74, 1899	1924-25	1970-72
	L	355	1868	1925	1970-72
		1,064 (Total)			
South Revetment	M	95	1878, 1899-1900, 1911	1943	1973
	N	780	1950	1950	---
		875 (Total)			

(U.S.A.E.D.D. 1993)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☐ A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ B Property is associated with the lives of persons significant in our past.
- ☒ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values,or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ A owned by a religious institution or used for religious purposes.
- ☐ B removed from its original location.
- ☐ C a birthplace or grave.
- ☐ D a cemetery.
- ☐ E a reconstructed building, object, or structure.
- ☐ F a commemorative property.
- ☐ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

Engineering

Period of Significance

1867-1943

Significant Dates

1868, 1911, 1940

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

U.S. Army Corps of Engineers

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☒ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Name of repository:

U.S. COE Office-Grand Haven; U.S. COE Office-Detroit

Navigation Structures at South Haven Harbor
Name of Property

Van Buren, Michigan
County and State

10. Geographical Data

Acreage of Property 2.58 acres

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing		Zone	Easting	Northing
1	16	558580	4694425	3			
2	16	559100	4694500	4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title C. Stephan Demeter/Historical Archaeologist, Historian; Kathryn C. Egan, Historian

organization Commonwealth Cultural Resources Group, Inc. date October 5, 1993

street & number 2530 Spring Arbor Road telephone 517-788-3550

city or town Jackson state Michigan zip code 49203-3602

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name _____

street & number U.S. ARMY CORPS OF ENGINEERS
DETROIT DISTRICT
POST OFFICE BOX 1027

city or town DETROIT, MI 48231-1027

ephone _____

_____ zip code _____

Paperwork Reduction Act Statement: This information is being collected for application to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 *et seq.*).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

Narrative Statement of Significance

The South Haven navigation structures include two piers and two revetments that run along the terminus of the Black River ship channel. The total length of the entrance channel to the inner end of the piers is 2,700 ft, with the channel bank along the river channel to the Dyckman Avenue Bridge measuring another 2,400 ft. The piers and revetments are formed by stone filled timber cribs and piling. They were decked with concrete between 1911 and 1943. Between 1962 and 1973, the structure facade was largely altered with driven steel sheet piling on the lakeward and channel sides of the existing structures (U.S. Army Corps of Engineers [U.S.A.C.E.] 1952:1774; U.S. Army Engineers Detroit District [U.S.A.E.D.D.] 1993:2). Riprap ranging from 1 ton to 12 tons was placed in various locations along the piers to provide additional protection, in 1981 and 1982 (U.S.A.E.D.D. 1993:2).

At the present time, the piers and revetments at South Haven harbor have been extensively modified only in terms of their exterior profile appearance. The core elements of the extant structures represent the virtually unaltered substructure of the original pier and revetment complex, exhibiting upwards of 15 separate construction episodes.

The COE-owned and maintained South Haven piers and revetments qualify for nomination to the National Park Service, National Register of Historic Places by virtue of their significance as an expression of engineering design and construction techniques employed in Federal Harbor projects on the Great Lakes during the late nineteenth through early twentieth centuries (Criterion C).

Engineering Significance (Criterion C)

Technological Overview (General)

The opening of the upper Great Lakes region to a more intensified range of settlement had, by the early 1850s, led to accelerated commercial growth. In addition to increases in the mainstays of agricultural production and logging, this period also witnessed the emergence of the extractive mineral industries of Lake Superior and the development of urban consumer-production centers along the south shores of Lakes Erie and Michigan. The opening of the St. Mary's Ship Canal and the modification of the Welland Canal were important manifestations of this early phase of regional development. Whereas the former project provided direct access to the mining district of Lake Superior, the latter established a direct shipping link between the Great Lakes ports with those along the Atlantic seaboard and Europe (Strickland 1860:340). As an adjunct to the increasingly important role of ship navigation in regional economic growth, harbor construction took on a new significance. While federal involvement in port development projects on the upper Great Lakes had begun as early as the mid-1830s at St. Joseph on Lake Michigan, and at Monroe on Lake Erie, it was not until the early 1850s that these efforts were extended beyond simple channel clearing operations and began to manifest themselves in construction projects aimed at creating refuges along an otherwise largely unprotected coastline (Larson 1981:24).

An integral element of harbor construction activities on the Great Lakes was the creation of pier and breakwater barriers serving as shelter for shipping and the protection of dock and wharf facilities that might otherwise be directly exposed to wave and ice damage. Because of the occurrence of numerous protected harbors along the Atlantic coast the need for breakwater construction, and the prerequisite technology, had been of minimal importance to harbor engineering in the United States up through the early nineteenth century (Strickland 1826). It was not until the needs of a greatly expanded Great Lakes shipping trade began to require extensive harbor improvement projects that direct experience in this field was initiated. According to one turn-of-the-century source, it was directly due to this situation that "...the design and construction of breakwaters...

[had]...reached a high [stage of] development" in the United States (Wright 1914:699). The largest proportion of this work was the product of federally legislated United States Army Corps of Engineers activities.

Breakwater design on the Great Lakes since the mid-nineteenth century has depended on a variety of compositional elements, ranging from the use of timber cribbing, wood sheet and timber pilings, concrete, driven steel sheeting, and stone rubble. Variations in design fabrication have been numerous over the past 150 years. While these transitions can ultimately be traced to technological innovations ongoing in the construction trade during this period, other important factors relate directly to per unit costs, the local availability of supplies, function, and environmental stress factors.

The fact that jetties and breakwaters are virtually identical in terms of composition and design, and are nominally categorized under the general heading of pier structures, has tended to create a certain amount of confusion in structure identifications (Wright 1914:699). As defined in the field of marine engineering, jetties and breakwaters are distinguished, in part, according to their placement in relation to the shore (Wright 1914:699). A far more important element serving to segregate the two structural types is associated with their intended functions. These are categorized as follows:

> Breakwater
>
> A breakwater is a structure employed to reflect and/or dissipate the energy of water waves and thus prevent or reduce wave action in an area it is desired to protect. Breakwaters for navigation purposes are constructed to create sufficiently calm waters in a harbor area, thereby providing protection for the safe mooring, operating, and handling of ships and protection of shipping facilities. Breakwaters are sometimes constructed within large, established harbors to protect shipping and small craft in an area that would be exposed to excessive wave action. Offshore breakwaters may serve as aids to navigation and/or shore protection, and differ from other breakwaters in that they are generally parallel to and not connected with the shore.
>
> Jetty
>
> A jetty is a structure, generally built perpendicular to the shore, extending into a body of water to direct and confine a stream or tidal flow to a selected channel and to prevent or reduce shoaling of that channel. Jetties at the entrance to a bay or a river also serve to protect the entrance channel from storm waves and crosscurrents, and when located at inlets through barrier beaches jetties also serve to stabilize the inlet location [United States Department of the Army (U.S.D.A.) 1986:1-3].

Within the Great lakes the usage of the term "jetty" has traditionally been dropped in favor of the more generic designation of "pier" when referring to protective structures at channel mouths. While this may actually reflect a variable in design function, the origin of this usage can likely be traced back to the terminology employed in the enabling legislation authorizing the various federal harbor improvement projects in the region.

During the past century, numerous innovations have been adopted in pier (i.e., breakwater/jetty) construction on the Great Lakes. To a large extent, these transitions have reflected a delicate balance between factors of need and cost. One example representative of this approach can be seen in the relatively low occurrence of the stone rubble moles, almost universally adapted in Europe and the Mediterrian for breakwater construction since the Classical period. Prior to 1940, its use in the upper Great Lakes, above Lake Erie, was limited to no more than 7,082 ft of free-standing structure, of which more than half (3,949 ft)

had been erected between 1910 and 1913; at Ashland and Marquette harbors on Lake Superior; and Mackinac Island Harbor at the north end of Lake Huron (United States Army Engineer District, Detroit [U.S.A.E.D.D] 1986). The use of stone as ballast in timber crib breakwater construction was common throughout the nineteenth century. At soft-bottom harbor sites, it was also deposited as a barrier along the base of the breakwater to prevent scouring or undercutting of the substructure. At locations possessing hard clay or rock bottoms, stone was often employed as a foundation material for timber crib piers which as a result could be extended further into deeper waters than would normally have been possible with the use of crib-work alone. In addition to the above uses, stone was also employed as a shock absorbing sloped barrier on the lakeward side of the breakwaters (Figure 6). In some instances, stone rubble has been laid up along the harbor facing walls or carried up over the top of the original substructure (Figure 7). This approach to breakwater construction reflects one of several employed since the 1910s in rehabilitation projects aimed at stabilizing and improving the earlier dating timber crib or pile substructures. These efforts have led to the creation of composite structures exhibiting the profile of a rubble mound but possessing diverse core elements indicative of prior building phases.

In addition to stone and concrete rubble mounds, the use of interlocking steel sheet piling has widely been employed since its apparent initial use as part of the north breakwater at Port Washington Harbor in 1934 (U.S.A.E.D.D. 1986). This material has been employed both in new construction projects and in the rehabilitation of existing pier substructures. In the latter instance, the "replaced" structure forms the core element of the new structure. Since the late 1940s, the use of steel sheet pile cells, ovate to circular in horizontal cross section, has also been employed in breakwater/jetty construction. These units are customarily filled with combinations of stone, sand, or dredged spoil.

The use of cast-iron sheet piling was first employed during the construction of the Liverpool Dock in 1825. Its use in the United States did not occur for another two decades, when it was employed during the construction of the lighthouse at Brandywine Shoal on Delaware Bay (Kirby and Laurson 1932:258). Its use in the Great Lakes was minimal until the post-World War II period.

In general, the use of wood in harbor construction activities on the Atlantic seacoast of North America was pervasive up through the beginning of the nineteenth-century (Norman 1987). These early works took the form of timber cribs or consisted of vertically driven round timber piles with horizontal planking nailed along the inner side of the piles (Norman 1987:13). Both structure types were generally filled with either rock or soils derived from a variety of sources. Early nineteenth-century pier and bulkhead expansions along the Detroit waterfront indicate an ongoing use of such facilities as a disposal site for community wastes (Demeter and Weir 1987).

The use of driven round timber pile bulkhead supports had become fairly common in New York City wharf construction by the late 1830s (Hunt 1840:313; Norman 1987:21). Its use in wharf and jetty construction was a common feature of port development on the Great Lakes by the close of the following decade (Farmer 1890:816). In addition to stone and earthen fills, the use of wood scrap sawmill wastes was also a unique feature of regional construction techniques. As late as 1906, this approach was employed during the construction of 555 ft of the west pier of Port Wing Harbor (Lake Superior). While the use of such structures in breakwater development was minimal, one attempt utilizing this material was made in setting up 7,363 ft of substructure at Ashland Harbor (Lake Superior) between 1889 and 1894 (Figure 8). The end result was less than desired, leading to the capping of the entire structure, between 1908 and 1910, with an improvised dredge spoil and stone rubble mound (Figure 7).

Out of a total of 80 harbor projects presently under the jurisdiction of the U.S. Army Corps of Engineers, Detroit District, 37 (46.3 percent) exhibit breakwater/jetty elements consisting of timber cribbing. With few exceptions, the bulk of these are now encased as core elements within modified substructures. The timber crib substructure represents the dominant pier form employed throughout the Great Lakes during the nineteenth century. Their continued use into the present century can be

documented at 17 locations within the Detroit District; the last of these being associated with the development of the south breakwater at Manistee (Lake Michigan) between 1913 and 1920 (U.S.A.C.E. 1916; U.S.A.E.D.D. 1986). The timber crib was referred to as the simplest substructure employed in breakwater/jetty construction which, by the opening of the twentieth century, was reported to be used "only in minor harbors or under primitive conditions" (Wright 1914:700). The crib substructure was constructed on-shore of hewn logs, floated into position and sunk in place with the addition of stone. The interior of the crib was divided into compartments formed by transverse and longitudinal timber walls with some of the compartments being floored with wood planking in order to receive the stone ballast at the time of sinking. The remaining compartments were subsequently filled to provide additional stability with the individual units being fixed in place with bar and strap iron. The above-water superstructure was next completed with a continuation of timbers or planking, or a combination of both. Unlike the substructure which normally consisted of pine or hemlock (Gary Frankish, personal communication 1993), oak represented the preferred material for the superstructure element and for guard fenders along the structure (U.S.A.C.E. 1883:1706; 1889:2172, 2193). These works normally extended from 5 ft to 10 ft above water level and generally featured a sloping face to the lakeward side designed to deflect the impact of wave forces. The degree of slope, as well as the overall superstructure design of the different works, tended to vary dependent on anticipated wave stresses, the availability of materials, and, to some extent, project specific experimentation. One innovative approach designed for the breakwater at Frankfort Harbor (Lake Michigan) in 1882 called for the construction of a centrally positioned, longitudinally raised element consisting of 12 in × 12 in timbers (Figure 9). A more substantial design was adapted to the superstructure of the east breakwater built in Cleveland in 1887. The superstructure element of this pier was described as having been:

> ...carried up vertically for only 2 ft above water level and was then inclined at an angle of 1 on 2.5 until it attained a height of 10 ft above the water surface on the lake side. From that point it was horizontal until it met the harbor face which was vertical (Wright 1914:700).

