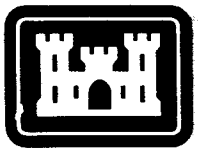
Operation and Maintenance Manual for
Local Flood Protection

1986 (REV: MAY 1990 TO
INCORPORATE AS-BUILT CONDITIONS)

Advance Measures

Flood Control Program

Luna Pier, Michigan



US Army Corps
of Engineers
Detroit District

NCDCO-C (NCEED/28 May 86) 1st End Mr. Jassak/vc/FTS 886-9307

SUBJECT: Preliminary O&M Manuals for Advance Measures Projects at the Village of Estral Beach, the City of Luna Pier, Detroit Beach (Frenchtown Twp), Milliman and Labo (Brownstown Twp), Michigan

FILE: ESTRAL/B.

DA, North Central Division, Corps of Engineers, 536 S. Clark St., Chicago, IL 60605-1592

JUN 25 1986

TO: Commander, Detroit District
Attn: NCEED

1. The subject O&M manuals have been reviewed and approved, subject to the following comments.

a. To Appendix A for Milliman Island, Labo Island, and Estral Beach add "Formats for Other Reports", as in Appendix A for Detroit Beach and Luna Pier.

b. In reviewing the O&M manuals for Milliman Island and Labo Island it appears that the manuals can be combined into one manual. It is suggested this possibility be given consideration.

c. Typographical error on Page 8, Paragraph 3.F., Line 2 of Luna Pier, should be taut instead of "taught".

d. Furnish "As Constructed Drawings" with each manual.

2. Furnish one copy of the final O&M manuals to this office.

FOR THE COMMANDER:

CARL C. CABLE, P.E.
Chief, Construction-
Operations Division

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

IN REPLY REFER TO

NCEED-D

28 MAY 1986

SUBJECT: Preliminary O&M Manuals for Advance Measures Projects at the Village of Estral Beach, the City of Luna Pier, Detroit Beach (Frenchtown Twp), Milliman and Labo (Brownstown Twp), Michigan

Commander, North Central Division
ATTN: NCDCO

1. Copies of the subject preliminary manuals are enclosed for your review and approval.

2. The manuals are for projects whose construction are near completion. The manuals therefore do not contain "As Built" drawings as they are not currently available. The manuals would be updated upon receipt of "As Built" and better quality drawings.

3. It is intended to have approved manuals available in the Detroit District Construction-Operations Division for release to the respective communities, should flooding occur and the projects require community operation and maintenance.

FOR THE COMMANDER:

Encl (Dup)

for P. McCALLISTER, P.E.
Chief, Engineering Division

ADVANCE MEASURES FLOOD PROTECTION PROJECT
AT LUNA PIER, MICHIGAN
OPERATION AND MAINTENANCE MANUAL

TABLE OF CONTENTS

PART I - INTRODUCTION

1. **AUTHORIZATION.** Emergency diking for flood protection was provided, at the City of Luna Pier, Michigan (hereinafter designated as the project). The project was authorized under the authority granted to the Chief of Engineers by section 5 of the Flood Control Act 1941, Public Law 77-288 as amended by Public Law 84-99 (1955) (33 U.S.C. 701n).

2. **LOCATION.** The City of Luna Pier is located in southeastern Monroe County which is in the southeastern portion of Michigan's Lower Peninsula. Luna Pier is located on the western shore of Lake Erie, approximately 42 miles south of Detroit, Michigan, and 6 miles north of Toledo, Ohio.

3. **DESCRIPTION OF PROJECT.** The project consists of the repair and rehabilitation the existing flood protection system built during the Operation Foresight program in 1973, as well as a locally constructed flood protection system completed in 1984. The major project features are listed below:

a. Raising and repairing clay dikes, 3,665 cubic yards of clay.
b. Placement of 3,579 square yards of clay fill behind existing cellular floodwall.
c. Construction of 1,189 square yards of aggregate surfacing for road ramps.
d. Placement of 1,277 steel screw anchors along the cellular floodwall.
e. Placement of 3,367 lineal feet of steel wave deflectors.
f. Placement of 3,334 lineal feet of precast concrete wave deflectors.
g. Placement of 1,520 tons of 250 lb. to 600 lb. riprap stone at the toe of the cellular floodwall.
h. Removal and reconstruction of 374 lineal feet of existing cellular structure sidewalk.
i. Placement of 41 cubic yards of pumped concrete fill in the cellular structure cells.
j. Placement of 55 tons of rock fill in the cellular structure cells.
k. Placement of 3,766 square yards of sod and 23,301 square yards of seed.
l. Placement of an additional 3,994 tons of riprap (see As Builts).
m. Placement of 845 square yards of filter fabric.
n. Placement of shotcrete to seal between cells of cellular structure.
o. Placement of flashboard dike (see As Built Drawings).
p. Placement of gabions (see As Built Drawings).

4. **PROTECTION PROVIDED.** Approximately 500 residential structures situated in a 235 acre area were provided flood protection as a result of the project. Backwater structures were constructed to a 578.4 foot elevation, while the lake front structures were constructed to a 581.0 foot elevation since they were directly subjected to wave action of Lake Erie. These elevations refer to the International Great Lakes Datum of 1955 (known as I.G.L.D.) which is the Mean Water Level (M.W.L.) at Father Point, Quebec. Protection afforded by the Project includes protection from flooding due to high water levels on Lake Erie; such as those experienced during the record Great Lakes water levels which occurred around 1973 and 1986. The City of Luna Pier, under the Local Cooperation Agreement, is responsible for keeping the protected area free of flood and drainage waters at all times.

5. **CONSTRUCTION HISTORY.** Project construction began on 12 September 1985 and was substantially complete in the spring 1986. Seeding, sodding and final cleanup were completed in the summer of 1987. The work was done by E.S. Wagner Company, Inc., of Oregon, Ohio under Detroit District Contract No. DACW35-85-C-0065.

6. **LOCAL COOPERATION.**

a. **Local Cooperation Requirements.** The project was constructed subject to the condition that the local sponsor (City of Luna Pier, Michigan) gave assurances satisfactory to the Secretary of the Army, that they would:

(1) Provide without cost to the United States all lands, easements and right-of-way for the emergency work, including, but not limited to, levee, borrow, spoil and access right-of-way. See APPENDIX E & F.

(2) Hold and Save the United States free from all claims for damages attributable to the construction works except for damages due to the fault or negligence of the United States or its Contractors.

(3) Contribute in cash thirty percent (30%) of the actual first cost of all protection works, less the Government Estimate for any designated canal closure. Fifteen percent (15%) of the thirty percent (30%), was provided by the Department of Natural Resources, State of Michigan. The remaining fifteen percent (15%) was provided by the City of Luna Pier.
(Note: Canal closures were not required for this project.)

(4) Maintain and Operate all works after completion, for a period of 25 years, without cost to the United States in a manner satisfactory to the Chief of Engineers. The foregoing maintenance and operation requirement extends to interrelated features of all protective works under control of the Community such as interior drainage and pumping facilities.

(5) Comply with applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970", Public Law 91-646, approved 2 January 1971, in acquiring lands, easements and rights-of-way

for the project and inform affected persons of pertinent policies, procedures and benefits in connection with the Act.

(6) Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto published in Part 300 of Title 32, Code of Federal Regulations, in connection with the maintenance and operation of the project.

(7) Finish dress and place sod on the clay protective works or seed with a good sod-producing seed mixture after completion of the work and prior to the end of the next seeding season.

(8) Release and forever discharge the United States, its officers, employees, agents and assigns, in the prosecution of the Advanced Measures protective works from all claims, demands, actions and causes of action whatsoever, which may arise by reason of, or in any manner have grown out of, or alleged to have grown out of, the construction of the said protective works.

(9) Grant permission to the United States of America, its officers, employees, agents and assigns and the Government contractors, their officers, employees, agents and assigns, to enter upon Community lands and rights-of-way, including any additional rights-of-way to be obtained by said Community, for the purpose the emergency flood control work here in before described.

b. **Assurances Furnished by Local Interest.** By a signed agreement between the United States and the City of Luna Pier,Michigan, dated 25 July 1985, the City of Luna Pier assured the United States that it would provide each of the items of the local cooperation. The agreement for assurances was approved by the District Engineer.

c. **Submitted Plans.** In addition to the preceding, the City of Luna Pier submitted modification plans to the District Engineer for flood protection at the location of two (2) boat ramps. With the approval of these plans, the City completed the required flood protection prior to substantial completion by the Corps of Engineers contractor; E.S. Wagner.

PART II - OPERATION AND MAINTENANCE

1. GENERAL PROCEDURES

a. **Regulations.** Section 208.10, Title 33 of the Code of Federal Regulations, contains regulations for the operation and maintenance of protection works, approved by the Secretary of the Army in accordance with authority contained in Section 3 of the Flood Control Act of 22 June 1936, as amended and supplemented. (See Appendix C.).

b. **Procedure for Insuring Compliance with Regulations.** The District Engineer will be kept informed as to the extent of compliance with approved regulations for operation and maintenance through regular periodic inspection of the project and through careful analysis of the semiannual reports which the operating and maintaining agency, City of Luna Pier, shall submit in accordance with the regulations. The District Engineer's views as to any measures required to conform to the approved regulations will be furnished to the agency responsible. In any case where the District Engineer has been unable to arrange satisfactory compliance, or where there is question or disagreement as to the measures required for compliance, a report of the circumstances, together with the recommendations of the Division and District Engineer, will be submitted to the Chief of Engineers for consideration. The District Engineer or his representatives shall have access at all times to all portions of the project works.

c. **Operations and Maintenance Manual.** This manual of operations and maintenance has been prepared and furnished to the operating and maintaining agency to assist them in carrying out their obligations, for a period of 25 years, by providing information and advice concerning the operation and maintenance of the project. Details and suggestions for complying with the regulations are given in the following paragraphs.

d. **Superintendent.** The City of Luna Pier shall designate an official, called a superintendent, who has read the Operational and Maintenance Manual in full and understands all of the requirements, and is responsible for carrying out the provisions of maintenance and operation of the protection project. The Superintendent shall be designated from available City personnel, whose name, address and telephone number shall be given to the District Engineer. In case of any change in the superintendent, the District Engineer shall be notified. In addition to the duties which are outlined in other portions of the manual, the superintendent has a general responsibility for developing and maintaining an organization which can carry out efficiently the maintenance and operation of all structures and facilities during high water or rain storm periods and the inspection and maintenance of the project works at all other times.

e. **Improvements or Alterations to the project.** Drawings or prints of proposed improvements or alternations to the protective works are required and should be submitted, to the District Engineer, U.S. Army Engineer District Corps of Engineers, at the address shown in Appendix D. Submission of the drawings should be sufficiently in advance of initiation of the proposed construction to permit adequate study and consideration of the work. Drawings in

duplicate, or reproducible prints, showing any improvements or alternations as finally constructed should be furnished to the District Engineer after completion of the work.

f. **Semiannual Report to the Corps of Engineers.** A semiannual report shall be submitted to the District Engineer, U.S. Army Engineer District, Detroit, Corps of Engineer, at the address shown in Appendix D. The semiannual report periods shall be from 1 August through 31 January, and from 1 February through 31 July. Reports shall be submitted within 30 days after the end of each reporting period. The report should cover inspection and maintenance of the protective works and should include dated inspection check-lists or report sheets (See Appendix A) made during the period covered by the reports. In case repairs have been made, either temporary or permanent, the nature and dates of construction are pertinent and should be included in the report. Prints of any photographs showing the protective works during high water or rain storms, creating high waves or flooding are desired whenever available.

g. **Periodic Inspections.** Periodic inspections should be made at the following times:

(1) Immediately following each major high water period.

(2) Otherwise at periods not exceeding six (6) months.

(3) At such times as may be deemed necessary by the Superintendent.

h. **Joint Inspection.** A joint inspection should, if possible, be made annually by the District Engineer or his authorized representatives, and the Superintendent. Arrangements for this inspection should be initiated by the Superintendent. Points of contact with telephone numbers are contained in Appendix D.

i. **Check Sheets.** To facilitate inspection, either routine or emergency, there is a suggested form of a check sheet and supplemental report provided in Appendix A. These or similar forms, should be used in each inspection to insure that no feature of the protective system is overlooked. Any item requiring repairs should be noted in a supplemental report and conditions of items should be indicated by a check, on the check sheet.

2. PROJECT FEATURES.

a. **Design.** The Project incorporates a number of design contracts. In 1973, the Corps of Engineers constructed emergency flood control structures which consisted of rock and sand cribs on the Lakeside, and clay dikes to prevent backwater flooding. In 1983 N.K. Becker and Associates Ltd., designed and constructed a concrete cellular lakefront floodwall which provided protection to 578.5 feet (I.G.L.D.). When the Advance Measures Program was initiated in 1985 the Corps developed a least cost flood protection plan which provided protection separate from the existing concrete floodwall along the lakefront to an elevation of 581.0 feet (I.G.L.D.). The Corps of Engineers A/E design contractor, Black and Veatch, hired a subcontractor, N.K. Becker, to design a structure which incorporated the existing cellular concrete floodwall. The City of Luna Pier had requested that the existing cellular concrete floodwall be incorporated into the project and agreed to pay any additional cost above the least cost Corps of Engineers design.

b. **Protective Works.** The protective works include the following:

(1) **The raising and repairing of existing clay dikes to the elevation of 578.4 feet (I.G.L.D.).** The clay dikes have a top width of five feet, plus a landside and waterside slope of one vertical to two horizontal. The clay dikes are sodded on the waterside and seeded on the landside. The project consists of clay dikes in a number of areas. These should be inspected as well as the ones which were recently repaired or raised.

(2) **Incorporation of existing cellular wall.** In 1983 the cellular wall was constructed of seven (7) foot long sections of concrete pipe placed on stabilized base material (gravel). The cells were bolted together and lined with a fabric liner. They were then filled with random material placed in a membrane and capped with a six (6) inch reinforced concrete cap (walkaway). In 1985 under this project a wave deflector was added. As-built drawings for the concrete cellular wall are available at the City of Luna Pier offices. It is extremely important that all cells be filled as designed. Minor lakeward tilting of some sections of the wall was observed. This condition has been analyzed, and undermining was the suspected cause. A program for monitoring the behavior of the cellular wall was established, carried out, and the undermining was corrected.

(3) **Installation of steel and reinforced concrete wave deflectors.** Wave deflectors were installed on the lakeside of the cellular wall extending the protection to the elevation of 581.0 feet (I.G.L.D.). See details of construction presented in Appendix B. Although design to be "removable," their size and weight would make them difficult to handle. Any plan to remove these structures must be submitted to the District Engineer prior to implementation.

(4) **Installation of steel screw anchors.** Installation of screw anchors was necessary to assure stability of the cellular wall, as extended, when subjected to severe wave action. The installation requirements used are shown, in detail, in Appendix B.

(5) **Placement of 250 pound to 600 pound riprap at the toe of the cells.** The riprap provided, protects the cell from being undermined, protects the screw anchor shafts from severe ice loading, provides sufficient cover for the screw anchors, and adds stability to the cellular wall. In light of the design intent, it is imperative that the riprap be maintained as showed in the required cross section. Riprap placed at the base of such structures may work itself into lake bottom due to washing action during normal wave conditions. Storm conditions may accentuate this action. The Project riprap was placed on existing riprap, and substantial future settlement is not expected. Conditions at the toe of the structure were not, however completely known, and some settlement is possible.

(6) **Placement of a clay wedge against the landward side of the cellular wall.** A clay wedge was placed on the landward side of the cells, compacted, and later seeded, as showed in the cross section in Appendix B. The purpose of the wedge is to control leakage through cell interfaces, as well as add to the stability of the structure.

(7) **Repair of existing cellular wall.** Approximately 374 feet of existing cellular wall was repaired according to plans shown in Appendix B. These details should be utilized in the event, future repairs are required.

(8) **Raised roadway in backwater area.** A roadway was raised in the backwater area near the intersection of Allen Cove Road and Gardner Drive. Existing road ramps in other areas were utilized in the required flood protection, and should be inspected as part of the Project.

(9) **Tying into existing flood protection structures.** As previously mentioned, existing clay dikes and road ramps were utilized in the planned flood protection, and as such are part of the Project. In addition, there are eight (8) locations where other existing flood control structures were either utilized, or adapted into the Project plan. See Appendix B for locating these structures, as well as details or individual descriptions.

(10) **The Installation of flashboard dikes.** The flashboard dikes have a top elevation of 578.4 feet (I.G.L.D.). The material used in the construction of the flashboard dikes are as follows:

(a) 2 inch diameter, extra strong (Schedule 80), 10 foot long straight steel pipes conforming to ASTM A53.

(b) 2"x 6" lumber, No. 2 grade, 14 foot lengths, and treated with Type CCA preservative.

(c) Wire, #9 gauge, galvanized.

(d) Clay backfill with a three foot crest width, two horizontal to one vertical landside slope, and seeded.

(e) Riprap, Installed to a 577.6 foot (I.G.L.D.) elevation.

Placed on a one vertical to two horizontal slope.

(f) Polyethylene sheeting; 6 mil. thick.

c. **Source of Materials.**

(1) All clay, topsoil, sod, seed, stone, and concrete were obtained from local sources and are readily available.

(2) All wood, steel, and plastic sheeting used in the construction of flashboard dikes were supplied by the government.

(3) The precast concrete wave deflectors, prefabricated steel wave deflectors and steel screw anchors are specialty items. The manufactures / suppliers used by the Contractor in this project are listed below:

(4) Points of contact for specialty Items:

(a) For screw anchors, anchor tie rods, connections, etc.:

A.B. Chance Co.
210 N. Allen St.
Centralia, MO. 65421
(314) 682-8414

(b) For steel wave deflectors:

Van Loon Industries, Inc.
36569 Groesbeck Highway
Mount Clemens, MI. 48043
(313) 791-2270

(c) For pre-cast wave deflectors:

Michigan Pre-cast Concrete
4950 Mason Road
Howell, MI. 48848
(517) 546-1005

d. **Interior Drainage.** Interior drainage is to be provided by the City according to the Local Cooperation Agreement. It may be necessary for the City of Luna Pier to analyze the interior drainage system for adequacy.

