

ENVIRONMENTAL ASSESSMENT OF RODEO FOR MARSH RESTORATION

Glyphosate (Rodeo) is registered by the U.S. Environmental Protection Agency for use in aquatic systems. It has been used successfully to restore Phragmites-dominated marshes by the U.S. Fish and Wildlife Service at Brigantine National Wildlife Refuge in New Jersey (Beall 1984) and Prime Hook National Wildlife Refuge in Delaware (Daly 1984), by the Delaware Division of Fish and Wildlife at Augustine Wildlife Management Area (Jones and Lehman 1986) and by the New Jersey Division of Fish, Game and Wildlife at Beaver Swamp Wildlife Management Area (R. Hall, pers. comm.). Extensive research has been conducted on its environmental impacts (Sullivan 1988) and it has been found to be extremely safe when properly applied. The Michigan Department of Agriculture (Kirkpatrick, 1986) concluded in its "Data Assessment for Rodeo" that:

"It is evident from data reviewed that glyphosate has low acute toxicity (Category III) for acute oral, acute dermal, and primary eye irritation and is in Category IV of primary skin irritation. It is not teratogenic to rats or rabbits and is not mutagenic. The oncogenic potential is not fully defined and repeat tests are required. Glyphosate is no more than slightly toxic to birds, aquatic invertebrates, and fish. Glyphosate is stable to hydrolysis and strongly adsorbed to soil, thus no potential to contaminate ground water. Glyphosate is foliar absorbed and translocated to all plant parts. It has no residual control and is not root absorbed. Its mechanism is inhibition of amino acid biosynthesis resulting in reduction of protein synthesis and inhibition of growth."

Rodeo has been found not to bioaccumulate and has been shown to breakdown in the environment rapidly and completely to natural products (Newton et.al. 1984, Chen et.al. 1989). Newton et.al. 1984 in extensive studies conducted in Oregon found the following:

"Glyphosate herbicide residues and metabolites were evaluated in forest brush field ecosystems in the Oregon coast range aerially treated with 3.3 kg/ha glyphosate. Deposits were recorded at various canopy depths to determine interception and residues in foliage, litter, soil, streamwater, sediments and wildlife for the the following 55 days. The half-life of glyphosate ranged from 10.4 to 26.6 days in the foliage and litter and twice as long in soil. The treated stream peaked at 0.27 mg/l and decreased rapidly; concentrations were higher in sediment than in water and persisted longer. Coho salmon fingerlings did not accumulate detectable amounts. Exposure to mammalian herbivores, carnivores and omnivores and retention of herbicide seemed to vary with food preference; however, all species had visceral and body contents at or below observed levels in ground

cover and litter, indicating that glyphosate will not accumulate in higher trophic levels. (Aminomethyl) phosphonic acid was found at low concentrations but degraded rapidly. p-Nitrosoglyphosate was nondetectable."

Glyphosate will not vaporize from a treated area and move to a non target area (Brandt 1983).

Rodeo treatments temporarily eliminate all vegetative cover from the marsh although submerged aquatic plants are not impacted (Forney and Davis 1981). This affords native species the opportunity to re-colonize these areas and to out-compete Phragmites spp.

LITERATURE CITED

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Department of Environmental Protection
Division of Fish, Game and Wildlife
July 24, 1991

APPENDIX II

MEMORANDUM OF UNDERSTANDING BETWEEN THE OFFICE OF NATURAL
RESOURCE DAMAGES AND THE DIVISION OF FISH, GAME AND WILDLIFE

WHEREAS, the Oriental Republic of Uruguay, the United States, and the States of New Jersey and Delaware entered a Consent Decree with the United States District Court for the District of Delaware on 14 July 1993 that stipulated that \$1,070,486.00 plus accrued interest be designated as "natural resource damage recovery" for restoration of New Jersey's natural resources that were damaged by the *Presidente Rivera* oil spill of 24 June 1989.

WHEREAS, The New Jersey Office of Natural Resource Damages (NJONRD), in conjunction with the federal natural resource trustees, the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior (DOI), oversees the expenditure and use of the above referenced natural resource damage recovery funds.

WHEREAS, the above referenced Consent Decree authorizes the general use of the *Presidente Rivera* natural resource damage recovery for restoration projects to compensate the public for resources impacted by the *Presidente Rivera* oil spill.

WHEREAS, the New Jersey Division of Fish, Game, and Wildlife manages and administers public resources that were impacted by the *Presidente Rivera* oil spill.

WHEREAS, the New Jersey Division of Fish, Game, and Wildlife is actively pursuing funding sources for the acquisition and restoration of a 450 acre parcel of degraded wetlands known as Mason Point in Salem County.

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

The Office of Natural Resource Damages will obtain the concurrence of NOAA and DOI, to specifically authorize the transfer of natural resource damage recovery funds from account No. XXXXXXXXX in the amount of \$200,000 for the exclusive use of acquiring and/or restoring the Mason Point parcel. If these funds are not committed within two years, or it is determined that the project is not feasible for practical or other reasons, the \$200,000 will revert back into Account No. XXXXXXXXX for use in other restoration projects deemed appropriate under the Consent Decree.

The Division of Fish, Game, and Wildlife shall administer the expenditure of the \$200,000 and oversee the progress and completion of the acquisition and restoration. The Division of Fish, Game, and Wildlife will prepare reports, as requested by the Office of Natural Resource Damages, regarding accounting of the \$200,000 and the status of the Mason Point acquisition and restoration.