This configuration was later modified during the construction of the breakwater at Presque Isle in 1897 in order to accommodate the heavier seas produced on Lake Superior. In this instance, a sloping deck of 6 in × 12 in plank was constructed on the timber superstructure set at 0.5 ft above the low-water datum on the lakeward (parapet) side and extending to 10 ft high on the inner (banquette) harbor facing side. Lacking the flat top of the Cleveland breakwater, the Presque Isle superstructure was designed to allow "...the waves to slide over the work and fall down vertically inside, with a minimum of impact and resistance" (U.S.A.C.E. 1897:2638) (Figure 10).

Vertical iron strapping was added to the lakeward facing side of both the Cleveland and Presque Isle structures in order to anchor the superstructure to the substructure.

The use of a composite breakwater was first attempted in 1882 at Oswego, New York (Lake Ontario). In this instance, a concrete mortared cut stone deck was added as the superstructure to a timber crib substructure. This procedure was quickly abandoned when it became apparent that the flexible crib provided an extremely poor foundation to this variety of masonry work. By the close of the century the substitution of wood and cut stone with massed concrete as the primary constituent of superstructure construction was introduced at Buffalo and Cleveland harbors on Lake Erie.

The use of timber crib substructures in breakwater/jetty construction on the Great Lakes had been adopted in part due to its traditional usage in pier construction and the ready availability of timber and plank; however, crib piers were easily damaged in collision, and suffered from sand and ice erosion. Wave action similarly affected these structures both as a result of direct impact forces against the crib substructures, which often led to structural displacement, and the movement of the fill stone within the crib works. The wedgelike action of smaller stones similarly tended to place additional stress on the timber frame of the crib, either abrading the walls or separating its timber components. Weathering at the water line between high and low lake

level horizons also represented a significant problem. By the turn of the twentieth century, it was postulated that timber crib breakwaters had an "average life...[of]... about 15 years" (Wright 1914:700). In effect, they were not designed as permanent structures, but only as stop-gap elements employed to meet the immediate needs of harbors or refuges whose long-term requirements were indeterminant. In all probability, the boomtown atmosphere that necessitated harbor development around lumber and ore shipping centers was viewed as a short-term need likely to evaporate as production in these extractive industries decreased.

In order to reduce maintenance requirements on crib structures, certain procedures had been employed by the U.S. Army Corps of Engineers as public pier facilities began to fall under their jurisdiction during the mid-nineteenth century. Many of the crib structures completed by individuals and municipalities prior to this period had been set in place without adequate foundation preparation. These were, in some instances, anchored in place with the use of riprap mounded along the lakeward and (often) harbor facing walls. By the 1880s, crib components associated with soft-bottom harbor locations were consistently placed on driven round timber pilings with riprap laid along the base to prevent scouring. By the 1890s, those associated with hard-bottom locations were generally fixed on a foundation of small core stone with the upper elements of the substructure being secured with sloped riprap.

In addition to transitions in foundation and superstructure design implemented during the last quarter of the nineteenth and first quarter of the twentieth centuries, the crib substructures were themselves subject to certain modifications. This feature of breakwater/jetty design was most pronounced with regard to crib size. While widths tended to range anywhere from about 20 ft to 35 ft, lengths were fairly standardized. During the third quarter of the nineteenth century, the use of a 32 ft length seems to have been most common (U.S.A.C.E. 1867:153; 1876:469; Wright 1914:700). In the 1880s, crib length was increased to a more or less standardized 50 ft setting (U.S.A.C.E. 1883:1704; 1889:2171). By the 1910s, during the terminal phase of timber crib construction usage, the standard length had increased to 100 ft (U.S.A.C.E. 1916:3032).

The use of concrete as a protective element added to timber crib and stone rubble piers was initially employed during the reconstruction of the mole at Cherbourg completed in 1850 (Hamilton 1958:466). Between 1870 and 1872, a stone rubble breakwater extending for 9,675 ft was constructed at Alexandria, Egypt. This structure ranged up to a maximum of 60 ft in depth, on which a layer of armor stone was placed along the seaward side consisting of 20-ton concrete blocks (Vernon-Harcourt 1891:194). Both projects featured the use of concrete as a superstructure element. In the Cherbourg example, the cement composition utilized was described as "hydraulic lime" capable of hardening below water, while that associated with the construction of the Alexandria breakwater consisted of Portland cement blocks molded on shore and either barged or craned into place.

The shallow water breakwater constructed at Aberdeen Harbor employed both cement varieties. Begun in 1871, the base of this structure consisted of unmixed hydraulic lime placed in sack cloth bags ranging from 50 tons to 100 tons, which were barged into place and sunk to form the foundation. These were laid to within 2 ft above the low water datum and conformed to the uneven harbor bottom prior to setting (Vernon-Harcourt 1891:202-203; Wright 1914:702). The superstructure consisted of a megalithic concrete wall composed of Portland cement deposited in mass within a timber framed mold. The resultant wall measured approximately 23 ft in height and 42 ft at the base, constricting to 30 ft in width at the top. It was surmounted by a 6 ft parapet wall facing to the seaward side (Figure 11).

These advances in the use of concrete composition walls had a rapid impact on engineering standards practiced in the United States. One factor of prime importance in establishing this trend was the securing of a patent for the production of an artificial Portland cement in the United States by David O. Saylor in 1871. Saylor's cement was later specified by the federal government for use in the construction of the South Pass jetties at the Mississippi Delta. Built between 1875 and 1879, the east

jetty of this project extended for 1 mi in length with the west jetty running for 0.5 mi in distance. Both were composed of megalithic concrete blocks, the largest of which weighed 260 tons, measuring 5 ft × 13 ft × 55 ft (Condit 1960:228).

The growth of the cement industry in the United States during the succeeding decade took advantage of a discovery made in about 1875 that utilized slaked blast furnace slag in the manufacture of an "adulterated" variety of Portland cement (Burchard 1914:759; Condit 1960:227; Thorpe 1898:483-485). Its use, in combination with slaked lime, was also widely employed in the manufacture of artificial puzzolanic cements employed in underwater work (Burchard 1914:760). When correctly ground as a sharp particle aggregate, slags were also utilized as a substitute for quartz sands in concrete production (Baker 1894:79). This material typically consisted of 6 to 8 parts of slag aggregate to 1 part of cement (Condit 1960:227-228). The increased importance of concrete as a construction material in North America can be seen to correlate with increases in iron ore production. During the 16-year period between 1856 and 1872, the cumulative production of iron ore from the Lake Superior region was estimated at 5,567,373 tons (Tuttle 1873:575). This figure represents slightly less than 17 percent of the total iron ore tonnage that passed through the Soo Locks alone in 1905, amounting to 34,353,456 tons (Dunbar 1965:503).

The adaptation of concrete in pier construction in the Great Lakes remained limited until the closing decade of the nineteenth century, when it began to emerge as a preferred material in superstructure construction and rehabilitation activities associated with timber crib breakwaters and jetties. Among the earlier of the projects of this type carried out by the U.S. Army Corps of Engineers on the Great Lakes was the reconstruction of the "old breakwater" superstructure in Buffalo Harbor built in 1887/89 (Baker 1894:543; U.S. Army Engineer District, Buffalo [U.S.A.E.D.B.] 1989) (Figure 12). The composition employed in this instance was described as a "natural cement concrete," a low temperature calcinated limestone generally referred to as Roman cement (Burchard 1914:759).

The general configuration of the Buffalo breakwater superstructure was subsequently adopted in the rehabilitation (1898) of the West Breakwater superstructure in Cleveland Harbor (Wright 1914:701; U.S.A.E.D.B. 1989). In this instance, the timber crib substructure was removed to a point approximately 3 ft below mean water level and capped by three parallel lines of precast Portland cement concrete blocks, each measuring 4 ft × 4 ft × 8 ft. The open spacing between the blocks was filled with stone and the entire structure capped with a 5 ft thick banquette deck surmounted on the lake facing side by a sloped 5 ft high concrete parapet (Figure 13).

Within the present boundaries of the Detroit District Corps office, the superstructure of the Marquette Harbor breakwater represents a significant innovation in the use of mass concrete construction design. Rather than employing a raised outer parapet on the lake facing side, this portion of the superstructure exhibits an offset bileveled sloping face designed to break up the heavier wave forces produced on Lake Superior. Built between 1896 and 1905 on a timber crib substructure, this work entailed the placement of two parallel coarses of precast concrete sill blocks (rectangular in cross section) positioned atop the outer and inner crib walls with the space between being filled with stone. This was surmounted by a mass concrete deck structure standing a maximum of 8.4 ft above the foundation blocks on the harbor side. In addition to the offset lakeward slope face, this superstructure also featured an enclosed gallery walkway within the harbor side of the structure (Figure 6).

The conversion from wood plank and timber to concrete pier superstructures remained an ongoing feature of breakwater and jetty reconstruction projects for the next half century. During this same period, another innovation took place in the substitution of smooth surfaced concrete sill blocks (Figure 13) with recessed surface blocks designed to reduce the potential of shifting that might result from storm action, collision or decomposition of the timber substructure. This was initially introduced during the reconstruction of the main breakwater at Harbor Beach, on Lake Huron, in 1905 (Wright 1914:702; U.S.A.E.D.D. 1986) (Figure 14). Another development that occurred during this period was the introduction of the reinforced concrete caisson as a substitute for the timber crib substructure. Having first been introduced during the construction of the Algoma breakwater

(Lake Superior) in 1908, these caissons measured 24 ft × 20 ft × 18 ft with 10 in thick vertical walls and a 14 in thick floor (U.S.A.C.E. 1908:1954). These were manufactured on-shore and floated to the construction site where they were sunk along the alignment of the proposed breakwater/jetty locations that had been prepared with wood piles. The caissons were next filled with stone riprap and capped with a concrete deck. This structure type was initially reinforced with 6 in × 6 in horizontal timbers and 12 in × 12 in vertical support posts along the interior walls. This element was further secured by the placement of transverse and longitudinal walls composed of 6 in × 6 in timbers that served to subdivide the structure into four compartments (Figure 15). The arrangement was similar to that of the timber crib which the concrete caisson was designed to replace. This usage presumably also lent itself to the adoption of the erronious designation for the concrete caisson as being a "concrete crib" (Wright 1914:703).

As with the timber crib, the vertical wall configuration of the original concrete caisson design accepted the full impact of wave forces that invariably led to a certain amount of shifting of the substructure. This was compensated for by the use of riprap stone mounded along both the lakeward and harbor facing sides of substructure (U.S.A.E.D.D. 1986). The rectangular cross-sectioned concrete caisson was last employed during the construction of the Sheboygan Harbor breakwater (Lake Michigan) in 1913-15. During the construction of the south breakwater (Lake Michigan) extension at Racine Harbor (Lake Michigan) in 1917-19, a sloped wall concrete caisson design was introduced. These had the advantage of not only deflecting the force of wave impacts, but also required lesser volumes of stone fill within the caisson module. This latter feature, combined with the utilization of sand as an alternative ballast fill served to reduce the material cost of construction.

The use of concrete caissons in breakwater/jetty construction on the Great Lakes was limited to Lake Michigan within the boundaries of the defunct Milwaukee District office; since absorbed by the Detroit District. Out of a total of 80 harbor projects presently under the jurisdiction of the Detroit District, only 9 (11.25 percent) exhibit the usage of concrete caissons in breakwater/jetty construction. The latest of these occurred in conjunction with a 540 ft extension of the north breakwater at Kewaunee Harbor in 1936-37 (U.S.A.E.D.D. 1986).

Historic Background (Site Specific)

During the nineteenth century, lumbering and agriculture were two primary sources of commerce in southwestern Michigan and the Upper Great Lakes. The majority of the trade during this period flowed between Chicago and ports along the coast of Lake Michigan. South Haven served several important roles during this period: 1) as an important harbor of refuge; 2) as an outlet to the lumber district in Allegan and Van Buren counties (U.S.A.C.E. 1867:105, 149); and 3) as a commercial port for agricultural products.

The town of South Haven was first settled in 1833 and the community slowly grew as farmers moved into the area. As lands were cleared timber was turned into high quality cord wood. By the 1850s, financiers also owned lands timbered with pine and oak, along the Black River. They awaited aid to improve the harbor so that lumbering equipment could be brought into the area. Following the initial development of the harbor and channel by the citizens of the area, a shingle mill, sash, blind, and door factory were built (U.S.A.C.E. 1867:149).

Fruit tree production was also important to the development of South Haven and Van Buren County. The first orchard was planted in South Haven in 1852, and by the 1870s Van Buren County ranked first in the state, in fruit production (Ensign 1880:124; Hathaway 1989:110). Cereals were another important crop grown in the rich soils in Van Buren County (U.S.A.C.E. 1967:150). Export records from South Haven reflect the importance of these products to the commercial development of the community. A total of $681,820 worth of exports were shipped from South Haven in 1867. Wood products comprised $567,500 (83 percent) of the exports and cereal and fruit $88,750 (13 percent) of the commerce.

By the 1860s, as commercial interests in the county grew, lumber and agricultural products were shipped via land and water. Despite legislation in 1866, authorizing the Kalamazoo & South Haven Railroad to construct a line between the mouth of the Black River and Bronson (the Kalamazoo County seat at the time), the railroad was not completed to South Haven until December of 1869 due to several financial difficulties (Ensign 1880:54). Prior to that time, goods had to be transported over rough roads through the woods to more distant railroads.

The nearest harbors to South Haven were St. Joseph, 30 mi south, and Grand Haven, 60 mi to the north. The total distance of 90 mi along the coast was too great for safe navigation in the fall. In 1867, cargo was brought to the community by small propeller boats that made biweekly trips from St. Joseph and by vessels from Chicago that anchored on a bar on the lake and then brought their loads to shore on lighters (Ensign 1880:44). Commercial growth of the community was, therefore, curtailed by a need for better facilities for shipment (U.S.A.C.E. 1867:150-151).