3. **MAINTENANCE.**

a. **General.** The Superintendent is to make periodic inspections, to take immediate steps to remedy any adverse conditions disclosed by such inspections, and to provide for any periodic repairs and all adjustments that may be required to restore or preserve all the protective works. Bench mark locations and elevations for use in maintenance work are available on the drawings contained in Appendix B. These bench marks are referred to (I.G.L.D.), (1955).

b. **Clay Dikes.** Earth sections shall be checked for evidence of serious surface erosion, undermining, settlement, seepage paths, objectionable plant growth, animal burrows, unauthorized excavation or removal, and need for reseeding and resodding.

c. **Concrete Structures.** All concrete work shall be checked for settlement, spalling, buckling, cracking and any other form of deterioration. Displacement cracks, spalling near stress points and buckling shall be reported to the District Engineer, analyzed to determine the cause, and repaired as soon as possible. Cracks shall be filled with a sealer, and spalled concrete shall be patched as required. Joints shall be checked for missing sealer material.

d. **Steel Wave Deflectors.** The steel wave deflectors should be checked for evidence of buckling, cracked welds or loosened bolted connections. The paint on the surface of the steel wall which has started blistering or peeling should be removed by either a low pressure blast using sand, plastic pellets, etc. or a blast of water under high pressure. If repainting of the affected area is required, a wash primer (Formula No. 117 for metals) specified in Military Specification No. DOD-P-15328D should be applied prior to the completion of the final coat.

e. **Anchor Bolts.** Anchor bolts were used to install all 6,700 feet of the wave deflectors. They should be checked to assure that they continue to provide sufficient anchorage for the deflectors. In order to maintain a proper torque-tension in the anchor bolts, the bolts shall be brought to a "snug tight" condition. The snug tightness may be attained by a few impacts of an impact wrench. Snug tightening shall progress in a systematic manner as necessary until all bolts in the wall are snug tight and connection is fully compacted. Following this initial operation all bolts shall be tightened further by 1/3 turn. During the tightening operation there shall be no rotation of the part not turned by the wrench. Tightening shall progress systematically from most rigid part of the wall to its free edge. This procedure shall be repeated at least once a year and after every significant storm.

f. **Screw Anchors.** The screw anchors should be checked to assure that the anchor rod is taut. However, no significant pre-load is required in the screw anchors. Ice loading would probably be most likely to cause damage. The anchor itself requires the earth and stone cover as shown on the drawings of

Appendix B. Therefore the lake bottom near the structure should be checked.

g. **Riprap.** Riprap must be checked to assure it remains as shown in the cross-sections provided in Appendix B. The riprap is required for stability. Should the riprap be washed out or settle, additional riprap of appropriate size must be placed immediately.

h. **Utilization of Existing Structures.** Existing structures which were utilized to complete the plan for flood protection should be maintained to at least the condition they were in when the project was completed. Local structures which are similar are those discussed in the manual should be inspected and maintained as described in this manual.

i. **Right-of-way.** The permanent right-of-way should be maintained free and clear of all obstructions, to facilitate inspection and repair.

j. **Aggregate Surfaced Road Ramps.** Road ramps shall be checked for evidence of slope flattening, undermining, apparent movement, loss of aggregate surfacing and crest elevation.

4. OPERATION.

a. **Storm Observation.** Observation should be made, if possible, of wave action during lake storms and during periods of high water to note any locations which may be damaged, or have been damaged. When it is anticipated that damage may occur, all necessary measures must be taken to provide protection for these areas. All damaged areas must be repaired or protected immediately to prevent further damage. The critical periods during which storms may occur will generally be during the spring and fall seasons, although severe storms can occur at any time.

b. **Flood Fighting.** State and Local Government have basic responsibility for conducting flood fighting operations. However, if it is determined that emergency flood fighting assistance is required beyond the State and Local capability during a flood event, the Corps of Engineers can get involved in accordance with Public Law 84-99. This assistance should be requested through the County Emergency Services Office and the Michigan State Police Emergency Procedure Branch, see Appendix D for points of contact.

APPENDIX A

INSPECTION/REPORT FORMS

ADVANCE MEASURES FLOOD PROTECTION PROJECT AT LUNA PIER, MICHIGAN

Item No.	Reason for Inspection: _____ Date: _____ Inspection Made By: _____ DESCRIPTION	CONDITION (Check One) Yes (1)	Poor(1)	Fair(2)	Good	None
	GENERAL					
1.	*Unauthorized Encroachment on R.O.W*		▒	▒	▒	
2.	*Unauthorized Changes*		▒	▒	▒	
3.	*Breaches*		▒	▒	▒	
4.	*Weed, Brush & Tree Control*	▒				▒
5.	*Potential Problem Areas*		▒	▒	▒	
	CLAY DIKES / FILL					
6	*General Condition*	▒				▒
7.	*Crown and Slope Cover*	▒				▒
8.	*Crown and Slope Sloughing*		▒	▒	▒	
9.	*Crown and Slope Scouring*		▒	▒	▒	
10	*Crown and Slope Settlement*		▒	▒	▒	
11	*Evidence of Seepage*		▒	▒	▒	
12	*Evidence of Burrowing Animals*		▒	▒	▒	
	CONCRETE CELLULAR FLOODWALL					
13	*General Condition*	▒				▒
14	*Concrete Condition*	▒				▒
15	*Settlement*		▒	▒	▒	
16	*Tilting*		▒	▒	▒	
17	*Evidence of Undermining*		▒	▒	▒	
18	*Evidence of Loss of Fill*		▒	▒	▒	
	CELL CAP / WALKWAY / WAVE DEFLECTOR					
19	*General Condition*	▒				▒
20	*Condition of Previous Repairs*	▒				▒
21	*Condition of Joints*	▒				▒
22	*Cracking*		▒	▒	▒	
23	*Displacement*		▒	▒	▒	
24	*Buckling*		▒	▒	▒	
25	*Spalling*		▒	▒	▒	
	REINFORCED CONCRETE WAVE DEFLECTORS					
26	*General Condition*	▒				▒
27	*Anchorage*	▒				▒
28	*Cracking*		▒	▒	▒	
29	*Spalling*		▒	▒	▒	

▒ *Condition not applicable*

(1) If column is checked, supplemental report is required.

(2) If column is checked, supplemental report is required if there is a strong possibility that the condition may become worse.

ADVANCE MEASURES FLOOD PROTECTION PROJECT AT LUNA PIER, MICHIGAN

Reason for Inspection: _____

Date: _____

Inspection Made By: _____

Item No.	DESCRIPTION	CONDITION (Check One) Yes (1)	Poor(1)	Fair(2)	Good	None
	STEEL WAVE DEFLECTOR					
30	General Condition (Including Paint)					
31	Anchorage					
32	Bolted Connections					
33	Welded Connections					
	SCREW ANCHORS					
34	General Condition					
35	Condition of Connection to Cell Cap					
36	Loss of Cover Over Anchor					
37	Anchor Rods Bent or Damaged					
	RIPRAP					
38	General Condition of Stone					
39	Loss of Stone					
	ROAD RAMPS					
40	General Condition					
41	Condition of Road Surface					
42	Condition of Side Slopes					
43	Undermining					
44	Settlement					
	SPECIAL / EXISTING FLOOD CONTROL STRUCTURES TIED–IN TO MAJOR PROJECT FEATURES					
45	General Condition					
46	Tie–Ins to Major Project Features					
47	Seepage					
48	Settlement					
49	Undermining					
50	Loss of Structural Integrity					
	FLASHBOARD DIKES					
51	Timber, Steel & Alignment Condition					
52	Seepage control					
53	Slope Armor Stone Condition					
54	Fill Material Level / No Exposed Polyethylene Sheeting Condition					

Number of Supplemental Reports Associated with this Inspection: _____

Condition not applicable

(1) If column is checked, supplemental report is rerquired.

(2) If column is checked, supplemental report is required if there is a strong possibility that the condition may become worse.

SUBMITTED BY: _____ *Date:* _____

Project Superintendent

FORMATS FOR OTHER REPORTS

1. **Supplemental Reports.** As stated previously, a Supplemental Report is required when Project deficiencies are observed during an inspection. The following items should be included for each deficiency noted:

a. Reference to Item No. in checklist.

b. Location of deficiency (preferably by Project stationing).

c. Description of deficiency.

d. Photos (if available).

e. Narrative which should include (if applicable):

(1) Possible causes

(2) Need for design analysis or redesign

(3) Alternatives for correcting deficiency

(4) Alternatives for prevention of recurrence

(5) Conclusions

f. Planned course of action which includes:

(1) Immediate required action

(2) Future required action

g. Future follow-up/monitoring

2. **Special Reports.** As stated in the text, special inspections may be necessary for a number of reasons. When such an inspection is made reference should be made to the General Inspection Checklist for items to inspect. The following should be included in each Special Report:

a. Reason for inspection.

b. Area or feature of Project inspected (including the location).

c. Findings during inspection (if deficiencies or potential problem areas are discovered, they should be addressed as required in the Supplemental Report format).

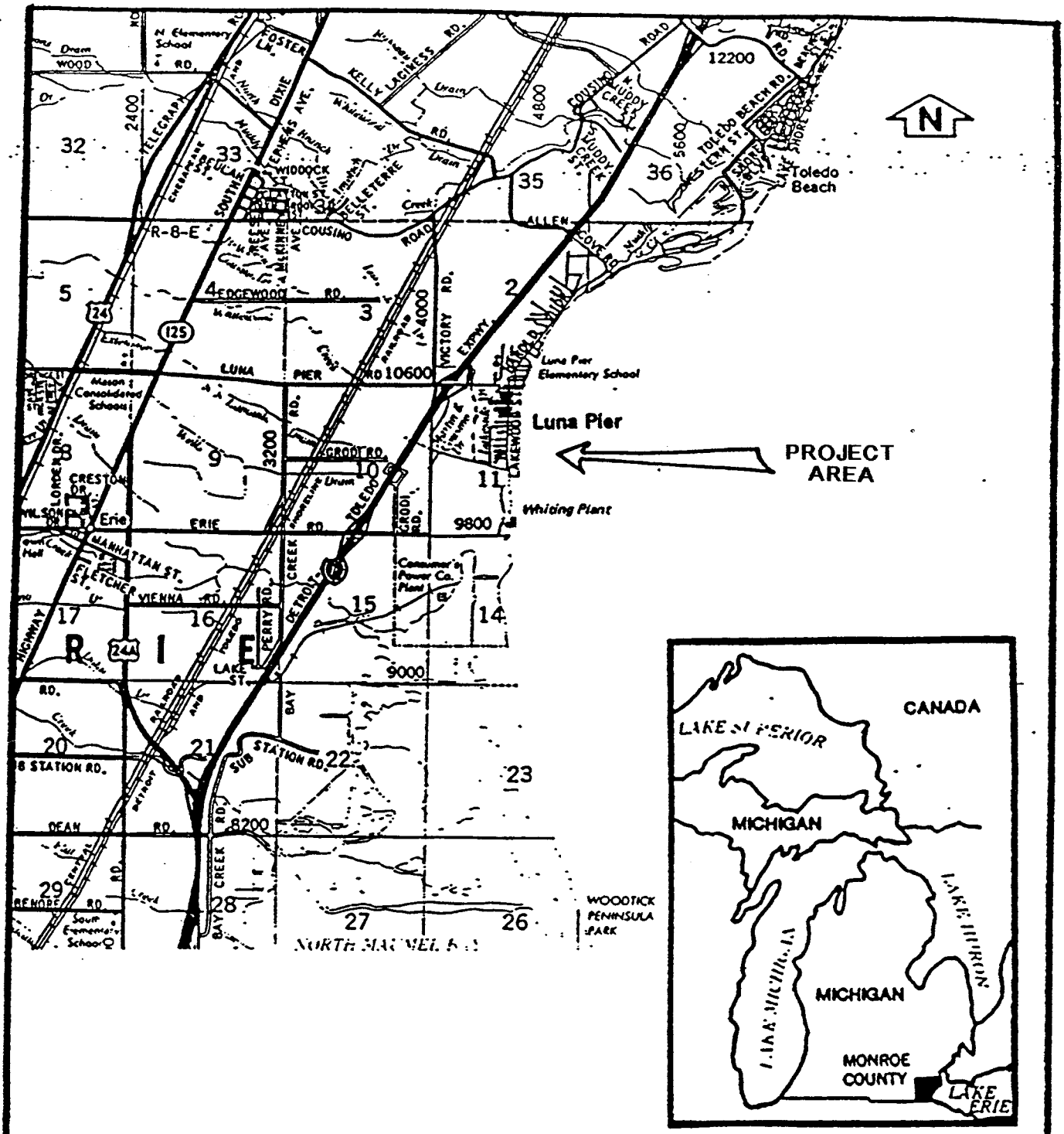
d. Conclusions.

e. Future follow-up/monitoring.

APPENDIX B

LOCATION MAP, VICINITY MAP, PROJECT MAP AND AS-BUILT DRAWINGS

INDEX OF DRAWINGS



VICINITY MAP

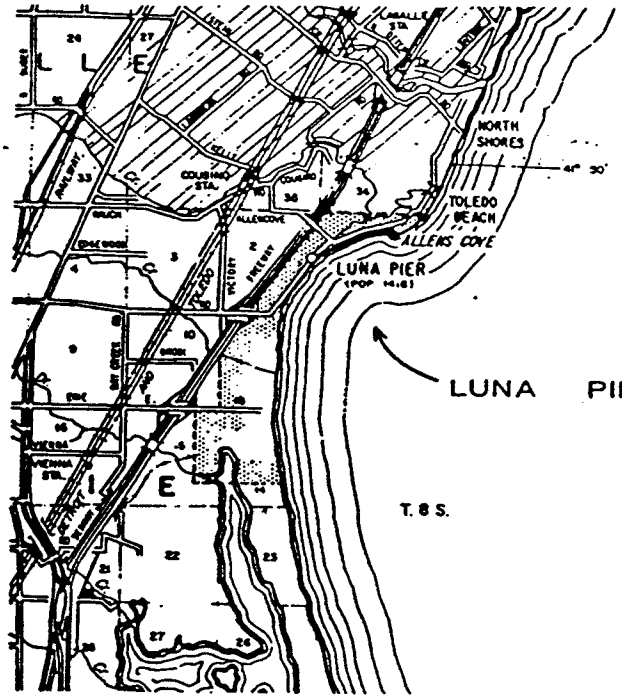
LOCATION MAP

LUNA PIER

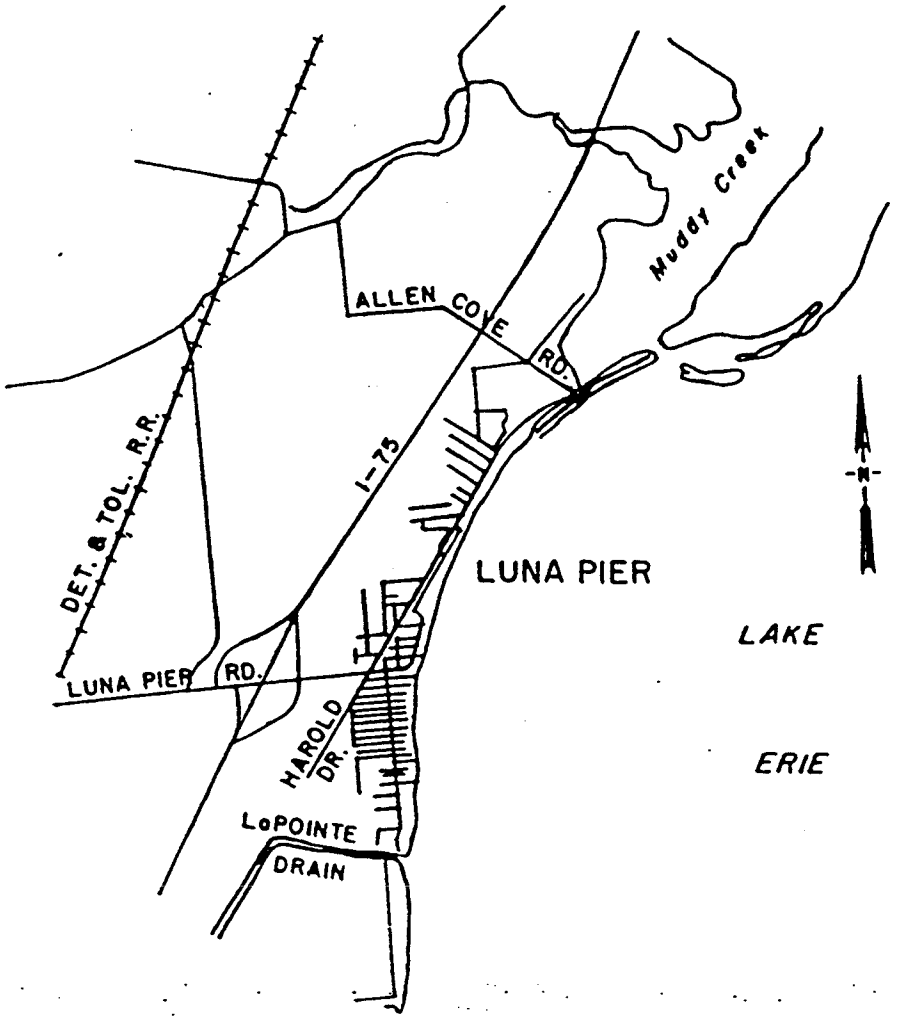
MONROE COUNTY MICH.

