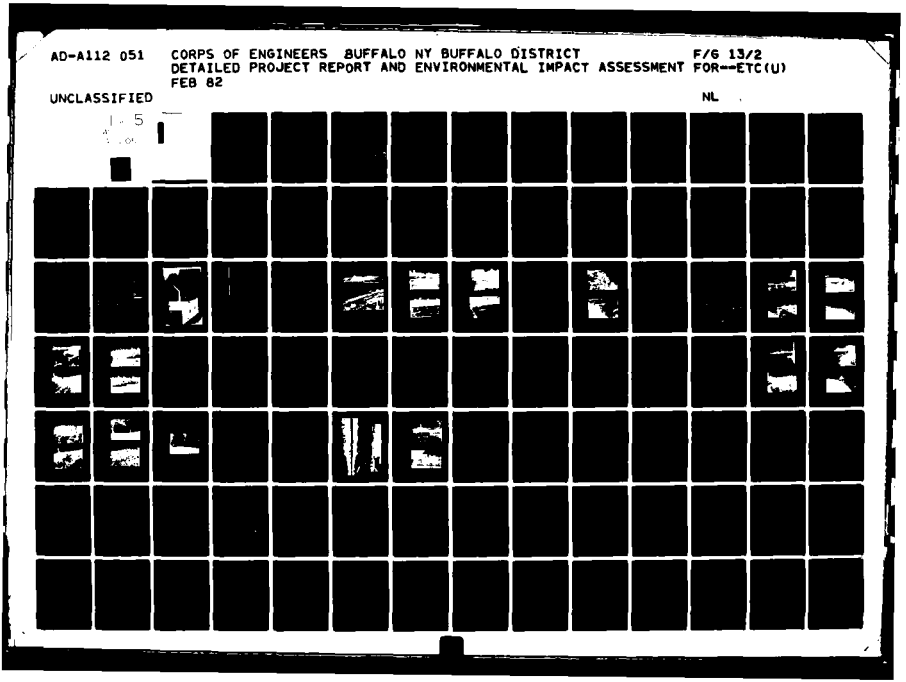
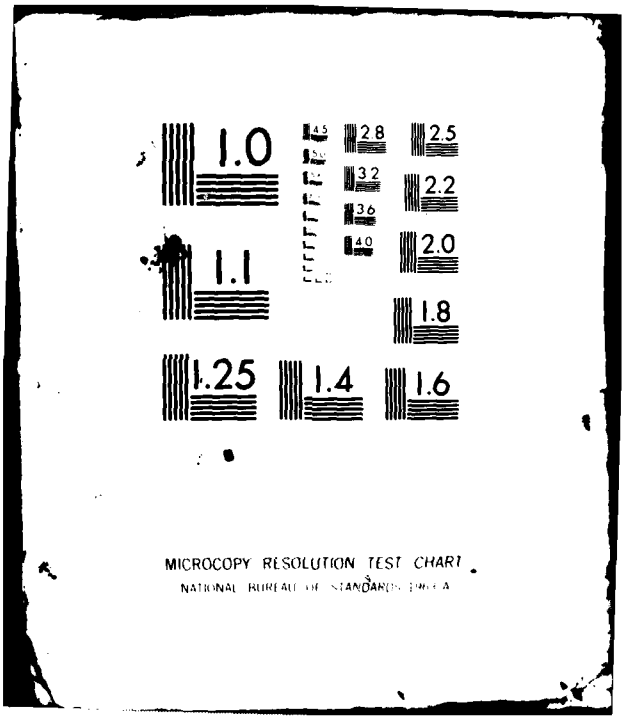
AD-A112 051 CORPS OF ENGINEERS BUFFALO NY BUFFALO DISTRICT F/G 13/2
DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT ASSESSMENT FOR--ETC(U)
FEB 82

UNCLASSIFIED NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

NCBPD-ER

8 March 1982

TO WHOM IT MAY CONCERN:

Enclosed is a copy(ies) of the Draft Detailed Project Report (DDPR), including the Environmental Assessment (EA), and Finding of No Significant Impact (FONSI) for the proposed beach erosion control and shoreline protection project at Lakeshore Park, Ashtabula, OH. The EA and FONSI were prepared in accordance with the Council on Environmental Quality's "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," CFR 1500-1508, as promulgated in Corps of Engineers Regulations ER 200-2-2, "Environmental Quality: Policy and Procedures for Implementing NEPA." Although reference is made in the documents to an Enviornmental Impact Statement, it was decided late in the final planning stage that an EA would be sufficient in assessing the impacts of the Selected Plan.

It is requested that the enclosed EA and FONSI be reviewed and comments forwarded to the District Engineer within 30 days. If, by 9 April 1982, no comments are received which would reverse the Finding of No Significant Impact, the FONSI will be signed and made part of the official project documentation.

Thank you for your cooperation in this matter.

Sincerely,

2 Incl
as stated

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, the Buffalo District, Corps of Engineers has assessed the environmental impacts of the following proposed project:

Beach Erosion Control and Shoreline Protection Study
Lakeshore Park, Ashtabula, OH

The project, authorized under Section 103(a) of the River and Harbor Act of 1962, as amended by Section 310 of the River and Harbor Act of 1965 and by Section 112 of the River and Harbor Act of 1970, involves the construction of three offshore breakwaters and the restoration of an 800-foot long recreational beach. The breakwaters, each 125 feet long with 200-foot gaps between them, would be of rubblemound construction and placed approximately 150 feet offshore. A total of 37,000 cubic yards of clean sandfill would be placed along an 800-foot reach to the lee of these structures. Approximately 10 percent of this beachfill would require replenishment on an annual basis.

The project is not a major Federal action and analysis has shown that it would have no significant adverse effects on the quality of the human environment. Public coordination to date, has uncovered no areas of environmental controversy. Based on these factors, it has been determined that an Environmental Impact Statement will not be required.

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

Date:_____

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A112051	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Draft Detailed Project Report and Environmental Impact Assessment for Lakeshore Park, Ashtabula, Ohio Beach Erosion Control and Shoreline Protection Study Stage 3 Documentation	5. TYPE OF REPORT & PERIOD COVERED FINAL
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) n/a	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, Buffalo 1776 Niagara Street Buffalo, N.Y. 14207	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, Buffalo 1776 Niagara Street Buffalo, N.Y. 14207	12. REPORT DATE February 1982
	13. NUMBER OF PAGES 439
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*	15. SECURITY CLASS. *(of this report)*
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Distribution Unlimited

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

DTIC ELECTE MAR 16 1982 S H

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*
Among other subjects covered are: study authority, scope; problem identification, needs and opportunities; local cooperation requirements; assessment and evaluation of detailed plan(s) and environmental impacts. Technical works involve coastal design, geotechnical, and economic evaluation.

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*
Lakeshore Park consists of approximately 50 acres of Lakefront property located in the township of Ashtabula, Ohio. The Buffalo District of the Corps of Engineers has investigated public concerns of the study area related to shoreline, beach and bluff erosion. Several alternative plans were studied to address the erosion problem. The tenatively selected plans consists of three offshore rubblemound breakwaters and an 800 foot recreational beach. That plan would best address the identified public concerns and contribute to the goal of National Economic Development.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT ASSESSMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

MAIN REPORT

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

REVISED FEBRUARY 1982

DRAFT
DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR LAKESHORE PARK, SECTION 103
STAGE 3 DOCUMENTATION

TABLE OF CONTENTS

Description	Page
ACKNOWLEDGEMENT	x
A. MAIN REPORT	
SECTION I - INTRODUCTION	1
INTRODUCTION	1
STUDY AUTHORITY	1
SCOPE OF STUDY	4
THE STUDY PROCESS	5
STUDY PARTICIPANTS AND COORDINATION	5
THE REPORT	9
PRIOR CORPS STUDIES	10
STUDIES BY OTHERS	12
SECTION II - PROBLEM IDENTIFICATION	16
NATIONAL OBJECTIVES	16
THE STUDY AREA (Existing Conditions, Economy, Resources)	16
CONDITIONS IF NO FEDERAL ACTION TAKEN	37
PROBLEMS, NEEDS, AND OPPORTUNITIES	37
PLANNING OBJECTIVES	47
PLANNING CONSTRAINTS	47

DTIC COPY INSPECTED 2

Accession For
NTIS GRA&I
DTIC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist Avail and/or Special
A

TABLE OF CONTENTS (Cont'd)

Description	Page
SECTION III - FORMULATION OF PRELIMINARY PLANS	48
MANAGEMENT MEASURES	48
PLAN OF OTHERS	48
LOCAL COOPERATION REQUIREMENTS	51
PLAN FORMULATION RATIONALE	53
GENERAL FORMULATION AND EVALUATION CRITERIA	53
SECTION IV - ANALYSIS OF PLANS IN PRELIMINARY PLANNING	55
ALTERNATIVES CONSIDERED IN STAGE 2	55
SUMMARY OF COSTS AND BENEFIT/COST RATIOS	71
SUMMARY OF STAGE 2 RESULTS	74
Alternatives Eliminated in Stage 2	74
Alternative Plans Carried into Stage 3	77
Alternatives Eliminated Early in Stage 3	77
SECTION V - ASSESSMENT AND EVALUATION OF DETAILED PLAN(S)	79
ALTERNATIVE PLAN 1 (NO ACTION)	79
Plan Description	79
Cost Estimates (Allocation and Apportionment)	79
Implementation Responsibility	79
Economic Evaluation	79
Impact Assessment	79
Public Views (Federal, Non-Federal)	82

TABLE OF CONTENTS (Cont'd)

Description	Page
SECTION V - ASSESSMENT AND EVALUATION ON DETAILED PLAN(S) (CONT'D)	79
ALTERNATIVE PLAN 2 (OFFSHORE BREAKWATERS, 800-FOOT BEACH)	83
Plan Description	83
Cost Estimates (Allocation and Apportionment)	83
Implementation Responsibilities	91
Economic Evaluation	93
Impact Assessment	102
Public Views	103
SECTION VI - COMPARISON OF DETAILED PLAN(S)	105
COMPARATIVE EVALUATION OF CANDIDATE PLANS	105
RATIONALE FOR "NED" Plan	112
RATIONALE FOR DESIGNATION OF "EQ" PLAN	118
RATIONALE FOR THE TENTATIVELY-RECOMMENDED PLAN	118
SECTION VII - CONCLUSIONS AND RECOMMENDATIONS	121
CONCLUSIONS	121
RECOMMENDATIONS	122
SECTION VIII - FINALIZING THE DPR	124
FUTURE ACTIVITIES	124
PROPOSED SCHEDULE	124

TABLE OF CONTENTS (Cont'd)

B. DRAFT ENVIRONMENTAL IMPACT STATEMENT

Subject	Page
SUMMARY	EIS-1
MAJOR CONCLUSIONS AND FINDINGS	EIS-1
AREAS OF CONTROVERSY	EIS-2
UNRESOLVED ISSUES	EIS-2
RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS	EIS-3
NEED FOR AND OBJECTIVES OF ACTION	EIS-5
STUDY AUTHORITY	EIS-5
PUBLIC CONCERNS	EIS-5
PLANNING OBJECTIVES	EIS-6
ALTERNATIVES	EIS-8
PLANS ELIMINATED FROM FURTHER STUDY	EIS-8
WITHOUT CONDITIONS (NO ACTION)	EIS-10
PLANS CONSIDERED IN DETAIL	EIS-11
IMPLEMENTATION RESPONSIBILITIES	EIS-12
AFFECTED ENVIRONMENT	EIS-16
ENVIRONMENTAL CONDITIONS	EIS-16
SIGNIFICANT RESOURCES	EIS-17
ENVIRONMENTAL EFFECTS	EIS-20
CULTURAL RESOURCES	EIS-20

TABLE OF CONTENTS (Cont'd)

Subject	Page
TERRESTRIAL RESOURCES	EIS-20
RECREATION RESOURCES	EIS-21
AQUATIC RESOURCES	EIS-22
AIR RESOURCES	EIS-22
PLAN ECONOMICS	EIS-23
LIST OF PREPARERS	EIS-24
PUBLIC INVOLVEMENT	EIS-25
PUBLIC INVOLVEMENT PROGRAM	EIS-25
REQUIRED COORDINATION	EIS-26
STATEMENT RECIPIENTS	EIS-27
PUBLIC VIEWS AND RESPONSES	EIS-29
INDEX, REFERENCES AND APPENDICES	EIS-30

C. APPENDICES

Appendix	Title
A	DETAILED ENGINEERING DESIGN
B	GEOTECHNICAL
C	ECONOMICS
D	COST ESTIMATES
E	PUBLIC INVOLVEMENT
F	ENVIRONMENTAL INFORMATION

TABLE OF CONTENTS (Cont'd)

PLATES AND FIGURES

Number	Description	Page
1	Locality Map	2
1.1	Harbor Marina Master Plan Study (Site Alternatives)	13
1.2	Lakeshore Park Recreation Plan	14
2.0	Land View Photo of Lakeshore Park in 1928	17
2.1-2.2	Land View Photo Showing Recreational Opportunities at Lakeshore Park	18-19
2.3	Land View Photo Showing Stone Revetment Built in 1977 to Protect Pavilion from Flooding	21
2.4	Lakeshore Park Recreation Plan. Planning Area	22
2.4.a	Land Needed for Beach Restoration Project	23
2.5	Landview Photo of West Lakefront Area	24
2.6	Central Lakefront Area	25
2.7	East Lakefront Area (Photo)	26
2.8	East Lakefront Area (Photo)	27
2.9	Access Corridors and Routes (External Traffic Flow)	35
2.9a	Internal Traffic and Parking	36
2.10	Land View Photo Showing Erosion	38
2.11	Land View Photo Showing Erosion	39
2.12	Land View Photo Showing Erosion	40
2.13	Land View Photo Showing Erosion	41
2.14	Photo Showing Old Beach at Lakeshore Park	42
2.15	Photo Showing Flooded Pavilion	45
2.16	Photo Showing Protective Works Underway	46
3.1	Harbor Marina Master Plan Study, Alternative Site A	50

TABLE OF CONTENTS (Cont'd)

Number	Description	Page
3.2	Stage 3 Alternative Plan 2	52
4.1	Stage 2 Alternative Plan 2	56
4.2	Stage 2 Alternative Plan 3	57
4.3	Stage 2 Alternative Plan 4	58
4.4	Stage 2 Alternative Plan 5	59
4.5	Stage 2 Alternative Plans 7 and 7A	60
4.6	Stage 2 Alternative Plans 8 and 8A	61
5.1	Plan View of Alternative Plan 2 (Tentatively Selected)	84
5.1a	Regional Swimming Needs	98
5.2	Typical Breakwater Section	85
5.3	Average Beach Profile	86

TABLES

Number	Description	Page
1	Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements	EIS-4
1.1-1.4	Grain Size Analysis	7
1.5	Summary Comparison of Marina Sites	15
2	Comparative Impacts of Alternatives	EIS-15
2.1	Population Growth Trends for Local Demand Area	29
2.2	Population Projections for Counties Included in Regional Demand Elements	30
2.3	Comparative Statement of Traffic	31
2.4	Freight Traffic	32
2.5	Industry of Employed Persons as a Percent of Total Employed Persons 16 and Over by County - 1970	33

TABLE OF CONTENTS (Cont'd)

Number	Description	Page
2.6	Percent Distribution of Income of Families and Unrelated Individuals by County - 1969	34
2.7	Fecal Coliforms (per 100 ml) at Lakeshore Park	44
4.1	Cost Apportionment for Alternative 2 (Stage 2)	62
4.2	Benefit-Cost Ratio	63
4.3	Cost Apportionment for Alternative 3 (Stage 2)	65
4.4	Cost Apportionment for Alternative 4 (Stage 2)	66
4.5	Cost Apportionment for Alternative 5 (Stage 2)	67
4.6	Cost Apportionment for Alternative 7 (Stage 2)	69
4.7	Cost Apportionment for Alternative 7A (Stage 2)	70
4.8	Cost Apportionment for Alternative 8 (Stage 2)	72
4.9	Cost Apportionment for Alternative 8A (Stage 2)	73
4.10	Average Annual Cost for Alternatives 1-8A	75
4.11	Benefit-Cost Analysis	76
5.1	Total Construction First Cost (Stage 3)	88
5.2	Annual Maintenance Cost for Alternative 2 (Stage 3)	88
5.3	Estimate of Total Project Cost and Cost Apportionment for Alternative 2 (Stage 3)	89
5.4	Cost Apportionment for Alternative Plan 2 (Stage 3)	90
5.5	Estimated Investment Cost and Annual Charges for Alternative Plan 2 (Stage 3)	92
5.6	Summary of Average Annual Benefits for Alternative Plan 2 With and Without Impact of Steel Mill Upon Growth (Stage 3)	94
5.7	Net Benefit and Benefit-Cost Ratios (Stage 3)	95
5.8	Secondary Evaluative Criteria for Optimum Alternative	95

TABLE OF CONTENTS (Cont'd)

Number	Description	Page
5.9	Recreation Needs	97
5.10	Swimming Facility Needs	99
5.11	Bathing Demand Projection	100
6.1	System of Accounts - Summary Comparison of Candidate Plans	105-111
6.2	System of Accounts for Candidate Plan 1	112-114
6.3	System of Accounts for Candidate Plan 2	115-117
6.4	Cost Comparison of Candidate Plans	120

ACKNOWLEDGEMENT

This Stage 3 Detailed Project Report document was prepared through the efforts and contributions of the Buffalo District technical staff, and other Federal and non-Federal agencies, and individuals whose cooperations have been greatly appreciated. Wiener Cadet, Civil Engineer, performed the duties of Project Manager for this Stage 3 of the study. Some of the Corps personnel involved were:

Jonathan Kolber	- Geotechnical Engineer
Wiener Cadet	- Coastal Engineer
Thomas Bender	- Coastal Engineer
Joseph Kurek	- Cost Estimator
James Wheeler	- Cost Estimator
Alex Ratkowski	- Economist
Jonathan Brown	- Economist
Philip E. Berkeley	- Biologist
Richard Lewis	- Archeologist
William Butler	- Geographer
Barry Payne	- Biologist
Irving Stone	- Draftsman

Recognition is also extended to Mr. Hugh Thomas, Deputy Administrator with the Ashtabula County Planning Commission, and local coordinator for this study. Other individuals involved are numerous and not easily identified. Therefore, a special acknowledgment is given to them through the employing agencies they have represented:

Ashtabula County Planning Commission
Ashtabula Township Park Commission
Ohio Department of Natural Resources
U.S. Fish and Wildlife Service, Columbus, OH Field Office
U.S. Coast Guard, Ninth District, Cleveland, OH
Ashtabula Port Authority
Ashtabula Marine Advisory Board
Ohio Department of Health

The efforts and cooperation of many others of the Corps of Engineers District, Buffalo, are recognized:

Freda Soper	- Chief, Word Processing Center
Lillian J. Stryczek	- Lead Clerk, Word Processing Center
Susan M. Ward	- DMT Operator
George Key	- Acting Chief, Reproduction

The Buffalo District has conducted this study under the general supervision of Donald M. Liddell, Chief, Engineering Division; Charles E. Gilbert, Chief, Planning Division, and John Zorich, Chief, Western Branch. Colonel George P. Johnson was District Engineer during preparation of this Stage 3 Detailed Project Report.

We further extend our acknowledgment to all those who in some respect have contributed to the achievement of this Stage 3 document.

DETAILED PROJECT REPORT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
UNDER
SECTION 103 OF THE 1962 RIVER AND HARBOR ACT, AS AMENDED
STAGE 3 DOCUMENT

SECTION I

INTRODUCTION

INTRODUCTION

Lakeshore Park is located in Ashtabula County, OH. It is approximately 40 miles southwest of Erie, PA, and about 50 miles northeast of Cleveland, OH, (Plate 1). The southwest park boundary is the Ashtabula City Corporation limits. Lakeshore Park's immediate neighbors along Lake Erie are the Port of Ashtabula to the west and the Cleveland Electric Illuminating Company to the east.

Early capital improvements and park planning date back to 1916 when the existing roads and the park itself, with its historical pavilion, were built. Since then the area has undergone considerable changes both under the influence of nature and man-made work. Other problems such as flooding, shore erosion, and the ever-increasing demand for new types and multiple use forms of recreation have persisted and become more and more difficult for the local authorities to cope with.

At the request of the Ashtabula Township Park Commission and Congressman William Stanton, the Buffalo District prepared, in December 1974, a Reconnaissance Report recommending a Detailed Project Report for beach erosion and shoreline protection under the authority of Section 103 of the 1962 River and Harbor Act. The recommended plan of improvement had called for offshore breakwaters and a recreational beach to restore, and protect the shore against flooding and erosion by lake storms; and conserve and develop natural resources.

During Stage 2 investigations, several alternative plans were developed through coordination with local interests and with the help of other Federal and non-Federal agencies. Workshops and public meetings were held to discuss those alternatives. As a result, the Stage 2 report recommended carrying forth into Stage 3 the most economically feasible plans which would meet both Federal criteria and locals needs.

This final report documents the result of the Stage 3 investigations, and refinements of the preferred alternatives.

STUDY AUTHORITY

This report was prepared under the authority of Section 103(a) of the River and Harbor Act of 1962, as amended by Section 310 of the River and Harbor Act

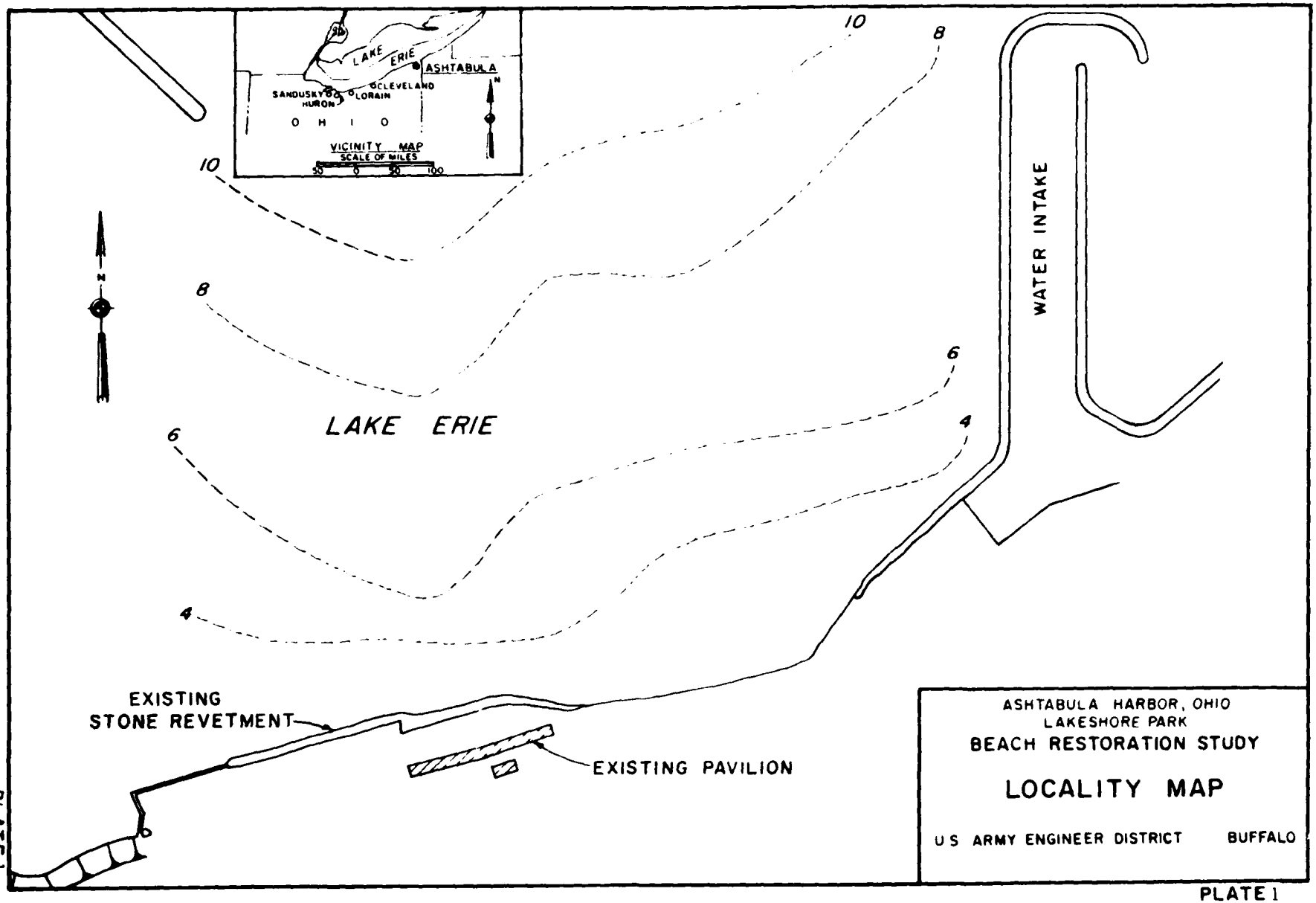


PLATE 1

PLATE 1

of 1965 and by Section 112 of the River and Harbor Act of 1970. These laws amend Public Law 826, 84th Congress (28 July 1956) to read as follows:

"That (a) with the purpose of preventing damage to the shores of the United States, its Territories and possessions and promoting and encouraging the healthful recreation of the people, it is hereby declared to be the policy of the United States, subject to the following provisions of this Act to assist in the construction, but not the maintenance, of works for the restoration and protection against erosion by waves and currents, of the shores of the United States, its Territories and possessions.

"(b) The Federal contribution in the case of any project referred to in subsection (a) shall not exceed one-half of the cost of the project, and the remainder shall be paid by the State, municipality, or other political subdivision in which the project is located except that the costs allocated to the restoration and protection of Federal property shall be borne fully by the Federal Government, and further, that Federal participation in the cost of a project for restoration and protection of State, county, and other publicly owned shore parks and conservation areas may be in the discretion of the Chief of Engineers, not more than 70 percentum of the total cost exclusive of land costs, when such areas: Include a zone which excludes permanent human habitation; include but are not limited to recreational beaches; satisfy adequate criteria for conservation and development of the natural resources of the environment; extend landward a sufficient distance to include, where appropriate, protection dunes, bluffs, or other natural features which serve to protect the uplands from damage; and provide essentially full park facilities for appropriate public use all of which shall meet with the approval of the Chief of Engineers.

"(c) When in the opinion of the Chief of Engineers the most suitable and economical remedial measures would be provided by periodic beach nourishment, the term 'construction' may be construed for the purposes of this Act to include the deposit of sand fill at suitable intervals of time to furnish sand supply to project shores for a length of time specified by the Chief of Engineers.

"(d) Shores other than public will be eligible for Federal assistance if there is benefit such as that arising from public use or from the protection of nearby public property or if the benefits to those shores are incidental to the project, and the Federal contribution to the project shall be adjusted in accordance with the degree of such benefits.

"(e) No Federal contribution shall be made with respect to a project under this Act unless the plan therefore shall have been specifically adopted and authorized by Congress after investigation and study by the Beach Erosion Board under the provisions of Section 2 of the River and Harbor Act approved July 3, 1930, as amended and supplemented, or, in the case of a small project under Section 3 of this Act, unless the plan therefor has been approved by the Chief of Engineers.

"SEC 2. The Secretary of the Army is hereby authorized to reimburse local interests for work done by them, after initiation of the survey studies

which form the basis for the project, on authorized projects which individually do not exceed $1,000,000 in total cost: PROVIDED, That the work which may have been done in the projects is approved by the Chief of Engineers as being in accordance with the authorized projects: PROVIDED FURTHER, That such reimbursement shall be subject to appropriations applicable thereto or funds available therefore and shall not take precedence over other pending projects of higher priority for improvements.

"SEC 3. The Secretary of the Army is hereby authorized to undertake construction of small shore and beach restoration and protection projects not specifically authorized by Congress, which otherwise comply with Section 1 of this Act, when he finds that such work is advisable, and he is further authorized to allot from any appropriations hereafter made for civil works, not to exceed $25,000,000 for any one fiscal year for the Federal share of the cost of construction of such projects: PROVIDED, That no more than $1,000,000 shall be allotted for this purpose for any single project and the total amount allotted shall be sufficient to complete the Federal participation in the project under this section including periodic nourishment as provided for under section 1(c) of this Act: PROVIDED FURTHER, That the provisions of local cooperation specified in section 1 of this Act shall apply; AND PROVIDED FURTHER, That the work shall be complete in itself and shall not commit the United States to any additional improvement to insure its successful operation, except for participation in periodic beach nourishment in accordance with section 1(c) of this Act, and as may result from the normal procedure applying to projects authorized after submission of survey reports."

"SEC 4. As used in this Act, the word 'shores' includes all the shorelines of the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and lakes, estuaries, and bays directly connected therewith."

These laws authorized the Corps of Engineers to assist in the construction of works for the restoration and protection of the shores of the Great Lakes against erosion by waves and currents, particularly Lakeshore Park, which has been subjected to erosion and flooding due to high lake level and northeast storms.

SCOPE OF STUDY

Lakeshore Park consists of about 50 acres of lakefront property, located in the township of Ashtabula, OH. The park is owned by the town of Ashtabula and managed by the Township Park Commission. A 440-foot X 24-foot pavilion overlooks a small beach and boat livery. The total park frontage on Lake Erie is about 2,500 feet. From the east park boundary, low clay bluffs extend 800 feet along the shore to the west. These bluffs are being rapidly eroded by high Lake Erie water levels and northeast storms. The remainder of the shoreline is presently protected by a recently constructed stone revetment. This stone revetment was constructed to protect the park pavilion from flooding during winter storms. Presently, the primary concern of the Park Commission is the rapid loss of park land along the bluffs to the east of the pavilion, and restoration of a recreational beach.

The purpose of this study has been to determine the best possible ways of correcting the beach erosion and shoreline protection problems at Lakeshore Park while providing for the restoration of a recreational beach. The study will address environmental, economic, and engineering considerations. Plan evaluation has been carried to the level of detail mandated by "Principles and Standards for Water and Related Land Resources Planning."

THE STUDY PROCESS

The Lakeshore Park beach erosion and shoreline protection study is a three-stage study carried out under the Continuing Authority Program (project not specifically authorized by Congress). The first stage of this study scoped general investigation activities and the direction of the study. It produced, in December 1974, a "Reconnaissance Report" which gave the estimated cost of the study and identified the economy of the potential project area and possible environmental issues that would need to be addressed if a feasibility study were to be conducted. The second stage identified and analyzed a range of alternative solutions to the problems at Lakeshore Park and produced a staff report referred to as Stage 2 Documentation in August 1979. This third and final stage develops and refines the recommended plan(s) to the extent necessary to proceed directly from this Detailed Project Report to preparation of Plans and Specifications. This Stage 3 report contains the District Engineer's recommendation and a Draft Environmental Impact Statement.

The Buffalo District has scoped this study to identify the pros and cons, and public preferences concerning proposed protection and restoration work for Lakeshore Park and to determine whether or not the recommended plan or any other alternative plans should be implemented.

The study considers regional recreational swimming opportunities and needs, forecasts swimming demand for the park beach area and recreational fisheries which could benefit from artificial reefs that will be developed by means of offshore rubblemound breakwaters. This Stage 3 Draft Detailed Project Report of the study includes a main report, a Draft Environmental Impact Statement and six appendices. The main report is written to give both the general and technical reader and the reviewing echelon a clear understanding of the study, the study results, and the basis for key decisions and conclusions. Its organization and content follows the Corps of Engineers guidelines for feasibility report as defined by ER 1105-2-920.

STUDY PARTICIPANTS AND COORDINATION

The Buffalo District has conducted this study in cooperation with Mr. Hugh Thomas of the Ashtabula County Planning Commission. The District held an Initial Orientation Workshop meeting on 6 September 1978 at Lakeshore Park with various State and local officials. At this meeting, Mr. Hugh Thomas was designated liaison between the local agencies and the Corps. Mr. Thomas' efforts throughout the course of this study have been greatly appreciated. Other smaller workshop meetings whose purpose was to coordinate activities were also held at various times. On 25 September 1979, a public meeting was held at the Kent State University in Ashtabula to present the

results and recommendations of the Stage 2 study and obtain locals' views on alternatives for Stage 3. (For more information, see Appendix E, Exhb. E-5.)

The Buffalo District has coordinated with several Federal, State, county, and regional agencies including:

Federal

U. S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Department of Housing and Urban Development
Advisory Council on Historic Preservation
Ninth Coast Guard District
U.S. Department of Transportation

State

Ohio Department of Natural Resources
Ohio Office of Budget and Management
Ohio Department of Health
Ohio Historical Preservation Office

County

Ashtabula County Council of Governments
Ashtabula County Planning Commission

Regional

Ashtabula Township Park Commission
Ashtabula Township Trustees
Cleveland Electric Illuminating Company

The Buffalo District has coordinated with the Cleveland Electric Illuminating Company, Ashtabula Plant, through Mr. Hugh Thomas of the Ashtabula County Planning Commission.

The Cleveland Electric Illuminating Company (CEI) was planning to dredge about 113,620 cubic yards of material from their intake channel. Through coordination with Mr. Thomas the locals conveyed to the Corps their intentions to negotiate with CEI to have the dredge material placed at Lakeshore Park.

As a result, EPA performed related work on sieve and chemical analyses to determine percentages of different grain sizes and the level of acceptable pollutants. The results of these analyses (see Tables 1.1-1.4) indicated that grain sizes were too fine and, therefore, unsuitable for use as beachfill.

The District, after reviewing letters received from both the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency, decided that the dredge material from the Cleveland Electric Illuminating Company intake channel was unsuitable for use as beach material for the

Table 1.1 - Grain Size Analysis (April 1980)

Ashtabula Intake - Site Number 1		
Screen Size	Total Sediment in Grams	Percent of Total
4	0	0.0
10	0	0.0
16	0.37 gm	0.12
28	0.61 gm	0.19
50	9.10 gm	2.90
100	24.13 gm	7.70
200	91.64 gm	29.23
PAN	186.70 gm	59.86
TOTALS	313.55 gm	100.00

SOURCE: Environmental Resource Associates, Inc., 20700 North Park Blvd., University Heights, OH.

Table 1.2 - Grain Size Analysis (April 1980)

Ashtabula Intake - Site Number 2		
Screen Size	Total Sediment in Grams	Percent of Total
4	0	0.0
10	.02 gm	.01
16	.09 gm	0.02
28	.12 gm	0.03
50	5.16 gm	1.26
100	40.97 gm	10.03
200	155.39 gm	38.03
PAN	206.90 gm	50.63
TOTALS	408.65 gm	100.00

SOURCE: Environmental Resource Associates, Inc., 20700 North Park Blvd., University Heights, OH.

Table 1.3 - Grain Size Analysis (April 1980)

Ashtabula Intake - Site Number 3		
Screen Size	Total Sediment in Grams	Percent of Total
4	0	0.0
10	.11 gm	0.03
16	.08 gm	0.02
28	.12 gm	0.04
50	11.39 gm	3.42
100	53.93 gm	16.19
200	40.94 gm	12.29
PAN	226.61 gm	68.01
TOTALS	333.18 gm	100.00

SOURCE: Environmental Resource Associates, Inc., 20700 North Park Blvd., University Heights, OH.

Table 1.4 - Grain Size Analysis (April 1980)

Ashtabula Intake - Site Number 4		
Screen Size	Total Sediment in Grams	Percent of Total
4	8.23 gm	1.54
10	5.20 gm	0.97
16	9.88 gm	1.85
28	10.05 gm	1.88
50	37.03 gm	6.94
100	101.36 gm	18.98
200	130.91 gm	24.52
PAN	231.24 gm	43.32
TOTALS	533.90 gm	100.00

SOURCE: Environmental Resource Associates, Inc., 20700 North Park Blvd., University Heights, OH.

Lakeshore Park project. Copies of pertinent correspondence are provided in Appendix E.

The District has also maintained coordination with the U.S. Fish and Wildlife Service. Their draft Fish and Wildlife Coordination Act report for the Lakeshore Park project was received in June 1980. They anticipated no significant adverse effect to the environment or fish and wildlife resources, due to implementation of Alternative Plan 2. On 26 August 1980, a public notice and preliminary evalutation under Section 404 of the Clean Water Act was circulated to Federal, State, and local interests. On 20 January 1981, a Section 401 Water Quality Certificate was issued by the Ohio Envionmental Protection Agency (see Appendix F).

THE REPORT

This main report is divided into eight sections (I through VIII). These sections are identified by appropriate titles with related paragraphs providing substantial information pertinent to the study. The Draft Environmental Impact Statement follows Section VIII; and detailed information is furnished in six appendices.

Section I is an introduction which briefly describes the events leading to this report, and the various alternatives considered. It identifies study participants and summarizes other studies pertaining to Lakeshore Park, Ashtabula, OH.

Section II provides a description of the study area, its physical dimension, geography, economy, resources, development on the stone revetment (recently constructed to protect the park pavilion from flooding during winter storms), water quality, population, and other demographic information. It summarizes the problems, needs, and concerns about the park and other officially expressed concerns about the project. It also defines the national objectives for planning water resources projects and the planning objectives specific to this study.

Section III discusses the general formulation and evaluation criteria, management measures and local cooperations requirements. It explains, in general, Federal and non-Federal cost-sharing for small flood and beach erosion control project authorized under the Continuing Authorities Program. This section also discusses other independent studies carried out by private consulting firms for the development of the Lakeshore Park area in general.

Section IV provides a summary analysis of those plans considered in the preliminary Stage 2 planning. The description of those plans along with their costs, and B/C ratios are also discussed. This section also identifies those alternative plans eliminated in Stage 2, and early in Stage 3; and provides the rationales supporting their elimination.

Section V describes the detailed plan(s) considered in Stage 3 and assesses their potential environmental and economic impacts. Cost estimates, allocation, apportionment, and mitigation requirements along with other Federal and non-Federal responsibilities are also discussed.

Section VI provides a system of accounts for comparison of detailed plans and the rationale used in selecting the National Economic Development (NED) and Environmental Quality (EQ) plans. It also identifies the tentatively selected plan and provides a cost comparison (construction first cost and annual cost) of the candidate plans.

Section VII contains Buffalo District's conclusions and recommendations as a result of this Stage 3 investigation.

Section VIII discusses future activities and proposed schedule.

The six appendices are as follows:

Appendix A - "Detailed Engineering Design." It includes design assumptions, calculations, and other related information.

Appendix B - "Geotechnical" includes information on regional and local geology, coastal processes, stability study, assumptions, calculations, and related information.

Appendix C - "Economic Analysis" includes information, assumptions, and calculations of projected benefits.

Appendix D - Construction cost estimates including operations and maintenance costs.

Appendix E - "Public Involvement" documents public involvement in the project planning process; correspondence with Federal, State and other agencies, and interested individuals; and newspaper articles during the final stage of the study.

Appendix F - "Detailed Environmental Information" contains relevant environmental information obtained during this study, including information on related Water Quality parameters, fish and wildlife resources, endangered species, and cultural resources.

Appendix G - "Reconnaissance Report on Section III Study of Ashtabula Harbor, OH."

PRIOR CORPS STUDIES

In December 1974, Buffalo District prepared a Reconnaissance Report at the request of the Ashtabula Township Park Commission and Congressman William Stanton. This report favorably recommended the preparation of a Detailed Project Report for a beach erosion and shoreline protection project at Lakeshore Park in Ashtabula, OH, under the authority of Section 103 of the 1962 River and Harbor Act. The Reconnaissance Report also recommended that the U.S. Army Corps of Engineers prepare a Section 111 Study (mitigation of shore damages attributable to navigation projects authorized by the 1968 River and Harbor Act) to determine if the park erosion problems are caused by the Federal navigation project at Ashtabula Harbor.

In compliance with this second recommendation, the Buffalo District did prepare a Reconnaissance Report on the Section 111 Study of Ashtabula Harbor. This report, dated 9 December 1975 (revised) recommended that funds be authorized to conduct a General Real Estate Study in order to determine the acceptability of Federal land acquisition as an alternative to structural mitigation measures under Section 111 authority. This recommendation was rejected by the Office of the Chief of Engineers in the 2nd Indorsement to the Section 111 Reconnaissance Report dated 24 January 1977.

The Reconnaissance Report also recommended that no further action be taken at Ashtabula, OH under provisions of Section 111 of the 1968 River and Harbor Act. This recommendation was approved by the Office of the Chief of Engineers in the 24 January 1977 2nd Indorsement to the Section 111 Reconnaissance Report.

However, the study has also determined that the harbor structures are at least partially causing the erosion problems at Lakeshore Park. Thus, the 1975 report further recommended that a portion of the beach to be developed at Lakeshore park, estimated at approximately 4.2 cubic yards per linear foot of beach, be replaced at a Federal Cost as part of the Section 103 Beach Erosion and Shoreline Protection Project. (See Appendix "G" page 30; para. 92.a.)

In August 1979, the Stage 2 Detailed Project Report prepared by the Buffalo District, considering the Section 111 Report recommendation, stated: "The Section 111 Reconnaissance Report on mitigation of shore damages attributable to the Federal navigation project at Ashtabula Harbor recommended that a portion of the beach at Lakeshore Park, estimated at approximately 4.2 cubic yards per lineal foot of beach will be replaced at 100 percent Federal expense. In addition, the Federal share of annual beach nourishment costs associated with mitigation under Section 111 will be in the same proportion as the damage attributed to the Federal navigation work is to the total damage."

For an 800-foot beach, the quantity of sand at 100 percent Federal cost would be 3,360 cubic yards (800 LF X 4.2 $^{cy}/_{lf}$). The cost (May 1979 price levels) for the 3,360 cubic yards of sand would be approximately $22,700 (based on $4.50 per ton of sand and 1.5 tons per cubic yard). Since this (3,360 cy) is approximately 4.7 percent of the total initial sandfill (71,000 cy), 4.7 percent of the estimated annual nourishment would also be placed at 100 percent Federal expense.

By analogy, for a 1,300-foot beach, the quantity of sand to be placed at 100 percent Federal expense would be 5,460 cubic yards (4.2 cy x 1,300), representing 5 percent (5,460 x 100/108,300) of the total sandfill (108,300) for such a beach.

The Stage 3 Draft Detailed Project Report dated March 1981 also considered the "Section 111 Problem" and made the following proposal: Since the 3,360 cubic yards computed above represent 6.5 percent of the total initial sandfill to be placed at the beach area and 25 percent of annual nourishment (estimated at 13,000 cy) for an unprotected 800-foot beach, a more economical

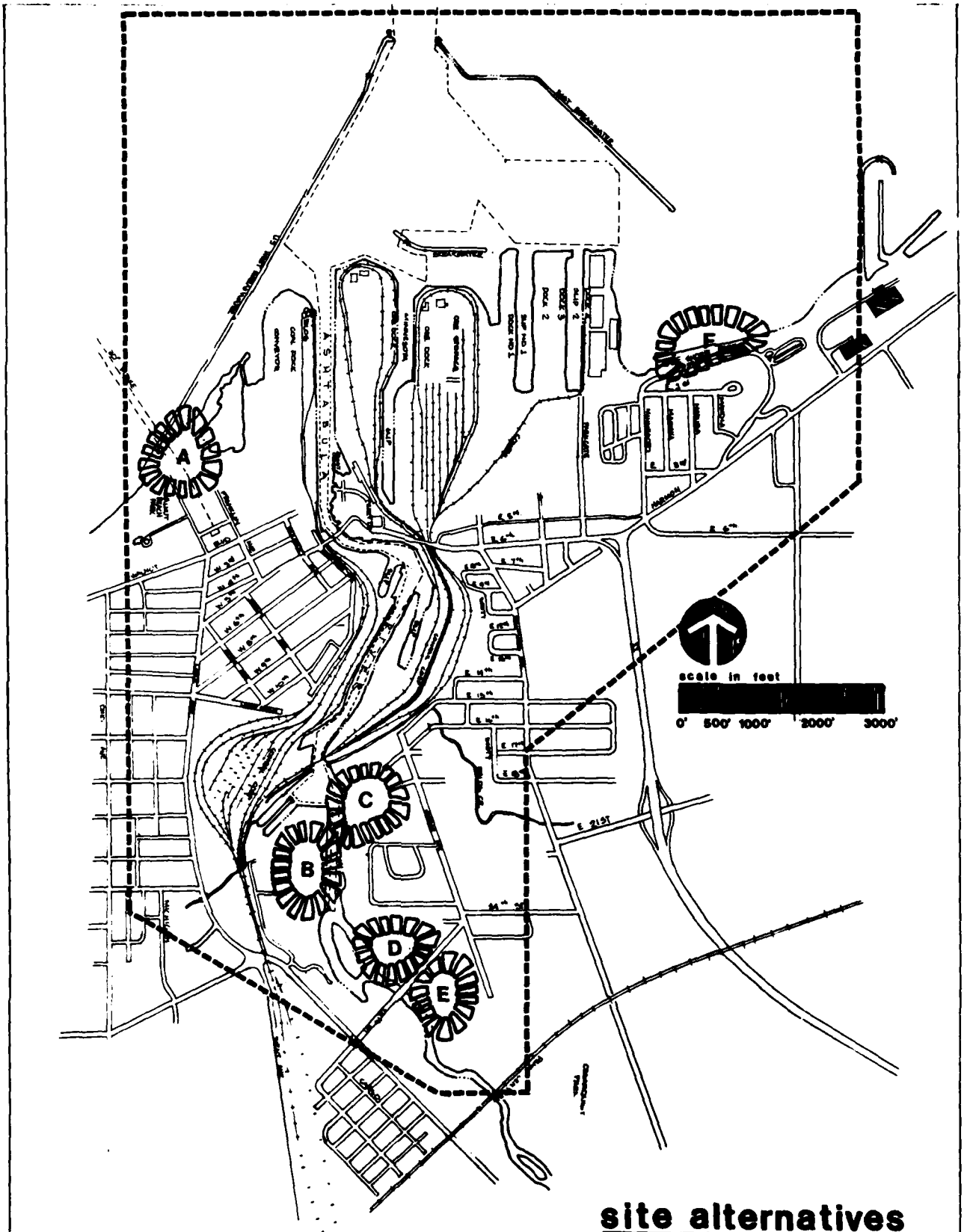
and practicable means of mitigating existing and subsequent erosion damages at Lakeshore Park is for the Corps to be responsible for 6.5 percent ($29,000) of the initial sandfill associated with mitigation as well as 25 percent ($11,300) of the town expenditure for periodic nourishment subject to availability of funds. This proposal was abandoned because of lack of detailed technical studies of the influence of navigation works at Ashtabula Harbor on the adjacent shores.

STUDIES BY OTHERS

In addition to the Buffalo District's Reconnaissance Report completed in 1974 and the Detailed Project Report currently in its last stage before proceeding into construction, there have been other independent studies carried out by private consulting firms on behalf of local authorities to develop shoreline protection from erosion, and maximize recreational opportunities.

A Master Plan study, intended to benefit the city of Ashtabula and several agencies in determining the best sites for a municipal marina, was prepared by the Snell Environmental Group of Akron, OH, in October 1978 (see Plate 1.1). This study rated both Walnut Beach (Site A) and Lakeshore Park (Site F) as excellent sites for the development of the marina. A summary comparison of sites is given in Table 1.5.

A Lakeshore Park recreation plan was developed in February of 1980 by Woodruff Engineering Inc., Consulting Engineers to allow the Park Commission to develop a capital improvement program to save the main pavilion from flood hazards, erosion and deterioration, and provide recreational opportunities to all persons on an equal basis. The recommended development plan, including construction of a marina at the west end of the park, is shown on Plate 1.2



site alternatives

HARBOR MARINA MASTER PLAN STUDY

ASHTABULA, OHIO ...

prepared by:

Plate 1.1

Plate 1.1

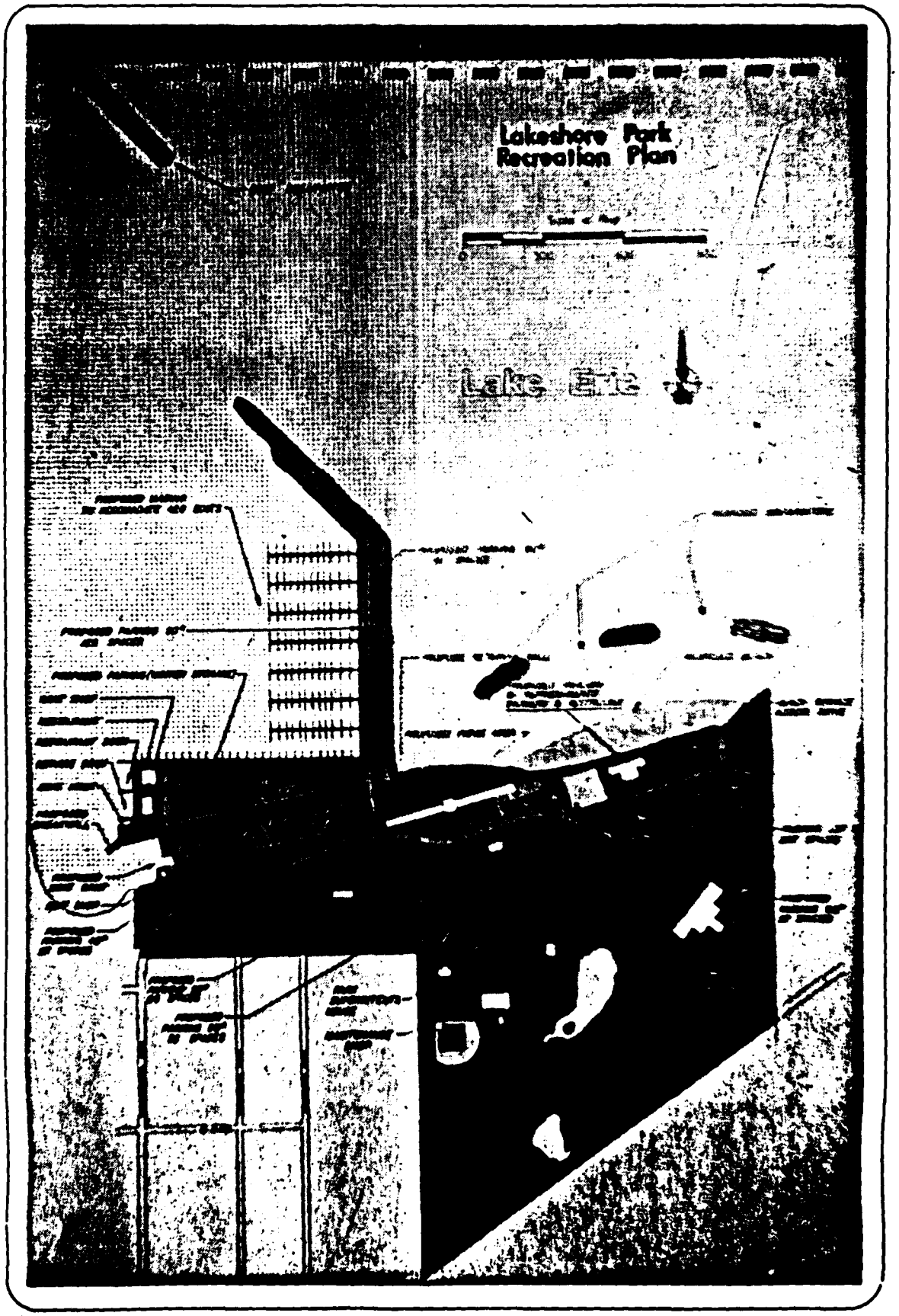


Plate 1.2

Table 1.5

Summary Comparison of Sites

CRITERIA	A		B		C		D		E		F	
	Evaluation	Pts	Evaluation	Pts	Evaluation	Pts	Evaluation	Pts	Evaluation	Pts	Evaluation	Pts
LOCATION	excellent	60	good	30	fair	15	good	30	poor	0	excellent	60
AUTO ACCESS	good	50	very good	75	fair	25	very good	75	very good	75	very good	75
DRAIN	very good	45	good	30	good	30	good	30	good	30	very good	45
AREA CHARACTER	very good	30	fair	10	very good	30	very good	30	very good	30	good	20
SIZE - SHAPE	good	50	excellent	100	good	50	good	50	very good	75	very good	75
DISTANCE FROM LAKE	excellent	80	fair	20	fair	20	poor	0	poor	0	excellent	80
WATER FACTORS	fair	25	good	50	good	50	poor	0	poor	0	fair	25
TOPOGRAPHY	good	30	good	30	poor	0	good	30	very good	45	good	30
PRESENT CONDITION	fair	5	fair	5	good	10	good	10	good	10	very good	15
COMPATIBILITY TO SURROUNDINGS	good	40	fair	90	good	40	good	40	good	40	very good	60
COMPLEMENTARY FACILITIES	good	30	fair	15	fair	15	poor	0	poor	0	good	30
DEMAND FOR FACILITIES	good	10	good	10	good	10	good	10	good	10	good	10
UTILITIES	very good	30	good	20	good	20	good	20	good	20	very good	30
PRESENT OWNERSHIP	very good	30	fair	10	fair	10	good	20	good	20	very good	20
ENVIRONMENTAL ASSESSMENT	fair	15	very good	45	very good	45	very good	45	poor	0	very good	45
TOTAL POINTS		530		470		370		390		355		620

...Plan Report for the city of Ashtabula, OH, prepared by Snell Environmental Group of Akron, OH, 1978

SECTION II

THE STUDY AREA

NATIONAL OBJECTIVES

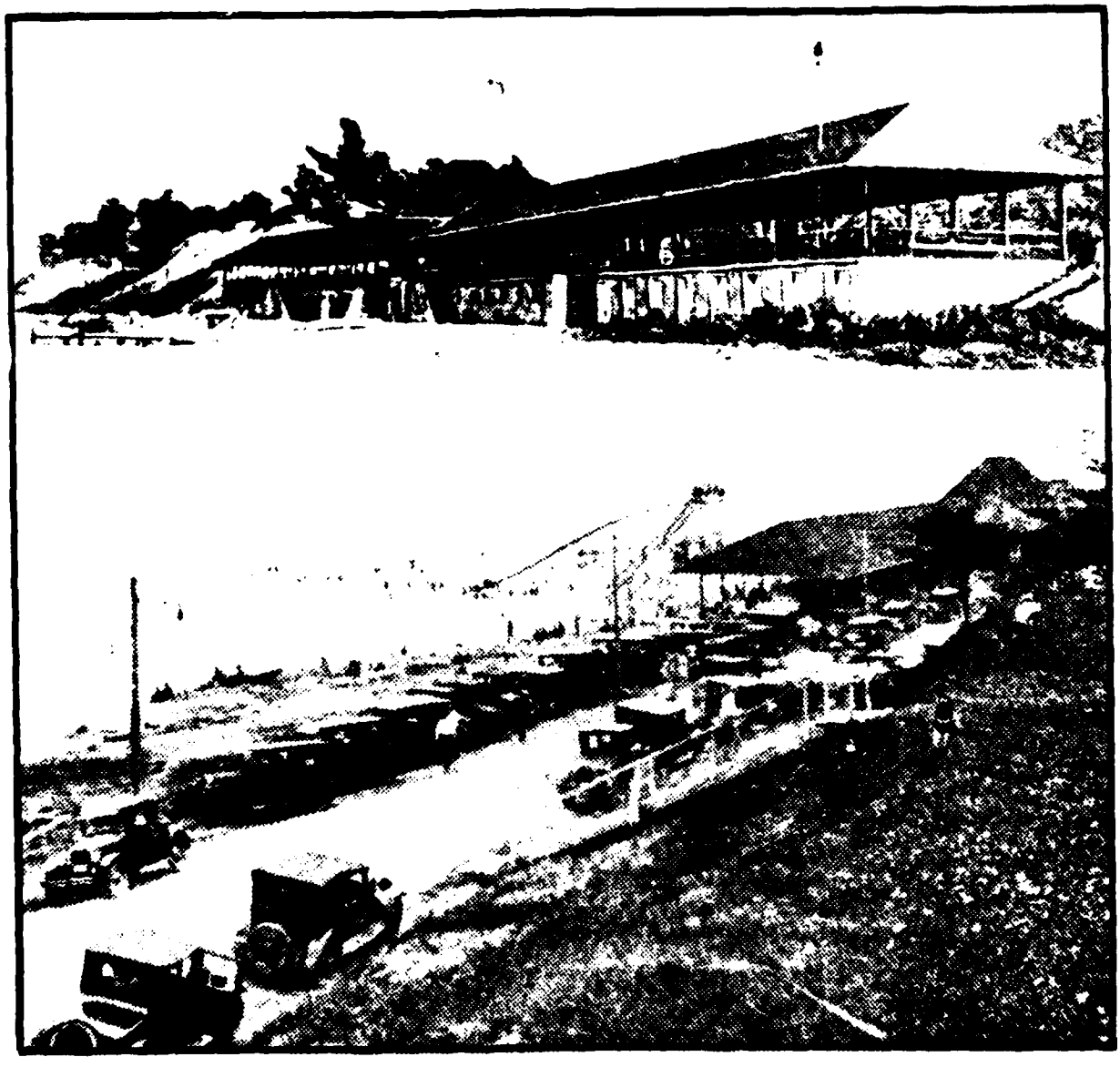
Current Federal policy, as developed by the President's Water Resources Council, requires that the alternative water and related land resource plans be formulated in accordance with the national objectives of National Economic Development (NED) and Environmental Quality (EQ). Therefore, in accordance with the guidance established in Engineering Regulations 1105-2-200, "Multiobjective Planning Framework" dated 13 July 1978, this study will be consistent with the planning requirements of the Water Resources Council Principles and Standards (P&S), the National Environmental Policy Act of 1969 (NEPA), and related policies. In accomplishing the study, equal consideration will be given to the P&S objectives of NED and EQ described below:

National Economic Development (NED) - National Economic Development is achieved by increasing the value of the nation's output of goods and services and improving economic efficiency.

Environmental Quality (EQ) - Environmental quality is achieved by the management, conservation, preservation, creation, restoration or improvement of the quality of certain natural and cultural resources and ecological systems.

THE STUDY AREA (Existing Conditions, Economy, Resources)

Lakeshore Park is located along Lake Erie in Ashtabula County, OH. It is approximately 40 miles southwest of Erie, PA, and about 50 miles northeast of Cleveland, OH. The southwest park boundary is the city of Ashtabula Corporation limits. Lakeshore Park's immediate neighbors along Lake Erie are the Port of Ashtabula to the west and the Cleveland Electric Illuminating Company to the east. The area is characterized by broad flat plains which end abruptly at Lake Erie. Soils are derived from till and deposits of former glacial lakes. Several ridges, parallel to the lake, cross the area. Major highway access to Lakeshore Park is provided by Interstate 90, which connects Cleveland, OH, and Erie, PA. The land area known as Lakeshore Park consists of about 50 acres of lakefront property with about 2,500 feet of frontage on Lake Erie. It was developed in the 1920's, and was, for some time, a major recreation facility for the entire northeastern portion of Ohio (see Plate 2.0). It includes picnic shelters, parking areas, a 40-unit trailer park, zoo, playground, tennis courts, and concession stands. A 440-foot X 24-foot pavilion overlooks a small beach and boat livery. The western end of the park also includes a boat launching ramp. (See Plates 2.1 and 2.2.) From the east boundary, low clay bluffs extend 800 feet along the shore to the west. These bluffs are being rapidly eroded by high water and northeast storms. The remainder of the park shoreline was originally protected by a concrete seawall constructed by the Civilian Conservation Corps in the late 1930's. It is presently protected by a stone revetment constructed in 1977 to protect the pavilion from flooding during winter



Lakeshore Park in 1928 was a major recreational area for northeast Ohio (Source of photo unknown.)

Plate 2.0

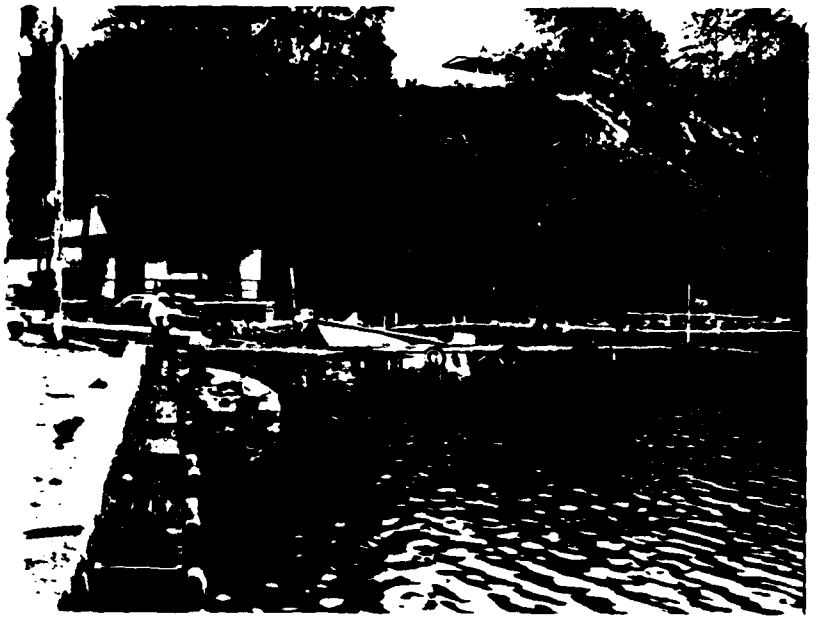
Looking southwest from eastern end of park bluff. 40-unit trailer park and playground.

June 1980

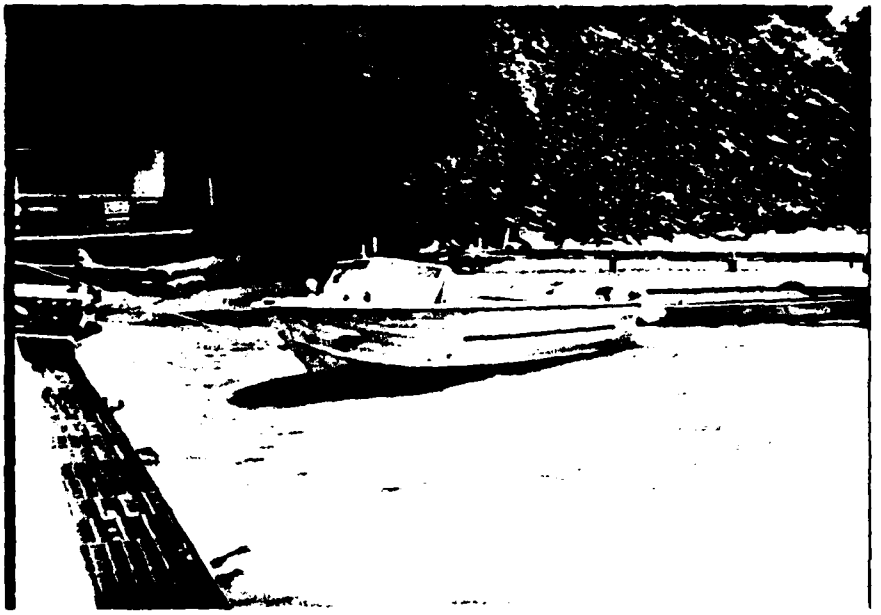
Looking south from western end of park bluff. Main parking lot with picnic areas and restroom facilities in the background.

June 1980

Plate 2.1



Looking south from western end of park. Two boat launching ramps provide public access to Lake Erie.



The area is a departure point for local boaters who fish in the vicinity of the Ashtabula Harbor structures.

June 1980

storms. However, recent field investigations performed by the Buffalo District have revealed that the eastern flank of that revetment has sustained damages which may lead to its failure unless periodic maintenance repairs are performed by the Park Commission in the future (see Plate 2.3).

The park is owned by the town of Ashtabula and managed by the Township Park Commission who purchased the land in 1910 and had its roads laid out, designed and built during the second decade of the 1900's. The 440-foot X 24-foot pavilion, today a historical landmark in Ashtabula, was built in 1919 by J. L. Wilson, Architect Engineer. The Lakeshore Park recreation plan, developed in February 1980 by Woodruff Consulting Engineers Inc., divides the park into planning areas. Plates 2.4 and 2.4.a show the general area boundaries within Lakeshore Park, and the lands that are needed to fulfill the project's intended purposes. A brief description of those planning areas and the functional nature of the needed adjoining lands are given below.

West Lakefront Area - This area is being used for boat launching and for parking during period of recreational fishing from the harbor breakwaters (see Plate 2.5).

Central Lakefront Area - This area is considered the focal point for all Lakefront Park activities. It includes the Lakefront pavilion, rest rooms, refreshment stands, and a parking area (see Plate 2.6). The parking area (approximately 31,000 ft^2) is needed to provide 62 spaces for beach users' vehicles on a permanent basis.

East Lakefront Area - This area is characterized by a small recreational beach, a severely eroded clay bluff, approximately 15 feet high extending 800 feet along the shore, and a beach service access road and sidewalk 30 feet wide by 100 feet long. Other recreation facilities include a 40-unit trailer park, sport fields and playground equipment. Shoreline protection in this area is the key to the entire recreational plan (see Plates 2.7 and 2.8). A relatively large parking area (approximately 94,000 ft^2) will be built to accommodate approximately 267 beach users' vehicles on a permanent basis.

East Inland Area - This area, occupied by an older park pavilion and a rest room building, is an activity area for small open space activities. The terrain is plateau-like with steep hills on three sides limiting potential alternative plans for new development opportunities. Under the Lakeshore Park "recommended recreation plan," this area will include a 30-unit motel restaurant with banquet facilities, and a parking area (approximately 53,000 ft^2) providing about 97 spaces for beach users' vehicles on a permanent basis.

Central Inland Area - This area, densely wooded, is being used for passive recreational uses. A large volume of truck traffic along Route 531 generates noise which becomes a major problem for the area.

West Inland Area - This area is characterized by a softball diamond with bleachers, tennis courts, maintenance facilities, rest rooms, the Kiwanis Pavilion and a new pavilion, a "petting" zoo, and a lake. Parking facilities (approximately 56,000 ft^2) for about 111 beach users' and others' vehicles will also be provided on a permanent basis.

Looking west from east flank of revetment. Stone revetment constructed in 1977 to protect the park pavilion from flooding.

June 1980

Breakwater stone, acquired from the removal of an Ashtabula Harbor structure, was used in the construction of the revetment.

June 1980

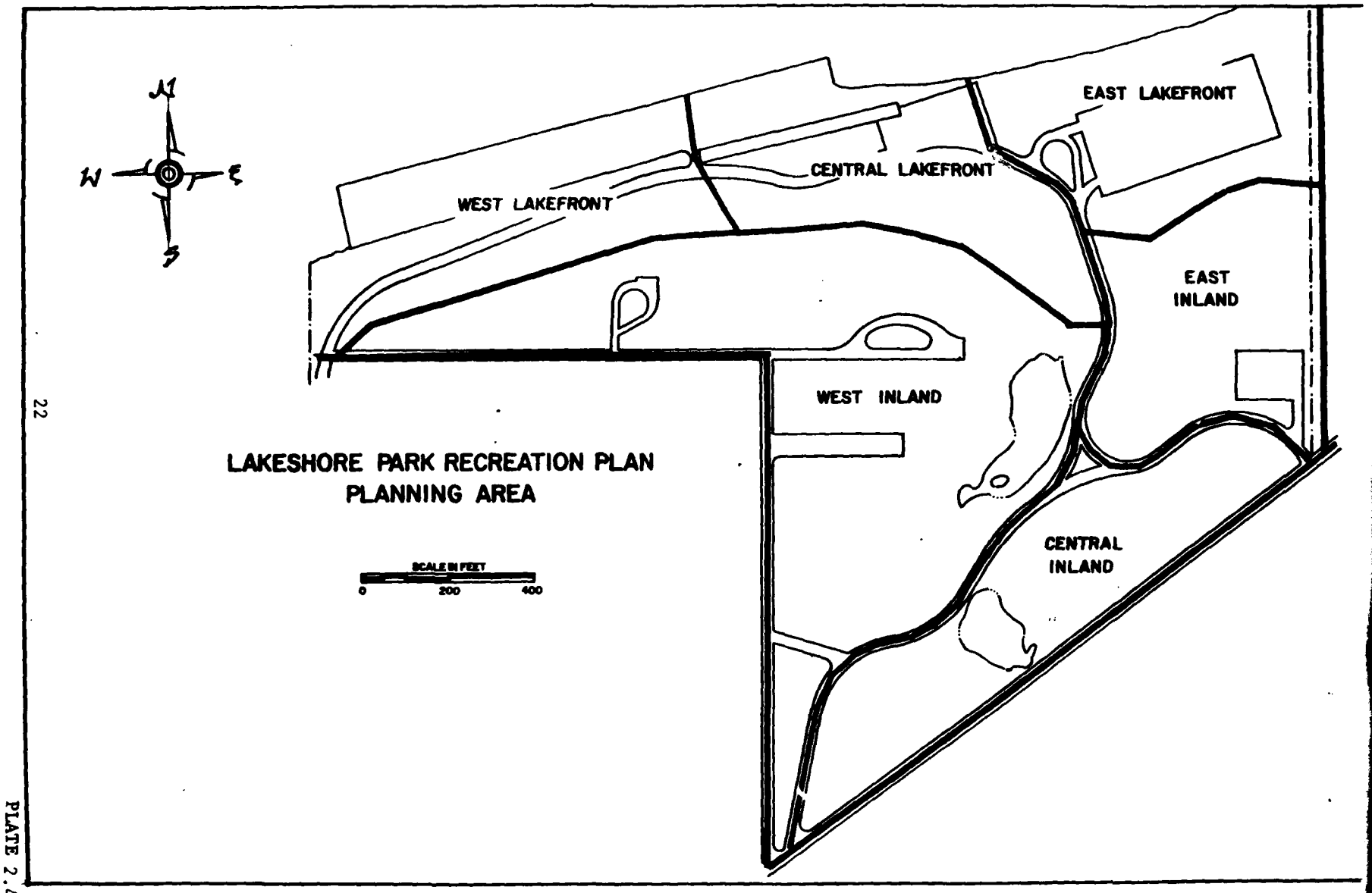

N
W
E
S
WEST LAKEFRONT
CENTRAL LAKEFRONT
EAST LAKEFRONT
EAST INLAND
WEST INLAND
CENTRAL INLAND
LAKESHORE PARK RECREATION PLAN
PLANNING AREA
SCALE IN FEET
0
200
400

PLATE 2.4

LANDS NEEDED FOR BEACH RESTORATION PROJECT

LAKESHORE PARK, ASHTABULA

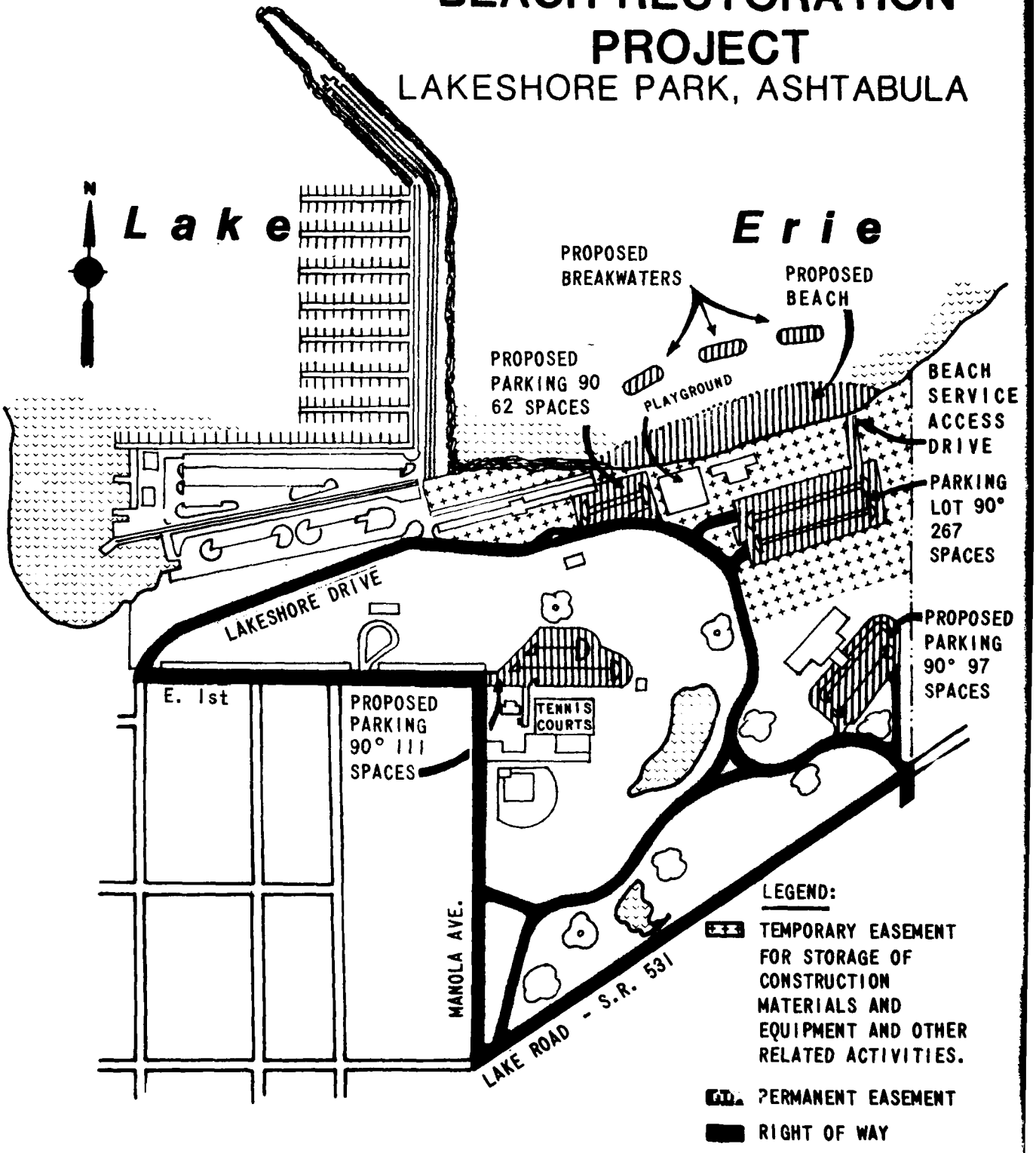


PLATE 2.4.a

West Lakefront Area

Looking northeast from west park boundary. Public boat launch facilities provide access to Lake Erie for recreational boaters and fishermen.

Looking east-northeast along concrete seawall. Parking is available for boaters and shore fishermen.

June 1980

Plate 2.5

Central Lakefront Area

Looking west from parking lot. The park pavilion serves as a promenade and covered picnic area.

June 1980

The area fronting the pavilion provides additional picnicking areas and onshore fishing sites.

June 1980

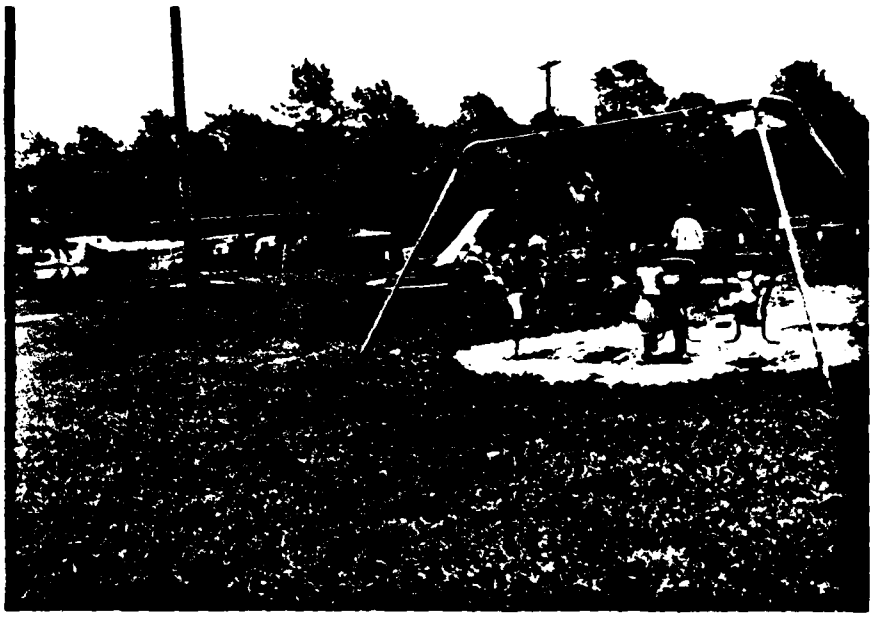
East Lakefront Area

Looking east from eastern flank of revetment. The small sand and gravel beach offers limited recreational opportunities.

A severely eroded clay bluff, approximately 15 feet high, extends 800 feet along the shore. Note trailer park and CEI generating plant in the background

June 1980

East Lakefront Area



Looking southwest near top of the clay bluff. The 40-unit trailer park offers overnight recreational opportunities.

June 1980

The east lakefront area provides a play area for park users.

June 1980

Plate 2.8

The city of Ashtabula contains the largest concentration of population in the local demand area which includes the city and the townships of Ashtabula, Kingsville, and Saybrook. About 1.0 million people are within a 50-mile radius of Lakeshore Park in Ashtabula, OH. Between 1960 and 1970, the city of Ashtabula experienced a slight decrease in population, with the population projected to stabilize at the 1970 level through 1975 (see Table 2.1). Ashtabula County ranks fifth in total population among the seven counties included in the regional demand element, and, with the exception of Trumbull County, all are projected to grow in population through the year 2000 (see Table 2.2).

The city of Ashtabula has a number of large industrial employers within its boundaries, including Union Carbide, Reliance Electric Company, RMI Company, and ABS Industries, Inc. Ashtabula Township, and particularly the area immediately southwest of Lakeshore Park, is the most heavily industrialized area in Ashtabula County. The area is characterized by heavy industries with products such as chemicals, ferro alloys, and other metals. The predominant physical features within the immediate shoreline area contiguous to Lakeshore Park are Ashtabula Harbor and the Port of Ashtabula to the west and the CEI plant to the east. Ashtabula is primarily a bulk commodity port handling approximately 12.8 millions of tons annually. For more information, see Tables 2.3 and 2.4, preceded by a short description of the harbor.

The labor force of Ashtabula City is approximately 8,500. Favorable geographic location, well-developed port facilities, an extensive transportation network, and experienced labor force constitute the major contributing factors in the economic development of the city of Ashtabula. Growth in recent years has been due more to the expansion of present companies than to the location of new firms in the area. Ashtabula has also recently embarked on a renewal effort aimed at revitalizing its downtown commercial and retail area. The relative significance of the various industrial sectors on a regional basis can be seen in Table 2.5.

Census data for 1969 reveal that the largest percent of families, and individuals earned between $10,000 and $15,000 per year. The relative distribution of income for the seven-county regional demand area is presented in Table 2.6.

Access to Lakeshore Park, internal traffic circulation and parking areas are of critical importance to the development of the "Recreation Plan." Plate 2.9 and 2.9a illustrates the major access corridors and routes to Lakeshore Park. State Route 11, connected directly to Interstate Route 90, has its northern terminus less than one-quarter of a mile away from the park. Pedestrian and bicycle access to the park from adjacent neighborhoods is easily routed off the major access highways and onto the residential streets leading to the park entrances. Lakeshore Park is an area which has been greatly modified by both man and nature. During early park construction in the 1920's, a large hill at the eastern end of the park was graded and landscaped to promote better access to the shore and more intensive park development. The shoreline is an active erosion area which is naturally barren of plant life and consists of a narrow sand and gravel beach.

Table 2.1 - Population Growth Trends for Local Demand Area (Thousands)

Municipalities	1960		1970		1975	
	Population	Percent of County (1)	Population	Percent of County (1)	Population	Percent of County (1)
Ashtabula Township	7.1	7.6	7.4	7.5	7.6	7.5
Ashtabula City	24.6	26.4	24.3	24.7	24.3	23.8
Kingsville Township	3.7	4.0	4.2	4.3	4.7	4.6
Saybrook Township	6.2	6.7	6.6	6.7	6.7	6.6
Total	41.6	44.7	42.5	43.2	43.3	42.5

(1) Ashtabula in Ohio

SOURCE: U. S. Census of Population, General Population Characteristics, 1970, U. S. Department of Commerce, Bureau of the Census.

Table 2.2 - Population Projections for Counties Included in Regional Demand Element

	1970	1980	1990	2000
OHIO				
Ashtabula	98,200	111,200	122,700	132,600
Lake	197,200	216,800	244,100	263,700
Geauga	63,000	77,000	98,000	120,200
Portage	125,900	149,000	174,500	201,600
Trumbull	232,600	246,400	253,700	252,400
PENNSYLVANIA				
Erie	263,700	280,700	292,100	298,600
Crawford	81,300	83,400	88,900	90,900

SOURCE: Ohio Department of Economics and Community Development, 1974

The lakeshore of northern Ashtabula County has been urbanized for many years. Growth pressures in this coastal zone are similar to many other areas in the United States. Demand for residential, commercial, industrial, and recreational land with access to a large body of water is increasing rapidly. Lakeshore Park is a high density recreation area which offers a wide range of facilities and services to the park user as described above. Its natural character, within the urban setting of Ashtabula, is aesthetically pleasing. The visual aspect of the lake, the horizon, and the sky is desirable to most park users.

Table 2.3 - Comparative Statement of Traffic

Year	Tons	Year	Tons
1969	10,823,891	1974	10,852,259
1970	11,925,980	1975	8,738,094
1971	11,261,010	1976	11,700,411
1972	12,063,864	1977	11,632,975
1973	10,872,484	1978	12,830,261

SOURCE: Waterborne Commerce of the United States, Calendar Year 1978, compiled under the supervision of the Water Resources Support Center, U. S. Army Corps of Engineers, Fort Belvoir, VA.

ASHTABULA HARBOR, OHIO

Section included: Outer Harbor and Ashtabula River from mouth to and including city of Ashtabula dock (former Great Lakes engineering work dock), 1.75 miles. Controlling depth: The harbor shoreward of the inner breakwater, the approach to the Penn Central Railroad Company's slip and the lower 2,000 feet of the Ashtabula River, 27 feet; thence to car ferry slip, 10 feet; thence to a point 1,550 feet upstream from turning basin and including turning basin, 3 feet. Project depth: entrance channel, 29 feet; westerly portion of outer harbor to inner breakwater, 28 feet; approach channel to docks east of inner breakwater, 28 feet; turning basin in the easterly portion of the outer harbor, 22 feet; channel from inside the inner breakwater to mouth of river and 2,000 feet upstream and approach channel to Penn Central Railroad slip, 27 feet; thence to car ferry slip, 18 feet; thence to a point 1,550 feet upstream from turning basin and including turning basin, 16 feet.

Table 2.4 - Freight Traffic, 1978
(short tons)

Commodity	Total	Foreign			Domestic		
		Overseas	Canadian		Lakewise		
		Imports	Imports	Exports	Receipts	Shipments	Local
Total	12,830,261	181,662	1,836,060	3,734,609	5,552,156	1,525,689	85
0841 Crude Rubber and Allied Gums	459	459	-	-	-	-	-
0911 Fresh Fish, Except Shellfish	85	-	-	-	-	-	85
1011 Iron Ore and Concentrates	6,821,729	-	1,716,178	-	5,105,551	-	-
1091 Nonferrous Ores, Concent Nec.	102,846	102,846	-	-	-	-	-
1121 Coal and Lignite	5,241,874	-	-	3,716,185	-	1,525,689	-
1411 Limestone	446,605	-	-	-	446,605	-	-
1442 Sand, Gravel, Crushed Rock	60,195	-	60,195	-	-	-	-
1451 Clay	5,605	5,605	-	-	-	-	-
1499 Nonmetallic Minerals, Nec.	18,424	-	-	18,424	-	-	-
2431 Veneer, Plywood, Worked Wood	21,894	-	21,894	-	-	-	-
2631 Paper and Paperboard	11,459	-	11,459	-	-	-	-
2873 Phosphatic Chem. Fertilizers	18,030	-	18,030	-	-	-	-
3011 Rubber and Misc. Plastic Prod.	1	1	-	-	-	-	-
3211 Glass and Glass Products	1	1	-	-	-	-	-
3315 Iron, Steel Shapes, Exc. Sheet	3,284	3,284	-	-	-	-	-
3318 Ferroalloys	44,636	36,332	8,304	-	-	-	-
3322 Copper Alloys, Unworked	15	15	-	-	-	-	-
3411 Fabricated Metal Products	33	33	-	-	-	-	-
3611 Electrical Mach. and Equip.	24	24	-	-	-	-	-
4012 Nonferrous Metal Scrap	33,062	33,062	-	-	-	-	-

SOURCE: Waterborne Commerce of the United States, Calendar Year 1978, compiled under the supervision of the Water Resources Support Center, U. S. Army Corps of Engineers, Fort Belvoir, VA.

Table 2.5 - Industry of Employed Persons as a Percent of Total Employed Persons 16 and Over - By County - 1970*

	Ashtabula	Geauga	Lake	Portage	Trumbull	Erie	Crawford
Total Employed, 16 years and older	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, Forestry, and Fisheries	4.0	3.5	1.1	2.1	1.0	2.2	4.0
Construction and Mining	5.3	8.0	5.4	6.1	4.5	5.0	5.6
Manufacturing	39.3	39.0	47.0	37.6	49.1	40.7	40.3
Durable	23.0	26.1	34.2	23.7	45.1	31.3	29.2
Nondurable	16.3	13.0	12.7	13.9	3.7	9.4	11.1
Transportation and Utilities	9.6	5.2	5.0	5.3	4.7	5.8	7.1
Wholesale Trade	2.0	2.6	3.0	2.2	2.2	2.7	2.2
Food Services	5.8	4.7	5.0	6.2	5.4	5.4	4.6
Retail Trade	9.8	8.7	9.6	8.6	9.6	10.0	8.6
Finance, including Real Estate and Insurance	3.21	3.7	3.3	2.5	2.6	3.7	1.2
Services, excluding Food	15.4	24.8	20.8	29.5	20.7	24.4	11.6
Business and Personal	5.0	6.4	5.3	4.5	4.7	5.7	2.3
Recreation and Health	3.9	6.0	4.2	4.6	5.6	5.7	2.8
Education and Kindred	6.7	7.1	6.0	14.8	5.6	6.8	3.8
Nonprofit Organizations	1.2	1.1	0.8	1.0	1.0	1.5	0.8
Professional	1.2	2.4	2.0	2.5	1.3	1.8	0.7
Public Administration	2.5	2.2	2.5	2.0	2.5	2.9	1.2

*SOURCE: U. S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Ohio and Pennsylvania), 1970

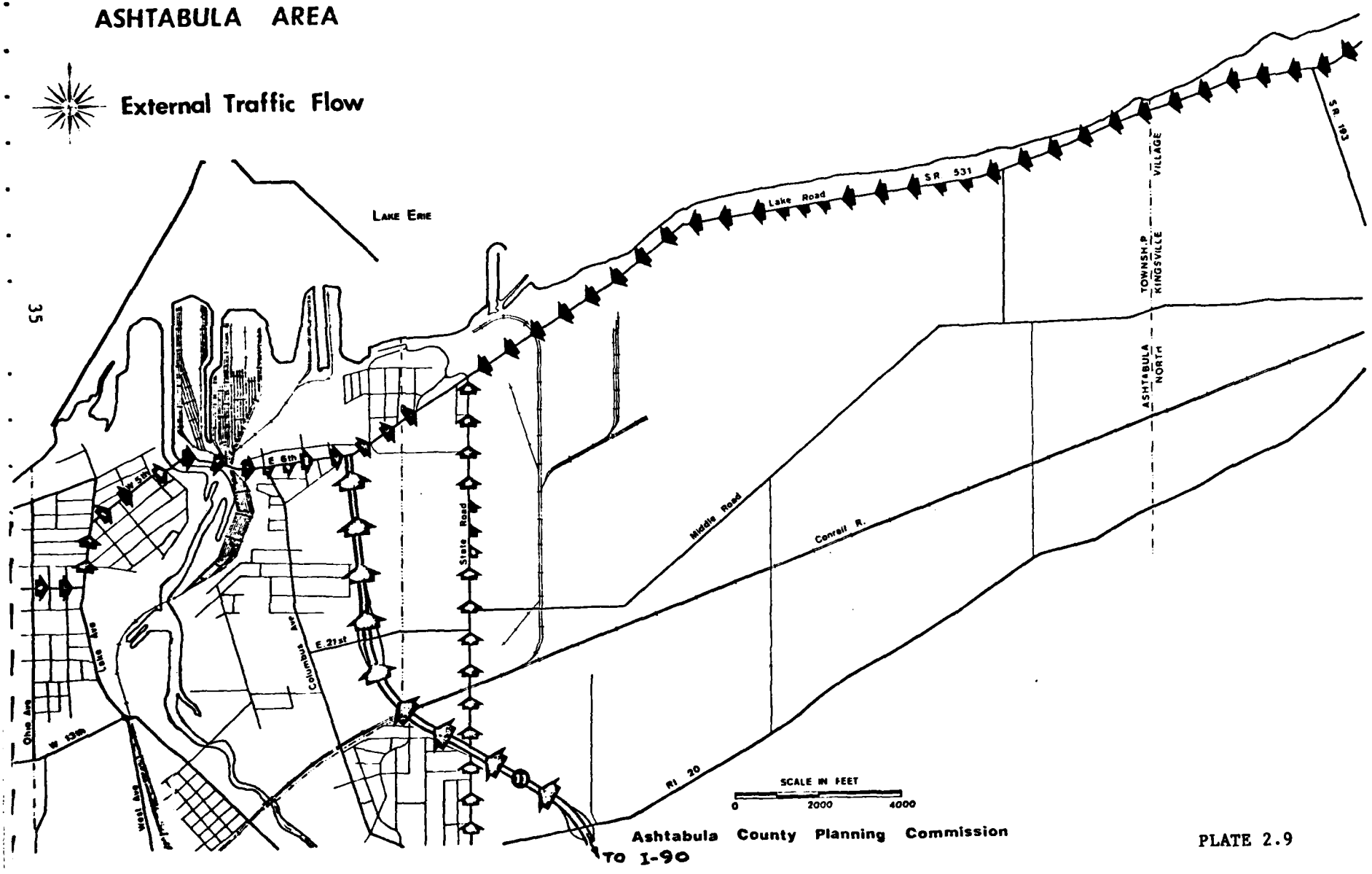
Table 2.6 - Percent Distribution of Income of Families and Unrelated Individuals by County - 1969

	Ohio					Pennsylvania	
	Ashtabula	Geauga	Lake	Portage	Trumbull	Erie	Crawford
$							
Less than 1,000	1.80	1.05	00.99	1.34	1.46	1.43	1.87
1,000 to 1,999	2.62	1.57	1.12	1.78	1.76	2.22	3.90
2,000 to 2,999	3.45	2.05	1.55	2.34	2.47	3.72	4.59
3,000 to 3,999	3.74	2.53	1.99	2.54	2.81	4.10	5.00
4,000 to 4,999	4.18	2.42	2.16	3.17	3.23	4.22	5.09
5,000 to 5,999	4.88	2.59	2.61	3.79	3.72	5.74	6.15
6,000 to 6,999	6.33	3.68	3.03	4.69	4.69	7.03	8.45
7,000 to 7,999	7.17	5.06	4.73	6.82	6.85	9.23	9.11
8,000 to 8,999	8.05	5.83	6.56	7.78	8.27	9.28	8.90
9,000 to 9,999	8.72	6.56	7.91	7.98	8.59	8.33	8.29
10,000 to 11,999	16.54	14.20	17.67	15.665	15.81	15.64	13.56
12,000 to 14,999	15.26	17.98	21.73	18.46	17.77	13.46	13.26
15,000 to 24,999	14.31	27.20	23.74	19.00	18.89	12.40	10.09
25,000 to 49,999	2.57	6.46	3.67	4.08	3.03	2.67	1.46
50,000 or more	00.39	00.83	0.56	0.56	0.64	0.5	0.30

*SOURCE: U. S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Ohio and Pennsylvania), 1970

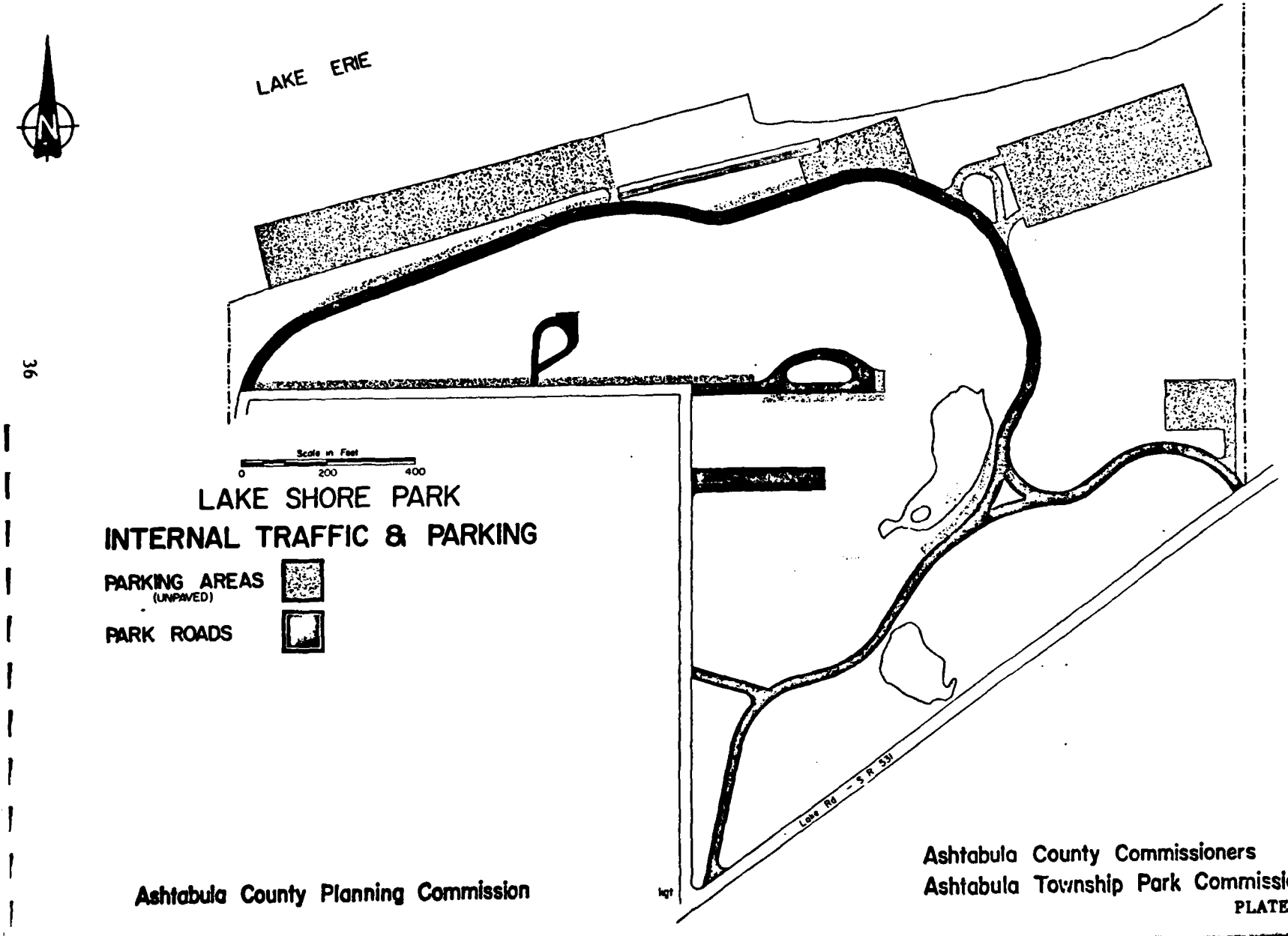
ASHTABULA AREA

External Traffic Flow



Ashtabula County Planning Commission

PLATE 2.9



Ashtabula County Planning Commission

Ashtabula County Commissioners
Ashtabula Township Park Commission

PLATE 2.9a

Although pollution problems had forced the closing of the beach for a period of years in the 1960's, expansion of the municipal waste treatment plant in 1970-71 has improved water quality to acceptable levels for water contact recreation. The urban/industrial surroundings which influence noise and air pollutant levels may prove to be an irritation to most, but, through contrast, serves to increase the natural value of the park.

For more detailed information on the geography, economy, and significant resources of the study area, see Appendix C and the Draft Environmental Impact Statement.

CONDITIONS IF NO FEDERAL ACTION TAKEN

If no action is taken to correct the beach erosion and shoreline protection problems at Lakeshore Park, the bluffs to the east of the park pavilion will continue to erode at the present rates. The park's parking lot above the bluffs may soon be subject to undercutting and failure. The condition of the park's beach will worsen and few people will utilize it. Many of those who desire a sandy type beach will continue to look to other sites which may result in the continued loss of income to the town of Ashtabula from concession rentals. The eastern 200-foot flank of the stone revetment will continue to deteriorate, increasing potentials for flood damages to the pavilion. Without the restoration of a recreational beach, protection against shore erosion, and flooding, full park development as visualized in the "Lakeshore Park Recreation Plan" will be hindered.

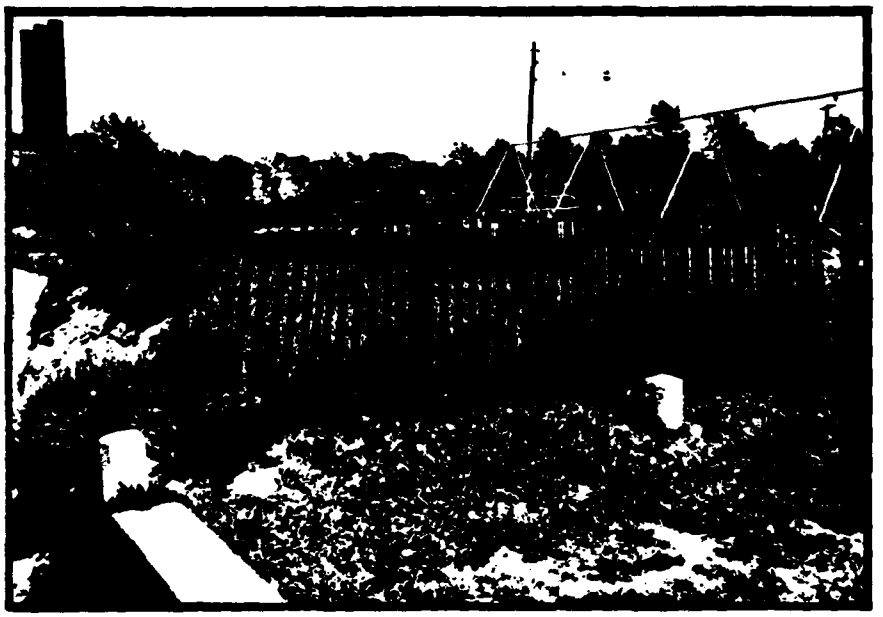
Although it is difficult to predict what specific actions would be taken by local interests to deal with the erosion problem, an assumption can be made based on what actions have been taken in the past. When erosion and flooding in the area fronting the park pavilion became a problem, a concrete seawall was constructed in the 1930's and, in 1970, was reinforced with 15,000 tons of stones from the U.S. breakwater. A pumphouse that conveys water to duck ponds in the East Inland area was eroded out in 1978. It was replaced by a new one located in the upland area a few feet off the bluff line. This structure is currently damaged due to the cumulative effects of erosion resulting from northeast storms and will have to be replaced. As other park facilities incur these types of damages, similar actions, provided they are within their financial capabilities, may be taken by the town of Ashtabula.

PROBLEMS, NEEDS, AND OPPORTUNITIES

The rapid loss of park land and the lack of a recreational beach are critical problems which exist at Lakeshore Park. From the east park boundary to a stone revetment protecting the park pavilion, low clay bluffs approximately 15 feet high, extend approximately 800 feet along the shore. High water and northeast storms are rapidly eroding these bluffs and threatening the park's parking lot with possible failure (Plates 2.10-2.14). Erosion is aggravated by the fact that little littoral material (sand, gravel, etc.) reaches the shoreline. The predominant west to east littoral movement is almost totally blocked by the Ashtabula Harbor structures. The Cleveland Electric Illuminating Company (CEI) intake structure, immediately east of the

Looking east from east end of park pavilion. High lake level has caused loss of lakefront land.

March 1974



Looking east from east end of park pavilion. Note playground and trailer camp in background. Snow fence installed in April 1974 because of undermining of bluff by high water. Tree along bluff is same as in above photo.

June 1974

Plate 2.10

Looking east from east end of park pavilion. Note relative position of tree to edge of bluff as compared to previous photos and photo below.

September 1978

Looking west from east end of park. Note relative position of tree to edge of bluff.

June 1980

Looking south from park shoreline. The tree is that pictured on plates 2.10 and 2.11.

June 1980

Present erosion rates have been estimated at 2.4 feet per year.

June 1980

Looking north from top of bluff. The erosion of the clay bluffs creates hazardous conditions for the park users.

June 1980

Looking southeast from the park shoreline. High lake levels and northeast storms are the causes of the rapid erosion of the bluffs.

June 1980

Plate 2.13

Looking west along the beach. Photo shows the former extent of the beach which has since been severely eroded.

July 1974

Plate 2.14

park, effectively obstructs any littoral drift from the east during normal periodic reversals. The Reconnaissance Report, dated 30 December 1974, estimated the average erosion rate along the park bluffs to be 1.6 feet per year between 1948 and 1973. Comparison of aerial photos for 1968, 1973, 1974, and 1978 indicates an average annual erosion rate of 2.2 from 1968 to 1973 and 2.4 feet between 1973 and 1978.

Erosion and high lake levels have had a devastating effect on the existing beach and have severely limited recreational opportunities at Lakeshore Park. The beach fronting the park bluffs presently consists of only a narrow gravel beach approximately 15 feet wide. Although this beach is open, few swimmers make use of it. Pollution problems had forced the closing of the beach for a period of years in the 1960's and the beach was posted for health reasons in 1971. However, the expansion of the municipal waste treatment plant in 1970-71 has reduced bacterial content to acceptable levels (less than 200 fecal coliforms per 100 ml). Since expansion of the plant, fecal coliform counts have exceeded this level only once, during a period when the area experienced 4-foot waves. The Ohio Department of Health, which has been conducting a beach water quality monitoring program at the park for a number of years, has indicated that there does not appear to be any great pollution problem (see Table 2.7).

In the 1930's, the Civilian Conservation Corps constructed a concrete seawall in front of the park pavilion to protect it from the northeast storms coming off of Lake Erie. By 1974, this wall was deteriorated and in urgent need of repair. The lower level of the pavilion was being subjected to the lake storms and had been rendered useless due to flooding (see Plate 2.15). In 1977, in order to protect the pavilion from further damage, approximately 15,000 tons of breakwater stone, acquired from the removal of the westerly section of the inner breakwater of Ashtabula Harbor, was placed directly on top of the original concrete seawall. The Town Park Commission in 1979 backfilled and graded the area between the pavilion and this stone revetment (Plate 2.16). To date, the lower level of the pavilion has still, however, not been utilized by the Park Commission. The upper story still functions as a picnic shelter and promenade.

The Ashtabula County Planning Commission, in conjunction with the consulting firm of Woodruff, Inc., has prepared a master plan for the park development ("Lakeshore Park Recreation Plan"). Consideration is given to scenic parking areas, erosion control measures, a small-boat harbor facility to the west of the park pavilion, swimming beaches, and fishing areas. The area supports an important local sport fishery with shore angler harvests including drum, yellow perch, white bass, and other species. High catch areas are located at protected areas such as the CEI water intake and the stone revetment in front of the park pavilion.

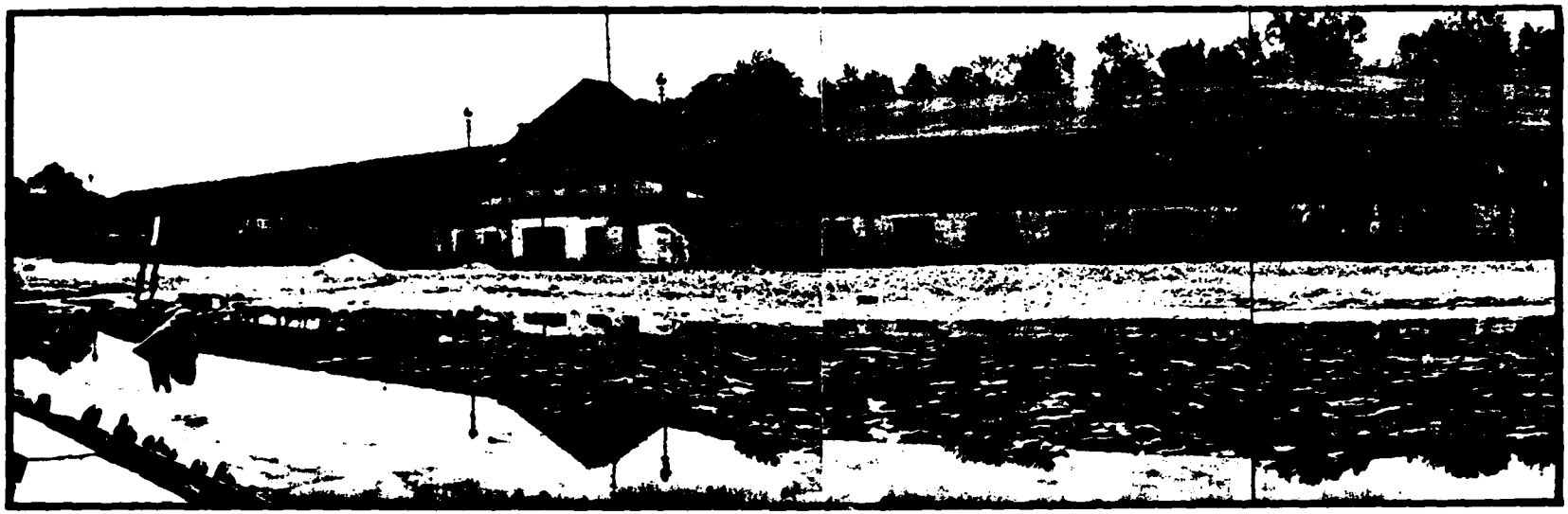
The demand for recreation at Lakeshore Park remains strong. There is a wide range of activities available, much more so than at most recreational parks, which makes the park unique to the area. Considering the wide variety of recreational activities and conveniences afforded the recreational visitor, the value of a visit to the beach area is very high with respect to other, less developed and less diversified beaches in the area. Presently,

Table 2.7 - Lakeshore Park, OH,- Fecal Coliforms (per 100 ml) - Geometric Mean (1)

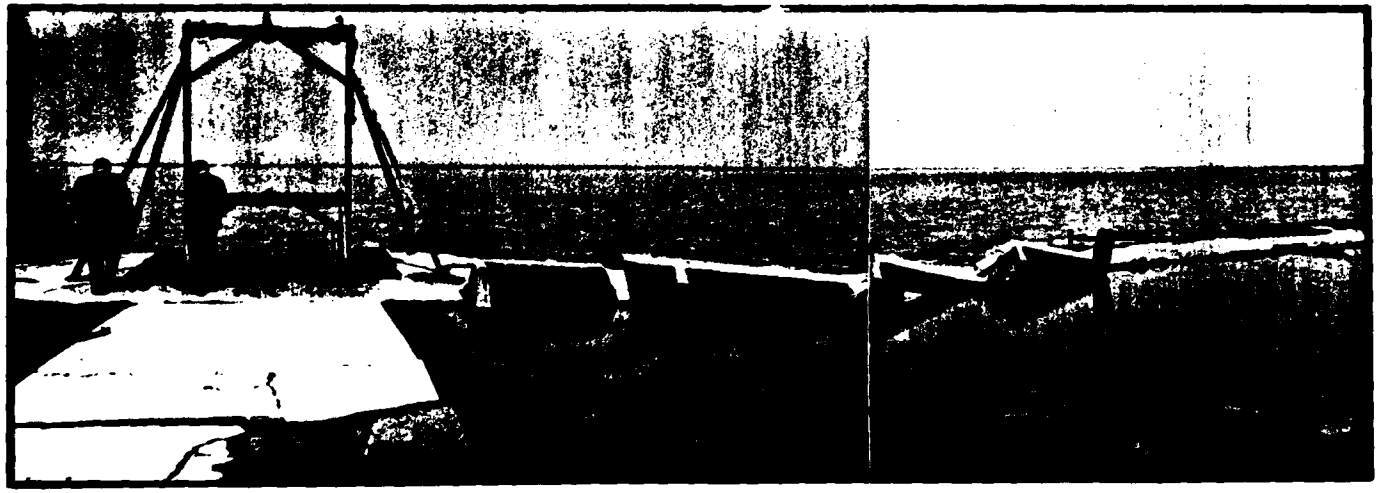
Year	May	June	July	August	September
1971	1,202.1*	339.4*	7.0	119.3	81.2
1972	17.8	32.1	36.5	11.0	17.2
1973	61.3	66.0	28.9	12.7	9.3
1974	7.9	10.9	11.1	18.6	16.4
1975	87.4	13.8	4.0	23.3	5.5
1976	30.1	15.3	16.2	32.4	-
1977	14.1	11.5	23.6	46.8	-
1978**	33.2	39.4	12.3	28.0	15
1979**	-	97.4	22.1	27.4	20

* Exceeds Ohio EPA Minimum Standards
** Walnut Beach

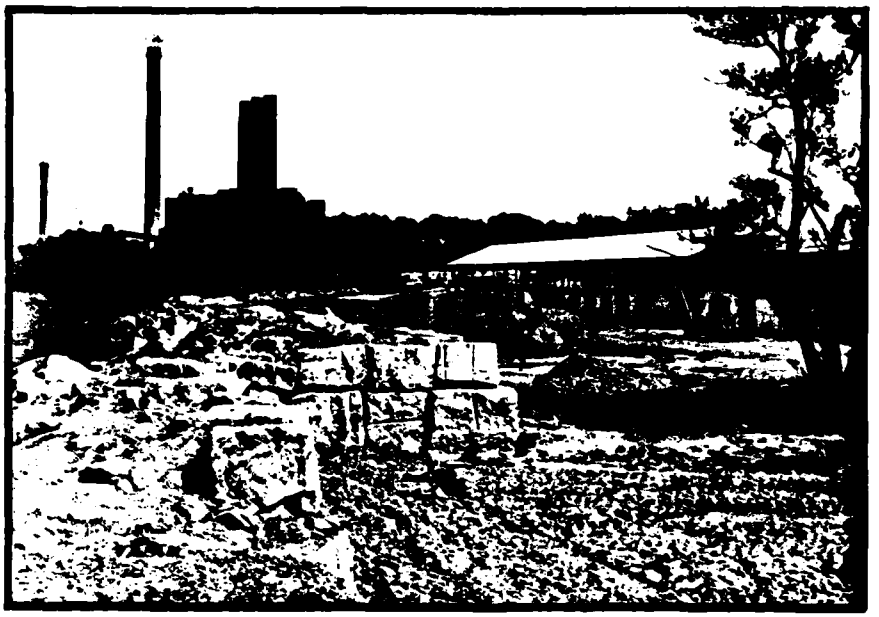
(1) SOURCE: Ohio Department of Health, 1979



Lakeshore Park Pavilion - Flooding to lower level during winter storms had rendered the bath house and boat livery unusable. June 1974



Looking north from front of park pavilion, concrete seawall and boat launching equipment had been severely damaged by northeast storms. June 1974



The Town Park Commission has a stone revetment placed in 1977 to protect pavilion. Photo shows recent backfilling operation.