Development of the South Haven navigational facilities throughout the late nineteenth and early twentieth centuries continued to influence and enhance the commercial and transportational interests within the area. Lumbering continued to be an important source of commerce to the community throughout the late nineteenth century. At the same time, shipbuilding also became an important industry in South Haven and Bangor, upriver from South Haven (Smith 1893:190; Fuller 1939), and agricultural resources continued to be an important export. During the early-twentieth century the commercial fisheries developed in South Haven and it became an important recreational/tourist retreat (Fuller 1939:68; Rubenstein and Ziewace 1981).

The earliest improvements to the natural harbor at South Haven were initiated by citizens of the area. On February 25, 1861, the legislature passed an act to provide for the levying of a special tax in certain townships in Van Buren and Allegan counties for improvement of the (South) Black River in Van Buren County. Nearly $2,000 was raised for the harbor development. The work commenced in 1862 and was completed in 1866 (Ensign 1880:46). The banks of the river, for 500 ft on each side, were protected by a rough, close piling. The original pier-protected entrance channel extended to the lake and was 80 ft wide and 7 ft deep. The piers were constructed of timber cribs, except for approximately 80 ft of the north pier, which was constructed of piles. The cribs were constructed of rough, unhewn timbers that were notched and pinned together and filled with brush, sand, and gravel. The same filling was used in the pile pier (U.S.A.C.E. 1867:148).

Despite the improvements to the harbor, access upriver was limited. Because of bars within the channel, vessels had to anchor at the mouth of the river and load with the aid of flat-bottomed scows. Dickinson, Rogers & Company (who were doing a heavy lumber business in the mid-1860s) with the aid of Messrs. Hannahs & Company (commission merchants), and a few enterprising citizens of the town of South Haven, raised a fund of $12,000. With these monies they dredged a channel about 30 ft wide and 9 ft deep along the north edge of the river from the entrance piers to the mill grounds (U.S.A.C.E. 1867:149).

The USACE surveyed the harbor in November of 1866 and identified several navigational faults with the original design. The harbor entrance was narrow with the piers set 85 ft apart, diverging at an angle of 30° to each other. Further, there was a sandbar, approximately 750 ft from the harbor entrance which represented an obstacle to vessels entering and leaving the harbor during low water periods (USACE 1867:148).

South Haven Harbor was adopted as a federal project by the River and Harbor Act of March 2, 1867. This act provided for improvements to the channel and removal of the obstructive sandbar. The approved construction plan involved: widening the river channel from 85 ft to a width of 120 ft; protecting the banks of the river with sheath piling; protecting the channel with two piers, 175 ft apart at the mouth of the river (oriented south 84°30' west of the mouth of the river) and extending from the river to the 12 foot contour of Lake Michigan; and dredging out the channel to a depth of 12 ft to the outer bar (this

plan required removal of the south pier.) The plan was immediately implemented. The north pier was extended 512 ft into the lake, and the south pier was extended 576 ft. In addition, the riverbanks were reveted with 780 linear ft of timber piling (U.S.A.C.E. 1867:105, 148).

In 1871, a beacon with a fifth-order lamp was erected on the south pier (Ensign 1880:46). The lighthouse was supported and operated by the Light-House Establishment. The life-saving service also maintained a station at the mouth of the river, on the north shore of the river (Figure 16).

Throughout the 1870s, repairs and improvements were made to the piers and revetments and channel and harbor dredging continued. In 1873, repairs were made to the north pier, a displaced pier was resunk, and a new crib added (extending the north pier to 590 ft). A contract was awarded to Alanson Dodge for the year 1874-75 to build 300 ft of pile revetment (14 ft wide) and channel dredging. Difficulties were encountered in dredging within the harbor. A mass of brush was found underlying the old slab pier and piles were found to have been driven through the slabs and broken off. A second contract was let in May 1875 to Messrs. Squire & White to continue building the revetment and for dredging. By 1876, 525 ft of pile revetment had been built on the north side and the project was complete, except that the minimum channel depth was only about 8.5 ft (U.S.A.C.E. 1876:102, 511-512).

By June 30, 1880, the 12 foot project depth was secured, although at the time it was recommended that the channel be dredged to a depth of 14 ft to the lake. Additional improvements to the structure were completed in 1880. The piers were made sand-tight and 1,949 linear ft of sand-fence were interposed against the drift of sand over the piers (U.S.A.C.E. 1880:2028) (Figures 16 and 17).

Shoaling and the destructive action of the lake continued to take its toll on the harbor and structures in South Haven, requiring continual dredging and repairs to be made. In 1889 and 1890, the outer crib of the north pier was cut down to 5 ft underwater and the stone and drift removed. The pier was then rebuilt and refilled. One-hundred and fifty ft of the south pier was also overhauled and the sand removed from the south beach, where it was no longer needed, and moved to the outer wall of the north pier in the vicinity of the shoreline to further protect the pier (U.S.A.C.E. 1890:2656-2657).

The citizens of South Haven also contributed to the improvement of the navigation facility. A subscription fund was raised to dig a basin at the river, near the head of the harbor. This work was completed between December 7 and 14, 1889 (U.S.A.C.E. 1890:2656).

The River Harbor Act of March 3, 1905, provided for pier extension, dredging of the channel to a depth of 16 ft, and further improvements upstream including a turning basin 300 ft wide just downstream from the Dyckman Avenue bridge; however, the law provided that none of the appropriated funds for improvement should be expended, except for maintenance of the existing channels, until proper dock lines were established and suitable bulkheads were built along these lines by the City of South Haven or by the riparian owners. The law further specified that the property lying on the channel side of these dock lines must be deeded to the United States, free of cost (U.S.A.C.E. 1910:804-805).

Between 1905 and 1910, maintenance work was done on the piers, replenishing the stone fill, and the channel was dredged to a minimum depth of 16 ft. The construction provided for by the River and Harbor Act of 1905 awaited the satisfaction of the stipulations of the law. By 1910, in accordance with these conditions, the City of South Haven had completed construction of bulkheads along these lines and the required lands were deeded to the United States (U.S.A.C.E. 1910:805; 1926:1318).

In April 1912 a contract was let for extending the piers (400 ft to be added to each), provided for by the River and Harbor Act of 1905. In the intervening fiscal year:

> [f]oundation sites were dredged, foundations prepared, six cribs each 100 by 24 by 20 1/2 feet built and the other two cribs partly built, three cribs placed in the extension of the north pier and two in the south pier, foundations prepared for two additional cribs, and the superstructure built over two cribs in each pier (U.S.A.C.E. 1913:1141).

By June 30, 1913, the total length of the channel between the piers was 1,980 ft and 2,600 ft in the river. Repairs to the original structure continued throughout this time. In addition, the channel had been dredged to 20 ft between the piers and 18 ft within the river (U.S.A.C.E. 1913:1142).

Subsequent to this later building phase, an elevated walkway and pierhead lighthouse were added to the south pier. Both structures are of riveted steel/iron composition. The South Haven elevated walkway on the south pier is one of only four surviving in the state (Harold 1990).

As the harbor continued to be improved, to accommodate larger vessels, the costs of water-borne commerce diminished and it became an increasingly important means of transportation. By 1909, vessel freight rates were 13 percent less than rail rates. At that time, 73 percent of the water-borne commerce was local and 27 percent was through-traffic; there were 497 vessel arrivals and departures, with 14,763 short tons of cargo, with an estimated value of $1,324,780. The total number of passengers in 1909 was 145,225. Many of these were tourists who had come to enjoy the beauty of Lake Michigan.

By 1912, vessel rates to and from Chicago were 27 percent less than the corresponding rail rates. In turn, traffic and commerce increased from the South Haven Harbor. In 1912, there were 947 vessel arrivals and departures, with 24,452 short tons of cargo, of an estimated value of $1,448,771. Tourism also increased and 155,311 passengers were carried in 1912 (U.S.A.C.E. 1913b:1142).

In the 1920s, commerce of fruit, building materials, pianos, and unclassified freight, as well as tourism, decreased relative to the preceding decade. In 1925, for example, only 12,399 short tons and 52,669 passengers were shipped (U.S.A.C.E. 1926:1319). Lakewise transportation and commerce continued to fluctuate throughout the latter 1920s and early 1930s as a result of the Depression. By 1934, however, freight traffic had increased dramatically, and 154,208 tons were shipped in and out of the harbor facility (U.S.A.C.E. 1935:805).

During the first half of the twentieth century, concomitantly with increases in freight traffic. During the 1930s, several wharves were used for handling coal, building materials, wood pulp, fish, and miscellaneous commodities. In addition, the city had constructed a municipal wharf and warehouse that was leased to a corporation in the interest of general commerce on like terms for like services (U.S.A.C.E. 1935:1221).

Following a lull in commerce during World War II, water transportation and commerce through the South Haven Harbor more than doubled. In 1950, there were 153,624 trips in and out of the harbor and 84,070 tons of freight moved (U.S.A.C.E. 1950:1074).

The existing piers continued to be modified with the addition of a concrete deck. Further improvements to the harbor were initiated by the River and Harbor Act of 1935. This act provided for the entrance channel to be dredged to a depth of 21 ft deep and 130 ft wide, from the deep water in Lake Michigan to the shoreline; from there the channel was to be dredged

19 ft deep and 130 ft wide to the turning basin at the head of the project area (the Dyckman Avenue bridge), and the turning basin was to be enlarged to a depth of 19 ft deep and 375 ft wide (U.S.A.C.E. 1934:no page; 1935:1221). The work on the channel and turning basin were completed by 1938 (U.S.A.C.E. 1946:1750).

Rehabilitation work on the navigation facility has continued throughout recent decades. By 1946, all but 744 ft at the inner end of the south revetment had been capped with concrete. These repairs improved the condition of the piers, which were judged to be in good condition (U.S.A.C.E. 1946:1749-1750). In 1960, the turning basin was enlarged to a width of 440 ft (U.S.A.C.E. 1962:1427). Between 1950 and 1972, major portions of the piers and revetments were repaired by driving steel sheet piling on each side of the existing structures, filling voids with stones, and capping the structure with concrete (U.S.A.C.E. 1952:1774; U.S.A.E.D.D. 1993:2). From 1981 to 1982, riprap ranging from 1 ton to 12 tons was placed in various locations along the piers to provide additional protection (U.S.A.E.D.D. 1993:2). These rehabilitation efforts have helped to preserve the original U.S.A.C.E. structures. In 1985 inspection of the structures:

> revealed that the north pier was in sound condition [and that] the lakeward section of the south pier appeared stable and in fair condition, with the remaining portions of the south pier appearing in good condition (U.S.A.E.D.D. 1993:2).

The South Haven Harbor entrance piers and revetments derive their significance in that they reflect the evolution of an aspect of engineering technology employed in Great Lakes Federal harbor projects during the mid-nineteenth through early twentieth centuries. This period was in one sense marked by the carry over of traditional pre-industrial pier components such as exemplified in the continued utilization of stone filled timber crib substructures, which dominated facility construction activities during the 1868 through 1913 period.

Regional industrialization allowed for certain technological innovations to be adapted to pier construction by the closing decade of the nineteenth century. The development of local Portland cement production utilizing iron and steel furnace slags led to the use of massed and slab concrete superstructure designs at the South Haven facility by 1911.

The transition to the use of driven steel sheet piling for pier construction and reconstruction projects can be documented for COE harbor improvement activities in the Great Lakes to a ca. 1934 setting. Its appearance at South Haven Harbor, began in 1962. The resultant steel sheet substructures (3,309 ft) set in place over the 11-year period between 1962 and 1973 have obscured approximately 88 percent of the original pier and revetment components (Sections A, north pier, B, C, D, D_1, E, F, F_1, G, H, J, K, K-1, K-2, L, and M) (Figures 1 through 5). These, however, have not been destroyed, but, merely sealed with an exterior facade containing the old piers and revetments as a core element and forming what might best be referred to as a stratified composite structure.

Original substructure construction design elements potentially open to visual examination form approximately 12 percent (400 ft) of the 3,309 ft long pier and revetment structures; exclusive of Section N (780 ft). This unaltered element is restricted to the end 400 ft (Section A) of the south pier consisting of timber crib components constructed in 1912/13.

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National Park Service

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Section number 10 Page 1

Verbal Boundary Description

The nominated navigation structures at South Haven Harbor, Michigan, consist of COE-owned and maintained properties designated as the north pier (1,095 ft), the south pier (1,064 ft), the north revetment (1,055 ft), and the south revetment (95 ft). It does not, however, include that element of the south revetment designated as Section N, built in 1950, and forming the east-northeast (or inland) end (780 ft) of this latter structure. The combined structures (nominated) extend for a total distance of 3,309 lineal ft and encompass an area of approximately 112,506 sq ft (2.58 acres); calculated at an overall average of 32 ft width.

Boundary Justification

The nominated property is restricted to those structural elements under actual COE ownership and jurisdiction flanking the ship channel entrance at the mouth of the Black River in the City of South Haven, Van Buren County, Michigan. The nominated property does not include the channel or lake bottoms abutting the piers and revetments.