DETROIT DISTRICT, CORPS OF ENGINEERS

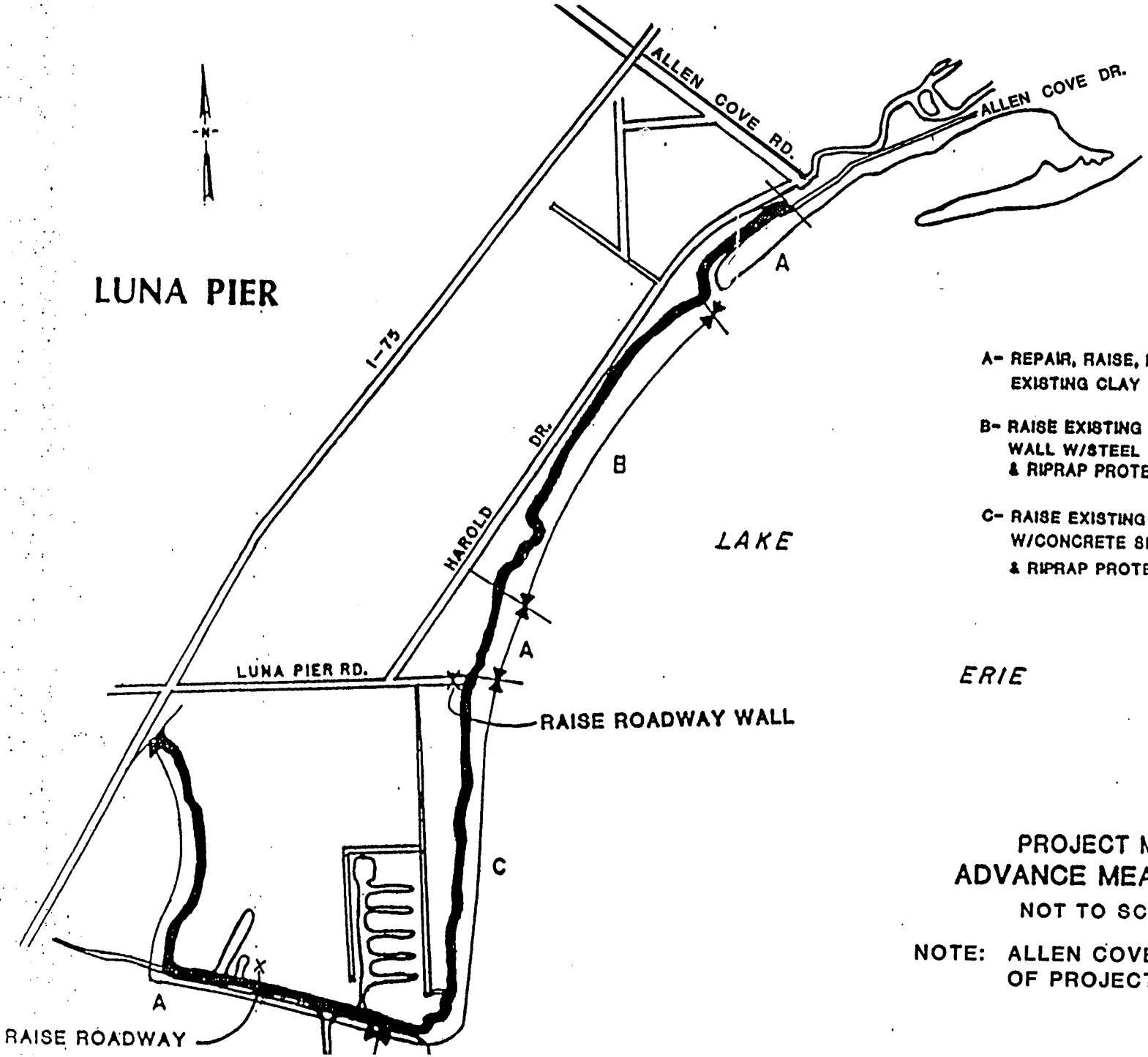
PLATE 1



LOCATION MAP

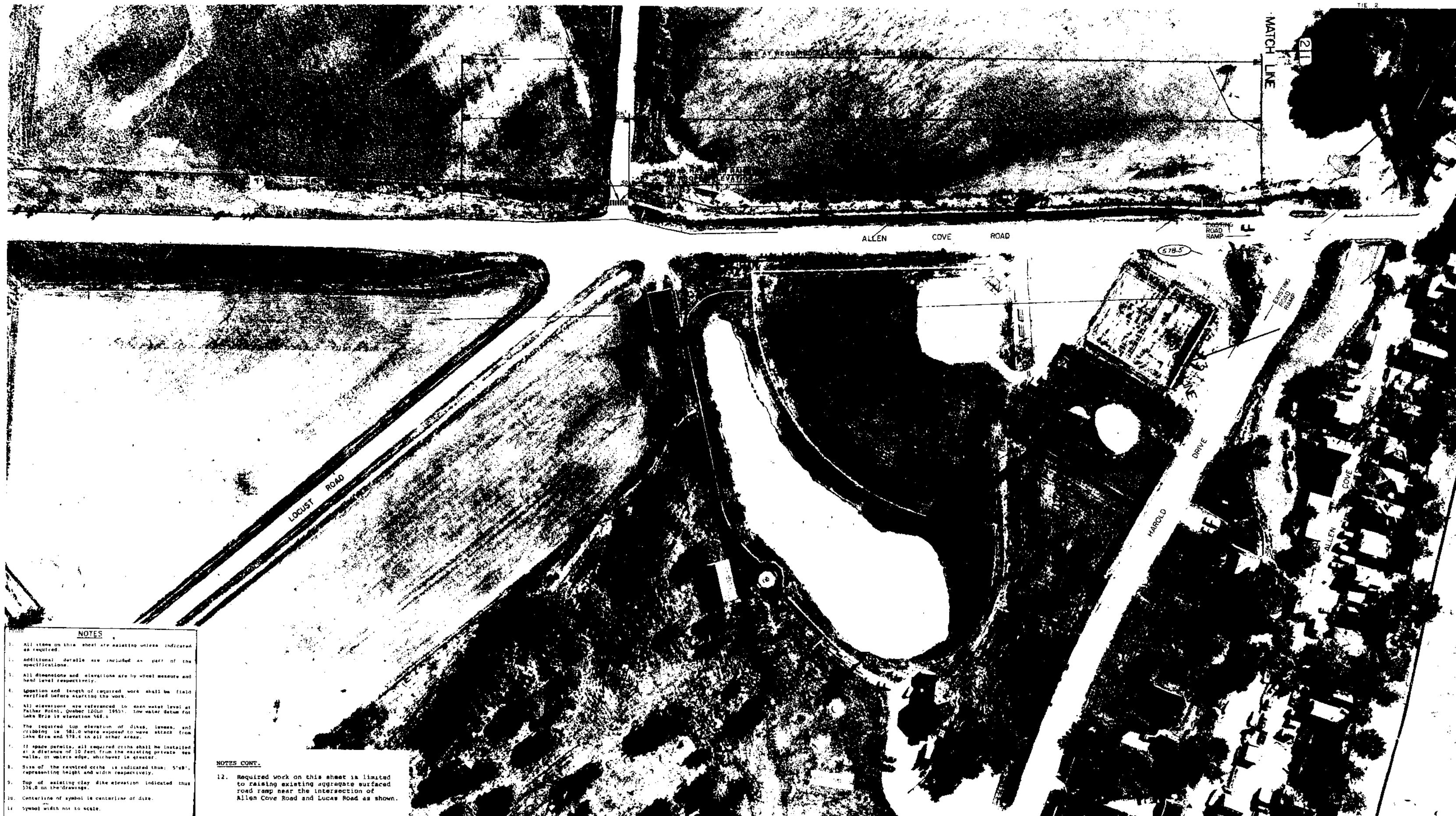


VICINITY MAP



PROJECT MAP
ADVANCE MEASURES
NOT TO SCALE

NOTE: ALLEN COVE PROTION OF PROJECT NOT SHOWN.



NOTES

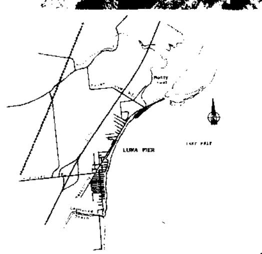
1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.6 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus 576.0 on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

NOTES CONT.

12. Required work on this sheet is limited to raising existing aggregate surfaced road ramp near the intersection of Allen Cove Road and Lucas Road as shown.

LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. REGRADE/REPAIR EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

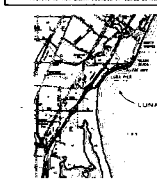


VICINITY MAP

SCALE

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION



LOCATION MAP

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd.

NOTE:
SHEET 2 OF 14 (DM 12/1122) IS DELETED FROM CONTRACT

NO.	DATE	REVISION	BY
	28 JULY 89	AS BUILT	DLA

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT MICHIGAN

DRAWN BY: DL
TRACED BY:
CHECKED BY: HRP
REVIEWED: NKB

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 1/2

SUBMITTED: Chief, Design Branch
APPROVAL RECOMMENDED: Chief, Engineering Division, P.E.
DATE 19 JULY 1985
APPROVED: COL. C.E. DISTRICT ENGINEER

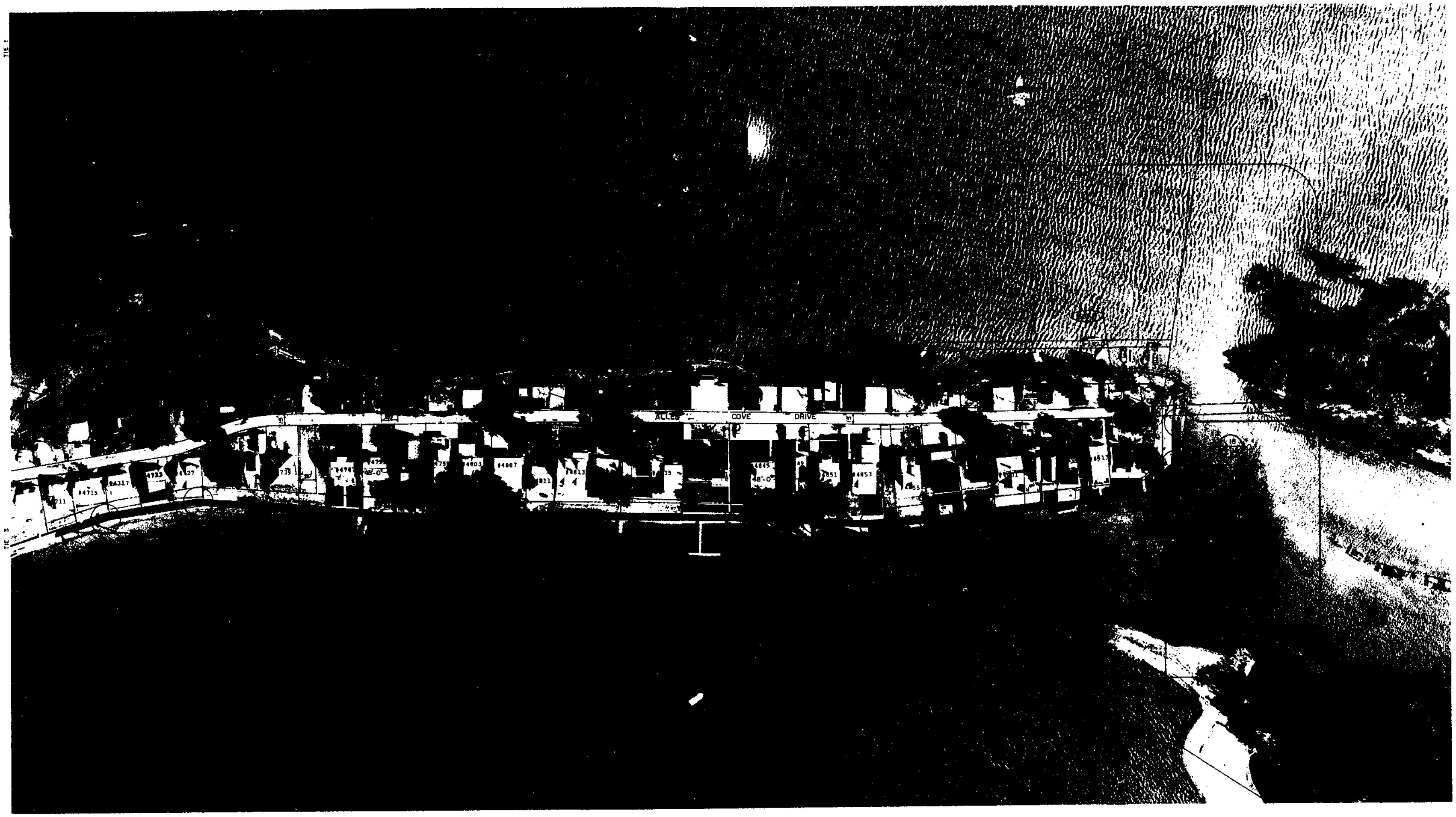
SHEET 1 OF 14
DRAWING NUMBER DM12/1121

ABRAMS AERIAL SURVEY CORPORATION

DATE OF PHOTOGRAPHY 18 JUNE 1985

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

INVITATION NO. DACW. 35-85-C-0065



LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. REGRADE/REPAIR EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION – LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION – LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION – LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL – NO WORK REQUIRED

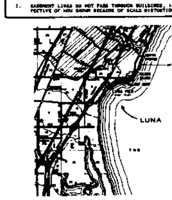
NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (576.0) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.
12. For damaged concrete cell drill hole in existing concrete sidewalk and pump 2500 p.s.i. concrete into cell to fill.

SCALE 1" = 50'

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION.



LOCATION MAP

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

NO.	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN.

DRAWN BY: CL
TRACED BY:
CHECKED BY: HRF
REVIEWED: HKB

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIF
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 1/2 to 2/3

SUBMITTED: P.E. Chief, Design Branch
APPROVAL RECOMMENDED: C. Argiroff P.E. Chief, Engineering Division
DATE 19 JULY 1985

APPROVED: Col. C.E. District Engineer

SHEET 2 OF 14
DRAWING NUMBER DM12/1122

INVITATION NO. DACW35-85-C-0065

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

ABRAMS AERIAL SURVEY CORPORATION

DATE OF PHOTOGRAPHY 18 JUNE 1985

B-1

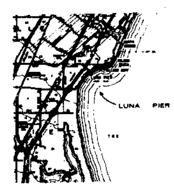
LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. REGRADE/REPAIR EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.6 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or water edge, whichever is greater.
8. Size of the required cribs is indicated thus: 3'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (576.0) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

SCALE 1" = 50'



LOCATION MAP

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY DL
TRACED BY
CHECKED BY
REVIEWED

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCHLINES 4/3 TO 3/2

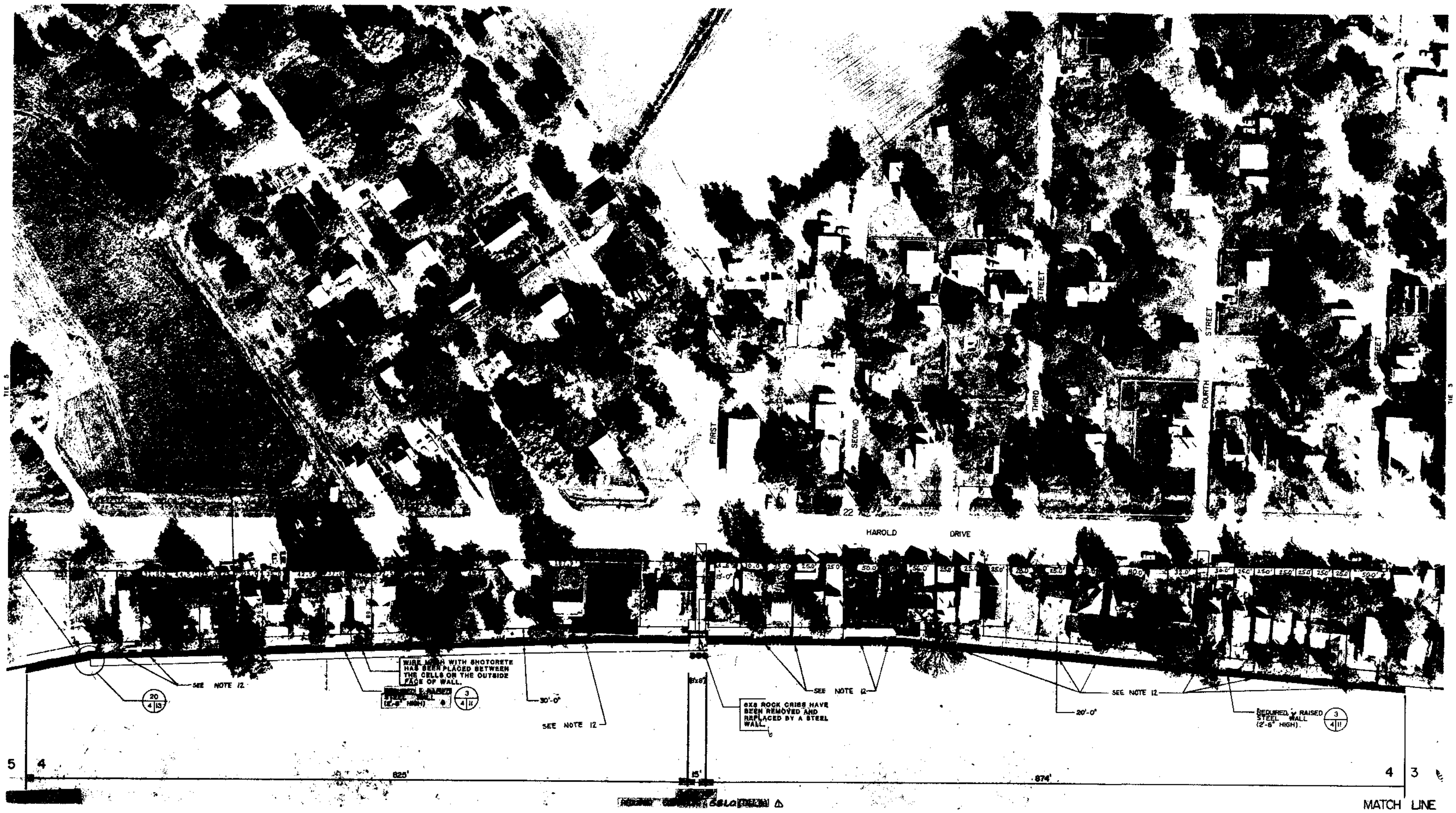
SUBMITTED
APPROVAL RECOMMENDED
DATE 18 JULY, 1985
APPROVED
COL., C.E. DISTRICT ENGINEER
SHEET 3 OF 14
DRAWING NUMBER DM 12/1123

INVITATION NO. DACW.35-85-C-0066

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

ABRAMS AERIAL SURVEY CORPORATION
DATE OF PHOTOGRAPHY 16 JUNE 1985

B-1



B.M. 22- ELEVATION 577.64 (I.G.L.D.)
TOP OF HYDRANT AT N.W. CORNER OF HAROLD DRIVE AND NORTH SECOND STREET.

LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. REGRADE/REPAIR EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (578.8) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale

NOTES CONT.

12. For damaged concrete cell drill hole in existing concrete sidewalk and pump concrete into cell to completely fill the cell. All cells required to be filled are marked by a green paint spot on the landward side of the cell.

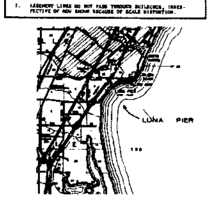
SCALE 1" = 50'

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION.

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT



LOCATION MAP

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

ABRAMS AERIAL SURVEY CORPORATION

DATE OF PHOTOGRAPHY 19 JUNE 1985

THIS PLAN ACCOMPANIES CONTRACT NO. ___ MODIFICATION NO. ___

NO.	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

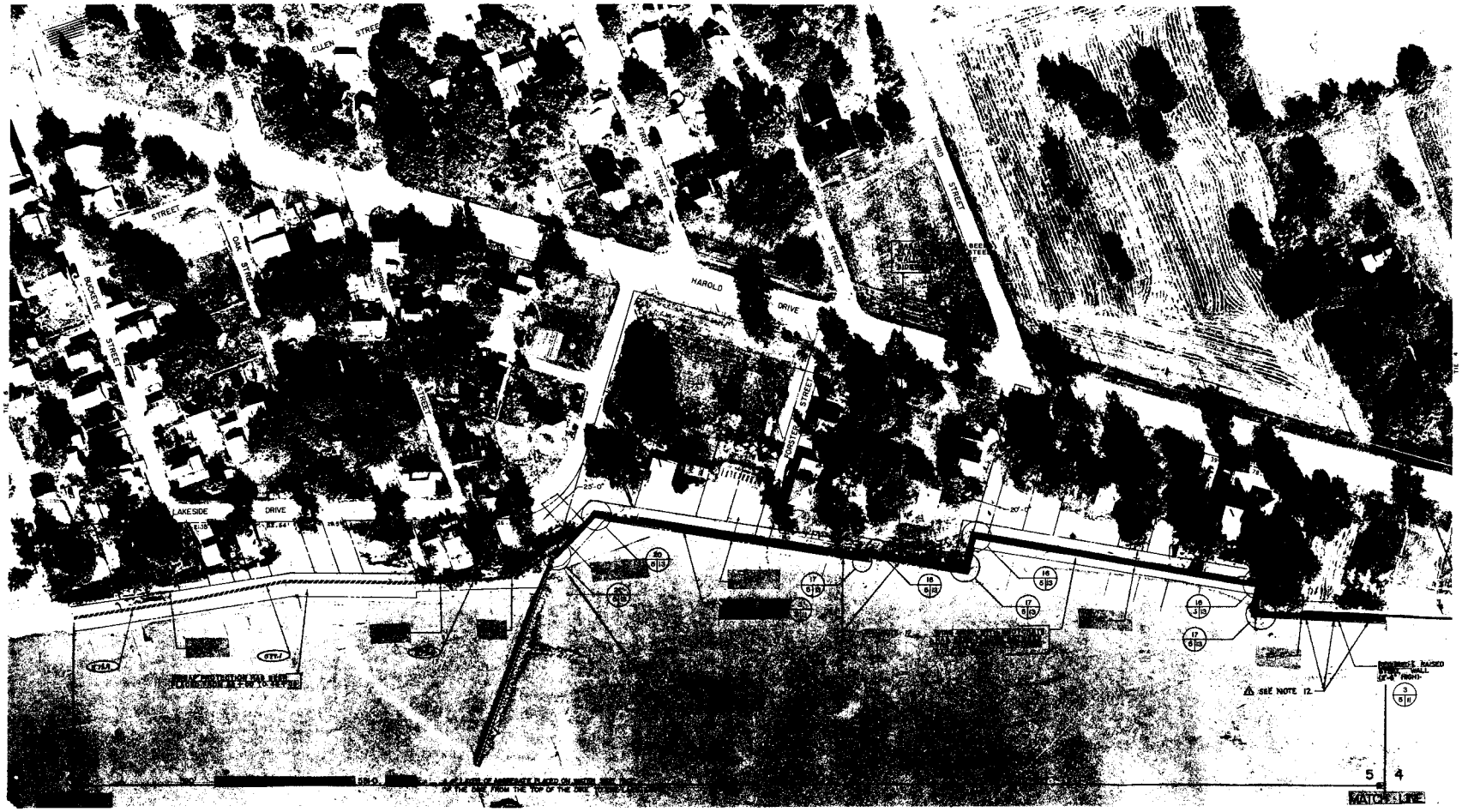
DRAWN BY: DL
TRACED BY:
CHECKED BY: HRP
REVIEWED: NKB

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 5/4 to 4/3

SUBMITTED: P.E. Chief, Design Branch
APPROVAL RECOMMENDED: P.E. Chief, Engineering Division
DATE 19 JULY 1985
APPROVED: COL, C E DISTRICT ENGINEER

SHEET 4 OF 14
DRAWING NUMBER DM12/1124

INVITATION NO. DACW 35-85-C-0065



LEGEND FOR REQUIRED WORK

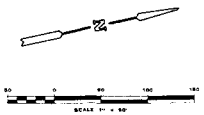
1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. RAISE EXISTING CLAY DIKES ⚠
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES:

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Fisher Point, Quebec (1962 - 1959). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing in 581.6 shall be exposed to wave attack from Lake Erie and 576.1 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or mature edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (579.0) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

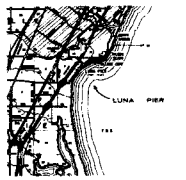
NOTES CONT.

12. For damaged concrete cell drill hole in existing concrete sidewalk and pump concrete into cell to completely fill the cell. All cells required to be filled are marked by a green paint spot on the landward side of the cell.
13. Required work shown on drawing as "RAISE EXISTING CLAY DIKES" consist of raising the existing dike on the top and landward slope an average of 2'-0" to reach the required elevation.



ALIGNMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION AND TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT RUN THROUGH BUILDINGS, RESPECTIVE OF ANY MINOR DEGREE OF SCALE DISTORTION.



LOCATION MAP

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT

Black & Veatch Engineers-Architects
B N.K. Becker and Associates Ltd.

NO.	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
TRACED BY: HP
CHECKED BY: JWD
REVIEWED:
SUBMITTED: Chief, Design Branch
APPROVED: COL, CE DISTRICT ENGINEER

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 6/5 to 5/4

APPROVAL RECOMMENDED: Chief, Engineering Section
DATE 19 JULY 1989

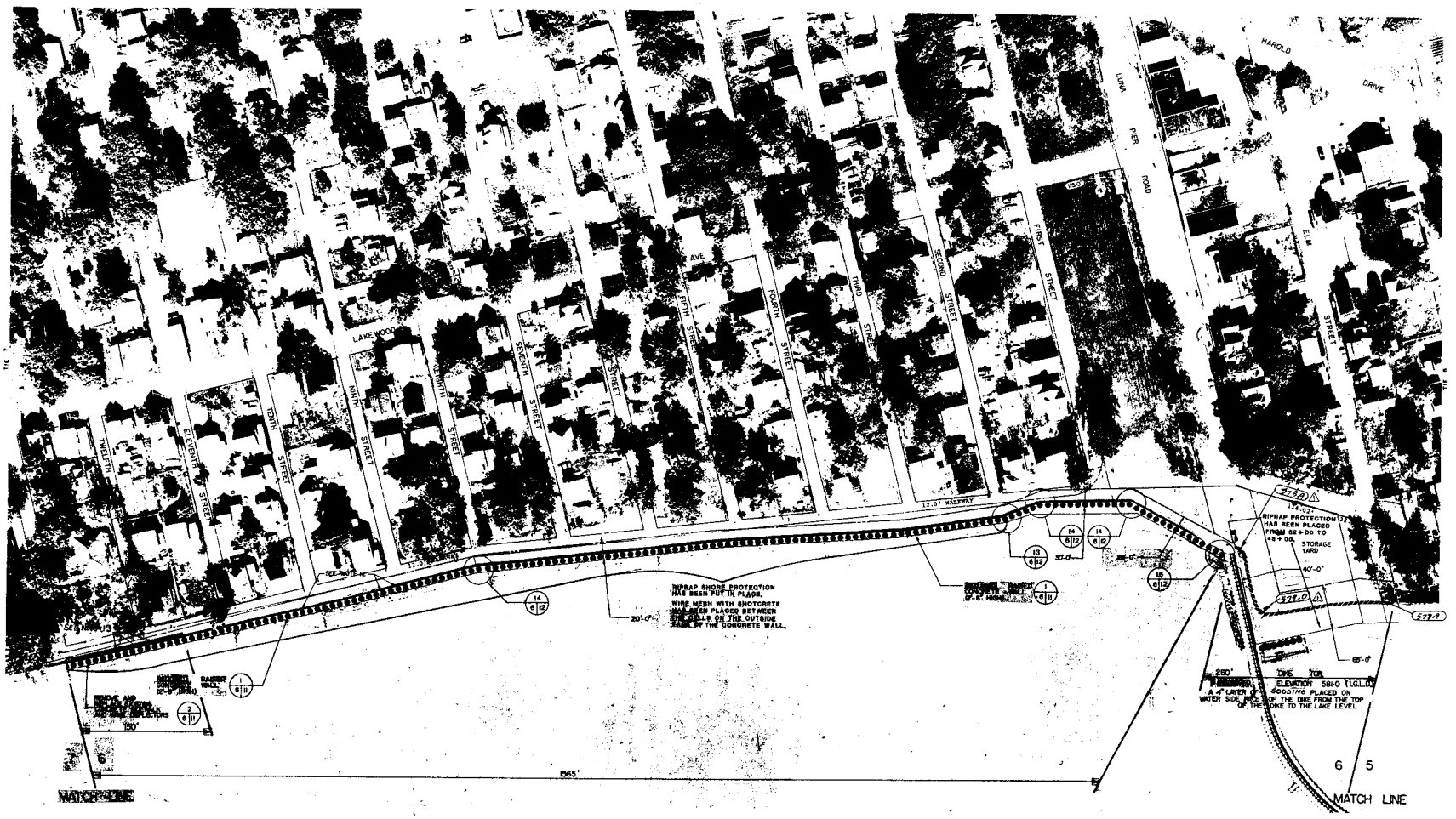
DRAWING NUMBER: DM12/1126
SHEET 5 OF 14

INVITATION NO. DACW.35-85-C-0065

THIS PLAN ACCOMPANIES CONTRACT NO
MODIFICATION NO

ABRAMS AERIAL SURVEY CORPORATION

DATE OF PHOTOGRAPHY
18 JUNE 1985



LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. RAISE EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6"): INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6"): INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Fermi Point, October 1962 - 1953): Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.6 where exposed to wave attack from Lake Erie and 578.6 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus 574.8 on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

NOTES CONT.

12. For damaged concrete cell drill hole in existing concrete sidewalk and pump concrete into cell to completely fill the cell.
13. Fill void areas in concrete cell with 3" to 6" rock fill.
14. All cells required to be filled with concrete or stone are marked by a green paint spot on the landward side of the cell.
15. Required work shown on this drawing as "RAISE EXISTING CLAY DIKES" consist of raising the dike on the top and landward slope an average of 2'-0" to reach the required elevation.

SCALE 1" = 50'

LAYOUT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPH.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, TANKS, PHOTOS OF NEW DRAWN BECAUSE OF SCALE DISTORTION.

LOCATION MAP

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd.

DATE OF PHOTOGRAPHY 18 JUNE 1985

THIS PLAN ACCOMPANIES CONTRACT NO. MODIFICATION NO.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
TRACED BY:
CHECKED BY: HRD
REVIEWED: MRD
SUBMITTED: Chief, Design Branch
APPROVED: Chief, Engineering Division

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 7/6 to 6/5

APPROVAL RECOMMENDED: P.E. Chief, Engineering Division
DATE 19 JULY 1985

APPROVED: COLCC DISTRICT ENGINEER

DRAWING NUMBER: DM12/1128
SHEET 6 OF 14

INVITATION NO. DACW. 35-85-C-0065

ABRAMS AERIAL SURVEY CORPORATION

NOTE:
WIRE MESH WITH SHOTCRETE HAS BEEN PLACED BETWEEN THE CELLS ON THE OUTSIDE FACE OF CONCRETE WALL.

LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. REGRADE/REPAIR EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (576.0) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

NOTES CONT.

12. For damaged concrete cell drill hole in existing concrete sidewalk and pump concrete into cell to completely fill the cell.
13. Fill void area in concrete cell with 3" to 6" rock fill.
14. All cells required to be filled with concrete or rock fill are marked by a green paint spot on the landward side of the cell.

N

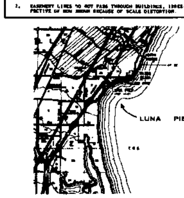
SCALE 1" = 50'

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION.

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
20 YEAR DIKE EASEMENT



LOCATION MAP

Black & Veatch
Engineers-Architects

N.K. Becker and Associates Ltd.

NO.	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
TRACED BY:
CHECKED BY: HRP
REVIEWED: RKB

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 8/7 to 7/6

SUBMITTED: Chief, Design Branch, P.E.
APPROVAL RECOMMENDED: Chief, Engineering Division, P.E.
DATE 19 JULY 1986
APPROVED: COL., C.E. DISTRICT ENGINEER

SHEET 7 of 14
DRAWING NUMBER DM12/1127

ABRAMS
AERIAL SURVEY CORPORATION

LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. RAISE EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 576.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (576.8) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.
12. The required work on this drawing for raising the existing dikes consist of raising the existing dike on the top an average of one (1) foot higher and covering with a layer of aggregate surfacing the same as specified for aggregate surfaced road ramps in the specifications. A sketch of a typical cross section through the dike is in the detail drawings attached to the specifications.

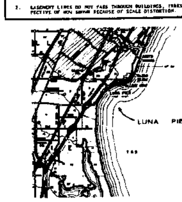
SCALE 1" = 60'

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION.

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT



LOCATION MAP

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd.

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	OLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
TRACED BY:
CHECKED BY: HRP
REVIEWED: HRP

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 9/8 to 8/7

SUBMITTED: P.E. Chief, Design Branch
APPROVAL RECOMMENDED: C. P.E. Chief, Engineering Division
DATE 19 JULY 1985
APPROVED: COL, C E DISTRICT ENGINEER

SHEET 8 OF 14
DRAWING NUMBER DM12/1128

INVITATION NO. DACW.35-85-C-0065

LEGEND FOR REQUIRED WORK

1. ROCK CRIB
2. SAND CRIB
3. CLAY DIKE
4. RAISE EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6 RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and hand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (IGLD 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.0 where exposed to wave attack from Lake Erie and 578.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 10 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x6', representing height and width respectively.
9. Top of existing clay dike elevation indicated thus (576.8) on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

NOTES CONT.

12. Required work on this drawing for raising the existing clay dikes is limited to raising the existing clay dike from Matchline 9/8 to a point 200 feet Northwest of the Matchline an average one (1) foot and adding an aggregate surfacing the same as specified for aggregate surfaced road ramps in the contract specifications. A sketch of the typical cross section through the dike is in the detail drawings attached to the specifications.

N

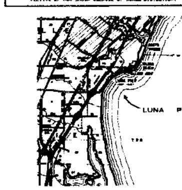
SCALE 1" = 80'

EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE IN LOCATION DUE TO SCALE DISTORTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS, IRRESPECTIVE OF HOW SHOWN BECAUSE OF SCALE DISTORTION.

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT



LOCATION MAP

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY DL
TRACED BY
CHECKED BY
REVIEWED

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM MATCH LINES 10/9 to 9/8

SUBMITTED: P.E. Chief, Design Branch
APPROVAL RECOMMENDED: P.E. Chief, Engineering Division
DATE 19 JULY 1985
APPROVED: COL, C.E. DISTRICT ENGINEER

SHEET 9 OF 14
DRAWING NUMBER DM12/1129

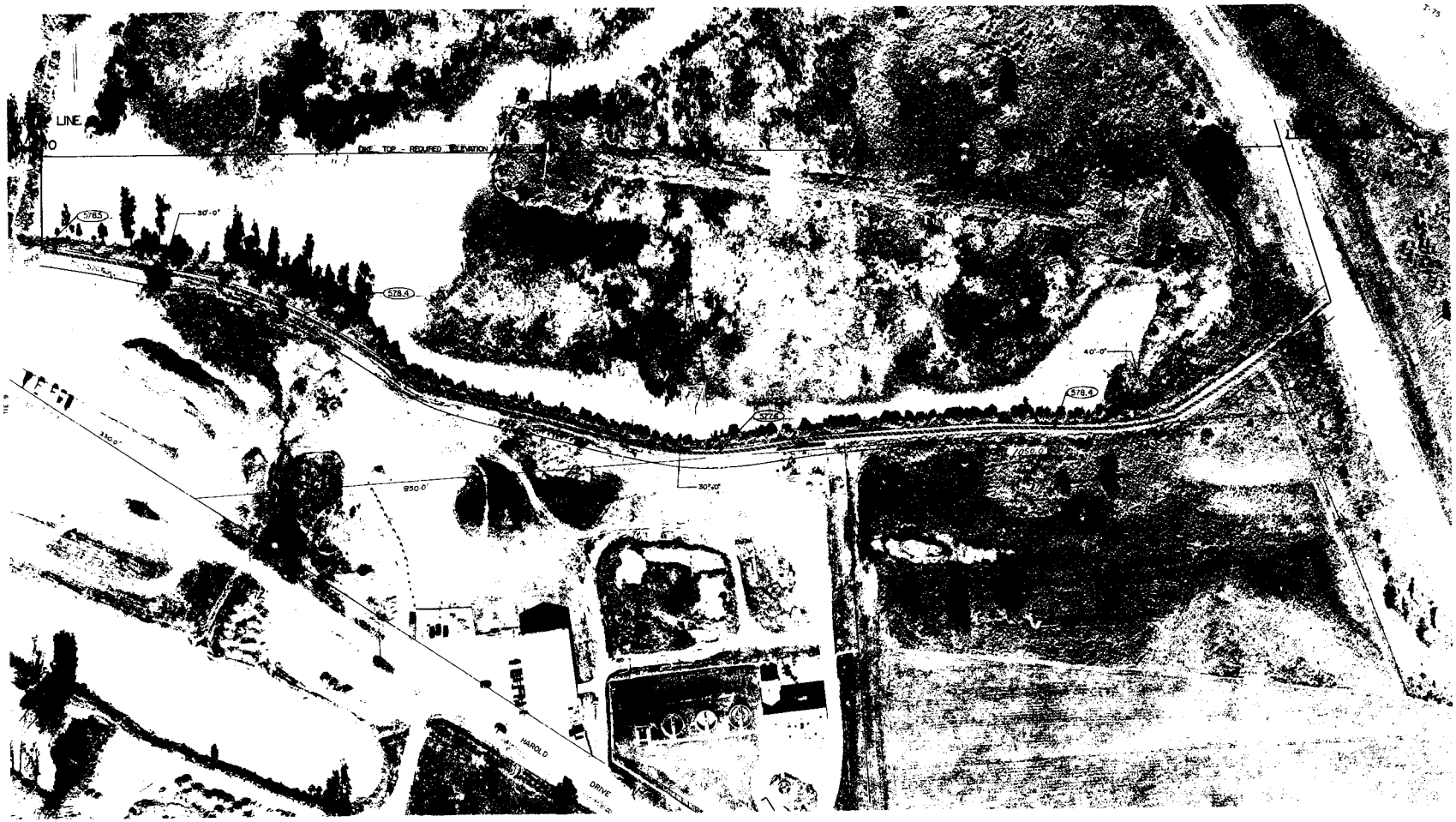
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