September 1978

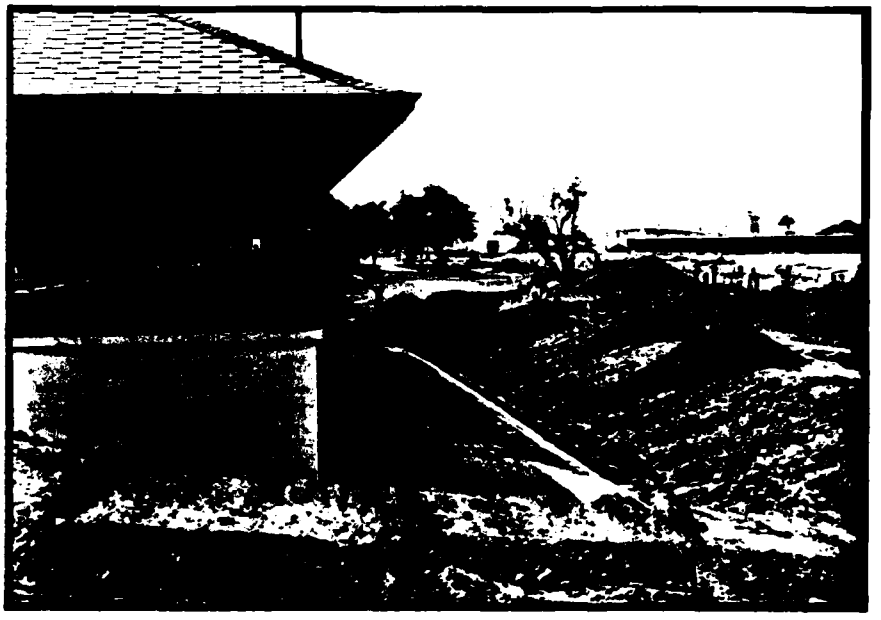


Photo shows backfill being placed between pavilion and stone revetment.

September 1978

the primary concern of the Ashtabula Township Park Commission is the rapid loss of park land along the bluff, possible flooding from storm waves, increases in lake level and the restoration of the recreational beach.

PLANNING OBJECTIVES

The basic function of plan formulation is to develop alternative plans which will provide the best use or combination of uses of water and related land resources. These plans must be responsive to the needs and opportunities of Lakeshore Park and contribute to national economic development and environmental quality objectives. In pursuit of these broad national objectives, the following more specific planning objectives serve to guide the formulation process. The plans must:

a. Eliminate shoreline erosion along the 800 feet of erodible bluffs for the prevention of further upland damages at Lakeshore Park during the period 1982-2032.

b. Restore a recreational beach along the East Lakefront area in order to contribute to the land and water-based recreation resources at Lakeshore Park for swimming, fishing, picnicking, boating, and camping during the period 1982-2032.

c. Contribute to the reduction of flooding along the Central Lakefront area for protection of property during the period 1982-2032.

d. Contribute to the ecological value of Lakeshore Park habitat in terms of diversity, wildlife, erosion control, and aesthetics during the period 1982-2032.

e. Contribute to the preservation and/or enhancement of the natural and scenic view of Lake Erie during the period 1982-2032.

In fulfilling these objectives, alternatives were developed so that they be consistent with possible future development of a small-boat harbor to the west of the park pavilion, as proposed in the approved "Lakeshore Park Recreation Plan."

PLANNING CONSTRAINTS

Planning constraints are conditions that exist which could affect the implementation of a given alternative. An obvious planning constraint is in the willingness of the local sponsor to meet the conditions of local cooperation. In the Lakeshore Park project, another planning constraint is the limited parking space for beach users. The locals' financial limitations and the destructive effect on the environment caused by the partial removal of the stone revetment in front of the pavilion, have placed constraints on the implementation of any Alternative Plan(s) which calls for such removal.

SECTION III

FORMULATION OF PRELIMINARY PLANS

Given a knowledge of the resources, problems and needs, and public attitudes toward general solutions in an area, the process of detailed plan formulation can begin. All means of meeting both the planning objectives and the national objectives must be formulated and screened in progressively greater detail. Undesirable alternatives must be systematically eliminated. Viable alternatives must be carefully assessed and evaluated to assure selection of the best plan of improvement.

MANAGEMENT MEASURES

All possible management measures available to solve a given water resource related problem must be identified before the best available plan can be selected. These management measures are the general alternative solutions available.

Traditionally, the following management measures have been considered in solving beach and shoreline erosion problems:

a. Offshore breakwaters in conjunction with beachfill;

b. Rubblemound groins in conjunction with beachfill;

c. Unprotected beachfill;

d. Shoreline revetment or sheet pile walls; and

e. Nonstructural measures such as abandonment of the shoreline area.

PLAN OF OTHERS

For the Corps of Engineers to effectively develop plans for any water resources project, it is necessary to consider all plans being developed by other agencies.

The Ashtabula County Planning Commission, in conjunction with Woodruff Consulting Engineers, Inc., completed in February of 1980, a master plan for the development of Lakeshore Park. The master plan entitled "Lakeshore Park Recreation Plan" was prepared for the Ashtabula Township Park Commission whose approval to the plan was obvious in a letter to the Corps of Engineers, dated 27 February 1980, in which they said: "We fully intend to implement the activities suggested in the report as best and as soon as we can." (see App. E) The report consists of various alternatives which would optimize the recreational potential of Lakeshore Park. Considerations were given to scenic parking areas, erosion control measures, a small-boat harbor to the west of the park pavilion, swimming beaches, fishing areas, picnic and playground areas, restaurant, and overnight facilities. Plate 1.2 of Section 1, a composite master plan for the future, shows all proposed improvement work which the Ashtabula County Planning Commission expects to implement by the year

2000. The organization of this plan, as described in their report, follows in three phases. The first is an overall perspective of problems shared by the entire land area of the park, including discussions of land use, traffic, security, and general environment. The second phase within the sequence divides the park into planning areas, where each area has natural dissimilarities with the other areas. The last phase of the plan blends together the other sections into a composite plan.

Subsequent to completion of the Stage 2 Detailed Project Report by the Corps of Engineers, the Planning Commission preferred Alternative Plans 2 (800-foot protected beach) and 3 (1,300-foot protected beach) as shore protection measures to be considered in the development of the "Lakeshore Park Recreation Plan." In their report to the Commission, Woodruff Engineering, Inc. made the following comments:

a. The 800-foot beach with the breakwalls is recommended for these reasons:

(1) Least cost (most economically feasible alternative).

(2) Parking constraints (satisfy required amount of parking spaces).

b. "Because of the lower bathing area capacity projection for the 800-foot beach, the parking demand is lower than the 1,300-foot beach which cannot be handled without massive parking improvements."

c. "The U.S. Army Corps of Engineers should be assisted in any way possible to have the new beach facility in place at the earliest possible time. The 800-foot beach is the best project size for the overall park development."

In October of 1978, Snell Environmental Group completed a master plan of a marina study for the city of Ashtabula. This study was prepared at the request of the Ashtabula Port Authority. The report evaluated six potential sites for small-boat harbors including Lakeshore Park (refer to Plate 1.1). Although the Lakeshore Park site received a favorable rating in the report, the Port Authority selected Walnut Beach (Site "A" located at the westerly end of Ashtabula Harbor, Plate 3.1 as its recommended site. However, there has been opposition to a small-boat harbor at Walnut Beach by local interests due to a foreseeable partial loss of that beach (their only sand beach) in the event of marina construction. As a result of growing oppositions, the Ashtabula Port Authority held a public meeting in January of 1980, at the Ashtabula Branch of Kent State University to inform the public of its plan. The Corps of Engineers was represented by Mr. Wiener Cadet of the Buffalo District Western Basin Section. During that meeting, both opponents and supporters (mostly local public officials) stuck to their original positions. Some environmental reasons were cited for rejecting the Walnut Beach site in favor of Lakeshore Park site. Some residents claimed that sand deposited in the Walnut Beach area would cost as much as $4.0 million to be dredged. The Port Authority President, acting as mediator during the meeting, said: "The Port Authority merely wanted the opportunity to see if the various objections to the site could be overcome before rejecting Walnut Beach and that the Port

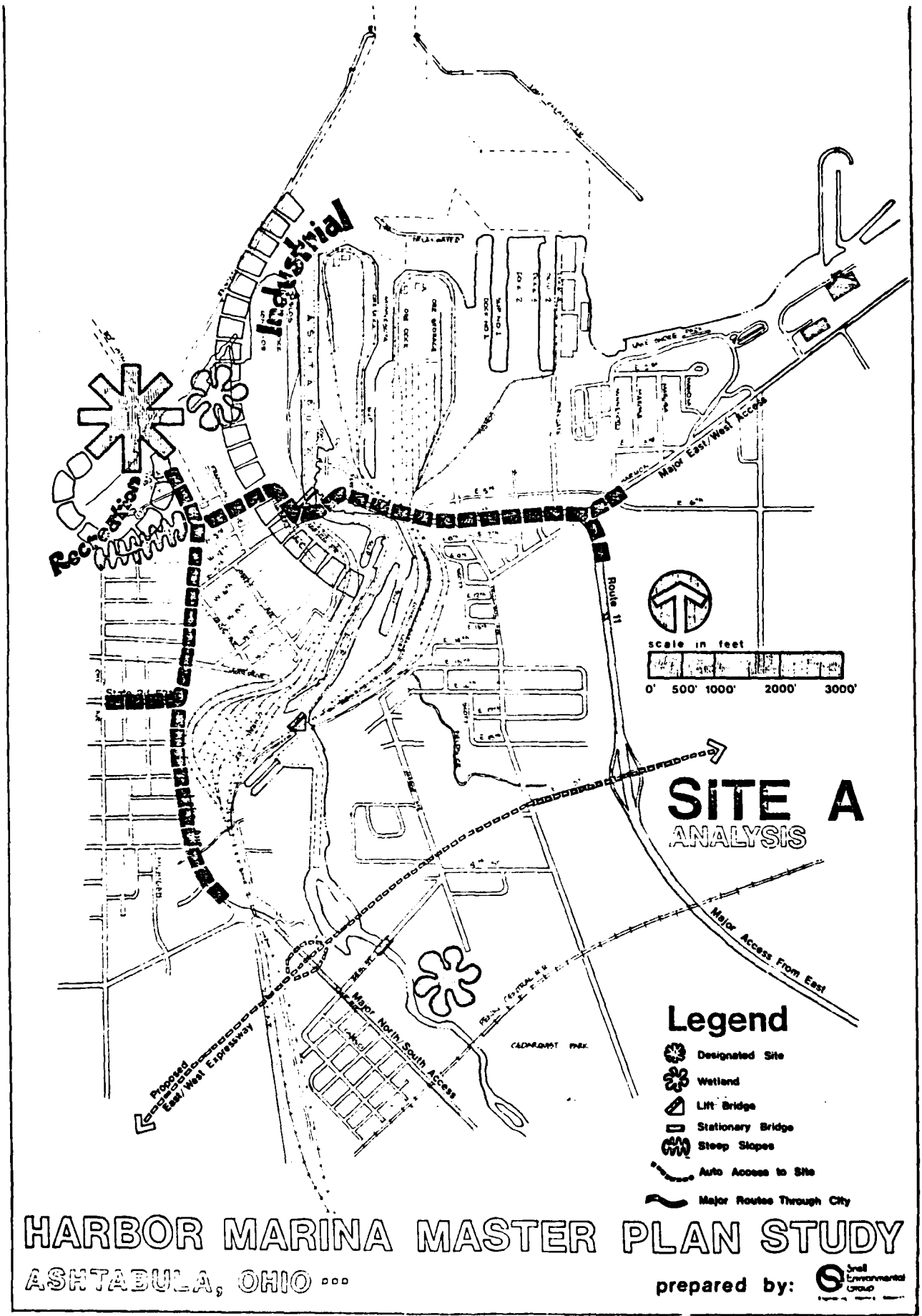

Industrial
Recreation
Major East/West Access
Route 11
scale in feet
0' 500' 1000' 2000' 3000'
SITE A
ANALYSIS
Major Access From East
Major North/South Access
Proposed East/West Expressway
CEDARQUIST PARK
Legend
Designated Site
Wetland
Lift Bridge
Stationary Bridge
Steep Slopes
Auto Access to Site
Major Routes Through City
HARBOR MARINA MASTER PLAN STUDY
ASHTABULA, OHIO
prepared by:

Plate 3.1

Authority would do anything it could to support another marina at Lakeshore Park." In April of 1980, 3 months after that meeting, the Ashtabula Port Authority, as a result of State action that will provide funding only for one marina, decided to join the Lakeshore Marine Advisory Board in seeking a local marina. The Board which is made up of local boaters, had recommended a marina be built at Lakeshore Park, as an integral part of the "Lakeshore Park Recreation Plan." (See Plate 3.2 for location of the proposed marina.)

LOCAL COOPERATION REQUIREMENTS

Formal assurances of local cooperation must be furnished by a municipality or public agency, fully authorized under State laws to give assurances and financially capable of fulfilling all items of local cooperation. As local cooperation requirements for the Lakeshore Park, Section 103, Beach Erosion and Shoreline Protection Project, the local sponsor must agree to:

a. Contribute in cash 30 percent of the project construction cost and all costs in excess of the Federal expenditure limitation of $1,000,000. Such contribution may be made in a lump sum prior to the initiation of construction or in annual installments at a rate proportionate to the scheduled apportionment of Federal funds.

b. Provide without cost to the United States all necessary lands, easements, rights-of-way, and relocations required for construction of the project, including that required for periodic nourishment.

c. Comply with the 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 construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

d. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its Contractors.

e. Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based, during the actual life of the project.

f. Assure maintenance and repair, and local share of periodic beach nourishment where applicable, during the useful life of the works as required to serve the project's intended purpose.

g. Carry out the annual beach nourishment program for the 50-year life of the project with the only cost to the United States being the said annual reimbursement to the town of 70 percent of the city expenditure thereof, subject to availability of funds.

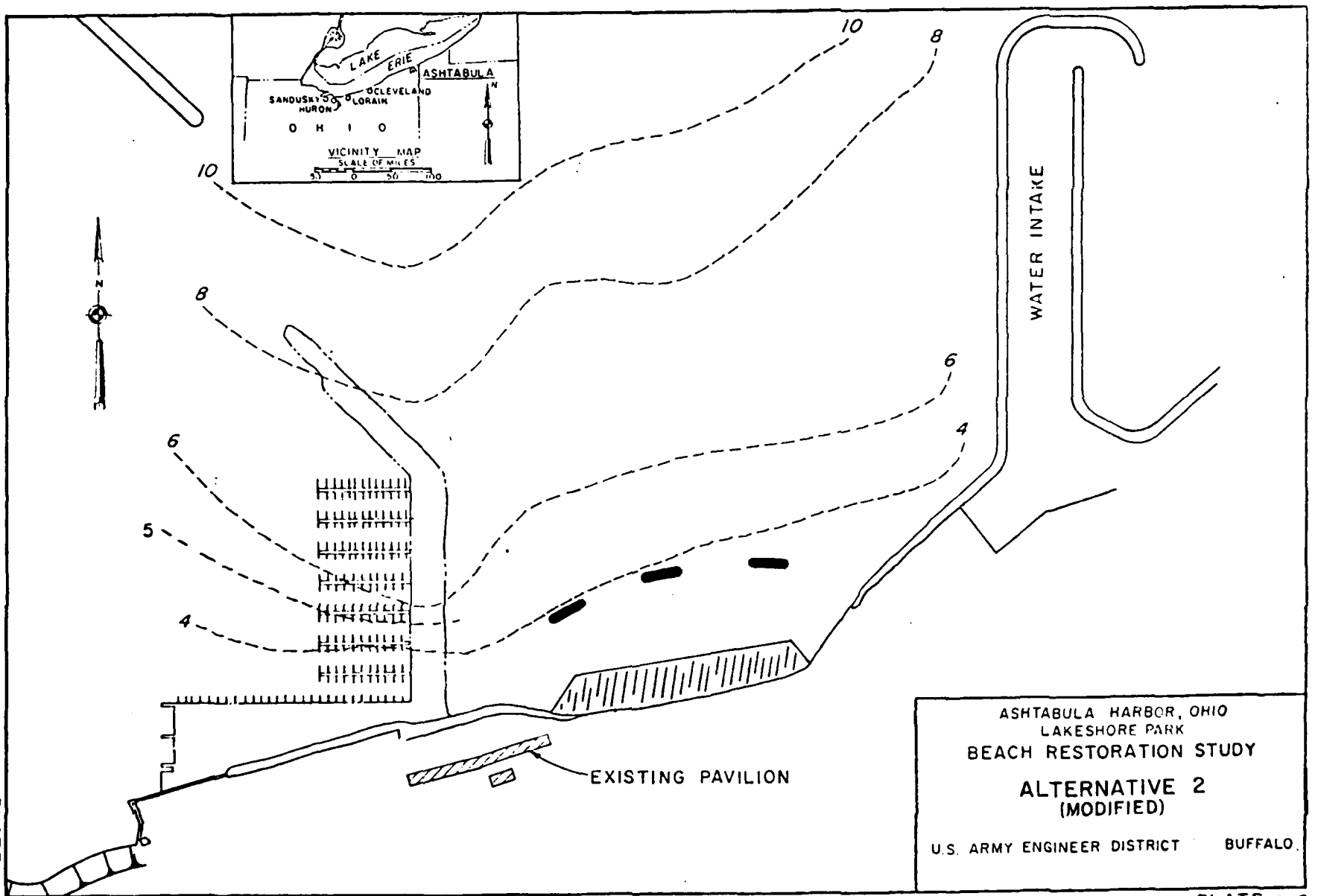


PLATE 3.2

PLATE 3.2

h. Provide and maintain necessary access roads, parking areas, the stone revetment in front of the pavilion, and other public use facilities open and available to all on equal terms.

i. Assure that water pollution from point sources in the park that would affect the health of bathers will not be permitted.

j. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 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 and the park benefitted thereby.

These terms of local cooperation, except for item "j," were taken from the Department of the Army Publication EP 1165-2-1 (27 March 1981) entitled "Digest of Water Resources Policies and Authorities."

PLAN FORMULATION RATIONALE

Each alternative developed using the possible solutions identified previously in the Paragraph titled MANAGEMENT MEASURES, is subject to various formulation and assessment criteria.

Each alternative considered must be physically able to solve the particular water resource problem being addressed. For that, certain specific technical engineering criteria must be met. In addition, within the structure of the overall planning framework other specific criteria, relative to general policies, economic principles, social and environmental values, and local conditions must be established.

The process of formulating a plan, including the screening of alternatives also requires that impacts of a proposed action be measured and the results displayed or accounted for in terms of contributions to four accounts of National Economic Development (NED), Environmental Quality (EQ), Regional Development (RD), and Social Well Being (SWB).

The technical, economic, socio-economic, and environmental criteria are described below.

GENERAL FORMULATION AND EVALUATION CRITERIA

Federal policy on multiobjective planning, derived from both legislative and executive authorities, establishes and defines the national objectives for water resource planning, specifies the range of impacts that must be assessed, and sets forth the conditions and criteria which must be applied, when evaluating plans. Plans must be formulated to meet the needs of the area with regard to benefits and costs, both tangible and intangible, and effects on the ecology, and social well being of the community.

The planning framework, established in Water Resource Council's "Principles and Standards for Planning Water and Related Land Resources" requires the systematic preparation and evaluation of alternative solutions

to problems, under the objectives of National Economic Development (NED) and Environmental Quality (EQ). The formulation of a plan including the screening of alternatives, must be as necessary within the context of an appropriate framework and set of criteria. Those criteria are listed as follows:

a. Technical Criteria

(1) A coincident 200-year design frequency, in this case a 10-year recurrence significant deep water wave height in combination with the 20-year lake level) was used for design of the structures.

(2) Overtopping of protective works for the design condition would be permitted to the extent that the residual interior wave shall be limited to a height consistent with the estimated rate of beach material migration.

b. Economic Criteria

(1) Tangible benefits should exceed project economic costs.

(2) Each separable unit of improvement or purpose should provide benefits at least equal to its cost unless justifiable on a non-economic basis.

(3) Each plan, as ultimately formulated, should provide the maximum net benefits possible within the formulation framework.

(4) The costs for . alternative plan of development should be based on estimates of quant[illegible]nd current price levels.

(5) The benefits and costs should be in comparable economic terms to the fullest extent possible.

(6) A 50-year economic life and 7-3/8 percent interest rate are used for the economic evaluation.

(7) The base case for comparison of alternative plans is the no-action plan.

c. Socio-economic and Environmental Criteria

The criteria for socio-economic and environmental consideration in water resource planning are prescribed by the National Environmental Policy Act of 1969 (PL 91-190), and Section 122 of the River and Harbor Act of 1970 (PL 91-611). These criteria prescribe that all significant adverse and beneficial economic, social, and environmental effects of planned developments be considered and evaluated during formulation.

SECTION IV

ANALYSIS OF PLANS IN PRELIMINARY PLANNING

During the preliminary stage (Stage 2) of this investigation, the Buffalo District Corps of Engineers developed various alternative solutions to the flooding, beach erosion and shoreline protection problems occurring at Lakeshore Park in Ashtabula, OH. A total of ten different alternatives were studied. (See Plates 4.1 to 4.6.) They basically involved construction of breakwaters and sandfill beaches of different sizes, types, locations, and combinations. These alternatives were assessed both environmentally and economically. An access road, common to most of them, would be constructed, to the beach from the top of the existing bluffs. Following is a discussion of these aforementioned alternatives, summarizing their general characteristic traits, their economic evaluation, and consistencies with the multiuse objective for the park, as reported in the Stage 2 Detailed Project Report.

ALTERNATIVES CONSIDERED IN STAGE 2 (1)

a. Alternative 1 - This alternative is the "no-action" plan, under which, the bluffs to the east of the park pavilion would continue to erode and the beach would remain as is, an unattractive, small gravel-type beach. The only costs to the Federal Government would be those incurred for planning, prior to the selection of this alternative. Although this alternative would not alleviate the shore erosion problem at Lakeshore Park, it will be considered until all items of local cooperation are formally agreed to.

b. Alternative 2 - This alternative consists of two 250-foot long rubblemound breakwaters with a crest width of 13 feet and a height of approximately 11.6 feet, spaced 250 feet apart, protecting an 800-foot reach of sandfill beach with a 100-foot berm fronted by 1 on 15 foreshore slope. Alternative 2 would require an initial placement of 71,000 c.y. of sandfill, 10 percent of which would have to be replaced on an annual basis (see Plate 4.1). The total project cost estimated at $1,666,800 is apportioned as follows:

Non-Federal	$ 603,440	
Corps	1,033,360	
Coast Guard	30,000	(see Table 4.1)

The B/C ratio is 1.87 with an average annual cost of $144,497 and average annual benefits of $270,236, yielding net benefits of $125,739 (see Table 4.2).

Alternative 2 is carried into detailed design stage (Stage 3) of the study. It is the plan most consistent with the multi-use objective for the park.

(1) Historical present tense is being used throughout this section.

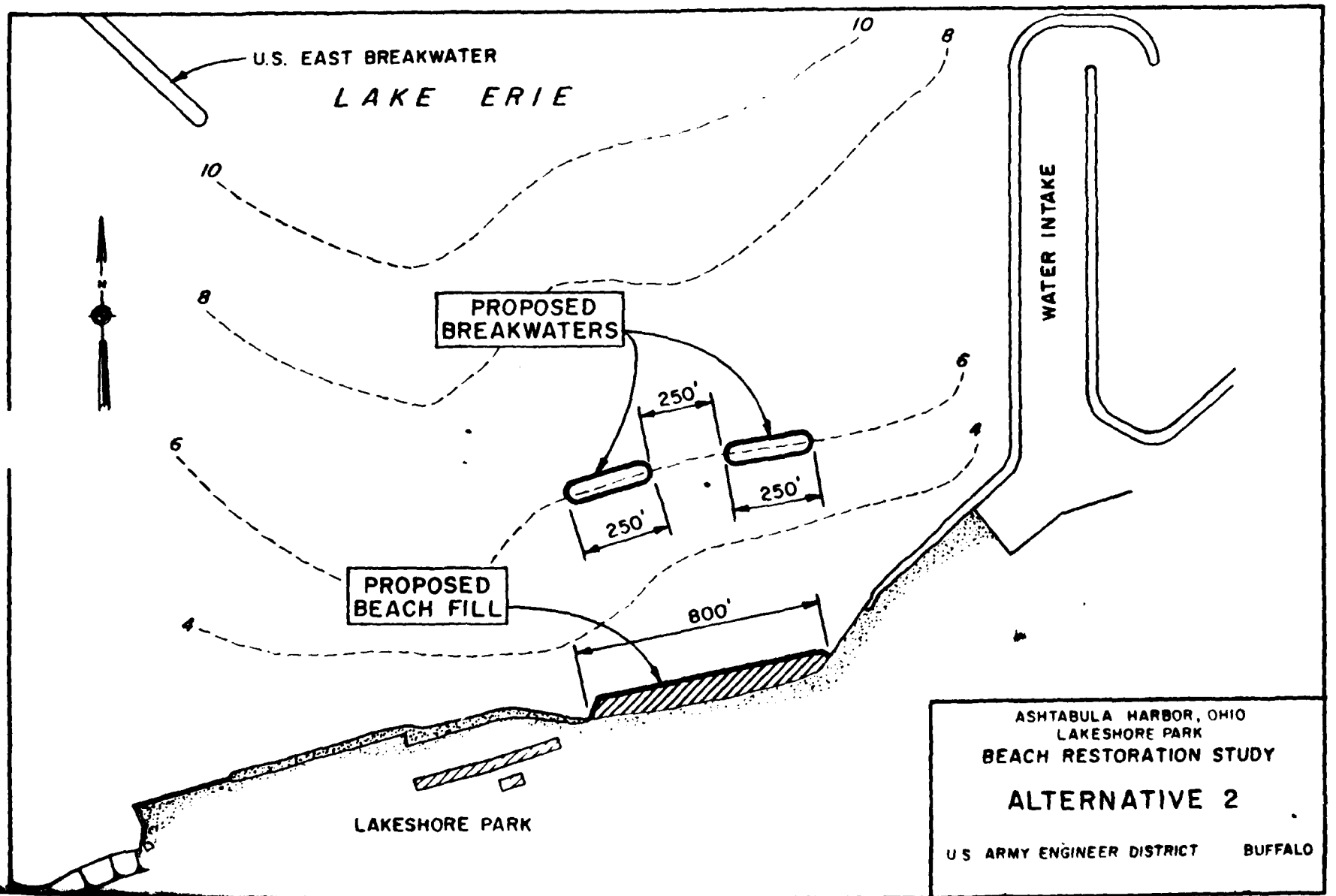
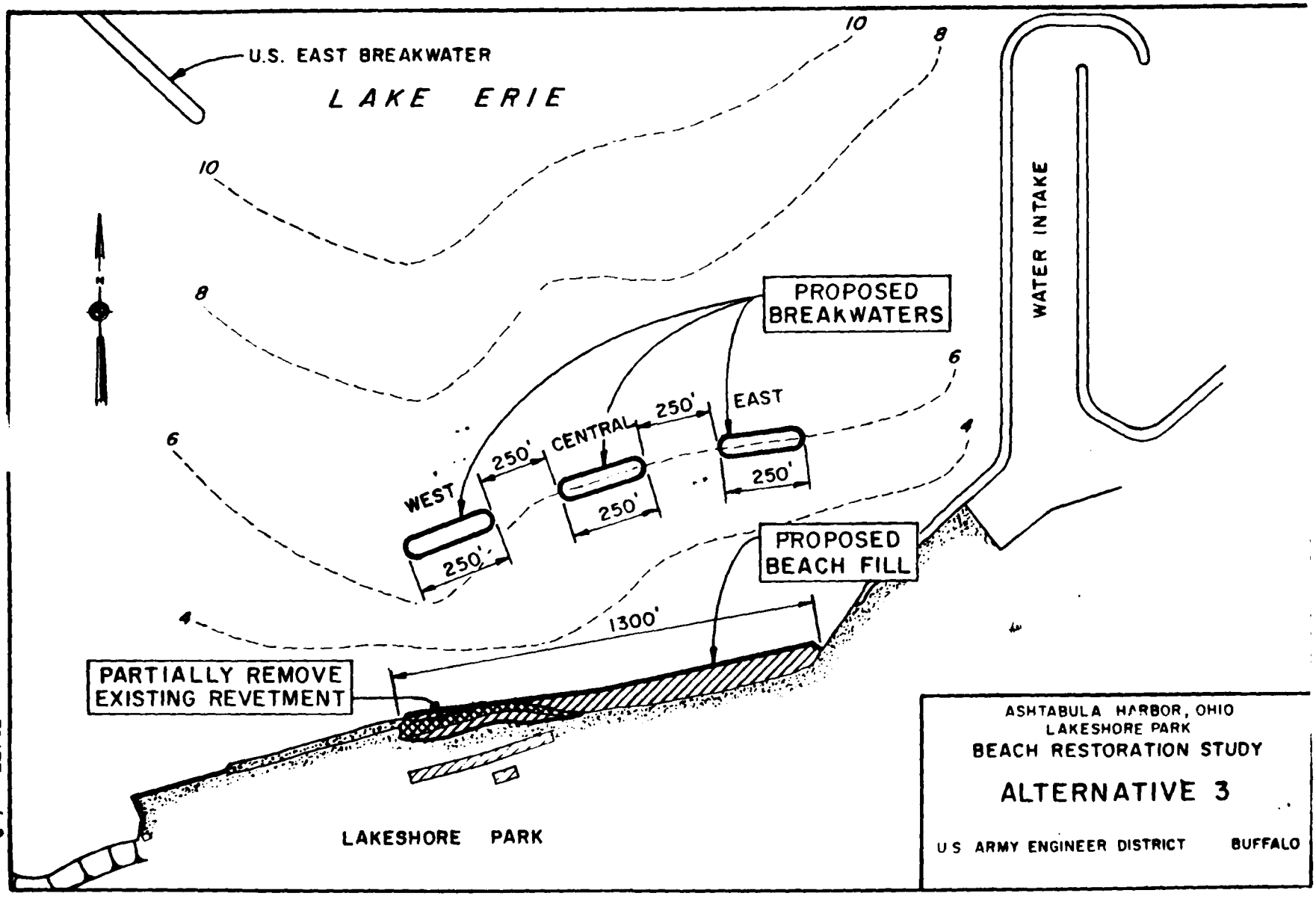
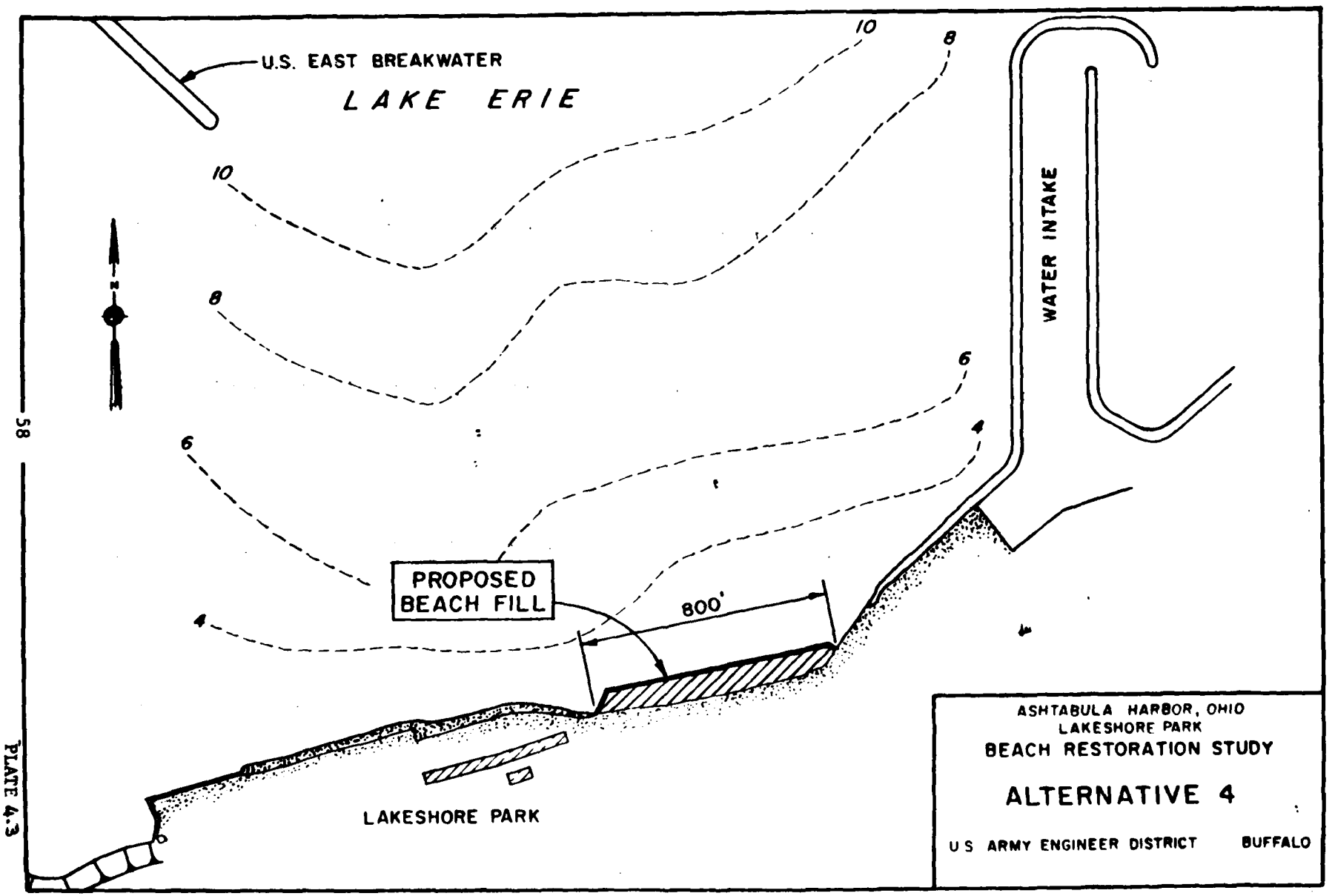

U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
4
PROPOSED BREAKWATERS
250'
250'
250'
PROPOSED BEACH FILL
800'
WATER INTAKE
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 2
U S ARMY ENGINEER DISTRICT BUFFALO

PLATE 4


U.S. EAST BREAKWATER
LAKE ERIE
10
8
6
4
PROPOSED BREAKWATERS
WATER INTAKE
WEST
CENTRAL
EAST
250'
250'
250'
250'
250'
PROPOSED BEACH FILL
1300'
PARTIALLY REMOVE EXISTING REVETMENT
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 3
U S ARMY ENGINEER DISTRICT BUFFALO

57

PLATE 4.2


U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
4
WATER INTAKE
PROPOSED BEACH FILL
800'
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 4
U S ARMY ENGINEER DISTRICT BUFFALO

58

PLATE 4.3

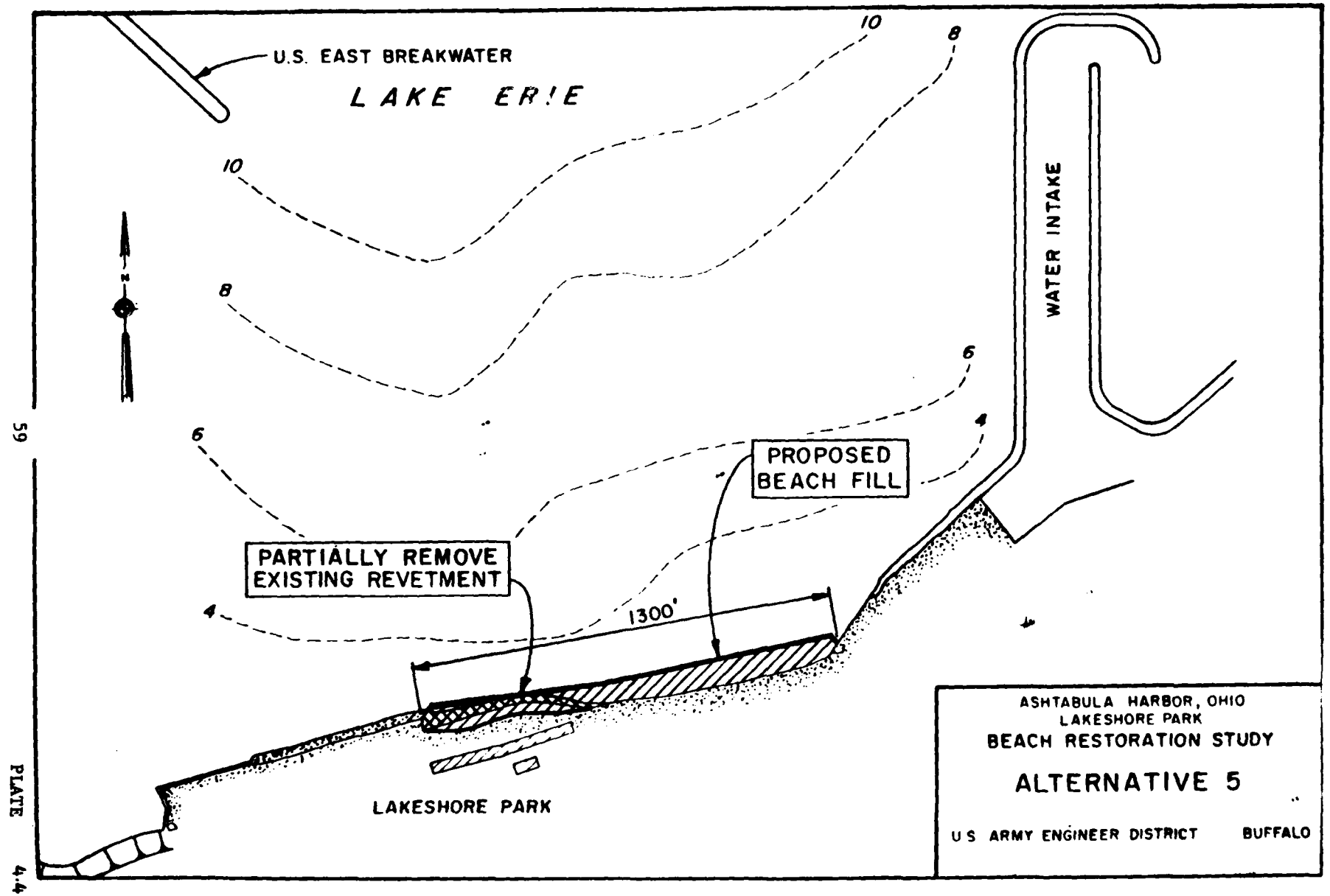

U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
4
WATER INTAKE
PROPOSED BEACH FILL
PARTIALLY REMOVE EXISTING REVETMENT
1300'
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 5
U S ARMY ENGINEER DISTRICT BUFFALO

PLATE 59
4-4

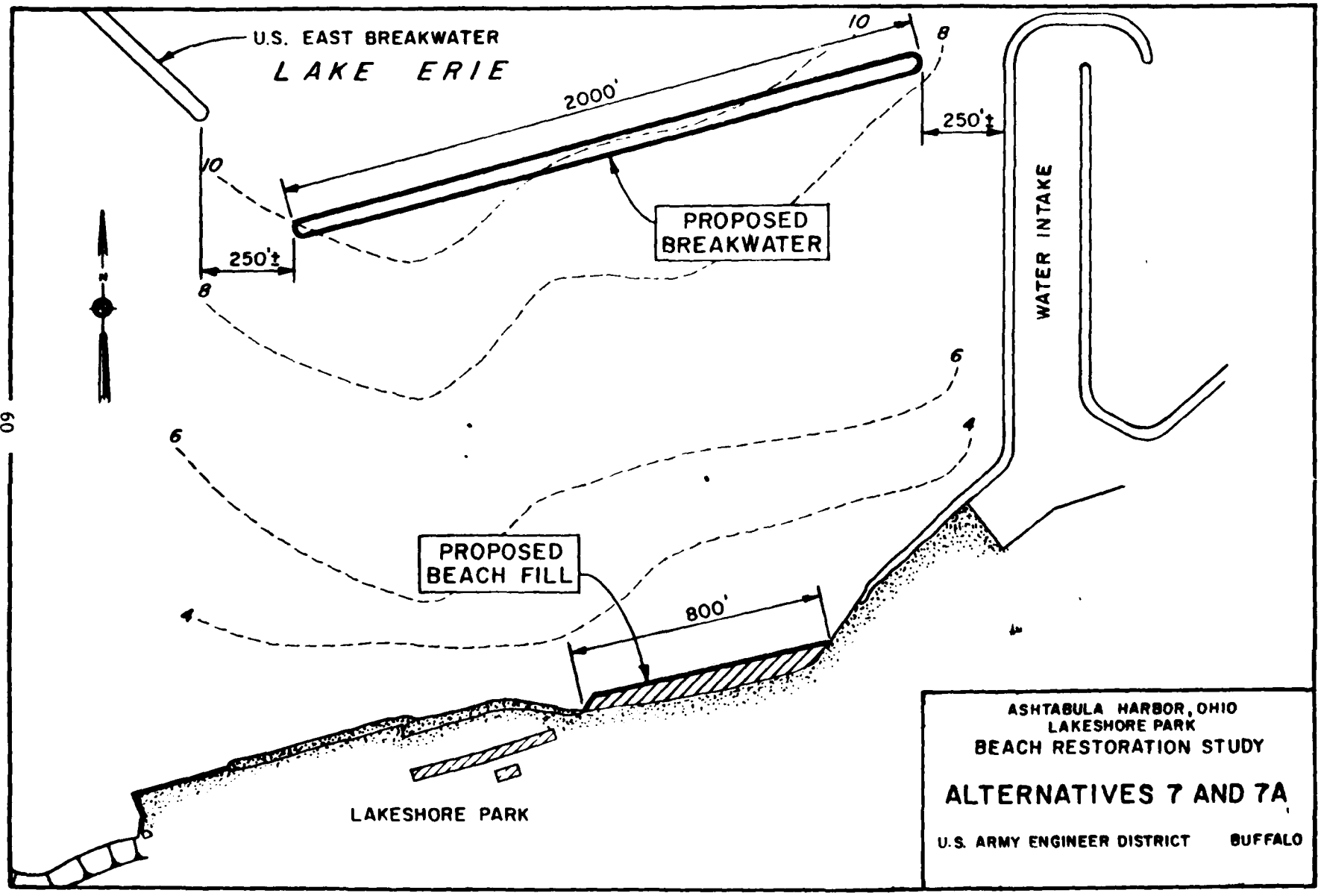

U.S. EAST BREAKWATER
LAKE ERIE
2000'
10
8
250'±
PROPOSED BREAKWATER
WATER INTAKE
6
4
PROPOSED BEACH FILL
800'
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVES 7 AND 7A
U.S. ARMY ENGINEER DISTRICT BUFFALO

PLATE 4.5

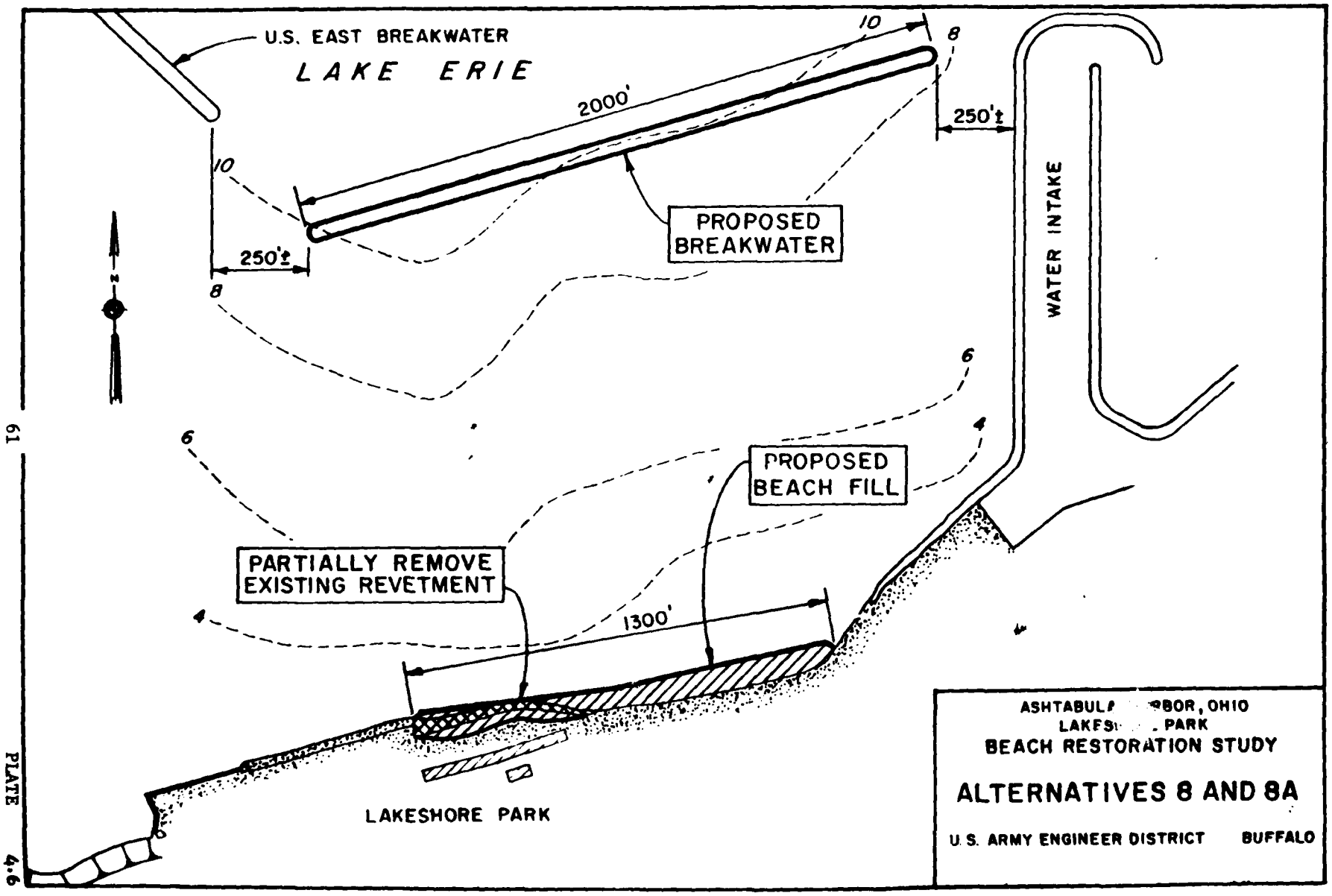

U.S. EAST BREAKWATER
LAKE ERIE
10
8
2000'
250'±
10
PROPOSED BREAKWATER
250'±
8
WATER INTAKE
6
6
4
PROPOSED BEACH FILL
PARTIALLY REMOVE EXISTING REVETMENT
1300'
4
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESIDE PARK
BEACH RESTORATION STUDY
ALTERNATIVES 8 AND 8A
U.S. ARMY ENGINEER DISTRICT BUFFALO
61
PLATE 4.6

Table 4.1 - Cost Apportionment - Alternative 2

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	792,700(2)	30,000	387,300	1,210,000
Present Worth of 5 Years of Annual Beach Nourishment(1)	10,660(1)		216,140	226,800
Total	1,033,360	30,000	603,440	1,666,800

(1) Considered a construction cost. Approximately 4.7 percent of yearly cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 4.7 percent ($22,700) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

able 4.2 - Benefit-Cost Ratio

Items / Alternatives	Average Annual Benefits (1)	Average Annual Costs	Net Benefits	Benefit/Cost
	$	$	$	$
1	0	0	0	0
2	270,236	144,497	125,739	1.87
3	273,210	220,255	52,955	1.24
4	270,236	194,153	76,083	1.39
5	273,210	294,565	- 21,355	0.93
6	N/A	N/A	N/A	N/A
7	270,236	391,023	-120,787	0.69
7A	270,236	515,052	-244,816	0.52
8	273,210	460,978	-187,768	0.59
8A	273,210	559,006	-285,796	0.49

(1) Average Annual Benefits include benefits associated with swimming ($1.93 user day value and 75 square feet minimum beach area per person), and prevention of erosion to the park bluffs. They do not include benefits for a proposed small-boat harbor.

c. Alternative 3 - This alternative consists of three 250-foot long rubblemound breakwaters of the same dimensions and gaps as those in Alternative 2. They would protect a 1,300-foot reach of sandfill beach, 100-feet wide, fronted by a 1 on 15 foreshore slope. Alternative 3 would require an initial placement of 108,300 c.y. of sandfill, 10 percent of which would have to be replaced on an annual basis (see Plate 4.2). This alternative calls for partial removal of the existing stone revetment in front of the pavilion. The total project cost, estimated at $2,435,700, is apportioned as follows:

Non-Federal	$1,351,515	
Corps	1,054,185	
Coast Guard	30,000	(see Table 4.3)

The B/C ratio is 1.24 with an average annual cost of $220,255 and average annual benefits of $273,210, yielding net benefits of $52,955 (see Table 4.2).

Although the 1,300-foot beach would satisfy the expected bathing demand for the 50-year life of the project, present and proposed parking facilities are unable to accommodate the expanded beach capacity. For this reason, the local cooperator, the Ashtabula Town Park Commission, has recommended that Alternative 3 be eliminated in the final design stage.

d. Alternative 4 - This alternative consists of an unprotected 800-foot long reach of sandfill beach of the same dimensions at the beach in Alternative 2, and calls for placement of 71,000 cubic yards of sandfill (see Plate 4.3).

An offshore loss rate is estimated at 18,000 (25 percent) cubic yards per year, requiring replenishment on an annual basis. The total project cost estimated at $1,564,930 is apportioned as follows:

Non-Federal	$ 515,210	
Federal	1,049,720	(see Table 4.4)

The B/C ratio is 1.39 with an average annual cost of $194,153 and average annual benefits of $270,236, yielding net benefits of $76,083 (see Table 4.2).

This Alternative provides an uncertain beach area. It has been eliminated from further study because of the high offshore loss rates of beach sand and the high annual nourishment quantities.

e. Alternative 5 - This alternative is basically the same as Alternative 4. It consists of a 1,300-foot long reach of sandfill beach of the same dimensions as the beach in Alternative 3, and calls for placement of 108,300 cubic yards of sandfill (see Plate 4.4). An offshore loss rate is estimated at: 27,075 (25 percent) cubic yards per year, requiring replenishment on an annual basis. The total project cost, estimated at $2,273,370, would be apportioned as follows:

Non-Federal	$1,193,200	
Federal	1,080,170	(see Table 4.5)

Table 4.3 - Cost Apportionment
Alternative 3

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	806,900(2)	30,000	1,023,100	1,860,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	17,285(1)		328,415	345,700
Total	1,054,185	30,000	1,351,515	2,435,700

(1) Considered a construction cost. Approximately 5 percent of annual cost, which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 5 percent ($36,900) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

Table 4.4 - Cost Apportionment
Alternative 4

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	538,810(2)		221,190	760,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	280,910(1)		294,020	574,930
Total	1,049,720	0	515,210	1,564,930

(1) Considered a construction cost. Approximately 4.7 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 4.7 percent ($22,700) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

Table 4.5 - Cost Apportionment
Alternative 5

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	806,900(2)		371,100	1,178,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	43,270(1)		822,100	865,370
Total	1,080,170		1,193,200	2,273,370

(1) Considered a construction cost. Approximately 5 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 5 percent ($36,900) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

The B/C ratio is .93 with an average annual cost of $294,565 and an average annual benefit of $273,210 (see Table 4.2).

Alternative Plan 5, would not produce a net benefit.

f. Alternative 6 - This alternative, consisting of an 800-foot long beach protected by a single groin, was eliminated in Stage 2 for functional reasons. The groin would mainly protect against wave energy component parallel to the shoreline, which is minimal at Lakeshore Park, where wave energy is mostly perpendicular to the shore giving way to very little longshore transport.

g. Alternative 7 - It consists of a single 2,000-foot long rubblemound breakwater, with a crest width of 17 feet and a height of approximately 16.9 feet (see Plate 4.5). This breakwater would be located 1,600 feet offshore protecting an 800-foot beach of the same geometry and characteristics as that in Alternative 2. Alternative 7 would require an initial placement of 71,000 cubic yards of sandfill, approximately 14 percent of which would have to be replaced on an annual basis. The total project cost, estimated at $4,809,450 is apportioned as follows:

Non-Federal	$3,741,750	
Corps	1,037,700	
Coast Guard	30,000	(see Table 4.6)

The B/C ratio is .69 with an average annual cost of $391,023 and average annual benefits of $270,236, yielding net benefits of $-120,787 (see Table 4.2).

This alternative, along with the remaining alternatives (7A, 8, and 8A), are all beyond the sponsor's financial capabilities. They do not produce a net benefit. For these reasons, Alternative 7 was not considered in Stage 3.

h. Alternative 7A - This alternative is basically the same as Alternative 7, except that the breakwater crest elevation is designed to allow a maximum transmitted wave of 1 foot in the leeside of the structure, due to the possibility of a small-boat harbor to be built to the west of the park pavilion (see Plate 4.5). Alternative 7A would require an initial placement of 71,000 cubic yards of sandfill, approximately 5 percent of which would have to be replaced on an annual basis. The total project cost, estimated at $6,974,160, is apportioned as follows:

Non-Federal	$5,916,100	
Corps	1,028,060	
Coast Guard	30,000	(see Table 4.7)

The B/C ratio is .52 with an average annual cost of $515,052 and average annual benefits of $270,236, excluding recreational boating benefits, yielding net benefits of $-244,816 (see Table 4.2). Alternative 7A was eliminated in Stage 2 because of high costs and lack of economic justification.

Table 4.6 - Cost Apportionment
Alternative 7

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	792,700(2)	30,000	3,437,300	4,260,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	15,000(1)		304,450	319,450
Total	1,037,700	30,000	3,741,750	4,809,450

(1) Considered a construction cost. Approximately 4.7 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 5 percent ($22,700) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

Table 4.7 - Cost Apportionment
Alternative 7A

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	792,700(2)	30,000	5,807,300	6,630,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	5,360(1)		108,800	114,160
Total	1,028,060	30,000	5,916,100	6,974,160

(1) Considered a construction cost. Approximately 4.7 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. See discussion of Prior Corps Studies in Section 1 for more details.

(2) Includes 4.7 percent ($22,700) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

i. Alternative 8 - This alternative consists of a single 2,000-foot long rubblemound breakwater as described in Alternative 7, protecting a 1,300-foot reach of sandfill beach of the same geometry and characteristics as that in Alternative 3 (see Plate 4.6). Alternative 8 would require an initial placement of 108,300 cubic yards of sandfill, approximately 14 percent of which would have to be replaced on an annual basis. The total project cost estimated at $5,394,000 is apportioned as follows:

Non-Federal	$4,302,900	
Corps	1,061,100	
Coast Guard	30,000	(see Table 4.8)

The B/C ratio is .59 with an average annual cost of $460,978 and average annual benefits of $273,210, yielding net benefits of -$187,768 (see Table 4.2). Alternative 8 was eliminated in Stage 2 because of high costs and lack of economic justification.

j. Alternative 8A - This alternative is basically the same as Alternative 8, except that the breakwater crest elevation is designed to allow a maximum transmitted wave of 1 foot in the leeside of the structure due to the possibility of a small-boat harbor to be built to the west of the park pavilion (see Plate 4.6). Alternative 8A would require an initial placement of 108,300 cubic yards of sandfill, approximately 5 percent of which would have to be replaced on an annual basis. The total project cost, estimated at $7,451,760, is apportioned as follows:

Non-Federal	$6,376,270	
Corps	1,045,490	
Coast Guard	30,000	(see Table 4.9)

The B/C ratio is .49 with an average annual cost of $559,006 and average annual benefits of $273,210 yielding net benefits of -$285,796 (see Table 4.2).

SUMMARY OF COSTS AND BENEFIT/COST RATIOS

a. Total Project Costs

For an 800-foot beach, Alternative 4 has the lowest "Total Project Cost" ($1,564,930) and the lowest non-Federal share of the "Total Project Cost" ($515,210), while Alternative 7A has the highest ($6,974,160 and $5,916,100, respectively). For a 1,300-foot beach, Alternative 5 has the lowest of these costs ($2,273,370 and $1,193,200) and Alternative 8A the highest ($7,451,760 and $6,376,270). These costs include the cost of the Detailed Project Report, preparation of plans and specifications, initial construction, and the present worth of the first 5 years of annual nourishment.

b. Annual Nourishment Costs

For an 800-foot beach, Alternative 7A has the lowest estimated annual nourishment cost ($27,750) and Alternative 4 the highest ($139,750). For a

Table 4.8 - Cost Apportionment
Alternative 8

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	806,900(2)	30,000	3,843,100	4,680,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	24,200(1)		459,800	484,000
Total	1,061,100	30,000	4,302,900	5,394,000

(1) Considered a construction cost. Approximately 5 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 5 percent ($36,900) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

Table 4.9 - Cost Apportionment
Alternative 8A

Item	Corps	U. S. Coast Guard	Non-Federal	Total
	$	$	$	$
Planning Costs	230,000			230,000
Initial Construction	806,900(2)	30,000	6,213,100	7,050,000
Present Worth of 5 Years of Annual Beach Nourishment (1)	8,590(1)		163,170	171,760
Total	1,045,490	30,000	6,376,270	7,451,760

(1) Considered a construction cost. Approximately 5 percent of annual cost which is 100 percent Federal expense as mitigation to Federal harbor structures. For details, see discussion of Prior Corps Studies in Section 1.

(2) Includes 5 percent ($36,900) of initial sandfill as 100 percent Federal expense as mitigation to Federal harbor structures.

1,300-foot beach, Alternative 8A has the lowest estimated annual nourishment cost ($41,750) and Alternative 5 the highest ($210,350). See Table 4.10.

c. Annual Maintenance Costs

For an 800-foot beach, Alternative 4 has the lowest estimated annual maintenance costs ($200) and Alternative 7A the highest ($14,450). For a 1,300-foot beach, Alternative 5 has the lowest estimated annual maintenance costs ($200) and Alternative 8A the highest ($14,450). See Table 4.10.

d. Average Annual Costs

For an 800-foot beach, Alternative 2 has the lowest average annual costs ($144,497) and Alternative 7A the highest ($515,052). For a 1,300-foot beach, Alternative 3 has the lowest average annual costs ($220,255) and Alternative 8A the highest ($559,006). See Table 4.10.

e. Net Benefits and Benefit-Cost Ratios

For an 800-foot beach, Alternative 2 has the highest net average annual benefits and benefit-cost ratio ($125,739 and 1.87) and Alternative 7A the lowest($-244,816 and 0.52). For a 1,300-foot beach, Alternative 3 has the highest net average annual benefits and benefit-cost ratio ($52,955 and 1.24) and Alternative 8A the lowest ($-285,796 and 0.49). See Table 4.11.

SUMMARY OF STAGE 2 RESULTS

Alternatives Eliminated in Stage 2

a. Alternative 5 (unprotected 1,300-foot beach) - Eliminated because of high offshore losses, and associated high costs for annual nourishment. Also, negative net benefits and benefit-to-cost ratio less than 1.0.

b. Alternative 6 (800-foot beach protected by a single groin) - Eliminated because of high offshore losses; and groin would not serve its functional purpose.

c. Alternative 7 (800-foot beach protected by 2,000-foot breakwater) - Eliminated because of high costs and benefit-to-cost ratio less than 1.0.

d. Alternative 7A (same as Alternative 7 except with breakwater crest at elevation +12.7 LWD) - Eliminated because of high costs and lack of economic justification; 0.52 B/C ratio.

e. Alternative 8 (1,300-foot beach protected by 2,000-foot breakwater) - Eliminated because of high cost and benefit-to-cost ratio less than 1.0.

f. Alternative 8A (same as Alternative 8 except with breakwater crest at elevation +12.7 LWD) - Eliminated because of high cost and lack of economic justification; 0.49 B/C ratio.

Table 4.10 - Average Annual Costs

Item	Alternatives								
	1	2	3	4	5	6	7	7A	8	8A
	$	$	$	$	$	$	$	$	$	$
First Cost (1)	0	1,210,000	1,860,000	760,000	1,178,000	N/A	4,260,000	6,630,000	4,680,000	7,050,000
Annual Costs										
Amortization of First Cost (2)	0	86,297	132,655	54,655	84,015	N/A	303,823	472,852	333,778	502,806
Annual Beach Nourishment	0	55,130	84,030	139,750	210,350	N/A	77,650	27,750	117,650	41,750
Annual Maintenance	0	3,070	3,570	200	200	N/A	9,550	14,450	9,550	14,450
Average Annual Cost (3)	0	144,497	220,255	194,153	294,565	N/A	391,023	515,052	460,978	559,006

(1) Includes initial construction, engineering and design, and supervision and administration. Does not include any annual beach nourishment costs.

(2) 6-7/8 percent interest rate, 50-year project life (amortization factor - 0.07132).

(3) With Federal limitation of $1,000,000 plus apportionment of impact of existing Federal structures in Ashtabula Harbor, the apportionment of annual costs would vary from year to year.

Table 4.11 - Benefit-Cost Analysis

Item	Alternatives									
	1	2	3	4	5	6	7	7A	8	8A
	$	$	$	$	$	$	$	$	$	$
Average Annual Benefits (1)	0	270,236	273,210	270,236	273,210	N/A	270,236	270,236	273,210	273,210
Average Annual Costs	0	144,297	220,194	194,153	294,565	N/A	391,023	515,052	460,978	559,006
Net Benefits	0	125,739	52,955	76,083	- 21,355	N/A	- 120,787	- 244,816	- 187,768	- 285,796
Benefit/Cost	0	1.87	1.24	1.39	0.93	N/A	0.69	0.52	0.59	0.49

(1) Average annual benefits include benefits associated with swimming ($1.93 user day value and 75 square feet minimum beach area per person) and prevention of erosion to the park bluffs. They do not include benefits for a proposed small-boat harbor.

Alternative Plans Carried into Stage 3

a. Alternative 1 (No Action)

b. Alternative 2 (800-foot beach protected by rubblemound breakwaters)

c. Alternative 3 (1,300-foot beach protected by rubblemound breakwaters)

d. Alternative 4 (unprotected 800-foot beach)

Alternatives Eliminated Early in Stage 3

a. Alternative 3 (1,300-foot beach protected by rubblemound breakwaters) - Early in Stage 3, it became apparent that the Lakeshore Park Master Plan would not provide sufficient parking area to accommodate auto users of a 1,300-foot beach. In addition, local interests indicated a preference for retaining the stone revetment which provides some protection to the pavilion against lake flooding. They also expressed concerns for the high cost associated with this plan. Construction of a sand beach over the existing stone revetment would destroy a potentially productive aquatic habitat. Also, retention of the stone revetment between the proposed sand beach to the east and the proposed small-boat harbor to the west would provide a desirable buffer zone between these conflicting types of recreational activities, while offering some opportunity for land-based fishing.

For these reasons, and the Park Commission's stated preference to eliminate Alternative 3 from further consideration, no detailed plans were prepared for this alternative in Stage 3.

b. Alternative 4 (unprotected 800-foot beach) - Alternative 4 was given further consideration early in Stage 3. The District concluded that, although it (Alternative 4) would delay the erosion process and provide a recreation option, it will not effectively reduce the erosion problem which is identified as the most critical problem at Lakeshore Park. The beach area will be highly uncertain due to detrimental littoral transport (onshore - offshore transport) which is perpendicular to the shore. The local wave climate, conditioned by the US breakwaters at Ashtabula Harbor to the west, and the CEI intake channel breakwater to the east, would generate high offshore losses of beachfill (clean and well-graded sand) which is a limited resource in the region. This high loss offshore would require high annual replenishment expenditures, 70 percent of which is to be borne by the Federal Government. This offshore lose rate of sandfill for that alternative is estimated to be approximately 25± percent of 9,300 cubic yards per year based on current estimate of beachfill. The present worth of which, considering 7-3/8 interest rate, and 50-year project life, is $1,100,000, as opposed to $900,000 estimated cost of building a system of three breakwaters including annual nourishment over a 50-year project life.

Also, this Alternative Plan 4 will not yield the greatest recreation improvement on a per capita benefit basis without any structural protection.

For these reasons, and the local officials' stated concerns about this alternative, no detailed plans were prepared in Stage 3.

All the alternatives involved were assessed in terms of National and planning objectives. Only Alternatives 2, 3, and 4 with B/C ratios higher than 1.0 responded to the National Economic Development (NED) objective. The Environmental Quality objectives, however, were met by almost all of the considered plans. These plans would be more aesthetically pleasing than the existing gravel beach. Those with rubblemound breakwaters would create aquatic habitat diversity which would benefit the area fisheries. However, Alternatives 3, 5, 8, and 8A, with a 1,300-foot long reach of beach would cause a loss of artificial reefs by the partial removal of the existing stone revetment in front of the pavilion.

Most of the alternatives, specifically 2, 3, 7, 7A, 8, and 8A would meet the planning objectives. They would eliminate erosion of the 800-foot clay bluffs, prevent further upland damages, restore a recreational beach, and provide increased recreational opportunities...

As a result of a workshop meeting held in Ashtabula, OH, on Wednesday, 18 July 1979, with representatives from the Ohio Department of Natural Resources, Ashtabula Township Park Commission, Ashtabula County Planning Commission, Astabula City Council, Ashtabula Port Authority, Ashtabula Marine Advisory Boards, Ohio Department of Energy, Woodruff Inc., and the Ashtabula Star Beacon, local officials unanimously agreed that Alternative 2 was the favored plan. They stated that 4 and 5 offered no structural protection to the beach and the 7, 7A, 8, and 8A are beyond their financial capability. Alternative 3 was not specifically discarded. Its implementation would depend on final costs, ability to provide adequate parking space, and the structural integrity of the protective stone revetment.

Subsequent to the July 1979 meeting, the District recommended that Alternatives 2 and 3 be reexamined in the Stage 3 DPR. In compliance with NCD request, Alternative 4 also was looked at in Stage 3. However, early in Stage 3, Alternatives 3 and 4 were rejected by the District for the reasons outlined above. The Commission's views on eliminating Alternative 3 were requested in a letter to the Park Commission dated 17 October 1979 (Appendix E). They concurred in the District decision and stated that "it would be in the best interest of the Park to eliminate Alternative 3" (see letter to District Engineer, Appendix E, 27 February 1980).

SECTION V

ASSESSMENT AND EVALUATION OF DETAILED PLAN(S)

A total of 10 structural alternative plans were initially considered as possible solutions to meet our national, regional, and planning objectives. Of these 10 plans, six were dropped from further consideration at the end of the Stage 2 study. Additional study of the remaining four alternatives in the early Stage 3 planning indicated that only one alternative warranted further detailed study due to technical, economic, and environmental considerations. This alternative is Alternative Plan 2 (800-foot beach and offshore breakwaters). The basis of comparison for the above alternative plan is Alternative Plan 1 (No Action Plan) which will be considered until all items of local cooperation are agreed to.

This section describes the alternative Plans 1 and 2 detailed in Stage 3, and assesses potential environmental and economic impacts. It also provides a discussion of cost estimates (allocation, apportionment) along with other Federal and non-Federal responsibilities.

1. ALTERNATIVE PLAN 1 (NO ACTION)

a. Plan Description

For the "No Action" alternative, the Corps of Engineers would not participate in the protection or improvement of Lakeshore Park. Although some action has been taken to alleviate the erosion problem at Lakeshore Park, for assessment purposes, it is assumed that no other party would act to control erosion or maintain the beach. Under this alternative, the bluffs to the east of the park pavilion would continue to erode and the park's beach would remain as is, a small gravel-type beach. This alternative avoids the monetary investment and potential adverse environmental impacts associated with a structural beach erosion control alternative; however, it would not realize the beneficial impacts of providing shoreline protection, beach restoration for recreational swimming, and reducing potentials for flood hazards.

b. Cost Estimates (Allocation and Apportionment)

Alternative 1 involves no Federal action at Lakeshore Park and, therefore, no costs are associated with construction. However, the planning costs incurred prior to selection of this Alternative would be a Federal responsibility. Non-Federal interests would have no financial responsibility.

c. Implementation Responsibility (Federal Responsibility, Non-Federal Responsibility, . . .)

Not Applicable.

d. Economic Evaluation

Not Applicable.

e. Impact Assessment

The "No Action" alternative, although not favored by local interests, avoids as discussed above, both the monetary investments and potential adverse impacts associated with structural improvements. If no Federal action is taken, park land would continue to erode and park development would not reach its full potential. Erosion of the bluffs at their present rate may soon cause the failure of the parking lot to the east of the park pavilion. Although recreational activities at the park would not be interrupted by construction activities, long-term opportunities at the park would suffer from the absence of a recreational beach and continued shoreline erosion. In the long-run, huge economic loss may occur as a result of a no-Federal action as suggested below by a recent appraisal of the Park recreation facilities:

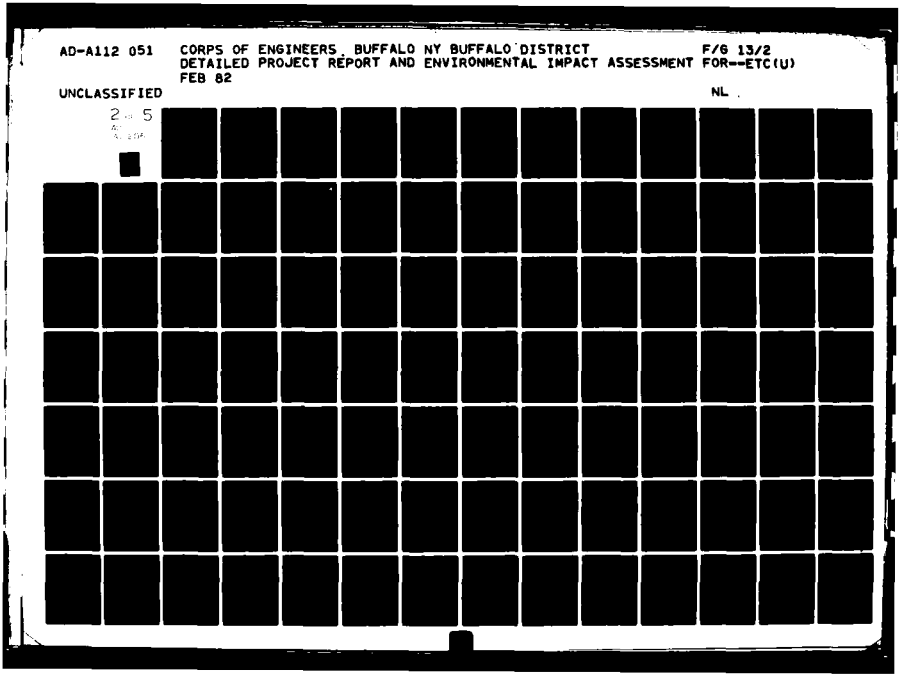
LAKESHORE PARK RECREATION FACILITIES APPRAISAL (1)

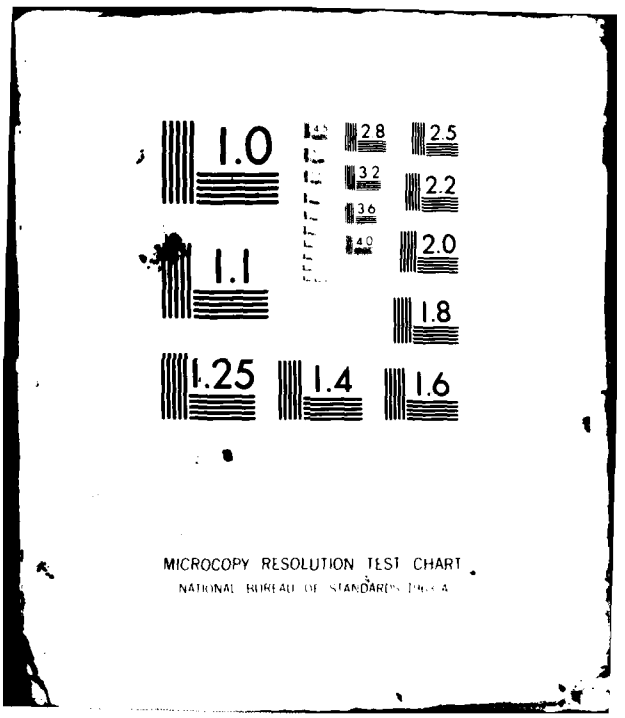
		$
Main Pavilion		
Picnic Tables (26), Swings (4), Benches (15)		
Utilities		
Parking Lot		
		320,000
Concession Stand	$10,000	
Equipment	4,000	
Utilities	2,000	
Benches	500	
Parking	2,000	
		18,500
Playground		
Equipment	$18,000	
Landscaping	2,000	
		20,000
Boat Launching Area	$500,000	
Bait & Tackle Shop	15,000	
Rest Rooms	5,000	
		520,000

(1) Replacement Values.

	$	$
Restrooms & Changing Area		
(Across from Main Pavilion)		
		30,000
Sea Wall Protecting Pavilion and Parking Lots to the East and West	500,000 (1)	
		500,000
Overlook Pavilion	80,000	
Parking & Utilities & Picnic Tables (16)	21,600	
		101,600
Tourist Camp Pavilion	50,000	
Parking & Utilities & Picnic Tables (18)	15,000 1,800	
		66,800
Kiwanis Pavilion	30,000	
Picnic Tables (16)	1,600	
Parking Lot & Utilities	20,000	
		51,600
Tennis Courts/Ice Skating Rink	100,000	
Utilities	10,000	
		110,000
Baseball Field	20,000	
		20,000
Ponds, Bridge, Rock Garden	60,000	
Duck House	5,000	
Animal Facilities	5,000	
		70,000

(1) Contract Prices and Associated Costs


AD-A112 051
CORPS OF ENGINEERS BUFFALO NY BUFFALO DISTRICT
DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT ASSESSMENT FOR--ETC(U)
FEB 82
F/G 13/2
UNCLASSIFIED
NL
2 of 5


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

	$	$
Trailer Camp	200,000	
Utilities & Roads	60,000	
		260,000
Access Roads		?
Trees and Open Space Areas		
(55 acres total)		?
Other Picnic Tables & Benches (40)		4,000
Other Restroom Facilities (2 buildings)		30,000
Scenic Lookout Shelter	10,000	
Five Benches	500	
		10,500
TOTAL		2,133,000.00

The No Action Alternative would not meet the planning objectives of eliminating shoreline erosion along the 800 feet of erodible bluffs, restoring a recreational beach at Lakeshore Park, or reducing the potential for flooding from frequent windstorms and high lake levels. Severe economic loss and psychological malaise may someday characterize an era of bad memories in the town history, if no action is taken.

f. Public Views (Federal, Non-Federal)

Federal agencies had no comment. Non-Federal agencies were not in favor of Alternative 1.

For more information, refer to subparagraph "f" under Alternative Plan 2, below.

2. ALTERNATIVE PLAN 2 (THREE OFFSHORE BREAKWATERS AND AN 800-FOOT BEACH)

a. Plan Description

The two-breakwater system proposed in the Stage 2 documentation was replaced by a three-breakwater system to allow for a greater length of shoreline protection and better water circulation. Each breakwater would be 125 feet long with 200-foot gaps between them covering a total length of 775 feet from east end to west end. (Plate 5.1). They will be of rubblemound construction and consist of stones in sizes ranging from 100 to 450 pounds (underlayer), and from 1.0 to 2.5 tons (armor layer). They will be built with a constant crest elevation of 575.1 or +6.5 (LWD), along with a crest width of 8.5 feet (see Plate 5.2). They would protect an 800-foot long reach of beachfill, located at the foot of the existing clay bluff. The beachfill would rise to elevation 576.6 (IGLD), or +8 feet above the Lake Erie Low Water Datum (LWD). The average berm would be 90 feet wide, fronted by a combination of 1 on 12 and 1 on 20 foreshore slopes, resulting in a 165-foot $\pm$ wide usable beach, as shown in profile A-A on Plate 5.3.

A total of 37,000 cubic yards of sandfill would be placed along the entire 800-foot reach, and would consist of medium-grained, reasonably well-graded, hard, durable, natural sand particles. The sand would be clean and free of organics, clay, deleterious, or other foreign or objectionable material. The sand would contain no more than 20 percent flat or elongated particles. The loss rate offshore is estimated to be approximately 10 percent of beachfill requiring replenishment on a yearly basis. A permanent access road to the beach from the top of the existing bluff would be built to facilitate the initial placement of the beachfill and subsequent periods of annual nourishment.

The three breakwaters would be located at the 3-foot $\pm$ contour, below low water datum, or at lake bottom elevation 563.6, which is approximately 150 feet offshore from the restored beach (toe of slope). The central breakwater would be approximately parallel to the shoreline while the eastern and western breakwaters would be at an angle to the shore to provide further protection for the beach during episodes of north-northwesterly or north-northeasterly wave attack. They would be of rubblemound construction and consist of stones in sizes ranging from 100 pounds to 2.5 tons, randomly placed, with an average porosity of 37 percent. A constant crest elevation of +6.5 (LWD) would be used for all three breakwaters along with a crest width of 8.5 feet. The engineering details of Alternative 2 (modified) are given in Appendix A.

b. Cost Estimates (Allocation and Apportionment)

Alternative Plan 2 involves costs for planning, construction, and annual maintenance.

Planning costs are those incurred by the U.S. Army Corps of Engineers during the study. They are associated with the development of the Detailed Project Report. This involves preparation of the Reconnaissance Report, the Stage 2 planning document, the Environmental Impact Statement, and the Final

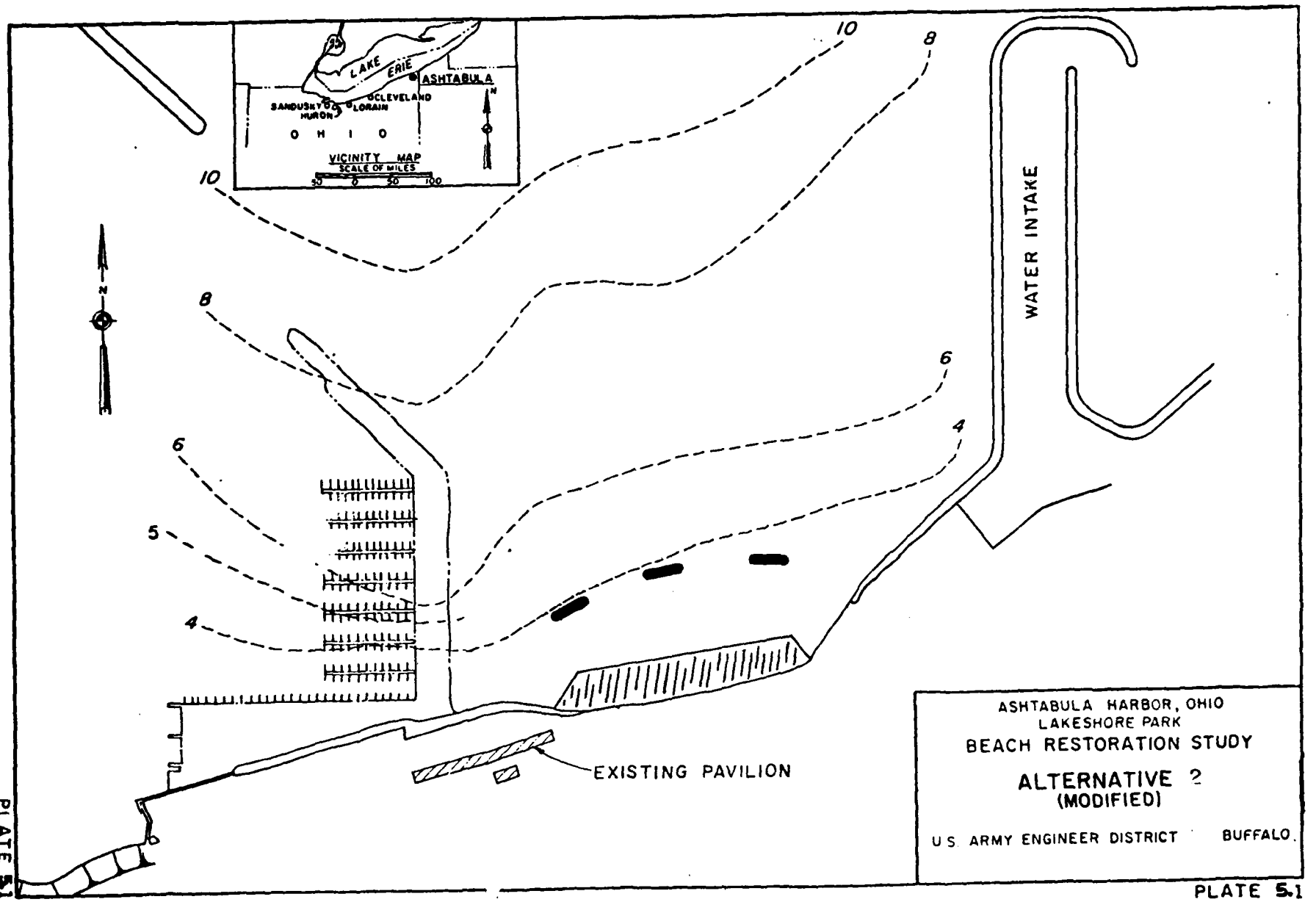

LAKE ERIE
ASHTABULA
CLEVELAND
SANDUSKY
HURON
LORAIN
OHIO
VICINITY MAP
SCALE OF MILES
50 0 50 100
N
10
8
6
4
5
WATER INTAKE
EXISTING PAVILION
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 2
(MODIFIED)
U.S. ARMY ENGINEER DISTRICT BUFFALO.
PLATE 5.1

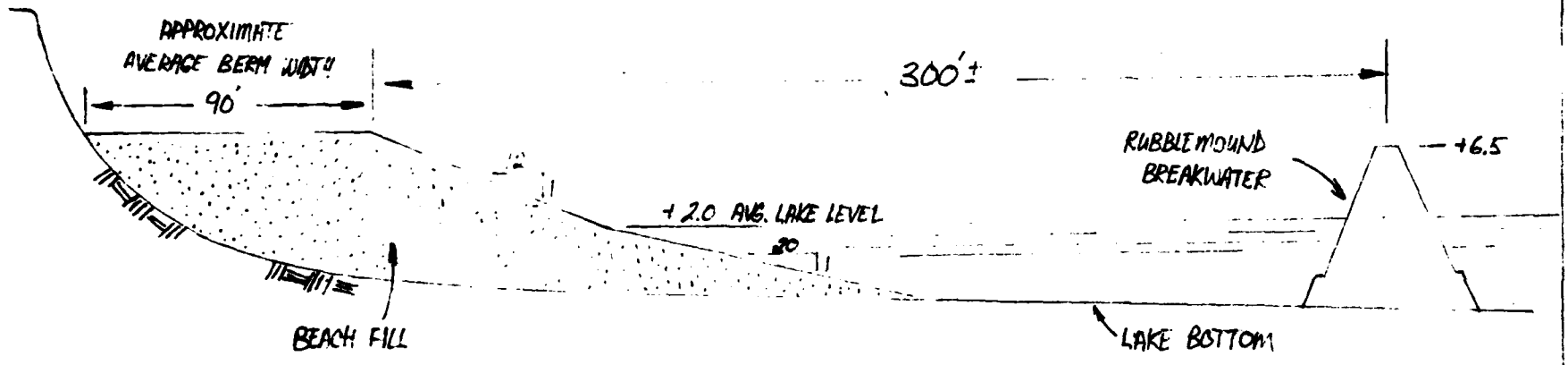
PLATE 5.1

BY ..... DATE .....
CHKD. BY ..... DATE .....

SUBJECT .....

SHEET NO. ..... OF .....
JOB NO. .....

Plate 5.2 - Typical Breakwater Section



AVERAGE BEACH PROFILE
(NOT TO SCALE)

PLATE 5

Detailed Project Report. These costs are presently estimated to total $180,000. The detailed estimates of quantities and costs for Plan 2 are presented in Appendix D.

Construction costs are the project first costs associated with initial construction, including engineering and design, supervision and administration, and annual nourishment for project years one to 50 brought back to present worth. (See Table 5.1.) Included in the total construction cost is the estimated cost for navigation aids on the breakwaters ($37,000), which is to be borne by the U.S. Coast Guard. Based on the above data, the total construction cost subject to cost sharing between Federal (Corps of Engineers) and non-Federal interests is estimated to be $1,222,000 (Table 5.3; items 1, 2, 3, 4, 5, 6). Other costs not subject to cost sharing are the cost of lands, annual maintenance costs associated with maintaining the offshore breakwaters, and the access road; and navigation aids costs (Tables 5.2 and 5.3).

With the cost of the Detailed Project Report estimated to be $180,000, the Federal (Corps of Engineers) share of the construction cost is limited to $820,000 or less (based on $1,000,000 limitation for Section 103 project). The U. S. Coast Guard share is estimated to be $37,000, and the non-Federal (others) share is estimated to be $483,000. This produces a total project cost of $1,340,000 (Table 5.3). Table 5.4 provides a summary of the Federal and non-Federal project costs for Alternative Plan 2.

The above discussion sets the Corps of Engineers share of planning, design, and construction costs of Alternative Plan 2 under Section 103 at $1,000,000 (spring 1981 price levels) which is the current Federal project cost limitation. Corps of Engineers involvement in annual beach nourishment for the project life is limited to 70 percent of total annual nourishment. The remaining portion (30 percent) will be the responsibility of non-Federal interests.

The Corps of Engineers is not responsible for annual maintenance costs. Annual maintenance costs on the breakwaters and the access road is a non-Federal responsibility and is presently estimated to be $2,000. For more information on those maintenance costs, see Appendix D.

Annual operation and maintenance costs on navigation aids are the responsibility of the U.S. Coast Guard and are presently estimated to be $2,000.

Table 5.1 - Total Construction First Cost for Alternative Plan 2

Items	$ (1)
Armor Stone	234,990
Underlayer Stone	37,880
Beach Sandfill	226,400
Access Road	10,895
Total Contractor's Earnings	550,085
Contingencies @ 20 % ±	109,915
Total Contractor's Earnings Including Contingencies	660,000
Plans and Specifications	60,000
Supervision and Administration	81,000
Navigation Aids	37,000
50 years of Annual Nourishment (2)	421,000
Total Construction First Cost	1,259,000

(1) Based on spring 1981 price levels.

(2) Present worth of annual beach nourishment for project years 1 through 50, defined as construction cost including contingencies. Annual nourishment rate 3,700 copies at $7.20 per copy; interest rate 7-3/8 percent. Present worth factor 13.1728.

Table 5.2 - Annual Maintenance Costs for Alternative Plan 2 (1)

Items	$
Breakwaters	1,300
Navigation Aids	2,000
Access Road	700
Total Annual Maintenance	4,000

(1) Based on spring 1981 price levels.

Table 5.3 - Estimate of Total Project Cost and Cost Allocation for Alternative Plan 2 (Spring 1981 Price Levels)

Items	Amount	Total
TOTAL PROJECT COST (1)		
Breakwater Stones	327,000	
Initial Beach Sandfill	320,000	
Access Road	13,000	
Plans and Specifications	60,000	
Supervision and Administration	81,000	
50 Years Annual Nourishment (2)	421,000	
Navigation Aids (3)	37,000	
Lands	81,000	
TOTAL PROJECT COST		1,340,000
FEDERAL SHARE		
Corps (70 Percent of Items 1 Through 6) (4)	820,000 (4)	
Coast Guard - Navigation Aids	37,000	
TOTAL FEDERAL SHARE		857,000
NON-FEDERAL SHARE		
Cash Contribution; 30 Percent of Items 1 Through 6 Plus any Excess on Federal (Corps) Limitation	402,000 (5)	
Lands	81,000	
		483,000

(1) Includes contingencies @ 20 % ±.

(2) Present worth of annual beach nourishment for Project Years 1 Through 50. See Table 5.1.

(3) Cost to be borne 100 percent by Coast Guard.

(4) Would have been $855,400. However, Federal (Corps) share is limited to $1,000,000, including planning cost of $180,000. Thus, Corps share is $820,000 (1,000,000 - 180,000).

(5) $366,600 (30 percent of Items 1 through 6) + $35,400 (excess of Corps limitation).

Table 5.4 - Cost Apportionment for Alternative Plan 2 (1)

Items	Federal		Non-Federal	Total
	Corps	Coast Guard	(Local Sponsor(s))	
Initial Construction Excluding Lands and Navigation Aids	526,000 (3)	-	275,700 (4)	801,000
Present Worth of 50 Years of Annual Beach Nourishment	294,700 (2)	-	126,300	421,000
Navigation Aids	-	37,000	-	37,000
Lands	-	-	81,000	81,000
TOTAL	820,000	37,000	483,000	1,340,000

(1) Does not include planning cost which are considered "Preauthorized Study Cost," and are excluded from the economic analysis.

(2) Represents 70 percent of the total cost of nourishment over the 50-year project life.

(3) Seventy percent of items 1 through 5 (Table 5.3), or difference between total Corps share (820,000) and its share of total nourishment (294,700), whichever is less.

(4) Thirty percent of items 1 through 5 (see Table 5.3) plus the excess on Corps limitation (35,400).

Table 5.5 following lists the total annual charges and the Federal and non-Federal shares of the annual charges. It shows that the total annual charges for Plan 2 are $106,000; apportioned $67,000 Federal, and $39,000 non-Federal.

c. Implementation Responsibilities

The cost to undertake this project under the authority of Section 103 of 1962 River and Harbor Act is shared between Federal and non-Federal interests which are in the case of this project: (a) The U.S. Army Corps of Engineers and the U.S. Coast Guard and, (b) all other State, city, and local agencies.

Federal

Lakeshore Park, having met all the specified criteria outlined in the Department of the Army publication EP 1165-2-1, paragraph C.2, dated 2 September 1979, is therefore eligible for Federal (Corps of Engineers) cost sharing up to 70 percent of the total construction cost, exclusive of land or a maximum of $1,000,000, whichever is less. The Coast Guard is responsible for the cost of any navigation aids, including their annual operation and maintenance cost as described earlier.

The Federal (Corps of Engineers) cost share includes all Corps of Engineers costs for investigations, planning, design, and construction, including annual beach nourishment. For this project, annual beach nourishment has been considered a construction cost for project years 1 through 50. This was verbally approved by Chief, Coastal Engineering, North Central Division, Corps of Engineers, after telephone discussion with Chief, Coastal Engineering, Buffalo District, Corps of Engineers.

The U.S. Coast Guard is responsible for the cost of providing navigation aids, including their annual operation and maintenance costs as described earlier.

Non-Federal

The local sponsor, the Ashtabula Township Park Commission, is responsible for lands, easements, and rights-of-way, plus 30 percent of the total construction cost of the project and all other costs in excess of the Federal expenditure limitation of $1,000,000.

Non-Federal costs include all project construction costs in excess of the specific Corps cost limitation to insure that expenditure of Corps funds will result in a project that is integrally complete and fully effective. The scope of the project may be increased if local interests are willing to pay for the additional costs.

The Ashtabula Township Park Commission, as the local sponsor, is also responsible for meeting the terms established in the "Items of Local Cooperation" and is, therefore, responsible for all annual maintenance costs associated with the offshore breakwaters, the stone revetment in front of the pavilion, and the access roads.

Table 5.5 - Estimated Investment Cost and Annual Charges for Alternative Plan 2 (Spring 1981 Price Levels)

Items	Erosion Recreation	Total
TOTAL INVESTMENT		
Total Project Cost Exclusive of Land	1,259,000	
Interest During Construction	-	
Lands	81,000	
Total Investment Cost	1,340,000	1,340,000
ANNUAL CHARGES FOR THE PROJECT		
Interest	99,000 (1)	
Amortization	3,000 (1)	
Maintenance	4,000 (2)	
Total Annual Charges	106,000	106,000
FEDERAL SHARE		
Total Investment Cost		
Total Project Cost	857,000	
Total Investment	857,000	857,000
Annual Charges		
Interest	63,000	
Amortization	2,000	
Maintenance	2,000	
Total Annual Charges	67,000	67,000
NON-FEDERAL SHARE		
Total Investment Cost		
Total Project Cost Exclusive of Lands	402,000	
Lands	81,000	
Total Investment	483,000	483,000
Annual Charges		
Interest	36,000	
Amortization	1,000	
Maintenance	2,000	
Total Annual Charges	39,000	39,000

(1) 7-3/8 percent interest rate, 50-year life (int. fact = .07375; amortz = .00216.

(2) Includes cost of maintaining breakwaters, access roads, and navigation aids (Table 4.2).

d. Economic Evaluation

The economic (benefit-cost) analysis presented in this report is based on a comparison of average annual benefits and average annual costs.

The benefits from beach erosion measures at Lakeshore Park include primary benefits from physical damage prevented, and increased recreational opportunities in the form of beach usage and swimming. Benefits are measured as the difference in the monetary values anticipated with the improvements and the monetary values anticipated without the improvements.

The recreational benefits (swimming) over the 50-year project life are based on the visitation estimates weighted by some appropriate user value. This user value was obtained by applying a unit day value to estimated use, based on a points system developed by the U. S. Water Resources Council (WRC). Using Table K-32 (Federal Register/vol. 44, No. 242), Lakeshore Park, for general recreation, has scored a total point value equal to 43. These points were converted to dollar values and equal to $2.62 (see Appendix C).

Benefits from physical damage prevented are those associated with the prevention of erosion of the bluffs and flooding to the east and north of the park pavilion, respectively.

Table 5.6 summarizes the average annual benefits associated with the beach-breakwater system.

Detailed explanation on the development of these figures is presented in the economics appendix. In reading the economics appendix, it should be noted that the 800-foot beach will not satisfy the projected demand for recreational bathing at Lakeshore Park (based on a requirement of a minimum of 75 square feet of beach per bather).

Average annual cost includes interest, amortization of project total first costs over the 50-year project life at a 7-3/8 percent interest rate, and annual maintenance costs and required annual beach replenishment cost (a construction cost). Project total first costs include all Corps of Engineers cost for investigations, design, and construction incurred subsequent to the Division Engineer's transmittal of the Detailed Project Report to the Office of the Chief of Engineers for approval. These costs are normally those related to preparation of plans and specifications and project construction. The total average annual costs and charges are given in Table 5.5 above, and broken down into Federal and non-Federal shares.

Average annual benefits and average annual costs are compared in two ways. Average annual costs are subtracted from average annual benefits to determine the net benefits for the considered alternative plan. Average annual benefits are also divided by average annual costs to determine the benefit/cost ratio. (See Table 5.7, following.) An economically justifiable alternative is one in which average annual benefits equal or exceed annual costs (benefit/cost ratio greater than one or equal to unity). Note, also, that the alternative with the highest benefit-to-cost ratio does not

Table 5.6 - Summary of Average Annual Benefits for the Tentatively Selected Plan With and Without Impact Upon Growth of the Proposed Steel Mill

Items	Flood and Erosion Prevention Benefits			
	Total Peak Average Annual Beach Usage and Swimming Benefits	Total Offpeak Average Annual Beach Usage and Swimming Benefits	Average Annual Land Erosion Prevention Benefits	Total Average Annual Benefits
	$	$	$	$
W/O Impact of Steel Mill	197,900	100,800	1,500 (1)	300,200
Impact of (2) Steel Mill	- (3)	2,300	-	2,300
W/Impact of Steel Mill	197,900	103,100	1,500 (1)	302,500

(1) a. A pump house designed to protect a pump that conveys water through a piping system to ponds and artificial lakes in the East Inland area, was eroded out in 1978. It was replaced by a new one located in the upland area a few feet off the bluff line.

The cost of rebuilding and relocating that pump house and appurtenances was estimated at $5,000.

It is presently damaged due to cumulative effect of erosion resulting from winter northeast storms, and constitutes a hazard to park attendants. It is estimated that the pump house will be totally lost by project year 1. The average annual equivalence of this loss is $500.

b. Based on local realtor estimates, the value of 1 acre of lakefront property is approximately $15,000 or $.35 per square foot.

Considered the bluff annual rate of erosion of 2.4 feet, which extends 800 feet along the shore, the reduction in cost due to land erosion on an annual basis equals approximately $1,000.

(2) The average impact of the steel mill upon growth (demand) over the 50-year project life was first obtained by comparing Table 21 of Appendix C and Table 15 of the Stage 2 Document, which is not repeated here.

This impact on both peak and offpeak demand is purely informative. It is translated into monetary terms by interpolating between Tables 22-24 of Appendix C.

(3) There is no effect on peak beach usage with greater population. As a resulting from the proposed steel mill at Conneaut, OH. This is because demand exceeds capacity in the project base year without the steel mill.

necessarily correspond with the alternative with the largest net benefit. The B/C ratio is to be viewed more as a secondary evaluative criterion and not as a measure of the economically feasible alternative. In addition, other secondary evaluative criteria in the form of payback period, both undiscounted and discounted, are presented in Table 5.8, following.

The costs presented in this report are based on January 1981 price levels, a 50-year project life, and an interest rate of 7-3/8 percent. Total construction first cost and annual maintenance costs are presented in Tables 5.1 and 5.2.

Table 5.7 - Net Benefits and Benefit-Cost Ratios

Alternatives	1	2	
	$	$	
Total First Cost Exclusive of Periodic Nourishment	0	919,000	-
Total Investment Cost Exclusive of Periodic Nourishment	0	919,000	68,000
Interest (7-3/8% - 50 Year)	0	-	2,000
Amortization (Factor = .00216)	0	-	4,000
Annual Operating & Maintenance	0	-	32,000
Total Average Annual Cost	0	-	106,000
Total Average Annual Benefits	0	-	300,200
Benefit-Cost Ratios	0	-	2.8
Net Benefits	0	-	194,200

Table 5.8 - Secondary Evaluative Criteria

Undiscounted Payback Period	3 years
Discounted Payback Period	3 years

Projected Bathing Demand

The city of Ashtabula has an ample supply of public facilities supporting general recreational activities. However, there is a shortage of publically accessible recreational sites having beach and swimming facilities. The Ohio Department of Natural Resources has also indicated a shortage of swimming capacity for most of the State of Ohio. On the other hand, a broad range of recreational activities, including swimming is in high demand in most parts of the State, particularly Planning Region 11, which contains Ashtabula County. Table 5.9, shows Ashtabula County recreation needs.

The Ohio Department of Natural Resources (ODNR) has also determined that the specific planning region that contains Ashtabula County has an insignificant supply of recreational sites having swimming and beach facilities. Figure 5.1a, following, shows that Ashtabula has a high level of swimming needs. An inventory of Alternative sites having beach and swimming facilities in the local demand area (Lakeshore Park), was made by the Midwest Research Institute Project for the Buffalo District. It shows only two of these facilities are accessible to the public; Walnut Beach, located 4 miles west of Lakeshore Park, and Saybrook Township Park, located in the town of Saybrook, 10 miles west of Lakeshore Park. Those sites have ranges of recreational facilities far less attractive than those at Lakeshore Park. (For more information, refer to Economic Appendix.) Thus, the greatest needs are concentrated in the more urbanized city of Ashtabula, which has a large relative and absolute swimming facility needs, as shown in Table 5.10.

Table 5.11 indicates how peak bathing demand will increase between years 1982 (assumed first year of the project) and 2032. The first set of figures are the projected annual peak demands. The second set of figures are the daily peak demands based on 30 peak days per year (Saturdays, Sundays, and holidays), and the final set of figures indicate an instantaneous peak daily demand based on a turnover factor of 1.5.

Detailed explanation on the development of these figures is presented in the economics appendix. In reading the economics appendix, it should be noted that the 800-foot beach will not satisfy the projected demand for recreational bathing at Lakeshore Park (based on a requirement of a minimum of 75 square feet of beach per bather).

Table 5.9 - Ashtabula County Recreation Needs

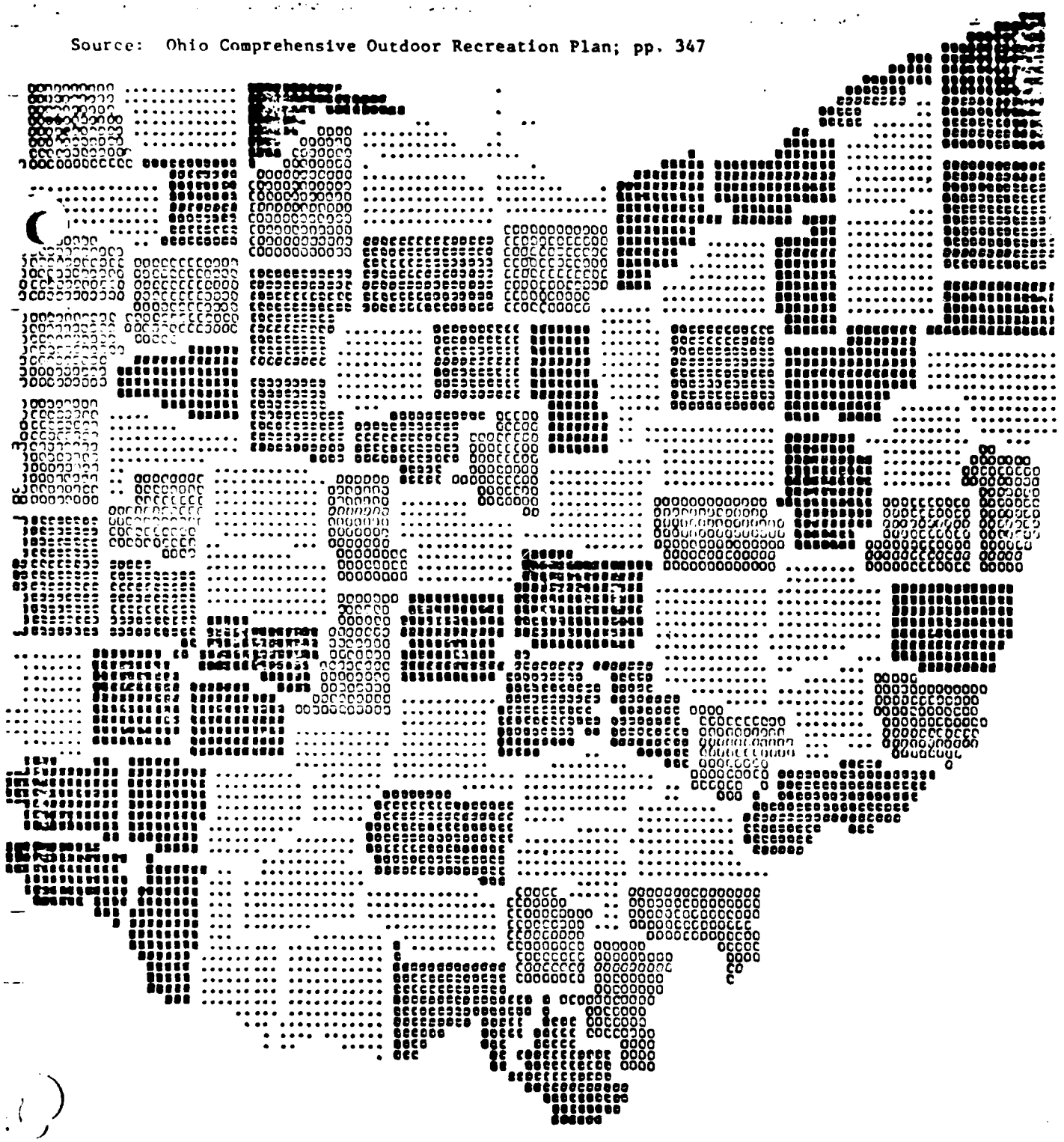
Activity	1975	1980	1990
	ASHTABULA		
Bicycling	6.7	7.6	8.8
Boating	-5,950.8 1/	-4,224.6	-1,457.9
Camping	103.3	188.5	343.2
Canoeing	6.1	8.2	11.6
Fishing	-21,075.3	-20,753.1	-20,187.9
Golf	-17.2	-6.0	10.8
Hiking	5.8	7.4	10.0
Horseback Rdg.	0.5	1.0	2.0
Hunting	-121,876.8	-121,202.1	-120,183.9
Picnicking	119.8	203.1	334.9
Playground Act.	-108.5	-106.6	-103.5
Outdoor Games	-261.4	-258.8	-253.9
Sailing	-1,116.6	-198.6	509.2
Sledding	-17.7	-16.9	-15.9
Snowskiing	3.9	4.7	5.9
Swimming	71,223.2	94,507.9	134,018.3
Tennis	52.3	60.6	72.5
Trailbikes	7.8	8.7	10.1

Measurements

Bicycling - miles
Boating - acres
Camping - sites
Canoeing - miles
Fishing - acres
Golf - holes
Hiking - miles
Horseback Rdg. - miles
Hunting - acres
Picnicking - tables
Playgrd. Act. - acres
Outdoor Games - acres
Sailing - acres
Sledding - acres of slopes
Snowskiing - slopes
Swimming - sq. ft.
Tennis - courts
Trailbikes - miles

1/ Negative numbers idicate a surplus.
SOURCE: Ohio Comprehensive Outdoor Recreation Plan; pp. 359.

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 347



Final Swimming Needs--1975

FIGURE 5.1a

Table 5.10 - Swimming Facility Needs (Square Feet)
Final Iteration

Planning Region	1975	1980	1990
1	2,335,611.0	2,585,318.0	2,977,747.0
2a	1,649,074.0	1,912,578.0	2,466,923.0
2b	225,810.3	285,804.9	415,623.2
3	290,282.8	349,315.9	469,808.3
4a	108,471.4	125,566.4	159,444.4
4b	753,089.4	888,698.6	1,151,335.0
5a	244,310.1	285,437.2	359,896.5
5b	215,290.4	250,358.6	310,316.0
6	1,941,768.0	2,265,394.0	2,921,158.0
7	238,249.7	269,800.4	308,865.5
8	211,551.6	230,976.4	256,965.9
9	338,608.9	379,433.2	440,638.8
10a	3,820,979.0	4,263,868.0	5,047,140.0
10b	1,384,400.0	1,630,295.0	2,148,565.0
11	413,870.6	516,999.3	674,955.1

SOURCE: Ohio Comprehensive Outdoor Recreation Plan; pp. 147.