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National Park Service

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Photographs

1. Photographer: Christopher J. Marzonie
   Date: 31 May 1993
   Negative Location: Commonwealth Cultural Resources Group, Inc., Jackson, MI
   Description: South Pier, South Haven Harbor. View to West

2. Photographer: Christopher J. Marzonie
   Date: 31 May 1993
   Negative Location: Commonwealth Cultural Resources Group, Inc., Jackson, MI
   Description: South Pier and Black River Channel, South Haven Harbor. View to East

3. Photographer: Christopher J. Marzonie
   Date: 31 May 1993
   Negative Location: Commonwealth Cultural Resources Group, Inc., Jackson, MI
   Description: North Pier, South Haven Harbor. View to North

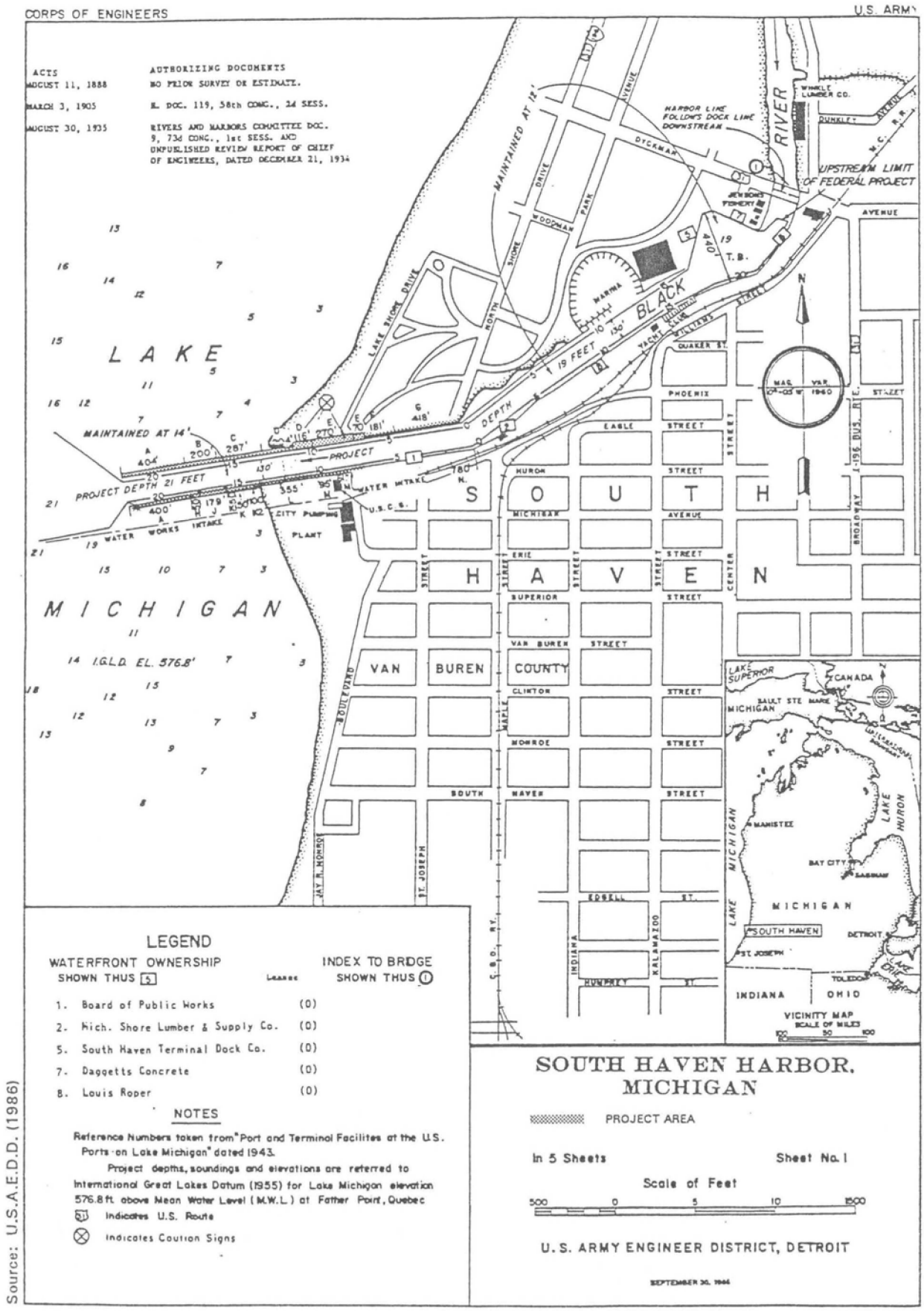


Figure 1. South Haven Harbor Navigation Structures

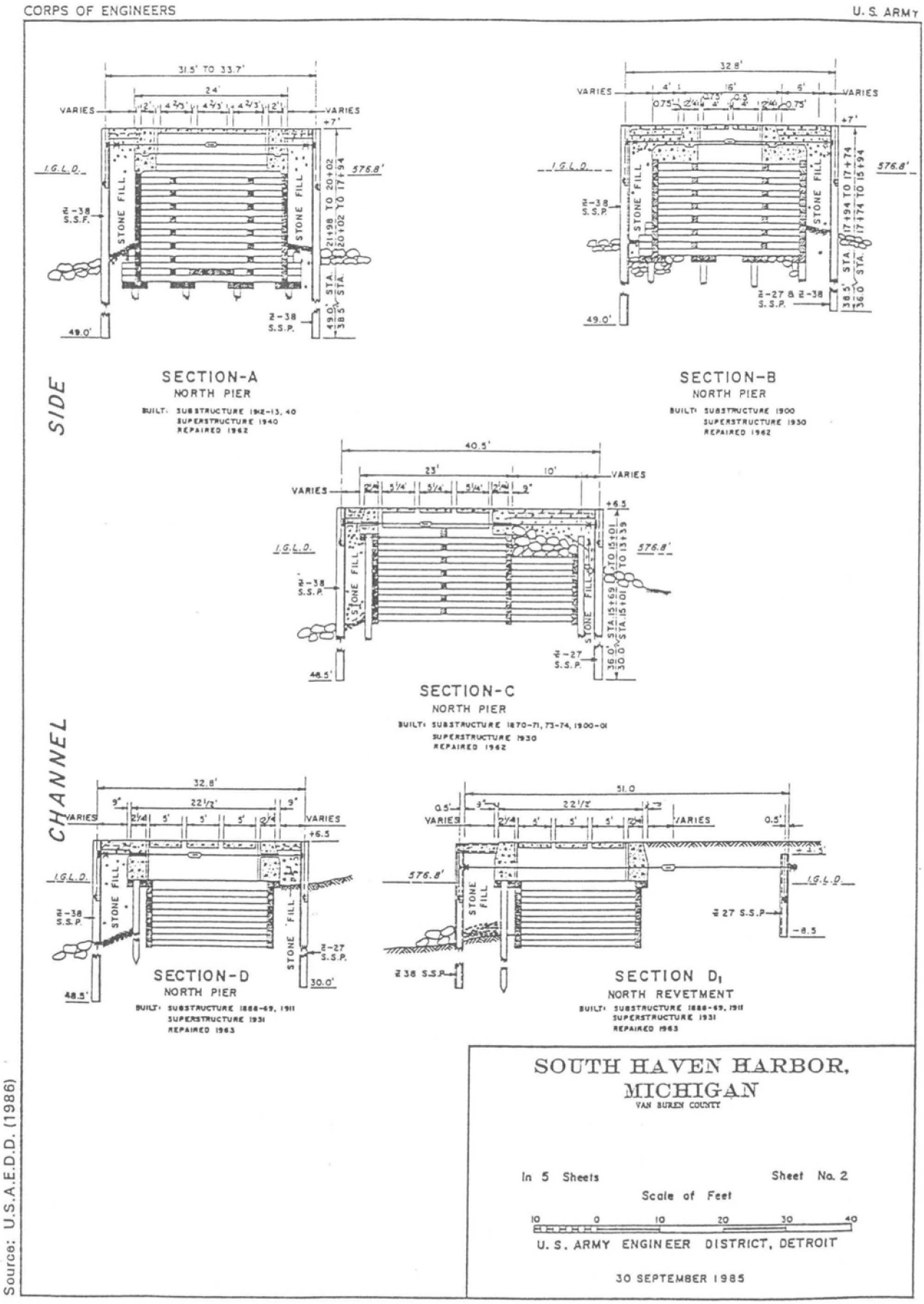
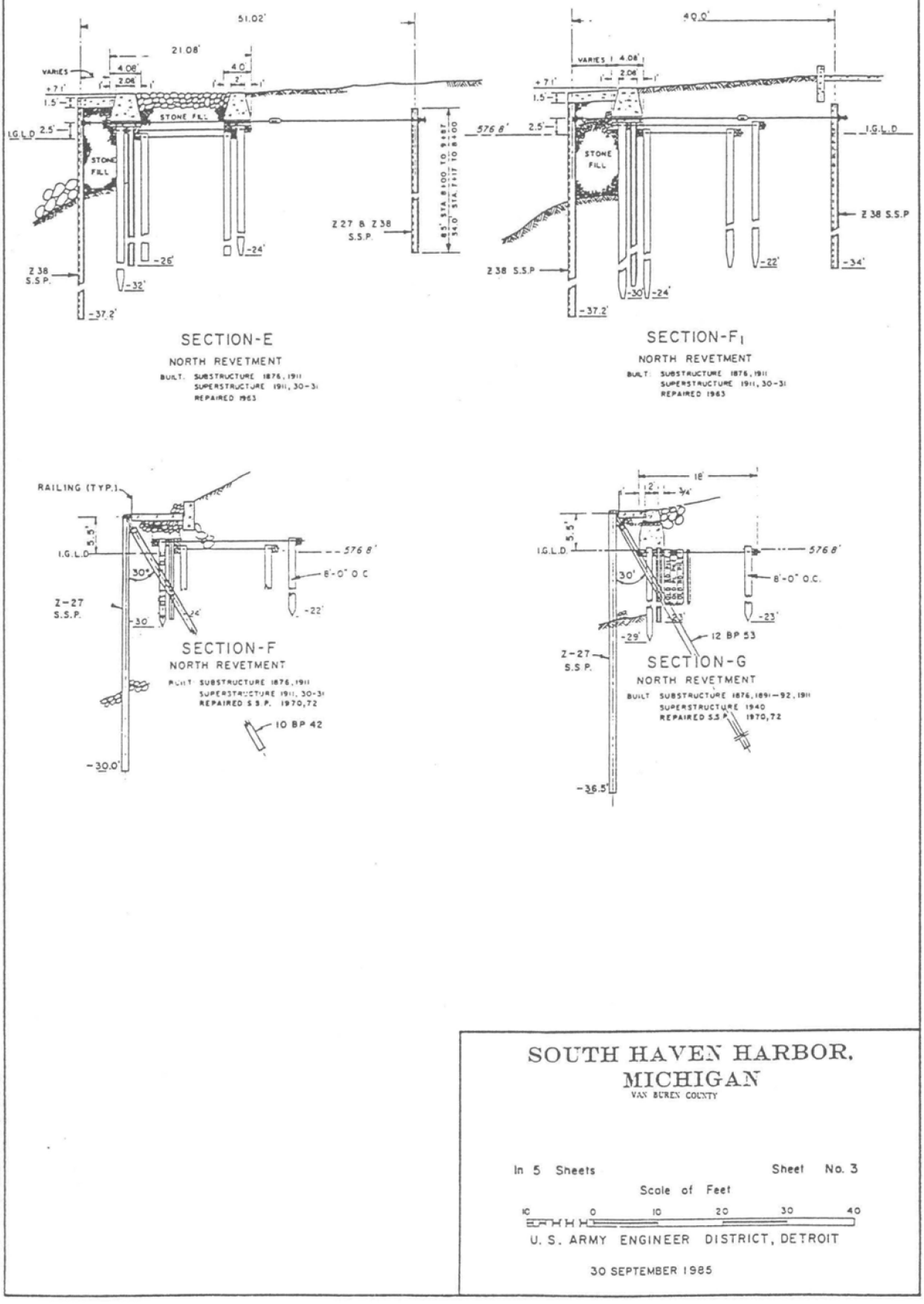


