STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

NATURAL RESOURCES PROTECTION ACT

38 M.R.S.A. §§ 480-A THRU 480-BB

PERMIT APPLICATION

OF

LUBEC SAFE HARBOR

MAIN STREET
LUBEC, MAINE

FOR

TOWN OF LUBEC

40 SCHOOL STREET
LUBEC, MAINE 04652

June 15, 2019

PREPARED BY

DOWN to EARTH
PROFESSIONAL LAND SERVICES, INC.
P.O. BOX 443
BRADLEY, MAINE 04411-0443
TEL. 207-827-6733

Table of Contents

Department of Environmental Protection
Bureau of Land & Water Quality
17 State House Station
Augusta, Maine 04333
Telephone: 207-287-7688

FOR DEP USE
ATS #_____
L-_____
Total Fees: _____
Date: Received _____

APPLICATION FOR A NATURAL RESOURCES PROTECTION ACT PERMIT

➔PLEASE TYPE OR PRINT IN *BLACK INK ONLY*

1. Name of Applicant:	TOWN OF LUBEC	**5.Name of Agent:**	OSCAR EMERSON, PE DOWN TO EARTH P.L.S.
2. Applicant's Mailing Address:	40 SCHOOL STREET LUBEC, ME 04652	**6. Agent's Mailing Address:**	PO BOX 443 BRADLEY, ME
3. Applicant's Daytime Phone #:	(207) 733-2341	**7. Agent's Daytime Phone #:**	207(827) 6733
4. Applicant's Email Address (Required from *either* applicant or agent):	clerk@townoflubec.com	**8. Agent's Email Address:**	oemerson@downtoearthpls.com

9. Location of Activity: (Nearest Road, Street, Rt.#)	MAIN ROAD	**10. Town:**	LUBEC	**11. County:**	WASHINGTON

12. Type of Resource: (Check all that apply)
- ☐ River, stream or brook
- ☐ Great Pond
- ■ Coastal Wetland
- ☐ Freshwater Wetland
- ☐ Wetland Special Significance
- ☐ Significant Wildlife Habitat
- ☐ Fragile Mountain

13. Name of Resource: JOHNSON'S BAY

14. Amount of Impact: (Sq.Ft.) Fill: 143,233 S.F.
Dredging/Veg Removal/Other:

15. Type of Wetland: (Check all that apply)
- ☐ Forested
- ☐ Scrub Shrub
- ☐ Emergent
- ☐ Wet Meadow
- ☐ Peatland
- ☐ Open Water EST.
- ■ Other MARINE

FOR FRESHWATER WETLANDS

Tier 1	*Tier 2*	*Tier 3*
☐ 0 - 4,999 sq ft. ☐ 5,000-9,999 sq ft ☐ 10,000-14,999 sq ft	☐ 15,000 – 43,560 sq. ft.	■ > 43,560 sq. ft. or ☐ smaller than 43,560 sq. ft., not eligible for Tier 1

16. Proposed Start Date and Brief Activity Description: START DATE: SUMMER/FALL 2020. THE CONSTRUCTION OF A STONE-RUBBLE AND SHEET PILE BREAKWATER, BOAT RAMP & FLOATING DOCK PILINGS.

17. Size of Lot or Parcel & UTM Locations: ☐ _____square feet, or ■ 3.4± acres
UTM Northing: 19658554.1 UTM Easting: 4968989.8

18. Title, Right or Interest: ■ own ☐ lease ☐ purchase option ☐ written agreement

19. Deed Reference Numbers:	Book#: 4473 Page: 290	**20. Map and Lot Numbers:**	Map #: 18	Lot #: P/O 17	
21. DEP Staff Previously Contacted:	JESSICA DAMON	**22. Part of a larger project:**	☐ Yes ■ No	**After-the-Fact:**	☐ Yes ■ No
23. Resubmission of Application?:	☐ Yes➔ ■ No	**If yes, previous application #**		**Previous project manager:**	
24. Written Notice of Violation?:	☐ Yes ➔ ■ No	**If yes, name of DEP enforcement staff involved:**		**25. Previous Wetland Alteration:**	☐ Yes ☐ No

26. Detailed Directions to the Project Site: ON THE NORTH WESTERLY SIDE OF ROUTE 189, ACROSS FROM THE MAIN STREET (RT 189)/SOUTH STREET INTERSECTION.

27.

TIER 1
- ☐ Title, right or interest documentation
- ☐ Topographic Map
- ☐ Narrative Project Description
- ☐ Plan or Drawing (8 1/2" x 11")
- ☐ Photos of Area
- ☐ Statement of Avoidance & Minimization
- ☐ Statement/Copy of cover letter to MHPC

TIER 2/3 AND INDIVIDUAL PERMITS
- ■ Title, right or interest documentation
- ■ Topographic Map
- ■ Copy of Public Notice/Public Information Meeting Documentation
- ■ Wetlands Delineation Report (Attachment 1) that contains the Information listed under Site Conditions
- ■ Alternatives Analysis (Attachment 2) including description of how wetland impacts were Avoided/Minimized
- ■ Erosion Control/Construction Plan
- ■ Functional Assessment (Attachment 3), if required
- ☐ Compensation Plan (Attachment 4), if required
- ■ Appendix A and others, if required
- ■ Statement/Copy of cover letter to MHPC
- ☐ Description of Previously Mined Peatland, if required

28. FEES Amount Enclosed:

CERTIFICATIONS AND SIGNATURES LOCATED ON PAGE 2

IMPORTANT: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following :

DEP SIGNATORY REQUIREMENT

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor a permit be issued.

CORPS SIGNATORY REQUIREMENT

USC Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry shall be fines not more than $10,000 or imprisoned not more than five years or both. I authorize the Corps to enter the property that is subject to this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

DEP SIGNATORY REQUIREMENT

"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Further, I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the address located on the front page of this application (see #4 for the applicant and #8 for the agent)."

(AGENT) Date: 6/19/19

SIGNATURE OF AGENT/APPLICANT

NOTE: Any changes in activity plans must be submitted to the DEP and the Corps in writing and must be approved by both agencies prior to implementation. Failure to do so may result in enforcement action and/or the removal of the unapproved changes to the activity.

(pink)

To Whom It May Concern:

I, Carol Dennison, Selectman of the Town of Lubec, authorize Oscar Emerson of Down to Earth Professional Land Services, Inc., to prepare and sign Federal, State and Municipal permit applications for the Lubec Safe Harbor project in Lubec, Maine.

Carol Dennison
Carol Dennison, Selectman

6/19/19
Date

Attachment 1 – Activity Description

Introduction:

The proposed project, Lubec Safe Harbor, will be a newly implemented marina-style development located on land owned by the municipality. The site is located on the northeasterly side of Route 189 (Main Street), at the Main Street/South Street intersection. The site is located adjacent to the Lubec Historical Society building. The public facility will consists of upland infrastructure such as service drives, parking area and utilities and water dependent uses such as a boat ramp, breakwater, floating docks, pilings and dry dock area.

Impacts:

Proposed service drives and vehicle/trailer parking area is to be located on upland areas above the projected 100-year flood event and highest annual tide event. The total impervious area of the parking surface totals 39,500 square feet and does not impact any freshwater or coastal wetlands.

The implementation of the proposed boat ramp and breakwater will result in 143,178 square feet of impact of coastal wetland below the high water line. The material of the boat ramp (15 feet wide, 260 feet long) and the first 760± feet of breakwater will consist of gradations of stone rubble, with side-slope embankments varying at 1:1 to 1.5:1 grades. The crest of the breakwater will be 24 feet in width for the passage of vehicles utilizing floating docks and hoist. The crest height of the breakwater will be 25' NAVD88. The remaining 500± of breakwater will consist of circular sheet pilings, averaging 30 feet in diameter with vertical face.

It is estimated that 70 log-type piling will be incorporated, including dry-dock area, resulting in a cumulative disturbed area of coastal wetland of 56 square feet.

The total area of disturbance of coastal wetland area, consisting primarily of fill, totals 143,234 square feet.

Attachment 2-Alternative Analysis

Introduction - The village of Lubec is located at the easterly end of Lubec Neck, bounded on the south and east by the Lubec Channel and on the north by Johnson Bay, an arm of Cobscook Bay. The village is the town center and the town's most populated area, with smaller villages located along state Route 189 and the several peninsulas extending north into Cobscook Bay. The Lubec lobstering and fishing fleet is currently scattered about the many small coves due to lack of a protected centralized off-loading facility. Until the late 1970s, Lubec Neck was one of Maine's most active commercial fishing ports, with several large cannery operations processing herring and other species. Following the collapse of that fishery, the canneries closed and the community suffered an economic decline. Today, there is a rebound in marine industries mainly due to lobstering, shellfish harvesting and the growth of salmon farming.

Previous efforts to implement a marina at Lubec proper consisting of floating and docks and floating breakwater units have failed. The length of fetches contributing to excessive wind and wave action and severe northeast storms have contributed to destruction of vulnerable structures and infrastructure.

The Town of Lubec does not have its own boat launch. A state (DACF) boat ramp currently exits at the end of North Water Street Gun Rock), however it is a seasonal facility and subject to the afore-mentioned northeast storms and the northwesterly winds and waves. The town of Lubec contains over 150 commercial fisherman and shellfish harvesters, imapcting over 300 households, and in many cases, the sole income for those families. Local business owners economically depend on this income. From 2006-2016, a total of 68,998,016 pounds of product were removed from Cobscook Bay with a value of $91,684,114 (Rob Watts, Landings Program, DMR). The fishing industry is the biggest employer in the Town of Lubec, yet the entire fishing fleet is on moorings. There is no safe harbor for boats during storms. There are no safe places to launch skiffs during high winds to get to their boats to go fishing or simply check on them. The fisherman must fish on the designated dates per fishery regardless of weather. Because of the lack of a sheltered harbor, fisherman have lost their lives just trying to get to or from their boat. Because of the many losses the community has endured, a Lost Fisherman's Memorial was erected for those men and women who have died on the sea.

Presently, the fishermen move their boats from one part of Johnson's Bay to another in an attempt to keep them from sinking depending on the wind direction. Because all fleets are on moorings, many vessels have sunk during bad weather or they have broken their mooring line and went ashore because of the predominant on shore (northerly) winds. There are reported occasions where the wind developed after fishermen have left to go fishing and they return to sunken skiffs or they can't get ashore because it is so rough, they would die if they attempt it. Often fisherman must forgo a day of fishing because they can't get to their boats. When the wind is blowing hard and fisherman try to get their skiffs off the beach they are swamped by incoming waves, soaking the fisherman in

freezing cold temperatures thus creating hypothermic conditions the fishermen must endure for the entire day while they are fishing.

Weather conditions also affect the Marine Patrol and their fleet. Their boat is kept on a mooring in the unprotected harbor. It is difficult for them to reach their boat during inclement weather, so if an emergency a fisherman is in the water.

Alternatives – The US Army Corps of Engineers conducted a Navigation Improvement Study under the authority of Section 107 of the River and Harbor Act of 1960, as amended. The June 2004 report identified seven potential safe harbor sites throughout Lubec and evaluated the merits of each one, such merits including expected performance, costs, location and availability. The town of Lubec and the Lubec Safe Harbor Committee has utilized this study to determine a candidate site for a safe harbor project. The site chosen was based on land acquisition availability, centralized location, presence of ledge outcropping for underpinning and being adjacent to the Lubec Historical Society building site. The candidate site is referred to as the "Columbia Cove" site in the referenced USACOE report. Refer to Appendix A for a copy of the USACOE report in its entirety.

Minimization – The layout of the proposed Lubec Safe Harbor project is the result of nearly two years of dialogue with engineers, marine construction consultants, the Lubec Safe Harbor Committee and the residents of Lubec. Due to the presence and availability of quarry stone and blasted ledge, stone rubble breakwater designs have been evaluated and modified to reduce the overall footprint of coastal wetland disturbance while maintaining the integrity of endurance of severe weather.

The following are parameters that were required for a functioning safe harbor project:

- Stone rubble breakwater with stone armament resistant to wave action.
- Breakwater to accommodate vehicular traffic (24' wide travel surface) to access commercial hoist.
- Breakwater crest height sufficient to withstand 100-year flooding events with storm surges.
- A municipal-public boat ramp.
- Availability for floating dock system.

The following were incorporated into the parameters above to minimize the impact of the proposed project:

- Breakwater riprap armament side slope reduced to 1:1 grade on the leeward side.
- Breakwater riprap armament side slope reduced to 1.5:1 grade on the seaward side.
- Proposed boat ramp position relocated adjacent to breakwater to reduce the number of riprap shoulders.
- Approximately 40% of the proposed breakwater will consist of circular sheet piling cells, consisting of vertical faces thus reducing overall footprint.

Conclusion – The layout of the proposed project is a result of balancing required parameters for a properly functioning safe harbor with avoiding and minimizing impacts to the natural resource.

DOWN to EARTH
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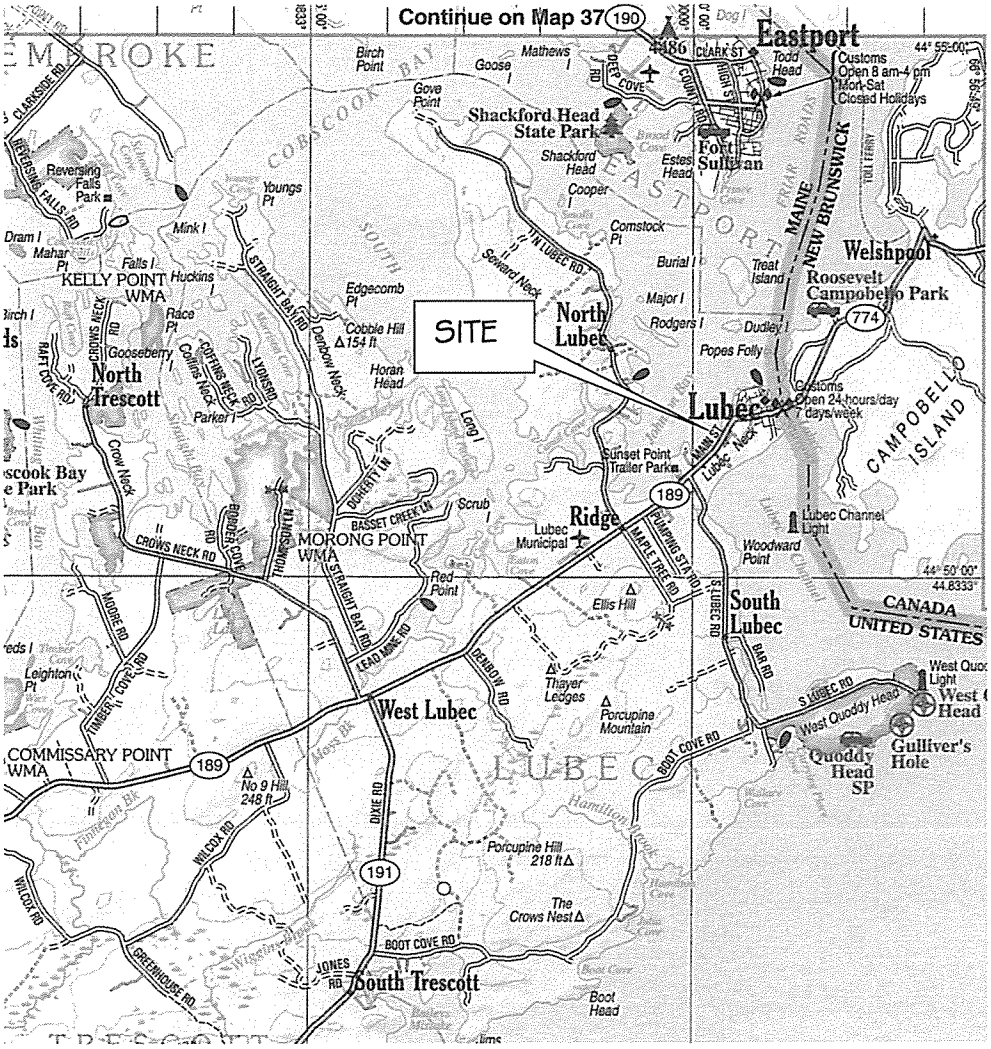

VICINITY MAP
NOT TO SCALE

DOWN to EARTH
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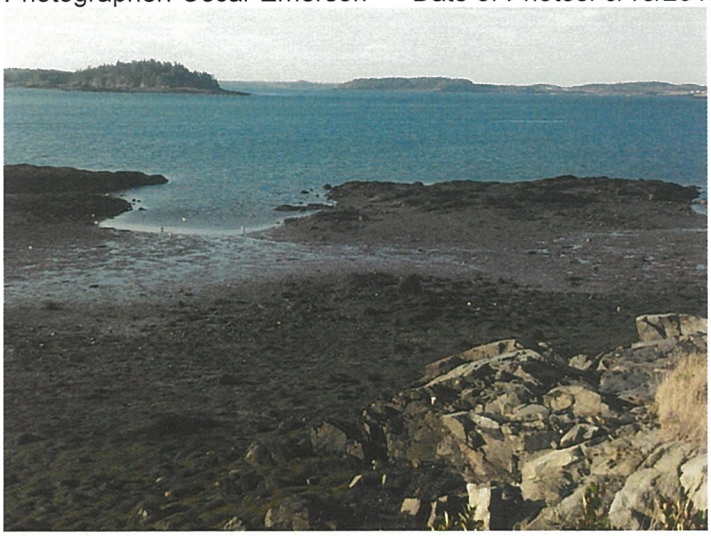
Photographer: Oscar Emerson Date of Photos: 6/18/2019



At westerly property line looking north

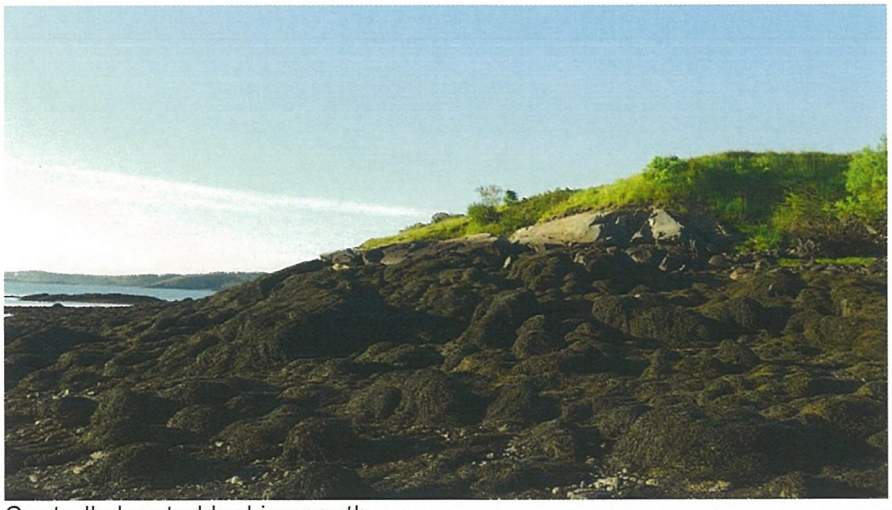
Centrally located looking north

Centrally located looking west-upland

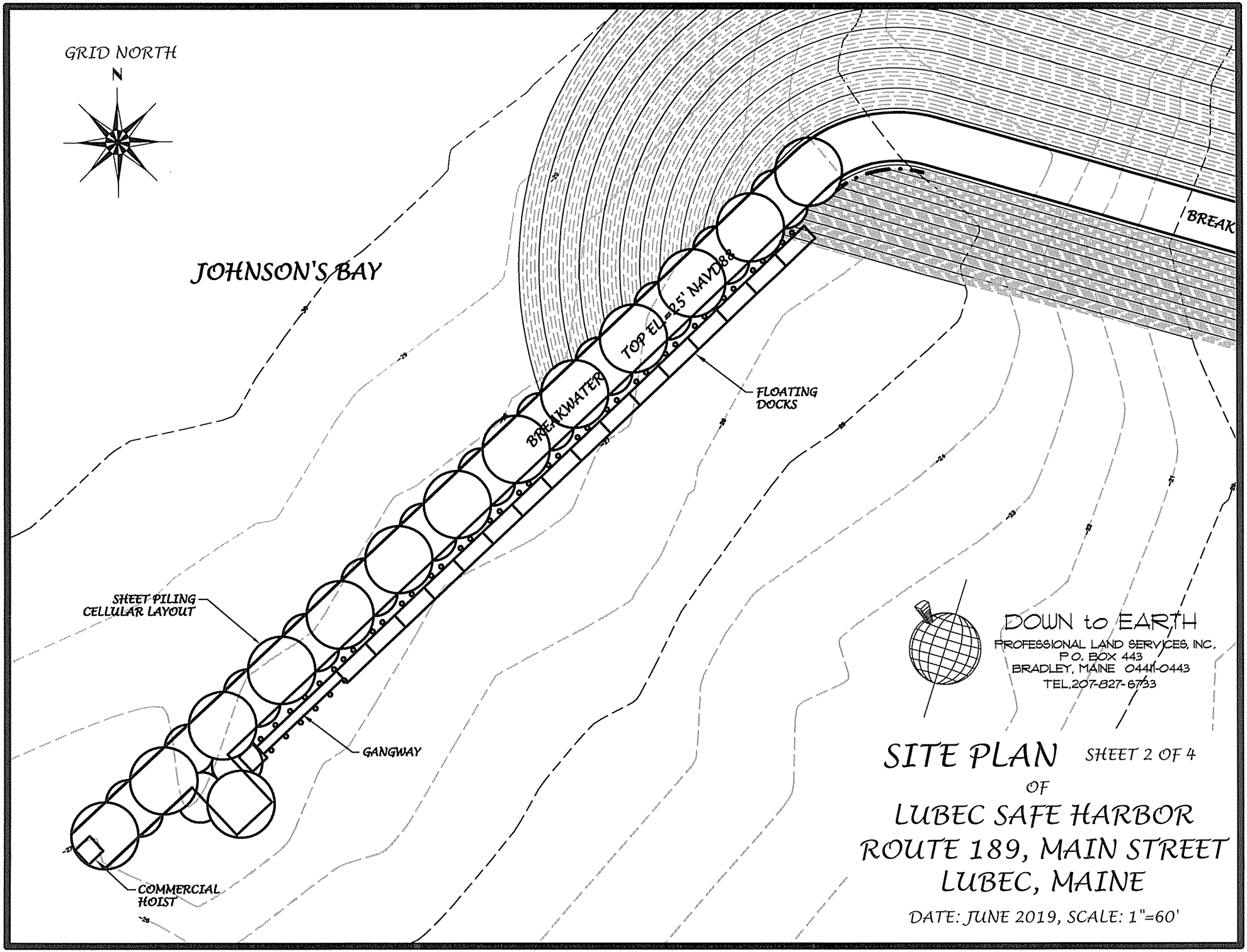
Centrally located looking west-shoeline

At westerly property line looking east

Centrally located looking east-shoreline



Centrally located looking south



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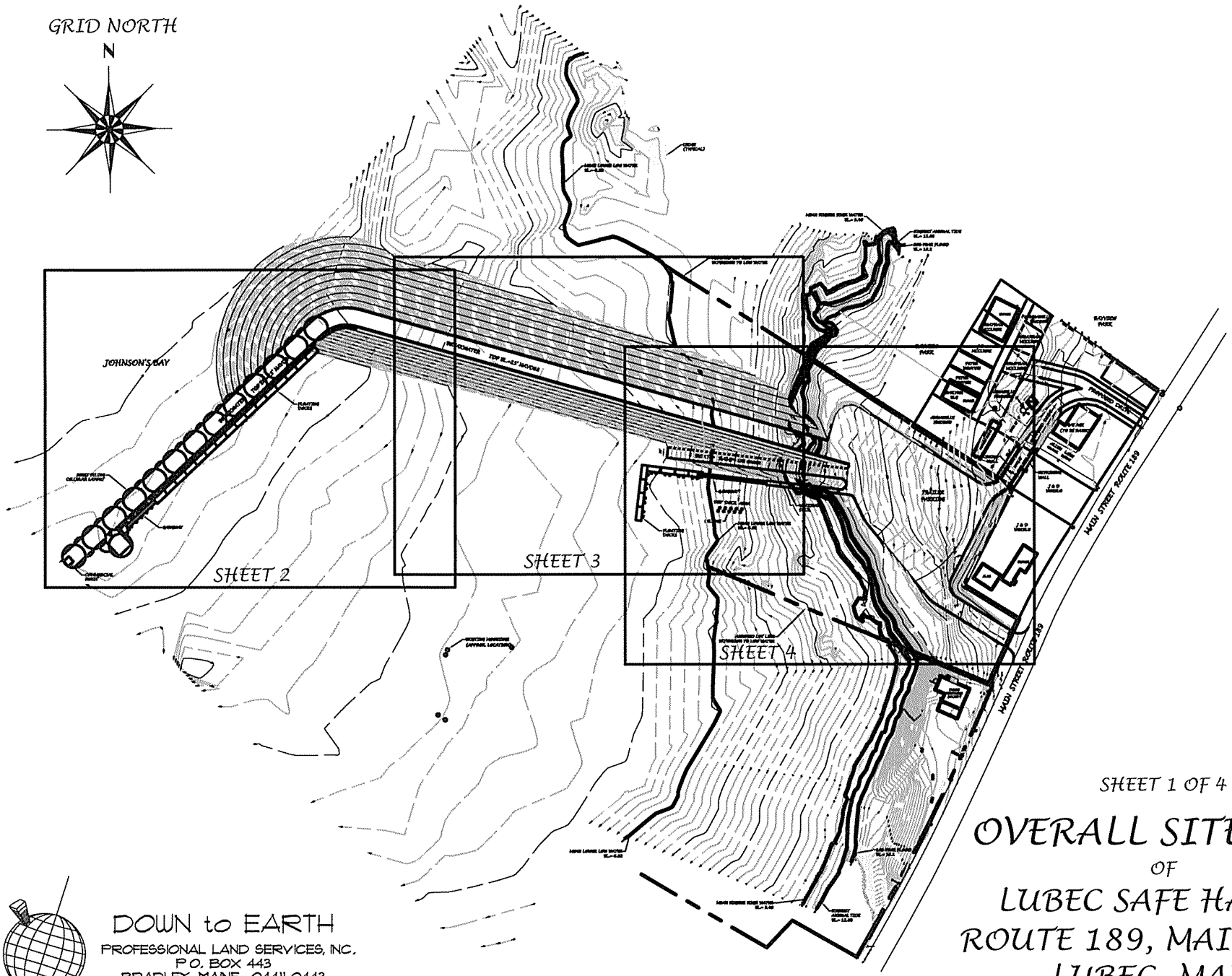
SITE PLAN

SHEET 2 OF 4

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019, SCALE: 1"=60'



SHEET 1 OF 4

OVERALL SITE PLAN

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019, SCALE: 1"=200'