James F. Hall, Assistant Commissioner,
Natural and Historic Resources

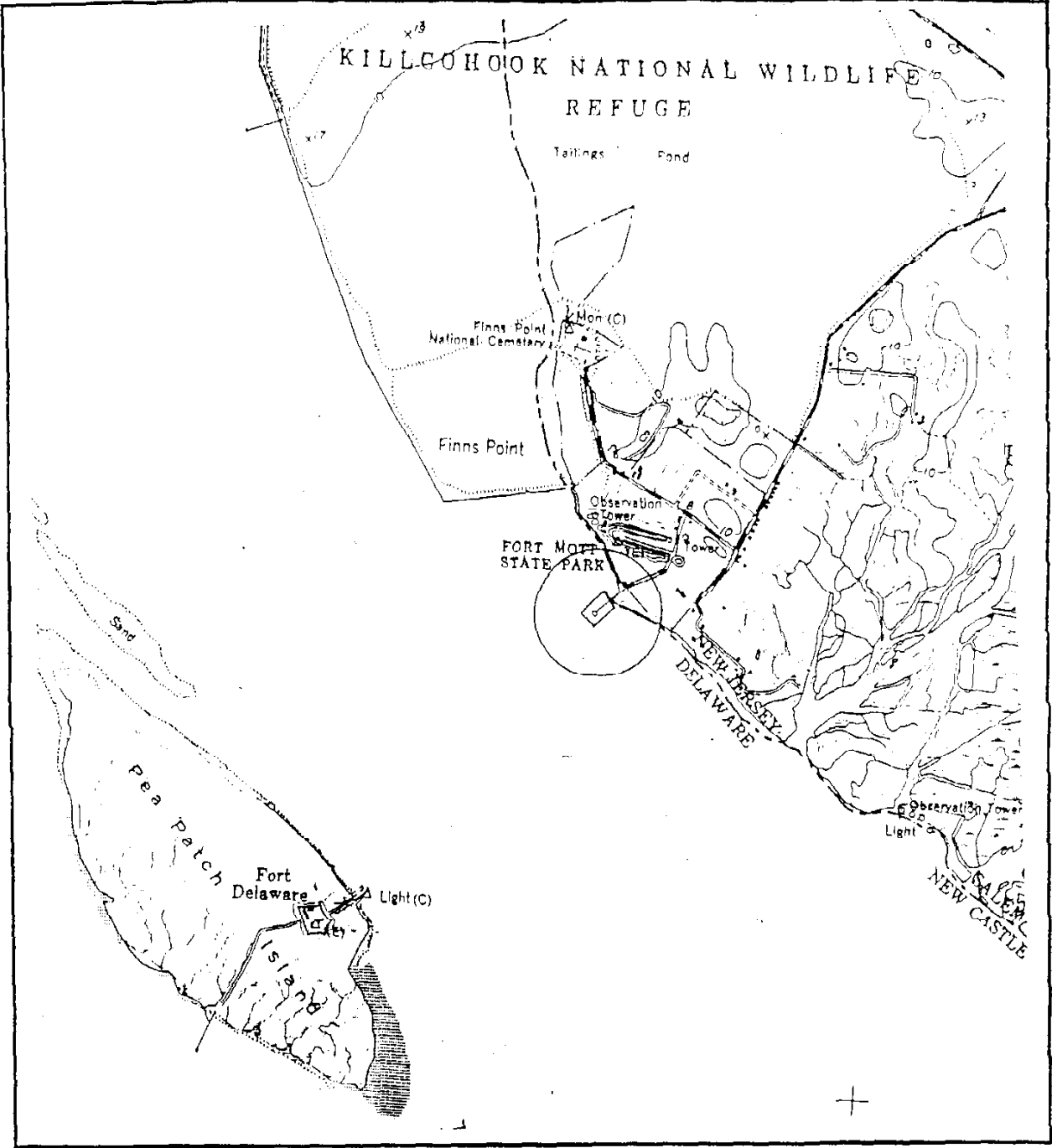
Martin J. McHugh, Chief,
Office of Natural resource Damages

Robert McDowell, Director,
Division of Fish, Game and Wildlife

APPENDIX III

FORT MOTT STATE PARK
PIER
REHABILITATION

*Sections of draft report prepared by
S.T. Hudson Engineers, Inc.
Nov. 12, 1993
For the State of New Jersey*



PROJECT AREA MAP

U.S.G.S. Quadrangle
 DELAWARE CITY, DEL.-N.J.
 1948 Photorevised 1970

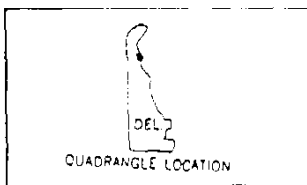


Figure 1

SECTION 1

EXECUTIVE SUMMARY

The purpose of this study is to examine options for the rehabilitation of an historic pier at Ft. Mott State Park. Two objectives are to be met: the pier must be made suitable as a terminus for ferry service between Fort Mott and Fort Delaware on Pea Patch Island, and Fort DuPont on the Delaware shore, with provision for handicapped access. The rehabilitated pier must also be eligible for inclusion in the Fort Mott and Finn's Point National Cemetery Historic District, in accordance with Department of the Interior criteria.

Several alternative configurations have been examined, as described herein, and the field narrowed down to four principal options.

Two of the options involve leaving the existing pier in more or less as-is condition, maximizing opportunities for studying its structure, and allowing access for future investigations. One of these options is to build a walkway parallel to the existing pier; the other is to support a walkway above it.

The other two options are to reconstruct the pier, or to encapsulate it in sheet piling, with timber sheathing to simulate its historic appearance.

The results thus far of comparing those options are summarized in the following table.

The entries under "Design Considerations" and "Estimated Cost" are subject to further investigation and refinement, but are unlikely to shift significantly relative to each other.

The entries under "Permitting Considerations" and "Environmental Considerations" remain to be confirmed by discussions with the appropriate agencies, but represent their expected reaction, based on previous experience.

Two estimated construction costs are given for each option: without - and with - the estimated \$360,000 required for ferry pier facilities common to each option as discussed in Section 3. Each of the options includes a 600 s.f. passenger shelter with bulletin board, etc., and provision for future utilities as required. Each option also includes removal of a portion of the wooded dune at the inshore end of the pier, together with grading, landscaping and paving as required to connect the walkway to the existing sidewalk inshore of the dune.