Table 5.11 - Bathing Demand Projection

Year	Peak Demand		Instantaneous
	Annual	Daily	Daily
1982	92,062	3,069	2,046
1992	96,691	3,223	2,149
2002	101,728	3,391	2,261
2008	105,059	3,502	2,335
2012	107,276	3,576	2,384
2022	113,413	3,780	2,520
2032	120,227	4,008	2,672

(1) The determination of the width of the beach above the water line is discussed in the "Assessment and Evaluation of Alternatives" section of this report.

The annual peak demand on the beach is estimated to be 120,227 people by the year 2032. With 30 peak days per year, the projected future peak daily bathing demand is 4,008. This future includes a turnover factor of 1.5. The projected instantaneous future peak daily bathing demand is, therefore, 2,672. Alternatives involving the 800-foot long by 160-foot wide (1) beach have the capacity to accommodate 1,706 people based on a minimum beach area requirement of 75 square feet per bather. Therefore, the proposed beach will not meet the projected 50-year peak demand.

Detailed discussion of projected bathing demand is presented in the Economic Appendix.

Parking Requirements

Provisions for adequate parking must be considered for all alternatives. In determining parking requirements, it was assumed that a certain percentage (15 percent $\pm$) of the users from the local area would gain access to the park by means other than automobiles. The following table presents both the projected local share of the peak demand and estimated number of peak daily non-auto users between the years 1982 and 2032.

Year	Local Share of Peak Demand: Annual	Local Share of Peak Demand: Daily	Estimated Non-Auto Users (1)
1982	55,135	1,840	280
1992	56,642	1,890	284
2002	58,190	1,940	290
2008	59,139	1,970	296
2012	59,780	1,990	300
2022	61,414	2,050	308
2032	63,093	2,100	315

(1) Since these people do not have the luxury of automobile transportation, a turnover factor was not used to develop these figures.

In the section of this report entitled "Projected Bathing Demand," instantaneous peak daily demand for the years 1982 to 2032 were developed. In deducting the estimated non-auto users from these figures, it is possible to estimate the number of people who will require parking at any given time during the day. The following table presents these figures:

Year	Instantaneous Peak Daily Demand	Non-Auto Users	Auto Users
1982	2,045	280	1,765
1992	2,141	284	1,857
2002	2,261	290	1,971
2008	2,335	296	2,039
2012	2,384	300	2,084
2022	2,520	308	2,212
2032	2,672	315	2,357

Referring to the Lakeshore Park "Recommended Recreation Plan" parking can be provided for 537 vehicles. Development of additional parking areas would require major changes to the master plan.

Based on the estimated number of auto users developed above, and that 537 parking spaces can be provided an average number of people per car was determined. The following table displays these calculations:

Year	Estimated Number of Auto Users	Parking Spaces	Users Per Vehicle
1982	1,765	537	3.3
1992	1,857	537	3.4
2002	1,971	537	3.6
2008	2,039	537	3.8
2012	2,084	537	3.9
2022	2,212	537	4.1
2032	2,357	537	4.4

In a 1972 summer recreation survey of Presque Isle State Park (Pennsylvania) conducted by the Division of Outdoor Recreation of the Pennsylvania Bureau of State Parks, it was found that an average of three people were arriving per car. In the 1980's it is shown that with 537 available parking spaces, an average of 3.3 people would have to arrive per vehicle. Based on the 1972 survey results at Presque Isle State Park, and with increased emphasis on carpooling, this is a realistic figure for future conditions at Lakeshore Park. As discussed earlier, usage of a proposed 800-foot long beach will not increase due to its restricted capacity. Therefore, parking requirements can be met for this size beach throughout the life of the project.

e. Impact Assessment

Alternative 2 consists of constructing three rubblemound breakwaters and placement of 37,000 cubic yards of sandfill along approximately 800 feet of shoreline. In addition, an average annual replenishment of 3,700 cubic yards of sandfill is needed to maintain the required beach dimensions. Construction of the segmented breakwaters would be accomplished with a marine plant consisting of cranes on barges, scows, and tug boats, whereas placement of sandfill would require a land plant consisting of dump trucks, front-end loaders, and bulldozers. Construction of this plan would most likely take about 3 to 4 months to complete and extend through one construction season. The construction procedure that would probably be followed is to use derrick boats to place the quarry stone which would be transported to the site on scows towed by tug boats. Placement of the stone would be accomplished utilizing a crane equipped with rock grapples. As the breakwater segments are completed, sand that is truck-hauled to the site can be

spread in the leeside of the structures to provide the design beach dimensions.

Considerable amounts of turbidity may be unavoidably created during breakwater construction and beach restoration operations. Air quality in the project area may be affected by dust, noise, odors, and emissions from the operation of construction equipment. These water and air quality impacts would be high-magnitude, short-term impacts and would disappear soon after construction and beach replenishment is completed. The presence of heavy construction equipment may also cause some soil compaction, erosion, and temporary unsightliness. During construction and periods of annual nourishment, park use may be temporarily disrupted.

The placement of beachfill would cover approximately 2.38 acre of existing benthic habitat. However, this nearshore area can be expected to regain its present condition through recolonization and vertical migration of benthic organism. The construction of rubblemound breakwaters would result in the loss of 0.47 acre of benthic habitat and could cover possible spawning habitat for yellow perch. However, the use of large stone riprap should diversify benthic and fisheries habitat and increase fisheries utilization in the area if other environmental factors are favorable. Similar structures in the area (e.g., the CEI water intake) have proven to be high catch areas for local sport fishermen. The total area of the breakwaters available for colonization is about 0.53 acre, although considerably more habitat would be available in the interstices of the structures. The presence of offshore breakwaters will disrupt existing lake circulation patterns at the park; however, this effect should be minimal due to open flanks, voids in the stone, and gaps between the breakwaters. The new sand beach would be more aesthetically pleasing than the existing gravel beach; however, an open view of the lake would be disrupted by the presence of the breakwaters.

Implementation of Alternative 2 (modified) would satisfy the stated planning objectives. The proposed breakwaters and beach would provide protection to the shoreline from further erosion and would provide increased swimming opportunities at Lakeshore Park. An 800-foot beach would increase bathing at the park but would not satisfy the projected demands. Planned parking facilities, however, can only accommodate the bathing capacity of an 800-foot beach. By constructing a beach to the east of the park pavilion, the newly-constructed revetment located to the west of the proposed beach would not be altered, thus preserving an area of aquatic habitat. Also, the possible development of a small boat marina at the west end of the park could still be accomplished.

f. Public Views

The Buffalo District Corps of Engineers has kept the public abreast of developments in the study area and have provided them with opportunities to express their views and furnish input for incorporation into the planning process. The views of the Federal and non-Federal agencies and others are summarized in the following paragraphs.

Views of Federal Agencies

Those Federal agencies whose jurisdiction would extend into implementation of a plan of improvement have been kept informed of developments throughout this study. Several of these agencies were provided project information but offered no comments on any of the plans. The only Federal agencies to provide specific comments to any of the potential plans of improvement investigated in this study were the U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (USF&WS). EPA stated that dredged material from the CEI would not be suitable for beach nourishment as suggested by the local sponsor (see Appendix E). The USF&WS provided correspondence stating that the proposed plan would not have significant impacts on fish and wildlife resources or any endangered species (see Appendix E).

Views of Non-Federal Agencies and Others

Telephone conversations, field interviews, office visits, written correspondence, and workshops have all assisted in having a clear understanding of the needs in the study area and desires of those who would benefit from improvements. A public meeting was held on 25 September 1979 to discuss Corps work in the study to date.

The Ohio Department of Natural Resources (ODNR), Ohio Department of Energy, Ashtabula County Planning Commission, Ashtabula Township Park Commission, Ashtabula City Council, Ashtabula Port Authority, and Ashtabula Marine Advisory Board are in unanimous agreement that a system of segmented breakwaters protecting an 800-foot beach is the favored plan of improvement at Lakeshore Park. The ODNR, Ohio Department of Energy, Ashtabula County Planning Commission, Ashtabula City, and Ashtabula Township also stated that the preferred plan is consistent with present and proposed land use plans as well as the proposed Ohio Coastal Zone Management and the Ashtabula County Overall Economic Development Program. The Cleveland Electric Illuminating Company has voiced no objections to the beach proposal. (See Appendix E.)

The Ohio Historic Preservation Office stated that the proposed plan would not affect any properties, either archeological or historic, eligible for, nominated to, or listed in the National Register of Historic Places; however, they did recommend an on-site cultural survey. (See Appendix E). The Ohio Environmental Protection Agency concurred with the U.S. EPA in stating that the CEI water intake dredged material is not suitable for beachfill (see Appendix E). The Ohio Department of Health was requested to make an assessment of water quality at Lakeshore Park. On 4 June 1980, they concluded that the area does not show any great pollution hazard or threat to bathing recreation (see Appendix E). On 16 October 1980, they issued a Section 401 Water Quality Certificate for the proposed project (see Appendix F).

SECTION VI

COMPARISON OF DETAILED PLAN (S)

The Principles and Standards of the Water Resources Council require that a National Economic Development Plan (NED Plan) and an Environmental Quality Plan (EQ Plan) or the plan that is least damaging to the environment be identified. Using these plans, the overall formulation process leading to the selected plan consists of a series of trade-offs in order to minimize conflicts and maximize compatibility between the economic, environmental, and social well-being factors. The trade-off analysis consists of determining beneficial and adverse effects of each plan with the future conditions expected without the plan. The selected plan of improvement is hereafter developed from this formulation process. The following tables present a summary comparison of the candidate plans and their effects on the region and "rest of the nation."

COMPARATIVE EVALUATION OF CANDIDATE PLANS

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
A. Plan Description		
1. Area	Area between west end of pavilion and the water intake west breakwater tip to the east of the pavilion.	Area between west end of park pavilion and the water intake west breakwater tip to the east of the pavilion.
2. Structures	None.	800-foot beach with three 150-foot long breakwaters spaced 250 feet apart.
3. Land Use	None.	Compatible with long range land use objectives.
B. Significant Impacts		
1. Social Effects:		
a. Community Cohesion	Decrease.	Maintain and enhance community stability.
b. Community Growth	Decrease.	Increase recreational growth and related service activities.

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
c. Displacement of People	No change.	No change.
d. Noise	No change.	Temporary construction noise.
e. Recreational	Limited growth of recreational activities, and/or decline.	Allows for sizable increase in recreational opportunities.
f. Public Safety	Continued hazardous recreational conditions.	Improved for swimming and other activities.
2. Economic Effects:		
a. Regional Growth	Restricts potential growth.	Improves growth potentials.
b. Property Values	Decrease.	Increased because of the shore erosion and flood control measures; and development of related water-oriented activities.
c. Tax Revenue	Decrease.	Increased because of higher property valuation and higher park attendance.
d. Public Facilities and Services	Decreased usage due to hazardous conditions.	Increased usage of roadway, water, sanitary, and recreational facilities.
e. Private Facilities and Services	No change.	Increase.
f. Employment/ Labor Force	No change.	Increase anticipated in retail and service-oriented jobs.
g. Business and Industrial Activity	Continued normal activity.	Anticipated growth in recreation-related business.

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
h. Lease Income	Continued normal growth.	Increased with park attendance.
i. Commercial Revenue	Continued normal growth.	Above normal due to greater use of recreational products.
3. Environmental Effects:		
a. Natural Resources	Adversely affected.	Lake bottom will be altered by construction, but effects would be temporary and tolerable within the marine setting of the area.
b. Man-made Resources	Negative effect.	No impact anticipated.
c. Air Quality	No change.	No significant adverse impact.
d. Water Quality	No change.	Temporary turbidity during construction.
e. Aquatic Habitat	Annual gain of 0.04 acre due to loss of terrestrial habitat.	At least 0.53 acre of new and more diverse habitat added. Loss of 2.85 acre of existing substrate due to breakwaters and sand placement.
f. Terrestrial Habitat	Annual loss of 0.04 acre due to beach erosion.	Net gain of 2.94 acres of sand beach.
g. Noise	No change.	Temporary construction noise. Minimal long-term increase in noise from auto users.

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
C. Plan Evaluation		
1. Contribution to Planning Objectives:		
a. Enhance NED Development	No	Yes
b. Restore Recreational Beach	No	Yes
c. Reduce Erosion and Flooding Due to High Lake Level	No	Yes
d. Enhance Sport Fishing	No	Yes
2. Relationship to Four National Accounts:		
a. National Economic Development Costs:		
Federal Investment Cost	0	$ 857,000
Non-Federal First Investment Cost	0	$ 483,000
Total Investment Cost	0	1,340,000
Federal Annual Cost	0	67,000

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
Non-Federal Annual Cost	0	$ 39,000
Total Annual Cost	0	$ 106,000
Benefits:		
Value as Recreational Beach (Annual)	$5,100	$ 298,700
Physical Change Prevented (Annual)	0	$ 1,500
Total Benefits (Annual)	$5,100	$ 300,200
Net Annual Benefit	$5,100	$ 194,200
Benefit/Cost Ratio	-	2.80
b. Environmental Quality		
Man-made Resources	No change.	Increase beach usage.
Water Quality	No change.	Some decrease.
Adequate Habitat Developed	No change.	Improved fish habitat.
Natural Resources	No change.	No change.
Air Quality	No change.	No appreciable change.
Aquatic Habitat (Benthic)	No change.	Increase diversity.

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
Terrestrial Habitat	No change.	No change.
Noise	No change.	Minimal increase.
c. Regional Economic Growth		
(1) Positive:		
Value of Increased Income	No change.	Yes
Value of Increased Employment	No	Yes
(2) Negative:		
Value of Income Lost	Yes	No
Quantity of Jobs Lost	No	No
Undesirable Growth	Yes	No
d. Other Social Effects		
(1) Beneficial:		
Desirable Community Growth	No	Yes
Community Cohesion	No	Yes
Recreational	No	Significant increase.
Aesthetics	No	Yes

Table 6.1 - System of Accounts
Summary Comparison of Candidate Plans (Cont'd)

Description	ALTERNATIVE 1 No Action Plan	ALTERNATIVE 2 (Recreational Beach With Rubblemound Breakwaters)
Health	No	Yes
Water-Based Traffic	No	Yes
Sport Fishing	No change.	Yes
Public Safety	No	Yes
(2) Adverse:		
Undesirable Community Growth	No	No
Land-Based Traffic	No	Yes

RATIONALE FOR "NED" PLAN

The NED Plan accounts for the planning objectives to the extent that they maximize the net economic benefits. Therefore, the candidate plans are analyzed based on their respective contributions to providing an increase in national economic efficiency. The plan yielding the largest contribution to the total average annual benefits, taking into account average annual costs, and benefit-cost ratio, is identified. The NED Plan is identified in Table 6.4 as Alternative Plan 2, which yields a net economic benefit of $194,200 per year.

Table 6.2 - System of Accounts (Consistent With Requirements of WRC Principles & Standards, September 1980)
Candidate Plan 1 (No Action)
Effects on Region and "Rest of Nation"

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
1. National Economic Development			
Beneficial:			
Value as a Recreation Beach (Annual)	$5,100	0	0
Physical Change Prevented (Annual)	$1,500	0	0
Fishing Benefits	0	0	0
Total NED Benefits	$6,600	0	0
Adverse:			
Project Cost (Annual)	0	0	0
Total NED Costs	0	0	0
Net NED Benefits	$6,600	0	0
2. Environmental Quality			
Beneficial:			
Man-made Resources	No	No	No

Table 6.2 - System of Accounts (Consistent With Requirements of WRC Principles & Standards, September 1980)
Candidate Plan 1 (No Action)
Effects on Region and "Rest of Nation" (Cont'd)

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
Water Quality	No	No	No
Aquatic Habitat Developed	Minimal	No	No
Terrestrial Habitat Developed	No change.	No	No
Adverse:			
Natural Resources	Yes	No	No
Air Quality	No	No	No
Aquatic Habitat (Benthic)	No	No	No
Turbidity	No change.	No	No
Noise	No	No	No
3. Regional Economic Development			
Positive:			
Value of Increased Income	No estimate.	No	No
Value of Increased Employment	No estimate.	No	No
Negative:			
Value of Income Lost	No estimate.	No estimate.	No
Quantity of Job Lost	No estimate.	No estimate.	No

Table 6.2 - System of Accounts (Consistent With Requirements of WRC Principles & Standards, September 1980)
Candidate Plan 1 (No Action)
Effects on Region and "Rest of Nation" (Cont'd)

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
Undesirable Growth	No	No	No
4. Other Social Effects			
Beneficial:			
Desirable Community Growth	No	No	No
Community Cohesion	No	No	No
Recreational	No	No	No
Aesthetics	No	No	No
Health	No	No	No
Sport Fishing	No change.	No change.	No change.
Public Safety	No	No	No
Energy Conservation	No	No	No
Adverse:			
Undesirable Community Growth	No	No	No
Land-Based Traffic	No	No	No
Displacement	Yes	No	No
Community Cohesion	Yes	No	No
Recreational	Yes	No	No
Public Safety	Yes	No	No
Aesthetics	No change.	No	No

Table 6.3 - System of Accounts (Consistent With Requirements of Principles & Standards, September 1980)
Candidate Plan 2
Effects on Region and "Rest of Nation"

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
1. National Economic Development			
Beneficial:			
Recreational Swimming (Annual)	$298,700	$298,700	0
Physical Change Prevented (Annual)	$ 1,500	$ 1,500	0
Fishing Benefits (Annual)	No value estimated.	No value estimated.	0
Total NED Benefits	$300,200	$300,200	0
Adverse:			
Project Cost (Annual)	$106,000	$106,000	0
Total NED Costs	$106,000	$106,000	0
Net NED Benefits	$194,200	$194,200	0
2. Environmental Quality			
Beneficial:			
Man-made Resources	Yes	Yes	No
Water Quality	No	No	No
Aquatic Habitat Developed	Yes	Yes	No
Terrestrial Habitat Developed	Yes	Yes	No

Table 6.3 - System of Accounts (Consistent With Requirements of Principles & Standards, September 1980)
Candidate Plan 2
Effects on Region and "Rest of Nation" (Cont'd)

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
Adverse:			
Natural Resources	No	No	No
Air Quality	Insignificant	No	No
Aquatic Habitat (Benthic)	Loss of some existing habitat during construction.	Temporary during construction.	No
Turbidity	Temporary during construction.	No	No
Noise	Minimal during construction.	No	No
3. Regional Economic Development			
Positive:			
Value of Increased Income	Yes	Yes	No
Value of Increased Employment	Yes	Yes	No
Negative:			
Value of Income Lost	No	No	No
Quantity of Job Lost	No	No	No
Undesirable Growth	No	No	No

Table 6.3 - System of Accounts (Consistent With Requirements of Principles & Standards, September 1980)
Candidate Plan 2
Effects on Region and "Rest of Nation" (Cont'd)

Impact Accounts	Location of Impacts: Within Lakeshore Park Area	Within the Lake Erie Area	Within the Rest of the Nation
4. Other Social Effects			
Beneficial:			
Desirable Community Growth	Yes	Yes	No
Community Cohesion	Yes	Yes	No
Recreational	Yes	Yes	No
Aesthetics	Yes	No	No
Health	Yes	Yes	No
Sport Fishing	Yes	Yes	No
Public Safety	Yes	Yes	No
Energy Conservation	Yes	Yes	Minimal
Water-Based Traffic	Yes	Yes	No
Adverse:			
Undesirable Community Growth	No		
Land-Based Traffic	Yes	Yes	No
Displacement	No	No	No

RATIONALE FOR DESIGNATION OF "EQ" PLAN

An EQ Plan addresses the planning objectives in the way which emphasizes aesthetic, ecological, and cultural contributions. Beneficial EQ contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of Lakeshore Park and Lake Erie. Designating an EQ Plan involves measuring the environmental changes related to different plans and selecting the plan which, based on public input, contributes to or is most harmonious with environmental objectives. At a minimum, an alternative plan must make net positive contributions to the EQ account in order to be designated the EQ Plan. An EQ Plan is not a "do nothing" plan or a plan to maintain existing conditions.

In some studies, it may be impossible to develop a plan that meets the minimum requirements for designating an EQ Plan; i.e., a plan that makes net positive contributions to the EQ account. In those cases, the plan which is least damaging to the environment will be identified. The Lakeshore Park project is such a case. Two planning objectives were developed with the purpose of contributing to the ecological value of Lakeshore Park and to the preservation and/or enhancement of the natural and scenic view of Lake Erie. Because there was no specific opportunity to improve the natural environment at Lakeshore Park nor was there any identified need, neither of these objectives were achieved to the extent necessary for the development of an EQ Plan. Nevertheless, none of the alternatives originally considered would produce long-term, adverse impacts on the environment. Therefore, the Stage 3 plan which is designated as the least damaging to the environment is Alternative Plan 2.

Although Alternative Plan 2 does not produce net positive contributions to the EQ account, beneficial EQ contributions are made by the plan. The restoration of a recreational beach and subsequent elimination of erosion scars along the shoreline will enhance the aesthetic attributes of the park. The use of rubblemound breakwaters will contribute to the local ecology by increasing habitat diversity. Since the stone revetment along the Central Lakefront section will be retained, an area of productive benthic habitat will be preserved. On strictly an acre-per-acre basis, however, the construction of breakwaters and placement of beachfill would result in a net loss of aquatic habitat (possible yellow perch spawning habitat). In addition, no aspects of the proposed plan would compensate for short-term, adverse impacts on air and water quality during construction.

RATIONALE FOR THE TENTATIVELY-RECOMMENDED PLAN

Alternative Plan 2 is chosen as the tentatively-recommended plan since it will prevent shoreline erosion and restore a recreational beach at Lakeshore Park in the most economical and environmentally-agreeable manner. The plan was selected as both the NED Plan and least damaging to the environment since, while fulfilling the planning objectives, it simultaneously produces the greatest net benefits (+$194,200) and does not produce significant long-term adverse impacts on the environment. Alternative 1, the No Action Plan, was eliminated because, even though it avoids a capital investment, it does not meet any planning objectives or provide any benefits.

The public response to acceptibility or refusal of a plan can also prove to be very important in determining whether or not a favorable plan is actually approved. Presently, Alternative Plan 2 is the most desirable since virtually no negative responses from either local interests, private citizens, or involved organizations and agencies have been received. The Ashtabula Township Park Commission, the local sponsor, is strongly in favor of this plan. The U.S. Fish and Wildlife Service does not anticipate that project construction and maintenance would have significant adverse impacts of fish and wildlife resources (see Appendix E).

Quantifying all the beneficial and adverse environmental effects of Alternative Plan 2 is not possible. The various components of the plan result in the elimination of shoreline erosion, restoration of a recreational beach, diversification of aquatic habitat, and the preservation of the stone revetment. The beneficial effects of these plan components include an increase in the aesthetic quality of the shoreline, the stabilization of potentially hazardous bluffs, the development of more suitable recreational space, a potential increase in diversity of the sport fishery, and an increase in swimming recreation. The adverse effects on the environment are expected to be minimal. These impacts include a small reduction in aquatic habitat, a disruption of the view of the lake by offshore breakwaters and short-term degradation of air and water quality, and interruption of recreational activities during construction and maintenance operations.

From an economic viewpoint, a B/C ratio of 2.80 is very substantial and would compensate future cost increases which might be caused by inflation.

Concerned individuals and interests have been contacted and all input has been weighed and incorporated in the selection of Alternative Plan 2 as the tentatively-recommended plan. The lack of opposition made this selection much less complicated. Implementation of Alternative Plan 2 would provide the most efficient use of Federal and local funds in protection of the park and existing facilities as well as accommodate the proposed development of the park.

Table 6.4 - Cost Comparisons of Candidate Plans

Candidate Plans/ Items	1	2 NED & Least Damaging
FIRST COSTS:		
Breakwater Armor Stones	0	327,000
Initial Beach Sandfill	0	320,000
Access Road	0	13,000
Plans and Specifications	0	60,000
Supervision and Administration	0	81,000
Fifty Years Annual Nourishment		421,000
Navigation Aids	-	37,000
Total First Costs	0	1,349,000
AVERAGE ANNUAL COSTS:		
Interest	-	99,000
Amortization	-	3,000
Total Capital Cost	-	102,000
Maintenance		4,000
Total Average Annual Costs	-	106,000
Average Annual Benefits	0	300,200
Net Annual Benefits	0	194,200
Ratio of Benefits to Costs	-	2.80

SECTION VII

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on the study results presented in this report, the Buffalo District concludes the following:

a. This study has verified a local and regional need for additional recreational facilities at Lakeshore Park.

b. Erosion rates at the park shoreline are sufficiently significant to result in a loss of park land, and are significantly hindering park development.

c. Water quality at the park is high enough to allow swimming and the development of a recreational beach without presenting a threat to human health or significantly limiting park use.

d. Several shoreline protection plans which are economically justified in terms of Corps of Engineers benefit-cost evaluation methods, can be implemented without causing any long-term adverse environmental impacts of major significance.

e. The District's environmental studies and consultation with appropriate State and Federal agencies indicate that proposed beach erosion and shoreline protection measures at Lakeshore Park would not produce major long-term adverse impacts on the human or natural environment.

f. Alternatives involving a 1,300-foot beach would satisfy bathing demand at the park for the 50-year life of the project, but would not be consistent with the Township's overall development plan for the park. Major modifications would have to be made to the plan in order to provide adequate parking facilities for a 1,300-foot beach. Only those alternatives which involve an 800-foot beach would be consistent with the "Lakeshore Park Recreation Plan."

g. The construction of the offshore breakwaters and restoration of the beach would result in a different, and possibly improved habitat for benthic species and a number of fish species. Most direct impacts on the natural environment are associated with construction activities.

h. The construction of new facilities called for in the Master Plan, will provide a year-round use of the park, enhance community cohesion, and lend a cooperative feeling among the park's neighbors.

i. Community support of the overall recreation plan as well as individual projects within the plan is clearly expressed by the Ashtabula Township Park Commission, many public agencies, and private citizens.

j. It is in the national interest to implement the tentatively selected Plan 2 (modified). It will correct the beach erosion and shoreline protection problem at Lakeshore Park while reducing the potential for flooding due to Lake Erie storms.

RECOMMENDATIONS

Based upon the study findings outlined in this report, the District Engineer recommends that Alternative Plan 2 (modified) be implemented, provided that local interests give assurances satisfactory to the Chiefs of Engineers that they agree to:

a. Contribute in cash, 30 percent of the project construction cost and all costs in excess of the Federal expenditure limitation of $1,000,000. Such contribution may be made in a lump sum prior to the initiation of construction or in annual installments at a rate proportionate to the scheduled apportionment of Federal funds.

b. Provide without cost to the United States all necessary lands, easements, rights-of-way, and relocations required for construction of the project, including that required for periodic nourishment.

c. Comply with the 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 construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

d. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its Contractors.

e. Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based, during the actual life of the project.

f. Assure maintenance and repair, and local share of periodic beach nourishment where applicable, during the useful life of the works as required to serve the project's intended purpose.

g. Carry out the annual beach nourishment program for the 50-year project life with the only cost to the United States being the said annual reimbursement to the town of 70 percent of the town expenditure thereof, subject to availability of funds.

h. Provide and maintain necessary access roads, parking areas, the stone revetment in front of the pavilion, and other public use facilities open and available to all on equal terms.

i. Assure that water pollution from point sources in the park that would affect the health of bathers will not be permitted.

j. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 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 and the park benefitted thereby.

SECTION VIII

FINALIZING THE DPR

FUTURE ACTIVITIES

Subsequent to NCD approval of the draft DPR and DEIS, future activities will consist of finalizing the DPR. This entails answers to comments and some coordination: The DDPR and DEIS will be distributed to Federal and State agencies, and the public for coordination; and the EIS be filed with EPA. A meeting with the local sponsor and other interested parties to discuss and clarify some of the major points of interest is planned. Precise information will be released prior to the meeting taking place. The final report will then be submitted to NCD and published. After OCE review and approval, future planning activities will be as follows:

(1) Obtain local cooperation agreement and Right of Way (ROW) drawings.

(2) Prepare Plans and Specifications.

(3) Award construction contract.

PROPOSED SCHEDULE

Milestone Number	Milestone Description	Milestone Date
88	Division Review of DDPR and DEIS	Oct 81
89	Submit FDPR and FEIS and SOF to NCD	Apr 82
90	Division Concurrence in FDPR, FEIS, and SOF	Jun 82
91	Receive OCE Project Approval	Jun 82
92	Prepare Plans and Specs	Apr 82*
93	Award Construction Contract	Sep 82

*Assume OCE approval to do Plans & Specs.

ENVIRONMENTAL IMPACT ASSESSMENT

Proposed Plan for Beach Erosion and Shoreline Protection
at Lakeshore Park, Ashtabula County, Ohio

The responsible lead agency is the U. S. Army Engineer District, Buffalo, NY

Abstract: Lakeshore Park consists of approximately 50 acres of lakefront property located in the township of Ashtabula, OH. The Buffalo District has investigated public concerns of the Lakeshore Park study area related to shoreline protection and the restoration of a recreational beach. Of the ten plans initially considered, two were selected for detailed study. Alternative 2, consisting of a three-breakwater system protecting 800 feet of beachfill, would prevent shoreline erosion and provide a recreational beach. Alternative 1, the No-Action Plan, would provide no structural features or beach nourishment. Alternative 2 has been tentatively selected based on its performance in addressing the identified public concerns and its net positive contributions to the goal of National Economic Development. Implementation of any of the alternatives originally considered would not produce significant long-term adverse impacts on the environment.

SEND YOUR COMMENTS TO THE DISTRICT ENGINEER BY:

9 APR 1982

If you would like further information on this assessment, please contact:

Mr. William Butler
U. S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207

Commercial Telephone:
(716) 876-5454
FTS Telephone: 473-2173

Note: Information, displays, maps, etc., discussed in the Lakeshore Park Main Report are incorporated by reference in the EA.

PROPOSED PLAN FOR BEACH EROSION AND SHORELINE PROTECTION
AT LAKESHORE PARK, ASHTABULA COUNTY, OHIO

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS

Paragraph	Subject	Page
1.	SUMMARY	EIS-1
	MAJOR CONCLUSIONS AND FINDINGS	EIS-1
	AREAS OF CONTROVERSY	EIS-2
	UNRESOLVED ISSUES	EIS-2
	RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS	EIS-3
2.	NEED FOR AND OBJECTIVES OF ACTION	EIS-5
	STUDY AUTHORITY	EIS-5
	PUBLIC CONCERNS	EIS-5
	PLANNING OBJECTIVES	EIS-6
3.	ALTERNATIVES	EIS-8
	PLANS ELIMINATED FROM FURTHER STUDY	EIS-8
3.01	Alternative 3	EIS-8
3.03	Alternative 4	EIS-8
3.05	Alternative 5	EIS-8
3.07	Alternative 6	EIS-9
3.08	Alternative 7	EIS-9
3.10	Alternative 7A	EIS-9
3.12	Alternative 8	EIS-10
3.14	Alternative 8A	EIS-10
	WITHOUT CONDITIONS (NO ACTION)	EIS-10
	PLANS CONSIDERED IN DETAIL	EIS-11
3.17	Alternative 1	EIS-11
3.19	Alternative 2	EIS-11
	IMPLEMENTATION RESPONSIBILITIES	EIS-12
3.24	Federal	EIS-12
3.27	Non-Federal	EIS-13

TABLE OF CONTENTS (Cont'd)

Paragraph	Subject	Page
4.	AFFECTED ENVIRONMENT	EIS-16
	ENVIRONMENTAL CONDITIONS	EIS-16
	SIGNIFICANT RESOURCES	EIS-17
4.06	Cultural Resources	EIS-17
4.08	Terrestrial Resources: Natural Resources and Wildlife	EIS-18
4.09	Recreation Resources: Lake Erie Shoreline	EIS-18
4.11	Recreation Resources: Lakeshore Park	EIS-18
4.12	Aesthetics	EIS-18
4.13	Aquatic Resources: Water Quality	EIS-19
4.14	Air Resources	EIS-19
4.15	Social Resources	EIS-19
4.16	Economic Resources	EIS-19
5.	ENVIRONMENTAL EFFECTS	EIS-20
	CULTURAL RESOURCES	EIS-20
	TERRESTRIAL RESOURCES	EIS-20
5.02	Natural Resources and Wildlife	EIS-20
	RECREATION RESOURCES	EIS-21
5.06	Public Facilities and Services	EIS-21
5.07	Recreation Facilities and Services	EIS-21
5.09	Aesthetics	EIS-21
	AQUATIC RESOURCES	EIS-22
5.12	Water Quality	EIS-22
5.15	Aquatic Habitat	EIS-22
	AIR RESOURCES	EIS-22
5.16	Air Quality	EIS-22
	PLAN ECONOMICS	EIS-23
6.	LIST OF PREPARERS	EIS-24

TABLE OF CONTENTS (Cont'd)

Paragraph	Subject	Page
7.	PUBLIC INVOLVEMENT	EIS-25
	PUBLIC INVOLVEMENT PROGRAM	EIS-25
	REQUIRED COORDINATION	EIS-26
	STATEMENT RECIPIENTS	EIS-27
7.12	Federal	EIS-27
7.13	State	EIS-28
7.14	Local	EIS-28
7.15	Legislative	EIS-28
7.16	Private Organizations and Individuals	EIS-28
	PUBLIC VIEWS AND RESPONSES	EIS-29
8.	INDEX, REFERENCES, AND APPENDICES	EIS-30

TABLES

Number	Subject	Page
1	Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements	EIS-4
2	Comparative Impacts of Alternatives	EIS-15

PLATES

Number	Subject	Page
1	Tentatively Selected Plan - Alternative 2	EIS-32
2	Beach Profile	EIS-33

SUMMARY

MAJOR CONCLUSIONS AND FINDINGS

1.01 As a first task in the planning process, problems in a study area are identified by eliciting information from the public about water and related land resource management needs. The needs identified for Lakeshore Park include the elimination of shoreline erosion along 800 feet of erodible bluffs and the restoration of a recreational beach, while at the same time being consistent with the possible future development of a small-boat harbor to the west of the park pavilion.

1.02 As mandated by the Corps planning process, various alternative plans have been formulated to address area needs and planning objectives, and these plans have been addressed and evaluated for economic and environmental impacts. During Stage 2 planning, nine alternatives, as well as the No-Action Plan, were analyzed. The plans were refined and one alternative, Alternative 2, capable of providing shoreline erosion protection and a recreational beach, was developed, as was the No Action alternative. During Stage 3 planning, Alternative 2 was modified from a two- to a three-breakwater system to provide a greater length of beach and shoreline protection and to allow better water circulation near the shore.

1.03 The National Economic Development (NED) Plan addresses the planning objectives in a way which maximizes net economic returns. As a minimum, the NED Plan will produce net economic benefits, that is, annual benefits will exceed annual costs. With net annual economic benefits totaling $215,000, Alternative 2 has been designated as the NED Plan.

1.04 Recognizing that environmental quality (EQ) has both natural and human manifestations, an EQ Plan addresses the planning objectives in the way which emphasizes aesthetic, ecological, and cultural contributions. Beneficial EQ contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of the study area. Determination of EQ benefits involves subjective analysis, underscoring the need for interdisciplinary planning with extensive public input to place values on the environmental contributions of plans. Designating an EQ Plan involves measuring the environmental changes related to different plans and selecting the plan which, based on public input, contributes to or is most harmonious with environmental objectives. At a minimum, an alternative plan must make net positive contributions to the EQ account in order to be designated the EQ Plan.

1.05 In some studies, it may be impossible to develop a plan that meets the minimum requirements for designating an EQ Plan, i.e., a plan that makes net positive contributions to the EQ account. In those cases, the plan which is the least damaging to the environment will be identified. The Lakeshore Park Section 103 Beach Erosion and Shoreline Protection Project is such a case.

1.06 During Stage 2 planning, Alternative 4, an unprotected 800-foot beach, was designated as the least damaging to the environment. Although this plan has been eliminated from further study (See para. 3.04), implementation of any of the alternatives would not have long-term, adverse impacts on the environment. Therefore, the Stage 3 plan which is the least damaging to the environment is Alternative 2.

1.07 The tentatively selected plan is Alternative 2, which incorporates three offshore breakwaters and an 800-foot beach as the principal project features. The rationale behind the selection of this plan is that it is the most cost efficient, would not adversely affect the environment, and achieves the planning objectives of providing beach erosion protection and a recreational beach at Lakeshore Park. The plan insures the integrity of the stone revetment along the western shore of the park thus reducing the potential for flood hazards caused by frequent windstorms and high lake levels. In addition, it is consistent with the recreational development concept for the park as presently envisioned by the Ashtabula Township Park Commission.

1.08 The construction of three offshore breakwaters, placement of beachfill material, and subsequent annual nourishment have been specified through application of Section 404(b)(1) of the Clean Water Act guidelines. Appropriate measures have been identified and incorporated into the proposed plan to minimize adverse effects on the aquatic environment. Consideration has been given to the need for the proposed activity, the availability of alternative sites, methods of discharge that are less damaging to the environment, and such water quality standards as are appropriate and applicable by law. Circulation of the Section 404 evaluation resulted in no requests for a public hearing by any individual whose interests might be affected by the proposed activity. Construction of the proposed project would not affect any wetlands.

1.09 The general objective of Executive Order 11988 - Floodplain Management, is to avoid, to the maximum extent possible, long- and short-term adverse impacts associated with the occupation and modification of the base floodplain whenever there is a practicable alternative to such an action. The Corps has concluded that there is no practicable alternative to the proposed action, which would occur within the 100-year floodplain of Lake Erie, and that the recommended action is in conformance with the Executive Order.

AREAS OF CONTROVERSY

1.10 To date, there are no issues that were the subject of major disagreement among public interests during the course of the study.

UNRESOLVED ISSUES

1.11 To date, there are no unresolved major disagreements among study area interests.

RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS

1.12 The Stage 3 plans have been considered in relation to a number of Federal laws and policies, as well as State laws, which have a bearing on the issues involved. Table 1 presents a summary of environmental review and consultation requirements applicable to Corps civil works actions.

Table 1 - Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements (Tentatively Selected Plan - Alternative 2)

	Alternative 2
Federal Statutes	
Archeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et seq.	N/A
Clean Air Act, as amended, 42 U.S.C. 7401, et seq.	Partial - USEPA Regional Administrator's comments requested on this DEIS.
Clean Water Act as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251, et seq.	Full
Coastal Zone Management Act as amended, 16 U.S.C. 1451, et seq.	N/A
Endangered Species Act as amended, 16 U.S.C. 1531, et seq.	Full
Estuary Protection Act, 16 U.S.C. 1221, et seq.	N/A
Federal Water Project Recreation Act as amended, 16 U.S.C. 460-1(12), et seq.	Partial - Review copies of this DEIS and DPR sent to the Department of the Interior.
Fish and Wildlife Coordination Act as amended, U.S.C. 661, et seq.	Full
Land and Water Conservation Fund Act as amended, 16 U.S.C. 4601 - 4601-11, et seq.	Partial - Review copies of this DEIS and DPR sent to the Department of the Interior.
Marine Protection, Research and Sanctuaries Act, 22 U.S.C. 1401, et seq.	N/A
National Historic Preservation Act as amended, 16 U.S.C. 470a, et seq.	Partial - Coordination with State of Ohio and on-site inspection completed. Advisory Council comments requested on this DEIS.
National Environment Policy Act as amended, 42 U.S.C. 4321, et seq.	Partial - Full compliance will be obtained when the Record of Decision is signed.
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	Full
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	N/A
Wild and Scenic Rivers Act as amended, 16 U.S.C. 1271, et seq.	N/A
Executive Orders, Memoranda, etc.	
Floodplain Management (E.O. 11988)	Partial - Evaluation is included as an appendix for public review.
Protection of Wetlands (E.O. 11990)	N/A
Environmental Effects Aboard of Major Federal Actions (E.O. 12114)	N/A
Analysis of Impacts on Prime and Unique Farmlands (CEQ Memorandum, 30 Aug 76)	N/A
State and Local Policies	
Section 401 Water Quality Permit	Full
Land Use Plans	
U. S. Department of Housing and Urban Development	Full
Ohio Department of Natural Resources	Full
Ohio Office of Budget and Management	Full
Ohio Department of Energy	Full
Ashtabula County Planning Commission	Full
Ashtabula Township Park Commission	Full
Ashtabula Township Trustees	Full

Notes: The compliance categories used in this table were assigned based on the following definitions:

a. Full compliance - All requirements of the statute, E.O., or other policy and related regulations have been met.

b. Partial compliance - Some requirements of the statute, E.O., or other policy and related regulations remain to be met.

c. Not Applicable - N/A statute, E.O., or other policy not applicable.

NEED FOR AND OBJECTIVES OF ACTION

STUDY AUTHORITY

2.01 This report is made under the authority of Section 103(a) of the Rivers and Harbors Act of 1962, as amended by Section 310 of the Rivers and Harbors Act of 1965 and by Section 112 of the Rivers and Harbors Act of 1970. These laws amend Public Law 826, 84th Congress (28 July 1956).

2.02 These laws authorize the Corps of Engineers to assist in the construction of works for the restoration and protection of the shores of the Great Lakes against erosion by waves and currents. The term "construction" may be construed to include the deposit of sandfill at suitable intervals of time to furnish sand supply to project shores.

2.03 The Corps of Engineers is authorized to undertake construction of small shore and beach restoration projects not specifically authorized by Congress, when it is found that such work is advisable, provided that no more $1,000,000 shall be allotted for this purpose for any single project and the total amount allotted shall be sufficient to complete the Federal participation in the project including periodic nourishment. The Federal contribution in the Lakeshore Park project is limited to 70 percent of the total construction cost.

PUBLIC CONCERNS

2.04 The rapid loss of parkland and the lack of a recreational beach are important public concerns at Lakeshore Park. From the east park boundary to the stone revetment protecting the park pavilion, low clay bluffs, approximately 15 feet high, extend 800 feet along the shore. High water and northeast storms, main causes of past flooding, are rapidly eroding these bluffs causing a loss of parkland and threatening the park's parking lot with possible failure. Erosion is aggravated by the fact that little littoral material (sand, gravel, etc.) reaches the shoreline. The predominant west to east littoral movement is blocked by the Ashtabula Harbor structures. The Cleveland Electric Illuminating Company (CEI) intake structure, immediately east of the park, effectively obstructs any littoral drift from the east during normal periodic reversals. The Reconnaissance Report, dated 30 December 1974, estimated the average erosion rate along the park bluffs to be 1.6 feet per year between 1948 and 1973. Comparison of aerial photos for 1968, 1973, 1974, and 1978 indicates an average annual erosion rate of 2.2 feet from 1968 to 1973 and 2.4 feet between 1973 and 1978.

2.05 Erosion and high lake levels have had a devastating effect on the existing beach and have severely limited recreational opportunities at Lakeshore Park. The beach fronting the park bluffs presently consists of only a narrow gravel beach approximately 15 feet wide. Although this beach is open, few swimmers make use of it. Pollution problems had forced the closing of the beach for a period of years in the 1960's and the beach was

posted for health reasons in 1971. However, the expansion of the municipal waste treatment plant in 1970-71 has reduced bacterial content to acceptable levels (less than 200 fecal coliforms per 100 ml). Since expansion of the plant, available data shows that fecal coliform counts have exceeded this level only once - during a period when the area experienced 4-foot waves. The Ohio Department of Health, which has been conducting a beach water quality monitoring program at the park for a number of years, has indicated that there does not appear to be any great pollution problem (See Appendix F).

2.06 In the 1930's, the Civilian Conservation Corps constructed a concrete seawall in front of the park pavilion to protect it from the northeast storms coming off of Lake Erie. By 1974, this wall was deteriorated and in urgent need of repair. The lower level of the pavilion was being subjected to lake storms and had been rendered useless due to flooding. In 1977, in order to protect the pavilion from further damage, approximately 15,000 tons of breakwater stone, acquired from the removal of the westerly section of the inner breakwater of Ashtabula Harbor, was placed directly on top of the original concrete seawall. The Town Park Commission recently backfilled and graded the area between the pavilion and the revetment. Although voids have recently developed between the stone and fill material, local officials have stated that they want the revetment to remain. To date, the lower level of the pavilion has still, however, not been utilized by the Park Commission. The upper story still functions as a picnic shelter and promenade.

2.07 The Ashtabula County Planning Commission, in conjunction with the consulting firm of Woodruff, Inc., prepared a master plan for park development ("Lake Shore Park Recreation Plan" February 1980). Consideration is given to scenic parking areas, erosion control measures, a small-boat harbor to the west of the pavilion, swimming beaches, and fishing areas. Any shoreline protection plans, therefore, must be consistent with these development plans.

PLANNING OBJECTIVES

2.08 Development of the various alternative shoreline erosion control plans for Lakeshore Park considered the two national water resource planning objectives, as defined by the U. S. Water Resources Council, and a number of study area-specific planning objectives developed in relation to public concerns and resource management needs of the project area.

2.09 The two national objectives are:

a. To enhance national economic development (NED) by increasing the value of the nation's output of goods and services and by increasing national economic efficiency. For a shoreline erosion control project such as the Lakeshore Park project, the value of the recreational experience at the park shoreline to the beach user is the primary measure of NED.

b. To enhance the quality of the environment (EQ) by the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

2.10 The planning objectives developed for the Lakeshore Park study state that the beach erosion control study must:

a. Eliminate shoreline erosion along the 800 feet of erodible bluffs to prevent further upland damages at Lakeshore Park during the period 1982-2032.

b. Restore a recreational beach along the East Lakefront area in order to contribute to the land and water-based recreation resources at Lakeshore Park for swimming, fishing, picnicking, boating, and camping during the period 1982-2032.

c. Contribute to the reduction of flooding along the Central Lakefront area for protection of property during the period 1982-2032.

d. Contribute to the ecological value of Lakeshore Park habitat in terms of diversity, wildlife, erosion control, and aesthetics during the period 1982-2032.

e. Contribute to the preservation and/or enhancement of the natural and scenic view of Lake Erie during the period 1982-2032.

2.11 In fulfilling these objectives, alternatives should be developed that are consistent with the possible future development of a small-boat harbor to the west of the park pavilion, as proposed in the draft "Lake Shore Park Recreation Plan."

ALTERNATIVES

PLANS ELIMINATED FROM FURTHER STUDY

3.01 Alternative 3 - This alternative consists of three 250-foot long rubblemound breakwaters with 250-foot gaps between them. The breakwaters would protect a 1,300-foot reach of beachfill extending from the westerly end of the park pavilion to the park's east boundary (Plate 4.2, DPR). This plan would involve the removal of approximately 500 feet of the existing stone revetment in front of the pavilion to an elevation of 572.6 (IGLD 1955). 1/ In addition, the area on the landward side of the stone revetment would be excavated to this elevation. Alternative 3 would require an initial placement of 108,300 cubic yards of sandfill, 10 percent of which would have to be replaced on an annual basis. To construct the beach and provide access for annual beach nourishment, it would be necessary to construct an access road to the beach from the top of the bluff. The net benefits for Alternative 3 are +$52,955, and the benefit/cost ratio is 1.24.

3.02 Although the 1,300-foot beach would satisfy the expected bathing demand for the 50-year life of the project, present and proposed parking facilities are unable to accommodate the expanded beach capacity. For this reason, the local cooperator, the Ashtabula Town Park Commission, has recommended that Alternative 3 be eliminated early in the final design stages.

3.03 Alternative 4 - This alternative consists of an unprotected 800-foot long beach located at the foot of the existing bluff and extends to the east park boundary (Plate 4.3, DPR). Alternative 4 would require an initial placement of 71,000 cubic yards of sandfill, 25 percent of which would have to be replaced on an annual basis. To construct the beach and provide access for annual beach nourishment, it would be necessary to construct an access road to the beach from the top of the bluff. The net benefits for Alternative 4 are +$76,083, and the benefit/cost ratio is 1.39.

3.04 Due to the high annual beach nourishment rates and the uncertainty of future inflation rates, local interests do not feel that they can financially obligate themselves to the degree required for the implementation of this plan. In general, this alternative provides an uncertain beach area. It has been eliminated early in Stage 3 because of the high offshore loss rates of beach sand and the high annual nourishment quantities.

3.05 Alternative 5 - This alternative consists of an unprotected 1,300-foot long beach extending from the westerly end of the park pavilion to the park's eastern boundary (Plate 4.4, DPR). This plan would involve the removal of approximately 500 feet of the existing stone revetment in front of the pavilion. Alternative 5 would require an initial placement of 108,300 cubic

1/ International Great Lakes Datum (IGLD) is mean sea level at Father Point, Quebec.

yards of sandfill, 25 percent of which would have to be replaced on an annual basis. To construct the beach and provide access for annual beach nourishment, it would be necessary to construct an access road to the beach from the top of the bluff. The net benefits for Alternative 5 are -$21,355, and the benefit/cost ratio is 0.93.

3.06 Alternative 5 has been eliminated from further study because the present and proposed parking facilities are unable to accommodate the expanded capacity of a 1,300-foot beach, local interests desire structural protection for the beach, and the plan does not produce a net benefit.

3.07 Alternative 6 - This alternative consists of an 800-foot beach protected by a single groin. The function of groins is to trap littoral drift material being transported in the surf zone in a direction parallel to the shoreline. Due to the protective structures to the east and west of Lakeshore Park, wave energy is generally perpendicular to the shore and little longshore transport is generated. It is, therefore, not feasible to stabilize or accrete beach material at Lakeshore Park with a groin concept, and the plan was eliminated during the Stage 2 study.

3.08 Alternative 7 - This alternative consists of a 2,000-foot long rubble-mound breakwater located 250 feet ± from the Cleveland Electric Illuminating Company's intake structure and the U. S. east breakwater for Ashtabula Harbor (Plate 4.5, DPR). The crest elevation of the breakwater would be 6.9 feet above Low Water Datum (LWD) 2/. The breakwater would protect the park shoreline including an 800-foot long reach of beachfill. Alternative 7 would require an initial placement of 71,000 cubic yards of sandfill, approximately 14 percent of which would have to be replaced on an annual basis. To construct the beach and provide access for annual beach nourishment, it would be necessary to construct an access road to the beach from the top of the bluff. The net benefits for Alternative 7 are -$120,787, and the benefit/cost ratio is 0.69.

3.09 Alternative 7 has been eliminated from further study because the costs of the project would be beyond the financial capabilities of the local interests. Also, the plan does not produce a net benefit.

3.10 Alternative 7A - This alternative involves the same structural components as Alternative 7 except the breakwater would be constructed to a constant crest elevation of 12.7 feet above LWD (Plate 4.5, DPR). The breakwater has been designed to allow transmittal of a 1-foot (maximum) wave to the beach and to help facilitate the construction of a small-boat harbor at Lakeshore Park. The annual nourishment rate for this plan is estimated to be approximately 5 percent of the initial placement of 71,000 cubic yards. The net benefits for Alternative 7A are -$244,816, and the benefit/cost ratio is 0.52.

3.11 Alternative 7A has been eliminated from further study because the costs of the project would be beyond the financial capabilities of the local interests. Also, the plan does not produce a net benefit.

2/ LWD for Lake Erie is 568.6 feet above mean sea level at Father Point, Quebec (IGLD, 1955).

3.12 Alternative 8 - This alternative consists of 2,000-foot long rubble-mound breakwater with a crest elevation of 6.9 feet above LWD located 250 feet + from the Cleveland Electric Illuminating Company's intake structure and the U. S. east breakwater for Ashtabula Harbor (Plate 4.6, DPR). The breakwater would protect the park shoreline including a 1,300-foot long reach of beachfill. This plan would involve the removal of approximately 500 feet of the existing stone revetment in front of the park pavilion. Alternative 8 would require an initial placement of 108,300 cubic yards of sandfill, approximately 14 percent of which would have to be replaced on an annual basis. To construct the beach and provide access for annual beach nourishment, it would be necessary to construct an access road from the top of the bluff. The net benefits for Alternative 8 are -$187,768, and the benefit/cost ratio is 0.59.

3.13 Alternative 8 has been eliminated from further study because the costs of the project would be beyond the financial capabilities of the local interests, and the plan does not produce a net benefit. Also, the present and proposed parking facilities at Lakeshore Park are unable to accommodate the expanded capacity of a 1,300-foot beach.

3.14 Alternative 8A - This alternative involves the same structural components as Alternative 8 except the breakwater would be constructed to a constant crest elevation of 12.7 feet above LWD (Plate 4.6, DPR). The breakwater has been designed to allow transmittal of a 1-foot (maximum) wave to the beach and to help facilitate the construction of a small-boat harbor at Lakeshore Park. The annual nourishment rate for this plan is estimated to be approximately 5 percent of the initial placement of 108,300 cubic yards. The net benefits for Alternative 8A are -$285,796, and the benefit/cost ratio is 0.49.

3.15 Alternative 8A has been eliminated from further study because the costs of the project would be beyond the financial capabilities of the local interests, and the plan does not produce a net benefit. Also, the present and proposed parking facilities at Lakeshore Park are unable to accommodate the expanded capacity of a 1,300-foot beach.

WITHOUT CONDITIONS (NO ACTION)

3.16 If no action is taken to protect the shoreline at Lakeshore Park, it is expected that high waters and northeast storms would continue to cause severe erosion. The assumption is made that present and future erosion rates would be equivalent to historical rates estimated from recent aerial photographs. The average annual erosion rate for the period between 1973 and 1978 was 2.4 feet. Based on this figure, Lakeshore Park would lose approximately 2,000 square feet of land per year. By not restoring a recreational beach, the demand for bathing areas in Ashtabula County would continue to exceed the supply at an increasing rate. The projected instantaneous future peak daily bathing demand at the park for the year 2032 is 2,765, which greatly exceeds the present theoretical capacity of approximately 160 bathers. The impacts of these conditions are discussed below.

PLANS CONSIDERED IN DETAIL

3.17 Alternative 1 - No Action - By this plan, the Corps of Engineers would not participate in the protection or improvement of Lakeshore Park. For assessment purposes, it is assumed that no party would act to control erosion or maintain the beach.

3.18 If no action is taken to correct the beach erosion and shoreline protection problems at Lakeshore Park, the bluffs to the east of the park pavilion would continue to erode at the present rates. The park's parking lot west of the bluffs may soon be subject to undercutting and failure. The condition of the park's beach would remain unchanged and few people would utilize it. Many of those who desire a sandy type beach would continue to look to other sites which may result in the continued loss of income to the town of Ashtabula from concession rentals. Without the restoration of a recreational beach and protection against shore erosion, full park development as visualized in the "Lake Shore Park Recreation Plan" would be hindered. This alternative avoids the monetary investment and potential adverse environmental impacts associated with a structural beach erosion control alternative; however, it would not realize the beneficial impacts of providing shoreline protection, recreational swimming, and reduced potentials for flood hazards.

3.19 Alternative 2 - The two-breakwater system proposed in the Stage 2 documentation was replaced by a three-breakwater system to allow for a greater length of beach protection and better water circulation. Each breakwater would be 125 feet long with 200-foot gaps between them covering a total of 775 feet from the east end to the west end (Plate EIS-1). They would protect an 800-foot long reach of beachfill, located at the foot of the existing clay bluff. The beachfill would be placed to elevation 576.6 (IGLD), or +8 feet above the Lake Erie Low Water Datum (LWD) which is the point of maximum runup for the design wave condition. It is expected that wave action would reshape the initial 150-foot berm resulting in an average berm width of 90 feet as shown on Plate EIS-2.

3.20 A total of 37,000 cubic yards of sandfill would be placed along the entire 800-foot reach and would consist of medium-grained, reasonably well-graded, hard, durable, natural sand particles. The sand would be clean and free of organics, clay, deleterious or other foreign or objectionable material. The sand would contain no more than 20 percent flat or elongated particles. The loss rate offshore is estimated to be approximately 10 percent of the beachfill requiring replenishment on a yearly basis. A permanent access road to the beach from the top of the existing bluff would be built to facilitate the initial placement of the beachfill and subsequent periods of annual nourishment. The road would be 15 feet wide by 100 feet long with a 5-foot sidewalk on each side.

3.21 The three breakwaters would be located at the 3 to 4-foot contour below LWD or at lake bottom elevation 565.0 which is approximately 350-400 feet offshore from the restored beach. The central breakwater would be approximately parallel to the shoreline while the eastern and western breakwaters would be at a slight angle to the shore to provide further protection for the beach during episodes of north-northwesterly or north-northeasterly wave

attack. They would be of rubblemound construction and consist of a stone armor layer (1.0 - 2.5 tns each) on top of an underlayer (100-450 pounds each) which would serve as a bedding stone. A constant crest elevation of +6.5 (LWD) would be used for all three breakwaters along with a crest width of 8.5 feet.

3.22 Alternative 2 with a benefit/cost ratio of 2.8 and net benefits of +$194,200 is the most economically efficient of all the plans investigated. For this reason, this alternative has been designated as the National Economic Development (NED) Plan. In some studies, it may be impossible to develop a plan that meets the requirements for designating an Environmental Quality (EQ) Plan, i.e., a plan that makes net positive contributions to the EQ account. The Lakeshore Park beach erosion project is such a case. During Stage 2 of the study, Alternative 4, an 800-foot unprotected beach, was designated as the least environmentally damaging but was subsequently eliminated from further study. The Stage 3 plan which is the least damaging to the environment is Alternative 2. Implementation of this plan would not cause major adverse environmental impacts and would help eliminate shoreline erosion, restore a recreational beach, and diversify the local aquatic habitat. Based on these facts, Alternative 2 has been designated the tentatively selected plan.

IMPLEMENTATION RESPONSIBILITIES

3.23 The cost to undertake this project under the authority of Section 103 of the 1962 River and Harbor act is shared between Federal and non-Federal interests which are in the case of this project:

(a) The U.S. Army Corps of Engineers and the U.S. Coast Guard, and

(b) All other State, city, and local agencies.

3.24 Federal - Lakeshore Park, having met all the specified criteria outlined in the Department of the Army publication EP 1165-2-1, paragraph C.2, dated 2 September 1979, is therefore eligible for Federal (Corps of Engineers) cost sharing up to 70 percent of the total construction cost, exclusive of land or a maximum of $1,000,000, whichever is less. The Coast Guard is responsible for the cost of any navigation aids, including their annual operation and maintenance cost as described earlier.

3.25 The Federal (Corps of Engineers) cost share includes all Corps of Engineers costs for investigations, planning, design, and construction, including annual beach nourishment. For this project, annual beach nourishment has been considered a construction cost for project years 1 through 50. This was verbally approved by Chief, Coastal Engineering, North Central Division, Corps of Engineers, after telephone discussion with Chief, Coastal Engineering, Buffalo District, Corps of Engineers.

3.26 The U.S. Coast Guard is responsible for the cost of providing navigation aids, including their annual operation and maintenance costs as descried earlier.

3.27 Non-Federal - The local sponsor, the Ashtabula Township Park Commission, is responsible for lands, easements, and rights-of-way, plus 30 percent of the total construction cost of the project and all other costs in excess of the Federal expenditure limitation of $1,000,000.

3.28 Non-Federal costs include all project construction costs in excess of the specific Corps cost limitation to insure that expenditure of Corps funds will result in a project that is integrally complete and fully effective. The scope of the project may be increased if local interests are willing to pay for the additional costs.

3.29 The Ashtabula Township Park Commission, as the local sponsor, is also responsible for meeting the terms established in the "Items of Local Cooperation" and is, therefore, responsible for all annual maintenance costs associated with the offshore breakwaters, the stone revetment in front of the pavilion, and the access roads. The local sponsor must agree to:

a. Contribute in cash 30 percent of the project construction cost and all costs in excess of the Federal expenditure limitation of $1,000,000. Such contribution may be made in a lump sum prior to the initiation of construction or in annual installments at a rate proportionate to the scheduled apportionment of Federal funds.

b. Provide without cost to the United States all necessary lands, easements, rights-of-way, and relocations required for construction of the project including that required for periodic nourishment.

c. Comply with the 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 construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

d. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its Contractors.

e. Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based during the actual life of the project.

f. Assure maintenance and repair, and local share of periodic beach nourishment, where applicable, during the useful life of the works as required to serve the project's intended purpose.

g. Carry out the annual beach nourishment program for the 50-year project life with the only cost to the United States being the said annual reimbursement to the town of 70 percent of the town expenditure thereof, subject to the availability of funds.

h. Provide and maintain necessary access roads, parking areas, the stone revetment in front of the Pavilion, and other public use facilities open and available to all on equal terms.

i. Assure that water pollution from point sources in the Park that would affect the health of bathers will not be permitted.

j. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 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 and the park benefitted thereby.

Table 2 - Comparative Impacts of Alternatives
[Tentatively Selected Plan is Alternative 2]

Base Condition and Alternatives	Cultural Resources	Terrestrial Resources	Recreation Resources	Aesthetics	Aquatic Resources	Air Resources	Plan Economics
Base Condition	Cultural Resources: No sites in project area on National Register of Historic Places (NRHP).	Natural Resources and Wildlife: Available: 0.27 acre of beach in project area.	Public Facilities and Services: Available: Adequate public services and facilities for park users. Recreation Facilities and Services: Available: Public access to Lake Erie shoreline; wide range of recreation facilities and services; small, gravel bathing beach; beach capacity: 160 bathers; important local sport fishery.	Available: Aesthetically pleasing park; erosion scars at the shoreline; confined view of Lake Erie.	Water Quality: Available: acceptable water quality for water contact recreation. Aquatic Habitat: Available: Lake Erie ecosystem in vicinity of project area.	Available: Exceeds total suspended particulates standards set by the State of Ohio (1978).	Not applicable.
Alternative 1: No Action	Cultural Resources: Impact: None	Natural Resources and Wildlife: Construction Impacts: None. - 0.04 acre per year of terrestrial habitat due to beach erosion.	Public Facilities and Services: Impact: None. Recreation Facilities and Services: Impact: No protection of parkland from erosion; inadequate beach to accommodate future expected bathing demand; possible undermining of parking lot.	Impact: No disturbance due to construction; no additional structures to interrupt view of the lake; erosion scars would persist.	Water Quality: Impact: None. Aquatic Habitat: 0 acres gained or lost due to breakwater construction; +0.04 acre yearly due to beach erosion.	Impact: None.	Investment Costs: $0 Average Annual Costs: $0 Average Annual Benefits: $5,100 Net Benefits: $5,100 B/C Ratio: Not applicable $180,000 (Planning costs)
Alternative 2 Three Breakwaters and an 800-foot Beach	Cultural Resources: Impact: None	Natural Resources and Wildlife: Temporary disruption of local wildlife during construction; +2.94 acres of terrestrial habitat due to sand placement; -0.05 acre due to access road construction.	Public Facilities and Services: Impact: Short-term impact during construction. Recreation Facilities and Services: Impact: Provides protection from beach erosion; provides beach to accommodate future expected bathing demand at the park 1/; beach capacity: 1,709 bathers; short-term disruption of park activities during construction and beach nourishment; possible increased diversity in sport fish species.	Impact: Temporary degradation during construction; enhance extent and permanence of beach; view of lake would be confined further; erosion scars would be eliminated.	Water Quality: Impact: Short-term impacts during construction; possible degradation due to interruption of natural circulation patterns. Aquatic Habitat: Impact: -0.47 acre due to breakwater construction; +0.53 acre on submerged breakwater surfaces; -2.38 acre due to sand placement.	Impacts: Temporary effects during construction - dust, noise, odors, vehicle emissions; some decrease in quality as number of visitors increases.	Investment Costs: $1,340,000 Average Annual Costs: $106,000 Average Annual Benefits: $300,200 Net Benefits: $194,200 B/C Ratio: 2.80

1/ Assuming limited parking capacity.

AFFECTED ENVIRONMENT

ENVIRONMENTAL CONDITIONS

4.01 Lakeshore Park consists of approximately 50 acres of rolling topography and shade trees with about 2,500 feet of Lake Erie frontage. The park is located in the township of Ashtabula, OH, and is managed by the Ashtabula Township Park Commission. A 440' X 24' pavilion overlooks a small beach and picnic area. From the east park boundary, 15-foot high clay bluffs fronted by a 15-foot wide beach extend approximately 800 feet along the shore. These bluffs are being rapidly eroded by high water and northeast storms. The remainder of the shoreline is presently protected by a stone revetment constructed in 1977 to protect the park pavilion from flooding during winter storms and reduce shoreline erosion. Recently, however, voids have developed between the revetment and the landfill behind it and periodic maintenance by the Commission will be required to insure the structural integrity of the structure. The primary concern of the Park Commission are the rapid loss of parkland along the bluffs to the east of the pavilion and restoration of a recreational beach.

4.02 Lakeshore Park is a high density recreation area located approximately 40 miles southwest of Erie, PA, and approximately 50 miles northeast of Cleveland, OH. The park attracts people from northeast Ohio and northwest Pennsylvania and has a population of approximately 1 million people within a 50-mile radius from which to draw. The demand for recreation at the park is strong. The large range of activities available, much more so than at most recreational parks, makes the park a unique area. The park contains a pavilion overlooking the lake, a small beach, picnic shelters, parking areas, a 40-unit trailer park, a petting zoo, two duck ponds, tennis courts, an athletic field, playground, and concession stands. The park also has the only public boat launching ramp in Ashtabula County west of Conneaut, OH. A great variety of recreational activities and conveniences are afforded the recreational visitor. In view of this, the value of a visit to the beach area is higher than a visit to the average, less developed and diversified beach.

4.03 The general character of the area's land use is predominantly urban. One of the dominant land uses and environmental factors in the park setting is the Port of Ashtabula operations to the west of the park. The port operations in Ashtabula Harbor have been traditionally based on iron ore and coal. The park is separated from the nearest dock owned by Pinney Dock and Transport Company by a buffer zone of only a few hundred feet. Another major land use along the Ashtabula shoreline is Lakeshore Park's eastern neighbor, the Cleveland Electric Illuminating Company (CEI). CEI has two generating plants on this property fired by both coal and oil. The CEI smoke stacks are one of the dominant features of the local landscape. The area immediately southeast of the park is characterized by heavy industries producing chemicals, ferro alloys, and other metals. New industries have been developing in the open areas south of the park and existing industries have made significant expansions in recent years. Immediately west of the park is a

residential area. Most of the homes are single-family residences occupied year-round. They range in general condition from good to fair and are mostly older homes. The neighborhood is characterized by low to moderate income families.

4.04 The Ashtabula Harbor breakwaters to the west and the CEI intake structure to the east give the offshore area a protected nature and encourage the resting and feeding of migrating waterfowl. On 13 March 1979, U. S. Fish and Wildlife Service biologists observed approximately 250 canvasbacks, scaup, and redheads, along with small numbers of common goldeneye and green-winged teal. Several species of gulls permanently occupy the area and use the breakwaters as nesting sites. These structures also provide cover and spawning and feeding areas and are popular fishing sites. Shore fishing, particularly along the stone revetment, of drum, yellow perch, and white bass, is important to the local community.

SIGNIFICANT RESOURCES

4.05 Each significant resource included in the Comparative Impacts of Alternatives table (p. EIS-15) is described below, including its location, quantity, and quality. Criteria for resource significance are stated in the descriptions, and include the following:

a. Resources identified in the laws, regulations, and guidelines or other institutional standards of national, regional, and local scope;

b. Resources meeting certain study-specific technical criteria for measuring characteristics that may be critical to resource existence;

c. Resources specifically identified as a concern by public interests;

d. Resources which, if affected by a plan, would violate an institutional standard, meet a study-specific technical criterion, or become the subject of public concern.

4.06 Cultural Resources - No properties, either archeological or historical, eligible for, nominated to, or listed in the National Register of Historic Places, would be affected by the project. However, the Ohio State Historic Preservation Office recommended that since the park is located in an "archeologically sensitive area," an onsite cultural survey should be conducted. Subsequent consultation with the "Soil Survey of Ashtabula County, Ohio," USDA Soil Conservation Service, 1973, and with park personnel revealed that the soils were heavily disturbed. This was confirmed by a field investigation on 5 June 1980 by Richard Lewis, staff archeologist. It was concluded, therefore, that the likelihood of locating any sites of archeological significance is minimal.

4.07 The park pavilion is a historical landmark of local significance which was designed in 1919 by architect J. L. Wilson. As of yet, however, the structure does not have recognition as a landmark of national significance.

4.08 Terrestrial Resources: Natural Resources and Wildlife - Lakeshore Park is an area which has been greatly modified by both man and nature. During early park construction in the 1920's, a large hill at the eastern end of the park was graded and landscaped to promote better access to the shore and more intensive park development. The available terrestrial habitat in this area presently consists of mowed grass and a few shade trees. The nearshore bluff area could potentially provide nesting sites for kingfishers and swallows, although no bank openings were noted during field investigations. The shoreline is an active erosion area which is naturally barren of plant life and consists of a narrow sand and gravel beach. No designated critical habitat for endangered species is present in the project area at this time.

4.09 Recreation Resources: Lake Erie Shoreline - The lakeshore of northern Ashtabula County has been urbanized for many years. Growth pressures in this coastal zone are similar to many other areas in the United States. Demand for residential, commercial, industrial, and recreational land with access to a large body of water is increasing rapidly. The proposed Ohio Coastal Zone Management Program has addressed this issue, along with many other coastal related issues. In this program, parks along Lake Erie have been designated areas of particular concern due to the importance of preserving public access to Lake Erie.

4.10 Access to Lake Erie is a regional and State problem. Lake Erie is Ohio's largest body of water and a large number of people living in Ohio live very near the lake. Recreational access competes with other uses that are important to the overall economics of the State and the United States. Compromising and prioritizing future land uses in the coastal zone will be even more complex as the nation's energy needs become more critical. Ohio's electrical energy generating plants have to be located near their markets and near a source of water. Both nuclear and fossil fuel plants in the northern part of Ohio could be located near Lake Erie in the future, thereby increasing the importance of maintaining public access to its shores.

4.11 Recreation Resources: Lakeshore Park - Lakeshore Park is a high density recreation area which offers a wide range of facilities and services to the park user. The park includes a small beach area at the easterly end, picnic shelters, parking areas, a 40-unit trailer park, a zoo, playground, tennis courts, and concession stands. A 440' X 24' pavilion overlooking the lakefront serves as a picnic shelter and promenade. The park also has the only public boat launching ramp in Ashtabula County, west of Conneaut, Ohio. The present gravel beach has a theoretical capacity to accommodate 160 bathers (based on a minimum requirement of 75 square feet per bather). Although the beach is open for swimming, few swimmers make use of it. A combination of water pollution problems in the 1960's and beach erosion has caused the beach area to fall into virtual total disuse.

4.12 Aesthetics: The natural character of the park within the urban setting of Ashtabula, Ohio is aesthetically pleasing. However, shoreline erosion of the park's clay bluffs detracts from the beach area. Although the view of Lake Erie is somewhat confined by Ashtabula Harbor structures to the west and

the CEI water intake structure to the east, the visual aspect of the lake, horizon, and sky is desirable to many park users.

4.13 Aquatic Resources: Water Quality - Although pollution problems had forced the closing of the beach for a period of years in the 1960's, expansion of the municipal waste treatment plant in 1970-71 has improved water quality to acceptable levels for water contact recreation. An analysis of fecal coliform data from 1971 to 1977 indicates that ambient water quality at the project site would present no hazard to human health. In a letter dated 4 June 1980, the Ohio Department of Health, which has been monitoring water quality at the park since 1968, stated that there does not appear to be any great water pollution problem.

4.14 Air Resources - Data obtained from the Ohio Environmental Protection Agency (1978) indicates that Total Suspended Particulate levels generally range from Unhealthful to Very Unhealthful. Levels for other criteria pollutants, sulfur dioxide and nitrogen dioxide, generally fall within the Good to Moderate range. The urban/industrial surroundings of the park greatly influence noise and air pollutant levels. This may prove to be an irritation to most, but, through contrast, serves to increase the value of a "natural" area such as Lakeshore Park.

4.15 Social Resources - The proposed project is not expected to have any long-term, adverse impacts on community cohesion or desirable community growth nor will any people be displaced. Therefore, it has been determined that these resources are not significant to the study.

4.16 Economic Resources - Similarly, tax revenues, property values, desirable regional growth, employment and labor force, business and industrial activity, or any farms are not expected to be significantly impacted.

ENVIRONMENTAL EFFECTS

This chapter briefly describes the effects of both alternatives, No Action and Alternative 2, on the previously described significant resources. Its purpose is to provide the reader with a detailed analysis of the impacts described in the Comparative Impacts of Alternatives Table (p. EIS-15). This section is the scientific and analytic basis for the comparison of the alternatives.

CULTURAL RESOURCES

5.01 The Ohio State Historic Preservation Office, in a letter dated 22 June 1979, stated that the proposed work would not have an effect on known historic or archeological resources under any of the alternatives (See Appendix F). A reconnaissance level survey performed on 5 June 1980 confirmed that no cultural resources presently exist within the project area.

TERRESTRIAL RESOURCES

5.02 Natural Resources and Wildlife - Some temporary negative impacts could occur to wildlife populations and their habitat as a result of construction of the project. These impacts are expected to be of short duration and confined to the immediate project area. Noise generated by construction equipment and related activity would temporarily displace species which are intolerant of disturbances. There would not be any long- or short-term adverse impacts to endangered species or critical habitat under either of the alternatives (See Appendix F).

5.03 Alternative 2 would have a slight negative impact on terrestrial vegetation because it involves a terrestrial right-of-way to the beach (i.e., an access road for beach nourishment). The beach nourishment plan component would have negligible impacts upon vegetation since the beach where nourishment material is to be spread is naturally barren of plant life. In general, upland areas affected by the project would not have significant adverse impacts on wildlife resources.

5.04 Both of the alternatives would have an impact on terrestrial habitat in the form of gain or loss of land area. Under Alternative 2, approximately 3 acres would be gained by sand placement. Assuming erosion rates equivalent to those for the period between 1973 and 1978, approximately 0.04 acre per year of terrestrial habitat would be lost with implementation of the No Action alternative.

5.05 Alternative 2 would require the commitment of natural resources in the form of construction material and energy expended during the construction process. These include: (1) stone - approximately 7,700 tons of stone would be used in breakwater construction; (2) beachfill - approximately 37,000 cubic yards of sandfill and an annual replenishment of 3,700 cubic yards

would be required for beach restoration; (3) roadway materials - approximately 100 linear feet of roadway materials (asphalt-concrete surface, bituminous aggregate base, etc.) would be employed; and (4) oil and gasoline would be used by vehicles and machinery in all phases of construction. The No Action alternative would require none of these commitments.

RECREATION RESOURCES

5.06 Public Facilities and Services - Local business establishments, such as restaurants, service and repair shops, motels, retail stores, may benefit from the presence of construction workers involved in carrying out Alternative 2. This effect would be slight because of the small size of the anticipated work crews compared to the population of Ashtabula. Similarly, demand for public services, in the form of police, rescue, and medical services, may rise due to the presence of the workers and anticipated increase in park attendance. The magnitude of this effect is again very slight. Other public services, such as refuse collection, sewage treatment, water supply, and public utilities, would certainly be sufficient to accommodate any foreseeable immediate project-related population increases.

5.07 Recreation Facilities and Services - Alternative 2 would provide adequate erosion protection for existing recreational resources at Lakeshore Park, as well as accommodate future development recommended in the "Lake Shore Park Recreation Plan." Although present recreational activities would be disrupted during construction and annual beach nourishment, the restoration of a beach would add significantly to recreational opportunities at the park. An 800-foot long by 160-foot wide beach has the capacity to accommodate 1,709 people based on a minimum beach requirement of 75 square feet per bather. Proposed parking facilities would be capable of handling this amount of bathers. Breakwater construction may improve the local sport fishery by increasing the diversity of the aquatic habitat.

5.08 Alternative 1, or No Action, would provide no protection to any of the recreational resources at Lakeshore Park. Present recreational activities would not be disrupted, but the park would continue to have only a small, gravel beach and bluff erosion would continue. The existing parking lot above these bluffs may be subject to undermining and failure.

5.0^ Aesthetics - Construction noises which would occur could be disturbing to visitors in the park if Alternative 2 is carried out. Breakwater construction would be accompanied by the fairly continuous motor noise of cranes moving stone into position. The beach nourishment aspect of the plan would generate noise during earth-moving operations using trucks and bulldozers, which would be moderate to high in intensity but would be fairly localized, of short duration, and would be onshore where sound is likely to be partially absorbed by adjacent vegetation. Climatic conditions of the Lake Erie coast dictate that major construction be accomplished during the spring-to-fall months which is the period of heaviest use of the park and beach. Beach nourishment can be performed in the spring before most bathers frequent the area. Offshore construction activities would present an obstruction to the natural view of the lake and in some ways detract from the scenic beauty of the shore.

5.10 The sand beach that would be constructed should prove to be more aesthetically pleasing than the present gravel beach and actively eroding clay bluffs. In general, the beach would provide more stable shore conditions. The offshore breakwaters would interrupt further an already confined view of the lake.

5.11 Under Alternative 1 (No Action), no additional structures to interrupt the view of the lake would be constructed and those adverse impacts associated with intensive construction activities would be avoided. The beach and bluffs, however, would remain unprotected and subject to erosion scars.

AQUATIC RESOURCES

5.12 Water Quality - Short-term impacts on water quality would occur during construction of Alternative 2. There would probably be some unavoidable spilling of fuels, oil, and grease into the water from the operation of both land-based and marine construction and earth-moving equipment. Considerable amounts of turbidity would be unavoidably created during breakwater construction, as well as during beach nourishment. These would be high-magnitude, short-term impacts and should disappear soon after construction and/or nourishment is completed.

5.13 The presence of offshore breakwaters, implemented to control shoreline erosion, may cause a degradation in water quality in their lee by interrupting normal circulation patterns, resulting in a tendency towards stagnation with a concomitant increase in concentrations of coliform bacteria originating either from bathers or from outside sources. This effect should be lessened by breakwater design which would incorporate open flanks, voids in the stone, and gaps between the structures.

5.14 The No Action alternative would result in no impacts on water quality.

5.15 Aquatic Habitat - Aquatic habitat would be affected under both alternative plans. Under Alternative 2, 0.47 acre of existing aquatic habitat would be lost due to breakwater construction. However, the submerged breakwater surfaces would provide approximately 0.53 acre of new benthic habitat, although considerably more area would be available in the interstices of the structures. Although the placement of stone for construction of the breakwater sections would cover possible spawning habitat for yellow perch, the breakwater material would provide a different and possibly improved habitat for benthic species and a number of fish species, such as white bass. Approximately 2.38 acre of aquatic habitat would be lost due to sand placement and annual nourishment. Under the No Action alternative, no aquatic habitat would be gained or lost due to breakwater construction. However, 0.04 acre would be gained per year due to the loss of terrestrial habitat caused by beach erosion.

AIR RESOURCES

5.16 Air Quality - Air quality in the proposed project area, would be temporarily affected by dust, noise, odors, and vehicle emissions from the operation of construction equipment during implementation of Alternative 2

The construction Contractor would be required to control such emissions and effects where practicable. Some decrease in air quality may also occur as a result of increased park usage. The No Action Plan would have no impacts on air quality.

PLAN ECONOMICS

5.17 If Alternative 2 is implemented, initial investment costs would be $1,340,000 and average annual costs would be $106,000. Average annual benefits would total $300,200, and net benefits (average annual benefits-average annual costs) would be $194,200. The benefit/cost ratio (average annual benefits/average annual costs) for this alternative would be 2.80.

5.18 The No Action alternative, Alternative 1, would have average annual costs of $0, average annual benefits of $5,100, net benefits of $5,100, and no B/C ratio.

LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Impact Statement:

Name	Discipline/Expertise	Experience	Role in Preparing EIS
Mr. Philip E. Berkeley	Aquatic Biology	Five years, wildlife biologist, EIS studies, Buffalo District	Effects on Biological Resources. General EIS Review
Ms. Mary Jo Braun	Political Science/Social Science	Two years, social scientist, EIS studies, Buffalo District	Environmental Impact Assessments
Mr. William Butler	Geography	One year, cartographic aid, Bureau of Land Management; one year, geographer, EIS studies, Buffalo District	EIS Coordinator. Socioeconomic Impacts, Effects on Natural Resources
Mr. Wiener Cadet	Engineering/Civil	Three years, design and civil engineer, Private Consulting Firms; three years, coastal engineer and planner, Buffalo District	Project Manager. Formulation of Alternatives, Needs, Assessment
Mr. Richard H. Lewis	Archaeology/History	Four years, archaeologist, EIS studies, Rock Island and Buffalo Districts	Cultural Resources Impact Assessment

PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT PROGRAM

7.01 Study activities have been coordinated with appropriate Governmental agencies, local private clubs and associations, and the general public. Public participation has been encouraged through public meetings, workshops, and advisory committees, as well as media releases. During preparation of the Stage 2 Detailed Project Report, one orientation meeting, two workshops, and a public meeting were held to keep local cooperators and concerned citizens informed of developments in the study and assess their views and input for incorporation into the planning process.

7.02 On 6 September 1978, an orientation meeting was held at Lakeshore Park to familiarize the various State and local agencies with the role of the U. S. Army Corps of Engineers in this study, and to receive the ideas of these agencies concerning future development of the park in terms of recreational beach requirements and shoreline protection. The local officials in attendance expressed concern that, by the time project construction begins, their share of the costs will have risen and an additional 10 to 15 feet of parkland to the east of the pavilion may be lost. The possibility of classifying this work under Section 14 authority (Emergency Shoreline Protection of Public Works) was brought up, but the parkland being lost could not be considered as an essential public works facility and the project would probably not meet Section 14 economic criteria, therefore, it would not be eligible for Federal funds under this authority. Local officials were concerned about the possible development of a boating marina at the park, but were informed that this type of development is not provided for under the Section 103 authority of this project. The local officials were not sure about what they wanted in the way of a recreational beach, but they wanted the stone revetment, recently placed in front of the park pavilion, to remain.

7.03 On 17 January 1979, a meeting was held with Mr. Hugh Thomas of the Ashtabula County Planning Commission who had been designated as liaison between local agencies and the Corps. The Corps was informed that the Planning Commission is preparing a master plan for development at Lakeshore Park. In relationship to the beach erosion and shoreline protection study, Mr. Thomas felt that the recommended plan would consist of a recreational beach from 700 to 850 feet in length, protected by offshore breakwaters. Also, it seemed that the most important consideration in selecting an alternative as the recommended plan would be project costs. Nevertheless, Mr. Thomas felt that the Corps should discuss the following without regard to costs: (1) beach lengths from 700 to 1,300 feet; (2) the use of groins; (3) an unprotected beach; (4) construction of a breakwater from the CEI plant intake to the east breakwater in Ashtabula Harbor. Mr. Thomas stated that the development of a recreational beach would take priority over a small-boat harbor.

7.04 On 26 April 1979, a workshop meeting was held in the Cleveland, Ohio offices of Woodruff, Inc. (consulting engineers on the "Lake Shore Park Recreation Plan"). Local officials expressed concern over the amount of parking required for the proposed beach. Space for a maximum of about 550 cars had been allotted. Also, if sand is to be brought in by truck for beach nourishment, an access road would have to be provided. Local representatives also stated that water is pumped from the lake to the park ponds in the summer. The pump is located on top of the bluff to the east of the pavilion. The pipe leading to the lake is presently removable but will have to be made fixed with implementation of this project.

7.05 On 26 June 1979, a meeting again was held with Mr. Hugh Thomas of the Ashtabula County Planning Commission. Mr. Thomas stated that parking layouts developed in the "Lake Shore Park Recreation Plan" would satisfy an 800-foot recreational beach and that major changes would have to be made to satisfy a 1,300-foot beach. The Corps was also informed that the Commission's recreational plan proposes the construction of a marina to the west of the pavilion. Mr. Thomas felt at the time that Alternative 2 (800-foot beach protected by two offshore breakwaters) stands the best chance of being adopted by the locals because of parking constraints and cost. Mr. Thomas also commented that the estimated annual maintenance cost allocated for the access road ($200) may be too low.

7.06 On 18 July 1979, a workshop meeting was held at the Ashtabula Township Hall in Ashtabula, Ohio. All attendees were in general agreement that Alternative 2 should be the one to be carried through to detailed design. The local people raised the question as to whether or not the town of Ashtabula could be the Contractor for the beach portion of the project since they have a large supply of sand in the area. With regard to the other alternatives, the local people did not like the idea of beachfill without structural protection (Alternatives 4 and 5) and felt that Alternatives 7, 7A, 8, and 8A were beyond their financial capability.

7.07 On 25 September 1979, a public meeting was held at the Kent State University Auditorium in Ashtabula, Ohio, to discuss Corps work in the study to date. Mr. Vincent D'Angelo of Woodruff, Inc., Consulting Engineers, representing the Ashtabula Township Park Commission, again expressed concern that the $1 million Federal spending limit on the project and present inflation rates will cause the local share of the costs to rise. Local boating interests inquired as to whether or not other Federal funding for breakwater design to accommodate the development of a small-boat harbor was available. One individual suggested that the beach erosion control project be tied in to a comprehensive plan including a small-boat harbor and a diked disposal site for Ashtabula River dredgings.

REQUIRED COORDINATION

7.08 A notice of intent to prepare this Draft Environmental Impact Statement (DEIS) was published in the Federal Register on 19 September 1979. Throughout the study, coordination has been maintained with the U. S. Fish and Wildlife Service (USFWS) who have provided an interim fish and wildlife report and draft Fish and Wildlife Coordination Act report on the possible

impacts of the proposed project (Appendix F). From this coordination, it was determined that the proposed construction would not have significant adverse impacts on fish and wildlife resources. Consultation with the USFWS under Section 7 of the Endangered Species Act determined that the proposed project would not have any adverse impacts on endangered species or designated critical habitat. On 26 August 1980, a public notice and preliminary evaluation under Section 404 of the Clean Water Act was circulated to Federal, State, and local interests to identify any interests which may be affected by the proposed construction of offshore breakwaters and the discharge of beachfill material. After a 30-day review period, no responses were received and, therefore, no Section 404 public hearing will be scheduled. On 20 January 1981, the Ohio Environmental Protection Agency issued a Section 401 Water Quality Certificate for the proposed project (See Appendix F). The National Environmental Protection Act of 1969 (NEPA) requires that this Draft Environmental Impact Statement (DEIS) be circulated for review and comment to all Federal and State agencies having jurisdiction by law or special expertise with respect to any environmental impact involved, or which is authorized to develop and enforce environmental standards. Comments will also be requested from all other parties on the project mailing list and from State and local clearinghouses in accordance with OMB Circular A-95 (Revised). This DEIS, any comments received, and any underlying documents will be made available to the general public pursuant to the provisions of the Freedom of Information Act (5 U.S.C. 552). In addition, a public meeting concerning the information contained in this DEIS and the accompanying Detailed Project Report is tentatively scheduled. Precise information will be released prior to the meeting taking place.

7.09 In accordance with Executive Order 11988 - Floodplain Management, when the head of a Federal agency finds that the only practicable alternative requires siting in a floodplain, the agency shall, prior to taking action, prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain. The evaluation required above is included with this statement for public review. (See Appendix F).

7.10 In order to attain full compliance with the National Historic Preservation Act as amended, the Clean Air Act as amended, the Federal Water Project Recreation Act as amended, and the Land and Water Conservation Fund Act as amended, this DEIS has been circulated to the appropriate Federal agencies for review and comment.

STATEMENT RECIPIENTS

7.11 The remaining required coordination will be accomplished by circulation of the DEIS and/or notice of availability for review and comment. A list of recipients follows:

7.12 Federal

Advisory Council on Historic Preservation
Great Lakes Basin Commission
Great Lakes Fishery Commission
U. S. Department of Agriculture
U. S. Department of Commerce

U. S. Department of Housing and Urban Development
U. S. Department of the Interior
U. S. Department of Transportation
U. S. Environmental Protection Agency
Water Resources Council
Council on Environmental Quality

7.13 State

Ohio State Clearinghouse
Eastgate Development and Transportation Agency
Ohio Department of Health
Ohio Environmental Protection Agency
Ohio Department of Natural Resources
Ohio Department of Energy
Ohio Historic Preservation Office
Northeast Ohio Areawide Coordinating Agency

7.14 Local

Ashtabula County Planning Commission
Ashtabula County Marine Advisory Board
Ashtabula City Council
Ashtabula Town Trustees
Ashtabula Town Park Commission
Ashtabula Port Authority
Ashtabula Area Chamber of Commerce
Ashtabula Public Library
Harbor Public Library

7.15 Legislative

Honorable Howard M. Metzenbaum, U. S. Senator
Honorable John Glenn, U. S. Senator
Honorable J. William Stanton, Representive in Congress
Honorable James A. Rhodes, Governor

7.16 Private Organizations and Individuals

Pinney Dock and Transport Co.
Cleveland Electric Illuminating Co.
Conrail
Union Carbide
Woodruff, Inc.
Snell Environmental Group
T. Baker Smith & Son, Inc.
Brockway Marine, Inc.
Jack's Marine
Great Lakes Tomorrow
Lake Erie Marine Trade Assoc.
Sierra Club, Northeast Ohio Group
A & B Dock Company

Triad Salvage
Ms. Deborah Carr
Mrs. Don P. Cook
Mr. Ralph W. Hakundy
Mr. George Kister
Mr. Larry Martin

PUBLIC VIEWS AND RESPONSES

7.17 The course of study leading up to the Detailed Project Report (DPR) dealt mainly with the initial consideration of all possible alternatives, including the No Action alternative. During this stage, many plans and concerns were submitted to the Corps by the public. The format for this public input was mainly through statements presented through public meetings, workshops, advisory committees, and written correspondence.

7.18 As stated earlier, the primary concerns of the Ashtabula Township Park Commission are the rapid loss of parkland along the bluffs to the east of the pavilion and the restoration of a recreational beach. The local sponsor has stated that the local share of the project cost is the most important consideration in selecting an alternative. In addition, local officials have stated that they want the stone revetment, recently placed in front of the park pavilion, to remain. The U. S. Fish and Wildlife Service also expressed concern that removal of this revetment would disturb or destroy some benthic and fishery habitat. A master plan for the development of Lakeshore Park has been prepared by the Ashtabula County Planning Commission, in conjunction with the consulting firm of Woodruff, Inc. This report ("Lake Shore Park Recreation Plan") has been prepared for, and will have the approval of the Ashtabula Township Park Commission. Consideration is given to scenic parking, erosion control measures, a small-boat harbor facility to the west of the pavilion, swimming beaches, and fishing areas. Parking layouts developed in the plan would accommodate an 800-foot recreational beach and major changes would have to be made to satisfy a 1,300-foot beach. Therefore, any plan for improvement at Lakeshore Park must be consistent with these local development plans.

7.19 Local officials have expressed concern over the length of time involved in final plan implementation which could result in the loss of an additional 10 to 15 feet of parkland and an increase in the local share of the project. The possibility of classifying this work under Section 14 authority (Emergency Shoreline Protection of Public Works) was brought up, but the parkland being lost could not be considered as an essential public works facility and the project would probably not meet Section 14 economic criteria, therefore, would not be eligible for Federal funds under this authority. As a means of reducing the local costs of the project, town officials raised the question as to whether or not the town of Ashtabula could be the Contractor for the beach portion of the project since they have access to a large supply of sand in the area. However, one source of material, the proposed Walnut Beach marina, has been eliminated due to the ecological significance of the wetland at the site. The second source, the CEI intake dredgings, is not suitable for beach nourishment material.

8. INDEX, REFERENCES AND APPENDICES
[Tentatively Selected Plan is Alternative 2]

Subject	Study Documentation: Environmental Impact Statement	Main Report (References Incorporated)	Report Appendices (References Incorporated)
Aesthetics	pp. EIS-18-19, EIS-21-22 para. 4.12, 5.09-5.11	p. 28	Appendix F
Affected Environment	pp. EIS-16-19 para. 4.01-4.16	pp. 15-35	Appendix C, F
Air Resources	p. EIS-19, EIS-22 para. 4.14, 5.16	p. 35	-
Alternatives	pp. EIS-8-14 para. 3.01-3.24	pp. 53-74	-
Areas of Controversy	p. EIS-2, para. 1.10		-
Aquatic Resources	pp. EIS-19, EIS-22 para. 4.13, 5.12-5.15	p. 35, p. 41, p. 44	Appendix F
Comparative Impacts of Alternatives	p. EIS-15 Table 2	pp. 103-118	-
Cover Sheet	p. i		-
Cultural Resources	pp. EIS-17, EIS-20 para. 4.06-4.07, 5.01	p. 19	Appendix F
Economic Resources	p. EIS-19, para. 4.16	pp. 28-32	Appendix C
Environmental Conditions	pp. EIS-16-17 para. 4.01-4.04	pp. 15-35	Appendix C, F
Environmental Effects	pp. EIS-20-23 para. 5.01-5.16	pp. 78, 100-101	-
Implementation Responsibilities	pp. EIS-12-14 para. 3.23, 3.24	pp. 50-51, 78, 89, 120-121	-
List of Preparers	p. EIS-24	See Acknowledgment (viii)	-
Major Conclusions and Findings	pp. EIS-1-2 para. 1.01-1.09	pp. 119-120	-
Need for and Objectives of Action	pp. EIS-5-7 para. 2.01-2.11	pp. 1, 4-5, 15, 35-45	-
Plan Economics	p. EIS-23 para. 5.17-5.18	pp. 52, 60-61, 63-65, 67-68, 70-71, 73-74, 77, 78, 84-89, 90-94	Appendix C
Planning Objectives	pp. EIS-6-7 para. 2.08-2.11	pp. 15, 41-45	-

8. INDEX, REFERENCES AND APPENDICES (Cont'd)
[Tentatively Selected Plan is Alternative 2]

Subject	Study Documentation: Environmental Impact Statement	Main Report (References Incorporated)	Report Appendices (References Incorporated)
Plans Considered in Detail	p. EIS-11-12, 31-32 para. 3.17-3.22	pp. 75, 77-8	Appendix A
Plans Eliminated from Further Study	pp. EIS-8-10 para. 3.01-3.15	pp. 72, 75-83	-
Public Concerns	pp. EIS-5-6 para. 2.04-2.07	p. 4, pp. 35-41, 42-44	Appendix E
Public Involvement	pp. EIS-25-29 para. 7.01-7.19	pp. 5-9, 46-50, 102	Appendix E
Public Involvement Program	pp. EIS-25-26 para. 7.01-7.07	pp. 5-6, 46-50, 102	Appendix E
Public Views and Responses	p. EIS-29 para. 7.17-7.19	pp. 6-9, 46-50, 76, 78, 101-102	Appendix E
Recreation Resources	pp. EIS-18, EIS-21 para.4.09-4.11, 5.07-5.08	pp. 14, 15-25, 94-100	-
Relationship to Environmental Requirements	pp. EIS-3-4 para. 1-12, Table 1	pp. 9, 102	Appendix E, F
Required Coordination	pp. EIS-26-27 para. 7.08-7.10	pp. 5-9	Appendix E, F
Significant Resources	pp. EIS-17-19 para. 4.05-4.16	pp. 15-35, 52-53	Appendix F
Social Resources	p. EIS-19 para. 4.15	pp. 19, 26-28	Appendix C
Statement Recipients	pp. EIS-27-29 para. 7.11-7.16	-	-
Study Authority	p. EIA-5, para. 2.01-2.03	pp. 1-4	-
Summary	pp. EIS-1-4 para. 1.01-1.12	-	-
Table of Contents	pp. ii-iv	-	-
Terrestrial Resources	pp. EIS-18, EIS-20-21 para. 4.08, 5.02-5.05	p. 15	Appendix F
Unresolved Issues	p. EIS-2, para. 1.11	-	-
Without Conditions (No Action)	p. EIS-10, para. 3.16	p. 15-35	-

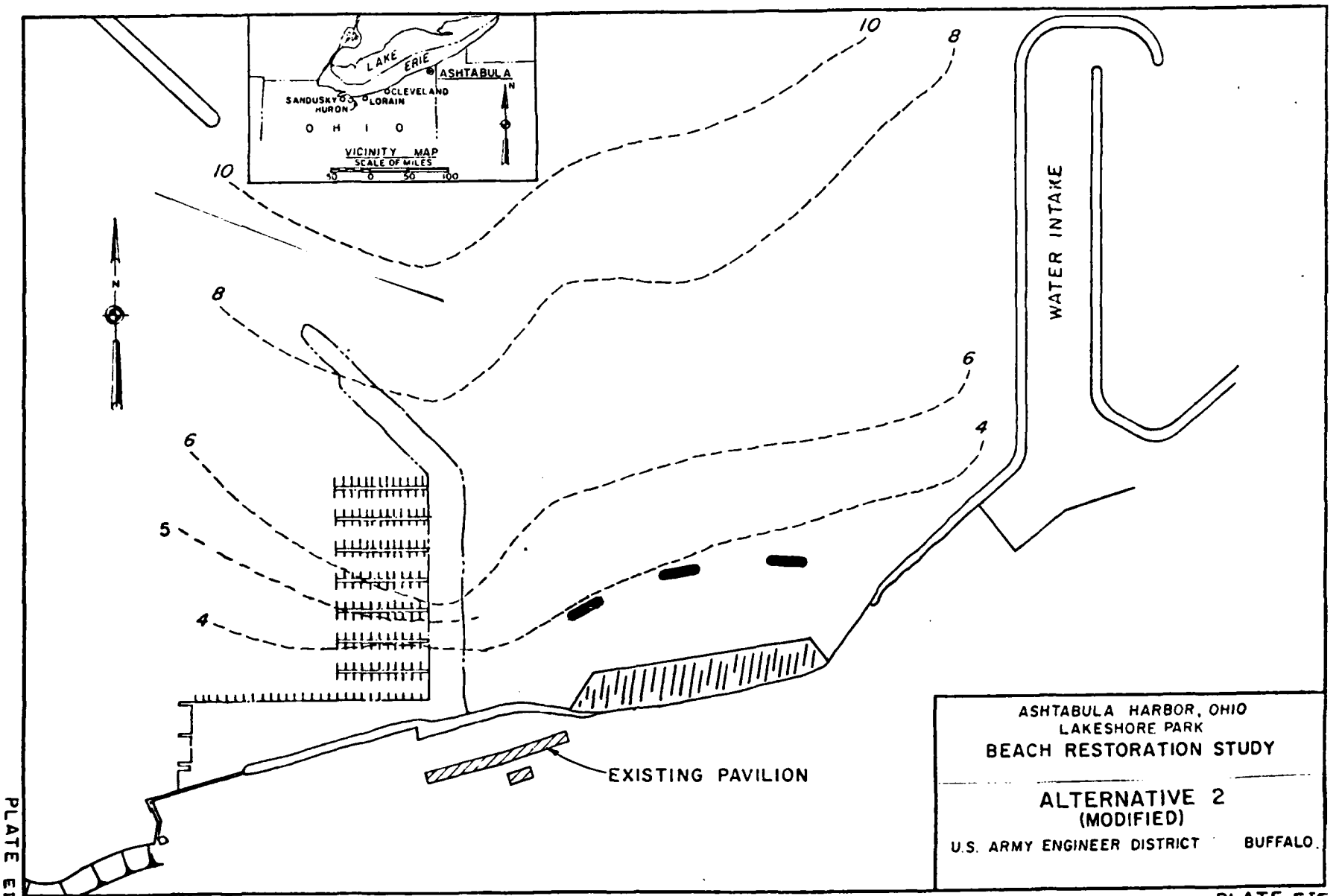
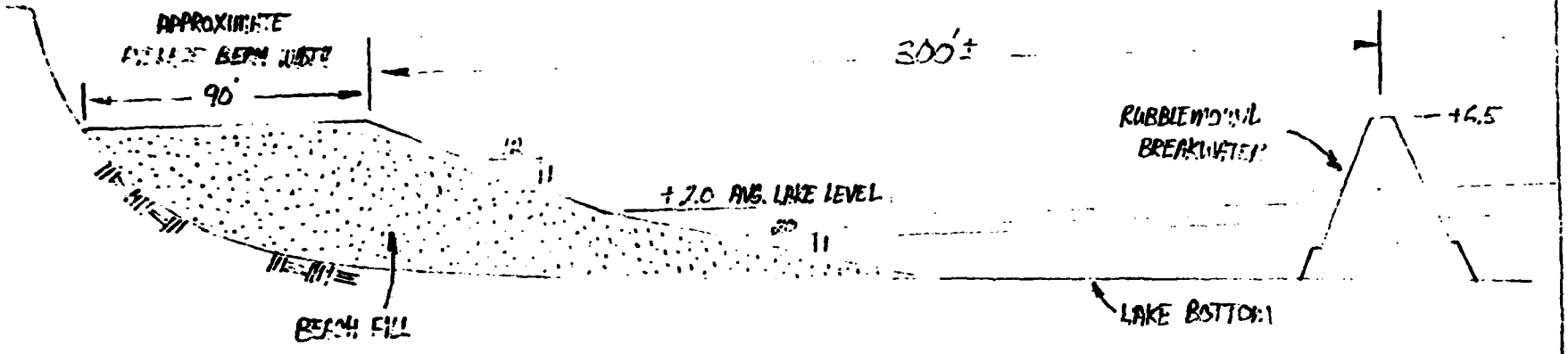


PLATE EIS-1

EIS-32

PLATE EIS-1



AVERAGE BEACH PROFILE
(NOT TO SCALE)

PLATE EIS-2

PLATE EIS-2

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDICES

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX A
DETAILED DESIGN

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

APPENDIX A
DESIGN

TABLE OF CONTENTS

Paragraph	Title	Page
	INTRODUCTION	
A1	GENERAL	A-1
A2	WATER LEVELS	A-1
A3	DESIGN WATER LEVEL	A-1
A4	DEEPWATER DESIGN WAVE	A-6
A5	REFRACTION ANALYSIS	A-10
A6	DESIGN CRITERIA AND ASSUMPTIONS	A-10
A7	ACCESS ROAD	A-17
	BREAKWATER DESIGN	
A8	GENERAL	A-17
A9	DISTANCE OFFSHORE AND DESIGN DEPTH	A-24
A10	LENGTH AND SPACING	A-24
A11	DESIGN WAVES	A-25
A12	BREAKING CONDITIONS	A-30
A13	ARMOR UNIT WEIGHT	A-30
A14	ARMOR LAYER THICKNESS	A-31
A15	CREST WIDTH	A-31
A16	UNDERLAYER	A-31
A17	CREST ELEVATION	A-32
	BEACH DESIGN	
A18	GENERAL	A-35
A19	BEACH DIMENSIONS	A-35
A20	BEACH CONFIGURATION AND QUANTITIES	A-37
A21	BEACH CREST ELEVATION	A-37

TABLES

Number	Title	Page
1	Deepwater Wave Characteristics	A-6
2	Significant Deepwater Wave Heights	A-8
3	Significant Period by Angle Classes and Wave Heights	A-9

APPENDIX A
DESIGN

TABLE OF CONTENTS (Cont'd)

FIGURES

Number	Title	Page
1	Wind Diagram for Ashtabula Harbor	A-2
2	Lake Erie Annual Mean Levels Frequency Curve	A-3
3	Cleveland, OH, Annual Peak Rise Frequency Curve	A-4
4	Erie, PA, Annual Peak Rise Frequency Curve	A-5
5	Angle Classes and Wave Direction	A-7
6	Refraction Diagram N10°E, T=6.5 secs	A-11
7	Refraction Diagram N20°E, T=6.5 secs	A-12
8	Refraction Diagram N30°E, T=6.5 secs	A-13
9	Refraction Diagram N30°W, T=7.4 secs	A-14
10	Refraction Diagram N12°W, T=7.4 secs	A-15
11	Refraction Diagram N 2°W, T=7.4 secs	A-16
12	Plan of Geophysical Profiles	A-18
13	Geophysical Profiles	A-19
14	Geophysical Profiles	A-20
15	Location of Beach Service Access Road	A-21
16	Typical Road Cross Section	A-22
17	Typical Road Profile	A-23
18	Gross and Net Wave Directions	A-27
19	Diffraction Analysis through Breakwater Gaps	A-28
20	Sand Fill Gradation Curves	A-36

PLATES

Number	Title	Page
1	Long Term Beach Plan View and Breakwater Layout	A-38
2	Beach Profiles	A-39
3	Typical Breakwater Section	A-40

APPENDIX A
DESIGN WAVE ANALYSIS

INTRODUCTION

A1. GENERAL

This Appendix contains information on the recreational beach, design criteria, assumptions, and detailed design of the breakwater structures to be constructed at Lakeshore Park, Ashtabula, OH, under the Corps Section 103 Beach Erosion and Shoreline Protection Project. This analysis will be conducted using the same basic plan as proposed in the selected Stage 2 report (Alternative 2) but with modified configuration of the structures and beach as shown on Plate 1 of this Appendix.

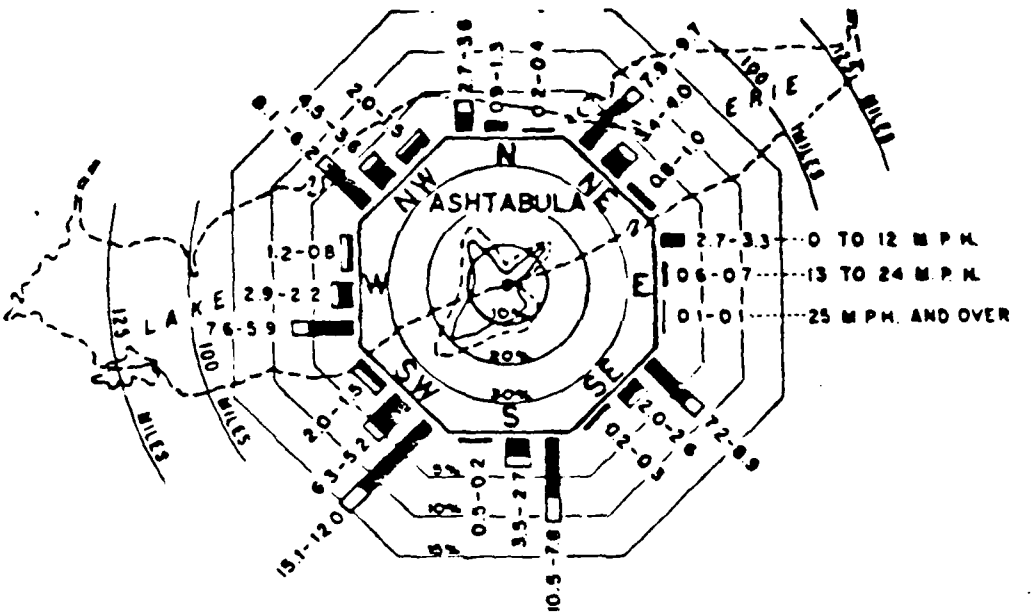
A2. WATER LEVELS

Water surface elevations on the Great Lakes vary irregularly from year to year. During each year, the water surfaces consistently fall to their lowest stages during the winter and rise to their highest stages during the summer. Yearly and seasonal fluctuations are caused by variations of precipitation rate within the Great Lakes area. In addition to annual and seasonal fluctuations, the Great Lakes are subject to short-term fluctuations caused by meteorological disturbances. Differences in barometric pressures and wind blowing over the surface of the lake cause temporary water fluctuations which vary locally. (Reference wind diagram for Ashtabula, OH, Figure 1)

A3. DESIGN WATER LEVEL

The Lake Erie water elevation used as a reference in this analysis is low water datum (IGLD, 1955), which is 568.6 feet. The design water level is used to determine the structural stability of the rubblemound breakwaters during all seasons of the year. A 200-year recurrence interval for the combination of water level and wave height was used for the structural design of the proposed breakwaters at Lakeshore Park, Ashtabula, OH. The recurrence interval was obtained by the combination of a 10-year wave height, and a 20-year annual mean lake level, as recommended by NCD in the NCDED-H letter dated 4 May 1976, Subject: Guidance For Use of WES Technical Report H-76-1, Design Wave Information for the Great Lakes. Using the "Standardized Frequency Curves for Design Water Level Determination on the Great Lakes" developed by the Detroit District and dated May 1979, the 20-year annual mean water level for Lake Erie is 573.1 (Figure 2). Since Ashtabula is mid-way between Cleveland, OH, and Erie, PA, the 1-year peak rise which is 1.1 feet was obtained by interpolation between Cleveland, OH (peak rise .9, Figure 3) and Erie, PA (peak rise 1.3, Figure 4). The design water level is therefore:

20-year annual mean water level:	573.1
1-year annual peak rise:	1.1
Design water level:	574.2 (+5.6) LWD



WIND DIAGRAM FOR ASHTABULA, OHIO

NOTES

▬ INDICATES DURATION FOR ICE-FREE PERIOD (MAR. TO DEC INCL.) IN PERCENT OF TOTAL DURATION.