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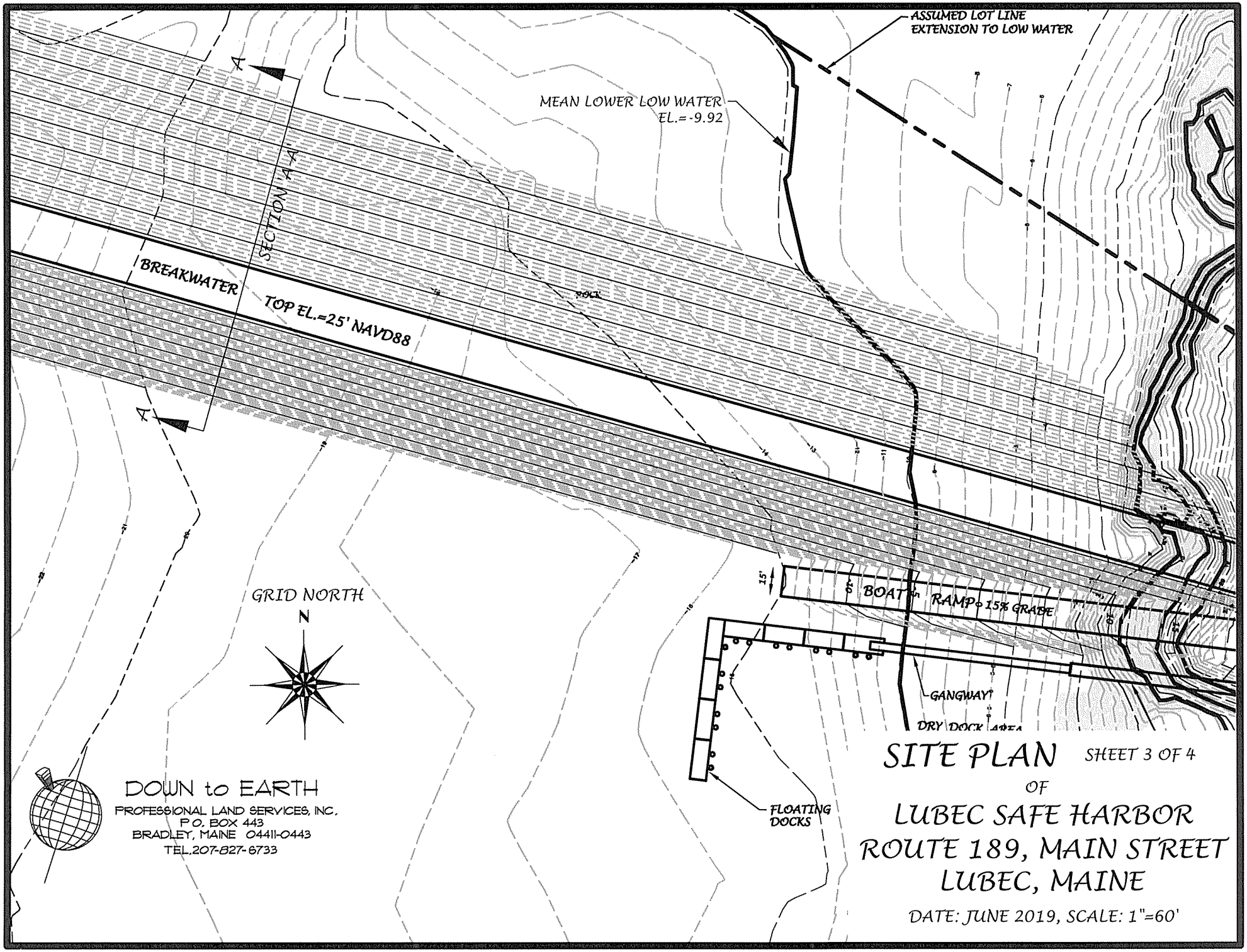

SITE PLAN

SHEET 3 OF 4

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019, SCALE: 1"=60'

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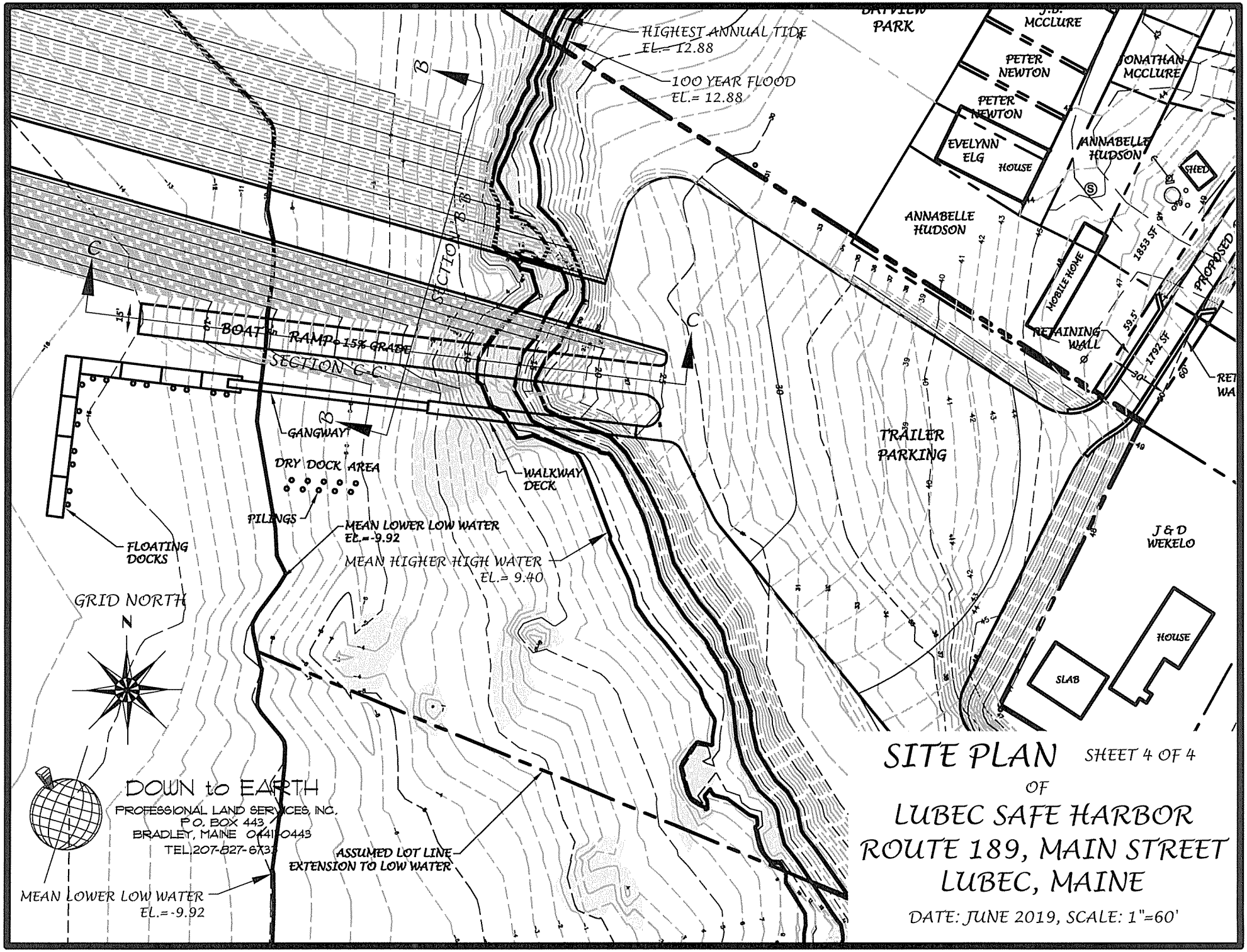


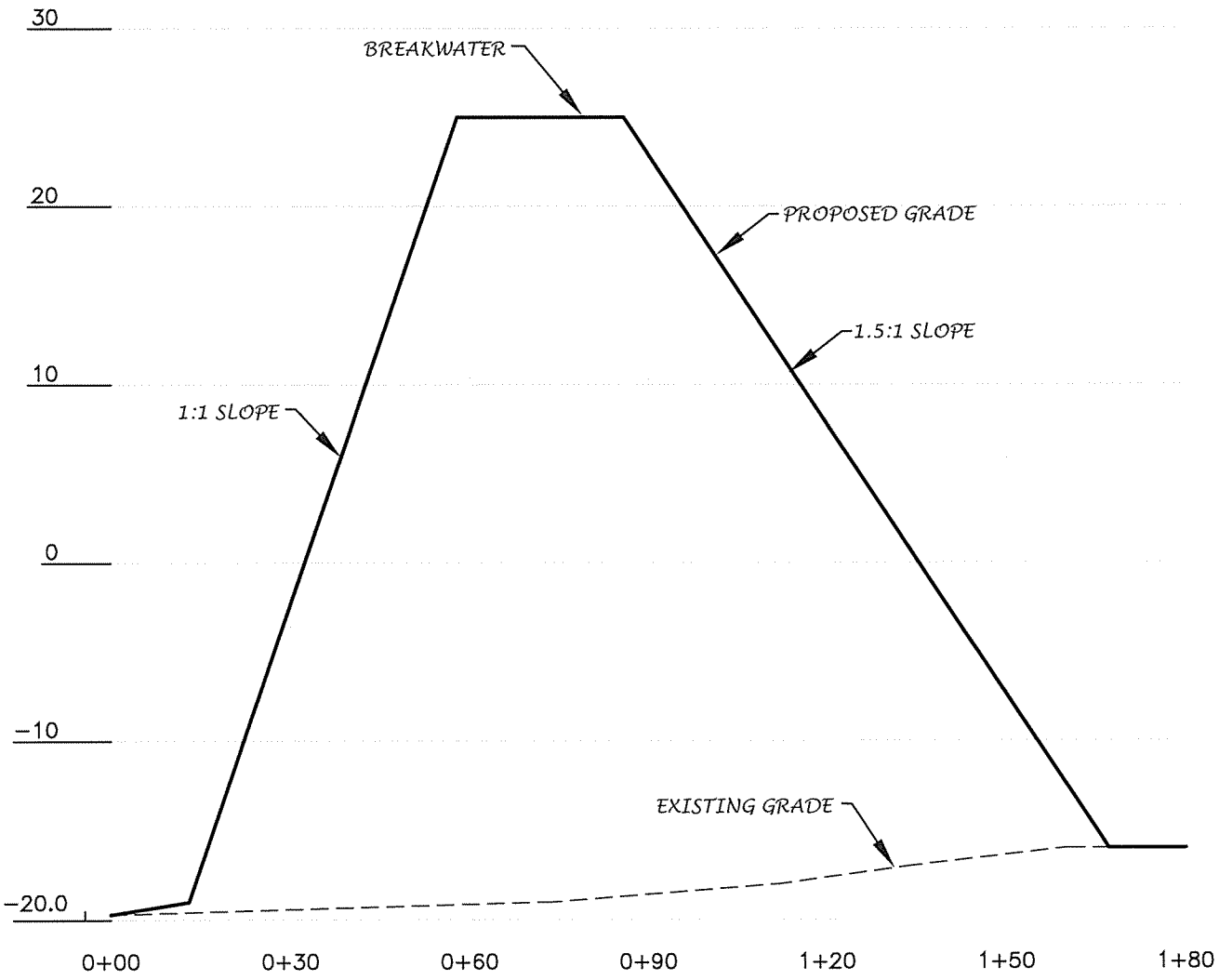
SITE PLAN

SHEET 4 OF 4

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019, SCALE: 1"=60'



SCALE: 1"=30' HORIZONTAL
1"=10' VERTICAL

CROSS SECTION 'A-A'

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019

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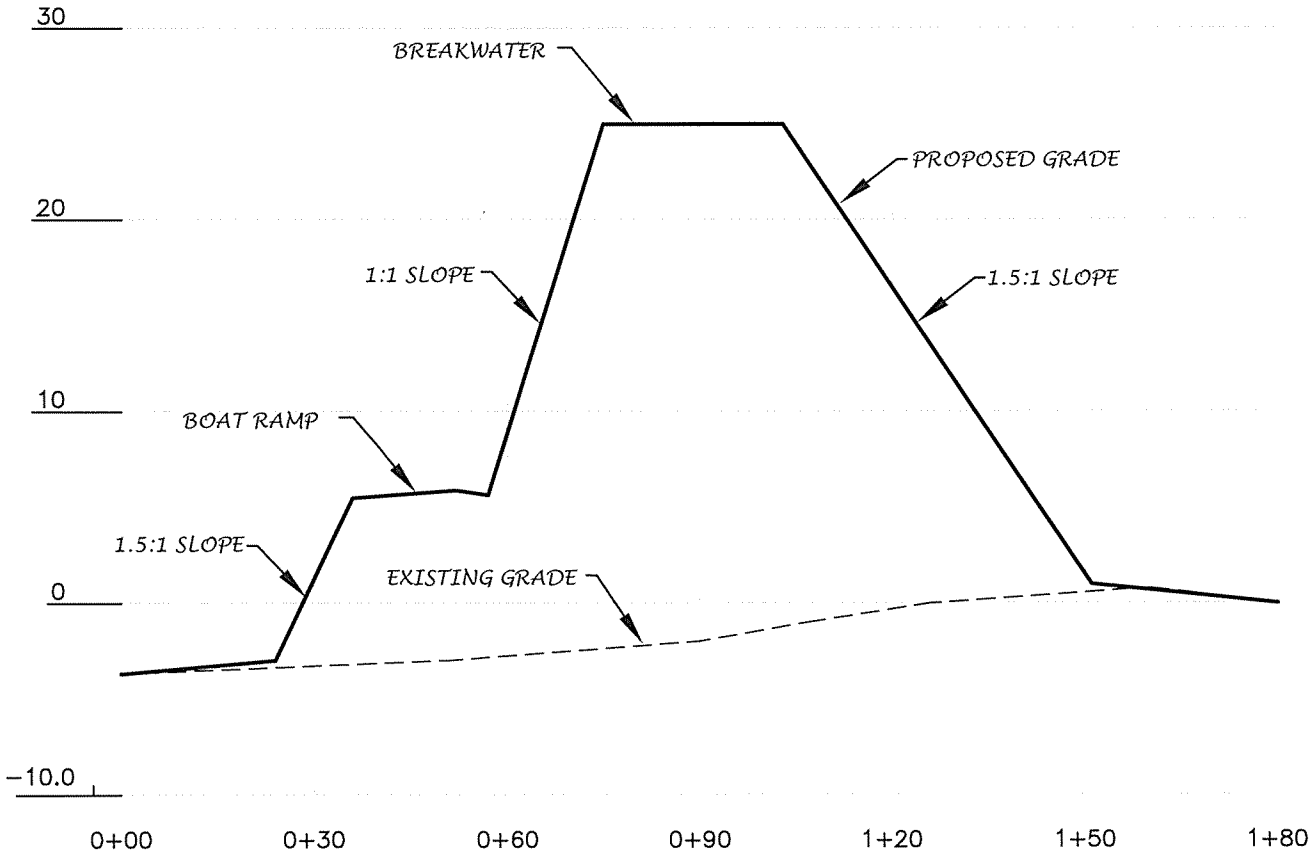

SCALE: 1"=30' HORIZONTAL
1"=10' VERTICAL

CROSS SECTION 'B-B'

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019

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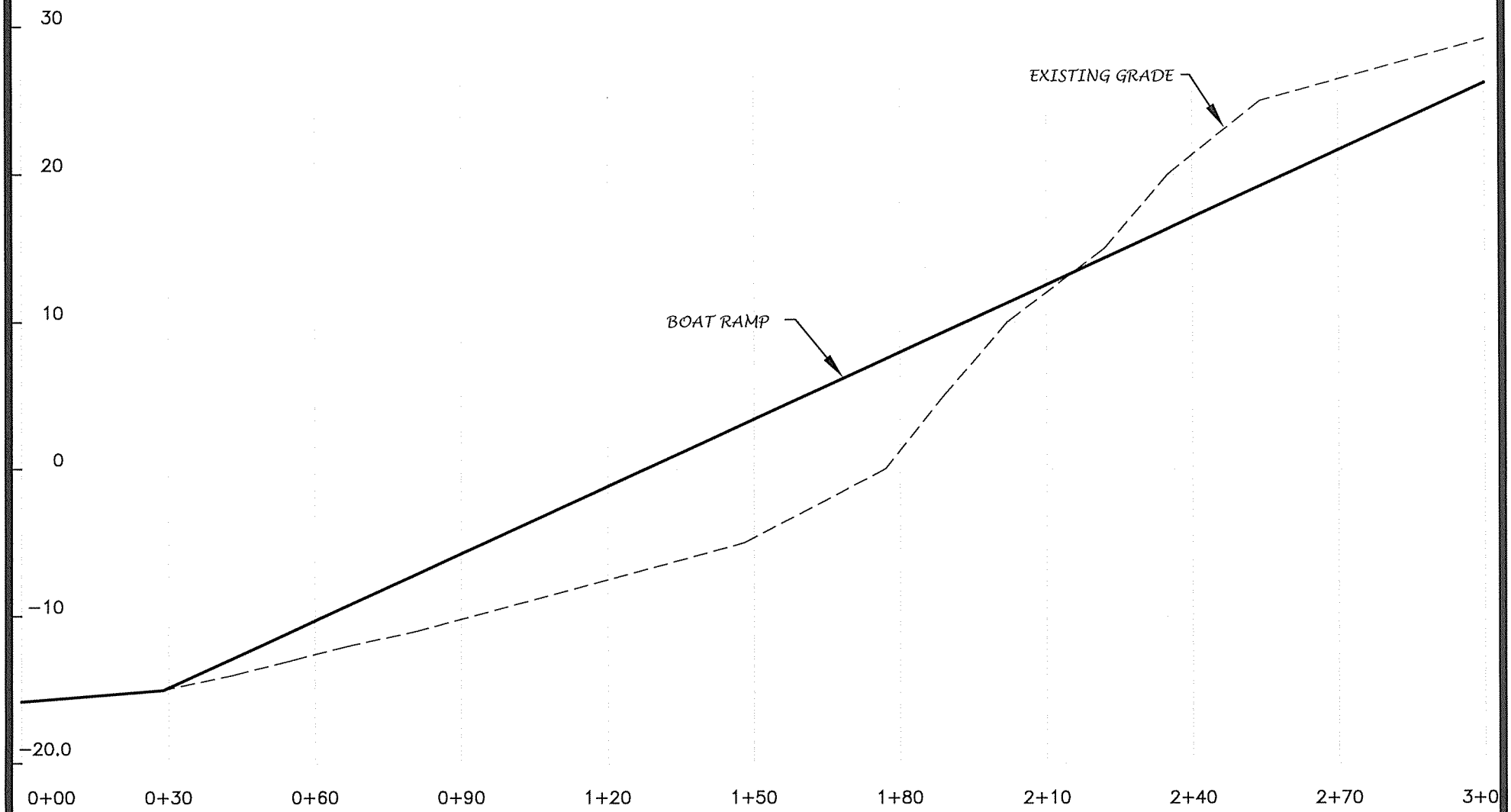

SCALE: 1"=30' HORIZONTAL
1"=10' VERTICAL

CROSS SECTION 'C-C'

OF

LUBEC SAFE HARBOR
ROUTE 189, MAIN STREET
LUBEC, MAINE

DATE: JUNE 2019

DOWN to EARTH
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Attachment 7 - Construction Plan

Phase I
Access to the proposed project will be via Route 189, Main Street in Lubec, Maine. A new entrance will be constructed easterly and adjacent to the Lubec Historical Society property. A new service drive is to be constructed for access to the area earmarked for vehicular and trailer parking. A temporary stone construction exit will be implemented to avoid sediment tracking onto Main Street.

Phase II
Prior to any construction activities, erosion control mix (ECM) will be installed along the perimeter of the proposed parking area. The parking area will be grubbed and loamy overburden material will be stockpiled at the adjacent town-owned property, and to be utilized for finish grading activities. Ledge removal activities will be conducted to sub-grade elevations. Excavated ledge material will be stockpiled at the adjacent town-owned property to be utilized for breakwater construction.

Phase III
Construction of stone-rubble breakwater and boat ramp will be constructed with on-site stone material and supplemental material trucked in from nearby sources. Stone construction will be brought to subgrade elevations.

Phase IV
The circular cell sheet pile portion of the breakwater will be constructed and accessed via the stone-rubble portion of the breakwater. Construction activities via barge may be required.

Phase V
Log pilings will be installed for anchoring of floating docks and dry dock area.

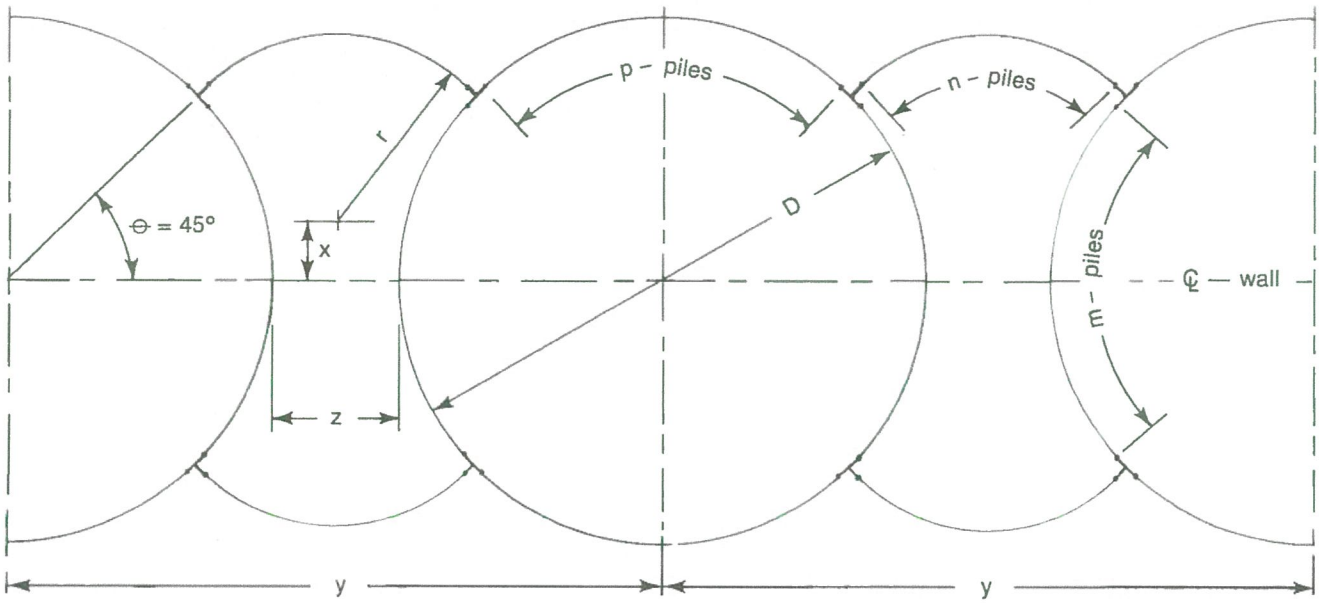
Phase VI
Finished grading of vegetated areas associated with the parking area will be conducted, utilizing stockpiled loam material as much as possible.

Phase VII
Finished surfaces for the boat ramp (concrete), breakwater (bituminous pavement with aggregate base) and parking area (bituminous pavement and aggregate base).

Phase VIII
Loam, seed and mulch all disturbed areas not paved or riprap.

Phase IX
Remove all temporary erosion control measures upon stabilization of the site.

Cellular Layout Using PS27.5 and/or PS31
Circular Type With 90° T Connections



SECTION PS27.5 and PS31

*Number of Piles in Cell	D ft	z ft	y ft	r ft	x ft	Number of Piles			Area, sq ft		Average Width ft
						m	n	p	Within circle	Between circles	
44	22.98	8.10	31.08	10.49	.71	10	9	10	415	228	20.7
48	25.07	7.49	32.56	10.49	1.45	11	9	11	493	236	22.4
52	27.16	6.88	34.04	10.49	2.18	12	9	12	579	242	24.1
56	29.25	6.27	35.52	10.49	2.92	13	9	13	672	247	25.9
60	31.34	5.66	37.00	10.49	3.66	14	9	14	771	251	27.6
64	33.43	6.52	39.95	11.53	3.66	15	10	15	877	302	29.5
68	35.52	5.91	41.43	11.53	4.40	16	10	16	990	305	31.3
72	37.61	5.30	42.91	11.53	5.14	17	10	17	1110	308	33.1
76	39.69	6.16	45.85	12.58	5.14	18	11	18	1237	365	34.9
80	41.78	5.55	47.33	12.58	5.88	19	11	19	1370	367	36.7
84	43.87	6.42	50.29	13.62	5.88	20	12	20	1511	429	38.6
88	45.96	5.80	51.76	13.62	6.62	21	12	21	1658	430	40.4
92	48.05	6.67	54.72	14.66	6.62	22	13	22	1812	498	42.2
96	50.14	6.06	56.20	14.66	7.35	23	13	23	1974	499	44.0
100	52.23	5.45	57.68	14.66	8.09	24	13	24	2141	499	45.8
104	54.32	6.31	60.63	15.71	8.09	25	14	25	2316	573	47.7
108	56.41	5.70	62.11	15.71	8.83	26	14	26	2498	573	49.5
112	58.50	6.57	65.07	16.75	8.83	27	15	27	2686	652	51.3
116	60.59	5.95	66.54	16.75	9.57	28	15	28	2881	651	53.1
120	62.68	6.82	69.50	17.80	9.57	29	16	29	3084	736	55.0
124	64.76	6.21	70.97	17.80	10.31	30	16	30	3293	735	56.8
128	66.85	5.59	72.44	17.80	11.05	31	16	31	3508	733	58.6

*Including four T piles

Average width shown = [area within circle + area between circles] ÷ y.

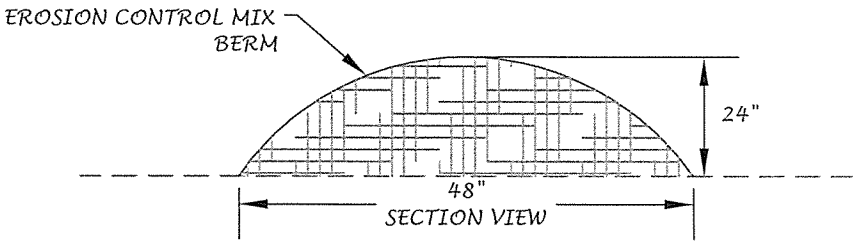
See page 24 for "Setting and Driving Tips," including guidance for template sizing.

Attachment 8 – Erosion Control Plan

Erosion control for the adjacent upland development, vehicular and trailer parking, will be utilizing conventional Best Management Practices (BMPs) including stone construction exit and erosion control mix (ECM). Dust control will be accomplished by routine application of water and any tracking occurring on adjacent roadways will be swept and cleaned on a daily basis.

Construction within the coastal wetland will consist of clean stone material free of fine sediments. Upon installation of the circular sheet piling, fill material is isolated from the water body.

No adverse impact is anticipated from log piling installation.