Figure 2. North Pier/Revetment Cross Sections

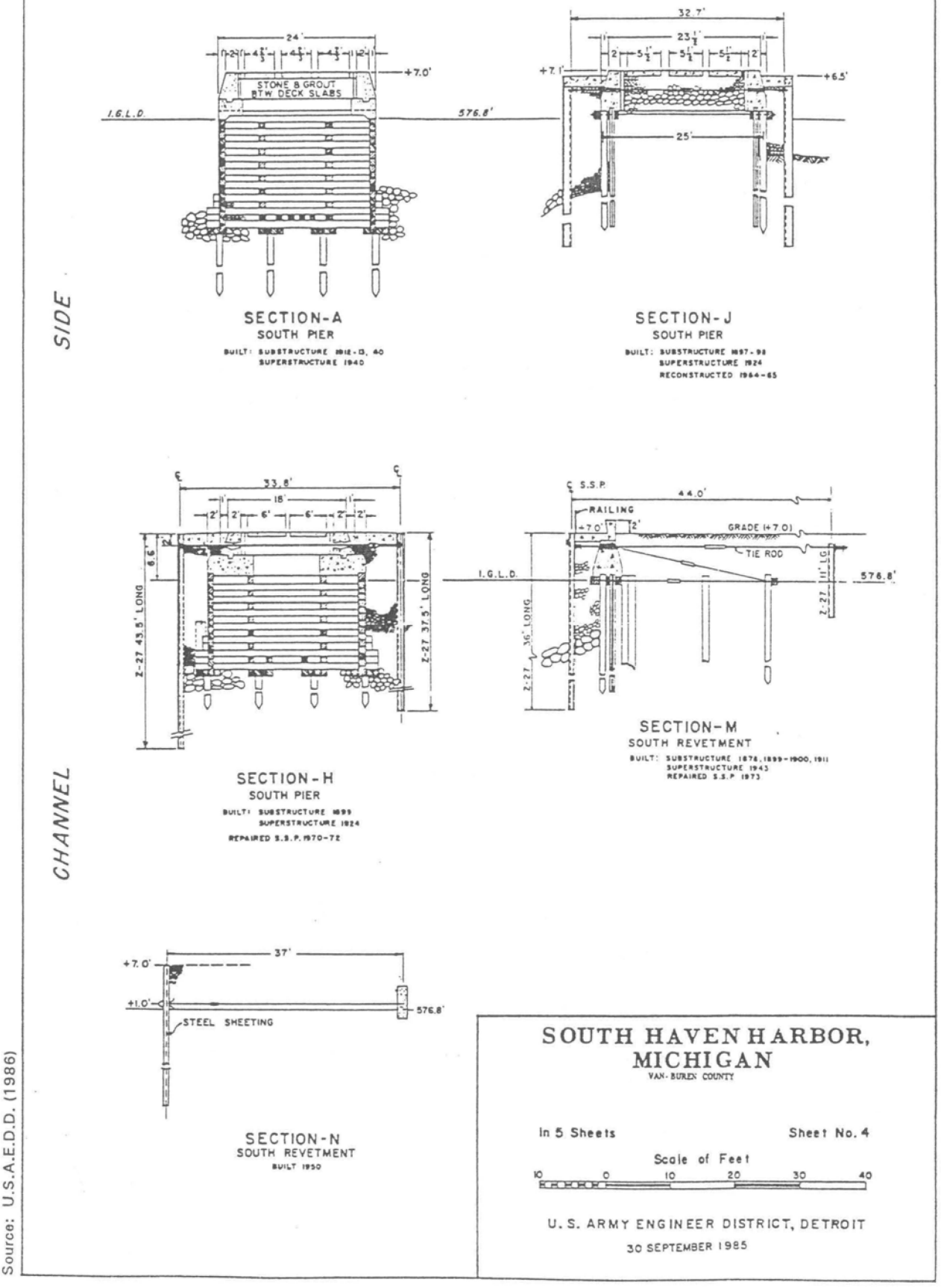
CORPS OF ENGINEERS

U.S. ARMY



Source: U.S.A.E.D.D. (1986)

Figure 3. North Revetment Cross Sections



Source: U.S.A.E.D.D. (1986)

Figure 4. South Pier/Revetment Cross Sections

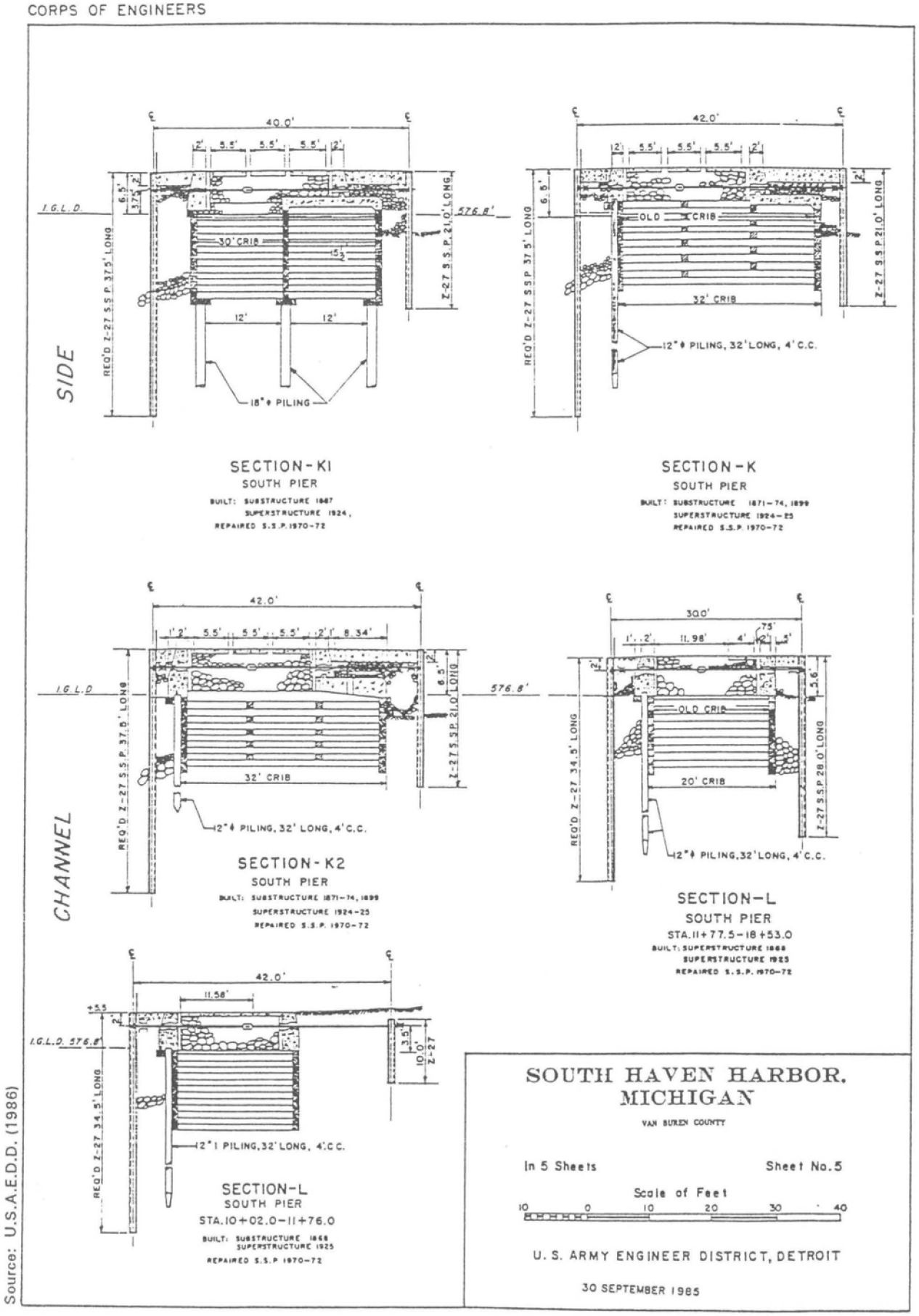
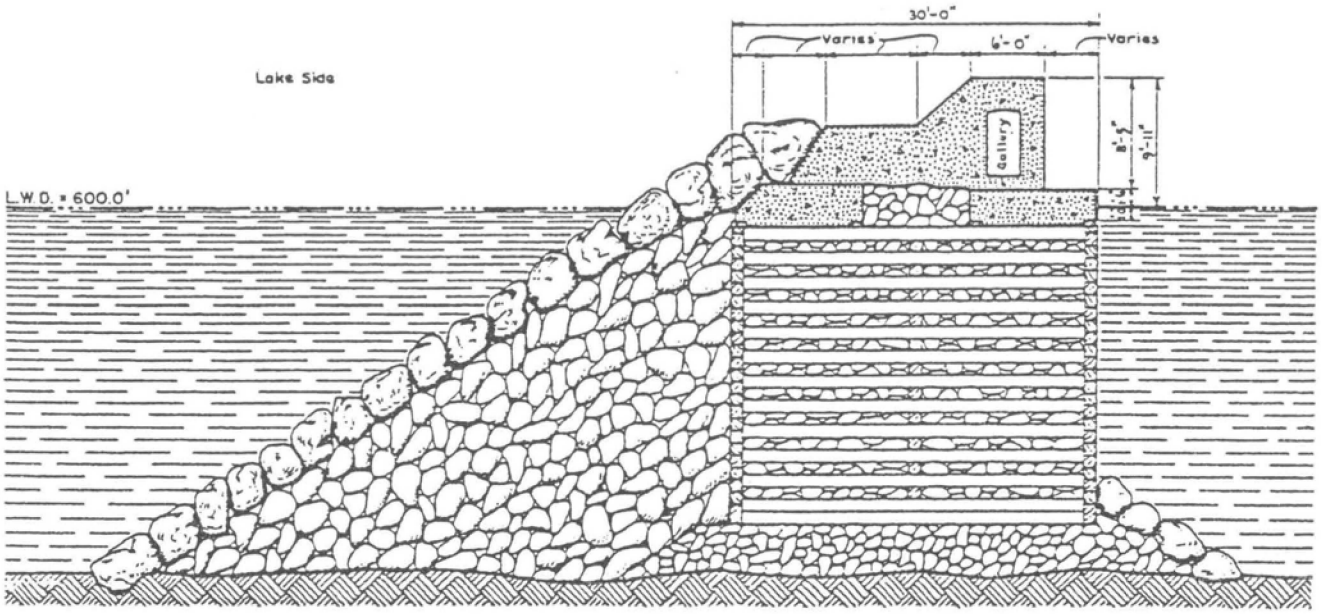
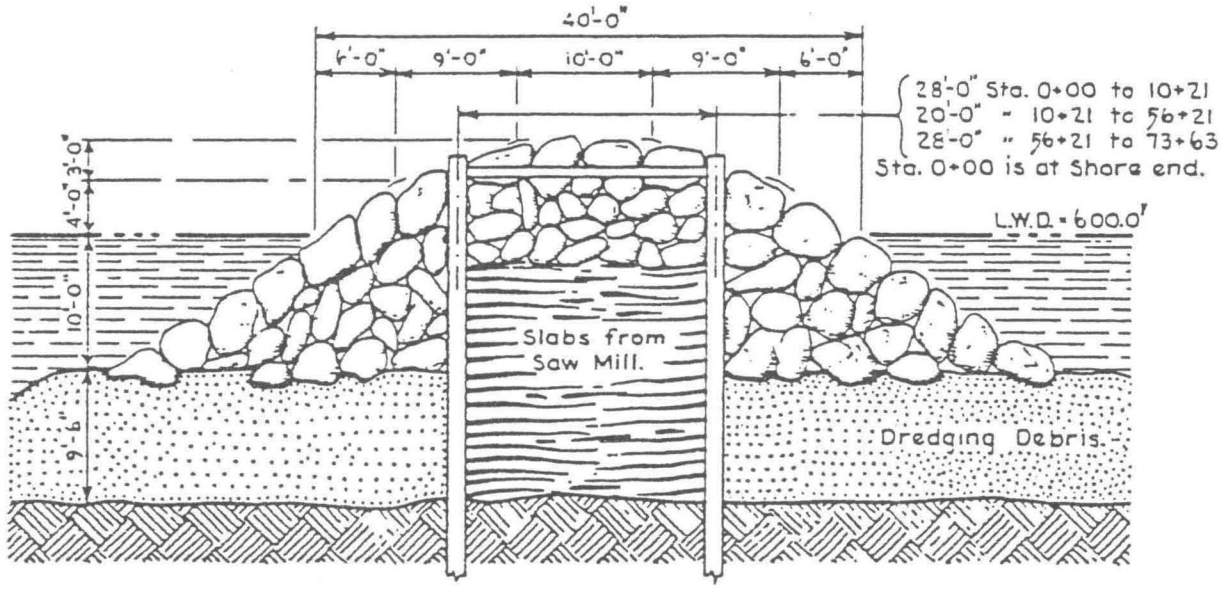


Figure 5. South Pier Cross Sections



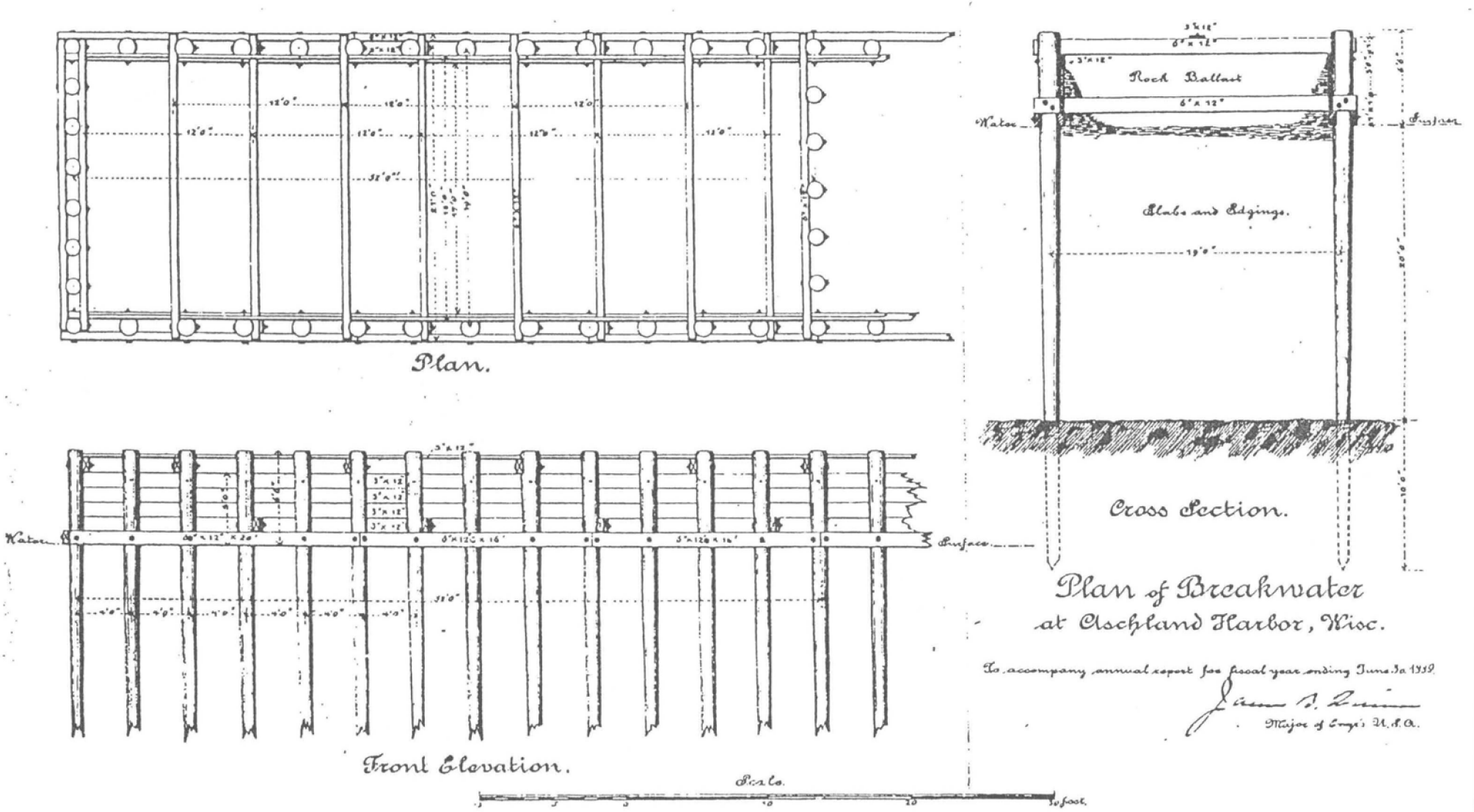
Source: U.S.A.E.D.D.(1986)