The results thus far clearly favor options A or B: installation of an independent walkway adjacent to - or above - the existing pier.

**FORT MOTT FERRY PIER REHABILITATION OPTIONS:
SUMMARY ANALYSIS**

OPTION	A	B	C	D
Configuration	Independent walkway on downriver side of existing pier.	Walkway supported above existing pier, with observation "wings" at outshore end.	Reconstruction of pier, building up crib structure from existing sound base.	Encapsulation of existing pier, using steel sheet piling - sheathed with timber for appearance - to enclose the existing structure.
Design Considerations	Relatively straight-forward; ice resistance and compatible appearance will be major factors.	Somewhat more complex design than A; requires driving piles through bottom of crib structure. Must withstand ice loads at high water, and appearance should not detract from historic pier.	Significant removal of existing structure required to reach sound material. Also, remaining historic structures outside of "new" crib will give anachronistic appearance if left in place.	Will require removal of rip-rap banked against existing timber sheeting below MLW; also will require removal of some external timber structure (fender piles, etc.).
Est. cost (not including common items @ \$360,000 additional)	\$443,000 Thus project total \$803,000	\$600,000 Thus project total \$960,000	\$879,000 Thus project total \$1,239,000	\$895,000 Thus project total \$1,255,000
Environmental Permitting Considerations	Relatively straight-forward; no major problem expected.	Relatively straight-forward; no major problem expected.	Could lead to problems, as pier is now technically wetlands. Also, proposed action could be interpreted as filling river (approx. 0.25 acre).	Could lead to problems, as pier is now technically wetlands. Also, proposed action could be interpreted as filling river (approx. 0.25 acre).
Historical Preservation Considerations	With interpretive graphics on parallel walkway railing, enables existing pier to be viewed as historic ruin, with unique engineering features fully visible (and accessible).	With interpretive graphics on parallel walkway railing, enables existing pier to be viewed as historic ruin, with unique engineering features fully visible (and accessible). Minimal damage to historic structure.	Visible structure would only superficially resemble historic structure, parts of which must be destroyed during construction. The remainder will be rendered inaccessible to future investigation, so mitigation (archival cataloging) may be required.	Visible structure would only superficially resemble historic structure, parts of which must be destroyed during construction. The remainder will be rendered inaccessible to future investigation, so mitigation (archival cataloging) may be required.

SECTION 2

INTRODUCTION

The purpose of this study is to examine options for the rehabilitation or reconstruction of an historic pier at Ft. Mott State Park. Two objectives are to be met: the pier must be made suitable as a terminus for ferry service between Ft. Mott at Forts Delaware and DuPont, on Pea Patch Island and on the Delaware shore respectively, with provision for handicapped access.

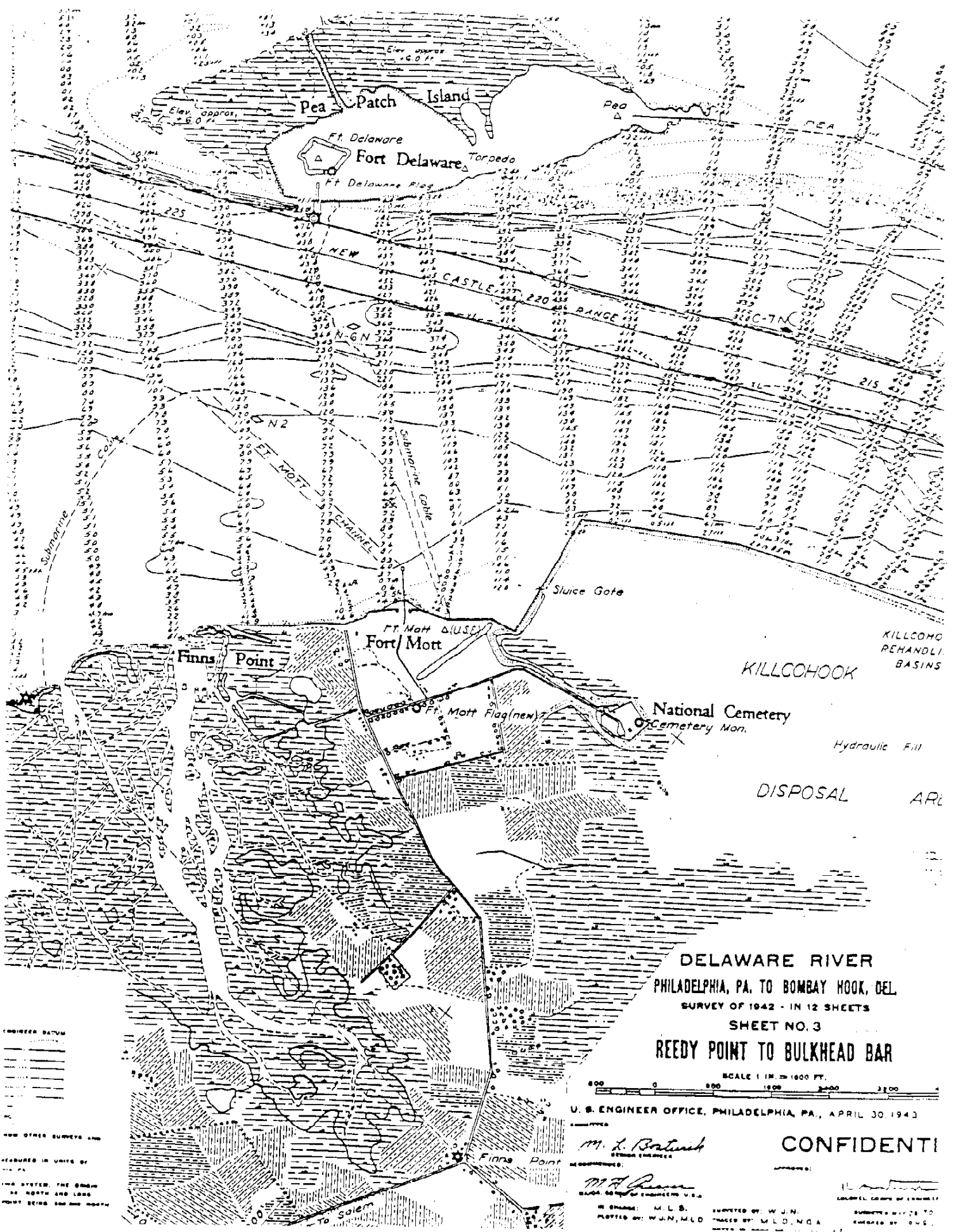
The rehabilitated or reconstructed pier must also be eligible for inclusion in the Ft. Mott and Finn's Point National Cemetery Historic District, in accordance with Department of the Interior criteria.