INVITATION NO. DACW.35-85-C-0065

ABRAMS AERIAL SURVEY CORPORATION

DATE OF PHOTOGRAPHY
18 JUNE 1985

B-



LEGEND FOR REQUIRED WORK

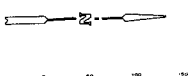
1. ROCK CRIB
2. SAND CRIB
3. CLAY DIRT
4. RAISE EXISTING CLAY DIKES
5. RIP-RAP FOR TOE PROTECTION - LAKESIDE
6. RAISED CONCRETE WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
7. RAISED STEEL WALL (2'-6") INCLUDING RIP-RAP FOR TOE PROTECTION - LAKESIDE AND CLAY WEDGE BEHIND EXISTING CONCRETE SHOREWALL STRUCTURE AND SCREW ANCHORS
8. EXISTING WALL - NO WORK REQUIRED

NOTES

1. All items on this sheet are existing unless indicated as required.
2. Additional details are included as part of the specifications.
3. All dimensions and elevations are by wheel measure and sand level respectively.
4. Location and length of required work shall be field verified before starting the work.
5. All elevations are referenced to mean water level at Father Point, Quebec (1062 - 1955). Low water datum for Lake Erie is elevation 568.6.
6. The required top elevation of dikes, levees, and cribbing is 581.6 where exposed to wave attack from Lake Erie and 578.4 in all other areas.
7. If space permits, all required cribs shall be installed at a distance of 15 feet from the existing private sea walls, or waters edge, whichever is greater.
8. Size of the required cribs is indicated thus: 5'x8' representing height and width respectively.
9. Top of existing clay dike elevation indicated thus 572.0 on the drawings.
10. Centerline of symbol is centerline of dike.
11. Symbol width not to scale.

NOTES CONT.

12. Required work on this drawing for raising clay dikes includes raising the existing dike on the top and protected side an average of one (1) foot to reach the required elevation along a 300 foot reach adjacent to the Waste Water Treatment Facility.



EASEMENT NOTES

1. EASEMENT LINES ARE APPROXIMATE. IF LOCATION HAS TO SCALE DISTRIBUTION OF THE AERIAL PHOTOGRAPHS.
2. EASEMENT LINES DO NOT PASS THROUGH BUILDINGS. IMPRECISION OF NON SCALE BECAUSE OF SCALE DISTRIBUTION.

LOCATION MAP

LEGEND FOR EASEMENTS

PROPERTY LINE
TEMPORARY WORK STORAGE AND ACCESS
25 YEAR DIKE EASEMENT

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd

THIS PLAN ACCOMPANIES CONTRACT NO
MODIFICATION NO

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

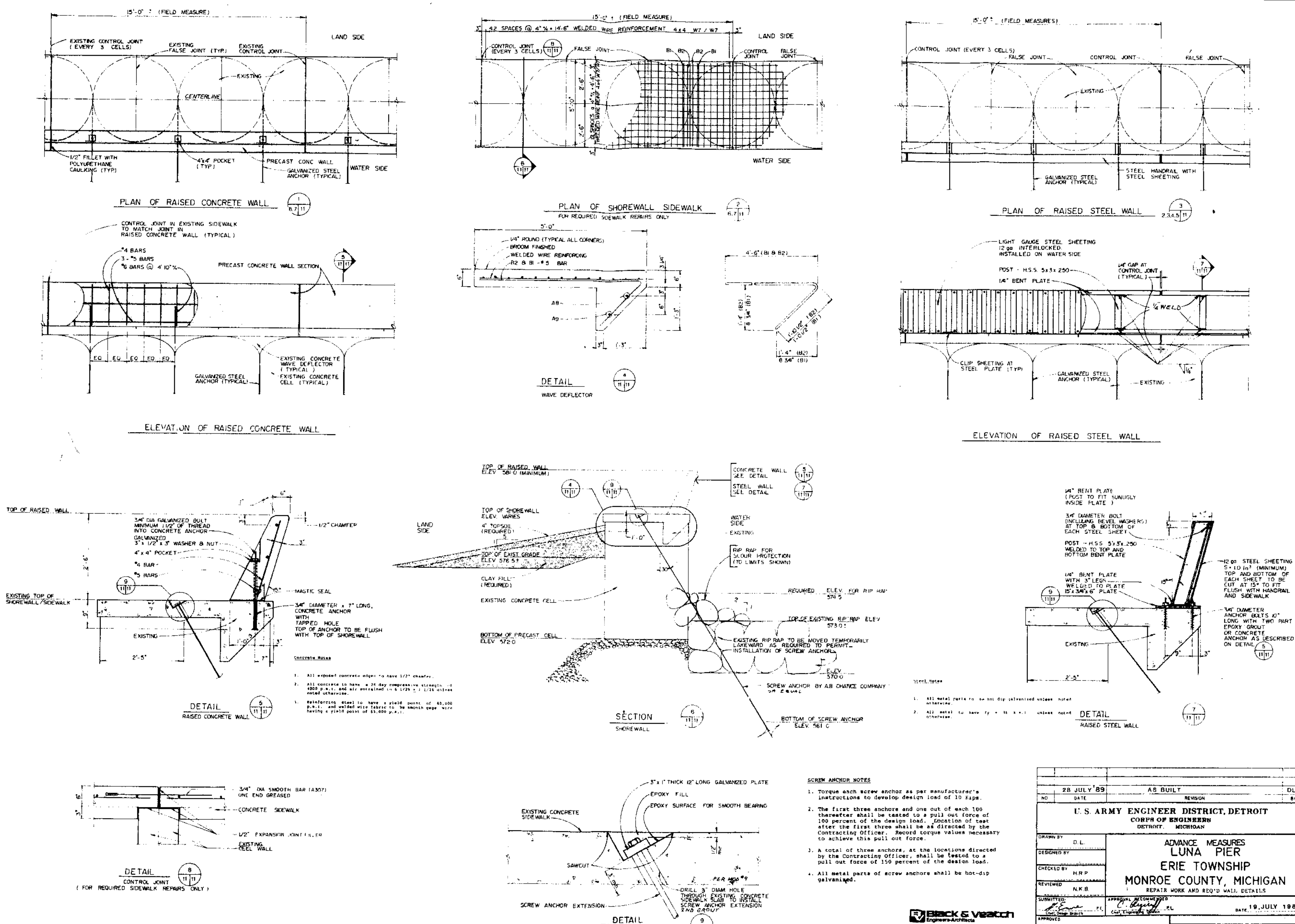
ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
FROM HATCH LINES 9/10

DRAWN BY	DL
TRACED BY	
CHECKED BY	MNP
REVIEWED	MHB
SUBMITTED	Chief, Design Branch, PE
APPROVED	Col, CE DISTRICT ENGINEER
APPROVAL RECOMMENDED	Chief, Engineering Division, PE
DATE	19 JULY 1989
SHEET NO.	10 OF 14
DRAWING NUMBER	DM12/1130

INVITATION NO. DACW.35-85-C-0065

ABRAMS AERIAL SURVEY CORPORATION
LANSING, MICHIGAN

DATE OF PHOTOGRAPHY
18 JUNE 1985



Concrete Notes

1. All exposed concrete edges to have 1/2" chamfer.
2. All concrete to have a 28 day compressive strength of 4000 p.s.i. and air entrained to 6 1/2% ± 1 1/2% unless noted otherwise.
3. Reinforcing steel to have a yield point of 60,000 p.s.i. and welded wire fabric to be smooth gage wire having a yield point of 65,000 p.s.i.

Steel Notes

1. All metal parts to be hot dip galvanized unless noted otherwise.
2. All metal to have Fy = 36 k.s.i. unless noted otherwise.

SCREW ANCHOR NOTES

1. Torque each screw anchor as per manufacturer's instructions to develop design load of 10 Kips.
2. The first three anchors and one out of each 100 thereafter shall be tested to a pull out force of 100 percent of the design load. Location of test after the first three shall be as directed by the Contracting Officer. Record torque values necessary to achieve this pull out force.
3. A total of three anchors, at the locations directed by the Contracting Officer, shall be tested to a pull out force of 150 percent of the design load.
4. All metal parts of screw anchors shall be hot-dip galvanized.

Black & Veatch Engineers-Architects

N.K. Becker and Associates Ltd.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: D.L.
DESIGNED BY:
CHECKED BY: H.R.P.
REVIEWED: N.K.B.

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
REPAIR WORK AND REQ'D WALL DETAILS

SUBMITTED: P.E. Chief, Design Branch
APPROVAL RECOMMENDED: P.E. Chief, Engineering Division
DATE 19 JULY 1985
APPROVED: COL, C.E. DISTRICT ENGINEER

SHEET 11 of 14
DRAWING NUMBER DM12/1131

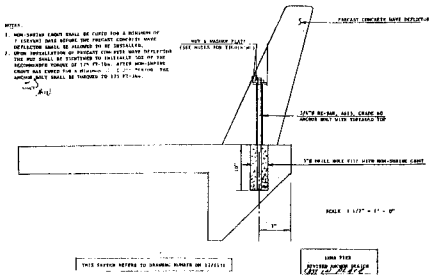
INVITATION NO. DACW 35-85-C-0065

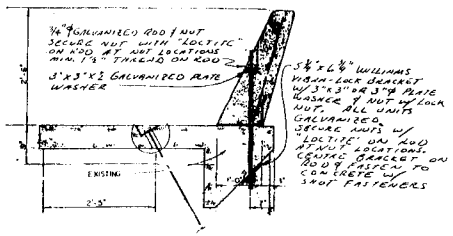
Location and type of markers placed per "A" see additional Cross Section for marker details.

C : Cast in Place D : Drill Thru

Station	Type	Station	Type	Station	Type	Station	Type	Station	Type
0+04	D	2+64	D	5+86	D	7+12	D	8+98	D
0+07		2+69		5+91		7+16		9+03	
0+12		2+93		5+96		7+21		9+08	
0+17		2+98		6+00		7+26		9+13	
0+22		3+03		6+05		7+46		9+18	
0+72		3+38		6+10		7+51		9+23	
0+77		3+43		6+15		7+56		9+28	
0+82		3+48		6+20		7+76		9+33	
0+96	C	4+20		6+25		7+81		11+78	
0+98		4+35		6+44		7+86		11+83	
1+00		4+40		6+49		8+05		11+88	
1+03		4+60		6+54		8+10		11+93	
1+22	D	4+65		6+59		8+15		11+98	
1+27		4+70		6+64		8+20		12+03	
1+32		4+14		6+69		8+25		12+08	
1+51		4+79		6+73		8+30		12+13	
1+56		4+84		6+78		8+49		12+18	
1+61		4+89		6+83		8+54		12+62	
1+80		4+94		6+87		8+59		12+67	
1+85		4+98		6+92		8+78		12+32	
1+90		5+47		6+97		8+83		13+06	
2+54		5+52		7+02		8+88		13+13	
2+59		5+57		7+07		8+93		13+18	C

Station	Type	Station	Type	Station	Type	Station	Type	Station	Type
14+42	D	18+98	D	23+61	D	28+48	D		
14+47		19+03		24+24		28+53			
14+52		20+26		24+59		28+58			
14+76		20+31		24+64		28+92			
14+81		20+36		25+27		28+97			
14+86		20+41		25+32		29+02			
15+58	W	20+46		25+37		30+54			
15+63		20+51		26+15		30+59			
15+68		20+71		26+20		30+64			
17+32	D	20+76		26+25		30+83			
17+37		20+81		27+46		30+88			
17+42		21+59		27+51		30+93			
17+47		21+64		27+56		30+98			
17+52		21+69		27+60		31+03			
17+57		22+05		27+65		31+08			
17+77		22+10		27+70		31+27			
17+82		22+15		27+90		31+32			
17+87		22+20		27+95		31+37			
18+06		22+25		28+00		31+41			
18+11		22+30		28+04		31+46			
18+16		23+36		28+09		31+51			
18+78		23+41		28+14		31+55			
18+83		23+46		28+33		31+56			
18+88		23+51		28+38					
18+98		23+56		28+43					





DETAIL
RAISED CONCRETE WALL

19 MARCH 87

NO	DATE	REVISION	BY
	28 JULY 89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: D.L.
DESIGNED BY:
CHECKED BY: H.R.P.
REVIEWED: N.K.B.
SUBMITTED: CHIEF, DESIGN BRANCH
APPROVED: COL, CE DISTRICT ENGINEER

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
LOCATION AND TYPE OF ANCHOR CHART, WALL DETAIL

APPROVAL RECOMMENDED
CHIEF, ENGINEERING DIVISION
DATE 19 JULY 1985

SHEET 11A OF 14
DRAWING NUMBER DM12 1131A

THIS PLAN ACCOMPANIES CONTRACT NO. DACW
SPECIFICATION NO.

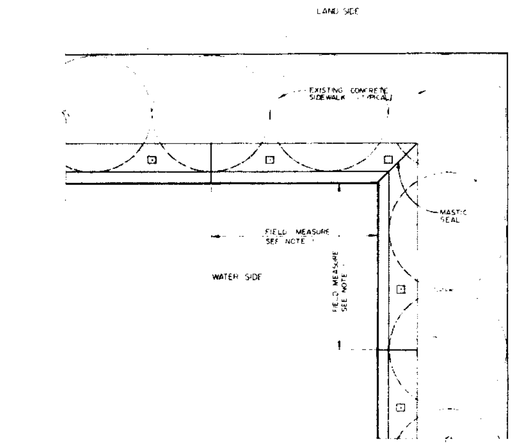
INVITATION NO. DACW 35-85-C-0065

B-11

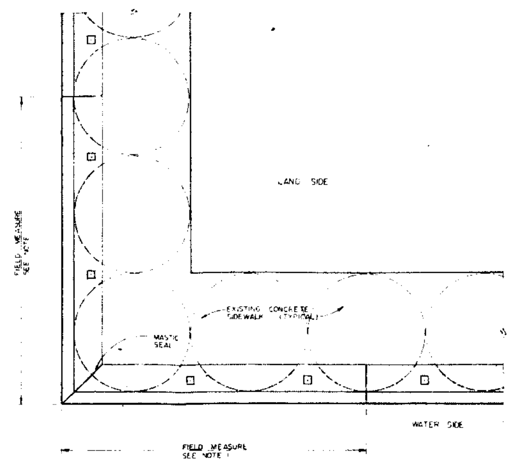
CORNER AND END DETAILS FOR RAISED CONCRETE WALL

Notes

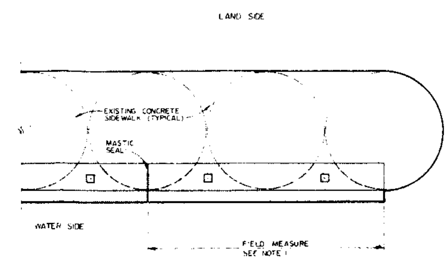
1. All raised concrete wall sections to be attached to the existing concrete sidewalk by a minimum of two anchors. See Sheet No. 11 for anchor type and details.
2. Saw cut precast concrete raised wall sections to fit corners based on field measurements.
3. Place mastic seal in gap between adjacent raised wall sections and directly beneath all raised wall sections where they bear on the existing concrete sidewalk.