▭ INDICATES DURATION FOR ICE PERIOD (JAN. TO FEB INCL.) IN PERCENT OF TOTAL DURATION.

~ INDICATES PERCENT OF TOTAL WIND MOVEMENT OCCURRING DURING ICE-FREE PERIOD.

····· INDICATES PERCENT OF TOTAL WIND MOVEMENT OCCURRING DURING COMBINED ICE AND ICE-FREE PERIODS

FIGURES AT ENDS OF BARS INDICATE PERCENT OF TOTAL WIND DURATION FOR ICE-FREE PERIOD AND COMBINED ICE-FREE AND ICE PERIODS, RESPECTIVELY.

WIND DATA BASED ON RECORDS OF THE U. S COAST GUARD LIFE BOAT STATION AT ASHTABULA, OHIO FOR PERIOD 1 JAN. 1937 TO 31 DEC. 1968 INCL., LESS 1944, AND 1960

FIGURE 1 - Wind Diagram for Ashtabula Harbor

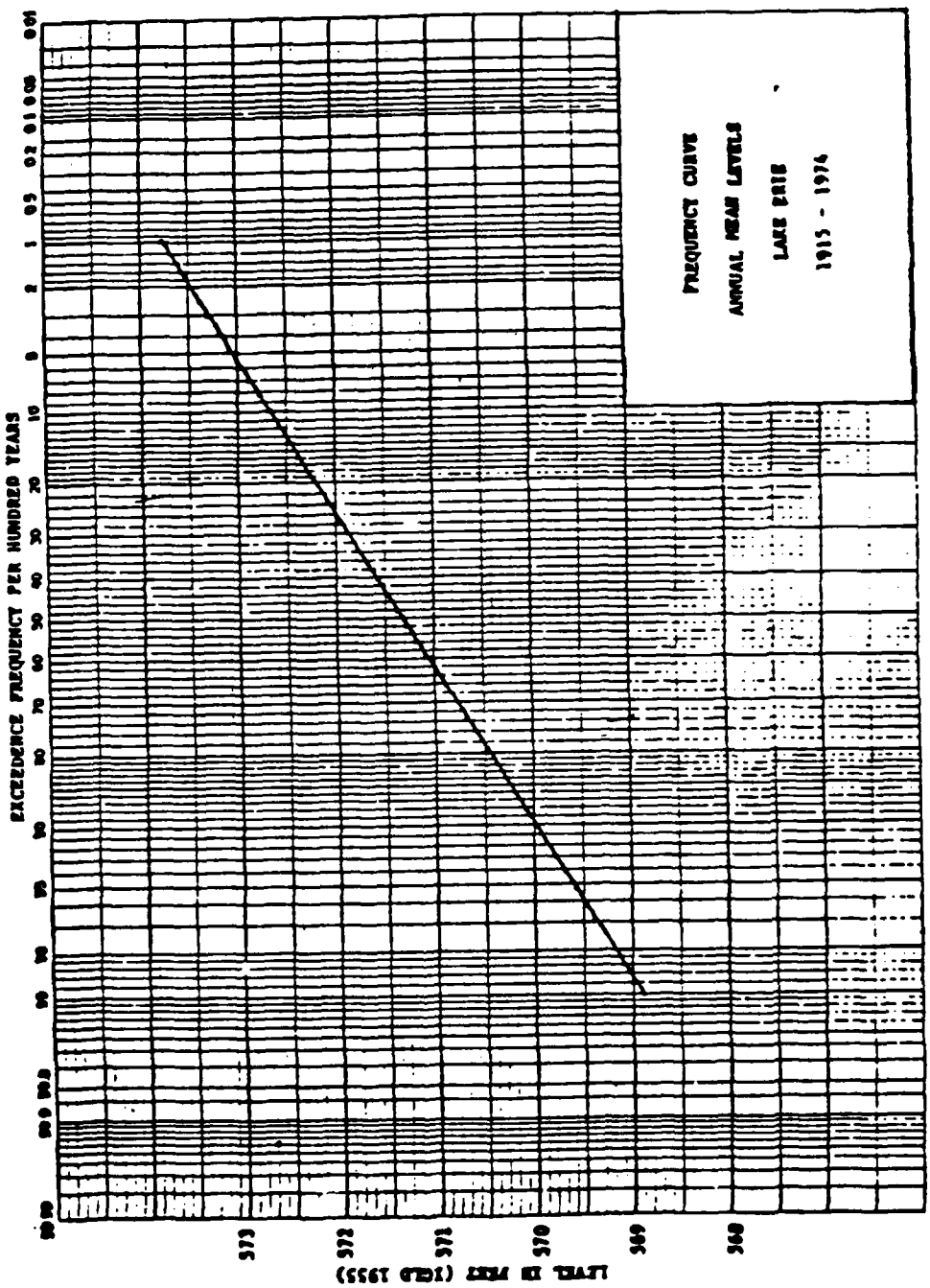


FIGURE 2 - Lake Erie Annual Mean Levels Frequency Curve

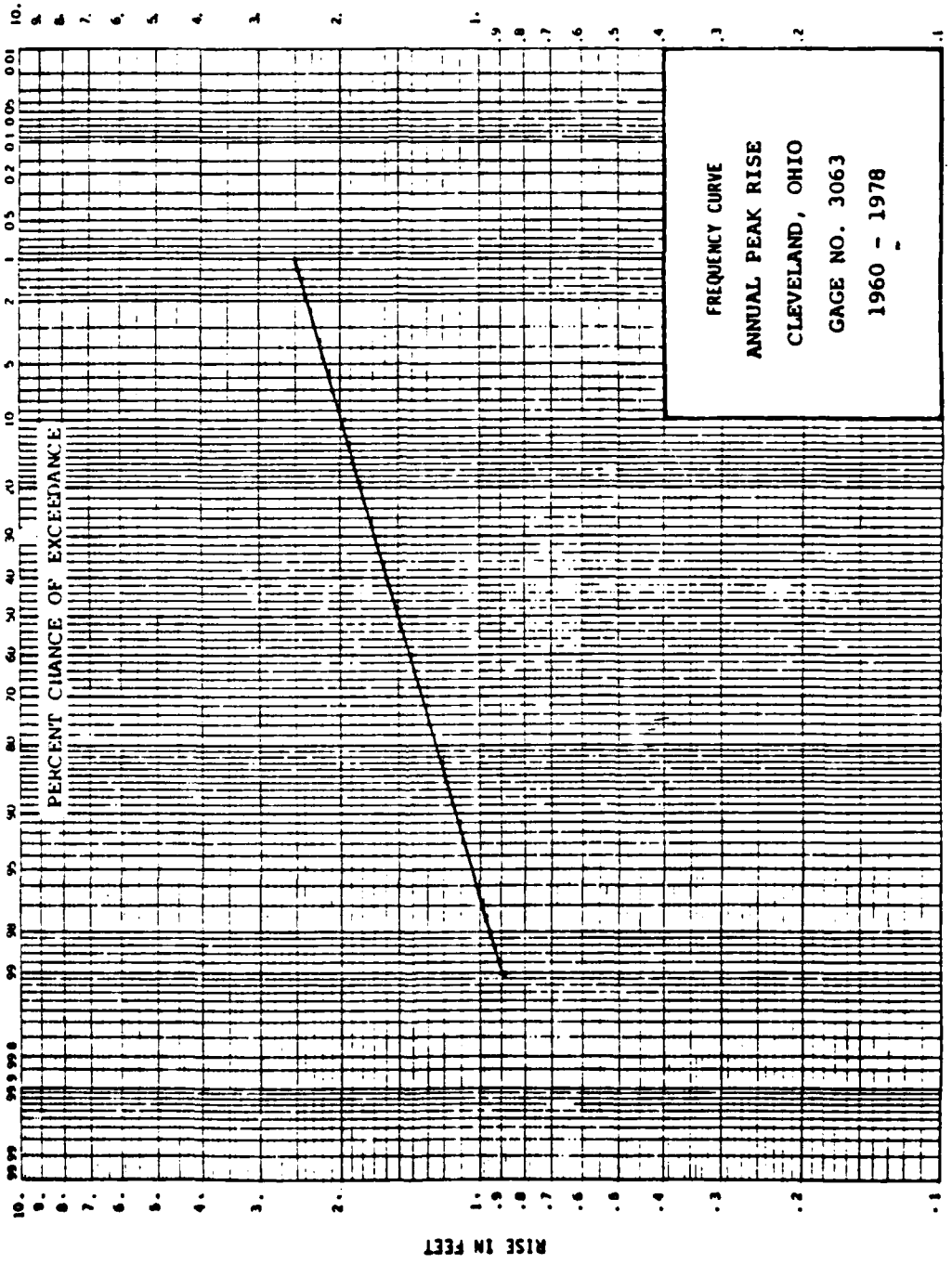


FIGURE 3 - Cleveland, Oh., Annual Peak Rise Frequency Curve

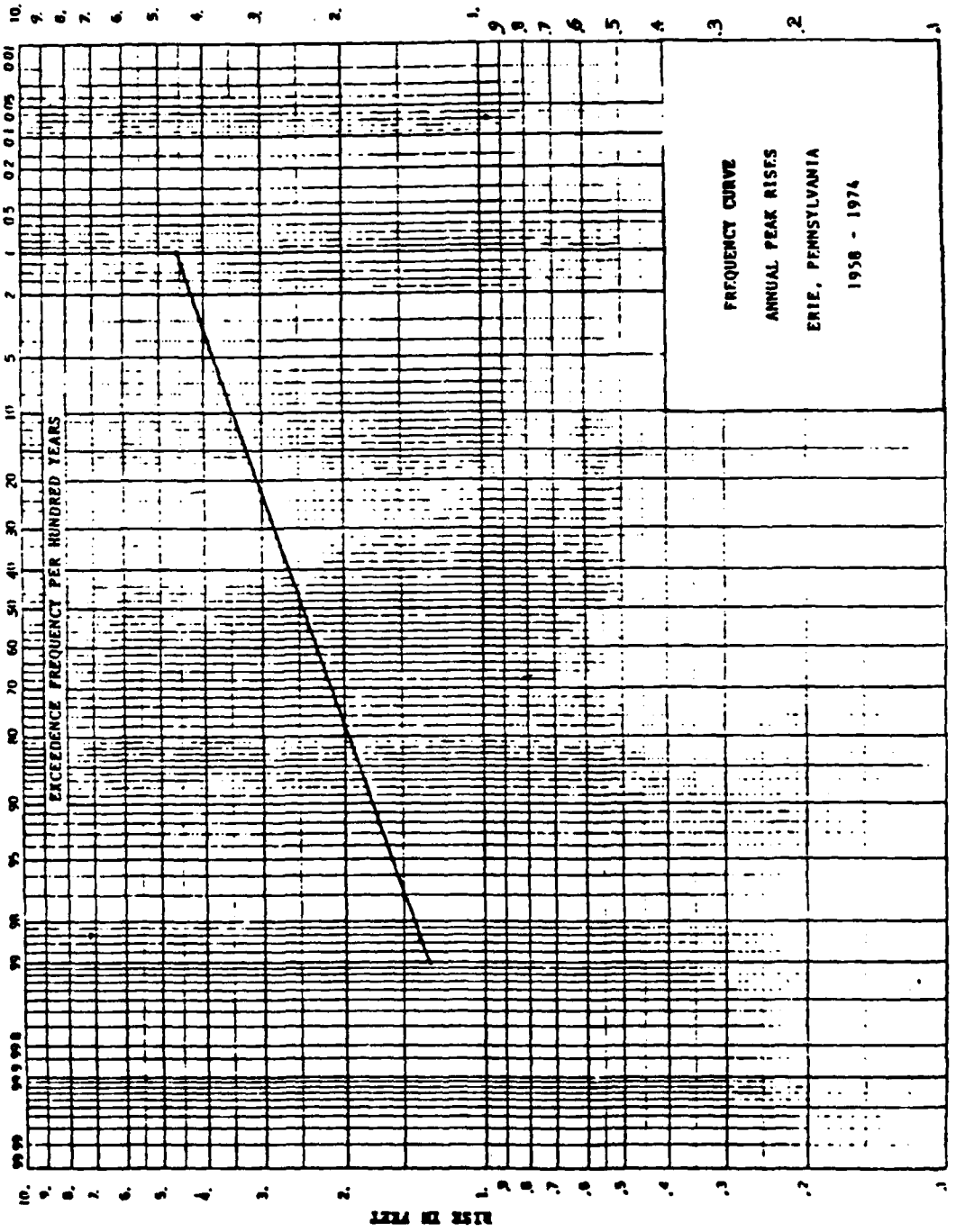


FIGURE 4 - Erie, Pa., Annual Peak Rise Frequency Curve

A4. DEEPWATER DESIGN WAVE

Lakeshore Park, Ashtabula, OH, is exposed to waves approaching from the northeast through north to northwest; however, storms from the north-northwest clockwise through north to north-northeast are likely to cause the most severe wave action at Lakeshore Park. The significant deepwater wave heights and associated periods which could be expected at Ashtabula, OH, were determined by the Waterways Experiment Station and published in Technical Report H-76-1.

Much of the design information in the Shore Protection Manual (SPM) assumes monochromatic waves; however, waves are quite irregular in height, period, and direction with some or most of the waves breaking, or near the point of breaking, during extreme wave conditions. Therefore, Goda's methods for estimating nearshore irregular wave conditions for the case of continuously shallowing bottom contours, were used. (CERC TP 80-3.)

Table 2 of this appendix shows those significant deepwater wave heights for Ashtabula, OH, for three angle classes and each season of the year for various recurrence intervals. Table 3 lists the associated wave periods. The three angle classes (Figure 5) are defined as viewed by an observer standing on shore. They are stratified as follows:

a. Angle Class 1 - Mean wave approach angle greater than 30° to the right of a normal to shore;

b. Angle Class 2 - Mean wave approach angle within 30° to either side of a normal to shore;

c. Angle Class 3 - Mean wave approach angle greater than 30° to the left of a normal to shore.

As can be seen from Figure 5, Angle Class 3 waves are totally blocked by the U. S. breakwaters protecting Ashtabula Harbor. Therefore, only waves from Angle Classes 1 and 2 will be used in the design analysis.

Table 1 below, gives the wave period associated with each 10-year occurrence wave height at Ashtabula, OH, as a function of wave direction and class, as presented in WES Technical Report H-76-1.

Table 1 - Deepwater Wave Characteristics

Angle Class	Wave Height	Wave Periods	General Direction
1	8.5	6.9	NNE and N
2	11.8	7.4	NNW and N

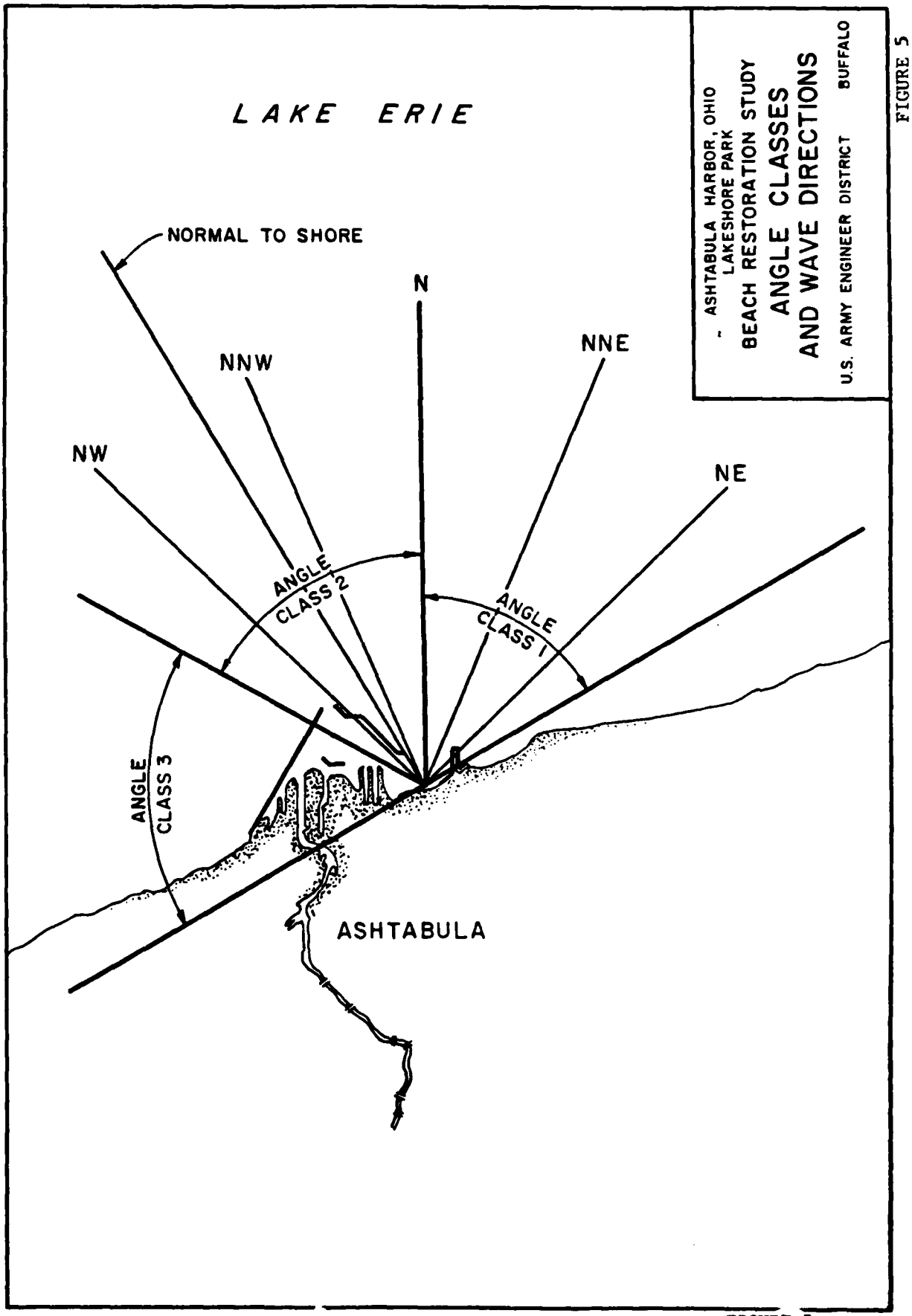


FIGURE 5

FIGURE 5

Table 2 - Significant Deepwater Wave Heights
Grid Location 8.15 Lat = 41.51 Lon = 80.78
Ashtabula, Ohio
Shoreline Grid Point 15

	1	2	3	4
		Winter Angle Classes		
5	4.9 (0.9)	10.2 (0.6)	11.5 (0.3)	12.7 (0.9)
10	7.2 (1.2)	11.8 (0.8)	12.5 (0.4)	13.7 (1.2)
20	9.2 (1.5)	13.4 (1.0)	13.4 (0.5)	14.8 (1.6)
50	12.1 (1.8)	15.4 (1.3)	14.4 (0.7)	16.6 (1.9)
100	14.4 (2.1)	17.1 (1.5)	15.1 (0.8)	18.2 (2.2)
		Spring Angle Classes		
5	3.0 (0.4)	4.3 (0.8)	6.9 (0.5)	7.9 (0.8)
10	3.9 (0.6)	6.2 (1.0)	8.2 (0.6)	9.2 (1.1)
20	4.9 (0.7)	8.2 (1.3)	9.5 (0.8)	10.5 (1.3)
50	6.6 (0.9)	10.5 (1.6)	11.2 (1.0)	12.4 (1.6)
100	7.5 (1.0)	12.5 (1.8)	12.1 (1.1)	13.8 (1.9)
		Summer Angle Classes		
5	3.9 (1.4)	5.6 (0.6)	6.2 (0.8)	7.2 (1.5)
10	4.6 (1.8)	6.2 (0.8)	7.2 (1.0)	8.0 (1.9)
20	5.6 (2.3)	6.9 (1.0)	8.2 (1.3)	8.8 (2.4)
50	7.5 (2.9)	7.9 (1.3)	9.2 (1.6)	9.9 (3.0)
100	9.2 (3.3)	8.5 (1.5)	9.8 (1.8)	10.8 (3.5)
		Fall Angle Classes		
5	8.2 (0.2)	9.8 (0.5)	10.8 (0.3)	11.4 (8.5)
10	8.5 (0.2)	11.2 (0.6)	11.8 (0.4)	12.4 (0.7)
20	8.9 (0.3)	12.1 (0.8)	12.5 (0.6)	13.4 (0.8)
50	9.5 (0.3)	13.8 (1.0)	13.8 (0.7)	14.8 (1.0)
100	9.8 (0.4)	15.1 (1.1)	14.4 (0.8)	15.9 (1.2)

Table 3 - Significant Period by Angle Class and Wave Height
Grid Location 8.15 Lat = 41.51 Lon = 80.78
Ashtabula, Ohio
Grid Point Number 15

Wave Height (ft.)	Angle Class 1	2	3
1	2.3	2.2	2.3
2	3.6	3.5	3.7
3	4.5	4.4	4.6
4	5.2	5.1	5.3
5	5.8	5.6	5.9
6	6.1	5.9	6.3
7	6.4	6.1	6.7
8	6.7	6.4	7.2
9	7.0	6.7	7.6
10	7.4	6.9	8.0
11	7.7	7.2	8.4
12	8.0	7.5	8.8
13	8.3	7.8	9.3
14	8.6	8.0	9.7
15	8.9	8.3	10.1
16	9.2	8.6	10.5
17	9.5	8.8	10.9
18	9.8	9.1	11.4
19	10.1	9.4	11.8
20	10.4	9.6	12.2
21	10.8	9.9	12.6
22	11.1	10.2	13.0
23	11.4	10.5	13.5
24	11.7	10.7	13.9
25	12.0	11.0	14.3

A5. REFRACTION ANALYSIS

A computer program written by R. S. Dobson at the Waterways Experiment Station, Vicksburg, MS, was utilized to undertake a water wave refraction analysis which describes the shoreward propagation of deepwater waves at Lakeshore Park. Based on offshore bathymetry and deepwater wave conditions and directions, output is in the form of computer drawn plots describing the shoreward propagation of wave orthogonals. Associated with each plot is a listing of respective refraction coefficients that correspond to the path of the wave orthogonals. Refraction diagrams were produced for a total of six different wave directions which fall into the two different angle classes. The refraction diagrams for the two angle classes are shown in Figures 6 through 11. Figures 6, 7, and 8 show wave orthogonals from deepwater wave directions N10°E, N20°E, and N30°E for a wave period of 6.5 seconds (Angle Class 1); while Figures 9, 10, and 11 show wave orthogonals for waves from N30°W, N12°W, and N2°W for a wave period of 7.4 seconds (Angle Class 2). The water level used in computation of the plots was the design water level +5.6 LWD.

The refraction coefficient was determined by averaging the wave refraction coefficients at the proposed structure location for the three refraction diagrams in each angle class. The average refraction coefficient for the Angle Class 1 direction was calculated to be 0.83 while the refraction coefficient for the Angle Class 2 direction was calculated to be 0.79.

A6. DESIGN CRITERIA AND ASSUMPTIONS

The primary purpose of this study is to prevent beach erosion and provide shoreline protection at Lakeshore Park while providing for the restoration of a recreational beach. The new beach will be significantly protected by the existing U. S. breakwaters at Ashtabula Harbor to the west, and the Cleveland Electric Illuminating Company intake channel to the east. Therefore, no significant longshore transport and associated sand losses can be expected from easterly and westerly waves. The beach, however, will be exposed to direct wave attack from NNW through NNE. Based on experience at other locations on the Great Lakes, under the action of those waves, an unprotected sandfill would migrate to the offshore at an estimated rate of 20 percent of the initial quantity of sand per year requiring substantial yearly replenishment. This resulted in the decision to construct offshore breakwaters for what is believed to be the most effective way to control the placed sand losses to 10 percent or less and to maintain a recreational beach.

The stability of the structures was determined using a 20-year recurrence annual mean lake level coupled with a 99 percent chance of exceedence peak rise. This was used in combination with a 10-year recurrent significant deepwater wave height as developed by the Waterways Experiment Station (WES) for Ashtabula, OH. Table 2 of this Appendix contains the significant deepwater wave heights for various recurrence intervals; and Table 3 gives the wave periods associated with these wave heights. The waves from Angle Class 3 were not included in the design due to the protection from this direction provided by the harbor breakwaters. The project is,

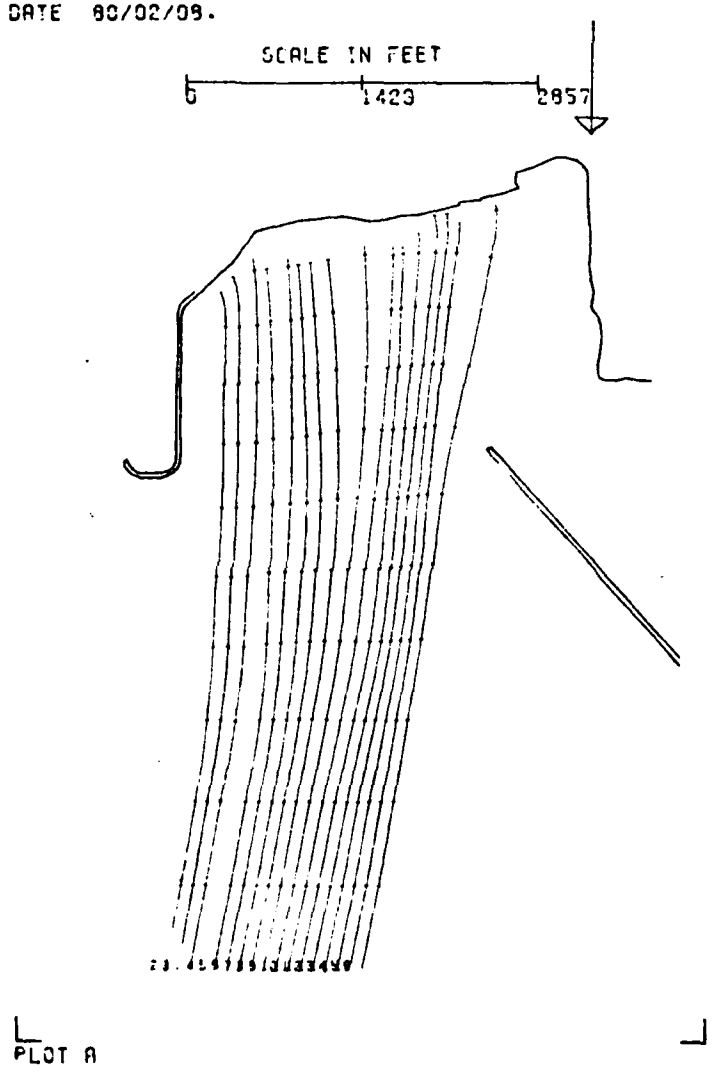


FIGURE 6 - Refraction Diagram, N 10^{o}E, T = 6.5 secs.

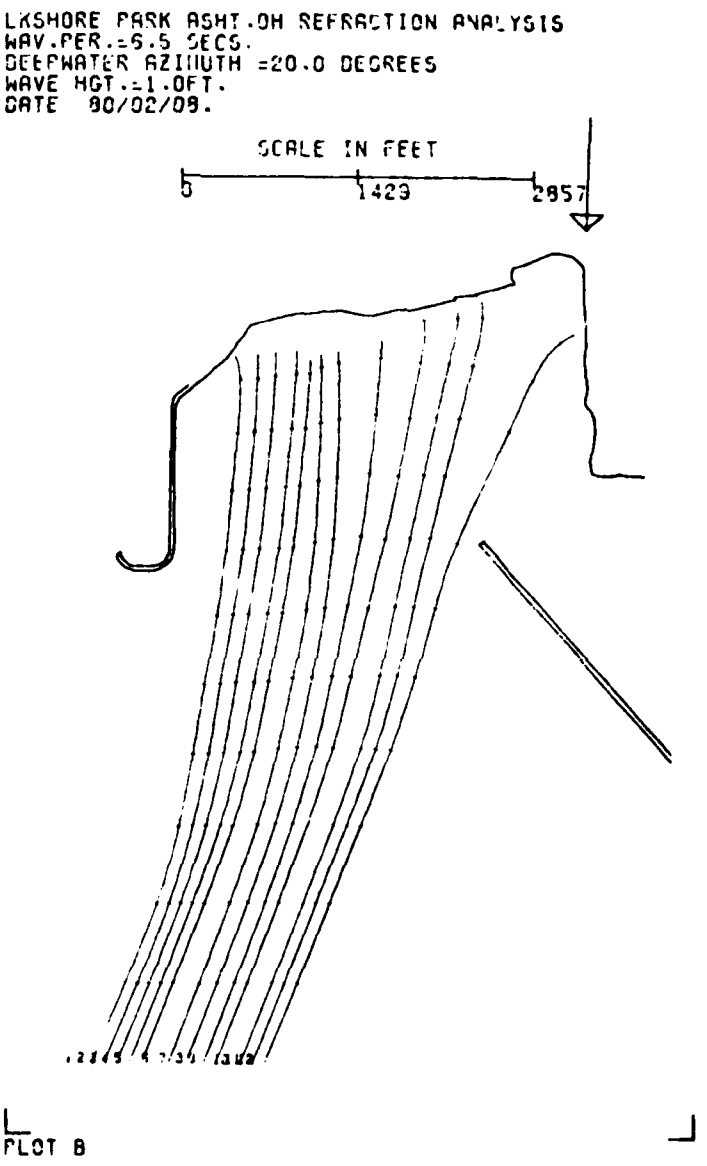
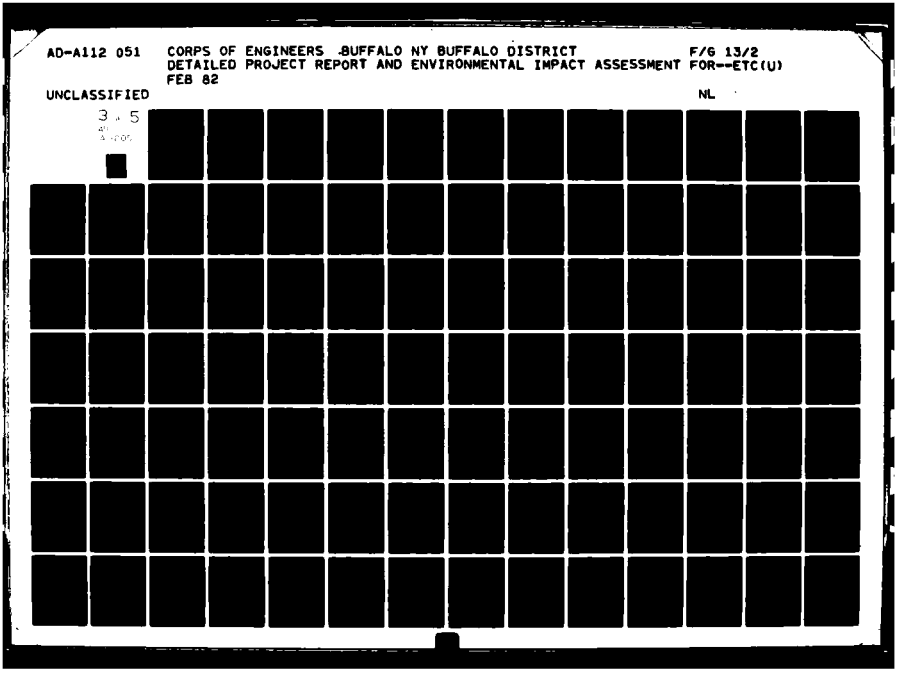
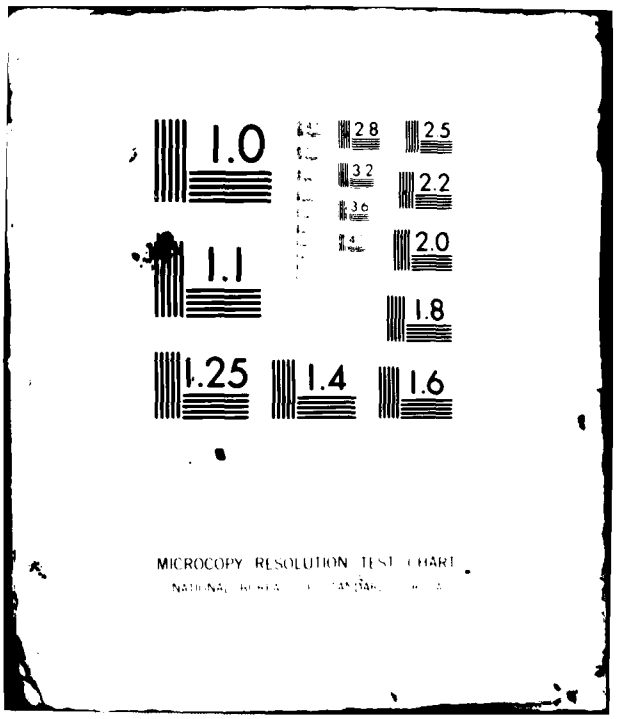


FIGURE 7 - Refraction Diagram, N 20°E, T = 6.5 secs.


AD-A112 051
CORPS OF ENGINEERS BUFFALO NY BUFFALO DISTRICT
DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT ASSESSMENT FOR--ETC(U)
FEB 82
F/G 13/2
UNCLASSIFIED
NL
3 . 5


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
MICROCOPY RESOLUTION TEST CHART

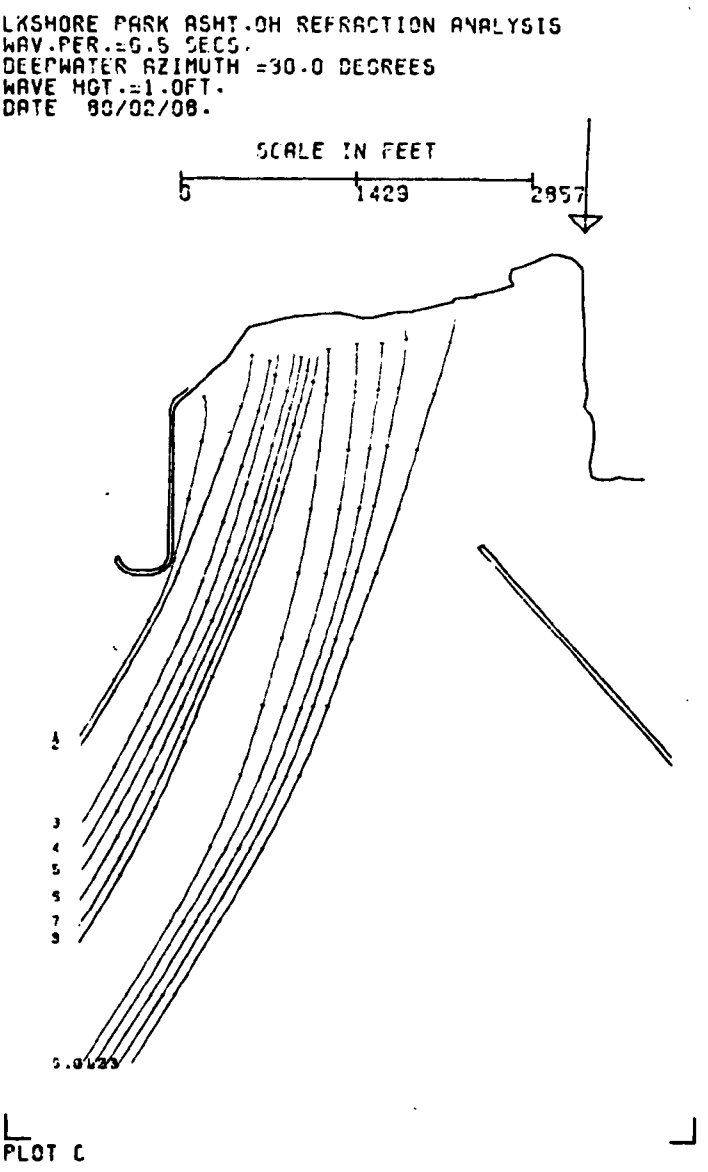


FIGURE 8 - Refraction Diagram N 30°E, T = 6.5 secs.

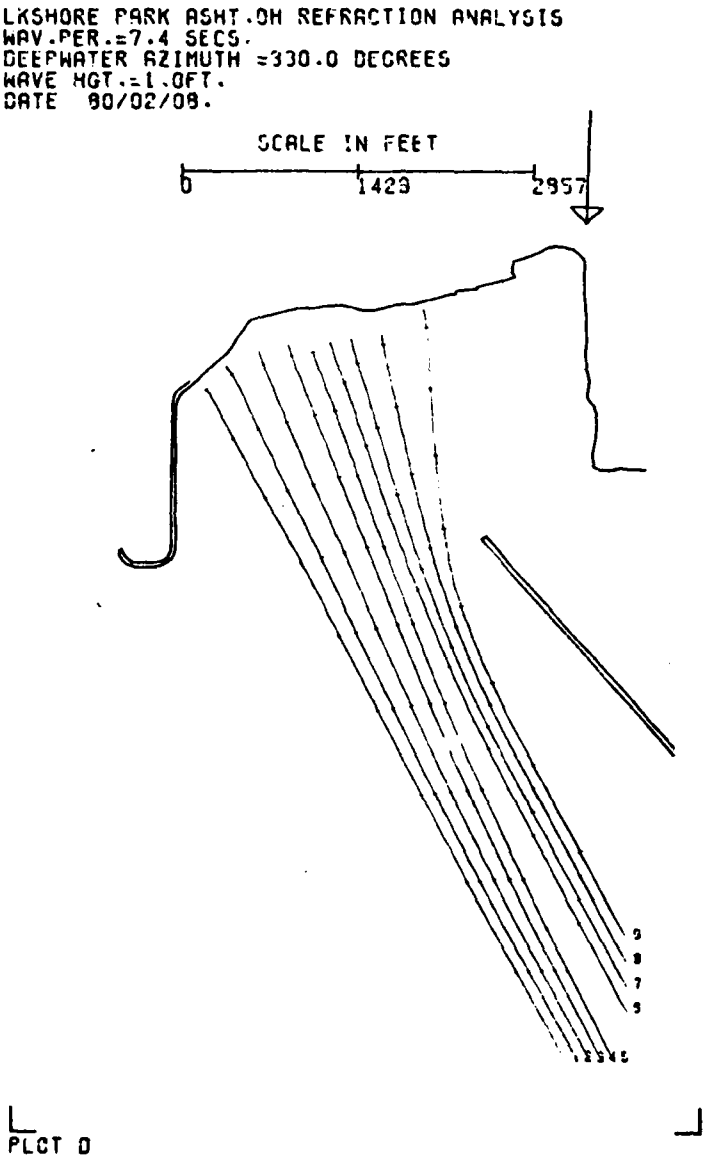


FIGURE 9 - Refraction Diagram, N 30°W, T = 7.4 secs.

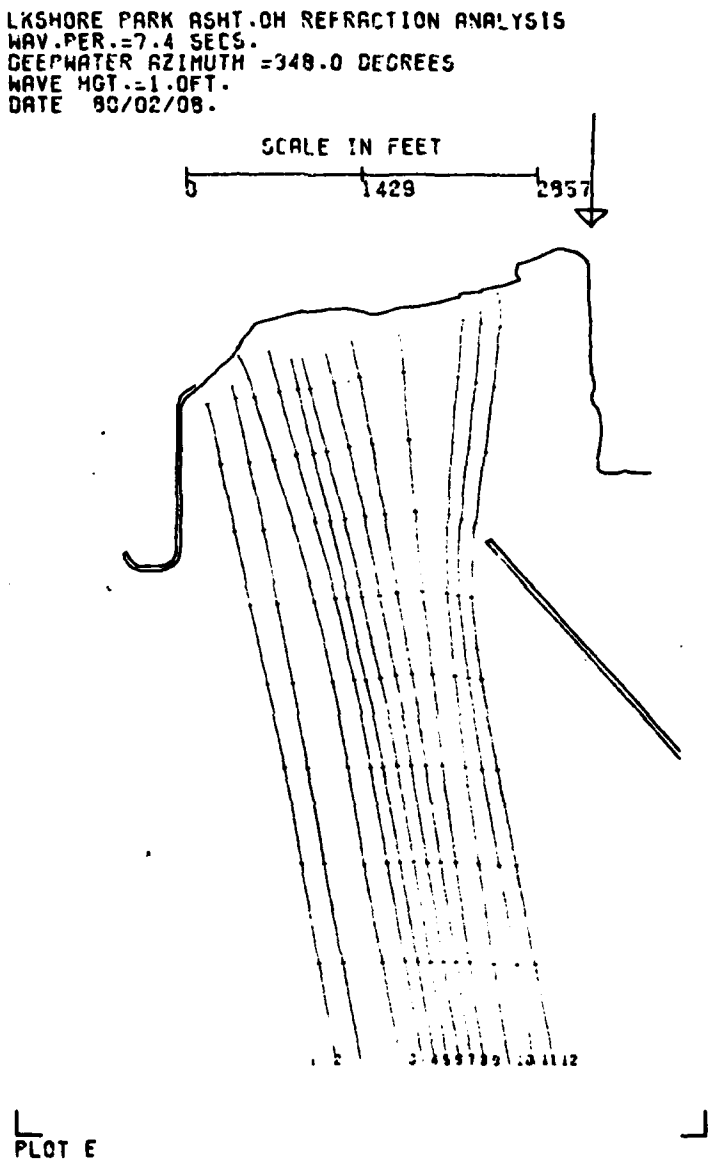


FIGURE 10 - Refraction Diagram, N 12°W, T = 7.4 secs.

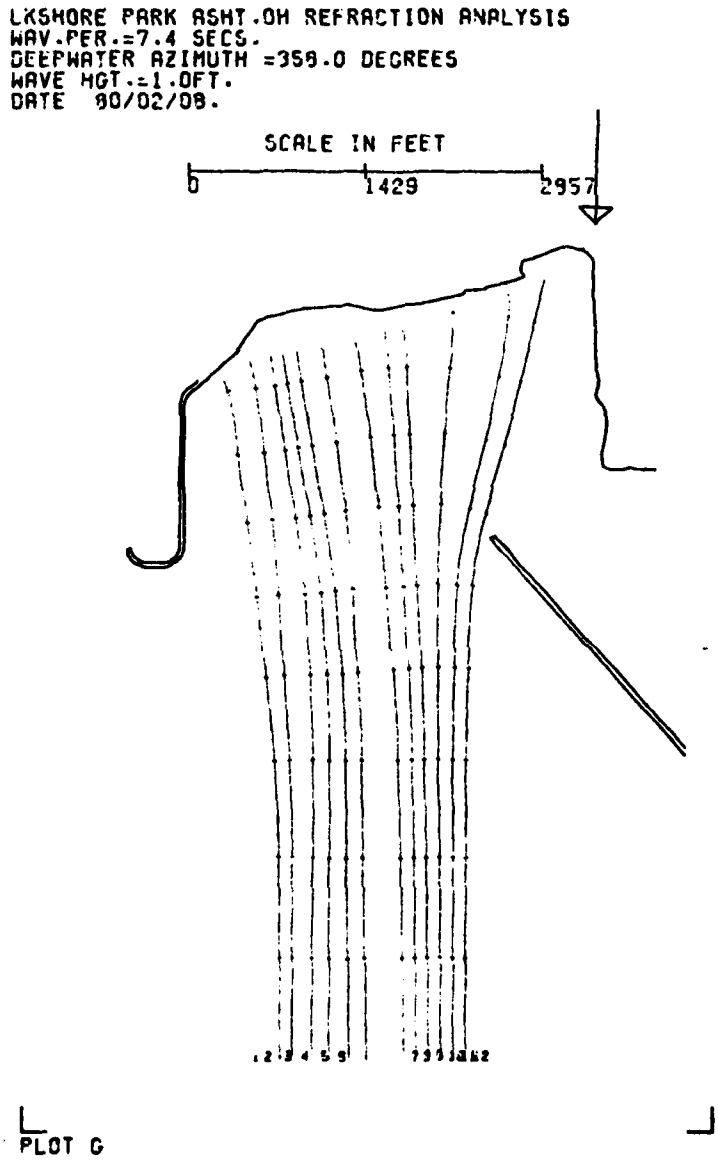


FIGURE 11 - Refraction Diagram, N 20°W, T = 7.4 secs.

therefore, subject to direct wave attack only from Angle Classes 1 and 2. The deepwater waves were transformed to shallow conditions by use of TP 80-3, described earlier, "Estimating Nearshore Conditions for Irregular Waves." This method allows for computation of design wave heights at the point of interest.

The design side slope for the breakwaters is 1 verticle on 2 horizontal for both sides of the structure. The breakwaters will be of rubblemound construction with a life expectancy of 50 years. Rubblemound construction was selected for its efficient wave energy absorbtion and dissipation characteristics. The specific weight of the stone used in the design is 155 pounds per cubic foot. Stability coefficients were selected for breakwater head sections with no damage, minor overtopping criteria, and an armor layer of angular quarry stones randomly placed. The breakwaters will be built on bedrock foundation: A geophysical survey of Ashtabula Harbor made in October 1979 by Woodward-Clyde Consultants, Consulting Engineers and Environmental Scientists for the U. S. Army Engineer District, Buffalo, has confirmed that the bedrock underlying the soils of Ashtabula County is dominantly shale and sandstone of the Devonian and Mississippian system, and that most of the county is underlain by shale of the Ohio formation (see Figures 12-14 for path of geophysical data and related profiles).

A7. ACCESS ROAD

A permanent access road to the beach from the top of the existing bluff will be built to facilitate the initial placement of the beachfill and subsequent periods of annual nourishment. The road will be 15 feet wide by 100 feet long with a 5-foot sidewalk on each side of the road. Typical section and profile of the road are shown on Figures 16 and 17. A plan view of it (road) is shown on Figure 15 taken from the "Lakeshore Park Recreation Plan" developed by Woodruff Inc., Consulting Engineers, Beachwood, OH, for the Ashtabula County Board Commissioners and the Ashtabula Township Park Commissioners.

BREAKWATER DESIGN

A8. GENERAL

The two breakwater system proposed in the Stage 2 documentation was replaced by a three-breakwater system, 125 feet long separated by 200-foot gaps (Plate 1). They will protect an 800-foot long reach of beachfill, located at the foot of an existing clay bluff. As a result of the analysis in paragraphs A9 and A10 and from beach-breakwater system monitoring experience at Presque Isle Peninsula, PA, and Lakeview Park, OH, it was concluded that the breakwaters should be located 3-4 feet below LWD or at an approximate lake bottom elevation 565.0+ which is approximately 250 feet offshore of the restored beach (Plate 2). The central breakwater will be approximately parallel to the shoreline while the eastern and western breakwaters will be at an angle to the shore to provide further protection for the beach during episodes of north-northwesterly or north-northeasterly wave attack.

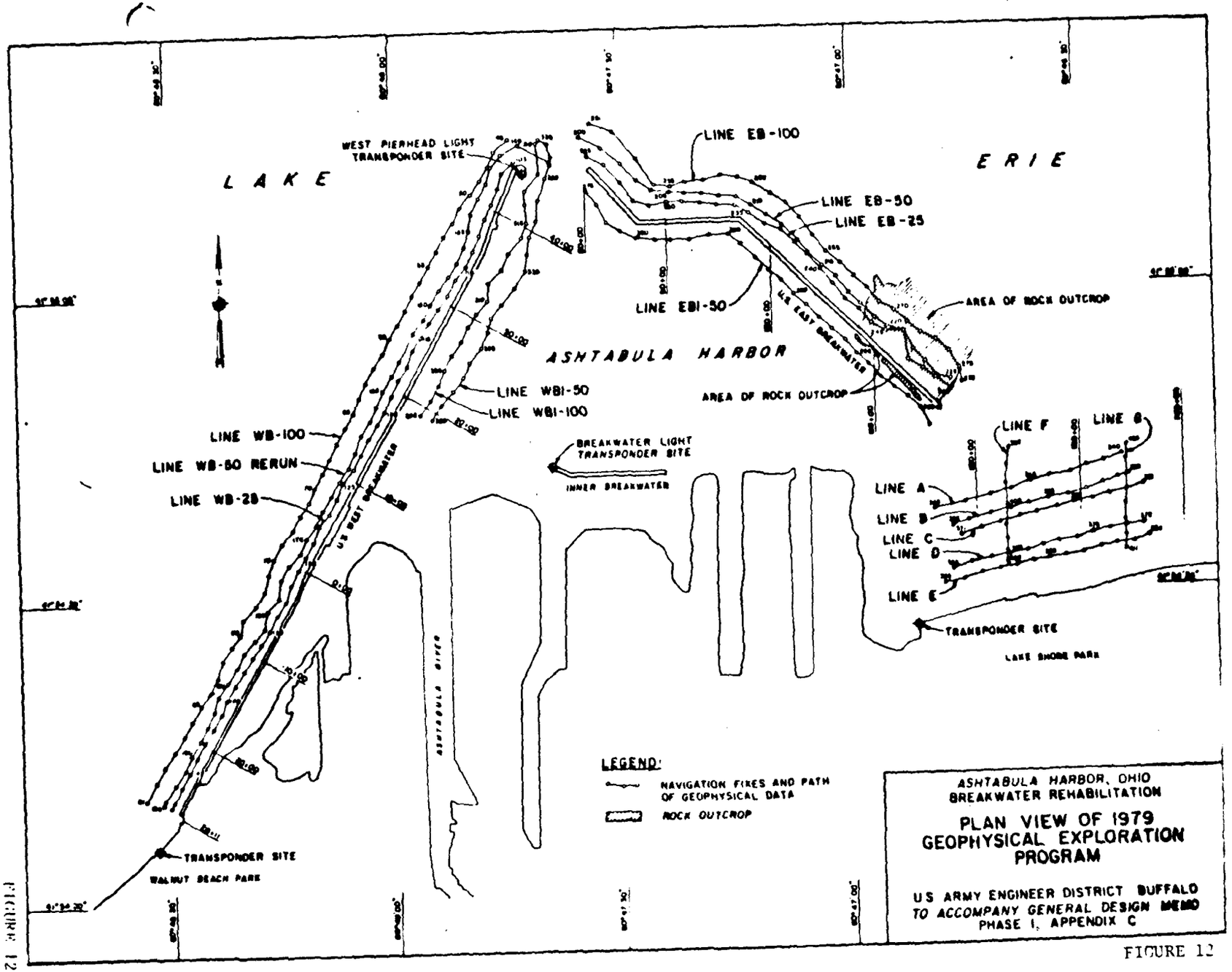


FIGURE 12

FIGURE 12

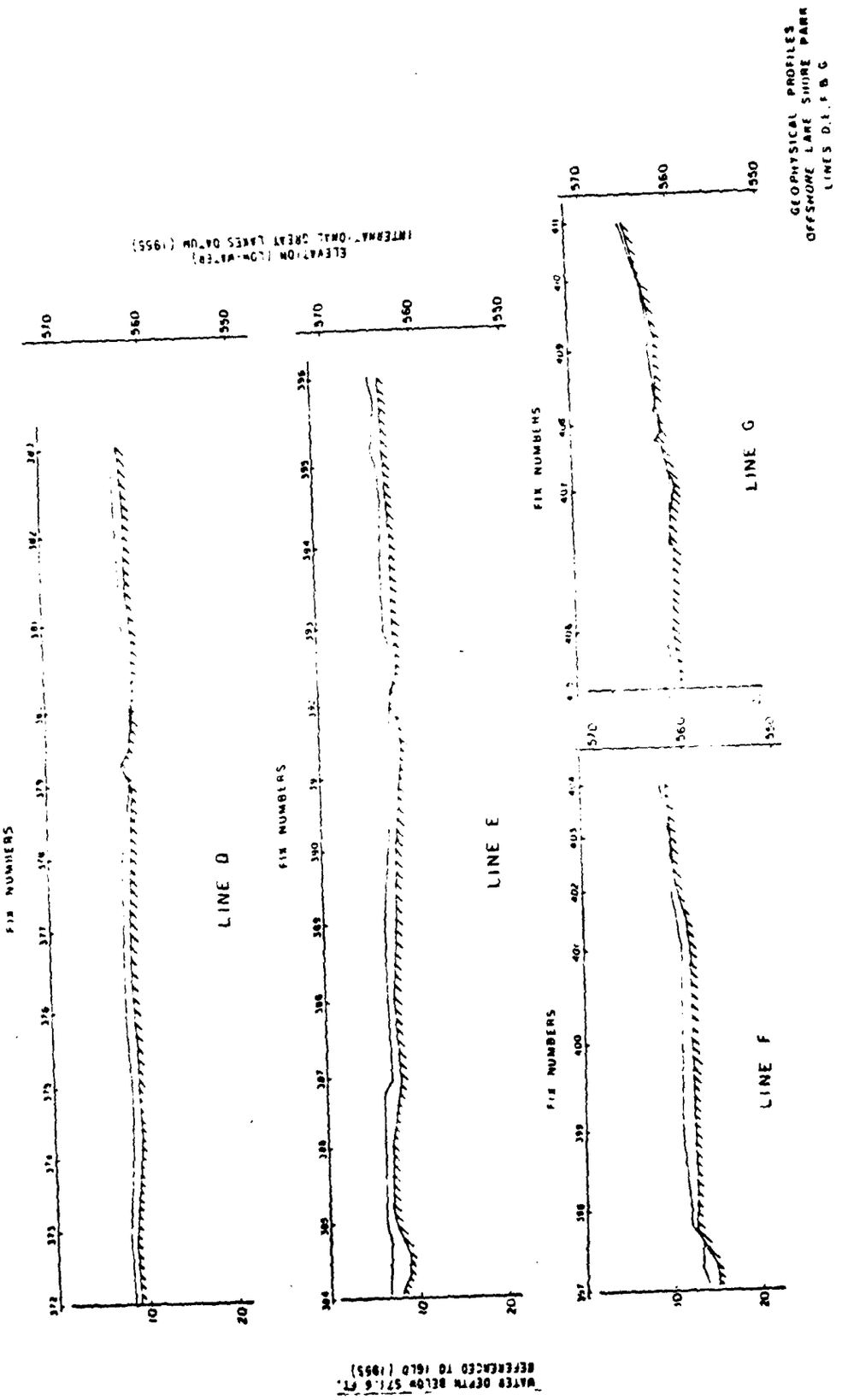


FIGURE 13 - Geophysical Profiles

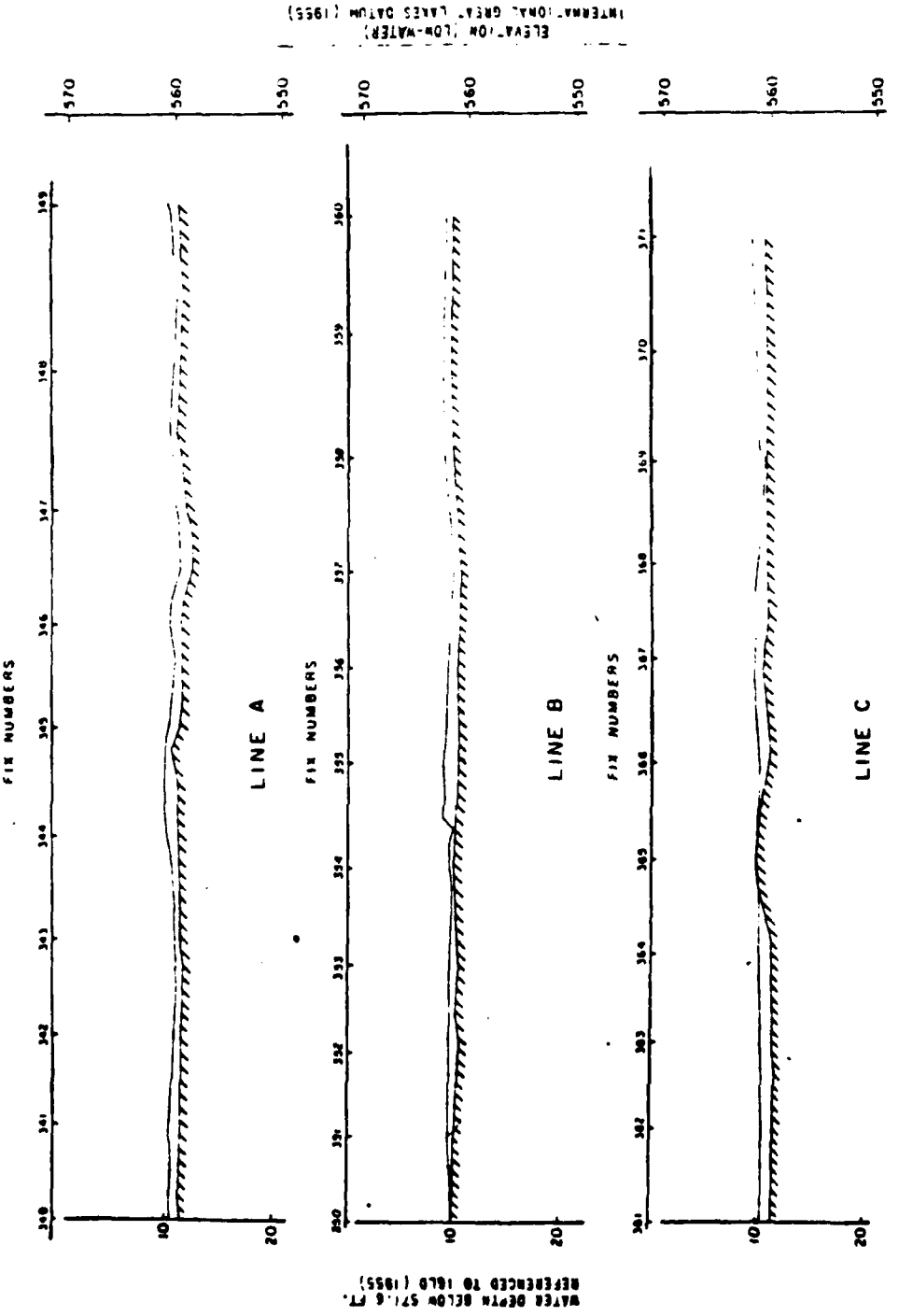


FIGURE 14 - Geophysical Profiles

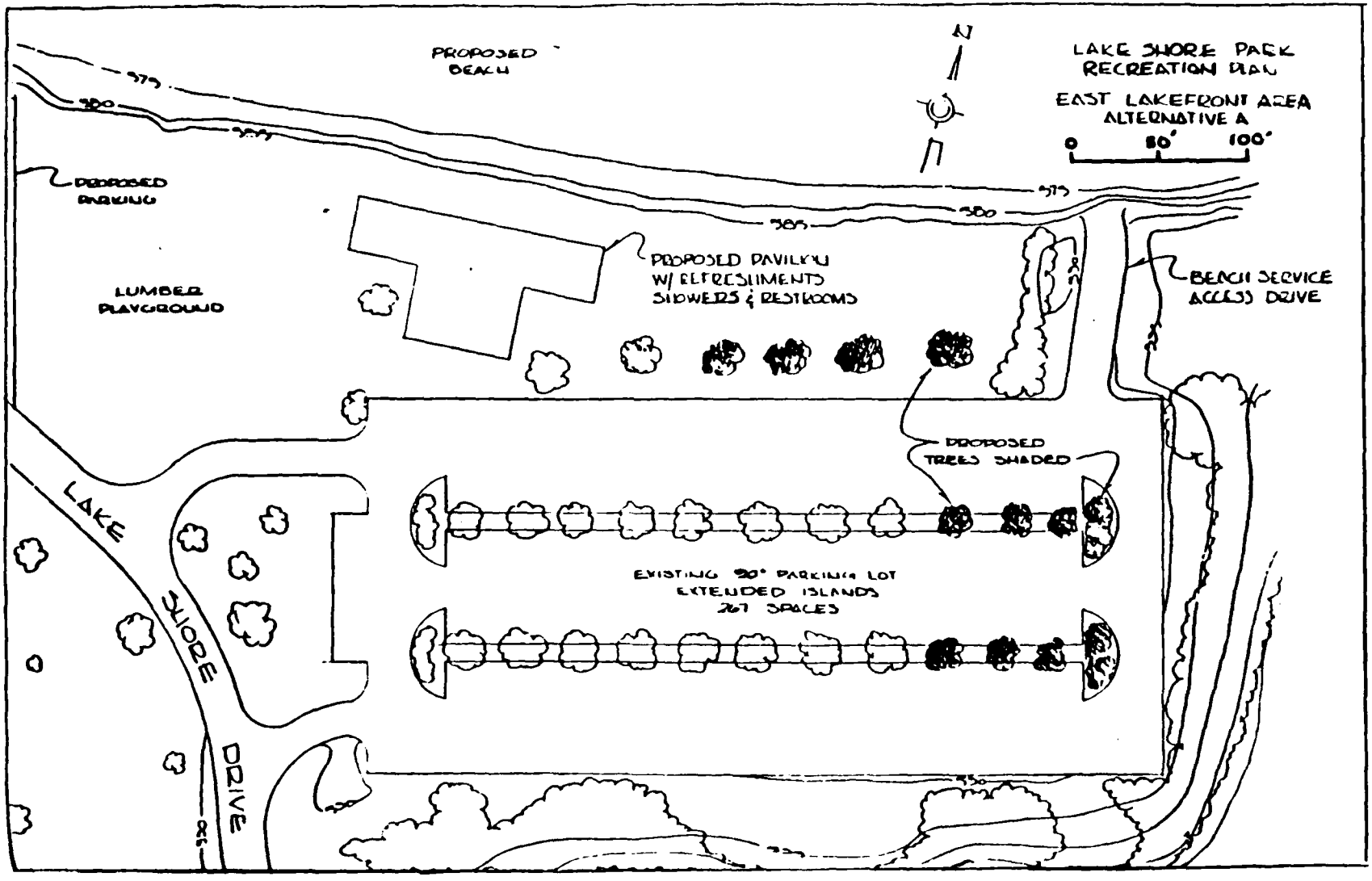
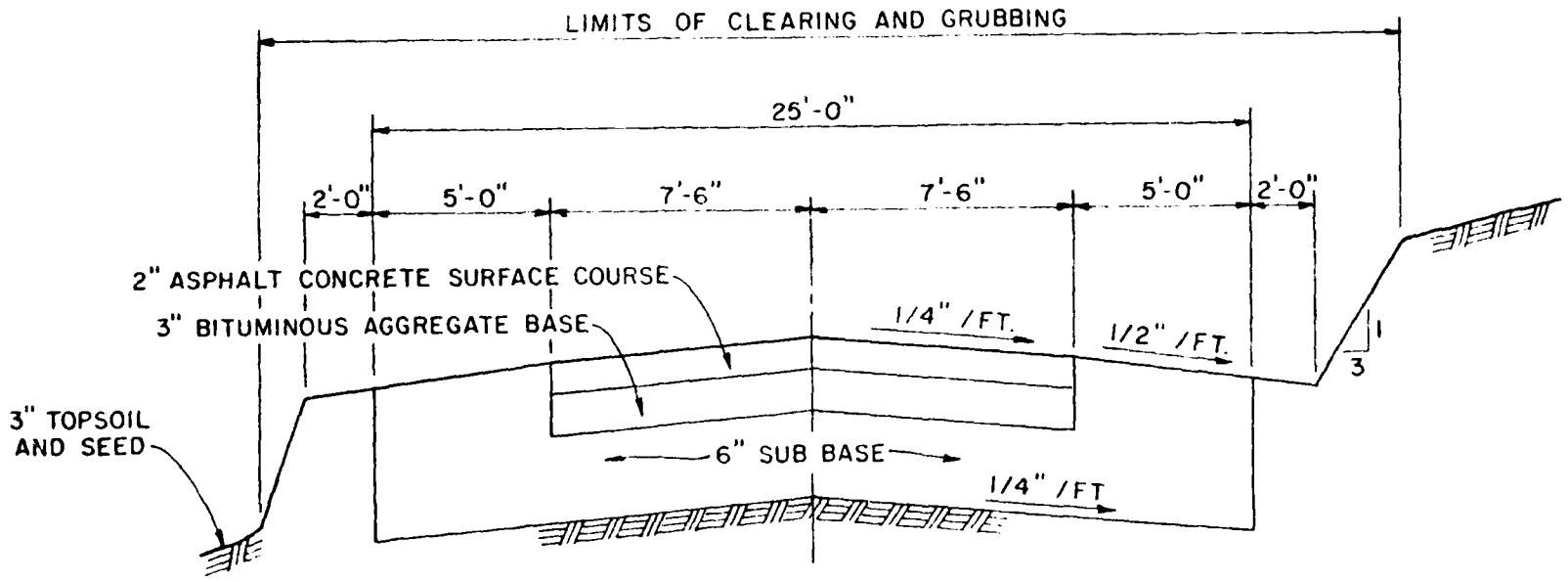


FIGURE 15 – Layout Plan of Beach Service Access Road



TYPICAL SECTION

NOT TO SCALE

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

PERMANENT ACCESS ROAD

U S ARMY ENGINEER DISTRICT BUFFALO

FIGURE 16

FIGURE 16

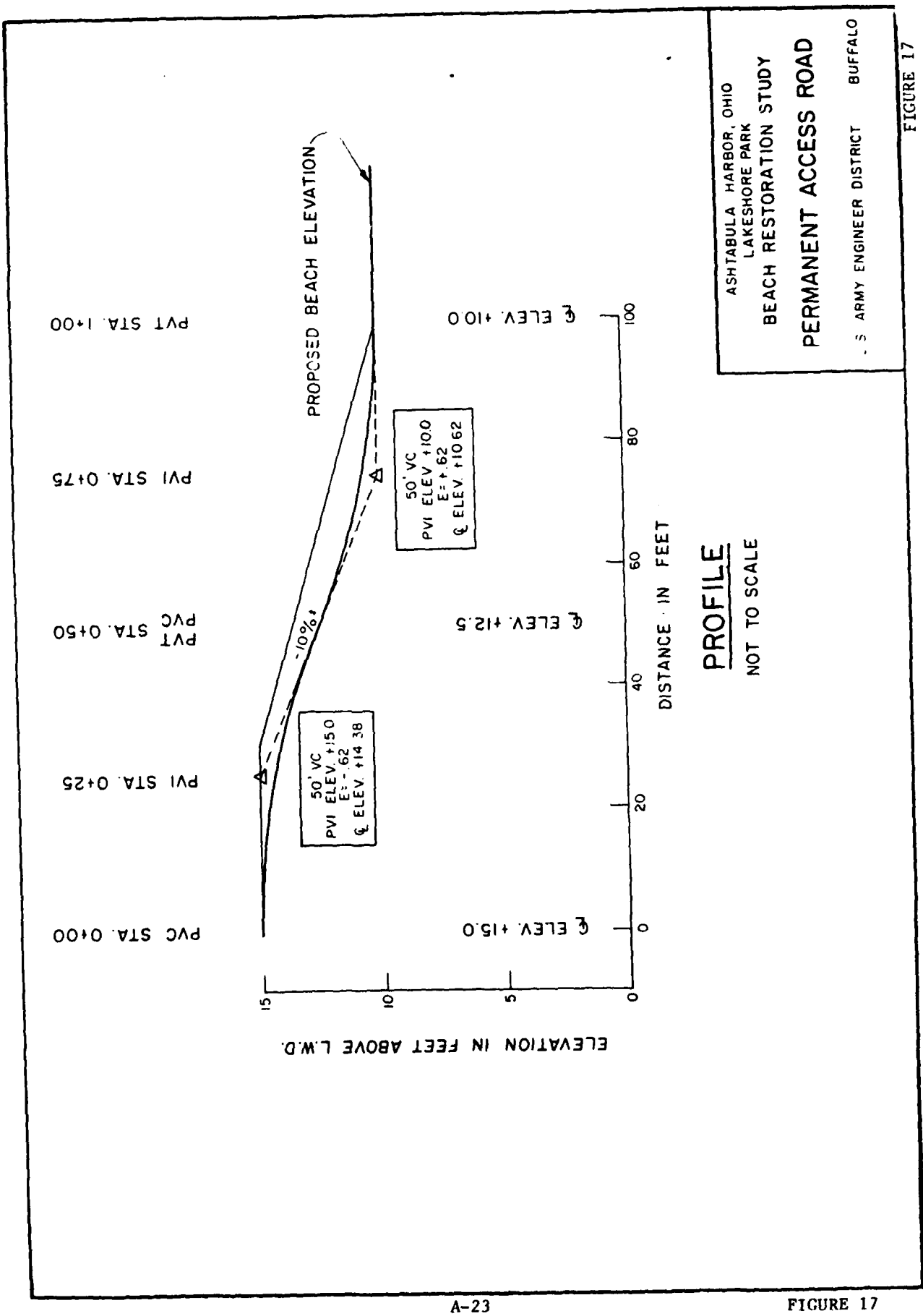


FIGURE 17

FIGURE 17

The breakwaters will be of rubblemound construction and consist of an armor layer on top of an underlayer which will serve as a bedding stone. The design crest elevation is at elevation 575.1 (+6.5) which was computed to allow a maximum 3.0 foot transmitted wave under design conditions. Based on District experience at Lakeview Park, OH, and Presque Isle, Erie, PA, this is the maximum wave that can be allowed without causing excessive damage to the beach.

Armor unit size, layer thickness, crest width, and underlayer material were designed in accordance with procedures presented in the Shore Protection Manual as described in paragraphs A12 through A17. A typical design cross section for the breakwaters is shown in Plate 3.

A9. DISTANCE OFFSHORE AND DESIGN DEPTH

The distance of an offshore breakwater system from the shoreline is dependent on several variables including breakwater length, spacing, wave conditions, bathemetry, and cost. It is not possible to analyze each of these parameters independently and in turn arrive at an optimum breakwater configuration, but rather it should be attempted to assess the relative importance of each with regards to its cost and its functional attributes. In most cases, it can be found the distance offshore, and hence, the design depth are usually controlling factors as determined by the size and purpose of the project along with the cost and method of construction. The other parameters, including breakwater length and spacing, can then usually be tailored to this criteria in a cost-effective manner based on the wave conditions at the site.

This project involves a relatively closed system with a beach of predetermined length and a width of approximately known dimensions. It is, therefore, desired to keep the breakwaters as close to shore as possible to minimize the total footage required to protect the area, thereby minimizing the cross sectional area of the breakwaters and, hence, the cost. However, the breakwaters must also be far enough from shore to maintain a stable beach, provide enough recreational area, and also to allow adequate depth of water for floating plant to operate since this would be the least expensive mode of construction. Based on these constraints and on a preliminary evaluation of the anticipated beach profiles, the most suitable location for the breakwaters is 350 to 400 feet from the existing shoreline and at a depth of -3 to -4 feet LWD. With a design water level of 574.2, this equates to a maximum design depth of 9.6 feet.

A10. LENGTH AND SPACING

While no explicit design criteria exists for selection of the optimum breakwater length and spacing for an offshore breakwater system, engineering judgement based on previous experience along with limited design information must be used. One rule-of-thumb incorporates a diffraction analysis to determine the point of intersection of the $K_D = 0.3$ isolines through the individual breakwater gaps. Through analysis of several case studies, this point has been found to lie near the shoreward terminus of the beach and is also a good indicator that substantial wave energy exists between the beach

and breakwater to prevent total tombolo formation and allow water circulation and the normal littoral drift to bypass the system. This line of analysis was performed by Moffatt and Nichol Engineers for the Lakeview Park, Lorain, OH, beach restoration project. In order to perform a similar analysis for Lakeshore Park, it is first necessary to establish the gross westerly and easterly wave directions. This was done by analyzing the present park layout in relation to the predominant incoming wave directions and establishing the most critical wave approach directions from the easterly and westerly directions. Due to the protection provided by the water intake structures to the immediate east and the U. S. breakwaters to the immediate west, the range of angles of wave approach are very limited. The established gross easterly and westerly wave directions to be used in the wave diffraction analysis are shown in Figure 18.

Diffraction plots were developed using an average wave condition for the gross easterly and westerly wave directions for various combinations of breakwater length and spacing. The diffraction diagrams from the SPM (Figures 2-42 to 2-57) were used as an aid to develop the diffraction plots from which a breakwater configuration was selected and is shown in Figure 19. The breakwater lengths are 125 feet and the spacings are 200 feet. The average wave condition that was used in constructing the diagrams was a 5.0 sec. wave for both the easterly and westerly directions. This wave period is most representable of the waves that will impinge upon the beach. Contours of equal diffraction coefficient for the net wave direction are shown by the dashed lines while diffraction coefficients for the K_D = 0.3 isolines for the gross westerly and easterly directions are shown by the solid lines. Considerably longer breakwaters and shorter gaps would have resulted in an intersection of the K_D - 0.3 isolines considerably closer to shore that would conflict with the anticipated beach dimensions. Considerably shorter breakwaters and larger gaps would not protect the sand beach to the desired degree. The configuration, as shown, should provide the necessary protection to the beach, yet permit adequate wave penetration to prevent tombolo formation and allow continued littoral processes.

The breakwaters are placed in an arcing configuration with the two end breakwaters slightly closer to shore. The westerly breakwater will be approximately 350 feet from the existing shoreline while the central and easterly breakwaters will be approximately 400 feet from the existing shore. This is necessary to give greater protection to the entire beach from the variable incoming wave directions especially since there are no terminal groins to retain the beach from lateral movement. Terminal groins should not be required because of the limited wave energy from Angle Classes 1 and 3 (see Figure 5).

A11. DESIGN WAVES

The design deepwater waves listed in Table 1 along with the refraction coefficients determined in paragraph A5, were used as input to determine the design wave for structural design of the offshore breakwaters. As mentioned earlier, Goda's method for determination of nearshore irregular wave conditions is used to compute the design wave height at the point of interest. As can be seen in the breakwater layout of Plate 1, the breakwaters are to be

placed between the -3 to -4 foot depth contours. The east breakwater is in slightly shallower water and the west breakwater is in slightly deeper water. The design wave to be used for all three breakwaters is to be computed at the -4 foot contour. H_{SIG} will be used opposed to H_{MAX} due to the somewhat protected location of the park which reduces the severity of wave attack. The following computations are performed to determine the significant wave height for the Angle Class 1 and 2 waves.

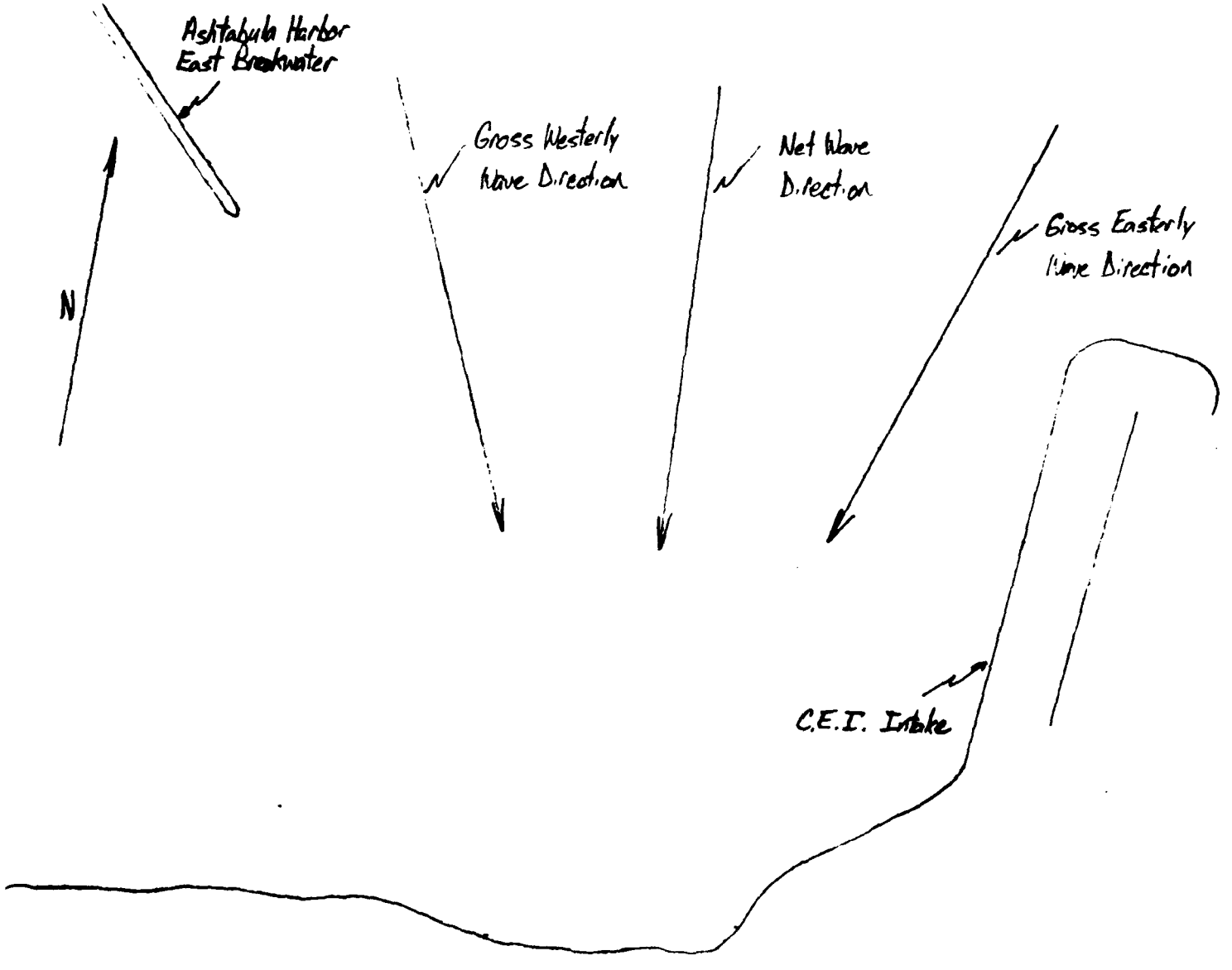


Fig. 18 - Gross and Net Wave Directions

A-27

BY T.J.B. DATE 6/16/81 SUBJECT Diffraction Analysis SHEET NO. ... OF ...
CHKD. BY ... DATE ... Lakeshore Park JOB NO. ...

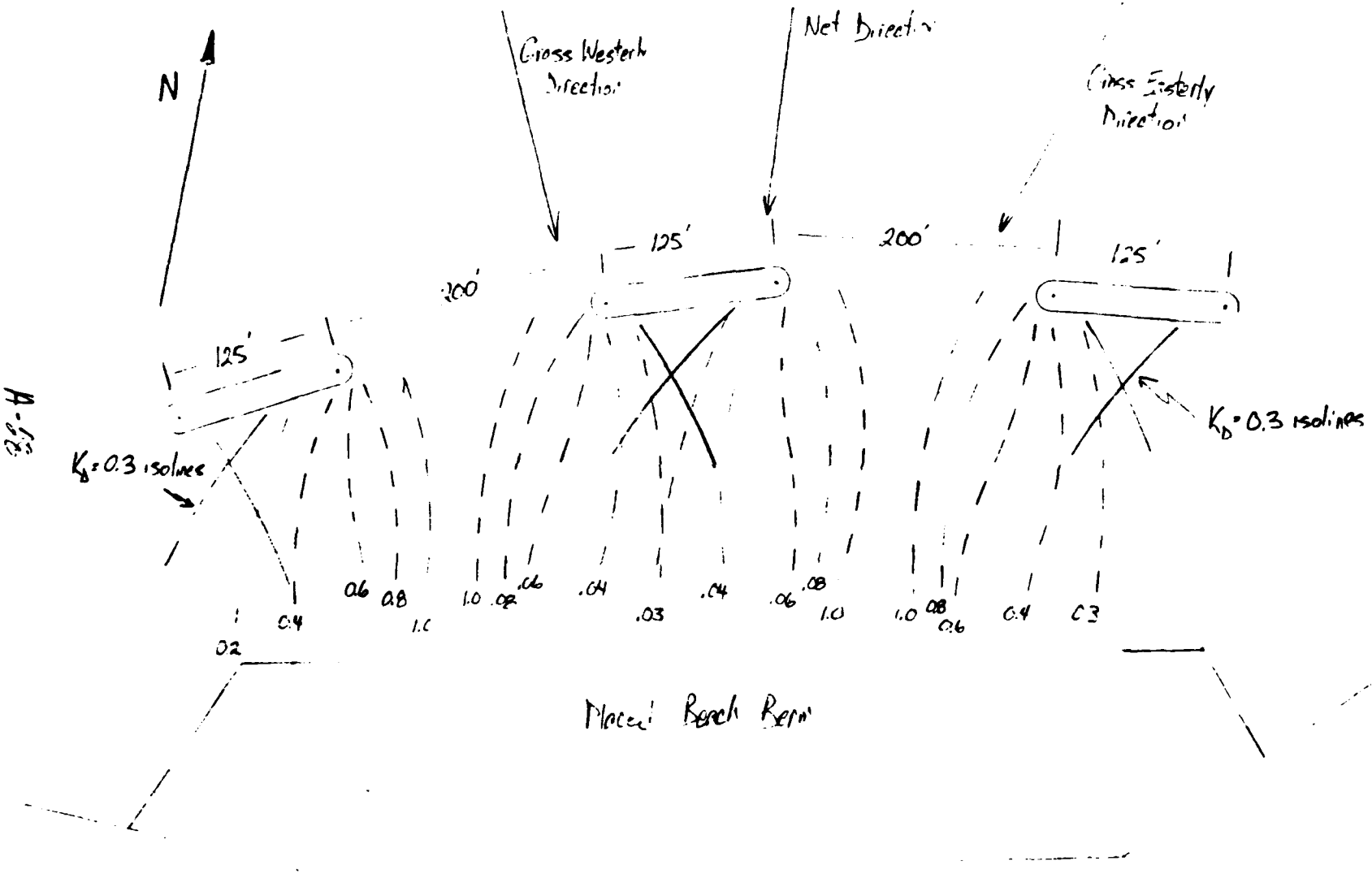


Fig 19 - Diffraction Analysis Trough Breakwater

BY TJB DATE 6/19/81 SUBJECT Design Wave Calculations SHEET NO. ... OF ...
CHKD. BY ... DATE ... for Breakwater Design - Lakeshore Pk JOB NO. ...

A11. Con'td

Angle Class 1

$H_o = H_o k_r$ $T = 6.9$ sec $S = 1/100$

$H_o' = (8.5)(.83) = 7.0$ ft

$d_s = 9.6$ ft

$d_s/H_o' = 9.6/1.0 = 1.37$

$L_o = 5.12(T)^2 = 5.12(6.9)^2 = 244$ ft

$H_o'/L_o = 7.0/244 = .029$

From TP 80-3 $H_{S16}/H_o' = 0.85$

$H_{S16} = (7.0)(.85) = 6.0$ ft.

Angle Class 2

$H_o' = H_o k_r$ $T = 7.4$ s $S = 1/100$

$H_o' = (11.8)(.79) = 9.3$

$d_s = 9.6$ ft.

$d_s/H_o' = 9.6/9.3 = 1.03$

$L_o = 5.12(T^2) = 5.12(7.4)^2 = 280$ ft

$H_o'/L_o = 9.3/280 = .033$

From Ref. __ $H_{S16}/H_o' = 0.65$

$H_{S16} = (9.3)(0.65) = \underline{6.1 \text{ ft.}}$

The design wave is therefore an angle class 2 wave equal to 6.1 ft.

BY TJL DATE 6/10/11 SUBJECT Design Waves, Armor Weight SHEET NO. ..... OF .....
CHKD. BY ..... DATE ..... Lakeshore Park JOB NO. .....

A12. Breaking Conditions

Since it is not known whether this design wave is a breaking wave or not an analysis is performed to determine the wave type. Figs 7-2 and 7-3 (SPM) are used to determine the maximum and minimum breaking depth and therefore the breaking condition.

$H_o' = 9.3$ ft From Fig 7-3 $H_b/H_o' = 1.13$ $d_b/H_{b_{min}} = 1.22 \Rightarrow d_{b_{min}} = 12.3$

$T = 7.4$ secs

$L_o = 256$ ft.

$H_b = 10.05$

$S = .01$

$H_b/gT^2 = .0057$

$H_o'/gT^2 = .0052$ From Fig. 7-2 $d_b/H_{b_{max}} = 1.53$ $d_{max} = 15.4$ ft

Since the design depth of 9.6 ft. is less than both the maximum and minimum breaking depths the design wave is a breaking wave

A13. Armor Unit Weight

$$W = \frac{w_r H^3}{K_D (S_r - 1)^3 \cot\theta}$$

$$W = \frac{(155)(6.1)^3}{2.5(2.48-1)^3}$$

$W = 2170$ lbs

W = weight in lbs of individual armor unit
w_r = unit weight of stone = 155 lbs/ft³
H = design wave height = 6.1 ft
S_r = specific gravity relative to water = 2.48
K_D = stability coefficient = 2.5
$\cot\theta$ = structure slope = 2.0

Use 0.9W to 2.0W

$0.9(2170) = 1953$ lbs. $\}$ Use 1.0 tons to 2.5 tons
$2.0(2170) = 4340$ lbs. $\}$

A range of 0.9W to 2.0W is used to define the minimum and maximum limits for armor stone weight. This range is adequate in size to insure that suppliers can produce the stone economically. Also, the 0.9W is close enough to W to insure that at least 75 percent of the individual armor units as required by the SPM will have a weight greater than W without any further gradation restrictions.

BY TW DATE 6/15/81 SUBJECT Breakwater Geometry SHEET NO. ____ OF ____
CHKD. BY ____ DATE ____ Lakeshore Park JOB NO. ____

A15. Armor Layer Thickness

$$r = nk_\Delta \left(\frac{W}{W_r}\right)^{1/3}$$

where r = avg. layer thickness in feet
k_Δ = layer coefficient = 1.15 Table 7-11
n = number of armor units comprising the cover layer = 2 stone

$$r = (2)(1.15)\left(\frac{2170}{155}\right)^{1/3}$$

$$r = 5.5 \text{ ft.}$$

A15. Crest Width

$$B = nk_\Delta \left(\frac{W}{W_r}\right)^{1/3}$$

where B = crest width in ft.
n_1 = number of armor units comprising the cover layer = 3

$$B = 3(1.15)\left(\frac{2170}{155}\right)^{1/3}$$

$$B = 8.3 \text{ ft.} \quad \therefore \text{ Use } B = 8.5 \text{ ft.}$$

A protective toe stone will also be placed at the base of the structure along its perimeter. This stone will provide added protection to the stability of the armor slope should there be any armor stone displacement.

A16. Underlayer

Use 0.2W to 0.06W

$0.2W = 0.2(2170) = 434$ lbs. $\therefore$ Use 100 lbs. to 450 lbs.

$0.06W = 0.06(2170) = 130$

Layer Thickness $r = nk_\Delta \left(\frac{W_u}{W}\right)^{1/3}$ where $W_u = W/10 = 217$ lbs.

$$r = 2(1.15)\left(\frac{217}{155}\right)^{1/3}$$

$$r = 2.6 \text{ ft.}$$

Even though the design underlayer thickness is 2.6 ft. underlayer stone will be used as a core stone with a thickness of 4.0 to 5.0 ft. This is necessary to attain the proper crest elevation as determined in para. A17.

BY DLC DATE 6/19/81 SUBJECT Breakwater Crest Elevation SHEET NO. ... OF ...
CHKD. BY ... DATE ... JOB NO. ...

A17. Crest Elevation - The crest elevation of an offshore breakwater is of concern since this feature can have significant affect on the formation or maintenance of a salient in the lee of the structure. If the structure is too low and too impermeable, wave transmission over and through the structure can result in transmitted waves that will erode and destroy the beach it was intended to protect. However, if it is a complete barrier to all wave conditions, it is overdesigned and will have a tendency to cause tombolo formation. The basis behind setting the crest elevation is therefore to allow only periodic overtopping to a limited degree which will not jeopardize the beach. The following computations allow a maximum 3.0 ft. transmitted wave under design conditions which should satisfy this criteria. Wave transmission and runup is determined by the Cross and Sollitt technique as described in "Wave Transmission by Overtopping", Ralph H. Cross and Charles Sollitt, Journal of the Waterways, Harbors, and Coastal Engineering Div., 1972 along with the runup curves in the SPM.

Determine wave runup

$H_i' = 9.3$ ft $H_i = 6.1$ ft
$T = 7.4$ sec. $H_o/gT^2 = .0052$
$L_o = 256$ ft
$d_s = 9.6$ ft $d_s/H_o' = 1.03$ $\cot\theta = 2.0$

From Fig 7-10 for $d_s/H_o' = 0.8$ $R/H_o' = 2.45$
$d_s/H_o' = 1.03$ $R/H_o' = 2.46$ (interpolated)
From Fig. 7-11 $d_s/H_o' = 2.0$ $R/H_o' = 2.50$

$\therefore R_{smooth} = (2.46)(9.3) = 22.9$ ft.

From Fig 7-13 Scale correction factor = 1.19

BY TJB DATE 6/19/81 SUBJECT Breakwater Crest Elevation SHEET NO. ... OF ...
CHKD. BY ... DATE ... Lakeshore Park JOB NO. ...

$\therefore R_{SMOOTH\ ACTUAL} = (22.9)(1.19) = 27.3$ ft.

Fig. 7-15 of the SPM can be used with Fig. 7-10 to estimate the percent reduction of runup resulting from adding riprap to a 1:1.5 slope and to apply that reduction to structures with different slopes. The runup, uncorrected for scale effects, on a 1:1.5 smooth impermeable slope is:

From Fig. 7-10 $d_s/H_o' = 0.8$ $R/H_o' = 2.82$

$d_s/H_o' = 1.03$ $R/H_o' = 2.76$ (interpolated)

From Fig. 7-11 $d_s/H_o' = 2.0$ $R/H_o' = 2.54$

From Fig 7-15 for $d_s/H_o' = 1.03$ $R/H_o' = 1.3$

$\therefore$ Runup reduction factor $= \frac{R/H_o'\ RIPRAP}{R/H_o'\ SMOOTH} = \frac{1.3}{2.76} = 0.47$

$\therefore R_{RIPRAP} = (27.3)(.47) = 12.8$ ft.

This runup is overestimated due to the fact that Figs. 7-8 through 7-18 SPM are from tests with a 1:10 beach slope whereas the actual beach slope at Lakeshore Park is approximately 1:100. Therefore to remedy this discrepancy we use Goda's charts to calculate the wave heights at the toe depth for the 1:10 slope and for the 1:100 slope. The runup from the SPM calculations can be reduced by the ratio of the two wavelengths (see NCDED-C 22 August 1978 Guidance for Calculating Decay of Significant Wave Height in the Surf Zone.)

1:10 slope: $H_{s16}/H_o' = .099$

1:100 slope $H_{s16}/H_o' = 0.65$

$$\frac{H_{S16}/H'_{b\,1:100}}{H_{S16}/H'_{b\,1:10}} = \frac{0.65}{0.99} = 0.66$$

Actual Runup = 0.66 (12.8) = 8.5 ft.

Crest Height

Using Cross and Sollitt Technique

$$K_T = \frac{H_T}{H_I} = 0.54\left(1.04 - H_b/R\right)$$

$$H_b = R\left(1.04 - \frac{H_T}{.54 H_I}\right)$$

$$H_b = 8.5\left(1.04 - \frac{3.0}{.54(6.1)}\right)$$

$$H_b = 1.1 \text{ ft.}$$

Where H_T = Transmitted wave height = 3.0 ft
H_I = incident wave height = 6.1 ft
H_b = crest height above design water level
R = wave runup = 8.5 ft.

Set crest height = 1.1 + 5.6 = +6.7 ft. LWD ⇒ Use +6.5 ft. LWD

Therefore the crest elevation must be 6.7 ft. above LWD to allow a maximum 3.0 ft. transmitted wave

A typical cross-section of the breakwaters is shown in Plate 3

BEACH DESIGN

A18. GENERAL

Based on analysis of profiles of the historic beach, expected wave climate, a diffraction analysis, and the berm width necessary to provide adequate protection to the existing beach and bluff, the initial berm will be placed 150 feet wide. The beach fill will be placed to elevation 576.6 (+8 feet) LWD which is the point of maximum runup for the design wave condition. It is expected that wave action will reshape the initial berm to the approximate profiles as shown on Plates 1 and 2. These results along with the anticipated beach readjustment logic are described in the following sections.

A total of 37,000 cubic yards of sandfill will be placed along the entire reach to provide a beach berm 150 feet wide, and will consist of medium-grained, reasonably well-graded, sound, hard, durable, natural sand particles. The sand will be clean and free of organics, clay, deleterious, or other foreign or objectionable material. The sand will contain no more than 20 percent flat or elongated particles. The gradation for beachfill is as shown in Figure 20. The loss rate offshore is estimated to be approximately 10 percent of the beachfill placed, based on experience from the Lakeview Park, OH, and Presque Isle Peninsula, PA, erosion control projects, thereby requiring replenishment on a yearly basis.

A19. BEACH DIMENSIONS

Federal participation in beach construction is limited to restoration of the historic beach or to the minimum beach width required to achieve a stable project; therefore, both of these restraints were considered when designing the Lakeshore Park protective beach.

An analysis of aerial photographs was made to determine what the historic recession rate for Lakeshore Park has been over the period from 1938 to 1978. In comparison of bluff profiles, it was determined that a maximum of 100 feet of land has been lost in that period. This alone should justify restoration of a 100-foot beach.

In determining what size beach is necessary to protect existing land, consideration was given to the beach restoration projects at both Presque Isle, PA, and Lakeview Park, OH. The beach berm at Presque Isle (without breakwaters) is annually nourished to a 60-75 foot berm and to an elevation of +10 feet LWD. This size berm has been found to provide marginal protection since vast quantities of sand are required for nourishment each year. The Lakeview Park project has required small amounts of sand; however, the scalloping of the beach due to the presence of the breakwaters results in a series of protuberances and erosion areas that cut into the beach. This type of beach readjustment will also occur to the Lakeshore Park beach except it will be more dramatic since the breakwaters will be further apart and little or no sand will be naturally entering the system. Based on these experiences and on the anticipated beach adjustment, it is recommended that the initial beach be constructed to a minimum berm width of 150 feet. Considerable adjustment and sloping of the berm will occur and erosion of the beach will

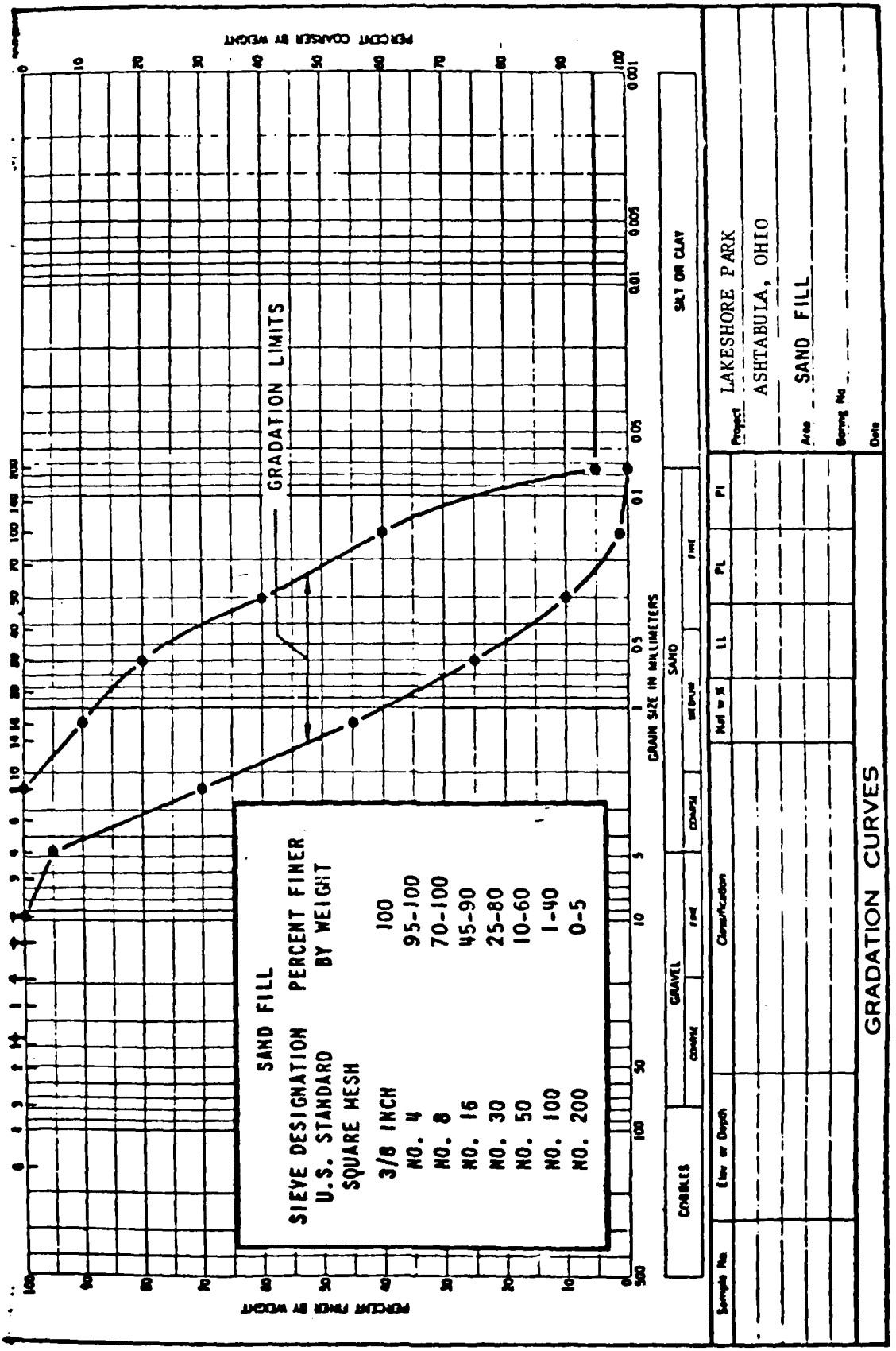


FIGURE 20 - Sand Fill Gradation Curve

be prevalent at the gaps of the breakwater. Due to the anticipated amount of erosion during seasonal beach changes, this would leave on the order of 60 feet of beach berm. This amount of berm is considered the least necessary to protect the existing land during major storms which could erode the berm back to 10 to 30 feet wide at the gaps. Based on what is required to achieve a stable beach project, the initial berm width will be set at 150 feet with a minimum berm width to be maintained at 60 feet in succeeding years.

A20. BEACH CONFIGURATION AND QUANTITIES

Plate 2 shows a sketch of the anticipated beach profiles after placement of the beach berm and after a period of stabilization. Adjustment of the placed berm will initially be rapid with erosion of the beach between the breakwaters and deposition of material in the lee of the breakwaters. The beach berm width between the breakwaters will erode back to a width of approximately 60 feet and the beach in the lee of the breakwaters will grow lakeward beyond the original placed berm. The natural angle of repose of the placed material will be approximately 30° (1V to 1.5H); but within the first season, the beach will flatten out to approximately 1V to 12H for the foreshore and 1V to 20H for the offshore beach. This will result in an average total usable beach width of approximately 165 feet. The total quantity of placed beach fill will be approximately 37,000 cubic yards with annual replenishment estimated to be 10 percent or 3,700 yards.

The beach profile that is shown in Plate 2 is based on the results of other similar breakwater systems and on the diffraction analyses shown in Figure 19. The diffraction analysis assumed wave attack solely from the exposed area between the U. S. breakwaters at Ashtabula and the intake structures at the CEI plant. However, a local wave condition originating inside Ashtabula Harbor and propagating towards the northwest corner of the project is expected to have some influence on the beach profile. Since this is the predominant wind direction, short steep waves will tend to erode and steepen the west end of the beach and cause a slight easterly shift in the protuberances. The east end of the beach will tend to be somewhat flatter and broader. These features can be seen in Plate 1.

A21. BEACH CREST ELEVATION

The beach crest elevation that is required was determined by computing the maximum wave runup for the design wave condition. The crest elevation is set for no overtopping since overtopping waves could wash out a significant quantity of sand and may induce pumping and further sand losses. The point of maximum wave runup was determined by use of the Coastal Engineering Technical Aid, "Revised Wave Runup Curves for Smooth Slopes," (CETA No. 78-2). Based on the beach profiles at Lakeview Park, OH, and assuming the beach at Lakeshore Park will adjust to a similar slope, the beach slope used in this computation is set at 1V to 20H. Using Figure 2 from the above reference for $H_o'=9.3$ and $d_s/H_o'=3$, the maximum wave runup is determined to be 2.5 feet. This runup on top of the design water level of +5.6 feet equates to a maximum elevation of +8.1 feet LWD. The berm crest elevation is, therefore, set at +8.0 feet LWD. A typical cross section of the beach and breakwaters is shown in Plate 2.

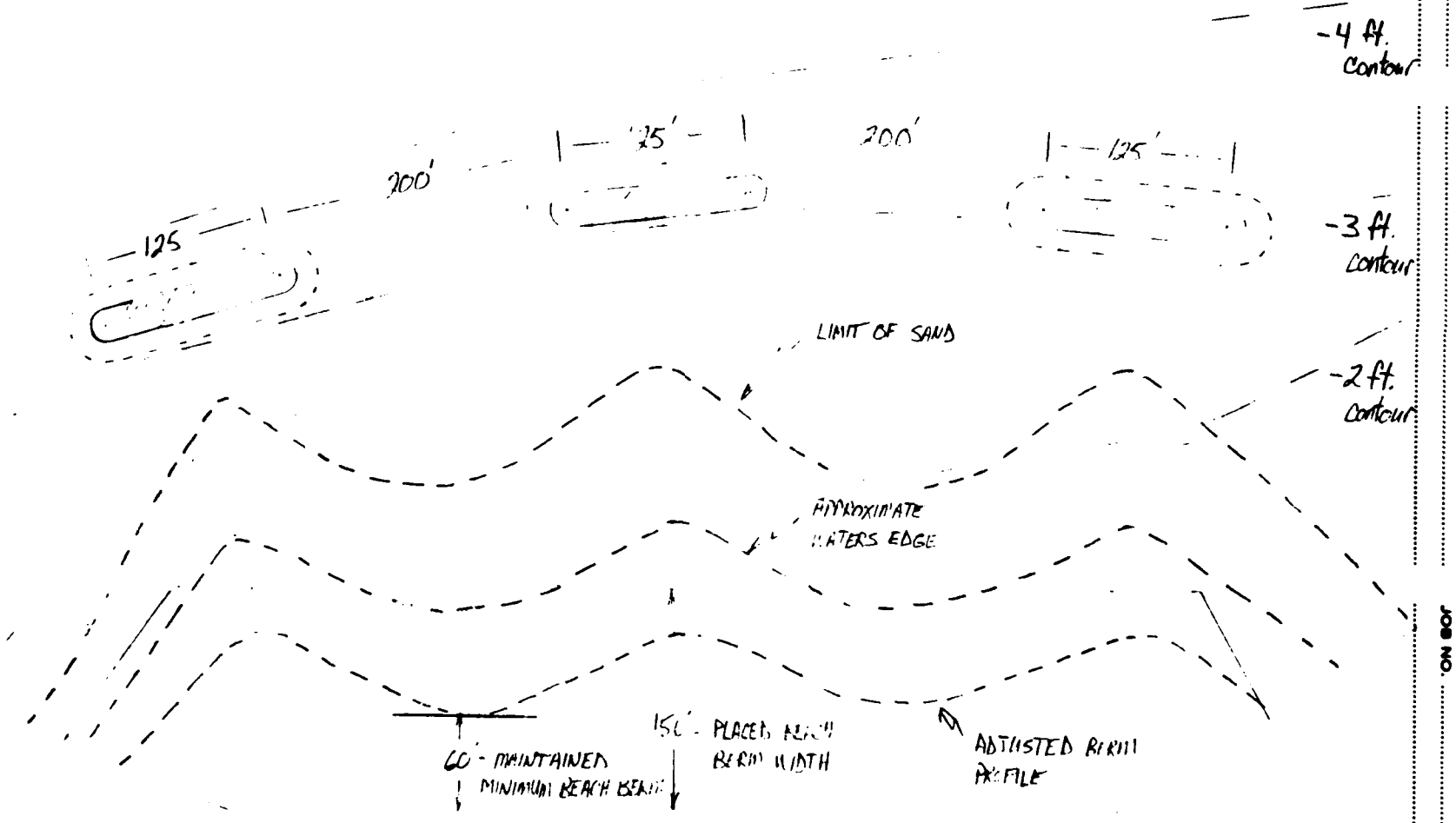
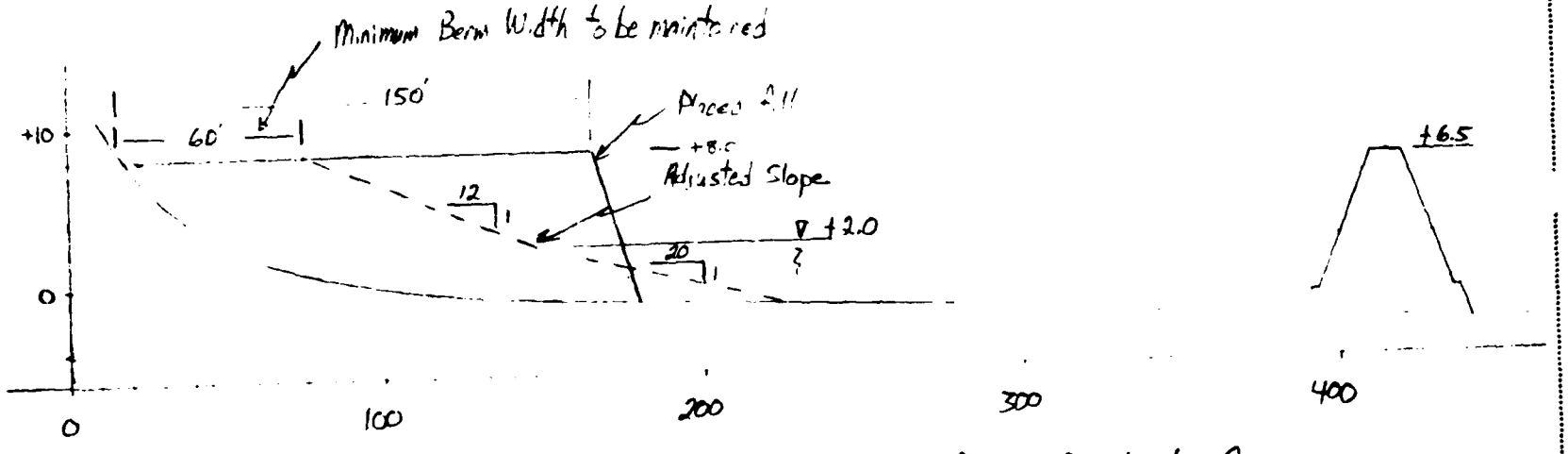
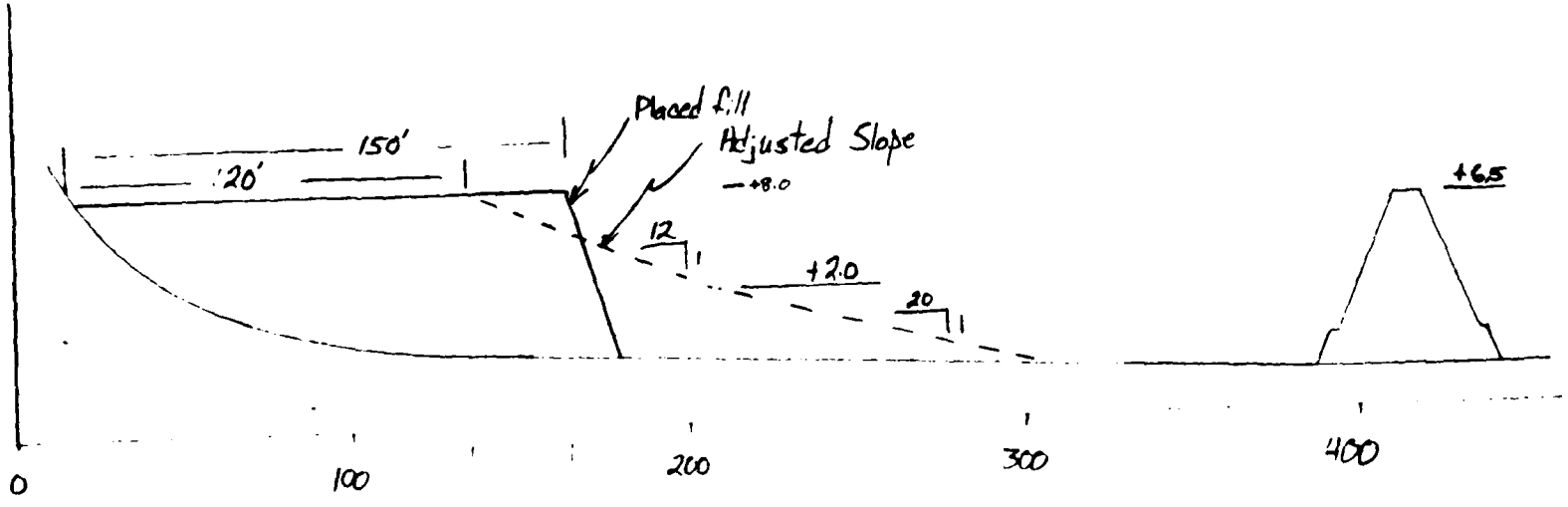


Plate 1 - LONG TERM BEACH PLAN [illegible] LAYOUT



(1) Approximate Placed and Adjusted Beach Profiles - Breakwater Gaps



(2) Approximate Placed and Adjusted Beach Profiles - Breakwater Lee

Plate 2 - Beach Profiles

A-39

BY ..... DATE ..... SUBJECT .....
CHKD. BY ..... DATE .....
SHEET NO. ..... OF .....
JOB NO. .....