Figure 6. Marquette Harbor Breakwater



Source: U.S.A.E.D.D. (1986)

Figure 7. Ashland Harbor Breakwater



Source: U.S.A.C.E (1889)

Figure 8. Slab Breakwater, Ashland Harbor

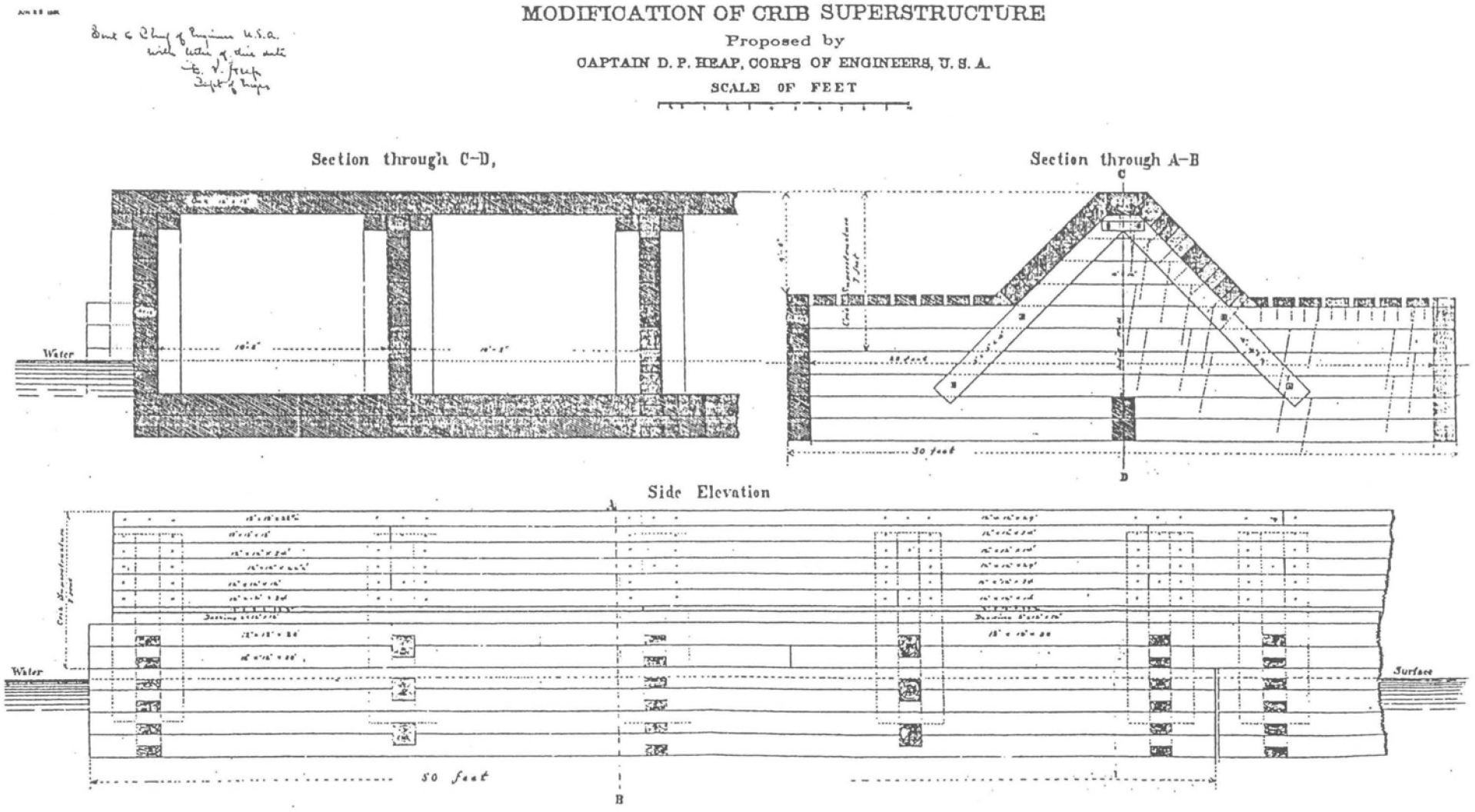
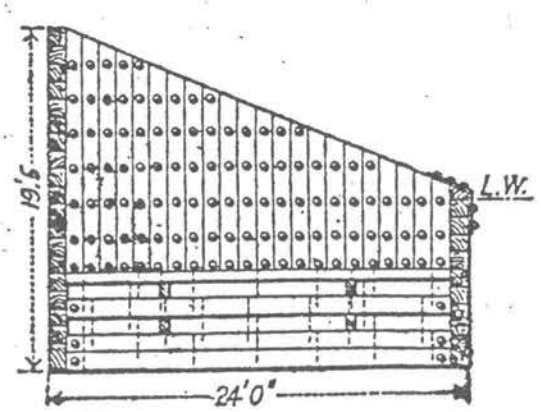
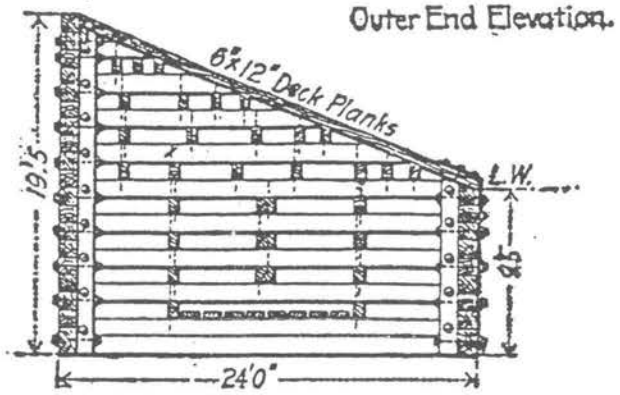


Figure 9. Breakwater Superstructure, Frankfort Harbor



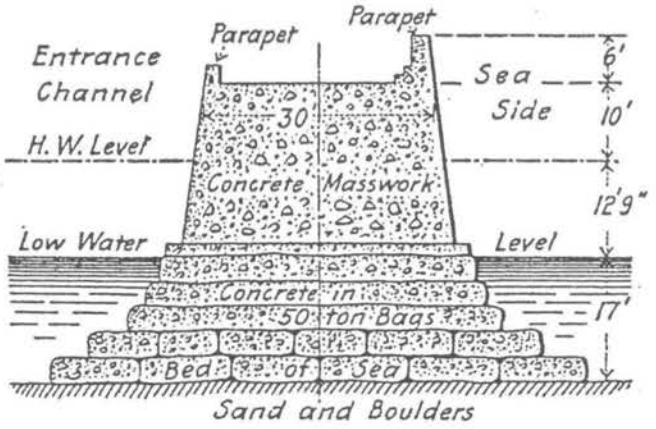
Outer End Elevation.



Cross Section

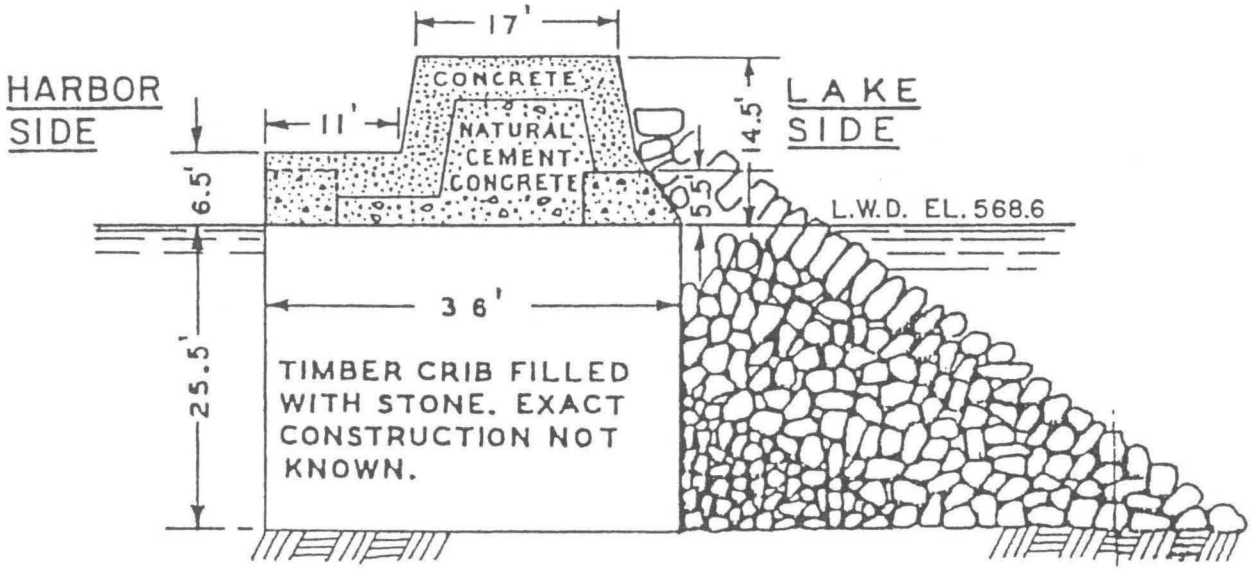
Source: Wright (1914:701)

Figure 10. Presque Isle Harbor Breakwater



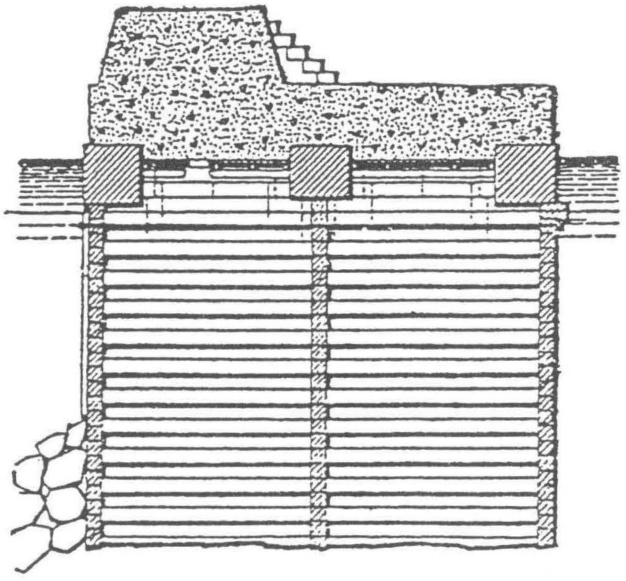
Source: Wright (1914:702)

Figure 11. Aberdeen Harbor Breakwater



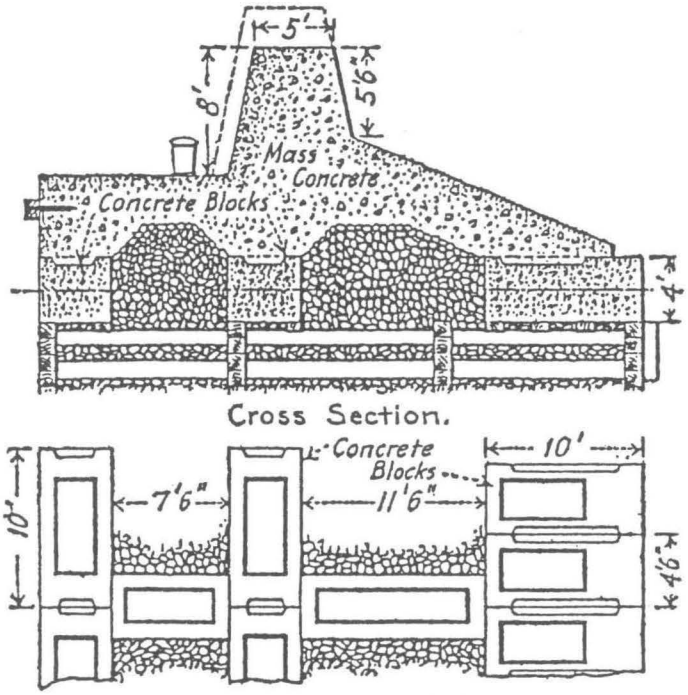
Source: U.S.A.E.D.B. (1989)