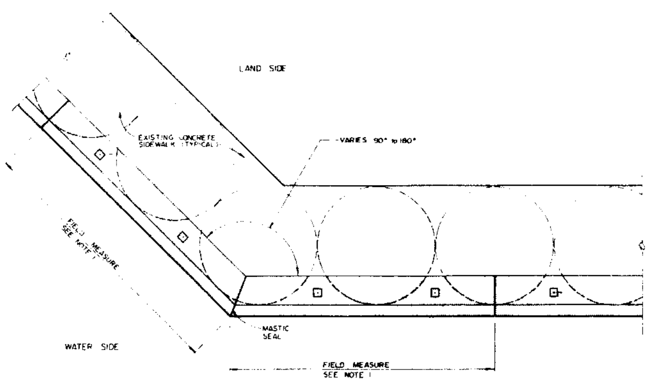
DETAIL
INSIDE CORNER
10 / 7 | 12



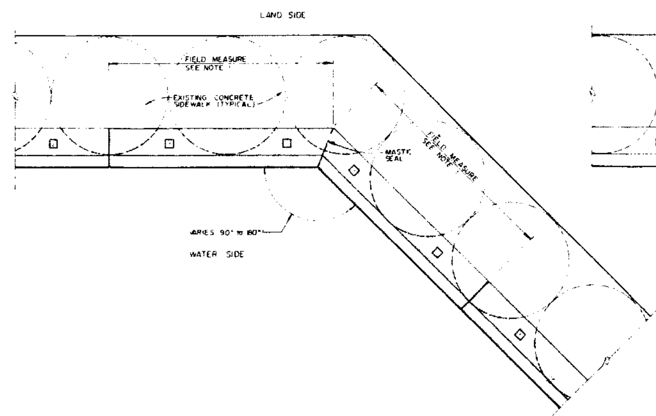
DETAIL
OUTSIDE CORNER
11 / 7 | 12



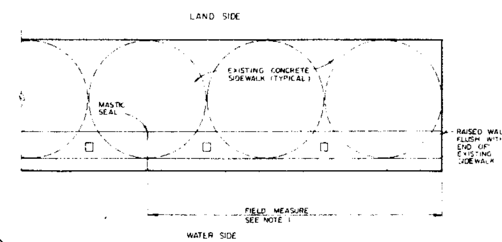
DETAIL
CIRCULAR END
12 / 7 | 12



DETAIL
90° to 180° OUTSIDE CORNER
13 / 6,7 | 12



DETAIL
90° to 180° INSIDE CORNER
14 / 6,7 | 12



DETAIL
SQUARE END
15 / 6 | 12

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
DESIGNED BY:
CHECKED BY: HRL
REVIEWED: HKB

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
CORNER DETAILS - CONCRETE WALL

SUBMITTED: [signature] P.E. Chief, Design Branch
APPROVAL RECOMMENDED: [signature] P.E. Chief, Engineering Division
DATE: 19 JULY 1985
APPROVED: [signature] COL., C.E. DISTRICT ENGINEER

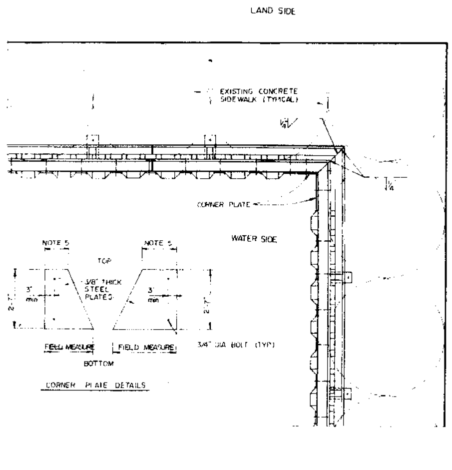
SHEET 12 OF 14
DRAWING NUMBER: DM12/1132

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

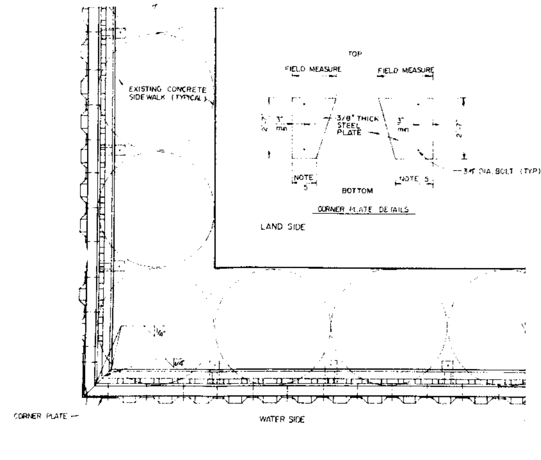
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

INVITATION NO. DACW 35-85-C-0065

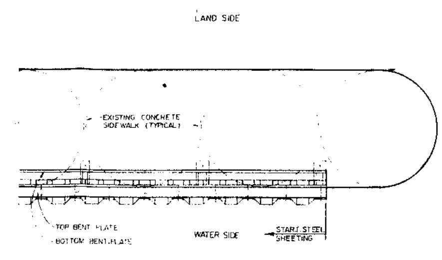
CORNER AND END DETAILS FOR RAISED STEEL WALL



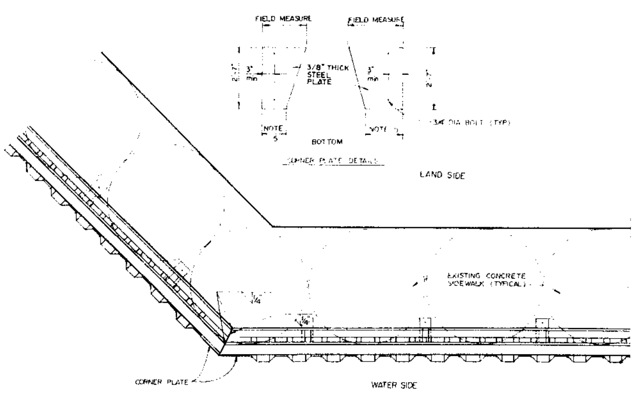
DETAIL 16/5,13 INSIDE CORNER



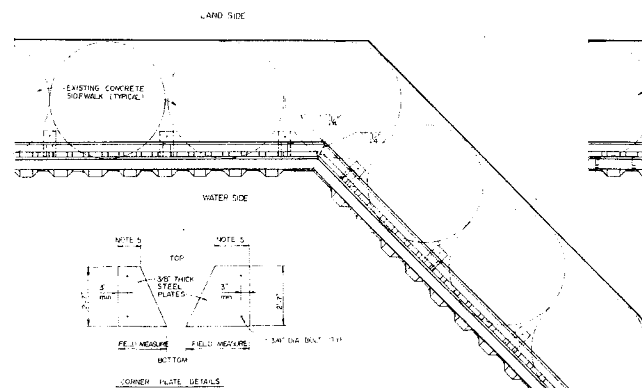
DETAIL 17 OUTSIDE CORNER



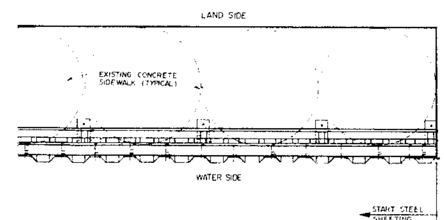
DETAIL 18 CIRCULAR END



DETAIL 19/2,3,13 90° to 180° OUTSIDE CORNER



DETAIL 20/2,3,4,5,13 90° to 180° INSIDE CORNER



DETAIL 21/5,13 SQUARE END

Notes

1. All raised steel wall corners sections to consist of minimum of 3 plates fastened on the concrete sidewalk. See Sheet No. 11 for anchor type and details.
2. Corner plate welds to be 1/4" fillet and the full height of the plates. Bent plate welds to be 1/4" fillet and around its complete perimeter.
3. All metal parts are to be hot dip galvanized. Field welds and damaged metal surfaces to have 2 coats of galvanizing paint.
4. If required, contractor to supply and install metal spacers or washers between the top and/or bottom bent plates and the corner and/or end transition plates.
5. Smallest dimension of fillet plate not to exceed the standard laying width of the steel sheeting. Field measure.
6. For typical structural details of the raised steel wall, see Sheet No. 11.

NO	DATE	REVISION	BY
	28 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
DESIGNED BY:
CHECKED BY: NRP
REVIEWED: NKB

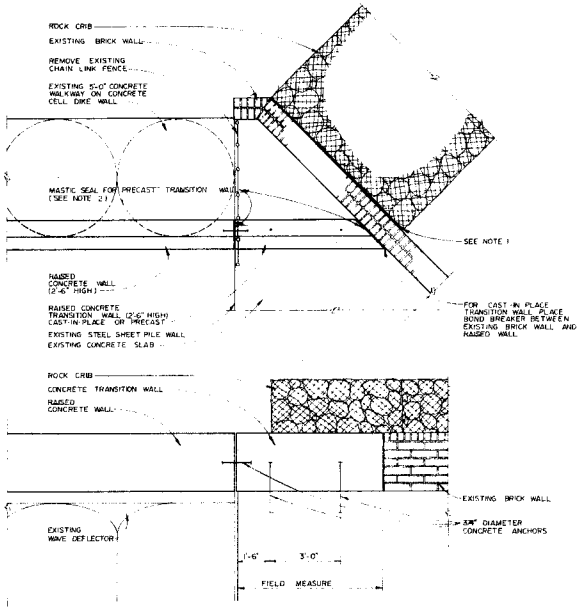
ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
CORNER DETAILS - STEEL WALL

SUBMITTED: Chief, Design Branch
APPROVAL RECOMMENDED: Chief, Engineering Division
DATE 19 JULY 1985
APPROVED: COL. C.E. DISTRICT ENGINEER

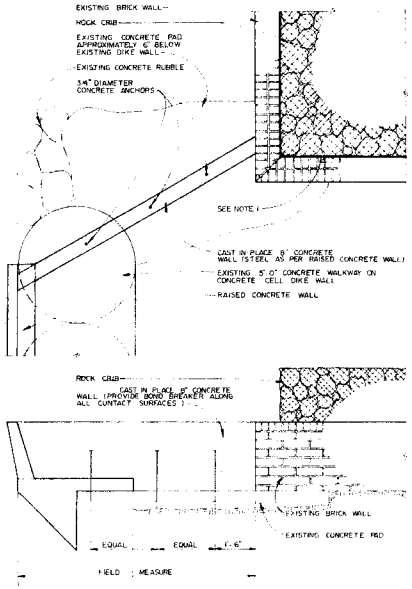
SHEET 13 OF 14
DRAWING NUMBER DM12/1133

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

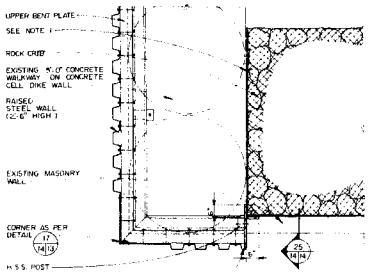
INVITATION NO. DACW 35-85-C-0065



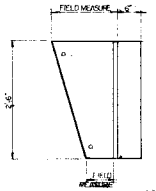
DETAIL
PRIVATE WALL
N.T.S.
22 / 7/14



DETAIL
PRIVATE WALL
N.T.S.
23 / 7/14



DETAIL
CONNECTION OF RAISED STEEL WALL TO ROCK CRIB
N.T.S.
24 / 7/14



DETAIL
STEEL 'T' PLATE
N.T.S.
25 / 14/14

---

1. The seal between the existing walls and the required Corps dike(s) are to consist of a mastic seal for gaps less than 1" in width and a grout mix (3500 p.s.i. strength) for gaps larger than 1" in width.

2. Saw cut precast concrete raised wall sections to fit corners based on field measurements.

NO	DATE	REVISION	BY
	29 JULY '89	AS BUILT	DLA

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY: DL
DESIGNED BY:
CHECKED BY: HNP
REVIEWED: MKB
SUBMITTED:

ADVANCE MEASURES
LUNA PIER
ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN
TIE-IN DETAILS, TO OTHER WALLS

APPROVAL RECOMMENDED
DATE 19 JULY 1985

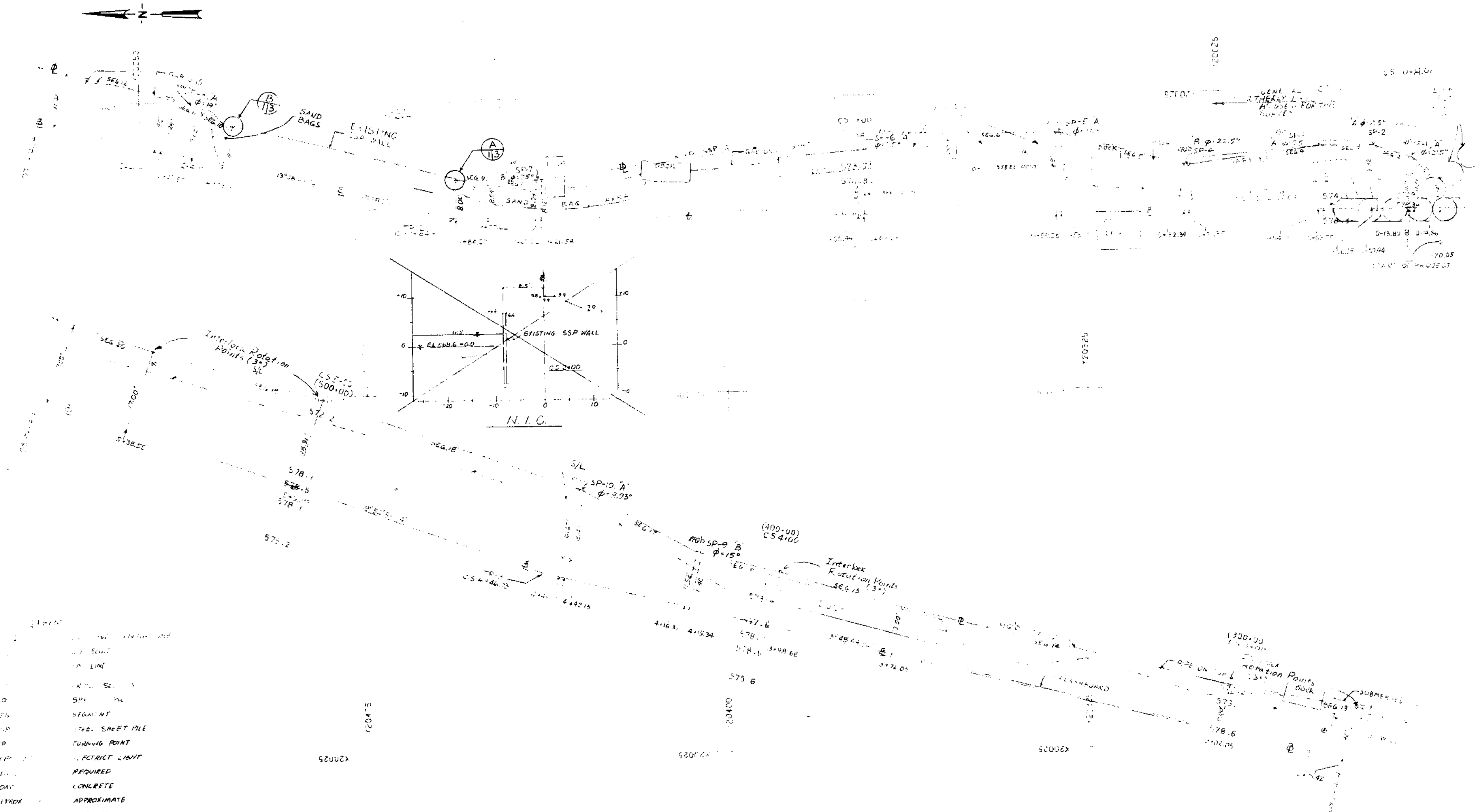
APPROVED
COL, C E DISTRICT ENGINEER

DRAWING NUMBER
SHEET # OF #
DM12/1134

Black & Veatch Engineers-Architects
N.K. Becker and Associates Ltd.

THIS IS AN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

INVITATION NO. DACW 35-85-C-0065



LEGEND

SP	SPECIAL PILE
SEG	SEGMENT
SSP	STEEL SHEET PILE
TP	TURNING POINT
ELEC.	ELECTRICT LIGHT
REQ	REQUIRED
CONC	CONCRETE
APPROX	APPROXIMATE
TYP	TYPICAL
EXT'G	EXISTING
W.S.	WATER SURFACE
EL	ELEVATION
STD	STANDARD
NTS	NOT TO SCALE
LG	LONG
LWD	LOW WATER DATUM
DIA	DIAMETER
N.I.C.	NOT IN CONTRACT

10' 0 10' 20' 1/8" = 1'-0"

MUDDY CREEK BASELINE SURVEY PGE 1 2

NO.	DATE	REVISION	BY
	28 JULY 1989	"AS BUILT"	D.L.A.

U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY W.S. & F.K.
DESIGNED BY
CHECKED BY JRG
REVIEWED

ADVANCE MEASURES

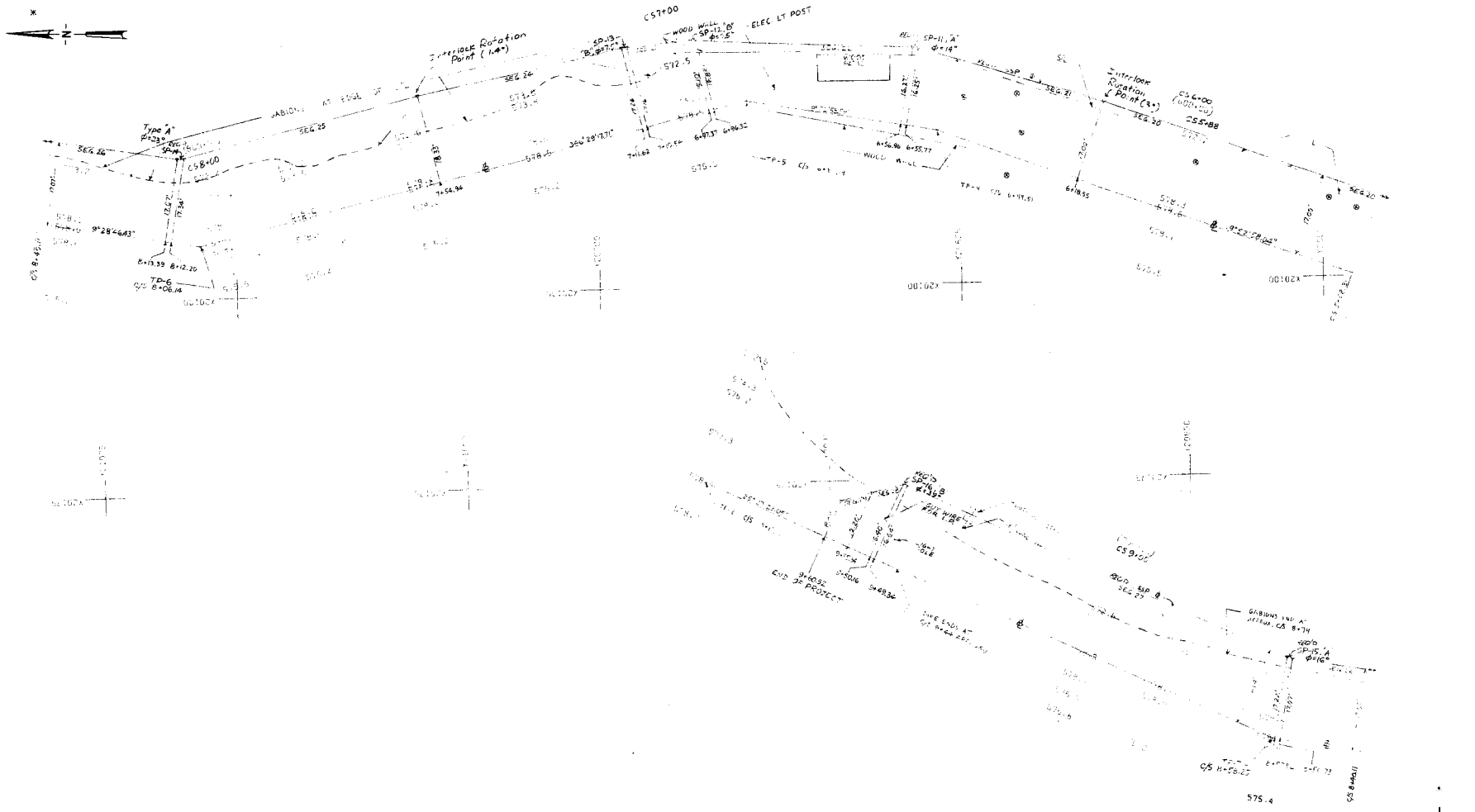
MUDDY CREEK EROSION PROTECTION

LUNA PIER – ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN

SUBMITTED
APPROVAL RECOMMENDED
DATE
APPROVED
COL., C.E. DISTRICT ENGINEER
DRAWING NUMBER
SHEET 1 OF 3

INVITATION NO. DACW

B-19



NO	DATE	REVISION	BY
	28 JULY 1989	"AS BUILT"	D.L.A

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

DRAWN BY W.S. & P.K.
DESIGNED BY P.K.
CHECKED BY J.K.
REVIEWED
SUBMITTED
APPROVED
CHIEF, ENGINEERING DIVISION

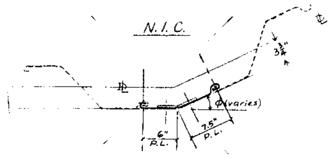
ADVANCE MEASURES
MUDDY CREEK EROSION PROTECTION
LUNA PIER – ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN

APPROVAL RECOMMENDED
DATE
DISTRICT ENGINEER
DRAWING NUMBER
SHEET 2 of 3

INVITATION NO. DACW

B

SPECIAL NOTE: ALL ANGLES ARE TO BE MADE BY BENDING FLANGES OF SZ15 PILES

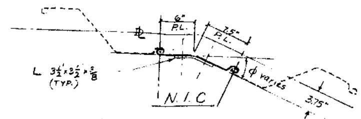


REQ'D SPECIAL CORNER
TYPE "B" (SEE SPECIAL NOTE)

Detail Applicable to:

SP	ϕ
4	22.5°
7	7.5°
9	15.0°
12	7.5° (inverted)
13	7.5° (inverted)
16	39.0° (inverted)

Term "inverted" means as shown on detail but driven "up-side-down".