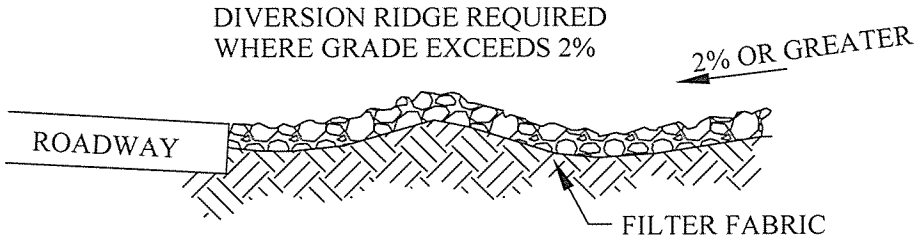
EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER. EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH. THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:

EROSION CONTROL MIX BERM

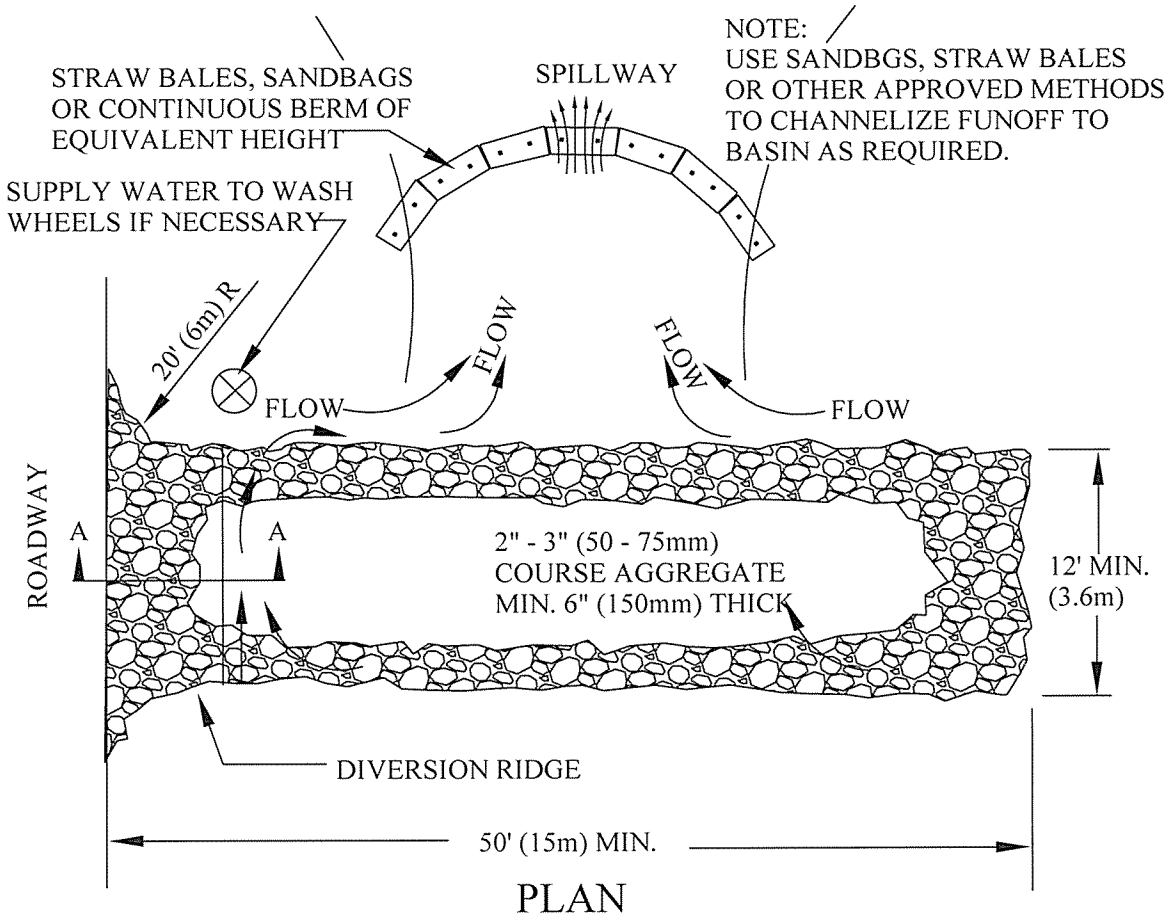
N.T.S.

*THE ORGANIC MATTER CONTENT SHALL BE BETWEEN 50 AND 100%, DRY WEIGHT BASIS.

* PARTICLE SIZE BY WEIGHT SHALL BE 100% PASSING A 6" SCREEN AND A MINIMUM OF 70%, MAXIMUM OF 85%, PASSING A 0.75" SCREEN.
* THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
* LARGE PORTIONS OF SILTS, CLAYS, OR FINE SANDS ARE NOT ACCEPTABLE.
* SOLUBLE SALTS CONTENT SHALL BE < 4.0 MMHOS/CM.
* THE PH SHOULD FALL BETWEEN 5.0 AND 8.0.



SECTION A – A



PLAN

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING. REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT

Attachment 9 – Site Condition Report

Introduction

The subject area for breakwater and boat ramp construction consist of a marine tidal and deep water environment. U.S Fish and Wildlife National Wetlands Inventory mapping designates the subject area as Estuarine and Marine Wetland (M2US1N) and Estuarine and Marine Deepwater (M1UBL). There are no influxes of significant freshwater introduction or tributaries within the site vicinity. The general conditions are a matrix of very stony sandy topography with ledge outcropping. The intertidal zone leeward abruptly terminates to ledge bluffs at the outer edges of the upland area.

Review of online mapping service of State of Maine Department of Inland Fisheries and Wildlife, US Fish and Wildlife Service and Maine GIS, there are no apparent significant habits for endangered species or wading birds at the subject site. The entire peninsula of Lubec falls within habitat for the Atlantic Salmon.

Site reconnaissance was conducted on site during low tide at 6:40 PM, on June 18, 2019. The following are observations at test plots at the upper and lower elevations of the intertidal zone:

Plot #1
Maine State Plane Coordinates N 437560, E 1374812
Vegetation – Bladderwrack seaweed, Rockweed seaweed
Biology – Sea lice, barnacles, periwinkle
Soil – Ledge, rocky/stony substrate

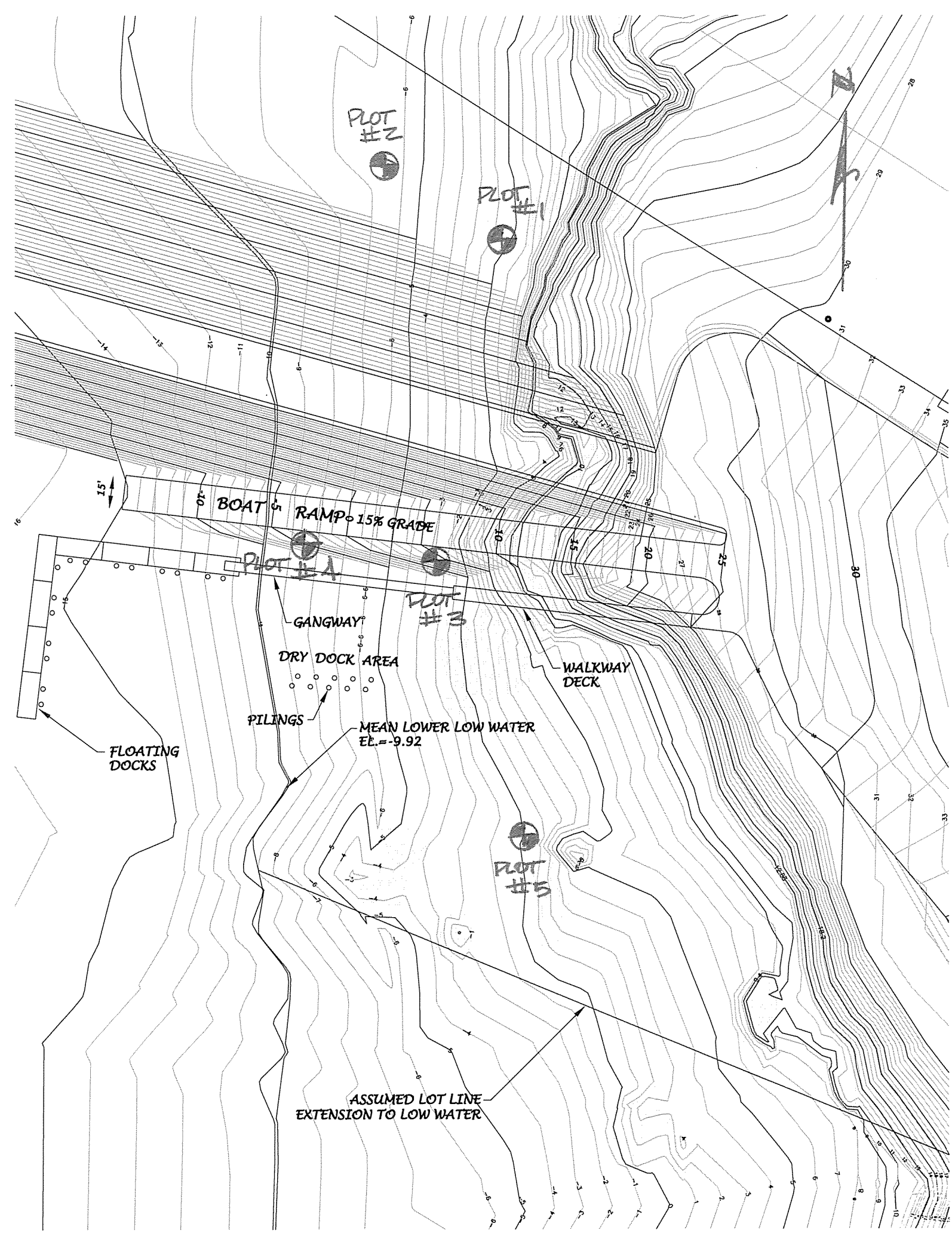
Plot #2
Maine State Plane Coordinates N 437581, E 1374718
Vegetation – none
Biology – Soft shell clams
Soil – Stony gravel substrate

Plot #3
Maine State Plane Coordinates N 437402, E 1374785
Vegetation – Bladderwrack seaweed, Rockweed seaweed
Biology – Sea lice, barnacles, periwinkle
Soil – Ledge, stony gravel, very consolidated

Plot #4
Maine State Plane Coordinates N 437581, E 1374718
Vegetation – none
Biology – Soft shell clams
Soil – Stony gravel substrate, very consolidated at 6”

Plot #5
Maine State Plane Coordinates N 437581, E 1374718
Vegetation – none
Biology – Soft shell clams
Soil – Stony gravel substrate, very consolidated at 6"

Refer to the following sketch plan depicting plot locations.


PLOT #2
PLOT #1
PLOT #4
PLOT #3
PLOT #5
BOAT RAMP @ 15% GRADE
15'
GANGWAY
DRY DOCK AREA
PILINGS
FLOATING DOCKS
MEAN LOWER LOW WATER EL.=-9.92
WALKWAY DECK
ASSUMED LOT LINE EXTENSION TO LOW WATER
N

APPENDIX A: MDEP VISUAL EVALUATION
FIELD SURVEY CHECKLIST
(Natural Resources Protection Act, 38 M.R.S. §§ 480 A - Z)

Name of applicant: TOWN OF LUBEC Phone: (207) 733-2341

Application Type: INDIVIDUAL NRPA

Activity Type: (brief activity description) FILL ACTIVITY FOR BREAKWATER AND BOAT RAMP

Activity Location: Town: LUBEC County: WASHINGTON

GIS Coordinates, if known: _____ _____

Date of Survey: 6/19/19 Observer: OSCAR EMERSON Phone: (207) 827-6733

	Distance Between the Proposed Visibility Activity and Resource (in Miles)		
1. Would the activity be visible from:	0-¼	¼-1	1+
A. A National Natural Landmark or other outstanding natural feature?	☐	☐	■
B. A State or National Wildlife Refuge, Sanctuary, or Preserve or a State Game Refuge?	☐	☐	■
C. A state or federal trail?	☐	☐	■
D. A public site or structure listed on the National Register of Historic Places?	☐	■	☐
E. A National or State Park?	☐	☐	■
F. 1) A municipal park or public open space?	☐	☐	■
2) A publicly owned land visited, in part, for the use, observation, enjoyment and appreciation of natural or man-made visual qualities?	■	☐	☐
3) A public resource, such as the Atlantic Ocean, a great pond or a navigable river?	■	☐	☐
2. What is the closest estimated distance to a similar activity?	☐	☐	■
3. What is the closest distance to a public facility intended for a similar use?	☐	☐	■
4. Is the visibility of the activity seasonal? (i.e., screened by summer foliage, but visible during other seasons)		☐Yes	■No
5. Are any of the resources checked in question 1 used by the public during the time of year during which the activity will be visible?		☐Yes	■No

A listing of National Natural Landmarks and other outstanding natural features in the State of Maine can be found at: www.nature.nps.gov/nnl/Registry/USA_map/states/Maine/maine.htm . In addition, unique natural areas are listed in the Maine Atlas and Gazetteer published by DeLorme.

(pink)

APPENDIX B: MDEP COASTAL WETLAND CHARACTERIZATION: INTERTIDAL & SHALLOW SUBTIDAL FIELD SURVEY CHECKLIST

NAME OF APPLICANT: TOWN OF LUBEC PHONE: (207) 733-2341
APPLICATION TYPE: INDIVIDUAL NRPA
ACTIVITY LOCATION: TOWN: LUBEC COUNTY: WASHINGTON

ACTIVITY DESCRIPTION: ■ fill ☐ pier ☐ lobster pound ☐ shoreline stabilization
☐ dredge ☐ other: _____

DATE OF SURVEY: 6/19/19 OBSERVER: OSCAR ENERSON, PE, PLS, LSE

TIME OF SURVEY: 6:40 PM TIDE AT SURVEY: LOW

SIZE OF DIRECT IMPACT OR FOOTPRINT (square feet):
Intertidal area: 17,700 SF Subtidal area: 125,533 SF

SIZE OF INDIRECT IMPACT, if known (square feet): _____
Intertidal area: _____ Subtidal area: _____

HABITAT TYPES PRESENT (check all that apply):
☐ sand beach ☐ boulder/cobble beach ☐ sand flat ■ mixed coarse & fines ☐ salt marsh
■ ledge ■ rocky shore ☐ mudflat (sediment depth, if known:____)

ENERGY: ☐ protected ☐ semi-protected ☐ partially exposed ■ exposed

DRAINAGE: ■ drains completely ☐ standing water ☐ pools ☐ stream or channel

SLOPE: ☐ >20% ☐ 10-20% ☐ 5-10% ☐ 0-5% ☐ variable

SHORELINE CHARACTER:
■ bluff/bank (height from spring high tide:____) ☐ beach ☐ rocky ☐ vegetated

FRESHWATER SOURCES: ☐ stream ☐ river ☐ wetland ☐ stormwater

MARINE ORGANISMS PRESENT:

	absent	occasional	common	abundant
mussels	■	☐	☐	☐
clams	☐	■	☐	☐
marine worms	■	☐	☐	☐
rockweed	☐	☐	■	☐
eelgrass	■	☐	☐	☐
lobsters	■	☐	☐	☐
other PERIWINKLE	☐	■	☐	☐

SIGNS OF SHORELINE OR INTERTIDAL EROSION? ☐ yes ■ no

PREVIOUS ALTERATIONS? ☐ yes ■ no

CURRENT USE OF SITE AND ADJACENT UPLAND:
■ undeveloped ■ residential ☐ commercial ☐ degraded ☐ recreational

PLEASE SUBMIT THE FOLLOWING:
■ Photographs ■ Overhead drawing (pink)

U.S. Fish and Wildlife Service

National Wetlands Inventory

Wetlands

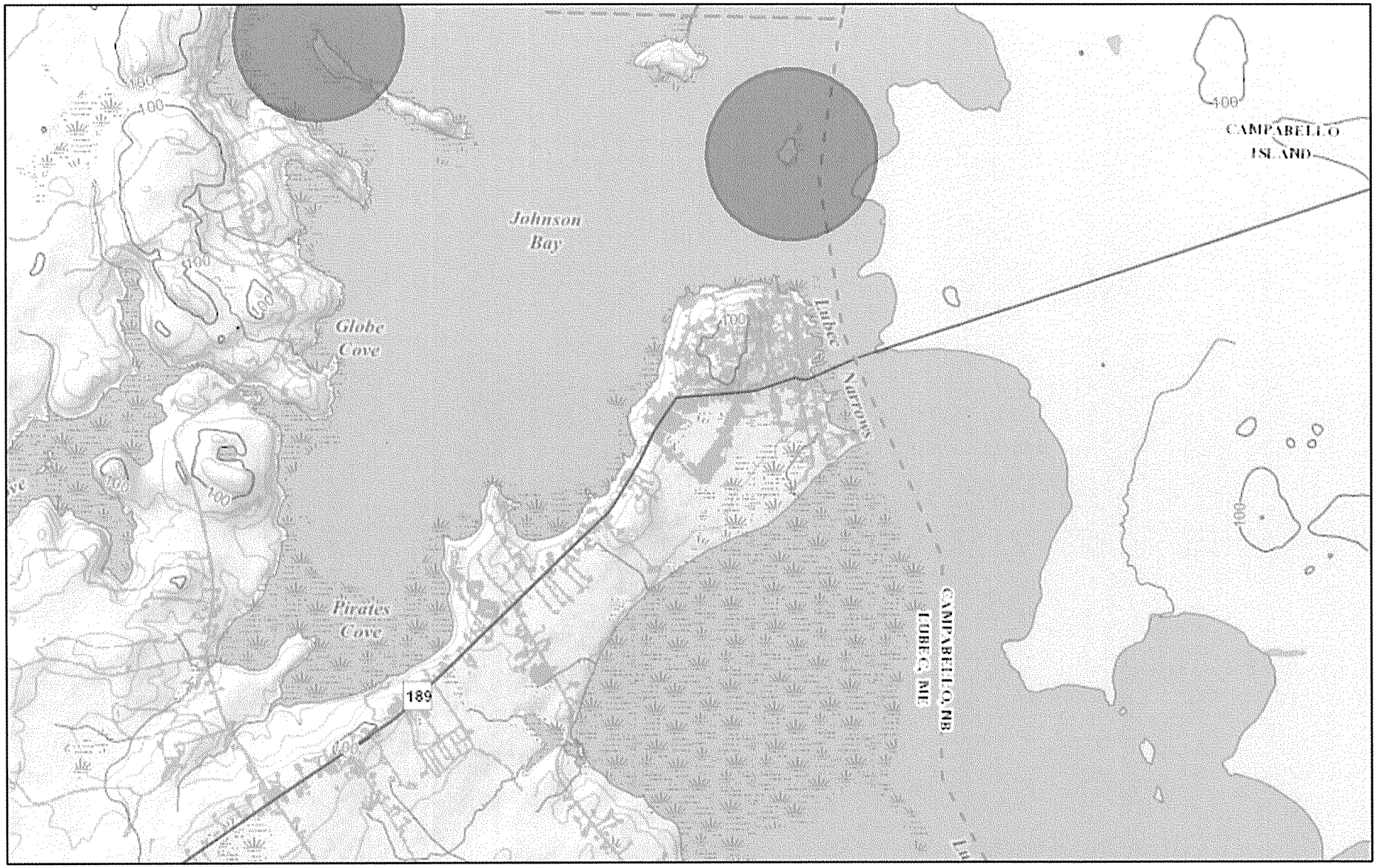
June 20, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Plant and Animal Habitat



June 20, 2019

ETSC Animal Habitat Buffers

1:36,112

0 0.2 0.4 0.8 mi

0 0.35 0.7 1.4 km

This map is intended for planning purposes and should not be used for

PUBLIC NOTICE:
NOTICE OF INTENT TO FILE

Please take notice that

TOWN OF LUBEC

40 SCHOOL STREET, LUBEC, ME 04652 (207) 733-2341

(*Name, Address and Phone # of Applicant*)

is intending to file a Natural Resources Protection Act permit application with the Maine Department of Environmental Protection pursuant to the provisions of 38 M.R.S. §§ 480-A thru 480-BB on or about

JUNE 30, 2019

(anticipated filing date)

The application is for

THE CONSTRUCTION OF A STONE-RUBBLE AND SHEET PILE BREAKWATER,

(description of the project)

BOAT RAMP, AND FLOATING DOCK SUPPORTS

at the following location:

MAIN STREET, LUBEC MAINE

(*project location*)

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing, no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application.

For Federally licensed, permitted, or funded activities in the Coastal Zone, review of this application shall also constitute the State's consistency review in accordance with the Maine Coastal Program pursuant to Section 307 of the federal Coastal Zone Management Act, 16 U.S.C. § 1456. (Delete if not applicable.)

The application will be filed for public inspection at the Department of Environmental Protection's office in (*Portland, Augusta or Bangor*) (circle one) during normal working hours. A copy of the application may also be seen at the municipal offices in BANGOR, Maine.

(*town*)

Written public comments may be sent to the regional office in Portland, Augusta, or Bangor where the application is filed for public inspection:

MDEP, Central Maine Regional Office, 17 State House Station, Augusta, Maine 04333
MDEP, Southern Maine Regional Office, 312 Canco Road, Portland, Maine 04103
MDEP, Eastern Maine Regional Office, 106 Hogan Road, Bangor, Maine 04401

(pink)

PUBLIC NOTICE FILING AND CERTIFICATION

Department Rules, Chapter 2, require an applicant to provide public notice for all Tier 2, Tier 3 and individual Natural Resources Protect Act projects. In the notice, the applicant must describe the proposed activity and where it is located. **"Abutter"** for the purposes of the notice provision means any person who owns property that is BOTH (1) adjoining and (2) within one mile of the delineated project boundary, including owners of property directly across a public or private right of way.

1. **Newspaper:** You must publish the Notice of Intent to File in a newspaper circulated in the area where the activity is located. The notice must appear in the newspaper within 30 days prior to the filing of the application with the Department. You may use the attached Notice of Intent to File form, or one containing identical information, for newspaper publication and certified mailing.

2. **Abutting Property Owners:** You must send a copy of the Notice of Intent to File by certified mail to the owners of the property abutting the activity. Their names and addresses can be obtained from the town tax maps or local officials. They must receive notice within 30 days prior to the filing of the application with the Department.

3. **Municipal Office:** You must send a copy of the Notice of Intent to File and a **duplicate of the entire application** to the Municipal Office.

ATTACH a list of the names and addresses of the owners of abutting property.

CERTIFICATION

By signing below, the applicant or authorized agent certifies that:

5. A Notice of Intent to File was published in a newspaper circulated in the area where the project site is located within 30 days prior to filing the application;
6. A certified mailing of the Notice of Intent to File was sent to all abutters within 30 days of the filing of the application;
7. A certified mailing of the Notice of Intent to File, and a duplicate copy of the application was sent to the town office of the municipality in which the project is located; and
8. Provided notice of and held a public informational meeting, if required, in accordance with Chapter 2, Rules Concerning the Processing of Applications, Section 13, prior to filing the application. Notice of the meeting was sent by certified mail to abutters and to the town office of the municipality in which the project is located at least ten days prior to the meeting. Notice of the meeting was also published once in a newspaper circulated in the area where the project site is located at least seven days prior to the meeting.

The Public Informational Meeting was held on _____.
Date

Approximately _____ members of the public attended the Public Informational Meeting.

_____ 6/19/19
Signature of Applicant or authorized agent Date

DOWN to EARTH
PROFESSIONAL LAND SERVICES, INC.
P.O. BOX 443
BRADLEY, MAINE 04411-0443
TEL.207-827-6733

June 19, 2019

Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333

Subject: Natural Resources Protection Act Permit, Individual Application
Lubec Safe Harbor
Main Road, Lubec, Maine

Dear Sir/Madam:

The applicant, Town of Lubec, is proposing to construct a breakwater and boat ramp located at Route 189 and Johnson's Bay. As per standard MDEP permitting procedure, a copy of the Individual NRPA application is hereby submitted to MHPC.

If you have any questions regarding the contents contained herein, please feel free to call.

Sincerely,

Oscar F. Emerson, PE

Wetland Function-Value Evaluation Form

Total area of wetland MARINE Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use RESIDENTIAL Distance to nearest roadway or other development 470'

Dominant wetland systems present ESTUARINE & MARINE Contiguous undeveloped buffer zone present YES

Is the wetland a separate hydraulic system? YES If not, where does the wetland lie in the drainage basin? BOTTOM

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. _____

Latitude _____ Longitude _____

Prepared by: OFF Date 6/19/19

Wetland Impact:
Type FILL Area 143,233

Evaluation based on:
Office _____ Field ✓

Corps manual wetland delineation completed? Y _____ N ✓

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		✓			NOT APPLICABLE
Floodflow Alteration		✓			NOT APPLICABLE
Fish and Shellfish Habitat		✓	3, 4, 5,		NO ABUNDANCE OF SHELLFISH OBSERVED AREA CLOSED TO SHELLFISH HARVESTING.
Sediment/Toxicant Retention			2?, 3		
Nutrient Removal		✓	1, 2, 3		DENSE VEGETATION IN UPLAND AREA
Production Export			3, 6		
Sediment/Shoreline Stabilization	✓		2, 3, 11, 12, 15		STABILIZING VEGETATION IN UPLAND ADJACENT TO WETLAND.
Wildlife Habitat		✓	1, 3, 21		NO WILDLIFE OBSERVED.
Recreation		✓	9		OBSERVATION ONLY
Educational/Scientific Value		✓	2, 4, 8		ADJACENT TO MAINE HISTORICAL SOCIETY
Uniqueness/Heritage		✓	8, 10, 16, 17		4 OUT OF 32 QUALIFIERS
Visual Quality/Aesthetics	✓		7, 10, 11, 12	X	VIEW OF JOHNSONS BAY
ES Endangered Species Habitat		✓			
Other					

Notes:

*Refer to backup list of numbered considerations.

Attachment 13 – Compensation

The proposed compensation is to be in-lieu-fee. Calculated fee for Washington County is as follows:

143,233 SF X 2.90 X 2 = $830,752

Section 107 Navigation Improvement Study
Initial Appraisal of Federal Interest

Lubec Harbor
Lubec, Maine

US ARMY CORPS
OF ENGINEERS
New England District

June 2004

LUBEC HARBOR, MAINE

SECTION 107
NAVIGATION IMPROVEMENT STUDY

INITIAL APPRAISAL OF FEDERAL INTEREST

LUBEC HARBOR, MAINE

SECTION 107
INITIAL APPRAISAL OF FEDERAL INTEREST

TABLE OF CONTENTS

LUBEC HARBOR, MAINE
SECTION 107 STUDY
INITIAL APPRAISAL OF FEDERAL INTEREST

Introduction

Lubec is the eastern-most town of the United States, located on the northeast coast of Maine in Washington County across the Lubec Channel from Canada's Campobello Island in New Brunswick. Lubec is located about 5 miles south across Johnson Bay from the City of Eastport, Maine (see Figure 1).

The village of Lubec is located at the easterly end of Lubec Neck, bounded on the south and east by Lubec Channel and on the north by Johnson Bay, an arm of Cobscook Bay. The Village is the town center and the Town's most populated area, with smaller villages located along state Route 189 and the several peninsulas extending north into Cobscot Bay. The Lubec lobstering and fishing fleet is currently scattered about the many small coves due to lack of a protected centralized off-loading facility. Until the late 1970s, Lubec Neck was one of Maine's most active commercial fishing ports, with several large cannery operations processing herring and other species. Following the collapse of that fishery, the canneries closed and the community suffered an economic decline. Today a rebound in marine industries is mainly due to lobstering and the growth of Salmon farming.

This harbor was a subject of a navigation improvement study reconnaissance investigation under Section 107 authority in 1987, which was updated for the Town in 1993. Those investigations examined breakwater protection for the harbor at Lubec Neck and also examined Rogers Island Harbor. However, Federal participation was found not to be economically justified during those studies. Local users now believe that the efforts undertaken at those times did not account for important factors that should have been included. Mainly, they indicate that the actual users themselves were not adequately involved in the development of the facts and economic justification for the studies.

This Initial Appraisal of Federal Interest is a result of preliminary engineering and economics investigations conducted during a site visit on 30 May 2002 and follow-up telephone discussions and interviews.