Figure 12. Buffalo Harbor "Old Breakwater"



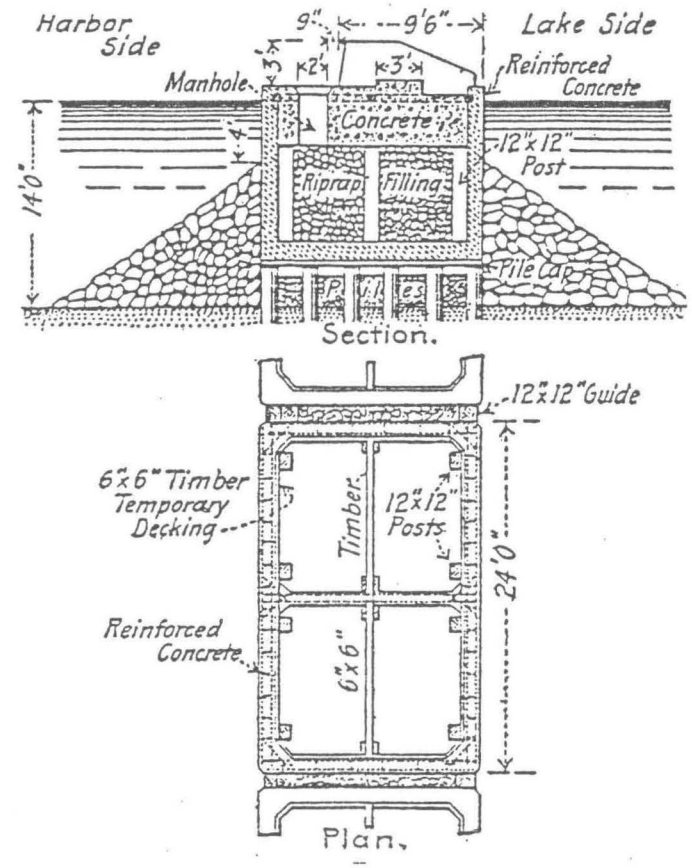
Source: Wright (1914:701)

Figure 13. Cleveland West Harbor Breakwater



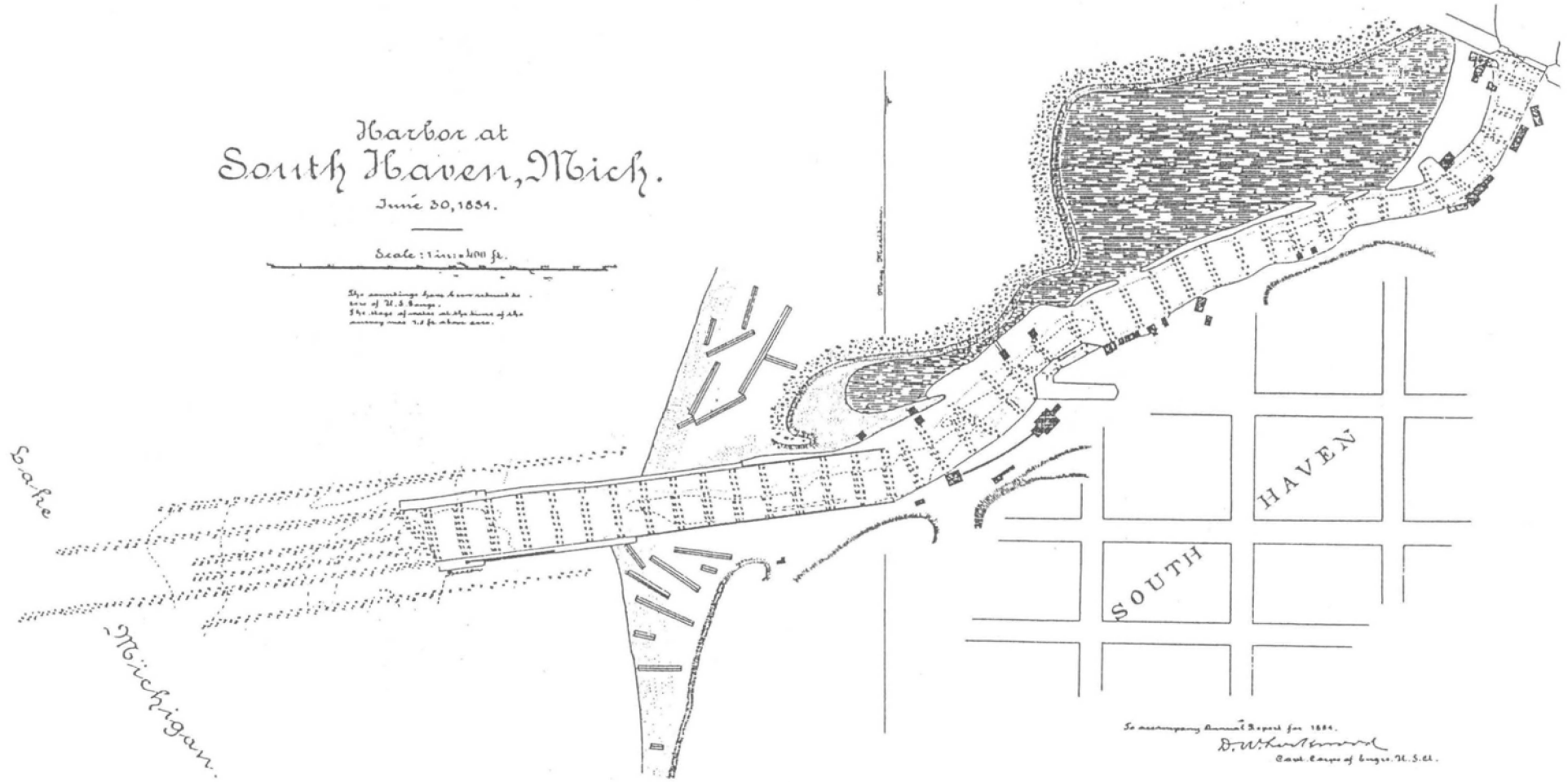
Source: Wright (1914:702)

Figure 14. Harbor Beach Breakwater Superstructure



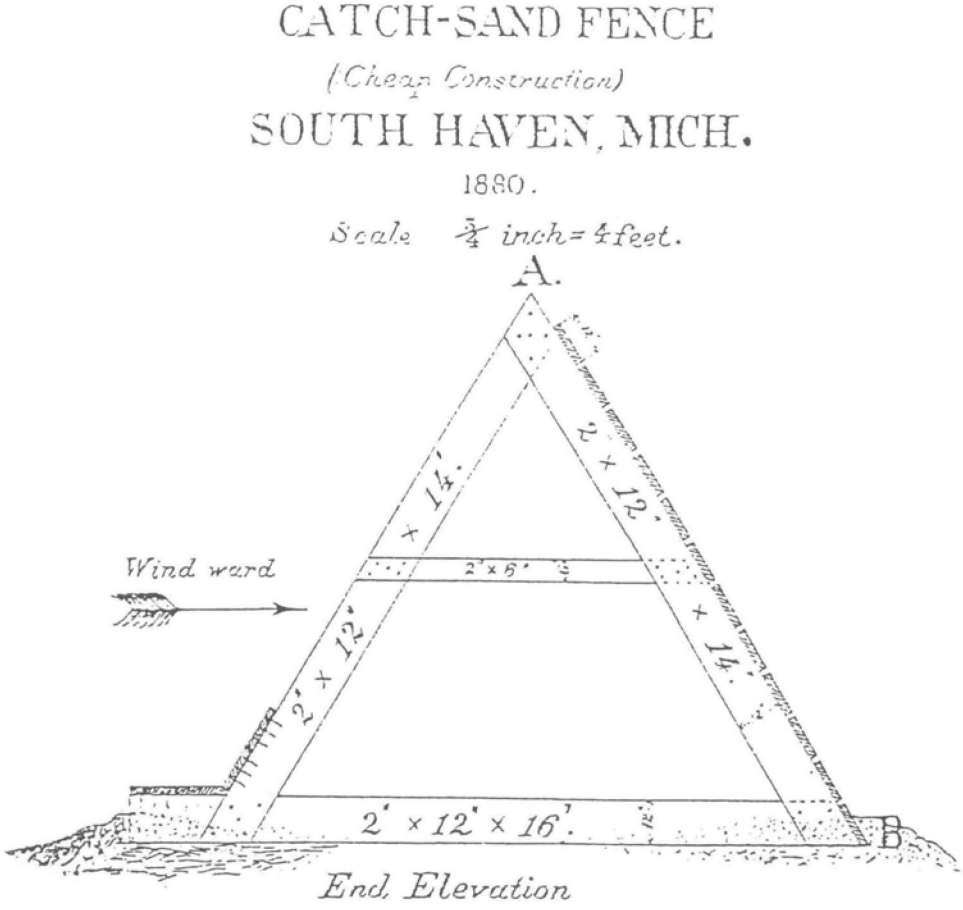
Source: Wright (1914:703)

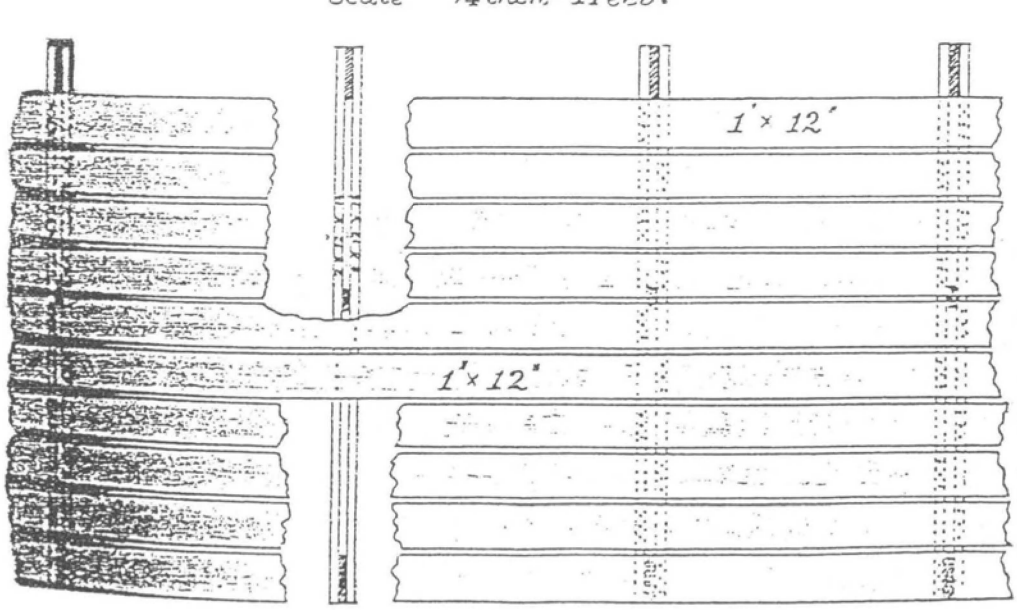
Figure 15. Algoma Harbor Breakwater



Source: U.S.A.C.E. (1884: 1992-3)