The completed study will include the results of all investigations and at least three recommended designs, together with outline specifications and cost estimates. The final report will also include all materials necessary to prepare environmental permit applications for the selected alternative, as well as an application for inclusion in the Historic District.

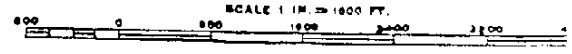
S. T. Hudson Engineers, Inc., together with our subconsultants R. Alan Mounier, Inc. and Dolan Research, have been engaged by the Division of Building and Construction to carry out this work. This Draft Report has been prepared at approximately the 50% point in the study.

The foldout following this page is excerpted from a U. S. Army Corps of Engineers soundings chart of the Delaware River prepared in 1943, and shows clearly the relative positions of Fort Mott, Fort Delaware and Fort DuPont. Note the designated "Fort Mott Channel", leading to the pierhead, suggesting that the pier was still in use at that time.

The Ft. Mott Pier was built in the last century as a crib structure - basically a series of boxes made of heavy interlocking timbers floated into position, then filled with stone to sink them to the prepared bottom and hold them in place. It is an early and now obsolete type of marine foundation that is of interest to students of engineering history. A number of such structures are still in use along the Delaware River, primarily at industrial facilities. Although the Ft. Mott Pier has been repaired a number of times, as discussed in Section 4, it is now in a state of advanced deterioration above the low water line.



DELAWARE RIVER
 PHILADELPHIA, PA. TO BOMBAY HOOK, DEL.
 SURVEY OF 1942 - IN 12 SHEETS
 SHEET NO. 3
 REEDY POINT TO BULKHEAD BAR



U. S. ENGINEER OFFICE, PHILADELPHIA, PA., APRIL 30, 1943

DESIGNED BY
M. J. Bostwick
 CIVIL ENGINEER

CONFIDENTIAL

CHECKED BY
M. J. Bostwick
 CIVIL ENGINEER

APPROVED BY
 COLONEL CAROL G. HENNING

IN CHARGE: M. L. S. SURVEYED BY: W. J. N. PLOTTED BY: W. J. N., M. L. D. CHECKED BY: M. L. D., N. G. A. ENGINEERED BY: O. W. S.

ENGINEER DATUM
 FROM OTHER SURVEYS AND
 MEASURED IN UNITS OF
 THE SYSTEM: THE ORIGIN
 IS NORTH AND LONG
 POINT BEING 800 000 NORTH

Photos 1 and 2 show essentially the same view of the upriver side of the pier at low and high water, respectively. Pea Patch Island is in the background. Note that at high water the remains of the pier are essentially inundated; the pier is also overgrown with Phragmites and Spartina, "signature" wetlands species of reeds and marsh grass, respectively. The pier is thus now technically wetlands habitat, which may present a permitting problem.

Photo 3 shows on the right-hand side the interlocking notched timbers characteristic of crib structures. On the left can be seen two types of timber sheeting subsequently added to repair and/or protect the original crib structure - see Section 4 for discussion.

Photo 4 is another view of the remaining notched timbers and external sheeting.

Investigative work performed to date includes the following:

- A. A site topographic survey has been carried out, with preliminary results shown on Drawing No. 1 (rear pocket). Additional data will be added. The general elevation of the terrain immediately inshore of the pier is about 10 ft. above Mean Low Water (MLW); the remaining portion of the pier is about 4 ft. above MLW.

Drawing No. 1 includes a plan of the pier. Note that the pier extends about 350 ft. out from the existing shore.

We have not yet been able to determine exactly where the Delaware/New Jersey state line falls on the pier structure, but from existing maps it appears to lie about 300 ft. in from the outshore end, so that portions of the pier are in both states. This will require parallel permitting for any rehabilitation/reconstruction scheme.

- B. A hydrographic survey was also performed, and the results are included on Drawing No. 1. Again, additional soundings have been taken both upriver and downriver of those shown, and will be added to No. 1. The additional soundings show no significant change in water depth north or south of the pier; in general the results indicate adequate depth for the proposed ferry (the "Dela Fort") with no dredging required.
- C. R. Alan Mounier, Inc. has carried out a background historical investigation of the Ft. Mott Pier, and their draft report is included as Appendix A. It will be expanded to include additional background material, some graphics, and a bibliography. In general, their findings are consistent with information already available to NJDEPE's Division of Parks and Forestry.