Study Authority

This investigation was conducted under the continuing authority of Section 107 of the River and Harbor Act of 1960, as amended.

During meetings in 2001 (15 November) and 2002 (30 May), Harbormaster Mark Staggs and other local officials requested the New England District, Corps of Engineers (NAE) to initiate a Section 107 Study to determine what steps could be taken to minimize/ mitigate wave damages on public and private shore property and moored vessels in the harbor (Appendix A).

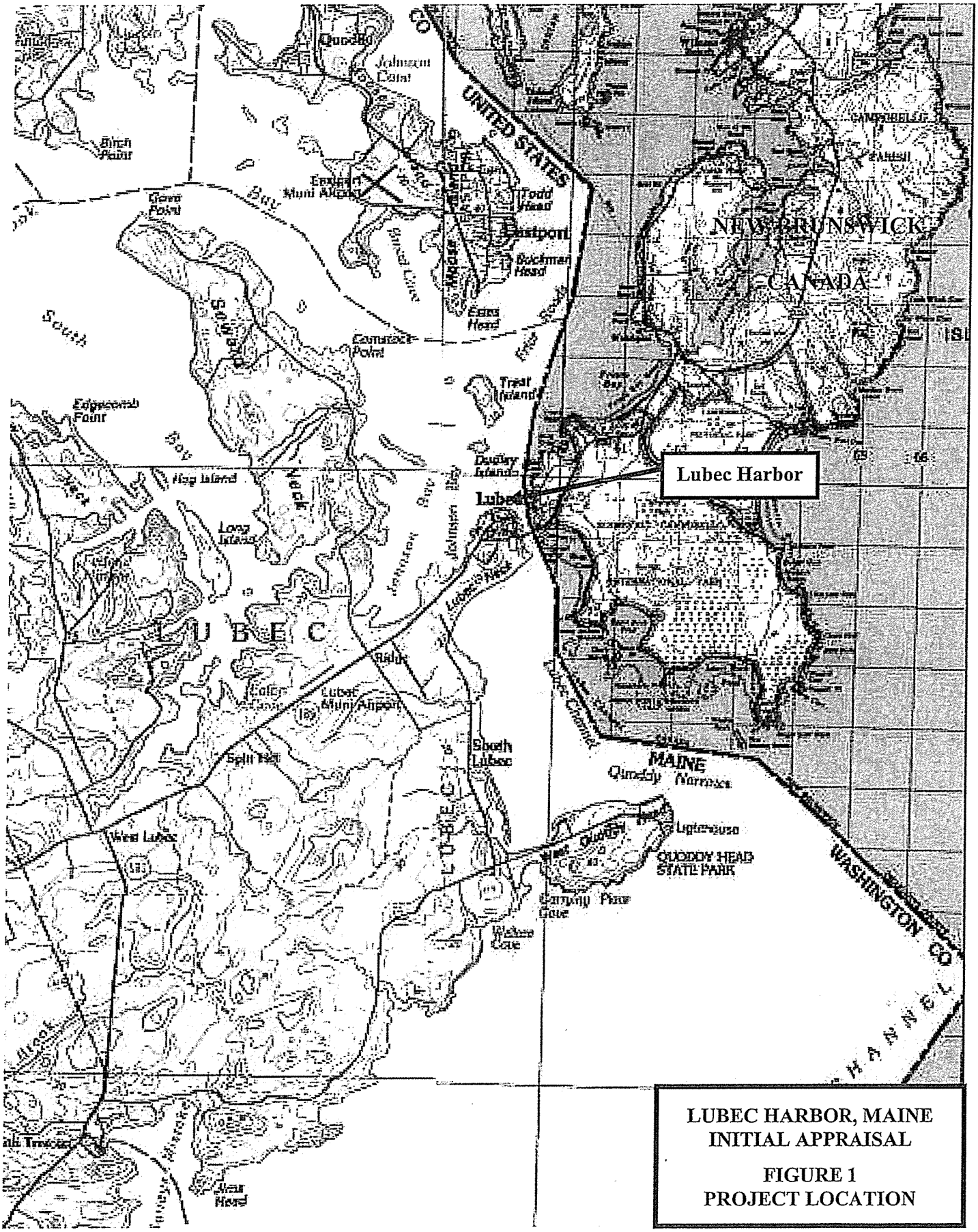
Existing Federal Navigation Project

The existing Federal Navigation Project at Lubec, shown in Figure 2, consists of a 12-foot deep, 500-foot wide channel that extends about 16,700 feet from Quoddy Roads to Johnson Bay. The channel was constructed in 1890 and widened in 1894 and 1905 to provide protective passage for vessels traveling to Lubec, Johnson Bay, Passamaquoddy and Cobscot Bays, the City of Eastport, and the towns along the Saint Croix River up to Calais. The Franklin Roosevelt Memorial – Campobello Bridge (International Bridge) crosses the channel and connects Lubec Village with Campobello Island, New Brunswick, Canada. The bridge is a fixed span with a clearance of 47 feet at mean high water.

Stone breakwaters were constructed along the U.S. shoreline to protect structures from the effects of extreme tidal currents that pass through the channel. A 260-foot long breakwater at Gun Rock was constructed in 1884. It was extended a further 90 feet in 1956. Federal funds were also expended under Section 14 authority in constructing stone rip-rap bank protection at Mulholland Point Lighthouse on the New Brunswick side of the channel, completed in March 1989. US funding was justified on the basis of that site's inclusion in the Roosevelt-Campobello International Park. The authorization history of the existing Federal navigation project is shown in Table 1. The construction and maintenance history of the Federal project is shown in Table 2.

TABLE 1
LUBEC CHANNEL, LUBEC, ME & DEER ISLE, NB
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction Dates
River & Harbor Act of 3 March 1879	Channel -12 Feet MLW by a Minimum Width of 200 Feet Wide through Lubec Narrows Connecting Quoddy Roads with Friar Roads in Passamaquoddy Bay	Oct 1879 – June 1883
Annual Report for 1884, Appendix A-1	Rubblemound Breakwater Extending 259 Feet Northeasterly Across Gun Rock	May 1884 – July 1884
River & Harbor Act of 5 July 1884	Widening the Channel to 275 Feet, 300 Feet in the Bends, and Deepening the Channel to -15 Feet MLW	May 1885 – June 1890 Widened to 12 Feet
Annual Report for 1886, Appendix A-1	Recommends that Deepening the Channel to -15 Feet be Deferred	NA
River & Harbor Act of 17 August 1894	Channel -12 Feet MLW by 500 Feet Wide, 650 Feet at the Bends, from Quoddy Roads to Johnson Bay	Sept 1895 – July 1904
River & Harbor Act of 3 September 1954	A 90-Foot Easterly Extension of the Gun Rock Breakwater, and A New Stone Breakwater 385 LF Easterly from Short Point, both with 6-Foot Top Width, and 24-Foot MLW Top Elevation (Short Point) and +21 Feet MLW (Gun Rock)	April 1956 – May 1956

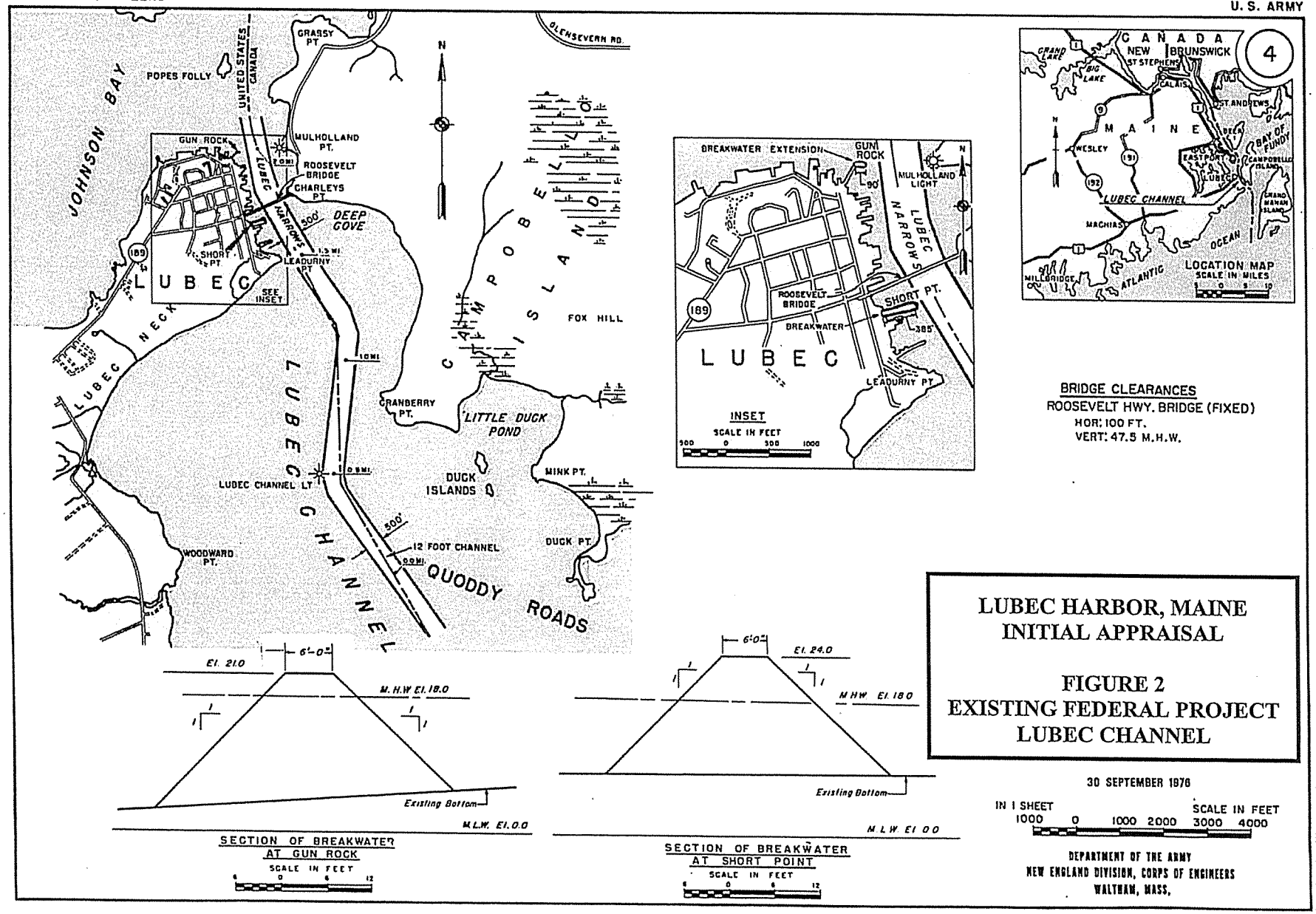


LUBEC HARBOR, MAINE
INITIAL APPRAISAL

FIGURE 1
PROJECT LOCATION

CORPS OF ENGINEERS

U. S. ARMY



BRIDGE CLEARANCES
ROOSEVELT HWY. BRIDGE (FIXED)
HOR: 100 FT.
VERT: 47.5 M.H.W.

LUBEC HARBOR, MAINE
INITIAL APPRAISAL

FIGURE 2
EXISTING FEDERAL PROJECT
LUBEC CHANNEL

30 SEPTEMBER 1976

IN 1 SHEET
SCALE IN FEET
1000 0 1000 2000 3000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

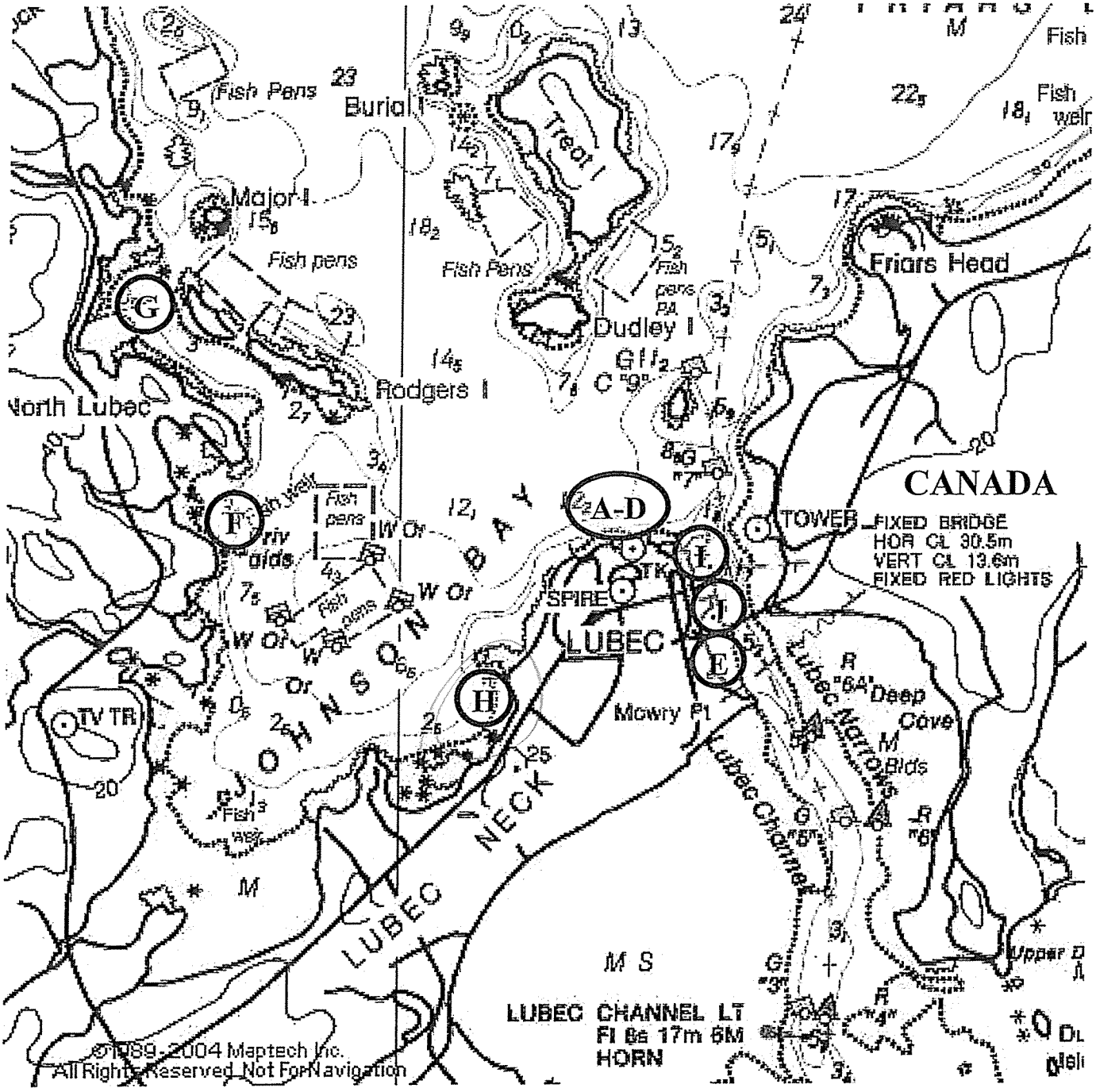
TABLE 2
LUBEC CHANNEL, LUBEC, ME & DEER ISLE, NB
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Oct 1879 - Nov 1879	Begin Improvement Dredging of the 12-Foot MLW by 200-Foot Wide Channel	3,720 cy
June 1881 – Oct 1882	Continue Improvement Dredging of the 12-Foot MLW by 200-Foot Wide Channel	96,827 cy
Oct 1882 – June 1883	Continue Improvement Dredging of the 12-Foot MLW by 200-Foot Wide Channel	129,849 cy
May 1884 – July 1884	Construction of the Gun Rock Breakwater Extending 259 LF North from Lubec Neck	Unknown
May 1885 – July 1885	Begin Improvement Dredging to Widen the 12-Foot MLW Channel to 275-300 Feet	29,064 cy
June 1887 – Aug 1887	Continue Improvement Dredging to Widen the 12-Foot MLW Channel to 275-300 Feet	25,138 cy
June 1890	Continue Improvement Dredging to Widen the 12-Foot MLW Channel	20,286 cy
Sept 1895 – July 1896	Begin Improvement Dredging to Further Widen the 12-Foot Channel to 500 Feet, 650 Feet in the Bends	120,000 cy
Aug 1897 – Oct 1897	Continue Improvement Dredging to Widen the 12-Foot MLW Channel to 500 Feet	56,000 cy
June 1900 – Oct 1900	Continue Improvement Dredging to Widen the 12-Foot MLW Channel to 500 Feet	96,109 cy
Sept 1903 – July 1904	Continue and Complete Improvement Dredging to Widen the 12-Foot Channel to 500 Feet	130,266 cy
April 1956 – May 1956	Construction of the 90 LF East Extension to the Gun Rock Breakwater and Construction of the 385 LF Stone Breakwater at Short Point	2,040 Tons Stone for Gun Rock 6,380 Tons Stone for Short Point

Problem Identification

In 1976 the town approached several Federal and state agencies in an effort to secure funding for construction of a municipal fish pier facility to alleviate the lack of adequate landing facilities for the town's commercial fishermen (Photos No.1 and 2). Funding was secured through the farmers Home Administration and the Economic Development Administration and the pier was completed in 1980. Site selection was limited to a steep sloping area to compensate for the tide range and eliminate the need for dredging.

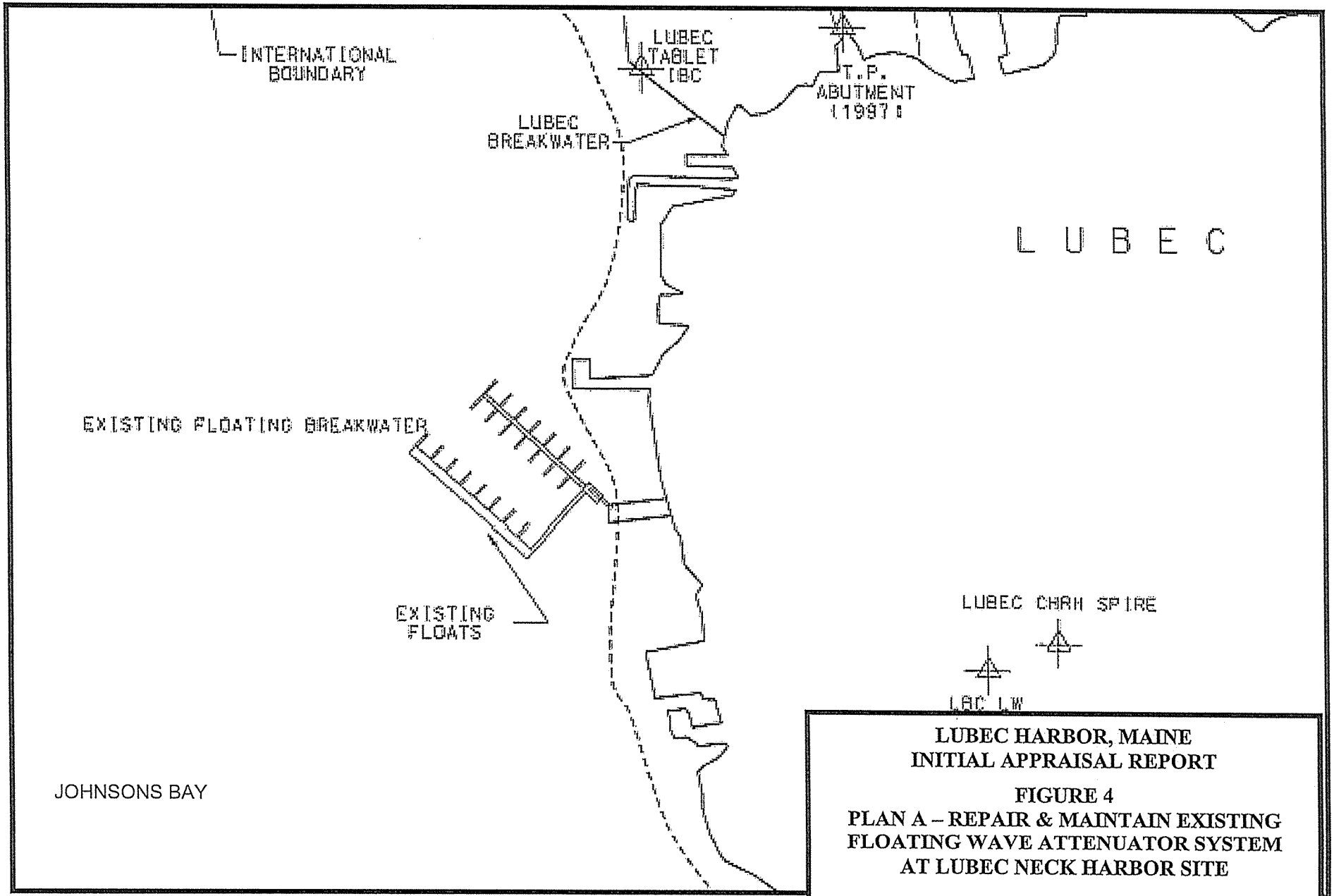
Since construction use of the pier has been minimal because of the unprotected nature of the northeast shore of Lubec Neck in the downtown. The underutilized pier is exposed to



ALTERNATIVE LUBEC HARBOR SITES	
A THRU D	Lubec Neck Harbor
E	Channel Park
F	Globe Cove
G	Rogers Island Harbor
H	Columbia Cove
I	Smokehouse & Stinson Wharf
J	Bridge North

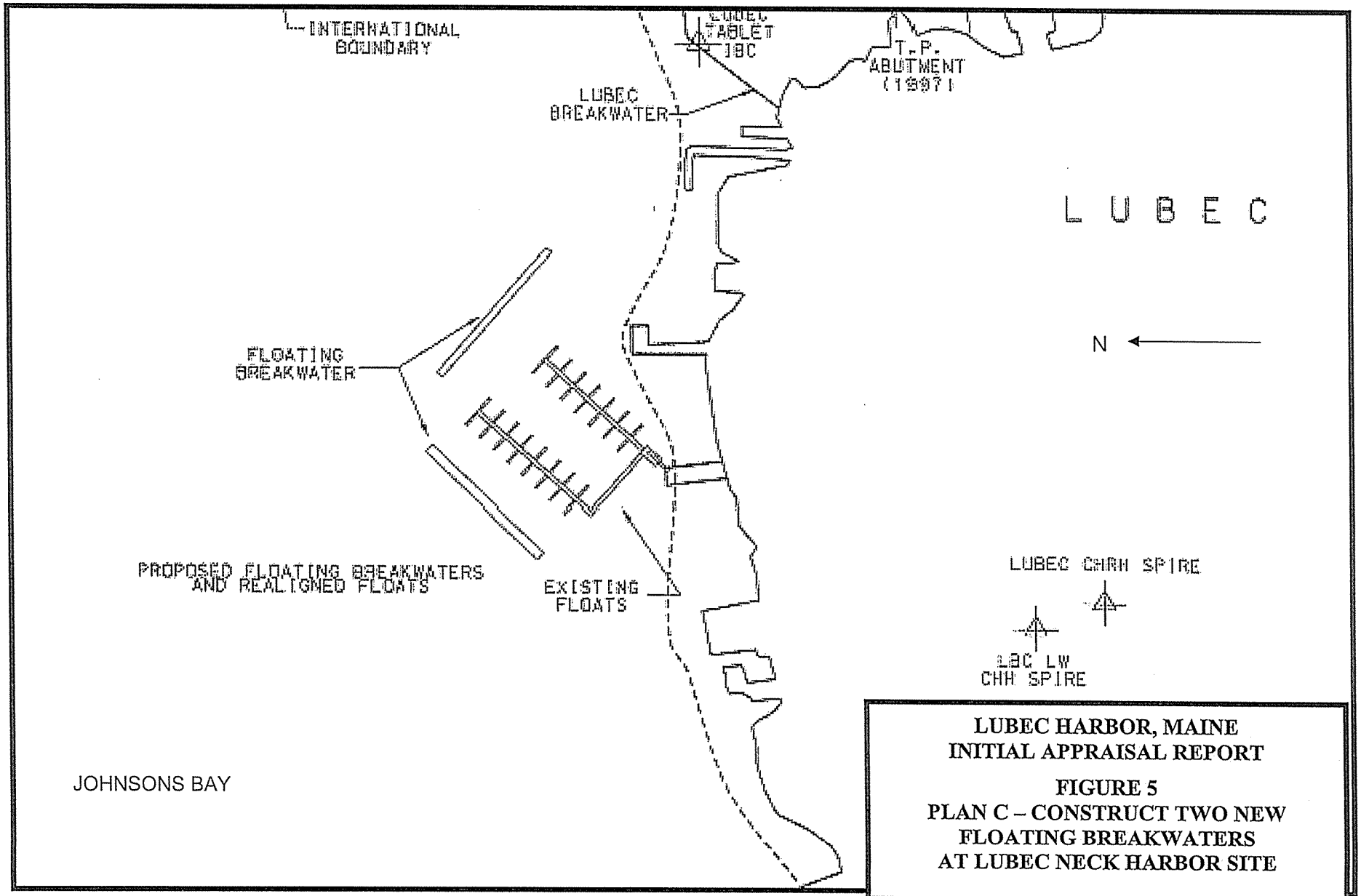
LUBEC HARBOR, MAINE
INITIAL APPRAISAL REPORT