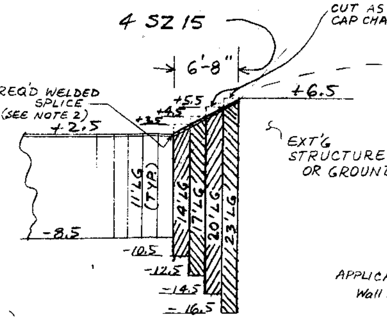


REQ'D SPECIAL CORNER
TYPE "A" (SEE SPECIAL NOTE)

Detail Applicable to:

SP	ϕ
1	21.5°
2	17.5°
3	7.5°
5	15.0°
6	7.5°
8	14.0°
10	8.93°
11	14.0°
14	23.0° (inverted)
15	16.0° (inverted)

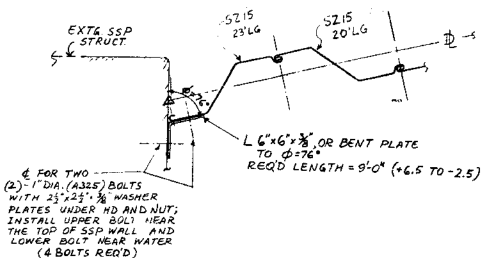
NOTE: Use ¾" std. rivets or bolts to fabricate the Special Piles (Corners), with 3" spacing for 2 ft. top and bottom; 6" max. spacing for remainder of length.
N.I.C.



APPLICABLE TO:
Wall SEG. #1, #9, #10 and #29

REQ'D Typ. Transition Wall Segment

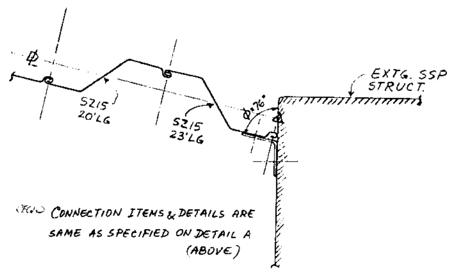
NTS
N.I.C.



DETAIL (A / 13)
N.T.S.

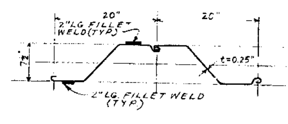
REQ'D WALL SEGMENTS

Station	Segment / Special Pile	Piles	Length
C/S 0-20.05			
C/S 0-14.80	SEG. 1	4 SZ15	Length Varies uniformly from 23' to 16'
C/S 0-12.80	SP-1 (ϕ=21.5°)		
C/S 0-07.44	SEG. 2	4 SZ15	L=11.0'
C/S 0-06.25	SP-2 (ϕ=17.5°)		
C/S 0+03.75	SEG. 3	6 SZ15	L=11.0'
C/S 0+04.91	SP-3 (ϕ=7.5°)		
C/S 0+31.35	SEG. 4	16 SZ15	L=11.0'
C/S 0+32.34	SP-4 (ϕ=22.5°)		
C/S 0+58.10	SEG. 5	16 SZ15	L=11.0
C/S 0+59.28	SP-5 (ϕ=15°)		
C/S 0+99.28	SEG. 6	24 SZ15	L=11.0'
C/S 1+00.44	SP-6 (ϕ=7.5°)		
C/S 1+66.54	SEG. 7	40 SZ15	L=11.0
C/S 1+67.62	SP-7 (ϕ=7.5°)		
C/S 1+77.[illegible]	SEG. 8	[illegible] SZ15	L=11.0'
C/S 1+84.29	SEG. 9	4 SZ15	Length Varies uniformly from 14' to 23'
[illegible] Connection to Exist. SSP Wall (C/S 1+84.29 & C/S 2+34.63)			
C/S 2+34.[illegible]			
C/S 2+41.[illegible]	SEG. 10	4 SZ15	Length Varies uniformly from 23' to 14'
C/S 2+47.57	SEG. 11	4 SZ15	L=11.0'
C/S 2+48.75	SP-8 (ϕ=14°)		
C/S 2+75.42	SEG. 12	16 SZ15	L=11.0'
C/S 3+02.05	SEG. 13	16 SZ15	L=11.5'
C/S 3+72.05	SEG. 14	42 SZ15	L=12'
C/S 3+99.69	SEG. 15	16 SZ15	L=11.5'
C/S 4+15.34	SEG. 16	[illegible]	L=11.0'
C/S 4+16.37	SP-9 (ϕ=15°)		
C/S 4+42.13	SEG. 17	16 SZ15	L=11.0
C/S 4+45.27	SP-10 (ϕ=8.93°)		
C/S [illegible]	SEG. 18	34 SZ15	L=11'
C/S [illegible]	SEG. 19	20 SZ15	L=11'
C/S 6+18.[illegible]	SEG. 20	48 SZ15	L=11'
C/S 6+[illegible]	SEG. 21	24 SZ15	L=11'
C/S 6+[illegible]	SP-11 (ϕ=14°)		
C/S [illegible]	SEG. 22	27 SZ15	L=11'
C/S [illegible]+97.[illegible]	SP-12 (ϕ=7.5°)		
C/S 7+[illegible].56	SEG. 23	8 SZ15	L=11'
C/S 7+11.62	SP-13 (ϕ=7.5°)		
C/S 7+[illegible]	SEG. 24	26 SZ15	L=11'
C/S 8+[illegible]	SEG. [illegible]	30 SZ15	L=11'
C/S [illegible]	SP-14 (ϕ=23°)		
C/S [illegible]	SEG. 26	26 SZ15	L=11'
C/S [illegible]	SP-15 (ϕ=[illegible])		
C/S [illegible]	SEG. 27	52 SZ15	L=11'
C/S [illegible]	SP-16 (ϕ=39°)		
C/S [illegible]	SEG. 28	4 SZ15	L=11'
C/S [illegible]	SEG. 29	4 SZ15	Length varies uniformly from 14' to 23'

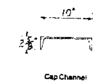


REQ'D CONNECTION ITEMS & DETAILS ARE SAME AS SPECIFIED ON DETAIL A (ABOVE)

DETAIL (B / 13)
N.T.S.



REQ'D TYPICAL SZ-15 COLD FORM
NOT TO SCALE



C 10×15.3
NTS

1. USE 2-2" LG. FILLET WELDPER SHEET PILE FOR CAP CHANNEL ATTACHMENT (A307 BOLTS REQ'D).
2. SPLICING OF CAP CHANNEL SHALL BE ACCOMPLISHED BY CONTINUOUS ¼" BUTT WELD ON THREE SIDES.
3. MITERRED JOINTS ARE REQ'D AT EA. CORNER (SP-1 THROUGH SP-16) AND AT EA. OF EIGHT (8) INTERLOCK ROTATION POINTS.

NO	DATE	REVISION	BY
	28 JULY 1989	"AS BUILT"	D.L.A.

U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

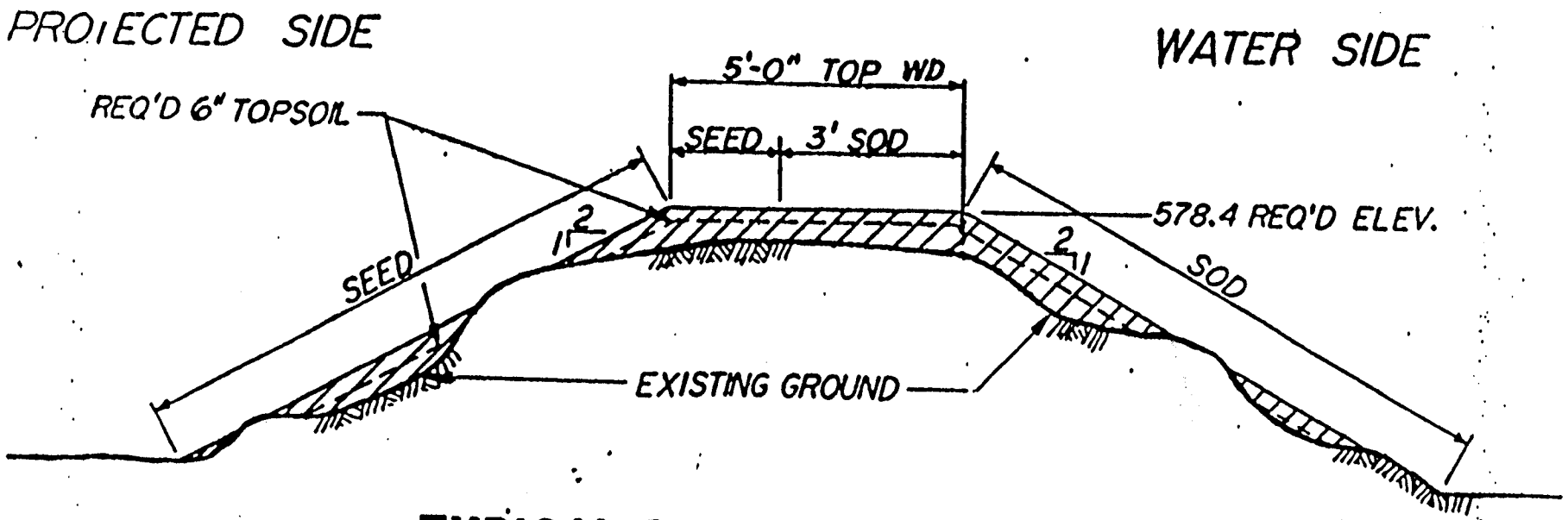
DRAWN BY: PK
DESIGNED BY: PK
CHECKED BY: RG
REVIEWED:
SUBMITTED:
APPROVED:
COL. C.E. DISTRICT ENGINEER

ADVANCE MEASURES
MUDDY CREEK EROSION PROTECTION
LUNA PIER – ERIE TOWNSHIP
MONROE COUNTY, MICHIGAN

APPROVAL RECOMMENDED: DATE:
DRAWING NUMBER:
SHEET 3 of 3

INVITATION NO. DACW

B-21



TYPICAL CROSS SECTION

NOT TO SCALE

R-22

RAISE AND REPAIR CLAY DIKE

NOTES:

1. IF DIKE SURFACES ARE ABOVE REQ'D ELEV. AND GRADE, NO WORK IS REQUIRED.

LEGEND:

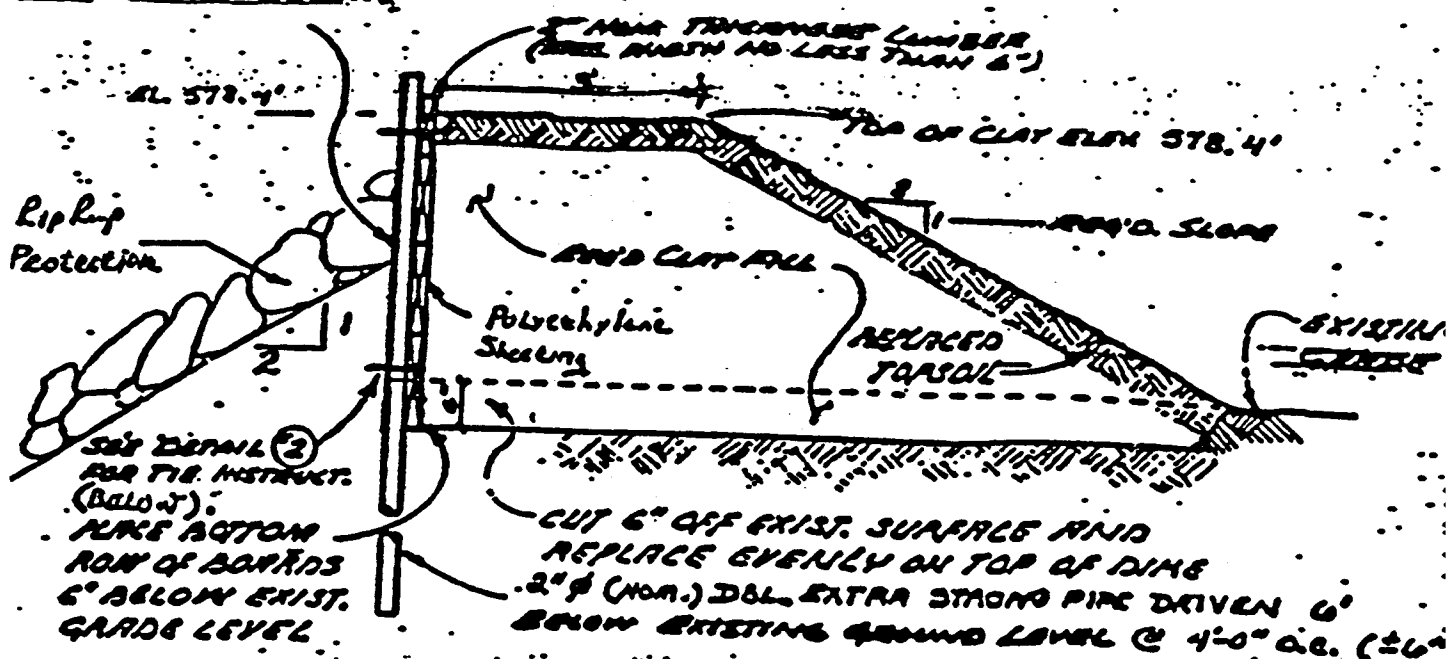
REQUIRED CLAY & TOPSOIL, SEED OR SOD

ADVANCE MEASURES

1"x2" SLATS NAILED TO FLASHBOARD LUMBER. (2 NAILS PER BOARD). SEE DETAIL BELOW.