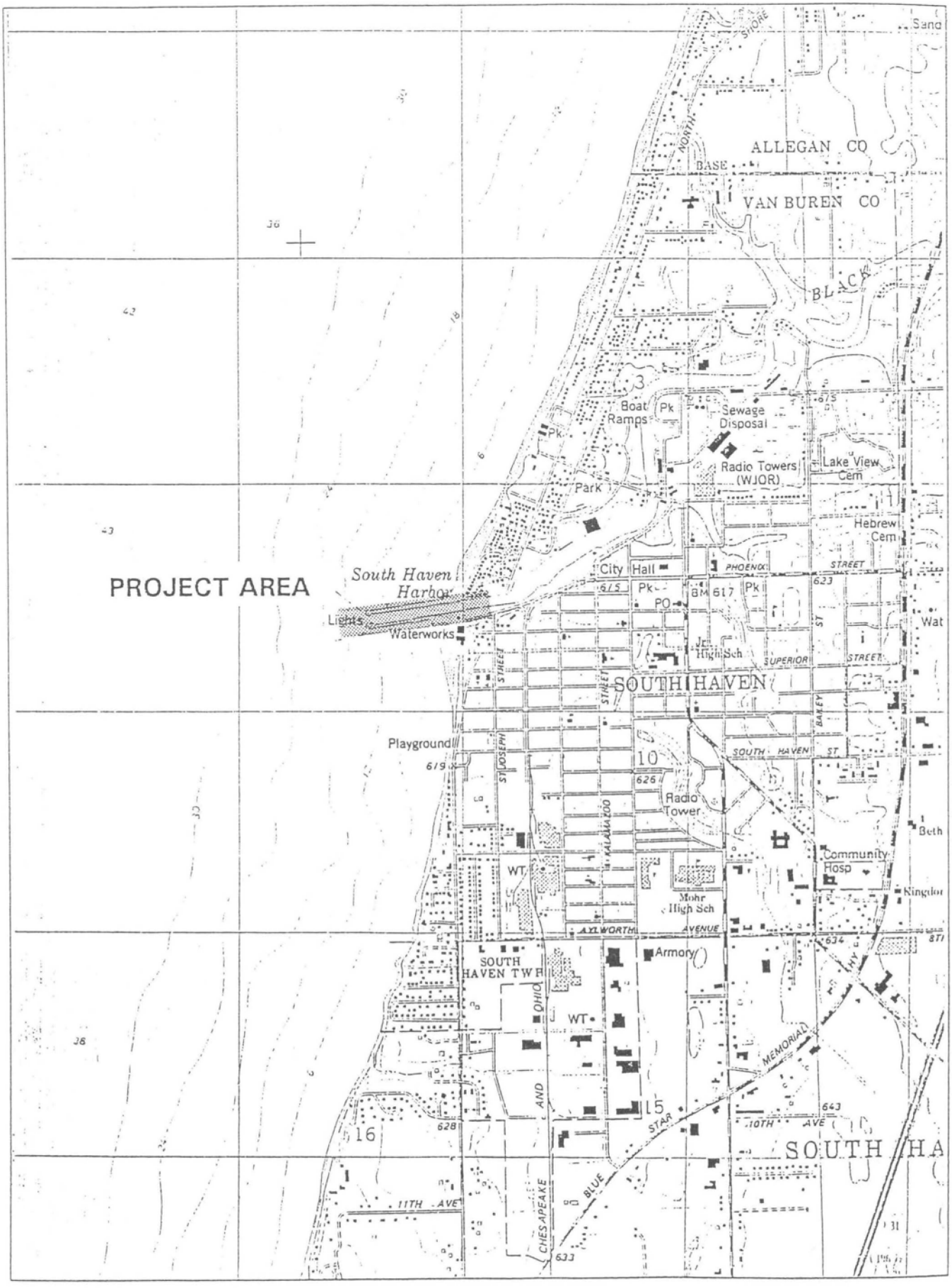
Figure 16. South Haven Harbor, 1884





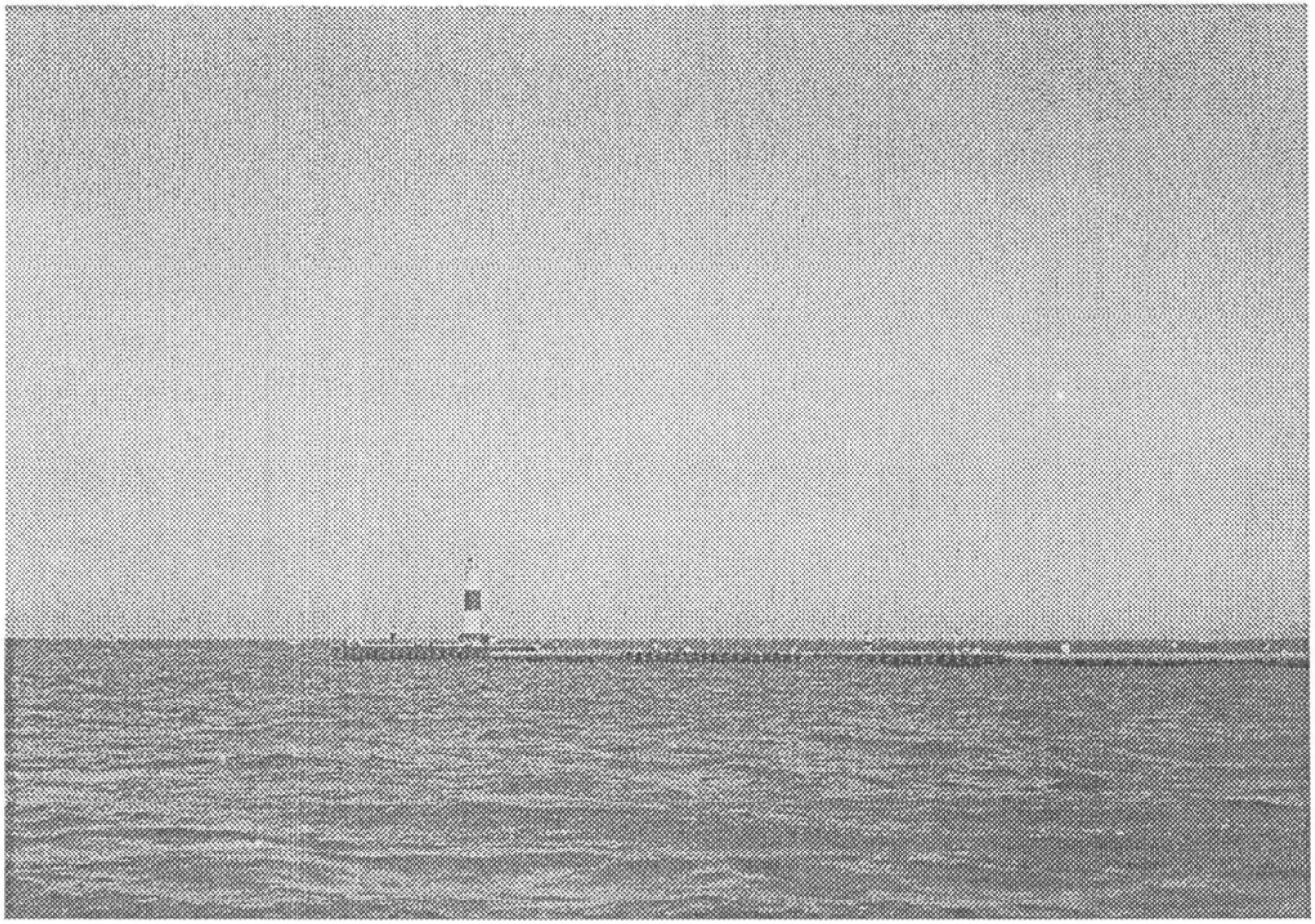
Source: U.S.A.C.E. (1880: 2029)

Figure 17. Sand Fence Cross Section and Profile


PROJECT AREA
South Haven Harbor
Lights
Waterworks
Playground
Boat Ramps
Pk
Park
Sewage Disposal
Radio Towers (WJOR)
Lake View Cem
Hebrew Cem
City Hall
PO
BM 617
Jr. High Sch
SOUTH HAVEN
Radio Tower
Community Hosp
Mohr High Sch
Armory
SOUTH HAVEN TWP
WT
ALLEGAN CO
VAN BUREN CO
BASE
PHOENIX STREET
SUPERIOR STREET
SOUTH HAVEN ST
AYLWORTH AVENUE
MEMORIAL HWY
10TH AVE
11TH AVE
CHESAPEAKE AND OHIO
BLUE STAR
ST JOSEPH
KALAMAZOO
BAKEY
Sand
Wat
Beth
Kingsl
SOUTH HA

1. South Pier, South Haven, Van Buren County, Michigan

2. South Pier, South Haven, Van Buren County, Michigan



3. North Pier, South Haven, Van Buren County, Michigan

South Haven Harbor Navigation Structures

CORPS OF ENGINEERS

U.S. ARM

8

ACTS	AUTHORIZING DOCUMENTS
AUGUST 11, 1888	NO PRIOR SURVEY OR ESTIMATE.
MARCH 3, 1905	H. DOC. 119, 58th CONG., 2d SESS.
AUGUST 30, 1935	RIVERS AND HARBORS COMMITTEE DOC. 9, 73d CONG., 1st SESS. AND UNPUBLISHED REVIEW REPORT OF CHIEF OF ENGINEERS, DATED DECEMBER 21, 1934

LEGEND

WATERFRONT OWNERSHIP SHOWN THUS [5]

INDEX TO BRIDGE SHOWN THUS (1)

	Lessee	
1. Board of Public Works		(0)
2. Mich. Shore Lumber & Supply Co		(0)
5. South Haven Terminal Dock Co.		(0)
7. Daggetts Concrete		(0)
8. Louis Roper		(0)

NOTES

Reference Numbers taken from "Port and Terminal Facilites at the U.S. Ports on Lake Michigan" dated 1943.

Project depths, soundings and elevations are referred to International Great Lakes Datum (1955) for Lake Michigan elevation 576.8 ft. above Mean Water Level (M.W.L.) at Father Point, Quebec

[31] Indicates U.S. Route

⊗ Indicates Caution Signs

SOUTH HAVEN HARBOR, MICHIGAN

In 5 Sheets

Sheet No. 1

Scale of Feet

500 0 5 10 1500

U.S. ARMY ENGINEER DISTRICT, DETROIT

SEPTEMBER 30, 1966

ITEM 1
South Pier, South HAVEN
VAN BUREN Co, MI

ITEM 2
SOUTH PIER, SOUTH HAVEN
VAN BUREN Co., Mi

ITEM 3
NORTH PIER, SOUTH HAVEN
VAN BUREN Co., MI

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SOUTH HAVEN QUADRANGLE
MICHIGAN
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 SOUTH HAVEN 15' QUADRANGLE

3768 II SW (GLENN)

LAKE MICHIGAN

APPROXIMATE MEAN LAKE ELEVATION 580

Miami Park
Mt Pleasant
Trailer Park
Sandpit
ALLEGAN CO
VAN BUREN CO
BLACK R
Boat Ramps
Sewage Disposal
Radio Towers (WJOR)
Lake View Cem
Hebrew Cem
South Haven Harbor
Lights
Waterworks
City Hall
PO
Water Tank
Jr High Sch
SOUTH HAVEN
Playground
Radio Tower
Community Hosp
Bethel Ch
Kingdom Hall
Mohr High Sch
Armory
SOUTH HAVEN TWP
Trailer Park
Sandpit
Pk
WT
PHOENIX STREET
SUPERIOR STREET
ST JOSEPH STREET
KALAMAZOO STREET
OHIO AVENUE
AYLWORTH AVENUE
BLUE STAR MEMORIAL HIGHWAY
BAILEY AVE
CHESAPEAKE AND OHIO RAILWAY
(LACOTA) 3768 I NW
(COVERT) 3768 IV SE
(MCDONALD) 3768 I SW
12 MI. TO MICH. 89 HOLLAND 25 MI.
BANGOR 9 MI. KALAMAZOO 36 MI.
0.8 MI. TO MICH. 140 19 MI. TO INTERSTATE 94
360 000 FEET
330 000 FEET
T1N
T1S
R 17 W

Navigation Structures at South Haven Harbor Van Buren Co., Michigan
UTM References
1. 16/558580/4694425
2. 16/559100/4694500

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1976. Field checked 1977. Map edited 1981

Selected hydrographic data compiled from NOS chart 14906 (1979). This information is not intended for navigational purposes

Projection and 10,000-foot grid ticks: Michigan coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 16
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 1 meter north and 3 meters east as shown by dashed corner ticks

Red tint indicates areas in which only landmark buildings are shown

MN GN
2° 36 MILS | 0°28' 8 MILS
UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS LOW WATER 576.8 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
AND BY THE GEOLOGICAL SURVEY DIVISION
MICHIGAN DEPARTMENT OF NATURAL RESOURCES, LANSING, MICHIGAN 48909
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MICHIGAN
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Primary highway, hard surface
Light-duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route U. S. Route State Route

SOUTH HAVEN, MICH.
NE/4 SOUTH HAVEN 15' QUADRANGLE
N4222.5—W8615/7.5

1981

DMA 3768 IV NE—SERIES V862

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1982

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY NAME: Navigation Structures at South Haven Harbor, Michigan

MULTIPLE NAME:

STATE & COUNTY: MICHIGAN, Van Buren

DATE RECEIVED: 9/08/95 DATE OF PENDING LIST: 9/19/95
DATE OF 16TH DAY: 10/05/95 DATE OF 45TH DAY: 10/23/95
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 95001160

NOMINATOR: FEDERAL

REASONS FOR REVIEW:

APPEAL:	N	DATA PROBLEM:	N	LANDSCAPE:	N	LESS THAN 50 YEARS:	N
OTHER:	N	PDIL:	N	PERIOD:	N	PROGRAM UNAPPROVED:	N
REQUEST:	N	SAMPLE:	N	SLR DRAFT:	N	NATIONAL:	N

COMMENT WAIVER: N

___ACCEPT ___RETURN ___REJECT SEP 23 1995 DATE
OCT 23 1995

ABSTRACT/SUMMARY COMMENTS:

Entered in the
National Register

RECOM./CRITERIA_____

REVIEWER_____ DISCIPLINE_____

TELEPHONE_____ DATE_____

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

7 SEP 1995

Policy Review and Analysis Division
Office of Environmental Policy

Ms. Carol Shull
Chief of Registration
National Register of Historic Places
Department of the Interior
National Park Service
Post Office Box 37127
Washington, D.C. 20013-7127

Dear Ms. Shull:

Enclosed are four National Register of Historic Places nominations for historic structures in Michigan and Minnesota. The nominations are: Navigation Structures at South Haven Harbor, Van Buren County, Michigan; South Breakwater at Manistee Harbor, Manistee County, Michigan; Piers and Revetments at Grand Haven, Ottawa County, Michigan; and U.S. Army Corps of Engineers Vessel Yard at Duluth, St. Louis County, Minnesota. These nominations were prepared by the Corps Detroit District in conjunction with the Michigan and Minnesota State Historic Preservation Offices.

As the Corps Federal Preservation Officer, I have reviewed the nominations and have certified by signing Section 3. of the enclosures that the four historic properties should be included in the National Register of Historic Places. I request that you take the actions necessary to list these properties and inform me when the process is complete. Should you find that these submittals require revision or, if additional information is needed, please return the nomination(s) to me with your requirements.

Sincerely,

A. Forester Einarsen

A. Forester Einarsen
Chief, Office of Environmental Policy
Policy Review and Analysis Division

Enclosures

Copies Furnished:
Commander, North Central Division, ATTN: CENCD-PE-PD-ER
Commander, Detroit District, ATTN: CENCE-EP-E