FIGURE 3
ALTERANTIVE HARBOR LOCATIONS



LUBEC HARBOR, MAINE
INITIAL APPRAISAL REPORT

FIGURE 4
PLAN A – REPAIR & MAINTAIN EXISTING FLOATING WAVE ATTENUATOR SYSTEM AT LUBEC NECK HARBOR SITE



LUBEC HARBOR, MAINE
INITIAL APPRAISAL REPORT

FIGURE 5
PLAN C – CONSTRUCT TWO NEW FLOATING BREAKWATERS AT LUBEC NECK HARBOR SITE

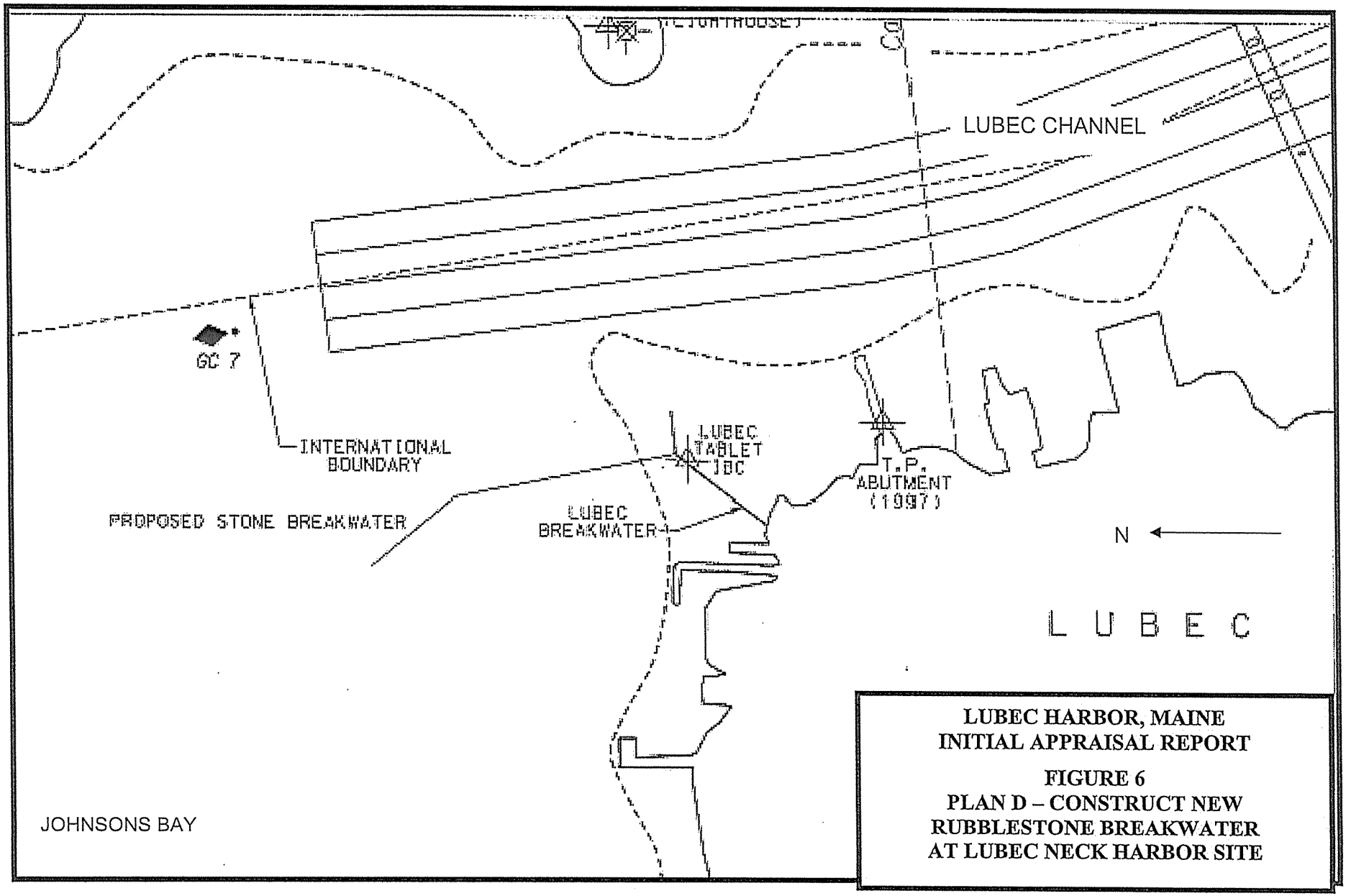


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FIGURE 6
PLAN D – CONSTRUCT NEW RUBBLESTONE BREAKWATER AT LUBEC NECK HARBOR SITE

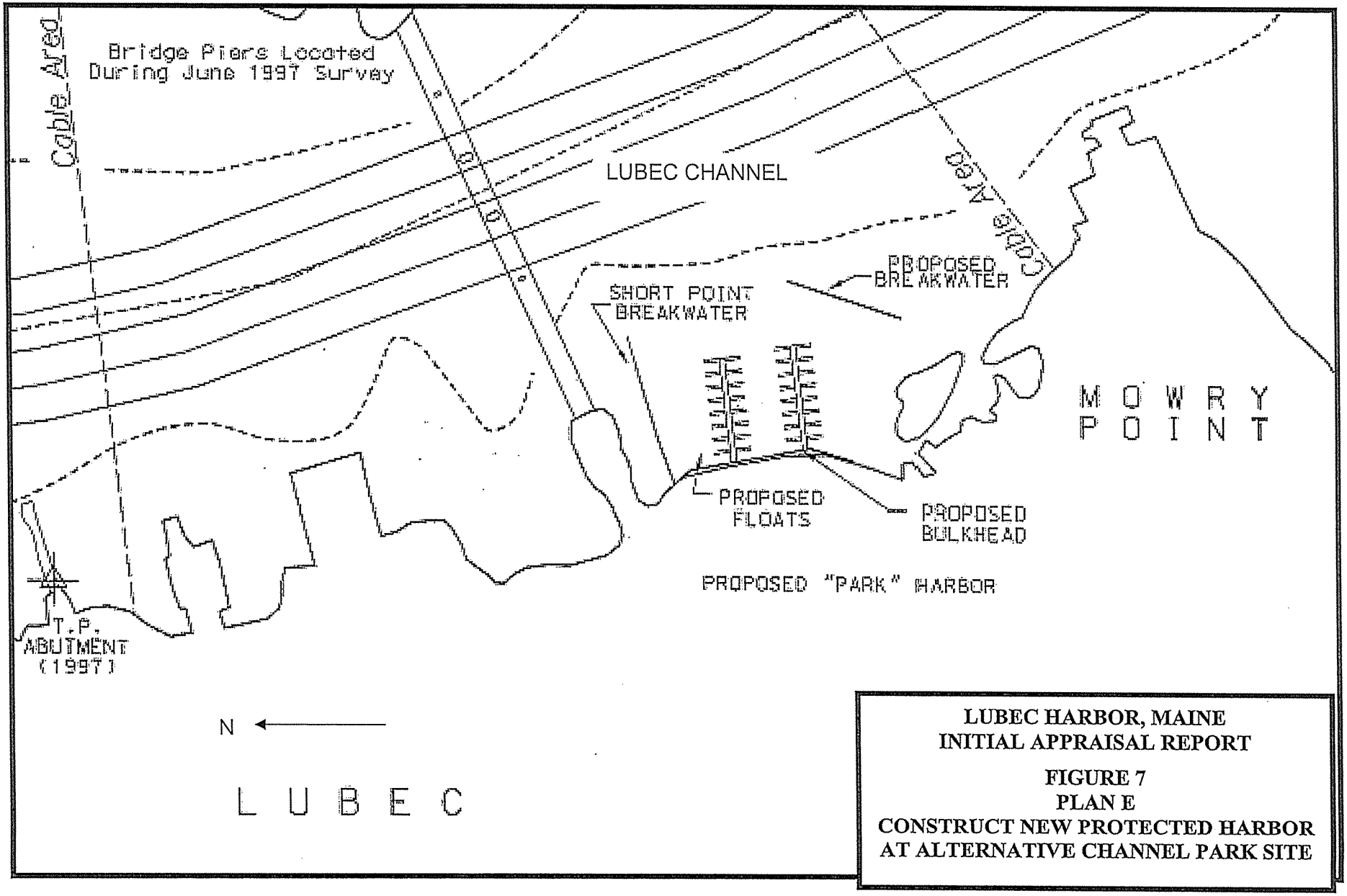

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FIGURE 7
PLAN E
CONSTRUCT NEW PROTECTED HARBOR
AT ALTERNATIVE CHANNEL PARK SITE

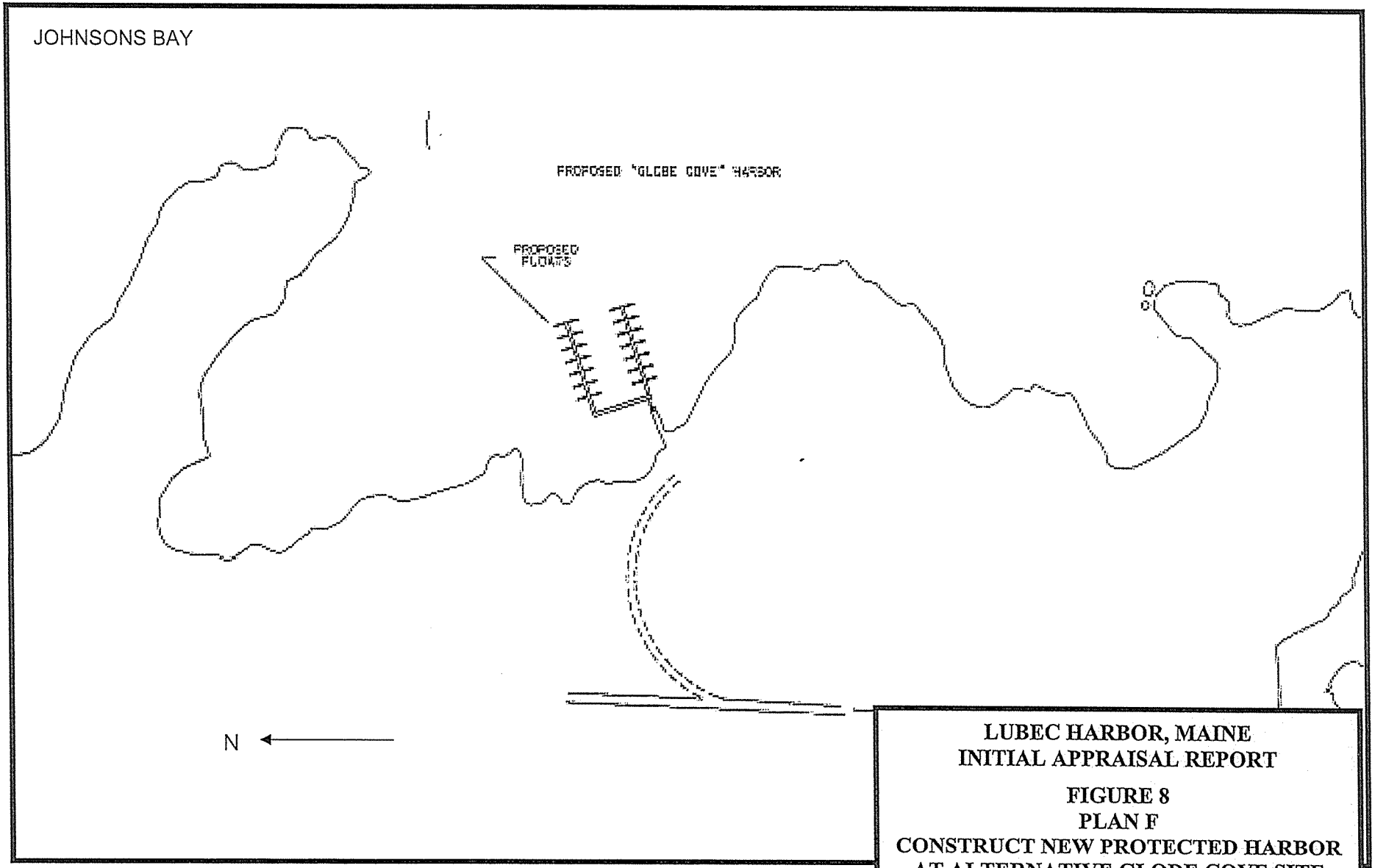

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FIGURE 8
PLAN F
CONSTRUCT NEW PROTECTED HARBOR
AT ALTERNATIVE GLODE COVE SITE

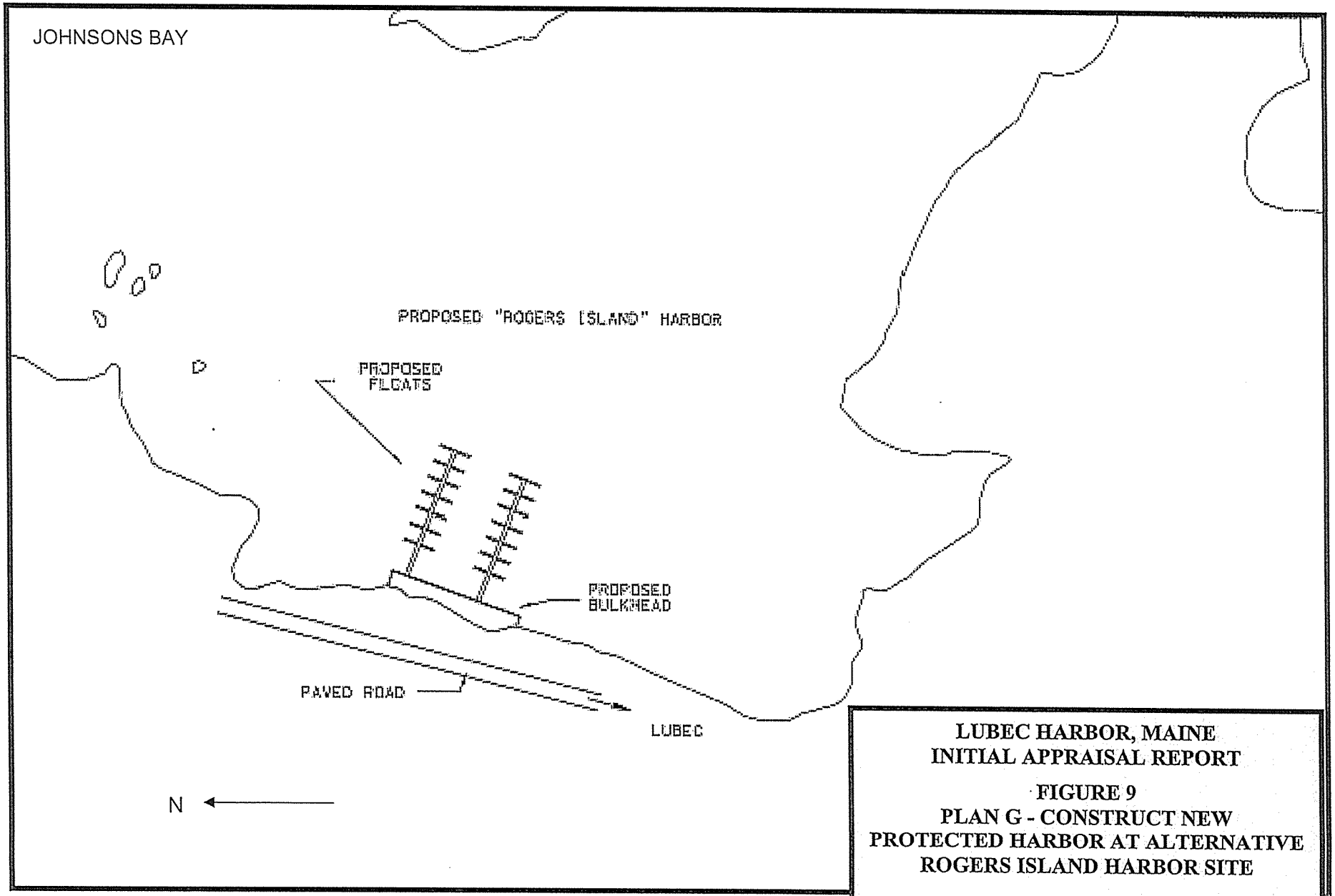

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FIGURE 9
PLAN G - CONSTRUCT NEW PROTECTED HARBOR AT ALTERNATIVE ROGERS ISLAND HARBOR SITE

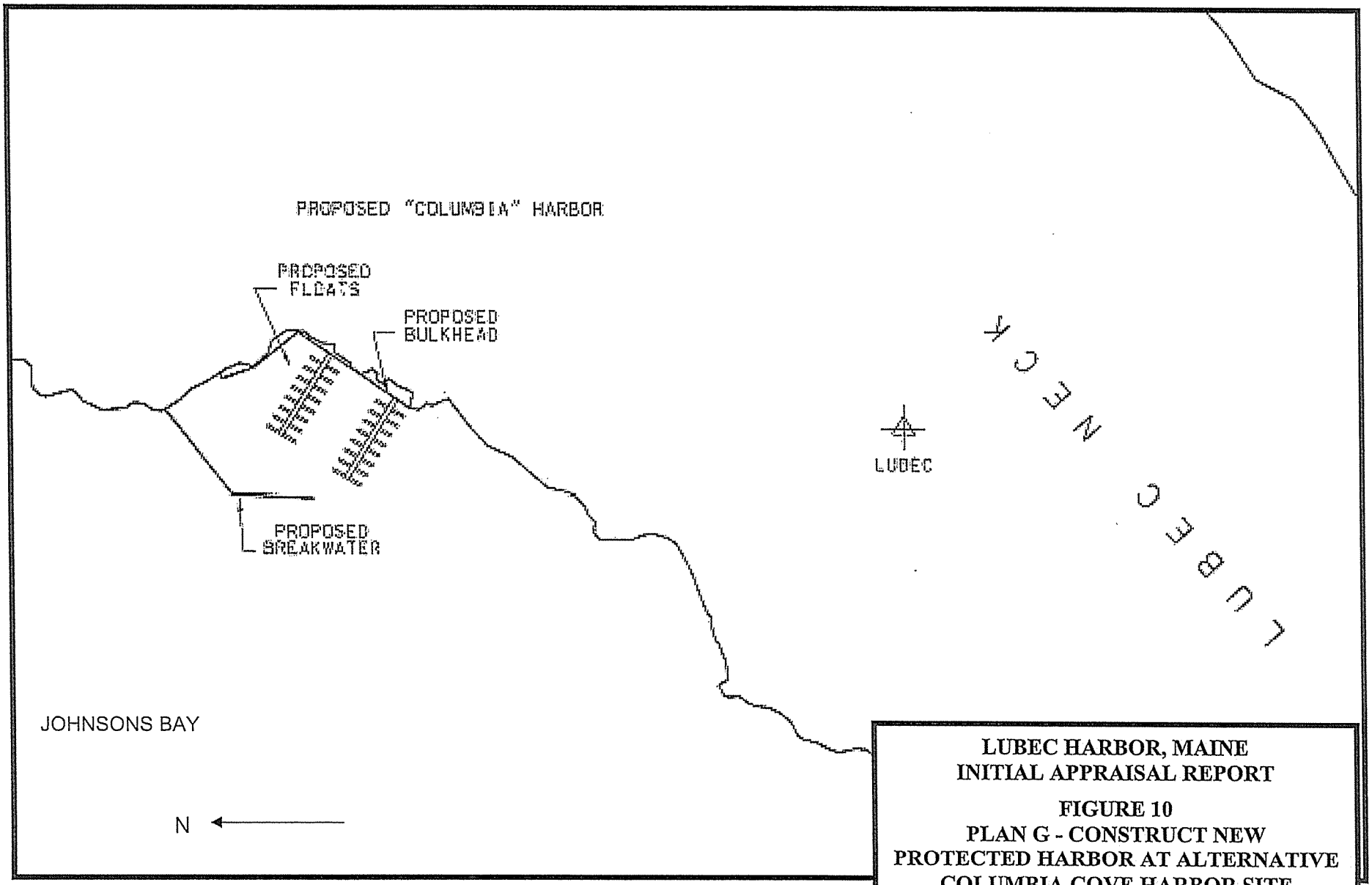

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FIGURE 10
PLAN G - CONSTRUCT NEW PROTECTED HARBOR AT ALTERNATIVE COLUMBIA COVE HARBOR SITE

wind and waves across a 15-mile fetch over Johnson and Passamaquoddy Bays. Wave heights frequently exceed two feet in the mildest conditions. Storm driven waves result in much higher seas which prevent use of the facility for safety reasons.

In late June 1997, the Town, with aid from Maine DOT, installed the present wave attenuator (Photo No.3). The attenuator is a steel & zinc cage, about 8 feet deep, with steel cylinder floats on top, and a pressure treated wood deck above. Water depth at the site is about 25 to 30 feet deep, with an 18 to 28-foot tide range. The attenuator is in four sections, joined with flexible connections. The structure is anchored with flexible "bungee" rope assemblies (eight strands each), attached to helical anchor screws embedded in the harbor bottom. The attenuator is oriented to protect the harbor marina and pier area from northwesterly winds and waves. The site is exposed to heavy winds and waves from both the northwest and northeast. The attenuator sections were designed and constructed by Tyco Ltd. of Ontario, and the layout, anchoring and placement of the attenuator were by Pine Tree Engineering of Bath, Maine and Child's Engineering (Richard Fitzgerald – Chief Engineer). The mooring anchors were provided and set by Straight Moorings (Paul Gordon – 506-468-2100 or 1886).

The marina serves as a base to the majority of the local fishing fleet, which draws from Lubec and several surrounding towns. The marina has space for about 50 craft when fully operational. Space is also provided for transient fishing craft which frequent the area during the scalloping and shrimping season. In the summer months, transient cruising sailing craft transiting US and Canadian waters also stop at the marina. The fish pier is a heavy-duty concrete deck pile supported structure with a large hoist and adjacent paved boat ramp. The attenuator provides access to several float slips, as wells as protecting the other two lines of float slips. The attenuator and other floats have electric and potable water supply. The site is partially protected by the Federal breakwater at Gun Rock from seas transmitted northerly up the Lubec Channel. In 1996, the year prior to placement of the attenuator, two fishermen were killed while attempting to skiff out to their boat. There have been no fatalities since.

Structural damage to the attenuator and its anchoring systems made slips in that area unusable. Other slip floats in the eastern area of the harbor had been removed from the water as fall-spring seas made them unusable and susceptible to damage. A number of useable slips were unoccupied as some fishermen would not risk using the marina at that time of year, and had relocated to other more protected small harbors in the area. Sea conditions made the pier unusable in some situations.

One of the four attenuator sections had been severely damaged and had been disconnected and temporarily moored east of the harbor area. Flexible connections between the second and third sections had failed resulting in significant damage to the adjoining ends of both sections as they repeatedly collided. Marina floats joining the attenuator had been damaged by the movement of the attenuator. Electrical and water service had been discontinued since the damage occurred. The harbormaster stated that this was typical damage that occurs each fall and winter. A number of the flexible vertical bungee connectors (formerly five-strand connectors) had parted, leading the town to request their replacement with eight-strand connectors.

The fishing fleet, including the four companies operating offshore salmon farm pens, landed over $23 million in seafood over the fish pier last year. The catch included salmon, mussels, lobsters, scallops (1 Dec to 15 April season), urchins, sea cucumbers and bait smolts. This figure does not include the equipment, salmon feed and fuel used by the salmon farms. The four aquaculture companies are Stoltz International, Atlantic Salmon, Connors Brothers, and L&R Seafood. Common fall through spring seas prevent fishermen and the boats servicing the salmon pens, from leaving the harbor. Scallopers generally work in the waters of Conscook and Passamaquoddy Bays, while the lobstermen work in the waters of the Grand Manan Channel, and US waters north of West Quoddy Head.

Problems with the system include the following:

a. The use of inadequate design parameters for the site (e.g., northeast winds were not accounted for, incorrect tidal range was used, no current was accounted for)

b. Poor placement of certain anchorage locations (although anchors that were properly placed have preformed very well)

c. Poor original mooring connections (Sea-Flex system has recently been upgraded)

d. Poor construction techniques used for attaching the sections of breakwater together (connector nuts were not properly fastened, connector plates were bent)

e. Ice and snow buildup on the decking during the winter and marine growth on the steel wave attenuator

f. An overall lack of maintenance due to poor weather conditions (ice and snow) hampers the maintenance of the facility.

It was also noted that many of the bolts and connector plates appear to be undersized for this type of coastal facility and weather conditions experienced at the site. Also, the steel wave attenuator below the floats has a solid bottom that collects debris.

Plan Formulation

It was apparent from discussions with local users that relocating the town harbor may not be a feasible option due to physical and financial constraints. Even in its present condition, the floating breakwater has apparently provided some protection from waves from the northwest. However, it does not provide protection from storm waves from the northeast and requires excessive maintenance. The present floating breakwater system could provide adequate protection if additional floating structures are properly designed, placed, and maintained. Any additional breakwater system should be placed to provide protection from the northeast. The harbormaster would like to see a design that does not have a top deck to prevent snow and ice buildup. The present design of the floating breakwater system should be reviewed and alternative configurations provided.

About seven different options/alternatives were developed for consideration in consult with Town officials and users. The locations of these alternatives are shown in Figure 3. Briefly, these alternatives include:

a. Repair and Strengthen the Existing Attenuator (Figure 4): This could include removal and repositioning of slip floats so that the attenuator stands alone. About the only part of the system that seems to have performed as designed is the helix augers.

b. Repair the Existing Attenuator and Add a Second Attenuator: In combination with "a" construct a second attenuator to protect the harbor from northeasterly seas. The layout for these structures would be the same as shown for the floating breakwater plan described below and shown in Figure 5. The existing wave attenuator would be detached from the municipal float array to eliminate the design conflicts with its use as a float.

c. Replace the Attenuator with a Different Floating Structure: Construction of a better floating structure(s) to protect the harbor from both sea directions, as shown in Figure 5. Some users are not entirely happy with the 1997 design, even if it were undamaged. The open cage structure requires constant cleaning by divers to prevent marine growth from weighing it down. The strong tidal currents also contribute to wear on the anchoring system and flexible connections, and heavy seas cause considerable annual damage to the planking and other components. Historically, the Corps has no knowledge of floating wave attenuators or other structures that can survive this kind of high-energy marine environment. We would not recommend a floating breakwater.

d. Stone Breakwater: Construct a traditional rubble-mound or other fixed design breakwater to replace the attenuator and better protect the harbor and the docked vessels (see Figure 6). This structure would be a northerly and northwesterly extension of the existing Federal breakwater at Gunn Point at the north end of the Lubec Channel.

e. Construct a New Harbor at the International Bridge: The area south of the International Bridge at the Town Park along Lubec Channel would provide a more protected location for a small boat harbor. This site, shown in Figure 7, is located north of the former Puss 'n Boots cat food factory and the Federal breakwater at Short Point. Through dredging and construction of a wave barrier, a new harbor may be constructed at this site, with sufficient capacity to meet the community's needs. This site would require extensive dredging and construction of a new fish pier. The Town owns the land, which is a large parcel capable of providing storage and repair facilities. The old cat food factory is being rebuilt as a small shipyard.

f. Construct a New Harbor at Globe Cove (Figure 8): This site is located along Lubec Neck across the highway from the cemetery. This site would also require a breakwater. However, there are existing shallow ledge areas for a foundation if a stone breakwater were proposed. Globe Cove is privately owned and would require extensive dredging.

g. Construct a New Harbor at Rogers Island Harbor at North Lubec (Figure 9): A new pier, shore support facilities, and dredging would be required. There is public land but no existing access or utilities. This site looked good for offering protection from northeast and northwest winds but was far from downtown. We were told this would mean

recreational boaters might not stop by due to inconvenience. This decrease in use/fees would impact the towns earnings for upkeep of the marina.

h. Construct a New Harbor at Columbia Cove (Figure 10): This site is on the north shore of Lubec Neck, west of the existing harbor. Part of the area is owned by the historical society. The town has a chance to acquire the area. This area may still be somewhat exposed to NE winds, although a little better protected than current location. Would likely still need some wave protection. Depths are much shallower than existing harbor which is about 20-30 feet deep @ MLW. Field observations indicate that ledge is likely to exist in this area.

i. New Harbor & Marina North of International Bridge: This plan consists of construction of a new protected harbor area and town marina in the area just north of International Bridge. The town may be able to acquire the site. However, this site is too small to warrant the expenditures necessary. Also potential undermining of bridge structures by dredging may require substantial additional cost to address. This plan was not investigated further.

j. New Harbor & Marina at the Smokehouse and/or Stinson's Wharf: Both of these sites are located north of the International Bridge, would require dredging and ledge removal, and provide little protection from the northeast. Also, they are very close to the existing Federal navigation project. The areas are too small for breakwater construction. Parking options for these two sites was also minimal to non-existent. Plans for these sites were not investigated further.

Project First Costs

Rough planning-level costs were developed for some of the above alternatives. These costs are discussed in some detail below, along with assumptions made, and are better summarized in Table 3 below.