BY ..... DATE .....
CHKD. BY ..... DATE .....

SUBJECT .....

SHEET NO. ..... OF .....
JOB NO. .....

A.40

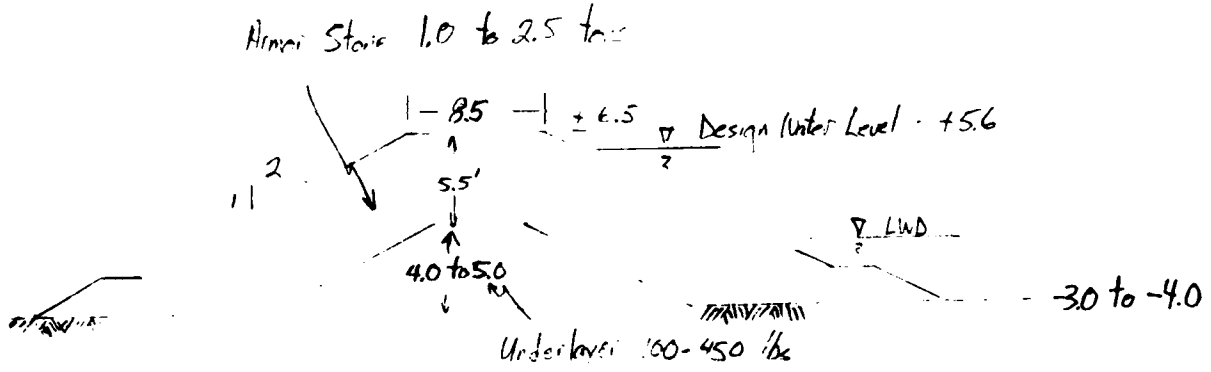


Plate 3 - Typical Breakwater Section

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX B
GEOTECHNICAL

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

APPENDIX B
GEOTECHNICAL APPENDIX

TABLE OF CONTENTS

Paragraph	Title	Page
B1.	REGIONAL GEOLOGY	B-1
	Physiography	B-1
	Surficial Geology	B-1
	Bedrock Geology	B-1
	Structural Geology	B-1
	Groundwater	B-1
B2.	LOCAL GEOLOGY	B-1
	Surficial Geology	B-1
	Bedrock Geology	B-2
B3.	COASTAL PROCESSES	B-2
B4.	SUBSURFACE EXPLORATIONS	B-2
	1979 Geophysical Program	B-2
	1979 Probing and Grab Sample Program	B-4
B5.	LABORATORY TESTING	B-4
B6.	GEOTECHNICAL DESIGN	B-4
	General	B-4
	Stability Analysis	B-4
	Construction Materials	B-4
B7.	CONSTRUCTION CONSIDERATIONS	B-6

TABLES

Number	Title	Page
B1	Test Data Summary (Grab Samples)	B-5

PLATES

Number	Title	Page
B1	Plan of Subsurface Explorations	
B2	Geologic Profile	
B3	Location Map - Possible Material Sources	
B4	Material Survey - Summary of Sources	
B5-B10	Material Survey Data Sheet	

B1. REGIONAL GEOLOGY

Physiography. Lakeshore Park is located along Lake Erie about 0.5 miles east of Ashtabula Harbor, OH, and is within the eastern lake section of the Central Lowland Province. This area is characterized by broad flat plains which end abruptly at Lake Erie. Soils are derived from till and deposits of former glacial lakes. Several ridges, parallel to the lake, cross the area. The most prominent of these is known as the Ashtabula Moraine and is composed of till. It rises 30 to 60 feet above the surrounding surface. Other ridges with less relief are remnants of glacial lake shorelines. These features are composed of sand and gravel. Ashtabula River provides the major drainage in the area. Its lower course flows through a narrow valley cut in shale to a depth of 75 to 100 feet (Leverett, 1902).

Surficial Geology. Most of northeastern Ohio consists of material deposited during the late Wisconsinan. These deposits consist of till and stratified gravel, sand, silt, and clay. The lake escarpment Morainic System which forms a hummocky ridge about 5 miles south of Lake Erie consists mostly of till deposited within the last 14,000 years. Lakeward from the moraine are several ridges representing shorelines of former glacial Great Lakes. These ridges are about 10 feet high and consist of stratified sand and gravel. Near Ashtabula, the Whittlesey Beaches reach a height of 70 feet. Towards the lake, the soils are clayey silt which are deposits of the former high level lakes and till. Recent deposits are beach sand along the lake and gravelly alluvium in the major streams.

Bedrock Geology. Bedrock exposed in northern Ohio known as the Chagrin Formation is a silty shale as much as 1,500 feet thick. Borings taken in Ashtabula Harbor show the top of rock to be at an elevation of about 540 feet (IGLD). These borings show the rock to be a soft fissile shale with closely spaced joints.

Structural Geology and Seismicity. The Lake Erie Watershed is a stable area of gently dipping beds with an inherently low degree of seismicity (Argonne National Laboratory, 1978). There have been several earthquakes recorded in the area, but these have been local and assumed to be readjustment of the crust, due to unloading of glaciers. The shale bedrock presents no structural or stability problems as related to the proposed construction.

Groundwater. There are no sources of abundant groundwater in the region due to the relative inpermeability of shale, till, and lake bottom deposits. The strand deposits of former lakes act as aquifers, but since these are not extensive, they are not important water suppliers.

B2. LOCAL GEOLOGY

Surficial Geology. The shoreline of Lakeshore Park is backed by a low, 10-foot high bluff composed of blue gray silt till, overlain by stratified clay and sand; the upper 2 feet of the bluff is sandy silt. South of the low bluff for about 500 feet the land surface is flat and then rises rapidly about 40 feet. This steep bluff appears to be a wave-cut cliff composed of till. Till in this area is described by White and others (1969), and is

characterized as having an average composition of 31.3 percent sand, 45.4 percent silt, and 23.3 percent clay. The beach at Lakeshore Park is narrow and composed of coarse to medium sand.

Bedrock Geology. Bedrock at Lakeshore Park is exposed at an elevation of 568.5 feet (Pincus, 1961) in the offshore area and is probably of the Chagrin Formation. Hartley (1964) indicates that the nearshore bottom in this area is bedrock.

B3. COASTAL PROCESSES

Bottom deposits found in this vicinity are derived mainly from bluff erosion and fluvial sources. These sediments are distributed, transported, and deposited by lake currents and waves. The predominant direction of littoral drift is from west to east. The West Breakwater forms a barrier to this drift, which has resulted in the formation of Walnut Beach. The littoral drift consists mainly of sand and gravels. It is believed that the proposed Lakeshore Park project will cause no significant changes in the existing coastal processes.

B4. SUBSURFACE EXPLORATIONS

1979 Geophysical Program. A geophysical survey was conducted in October 1979 by Woodward-Clyde Associates of Plymouth Meeting, PA, offshore of Lakeshore Park. This survey was planned and conducted to evaluate subsurface conditions just beyond the breakwaters, using three basic pieces of equipment: *echo sounder, side scan sonar, and subbottom profiler.* This survey involved only remote sensing without any physical sampling. Data obtained from this survey was intended for correlation with other subsurface investigations conducted (probings, borings, rock coring). The survey was conducted along preselected courses, along the proposed alignment of the offshore breakwaters. All survey systems used for this program are based on accoustical wave principles, i.e., sound waves incident upon an accoustic interface are partially reflected. The interface contrast is a function of the different density and elastic properties of the materials on either side. Based on the time it takes for transmitted energy to travel from the accoustic source to a given interface and back to the receiver, the distance to each interface can be calculated if the speed of sound in the materials is known.

A brief description of each system used on this program is presented:

a. Echo Sounder - This system's basic principle involves propagating sound waves from a transducer, which are reflected by the bottom surface (water-sediment interface) back to the receiver. The travel time is measured, and by knowing the velocity of sound in water (corrected for temperature and salinity), a very accurate depth determination is obtained.

b. Side Scan Sonar - Side scan sonar systems transmit accoustical energy and receive reflections horizontally across the lake bottom. This system provides graphic records in the form of a two-dimensional view of the lake bottom and objects on its surface. Signals reflected from the bottom

and objects on it, within system range, are displayed on a continuous graphic record. This system can resolve relatively small objects on the sea floor, as well as details of topographic irregularities.

c. Subbottom Profiler - Subbottom profilers, i.e., continuous seismic reflector profiles, operate on the same basic principle as echo sounders, but use a lower sonic frequency. Regularly pulsed, low-frequency accoustic energy is transmitted into the water and reflected back to a receiver off interfaces between subbottom materials having different accoustic impedances. The reflections from each pulse are successively recorded on a moving paper chart recorder, resulting in a cross section having consistent time scales. The particular system used was a high resolution, shallow penetration unit, which produces sharp, clearly defined data to a relatively shallow depth, about 100 feet. Since this project is concerned with features at, or very close to, lake bottom, the tradeoff of lesser penetration for better resolution was very useful.

d. Precision Electronic Navigation System - The navigation system used to reference the geophysical survey was a Motorola Mini-Ranger III. This involves accurate measurement of two-way travel time of high-frequency electromagnetic waves through the air between the survey vessel and two transponder stations, located at known locations. A trilateration method is used, knowing the velocity of the electromagnetic waves through the air. In this case, transponders were located on towers and other structures located on or near the breakwaters. The continuous-recording charts are referenced to the navigation system by marking fixes on the records at approximately 50 meter intervals.

The vessel used to perform the geophysical survey was a 30-foot cabin cruiser chartered locally. Accoustic transducers for the subbottom profiler and echo sounder were carried through the water on a staff suspended over the side of the boat. A towfish containing transducers for the side scan sonar was pulled along beneath the boat.

The path along which the geophysical survey was performed is shown on Plate B1. This plate also shows transponder locations.

A total of 7 geophysical survey lines were performed, 5 roughly parallel to shore, and 2 normal to the other 5, to provide adequate navigational control. The lines parallel to shore ranged from about 300 feet offshore to about 1,000 feet offshore. They blanket the proposed breakwater alignment(s). Each line was on the order of 2,000 feet long. The lines normal to shore and normal to the other 5 lines were on the order of 1,000 feet long.

The subbottom profiler revealed only a thin (less than 1 foot) layer of sediments overlying bedrock. Relatively flat bedrock outcrops are exposed over the entire area surveyed. Some minor bottom relief, less than 1-foot high in general, was disclosed by the side scan sonar. This is probably scattered cobbles overlying the bottom. To summarize, the geophysical survey indicates a relatively smooth bottom surface over the entire area surveyed, with a very thin sediment cover and some scattered cobbles on the bottom surface.

1979 Probings and Grab Sample Program. Six probings and corresponding grab samplings were performed along the proposed alignment of the offshore breakwaters (Plate B-1). This work was conducted by Herbert Associates Ltd., Virginia Beach, VA, in October 1979. Five of the 6 probings indicated direct penetration into shale bedrock upon reaching the top of bottom sediments. The first probing revealed about 1 foot of fine sand and cobbles overlying shale bedrock.

All 6 grab samples, which were obtained concurrent with the probings by a diver, consisted of coarse gravels in general. The sample corresponding to the probing which encountered 1 foot of fine sand and cobbles consisted of coarse gravel and fine-coarse sand.

The subsurface explorations conducted at Lakeshore Park indicate a very thin or nonexistent cover of cohesionless sediment, overlying relatively smooth shale bedrock.

B5. LABORATORY TESTING

The 6 grab samples obtained by diver were visually identified by Ohio River Division Laboratory, Cincinnati, OH. All 6 samples were classified as GP (Gravels) according to the Unified Soil Classification System. Only 1 sample (No. P79-31) had a significant fraction other than gravel, which was coarse to fine sand, in addition to the coarse gravel. The results of the laboratory testing are presented in Table B-1.

B6. *GEOTECHNICAL DESIGN*

General. Very favorable geotechnical conditions exist at the project site regarding the proposed offshore breakwater construction. Virtually no sediment is disclosed overlying shale bedrock. No deposits of weak, soft, or compressible materials were disclosed. Refer to geologic profile (Plate B-2).

Stability Analysis. There is no viable concern for instability of the proposed breakwaters. The entire cross section consists of armor stone (3 to 7.5 tons) placed directly over rock or, at worst, the thin existing cover of gravelly sediment. Reasonably gentle (1V: 2H) side slopes are proposed. There is no concern whatsoever for settlement or shear failure in the foundation (shale bedrock). This structure was designed per the Shore Protection Manual, hence the stone size is adequate to resist design wave attack. Finally, since this is a rubblemound structure, this precludes the possibility of overturning or sliding, as a unit, due to wave forces.

Construction Materials. A material survey, listing possible sources for the construction materials (armor stone and beach fill), is presented on Plates B-3 through B-10. Information listed includes material types which are possible from each source, source location, and distance from the project sites, laboratory test record information, and service record information.

TABLE B-I - TI

BORING NO.	SAM NO	DEPTH OR ELEV OF SAMPLE (FT)	LABORATORY CLASSIFICATION	MECHANICAL ANALYSIS GRAV %	SAND %	FINES %	ATTERBERG LIMITS LL	PL	NAT WATER CONT %	DRY DENSITY LBS/CU	OPT WATER %	MAX DRY DENSITY
P79-31	G-1	10.9-11.8	GP	93	4	3						
P79-32	G-1	11.1-11.4	GP	100	-	-						
P79-33	G-1	10.6-11.4	GP	100	-	-						
P79-34	G-1	10.0-10.6	GP	100	-	-						
P79-35	G-1	10.7-11.9	GP	100	-	-						
P79-36	G-1	10.0-11.1	GP	100	-	-						

ENG FORM 2086 EDITION OF 1 MAR 68 IS OBSOLETE
1 JAN 73

TABLE B-I - TEST DATA SUMMARY

LAKESHORE PARK SECTION 103 DPR

| ATTERBERG LIMITS | NAT. WATER CONT. | DRY DENSITY LBS/CU | INITIAL | | |

GRAB SAMPLE

GRAB SAMPLE

GRAB SAMPLE

GRAB SAMPLE

GRAB SAMPLE

GRAB SAMPLE

BEACH RESTORATION STUDY
TEST DATA SUMMARY
(GRAB SAMPLES)
ALTERNATIVE 2 (MODIFIED)
U.S. ARMY ENGINEER DISTRICT

T TRIAXIAL COMPRESSION
UC UNCONFINED COMPRESSION
DS DIRECT SHEAR
U UNCONSOLIDATED
CU CONSOLIDATED UNDRAINED

2

B7. CONSTRUCTION CONSIDERATIONS

There are no special foundation considerations of the project site which will require alteration of standard construction procedures for placement of the proposed rubblemound structures.

References

Argonne National Laboratories, 1978. An examination of Issues Related to U. S. Lake Erie Natural Gas Development, prepared for U. S. Army Corps of Engineers and U. S. Environmental Protection Agency under Contract # 78/84, 194 p.

Forsyth, Jane L., 1959. The Beach Ridges of Northern Ohio. Information Circular No. 25, State of Ohio, Department of Natural Resources, Division of Geological Survey, Columbus, OH, 10 p.

Hartley, Robert P., 1983. Effects of Large Structures on the Ohio Shore of Lake Erie. Report of Investigations No. 83. State of Ohio, Department of Natural Resources, Division of Geological Survey, Columbus, OH, 30 p.

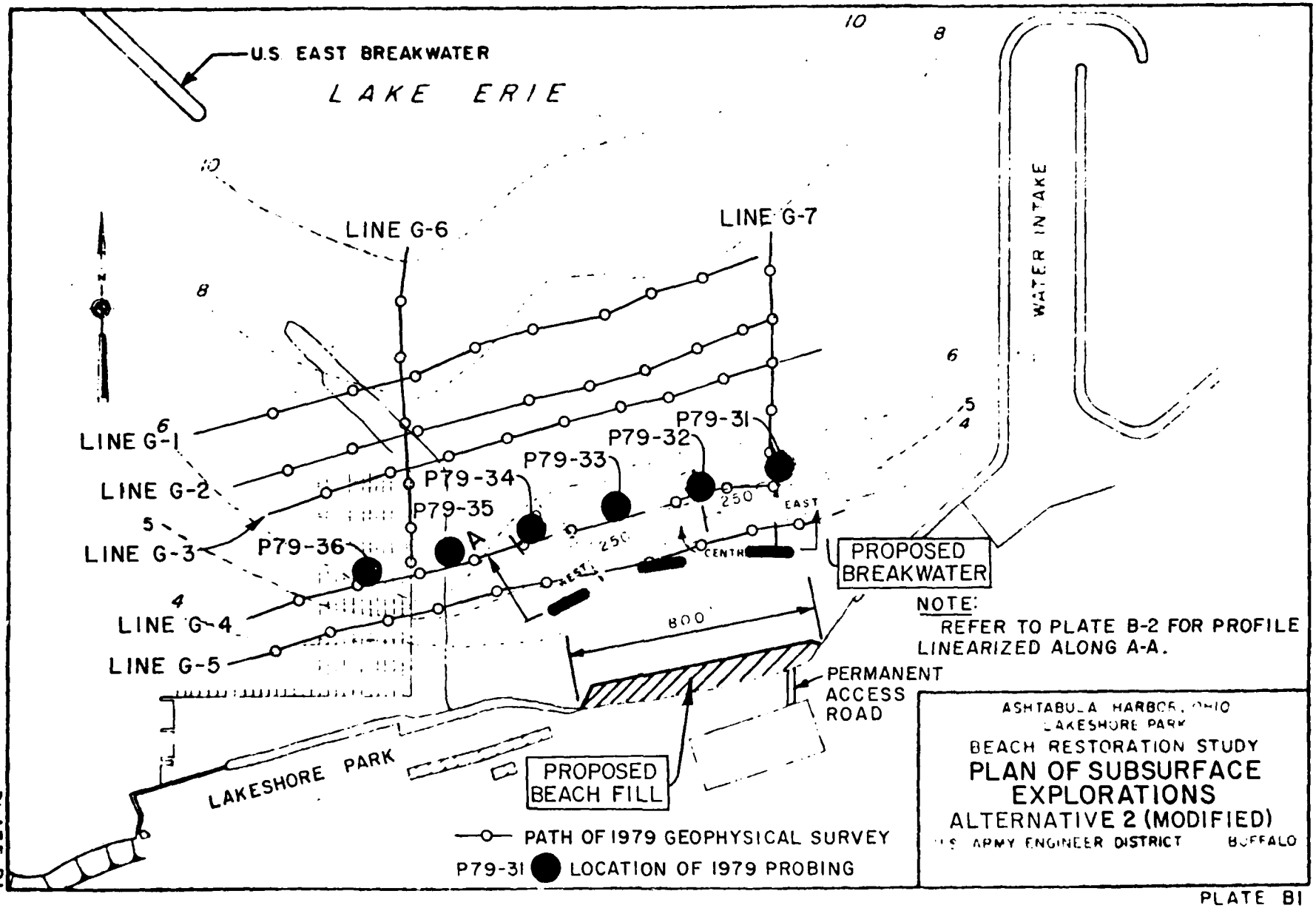
Leverett, Frank, 1902. Glacial Formations and Drainage Features of the Erie and Ohio Basins. Monographs of the U. S. Geological Survey, Vol. XLI, published by Government Printing Office, Washington, D.C., 802 p.

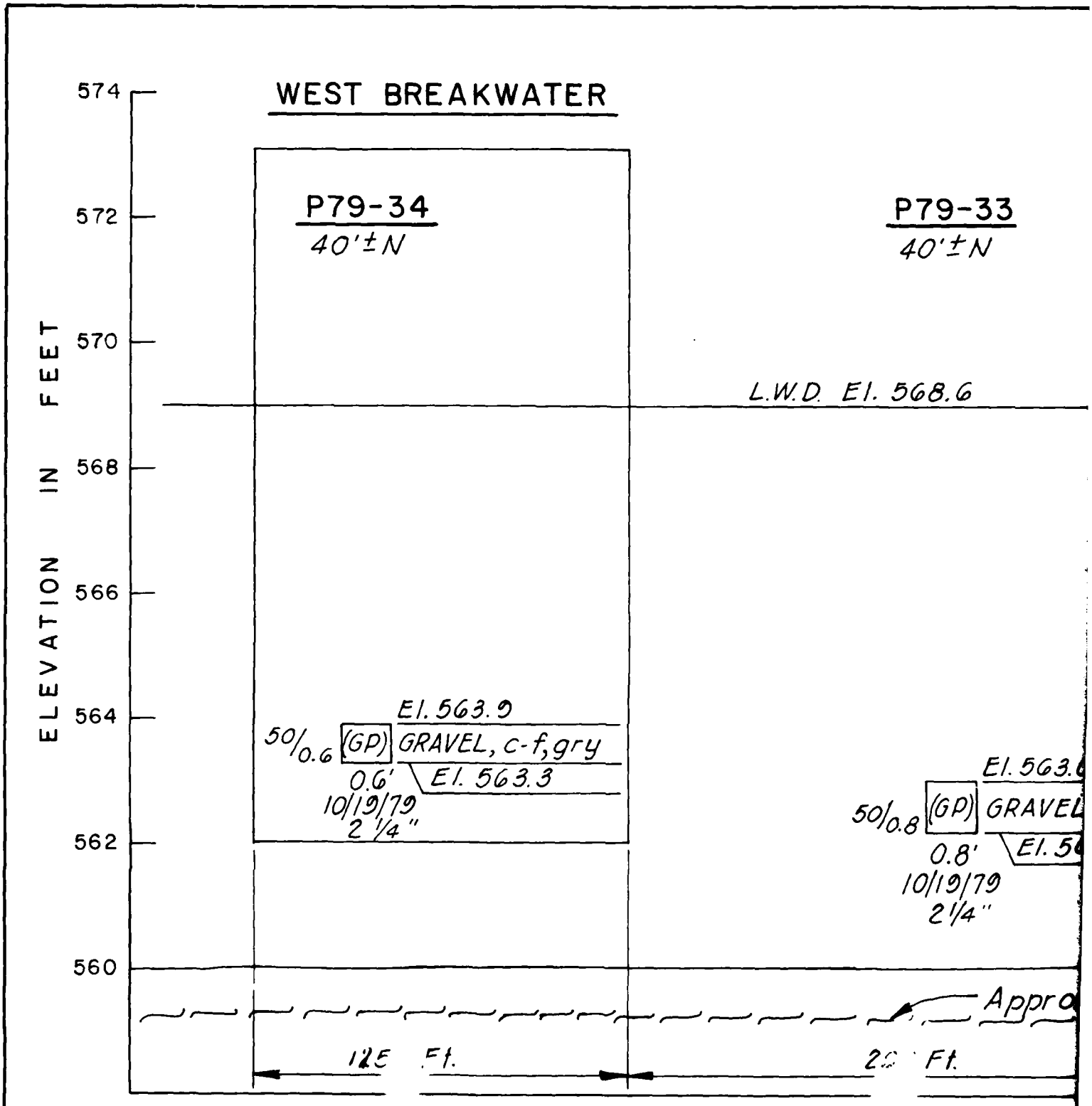
Pincus, Howard J., 1956. Engineering Geology of the Ohio Shoreline of Lake Erie. Technical Report No. , published by State of Ohio, Department of Natural Resources, Division of Shore Erosion, Columbus, OH.

Smith, William S., 1959. Sand and Gravel Resources of Northern Ohio. Report of Investigations No. 6, Department of Public Works, Geological Survey of Ohio, Columbus, OH, 34 p.

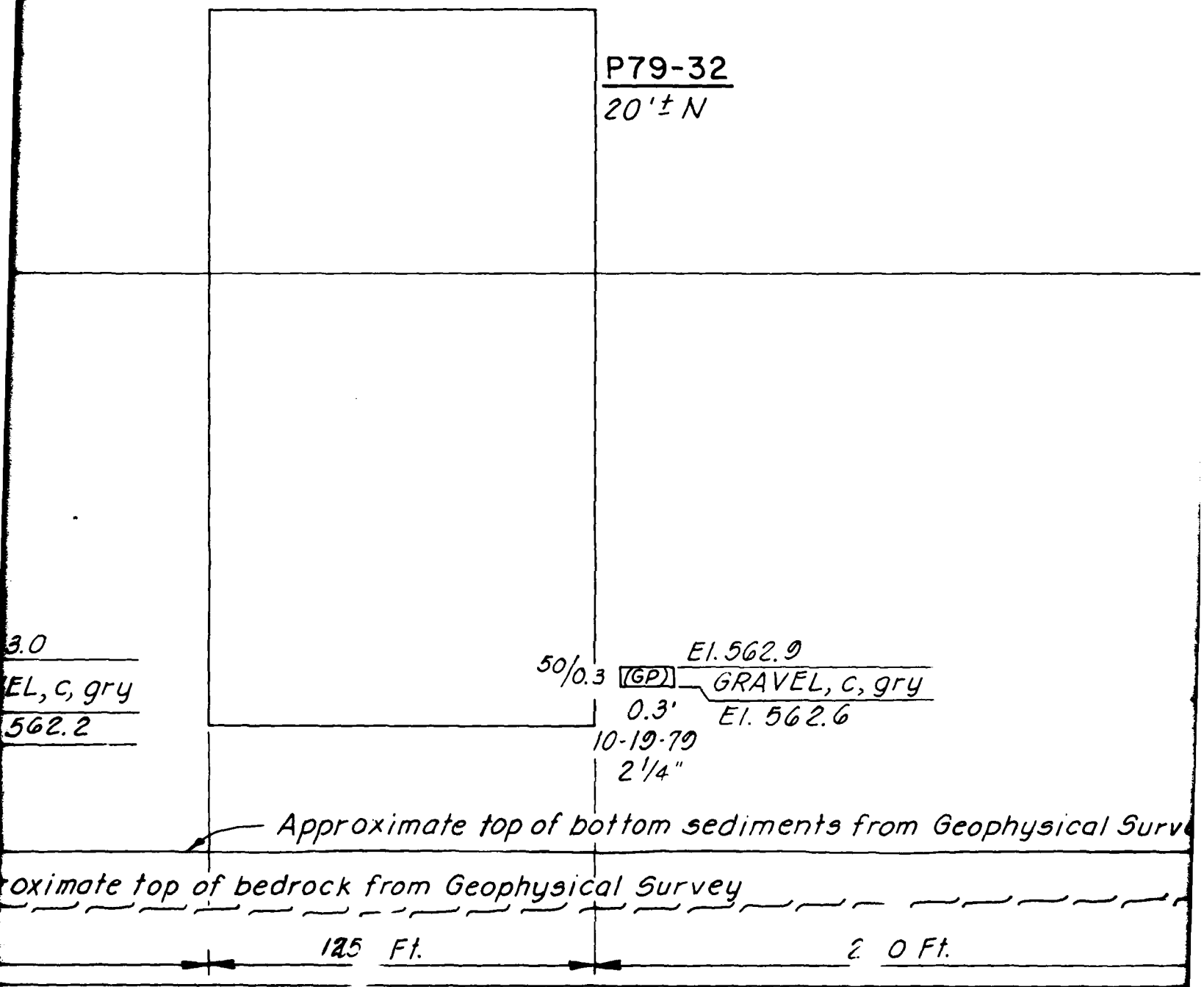
White, George, W., Stanley M. Totten, and David J. Cross, 1960. Pleistocene Stratigraphy of Northwestern Pennsylvania. General Geology Report G38, Commonwealth of Pennsylvania, State Planning Board, Bureau of Topographic and Geologic Survey, 88 p.

Yates, George B., 1979. Geophysical Survey Ashtabula Harbor, Ohio, Contract No. DACW49-79-C-0089, Final Report prepared for Buffalo District, Corps of Engineers by Woodward-Clyde Consultants, Plymouth Meeting, Pennsylvania, 17 p.


U.S. EAST BREAKWATER
LAKE ERIE
WATER INTAKE
LINE G-1
LINE G-2
LINE G-3
LINE G-4
LINE G-5
LINE G-6
LINE G-7
P79-31
P79-32
P79-33
P79-34
P79-35
P79-36
A
A
250
EAST
CENTER
WEST
250
800'
PROPOSED BREAKWATER
PERMANENT ACCESS ROAD
PROPOSED BEACH FILL
LAKESHORE PARK
NOTE:
REFER TO PLATE B-2 FOR PROFILE LINEARIZED ALONG A-A.
PATH OF 1979 GEOPHYSICAL SURVEY
P79-31 LOCATION OF 1979 PROBING
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
PLAN OF SUBSURFACE EXPLORATIONS
ALTERNATIVE 2 (MODIFIED)
U.S. ARMY ENGINEER DISTRICT BUFFALO
PLATE B1
PLATE B1


WEST BREAKWATER
P79-34
40'±N
P79-33
40'±N
ELEVATION IN FEET
574
572
570
568
566
564
562
560
L.W.D. El. 568.6
El. 563.9
50/0.6
(GP)
GRAVEL, c-f, gry
El. 563.3
0.6'
10/19/79
2 1/4"
50/0.8
(GP)
GRAVEL
0.8'
10/19/79
2 1/4"
Appro
125 Ft.
Ft.

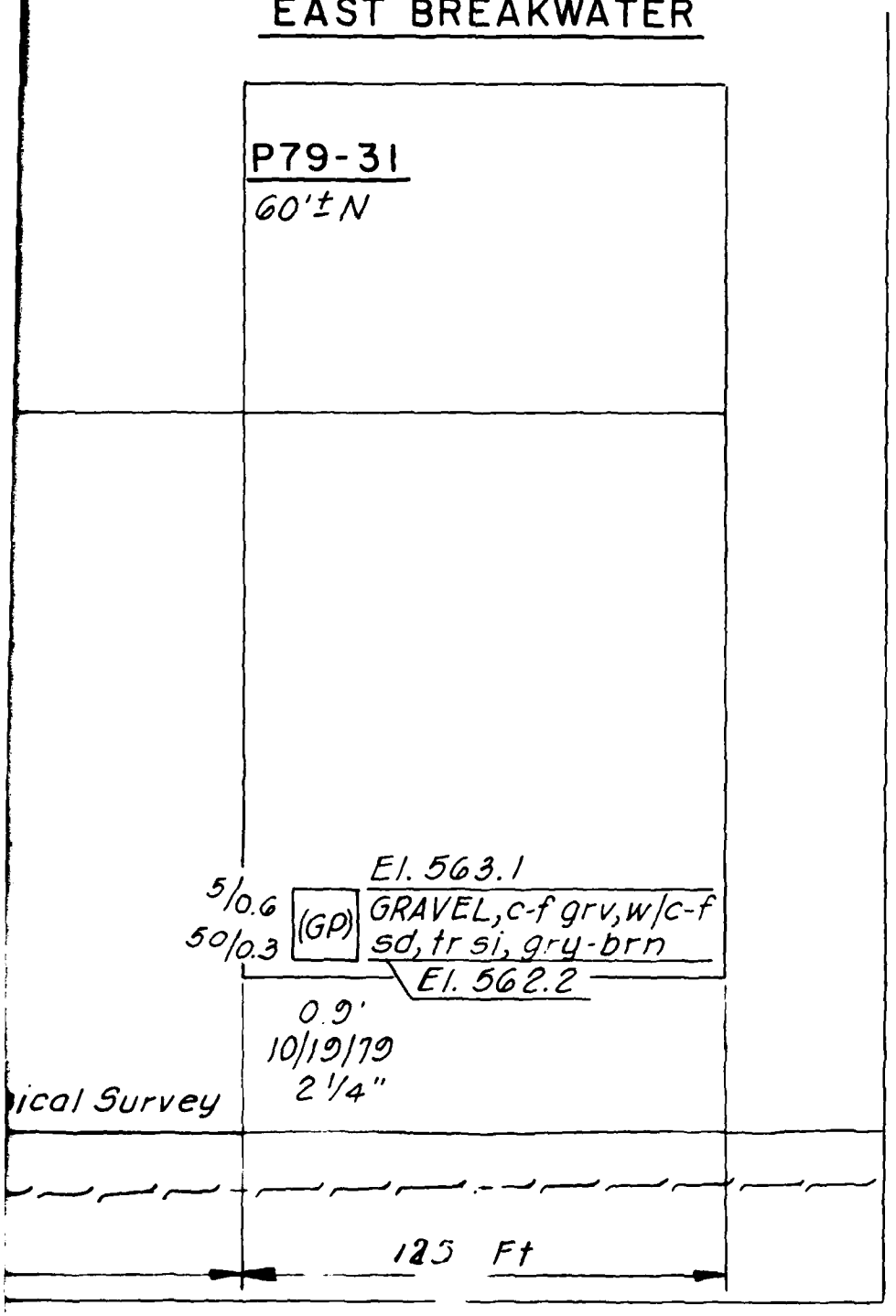
CENTRAL BREAKWATER



Scale: Vert. 1" = 2 Ft.
Horiz 1" = 50 Ft.

Notes:
1. Refer to Plate B1 for Plan of Subsu
2. Section A-A (Plate B1) has been "li
on this plate.
3. No survey control has been establi
Therefore, data has been scaled

2



P79-31

Probing
Year of probing
Probing number
Baseline offset 40'±N

Penetration resistance — 5
(Blows/Ft.)
Penetration resistance
(Blows/fraction of a foot) — 50/0.5

(GP)

Depth of probing — 0.9'
Date probing completed — 10/19/79
Diameter of probe — 2 1/4"

TYPICAL PROBIN

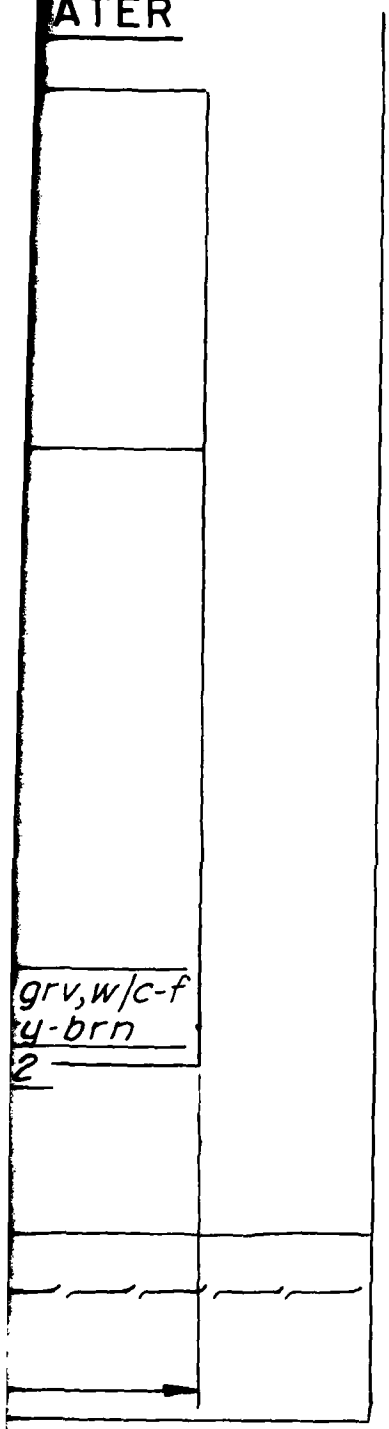
ABBREVIATIONS

brn - brown
c - coarse
f - fine
grv - gravel
gry - gray
sd -
si -
tr -
w/ -

of Subsurface Explorations.
been "linearized" for presentation

established for this project.
scaled to approximate locations.

ATER



P79-31

Probing
Year of probing
Probing number
Baseline offset 40'±N

Elevation of top of bottom sediments
El. 563.1

Penetration resistance — 5 (Blows/Ft.)
Penetration resistance (Blows/fraction of a foot) — 50/0.5

(GP) Material classification from laboratory descriptions
Gravel, c-f grv, w/c-f sd, tr si, gry-brn

El. 562.2
Elevation of probing termination (Refusal)

Depth of probing — 0.9'
Date probing completed — 10/19/79
Diameter of probe — 2 1/4"

TYPICAL PROBING SCHEMATIC

ABBREVIATIONS

brn - brown	sd - sand
c - coarse	si - silt
f - fine	tr - trace
grv - gravel	w/ - with
gry - gray	

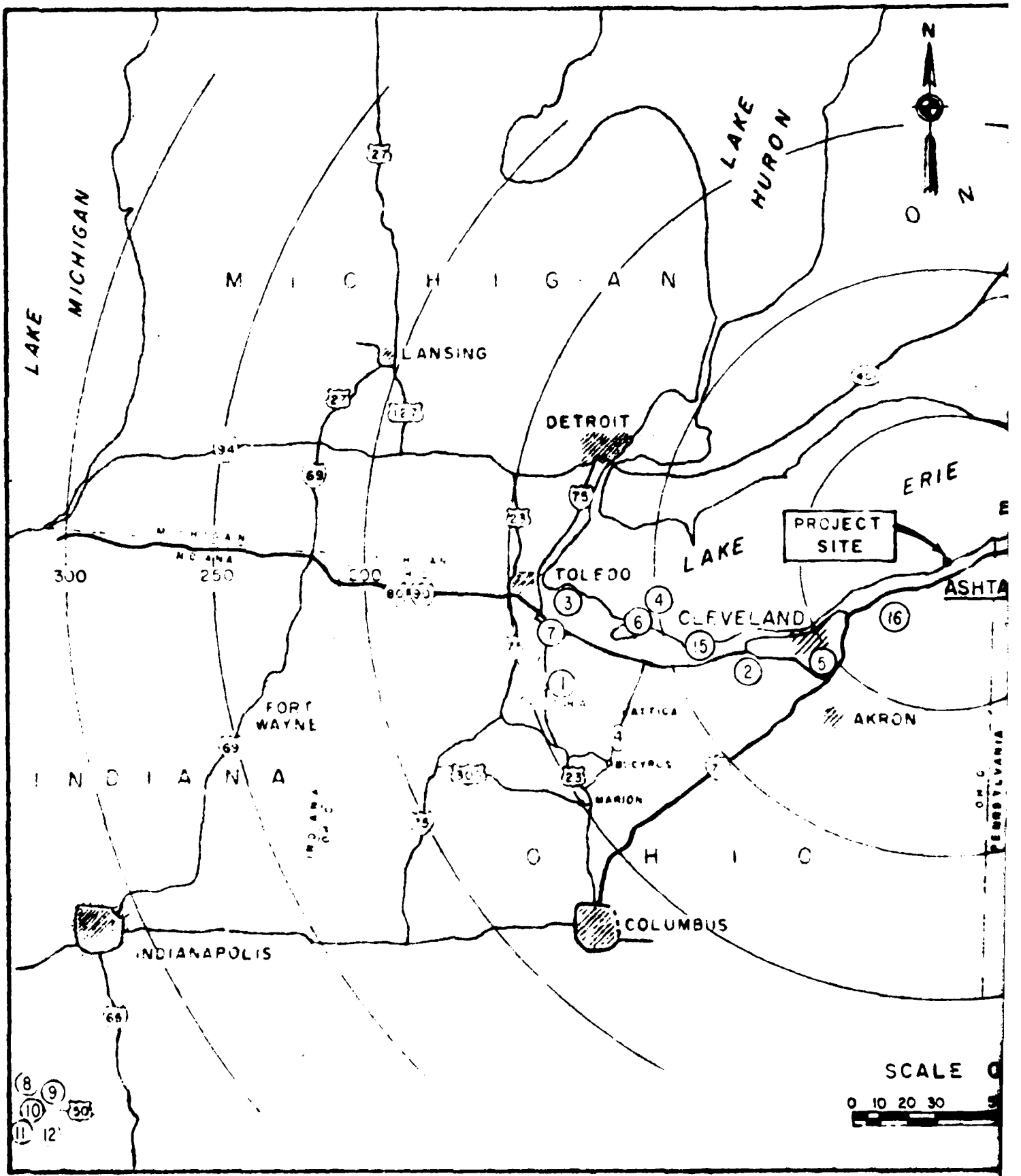
ntation

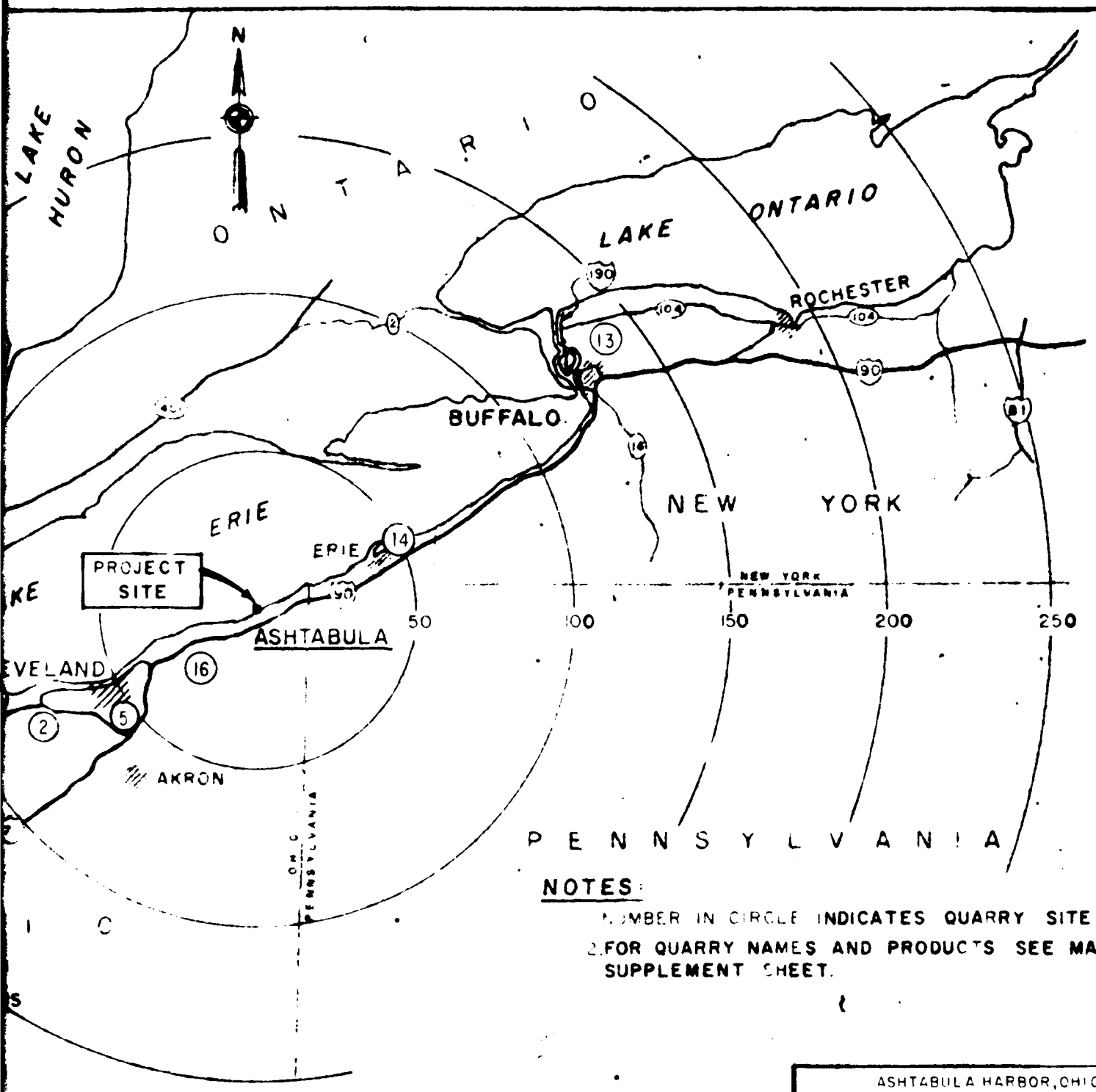
rct.

tions.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
GEOLOGIC PROFILE
ALTERNATIVE 2
(MODIFIED)
U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE B2


LAKE MICHIGAN
LAKE HURON
LAKE ERIE
M I C H I G A N
I N D I A N A
O H I O
LANSING
DETROIT
TOLEDO
CLEVELAND
AKRON
FORT WAYNE
INDIANAPOLIS
COLUMBUS
MARION
PROJECT SITE
ASHTA
300
250
200
SCALE
0 10 20 30



NOTES:

1. NUMBER IN CIRCLE INDICATES QUARRY SITE.
2. FOR QUARRY NAMES AND PRODUCTS SEE MAP SUPPLEMENT SHEET.

SCALE OF MILES

0 10 20 30 50 100

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

LOCATION MAP
POSSIBLE MATERIAL SOURCES

U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT
APPENDIX B

PLATE B3

2

MAP SUPPLEMENT SHEET
SUMMARY OF POSSIBLE SOURCES FOR
CONSTRUCTION MATERIALS

SITE NUMBER	SOURCE	QUARRY OR PIT LOCATION	RADIAL DISTANCE	ARMOR STONE, TYPE A1	ARMOR STONE, TYPE A2	SAND FILL
1.	BROUGH STONE CO.	WEST MILLGROVE, OH	148 MI.	X	X	
2.	CLEVELAND QUARRIES	SOUTH AMHERST, OH	85 MI.	X	X	
3.	E KRAEMER AND SON, INC.	CLAY CENTER, OH	136 MI.	X	X	
4.	QUALITY QUARRIES	KELLEY'S ISLAND, OH	103 MI.	X	X	
5.	ROCKSIDE RECLAMATION INC	GARFIELD HEIGHTS, OH	55 MI.	X	X	
6.	STANDARD SLAG CO.	MARBLEHEAD, OH	105 MI.	X	X	
7.	WOODVILLE LIME AND CHEMICAL	WOODVILLE, OH	137 MI.	X	X	
8.	EMPIRE WOOD CO.	BLOOMINGTON, IN	360 MI.	X	X	
9.	B G HOADLEY QUARRIES	BLOOMINGTON, IN	355 MI.	X	X	
10.	INDIANA LIMESTONE CO	BEDFORD, IN	365 MI.	X	X	
11.	VICTOR OOLITIC STONE CO	BLOOMINGTON, IN	374 MI.	X	X	
12.	WOOLERY STONE CO.	BLOOMINGTON, IN	363 MI.	X	X	
13.	FRONTIER STONE PRODUCTS	LOCKPORT, N.Y.	150 MI.	X	X	
14.	ERIE SAND AND GRAVEL	ERIE, PA	50 MI.			X
15.	ERIE SAND AND GRAVEL	LORAIN, OH	125 MI.			X
16.	R.W. SIDLEY	THOMPSON, OH	25 MI.			X

10.	INDIANA LIMESTONE CO	BEDFORD, IN	365 MI.	X	X									
11.	VICTOR OOLITIC STONE CO	BLOOMINGTON, IN	374 MI.	X	X									
12.	WOOLERY STONE CO.	BLOOMINGTON, IN	363 MI.	X	X									
13.	FRONTIER STONE PRODUCTS	LOCKPORT, N.Y.	150 MI.	X	X									
14.	ERIE SAND AND GRAVEL	ERIE, PA	50 MI.			X								
15.	ERIE SAND AND GRAVEL	LORAIN, OH	125 MI.			X								
16.	R.W. SIDLEY	THOMPSON, OH	25 MI.			X								

NOTES:

ARMOR STONE, TYPE A1 - 1.5 - 2.5 TONS

ARMOR STONE, TYPE A2

SAND FILL - GRADED PRODUCT: 3/8 INCH

X - INDICATES QUARRY CAPABLE OF PRODUCING THAT MATERIAL. SEE GRADATION CURVES.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

MATERIAL SURVEY
SUMMARY OF SOURCES

U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT,
APPENDIX B

PLATE B

SOURCE	ROCK TYPE	PROPOSED USE	RADIAL DISTANC
BROUGH STONE CO. QUARRY AT WEST MILLGROVE, OHIO OFFICE AT TOLEDO, OHIO	NIAGARAN DOLOMITE	A1, A2	148 MI.
CLEVELAND QUARRIES QUARRY AT SOUTH AMHERST, OHIO OFFICE AT SOUTH AMHERST., OH	BEREA SANDSTONE	A1, A2	85 MI.
E. KRAEMER AND SON, INC. QUARRY AT CLAY CENTER, OHIO OFFICE AT CLAY CENTER, OHIO	NIAGARAN DOLOMITE	A1, A2	136 MI
QUALITY QUARRIES QUARRY AT KELLEY'S ISLAND, OHIO	AMHERSTBURG AND LUCAS DOLOMITE	A1, A2	103 M

RADIAL DISTANCE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USE
148 MI.	NOVEMBER 1972	ORD LAB LAB #103/73.006C	CONFINED DREDGE SPOIL DISPOSAL PROGRAM (LORAIN DIKE) ARMOR STONE	UNKNOWN
	AUGUST 1976	ORD LAB LAB #103/76T.307B	CONFINED DREDGE SPOIL DISPOSAL AREA AT LORAIN (CONCRETE AGGREGATE)	UNKNOWN
85 MI.	AUGUST 1967	ORD LAB LAB #103/68.604C	PILOT STUDY CONFINED DIKE DISPOSAL PROGRAM CLEVELAND HARBOR (RIPRAP)	UNKNOWN
	APRIL 1972	ORD LAB LAB #103/72.606C	WELLSVILLE REHABILITATION PROJECT. WELLSVILLE N.Y. (DERRICK STONE)	UNKNOWN
	APRIL 1975	ORD LAB LAB #103/75.618B	CONFINED DREDGE SPOIL DISPOSAL AREA NO. 7. LORAIN HARBOR. OHIO	UNKNOWN
136 MI.	MARCH 1972	ORD LAB LAB #103/72.606C	CONFINED DREDGE SPOIL DISPOSAL PROGRAM (ARMOR STONE)	UNKNOWN
103 MI.	JULY 1976	ORD LAB LAB #103/76T.603B	CONFINED DREDGE SPOIL DISPOSAL PROGRAM DIKE 14 (ARMOR STONE)	1976
		ORD LAB LAB #103/78.601B	CONFINED DREDGE SPOIL DISPOSAL PROGRAM DIKE 4 (ARMOR STONE)	-

SERVICE RECORD

DATE USED	PROJECT	EVALUATION	
WN	UNKNOWN	UNKNOWN	UNIT WEIGHT VARIES (AVAILABLE SEVERAL MI
WN	UNKNOWN	UNKNOWN	EXCESS AMOUNT (14.8 AGGREGATE. WILL RE
WN	UNKNOWN	UNKNOWN	UNIT WEIGHT AVERAGE SERVICE RECORD. IT DISTRICT. HOWEVER,
WN	UNKNOWN	UNKNOWN	
WN	UNKNOWN	UNKNOWN	SPECIFIC GRAVITY VA REQUIRED.
WN	UNKNOWN	UNKNOWN	UNIT WEIGHT VARIES AVAILABLE. COARSE TO APPROVAL.
	C D.D.S. DIKE 14	TOO EARLY TO EVALUATE	WEIGHTED UNIT AVER
			UNITS K1-L2-1 UPPE LOWER & K1-L1A-1 O ACCEPTABLE FOR A S

3

EVALUATION	REMARKS
UNKNOWN	UNIT WEIGHT VARIES FROM 158 P.C.F. TO 166 P.C.F. RAIL FACILITIES AVAILABLE SEVERAL MILES AWAY FROM QUARRY.
UNKNOWN	EXCESS AMOUNT (14.8%) OF MINUS #200 MATERIAL WAS RECORDED IN FINE AGGREGATE. WILL REQUIRE WASHING.
UNKNOWN	UNIT WEIGHT AVERAGES ABOUT 143.5 P.C.F. THIS SANDSTONE HAS A GOOD SERVICE RECORD. IT HAS BEEN USED ON SEVERAL OUTER BREAKWALLS IN THIS DISTRICT. HOWEVER, IT WILL FAIL MOST DURABILITY TESTS.
UNKNOWN	
UNKNOWN	SPECIFIC GRAVITY VARIES FROM 2.28 TO 2.33. MINIMUM OF 100 DAYS CURING REQUIRED.
UNKNOWN	UNIT WEIGHT VARIES FROM 167 P.C.F. TO 169 P.C.F. RAIL FACILITIES AVAILABLE. COARSE AGGREGATE FOR CONCRETE WILL REQUIRE TESTING PRIOR TO APPROVAL.
TOO EARLY TO EVALUATE	WEIGHTED UNIT AVERAGE FOR UNITS BELOW IS 154 P.C.F.
	UNITS KI-L2-1 UPPER & LOWER & KI-L1A-1 ONLY ACCEPTABLE FOR A STONE.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

OHIO MATERIAL SOURCES MATERIALS SURVEY

U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT, APPENDIX B

4

PLATE

SOURCE	ROCK TYPE	PROPOSED USE	RADIAL DISTANC
ROCKSIDE RECLAMATION INC. QUARRY AT GARFIELD HEIGHTS, OHIO	EUCLID SANDSTONE LENTIL OF THE BEDFORD SHALE	A1, A2	55 M.
STANDARD SLAG CO. QUARRY AT MARBLEHEAD, OHIO OFFICE AT MARBLEHEAD, OHIO	LUCAS FORMATION (DOLOMITE)	A1 A2	105 MI

DIAL TANCE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USED
55 M	JUNE 1974	ORD LAB LAB #103/74.621C	OPERATION FORESIGHT PROJECT REPAIR EASTLAKE, OHIO (LARGE RIPRAP)	UNKNOWN
	AUGUST 1976	ORD LAB LAB #103/76.624B	CLEVELAND CONFINED DREDGE SPOIL DISPOSAL AREA NO. 14 (ARMOR STONE)	UNKNOWN
	DECEMBER 1977	ORD LAB LAB #103/77.623B	CLEVELAND CONFINED DREDGE SPOIL DISPOSAL AREA NO. 14 (ARMOR STONE)	1977
105 M	DECEMBER 1968	ORD LAB LAB #103/69.607C	CLEVELAND DIKED DISPOSAL AREA NO. 2 CLEVELAND HARBOR, OH. (CORE STONE AND ARMOR STONE)	1969
	MARCH 1972	ORD LAB LAB #103/72.606C	CONFINED DREDGE SPOIL DISPOSAL PROGRAM (CORE, INTERMEDIATE, FILTER AND ARMOR STONE)	1973-1974
				1974-1977

SERVICE RECORD			
USED	PROJECT	EVALUATION	
	OPERATION FORESIGHT PROJECT REPAIR EASTLAKE, OHIO	UNKNOWN	
	UNKNOWN	UNKNOWN	THIS SANDSTONE IS WELL C
	OPERATION FORESIGHT PROJECT REPAIR EASTLAKE, OHIO	TOO EARLY TO EVALUATE	UNIT WEIGHT VARIES FROM
	CLEVELAND DIKED DISPOSAL AREA NO. 2 CLEVELAND HARBOR, OH (RIPRAP STONE)	SATISFACTORY	ALSO TESTED FOR FINE AND SPECIFIC GRAVITY FOR FI LEDGE ROCK VARIES FROM 2 FACILITIES AVAILABLE. O STONE. ONLY CRUSHED STO GATE
	LORAIN DIKED DISPOSAL AREA, LORAIN HARBOR, OH (ARMOR, CORE, AND UNDERLAYER STONE)	TOO EARLY TO EVALUATE	

RD	EVALUATION	REMARKS
IR	UNKNOWN	
	UNKNOWN	THIS SANDSTONE IS WELL CEMENTED WITH NO "CURING EFFECT" NOTED.
IR	TOO EARLY TO EVALUATE	UNIT WEIGHT VARIES FROM 149.1 P.C.F. TO 152.2 (NEW PORTION OF QUARRY).
D.	SATISFACTORY	ALSO TESTED FOR FINE AND COARSE AGGREGATES FOR CONCRETE AND CELL FILL. SPECIFIC GRAVITY FOR FINE AGGREGATE IS 2.59; FOR COARSE AGGREGATE 2.6 LEDGE ROCK VARIES FROM 2.62 TO 2.75. SELF UNLOADING VESSELS AND BARG FACILITIES AVAILABLE. ONLY UNITS 17 AND MN-1 ARE ACCEPTABLE FOR A STONE. ONLY CRUSHED STONE FROM LIFT 3 ACCEPTABLE FOR CONCRETE AGGRE-GATE
AIN	TOO EARLY TO EVALUATE	

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

OHIO MATERIAL SOURCES MATERIALS SURVEY

S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT,
APPENDIX B

PLATE B

SOURCE	ROCK TYPE	PROPOSED USE	RADIAL DISTANCE
WOODVILLE LIME AND CHEMICAL CO. QUARRY AT WOODVILLE, OHIO OFFICE AT WOODVILLE, OHIO	NIAGARAN DOLOMITE	A1, A2	[illegible] M.

DIAL TANCE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USED
7 M	OCTOBER 1970	ORD LAB LAB #101/71.320C	FREMONT, OHIO LOCAL FLOOD PROTECTION (RIPRAP)	1971
	SEPTEMBER 1970	ORD LAB LAB #101/71.312C	FREMONT, OHIO LOCAL FLOOD PROTECTION (FINE AND COARSE AGGREGATES FOR CONCRETE, GRANULAR FILL, BASE COURSE, BEDDING AND FILTER)	1971
	DECEMBER 1968	ORD LAB LAB #103/69.607C	CLEVELAND DIKED DISPOSAL NO. 2	UNKNOWN
	OCTOBER 1967	UNKNOWN	CLEVELAND PILOT STUDY DISPOSAL AREA (RIPRAP)	1968

2

SERVICE RECORD			
E USED	PROJECT	EVALUATION	
	FREMONT OHIO LOCAL FLOOD PROTECTION (RIPRAP)	TOO EARLY TO EVALUATE	AVERAGE WEIGHT IS 165 P OF PRODUCING LARGE AR FROM NORMAL PRODUCTION
	FREMONT, OHIO LOCAL FLOOD PROTECTION PROJECT (CONCRETE FLOOD WALLS)	TOO EARLY TO EVALUATE	SPECIFIC GRAVITY FOR FI FROM 3.03 TO 3.30 BOTH TESTING PRIOR TO APPROV
	UNKNOWN	UNKNOWN	
	CLEVELAND PILOT STUDY DISPOSAL AREA	SATISFACTORY	

EVALUATION	REMARKS
TOO EARLY TO EVALUATE	AVERAGE WEIGHT IS 185 P.C.F. RAIL FACILITIES AVAILABLE. QUARRY CAPABLE OF PRODUCING LARGE ARMOR STONE; HOWEVER, ARMOR STONE WOULD BE OVERSIZE FROM NORMAL PRODUCTION BLASTING.
TOO EARLY TO EVALUATE	SPECIFIC GRAVITY FOR FINE AGGREGATE VARIES FROM 2.68 TO 2.70 FN VARIES FROM 3.03 TO 3.30 BOTH FINE AND COARSE AGGREGATES WILL REQUIRE TESTING PRIOR TO APPROVAL.
UNKNOWN	
SATISFACTORY	

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

OHIO MATERIAL SOURCES MATERIALS SURVEY

U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT
APPENDIX B

4

PLATE B7

SOURCE	ROCK TYPE	PROPOSED USE	RADIA DISTAN
INDIANA LIMESTONE CO. QUARRY NEAR BEDFORD, INDIANA OFFICE AT BEDFORD, INDIANA	SALEM LIMESTONE	A1, A2	365 MI
EMPIRE WOOD CO. QUARRY AT BLOOMINGTON, IN OFFICE AT WILLIAMS, IN	SALEM LIMESTONE	A1, A2	360 MI
B.G. HOADLEY QUARRIES QUARRY AT BLOOMINGTON, IN OFFICE AT BLOOMINGTON, IN	SALEM LIMESTONE	A1, A2	355 MI
VICTOR OOLITIC STONE CO. QUARRY AT BLOOMINGTON, IN OFFICE AT BLOOMINGTON, IN	SALEM LIMESTONE	A1, A2	374 MI
WOOLERY STONE CO. QUARRY AT BLOOMINGTON, IN OFFICE AT BLOOMINGTON, IN	SALEM LIMESTONE	A1, A2	363 MI

ADIAL STANCE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USE
365 MI.	JANUARY 1973	ORD LAB LAB #103/73.612C	COMBINED DREDGE SPOIL DISPOSAL PROGRAM (ARMOR STONE)	JULY 1972
	OCTOBER 1976	ORD LAB LAB #103/76.629B	CONFINED DREDGE DISPOSAL DIKE AT LORAIN (ARMOR STONE)	UNKNOWN
360 MI.	OCTOBER 1976	ORD LAB LAB #103/76.629B	CONFINED DREDGE DISPOSAL DIKE AT LORAIN (ARMOR STONE)	TESTED BUT NOT
355 MI.	OCTOBER 1976	ORD LAB LAB #103/76.629B	CONFINED DREDGE DISPOSAL DIKE AT LORAIN (ARMOR STONE)	TESTED BUT NOT
374 MI.	OCTOBER 1976	ORD LAB LAB #103/76.629B	CONFINED DREDGE DISPOSAL DIKE AT LORAIN (ARMOR STONE)	TESTED BUT NOT
363 MI.	OCTOBER 1976	ORD LAB LAB #103/76.629B	CONFINED DREDGE DISPOSAL DIKE AT LORAIN (ARMOR STONE)	TESTED BUT NOT
	2			

SERVICE RECORD

D	PROJECT	EVALUATION	R
	CLEVELAND HARBOR OUTER BREAKWATER REPAIR	TOO EARLY TO EVALUATE	UNIT WEIGHTS VARY FROM 148 P.C AVAILABLE. ONLY CUT STONE AVA
	CONFINED DREDGED DISPOSAL DIKE AT LORAIN	TOO EARLY TO EVALUATE	
SED			UNIT WEIGHTS VARY FROM 146.0 P
SED			UNIT WEIGHTS VARY FROM 145.4 P
USED			UNIT WEIGHTS VARY FROM 145.4 P
USED			UNIT WEIGHTS VARY FROM 148.5
			IND

EVALUATION	REMARKS
TOO EARLY TO EVALUATE	UNIT WEIGHTS VARY FROM 148 P.C.F. TO 155 P.C.F. RAIL FACILITIES AVAILABLE. ONLY CUT STONE AVAILABLE.
TOO EARLY TO EVALUATE	
	UNIT WEIGHTS VARY FROM 146.0 P.C.F. TO 146.6 P.C.F.
	UNIT WEIGHTS VARY FROM 145.4 P.C.F. TO 147.3 P.C.F.
	UNIT WEIGHTS VARY FROM 145.4 P.C.F. TO 151.6 P.C.F.
	UNIT WEIGHTS VARY FROM 148.5 TO 157.3 P.C.F.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

INDIANA MATERIAL SOURCES MATERIALS SURVEY

U S ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT, APPENDIX B

4

PLATE B8

SOURCE	ROCK TYPE	PROPOSED USE	RADIAL DISTANCE
FRONTIER STONE PRODUCTS, INC. QUARRY AT LOCKPORT, N.Y. OFFICE AT LOCKPORT, N.Y.	LOCKPORT FORMATION (DOLOMITE)	A1, A2	150 MI.

L CE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USED
.	FEBRUARY 1971	ORD LAB LAB #103/71.612C	BUFFALO DIKED DISPOSAL AREA #2 (RIPRAP)	UNKNOWN
	AUGUST 1974	UNKNOWN	CONFINED DIKE DISPOSAL PROGRAM BUFFALO HARBOR, N.Y. SITE 4 (ARMOR STONE)	UNKNOWN
	SEPTEMBER 1974	ORD LAB LAB #103/75.604B	CONFINED DIKE DISPOSAL PROGRAM, BUFFALO HARBOR, N.Y. SITE 4 (ARMOR STONE)	UNKNOWN
	FEBRUARY 1976	ORD LAB LAB #103/76.603B	CONFINED DIKE DISPOSAL PROGRAM, BUFFALO HARBOR, N.Y. SITE 4 (ARMOR AND UNDERLAYER STONE)	UNKNOWN
	SEPTEMBER 1978	ORDL	SCAJAQUADA CREEK FLOOD CONTROL PROJECT (RIPRAP)	SEPTEMBER 1978
	2			1.

SERVICE RECORD			
D	PROJECT	EVALUATION	R
	UNKNOWN	UNKNOWN	UNIT WEIGHTS VARY FROM 162 P.C
	BUFFALO DISPOSAL DIKE NO. 4	TOO EARLY TO EVALUATE	ONLY THE GASPORT MEMBER ACCEPT TIES ON NYS BARGE CANAL AVAILA DECEW MEMBER NOT ACCEPTABLE.
	UNKNOWN	UNKNOWN	
	UNKNOWN	UNKNOWN	
	SCAJAQUADA CREEK FLOOD CONTROL PROJECT (RIPRAP)	TOO EARLY TO EVALUATE	RIPRAP PRODUCED FROM BOTH GASP FORMATION. UNIT 7 OF THE GOAT USE.
			NE
	3		

EVALUATION	REMARKS
UNKNOWN	UNIT WEIGHTS VARY FROM 162 P.C.F. RAIL FACILITIES NOT AVAILABLE.
TOO EARLY TO EVALUATE	ONLY THE GASPORT MEMBER ACCEPTABLE FOR ARMOR STONE. LOADING FACILITIES ON NYS BARGE CANAL AVAILABLE. SELECTIVE QUARRYING REQUIRED. DECEW MEMBER NOT ACCEPTABLE.
UNKNOWN	
UNKNOWN	
TOO EARLY TO EVALUATE	RIPRAP PRODUCED FROM BOTH GASPORT AND GOAT ISLAND MEMBERS OF LOCKPORT FORMATION. UNIT 7 OF THE GOAT ISLAND MEMBERS NOT ACCEPTABLE FOR ANY USE.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

NEW YORK MATERIAL SOURCES MATERIALS SURVEY

U S ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT,
APPENDIX B

SOURCE	ROCK TYPE	PROPOSED USE	RADIAL DISTANCE
ERIE SAND AND GRAVEL CO. STOCKPILE AT ERIE, PA OFFICE AT ERIE, PA	LAKE SAND	SAND FILL	50 MI.
ERIE SAND AND GRAVEL CO. STOCKPILE AT LORAIN, OHIO OFFICE AT SANDUSKY, OHIO	LAKE SAND	SAND FILL	125 MI.
R.W. SIDLEY QUARRY AT THOMPSON, OHIO OFFICE AT THOMPSON, OHIO	SHARON CONGLOMERATE	SAND FILL	25 MI.

AL NCE	LABORATORY TEST RECORD			
	DATE TESTED	LABORATORY	PROJECT FOR WHICH TESTED	DATE USED
MI.	NOVEMBER 1976	ORD LAB LAB NO. 103/78.627B	PRESQUE ISLE BEACH NOURISHMENT PROJECT (BEACH FILL)	1975-1976
	JANUARY 1981	ORD LAB LAB NO. 103/81.604B	PRESQUE ISLE BEACH NOURISHMENT PROJECT (BEACH FILL)	
5 MI.	1977		LAKEVIEW PARK BEACH EROSION CONTROL PROJECT (BEACH FILL)	1977
	1980	ORD LAB LAB NO. 103/80.622B	1980 BEACH REPLENISHMENT PROJECT AT LAKEVIEW PARK PROJECT (BEACH FILL)	1980
5 MI.	JANUARY 1980	ORD LAB LAB NO. 103/80.605B	DUNKIRK SMALL BOAT HARBOR	
	2			

SERVICE RECORD

TE USED	PROJECT	EVALUATION	
76	PRESQUE ISLE BEACH NOURISHMENT PROJECT	SATISFACTORY	SAND IS OBTAINED FRO ERIE, PA
	LAKEVIEW PARK BEACH EROSION CONTROL PROJECT	SATISFACTORY	SAND IS OBTAINED FR FROM VERMILLION AND
	1980 BEACH REPLENISHMENT PROJECT AT LAKEVIEW PARK	SATISFACTORY	
			VERY CLEAN SAND. 9 QUARTZ.

EVALUATION	REMARKS
SATISFACTORY	SAND IS OBTAINED FROM A PERMIT DREDGING AREA LOCATED OFFSHORE FROM ERIE, PA
SATISFACTORY	SAND IS OBTAINED FROM TWO PERMIT DREDGING AREAS LOCATED OFFSHORE FROM VERMILLION AND FAIRPORT, OH
SATISFACTORY	
	VERY CLEAN SAND. 98% QUARTZ.

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

OHIO MATERIAL SOURCES MATERIALS SURVEY

U.S. ARMY ENGINEER DISTRICT BUFFALO
TO ACCOMPANY DETAILED PROJECT REPORT
APPENDIX B

4

PLATE B10

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX C
ECONOMICS

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

APPENDIX C - ECONOMICS

Introduction

Lakeshore Park is located in the township of Ashtabula, OH, which is adjacent to Ashtabula City. Geographically, the city of Ashtabula is situated about 40 miles southwest of Erie, PA, and about 50 miles northeast of Cleveland, OH. (See Figure 1) Major highway access to Lakeshore Park is provided by Interstate 90, which connects Cleveland, OH, and Erie, PA. An exit point on Interstate 90 is located about 4 miles from Lakeshore Park.

Lakeshore Park was developed in the 1920's, and was, for some time, a major recreation facility for the entire northeastern portion of Ohio. The park is owned by the township of Ashtabula and is managed by the Township Park Commission.

High coliform contents led to the closing of the swimming facilities for a period in the 1960's. Extension of the outflow from the local sewage-treatment plant has reduced the coliform contents to an acceptable level. Deterioration of the shoreline, however, has substantially reduced the desirability of the swimming area. The tentatively selected alternative plan to be evaluated in this report will result in a significant revival of the swimming facilities of the park. The revival of the park's swimming facilities will, in turn, have an impact on increasing the demand for all of the recreational facilities of the park.

Spacial Characteristics

The potential demand for a particular recreational facility is a function of socio-demographic and economic variables, and of the capacity and availability of recreational facilities. These factors are, in turn, conditioned by location, or spacial characteristics.

There are three spacial components to the potential demand for the recreational facilities of Lakeshore Park. Two of these spacial components can be geographically specified in terms of: (1) the local demand area and, (2) the regional demand area. The third spacial component derives from visitations to the park of long-distance vacation travelers.

The local demand area for the recreational facilities of Lakeshore Park will be defined in this study as the geographic area that includes Ashtabula City and the coastal municipalities adjacent and contiguous to Ashtabula City -Ashtabula Township, Kingsville Township, and Saybrook Township. Figure 2 shows the location of Ashtabula County within the State of Ohio, and Figure 3 shows the location of the local demand area.

The regional demand area is defined in this study to be made up of Ashtabula County and the six counties (four in Ohio and two in Pennsylvania) that are adjacent and contiguous to Ashtabula County. These six counties are Lake, Geauga, Portage, and Trumbull Counties in Ohio, and Erie and Crawford Counties in Pennsylvania (See Figure 4). Note also that, except for Ashtabula and Crawford, all of the counties in the regional demand area

are contained by Standard Metropolitan Statistical Areas which by definition contain large concentrations of population.

Socio Demographics

The largest concentration of population in the local demand area is contained in Ashtabula City. Between 1960 and 1970 Ashtabula City has experienced a slight decrease in population, with the population projected to stabilize at the 1970 level through 1975. (See Table 1) Ashtabula City, with a total of about 7 square miles, will, nevertheless, continue to have the highest population density within the local demand area, as shown in Table 2.

The relatively high population density of Ashtabula City indicates, quite clearly, that Ashtabula City constitutes the most significant element in the local demand for the recreational facilities of Lakeshore Park. Furthermore, continuing increases in fuel costs and the resulting increase in travel cost will, no doubt, cause a relative increase in the significance of the entire local demand component for Lakeshore Park.

Ashtabula County ranks fifth in total population among the seven counties included in the regional demand element, and, with the exception of Trumbull County, all are projected to grow in population through the year 2000. (See Table 3) When population is viewed from the perspective of population per square mile, Ashtabula County ranks fifth. Lake County has the highest population density of the seven counties in the regional demand element. (See Table 4)

The relatively short distance to Lakeshore Park for residents of Ashtabula City provides for a high level of accessibility in terms of the local demand area. Furthermore, the widespread use of bicycles and the availability of public transportation in Ashtabula City eliminate distance as a significant deterrent to park attendance.

Distance, as a deterrent to park attendance, is a factor affecting residents of outlying municipalities, since automobile is the primary mode of transport. One way of measuring the availability of automobile transportation is to measure the percent of occupied housing units having one or more automobiles. Table 5 shows the percent of occupied housing units having one or more automobiles for the three coastal municipalities that are contiguous and adjacent to Ashtabula City.

Table 1 - Population Growth Trends for Local Demand Area
(Thousands)

Municipalities	1960		1970		1975	
	Population	Percent of County 1/	Population	Percent of County 1/	Population	Percent of County 1/
Ashtabula Township	7.1	7.6	7.4	7.5	7.6	7.5
Ashtabula City	24.6	26.4	24.3	24.7	24.3	23.8
Kingsville Township	3.7	4.0	4.2	4.3	4.7	4.6
Saybrook Township	6.2	6.7	6.6	6.7	6.7	6.6
Total	41.6	44.7	42.5	43.2	43.3	42.5

1/ Ashtabula in Ohio

Source: U. S. Census of Population, General Population Characteristics, 1970, U. S. Department of Commerce, Bureau of the Census.

Table 2 - Population Densities for Municipalities in Local Demand Area - 1970

Ohio		
Municipalities	Area (Sq Mi)	Density (Sq Mi)
Ashtabula City	6.8	3,549
Conneaut City	27.4	531
North Kingsville Village	8.4	259
Saybrook Township	31.4	200

Source: Land Use and Zoning, Conneaut City Planning Commission, C. Hill and Associates, Columbus, Ohio, 1965

Land Use - Ashtabula City, Ashtabula County Planning Commission, 1972

Census of Population, General Population Characteristics, 1970, U. S. Department of Commerce, Bureau of Census

Table 3 - Population Projections for Counties Included in Regional Demand Element

	1970 1/	1980 1/	1990	2000
OHIO				
Ashtabula	98,200	104,200	122,700	132,600
Lake	197,200	212,800	244,100	263,700
Geauga	63,000	74,500	98,000	120,200
Portage	125,900	135,900	174,500	201,600
Trumbull	232,600	241,900	253,700	252,400
PENNSYLVANIA				
Erie	263,700	279,800	292,100	298,600
Crawford	81,300	88,900	88,900	90,900

1/ Actual census counts

Source: Ohio Department of Economics and Community Development, 1974

U. S. Census of Population and Housing, Ohio, U. S. Department of Commerce, Advance Report, 1980

Table 4 - Population Density (Per Square Mile) for Counties in Regional Demand Element - 1970

Counties	Density
OHIO	
Ashtabula	140
Lake	854
Geauga	155
Portage	254
Trumbull	383
PENNSYLVANIA	
Erie	324
Crawford	80

Source: County and City Data Book: A Statistical Abstract Supplement, U. S. Department of Commerce, Bureau of the Census, 1972

Table 5 - Percent of Occupied Housing Units With One or More Automobiles - Outlying Coastal Muncipalities

Township	Percent
Saybrook	.78
North Kingsville	.91
Ashtabula	.90

Source: County and City Data Book: A Statistical Abstract Supplement, U. S. Department of Commerce, Bureau of the Census, 1972.

The relatively low percent of households with one or more automobiles for Saybrook Township, as indicated in Table 5, should render Saybrook Township a comparatively unimportant source of demand for Lakeshore Park.

Distance is also a significant factor in the regional demand area, and the automobile is the primary mode of transport. Interstate I-90, plus a convenient network of State and County roads, provide excellent road accessibility to Lakeshore Park. Table 6 indicates that the percent of total occupied housing units with one or more automobiles in all seven counties exceeds the percentage for their respective States.

Table 6 - Percent of Occupied Housing Units With One or More Automobiles - By State and County

Counties	Percent
OHIO - STATEWIDE	86.1
Ashtabula	90.1
Lake	94.8
Geauga	92.1
Portage	93.2
Trumbull	91.3
PENNSYLVANIA - STATEWIDE	80.1
Erie	86.1
Crawford	86.5

Source: County and City Data Book: A Statistical Abstract Supplement, U. S. Department of Commerce, Bureau of the Census, 1972

Recreational Facilities - Local and Regional

The demand for a recreational facility is conditioned not only by the recreational attributes of the particular recreational facility, but also by the recreational attributes and availability of alternative recreational facilities in a given geographic area. Alternative recreational facilities, of course, become less important with increasing distance from the particular facility.

Lakeshore Park contains 50 acres of land area, with a total lakefront of approximately 2,500 feet. The specific recreational facilities available at Lakeshore Park include a boating ramp, a 40-unit trailer park, picnic tables and shelters, baseball diamonds, and playground equipment. In addition, there are concession stands selling food and beverages and a 440' X 24' pavilion overlooking the lakefront area. The upper level of the pavilion serves as a picnic shelter and promenade. As mentioned earlier, the lakefront area of the park had, for some time, provided a beach and swimming area that, because of a combination of water pollution and beach erosion, has fallen into virtual total disuse. The lower level of the pavilion had also provided an area for boat storage and rental. Severe damage caused by flooding from winter storms has rendered the lower-level area of the pavilion inoperative.

From the east park boundary, low clay bluffs (approximately 15 feet high) extend 400 feet along the shore to the west. These bluffs are being rapidly eroded by high water and northeast storms. The remainder of the park shoreline was originally protected by a concrete seawall constructed by the Civilian Conservation Corps in the late 1920's. In 1974 this area was severely damaged by a combination of waves and high water. High lake levels and waves have created a riptide condition in the vicinity of the seawall. In 1977 a portion of the damaged seawall was replaced by a stone revetment in an attempt to protect the pavilion from further damage.

A reconnaissance report, dated 30 December 1974, estimated the average erosion rate along the park bluffs to 1.6 feet per year between 1948 and 1973. Comparison of aerial photos for 1968, 1973, 1974, and 1978 indicates an average annual erosion rate of 2.2 feet from 1968 to 1973 and 2.4 feet between 1973 and 1978. The high rate of erosion between 1973 and 1978 was due primarily to the unusually high lake levels, particularly during the early half of the 1970's.

There is currently a tentative plan to increase the range of recreation activities offered at Lakeshore Park with the addition of a small-boat harbor at the west end of the park. The construction of a small-boat harbor at Lakeshore Park has the support of both the Ashtabula County Planning Commission and local officials. As a result of a State action that will provide funding for only one marina, in April of 1980 the Ashtabula Port Authority decided to join the Lakeshore Advisory Board in seeking a local marina. The Board, which is made up of local boaters, recommended a marina be built at Lakeshore Park as an integral part of the "Lakeshore Park Recreation Plan" (see Figure 5 for location of the proposed marina).

Although the city of Ashtabula has an ample supply of public facilities supporting general recreational activities, there is a shortage of publically-accessible recreational sites having beach and swimming facilities. The Ohio Department of Natural Resources has also indicated a shortage of swimming capacity for most of the State of Ohio. On the other hand, a broad range of recreational activities, including swimming, is in high demand in most parts of the State, particularly planning region 11 which contains Ashtabula County (see Tables 7-11).

However, ODNR does not foresee residents traveling outside of their own counties in search of sites with adequate capacity as stated in the Ohio Comprehensive Outdoor Recreation Plan 1975-80; pp. 143-144:

> "The demand generated by swimming is very frequently satisfied inside the county of residence; less than 2 percent of the activity occasion are transferred outside the county of residence."

Therefore, it does not appear that the regional demand component for beach and swimming facilities at Lakeshore Park will be significant. The Ohio Department of Natural Resources has also determined that the specific planning region that contains Ashtabula County has an insignificant supply of recreational sites having swimming and beach facilities (see Figure 6 below). This is supported by an inventory of alternative sites having beach and swimming facilities in the local demand area, made by the Midwest Research Institute Project No. 4782-D, December 1979, for the Buffalo District (see Table 12 below). Only two of these facilities are accessible to the public; Walnut Beach and Saybrook Township Park.

Saybrook Township Park is located in the town of Saybrook, 10 miles west of Lakeshore Park and operated by the Saybrook Township Park Commission. The park has a range of recreational facilities comparable to those at Lakeshore Park. However, the township population density is less than 6 percent of that of Ashtabula City. It has comparatively small capacities in relationship to the local demand capacity. Thus, the greatest needs are concentrated in the more urbanized city of Ashtabula, which has large relative and absolute capacity needs for swimming. The total local visitation projection will then be allocated to Walnut Beach and Lakeshore Park.

Walnut Beach Park is located 4 miles west of Lakeshore Park. It is owned and operated by the city of Ashtabula. This park consists of a small beach area at its easterly end, bath houses, restrooms, and concession stands. The beach is 490 feet long. (No statistical information on usage is now available as reported in the Midwest Research Institute report.) The poor condition of its recreational facilities and its aesthetically inferior topography as compared with Lakeshore Park makes it far less attractive.

Table 7 - Ashtabula County Recreation Needs

Activity	1975	1980	1990
	ASHTABULA		
Bicycling	6.7	7.6	8.8
Boating	-5,950.8 1/	-4,224.6	-1,457.9
Camping	103.3	188.5	343.2
Canoeing	6.1	8.2	11.6
Fishing	-21,075.3	-20,753.1	-20,187.9
Golf	-17.2	-6.0	10.8
Hiking	5.8	7.4	10.0
Horseback Rdg.	0.5	1.0	2.0
Hunting	-121,876.8	-121,202.1	-120,183.9
Picnicking	119.8	203.1	334.9
Playground Act.	-108.5	-106.6	-103.5
Outdoor Games	-261.4	-258.8	-253.9
Sailing	-1,116.6	-198.6	509.2
Sledding	-17.7	-16.9	-15.9
Snowskiing	3.9	4.7	5.9
Swimming	71,223.2	94,507.9	134,018.3
Tennis	52.3	60.6	72.5
Trailbikes	7.8	8.7	10.1

Measurements

Bicycling - miles	Hiking - miles	Sailing - acres
Boating - acres	Horseback Rdg. - miles	Sledding - acres of slopes
Camping - sites	Hunting - acres	Snowskiing - slopes
Canoeing - miles	Picnicking - tables	Swimming - sq. ft.
Fishing - acres	Playgrd. Act. - acres	Tennis - courts
Golf - holes	Outdoor Games - acres	Trailbikes - miles

1/ Negative numbers idicate a surplus.
SOURCE: Ohio Comprehensive Outdoor Recreation Plan; pp. 359.

Table 8 - Swimming Capacity[1/] Needs - 1975

Planning Region	1973 Capacity (1)	Needed Capacity[2/] Demanded Capacity (2)	Gross (3)	Net (4)	Gross Minus Net Capacity (5)
1	40,986.7	132,620.1	93,424.4	91,681.5	1,742.9
2a	26,894.0	91,455.3	67,963.0	64,561.2	1,401.8
2b	21,704.5	26,658.9	9,032.4	4,954.4	4,078.0
3	22,143.8	32,397.1	11,611.3	10,253.3	1,358.0
4a	12,728.8	14,160.0	4,338.9	1,431.3	2,907.6
4b	85,203.2	75,273.8	30,123.6	9,934.4	40,058.0
5a	15,643.5	23,443.9	9,772.4	7,800.5	1,971.9
5b	20,201.1	23,331.6	8,611.6	3,130.6	5,481.0
6	49,257.9	119,787.9	77,670.6	70,530.0	7,140.6
7	30,356.2	33,237.0	9,530.0	2,579.8	6,950.2
8	16,977.0	20,780.7	8,462.1	3,803.7	4,658.4
9	49,760.2	45,616.4	13,544.4	4,143.8	17,688.2
10a	74,433.7	219,782.9	152,839.2	145,349.3	7,489.9
10b	72,313.2	120,271.9	54,576.0	47,958.7	6,617.4
11	62,622.2	71,756.3	16,554.8	9,134.2	7,420.6
State	601,480.3	1,050,571.0	566,053.6	449,088.3	116,965.3

1/ All capacity figures are daily capacity.
2/ Gross needed capacity is the sum of needs of only those counties in the planning region with positive needs (i.e., a deficit capacity); the net needed capacity is the sum of needs of all counties, both those counties with positive needs and those with negative needs (i.e., a surplus capacity).

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 146.

Table 9 - Swimming Capacity[1/] Needs - 1980

Planning Region	1973 Capacity (1)	Needed Capacity[2/] Demanded Capacity (2)	Gross (3)	Net (4)	Gross Minus Net Capacity (5)
1	40,938.7	142,808.3	103,412.7	101,869.6	1,543.1
2a	26,894.0	102,333.4	76,503.1	75,439.4	1,063.7
2b	21,704.5	29,751.0	11,432.2	8,046.6	3,385.6
3	22,143.8	35,024.5	13,972.6	12,880.7	1,091.9
4a	12,728.8	15,423.6	5,022.7	2,694.8	2,327.8
4b	85,208.2	82,636.4	35,547.9	2,571.8	38,110.7
5a	15,643.5	25,211.9	11,417.5	9,568.5	1,849.0
5b	20,201.1	25,202.4	10,014.3	5,001.3	5,013.0
6	49,257.9	133,923.3	90,615.7	84,665.4	5,950.3
7	30,657.2	35,145.1	10,792.0	4,487.9	6,304.1
8	16,977.0	22,015.5	9,239.1	5,128.5	4,110.5
9	49,760.2	48,249.2	15,177.3	1,511.0	16,688.4
10a	74,433.7	238,327.4	170,554.8	163,893.7	6,661.1
10b	72,313.2	132,580.1	65,211.9	60,266.8	4,945.1
11	62,622.2	76,374.8	20,680.0	13,752.6	6,927.3
State	601,480.3	1,145,092.0	649,592.6	543,611.1	105,981.4

1/ All capacity figures are daily capacity.
2/ Gross needed capacity is the sum of needs of only those counties in the planning region with positive needs (i.e., a deficit capacity); the net needed capacity is the sum of needs of all counties, both those counties with positive needs and those with negative needs (i.e., a surplus capacity).

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 146.

Table 10 - Swimming Capacity[1/] Needs - 1990

Planning Region	1973 Capacity (1)	Needed Capacity[2/] Demanded Capacity (2)	Gross (3)	Net (4)	Gross Minus Net Capacity (5)
1	40,938.7	158,819.3	119,109.9	117,880.6	1,229.3
2a	26,894.0	125,241.5	98,676.9	98,347.5	329.4
2b	21,704.5	36,140.4	16,624.9	14,435.9	2,189.0
3	22,143.8	40,367.0	18,792.3	18,223.2	569.1
4a	12,728.8	17,720.9	6,377.8	4,992.1	1,385.6
4b	85,208.2	96,984.9	46,053.4	11,776.8	34,276.6
5a	15,643.5	28,420.2	14,395.9	12,776.8	1,619.1
5b	20,201.1	28,148.0	12,412.6	7,946.9	4,465.7
6	49,257.9	162,500.5	116,846.3	113,242.6	3,603.7
7	30,657.2	37,511.5	12,354.6	6,584.4	5,500.3
8	16,977.0	23,896.9	10,278.6	6,919.9	3,368.7
9	49,760.2	52,244.0	17,625.6	2,483.7	15,141.8
10a	74,433.7	271,678.1	201,885.6	197,244.4	4,641.2
10b	72,313.2	155,683.1	85,942.6	83,369.8	2,572.8
11	62,622.2	83,096.9	26,998.2	20,474.8	6,523.4
State	601,480.3	1,318,445.0	804,374.2	716,967.8	87,406.4

1/ All capacity figures are daily capacity.

2/ Gross needed capacity is the sum of needs of only those counties in the planning region with positive needs (i.e., a deficit capacity); the net needed capacity is the sum of needs of all counties, both those counties with positive needs and those with negative needs (i.e., a surplus capacity).

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 147.

Table 11 - Swimming Facility Needs (Sq. Ft.)
Final Iteration

Planning Region	1975	1980	1990
1	2,335,611.0	2,585,318.0	2,977,747.0
2a	1,649,074.0	1,912,578.0	2,466,923.0
2b	225,810.3	285,804.9	415,623.2
3	290,282.8	349,315.9	469,808.3
4a	108,471.4	125,566.4	159,444.4
4b	753,089.4	888,698.6	1,151,335.0
5a	244,310.1	285,437.2	359,896.5
5b	215,290.4	250,358.6	310,316.0
6	1,941,768.0	2,265,394.0	2,921,158.0
7	238,249.7	269,800.4	308,865.5
8	211,551.6	230,976.4	256,965.9
9	338,608.9	379,433.2	440,638.8
10a	3,820,979.0	4,263,868.0	5,047,140.0
10b	1,384,400.0	1,630,295.0	2,148,565.0
11	413,870.6	516,999.3	674,955.1

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 147.

Table 12 - Inventory of Public and Private Beach and Swimming Facilities

Facility Name	Location	Use of Beach	Length of Beach (ft.)	Supporting Facilities		
				Bath Houses	Rest Rooms	Concessions
Holiday Village	Kingsville, OH	Private	272	N	N	N
Walnut Beach Park	Ashtabula, OH	Public	492	N	Y	Y
Saybrook Township Park	Saybrook, OH	Public	487	Y	Y	Y
Redbrook Boat Club	Saybrook, OH	Private	1,456	N	Y	Y
Hillside Beach I	Saybrook, OH	Private	248	N	N	N
Hillside Beach II	Saybrook, OH	Private	972	N	N	N
Shorehaven Cottages	Ashtabula, OH	Private	1,562	N	N	N
Reynolds Lil Acres	Ashtabula, OH	Private	N.A.	N	N	N
Pierce Trailer Park	Ashtabula, OH	Private	N.A.	N	N	N
Erie View	Saybrook, OH	Private	N.A.	N	Y	N
Girard Cottages	Ashtabula, OH	Private	N.A.	N	N	N
Lakeland Community Assoc.	Ashtabula, OH	Private	N.A.	N	N	N
Fittings Campsites	Saybrook, OH	Private	N.A.	N	N	N
Hernandez Campgrounds	Ashtabula, OH	Private	298	Y	Y	N
The Ranch	Ashtabula, OH	Private	N.A.	N	N	N
Saybrook on the Lake	Ashtabula, OH	Private	382	Y	Y	Y

Table 12 - Inventory of Public and Private Beach and Swimming Facilities (Cont'd)

Facility Name	Location	Use of Beach	Length of Beach (ft.)	Supporting Facilities		
				Bath Houses	Rest Rooms	Concessions
Greentop	Ashtabula, OH	Private	719	N	N	N
Maple View Cottages	Ashtabula, OH	Private	N.A.	N	N	N
Elmwood Beach	Saybrook, OH	Private	N.A.	N	N	N
Haywood Beach Corp.	Ashtabula, OH	Private	N.A.	N	N	N
Redwood Cottages	Ashtabula, OH	Private	141	N	N	N
Olive Drive Assoc. Inc.	Ashtabula, OH	Private	1,032	N	N	N
Luoma Campgrounds	Ashtabula, OH	Private	N.A.	Y	Y	N
Ravine Campgrounds	Ashtabula, OH	Private	N.A.	N	Y	N

Economic Base

The economic characteristics of a geographic area provide an important set of determinates of both the level and structure of the various activities that occur in the area. These activities include, of course, the recreation activities of the geographic area. Studies on the demand for recreation, for example, have revealed that there is a significant statistical relationship between the demand for the specific types of recreation activities and the level of income.

The relationship between income and the demand for a particular recreational activity can be either positive or negative, depending on the particular type of recreational activity. An increase in income, for example, is associated with an increase in participation in recreational activities such as skiing and golfing. On the other hand, increases in income are associated with a decrease in participation in fishing and hunting. Similarly, the demand for recreational facilities provided by the public sector tends to vary inversely with income, and the demand for recreational facilities provided by the private sector tends to vary directly with income.

There is also a strong link between the income generated in a geographic area and the industrial composition of the area. Specifically, an area characterized by a preponderance of manufacturing industries, particularly durable goods manufacturing, will generate a larger dollar amount of income than a geographic area characterized by a preponderance of retail or service industries.

The city of Ashtabula has a number of large industrial employers within its boundaries, including Union Carbide, Reliance Electric Company, RMI Company, and ABS Industries, Inc. Within the geographic area bounded on the west by Cleveland, on the south by Youngstown, and on the east by Erie, PA, Ashtabula City can be considered a commercial and service activity center. The municipalities surrounding Ashtabula City, namely, the townships of Kingsville, Ashtabula, and Saybrook, are basically bedroom communities. Residents of these communities commute to work primarily in Conneaut, Ashtabula City, and the industrial areas east of Cleveland. The industrial base in these communities is extremely limited in scope and size, with small light industry predominant. Most of the development of these communities is the result of the suburbanization and expansion of existing operations located in Ashtabula City. The labor force of these three towns combined is approximately 7,000. By comparison, the labor force of Ashtabula City is approximately 8,500. Favorable geographic location, well-developed port facilities, an extensive transportation network, and experienced labor force constitute the major contributing factors in the economic development of Ashtabula City. Growth in recent years has been due more to the expansion of present companies than to the location of new firms in the area. Ashtabula has also embarked recently on a renewal effort aimed at revitalizing its downtown commercial and retail area.

As Table 13 indicates, the manufacturing sector supplies the largest relative share of industrial activity in Ashtabula City, accounting for some 38 percent of employment for individuals 16 years old and over. Moreover, approximately 20 percent of employed persons 16 and over are involved in durable

Table 13 - Industry of Employed Persons as a Percent of Total Employed Persons 16 and Over for Ashtabula City - 1969

Industry	Percent
Agriculture, Forestry, and Fisheries	1.75
Construction and Mining	3.84
Manufacturing	37.70
Durable	20.23
Nondurable	17.47
Transportation and Utilities	11.28
Wholesale Trade	2.41
Food Services	5.88
Retail Trade	10.44
Finance, including Real Estate and Insurance	3.66
Services, excluding Food Services	23.04
Business and Personal	5.24
Recreation and Health	4.28
Education and Kindred Services	6.89
Nonprofit Organizations	1.98
Professional Services	1.18
Public Administration	3.47

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Ohio), 1970

goods manufacturing. It should also be noted that the relative significance of the manufacturing sector has increased between 1960 and 1970, and the increase in the relative significance of manufacturing has come at the expense of a decrease in the relative significance of the transportation-services sector. Nevertheless, the reader should keep in mind that the purpose of this section is purely descriptive. It is not intended to offer a comparative regional study.

Census data for 1969 reveal that over half of the families and unrelated individuals in Ashtabula City earned less than $10,000 per year. (See Table 14). In terms of income intervals, the largest percent of families and individuals earned between $10,000 and $15,000 per year. This is in keeping with the high relative significance of the manufacturing sector in Ashtabula City - average wages, nationwide, tend to be highest in the manufacturing sector.

The relative significance of the various industrial sectors on a regional basis can be seen in Table 15. It is apparent that, viewed from the perspective of the percent of employed persons 16 years old and older, the manufacturing sector predominates in all seven counties included in the regional demand area. Moreover, durable goods manufacturing is the most important component in the manufacturing sector for all seven counties. Historically, this pattern characterizes the entire region on the southern boundary of Lake Erie.

The relative distribution of income for the seven-county regional demand area is presented in Table 16, and summary figures are presented in Tables 17 and 18. Table 17 indicates that the two counties in Pennsylvania had the largest percent of families and unrelated individuals earning less than $10,000 per year. Ashtabula County, among the five counties in Ohio, ranks first in the percent of families and unrelated individuals earning less than $10,000 per year. Among the seven counties, Geauga and Lake Counties in Ohio rank first and second, respectively, in terms of mean income and median income, and Ashtabula County ranks fifth. The primary significance of the manufacturing sector, particularly durable goods manufacturing, is borne out in Table 16 by the preponderance of incomes in the $10,000 to $15,000 income range. Table 18 provides the mean and median income for Ohio and Pennsylvania as general information and a reference point from which comparisons can be made. However, it is important to note that the relevant comparison here is not between the counties and their respective States, but rather between the counties concerned.

Special attention must be given to a proposal by U.S. Steel to build a lakefront steel mill in Conneaut, OH. Conneaut is approximately 10 miles southwest of Ashtabula City. Application for a permit to build that mill was submitted to the Corps of Engineers. The Corps prepared a four-volume Draft Environmental Impact Statement as part of the application, which was reviewed by the Environmental Protection Agency. On 18 June 1979, the Buffalo District issued a permit to build the 3.5 billion plant in Conneaut, OH.

The proposed steel mill has drawn considerable opposition from both farmers and environmentalists, who have charged that the steel mill would destroy the rural character of the region and substantially increase air, water, and noise pollution.

Table 14 - Percent Distribution of Income of Families and Unrelated Individuals for Ashtabula City - 1969

Income	Percent
$	
Less than 1,000	2.24
1,000 to 1,999	2.83
2,000 to 2,999	4.01
3,000 to 3,999	4.01
4,000 to 4,999	5.21
5,000 to 5,999	4.52
6,000 to 6,999	7.15
7,000 to 7,999	7.11
8,000 to 8,999	7.68
9,000 to 9,999	9.58
10,000 to 11,999	15.59
12,000 to 14,999	14.81
15,000 to 24,999	12.86
25,000 to 49,999	2.09
50,000 or more	0.32

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Ohio), 1970

Table 15 - Industry of Employed Persons as a Percent of Total Employed Persons 16 and Over - By County - 1970*

	Ashtabula	Geauga	Lake	Portage	Trumbull	Erie	Crawford
Total Employed, 16 years and older	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, Forestry, and Fisheries	4.0	3.5	1.1	2.1	1.0	2.2	4.0
Construction and Mining	5.3	8.0	5.4	6.1	4.5	5.0	5.6
Manufacturing	39.3	39.0	47.0	37.6	49.1	40.7	40.3
Durable	23.0	26.1	34.2	23.7	45.1	31.3	29.2
Nondurable	16.3	13.0	12.7	13.9	3.7	9.4	11.1
Transportation and Utilities	9.6	5.2	5.0	5.3	4.7	5.8	7.1
Wholesale Trade	2.0	2.6	3.0	2.2	2.2	2.7	2.2
Food Services	5.8	4.7	5.0	6.2	5.4	5.4	4.6
Retail Trade	9.8	8.7	9.6	8.6	9.6	10.0	8.6
Finance, including Real Estate and Insurance	3.2	3.7	3.3	2.5	2.6	3.7	1.2
Services, excluding Food	15.4	24.8	20.8	29.5	20.7	24.4	11.6
Business and Personal	5.0	6.4	5.3	4.5	4.7	5.7	2.3
Recreation and Health	3.9	6.0	4.2	4.6	5.6	5.7	2.8
Education and Kindred	6.7	7.1	6.0	14.8	5.6	6.8	3.8
Nonprofit Organizations	1.2	1.1	0.8	1.0	1.0	1.5	0.8
Professional	1.2	2.4	2.0	2.5	1.3	1.8	0.7
Public Administration	2.5	2.2	2.5	2.0	2.5	2.9	1.2

*Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Ohio and Pennsylvania), 1970

Table 16 - Percent Distribution of Income of Families and Unrelated Individuals by County - 1969

	Ohio					Pennsylvania	
	Ashtabula	Geauga	Lake	Portage	Trumbull	Erie	Crawford
$							
Less than 1,000	1.80	1.05	00.99	1.34	1.46	1.43	1.87
1,000 to 1,999	2.62	1.57	1.12	1.78	1.76	2.22	3.90
2,000 to 2,999	3.45	2.05	1.55	2.34	2.47	3.72	4.59
3,000 to 3,999	3.74	2.53	1.99	2.54	2.81	4.10	5.00
4,000 to 4,999	4.18	2.42	2.16	3.17	3.23	4.22	5.09
5,000 to 5,999	4.88	2.59	2.61	3.79	3.72	5.74	6.15
6,000 to 6,999	6.33	3.68	3.03	4.69	4.69	7.03	8.45
7,000 to 7,999	7.17	5.06	4.73	6.82	6.85	9.23	9.11
8,000 to 8,999	8.05	5.83	6.56	7.78	8.27	9.28	8.90
9,000 to 9,999	8.72	6.56	7.91	7.98	8.59	8.33	8.29
10,000 to 11,999	16.54	14.20	17.67	15.66	15.81	15.64	13.56
12,000 to 14,999	15.26	17.98	21.73	18.46	17.77	13.46	13.26
15,000 to 24,999	14.31	27.20	23.74	19.00	18.89	12.40	10.09
25,000 to 49,999	2.57	6.46	3.67	4.08	3.03	2.67	1.46
50,000 or more	00.39	00.83	0.56	0.56	0.64	0.5	0.30

Source: U. S. Department of Commerce, Bureau of the Census, General, Social, and Economic Characteristics (Ohio and Pennsylvania), 1970.

Table 17 - Percent of Families and Unrelated Individuals Receiving Less Than $10,000 in Annual Income by County - 1969

Counties	Percent
Ohio	
Ashtabula	50.94
Geauga	33.34
Lake	32.65
Portage	42.23
Trumbull	43.85
Pennsylvania	
Crawford	61.35
Erie	55.30

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Pennsylvania and Ohio), 1970

Table 18 - Mean and Median Income of Families and Unrelated Individuals By County - 1969

Counties	Mean Income $	Median Income $
1. Ohio	9,637	8,668
Ashtabula	10,659	9,894
Geauga	13,696	12,411
Lake	12,900	11,964
Portage	12,098	10,992
Trumbull	11,734	10,778
2. Pennsylvania	9,038	7,954
Crawford	9,323	8,658
Erie	10,404	9,363

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics (Pennsylvania and Ohio), 1970

In the Draft EIS, it was concluded that the plant could be built to meet existing Government pollution standards, but not without some potentially serious consequences for the environment. These consequences include deterioration of air quality, damage to crops, killing of some species of fish, and accelerated erosion of the land surface. In addition, the Draft EIS assessed the social and economic impact of the plant and predicted that large numbers of unemployed workers would be attracted to the area and warned of rapid increases in the cost of living for the impacted area.

For purposes of reporting the impact of the proposed mill, the EIS delineates three geographic focal points. One of these geographic focal points is referred to as the Regional Study Area and another is referred to as the Principal Study Area. The Regional Study Area is located south of Lake Erie and extends from extreme Northeastern Ohio to Northwestern Pennsylvania. It is comprised of Erie and Crawford Counties in Pennsylvania, and Ashtabula County in Ohio.

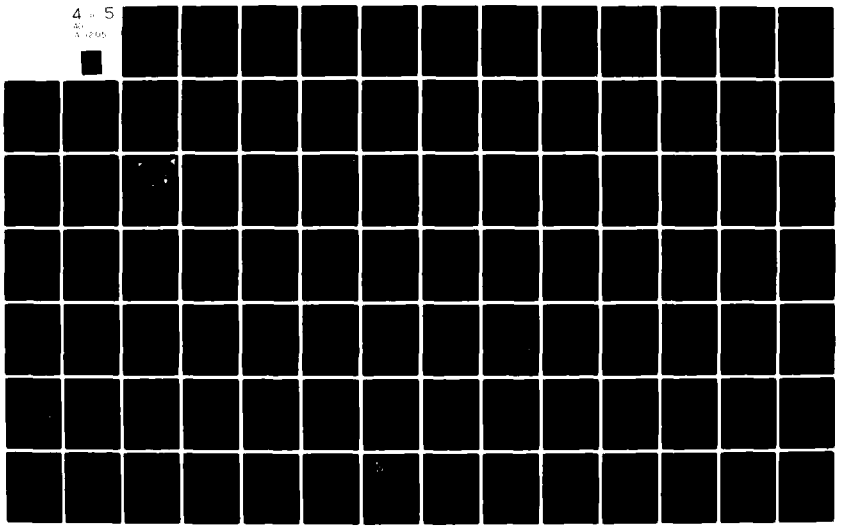
The Local Study Area is comprised of the communities in which the proposed mill would be located and represents an area in which significant residential and commercial development associated with the proposed mill would occur. The Local Study Area in Pennsylvania consists of Springfield Township (which includes the unincorporated areas of West Springfield and North Springfield) and East Springfield Borough. This part of the Local Study Area covers 37 square miles and is exclusively rural, sparsely populated, and predominantly agricultural. The city of Conneaut comprises the Ohio portion of the Local Study Area. It contains a retail trade area, a slowly-growing industrial base, as well as some thickly-settled residential areas. It is also the location of one of the largest private and iron ore ports and shipping facilities in the U.S.

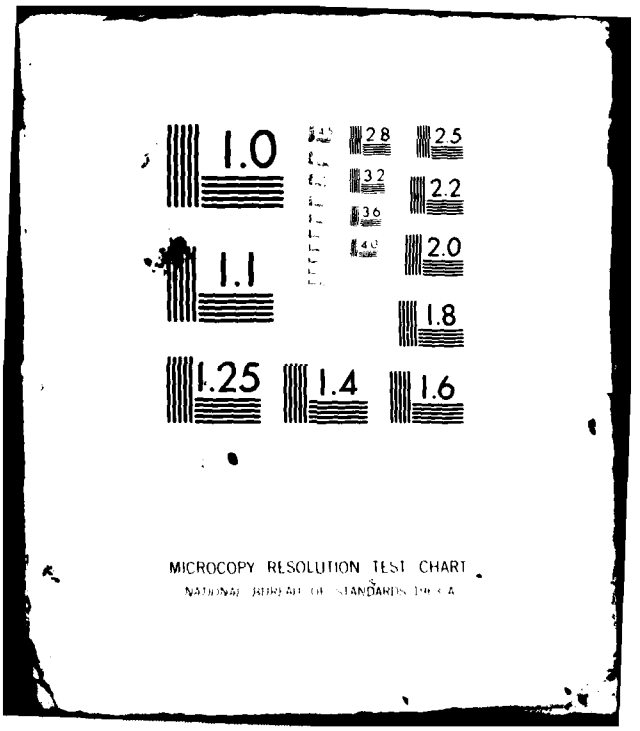
In the combined Ohio-Pennyslvania Regional Study Area, the proposed plant is expected to generate $20 million (1975 dollars) annually in purchases during the construction phase scheduled to be completed in the first quarter of 1987; 55 million dollars in annual purchases during the operations phase, which tentatively begins in 1982 and extends through 1990 (those dates are planned construction dates). In addition, the proposed plant would directly and indirectly generate employment opportunities within the Regional Study Area and the Principal Study Areas. Plant-related direct, indirect, and induced employment in the Regional Study Area is expected to increase steadily until a peak of 16,800 jobs is reached in 1986. Between 1986 and 1990, the number of these positions would decrease gradually, eventually stabilizing in 1990 at about 13,400. Within the Ohio Local Study Area, combined direct, indirect, and plant-induced employment would reach a peak of about 6,035 jobs in 1986, declining to a stable level of 4,265 jobs in 1990. Plant-related employment in the Pennsylvania Local Study Area will reach a peak of 7,965 jobs in 1986, leveling off to about 6,485 jobs in 1990.

The greatest overall population impact is expected to occur in 1990 when approximately 15,800 new residents would be living within the limits of the Principal Study Area. About 5,265 of these new residents are projected to reside in the Ohio Local Study Area, while in the Pennsylvania Local Study

AD-A112 051 CORPS OF ENGINEERS BUFFALO NY BUFFALO DISTRICT F/G 13/2
DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT ASSESSMENT FOR--ETC(U)
FEB 82

UNCLASSIFIED NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

Area, the total increase is projected to be 2,830 individuals. Smaller population increases would be expected in Kingsville Township and Village, Ashtabula Township, and the Girard Area in Pennsylvania.