PHOTO 1:
Pier at low water
(Up river side)

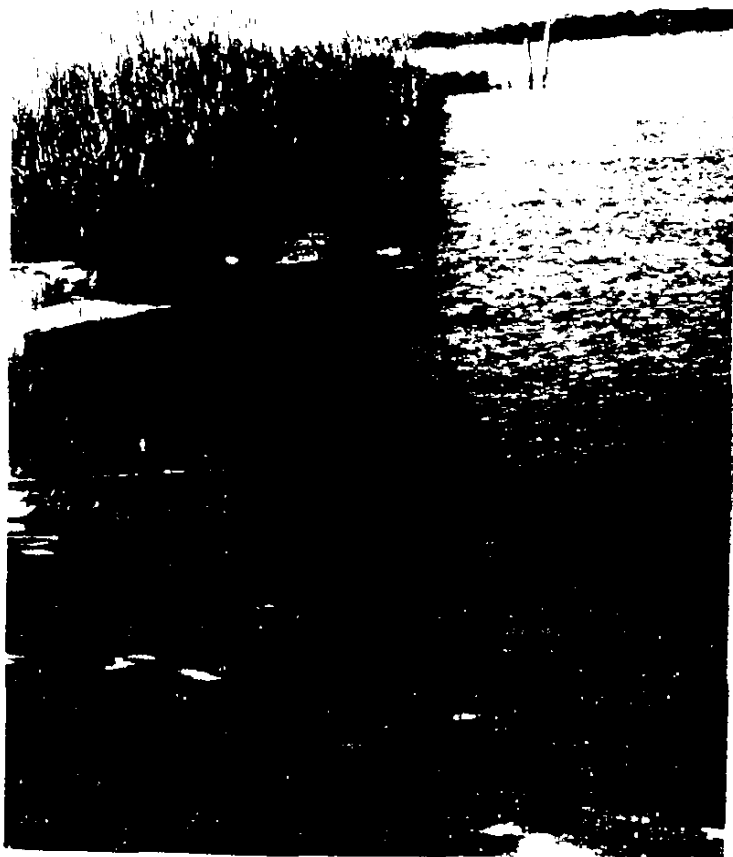


PHOTO 2:
Pier at high water

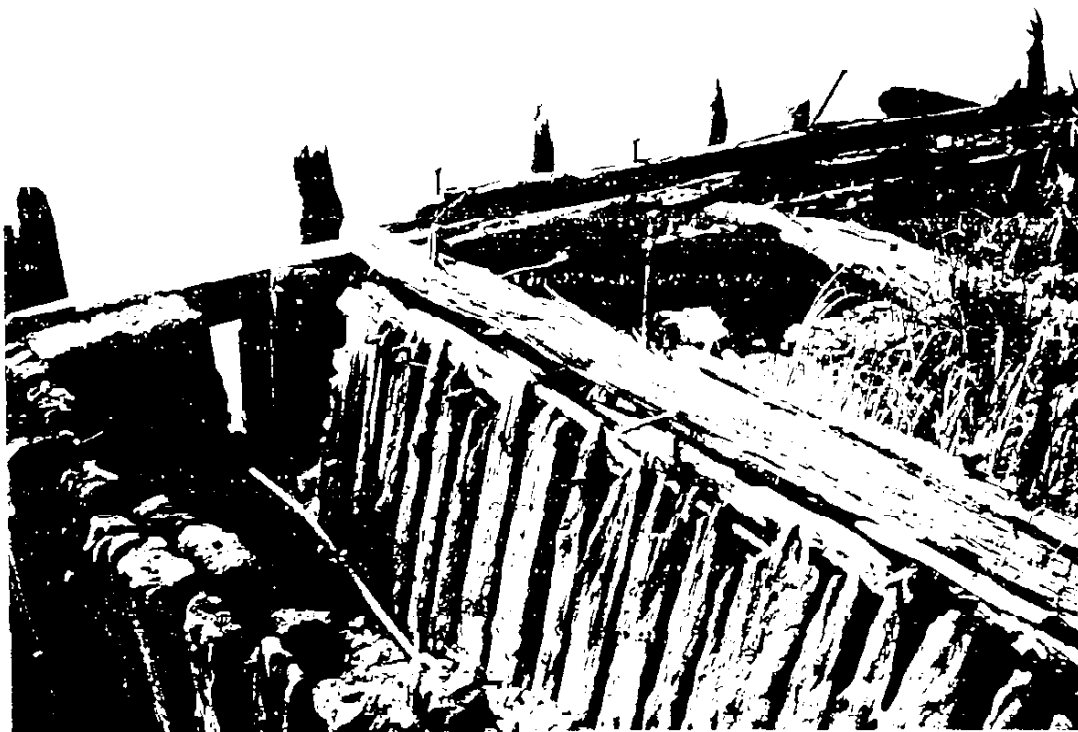


PHOTO 3: Outshore ("T") End of pier, from downriver, showing notched timber construction.