The planning-level cost estimates were derived according to each option presented above. These include:

a. Rehabilitate the Existing Wave Attenuator: This plan consists of removing the wave attenuator from the water for repairs, installing new planking, connection details and hardware, and then reinstalling the wave attenuator to its original position. The cost of the repairs is estimated at about $100,000, plus mobilization costs.

b. Install a Second Wave Attenuator: This plan consists repairing the existing attenuator as in Plan A above, and installing a new wave attenuator adjacent to the existing attenuator to protect the harbor area from easterly waves. This assumes a design for the new attenuator similar to the existing wave attenuator and a similar mooring arrangement. The cost for the new floating structure would be about $1,400,000. Maintenance of these structures however, would be significant, both in cost and recurrence, and is therefore not recommended.

c. New Floating Structure(s): – Construction of a new floating breakwater or wave attenuator to protect the existing harbor area on Lubec Neck. This would consist of one or two structures to replace the existing wave attenuator and provide protection from easterly seas. This would require a design with greater ability to survive in heavy seas than the existing design, so as to extend the maintenance life of the structure(s). However, no proven floating designs are known for the sea conditions typical of Lubec Harbor, and therefore this option is not considered practical at this time.

d. Stone Breakwater: This plan consists of construction of a permanent breakwater to protect the existing dock/pier from northeast winds is estimated to require a 700' curved breakwater with a base width of about 160', height of about 50' (to elev +27 MLW), and crest width of 10'. This would require about 110,000 cy or 248,000 tons of stone, at a cost of about $25 million. This breakwater would then make the pier useable during most weather and would provide a protected area for the marina.

e. New Harbor & Marina South of the International Bridge: Details on subsurface conditions would need to be collected prior to design efforts – assume a subsurface sampling plan of about $100,000. Assume no ledged was found, and an anchorage area of 400' x 200' required dredging of about 50,000 cy of material at about $20/cy, this cost would be about $1,00,000. There would be a need for floats, bulkhead, water, power, paving and possible protection from waves from the south (i.e. breakwater, or sheet pile, etc). The harbormaster believes that a mirror image of the orientation laid out in 1987 would better allow for egress and ingress to the harbor from the international channel. Assuming a 500-foot bulkhead; The square footage of sheet pile would be about 500 x 90 = 45,000, costing $35/SF totaling $1.6 million. Assume the town could reuse existing floats say $150,000 to rehabilitate and relocate. A breakwater would be needed here as well. Assume 400 LF, 25' high 1.5 to 1 slope 10' crest width area = 1187.5 SF. Stone Volume = 17,600 cy or about 40,000 tons of stone estimated to cost about $100/ton or $4 million. A Feasibility Analysis would need to be added (at the outset), as well as plans and specifications, environmental documentation, permits, coordination with resource agencies, etc).

f. New Harbor & Marina at Globe Cove: This site is similar to the Roger's Island site (except this site is privately owned) and just as far from downtown. Assume the land will cost $300,000. Estimating a large area could be used and not as much dredging required yielded 800 x 300 x 5/27 = 45,000 cy or $900,000 for dredging. A pier would be required as well as land, power, and water. Reuse the existing town floats = $250,000. Assume that boats here might be on moorings as well as tied to floats.

g. New Harbor & Marina at Rogers Island Harbor – follow same assumptions as Globe Cove, except the town owns this site.

TABLE 3
Lubec Harbor, Lubec, Maine
Planning Level Construction Cost Estimates

Alternatives at Existing Harbor Site at Lubec Neck

December 2002 Project First Costs	PLAN A Repair Existing Wave Attenuator	PLAN B Repair and Add New Attenuator	PLAN C New Floating Breakwaters	PLAN D New Stone Breakwater
Construction Contract	$100,000	$1,400,000	$2,000,000	$22,000,000
Contingencies (20%)	20,000	280,000	400,000	4,400,000
Engineering & Design	70,000	115,000	145,000	175,000
Supervision & Administration	28,000	178,000	250,000	1,330,000
Total	$218,000	$1,973,000	$2,795,000	$27,905,000

TABLE 3 (Continued)
Lubec Harbor, Lubec, Maine
Planning Level Construction Cost Estimates

Plans for Alternative Harbor Sites in Lubec

December 2002 Project First Costs	PLAN E New Harbor at Channel Park Harbor	PLAN F New Harbor at Globe Cove Harbor	PLAN G New Harbor at Rogers Island Harbor	PLAN H New Harbor at Columbia Cove Harbor
Federal GNF Construction Contract				
Dredging and Disposal	$1,000,000	$800,000	$720,000	$300,000
Ledge Blasting and Removal	none	none	none	1,200,000
Stone Breakwater Construction	3,200,000	3,600,000	1,200,000	3,000,000
Contingencies	840,000	880,000	384,000	900,000
Engineering & Design (P&S, PM, EDC)	360,000	340,000	275,000	275,000
Supervision & Administration	312,000	327,000	148,000	334,000
Total Federal GNF	$5,712,000	$5,947,000	$2,727,000	$6,009,000
Non-Federal Construction Contract				
Land Acquisition	none	$500,000	$250,000	$500,000
Water, Power, Paving, etc.	$250,000	250,000	250,000	250,000
New Bulkhead & Revetment	1,440,000	1,440,000	850,000	1,600,000
Rehab & Relocate Floats	135,000	150,000	200,000	150,000
Contingencies	365,000	468,000	310,000	500,000
Engineering & Design (P&S, PM, EDC)	150,000	210,000	90,000	140,000
Supervision & Administration	141,000	178,000	122,000	190,000
Total Non-Federal Facilities	$2,481,000	$3,196,000	$2,072,000	$3,330,000
Total Project	$8,193,000	$9,143,000	$4,799,000	$9,339,000

h. New Harbor & Marina at Columbia Cove Harbor – Likely ledge in area. Assume dredging a 400 x 200 x 5 of sand and a similar amount of rock to be blasted with the rock being used as base for rock breakwater on the ledge. Say 400 x 200 x 5/27 = 14,800 @ $20/cy = $300,000 for sand and 14,800 x $80/cy = $1.2 million for rock. Breakwater = 400 LF 25' high 1.5 to 1 slope 10' crest width area = 1187.5 SF. Volume = 17,600 cy or about 40,000 tons of stone estimated to cost about $100/ton or $4 million. Land, water, power needed. As with the other harbor relocation plans, the existing marina floats would be rehabilitated and relocated.

Detailed alternatives such as floating structures, rubble mound breakwaters, vinyl or other composite sheet pile structures, sediment sampling and testing requirements, subsurface conditions, and design details for any considered plans would be investigated in depth during the feasibility study.

Project Annual Costs

In order to compare the benefits and costs of the project, project costs must be expressed as annual costs. Annual costs include the amortized first cost of project implementation plus the estimated annualized cost of project maintenance over the project life. For navigation improvements constructed under the Corps civil works program the project economic life is fifty years. Amortization of first costs uses a Capital Recovery Factor for the 50-year project life, currently set at 5-7/8 percent (or 0.06234) for Fiscal Year 2003.

Maintenance would be required for any structures and dredged areas. For Plan A, repair to the existing floating wave attenuator, the first cost and annual maintenance cost were considered the same, as these repairs would be needed yearly. For Plans B, with two structures, the annual maintenance cost was estimated at twice that of Plan A. For Plan C, with two floating breakwaters of greater strength than those in Plan B, the annual maintenance cost was estimated at 75 percent of Plan B. For Plan D, the stone breakwater, annual maintenance was estimated at ¾ of one percent, consistent with actual experience with exposed stone structures on this coast. For the several harbor relocation plans, the annual maintenance cost for the Federal structures was estimated at one-half of one percent of the first cost of the Federal GNF, to reflect their more protected locations. Local facilities maintenance costs would decline under all plans these savings are included in project benefits. Annual costs for the several alternatives are shown in Table 4.

TABLE 4
ANNUAL COSTS
LUBEC HARBOR, LUBEC, MAINE

Alternatives at Existing Harbor Site at Lubec Neck

December 2002	PLAN A Repair Existing Wave Attenuator	PLAN B Repair and Add New Attenuator	PLAN C New Floating Breakwaters	PLAN D New Stone Breakwater
Project First Costs	$218,000	$1,973,000	$2,795,000	$27,905,000
Project Annual Cost				
Interest and Amortization (5-7/8% - 0.06234)	$13,600	$123,000	$174,200	$1,739,600
Annual Maintenance	218,000	436,000	$327,000	$209,300
Total Annual Cost	$231,600	$559,000	$501,200	$1,948,900

TABLE 4 (Continued)
ANNUAL COSTS
Lubec Harbor, Lubec, Maine

Plans for Alternative Harbor Sites in Lubec

December 2002 Project First Costs	PLAN E New Harbor at Channel Park Harbor	PLAN F New Harbor at Globe Cove Harbor	PLAN G New Harbor at Rogers Island Harbor	PLAN H New Harbor at Columbia Cove Harbor
Federal GNF First Cost	$5,712,000	$5,947,000	$2,727,000	$6,009,000
Non-Federal Facilities First Cost	$2,481,000	$3,196,000	$2,072,000	$3,330,000
Total Project	$8,193,000	$9,143,000	$4,799,000	$9,339,000
Project Annual Cost				
Interest and Amortization (5-7/8% - 0.06234)	$510,800	$570,000	$299,200	$582,200
Annual Maintenance	$28,600	$29,700	$13,600	$30,000
Total Annual Cost	$539,400	$599,700	$312,800	$612,200

Project Justification

The economic evaluation (see Appendix B) shows that annual benefits are realized by preventing vessel damages, lost business from vessel down-time and lost town marina revenues, and damages to the marina in Lubec Harbor are estimated at. Annual benefits to improving the quality of recreation navigation for boaters in that area of the harbor may also be realized.

An assumption is made that the proposed layouts at the alternative harbor sites would provide adequate protection to all the facilities providing the economic justification. If this project moves ahead, this assumption will be verified in the Feasibility Analysis and these numbers will be updated accordingly. The annual benefits and comparison of annual benefits and costs are shown in Table 5.

TABLE 5
LUBEC HARBOR, MAINE
Annual Project Benefits and
Benefit-Cost Evaluation

PLAN	Annual Cost	Annual Benefits	Net Annual Benefits	Benefit/Cost Ratio
PLAN A	$231,600	$34,310	none	0.15
PLAN B	$559,000	$189,600	none	0.34
PLAN C	$501,200	$216,600	none	0.43
PLAN D	$1,948,900	$270,800	none	0.14
PLAN E	$539,400	$270,800	none	0.50
PLAN F	$599,700	$270,800	none	0.45
PLAN G	$312,800	$270,800	none	0.87
PLAN H	$612,200	$270,800	none	0.44

The project benefits cited in Table 5 above represent the upper bound of the evaluated benefits. Mid-range and lower bound benefit totals would yield lower benefit-cost ratios and less net benefits. None of the preliminary alternatives examined exhibited net benefits. The relocation of the harbor to the site at Rogers Island Harbor on Lubec neck had the highest benefit-cost ratio. Due to the highly speculative nature of benefits and costs at the initial appraisal level of planning, it is possible that more detailed analysis of

the Rogers Island Harbor site or some other relocation site, may yet prove economically justified. Further study would be required to examine this potential but would entail some risk on the part of parties participating in such a study given the inadequate benefits identified at this stage.

Feasibility Analysis

The Feasibility Analysis would be expected to take about 24 months to complete. The estimated cost of the Feasibility Analysis at this time is about $390,000 (not including the costs to develop the Initial Appraisal of Federal Interest). The initial $100,000 is 100% Federally funded. The remainder ($390,000) is cost-shared 50-50. Therefore the non-Federal share requirement is $195,000.

The Feasibility would include a detailed analysis of the wave climate in the area to ensure that the designs developed in this Initial Appraisal were accurate (from length, orientation, location and construction material points of view). Additionally, subsurface investigations would be required at one or more alternative sites to determine if bedrock or other obstructions would impact the cost-estimates of the layouts proposed here, or would require different alignments of the structures. Also included in the report would be an Environmental Assessment of the proposal(s) and an archaeological analysis of the proposed work site(s). Hydrographic surveys and environmental investigations, including resource and sediment characterization would also be conducted where needed.

The Feasibility Analysis, once complete, would detail if a project proposal is economically justified and otherwise, in the Federal interest. If a project is favorable and the non-Federal sponsor agrees with the findings, the Corps and the Sponsor would seek to enter into a Project Cooperation Agreement (PCA) for construction of the project. This PCA would detail all the financial cost-sharing responsibilities of the Government and the non-Federal sponsor. Below is an estimated schedule of some significant events and the estimated costs (depending on acceptable options) associated with the Feasibility Analysis.

Should Feasibility studies yield a project proposal in the Federal Government's interest and within the Federal funding ceiling for this program[1], and the non-Federal sponsor agrees with the findings of the Feasibility study, a Project Cooperation Agreement (PCA) would be executed. The PCA would detail cost-sharing and other requirements for participation by the Government and the non-Federal sponsor. Cost-sharing for construction of Federal navigation projects is related to the depths required for navigation in the harbor under consideration. In this case, the Federal channel at Lubec is authorized at 12-feet below mean low water, and the projected fleet that would use any protected harbor at Lubec would require less than 20 feet of depth at mean lower low water. For this depth, the cost-sharing percentage for project construction is 80% Federal, and 20% non-Federal.

[1] The Section 107 Civil Works Program has a $4 Million Federal cost limit per project. Any required funds beyond $4 Million become a 100% non-Federal responsibility.

TABLE 6
LUBEC HARBOR, MAINE
Feasibility Cost Estimate

Item	Estimated Event Dates	Total Cost
Initial Appraisal	Prior to Feasibility	$100,000
Project Management	Months 1-24	$30,000
Benthic Sampling & Testing	Months 1-3	$20,000
Environmental Assessment	Months 3-12	$27,000
Hydrographic Surveys	Months 4-6	$40,000
Subsurface Exploration	Months 6-10	$100,000
Design	Months 9-15	$60,000
Environmental Approvals	Months 9-12	$20,000
Report Writing	Months 15-24	$20,000
Miscellaneous Items	Months 1-24	$10,000
Subtotal		$427,000
15% Contingency		$63,000
TOTAL		**$490,000**
First $100K is 100% Federal		**$100,000**
Balance of Federal Share		**$195,000**
Non-Fed Share		**$195,000**

At the conclusion of the feasibility phase, and assuming that a favorable project has been identified for Federal participation and the Sponsor concurs in the plan and agrees to the required terms, the Plans and Specifications (P&S) phase would begin upon receipt of Federal funds. Preparation of detailed P&S for the project would allow advertisement to solicit bids for construction of the project. The sponsor may elect to have the construction of any local service facilities included in the Federal P&S and construction at full non-Federal expense.

Environmental windows to perform this work have not yet been discussed with Federal or State resource agencies. Pending on the scope and duration of the work this project may be a multiple-year effort.

Conclusions and Recommendations

At this point, it appears that sufficient benefits do not warrant continuation to the Feasibility (second phase) Study. However, at least one alternative harbor relocation plan showed a benefit-cost ratio of nearly 0.9 to 1. Given the preliminary nature of this initial appraisal level of analysis further evaluation of that alternative, or refinement of some other alternative, may ultimately yield an implementable project eligible for Federal participation. Proceeding with a feasibility study on this basis would entail a degree of risk for the Government and the sponsor based on the lack of clearly demonstrated economic justification potential at this phase. However, should the community wish to proceed with the cost-shared study recognizing this risk, then the Government may be willing to continue the investigation.

In order to continue into a cost-shared feasibility study, a non-Federal sponsor needs to be identified, willing and capable of entering into a Feasibility Cost-Sharing Agreement (FCSA) with the Government and meeting the terms of that agreement. The risk of expending Government and Sponsor contributed study funds on a project that may ultimately not be found eligible for Federal participation may be mitigated by establishing benefit-cost comparison checkpoints frequently in the study as each new avenue of investigation yields significant new data and refines the cost and benefit estimates. Should the investigations indicate that net benefits would not be produced, then the parties to the FCSA may elect to terminate the study and avoid further expense.

The recommendation of this initial appraisal level investigation is that the New England District, with the State of Maine or the Town of Lubec as the non-Federal cost-sharing partner, proceed with a cost-shared feasibility study of providing navigation improvements for a protected year-round harbor and shore facilities at Lubec, Maine. preliminary estimate of the cost to perform the feasibility study is $490,000, and the duration is expected to be about 24 months from the execution of an FCSA and the receipt of Federal and non-Federal funds. These estimates will be refined during finalization of the Project Management Plan and Feasibility Scope. The current estimate will require a non-Federal cost-share of about $195,000 for completion of the Feasibility Study.

The recommendations contained herein reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in local and state programs, or the formulation of a national Civil Works water resources program. Consequently, the recommendations may be modified at higher levels within the Executive Branch before they are used to support funding. However, prior to initiating the feasibility study, the non-Federal Sponsor will be advised of any modifications and will be afforded an opportunity to comment further.

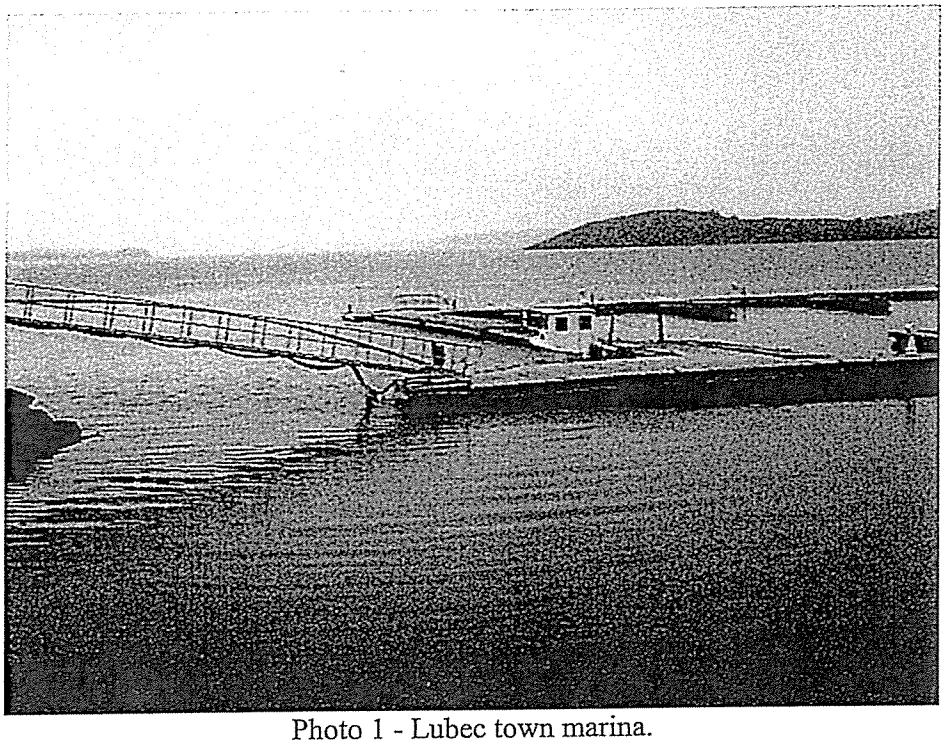


Photo 1 - Lubec town marina.

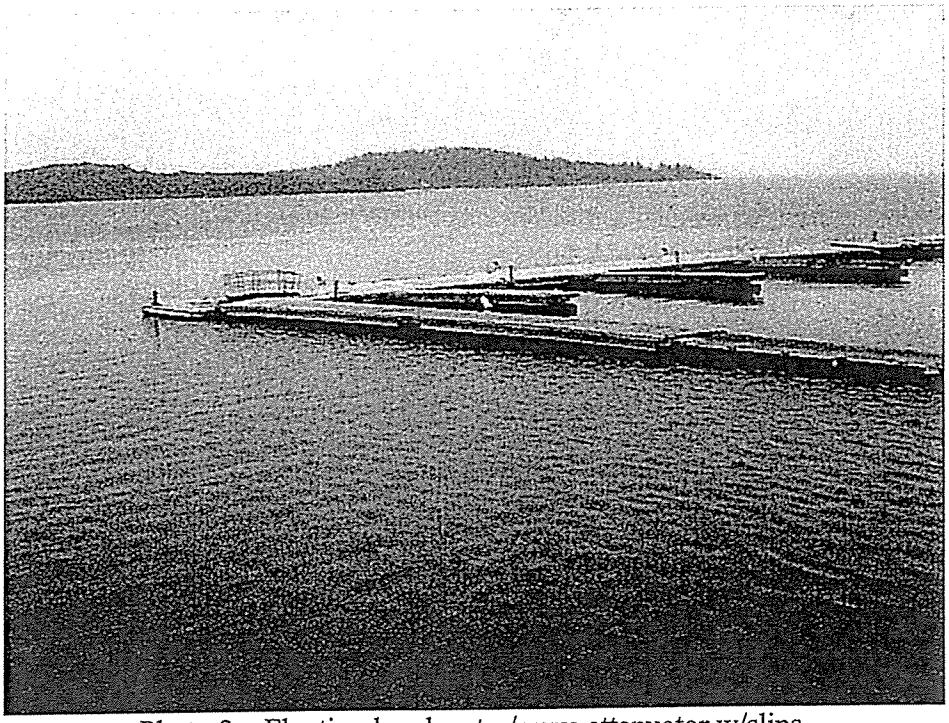


Photo 2 – Floating breakwater/wave attenuator w/slips.

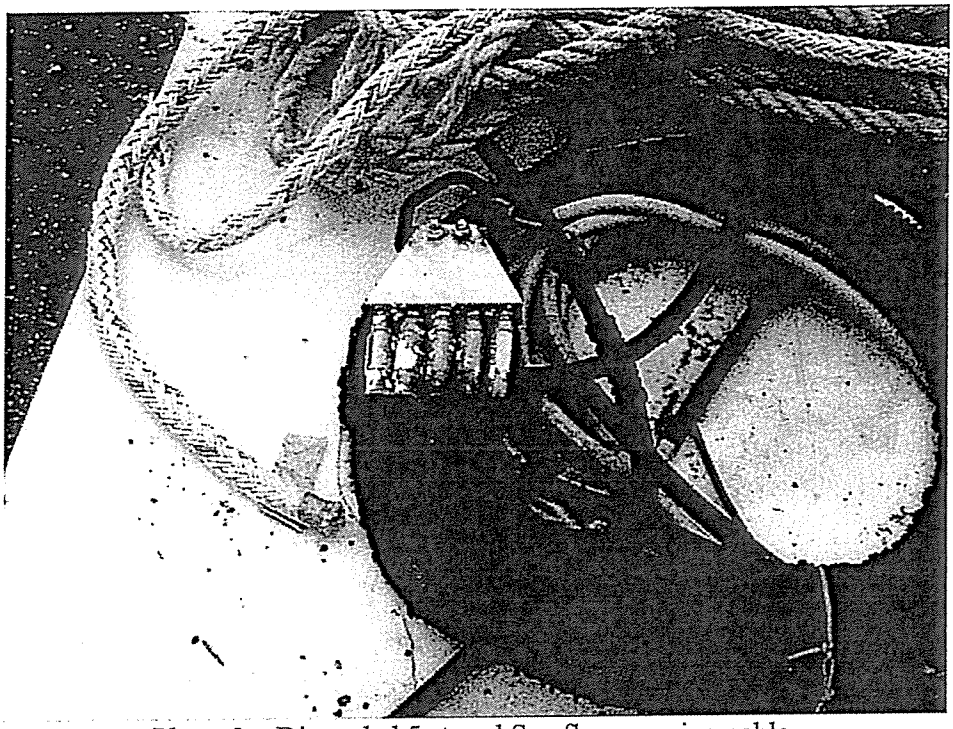


Photo 3 – Discarded 5 strand Sea flex mooring cable.

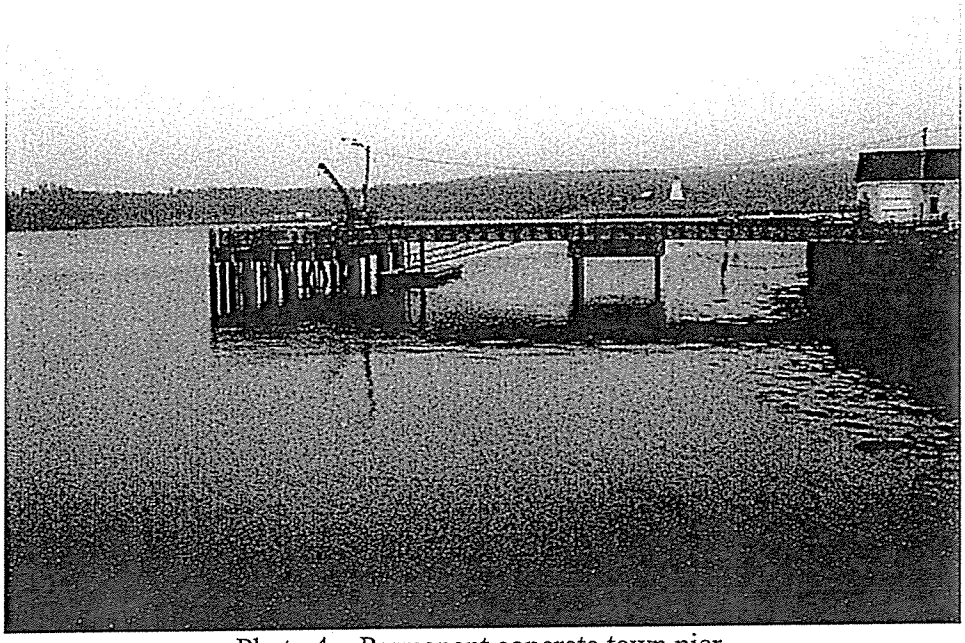


Photo 4 – Permanent concrete town pier.

Photo 5 – Top of floating breakwater/wave attenuator. Note new decking.

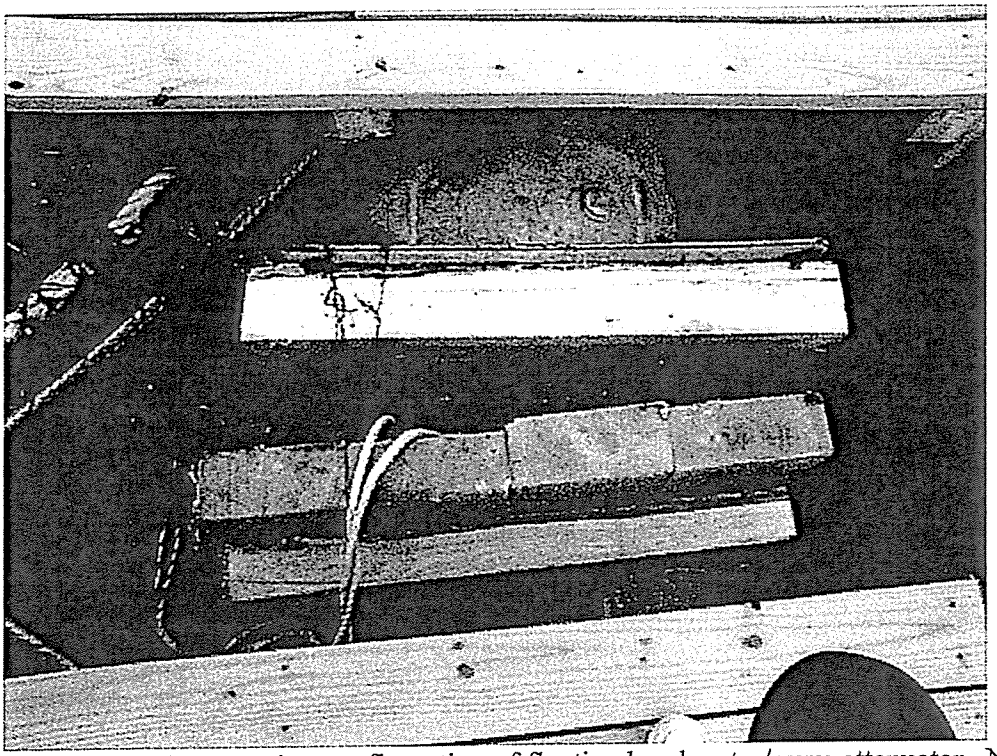


Photo 6 – typical connection configuration of floating breakwater/wave attenuator. No positive connection, only lashed together with rope.