Visitation Forecasts - General Statement of Methodology

Total expected visitation at the Lakeshore Park is the sum of total expected visitation from the Local Demand Area, total expected visitation from the Regional Demand Area, and expected visitation from Long Distance Travelers. Visitation from each of these components is divided, in turn, into a Peak Visitation component and an Offpeak Visitation component.

Peak Visitation estimates for a given year (season) is made a function of estimated population, the swimming participation rate per individual, the number of individuals in family units earning $15,000 per year or more, and the number of individuals in family units earning less than $15,000 per year.

An average annual rate of population growth was calculated for the Local Demand Area and for each of the counties in the Regional Demand Area. The average annual rate of growth for the period 1982 to 1992 reflects the expected effect of the new steel plant at Conneaut, OH, on population growth for those areas in this study that were determined by A. D. Little to be impacted by the new steel plant. (This impact hinges on the probability of construction of the steel mill but has no effect on visitation projections made.) Growth rates for the period 1982-1992 for the impact areas were based on A. D. Little estimates. For the remaining periods within the 50-year project life, and for the period between 1970 and 1982, population growth rates were based on population projections by the Bureau of the Census for the Local Demand Area and the Ohio Department of Economic and Community Development for the Regional Demand Area.

The participation rate used in this study is an average participation rate per household for the State of Ohio, and was derived from sample surveys by the Ohio Department of Natural Resources. This participation rate was converted to an individual participation rate by dividing it by an approximate average family unit size, to obtain a participation rate per individual member of a family unit; and is assumed to characterize the participation rate for all individuals included in the population estimates.

Individuals in family units earning $15,000 or more per year were assumed to have a lower participation rate than individuals in family units earning less than $15,000 per year. Therefore, the participation rate for the State of Ohio (on an individual basis) was multiplied by the number of individuals in family units earning less than $15,000 per year (the number of individuals in this income category was determined on an annual basis by multiplying the population estimate by the proportion of individuals, in the area concerned, in this income category), and a somewhat lower participation rate was multiplied by the number of individuals in family units earning more than $15,000 per year. The sum of these products yielded Total Potential Peak Visitation per person.

The local component for Potential Peak Visitation was adjusted for alternative sites to obtain Total Season Visitation at Lakeshore Park. Adjustments to Total Peak Visitation at the Regional level were made separately to each of the counties in the Regional Demand area. The adjustment factor for each county was based on proximity to Lakeshore Park, population density and alternative recreation sites.

The Offpeak component of Season Visitation estimates included the adjustment made for Peak Visitation estimates plus adjustments for individuals likely to be precluded from swimming because of employment commitments - individuals between 16 and 65, less those individuals between 16 and 65 not in the labor force, based on Census data for the entire U. S.

Visitation estimates for long distance travelers was assumed to be equal to the capacity of the trailer park (40 units) times four individuals per unit on peak days, and one-half of peak-day visitation for offpeak days.

Population Projections for 1982

I. LOCAL DEMAND

A. Peak Visitation for Season

1. Income Adjustment

44,125	Population of Local Demand Area - 1982 [1]
x .1527	Proportion of family units earning $15,000 or more [2]
6,737	Approximate number of individuals in family units earning $15,000 or more per year.
44,125	
- 6,737	
37,388	Approximate number of individuals in family units earning less than $15,000 per year.

2. Participation Rate and Total Peak Visitation. The participation rate is defined as the average number of times members of households engage in an outdoor recreation activity during peak periods (weekends and holidays) on an annual basis.

The average participation rate for swimming for the State of Ohio is 5.253 (Ohio State Comprehensive Outdoor Recreation Plan Study). This is converted to an average individual participation rate by dividing by the average family size.

Thus:

$$\text{Average Individual Participation Rate} = \frac{5.253}{3} = 1.75$$

It will be assumed that the participation rate for individuals in family units earning $15,000 or more per year is lower than the participation rate for individuals in families earning less than $15,000 per year. This is justified particularly in the case of public beach and swimming facilities whose use decreases inversely with income.

Thus:

Average participation rate for individuals in family units earning $15,000 or more per year is assumed to be 1.20.

Average participation rate for individuals in family units earning less than $15,000 per year = 1.75.

Total Season Visitation can be calculated by multiplying the number of individuals in each income category by their respective participation rates.

---

[1] An average annual rate of growth of 0.27 percent was calculated using historical population census data for 1960 to 1975. This average annual growth rate was used to project population value for 1982.

[2] Based on 1970 census data for 1969 for the city of Ashtabula, which was assumed to characterize the entire local demand area.

This yields:

$$(6,737)(1.20) + (37,388)(1.75) = 8,084 + 65,249 = 73,513$$ Total Beach/ Swimming Visitation for Local Demand Area

3. Alternative Recreation Site

In order to arrive at a total season visitation figure for Lakeshore Park, it is necessary to take into account alternative recreation sites having comparable recreation facilities within the Local Demand Area. Walnut Beach Park, on Lake Erie, is west of Lakeshore Park and is the most significant, comparable recreation site. It has a total park area of 18 acres where Lakeshore Park totals 50 acres. The beach area at Walnut Beach Park is 80,000 square feet as compared to 132,000 square feet of usable beach area available at Lakeshore Park. Both parks provide facilities for picnicking activities with 116 tables at Lakeshore Park and 50 tables at Walnut Beach Park. Other supporting facilities at these parks include playgrounds, tennis courts, basketball courts, concession stands, bathhouses, and rest rooms. Two major supporting facilities available only at Lakeshore Park are recreational boating and trailer camping. Attributes of these parks, weighted by their relative importance, are used to allocate the local demand area swimming visitation estimate. The results of this method shown below indicate that approximately 75 percent of the projected local demand is allocated to Lakeshore Park while Walnut Beach Park receives the remaining 25 percent.

	Park Area		Parking Capacity		Picnic Tables		
	Percent of Total	Weight Factor	Percent of Total	Weight Factor	Percent of Total	Weight Factor	
Lakeshore Park	(.74	X .1333) +	(.49	X .1333) +	(.70	X .1333) +	

	Beach Area		Boating and Camping Facilities		Weighted Allocation Factor
	Percent of Total	Weight Factor	Percent of Total	Weight Factor	
	(.62	X .30) +	(1.0	X .30) =	.744

	Park Area		Parking Capacity		Picnic Tables	
	Percent of Total	Weight Factor	Percent of Total	Weight Factor	Percent of Total	Weight Factor
Walnut Beach Park	(.26	X .1333) +	(.51	X .1333) +	(.30	X .1333) +

	Beach Area		Boating and Camping Facilities		Weighted Allocation Factor
	Percent of Total	Weight Factor	Percent of Total	Weight Factor	
	(.38 X	.30) +	(0 X	.30) =	.256

The assignment of weighting factors is based on the assumption that park attributes of beach area, and boating and camping facilities are the major components influencing local beach visitation. Weighting factors of 30 percent are assigned to each of these park components. The remaining 40 percent is divided equally among the remaining park characteristics which are deemed less important influencing factors of local beach visitation. Therefore, 13-1/3 percent is the weighting factor used for the park attributes of park area, parking capacity, and number of picnic tables.

Taking this into account we have:

73,513	Total Annual Beach Visitation for Local Demand Area Occurring on Peak Days
x .75	
55,135	Total Annual Local Beach Visitation for Lakeshore Park Occurring on Peak Days

B. Offpeak Local Demand

1. Adjustment for individuals likely to be occupied in job-related activities on offpeak days

44,125		Total Population of Local Demand Area - 1982
- 29,564		Number of Individuals Likely in Job-related Activities[3/]
14,561		
+ 2,069		Number of Individuals Between 16 and 65 Not in Labor Force[4/]
16,630		Total Offpeak Local Population - 1970

2. Adjustments for Income

16,630		Total Offpeak Population
x .1527		Proportion of Family Units Earning $15,000 or More Per Year[5/]
2,539		Total Offpeak Population Earning $15,000 or More Per Year

16,630	
- 2,539	
14,091	Total Offpeak Population Earning Less Than $15,000 Per Year

Using participation rates for income categories:

(1.20)(2,539) + (1.75)(14,091) = 3,047 + 24,659 = 27,706 Total Local OffPeak Visitation 1970

3. Adjustment for Alternative Recreation Sites [6/]

(27,706)(.75) = 20,780 Total Local Offpeak Visitation to Lakeshore Park-1970

II. REGIONAL DEMAND

A. Peak Visitation for Season

3/ Based on 1970 census data for individuals between 16 and 65 for the entire U.S.A. (67 percent of total population).

4/ Based on 1970 census data for individuals between 16 and 65 for the entire U.S.A. (7 percent of total population).

5/ Based on 1970 census data for 1969 for the city of Ashtabula, which was assumed to characterize the entire local demand area.

6/ Same adjustment factor as that used for peak demand.

1. Population of Regional Demand Area by County 7/

Ohio	1982 Population
Ashtabula	64,736*
Lake	224,065
Geauga	82,058
Portage	153,361
Trumbull	244,868
Pennsylvania	
Erie	279,916
Crawford	86,358
	366,275

*Net of Local Demand Area

2. Adjustment for Income

Income by Category for Regional Demand Area by County

	Proportion Earning $15,000 or More Per Year	Number Earning $15,000 or More Per Year	Number Earning Less Than $15,000 Per Year
Ohio			
Ashtabula	.1727	11,180	53,556
Lake	.2797	62,671	161,394
Geauga	.3449	28,302	53,756
Portage	.2364	36,254	117,107
Trumbull	.2256	55,242	189,626
Pennsylvania			
Erie	.1557	43,583	236,333
Crawford	.1185	10,233	76,125

7/ An average annual growth rate was computed for each county in the Regional Demand Area based on population projections made in 1974 by the Ohio Department of Economic and Community Development (Table 3). These growth rates were calculated using the projected 1990 population estimates as the terminal year and 1970 census data as the initial year. These rates were then applied to 1970 census data for each county to produce an 1982 population figure.

Participation by Income Category by County

	Those Earning $15,000 or More Per Year (1.20)	Those Earning Less Than $15,000 Per Year(1.75)
Ohio		
Ashtabula	13,416	93,723
Lake	75,205	282,440
Geauga	33,962	94,073
Portage	43,505	204,937
Trumbull	66,290	331,846
Pennsylvania		
Erie	52,300	413,583
Crawford	12,280	133,219

3. Adjustment for Regional Participation

a. Percent of Potential Demand from Each County Allocated to the Regional Demand Component by County:

Ohio	Percent
Ashtabula	1
Lake	3
Geauga	1
Portage	2
Trumbull	2
Pennsylvania	
Erie	1
Crawford	1

No survey results that would substantiate allocation to Regional Demand Component are now available. However, conversation with Park Supervisor at Lakeshore Park suggested that about 10 percent of park usage was derived from outside the immediate area (the local demand area). The 10 percent figure applies to present facilities of Lakeshore Park, which includes a severely deteriorated beach swimming facility.

The allocation of regional demand used in the report added 1 percentage point to give some conservative consideration to the improved beach/swimming facilities of Lakeshore Park resulting from the proposed project. Within this 11 percent figure, (allocation was based on population densities of counties in the regional demand area), a larger percent was allocated to counties with higher population densities.

b. Allocation to Regional Demand Component by County and Income Category

State-Counties	Those Earning $15,000 or More Per Year	Those Earning Less Than $15,000 or More Per Year	Total Regional Peak Demand
Ohio			
Ashtabula	134	937	1,071
Lake	2,256	8,473	10,729
Geauga	340	941	1,281
Portage	870	4,099	4,969
Trumbull	1,326	6,637	7,963
	4,926	21,087	26,103
Pennsylvania			
Erie	523	4,136	4,659
Crawford	123	1,332	1,455
	646	5,468	6,114
Total	5,572	26,555	32,127

B. Regional Demand - Offpeak

1. Adjustment for Individuals Likely to be Occupied in Job-Related Activities.

Total Population Less Individuals Between 16 and 65 by County[8/]

Ohio	
Ashtabula	21,363
Lake	73,941
Geauga	27,079
Portage	50,609
Trumbull	80,806
Pennsylvania	
Erie	92,372
Crawford	28,498

(Total Population) - (Individuals Between 16 and 65) + (Individuals Between 16 and 65 Not in Labor Force)[9/]

8/ Based on 1970 census data - 67 percent of total population.
9/ Seven percent of individuals between 16 and 65.

Ohio	
Ashtabula	24,399
Lake	84,450
Geauga	30,928
Portage	57,802
Trumbull	92,290
Pennsylvania	
Erie	105,500
Crawford	32,548

2. Adjustment for Income Category by County.

	Those Earning $15,000 or More Per Year[10/]	Those Earning Less Than $15,000 Per Year
Ohio		
Ashtabula	4,214	20,185
Lake	23,620	60,830
Geauga	10,667	20,261
Portage	13,664	44,138
Trumbull	20,821	71,469
Pennsylvania		
Erie	16,426	89,074
Crawford	3,857	28,691

10/ Proportions are identical to those used for adjustments to income for Regional Peak Demand.

a. Participation in Swimming by County

	Those Earning $15,000 or More Per Year(1.20)	Those Earning Less Than $15,000 Per Year(1.75)
Ohio		
Ashtabula	5,057	35,323
Lake	28,344	106,453
Geauga	12,800	35,457
Portage	16,397	77,242
Trumbull	24,985	125,070
Pennsylvania		
Erie	19,711	155,880
Crawford	4,628	50,209

b. Allocation of Regional Offpeak Demand by Income Category and by County 11/

State-Counties	Those Earning $15,000 or More Per Year	Those Earning Less Than $15,000 or More Per Year	Total Regional Offpeak Demand
Ohio			
Ashtabula	51	353	404
Lake	850	3,194	4,044
Geauga	128	355	483
Portage	328	1,545	1,873
Trumbull	500	2,501	3,001
	1,857	7,948	9,805
Pennsylvania			
Erie	197	1,559	1,756
Crawford	46	502	548
	243	2,061	2,304
Total	2,100	10,009	12,109

11/ The percentages used for allocation are the same as those used for Peak Demand.

III. LONG-DISTANCE TRAVELERS

A. Peak Long-Distance Traveler = (40)(4)(30) = 4,800 per year[12/]

B. Offpeak Long-Distance Travelers = (20)(2)(47) = 3,760 per year[13/]

12/ 30 peak days per season.
13/ 47 offpeak days per season.

Table 19 - Summary of Visitation Forecasts - 1982

Demand Component	Season			Per Day		
	Season Total		Total Peak and Offpeak	Per Day Total		Total Peak and Offpeak
	Peak 1/	Offpeak 2/		Peak 1/	Offpeak 2/	
Local	55,135	20,780	75,915	1,838	442	2,280
Regional	32,127	12,109	44,236	1,071	258	1,329
Long-Distance	4,800 3/	3,760 4/	8,560	160	80	240
Total	92,062	36,649	128,711	3,069	780	3,849

1/ 30 Peak days per season.

2/ 47 Offpeak days per season.

3/ (40 camp sites occupied) (4 per camp site) (30 peak days) = 4,800

4/ (20 camp sites occupied) (4 per camp site) (47 offpeak days) = 3,760

Table 20 - Average Annual Growth Rates Used for Population Projections

	1970-1982 (percent)	1982-1992 (percent)	1992-2032 (percent)
Local Demand Area 1/	.27	.27 (.80)*	.27
Regional Demand Area			
Ashtabula	1.20	1.20 (1.50)*	1.20
Lake	1.07	1.07	1.07
Geauga	2.23	2.23	2.23
Portage	1.66	1.66	1.66
Trumbull	.43	.43	.43
Erie	.52	.52	.52
Crawford	.50	.50 (.58)*	.50

1/ The average annual growth rate for the periods between 1970-1982 was computed from population growth trends contained in Table 1, based on U. S. Census projections. The average annual rate for growth for the remaining periods, and for all other counties, was computed from population projections by the Ohio Department of Economics and Community Development.

* The average annual rates of growth for the period 1982-1992 for the local demand area (.80); for Ashtabula County (1.5) and for Crawford County (.58), are calculated from A. D. Little population projections made for these counties based on projected impact(s) of the steel mill upon growth. These annual growth rates are not used in developing Table 21 - Visitation Projections. Rather, the impact upon growth of the steel mill is simply shown in Table 25 and is purely informative.

Table 21* - Visitation Projections 1982-2032

	1982	1992	2002	2008	2012	2022	2032
1. Local							
Peak	55,135	56,642	58,190	59,139	59,780	61,414	63,093
Offpeak	20,780	21,348	21,931	22,289	22,531	23,147	23,779
2. Regional							
a. Ashtabula:							
Peak	1,071	1,084	1,097	1,172	1,110	1,124	1,137
Offpeak	404	447	500	535	559	624	698
b. Lake							
Peak	10,729	11,933	13,273	14,148	14,764	16,422	18,266
Offpeak	4,044	4,498	5,003	5,333	5,565	6,190	6,885
c. Geauga							
Peak	1,281	1,597	1,991	2,273	2,482	3,094	3,857
Offpeak	483	602	751	857	936	1,167	1,455
d. Portage							
Peak	4,969	5,858	6,906	7,623	8,142	9,599	11,316
Offpeak	1,873	2,208	2,603	2,873	3,069	3,618	4,265
e. Trumbull							
Peak	7,963	8,312	8,676	8,902	9,056	9,453	9,867
Offpeak	3,001	3,133	3,270	3,355	3,413	3,563	3,719
f. Erie							
Peak	4,659	4,936	5,188	5,346	5,453	5,732	6,025
Offpeak	1,756	1,861	1,956	2,015	2,056	2,161	2,272
g. Crawford							
Peak	1,455	1,529	1,607	1,656	1,689	1,775	1,866
Offpeak	548	576	605	623	636	669	703
3. Long Distance							
Peak	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Offpeak	3,760	3,760	3,760	3,760	3,760	3,760	3,760
Total Peak	92,062	96,691	101,728	105,059	107,276	113,413	120,227
Total Offpeak	36,649	38,433	40,379	41,640	42,525	44,899	47,536
Total Peak and Offpeak	128,711	135,124	142,107	146,699	149,801	158,312	167,763

* No impact of the steel mill upon population growth considered in this table.

Table 22 - Peak Demand and Capacity

Year	800-Foot Beach	
	Annual Peak Demand	Annual Peak Capacity 1/
1982	92,062	76,800
1992	96,691	76,800
2002	101,728	76,800
2008	105,059	76,800
2012	107,276	76,800
2022	113,413	76,800
2032	120,227	76,800

1/ The parameters used in determining capacity for the 800-foot beach are:

Total width of usable beach	160 feet
Space standard	75 sq. ft./person
Turnover rate per day	1.5
Number of peak days per year	30

Therefore: Annual Peak Capacity = $\frac{(800)(160)}{75}$ $\frac{(1.5)(30)}{}$ = 76,800

SUMMARIES OF POPULATION PROJECTIONS

Table 19 provides a summary of visitation estimates for 1982. The average annual growth rates used to project population for the Local Demand Area for each of the counties in the Regional Demand Area are given in Table 20. These average annual growth rates were applied to the visitation estimates summarized in Table 21, by county, (for the Regional Demand Area) to project visitation at Lakeshore Park through the year 2032.

BENEFITS

The benefits from beach erosion control measures at Lakeshore Park include primary benefits from physical change prevented, and increased recreational usage in the form of beach usage and swimming. Benefits are measured as the difference in the monetary values under with versus without project improvements.

EXISTING BEACH USAGE

As mentioned previously, the deterioration of Lakeshore Park Beach has seriously affected beach usage. Existing beach usage consists of a small number of people sitting on lawn chairs on the beach or walking along the beach. Although swimming is discouraged, a few people are still observed wading or swimming on warm weather days. Attendance data for the existing beach is not available, though through discussions with the Town Park Commission and observations at the existing site, an estimation of existing attendance was determined. The value of recreation of the existing beach is calculated using 60 people on peak days and 20 people on nonpeak days. The annual total attendance is then calculated to be 2,740 people-days (1,800 peak, 940 nonpeak).

The recreation values (swimming) under with and without project conditions are based on the visitation estimates weighted by their respective assigned unit day values. The unit day values assigned in this study are based on a points system developed by the U. S. Water Resources Council Volume 44 and is equal to $2.62 for a with project beach and $1.86 for the existing beach.

The unit day value method for estimating recreation benefits relies on expert or informed opinion and judgment to approximate the average willingness to pay of users of Federal or Federally assisted recreation resources. By applying a carefully thought-out and adjusted unit day value to estimated use, an approximation is obtained that may be used as an estimate of project recreation benefits. The assignment of unit day point value and their dollar value equivalent for the existing beach and the with project beach is shown below.

Unit Day Value Points for Lakeshore Park

	Existing Beach			800-Foot Project Beach		
Criteria	Judgment Factor	Point Range	Assigned Point	Judgment Factor	Point Range	Assigned Point
Recreation Experience	Several general activities	5-10	5	Several general activities	5-10	10
Availability of Opportunity	Several within 1 hour travel; a few within 30 minutes travel time	0-3	3	Several within 1 hour travel; a few within 30 minutes travel time	0-3	3
Carrying Capacity	Minimum facility development for public health safety	0-2	1	Optimum facilities to conduct activity at site potential	9-11	10

Unit Day Value Points for Lakeshore Park

	Existing Beach			800-Foot Project Beach		
Criteria	Judgment Factor	Point Range	Assigned Point	Judgment Factor	Point Range	Assigned Point
Accessibility	Good access; good roads to site; fair access; good roads within site	11-14	11	Good access; good roads to site; fair access; good roads within site	11-14	14
Environmental Quality	Low esthetic factors exist that significantly lower quality	0-2	2	Average esthetic quality; factors exist that lower quality to minor degree	3-6	6
Total Points		16-31	22		28-44	43
Dollar Value Equivalent			$1.86 1/			$2.62 1/

1/ Value is calculated by linear interpolation for general recreation activity category; 20 points = $1.80, 30 points = $2.10, 40 points = $2.50, 50 points = $2.90

Source: 44 FR 72963 (Published 14 December 1979) Table K-3-2

WRC Reference Handbook, Fiscal Year 1981, p. 38, revised Table K-3-1

Swimming benefits over the 50-year project life have been decadized and summed to provide a figure for average annual benefits. Table 22 indicates that the 800-foot beach will exceed capacity in the base year 1982. The average annual recreation benefit due to flood and erosion prevention were calculated separately for: (1) Peak Visitation at an 800-foot beach, (2) Offpeak Visitation. The calculations for each of these are contained in Tables 23 and 24, respectively. Table 25 includes the average annual land erosion prevention benefits to yield Total Average Annual Benefits.

ECONOMICAL FEASIBILITY

As Table 26 indicates, Alternative 2 yields a commending value for net benefits. Note, also, that Alternative 2 is the alternative with the highest Benefit/Cost ratio. It should be pointed out, however, that the alternative with the largest net benefits does not necessarily correspond with the alternative with the highest Benefit/Cost ratio. The Benefit/Cost ratio is to be

viewed more as a secondary evaluation criterion, and not as a measure of the most economically feasible alternative.

In addition, other secondary evaluative criteria in the form of Payback Period, both undiscounted and discounted, are presented in Table 27 for Alternative 2.

Table 23 - Total Peak Average Annual Benefits

Annual Peak Day Attendance Without Project	Value Per Visit Without Project	Total Value Without Project	Annual Peak Day Attendance With Project	Value Per Visit With Project	Total Value With Project	Average Annual Peak Day Benefits 1/
	$	$		$	$	$
1,800	1.86	3,348	76,800	2.62	201,216	197,868

1/ Benefits are calculated as the difference of total value with project and total value without project.

Table 24 - Total Offpeak Average Annual Benefits

Year	Project Year	Total Value Without Project 1/	Attendance With Project	Value per Visit With Project	Total Value With Project	Total Value With Project	Total Value Without Project	Increment in Value	Average Annual Equivalent Factor
		$		$	$	$		$	
1982	0	1,748	36,649	2.62	96,020	94,272		94,272	1.0000
1992	10	1,748	38,433	2.62	100,694	98,946		4,674	.7337
2002	20	1,748	40,379	2.62	105,793	104,045		5,099	.7253
2012	30	1,748	42,525	2.62	111,416	109,668		5,623	.7065
2022	40	1,748	44,899	2.62	117,635	115,887		6,219	.6591
2032	50	1,748	47,536	2.62	124,544	122,796		6,909	.4918

Year	Project Year	Average Annual Equivalent Value	Present Worth Factor	Present Worth of One Per Period	Future Present Worth Factor	Present Worth in Project Year Zero	Amortization Factor Over 50-Year Project	Increment in Average Annual Rec. Benefits	Total Average Annual Rec. Benefits Resulting From Flood and Erosion Preventive Measures
		$		$		$		$	$
1982	0	94,272	1.0000	94,272	1.0000	94,272	1.0000	94,272	
1992	10	3,429	1.0000	3,429	1.0000	3,429	1.0000	3,429	
2002	20	3,698	12.7721	47,231	.4909	23,186	.0759	1,760	
2012	30	3,973	11.9556	47,500	.2410	11,448	.0759	869	
2022	40	4,099	10.2921	42,187	.1183	4,991	.0759	379	
2032	50	3,398	6.9034	23,458	.0580	1,361	.0759	103	
									100,812

1/ 940 annual nonpeak attendance X $1.86

Table 25 - Summary of Average Annual Benefits for the Tentatively Selected Plan With and Without Impact Upon Growth of the Proposed Steel Mill

Items	Flood and Erosion Prevention Benefits			
	Total Peak Average Annual Beach Usage and Swimming Benefits	Total Offpeak Average Annual Beach Usage and Swimming Benefits	Average Annual Land Erosion Prevention Benefits	Total Average Annual Benefits
	$	$	$	$
w/o impact of steel mill	197,900	100,800	1,500 1/	300,200
impact of 2/ steel mill	3/	2,300	-	2,300
w/impact of steel mill	197,900	103,100	1,500 1/	302,500

1/ a. A pump house designed to protect a pump that conveys water through a piping system to ponds and artificial lakes in the East Inland area, was eroded out in 1978. It was replaced by a new one located in the upland area a few feet off the bluff line.

The cost of rebuilding and relocating that pump house and appurtenances was estimated at $5,000.

It is presently damaged due to cumulative effect of erosion resulting from winter northeast storms, and constitutes a hazard to park attendants. It is estimated that the pump house will be totally lost by project year 1. The average annual equivalence of this loss is $500.

b. Based on local realtor estimates, the value of 1 acre of Lakefront property is approximately $15,000 or $.35 per square foot.

Considering the bluff annual rate of erosion of 2.4 feet, which extends 800 feet along the shore, the reduction in cost due to land erosion on an annual basis equals approximately $1,000.

2/ The average impact of the steel mill upon growth (demand) over the 50-year project life was first obtained by comparing Table 21 of this appendix and Table 15 of the Stage 2 Document, which is not repeated here.

This impact on both peak and offpeak demand is purely informative. It is translated into monetary terms by interpolating between Tables 22-24.

3/ There is no effect on peak beach usage with greater population resulting from the proposed steel mill at Conneaut, Ohio. This is because demand exceeds capacity in the project base year without the steel mill.

Table 26 - Net Benefits and Benefit-Cost Ratios

Alternative/Item	1	2
	$	$
Total First Cost Exclusive of Annual Nourishment	0	919,000
Total Investment Cost Exclusive of Annual Nourishment	0	919,000
Interest (7-3/8 - 50 Year)	0	68,000
Amortization (Factor = .00216)	0	2,000
Annual Operating & Maintenance	0	4,000
Annual Beach Nourishment	0	32,000
Total Average Annual Cost	0	106,000
Total Average Annual Benefits	0	300,200
Benefit-cost Ratio	0	2.8
Net Benefits	0	194,200

Table 27 - Secondary Evaluative Criteria

Undiscounted Payback Period	3 years
Discounted Payback Period	3 years

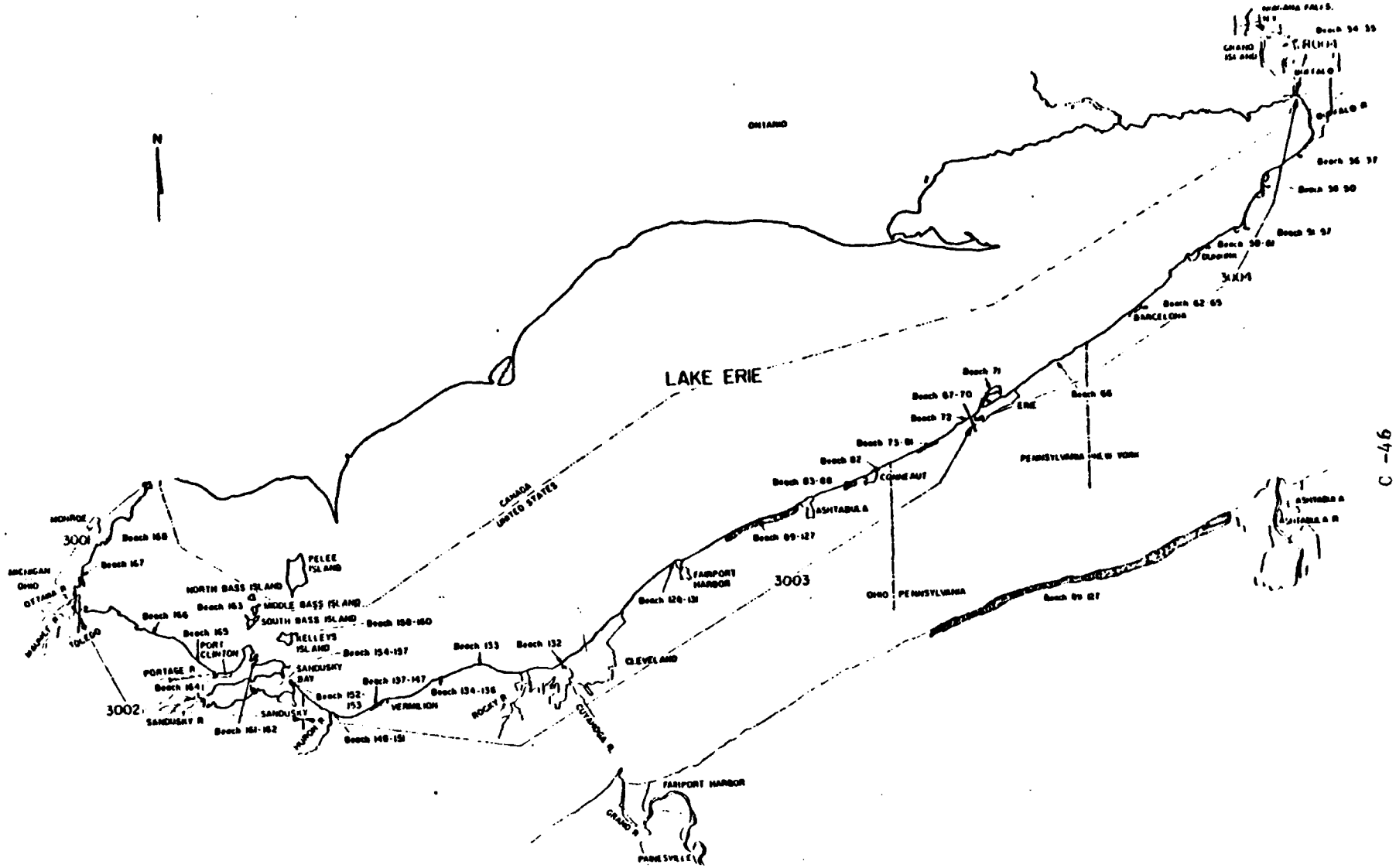


Figure 1 - Beach Location Map--Niagara River, Lake Erie

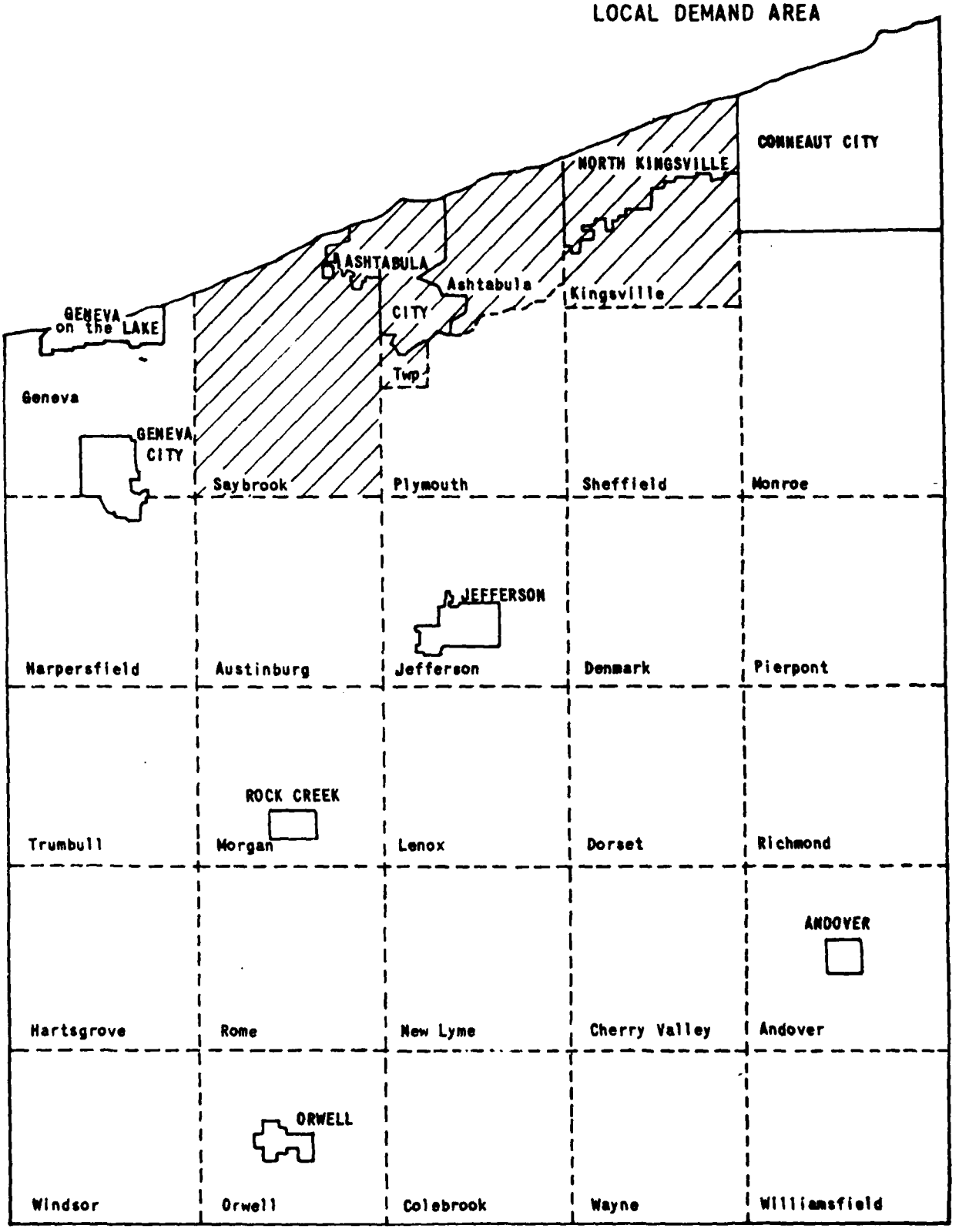
FIGURE 2

OHIO AND ASHTABULA COUNTY

U.S. DEPARTMENT OF COMMERCE Social and Economic Statistics Administration BUREAU OF THE CENSUS

FIGURE 3

LOCAL DEMAND AREA



ASHTABULA COUNTY

3

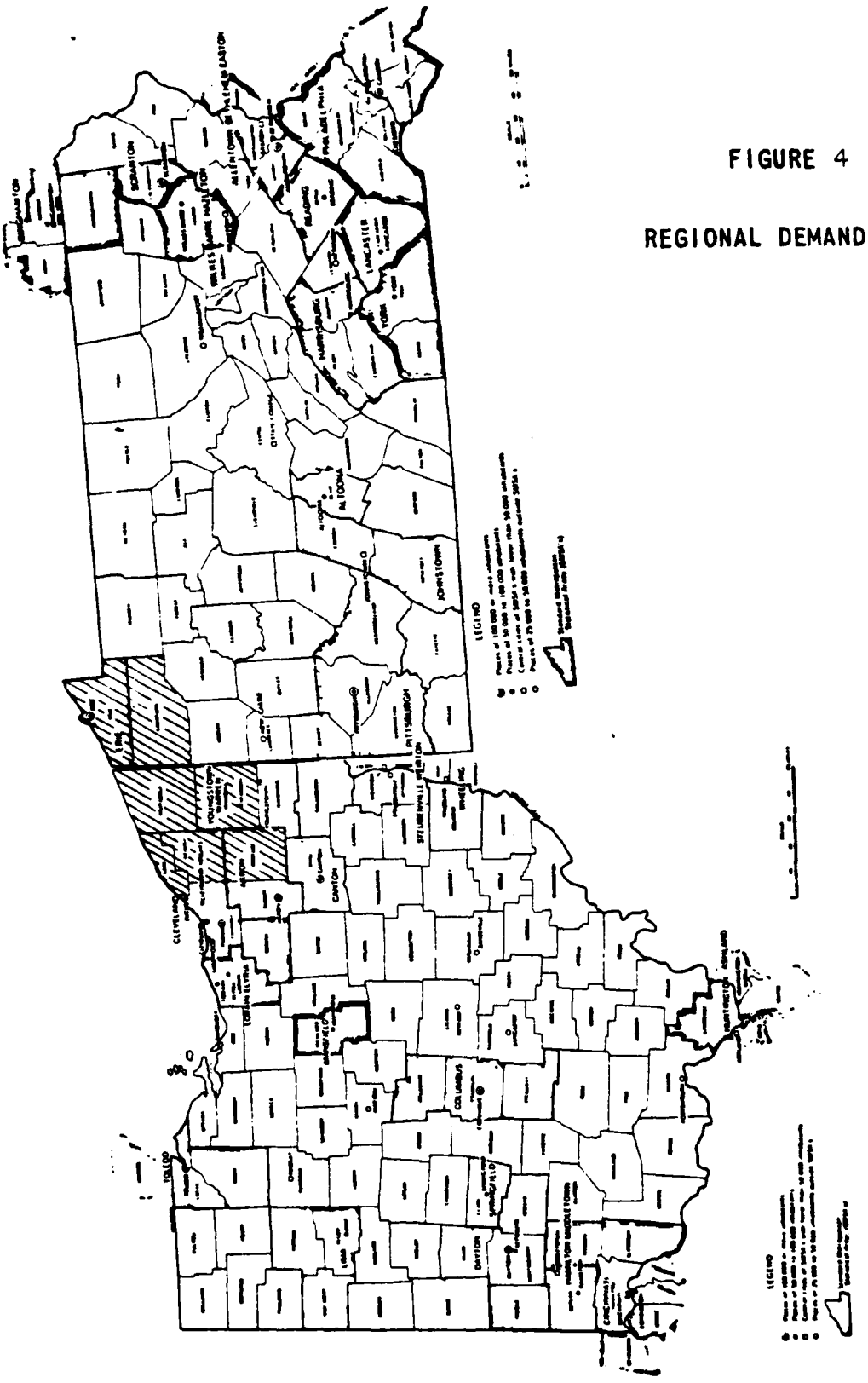


FIGURE 4

REGIONAL DEMAND AREA

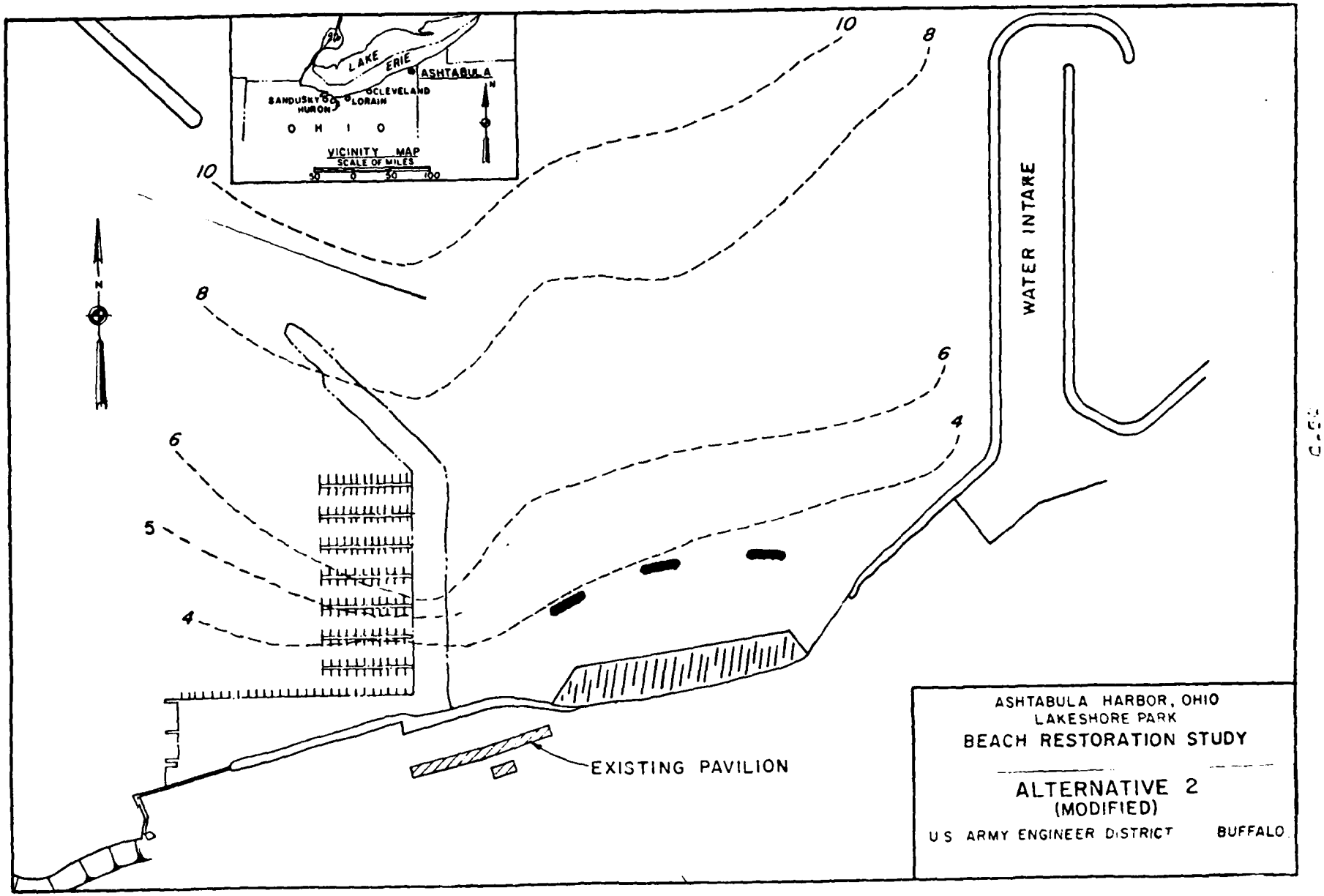

LAKE ERIE
ASHTABULA
CLEVELAND
LORAIN
SANDUSKY
HURON
O H I O
VICINITY MAP
SCALE OF MILES
50 0 50 100
N
10
8
6
5
4
WATER INTAKE
EXISTING PAVILION
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 2
(MODIFIED)
U S ARMY ENGINEER DISTRICT BUFFALO

FIG. 5

Source: Ohio Comprehensive Outdoor Recreation Plan; pp. 347

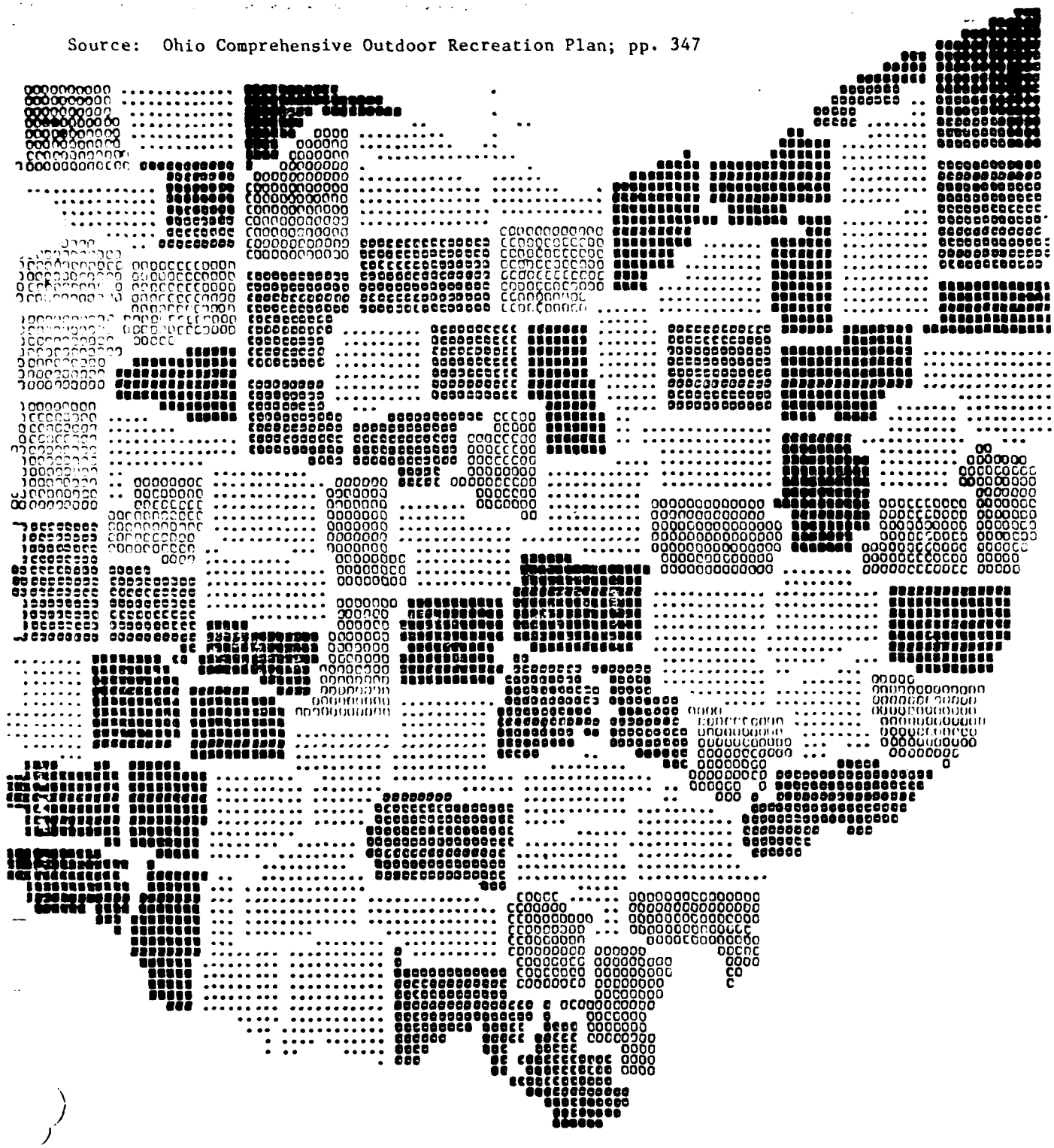


Figure 6

Final Swimming Needs--1975

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX D
COST ESTIMATES

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

REASONABLE CONTRACT ESTIMATE					SHEET OF
PROJECT LAKESHORE PARK - ASHTABULA OHIO DPR COSTS ESTIMATE					INVITATION NO.
ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
1	ARMOR STONE (1.0 to 2.5 TONS)	6,300	TON	$37.30	234,990
2	UNDERLAYER STONE (100-45 lbs)	1,400	TON	27.20	37,800
3	BEACH SANDFILL	37,000	C.Y.	7.20	266,400
4	ACCESS ROAD	100	L.F.	108.95	10,895
	TOTAL CONTR. EARNINGS				550,085
	CONTINGENCIES @ 20% ±				109,915
	TOTAL CONTR. EARNINGS PLUS CONTINGENCIES				660,000
	PLANS AND SPECS.				60,000
	SUPERVISION & ADMIN.				81,000
	SUB-TOTAL				$201,000
	NAVIGATION AIDES	2	EA.	19,500	37,000
	TOTAL FIRST COSTS				$838,000
	ANNUAL NOURISHMENT	2,700	C.Y.	7.20	26,640
	ANNUAL MAINTENANCE				
	Breakwater	28	TON	37.30	1,044
	Navigation Aids	2	EA.	1000.00	2,000
					29,684
	CONTINGENCIES @ 20% ±				6,316
	TOTAL ANNUAL MAINTENANCE				36,000

ENG FORM APR 67 1738 SUPERSEDES ENG FORM 1738, 1 APR 54, WHICH IS OBSOLETE. J.W 7/31/81

REASONABLE CONTRACT ESTIMATE					SHEET 1 OF
PROJECT Lakeshore Park Navigation Aid Cost Estimate					INVITATION NO.
ITEM NO.	Revised DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
	From Cattaraugus Creek Harbor Estimates				
	Light Foundation		Ea.	10,500	
	Navigation Light		Ea.	6,000	
	Stone displacement			-1,000	
	Contingencies @ 20% =			3,000	
				18,500	

ENG FORM APR 67 1738 SUPERSEDES ENG FORM 1738, 1 APR 54, WHICH IS OBSOLETE. JW 5/29/81

GPO : 1967 O-000-000

Subject Lake Shore Park - Ashtabula Harbor Ohio
Computation of Determination of unit prices -3.5 Breakwater Location
Computed by J Wheeler Checked by _____ Date 7/31/81

Armor Stone — Unit Prices are Spring of 81 Levels
Quantity 6,300 Ton
Gradation 1.0 to 2.5 Ton

Ashtabula Harbor, East & West Breakwater Major Rehab.
Item No. 5 Underlayer Stone (0.5 Ton to 2.0 Ton)
16,000 Ton Bids open Feb., 81'

	Govt. Est.	Incl. OH & Profit Av. Bid Price
Stone delivery	11.48 /Ton	10.81
Materials	13.50 /Ton	12.72
Placement	10.14 /Ton	9.52
Field Test	.01 /Ton	.01
Sub-Total	35.13	33.06
Mob. & Demob. (Add)	0.63	1.87
Distributed Profit	3.89	
Total	39.62 /Ton	Average 34.93 /Ton

USE $37.39 /Ton

Underlayer Stone 1,700 Ton (100% to 950# Stone)

Ashtabula Harbor, E & W Breakwater Major Rehab.
Item No. 6 Bedding Stone
34,000 Ton

	Govt. Est	Aver. Bid Price incl. OH & Profit
Stone Delivery	10.12 /Ton	9.19
Materials	7.99	7.62
Placement	7.31 /Ton	6.63
Field Test	0.01 /Ton	0.01
Sub-Total	25.83 /Ton	23.45
Mob. & Demob. (Add.)	0.46 /Ton	1.38
Distributed Profit	2.87 /Ton	
Total	29.18 /Ton	Average 24.82 /Ton

USE $27.00 /Ton

Beach Sand Fill

Use Presque Isle negotiated price $4.22 /Cy
Converting to C.Y. meas. = 4.22 (1.512) = 7.26 /C.Y. USE

Access Road Lakewood Park Apr. Bids (3) = $16,091 ÷ 200 LF = $80.02 /LF
$20.09 /LF (5510/2577) FNR = $108.95 /LF USE $108.95 /LF

Subject Lakeshore Park - Ashtabula Ohio

Computation of Engineering & Design - Supvn & Admin.

Computed by J Wharton Checked by _____ Date 7/31/81

Engineering & Design

Assumption was made that total cost for the D.P.R and Plans & Specs would be 18% of average Construction cost for Alternatives 2, 3 or 4

$1,318,000 (.18) = 240,000

Total $240,000

D.P.R. -180,000

$60,000 Est. Cost for Plans & Specs.

Supervision & Administration

Supervision & Inspection

660,000 (0.08) = $52,800 $53,000

Overhead

Engineering & Design

$60,000 (0.19) = $11,400

Supvn. & Inspect.

$53,000 (0.32) = 16,960

28,360

Total S & A $81,360 USE $81,000

Subject Lakeshore Park, Ashtabula, OH

Computation of Estimate of Cost for Plans and specs.

Computed by [illegible] Checked by _____ Date 13 Aug 80

Methodology used.

ALTERNATIVE	TOTAL COST OF CONSTRUCTION PLUS CONTINGENCIES (May 79 Price Level)
2	$ 1,019,000
3	$ 1,617,000
TOTAL	$ 2,636,000
AVERAGE COST	$ 1,318,000

Assumption was made that the total cost for the DPR and Plans and specs would about 18% of the average construction cost or $240,000.

Present estimate of DPR costs is $ 180,000.

Thus:

240,000

-180,000

$ 60,000 (Estimated Cost for Plans and specs.)

Subject Lakeshore Park Ashtabula. Ohio

Computation of Annual Maintenance Cost

Computed by T. Wheeler Checked by _____ Date 7/31/81

Breakwater

For back up see previous Est. Lake shore Park

1000 tons over 50 years @ $37.32/ton = $37,300/50 = $800

Assum an additional Cost of 50% the Project being small.

$800 X 1.30 = $1040/yr.

Navigation Aids

Maintenance was taken from Cleveland Harbor Dec. 1975 Estimated Maintenance for breakwater $990 ea (Annual use $1000/ea.

Page ___ of ___ pages,

Subject Lakeshore Park, Ashtabula, Ohio
Computation of Annual Maintenance Costs
Computed by ___ Checked by ___ Date ___

1. MAINTENANCE ON NAVIGATION AIDS

Estimated maintenance for breakwater modification project at Cleveland Harbor December 1975

$940 ea (annual)

For Lakeshore Park, assume $1,000 annual cost (ea.)

2. MAINTENANCE ON ACCESS ROADS.

Roadway area: 15'x100 = 1500 SF
= 167 S.Y

ASSUMPTION:

Wearing surface will require replacement in 5 years

Wearing surface for access road = 2 in.

Cost for wearing surface: $3.00/2in/s.y

Repair Cost: 167 s.y x 3.00/sy = 500

Mob & Demob = 3,000

Total Cost +3,500

say $3,500 expense per 5 years

Thus, Annual maintenance cost: $700.

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX E
PUBLIC INVOLVEMENT

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

DAEN-CWO-M (9 Dec 75) 2nd 1nd
SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, OH

DA, Office of the Chief of Engineers, Washington, D.C. 20314 24 Jan 77

TO: Division Engineer, North Central, ATIN: NCDPD-PF

1. The recommendations of the Division and District Engineers that no further studies be made at this time on the effects of Ashtabula Harbor structures on adjacent shores under current provisions of Section 111 of 1968 River and Harbor Act are concurred in.

2. It has been determined by OCE that consideration can not be given to land acquisition as a means to mitigate shore damage under Section 111 authority. Land acquisition is only authorized under Section 111 in those limited instances where the land is required in order to construct the structural measures. General real estate studies to determine whether the land acquisition alternative is acceptable should not be conducted for Section 111 projects.

FOR THE CHIEF OF ENGINEERS:

GEORGE BRAZIER
Chief, Construction-Operations Division
Directorate of Civil Works

jhr/2261

NCBED-PW 17 November 1978

Mr. Charles Sheppard, Secretary
Ashtabula Port Authority
P. O. Box 809
Ashtabula, OH 44004

Dear Mr. Sheppard:

The U. S. Army Corps of Engineers is presently involved in the study of beach erosion and shoreline protection at Lake Shore Park. In order to coordinate the work of the Corps with that of the Ashtabula Port Authority and other local interests, I would appreciate receiving a copy of the report done for the Port Authority by Snell Environmental Group concerning possible marina sites at Lake Shore Park, Walnut Beach, and 24th Street.

Your cooperation is greatly appreciated.

Sincerely yours,

CHARLES E. GILBERT
Chief, Planning & Reports Br

CF:
NCBED-PW
NCBED-DC
NCBRO

NCBED-PW

16 February 1979

Mr. Harold Leehan, Chairman
Ashtabula Port Authority
P.O. Box 889
Ashtabula, Ohio 44004

Dear Mr. Leehan,

In order to properly conduct a beach erosion and shoreline protection study at Lake Shore Park, it is necessary for us to keep abreast of the Port Authority's plan for development of a small boat marina in the Ashtabula area. In this regard, I would appreciate knowing if the Port Authority is still committed to developing a marina at the Walnut Beach site, or if other locations (Lake Shore Park in particular) are still being considered. If other locations are still being considered, it would be important for us to know when the final site selection will be made.

Your help in this matter will be valuable in our study of the Lake Shore Park beach erosion project. If you have any questions or desire additional information, please contact Brian Moore, Project Manager for Lake Shore Park, at 716-876-5454 ext. 2276.

Sincerely,

DONALD M. LIDDELL
Chief, Engineering Division

CF: NCBED-PW
NCBED-DC
NCBRO
Hugh Thomas - Ash. County Planning Commission

NCDPD-PF (10 Aug 79) 1st Ind
SUBJECT: Stage 2 Documentation for Section 103 (Beach Erosion and Shoreline Protection) Detailed Project Report for Lake Shore Park, Ashtabula, Ohio

DA, North Central Division, Corps of Engineers, 536 S. Clark Street, Chicago, Illinois 60605

TO: District Engineer, Buffalo

Subject report is approved for continuation of the study subject to consideration of inclosed list of comments. Milestone 84 is considered complete.

FOR THE DIVISION ENGINEER:

for ALFRED P. BEHM, P.E.
Chief, Planning Division

Incl 1 wd
Added Incl 2 comments

CORPS OF ENGINEERS

THE GAZETTE
ASHTABULA CO.
JEFFERSON, O.
S - W - CIRC. 5100

BUFFALO DISTRICT

4/5

SEP- 6-79

Lake Shore Park to get new boat ramps, breakwall

ASHTABULA TWP.— Ashtabula County and Lake Snore Park Commissioners have been awarded a $17,850 federal grant for a revitalization program at the township park.

The grant will fund replacement of an exisiting boat launching ramp, additional shore protection and development of a boater parking area, Ohio Energy Director Robert S. Ryan said.

Further funding for the project is being provided by the Ohio Department of Natural Resources and the Ashtabula Township Park Board, he added.

"We are really enthused," Commissioner Alfred Mackey said. "It means a lot for the revitalization of the park."

The project will be administered by the Ashtabula County Planning Commission.

While Mackey declined comment on total funding available, he said the grant, one of five approved through Ohio's Coastal Energy Impact Program, is one phase of a more extensive park improvement program.

"We don't know the exact amount because it has not been submitted to bidders, but it will be in six figures," the commissioner said.

Affecting the west lake front area of the park, the plan, which proposes a breakwall extension, three new boat ramps and parking areas, will be tied into an Army Corps of Engineers beach project for the eastern area, Hugh Thomas, assistant county planning director, said.

The park board was not available for comment at press time.

With planning dating back more than a year, the park is eligible for funding due to its proximity to Cleveland Electric Illuminating Company's Ashtabula Plant and coal handling at nearby dock companies, Energy Director Ryan said.

"The purpose of CEIP to ease the economic, social and environmental impacts caused by energy facilities or activities in the Ohio coastal zone," he explained.

In addition to the existing generating plant, CEI officials recently acknowledged the area was under consideration for a proposed nuclear power facility.

The grant is the only construction grant awarded to any applicant in the state in the fiscal year 1979 under the Coastal Zone Management program.

Other 1979 grant recipients were the City of Oregon, Ohio, which recieves $12,000 to develop plans for provision of needed facilities in the vicinity of the Toledo Edison Company, Standard Oil Company and Port of Toledo. The Erie Regional Planning Commission was approved for $28,000, and the City of Sandusky, $9,600, for land use plans for Sandusky County's coastal zone areas.

The Ohio Department of Natural Resources is the only state agency to receive funding, getting a $22,000 grant approval for a biological inventory of rare and endangered species which could be adversely affected by energy facility siting in Ashtabula, Lucas, Wood, Ottawa, Sandusky, Erie and Lake Counties.

To date, the Ohio Department of Energy has initiated 12 area projects along the Lake Erie coastal zone. Each project is being carried out by local authorities at the regional, county or municipal level, state officials said, with the overall program coordination and technical assistance available at the state level, Ryan said.

- J Zovich

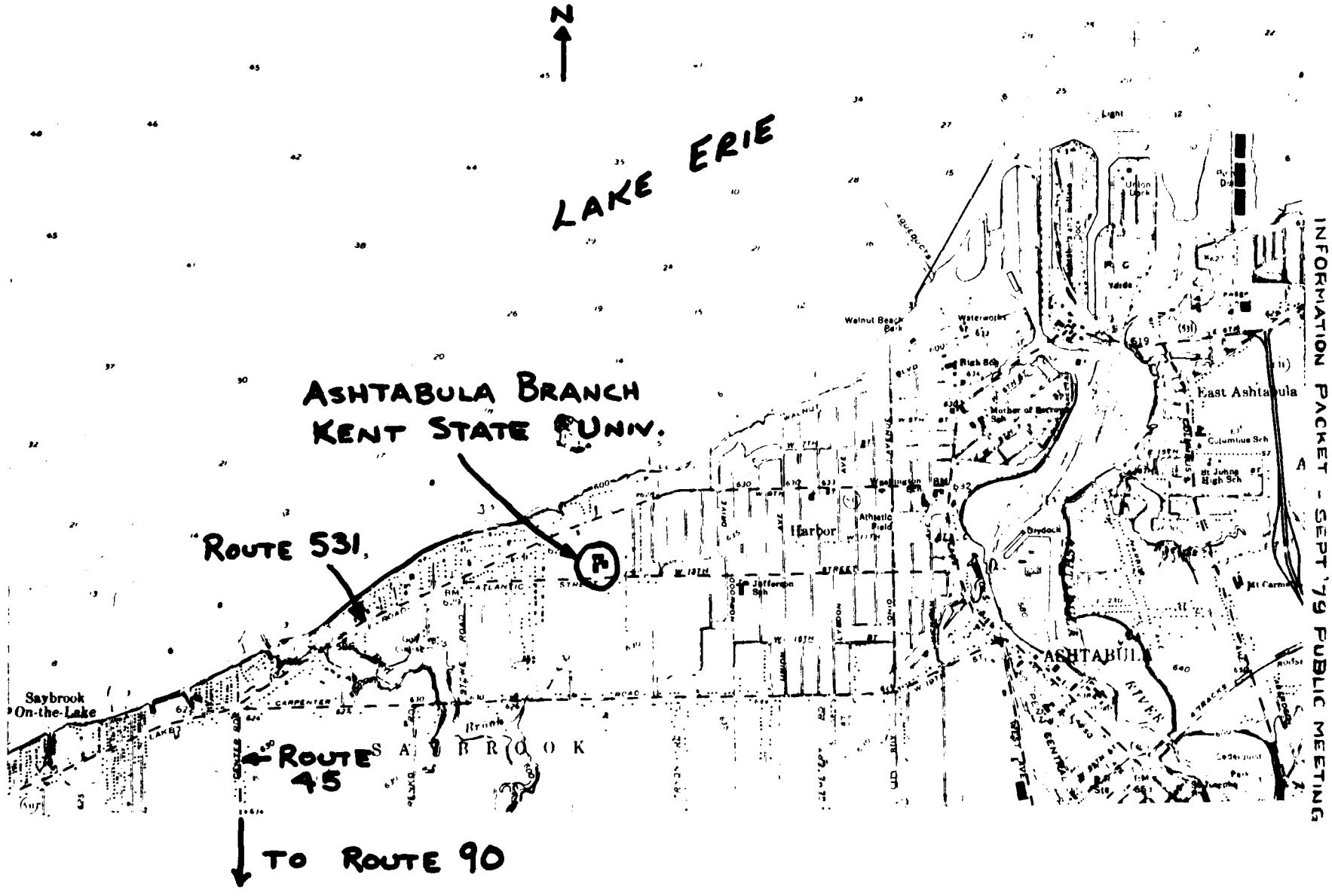

N
LAKE ERIE
ASHTABULA BRANCH
KENT STATE UNIV.
ROUTE 531
ROUTE 45
TO ROUTE 90
Saybrook
On-the-Lake
SAYBROOK
Harbor
East Ashtabula
ASHTABULA
Walnut Beach Park
Athletic Field
Drydock
Jefferson Sch
Columbus Sch
St Johns High Sch
Mother of Sorrows Sch
Rich Sch
Waterworks
Union Dock
Light
Yards
Post Office
Bridge
Brook
ATLANTIC
CARPENTER
LAKE
STATE ROAD
WALNUT
RIVER
TRACKS
CENTRAL
Cemetery

Fig. 1

NOTES AND AGENDA

Public Meeting
on
Lake Shore Park Preliminary Designs
25 September 1979

1. NOTES

Registration Cards. You will be given a registration card at the meeting. Please give your completed registration card to any meeting official. These cards become a part of the meeting record. Make sure you indicate on the card whether you wish to make a statement. Questions will be answered after all the statements are given.

Statements. Written statements are preferred for the sake of accuracy, but oral statements may be made without a written document. Written statements need not be read; they become part of the official record whether or not read aloud. Prepared statements may be submitted to any meeting official.

Meeting Proceedings. You may record the proceedings of the meeting if you wish, however, a professional stenographer will record the proceedings and transcripts of this record will be available at cost from the District Engineer, U. S. Army Engineer District, Buffalo, 1776 Niagara Street, Buffalo, NY 14207.

2. AGENDA

Opening Remarks, Introductions, Statement of Meeting Purposes, and Corps Presentation, Colonel George P. Johnson, District Engineer, U. S. Army Engineer District, Buffalo.

Presentation of Views. (Each group will have an opportunity to speak, but not necessarily in the order listed.)

(1) Members of Congress (or their representatives)

(2) Representatives of the Governor

(3) Members of State Legislature

(4) Representatives of Federal Agencies

(5) Representatives of State Agencies

(6) County Officials

(7) City and Town Officials

(8) Interested Individuals

(9) Representatives of Civic Organizations

Questions and Answers. (Questions and suggestions concerning the various alternatives are encouraged.)

Closing Comments. Colonel George P. Johnson

Inc 2

PUBLIC INVOLVEMENT

It is the Corps policy to actively involve the public in water resources studies to insure that the study responds to the public's needs and study objectives. This will be accomplished during the meeting by recording prepared and informal statements and answering questions asked during the meeting.

All concerns expressed by the interested individuals during this meeting will be addressed in the final design report. After the final design report is completed and approved, copies will be made available to the public and all concerned agencies.

The preliminary design report has recently been completed and is available for public review. Two copies of this report are available to the public at both the Ashtabula Public Library (West 44th Street, Ashtabula, OH), and the library at the Ashtabula Branch of Kent State University (3325 West 13th Street, Ashtabula, OH). A limited number of individual copies of this report are also available. The Buffalo District will distribute these reports to interested individuals until the supply is exhausted. Written requests for copies of this report should be sent to:

Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

LAKE SHORE PARK, ASHTABULA, OHIO
BEACH EROSION AND SHORELINE PROTECTION STUDY

INTRODUCTION

Lake Shore Park consists of about 50 acres of lakefront property, located in the township of Ashtabula, OH. A 440' X 24' pavilion overlooks a small beach and boat livery. The total park frontage on Lake Erie is about 2,500 feet. From the east park boundary, low clay bluffs extend 700 feet along the shore to the west. These bluffs are being rapidly eroded by high water and northeast storms. The remainder of the shoreline is presently protected by a recently constructed stone revetment. This stone revetment was constructed to protect the park pavilion from flooding during winter storms. Presently, the primary concern of the Park Commission is the rapid loss of park land along the bluffs to the east of the pavilion and restoration of a recreational beach. See Plates 1, 2, and 3 near the end of this packet.

The purpose of this phase of the study has been to evaluate a number of possible alternative solutions with the objective of determining the best way of correcting the beach erosion and shoreline protection problems at Lake Shore Park while providing for the restoration of a recreational beach. The study has addressed environmental, economic, and engineering considerations. Plan evaluation has been carried to the level of detail mandated by the Water Resource Council's "Principals and Standards for Water and Related Land Resources Planning."

The 10 alternatives that were developed can generally be grouped according to beach lengths. Development of both an 800-foot beach and a 1,300-foot beach was studied. An 800-foot beach length was chosen so that a beach could be developed without altering the existing stone revetment. The 1,300-foot beach is the largest beach which could be built and still allow for development of a small boat harbor to the west of the park pavilion. These beach lengths were studied in terms of unprotected beachfills and in conjunction with various offshore breakwater plans. A description of the 10 alternatives considered in this phase is provided beginning on page 7.

To construct a beach and provide access for annual beach nourishment, it will be necessary to construct an access road to the beach from the top of bluffs. This roadway will be located at the easterly end of the proposed beach.

COST ALLOCATION AND ECONOMIC ANALYSIS

The cost to undertake this project under the authority of Section 103

of the 1962 River and Harbor Act is shared between Federal (Corps of Engineers and U. S. Coast Guard) and non-Federal (other than Corps of Engineers and U. S. Coast Guard) interests. The U. S. Coast Guard is responsible for the cost of any navigation aids, including their operation and maintenance. For the Lake Shore Park project, the remaining project costs are cost-shared, 70 percent Federal (Corps of Engineers) to 30 percent non-Federal. The Federal (Corps of Engineers) share is, however, presently limited to a maximum of $1,000,000 per project.

The Federal (Corps of Engineers) cost-share includes all Corps of Engineers' cost for investigations, planning, design, and construction including annual beach nourishment. For this project, annual beach nourishment has been considered a construction cost for project years one through five (after initial project construction). The need for annual beach nourishment and the cost apportionment of it (based on the Federal project limitation) will be reviewed and renegotiated at that time.

A Corps of Engineers Section 111 Reconnaissance Report on mitigation of shore damages attributable to the Federal navigation project at Ashtabula Harbor recommended that a portion of the beach at Lake Shore Park, estimated at approximately 4.2 cubic yards per lineal foot of beach, be replaced at 100 percent Federal expense. In addition, the Corps will be totally responsible for a portion of annual beach nourishment costs associated with mitigation under Section 111. For an 800-foot beachfill, the initial quantity of sand at 100 percent Federal cost will be 3,360 cubic yards (800 LF X 4.2 CY/LF). The cost (May 1979 price levels) for 3,360 cubic yards of sand is estimated to be approximately $22,700 (based on $4.50 per ton of sand and 1.5 tons per cubic yard.) Since this is approximately 4.7 percent of the total initial sandfill, 4.7 percent of the estimated annual nourishment will also be placed at 100 percent Federal expense. For a 1,300-foot beachfill, the initial quantity of sand at 100 percent Federal cost will be 5,460 cubic yards (1,300 LF X 4.2 CY/LF.) The cost for 5,460 cubic yards of sand is estimated to be approximately $36,900. Since this is approximately 5.0 percent of the total initial sandfill, 5.0 percent of the estimated annual nourishment will also be placed at 100 percent Federal expense.

Non-Federal costs include all project costs in excess of the specific Corps cost limitation to insure that expenditure of Corps funds will result in a project that is integrally complete and fully effective. The scope of the project may be increased including the addition of project purposes, such as providing additional protection for a small boa harbor, if the local interests are willing to pay the additional costs. Non-Federal interests ar also totally responsible for all annual maintenance costs, such as maintenance of offshore breakwaters and access roads.

The economic (benefit/cost) analysis is based on a comparison of average annual benefits and average annual costs.

The benefits from beach erosion control measures at Lake Shore Park include primary benefits from physical damage prevented and increased recreational usage in the form of beach usage and swimming. Benefits are measured as the difference in the monetary values anticipated with the improvements and the monetary values anticipated without the improvements.

The recreational benefits (swimming) over the 50-year project life are based on the visitation estimates weighted by some appropriate user value. The user value assigned in this study was based on a points system developed by the U. S. Water Resources Council (III-E-43) and is equal to $1.93.

Benefits from physical damage prevented are those associated with the prevention of erosion of the bluffs to the east of the park pavilion.

The following table summarizes the average annual benefits associated with both an 800-foot recreational beach alternative and a 1,300-foot recreational beach alternative.

Beach Length	Average Annual Benefits		
	Recreational	Erosion Protection	Total
	$	$	$
800 feet	269,583	653	270,236
1,300 feet	272,557	653	273,210

Average annual costs include amortization of project first costs over the 50-year project life at a 6-7/8 percent interest rate, annual beach nourishment costs, and annual maintenance costs. Project first costs include all Corps of Engineers' costs for investigations, design, and construction incurred subsequent to the Division Engineer's transmittal of the Detailed Project Report to the Office of the Chief of Engineers for approval. These costs are normally those related to preparation of plans and specifications and project construction. The total average annual costs vary for each alternative.

Average annual benefits and average annual costs are compared in two ways. Average annual costs are subtracted from average annual benefits in order to determine the net benefits for the alternative. Average annual benefits are also divided by average annual costs to

determine the benefit/cost ratio. An economically justifiable alternative is one in which average annual benefits equal or exceed average annual costs (benefit/cost ratio greater than or equal to unity).

The costs presented in this report are based on May 1979 price levels, a 50-year project life, and an interest rate of 6-7/8 percent.

RECREATIONAL BATHING DEMAND

Recreational bathing demand figures were estimated in 10-year increments throughout the project life (1982-2032). Based on a minimum dry beach area requirement of 75 square feet per bather, an 800-foot long beach could only meet the projected peak demand through the year 2002. A 1,300-foot beach however, would meet the projected 50-year peak demand.

PARKING REQUIREMENTS

Provisions for adequate parking must be considered for all alternatives. The preliminary "Lake Shore Recreation Plan," as prepared by Woodruff, Inc., (consulting engineers) for the Ashtabula County Planning Commission, indicates that parking can be made available for a total of 556 vehicles. The Buffalo District determined that this would be adequate to meet the needs of a 800-foot long beach throughout the life of the project. The parking needs of a 1,300-foot long beach would be satisfied through the year 2002. However, additional parking would be required after that time.

SUMMARY OF ENVIRONMENTAL CONSIDERATIONS

DESCRIPTION OF THE AREA

The location of Lake Shore Park is shown on Plate 1. Ashtabula, OH, is located in Ashtabula County, about 40 miles southwest of Erie, PA, and about 50 miles northeast of Cleveland, OH.

The Lake Shore Park is owned by the town of Ashtabula and managed by the Township Park Commission. There is no user fee at the park. The park consists of about 50 acres of lakefront property and includes a small beach area at the easterly end, picnic shelters, parking areas, a 40-unit trailer park, zoo, tennis courts and concession stands, as shown on Plate 2. A 440' X 24' pavilion overlooks the lakefront. The park also includes the only public boat launching ramp in Ashtabula County, west of Conneaut, OH. The total lakefront is about 2,500 feet.

From the east park boundary, low clay bluffs extend 800 feet along the shore to the west. These bluffs are being rapidly eroded by high water and northeast storms. The remainder of the park shoreline was originally protected by a concrete seawall constructed by the Civilian Conservation Corps in the 1930's. By 1974, this wall was deteriorated and in urgent need of repair. The lower level of the pavilion was being subjected to the lake storms and much damage had occurred. In 1977, in order to protect the pavilion from further damage, approximately 15,000 tons of breakwater stone, acquired from the removal of the westerly section of the inner breakwater of Ashtabula Harbor were placed directly on top of the original concrete seawall. The Town Park Commission recently backfilled and graded the area between the pavilion and stone revetment.

The park pavilion is a two-story concrete and steel structure 440' X 24'. It once housed a boat livery-bathhouse facility, concessions, and equipment storage on the lower level. The lower area had been rendered useless by flooding during winter storms prior to placement of the stone revetment. To date, this area has still, however, not been utilized by the Park Commission. The upper story still functions as a picnic shelter and promenade.

About 1.0 million people are within a 50-mile radius of Lake Shore Park, in Ashtabula. The park draws people from northeast Ohio, Pennsylvania. With a population of this magnitude within a one-hour drive of the park, the new beach area can be expected to be fully utilized. The erosion and high lake levels have had a devastating effect on the existing beach. Although it is open for swimming, it has been reduced to gravel and few swimmers make use of it. A new sewage disposal plant in the area has reportedly helped to alleviate the riptide and pollution problems that had forced the beach to close for a period of years. The Ohio Department of Health tests water

quality at the beach once a week during the summer months. Testing has been carried out since 1968. There does not seem to be any great water pollution problem evident as of 1979. The demand for recreation at Lake Shore Park is strong. There is a large range of activities available, much more so than at most recreational parks. This makes the park unique to the area. A great variety of recreational activities and conveniences are afforded the recreational visitor. In view of this, the value of a visit to the beach area is higher than a visit to the average less developed and diversified beach.

LOCAL CONCERNS

The primary concern of the Park Commission at present is the rapid loss of parkland along the bluffs to the east of the pavilion. A new stone revetment extending from the east end of the pavilion, west was constructed in 1977 to protect the shore and the pavilion. Lake Shore Park, which was developed about 1920, was at one time a major recreation facility for the entire northeast Ohio area. It has declined over the years and was closed during the 1960's because of lake pollution problems. With the recent improvement of local water quality, the beach has been reopened and the use of the beach facilities has increased.

A comparison of 1968, 1973, 1974, and 1978 aerial photos of the Lake Erie coast has indicated an average erosion rate along the park bluffs of 2.4 feet per year. This is above the rate of 1.6-foot per year that is about average for the southern lakeshore. The erosion in the park area is aggravated by the weak littoral drift entering the area. The west to east drift is almost totally blocked by the harbor structures. The Cleveland Electric Illuminating Company intake structure almost completely obstructs any littoral drift from the east during the normal periodic reversals.

ALTERNATIVES AND IMPACTS

A study on future park development by the Town Park Commission is now in progress. Community services and facilities (police and fire protection, utilities, hospitals), are adequate to serve the park and its users under all alternatives. State and interstate highways provide easy access to Lake Shore Park from the surrounding area.

The U.S. Fish and Wildlife Service reported the following project-related information to the Buffalo District by letter of 11 May 1979:

"Because of its protected nature, the offshore area is used by migrating waterfowl for resting and feeding. On March 13, 1979, we observed approximately 250 canvasbacks, scaup, and redheads, along

with small numbers of common goldeneye and green-winged teal. Several species of gulls permanently occupy the area and use the breakwaters as nesting sites.

"Fishery resource survey data from offshore Lake Shore Park are not available. However, the following tabular information from Ohio DNR indicates that a good sport fishery does exist from the shore.

SHORE ANGLER HARVEST AND PRESSURE DATA

Lake Shore Park Ashtabula	1975	1976	1977
ANGLER HOURS	11,600	7,500	15,000
Yellow Perch	984	329	2,765
White Bass	152	71	18
Drum	4,736	3,643	6,427
Other Species	439	291	404

For the years sampled, harvest of white bass has decreased, while yellow perch harvest has increased. Catch of freshwater drum, likewise, has increased and remained relatively stable for 1976. We can conclude from the above data that shore fishing from the park is important for the local community. We plan to sample the fishery resource in the project area in late spring and early summer (1979)."

DESCRIPTION OF ALTERNATIVES

Several alternative plans for improving conditions at Lake Shore Park were considered. These alternatives and a brief description of each are given below.

ALTERNATIVE 1 - NO ACTION - Although this alternative is not recommended as it would not alleviate the shore erosion problem at Lake Shore Park, it will be considered until all items of local cooperation are formally agreed to.

ALTERNATIVE 2 - TWO SEGMENTED OFFSHORE BREAKWATERS AND 800-FOOT BEACH FILL - This alternative would provide for two segmented offshore breakwaters of rubblemound construction. They would each be 250-foot in length, 250 feet apart, parallel to and approximately 600 feet from the shore (Plate 4). The proposed initial beach fill of 71,000 c.y. of sand would be 800 feet in length and would provide a 217-foot wide recreational beach (with a mean lake level of 2.2 feet above LWD from June through September - Plate 5) extending 800 feet east from the east end of the pavilion. The plan would also include an annual beach replenishment of 7,100 c.y. of sand to maintain the initial fill.

The beach fill would provide erosion protection of the shoreline as well as increase the recreational capacity of the park based on a required minimum dry beach area of 75 square feet per bather. The 800' beach may not be large enough to accommodate the projected future peak daily bathing demand after year 2002.

The two offshore segmented breakwaters would protect the beach fill from erosion caused by northeast storms. The submerged rubblemound breakwater surfaces would create aquatic habitat diversity and benefit the area fishery. There would be some overtopping of the breakwaters, but they would still reduce the amount of annual beach replenishment that would be needed as compared to that needed for an unprotected beach. Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area.

This alternative leaves the newly constructed revetment, extending from the east end of the pavilion west in place.

The beach fill would prove to be more aesthetically pleasing than the gravel that presently exists at the waterline. The breakwaters, however, may appear to be an eyesore to some as they would obstruct a clear view of the open lake.

ALTERNATIVE 3 - THREE SEGMENTED OFFSHORE BREAKWATERS AND 1,300-FOOT BEACH FILL - This alternative would provide for three segmented offshore breakwaters of rubblemound construction, 250 feet in length and 250 feet apart. Each would be approximately 600 feet from and parallel to the shore. The proposed initial beach fill of 108,300 c.y. of sand would be 1,300 feet in length, extending east from the west end of the pavilion (Plate 6). This would provide a 217-foot wide recreational beach (with a mean lake level of 2.2 feet above LWD from June through September - Plates 5 and 7). The plan would also include annual beach replenishment of 10,830 c.y. of sand to maintain the initial beach fill.

The 1,300' proposed beach would provide optimal recreational capacity for the projected future peak daily bathing demand, but would also alter that portion of the newly constructed revetment that is directly in front of the pavilion. The revetment and fill behind the revetment would be excavated to an elevation of four feet above LWD and replaced with sand to an elevation 10 feet above LWD to provide the beach. In lieu of the revetment, the newly created beach would serve to protect the pavilion from flooding caused by high lake levels and northeast storms. This newly created beach, an unstable substrate, will not provide the area of aquatic fishery habitat that the stone substrate (revetment) provides.

The protection from flooding afforded the pavilion by the newly-created beach would continue to allow the lower level of the pavilion the opportunity to be refurbished and rented to concessionaires, thus increasing income to the town of Ashtabula.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. The three segmented breakwaters would not afford total shoreline protection, but would decrease the amount of annual beach nourishment needed as compared to an unprotected beach. The submerged breakwater rubble-mound surfaces would creat aquatic habitat diversity and benefit the area fishery.

The beach fill would prove to be more aesthetically pleasing than the gravel that presently exists where the previous beach has eroded away. The breakwaters themselves may appear to be an eyesore to some as they would obstruct the view of the open lake.

ALTERNATIVE 4 - 800-FOOT BEACH FILL - This plan calls for a proposed initial beach fill 800 feet in length, as described under Alternative 2. The alternative also includes annual beach replenishment of 18,000 c.y. of sand to maintain the initial beach fill. Construction of breakwaters would not be included in this plan (Plate 8).

Underutilization of the park facility has resulted due to beach loss from erosion and past flooding of the pavilion. Although an 800-foot beach would increase utilization of the park, it may not be able to accommodate all future expected park recreational bathing demands after year 2002.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. As the beach is unprotected, much more annual nourishment would be needed than if there was a protective structure, i.e., breakwater.

The 800' beach would allow the newly-constructed revetment, which extends from the east end of the pavilion west, to remain in place.

The absence of a breakwater will be more aesthetically pleasing as it would provide for a clear, unobstructed view of the open lake.

ALTERNATIVE 5 - 1,300-FOOT BEACH FILL - This plan calls for a proposed initial beach fill of 108,300 c.y. of sand, 1,300 feet in length, as described under Alternative 3. This alternative also includes annual beach replenishment of 27,100 c.y. of sand to maintain the initial beach fill. Construction of breakwaters would not be included in this plan (Plate 9).

A 1,300-foot beach would be sufficient to accommodate future expected peak bathing demand. Also, being able to accommodate more users, the beach may bring a greater economic benefit to the area from concessions and general spending in the area.

Extending the beach in front of the pavilion would, as described in Alternative 3, alter that portion of the newly constructed revetment that is directly in front of the pavilion. The new beach fill would then provide the protection for the pavilion from flooding caused by storms. This newly created beach, an unstable substrate, will not provide the area of aquatic fishery habitat that the stone substrate (revetment) provides.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. The lack of a breakwater or series of breakwaters would not protect the beach from wave action, and more beach nourishment material would be needed than if there were a breakwater present.

The lack of a breakwater would, however, be more aesthetically pleasing as there would be no structure to obstruct the view of the open lake. The beach fill also would be more aesthetically pleasing than the gravel presently at the shoreline.

ALTERNATIVE 6 - GROIN PLAN - This plan calls for an 800' beach protected by a groin.

The function of groins is to trap littoral drift material being transported in the surf zone in a direction parallel to the shoreline. This transport is due to the horizontal component of wave energy acting in the direction.

At Lake Shore Park, the wave energy is generally perpendicular to shore due to the protective structures to the east and west. For this reason, it is concluded that littoral transport is mainly perpendicular to the shore and longshore transport is minimal. It is, therefore, not feasible to stabilize or accrete beach material at Lake Shore Park with a groin concept.

ALTERNATIVE 7 - CONTINUOUS OFFSHORE BREAKWATER ANd 800-Foot BEACH FILL - This alternative calls for a 2,000-foot continuous offshore breakwater, of rubblemound construction, approximately 1,600 feet offshore located southeast of the U. S. East Breakwater, allowing for a 250± entrance channel between the east end of the U. S. East Breakwater and the west end of the proposed breakwater, and a 250± entrance channel between the east end of the proposed breakwater and the Cleveland Electric Illuminating Company's intake structure (Plate 10).

This alternative also calls for an 800-foot initial beach fill, 71,000 c.y. of sand, as described in Alternative 2. Annual beach replenishment of 10,000 c.y. of sand would be needed to maintain the initial fill. Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area.

The 2,000 feet continuous breakwater would provide almost complete shore protection for Lake Shore Park, thus increasing the utilization of the area by providing a fairly stable beach. The submerged breakwater rubblemound surfaces would create aquatic habitat diversity and benefit the area fishery. The breakwater would reduce the amount of annual beach nourishment needed as compared to an unprotected beach. However, it may not prove to be aesthetically pleasing to some, as it will obstruct the view of the open lake.

ALTERNATIVE 7A - CONTINUOUS OFFSHORE BREAKWATER, 800-FOOT BEACH FILL - This alternative consists of a 2,000-foot continuous offshore breakwater of rubblemound construction, as discussed in Alternative 7. The breakwater in Alternative 7A would, however, be higher to afford protection for a proposed small-boat harbor at the west end of the park. An 800'-foot initial beach fill of 71,000 c.y. of sand would be constructed as described in Alternative 2. This plan would also include annual beach replenishment of 3,600 c.y. of sand to maintain the initial fill.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. The sand would be more aesthetically pleasing than the gravel presently at the shoreline, however.

The higher breakwater would afford protection for a small-boat harbor that has been proposed by the town, to be constructed at the west end of the park. The small-boat harbor would increase the recreational diversity of the park and attract new users to the park facility. In addition to providing a convenience and service to area residents, the boat harbor may prove to be an economic benefit to the economy through increased utilization of the park and spending generated by the boating activity in the area. Depending on how close the harbor is constructed to the beach, the small-boat harbor may cause a safety hazard to the bathers. It may also increase water pollution in the area.

By affording greater protection to the shore, the annual amount of beach nourishment needed would be reduced, as compared to the amount needed for an unprotected beach. The breakwater may not be aesthetically pleasing to some, however, as it will obstruct a clear view of the open lake.

ALTERNATIVE 8 - CONTINUOUS OFFSHORE BREAKWATER AND 1,300-FOOT BEACH FILL - This alternative consists of a 2,000-foot continuous offshore breakwater of rubblemound construction as discussed in Alternative 7, and a 1,300-foot initial beach fill of 108,300 c.y. of sand as discussed in Alternative 3 (Plate 11). This plan would also include annual beach replenishment of 15,200 c.y. of sand to maintain the initial fill.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. The 1,300-foot beach fill would be adequate to accommodate future expected peak bathing demand and would be more aesthetically pleasing than the present gravel at the shore. Extending the beach in front of the pavilion would, as described in Alternative 3, alter that portion of the newly-constructed revetment that is directly in front of the pavilion. The new beach would then provide the protection for the pavilion from flooding caused by storms in lieu of the stone revetment. This newly-created beach, an unstable substrate, will not provide the area of aquatic fishery habitat that the stone substrate (revetment) provides.

The submerged breakwater rubblemound surfaces would create aquatic habitat diversity and benefit the area fishery. The breakwater would lessen the amount of annual beach replenishment needed as compared to the amount needed for an unprotected beach. It may not be aesthetically pleasing to some, as it would obstruct the view of the open lake.

ALTERNATIVE 8A - CONTINUOUS OFFSHORE BREAKWATER, 1,300-FOOT BEACH FILL - This alternative consists of a 2,000-foot continuous offshore breakwater of rubblemound construction, as discussed in Alternative 7A and a 1,300-foot initial beach fill of 108,300 c.y. of sand as discussed in Alternative 3. The plan would also include annual beach replenishment of 5,400 c.y. of sand to maintain the initial fill.

Initial sand placement and annual nourishment would result in temporary increases in turbidity in the project area. The 1,300-foot beach would be adequate to accommodate future expected peak bathing demand and would be more aesthetically pleasing than the gravel presently at the shoreline. Extending the beach in front of the pavilion would, as described in Alternative 3, alter that portion of the newly-constructed revetment that is directly in front of the pavilion. The new beach would provide the protection for the pavilion from flooding caused by storms in lieu of a stone revetment. This newly-created beach, an unstable substrate, will not provide the area of aquatic fishery habitat that the stone substrate (revetment) provides.

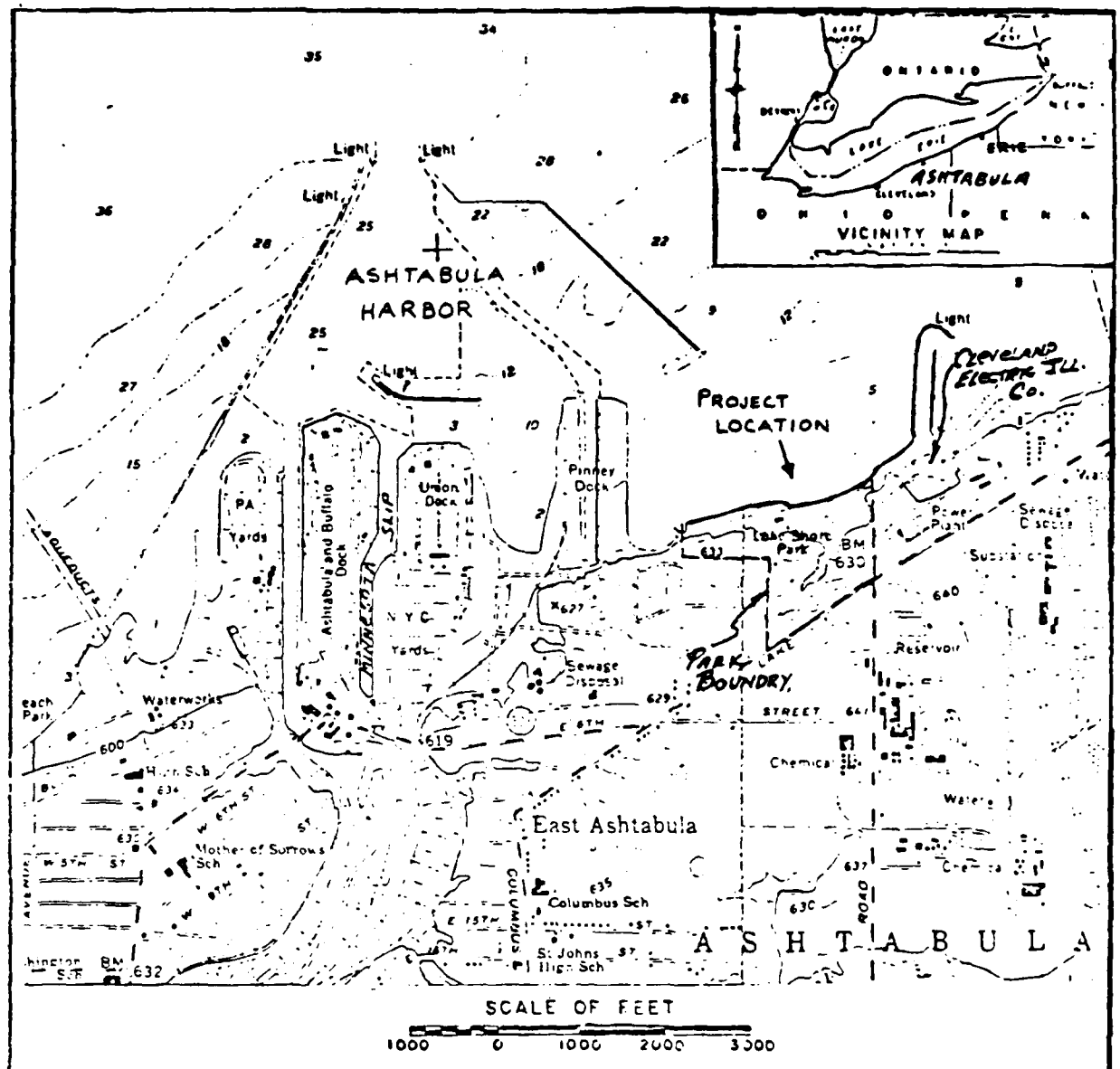
The submerged breakwater rubblemound surfaces would create aquatic habitat diversity and benefit the area fishery. The higher breakwater would lessen the amount of annual beach replenishment needed, as compared to the amount needed for an unprotected beach, and would provide protection for the shore and a small-boat harbor that has been proposed by the town to be constructed at the west end of the park. The breakwater may not be aesthetically pleasing to some as it will obstruct the view of the open lake.

The small-boat harbor would increase the recreational diversity of the park and attract new users to the park facility. In addition to providing a convenience and service to area residents, it may prove to be an economic benefit to the economy through increased utilization of the park and the spending generated by the boating activity in the area. Depending upon how close the small-boat harbor is to the west end of the beach, the harbor may create a safety hazard for the bathers, as well as increase water pollution in the area.

The previously cited U. S. Fish and Wildlife Service letter of 11 May 1979 included the following statements:

"The upland area affected by the project would not have a significant adverse impact to wildlife resources. The bluff area could potentially provide nesting sites for kingfishers and swallows, although no bank openings were noted.

"Based upon available information regarding the project area, we do not anticipate significant project-caused adverse impacts to fish and wildlife resources. Therefore, an in-depth four-season study of these resources at the project site will not be necessary prior to preparation of a draft Fish and Wildlife Coordination Act report (to be submitted for inclusion in the DPR/DES)."

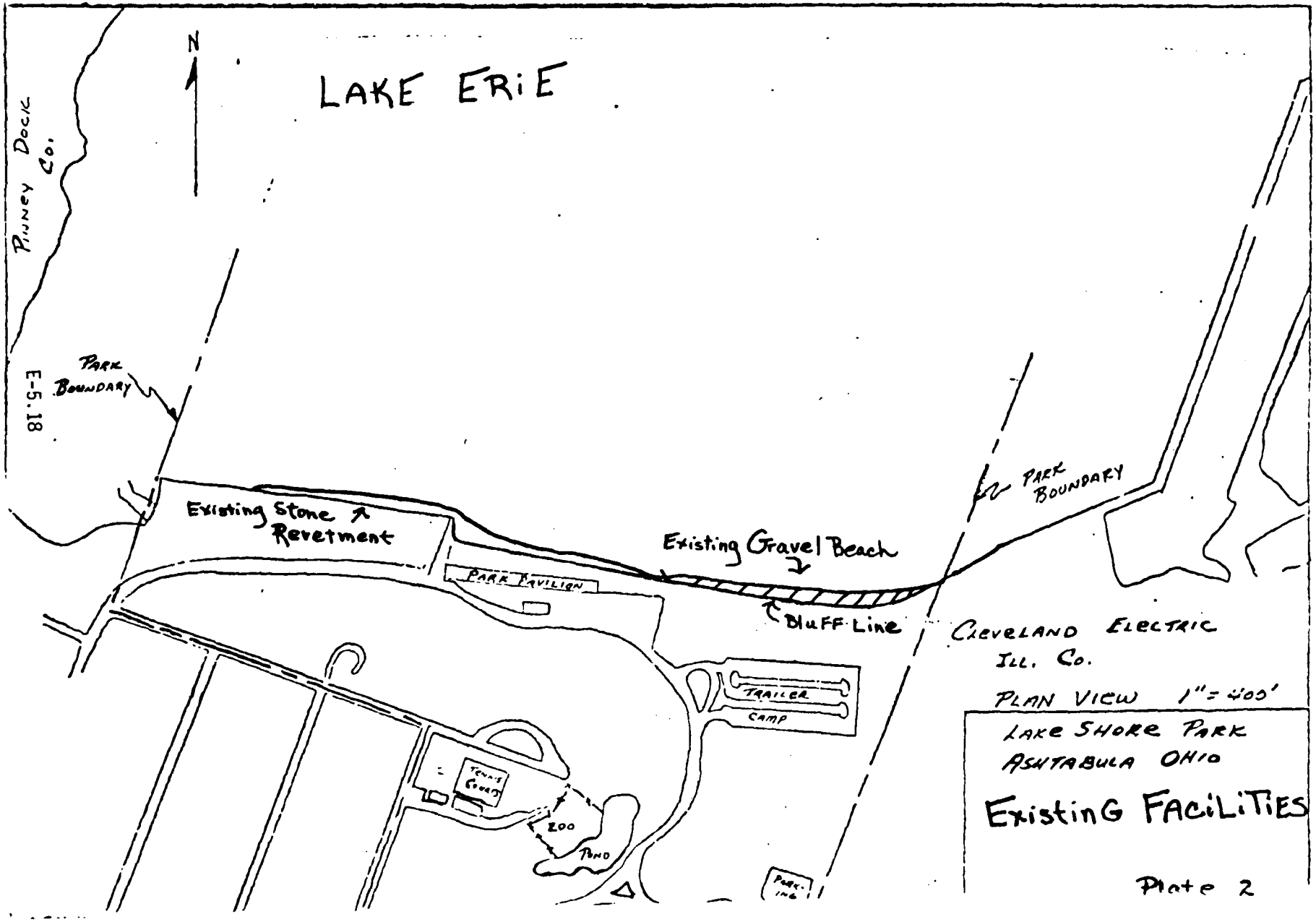


LAKE SHORE PARK, ASHTABULA, OHIO

LOCATION MAP

U.S. ARMY ENGINEER DISTRICT, BUFFALO
AUGUST 1974

PLATE 1

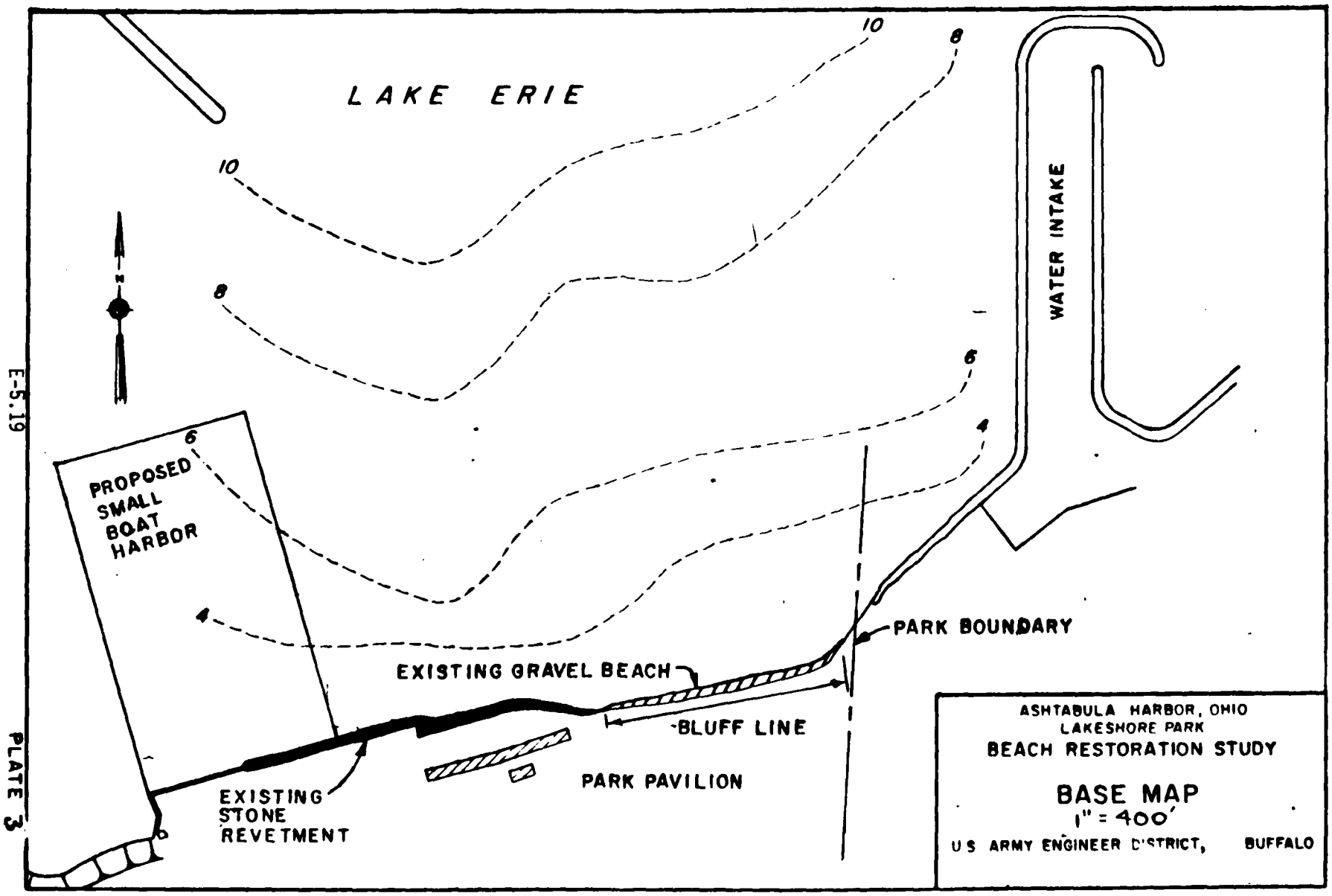


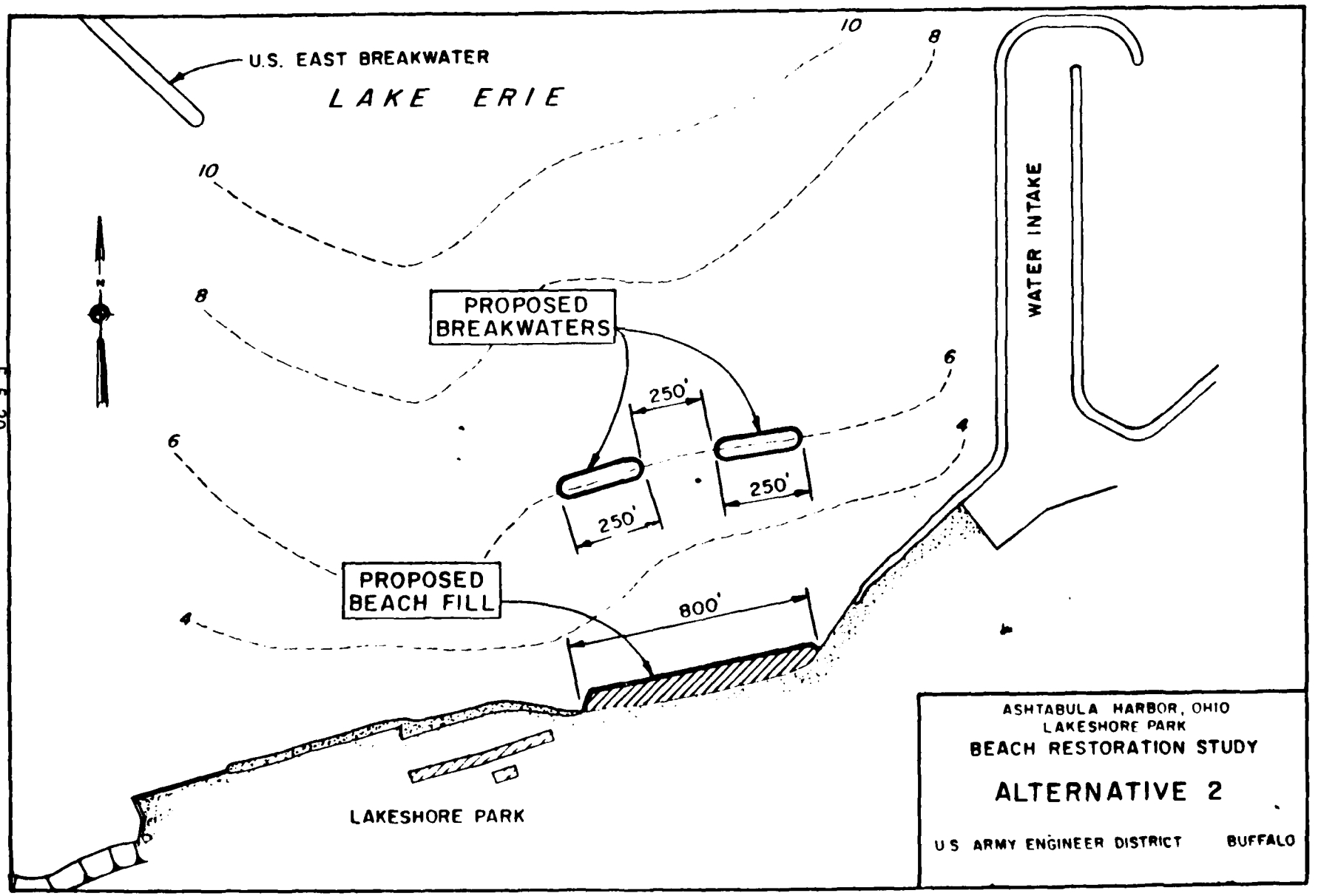
PLAN VIEW 1" = 400'

LAKE SHORE PARK
ASHTABULA OHIO

EXISTING FACILITIES

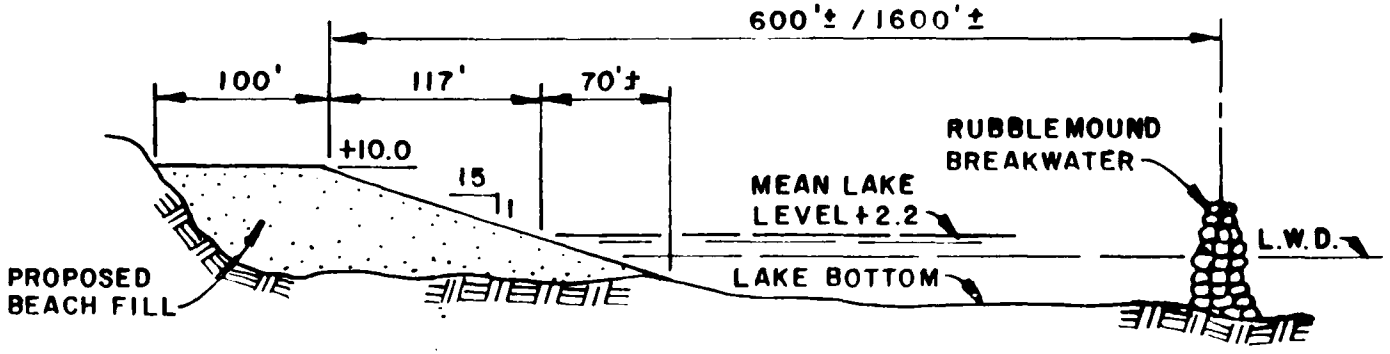
Plate 2


LAKE ERIE
10
8
10
8
6
6
4
4
WATER INTAKE
PROPOSED SMALL BOAT HARBOR
PARK BOUNDARY
EXISTING GRAVEL BEACH
BLUFF LINE
PARK PAVILION
EXISTING STONE REVETMENT
E-5.19
PLATE 3
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
BASE MAP
1" = 400'
U S ARMY ENGINEER DISTRICT, BUFFALO


U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
PROPOSED BREAKWATERS
250'
250'
250'
PROPOSED BEACH FILL
800'
WATER INTAKE
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 2
U S ARMY ENGINEER DISTRICT BUFFALO

E-5.20

PLATE 4



BEACH PROFILE A-A

(USED IN AREA OF EXISTING BEACH)
NOT TO SCALE

NOTE:

MEAN LAKE LEVEL BETWEEN 1900 THRU 1978 IN MONTHS OF JUNE, JULY, AUGUST AND SEPTEMBER WAS +2.2'

SOURCE: "MONTHLY BULLETIN OF LAKE LEVELS FOR THE GREAT LAKES"

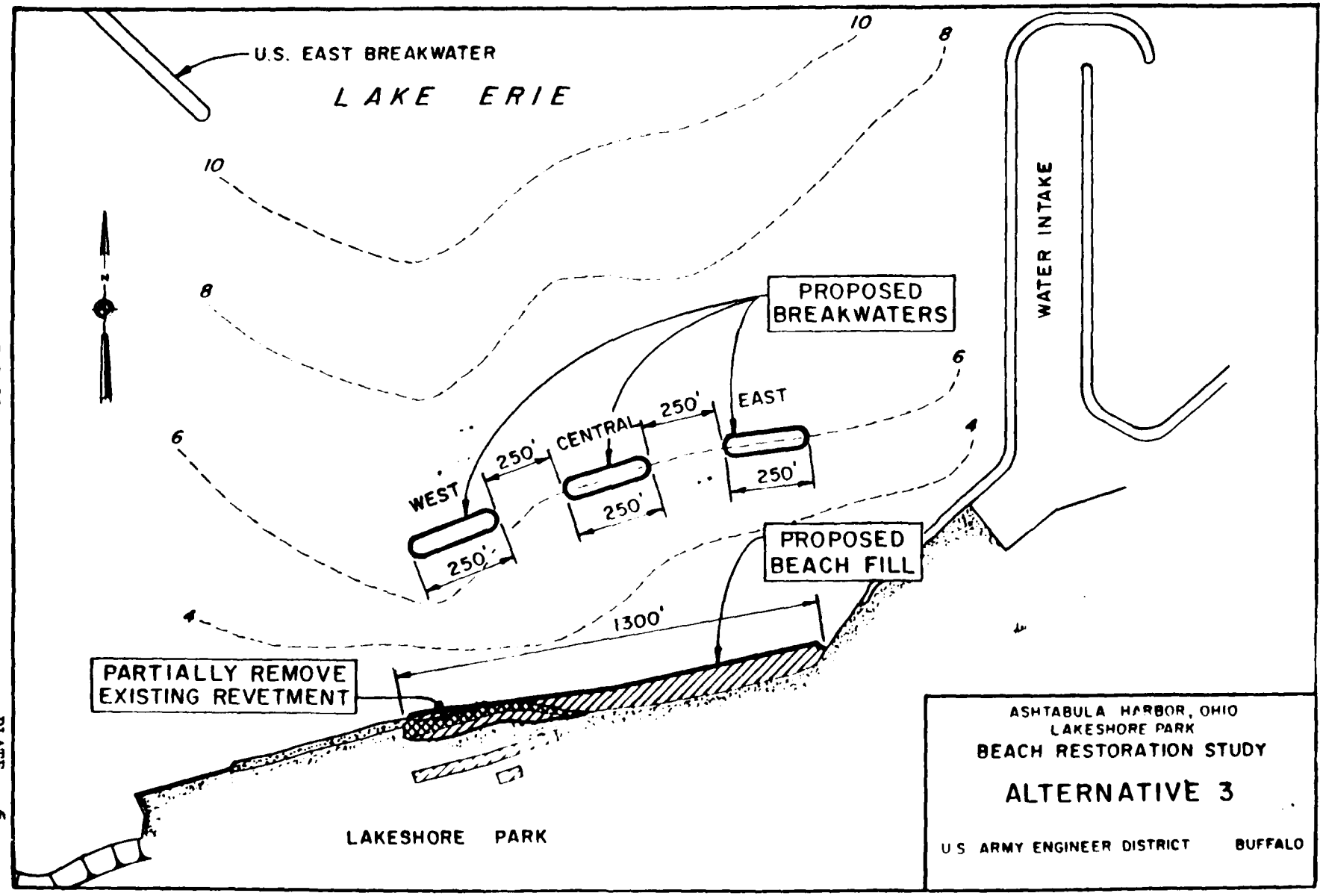
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

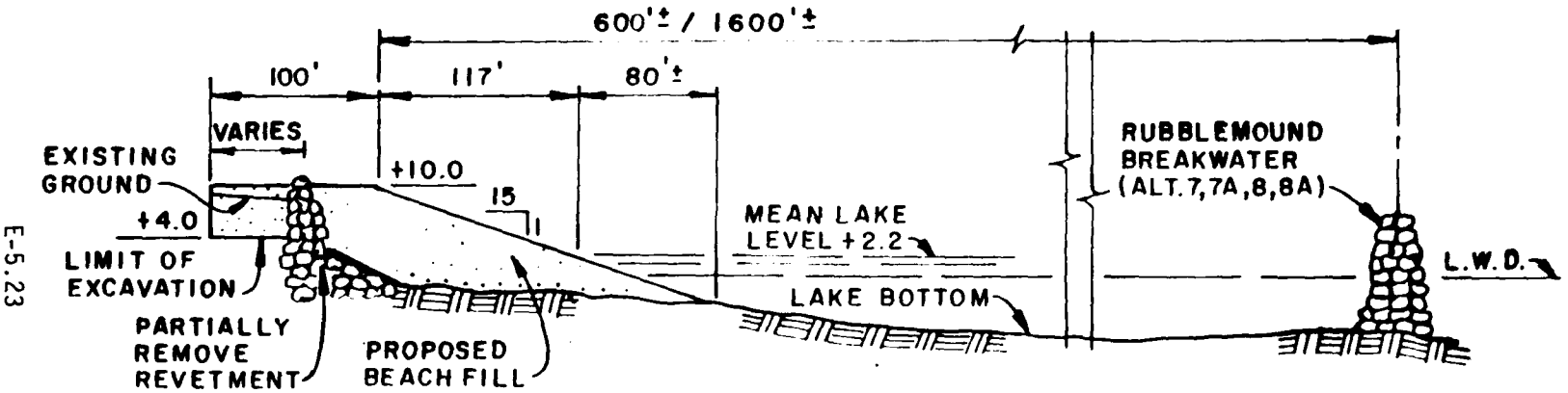
BEACH PROFILE A-A

U. S. ARMY ENGINEER DISTRICT, BUFFALO

E-5.21

PLATE 5


U.S. EAST BREAKWATER
LAKE ERIE
10
8
6
4
WATER INTAKE
PROPOSED BREAKWATERS
WEST
CENTRAL
EAST
250'
250'
250'
250'
250'
PROPOSED BEACH FILL
1300'
PARTIALLY REMOVE EXISTING REVETMENT
LAKESHORE PARK
E-5.22
PLATE 6
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 3
U S ARMY ENGINEER DISTRICT BUFFALO



BEACH PROFILE B-B

(USED IN AREA OF EXISTING STONE REVETMENT)

NOT TO SCALE

E-5.23

NOTE:

MEAN LAKE LEVEL BETWEEN 1900 THRU 1978 IN MONTHS OF JUNE, JULY, AUGUST AND SEPTEMBER WAS +2.2'.