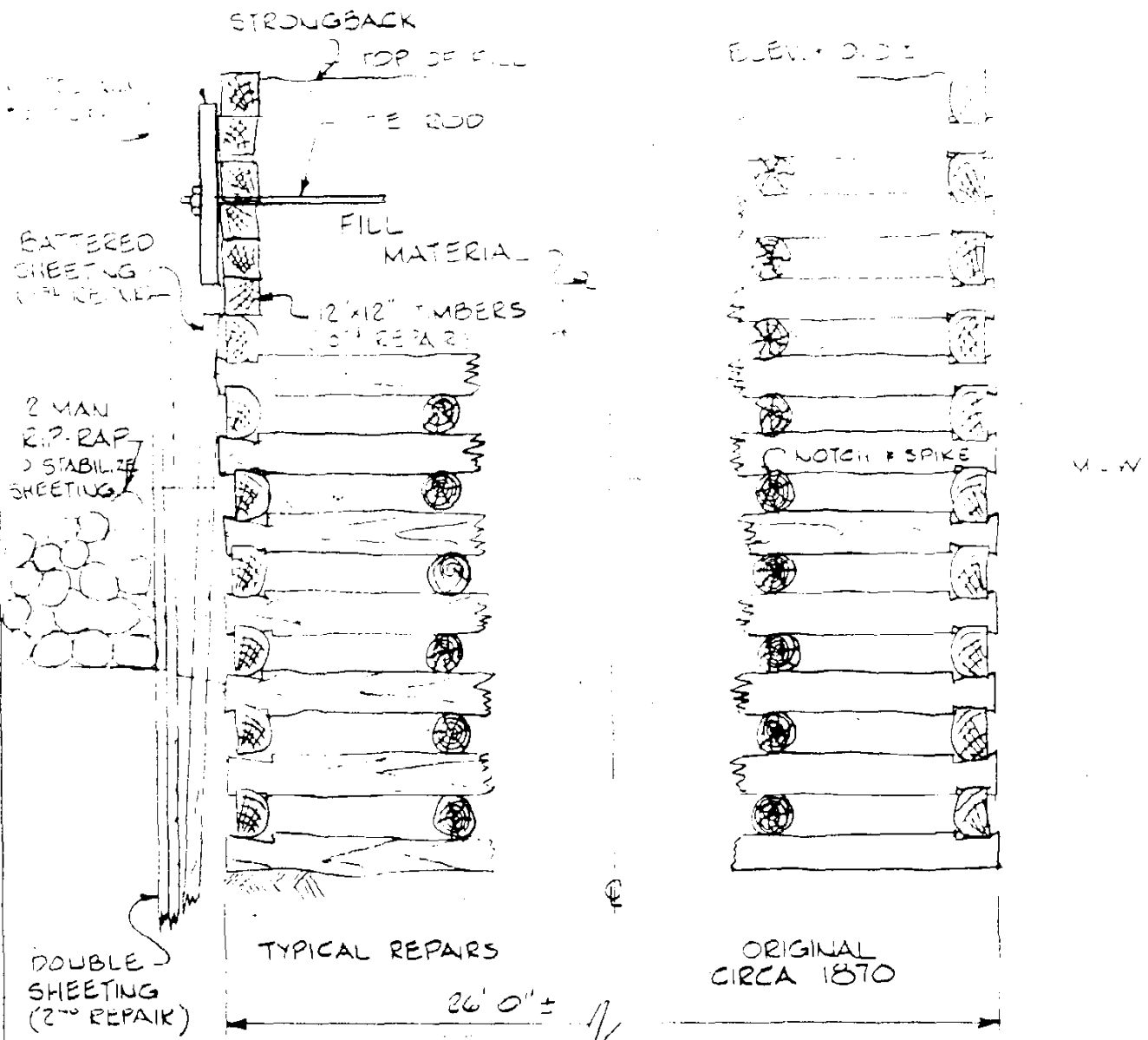
PHOTO 4: View of structure showing notched and spiked longitudinal cribbing timbers and external sheeting.

- D. R. Alan Mounier, Inc. also carried out an inshore archeological investigation. The results are summarized in Appendix B - a formal report will follow. No archeological impediment to the proposed pier rehabilitation or reconstruction was found.
- E. A magnetometer survey of the waters surrounding the pier was conducted by Dolan Research. The purpose of this survey was to detect, by disturbances in the earth's magnetic field, the presence of possible archeological artifacts on the river bottom. The results are plotted on Drawing No. 2 (rear pocket), and show a significant "target" at the outermost upriver corner of the pier, together with some lesser targets. A follow-up diver investigation showed these to be debris from the superstructure of the pier; again, no archeological impediment to the proposed pier rehabilitation or reconstruction was found. A draft report on this work, which includes additional historic background on the Ft. Mott Pier, will be found in Appendix C.
- F. An underwater condition survey of the pier structure was also carried out by a diver/engineer - a formal report will follow as Appendix D. The external sheeting prevented access to the crib structure itself, but the sheeting itself is sound below MLW. Timber fender piling outshore of the end of the pier was also sound below water, and no signs of marine borers were found in either piles or sheeting. From this evidence it is likely that the timbers of the crib structure which are below MLW are sound. Stone riprap has been piled against the sheeting out to a distance of 20 feet from the pier - this is discussed further in Section 4, Pier Rehabilitation Alternatives.

Investigations still to be performed include an exploratory excavation of one or more of the cells of the crib structure, discussed further in Section 4. Offshore soil borings will also be conducted by a subcontractor: it is anticipated that three borings will be required, spaced from approximately MLW to a point approximately 100 ft. off the outshore end of the pier, taken to a minimum depth of 80 ft.

Most importantly, meetings with the appropriate regulatory agencies of both New Jersey and Delaware, and the Federal Government, remain to be held.