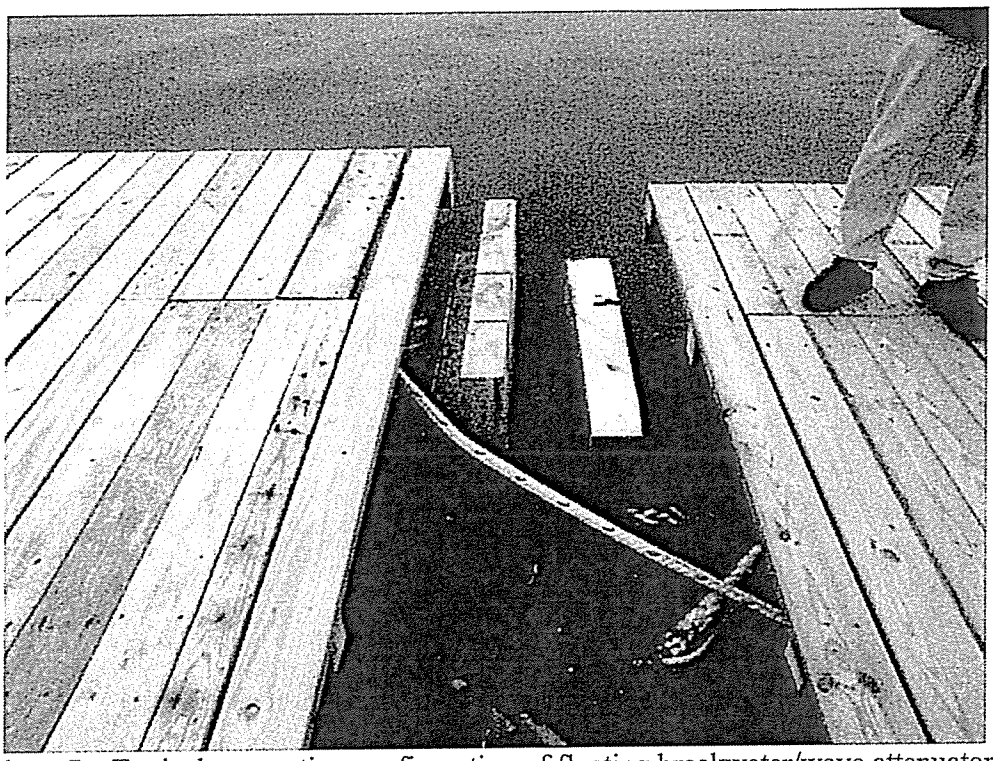


Photo 7 – Typical connection configuration of floating breakwater/wave attenuator.

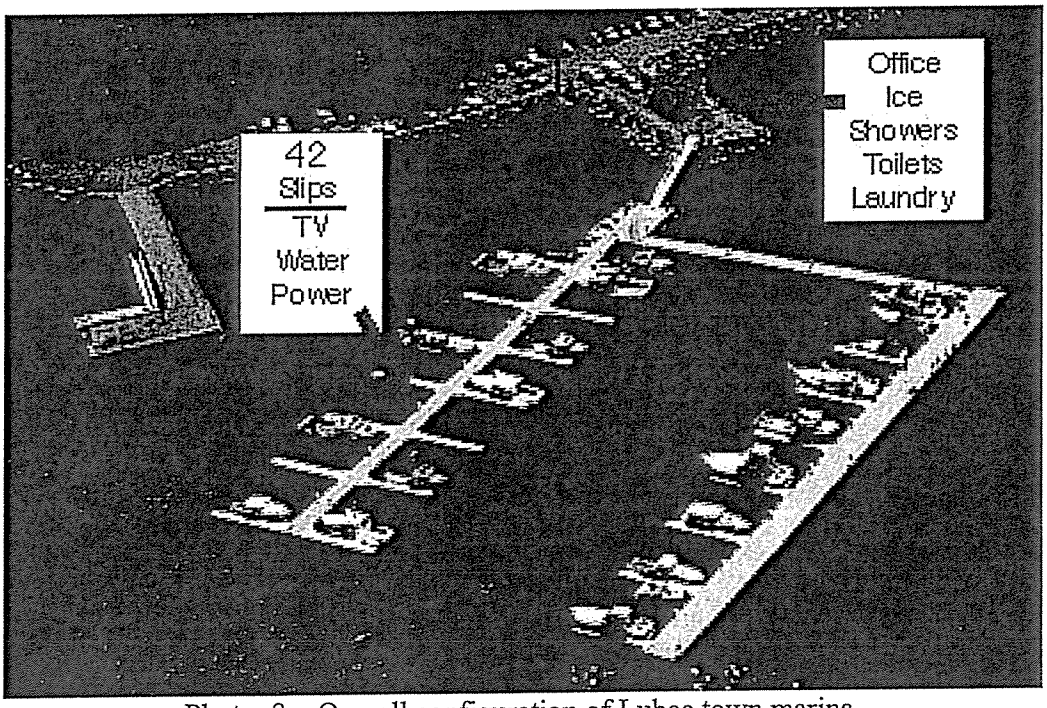


Photo 8 – Overall configuration of Lubec town marina.

LUBEC HARBOR

LUBEC, MAINE

SECTION 107 NAVIGATION IMPROVEMENT STUDY
INITIAL APPRAISAL REPORT

APPENDIX A

PERTINENT CORRESPONDENCE

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-EP-PN

9 June 2004
Montoya/arw/086

MEMORANDUM FOR Commander, U.S. Army Engineer Division, North Atlantic ATTN: CENAD-PL-P (Ms. Monte), Fort Hamilton Military Community, Bldg. 301, Brooklyn, NY 11252-6700

SUBJECT: Navigation Improvement Study, Lubec Harbor, Lubec, Maine – PWI # 174213

1. Under authority contained in Section 107 of the 1960 River and Harbor Act, as amended, investigations were made to determine the need and feasibility of improving the existing Federal navigation project in Lubec Harbor, Maine. During meetings in May of 2002 the Town of Lubec, requested Federal assistance for the Corps to overtake maintenance responsibility of a town-owned wave attenuator.

2. The New England District conducted an economic analysis and an initial appraisal of Federal interest. The initial appraisal focused on the feasibility of protecting the existing harbor infrastructure, or relocating the existing harbor to a safer, less exposed location. Commercial, private and public property along the shores of Lubec Harbor and craft based in those areas are exposed to northeasterly and northwesterly winds and waves. Information was obtained regarding uses of the harbor, problems with navigation, and the need for improvements to the Federal navigation project for Lubec Harbor.

3. Based on the information obtained, we concluded that there are not sufficient benefits to justify Federal participation in repairing or replacing the Town's wave attenuator. Some of the alternatives for relocating the harbor and its facilities to more protected locations have more favorable B/C ratios of up to 0.91. In a 15 April 2004 letter (enclosed) to the Town however, we indicated that a more detailed analysis focused on the more favorable alternatives might yield better results, but in order to determine that, an FCSA would need to be executed to proceed with a cost-shared feasibility study. The Town Manager indicated by phone on 4 June 2004 that the Town would not pursue a cost-shared feasibility study, and we informed the Town that further study efforts would be terminated.

4. A cost of $65,000 was incurred for the Lubec Harbor investigation. If further information is needed, please contact the Study Manager, Mr. Duban Montoya, at (978) 318-8086.

Enclosure

BRIAN A. GREEN
LTC, EN
Acting Commander

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 15, 2004

Engineering/Planning Division
Planning Branch

Ryan Hada, Town Manager
Lubec Town Hall
40 School Street
Lubec, Maine 04652

Dear Mr. Hada:

This letter is in reference of the Initial Appraisal of Federal Interest for navigation improvements to Lubec Harbor conducted under the authority of Section 107 of the River and Harbor Act of 1960, as amended. In late 2002 and early 2003 draft copies of the Initial Appraisal Report as well as planning level cost estimates were provided to the Town of Lubec for review and comment. No comments were received from the Town.

In general, the Appraisal concluded that it appeared that economic benefits did not warrant continuation to a Feasibility (second phase) Study for most alternatives considered by the Corps and the Town. Rehabilitation of the existing floating wave attenuator system was not justified due to high annual maintenance costs. Constructing a new stone breakwater was also not economically justified. However, some of the plans for relocating the harbor were close enough to warrant further evaluation in the feasibility phase.

As it was explained in the Appraisal Report, in order to carry on with this study, and proceed to the Feasibility phase, a non-Federal sponsor needs to be identified who is willing to sign a Feasibility Cost-Sharing Agreement (FCSA) with the Government. The Feasibility study would be cost-shared 50/50, for amounts in excess of $100,000 and would take about 24 months to complete. We expressed to the Town our willingness to initiate a feasibility study with the goal of making an early call on engineering feasibility and economic justification of the relocation proposals, so as to limit the Town's and the Government's study costs should these alternatives prove not justified.

If the final analysis were to indicate that construction was feasible and in the Federal Government's interest, we would seek to enter into a Project Cooperation Agreement (PCA) with the non-Federal sponsor and seek funds for plans, specifications and construction. Based on the Initial Appraisal, the estimated cost of completing the Feasibility Analysis would be about $490,000, and the non-Federal share requirement would be about $195,000.

As you may probably be aware, a Congressional budget add of $50,000 was made available to the Corps of Engineers for fiscal year 2004. Our Congressional authority to use those funds however still requires that a Non-Federal sponsor be identified to cost-share the Feasibility Analysis. Any changes to that requirement would have to be directed to us by the Congress.

This study will be terminated on May 15, 2004 unless a non-Federal sponsor is identified for this project in the meantime. This investigation may be re-initiated any time in the future should either our Congressional authority be changed, or a non-Federal sponsor be identified. In either case, we will be glad to work with the Town of Lubec.

Sincerely,

John R. Kennelly
Chief of Planning

Town of Lubec
40 School Street
Lubec, ME 04652
(207) 733-2341

March 11, 2003

Duban Montoya
Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Montoya,

The Lubec Board of Selectmen met with the Lubec Harbor Board of Trustees in a special selectmen's meeting on Thursday March 6, to discuss the draft report from your office and the viable options that you have presented us with.

We wish to let you know that the Town of Lubec is continuing to narrow down the options that the Army corps has outlined to us for a "Safe Harbor" to the sites that would be preferable to the town. In an effort to do this and to bring public support to this project we have scheduled a Public Hearing to take place on Thursday, March 20. Shortly after the hearing, we will inform you of the results.

It should be noted that any decisions made by the town at this time will be made utilizing public opinion and municipal concerns, rather than on sound engineering advice and environmental constraints. It is understood that once the town has determined its site preference(s) that the Army Corps of Engineers will evaluate the selection for appropriateness.

At this point in time, as you know, the Town has no sources of funding.

Sincerely,

Arthur Glidden, Chairman
Lubec Board of Selectmen

Cc: Gail Kelly, Senator Snowe's Office
Judy Cuddy, Senator Collin's Office
Marcia Gartley, Representative Michaud's Office

To: MFR
Subject: Trip Report – Lubec Harbor, Maine

Date: 19 November 2001

1. The undersigned and Todd Randall of NAE met with officials and harbor interests in Lubec, Maine on 15 November 2001 to investigate the needs of the local community in response to a line item in the FY2002 appropriations bill. The bill provided $100,000 under Section 107 authority for a feasibility study of "repairing or replacing the wave attenuator" at Lubec Harbor.

2. We met first with the acting Town Administrator, Ms. Bernice Mains, at the Town Offices. We later met with the following individuals at the harbormaster's office at the town fish pier.

Diana Wilson, Town Selectman and Marina Grant Administrator	207-733-0954
Mark Staggs, Harbormaster (former USCG)	207-733-8999
Bobby Huntley, Deputy Harbormaster	
Peter Boyce, Harbor Commission	

3. The fish pier, built in 1981 by FHA and EDC, was unusable much of the time due to exposure to wind and waves. In late June 1997, the Town, with aid from Maine DOT, installed the present wave attenuator. The attenuator is a steel & zinc cage, about 8 feet deep, with steel cylinder floats on top, and a pressure treated wood deck above. Water depth at the site is about 25 to 30 feet deep, with a 18 to 28-foot tide. The attenuator is in four sections, joined with flexible connections. The structure is anchored with flexible "bungy" rope assemblies (five strands each), attached to helical anchor screws embedded in the harbor bottom. The attenuator is oriented to protect the harbor marina and pier area from northwesterly winds and waves. The site is exposed to heavy winds and waves from both the northwest and northeast. The attenuator sections were designed and constructed by Tico Ltd. of Ontario, and the layout, anchoring and placement of the attenuator were by Pine Tree Engineering of Bath, Maine and Child's Engineering (Richard Fitzgerald – Chief Engineer). The mooring anchors were provided and set by Straight Moorings (Paul Gordon – 506-468-2100 or 1886).

4. The marina serves to base the majority of the local fishing fleet, which draws from Lubec and several surrounding towns. The marina has space for about 50 craft when fully operational. Space is also provided for transient fishing craft which frequent the area during the scalloping and shrimping season. In the summer months, transient cruising sailing craft transiting US and Canadian waters also stop at the marina. The fish pier is a heavy duty concrete deck pile supported structure with a large hoist and adjacent paved boat ramp. The attenuator provides access to several float slips, as wells as protecting the other two lines of float slips. The attenuator and other floats have electric and potable water supply. The site is partially protected by the Federal breakwater at Gun Rock from seas transmitted northerly up the Lubec Channel. In 1996, the year prior to placement of the attenuator, two fishermen were killed while attempting to skiff out to their boat. There have been no fatalities since.

5. The marina was only about 1/3 full. Structural damage to the attenuator and its anchoring systems made slips in that area unusable. Other slip floats in the eastern area of the harbor had been removed from the water as fall-spring seas made them unusable and susceptible to

damage. A number of useable slips were unoccupied as some fishermen would not risk using the marina at that time of year, and had relocated to other more protected small harbors in the area. Sea conditions made the pier unusable in some situations.

6. One of the four attenuator sections had been severely damaged and had been disconnected and temporarily moored east of the harbor area. Flexible connections between the second and third sections had failed resulting in significant damage to the adjoining ends of both sections as they repeatedly collided. Marina floats joining the attenuator had been damaged by the movement of the attenuator. Electrical and water service had been discontinued since the damage occurred. The harbormaster stated that this was typical damage that occurs each fall and winter. A number of the flexible vertical bungy connectors had parted, leading the town to request their replacement with eight-strand connectors.

7. The fishing fleet, including the four companies operating offshore salmon farm pens, landed over $23 million in seafood over the fish pier last year. The catch included salmon, mussels, lobsters, scallops (1 Dec to 15 April season), urchins, sea cucumbers and bait smolts. This figure does not include the equipment, salmon feed and fuel used by the salmon farms. The four aquaculture companies are Stoltz International, Atlantic Salmon, Connors Brothers, and L&R Seafood (Bill Groom). Common fall through spring seas prevent fishermen and the boats servicing the salmon pens, from leaving the harbor. Scallopers generally work in the waters of Conscook and Passamaquoddy Bays, while the lobstermen work in the waters of the Grand Manan Channel, and US waters north of West Quoddy Head.

8. Town officials proposed several means of addressing the problems, involving either protecting the existing pier site, or creating a new harbor. A list of the suggested solutions or partial solutions is as follows:

a. Repair and strengthen the existing attenuator. This could include removal and repositioning of slip floats so that the attenuator stands alone. About the only part of the system that seems to have performed as designed is the helix augers.

b. In combination with "a" construct a second attenuator to protect the harbor from northeasterly seas.

c. Replace the attenuator with a better floating structure to protect the harbor from both sea directions. Local officials are not entirely happy with the 1997 design, even if it were undamaged. The open cage structure requires constant cleaning by divers to prevent marine growth from weighing it down. The strong tidal currents also contribute to wear on the anchoring system and flexible connections.

d. Construct a traditional rubblestone or other fixed design breakwater to replace the attentuator. The cost of this plan was about $12 million in 1987, and would be about $20 million today. The harbormaster believes that a mirror-image of the orientation laid out in 1987 would better allow for egress and ingress to the harbor from the international channel.

e. Construct, through dredging and wave barrier, a new harbor along the Lubec channel south of the international bridge (and Federal breakwater at short point) at the park and former Puss 'n Boots factory. This would require extensive dredging and construction of a new fish pier. The Town owns the land, which is a large parcel capable of providing storage and repair facilities. The old cat food factory is being rebuilt as a small shipyard.

f. Construct a new harbor at Globe Cove, or the small cove along Lubec Neck across the highway from the cemetery. Both site would require a breakwater, but there are existing shallow ledge areas for a foundation. Globe Cove is privately owned and would require extensive dredging. The other small cove has public land and would require access and minor dredging. Both sites would require a new pier.

g. Construct a new harbor at Roger's Island Harbor at North Lubec. A new pier and dredging would be required. There is public land but no existing access or utilities.

9. One of the town's goals is to attract additional transient recreational boat use of any facility. Revenue from the local fishing fleet and aquaculture businesses pays for the cost of most harbor operations and regular marina maintenance. Revenue from recreational boats provides an added benefit to the local economy through services.

10. The first step in any examination of the problem at Lubec under Corps authority should be to conduct an economic investigation to determine the full range of potential benefits from the current problems. Cost avoidance for maintenance to the attenuator structure(s) should be factored in to the analysis. The solutions most likely to capture the most benefits could then be identified for further engineering and cost investigations. It would be prohibitive, even in an initial phase, to examine the town's full range of potential solutions in even a preliminary fashion.

Mark L. Habel
Navigation Section

Cc: Planning Files (Lubec Harbor)
Rich Ring (Economics)

LUBEC HARBOR

LUBEC, MAINE

SECTION 107 NAVIGATION IMPROVEMENT STUDY
INITIAL APPRAISAL REPORT

APPENDIX B

ECONOMIC ANALYSIS

Lubec Harbor
Lubec, Maine
Section 107 Initial Appraisal of Federal Interest
Economic Analysis

Introduction

The purpose of this initial economic analysis is to identify and evaluate the National Economic Development (NED) benefits of providing improvements to Lubec Harbor in Lubec, Maine. Lubec is located in northeastern Maine, in Washington County, and is the northeastern-most town in the United States, located on the Canadian border. The harbor contains primarily recreational boats in the summer months, and commercial fishing boats the rest of the year.

This analysis is based on information obtained at meetings with town officials and local interests, from the town Harbormaster, and from local aquaculture companies. All benefits and costs are stated at the January 2003 price level. Costs and benefits are converted to average annual equivalents based on a 50-year project life and the FY 2003 Federal interest rate for water resources projects of 5 7/8 percent.

Description of Study Area

Lubec Harbor is located in eastern Lubec, on the tip of Lubec Neck, across from Campobello Island, New Brunswick, Canada. The harbor contains a large commercial pier, and a large slip and float system that includes a wave attenuator. The commercial pier was built in 1981, but was largely unusable due to its exposure to northeast and northwest winds and waves. The wave attenuator was built in 1997 to the west-northwest of the pier, and has made the pier usable during most weather except for northeast storms. Lubec Marina has space for about 45 vessels when fully occupied. The harbor has a mean tidal range of 18 feet and a maximum range of 26 feet.

The number of boats at the Lubec Marina varies throughout the year. During the summer months, the marina contains local and transient recreational boats, and a small number of lobster boats. In the summer of 2002, the marina contained an average of 38 recreational boats, most of which were transient boats, and 6 lobster boats. During the fall, spring, and summer, the harbor contains primarily commercial fishing vessels, vessels associated with the local aquaculture companies, a Maine Marine Patrol vessel, and periodically, a coast guard vessel. The number and make-up of the commercial fishing fleet varies month by month, depending on the fishing season. Species fished by Lubec fishermen include salmon, mussels, lobsters, scallops, urchins, and sea cucumbers. The harbor generally contains 10 to 20 boats in September and October, grows to 40 or 50 boats by December as scallop season begins, and decreases down to 10 or 15 boats in March and April. The summer boating season then begins in May. Approximately $23 Million in seafood landings passed over the commercial pier in 2001, which includes the value of salmon from the aquaculture companies.

Currently, Lubec Harbor contains two operating aquaculture companies, Stolt Seafarms and L&R Seafood. These companies grow salmon in pens from smolts (18 months old) to full-grown salmon. The companies use the commercial pier in Lubec Harbor extensively, to load smolts to bring to their grow-out facilities, to load feed and supplies, and to land grown fish to deliver to processing plants. Prior to 2002, there were two additional aquaculture companies operating in the Harbor, Connors Seafood and Atlantic Salmon, but these stopped operating this past year due to the effects of a severe outbreak of Infectious Salmonoid Anemia. It is expected that they will resume operations within 1 to 2 years.

The town of Lubec is located in Washington County, and is bordered by the town of Trescott to the west, by Cobscook Bay and the town of Eastport to the north, by Lubec Narrows and Campobello Island to the east, and by the Atlantic Ocean to the south. Based on the US Census, in 2000 Lubec had a population of 2,006, contained 1,309 housing units, and had a median family income of $26,098. This median income was significantly lower than the state median family income of $45,179, making Lubec one of the lowest-income towns in the state. According the Maine Department of Labor, the largest employment sectors in Lubec are Services, Government, Manufacturing, and Retail Trade. The largest employers are Lubec Regional Medical Center, the town school department, Ocean View Nursing Home, and Sunrise County Home Health Care.

Existing Conditions

The primary problem in Lubec Harbor is lack of protection from northeast winds, especially during severe northeast storms. The existing wave attenuator protects the marina and the commercial pier from northwest winds, but provides no protection from northeast winds. During severe northeast storms, the commercial pier is unusable, and fishing boats docked at the marina have to be relocated to other, more protected harbors. Additionally, the marina and attenuator have suffered frequent and severe damages from NE winds and waves. The commercial pier has experienced some damages, but of a lesser nature due to its more substantial construction. There is significant local concern that the marina and attenuator could be completely lost in a severe storm, especially if in a weakened condition from previous damages.

Under existing conditions, the exposure to northeast storms requires that commercial boats docked at the marina have to be relocated during northeast storms. This causes significant inconvenience and increased costs to the commercial fishermen, to the extent that some have permanently relocated to other harbors. In addition, the need to relocate boats has decreased slip-fee revenues to the town, both from boats that cannot use their slip for specific days, and from boats that have permanently relocated. Damage to the marina from NE storms has caused a number of slips to be damaged to the extent that they are currently unusable, which has caused the town to lose slip revenues from recreational vessels in the summer months. When NE winds make the commercial pier unusable, the local aquaculture companies are unable to operate at maximum efficiency, and must find other ways to land their product and receive supplies.

If the wave attenuator and marina were completely lost, the commercial pier would become unusable again due to its exposure. This would cause significant losses to the local economy and local industries. The town would no longer have a marina at which local fishermen could dock, and the fishermen would either have to relocate, or skiff out to moored boats, a process that they used before the wave attenuator and marina were constructed, but which resulted in several fatalities. The significant fish landings which pass over the commercial pier would have to be landed at another port, and the aquaculture companies would have to receive supplies and land their harvests at an alternate location.

Based on information provided by the Lubec harbormaster, during the 2001-2002 fishing season (Oct. 2001 – March 2002), severe northeast storms required that boats be moved 15 times. In November, there were two events; in December, January and February there were 4 events in each month; and in March there was 1 event. In most cases each event lasted 2-3 days. In each event, boats had to moved to other harbors, and the commercial fish pier was unusable.

Fleet Information

The number and type of vessels in Lubec Harbor varies significantly throughout the year. In the summer months, the harbor contains both local and transient recreational vessels, of varying sizes. During the rest of the year, the number and type of boats docked at the marina varies with the fishing season, as described previously. In addition to the commercial boats that dock at the marina, a much larger number of commercial boats, both from other areas in Lubec and transients, use the commercial pier to offload catch and load supplies.

Without Project Condition

There is significant uncertainty regarding the future without project condition for Lubec Harbor. In order to capture this uncertainty in this analysis, two without project conditions are defined. The first is referred to as the best-case without project condition. Under this condition, it is assumed that conditions will exist as they are currently for the 50-year period of analysis. The wave attenuator and marina will continue to exist as they are today, and will continue to protect the commercial fish pier from NW winds and waves. The commercial pier will continue to be used extensively as it is now, and the marina will continue with its current level of occupancy, as it fluctuates through the year. The marina and commercial fish pier will continue to be unprotected from NE winds and storms. Fishing boats will continue to need to be moved during severe events during the winter-spring fishing season. The town will continue to suffer lost slip fees, both in the winter from commercial fishing vessels and in the summer from recreational vessels. The existing wave attenuator and marina will continue to be damaged and require extensive repair and maintenance due to damages sustained in NE storms. This first scenario is essentially continuation of the existing conditions.

The second without project condition analyzed is a worst-case scenario. Under this scenario, a very severe northeast storm will hit Lubec Harbor, and will wash-out and destroy the marina and wave attenuator. If this occurs, the commercial pier would be unprotected from both NE and NW storms, and would be rendered essentially unusable, as it was before the wave attenuator was built. Under this scenario, the commercial fishermen who use the pier, both those based at the marina and based elsewhere, would have to find alternative locations to offload their catch and load supplies. Travel costs both on land and sea would likely increase for fishermen. Some fishermen could resort to skiffing out to their boats as they did before the attenuator was constructed, a method that resulted in several deaths due to dangerous conditions. The aquaculture companies would have to find alternate methods or locations to receive their supplies and land their products. The important employment opportunities currently provided in Lubec by all of the marine-related industries would be lost to the town. In the recent past, these industries have included fishing, which has provided up to 180 jobs; fish buying, which has provided approximately 25 jobs; and aquaculture, which before the ISA outbreak provided approximately 130 jobs. The loss of these employment opportunities would reverse valuable progress that was made during the 1990's building these industries in the town.

With Project Condition

For the with project condition, two improvement alternatives are examined. The first is to construct some form of wave protection to protect the marina and commercial pier from northeast winds and storms. The second alternative is to completely relocate the harbor to a location that is naturally better protected. This alternative would involve re-constructing the commercial pier and the marina with its slips at a new location. All of the existing infrastructure and utilities associated with the harbor and required for the day-to-day operations of the fishermen, recreational boaters, aquaculture companies, and fish dealers would have to be rebuilt or relocated. With either alternative, the costs that would be incurred and losses that would be suffered under either without project condition would be prevented.

Benefit Analysis

Benefits to protecting Lubec Harbor from northeast storms are estimated by comparing each without project condition to the with project condition. This results in a benefit figure for the best-case without project condition and a benefit figure for the worst-case condition. These figures show the upper and lower bounds of the likely benefits to protecting or relocating the harbor.

Benefit Analysis - Best-Case Without Project Condition

Benefits to a Federal project in Lubec Harbor assuming the best-case without project condition include the costs savings and efficiencies that would be realized. The following categories of benefits are analyzed: 1) costs to move commercial fishing boats in northeast storms; 2) damages to wave attenuator and marina; 3) lost slip fees at Lubec

Marina; and 4) value of use of commercial pier to aquaculture companies. Information used to estimate these benefits was obtained from the Lubec Harbormaster, and from the two currently operating aquaculture companies. No benefits are taken for Recreational Boating, primarily because severe northeast storms do not occur during the recreational boating season. It is assumed that there would be no net change in fish catch with the project. Benefits to commercial fishermen are reduced operating costs for catching the same amount of fish as they catch currently.