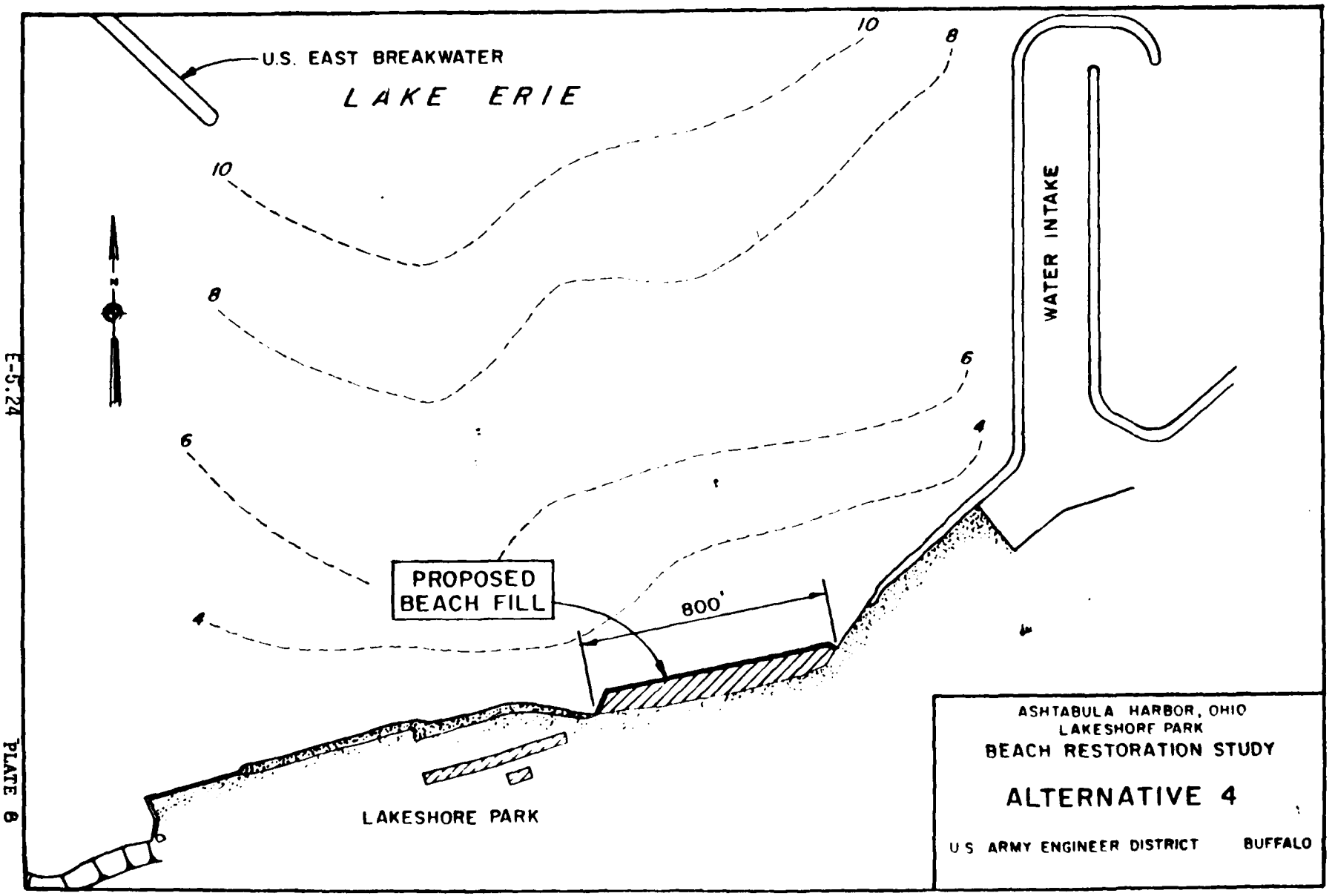
SOURCE: "MONTHLY BULLETIN OF LAKE LEVELS FOR THE GREAT LAKES"

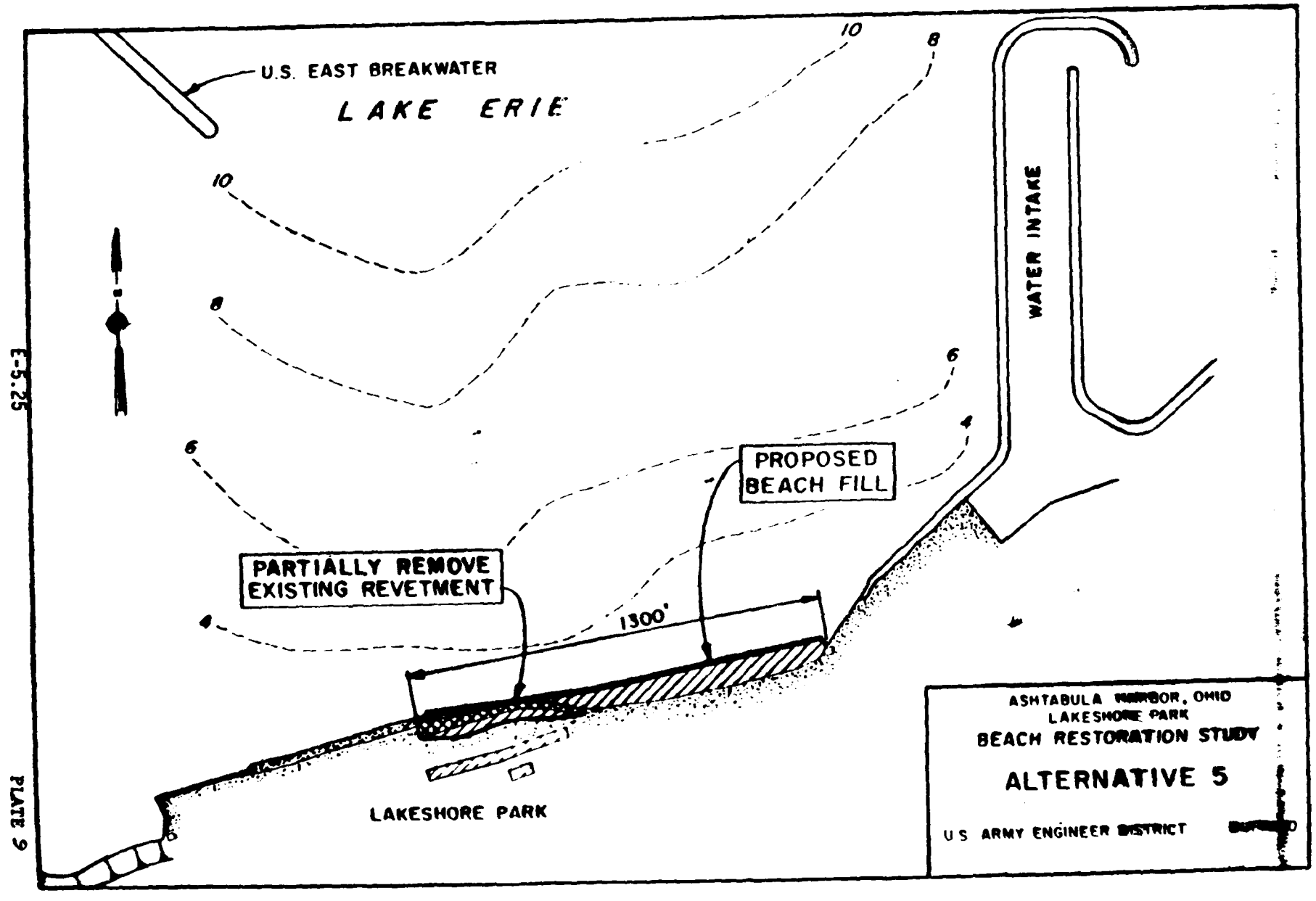
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

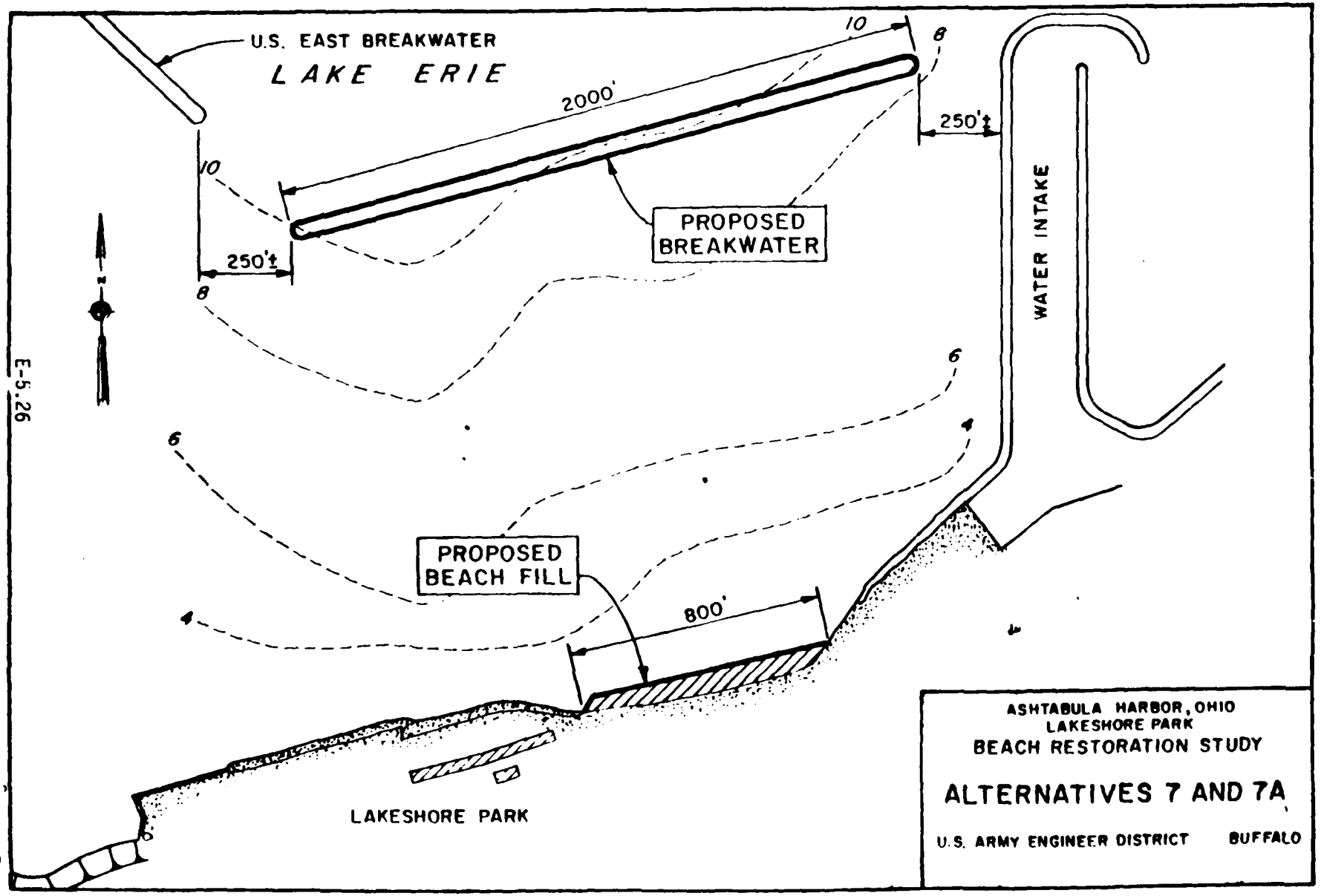
BEACH PROFILE B-B

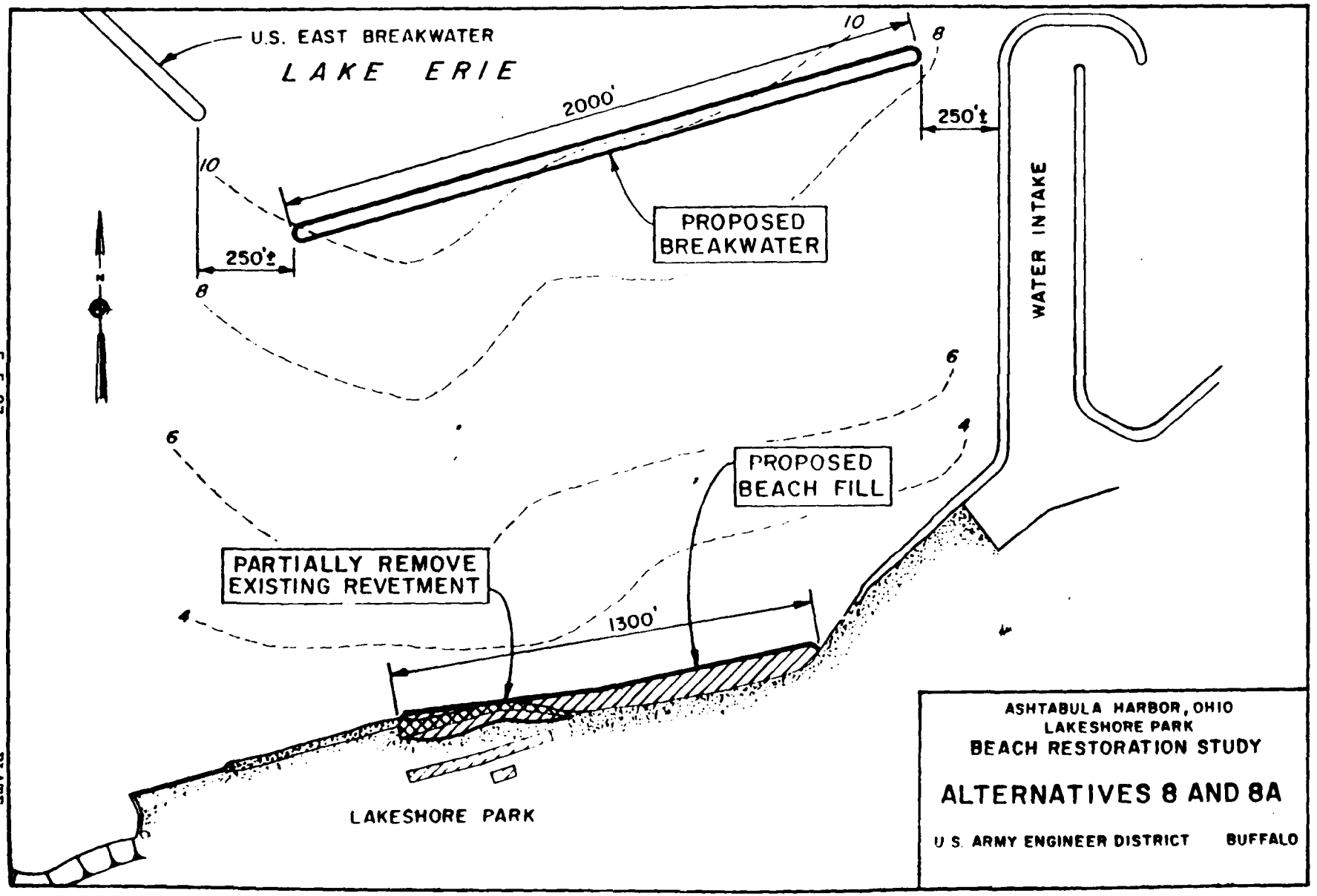
U.S. ARMY ENGINEER DISTRICT, BUFFALO

Page 7


U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
4
WATER INTAKE
PROPOSED
BEACH FILL
800'
LAKESHORE PARK
E-5.24
PLATE 8
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 4
U S ARMY ENGINEER DISTRICT BUFFALO


U.S. EAST BREAKWATER
LAKE ERIE
10
8
10
8
6
6
4
4
WATER INTAKE
PROPOSED
BEACH FILL
PARTIALLY REMOVE
EXISTING REVETMENT
1300'
LAKESHORE PARK
E-5,25
PLATE 9
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVE 5
U S ARMY ENGINEER DISTRICT


U.S. EAST BREAKWATER
LAKE ERIE
2000'
10
8
250'±
PROPOSED BREAKWATER
WATER INTAKE
6
PROPOSED BEACH FILL
800'
LAKESHORE PARK
E-5.26
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVES 7 AND 7A
U.S. ARMY ENGINEER DISTRICT BUFFALO


U.S. EAST BREAKWATER
LAKE ERIE
10
8
2000'
250'±
10
PROPOSED BREAKWATER
250'±
8
WATER INTAKE
6
6
PROPOSED BEACH FILL
PARTIALLY REMOVE EXISTING REVETMENT
1300'
4
LAKESHORE PARK
E-5.27
PLATE 11
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
ALTERNATIVES 8 AND 8A
U.S. ARMY ENGINEER DISTRICT BUFFALO

COST COMPARISON OF ALTERNATIVES

The tables on the following pages summarize the cost data for the 10 alternatives. Table 1 displays the total project costs and how they are allocated between the Federal and non-Federal interests. The total project costs include planning costs, construction costs and the present worth of the first five years of annual nourishment. Annual beach nourishment costs and annual maintenance costs are shown on Tables 2 and 3, respectively. Table 4 shows the average annual cost of each alternative as calculated for a 50-year project life at 6-7/8 percent interest rate, and in Table 5 average annual costs are compared to average annual benefits.

Table 1 Total Project Costs

Alternative	Total Project Costs[1]			
	U.S. Army Corps of Engineers[3]	U.S. Coast Guard[4]	Non-Federal (Other)	Total[2]
	$	$	$	$
Alternative 1	0[5]	0	0	0
Alternative 2	1,033,360	30,000	603,440	1,666,800
Alternative 3	1,054,185	30,000	1,351,515	2,435,700
Alternative 4	1,049,720	0	515,210	1,564,930
Alternative 5	1,080,170	0	1,193,200	2,273,370
Alternative 6	N/A	N/A	N/A	N/A
Alternative 7	1,037,700	30,000	3,741,750	4,809,450
Alternative 7A	1,028,060	30,000	5,916,100	6,974,160
Alternative 8	1,061,100	30,000	4,302,900	5,394,000
Alternative 8A	1,045,490	30,000	6,376,270	7,451,760

1/ May 1979 price levels.

2/ Includes present worth of five years of annual beach nourishment which is considered a construction cost - interest rate 6-7/8 percent.

3/ Corps share is 70 percent of project cost with a limit of $1,000,000. Figures over $1,000,000 represent costs associated with a Section III mitigation report dated 9 December 1975 (revised).

4/ Cost for navigation aids on breakwaters.

5/ U.S. Army Corps of Engineers would be responsible for all planning costs incurred prior to selection of this alternative.

Table 2 Annual Beach Nourishment

Alternative	Annual Beach Nourishment[1/]		
	Estimated Loss Rate	Quantity	Cost
			$
Alternative 1	N/A	N/A	N/A
Alternative 2	10 Percent	7,100 cy	55,130
Alternative 3	10 Percent	10,830 cy	84,030
Alternative 4	25 Percent	18,000 cy	139,750
Alternative 5	25 Percent	27,100 cy	210,350
Alternative 6	N/A	N/A	N/A
Alternative 7	14 Percent	10,000 cy	77,650
Alternative 7A	5 Percent	3,600 cy	27,750
Alternative 8	14 Percent	15,200 cy	117,650
Alternative 8A	5 Percent	5,400 cy	41,750

1/ Based on a Section III mitigation report dated 9 December 1975 (revised), 4.7 percent of annual nourishments cost for an 800-foot beach and 5.0 percent for a 1,300-foot beach will be replaced at 100 percent Federal expense.

Table 3 Annual Maintenance Costs

Alternative	Annual Maintenance Costs[1/]		
	U.S. Coast Guard	Non-Federal	Total
	$	$	$
Alternative 1	N/A	N/A	N/A
Alternative 2	2,000	1,070	3,070
Alternative 3	2,000	1,570	3,570
Alternative 4	0	200	200
Alternative 5	0	200	200
Alternative 6	N/A	N/A	N/A
Alternative 7	2,000	7,550	9,550
Alternative 7A	2,000	12,450	14,450
Alternative 8	2,000	7,550	9,550
Alternative 8A	2,000	12,450	14,450

1/ Includes maintenance costs on breakwaters, aids to navigation, and access road. The cost for annual beach nourishment is not included in these figures.

Table 4 Average Annual Costs

Item	Alternatives									
	1	2	3	4	5	6	7	7A	8	8A
	$	$	$	$	$		$	$	$	$
First Cost[1/]	0	1,210,000	1,860,000	760,000	1,178,000	N/A	4,260,000	6,630,000	4,680,000	7,050,000
Annual Costs										
Amortization of First Cost[2/]	0	86,297	132,655	54,203	84,015	N/A	303,823	472,852	333,778	502,806
Annual Beach Nourishment	0	55,130	84,030	139,750	210,350	N/A	77,650	27,750	117,650	41,750
Annual Maintenance	0	3,070	3,570	200	200	N/A	9,550	14,450	9,550	14,450
Avg. Annual Cost[3/]	0	144,497	220,255	194,153	294,565	N/A	391,023	515,052	460,978	559,006

1/ Includes initial construction, engineering and design, and supervision and administration. Does not include any annual beach nourishment costs.

2/ 6-7/8 percent interest rate, 50 year project life (amortization factor - 0.07132).

3/ With Federal limitation of $1,000,000 plus apportionment of impact of existing Federal structures in Ashtabula Harbor, the apportionment of annual costs will vary from year to year.

Table 5 Benefit-Cost Analysis

Item	Alternatives									
	1	2	3	4	5	6	7	7A	8	8A
Average Annual Benefits	$0	$270,236	$273,210	$270,236	$273,210	N/A	$270,236	$270,236	$273,210	$27
Average Annual Costs	$0	$144,497	$220,255	$194,153	$294,565	N/A	$391,023	$515,052	$460,978	$559,006
Net Benefits	$0	$125,739	$52,955	$76,083	$-21,355	N/A	$-120,787	$-244,816	$-187,768	$-285,796
Benefit/Cost	0	1.87	1.24	1.39	0.93	N/A	0.69	0.52	0.59	0.49

1/ Average annual benefits include benefits associated with swimming ($1.93 user day value and 75 square feet minimum beach area per person) and prevention of erosion to the park bluffs. They do not include benefits for a proposed small-boat harbor.

STUDY RESULTS

Each plan was evaluated to determine if it met the planning goals and objectives of this study. Alternative 2 was selected as the National Economic Development (NED) Plan because it maximized net benefits. Alternative 4 was identified as being least damaging to the environment, however, implementation of any of the alternatives would not significantly affect the environment.

STUDY RECOMMENDATION

The Buffalo District recommends that:

a. Alternatives 1, 2, and 3 be carried to final design.

b. No further studies of the other alternatives be initiated.

These recommendations were predicated on input provided by various State and local officials during a meeting in Ashtabula on 26 June 1979.

FUTURE ACTIONS

After this public meeting, the Buffalo District will begin final design studies on the two recommended alternatives. The final selection of the recommended alternative will be determined from the results of these final design studies and will be closely coordinated with the appropriate State and local officials. A report on these final design studies will then be sent to Division Headquarters in Chicago for their approval, and then to the Office of the Chief of Engineers (OCE) for approval. With OCE project approval, the Buffalo District can then begin preparation of project plans and specifications, which will lead to project construction. The current schedule indicates that the Lake Shore Park Project can be constructed in 1981.

CORPS OF ENGINEERS

THE STAR BEACON
ASHTABULA, O.
E.M. • CIRC. 18,700

BUFFALO DISTRICT

An a[illegible] for a loss?

JAN-16-80

Marina site pros, cons aired

By STEVE ORAVECZ
Staff Reporter

There were few surprises as about 40 people turned out for a public meeting on the $4 million, 300-boat Walnut Beach marina proposed by the Ashtabula City Port Authority.

Both opponents and supporters stuck to positions established when the marina question surfaced last November.

The opposition essentially cited environmental reasons for rejecting the Walnut Beach site in favor of Lake Shore Park. Jim Bissell of the Cleveland Museum of Natural History said a marina and a natural area could not exist together.

Bissell said the rare plant and animal life along Walnut Beach from the pond past the swimming area are of statewide significance. He said the area could attract Clevelanders who would otherwise drive passed Ashtabula on their way to Presque Isle State Park in Pennsylvania.

Harbor area resident Charles Lyon claimed sand desposited by Lake Erie would cost as much as $4 million to remove. He said the U.S. Army Corps of Engineers told him they did not plan to do the dredging.

Port Authority President Joseph DelPriore said any one of the reasons against Walnut Beach could stop the project along the line. But he said the Port Authority merely wanted the opportunity to see if the various objections to the site could be overcome before rejecting Walnut Beach.

DelPriore said the Port Authority would do anything it could to support another marina at Lake Shore Park. Estimated demand for a marina in the Ashtabula area would make both projects viable, he said.

Opponents do not oppose construction of a marina, but they do want another site. The proposed location is just inside the west breakwall and would not infringe on the swimming area, DelPriore said.

Discussion was mostly calm, although tempers occasionally got close to the surface.

The tone of the meeting was established when Port Authority President Joseph DelPriore began by calling on those present to avoid confrontation. While everyone got a chance to speak, the Port Authority was clearly in control.

City recreation director Donald Bento cut across the established positions. Neither supporting nor opposing the proposed marina, he asked for a solution which would save the Walnut Beach area.

"Will we have to destroy it to save it?" he said, paraphrasing an American officer in Vietnam who was refering to a village that had just been flattened.

"No one wants to put money in down there. The state doesn't want to put money down there." Bento said the $90,000 grant the city received to upgrade the whole area was "a drop in the bucket."

Bento said the nature area at Walnut Beach has deteriorated rapidly since 1938. He said the area was worth saving but, "I'm wondering what to do to save the area."

Bento called the marina a good solution compared to further industrial use of the area. He challenged marina opponents to develop a better way of preserving the area.

Ward 1 Councilman Larry Anderson suggested the Port Authority pursue a marina at the western edge of Lake Shore Park. While the point was disputed, Anderson said that land is inside city limits and would allow the authority to at least share revenues with the Ashtabula Township Park board which runs Lake Shore Park.

One reason the authority chose Walnut Beach is the fact that site was within its jurisdiction. DelPriore said revenue from a marina in township territor would not benefit the city.

DelPriore said the reason the authority began the marina project was to help the city. He said it would generate $500,000 annually in the local economy.

City Manager Clifford McClure defended the Walnut Beach site or economic grounds. He said the Fifth Street lift bridge would eventually be replaced by a high level bridge rerouting traffic away from the harbor area.

If that happens, McClure said, "You can tell the harbor merchants to fold up" unless there is another attraction like the marina to draw people.

"It's the same old story. When someone thinks of doing something (in Ashtabula) someone thinks why it shouldn't be done."

"If it (the marina) is no good let's scrap it, but let's look at it," McClure said.

CORPS OF ENGINEERS

The Gazette
Ashtabula, Co.
Jefferson, Ohio
Jan 31 - 80

BUFFALO DISTRICT

Lakeshore Park work slated

ASHTABULA — Work is scheduled to begin this spring on a comprehensive recreation development plan for Lakeshore Park.

The Ashtabula County Board of Commissioners and the Ashtabula Township Park Commission last Thursday unveiled their plan to modernize and upgrade the 50-acre park over the next 12 years.

A $45,000 program to construct additional seawall protection and boat launching facilities will begin this spring and may be completed by the summer, thanks to an Ohio Department of Energy grant for $36,000. The parks commission is providing $4,500 in funding and the county an equal amount in services.

The Coastal Energy Impact Program, a program of the Office of Coastal Zone Management, U.S. Department of Commerce, supplied monies for the state grant.

"The development of Lakeshore Park has been a long time overdue," said Homer Nevel, park commission vice president. "This plan is a big step in the redevelopment of one of the most unique parks along Lake Erie."

Hugh Thomas, assistant county administrator and co-author of the Lakeshore Park Recreation Plan, said this will be the first major alteration in the park since it was designed in 1914.

"It's an ambitious project," Thomas said. "There have been some changes over the years, but nothing this big."

The first step calls for constructing an additional boat ramp (there are presently two "substandard" ramps, according to Thomas) and expanding the ramp parking area to accomodate 58 vehicles. Additional seawalls will also be built to prevent waves from washing over portions of the ramp and parking area.

Thomas added that the Army Corps of Engineers is working on a design for an 800-square foot beach area on the east side of the park. That project will probably not begin for "a couple of years," Thomas said, and is expected to cost over a million dollars

"These extimates aren't conservative. This is what these programs will cost," he said. "What we want is to get the most recreational benefit for the greatest number of people."

Additional funds and services for the current project were provided by Woodruff Inc., consulting engineers, and the county planning commission. Cooperation was also given by the Ashtabula Marine Advisory Board, the Ohio Department of Natural Resources and the U.S. Coast Guard.

J. Zorich

The Ashtabula Township Park Commission
EAST FIRST AND MANOLA AVENUE
Ashtabula, Ohio 44004
Please make reply to

February 27, 1980

George P. Johnson
Colonel Corps of Engineers
Engineer District
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Johnson:

Please consider this correspondence as a letter of intent from the Ashtabula Township Park Commission for the items of local cooperation for the proposed Lakeshore Park, Ohio (Section 103, Beach Erosion and Shoreline Protection Project.)

The Ashtabula Township Park Commission agrees to the following items of local cooperation:

A) Contribute in cash, in-kind services, or materials the local share of project construction costs as agreed to by the Army Corps of Engineers and the Township Park Commission.

B) Provide without cost to the United States all necessary lands, assessments, and rights-of-way.

C) Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance of the project. (This does not include damages due to the fault or negligence of the United States or its Contractors. Section 9 of PL93-251.)

D) Assure to the best of its ability that water pollution that would effect the health of bathers will not be permitted.

E) Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based during the economic life of the project.

F) Assure maintenance and repair, and local share of periodic beach nourishment where applicable, during the useful life of the works as required to serve the projects intended purpose.

G) Provide and maintain necessary public access roads, parking areas, and other public use facilities open and available to all on equal terms.

The Ashtabula Township Park Commission, after reviewing the minutes of the various workshops and public hearings and the Stage Two Report for the Section 103 Project at Lakeshore Park, has determined that it would be in the best interests of the park to eliminate Alternative Three at this time in the final design stages.

The development of the Lakeshore Park Recreation Plan has made it evident that the larger beach of Alternative Three would require too much off-street parking to be conveniently handled within Lakeshore Park and still maintain its original design criteria.

If you have any questions concerning the items of local cooperation as we expressed above or the recreation plan for Lakeshore Park, please contact us or Mr. Hugh Thomas at the Ashtabula County Commissioners Office, (216)576-2040, Extension 221.

Sincerely,
Ashtabula Township Park Commission

Richard Charles, President

Homer Nevel, Vice President

The Ashtabula Township Park Commission

EAST FIRST AND MANOLA AVENUE

Ashtabula, Ohio 44004

Please make reply to .....

February 27, 1980

Dear Mr. Cadet:

We have enclosed with this letter a copy of the Lakeshore Park Recreation Plan for your review and for visual reference to this correspondence.

The Ashtabula Township Park Commission has received excellent cooperation from the various federal, state, and county officials and agencies involved in developing this plan. We have also had considerable support from local interest groups and the general public. The Park Commission, however, does not want to sit on this plan. We fully intend to implement the activities suggested in the report as best and as soon as we can.

Your personal assistance is vitally needed to make this project a success. The programs relating to the plan are ambitious and expensive. The hard work and expense will be worthwhile when the redevelopment projects are integrated into the Lakeshore Park comprehensive recreation program.

Sincerely,

ASHTABULA TOWNSHIP PARK COMMISSION

Richard Charles

Richard Charles, President

Homer Nevel

Homer Nevel, Vice President

2 Copies

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
P.O. BOX 5000 • CLEVELAND, OHIO 44101 • TELEPHONE (216) 622-9800 • ILLUMINATING BLDG. • 55 PUBLIC SQUARE
Serving The Best Location in the Nation

REGULATORY FUNCTIONS
RECEIVED
1980 APR 29 AM 9:50
BUFFALO DISTRICT

April 23, 1980

Mr. David Heicher
U. S. Army Corps of Engineers
Buffalo District
1776 Magara Street
Buffalo, New York 14207

Dear Mr. Heicher:

Attached are the sediment grain-size analyses for the four (4) intake channel location shown on the attached map. As requested, the samples were collected using a Ponar dredge.

If you have any further questions, please contact Holland D. Abilay at (216) 622-9800, Extension 3243.

Very truly yours,
CLEVELAND ELECTRIC ILLUMINATING CO.

By: J. P. Fitzgerald
J. P. Fitzgerald, Manager
Plant and Substation Engineering Dept.

JPF/HDA:ms

Attachments

cc: H. D. Abilay
N. D. Flack
D. H. Hauser
A. J. Kennedy

Corps of Engineers

CLEVELAND PRESS
CLEVELAND, OHIO
APRIL 29, 1980

Buffalo District

Authority joins group in marina searc

By JOE KOVACH
Staff Reporter

The Ashtabula Port Authority decided Monday to join the Lake Shore Marine Advisory Board in seeking a local marina.

Authority secretary Charles Sheppard said the action resulted from reports that state funding will only be provided for one marina site in the area.

The resolution passed made no mention of any specific marina site.

The port authority had recommended a Walnut Beach site for a 300-boat marina, which was opposed by a number of local residents fearing environmental damage to the park.

The advisory board, made up of local boaters and officials, had recommended a marina be built at Lake Shore Park.

The resolution also contains the conditions that the search for the marina site be funded and carried out jointly, with no definite site specified until the final report, according to Sheppard.

The authority also voted Monday to support the city's 1.2 percent income tax renewal and .3 percent increase, which will be on the June ballot.

The authority continued efforts to keep a water quality monitor in the Ashtabula River. The monitor is scheduled to be removed, as federal and state funding will run out shortly.

Sheppard said letters will be sent to State Rep. Robert Boggs (D-97) and State Senator Marcus Roberto (D-18), "drawing their attention to the fact that in the state of Ohio, there are 32 monitors at present in place and that only three are to be removed (including Ashtabula's).

"The reason we think it's very important is because of the Fields Brook problem and the possible radiation problem from the plants on the east side," Sheppard said.

ODNR
Ohio Department of Natural Resources
Fountain Square · Columbus, Ohio 43224 · (614) 466-3770

May 2, 1980

Lt. Col. Thomas R. Braun
Deputy District Engineer
Buffalo District- Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Braun:

This department initiated and has continued to support a beach erosion control shoreline protection project at Lakeshore Park. We concur with the proposed plan to construct a three-breakwater system and an 800 foot long reach of sand beachfill.

The project has no conflicts with any other plans, policies or controls of the Ohio Department of Natural Resources.

Sincerely,

Robert W. Teater

ROBERT W. TEATER
Director

RWT:bm
cc: James A. Swartzmiller

OhioEPA

May 7, 1980

Mr. L. H. Hair, P.E., Chief
Construction-Operations Division
Department of the Army
Buffalo Distrrict, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Re: 79-471-3

Dear Mr. Hair:

This letter is in response to your 1 May 1980 request for final comments on the Cleveland Electric Illuminating Company's Department of the Army permit application. CEI has applied for a permit to perform dredging at Ashtabula, Ohio and to dispose of the sediments in the open waters of Lake Erie.

The recent sediment grain size analysis has been reviewed. Due to the large percentage of silt and clay particles in the sediment, this Agency would not consider this material suitable for beach nourishment.

Section 401 Water Quality Certification will be issued allowing the applicant to dispose of the dredged material in the open waters of Lake Erie.

Sincerely,

John H. Albrecht
Dredge and Fill Coordinator
DIVISION OF SURVEILLLANCE AND STANDARDS

JHA:sam

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF

May 14, 1980

District Engineer
Buffalo District, Corps of Engineers
Department of the Army
1776 Niagara Street
Buffalo, New York 14207

Attention: Regulatory Functions Branch

Dear Sir:

This letter is in response to your request for comments regarding activities proposed by the Cleveland Electric Illuminating Company, under Public Notice #79-471-3, dated December 6, 1979.

We have no objection to the open lake disposal of the dredged material. It appears, however, that the dredged material is predominately silt and finer textured materials and is not suitable for beach nourishment.

We also recommend that the applicant be required to comply with the attached comments, as indicated.

If you should have any questions concerning this letter, please contact Mr. Gordon Garcia, of my staff, at 312/886-6692.

Sincerely yours,

Elmer D. Shannon

Elmer D. Shannon, Chief
Wetlands, Dredge & Fill Staff
Office of Environmental Review

cc: Ohio Department of Natural Resources
Ohio EPA
U.S. Fish and Wildlife Service, Columbus, OH

TO: Eber L. Wright, Ashtabula County Planning Commission Executive Director

FROM: Hugh L. Thomas, Ashtabula County Deputy Administrator

DATE: May 14, 1980

SUBJECT: Lakeshore Park Beach Draft Environmental Impact Statement

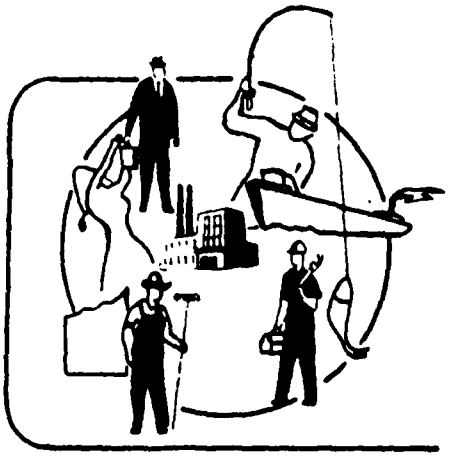
Dear Eber:

In response to your request, I am forwarding a review and comment of the Army Corps of Engineer's questions concerning the conformity of the proposed beach restoration and erosion control with any existing goals, objectives, plans, and policies of the County.

This project is specifically mentioned in the Lakeshore Park Recreation Plan prepared by the Ashtabula County Planning Commission in 1979. The Corp's proposed project is consistant with that plan's goals of increasing coastal water-oriented recreation opportunity and decreasing erosion of land.

The beach project, as far as I can ascertain from my research, will not require a zoning permit since no change of land use will result. Furthermore, there seems to be no adverse effects on any surrounding property owners. The Cleveland Electric Illuminating Company is the property owner to the east of the beach area. C.E.I. has been notified by the Corps and has received copies of the park's recreation plan. C.E.I. has voiced no objectives to the beach proposal. No other objections to the recreation plan have been received by interested governmental units including: Ohio Department of Energy, Ohio Department of Natural Resources, E.D.A.T.A., Ashtabula City, and Ashtabula Township.

The project is also consistant with the County Overall Economic Development Program's goal of developing and maximizing the useage of the County's natural resources. The erosion control aspect of the proposal should implement an objective of both the County Planning Commission and the Ohio Coastal Zone Management Program.



COUNTY OF ASHTABULA

County Planning Commission

Executive Director Eber L Wright

ASHTABULA COUNTY OFFICE BUILDING, JEFFERSON, OHIO 44047

Telephone 576-2040

May 19, 1980

Mr. Thomas Braun
Lt. Col., Deputy District Engineer
Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara St.
Buffalo, NY 14207

Dear Mr. Braun:

The Ashtabula County Planning Commission at its regular meeting on May 15, 1980, moved and seconded to support the proposed plan involving the construction of a three-breakwater system, each 150 feet long with 250 foot gaps that will protect an 800 feet long reach of beachfill at Lakeshore Park.

The project is consistant with all Ashtabula County planning policies (see enclosed review by Hugh L. Thomas, County Deputy Administrator).

If we can be of further assistance, please contact us.

Sincerely,

Eber L. Wright

Eber L. Wright
Executive Director

Enc.

ELW/kb

246 N. High Street
Post Office Box 118
Columbus, Ohio 43216

Telephone (614) 466-3543
If no answer (614) 466-8686

JAMES A. RHODES
Governor

JOHN H. ACKERMAN, M.D., M.P.H.
Director of Health

June 4, 1980

Mr. Bill Butler
Buffalo District
Corps of Engineers
1776 Niagra Street
Buffalo, New York 14207

Dear Mr. Butler:

The Ohio Department of Health has been conducting a beach water quality monitoring program which includes Lake Shore Park for a number of years. This program is mentioned in your "Summary of Environmental Conditions at Lakeshore Park, Ashtabula, Ohio".

My comments on Lake Shore beach are essentially the same as those already expressed. Lake Shore does not show any great pollution hazard although there are occasional high counts of bacteria normally due to rainfall.

Some additional information regarding the beach that may help your determinations involve the level of response Lake Shore Park gets from the health department based upon water quality monitoring. The Ashtabula County Health Department has always taken an interest in water quality data from beaches in the district and has used the information to implement sewage nuisance abatement programs.

Their involvement plus the E.P.A. sponsored sewage treatment improvements have had major impact upon improving water quality in the Ashtabula County area.

I would anticipate that our monitoring program will continue to show improvement in years to come and I certainly hope that the corps can move forward with the park improvements that are proposed.

Please contact me if you have any further questions on this project as I would be happy to help you expedite it.

Sincerely,

Timothy Horgan
Sanitarian in Charge
Recreation Sanitation Unit
Division of Personal
Environmental Health Services

TH/by

PUBLIC HEALTH COUNCIL
Joseph C. Lestini, R.Ph., Chairman Mary A. Agna, M.D., Vice Chairman William Dorner, Jr., M.D.
J. Bruce Wenger, D.V.M. Richard V. Brunner, D.D.S. Bryan A. Rogers, M.H.A. Robert L. Turton, D.O.

bb/2276

NCBED-PW

12 June 1980

Richard Charles, President
Ashtabula Township Park Commission
East First & Manola Avenue
Ashtabula OH 44004

Dear Mr. Charles:

The purpose of this letter is to inform the Commission that the Buffalo District, after reviewing letters received from the Ohio Environmental Protection Agency and the U.S. Environmental Protection Agency (see Inclosures 1 & 2) decided that the material to be dredged from the Cleveland Electric Illuminating Company intake channel is unsuitable for use as beach material for the Lakeshore Park Project. Therefore, we have cancelled the core sampling program that was designed to determine the suitability of that material for beachfill.

We regret that we cannot offer any further cooperation in this respect but are looking forward to meeting our proposed goals of increasing coastal water-oriented recreation opportunity and decreasing shore erosion at Lakeshore Park in Ashtabula Township.

If you have any questions or comments, please contact Mr. Wiener Cadet of my staff at 716-876-5454, ext. 2276.

Sincerely,

2 Incl
as stated

DONALD M. LIDDELL
Chief, Engineering Division

CF:
NCBED-PW
NCBED-D
NCBED-DF

Cadet _____
Zorich _____
Gilbert _____
Hallock/
Liddell _____

COUNTY of ASHTABULA

Board of County Commissioners

Peter A. Iarocci
Alfred W. Mackey
Harold Christian
Betty Johns - Administrator/Clerk

25 West Jefferson Street
JEFFERSON, OHIO 44047
216 / 576-2040

July 20, 1981

U. S. Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Attn: Weiner Cadet

Dear Weiner:

Enclosed please find my estimate of the values of the facilities at Lake Shore Park in Ashtabula Township. The basis of most of these cost estimates are my own inspection of the facilities, research as to when the facility was built, and developing an estimated replacement cost. Newer facilities or projects recently bid have more difinitive prices. I hope the estimates will be of value to you.

Also, I will forward the pictures of the beach useage last week. It seems that the playground project and other park improvements have affected the recent useage rate. There were at least fifty people on the beach at the time I was there. The Park Commission hopes to increase the number of people visiting the beach by making further improvements and increasing the maintenance of the area.

Sincerely,

Hugh L. Thomas

Hugh L. Thomas
Deputy Administrator

HLT/wa

Enc. (3 pgs.)

LAKE SHORE PARK RECREATION FACILITIES APPRAISAL *

Main Pavilion			
Picnic Tables (26), Swings (4), Benches (15) Utilities Parking Lot			$320,000
Concession Stand	$10,000		
Equipment	4,000		
Utilities	2,000		
Benches	500		
Parking	2,000		
			$ 18,500
Playground			
Equipment	$18,000		
Landscaping	2,000		
			$ 20,000
Boat Launching Area	$500,000		
Bait & Tackle Shop	15,000		
Rest Rooms	5,000		
			$520,000
Restrooms & Changing Area			
(Across from Main Pavilion)			$ 30,000
Sea Wall Protecting Pavilion and Parking Lots to the East and West		$500,000**	$500,000
Overlook Pavilion	$ 80,000		
Parking & Utilities & Picnic Tables (16)	21,600		
			$101,600

E-20.1

Pg 1 of 3 Pages

Tourist Camp Pavilion	$ 50,000	
Parking & Utilities &	15,000	
Picnic Tables (18)	1,800	
		$ 66,800
Kiwanis Pavilion	$ 30,000	
Picnic Tables (16)	1,600	
Parking Lot & Utilities	20,000	
		$ 51,600
Tennis Courts/Ice Skating Rink	$100,000	
Utilities	10,000	
		$110,000
Baseball Field	$ 20,000	
		$ 20,000
Ponds, Bridge, Rock Garden	$ 60,000	
Duck House	5,000	
Animal Facilities	5,000	
		$ 70,000
Trailer Camp	$200,000	
Utilities & Roads	60,000	
		$260,000
Access Roads		?
Trees and Open Space Areas		
(55 acres total)		?

Other Picnic Tables & Benches (40)		$ 4,000
Other Restroom Facilities (2 buildings)		$ 30,000
Scenic Lookout Shelter	$10,000	
Five Benches	500	
		$ 10,500
	TOTAL	$2,133,000.00

* - Replacement Values

** - Contract Prices and Associated Costs

COUNTY of ASHTABULA

Board of County Commissioners

Peter A. Iarocci
Alfred W. Mackey
Harold Christian
Betty Johns - Administrator/Clerk

25 West Jefferson Street
JEFFERSON, OHIO 44047
216 / 576-2040

July 24, 1981

Mr. Weiner Cadet
Project Manager
Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Mr. Cadet:

Enclosed please find two photographs of the beach (East and West views) and some of the recreational users at Lake Shore Park in Ashtabula Township. The pictures were taken around 1:00 p.m. on Friday, July 17, 1981. I counted approximately fifty-two (52) persons in the water and on the beach. There were an additional thirty-six children and parents on the bluff area using the playground equipment.

During the weekends, the usage increases, especially when the weather is as hot as it was in the past few weeks. The Park has experienced a good season with the pavilions booked to capacity every weekend and most evenings. A contract has been awarded to construct the boat launching facilities to the west of the main pavilion and the park is expecting next year to be its biggest boating season in its history.

Please advise me if you need additional information. The Park Commission is considering the Corps' proposal to decrease the beach size.

Sincerely,

Hugh L. Thomas

Hugh L. Thomas
Deputy Administrator

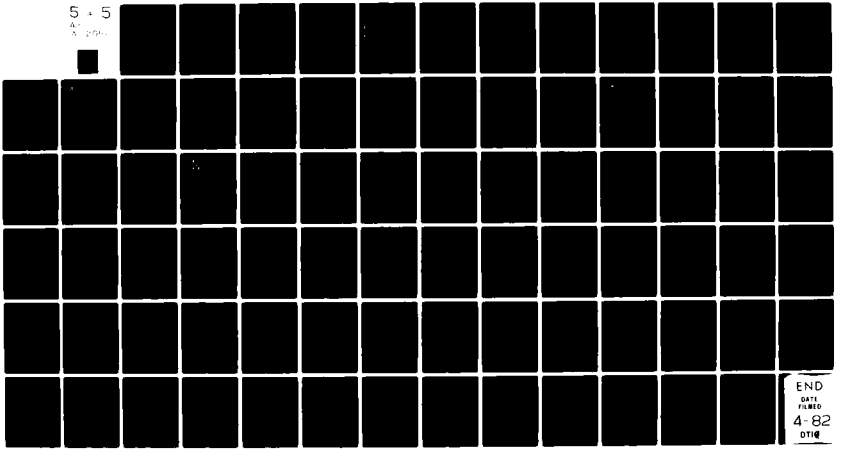
HLT/wa

Enc. (2)

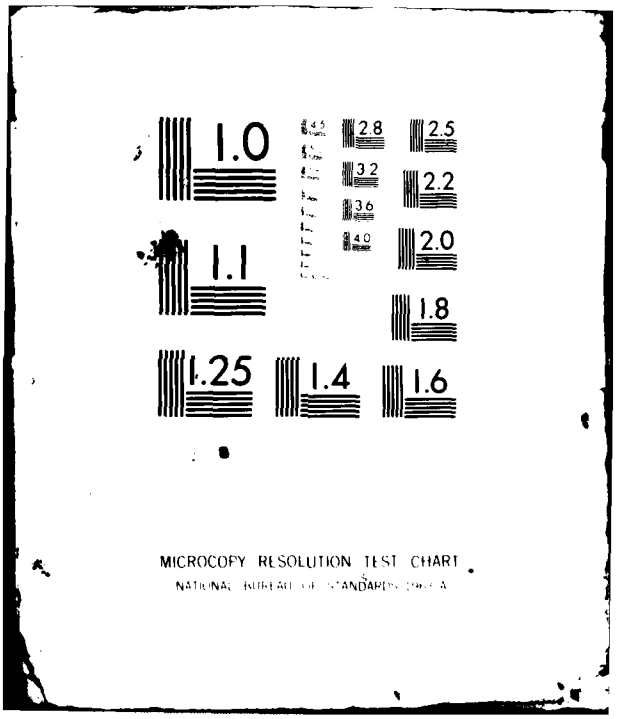
AD-A112 051 CORPS OF ENGINEERS BUFFALO NY BUFFALO DISTRICT F/G 13/2
DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT ASSESSMENT FOR--ETC(U)
FEB 82

UNCLASSIFIED NL

5 - 5



END
DATE FILMED
4-82
DTIC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

Ashtabula Township Park Commission
EAST FIRST AND MANOLA AVENUE
ASHTABULA, OHIO 44004

December 14, 1981

Mr. Weiner Cadet
Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Mr. Cadet:

The Ashtabula Township Park Commission is very interested in the initiation of the beach erosion and shoreline protection project at Lake Shore Park in 1982. We would hope to have a contract awarded by September on this project.

The Park Commission is discussing the possibility of the joint financing of the local share of this project with the Ohio Department of Natural Resources. Available funds for construction projects such as the one proposed at Lake Shore Park are at a premium. We hope that the Corps of Engineers', ODNR's and The Park Commission's combined efforts will produce a solution to the erosion problem on the east end of the park.

The Park Commission has participated with ODNR and the Ohio Department of Energy in developing a new boat launching facility with shore protection on the western end of the Park. A copy of a newspaper photograph is enclosed.

The protection of the eastern part of the Park's shoreline has been made more imperative due to the construction this summer of a new children's playground. The Park Commission and the State of Ohio have invested approximately $20,000 in material and labor on this playground project. The project was made necessary because erosion made the old playground unsafe and bluff undermining caused equipment to slip over the bank. The parking lot adjacent to the playground is showing signs of bluff deterioration at its northeast corner.

Obviously these problems must be corrected. We will be in touch with you to work out further details of this project.

Sincerely,

ASHTABULA TOWNSHIP PARK COMMISSION
Richard Charles - President

BY: Richard Charles, President

Enc.
cc: Hugh L. Thomas, Dep. Administrator
Ashtabula County Commissioners' Office

NCBPD-WS 22 January 1992

Richard Charles, President
Ashtabula Township Park Commission
East First and Manola Avenue
Ashtabula, OH 44004

Dear Mr. Charles:

The purpose of this letter is to request an updated "Letter of Intent" from the Ashtabula Township Park Commission for the required items of local cooperation for the proposed Lakeshore Park Section 103 (1962 River and Harbor Act) Beach Erosion and Shoreline Protection Project.

Because of changes in project costs and cost sharing, since your 27 February 1980 "Letter of Intent," I am requesting that the Commission provide an updated letter which agrees to the following items of local cooperation:

a. Contribute in cash, 30 percent of the project construction cost and all costs in excess of the Federal expenditure limitation of $1,000,000. Such contribution may be made in a lump sum prior to the initiation of construction or in annual installments at a rate proportionate to the scheduled apportionment of Federal funds. The final apportionment of costs will be made after actual costs have been determined.

b. Provide without cost to the United States all necessary lands, easements, rights-of-way, and relocations required for construction of the project, including that required for periodic nourishment.

c. Comply with the 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 construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

d. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance of the project; except damages due to the fault or negligence of the United States or its Contractors.

e. Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based, during the economic life of the project.

NCBPD-WB
Richard Charles, President

aw/2276

f. Assure maintenance and repair, and local share of periodic beach nourishment where applicable, during the useful life of the works as required to serve the project's intended purpose.

g. Carry out the annual beach nourishment program for the 50-year project life with the only cost to the United States being the annual reimbursement to the town of 70 percent of the town expenditure thereof, subject to availability of funds.

h. Provide and maintain necessary access roads, parking areas, the stone revetment in front of the pavilion, and other public use facilities open and available to all on equal terms.

i. Assure that water pollution from point sources in the park that would affect the health of bathers will not be permitted.

j. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 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 and the park benefitted thereby.

Please note that the requested "Letter of Intent" is not a binding commitment. It does provide an indication that the Commission has sufficient financial capabilities and does intend to sign the formal binding assurances prior to commencement of construction. That letter must include, verbatim, all local cooperation requirements set forth above and must be signed or co-signed by the Chief Legal Officer of the Ashtabula Township Park Commission.

If you have any questions on this matter, please feel free to contact me or Mr. Weiner Cadet of my staff at (716) 876-5454.

Sincerely,

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

CF:
Hugh Thomas, Deputy Administrator
Jefferson, OH 44047

James Swartzmiller, Chief
Columbus, OH 43224

Robert Lucas, Governmental Agency
Coordinator
Columbus, OH 43224

NCDRE
NCECO-CL
NCBPD-WB

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR
LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX F
ENVIRONMENTAL INFORMATION

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

SURVEILLANCE & STANDARDS
OCT 16 1980

AUG 26 1980

PUBLIC NOTICE

BEACH EROSION AND SHORELINE PROTECTION PROJECT

LAKESHORE PARK, ASHTABULA, OHIO

1. This Public Notice has been prepared and distributed to identify what dredged or fill materials will be discharged into waters of the United States by implementation of the proposed project, and to provide an opportunity for any person affected by such discharge of materials, to request a public hearing.

2. Authorization - Section 103(a) of the 1962 River and Harbor Act, as amended, authorized the Corps of Engineers to assist in the construction of works for the restoration and protection against erosion by waves and currents of the shores of the Great Lakes.

3. Reports and Recommendations - The Buffalo District will release a Draft Stage III Detailed Project Report and Draft Environmental Impact Statement in November 1980, describing two preferred plans for Lakeshore Park. These are Alternative 1 (No Federal Action); and, Alternative 2 (Modified) (consisting of a three-offshore breakwater system protecting an 800-foot reach of backfill). A public meeting concerning the information supplied in the draft reports is tentatively scheduled for December 1980 at the Kent State University auditorium in Ashtabula, OH (precise information will be released prior to the meeting taking place).

4. Based upon technical, environmental, and economic criteria, as well as significant public input, I have concluded that it is in the best public interest to recommend Alternative 2 (Modified) as the tentatively selected plan.

5. Alternative 2 (Modified) - The proposed project would provide protection to the shoreline from further erosion and provide increased swimming opportunities at the park. Three breakwaters would be constructed at the 5-foot± contour or at lake bottom elevation 561.6 (IGLD) which is approximately 500 feet offshore of the restored beach. Each breakwater would be 150 feet long with 250-foot gaps between them (Plate 1). The central breakwater would be approximately parallel to the shoreline while the eastern and western breakwaters would be at a slight angle to the shore to provide further protection for the beach during episodes of north-northwesterly or north-northeasterly wave attack. They would be of

PLANNING

rubblemound construction and consist of one layer of stone randomly placed, with an average porosity of 37 percent. A constant crest elevation of +4.5 (LWD) would be used for all the breakwaters along with a crest width of 13.0 feet.

6. The breakwaters would protect an 800-foot long reach of beachfill, located at the foot of existing clay bluffs at the eastern end of the park. The beachfill would rise to elevation 578.6. The berm would be 100 feet wide, fronted by a 1 on 12 foreshore slope as shown in profile A-A on Plate 2. A total of 52,000 cubic yards of clean sand fill would be placed along the entire reach. The loss rate offshore is estimated to be 5,200 cubic yards requiring replenishment on a yearly basis. A permanent access road to the beach from the top of the existing bluff would be built to facilitate the initial placement of the beachfill and subsequent periods of annual nourishment.

7. Preliminary evaluation (as discussed in the Section 404 Evaluation Report) concludes that the proposed construction of breakwaters and placement of beachfill would not cause unacceptable disruption to the beneficial water quality uses of the affected aquatic ecosystem.

8. This proposed project involves the discharge of fill material into waters of the United States. Therefore, the evaluation of the impact of the activity on the public interest includes application of the guidelines promulgated by the Administrator of the U. S. Environmental Protection Agency (40 CFR, part 230), under the authority of Section 404(b) of the Clean Water Act. Any person who has an interest which might be affected by the proposed discharge may request a public hearing. The request must be submitted, in writing, to the District Engineer within 30 days of the date of this notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity.

2 Incl
as stated

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

NOTICE TO POSTMASTER: It is requested that the above notice be conspicuously displayed for 30 days from the date of issuance.

SECTION 404(b) EVALUATION
BEACH EROSION AND SHORELINE PROTECTION PROJECT
LAKESHORE PARK
ASHTABULA, OHIO

Introduction - Section 404(b)(1) of the Clean Water Act (33 USC 1344) states that each disposal site for dredged or fill material to be discharged into the navigable waters of the United States shall be specified through the application of guidelines developed by the Administrator of the U. S. Environmental Protection Agency (EPA) and the Secretary of the Army. The present Section 404(b)(1) evaluation addresses the construction of offshore breakwaters and the placement of sand beachfill at Lakeshore Park, Ashtabula, OH. The purpose of the project is to eliminate shoreline erosion along 800 feet of clay bluffs and to restore a recreational beach.

1. Project Description. Section 103(a) of the 1962 River and Harbor Act authorized the U. S. Army Corps of Engineers to assist in the construction of works for the restoration and protection against erosion by waves and currents of the shores of the Great Lakes. The proposed plan involves the construction of three offshore, rubblemound breakwaters, each 150 feet long with 250-foot gaps. They would be constructed approximately 500 feet offshore and would protect an 800-foot long reach of beachfill (52,000 cubic yards) placed at the foot of an existing clay bluff. Approximately 10 percent of the beachfill would require renourishment on a yearly basis.

a. Description of the Proposed Discharge of Fill Materials.

(1) Source, Characteristics, and Quantity of Material - Under the selected plan, breakwaters would be constructed with approximately 9,200 tons of angular quarry stone obtained from a nearby commercial source. They would consist of one layer of stone randomly placed, with an average porosity of 37 percent. Each armor unit would weigh approximately 3.5-7.5 tons. Approximately 52,000 cubic yards of sand fill would be placed along an 800-foot reach of shoreline, and would consist of medium-grained, reasonably well-graded, sound, hard, durable, natural sand particles or crushed conglomerate. It would be clean and free of organics, clay, deleterious, or other foreign or objectionable material. The sand would contain no more than 20 percent flat or elongated particles. The loss rate offshore is estimated to be approximately 5,200 cubic yards per year, requiring replenishment on a yearly basis. Sand would be obtained from a nearby commercial source.

b. Description of the Proposed Discharge Site.

(1) Location and Type of Disposal Site - Lakeshore Park occupies approximately 2,500 feet of Lake Erie frontage in the township of Ashtabula, OH (Plate 1). From the east park boundary, low clay bluffs fronted by a narrow gravel beach, extend approximately 800 feet along the shore. Ashtabula Harbor structures to the west and the Cleveland Electric Illuminating Company's intake structure to the east give the offshore area a confined nature.

(2) Methods and Timing of Discharge - Construction of the segmented breakwaters would be accomplished with a marine plant consisting of cranes on barges, scows, and tug boats, whereas, placement of sand fill would require a land plant consisting of dump trucks, front-end loaders, and bulldozers. Construction of this plan would most likely take about 5 months to complete and extend through one construction season. The construction procedure that would probably be followed is to use derrickboats to place the quarry stone which would be transported to the site on scows towed by tug boats. Placement of the stone would be accomplished, utilizing a crane equipped with rock grapples. As the breakwater segments are completed, sand that is truck-hauled to the site can be spread in the lee of the structures to provide the design beach dimensions. As stated earlier, annual beach nourishment would be carried out for the life of the project.

(3) Projected Life of Discharge Sites - The construction of the offshore breakwaters and restoration of a recreational beach would be one time occurrences. However, the annual replenishment of 5,200 cubic yards of beachfill would be continued for the 50-year life of the project.

(4) Bathymetry of Discharge Sites - The breakwaters would be built on a bedrock foundation at a depth of about 5.5+ feet below Low Water Datum (LWD)* or approximately 500 feet from shore. Beachfill would be placed from the clay bluffs to a point 50 feet lakeward of the mean lake level waterline (+2.2 LWD). Existing substrates in both these areas are composed primarily of sand.

2. Physical Effects (40 CFR 230.4-1(a)).

a. Effects on Wetlands (40 CFR 230.4-1(a)(1)). The proposed discharges would have no effect on any wetlands.

b. Impact on the Water Column (40 CFR 230.4-1(a)(2)).

(1) Light Transmission - Construction of offshore breakwaters and placement of beachfill could create short-term increases in turbidity resulting in a temporary reduction in light transmission. This effect would probably be negligible as the littoral zone is normally a fairly turbulent area.

(2) Aesthetic Values - Construction of offshore breakwaters, rising approximately 4.5 feet above LWD, may obstruct further on already confined view of the lake. Beach nourishment would be a departure from the existing shoreline conditions, however, erosion scars along the clay bluffs would be eliminated and the beach would be more aesthetically pleasing.

(3) Direct Effects on Nekton and Plankton - Implementation of either plan component would not produce any destructive effects on nekton or plankton.

*LWD for Lake Erie is 568.6 feet above mean sea level at Father Point, Quebec.

c. Covering of Benthic Communities (40 CFR 230.4-1(a)(3)).

(1) Actual Covering of Benthic Communities - Covering of benthos will occur with both plan components. Breakwaters would cover approximately 0.55 acre along a total length of 450 feet. Beachfill material would be placed both above and below the water level along 800 feet of shoreline. Quantities cannot be accurately specified for any placements other than the initial placement, which would be 52,000 cubic yards of material expected to cover an estimated 0.43 acre of subaqueous surface. Any offshore transport and subsequent deposition of this material can be expected to be no greater than existing rates.

(2) Changes in Community Structure or Function - The underwater surfaces of the breakwaters would provide significant new habitat for a different assemblage of benthos species. The total area of breakwaters available for colonization is about 0.31 acre, although considerably more habitat would be available in the interstices of rubblemound structures. Active erosion areas such as Lakeshore Park generally have very sparse populations of benthic fauna. The habitat provided on the breakwaters should actually increase the diversity and population size of macrobenthos compared to what is lost by covering the sandy substrate.

d. Other Effects (40 CFR 230.4-1(a)).

(1) Changes in Bottom Geometry and Substrate Composition - Changes would occur, as intended, with the restoration of a recreational beach. Substrate composition will be basically unaltered, except the replenishment material may differ slightly from the native beach sand.

(2) Water Circulation - The construction of three offshore breakwaters may disrupt natural circulation patterns of the nearshore area.

(3) Exchange of Constituents Between Sediments and Water - Because the deposition is inert, no change in biological communities due to exchange of constituents between sediments and overlying water is expected to occur.

3. Chemical-Biological Interactive Effects (40 CFR 230.4-1(b)).

a. Exclusion Criteria. Breakwater construction material is chemically inert and physically immobile under the conditions existing at the lakeshore. These characteristics clearly eliminate the possibility of occurrence of chemical-biological interaction, and any testing specified under 40 CFR 230.4-1(b)(2) and (3) - elutriate testing and bioassay testing, respectively - is not applicable in this instance. Fill material for beach nourishment which is composed predominantly of sand, gravel, or shell having particle sizes compatible with material on receiving shores is excluded from testing under 40 CFR 230.4-1(b)(2) and (3); this category embraces the beach nourishment component of the Lakeshore Park beach erosion control project.

4. Description of Site Comparison (40 CFR 230.4-1(b)).

a. Exclusion Criteria. The breakwater component of the plan includes only a disposal site (no dredging site, since the material is obtained from upland sources), therefore, a comparison of sites is not applicable here. This is also the case for beach nourishment if the material is obtained from upland sources. It is herein decided that beach nourishment material obtained from offshore sources would not be the subject of an inventory of total concentration of critical chemical constituents. Because sand is generally chemically inert, such an inventory would not be of value in a site comparison.

b. Similarly, no site comparison is applicable for a biological community analysis.

5. Applicable Water Quality Standards (40 CFR 230.4-2).

a. Because the fill material is inert, no direct effects upon water quality are anticipated.

b. The nearshore waters of Lakeshore Park are utilized for recreational bathing. The State of Ohio specifies a maximum safe level of fecal coliform organism density, above which use of a bathing beach is not permitted. The water quality at the park is monitored regularly throughout the bathing season; the Ohio Department of Health, in a letter dated 4 June 1980, reported that Lakeshore Park does not show any great pollution hazard, although there are occasional high counts of bacteria normally due to rainfall.

c. Breakwater construction implemented to control shoreline erosion may cause a degradation in water quality by lessening circulation along the shore, resulting in a tendency towards stagnation, with a concomitant increase in the concentration of coliform bacteria originating either from the bathers or from outside sources. As an item of local cooperation, the Ashtabula Township Park Commission has agreed to assure that water pollution that would affect the health of bathers will not be permitted.

6. Selection of Disposal Site for Fill Material (40 CFR 230.5).

a. Need for the Proposed Activity. The proposed activity is intended to eliminate shoreline erosion along 800 feet of erodible bluffs and restore a recreational beach at Lakeshore Park.

b. Alternate Sites Considered. Breakwaters and beach replenishment material are planned to be placed at locations which are considered to be the best sites to satisfy the need for beach erosion control.

c. Objectives in Discharge Determination. Objectives determined in discharge determination (40 CFR 230.5(a)) including the following impacts on

chemical, physical, and biological integrity of aquatic ecosystems evaluated in terms of their impact upon water uses at the discharge site (40 CFS 230.5(b)(1-10)), and incorporating considerations to minimize harmful effects (40 CFR 230.5(c)(1-7)):

(1) Impact on Food Chain - Construction of breakwaters and placement of beachfill would have an insignificant impact upon the food chain. After construction, the breakwaters would provide a more diverse habitat, thereby increasing the variability of the local aquatic food chain.

(2) Impact on Diversity of Plant and Animal Species - The breakwaters should act as artificial reefs, providing substrate for attachment of algae and invertebrate animal communities, and protective cover for fish. This should result in an increase in diversity of plant and animal species.

(3) Impact on Movement into and out of Feeding, Spawning, Breeding, and Nursery Areas - Breakwaters would cover approximately 0.55 acre of possible yellow perch spawning areas. Approximately 0.31 acre of new, more diverse habitat would be added on the submerged surfaces of the structures.

(4) Impact on Wetland Areas Having Significant Functions of Water Quality Maintenance - There would be no impact on any wetlands.

(5) Impact on Water Retention Areas - There would be no impact on areas which serve to retain natural high waters or flood waters.

(6) Methods to Minimize Turbidity - Turbidity increases during construction may occur which would be minimized, as necessary, by environmental protection aspects of construction requirements.

(7) Methods to Minimize Degradation of Aesthetic, Recreational, and Economic Values - Degradation of aesthetic values is minimized in the breakwater plan component by limiting, to whatever extent possible, the height and length of the breakwaters, and providing maximum possible spacing of the structures. The use of rubblemound breakwaters should provide a more natural appearance than would other types, e.g., steel sheet pile. Within the beach replenishment plan component, aesthetic value degradation would be minimized by utilizing the most natural-appearing suitable beachfill which is available and consistent with favorable plan economics. Minimization of degradation of recreational values is a major planning objective of the beach erosion control project. The protection of and subsequent recreational development at Lakeshore Park should enhance local land values.

(8) Threatened and Endangered Species - There would be no impact on threatened or endangered species.

d. Impact on Water Uses (40 CFR 230.5(b)(1-10)).

(1) Municipal Water Supply Intakes - No impacts on municipal water supply intakes would occur.

(2) Shellfish - No significant impact on shellfish would occur.

(3) Fisheries - Approximately 0.55 acre of possible yellow perch spawning area would be covered by breakwater construction.

(4) Wildlife - No significant impact on wildlife would occur.

(5) Recreation Activities - Existing recreation activities would be temporarily disrupted during project construction and annual beach nourishment. No significant, long-term increases in turbidity, nutrients, pathogenic organisms, or oil and greases are expected to occur.

(6) Impact on Threatened and Endangered Species - The proposed discharges would have no effect on threatened or endangered species habitats as defined in the Endangered Species Act.

(7) Impact on Benthic Life - Breakwater construction would cover approximately 0.55 acre and placement of beachfill would cover 0.43 acre of benthic habitat. The rubblemound breakwaters, however, would enhance the existing benthic community by adding at least 0.31 acre of new, more diverse habitat.

(8) Impact on Wetlands - The proposed activity would have no effect on wetlands.

(9) Impact on Submersed Vegetation - The proposed activity would have no significant effect on submersed vegetation.

(10) Size of Disposal Site - The size of the breakwaters and the beach are the minimum necessary to provide shoreline erosion protection and recreational swimming opportunities.

(11) Coastal Zone Management - The proposed activity does not conflict with the State of Ohio's proposed coastal zone management program.

e. Considerations to Minimize Harmful Effects (40 CFR 230.5(c)).

(1) Water Quality Criteria - During construction, the Contractor would be required to minimize turbidity and accidental spills of fuels, oils, greases, etc. Open flanks, voids in the stone, and gaps between the breakwaters should lessen impacts upon water circulation. After construction, the Ohio Department of Health would continue to monitor water quality during the bathing season to insure that water quality at the park does not present a health hazard to the bathers.

(2) Alternatives to Open Water Disposal - Alternatives which do not provide a recreational beach (e.g., sheet pile wall, abandonment) have been eliminated for economic reasons.

(3) Physical Characteristics of Alernative Disposal Sites - Not Applicable.

(4) Ocean Dumping - Not Applicable.

(5) Covering Contaminated Material with Cleaner Material - Breakwater armor units and beachfill would be inert and clean and would require no covering.

(6) Minimize Effect of Runoff from Confined Areas on the Aquatic Environment - Not Applicable.

(7) Coordination of Potential Monitoring Activities with EPA - Not Applicable.

7. Statement as to Contamination of Fill Materials if from a Land Source (40 CFR 230.5(d)). Fill material would be clean and inert (See Section 1.a.(1)).

8. Mixing Zone Determination. Since the fill material would be clean and inert, the determination of the mixing zone would not be applicable.

9. Conclusions and Determinations.

a. I have reviewed the documents pertinent to the construction of offshore breakwaters and a recreational beach at Lakeshore Park, OH, and have concluded that:

(1) An ecological evaluation has been performed following the evaluation guidance contained in 40 CFR 230.4, in conjunction with the evaluation considerations in 40 CFR 230.5 (40 CFR 230.3(d)).

(2) Appropriate measures have been identified and incorporated into the proposed plan to minimize adverse effects on the aquatic environment as a result of the placement of fill material (40 CFR 230.3(d)(1)).

(3) Consideration has been given to the need for the proposed activity, the availability of alternative sites and methods of discharge that are less damaging to the environment, and such water quality standards as are appropriate and applicable by law (40 CFR 230.5).

(4) No wetlands would be affected by construction of the project (40 CFR 230.5(b)(8)).

10. Findings. I find that the discharge of 52,000 cubic yards of beachfill material and subsequent annual nourishment, and the construction of three offshore breakwaters at Lakeshore Park, OH, have been specified through application of Section 404(b)(1) of the Clean Water Act guidelines.

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

Date 8/22/80

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

AUG 26 1980

PUBLIC NOTICE

BEACH EROSION AND SHORELINE PROTECTION PROJECT

LAKESHORE PARK, ASHTABULA, OHIO

1. This Public Notice has been prepared and distributed to identify what dredged or fill materials will be discharged into waters of the United States by implementation of the proposed project, and to provide an opportunity for any person affected by such discharge of materials, to request a public hearing.

2. Authorization - Section 103(a) of the 1962 River and Harbor Act, as amended, authorized the Corps of Engineers to assist in the construction of works for the restoration and protection against erosion by waves and currents of the shores of the Great Lakes.

3. Reports and Recommendations - The Buffalo District will release a Draft Stage III Detailed Project Report and Draft Environmental Impact Statement in November 1980, describing two preferred plans for Lakeshore Park. These are Alternative 1 (No Federal Action); and, Alternative 2 (Modified) (consisting of a three-offshore breakwater system protecting an 800-foot reach of backfill). A public meeting concerning the information supplied in the draft reports is tentatively scheduled for December 1980 at the Kent State University auditorium in Ashtabula, OH (precise information will be released prior to the meeting taking place).

4. Based upon technical, environmental, and economic criteria, as well as significant public input, I have concluded that it is in the best public interest to recommend Alternative 2 (Modified) as the tentatively selected plan.

5. Alternative 2 (Modified) - The proposed project would provide protection to the shoreline from further erosion and provide increased swimming opportunities at the park. Three breakwaters would be constructed at the 5-foot± contour or at lake bottom elevation 561.6 (IGLD) which is approximately 500 feet offshore of the restored beach. Each breakwater would be 150 feet long with 250-foot gaps between them (Plate 1). The central breakwater would be approximately parallel to the shoreline while the eastern and western breakwaters would be at a slight angle to the shore to provide further protection for the beach during episodes of north-northwesterly or north-northeasterly wave attack. They would be of

rubblemound construction and consist of one layer of stone randomly placed, with an average porosity of 37 percent. A constant crest elevation of +4.5 (LWD) would be used for all the breakwaters along with a crest width of 13.0 feet.

6. The breakwaters would protect an 800-foot long reach of beachfill, located at the foot of existing clay bluffs at the eastern end of the park. The beachfill would rise to elevation 578.6. The berm would be 100 feet wide, fronted by a 1 on 12 foreshore slope as shown in profile A-A on Plate 2. A total of 52,000 cubic yards of clean sand fill would be placed along the entire reach. The loss rate offshore is estimated to be 5,200 cubic yards requiring replenishment on a yearly basis. A permanent access road to the beach from the top of the existing bluff would be built to facilitate the initial placement of the beachfill and subsequent periods of annual nourishment.

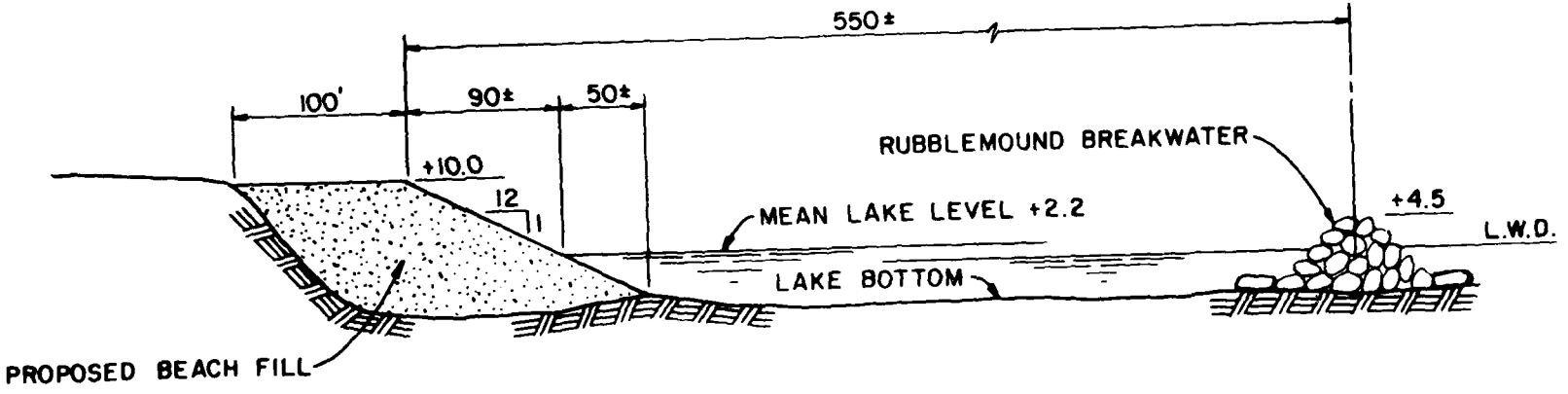
7. Preliminary evaluation (as discussed in the Section 404 Evaluation Report) concludes that the proposed construction of breakwaters and placement of beachfill would not cause unacceptable disruption to the beneficial water quality uses of the affected aquatic ecosystem.

8. This proposed project involves the discharge of fill material into waters of the United States. Therefore, the evaluation of the impact of the activity on the public interest includes application of the guidelines promulgated by the Administrator of the U. S. Environmental Protection Agency (40 CFR, part 230), under the authority of Section 404(b) of the Clean Water Act. Any person who has an interest which might be affected by the proposed discharge may request a public hearing. The request must be submitted, in writing, to the District Engineer within 30 days of the date of this notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity.

2 Incl
as stated

GEORGE P. TOMPSON
Colonel, Corps of Engineers
District Engineer

NOTICE TO POSTMASTER: It is requested that the above notice be conspicuously displayed for 30 days from the date of issuance.



BEACH PROFILE A-A

NOT TO SCALE

NOTE:

MEAN LAKE LEVEL BETWEEN 1900 THRU 1979 IN THE MONTHS OF JUNE, JULY, AUGUST AND SEPTEMBER WAS +2.2'.

SOURCE: "MONTHLY BULLETIN OF LAKE LEVELS FOR THE GREAT LAKES".

ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY

BEACH PROFILE A-A

U.S. ARMY ENGINEER DISTRICT BUFFALO

PLATE 2

F-2.3

PLATE 2

F 2.3

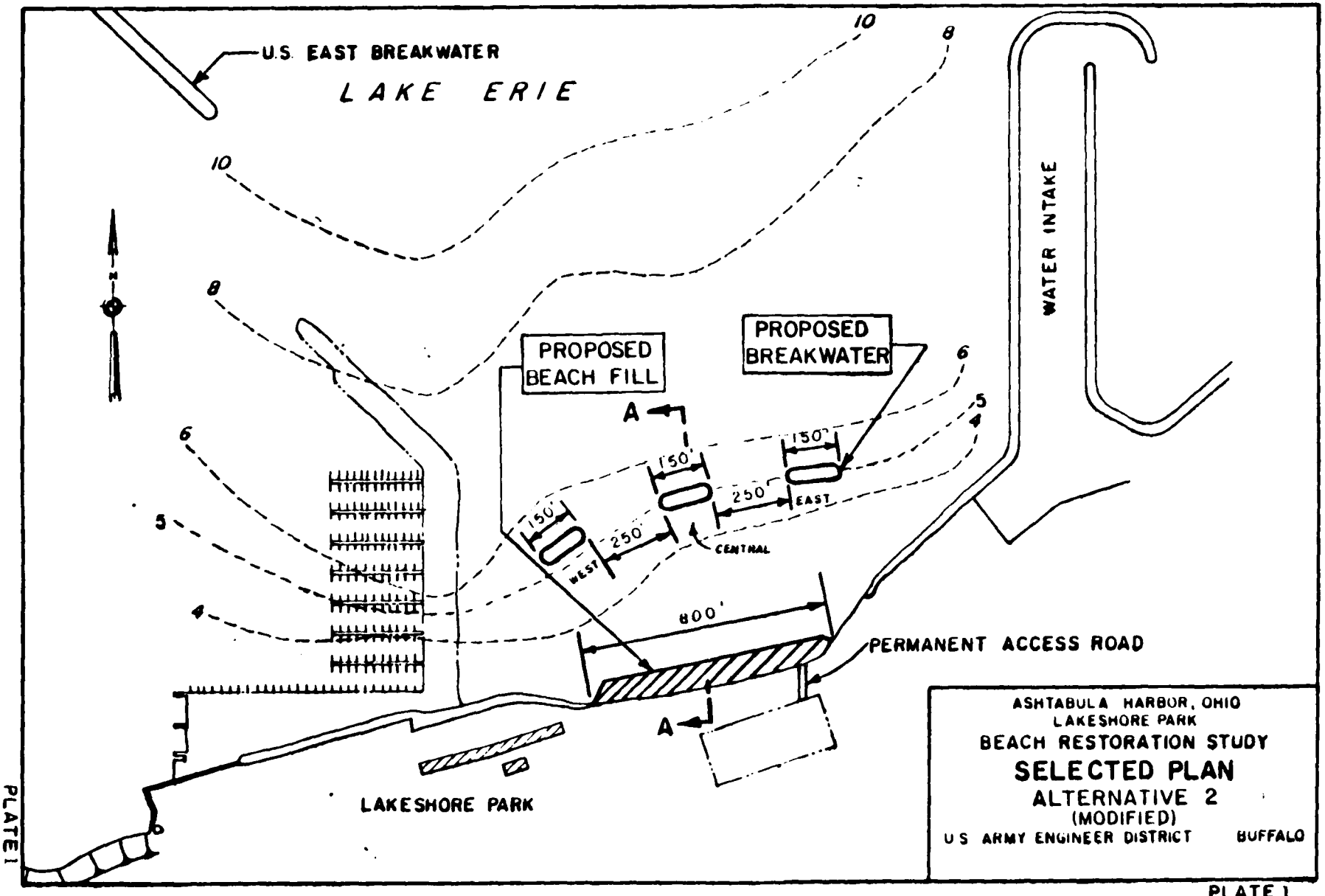

U.S. EAST BREAKWATER
LAKE ERIE
10
8
6
5
4
PROPOSED BEACH FILL
PROPOSED BREAKWATER
A
150'
250'
EAST
CENTRAL
WEST
800'
WATER INTAKE
PERMANENT ACCESS ROAD
LAKESHORE PARK
ASHTABULA HARBOR, OHIO
LAKESHORE PARK
BEACH RESTORATION STUDY
SELECTED PLAN
ALTERNATIVE 2
(MODIFIED)
U S ARMY ENGINEER DISTRICT BUFFALO

PLATE 1

F-2.4

OhioEPA

Re: Ashtabula County
Ashtabula
Grant of 401 Certification
Project for Shoreline Protection in Lake Erie
Public Notice No. (NA)

January 20, 1981

Buffalo Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Gentlemen:

Pursuant to Section 401 of the Federal Water Pollution Control Act, Public Law 95-217, the Ohio Environmental Protection Agency hereby certifies that the above-referenced project will comply with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act. This certification is specifically limited to a 401 certification with respect to water pollution and does not relieve the applicant of further certifications or permits as may be necessary under the law. This Certification is issued subject to the following conditions:

- Positioning of the breakwaters as indicated will in no way impede the natural flow of water to an extent sufficient to cause stagnation thus rendering such waters unfit for municipal, industrial, agricultural, or other uses.

- Extreme care must be employed during construction to avoid creation of unnecessary turbidity.

- Fill used in this project will not be of a polluted nature.

- Any damages caused to the immediate environment of the project by equipment needed for construction or hauling will be repaired immediately.

You are hereby notified that this action of the Director is final and may be appealed to the Environmental Board of Review pursuant to Section 3745.04 of the Ohio Revised Code by any person who was a party to this proceeding. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. It must be filed with the Environmental Board of Review within thirty (30) days after the notice of the Director's action. A copy of the appeal must be served on the Director of the Ohio Environmental Protection Agency and the Environmental Law Division of the

Office of the Attorney General within three (3) days of the filing with the Board. An appeal may be filed with the Environmental Board of Review at the following address:

Environmental Board of Review
Suite 123 (Temporary Address)
240 Parsons Avenue
Columbus, Ohio 43215

Very truly yours,

James F. McAvoy
Director

JFM/rb

Copy to Division of Water, DNR
Copy to Office of Planning Coordinator, OEPA

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

East Lansing Area Office
Manly Miles Building, Room 202
1405 South Harrison Road
East Lansing, Michigan 48823

AUG 11 1981

Colonel George P. Johnson
District Engineer
U. S. Army Engineer District
Buffalo
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Johnson:

This is our final Fish and Wildlife Coordination Act report for the Lakeshore Park Beach Erosion Project at Ashtabula, Ashtabula County, Ohio. This report is based upon information provided in the March 1981 Preliminary Stage III Draft Detailed Project Report and Draft Environmental Impact Statement, and has been prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and in compliance with the intent of the National Environmental Policy Act of 1969.

The Lakeshore Park project; as authorized under Section 103(a) of the River and Harbor Act of 1962, as amended by Section 310 of the River and Harbor Act of 1965 and by Section 112 of the River and Harbor Act of 1970; would provide beach and shoreline erosion control and restore 800 feet of recreational beach. The selected plan, Alternative 2 (modified), is basically the same as the selected plan addressed in our June 30, 1980 draft report. It involves the construction of a three-breakwater system, each 150 feet long with 250-foot gaps. They will protect an 800-foot reach of beachfill, located at the foot of an existing clay bluff. The beachfill will rise to an elevation of 578.6 feet IGLD. The berm will be 100 feet wide, fronted by a 1 on 12 foreshore slope. The sandfill, approximately 52,000 cubic yards, will consist of clean, medium-grained, natural sand particles. Beachfill eroded offshore, about 10 percent of the total, will be replenished on a yearly basis. The breakwaters will be located at the 5-foot ± depth contour or at lake bottom elevation 563.6 which is approximately 500 feet offshore of the restored beach. They will be of rubblemound construction and consist of stones ranging from 3.0 to 7.5 tons, randomly placed with an average porosity of 37 percent. A constant crest elevation of +4.5 feet (LWD) will be used for all three breakwaters along with a crest width of 13.0 feet. A permanent access road to the beach from the top of the existing bluff will be built to facilitate initial placement of the beachfill and annual nourishment measures.

Based upon the following information provided by the Ohio Division of Wildlife, the Lakeshore Park area supports an important sport fishery, which is primarily used by local fishermen.

SHORE ANGLER HARVEST AND PRESSURE DATA*

Fish Species	Numbers of Fish Harvested 1975	1976	1977	1980
Yellow perch	984	329	2,765	178
White bass	152	71	18	75
Drum	4,736	3,643	6,427	3,397
Other species	439	291	404	413
ANGLER HOURS	11,600	7,500	15,000	6,579

* Angler data are not available for 1978 and 1979

The above data include survey results for 1980 which were not available for our June 30, 1980 draft report. Catch per angler hour was significantly higher for yellow perch in 1977. The remaining values for other species are relatively stable for the surveyed years. While these data are estimates, they do indicate that sport fishing is an important activity along the shoreline of Lakeshore Park.

In 1980, Service biologists conducted a limited fishery survey of the project area. A variable mesh gill net was placed approximately 300 yards from the proposed breakwater location. The nets were set in the mid-afternoon, left in place overnight, and pulled in the early morning. The following fish species were collected:

SPECIES	Numbers of Fish Collected May 20-21	Aug. 14-15	Sept. 16-17
Alewife	3		
Gizzard shad			10
Rainbow smelt	27		
Quillback carpsucker			1
White sucker	3	11	3
Shorthead redhorse		2	
Carp			1
Emerald shiner	33	16	4
Troutperch	1		
White bass		2	5
Yellow perch	11	8	4
Walleye	1		1
Logperch	5		1
Smallmouth bass	1		5
Rock bass		2	2

All yellow perch collected in May were mature males, presumably arriving at their spawning locations. Thus, placement of stone for construction of the 150-foot breakwater sections could cover possible spawning habitat for yellow perch. However, the breakwater material would provide a different, and possibly improved habitat for the benthic fauna which, in turn, would provide an additional food source for a number of fish species. The

short breakwater sections proposed in the selected plan should allow greater circulation of water offshore from the park, thus limiting stagnation problems. We believe the offshore area will continue to be used as a resting and feeding area for migratory waterfowl.

Our position regarding the impacts of this project is the same as stated in our June 30, 1980 report; that is, we do not believe that construction and maintenance of the breakwaters and beach will have a significant adverse impact upon the fish and wildlife resources in the project area. Therefore, we do not recommend additional mitigation features beyond those which are addressed in our draft report and are included in your Stage III document.

Sincerely yours,

David W. Hanson

Area Manager

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:
AFF-SE

Colonel George P. Johnson
District Engineer
U. S. Army Engineer District
Buffalo
1776 Niagara Street
Buffalo, New York 14207

JUN 3 1980

Dear Colonel Johnson:

I am responding to your letter of May 7, 1980 and your proposed project for beach erosion control and shoreline protection at Lakeshore Park, Ashtabula County, Ashtabula, Ohio.

Based on information currently available, the following listed endangered species may be found within the project area:

Indiana Bat	Myotis sodalis
Bald Eagle	Haliaeetus leucocephalus
Blue Pike	Stizostedion vitreum glaucum

There is no designated critical habitat in the project area at this time.

Due to the nature of the project there should be no adverse impact on the Indiana bat since there is no summer nursery habitat within the project area. A review of the most recent survey data available indicates there are no nesting bald eagles in or near the project site. The potential impact of the project on the blue pike could be considered as beneficial because the proposed breakwater structures could qualify as potential spawning habitat.

This letter provides comment only on the endangered species aspect of the project. Comments on other aspects of the project under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et. seq.) may be sent under separate cover.

This precludes the need for consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended.

Sincerely yours,

Charles A. Hughlett

Charles A. Hughlett
Acting Regional Director

NCBED-PE

XX THRU: Ch, Env Res Sec

Cultural Resources Investigation for Lakeshore Park, Ashtabula, Ohio

✓R. H. Lewis

11 Jun 80
Lewis/ds/2171

TO: NCBED-PW/Cadet

1. On 7 June 1979, a letter was sent from the Buffalo District Corps of Engineers to the Ohio State Historic Preservation Office (SHPO), the Regional Archaeological Preservation Office-Cleveland (RAPO), and the Interagency Archaeological Service-Atlanta (IAS), requesting information on known cultural resources within the environmental impact area of the Lakeshore Park Study. Copies of the District, SHPO, and RAPO letters are attached. IAS did not respond.

2. Based on the information obtained from these letters, it was decided a reconnaissance level survey should be performed for the area. This survey was performed on 5 June 1980, by Richard N. Lewis, staff Archaeologist, assisted by William E. Butler, Geographer, both of the Buffalo District. The results of this investigation are presented below:

a. Prior to the initiation of the investigation, the Soil Survey of Ashtabula County Ohio, U.S. Department of Agriculture, May 1973, was consulted. This survey showed that the soil of the entire project area was classed as "Made Land." Made Land is defined in the survey as "Areas of earth fill, of borrow pits, and of areas where much of the soils surface is covered by streets, homes, factories, or docks. In all areas the original soils have been greatly altered." (USDA 1973, p. 86) Discussion with the Lakeshore Park Supervisor indicated the area had once consisted of a hill in the eastern park area and a swamp in the central park area. In the 1930's, the hill was removed and used to fill the swamp. The area was then used for several years as an amusement park and subsequently graded and seeded for use as a playground and camping area.

b. The area was tested by using a 1 inch in diameter soil auger, which was driven into the soil to a depth of 18 inches in various locations throughout the project area. In the eastern area, the topsoil was from 1 to 2 inches in depth, underlain by bluish grey clay which, from the bank profile extended to a depth of 15 feet. In the central park area the soil was molted to a depth of 18 inches. The western park area is used as a parking area and could not be tested. These soil borings confirmed the park supervisors statements.

3. Based on the above information, it is the opinion of the investigators that no cultural resources presently exist within the project area. If cultural resources existed in the past, they may have been destroyed by the land modification described in para. a, and construction of the parking lot.

3 Incl
as stated

RICHARD H. LEWIS
Staff Archaeologist

June 22, 1979

Mr. Donald M. Liddell, Chief
U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207

Re: NCBED-PE
Lakeshore Park, Ashtabula

Dear Mr. Liddell:

The staff of the Ohio Historic Preservation Office has undertaken a review of the above Department of the Army Permit Application as part of its responsibility to develop and implement a comprehensive State Historic Preservation plan.

Based upon the information supplied in the Public Notice and after a review of our files, it is our opinion that the proposed project(s) will not affect any properties, either archaeological or historic, eligible for, nominated to, or listed in the National Register of Historic Places.

Although no known sites are to be affected, the applicant should be cautioned that any undertaking which utilizes previously undeveloped land has the potential for affecting unknown archaeological resources.

Should any archaeological sites, features, or materials be encountered during actual project construction, please notify the Ohio Historic Preservation Office or the Regional Archaeological Preservation Office for the project area.

Thank you for the oppotunity to review and comment on this project.

Sincerely,

Thomas H. Smith
State Historic Preservation Officer
Director, Ohio Historical Society

Ohio Historic Preservation Office
Ohio Historical Center I-71 & 17th Avenue Columbus, Ohio 43211 (614) 466-150

Regional Office: Cleveland Museum of Natural History
Wade Oval University Circle Cleveland, Ohio 44106 (216) 231-4600

July 16, 1979

U.S. Army Engineer District, Buffalo
ATTN: Environmental Resource's Section
1776 Niagara Street
Buffalo, NY 14207

RE: NCBED-PE

Dear Sirs:

This is in response to your letter of June 7, 1979, requesting information on the cultural resources within the Lakeshore Park, Ashtabula, Ohio.

To date no known archaeological properties are recorded within the proposed study area. However, the inventory of archaeological resources, both historic and archaeological, in the study area is incomplete. At this time, it is not possible to provide you with a complete listing of resources. Naturally, we are most concerned about any new construction which affects previously undisturbed land, because of its potential for affecting or archaeological properties.

There are many factors which indicate that the proposed construction site classifies as an archaeologically sensitive area. Many prehistoric sites exist in the floodplains and surrounding bluff areas of the major waterways which empty into Lake Erie. Also, the bluff areas along the lake have produced many prehistoric sites. In fact, we have reports of archaeological sites in the floodplains and bluff areas in both the Chagrin and Grand Rivers as well as areas along the lake between these two rivers. The area under study appears to be suitable for collecting natural resources which would make it particularly attractive to prehistoric man.

It is our recommendation that the entire area needed for the project should be investigated to determine the potential adverse effects involving possiole archaeological sites, both historic and prehistoric.

If we can be of any further assistance, please do not hesitate to contact us.

Sincerely,

David R. Bush
Regional Archaeological Preservationist

DRB/cc
cc: Dr. Thomas Smith,SHPO

Ohio Historic Preservation Office
Ohio Historical Center I-71 & 17th Avenue Columbus, Ohio 43211 (614) 466-8727

246 N. High Street
Post Office Box 118
Columbus, Ohio 43216

Telephone (614) 466-3543
If no answer (614) 466-8686

JAMES A. RHODES
Governor

JOHN H. ACKERMAN, M.D., M.P.H.
Director of Health

June 4, 1980

Mr. Bill Butler
Buffalo District
Corps of Engineers
1776 Niagra Street
Buffalo, New York 14207

Dear Mr. Butler:

The Ohio Department of Health has been conducting a beach water quality monitoring program which includes Lake Shore Park for a number of years. This program is mentioned in your "Summary of Environmental Conditions at Lakeshore Park, Ashtabula, Ohio".

My comments on Lake Shore beach are essentially the same as those already expressed. Lake Shore does not show any great pollution hazard although there are occasional high counts of bacteria normally due to rainfall.

Some additional information regarding the beach that may help your determinations involve the level of response Lake Shore Park gets from the health department based upon water quality monitoring. The Ashtabula County Health Department has always taken an interest in water quality data from beaches in the district and has used the information to implement sewage nuisance abatement programs.

Their involvement plus the E.P.A. sponsored sewage treatment improvements have had major impact upon improving water quality in the Ashtabula County area.

I would anticipate that our monitoring program will continue to show improvement in years to come and I certainly hope that the corps can move forward with the park improvements that are proposed.

Please contact me if you have any further questions on this project as I would be happy to help you expedite it.

Sincerely,

Timothy Horgan
Sanitarian in Charge
Recreation Sanitation Unit
Division of Personal
Environmental Health Services

TH/by

PUBLIC HEALTH COUNCIL
Joseph C. Lestini, R.Ph., Chairman Mary A. Agna, M.D., Vice Chairman William Dorner, Jr., M.D.
J. Bruce Wenger, D.V.M. Richard V. Brunner, D.D.S. Bryan A. Rogers, M.H.A. Robert L. Turton, D.O.

ODNR
Ohio Department of Natural Resources
Fountain Square · Columbus, Ohio 43224 · (614) 466-3770

May 2, 1980

Lt. Col. Thomas R. Braun
Deputy District Engineer
Buffalo District- Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Braun:

This department initiated and has continued to support a beach erosion control shoreline protection project at Lakeshore Park. We concur with the proposed plan to construct a three-breakwater system and an 800 foot long reach of sand beachfill.

The project has no conflicts with any other plans, policies or controls of the Ohio Department of Natural Resources.

Sincerely,

ROBERT W. TEATER
Director

RWT:bm
cc: James A. Swartzmiller

TO: Eber L. Wright, Ashtabula County Planning Commission Executive Director

FROM: Hugh L. Thomas, Ashtabula County Deputy Administrator

DATE: May 14, 1980

SUBJECT: Lakeshore Park Beach Draft Environmental Impact Statement

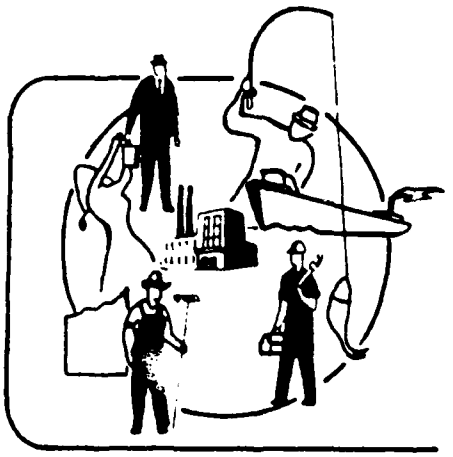
Dear Eber:

In response to your request, I am forwarding a review and comment of the Army Corps of Engineer's questions concerning the conformity of the proposed beach restoration and erosion control with any existing goals, objectives, plans, and policies of the County.

This project is specifically mentioned in the Lakeshore Park Recreation Plan prepared by the Ashtabula County Planning Commission in 1979. The Corp's proposed project is consistant with that plan's goals of increasing coastal water-oriented recreation opportunity and decreasing erosion of land.

The beach project, as far as I can ascertain from my research, will not require a zoning permit since no change of land use will result. Furthermore, there seems to be no adverse effects on any surrounding property owners. The Cleveland Electric Illuminating Company is the property owner to the east of the beach area. C.E.I. has been notified by the Corps and has received copies of the park's recreation plan. C.E.I. has voiced no objectives to the beach proposal. No other objections to the recreation plan have been received by interested governmental units including: Ohio Department of Energy, Ohio Department of Natural Resources, E.D.A.T.A., Ashtabula City, and Ashtabula Township.

The project is also consistant with the County Overall Economic Development Program's goal of developing and maximizing the useage of the County's natural resources. The erosion control aspect of the proposal should implement an objective of both the County Planning Commission and the Ohio Coastal Zone Management Program.



COUNTY OF ASHTABULA

County Planning Commission

Executive Director Eber L Wright

ASHTABULA COUNTY OFFICE BUILDING, JEFFERSON, OHIO 44047

Telephone 576-2040

May 19, 1980

Mr. Thomas Braun
Lt. Col., Deputy District Engineer
Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara St.
Buffalo, NY 14207

Dear Mr. Braun:

The Ashtabula County Planning Commission at its regular meeting on May 15, 1980, moved and seconded to support the proposed plan involving the construction of a three-breakwater system, each 150 feet long with 250 foot gaps that will protect an 800 feet long reach of beachfill at Lakeshore Park.

The project is consistant with all Ashtabula County planning policies (see enclosed review by Hugh L. Thomas, County Deputy Administrator).

If we can be of further assistance, please contact us.

Sincerely,

Eber L. Wright

Eber L. Wright
Executive Director

Enc.

ELW/kb

LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION AND SHORELINE PROTECTION STUDY
EXECUTIVE ORDER 11988 - INFORMATION

It is the Corps policy, in relationship to President Carter's Executive Order 11988 - Floodplain Management, dated 25 May 1977, to avoid development in a base (100-year) floodplain wherever possible. The general objective of the Executive Order is to avoid, to the maximum extent possible, long- and short-term adverse impacts associated with the occupation and modifications of a base floodplain whenever there is a practicable alternative to such an action. The Corps policy is to:

a. Avoid development in the base floodplain unless it is the only practicable alternative;

b. Reduce the hazards and risks associated with floods;

c. Minimize the impacts of floods on human safety; and

d. Restore and preserve the beneficial values of the base floodplain.

In relationship to Executive Order 11988 and general guidance contained in the ER 1105-2-200 series of Corps Regulations and ER 1165-2-26, several alternatives were developed for the primary planning objective of eliminating shoreline erosion along 800 feet of erodible bluffs at Lakeshore Park. During Stage 2 planning, several alternatives for shoreline protection were developed. These include:

1. No Action.

2. Two 250-foot long offshore, rubblemound breakwaters, with a 250-foot gap, protecting an 800-foot long beachfill (This plan was later modified to consist of three 150-foot breakwaters, with 250-foot gaps).

3. Three 250-foot long breakwaters, with 250-foot gaps, protecting a 1,300-foot long beachfill.

4. An unprotected 800-foot long beachfill.

5. An unprotected 1,300-foot long beachfill.

6. An 800-foot beach protected by a groin.

7. A 2,000-foot long breakwater protecting an 800-foot long beachfill.

8. A 2,000-foot breakwater protecting a 1,300-foot beachfill.

7A, 8A. Basically the same as Alternatives 7 and 8, except the breakwater design would take into account the possibility of a small-boat harbor being built to the west of the park pavilion.

Alternatives 1 and 2 have been carried forth to Stage 3 design. Alternative 2 is the tentatively selected plan.

EO 11988 EVALUATION

1. Potential Floodplain Development with the Project. No new development in the floodplain is expected after project construction.