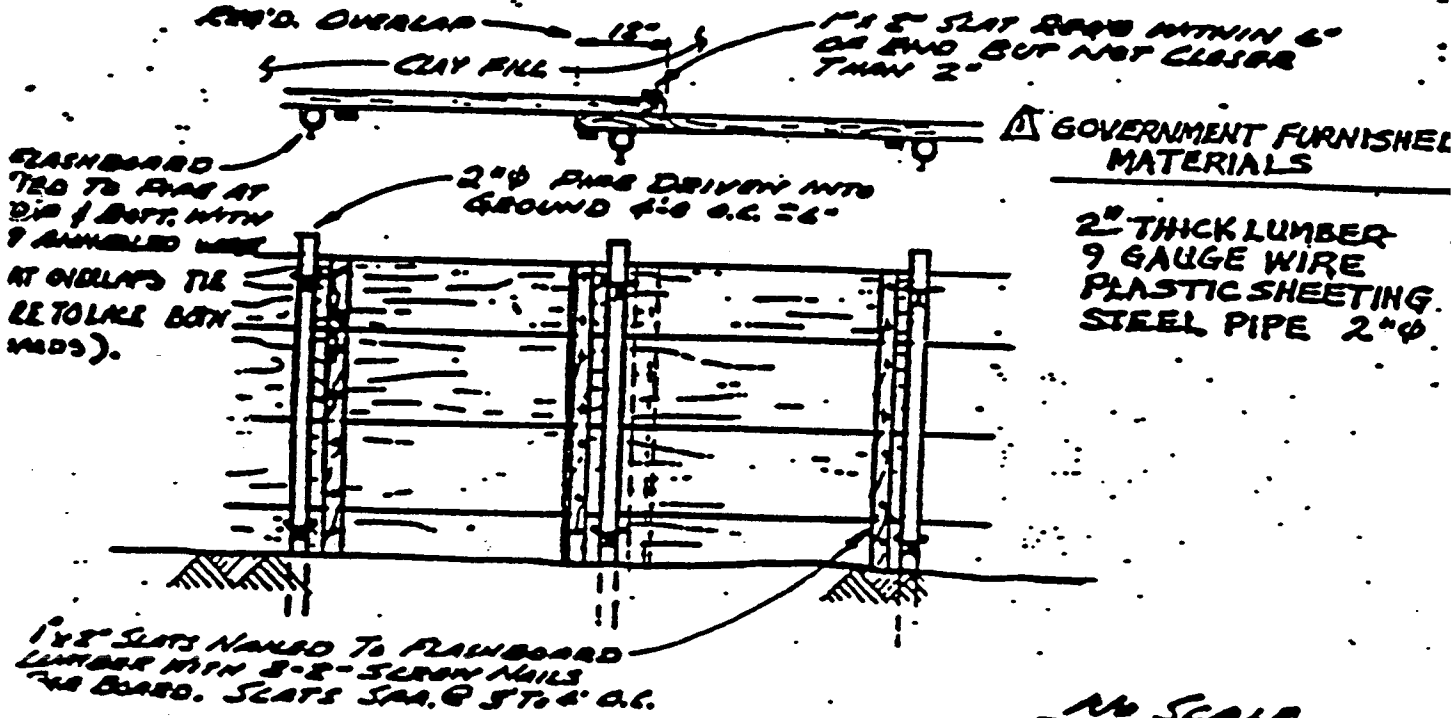
NOTE:

SEED FROM DIKE FLASHBOARD TO EXISTING GRADE



1 CLAY DIKE W/FLASH BOARD

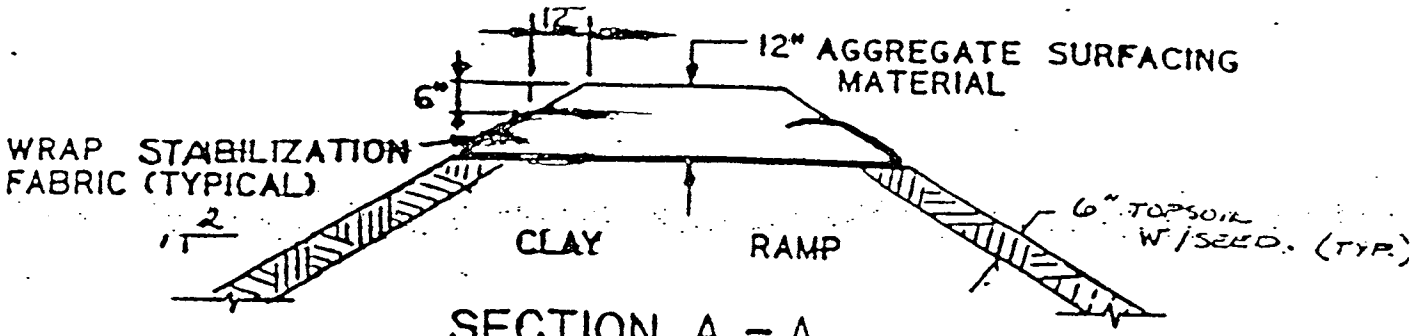
No Scale



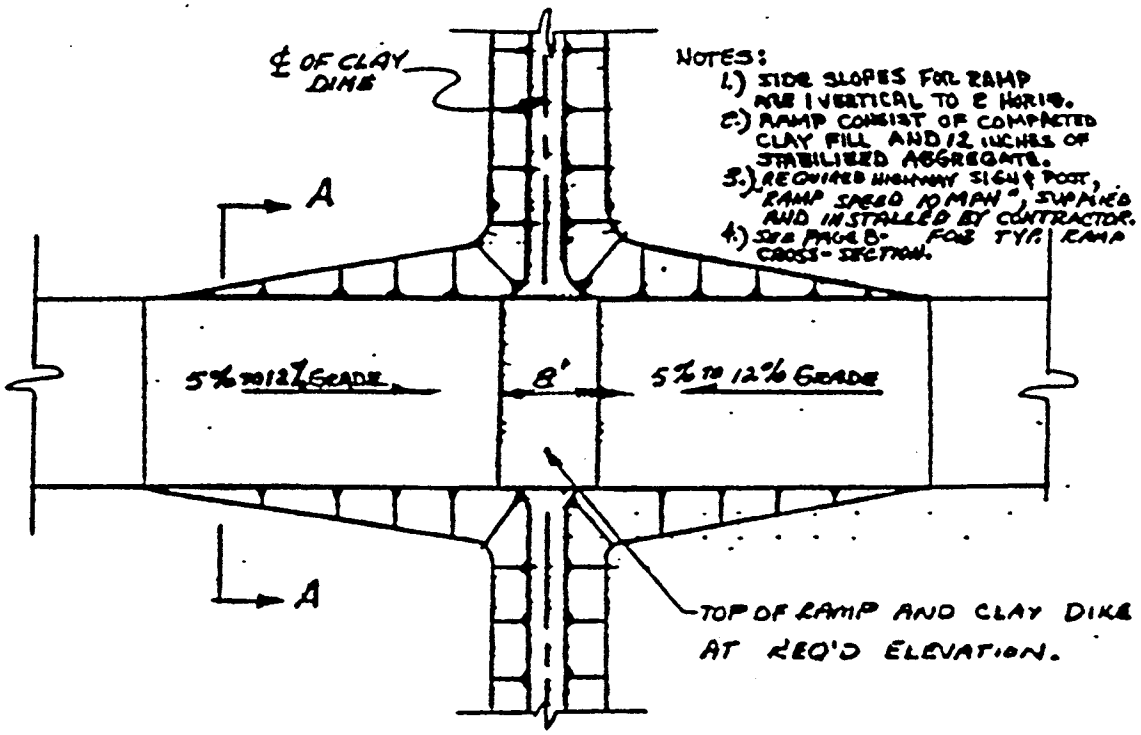
No Scale

2 FLASH BOARD DETAIL

(FROM DETAIL (1) ABOVE)



SECTION A - A
NOT TO SCALE



TYPICAL AGGREGATE SURFACED ROAD RAMP PLAN

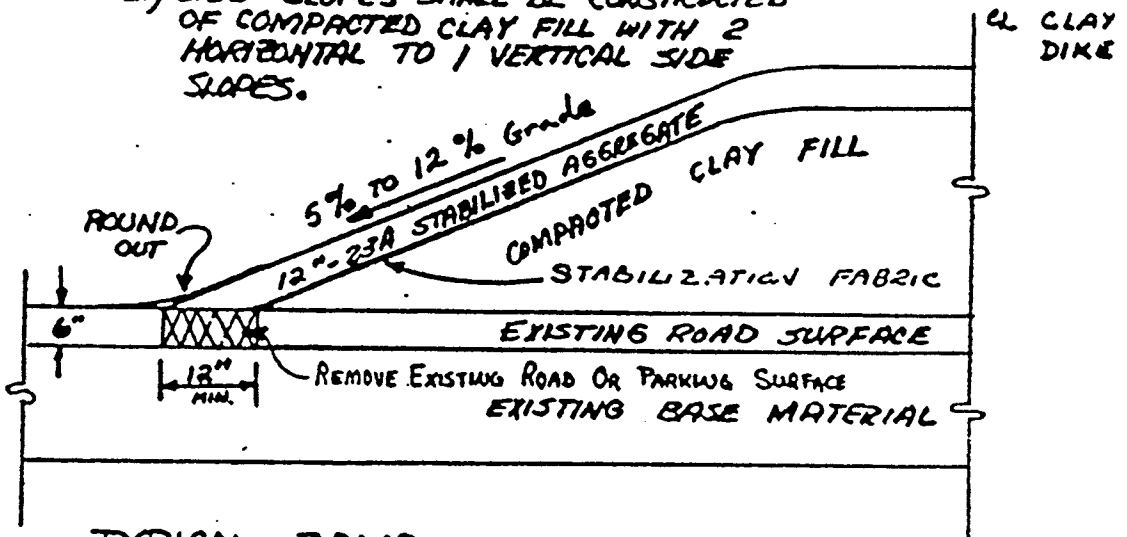
NO SCALE

ADVANCE MEASURES

NOTES:

1) REMOVE EXISTING ROAD SURFACE AS SHOWN, REPLACE WITH NEW SURFACE AGGREGATE.

2.) SIDE SLOPES SHALL BE CONSTRUCTED OF COMPACTED CLAY FILL WITH 2 HORIZONTAL TO 1 VERTICAL SIDE SLOPES.



TYPICAL RAMP CROSS-SECTION

AGGREGATE SURFACED ROAD RAMP

NO SCALE

ADVANCE MEASURES

APPENDIX C

SECTION 208.10, TITLE 33 OF THE CODE OF FEDERAL REGULATIONS

Section 208.10 **Local flood protection works; maintenance and operation of structures and facilities**-(a)General. (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of the Army, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the Department of the Army or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the Superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The Department of the Army will furnish local interest with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under this part.

(b) Levees-(1) Maintenance. The Superintendent shall provide at all times such maintenance as may be re-

quired to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) Operation. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet

all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) Flood walls - (1) Maintenance. Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) Operation. Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) Drainage structures - (1) Maintenance. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurrig adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) Operation. Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) Closure structures - (1) Maintenance. Closure structures for traffic openings shall be inspected by the Superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order;

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency..

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structure shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood period, and damaged or missing parts shall be repaired or replaced immediately.

(2) Operation. Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) Pumping plants - (1) Maintenance. Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies or lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on test and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) Operation. Competent operators shall be on duty at pumping plants whenever it appears that necessity for

pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pumphouse sumps flushed; and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) Channels and floodways - (1) Maintenance. Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building or unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) Operation. Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) Miscellaneous facilities - (1) Maintenance. Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) Operation. Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (Sec. 3, 49 Stat. 1571, as amended; 33 U.S.C. 701c) [9 F.R. 9999, Aug. 17, 1944; 9 F.R. 10203, Aug. 22, 1944].

APPENDIX D

POINTS OF CONTACT

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1. State and Federal Contacts.

The following individuals should be contacted IN THE ORDER INDICATED, if emergency assistance is required concerning the Advance Measures Project at Luna Pier, Michigan.

Monroe County Emergency Service Director, Civil Preparedness	Monroe County Emergency Service 965 S. Rainsinville Road Monroe, Michigan 48161 (313) 241-6400
Michigan State Police Emergency Procedure Branch	Michigan State Police Erie Post #28 Monroe, Michigan 48161 (313) 782-2434
State District Coordinator	Emergency Management Division 42145 W. Seven Mile Northville, Michigan 48167 (313) 256-1500
Corps of Engineers Chief, Emergency Management Branch	Detroit District Office 477 Michigan Avenue Detroit, Michigan 48226 (313) 226-5789

The Corps of Engineers normal duty hours are from 8:00 a.m. to 4:30 p.m., Monday through Friday. Refer all normal operations and maintenance inquires, requests for alterations within project limits, inspection reports etc., to:

U.S. Army Corps of Engineer
P.O. Box 1027
Detroit, Michigan 48231
ATTN: Chief, Emergency Management Branch
(313) 226-5789

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U.S. Army Corps of Engineer
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(313) 226-5789

2. City of Luna Pier's Contacts.

The following people should be contacted IN THE ORDER INDICATED, if City of Luna Pier, Michigan, assistance is required concerning the Luna Pier Advance Measures Project.

Project Superintendent City Manager	Luna Pier, City Hall 4357 Buckeye Luna Pier, Michigan 48157 (313) 848-8120
Mayor of Luna Pier, Michigan	Luna Pier, City Hall 4357 Buckeye Luna Pier, Michigan 48157 (313) 848-6495

APPENDIX E

(REV: MAY 1990)

LOCAL COOPERATION AGREEMENT

AGREEMENT BETWEEN
THE UNITED STATES OF AMERICA
AND
THE CITY OF LUNA PIER
FOR FLOOD PROTECTION
AT
LUNA PIER, MICHIGAN

THIS AGREEMENT, entered into this 25 day of July, 1985, by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), represented by the Contracting Officer executing this Agreement, and THE CITY OF LUNA PIER (hereinafter called the ("Community") under provision of Section 5 of Public Law 84-99 approved August 18, 1941 as amended (33 U.S.C.,701n);

WITNESSETH THAT:

WHEREAS, The Governor of the State of Michigan on 15 April 1985, declared a "State of Disaster" due to the imminent flood threat posed by the present Great Lakes water level.

WHEREAS, said Section 5 of Public Law 84-99 as amended provides supplementary assistance in performance of protective works required to cope with predicted flood flows, including the construction of levees or other protective works; and

WHEREAS, a Letter Report entitled "Advanced Measures Report LUNA PIER, Michigan" dated MAY 13, 1985. providing for the construction of required protective works and other interrelated features was approved on June 3, 1985 under provisions of Public Law 84-99; and,

WHEREAS, in consideration of the benefits which are expected to accrue by reason of the participation of the United States in said protective works; and

WHEREAS, the Community does hereby agree and pledge that they will truly and faithfully perform the following conditions as hereinafter separately agreed to;

NOW THEREFORE, the parties agree as follows:

1. The Community agrees that upon notification, that the Government will commence construction of protective works under provisions of Public law 84-99 and in accordance with the Advanced Measures Report dated May 13, 1985 the Community agrees and pledges; to wit;

a. Provide without cost to the United States all lands, easements and rights-of-way for the emergency work, including, but not limited to, levee, borrow, spoil and access rights-of-way.

b. Hold and Save the United States free from all claims for damages attributable to the construction works except for damages due to the fault or negligence of the United States or its Contractors.

c. Contribute in cash 30 percent of the actual first cost of all protection works, less the Government Estimate for any designated canal closure. Such local cash contribution presently estimated at $ 324,000.00 to be paid in a lump sum prior to initiation of advertising for construction and subject to final adjustment after actual costs have been determined

d. Maintain and operate all works after completion, without cost to the United States in a manner satisfactory to the Chief of Engineers, It is understood that the foregoing maintenance and operation requirement extends to interrelated features of all protective works under control of the Community such as interior drainage and pumping facilities.

e. Comply with applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 ", Public Law 91-646, approved 2 January 1971, in acquiring lands, easements and rights-of-way for the project and inform affected persons of pertinent policies, procedures and benefits in connection with said Act.

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, in connection with the maintenance and operation of the project.

g. Finish dress and place sod on the completed clay protective works or seed with a good sod-producing seed mixture after completion of the work and prior to the end of the next seeding season.

h. Construct, operate and maintain all required canal closure structures upon notice of the Contracting Officer in accordance with terms and conditions outlined in Addendum No. 1.

AND further the Community, as a part of the aforesaid considerations, does hereby release and forever discharge the United States, its officers, employees, agents and assigns, in the prosecution of the proposed advanced measures protective works herein contemplated from all claims, demands, actions and causes of action whatsoever, which may arise by reason of, or in any manner have grown out of or alleged to have grown out of, the construction of the said protective works as herein contemplated.

PERMISSION is hereby granted to the United States of America, its officers, employees, agents and assigns and the Government contractors, their officers, employees, agents and assigns, to

enter upon Community lands and rights-of-way, including any additional rights-of-way to be obtained by said Community, for the purpose of performing the emergency flood control work hereinabove described.

IT IS HEREBY certified that the undersigned have the legal authority to execute the above agreement; that the assistance herein requested is beyond the capability of local authorities; and that every possible effort shall continue to be made at the local level to accomplish effective protection from the flood.

EXECUTED this 25 day of July, 1985.

THE UNITED STATES OF AMERICA

APPROVED:

BY: Raymond T. Beurket Jr.
RAYMOND T. BEURKET, JR.
Colonel, Corps of Engineers
District Engineer
Contracting Officer

DATE:

City of Luna Pier, Michigan

BY: JERRY R. WELTON

It's MAYOR

ADDENDUM

1. The Community agrees to close all designated canals upon notification from the Contracting Officer.

2. The first cost of construction of closing each designated canal shall be credited toward the Community's cash contribution.

3. The credit shall be based upon a United States Government estimate to construct a clay barrier with stone rip-rap and culvert flap-gate to accommodate interior drainage.

4. Canal closure structures other than the standard clay barrier structure or interior levees will be allowed, but credit will be based upon the Government estimate for the standard clay barrier structure.

5. Plans and specifications for any canal closure structures or interior levees shall be submitted to the Contracting Officer for approval prior to initiating construction.

6. The Community shall comply with all applicable state, local and Federal regulations regarding any canal closure structure.

7. The Community agrees to operate and maintain each canal closure structure during all periods of imminent flooding.

ATTORNEY'S CERTIFICATE RE: ADVANCE MEASURES

City of Luna Pier, Michigan

In my opinion, the City of Luna Pier and the Army Corps of Engineers have the necessary legal rights to construct and maintain additional flood control protection facilities for twenty-five (25) years over, upon and across the lands described in the plans prepared by the Corps of Engineers dated July 19, 1985 consisting of sheets one through fourteen inclusive which were approved by Resolution of the City Council on the 25th days of July, 1985, except as to the area known as Allens Cove and thereafter approved by Resolution as to Allens Cove on August 2, 1985.

The City previously had acquired the perpetual right by means of waivers of riparian rights executed in 1983, quit claim deed from the State of Michigan as to certain Lake Erie bottomlands, judgments in condemnation proceedings in the Monroe County Circuit Court in 1983, Resolutions of the Board of County Road Commissioners of the County of Monroe transferring certain roads to the jurisdiction of the City, all of which vest the City with the perpetual right to construct and maintain flood control facilities which, in fact, were constructed at a heighth of 579 feet (I.G.L.D.). Additional rights were acquired to increase the heighth of the flood control protection to 581.5 feet (I.G.L.D.) and were acquired, in my opinion, pursuant to an Order of the Monroe County Circuit Court, Case No. 85-12512-CC, by Order dated August 15, 1985, granting said right as an exercise of police power without the necessity for the payment of compensation by reason of the additional rights acquired.

Compliance with Public Law 91-646 has been deferred due to the emergency nature of the project. Acceptance of this Certificate is requested on the condition that the City will under Section 305 of said Law to the greatest extent possible under State of Michigan law, follow the policies in Section 301 and comply with the provisions of Section 302 and 303 of said Law.

DATED: August 16, 1985

Respectfully submitted,

BRAUNLICH, RUSSOW & BRAUNLICH
A Professional Corporation
Attorneys for Plaintiff

By: /s/ William J. Braunlich, Jr.
William J. Braunlich, Jr.

APPENDIX F

LEVEE EASEMENT

25 - YEAR LEVEE EASEMENT

A 25-year assignable right and easement to construct, maintain, repair, operate and inspect and replace levees and flood control protection facilities, including all appurtenances there to; reserving, however, to the owners, their heirs and assigns, all such rights and priviliges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for the public roads and highways, public utilities, railroads and piplines.