It should be noted that there have recently been significant restrictions proposed on commercial fishing, both region-wide and in the state of Maine. The impacts of any changes in fishing regulations on the operations of fishermen who use Lubec harbor are unknown at this time. To date, the commercial fishing fleet has not been significantly affected. For the purpose of this analysis, the status of the fleet from the 2001-2002 fishing season was used as the condition likely to exist in the future.

1. Costs to Move Commercial Fishing Boats in Northeast Storms

During the 2001-2002 fishing season, there were 15 separate storm events for which the Lubec fishermen had to move their boats from the harbor. In November there were 2 events, in December, January and February there were 4 events each month, and in March there was 1 event. During the November event, there were about 15 boats in the harbor. During the December, January, and February events there were about 40 boats in the harbor, and during the March event there were 12 boats in the harbor. It is assumed for the purpose of this analysis that the past year is representative of a typical year. This is a conservative assumption, because, according the harbormaster, the 2001-2002 year was considered a light year for storms. Assuming that future years will be similar to the past year, there would typically be 15 separate storm events per year for which boats must be moved, and the number of boats in the harbor would be similar to the 2001-2002 season. Multiplying the number of events per month by the number of boats in the harbor in each month yields a total of 522 boat-moves per year, as shown below.

Month	#of events	# of boats			# of boat-moves
November	2	X	15	=	30
December	4	X	40	=	160
January	4	X	40	=	160
February	4	X	40	=	160
March	1	X	12	=	12
					522

When boats are moved, they are moved primarily to Eastport Harbor, although some are moved to Campobello Island and others are moved to protected inlets in the general area. Each time boats have to be moved, the fishermen incur excess costs. These include time and fuel costs to move the boat, time and fuel cost of a land-side driver to meet the fishermen to bring them home, and similar time and fuel costs to bring the boats

back to Lubec once the storm is over. The value of these costs are estimated in the calculations below. Fishermen's time is valued using 1/3 of the current average manufacturing wage in Washington County, Maine, as required by Corps regulations. The current average wage is $15.33, 1/3 of which is $5.18. Since the majority of fishermen move their boats to Eastport, that scenario is used to estimate the costs incurred. It is assumed that moving the boats to other locations would have similar overall costs, although the distribution of the types of costs may be different. For example, boats that move to Campobello Island or to private moorings would have much lower travel costs, but the captain and crew tend to stay with the boats for the duration of the storm, which would result in much higher time costs, and in this scenario the crew members must be paid, which is an additional cost. These excess costs would be prevented with a Federal project.

Time Costs to Move Boats:
522 boat-moves/year X 3 hours round-trip total travel time/event (land + sea) X 3 people/boat moved (1 captain + 1 crew + 1 land-side driver) X $5.18/hour = $24,336/year

Fuel Costs – Boats:
522 boat-moves/year X .67 hour (40 minutes) round-trip travel time (sea) X 38 gallons diesel burned/hour X $1.50/gallon diesel fuel = $19,935/year

Operating Costs – Cars:
522 boat-moves/year X 45 miles one-way to Eastport X 4 trips/boat-move (2 round-trips for each boat-move) X $0.26/mile average variable operating cost of private car = $24,430/year

Total Costs to Move Boats in Storms:

Time costs:	$24,336
Fuel costs – boats:	$19,935
Operating costs – cars:	$24,430
Total	$68,701 annual cost

2. Lost Slip Fees at Lubec Marina

The town of Lubec runs the Lubec Marina. Last year, the town collected approximately $33,000 in slip fees, of which about $21,000 was from commercial fishermen and $12,000 was from recreational boaters. Currently, the marina is not always full to capacity, due largely to the exposure of the harbor to northeast storms and the inconveniences of having to relocate boats during storms. With a project, the marina would be better protected, and it is likely that the marina would have higher occupancy rates. For the purpose of this analysis, it is estimated that slip revenues would increase by 50% with the project, or an increase of $16,500 per year. This value is used as a proxy for cost savings and other efficiencies of operations that would be realized by fishermen

who were able to move from moorings outside the harbor into the protected marina and who would have easier access to the marina's facilities and the commercial pier, once the harbor was protected from northeast storms.

3. Damages to Marina and Wave Attenuator

Over the past three years, damages to the marina and wave attenuator from severe northeast storms have totaled $128,660, based on insurance claims data provided by the harbormaster. The town had two separate claims in 1999, one for damages totaling $39,920, and the second for $46,893. In 2001, there were two claims, one of $8,039 and one of $33,808. Dividing the total claims over the three years of $128,660 by 3 yields average damages of $42,890/year. It is estimated that 80% of these damages, or $34,310/year, are damages from northeast storms, with the remainder being normal wear and tear or damages from northwest storms. The damages from northeast storms, estimated at $34,310 annually, would be prevented with the project.

4. Value of Use of Commercial Pier by Aquaculture Companies

Detailed data regarding the use of the commercial pier and the value of the supplies and products, which it ships across the pier, was provided by one of the aquaculture companies. The company estimates that the benefit provided by the commercial pier in saved labor time is valued at $69,000 per year. This is derived from saving 5 workers a total of 2 hours per day of work time, valued at $20/hour labor cost, for 345 work days per year. Without the pier, or if the pier were unusable as it was before the construction of the wave attenuator, the aquaculture companies would have to ship product and receive supplies using less-efficient methods, such as by skiffing their goods from the shoreline. Currently, with the wave attenuator, the pier is unusable an average of 31 days per year, or 9 percent of the total 345 days worked per year. With a Federal project protecting the harbor and pier from northeast winds, the pier would be usable year-round. To estimate the value of the improved efficiency to the aquaculture companies from being able to use the pier year-round, the total labor savings provided by the pier for 345 days is multiplied by the percentage of time the pier is currently unusable, 9 %, yielding a savings of $6,200 ($69,000 X .09). There are currently two aquaculture companies operating in Lubec. It is assumed that the other company benefits similarly from the pier, yielding a total benefit from being able to use the pier in all conditions of $12,400. There are two additional companies that are currently closed due to the ISA outbreak, but it is expected that these companies will return to full operations within three years. It is likely that these companies would realize similar efficiencies to their operations, estimated at $6,200 per year for each company, from year 3 through year 50 of the 50-year period of analysis. The annualized present value of this stream of benefits is $22,729.

Benefit Summary – Best-case Without Project Condition

The benefits to protecting Lubec Harbor from northeast storms, assuming conditions continue to exist as currently, are summarized below. These benefits would be obtained either by building a protective structure or by completely relocating the harbor facilities to a more protected location.

Annual Benefits
Best-Case Without Project Condition

1.	Costs to relocate fishing boats in northeast storms	$ 68,701
2.	Lost slip fees at Lubec Marina	$ 16,500
3.	Damages prevented to marina/attenuator	$ 34,310
4.	Operating efficiencies to Aquaculture companies	$ 22,729
	Total Annual Benefits	$142,240
	Rounded to	$142,200

Annual Benefits – Worst-Case Without Project Condition

In the worst-cast without project condition, it is assumed that the existing wave attenuator and marina would be lost to a severe event in the near future. For the purpose of this analysis, it is assumed that the loss would occur in year 5 of the 50-year period of analysis. Without the wave attenuator, the commercial pier would no longer be usable. All commerce that currently crosses the pier would have to be relocated. Commercial fishermen based in Lubec would likely offload their catch at Eastport Harbor, causing them to incur excess travel costs, and would have to skiff supplies to their boats, costing them significant extra time loading and unloading their boats and exposing them to much higher safety risks in the process. The aquaculture companies would also have to find alternative methods and locations for loading their supplies and unloading their product, causing them to lose efficiencies and have higher operating costs compared to if the commercial pier were still usable. The increased operating costs of the commercial fishermen and aquaculture companies that would occur in the worst-case without project condition would be prevented with a Federal project. The value of these costs prevented is the National Economic Development (NED) benefits of a Federal project. Other losses that would occur, such as the lost business in the town of Lubec, while very significant, and not able to be counted as NED benefits under current Corps regulations.
The value of the NED benefits is estimated in the paragraphs below.

1. Increased Operating Costs for Commercial Fishermen

It is estimated that, with the loss of the commercial pier, the commercial fishermen that are currently based at the marina would spend an extra 6 hours of time per fishing trip having to skiff supplies to their boat and having to offload their catch at

Eastport. It is estimated that the typical fisherman makes 35 fishing trips per year and that there are 3 men per boat. The value of the fishermen's time is valued using 1/3 the current manufacturing wage in Washington County of $15.33, 1/3 of which is $5.18. While the number of fishermen using the commercial pier varies significantly throughout the year, for the purpose of this analysis it is estimated that the average number of boats at the marina is 24. A second category of fishermen would also suffer increased costs, those Lubec fishermen who are not based at the marina but which use the pier to offload their catch and load supplies. It is estimated that these fishermen would have to expend an extra 2 hours of time per trip if the commercial pier were no longer usable. There are a large number of fishermen in this other category, with the total number varying throughout the year as the fishing season changes, and with some fishing full-time and some part time. For the purpose of this analysis, an average yearly fulltime equivalent of 30 fishing boats was used for this category. Both categories of fishermen would have increased fuel costs for traveling to Eastport to offload catch. These excess time and fuel costs would be prevented if the commercial pier were protected with a Federal project.

Increased time costs – Lubec Marina Fishermen
35 trips/year X 3 men/boat X 6 hours extra time/fishing trip X $5.18/hour X 24 boats = $78,321/year

Increased time costs – other Lubec Fishermen
35 trips/year X 3 men/boat X 2 hours extra time/fishing trip X $5.18/hour X 30 boats = $32,634/year

Increased fuel costs – all Lubec Fishermen
35 trips/year X 0.67 hour (40 minutes) extra travel time X 38 gallons diesel burned/hour X $1.50/gallon diesel fuel X 54 boats = $72,179/year

Total Increased Costs

Time Costs, Lubec Marina Fishermen:	$ 78,321
Time Costs, Other Lubec Fishermen:	$ 32,634
Fuel Costs, All Lubec Fishermen:	$ 72,179
Total Annual Cost	$183,134

2. Increased Operating Costs for Aquaculture Companies

Based on data provided by one of the aquaculture companies, as detailed in the best-case condition analysis, the commercial pier provides operating efficiencies estimated at $69,000 per year. These benefits would be lost if the commercial pier were unusable after the wave attenuator were washed away. It is assumed that all four aquaculture companies would be in full operations when the commercial pier was rendered unusable in year 5 of the 50 year period of analysis. However, the other aquaculture companies are smaller than the one which provided data, and thus their annual operating efficiencies from the pier are estimated at half of $69,000, or $34,500. This yields a total annual benefit to the four aquaculture companies from preserving the use of the commercial pier of $172,500 ($69,000 + $34,500 + $34,500 + $34,500).

3. Recreational Benefits

If the existing attenuator system were washed away, the existing slip system become largely unusable for recreational boats. Currently, the Lubec Marina receives approximately $12,000 annually in slip fees for recreational boats. This figure is used as a proxy for the value of the recreational boating use at the facility, as it is assumed that recreational boaters would not pay the slip fees unless they valued their recreational boating experience by at least that amount.

Benefit Summary – Worst-case Without Project Condition

The benefits to protecting Lubec Harbor from northeast storms, assuming that the existing wave attenuator will be lost to a severe storm in year 5 of the 50 year period of analysis, are summarized below. The benefits are the increased operating costs and lost recreational value that would occur without the project, but that would be prevented with the project. These benefits would be obtained by either building a new, sufficiently protective structure, or by completely relocating the harbor facilities to a more protected location. The benefits would begin to accrue when the wave attenuator is lost, which for the purpose of this analysis is estimated to be in year 5 of the 50 year period of analysis. The annual benefits of $364,634 would begin in year 5 and continue through year 50. The annualized present value of this stream of benefits is $270,800.

Benefit Summary
Worst-case Without Project Condition

1.	Increased operating costs for Commercial Fishermen	$183,134
2.	Increased operating costs for Aquaculture companies	$172,500
3.	Recreational Value Proxy	$ 12,000
	Total Years 5-50	$364,634
	Annualized Present Value	$270,800

Alternatives Examined

Five different alternatives were examined in this analysis. The first, Alternative A, is to repair the existing breakwater. This alternative provides no additional protection from northeast winds and waves. The second, Alternative B, is to repair the existing attenuator and construct a similar wave attenuator to protect from the northeast. Alternative C consists of constructing a completely new wave attenuator system to protect from both the northeast and northwest. Alternative D is to construct a stone breakwater to protect from both the northeast and northwest. Alternative E is to relocate the harbor and all necessary facilities to a more protected location. Within this alternative, several different locations were examined. Details regarding the designs of these alternatives are contained in the main report.

Not all of the alternatives provide equal degrees of protection to the harbor facilities and operations. Alternative A provides no new protection, as it only repairs the existing attenuator. Annual benefits to Alternative A are the value of the current annual damages to the attenuator, $34,310. Alternatives D and E would provide the most complete protection. As a result, each of these alternatives would achieve 100% of the benefits as estimated. Alternatives B and C, while providing protection from the northeast and the northwest, would not provide the complete protection that would be achieved with Alternatives D and E. Alternative B would achieve an estimated 70% of the benefits, and Alternative C would achieve an estimated 80% of the benefits. Alternative C achieves more benefits than B because it includes replacing the existing northwest attenuator with one with a somewhat improved design.

The annual benefits for the "best-case" scenario are used as the lower bound of the annual benefits. The annual benefits for the "worst-case" scenario are used as the upper bound of the annual benefits. A mid-point between the two values is also calculated. The benefits for each alternative and each scenario are shown below.

Alternative	Benefits Apportionment	Lower Bound	Mid-Point	Upper Bound
A	n.a.	n.a.	$ 34,310	n.a.
B	70% of total	$ 99,500	$144,600	$189,600
C	80% of total	$113,800	$165,200	$216,600
D	100%	$142,200	$206,500	$270,800
E	100%	$142,200	$206,500	$270,800

Costs of Alternatives

The construction costs and annualized costs, including estimated annual operation and maintenance costs, for each alternative are shown below. Operation and maintenance costs were not estimated for the harbor relocation alternatives.

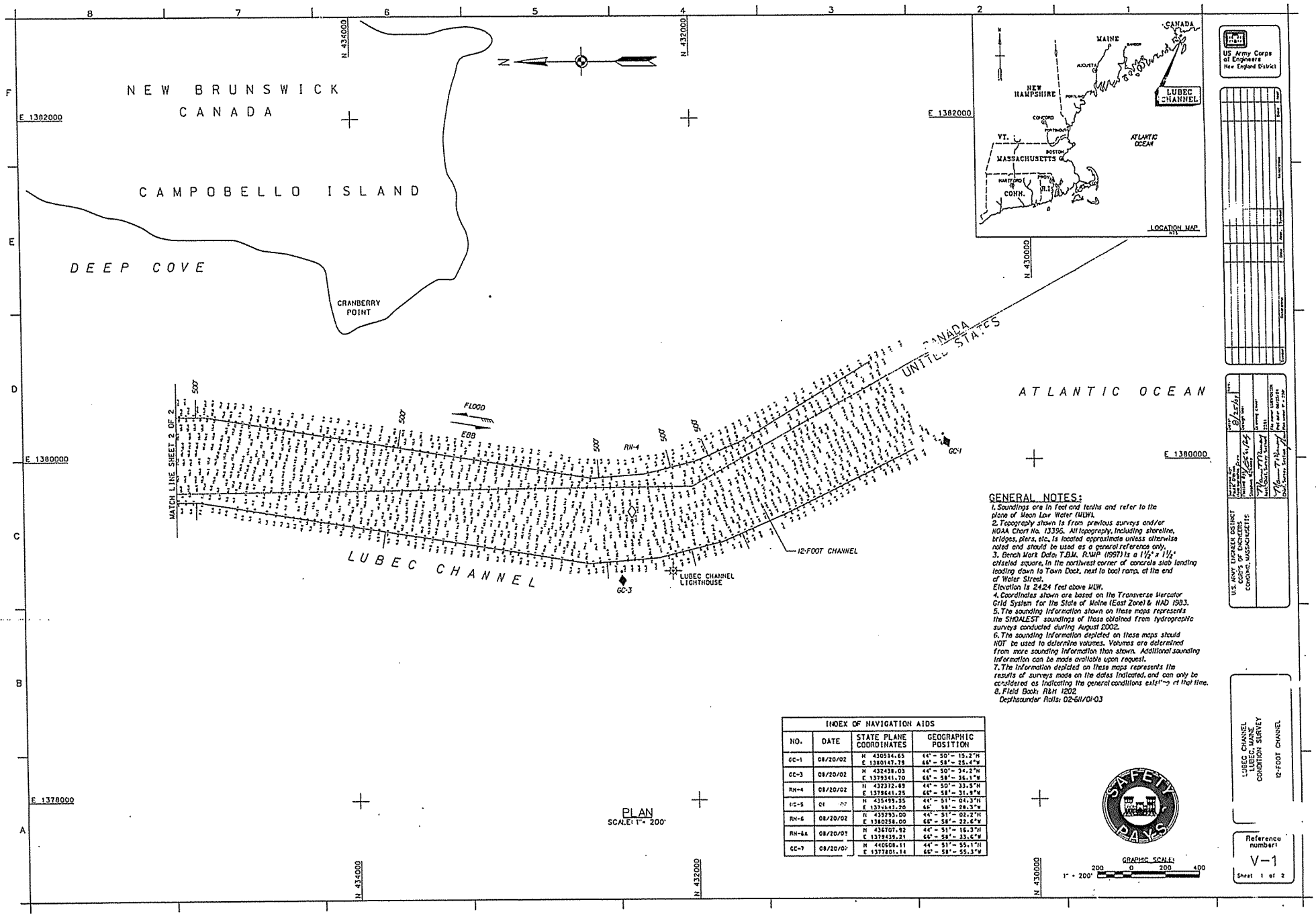
Alternative	First Cost	Annualized First Cost	Annual O&M Cost	Total Annual Cost
A - Repair Existing Atten.	$ 218,000	$ 13,600	$218,000	$ 231,600
B - Plan A + 2nd Attenuator	$ 1,973,000	$ 123,000	$436,000	$ 559,000
C – New Attenuator System	$ 2,795,000	$ 174,200	$327,000	$ 501,200
D – Stone Breakwater	$27,905,000	$1,739,600	$209,300	$1,948,900
E – Harbor Relocation				
E1 - South of Intl. Bridge	$ 8,193,000	$ 510,800	$ 28,600	$ 539,400
E2 - Globe Cove	$ 9,143,000	$ 570,000	$ 29,700	$ 599,700
E3 - Roger's Island Hbr.	$ 4,799,000	$ 299,200	$ 13,600	$ 312,800
E4 - Columbia Harbor	$ 9,339,000	$ 582,200	$ 30,000	$ 612,200

Economic Justification

A project is considered economically justified if it has a benefit to cost ratio greater than or equal to one. Costs and benefits are compared in annual terms. The annual benefits, annual costs, net annual benefits, and benefit cost ratio of each improvement plan analyzed, and for each without project condition, are shown below.

Lubec Harbor Section 107 Study
Economic Justification

Alternative	Annual Benefits		Annual Cost	Net Annual Benefits	Benefit to Cost Ratio
A	$34,310		$231,600	none	0.15
B	$ 99,540	(lower bound)	$559,000	none	0.18
	$144,600	(mid-point)	$559,000	none	0.26
	$189,600	(upper bound)	$559,000	none	0.34
C	$113,800	(lower bound)	$501,200	none	0.23
	$165,200	(mid-point)	$501,200	none	0.33
	$216,600	(upper bound)	$501,200	none	0.43
D	$142,200	(lower bound)	$1,948,900	none	0.07
	$206,500	(mid-point)	$1,948,900	none	0.11
	$270,800	(upper bound)	$1,948,900	none	0.14
E1	$142,200	(lower bound)	$539,400	none	0.26
	$206,500	(mid-point)	$539,400	none	0.38
	$270,800	(upper bound)	$539,400	none	0.50
E2	$142,200	(lower bound)	$599,700	none	0.24
	$206,500	(mid-point)	$599,700	none	0.34
	$270,800	(upper bound)	$599,700	none	0.45
E3	$142,200	(lower bound)	$312,800	none	0.45
	$206,500	(mid-point)	$312,800	none	0.66
	$270,800	(upper bound)	$312,800	none	0.87
E4	$142,200	(lower bound)	$612,200	none	0.23
	$206,500	(mid-point)	$612,200	none	0.34
	$270,800	(upper bound)	$612,200	none	0.44



PLAN
SCALE: 1" = 200'

GRAPHIC SCALE:
200 0 200 400
1" = 200'

GENERAL NOTES:

1. Soundings are in feet and tenths and refer to the plane of Mean Low Water (MLW).
2. Topography shown is from previous surveys and/or NOAA Chart No. 13395. All topography, including shoreline, bridges, piers, etc., is located approximate unless otherwise noted and should be used as a general reference only.
3. Bench Mark Data: T.B.M. R.W.P. (1997) is a 1½" x 1½" chiseled square, in the northwest corner of concrete slab landing leading down to Town Dock, next to boat ramp, at the end of Water Street.
Elevation is 24.24 feet above MLW.
4. Coordinates shown are based on the Transverse Mercator Grid System for the State of Maine (East Zone) & NAD 1983.
5. The sounding information shown on these maps represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during August 2002.
6. The sounding information depicted on these maps should NOT be used to determine volumes. Volumes are determined from more sounding information than shown. Additional sounding information can be made available upon request.
7. The information depicted on these maps represents the results of surveys made on the dates indicated, and can only be considered as indicating the general conditions existing at that time.
8. Field Book: R&H 1202
Depthsounder Rolls: 02-GII/01-03

INDEX OF NAVIGATION AIDS

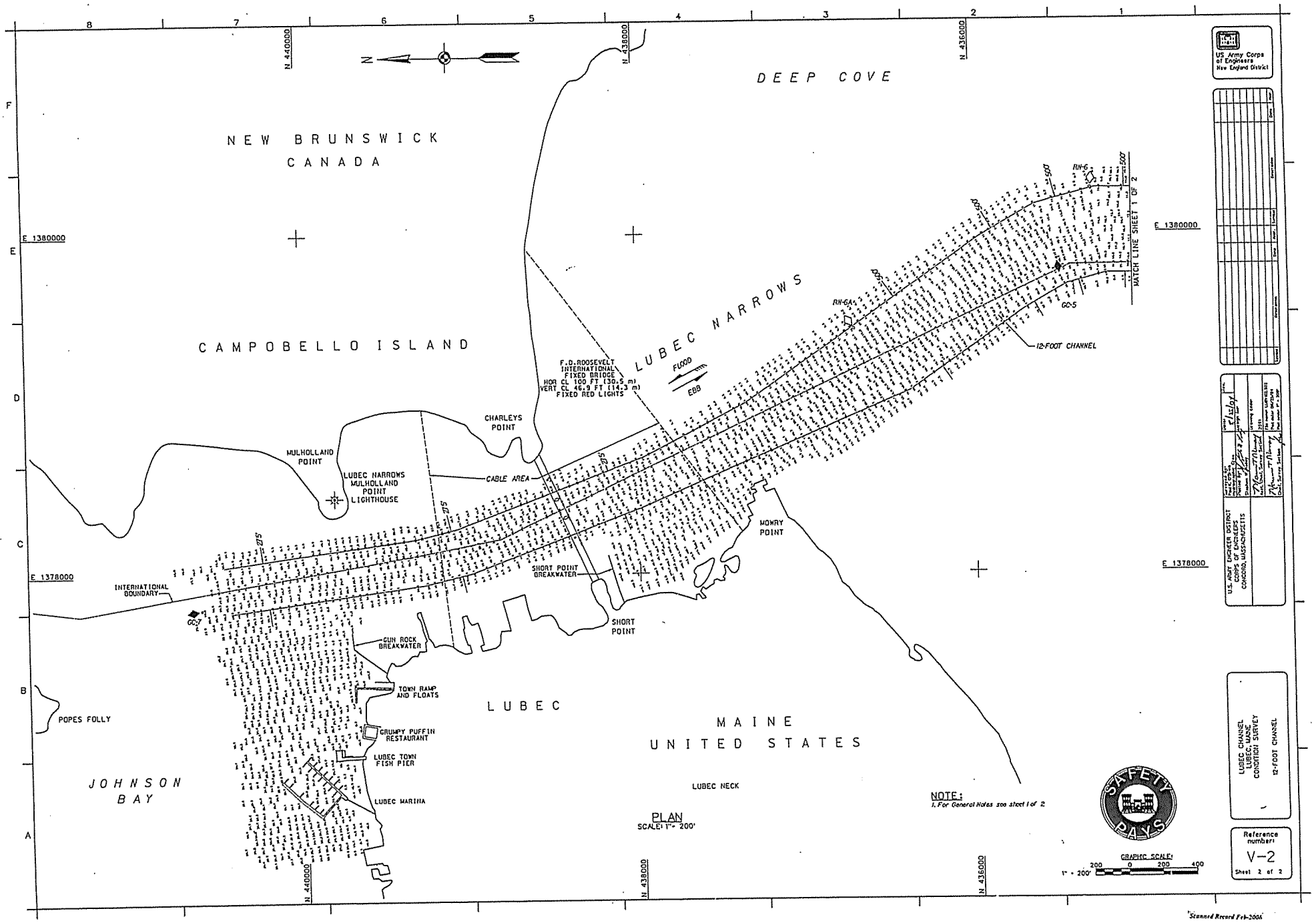
NO.	DATE	STATE PLANE COORDINATES	GEOGRAPHIC POSITION
GC-1	08/20/02	N 430534.65 E 1380147.79	44° - 50' - 15.3"N 66° - 58' - 25.4"W
GC-3	08/20/02	N 432438.03 E 1379341.70	44° - 50' - 34.2"N 66° - 58' - 36.1"W
RN-4	08/20/02	N 432372.69 E 1378641.25	44° - 50' - 33.5"N 66° - 58' - 31.9"W
GC-5	08/20/02	N 435499.35 E 1379643.20	44° - 51' - 04.3"N 66° - 58' - 28.3"W
RN-6	08/20/02	N 435393.00 E 1380258.00	44° - 51' - 03.2"N 66° - 58' - 22.6"W
RN-6A	08/20/02	N 436707.92 E 1379435.21	44° - 51' - 16.3"N 66° - 58' - 33.6"W
GC-7	08/20/02	N 440608.11 E 1377801.14	44° - 51' - 55.1"N 66° - 58' - 55.3"W

US Army Corps of Engineers
New England District

US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

LUBEC CHANNEL
LUBEC, MAINE
CONDITION SURVEY
12-FOOT CHANNEL

Reference number
V-1
Sheet 1 of 2



PLAN
SCALE 1" = 200'

NOTE:
1. For General Notes see sheet 1 of 2

GRAPHIC SCALE:
1" = 200'
200 0 200 400

US Army Corps of Engineers
New England District

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS

LUBEC CHANNEL
LUBEC, MAINE
CONDITION SURVEY
12-FOOT CHANNEL

Reference number:
V-2
Sheet 2 of 2

SAFETY PAYS

Scanned Record Feb-2006