2. Losses to the Natural and Beneficial Resources in the Floodplain. Since the shoreline area is actively eroding, no known natural and beneficial resources, which could be affected by potential development, exist in the floodplain.

3. Best Nonfloodplain Alternative. The nature of shoreline erosion processes require the implementation of structural measures within the base floodplain. Nonstructural measures such as abandonment are not economically feasible.

4. Preference for the Recommended Project from a National Viewpoint. Alternative 2 would enhance national economic development (NED) by increasing the value of the nation's output of goods and services and improving national economic efficiency. The project produces net benefits from increased recreational usage in the form of beach usage and swimming and reduced loss of parkland. Although none of the alternatives make net contributions to the environmental quality (EQ) account, Alternative 4 (an unprotected 800-foot beach) was designated the "least environmentally damaging" plan. However, implementation of any of the alternatives would not produce adverse, long-term effects on the environment.

5. Actions to Minimize Damage to the Floodplain and to Development Induced by the Project. The placement of beachfill at Lakeshore Park should preserve and restore the natural values of the floodplain by eliminating persistent erosion scars and making the shoreline area more suitable for recreational use. Low damage-potential land use such as recreation is advocated for floodplain development. Any upland park development induced by the project would not be subject to damages due to shoreline erosion.

The recommended project is preferred because it would eliminate shoreline erosion while providing a recreational beach at Lakeshore Park. The Corps has concluded that there is no practicable alternative to the proposed action, which would occur within the 100-year floodplain of Lake Erie, and that the recommended action is in conformance with Executive Order 11988 - Floodplain Management.

GEORGE P. JOHNSON
Colonel, Corps of Engineers
District Engineer

Date 3/24/81

DRAFT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT
FOR

LAKESHORE PARK, ASHTABULA, OHIO
BEACH EROSION CONTROL
AND
SHORELINE PROTECTION STUDY

STAGE III DOCUMENTATION

APPENDIX G

SECTION 111 RECON. REPORT

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

NCBED-PS

9 December 1975
5 August 1975
R 25 September 1975

SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, OH

Division Engineer, North Central
ATTN: NCDPD

SYLLABUS

1. The purpose of this study is to determine whether the Federal navigation works at Ashtabula Harbor, OH, have caused or aggravated the erosion of the adjacent Lake Erie shoreline and, if so, what mitigation measures should be taken to alleviate the damage.

2. This study has determined that since 1826 over 4,000,000 cubic yards of littoral material had been impounded by the harbor structures, principally by the West Breakwater and that erosion easterly or downdrift of the harbor is occurring at a faster rate than on the westerly or updrift side for no other apparent reason than the starvation of downdrift beaches by loss of the impounded material.

3. The study determined that the most suitable structural plan of improvement is replenishment of the beaches in the areas of aggravated erosion and annual replenishment, thereafter, equivalent to the impounding effect of the navigation works. Initial replenishment will require placement of about 133,000 cubic yards of beach fill to the east of the Cleveland Electric Illuminating Company (CEI) at an estimated cost of $1,007,000. The estimated annual charges amount to $385,000 including the cost of maintenance by annual replenishment of about 42,000 cubic yards of beach fill to compensate for the continued impoundment of that estimated amount of beach material by the navigation structures. Total benefits evaluated for this reach amount to about $29,800 annually. Benefits due to mitigation of damages due to the harbor improvements amount to $12,500. No further action is recommended under the current provisions of the Section 111 law.

4. Since the benefit-cost ratio of the structural measures to the east of the CEI intakes is much less than one, an alternative solution would be Federal acquisition of a strip of land along the area in which

erosion is attributable to the harbor. The strip of land would be deep enough to provide for a minimum of 50 years of protection from the long-term erosion rates determined in this report. The public would be allowed access to the lake as part of the requirements. The estimated first cost for acquisition of the land is about 58 percent above the cost of the least expensive structural alternative but since no maintenance is involved the annual costs are only about 27 percent of those for the structural plan. Acquisition of the land would have the least adverse environmental impacts of any alternative. A general Real Estate study of this alternative is recommended to determine its acceptability as a solution as an option to present Section 111 policy.

5. Acquisition is not practical in the Lake Shore Park area. A reconnaissance report dated December 1974 under Section 103 of the 1962 River and Harbor Act has determined economic justification for protection and improvement of about 1,400 feet of the easterly end of the park frontage. The improvement is a sand beach fill protected by either groins or an offshore breakwater. Under present conditions near the end of the east breakwater, waves approaching the shore would be affected by diffraction, refraction, and shoaling. This combination does not lend itself to an analytical analysis. It is virtually impossible to determine exactly how much of the erosion damage in this area is attributable to each of these causes. However, this report has determined that the Federal structure is attributed with causing a portion of the erosion at Lake Shore Park. A reasonable solution is to provide a portion of the beach under the 103 study as a 100 percent Federal expense. Assuming an initial beach is needed similar to what is required for mitigating erosion to the east of the CEI intake, 4.2 cubic yards of sand would be required per lineal foot of beach. This would amount to approximately 5,900 cubic yards at a cost of $32,500. The cost could be substantially less depending on the source and method of placement. A portion of the beach at Lake Shore Park is recommended to be replaced at a Federal cost when the Section 103 project currently awaiting funds for the Detailed Project Report is constructed.

AUTHORITY

6. This report on a preliminary investigation of mitigation of shore damage attributable to navigation works at Ashtabula Harbor is submitted in accordance with paragraph 13 of ER 1165-2-309. The investigation was requested by the State of Ohio, Department of Natural Resources, William E. Nye, former Director. Mr. Nye's letter of 13 December 1974 and previous correspondence are attached as Supplement No. 1 of this

report. The basic authority for the investigation is Section 111 of the River and Harbor Act of 1968 (PL 90-483, approved 13 August 1968) which states:

> "The Secretary of the Army, acting through the Chief of Engineers is authorized to investigate, study and construct projects for the prevention or mitigation of shore damages attributable to Federal navigation works. The cost of installing, operation and maintenance shall be borne entirely by the United States. No such projects shall be constructed without specific authorization by Congress if the estimated first cost exceeds $1,000,000."

PRIOR REPORTS

7. A cooperative beach erosion control study of the entire Lake Erie shoreline of the State of Ohio was made between 1947 and 1952 by the Corps of Engineers acting initially in cooperation with the State of Ohio Department of Public Works and subsequently, because of the reorganization of State agencies, with the Ohio Department of Natural Resources. Two published reports on this comprehensive study are particularly pertinent to the Ashtabula Harbor area. The report on Appendices III, VII, and XII, published as House Document No. 351, 82nd Congress, 2nd Session, is a study of the shoreline from Ashtabula Harbor westerly to Fairport Harbor. The report on Appendices V and X, published as House Document No. 350, 82nd Congress, 2nd Session, covers the shoreline easterly from Ashtabula Harbor to the Ohio-Pennsylvania State line. These reports contain detailed descriptions of the near-shore and coastal characteristics, shoreline and offshore changes, existing structures, the factors affecting shore processes and general plans of improvement for alleviation of shore damage.

8. In 1964, the State of Ohio, Department of Natural Resources, Division of Geological Survey published a report by Robert P. Hartley entitled, "Effects of Large Structures on the Ohio Shore of Lake Erie." This report contains general descriptions of the major harbor structures and the visible areas of accretion and erosion adjacent to these structures. The report contains no quantitative data on rates of accretion and erosion or detailed investigations of any particular structure. It concludes that "Most of the large structures along the Ohio shore have caused buildup of beaches on their updrift sides and accelerated erosion downdrift."

NCBED-PS
SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, OH

9. In 1966, the District Engineer, Buffalo District, Corps of Engineers, submitted a report on a beach erosion control study of the Lake Erie shoreline between the Lake-Ashtabula County Line and Ashtabula Harbor, OH. The report considered the protection of about 3,800 feet of State Highway No. 531 located close to the lakeshore about 6 miles west of Ashtabula Harbor. As originally submitted, the report was unfavorable toward adoption of a Federal project but in view of changed conditions; the report was returned by higher authority for further study. The most recent report dated June 1975 has determined that a Federal project for protecting the highway is justified. Plans and specifications will be initiated as soon as funds are received.

10. In December 1974, the District Engineer submitted a reconnaissance report on a beach erosion study of Lake Shore Park which is owned by the town of Ashtabula and located immediately east of Ashtabula Harbor. The study was made under authority of Section 103 of the 1962 River and Harbor Act in response to a request from Congressman William Stanton on behalf of the Ashtabula Township Park Commission. The reconnaissance report found economic justification for protection and improvement of about 1,400 feet of the easterly end of the park frontage by sand beach fill to improve a bathing beach protected by either groins or an offshore breakwater. This plan was developed in conjunction with preliminary planning for a small-boat harbor that would be developed along the adjacent 850 feet of the westerly end of the park frontage. In April 1972, the State of Ohio, Department of Natural Resources approved this location for a small-boat harbor of refuge at Ashtabula for which Federal authorization was granted in 1946. The Section 103 study recognized that the cost-sharing between the Federal government and local interests might be affected by the findings of this present study concerning the effect of the Ashtabula Harbor navigation improvements on the adjacent shoreline.

11. Several reports related to the improvement of Ashtabula Harbor in the interests of deep-draft navigation have been prepared. They are of particular interest in showing shoreline changes and describing the changes and additions to the harbor structures as the harbor was enlarged and developed.

NCBED-PS
SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, OH

TABLE 1

Summary of Pertinent Authorizing Report on
Major Harbor Changes at Ashtabula Harbor, OH

Document Number	Date of OCE Report
HD 654 61st Congress 2nd Session	4 February 1910
HD 997 64th Congress 1st Session	5 April 1916
HD 486 83rd Congress 2nd Session	29 June 1954

LOCATION AND DESCRIPTION OF AREA

12. Ashtabula Harbor is located about in the middle of the south shore of Lake Erie, between Fairport Harbor located about 26 miles to the west, and Conneaut Harbor, about 13 miles to the east. The harbor structures at these three deep-draft harbors provide the principal irregularities in an otherwise relatively straight shoreline extending in a general northeast-southwest direction. Arrowhead breakwaters extend lakeward of the general shoreline a distance of about 3,800 feet at Fairport Harbor, 5,500 feet at Ashtabula Harbor and 4,700 feet at Conneaut Harbor. All have breakwaters connected to shore at their westerly limits. The only other significant structures in the vicinity of Ashtabula Harbor are the parallel piers that provide an entrance to a small-boat marina at Red Brook, about 2-3/4 miles west of Ashtabula Harbor, and the Cleveland Electric Illuminating Company water intake structures, about 1/2 mile east of the end of the Ashtabula Harbor East Breakwater. These structures extend about 225 feet and 1,600 feet, respectively, lakeward of the general shoreline in their localities. There are many short groins and other types of shore protection, particularly west of Ashtabula Harbor, that appear to provide local protection but to have little significant overall effect on shore processes.

HISTORY AND DESCRIPTION OF FEDERAL PROJECT

13. The initial Federal project at Ashtabula Harbor was undertaken in 1826. Work consisted of clearing the river mouth and beginning construction of an east pier. By the end of 1828, piers had been constructed on both sides of the river mouth extending lakeward to an average length of about 642 feet. The piers were 150 feet apart starting at the shore

end but converged to narrow lthe channel to 100 feet at a distance of about 500 feet from shore end then flared to provide a 150-foot channel at the outer end at the 10-foot depth contour.

14. Between 1828 and 1881, both piers were periodically extended finally terminating at the 16-foot contour. A drawing, attached as Plate 2, that accompanied the Chief of Engineer's annual report dated 1881 shows the maximum extent of the piers and the location of the shoreline on both sides of the piers at six time periods between 1865 and 1881. In 1881, the piers extended about 1,300 feet lakeward of the shoreline on the east side. Up to that time, there was no evidence of erosion easterly of the piers. General lakeward movement of the shoreline was occurring on both sides of the piers but by 1881 the shoreline on the west side was about 450 feet farther lakeward. A comment in the report of the Chief of Engineers for 1879 is of particular interest to this present investigation. It states "I respectfully recommend that both piers be extended out to the curve of 16 feet of water in the lake and I am in hopes that we may thus escape further trouble, at least for a time; the sand seems, however, to move out as fast as the piers are extended."

15. Between 1893 and 1903, the Lake Shore and Michigan Southern Railway removed a portion of the inner end of the east pier and replaced it with a new bulkhead located 45 feet farther to the east, in effect, widening the channel by that amount. In 1906, the Railway, under authority of the Secretary of War took possession of the entire east pier, extended its bulkheads northerly 720 feet, thence easterly 900 feet and then southerly, inducing an area of about 15 acres which was filled and improved.

16. Similar changes were made on the other side of the river between 1903 and 1907 when the Pittsburg, Youngstown and Ashtabula Railroad Company, also under authority of the Secretary of War, removed the west pier and replaced it with a bulkhead 60 feet farther west, again increasing the channel width by a similar amount. About 16 acres of land was reclaimed for development by also constructing a parallel bulkhead about 750 feet farther to the west and filling the area between the bulkheads. In 1908, the railroad constructed a seawall, about 1,200 feet long, westerly of the filled area to protect it and to provide a slip along the west side of the reclaimed area that was dredged to a depth of 21 feet.

17. The first piece of the offshore breakwater system, a 432-foot length, constructed on stone filled timber cribs 30 feet wide, was built in 1897-98. It was located about 1,000 feet west-northwest of the end

of the then-existing river-mouth piers on the alinement of the present breakwater. This and subsequent modifications of the breakwater system, summarized in the following paragraphs, are shown in plan on Plate No. 3.

18. Between 1901 and 1909 the West Breakwater was extended lakeward about 1,400 feet terminating in a pierhead opposite the pierhead of an east breakwater constructed during the same period that provided an arrowhead entrance directly north of the river mouth. The Lake Shore and Michigan Southern Railway extended the U. S. East Breakwater about 1,100 feet easterly, generally parallel to shore, to protect the end of its slip.

19. Between 1912 and 1915 the west breakwater was again extended lakeward about 1,800 feet and also shoreward, terminating about 600 feet offshore. A new east breakwater was also constructed leaving about a 600-foot entrance gap farther to the east and about 2,500 feet lakeward of the previous arrowhead entrance. The pierhead and about 550 feet of the original U. S. East Breakwater were removed in 1915.

20. A shore return about 580 feet long was added to the West Breakwater in 1924 leaving only a 100-foot circulation gap at its near-junction with the inner end of the West Breakwater.

21. The latest modification of the harbor structures was made in 1934-36 when the West Breakwater was again extended 711 feet lakeward to a new pierhead and the westerly end of the East Breakwater was removed and realined to form the present arrowhead entrance.

22. Thus, during the development of Ashtabula Harbor, the navigation structures have progressed from parallel piers of increasing lengths to offshore breakwaters which, in turn, have provided three different harbor entrances, each farther offshore. The present entrance is about 5,500 feet lakeward of the original shoreline. The present navigation structures and harbor improvements are shown on the Ashtabula Harbor project map inclosed as Plate 1.

23. The top height of the West Breakwater is 10.3 feet above low-water datum. It has a core of quarry chips topped with quarry-run stone weighing between 500 pounds and 3 tons and covered with close fitting cover stone weighing over 3 tons. Typical cross sections of all the breakwaters are shown on Plate No. 1A. Pertinent to this investigation it is noted that the lower portions of the structures are quite impermeable to the passage of sand while the upper portion, consisting of entirely of larger stone with correspondigly larger voids, is probably not a complete barrier. The present annual shoaling pattern inside the harbor indicates that considerable sand passes over or through the West Breakwater.

SHORE CHARACTERISTICS

24. General. The following section describes the bluff characteristics, the beach characteristics, and streams entering the lake since these are the principal sources of beach material whose littoral movement might be affected by the Ashtabula Harbor navigation structures. Conditions westerly or updrift of the harbor will be described separately from those on the easterly or downdrift side.

25. Coast characteristics westerly of Ashtabula Harbor. The bluffs between Fairport Harbor and Ashtabula Harbor are described in detail in Appendices III, VII and XII of the beach erosion control report on the Ohio shoreline of Lake Erie, referred to in paragraph 6. A drawing from that report is included as Plate No. 4. It shows the regularity of the shoreline between the two harbors and the location of landmarks used in the following description of various reaches of coastal or bluff characteristics.

26. Generally, the bluffs between Fairport and Ashtabula vary in height from a maximum of 60 feet to as little as five feet. The average height is about 40 feet. The bluff face is nearly vertical throughout most of this entire reach, indicating a conditon of active erosion. The material in the bluff generally occurs in three distinct strata. The lower portion is a boulder clay consisting of a compact mixture of clay and silt with imbedded gravel and small boulders. This is usually covered with a layer of fine lacustrine silc and clay which in turn is covered by a layer of gravel and fine sand. These layers vary widely in thickness. In some reaches the bluff consists almost entirely of boulder clay, in others, the top surface of the boulder clay is less than five feet above lake level. The top layer of sand and gravel is generally in the order of four to seven feet thick. A notable exception occurs just westerly of Tuttle Park where the total height of the bluff is about 60 feet and the sand layer is 30 to 35 feet thick.

27. Between Madison Township Park and Geneva-on-the-Lake the bluff is only 10 to 12 feet high and is composed almost entirely of lacustrine silt. Between Geneva-on-the-Lake and Walnut Beach Park, just west of Ashtabula Harbor, the bluffs gradually increase in height from 30 to 50 feet and are composed almost entirely of boulder clay. Thus for 15 miles immediately west of Ashtabula Harbor the sand layer is largely non-existing and the supply of beach material from erosion of the bluffs is relatively small.

28. Beaches westerly of Ashtabula Harbor. When the field survey was made for the beach erosion control study of Appendices III, VII and XII, covering the shoreline betwen Fairport Harbor and Ashtabula Harbor, the lake level was approximately 2.5 feet above low-water datum (0.5 foot above mean lake level). At that time, over 60 percent of the shore within Lake County and 20 percent of the shore within Ashtabula County had beaches over 10 feet wide. However, all but three of the beach areas had been created or augmented by artificial means. The location and the existence o. non-existence of beaches was found to be closely related to the amount of sand supplied for littoral movement by erosion of the bluffs to the west of each beach area as well as to the existence of structures capable of trapping the drift. As stated in paragraph 21, the bluff immediately west of Tuttle Park contains a thick deposit of sand and a continuous wide beach extends nearly three miles eastward or downdrift of the sand bluff. In the other extreme, the lack of beaches between Geneva-on-the-Lake and Ashtabula Harbor, except in scattered areas where existing harbor structures or groins have gradually accumulated beaches over a long period of time, can be attributed to the nature of the boulder clay bluffs in this area which contain a low percentage of beach building material.

29. Streams west of Ashtabula Harbor. The Grand River enters Lake Erie through Fairport Harbor. It has a drainage area of about 760 square miles. The lower 1-1/2 miles within Fairport Harbor have been improved for deep-draft navigation. Analyses of the material removed by annual maintenance dredging at Fairport Harbor indicate that the amount of beach material carried to the lake by the Grand River is negligible.

30. Between Fairport Harbor and Ashtabula Harbor eight small streams enter the lake. Their drainage areas range from about two to 23 square miles. Of these, only Indian Creek, which enters the lake about 6-1/2 miles west of Ashtabula, and Wheeler Creek, about 10-1/2 miles west of Ashtabula, have any sizable beach areas near their outlets that indicate significant discharges of sand or gravel.

31. Coast characteristics easterly of Ashtabula Harbor. Plate 5, the General Plan taken from Appendices V and X of the beach erosion control report on the Ohio shoreline between Ashtabula Harbor and the Ohio-Pennsylvani State line, indicates the general regularity of the shore with the harbor structures at Ashtabula and Conneaut and the Cleveland Electric Illuminating Company's water intake just easterly of Ashtabula Harbor, being the only projections from an otherwise straight shoreline. The bluffs between Ashtabula and Conneaut are from 40 to 80 feet high and similar in character to those west of Ashtabula. They are founded

on shale that varies in elevation from approximtely four feet below to four feet above low-water datum. The underlying shale is exposed at the base of the bluffs about 2.6 miles east of the mouth of Ashtabula River, just east of Profile No. 2 (see Plate 5), for a distance of nearly a mile. Probings indicate another high shale area at an elevation of 1.5 feet above low-water datum in the vicinity of Profile No. 25 (approximately 10.3 miles east of the mouth of Ashtabula River). However, there is no visible outcrop in that vicinity.

32. Overlying the shale there is an undulating stratum of boulder clay which varies from 38 to 65 feet in thickness. Between profiles 33 and 37 (just west of Conneaut Harbor) the entire bluff consists entirely of boulder clay. Generally, however, the boulder clay is covered by an intermediate stratum of fine lacustrine silt and clay and a surface stratum of sand and gravel. This surface layer of sand and gravel varies in thickness from about two feet up to 27 feet. Some of the thickest deposits are in the first two miles easterly of the east end of the Ashtabula Harbor East Breakwater.

33. Beaches easterly of Ashtabula Harbor. In general, the only wide beaches between Ashtabula Harbor and Conneaut Harbor are those impounded by existing structures. A 130-foot groin built in 1907 at Kingsville-on-the-Lake has maintained a beach about 400 feet long. A beach extends about 1,000 feet westerly of the Conneaut Waterworks breakwater and the beach impounded by the West Breakwater at Conneaut Harbor extends about 1/2 mile to the west. It has a maximum width of about 600 feet at the breakwater.

34. Streams easterly of Ashtabula Harbor. Aside from the Ashtabula River and the Conneaut River that enter the lake within the respective harbors the only other sizable stream within this reach is Whitman's Creek. This stream, that enters the lake about 3.6 miles east of the Ashtabula River mouth has a drainage area of only 7.2 square miles. Between Whitman's Creek and Conneaut Harbor there are several small creeks, about one mile in length flowing northward into the lake. None is a significant source of sand and gravel for beach building.

FACTORS AFFECTING SHORE PROCESSES

35. Lake levels. The stillwater elevation of Lake Erie varies irregularly from year to year. Cycles of high and low stages, extending over periods of several years, follow each other without any consistent pattern. These cycles are produced primarily by rainfall and runoff in the Lake Erie and Upper Lakes basins. They are unpredictable with

any degree of reliability except for perhaps four to six months in advance during which time the influence of precipitation and runoff during preceding months and estimates of future precipitation can be combined with a fair degree of accuracy. Each year the lake surface is subject to consistent seasonal rise and fall, the lowest stages prevailing during the winter months and the highest stages during the summer. The average long-term seasonal variation in monthly mean stage for Lake Erie is about 1.5 feet.

36. In addition to the annual fluctuation, there are also oscillations of irregular amount and duration produced by storms. Some local changes may have a duration of only a few minutes up to several hours during which fluctuations are produced by local squalls and changes in barometric pressure. At other times the level of the entire lake is affected for longer periods by strong winds of sustained velocity and direction that drive the surface water forward to raise the level on the lee shore and lower the level on the weather shore. This type of fluctuation is very pronounced on Lake Erie because of its shallow depth that affords less opportunity for the wind-impelled surface water to return through reverse currents beneath the storm-disturbed surface. Oscillations of the lake surface may continue for many hours after abatement of the storm conditions by which they were produced.

37. Since Ashtabula Harbor is located near the middle of the long axis of Lake Erie, and near the nodal point of the longitudinal oscillations, the effect of these oscillations is relatively small compared to that at the ends of the lake. The effect of transverse oscillations and wind set-up due to northerly winds are of comparable magnitude even though the fetch distance is much shorter from that direction. By interpolation between values of temporary fluctuations, recorded by automatic gages at other points on Lake Erie, it is estimated that a temporary fluctuation of about two feet above the stillwater level occurs with a frequency of about once a year in the vicinity of Ashtabula Harbor.

38. Pertinent data on Lake Erie levels, compiled from gage records at Cleveland, OH, are shown in the following table.

TABLE 2

Lake Erie Levels 1860-1973

Item	Elevation (1) IGLD	Elevation (1) LWD	Date
Highest monthly mean stage	573.51	+4.71	June 1973
Lowest monthly mean stage	567.49	-1.11	Feb. 1936
Mean surface (1860-1973)	570.42	+1.82	
Yearly mean 1974	572.52	+3.92	

(1) Elevations, in feet, are referred to mean-water level at Father Point, St. Lawrence River, Quebec (IGLD) and to low-water datum (LWD) for Lake Erie, elevation 568.6 feet.

39. Winds and wave action. The closest stations of the National Oceanographic and Atmospheric Administration (formerly U. S. Weather Bureau) are located at Erie, PA and at Hopkins Airport at Cleveland, OH. Erie, PA is about 37 miles easterly of Ashtabula Harbor and Cleveland is about 53 miles westerly. Although Erie is closer, no studies have been made relating wind data available from that station to wave action and shore processes. However, a study, sponsored by the Lake Erie Regional Transportation Authority and conducted by the U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS, through a contract with A. H. Glenn and Associates, New Orleans, LA was completed in 1974 to furnish data for the design of a proposed Lake Erie International Jetport at Cleveland, OH. The study includes a wave hindcast for Lake Erie at Cleveland, OH, prepared using 10 years of recorded wind data from Burke Lakefront Airport in Cleveland Harbor supplemented by wind data from Cleveland Hopkins Airport. Although the wind data collection stations are too remote from Ashtabula to precisely represent wave hindcasting parameters such as wind and wave conditions, fetch distances and average depths, it is considered that the Cleveland data are the best available for this reconnaissance report.

40. Table 13 entitled: "Average Percentage Frequency of Occurrence of Wind Speed-Direction Groups" taken from the Cleveland report is inclosed as Supplement No. 2. It gives the frequency of occurrence of wind speeds in groups of velocities at 5 mph intervals from 16 equally spaced compass directions. Figure 1, Supplement No. 3, shows graphically the average interval in years between occurrences of storms of specified wind speed-duration characteristics.

41. Table 26 entitled: "Average Monthly Percentage Occurrence of Significant Wave Height-Direction Groups", inclosed as Supplement No. 4, gives the frequency of occurrence of significant wave heights from the same 16 compass directions. Since the point for which the wave heights at Cleveland were hindcast was at a considerable distance offshore, wave heights for wind directions from ENE through S to SW are tabulated even though the generating winds are offshore.

42. Significant wave periods are shown for significant wave groups (WSW-N-NE Directions) in Table 39, inclosed as Supplement No. 5.

43. Data on the 30 worst storms at Cleveland during the 10-year period studied, and on two previous severe storms, are shown in Table 41, inclosed as Supplement No. 6. Wind and wave characteristics are shown for each storm. Figure 3 of the Cleveland report, inclosed as Supplement No. 7, shows graphically the average interval in years between the occurrence of maximum and significant wave heights based on data from the same 32 storms.

44. Littoral drift. In the vicinity of Ashtabula Harbor winds from WSW through W to NW set up currents along the shore in a general west to east direction. Winds from the NNW are nearly normal to shore and cause little lateral movement while winds from N through NE to ENE set up currents in an east to west direction. Winds from the other compass directions shown in Table 13, (Supplement No. 2) from more southerly directions are generally offshore and have little effect on littoral movement.

45. Referring again to Table 13 it can be seen that winds from N-NNE-NE and ENE, which produce an east-west drift movement, occur a total of 17.9 percent of the time during an average year. Winds from the WSW-W-WNW and NW directions that produce a west to east drift occur a total of 24.1 percent of the time. The prevailing winds from westerly directions thus exceed by 6.2 percent the frequency of occurrence of easterly winds. This should result in a net west to east littoral movement which is confirmed by the predominant accretion on the west side of existing groins and breakwaters in the vicinity of Ashtabula Harbor. Table 13 also shows that winds of the higher velocities occur more frequently from the westerly directions.

46. Water seepage and frost action. - The rate of erosion resulting from the sloughing of material from the face of the silt and clay bluffs is hastened by the action of ground water, surface run-off and frost action. Although some of the bluff material is relatively impervious it contains enough thin lenses of sand to allow percolation of ground water to the

face of the bluff. During dry periods, shrinkage cracks occur near the surface both on top and along the face of the bluff, allowing surface water from subsequent rains to penetrate and further soften the bluff material. Freezing of water in these cracks and seepage lenses during the winter months hastens the disentegration process. Large sections fall off and slide or drop to the bottom of the bluff where wave action quickly breaks up and washes away the fine material. Unprotected bluffs cannot attain a stable slope and the process of slumping, removal and undercutting by wave action goes on in a continuous cycle, the rate dependent to a large extend upon lake levels and the related intensity of wave attack.

47. The intensive development of the shore frontage with summer cottages and permanent homes adds to the seepage problem. Frequently, as is the case westerly at Ashtabula Harbor, the water supply is from public water supply mains supplied from a source outside the immediate area while sewage disposal is generally by means of individual septic tanks. Thus the ground water supply is increased which adds to the seepage and, in turn, to the erosion problem.

Analysis and Study of the Specific Problem

48. General. The specific purpose of this preliminary investigation is to determine whether the navigation structures built at Ashtabula Harbor have increased the erosion or caused other damage to the adjacent shore. This requires a determination and study of potential effects that the structures might have on the shore. The obvious potential sources of damage are: (1) the interruption of littoral drift that might cause starvation of downdrift beaches and; (2) the concentration of wave energy at one or more points in or near the harbor by wave reflection or diffraction by harbor structures that might concentrate wave energy and increase the erosion at specific locations.

49. These potential causes of erosion and rates of erosion in the locality have been determined in this preliminary investigation to the extent possible using available information without further field studies. Considerable information is available from previous studies, surveys and reports. From this information rough calculations of the amount of material that has been impounded by the harbor structures and removed by dredging have been made. Rates of erosion have been obtained from previous reports and updated by a comparision of large scale aerial photos of the shore taken in 1946 and 1973.

50. Impoundment by harbor structures. - The amount of littoral material impounded initially by the river mouth piers and later by the West Breakwater has been roughly computed by comparing a survey chart made in 1876 by the U. S. Lake Survey with its 1974 navigation chart. The only navigation improvements at the time of the 1876 survey were the river mouth piers. Accretion adjacent to the piers that had occurred prior to 1876 has not been included in the impoundment calculation because of lack of data on the shore and offshore depths at the time of construction of the piers. As previously stated the west breakwater was begun in 1897 and completed in 1936. The 580-foot shore connection was completed in 1924. Since then the West Breakwater has been a continuous structure acting as a barrier to litcoral drift. However, the shoaling pattern inside the harbor indicates that considerable sand is blown or washed over and through the upper part of the structure. There is no indication that sand has built out far enough to pass around the outer end of the West Breakwater. No dredging is required to maintain the entrance gap or outside entrance channel at this time.

51. Comparison of the 1876 and 1974 charts was made by superimposing a 500-foot spaced grid on each and comparing elevations of the corners of corresponding grid squares. Areas covered included that inside the West Breakwater between the breakwater and the railroad company pier extending out to the maintained Federal project. The area outside the West Breakwater was roughly triangular flaring from the outer end of the breakwater toward the west approximately following the apparent toe of the accretion in depths of from 30 feet at the end of the breakwater to 16 feet at the shoreward end. The considered area extended about 1/4 mile westward of the shorearm which was the limit of the survey. A narrow tapering area of accretion is shown by aerial photos to extend another 1/4 mile to the west but the volume involved would be small in comparison to the total measurable within the limits of available charts.

52. The total accretion inside the breakwater between 1876 and 1974 is about 1,883,000 cubic yards. Outside the West Breakwater another 2,265,000 cubic yards accumulated for a total of 4,148,000 cubic yards. This is an average of about 42,300 cubic yards annually which is considered a conservative estimate because of the limitations of the available survey data.

53. Dredged material. - In addition to the accumulated material still in place, much has been removed by almost annual dredging for maintenance of the harbor since the first structures were built in 1826. Early reports of the Chief of Engineers, prior to about 1910 when the first arrowhead breakwater system was completed, frequently refer to the rapid

accumulation of sand and gravel westerly of the west pier and in a bar off the lakeward ends of the piers. The reported amounts dredged annually since 1872 are shown in a tabulation included as Supplement No. 8. A total of about 6,200,000 cubic yards of material has been removed and disposed of in deep water outside the harbor area. Since the dredging quantities were reported as scow or bin measure, as measured in the scows or hoppers of the suction dredges used in the dredging operations, a conversion factor of 115-cubic yards scow or bin measure equivalent to 100-cubic yards place measure was used in arriving at this total yardage given as place measure. This is also considered a conservative estimate of the total dredged quantities as no records of dredging done by private interests during the early history of the harbor, for deepening and maintaining their slips, are available.

54. The annual dredging required has increased steadily, particularly as the breakwater systems were expanded and channels were deepened and extended. A dramatic increase in the annual dredging occurred following the deepening of the 18-foot and 16-foot river channels in 1939-40 and their subsequent maintenance. The channel and turning basin, completed in the east outer harbor in 1960, also added substantially to the area to be maintained and to subsequent dredging quantities.

55. Nature of dredged material. - The grain size of the dredged material indicates that much of the material being removed, particularly in recent dredging operations, is too fine to have been supplied as littoral drift. Grain size analysis of the material are not available but samples taken in the outer harbor at depths of 30-feet to 36-feet by USEPA in 1974 are described as "gritty gray sludge" and "sludge-ooze, gray color." Samples from the river from one to two miles above the mouth are similarly described as "gray-brown ooze" and "reddish-brown ooze." The similarity suggests that the river is a significant source of the harbor sediments. Another probable source is the fine material in suspension in the near shore zone of the lake that is carried along shore by the littoral currents and deposited in the relatively quiet water inside the harbor. Consistent annual shoaling along the dredging limits just inside and parallel to the West Breakwater indicates that some material, which is probably coarser than the river sediments, is washed over and through the West Breakwater. Other than from this small area the bulk of the dredged material now being removed from the harbor is much too fine to provide stable beach fill and its disposal elsewhere has little, if any, effect on the downdrift beaches.

56. Shoreline and offshore changes east of Ashtabula Harbor. - The change in depths between 1894 and 1974 in an area just outside the Federal project in the vicinity of the east end of the East Breakwater, containing about 137 acres, was investigated to compare changes immediately downdrift of the harbor with those found immediately updrift. The limits of the area, included on available maps, extended both inside and well outside (lakeward and easterly) of the East Breakwater. Shoaling was found to have occurred throughout most of the area amounting to an average of about 3.9 feet. This corresponds to a total accretion of about 866,000 cubic yards. The consistency of the material is not known from recent sampling but is noted as "clay" in two widely separated places on the 1974 chart. Much of the original bottom shown on the 1894 chart was shown as bare rock or having only a few tenths of a foot of cover. Close inshore there is still no cover over the rock bottom.

57. The report in Appendix V and X of the State of Ohio beach erosion control study contains the following statement concerning shore line changes easterly of Ashtabula Harbor based on a comparison of hydrographic surveys made in 1876 and 1948 by the U. S. Lake Survey. The locations of the profile lines (cross sections) referred to are shown on the General Plan of that report, attached herein as Plate No. 5. "Comparative profiles indicate that the rate of recession of the low-water datum shoreline has been greater west of profile 20 than to the east of that profile. Comparison of the profiles shows that the shoreline has moved an average of 100-feet (1.4 feet annually) between profiles 1 and 14. The maximum landward movement of 235 feet (3.3 feet annually) occurred in the vicinity of profile 1, which is 600-feet east of the Cleveland Electric Illuminating Company. The shore line has moved an average of 220-feet (3.0 feet annually) landward between profiles 15 and 20. The most severe recession in the study area (between Ashtabula and the Ohio-Pennsylvania State line) occurred in the vicinity of profile 20 where the 1948 low water shoreline was approximately 290-feet landward of the 1876 low water datum shoreline---. There has been a 130-foot lakeward movement of the shoreline in the vicinity of profile 21---. The shoreline east of profile 20 has remained relatively stable during the period between surveys." These areas of erosion are indicated on Plate No. 5.

58. Comparative profiles from the 1876 and 1948 surveys, extending from the top of the 1948 bluff line out to the 20-foot depth contour generally indicate recession of the bluff and erosion of the beaches inside the five-foot depth contour and accretion averaging two to three feet lakeward of the five-foot depth out to the survey limit of 20-feet.

59. During the present investigation a comparison was made of aerial photos of the shore easterly of Ashtabula Harbor in 1948 with similar photos taken in 1973 to determine the rate of recession of the bluff during a recent 25-year period. The points selected for comparison were selected arbitrarily at about 1/2 mile intervals easterly from the east end of the U. S. East Breakwater. In the first mile the existence of the CEI plant and the construction of other plants have changed natural conditions. Because of distortion in the aerial photos, scaled distances are not exact but special care was taken, through use of accurate control maps, to locate the top of bluff with reference to the edge of Highway 531 which follows the shore quite closely in this area. In the following tabulation the location of the points where measurements were taken with respect to the range lines of the Appendix V and X report are also indicated. The locations of the range lines are shown on Plate No. 5.

TABLE 3

Rates of Bluff Erosion East of Ashtabula Harbor

Distance E. of E. Brkw. (Miles)	Vicinity of Range No:	Distance-N. edge of road to top of bluff 1948	1973	Loss of bluff 1948-1973 Total (ft)	Avg. annual (ft)
1-1/2	2	380	330	50	2.0
2	-	400	370	30	1.2
2-1/2	3	400	350	50	2.0
3	4	200	165	35	1.4
3-1/2	10	140	120	20	0.8
4	14	375	375	0	0.0
4-1/2	16	400	350	50	2.0
5	-	390	375	15	0.6

60. The rate of shoreline erosion (1.4 feet annually) between profiles 1 and 14 for the 1876 to 1948 period agrees very closely with the average rate of bluff erosion (1.2 feet annually) between 1948 and 1973.

61. Shoreline and offshore changes west of Ashtabula Harbor. - The following is quoted from the report on Appendices III, VII, and XII of the State of Ohio beach erosion control study that included about 26 miles of shore westerly from Ashtabula Harbor to Fairport Harbor, OH. The limits of the study area and locations of the profiles referred

to are shown on the General Plan of that study, inclosed herein as Plate No. 4. The changes described occurred between 1876 and 1948. Paranthetical notes have been added.

62. "Exclusive of profiles 87 and 88, which were taken at the beach immediately west of the West Breakwater at Ashtabula Harbor, there has been an average 55-foot (0.8-foot annual) landward movement of the shoreline between profiles 45 and 93 (the shore for about 17 miles immediately west of Ashtabula Harbor). The maximum landward movement of 190-feet (2.6-feet annually) occurred in the vicinity of profile 75. There is no beach at this location and wave attack at the base of the bluff continues unimpeded---. The lakeward movements of 240-feet and 530-feet, occurring at profiles 87 and 88 respectively, are due to the impounding action of the West Breakwater at Ashtabula Harbor."

63. The same report discusses the offshore changes as follows: "It is therefore considered impractical to determine and describe the offshore depths in detail. However, in general, deepening of the offshore areas between the shoreline and the 10-foot depth has occurred wherever erosion and recession of the bluffs has taken place. In general slight accretion has occurred between the 10 and 30-foot depths."

64. A study of the changes in the top of the bluff west of Ashtabula Harbor was made using 1948 and 1973 aerial photos as previously described for the shore easterly of the harbor. However, the rate of erosion was found to be so much lower that comparisions at points picked arbitrarily at 1/2-mile intervals generally showed no detectable erosion. Measurable amounts could be found only at specific areas where erosion was most obvious. One such area is located about 2-1/4 miles west of the West Breakwater, just east of the marina jetties at Red Brook where at one point the bluff had receded about 100-feet in the 25-year period or at an average rate of about four-feet per year. Another area of serious erosion is located about five-miles west of Ashtabula Harbor where several hundred feet of the bluff has receded about 50-feet or at an average rate of about two-feet per year. This is the area reported on in a beach erosion study dealing with the protection of State Highway 531 referred to in paragraph 4. It is also in the vicinity of Profile 75 of the Appendices III, VII, and XII study where the most serious erosion between Fairport and Ashtabula Harbors was reported (2.6-feet annually).

65. Other evidence of shoreline changes. - Inclosed as Plate No. 2 is an early drawing of Ashtabula Harbor, that accompanied the 1881 annual report of the Chief of Engineers, which shows the location of the shoreline on both sides of the harbor entrance piers at six time intervals

between 1865 and 1881. The shorelines shown are apparently uncorrected for lake stage since the 1879 shoreline is the most lakeward on both sides of the piers and lake levels that year were generally lower than during the other years between 1865 and 1881. The pattern of lakeward and shoreward movements of the shoreline is much the same on both sides of the piers. However, the shorelines on the west or updrift side were from 440-feet to 570-feet lakeward of the corresponding shorelines on the east side during this period.

66. An even earlier report in 1839 states: "At this date the west pier projected 730-feet and the east pier 660-feet on the west side and 455-feet on the east side". This shows that during the years immediately after construction of the piers accretion was rapid on both sides at an average rate of about 50-feet per year on the west and 38-feet per year on the east.

67. A drawing from the files of the Buffalo District, dated 4 Dec 35, entitled: "Changes in Shoreline 1844-1935", inclosed as Plate No. 3, shows the location of the shorelines in 1844, 1894, 1923, and 1935. It also indicates the date of construction and the location of Federal navigation improvements and dock facilities provided prior to and during that period. The consistent and extensive accretion west of the river mouth piers is very evident. Changes on the east side are obscured by the early and more extensive harbor development by the railroad. It is of interest to this investigation to note that accretion occurred on the east side of shore structures but at a much slower rate than on the west side. There was little or no change in the shoreline between 1844 and 1894 easterly of the then-existing harbor development for a distance of about 3,500-feet. Minnesota Avenue, shown near the east limit of the drawing is about at the westerly limit of the present Lake Shore Park. About 350-feet east of Minnesota Avenue the shoreline receded about 110-feet between 1894 and 1923, an average annual rate of about 3.8-feet per year.

68. Potential effects of harbor structures on wave energy. - As stated in paragraph 42, in addition to the effect of the harbor structures on litteral drift, a second potential source of damage is possible concentration of wave energy by reflection or diffraction from the harbor structures.

69. A report on a preliminary examination and survey of Ashtabula Harbor made in 1915, published in H. D. 997-64th Congress, 1st Session, that recommended construction of the shorearm of the West Breakwater contains

the following statement: "In 1913, property owners living on the west shore west of the harbor, presented petitions asking for the construction of a shore jetty at the end of the West Breakwater, stating that the extension of the West Breakwater on its present line has caused erosion of their property." This statement was made while the last shoreward extension of the West Breakwater was under construction but two years prior to its completion in 1915. If, in fact, the breakwater extension did cause additional erosion it could have been due to wave build-up and reflection off the wall during westerly or northerly storms. However, it is more likely that the increased erosion, complained of in 1913, was due to the higher than average lake level that peaked at about 3.5 feet above low water datum, the highest level that had occurred since 1889. After construction of the requested shore connection in 1924 a wide beach formed to the west and no further erosion damage is reported in that vicinity. No other references to erosion damage from the effects of the harbor structures were found in the early reports and documents reviewed during this investigation. However, as stated in paragraph 3, a 1964 report by the State of Ohio Department of Natural Resources, Division of Geological Survey reaches the general conclusion that most of the large structures on Lake Erie cause accretion on the updrift side and accelerated erosion downdrift.

70. Potential damage from wave reflection off the U. S. East Breakwater appears to be minimal. The east end of the breakwater is about 2,000 feet offshore and its alinement is such that reflected waves would be directed offshore or toward the CEI intake structures rather than toward any section of unprotected shore. Secondary reflection off the intake is possible but direct reflection of waves from other directions off the intake are potentially more damaging than those reflected off the breakwater. Reflected waves and eddy currents off the intake may, in part, account for the lack of a beach at the easterly end of the park frontage. However, there is no obvious point of excessive erosion in the area and the rate of erosion of about 1.6-feet per year between 1948 and 1973, reported in the recent Section 103 Study of the park frontage is no greater than found at a number of other points in the five miles east of the harbor shown in the Table in paragraph 52.

71. Detailed diffraction studies are beyond the scope of this investigation. However, the conditions of breakwater alinement and exposure to wave action are such that, if it is assumed that the depth is constant inside the breakwater, diffraction could be expected to increase the wave heights by 10 to 15 percent at some points shoreward of the breakwater. Under the actual conditions near the end of the east breakwater,

waves approaching the shore would be simultaneously affected by diffraction, refraction, and shoaling. The point of maximum wave-energy concentration changes with each change in direction of deep-water wave approach. It therefore moves over a considerable length of the leeward shore with no apparent localized erosion.

72. Damaging effects of harbor improvements. - It seems evident from the preceding discussion that the harbor structures do not cause measurable concentrations of wave energy that aggravate the erosion problems at any particular points. however, it has been found that the rate of erosion of the bluffs easterly or downdrift of the harbor for a distance of at least six-miles is measurably greater than that generally found in the same distance to the west of the harbor. No natural differences in shore characteristics, alinement or exposure to wave action have been found in this investigation that would account for the higher rate of erosion easterly of the harbor. However, the impoundment of littoral drift to the west of and within the harbor in the amounts found to have occurred since the harbor was first improved in 1826 must be assumed to have deprived the downdrift area of an equivalent amount of beach building material. This, in turn, has reduced the heights and width of downdrift beaches available to absorb wave energy and protect the bluffs from erosion.

73. Material dredged from the harbor, particularly between 1826 and 1924 before the West Breakwater was extended to shore, also contained a high percentage of granular material that was removed from the littoral zone and disposed of in deep water offshore. The material being dredged at the present time from within the confined limits of the harbor is finer and only a small percentage would be suitable for beach fill. Under present conditions the only damage found to be attributable to the harbor navigation structures is the interruption and impoundment of the natural littoral drift estimated, as described in paragraph 46, to have amounted in total to about 4,148,000 cubic yards or about 42,300 cubic yards annually between 1876 and 1974.

Plans Investigated

74. The obvious means of mitigating any damage caused by the harbor structures is to replace beach material on the downdrift side of the harbor equivalent in quantity and quality to that impounded by the harbor structures, particularly the U.S. West Breakwater. The Cleveland Electric Illuminating Company's intake structure divides the downdrift area into two separate compartments each of which require fill to provide adequate protective beaches. The area to the west of the intake is the--

frontage of Ashtabula Township's Lake Shore Park. The first mile downdrift of the intake is occupied by the industrial developments of CEI and chemical plants; the next two miles to Kingsville-on-the-Lake is undeveloped frontage owned by CEI. Beach replenishment or stockpiling for future nourishment immediately downdrift of the intake should be undertaken with caution because of the possibility of clogging the CEI outflow channel by reversals in the predominant littoral drift.

75. Careful study of several other factors involved in a by-passing or beach nourishment project must be made prior to its undertaking. Among these factors are a determination of the suitability of the impounded material if it is to be used as the source of the proposed fill. Its grain size throughout all parts of the impounding area should be determined to establish whether it is coarse enough to be reasonably stable as beach fill. The degree of pollution must also be determined. Objections to removal of the material can be expected from property owners westerly of the West Breakwater including the City of Ashtabula, the owner of Walnut Beach Park which is located in that area. Removal of material between the breakwater and the railroad company's pier might be beneficial to navigation by improving the access to the west side of the pier. An environmental impact study should thoroughly investigate effects in both the nourishment and borrow areas.

76. Several methods of transferring sand from the vicinity of the West Breakwater to the proposed nourishment areas are available. These include: (1) a hydraulic dredge and pipeline; (2) dragline dredging and truck haul; (3) use of a hopper dredge with pump-out capability; and (4) clam shell or dipper dredging and transport by split hulled barges. The existing conditions present problems for each of these methods that tend toward high costs and varying degrees of feasibility. The pipeline from a hydraulic dredge would necessarily cross the active navigation channels requiring that at least part of the pipeline be submerged. The pumping distance to the closest proposed beach fill at Lake Shore Park is about two miles and about three miles to the updrift end of the shore to the east of the presently developed industrial frontage. At least two booster pumps would be required. Truck haul would be through busy, congested streets in the harbor area, partially through park areas and reaching the beach at the easterly end would require special access roads from the highway that roughly parallels the top of the high bluff. Use of a hopper dredge requires provision of mooring facilities and pipelines in the discharge areas with weather becoming a vital factor in the entire operation. Dredging and transport by barges is subject to the same weather delays. Even with the use of split hulled barges material cannot be placed directly on the beach where it would be most effective but would be deposited offshore in depths of not less than 5 to 10 feet and even then at considerable risk to the barge particularly during rough weather.

77. The minimum improvement to be provided in the six miles of shore easterly of the industrial development at CEI and the chemical plant to Profile No. 20 (See Plate 4) should consist of initial fill to compensate, at least in part, for past depletion of the beach by years of impoundment by the harbor structures and to mitigate future damages by annually by-passing an amount of sand equivalent to that impounded by the West Breakwater. To provide a beach with a crest height of 6 feet above LWD, having no horizontal berm, and with a slope of 1 on 12 from the beach crest to the natural lake bottom requires about 4.2 yards of sand fill per foot of beach or a total of about 133,000 cubic yards for the six miles of shore. This beach profile is not adequate for full protection of the shore at all lake stages but at mean lake stage of about two feet above LWD the exposed beach width of about 48 feet should be effective. This is a very modest initial improvement, corresponding to placement of only about three percent of over 4,000,000 cubic yards estimated to have been impounded since the harbor was built and equivalent to the average amount of material impounded in a little over three years. However, it does provide beaches at least equivalent to the natural beaches updrift of the harbor and is therefore a reasonable mitigation measure. Future bypassing of the material impounded annually by the West Breakwater, estimated to amount to about 42,000 cubic yards, should fully mitigate any possible future damages. The initial fill and annual replenishment can most economically be provided as feeder beaches so located as to be most effective in restoring depleted beaches.

78. In lieu of providing beaches downdrift of the harbor to mitigate the erosion damage, protection could be provided by stone revetment at the toe of the bluff. This would be unsightly and interfere with normal use of the shore frontage, particularly in residential areas. Suitable stone is not readily available nearby and the cost of revetment has been found in many cases to be equal to or higher than alternative beach fill plans.

79. Other sources of sand fill, such as offshore deposits and upland pits might be used if the impounded material near the West Breakwater is found to be unsuitable or unavailable.

79A. A preliminary cost of Federal acquisition has been made for this report. Using the general land values furnished by the county real estate office, the cost of acquiring a strip of land to provide protection for 50 years from the long-term erosion rate would amount to $792,000. Approximately 16 structures would have to be acquired. Estimating the average value to be $20,000 this would amount to $320,000. Table 4A gives a breakdown of the total Federal acquisition costs.

Economic Analysis

80. Estimate of first cost. - The estimate of first cost for the considered structural plan of improvement, consisting of the placement of 133,000 cubic yards over a shore frontage of about six miles downdrift of the harbor is shown in the following table. Unit costs are based on recent unit prices on contracts for similar work at other nearby locations on Lake Erie with minor adjustments in view of local conditions. The estimated cost is based on delivery of the material by truck haul and allows considerable flexibility in selection of the source of the sand fill.

Table 4

First Cost of Beach Restoration Plan of Improvement
(June 1975 Price Level)

Item	Quantity c.y.	Unit Cost	Total Cost
Sand fill:			
East of industrial area	133,000	$5.50	$ 732,000
Contingencies 25%+			183,000
Sub Total			915,000
Engineering and design			55,000
Supervision and administration			37,000
Total Cost			$ 1,007,000

NCBED-PS
SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, Oh

80A. The estimate of first costs for Federal acquisition is shown in the following table.

Table 4A

First Cost of Federal Acquisition (June 1975 Price Level)

Item	Quantity acres or no.	Unit Cost	Total Cost
Land	86.6	Variable 1/	$ 792,000
Structures	16	$20,000	320,000
Contingencies 25%+/			278,000
Sub Total			$1,390,000
Engineering and design			110,000
Supervision and administration			100,000
Total Cost			$1,600,000

1/ Dependent on relation to developed areas.

81. Estimated annual costs. - The estimated annual costs for the structural plan based on an interest rate of 6-1/8 percent and a project life of 50 years are as follows:

Interest (6-1/8%)	$ 51,700
Amortization (.0033)	3,300
Maintenance	320,000
Total annual cost	$ 385,000

Maintenance costs are based on the annual replenishment of 42,300 cubic yards of sand at a unit cost of $7.50 equivalent to that used in the first cost including contingencies, engineering and design, and supervision and administration. This amount of maintenance is not based upon the amount estimated to be required to maintain the considered improvement in its initial condition but upon the action considered necessary annually to mitigate future damages due to interruption of an equivalent amount of littoral drift.

81A. The estimated annual costs for Federal acquisition are as follows:

Interest (6-1/8%)	$ 98,000
Amortization (.0033)	5,300
Total Annual Cost	$ 103,300

82. Estimate of benefits. - The purpose and nature of this investigation should confine benefits to those derived from mitigation of damages caused by the Ashtabula Harbor navigation improvements. The present and planned development of downdrift areas must be considered in evaluating the damages. For this reason it has been assumed that a portion of Lake Shore Park will be developed as a public bathing beach and that areas downdrift of the present industrial complex will continue, for the foreseeable future, to be held or used for industrial, agricultural and residential purposes. Therefore, no recreation benefits have been determined to the east of the industrial area. Benefits from the improvement of Lake Shore Park have been evaluated in the Section 103 study of the area, referred to in paragraph 5 and have not been included in this report.

83. Potential benefits from protection of the six miles of shore downdrift of the harbor would be realized from prevention of loss of land and residences. The six miles of shore is about equally divided between undeveloped frontage owned by Cleveland Electric Illuminating Company and residential properties with both summer and permanent homes. The industrial land, that extends over a mile inland in some places, has an overall market value of $250 per acre according to information on land values furnished by the county real estate office. However, the value of this shore frontage is considered to be in the order of $20,000 per acre if sold for residential use. Shore front lots suitable for summer homes having a lake frontage of about 40 feet and a depth of 100 feet are valued at $1,000. Larger lots with an average 60-foot frontage are valued at $1,800 to $3,600 in areas developed with permanent homes. The smaller lots have a value of $0.25 per square foot; the larger lots from $0.30 to $0.60 per square foot.

84. The average rate of erosion in this six mile reach is in the order of 1.4 feet per year. A detailed survey of land use is beyond the scope of this investigation but a study of maps and aerial photos indicates that about three miles of the shore is undeveloped and three miles is in somewhat scattered residential use perhaps equally divided between permanent and summer homes. On this basis the annual damage from loss of land alone is:

Industrial land	$ 10,000
Summer home lots	2,800
Permanent home lots	5,000
	17,800

85. In addition to the loss of land as the erosion progresses, buildings are also lost occasionally and the value of all property depreciates drastically as the buildings become seriously threatened. It is roughly estimated that this loss would approach that due to loss of land or amount to about $12,000 annually. This estimate was made based on information obtained from current aerial photographs and known development of the area.

86. The total evaluated benefits from protection of the six miles of shore are summarized in Table 5. Only a part of the evaluated damages were caused by the harbor structures. A comparison of average erosion rates updrift (westerly) of the harbor with those to the east is a means of determining what portion of the total damages are attributable to the harbor. It has been previously determined that the average rate of shore erosion between 1876 and 1948 was about 0.8 feet per year westerly of the harbor and about 1.4 feet per year easterly of the harbor. The 0.6 foot of additional erosion or 42 percent of the total erosion easterly of the harbor can be attributed to the effect of the harbor structures. Consequently only 42 percent of the total damages prevented can be claimed as benefits due to mitigation. As shown in Table 5 the benefits due to mitigation of damages due to the harbor structures amounts to $12,500 annually.

Table 5

Evaluated Benefits (June 1975 Price Level)

Description	Average Annual Benefit
Prevention of erosion	
Industrial land	10,000
Residential lots (summer)	2,800
Residential lots (year-round)	5,000
Prevention of structural damage and depreciation of residential properties	12,000
Total Benefits	29,800
Benefits due to mitigation (42% of total)	12,500

87. In addition to these evaluated benefits there are other long range potential damages that would be prevented. State Highway 531 follows the shore and, generally, within 100 to 150 years at the present rate of erosion, many portions will be dangerously close to the top of the bluff. A few reaches of the highway can be affected much sooner than

this probably within 30 to 40 years. Its loss would seriously disrupt access along the lakeshore. The closest parallel road is over a mile inland. Intangible benefits would be realized by all property owners in increased peace of mind and feelings of security that would encourage a higher degree of development of shore property.

Conclusions

88. The navigation structures at Ashtabula Harbor and the maintenance dredging since construction of the harbor in 1826 are considered to be at least partially responsible for erosion problems to the east or downdrift of the harbor. Over 4,000,000 cubic yards of littoral material has been impounded by the harbor structures in addition to that removed by maintenance dredging and disposed of in deep water. It is concluded that the serious erosion downdrift of the harbor could be alleviated by restoration of beaches at the toe of eroding bluffs. Annual replenishment in an amount at least as great as the average annual impoundment, estimated to be in the order of 42,000 cubic yards, would be required to mitigate future damage due to the navigation structures. However, the cost for any structural measure would be prohibitive.

89. The first costs of the structural plan is estimated to be about $1,007,000. The benefit cost ratio for the beach replenishment plan developed in this report is 0.03. The cost of Federal acquisition to the east of the CEI intake is estimated to be $1,600,000. Based on annual costs, Federal acquisition seems to be a more practical alternative to the east of the CEI structure. However, the B/C ratio for this plan is only 0.12 about four times greater than the structural plan. It is concluded that a general Real Estate study would be beneficial, if funded, to determine whether Federal acquisition would be an acceptable solution to implement different from the present 111 policy. Currently, this option is not covered under the Section 111 authority.

90. The study has also determined that the harbor structures are at least part of the cause of the erosion problems at Lake Shore Park.

91. This investigation indicates that further study of the effects of the navigation structures to determine a structural solution to mitigate the effects is not justified under the current Section 111 authority.

NCBED-PS
SUBJECT: Reconnaissance Report on Section 111 Study of Ashtabula Harbor, OH

Recommendations

92. I recommend that:

a. A portion of the beach at Lake Shore Park, estimated at approximately 4.2 cubic yards per lineal foot of beach be replaced at a Federal cost as part of the Section 103 project now authorized for preparation of a Detailed Project Report when funds are available.

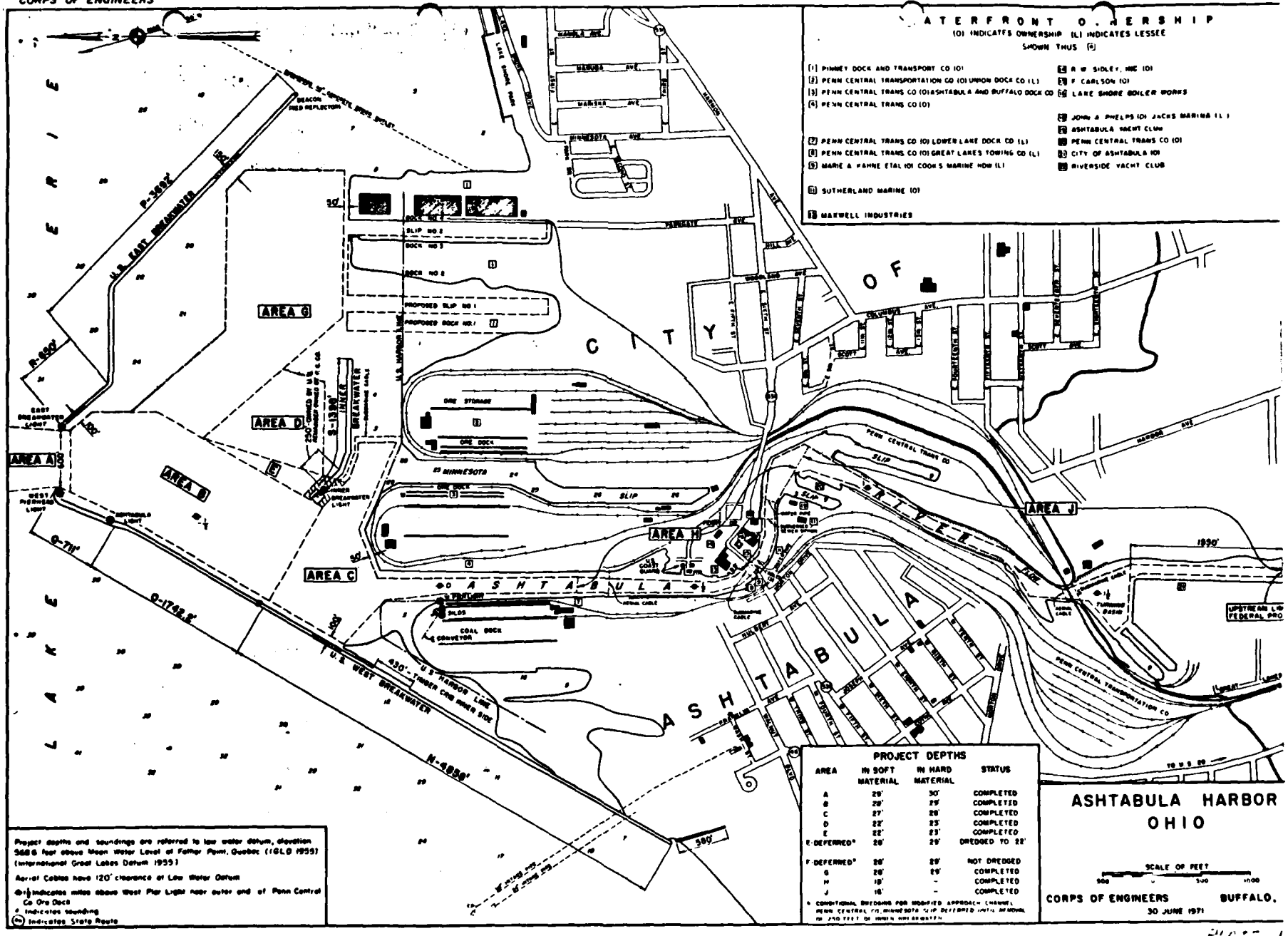
b. Funds be authorized to conduct a general Real Estate study in order to determine the acceptability of Federal land acquisition as an alternative to structural mitigation measures for the Section 111 authority for future consideration.

c. No further action be taken at this time at Ashtabula, OH, under current provisions ~~of Section~~ 111 of the 1968 River and Harbor Act.

BERNARD C. HUGHES
Colonel, Corps of Engineers
District Engineer

CORPS OF ENGINEERS

U.S.A



PAGE 1

DEPARTMENT OF
NATURAL RESOURCES
JOHN J. GILLIGAN
Governor
WILLIAM B. NYE
Director

Division of Geological Survey
LAKE ERIE SECTION P.O. BOX 650 • SANDUSKY, OHIO 44870

8 February 1974

Colonel Hughes
District Engineer
Corps of Engineers, Buffalo District
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Hughes:

I talked to General Bachus in Detroit last Thursday and he said that he would like to get some Section III studies (Rivers and Harbors Act, 1968) started on the Great Lakes. This is the reason I am writing you. The Division of Geological Survey is very interested in continuing our work on shore processes - we hope to have finished by the end of this year shore erosion and flooding studies of each of the Ohio counties -- and one of the areas that we would like to investigate more fully is the effect of some of the large harbor structures on the shore processes. Perhaps if you are interested in getting a few Section III studies going on Lake Erie we could get together and discuss our ideas. Personally, I am very anxious to get going on a study(ies) of this nature as I feel that we could accomplish something worth doing. I am,

Sincerely yours,

Charles H. Carter

Charles H. Carter
Geologist
Ohio Division of Geological Survey
Lake Erie Section

cc. H.R. Collins, Chief, Division of Geological Survey
Norman Arno, Engineering Division, North Central Division

Supplement 1 to 1
Pg 1 of 4

DEPARTMENT OF
NATURAL RESOURCES
JOHN J. GILLIGAN
Governor
WILLIAM B. NYE
Director

Director's Office
FOUNTAIN SQUARE • COLUMBUS, OHIO 43224 • (614) 469-3770

July 31, 1974

Colonel Bernard C. Hughes
District Engineer
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Hughes:

I was recently informed that the Corps has undertaken several Section 111 studies (PL 483, 90th Congress) on Lake Michigan. Because of our interest in our own Lake Erie shoreline and because of the probable detrimental influence of several of the Federal navigation works along our shore within the Buffalo District we would like the Corps to initiate five Section 111 studies for the State of Ohio.

According to the Division of Geological Survey the Federal navigation works that should be investigated are located at Conneaut, Ashtabula, Fairport, Vermilion, and Huron.

We would greatly appreciate your consideration of this matter, moreover the Department of Natural Resources will be pleased to assist your organization in any way we can, I am,

Sincerely,

WILLIAM B. NYE
Director

WBN:eh

Supplement No. 1
pg. - of 4

DEPARTMENT OF
NATURAL RESOURCES
JOHN J. GILLIGAN
Governor
WILLIAM B. NYE
Director

Director's Office
FOUNTAIN SQUARE · COLUMBUS, OHIO 43224 · (614) 466-3770

October 4, 1974

Colonel Bernard C. Hughes
District Engineer
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

Initiation of Studies Pursuant to
Section 111 of Public Law 90-483

Dear Colonel Hughes:

Reference is made to my letter of 31 July 1974 regarding the above listed subject.

Can you advise on the possibility of initiating Section 111 studies during the current fiscal year for the five harbors that were identified in my earlier correspondence?

Your early response would be appreciated.

Sincerely,

William B. Nye

WILLIAM B. NYE
Director

WBN/fm

Supplement No. 1
Pg 3 of 4

DEPARTMENT OF
NATURAL RESOURCES
JOHN J. GILLIGAN
Governor
WILLIAM B. NYE
Director

Director's Office
FOUNTAIN SQUARE · COLUMBUS, OHIO 43224 · (614) 466-3770

December 13, 1974

Colonel Bernard C. Hughes
District Engineer
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

Proposed Initiation of Section 111
Studies (P.L. 90-483) at Lake Erie
Harbors

Dear Colonel Hughes:

This is to acknowledge receipt of your letter of 14 November 1974 relative to the above listed subject.

In response to your correspondence, members of my staff have once again reviewed the list of priority harbors that was furnished to your planning office in September of this year. Since all five harbors considered possess serious erosion problems, it was extremely difficult to determine a listing of priorities. However, in light of the Buffalo District's limited study capabilities for the current fiscal year, as expressed in your 14 November letter, we have concluded that study efforts for Ashtabula as well as Fairport should commence as soon as possible. These recommendations are made with the understanding that a Section 111 study for Conneaut Harbor has been underway for some time and is expected to be completed at any early date.

We appreciate the opportunity to provide our recommendations and trust that meaningful results will be obtained from these studies.

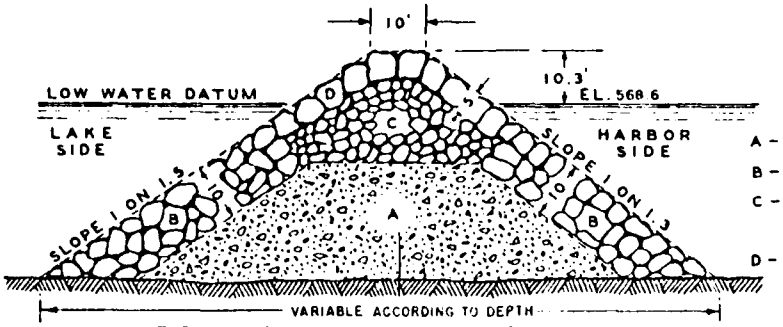
Sincerely,

William B. Nye

WILLIAM B. NYE
Director

WBN/fm

Supplement No 1
Pg. 4 of 4

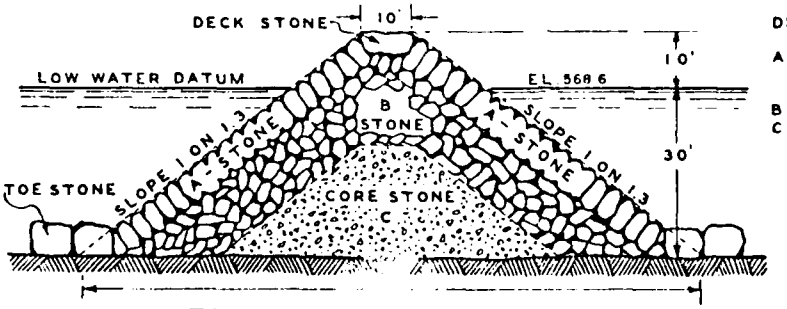


A - QUARRY CHIPS.
B - QUARRY RUN NOT LESS THAN 3 TONS.
C - QUARRY RUN BETWEEN 500 LBS. AND 3 TONS.
D - CAPPING STONE GREATER THAN 3 TONS.

SECTION OF EAST AND WEST BREAKWATERS -N-O-P-

BUILT - E.B. 1912-1915
W.B. 1897-1924

TIMBER CRIB IN SECTION N

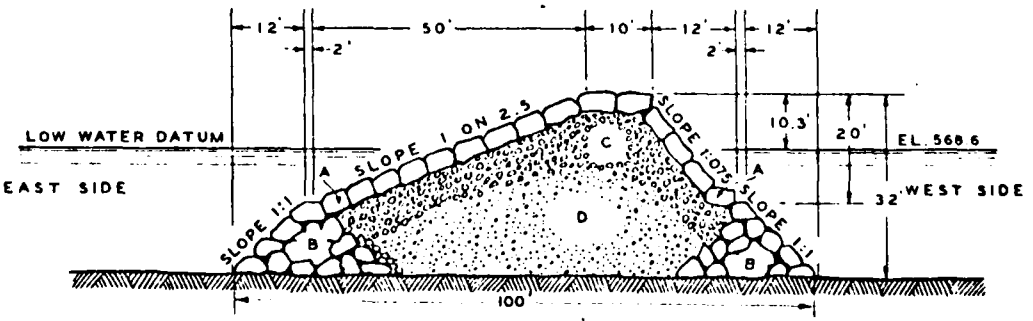


DECK STONE - MINIMUM WEIGHT 5 TONS. MINIMUM THICKNESS 30 INCHES.
A - STONE: MINIMUM WEIGHT 3 TONS. NOT LESS THAN 50% 5 TONS OR MORE. MINIMUM THICKNESS 24 INCHES.
B - STONE: MINIMUM WEIGHT 150 LBS.
C - STONE: NOT LESS THAN 35% 75 LBS. NOT MORE THAN 3% WEIGHING LESS THAN ONE LB. EACH.

TOE STONE
MINIMUM WEIGHT 7 TONS.
MINIMUM THICKNESS 42 INCHES.

SECTION OF BREAKWATERS

BUILT 1934 - 1936



A - PLACED COVERING STONE 3' THICK. B - LARGE RIP RAP.
C - SMALL RIP RAP. D - LAKE SAND.

ORIGINAL SECTION OF INNER BREAKWATER -S-

BUILT 1901 - 1909

ASHTABULA HARBOR OHIO

CORPS OF ENGINEERS BUFFALO, N.Y.

1 JANUARY 1962

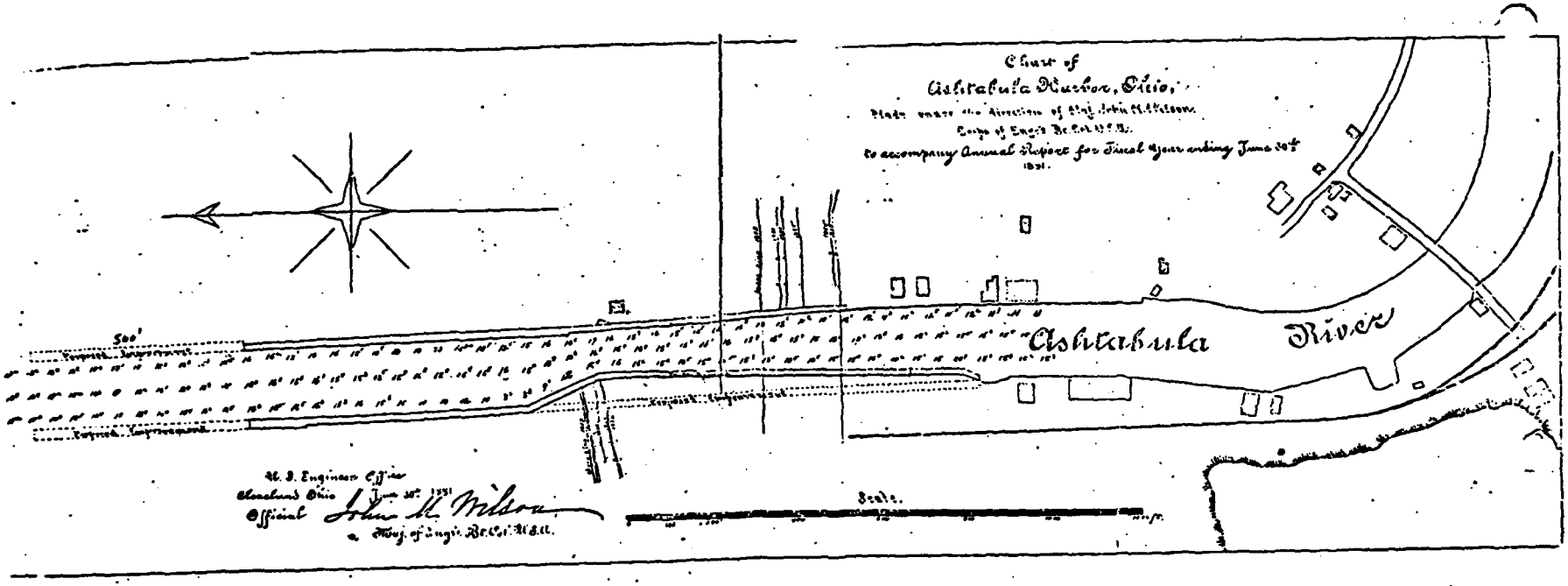
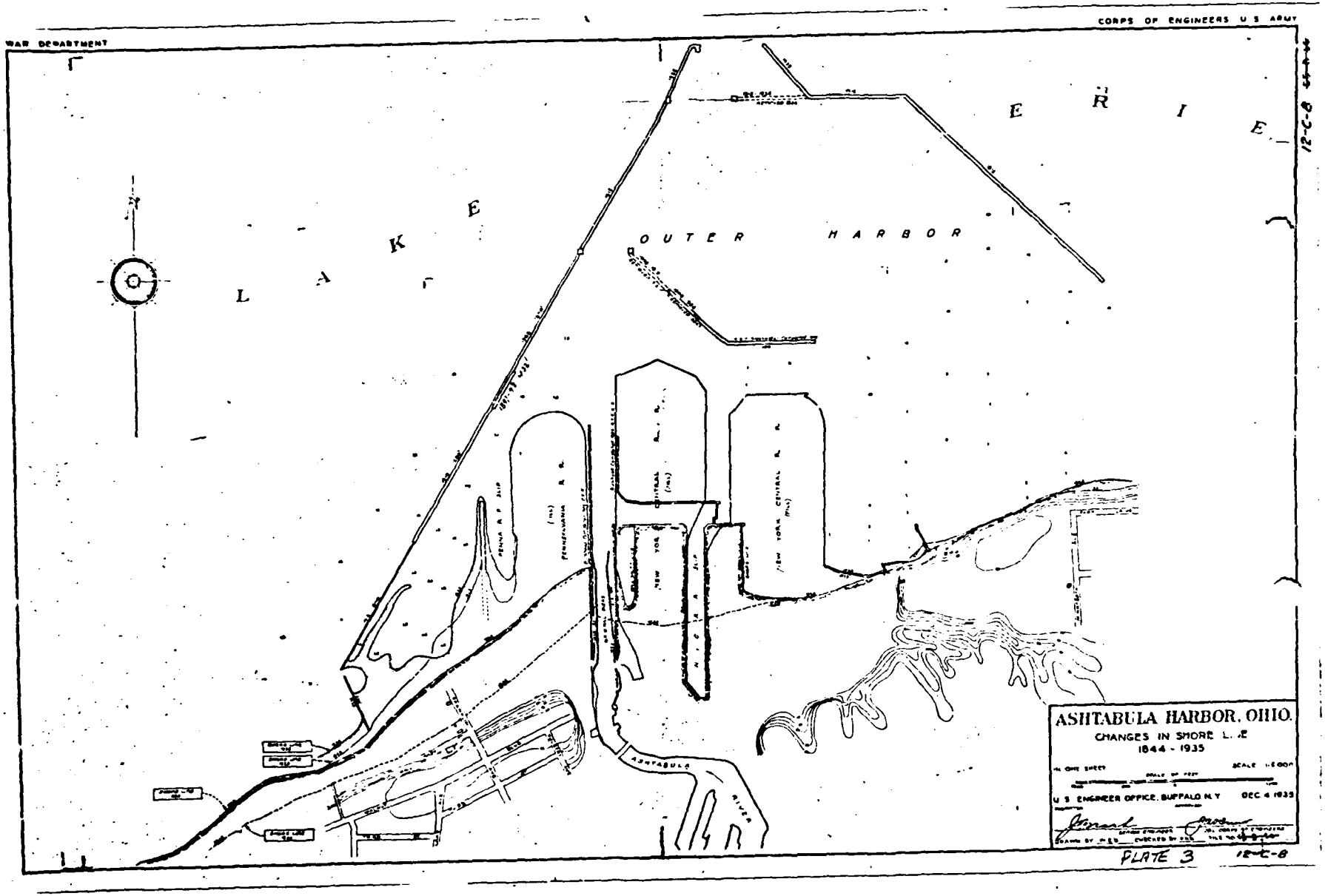
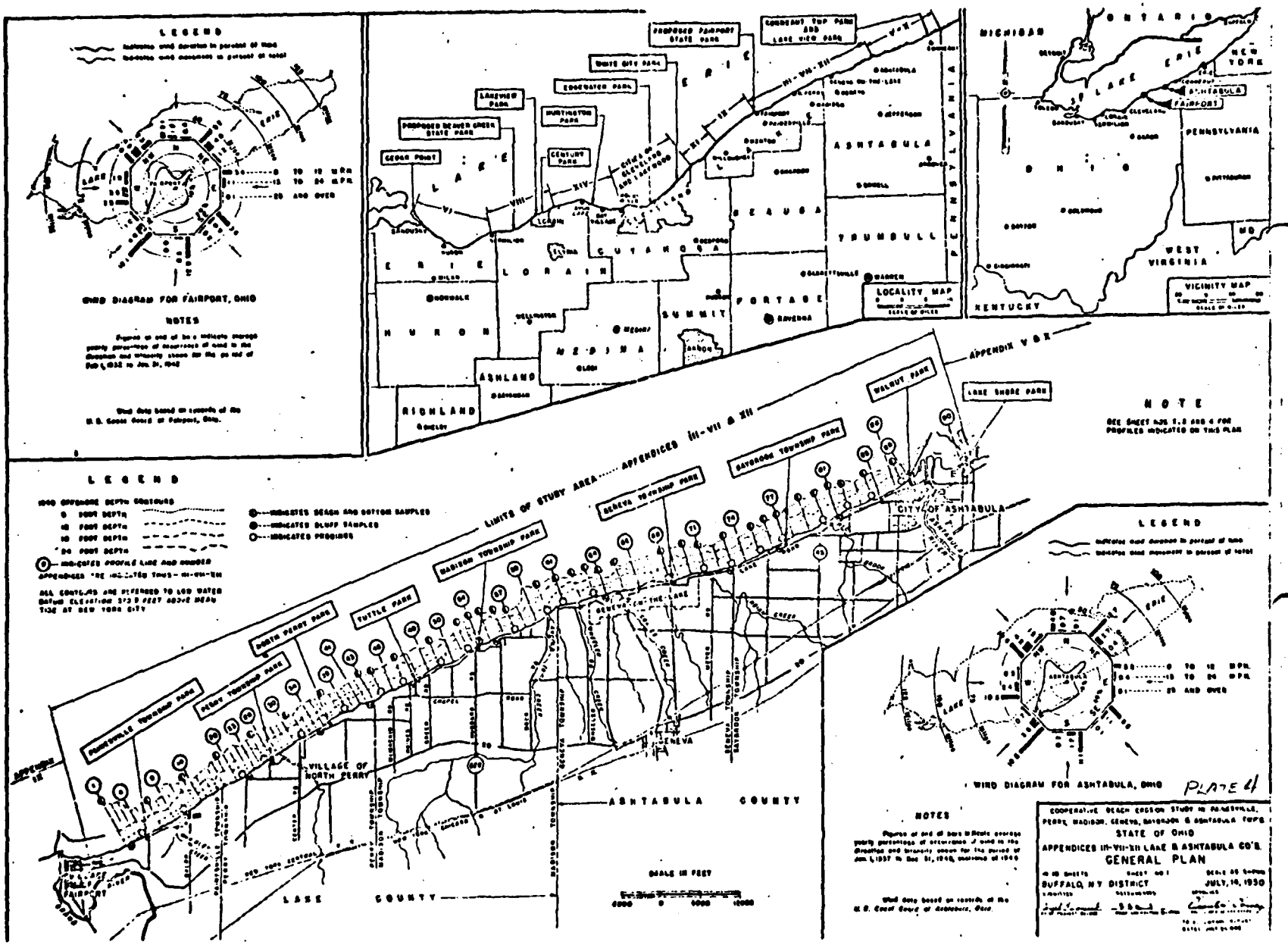


Chart of
Ashtabula Harbor, Ohio.
to accompany Annual Report for Fiscal year ending June 30th
1891.
500'
Ashtabula River
U. S. Engineer Office
Cleveland Ohio June 30th 1891
Official John M. Wilson
Maj. of Engrs. Bvt Col. U.S.A.
Scale.

PLATE 2


WAR DEPARTMENT
CORPS OF ENGINEERS U S ARMY
LAKE ERIE
OUTER HARBOR
ASHTABULA RIVER
ASHTABULA HARBOR, OHIO.
CHANGES IN SHORE LINE
1844 - 1935
U S ENGINEER OFFICE, BUFFALO N.Y. DEC 4 1935
PLATE 3
12-C-8


LEGEND
WIND DIAGRAM FOR FAIRPORT, OHIO
NOTES
LOCALITY MAP
VICINITY MAP
LEGEND
LIMITS OF STUDY AREA ..... APPENDICES III-VII & XII
APPENDIX V & IX
NOTE
LEGEND
WIND DIAGRAM FOR ASHTABULA, OHIO
NOTES
COOPERATIVE BEACH EROSION STUDY IN PAINESVILLE, PERRY, MADISON, GENEVA, SAYBROOK & ASHTABULA TWPS
STATE OF OHIO
APPENDICES III-VII-XII LAKE & ASHTABULA CO'S.
GENERAL PLAN
BUFFALO, N.Y. DISTRICT
JULY, 10, 1950
PLATE 4

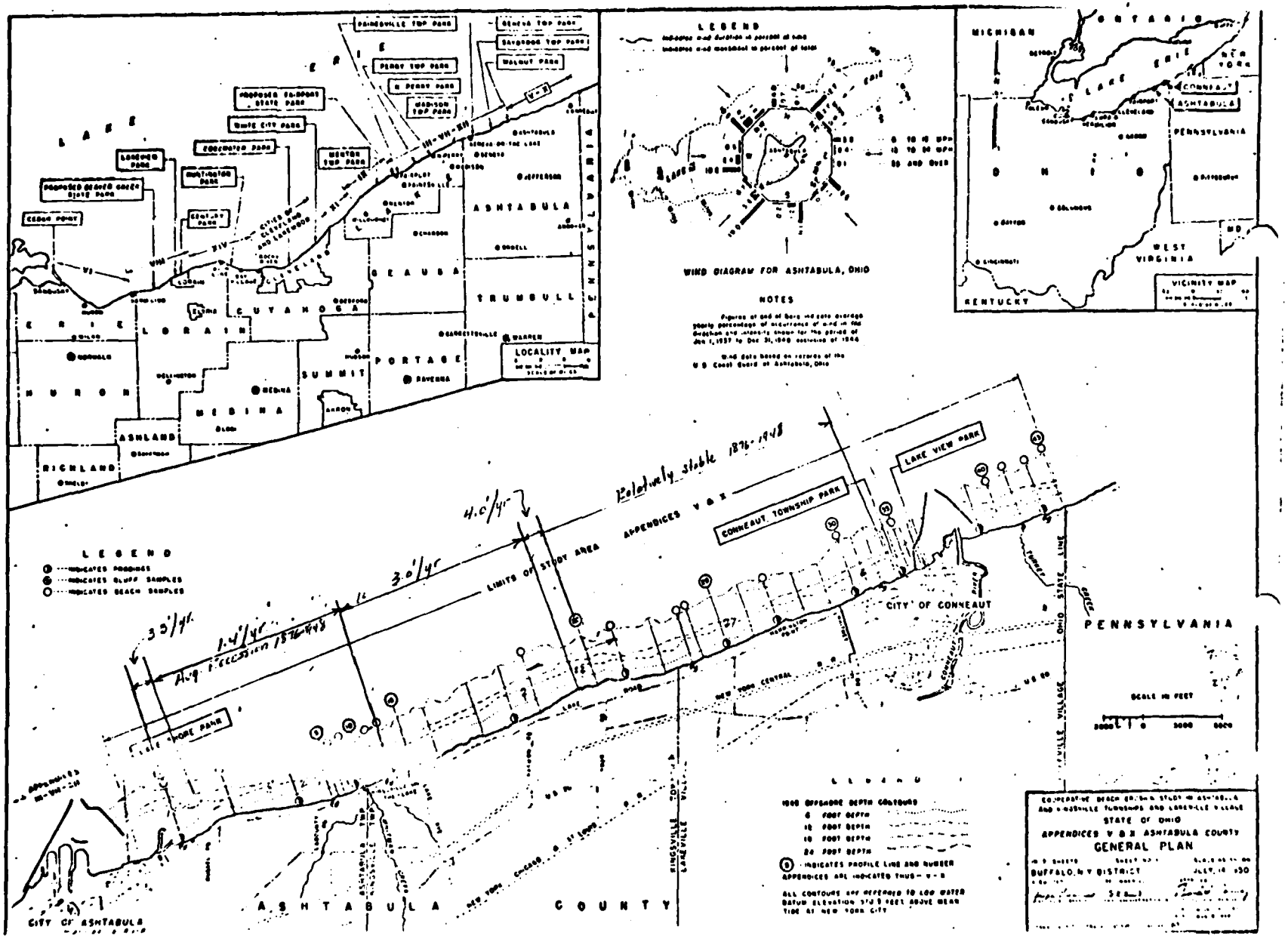
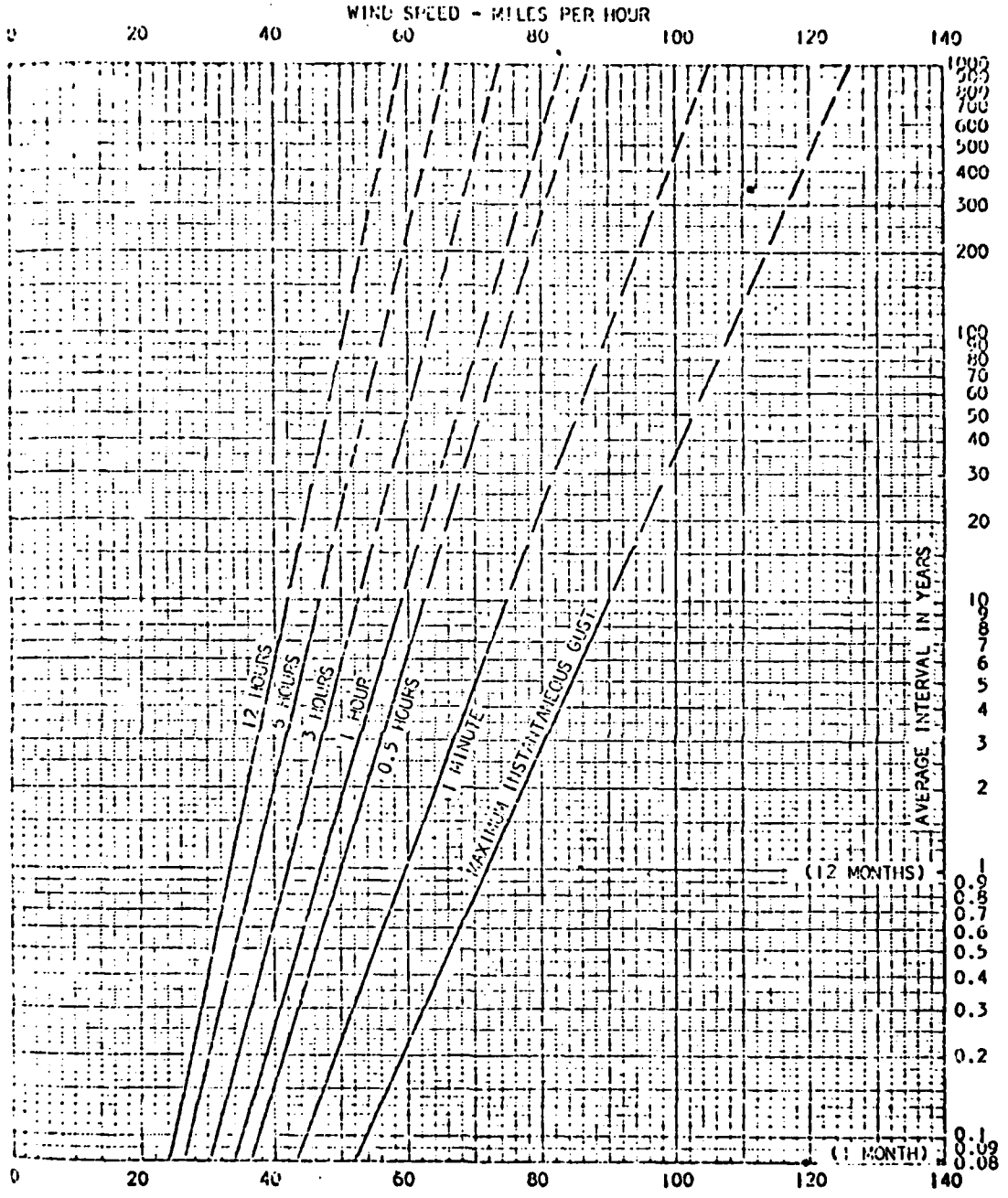

LAKE ERIE
PAINESVILLE TWP PARK
PERRY TWP PARK
HARPERSFIELD STATE PARK
WHITE CITY PARK
ZOOLOGICAL PARK
HISTORICAL PARK
HESTON TWP PARK
GENEVA TWP PARK
SAYBROOK TWP PARK
WALNUT PARK
PROPOSED GRAND CREEK STATE PARK
CEDAR POINT
LEGEND PARK
KELLEY'S ISLAND
CITIES OF CLEVELAND AND LAKEWOOD
ASHTABULA
GEAUGA
TRUMBULL
CUYAHOGA
ERIE
LORAIN
SUMMIT
PORTAGE
MEDINA
HURON
ASHLAND
RICHLAND
LOCALITY MAP
LEGEND
WIND DIAGRAM FOR ASHTABULA, OHIO
NOTES
MICHIGAN
ONTARIO
NEW YORK
PENNSYLVANIA
OHIO
WEST VIRGINIA
KENTUCKY
VICINITY MAP
LAKE VIEW PARK
CONNEAUT TOWNSHIP PARK
LAKE SHORE PARK
CITY OF CONNEAUT
PENNSYLVANIA
OHIO STATE LINE
LIMITS OF STUDY AREA
APPENDICES V & X
Relatively stable 1876-1948
4.0'/yr
3.0'/yr
1.4'/yr
3.0'/yr
LEGEND
INDICATES SOUNDINGS
INDICATES BLUFF SAMPLES
INDICATES BEACH SAMPLES
1000 OFFSHORE DEPTH CONTOURS
INDICATES PROFILE LINE AND NUMBER
APPENDICES ARE INDICATED THUS — V - X
ALL CONTOURS ARE REFERRED TO LOW WATER DATUM ELEVATION 570.5 FEET ABOVE MEAN TIDE AT NEW YORK CITY
ASHTABULA COUNTY
CITY OF ASHTABULA
SCALE IN FEET
COOPERATIVE BEACH EROSION STUDY OF ASHTABULA AND CONNEAUT TOWNSHIPS AND CONNEAUT VILLAGE
STATE OF OHIO
APPENDICES V & X ASHTABULA COUNTY
GENERAL PLAN
BUFFALO, N.Y. DISTRICT
JULY, 19 50

TABLE 13 : AVERAGE PERCENTAGE FREQUENCY OF OCCURRENCE OF WIND SPEED - DIRECTION GROUPS: 41°39.0'N, 81°33.5'W: LAKE ERIE: OFFSHORE CLEVELAND, OHIO: ANNUAL

Direction	Wind Speed Groups (mph) 0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-40	40 Plus	Total
N	0.3	1.2	1.8	1.8	0.9	0.4	0.2	0.0	0.0	6.6
NNE	0.3	0.8	1.5	1.4	0.8	0.4	0.2	0.1	0.0	5.5
NE	0.2	0.6	0.9	0.9	0.6	0.3	0.1	0.0	0.0	3.6
ENE	0.1	0.4	0.5	0.5	0.4	0.2	0.1	0.0	0.0	2.2
E	0.1	0.4	0.7	0.6	0.5	0.2	0.1	0.0	0.0	2.6
ESE	0.1	0.5	0.9	0.9	0.5	0.3	0.1	0.1	0.0	3.4
SE	0.2	0.8	1.3	1.3	0.8	0.4	0.1	0.1	0.0	5.0
SSE	0.3	1.4	2.4	2.2	1.3	0.6	0.3	0.1	0.1	8.7
S	0.5	1.9	3.3	3.2	1.9	0.8	0.4	0.2	0.2	12.4
SSW	0.4	1.8	3.0	2.9	1.8	0.9	0.4	0.2	0.1	11.5
SW	0.4	1.4	2.5	2.2	1.7	0.9	0.3	0.1	0.1	9.6
WSW	0.2	1.0	2.0	2.0	1.3	0.7	0.3	0.2	0.1	7.8
W	0.2	0.8	1.5	1.5	1.1	0.6	0.3	0.1	0.1	6.2
WNW	0.2	0.6	1.3	1.4	1.0	0.5	0.2	0.1	0.1	5.4
NW	0.2	0.7	1.2	1.2	0.7	0.4	0.2	0.1	0.0	4.7
NNW	0.2	0.8	1.2	1.2	0.7	0.4	0.2	0.1	0.0	4.8
Total	3.9	15.1	26.0	25.2	16.0	8.0	3.5	1.5	0.8	100.0

Supplement No. 3.



WIND SPEED - MILES PER HOUR

A. H. GLENN AND ASSOCIATES

FIGURE 1

AVERAGE INTERVAL IN YEARS BETWEEN OCCURRENCES OF STORMS OF SPECIFIED WIND SPEED - DURATION CHARACTERISTICS: 41°39.0'N, 81°33.5'W AND 41°36.2'N, 81°42.4'W; LAKE ERIE: OFFSHORE CLEVELAND, OHIO

Supplement No 3

TABLE 26: AVERAGE MONTHLY PERCENTAGE OCCURRENCE OF SIGNIFICANT WAVE HEIGHT - DIRECTION GROUPS: 41°39.0'N, 81°33.5'W: LAKE ERIE: OFFSHORE CLEVELAND, OHIO: APPROXIMATELY 43 FOOT CHART DEPTH: ANNUAL

Direction	Significant Wave Height Groups (Feet) 0	1	2	3	4	5	6	7	8	9	10 Plus	Total
N	0.3	1.0	1.6	1.5	1.1	0.6	0.3	0.2	0.1	0.1	0.0	6.8
NNE	0.2	0.7	1.1	1.2	1.0	0.6	0.3	0.2	0.1	0.1	0.0	5.5
NE	0.2	0.4	0.7	0.7	0.7	0.5	0.2	0.1	0.1	0.0	0.0	3.6
ENE	0.9	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
E	1.2	1.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
ESE	1.8	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4
SE	3.3	1.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
SSE	6.0	2.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9
S	6.9	4.8	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7
SSW	4.3	4.9	1.8	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	11.6
SW	2.1	3.6	2.5	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	9.5
WSW	0.3	1.4	2.1	1.8	1.1	0.5	0.2	0.1	0.1	0.0	0.0	7.6
W	0.2	0.8	1.6	1.4	1.0	0.6	0.3	0.1	0.0	0.0	0.0	6.0
WNW	0.2	0.7	1.2	1.3	0.9	0.5	0.3	0.1	0.0	0.0	0.0	5.2
NW	0.2	0.6	1.1	1.2	0.8	0.4	0.2	0.1	0.0	0.0	0.0	4.6
NNW	0.2	0.7	1.1	1.2	0.8	0.4	0.2	0.1	0.1	0.0	0.0	4.8
Total	28.3	27.1	17.1	11.9	7.8	4.1	2.0	1.0	0.5	0.2	0.0	100.0
Total (WSW - N - NE)	1.8	6.3	10.5	10.3	7.4	4.1	2.0	1.0	0.5	0.2	0.0	44.1

Supplement of

TABLE 39 : AVERAGE MONTHLY PERCENTAGE OCCURRENCE OF SIGNIFICANT WAVE PERIOD IN SELECTED SIGNIFICANT WAVE HEIGHT GROUPS (WSW - N - NE DIRECTIONS): 41°39.0'N, 81°33.5'W: *LAKE ERIE: OFFSHORE CLEVELAND, OHIO: APPROXIMATELY 43 FOOT CHART DEPTH: ANNUAL

Significant Wave Period (Seconds)	Significant Wave Height Groups (Foot) 0	1	2	3	4	5	6	7	8	9	10 Plus	Total
0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
2	0.8	1.2	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	2.8
3	0.5	2.8	3.0	0.6	0.3	0.2	0.1	0.0	0.0	0.0	0.0	7.5
4	0.1	1.5	4.6	3.6	1.7	0.6	0.2	0.1	0.1	0.0	0.0	12.5
5	0.1	0.4	1.5	4.2	3.1	1.7	0.7	0.3	0.1	0.1	0.0	12.2
6	0.0	0.1	0.5	1.0	1.5	1.0	0.7	0.4	0.2	0.1	0.0	5.5
7	0.0	0.1	0.2	0.4	0.4	0.4	0.2	0.1	0.1	0.0	0.0	1.9
8	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.8
9 Plus	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Total	1.8	6.3	10.5	10.3	7.4	4.1	2.0	1.0	0.5	0.2	0.0	44.1

Supplement No. 5

TABLE 41: MOST SEVERE (WAVE PRODUCING) STORM: WIND AND WAVE CONDITIONS: JANUARY 1962 - DECEMBER 1971 AND THE STORMS OF NOVEMBER 9 - 11, 1913, AND NOVEMBER 24 - 25, 1950: 41°39.0'N, 81°33.5'W, APPROXIMATELY 43 FOOT CHART DEPTH. AND 41°38.2'N, 81°42.4'W, APPROXIMATELY 54 FOOT CHART DEPTH: LAKE ERIE: OFFSHORE CLEVELAND, OHIO

Storm Rank[1]	Dates	Storm Winds: Storm Wind Speeds (mph) 6 Hour	3 Hour	1 Hour	Wind-Wave Direction[2]	Storm Waves[3]: Significant Wave Height (Feet)	Maximum Wave Height (Feet)	Significant Wave Period (Seconds)
A	11/9-11/1913	58	65	73	NW	15.0	27.9	8.4
B	11/24-25/1950	51	57	64	NNW	14.0	26.0	8.0
1	1/26-27/1971	48	54	61	NW	13.0	24.2	7.6
2	1/16/1965	40	45	50	NE	12.5	23.3	7.4
3	4/18-19/1969	37	42	47	NE	11.8	21.9	7.2
4	5/7/1967	36	41	46	NE	11.6	21.6	7.1
5	3/12-13/1968	36	40	45	NE	11.3	21.0	7.0
6	10/21-22/1964	42	47	53	WNW	11.1	20.6	6.9
7	3/5-6/1964	41	46	52	WNW	10.9	20.3	6.9
8	11/20-22/1971	37	42	47	N	10.9	20.3	6.9
9	1/15/1968	35	39	44	NNE	10.7	19.9	6.8
10	11/12-13/1968	35	39	44	NNE	10.6	19.7	6.7
11	12/5-6/1970	40	45	50	WNW	10.6	19.7	6.7
12	11/14-15/1967	36	40	45	N	10.6	19.7	6.7
13	11/3/1970	40	45	50	WNW	10.5	19.5	6.6
14	4/2/1970	39	44	49	WNW	10.4	19.3	6.6
15	11/2/1966	33	37	41	NE	10.3	19.2	6.6
16	4/26/1966	32	36	40	NE	10.2	19.0	6.5
17	12/30-31/1971	36	41	46	NW	10.1	18.8	6.5

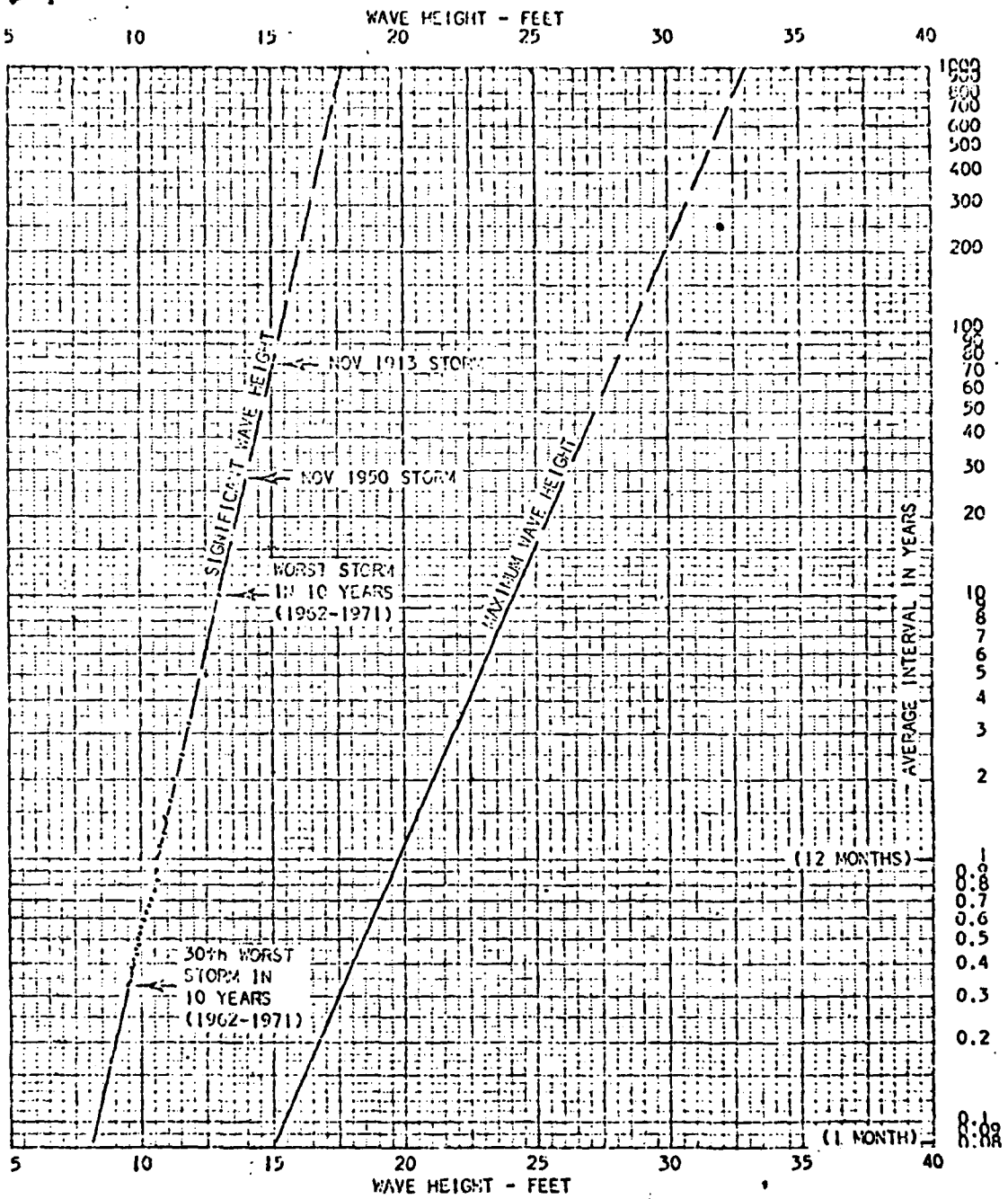
TABLE 41 CONTINUED:

Storm Rank[1]	Dates	Storm Winds: Storm Wind Speeds (mph) 6 Hour	5 Hour	1 Hour	Wind-Wave Direction[2]	Storm Waves[3]: Significant Wave Height (Feet)	Maximum Wave Height (Feet)	Significant Wave Period (Seconds)
18	12/4/1970	36	40	45	NNW	10.0	18.6	6.5
19	12/14-16/1968	34	38	43	N	10.0	18.6	6.5
20	9/13/1970	31	35	39	NE	9.9	18.4	6.5
21	3/3-4/1971	31	35	39	NE	9.9	18.4	6.5
22	3/10/1964	31	35	39	NE	9.8	18.2	6.4
23	3/5-6/1962	31	35	39	NE	9.8	18.2	6.4
24	1/25-27/1964	36	41	46	W	9.7	18.0	6.4
25	12/4-5/1968	36	41	46	W	9.7	18.0	6.4
26	3/15/1967	33	37	41	N	9.6	17.8	6.4
27	11/16-17/1965	35	39	44	NW	9.6	17.8	6.4
28	11/18-19/1967	35	39	44	NW	9.6	17.8	6.4
29	9/10-11/1970	35	39	44	NW	9.6	17.8	6.4
30	9/17/1969	30	34	38	NE	9.5	17.6	6.3

NOTES: [1]Storm Rank is from the highest storm wave (1) to the lowest storm wave (30) from January 1962 - December 1971. Storm Ranks A and B are for the storms of November 1913 and November 1950.

[2]Direction from which storm winds blow and maximum and significant storm waves approach. Only the directions WSW - N - NE developing the highest wave condition during the storm are considered.

[3]Wave action in February is assumed to be nil because of ice coverage. Wave action in other winter months is assumed to be unaffected by ice coverage (see text).



A. H. GLENN AND ASSOCIATES

FIGURE 3

AVERAGE INTERVAL IN YEARS BETWEEN OCCURRENCE OF MAXIMUM AND SIGNIFICANT WAVE HEIGHT: 41°39.0'N, 81°33.5'W, APPROXIMATELY 43 FOOT CHART DEPTH, AND 41°38.2'N, 81°42.4'W, APPROXIMATELY 54 FOOT CHART DEPTH: LAKE ERIE: OFFSHORE CLEVELAND, OHIO

Fiscal Year ending	Cubic yards	Fiscal year ending	Cubic yards	Fiscal year ending	Cubic yards
1872	3,436	1907	5,991	1942	[illegible]
73	—	08	-	43	[illegible]
74		09		44	[illegible]
75	10,455	1910		45	194,[illegible]
76		11	5,253	46	202,956
77		12	—	47	95,5[illegible]
78	—	13	—	48	111,410
79	8,091	14	15,267	49	103,737
1880	7,989	15	57,101	1950	311,254
81	4,133	16	20,000 (E)	51	192,[illegible]
82	5,447	17	14,407	52	[illegible]
83	—	18	—	53	214,[illegible]
84	2,[illegible]	19	—	54	166,223
85	17,173	1920	—	55	186,164
86		21	—	56	278,272
87	8,483	22	—	57	33,696
88	12,731	23	43,629	58	24[illegible]
89	2414	24	18,679	59	168,187
1890	2,800	25	26,356	1960	159,373
91	4,101	26	4,350(E)	61	191,302
92	24,000	27	25,592(E)	62	61,057
93	1,189	28	38,[illegible](E)	63	177,[illegible]
94	—	29	24,[illegible](E)	64	113,776
95		1930	36,[illegible](E)	65	119,708
96	22,375	31	32,[illegible](E)	66	250,617
97		32	50,547(E)	67	[illegible]8,186
98	4,960	33	56,[illegible]6(E)	68	148,629
99	12,152	34	52,[illegible](E)	69	235,323
1900	1,153	35	47,207(E)	1970	112,966
01	12,400	36	52,[illegible](E)	71	107,581
02	11,780	37	55,456	72	—
03	10,375	38	92,[illegible]73	73	2[illegible]2
04	[illegible]	39	43,[illegible]	74	95[illegible]
05	15,[illegible]4	40	—		7,[illegible]
06	[illegible]	41	73,[illegible]		

SUPERSEDED NO. 8

[7,116,[illegible] × 100/115 = 6,183,[illegible] cy]

(E) Quantity estimated based on [illegible]

EN
DAT
FILM
4-
DT