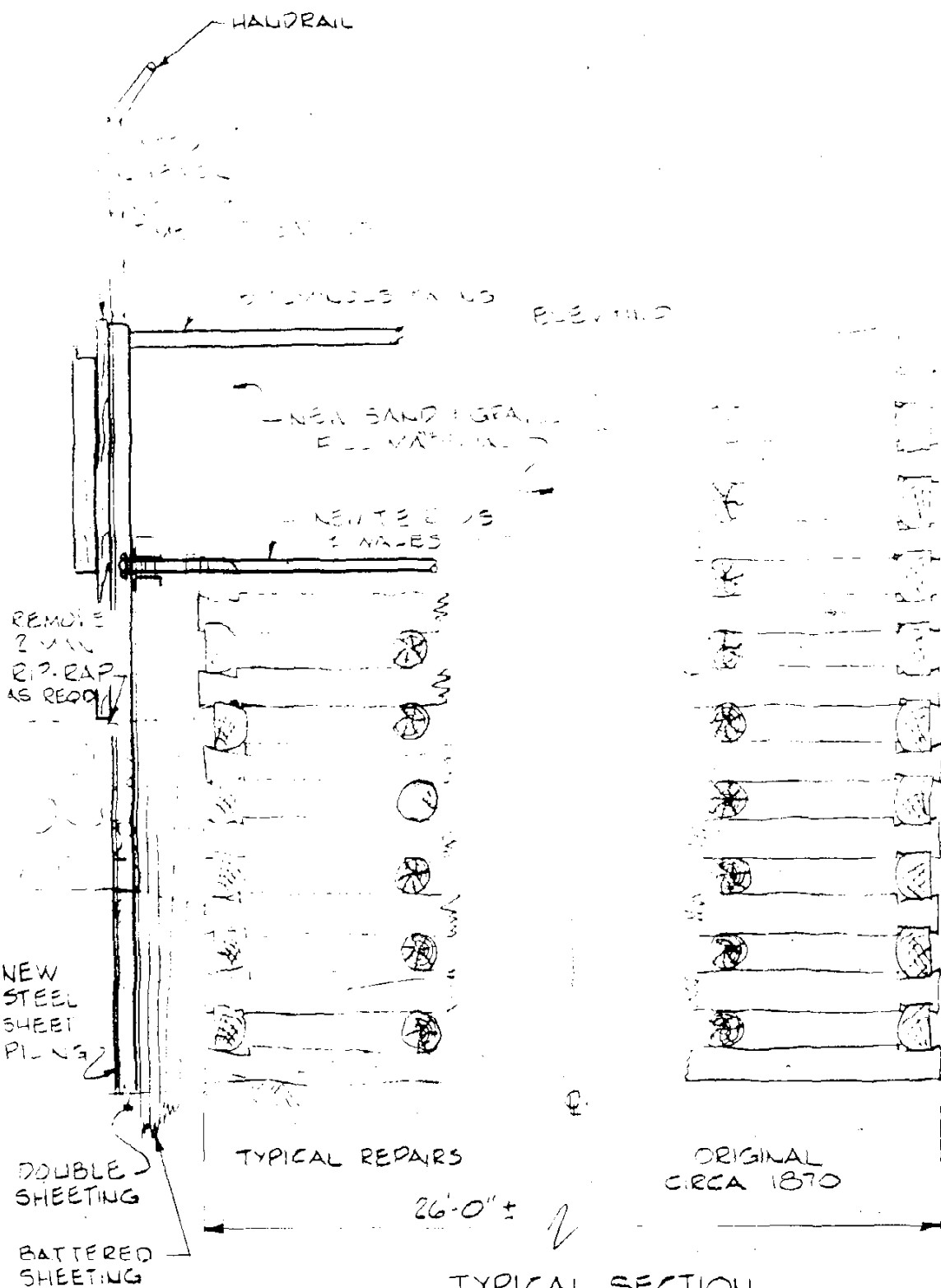
Section 3 following discusses those elements, common to all rehabilitation/reconstruction options, which will be required to accommodate modern ferry service with handicapped access. Section 4 is a description and discussion of the various rehabilitation and/or reconstruction options being investigated. Conclusions and recommendations are in Section 5.



TYPICAL SECTION
SCALE 1/4" = 1'-0"

SKETCH # 6

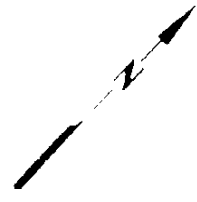
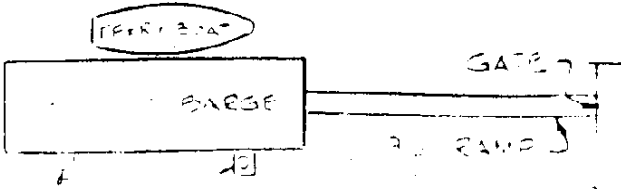
S.T. HUDSON ENGINEERS, INC.
 PROFESSIONAL ENGINEERS & CONSULTANTS
 800 Hudson Square
 P.O. Box 8108
 Camden, N.J. 08103
 Tel. No. 856-342-6383
 856-342-4800



TYPICAL SECTION
SCALE: 1/4" = 1'-0"

SKETCH # 7

S.T. HUDSON ENGINEERS, INC.
 PROFESSIONAL ENGINEERS & CONSULTANTS
 800 Hudson Square
 P.O. Box 2108
 Cambridge, N.J. 08102
 609-342-8800
 609-342-8323



WATER END
100'

APPROX HIGH WATER LINE

PILE SUPPORTED
WALKWAY
SPRITS, ADJACENT

APPROX LOW
WATER LINE

APPROX HIGH WATER LINE

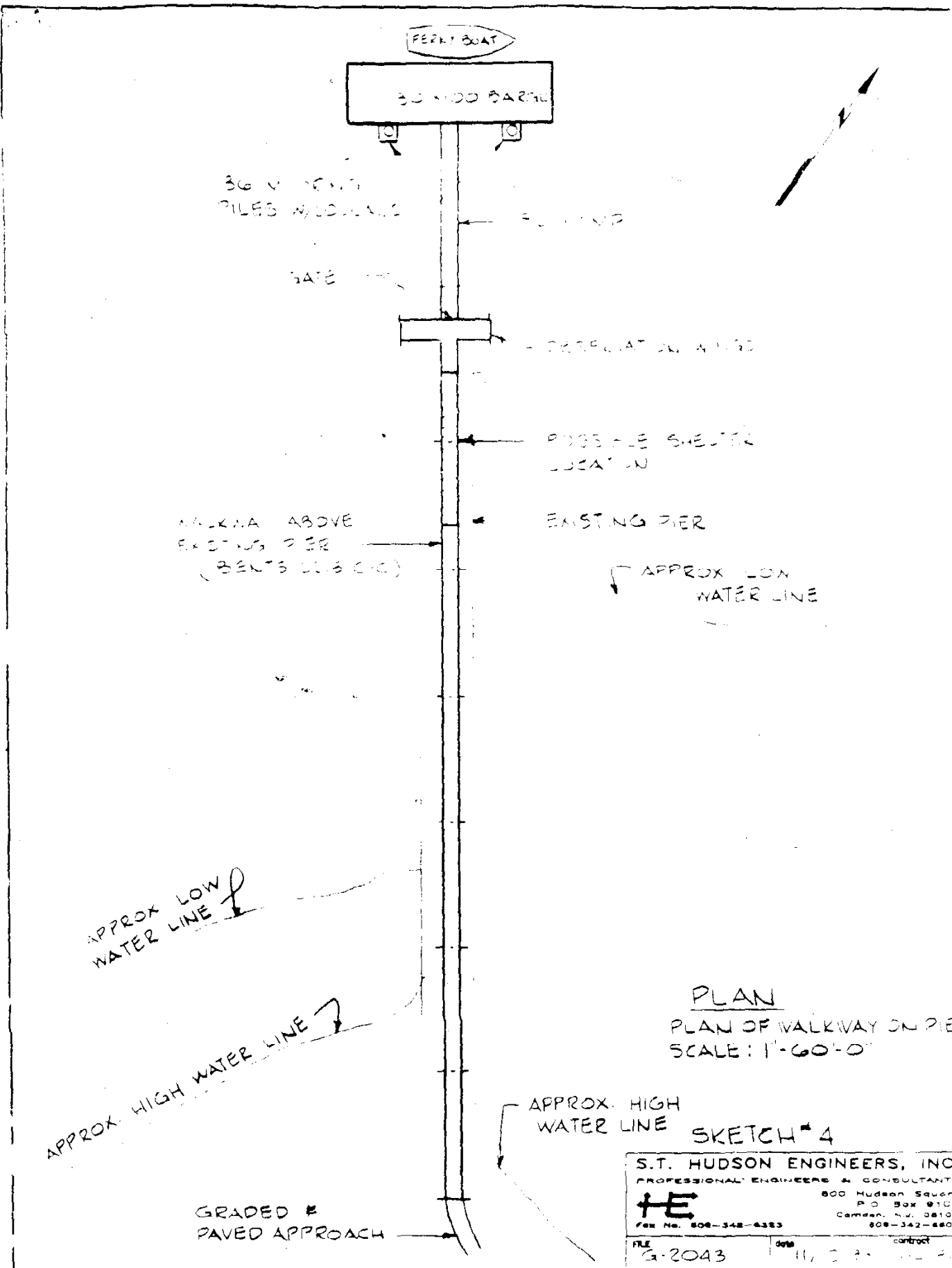
GRADED &
PAVED APPROACH

APPROX HIGH
WATER LINE

PLAN
INDEPENDENT WALKWAY
SCALE: 1" = 60'-0"

SKETCH #2

S.T. HUDSON ENGINEERS, INC.		
PROFESSIONAL ENGINEERS & CONSULTANTS		
800 Hudson Square P.O. Box 0108 Camden, N.J. 08102		
Fax No. 800-342-8323		800-342-8800
FILE	DATE	CONTRACT
02012	10 23	100 55



PLAN
 PLAN OF WALKWAY ON PIER
 SCALE: 1"=60'-0"

SKETCH # 4

S.T. HUDSON ENGINEERS, INC.
 PROFESSIONAL ENGINEERS & CONSULTANTS
 800 Hudson Square
 P.O. Box 9100
 Camden, N.J. 08102
 808-342-6800

HE

FILE G-2043 DATE 11/2/51 CONTRACT



State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Division of Parks and Forestry
CN 404
Trenton, NJ 08625-0404
Tel. #609-292-2733
Fax #609-984-0503

Robert C. Shinn, Jr.
Commissioner

March 7, 1996

David J. Hazelton
Project Assistant
Delaware River and Bay Authority
P.O. Box 71
New Castle, DE 19720

Dear Mr. Hazelton:

I am writing to you as a follow up to our meeting and discussions on February 27, 1996 at the Delaware River and Bay Authority's (DRBA) headquarters.

As we discussed, the Division of Parks and Forestry requests that the DRBA not only lease the pier from the Division of Parks and Forestry for its recreational ferry service, but also undertake the actual restoration of this pier through a cooperative agreement with our division.

It is the intent of the Division of Parks and Forestry to undertake the following initiatives in conjunction with the DRBA to complete this project.

New Jersey Division of Parks and Forestry Responsibilities:

1. Complete the design and permit phases of this project through our current consultant, Hudson Engineering.
2. Provide all plans and specifications to the DRBA for their contracting purposes.
3. Perform all mitigation measures which may be required for wetlands protection and enhancement.
4. Provide DRBA's contractor with a suitable staging area for restoration of pier structure within Fort Mott State Park.
5. Coordinate the reconstruction of pier with park functions and special events.

6. Purchase of suitable floating barge to be retrofitted by the DRBA's contractor and utilized for this project.
7. Lease to the DRBA in consideration of its investment in the restoration of the pier, the actual pier and floating barge for \$1.00/per year. Proposed lease term is 10 years in duration with an option to renew for 10 additional years.

The DRBA's Responsibilities:

1. Restore the pier and retrofit barge to accommodate ferry service in accordance with the final plans, specifications and permit requirements.
2. Operate the ferry service and collect all fees for such in accordance with the pending agreement with the Delaware Division of Parks and Recreation.
3. Lease said pier from the Division of Parks and Forestry and maintain such for recreational ferry service use for the full term of the lease.
4. Provide appropriate insurance idemnification and coverage for the operation of this ferry service and name the State of New Jersey as additionally insured against all claims and legal actions.
5. Provide sufficient funding to accomplish the restoration and retrofitting project as described in number 1 above in accordance with the following formula:
 - DRBA - 50% of total cost or \$400,000 whichever is greater of the actual cost.
 - NJ Division of Parks & Forestry - 50% of total cost or \$600,000, whichever is lesser of the actual costs.

The actual costs of the project would be the following elements:

1. Contracts with fabricators and contractors for completion of pier restoration.
2. All fees and costs associated with construction supervision and oversight.

I believe the above items set forth our intent to complete this project in accordance with our previous discussions. I am quite sure there are several operational and management issues yet to be addressed which will involve both the Delaware Division of Parks and Recreation and the New Jersey Division of Parks and Forestry.

David J. Hazelton
Page 3
March 7, 1996

Please review the above noted issues and if you have any questions or concerns in the interim, please give me a call at (609) 292-2734.

Thank you for your continuing cooperation and assistance on this most worthwhile project.

Sincerely,



Carl R. Nordstrom
Deputy Director

CRN/rm

c. Assistant Commissioner James Hall
Director Gregory A. Marshall
Richard Barker
James T. Rozmus
Scott Mauger
Alvin Payne
Charles Salkin, Director, DE Division of Recreation & Parks

APPENDIX IV